

PDCA - 02

VARDHAMAN MAHAVEER OPEN UNIVERSITY, KOTA

Post Graduate Diploma in Computer Application (PGDCA)

Application Software and Web Designing)

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UNIT 1 : WORD PROCESSING SOFTWARE

Structure of the Unit

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- 1.1.2 Starting of MS Word
- 1.1.3 Components of the Word Window
- 1.1.4 Functions

1.2 Creating & Opening Document

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- 1.2.2 Open Existing File

1.3 Saving a Document

- 1.3.1 Save Option
- 1.3.2 Save As Option
- 1.3.3 Difference Between Save and Save As Check your progress

1.4 Entering Text in a Document

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Check your progress

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- 1.7.1.1 Creating a Table with the Standard Method
- 1.7.1.2 Create Table using Insert Table Option from Table Menu.
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- 1.7.2 Entering and Editing Text in a Table
- 1.7.3 Inserting Rows and Columns
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- 1.7.7 Merge and Splitting Cells
- 1.7.8 Calculation in Tables Check your progress
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Check your Progress

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- 1.10 Glossary
- 1.11 Further Readings
- 1.12 Answer to the Self Learning Exercises
- 1.13 Unit-end Questions

1.0 <u>OBJECTIVE</u>

Micro-Soft Word 2000 is a popular component of the MS Office 2000. This is a word processor, which provides various kinds of word processing facilities. The course includes basic concepts of Saving, Editing, Copying, Paste, Fonts, Mail merge, Font styles, etc. for performing various processing operations on text. This course is designed to advance user's knowledge of the formatting features within Word and realize the advantages of using a powerful electronic processing of word. The course is entirely 'hands on', so those reading will get practice in creating and processing of actual text, enhancing them with Fonts, Styles & advance features like bullets, borders & colors.

1.1 INTRODUCTION TO MICROSOFT WORD 2000

Word processing software provides a much more easy way of word Processing. Microsoft Word 2000 is such type of Word Processing Software. Microsoft Word 2000 is a tool of Microsoft Office 2000.

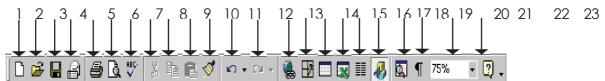
Word processing software provides following functions

- o Creating & Opening a Text Document
- o Provide Edit facility (Cut, Copy, Paste, Clear, Redo, Undo, Select All, Find & Replace)
- o Spell Checking
- o Import/Export Text
- o Mail Merge
- o Table Handling
- o Print preview of text
- o Font style and font sizes.
- o Graphics
- o Templates
- o Document wizard

> And this word processor can be used in wide range of Applications.

- o It can be used for Writing letters
- o It can used to create Resumes
- o It can be used for Writing Books
- o It can be used to create World Wide Web Pages

1.1.1 Standard Toolbars used in Microsoft Word 2000



Common Buttons of the Standard toolbars are

(1) New	(2) Open	(3) Save
(4) E-mail	(5) Print	(6) Print-Previews
(7) Spell Checker	(8) Cut	(9) Copy
(10) Paste	(11) Format Painter	(12) Undo
(13) Redo	(14) Insert Hyperlink	(15) Tables and Borders
(16) Insert Table	(17) Insert Microsoft Excel Worksheet	(18) Columns
(19) Drawing	(20) Document Map	(21) Show/Hide
(22) Zoom	(23) Help	

These tools are discussed later in this unit with their respective actions.

1.1.2 Starting of MS-Word

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¥?	Yahoo! M	lessenger		Windows Media Player Bonus Pack	+
1	GolZilla		-	WinZip	٠
Q	Search F	or Files	-	Yahool Messenger	۲
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	Favorites			Microsoft Excel	
0	Documer		C	Microsoft Outlook	
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ž	<u>B</u> un		23	MS-DOS Prompt	
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	Start	🍯 🧭 🖄		Windows Media Player	

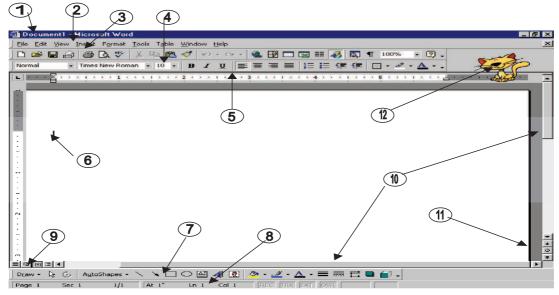
Microsoft Word is a Windows based word processing application. Steps to start MS Word 2000 .

- Click on the start button on the Taskbar
- Click on the Program option in start menu.
- Click on the Microsoft word icon.

1.1.3 Components of the Word Window

- 1. Caption Bar 2. Menu Bar
- 5. Ruler 6. Cursor
- 9. View Buttons 10. Scroll Bars
- Standard Tool Bar
 Drawing Toolbar
 - olbar 8 Statu
- 11. Document Navigator
- 4. Formatting Toolbar
- 8. Status Bar
 - 12. Office Assistant

1.1.4 Function of the Various Components of Microsoft Word Window



1. Title Bar :- Title bar shows the name of the document and situated in the top of the window application.

Word Processing Software

- 2. Menu Bar :- Menu bar contains the various commands under the various topics to perform some special tasks. Menu bar is located under the title bar.
- **3.** Standard Toolbar :- Toolbar is nothing more than the shortcut of the Menu options to execute or perform the menu options in the easiest and faster way. Standard toolbar contains the commands for the Word's most frequently used commands.
- 4. Formatting Toolbar :- Formatting toolbar contains the various commands related to the formatting of the document.
- 5. **Ruler** :-From Ruler margins and indents can be adjusted in the easier way and it also provides measurement for the page formatting.
- 6. Cursor :- Cursor is Word pointer, which tells that from the or on the cursor position you can perform your action.
- 7. **Drawing Toolbar :** Drawing toolbar has the various commands related to the graphics and the drawing options.
- 8. Status Bar:- It displays the positioning of the cursor, displays the status of some important keys of keyboard, and shows the messages for the toolbar button when a mouse points to it, display messages for menu option when a menu option is selected or pointed out by a user.
- **9.** View Buttons :- View buttons are shortcuts of various views in the View Menu which will be discussed later.
- 10. Scroll Bars :- There are two types of scroll bars
 - i. Horizontal Scrollbar
 - ii. Vertical Scrollbar

Working of both the scroll bar is to scroll the document in the either directions

- **11. Document Navigator:** Document Navigator allows navigating the document in different types of objects and is activated when clicked on the ball type button on the vertical scroll bar.
- 12. Office Assistant: Office assistant provides you the online help, real-time tips while working.

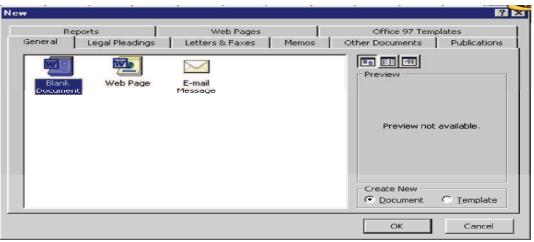
1.2 CREATING & OPENING DOCUMENT

For creating a new file or Opening an existing file we should follow the following steps.

1.2.1 Open a New File

To open a new file, follow the following steps

- i. Click on the File menu
- ii. Now Click on the New option of the File menu (directly press the Ctrl+N from the key board.)



Unit-I

Word Processing Software

iii. Select the Blank document from the General Tab from the following dialog box and then press OK button.

1.2.2 Opening of an Existing File (Document)

To open an existing file/document, following steps are required to be followed

1. Select the Open option from the File menu (or directly press the Ctrl+O from the key board) OR

Click on the Open tool from the standard toolbar



Then the open dialog box will appear as shown in figure

- 2. Select the appropriate folder from Look in combo box.
- 3. Select the required file from the file window

OR

Write the required file's name in the File name window

4. Click on open button on the right hand side

1.3 <u>SAVING A DOCUMENT</u>

For Saving a Document we are having two Options:

- 1. Save Option
- 2. Save as Option

1.3.1 Save Option

For saving a document, following are the steps

Save As							? ×
Save in:	My Docur	nents	-	+ 🗈	😬 🎫	• Tools •	
() History							
My Documents							
Desktop							
Favorites							
<u></u>	l File <u>n</u> ame:	Doc1			-	1 🖪	Save
Web Folders	Save as <u>t</u> ype:	Word Documen	t		-	-	Cancel

1. Click on the File \rightarrow **Save** option. *OR* Press *Ctrl* + *S*

OR

Press the Save tool from standard toolbar

If you are saving the file for the first time the Save as window will appear

- 2. Choose the appropriate folder from Save in combo box.
- 3. Write the proper file name in the File name text box
- 4. And then press the Save button

1.3.2 Save As Option

For saving a document, following are the steps

- 1. Click on the File \rightarrow Save As option.
- 2. Choose the appropriate folder from Save in combo box.
- 3. Write the proper file name in the File name text box
- 4. And then press the Save button

1.3.3 Difference Between Save and Save as

Save and Save As options do the same work of saving a document but the difference between both options is that the Save As command every time gives you the Save As dialog box and you can save the file with different names also.

But the Save option will gives you the Save As dialog box when you are saving the document for very first time. Other times it will save the document with the previous name without giving any dialog box.

CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

- 1. Save the document.
- 2. Scroll down one page.
- 3. Select the first line of the document at a single mouse click.
- 4. Save the document in the name Lab 1.
- 5. Adjust the left margin of the document measure to 1.50".
- 6. Close the document.

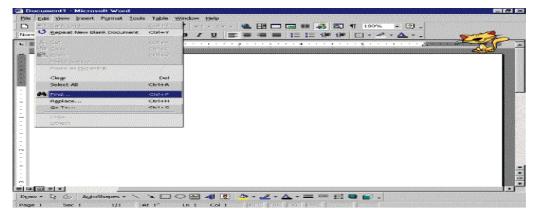
If your answers are correct, then proceed to the next section.

1.4 ENTERING TEXT IN A DOCUMENT

Following steps are to be followed for entering a text in a document:-

- 1. Start \rightarrow Programs \rightarrow MS-Word \rightarrow Enter
- 2. Now open New Document (Ctrl+N) or open existing document file (Ctrl+O)
- 3. Now any text can be typed in the document file by using any font and size with help of keyboard.
- 4. Now Save the document by pressing Save (Ctrl+S) / Save As option.

1.5 EDITING TEXT IN A WORD DOCUMENT



1.5.1 Moving Text and Copying Text in a Document

Moving Text means transfer of a text from one location to another location.

Copying Text means copy of a text from one location and transfers it to another location.

For this we can use the following commands:

- Commands Undo and Redo
- Cut and Paste
- Copy and Paste
- Finding and Replacing Text in a Document
- 🖝 Go To

1.5.2 Commands Undo and Redo

1. Undo 🔊 -

To reverse changes while editing, undo command is used. To perform undo you can Click on the Undo option under Edit menu

Or

Click on the Undo button on Standard toolbar

Or

Press Ctrl+z.

2. Redo 🖙 -

If an undo has to perform on last reversed action that is known as Redo. To perform redo you can Click on the Redo option under Edit Menu

Or

Click on the Undo button on Standard Toolbar

Or

Press Ctrl+y

1.5.3 Cut and Paste

Cut and Paste means moving of text and moving of text means removing text from one portion of the document and placing it at some other location.

- To cut text:
 - i. Select the text or make the block of the text
 - ii. Select cut from Edit menu

or

Click on the cut button of standard toolbar

or

Press the ctrl+x button

or

Move the mouse pointer on the selected text and right click and select cut.

- To paste the selection
 - i. Move the cursor at the location where the text is to be pasted
 - ii. Select Paste from Edit menu

or

Click paste button on the standard toolbar

or

Press Ctrl + v

or

Click the right mouse button and select paste from the context menu.

1.5.4 Copy and Paste

Copying means duplicating the contents of a document at some other desired place. The procedure for copying text is almost the same as that of moving text with a little difference, which is being discussed in following steps.

- To copy a particular text
 - i. Select the text or make the block of the text
 - Select copy from Edit menu Or
 Click on the copy button of standard toolbar Or

Press the Ctrl+c button

Or

Move the mouse pointer on the selected text and right click and select copy.

selection example - Microsoft Word	-8
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	3 5
The concept of Web Services originated from the basic idea of c development costs as much as possible by reusing code and components.	
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of reusing code was, to copy code already written ar 🐰 cut solution, but it nevertheless meant that the 'whee 🗈 Copy	again and
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Paste operation is same as described in the cut and paste section

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The concept of Web Services origin development costs as much as possible after spending months writing lines of C of reusing code was, to copy code alread solution, but it nevertheless meant that again. In the late eighties, with the advent of again managed to cut down development costs by building in inherent features within the development tool or even the compiler. In the constant quest to improve design and cut programming costs, technology companies kept on introducing newer concepts. In fact, the roadmap to the current hot technology can be drawn starting from those same aspirations. In this article, we look at some of the preceding technologies as well as at some of the technologies that are.	lormal	- Arial	- 11 - B /	/ ⊻ ≡ ≡ ≡ 1= 1:	目頃頃□・┛・▲・	
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9

1.5.5 Finding and Replacing Text in a document and GoTo

Find

Some times while working in document you need to find a particular text. Finding of text can be done in following way

1. To find a particular text you have to perform the following steps

Find and Replace			? ×
Fin <u>d</u> Re <u>pl</u> ace	<u>G</u> o To		
Find what:			I
Search Options Search <u>:</u> Match_case Find whole word Se wildcards Sounds like Find all word for Find	_	Less 2 Find Nex	Cancel

- i. On the Edit menu, click Find. Then you will see the following window
- ii. In the Find what box, enter the text that you want to search for.
- iii. Select the direction of searching from Search list box.
- iv. Select any other options that you want.

Match case: To find the characters that are a word by themselves and are not a part of another word.

Find whole words only: To find the characters that are a word by themselves and are not a part of another word.

Use wildcards: To specify the wildcard characters (? Or *) in the Find what text box.

Sounds like: To find words that sound similar but are spelt differently. For example hair, heir, hear and hare sound similar to here.

Find all word forms: To find all grammatical forms of the word. For example, on entering the word eat it also searches ate, eaten and eating words.

- v. For Help on an option, click the question mark and then click the option.
- vi. Click Find Next.
- vii. If you want find similar word again in the rest of the document click on the Find next button.

Replace

If you have to replace a word in the document with another word you can use find and replace command to do that. Find we have discussed above now it's the turn of Replace.

- i. On the Edit menu, click Replace. Then you will find the following window.
- ii. The Find what box, enter the text that you want to search for.
- iii. In the Replace with box, enter the replacement text.
- iv. Select any other options that you want.
- v. For Help on an option, click the question mark and then click the option.
- vi. Click Find Next, Replace, or Replace All.
- vii. To cancel a search in progress, press ESC.

ind and Replace					? >
Fin <u>d</u> Replace	GO TO				
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Replace with:	I.				<u>•</u>
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Find whole wor	ds onl <u>v</u>				
Find all word fo Replace	rms				
Noplaco	Format *	Sp <u>e</u> cial *	No Formatting	2	

Go to

To go to on a particular location or particular item use Go to option under the Edit menu. Steps are as follows:

- 1. Click on the Go to option under the Edit menu. Then the following window will appear on the screen.
- 2. Select according to what you want to navigate in the document from Go to what combo box.

Find and Replace	<u>? ×</u>
Find Replace Go To	
Go to what: Page Section Line Bookmark Comment Footnote Endnote	Enter page number: Enter + and – to move relative to the current location. Example: +4 will move forward four items. Previous Next Close

- 3. Enter the parameter as page number or name of the bookmark.
- 4. Click on the previous or next depending upon the direction you want to go.

CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

- 1. Move the second paragraph of the text to the end of the paragraph.
- 2. Undo your last change.
- 3. Select the entire document and then deselect it.
- 4. Search the word "is" occurring in the document.
- 5. Change the word "is" to "in" occurring in the whole document at a time.
- 6. Quickly move to page 4 of the document.

If your answers are correct, then proceed to the next section.

1.6 FORMATTING TEXT IN A DOCUMENT

Formatting of a document involves following main options:

- > Text Formatting
- > Font

- > Paragraph
- Bullet and Numbering
- ≻ Tab
- > Columns
- > Styles

Once the text of a document has been typed, it is required to be formatted. MS-Word provides Format menu to give a meaningful format of your document, so that a user can read and understand the document in an easy manner. Following are the options available in the Format menu.

Document1 - Micros		
	Format <u>T</u> ools Table <u>W</u> indow	
Normal Times	A Eant	
	Borders and Shading golumns Jabs Drop Cap If Text Direction Change Casg Packground	
	Conservation Conservation Conservation Conservation Conservation Conservation Conservation	
Draw + 🔓 🍪 Auto	Shapes 🔹 🔨 🔌 🗖 🔿 🎑	4 🗵 💩 - 🛃 - 📥 - = = = 🛱 🖬 💣 -
Page 1 Sec 1	1/1 At 1" Lo 1	Col 1 REC TRK EXT OVR

1.6.1 Page/Text Formatting

Format of font i.e. the font type, font size, font style, font Color; character spacing etc can be changed by going in the option Font of Format menu.

1.6.2 Fonts

The word font means the way of writing characters.

Font		? ×
Font Character Spaci	ng Te <u>x</u> t Effects	
Eont:	Font st <u>v</u> le:	Size:
Arial	Regular	11
Arial Arial Black	Regular	
Arial Narrow	Bold	10
Arial Unicode MS Batang	- Bold Italic	
	Underline style:	Underline color:
Font color:		Automatic
		1.1.4.6.6.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
Effects		A contract of the second state of the second
Strikethrough		Small caps
Double strikethrough Superscript	Emboss	Hidden
Subscript		
Preview		
	to	
This is a TrueType font. This fo	nt will be used on both printer	and screen.
Default		OK Cancel

Word Processing Software

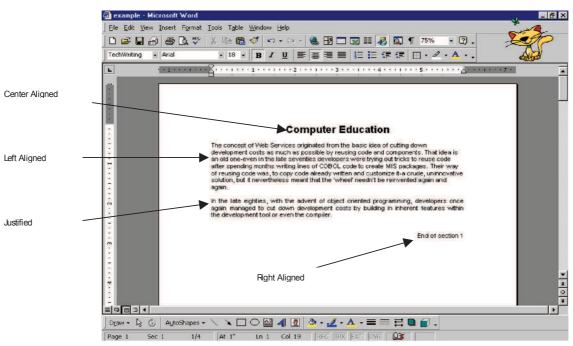
To change the font-using Font dialog box gives you the opportunity to see the result within the dialog box before applying it on the text. Other benefit of using the font dialog box is that you can apply several effects within the same dialog box like font color, bold or font size etc. Following are the steps to change the font using Font dialog box.

- 1. Select the desired text to change the font.
- 2. Select the Font option from Format menu. It will give you the following window.
- 3. Scroll through the Font list and click the font that you want.
- 4. Select the font color, underline style and Effects of your choice.
- 5. Select the font style according to the text.
- 6. Click on Ok button.

1.6.3 Paragraphs Formatting

Alignment of the Paragraph

Alignment refers to the way the right and left edges of a paragraph line up along the right and left margins of your document. Word gives you four alignment choices - left, centered, right and justified.



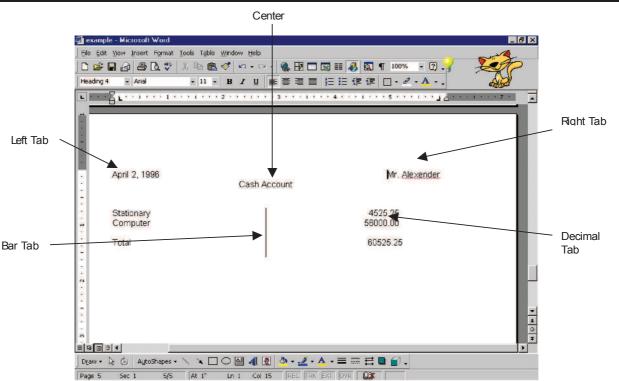
Click on the paragraph in which you want to change the alignment.

- 1. Bring up the Paragraph dialog box as stated above.
- 2. Choose the alignment from Alignment drop down list.
- 3. Press the Ok button.

1.6.4 Tabs

A position you set for placing and aligning text on a page. Microsoft Word has four kinds of tab stops, as shown below.

- Left text extends to the right from the tab stop.
- Center text is centered at the tab stop.
- Right text extends to the left from the tab stop until the tab's space is filled, and then the text extends to the right.
- Decimal text before the decimal point extends to the left, and text after the decimal point extends to the right.
- Bar tabs generates a bar.



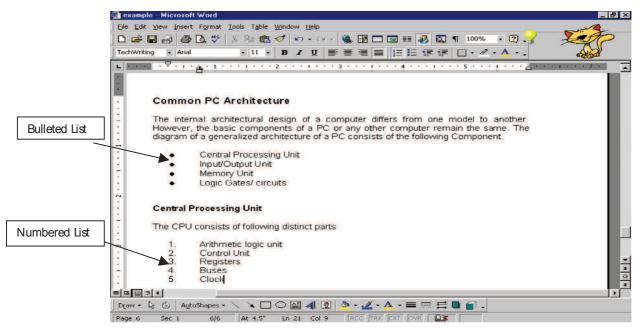
1.6.5 Bullets and Numbering

Word's bulleted and numbered list features add bullets or numbers for you, and they create hanging indents so that when text in an item wraps to the next line, it doesn't wrap underneath the number of bullet.

Word enables you to create single level lists as well as multilevel lists.

Single Level Lists

Single level lists are shown below in the figure



Follow these steps to create a single-level bulleted or numbered list:

- 1. Click where you want to start a list.
- 2. Click the Bullets or Numbering button on the Formatting toolbar.

- 3. Type the first item in the list and press Enter. Word automatically inserts a bullet or number on the next line for you.
- 4. After the last item press Enter twice to turn off the bullets or numbers.

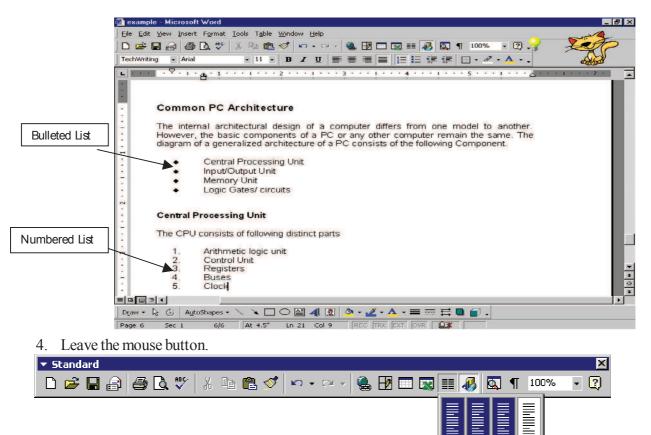
Instead of turning on the bulleted or numbered list feature and then typing the list, you can also type the list first, select it, and then click the Bullets or Numbering toolbar button.

1.6.6 Columns

You can use columns to create documents such as newsletters or book pages. The column option controls the width and number of columns. Narrower column widths make your text easier to read. Often, creating columns enables you to fit more text on a single page. Columns work particularly well where you have several shorter topics making up a larger document, as with a newspaper.

To create a column:

- 1. Select the text which you want to convert in column.
- 2. Click on the column button in the Standard toolbar.
- 3. A drop-down list appears with four columns across it. Click on the first column in the drop-down list and drag across to highlight desired number of columns.



- 1. Click anywhere in the column-text.
- 2. Choose Column option from Format menu to display the column dialog box.
- 3. Click on the format that you want for the column.
- 4. If you have specific requirements for column widths, fill it into the Width and spacing and fill the Number of column box.

3 Columns

- 5. For line, check the Line between check box.
- 6. Press Ok Button.

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Col #: Width: Spacing:	
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Equal column width	
Apply to: Whole document	🗖 Start new column

1.6.7 Styles

A style is a set of formatting characteristics that you can apply to text in your document to quickly changes its appearance. When you apply a style, you apply a whole group of formats in one simple task. For example, you may want to format the title of a report to make it stand out. Instead of taking three separate steps to format your title as 16 pt, Arial, and center-aligned, you can achieve the same result in one step by applying the Title style.

When you start Microsoft Word, the new blank document is based on the Normal template, and text that you type uses the Normal style. This means that when you start typing, Word uses the font, font size, line spacing, text alignment, and other formats currently defined for the Normal style. The Normal style is the base style for the Normal template, meaning that it's a building block for other styles in the template.

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There are a number of other styles besides Normal available in the Normal template. A few basic ones are shown in the Style list on the Formatting toolbar. You can preview and select others in the Style dialog box (Format menu, Style command).

Advantage of Using Styles

- 1. Styles can dramatically reduce the time it takes to format a document often by 90% or more.
- 2. Styles can also help you make sure all your documents look consistent, with very little effort on your part.
- 3. If you export your word document to a desktop publishing program, most programs can use Word styles to help automate their work.

- 4. If you need to change the way your styled document looks, you need to change only a few styles, not hundreds of manual formats.
- 5. it's much easier to take advantage of Word's powerful automation and organization features if you use styles. For example, Word can automatically build and update a table of contents based on the styles in your document. Without styles, you would have to manually apply a field to every single item you want to include in your table of contents.

Types of Style

Style comes in two types:

- 1. Character based style
- 2. Paragraph based style

1. Character based Style: A character style affects selected text within a paragraph, such as the font and size of text, and bold and italic formats. Characters within a paragraph can have their own style even if a paragraph style is applied to the paragraph as a whole. If you want to be able to give certain types of words or phrase the same kind of formatting, and the formatting isn't in an existing style, you can create a new character style..

2. Paragraph Based Style: A paragraph style controls all aspects of a paragraph's appearance, such as text alignment, tab stops, line spacing, and borders, and can include character formatting. If you want a paragraph to have a particular combination of attributes that aren't in an existing style (for example, a bold, italic, center-aligned heading in the Arial Narrow font), you can create a new paragraph style.

Apply a Different Style

- 1. Do one of the following:
 - To apply a paragraph style, click the paragraph or select the group of paragraphs you want to change.
 - To apply a character style, click the word or select the words you want to change.
- 2. On the Format menu, click Style.
- 3. In the Styles box, click the style you want to apply, and then click Apply.

If the style you want is not listed, select another group of styles in the List box. A paragraph mark appears to the left of each paragraph style. A bold, underlined letter "a" appears to the left of character styles.

Create a New Character Style

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Based on:	Style for following paragraph:
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Preview	
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Description Heading 1 + Level 1	
Add to template	Automatically update
OK Cancel	Format - Shortcut Key

Word Processing Software

- 1. On the Format menu, click Style.
- 2. Click New and the following dialog box will appear.
- 3. In the Name box, type a name for the style.
- 4. In the Style type box, click Character.
- 5. Select the other options you want, and then click Format to set attributes for the style.
- 6. Click Ok button.

Create a New Paragraph Style

The quickest way to create a new paragraph style is to format a paragraph, select it, and then base the new style on the formatting and other properties applied to the selected text.

- 1. Select the text that contains the formatting you want to use for your style.
- 2. On the Formatting toolbar, click inside the Style box.
- 3. Type over the existing style name to create the name for the new style.
- 4. Press ENTER.

Modify a Style

- 1. On the Format menu, click Style.
- 2. In the Styles box, select the style you want to modify, and then click Modify.

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- 3. Click Format, and then click the attribute such as Font or Numbering you want to change.
- 4. Click OK after you've changed each attribute, and then repeat for any additional attributes you want to change.

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CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

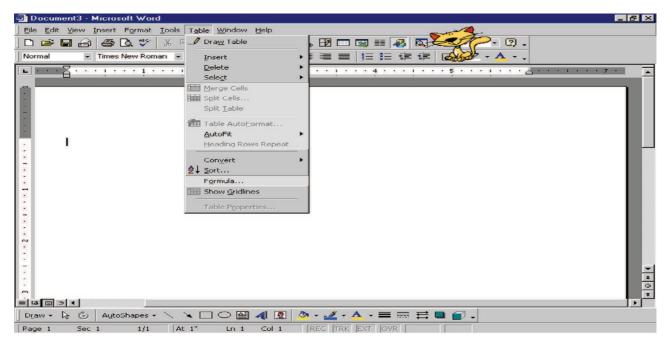
True or False

- 1. A Paragraph style affects selected text within a paragraph, such as the font and size of text, and bold and italic formats.
- 2. Background and Themes are used to create a web page in word.
- 3. You can use columns to create documents such as newsletters or book pages.
- 4. Break is a position you set for placing and aligning text on a page.
- 5. Tabs can dramatically reduce the time it takes to format a document often by 90% or more. []

Fill in the Blanks

- 1. A ______ is a set of formatting characteristics that you can apply to text in your document to quickly changes its appearance.
- 2. You can use ______ to create documents such as newsletters or book pages.
- 3. To promote the item to a higher numbering level, click anywhere in the item, and click _______ Indent.
- 4. An ______ is a list created by using the Bullets and Numbering command (Format menu) to apply a _______ structure to any list or document, including a legal or technical document.
- 5. ______ is the space between two lines in a paragraph.

1.7 HANDLING TABLES IN THE TEXT

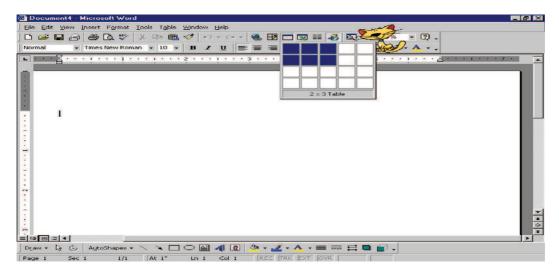


A table is made up of rows and columns of cells that you can fill with text and graphics. Tables are often used to organize and present information, but they have a variety of other uses as well. You can use tables to align numbers in columns, and then sort and perform calculations on them. You can also use tables to create interesting page layouts and arrange text and graphics.

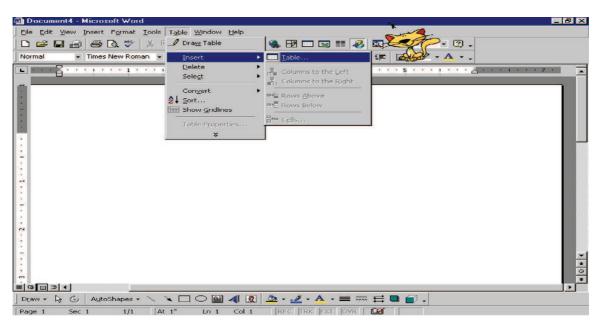
1.7.1 Create a Table

Word provides you three methods for creating tables.

- 1. Create table using Insert Table button in Standard toolbar.
- 2. Create table using Insert Table option From Table Menu.
- 3. By Drawing Method.
- 1.7.1.1 Creating a Table with the Standard Method
 - 1. Place your cursor from where you want to create the table.
 - 2. Click on the Insert Table button on Standard toolbar.
 - 3. Drag the mouse over the grid that appears while holding down the mouse button and highlight 3 x 2 Table.
 - 4. Word will insert an empty table when you release the mouse button.



- 1.7.1.2 Create Table using Insert Table Option from Table Menu.
 - 1. Place the cursor from where you want to create the table.
 - 2. Choose Table option from Insert option of Table menu



3. Enter the desired number of columns and rows for table in the dialog box that appears.

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- 4. Press the OK button
- 1.7.1.3 Drawing a Table
 - 1. Make sure that you are in print layout view, (Tables and Borders menu is available only in Print Layout view.) and then click the Tables and Borders button on standard toolbar to display the Tables and Borders toolbar.

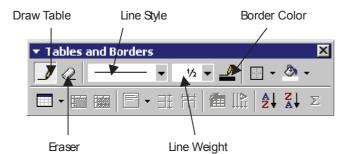
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2. Click the Draw Table button. Now your mouse pointer will looks like a small pencil



- 3. Choose the Line Style and Line weight.
- 4. Choose the Border Color.
- 5. Starting from the upper-left corner, drag diagonally down and to the right, releasing the mouse button when the outline is the right size.

6. Now draw the inside lines for rows and columns.

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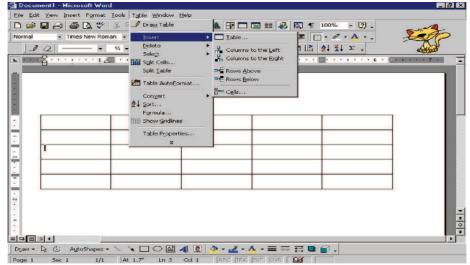
7. Use eraser to delete any unwanted lines.

1.7.2 Entering and Editing Text in a Table

- 1. Enter text in table just as it is entered in the MS-Word document. Use mouse or arrow keys to position the insertion point in a cell and then type the text. MS-Word will automatically wrap the text within the cell as we reach the right edge.
- 2. To move from cell to cell within the table, se mouse or use the Tab or Shift + Tab keys to move to the next or previous cell. If Tab is pressed in the last cell of the last row, MS-Word creates a new row.
- 3. Since we use the tab key to navigate within a Table, we cannot use Tab to enter tab characters, for this use Ctrl + Tab keys.
- 4. When a table is inserted, the insertion point is positioned in the first cell. We can start typing right away.

1.7.3 Inserting Rows and Columns

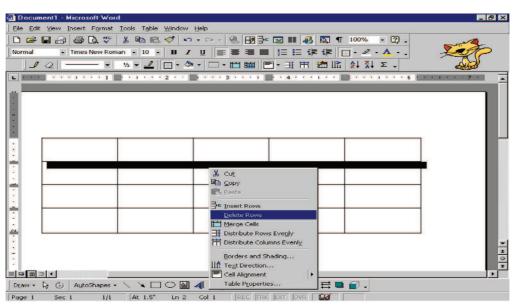
1. Place the cursor in the table where you want to insert the row or column.



- 2. Choose Insert row (above or below) or insert column (right or left) from Insert option of Table menu.
- **Note:** To add a row at the end of the table, position the insertion point in the last cell of last row and then press the Tab key. The cells in the new row will have the formatting of the cells in the preceding row.

1.7.4 Deleting Rows and Columns

- 1. Select the Rows or Column which you want to delete.
- 2. Right Click. A context menu will appear and the delete option is there according to your selection.



3. Select the option of Delete row or Delete column that will appear according to your selection of row or column.

1.7.5 Change the Column Width in a Table

Rest the pointer on the column boundary you want to move until it becomes, and then drags the boundary until the column is the width you want.

Notes

To change a column width to a specific measurement, click a cell in the column. On the Table menu, click Table

Properties, and then click the Column tab. Choose the options you want.

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Table Row Column Cell	
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ОК	Cancel

To make the columns in a table automatically fit the contents, click a table, point to AutoFit on the Table menu, and then click AutoFit to Contents.

To display column width measurements, click a cell and then hold down ALT as you drag the markers on the ruler.

Word Processing Software

1.7.6 Change the Row Height in a Table

Rest the pointer on the row boundary you want to move, and then drag the boundary.

Notes:

To change a row height to a specific measurement, click a cell in the row. On the Table menu, click Table Properties, and then click the Row tab. Select the options you want.

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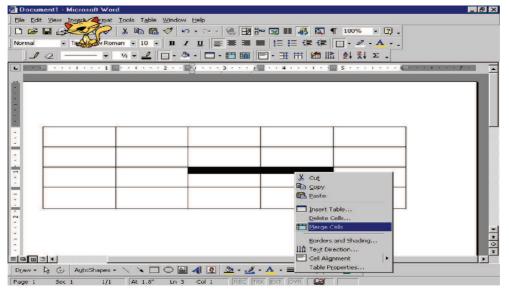
To display row height measurements, click a cell, hold down ALT as you drag the markers on the vertical ruler.

1.7.7 Merge and Splitting Cells

Merge Cells into One Cell in a Table

You can combine two or more cells in the same row or column into a single cell. For example, you can merge several cells horizontally to create a table heading that spans several columns.

1. On the Tables and Borders toolbar, click Eraser



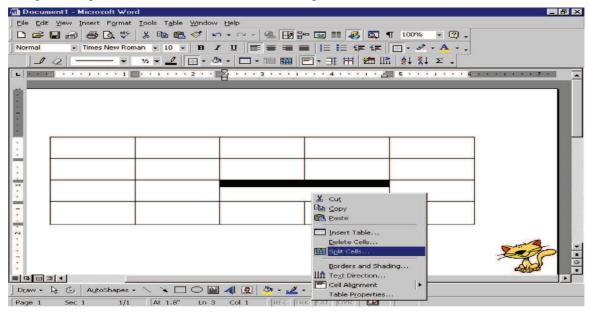
2. Drag the eraser over the cell dividers you want to remove.

Note: You can quickly merge multiple cells by selecting them and clicking Merge Cells from the context menu produced by right click.

Split a cell into multiple cells in a table

1. On the Tables and Borders toolbar, click Draw Table. The pointer changes to a pencil. 2. Drag the pencil to create new cell partitions.

Note: To split multiple cells, select them, and then click Split Cells



Sorting of the Table

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- 1. Select the table or the column which you want to sort.
- 2. Choose Sort option from table menu. You will find out the following dialog box on the screen.
- 3. Select the Column on which you want to do the sorting. You can select more than one column.
- 4. Select the Ascending or descending option.
- 5. Select the Header row if there is any header row in the table.
- 6. Click on the OK button.

1.7.8 Calculation in Tables

You can also perform the calculations on the table columns. Steps for performing calculation will be.

- 1. Put the mouse in the cell in which you want your calculation. (But remember that the numeric values on which you want to perform calculation must be in continuous order i.e. there must not be any blank cell or there must not be any text value.
- 2. Select the option Formula from the Table menu.

- 4. Select the Number Format.
- 5. Press Ok Button. Results will come out in the cell.

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CHECK YOUR PROGRESS

Practice the following questions.

- 1. Create a New file on student's performance report using Tables.
- 2. Split the table from the fourth row.
- 3. Merge two columns into one column.

1.8 HEADER AND FOOTER

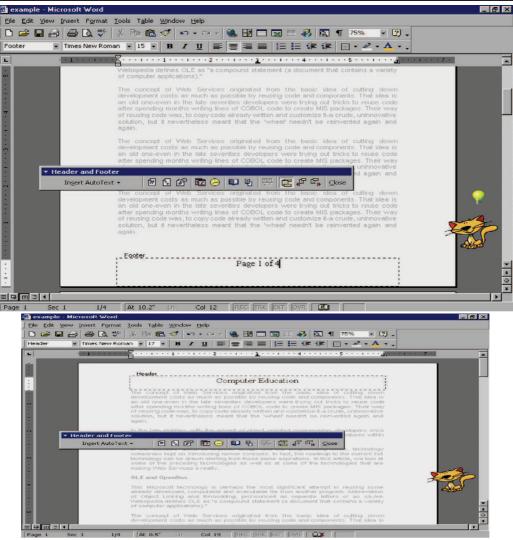
Headers and footers are typically used in printed documents. You can create headers and footers that include text or graphics for example, page numbers, the date, a company logo, the document's title or file name, or the author's name that are usually printed at the top or bottom of each page in a document. A header is printed in the top margin; and the footer is printed in the bottom margin.

Steps to create a header or footer are given below.

- 1. Select Header and Footer from the View menu.
- 2. Header and Footer toolbar is displayed, Header area is activated and document's text color changes to light gray.
- 3. Type the text in Header area.
- 4. If you want to create footer, click the switch between Header and Footer toolbar button to enable footer area active.
- 5. Type the text in footer area.
- 6. Apply any formatting that you like on header or footer of the document.
- 7. Click on close button to return back to the document

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CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

- 1. View the document as it will appear in Web browser.
- 2. View the document with Page layout and formatting.
- 3. View the headers before printing the document.
- 4. Insert the page number as footer.

If your answers are correct, then proceed to the next section.

1.9 <u>SUMMARY</u>

This unit has introduced you the basic features of word-processing software and what it can do for individuals and other business houses. We have learnt how to create our own documents, open existing documents and finally save them before closing. The standard toolbar and the formatting toolbar offer a variety of buttons which offer a quick service to the user. Look of the document can be made impressive and eye-catching by applying different font types, styles and sizes. You can emphasize or highlight your text by making it bold, italicized and underlined. Lowercase characters can be changed to uppercase and vice-versa by pressing <Shift + F3> keys together. This makes the major heads clearly readable and remembered. The 'Find and Replace' feature of WORD 2000 helps us in finding a particular word and can be replaced with some other desired word. This makes searching of the words easier and global replacements happen without fail in no time. MS-WORD 2000 can give you numbers to your pages which make referencing easier.

1.10 GLOSSARY

Copy: Copying means duplicating the contents of a document at some other desired place Header: A header is any information printed in the top margin.

Footer: Footer is any information printed in the bottom margin.

Merge: combine two or more cells in the same row or column into a single cell.

Split: Partition of a single cell into two or more cells.

Table: A table is made up of rows and columns of cells that you can fill with text and graphics.

Bookmark: A bookmark is an item or location in a document that you identify and name for future reference. You can use bookmarks to quickly jump to a specific location, create cross-references; mark page ranges for index entries, and so on.

Font: means the way of writing characters.

Word wrap: means to adjust a word in a given specified area.

Formatting: means changing the size, color, style, font, pattern, etc of given text.

Template: A template determines the basic structure for a document and contains document settings such as AutoText entries, fonts, key assignments, macros, menus, page layout, special formatting, and styles.

Undo: is used to reverse changes while editing,

Redo: If an undo has to perform on last reversed action that is known as Redo.

Cut and Paste: Cut and Paste means moving of text and moving of text means removing text from one portion of the document and placing it at some other location.

1.11 FURTHER READINGS

- 1. Microsoft WORD: The Microsoft Reference Guide to All Commands, Functions, and Features by Nancy Andrews.
- 2. Microsoft Word for Windows: a tutorial to accompany Peter Norton's Introduction to computers by Heather Millet Duggan, Peter Norton.
- 3. Writing Your Dissertation with Microsoft Word: A Step-by-step Guide by Vincent Kiernan – 2005.
- 4. Microsoft Word 5 Quick Reference by Bryan L. Pfaffenberger using Microsoft Word by B i 1 1 Camarda.
- 5. Microsoft Word 97 at a Glance by Jerry Joyce, Marianne Moon.

1.12 ANSWER TO THE SELF LEARNING EXERCISES

Answer to check your progress 1.1, 1.2 & 1.3 (1-6) Practice by seeing the Text.

Answer to check your progress 1.4 &1.5 & (1-6) Practice by seeing the Text.

Answer to check your progress 1.6

True or False

1 False 5 False 2 True 3 True 4. False

Fill in the Blanks

1. Styles

2. Columns (3-5) Search Yourself

Answer to check your progress 1.7

(1-3) Practice by seeing the Text.

Answer to check your progress 1.8

(1-4) Practice by seeing the Text.

[]

Solved Questions

I. **True or False**

- 1. Microsoft Word is a Windows Based as well Linux Based word processing application. []
- 2. Save and Save as options are exactly same.
- 3. To insert Header and footer one can select the option Header and footer from Insert menu.

П. Fill in the Blanks

- 1. Shows the name of the document and situated in the top of the window application.
- There are two types of scrollbars (a.) ______ (b.) ______
 Hot keys for Copy and Paste are ______ and _____.

Answers:

I. **True or False**

2. False 3. False 1. False

II. **Fill in the Blanks**

- 1 Title Bar
- 2. (a) Horizontal Scrollbar (b) Vertical Scrollbar.
- 3. (a) Ctrl+c (b) Ctrl+v

1.13 UNIT END QUESTIONS

Describe the Following

- 1. Write a short note about Paragraph formatting.
- 2 How are Tabs set?
- 3. What are columns and where are columns used.
- 4. Write a short note about Styles.
- 5. Find the average of three subjects using insert field and substituting formulas.
- 6. Sort the table in ascending order assigning the Roll no as the suitable position.

Practice the following

- 1. Make the following changes in the text:
 - (a) Replace the word 'ability' with 'suggest'. Use 'Find and Replace' command.
 - (b) Delete the blank lines in the letter.
 - (c) Combine paragraph one and two such that they form one paragraph.
 - (d) Copy the last paragraph in the beginning of the letter.
 - (e) Insert a new paragraph at the end of the first paragraph and key in the contents yourself.
 - (f) Make the last paragraph left aligned.
 - (g) Make the right paragraph right aligned.
 - (h) Delete the last paragraph.
 - (i) Move the first paragraph and make it the last paragraph.
 - (i) Make the whole letter justified.
 - (k) Change the left margin to 5 and right margin to 55.
 - (1) Save the document by the name Book.
 - (m) Close the file that you have just created.

True or False

1.	Microsoft word is	not	a word process	sor.		[]
2.	Title bar contains t	he va	arious comman	nds under	the various topics to perform some	special
	tasks.					[]
3.	Copying means du	plica	ting the conter	nts of the	document at some other desired place	ce. []
4.	If you have to replace	acea	a word in the de	ocument	with another word you can use GO	OTO
	command to do that	at.				[]
5.	5. Cut and Paste means moving of text.					[]
6.	6. To reverse changes while editing redo command is used.					[]
7.	7. You have to use the same header and footer throughout a document.					[]
An	s (True or False)					
1.	False	2.	True	3.	True	
	P 1	-	-	-	— — —	

4. False 5. True 6. True 7. True

UNIT II : SPELL CHECKING AND GRAMMAR CHECKING

Structure of the Unit

2.0 Objective

2.1 Introduction

- 2.1.1 Standard Toolbars
- 2.1.2 Start with MS Word
- 2.1.3 Components
- 2.1.4 Functions of the Component

2.2 Tools of Microsoft Word 2000

- 2.2.1 Spelling and Grammar
- 2.2.2 AutoCorrect
 - Check your progress

2.3 Insertion

- 2.3.1 Inserting Objects
- 2.3.2 Inserting Pictures
- 2.3.3 Inserting Files
- 2.3.4 Inserting Break
- 2.3.5 Auto Text Entries
- 2.3.6 Create Cross-references for Index Entries
- 2.3.7 Table of Contents
- 2.3.8 Word Wrapping
 - Check your Progress

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Check your Progress

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- 2.7.3 Editing Fills and Re-coloring Pictures
- 2.7.4 Personalize Publications
- 2.7.5 Share, Print and Publish
- 2.7.6 Applications
 - Check your Progress
- 2.8 Summary2.9 Glossary
- 2.9 Glossary
- 2.10 Further Readings2.11 Answer to the Self Learn
- 2.11 Answer to the Self Learning Exercise
- 2.12 Unit-end Questions

2.0 OBJECTIVE

Micro-Soft Word 2000 is a popular component of the MS Office 2000. This chapter includes Spell Checking and Grammar Checking facilities in big documents with speed and accuracy. The course also includes facilities of inserting objects, pictures, files, template, wizards, Mail merge, MS Publisher etc. in various applications. After reading the complete unit you would be comfortable enough in editing and processing of a word document.

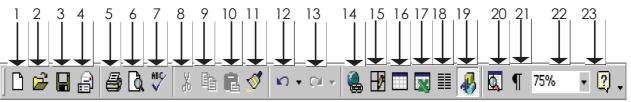
2.1 INTRODUCTION TO MS WORD 2000

Microsoft Word 2000 is a tool of Microsoft Office 2000. Spell checking and Grammar checking is a part of MS Word. and it can be used in wide range of Applications. It is used for writing letters; create Resumes, Writing Books, and World Wide Web Pages. Microsoft Word 2000 provides following functions:

(1) Creating & Opening a Text Document

- (2) Provide Edit facility
- (3) Spell Checking
- (4) Mail Merge
- (5) Table Handling
- (6) Print preview of text
- (7) Font style and font sizes
- (8) Graphics
- (9) Templates
- (10) Document wizard

2.1.1 Standard Toolbars used in Microsoft Word 2000



Common Buttons of the Standard toolbars are:

- 1New2Open4E-mail5Print7Spell Checker8Cut10Paste11Format Painter
- 13 Redo 14 Insert Hyperlink
- 16 Insert Table
- 19 Drawing20 Documents Map
- 22 Zoom 23 Help

- 3. Save
- 6 Print Previews
- 9 Copy
- 12 Undo
- 15 Tables and Borders
- 17 Insert Microsoft Excel Worksheet 18 Column
 - 21 Show/Hide

These tools are discussed later in this unit with their respective actions.

2.1.2 Starting of MS-Word

Microsoft Word is a Windows based word processing application. Steps to start MSWord 2000.

- Click on the start button on the Taskbar
- > Click on the Program option in start menu.

Click on the Microsoft word icon.



2.1.3 Components of the Word Window

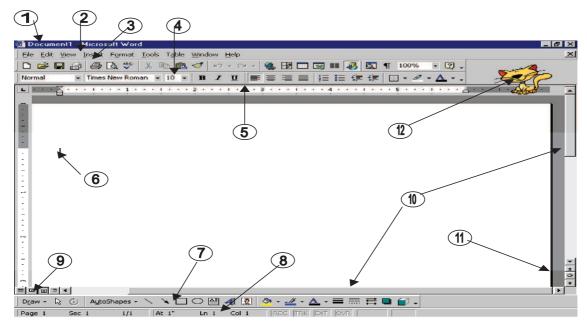
1 Caption Bar

10. Scroll Bars

- 4. Formatting Toolbar
- 2 Menu Bar
- 5. Ruler
- 7. Drawing Toolbar
- 8. Status Bar
- 11. Document Navigator
- 3. Standard Tool Bar
- 6. Cursor
- 9. View Buttons
- 12. Office Assistant

Function of the Various Components of Microsoft Word Window 2.1.4

1. Title Bar: Title bar shows the name of the document and situated in the top of the window application.



- Menu Bar : Menu bar contains the various commands under the various topics to perform some 2. special tasks. Menu bar is located under the title bar
- 3. Standard Toolbar: Toolbar is nothing more than the shortcut of the Menu options to execute or perform the menu options in the easiest and faster way. Standard toolbar contains the commands for the Word's most frequently used commands.
- 4. Formatting Toolbar: Formatting toolbar contains the various commands related to the formatting of the document.
- 5. Ruler : From Ruler margins and indents can be adjusted in the easier way and it also provides measurement for the page formatting.
- 6. Cursor : Cursor is Word pointer, which tells that from the or on the cursor position you, can perform your action.

- 7. **Drawing Toolbar :** Drawing toolbar has the various commands related to the graphics and the drawing options.
- 8. Status Bar: It displays the positioning of the cursor, displays the status of some important keys of keyboard, shows the messages for the toolbar button when a mouse points to it, display messages for menu option when a menu option is selected or pointed out by a user.
- 9. View Buttons : View buttons are shortcuts of various views in the View Menu which will be discussed later.
- 10. Scroll Bars : There are two types of scroll bars
 - i. Horizontal Scrollbar
 - ii. Vertical Scrollbar

Working of both the scroll bar is to scroll the document in the either directions

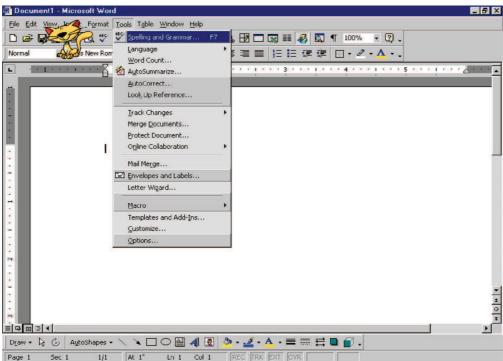
- **11. Document Navigator :** Document Navigator allows navigating the document in different types of objects and is activated when clicked on the ball type button on the vertical scroll bar.
- 12. Office Assistant : Office assistant provides you the online help, real-time tips while working.

2.2 TOOLS OF MICROSOFT WORD 2000

Microsoft Word Tools menu provides various tools to make your work more accurate and faster.

2.2.1 Spelling and Grammar

As you typed, Word can automatically check your document and underline possible spelling and grammatical errors, spelling errors by default underlined in RED color and grammatical errors are underlined in GREEN.



To correct the Spelling of Words and Grammar

- 1. Right click the word. A context menu will appear with a list of possible spelling corrections.
- 2. Select the best suitable spelling or grammar.
- 3. Or, Add the word using add option if you think that the word is correct.
- 4. If you don't want to add the word, you can ignore it, if according to you, the word is right.

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Using the Spelling and Grammar Checker

The spell checker lets you check the spelling and grammar of an entire document all at once. You won't really need to use it if you use automatic spelling checking to fix your spellings. However if you're working on a rather larger document, the spelling and grammar checker comes in use.

To check your document with spelling and Grammar checker do the following steps.

1. Click on the Spelling and Grammar button of Format toolbar, or Spelling and Grammar option of Tools menu, or press F7 key

	/	Spelling and Gr	ammar			
▼ Standard						×
D 🖻 🖬 🔒 🎒 🖪 🖓 🖇	Pa 📬	l 🝼 🗠 - 🗠	- 🗟 🗗 🗔	🖾 🎫 🌆	¶ 100%	- 🛛

2. This will bring you the following dialog box and the first error it encounters within the red color text and the suggestions in the next window.

example - Microsoft ₩ord	-
e Edit View Insert Format Iools Table Window Help	
	-
hWriting • Arial • 11 • B J U 医香蕈菌 短短螺 图• L • A • •	
🛛	
Spelling and Grammar: English (U.S.)	
dowr development Not in Dictionary: dea is	
an old one-t The concept of Web Services origenated from A Ignore code	
after spendir the basic idea of cutting down development	
of reusing cc costs as much as possible by reusing code Ignore Al rative	
solution, but and components.	
Suggestions:	
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making Web	hae
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- 3. Sometimes Word doesn't offer the correct spelling or the grammar for a misspell word. If this happens, select the word in the top half of the dialog box and type the correct grammar or the word there.
- 4. If the word is spelt right, then click the add button.
- 5. To leave the word as it is, click the ignore button.
- 6. After finishing of spell and grammar check, it shows you a message box to inform you of the finishing of the spell check. Click on the Ok button.

2.2.2 AutoCorrect

What is AutoCorrect?

You can use the AutoCorrect feature to automatically detect and correct types, misspelled words, grammatical errors, and incorrect capitalization. For example, if you type "the" plus a space, then AutoCorrect replaces what you have typed with "the." You can also use AutoCorrect to quickly insert text, graphics, or symbols. For example, type (c) to insert ©, or type ac to insert "Acme Corporation."

toCorrect: E	inglish (U.S.)	? ×
AutoCorrect	AutoFormat As You Type AutoText Au	toFormat
Correct 1	Wo INitial CApitals	Exceptions
Capitalize	e first letter of <u>s</u> entences	
	e names of days	
	accidental usage of cAPS LOCK key	
Replace :	text as you type <u>with:</u> I Plain text C Formatted to	ext
(c)	©	
(r)	®	
(tm)	TM	
17		
:(8	
)-()	0	
	Add	Delete
	ок	Cancel

Add an AutoCorrect Entry to Correct a Typing Error

- 1. On the Tools menu, click AutoCorrect.
- 2. In the Replace box, type a word or phrase that you often mistype or misspell for example, type usually.
- 3. In the with box, type the correct spelling of the word for example, type usually.
- 4. Click Add.

Create an AutoCorrect Entry to Store and Automatically Insert Text and Graphics

- 1. Select the text or graphic you want to store as an AutoCorrect entry.
 - > To store paragraph formatting with the entry, include the paragraph mark in the selection.
- 2. On the Tools menu, click AutoCorrect.
- 3. Make sure the 'Replace text as you type' check box is selected.
- In the Replace box, type a name for the AutoCorrect entry (that is, the abbreviation or word that Microsoft Word replaces automatically as you type).
- 5. Do one of the following:
 - > To save the entry without its original formatting, click Plain text.
 - > To save the entry with its original formatting, click formatted text.

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6. Click Add.

When you're ready to automatically insert the AutoCorrect entry, type the entry name, followed by a space or other punctuation. There are many other tools in MS Word such as mail mege, macros etc which we cover separately in other sections.

CHECK YOUR PROGRESS

Describe the following:

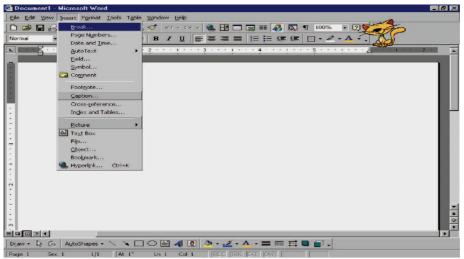
- 1. Explain the different types of tools available in MS Word.
- 2. What is AutoCorrect?
- 3. What do you mean by Spelling and Grammar Checker?

If your answers are correct, then proceed to the next section

2.3 INSERTION

Insert Menu

Insert menu helps you to insert various word components in between the word document. Insert menu has the following options.



Inserting Objects, Inserting Pictures, Inserting files, Inserting Break, Auto Text Entries, Create Cross-references for Index Entries, Table of Contents and Word Wrapping

2.3.1 Inserting Objects

You can create two types of objects.

- (1) Linked Object: An object that is created in a source file and inserted into a destination file, while maintaining a connection between the two files. The linked object in the destination file can be updated when the source file is updated.
- (2) Embedded Object: Information (object) that is contained in a source file and inserted into a destination file. Once embedded, the object becomes part of the destination file. Changes you make to the embedded object are reflected in the destination file.

Create a new embedded object

- 1 Click in the document where you want to place the embedded object.
- 2 On the Insert menu, click Object, and then click the Create New tab.
- 3 In the Object type box, click the type of object you want to create.
- 4 To display the embedded object as an icon for example, if others are going to view the document online select the Display as icon check box.

5 You can also insert a Microsoft Excel worksheet as an embedded object by clicking Insert Microsoft Excel.

Create a linked object or embedded object with existing information

- 1. Open both the Microsoft Word document and the Microsoft Excel worksheet that contains the data you want to create a linked object or embedded object.
- 2. Switch to Microsoft Excel, and then select the entire worksheet, a range of cells (cell: A box formed by the intersection of a row and column in a worksheet or a table, in which you enter information.), or the chart you want.
- 3. Click Copy.
- 4. Switch to the Word document, and then click where you want the information to appear.
- 5. To link or embed the object, do one of the following:

Create a linked object

- 1. Click Paste.
- 2. Place the insertion point on the Paste Options button near the copied object, and then click the arrow on the button to select an option to link the data.

Create an embedded object

- 1 On the Edit menu, click Paste Special
- 2 Click Paste.

In the as box, click the entry with the word "object" in its name. For example, click Microsoft Excel Worksheet Object

2.3.2 Inserting Pictures

Add Word Art

- 1. On the Drawing toolbar, click Insert WordArt
- 2. Click the WordArt (WordArt: Text objects you create with ready-made effects to which you can apply additional formatting options.) affect you want, and then click **OK**.
- 3. In the Edit WordArt Text dialog box, type the text you want.
- 4. Do any of the following:
 - To change the font type, in the Font list, select a font.
 - To change the font size, in the Size list, select a size.
 - To make text bold, click the bold button.
 - To make text italic, click the Italic button.

Inserting Images from Clip Gallery

To insert an image from Clip Gallery you have to follow these steps:

- 1. Move the cursor where you want to insert the image.
- 2. Select Clip art option from Insert->Picture menu.
- 3. Click the picture category from which you want to insert the picture.
- 4. If you know what type of image you're looking for, type a descriptive word or two in the Search for Clips text box, and press Enter. Word displays the images that are most closely match your keywords.
- 5. When you find out the image that you want to use, click it.
- 6. Clicking on the image will display a small toolbar. From that toolbar, click the Insert button as given in the figure given below

This will insert a clipart in your document.



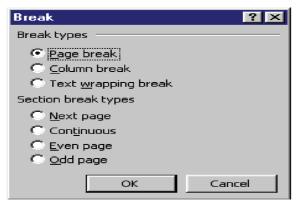
2.3.3 Inserting Files

From an entire file

- 1. Click in the document where you want to place the linked object or embedded object.
- 2. On the Insert menu, click Object.
- 3. Click Create from file.
- 4. In the File box, type the name of the file you want to create a linked object or embedded object from, or click Browse to select from a list.
- 5. To create a linked object, select the Link check box. An embedded object is created if you don't select the Link check box.
- 6. To display the linked object or embedded object as an icon for example, if others are going to view the file online select the Display as icon check box.

2.3.4 Break Option

Break option is to insert a break in between the page. This break is of any kind i.e., it can be page break, column break etc. To insert a break choose the Break option from Insert menu. It will give you the following dialog box.



This dialog has various options

- 1. Page Break : It inserts a manual page break at the insertion point.
- 2. Column Break: Inserts a manual column break at the insertion point.
- **3.** Text Wrapping Break: Ends the current line and forces the text to continue below a picture, table, or other item.
- 4. Next Page: Inserts a section break and breaks the page so that the next section starts at the top of the next page.

- 5. Continuous Page : Inserts a section break and starts the new section immediately, without inserting a page break.
- 6. Even Page : Inserts a section break and starts the next section on the next even-numbered page. If the section break falls on an even-numbered page, Word leaves the next odd-numbered page blank.
- 7. Odd Page : Inserts a section break and starts the next section on the next odd-numbered page. If the section break falls on an odd-numbered page, Word leaves the next even-numbered page blank.

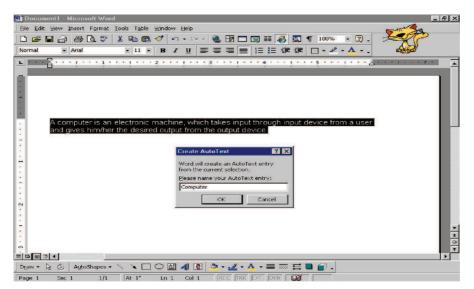
2.3.5 Auto Text Entries

AutoText provides you a way to store and quickly insert text, graphics, fields, tables, bookmarks etc. that you use frequently. Microsoft Word comes with a number of built-in AutoText entries that are divided into different categories. For example, if you're working on a letter, Word can offer letter-specific AutoText entries, such as greetings and closings.

Also you can create you own AutoText entries. This is useful if you often use the same large or complex item and don't want to have to reinsert or retype it, or if you want to store text that contains a particular style or format.

To Create an AutoText entry you have to perform following steps:

- 1. Select the text that you want to create in AutoText entries.
- 2. Select the option New under Insert -> AutoText options or press alt+F3 keys to display the AutoText dialog box given in following figure.
- 3. Enter the name of the entry you want to give to the AutoText entry in the text box.
- 4. Click Ok.



To insert an AutoText entry into your document you have to follow these steps.

- 1. Place your cursor where you want to insert your entry
- 2. Type the first few letters of the name. A screen tip will appears for your entry.
- 3. Press Enter.
- 4. A more convenient way is to write the name of AutoText entry and press F3 key.

2.3.6 Create Cross-references for Index Entries

- 1. Select the text you want to use as an index entry (index entry is a field code that marks specific text for inclusion in an index. When you mark text as an index entry, Microsoft Word inserts an XE (Index Entry) field formatted as hidden text.)
- 2. Press ALT+SHIFT+X.

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- 3. Under Options, click Cross-reference, and then enter the text you want to use as a cross-reference for the index entry.
- 4. Click Mark.

2.3.7 Table of Contents

Creating Table of Contents has following advantages:

- 1. The table of contents is actually a field, so you can update it at any time to reflect changes in your document. Word can update both the headings and page numbers or just the page numbers.
- 2. Each heading in the table of contents is a hyperlink that leads to that heading in the document text. The hyperlink lets your table of contents double as a navigation tool. Before creating Table of Contents you have to apply heading style.

Then you have to follow these steps.

- 1. Click the location where you want the table of contents to appear, if you want it to be on a separate page, insert manual page breaks before and/or after it as necessary.
- 2. Select the Index and Tables from Insert menu to display the Index and Tables dialog box, and click the Table of contents tab.
- 3. Select the desired format from Format drop down list.

Index and Tables			? ×
Index Table of Contents Table of Figures	Web Preview	es	1
Heading 1	<u>Heading 1</u> <u>Heading 2</u> <u>Heading 3</u>		1
Show page numbers Right align page numbers Tab leader:			
General Forma <u>t</u> s: From template Show levels		Options	Modify
		ок	Cancel

- 4. Select the levels up to which you want to take the heading levels from Show levels option.
- 5. Click the Ok button.

2.3.8 Applying Word Wrapping

ormat Picture				?>
Colors and Lines	Size	Layout Pictu	ure Text Box	Web
Wrapping style				
×	×	×	Ħ	×
In line with text	Sguare	Tight	<u>B</u> ehind text	In front of text
Horizontal alignm	ent			
C Left	C Center	C Right	🖲 Other	
			A	dvanced
			OK	Cancel

Word gives you six options for controlling how text flows around your image. The same options are available for all graphics. To set a text-wrapping option you have to perform following steps.

- 1. Click the picture or drawing object.
- 2. On the Format menu, click the command for the type of object you selected for example, AutoShape or Picture, and then click the Layout tab.
- 3. Click the text-wrapping style you want.
- 4. For more text-wrapping options, click Advanced, and then click the Text Wrapping tab.

CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

- 1. Insert a page break after the second paragraph.
- 2. Insert a page number on all the pages of the document.
- 3. Insert an endnote represented by the symbol.
- 4. Create a Cross reference for the Labels, Endnote, and Footnote.
- 5. Create an index or content of your document.
- 6. Insert a picture from Clip Art.

If your answers are correct, then proceed to the next section

2.4 TEMPLATES AND WIZARDS

2.4.1 Template

Every Microsoft Word document is based on a template. A template determines the basic structure for a document and contains document settings such as AutoText entries, fonts, key assignments, macros (An action or a set of actions you can use to automate tasks.), menus, page layout, special formatting, and styles. There are two basic types of templates:

- 1. Global Template
- 2. Document Template
- 1. Global Template: A document template that you have loaded in Microsoft Word by using the Templates and Add-Ins command on the Tools menu. You can use the macros, AutoText entries, and custom toolbar, menu, and shortcut key settings stored in a global template while you work with any document, not just documents based on that template.

The Normal template is by design always a global template. Customized items you store in the Normal template are available to all documents. Normal template: A general-purpose template that you can use for any type of document. When you start Microsoft Word or click New Blank Document, Word creates a new blank document that is based on the Normal template. You can modify this template to change the default document formatting or content.

2. Document template: Templates you save in the Templates folder appear on the General tab in the Templates dialog box. If you want to create custom tabs for your templates in the Templates dialog box, create a new subfolder in the Templates folder and save your templates in that subfolder. The name you give that subfolder will appear on the new tab.

Create a document template

Creating a Template involve following Steps:

To base a template on an existing document

- 1. On the File menu, click Open.
- 2. Open the document you want.

To base a new template on an existing template

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- 1 On the File menu, click New.
- 2 In the New Document task pane under New from template, click General Templates.
- 3 Click a template that is similar to the one you want to create, click Template under Create New, and then click OK.
- 4 On the File menu, click Save As.
- 5 In the Save as type box, click Document Template. This file type will already be selected if you are saving a file that you created as a template
- 6 The default folder is the Templates folder in the Save in box. To save the template so that it will appear on a tab other than General, switch to the corresponding subfolder within the Templates folder.
- 7 In the File name box, type a name for the new template, and then click Save.
- 8 In the new template, add the text and graphics you want to appear in all new documents that you base on the template, and delete any items you don't want to appear.
- 9 Make the changes you want to the margin settings, page size and orientation, styles, and other formats.
- 10. On the Standard toolbar click Save, and then click Close on the File menu

2.4.2 Wizards

Use the Wizard to create a letter

The Letter Wizard helps you easily enter the set phrases characteristic of seasonal greetings and greetings of personal inquiry. Use the Letter Wizard to easily create a letter.

- 1. On the Tools menu, click AutoCorrect, and then click the AutoFormat as You Type tab.
- 2. Select the Insert closing and Launch Letter Wizard check boxes under automatically as You Type.
- 3. Click OK.
- 4. Enter a salutation in a document and press ENTER. On the line following the line where the cursor is placed, the closing is automatically entered, the Letter Wizard is started, and the Letter toolbar is displayed.
- 5. On the Letter toolbar, click Letter. The Letter Wizard dialog box is displayed.
- 6. In the Seasonal Greeting box, enter the current month. Below the box, a list of seasonal greetings appropriate to the month entered is displayed. Select an appropriate greeting.
- Do one of the following: To write a letter of personal inquiry, click an appropriate greeting in the Personal Inquiry Greeting box. To enter a thank you letter, click Next, and click an appropriate greeting in the Thank You Greeting box.
- 8. When you have selected the necessary greetings, click Finish.

CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

- 1. What is Template?
- 2. What is Wizard?
- 3. What is the difference between global and document Template?
- 4. Create a Letter using Wizard.

If your answers are correct, then proceed to the next section

2.5 MAIL MERGE

Mail merge is a pretty simple concept. You take a document (such as a form letter) and a set of information (such as the names and addresses of all your clients) and you merge them. When you merge the form letter and the list of names, you can generate a mass mailing. Each copy of the document you print will be personalized with a

different name and address. Typing the letter once, combining it with your client list, and printing it can therefore accomplish a mailing to hundreds of clients.

Before Starting Mail Merge

Before you start learning mail merge process, you need to understand the two documents that make up a mail merge:

- 1. Main Document : In a mail-merge operation, the document containing the text and graphics stays the same for each version of the merged document. ³/₄ For example, the return address and the body of a form letter.
- 2. Data Source : A file that contains the text and graphics that varies with each version of a mail-merge document. For example, a list of names and addresses for a form letter you want to send to a list of client's ³/₄ or in any report in which you want to use information from a database.

2.5.1 Creating the Main Document

The main document can be a form letter, an invoice, an invitation or any type of document. The idea here is that the document will go to many recipients, and some unique information must be included to personalize it.

- 1. If you have an existing letter that you want to use for your form letter, open it, and modify it according to your need or if you want to start a letter from scratch, start a new blank document.
- 2. Save the document.
- 3. Choose tools, Mail Merge to display the Mail Merge Helper Dialog box.
- 4. Click the Create button.

Mail Merg	e Helper	? ×
Use this cl button.	necklist to set up a mail merge. Begin by choosing the Create	,
188	Main document	
2 🖻	Form Letters Mailing Labels Envelopes	
	Catalog Restore to Normal Word Document	
3 🐨	Merge the data with the document	
	C	ancel

- 5. Select Form Letter from the drop-down list. Dialog boxes will appear with two choices: to create a form letter within the active window or in new window.
- 6. Click the Active window Button

Mail Merge Helper ? 🗙
Use this checklist to set up a mail merge. Begin by choosing the Create button.
1 ==
Main document
Create -
Microsoft Word
To create the form letters, you can use the active document window MainLetter_MailMerge or a new document window. Active Window New Main Document
3 Merge the data with the document
Cancel

- 7. Then the Helper dialog box will come again but with different shape: with some more buttons and some active buttons, which were inactive before.
- 8. Click on edit button if you haven't written the letter body.

2.5.2 Building Data Source

In this second phase, you tell Word which document you want to use as your data source. You can either create a new one or open an existing one.

A data source is a file that contains the data that varies in each copy of a merged document. For example, a data source can include the name and address of each recipient of a form letter.

Mail Merg	e Helper	? ×
	step in setting up the mail merge is to specify a data source. e Get Data button.	
1 🖙	Main document	
2 🛍	Create + Edit + Merge type: Form Letters Main document: F:\Data\\MainLetter_MailMerge.doc Data source	
3 🖻	Merge the data with the document	cel

Create a New Word Data Source

- 1. Make sure you've already set up the main document.
- 2. If you don't see the Mail Merge Helper dialog box, click in the main document, and then click Mail Merge on the Tools menu.
- 3. Under Data source, click Get Data, and then click Create Data Source.
- 4. In the Field names in header row box, specify the data fields (A category of information in a data source. A data field corresponds to one column of information in the data source. The name of each data field is listed in the first row (header row) of the data source. "Postal Code" and "Last Name" are examples of data field names.) That you want to include in the data source:

To delete a data field, click the field name in the Field names in header row box, and then click Remove Field Name.

Mail Merg	e Helper	? ×
	step in setting up the mail merge is to specify a data source. ne Get Data button.	
185	Main document	
	<u>⊂</u> reate ▼ <u>E</u> dit ▼	
	Merge type: Form Letters Main document: F:\Data\\MainLetter_MailMerge.doc	
2 🛍	Data source	
	Get Data	
	<u>C</u> reate Data Source	
3 開き	Open Data Source	
	Use <u>A</u> ddress Book ht Header Options	
	Econorio de Conorio	
	Can	cei

To add a data field, type a new field name in the Field name box, and then click Add Field Name.

To change the order of the data fields, click a field name in the Field names in header row box, and then click one of the arrow buttons.

- 5. When you finish specifying the data fields, click OK.
- 6. Locate the folder that you want to save the data source in, type a file name, and then click Save.
- 7. Click Edit Data Source

Create Data Source	? ×
header row. Each of the columns in	sed of rows of data. The first row is called the n the header row begins with a field name. d names in the list below. You can add or remove er row.
Ejeld name:	Field names in header row:
Remove Field Name MS Query	Address2
Microsoft Word	X
The data source you just creat to your data source by choosin	ed contains no data records. You can add new records ig the Edit Data Source button, or add merge fields to ng the Edit Main Document button.

- 8. In the Data Form dialog box, fill in the information for each data record (A complete set of related information in a data source. A data record corresponds to one row of information in the data source. All information about one client in a client mailing list is an example of a data record:
- To fill in a record, type information for a data field, and then press ENTER to move to the next field. If you don't want to include information for a particular field, press ENTER to skip the field. Don't type spaces in the box.
- To start a new data record, click Add New.

Title:	Mr.	<u> </u>	OK
FirstName:	John		Add New
astName:	Smith		
Address1:	36, Street II		<u>D</u> elete
Address2:	Abc Road		Restore
City:	New Delhi		Find
State:	Delhi		<u>Cina</u>
PostalCode:	110026		<u>Vi</u> ew Source
		-	
		_	

9. To return to the main document, click Mail Merge Main Document on the Database toolbar.

			Mail Merge Main Document
🔻 Database		×	5
🛒 😭 🗮 🐺	2 X X B	W T	

Now the main document displays out with the new toolbar of Mail Merge.

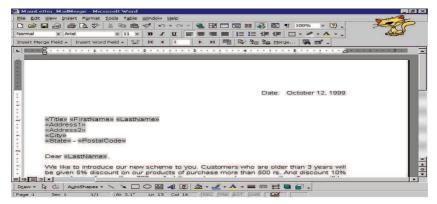
Inserting the Merge Fields

It's time to enter merge fields in the form letter you typed. The merge fields in the letter will correspond to the fields in your database.

- 1. Place your cursor halfway between the date and salutation.
- 2. Choose the Insert Merge field's button on the Mail Merge toolbar.

	Merge - Microsoft Word	- 8
	sert Format Iools Table Window Help 🚳 🖸 🐄 🖇 🖓 📾 📆 🛷 🖙 - 🖙 - 🍓 🗗 🗔 📰 🙀 🖏 🖏 🖣 100% - 20 -	200
Normal A		A
		C.(CO)
Title		
FirstName LastName Address1 Address2 City State PostalCode	Date: October 12, 1999	
VVe like be give	air/Madam. e to introduce our new scheme to you. Customers who are older than 3 years will an 5% discount on our products of purchase more than 500 rs. And discount 10% Autoshapes •	

- 3. Word inserts the merge field surrounded by chevron brackets. Insert the remaining merge fields in the address block, pressing Enter and adding spaces and commas where necessary. If you have a salutation field, add it after Dear, and follow it with a colon or comma.
- 4. Save the main document.



2.5.3 Merging Document and DATA

At this point you have the following options:

- *w* you can view the letters that would result from performing a mail merge.
- you can run a check for errors in the merge before performing any of the above actions. This check looks for things such as fields that don't match the fields in your data source.
- you can merge your letters to a new document, creating one large file containing all the letters, one after the other that would result from combining your data and document.
- you can merge to your printer, proceeding to print out these letters without previewing or saving them to a document.
- regional you can print the documents to e-mail.

It is always safer to view your merged document before printing or check for the errors in the merging if any.

2.6 MACRO

What is a Macro?

If you perform a task repeatedly in Word, you can automate the task by using a macro. A macro is a series of Word commands and instructions that you group together as a single command to accomplish a task automatically. Instead of manually performing a series of time-consuming, repetitive actions in Word, you can create and run a single macro — in effect, a custom command — that accomplishes the task for you.

Here are some typical uses for macros:

To speed up routine editing and formatting

- to combine multiple commands; for example, inserting a table with a specific size and borders, and with a specific number of rows and columns
- To make an option in a dialog box more accessible
- to automate a complex series of tasks

Word offers two ways for you to create a macro: the macro recorder and the Visual Basic Editor.

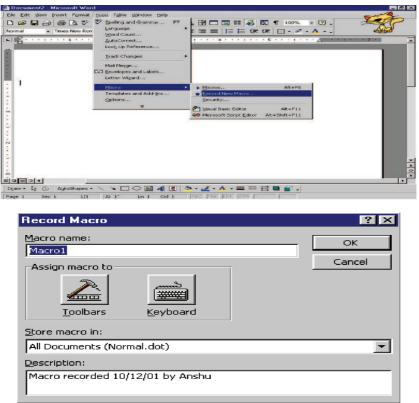
2.6.1 Recording a Macro

The macro recorder can help you get started creating macros. Word records a macro as a series of Word commands in Visual Basic for Applications. When you record a macro, you can use the mouse to click commands and options, but the macro recorder doesn't record mouse movements in a document window. For example, you can't use the mouse to move the insertion point or to select, copy, or move items by clicking or dragging. You must use the keyboard to record these actions. When you're recording a macro, you can temporarily pause recording and then resume recording where you stopped.

For quick access to your macro, you can assign it to a toolbar, a menu, or shortcut keys. Running the macro is as simple as clicking the toolbar button or menu command or pressing the shortcut keys. You can also use the Macros command (Tools menu, Macro submenu) to run a macro.

2.6.2 Record a Macro in Word

1. On the Tools menu, point to Macro, and then click Record New Macro.



- 2. In the Macro name box, type a name for the macro.
- 3. In the Store macro in box, click the template or document in which you want to store the macro.
- 4. In the Description box, type a description for the macro.
- 5. If you don't want to assign the macro to a toolbar, a menu, or shortcut keys, clicks OK to begin recording the macro.

To assign the macro to a toolbar or menu, click Toolbars. In the Commands box, click the macro you are recording, and drag it to the toolbar or menu you want to assign it to. Click Close to begin recording the macro.

Customize	1 ×
Tool <u>b</u> ars <u>C</u> ommands <u>O</u> ptions	
Categories: Comman <u>d</u> s:	
Macros.Macro1	
Selected command: Description Modify Selection -	
Save in: Normal Keyboard Close	

To assign the macro to shortcut keys, click Keyboard. In the Commands box, click the macro you are recording. In the Press new shortcut key box, type the key sequence, and then click Assign. Click Close to begin recording the macro.

stomize Keyboard		?
Categories: Macros	Commands:	Close
		Assign Remove
Press <u>n</u> ew shortcut key:	Current keys:	Reset All
-		-
Description		Save changes in:

6. Perform the actions you want to include in your macro.

You can use the mouse to click commands and options, but the macro recorder cannot record mouse actions in a document window. To move the insertion point or select, copy, or move text, for example, you must use shortcut keys.

7. To stop recording your macro, click Stop Recording.



CHECK YOUR PROGRESS

Before reading next section, practice the following questions.

True or False

1. Macros are used to send same let	tter to different recipients.	[]
2. The Letter Wizard in Word can h	elp you write a letter quickly and easily.	[]
3. In mail merge a data source is a f	ile that contains the data that varies in each copy of	
a merged document		[]
4. Word count option gives you all t	the statistics of the document that how many word,	
characters, lines, paragraphs are	there in the document.	[]

Fill in the Blanks

1. If you perform a task repeatedly in Word, you can automate the task by using a _____

- 2. The _____ can be a form letter, an invoice, an invitation any type of document
- 3. After viewing tracked changes, you can ______each change
- 4. If you are finding any difficulty to understand a word or if you want a synonym for a particular word you can take the help of ______.
- 5. The spell checker lets you check the spelling and grammar of an entire document all at once.

Describe the Following

- 1. Write a short note about mail merge.
- 2. What is macro? And how it is used?
- 3. What is the difference between auto correct and track changes options?

If your answers are correct, then proceed to the next section.

2.7 MS PUBLISHER

2.7.1 Overview of Microsoft Office Publisher

This section provides an overview of MS Publisher 2007, the desktop publishing and marketing materials solution for the 2007 Microsoft Office system. MS Publisher can help you create a wide variety of high-quality publications and marketing materials—from single-page flyers to more complex brochures, catalogs, and e-mail newsletters.

2.7.2 Design and Reuse Pages That Reflect Your Business Brand

Unless you are starting a new business, you are likely to have an established brand identity for your business, such as a business logo, color scheme, fonts, and business information (your tagline and address, for example). MS Publisher 2007 includes tools to help you efficiently create, customize, and reuse marketing communications materials that reflect your brand identity. Use the collection of intuitive design tools in Office Publisher 2007 to create custom publications. With Office Publisher 2007, you can use your creativity to take your publications further.

Choose from Hundreds of Templates—Offline or Online

You can get started quickly by choosing from a library of hundreds of customizable design templates or blank publications, including newsletters, brochures, flyers, postcards, Web sites, e-mail formats, and more.

Easily Save and Locate Your Customized Templates

When you have created or customized a template, you do not want to waste time trying to locate it later. Office Publisher 2007 enables you to create and assign categories for any publication that you save as a template.

Start with a Recently Used Publication

Now, you can browse previews of recently used work in the startup screen, so finding your work is quick and easy.

Apply Elements from Your Brand Identity

Most businesses have an established brand identity with an existing logo, colors, and fonts that their clients know and recognize. New functionality enables you to apply your brand identity to every template within Office Publisher 2007 before actually starting.

Build Custom Materials from a Database

Marketing materials such as datasheets or catalogs are often most effective when they are up to date and targeted to a specific client or client segment. However, you do not always have the time to create a new, customized datasheet for every client meeting or conference or to create a new weekly sales sheet. Unit-II

2.7.3 Editing fills and Re-coloring Pictures

Whether you are starting from a template or a blank publication, you can further customize and refine your publication using the collection of intuitive design, layout, graphics, and typography tools in Office Publisher 2007. The following table describes some of the layout and design features found in Office Publisher 2007.

Adjust Images within Office Publisher 2007

- Recolor pictures
- Adjust brightness and contrast
- Crop and compress images
- Set text-wrapping properties
- This is a set of the s
- Insert images from a scanner or digital camera
- Rotate and flip images
- The second second with drawing tools and Auto Shapes
- Tiew image details with Graphics Manager
- Save elements as a picture

Take control of your layout

- Create multiple master pages
- Align text and objects with baseline alignment, movable rulers, grids, and guides
- Link text frames
- Easily navigate, move, rename, duplicate, insert a page, or apply a master page with page navigation

Improve the appearance of text

- Adjust character spacing with tracking and kerning
- Set text-wrapping properties
- TrueType fonts
- Create bulleted and numbered lists
- Add headers and footers
- Thandle paragraph and line breaks with widow and orphan controls

Incorporate design elements

- Create a consistent look with color and font schemes
- Insert professionally designed objects from the Design Gallery
- Theck your work with Design Checker

2.7.4 Personalize Publications and Marketing Materials for Professional, Targeted Results

Create personalized e-mail publications using the new E-mail Merge. Enhancements to Mail Merge now support sending personalized e-mail publications and enable you to add bookmarks to help readers navigate through an e-mail newsletter, as well as add personalized hyperlinks to direct users to unique online information.

Create, manage, and store a single-client list or data list in Office Publisher 2007 by combining and editing lists from multiple sources, including Microsoft Office Excel 2007 spreadsheet software, Office Outlook 2007, Office Outlook 2007 with Business Contact Manager, Microsoft Office Access 2007, and more.

2.7.5 Easily Share, Print, and Publish Your Publisher Publications

Office Publisher 2007 provides new and improved ways for you to easily share, print, and publish your publications.

2.7.6 Application of MS-Publisher

- MS Publisher provides direct mail formats for following Application:
- (1) Brochure (2) Flyer (3) Post card
- (4) Invitation (5) Personal letter (6) Newsletter
- (7) Catalog

Unit-II

You can create most of these in a simple word processing program or with small publishing software such as Microsoft Publisher. MS Publisher has templates for each format, which makes it easy. You simply insert your graphic and text where you want it and print. You can print them on a standard home office printer for a few pennies per sheet. With MS Word, you can design pages using WordArt as well as photos, clip art and other graphics. If designing a flyer using MS Word, however, use text boxes instead of just typing text on the page. It will be a lot easier.

An invitation is essentially a four-sided post card. If you've been to a wedding or a graduation you've seen them. They are also applicable for business use, especially if you have an event you want to invite people to attend. Again, MS Publisher comes in handy. A personal letter is best done in MS Word. You type it up like any letter but address it to a specific individual. But if you plan to do this be sure to use a high-grade paper. It will look more professional and the extra pennies you spend on it will boost your image. A newsletter is very simple. In the electronic age you can create one in MS Publisher using the e-mail template and e-mail it to your list at no charge.

2.8 SUMMARY

This unit has introduced you to the basic features of a MS Word and what it can do for individuals and other business houses. The standard toolbar and the formatting toolbar offer a variety of buttons, which offer a quick service to the user. The looks of the document can be enhanced by adding clips to it from the Clip Gallery.

WORD 2000 flags the misspell or incorrect words. The 'Spell Check' facility helps in finding out incorrect words and finally corrects them this unit has introduced the steps for Inserting objects, Pictures, Files etc. This unit has defines global, document templates, wizards for letter creation. , Mail Merge Procedure and also defines Procedure for addition and deletion of Macro. This unit also includes MSPublisher in which we design pages using MS Publisher. With all these advanced features, WORD 2000 is fast gaining popularity among users. Its easy and ready to use tools have made the life of end users very comfortable.

2.9 GLOSSARY

Copy: Copying means duplicating the contents of a document at some other desired place.

Header: A header is any information printed in the top margin.

Footer: Footer is any information printed in the bottom margin.

Merge: Combine two or more cells in the same row or column into a single cell.

Split: Partition of a single cell into two or more cells.

Table: A table is made up of rows and columns of cells that you can fill with Text and graphics **Bookmark**: A bookmark is an item or location in a document that you identify and name for future reference. You can use bookmarks to quickly jump to a specific location, create cross-references; mark page ranges for index entries, and so on.

Font: means the way of writing characters

Word wrap: Means to adjust a word in a given specified area.

Formatting: Means changing the size, color, style, font, pattern, etc of given text.

Template: A template determines the basic structure for a document and contains. Document settings such as AutoText entries, fonts, key assignments, macros, menus, page layout, special formatting, and styles. **Undo:** It is used to reverse changes while editing,

Redo: If an undo has to perform on last reversed action that is known as Redo.

Cut and Paste: Cut and Paste means moving of text and moving of text means removing text from one portion of the document and placing it at some other location.

Wizards: are used to automatically create applications.

Macro: A macro is a series of Word commands and instructions that you group together as a single command to accomplish a task automatically. Instead of manually performing a series of time-consuming, repetitive actions in Word, you can create and run a single macro — in effect, a custom command — that accomplishes the task for you.

Mail Merge: You take a document (such as a form letter) and a set of information (such as the names and addresses of all your clients) and you merge them.

Unit-II

Break: Break option is to insert a break in between the page. This break is of any kind i.e., it can be page break, column break etc.

Spell Checker: The spell checker lets you check the spelling and grammar of an entire document all at once. **Autocorrect**: You can use the AutoCorrect feature to automatically detect and correct types, misspelled words, grammatical errors, and incorrect capitalization.

2.10 FURTHER READINGS

- 1. Microsoft WORD: The Microsoft Reference Guide to All Commands, Functions, and Features by Nancy drews
- 2. Microsoft Word for Windows: a tutorial to accompany Peter Norton's Introduction to computers by Heather Millet Duggan, Peter Norto
- **3.** Writing Your Dissertation with **Microsoft Word**: A Step-by-step Guide by Vincent Kiernan 2005
- 4. Microsoft Word 5 Quick Reference by Bryan L. Pfaffenberger using Microsoft Word by Bill Camarda
- 5. Microsoft Word 97 at a Glance by Jerry Joyce, Marianne Moon

2.11 ANSWERS TO SELF LEARNING EXERCISE

Answer to Check your Progress 2.1 & 2.2

- 1. See the Text.
- 2. AutoCorrect: You can use the AutoCorrect feature to automatically detect and correct types, misspelled words, grammatical errors, and incorrect capitalization.
- 3. The spell checker lets you check the spelling and grammar of an entire document all at once. You won't really need to use it if you use automatic spelling checking to fix your spellings. However if you're working on a rather larger document, the spelling and grammar checker comes in use

Answer to Check your Progress 2.3

(1.-6) Practice by Seeing the Text.

Answer to Check your Progress 2.4

- 1 A template determines the basic structure for a document and contains document settings such as AutoText entries, fonts, key assignments, macros, menus, page layout, special formatting, and styles
- 2. Wizard helps you easily enter the set phrases characteristic of seasonal greetings and greetings of personal inquiry. Use the Letter Wizard to easily create a letter.
- 3. See the Text
- 4. See the Text

Answer to Check your Progress 2.5 & 2.6

True or False

1. True 2. True 3. True 4. True

Fill in the Blanks

1. Macro 2. Main Document 3. Search yourself 4. Spelling & grammar

Describe the Following

- 1. Mail Merge: You take a document (such as a form letter) and a set of information (such as the names and addresses of all your clients) and you merge them.
- 2. Macro: A macro is a series of Word commands and instructions that you group together as a single command to accomplish a task automatically. Instead of manually performing a series of time-consuming, repetitive actions in Word, you can create and run a single macro in effect, a custom command that accomplishes the task for you

SOLVED QUESTIONS

Que.1. What is Bookmark?

Ans. A bookmark is an item or location in a document that you identify and name for future reference. You can use bookmarks to quickly jump to a specific location, create cross-references; mark page ranges for index entries, and so on.

Que.2. What is the use of MS Publisher?

Ans. MS Publisher provides the desktop publishing and marketing materials solution for the system. MS Publisher can help you create a wide variety of high-quality publications and marketing materials from single-page flyers to more complex brochures, catalogs, and e-mail newsletters.

Que.3. What is Linked Object?

Ans. An object that is created in a source file and inserted into a destination file, while maintaining a connection between the two files. The linked object in the destination file can be updated when the source file is updated.

Que.4. What is Embedded Object?

Ans. Information (object) that is contained in a source file and inserted into a destination file. Once embedded, the object becomes part of the destination file. Changes you make to the embedded object are reflected in the destination file.

Que.5. What is the difference between Page Break and Column Break?

Ans. Page Break inserts a manual page break at the insertion point. Where as Column Break Inserts a manual column break at the insertion point

Que.6. What are the uses of Macros?

- Ans. There are some typical uses for macros:
 - To speed up routine editing and formatting
 - To combine multiple commands; for example, inserting a table with a specific size and borders, and with a specific number of rows and columns
 - To make an option in a dialog box more accessible
 - To automate a complex series of tasks

2.12 UNIT-END QUESTIONS

- Que-1. How do you Record a Macro in Word?
- Que-2. How does you Insert Images from Clip Gallery?
- Que-3. What is the step to set a text wrapping.
- Que-4. How do you create a letter-using Wizard?
- Que-5. What is data source?
- Que-6. Write down the Applications of MS Publisher.
- Que-7. Write a short note about mail merge.
- Que-8. Write is Template?
- Que-9. What is Global Template?
- Que-10. What is Document Template?
- Que-11. What is Mail Merge?
- Que-12. What is MS Publisher?

Unit-II

UNIT III-SPREAD SHEET PACKAGE-MS EXCEL 2000

Structure of the Unit

- 3.0 Objectives
- 3.1 Introduction

3.2 How to start with MS Excel 2000

3.2.1 Components of Excel Window Check your progress

3.3 Spreadsheet terminology

3.3.1 Organization of worksheet area Check your progress

3.4 Worksheet management: name, Add, Delete, Move, Copy multi select

- 3.4.1 Data type
- 3.4.2 Data entry
- 3.4.3 Editing
- 3.4.4 Data coping
- 3.4.5 Math Operators and expressions
- 3.4.6 Creating Formulas and functions Check your progress
- 3.5 Summary
- 3.6 Further Readings
- 3.7 Glossary
- 3.8 Answer to the self learning exercise
- 3.9 Unit-end Questions

3.0 OBJECTIVES

This course provides an introduction to spreadsheet fundamentals. The current version of software is MS Excel 2003; however Excel XP is the minimum acceptable platform. The course includes basic spreadsheet construction and layout, commands, files, graphics, and printing and involves hands-on computer use. Some computer knowledge and basic mathematics skills are recommended.

3.1 INTRODUCTION

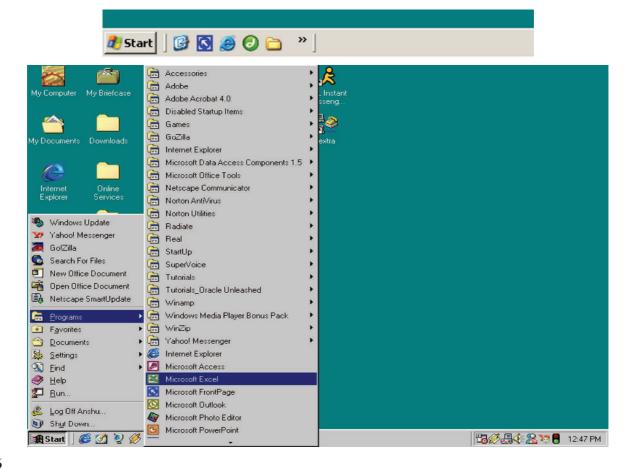
EXCEL 2000 is a very powerful and easy to use spreadsheet package, which is being commonly used these days. It is basically an end user application package. It works very well with numbers and their complex calculations. Excel 2000 helps to prepare your data in an organised, orderly and meaningful fashion. Excel 2000 finds its major contribution in creating reports, using formulas and performing calculations. It is best suited for scientific and statistical analysis. Excel 2000 can also be used to prepare Profit and Loss accounts, Balance sheet and other Tax statements. It works well for both simple and complicated numbers. It can be used for preparing analytical reports including statistical analysis, forecasting and regression analysis. Good looking and attractive charts can be created which depict data in clearer and meaningful fashion. Excel 2000 can also used to create relationships between different types of data. Excel 2000 can do all the work of a full-fledged word-processor but it lacks the advanced features of desktop publishing it also supports the high level features of object linking and embedding which means data from WORD can be safely and easily put and linked with data in Excel and vice versa is also true.

3.2 HOW\ TO START WITH MS EXCEL 2000

To start with Excel

One has to follow the following steps.

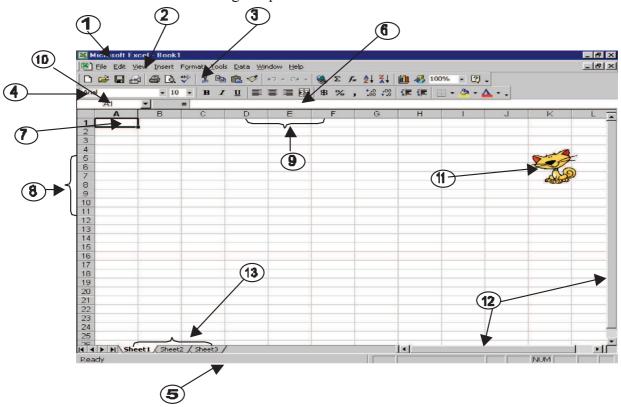
1. Click on the Start Button at windows taskbar.



- 2. Select Program option
- **3.** Select Microsoft Excel option.
- 4. Choosing this option will open up Microsoft Excel and you will see the following screen.

3.2.1 Excel Window Components

An Excel window has the following components.



Functioning of various components of Microsoft Excel is given below.

- 1. Title Bar : Title bar shows the name of the document and situated in the top of the window application.
- 2. Menu Bar : Menu bar contains the various commands under the various topics to perform some special tasks. Menu bar is located under the title bar
- **3. Standard Toolbar :** Toolbar is nothing more than the shortcut of the Menu options to execute or perform the menu options in the easiest and faster way. Standard toolbar contains the commands for the Word's most frequently used commands.
- 4. Formatting Toolbar : Formatting toolbar contains the various commands related to the formatting of the document.
- 5. Status Bar: It displays the positioning of the cursor, the status of some important keys of keyboard, shows the messages for the toolbar button when a mouse points to it, and display messages for menu option when a menu option is selected or pointed out by a user.
- 6. Formula Bar : Formula bar shows you the formula instead of the result whenever you click on a cell in which you have a formula.

	С	HECK YOU	R PROGRESS		
	(1)	How many bars	(components) are avai	lable in the spreadsh	neet?
		-	b) 6 (c) 7	(d) 3	
	(2)	Which toolbar c	ontains the various com	mands related to the	formatting of the document?
		(a) Title bar	(b) menu bar	(c) status bar	(d) formatting toolbar
	(3)	Which bar shows	the name of the docume	nt and situated in the	top of the window Application?
		(a) Title bar	(b) menu bar	(c) status bar	(d) formula bar
3.3	SI	PREADSHEE'	Г TERMINOLOG	Y	
	1.	Active cell: the	cell in a spreadsheet appli	ication in which data 1	may be entered.
	2.	Cell : the space of	on a spreadsheet where a	column and row inter	sect.
	3.	Column : a verti	cal row of cells in a spread	dsheet document.	
	4.	Entry bar : the b the active cell.	ar across the top of a spre	eadsheet document the	at displays the data being entered in
	5.	Formula : an equ	ation which will perform	a mathematical calcul	ation in a spreadsheet.
	6.	Row: refers to the	e numbered cells that app	pear horizontally on a	spreadsheet document.
	7.	U	information by kinds or or readsheet or database pr	, 1	lar order. "Sort" is a command that
	8.	-	program that is similar ram can be added automa	•	er book. Columns of numbers in a
	9.		key that is used for spacing the program; or for moving the program is the progra		programs; for traveling from cell to database programs, etc.
3.3.1	Or	ganization of a w	orksheet area		
	1.		combination of all the ho has maximum 65,536 row		ogether in single horizontal line. An
	2.		nns are combination of all has maximum 256 colum		l together in a single vertical line. An
	3.	Cell: A Cell is an	intersection point of row	v and column. It is use	ed to store data.
		There are 65536	x 256 = 16777216 cells i	in a single worksheet.	
	4.	Name Box : This	s box shows the name or	the address of the cur	rently active cell.
	5.	Formula Bar : F which you have a		rmula instead of the re	sult whenever you click on a cell in
	CHE	ECK YOUR P	ROGRESS		
	(1)	What is cell?			
		(a) The space on	a spreadsheet where a co	olumn and row interse	ect
			a spreadsheet where a co		
			a spreadsheet where a ro		
		(d) All are the ab	ove		

- (2) How many rows are available in the spreadsheet?
 (a) 65,536
 (b) 65,535
 (c) 65,537
 (d) 65,534
 (3) How many columns are available in the spreadsheet?
 - (a) 256 (b) 255 (c) 254 (d) 257
- (4) Which box shows the name or the address of the currently active cell? (a) Name box (b) formula box (c) cell (d) none

3.4 WORKSHEET MANAGEMENT: (NAME, ADD, DELETE, MOVE, COPY, MULTI SELECT)

Following steps are required to manage a work sheet:-

Name or Rename of Worksheet:

Rename: For this, right click on the worksheet the following option will display.

24		
21		
22		
23		
24		
25	Insert	
26		
27	Delete	
28	<u>R</u> ename	
29	Move or Copy	
30		
31	Select All Sheets	
32	Tab Color	
33		
II I → M Sheet4 She	S View Code	1
Ready		
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Choose the rename option.

Name: The worksheet may be selected for naming. Here you can type the worksheet name.

Addition of a new worksheet:

Microsoft Excel - Book1									
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4		Page <u>B</u> reak							
5	f*	Eunction							
7		<u>N</u> ame		•					

Spread Sheet Package–MS-EXCEL 2000

For adding/inserting a new worksheet choose the worksheet option in the following manner-Open all the workbooks that you want to open as a group.

- 1. Click on the insert menu of the menu bar
- 2. Choose the worksheet option and click.

Or

Delete a Worksheet:

Delete sheet command is used to delete the current sheet and keep remember that once a sheet deleted can't be recovered. So take care while issuing this command that you are on the sheet, which you want to delete.

You can delete using delete option that you can find in the following menu. 24 25 Insert... 26 Delete 27 Rename 28 29 Move or Copy... 30 Select All Sheets 31 32 Tab Color... 33 5 View Code I I I I Sheet4 / Sheet1 / Sheet2 Sheeta Ready 🕑 🖸 🥭 🕗 🗀 🛃 Start » 🗀 dps (Not Responding) 🛛 🕅 Unit 3,4,5 Microsof ...

Move or Copy Worksheet

A sheet can be copied or moved to the same workbook as well as to the other workbook. To do so the user has to make use of the Move or copy sheet option from the edit menu in the following manner.

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	Microsoft Excel - Book22								
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6	3	Smith	Sales	Move sel	ected sheets				
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15						20	×		
16				Creat	e a copy				
17									
18					OK	Cancel			
10									

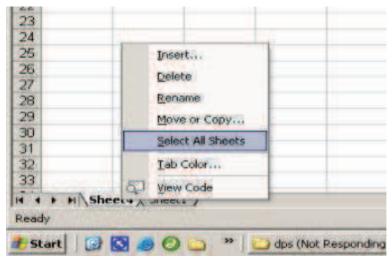
To copy or to move a worksheet, follow these steps.

- 1. Select the workbook from **To books** list box in which you want to copy or move the current worksheet.
- 2. If you want to create a copy of the current work sheet check mark the Create a copy option. Otherwise if you want to move the current worksheet, remains the Create a copy option unchecked.
- 3. Press Ok button.

Multi selection of worksheet:

This can be done in the following manner-

- 1. Right click on worksheet
- 2. Select All Sheets option.



3.4.1 Data Type

In a spreadsheet there are three basic types of data available to it.

- labels (text with no numerical value)
- constants (just a number constant value)
- formulas* (a mathematical equation used to calculate)

Data Types	Examples	Descriptions		
LABEL	Name or Wage or Days	Anything that is just text		
CONSTANT	5 or 3.75 or -7.4	Any number		
FORMULA	=5+3 or = 8*5+3	Math equation		

*ALL formulas MUST begin with an equal sign (=).

3.4.2 Data entry

A cell contains the data entered by operator. At any time, one cell is always highlighted which is called the currently active cell.

The address of this currently active cell is shown in the 'Name' box, which lies in the upper left corner of the screen, exactly above the column letter A. You can place your data in any portion of the worksheet.

Take your cell pointer at a place wherever you want to put your data in any portion of the worksheet. Take your cell pointer at a place wherever you want to put your data with the help of either the mouse pointer or move to that particular cell with the help of arrow keys. Similarly, in order to select a group of continuous cells, take your mouse pointer at the cell from where you want your range to start.

Spread Sheet Package–MS-EXCEL 2000

Click at that cell and then drag your mouse pointer diagonally to the opposite corner, release the mouse pointer when the desired range is made. All the cells in the range become highlighted.

3.4.3 Data editing

Cut and Paste

Cut and Paste means moving of text of cells and moving of text means removing text from one portion of the worksheet and placing it at some other location.

To cut text of cells:

- 1. Select the cells or make the range of the cells
- 2. Select cut from Edit menu

or

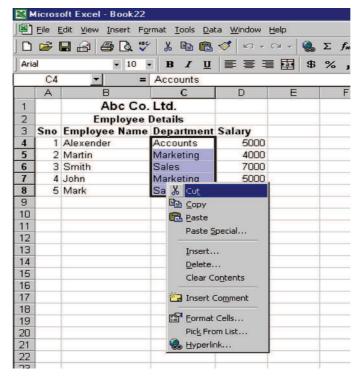
Click on the cut button of standard toolbar

or

Press the ctrl+x button

01

Move the mouse pointer on the selected text and right click and select cut as shown in figure given below



To paste the selection

- 1. Move the cursor at the location where the text is to be pasted
- 2. Select Paste from Edit menu

or

Click paste button on the standard toolbar

or Press Ctrl+v *or*

Click the right mouse button and select paste from the context menu. Reversing Commands Unit-III

1. Undo 🔊 -

To reverse changes while editing undo command is used. To perform undo you can Click on the Undo option under Edit menu

or

Click on the Undo button on Standard toolbar

or

Press Ctrl+z.

2. Redo 🖙 -

If an undo has to perform on last reversed action that is known as Redo. To perform redo you can

- (a) Click on the Redo option under Edit Menu or
- (b) Click on the Undo button on Standard Toolbar or
- (c) Press Ctrl+y

Find Replace and go to Options

Find

Some times while working in Worksheet you need to find a particular text.

To find a particular text you have to follow the steps given below:

- 1. On the Edit menu, click Find. Then you will see the following window
- 2. In the Find what box, enter the text that you want to search for.
- 3. Select the direction of searching from Search list box.
- 4. Select any other options that you want.

Match case: To find the characters that are a word by themselves and are not a part of another word.

Find entire cell only: To find the characters that are a word by themselves and are not a part of another

word.

- i. For Help on an option, click the question mark and then click the option.
- ii. Click Find Next.
- iii. If you want find similar word again in the rest of the document click on the Find next button.

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Replace

If you want to replace a word in the document with another word you can use find and replace command.

- i. On the Edit menu, click Replace. Then you will find the following window
- ii. The Find what box, enter the text that you want to search for.
- iii. In the Replace with box, enter the replacement text.
- iv. Select any other options that you want.
- v. For Help on an option, click the question mark and then click the option.
- vi. Click Find Next, Replace, or Replace All.
- vii. To cancel a search in progress, press ESC.

Go to

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Follow the Following steps to do so-

- 1. Click on the Go to option under the Edit menu. Then the following window will appear on the screen.
- 2. Enter the parameter as page number or cell name in the reference text box.
- 3. Click on the Ok button.

Create Linear and Growth Trends with the Series Command

When you use the Series command, the resulting series replaces the original selected values. To save the original values, copy them to a different row or column. Then create the series by selecting the copied values.

- 1. Select the cell where you want to start the series. The cell must contain the first value in the series.
- 2. On the Edit menu, point to Fill, and then click Series.
- 3. Now do one of the following:
 - To fill the series down the page, click Columns.
 - To fill the series across the page, click Rows.

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- 4. In the Step value box, enter the value that you want to increase the series. In a linear series, the step value is added to the first starting value and then added to each subsequent value. In a growth series, the first starting value is multiplied by the step value. The resulting product and each subsequent product are then multiplied by the step value.
 - i. Under Type, click Linear or Growth.
 - ii. In the Stop value box, enter the value you want to stop the series at.

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Clear Command

Clear command is used to clear a content, format or comments.

- 1. Format: Clearing format means that if there is any content with some format is there in current cell then by issuing clear format command will clear that format only not the contents. The content will remains same as it is but the format of the cell or the format of the content will be cleared.
- 2. Contents: Clearing content means that if there is any content with some format is there in current cell then by issuing clear content command will clear that content only not the formats. The format will remains same as it is but the format of the cell or the format of the content will be cleared.
- **3.** Comments: Clear Comments will clear the comments settled in a cell for reference. Setting of comment you will learn in next few chapters.
- 4. All: Clearing all means to clear all whatever there in the cell or the in the range.

Delete

Issuing command Delete from Edit menu will give you four options to delete. These are as follows:

- 1. Delete cell and shift the right cell on the place of the current cell, which is going to be deleted.
- 2. Delete cell and shift the left cell on the place of the current cell, which is going to be deleted.
- 3. Delete the whole row.
 - 4. Delete the whole column.

3.4.4 Data Copying

Copying does mean duplicating the contents of the document at some other desired location or place. The procedure for copying text is almost the same as that of moving text with a little difference, which is being discussed in the following steps.

To copy a particular text

- i. Select the cell or make the range of the cells
- ii. Select copy from Edit menu

or

Click on the copy button of standard toolbar

or

Press the ctrl + c button

or

Move the mouse pointer on the selected range and right click and select Copy.

Paste operation has already been discussed and is same as described in the cut and paste section

3.4.5 Math Operators and expressions

Mathematical operators specify the type of calculation that you want to perform on the operands or elements of a formula. Microsoft Excel has four types of operators i.e. Arithmetic, Comparison, Text, and Reference.

Arithmetic operator	Meaning (Example)
+ (plus sign)	Addition (3+3)
– (minus sign)	Subtraction (3–1) Negation (–1)
* (asterisk)	Multiplication (3*3)
/ (forward slash)	Division (3/3)
% (percent sign)	Percent (20%)
^ (caret)	Exponentiation (3 ²)

Arithmetic operators

To perform basic mathematical operations such as addition, subtraction, or multiplication; combine numbers; and produce numeric results. Following are some arithmetic operators.

Comparison operators

By using these operators you can compare two values. When two values are compared by using these operators, the result is a logical value either TRUE or FALSE.

Comparison operator	Meaning (Example)	
= (equal sign)	Equal to (A1=B1)	
> (greater than sign)	Greater than (A1>B1)	
< (less than sign)	Less than (A1 <b1)< td=""></b1)<>	
>= (greater than or equal to sign)	Greater than or equal to (A1>=B1)	
<= (less than or equal to sign)	Less than or equal to (A1<=B1)	
(not equal to sign)	Not equal to (A1<>B1)	

Text concatenation operator:

To perform concatenation operation we use the ampersand (&) to join, or concatenate, one or more text strings to produce a single piece of text.

Text operator	Meaning (Example)	
& (ampersand)	Connects, or concatenates, two values to produce one continuous text value ("North"&"wind")	

Reference operators:

Combine ranges of cells for calculations with the following operators.

Reference operator	Meaning (Example)				
: (colon)	Range operator, which produces one reference to all the cells between two references, including the two references (B5:B15)				
, (comma)	Union operator, which combines multiple references into one reference (SUM(B5:B15,D5:D15))				
(space)	Intersection operator, which produces on reference to cells common to the two references (B7:D7 C6:C8)				

3.4.6 Creating Formulas and functions ROUNDUP

Formula	Description (Result)	
=ROUNDUP(3.2,0)	Rounds 3.2 up to zero decimal places (4)	
=ROUNDUP(76.9,0)	Rounds 76.9 up to zero decimal places (77)	
=ROUNDUP(3.14159, 3)	Rounds 3.14159 up to three decimal places (3.142)	
=ROUNDUP(-3.14159, 1)	Rounds -3.14159 up to one decimal place (-3.2)	
=ROUNDUP(31415.92654, -2)	Rounds 31415.92654 up to 2 decimal places to the left of the decimal (31500)	

Unit-III

SUM

Formula	Description (Result)			
=SUM(B2:B3, B5)	Adds 2 invoices from Buchanan, and one from Suyama (44,000)			
=SUM(B2,B5,B7)	Adds individual invoices from Buchanan, Suyama, and Dodsworth (57,500)			

Note : The SUM function can include up to 30 cell or range references.

AVERAGE

Formula	Description (Result)		
=AVERAGE(A2:A7)	Averages all of numbers in list above (9.5)		
=AVERAGE(A2:A4,A7)	Averages the top three and the last number in the list (7.5)		
=AVERAGE(IF(A2:A7<>0, A2:A7,""))	Averages the numbers in the list except those that contain zero, such as cell A6 (11.4)		

ABS

It returns the absolute value of a number. The absolute value of a number is the number without its sign. Number is basically the real number of which you want to find the absolute value.

Formula	Description (Result)		
=ABS(2)	Absolute value of 2 (2)		
=ABS(-2)	Absolute value of -2 (2)		
=ABS(A2)	Absolute value of -4 (4)		

MULTIPLY

Formula	Description (Result)
=A2*A3	Multiplies the numbers in the first two cells (75)
=PRODUCT(A2:A4)	Multiplies all the numbers in the range (2250)
=PRODUCT(A2:A4,2)	Multiplies all the numbers in the range, and 2 (4500)

POWER

To do this task use the "^" operator or the POWER function.

The example may be easier to understand if you copy it to a blank worksheet.

Formula	Description (Result)		
=POWER(5,2)	Calculates five squared (25)		
=5^3	Calculates five cubed (125)		

COUNT

It count cells that contain numbers Use the COUNT function to do this task. Unit-III

Formula Description (Result)			
=COUNT(A2:A6)	Counts number of cells that contain numbers (3) in the list. A date is a number.		
=COUNT(A2:A3,A6)	Counts number of cells that contain numbers (2), of the top two and bottom cells in the list. A date is a number.		

CHECK YOUR PROGRESS

(1) Formula must begin with this symbol-(a) +(b) -(d) none (c) =(2) This mathematical function returns integer or absolute value-(a) Abs () (b) absolute () (c) int () (d) sum () (3) Sum () is a – (a) Mathematical function (b) statistical function (c) Text function (d) none of the above (4) MIN (5,10,02,25,30) returns – (a) 02 (b) 00 (c) 05 (d) 10

3.5 SUMMARY

Overall the evaluations would appear to indicate that the computer component of this course was highly successful. The objectives of this development to cope with large numbers of students and to foster development of spreadsheet skills were achieved. As such the described system offers accounting instructors and those in other number based subjects (e.g. engineering) the opportunity to provide students with an improved learning experience in an efficient, cost effective manner.

3.6 FURTHER READINGS

- 1. Philip Howard (2005-04-22). Managing spreadsheets. *IT-Directors.com*.
- 2. Raymond R. Panko (2005-01). What We Know About Spreadsheet Errors.
- **3.** Beare, R. (1993). A spreadsheet system for educational use based on Microsoft Excel, Australian Educational Computing, July 1993.

3.7 GLOSSARY

- The A spreadsheet is a rectangular table (or grid) of information, often financial information.
- The Graphical User Interface is a particular case of user interface for interacting with a computer which employs graphical images and widgets in addition to text to represent the information and actions available to the user.
- The Microsoft Excel (full name Microsoft Office Excel) is a spreadsheet program written.
- A formula is a concise way of expressing information symbolically or a general relationship between quantities.
- A data type is a constraint placed upon the interpretation of data in a type system in computer programming.

3.8 ANSWER TO THE SELF LEARNING EXERCISE

Answer to Check your progress 3.2

1. (b) 2. (d) 3. (a)

	er to C	Check your prog	gress 3.3			
	1.(a)		2. (a) 3. (a)		4. (a)	
Answ	er to C	Check your prog	gress 3.4			
	1.(c)		(a)	3. (a)	4. (a)	
3.9	UNIT-END QUESTIONS					
	(1) What is spreadsheet and define workbook, row, column and cell.					ıd cell.
	(2)	Explain the various components of EXCEL window.				
	(3)	Define what is the work organization of the spreadsheet?				
	(4) What is the procedure to find the particular text and replace that with another text?(5) Write the syntax of the following functions-					that with another text?
		(a) Sum ()	(b) aver	age ()	(c) abs ()	(d) power ()
	(6)	How many types of operators are available in the spreadsheet explain using suitable example?				
	(7)	How can move and copy the text in the spreadsheet illustrate using steps?				

 $\textcircled{\baselineskip}{0}$

Unit-III

Unit-III

Structure of Unit

- 4.0 **Objectives**
- 4.1 Introduction

4.2 Formatting Features

- 4.2.1 Text, Row & Columns Numbers, borders, colors & pallets
- 4.2.2 Absolute and relative addresses
- 4.2.3 Introduction to excel Functions
- 4.2.4 Excel Mouse techniques
- 4.2.5 Preparing worksheets for use by other users Check your progress
- 4.3 Summary
- 4.4 Glossary
- 4.5 Further Readings
- 4.6 Answer to the Self Learning Exercise
- 4.7 Unit End Questions

4.0 **OBJECTIVES**

MS Excel 2000 is the popular version of the spreadsheet from Microsoft. This course is designed to advance users' knowledge of the formatting features and functions within Excel and realize the advantages of using a powerful electronic spreadsheet. The course is entirely 'hands on', so those reading will get practice in creating and modifying actual spreadsheets, enhancing them with Text, Row & Columns Numbers, borders, colors & pallets.

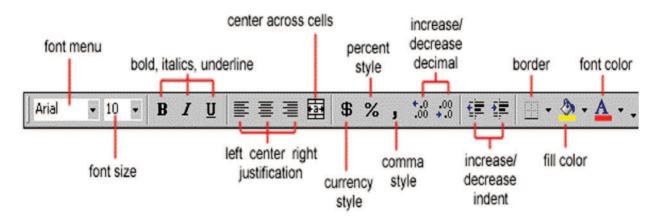
4.1 INTRODUCTION

MS-EXCEL 2000 is a window based application package of MS-Office suite, which is used to make calculations and derive analysis on the basis of produced data in a tabular form. In addition to exhibiting detailed account of annual budget and profit or loss in a table, it can be presented in different graphical forms. With the help of this advance package, various formatting features like

Text, Row & Columns Numbers, borders, colors & pallets, Absolute and relative addresses, Functions, Mouse techniques, preparing worksheets for use by other users, can be used for related purpose.

4.2 FORMATTING FEATURES TEXT NUMBERS, BORDERS, COLORS & PLATTERS

The contents of a highlighted cell can be formatted in many ways. Font and cell attributes can be added from shortcut buttons on the formatting bar. If this toolbar is not already visible on the screen, select **View**|**Toolbars**|**Formatting** from the menu bar.



Format Cells Dialog Box

For a complete list of formatting options, right-click on the highlighted cells and choose **Format Cells** from the shortcut menu or select **Format Cells** from the menu bar.

Number tab

The data type can be selected from the options on this tab. Select **General** if the cell contains text and number, or another numerical category if the cell is a number that will be included in functions or formulas.

Alignment tab

These options allow you to change the position and alignment of the data with the cell.

Font tab

All of the font attributes are displayed in this tab including font face, size, style, and effects.

Border and Pattern tabs

These tabs allow you to add borders, shading, and background colors to a cell.



Formatting Features-MS EXCEL 2000

Number Alignment Lategory: General Number	Sample
Currency Accounting Date Time Percentage Fraction Scientific Text Special Custom	General format cells have no specific number format.

Dates and Times

If you enter the date "January 1, 2001" into a cell on the worksheet, Excel will automatically recognize the text as a date and change the format to "1-Jan-01". To change the date format, select the **Number** tab from the **Format Cells** window. Select "Date" from the **Category** box and choose the format for the date from the **Type** box. If the field is a time, select "Time" from the **Category** box and select the type in the right box. Date and time combinations are also listed. Press **OK** when finished.

Format Cells					? ×
Number Alignment Category: General Number Currency Accounting Date Time Percentage Fraction Scientific Text Special Custom	Samp 12:0 Type: 13:30 1:30 1:30 1:30 30:55 37:30 3/14/ 3/14/ and time	ile 0 PM 0 PM 0:55 55 PM 55 PM 55 PM 55 PM 98 1:30 PM 98 13:30 98 13:30	1	Protection	
Tormats to display just the	s date por	cion.			
		[OK	Can	cel

Styles

The use of styles in Excel allows you to quickly format your worksheet, provide consistency, and create a professional look. Select the Styles drop-down box from the formatting toolbar (it can be added by customizing the toolbar). Excel provides several preset styles:

Formatting Features-MS EXCEL 2000

0			
🔀 Microsoft Exc	el - Book1		
Eile Edit Vie	w <u>I</u> nsert I	F <u>o</u> rmat <u>T</u> ools	s <u>D</u> ata <u>W</u> ind
D 🛩 🖬 🚝) 🖪 💞	አ 🖻 🛍	🚿 🔊 📼
Normal	👻 Arial		• 10 •
Comma		=	
Comma [0] Currency	В	С	D
Currency [0]			
Normal			
Percent			
3			
A		I I	

Unit-IV

- Comma :- Adds commas to the number and two digits beyond a decimal point.
- Comma [0] :- Comma styles that round to a whole number.
- Currency :- Formats the number as currency with a dollar sign, commas, and two digits beyond the decimal point.
- Currency [0] :- Currency styles that round to a whole number.
- The Normal :- Reverts any changes to general number format.
- *Percent* :- Changes the number to a percent and adds a percent sign.

Style Dialog Box

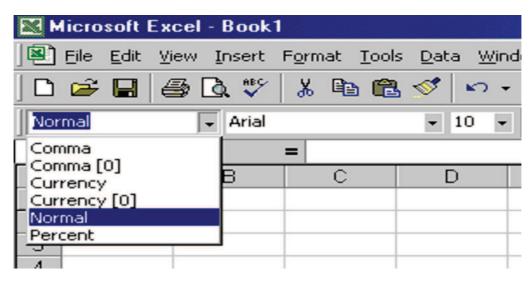
Create your own styles from the Style Dialog Box.

Style		?×
<u>S</u> tyle name:	Comma	ОК
Style includes -		Cancel
₩ <u>N</u> umber	_(* #,##0.00_);_(* (#,##0.00);_(* "-"??_);_(@_)	Modify
🗖 Alignment		
Font]	Arial 10	<u>A</u> dd
☐ <u>B</u> order		<u>D</u> elete
Patterns		M <u>e</u> rge
Protection		

- Fighlight the cell(s) you want to add a style to.
- Select Format Style... from the menu bar.
- The Modify the attributes by clicking the **Modify** button.
- Check all the items under **Style includes** that the style should format.
- Click Add to preview the formatting changes on the worksheet.
- Tighlight the style you want to apply to the paragraph and click **Apply**.

Create a New Style

- Select the cell on the worksheet containing the formatting you would like to set as a new style.
- Click the **Style** box on the Formatting toolbar so the style name is highlighted.
- The Delete the text in the Style box and type the name of the new style.
- The Press **ENTER** when finished.



Format Painter 🝼

A handy feature on the standard toolbar for formatting text is the Format Painter. If you have formatted a cell with a certain font style, date format, border, and other formatting options, and you want to format another cell or group of cells the same way, place the cursor within the cell containing the formatting you want to copy. Click the **Format Painter** button in the standard toolbar (notice that your pointer now has a paintbrush beside it). Highlight the cells you want to add the same formatting to.

To copy the formatting to many groups of cells, double-click the **Format Painter** button. The format painter remains active until you press the **ESC** key to turn it off.

Auto Format

	Α	В	С	D
1	Textbook	Quantity	Price	
2	Biology	4	\$99.99	
3	Chemistry	2	\$79.95	
4	Calculus	7	\$65.99	
5	English	12	\$49.99	
E				

Excel has many preset table formatting options. Add these styles by following these steps:

- *F* Highlight the cells that will be formatted.
- Select Format |AutoFormat from the menu bar.
- On the AutoFormat dialog box, select the format you want to apply to the table by clicking on it with the mouse. Use the scroll bar to view all of the formats available.
- Click the **Options...** button to select the elements that the formatting will apply to.
- Click **OK** when finished.

	Jan	Feb	Mar	Total		Jan	Feb	Mar	Total	
East	7	7	5	19	East	7	7	5	1	9
West	6	4	7	17	West	6	4	7	1	7
South	8	7	9	24	South	8	7	9	2	4
Total	21	18	21	60	Total	21	18	21	6	ō
		Simple	е			(Classic	: 1		
	Jan	Feb	o Ma	Total		Jan	Feb) Ma	ar Tota	1
	§ 7	\$ 7	\$ 5		East \$	67	\$ 7	\$ 5	5\$19)
Nest	6	4			West	6	4		7 17	8
South	8	7	9	24	South	8	7	9	9 24	L I
boan										

	А	В	С	D
1	Textbook	Quantity	Price	
2	Biology	4	\$99.99	
3	Chemistry	2	\$79.95	
4	Calculus	7	\$65.99	
5	English	12	\$49.99	
E				

4.2.1 Formation Row & Columns

Resizing Rows and Columns

There are two ways to resize rows and columns.

Resize a row by dragging the line below the label of the row you would like to resize. Resize a column in a similar manner by dragging the line to the right of the label corresponding to the column you want to resize.

OR

Click the row or column label and select **Format**|**Row**|**Height** or **Format**|**Column**|**Width** from the menu bar to enter a numerical value for the height of the row or width of the column.

Selecting Cells

Before a cell can be modified or formatted, it must first be selected (highlighted). Refer to the table below for selecting groups of cells.

Formatting Features-MS EXCEL 2000

Cells to select Mouse action		
One cell	click once in the cell	
Entire row	click the row label	
Entire column	click the column label	
Entire worksheet	click the whole sheet button	
Cluster of cells	drag mouse over the cells or hold down the SHIFT key while using the arrow keys	

To activate the contents of a cell, double-click on the cell or click once and press F2.

Moving and Copying Cells

Moving Cells 🐰

To cut cell contents that will be moved to another cell select **Edit** then **Cut** from the menu bar or click the **Cut** button on the standard toolbar.

Copying Cells 🗈

To copy the cell contents select **Edit** then **Copy** from the menu bar or click the **Copy** button on the standard toolbar.

Pasting Cut and Copied Cells 📳

Highlight the cell you want to paste the cut or copied content into and select **Edit** then **Paste** from the menu bar or click the **Paste** button on the standard toolbar.

Drag and Drop

If you are moving the cell contents only a short distance, the drag-and-drop method may be easier. Simply drag the highlighted border of the selected cell to the destination cell with the mouse.

Inserting column

Sometimes we (all) make mistakes or things change. If you have a spreadsheet designed and you forgot to include some important information, you can insert a column into an existing spreadsheet. What you must do is click on the column label (letter) and chooses in **Columns** from the **Insert** menu. This will insert a column **immediately left** of the selected column.

	Å	B	C	D	Ε		Å	В	C	D	Ε	F
1	1	2	3	4	5	1	1	2		3	4	5
2	2	4	7	11	16	2	2	4		7	11	16
3	3	- 7	14	25	41	3	- 3	- 7		14	25	41
4	4	11	- 25	50	91	4	4	11		25	50	91

As you can see from this example there was a blank column inserted into the spreadsheet. You might wonder if this will affect your referenced formulas. Yes, the Referenced cells are changed to their new locations. For example:

Cell C4 was =C3+B4 and now is =D3+B4

Inserting rows

Likewise, we can also insert rows. With the row label (number) selected you must choose the **Row** from the **Insert** menu. Again this will insert a row **before** the row you have selected.

	A	В	C	D	E		A	В	C	D	E
1	1	2	3	4	5	1	1	2	3	4	5
2	2	4	7	11	16	2	2	4	7	11	16
7	2 7	- 7	14	25	10	3					
J	J	(14	23	41	4	- 3	7	14	25	41
4	4	11	25	50	91	5	4	11	25	50	91

The formulas will be updated to their corresponding locations. C3 was = C2+B3 NOW C4=C2+B4

4.2.2 Absolute and relative addresses

Calling cells by just their column and row labels (such as "A1") is called **relative referencing**. When a formula contains relative referencing and it is copied from one cell to another, Excel does not create an exact copy of the formula. It will change cell addresses relative to the row and column they are moved to.

For example, if a simple addition formula in cell C1 = (A1+B1)" is copied to cell C2, the formula would change to = (A2+B2)" to reflect the new row.

To prevent this change, cells must be called by **absolute referencing** and this is accomplished by placing dollar signs "\$" within the cell addresses in the formula. Continuing the previous example, the formula in cell C1 would read "=(A1+B1)" if the value of cell C2 should be the sum of cells A1 and B1. Both the column and row of both cells are absolute and will not change when copied.

Mixed referencing can also be used where only the row OR column fixed. For example, in the formula =(A (A), the row of cell A1 is fixed and the column of cell B2 is fixed.

4.2.3 Introduction to excel Functions

Basic Functions

 $\label{eq:Functions} For example, of performing mathematical operations than formulas. For example, if you wanted to add the values of cells D1 through D10, you would type the formula$

Function	Example	Description
SUM	=SUM(A1:100)	finds the sum of cells A1 through A100
AVERAGE	=AVERAGE(B1:B10)	finds the average of cells B1 through B10
MAX	=MAX(C1:C100)	returns the highest number from cells C1 through C100
MIN	=MIN(D1:D100)	returns the lowest number from cells D1 through D100
SQRT	=SQRT(D10)	finds the square root of the value in cell D10
TODAY	=TODAY()	returns the current date (leave the parentheses empty)

"=D1+D2+D3+D4+D5+D6+D7+D8+D9+D10".

A shorter way would be to use the SUM function and simply type "=SUM(D1:D10)". Several other functions and examples are given in the table below:

Function Wizard *f*_{*}

View all functions available in Excel by using the Function Wizard.

- Activate the cell where the function will be placed and click the Function Wizard button on the standard toolbar.
- From the Paste Function dialog box, browse through the functions by clicking in the Function category menu on the left and select the function from the Function name choices on the right. As each function name is highlighted a description and example of use is provided below the two boxes.

Paste Function	<u>?</u> ×
Function category:	Function name:
Most Recently Used All Financial Date & Time Math & Trig Statistical Lookup & Reference Database Text Logical Information	DATE DATEVALUE DAY DAY5360 HOUR MINUTE MONTH NOW SECOND TIME TIMEVALUE
Returns the number that represent code.	ts the date in Microsoft Excel date-time
2	OK Cancel

- Click **OK** to select a function.
- The next window allows you to choose the cells that will be included in the function. In the example below, cells B4 and C4 were automatically selected for the sum function by Excel. The cell values {2, 3} are located to the right of the Number 1 field where the cell addresses are listed. If another set of cells, such as B5 and C5, needed to be added to the function, those cells would be added in the format "B5:C5" to the Number 2 field.

-SUM-		
	Number1 34:C4	<u>]</u> = {2,3}
	Number2	🗾 = number
Adds a	II the numbers in a range of cells.	= 5
	Number1: number1, number2, are 1 to are ignored in cells, included if	30 numbers to sum. Logical values and text typed as arguments.
2	Formula result =5	OK Cancel

Click **OK** when all the cells for the function have been selected.

Autosum **D**

Use the Autosum function to add the contents of a cluster of adjacent cells.

Select the cell that the sum will appear in that is outside the cluster of cells whose values will be added.

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Cell C2 was used in this example.

- Click the Autosum button (Greek letter sigma) on the standard toolbar.
- Tighlight the group of cells that will be summed (cells A2 through B2 in this example).
- The Press the ENTER key on the keyboard or click the green check mark button on the formula bar 🗸.

] And	BI	→ 10	• в и п	
	NOW	▼ × √ =	=SUM(A2:B2))
	А	В	С	D
1	number 1	number 2	sum	
2	87	49	=SUM(<mark>A2:B2</mark>)	
3	54	30		
4	34	10		
L 7	40	0		

Spreadsheets have many Math functions built into them. Of the most basic operations are the standard multiply, divide, add and subtract. These operations follow the order of operations (just like algebra). Let's look at some examples.

For these following examples lets consider the following data:

A1 (column A, row 1) = 5		А	В	
A2 (column A, row 2) = 7	1	5	3	
A3 (column A, row 3) = 8	2	7	4	
B1 (column B, row 1) = 3	3	8	6	
B2 (column B, row 2) = 4				-
B3 (column B, row 3) = 6				

Operation	Symbol	Constant Data	Referenced Data	Answer
Multiplication	*	= 5 * 6	= A1 * B3	30
Division	/	= 8 / 4	= A3 / B2	2
Addition	+	= 4 + 7	= B2 + A2	11
Subtraction	-	= 8 - 3	= A3 - B1	5
Subtraction	-	= 8 - 3	= A3 - B1	5

Probably the most popular function in any spreadsheet is the SUM function. The Sum function takes all of the values in each of the specified cells and totals their values. The syntax is:

=SUM(first value, second value, etc)

In the first and second spots you can enter any of the following (constant, cell, range of cells).

- *Blank* cells will return a value of zero to be added to the total.
- Text cells can not be added to a number and will produce an error.

Lets use the table here for the discussion that follows:			А
We will look at several different specific examples that show		1	25
how the typical function can be used! Notice that in A4 there		2	50
is a TEXT entry. This has NO numeric value and can not be		3	75
included in a total.	4	4	test
		5	

Formatting Features-MS EXCEL 2000

62.5

58.33

Example	Cells to ADD	Answer
=sum (A1:A3)	A1, A2, A3	150
=sum (A1:A3, 100)	A1, A2, A3 and 100	250
=sum (A1+A4)	A1, A4	#VALUE!
=sum (A1:A2, A5)	A1, A2, A5	75

There are many functions built into many spreadsheets. One of the first ones that we are going to discuss is the **Average** function. The average function finds the average of the specified data. *(Simplifies adding all of the indicated cells together and dividing by the total number of cells.)* The syntax is as follows.

=Average (first value, second value, etc.)

=average (A1:A5)

=average (A1:A2, A4)

Text fields and blank entries are not included in the calculations of the Average Function.

Lets use the table here for the discussion that follows: We will look at several different specific examples that show how the average function can be used!			1 2 3 4 5	A 25 50 75 100
Example	Cells to average		Ans	wer
=average (A1:A4) A1, A2, A3, A4			62.5	5
=average (A1:A4, 300) A1, A2, A3, A4 and 300		110		
			1	

A1, A2, A3, A4, A5

A1, A2, A4

Lets use the table here for the discussion that follows. We will look at several different specific examples that show how the		А
Max functions can be used!	1	10
	2	20
	3	30
	4	test
	5	

The next function we will discuss is **Max** (which stand for Maximum). This will return the largest (max) value in the selected range of cells.

- The Blank entries are not included in the calculations of the Max Function.
- Text entries are not included in the calculations of the Max Function.

Example of Max	Cells to look at	Ans. Max
=max (A1:A4)	A1, A2, A3, A4	30
=max (A1:A4, 100)	A1, A2, A3, A4 and 100	100
=max (A1, A3)	A1, A3	30
=max (A1, A5)	A1, A5	10

Formatting Features-MS EXCEL 2000

The next function we will discuss is **Min** (which stands for minimum). This will return the smallest (Min) value in the selected range of cells.

- The Blank entries are not included in the calculations of the Min Function.
- Text entries are not included in the calculations of the Min Function.

Lets use the table here for the discussion that follows. We will look at several different specific examples that		Α
show how the min functions can be used!	1	10
	2	20
	3	30
	4	test
	5	

Example of min	Cells to look at	Ans. min
=min (A1:A4)	A1, A2, A3, A4	10
=min (A2:A3, 100)	A2, A3 and 100	20
=min (A1, A3)	A1, A3	10

The next function we will discuss is **Count**. This will return the number of entries (actually counts each cell that contains number data) in the selected range of cells.

- Blank entries are not counted.
- Text entries are NOT counted.

Lets use the table here for the discussion that follows. We will look at several different specific examples		A
that show how the Count functions can be used!	1	10
	2	20
	3	30
	4	test
	5	

Example of Count	Cells to look at	Answer
=Count (A1:A3)	A1, A2, A3	3
=Count (A1:A3, 100)	A1, A2, A3 and 100	4
=Count (A1, A3)	A1, A3	2
=Count (A1, A4)	A1, A4	1
=Count (A1, A5)	A1, A5	1

The next function we will discuss is **IF**. The IF function will check the logical condition of a statement and return one value if true and a different value if false. The syntax is

- ☞ =IF (condition, value-if-true, value-if-false)
- Solution Value returned may be either a number or text
- The second secon

Formatting Features-MS EXCEL 2000

	А	В
1	Price	Over a dollar?
2	\$.95	No
3	\$1.37	Yes
4	comparing #	returning #
5	14000	0.08
	3	I Price 2 \$.95 3 \$1.37 4 comparing #

Example of IF typed into column B	Compares	Answer
=IF (A2>1,"Yes","No")	is (.95 > 1)	No
=IF (A3>1, "Yes", "No")	is (1.37 > 1)	Yes
=IF (A5>10000, .08, .05)	is (14000 > 10000)	.08
=IF (A6>10000, .08, .05)	is (8453 > 10000)	.05

The PMT function returns the periodic (in this case monthly) payment for an annuity (in this case a loan). This is the PMT function that was used for the car purchase in the first example. There are a few things that we must know in order for this function to work. To calculate the loan we must know a combination of the following—

- ☞ (rate) interest rate per period
- (NPER) number of payments until repaid
- @ (PV) present value of the loan (amount we are borrowing)
- (FV) future value of the money (for saving or investing)
- (type) enter 0 or 1 to indicate when payments are due.=PMT(rate, NPER, PV, FV, type)

	A	В	C	
1		computer lea	lger	equation goes into c7 =PMT(C4/12,C5,-C3)
2		1		
3		Carloan	\$12,000.00	
4		interest	9.60%	C4 is the yearly interest and since it's compounded
5		# of payments	60	
6				monthly we divide by 12
7		Monthly Pmt.	\$252.61	
				C5 is the number of months (# of payments)
				-C3 is the amount of money we have (borrow - negative)

angle	sin	cos	tan
REF	=sin(REF)	=cos(REF)	=tan(REF)
0	0.00	1.00	0.00
30	0.50	0.87	0.58
45	0.71	0.71	1.00
90	1.00	0.00	
180	0.00	-1.00	0.00

Note that the rate is per period. If we have an annual interest rate of 9.6% and we are calculating monthly payments, we must divide the annual interest rate by 12 to calculate the monthly interest rate.

Formatting Features-MS EXCEL 2000

Excel has most of the math and trig functions built into it. If you need to use the **SIN**, **COS**, **TAN** functions, they can be typed into any cell. If you wanted to find:

format for **degrees** formula = $\sin(\text{angle } * \text{pi}()/180)$ the argument angle is in degrees

format for **radians** formula = sin (angle) the argument angle is in radians

To calculate trig functions in degrees you must convert them - otherwise excel will calculate them in radians. You can type in either an actual number for the REF or you can also type in a reference from the excel spreadsheet (like A2).

CHECK YOUR PROGRESS

- 1. Formatting features are available in
 - (a) Edit bar (b) view bar (c) format bar (d) none of the above
- Which options allow you to change the position and alignment of the data with the cell –

 (a) Number tab
 (b) Assignment tab
 (c) font tab
 (d) Border and Palletsern tabs
- 3. Excel provides several preset styles
 (a) Comma
 (b) currency
 (c) both (a) & (b)
 (d) none of the above

 4. What does show this 3 -?
- (a) To cut (b) to copy (c) to paste (d) to move

4.3 SUMMARY

Overall the evaluations would appear to indicate that the computer component of this course was highly successful. The objectives of this development to cope with large numbers of students and to foster development of spreadsheet skills were achieved. As such the described system offers accounting instructors and those in other number based subjects (e.g. engineering) the opportunity to provide students with an improved learning experience in an efficient, cost effective manner.

4.4 GLOSSARY

Formatting is to prepare a storage medium, usually a disk, for reading and writing. **Platter** is a plate where user can choose combination of colors.

4.5 FURTHER READINGS

- 1. Philip Howard (2005-04-22). Managing spreadsheets. IT-Directors.com.
- 2. Raymond R. Panko (2005-01). What We Know About Spreadsheet Errors.
- 3. Beare, R. (1993). A spreadsheet system for educational use based on Microsoft Excel, Australian Educational Computing, July 1993.

4.6 ANSWER TO THE SELF LEARNING EXERCISE

Answer to check your progress 4.2

1.(c) 2.(b) 3.(c) 4.(a)

4.7 UNIT-END QUESTIONS

1. Define each –

- (a) Format Cells Dialog Box (b) Date & Times
- (c) Styles (d) Auto Format
- 2. What are the Excel functions? Illustrate with example.
- 3. Explain about formation of rows & columns.
- 4. What is the purpose of absolute and relative address in EXCEL? Explain using suitable examples.

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Unit V: ADVANCE FEATURES-MS EXCEL 2000

Structure of the Unit

5.1 Introduction

5.2 Advanced Features of MS – EXCELS

- 5.2.1 Data validation
- 5.2.2 Conditional formats
- 5.2.3 Comments, Options
- 5.2.4 Protection
- 5.2.5 Text data
- 5.2.6 Delimiters
- 5.2.7 Database Queries
- 5.2.8 Goal seek
- 5.2.9 Scenarios
- 5.2.10 Freezing
- 5.2.11 Painting
- 5.2.12 Excel worksheets sort
- 5.2.13 Filter
- 5.2.14 Naming ranges
- 5.2.15 past special options
- 5.2.16 Pivot table
- 5.2.17 Data table
- 5.2.18 Charts
- 5.2.19 Macros: reading, editing
- 5.2.20 working with objects.
 - Check your progress
- 5.3 Summary
- 5.4 Further Readings
- 5.5 Glossary
- 5.6 Answer to the self learning exercise
- 5.7 Unit-end Questions

5.0 **OBJECTIVES**

MS Excel 2000 is the popular version of the spreadsheet from Microsoft. This course is designed to advance users' knowledge of the features and functions within Excel and realize the advantages of using a power-ful electronic spreadsheet. The course is entirely 'hands on', so those reading will get practice in creating and modifying actual spreadsheets, enhancing them with charts and graphics and using more advanced formulae.

5.1 INTRODUCTION

MS-EXCEL 2000 is a window based application package of MS-Office suite, which is used to make calculations and derive analysis on the basis of produced data in a tabular form. In addition to exhibiting detailed account of annual budget and profit or loss in a table, it can be presented in different graphical forms. With the help of this advance package, various data validations, Conditional formats, Comments, Options, Protection, Text data, Delimiters, Database Queries, Goal seek, Scenarios, Freezing, Painting, Excel worksheets sort, Filter, Naming ranges, past special options, Pivot table, Data table, Charts, Macros: reading, editing, Working with objects can be used for related purpose.

5.2 ADVANCE FEATURES OF MS – EXCELS

5.2.1 Data Validation

Validation is a facility on the track of accuracy. In computer technology, sometimes you need to put some validations on some particular cells for the users to not to enter value other than some specific requirement. To provide validation you have to follow the following steps.

- 1. Select the cells in which you want to provide some validations.
- 2. Select the Validation option from Data menu.

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- **3.** Click a data validation option in the Allow box to apply restrictions on data entry to selected cells on the worksheet. Click the Custom option to enter a formula, use an expression, or refer to a calculation in another cell to determine valid entries.
- 4. Click the comparison operator you want to use. The available operators depend on the type of data you chose in the Allow box.
- 5. Enter the minimum value, start date, or start time as a value, cell reference, or formula for the data validation option you chose in the Allow box.
- 6. Apply the maximum value, end date, or end time as a value, cell reference, or formula for the data validation option you chose in the Allow box.
- 7. Now Click the Input Message tab to provide an input message when user clicks on the cells in which validation is set.

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- **8.** Enter the value of Title and Input message.
- **9.** Click on Error alert to provide some error message when the user enters value other than the validations.
- 10. Enter the Error message title, Error message and click Ok button
- 11. Now if someone clicks on the restricted cells then he will input message and it will be displayed
- 12. If user will make some errors then error message will flash.

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5.2.2 Conditional Formats

If a cell contains formula results or other cell values that you want to monitor, you can identify the cells by applying conditional formats. For example, you can apply green shading (highlighting) to the cell if the sales exceed forecast and red shading if sales fall short.

When Conditions Change

If the value of the cell changes and no longer meets the specified condition, Microsoft Excel temporarily suppresses the formats that highlight that condition. Conditional formats remain applied to the cells until you remove them, even though none of the conditions are met and the specified cell formats are not displayed.

Highlight Cells that Meet Specific Conditions

- 1. Select the cells you want to highlight.
- 2. On the Format menu, click Conditional Formatting.

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Advance Features–MS EXCEL 2000

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3. Do one of the following:

To use values in the selected cells as the formatting criteria, click Cell Value Is, select the comparison phrase, and then type a value in the appropriate box. You can enter a constant value or a formula. If you enter a formula, you must start it with an equal sign (=).

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Advance Features–MS EXCEL 2000

To use a formula as the formatting criteria (to evaluate data or a condition other than the values in selected cells), click Formula Is in the box on the left, and then enter the formula in the box on the right. The formula must evaluate to a logical value of TRUE or FALSE.

- 4. Click Format.
- Select the font style, font color, underlining, borders, shading, or patterns you want to apply. Microsoft Excel applies the selected formats only if the cell value meets the condition or if the formula returns a value of TRUE.
- 6. To add another condition, click Add, and then repeat steps 3 through 5. You can specify up to three conditions. If none of the specified conditions are true, the cells keep their existing formats. You can use the existing formats to identify a fourth condition.

5.2.3 Insert a Comment

- 1. Select the text or item you want to comment on, or click at the end of the text.
- 2. On the Insert menu, click Comment.
- 3. Type the comment text in the comment balloon.

Notes

- 1. If the comment balloons are hidden, you can type the comment in the **Reviewing Pane**.
- 2. You can rest the insertion point over the balloon to display the name of the reviewer.
- 3. To respond to a comment, click in the comment you want to respond to, and then click **Comment** on the **Insert** menu. Type your response in the new comment balloon.

Clear command is used to clear a content, format or comments.

- 1. Format: Clearing format means that if there is any content with some format is there in current cell then by issuing clear format command will clear that format only not the contents. The content will remains same as it is but the format of the cell or the format of the content will be cleared.
- 2. Contents: Clearing content means that if there is any content with some format is there in current cell then by issuing clear content command will clear that content only not the formats. The format will remains same as it is but the format of the cell or the format of the content will be cleared.
- 3. Comments: Clear Comments will clear the comments settled in a cell for reference. Setting of comment you will learn in next few chapters.
- 4. All: Clearing all means to clear all whatever there in the cell or the in the range.

5.2.4 Protection

- 1. Protecting Your Data
- 2. We protect our files using password protection, when you save your file. However, Excel also offers several commands that let you protect workbooks, workbook structures, worksheets and individual cells from access or modification by others. This type of protection is handy when you are sharing files.
- 3. Once you assign a password, there is no way to unprotect the sheet or workbook

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- 4. without it. Don't forget you passwords! And remember, capitalization matters!
- 5. Passwords are case sensitive.
- 6. Users can gain access to the workbook/worksheet only by providing the password you assign. When individual cells have been locked, if
- 7. you try to change the content of the locked cell, Excel will display an error message Locked cells cannot be changed.
- To Assign a Password to a Workbook

Use the following steps to assign a password to a workbook:

- 1. Open the workbook.
- 2. Click on the File menu and click on Save As.

Excel displays the Save As dialog box.



Click on the Tools option menu. (See figure 26 above). A Menu will appear.

Click on General Options. Excel will display the Save Options Dialog Box.

Save Options	/ Password to
Always create backup	open field.
Password to gpen:	Advanced
Password to modify:	
Read-only recommended	
0	K Cancel

In the Password to open field, type the password you want to assign to the file.

Advance Features–MS EXCEL 2000

TIP Your password is limited to 15 characters. It can be a mixture of alpha and numeric characters but the first character should be an Alpha character. Excel is Case Sensitive in passwords.

In the Password to modify box, type the password you want to assign to the file.

- 3. Click OK to close the dialog box.
- 4. Excel will display the Confirm Password dialog box. (see Figure 28)

Re-type the password, and then click OK.



Excel will return to the Save As dialog box.

5. Click on Save.

Excel asks if you want to replace the existing file.

6. Click on Yes.

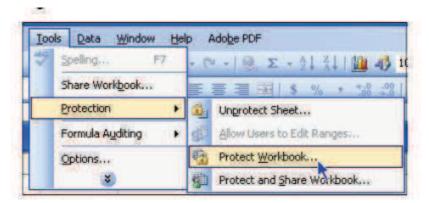
Excel saves the file and assigns the password you provided. Protecting Workbook Structure & Windows .Once you have opened a workbook, you can also protect the workbooks Structure and Windows from being modified.

Protecting the Structure prevents modification of the worksheet arrangement in a workbook. Protecting the Windows prevents moving or resizing of the workbook window.

To active these protections:

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1. From the Tools menu select Protection.



2. From the Protection sub-menu select Protect Workbook.



- 3. Select the appropriate box(s) in the "Protect Workbook for" field.
- 4. In the "Password" field, type in your password. Remember - This field is case sensitive.
- 5. Click OK.

Your Workbook Structure and/or Windows are now secure. Unlocking Individual Cells on a worksheet There are occasions when you want to only lock specific cells in your worksheet. For example, when you are sharing a workbook and you want others to enter quarterly information but not alter the formulas that will be in the total columns.

This process must be done PRIOR to protecting your workbook or worksheet.

Removing a Password

You can remove both the access and write reservation password from a

workbook once you no longer want to protect it.

To remove a password from a workbook, use the following steps:

- 1. Open or activate the workbook
- 2. Click on the File menu and click on Save As. Excel displays the Save As dialog box.
- 3. Click on Tools, then General Options from the sub menu Excel displays the Save Options dialog box.
- 4. Select the password characters in the Password to open or Password to modify boxes.
- 5. Press the Delete key.
- 6. Click on OK.

Excel returns you to the Save As dialog box.

- 7. Click on Save. Excel will ask you if you want to replace the existing file.
- 8. Click on Yes. Excel will save the file and remove the password protection.

5.2.5 Text data

In a spreadsheet there are three basic types of data that can be entered.

labels –(text with no numerical value)

constants – (just a number — constant value)

formulas* – (a mathematical equation used to calculate)

Data Types	Examples	Descriptions
LABEL	Name or Wage or Days	anything that is just text
CONSTANT	5 or 3.75 or -7.4	any number
FORMULA	=5+3 or = 8*5+3	math equation

*ALL formulas MUST begin with an equal sign (=).

5.2.6 Delimiters

Split Column by Delimiter

Select a single cell in the column you want to split, then invoke 'DigDB->Column->Split->by Delimiter...'

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2	Mr. David K Ray						1
3	Barry Ray	1			Column 🕨	Append	
4	Mr. Greg Ray				Table 🕨	Trim	
5	Mr. Joe K. Smith				Selected Area	Combine	
6	Pete F Kay					Concession of the local division of the loca	
7	Ms. Jane Rod				by <u>D</u> elimitor	Split	•
8					by Length	Created	
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11							

The column will be automatically selected. You can now select how to split.

	Α	B	C	D	E	F	G	Н
1	Name							
	Mr. David K Ray							
3	Barry Ray							
	Mr. Greg Ray	DigDB - Split C	olumn By D	elimitor			×	
	Mr. Joe K. Smith							
6	Pete F Kay	Split column by	First	▼ Other	ot	her:		
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Suppose we want to separate out the 'Last Name' part, that is to set split by the *Last Space*. Note we can split by any text by typing the text into the input box.

	Α	B	C	D	E	F	G	Н
1	Name							
	Mr. David K Ray							
3	Barry Ray			20001000				
	Mr. Greg Ray	DigDB - Split C	olumn By D	elimitor			×	
	Mr. Joe K. Smith							
6	Pete F Kay	Split column by	Last	Space	🗾 ot	her:		
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14								
15								

Click 'OK' to split. In result, the original column is unchanged; two new columns will be added: the first part consists the text before the delimiter (excluding the delimiter), the second part is simply the remainder (including the delimiter).

	A	В	C	D	E	F	G	H
1	Name	Before last '	Remainder					
2	Mr. David K Ray	Mr. David K	Ray					
3	Barry Ray	Barry	Ray					
4	Mr. Greg Ray	Mr. Greg	Ray					
	Mr. Joe K. Smith	Mr. Joe K.	Smith					
6	Pete F Kay	Pete F	Kay					
7	Ms. Jane Rod	Ms. Jane	Rod	17				
8 9								
9								
10								
11								
11 12								

In our case, the remainder have a preceding space in it. To get rid of the space, you can either use DigDB->Column->Trim to trim it. Our you can further split it by length, i.e., split the remainder column by first 1 character.

Split Column by Length

1. Following the above example, after the split by delimiter, we have a 'Remainder' column with a preceding space in it. To get rid of the preceding space means to split the column by the first 1 character. Therefore, click a single cell in the column, invoke 'DigDB->Column->Split->by Length...'

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[[]]]	А	В	С		Clear Filter	1	F	G	H
1	Name	Before last'	Remainder		Extract Result	•			
2	Mr. David K Ray	Mr. David K	Ray			-			1
3	Barry Ray	Barry	Ray		Column		Append	ł	
4	Mr. Greg Ray	Mr. Greg	Ray		Table		Trim		
5	Mr. Joe K. Smith	Mr. Joe K.	Smith		Selected Area		Combin	e	
6	Pete F Kay	Pete F	Kay	Ĩ	-	÷1	_		
7	Ms. Jane Rod	Ms. Jane	Rod		by <u>D</u> elimitor		Split		•
8					by <u>L</u> ength		Conver		
9					Touroput		Conver		
10					Sort	•	<u>R</u> oundi	ng	

2. Set how to split:

	A	В	С	D	E	F	G	H
1	Name	Before last ' '	Remainder					
2	Mr. David K Ray	Mr. David K	Ray					
3	Barry Ray	Barry	Ray					
4	Mr. Greg Ray	Mr. Greg	Ray					
5	Mr. Joe K. Smith					-		
6	Pete F Kay	DB - Split Colu	nn By Count	of Characte	ers	×		
7	Ms. Jane Rod	ta antinan tau	Tires -					
8 9	Sp	lit column by	First 💌	1 4	charac	ters		
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12 13								
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15								

3. Split result. Each cell is broken into two parts - (1) the first or last x number of characters you want, (2) the remainder

	А	B	С	D	E	F	G
1	Name	Before last ''	Remainder	First 1 characters	Remainder		
2	Mr. David K Ray	Mr. David K	Ray		Ray		
3	Barry Ray	Barry	Ray		Ray		
	Mr. Greg Ray	Mr. Greg	Ray		Ray		
5	Mr. Joe K. Smith	Mr. Joe K.	Smith		Smith		
6	Pete F Kay	Pete F	Kay		Kay		
7	Ms. Jane Rod	Ms. Jane	Rod		Rod		
8							
9							
10							
11							
12							

5.2.7 Database Queries

The SQL Tester is an interactive Query Tool (add-in) for retrieving data and displaying it on the screen in an ad hoc basis from almost all kinds of databases. The output can be placed in worksheets and added to workbooks VBA projects. It also allows you to: Copy the displayed data into a worksheet including connectionstring and query-string Create dynamic queries where the data can be updated on a regular basis. Insert a complete VBA-procedure which is based on the query and the database-connection. Easily create queries by selecting keywords, names of tables and columns from user-friendly forms.

It also allows you to:

- Copy the displayed data into a worksheet including connection-string and query-string
- Create dynamic queries where the data can be updated on a regular basis.
- This is based on the query and the database-connection.
- @ Easily create queries by selecting keywords, names of tables and columns from user-friendly forms.
- Create, test and export the queries to the clipboard or to text files.
- Timport queries from text files and have them executed.

- *Work with disconnected records.*
- Get more accurate and higher quality of the retrieved data compared to MS Query.
- The extensive help file is available.
- The best part is that You are not bound to the databases tools & windows!

5.2.8 Goal Seek

Goal seek is a method for finding the input value that a formula needs to return a given result. When goal seeking, Microsoft Excel varies the value in a cell that you specify until a formula that's dependent on that cell returns the result you want. Use the Goal Seek command when you want to find a specific value for a particular cell by adjusting the value of only one other cell.

Steps of Goal Seeking

Suppose if you have a condition that you have a value of 10000 in A1 and you don't know the value of B1 but you know the result of A1 and B1 is 20000 and now you want to know the value of B1. Perform the following steps.

- 1. Write 10000 in cell A1 and write the formula in C1 to calculate the sum of cell A1 and cell B1.
- 2. Put the cursor on the C1.
- 3. On the Tools menu, click Goal Seek.

🔀 Microsoft Ex	cel - Book1						<u>- 8 ×</u>
		ools <u>D</u> ata <u>W</u> indow <u>H</u> elp		may-	-		_ & ×
] D 📽 🖬 🔒) @ D. 🖤 🐰	B B 1	😪 Σ f*		100% - 🔇	-	
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C1	▼ = =A1+						
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2							
4	Goal Seek	? ×					
5	Set cell:						
6	and the second sec	C1 🗾					
7	To <u>v</u> alue:	20000					
8	By changing cell:	\$B\$1					
9	_						
11		OK Cancel					
12							
13							
14							
15							
16 17							
18							
19							
20							
21							
22							
23							
24	et1 / Sheet2 / Sheet	3 /		11			
			3 # - A				
Enter						NUN	4

4. In the Set cell box, enter the reference for the cell that contains the formula you want to resolve i.e. C1.

- 5. In the To value box, type the result you want i.e. 20000.
- 6. In the By changing cell box, enter the reference for the cell that contains the value you want to adjust. This cell must be referenced by the formula in the cell you specified in the Set cell box i.e. B1
- 7. Press the OK button. You will see the result in a dialog box if the result is right press Ok button other wise Press Cancel Button

5.2.9 Scenarios

If you have a formula or function that has an unknown variable as part of it, the <One-Input Table> will be sufficient. If you have more than one unknown variable in your spreadsheet, you can set up a Scenario that controls those cells in the formulas or functions that you want. The Scenario Manager is located under the Tools menu.

	A	В		С	We can now select the two variable
1					(C4 & C6) and choose Scenarios from
2					Tools menu. This is done by clicking or
3		Fiscal '99 Budget	\$	100,100	and holding the [CTRL] key down w
4		Increase for 2000		3.5%	clicking C6.
5		Fiscal 2000 Budget	\$10	03,603.50	
6		Increase for 2001		5.0%	
7		Fiscal '01 Budget	\$10	08,783.68	

Scenario Manager	? ×	Each scenario consists of a name, a description (if desired) and data for the
	Show	variable cells. We'll create 3 scenarios: one
No Scenarios defined. Choose Add to add scenarios.	Close	for Expected, one for Higher than Expected, and one for Lower than Expected.
	<u>A</u> dd	
	Delete	
	Edit	
	Merge	
Changing cells:	Summary	
Comment:		

Scenaria	Values			? ×
Enter valu	es for each	of the changing cells.		ОК
<u>1</u> :	\$C\$4	0.035		
<u>2</u> :	\$⊂\$6	0.05		Cancel
				<u>A</u> dd
Scenario	Values			? X
	es for each	of the changing cells.	_	<u>?</u> ×
	es for each	of the changing cells. 0.035		ок
Enter valu	es for each	0.035		OK Cancel
Enter valu <u>1</u> :	es for each \$C\$4	0.035		ок
Enter valu <u>1</u> :	es for each \$C\$4	0.035		OK Cancel
Enter valu <u>1</u>)	es for each \$C\$4	0.035		OK Cancel

For the Expected scenario, the increase for 2000 will be 3.5%, and the increase for 2001 will be 5%. For Higher than Expected, the numbers are 7% and 10%, and 1%-2% for Lower than Expected. <Click here> to see a video which demonstrates the ability to double-click on any scenario and see the results in the spreadsheet. (518K)

5.2.10 Freezing or Freeze Panes

	A	В	C	D	E	
1		January	February	March	April	
6	Class 5	34	23	48	29	
7	Class 6	54	71	24	48	
8	Class 7	34	23	34	24	
9	Class 8	45	34	34	34	
10	Class 9	43	54	54	23	
11	Class 10	23	34	34	71	
12	Class 11	42	45	33	23	
13	Class 12	28	34	34	34	-
14	Class 13	29	23	23	54	
15	Class 14	48	71	71	34	
16	Class 15	24	23	23	45	
17	Class 16	22	34	34	28	

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- Click the label of the row below the row that should remain frozen at the top of the worksheet.
- Select Window | Freeze Panes from the menu bar.

To remove the frozen panes, select Window|Unfreeze Panes.

Freeze panes has been added to row 1 in the image above. Notice that the row numbers skip from 1 to 6. As the worksheet is scrolled, row 1 will remain stationary while the remaining rows will move.

5.2.11 Printing

Print Preview

Select **File**|**Print Preview** from the menu bar to view how the worksheet will print. Click the **Next** and **Previous** buttons at the top of the window to display the pages and click the **Zoom** button to view the pages closer. Make page layout modifications needed by clicking the **Page Setup** button. Click **Close** to return to the worksheet or **Print** to continue printing.

Print

To print the worksheet, select File Print from the menu bar.

		?
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		🔽 Print to file
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n C Entire workbook		I ✓ C <u>o</u> llate
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- Print Range Select either all pages or a range of pages to print.
- Print What Select selection of cells highlighted on the worksheet, the active worksheet, or all the worksheets in the entire workbook.
- Copies Choose the number of copies that should be printed. Check the Collate box if the pages should remain in order.
- Click **OK** to print.

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5.2.12 Sorting of Data

Basic Sorts A

To execute a basic descending or ascending sort based on one column, highlight the cells that will be sorted and click the **Sort Ascending** (A-Z) button or **Sort Descending** (Z-A) button on the standard toolbar.

Complex Sorts

To sort by multiple columns, follow these steps:

- *F* Highlight the cells, rows, or columns that will be sorted.
- Select **Data**|**Sort** from the menu bar.
- From the Sort dialog box, select the first column for sorting from the Sort By drop-down menu and choose either ascending or descending.

Select the second column and, if necessary, the third sort column from the Then By drop-down menus.

Sort				? ×
Sort by				
number 1	-	C Asce		
	_	<u> Desc</u> Desc D	ending	
Then by		-	22	
number 2	•	C Asce		
		Desc	:e <u>n</u> ding	
Then by		Asce	n din n	
	-	C Desc		
My list has		(Desc	enaing	
• Header row	ΟN	o header r	o <u>w</u>	
Options		ок	Car	ncel

- If the cells you highlighted included the text headings in the first row, mark My list has...Header row and the first row will remain at the top of the worksheet.
- Click the **Options** button for special non-alphabetic or numeric sorts such as months of the year and days of the week.

Sort Options	? ×
Eirst key sort order	
Sunday, Monday, Tuesday, Wedr 💌	OK
☐ <u>C</u> ase sensitive	Cancel
Orientation	
Sort to bottom	
C Sort left to right	

Click **OK** to execute the sort.

5.2.13 Filtering List

Sometimes the user wants to locate some information from an extensive list. To find the information quickly, Microsoft Excel provides Filter list option. This option enables the user to display the information regarding the selected options. Microsoft Excel provides two commands for filtering lists:

- @ AutoFilter, which includes filter by selection, for simple criteria
- P Advanced Filter, for more complex criteria

Using Auto Filter

You can apply filters to only one list on a worksheet at a time.

- 1. Click a cell in the list you want to filter.
- 2. On the Data menu, point to Filter, and then click AutoFilter.

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3		Employee Name 👻 👻	Department 👻							
4		Alexender	Accounts	5000	200	5200				
5		John	Marketing	5000	520	5520				
6		Martin	Marketing	4000	500	4500				
7		Mark	Sales	6000	256	6256				
3	3	Smith	Sales	7000	740	7740				
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1		Total of the Salary	27000							
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- 3. To display only the rows that contain a specific value, click the arrow in the column that contains the data you want to display.
- 4. Click the value.
- 5. To apply an additional condition based on a value in another column, repeat steps 3 and 4 in the other column.

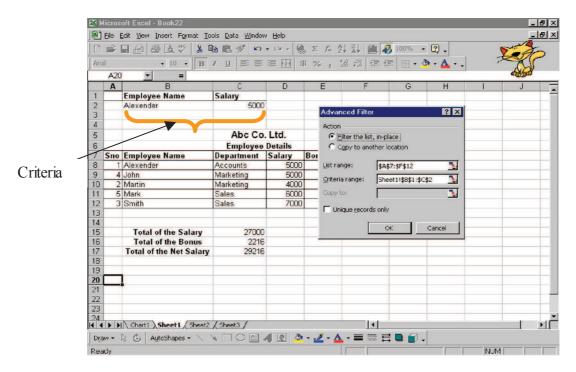
Filter a List by using Advanced Criteria

Your worksheet should have at least three blank rows above the list that can be used as a criteria range. The list must have column labels.

- 1. Select the column labels from the list for the columns that contain the values you want to filter, and click Copy .
- 2. Select the first blank row of the criteria range, and click Paste.

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- 3. In the rows below the criteria labels, type the criteria you want to match. Make sure there is at least one blank row between the criteria values and the list.
- 4. Click a cell in the list.
- 5. On the Data menu, point to Filter, and then click Advanced Filter.
- 6. To filter the list by hiding rows that don't match your criteria, click Filter the list, in-place.



7. In the Criteria range box, enter the reference for the criteria range, including the criteria labels.

To move the Advanced Filter dialog box out of the way temporarily while you select the criteria range, click Collapse Dialog.

5.2.14 Naming ranges

Name Box

This box shows the name or the address of the currently active cell.

5.2.16 Past special options

By default, when you Copy and Paste the content of any cell(s), Excel will **Paste** all cell formatting. We can, however, use what is called **Paste Special** to nominate the attributes of the copied data we wish to Paste.

To do this, again **Copy** the cell(s) in any of the above methods (except Drag and Drop). Now select your destination cell and go to **Edit>Paste Special** or right click and select **Paste Special** from the Shortcut menu. This will display the **Paste Special** dialogue box. In this dialog box under the heading **Paste**, there are different options that can be applied, the default is **All**, which is exactly the same as using any of the **Paste** methods described above.

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5.2.17 Pivot Table

A PivotTable report is an interactive table that you can use to quickly summarise large amounts of data. You can rotate its rows and columns to see different summaries of the source data, filter the data by displaying different pages, or display the details for areas of interest.

When to use a PivotTable Report

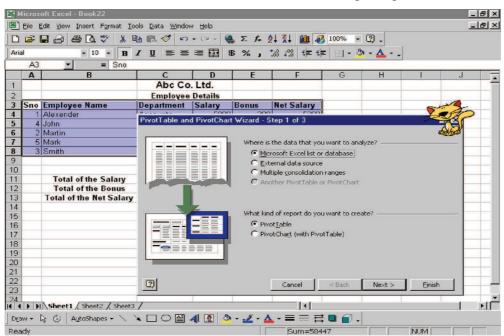
Use a PivotTable report when you want to compare related totals, especially when you have a long list of figures to summarise and you want to compare several facts about each figure. Use PivotTable reports when you want Microsoft Excel to do the sorting, subtotaling, and totaling for you. Because a PivotTable report is interactive, you or other users can change the view of the data to see more details or calculate different summaries.

Creating a PivotTable Report

To create a PivotTable report, use the PivotTable and PivotChart Wizard as a guide to locate and specify the source data you want to analyse and to create the report framework. You can then use the PivotTable toolbar to arrange the data within that framework.

Follow the steps give below to create a pivot table:

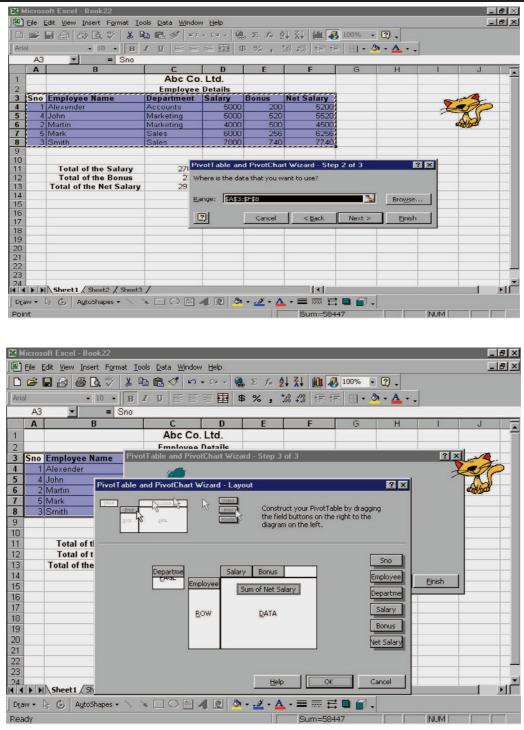
- 1. Select the source table in the worksheet for which a pivot table is to be created. A pivot table from an external data source can also be created.
- 2. On the Data menu choose the Pivot table and Pivot Chart Report option.



- 3. In this step click an option for the data source type and
- 4. click next.
- 5. In the next step specify the data source range in the Range box if you haven't selected the range yet.
- 6. Click the next button

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- 7. Click the layout button to set the layout of the pivot table.
- 8. Select the field, drag and drop it into the section Row (summarises the data from top down as well as applies a vertical format to the table). Column (Summarises the data from left to right as well as applies a horizontal format to the table), Page (Create a drop down menu above the table.), or Data (Data drop area is the summary of numbers) of the dialog box to create a desired layout.
- 9. Click Ok button and then click the Finish button.

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	<u>File Edit View Insert</u>	Format T	ools <u>D</u> ata <u>V</u>	/indow	Help								-	a ×
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1	Department	(All) 💌												
3	Sum of Net Salary	Salary -	Bonus 👻	-									1	_
4	Dum of Net Dalary		4000 Total			5000 Total	6000	6000) Total	7000	7000 Total	Grand Total	12	
5	Employee Name 👻	500	1000 10141	200		cooc rotal	256		10101	740	1000 1010	orand rotal	×	
6	Alexender	-		5200		5200						5200	ALGO,	
7	John				5520	5520						5520		
8	Mark						6256		6256			6256		
9	Martin	4500	4500									4500		
10	Smith	-	1							7740	7740	7740		
11	Grand Total	4500	4500	5200	5520	10720	6256		6256	7740	7740	29216		_
12														
13														
14		▼ P	ivotTable								×			
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23					_			_						
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5.2.18 Insert Chart

Charts allow you to present data entered into the worksheet in a visual format using a variety of graph types. Before you can make a chart you must first enter data into a worksheet. This page explains how you can create simple charts from the data.

Chart Wizard 🛍

The Chart Wizard brings you through the process of creating a chart by displaying a series of dialog boxes.

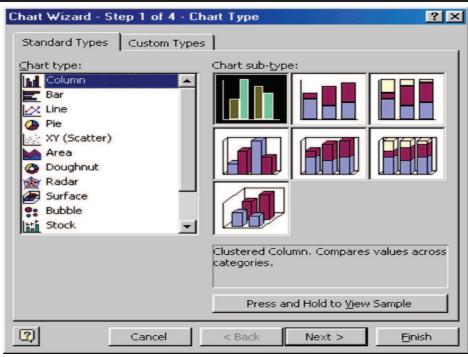
Enter the data into the worksheet and highlight all the cells that will be included in the chart including headers

	A	B	С
1		Students	
2	English	34	
3	Biology	32	
4	Calculus	26	
5	Physics	28	
6	History	39	
7			

- Click the Chart Wizard button on the standard toolbar to view the first **Chart Wizard** dialog box.
- Chart Type Choose the Chart type and the Chart subtype if necessary. Click Next.
- Chart Source Data Select the data range (if different from the area highlighted in step 1) and click Next.

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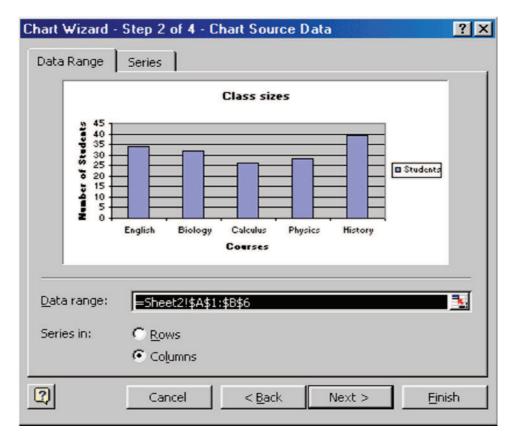


Chart Options - Enter the name of the chart and titles for the X- and Y-axes. Other options for the axes, grid lines, legend, data labels, and data table can be changed by clicking on the tabs. Press Next to move to the next set of options.

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Chart Wizard - Step 3 of 4 - Chart	Options ?X
Titles Axes Gridlines Leg Chart <u>ti</u> tle: Class sizes	gend Data Labels Data Table Class sizes
Category (X) axis: Courses Value (Y) axis: Number of Students Second category (X) axis: Second value (Y) axis:	Hamble Courses
Car	ncel < <u>B</u> ack Next > <u>Fi</u> nish

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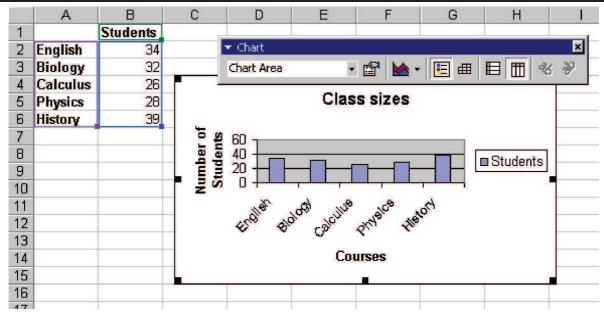
Chart Location - Click As new sheet if the chart should be placed on a new, blank worksheet or select As object in if the chart should be embedded in an existing sheet and select the worksheet from the drop-down menu.

Chart Wizard	I - Step 4 of 4 - Cha	art Location 🥂	×
Place chart: -			
	C As new <u>s</u> heet:	Chart1	
	• As <u>o</u> bject in:	Sheet2	-
2	Cancel	< <u>B</u> ack Next > <u>Fi</u> nish	

Click **Finish** to create the chart.



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Resizing the Chart

To resize the chart, click on its border and drag any of the nine black handles to change the size. Handles on the corners will resize the chart proportionally while handles along the lines will stretch the chart.

Moving the Chart

Select the border of the chart, hold down the left mouse button, and drag the chart to a new location. Elements within the chart such as the title and labels may also be moved within the chart. Click on the element to activate it, and use the mouse to drag the element to move it.

Chart Formatting Toolbar

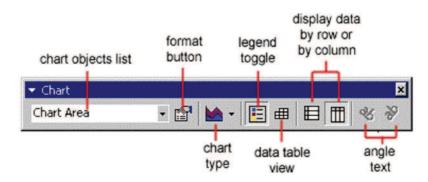


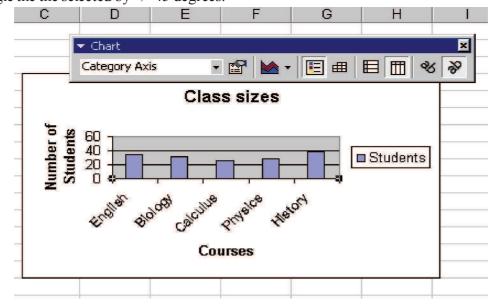
Chart Objects List - To select an object on the chart to format, click the object on the chart or select the object from the **Chart Objects List** and click the **Format button**. A window containing the properties of that object will then appear to make formatting changes.

Chart Type - Click the arrowhead on the chart type button to select a different type of chart.

Legend Toggle - Show or hide the chart legend by clicking this toggle button.

Data Table view - Display the data table instead of the chart by clicking the Data Table toggle button.

Display Data by Column or Row - Charts the data by columns or rows according to the data sheet. **Angle Text** - Select the category or value axis and click the **Angle Downward** or **Angle Upward** button to angle the the selected by +/- 45 degrees.



Copying the Chart to Microsoft Word

A finished chart can be copied into a Microsoft Word document. Select the chart and click **Copy**. Open the destination document in Word and click **Paste**.

5.2.19 Macros: reading, editing,

Recording A Macro

Macros can speed up any common editing sequence you may execute in an Excel spreadsheet. In this example we will make a simple macro that will set all the margins on the page to one inch.

Click Tools Macro Record New Macro from the menu bar.

Record Macro		? ×
Macro name: Macro1		
Shortcut <u>k</u> ey: Ctrl+	Store macro ir This Workboo	
Description: Macro sets all marg	ins to 1 inch	
	ОК	Cancel

- Name the macro in the Macro name field. The name cannot contain spaces and must not begin with a number.
- If you would like to assign a shortcut key to the macro for easy use, enter the letter under Shortcut key. Enter a lower case letter to make a CTRL+number shortcut and enter an upper case letter to

assign a CTRL+SHIFT+number shortcut key. If you select a shortcut key that Excel already uses, your macro will overwrite that function.

- Select an option from the **Store macro in** drop-down menu.
- Enter a description of the macro in the **Description** field. This is for your reference only so you remember what the macro does.
- Click **OK** when you are ready to start recording.
- Select options from the drop down menus and Excel will record the options you choose from the dialog boxes, such as changing the margins on the Page Setup window. Select File|Page Setup and change all the margins to 1". Press OK. Replace this step with whatever commands you want your macro to execute. Select only options that modify the worksheet. Toggle actions such as View|Toolbars that have no effect on the worksheet will not be recorded.



Click the **Stop** button the recording toolbar. The macro is now saved.

Running A Macro

- To run a macro you have created, select Tools Macro Macros from the menu bar.
- From the Macros window, highlight the Macro name in the list and click Run.

Macro	? ×
Macro name:	
Macro1	Run
Macro1	Cancel
	<u>S</u> tep Into
	<u>E</u> dit
	Create
<u> </u>	<u>D</u> elete
Macros in: All Open Workbooks	Options
Description ————————————————————————————————————	

If the macro is long and you want to stop it while it is running, press BREAK (hold CTRL and press PAUSE).

5.2.20 Insert Objects

Excel provides you the facility to link or embed the objects of other software's in your worksheet and work on the linked or embedded objects as you are working on that software itself.

To embed an object you have to follow these steps.

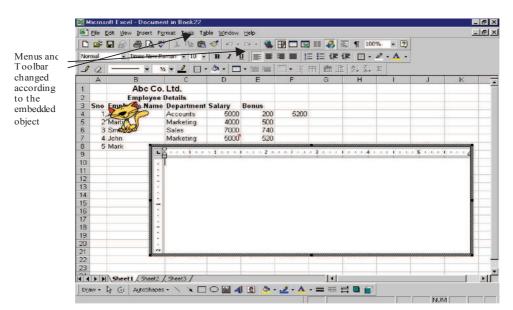
- 1. Click in the document where you want to place the embedded object.
- 2. On the Insert menu, click Object, and then click the Create New tab.

Object	? ×
Create New Create from Eile Object type: Eitmap Image Calendar Control 9.0 Comic Chat Room Image Document Image Document Media Clip Microsoft Chat Room Microsoft Chat Room Microsoft Clip Gallery Result Inserts a new Bitmap Image object into your document.	r Displ <u>a</u> y as icon
c	Cancel

- 3. In the Object type box, click the type of object you want to create.
- 4. To display the embedded object as an icon for example, if others are going to view the worksheet online select the Display as icon check box.

Notes:

- Only programs that are installed on your computer and that support linked and embedded objects appear in the Object type box.
- When you click Microsoft Word Document in the Object type box, an entire document is inserted into your worksheet. The document displays only one page at a time. To display a different page, double-click the Microsoft Word object, and then click a page down button.



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	CHECK YO	UR PROGRESS						
(1)	Validation option find in –							
	(a) Data menu	(b) format menu	(c) file menu	(d) none of the above				
(2)	Comment option find in –							
	(a) Insert menu	(b) data menu	(c) file menu	(d) none of the above				
(3)	Macro find in –							
	(a) Edit menu	(b) tool menu	(c) view menu	(d) format menu				
(4)	How many features are available in chart formatting menu bar-							
	(a) 7	(b) 5	(c) 8	(d) 6				

5.3 SUMMARY

The objectives of this development to cope with large numbers of students and provide Advanced presentation features like Formatting slide appearance, Macros Adding finishing touches to a presentation, Advanced saving and presenting options, Recording a macro and adding it to a custom toolbar, Setting up a slide show and transitions.

5.4 GLOSSARY

Validation implies one is able to testify that a solution or process is correct or compliant with set standards or rules.

Comment is a statement of fact or opinion, especially a remark that expresses a personal reaction or attitude.

Protection is a safe guard from unauthorized accessing.

Delimiter is a character or combination of characters used to separate one item or set of data from another. For example, in comma-delimited records, a comma is used to separate each field of data.

A database is a collection of records or information which is stored in a computer in a systematic way.

Freeze is to stop functioning properly, usually temporarily.

Sort is to arrange according to class, kind, or size.

Filter is used to extract impurities.

Macro is a symbol, name, or key that represents a list of commands, actions, or keystrokes.

5.5 FURTHER READINGS

- 1. Philip Howard (2005-04-22). Managing spreadsheets. IT-Directors.com.
- 2. Raymond R. Panko (2005-01). What We Know About Spreadsheet Errors.
- 3. Beare, R. (1993). A spreadsheet system for educational use based on Microsoft Excel, Australian Educational Computing, July 1993.

5.6 ANSWER TO THE SELF LEARNING EXERCISE

Answer to check your progress 5.2

1. (a) 2. (a) 3.(b) 4. (a)

5.7 UNIT-END QUESTIONS

(1) What are the advanced features of MS-EXCEL 2000?

(2) Describe the following

- 1. Shift the contents of the cell C1 to D1.
- 2. Insert a new row between row 7 and 8.
- 3. Insert a new column between D and E.
- 4. Insert a picture into the worksheet.

(3) Describe the Following

- 1. Write a short note on inserting a chart.
- 2. What is formulas and how to insert a function in formulas?
- 3. What is the use of giving name to cells?
- 4. What is the difference between embedding and linking an object?

(4) How can create macro and objects?

 $\textcircled{\begin{tabular}{c} \bullet \bullet \bullet \bullet \\ \bullet \bullet \bullet \bullet \bullet \end{array}}$

Unit VI: PRESENTATION SOFTWARE -MS POWER POINT 2000

Structure of the Unit

6.1 Introduction

6.2 Anatomy of PowerPoint Presentation

- 6.2.1 Creating a Presentation choosing a Design Template
- 6.2.2 Adding a Slide Check your progress

6.3 Creating and viewing a presentation: Choosing a design Template,

- 6.3.1 Creating a title slide,
- 6.3.3 Adding a new slide to a presentation,
- 6.3.4 Creating a bulleted list slide

Check your progress

- 6.4 Summary
- 6.5 Further Readings
- 6.6 Glossary
- 6.7 Answer to the self learning exercise
- 6.8 Unit-end Questions

6.0 **OBJECTIVES**

The computer with power point presentation software combines the advantage of the overhead projector, the slide projector, flip chart. With computer projection systems, presentation can be made to audiences as small as five (use a monitor only) or as large as an auditorium full of students. Projection can best be done in a semi-dark room. A darkened room is not necessary. The trainer faces the audience. By keeping eye contact with the participants, the trainer is able to maintain control of the group while at the same time controlling the presentation. The presentation is prepared by using presentation software. The software has a number of special effects: Animation, Backgrounds, Slide transitions, Uncover (Left-down, Left-up, Right-down, Right-up), Wipe (Down, Left, Right, Up), Fly from (Bottom, Left, Right, Top, Bottom-left, Bottom-right, Top-left).

6.1 INTRODUCTION TO POWERPOINT 2000

PowerPoint is the component of Microsoft Office that is used to create professional- quality presentations. A presentation is a structured delivery of information. These can be reproduced on transparency, paper, on-screen presentations. PowerPoint components can be used to work on slides, organize presentation contents with outlines, and generate speaker notes and audience handouts. Teachers, professors, politicians, and sales representatives make presentations to sell their concepts.

PowerPoint 2000 helps you to structure the ideas and information that you want to convey to your audience. It allows you to create the contents of your presentation by typing the text and inserting pictures, sounds and animations. With it, you can add visual images, supporting documents, and audio recordings to enhance your presentation. PowerPoint makes the creation of any presentation simple by providing you with built - in professional design called Auto Layouts and presentations templates. You can also create different versions of a presentation for different audiences and build your contents in either a text – based outline view or a design – based slide view.

Starting Power Point 2000

The steps to activate PowerPoint 2000 are:

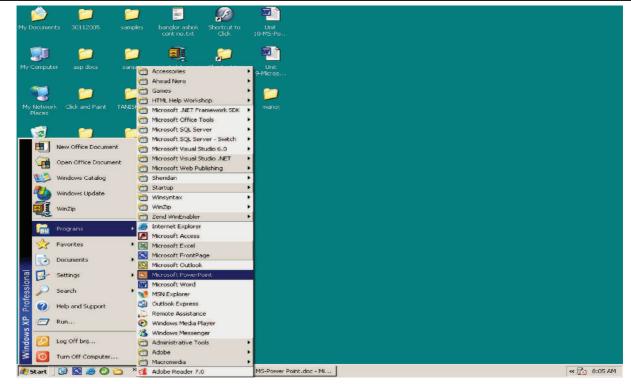
- 1. Click the Start button in the taskbar.
- 2. Select the Programs option from the Start menu.



3. Click the PowerPoint option (refer Starting Excel 2000). The PowerPoint dialog box is displayed as shown in figure below

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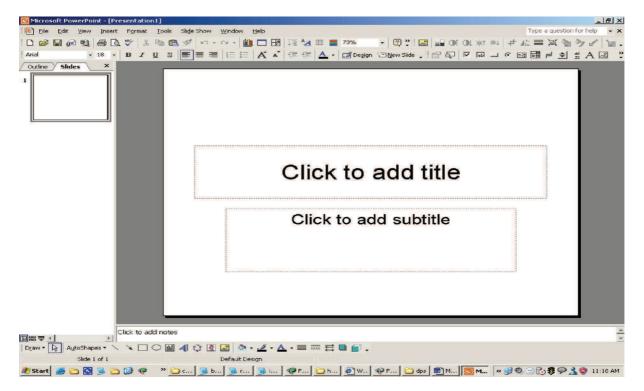
Presentation Software–MS Power Point 2000



All the options shown in the dialog box will be dealt with subsequently

6.2 ANATOMY OF POWERPOINT PRESENTATION

Before you start creating presentations, you need to understand the structure of the PowerPoint screen. The PowerPoint screen displays several toolbars and other basic screen elements (refer figure given below).



The components of a PowerPoint screen are:

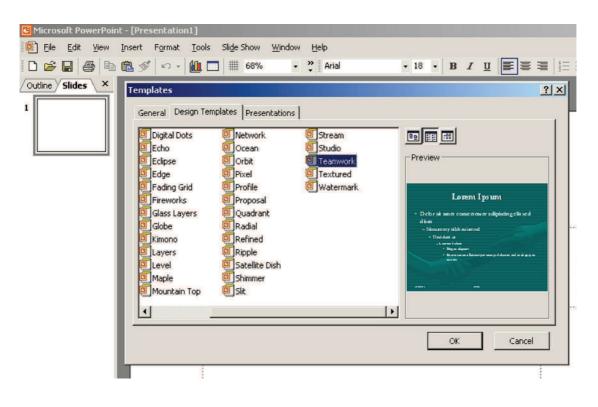
- Menu Bar is similar to the menu bar in other Microsoft Office applications having File, Edit, View, Insert, Format, Tools, Window, Help menus.
- Toolbars are collections of buttons that you can click and activate some of the most common commands in PowerPoint. These commands can also be activated through menus.
- Status Bar is located at the bottom of the PowerPoint screen. It displays the number of the current slide and the name of the template on which the presentation is based.
- The Vertical Scroll Bar helps you to scroll through the slides in a presentation.
- Slide Buttons are located at the bottom of the vertical scroll bar and help you to display the previous and next slides.

6.2.1 Creating a Presentation Choosing a Desing Template

A presentation template is a saved presentation file that contains predefined slide and title masters, color schemes and graphic elements. The presentation templates also include masters with pre – formatted fonts and styles.

The steps to apply a template to a new presentation are:

- 1. Select the Template option from the PowerPoint opening dialog box. The following screen appears .
- 2. Click on the Design Template tab to display various design templates.



3. Select the template and click on the OK button to activate the template. The New Slide box is displayed as shown in the figure below.

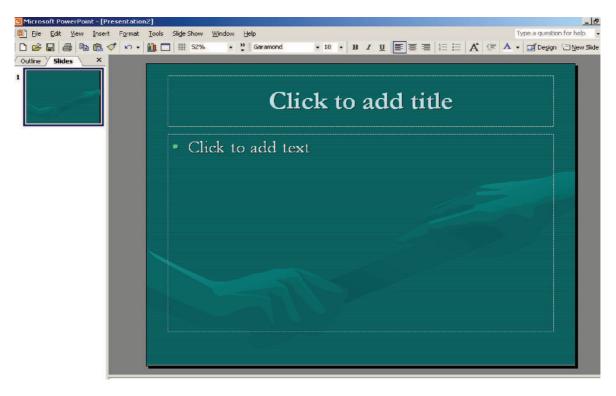
Presentation Software–MS Power Point 2000

Microsoft PowerPoint - [Presentation2]			_
🔨 Eile Edit View Insert Format Io		Type a question fo	
D 🖆 🖬 🖨 🖄 🔊 🔹 🛍] 🗖 ⅲ 76% • " Garamond • 18 • B I ឬ 📰 🚍 🚝 🚝 🗚 🐺 A	- 📝 Design 🖄	<u>N</u> ew S
Coutine Slides ×	• • Slide Layout Apply slide layout: Text Layouts Image: Im		

4. Select the layout from the New Slide dialog box and click OK button.

Template in a general meaning is a pattern, which will remain the same throughout the presentation. All the slides will have the same background as selected by you.

Creating a Blank Presentation



The third option in the PowerPoint dialog box is creating a blank presentation.

The steps in creating a blank presentation are as follows:

- 1. Select the New option from the File menu.
- 2. Select the General tab and double click on the Blank Presentation icon. The New slide dialog box is displayed.
- 3. Select the suitable layout and click on the OK button.

A slide as shown in the following figure will be displayed.

6.2.2 Adding a Slide

The steps to add a new slide are:

- 1. Select the New Slide option from the Insert menu or click on the Insert New Slide button on the toolbar.
- 2. Select an appropriate layout from the New Slide dialog box.
- **3.** Click on the OK button.

CHECK YOUR PROGRESS

	· · ·	• point is a – werful drawing a	pplication	(b) word proces	SSOT
	(c) Presentation software		(d) all of the above		
	(2) This is (a) Slic	s like in the pro les (b)	e sentation –) layouts	(c) handout	(d) none of the above
		ers or present eaker's notes(b)		s for their help – (c) handouts	(d) none of the above
(4)	How many c	components are	available on th	e presentation slide	2 -
	(a) 5	(b) 6	(c) 7	(d) 10	
(5)	Presentation	template contai	ins –		
	(a) Predefin	ed slide	(b) post c	lefined slide	
	(c) both (a) a	& (b)	(d) none	of the above	

6.3 CREATING AND VIEWING A PRESENTATION: CHOOSING A DESIGN TEMPLATE,

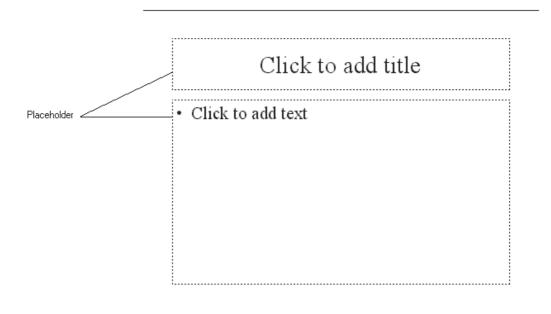
6.3.1 Creating a title slide, Text attributes,

Entering and Editing Text

Every Slide in a presentation contains text of some kind even if it is just the title. Entering and editing text in PowerPoint is similar to entering and editing text in any MS Office application.

Text Placeholders

In PowerPoint, you enter all text in text placeholders. The method of entering slide text involves replacing the sample text in a placeholder with your own text. The slide shown in the figure below includes two placeholders – one that contains a sample title and another that contains a bulleted list.



Inserting Text

The steps to insert text are:

- 1. Click on the slide title, which reads Click to add title (refer figure above). The text disappears and is replaced by the blinking insertion point.
- 2. Type a Title
- **3.** Position the mouse pointer inside the placeholder, which reads Click to addtext and click on the mouse button. The bullet item text disappears and is replaced by the blinking cursor.
- **4.** Type the text at the first bullet point and press the Enter key. This adds a second bullet point followed by the blinking insertion cursor.
- 5. Type the text.
- 6. Repeat steps 4 and 5 until you have added all the points for the slide.
- 7. Click anywhere outside the text block to view how the text will look on the slide.

Changing Case of the Text

The steps to change case of the text are:

- 1. Select the text for which you want to change the case.
- 2. Select the Change Case option from the format menu. The Change Case dialog box is displayed as

shown in figure below.

Change Case	? ×
O Sentence case.	
C lowercase	
C <u>T</u> itle Case	
C tO <u>G</u> GLE cASE	
ОК	Cancel

- **3.** Select the appropriate option.
- 4. Click on the OK button.

Checking Spelling

The steps to spell check a presentation file are:

- 1. Open the presentation you want to spell check.
- 2. Select the spelling option from the tools menu.

The spelling dialog box is shown in the figure at next page. Spell check highlights the first unrecognised word in the presentation file and displays the word in the 'Not in Dictionary' text box.

Spelling			? ×
Not in Dictionary:	ida		
Change <u>t</u> o:	Ida	Ignore	Ignore All
Suggestions:	Ida 🔼	<u>C</u> hange	Change All
	ides die	<u>A</u> dd	<u>S</u> uggest
Add <u>w</u> ords to:	CUSTOM.DIC	AutoCorrect	Close

- **3.** Select the appropriate command button such as: Ignore, Ignore All, Change, Change All or Add. The spelling checker takes the indicated action and then highlights the next unrecognised word.
- 4. Repeat step 3 until the Spell Checker displays a message saying that the entire presentation has been checked.
- 5. Click the OK button.

You can stop using Spell Checker at any time by clicking on the Close button in the Spelling dialog box.

Copying Text Styles

The steps to copy a style are as follows:

- 1. Select the word that has the format you want to copy.
- 2. Click on the format Painter icon in the Standard toolbar.
- **3.** If you want to change one word only, click anywhere in that word. Otherwise, click and drag to select the text you want to change.

Before doing all this we should know how to select the text so that we can make changes to our desired style text or Bullets characters.

What to Select	How to Select
Any amount of text	Place the mouse pointer at the beginning of the text; the pointer should be shaped like character I, hold the mouse button down and drag the pointer till where you want to select the text.
Single Paragraph	Place the mouse pointer (shaped like character I) anywhere on the paragraph and triple - click

Changing Text Attributes

Attributes of the text means the characteristics, which are associated with the text, for example Font, Font style, Font Size, Color, Effects etc. You can find most Font attributes in the Font dialog box. If you want to select the attributes of the text you must first select the text as told above. The font dialog box is displayed below.

Regular 32 Regular 32 Bold 36	Cancel
Regular 32 Bold 36	Cancel
Bold IS6	
Italic 40	Preview
	-
⊆olor	:
pt 🗌	_
) \$ %	
	efault for new object
	Bold Italic 44 48 pt Color

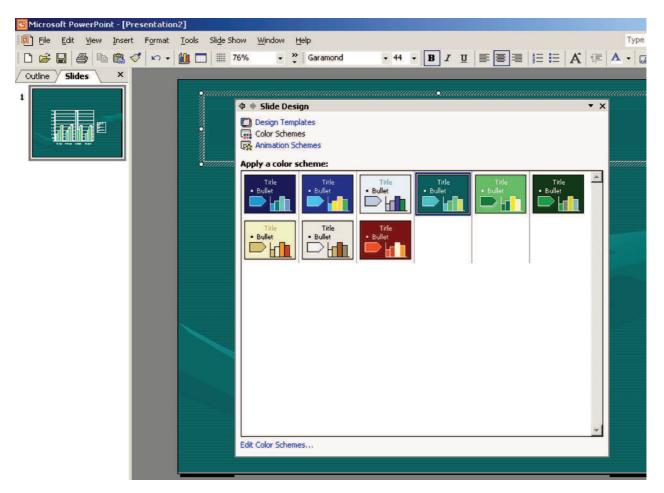
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Changing Slide Color Scheme

To change the Color Scheme of the entire presentation, follow the following steps:

1. Choose the Slide Color Scheme option from the Format menu.

The Color Scheme dialog box is displayed as shown at next page.



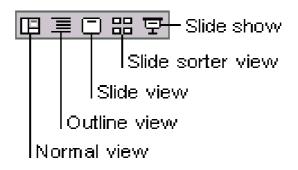
- 2. Click on the Custom tab.
- **3.** Select the Background Color in the 'Color Scheme' Section of the dialog box, and then click on the Change Color button.
- 4. To change the Background color, select another color from the palette.
- 5. To see the effects of a new background color without changing it permanently click the preview button.
- 6. Click on the OK button

The color scheme dialog box is redisplayed with the changed color scheme.

Choose the 'Apply to All' button to apply the new Color scheme to the entire presentation. If you choose the Apply button, the new scheme is applied only to currently displayed slide.

6.3.3 Viewing a PowerPoint Presentation

Microsoft PowerPoint comes with different views to help you while you are creating a presentation. The two main views you use in PowerPoint are normal view and slide sorter view. To easily switch between views, you click the buttons at the lower left of the PowerPoint window.



(a) Normal View

Normal view contains three panes: the outline pane, the slide pane, and the notes pane. These panes let you work on all aspects of your presentation in one place. You can adjust the size of the different panes by dragging the pane borders.

Outline pane: Use the outline pane to organise and develop the content of your presentation. You can type all of the text of your presentation and rearrange bullet points, paragraphs, and slides.

Slide pane: In the slide pane, you can see how your text looks on each slide. You can add graphics, movies, and sounds, create hyperlinks, and add animations to individual slides.

Notes pane: The notes pane lets you add your speaker notes or information you want to share with the audience. If you want to have graphics in your notes, you must add the notes in notes page view.

These three panes are also displayed when you save your presentation as a Web page. The only difference is that the outline pane displays a table of contents so that you can navigate through your presentation.

(b) Slide Sorter View

In slide sorter view, you see all the slides in your presentation on screen at the same time, displayed in miniature. This makes it easy to add, delete, and move slides, add timings, and select animated transitions for moving from slide to slide. You can also preview animations on multiple slides by selecting the slides you want to preview and then clicking Animation Preview on the Slide Show menu.

At any time while you are creating your presentation, you can start your slide show and preview your presentation by clicking Slide Show

Viewing the Slides

There are several ways to navigate from slide to slide when you are editing your presentation. The method you choose depends on what view is currently active.

The Keyboard or the Mouse can be used to navigate through the slides whichever you find easy to use.

Using the Keyboard to navigate through the slides in your presentation. Table 1 lists keyboard navigation which you can use to display different slides in your presentation.

Key Combination	Movement
Page Up	Positions you back one slide at a time
Page Down	Positions you Forward one slide at a time
Ctrl + Home	Positions you at the beginning of the presentation
Ctrl + End	Positions you at the end of the presentation

Handle the slide using keyboard

When you start a new presentation using either a Design Template or Blank Presentation option, the first screen you see is the New Slide Dialog box. After you create your presentation file, you can add or delete slides whenever necessary.

The first screen of your presentation is the Title Slide, which should be attractive, as it is said first impression is the last impression. This is the first slide of your presentation which the audience sees, so it sets the tone for the rest of the presentation. The AutoContent Wizard automatically creates the Title Slide. When you do not use AutoContent Wizard, you need to create a Title Slide for your Presentation by selecting the Title Slide Auto Layout.

6.3.4 Creating a bulleted list

Bullet lists are one of the most effective tools you can use in a presentation. They provide a brief and concise way to get the important points of your subject matter across to the audience. You can put any text into a bulleted list format.

The steps to change bullet characteristics are:

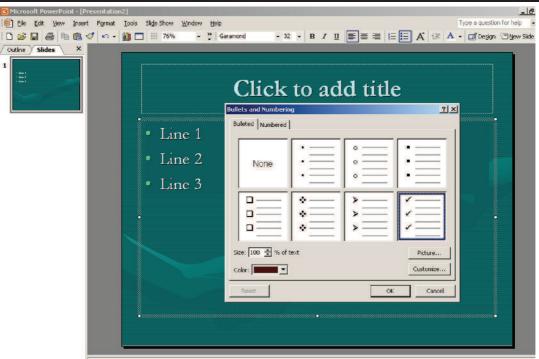
- 1. Select the text whose bullet you want to change.
- 2. Select the bullet option from the Format menu.

The bullet dialog box as shown at next page is displayed.

- 3. Select the new color from the Color drop down list.
- 4. Size the bullets by changing the percentage in the Size box.
- 5. Select the desired bullet character from the Character palette.
- 6. Click on the OK button to apply the bullet.

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	CHECK	YOUR	PROGRESS
--	-------	------	----------

(1) PowerPoint lets you add slide to your presentation using -

(a) Insert->slide (b) insert-> new slide

- (c) Format->new slide (d) none of the above
- (2) You can also add text by inserting text box. To do this we
 - (a) Click text box on the drawing toolbar
 - (b) Click text box on the standard toolbar
 - (c) Click text box on the formatting toolbar
 - (d) None of the above
- (3) Text can be copied in the slide using (a) Menu command (b) drag and dr
 - Menu command (b) drag and drop method
 - (c) Double click the mouse button (d) both (a) and (b)
- (4) How many views are used in slide presentation (a) 4 (b) 5 (c) 6 (d) 3
- (5) Ctrl + End is used
 - (a) Positions you back one slide at a time
 - (b) Positions you Forward one slide at a time
 - (c) Positions you at the end of the presentation
 - (d) all of the above

6.4 SUMMARY

With PowerPoint students can make learning more dynamic by creating presentations of classroom materials and projects. User can use graphics, text, movies, sounds, and the Internet to share information on any topic. Using PowerPoint templates, students can quickly and easily create presentations for many purposes, including lectures, research reports, meeting handouts and agendas, speaker introductions, and flyers.

6.5 FURTHER READINGS

- (1) Wward Tufte. *The Cognitive Style of PowerPoint: Pitching Out Corrupts Within* (Second edition). **Graphics Press, 2006.**
- (2) External links: Official website of PowerPoint at Microsoft

6.6 GLOSSARY

Power Point Animation is a form of animation which involves in using Microsoft PowerPoint and similar programs to create a game or movie.

Slides: Individual parts of a presentation. Slides are similar to the individual pages in a print document, and can contain text, graphics, and animation.

View: Microsoft PowerPoint has three main views: normal view, slide sorter view, and slide show view.

Power Point presentations have the same **design template** for all slides, although it is possible to select a different design template for each slide.

Slide Show: The way a presentation appears when you are presenting it.

Placeholder: Boxes with dotted or hatch-marked outlines that appear when you create a new slide. These boxes act as "placeholders" for objects such as the slide title, text, clip art, charts, and tables. Placeholders are sometimes called "text boxes."

6.7 ANSWER TO THE SELF-LEARNING EXERCISES

Answer to check your progress 6.2

1. (c) 2. (a) 3.(a) 4.(a) 5. (a)

Answer to check your progress 6.2 1. (b) 2.(a) 3.(d) 4.(a) 5.(c)

6.8 UNIT-END QUESTIONS

- (1) What does PowerPoint do? Is it a member of Office Suite?
- (2) Describe the way to create a presentation using design Templates?
- (3) Describes all the ways to add text to slide.
- (4) How will you change the lower case in to upper case of the text?
- (5) What is the purpose of viewing in slide presentation?

Unit-VII: ADVANCE FEATURES OF POWER POINT

Structure of the Unit

7.0	Objectives		
7.1	Introduction		
7.2	Using Hyperlink in the presentation		
7.3	Adding Graphics in a Slide Show		
	7.3.1	Insert a picture from the Clip Gallery	
	7.3.2	Insert an imported picture	
	7.3.3	Insert a Scanned picture	
7.4	Organi	zing Formats with Master Slides	
7.5	Naviga	tion with Action Buttons	
	7.5.1	Insert action buttons and hyperlinks for a self-running or Web presentation	
7.6	Adding	Animation Effects	
	7.6.1	Animated Layers or Slides	
7.7	Start a	Slide Show from within PowerPoint	
	7.7.1	About Self-Running Presentations	
7.8	Printing	g	
7.9	Using E-mail to Send Presentations in Microsoft PowerPoint		
	7.9.1	Send a Copy of an Entire Presentation	
7.10	Putting	g the Presentation on the Web	
	7.10.1	HTML Wizard	
	7.10.2	Testing the Web Presentation	
7.11	Summa	ury	
7.12	Glossa	ry	
7.13	Furthe	r Readings	
7.14	Answe	rs to the self-learning exercises	

7.15 Unit-end questions

7.0 **OBJECTIVES**

After going through this unit you will be able to :

- Understand the advanced features of Power Point like hyperlink creation, use of navigation buttons, master slides etc.
- Apply animation on objects, slides
- [©] Create a presentation for the web and E-mailing a slide show

7.1 INTRODUCTION

Microsoft PowerPoint is a powerful tool to create professional looking presentations and slide shows. PowerPoint allows you to construct presentations from scratch or by using the easy to use wizard.

This unit will help you to get some ideas about advanced features of Power Point 2000.

7.2 USING HYPERLINK IN THE PRESENTATION

Hyperlinks cause the selection of an object to result in a move to a new location or the performance of an action. You can create your own object or choose an AutoShape Action button.

To link an object with an action, select the object, then choose SLIDE SHOW : Action Settings.

Action S	Settings	? ×
Mouse	Click Mouse Over	
Act	tion on click	
C	None	
G	Hyperlink to:	
	First Slide	-
	Next Slide Previous Slide	
0	First Slide	
	Last Slide Last Slide Viewed	
0	End Show Custom Show	
	Slide	
O	URL Other PowerPoint Presentation	
	Other File	
	<u> </u>	
	Play sound:	
	Slide Projector	-
	Highlight <u>c</u> lick	
	ок	Cancel

Figure: Hyperlink Action Dialog Box

In the Action Settings dialog box, choose either Mouse Click or Mouse Over. Then select the button "Hyperlink to" then select the destination or action. You can also choose to play a built-in PowerPoint sound during this action and/or to highlight the object as you click it. 130

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7.3 ADDING GRAPHICS IN A SLIDE SHOW

You can insert clip art or a picture from the Clip Gallery, or you can insert a picture or a scanned photo you import from other programs and locations.

7.3.1 Insert a Picture from the Clip Gallery

- 1. Display the slide you want to add a picture to.
- 2. Click Insert Clip Art on the Drawing toolbar, and then click the Pictures tab.
- 3. Click the category you want.
- 4. Click the picture you want, and then click **Insert Clip** on the shortcut menu.
- 5. When you are finished using the Clip Gallery, click the **Close** button on the Clip Gallery title bar.

Note : You can also drag a picture from the Clip Gallery to your slide.

7.3.2 Insert an Imported Picture

1. Display the slide you want to add a picture to.

To add the picture to every slide in your presentation, add it to the slide master.

- 2. On the Insert menu, point to Picture, and then click From File.
- 3. Locate the folder that contains the picture you want to insert.
- 4. Click the picture.
- 5. Do one of the following:

To embed the picture into your presentation, click Insert.

To link the picture in your presentation to the picture file on your hard drive, click the arrow next to **Insert**, and then click **Link to File**.

7.3.3 Insert a Scanned Picture

To do this procedure, your device (a scanner or digital camera) must be connected to your computer and be TWAIN-compatible. You should also make sure that you have installed the device software that supports TWAIN.

- 1. Display the slide where you want to insert the scanned picture.
- 2. Set up the picture in the scanning device.
- 3. On the Insert menu in Microsoft PowerPoint, point to Picture, and then click From Scanner or Camera.
- 4. If you have more than one device attached to your computer, under **Device** select the device you want to use.
- 5. Do one of the following:

If the selected device is a scanner and you want to use default settings for scanning the image, click **Web Quality** (if you are going to show your presentation on the screen) or **Print Quality** (if you are going to print your presentation), and then click **Insert** to scan your picture.

Advance Peatures of Power Point

If the selected device is not a scanner (for example, a digital camera) or you want to customize any settings before you scan the picture, click **Custom Insert**. Follow the instructions that come with the device you're using.

6. When the image is displayed, make any changes you want.

By using the tools on the **Picture** toolbar, you can crop the picture; adjust its brightness, contrast, and color; and make other adjustments.

CHECK YOUR PROGRESS (7.2 AND 7.3)

1. Fill in the blanks :

(a) To add the picture to every slide in your presentation, add it to the _____.

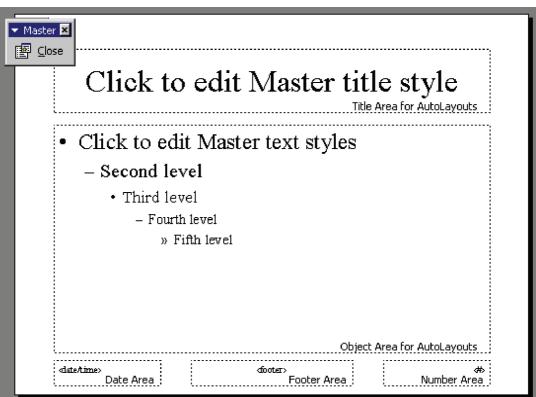
(b) A Picture can be ______ and _____ into a Power Point presentation.

- 2. What is hyperlink?
- 3. Differentiate between linked object and embedded object.

7.4 ORGANIZING FORMATS WITH MASTER SLIDES

Change the style of all slides in the presentation by changing the properties on the **Slide Master**. Each Design Template has its own Slide Master that can be altered. If you create slides from scratch, a consistent style can be added to the presentation by formatting the Slide Master.

1. Select View|Master|Slide Master from the menu bar.



2. Format the master slide just as you would format a regular slide by formatting text, formatting lists, adding background patterns and effects, and setting footers.

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3. Click the **Close** button on the **Master toolbar** to quit editing the master slide and return to the presentation.

Headers and Footers

Add the date and time, slide numbers, and other footer text to the master slide from the Header and Footer window.

- 1. Select View|Header and Footer... from the menu bar.
- 2. Check the **Date and time** box to add this feature to the slide. Select **Update automatically** to always display the current date and time or click **Fixed** and enter a date that will not change in the text field provided.
- 3. Check the **Slide number** box to add this feature to the slides.
- 4. Click the **Footer** box and add other text to the footer area of the slide.
- 5. Check the **Don't show on title slide** box to hide these features on the title slide of the presentation.
- 6. Click the Notes and Handouts tab to make the same changes to notes and handouts pages.
- 7. Click **Apply to All** to add the changes to every slide or **Apply** to add only to the current slide.

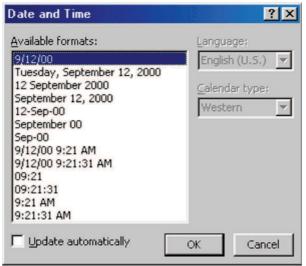
Header and Footer	? ×
Slide Notes and Handouts	
Include on slide	Apply to All Apply Cancel
Language: ⊆alendar type: English (U.S.) ▼ Western ▼ Fixed Slide number Footer	Preview
Don't show on title <u>s</u> lide	

Slide Numbers

To add the slide numbers in a fixed position on the slide, use the **Header and Footer** window detailed above. The slide number can otherwise be added anywhere on the slide by placing the cursor where the slide number should appear and selecting **Insert**|**Slide Number** from the menu bar. The text of the slide number can be formatted just as regular text style.

Date and Time

A date and/or time can also be added using the **Header and Footer** window or anywhere else on the slide. Place the cursor where the date and time should appear on the slide and select **Insert**|**Date and Time** from the menu bar. Select a format from the **Available formats** box and click **Update automatically** if this feature should always be updated to reflect the current date and time. Click **OK** to finish.



CHECK YOUR PROGRESS (7.4)

- 1. What is Slide Master?
- 2. How date and time can be changed on all the slides of a presentation?

7.5 NAVIGATION WITH ACTION BUTTONS

Action buttons : PowerPoint also comes with some ready-made action buttons that you can insert in your presentation and define hyperlinks for. Action buttons contain shapes, such as right and left arrows. Use them when you want to include commonly understood symbols for going to next, previous, first, and last slides. You can use these buttons for a self-running presentation at a kiosk or for a presentation that you plan to publish on your company intranet or the Internet. PowerPoint also has action buttons for playing movies or sounds.

7.5.1 Insert action buttons and hyperlinks for a self-running or Web presentation

Action buttons are ready-made buttons that appear pressed in when you click them during a slide show. If you want the same action buttons to appear on every slide, put them on the slide master.

- 1. Select the slide you want to place a button on.
- 2. To place the buttons on every slide, point to Master on the View menu, and then click Slide Master.
- 3. Point to Action Buttons on the Slide Show menu, and then select the button you want for example, Home, Back or Previous, Forward or Next, Beginning, End, or Return.
- 4. To insert a button with a predefined size, click the slide. To change the size of the button, drag the shape to the size you want. To maintain the shape's width-to-height ratio, hold down SHIFT as you drag the shape.

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5. When the **Action Settings** dialog box appears, click **OK** to accept the proposed hyperlink in the **Hyperlink to** list, or specify the link you want

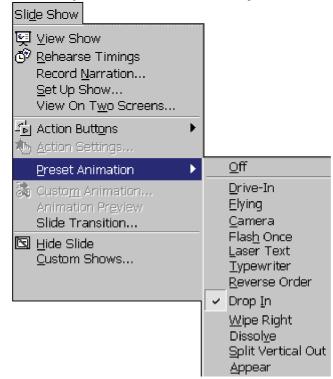
CHECK YOUR PROGRESS (7.5)

1. What are action buttons?

7.6 ADDING ANIMATION EFFECTS

To animate a single object on a PowerPoint slide

- 1. Select the object.
- 2. Choose SLIDE SHOW: Preset Animation.
- 3. Select the animation effect you desire for the selected object





7.6.1 Animated Layers or Slides

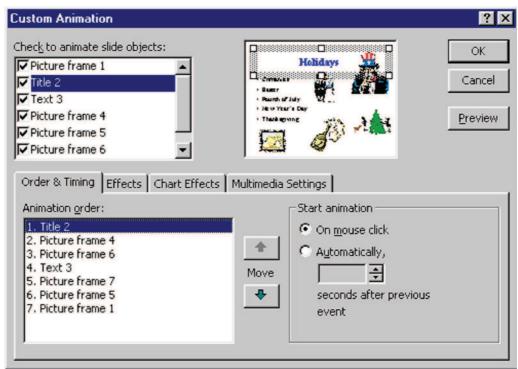
You may find it useful to bring a layered object into a presentation one layer at a time, building it on-screen. To animate a layered object or to animate each object on a slide,

- 1. Choose SLIDE SHOW: Custom Animation. (You must be in Normal, Outline, or Slide View.)
- 2. In the Custom Animation dialog box, each object is identified in the Check to animate slide objects list.
- 3. Click in the object's checkbox to animate that object. It will be added to the Animation order list.

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- 4. To change the order that the animated objects appear, select the object in the Animation order list, then click the up or down arrow to move the object through the list.
- 5. Choose whether the object appears only on a mouse click or after a specified number of seconds.

To choose other effects such as sound effects and how the object appears on the slide during the onscreen presentation, click on the Effects tab.



Layer Animation dialog box

To animate text,

- 1. Click on the Effects tab.
- 2. In the Introduce Text section, from the drop-down box, choose whether the text is introduced all at once, by word, or by letter.

To animate charts click the Chart Effects tab. You can choose to introduce the data by series, categories, or elements.

CHECK YOUR PROGRESS (7.6)

- 1. In which view mode you can create customized animation on a slide?
- 2. How do you change the order of animated objects appear on a slide?

7.7 START A SLIDE SHOW FROM WITHIN POWERPOINT

To start a slide show from within the power point do any of the following:

- Click **Slide Show** at the lower left of the PowerPoint window.
- The Slide Show menu, click View Show.
- The View menu, click Slide Show.
- Tress F5.

7.7.1 About Self-Running Presentations

Self-running presentations are a great way to communicate information without having to have someone available to run a slide show. For example, you might want to set up a presentation to run unattended in a booth or kiosk at a trade show or convention. You can make most controls unavailable so that users can't make changes to the presentation. A self-running presentation restarts when it's finished and also when it's been idle on a manually advanced slide for longer than five minutes.

When designing a self-running presentation, you'll want to keep the setting in mind — for example, whether the booth or kiosk will be in an unmonitored public place or whether supervision will be available. The answer will help you determine what elements you add to your presentation, how much control you give users, and what steps you need to take to prevent misuse.

To set up a self-running show: open the presentation, click **Set Up Show** on the **Slide Show** menu, and then click **Browsed at a kiosk (full screen)**. When you click this option, **Loop continuously until "Esc"** is automatically selected.

Options you might want to consider when designing a self-running presentation include:

Automatic or manual timings : You can set up a slide show to run by itself with automatic timings, or you can set it so that users can move through the show at their own pace by using the mouse to click action buttons. Mouse clicks are ignored unless they're on objects you've created hyperlinks to.

Set slide show timings

- 1. In normal or slide sorter view, select the slide or slides you want to set the timing for.
- 2. On the Slide Show menu, click Slide Transition.
- 3. Under Advance, click Automatically after, and then enter the number of seconds you want the slide to appear on the screen.
- 4. To apply the timing to the selected slides, click Apply.

To apply the timing to all the slides, click Apply to All.

5. Repeat the process for each slide you want to set the timing for.

Hyperlinks : You can use hyperlinks to move through the slide show or to jump to other slides and programs.

Voice narration : You can add recorded narration that plays with your slide show.

ActiveX controls : You can use the ActiveX controls that come with Microsoft PowerPoint to create a response slide in your show. For example, you can add a text box in which people can enter their names and addresses to receive further information.

CHECK YOUR PROGRESS (7.7)

- 1. How you can stop a self-running show?
- 2. What is Slide sorter view?

7.8 PRINTING

Print		? ×
Printer <u>N</u> ame: Lexmark Optr Comment:	a 5 1650	Properties
C Custom Show:	ent slide C Selection	Copies Number of copies:
Print what:	Handouts Slides per page: 6 💌 Order: © Horizontal	1 2 3 4 5 6
Grayscale Pure black and white Include animations	Scale to fit paper Frame slides Print hidden slides	OK Cancel

Select File|Print from the menu bar to print the presentation.

Print range - Select **All** to print all the slides in the presentation, **Current slide** to print only the current slide, or enter slide numbers in the **Slides** field to print only certain slides.

Copies - Enter the number of copies of each slide specified in Print range and check the **Collate** box if necessary.

Print What -

- Slides prints a full-page slide on each page.
- *The Handouts prints as many slides as you designate on each page.*
- The Notes Page prints one slide with that slide's notes on each page
- *•* **Outline view** prints the outline of the presentation
- Click OK to print.

7.9 USING E-MAIL TO SEND PRESENTATIONS IN MICROSOFT POWERPOINT

To send a presentation in e-mail directly from PowerPoint, you simply click **E-mail**. A message appears that allows you to send your PowerPoint work in one of two ways:

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Send a copy of a single slide When you send a copy of a slide in e-mail, the slide is sent in HTML format as the body of the message. Recipients can view your slide in any e-mail program that can read e-mail messages in HTML format. Recipients do not need PowerPoint installed on their computer in order to view the slide, although there are other system requirements for viewing, as well as for sending, routing, or posting a slide or presentation. When you send a copy of a slide in e-mail, the message header is displayed in PowerPoint to allow you to address the message and to set any message options you want.

🖃 <u>S</u> end this S	lide 🕕 📴 🕵 🚦 🕹 💘 🔝 Options Bcc From
📴 То	
📴 Cc	
Subject:	First Quarter Results

After you send the slide, the message header closes and the presentation remains open. The recipient list, along with any message options and attachments, is saved with the presentation. If you send a copy of the slide again, the information you entered previously will be displayed in the message header. This is useful if you send recurring updates of a slide to the same people.

If a recipient is using Microsoft Office 97 or earlier, it is better to send a slide as an attachment in an e-mail message. If you send a slide as the body of the message, the formatting will be lost.

7.9.1 Send a Copy of an Entire Presentation

To send an entire presentation, you must send it as an attachment in an e-mail message. You might also want to do this if the recipient you are sending your work to doesn't have an HTML-compatible e-mail program. To view a presentation you send as an attachment, recipients need PowerPoint 97 or later.

CHECK YOUR PROGRESS 7.8 AND 7.9

- 1. What are the options available in "Print What"?
- 2. If you send a slide to any one, In which format this slide will reach to the recipient?

7.10 PUTTING THE PRESENTATION ON THE WEB

Placing a presentation on the Web can be accomplished in one of two ways:

- 1. Place the presentation file itself (the .ppt file) on a web server. In this option, you would place a hyperlink on a web page, referencing the PowerPoint file, or simply tell your audience the address to access the presentation file.
- 2. For example, assume that your PowerPoint presentation is called "snow.ppt." You can create a link to snow.ppt from an existing or new web page. Depending on how your reader's computer is configured, the presentation either opens directly in PowerPoint or prompts the reader to save the file. This option gives the reader full control over a copy of the presentation, exactly as you created it.
- 3. The second option is to use PowerPoint's HTML wizard to prepare an HTML version of the presentation that you can then place on a web server. This option is presented next.

7.10.1 HTML Wizard

To save your presentation as HTML, choose FILE : Save as Web Page.

The bottom three choices allow you to specify the file type, file name, and the page title. You should leave the type set to Web page (*.htm, *.html).

Ę	Save a copy and customize its contents	<u>P</u> ublish
Page title:	IUPUI UNIVERSITY LIBRARY A Librar	<u>C</u> hange Title
File <u>n</u> ame:	CHICAGO.htm	-
Save as <u>t</u> ype	Web Page (*.htm; *.html)	-

Save as Dialog Box for Web Pages

PowerPoint will pick up the first line of text in the presentation and set the HTML TITLE tag to that text. It is unlikely that is what you will prefer. The TITLE information is that which displays in the colored band at the top of the browser window. It should not be confused with your heading or page contents title.

To make additional choices for your web pages, click Publish. In the Publish as Web Page dialog box, you can choose

- To publish the entire presentation or a range of slides.
- Tisplay any speaker's notes you may have in your presentation.
- Specify the browser versions you wish your presentation to be viewable by. Choosing Microsoft Internet Explorer or Netscape Navigator version 3.0 or later will keep your presentation accessible to the greatest number of readers. Choosing the IE 4.0 version will not produce acceptable results in Netscape Navigator.

Publish as Web Page
Publish what?
Image: Complete presentation
C Slide number 🗧 🕂 through 🚍
C Custom show:
Display speaker notes
Browser support
Microsoft Internet Explorer 4.0 or later (high fidelity)
C Microsoft Internet Explorer or Netscape Navigator 3.0 or later
C All browsers listed above (creates larger files)
Publish a copy as
Page title: PowerPoint Presentation Change
File name: C:\Docs\PowerPoint\Regis.htm
Open published Web page in browser Publish Cancel

Publish as Web Page Dialog Box

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When you make selections not supported by the reader's web browser, they will see a message to that effect when selecting the presentation and will be asked if they wish to continue. The static presentation slides will show, but any special effects not supported by the browser will be ignored.

Click Web Options for more selections. Click the General tab to choose to add navigation controls (such as forward, back, home) and their colors, to display any slide animation you may have used (slide transitions, not movement on the slide itself), and to resize slides dynamically according to the size of the reader's browser window.

The Pictures tab allows you to specify the default browser window (800x600 is the current standard). To create the web files, click Publish.

7.10.2 Testing the Web Presentation

To test the web files, start your web browser, and choose FILE : Open Page. Browse for the folder where you stored the web presentation. Unlike previous versions of PowerPoint, PowerPoint 2000, creates a single "control" file name with the name you specified in the Save as Web Page dialog box. All additional files will be placed by PowerPoint in a folder with the same name. DO NOT try to rename either the control file or the folder, or to move the control file into the folder. PowerPoint won't know how to find the files for your presentation. When you have located the folder containing the control file, and open it, the presentation will open as a local file for you to review.

The web presentation looks similar to the sample below. Notice that it looks a great deal like the PowerPoint Normal View with the list of slide titles in the left pane, the slide graphic in the upper left pane, and the presentation navigation buttons in the lower right pane. The left pane demonstrate another reason why it is important to title each of your slides in the Title Placeholder.



Remember that you will still have to move your PowerPoint/HTML files to a web server in order to make the presentation available for public use.

- 1. What is HTML Wizard?
- 2. Is it necessary to publish entire presentation?

7.11 SUMMARY

PowerPoint allows you to construct presentations from scratch or by using the easy to use wizard.

Hyperlinks cause the selection of an object to result in a move to a new location or the performance of an action.

You can insert clip art or a picture from the Clip Gallery, or you can insert a picture or a scanned photo you import from other programs and locations.

To Change the style of all slides in the presentation by changing the properties on the Slide Master. Each Design Template has its own Slide Master that can be altered. If you create slides from scratch, a consistent style can be added to the presentation by formatting the Slide Master.

An action button is a ready-made button that you can insert into your PowerPoint slides to create links to other slides or documents. These buttons only work when you are viewing your Slide Show, not when you are in design mode. You can use these buttons for a self-running presentation at a kiosk or for a presentation that you plan to publish on your company intranet or the Internet. PowerPoint also has action buttons for playing movies or sounds.

A self-running presentation restarts when it's finished and also when it's been idle on a manually advanced slide for longer than five minutes.

7.12 GLOSSARY

Hyperlink : Hyperlinks cause the selection of an object to result in a move to a new location or the performance of an action.

Template : A template determines the basic structure for a document and contains document settings such as AutoText entries, fonts, key assignments, macros, menus, page layout, special formatting, and styles.

Slide master : PowerPoint comes with a special type of slide called the slide master. The slide master controls certain text characteristics — such as font type, size, and color — called "master text," as well as background color and certain special effects, such as shadowing and bullet style.

Clip Gallery : The Clip Gallery contains a wide variety of pictures, photographs, sounds, and video clips that are ready for you to insert and use in your presentations.

Linked object : When an object is linked, information is updated only if you modify the source file. Linked data is stored in the source file. The destination file stores only the location of the source file and displays a representation of the linked data.

Embedded object : When an object is embedded, information in the destination file doesn't change if you modify the source file. Embedded objects become part of the destination file and, once inserted, are no longer part of the source file.

7.13 FURTHER READINGS

- The Basic Power Point 2000 by RSU Heathcate
- The Microsoft Power Point 2000 step by step by Katherine Pinard, Microst Press
- Care Easy Micosoft Power Point 2000 by Laura Stewart, Que Series

7.14 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to Check Your Progress 7.2 and 7.3

- 1. (a) slide master
 - (b) embed, link
- 2. A hyperlink is a hypertext link or a hypermedia link that contains links to other text documents, allowing the reader to skip around and read the documents in various order.
- 3. An embedded object is linked to the original data and is updated when the original data is updated or changed.

Answers to Check Your Progress 7.4

- 1. Slide Master is a special kind of a slide. If you want an object, such as a company logo or clip art, to appear on every slide in your presentation (except the title slide), place it on the Slide Master. All of the characteristics of the Slide Master (background color, text color, font, and font size) appear on every slide.
- 2. Place the cursor where the date and time appear on the slide and select **Insert**|**Date and Time** from the menu bar. Select a format from the **Available formats** box and click **Update automatically** if this feature should always be updated to reflect the current date and time. Click **OK** to finish.

Answers to Check Your Progress 7.5

1. An action button is a ready-made button that you can insert into your PowerPoint slides to create links to other slides or documents. These buttons only work when you are viewing your Slide Show, not when you are in design mode. You can use these buttons for a self-running presentation at a kiosk or for a presentation that you plan to publish on your company intranet or the Internet. PowerPoint also has action buttons for playing movies or sounds.

Answers to Check Your Progress 7.6

- 1. Normal, Outline, or Slide View
- 2. To change the order of the animated objects appear, select the object in the Animation order list, then click the up or down arrow to move the object through the list.

Answers to Check Your Progress 7.7

- 1. By pressing "Esc" key.
- 2. In slide sorter view, you see the entire presentation displayed in miniature. You can add slide transitions and preview slide transitions, animations, and timings.

Answers to Check Your Progress 7.8 and 7.9

- 1. Slide, Handouts, Notes Page and Outline
- 2. as a HTML page.

Answers to Check Your Progress 7.10

- 1. A wizard that can be used to convert your presentation into HTML format.
- 2. No. We can publish the entire presentation or a range of slides.

7.15 UNIT-END QUESTIONS

- 1. What is the advantage of Slide Master? How we can add action buttons in a presentation?
- 2. What are the basic printing options provided by MS PowerPoint?
- 3. What do you mean by term "Publishing of Web Pages"? How you can publish a presentation from within Power Point?

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Unit VIII : MS-ACCESS 2000

Structure of the Unit

- 8.0 **Objectives**
- 8.1 Introduction to MS-Access 2000
- 8.2 New Features in MS-Access 2000
- 8.3 Exploring Access 2000
- 8.4 Setting Up a Database
 - 8.4.1 Exploring Tables
 - 8.4.2 Viewing Tables
 - 8.4.2.1 Datasheet view
 - 8.4.2.2 Design view
 - 8.4.3 Creating tables
 - 8.4.3.1 To Create a Table using the Table Wizard
 - 8.4.3.1.1 Navigating in the table
 - 8.4.3.1.2 To Move within a Record
 - 8.4.3.1.3 To move from record to record
 - 8.4.3.2 Changing a Table in Design View
 - 8.4.3.2.1 To add a field to a table
 - 8.4.3.2.2 To rename a field to your table
 - 8.4.3.3 Setting a Data Type
 - 8.4.3.3.1 To set a data type
 - 8.4.3.3.2 Setting field properties
 - 8.4.3.4 To add data to a table
 - 8.4.3.5 Deleting data from a table
 - 8.4.3.6 Sorting records
 - 8.4.4 Exploring Forms
 - 8.4.5 Creating Forms
 - 8.4.5.1 Navigating a form
 - 8.4.5.1.1 Finding records in a form
 - 8.4.6 Exploring Reports
 - 8.4.6.1 AutoReport
 - 8.4.6.2 To create a new report
 - 8.4.6.3 To insert a picture in a report
 - 8.4.6.4 To adjust the position of the picture
 - 8.4.6.5 Report Printing
- 8.5 Summary
- 8.6 Glossary
- 8.7 Further Readings
- 8.8 Answers to the self-learning exercises
- 8.9 Unit-end questions

8.0 OBJECTIVE OF THE UNIT

After completion of this unit you will be able to :

- Know about new features of MS-Access 2000
- 🖙 Create a database, table
- The Modify the table by adding new data categories.
- The use a form to add data to your database table.
- Treate and print a new report.

8.1 INTRODUCTION TO MS-ACCESS 2000

Microsoft Access is a computer application used to create and manage computer-based databases on desktop computers and/or on connected computers (a network). Microsoft Access can be used for personal information management (PIM), in a small business to organize and manage all data, or in an enterprise to communicate with servers.

8.2 NEW FEATURES IN MS-ACCESS 2000

Access 2000 has several new and improved features that make it even easier to view and share information from a database. These features include:

- Improved wizards. The wizards help you create tables, forms, and queries and are even more intuitive to use.
- Same AutoCorrect. When you rename a field (column) in a table, the change is automatically updated in all dependent tables, queries, and forms.
- Drag and Drop to Excel. You can export data from Access 2000 to Excel 2000 simply by dragging the Access 2000 objects into Excel 2000 (tables, queries, and so on). This feature is convenient when you maintain information on your students in both Access 2000 and Excel 2000 and you need to transfer some data from one file to another.
- Compact on close. Databases can grow in size quickly and take up space on your hard disk. Access 2000 automatically compresses a database when the file is closed to reduce the file size. This is especially useful when space on the hard disk is limited and you are storing databases for a number of classes.
- Report snapshot. You can create snapshots of Access 2000 reports that can be distributed to a disk, printer, Web page, or e-mail.
- Data access pages. Creating Web pages from the objects in your database is a simple process using this new feature in Access 2000.

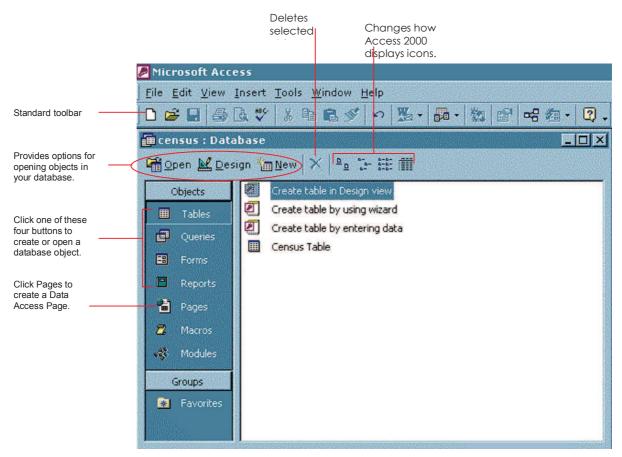
CHECK YOUR PROGRESS 8.1 AND 8.2

- 1. What is MS Access 2000?
- 2. What are the new features of MS Access 2000?

8.3 EXPLORING ACCESS 2000

To use Access 2000 effectively, you should be familiar with the structure of a database. A database consists of a collection of tables, queries, forms, reports, and pages that you use to manage and present data. These components are also called database *objects*. When you build a database, you create as many of these objects as you need and Access 2000 stores them in one database file. Each object you create in the database is dependent on other objects. That is, a query, form, or report draws information from tables, so changing data in any one of these objects changes the data in all of these objects. Because the objects in a database are related to one another, building a database requires careful planning.

In fact, it only makes sense to build a database when you need a flexible system for organizing and analyzing data. For example, when you are teaching three sections of one subject and you want to grade all three classes on one curve, it makes sense to store your records in a database instead of in an Excel 2000 workbook. You can store information on each class in separate tables and connect them by a common field. Then you can use a query to analyze student performance in all three classes.



There are seven main components of a database in Access 2000:

- Tables. Use tables to store database information.
- Forms. Use forms to enter or edit the information in your tables. Forms let you view one record at a time.

- **Reports**. Use reports to deliver a professional presentation or written report to your class.
- *^{ce}* **Queries**. Filter data so that you retrieve selected records or fields from the database.
- Pages. Create HTML pages from a database quickly and efficiently.
- The Macros. Automate tasks that you perform on a regular basis in a database.
- The Modules. Automate a group of related procedures in Access 2000.

You create and open database objects from the Access 2000 database window, which lists the objects in the left pane of the window. When you click on one of the first five items, the right pane gives options for creating the object, and it shows all existing objects of that type in the database. You can open an object by double-clicking it.

You first learn about tables in Access 2000. Later, you learn about forms, queries, reports, and pages. Macros and modules are features for advanced Access 2000 users.

CHECK YOUR PROGRESS 8.3

Fill in the blanks :

- 1. Use ______ to store database information.
- 2. _____ can be used to automate tasks that you perform on a regular basis in a database.
- 3. $\underline{}$ can be used to filter data so that you retrieve selected records or fields from the database.

8.4 SETTING UP A DATABASE

To get started with Access 2000, you can create a database for a class project to conduct a census. Students can gather information from interviews and store it in a database, then compare the results with city census results from the past four decades. They can use Access 2000 queries to analyze how demographics vary in different neighborhoods and how they have changed over time.

To create a database

- 1. Start Access 2000.
- 2. In the Microsoft Access dialog box, select Blank Access 2000 database and click OK.
- 3. In the **File New Database** window, decide where you want to store the database on your computer and name the database *Student Census*.
- 4. Click Create.

When you click **Create**, the Student Census database opens. You can now create and store tables, forms, reports, and queries in the census database.

8.4.1 Exploring Tables

The first object to add to your database is a table. You use tables to store all the data in the database. Each row of a table contains one record. Records are made up of *fields* that contain a particular piece of data in the **148**

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table. For example, when you create the census database, all the data for one household will be stored in a record. One field in the table might specify the number of people in the household or the neighborhood where the household is located.

Every table in Access 2000 must have a field that uniquely identifies each record in the table. This field is called the *primary key*. You can recognize the primary key in a table by the ID appended to it. The primary key ensures that you can retrieve data accurately and efficiently when you pull information from the database. Access 2000 automatically assigns a primary key to each of your records for you when you use an Access 2000 Table Wizard.

8.4.2 Viewing Tables

There are two ways to view your table: *Datasheet view* and *Design view*. When you double-click a table object from the Access 2000 database window, it opens in Datasheet view.

Use Datasheet view when you want to view, add, or delete data from a table. You can also reformat your table to change the size and order of the field columns in this view.

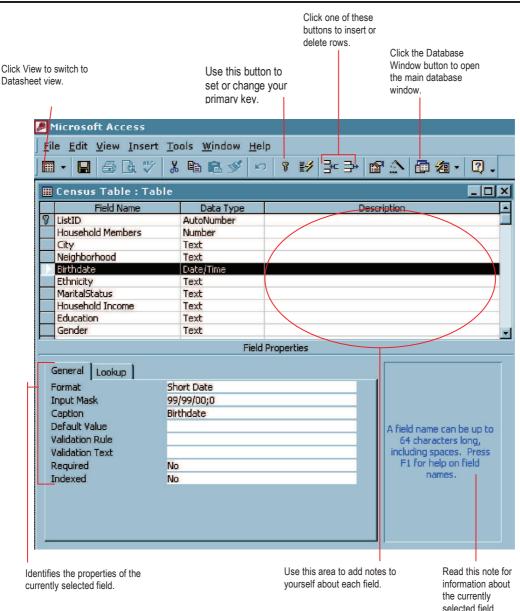
8.4.2.1 Datasheet View

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				scending and ig to sort reco field.		Click New Re Delete Recor or <mark>d</mark> elete reco	d to add		
B M	licroso	ft Access							
File	e Edit	View Insert	Format Records	Tools Wind	low Help				
	File Edit View Insert Format Records Tools Window Help ▲ • 🖬 🖨 Q 🂖 & 🖻 🖻 🚿 ∽ 🍓 🍂 XI 🍞 酒 ▽ 🏘 🕨 🚿 🗗 名 • Q -								
⊞ C	ensus	Table : Table							×
1	List ID	City	Neighborhood	Birthdate	Ethnicity	Income Range	Education	Gender	
	2	Seattle	Phinney Ridge	12/3/60	Caucasian	\$40,000-\$49,000	HS Diploma	M	
	3	Seattle	Ballard	1/4/52	African American	\$50,000-\$59,000	MA	M	
	4	Seattle	Wallingford	1/22/36	Caucasian	\$30,000-\$39,000	BA	F	
	5	Seattle	Wallingford	12/10/75	Asian American	\$80,000-\$89,000	BS	F	
	6	West Seattle	Admiral	8/15/55	Caucasian	\$70,000-\$79,000	BA	M	
	7	Seattle	Beacon Hill	5/10/60	Mexican American	\$70,000-\$79,000	JD	F	
	8	Seattle	Greenwood	6/12/59	Asian American	\$50,000-\$59,000	PHD	M	-
	9	Seattle	Greenlake	5/12/75	Caucasian	\$10,000-\$19,000	HS Diploma	F	
	10	Seattle	Greenlake	8/20/67	Caucasian	\$50,000-\$59,000	BA	M	
	11	Seattle	Ravenna	7/30/57	Asian	\$30,000-\$39,000	AA	F	
	12	Seattle	Capital Hill	9/15/67	Native American	\$40,000-\$49,000	BA	M	
	13	Seattle	Madrona	5/8/55	Caucasian	over \$100,000	MD	F	
	14	Seattle	Greenwood	12/3/42	Caucasian	\$50,000-\$59,000	BA	Male	
			Laurelhurst	10/1/E/	Caucasian	\$60,000-\$69,000	MA	Female	
	15	Seattle	Laureinurst	12/1/04	Caucasian	400,000-400,000	1816-2	i emaie	

Use these buttons to move to different records in a table.

8.4.2.2 Design View

Use Design view when you want to change the structure of a table. You can add or delete fields, change a field caption or size, or select the type of data you plan to enter into a field in Design view.



8.4.3 Creating Tables

When you open a database, you see three options for creating a table:

- Create table in Design view
- Create table by using wizard
- Create table by en tering data

Unless you are already familiar with Access 2000, you should use the Table Wizard when you create tables.

The Table Wizard helps you to organize data by providing sample fields that you can include in a table and it assigns a primary key to each record. Later, if you need to change the design of your table, you can modify it using Design view. The Table Wizard even provides a sample student table that you may want to build after you have finished designing the census database.

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8.4.3.1 To Create a Table using the Table Wizard

- 1. From the objects box in the Student Census database window, click **Tables**.
- 2. Double-click Create table by using wizard. The Table Wizard dialog box opens.
- 3. Click each of the tables in the **Sample Tables** list and scroll through the **Sample Fields** list.

Table Wizard					
Which of the sample tables listed below do you want to use to create your table?					
After selecting a table category, choose the sample table and sample fields you want to include in your new table. Your table can include fields from more than one sample table. If you're not sure about a field, go ahead and include it. It's easy to delete a field later.					
Business	Sample Fields:	Fields in my new table:			
C Personal	EmailName 🔺 Birthdate	City StateOrProvince			
Sample Tables:	LastMeetingDate	>> Birthdate			
Mailing List	ReferredBy	٤			
Contacts Customers	Photograph				
Employees	Notes Menicipatous	<<			
Products	SpouseName				
Orders 🔽	SpoucesInterests	Rename Field			
	Cancel < Back.	<u>N</u> ext > <u>F</u> inish			

- 4. When you see a field that you want to include in your table, click it and then click the single right arrow next to the **Sample Fields** list. If you want to include all of the Sample Fields in one table, simply click the double right arrow.
- 5. If you accidentally add a field that you don't want or add the same field twice, click it in the **Fields in my new table** list and then click the single left arrow to remove it.
- 6. When you are satisfied with the fields in the table, click **Next**. If you need to later, you can modify the fields in the table using Design view.
- 7. The Table Wizard provides a name for the table. Replace this name by typing *Census Table*.
- 8. Make sure the option for the Table Wizard to assign a primary key is selected and then click Next.
- 9. Click **Finish** to exit the Table Wizard.

The census table appears in Datasheet view.

8.4.3.1.1 Navigating in the Table

Before you enter data into a table, you need to know how to move around in it. Depending on what you want to do, you can use the TAB key, the navigation buttons at the bottom of the table, the arrow keys, or the HOME, END, PAGE UP, and PAGE DOWN keys.

8.4.3.1.2 To Move within a Record

- To select any field, click it.
- To move one field to the right, press TAB or use the right arrow key.
- To move one field to the left, press SHIFT+TAB or use the left arrow key.

- To move to the first field of the active record, press HOME.
- To move to the last field of the active record, press END.

8.4.3.1.3 To Move from Record to Record

- To move to the next record, click the single right arrow next to **Record**.
- To move to the previous record, click the single left arrow next to **Record**.
- To move to the first or last record in the table, click the First Record or Last Record icon next to **Record**.
- To move one window down, press PAGE DOWN.
- To move one window up, press PAGE UP.

8.4.3.2 Changing a Table in Design View

When you use the Access 2000 Table Wizard, chances are that you will not be able to design the table exactly as you like it. In the census, for example, you may want to include information on ethnicity and income, two fields that are not available from the Table Wizard **Sample Fields** list.

To modify a table, you must open it in Design view by selecting the table you want to modify from the main window of Access 2000 and then clicking **Design**, or if the table is already open, click the **Design** icon in the left corner of the table window.

8.4.3.2.1 To Add a Field to a Table

- 1. Open the table in Design view.
- 2. Click in the first empty row of the Field Name column.
- 3. Type the field name. Press the DOWN ARROW to move to the next empty row if you want to add another field. A data type will automatically be assigned to the field (which you can change later).
- 4. If the fields are in the wrong order, you can click to select a field and then drag it to where you want it to appear.
- 5. When you have finished adding fields, save and close the table.

To delete a field from the table, select the entire row by clicking the leftmost box and then press the DELETE key.

8.4.3.2.2 To Rename a Field to your Table

- 1. Open the table in Design view.
- 2. Select the row containing the field name you want to change by clicking it.
- 3. Type the new field name in the **Caption** box under **Field Properties**.
- 4. Save and close your table.

With the new AutoCorrect feature, the field name change is automatically updated in all queries, forms, reports, and pages that draw information from the table you have modified.

The data type determines the kind of data that can be entered into a field. It also formats the value you enter for the data type. For example, when you enter numbers in a field with a currency data type, the dollar and decimal signs will be automatically added to the numbers. Some of the more common data types are:

- Text. Any combination of letters and numbers.
- Currency. Numbers and monetary symbols. You can only add numbers to a field with a currency data type.
- The date and the time in 12- hour and 24- hour formats.
- * Yes/No. A single value that indicates yes or no, true or false.

Each field in an Access 2000 table must be assigned a data type. The fields you select from the Table Wizard already have a data type assigned to them. Text is the default data type for any fields you add to your table.

8.4.3.3.1 To set a data type

- 1. Open the table in Design view.
- 2. Click in the data type column of the field for which you want to set a data type.
- 3. Click the arrow in the data type text box to see the drop-down list of data types.

Field Name	Data Type
ListID	AutoNumber
Household Members	Number
City	Text
Region	Text
Birthdate	Date/Time
Ethnicity	Text
MaritalStatus	Memo
Household Income	Number
Education	Date/Time
Gender	Currency
	AutoNumber
	Yes/No
	OLE Object
	Hyperlink
	Lookup Wizard

- 4. Select the data type you want from the drop-down list.
- 5. Save and close the table.

8.4.3.3.2 Setting field properties

Each field in a table is defined by a set of properties. These properties determine the size of the field, how it is formatted, and what it is called, among other things. You can view or change field properties in Design view.

To set field properties

- 1. Open the table in Design view.
- 2. Select the field for which you want to set properties.
- 3. Click the General tab in the Field Properties window.

- 4. Click the property you want to modify and type the appropriate text. Do one or more of the following :
 - Type a number in the **Field Size** box to indicate the maximum number of characters that field can hold.
 - Select Y or N in the Required box to indicate whether data must be entered in this field for every record.
 - Type the caption you want for a field in the Caption box. This caption appears on the tables and forms. If you do not enter a caption, the field name appears as the caption.
- 5. After you have set the field properties, save and close your table.

8.4.3.4 To add data to a table

1. Open the table in Datasheet view.

Press TAB to move from the primary key column to the second column in the table. (You cannot add data to the primary key column. Access 2000 automatically generates the information in this column.)

- 2. Type data in the second column. As soon as you enter a value into the second column, Access 2000 automatically numbers the first record and adds another record to the table.
- 3. Press TAB to move to the next column in the table, and type your data. Unless a field is required, you can leave a field empty.
- 4. When you reach the end of the first record, press TAB to move to the next record in the table.
- 5. Save and close your table.

8.4.3.5 Deleting data from a table

You may add a field to your census table and later discover that you cannot collect data for that field, so you need to delete it from your table. Deleting fields and records in Access 2000 is simple:

- To delete an entire record, make sure you are in Datasheet view and click the record selector in the box at the left of the record and then press the DELETE key. Then click Yes.
- To delete an entire field from a table, go back to Design view and click the field header so that the whole row is selected and then press the DELETE key.

8.4.3.6 Sorting records

Access 2000 displays the information in a table in alphabetical or numerical order based on the primary key. However, you can sort information so that it appears in an order that works better for you. For example, if you want to group people by educational level in the census table, you can select that field and then click one of the sort buttons. Access 2000 alphabetizes the records according to the data in that field.

To sort records

- 1. In Datasheet view, click the header of the field to sort by so that the whole column is selected.
- 2. Click the **Sort Ascending** button **2** or the **Sort Descending** button **3** on the Datasheet toolbar.
- 3. Save and close the file.

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8.4.4 Exploring Forms

Forms make it easy for you to access information in a database. With a form, you can focus on one record in a database at a time, and you can view, add, and delete data from that record. In addition, you can customize a form to view and print information in a style you like. You can create a simple multi-page form that looks like this:

	-8	Census Table	_ D ×	1
Change the color		Seattle Census Information	<u> </u>	
of the font, background, or border for any	►	Individual Information Household Information	_Create a multi-page	
ext box in the		Birthdate 12/1/54 Education	MA	form when you want to organize fields into sub-categories.
		Ethnicity: Caucasian Gender	Female	into sub-categories.
				1
	Re	cord: 14 4 14 14 14 14 of 14 4	►	

8.4.5 Creating Forms

The easiest way to build a form is by using the Form Wizard. The Form Wizard lets you choose the layout of records in the form and also the background, color, and format of the display. The Form Wizard lets you preview the layout and style options when you create a form.

To create a form

- 1. From the list of objects in the census database window, click Forms.
- 2. Double-click Create form by using wizard.
- 3. Under Tables/Queries, select the table the form will be based on from the drop-down list.
- 4. Select the fields that you want to appear in the form by clicking each one and then clicking the arrow that appears to the right of the **Available Fields** list. If you want all the fields from the table to appear in the form, click the double arrow and then click **Next**.
- 5. Select the layout for your form by clicking Columnar, Tabular, or Datasheet and then click Next.
- 6. Select the style of the background print you prefer and then click Next.
- 7. Enter a name for the form you have created, then select **Open the form to view or enter information**, and then click **Finish**.

To open a form stored in the database, double-click it in the main database window.

8.4.5.1 Navigating a form

Many of the techniques you used for moving around in tables also apply to forms:

- To add data to a record, click in the box in which you want to add data and then type.
- To delete information, double-click in a box to select the text and then press the DELETE key.
- To move from record to record, press the arrow keys next to **Record** at the bottom of the window.
- To add a record to a form, click the **New Record** icon on the **Form View** toolbar.

To delete a record from a form, select it by clicking the bar on the left (indicating the whole record is selected) and then press the DELETE key. Click **Yes** to delete.

Any changes you make to a record in a form automatically appear in the table that the form draws information from.

8.4.5.1.1 Finding records in a form

At times, you may want to make changes to a record in a database, but the record isn't visible when you open your form. You can quickly find a record, or information within a record, by using **Find** on the **Standard** toolbar.

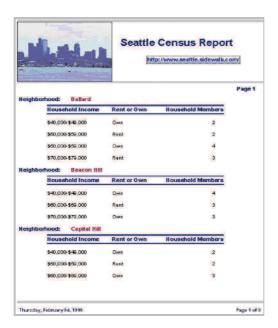
To find a record

- 1. On a form, activate the field for which you plan to enter a value. For example, if you want to find the record for a person with the last name "Smith," click in the **Last Name** box of the visible record.
- 2. Click Find *M* on the Standard toolbar.
- 3. In the **Find What** box, type what you are looking for. For example, if you are looking for Linda Smith's record, select the **Last Name** field, then type *Smith*.
- 4. Click Find Next to begin the search, and continue until all matches have been displayed.
- 5. Click **Close** to stop the search and close the window.

8.4.6 Exploring Reports

After you and your students have added information to the census database, you may want to report on some aspect of the data you have collected. Reports let you customize the display of information from the database. You can select the data you want to include and then select the report layout from a variety of design and format options. You can insert pictures, add headers, footers, and page numbers, group the information, and change the background colors, among other things.

8.4.6.1 AutoReport



A report provides an object used to print a database records. Although you can print tables, queries, or forms, reports are customized to be printer friendly. They can perform and display calculations. Once again, Microsoft Access provides wizards to quickly create reports.

The simplest way to create a report is by using the AutoReport feature available either from the New Object button on the Database toolbar or the New Report dialog box.

When you design your first report, use the Report Wizard. The Report Wizard asks you a series of questions to help you design the data exactly as you want. After you have created the report, you can open it in Design view to modify its structure.

8.4.6.2 To create a new report

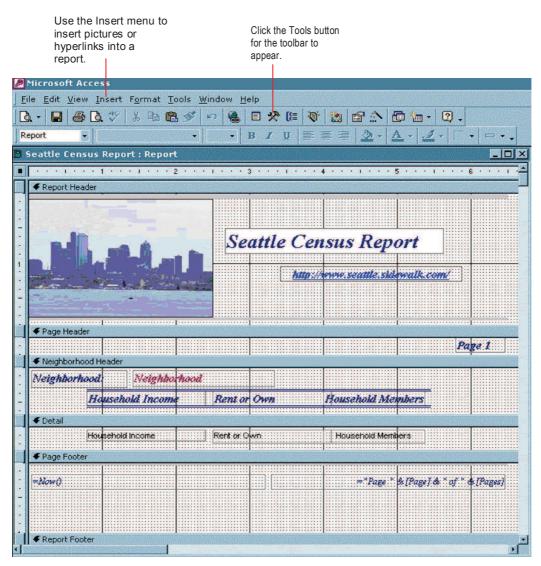
- 1. From the list of objects in the Student Census database window, click Reports.
- 2. Double-click Create report by using wizard.
- 3. Select the table for which you want to create a report from the **Tables/Queries** drop-down list and then double-click the fields in the **Available Fields** list to add them to the **Selected Fields** box. Click **Next**.
- 4. If you want to prioritize the fields, add grouping levels to your report. Do this by clicking a field and then clicking the right arrow to position it at the top of the list. You can select up to four fields to appear at the top of your report.

	Report Wizard				
	Do you want to add any group levels?		ighborhood		
Click these buttons to change the order of the groups.	Household Members Household Income Rent or Own		Household Member		
	Grouping Options	Cancel	< <u>B</u> ack	<u>N</u> ext >	Einish

- 5. To rearrange the grouping, use the up and down **Priority** arrows to move fields. When you have grouped the fields according to your preferences, click **Next**.
- 6. To order the values in a particular field, select the field from the drop-down list by clicking the arrow in the box and then click **Ascending** or **Descending**. You can sort records in up to four fields. After you indicate the sort preferences, click **Next**.
- 7. Select a Layout style from the list of options and then click Next.
- 8. Select a report style and then click Next.

- 9. Type the title you want to appear on the report. The title will also be the file name for the report.
- 10. Make sure **Preview the Report** is selected and then click **Finish**. The report appears in **Print Preview** after you click **Finish**.

If you like, you can enhance the appearance of your report by adding a picture or a hyperlink. To insert objects into a report, you must open it in Design view.



8.4.6.3 To insert a picture in a report

- 1. In Design view, click the section of the report where you want to insert a picture.
- 2. On the **Insert** menu click **Picture**.
- 3. From the drop-down list in the **Insert Picture** dialog box, select the folder containing the picture. Then double-click the file you want to insert.
- 4. Click **OK**. The picture is inserted into the selected area of the report.

Follow this same process for inserting hyperlinks, except click **Hyperlink** instead of **Picture** on the **Insert** menu.

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8.4.6.4 To adjust the position of the picture

- 1. Position the pointer over the picture until the pointer changes into a hand.
- 2. To move the picture, click and drag it. Use the horizontal and vertical rulers to align the picture.
- 3. Select **Print Preview** from the drop-down menu in the left corner to preview the report with the picture in it.
- 4. When you are satisfied with the position of the picture, save and close the report.

To learn more about customizing a report, open the report in Design view then click **Toolbox**. Experiment with the buttons in the toolbox to see what you can do.

8.4.6.5 Report Printing

The report is the favorite object used to print data. As done with the other objects, you can print a report whether it is opened or not. Before printing a report, you must first select or open it. If you want to print a report without opening it, in the Database window, make sure the Reports section is selected. Then, you can locate and right-click the desired report. If you follow this approach, the report would be sent directly to the printer. If you want to control or customize the printing of a report, first select it in the Reports section of the Database window or open it. Then, on the main menu, you can click File -> Print... This would display the Print dialog box, allowing you to select a printer if you have more than one. You can also specify such aspects as the color, the number of copies or the range of records to be printed.

CHECK YOUR PROGRESS 8.4

Fill in the blanks :

- 1. A table can be created in _____ different ways .
- 2. The ______ key uniquely indetifies each record in the table.
- 3. _____ are made up of the fields.
- 4. There are two ways to view the table _____ and _____
- 5. _____ is used to change the structure of the table.
- 6. To move to the first field of the active record, press key_____
- 7. Each field in a ______ is defined by set of properties.
- 8. By using a _____ you can view add and delete data from a record.
- 9. With a ______ you can focus on one record in database at a time.
- 10. Any changes in a record in a form automatically appears in the ______.
- 11. The simplest way to create a report is by using the ______ feature.
- 12. Before printing a report, you must first _____ or _____ it.

8.5 SUMMARY

Unit-VIII

To use Access, or to even plan an Access project, you need a good working familiarity with the Access user interface and the objects that make up a project. The primary display in Access is the Database view. This is where you can see all the objects within your database, either classified by type or clustered within a heterogeneous group. The Database view has an object bar allowing views of other types of objects and a toolbar (below the title bar) allowing you to take actions on the selected objects.

There are seven types of Access objects grouped within the Database view: tables, queries, forms, reports, pages, macros, and modules. Tables hold data. The other objects either display or manipulate that data.

Tables store all data within a relational database such as Access. Access offers three ways to make a table: Design view, by entry example, and by a wizard. Each field within a table must have a specific data type conforming to the type of data it's to hold. Each field also has an array of developer-set options called field properties. The properties for each field depend upon the data type. Primary fields act as unique identifiers for a record within a table. Although you should try to use actual data as a key, using artificial data such as an incrementing AutoNumber field is much better than no key (which should never occur). By linking fields between tables, which is the essence of a relational database, you can later construct various views of data from more than one table. Although other database objects such as forms or queries might do the job better (to some people's view), you can filter, sort, and find data within tables.

Forms present data in a way most people find easier to edit or view than simple datasheets. You can create forms using the AutoForm Wizard, the regular Form Wizard, or using Design view. You can always modify the wizard-generated forms using Design view. Many developers let the wizard make a simple form and then modify the layout using Design view. Forms have up to five bands. These are Form Header, Page Header, Detail, Page Footer, and Form Footer. You can add controls, either bound or unbound, to any of these bands. To add a bound control to a band, click on the field name in the field name list box, and drag it to the band on the form where you want it to appear. To add a non-default (non-text box) control to a form, click in the toolbox on the control type and on the field in the list box, and then click on the form where you want the control to reside.

Reports are to printers what forms are to screens. That's a bit of a simplification, but it does make the point of what each specializes in. The chief operational difference between a report and a form is that a report has no way to edit or enter data and a form does.

The skills you learn in report design or form design are almost 100 percent transferable to the other. Each object has an adjustable design grid, controls that can be bound or unbound, a toolbox, and the critical Properties list box for controls and other objects compromising the report. Additionally, both objects are constructed of bands.

You can use built-in (or user-defined) functions in unbound controls in reports, similar to how you can use them in forms. The function, when applicable, will operate differently depending on the band within which it is located. For example, a control with the COUNT() function in a group band will count occurrences over the group.

Unit-VIII

8.6 GLOSSARY

Data type - The attribute of a field that determines the kind of data the field can contain.

Database - A collection of data and objects related to a particular topic or purpose.

Database Objects - Tables, queries, forms, reports, macros and modules.

Datasheet - Data from a table, form or query displayed in a row-and-column format.

Default - A value or setting that a device or program automatically selects if you do not specify a substitute.

Design View - A window that displays the design of a table, form, report or query.

Embed - Information created in one document and inserted into another document.

Export - Exchanging files between Access and other programs.

Expression - A formula that calculates a value. You can use expressions in forms, reports, tables, queries, macros and modules.

Field - An element of a table that contains a specific type of data. A series of grouped fields make up a record. A collection or records make up a table.

Form - A view of data in a table.

Import - Copying data from another application into Access.

Link - A logical relationship between two or more tables, often based on corresponding or related fields in each of the tables.

Macro - A set of actions used to automate a task.

Module - A collection of statements and procedures stored together as a single named unit.

Object - A table, chart, graphic, equation, or other form of information you create and edit. An object can be

Primary Key - A field, or fields, used to uniquely identify a field.

Record - A collection of data about a particular entity, such as a person, place, event, or some other item. Records are represented as rows in Datasheet view.

Relational Database - A database schema in which information is linked by common fields between several tables.

Report - A document that presents information in a formatted and organized manner.

Table - A database object that consists of a group of rows (records) divided into columns (fields) that contain data.

Wizards - Tools used to assist the user in the creation of objects and controls in Access

8.7 FURTHER READINGS

The following books are suggested for further readings :

Sams Teach Yourself Microsoft Access 2000 in 24 Hours

by Timm Buchanan; Craig Eddy

Sams, Macmillan Computer Publishing

Sams Teach Yourself Microsoft Access 2000 in 21 Days by Paul Cassel

Macmillan Computer Publishing

8.8 ANSWERS TO THE SELF-LEARNING EXERCISES

Answers to Check Your Progress 8.1 and 8.2

- 1. Microsoft Access is a database application on desktop computers and/or on connected computers (a network). Microsoft Access can be used in a small business to organize and manage all data, or in an enterprise to communicate with servers.
- 2. MS Access provides some new features like :

(a) Improved wizards. (b) AutoCorrect the table name in dependent tables, forms etc. (c) Compact the database on close (d) Report snapshot that can be distributed to a disk, printer, Web page, or e-mail (e) Data access pages can be used to Create Web pages from the objects in the database.

Answers to Check Your Progress 8.3

1.	tables	2. macros	3. querries
Answers t	o Check Your Pro	gress 8.4	
1.	3		2. primary
3.	record		4. data sheet view, design view
5.	design view		6. home
7.	table		8. form
9.	form		10. table
11.	AutoReport		12. select, open

8.9 UNIT-END QUESTIONS

1. Create a database and add a table tblFriends with the following fields :

- (a) Name of the friend (b) Address
- (c) Office Phone No. (d) Residence Phone No.
- (e) Mobile No.

Take suitable data types for all the fields and some data in the table by using datasheet view.

- 2. Create a Form to view data from table tblFriend.
- 3. Create a Report to print all the data available with table tbl Friend.

Unit IX : DATA HANDLING IN MS-ACCESS

Structure of the Unit

9.0 Objectives

9.1 Access Help System

- 9.1.1 Examining Ways to Get Help
- 9.1.2 Using the Office Assistant
- 9.1.3 Using the Help Topics Dialog Box
- 9.1.4 The Contents Tab
- 9.1.5 The Index Tab
- 9.1.6 Screen Tips

9.2 Planning and Designing Your Database

- 9.2.1 Relational Databases
- 9.2.2 Review of Relational Database Terms
- 9.2.3 Relationships and Joins
- 9.2.4 The Three Types of Keys
- 9.2.5 Referential Integrity
- 9.2.6 The Three Types of Relationships

9.3 Creating and Using Table Indexes

- 9.3.1 Setting and Changing Indexes
- 9.3.2 Which Fields to Index

9.4 Joining Tables

9.5 Creating Queries

- 9.5.1 Ways to Create Queries
- 9.5.2 The Query Design View
- 9.5.3 Steps in Creating a Query
 - 9.5.3.1 Creating a Basic Query
 - 9.5.3.2 Specifying a Sort Order
 - 9.5.3.3 Specifying Criteria
 - 9.5.3.4 Showing and Excluding Fields
- 9.5.4 Using Advanced Selection Options in Queries
 - 9.5.4.1 Wildcards
 - 9.5.4.2 Creating Queries that Accept Parameters
 - 9.5.4.3 Adding Calculated Fields
- 9.5.5 Working with Subdatasheets
 - 9.5.5.1 Formatting the Datasheet
 - 9.5.5.2 Printing the Datasheet

9.5.5.3 Closing the Datasheet

9.6 Understanding Field Properties

- 9.6.1 Understanding Field Size
- 9.6.2 Input Mask
- 9.6.3 Captions
- 9.6.4 Understanding the Required Property
- 9.6.5 Comparing Format and Input Mask
- 9.6.6 Understanding Format
- 9.6.7 Understanding an Input Mask
- 9.6.8 Creating a Validation Rule
- 9.6.9 Creating Validation Text
- 9.7 Summary
- 9.8 Glossary
- 9.9 Further Readings
- 9.10 Answers to the self-learning exercises
- 9.11 Unit-end questions

9.0 OBJECTIVES OF THE UNIT

- The After completion of this unit you will be able to :
- Control of the second secon
- The second secon
- Create table indexes
- The Able to join tables and make different kind of queries, sub datasheets etc.

9.1 ACCESS HELP SYSTEM

9.1.1 Examining Ways to Get Help

You probably need some help learning more about the program. Online Help systems provide a reference tool and information about various Access tasks. The questions you might have can be answered in many ways, and several online functions are available to help you:

- Office Assistant
- Standard Windows Help menus
- Screen tips

Many of the examples in this chapter make use of the **Northwind** sample database that ships with Access 2000. To open the **Northwind** database, start Access, select the Open an Existing Database option, and double-click the More Files option. The Northwind database default location when Access 2000 is installed with Office 2000 is C:\Program Files\Microsoft Office\Office\Samples. It might be in a different location on your PC.

9.1.2 Using the Office Assistant

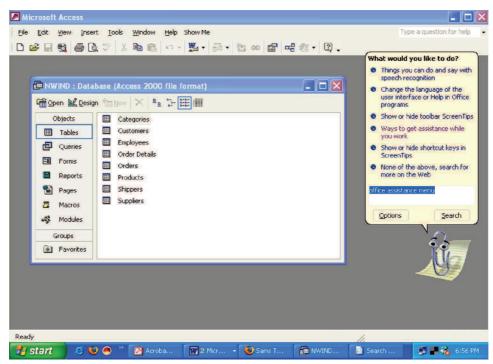


Figure 1: Using the Office Assistant menu.

Data Handling in MS-Access

One of the first things you notice when starting Access 2000 is a new, curious-looking creature in a box at the bottom right-hand corner of the screen. This is the Office Assistant—a feature in all the applications in the Office 2000 suite. His main function is to help you with any questions or problems you might have with any Office 2000 product. To activate the Office Assistant, click on him with your mouse. After you click the Office Assistant, press F1, or select Help, Microsoft Access, a menu is displayed by the Office Assistant listing several options.

Under the heading "What would you like to do?," a few context-sensitive Help topics are listed that are relevant to what you currently are doing in Access. You can view even more topics by clicking the See More topic at the bottom of the list. Below this option is a text box with room for you to type a request or Help question. If you need help but are not exactly sure which Help topic you should select, this is a good place to start. You can type a question using plain English, without relying on technical language. Or, you can just type one or two words related to the Help topic for which you are searching. After you finish typing, click the Search button. You then see Help topics that are related to the question you typed.

9.1.3 Using the Help Topics Dialog Box

The Help Topics dialog box shows you a few ways to get started with Access 2000. This dialog box offers three options:

- Contents: Displays the default view in the table of contents. After you click a topic, a menu of subtopics appears.
- Answer Wizard: Enables you to type in a question in plain English, and displays topics that should help you with your question.
- Index: Displays an alphabetical listing of the Help topics available to you. You can scroll through the list or type the first few letters of the topic on which you want to get help.

9.1.4 The Contents Tab

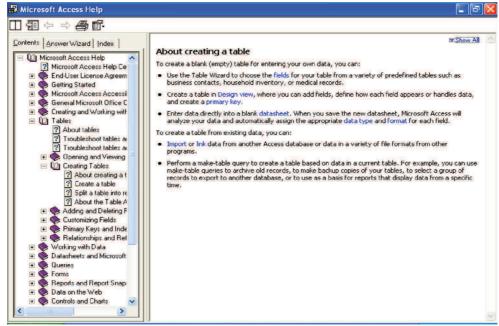


Figure 2: Viewing specific topics indicated by the book and page icons.

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The list of Help topics under the Contents tab is very general. Book icons designate general topics. Double-click a book icon to display more specific topics. You can double-click an open topic to close it. Doubleclicking the general topics leads you to specific Help topics, which are indicated by open-book icons and page icons, as shown in the above Figure.

9.1.5 The Index Tab

You can click the Index tab to search for help alphabetically. Type the first few letters of the help topic for which you are searching, and the menu jumps to the topics that start with those letters. Double-click a topic, or select the topic and click the Display button, to view the help topic.

When a Help topic is displayed, some words appear underlined. If you click these words, which are called *hyperlinks*, you are taken to a new area with more information on that specific word or topic. When viewing these Help topics, you can click the Back button to return to the previous Help topic. You can click Help Topics to return to the main Help menu.

9.1.6 Screen Tips

Screen tips are similar to ToolTips but usually provide more information. *Screen tips* give you a short explanation about the various parts of Access. They consist of text only, displayed in a rectangle. Screen tips provide a paragraph about the topic, whereas ToolTips consist only of a word or two. You use screen tips by clicking the Help icon on the toolbar or choosing Help, What's This? You then click the area of the screen that you want information on, and Access displays a screen tip consisting of a paragraph of text about the item you selected.

CHECK YOUR PROGRESS 9.1

(a) _____ key can be used to invoke the Access help system.

(b) _____ can be used to search for help alphabetically.

9.2 PLANNING AND DESIGNING YOUR DATABASE

The first step in creating any database is to plan the database carefully. This is especially important when you're designing a relational database such as the ones that you can create and view with Access 2000. In fact, having a good design is the single most important factor in creating an effective database. The design must be flexible, logical, and methodical.

Some of the key points that define an effective relational database are

- T is easily adapted to meet future changes in design requirements.
- Tts table layout and relationships are easily understood.
- Tt provides acceptable performance and disk space utilization.

9.2.1 Relational Databases

There are many different qualities which make a database system a relational database. A relational database can best be described as a set of data tables, each modeling a single entity and having certain "key" fields in common with other tables. These key fields establish the relational links between the data tables. The relational

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database model excels in providing the capability to collect, organize, and report on data that might be of a different nature, but is in some way related. This section discusses relational databases in detail by providing definitions for the database terms used when discussing relational databases.

The many table relationships contained in the Northwind sample database are shown in the following figure. The lines connecting the tables represent the joins (that is, relationships) between the key fields in the tables. It should be obvious that the Northwind database is a highly relational database, containing many related tables.

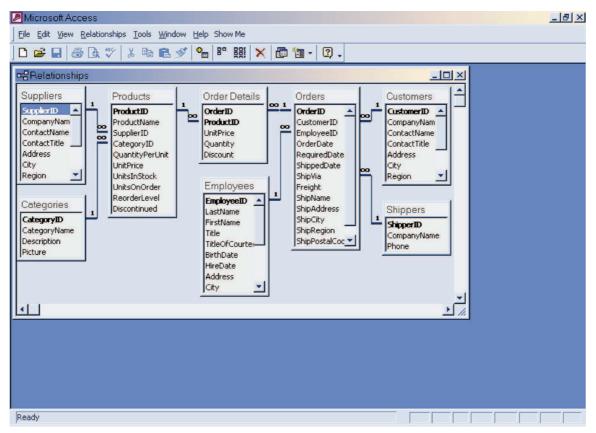


Figure 3: The Northwind database's Relationships window.

9.2.2 Review of Relational Database Terms

Field

The term *field* refers to the basic building block of any database, relational or not. A field is the database's way of representing a single piece of information or an attribute of an object. Fields should always be *atomic*, meaning that they cannot be broken into multiple pieces of information. For example, a field representing a person's entire name is not atomic because it could be broken into First Name and Last Name fields.

Fields are given a data type that defines the kind of data that can be stored in the field. There are many different data types available, including Text and Numeric.

Table

A table is a collection of fields. The data contained in a table is stored as a record. Each table in a database

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should represent a different entity. For example, the **Northwind** database contains separate tables for customers, suppliers, employees, products, and orders. Although these are all related in some way, they are all completely different entities.

Record

A record is a collection of data for a specific object or table. In the Northwind database, a customer record is the row of data stored for each customer. Each record in the database should contain a unique piece of information, representing one specific instance of the entity represented by the table. In the Customers table, for example, each record should represent one and only one customer.

Because a relational database does not store or retrieve records in any set way, there is no physical order to the records. In other words, there is no concept of a record number as there is in many other database systems.

Key Field

A field is said to be a key field when it can be used to relate two or more tables to each other. The keys are fields that these related tables have in common. The data values stored in key fields are identical between related records in the related tables. For example, in the Orders table, CustomerID and EmployeeID are fields that relate a specific order to a customer and an employee, respectively. Therefore, if an order record is created for Around the Horn (a customer in the Northwind database), the CustomerID field in the Orders record will contain the data AROUT. This, of course, is the CustomerID value found in the Customers table for Around the Horn.

Keys are classified as either **primary, foreign**, or **composite**, depending on their use and the fields that comprise them. Primary keys uniquely identify a record. Foreign keys point to a related record in another table. Composite keys are those made up of two or more fields.

9.2.3 Relationships and Joins

A relationship between two tables indicates that the two tables share a common key value. The order record discussed in the preceding section is related to a customer. The fact that the order has a value in its CustomerID field establishes a relationship between this particular order and Around the Horn's record in the Customers table.

A join is a sort of virtual table created when the user requests information from different tables that participate in a relationship. The key fields are used to find the matching records in the different tables participating in the join.

A more advanced form of a join is called the self-join. This is a join in which a table is joined to itself based on a field or combination of fields that have duplicate data in different records. This can be used in the Northwind Employees table, for example, to create a join among the employees using the ReportsTo and EmployeeID fields. The ReportsTo field might contain the EmployeeID of another employee's record in the table. This EmployeeID would be the EmployeeID of the employee the current employee reports to.

9.2.4 The Three Types of Keys

Primary Keys

Each table in a relational database should have a unique identifier that consists of one or more fields. Without this unique identifier, there is no way to define relationships between tables. The field or group of fields that is the unique identifier for a table is called the table's primary key. The selection of which field or fields to use as the primary key is one of the most important decisions made when designing a database.

The primary key must be able to uniquely identify each record in the table and, therefore, must never have duplicated values. Using an AutoNumber field guarantees that a duplicated value is never inserted in the primary key field. Access automatically inserts a unique value in the field when a record is inserted into the database. Access also prevents you from modifying or deleting the values in this field after they are inserted.

Composite Keys

There are often cases in which a record cannot be uniquely identified by a single field. In these cases, a composite key is used. A composite key is the group of fields that together uniquely identify a record. A composite key is also the primary key for that table. Although duplicate values are allowed within any of the fields of a composite key, there cannot be duplicated values across all the fields that make up the composite key.

An example explains this concept in a clearer way. The OrderDetails table is used to relate a record in the Orders table to a record in the Products table. Each line item of an order references a specific product. The OrderDetails table has a composite key consisting of its OrderID and ProductID fields. Using this table and its composite key, you can create relationships between many orders and many products. A specific OrderID can appear many times in the OrderDetails table, as can a specific ProductID. However, the same values for both OrderID and ProductID in a record cannot be repeated within the table. Each order can have only one OrderDetail for each product on the order. This is illustrated in the following Table.

OrderID	ProductID
1	2
1	3
2	2
2	3
2	4

Foreign Keys

A foreign key is a field (or group of fields) in one table that references the primary key field or fields of a related table. For example, the Orders table has a CustomerID and an EmployeeID field. These fields are foreign keys in the Orders table but are the primary keys of the Customers and Employees tables, respectively. The **170**

Relationships window graphically shows the relationship between foreign and primary keys. It is the relationship that actually allows Access to join data between the tables.

9.2.5 Referential Integrity

The term referential integrity refers to the capability to maintain links among tables. Basically, maintaining referential integrity means that every foreign key value stored in a table must map to a corresponding record in the table that has this foreign key as its primary key.

For example, if an order was created and an invalid value was placed in the CustomerID field, there would be no corresponding record in the Customers table. This Orders record would be called an "orphan" record because it has no "parent" record in the Customers table. Allowing this condition would violate the rules of referential integrity and would render your data practically useless.

Access can be made to enforce referential integrity and thus avoid this situation. This mechanism is part of the Relationships window (select Relationships from the Tools menu). To change the referential integrity settings for a relationship, select the relationship by clicking the line that joins the two tables and then use the Relationships, Edit Relationship menu.

9.2.6 The Three Types of Relationships

The real power of a relational database is the capability to combine primary and foreign keys to establish relationships between data tables. There are three types of relationships that can be created using the relational database model. Essentially, the type of relationship created between tables determines the format of the data retrieved when the tables are joined.

One-to-One

The simplest type of relationship is the one-to-one relationship. This means that for every record in one of the tables in the relationship, there is a single corresponding record in the other table that takes part in the relationship. Because these tables could easily be combined into a single table (thus avoiding having to join the two tables), this relationship is used only in special circumstances.

One-to-Many

A one-to-many relationship is a relationship in which a record in one table has one or more related records in another table. The one-to-many relationship is by far the most common relationship used in a relational database. Strictly speaking, the Northwind database contains nothing but one-to-many relationships.

In the Northwind database, there is a one-to-many relationship between the Customers table and the Orders table. Each customer can have more than one order related to it. The key field CustomerID is used to join the tables.

Many-to-Many

A many-to-many relationship is a relationship in which many records in one table can have many records in another table. The strict definition of relational databases does not allow for many-to-many relationships.

Instead, an intermediate table is created that holds the primary keys from the two original tables as foreign keys. This creates two one-to-many relationships for the intermediary table—one for each table in the many-to-many relationship.

CHECK YOUR PROGRESS 9.2

- (a) A table is a collection of _____.
- (b) Three types of keys are _____, ____ and _____.
- (c) The term ______ refers to the capability to maintain links among the tables.
- (d) A ______ relationship is a relationship in which a record in one table has one or more related records in another table.

9.3. CREATING AND USING TABLE INDEXES

Access uses indexes as road maps to find your data in a timely and efficient manner when you run a query or report or simply browse your tables. Indexes are similar to the index in the back of this book that you use to search for a particular topic or word. If you enter a lot of records and then run a query or a report based on the fields in one of your indexes, Access can more quickly handle the output of the data.

9.3.1 Setting and Changing Indexes

You create indexes on a table-by-table basis. To create an index for a table in a database using the desktop database store, perform the following steps:

- 1. In the Database window, select the table and click the Design button.
- 2. Click the Indexes button on the toolbar (the one with a few lines next to a lightning bolt). Even if this is a brand new table, Access might have created some indexes for you. For example, the primary key is always used as an index and will be listed on the Indexes dialog box.
- **3.** Click an empty row in the Index Name column. Type a name for the index. The name must be unique on the current table.
- 4. In the Field Name column, click the arrow and select a field to include in this index.
- 5. If the index will include multiple fields, click in the Field Name column of the row immediately following this one and select the next field's name. Do not enter anything for the Index Name column on this row. Repeat this step for each field in the index.
- 6. If you have additional indexes to define, return to step 3. Otherwise, click the Close button on the Indexes dialog box to return to the Design view window. Be sure to save the table design (Access will prompt you if you attempt to close the Design view window without having saved the changes). Access will create a default name for the index and put the focus in the Column Name column. Select the name(s) of the field(s) to be used in the index.

9.3.2 Which Fields to Index

It is not always obvious what types of fields should be indexed. Some data types, such as text, seem to always perform better with an index. AutoNumber fields and other nontext fields don't seem to gain much benefit

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from indexing. As a rule of thumb, you should index any Number or Date/Time fields that are frequently used as search criteria in queries. Some database pros feel that you cannot have too many indexes on a table. It's important to realize, however, that every index placed on a table must be updated whenever records are added, modified, or deleted.

9.4 JOINING TABLES

Access 2000 uses relationships to relate the data within various tables, especially when they're used in queries. To establish a relationship between two tables:

- 1. Close any tables you might have open and activate the Database window.
- 2. Click the Relationships button on the toolbar or click the Tools menu and select Relationships. Depending on your database, you might or might not have some relationships already established.
- 3. If either of the tables that are involved in the relationship is not visible in the Relationships window, click the Show Table button on the toolbar (a yellow plus symbol). If you prefer to use the menu, click the Relationships menu and then select Show Table.
- 4. Double-click the two tables. This adds them to the Relationships window. Click the Close button.
- 5. Drag the tables around so they are side-by-side and easier to work with.
- 6. Now the fun part: Select the table that contains the foreign key field. Click the foreign key field and drag this over to the primary key field of the related table. Drop it right over the primary key field. Access displays the Relationships dialog box.
- 7. Verify that the fields from each table are correct. Using the information from your database design, set the various properties of this new relationship.
- 8. Click the Create button and the Save button on the toolbar. Your new relationship is now safely embedded into your database.

CHECK YOUR PROGRESS 9.3 AND 9.4

State whether the given statement is true or false :

- (a) Indexes can be used to find your data in a timely and efficient manner when you run a query or report or retrieve the data from the table.
- (b) You should not index any Number or Date/Time fields that are frequently used as search criteria in queries.
- (c) To improve the performance of the table we should not make so many indexes on a table.
- (d) To make a relationship between two tables there must be a common field in both the tables.

9.5 CREATING QUERIES

Queries are used to retrieve specific data from the tables in the current database, from other data sources, and even from other queries. Such queries are called select queries. Queries can also perform actions upon the data in your tables, such as updating or deleting specific records. These queries are called action queries.

A *select query*, the most common kind of query, retrieves data from one or more tables (or other queries). The resulting data can be displayed in a datasheet or used as the data source for forms, reports, or data access pages.

An *action query* is a query that's designed to perform some sort of operation on the data in a table or tables, or to modify a table's structure. There are four kinds of action queries: the delete query, which is used to delete rows from the database, the update query, which is used to update data in the database, the append query, which is used to add new rows to a table or tables, and the make-table query, which creates a new table using data in existing tables.

9.5.1 Ways to Create Queries

Like most tasks in Access 2000, you have your choice of means to create new queries. Access provides five different mechanisms for creating queries:

Design view :- This is the manual means of creating a query. The Design view method provides you both a QBE Design Grid (known, confusing as it is, as the "Design view" on the View menu and toolbar button) and a SQL View. The Design Grid is a graphical tool for creating queries. The SQL View enables you to fine tune the SQL code that underlies the query.

Simple Query Wizard :- This wizard enables you to create the most basic of select queries. About all this wizard automates is the task of selecting which tables and queries will be used as the source of the data and which fields from those queries will be output by the query.

Crosstab Query Wizard:- This wizard helps you create a crosstab query, which displays summarized values from one field in a table and groups them by one set of data listed down the left side of the datasheet (such as a region or category) and another set of data listed across the top of the datasheet (such as year, quarter, or month). For example, you may wish to see sales grouped by region and quarter. The Crosstab Query Wizard assists you in creating such a query.

Find Duplicates Query Wizard :— Assists you in creating a query which will identify duplicate data contained in a table or returned by another query.

Find Unmatched Query Wizard:- This wizard helps you find records which are "orphaned" by related tables. In other words, records that should be related to one or more records in a different table but aren't. Orphaned records can be created when referential integrity is not enabled for a relationship and records are deleted from one of the tables.

9.5.2 The Query Design View

Whenever you edit an existing query or create a new query using the Design view method, you'll more than likely see the Query Design view shown in Figure below. Using the Design view you can visually create and modify the query which is being displayed. Throughout this chapter, the terms Design Grid and Design view refer to the same window (the one shown in Figure).

The Design view is divided into two sections: the table/query pane and the field pane. The table/query pane displays a Field List window for each of the tables and queries involved in the query. The field pane at the bottom of the window is also known as the QBE Design Grid. This is where you define the fields returned by the query, set the sort order, and specify any criteria.

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Figure 4: The Query Design Grid.

9.5.3 Steps in Creating a Query

To follow along, open the Northwind Traders sample database.

There are four major steps to creating a query:

- 1. Create the basic query.
- 2. Specify the sort order.
- 3. Specify the selection criteria.
- 4. Decide which fields that you want to see.

Each of these steps can themselves be broken down into a series of steps or actions that you must performed.

9.5.3.1 Creating a Basic Query

To create a new query, follow these steps:

- 1. Open the database to which you want to add the query. Activate the Database window and click on the Queries section. The Queries list will be displayed in the Database window.
- 2. Double-click the Create query in Design view entry in this list, or click the New button at the top of the

Database window, select Design view in the New Query dialog that appears, and click the OK button. Either way, the Query Design Grid window and the Show Table dialog box, will appear.

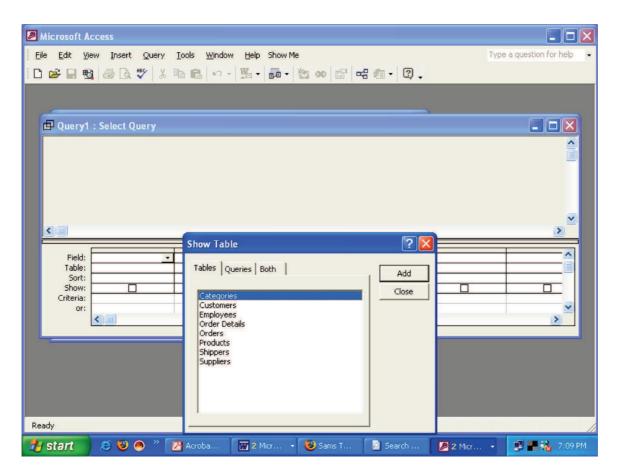


Figure 5: The Query Design Grid window and Show Table dialog for a new query.

- **3.** Add the tables or queries on which this new query is to be based by clicking the table or query name and then clicking the Add button. Alternatively, you can double-click the table or query name. As an example, double-click the Customers table. When you've added the appropriate tables and queries, click the Close button. This will close the Show Table dialog and leave you staring at the Query Design Grid with the table/query pane populated.
- 4. Add the fields which will be output by the query or used as criteria for selecting records to the QBE Design Grid at the bottom of the Design View window. This is done by either dragging and dropping the field's name from the Field List window onto the QBE Design Grid or by double-clicking the field's name. For our example, add the ContactName, CompanyName, and ContactTitle fields. Following figure shows the results of adding these fields to the grid.
- 5. Save the query using the Save toolbar button. To view the results of the query, click the drop-down arrow on the View toolbar button and select Datasheet view (or use the View menu and select Datasheet view). The datasheet window for your query will be displayed. To return to the Design Grid, use the Design View toolbar button or menu item.

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Figure 6 : The Design View window with some query design in place.

9.5.3.2 Specifying a Sort Order

The query you just created is not much different than viewing the Customers table in Datasheet view. There aren't as many fields showing, of course, but otherwise the results really haven't been worth the effort. There is, however, more that you can do. One advantage of queries is the capability to specify a sort field (or fields) and sort order (ascending or descending) that's particular to the query.

To specify a sort order for a query, follow these steps:

- 1. With the query open in the Design Grid, find the field you want to sort by in the QBE Grid at the bottom of the Design Grid window. Click in the Sort row. If you're following along from the previous section, click in the ContactName column.
- 2. Click the drop-down arrow to the right of the cell and select the sort order (ascending or descending) to be used for this field. For our example, select Ascending.
- 3. Repeat step two for any other fields which should also be used as sort fields. The order from left to right that the fields appear in the QBE Grid determines which are used first in the sorting. For example, if you set ascending sort order for both the ContactName and CompanyName fields, the sorting would be done by ContactName first and then by CompanyName. This means that if two Customer records have a contact named John Smith, the two rows will appear one after the other with the value of the CompanyName field determining which appears first. If you're following along, set the CompanyName field to be sorted ascending as well. Following figure shows how the Design View window should look.

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Field:	EmployeeID	FirstName	LastName	-			<u> </u>
Table: Sort:	Employees	Employees	Employees				
Show:							
Criteria: or:				_			~
				- 10			>
Ready							1

Figure 7: The Design View window with a sort order specified for the query.

4. Save the query's design by clicking the Save button. Go to the Datasheet view to see the results.

9.5.3.3 Specifying Criteria

Now you can select some fields and sort them in a specific way, but we're still not much better off than viewing the table's datasheet. However, queries also give you the capability of specifying the criteria with which to select the records. In other words, you tell the query what data must be present in (or missing from) the records that the query will display. This lets you work with a specific subset of data which may be more meaningful than the entire set of data contained in a table or returned by another query.

To specify criteria for your query, follow these steps:

- 1. With the query open in Design view, make sure the field or fields which will be used to specify the criteria are present in the QBE Grid at the bottom of the Design View window. If you're following along, add the Country field to the QBE Grid.
- 2. Click in the Criteria row for the field whose criteria you are specifying (in our example, the Country field). Enter the criteria to be used when selecting records by typing an expression.
- 3. Save the query and switch to the Datasheet view.

9.5.3.4 Showing and Excluding Fields

Now you've got a query that returns only selected fields, that sorts the returned data for you, and that

shows you the subset of data that you're interested in working with. But if you followed along with the previous section and saw that the query returned the customers in France only, there's a little more tweaking to be done.

Notice that the Country field, despite the fact that it always contained the word France, was also returned by the query. If you know the value in the field will always be France, you don't really need to display that field, do you? Well, Access provides a mechanism, which you can use to sort by or specify criteria on fields but not display those fields. For the default data store, this is done using the Show row's checkbox in the QBE Grid.

To have a field appear in the query's output, make sure its Show checkbox is checked. To have it not appear in the output, clear (uncheck) the Show checkbox. If you're following along with the example, uncheck the Show checkbox for the Country field and view the datasheet again. Your results should appear similar to the following Figure.

P (Query1 : Select Query			
	Employee ID First Name	Last Name		
	1 Nancy	Davolio		
	2 Andrew	Fuller		
	3 Janet	Leverling		
	4 Margaret	Peacock		
	5 Steven	Buchanan		
	6 Michael	Suyama		
	7 Robert	King		
	8 Laura	Callahan		
	9 Anne	Dodsworth		
*	(AutoNumber)			
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Figure 8: The Datasheet View window for the sample query.

9.5.4 Using Advanced Selection Options in Queries

Access 2000 provides a wide variety of additional features that enable you to create more complex queries.

9.5.4.1 Wildcards

The criteria we used in the example query above (='France') was perfect when we knew the exact value we were looking for from the query. But what if you don't want to require an exact match or don't know the exact spelling of a value ahead of time?

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Access provides special wildcard characters which can be used in query criteria to cover such circumstances. These characters, listed in the following table, can be used as placeholders within the value or can specify the beginning or ending characters of a text field.

Symbol	Usage	Example	Matches
*	Used to match any number of	An*	Anil, Anand, Allan
	character in a field either at the		
	beginning or the end of the field.		
?	Use to match a single character in	Ro?	Row, Rod
	a field		
#	Use to match any single number in	7#7	727, 737, 767
	a field		
-	Use to find a single character	J[a-o]N	Jan, Jon, Jen
	within a range of characters you		
	specify		

Access	2000	Wildcards

9.5.4.2 Creating Queries that Accept Parameters

In our sample query we added the criteria = 'France'. This criteria is just fine if we always want to return only the rows where the Country field has France in it. But what if we want to be able to choose which country will be used each time we run the query? In this case, you have to turn the criteria into a parameter.

After you've done so, you'll be prompted to enter a value for the country field each time you view the query's results, and Access will retrieve only records for that country. Now you won't have to create a query for each country, but instead can enter the desired country each time the query is viewed.

To turn a criteria into a parameter, simply replace the value portion of the criteria ('France' in our example) with a prompt question surrounded by square brackets. For our example, change the criteria to read =[Enter the desired country]. Then view the query in Datasheet view. When you do this, Access will prompt you with the dialog shown in the following figure. Enter a value (no need to enter the single quotes on this dialog, Access will supply them for you when it evaluates what you enter here) and click the OK button. The results are displayed in the Datasheet view.

Enter P	arameter V	alue	×
?			
I			
Ľ	ОК	Cancel	

Figure 9 : The Enter Parameter Value dialog box.

9.5.4.3 Adding Calculated Fields

Another useful reason to create queries is their capability to transform data through the use of calculated fields. You're not restricted to having your queries return the exact data from tables or other queries. Using

calculated fields, you can perform data manipulation on the data in your database and return more meaningful results from the query.

For example, if you have an order entry table, you could create a query, which calculates a discount priced based on the quantity of each item ordered. You can also use calculated fields to create a compound text field, which concatenates the values of several fields in the table. This is useful for creating mailing labels where you want the name and city/state/ZIP (or city/province/postal code) fields concatenated into one line.

To see how to work with calculate fields, return to the example query and follow these steps (or, open any query in Design view mode):

- 1. Click in the Field row of the first empty column in the QBE Grid.
- 2. Enter Addr2: [City] + ", " + [Region] + " " + [PostalCode]. This specifies that the calculated field should be named Addr2 and that its value should be calculated by concatenating the values of the City, Region, and PostalCode fields. The square brackets in the expression inform Access that what's within the brackets is a field name. If you have the same field name in two different tables referenced by your query, use the format [*tablename.fieldname*] to indicate exactly which field you mean.
- **3.** You can leave the Table row empty for this field. Check the Show checkbox so that the field will be output by the query.
- 4. Click the View button to switch to Datasheet view. Enter an appropriate country when prompted (we have already added a parameter to the query earlier).

-	Categories : Table Category ID Category Nam	e Description	Picture
+	+ 1 Beverages	Soft drinks, coffees, teas, beers, and ales	Bitmap Image
1	+ 2 Condiments	Sweet and savory sauces, relishes, spreads, and seasonings	Bitmap Image
	+ 3 Confections	Desserts, candies, and sweet breads	Bitmap Image
	+ 4 Dairy Products		Bitmap Image
	+ 5 Grains/Cereals		Bitmap Image
	+ 6 Meat/Poultry	Prepared meats	Bitmap Image
	+ 7 Produce	Dried fruit and bean curd	Bitmap Image
	+ 8 Seafood	Seaweed and fish	Bitmap Image
	(AutoNumber)		

Review of the Datasheet Windows

Figure 10: A typical Datasheet window.

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Datasheet views are very similar to Excel spreadsheets. An example is shown in the above Figure. As you can see, data is displayed in a row and column format. Each row represents a single record in the table or query results. Each column represents a field in the table or returned by the query. Tables, queries, and forms all have Datasheet views available.

You can use the row and column headings for various editing functions or to sort and filter the information. Using the + sign in the first column, you can expand the subdatasheet to show records related to the selected record. You can also format the way the data is displayed within the datasheet, as well as print or export that data.

9.5.5 Working with Subdatasheets

A subdatasheet shows records from another table or query which are related to the row whose expander (the plus sign) you clicked. The following figure shows the Customers table and the records from the Orders table related to a certain customer.

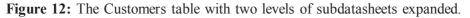
▦	Cı	isto	me	rs : Table								2
		C	usto	omer ID	Company N	ame	Contact Na	me	Contact Title			
•	+	AL	FK	1 /	Alfreds Futterkiste		Maria Anders	Sales	Representative		Ober	r
	+	AN	AT	R A	Ana Trujillo Emparedad	los y helados	Ana Trujillo	Owne	er		Avda	a
	+	AN	TO		Antonio Moreno Taquei		Antonio Moreno	Owne	r		Mata	
	-	AR	00	л и	Around the Horn		Thomas Hardy	Sales	Representative		120	F
	14			Order ID	Employee	Order Date	Required Date	Shipped Date	Ship Via	Freig	ght	Ĩ
			+	10355	Suyama, Michael	15-Nov-1996	13-Dec-1996	20-Nov-1998	Speedy Express	\$41.	95	,
			+	10383	Callahan, Laura	16-Dec-1996	13-Jan-1997	18-Dec-1998	6 Federal Shipping	\$34.	24	,
			+	10453	Davolio, Nancy	21-Feb-1997	21-Mar-1997	26-Feb-1997	United Package	\$25.	36	1
			+	10558	Davolio, Nancy	04-Jun-1997	02-Jul-1997	10-Jun-1997	Vinited Package	\$72.	97	2
			+	10707	Peacock, Margaret	16-Oct-1997	30-Oct-1997	23-Oct-1997	Federal Shipping	\$21.	74	,
			+	10741	Peacock, Margaret	14-Nov-1997	28-Nov-1997	18-Nov-1997	Federal Shipping	\$10.	96	,
			+	10743	Davolio, Nancy	17-Nov-1997	15-Dec-1997	21-Nov-1997	United Package	\$23.	72	,
			+	10768	Leverling, Janet	08-Dec-1997	05-Jan-1998	15-Dec-1997	Vited Package	\$146.	32	1
			+	10793	Leverling, Janet	24-Dec-1997	21-Jan-1998	08-Jan-1998	B Federal Shipping	\$4.	52	,
			٠	10864	Peacock, Margaret	02-Feb-1998	02-Mar-1998	09-Feb-1998	3 United Package	\$3.	04	,
			+	10920	Peacock, Margaret	03-Mar-1998	31-Mar-1998	09-Mar-1998	3 United Package	\$29.	61	,
			+	10953	Dodsworth, Anne	16-Mar-1998	30-Mar-1998	25-Mar-1998	3 United Package	\$23.	72	,
			+	11016	Dodsworth, Anne	10-Apr-1998	08-May-1998	13-Apr-1998	3 United Package	\$33.	80	,
		*		oNumber)						\$0.	00	
De		d.	14		1 • • • • • •	01		1				ſ

Figure 11 : The Customers table with an expanded subdatasheet.

You can continue this "drilldown" process with the subdatasheet's records, if a subdatasheet is available. For example, following figure shows the Customers table with a subdatasheet within a subdatasheet. The first subdatasheet shows all the orders related to the selected customer. The inner subdatasheet displays all the line items for the selected order.

Subdatasheets don't appear by magic. You have to define the relationships between the tables and inform Access that you want to use the subdatasheet features. When a subdatasheet has the focus, you can perform all the same functions available in the standard datasheet window. This includes formatting and filtering.

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		C	ust	ome	er ID	Company N	ame		Contact Name			Contact Title			
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	+	AN	IAT	R		Ana Trujillo Emparedad	los y helac	los	Ana Trujillo Owner					Avda	
	+	AN	ITC	N		Antonio Moreno Taquer	ría		Antonio Moreno Owner			0		Mata	
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				Or	der ID) Employee	Order D	ate	Requi	red Date	Shipped	Date	Ship Via	Frei	gh 🔺
			+		1035	5 Suyama, Michael	15-Nov-	1996	13-	Dec-1996	20-No	v-1996	Speedy Express	\$41.	95
			+			3 Callahan, Laura	16-Dec-	1996	13	Jan-1997			Federal Shipping	\$34.	24
			+		1045	3 Davolio, Nancy	21-Feb-	21-Feb-1997		21-Mar-1997		b-1997	United Package	\$25.	36
			-		1055	8 Davolio, Nancy	04-Jun-	1997	02	-Jul-1997	10-Ju	n-1997	United Package	\$72.	97
			14			Product		Unit	t Price	Quantity	Discour	-			
					Zaans	se koeken			\$9.50	25	0	%			
					Manji	mup Dried Apples		9	53.00	20	0	%			
					Filo N	Aix			\$7.00	30	0	%			
					Perth	Pasties		9	32.80	18	0	%			
					Röd k	Kaviar		9	615.00	3	0	%			
				*					\$0.00	1	0	%			
			+		1070	7 Peacock, Margaret	16-Oct-	1997	30-	Oct-1997	23-Oc	t-1997	Federal Shipping	\$21.	74
			+		1074	1 Peacock, Margaret	14-Nov-	1997	28-	Nov-1997	18-No	v-1997	Federal Shipping	\$10.	96
			+		1074	3 Davolio, Nancy	17-Nov-	1997	15-	Dec-1997	21-No	v-1997	United Package	\$23.	72
Rei	cor	d:	14			4 > > > >* of	13			•		1			•



9.5.5.1 Formatting the Datasheet

Changing Datasheet Formatting

By changing the datasheet formatting you can change elements such as the background color and how the cells are displayed graphically. To access these elements, use the Format, Datasheet menu item. The Datasheet Formatting dialog appears.

On this dialog you can choose whether or not to display the horizontal and vertical gridlines, what color and line style to use for the gridlines and the cell background, and whether to make the cells appear flat, raised, or sunken. To change the line style for a specific type of line (such as the datasheet border, horizontal grid lines, or vertical gridlines), select the appropriate entry in the left-hand drop-down list box of the Border and Line Styles frame. The Sample frame of this dialog shows how the datasheet will look if you click the OK button.

Changing Datasheet Font

You can also change the font used for all text displayed in the datasheet. Use the Format, Font menu item to access the Font dialog.

Changing Column Width and Row Height

You can also change the width of individual columns and the height of all rows in the datasheet. To resize a column or row, move the cursor to the line in the column or row header that separates the columns and rows.

When it's in the proper position, the cursor will change from a pointer to a sizing cursor. For the column header, this cursor is a vertical line with arrows pointing left and right. For the row header, this cursor is a horizontal line with arrows pointing up and down. You can drag this cursor in the desired direction to either expand or contract the row or column sizing.

In addition to this method, you can also double-click the mouse when the sizing cursor is active. This will cause the row or column to be sized to fit the data currently displayed in the datasheet. Also, you can use the Format, Column Width and Format, Row Height menu items to display dialog boxes.

To move a column to a different place in the datasheet, simply click the column header, hold the mouse button down, and drag the column to its new location.

9.5.5.2 Printing the Datasheet

After you have your datasheet loaded with the data you'd like to print, use the File, Page Setup menu item to set the output page's margins, paper orientation, and paper size.

Next, use the File, Print Preview menu item to display the output in the print preview window. This gives you a chance to see just how the printout will look and to make any adjustments if necessary. If everything is in order, click the toolbar's Print button and the datasheet will be output to your default printer.

To print using a dialog to choose the printer, select the print range, or set the number of copies to be printed, use the File, Print menu item. The Print dialog box appears where you can set these properties to meet your current needs.

9.5.5.3 Closing the Datasheet

When you've finished working with the datasheet, you need to close the window. Click the close button in the upper-right corner of the window. You can also use the File, Close menu item. If you have modified any of the formatting for the datasheet, such as the column widths, font, and so on, Access will prompt you asking whether you want to save these format changes. If you select Yes, then the next time you open that datasheet it will look just like it does now. If you don't care to save the formatting changes you've made, select No.

CHECK YOUR PROGRESS 9.5

- 1. Can I use the OR and AND selections in a filter?
- 2. Will sorting in Datasheet view take precedence over the design-designated sort order?
- 3. Can I use the greater than or less than signs for dates?
- 4. How can you filter for data by example in a datasheet?
- 5. What will the criterion >100 return?
- 6. You've set two sorts in the Design view of a query. Which field is the primary sort?
- 7. What does the SQL keyword ON mean?
- 8. Can you select by one table's fields but show another table's fields in a query?

9.6 UNDERSTANDING FIELD PROPERTIES

At the bottom of the design view of a table, you see a list of the Field properties. Let's examine some Field properties more closely.

9.6.1 Understanding Field Size

Field size designates the number of characters that can be stored in a field. The default value for the field is 50 characters. If this field will never need to be more than x characters, let's reduce the size.

9.6.2 Input Mask

An input mask is composed of literal display and mask characters that specify where, what kind, and how much data is to be entered. Notice the input mask is (000\-00\-0000). The zeroes, backslashes, and hyphens are special Access codes. The zeroes mean "require a numeric digit at this position," and the backslashes mean "display the next character as a literal," meaning that the hyphen characters will be displayed at their position, after the backslash. The input mask is defined so that if the user only enters numeric digits, hyphens will automatically be displayed in the appropriate positions.

9.6.3 Captions

A caption is the text displayed in the field prompt. The Caption for this field includes spaces, even though the field name does not.

9.6.4 Understanding the Required Property

The Required property indicates whether the user is required to enter data in a field. The current setting is No which is misleading in this case. Remember that the primary field must contain data regardless of the Required Property setting. Normally, however, the Required property should be set to Yes for any non-primary key field in which the user must enter data.

9.6.5 Comparing Format and Input Mask

So far, you've entered birthdates with two-digit years. Access assumes the century of two-digit years. The century assumption is made at the number 29. For example, if you enter a two-digit year between 30 and 99, Access assumes it's a twentieth century year or 19xx. If, on the other hand, you enter a two-digit year between 00 and 29, Access assumes it's the twenty-first century, or a year between 2000 and 2029. These assumptions have worked well for records entered so far. Assume, however, that an employee was born in 1929. If "29" is entered as the employee's birth year, Access will incorrectly assume the year was meant to be 2029. Though it is possible to change the century assumption in Access, it's easier to simply display the date field with four digits.

9.6.6 Understanding Format

Format affects how data is displayed in a table after it has been entered by the user and saved. It does not affect how the data is actually stored in the table. For example, the Birthdate Field format is set to Short Date, which will automatically display the day and month with two digits and the year with four digits. Regardless of how the data is entered in the field, the Short Date format will always display it in the correct format. If a date of "10 24

19" is entered, the Short Date format will automatically display it is as "10/24/2019". If a date of "August 16 1916" is entered, then the Format will display it as "08/16/1916". Even though the display of the data has changed, the data will always be stored in the manner in which it was entered.

9.6.7 Understanding an Input Mask

Remember that an Input Mask restricts the user to entering data in a specified way. It determines what kind and how data can be entered. This can be a useful tool in most cases. However, due to the century assumption it can be problematic in a Date field.

For example, the Input Mask for the Birthdate field is set to 99/99/00;0, which restricts the user to entering the day, month, and year with only two digits. If "08 16 16" is entered, Access will assume the year is 2016. When the input mask is combined with the format, the user is restricted to only entering years with two digits, but the year will be displayed with four digits due to the Short Date format. However, if the year 1916 is actually intended, the input mask prevents the user from being able to correct the year, even though all four digits are displayed. The input mask must be deleted since it is set to allow only two-digit years.

9.6.8 Creating a Validation Rule

A Validation rule limits the value or data that can be entered in a field. For example, we want to indicate that the only acceptable values in a field called Gender are M, F, or a null value so let's create a Validation rule. To enter a new Validation rule, type:

 ${\bf M}$ or ${\bf F}$ or Is Null

You see the cursor in the Validation Text field.

Notice that when you pressed enter, Access formatted the text to read: "M" Or "F" Or Is Null.

9.6.9 Creating Validation Text

Validation text is displayed when a user enters incorrect data. Now that you've created a Validation rule, it's a good idea to define this Validation text. If you leave it blank, the user will see a generic message from Access if a data entry error is made.

To enter Validation text, in the Validation Text field, type:

Please enter M or F in the Gender field.

Now, if the user makes a data entry error in the Gender field, the previous message will be displayed.

CHECK YOUR PROGRESS 9.6

- 1. What do you mean by input mask?
- 2. What do you understand by Required property?
- 3. What is Validation rule?

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9.6 SUMMARY

You can create a query using either the Design view or a wizard. In many cases, the add fields facility of the wizard can save you a lot of time compared to using the design grid exclusively. Although you can also create queries using SQL natively.

This unit covered select queries that are subsets of fields, records, or both, of other queries or tables. After you've included the fields you want in your query, you can add criteria to the design grid (or the SQL view) to narrow down the selection of your query. You can add criteria for any field included in a query, even if that field doesn't show (or return) when the query is run. You can do all the datasheet layout manipulation in a query that you can in a table's datasheet. Changes in field order in the Datasheet view won't change the Design view, but changes in field order in the Datasheet's layout.

You can sort on fields in the design grid. The sorting priority is left to right. You can also filter and sort in Datasheet view just as you can with a table's Datasheet view.

Adding criteria to different rows in different columns creates an OR query selecting records based on either criterion. Entering criteria on the same row for two or more columns creates an AND query requiring both criteria to be satisfied for a record return.

Using built-in Access functions and expressions, you can construct sophisticated query selections spanning dates, times, or alphanumeric strings.

Besides joins, you saw how to construct a new field in a query using an expression. You can also create new fields based on other expression fields. Finally, you saw how to construct ranges in queries and combine them with other criteria, which can be optionally ranged, too.

9.7 GLOSSARY

Criteria - A set of limiting conditions used in creating a query or filter to locate a specific subset of records.

Destination - A document or program receiving information that was originally generated in another program or document.

Expression - A formula that calculates a value. You can use expressions in forms, reports, tables, queries, macros and modules.

Filter - A set of criteria you can apply to data to show specific tasks, records or resources.

Import - Copying data from another application into Access.

Join - A link between tables that is identified by an association between a field in one table and a field of the same data type in another table.

Link - A logical relationship between two or more tables, often based on corresponding or related fields in each of the tables.

Macro - A set of actions used to automate a task.

Many-to-many relationship - A relationship between two tables in which one record in either table can have many matching records in the other table.

Module - A collection of statements and procedures stored together as a single named unit.

Object - A table, chart, graphic, equation, or other form of information you create and edit. An object can be **One-to-Many Relationship** - Records in one table have one or more related records in a second table, but each record in the second table is related to only one record in the first table.

One-to-One Relationship - One, and only one, record in a table relates to one, and only one, record in a second table.

Primary Key - A field, or fields, used to uniquely identify a field.

Query - Asking Access a question about records in a table of group of tables. The result of a query is a dynaset.

Referential Integrity - Rules employed in a relational-database schemes that are used to preserve the relationships between tables when you add or delete records.

9.8 FURTHER READINGS

The following books are suggested for further readings : Sams Teach Yourself Microsoft Access 2000 in 24 Hours by Timm Buchanan; Craig Eddy Sams, Macmillan Computer Publishing Sams Teach Yourself Microsoft Access 2000 in 21 Days by Paul Cassel, Macmillan Computer Publishing

9.9 ANSWERS TO THE SELF-LEARNING EXERCISES

Answers to Check Your Progress 9.1

(a) F1 (b) Index Tab

Answers to Check Your Progress 9.2

- (a) Fields (b) Primary Key, Foreign key, Composite key
- (c) Referential integrity (d) One-to-many

Answers to Check Your Progress 9.3 and 9.4

(a) True (b) False (c) True (d) True

Answers to Check Your Progress 9.5

- 1. Yes. Entering two field criteria in a filter by form will create an AND query. Using the OR keyword in a field will create an OR criterion.
- 2. Yes, it will. The last sort order holds reign.
- 3. Yes. >#12/31/99# will return records in which the date is at least the year 2000.
- 4. Click the filter by form button on the toolbar when in datasheet view.
- 5. Records where the criterion field is greater than 100.
- 6. The one leftmost in design view.
- 7. Specifies the fields to link two or more database objects.
- 8. Yes. Uncheck the show box for the fields you don't wish to display.

Answers to Check Your Progress 9.6

- 1. An input mask is composed of literal display and mask characters that specify where, what kind, and how much data is to be entered.
- 2. The Required property indicates whether the user is required to enter data in a field.
- 3. A Validation rule limits the value or data that can be entered in a field.

9.10 UNIT-END QUESTIONS

- 1. How does Access store date and time information?
- 2. Must you use only built-in Access functions in queries?
- 3. What are Indexes? How they can help?
- 4. What are the various field properties? Explain.

Unit X : Data Base System Architecture

Structure of the Unit

10.0	Objectives
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- 10.1 Introduction
- 10.2 Traditional File Oriented Approach

10.3 Basic Concepts

- 10.3.1 What are Databases?
- 10.3.2 Types of databases based on processing:
- 10.3.3 Types of databases based on organization requirement:
- 10.3.4 Components of Database System
- 10.3.5 Advantages of the Database Approach
- 10.3.6 Limitations of the Databases

10.4 Database System Architecture

- 10.4.1 Abstraction
- 10.4.2 System Architecture
- 10.4.3 Data Independence

10.5 Database Performance Issues

- 10.5.1 Physical database design
- 10.5.2 Sequential Access File Organization
- 10.5.3 Direct (or Random) Access File Organization
- 10.6 Tuning the database for performance.
- 10.7 Summary
- 10.8 Glossary
- **10.9** Further Readings
- 10.10 Answers to the self learning exercises
- 10.11 Unit-end questions

10.0 OBJECTIVES

After going through this unit student will be able to :

- Understand the databases and database management system
- Identify the drawbacks in file based systems
- *Terminal Control of DBMS* For the components and properties of DBMS.

10.1 INTRODUCTION

A database system is basically a computer based record keeping system. The collection of data, usually referred to as the database, contains information about one particular organization. It maintains any information that may be necessary for the decision-making process for the management. The intention of a database is that the same collection of data should serve as many applications as possible. A database is often conceived of as the repository of information needed for running certain functions in an organization. Such a database would permit not only the retrieval of data but also the continuous modification of data needed for control of operations. The database management system is the major software component of a database system. Some commercially and popular databases are ORACLE, INGRES etc. The role of the DBMS as an intermediary between the users and the database is very much like the function of a salesman in a consumer's system. The database user needs to know only what data he or she requires, the DBMS will take care of retrieving it.

10.2 TRADITIONAL FILE ORIENTED APPROACH

The traditional file-oriented approach to information processing has for each application a separate master file and set of transaction files used in the old applications like payroll, inventory, production planning and control with the COBOL programming language. An organization needs to share information between different departments and users. It is not easily possible in the traditional approach. The major drawback of such a file based approach is that the programs become dependent on the files and the files become dependent on the programs.

The file oriented approach to information processing has the following disadvantages:-

- Data Redundancy The same piece of information may be stored in two or more files repeatedly (Duplication of data) like student's name, address etc. Some of this information may be changing. It is therefore possible that while the address in the master file for one application has been updated and in the other file may have not been. It may not be easy to find out the redundancy in different files. The solution for this problem is that to avoid data redundancy and multiple copies of the data.
- Lack of Flexibility Due to the strong association between the program and data, most of the information retrieval possibilities would be limited to well-anticipated and pre-determined requests for data. The system would normally be capable of producing scheduled information and reports. In the today's fast changing business environment, there is a need for responding to un-anticipated queries or data.
- Program-Data dependency If a data field is to be added to a master file, all such programs that access the master file would have to be changed to allow for the new field added to the file.

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- Data availability Due to non-uniformity in file design, similar data may be stored in different files with different identification thus obtaining data is usually difficult.
- Limited Data Sharing With the traditional file processing approach, each application has its own private files and users have little opportunity to share data outside their own applications. In addition, a major management effort may also be required since different organizational units may own these different files.
- Data Integrity Integrity means accuracy and completeness of the data is not maintained because there is no control over their use and maintenance by authorized user and same data is found in different files. Therefore, there is a possibility that data in one file is correct and in another file is wrong.
- Lengthy Development Times With traditional file processing systems, there is little opportunity to leverage previous development efforts. Each new application requires that the developer essentially start from scratch by designing new file formats and descriptions, and then writing the file access logic for each new program. The lengthy development times required are often inconsistent with today's fast-paced business environment, in which time to market (or time to production for an information system) is a key business success factor.
- Excessive Program Maintenance The preceding factors all combine to create a heavy program maintenance load in organizations that rely on traditional file processing system. In fact, as much as 80 percent of the total information systems development budget may be devoted to program maintenance in such organizations. This of course leaves little opportunity for developing new applications.

Therefore, these disadvantages of file based system encourages a database approach.

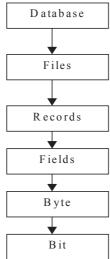
CHECK YOUR PROGRESS 10.2

- 1. Data redundancy means _____.
- 2. Traditional file system is not suitable for _____.

10.3 BASIC CONCEPTS

10.3.1 What are Databases?

Computer system organizes the data in a hierarchy that begins with bits, bytes, fields, records, files and databases.



Database is a collection of related data means which have implicit meaning. In other words, a database is logically coherent collection of data with some inherent meaning to facilitate rapid updating of individual records, concurrent updating of related records, easy access to all records by all application programs, generating routine or special purpose reports.

A database system is basically a computerized record keeping system whose overall purpose is to store information and to allow users to retrieve and update that information on demand.

10.3.2 Types of databases based on processing:

The databases can be managed dynamically and can be processed on-line. The database processing is of two types:-

- (i) Analytical Databases On Line Analytical Processing (OLAP) are basically static, read only databases. In this archived and historical data is stored and used for analysis.
- (ii) **Operational Databases** On Line Transaction Processing (OLTP) are used to manage more dynamic data. These types of databases allow the user to modify the data. These types of databases are used to retrieve realtime information.

10.3.3 Types of databases based on organization requirement:

The databases have been developed in various organizations to meet particular need. The growth of distributed processing data warehousing, data mining, end user computing, DSS(decision support system) also known as EIS(executive information system) have caused the development of several types of databases. The different types of databases found in computers using organizations are the following:-

- (i) Management Databases These databases can respond to dynamic requests for information which require quick answering. These databases store selective data extracted from operational database. In management databases, request for data is spontaneous and not preprogrammed. The basic objective of management database is to support planning and urgent information needs.
- (ii) **Operational databases** These databases stores detailed data with anticipated processing requirements programmed in conventional computer languages. The basic objective is to support routine operations.
- (iii) **Distributed Databases (DDB)** These databases are defined as a collection of multiple logically interrelated databases distributed over a computer network. These databases may be located in a same building or geographically distributed over large distances. They have the ability to access remote sites and transmit queries maintaining integrity of overall database.
- (iv) End User Database End users are the people whose job require access to the database for querying, updating and generating reports. End user database may contain documents generated by MSWORD or data files generated from spreadsheet package or DBMS package.
- (v) Text Databases These databases support storage, search and retrieval for text objects. Text databases are outcome of the advancement in use of computers in creating and storing the documents electronically.
- (vi) Image Databases These databases can store images in a variety of formats such as TIFF, JPEG, GIF commonly used images and video sequences in the databases. These are used in business for document image processing.

10.3.4 Components of Database System:

The database system comprises of four components:

- (a) Database Files: The database systems are designed and developed around centralized, integrated shared files that emphasize the independence of program and data. These files have data elements stored in database file organization formats. The different database systems have different ways of representing data physically on disk. These physical is usually hidden from the end user. The way data files stored at physical level are managed by DBMS facilitate faster access and economically save the storage area.
- (b) Hardware: Four hardware components are basically required:
 - (i) For support of execution of the database system i.e. hardware processor and associated main memory
 - (ii) For Storage, secondary storage devices such as Magnetic discs etc.
 - (iii) For end users on-line terminals are required for accessing and updating database files.
 - (iv) Hardware component required is the output system, or report generator. It allows user or programmer to design output without writing an application program in a programming language.
- (c) Software: In order to handle all requests made to database by user are facilitated by software known as Data Base Management System. DBMS allows the user to access the files, update, insert, delete and retrieve records as per request. DBMS ensures data security, integrity because database is accessed by many users. The other software that play a vital role and are sub modules of DBMS are:
 - (i) A host language Interface system This is one of the module of DBMS that communicates with application programs. Its basic functions are, To interpret instructions of application program written in HLL and To retrieve requested data from the database files.
 - (ii) The application Program These programs are independent of the data files in a database environment, In order to perform query, it uses standard data definitions.
 - (iii) A natural language interface system The English like simple easy to understand and write, command oriented language SQL(Structured Query Language) is used to retrieve and perform online update on to the database by the user.
 - (iv) Data Dictionary It is often seen that when a program becomes somewhat large in size, keeping a track of all the variable names that are used in the program and the purpose for which they were used becomes extremely difficult. Data dictionary holds the detailed information about different structures and data types, details of logical structures, details of relationship between data items and details of user privileges and access rights. An ideal data dictionary should include everything a DBA (Database Administrator) wants to know about the database.
- (d) User: Users can be categorized on the basis of their level of interaction and association with the data bases, these are:
 - (i) Application Programmers: responsible for writing database application programs in some programming language. Such programs access the database by issuing the appropriate request typically an SQL statement to the DBMS.
 - (ii) End Users: who interact with the system from online workstations or terminals. A given end user

can access the database via one of the online applications mentioned in the previous paragraph, or he or she can use an interface provided as an integral part of the database system software.

(iii) Database Administrator: person who understands the data, and the needs of the enterprise with respect to that data, at a senior management level.

10.3.5 Advantages of the Database Approach

The database approach offers a number of potential advantages compared to traditional file processing systems.

- (i) **Program Data Independence** The separation of data description (metadata) from the application programs that use the data is called data independence. With the database approach, data descriptions are stored in a central location called the repository. This property of database systems allows an organization's data to change and evolve (within limits) without changing the application programs that process the data.
- (ii) Minimal Data Redundancy– The design goal with the database approach is that previously separate (and redundant) data files are integrated into a single, logical structure. Each primary fact is recorded in only one place in the database. At other times it may be desirable to include some limited redundancy to improve database performance.
- (iii) Improved Data Consistency– By eliminating (or controlling) data redundancy, we greatly reduce the opportunities for inconsistency. For example, if a customer address is stored only once, we cannot have disagreement on the stored value. Also, updating data values is greatly simplified when each value is stored in one place only. Finally, we avoid the wasted storage space that results from redundant data storage.
- (iv) Improved Data Sharing A database is designed as a shared corporate resource. Authorized users are granted permission to use the database, and each user (or group of users) is provided one or more user views to facilitate this use.
- (v) Standards can be enforced In a centralized database environment, industry, state, country standards can be enforced more easily than in an environment where each group of user controls his own files and software.
- (vi) Flexible DBMS allows changes to the structure if required, of the database affecting the stored data and existing application.
- (vii) Development time of an application may be reduced Designing and implementing a new database may take more time but once the database is set up, then developing any new application using DBMS requires 1/6th time of the traditional file processing system.
- (viii) Reduces overall cost The DBMS approach reduces the wasteful overlap of activity of data processing personnel in different departments. This reduces the overall cost of operation and management as well.
- (ix) Unauthorized access may be restricted Database are used when multiple users share the database. Only authorized user is permitted to make changes in the existing database. The DBMS provides a security and authorization system for each class of user.
- (x) **Provide multiple user interface and support 4GL(or non procedural language) for manipulation of data -** DBMS provides a variety of user interfaces. The most common is

		graphical user interface. In addition to this users do not have to learn programming techniques to access the database.					
	(xi)	Database can maintain integrity – A DBMS generally possess the capability for defining and enforcing the constraints (restrictions) that must hold for the data that results to the correctness and accuracy of data.					
	(xii)	Provision of backup and recovery system – If there is any failure of hardware or software, then DBMS provides the facility of recovery by maintaining its regular backup. It also ensures that program may be resumed from the point at which it was interrupted.					
10.3.6	Limit	ations of the Databases					
	There	There are certain limitations of using DBMS, They are -					
	(i)	Security Problem – Sharing of data also carries the risk of the data being accessed by unauthorized user. The DBA must cope up this problem by taking security measures, concurrency control, recovery and integrity.					
	(ii)	Problem of Resources – To answer online queries, it requires large amount of data to be stored.					

Data Base System Architecture

- (II) **Problem of Resources** To answer online queries, it requires large amount of data to be stored. As a result more terminals may be needed to put managers and other users on-line. Communication devices are also required to connect to the database. It may require more resources such as multiprocessor system, software, storage devices etc.
- (iii) Concurrency problem Several problems can occur when concurrent transactions execute in an uncontrolled manner. There may be lost update problem when two transactions that access the same database items.
- (iv) **Overhead Cost** For large amount of data, database requires a powerful hardware platform and software for database management, which are quite expensive. More cost is added for skilled personnel such as system analyst, database designers, database administrators, programmers etc.

CHECK YOUR PROGRESS 10.3

- 1. The database processing is of ______ and _____ types.
- 2. _____ can take the total control on the database.
- 3. _____holds the detailed information about different structures and data types, details of logical structures, details of relationship between data items and details of user privileges and access rights.

10.4 DATABASE SYSTEM ARCHITECTURE

10.4.1 Abstraction

Unit-X

Database Abstraction means to provide users only that much information that is required by them. This means that the system does not disclose all the details of data, rather it hides certain details like how the data is stored and maintained.

10.4.2 System Architecture

The database system architecture possesses three level architecture, these are -

Internal (Physical) Level: The lowest level of abstraction describes how the data are actually stored. It describes how the data are actually stored on the storage medium.

Conceptual (Logical) Level: The next-higher level of abstraction describes what data are stored in the database, and what relationships exist among those data. The logical level thus describes the entire database in terms of a small number of relatively simple structures. The users of this level are not concerned with how these logical data structures will be implemented at the physical level, they are just concerned about what information is to be kept in the database.

External (View) Level: The highest level of abstraction describes only part of the entire database. Even though the logical level uses simpler structures, complexity remains because of the variety of information stored in a large database. Many users of the database system do not need all this information; instead, they need to access only a part of the database. The view level of abstraction exists to simplify their interaction with the system. The system may provide many views for the same database.

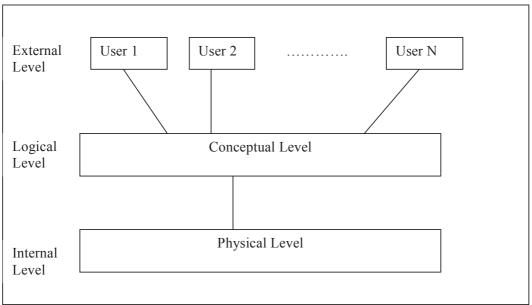
10.4.3 Data Independence

Database may be viewed through three levels of abstraction, any change at a level may affect other levels. The ability to modify a scheme definition in one level without affecting a scheme definition in the next higher level is called data independence.

There are two levels of data independence:-

- (i) **Physical data independence** It refers to the ability to modify the scheme followed at the physical level without affecting the scheme followed at the conceptual level i.e. the application programs remain the same even though the scheme at physical level gets modified.
- (ii) Logical data independence It refers to the ability to modify the conceptual scheme without causing any changes in the schemes followed at view levels. It also ensures that the application program remains the same.

It is more difficult to achieve logical data independence than the physical data independence. The reason being that the application programs are heavily dependent on the logical structure of the database.



CHECK YOUR PROGRESS 10.4

- 1. means to provide users only that much information that is required by them.
- 2. The lowest level of abstraction is _____
- 3. The ability to modify the conceptual scheme without causing any changes in the schemes followed at view levels is _____.

10.5 DATABASE PERFORMANCE ISSUES

The database performance is critical because the speed of processing time is important. The speed of processing is greatly determined by the storage structure of the database and the access technique.

10.5.1 Physical database design

Physical database design is the process of choosing specific storage structure and access paths for the database files to achieve good performance for variety of database applications. Choosing file organization and access paths usually depends on the different DBMSs of the companies. These includes indexing, clustering of records of files on a storage device. The following criterion may be used while designing physical database:-

- (i) **Response Time:-** The response time is measured by the time between submitting a database transaction and the response received.
- (ii) Storage Space:- The amount of storage space used by the database files and their access paths and indexes structure on the disk.
- (iii) Transaction throughput:- The average number of transactions which can be processed per minute, when system is in peak load condition.

The performance of the database also depends on record size and number of records in a file and the primary and secondary key values that determine records in a file and key values that determine the access path. The growth of the file and data must be calculated in advance. The database performance can be improved by the following ways:-

- (i) Choosing data types:- Data is usually in the form of records. Each record consists of a collection of related data values. Each value is a collection of one or more bytes i.e. field of the record. A field may be simple or composite. The emphasis must be given on to specify the data type which specifies the type of value a field can take. While selecting the data type consider the following:-
 - (a) Which represents maximum possible values
 - (b) Which minimizes the storage space
 - (c) Which maintains the data integrity
 - (d) Which supports all data manipulations as proposed by DBMS
- (ii) Coding and compression techniques:- The storage space occupied by database is very large. It may happen that data fields are placed at distance, which yields slow data processing rate. To improve data processing performance the following techniques can be applied:-
 - (a) Zip file routines may be applied to compress the whole of the file that minimizes the space utilization.
 - (b) A field that can contain limited number of possible values, they can be converted into a code that consumes less space.

- (iii) Data Volume and usage analysis: The database designer must consider the following before the designing of the physical database design:-
 - (a) Expected size of the organization
 - (b) Intended use of database
 - (c) Expected rate of queries

These factors are determined during system analysis and design phase. The access frequencies can be estimated from the transaction volume and timing of events, reporting and querying the transactions.

- (iv) Optimization of SQL:- The optimization of SQL commands can improve the database performance. The SQL statement SELECT...FROM...WHERE.. must consider ORDER BY and GROUP BY clauses to improve the speed and efficiency of the command.
- (v) Access Method and File Organization:- File has been defined as a collection of related information that may be payroll file, accounts file etc. Data files used in business can be classified into the following categories:-
 - (a) Master Files– These files contains relatively permanent information which is used as a source of reference and is updated periodically.
 - (b) Transaction Files– These files are created from source documents. These are used for recording events or transaction pertaining to the master file. These are also used to update master files.
 - (c) **Reference Files** These files contains keys that have records in other files because in order to retrieve a record from a file, referenced file is searched first to find the address of the record.
 - (d) Table Files-These files contains data in tabular form.
 - (e) **Report Files** These files are concise, meaningful and are generated from other data files for presenting reports online or on paper for the users and management.
 - (f) Historical Files– These files contains the information about the past. They usually contain statistical data for analysis purposes.
 - (g) **Backup Files** These files are the copy of master files kept as a measure of security, and can be used for recovery in case of disaster.

File management refers to logically organization of data into fields so that it is best understood by the users.

File Processing refers to an environment in which data are physically organized into files.

File organization refers to the organization of the data of a file into records, blocks and access structure.

Access Methods are group of operations that can be applied to a file. There are two types of access methods that are sequential access methods and direct access methods.

10.5.2 Sequential Access File Organization

In this file organization, the physical ordering of the records in a file on a storage device based on the values of one of their fields known as ordering field or primary key field. To locate a particular record, the sequential access method used in the program scans the file from the beginning till the desired record is located.

The advantages of this organization are:-

- (a) The designs of these files are simple and records are organized in a simple and contiguous fashion.
- (b) These organizations are best to update master files when number of transactions or file activity ratio is high and transactions are batched.
- (c) Easy to maintain backup

(d) This type of file organization is efficient, economical and less prone to errors.

The limitations of using this organization are:-

- (a) This is costly and time consuming if file activity ratio is low.
- (b) The response for locating information for a particular value is very low, thus online enquiry cannot be accomplished.
- (c) To update master file, the transactions have to be batched and whole master file has to be read even if few records are to be updated.

10.5.3 Direct (or Random) Access File Organization

In this file organization, records are placed in a manner that a desired record is found directly without searching sequentially. As records are stored in random order, records are also retrieved in any sequence irrespective of their physical order on the storage medium. This is directly performed by the CPU to access the desired record using randomizing procedure without searching all other records in the file. This is known as direct (self) addressing. This organization is useful for online inquiry system where immediate response is required.

The advantages of this organization are:-

- (a) Records can be accessed both randomly and sequentially.
- (b) Records need not be sorted it may be in any random order.
- (c) Transactions need not be batched as any single transaction is processed as it is entered.
- (d) It is useful in interactive realtime online processing environment such as banks, railway/air reservation etc.

The limitations of using this organization are:-

- (a) Storage space is not efficiently used because location of the stored records is randomly arranged.
- (b) It involves extra computation work to locate the address of the records.
- (c) It uses relatively expensive media such as magnetic disk.

The most commonly used direct access techniques are:-

- (i) Direct Sequential Access
- (ii) Random Access
- (i) Direct Sequential Access- This access method uses the following methods:-
- (a) Self direct addressing method It refers to addressing the record by its record key. It is easy to compute the record's address from the record key and physical address of the first record in the file. This method assists in computing the bucket address of the fixed length record, where keys are arranged in a consecutive number.

For example, if 10,000 records of university students need to be stored in the magnetic disk pack of 6 disks, cylinder-wise, let the first cylinder carry first 500 records, the second cylinder carries the next 500 records and so on. During retrieval of these records, read/write heads move cylinder by cylinder in which records have been sequentially arranged. Now if ten faces of the first cylinder carry the first 500 records in the following manner:–

Cylinder 1,11to 50Cylinder 1,251to 100...Cylinder 1,10451to 500

In order to have direct access in such file organization, we can show it in the following way:-

The total number of buckets = 1000,

Number of records per bucket = 10

We assume, the bucket address range from 101 to 1100

The keys of the records range from 1 to 10,000

To find the record key 9897 i.e. in which bucket it is stored, follow the steps given below:-

- 1. Divide the record key(to be searched)/No. of records per 9897/10 = 989 and a remainder 7 bucket.
- 2. Add first bucket number to the quotient of the record key 101+989=1090
- 3. The remainder (7) is the record's position within the bucket and remainder 0 indicates last record in the preceding bucket.

Advantages of Self-Addressing:-

- 1. A random enquiry can be made because it is easy to locate the position of a record,
- 2. It does not require index.

Disadvantages of Self-Addressing:-

- 1. The records must be of fixed length.
- 2. This method is impractical because gaps in key values would lead to empty buckets.
- 3. If some records are deleted their storage space remains empty. This results in wastage of storage space.

(b) Index sequential addressing method – In this organization, the records are stored either in sequential or non-sequential manner. In business data processing system, a common file organization is used in an ordered file with multilevel primary index on its ordering key field, such an organization is called indexed sequential file. These files have indexed sequential access methods (ISAM).

In indexed file organization, an index is created. To locate a record, the cylinder index is searched to find the cylinder address. Then for that cylinder, track index is searched to find the track address of the desired record. Each index entry matches a key value of the record and points to unique record. An index table usually contains the key value (unique) and address of that record (track number, cylinder number, surface numbers). The accessing is faster because no sorting and additional block access is required.

Advantages of using Index Sequential access file organization are:-

- 1. It includes the features of sequential and direct organization. Direct access is achieved by means of generating index.
- 2. If file activity ratio is high, then this file organization is efficient and economical.
- 3. It can be used in any kind of application.

Limitations of using Index Sequential access file organization are:-

- 1. It increases the processing time as reading of indexes is required prior to accessing the record.
- 2. It requires extra storage as record insertion causes overflow condition.
- 3. It requires more time because indexes are searched prior to record access.

Unit-X

CHECK YOUR PROGRESS 10.5

- 1. Time between submitting a database transaction and the response received is called ______.
- 2. Files contains relatively permanent information are called _____
- **3.** ISAM stands for _____.
- 4. The average number of transactions which can be processed per minute is called ______.

10.6 TUNING THE DATABASE FOR PERFORMANCE.

After the logical and physical design of the database, then the database can be loaded with data. The database transactions must be implemented by applications program according to the conceptual specification of transactions and then writing and testing of program code can be performed. Most systems include a monitoring utility program to collect performance statistics which are kept in the data dictionary or in system catalogue for later analysis. Thus, it is always necessary to modify the design on the basis of its observed performance after the database is implemented. This activity is known as database tuning. The objectives of tuning are:-

- (a) To minimize the response time of queries.
- (b) To make application run faster.
- (c) To improve the overall performance of the transaction.

If a given physical database design does not meet the expected objectives, then database designer reverts to logical database design and makes the adjustment to the logical schema with a view to remap it to a new set of physical tables and indexes. If the processing requirements are constantly changing, then changes must follow in logical and physical design. When trying to maintain a well tuned database, the following areas should be considered which relates to transactions, concurrency control and recovery:-

- (a) DBMS Installation (b) Input/Output Contention
- (c) Use of Memory (d) Use of CPU
- (e) Application tuning

10.7 SUMMARY

The collection of data, usually referred to as the database, contains information about one particular organization. The database management system is the major software component of a database system. A database system is an integrated collection of related files along with the details about their definition, interpretation, manipulation and maintenance. The primary goal of a DBMS is to provide an environment which is both convenient and efficient to use in retrieving information from and storing information into the database.

The database administration defines and maintains the three levels of the database as well as the mapping between levels to insulate the higher levels from changes that take place in the lower levels. The DBA is responsible for implementing measures for ensuring the security, integrity and recovery of the database.

The speed of processing is greatly determined by the storage structure of the database and the access technique. Choosing file organization and access paths usually depends on the different DBMSs of the companies. These includes indexing, clustering of records of files on a storage device

10.8 GLOSSARY

- Block A block normally consists of several records usually of fixed word length so as to make read/ write operations simpler.
- *Blocking Factor* The number of records in a block is called as the Blocking Factor.
- Cluster-A grouping of sectors on disk that function as a single unit.
- Data- A collection of facts in raw form that become information after proper organization or processing.
- DBMS-A set of programs provided to facilitate the users in organizing, creating, deleting and manipulating their data in a database.
- The **Data Dependence** Dependency of data on the application.
- Data Dictionary A document that maintains the data definitions of a database. It is automatically created/updated by the DDL as the database scheme is defined or changed.
- The **Data Integrity** Consistency of data in all files.
- The same data items in more than one file.
- Tatabase One who is responsible for defining, updating and controlling
- *Administrator* access to a database.
- Sector The smallest unit with which any disk can work. Disk drives are designed to access only whole sectors at a time.

10.9 FURTHER READINGS

- 1. Ramakrishnan and Gharke, Database management Systems, Tata McGraw Hill Pub. Co. Ltd.
- 2. Date Database Management Systems, Pearson Education Asia
- 3. Geraid V Post, Database Management Systems, Tata McGraw Hill
- 4. An introduction to Database Systems, Bipin C. Desai, Galgotia publications

10.10 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to check Your Progress 10.2

1. Duplication of data		On line information system		
Answers to Check Your Progress 10.3				
1. Analytical and Operational	2.	Database Administrator	r 3.	Data Dictionary.
Answers to Check Your Progress 10.4 1. Abstraction	2.	Physical	3.	Logical data independence.
Answers to Check Your Progress 10.5 1. Response time.	2.	Master Files 3.	Index	ed Sequential Accessing Methods

4. Throughput

10.11 UNIT-END QUESTIONS

- 1. What are the components of database system? Explain each of them briefly.
- 2. Explain the differences between a file-oriented system and a database oriented system.
- 3. Explain three level architecture of database system.
- 4. Explain the various ways by which database performance can be improved.
- 5. What are the important decisions which influence the physical design of a database?

Unit XI: DBMS-CLASSICAL DATA MANAGEMENT

Structure of the Unit

- 11.0 Objectives
- 11.1 Introduction

11.2 Database Models

- 11.2.1 The Hierarchical Database Model
- 11.2.2 The Network Database Model
- 11.2.3 The Relational Database Model
- 11.2.4 Difference between Relational and Other Models

11.3 The Relational Model

- 11.3.1 Terminology
- 11.3.2 The Relational Algebra

11.4 Normalization

- 11.4.1 First Normal Form (1NF)
- 11.4.2 Second Normal Form (2NF)
- 11.4.3 Third Normal Form (3NF)
- 11.4.4 Boyce-Codd Normal Form (BCNF)

11.5 Relational Database Management System(RDBMS)

- 11.5.1 Features of RDBMS
- 11.5.2 The twelve(12) rules for an RDBMS(codd's rule)
- 11.5.3 E-R Modeling
- 11.6 Summary
- 11.7 Glossary
- 11.8 Further Readings
- 11.9 Answers to the self learning exercises
- 11.10 Unit-end questions

11.0 OBJECTIVES

After going through this unit student will be able to :

- Tidentify the structures in the different models of DBMS
- Generation and different forms
- *Identify the essential features of relational model.*
- The Able to draw E-R diagrams

11.1 INTRODUCTION

A model is an abstraction process that hides superfluous details while highlighting details related to the applications at hand. A data model is a mechanism that provides this abstraction for database applications. The models can also enforce a set of constraints to maintain the integrity of the data. In modeling, we represent an entity set in the database by a set of its properties. The association between the properties is explicitly captured. A better design of the database can be achieved by normalization. Different forms of normalization exist which leads to better approach in terms of data retrieval and storage.

11.2 DATABASE MODELS

Databases can be differentiated according to function and also according to how they model the data. Data models are abstraction, usually mathematical algorithms and concepts. The evolution of databases is due to the analysis and design of data models. The advancement in data models has led to the database efficiency.

A database model is a collection of logical constructs used to represent the data structure and the data relationships found within the database. In other words, Database model is basically a description of container for data and methodology for storing and retrieving data from that container.

Database models can be grouped into categories: **conceptual models** and **implementation models**. The conceptual model focuses on the logical nature of the data representation. Therefore, the conceptual model is concerned with what is represented in the database rather than how it is represented. Conceptual models include the Entity Relationship model and the Object-Oriented Model.

Conceptual models use three types of relationships to describe associations among data. These three relationship types are:

- 1. **One-to-one:** Suppose that a company owns three computers and that each computer is operated by a single employee. In this case, a one-to-one relationship exists because each computer is assigned to only one employee, and each employee is assigned to only one computer.
- 2. One-to-many: A painter might create many different paintings, but each painting is created by only one painter.
- **3.** Many-to-Many: An employee might have many job skills and each job skill might be learned by many employees. Similarly, a student can take many courses, and each course can be taken by many students.

Unit-XI

DBMS-Classical Data Management

In contrast to the conceptual model, an implementation model places the emphasis on how the data are represented in the database or on how the data structure are implemented to represent what is modeled. Implementation models include the hierarchical database model, the network database model and the relational database model.

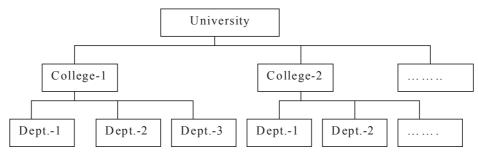
The databases can be modeled in three ways these are:

- Tierarchical
- Network
- Relational

Before 1980s the common database models were hierarchical and network systems and new model range is relational database models.

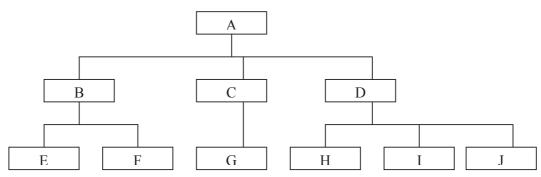
11.2.1 The Hierarchical Database Model

As the name implies, the hierarchical database model defines hierarchically arranged data. It represents one-to-many(1:M) relationship. It can be visualized as parent-child relationship. A parent data element can have one or more child data element. It can also be represented as inverted tree structure having root at the top and branches below. The following figure shows typical database occurrence of a hierarchical structure:-



Thus hierarchical schema defines the tree structure. Every node except the root has exactly one parent node and a node can have several child nodes and they may be ordered from left to right. Parents and children links are called pointers. It is not a popular technique because it does not support flexible data access.

Accessing of Data Records



A tree is a collection of nodes. One node is designated as root node and the remaining nodes form trees or sub trees. An ordered tree is a tree in which the relative order of the sub trees is significant. This relative order 205 not only signifies the vertical placement or level of the sub trees but also the left to right ordering. The following figure shows an ordered tree:

The path traces all segments from the root, starting at the leftmost segment. This "left-list" path is known as the preorder traversal or the hierarchic sequence. The preorder processing of the ordered tree will process the nodes in the sequence A,B,E,F,C,G,D,H,I,J.

Advantages

- i. Because all data are held in a common database, data-sharing becomes practical, and security is provided and enforced by the DBMS.
- ii. The DBMS creates an environment in which data independence can be maintained, thereby substantially decreasing programming effort and program maintenance.
- iii. Given the parent/child relationship, there is always a link between the parent segment and its child segment(s). Because the child segment is always automatically referenced to its parent, the hierarchical model promotes a condition known as database integrity.
- iv. The hierarchical model is very efficient when a database contains a large volume of data in 1:M relationships and when require large number of transactions, using data whose relationship are fixed over time.

Disadvantages

- i. Any changes in the database structure, such as the relocation of segments, still require changes in all applications programs t hat access the database. Therefore, the implementation of a database design can become very complicated.
- ii. A common many-to-many (M:N) relationship is difficult to implement in a hierarchical model.
- iii. A common two-parent condition cannot be implemented.
- iv. A hierarchical database is complex to manage and lack flexible. A deletion of one segment that leads to the involuntary deletion of all the segments under it. Such an error could be extremely costly.
- v. Modifications in the database structure can lead to problems with applications programs that were operating correctly before the changes were made; the benefit of data independence are thus limited by structural dependence.
- vi. Moving from one hierarchical DBMS to another is difficult; that is, portability was limited.
- vii. Perhaps the most serious criticism of the hierarchical model is that its use requires extensive programming activities. In fact, the hierarchical database has been called "a system created by programmers for programmers".

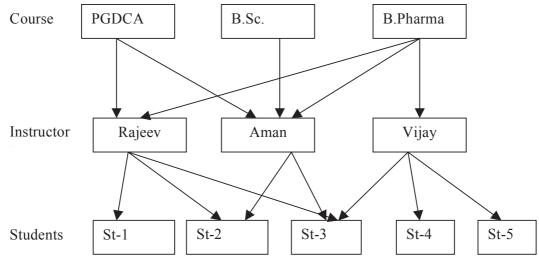
11.2.2 The Network Database Model

A Network data model can be defined as an extension of the hierarchical model. It represents many to many relationship (M:N). In this technique, a child data element can have more than one parent or no parent at all. When database is initially designed, the relationship among the data elements must be determined.

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The basic data structures in the network model are records and sets. Records are classified into record types. Each record type specifies the structure of group of records that store the same kind of information. It uses a set theory to provide a tree like hierarchy and represents relationship between records using the construct called set type. A set type basically describes 1:N relationship between two record types. Each set type is accomplished by its name, an owner record type and a member record type.

The network data modeling supports a flexible data access, because the desired data element fetching is not required to route from root data element. It forms a complex structure and therefore network databases are not used quite often.



Advantages

- i. **Conceptual simplicity.** Like the hierarchical database model, the conceptual view of the database is simple, thus promoting design simplicity.
- ii. Handles more relationship types. The M:N relationships are easier to implement.
- iii. **Data access flexibility.** An application can access an owner record and all the member records within a set. Therefore, if a member record has two or more owners, you can move directly from one owner to another.
- iv. **Promotes database integrity.** The network database model enforces database integrity because the user first must define the owner record and then the member.
- v. **Data independence.** This model achieves sufficient data independence to at least partially isolate the programs from complex physical storage details. Therefore, changes in the data characteristics do not require changes in the applications programs.

Disadvantages

- i. Network databases are difficult to design and use properly. The user must be very familiar with the database structure to take advantage of the system's efficiency.
- ii. It is difficult to make changes in a database, and s ome changes are impossible to make. If changes are made to the database structure, all sub-schema definitions must be revalidated before any applications programs can access the database.

DBMS-Classical Data Management

iii. The network model yields a very complex structure from the application programmer's point of view. Consequently, the programmer must be very familiar with the internal structure in order to access the database

11.2.3 The Relational Database Model

The Relational database model is implemented through a very sophisticated relational database management system (RDBMS). The most important advantage of the RDBMS is its ability to let the user/ designer operate in a human logical environment. The RDBMS manages all of the complex physical details. The Relational Model is based on the mathematics of n-ary relation, which is in turn founded on the disciplines of predicate calculus and set theory. Thus, the relational database is perceived by the user to be a collection of tables in which data are stored.

Each table is a matrix consisting of a series of row/column intersection. Tables, also called relations, are related to each other by sharing common entity characteristics. Each table is made up of records. Horizontal rows, known as tuples or records and vertical columns are known as attributes. The number of attributes defines the degree of relation. The number of tuples in a relation is known as cardinality of the relation.

A relational table stores a collection of related entities. In this respect, the relational database table resembles a file. But there is one crucial difference between table and a file: a table yields complete data and structural independence and uses constraints because it is a purely logical structure. How the data are physically stored in the database if of no concern to the user or the designer; the perception is what counts here.

Advantages

- 1. **Structural Independence.** The data access paths are irrelevant to relational database designers, programmers, and end users. Changes in the relational database structure do not affect the DBMS's data access in any way.
- 2. **Data Independence** is achieved more easily with normalization structure used in a relational database than in the more complicated tree or networked structure.
- 3. **Improved conceptual simplicity.** The relational database model is simpler at the conceptual level. Because the relational database model gives us the luxury of ignoring physical data storage characteristics, we can concentrate on the logical view of the database.
- 4. **Security** control and authorization can also be implemented more easily by moving sensitive attributes in a given table into a separate relation with its own authorization controls.
- 5. Easier database design, implementation, management, and use. Because the relational model achieves both data independence and structural independence, it becomes much easier to design the database and to manage its contents.
- 6. Ad hoc query capability.
- 7. A powerful database management system.

Disadvantages

1. Substantial hardware and system software overhead. Relational database model takes a more powerful computer to perform all the RDBMS - assigned tasks. Consequently, the relational database system tends to be slower than the other database systems.

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- 2. Poor design and implementation is made easy. The relational environment's easy to-use asset also becomes its liability. Relational software, especially at the micro computer level, is so simple to use that relatively untrained people find it easy to generate handy reports and queries without giving much thought to the need to design a proper database. As the database grows, lack of proper design tends to slow the system down and to produce the data anomalies found in file system.
- 3. May promote "islands of information" problems. Because the relational database model is so easy to use, too many people find it easy to create their own database subsets and applications. Although end user autonomy is desirable when the end users query a common database, such autonomy may also lead to the development of database subsets that are "owned" by divisions or individuals. The proliferation of such database subsets may produce the same "islands of information" problem that was characteristics of the file management system, with the same tendency to promote inconsistent data, thus causing problems in information generation and validation.

11.2.4 Difference between Relational and Other Models

- 1. **Normalization Theory-** Properties of a database that make it free of certain problems of updation and redundancy have been developed within the context of the relational model. However these properties can also be designed into a network data model database.
- 2. Set Theory As RDBMS is based on mathematical set theory, the usage of relational algebra and relational calculus for the manipulation of the relations/tables ensures that there is no ambiguity, which may otherwise, arise in establishing the linkages in a complicated network type database.
- 3. **Implementation Independence** The relational model logically represents all relationships implicitly. Therefore, the physical associations represented by an efficient access path among various files, one does not know without looking at the internal data model. However, the complexities of Network and Hierarchical models are defined at logical level. Thus relational model provides data independence over other models.
- 4. Logical key pointers The relational data model uses primary and secondary keys in records to represent the association between two records. This model's implementation is independent of the data manipulation language as only the physical database use address pointers and physical database is totally masked from the user of a relational database.

CHECK YOUR PROGRESS 11.2

- 1 A collection of conceptual tools for describing data, data relationship and semantics is called _____.
- 2 A ______ represents data by records organized in the form of trees and the relationships among data are represented links.
- 3 A _____ organizes the data into tables known as relations.
- 4 allows modification of a scheme definition without affecting other scheme definitions.

11.3 THE RELATIONAL MODEL

The relational model was propounded by E.F. Codd of the IBM and has since been acknowledged as a very important concept in DBMS technology. This model has established itself as the primary data model for commercial data processing applications.

11.3.1 Terminology

Different terms used in the relational model are:-

- Relation A table storing logically related data, data must be in a cell, all rows of this table are distinct, ordering of rows and columns is immaterial. Each row of the relation can be uniquely identified by its contents.
- Domain A domain is a pool of values (valid values) from which the actual values appearing in a given column are drawn.

A main feature of relational data model is that associations between rows are represented solely by data values in columns drawn from a common domain.

- Tuple-A row of a relation is generally referred to as a tuple.
- The A column of a relation is generally referred to as an attribute.
- The Degree It refers to the number of attributes in a relation.
- Cardinality It refers to the number of tuples in a relation.
- View It is a virtual table that does not really exist in its own right but is instead derived from one or more base tables.
- Primary Key A primary key is a set of one or more attributes that can uniquely identify tuples within the relation.
- Candidate Key All attribute combinations inside a relation that can serve as primary key are candidate keys as they are candidates for primary key position.
- *Alternate Key* A candidate key that is not primary key, is called an alternate key.
- Foreign Key A non key attribute whose values are derived from the primary key of some other table is known as foreign key in its current table.
- Referential Integrity It is a system of rules that a DBMS uses to ensure that relationships between records in related tables are valid and that users don't accidentally delete or change related data.

When referential integrity is enforced, the following must be observed:-

- User can't enter a value in the foreign key field of the related table that doesn't exist in the primary key of the primary table. However, user can enter a Null value in the foreign key, specifying that the records are unrelated.
- Tuser can't delete a record from a primary table if matching records exist in a related table.
- The User can't change a primary key value in the primary table, if that record has related records.

11.3.2 The Relational Algebra

The Relational Algebra is a collection of operations on relations. Each operation takes one or more relations as its operand and produces another relation as its result. The operations defined in relational algebra are select, project, Cartesian product, union, set difference, set intersection, natural join, division etc. The select and project are unary operations since they operate on one relation. The other operations are binary operations as they operate upon pairs of relations.

Select Operation

The select operation selects tuples from a relation that satisfy a given predicate i.e. a given condition. The selection is denoted by letter σ (Sigma).

Emp_code	Name	Dept
1	Rajeev	10
2	Aman	20
3	Sanjay	10
4	Surendra	30

To select only those tuples from emp relation where the department is equal to 10.

Which can be represented as: $\sigma \det = 10(emp)$

On the basis of the given selection, the following tuples will be selected:

Emp_code	Name	Dept
1	Rajeev	10
3	Sanjay	10

Project Operation

The project operation yields a vertical subset of a given relation in contrast to the horizontal subset returned by select operation i.e. the projection allows the user to select specified attributes in a specified order. As the result is also a relation, the duplicating tuples are automatically removed. Projection is denoted by pi (π).

To project employee names and department from the above relation emp. Which can be represented as: ð name,dept (emp)

Name	Dept
Rajeev	10
Aman	20
Sanjay	10
Surendra	30

Cartesian Product Operation

The Cartesian product is a binary operation and is denoted by a cross(x). The Cartesian product of two relations P and Q is written as PxQ. The Cartesian product yields a new relation which has a degree equal to the sum of the degrees of the two relations operated upon. The number of tuples of the new relation is the product of the number of tuples of the two relations operated upon. The Cartesian product of two relations yields a relation with all possible combinations of the tuples of the two relations operated upon.

Emp. table					
Emp_code	Name	Dept			
1	Rajeev	10			
2	Aman	20			
3	Sanjay	10			
4	Surendra	30			

_	Grade				
	Grade	GName			
	G1	CLERK			
	G2	OFFICER			

Emp code	Name	Dept	Grade	GName
1	Rajeev	10	G1	CLERK
1	Rajeev	10	G2	OFFICER
2	Aman	20	G1	CLERK
2	Aman	20	G2	OFFICER
3	Sanjay	10	G1	CLERK
3	Sanjay	10	G2	OFFICER
4	Surendra	30	G1	CLERK
4	Surendra	30	G2	OFFICER

Emp. x Grade

All rows of emp table matches the all rows of grade table.

Union Operation

The union operation is a binary operation that requires two relations as its operands. It produces a third relation that contain tuples from both the operand relations. The union operation is denoted by U. The union of two relations P and Q is written as $P \cup Q$.

For a union operation P U Q is to be valid, if the following two conditions must be satisfied by the two operands P and Q:

- 1. The relations P and Q must be of the same degree i.e. they must have the same number of attributes.
- 2. The domain of the ith attribute of P and the ith attribute of Q must be the same.

С			C++		
Rollno	Name	Age	Rollno	Name	Age
1	Sanjay	22	2	Alok	21
2	Alok	21	9	Shakti	22

Result of C U C++

Rollno	Name	Age
1	Sanjay	22
2	Alok	21
9	Shakti	22

Difference Operation

The set difference operation denoted by - (minus) allows us to find tuples that are in one relation but not in another. The expression P-Q results in a relation containing those tuples in P but not in Q.

C				C++		
Rollno	Name	Age	Rollno	Name	Age	
1	Sanjay	22	2	Alok	21	
2	Alok	21	9	Shakti	22	

Result of C - C++

	nebult of C	
Rollno	Name	Age
1	Sanjay	22

DBMS-Classical Data Management

Intersection Operation

The set intersection operation finds tuples that are common to the two operand relations. The set intersection is denoted by \ensuremath{n}

С			C++		
Rollno	Name	Age	Rollno	Name	Age
1	Sanjay	22	2	Alok	21
2	Alok	21	9	Shakti	22

Result of C n C++

Γ	Rollno	Name	Age
	2	Alok	21

CHECK YOUR PROGRESS 11.3

- 1. The ______ extracts columns from a relation and is denoted by _____.
- 2. The ______ yields a relation containing tuples from both the operand relations and is denoted by _____.
- 3. The ______ extracts tuples from a relation depending upon a condition and is denoted by ______.

11.4 NORMALIZATION

Designing a database is a complex task and the normalization theory is a useful aid in the design process. The process of normalization is concerned with the transformation of the conceptual schema into a computer representable form.

A bad database design may lead to certain undesirable situations like:-

- Inability to represent certain information
- Repetition of Information
- Coss of Information

All these may lead to the rewriting of applications. To minimize these anomalies (An anomaly is undesired consequence of data modification), normalization is used.

Normalization helps to attain a good database design and there by ensures continued efficiency of the database. If the database is in a normalized form, the data can be restructured, and the database can grow without rewriting of application programs. Normalization, which is a process for assigning attributes to entities, offers following advantages:-

- (i) It reduces data redundancies.
- (ii) It helps to eliminate data anomalies.
- (iii) It produces controlled redundancies to link tables.

A number of normal forms have been defined for classifying relations. Each normal form has associated with it a number of constraints on the kind of functional dependencies that could be associated with the relation.

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The normal forms are used to ensure that various types of anomalies and inconsistencies are not introduced into the database. An unnormalized relation contains non atomic values.

11.4.1 First Normal Form (1NF)

A relation is in first normal form (1NF) if the values in the domain of each attribute of the relation are atomic (indivisible) values. This definition of 1NF has been expressed in the following two forms:-

- (i) In every tuple of the relation, no attribute should have repeating groups.
- (ii) In every tuple of the relation, each attribute must have a value and that too an atomic value.

Student

RN#	Name	Subject
1	Ajay	C, VB,
		JAVA
2	Shankar	HTML,
		JavaScript,
		VB

	Student	
SN#	Name	Subject
1	Ajay	С
1	Ajay	VB
1	Ajay	JAVA
2	Shankar	HTML
2	Shankar	JavaScript
2	Shankar	VB
	DI (* * T	

Q 1 4

Unnormalized Relation

Relation in INF

To achieve the first normal form, the following tasks should be completed:-

- P All key attributes must be defined
- The No repeating groups in a table
- All attributes dependent on primary key

11.4.2 Second Normal Form (2NF)

Before preceding to 2NF, we must understand the term functional dependence. Functional dependence is a relationship that exists between any two fields. Consider a relation R

А	В	С
Ι	2	1
Ι	2	7
J	5	2
J	5	8
Κ	4	5

 $A \rightarrow B$ (B is functionally dependent on A)

 $A \rightarrow C$ (C is not functionally dependent on A)

B is functionally dependent upon A since for each value of A, there is only one value of B associated with. (For I in A, B stores 2, J in A, B stores 5, for K in A, B stores 3)

A relation is in second normal form (2NF) if and only if it is in 1NF and every non key attribute is fully dependent on the primary key.

Partial Dependency refers to the dependence of a non-key attribute on the portion of the composite primary key and not the whole primary key.

Example :- Given a 1NF relation as Student-Proj

rollno	Projectno	Hours	Studentname	projlocation
Prima	ry Key			

Functional dependencies are:-

Rollno + projectno → Hours Rollno → studentname Projectno → projlocation

2NF by decomposing into three tables:-

S	studprojhour	S		stud	Pre	ojloc.
rollno	projectno	hours	rollno	studentname	projectno	Projlocation

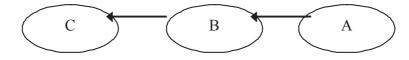
To achieve the second normal form, the following tasks should be completed:-

- In first normal form
- T includes no partial dependencies
- T can exhibit transitive dependencies.

11.4.3 Third Normal Form (3NF)

The elimination of transitive dependence from a 2NF relation leads to the relation in 3NF.

Transitive dependency means a non-key attribute (say A) is dependent on another attribute (say B) which in turn is dependent on primary key (say C).



A relation P is said to be in third normal form (3 NF) if and only if it is in 2NF and every non-key attribute is non-transitively dependent on the primary key.

Example:- Given a 2NF relation as Student-class

Rollno	name	dob	addr	classcd	cname	Headboy
						-

3NF by decomposing into two tables:-

		student				class	
Rollno	name	dob	addr	classcd	classcd	name	headboy

To achieve the second normal form, the following tasks should be completed:-

🖙 In 2NF

Tt does not contain transitive dependencies.

As we obtain the relations in 3NF, our major job of designing database is over. We can still enhance the design of the database by connecting the tables in 3NF to BCNF.

11.4.4 Boyce-Codd Normal Form (BCNF).

A relation is in BCNF if it is in 3NF and all of its determinants i.e. the attributes on which other attributes depend are candidate keys. To convert a 3NF into BCNF, decompose the relation such that every determinant becomes a candidate key.

Example:- Given a relation as

Rollno Teach id Class cd Grade	D 11	 <u>C1</u> 1	G 1
	Rollno	Class_cd	Grade

Here this table is in 3NF since all non-key attributes class_cd and grade are non-transitively dependent on the primary key rollno+teach_id. This is not in BCNF because class_cd is also a determinant here since teac_id depends on class_cd also and it is not a candidate key. To convert it into BCNF, we'll decompose the above table into two tables.

	stud		(Class_teach
Rollno	Class_cd	Grade	Class_cd	Teach_id

To achieve the BCNF normal form, the following tasks should be completed:-

🖙 In 3NF

© Every determinant in the table is a candidate key.

CHECK YOUR PROGRESS 11.4

- 1. _____ relations have nonkey attributes non-transitively dependent on the primary key.
- 2. The _____ leads to a good database design.
- 3. _____ relations have every determinant in the table a candidate key.

11.5 RELATIONAL DATABASE MANAGEMENT SYSTEM(RDBMS)

In RDBMS, the data is organized in tables consisting of rows and columns, where rows of a table represent records and column represents fields. A relational database is one that is built and operated in accordance with the Relational Model of data proposed by E.F.Codd(1970).

11.5.1 Features of RDBMS

- (i) The ability to create multiple relations and enter data into them.
- (ii) Retrieval of information stored in more than one table.
- (iii) An interactive query language
- (iv) RDBMS product has to satisfy at least six of 12 rules of codd to be accepted as a full fledged RDBMS.

11.5.2 The twelve(12) rules for an RDBMS(codd's rule)

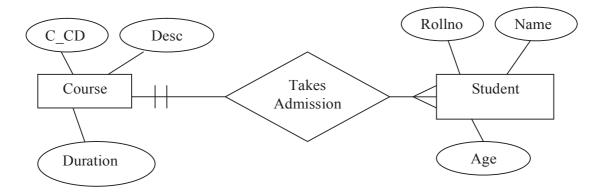
- (i) Information Representation All the information is explicitly and logically represented by the data values in the tables means any information such as table, view, column names etc. should be contained somewhere as a table form.
- (ii) Guaranteed Access It refers that the table can be taken as a storage structure and at the intersection of each column and a row there will necessarily be only one value of data.

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	(iii)	Systematic treatment of NULL values - In DBMS null values are supported for the representation of missing and inapplicable information.
	(iv)	Database description rule - A description of the database is stored and maintained the form of tables as is done while defining the data. This implies that a data dictionary should be present within the RDBMS that is constructed.
	(v)	Comprehensive Data Sublanguage - The RDBMS must be completely manageable through its own extension of SQL. The SQL should support Data definition, views, data manipulation, integrity constraints, authorization, transaction boundary.
	(vi)	View updating - It is possible to create views with all sort of aggregates and virtual columns, it is not possible to update through some of them. There exists a set of rules that when applied to a view, can be used easily to determine its level of logical complexity and apply these rules to those views that are defined as simple by such criteria.
	(vii)	High-level update, insert, delete - An RDBMS must do more than just be able to retrieve relational data sets. It has to be capable of inserting, updating and deleting data as a relational set. A database cannot be called relational, if it uses a single-record at time procedural technique when it comes to manipulating the data.
	(viii)	Physical data Independence - Different user access database through different devices or by application programs, database must remain logically consistent even when changes to the storage representation, or access methods to the data are changed.
	(ix)	Logical data Independence - Application programs must be independent of the changes made to the base tables. This rule allows many types of database design changes to made without the users being aware of them.
	(x)	Distribution Rule - RDBMS must have distribution independence. This is one of the most attractive aspects of the RDBMS. Database systems built on the relational framework are well suited to client/server database design.
	(xi)	Non-Subversion If an RDBMS supports a lower level language that permits row at a time processing, then this language must not be able to bypass any integrity rules or constraints of the relational language. Thus an RDBMS must be governed by relational rules as its primary laws.
	(xii)	Integrity Rule - Integrity constraints specific to a particular relational database must be definable in the relational data sublanguages and storable in the catalogue, not in the application programs.
11.5.3	E-R N	Iodeling
	Entity	relationship modeling is a technique for analysis and logical modeling of a system's data requirements.
It uses	three b	asic units Entity, their Attributes and the Relationships that exist between the entities. It uses a
graphic	al notat	tion for representing these.

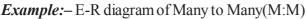
(i) Entity – An entity is an object, place or person that the system stores information about them. It can have multiple instances or occurrences. Each instance should be uniquely identifiable. Each entity has certain properties or attributes associated with it and operations applicable to it. Entity is denoted by symbol

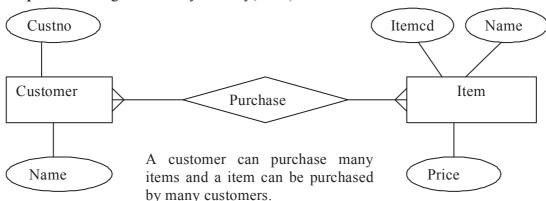


- (ii) Attributes- These are the data elements that describe an entity like rollno, name etc. and is denoted by
- (iii) Relationships- This is an association between entities. It is represented by rhombus in the E-R diagram. **Example of E-R Diagram:-**Course Student Enrolls in Relationships are of three types:- \bigcirc One to One (1:1) ☞ One to Many (1:M) ☞ Many to Many (M:M) These relationships are explained in 11.2 above. *Example:*–E-R diagram of One to One(1:1) SNO Name Area_c Name Surveys In Surveyor Area Topic Population
- *Example* :- E-R diagram of One to Many(1:M)



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CHECK YOUR PROGRESS 11.5

- 1. What are the basic units of E-R diagram?
- 2. _____ are data elements that describe an entity.
- 3. An RDBMS product has to satisfy at least _____ out of the 12 codd rules to be accepted as a full fledged RDBMS.

11.6 SUMMARY

In this unit, we understand the concept of major data modeling concepts and the data models used in DBMS. The E-R model is used increasingly as a tool for database applications modeling. Traditional data models are hierarchical, network and relational models. The hierarchical model evolved from the file-based system, the network model is a superset of the hierarchical model. The relational data model is based on the mathematical relational concept.

Conceptually, a relation can be represented as a table, each column of the table represents an attribute of the relation and each row represents a tuple of the relation. Mathematically a relation is a correspondence between a number of sets and is a subset of the Cartesian product of these sets. The sets are the domains of the attributes of the relation.

The process of normalization is concerned with the transformation of the conceptual schema into a computer representable form. We discussed the different normal forms such as:1NF, 2NF, 3NF, BCNF which leads to better database design.

11.7 GLOSSARY

Alternate key:- A candidate key which is not a primary key.

Attribute:-A column of a relation.

BCNF:– Boyce-Codd Normal Form - A relation is in BCNF if it is in3NF and every determinant is a candidate key.

Candidate Key:- Attribute combinations in a relation that can serve as a primary key.

Cardinality:– Number of tuples in a relation.

Data Independence:– Ability to modify a scheme definition within a database without affecting other scheme definitions.

DBMS-Classical Data Management

Data Redundancy:- Duplication of data.

Degree:- Number of attributes in a relation.

Domain:-A pool of values from which the actual values appearing in a given column are drawn.

Foreign Key:- Non key attribute, which is a primary key of another table.

Normalization:– The decomposition of more complex data structures into relations. This forms the basis of relational databases.

Primary Key:- Set of one or more attributes that can uniquely identify tuples within a relation.

Relation :- Data arranged in rows and columns and having certain properties.

Relational:-A language providing a set of operators for manipulating relations.

Algebra Tuple :- A row of a relation.

View:- A virtual table derived from one or more underlying base tables..

11.8 FURTHER READINGS

- 1. Ramakrishnan and Gharke, Database management Systems, Tata McGraw Hill Pub. Co. Ltd.
- 2. Date Database Management Systems, Pearson Education Asia
- 3. Geraid V Post, Database Management Systems, Tata McGraw Hill
- 4. An introduction to Database Systems, Bipin C. Desai, Galgotia publications

11.9 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to check your progress 11.2

- 1. Data Model2. Hierarchical Data Model
- 3. Relational Data Model 4. Data Independence

Answers to check your progress 11.3

1. Projection, π (pie) 2. Union, U 3. Selection, σ (Sigma)

Answers to check your progress 11.4

1. 3NF 2. Normalization 3. BCNF

Answers to check your progress 11.5

1. Entity, Attribute and Relationship 2. Attributes 3. Six

11.10 UNIT-END QUESTIONS

- 1. What are advantages and disadvantages of Network Model?
- 2. What is Normalization? What is its need?
- 3. What do you mean by relational database and list their advantages?
- 4. What do you understand by unary relation and binary relation?
- 5. What are the set difference and set intersection operations? How are they different?

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Unit XII : SQL - STRUCTURED QUERY LANGUAGE

Structure of the Unit

- 12.0 Objectives
- 12.1 Introduction

12.2 Introducing Oracle

- 12.2.1 Features of Oracle
- 12.2.2 Physical Oracle
- 12.2.3 Logical Oracle
- 12.2.4 Steps for starting Oracle

12.3 SQL-Structured Query Language

- 12.3.1 Literals
- 12.3.2 Data Types
- 12.3.3 Null Values
- 12.3.4 Comments
- 12.3.5 Tables used in examples

12.4 Querying Database Tables

- 12.4.1 The SELECT statement
- 12.4.2 Functions and Grouping
- 12.4.3 Querying Multiple Tables
- 12.4.4 Using Relation Algebra functions Union, Intersect and Minus
- 12.4.5 Nested Queries

12.5 Data Definition Language

- 12.5.1 Creating Tables
- 12.5.2 Inserting Values
- 12.5.3 Updating Values
- 12.5.4 Deleting Row(s)
- 12.5.5 Viewing the Structure of a Table
- 12.5.6 Modifying the structure of a Table
- 12.5.7 Removing table from the database

12.6 Transaction Control Commands

- **12.7** Views
- 12.8 Summary
- 12.9 Glossary
- 12.10 Further Readings
- 12.11 Answers to the self learning exercises
- 12.12 Unit-end questions

12.0 OBJECTIVES

After going through this unit student will be able to :

- Tidentify the structures in the different models of DBMS
- Identify the meaning of normalization and different forms
- Tidentify the essential features of relational model.
- P Able to draw E-R diagrams

12.1 INTRODUCTION

SQL, Structured Query Language, was developed in 1970s in an IBMS Laboratory. SQL sometimes also referred to as SEQUEL is a 4th generation non-procedural language. In non-procedural languages 'WHAT is required' is specified in contrast to 3GL's 'HOW it is to be done'. SQL the standard language of RDBMS allows the following with ease:-

- (i) Creation/Change in database structure
- (ii) Querying database
- (iii) Insert/Update/Delete the database contents
- (iv) Reports for Printing
- (v) Security Settings according to user

There are many DBMSs are available in the market that are capable of storing and maintaining the database of an enterprise, but ORACLE is one of the most popular DBMS's that is being used by number of organization all over the world. Oracle falls under the category of Relational Database Management System (RDBMS). In this unit, we will focus on all SQL commands by considering Oracle.

12.2 INTRODUCING ORACLE

The Oracle was developed by a company called Relational Software Incorporated (RSI) in year 1977. In 1979, this company launched its first commercial product called SQL RDBMS. The company now changed its name from RSI to Oracle Corporation. Oracle has been constantly updating its product and launched several versions. If student uses windows 98, Personal Oracle 8.0 will work, For Windows 2000, Oracle 8i will work and for windows xp Oracle 9i will work .

12.2.1 Features of Oracle

Oracle is a powerful RDBMS product that provides efficient and effective solutions for major database features. This includes:-

- (i) Large databases and space management control:- It supports the largest of databases where size can go up to terabytes. It allows full control on space usage.
- (ii) Many concurrent database users:- It supports large number of concurrent (means many users working at the same time on the same data) users.
- (iii) High availability:- It is having very low/no down time and can work 24 hours a day. Normal system operations like backup, partial computer system failures do not interrupt database uses.

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(iv)	Controlled Availability :- It can selectively control the availability of the data at the database level.
(v)	Manageable Security:- It provides full security features to limit and monitor data access.
(vi)	Database enforced integrity :- It maintains the database integrity through the use of constraints and referential integrity.
(vii)	Client/Server environment :- It takes the full advantage of a given computer system or net- work.
(viii)	Portability:- It is ported to work under different operating systems.
(ix)	Compatibility :- It is compatible with industry standards. It can be used on virtually any system with little or no modification.
(x)	Industry accepted standards:- It adheres to the accepted standards for the data access lan- guage, operating system and network communication protocols.
	acle database system can easily take advantage of distributed processing by using its client/server n this architecture, the database system is divided into two parts:-

- The A front-end or a client portion
- A back-end or server portion

The client executes the database application that accesses database information and interacts with the user. The server executes the Oracle software and handles the functions required for concurrent, shared data access to oracle database.

12.3.2 Physical Oracle

At the physical level, Oracle exists in various files:

- (i) Data files A database's data file contains all the database data.
- (ii) Control files A control file contains entries that specify the physical structure of the database.
- (iii) **Redo Log files** The primary function of the redo log is to record all changes made to data. In case of failure, the changes can be obtained from the redo log.
- (iv) Temporary files To store the intermediate data.
- (v) Configuration and parameter files To store the settings and providing parameters to different oracle commands.

12.3.3 Logical Oracle

The oracle logical database is represented in several structures:-

- (i) Tablespaces A tablespace is a logical storage entity that is assigned to one or more physical datafiles
- (ii) Segments- A segment is made up of one or more extents that are allocated for one specific type of storage. The four types of segments are data segments, index segments, temporary segments and rollback segments.

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- (iii) Extents- An extent is a combination of oracle data blocks that together make up a logical unit of storage.
- (iv) Blocks– This is the most atomic unit of storage in oracle. All oracle objects are stored in units of blocks.

12.2.4 Steps for starting Oracle

- (i) Install Oracle, versions depends on the availability and operating system of your computer.
- (ii) Click on programs->Oracle->SQL Plus.
- (iii) Provide User name 'scott' and password 'tiger' and click OK button.

After successful login, Oracle shall perform many security checks, starts oracle instance, mount the database and finally take you to the SQL*Plus window where you can issue SQL commands and can see the results. It will provide the SQL>prompt as shown below:-

Log On St.		
User Name:	scott	
Password		
Hest String:		
ОК	Cancel	

12.4 SQL-STRUCTURED QUERY LANGUAGE

To access data from the database, all programs and users must use Structured Query Language. SQL is the set of commands that is recognized by nearly all RDBMSs. The SQL has proved to be a language that can be used by both casual users as well as skilled programmers.

The SQL language has several parts:

- Data-definition language (DDL). The SQL DDL provides commands for defining relation schemas, deleting relations and modifying relation schemas.
- Interactive data-manipulation language (DML). The SQL DML includes a query language based on both the relational algebra and the tuple relational calculus. It includes also commands to insert tuples into, delete tuples from, and modify tuples in the database.
- *The SQL DDL includes commands for defining views.*
- Transaction control. SQL includes commands for specifying the beginning and ending of transaction.
- **Embedded SQL and Dynamic SQL.** Embedded and dynamic SQL define how SQL statements can be embedded within general-purpose programming languages like C, C++, Java etc.

- Integrity. The SQL DDL includes commands for specifying integrity constraints that the data stored in the database must satisfy.
- *Authorization.* The SQL DDL includes commands for specifying access rights to relations and views.

SQL*Plus is a software product from Oracle corporation that allows users to interactively use the SQL commands, produce formatted reports and support written command-procedures to access ORACLE database. Through SQL*Plus a user can:-

- The Enter, Edit, Store, retrieve and run SQL Commands.
- Format, perform calculations on stored and print query results in the form of reports
- List column definition of any table
- General Access and copy data between SQL databases
- Send messages to and accept responses from an end user.

12.3.1 Literals

Literals in general, refer to a fixed data value. This fixed data value may be of character or numeric type literal. For example 'Rajeev', 'Rakesh', '205' are character literals enclosed in single quotation mark.

Numeric literals can either be integer or real literals like 17 or 17.5. A numeric literal can store a maximum of 38 digits of precision.

12.3.2 Data Types

Data types are means to identify the type of data and associated operations for handling it. Different data types are:-

Data Type	Description
CHAR(n)	To store fixed size character type of data. Max. size is 255 bytes.
VARCHAR2(n)	Similar to char but can store variable number of characters
NUMBER(p, s)	Stores int. and real numbers.Max.21 bytes, Number having precision p and scales. The precision p can range from1 to 38 digits.
DATE	Stores date and time values in a table. Fixed at 7 bytes
LONG	It can store up to 2 GB of characters.
RAW(n)	Stores binary data such as graphics and sound. Can store up to 2000 bytes per row.

Apart from above data types, there are many more data types that are supported but are beyond the scope of this unit like CLOB, BLOB and BFILE data types that can store Character Large Object, Binary Large Object and Binary File Locator.

Difference between Char and Varchar2 data types

The difference between CHAR and VARCHAR2 is that of fixed length and variable length. The CHAR data type specifies a fixed length character string. When a column is given data type as CHAR(n), it ensures that all values stored in that column have this length. If a value is shorter than maximum length n then blanks are added.

VARCHAR2(n) specifies a variable length string. The maximum size a value in this column can have is n bytes. No blanks are added if the length is shorter than maximum length.

12.3.3 Null Values

If a column in a row has no value, then column is said to be null or to contain a null. Nulls can appear in any column provided they are not restricted by NOT NULL or PRIMARY KEY integrity constraint. Any arithmetic expression containing a null always evaluates to null.

12.3.4 Comments

A comment is a text that is not executed; it is only for documentation purpose. You can include a comment in a statement using either of these means:-

- *Get* Begin the comment with /* and end the comment with */ for multi line comment.
- *Begin the comment with two hyphens (--). It is a single line comment.*

12.3.5 Tables used in examples

Through out this unit, We are using standard tables emp, dept provided by oracle software in our example.

Column Name	Туре	Description
EMPNO	NUMBER(4)	Employee Number
ENAME	VARCHAR2(20)	Employee Name
JOB	CHAR(10)	Designation
MGR	NUMBER(4)	Manager's EMPNO
HIREDATE	DATE	Date of Joining
SAL	NUMBER(9,2)	Basic Salary
COMM	NUMBER(7,2)	Commission
DEPTNO	NUMBER(2)	Department Number

Structure of EMP table

Structure of DEPT table

Column Name	Туре	Description
DEPTNO	NUMBER(2)	Department Number
DNAME	VARCHAR2(20)	Name of the department
LOC	VARCHAR2(10)	Location of the department

CHECK YOUR PROGRESS 12.3

- 1. Single line comments are given by _____
- 2. ______ specifies a variable length string.
- **3.** _____ refers to a fixed data value.
- 4. _____ provides commands for defining relation schemas.
- 5. _____ includes a query language based on both the relational algebra and the tuple relational calculus

12.4 QUERYING DATABASE TABLES

To use the power of RDBMS, we need to communicate with it in a powerful way by making queries *i.e.* by asking the RDBMS to show your desired data in desired format. A statement in SQL is completed with a semicolon (;). SQL are case insensitive. However the text literal or character literals specified in quotation marks are case-sensitive.

12.4.1 The SELECT statement

This statement allows to make queries on the database. There are various ways and combinations, a SELECT statement can be used into. It can be used to retrieve information from a single row or column, multiple rows and columns and single or multiple tables. The syntax of the SELECT statement is:-

Syntax

SELECT <column-name>[,<column-name>,...] FROM <table-name>[,<table-name>....] [WHERE <condition>] [GROUP BY <column-name(s)>] [HAVING <condition>] [ORDER BY <expression>];

Examples:

e Edit Sear	'Plus ch Options He	lo						×
	: * from em							-
EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	
	SMITH	CLERK		17-DEC-80	800		20	
	ALLEN	SALESMAN		20-FEB-81	1600	300	30	
7521		SALESMAN		22-FEB-81	1250	500	30	
	JONES	MANAGER		02-APR-81	2975		20	
	MARTIN	SALESMAN		28-SEP-81	1250	1400	30	
	BLAKE	MANAGER		01-MAY-81	2850 2450		30 10	
	CLARK Scott	MANAGER ANALYST		09-JUN-81 19-APR-87	2450		20	
7839		PRESIDENT	7500	17-NOV-81	5000		10	
	TURNER	SALESMAN	7609	08-SEP-81	1500	0	30	
	ADAMS	CLERK		23-MAY-87	1100	0	20	
EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	
	JAMES	CLERK		03-DEC-81	1000		30	
7982		ANALYST	7566	03-DEC-81	3000		20	
	lected.				3000			
rows se]	Lected. : * from dep	pt; LOC			3000			
rows sel L> select DEPTNO	Lected. : * from dep				3000			
rows sel -> select DEPTNO 	Lected. * from dep DNAME ACCOUNTING RESEARCH	LOC NEW YORK DALLAS			3 8 8 8			
rows sel .> select DEPTNO 10 20 30	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel L> select DEPTNO 10 20 30	Lected. * from dep DNAME ACCOUNTING RESEARCH	LOC NEW YORK DALLAS			3 000			
rows sel L> select DEPTNO 10 20 30 40 L>	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3 000			
rows sel L> select DEPTNO 10 20 30 40 40 L> L>	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3 000			
rows sel DEPTNO 20 30 40 40 20 20 20 20 20 20 20 20 20 20 20 20 20	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3 000			
rows sel DEPTNO 10 20 30 40 L> L>	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel DEPTNO 20 30 40 L> L> L>	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel > select DEPTNO 10 20 30 40 -> -> -> -> -> ->	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel DEPTNO 10 20 30 40 L> L>	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel DEPTNO 10 20 30 40 22 30 40 22 24 24 24 24 24 24 24 24 24	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			
rows sel > select DEPTNO 10 20 30 40 -> -> -> -> -> -> -> -> -> ->	Lected. * from dep DNAME ACCOUNTING RESEARCH SALES	LOC NEW YORK DALLAS CHICAGO			3000			

- Show the empno, ename from the emp table of all employees.
 SQL>SELECT empno, ename FROM emp;
- Show the all information for all employees from the emp table.
 SQL>SELECT * FROM emp;

The output will look like as under:-

Using Column Aliases

Column aliases means the heading label provided by the user in double quotation mark (not using the default label).

SQL>SELECT ename "Name", sal*12 "Annual Salary" FROM emp;

Putting text in the query output

Adding text with the column data of every row.

SQL>SELECT empno, ename, comm.*100,'%' from emp;

Concatenating Strings(||)

This means that joining different fields or string literals and convert them into a single column value. SQL>SELECT ename $\|'-'\|$ job "Name and Job" FROM emp;

Conditional Retrieval of Rows

The rows can be retrieved on the basis of given condition by using the WHERE clause the SQL. Different operators can also be used in conjunction with the given condition. Operators used are:-

Relational Operators		
=	Equal To	
>	Greater Than	
<	Less Than	
>=	Greater than or equal to	
<=	Less than or equal to	
<>, !=	Not equal to	

Logical Operators

Logical Operators		
AND	Logical AND	
OR	Logical OR	
NOT	Logical NOT	

Special Operators	
IS NULL	Checking for NULL values
IN	Checking a value in a set.
BETWEEN	Checking a value within a range

Examples:

(i) Show the list of all the employees of department number 20.SQL>SELECT * FROM emp where deptno=20;

- (ii) Show the list of all the employees whose salary is greater than 1000.SQL>SELECT ename, sal FROM emp where sal>1000.
- (iii) Show the list of all the employees who are MANAGER.SQL>SELECT empno, ename FROM WHERE job='MANAGER';
- (iv) Show the list of all the employees who are CLERK and belongs to department number 20.
 SQL>SELECT ename FROM emp WHERE job='CLERK' and deptno=20;
- (v) Show the list of all the employees who joined on or before December 31st, 1981.
 SQL>SELECT * FROM emp WHERE hiredate <= '31-DEC-81';
- (vi) List the employees name who are having employee number 7369 or 7521 or 7839 or 7934.SQL>SELECT ename FROM emp WHERE empno IN(7369, 7521, 7839, 7934);
- (vii) List the employees who do not belongs to department number 10,30 and 40.SQL>SELECT * FROM emp where deptno NOT IN (10,30,40);
- (viii) List the employees name and salary whose salary falls in the range of 1000 and 2000.
 SQL>SELECT ename, sal FROM emp WHERE sal BETWEEN 1000 and 2000;
- (ix) List the employee names who are not eligible for commission.SQL>SELECT ename FROM emp WHERE comm. IS NULL;
- (x) List the employees who are not assigned to any department. SELECT ename FROM emp WHERE deptno IS NULL.

Condition based on pattern matching

SQL includes a string-matching or pattern matching operator LIKE for comparisions on character strings using patterns. Patterns are described using two special wildcard characters:

- * % (percent)– The % character matches any substring.
- (underscore) The _____ character matches any character.

Patterns are case-sensitive. The following are examples for considering patterns:

- " 'Raj%' matches any string beginning with 'Raj'
- "/wee%' matches any string containing 'ee' as a substring like 'Rajeev'.
- *^{ce}* '----' matches any string of exactly 4 characters.
- *^{ce}* '----%' matches any string of atleast 4 characters.

Examples:-

- (i) Show the employee name starting from 'A'.
 - SELECT ename FROM emp WHERE ename LIKE 'A%';

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- (ii) Show the employee name containing a substring 'IN'.
 - SELECT ename FROM emp WHERE ename LIKE '%IN%';

Eliminating Redundant Data (With Keyword DISTINCT)

The DISTINCT clause is used with SELECT to suppress duplicate values if any in a column.

Example: List the different jobs available in the emp table.

SQL> SELECT DISTINCT(job) FROM emp;

Ordering the results of a Query (Sorting Results)

SQL uses the ORDER BY clause to impose an order on the result of a query. This clause orders (sort) the query output according to the values in one or more selected columns.

- *Examples:* (i) Show the employee name and sal in the ascending (increasing) order. SQL>SELECT ename, sal FROM emp ORDER BY sal;
 - (ii) Show the employee names and hiredate in descending order of hiredate.
 SELECT ename, hiredate FROM emp ORDER BY hiredate DESC;

Perform Simple Calculations in SQL

If a simple calculation needs to be done, for example 5*10. The only SQL verb to cause an output to be written to monitor is SELECT. However, a SELECT must have a table name in FROM clause. Oracle provides a dummy table called Dual. This table can be used for obtaining calculation results and also system date.

Example:- SELECT 5*10 FROM dual; SELECT sysdate FROM dual;

12.4.2 Functions and Grouping

A function is a special type of predefined command set that performs some operation and returns a single value. SQL supports many types of functions. All these functions can be divided into two categories:-

- (i) Single Row (or Scalar) functions
- (ii) Multiple Row (or Group or Aggregate) functions.

Single Row Functions

These functions are further divided into many categories depending on the data types of their arguments and return values. These categories are:-

- Mumeric Functions
- Aggregate Functions
- Character Functions
- The Functions
- Data Type Conversion Functions

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Numeric Functions

The number functions are those functions that accept numeric values and returns the numeric values after performing the desired operation.

(i) MOD - This functions returns the modulus(remainder) of given two numbers.

```
Syntax
MOD(X,Y)
SQL>SELECT MOD(13,5) "Modulus" FROM dual;
It returns 3 as result(remainder).
```

(ii) POWER - This function calculates the power as xy i.e. x raised to power of y.
 Syntax
 POWER(X,Y)
 SQL>SELECT POWER(2,4) FROM dual;

It returns 16 as a result.

(iii) **ROUND** - This function returns a number rounded off as per given specifications.

```
Syntax
Round(n[,d])
SELECT ROUND(20.594,1) FROM dual;
It returns 20.6 as rounded off to 1 decimal place.
```

(iv) SQRT - This function returns the square root of a given number.

```
Syntax
SQRT(n)
SELECT SQRT(25) FROM dual;
It returns 5 as a result.
```

Aggregate(GROUP) Functions

The group functions or aggregate functions work upon groups of rows. These functions are sometimes also called multiple row functions.

- (i) AVG This function computes the average of a given data. Syntax
 AVG([DISTINCT | ALL] n)
 SELECT AVG(sal) FROM emp; It returns the average of the salary from emp table.
- (ii) COUNT This function counts the number of rows in a given column or expression. Syntax
 COUNT({* | [DISTINCT | ALL|] expr})

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SELECT COUNT(*) FROM emp;

It returns the total number of records present in the emp table.

(iii) MAX - This function returns the maximum value from a given column or expression.

Syntax MAX([DISTINCT | ALL] expr) SELECT MAX(sal) FROM emp; It returns the maximum salary (highest) from emp.

(iv) $\ensuremath{\textbf{MIN}}$ - This function returns the minimum value from a given column or expression

Syntax MIN([DISTINCT | ALL] expr) SELECT MIN(sal) FROM emp; It returns the minimum salary (lowest) from emp.

 (v) SUM - This function returns the total of values given in a column or expression. Syntax
 SUM([DISTINCT | ALL] n)
 SELECT SUM(sal) FROM emp; It returns the total of the salary of all employees.

Character Functions

The single row character functions are those functions that accept a character input and can return both character and number values.

 (i) CONCAT - This function concatenates(join) two strings Syntax CONCAT(char1, char2)
 SELECT CONCAT(ename,job) from emp;

It joins the employee name and job.

- (ii) INITCAP This function capitalizes the first letter of the string.
 - Syntax

INITCAP(Character(s)) Select INITCAP('rajeev') from dual; It returns 'Rajeev' from the given string.

(iii) LOWER - This function converts a string into lowercase.

Syntax LOWER(Character(s)) Select LOWER('RAJEEV') from dual;

It returns 'rajeev' from the given string.

(iv) LPAD - This function left-pads (insert in the left side) the given character to given string to reach at given width.

Syntax

LPAD(Character(s), n, [, character])

SELECT LPAD('Rajeev', 15,'-') FROM dual;

It fills 9 hyphens before given string as '-----Rajeev'.

- (v) **RPAD** This function is similar to LPAD except that it fills from the right instead of left.
- (vi) **SUBSTR** This function extracts a substring from a given string from the specified position m and number of characters given n.

Syntax

SUBSTR(char, m, [,n])

SELECT SUBSTR('Rajeev Srivastava',4,7) FROM dual;

It returns 'eev Sri' as output. Remember it counts spaces also.

(vii) UPPER - This function is same to LOWER except that it returns the string in uppercase.

(viii)LENGTH - This function returns the length of a given string.

Syntax LENGTH(Character(s)) SELECT LENGTH('Rajeev Srivastava') FROM dual; It returns 17 as output. It includes spaces also.

Date Functions

Date functions operate on values of the DATE datatype. All date functions returns a value DATE datatype except the MONTHS_BETWEEN function, which returns a number.

- (i) **ADD_MONTHS(d,n)** Add or Subtracts months to or from a date. Returns a date as a result.
- (ii) **MONTHS_BETWEEN(d1,d2)** Returns the number of months between two dates d1 and d2.
- (iii) LAST_DAY(d) Returns the date of the last day of the month specified.
- (iv) **NEXT_DAY(date,day)** Finds the date of the 'day' after the date.

Example:

SELECT SYSDATE, MONTHS_BETWEEN(SYSDATE, HIREDATE), ADD_MONTHS(SYSDATE, 5), LAST_DAY(SYSDATE), NEXT_DAY(SYSDATE, 'FRIDAY') FROM emp;

Data Type Conversion Functions

It provides functions that convert a value's data type. The three functions available are:-

- (i) **TO_CHAR(d,f)** Converts the date to character according to the format 'f.
- (ii) **To_Number(c,f)** converts a given character string to equivalent number.
- (iii) **To_Date(c,d)** Converts the character string to date.

Example:- Show all the employee names who have more than 2 years of experience as on January 1st, 1984.

SELECT ename FROM emp WHERE (TO_DATE('01-JAN-84','DD-MON-YY') - hiredate)/365 > 2;

SELECT sal+TO_NUMBER('100') FROM emp;

Grouping the Result of a Query

The GROUP BY clause is used with SELECT to combine a group of rows based on the values of a particular column or expression. SQL groups the result after it retrieves the rows from a table. Conditional retrieval of rows from a grouped result is possible with the HAVING clause. ORDER BY clause can be used to order the final result.

Examples:

- (i) Show the department numbers and number of employees in each department. SELECT deptno, count(*) FROM emp GROUP BY deptno;
- (ii) Show the department number and the total salary payable in each department. SELECT deptno, SUM(sal) FROM emp GROUP BY deptno;
- (iii) Show the total salary, maximum, minimum and average salary of employees jobwise for department number 20 and display only those rows having average salary greater than 1000.
 SELECT job, SUM(sal), AVG(sal), MAX(sal), MIN(sal) FROM emp where deptno = 20 GROUP BY job HAVING AVG(sal) > 1000;

12.4.3 Querying Multiple Tables

Joins are used to combine columns from different tables. The tables are listed in the FROM clause, separated by comma. The condition of the query can refer to any column of any table joined. The connection between tables is established through the WHERE clause.

EQUI Joins

When two tables are joined together using equality of values in one or more columns, they make an EQUI join.

Example: Show the employee numbers, names, department numbers and the department name.

SELECT empno, ename, emp.deptno, dname from emp, dept where emp.deptno = dept.deptno;

Natural Join

The join in which only one of the identical columns (coming from joined tables) exits, is called Natural Join. SELECT emp.* dept.dname, dept.loc FROM emp,dept WHERE emp.deptno = dept.deptno;

Self Join

A table joined with itself is called self join. When values within a column of a table are to be compared, we require a self join.

SELECT emp1.*, emp2.empno FROM emp emp1, emp emp2 WHERE emp1.empno >> emp2.empno AND emp1.job = emp2.job;

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Outer Join

The joins that we have seen so far are simple or inner joins.

An inner join selects only those rows from both the joining tables that have matching values with other joining tables. On the other hand, an Outer Join selects all the rows that satisfy the join condition and those rows from one table for which no rows from the other table satisfy the join condition.

Example : Show employee name, job, department number and department name. All the department names should be displayed whether they have employees or not.

SELECT ename, job, dept.deptno, dname FROM emp, dept WHERE emp.deptno(+) = dept.deptno; The outer joins can be of two types:-

- (i) Left Outer Join The outer join that returns all the rows of left(i.e. first) table whether or not they have matching rows in right(or second table). The non-matching rows of left table have NULLs in places of columns coming from right table. The (+) operator put with the right table gives left outer join.
- (ii) **Right Outer Join** The outer join that returns all the rows of right (i.e. second) table whether or not they have matching rows in left (or first) table. The non-matching rows of right table have nulls in places of columns coming from left table. The (+) operator put with the left table gives us right outer join.

Cartesian Join

When no WHERE clause is specified, each row of one table matches every row of the other table. This results in a Cartesian product.

SELECT empno, ename, dname from emp,dept;

It is useful in finding out all the possible combination of columns from different tables.

12.4.4 Using Relation Algebra functions - Union, Intersect and Minus

Multiple queries can be merged together and their results can be combined.. The queries are all executed independently, but their output is merged. Only the final query ends with a semicolon.

UNION

The union clause merges the outputs of two or more queries into a single set of rows and columns.

Example:- Show the different designations in department number 20 and 30.

SELECT job FROM emp WHERE deptno = 20

UNION

SELECT job FROM emp WHERE deptno = 30;

INTERSECT

The intersect clause takes the common output of two or more queries.

Example:- Display the jobs common to department number 20 and 30.

SELECT job FROM emp WHERE deptno = 20

SQL–Structure Query Language

INTERSECT

SELECT job FROM emp WHERE deptno = 30;

MINUS

The minus clause gives the output from first query which is not available in the second query.

Example:- Display the jobs that are not available in department 30 but which are available in department number 20.

SELECT job FROM emp WHERE deptno = 20 MINUS

SELECT job FROM emp WHERE deptno = 30;

12.4.5 Nested Queries

The result of one query is dynamically substituted in the condition of another. SQL first evaluates the inner query (or sub query) within the WHERE clause. The return value of inner query is then substituted in the condition of the outer query. When using relational operators, ensure that the sub query returns a single row output. In some cases DISTINCT clause can be used to ensure single valued output.

Example:- Show the employees belonging to the department of 'SMITH'.

Explanation of the question - Here, we do not know the department to which 'SMITH' belongs. So, we have to determine the department of 'SMITH' and use that department number to find out the other employees of that department.

By Normal Procedure

SELECT deptno FROM emp WHERE ename = 'SMITH';

Output : - deptno = 10

Now, SELECT ename FROM emp WHERE deptno = 10;

Combining the above two queries as nested query

SELECT ename FROM emp WHERE deptno = (SELECT deptno FROM emp WHERE ename = 'XYZ');

CHECK YOUR PROGRESS 12.4

- 1. Querying database tables is done by using the ______ statement of SQL.
- 2. Pattern matching is done through the _____ operator.
- 3. The conditions can be given by the _____ clause for grouped results.
- 4. In a join, the connection between tables is established using the _____ clause.
- 5. Joining a table to itself is called ______ join.
- 6. The dummy table used in Oracle for multiple purposes is _____.
- 7. The result of one query is dynamically substituted in the condition of another is called ______

12.5 DATA DEFINITION LANGUAGE

The DDL is used to create and modify the structure of tables. It can also update, delete or insert new records in the tables.

12.5.1 Creating Tables

Tables are created by using the CREATE TABLE command. The column names must be specified along with their data types. The user who creates them owns tables. The column names in the table must be unique.

Syntax

```
CREATE TABLE <tablename>(
	<column-name> <data-type><(size)> [constraint],
	<column-name> <data-type><(size)> [constraint],
	.....);
```

Column Constraints

Constraints are the part of the table definition that limit the values entered into its column.

- (i) Not Null Prevent a column from permitting NULL values.
- (ii) UNIQUE Ensures uniqueness of the values in a column.
- (iii) **PRIMARY KEY -** Same as UNIQUE, but only one column per table.
- (iv) CHECK Controls the value of a column(s) being inserted.
- (v) **DEFAULT** Assign a default value for column(s) at the time of insertion when no value is given for that column.
- (vi) **REFERENCES** Assigns a foreign key constraint to maintain "Referential Integrity".

Examples:-

- 1. CREATE TABLE ITEMMAST(
 - ITNO NUMBER(4) PRIMARY KEY,
 - NAME VARCHAR2(20) NOT NULL UNIQUE,
 - UOM CHAR(4),
 - RATE NUMBER(8,2) NOT NULL
 -);
- 2. CREATE TABLE ITEMMAST(

ITNO	NUMBER(4) PRIMARY KEY,
NAME	VARCHAR2(20) NOT NULL UNIQUE,

- CLASS CHAR(1) CHECK (CLASS IN('A','B','C')),
- ROL NUMBER(5) CHECK (ROL>0),
- STK NUMBER(5) DEFAULT 100
-);

REFERENCES (Foreign Key)

A foreign key is a combination of columns with values based on the primary key values from another table. A foreign key constraint, also known as referential integrity constraint.

Example:-

CREATE TABLE ITTRAN(

ITNO	NUMBER(4) REFERENCES ITEMMAST(ITNO),
TRANTYPE	CHAR(1) CHECK (TRANTYPE IN('I','R')),
TRNDT	DATE,
QTY	NUMBER(5)
);	

12.6.2 Inserting Values

All rows in a table are inserted using the INSERT command.

Syntax

INSERT INTO <tablename> VALUES(<list of values>);

Example:-

INSERT INTO emp VALUES(7311,'RAJEEV','MANAGER','18-JUN-97',5000);

While inserting data into tables, the following should be taken care of:-

- (i) Character data will be enclosed within single quotes.
- (ii) Column value for date type is provided within single quotes. It automatically converts the character field to date type field.
- (iii) NULL values are given as NULL, without any quotes.
- (iv) If no data is available for all the columns, then the column list must be included after the table name as:
 INSERT INTO emp (empno, ename,sal) VALUES(1179, 'RAJEEV', 6000);

12.6.3 Updating Values

Columns values in a table are updated using the UPDATE command. Updation can be carried out for all the rows in a table or selected rows.

Syntax

```
UPDATE <tablename> SET <col-name> = <value> [,<col-name> = <value>]
[where <condition>];
```

Example:-

- (i) UPDATE emp SET comm. = 500; (It will update column comm. By 500 for all rows.)
- (ii) UPDATE emp SET sal =sal * 0.1) WHERE ename = 'SMITH'; (It will update the sal column by 10% for employee 'SMITH')

12.6.4 Deleting Row(s)

Rows can be deleted from a table by using the DELETE command. The entire row (record) is deleted from the table.

Syntax

DELETE FROM <tablename>[WHERE <condition>];

Example:-

DELETE FROM emp WHERE job = 'CLERK'; (It will delete all the records of CLERK.

12.5.5. Viewing the Structure of a Table

To view the structure of a table, the DESCRIBE or DESC command is used.

Syntax

DESC[RIBE] <tablename>;

Example :

DESC emp;

12.5.6 Modifying the structure of a Table

The ALTER TABLE command is used to change the definitions of existing tables. This command performs the following actions:-

- (i) To add a column
- (ii) To add an integrity constraint
- (iii) To redefine a column (datatype, size, default value)

Syntax

ALTER TABLE <tablename>ADD/MODIFY <colname> <datatype> <size> [<constraint-name>];

Example:-

ALTER TABLE emp ADD (tel-no number);

ALTER TABLE emp MODIFY (job char(30));

ALTER TABLE emp ADD CONSTRAINT empc PRIMARY KEY(empno);

12.5.7 Removing table from the database

To remove the table from the database, DROP TABLE command is used.

Syntax

DROP TABLE <tablename>;

Example:-

DROP TABLE ittran;

CHECK YOUR PROGRESS 12.5

- 1. Foreign key constraint can be enforced by using the _____ constraint.
- 2. The _____ command is used to modify the contents of column(s) of a table.
- 3. The ______ constraint is used to verify the data as per specified business rules.

12.6 TRANSACTION CONTROL COMMANDS

A transaction is one logical unit of work consisting of one or more logically related statements. The commands used for controlling are:-

- (i) Commit Ends the current transaction by saving database changes and starts a new transaction.
- (ii) Rollback Ends the current transaction by discarding database changes and starts a new transaction.

(iii) Savepoint - Defines breakpoints for the transaction to allow partial rollbacks.

To Rollback, Please ensure that AUTOCOMMIT feature must be off. To off this feature, give the following command:

SQL>SET AUTOCOMMIT OFF

For Deleting, Droping, updating in a table, try to use the above command so that changes made by you unknowingly will not saved in the database and you can rollback to old status.

Example:-

SET AUTOCOMMIT OFF; UPDATE emp SET comm. = 700 WHERE empno = 7499; SAVEPOINT set_comm; UPDATE emp SET comm.= 9000; ROLLBACK TO SAVEPOINT set_comm; COMMIT;

12.7 VIEWS

A view is a virtual table and is like a window to a table. It does not have any data of its own, but derives the data from the table it is associated with. The main properties of view are as given:-

- The view is a database object that contains no data of its own.
- Tt is a virtual table whose contents are taken from other tables through the execution of a query.
- The changes in the tables are automatically reflected in the views.
- ☞ A view is created with the CREATE VIEW command.
- *A view is queried just like querying a table.*
- The A general user cannot distinguish between a table and a view.

Syntax

CREATE VIEW <viewname>AS <query>;

Example:-

CREATE VIEW dept20 AS SELECT * FROM emp WHERE deptno = 20;

After creating a view, it can be queried just like querying a table.

SELECT * FROM dept20;

There are several advantages of views which includes:-

- (i) SECURITY Users can be given access to only the rows/columns of tables that concern them.
- (ii) **Data Integrity** The WITH CHECK OPTION clause is used to enforce the query conditions on any updates to the view.
- (iii) **Protection from change -** If the structure of the database changes, the user's view of the data can remain the same.

12.8 SUMMARY

SQL is available in a number of database management packages based on the relational model of data. It allows for data definition, data manipulation and data control for a relational database. It maintains the data integrity. SQL can also be embedded in front end tools like visual basic, java, dot net etc. to provide the power of back-end. It is easy and English type language which can be used to handle data efficiently.

12.9 GLOSSARY

Comment Text that is not executed.

Data Type Means to identify type of data and associated operations for handling it.

Equi-Join Join in which tables are compared for equality.

Functions edefined command set that carries out an operation and returns a single value.

Inner Join Join that selects only matching rows from joining tables.

Join A query that combines rows from one or more tables.

Literal Fixed data value

Multiple-Row A function that works on values of a group of rows.

Function

Natural Join Join that consists of only one of the identical columns, coming from joined tables.

Null Un-initialized value i.e. Column with no value.

Outer Join Join that selects all rows from one joining table and only matching rows from other joining tables.

Query A command given to produce certain specified information from the database table(s).

Self Join A table joined with itself.

Single-Row A function that works on a value in single row.

Function

Sub Query A query statement that appears inside another SQL statements.

12.10 FURTHER READINGS

The following books are suggested for further reading:-

- 1. Ramakrishnan and Gharke, Database management Systems, Tata McGraw Hill Pub. Co. Ltd.
- 2. Leon and Lcon, SQL, Tata McGraw Hill
- 3. Abbey and Corey, Oracle 8i, Tata McGraw Hill Pub. Co. Ltd.
- 4. An introduction to Database Systems, Bipin C. Desai, Galgotia publications

12.11 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to check your progress 12.3

- 1. Two hyphens (--)
- 2. VARCHAR2
- 3. Literal
- 4. DDL
- 5. DML

Answers to Check Your Progress 12.4

- 1. SELECT
- 2. LIKE
- 3. HAVING
- 4. WHERE
- 5. SELF
- 6. DUAL
- 7. Nested Query

Answers to check your progress 12.5

- 1. References.
- 2. Update
- 3. CHECK

12.12 UNIT-END QUESTIONS

- 1. Name some basic SQL elements.
- 2. Differentiate between CHAR and VARCHAR2 data types.
- 3. Write a query to display details of employees who do not have manager.
- 4. What is the significance of GROUP BY clause in a SQL query?
- 5. What is the difference between WHERE and HAVING clause of SQL SELECT statement?
- 6. What do you mean by Join? Explain different types of joins.
- 7. What are views? Explain the features of views.
- 8. What do you mean by SavePoint?
- 9. What do you mean by constraints? Explain the foreign key concept.
- 10. What are aggregate functions? Explain with example.

Unit XIII : WEB DESIGNING

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Web Designing

13.0 OBJECTIVES

After going through this unit student will be able to :

- The Understand the key concepts of WWW
- Can create web pages with basic tags
- Can use advance concepts of tables, frames and forms
- Tunderstand to publish the web site

13.1 INTRODUCTION

World Wide Web is expanding at an incredible pace. The basic building blocks of www are documents developed by HTML. HTML has become the standard development language for web pages. This unit emphasizes on building the web pages starting from the basic tags to advanced features. It also provides you the advanced means of controlling web page layout.

13.2 BASICS OF WORLD WIDE WEB

13.2.1 WWW - World Wide Web

The World Wide Web is a collection of millions of files stored on thousands of computers (web servers) all over the world. These files represent text documents, pictures, video, sounds, programs etc. that has ever been recorded in computer files. The web is the largest and most diverse collection of information ever assembled.

It is an example of client-server technology. The internet user using a software known as the web browser, requests a document located on the web. The browser makes the request to the internet host containing that document. The flow of information is controlled by a protocol called Hyper Text Transfer Protocol (HTTP). The client web browser marked an HTTP request and is served by an HTTP server known as Web Server.

13.2.2 Uniform Resource Locator (URL)

The technique used to address documents on the web is called the Uniform Resource Locator. The URL provides an addressing scheme which allows the browser to request just about any document or web page located anywhere on the internet. In most cases specification of the port address is not required as the servers themselves have a default port address. It is 80 for HTTP. A URL normally takes the following form as below:-

Protocol	Access type	
http://	HTML documents	
https://	Secure HTML documents	
ftp://	FTP sites and files	
file://	HTML documents on local hard drive	
Gopher://	Gopher menus and documents	
mailto:	E-Mail messages	
telnet:	Remote Telnet (login) session	
news:	UseNet news group	

<Protocol>://<web-server-name>/<directory-name>/file-name>

Such as : http://www.rediff.com/docs/wpage.htm

Some protocols for URLs are as given above.

There are three different types of URLs - Absolute, Relative and Fragment.

- (i) Absolute URL It uses a complete internet address to give the location of a resource. It designates the protocol, host, path and name of a resource.
- (ii) **Relative URL** It is not fully qualifies, but rather it inherits the protocol, host and path information from its parent document. Relative URLs sometimes called 'partial URLs' are used for accessing files when the full internet address is unnecessary i.e. when most hyperlinks point to documents and other files located on the same site. For example : images.htm is a relative URL.
- (iii) Fragment URL Using either the name attribute of an <A> element or the id attribute of any element creates an anchor. These anchors can be referred in bookmark way as a fragment URL.

13.2.3 Hyper text transfer protocol (HTTP)

A web page is created by using a specialized language called Hyper Text Markup Language (HTML). Web pages are requested by internet users from the internet hosts or servers and are served over the internet using a protocol called http. The client web browser makes an http request and is served by an http server.

HTTP protocol (set of rules) enables hypertext data to be transferred from one computer to another. HTTP enables user to retrieve a wide variety of resources such as text, graphics, sound etc. and allow hypertext to access other internet protocols. The following steps accomplish this task:

- Connection is the establishment of networked TCP/IP connection between a client and a server thus enabling communication between them.
- **Request** initiates from a client requesting for specific services or resources.
- **Response** communicates to the client from the server. It supplies the requested resource.
- *Close*—is the termination of TCP/IP connection.

13.2.4 Web Server

Web server is responsible to accept connections from web browsers all over the internet and when requested, sends the html documents that are available in the site. This is done by using the http protocol.

A web server is simply a computer with an internet connection that runs software designed to send out HTML pages and other file formats (such as multimedia files). The server should have a high speed connection on the internet and powerful enough to deal with a number of simultaneous connections from the internet. It requires a robust operating system.

13.2.5 Web Page

A web page is a single unit of information, often called a document that is available via the World Wide Web (WWW). A web page is an HTML document that is stored on a web server and that has a URL so that it can

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be accessed via the web. A web page can be longer than one computer screen and can use more than one piece of paper when it is printed out.

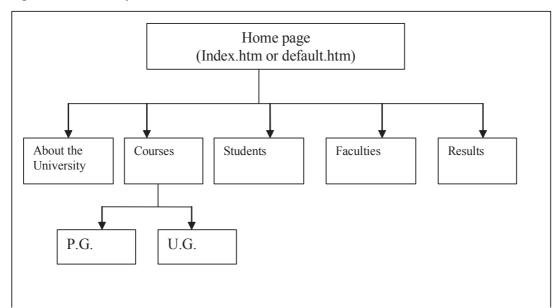
A web page is created by using HTML. It consists of standardized codes or "tags", which are used to define the structure of information on a web page. These codes enable web pages to have many features including text effect like bold, italic, headings, bulleted, numbered, tabular etc. Normally a web page contains several hyperlinks which refer to different web pages or part of the same web page or to different web site pages. A sample web page is as follow :-



13.2.6 Web Site

A web site is a collection of Web pages belonging to a particular person or organization. Each document on the web site, which may contain only text or a combination of text, images and multimedia is called web page. The URLs of these pages share a common prefix, which is the address of the home page of the site. The URL of the home page also serves as the URL of the web site. The default home page usually refers to index.htm or default.htm web page.

The possible hierarchy of the web site is as under:-



13.2.7 Web Browser

A browser is software that retrieves HTML documents across network connections and formats them for viewing. A browser can be assumed as a vehicle for accessing the World Wide Web.

A web browser is a client application that requests, receives and displays HTML pages or a web browser is a program that clients computer runs to communicate with the web servers on the internet, which enables it to download and display the web pages requested. Browsers are the "window to the web" for internet user around the world. A web browser can display many types of files offline i.e. when the user is not connected to the internet. Some popular browsers are :

- Microsoft Internet Explorer
- Provide the second s
- 🖙 Mosaic

A good home page for a browser is one that loads quickly, contains information that user wants to check regularly and links to a wide variety of other pages. Most browser windows have the same basic layout. These basic elements are:-

- Menu bar
- Toolbars
- Address window
- Viewing window
- 🖙 Status bar

Depending on the web browser features, user can access to some or all of the following ways to keep track of web sites:-

- Bookmarks- browser establishes a bookmark file when it is installed and populates it with links in a variety of categories.
- Favorites-It behaves like bookmarks. It is a folder of internet shortcuts. When a user choose from a menu, browser goes to the web page that the favorite denotes.
- History Browser stores the recently visited web pages in the form of internet shortcuts that are arranged into a hierarchy of folders inside the history folder or in a history database.

CHECK YOUR PROGRESS 13.2

- 1. The default port address for HTTP is _____.
- 2. _____ specifies the location of the web page.
- **3.** ______ is termed as the first home page.
- **4.** To view any web page, we require _____.

13.3 HYPER TEXT MARKUP LANGUAGE (HTML)

HTML is designed to specify the logical organization of a document, with important hypertext extensions. It has its own syntax and rules for proper communication. HTML is not really a programming language instead it is a markup language. It is designed to be a universal language for classifying the functions of different sections of a document or to define the different parts of page i.e. which part of document is title, body etc. HTML documents can be viewed by many different browsers of very different abilities. Pure HTML web page produces a static web page. A dynamic web page can also be created by using JavaScript and ASP.

HTML comprises of three major elements that gives a well-structured look for a document. Some of these elements are optional yet their usage assures a better presentation.

- 🖙 Head
- Je Body
- Footer

HTML instructions (tags) divide the text of a document into blocks called elements. These can be divided into two broad categories - those that define how the BODY of the document is to be displayed by the browser and those that define information about the document such as the title or relationships to other documents. Almost 80% of HTML tags will occur within a document's body. In browser, the tags themselves are not displayed but their effect is. Any tags and attributes that are unknown are ignored.

13.3.1 Web Page Layout

Before designing a web page it is preferable to follow the following norms:-

- The first and foremost aspect to be considered is the content that has to be written in the page.
- The paragraph should be short and to the point.
- The document should contain a title to identify the web page.
- The Sufficient space must be provided between paragraph and heading for clarity.
- Tusage of heavy graphics should be kept bare minimum to reduce the display time from the server.
- The pages should not be long as the user will find it annoying to use the scroll bar to view the rest of the screens. In such cases pages can be split into multiple pages.
- The Before uploading/publishing the web page it is better to proof read and check the spellings.

13.3.2 HTML Tags

Most of the tags supported by HTML are stand alone tags. There are few paired tags also. They are defined as <start-of-tag>......</end-of-tag>. The basic tags required to build a HTML documents are as under:-

Basic tags

Tag	Description	
<html></html>	Indicates the beginning and ending of HTML document	
	Indicates the beginning of document header	
	Indicates the title of the web page	
<body></body>	Indicates the beginning of body of the web page	

A sample html document is as under:-

Example:

<html>

<head>

<title>My First Web Page</title>

</head>

```
</body>
```

Hello Students, Our first web page ! Try out.

</body>

</html>

To see the output of the above html code, use the following steps:-

- 1. Open a notepad file.
- 2. Type the above code and save this file as a __.htm or __.html extension.
- 3. Now open internet explorer. Select File->Open.
- 4. click the Browse button and select the file that we created above or double click the file which shows the icon of internet explorer.

Note: While saving in notepad, Remember to give file name in double quotation as "w1.htm" and save. There are two categories of body elements for formatting the web page :-

- The Block level elements-used to define groups of text for a specific role.
- Text level elements-used to mark up text, style, links, images etc.

Formatting tags

Format	Tags	Description
Block Level		
Paragraph		Indicates start and end of paragraph
Line Break	br>	Indicates the change of line.
Horizontal line	<hr/> >	Draws a horizontal line on the web
		page
Preformatted Text	<pre></pre>	It preserve the white spaces, line
		breaks within the text.
Centers the text	<center></center>	Centers the entered text on the page
Indented text	<blockquote></blockquote>	Displays the indented text

Format	Tags	Description
Text Level		
Bold		bold effect on the text
Italic	<i>></i>	Italic effect on the text
Underline	<u></u>	Underlines the text between the tag
Hyperlink		Hyperlinks the text between the tag
Image		Displays the mentioned image
Heading	<h1></h1>	Heading level 1
	<h2></h2>	Heading level 2
	<h3></h3>	Heading level 3
	<h4></h4>	Heading level 4
	<h5></h5>	Heading level 5
	<h6></h6>	Heading level 6

Example

<html>

<head><title>My Second Page</title></head>

<body>

<h1>HTML is easy</h1>

<h2>HTML is easy</h2>

<h3>HTML is easy</h3>

<center><h4>HTML is easy</h4></center>

<h5>HTML is easy</h5>

<h6>HTML is easy</h6>

<i>HTML</i>tags are <u>case insensitive</u>
<hr>

Though there are six levels of header supported by HTML, only first four levels

can be easily identified. It is a good practice to give consistent headings throughout

our web page.

This gives the effect of pre formatted text. It does not

removes the extra spaces

```
and line breaks. Normally HTML removes extra spaces and line breaks.
```

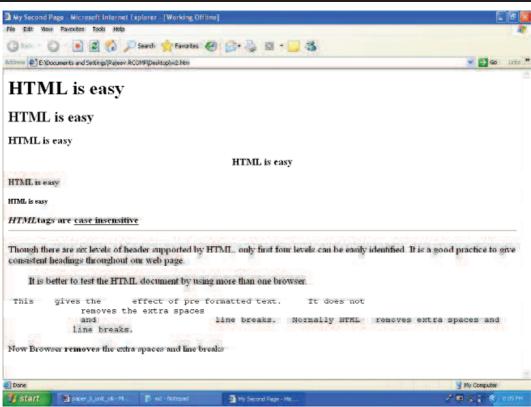
Now Browser removes the extra spaces

```
and line breaks
```

</body>

</html>

You can understand the output of the above code in the Internet explorer as under:-



Note: Avoid some characters such as the quote("), the ampersand (&) and the angle brackets (< and >) which have some special meanings.

13.3.3 Color Schemes

To change the color scheme of your web page, you can use the six body attributes to give the effect on the web page. The attributes are BGCOLOR, BACKGROUND, TEXT, LINK, VLINK and ALINK.

Colors can be specified by the name of the color or the RGB code. The color names can be specified as Black, silver, grey, white, maroon, red, purple, blue, yellow, green, aqua etc.

RGB codes are always six numbers and block of two numbers are in hexadecimal, two numbers specify an amount of red, next two represents green and last two represents blue. By tradition, hexadecimal colors are preceded by a sign #. For example blue color can be represented as "#0000FF". FF stands for maximum and 00 for nil. The following codes will give different effects:-

<body bgcolor="red">

<body bgcolor="#FF0000"> changes the background of web page in red color.

<body text="#0000FF"> changes the text in blue color

<body background="clouds.jpg"> puts the clouds picture as the background.

<body link="#008800"> changes the hyperlink color to shade of green. Default color of hyperlink is blue.

<body alink="#9900ff"> changes the active link color. Default color is red.

<body vlink="#90909a"> changes the visited link color. Default color is a shade of purple.

We can combine all or some of the above attributes as under:-

<body bgcolor="ff0011" text="0011ff" vlink="#90909a">

13.3.4 Font and Font Size

On the web page you can change the font, size, color of the font by using the font tag with the three attributes:-

- Color-specifies the color of a block of text
- Size- for relative or absolute sizes of text
- **Face** for specifies a font face such as verdana, arial Algerian etc.

 The color of the text converted in blue

Changes the font face to verdana

Absolute size

changes size relatively to 4 or +1 to 5

<big>..</big> makes text one size larger.

<small>....</small> makes text one size smaller.

There are seven size values ranging from 1 to 7. 1 is very small and 7 is larger than level one heading. Hello, See the effects

13.3.5 Subscript and Superscript Element

The subscript element _{and} changes the enclosed text in subscript. The superscript element ^{and} changes the enclosed test in superscript.

H₂O and X²+Y²

13.3.6 Heading Element

The heading start tags <h1> to <h6> can each use one of the following attributes to control the horizontal alignment of the heading:-

Align="LEFT" or Align="RIGHT" or Align="CENTER" or Align="JUSTIFY"

<h1 align="center">HTML Heading one </red></h1>

13.3.7 Paragraph Element

tag starts the paragraph from new line. This tag is also having align attribute as left, center, right and justify. The default alignment is left.

This is a new paragraph

13.3.8 Horizontal Line element

<hr> - It draws a horizontal line. It has many attributes as under:-

Align="Left" or "Right" or "Center"

NOSHADE - unshaded dark line with slightly 3d appearance.

Size="[number]" - The number must be in pixels. The default value is 2.

Width="[number]" - The number must be in pixels.

Width="[percent]" - percent value

<hr noshade> <hr size="4"> <hr noshade size="12"> <hr size="4" width="40%" align="right">

13.3.9 Arranging text with Lists

HTML provides several styles for building lists. The list elements can be arranged using number and bullets. This improves readability to a certain extent while organizing list elements. There are three types of lists as under:-

- The unordered Lists by ... tag. It produces bullets for list items.
- ☞ Ordered Lists by ... tag. It produces numbered list in a way.
- \bigcirc Definition Lists by $\le d \ge \dots \le /d \ge tag$. It consists a term followed by its definition.

Both ordered and unordered lists require start and end tags as well as the use of a special element to indicate where each list item begins (tag).

 tag has the Type attribute which can have the values 'CIRCLE' for hollow bullet, 'DISC' for solid bullet or 'SQUARE' for solid block. The default is DISC.

```
Example of unordered list

<BODY>

<UL>

<LI>HTML

<LI>VB

<LI>JAVA

</UL>

<UL TYPE="SQUARE">

<LI>HTML

<LI>VB

<LI>VB

<LI TYPE="DISC">JAVA

</UL>
```

One important aspect of lists is that we can nest one list inside another to create a sub list.

Ordered list uses numbers instead of bullets, and we can use and attribute to start numbering at a number other than one.

With tag we can use the type attribute with the values given below:-

Type="1" Shows Arabic numbers

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Type="a" Shows lowercase alphabets a,b,...z, aa,ab,...

Type="A" Shows uppercase alphabets A,B,C,....

Type="i" Shows lowercase Roman Numbers as i,ii,....

Type="I" Shows uppercase Roman Numbers as I, II, III...

Start="x" to start with the desired number.

Arabic numbers are the default.

Example of ordered list

```
<BODY>
<OL>
<LI>HTML
<LI VALUE="10">VB
<!-- Forced Number -->
<LI>JAVA
</OL>
<OL TYPE="I">
<LI>HTML
<LI>HTML
<LI>VB
<LI TYPE="DISC">JAVA
<LI TYPE="CIRCLE">ASP
</OL>
```

Defining terms and Definition List by <DL> tag. <DT> tag is used for definition terms. <DD> is used for definition themselves.

Example of definition list

```
<DL>
<DT>HTML
<DD> Creates web pages
<DT>VB
<DD> Creates applications
</DL>
```

CHECK YOUR PROGRESS 13.3

- 1. What is HTML?
- 2. What is the purpose of using <BODY> tag.
- 3. Differentiate between container tags and empty tags.
- 4. What is the method of using comment line in a HTML Code?

13.4 LINKING AND INSERTING IMAGES

13.4.1 Links to Web and documents

We can create links of text, images etc. and can connect to the desired source. There are two types of links as:-

These are the links to files which are not available on the current site.

These are the links to files that are the part of the own site.

Anchor element uses the <A> and tags to create both external and internal links with href and title attribute.

Click to link to rediff.com

It creates a external link. For internal links, follow the two steps as below:-

* In the target or current document give a name to the section

* Specify the name in the link

First Portion of the document
br>

Go to First

13.4.2 Inserting Images in the web page

Graphics/Images add interest and looks to web pages. By Graphics we can produce eye-catching images to draw the attention of the end user and also we can use images as hyperlinks. We can use different types of graphic files in our web page such as GIF(Graphics Interchange Format) and JPG or JPEG (Joint Photographic Expert Group) files. We can include images in our web page through tag. It uses the following attributes:-

SRC(file or url). It specifies the location of the image file.

ALT(alternate text). It specifies the text which would be displayed, if the browser does not support graphics.

ALIGN(TOP, MIDDLE or BOTTOM). It aligns the text according to the specified position.

 This code will create inline image with text.

To make an image appear as a separate paragraph, enclose it with the paragraph element.

 it align from the middle with text of the line.

 it creates a fix size image. Size is in pixels. Advantage of giving height and width is that browsers will take less time to show the page.

 it creates a thin border around the image. By default there is no border around the image.

Images can be used as hyperlink also as:-

Go to Yahoo

CHECK YOUR PROGRESS 13.4

- 1. The location of the image file is specified by using the ______ attribute.
- 2. The tag provides hypertext link capabilities is _____.
- 3. What is hyperlink?
- 4. What is ALINK and VLINK?

13.5 ARRANGING INFORMATION IN TABLES

The <TABLE>..</TABLE> tag as the name indicates sets the contents in a row and column format. The table can contain any kind of data i.e. it can include links, paragraphs, all header levels, another table, preformatted text, images and so on. The attributes related to table are:-

- The Optional caption element consists of the <CAPTION>...</CAPTION> tag for table heading. It can be positioned using the ALIGN attribute. It can be TOP, BOTTOM, LEFT or RIGHT.
- $\ \ \,$ The table row element < TR > ... < /TR > to define the row.
- \checkmark The table data element uses the $\langle TD \rangle \dots \langle TD \rangle$ to provide the data.
- \checkmark The table heading <TH> ... </TH> creates the heading cells.
- <TH> and <TD> can also be aligned. The possible alignments by using ALIGN attribute are LEFT, RIGHT or CENTER.

<TABLE> tag contains the following attributes:-

- BORDER This attribute makes the table border. If border attribute is omitted, it assumes a default value as 1 pixel. To remove the border from the table, give border="0".
- ALIGN It aligns the table in the page. There are three alignments LEFT, RIGHT and CENTER. The default value is LEFT.
- WIDTH It sets the width of the table in percent or in number (in pixels). If we don't specify the width, then the table will be only as wide as absolutely necessary.
- CELLSPACING It sets the space in between each cell in the table. It takes the value in number(pixels). Default value is 2. cell spacing is the common border width around each cell.
- CELLPADDING It determines space between the cell data and the cell borders.

<TR> tag includes the following attributes:-

- **BGCOLOR** It determines the background color of the row.
- ALIGN It is used for horizontal alignment as LEFT, RIGHT or CENTER.
- VALIGN It is used for vertical alignment as TOP, MIDDLE, BOTTOM and BASELINE.

Example:-

<TABLE BORDER="3" ALIGN="CENTER" WIDTH="60%" CELLSPACING="10" CELLPADDING="5">

```
<CAPTION ALIGN="BOTTOM">Computer Languages</CAPTION>
<TR BGCOLOR="#BB6699" ALIGN="RIGHT" VALIGN="BOTTOM">
<TH>S.N.
<TH>Name
</TR><TR><TD>1.
<TD>HTML</TR>
<TR><TD>2.<TD>JAVA</TR>
</TABLE>
```

COLSPAN and ROWSPAN attribute can be used in a cell to make the cell's contents merge with another cell. These attributes can be used in $\langle TD \rangle$ or $\langle TH \rangle$ tag.

```
<TD COLSPAN="NUMBER">
```

```
<TD ROWSPAN="NUMBER">
```

Images and other items can be inserted in table cells as and when required.

CHECK YOUR PROGRESS 13.5

- 1. What is table? What are the basic tags used for the creation of the table?
- 2. What is CELLPADDING?
- 3. The default value for the BORDER attribute is _____.

13.6 FRAMES

Frames are used to divide the web page into multiple page frames. Frames can control the layout of the browser window by segregating the window to rectangular sections and loading separate HTML files into each section of the window. Its limitation is that all browsers do not support frames. The following basic tags are associated with the frames:-

<Frameset>...</Frameset> tag divides pages into frames. It has the following attributes:-

COLS –Divides documents into columns

ROWS– Divides documents into rows.

<FRAME> tag specifies the file to be displayed in each frame. It has the following attributes:-

SRC- Specifies URL of the HTML file

NAME - Specifies the name of the frame

NORESIZE - Specifies that the size of the frame is fixed i.e. it cannot be altered by the users.

SCROLLING- Specifies scroll bars. It can take values Yes, No or Auto.

Frameset documents have a different structure than normal HTML documents. A regular HTML document has a head element and a body element, but a frameset document has a head element and a frameset element.

Example for main file which divides the page into frames:-

<html>

<head><title>A sample program for frame</title></head>

<frameset cols="50%,50%">

<frame src="file1.htm">

<frame src="file2.htm>

<noframes>

<body>Your browser does not support frames</body>

</noframes>

</frameset>

</html>

This example divides the web page into two columns. We can divide rows also or can nest the frames.

```
<frameset rows="25%,75%">
```

```
<frame frameborder="0" src="url">
```

```
<frameset cols="50%,50%">
```

<frame src="url">

<frame src="url">

```
</frameset>
```

```
</frameset>
```

Frames can be divided in ratio also as:-

```
<frameset cols="1*,3*">
```

Frames can be named by using name attribute. We can target any html link file to the targeted frame.

<frame src="url" name="main">

In any html file shown on any frame we can use the link attribute as under:-

```
<UL>
```

Java

If target frame name is missing then the browser will create a new full-sized window.

Four predefined names that can be targeted by an anchor. These four targets have special meanings. They all stat with an underscore(_). All four of these special target names are case-sensitive. The special target names are:-

- 1. _blank Cause the document to be loaded into a new window.
- 2. _parent- it refers to the parent frameset.
- 3. _self it loads the document into the current frame.
- 4. _top it removes frames altogether.

CHECK YOUR PROGRESS 13.6

- 1. What is a frame?
- 2. What is FRAMESET?
- 3. Frames can be used to control the ______ of the browser window.

13.7 FORMS

A form is simply a collection of fields of information. These fields of information come in many different varieties such as text boxes, radio buttons, pull down menus and other elements. The more general term for a field in a form is a control.

13.7.1 Understanding Form Element

The simplest type of form is just a button that links to a URL. This type of button is sometimes called a GO button. The simplest form looks like as:-

<BODY>

<FORM ACTION="http://www.yahoo.com" METHOD="GET">

<INPUT TYPE="SUBMIT" VALUE="GOTO YAHOO">

</FORM>

</BODY>

The form element begins with the <FORM> tag. Three attributes of FORM are:-

- *Constant of the constant of t*
- Method specifies that the form information should be posted to the URL given in the action attribute. There are only two possible values GET or POST.
- *Constant Constant Co*

13.7.2 Form Control Elements

The form element can contain different elements to create form controls. The INPUT element is used to create a variety of controls including text boxes and buttons.

- \bigcirc TEXT is used for single line text box.
- PASSWORD is similar to text, except characters are not revealed on screen.
- CHECKBOX is an Yes/No Option.
- @ RADIO Similar to checkbox except that in a group of radio buttons.

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- SUBMIT Submits a form to be processed.
- IMAGE- Exactly the same as a submit button except that we can specify any image instead of the normal gray button appearance.
- **RESET** Clears all of the input on a form, resetting it back to its default appearance.
- THIDDEN- A hidden input is not displayed on screen at all.
- FILE can be used to send a file from surfer's computer along with the rest of the form data.

The different types of form controls can use attributes in various ways such as the SIZE, MAXLENGTH, VALUE and CHECKED attributes.

Example:

<FORM>

<INPUT TYPE="TEXT" NAME="nm" size="30" VALUE="RAJEEV SRIVASTAVA">

<INPUT TYPE="PASSWORD" NAME="PW">

<INPUT TYPE="CHECKBOX" NAME="mail">Pl.send me mail.

<INPUT TYPE="RADIO" NAME="LANG" VALUE="VB" CHECKED>VB

<INPUT TYPE="RADIO" NAME="LANG" VALUE="JA">JAVA

<INPUT TYPE="RADIO" NAME="LANG" VALUE="CP" >C++

<INPUT TYPE="SUBMIT" VALUE="OK"><INPUT TYPE="RESET" VALUE="CANCEL">

</FORM>

13.7.3 Menu Controls by SELECT element

The select element must contain one or more option elements. The select element must begin with a <SELECT> tag with a required name attribute. It will create a drop-down menu control.

<SELECT Name="Users" SIZE="5">

<OPTION SELECTED > Rajeev Srivastava

<OPTION>Ashok Sharma

<OPTION>Sanjay Gupta

</SELECT>

If size is less than the number of options than scroll bar will appear. If size is greater than number of options than blank lines will appear. By default, only one item can be selected from the list. If we specify the optional MULTIPLE attribute, then more than one item can be selected by holding down the CTRL key. SELECTED element can indicate the default menu item.

TEXTAREA element is used to create multi line text. It has the following attributes:-

- The Name specifies the name of the text area.
- ☞ Rows Specifies the number of Rows.
- The Cols Specifies the number of columns.

<TEXTAREAROWS="5" COLS="60" NAME="feedback">

General Comments:

</TEXTAREA>

LABEL element is used to create labels.

<LABEL>First Name : <INPUT TYPE="TEXT" NAME="fnm"></LABEL>

Forms can be processed in three ways to process a form:-

- The By using a CGI program
- The By using a mailto link
- By using a script.(JavaScript and VBScript)

Some HTML extensions (Not supported by some browser)

<BLINK>...</BLINK> It shows blinking text.

<MARQUEE>.....</MARQUEE> It creates a region with scrolling text.

CHECK YOUR PROGRESS 13.7

- 1. What are the two methods used in FORM tag?
- 2. What is the purpose of SELECT tag?

13.8 GETTING CONNECTED AND PUBLISHING YOUR WEB SITE

The only way to create a web site is to publish pages to a web server. For this, we have to use File Transfer Protocol (FTP) to copy files from your computer to the proper place. To publish on the web, we need an internet account, web space, user name and password.

Publishing to the web

Publishing a web page involves a number of simple steps:-

- 1. Make sure the HTML documents and any image files are all named correctly.
- 2. Transfer the file(or files) to the correct directory on the web server using FTP.
- 3. Make sure that the permissions are correct.

When a user creates a first web file for the desired website, it will usually be the main home page that introduces the rest of your pages. File name of the home page must be index.htm or default.htm.

When you open an account with an ISP that includes web space, they will create a URL on their server that anyone can use to view your web pages like www.yoursite.com etc.

However, this URL is not the same address in which the user transfer the files. Web files must be trans-

Web Designing

ferred to a particular FTP url that is usually different from the normal url. This FTP address is only needed when you publish your web site.

13.9 SUMMARY

The explosive growth of the World wide web is relatively unprecedented. As personal computers become more common in home and offices, people began to learn to use them for document creation and page layout. The technique used to address documents on the web is called the Uniform Resource Locator(URL). A web page can be created by using HTML. It was conceived for transmission over the internet in the form of web pages. It follows the hyper text transfer protocol (http) to manipulate the web pages using browsers. This unit enables the student to create simple static web pages. To create dynamic web pages, student must learn JavaScript, ASP etc. which can be embedded in HTML pages.

13.10 GLOSSARY

Browser Clients software for displaying web pages and using hyperlinks to navigate the web.

Client A combination of computer and software capable of receiving information and instructions from a remote host computer or server.

HTML Element Commonly referred as a tag. It is a component of hierarchical structure, defined by a document type definition.

FTP File transfer protocols used for remote login to a computer to exchange files over a TCP/IP network.

Form An HTML component that enables web authors to have input fields on their pages, permitting feedback from users and offering interactive options.

Frames Presents information as concurrently displayed group of pages.

Hyperlink A connection between one file and another file or inside a file.

Internet A worldwide network of computer using communication using agreed-on protocols.

Server A combination of computer and software and network connection capable of providing information and acts on request.

Tags Markup instruction in a HTML document presented in angled brackets.

Uniform Resource Locator The path to a specific document on the internet that consists of protocols, a domain name or IP address a directory structure and the document name.

Web The Web is a subset of the internet that implements the concepts of hyperlinks to exchange information and acts according to HTTP.

13.11 FURTHER READINGS

The following books are suggested for further reading:-

HTML 4 UNLEASHED by Rick Darnell

HTML 4

13.12 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to Check Your Progress 13.2

- 1. 80
- 2. URL
- 3. Index.htm
- 4. Browser

Answers to Check Your Progress 13.3

- 1. HTML is the scripting language, which is used to create web documents. HTML commands specify the layout of a document as it appears on a web client.
- 2. The primary purpose is to display text, images and links that you want to display in your web page.
- 3. The container tags are pair tags i.e. they require a starting tag as well as an ending tag. They affect the text appearing between the both tags. The empty tags just require a starting tag and no ending tag. They just carry out the job assigned to them.
- 4. The comment line is declared as : <-- Any comments -->

Answers to Check Your Progress 13.4

- 1. SRC
- 2. <a href ...>
- 3. The links between web pages is known as hyperlink.
- 4. ALINK defines the the color of a link as it is being clicked on web page. The default color is RED. VLINK defines the color of a link after it has been visited. The default color is purple.

Answers to Check Your Progress 13.5

1. Table consists of a number of rows and columns. The following basic tags are used for table creation :-

 $<\!\!table\!\!>\!\ldots<\!\!/table\!\!>,<\!\!tr\!\!>\!\ldots<\!\!/tr\!\!>,<\!\!td\!\!>\!\ldots<\!\!/td\!\!>,<\!\!th\!\!>\!\ldots<\!\!/th\!\!>$ and

<caption>...</caption>

- 2. CELLPADDING tells the browser how much padding is required in the cell i.e.the space between the side of the cell and the contents of the cell.
- 3. One(1) pixel.

Answers to Check Your Progress 13.6

- 1. Frames allow us to divide the page into several rectangular areas and to display a separate document in each rectangle.
- 2. This is the main container for a frame. It has two attributes ROWS and COLS which divides the web page. A frame document has no BODY tag. By using FRAME tag it can display different web pages.
- 3. Layout

Answers to Check Your Progress 13.7

- 1. POST and GET. Post is by far the more popular, as it allows greater amount of data to be sent. GET is a little easier, it is best used with single responses like a single textbox.
- 2. SELECT is a container tag. Options are places in this tag with particular value that gets associated with NAME attribute that chosen.

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13.13 UNIT-END QUESTIONS

- 1. What would happen if a <title> tag is not closed using </title>?
- 2. Can we link Web pages through images? If so, how?
- 3. Differentiate between BR tag and HR tag.
- 4. Differentiate between BACKGROUND and BGCOLOR.
- 5. What is unordered list?
- 6. What is anchor tag?
- 7. Explain the attributes of TABLE tag.
- 8. What does the ACTION attribute accept in FORM tag?
- 9. How do you tell an HTML form to send its data to the Web Server?
- 10. What is web publishing?

0

Unit XIV : XML (EXTENSIBLE MARKUP LANGUAGE)

Structure of the Unit

- 14.0 Objectives
- 14.1 Introduction
- 14.2 Basics of XML
 - 14.2.1 HTML weaknesses
 - 14.2.2 Why XML
 - 14.2.3 What is XML

14.3 Structure of XML

- 14.3.1 Logical Structure
- 14.3.2 Physical Structure
- 14.4 XML Markup
- 14.5 Document Type Declarations and Validation
- 14.6 Styling XML for display
- 14.7 The XML declaration
 - 14.7.1 The root element
 - 14.7.2 Structure of an XML page

14.8 Valid and Well Formed Documents

14.9 Using Elements

- 14.9.1 Empty Elements
- 14.9.2 Element-Only Element
- 14.9.3 Mixed Elements
- 14.9.4 ANY elements

14.10 Creating a XML file

- 14.10.1 File Creation
- 14.10.2 Declarations in the file
- 14.10.3 Comments addition in XML file
- 14.10.4 Insertion of a Root Element
- 14.10.5 Attributes in an element
- 14.10.6 Nested Elements in xml document
- 14.10.7 Addition of HTML-Style text
- 14.11 eXtensible Style Language (XSL) : A introduction
- 14.12 Processing XSL Style Sheet
- 14.13 Basics of XSL Style Sheets
- 14.14 XSLT Template Constructs
- 14.15 View the records of XML file
- 14.16 Summary
- 14.17 Glossary
- 14.18 Further Readings
- 14.19 Answers to the self learning exercises
- 14.20 Unit-end questions

14.0 OBJECTIVES

After going through this unit student will be able to:

- Tunderstand the importance of XML in a maturing Internet
- The Weakness of HTML that make it unsuitable for Internet Commerce
- Tunderstand the XSL (eXtensible Style Language)
- Can view the Records of XML file

14.1 INTRODUCTION

XML is defined as an application profile of SGML. SGML is the Standard Generalized Markup Language defined by ISO 8879 and has been the standard to maintain structured documentation from long time, but is not well suited over the web. Defining XML as an application profile of SGML means that any SGML system will be able to read XML documents. XML is a restricted form of SGML. XSL was originally conceived as an answer to the styling needs of XML. XSL effectively defines a superset of the styling functionality currently available in CSS, but the document transformation capabilities of XSL are particularly suited to XML. XSL is based on both DSSSL (Document Style Semantics and Specification Language) and CSS(Cascading Style Sheets) of HTML, so it represents the merging of a great deal of style sheet knowledge.

14.2 BASICS OF XML

14.2.1 HTML weaknesses

Although HTML considered as the most useful in internet application, but there have been a lot of complaints leveled against it. People are now realizing that XML is superior to HTML. The following are the weaknesses of HTML found by the lot of developers:-

- TIML lacks syntactic checking i.e. you cannot validate HTML code.
- THTML lacks structure.
- *F* HTML is not suitable for data interchange.
- THTML is not content-aware.
- THTML is not object oriented.
- F HTML lacks a robust linking mechanism.
- THTML is not reusable.
- THTML is not extensible.

14.2.2 Why XML?

XML was created so that richly structured documents could be used over the web. HTML is bounds with a set of semantics and does not provide arbitrary structure. XML uses the features of SGML that it needs and tries to incorporate the lessons learned from HTML. Why XML is considered better than SGML, the following goals and degree that have already been met are:-

- XML can be used with existing Web protocols and mechanisms and does not impose any additional requirements. XML has been developed with the web in mind.
- TXML is compatible with SGML and most SGML applications can be converted into XML.
- T is easy to write programs that process XML documents.
- The number of optional features in XML has been kept to an absolute minimum.
- XML documents are reasonably clear to the layperson. XML's markup is reasonably self explanatory. A valid XML document:-
- The structural rules that the markup attempts to follow.
- Tists any external resources (external entities) that are part of the document.
- The clares any internal resources (internal entities) that are used within the document.
- Lists the types of non-XML resources(notations and binaries) used and identifies helper applications that might be needed.
- The design of XML is formal and concise. Information marked up in XML can be easily processed by computer programs.
- XML documents are easy to create. HTML is also famous for its ease of use, and XML capitalizes on this strength.

14.2.3 WHAT IS XML?

XML is a markup language for documents containing structured information contains contents such as text, pictures etc. and some indication of what role that content plays. Contents in a heading section have a different meaning from content in a footnote etc. A markup language is a mechanism to identify structures in a document. The XML specification defines a standard way to add markup to documents.

XML specifies neither semantics nor a tag set. XML is a meta-language for describing markup languages or we can say XML provides a facility to define tags and the structural relationships between them. As in XML there are no predefined tag sets, there can not be any preconceived semantics. All of the semantics of an XML document will either be defined by the applications that process them or by style sheets.

As XML is a text-based markup language that is fast becoming the standard for data interchange on the web. XML tags identify the data, rather than specifying how to display it. XML tag acts like a field name in our program. It puts a label on a piece of data that identifies it. For example : <Greeting>....</Greeting>. We are free to use any XML tags that make sense for a given application. For multiple applications to use the same XML data, they have to agree on the tab names they intend to use. The following is the example of XML data can be used in Greeting application:-

<preeting>

<to>coordinator_pgdca@vmou.org</to>

<from>srivastava@rediffmail.com</from>

<subject>Hello, Best wishes for PGDCA students</subject>

<desc>

XML is easy for students. The can learn easily. Best wishes.

</desc>

</greeting>

The data between the tag and its matching end tag defines an element of the XML data. The ability for one tag to contain another tag, which gives XML its ability to represent hierarchical data structures. As in HTML, white space is irrelevant, so we can format the data for readability and can process it easily with a program. In XML we can easily search a data set for greetings containing "Best" in the subject because XML tags identify the content of the data.

CHECK YOUR PROGRESS 14.2

1. XML is a markup language for documents containing ______ information.

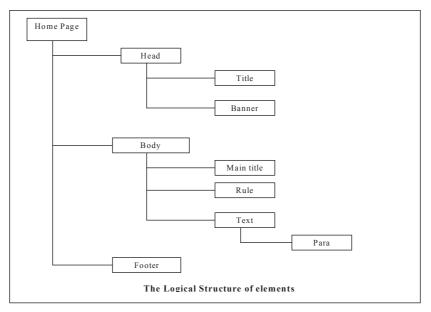
- 2. XML has been developed with the _____ in mind.
- 3. XML is fast becoming the standard for ______ on the web.

14.3 STRUCTURE OF XML

The XML document is divided into two different structures - Logical and Physical structure.

14.3.1 Logical Structure

Each XML document contains one or more **elements**, The boundaries of which are either delimited by start-tags and end-tags, or for empty elements, by an empty-element tag. Elements are the building bricks out of which an XML document is assembled. Each XML document must have only one root element, and all the other elements must be perfectly nested inside that element. Each element has a type, identified by name, sometimes called as "generic identifier" (GI), and may have a set of attribute specifications. Each attribute specification has a name and a value.



XML (eXtensible Markup Language

The arrangement of the elements in an XML document is called the logical structure. In order to be usable (technically, in order to be *well-formed*), the logical and physical structure of an XML document must be synchronous.

14.3.2 Physical Structure

In XML, each document contains one or more elements. An XML document may consist of one or many storage units. These are called **entities**, they all have **content** and are all identified by entity name.

Each XML document has one entity called the **document entity**, which serves as the starting point for the XML processor and may contain the whole document. Entities may be either **parsed** or **unparsed**. The contents of a **parsed entity** referred as its replacement text, this text is considered an integral part of the document. An **unparsed entity** is a resource whose contents may or may not be text and if text, they may be other than XML text. Each unparsed entity has an associated notation, identified by name. XML places no constraints on the contents of unparsed entities.

Parsed entities are invoked by name using entity references, unparsed entities by name, given in the value of ENTITY or ENTITIES attributes.

General entities are entities for use within the document content and sometimes referred with the unqualified term entity. **Parameter entities** are parsed entities for use within the DTD. These two types of entities use different forms of reference and are recognized in different contexts. They occupy different namespaces; a parameter entity and a general entity with the same name are two distinct entities.

CHECK YOUR PROGRESS 14.3

1. XML document may consist of one or more storage units which are called ______.

2. ______ entities are parsed entities for use within the DTD.

14.4 XML MARKUP

XML tags are created like HTML tags. Tags are most obvious component in XML syntax and are used to describe elements. There's a start and a closing tag like <tag>....</tag> as in HTML. The text between the brackets is called an element. Tags are **case sensitive**.

Tags can also contain attributes, additional information included as part of the tag itself, within the angle brackets. The syntax is:

<element attribute-name="attribute-value">.....</element>

The value of an attribute needs to be quoted, even if it contains only numbers.

Example:

```
<greeting from="srivastava@rediffmail.com" to="coordinator_pgdca@vmou.org"
```

subject="Hello-Best wishes for PGDCA students">

<desc>

XML is easy for students. They can learn easily. Best wishes.

```
</desc>
```

```
</greeting>
```

In XML commas between attributes are not ignored, if present, they generate an error.

XML elements can be empty, which means that they do not contain any parsed character data. Tags for **empty elements** in XML must use a **forward slash(/)** after the element name to indicate that they are empty. So the
br> tag becomes
 in XML.

One big difference between XML and HTML is that an XML document is always constrained to be well formed. There are several rules that determine when a document is well-formed, but one of the most important is that every tag has a closing tag. Another important aspect of a well-formed document is that all tags are completely nested.

Comments in XML files

Comments are used in an XML document to present information that is not technically part of that document's content. XML comments are used to provide descriptions of document data purely for the sake of the use or we can say, XML parsers and applications generally ignore comments.

Comments can be used anywhere within an XML document where parsed character data appears. Unparsed characters data (CDATA) sections are the only exception to this rule.

Example: <!-- Comment in XML-->

14.5 DOCUMENT TYPE DECLARATIONS AND VALIDATION

The DTD describes a model of the structure of the content of an XML document. This model says what elements must be present, which ones are optional, what their attributes are and how they can be structured with relation to each other. While HTML has only one DTD, XML allows to create own DTDs for applications. This gives complete control over the process of checking the content and structure of the XML documents created for that application. This checking process is called **validation**.

Document type declarations are used in XML to specify information about a document, including the root element and Document Type Definition (DTD). The document type declaration for a document is very important in establishing whether the document is valid or just well-formed. The following are the three main tasks carried out by a document type declaration:

- Specify the document's root element.
- The fining elements, attributes and entities specific to the document (Internal DTD)
- Tidentifying an external DTD for the document

Example: <!DOCTYPE EmployeeDetails SYSTEM "EmployeeDetails.dtd">

The root element of the document is the EmployeeDetails element, and the external DTD for the document is EmployeeDetails.dtd which is clearly specified in the document type declaration. XML parser uses this DTD to validate the document if an application requires validation. The structure of an XML document is determined by the document type declaration, which appears in the prolog of an XML document. Markup **270**

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declarations are provided in the document type declaration that establishes the grammar for a document or class of documents. The document type declaration can perform one or both of the following functions:

- Directly contain markup declaration in the prolog of the document that is collectively known as the internal DTD subset or local DTD.
- Reference external markup declarations that are collectively known as the external DTD subset or external DTD.

The reason for breaking the DTD into two parts has to do with flexibility. The external DTD subset describes general document structure for a class of documents, while the internal DTD subset describes a structure specific to a given document. The following types of markup declarations may be included within the DTD:

- The types of elements allowed in the document, as well as their content models.
- The attributes that may be assigned to each element.
- The Entities that are allowed in the document
- The Notations that are allowed for use with external entities.

Internal and External DTDs

Internal DTDs must be declared in the document type declaration, while external DTDs must be referenced. The following is the syntax of the document type declaration:

<!DOCTYPE RootElem SYSTEM ExternalDTDRef[Internal DTDDecl]>

Here ExternalDTDRef references the external DTD, which is the URI (Uniform Resource Identifier) of a file containing the external DTD. The document type declaration must appear after the XML declaration but before the first element (tag) in a document.

Example:

<!DOCTYPE organization SYSTEM "Organization.dtd" [<!ELEMENT employee(#PCDATA)>]>

The root element of the document is organization i.e. all documents of this type must be contained within the organization element. The document type declaration references an external DTD stored in the file Organization.dtd. Additionally, an element named employee is declared as part of the internal DTD.

XML declaration is a processor instruction that indicates the version of XML for a document as : <?xml version="1.0"?>

In addition to the XML version, the XML declaration can describe the standalone status of a document, as well as its character encoding.

<?xml version="1.0" standalone="no"?>

The two possible values for standalone are yes and no.

CDATA Sections

Unparsed character data section or CDATA sections are used in XML documents to block offtext that is to be sidestepped by an XML.

<![CDATA[

<name>Rajeev Srivastava</name>

<address>Queens Road</address>

]]>

<city>Jaipur</city>

In the above example, the name and address elements are not recognized as XML markup and the data contained within them is not recognized as parsed character data, because the tags are placed within a CDATA section. CDATA sections are one of the recommended ways to embed application code (JavaScript, VBScript, perl and so on) in XML code.

CHECK YOUR PROGRESS 14.5

- 1. Checking process in DTD is called _____.
- 2. CDATA sections are _____
- 3. _____ DTDs must be declared in the document type declaration

14.6 STYLING XML FOR DISPLAY

XML is a content based metalanguage, it does not mean much to refer to "Viewing an XML document". How do you view something does not include any information about how it is to be displayed? To view an XML document, the information must be provided about how it is to be rendered for display. This is accomplished with style sheets that are coded using either CSS or XSL.

CSS is a cascading style sheet technology that was created for using with HTML but can also work well with XML. XSL is more advanced style sheet technology that was created explicitly for use with XML. XSL is more complex than CSS, but it is also considerably more powerful.

Browsing XML

The concept of browsing XML document was nothing more than a concept. Internet Explorer 5.0 is the first commercial web browser to fully support XML 1.0. IE also supports some other closely related XML technologies suc as XML DOM(a subset of XSL), the XSL namespaces.

14.7 THE XML DECLARATION

The first line of an XML document is the XML declaration. It's a special kind of tag:

<?xml version="1.0"?>

14.7.1 The root element

All XML documents must have a root element. All other elements in the same document are children of this root element. The root element is the top level of the structure in an XML document.

14.7.2 Structure of an XML page

<?xml version="1.0"?>

<root>

<element>

<sub-element>

content

</sub-element>

<element>

</root>

All elements must be nested. The level of nesting can be arbitrarily deep. For example:

```
<?xml version="1.0"?>
```

<employee>

<name>

```
<firstname>Rajeev</firstname>
```

<familyname>Srivastava</familyname>

```
<title>Shri</title>
```

</name>

<address>

```
<houseno>149</houseno>
```

```
<street>Avenue 7</street>
```

<colony>Vaishali Nagar</colony>

```
<city>Jaipur</city>
```

</address>

</employee>

CHECK YOUR PROGRESS 14.7

1. All XML documents must have a ______ element.

2. The first line of an XML document is the

14.8 VALID AND WELL FORMED DOCUMENTS

An XML document needs to be well formed. Well formed means that the document applies to the syntax rules for XML. To be well formed a document needs to comply with the following rules:

- Tt contains a root element
- The All other elements are children of the root element
- All elements are correctly paired
- The element name in a start-tag and an end-tag are exactly the same.
- The Attribute names are used only once within the same element.

14.9 USING ELEMENTS

Elements are declared in a DTD using element declarations as:

<!ELEMENT ElementName Type>

The name of the element determines the name of the tag(s) used to mark up the element in XML document. The name must be unique within the context of a single DTD. The type of the element is specified in Type, which is also known as the context specification for the element. XML supports four types of elements:

- *Empty* The empty element does not contain any content, but it can contain attributes.
- **Element Only** The element only contains child elements.
- The mixed element contains a combination of child elements and character data.
- ☞ Any The any element contains any content allowed by the DTD.

The name of an element must not contain the ampersand character(&) or begin with the letter X, M and L in any case combination(XML, xml, Xml etc.)

14.9.1 Empty Elements

Empty elements serves as a means of representing XML content via a set of attributes, as opposed to text content. The syntax for declaration is:

<!ELEMENT ElementName Empty>

Example: <!ELEMENT img Empty>

These can be defined in a document in two ways as either with start tag/end tag pair or with an empty tag.

Example: or

If any content appears between a tag, even a space, the document would be invalid. Second way is better as it is concise and helps to make it clear that an element is empty.

14.9.2 Element-Only Element

An element-only element contains nothing but child elements. This can be created by listing the child elements that can appear within the element in the element declaration. The syntax for declaration is:

<!ELEMENT ElementName ContentModel>

The content model is itself specified by using a combination of special element declaration symbols and child element names. The symbols describe the relationship between the child elements and the container element. Within the content model, child elements are grouped into sequences or choice groups using parentheses [()]. Groups are separated by pipes[|]. Child elements within a sequence are separated by comma[,]. The following symbols are used to establish the content model of elements:

Symbol	Name	Description
0	Parenthesis	A sequence of choice of group of child elements.
,	Comma	Separate its items in a sequence.
	Pipe	Separates the items in a choice group of alternatives.
?	Question mark	Shows that a child element must appear exactly once or
		not at all
*	Asterisk	Shows that a child element can appear any number of
		times.
+	Plus	Shows that a child element must appear at least once.
	No Symbol	Shows that a child element must appear exactly once.

Example: <!ELEMENT empdetails(briefintro,(education|expr+)+,interest?,referedby*)>

14.9.3 Mixed Elements

Mixed elements contain both character data and child elements. The simplest mixed element is one that is declared to contain only character data. Text-only elements are declared using the #PCDATA as:

<!ELEMENT ElementName(#PCDATA)>

The content model for text-only elements consists solely of #PCDATA contained within parentheses, which indicates that the element contains parsed character data.

Example : <!ELEMENT course(#PCDATA)>

The following show how the course element is defined in a document:

<course>Computer Fundamentals</course>

Elements may also contain unparsed character data(CDATA), but CDATA section should be used within parsed character data. There is no direct support for a #CDATA type in the content model of an element.

Now on the basis of knowledge gained, we can create a skeleton of a useful DTD.

```
<!DOCTYPE page [
```

```
<!ELEMENT pages (page)>
<!ELEMENT page(head, body)>
<!ELEMENT head(title)>
<!ELEMENT body(title, para)>
<!ELEMENT author(#PCDATA)>
<!ELEMENT Publisher(#PCDATA)>
```

]

Mixed elements are declared very much like element-only elements. The content mode for a mixed element must contain a repeating choice list using the following syntax:

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<!ELEMENT ElementName(#PCDATA | ElementList)*>

Example: <!ELEMENT memo(#PCDATA | title | subject)*>

14.9.4 ANY elements

The ANY element has virtually no structure. It can contain character data, any declared element types or a mixed type. It can be considered as a wide-open content model. The declaration uses the following syntax:

<!ELEMENT ElementName ANY>

Due to lack of structure, it should be avoided in the document.

CHECK YOUR PROGRESS 14.9

1. The name of an element must not contain the ______.

- 2. The ______ element has virtually no structure.
- 3. An ______ element contains nothing but child elements.

14.10 CREATING A XML FILE

14.10.1 File Creation

Use any standard text editor and create a file called mydoc.xml.

14.10.2 Declarations in the file

Declarations must be mentioned in the file which identifies the file as an XML document. Xml syntax does not just deal with character data and markup. There are also processing instructions, which are special instructions intended for use by the applications that is processing an XML document. The example of a processing instruction is the familiar xml processing instruction as:

<?xml version='1.0' encoding='utf-8'?>

14.10.3 Comments addition in XML file

Comments are ignored by XML parsers.

<?xml version='1.0' encoding='utf-8'?>

<!- - A set of my documents - - >

14.10.4 Insertion of a Root Element

Every xml file defines exactly one element, known as root element. Any other elements in the file are contained within that element.

<?xml version='1.0' encoding='utf-8'?>

<!- - A set of my documents - - >

<mydocument>

</mvdocument>

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14.10.5 Attributes in an element

```
<mydocument
```

```
author="Rajeev"
```

```
publisher="abc publisher"
```

title="My First XML Document"

```
>
```

</mydocument>

14.10.6 Nested Elements in xml document

```
<mydocument
author="Rajeev"
publisher="abc publisher"
title="My First XML Document"
<
docu type="all">
<title>Introduction to XML</title>
</docu>
```

</mydocument>

14.10.7 Addition of HTML-Style text

<title>Introduction to <i>XML<i></title>

Since XML allows to define any tags, it makes sense to define a set of tags that look like HTML. The XHTML standard does exactly that.

14.11 EXTENSIBLE STYLE LANGUAGE (XSL) : A INTRODUCTION

XSL was originally conceived as an answer to the styling needs of XML. XSL effectively defines a superset of the styling functionality currently available in CSS, but the document transformation capabilities of XSL are particularly suited to XML. When a CSS style sheet is applied to an XML document, it uses the structure of XML tree as the basis for applying style rules. XSL is a style sheet technology that addresses two aspects of XML document:

```
Transforming document from one type to another(XSLT)
```

Styling documents according to formatting rules(XSL Formatting Objects)

XSLT and XSL formatting objects are implemented as an XML vocabulary consisting of relevant elements and attributes for carrying out each portion of the document rendering process. As both components of XSL are implemented as XML vocabularies, style sheets created from them are XML documents. This allows to create XSL style sheets using familiar XML syntax. XML schema is implemented as an XML vocabulary that replaces a pre-XML approach(DTDs) for describing the structure of XML documents. When an XML document is transferred using XSL, the transformation applies to the logical tree structure of that XML document. This means that the result of an XSL transformation is a tree of XML data, not an XML document.

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XSL(extensible style language) is a style sheet technology designed specifically for XML. In many ways, XSL accomplishes the same things that CSS does. However, XSL goes much further than CSS in manipulating the logical structure of XML documents. XSL includes some high-powered programmatic constructs that can be complex.

Difference between XSL and CSS

There are the mainly two differences between XSL and CSS:

- CSS can be used to style HTML document, while XSL cannot.
- TSL can be used to transform XML documents, while CSS cannot.

The real comparative issue between XSL and CSS is browser support. Internet Explorer 5.0 supports a subset of CSS1 and the proprietary version of XSL. The following are the three ways in which XSL and CSS can be used together to provide a hybrid XML style sheet solution:

- Use XSL on the server to transform XML documents into HTML documents that are styled with CSS style sheet.
- Use XSL on the server to transform XML documents into XML documents that are styled with CSS style sheet.
- Use XSL on the client to transform XML documents into HTML documents that are styled with CSS style sheets.

14.14 PROCESSING XSL STYLE SHEET

To understand XSL, a knowledge regarding how an XSL processor processes XML document is must. Two things are required before an XSL processor can process a document:

- The XML tree representation of the document.
- The XSL style sheet.

The XML tree representation of a document is obtained by parsing the document, which means that the XSL processor must be coupled with an XML parser in order to function. Assuming that a document is successfully parsed into a tree, the XSL processor can begin its work. The XSL processor starts with the root node in the tree, using it to perform pattern matching in the style sheet. An XSL style sheet consists of templates that use patterns to determine which portions of an XML document are to be formatted. The result tree that is generated by the XSL processor may contain XSL formatting objects, which are used to format the result tree for display.

The goal of design the architecture of XSL is that it is as flexible and extensible as possible. The important thing to keep in mind is that XSL is really two languages. **XSLT** is the XSL transformation language that is used to transform XML documents from one vocabulary to another. **XSL formatting objects** is the XSL formatting language that is used to apply formatting styles to XML documents for display purposes.

XSL Transformation (XSLT)

XSL Transformation (XSLT) is the transformation component of the XSL style sheet technology. XSLT

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consists of an XML vocabulary that is used to create style sheets for transforming XML document. It operates on parsed XML data in a tree form and outputs a result tree consisting of a transformed data. It uses a pattern matching mechanism to select portions of an XML document for transformation.

XSL Formatting Objects

XSL formatting objects is the formatting component of the XSL technology. It is being designed as a functional superset of CSS, which means that it will contain all of the functionality of CSS. The syntax of XSL formatting objects would not necessarily match that of CSS, but the same capabilities will be there. XSL formatting objects operates on a tree of XML data, which can either parsed directly from a document or transformed from a document using XSLT.

14.14 BASICS OF XSL STYLE SHEETS

The basic structure of XSL style sheet is very straightforward. An XSL style sheet consists of one or more templates that describe patterns, which are used to match XML content for styling purposes. The two basic constructs in an XSL style sheet are:

- Templates
- Patterns

The stylesheet element is the document element for XSL style sheets. This element is part of the XSL namespace, along with the other elements and attributes that make up XSL. It is required to declare XSL namespace to use XSL elements and attributes. The declaration is:

<xsl:stylesheet xmlns:xsl="http://www.w3.org/TR/WD-xsl">

The prefix for the XSL namespace is set to xsl, which is the common approach used in XSL style sheets.

Templates

A template is an XSL structure that describes output to be generated based upon the certain pattern-matching criteria. In a style sheet, Single template or multiple templates can be defined. Templates are defined in XSL stylesheets by using the **xsl:template element**, which is primarily a container element for patterns and transformation data.

The xsl:template element uses an *optional attribute* named *match* to match patterns in an XML document. The widest possible match for a document is to set the match attribute to "/", which indicates that the root of the tree is to be matched. The result is that the entire tree is selected for the template.

```
<xsl:template match="/">
```

```
</xsl:template>
```

The match attribute in a template is like a query in a database language. For example, the following matches only the element named name:

<xsl:template match="name">

<xsl:value-of/>

</xsl:template>

xsl:value-of element is used to insert the content of an element or attribute for output.

Patterns

Patterns are used in XSL templates to perform matches and ultimately they are responsible for determining which portions of an XML document are passed through a particular template for transformation. The pattern contact/city selects city element from contact element.

14.14 XSLT TEMPLATE CONSTRUCTS

The XSLT vocabulary defines several template constructs that control the application of templates in XSL style sheets. These templates constructs are actually elements that are defined in the XSL namespace. The common XSLT elements are:

- xsl:value-of
- ☞ xsl:for-each

xsl:apply-templates

xsl:value-of Element

This element is used to insert the value of an element or attribute in the resulting output of the style sheet. The template used to output of an element called name as html h1 heading is:

```
<xsl:template match="name">
```

```
<h1><xsl:value-of/></h1>
```

</xsl:template>

xsl:for-each Element

This element is used to establish a loop for iterating through elements in a document. The **select** attribute determines which elements are selected as part of the loop's iteration. Another attribute **order-by** specifies criteria that are used to sort data.

<xsl:for-each select="empaddress/contact">

.

</xsl:for-each>

xsl:apply-templates

This element is used to apply templates that are defined in a style sheet. It supports the select and orderby attributes. When the XSL processor encounters this attribute, the template corresponding to the pattern in the select attribute is applied, which means that relevant document data is fed into the template and transformed.

```
<xsl:apply-templates select="name"/>
```

```
<xsl:apply-templates select="city"/>
```

On the basis of above, we may now build a complete document to view in Internet Explorer 5.0 and above.

14.15 VIEW THE RECORDS OF XML FILE

To view the records of xml file, we must create the following three files to view in Internet Explorer. The files are:

- empaddress.dtd
- empaddress.xml
- empaddress.xsl

The coding to see the records of employees are as under:

empaddress.dtd file

<!ELEMENT empaddress (contact)+>

<!ELEMENT contact (name,address+,city,state,pin,phone)>

<!ELEMENT name (#PCDATA)>

<!ELEMENT address (#PCDATA)>

<!ELEMENT city (#PCDATA)>

<!ELEMENT state (#PCDATA)>

<!ELEMENT pin (#PCDATA)>

```
<!ELEMENT phone (#PCDATA)>
```

empaddress.xml file

```
<?xml version="1.0"?>
```

<?xml-stylesheet href="empaddress.xsl" type="text/xsl"?>

<!DOCTYPE empaddress SYSTEM "empaddress.dtd"[

<!ENTITY amp "&#38;">

<!ENTITY apos "'">

]>

<empaddress>

<!--- This is my work of XML --->

<contact>

<name>RajeevSrivastava</name>

<address>149, Vaishali Nagar</address>

<city>Jaipur</city>

<state>Rajasthan</state>

<pin>302016</pin>

<phone>2350408</phone>

</contact>

<contact>

<name>Rakesh Srivastava</name>

<address>Vidhyadhar Nagar</address>

<city>Jaipur</city>

<state>Rajasthan</state>

<pin>302016</pin>

<phone>2750618</phone>

</contact>

<contact>

<name>Ramesh Gupta</name>

<address>Tonk Road</address>

<city>Jaipur</city>

<state>Rajasthan</state>

<pin>302016</pin>

<phone>2654321</phone>

</contact>

</empaddress>

empaddress.xsl file

<?xml version="1.0"?>

<xsl:stylesheet xmlns:xsl="http://www.w3.org/TR/WD-xsl">

```
<xsl:template match="/">
```

<html>

<head>

```
<title>Employee Address Example</title>
```

</head>

```
<body bgcolor="#ff6688">
```

```
<xsl:for-each select="empaddress/contact">
```

<xsl:apply-templates select="name"/>

<xsl:apply-templates select="city"/>

```
<xsl:apply-templates select="phone"/>
```

```
</xsl:for-each>
```

</body>

</html>

```
</xsl:template>
```

```
<xsl:template match="name">
```

```
<h1><xsl:value-of/></h1>
```

</xsl:template>

```
<xsl:template match="address">
```

<xsl:value-of/>

</xsl:template>

```
<xsl:template match="city">
```

```
<xsl:value-of/>,
```

</xsl:template>

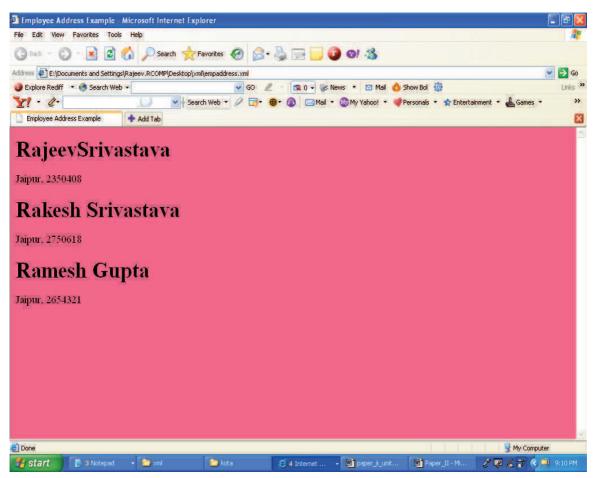
```
<xsl:template match="phone">
```

<xsl:value-of/>

```
</xsl:template>
```

```
</xsl:stylesheet>
```

After completing the coding of all the above three files. Open the empaddress.xml file in Internet Explorer and you will receive the output as under:



14.16 SUMMARY

XML is a markup language in abstract terms or XML is a markup labguage for documents containing structured information. XML document as an object constructed of various components. XML documents have both a logical and a physical structure and there are elements and entities. XML specifies neither semantics nor a tag set. XML is a text-based markup language that is fast becoming the standard for data interchange on the web. . XSL effectively defines a superset of the styling functionality currently available in CSS, but the document transformation capabilities of XSL are particularly suited to XML. XML document is transferred using XSL, the transformation applies to the logical tree structure of that XML document. This means that the result of an XSL transformation is a tree of XML data, not an XML document. A template is an XSL structure that describes output to be generated based upon the certain pattern-matching criteria.

14.17 GLOSSARY

CSS - Cascading Style sheets, a style sheet language for rendering HTML documents.

CDATA–A part of an XML document in which markup is not interpreted, but is passed to the application as-it-is.

DTD–A set of rules governing the element types that are allowed within an XML document and specifying the allowed content and attributes of each element type. The DTD also declares all the external entities

referenced within the document and the notations that can be used.

Element-A logical unit of information within an XML document.

Entity-Any data that can be treated as an object, such as an external file containing an image.

Valid XML document–A well-formed XML document that also conforms to all the rules governing the structure of its content expressed in its DTD.

Well-formed XML– An XML document that consists of a single (root) element containing correctly nested sub-elements. All entity references within a well-formed XML document refer to entities that have been declared in the DTD or are one of a small set of default entities, and all attribute values are enclosed in quotes.

XML declaration–A processing instruction at the start of an XML document that declares it to be XML code.

XML document-A document consisting of an optional XML declaration, followed by an optional document type declaration and then followed by a document element.

XML Processor– A program that reads XML documents, checks whether they are valid and well-formed and makes their contents available to XML applications.

14.18 FURTHER READINGS

The following books are suggested for further reading:-

- 1. XML: Teach Yourself, Techmedia
- 2. Beginning XML, Shreoff Publishers
- 3. Applied XML Solutions, Techmedia
- 4. XML In Record Time, BPB Publishers

14.19 ANSWERS TO THE SELF LEARNING EXERCISES

Answers to Check Your Progress 14.2

- 1. Structured
- 2. Web
- 3. Data Interchange

Answers to Check Your Progress 14.3

- 1. Entities
- 2. Parameter

Answers to Check Your Progress 14.5

- 1. Validation
- 2. Unparsed character data section
- 3. Internal

- 1. root
- 2. XML Declaration

Answers to Check Your Progress 14.9

- 1. Ampersand character(&).
- 2. ANY
- 3. element-only

14.20 UNIT-END QUESTIONS

- 1. What is XML? Write five features for using XML.
- 2. What is the document type declaration in XML?
- 3. What are the rules for well-formed documents in XML?
- 4. What are mixed elements?
- 5. Differentiate between internal and External DTD.
- 6. What is XSL? How does XSL helps to XML document?
- 7. How XSL is better than CSS?
- 8. How does and XSL processor works?
- 9. What is DOCTYPE?
- 10. How can you declare comments in XML document? Explain with example.

0

Unit XV : COMPUTER VIRUS

Structure of the Unit

- 15-0 Objectives
- 15.1 Introduction

15.2 History of Viruses

- 15.2.1 Summary History Page
- 15.2.2 Why people create Computer Viruses?
- 15.2.3 Effects of Computer Viruses

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15.3 What is a Virus?

- 15.3.1 Basic types of Viruses
- 15.3.2 Other malicious software
- 15.3.3 How Viruses work?
- 15.3.4 Replication Strategies
- 15.3.5 Host types of Viruses Check your progress

15.4 Virus Detection

- 15.4.1 Getting a Virus
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- 15.9 Answer to the Self Learning Exercise
- 15.10 Unit-end Questions

15.0 OBJECTIVES

Before 1988, the word "virus" had a strictly biological meaning. In that year, Robert Morris wrote and released the first "Internet worm", forcing everyone in the computer community to immediately consider this new electronic threat. While Morris created his virus to demonstrate a security flaw in ARPANET, the predecessor to the Internet, today's virus writers often have a more malicious intent. The Internet today spans the globe and serves billions of users, providing an environment in which a single virus can conceivably cause rapid and widespread damage to systems throughout the world. This unit will look at exploring five primary topics: what is computer virus? An overview of the major types of viruses and how they function, strategy to handle computer viruses, how to avoid viruses? Some commonly used viruses and their vaccines.

The most prevalent type of virus today is the e-mail worm, which often exploits security flaws in major e-mail programs. While there are a number of effective anti-virus software packages on the market to deal with this problem, many casual computer users do not use them. Most anti-virus response teams also take a reactive approach to combating viruses, dealing with new threats as they appear. A computer virus comes in contact with other programs to 'infect' them. The damage could consist of important files destroyed, corrupted data, slowing down of the infected computer, interrupted or unexpected closing of important programs. Viruses have grown in number and evolved in nature over the past decade. Now need active anti-virus programs, constantly running, checking every file when download or execute.

15.1 INTRODUCTION TO COMPUTER VIRUSES

The person might have a computer virus infection when the computer starts acting differently. For instance getting slow or when they turn the computer on, it says that all the data is erased or when they start writing a document, it looks different, some chapters might be missing or something else abnormal has happened.

If the person read email at their PC or if they use diskettes to transfer files between the computer at work and the computer at home, or if they just transfer files between the two computers they have a good possibility to get a virus.

A **computer virus** is a computer program which reproduces. A computer virus is often simply called a **virus**. The term is commonly used to refer to a range of malware, but a true virus does not need to be harmful. To distribute itself, a virus needs to execute or otherwise be interpreted. Viruses often hide themselves inside other programs to be executed.

Are all virus bad? A computer virus reproduces by making, possibly evolved, copies of itself in the computer's memory, storage, or over a network. This is similar to, but not exactly the same as the way a biological virus works. It is estimated by some experts that the Mydoom worm infected a quarter-million computers in a single day in January 2004. Another example is the ILOVEYOU virus, which occurred in 2000 and had a similar effect.

There are tens of thousands of viruses operating in the general Internet today, and new ones are discovered every day. While a generic explanation of how viruses work is difficult due to the wide variety of infection or spreading patterns, there are broad categories commonly used to describe various types of viruses. **288**

15.2 HISTORY OF VIRUS

15.2.1 Summary History Page

A program called "*Elk Cloner*" is credited with being the first computer virus to appear "in the wild" — that is, outside the single computer or lab where it was created. Written in 1982 by Rich Skrenta, it attached itself to the Apple DOS 3.3 operating system and spread by floppy disk. This virus was originally a joke, created by the high school student and put onto a game. The game was set to play, but release the virus on the 50th time of starting the game. Only this time, instead of playing the game, it would change to a blank screen that read a poem about the virus named Elk Cloner. The computer would then be infected.

Elk Cloner was quite the fairy-take character, restricting itself to a fairy harmless rhyme that went like so:

It will get on all your disks It will infiltrate your chips Yes it's **Cloner**! It will stick to you like glue It will modify RAM too Send in the **Cloner**!

The first PC virus was a boot sector virus called (c)**Brain**, created in 1986 by two brothers, Basit and Amjad Farooq Alvi, operating out of Lahore, Pakistan. The brothers reportedly created the virus to deter pirated copies of software they had written. However, analysts have claimed that the Ashar virus, a variant of Brain, possibly predated it based on code within the virus.

80's: The spread of the PC and Trojan Horses

1986: First virus

Before 1980 PC's were the province of the rich or professional. In particular in 1982 IBM started to release PCs and in 1984 the Apple Macintosh became available. Another thing that became a virus' best friend was the floppy disk. This allowed viruses to spread between computers that were not connected.

Basit and Amjad made the first virus. This was a "Laboratory virus" This virus was a boot sector virus. This virus had no harmful payload. A year later this virus was found on some computers in the University of Delaware, it had made it there on its own by replicating. That year another virus was made and let loose by programmer named RalfBurger, again the payload of the virus was generally harmless. This virus attached itself to .com files. It was the first executable virus.

1987: Your PC is Stoned, Jerusalem virus Escapes, and Cascading Letters

In 1987 the Jerusalem virus escaped captivity and spread infecting .exe and .com files. This virus caused infected files that were run on Friday the 13th to be deleted instead of executed. As Friday the 13ths are very rare this virus did not do a lot of harm.

It was a memory program. When booting from an infected floppy the message "Your PC is stoned" was displayed. This virus caused the letters on computer screen to fall down to the bottom of the screen. Of all the early viruses Jerusalem, Stoned, and Cascade are still common today, very common in fact.

1988: Viruses, do they exist?

1988 was the year of debate for viruses, some said they were urban legends, others believed they existed. Because of this debate this was a free year for viruses. Viruses infected so many systems that those viruses are still prominent today. After this year there was no debate about virus exist, they were a reality.

1989: Friday the 13th and the First Hoax Virus

The Jerusalem struck. This was the first media circus that had computer viruses in the center ring. Any companies that went public with news of an infection were hassled by the media for interviews, until they regretted going public. A virus called Data crime as was discovered and caused a media frenzy.

1990: Polymorphic Viruses, Other viruses, and the EICAR

1990 saw the first fully polymorphic viruses. These viruses were completely encrypted and hard to detect, let alone disassemble. The Dark Avenger from Bulgaria started sending many viruses. This year the Whale virus became famous, not for the damage it did but for how complex it was.

1991: Rise of the scanners, Glut of viruses and the Tequila and Ameoba

It was in this year that the virus problem began to attract large companies to help make software to combat them. Symantec launched its Norton Anti-Virus; Central Point launched CPAV to name a few. The Tequila and Maltese Ameoba virus using all the current virus technology were the beginning of about twelve viruses that caused much trouble this year.

1992: Self Mutating Engine, Michelangelo scare and Virus creation software

The Dark Avenger released the Self Mutating Engine, which allowed virus authors the world over to create polymorphic viruses.

1993: More polymorphic engines

1993 was the year of polymorphic engines. A hacker group named Trident came out with Trident Polymorphic Engine. Nowhere Man, of the Nuke group distributed the Nuke Encryption Device (NED). The Dark Angel released the Dark Angel's Multiple Encryptor (DAME).

1996: Boza, Concept, Stoag

This was the year of firsts. Boza was the first virus written just for Win95 files. After Microsoft introduced the powerful macro language VBA, it did not take long for hackers to recognize this as a great medium for viruses. Concept was the first Word macro virus. And finally, Stoag became the first virus for Linux.

1998: Strange Brew and Back Orifice

Strange Brew became the first Java virus. Everyone's favorite hacker group became public this year Cult of the Dead Cow released Back Orifice to the world at large.

1999: Melissa, Tristate and Bubbleboy

Melissa was the fastest spreading virus yet. It was a combination macro virus and worm. It spread using e-mail. The Tristate virus introduced a macro virus that could infect multiple types of files; Word, Excel, and PowerPoint. Bubbleboy foiled all common beliefs; merely opening the message in OutLook or previewing it in OutLook Express activated this virus.

2000: Love Letter

The Love Letter worm became the fastest spreading worm in history, shutting down many e-mail systems in the process. Ironically this worm was human powered. A person needed to click on the attachment in the e-mail message for it to execute.

15.2.2 Why people create computer viruses?

Unlike biological viruses, computer viruses do not simply evolve by themselves. Computer viruses do not come into existence spontaneously, nor are they likely to be created by bugs in regular programs. They are deliberately created by programmers, or by people who use virus creation software. Computer viruses can only do what the programmers have programmed them to do.

Virus writers can have various reasons for creating and spreading malware. Viruses have been written as research projects, pranks, vandalism, to attack the products of specific companies, to distribute political messages, and financial gain from identity theft, spyware, and cryptoviral extortion. Some virus writers consider their creations to be works of art, and see virus writing as a creative hobby. Additionally, many virus writers oppose deliberately destructive payload routines. Many writers consider the systems they attack an intellectual challenge or a logical problem to be solved; this multiplies when a cat-and-mouse game is anticipated against anti-virus software. Some viruses were intended as "good viruses". They spread improvements to the programs they infect, or delete other viruses. These viruses are, however, quite rare, still consume system resources, may accidentally damage systems they infect, and, on occasion, have become infected and acted as vectors for malicious viruses. Apoorly written "good virus" can also inadvertently become a virus in and of itself (for example, such a 'good virus' may misidentify its target file and delete an innocent system file by mistake). Moreover, they normally operate without asking for the permission of the computer owner. Since self-replicating code causes many complications, it is questionable if a well-intentioned virus can ever solve a problem in a way that is superior to a regular program that does not replicate itself.

15.2.3 Effects of computer viruses

Some viruses are programmed to damage the computer by damaging programs, deleting files, or reformatting the hard disk. Others are not designed to do any damage, but simply replicate themselves and make their presence known by presenting text, video, or audio messages. Even these benign viruses can create problems for the computer user. They typically take up computer memory used by legitimate programs. As a result, they often cause erratic behavior and can result in system crashes. In addition, many viruses are bug-ridden, and these bugs may lead to system crashes and data loss.

CHECK YOUR PROGRESS								
(1) When was the first virus made?								
	(c) 1986 (d) 1991							
(2) Where did the first virus come from?(a) A basement in Chicago (b) A Laboratory (c) Taiwan (d) Dark Avengers								
	and spread infecting ".exe" and "com" files?Stoned(d) Jerusalem virus							
(4) What type of virus is completely encrypt	oted and hard to detect?							
	Macro (d) Trojan							
(5) When was the first fully polymorphic vir	(5) When was the first fully polymorphic virus found?							
	1990 (d) 1992							
(6) Which was the first Java virus?	(6) Which was the first Java virus?							
(a) Trisate (b) Bubbleboy (c) I	Love Letter (d) Strange Brew							
(7) In 1999, which virus was the fastest spre	7) In 1999, which virus was the fastest spreading virus?							
(a) Trisate (b) Bubbleboy (c) I								
(8) In early 2001, which was the famous com	(8) In early 2001, which was the famous computer virus?							
(a) Trisate (b) Bubbleboy (c) N	Naked wife (d) Strange Brew							
(9) What was the name of the virus that was discovered and caused the first big media frenzy?								
(a) First Hoax Virus (b) Data crime (c) M	(c) Media guarder (d) Dark							
(10)Which company had released the "Self Mutating Engine" which allowed virus authors to create polymorphic viruses?								
(a) Dark Avenger (b) Sun (c) T	Teguila (d) Microsoft							
(1) What is the background of the computer virus?								
(2) How do create a computer virus?	?) How do create a computer virus?							
(3) What are the problems arise when the vi	3) What are the problems arise when the virus infects computer?							

15.3 WHAT IS A VIRUS?

Computer virus acronym V.I.R.U.S. - Vital Information Resources Under Siege

The word virus is derived from and used in the same sense as the biological equivalent. The term "virus" is often used in common parlance to describe all kinds of malware (malicious software), including those that are more properly classified as worms or Trojans. Most popular anti-virus software packages defend against all of these types of attack. In some technical communities, the term "virus" is also extended to include the authors of malware, in an insulting sense. The English plural of "virus" is "viruses". The term "virus" was first used in an

academic publication by Fred Cohen in his 1984 paper *Experiments with Computer Viruses*, where he credits Len Adleman with coining it. However, a 1972 science fiction novel by David Gerrold, *When H.A.R.L.I.E. Was One,* includes a description of a fictional computer program called "VIRUS" that worked just like a virus (and was countered by a program called "VACCINE").

A computer virus is a program that replicates and spreads by attaching itself to other programs. When the infected program is run, the virus executes an event.

A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. Viruses can also replicate themselves. All computer viruses are manmade. Since 1987, when a virus infected ARPANET, a large network used by the Defense Department and many universities, many anti-virus programs have become available. These programs periodically check your computer system for the best-known types of viruses.

15.3.1 Basic Types of Viruses

Virus types are used as a way for people to think about the things that viruses do, but being overly dogmatic about these types can often be confusing. Take these descriptions for the value they bring, but don't assume that they are comprehensive or particularly accurate in terms of describing the potential sorts of viruses that can be encountered. Following figure-1, is showing the families and habitates of the viruses.

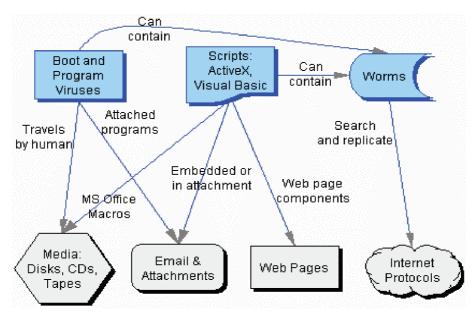


Figure-1 : Viruses - Families and Habitats)

(1) File viruses

File viruses, also known as parasitic or executable viruses, are pieces of code that attach themselves to executable files, driver files or compressed files, and are activated when the host program is run. After activation, the virus may spread itself by attaching itself to other programs in the system, and also carry out the malevolent

activity for which it was programmed. Most file viruses spread by loading themselves in system memory and looking for any other programs located on the drive. Some examples of file viruses are Randex, Meve and MrKlunky.

(2) Boot sector viruses

A boot sector virus affects the boot sector of a hard disk, which is a very crucial part. The boot sector is where all information about the drive is stored, along with a program that makes it up. By inserting its code into the boot sector, a virus guarantees that it loads into memory during every boot sequence. A boot virus does not affect files; instead, it affects the disks that contain them. Examples of boot viruses are Polyboot.B and AntiEXE.

(3) Multipartite viruses

Multipartite viruses are a combination of boot sector viruses and file viruses. These viruses come in through infected media and reside in memory. They then move on to the boot sector of the hard drive. From there, the virus infects executable files on the hard drive and spreads across the system. There aren't too many multipartite viruses in existence today, but in their heyday, they accounted for some major problems due to their capacity to combine different infection techniques. A well-known multipartite virus is Y winz.

(4) Macro viruses

Macro viruses infect files that are created using certain applications or programs that contain macros. These include Microsoft Office documents such as Word documents, Excel spreadsheets, PowerPoint presentations, Access databases and other similar application files such as Corel Draw, AmiPro etc. Since macro viruses are written in the language of the application and not in that of the operating system, they are known to be platform-independent—they can spread between Windows, Mac and any other system, so long as they are running the required application. The first macro virus was written for Microsoft Word and was discovered back in August 1995. Today, there are thousands of macro viruses in existence—some examples are Relax, Melissa.A and Bablas.

(5) Network viruses

This kind of virus is proficient in quickly spreading across a Local Area Network (LAN) or even over the Internet. Usually, it propagates through shared resources, such as shared drives and folders. Once it infects a new system, it searches for potential targets by searching the network for other vulnerable systems. Once a new vulnerable system is found, the network virus infects the other system, and thus spreads over the network. Some of the most notorious network viruses are Nimda and SQLSlammer.

(6) Email Viruses

An email virus could be a form of a macro virus that spreads itself to all the contacts located in the host's email address book. If any of the email recipients open the attachment of the infected mail, the virus spreads to the new host's address book contacts, and then proceeds to send itself to all those contacts as well. Email viruses can infect hosts even by previewing the infected email in a mail client. The most common and destructive e-mail virus is the ILOVEYOU virus.

(7) Companion virus

A **companion virus** does not have host files per se, but exploits MS-DOS. A companion virus creates new files (typically .COM but can also use other extensions such as ".EXD") that have the same file names as legitimate .EXE files. When a user types in the name of a desired program, if a user does not type in ".EXE" but instead does not specify a file extension, DOS will assume he meant the file with the extension that comes first in alphabetical order and run the virus. For instance, if a user had "(filename).COM" (the virus) and "(filename).EXE" and the user typed "filename", he will run "(filename).COM" and run the virus. Some companion viruses are known to run under Windows 95 and on DOS emulators on Windows NT systems.

(8) Logic bomb

A **logic bomb** employs code that lies inert until specific conditions are met. The resolution of the conditions will trigger a certain function (such as printing a message to the user and/or deleting files). Logic bombs may reside within standalone programs, or they may be part of worms or viruses. An example of a logic bomb would be a virus that waits to execute until it has infected a certain number of hosts. A **time bomb** is a subset of logic bomb, which is set to trigger on a particular date and/or time. An example of a time bomb is the infamous '**Friday the 13th**' virus.

(9) Stealth

Some viruses try to trick anti-virus software by intercepting its requests to the operating system. A virus can hide itself by intercepting the anti-virus software's request to read the file and passing the request to the virus, instead of the Operating System. The virus can then return an uninfected version of the file to the anti-virus software, so that it seems that the file is "clean".

15.3.2 Other malicious software

Earlier, the only way a computer was at risk was when user inserted an infected floppy. With the new age of technology, almost every computer is interconnected to the rest of the world at some point or other, so it's difficult to pinpoint the source and/or time of the infection. Besides the type of viruses we mentioned, here are some of the newer problems we face today.

(1) Trojan horses

(1.1) Trojan Horses are impostor files that claim to be something desirable but, in fact, are malicious. Rather than insert code into existing files, a Trojan horse appears to do one thing (install a screen saver, or show a picture inside an e-mail, for example) when in fact it does something entirely different, and potentially malicious, such as erase files. Trojans can also open back doors so that computer hackers can gain access to passwords and other personal information stored on a computer. For a Trojan horse to spread, it must be invited onto a computer by the user opening an email attachment or downloading and running a file from the Internet, for example.

(1.2) File-Destructive Trojans The only function of these Trojans is to destroy and delete files. They can automatically delete all the core system files on machine. The main idea behind Denial of Service (DoS) Attack Trojans is to generate a lot of Internet traffic on the victim's machine, to the extent that the Internet connection is too overloaded to let the user visit a website or download anything.

(1.3) Proxy/Wingate Trojans These types of Trojan turn the victim's computer into a proxy/wingate server. That way, the infected computer is available to the whole world to be used for anonymous access to various risky Internet services. The attacker can register domains or access pornographic Web sites with stolen credit cards or do similar illegal activities without being traced.

(1.4) **FTP Trojans** These trojans are probably the most simple, and are outdated. The only thing they do is open port 21 — the port for FTP transfers — and let everyone connect to machine. Newer versions are password-protected, so only the attacker can connect to computer.

(2) Software Detection Killers

These Trojans kill popular anti-virus/firewall programs that protect your machine, to give the attacker access to it. A Trojan could have any one or a combination of the above-mentioned functionalities.

(3) Worms

Computer Worms are viruses that reproduce and run independently, and travel across network connections. Two famous examples of worms are the MS-Blaster and Sasser worms. A **worm** is a piece of software that uses computer networks and security flaws to create copies of itself. It replicates itself to the new machine using the security flaw, and then begins scanning and replicating a new worm. Worms are programs that replicate themselves from system to system without the use of a host file. This is in contrast to viruses, which requires the spreading of an infected host file. There is a difference between how worms and viruses use the host file. Usually the worm will release a document that already has the "worm" macro inside the document. The entire document will travel from computer to computer, so the entire Effects of computer viruses.

15.3.3 How Viruses work (attack)

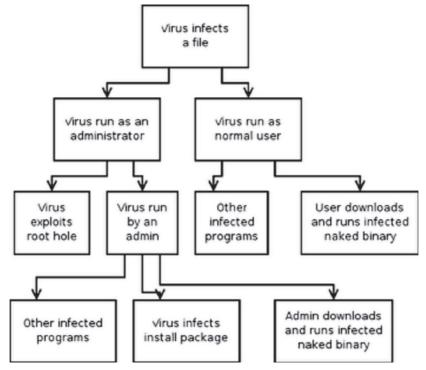
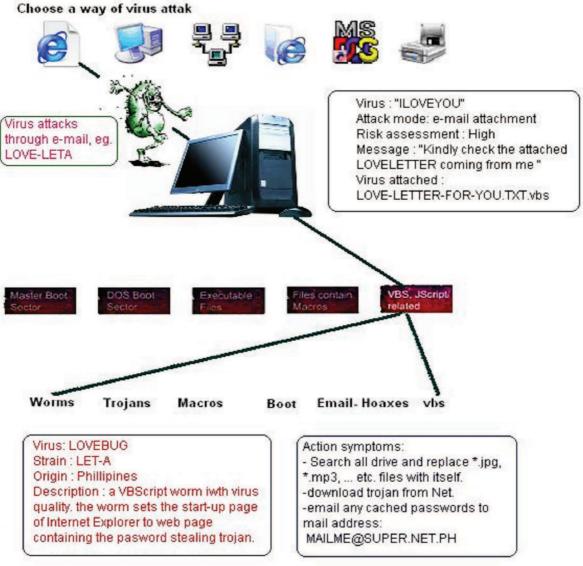


Figure 2 : Attack Tree

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Computer Viruses

Attack trees are conceptual diagrams of threats on systems and possible attacks to reach those threats. Attack tree for computer viruses. Here we assume a system such as Windows 95, where all users have full system access. All child nodes operate on OR conditions. Attack trees are multi-leveled diagrams consisting of one root, leaves, and children. From the bottom up, child nodes are conditions, which must be satisfied to make the direct parent leaf true; when the root is satisfied, the attack is complete. Only its direct child nodes may satisfy each leaf. A leaf may be the child of another leaf; in such a case, it becomes logical that multiple steps must be taken to carry out an attack. For example, consider classroom computers, which are secured to the desks. To steal one, the securing cable must be cut or the lock unlocked. The lock may be unlocked by picking or by stealing the key. Threatening, bribing, or distracting a guard may steal the key. Thus a four level attack tree can be drawn, of which one path is (Bribe Guard, Steal Key, Unlock Lock, Steal Computer). Figure-2 is showing four level of attack tree.



Above condition shows only OR conditions; however, an AND condition can be created by assuming an electronic alarm which must be disabled if and only if the cable will be cut. Rather than making this task a child node of cutting the lock, both tasks can simply reach a summing junction. Thus the path ((Disable Alarm, Cut Cable), Steal Computer) is created.

The following is an illustration of viruses attack modes, with specific example for each mode is:

- 1. Virus attacks through email, eg. LOVE-LETA.
- 2. Virus attacks through downloaded software eg. W32/QA2.
- 3. Virus attacks through computer network eg. BAT/911-B.
- 4. Virus attacks through WebPages visiting eg. Macroble.
- 5. Virus attacks through IRC eg. VBS/Stages-A.
- 6. Virus attacks through floppy disk eg. Wllop.

15.3.4 Replication strategies

In order to replicate itself, a virus must be permitted to execute code and write to memory. For this reason, many viruses attach themselves to executable files that may be part of legitimate programs. Viruses can be divided into two types, on the basis of their behavior when they are executed. Nonresident viruses immediately search for other hosts that can be infected, infect these targets, and finally transfer control to the application program they infected. Resident viruses do not search for hosts when they are started. Instead, a resident virus loads itself into memory on execution and transfers control to the host program.

(1) Nonresident viruses

Nonresident viruses can be thought of as consisting of a finder module and a replication module. The finder module is responsible for finding new files to infect. For each new executable file the finder module encounters, it calls the replication module to infect that file.

(2) Resident viruses

Resident viruses contain a replication module that is similar to the one that is employed by nonresident viruses. However, this module is not called by a finder module. Instead, the virus loads the replication module into memory when it is executed and ensures that this module is executed each time the operating system is called to perform a certain operation. For example, the replication module can be called each time the operating system executes a file. In this case, the virus infects every suitable program that is executed on the computer.

15.3.5 Host types

Viruses have targeted various types of hosts. This is a non-exhaustive list:

- Binary executable files (such as COM files and EXE files in MS-DOS, Portable Executable files in Microsoft Windows, and ELF files in Linux).
- Tolume Boot Records of floppy disks and hard disk partitions.
- The master boot record (MBR) of a hard disk.
- General-purpose script files (such as batch files in MS-DOS and Microsoft.
 Windows, VBScript files, and shell script files on Unix-like platforms).
- The Application-specific script files (such as Telix-scripts).
- Tocuments that can contain macros (such as Microsoft Word documents).

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CHECK YOUR PROGRESS

(1)	Generally speaking, how man	y TYPES are co	nputer viruses divi	ided into?				
	(a) Love-letter and naked-wife	(b) Love-letter	and naked-wife					
	(c) Love-letter and naked-wife	(d) Hoax mess	age					
(2)	What is a computer virus?							
	(a) A self-replicating program							
	(b) A piece of code that tricks the	ne user						
	(c) A hoax message							
	(d) A the computer virus usually in		er program files, take	es over the functionality of the				
	program and replicates itself							
(3)	What is a Trojan horse?							
	(a) A piece of code that tricks the user							
	(b) A piece of code that makes t	1	ast					
	(c) A piece of code that is self-re	1 0	C1					
	(d) A piece of code that inserts it	1	e					
(4)	Before the Internet became p viruses?	oopular, what wa	s the major spread	ling medium of computer				
	(a) Computer books (b) d	liskettes	(c) e-mail	(d) software products				
(5)	Which of the following may in	dicate a compute	er virus-infection?					
	(a) Less available memory than it	t should						
	(b) A disk or volume name has b	een changed						
	(c) Unknown programs or files h	nave been created						
	(d) all of above							
(6)	Computer virus acronym is		•••••	•••••				
Describe [Type Questions?							
(1)	What is a Computer Virus?							
(2)) What is a Computer Virus?) Illustrate how does a virus infect computer?							
(3)	What are the most common t	ypes of viruses a	nd Host types?					
(4)	What are the replication stra	tegies of the viru	s?					

15.4 VIRUS DETECTION

15.4.1 Getting a Virus

It seems to be a common belief that viruses are spread by games, by shareware. The truth is more complex. Remember how the most common sort of virus, Boot Sector Viruses, work a physical floppy disk has to be involved, and there doesn't need to be any software on it.

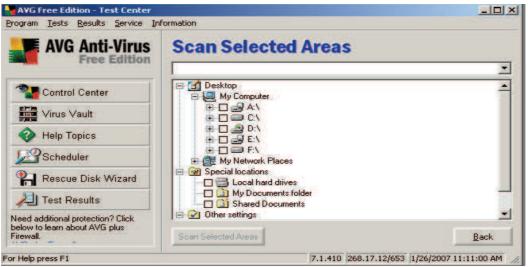
15.4.2 Warning Signs that MAY indicate user have a Virus

- 1. Programs taking longer to load.
- 2. Programs (such as MS Word 97 or Quake) crashing for no reason.
- 3. The hard disk being accessed more often.
- 4. Files that disappear for no reason and/or frequent file corruption.
- 5. Devices that once worked now refusing to work even when no changes were made to the configuration.

15.4.3 Steps to Detect if a Virus is Present

- 1. Boot from the hard disk of the computer suspected to be infected.
- 2. Format floppy disk in the A: drive.
- 3. CopyAUTOEXEC.BAT and CONFIG.SYS from C: to this disk.
- 4. Copy all files loaded in AUTOEXEC.BAT and CONFIG.SYS to this disk.
- 5. Copy a few COM and EXE files to this disk, preferably programs that you often execute.
- Following examples are to showing how can detect the virus from the computer.
- 1. Figures-3 show how user can detect virus from computer using AVG Anti-Virus





Figures 3 : Detect Virus, AVG Anti-Virus

- 1. Figures-4 show User can scan files for viruses using McAfee virus scan
 - (a) Use the START => Programs => Network Associates => McAfee Virus scan to start Virus Scan
 - (b) Select the folder you want to scan by using the Browse... button

🔍 McAfee VirusScan: C:\	
<u>File T</u> ools <u>H</u> elp	
Where & What Action Report Scan jn: H:\ Browse Include subfolders Include subfolders Include subfolders Compressed files Program files only Extensions	<u>S</u> can Now Stop <u>N</u> ew Scan
McAfee VirusScan: C:\ File Iools Help Where & What Action Report When virus is found: Image: Clean infected files automatically Image: Clean infected files automatically Description This option instructs VirusScan to clean files automatically. If VirusScan is unable to clean or has insufficient rights to act on the file, the file will be logged as infected.	Stop New Scan

Figures-4 : Detect Virus, McAfee Virus scan

15.4.4 Highest Risk Operating Systems

Inadequate security operating systems: following table-1 is showing the highest risk operating systems

			0	I	0 1			
57 %	47 %	37 %	27 %	17 %	14 %	14 %	14 %	14 %
DOS	Macin tosh	Wind ows		LAN Manager	Net Ware			Net Ware

Table-1:Highest risk operating system

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CHECK YOUR PROGRESS

- 1. What are the symptoms and indications of a virus infection?
- 2. What steps should be taken in diagnosing and identifying viruses?
- 3. How Do Scan Files for Viruses?
- 4. What is the inadequate security of different operating systems?

15.5 VIRUS PROTECTION OR VACCINATION

There are many ways of prevention from virus those are listed below such as home user, business users, Anti-virus.

15.5.1 Home Users

There are Steps to ensure safety:

- 1. Install an anti-virus program.
- 2. Update the program. Check the company's web site, new viruses are always being made.
- 3. Create an anti-virus emergency disk so user can get a clean reboot if ever needed.
- 4. Use the security settings in browser
- 5. Update software programs, as virus writers look for holes in system.
- 6. Contact software makers they typically do not send e-mail out to user. If you get e-mail, it's probably a hoax.
- 7. Don't open attached e-mail files even if user knows the sender, only open it if user is expecting it?

The Most Popular Anti-virus Software for the Home

- 🖙 Dr Solomon's Anti-Virus Toolkit
- 🖙 F-PROT Anti-Virus Toolkit
- InoculateIT
- CAfee Virus Scan
- The Norton Anti-Virus

15.5.2 Business Users

The most popular defenses against viruses and people breaking in are firewall protection. There are many companies, which make firewall software, below are the Norton version.

(1) Norton Anti-Virus Solution Suite

The Norton Anti-Virus Solution Suite is the MAXIMUM virus protection for all corporate environments. Every company is vulnerable to viruses from at least one entry point, the desktop; but most companies today are vulnerable at multiple entry points: desktop, network server, Internet e-mail gateway and firewall.

(2) Desktop and Notebook Protection

The anti-virus tools deployed by the organization must protect desktops, notebooks and workstations against all sources of potential virus threats including - - Internet downloads, floppy disks, e-mail attachments, shared files, compressed files, CD-ROM's and networked hard disks.

(3) Network Server and Groupware Protection.

The anti-virus tools used by an organization must provide real-time, scheduled and on-demand scanning

to protect against transmissions within servers and workgroups running Novell NetWare, Windows NT Server, Microsoft Exchange and Lotus Notes.

(4) Internet E-mail Gateway and Firewall Protection.

Administrators should be able to route file downloads, uploads and Internet e-mail messaging traffic through the firewall and SMTP server, where they may be scanned for viruses.

15.5.3 Anti-Virus Software:

There is lots of Anti-Virus software available in the market those are listed below.

(1) Network Monitoring Tools are

(1.1) Argus – Argus is a network-monitoring tool that uses a client-server model to capture data and associate it into "transactions." The tool provides network-level auditing.

(1.2) Swatch – The Simple WATCHER program, is an easily configurable log file filter/monitor. Swatch monitors log files and acts to filter out unwanted data and take one or more user-specified actions based on patterns in the log.

(2) Authentication/Password Tools

(2.1) Crack – Many system administrators run Crack as a regular system administration procedure and notify account owners who have "crackable" passwords.

(2.2) Shadow passwords – Under a shadow password system, the /etc/password file does not have encrypted passwords in the password field. Instead, the encrypted passwords are held in a shadow file that is not world readable.

(3) Service-Filtering Tools

(3.1) TCP/IP wrapper program - The TCP/IP wrapper program provides additional network logging information and gives a system administrator the ability to deny or allow access from certain systems or domains to the host on which the program is installed.

(4) Tools to Scan Hosts for Known Vulnerabilities

(4.1) ISS (Internet Security Scanner) – ISS is a program that will interrogate all computers within a specified IP address range, determining the security posture of each with respect to several common system vulnerabilities.

(4.2) SATAN (Security Administrator Tool for Analyzing Networks)– SATAN is a testing and reporting tool that collects a variety of information about networked hosts. SATAN is available from many sites.

(5) Multi-Purpose Tools

(5.1) COPS (Computer Oracle and Password System) – A COP is a publicly available collection of

programs that attempt to identify security problems in a UNIX system. COPS does not attempt to correct any discrepancies found; it simply produces a report of its findings.

(6) Integrity-Checking Tools

(6.1) **Tripwire-** Tripwire checks file and directory integrity; it is a utility that compares a designated set of files and directories to information stored in a previously generated database.

Other Tools

1. lsof- lsof lists open files and what UNIX processes have them open.

2. ifstatus - The ifstatus program can be run on UNIX systems to identify network interfaces that are in debug or promiscuous mode.

3. Smrsh- The smrsh program can help protect against a vulnerability that can allow unauthorized remote or local users to execute programs as any system user.

CHECK YOUR PROGRESS

- 1. How Do Scan Files for Viruses?
- 2. What Anti-Virus Software is Available?
- 3. How do anti-virus programs work?

15.6 SUMMARY

There are lots of viruses in the world and new viruses are coming up every day. There are new anti-virus programs and techniques developed too. It is good to be aware of viruses and other malware and it is cheaper to protect you environment from them rather then being sorry. There might be a virus in your computer if it starts acting differently. There is no reason to panic if the computer virus is found. It is good to be a little suspicious of malware when you surf in the Internet and download files. Some files that look interesting might hide a malware. A computer virus is a program that reproduces itself and its mission is to spread out. Most viruses are harmless and some viruses might cause random damage to data files. A Trojan horse is not a virus because it doesn't reproduce. The Trojan horses are usually masked so that they look interesting. There are Trojan horses that steal passwords and formats hard disks. Marco viruses spread from applications, which use macros. Macro viruses spreads fast because people share so much data, email documents and use the Internet to get documents. Macros are also very easy to write. Some people want to experiment how to write viruses and test their programming talent. At the same time they do not understand about the consequences for other people or they simply do not care. Viruses mission is to hop from program to other and this can happen via floppy disks, Internet FTP sites, newsgroups and via email attachments. Viruses are mostly written for PC-computers and DOS environments. Viruses are not any more something that just programmers and computer specialist have to deal with. Today everyday users have to deal with viruses.

15.7 GLOSSARY

Malware or malicious software is software designed to infiltrate or damage a computer system without the owner's informed consent

Mydoom, also known as W32.MyDoom@mm, Novarg, Mimail.R and Shimgapi, is a computer worm affecting Microsoft Windows. It was first sighted on January 26, 2004. It became the fastest-spreading e-mail worm ever (as of January 2004).

H.A.R.L.I.E., also referred to by the proper name HARLIE, is an acronym for Human Analog Replication, Lethetic Intelligence Engine

The **Blaster worm** (also known as **Lovsan** or **Lovesan**) was a computer worm that spread on computers running the Microsoft operating systems, Windows XP and Windows 2000, during August 2003.

The **Sasser** is a computer worm that affects computers running vulnerable versions of the Microsoft operating systems Windows XP and Windows 2000

A **boot sector** is a sector of a hard disk, floppy disk, or similar data storage device that contains code for bootstrapping programs (usually, but not necessarily, operating systems) stored in other parts of the disk.

A **boot disk** is a removable digital data storage medium, normally read-only, that can load (boot) an operating system or utility program

A **filename extension** is a suffix to the name of a computer file applied to show its format. It is commonly used to infer information about what sort of data might be stored in the file.

A **command line interface** or **CLI** is a tool for interacting with computers, often using a text terminal. Commands are entered as lines of text (that is, sequences of typed characters) from a keyboard, and output is also received as text.

A macro virus is a virus that is written in a macro language.

A hacker is often someone who creates and modifies computer software and computer hardware, including computer programming, administration, and security-related items.

A modem (from modulate and demodulate) is a device that modulates an analogue carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information.

A **Bulletin Board System** or **BBS** is a computer system running software that allows users to dial into the system over a phone line and, using a terminal program, perform functions such as downloading software and data, uploading data, reading news, and exchanging messages with other users.

Shareware is a marketing method for computer software

A master boot record (MBR) is the first sector ("sector zero") of a data storage device such as a hard disk. It is sometimes used for bootstrapping operating systems,

A **batch file** is a text file containing a series of commands intended to be executed by the command interpreter. When a batch file is run, the shell program (usually COMMAND.COM or cmd.exe) reads the file and executes its commands, normally line-by-line.

CIH, also known as Chernobyl or Spacefiller, is a computer virus written by Chen Ing Hau of Taiwan.

BIOS, in computing, stands for **Basic Input/Output System** also incorrectly known as **Basic Integrated Operating System**. BIOS refers to the software code run by a computer when first powered on.

Polymorphic code is code that mutates while keeping the original algorithm intact. This technique is sometimes used by computer viruses, shellcodes and computer worms to hide their presence.

Encryption is the process of obscuring information to make it unreadable without special knowledge, sometimes referred to as scrambling.

A **macro** in computer science is an abstraction, that defines how a certain input pattern is replaced by an output pattern according to a defined set of rules.

Antivirus software consists of computer programs that attempt to identify, thwart and eliminate computer viruses and other malicious software (malware).

The precursor to the Internet, **ARPANET** was a large wide-area network created by the United States Defense Advanced Research Project Agency (ARPA).

Database is a collection of records or information which is stored in a computer in a systematic (i.e. structured) way, so that a computer program can consult it to answer questions.

15.8 FURTHER READINGS

- 1. Lammer V., Computer Viruses, Virus Bulletin '93
 - 2. Helenius M., Computer viruses in Finland A questionnaire survey, University of Tampere 1994
 - 3. Sudduth A., The What, Why, and How of the 1988 Internet Worm, 1988

15.9 ANSWER TO THE SELF-LEARNING EXERCISE

Answer to the Check your progress 15.2

Objective Questions

1.(c) 2. (b) 3. (d) 4. (a) 5. (c) 6. (d) 7. (a) 8.(d) 9.(b) 10.(a)

Answer to the descriptive type questions

1. A program called "*Elk Cloner*" is credited with being the first computer virus to appear "in the wild" — that is, outside the single computer or lab where it was created. Written in 1982 by Rich Skrenta, it attached itself to the Apple DOS 3.3 operating system and spread by floppy disk.

2. They are deliberately created by programmers, or by people who use virus creation software. Computer viruses can only do what the programmers have programmed them to do.

3. Some viruses are programmed to damage the computer by damaging programs, deleting files, or reformatting the hard disk. Others are not designed to do any damage, but simply replicate themselves and make their presence known by presenting text, video, or audio messages. **306**

Unit-XV

Answer to the Check Your Progress 15.3

Objective Type Questions

1.(d) 2. (d) 3. (a) 4. (d) 5. (d)

6. V.I.R.U.S. - Vital Information Resources Under Siege

Answer to the Descriptive Type Questions

- 1. A computer virus is a program that replicates and spreads by attaching itself to other programs. When the infected program is run, the virus executes an event.
- 2. The following is an illustration of viruses attack modes, with specific example for each mode is:
 - 1. Virus attacks through email, eg. LOVE-LETA.
 - 2. Virus attacks through downloaded software eg. W32/QA2.
 - 3. Virus attacks through computer network eg. BAT/911-B.
 - 4. Virus attacks through WebPages visiting eg. Macroble.
 - 5. Virus attacks through IRC eg. VBS/Stages-A.
 - 6. Virus attacks through floppy disk eg. Wllop.
- 3. Viruses have targeted various types of hosts. This is a non-exhaustive list:
 - @ Binary executable files (such as COM files and EXE files in MS-DOS, Portable
 - The Executable files in Microsoft Windows, and ELF files in Linux).
 - Tolume Boot Records of floppy disks and hard disk partitions.
 - The master boot record (MBR) of a hard disk.
 - General-purpose script files (such as batch files in MS-DOS and Microsoft Windows, VBScript files, and shell script files on Unix-like platforms).
 - P Application-specific script files (such as Telix-scripts).
 - Tocuments that can contain macros (such as Microsoft Word documents).
- 4. Viruses can be divided into two types, on the basis of their behavior when they are executed. Nonresident viruses immediately search for other hosts that can be infected, infect these targets, and finally transfer control to the application program they infected. Resident viruses do not search for hosts when they are started. Instead, a resident virus loads itself into memory on execution and transfers control to the host program

Answer to the Check Your Progress 15.4

- 1. Warning Signs that MAY indicate user have a Virus
 - 1. Programs taking longer to load.
 - 2. Programs (such as MS Word 97 or Quake) crashing for no reason.
 - 3. The hard disk being accessed more often.

- 4. Files that disappear for no reason and/or frequent file corruption.
- 5. Devices that once worked now refusing to work even when no changes were made to the con figuration.
- 2. Steps to Detect if a Virus is Present
 - 1. Boot from the hard disk of the computer suspected to be infected.
 - 2. Format floppy disk in the A: drive.
 - 3. CopyAUTOEXEC.BAT and CONFIG.SYS from C: to this disk.
 - 4. Copy all files loaded in AUTOEXEC.BAT and CONFIG.SYS to this disk.
 - 5. Copy a few COM and EXE files to this disk, preferably programs that user often executes.
- 3. User can scan files for viruses using McAfee virus scan
 - (a) Use the START => Programs => Network Associates => McAfee Virus scan to start Virus Scan
 - (b) Select the folder you want to scan by using the Browse... button
- 4. Inadequate security operating systems: following table-1 is showing the highest risk operating systems

Table-1: Highest Risk Operating System

57 %	47 %	37 %	27 %	17 %	14 %	14 %	14 %	14 %
DOS	Macintosh	Windows	OS/2	LAN Manager				Net Ware

Answer to the Check Your Progress 15.5

- 1. There are Steps to ensure safety:
 - 1. Install an anti-virus program.
 - 2. Update the program. Check the company's web site, new viruses are always being made.
 - 3. Create an anti-virus emergency disk so user can get a clean reboot if ever needed.
 - 4. Use the security settings in browser
 - 5. Update software programs, as virus writers look for holes in system.
 - 6. Contact software makers they typically do not send e-mail out to user. If you get e-mail, it's probably a hoax.
 - 7. Don't open attached e-mail files even if user knows the sender, only open it if user is expecting it?
- 2. The Most Popular Anti-virus Software for the Home
 - 🖙 Dr Solomon's Anti-Virus Toolkit
 - 🖙 F-PROT Anti-Virus Toolkit
 - ThoculateIT

- Contraction McAfee Virus Scan
- Sorton Anti-Virus
- 3. (a) Norton Anti-Virus Solution Suite

The Norton Anti-Virus Solution Suite is the MAXIMUM virus protection for all corporate environments. Every company is vulnerable to viruses from at least one entry point, the desktop; but most companies today are vulnerable at multiple entry points: desktop, network server, Internet e-mail gateway and firewall.

(b) Desktop and Notebook Protection

The anti-virus tools deployed by the organization must protect desktops, notebooks and workstations against all sources of potential virus threats including - - Internet downloads, floppy disks, e-mail attachments, shared files, compressed files, CD-ROM's and networked hard disks.

(c) Network Server and Groupware Protection.

The anti-virus tools used by an organization must provide real-time, scheduled and on-demand scanning to protect against transmissions within servers and workgroups running Novell NetWare, Windows NT Server, Microsoft Exchange and Lotus Notes.

(d) Internet E-mail Gateway and Firewall Protection.

Administrators should be able to route file downloads, uploads and Internet e-mail messaging traffic through the firewall and SMTP server, where they may be scanned for viruses.

SOLVED QUESTIONS

1. What Are The Most Dangerous Types of Attachments?

Ans. The following file extensions show some common file types that can contain executable instructions. EXE (executable file), BAT (batch file), COM (command file), DOC (MS Word documents containing macros), PIF (program information file), SCR (screen saver file), SHS (scrap object file), VBE (visual basic script file), VBS (visual basic script file), WPD (WordPerfect documents containing).

2. How do viruses work?

Ans. Some viruses that are more sophisticated, such as worms, can replicate and send themselves automatically to other computers by controlling other software programs, such as an e-mail sharing application. Certain viruses, called Trojans, can falsely appear as a beneficial program to coax users into downloading them. Some Trojans can even provide expected results while quietly damaging your system or other networked computers at the same time.

3. How do viruses spread?

Ans. When user execute program code that's infected by a virus, the virus code will also run and try to infect other programs, either on the same computer or on other computers connected to it over a network. When user share a copy of an infected file with other computer users, running the file may also infect their computers; and files from those computers may spread the infection to yet more computers. Some viruses, known as 'multipartite' viruses, can spread both by infecting files and by infecting the boot areas of floppy disks.

4. What is a Trojan horse program?

Ans. A type of program that is often confused with viruses is a 'Trojan horse' program. This is not a virus, but simply a program (often harmful) that pretends to be something else. Simply downloading a file to computer won't activate a virus or Trojan horse; user has to execute the code in the file to trigger it. This could mean running a program file, or opening a Word/Excel document in a program (such as Word or Excel) that can execute any macros in the document.

5. What's the story on viruses and E-mail?

Ans. User can't get a virus just by reading a plain-text E-mail message or Usenet post. What user has to watch out for are encoded messages containing embedded executable code (i.e., JavaScript in an HTML message) or messages that include an executable file attachment (i.e., an encoded program file or a Word document containing macros).

15.10 UNIT-END QUESTIONS

- (1) What does antiviral software do?
- (2) What are the main types of PC irses?
- (3) What is a stealth virus?
- (4) What is the best way to remove a virus?
- (5) Is it possible to protect a computer system with only software?
- (6) What is the best anti-virus program?
- (7) Do local area networks (LANs) help to stop viruses or do they facilitate their spread?
- (8) Can viruses spread from one type of computer to another?
- (9) Is it really possible to use a computer virus for something useful?

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