LAB MANUAL

V1.1 Spring 2024

Application of ICT

Table of Contents

Week 01. Lab 1: Create Professional Document

Lab 1: Introduction to Microsoft Word and PowerPoint

1. Introduction

MS Word enables you to write letters, reports, memos and much, much more quickly and efficiently. It will also enable you to print the documents out and store them for future reference, modifying or altering them as youA wish.

In this lab you will learn the basic working of Microsoft PowerPoint. Like MS Word, MS PowerPoint is a part of Microsoft Office Suite and there are several features that you may find similar to MS Word. Microsoft PowerPoint is a software product used to perform computer-based presentations. Microsoft PowerPoint is a part of Microsoft Office package that creates and plays presentations. There are several features that you may find similar to MS Word. We will however, concentrate only on those features that are specific to MS PowerPoint.

2. Activity Time boxing

Table 1.1: Activity Time Boxing

Task No.	Activity Name	Activity time	Total Time
3	Quiz	25 min	25 min
7.2	Setting-up Microsoft Word	5 min	5 min
7.3	Walkthrough Tasks	2-3 min	60 min
8	Practice tasks	30 min	60 min

3. Quiz [Expected time = 25 minutes]

4. Objective

- Use of templates to prepare reports
- Learning about writing styles
- Acquiring knowledge about References tab and its different options
- Getting working knowledge about inserting figures and tables in a document
- To create the first presentation
  - Formatting Text boxes
  - Basic Slide design and layout
  - Inserting multimedia such as graphics, animation and sound in the presentation
- To Manage Slide Show

5. Concept Map

As mentioned in the introduction in this lab you will learn about insert, references and view tabs and also the different options within these tabs. Insert tab is useful to represent your ideas in graphical and tabular form. It can also be used to add mathematical equations and geometrical symbols. You can add Table of contents in your document by using reference tab. View tab provides you the ability to view the document in different layout.

A PowerPoint presentation is a good way to convey pieces of information, usually in the form of an outline, to a large audience. Generally, PowerPoint presentations are appealing to users because they are easy to create and edit and generally small enough to fit onto a CD or a USB You may think about various scenarios in which a presentation is made: in a lecture hall while teaching the students, marketing a product to sell, explaining a new scientific concept, etc.

Difference between a document and a presentation

You may recall various font and font size that you have practiced during the MS Word Lab. As presentations are projected to a group of people, font sizes are larger than for print documents (typical font sizes are 24 to 36 points). The large font sizes limit the content of an individual slide, so the content for each slide should be carefully selected. Points are often made with abbreviated, incomplete sentences. Complete paragraphs are even rarer. A single slide often makes a single point. Separate slides are required to integrate the single points made on other slides.

Following are a few advantages of using PowerPoint for presentations.

- PowerPoint will help students to present their assignments and projects
- PowerPoint in the lecture halls is an effective way of presenting teaching material to students.
- PowerPoint can be used to create interactive presentations containing text, art, animation, and audio and video elements

6. Homework before Lab

6.1 MS Office Installation

Copy the MS office setup from the \\172.16.0.2\softwares$\Office2019_1910_12130.20272_x64\Setup. Try to install it at home. Open MS word from the start menu and try to do the following task. For opening MS word, you can also refer to section 6 of this document.

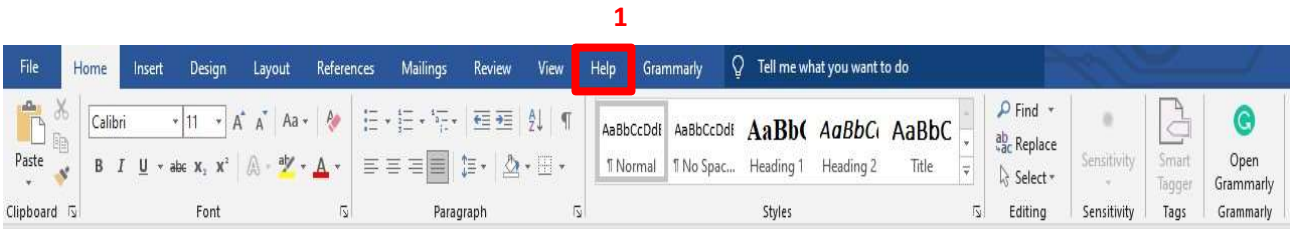


Figure 1. 1

1. Click on the Help tab to go to Microsoft Office Help as shown in **Figure 1. 1**. The Office Help is really good. After opening the help try to search the shortcut key for following tasks in MS Word.

- Create a new document of the same type as the current or most recent document
- Open a document
- Close a document

- Save a document

7. Procedure & Tools [Expected time = 5 min]

7.1 Tools

- Desktop Computer
- Microsoft Windows operating system, XP or any latest Edition
- Microsoft Word
- Microsoft PowerPoint

7.2 Setting-up Microsoft Word 2007

1. Click on start menu > type "word" > select "open" as shown in **Figure 1. 2**.

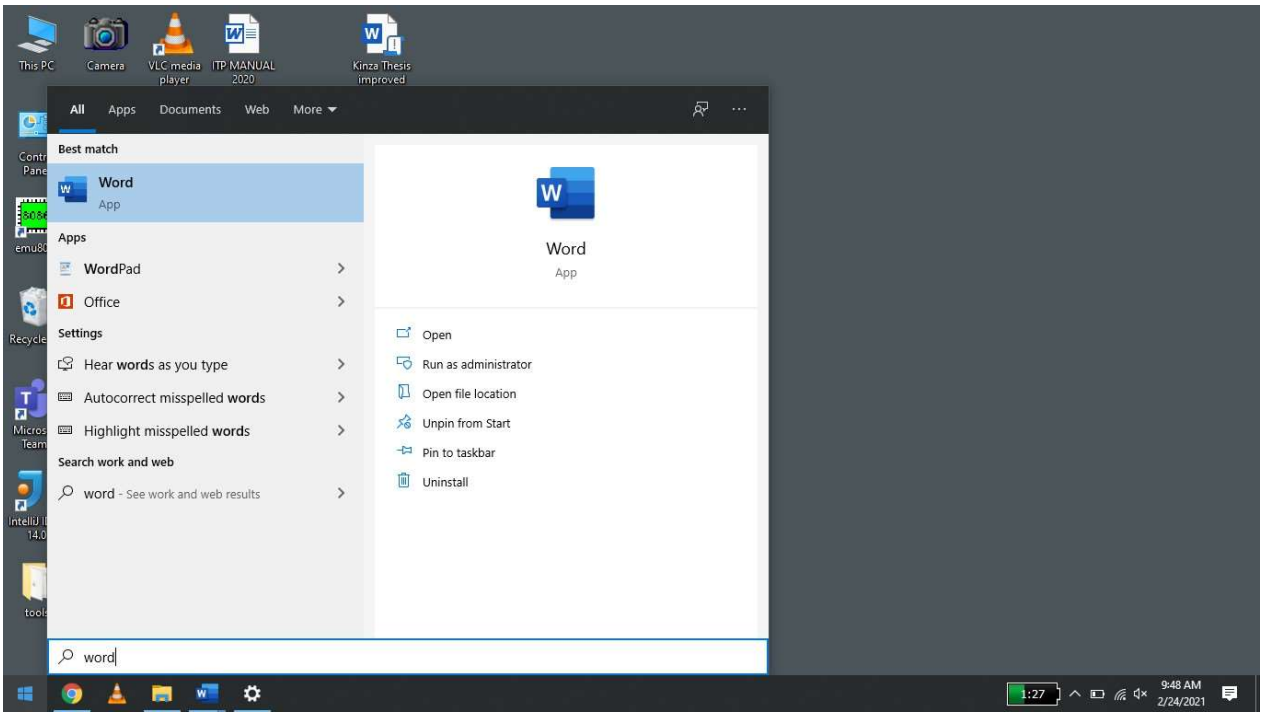


Figure 1. 2: Start Menu to open MS Word

7.2.1 Walk Through Task for MS Word [Expected time = 30 minutes]

This section is designed such a way that you can complete the following tasks independently. However, if there is any ambiguity you can refer it to the lab instructor.

Templates

Templates are a collection of styles and formatting settings, and they can save you a ton of time when creating a new document. You can find templates for almost any type of document, from flyers to resumes, and birthday cards to banners. You can also create your own templates to save yourself from having to remake documents from scratch.

Go to File menu and click 'New'. Select template you want to use or search for the required templates as shown in **Figure 1. 3**.

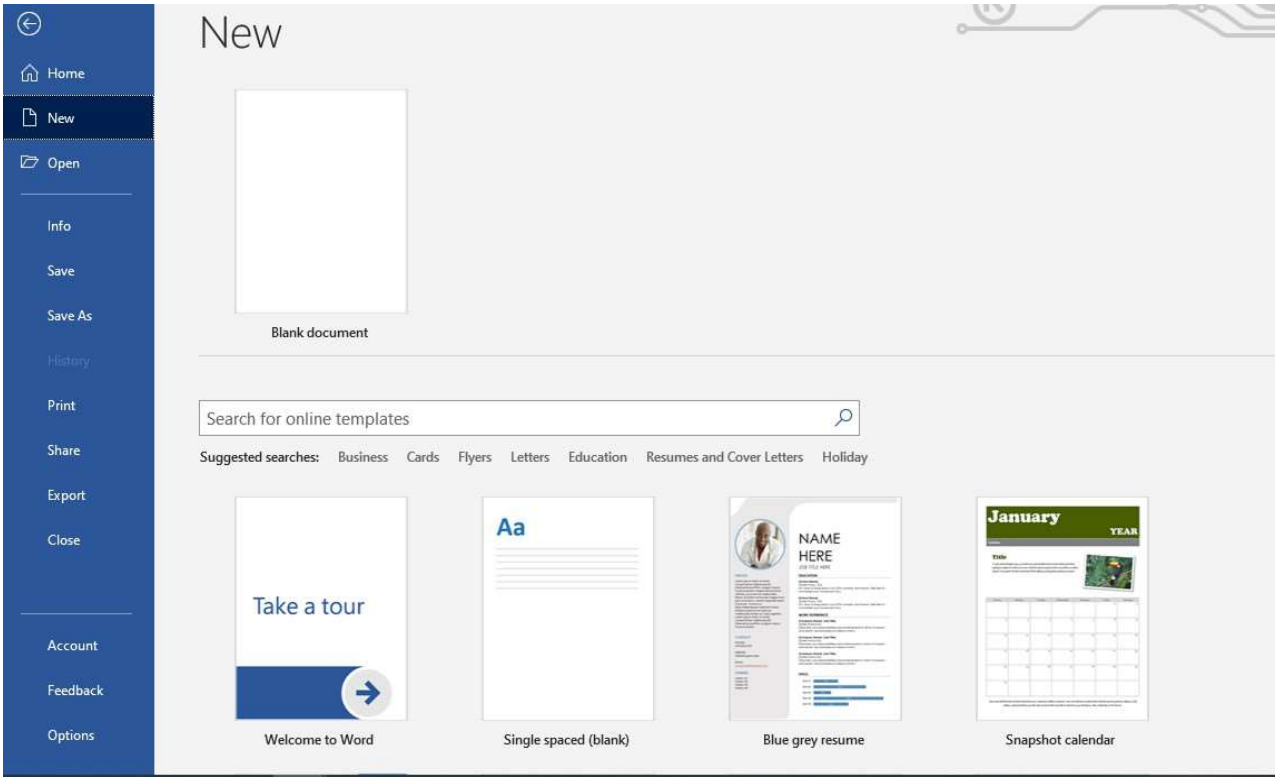


Figure 1. 3: Insert Template

Search 'Project status report 'and select one as shown in **Figure 1. 4**.

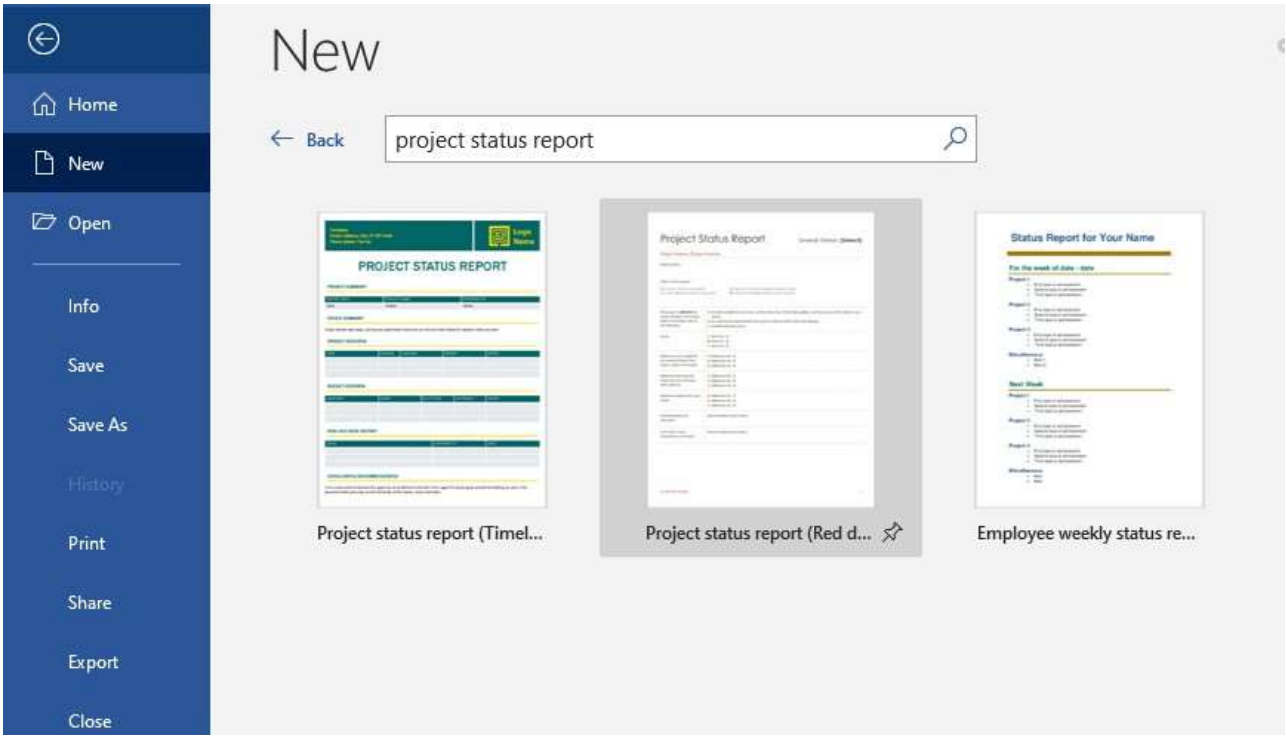


Figure 1. 4

Click “create” as shown in **Figure 1. 5**.

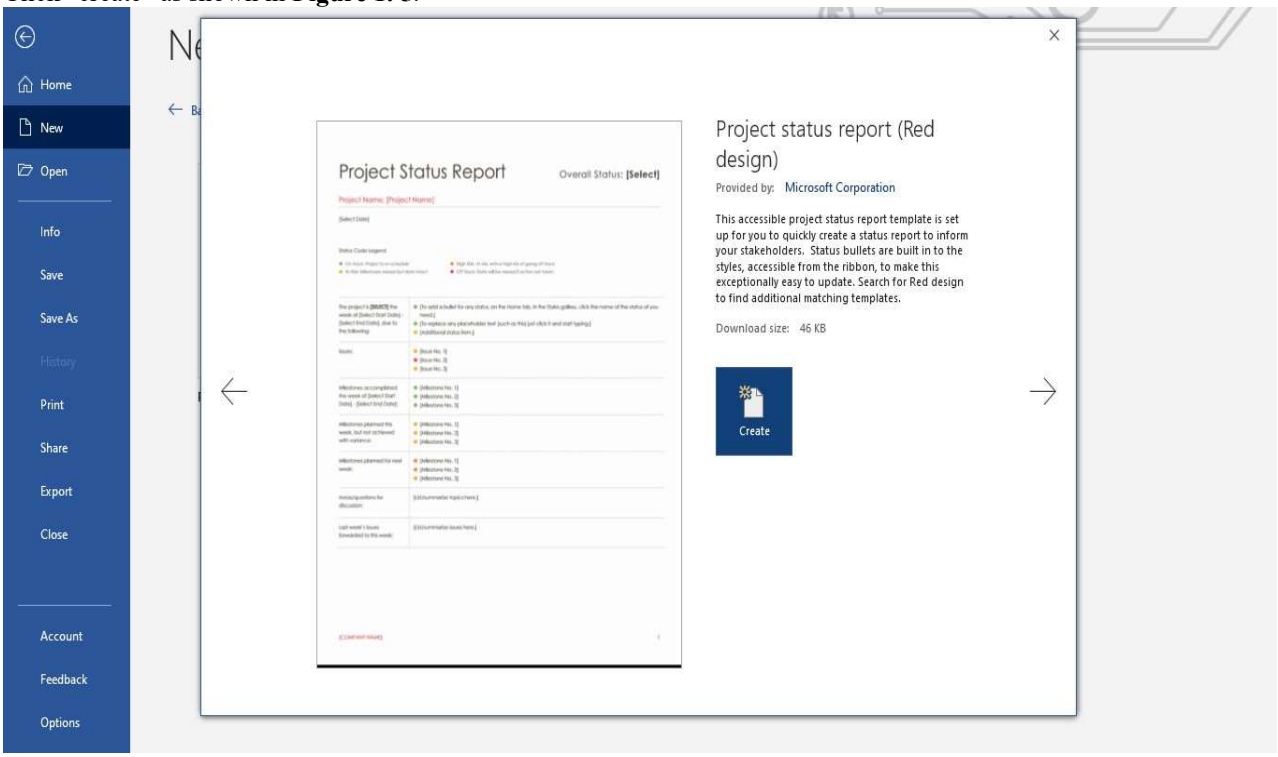


Figure 1. 5

Insert Cover Page:

Pages group is in the far left of the insert tab. You can insert from the three categories for pages which are; Cover Page, Blank Page, and Page Break as shown in **Figure 1. 6**. These features are useful if you are creating a professional or long document.

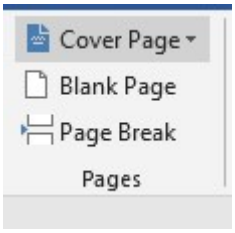


Figure 1. 6: Pages Group

Cover Page is the title page of the document. Word provides a number of preformed cover pages to give your document a professional look.

Cover page Exercise: Creating a Cover Page

1. Click the **Insert** tab to make it the active tab as shown in **Figure 1. 7**.

Figure 1. 7

2. To open the **Built-in Cover Page Gallery**, click the **down arrow** to the right of **Cover Page** in the **Pages** group on the **Insert** tab as shown in **Figure 1. 8**.

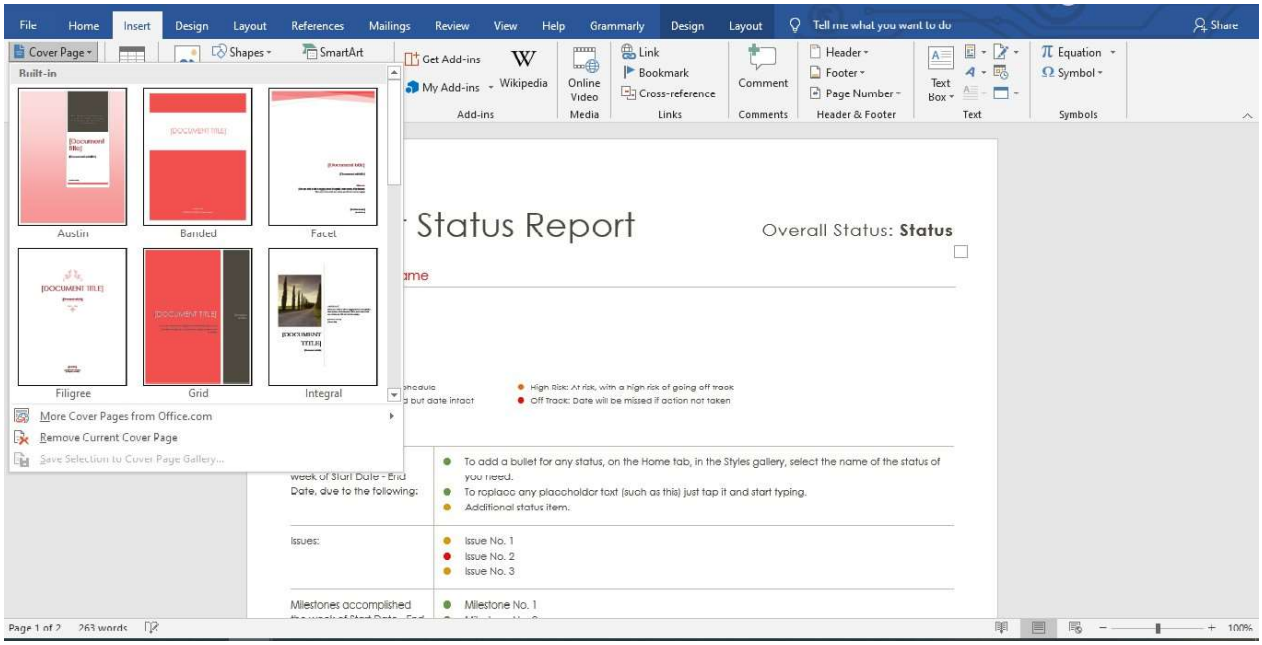


Figure 1. 8: Insert Cover Page

3. Scroll down and **click** the desired cover for the document from the **Cover Page Gallery**. Use the scroll bar or scroll arrow to see all the cover page choices.
4. A Cover page will be added to your document.

Style Group

Figure 1. 9: Style Group

The fourth group on the Home ribbon is the **Style** group as shown in **Figure 1. 9**. Styles are a collection of formatting options that you can apply to text. When you use styles to format your document, you can quickly and easily apply a set of formatting choices consistently throughout your document.

A **style** is a set of **formatting characteristics**, such as font name, size, color, paragraph alignment and spacing. Some styles even include borders and shading. For example, instead of taking three separate steps

to format your heading as 16-point, bold, Cambria, you can achieve the same result in one step by applying the built-in Heading 1 style. You do not need to remember the characteristics of the Heading 1 style. For each heading in your document, you just click in the heading (you don't even need to select all the text), and then click **Heading 1** in the gallery of styles.

Tables

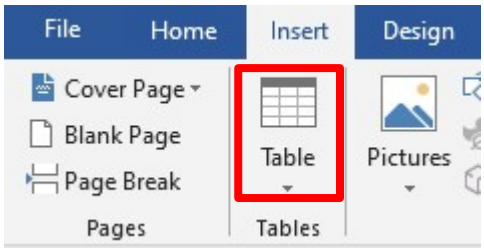


Figure 1: Table

Word provides tables option for placing data in a more formal way.

1. Click on table in insert tab. (**Figure 1. 7**)
2. To add Rows and Columns, select top to bottom for rows & left to right for columns (Figure 1. 10)
3. Click to apply when happy with the selection.
4. Click on the box to enter text.
5. Observe the new tab opened "Table Tools". You can use this tool to apply further formatting to your created table.

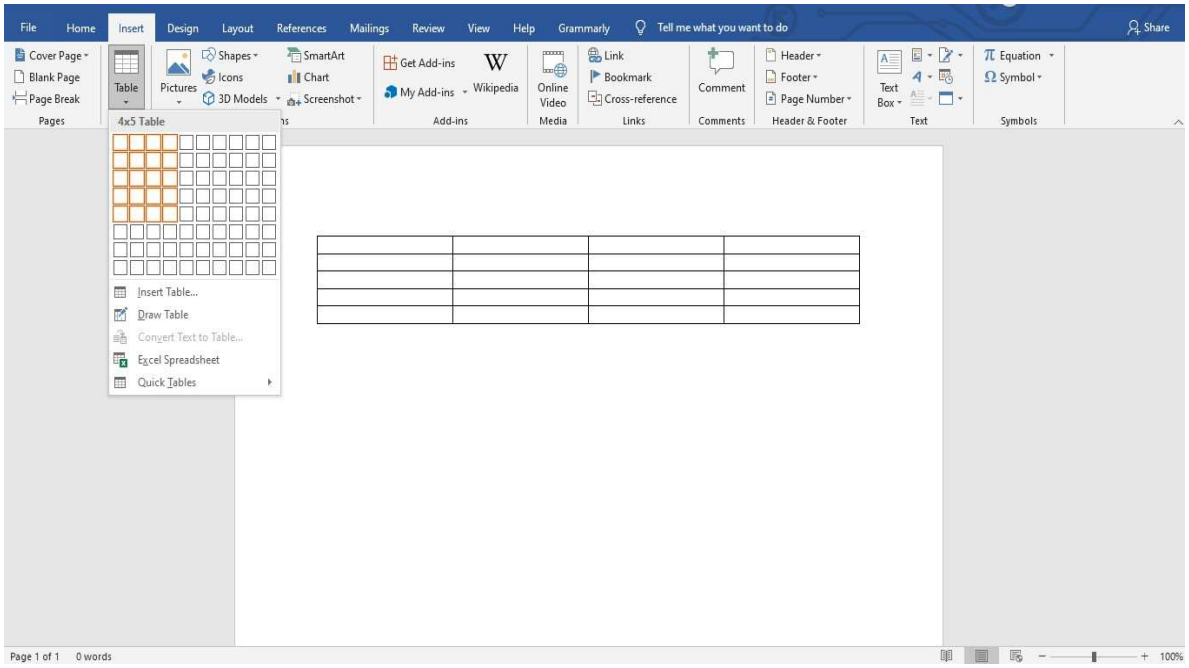


Figure 1. 10: Insert Table

Illustrations

Using Illustrations, you can add pictures of all types and styles to your document as shown in **Figure 1. 11**.

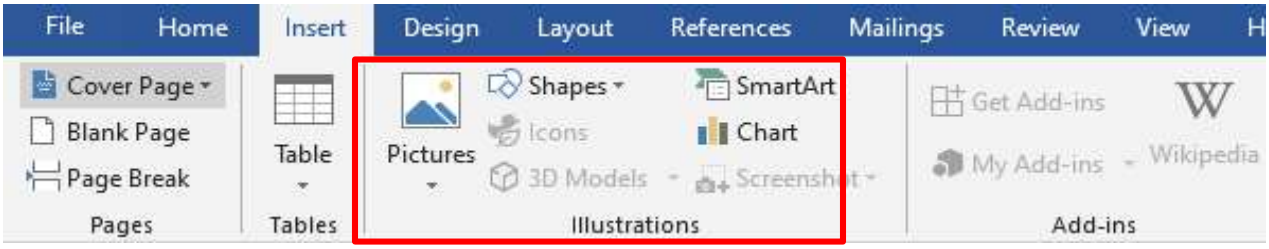


Figure 1. 11: Illustrations

Picture

The first selection in Illustrations is Insert a picture from a file. When you click on this a window will open to browse to a photograph or other picture you have saved on your computer as shown in **Figure 1. 12**.

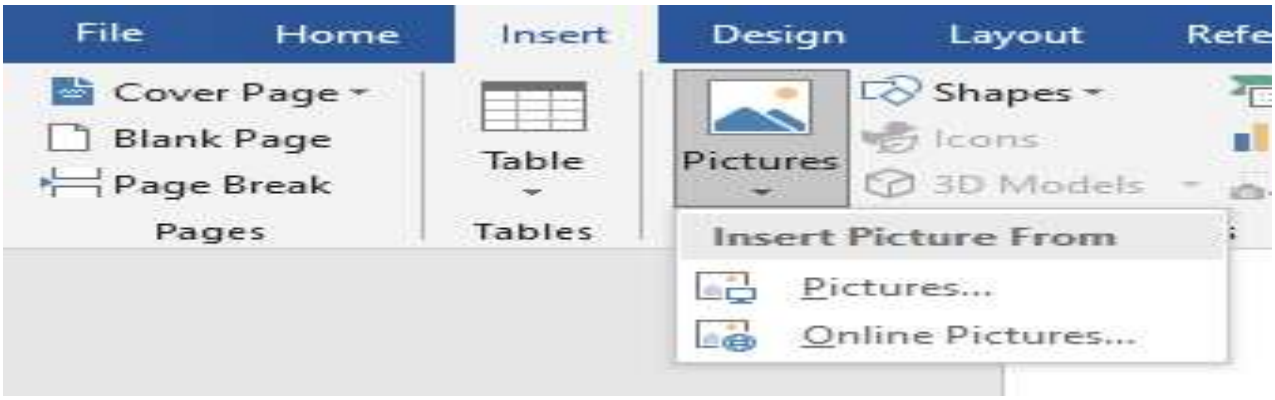


Figure 1. 12: Pictures

Smart Art

Smart Art allows you to add different graphs in your document as shown in **Figure 1. 13**.

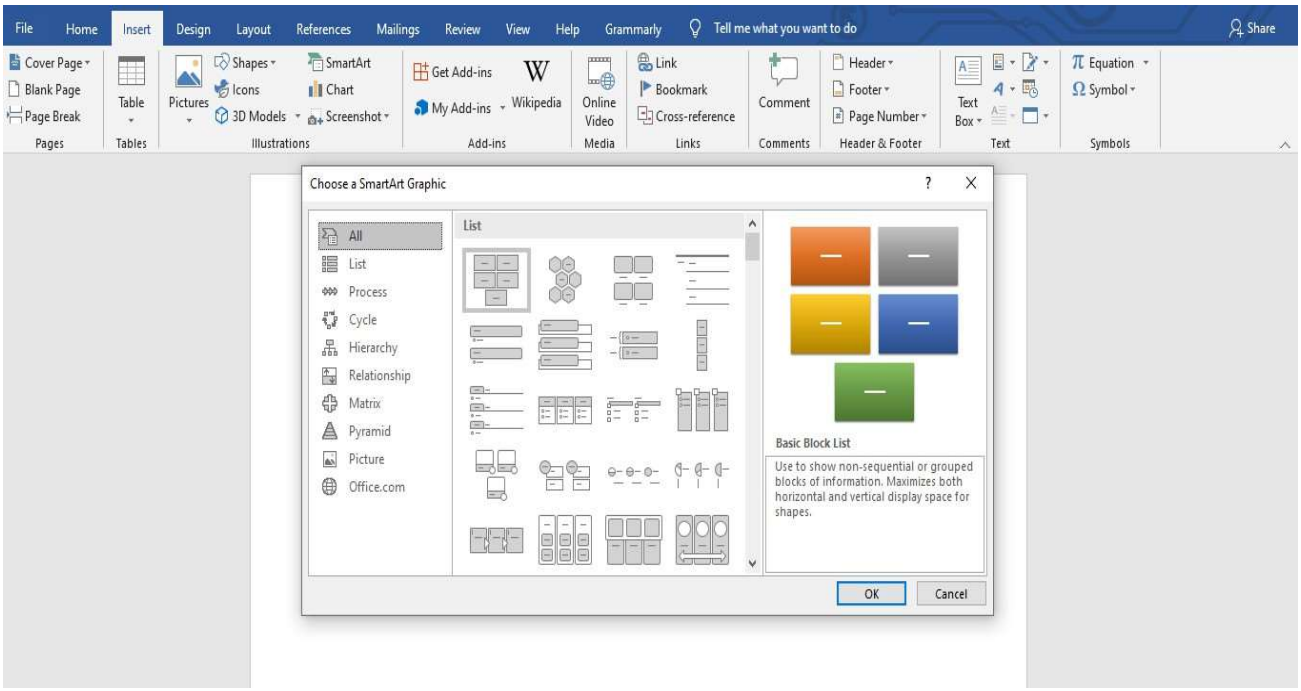


Figure 1. 13: Smart Art

Insert Caption

Click “References” tab to make it active as shown in **Figure 1. 14**.

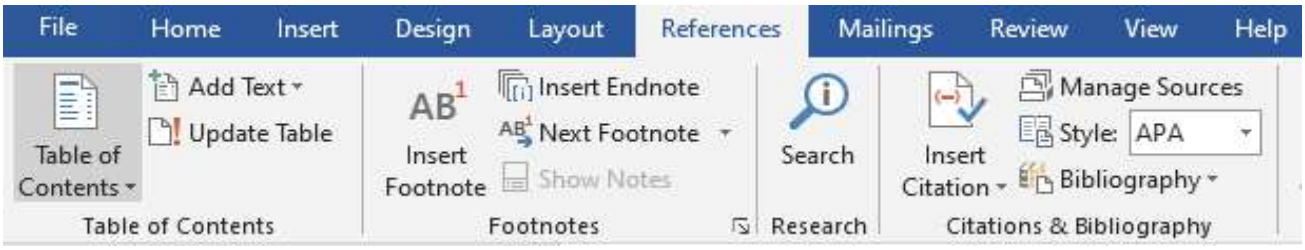


Figure 1. 14: References

Select a picture and click “Insert Caption”. Add a suitable caption for text and then click OK as shown in **Figure 1. 15.**

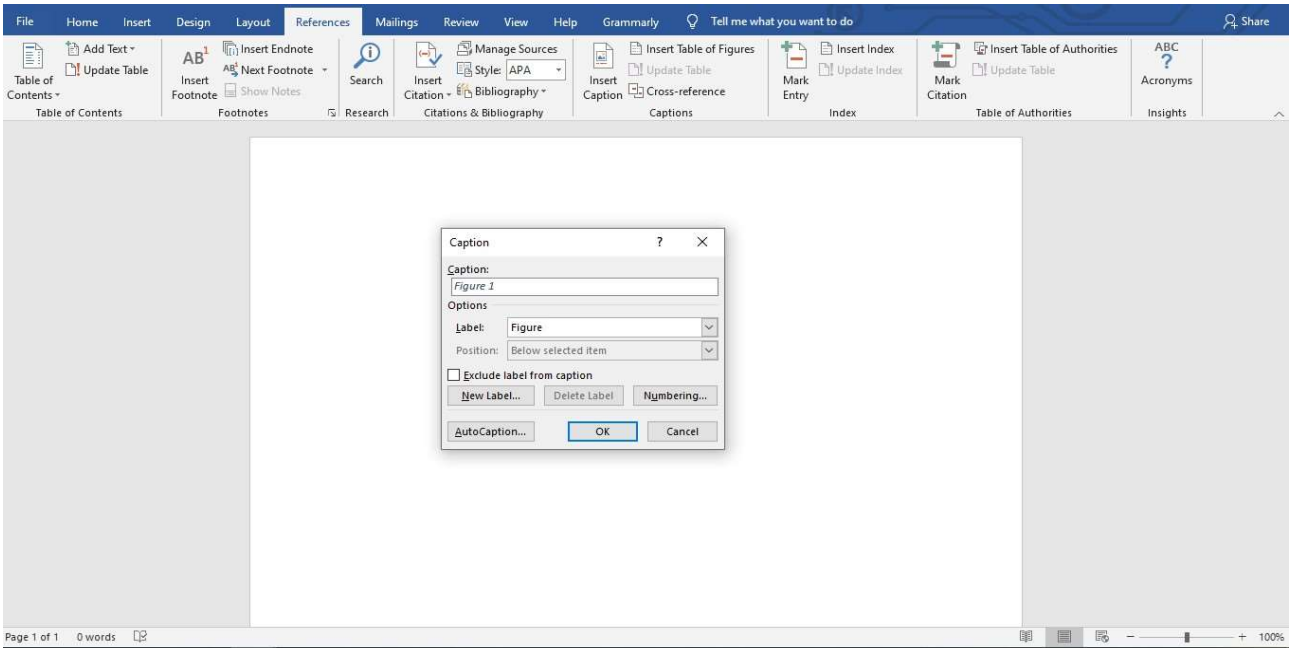


Figure 1. 15: Insert Caption

Table of Contents

While writing long documents consisting of several main and sub headings it becomes a difficult task to read and find relevant text. Microsoft Word helps deal with issue by assembling a table of contents (TOC) for you, listing headings each with appropriate page number. It also takes care of counting pages, and even updates the TOC for you if the document’s page numbers change. When you create a TOC, Word searches your document for headings to include, recognizing them by the ***Styles*** applied.

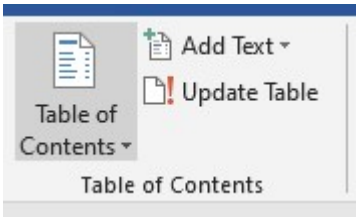


Figure 1. 16: Table of Contents

Exercise: How to add Table of Contents

1. Apply heading styles to your chosen headings.
2. Move the insertion point to the place where you want the Table of Contents to appear.
3. Click the References tab on the Ribbon and then click the Table of Contents button found in the Table of Contents group as shown in **Figure 1. 16**.
4. Click the Table of Contents style you want to use as shown in **Figure 1. 17**.
5. To customize your TOC, click the Table of Contents button and select Insert Table of Contents Field.
6. Click the Update Table button in the Table of Contents group of the References tab.
7. Click OK to update the table.
8. Save your file after you update the tables.
9. To delete a TOC, select the entire table and press Delete.

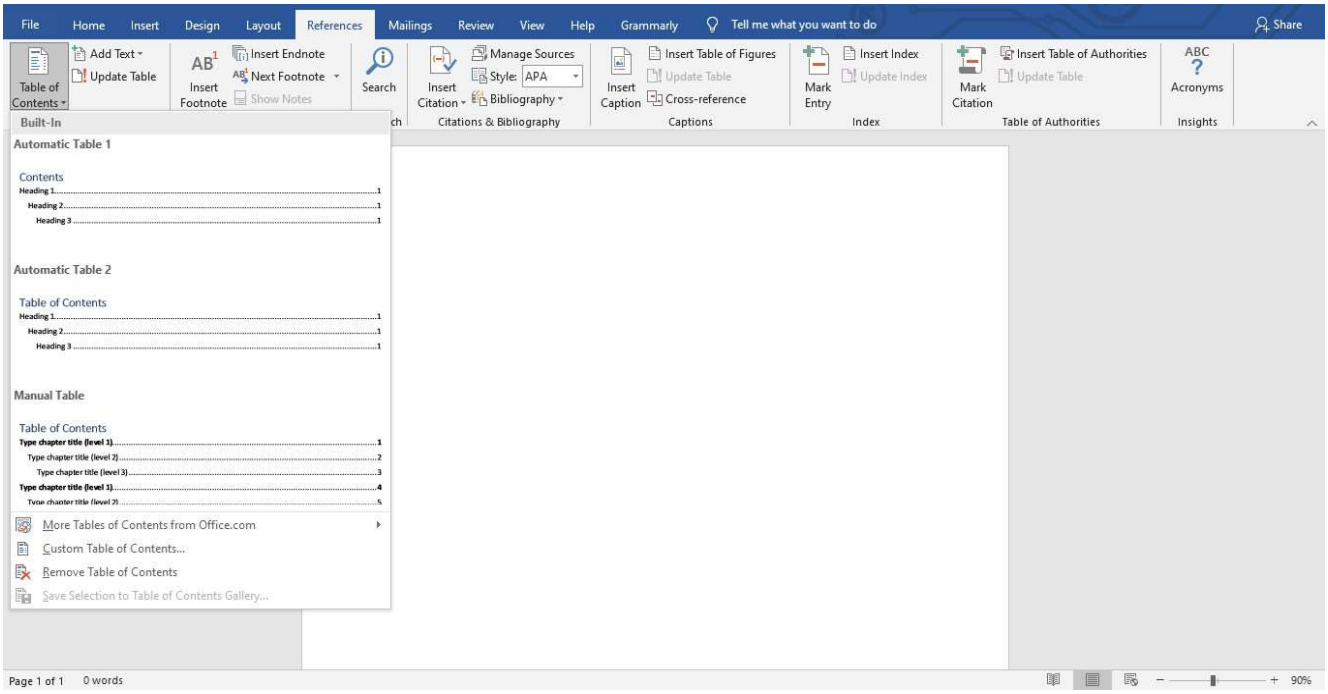


Figure 1. 17: Insert Table of Contents

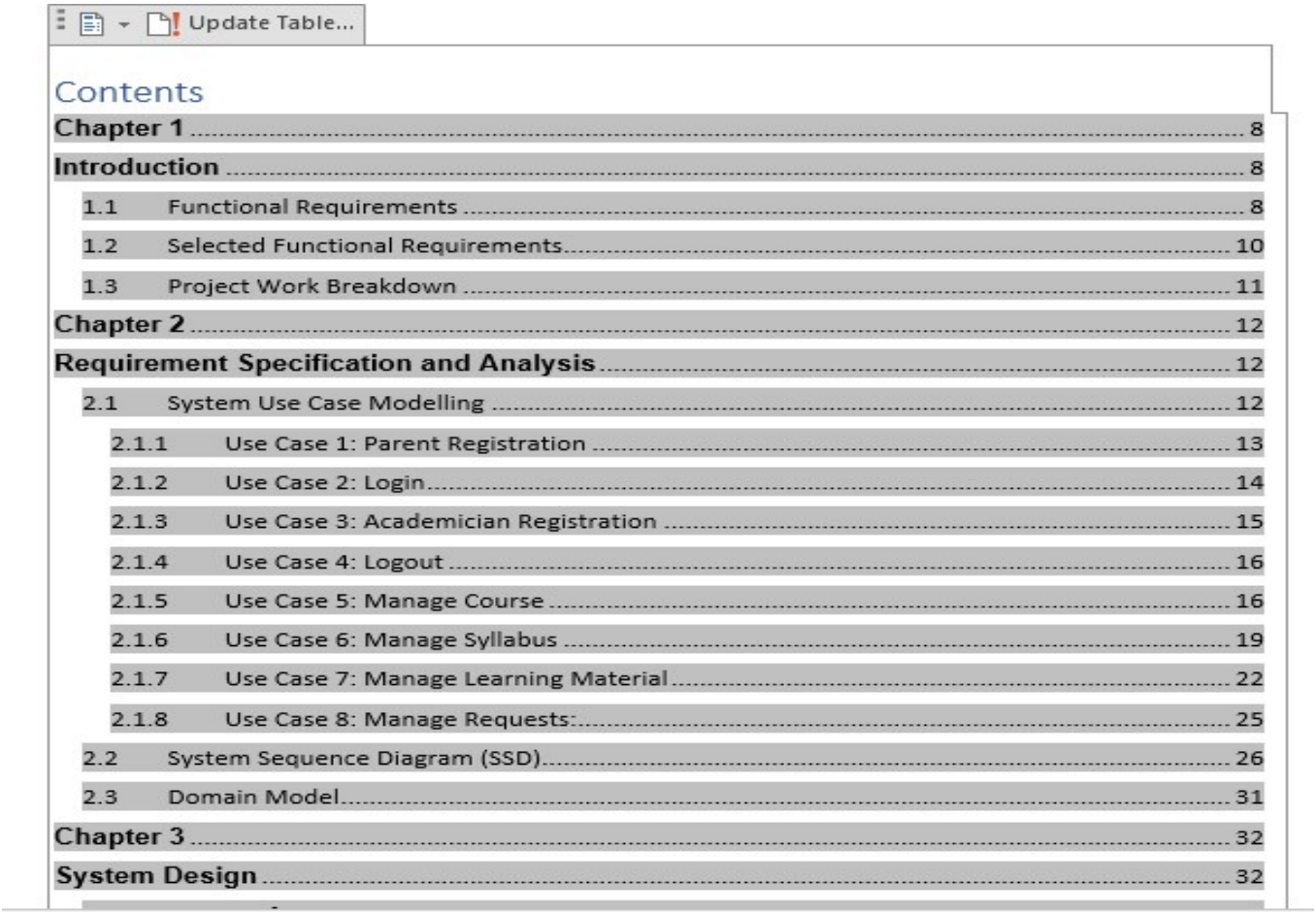


Figure 1. 18: Table of Contents

Table of Figures

Exercise: How to add Table of Figures:

1. Apply caption to your figures.
2. Move the insertion point to the place where you want the Table of figures to appear.
3. Click the References tab on the Ribbon and go to Captions section as shown in **Figure 1. 19** .

Figure 1. 19

4. Click on 'Insert table of figure'. A table of figures dialog box will appear as shown in **Figure 1. 20**.

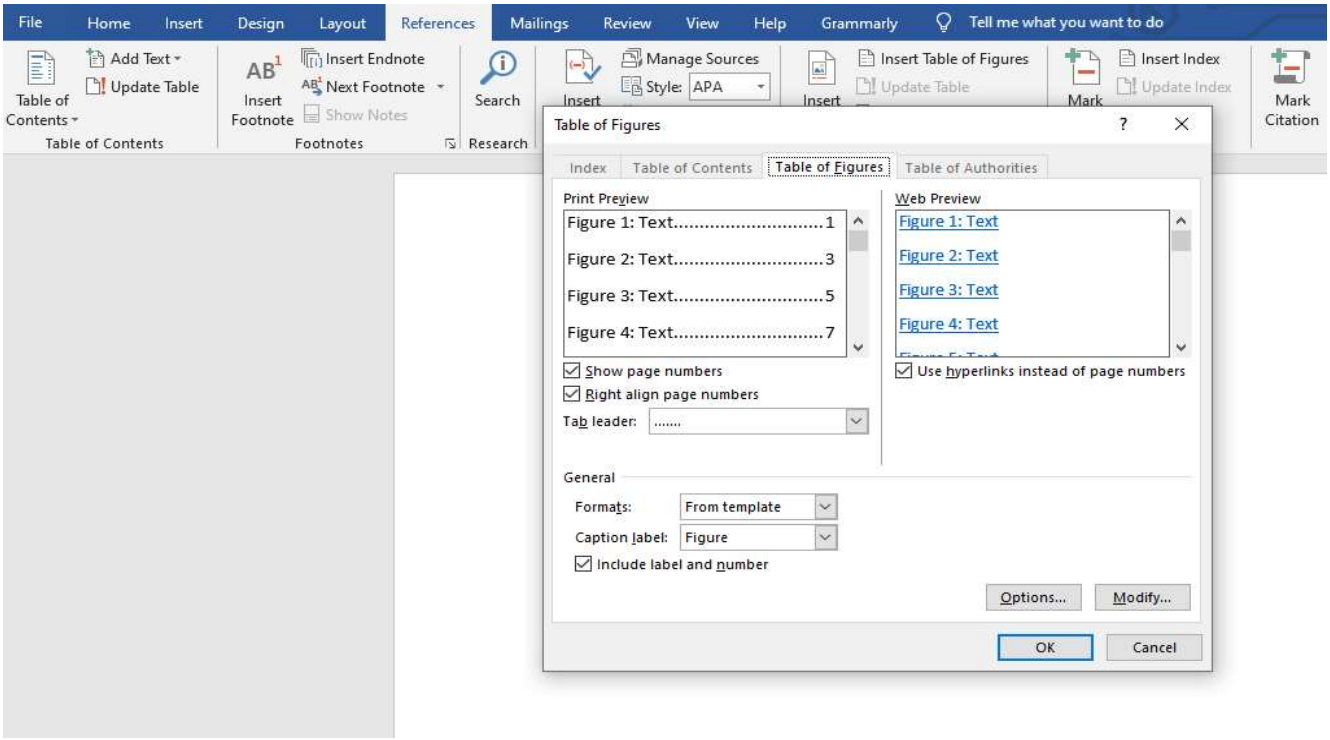


Figure 1. 20

5. Choose your desired style and click 'OK'. Table of figures will be created as shown in **Figure 1. 21**.

Week 02. Lab 2: Create Professional Presentation

Figure 1. 21: Table of Figures

7.2.2 Walk through Task for MS PowerPoint [Expected time = 30 minutes]

Home ribbon

Click on "Home" tab to make it active as shown in **Figure 1. 21**.

Figure 1. 22: Home Ribbon

Slides

Slides section allows you to add slides, manipulate it and change its layout etc.

New Slide:

1. Click on home ribbon
2. Click on new slide button
3. New slide will be shown in your presentation

Layout:

Different slide layouts are used to manage the arrangement of content on the side.
Click the layout you want. The layout appears in the drop-down pane of the PowerPoint window as shown in **Figure 1. 23**.

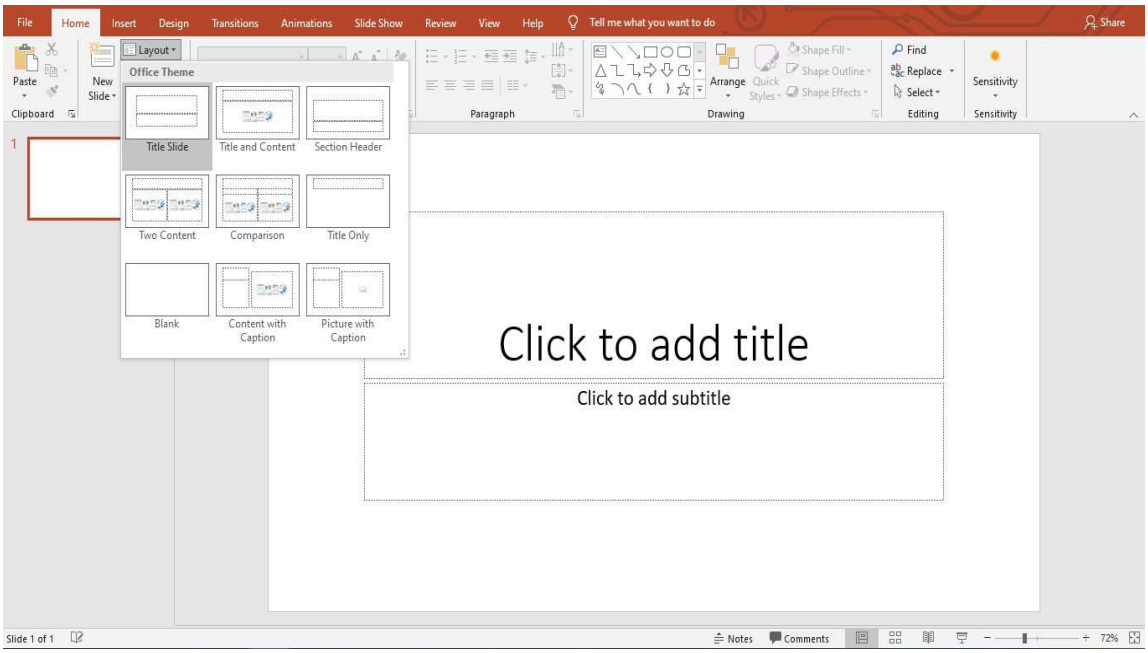


Figure 1. 23: Layouts

1. Make two of the slides as tile slide, third and fourth one as size and content layout and last one should be blank.

2. Write your name and registration number on first title slide.

3. On second slide write topic as "Computers "

4. Search text from internet and add some points about computers in the successive two slides and last slide should be having pictures of computers.

5. Output of above steps in shown in **Figure 1. 24**.

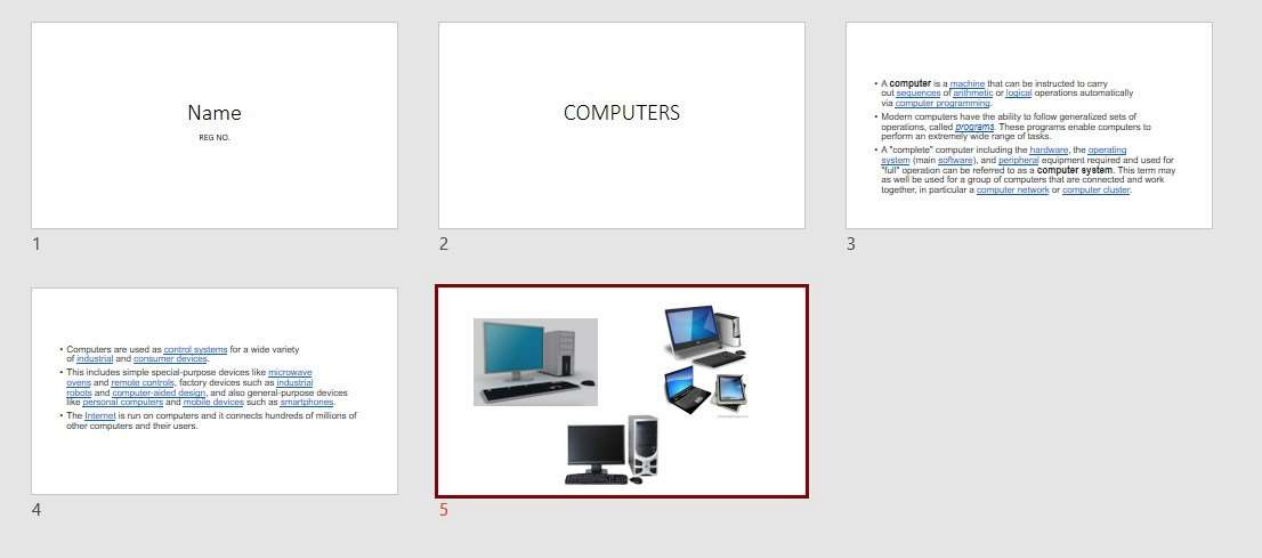


Figure 1. 24: Output of sample slides

Themes

Applying theme to your slides:

- A theme is a set of colors, fonts, and special effects. Themes provide attractive backgrounds for your PowerPoint slides.
- To apply a theme to all of the slides in your presentation:
  - Choose the Design tab.
  - Select the theme you want to apply as shown in **Figure 1. 25**.

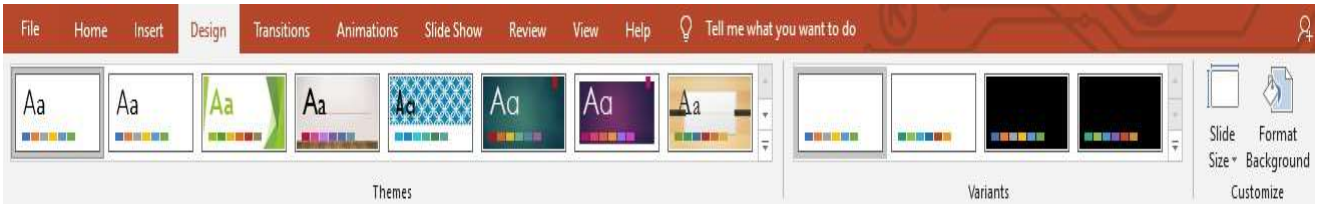


Figure 1. 25: Themes

To apply a theme to selected slides

Click the Slides tab, located on the left side of the window.

1. Hold down the Ctrl key and then click to select the slides to which you want to apply a theme.
2. Choose the Design tab as shown in figure.
3. Click the More buttons in the Themes group.
4. Right-click the theme you want to apply. A menu appears.
5. Click Apply to Selected Slides

Change fonts to Arial, colors to origin and add Metro effects in Design Tab.

Background:

You can add a dramatic effect to your theme by applying a background.

1. Choose the Design tab.
2. Click the Format Background button.
3. Click the background you want as shown in **Figure 1. 26**.

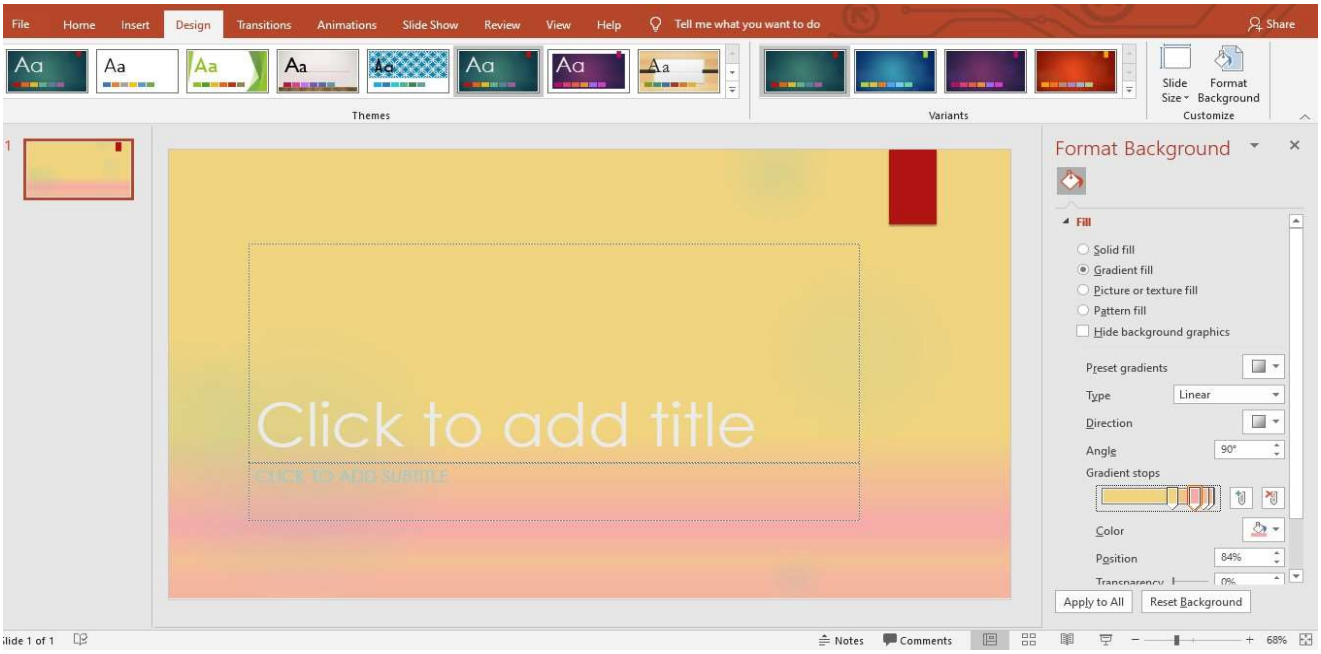


Figure 1. 26: Changing background of theme

Animations:

Animations allows you to add different animation styles to your slides. These styles can be applied to slides and the text in slides as well as shown in **Figure 1. 27**.

Figure 1. 27: Animations

Preview:

This button previews the animated slides being set by using slide transitions of the presentation.

Animations:

Animations control how objects move onto, off of, and around your slides. Transitions control how your presentation moves from one slide to the next

Custom Animation:

You can animate the objects on your PowerPoint slides. PowerPoint provides four types of animations as shown in **Figure 1. 28**.

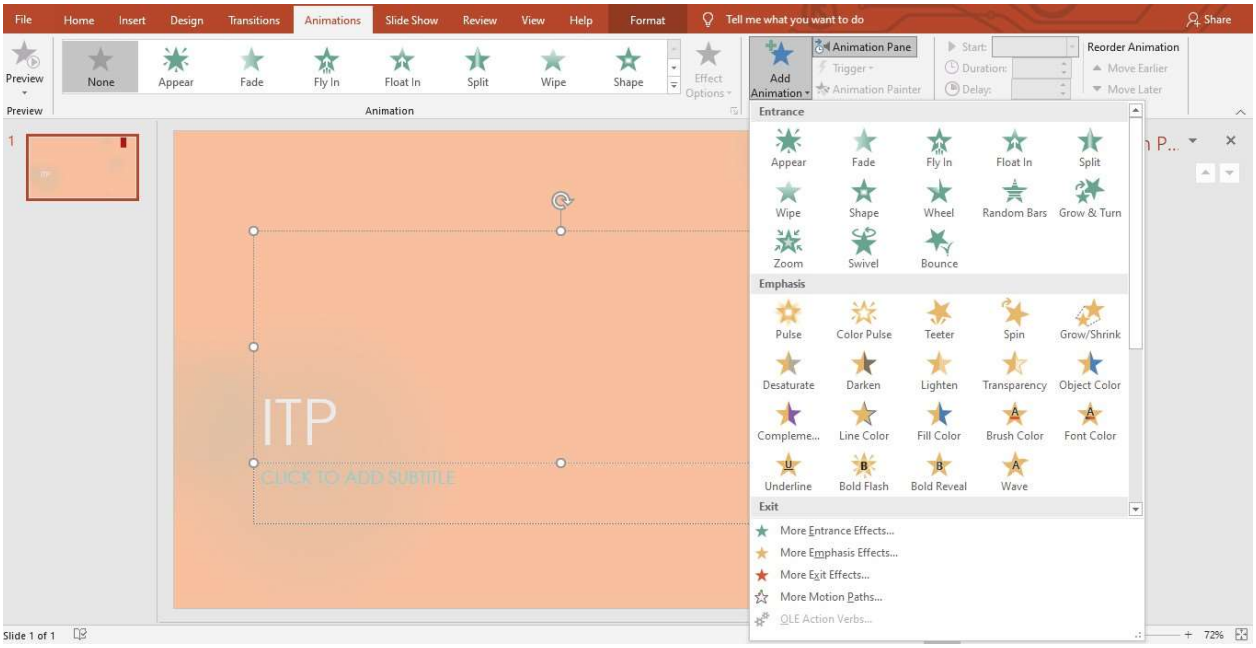


Figure 1. 28: Custom Animations

- Entrance

  An Entrance animation determines the manner in which an object appears on a slide; for example, an object can move onto a slide.

- Emphasis

  An Emphasis animation does something to draw attention to an object; for example, the object can become larger.

- Exit

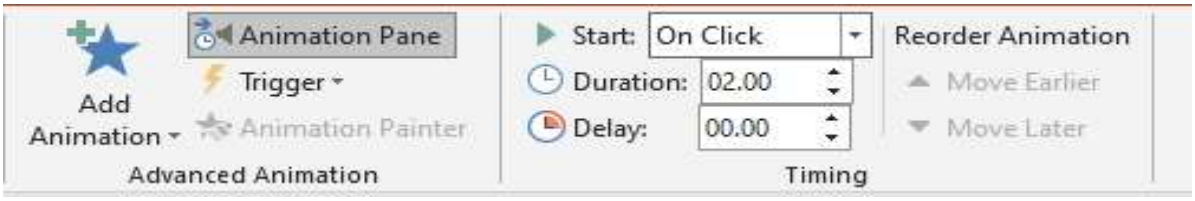
  An Exit animation determines the manner in which an object leaves a slide; for example, an object can move off a slide.

- Motion Paths.

  A Motion Paths animation determines how an object moves around a slide; for example, an object can move from left to right.

To choose an effect:

1. Select the object you want to animate.
2. Choose the Animations tab.
3. Click the Add Animation button. The Animation pane appears.
5. Choose the type of effect you want. A submenu appears.



6. Click the effect you want. PowerPoint applies the effect.

To modify an effect:

1. Click the down arrow next to the Start field on the Custom Animations pane and then select the start method you want as shown in **Figure 1. 29**.
2. Click the down arrow next to the Property field on the Custom Animations pane and then select the property you want. The Property field might be labelled Direction, Size, or some other property.
3. Click the down arrow next to the duration field on the Timings pane and then select the speed you want to apply to your animation.

A. Apply animations on text and images on all slides.

B. Choose Text animation from emphasis on all headings and Diamond from entrance for all other text bullet by bullet.

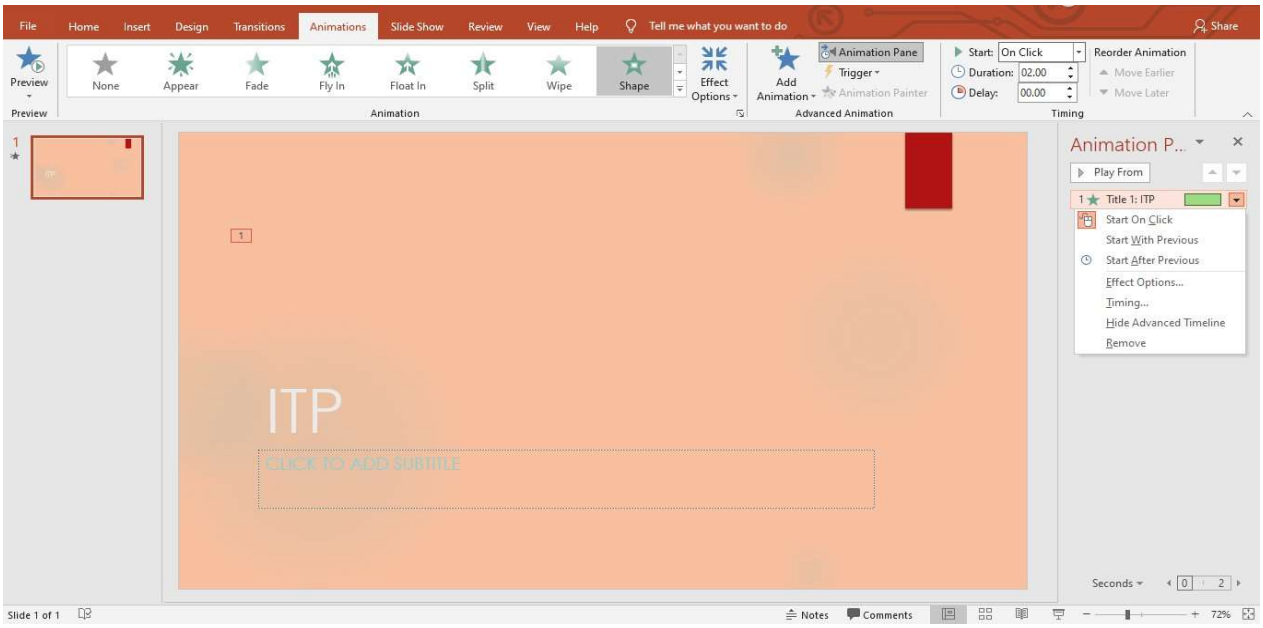


Figure 1. 29: Applying Animation on start method

To preview the animation, click the Play button 

on the Custom Animations pane.

Explore all of them yourself and animate your text and slides. Slideshow should display presentation in effective manner with animations on each slide.

Transition Sound

This button allows you to add some sound during slid transitions of your presentation. You can select various sounds from this option.

- In the pane that contains the Outline and Slides tabs, click the **Slides** tab.
- Select slide thumbnail of the slide that you want to add a sound to.
- In the animation pane, select the item you want to add sound to and click on the drop-down button, and then do one of the following:
  - On the **Transitions** tab, in the **Timing** group, click the arrow next to **Sound**, and then do one of the following:

1. To add a sound from the list, select the sound that you want.
2. To add a sound not found on the list, select **Other Sound**, locate the sound file that you want to add, and then click **OK**.

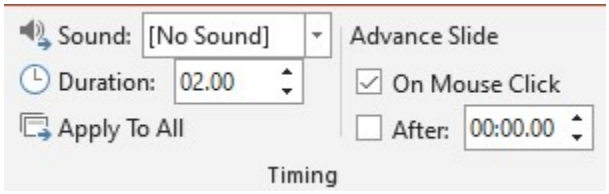


Figure 1.30: Transition sound

Select transition sound for the presentation that must not be annoying for the audience.

Transition Speed

It sets the speed of the slide transition to be slow, medium or fast.

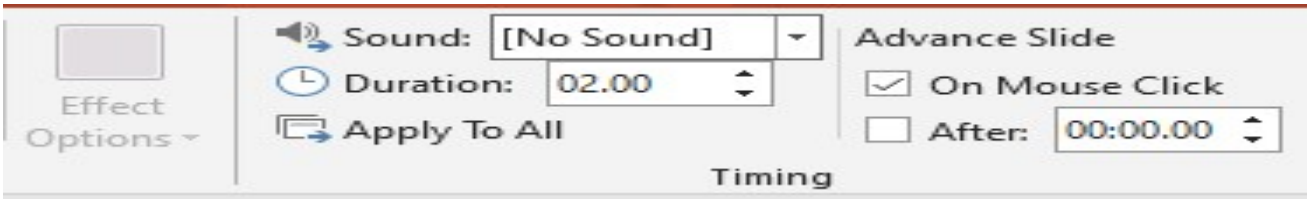


Figure 1.31: Managing Slides Transition

1.All slides should advance one by one at mouse click or keyboard keys.

Apply To all

This button applies all settings being chosen on all slides in the presentation.

Advance Slide

To advance the slides to the next one, set the duration of the transition between the previous slide and the current slide. For performing this task, do the following:

On the **Transitions** tab, in the **Timing** group, type or select the speed that you want: **Mouse click**
To advance the slide when you click the mouse, on the **Transitions** tab, in the **Timing** group, select the **On Mouse Click** check box. **Automatically After**

To advance the slide after a specified time, on the **Transitions** tab, in the **Timing** group, in the **After** box, enter the number of seconds that you want.

Slide Zoom-in/Zoom-out

To zoom in on a particular slide while playing the slideshow press **Ctrl and +.**
To zoom out, press **Ctrl and -.**

Adding a Scrollbar in a slide

Scrollbars are used when the content on a slide is very large and all that content must be present in the same slide.
To add scrollbar to a slide, follow the following steps:

1. Click the "File" tab on the ribbon. Click "Options" to open the PowerPoint Options dialog box.
2. Click "Customize Ribbon" and click the check box next to "Developer." Click "OK."

3. Click the "Developer" tab and click the "Text Box" button in the Controls group as shown in **Figure 1. 30**.

Figure 1. 30

4. Click and drag over your slide to add the text box.
5. Right-click the text box and click "Properties" to open its Properties dialog box.
6. Type or copy and paste the text box's contents into the Value box.
7. Click the drop-down box next to "ScrollBars" and select "2 - frmScrollBarsVertical" as shown in **Figure 1. 31.**
8. Click the drop-down box next to "WordWrap" and select "True" as shown in **Figure 1. 31.**
9. Click the drop-down box next to "MultiLine" and select "True" as shown in **Figure 1. 31.**
10. Press "F5" to preview the presentation with the scrollbar.

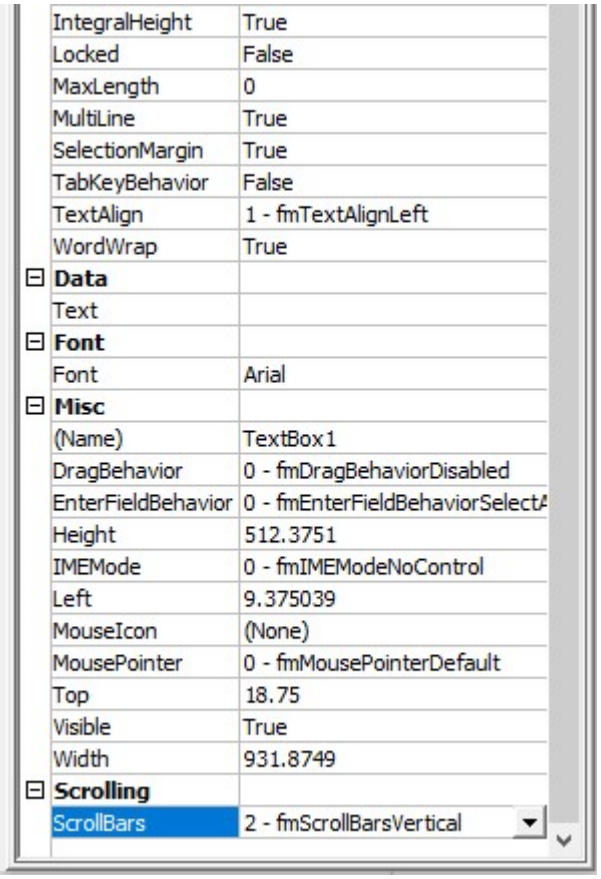


Figure 1. 31: Properties

8. Practice Tasks

This section will provide practice exercises which you need to finish during the lab. You need to finish the tasks in the required time. When you finish them, put these tasks into your lab designated Folder announced by lab instructor

8.1 Practice Task 1 [Expected Time 30 min]

Create a Word document on the topic of your choice using templates. The document should contain the following features.

1. It should contain table of contents.
2. It should have page numbers on each page in the footer.
3. Document must have a Title page with your name and registration number on it.
4. Document must have tables and figures in it with proper captioning.
5. It should contain a table of figures

8.2 Practice Task 2 [Expected Time 30 min]

1. Create a PowerPoint presentation of 8-10 slides. The Topic of presentation will be "Computers and their use" and create a presentation with following features applied to them:
2. Adapt Calibri style for text
3. Use blue and black color schemes for text
4. Use bullets and numberings to list down the types of computers.
5. Apply slide animation (shape plus) and text animations (motion paths in all directions) and slides should be change as per set time of 1 sec.

9. Evaluation criteria

The evaluation criteria for this lab will be based on the completion of the following tasks. Each task is assigned the marks percentage which will be evaluated by the instructor in the lab whether the student has finished the complete/partial task(s).

Table 1.2: Evaluation of the Lab

Sr. No.	Task No	Description	Marks
1	3	Quiz	40
2	5	Home task	20
3	7.3	Walkthrough Tasks	10
4	8.1 to 8.2	Practice tasks and Testing	30

10. Further Reading

10.1 Books

Word 2016 For Professionals Dummies
By Dan Gookin

Week 03. Lab 3: Arrangement of Bulk Data

Lab 3:Arrangment of Bulk Data Using Excel

1. Introduction

In this lab you will learn the basic working of Microsoft Excel. Like MS Word and MS PowerPoint, MS Excel is a part of Microsoft Office Suite and there are several features that you may find similar to MS Word and MS PowerPoint. We will however, concentrate only on those features that are specific to MS Excel.

MS Excel is an incredibly powerful tool for getting meaning out of vast amounts of data. But it also works really well for simple calculations and tracking almost any kind of information. Microsoft Excel can be used to create and manage business transactions that deal with accounting. The task you can complete with Excel ranges from preparing a simple family budget, preparing a purchase order, create an elaborate 3-D chart, or managing a complex accounting ledger for a medium size business.

2. Activity Time boxing

Table 2.1: Activity Time Boxing

Task No.	Activity Name	Activity time	Total Time
3	Quiz	15 min	30 min
5.1	Understanding of Spreadsheet	10 min	10 min
6.2	Setting-up MS Excel	5 min	5 min
6.3	Walkthrough Tasks	10 min each	90 min
7	Practice tasks	10 min	30 min

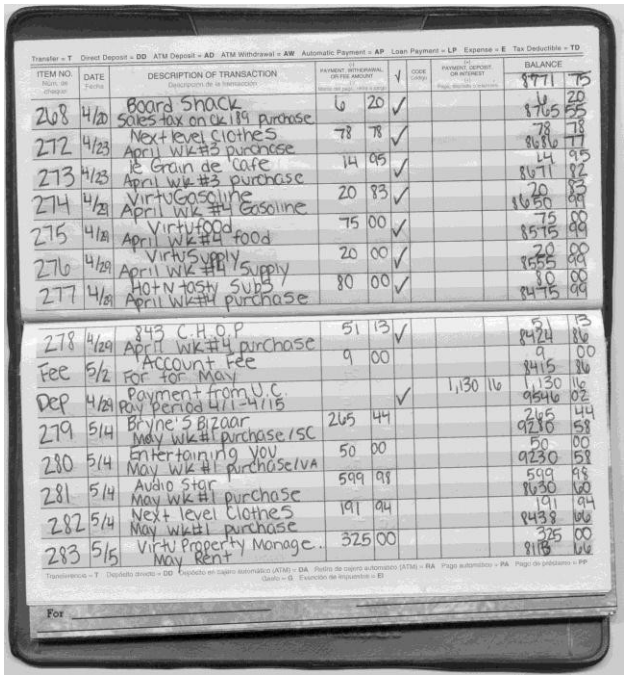
4. Objectives of the lab

- Using MS Excel Menu and Toolbar
- Understanding different pointer shapes
- Understanding the gird, rows, columns and cells.
- Sorting the data in rows or columns
- Performing calculations on the data in MS Excel
- Using multiple Spreadsheets
- Copy, Paste and Cut your data
- Saving and printing worksheets
- Using MS Excel Help

5. Concept Map

What is a Spreadsheet?

Suppose you would like to maintain personal finance register also known as check register that will keep track of the expenditures that you have been making during the current semester. Another scenario can be the budget management of a small house. You may be interested in question such as how much money has been spent on electricity bills and telephone bills. How much saving has been made? You may imagine a book that keeps record of all transaction/ expenditures and income. Such a book can be called a manual or paper spreadsheet. A sample is shown in the figure 1. In this case you may have to save data that can be numerical or alphanumeric (involving letters or numbers).



Spreadsheet is a tool that is used to organize data, such as a check register. Spreadsheets have been used for many, many years in business to keep track of expenses and other calculations.

Electronic Spreadsheet: Microsoft Excel is an example of spreadsheet application program that can be used for storing, organizing and manipulating data. The key benefit to using a spreadsheet program is that you can make changes easily, including correcting spelling or values, adding, deleting and formatting. It consists of a grid made from columns and rows similar to what you have seen in your

Mathematics notebooks in school days. This grid environment makes number manipulation very easy

As always with computer programs, there is more than one way to go about these things. The instructions here are intended to be an easy introduction to the use of Excel. This lab manual includes a subset of Microsoft Excel features

6. Homework Task before Lab

It is assumed that the user is both familiar and comfortable with the following prior to working with Microsoft Excel:

- Using the mouse and the left-click feature
- Basic navigation through Microsoft Windows
- Basic typing and keyboard commands
- Familiarity with Microsoft Word

6.1 Task

Open MS office suite help by clicking the Help tab in the MS Excel window as shown in **Figure 2. 1**.

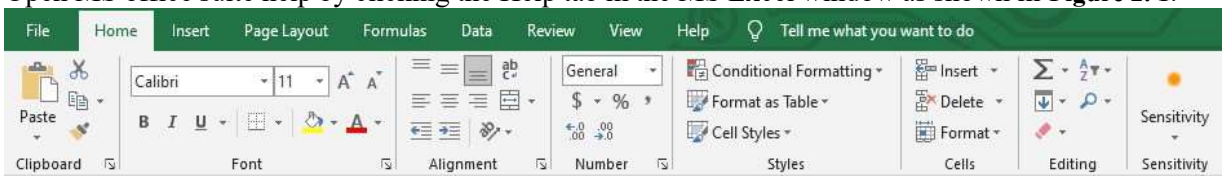


Figure 2. 1 : Help

The following window will appear as shown in **Figure 2. 2**. This is an online MS office help that retrieves the information you request from the Internet. You are supposed to retrieve information related to viewing and printing MS Excel documents using MS Excel online help system.

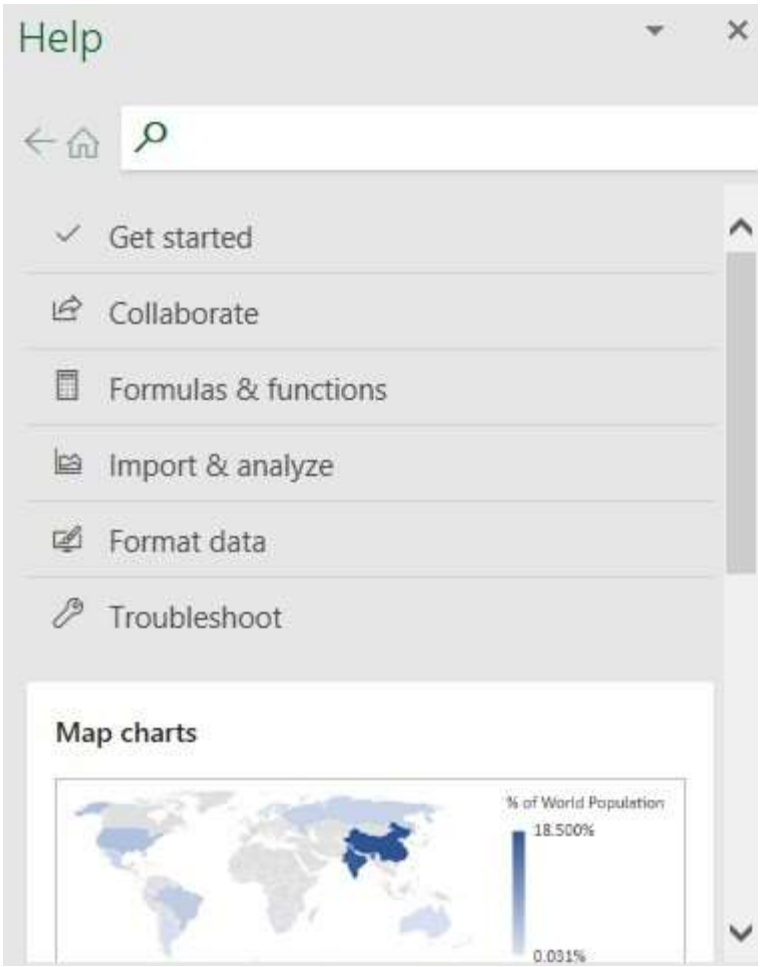


Figure 2. 2: Help Window

7. Procedure and Tools

- Desktop Computer
- Microsoft Windows XP operating system
- Microsoft Excel 2016

Microsoft Excel is an electronic spreadsheet. You can use it to organize your data into rows and columns. You can also use it to perform mathematical calculations quickly. Before you start working in Microsoft Excel, you need to open it. You can open Microsoft Excel by clicking on the Start button and typing excel in search box as shown in **Figure 2. 3**.

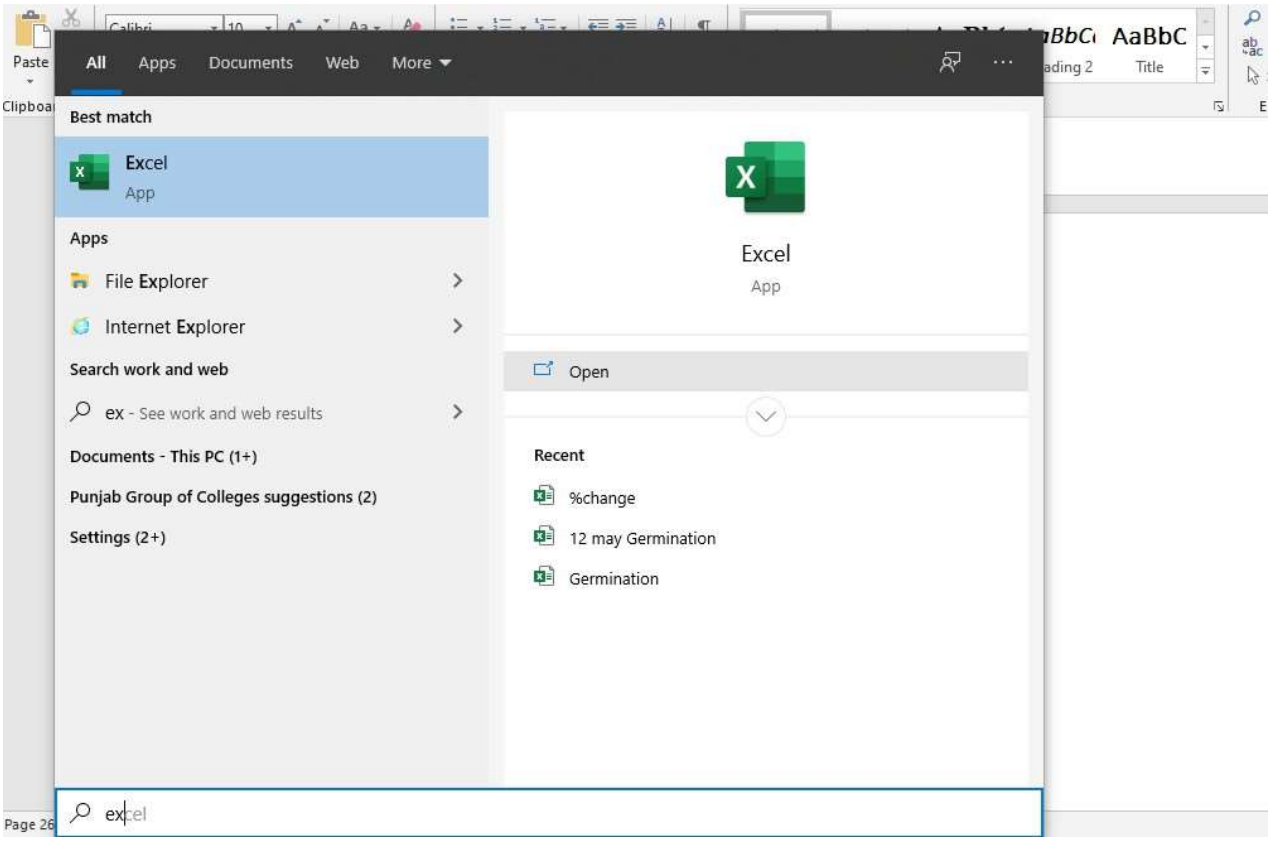


Figure 2. 3: Start Menu

A screen similar to **Figure 2. 4** will appear.

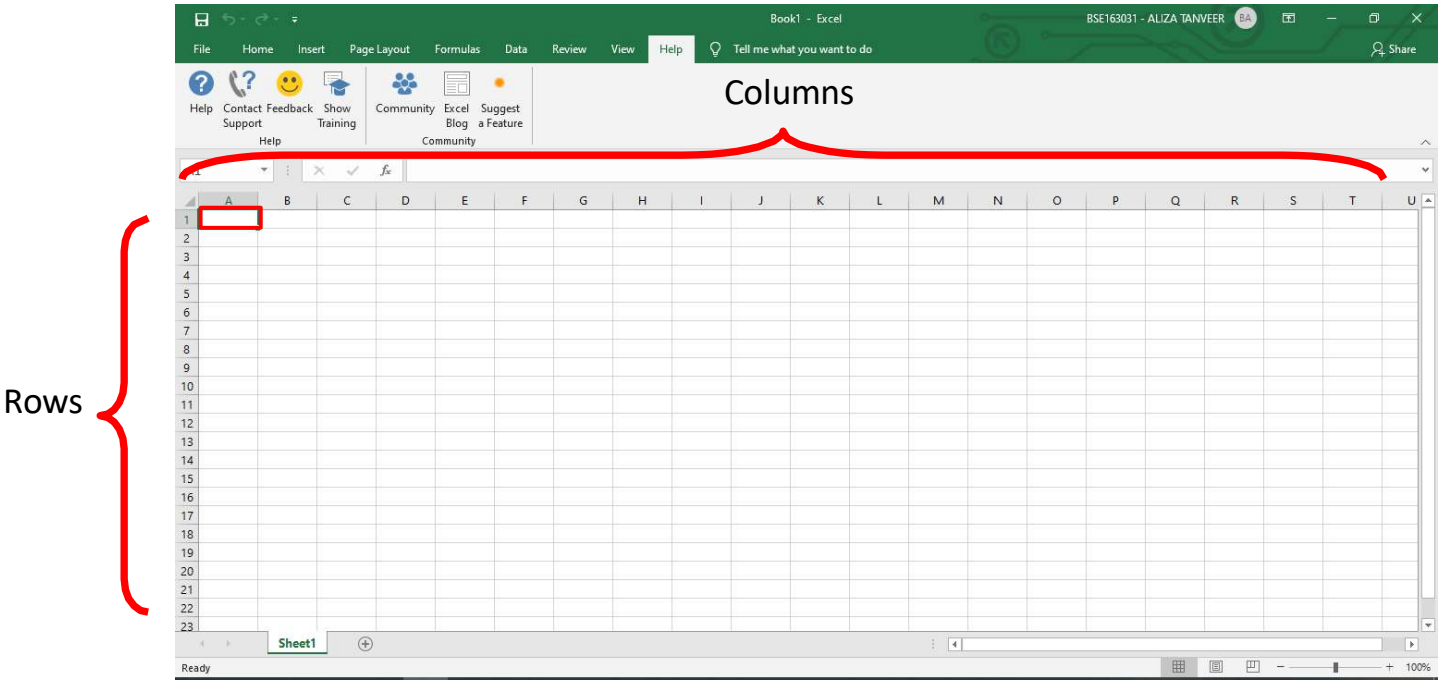


Figure 2. 4: Excel Layout

7.1 Excel Layout

Please refer to **Figure 2. 4** to observe the layout of MS Excel. On the top you will find a ribbon similar to MS Word and PowerPoint that we have discussed in previous lab. The different thing you will notice is the rectangular boxes on the screen divided with the help of rows and columns

Rows are identified by Numbers as shown in the leftmost columns whereas Columns are identified by Alphabets as shown in the topmost row.

If you want to select a particular cell, you will have to identify its address. The selected cell in the **Figure 2. 4**, for example, is A1. A being the first column and 1 being the first row.

7.2 Walkthrough Tasks [Expected time = 20 min]

7.2.1 Home

In this section we will go through step by step through each section of the Insert tab just like we did on the Home Tab in the previous lab. Below is a Snapshot of the insert tab in excel ribbon (**Figure 2. 5**). Later each section is explained individually in detail and practice exercises.

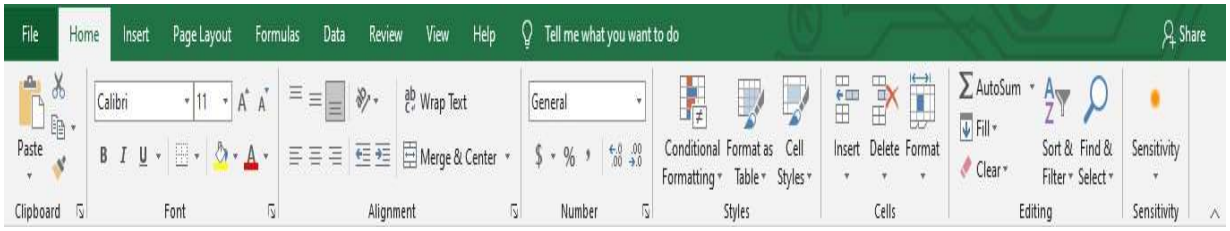


Figure 2. 5: Home Tab Ribbon

Clipboard

This section of Home Tab is covered in Lab 1.

Font

This section of Home Tab is covered in Lab 1.

Alignment

In this section we would cover Merge and Center tab as shown in **Figure 2. 6**.

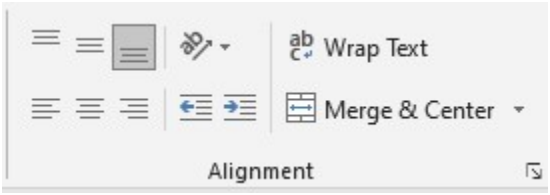


Figure 2. 6: Alignment

For performing merge and center, you need to first select the cells that you want to merge. The selection of cells is shown in **Figure 2. 8**.

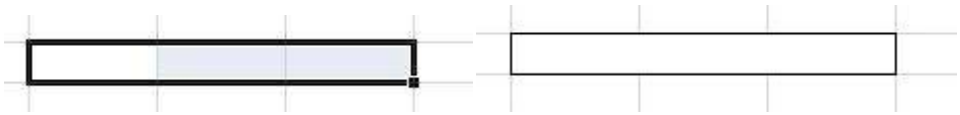


Figure 2. 7: Selection of Cells

Once selection of cells is done, click on Merge and center command. When you would click the command, the cells would be merged as shown in **Figure 2. 8**.

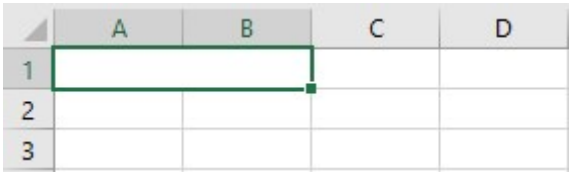


Figure 2. 8: Merge and Center

Number

In this section you can add various things with the number for example, you can add the currency, percentage sign, comma, decimal values after the number etc. **Figure 2. 9** shows the number section with different options displayed.

.

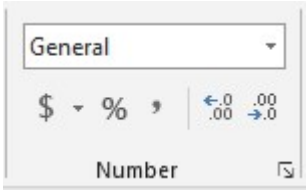


Figure 2. 9: Number Section

If you want to add currency to the number, click the drop-down list of dollar sign. When you click the dollar sign various currency options are displayed e.g., dollar sign, euro sign, pounds sign etc. All these signs are shown in Figure 2. 10.

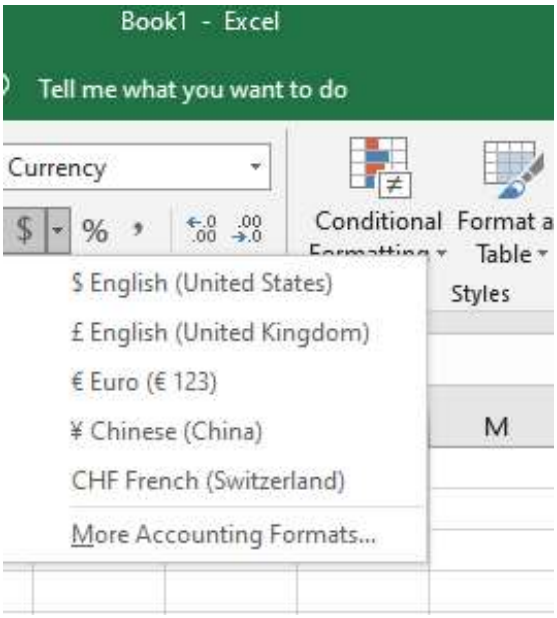


Figure 2. 10: Adding Currency

You can use a few clicks to adjust the row height and column width according to your desire. Click on "Format" in the cell section of the ribbon and a menu similar to **Figure 2. 11** will appear below.

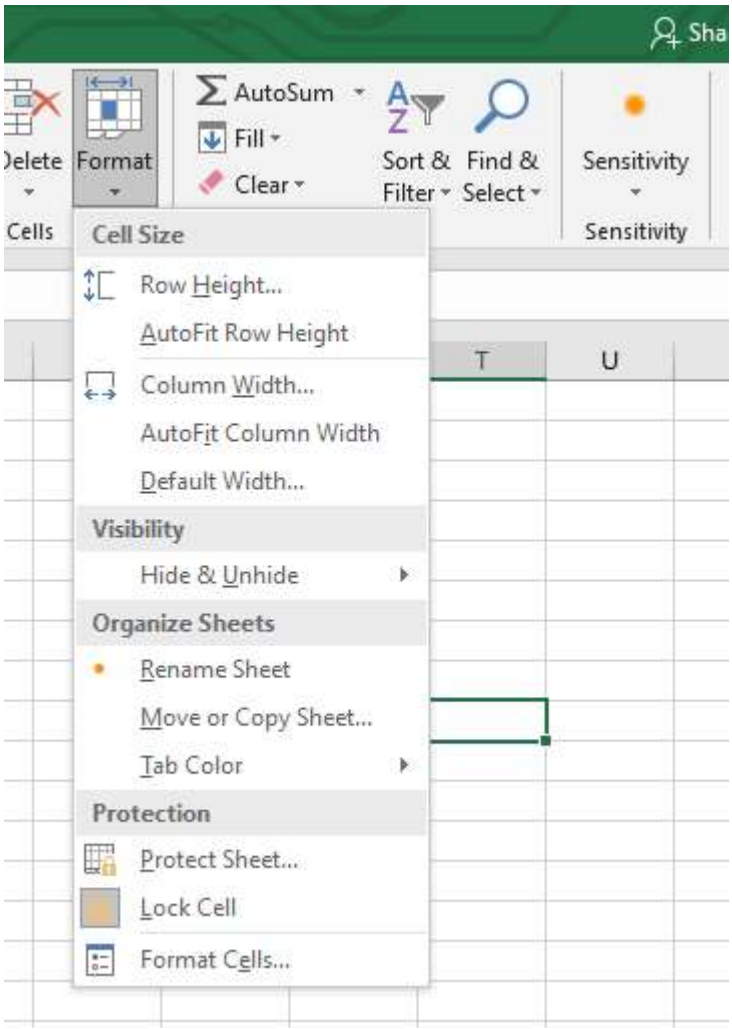


Figure 2. 11: Cell Format Menu

You can adjust the row height by clicking "Auto fit row height". This will adjust the height of all the cells in a row according to the font size of the data you have inserted. We will be doing our tasks on the following example data

1. Copy and paste this data into a newly created Excel File.

Table 2.2: Sample data for practice tasks

Product	**Cost Price**	**Sale Price**	**Shipping Cost**
Toothpaste	20	25	10
Shampoo	110	120	20
Soap	20	30	10
Mouthwash	49	50	15

2. Now Left align the Product column while apply right alignment for the rest of the columns
3. Merge Cost Price and Sale Price in the new column "Price" and use Sale price value for it.

4. Click on Auto row height and column width to adjust the height and width of the columns of your data.
5. As the Column Price is a number and can be counted as currency, modify setting of new column "Cost Price" and add American dollar USD$ ad its currency.
6. In the end you will have something similar to the **Figure 2. 12**.

Product	Cost Price	Shipping Cost
Toothpaste	$ 20.00	10
Shampoo	$ 110.00	20
Soap	$ 20.00	10
Mouthwash	$ 49.00	15

Figure 2. 12: Output of the First 6 Steps

7. Note that Cost Price is now merged in two columns B and C instead of one column.
8. Now select the column for Cost Price and select Unmerge in the menu appearing after clicking the arrow with the merge button.
9. After Unmerging you will notice that cost price has been reduced to one column. Now right click on the empty column and delete to remove the empty column. As result you will have something similar to the **Figure 2. 13**.

Product	Cost Price	Shipping Cost
Toothpaste	$ 20.00	10
Shampoo	$ 110.00	20
Soap	$ 20.00	10
Mouthwash	$ 49.00	15

Figure 2. 13: Output of steps 8 and 9

Note that Cost price is not placed in the only Column B instead of both B and C as in the previous figure.

7.2.2 Insert Tab [Expected time = 20 min]

Insert Tab can be used if you want to add graphics or link your document with another document. Insert tab in ribbon provides different options for inserting useful information to your excel sheet. The ribbon is shown in **Figure 2. 14**.

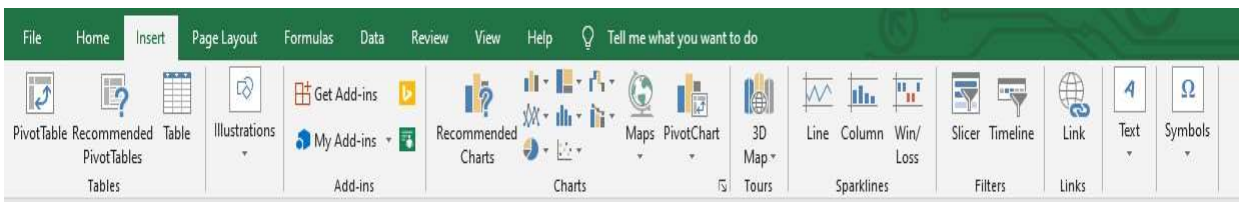


Figure 2. 14: Insert Tab in Ribbon

Week 04. Lab 4: Data Analysis and visualization

Charts

Charts allow you to present information contained in the worksheet in a graphic format. Excel offers many types of charts including: Column, Line, Pie, Bar, Area, Scatter and more. To view the charts available, click the Insert Tab on the Ribbon.

Creating a Chart:

- Select the cells that contain the data you want to use in the chart. In our example we can select the shipping cost column to be used as chart data
- Click the Insert tab on the Ribbon
- Click the type of Chart you want to create. There are different chart types as show in **Figure 2. 15**.

Figure 2. 15: Chart Tool

- Click the Column chart button and then select the 2d chart
- A bar chart will appear showing the shipping cost as chart as shown in **Figure 2. 16**.
- You can observe the costs at the Y-axis and as there are four items so you can see 4 bars at X-axis
- This chart has four components and you can right click on them separately to see the advance options available.

Figure 2. 16: Resulting Chart

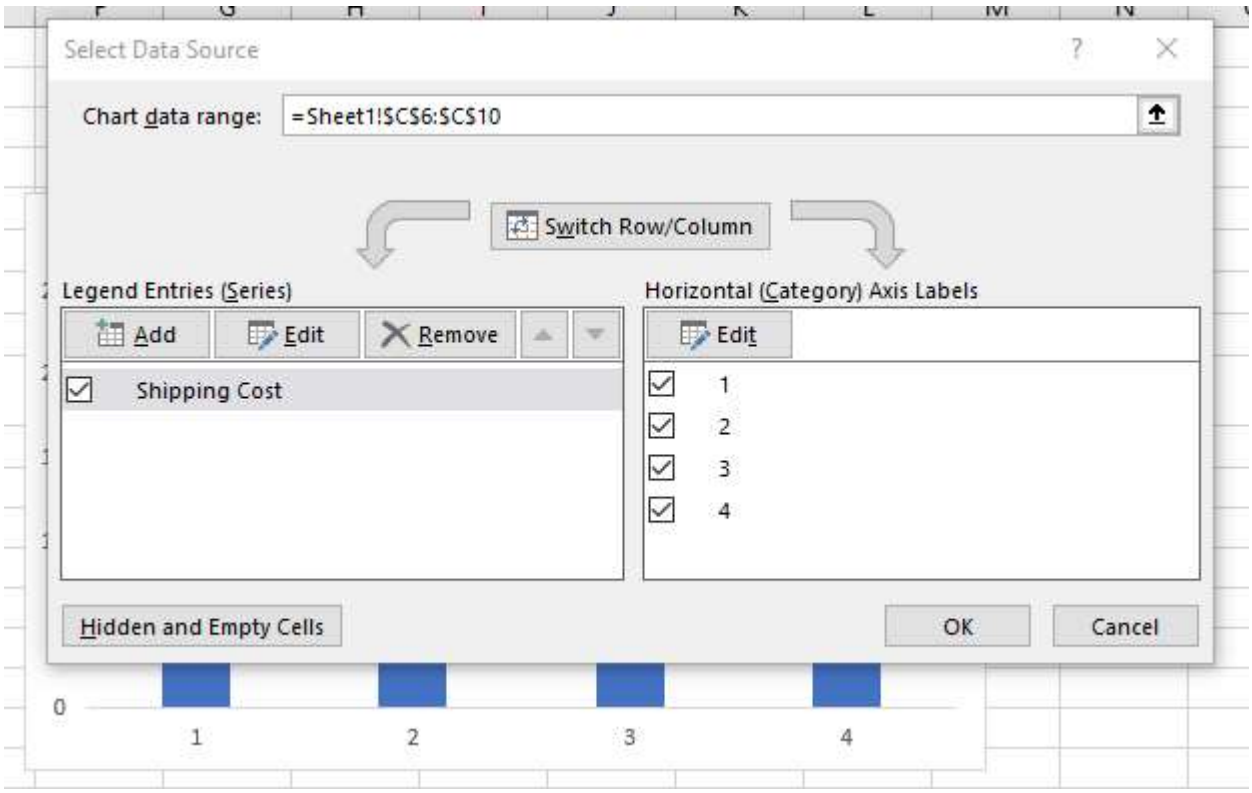


Figure 2. 17: Modifying chart data

Modifying a Chart:

- Once you have created a chart you can do several things to modify the chart.
  - Move the chart

To change the data included in the chart:

- Right click the Chart
- Click the Select Data button on the Design tab as shown in **Figure 2. 17**.

- You can see the data selected in the "Chart data Range" box.
- =Sheet1!$C$6:$C$10 tells us that we are using the data from sheet1 and our data starts from C6 and it goes till C10. The $ signs in the middle tell us that it is address of the cell and not the data inserted by user.

To reverse which data are displayed in the rows and columns, **Figure 2. 18** shows how to achieve this task.

- Click the Chart
- Click the Switch Row/Column button on the Design tab

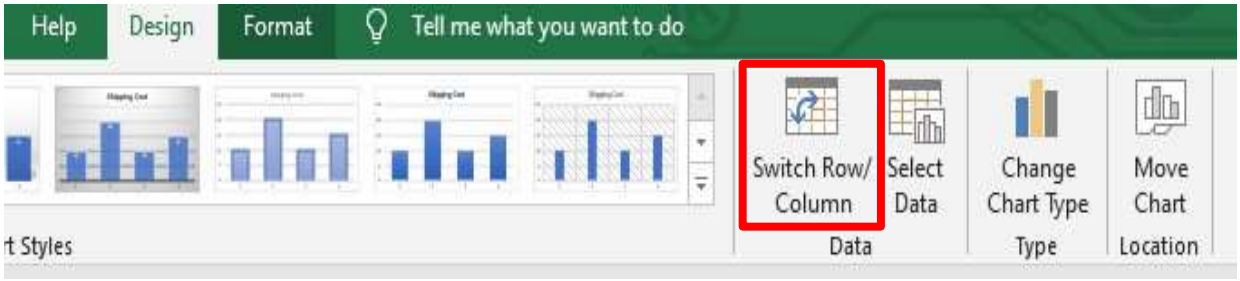


Figure 2. 18: Reverse Rows and Columns Data

Chart Tools

The Chart Tools appear on the Ribbon when you click on the chart. The tools are located on three tabs:

- Design
- Layout
- Format

Design Tab

Within the Design tab you can control the chart type, layout, styles, and location. This tab is shown in **Figure 2. 19**.

Figure 2. 19: Design Tab

1. Select the chart that you have drawn and now apply different chart layout to see the differences.
2. Apply the different colors available in the ribbon such as green or orange.
3. Try moving the chart with the help of the Move chart button in the end and move it to another sheet of this Excel File.

Format Tab

Within the Format tab you can modify shape styles, word styles and size of the chart. Format tab is shown in **Figure 2. 20**.

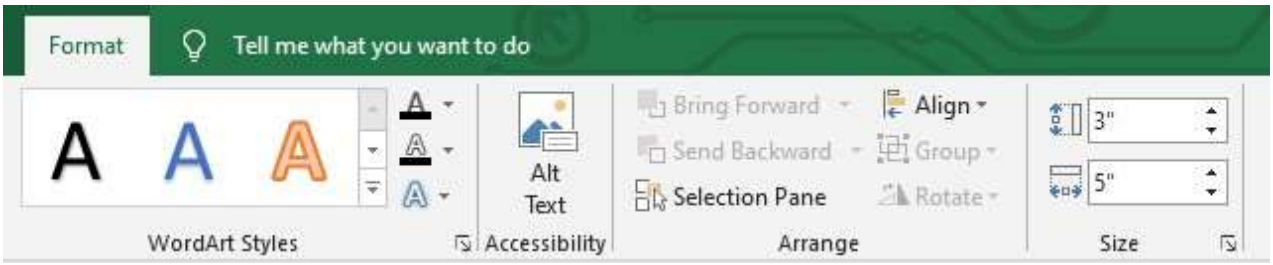


Figure 2. 20: Format Tab

7.2.3 Page Layout

Page layout ribbon is shown in **Figure 2. 21**. This ribbon contains different options related to page setup. All these options have been covered in lab of Microsoft Word.

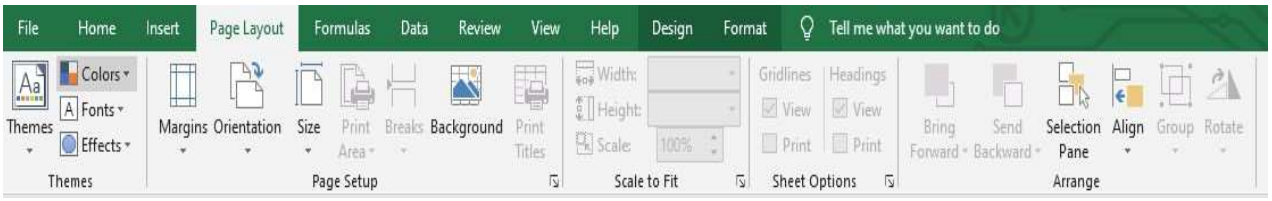


Figure 2. 21: Page Layout Tab

1. Select the chart and apply different format type to see what effect it makes on your chart style and color.

7.2.4 Formulas [Expected time = 25 min]

A formula is a set of mathematical instructions that can be used in Excel to perform calculations. Formals are started in the formula box starting with an = sign. A sample formula is shown in **Figure 2. 22**.

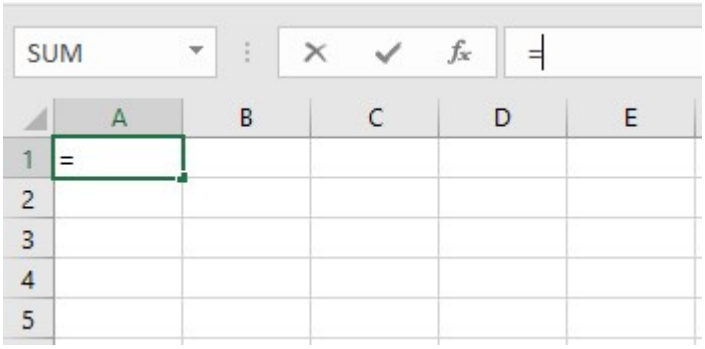


Figure 2. 22: Formula Example

The formula ribbon is shown in **Figure 2. 23**. This ribbon gives you different options for applying formulas. The first section represents Function library. Function library contains different formulas from various categories.

Figure 2. 23: Formulas Tab

Product	Price	Shipping Cost
Toothpaste	25	10
Shampoo	120	20
Soap	30	10
MouthWash	50	15

Figure 2. 24: Data for Sum Formula

Creating Basic Formula

To create a basic formula in Excel we need the data on which we need to apply the formula. Data is represented in **Figure 2. 24**.

To create a basic formula, you need to do the following:

- Select the cell for the formula
- Type "=" (the equal sign) and the formula
- The formula is of sum which would sum the values.
- ":" is used to specify the range of the cell on which you want to apply the formula
- Click Enter

Creating a basic formula is shown in **Figure 2. 25**.

	A	B	C	D
1	Product	Price	Shipping Cost	Total Price
2	Toothpaste	25	10	=sum(B2+C2)
3	Shampoo	120	20	
4	Soap	30	10	
5	Mouthwash	50	15	
6				

Figure 2. 25: Sum Formula

When you click enter you would get the result as shown in Figure 2. 26 the highlighted column represents the result after applying the formula.

	A	B	C	D
1	Product	Price	Shipping Cost	Total Price
2	Toothpaste	25	10	35
3	Shampoo	120	20	140
4	Soap	30	10	40
5	Mouthwash	50	15	65

Figure 2. 26: Result of Sum Formula

Calculate with Functions

A function is a built-in formula in Excel. A function has a name and arguments (the mathematical function) in parentheses.

- Sum: Adds all cells in the argument
- Average: Calculates the average of the cells in the argument
- Min: Finds the minimum value
- Max: Finds the maximum value
- Count: Finds the number of cells that contain a numerical value within a range of the argument

To calculate a function:

- Click the cell where you want the function applied
- Click the Insert Function button
- Choose the function
- Click OK

The process of calculating through a function is shown in following figures.

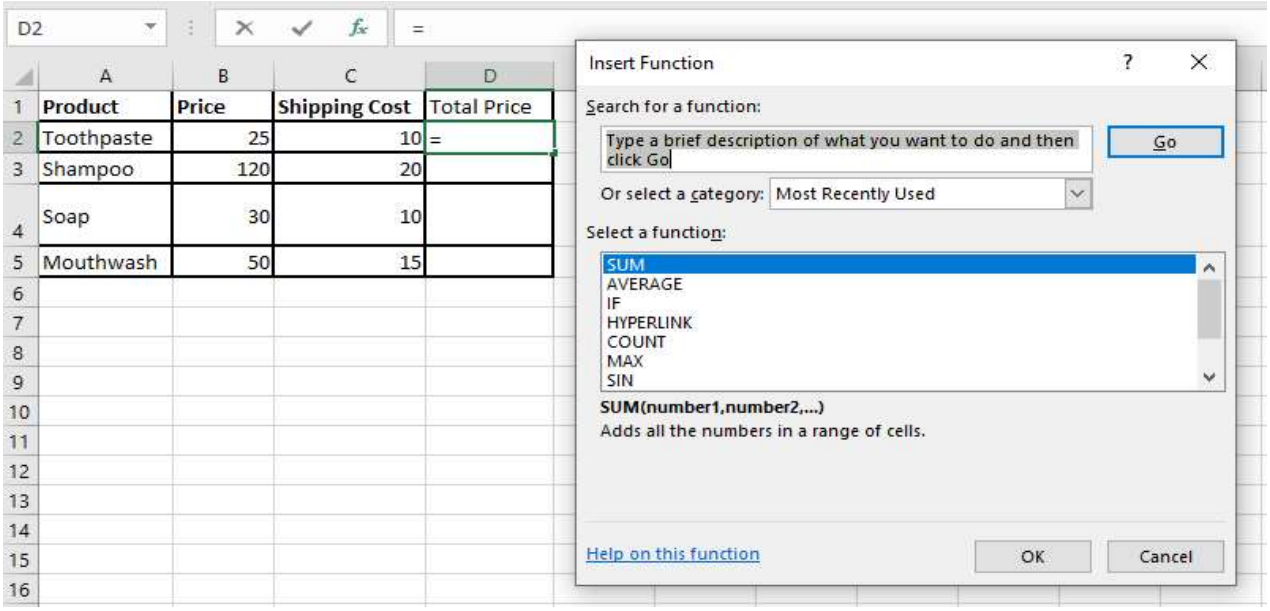


Figure 2. 27: Applying sum function

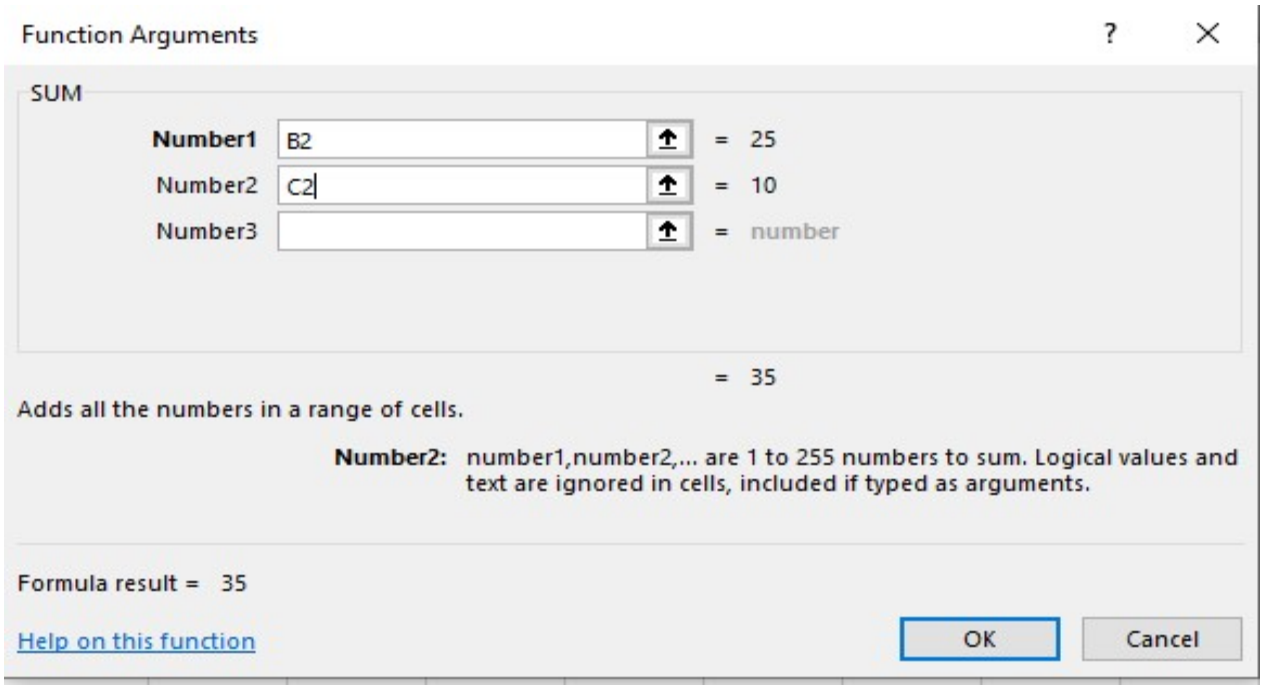


Figure 2. 28: Applying sum function

	A	B	C	D
1	**Product**	**Price**	**Shipping Cost**	Total Price
2	Toothpaste	25	10	35
3	Shampoo	120	20	
4	Soap	30	10	
5	Mouthwash	50	15	

Figure 2. 29: Output of sum function

Function Library

The function library is a large group of functions on the Formula Tab of the Ribbon.

- AutoSum: Easily calculates the sum of a range
- Recently Used: All recently used functions
- Financial: interest, cash flow return rates and additional financial functions – Logical: And, If, True, False, etc.
- Text: Text based functions
- Date & Time: Functions calculated on date and time
- Math & Trig: Mathematical Functions

The categories of Function library are shown in **Figure 2. 30.**

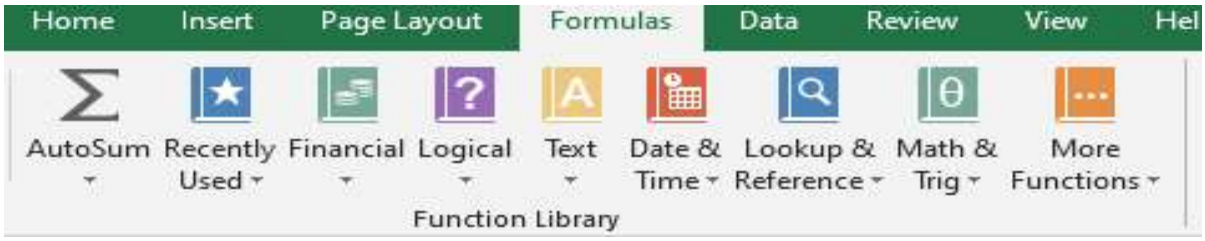


Figure 2. 30: Function Library

If-else Formula

If-else is an important formula in Microsoft Excel. There are always situations in which you need to decide what you want to do when a particular stage is reached. Suppose you want to apply 5% of tax on all those products whose price is greater than 5000 rupees. To do such a task in Microsoft Excel, you need IF-ELSE formula. Before you apply IF-ELSE formula you need the data again on which you apply the IF-ELSE formula. To apply the IF formula the data is given in **Figure 2. 31**.

Product	Price	Shipping Cost	Total Price
Toothpaste	25	10	35
Shampoo	120	20	140
Soap	30	10	40
MouthWash	50	15	65

Figure 2. 31: Sample Data

Now we want to know whether the products are expensive or cheap. To do so we would apply the IF formula. The condition for expensive is greater than or equal to 50. If the product's price is greater than or equal to 50 then it is expensive otherwise it is cheap.

To apply IF formula, you need to do the following:

- Select the cell where you want to apply the formula
- Put = (equal sign) in that cell
- Then write the if formula as shown in **Figure 2. 32**.

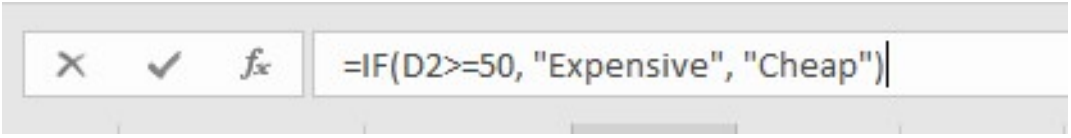


Figure 2. 32: IF formula

When you apply the formula shown in **Figure 2. 32**, you will get the result shown in **Figure 2. 33**.

	A	B	C	D	E
1	**Product**	**Price**	**Shipping Cost**	Total Price	**Decision**
2	Toothpaste	25	10	35	Cheap
3	Shampoo	120	20	140	Expensive
4	Soap	30	10	40	Cheap
5	Mouthwash	50	15	65	Expensive

Figure 2. 33: IF formula Result

Percentage Formula

There are some situations where you need to find some percent of a particular number, marks, price or the percentage of salary to incremented annually for employees. For all such tasks you need a percentage formula. We would apply a percentage formula for finding out how much sales tax to be applied on the products price. To do so we need the data i.e., prices of products. **Figure 2. 34** shows sample data for products

Product	Price	Shipping Cost	Total Price	
Toothpaste	25	10	35	
Shampoo	120	20	140	
Soap	30	10	40	
MouthWash	50	15	65	

Figure 2. 34: Data for Percentage Formula

We need to find 2% sales tax on product's prices. To do so you need to do the following:

- Select the cell where you want to apply the formula
- Put = (equal sign) in that cell
- Apply the percentage formula as shown in **Figure 2. 35**.

	A	B	C	D	E
1	**Product**	**Price**	**Shipping Cost**	**Total Price**	**Sales Tax**
2	Toothpaste	25	10	35	=D2*2/100
3	Shampoo	120	20	140	

Figure 2. 35: Percentage Formula

When you would apply the formula, you would get the required sales tax as shown in **Figure 2. 36**. Sales tax is shown in Highlighted column.

Product	Price	Shipping Cost	Total Price	Sales Tax
Toothpaste	25	10	35	0.7
Shampoo	120	20	140	2.8
Soap	30	10	40	0.8
Mouthwash	50	15	65	1.3

Figure 2. 36: Sales tax after percentage formula

7.2.5 Data Tab [Expected time = 25 min]

In Excel you need to play around data to achieve the desired goals. Therefore, the Data tab has very importance. In this tab you are given with various options that you can apply on the data in the Excel Sheet. We will not be covering everything from this ribbon shown in **Figure 2. 37**. We look at Sorting and filtering and how to get the external data from other sources.

Figure 2. 37: Data Tab

Sort & Filter

Sorting and Filtering allow you to manipulate data in a worksheet based on given set of criteria. You can sort the data in ascending and descending order. There are two types of sorts in Microsoft Excel i.e., Basic Sorts and Custom Sorts.

Basic Sort

To execute a basic descending or ascending sort based on one column perform the following steps:

- Highlight the cells that will be sorted
- Click the Sort & Filter button on the Home tab
- Click the Sort Ascending (A-Z) button or Sort Descending (Z-A) button

These steps are shown in **Figure 2. 38**.

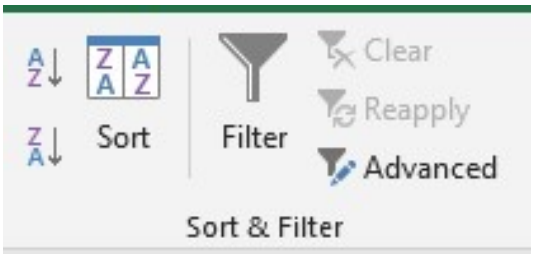


Figure 2. 38: Sort and Filter

Custom Sort

To sort on the basis of more than one column:

- Click the Sort & Filter button on the Home tab
- Choose which column you want to sort by first
- Click Add Level
- Choose the next column you want to sort
- Click OK

This process is represented in following figures.

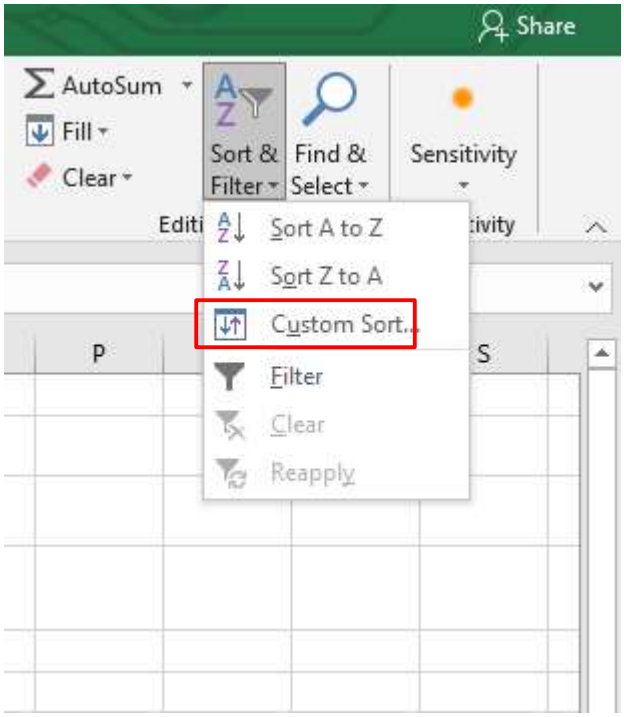


Figure 2. 39: Custom Sort

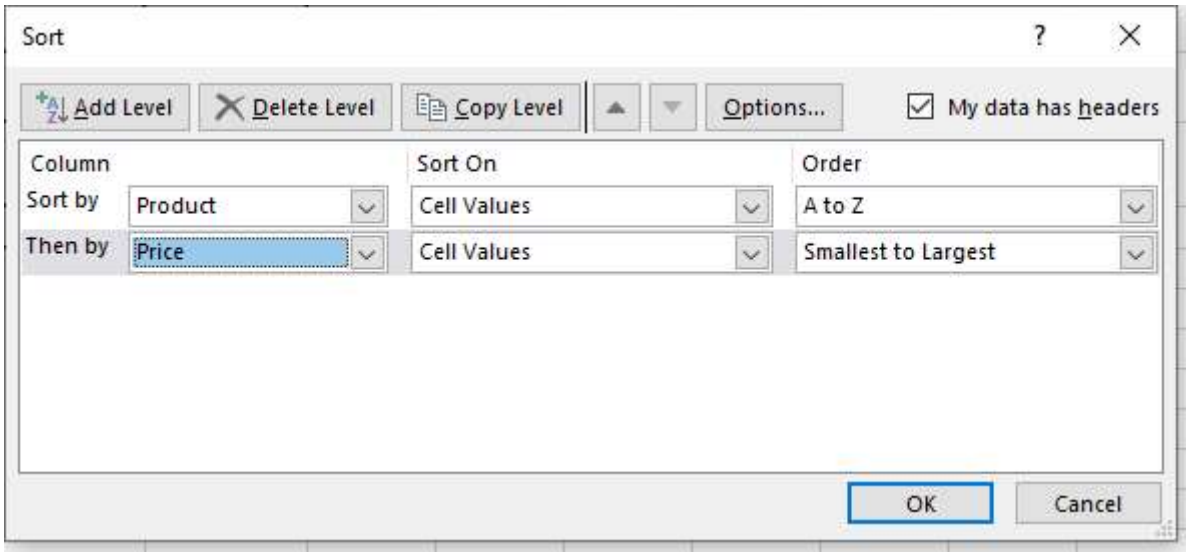


Figure 2. 40: Custom Sort column selection

Get and Transform Data

This section of Data tab gives you the option of importing data from other sources. As you can see in **Figure 2. 41** various sources have been shown from where you can get the data. The data sources are Access, Web, and Text etc.

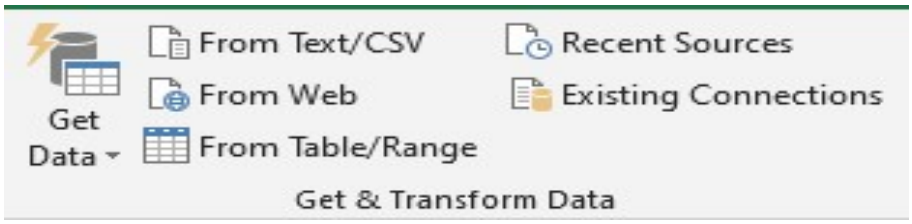


Figure 2. 41: Get and Transform Data

Data from File

Suppose you have created some data and that data is stored in some other file. You need that data in your Excel sheet. To get the data from the file click on "From File" option given in the Get Data section. When you click the option a dialog box would appear asking you to choose your data location. This dialog box is shown in **Figure 2. 42**.

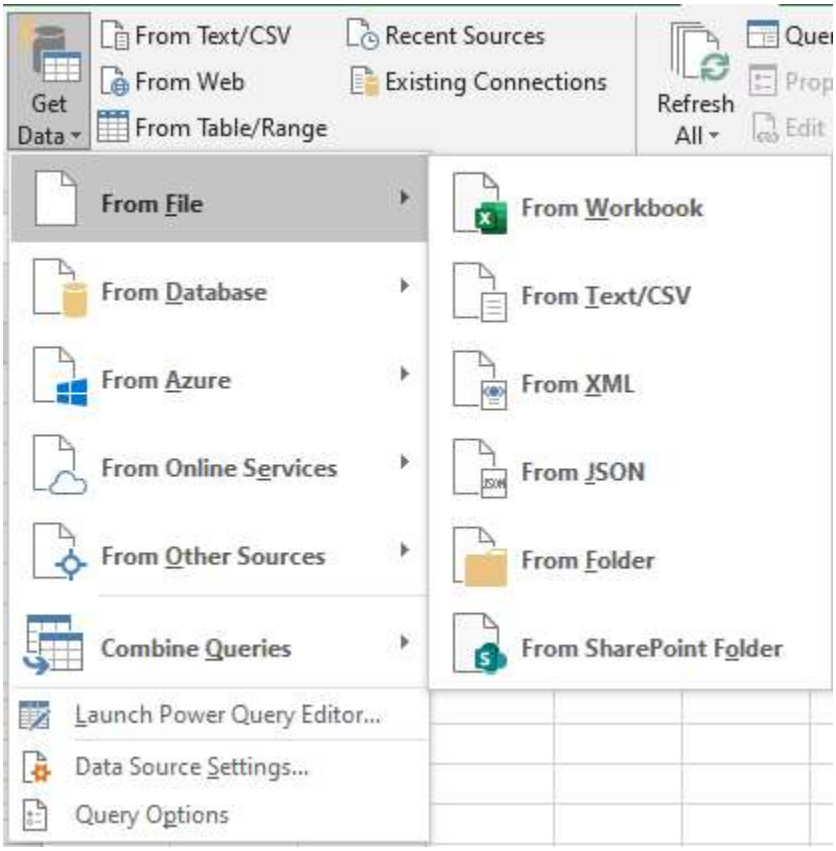


Figure 2. 42: Data from file

Click on New source button. When you click on this button, a wizard would appear which would ask you to choose the type of data. This wizard is shown in **Figure 2. 43**.

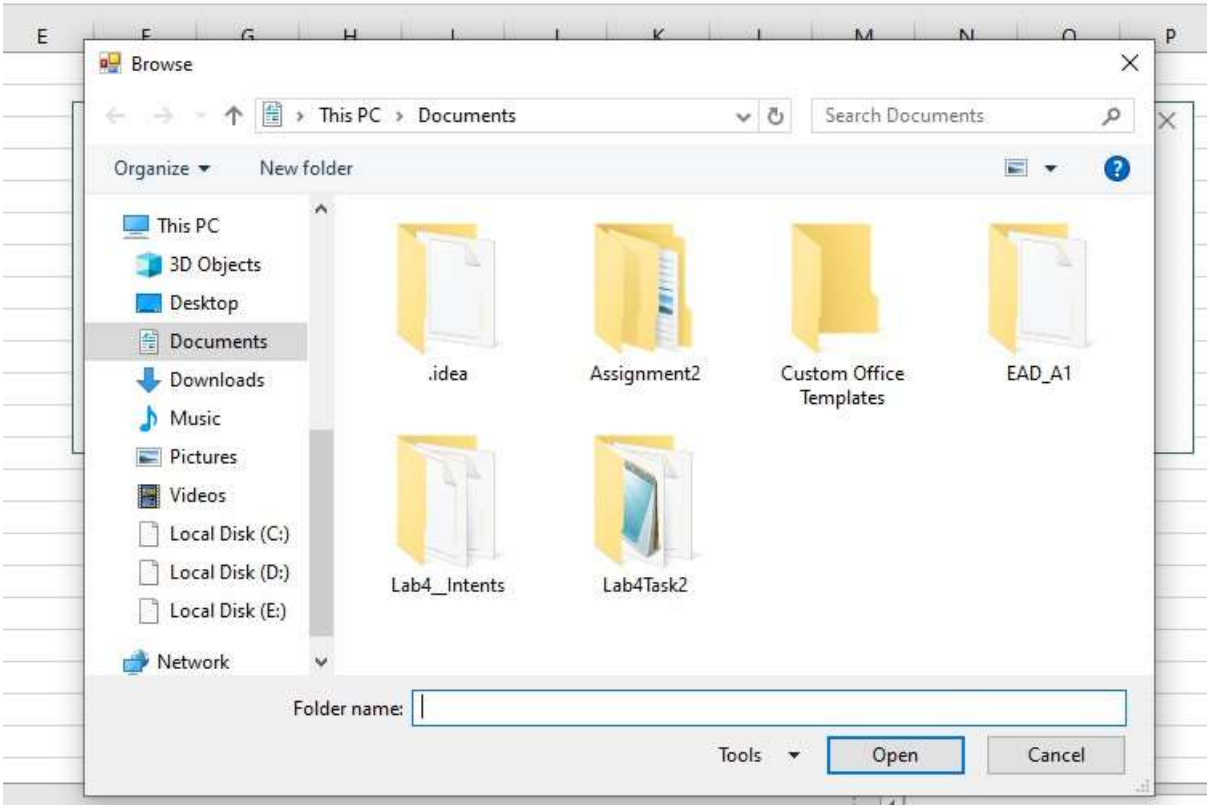


Figure 2. 43: Selecting Data Source Wizard

8. Practice Tasks [Expected time = 30 min]

You are given the sheet below in Table 1. You are supposed to create an Excel spreadsheet and fill in the data and then complete the tasks given below. The data is given in the table. Copy this data into a newly created Excel sheet.

Table 2.3.: Sample data for Practice Tasks

S. No	S. Name	1st Term (50)	2nd Term (50)	Obt. Marks	Total Marks	%age	Grade
1	Huma	20	25		100		
2	Awais	22	12		100		
3	Ali	33	25		100		
4	Musab	21	33		100		
5	Musawar	32	22		100		
6	Mariam	25	32		100		
7	Sumbal	32	34		100		
8	Hammad	22	22		100		
9	Naveed	26	20		100		
10	Ashraf	28	18		100		

8.1 Calculate the obtained marks for the two terms

8.2 After calculating the marks find the percentage

8.3 Then apply the if formula and calculate the grades according to the MAJU scheme as given in the following table

Table 2.4: Grading Scheme for Practice Tasks

Grade	Marks
A	>= 90
A-	>85 && <90
B+	>80 && <=85
B	>75 && <=80
B-	>71 && <=75
C+	>65 && <=71
C	>61 && <=65
C-	>56 && <= 60
D+	>52 && <=56
D	>50 && <=52
F	<50

8.4 Sort the grades in ascending order

8.5 Plot the data into a bar chart that shows the relationship between 1st term, 2nd term and total obtained marks. A sample is shown below in the **Figure 2. 44**.

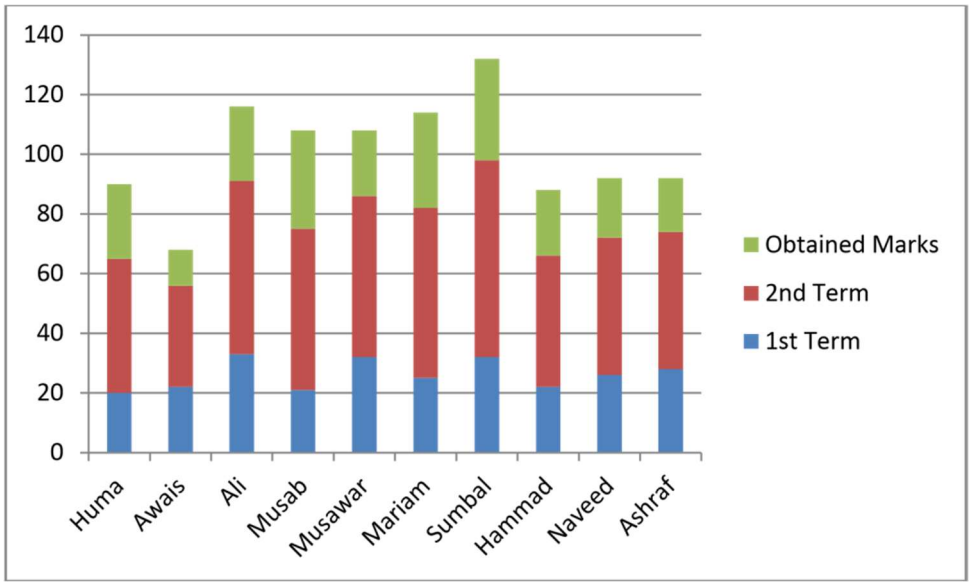


Figure 2. 44: Expected Outcome of Task 8.5

9. Evaluation Criteria

The evaluation criteria for this lab will be based on the completion of the following tasks. Each task is assigned the marks percentage which will be evaluated by the instructor in the lab whether the student has finished the complete/partial task(s)

Table 2.5: Evaluation of the Lab

Sr. No	Task No.	Task Description	Grade
1	5.1	Homework	20
2	6.1	Understanding Excel Layout	5
3	6.2	Walkthrough Tasks	5
4	7. 1-7.5	Practice Tasks	30
5		Quiz	40

10. Further Reading

- Free MS EXCEL tutorial: o
  http://www.gcflearnfree.org/excel

Week 08 Lab 08: Introduction to Database Management System

Contents

Introduction to database Management System

1. Introduction:

Database Management Systems (DBMS) are software systems used to store, retrieve, and run queries on data. A DBMS serves as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database.

DBMS manage the data, the database engine, and the database schema, allowing for data to be manipulated or extracted by users and other programs. This helps provide data security, data integrity, concurrency, and uniform data administration procedures.

DBMS optimizes the organization of data by following a database schema design technique called normalization, which splits a large table into smaller tables when any of its attributes have redundancy in values. DBMS offer many benefits over traditional file systems, including flexibility and a more complex backup system.

Database management systems can be classified based on a variety of criteria such as the data model, the database distribution, or user numbers. The most widely used types of DBMS software are relational, distributed, hierarchical, object-oriented, and network.

2. Microsoft Access

Microsoft Access has the look and feel of other Microsoft Office products as far as its layout and navigational aspects are concerned, but MS Access is a database and, more specifically, a relational database.

- Before MS Access 2007, the file extension was *.mdb, but in MS Access 2007 the extension has been changed to *.accdb extension.
- Early versions of Access cannot read accdb extensions but MS Access 2007 and later versions can read and change earlier versions of Access.
- An Access desktop database (.accdb or .mdb) is a fully functional RDBMS.
- It provides all the data definition, data manipulation, and data control features that you need to manage large volumes of data.
- You can use an Access desktop database (.accdb or .mdb) either as a standalone RDBMS on a single workstation or in a shared client/server mode across a network.
- A desktop database can also act as the data source for data displayed on webpages on your company intranet.
- When you build an application with an Access desktop database, Access is the RDBMS.

3. Data Definition

Let us now understand what Data Definition is:

- In document or a spreadsheet, you generally have complete freedom to define the contents of the document or each cell in the spreadsheet.
- In a document, you can include paragraphs of text, a table, a chart, or multiple columns of data displayed with multiple fonts.
- In spreadsheet, you can have text data at the top to define a column header for printing or display, and you might have various numeric formats within the same column, depending on the function of the row.
- An RDBMS allows you to define the kind of data you have and how the data should be stored.
- You can also usually define rules that the RDBMS can use to ensure the integrity of your data.
- For example, a validation rule might ensure that the user can't accidentally store alphabetic characters in a field that should contain a number.

4. Data Manipulation

Working with data in RDBMS is very different from working with data in a word processing or spreadsheet program.

- In a word processing document, you can include tabular data and perform a limited set of functions on the data in the document.
- You can also search for text strings in the original document and, with ActiveX controls, include tables, charts, or pictures from other applications.
- In a spreadsheet, some cells contain functions that determine the result you want, and in other cells, you enter the data that provides the source information for the functions.

An RDBMS provides you many ways to work with your data. For example,

- You can search a single table for information or request a complex search across several related tables.
- You can update a single field or many records with a single command.

- You can write programs that use RDBMS commands to fetch data that you want to display and allow the user to update the data.

Access uses the powerful SQL database language to process data in your tables. Using SQL, you can define the set of information that you need to solve a particular problem, including data from perhaps many tables.

5. Data Control

Spreadsheets and word processing documents are great for solving single-user problems, but they are difficult to use when more than one person needs to share the data.

- When you need to share your information with others, RDBMS gives you the flexibility to allow multiple users to read or update your data.
- An RDBMS that is designed to allow data sharing also provides features to ensure that no two people can change the same data at the same time.
- The best systems also allow you to group changes (which is also known as transaction) so that either all the changes or none of the changes appear in your data.
- You might also want to be sure that no one else can view any part of the order until you have entered all of it.
- Because you can share your Access data with other users, you might need to set some restrictions on what various users are allowed to see or update.

6. MS Access Objects

MS Access uses “objects" to help the user list and organize information, as well as prepare specially designed reports. When you create a database, Access offers you Tables, Queries, Forms, Reports, Macros, and Modules. Databases in Access are composed of many objects but the following are the major objects:

- Tables
- Queries
- Forms
- Reports

Tables:

Table is an object that is used to define and store data. When you create a new table, Access asks you to define fields which is also known as column headings.

- Each field must have a unique name, and data type.
- Tables contain fields or columns that store different kinds of data, such as a name or an address, and records or rows that collect all the information about a particular instance of the subject, such as all the information about a customer or employee etc.
- You can define a primary key, one or more fields that have a unique value for each record, and one or more indexes on each table to help retrieve your data more quickly.

Query:

An object that provides a custom view of data from one or more tables. Queries are a way of searching for and compiling data from one or more tables.

- Running a query is like asking a detailed question of your database.
- When you build a query in Access, you are defining specific search conditions to find exactly the data you want.
- In Access, you can use the graphical query by example facility or you can write Structured Query Language (SQL) statements to create your queries.
- You can define queries to Select, Update, Insert, or Delete data.
- You can also define queries that create new tables from data in one or more existing tables.

Form:

Form is an object in a desktop database designed primarily for data input or display or for control of application execution. You use forms to customize the presentation of data that your application extracts from queries or tables.

- Forms are used for entering, modifying, and viewing records.
- The reason forms are used so often is that they are an easy way to guide people toward entering data correctly.
- When you enter information into a form in Access, the data goes exactly where the database designer wants it to go in one or more related tables.

Report:

Report is an object in desktop databases designed for formatting, calculating, printing, and summarizing selected data.

- You can view a report on your screen before you print it.
- If forms are for input purposes, then reports are for output.
- Anything you plan to print deserves a report, whether it is a list of names and addresses, a financial summary for a period, or a set of mailing labels.
- Reports are useful because they allow you to present components of your database in an easy-to-read format.
- You can even customize a report's appearance to make it visually appealing.
- Access offers you the ability to create a report from any table or query.

7. How to create database

In this chapter, we will be covering the basic process of starting Access and creating a database. This chapter will also explain how to create a desktop database by using a template and how to build a database from scratch.

To create a database from a template, we first need to open MS Access and you will see the following screen in which different Access database templates are displayed.

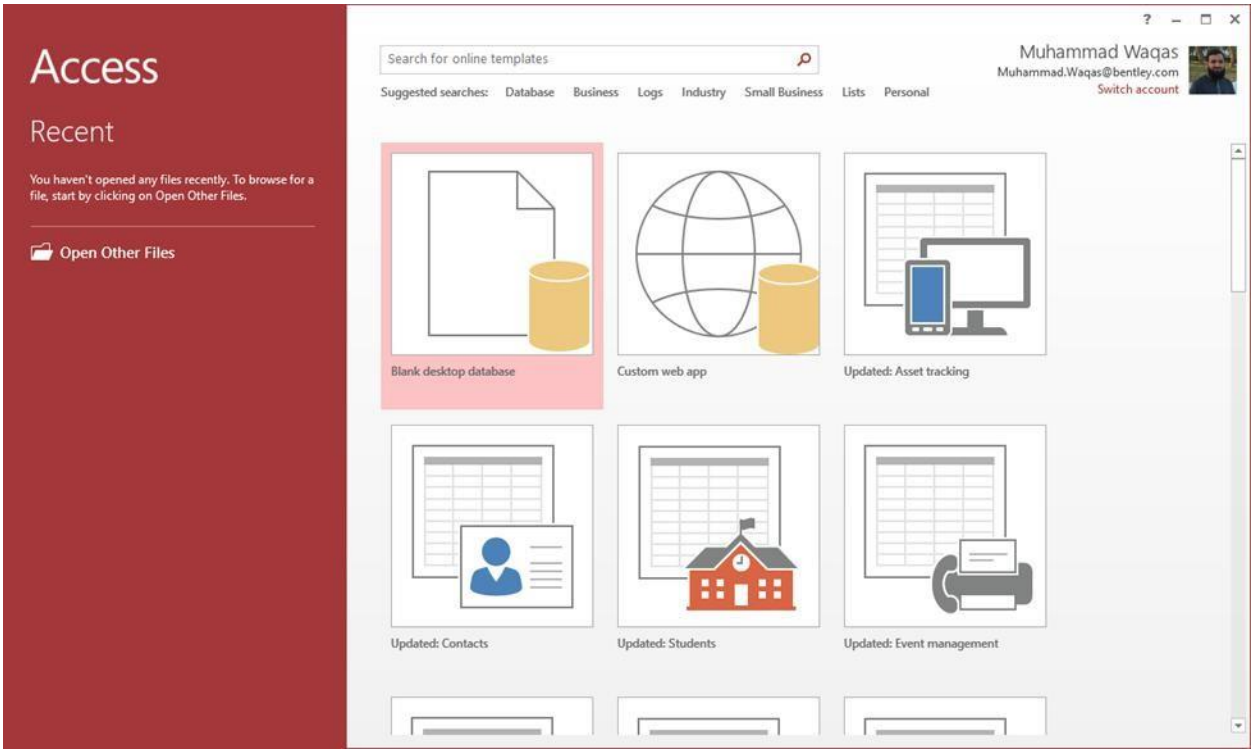


Figure 1.1 Blank database

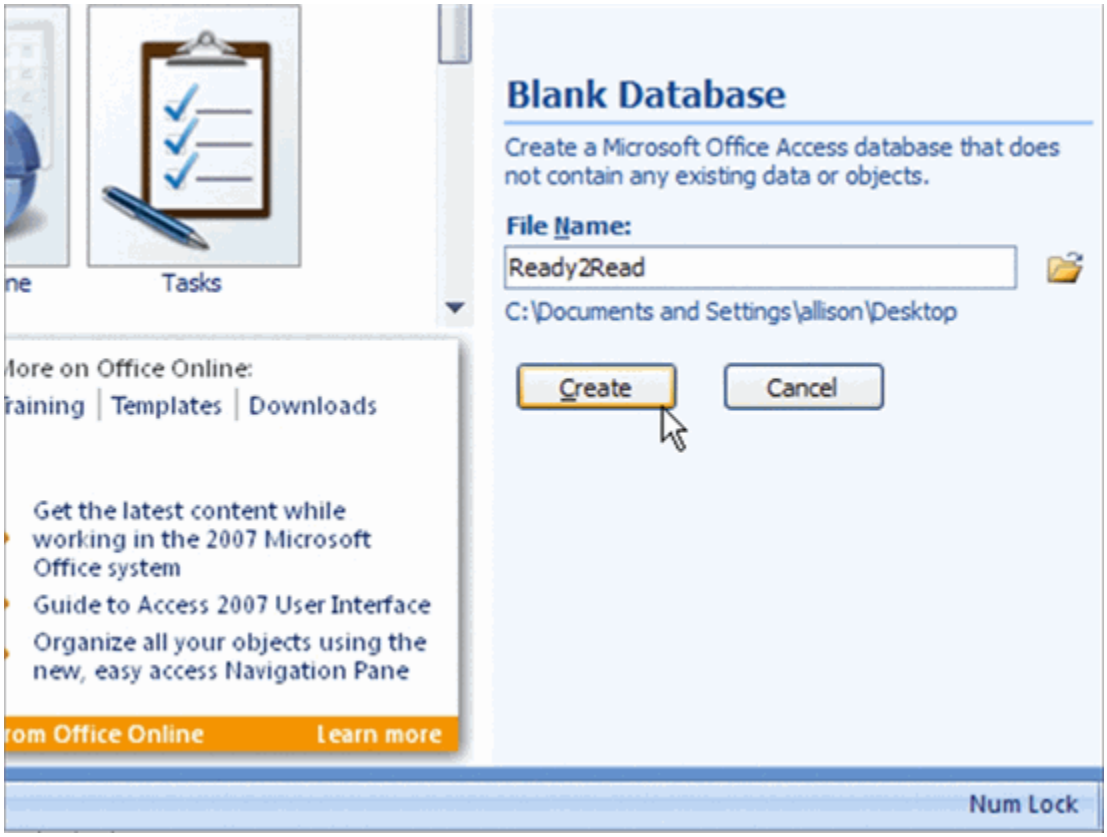


Figure 1.2 Create database

Setting up tables.

Access will create a new blank database and will open up the table which is also completely blank.

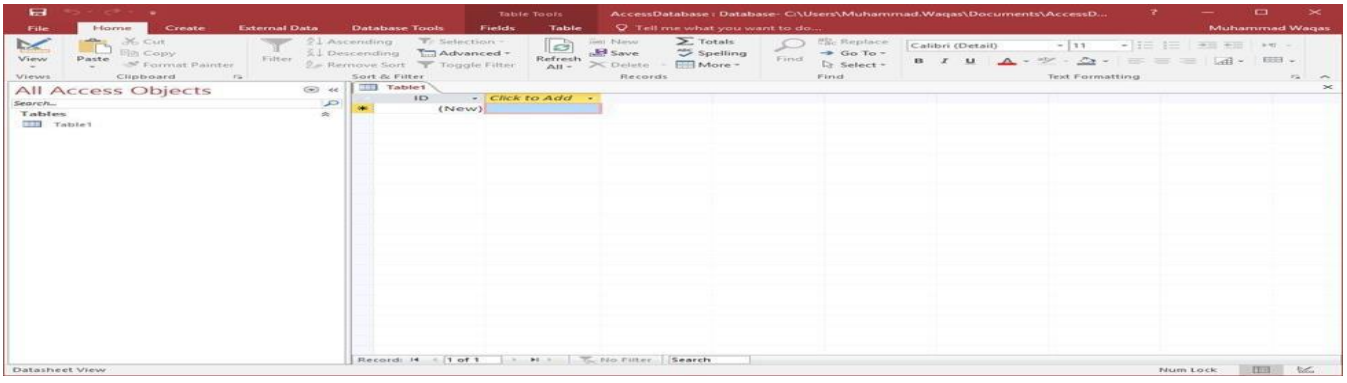


Figure 1.3 Create New table.

8. Data types

Every field in a table has properties and these properties define the field's characteristics and behavior. The most important property for a field is its data type. A field's data type determines what kind of data it can store. MS Access supports different types of data, each with a specific purpose.

- The data type determines the kind of the values that users can store in any given field.
- Each field can store data consisting of only a single data type.
- Here are some of the most common data types you will find used in a typical Microsoft Access database.

Here are some of the most common data types you will find used in a typical Microsoft Access database.

Type of Data	Description	Size
Short Text	Text or combinations of text and numbers, including numbers that do not require calculating (e.g. phone numbers).	Up to 255 characters.
Long Text	Lengthy text or combinations of text and numbers.	Up to 63, 999 characters.
Number	Numeric data used in mathematical calculations.	1, 2, 4, or 8 bytes (16 bytes if set to Replication ID).
Date/Time	Date and time values for the years 100 through 9999.	8 bytes.
	Currency values and numeric data used in	

Currency	mathematical calculations involving data with one to four decimal places.	8 bytes.
AutoNumber	A unique sequential (incremented by 1) number or random number assigned by Microsoft Access whenever a new record is added to a table.	4 bytes (16 bytes if set to Replication ID).
Yes/No	Yes and No values and fields that contain only one of two values (Yes/No, True/False, or On/Off).	1 bit.

Table 1.1 Data types

Introduction to SQL

Learning Objective

After completing this lab the student should be able to:

- What is Schemas?
- Understand and familiar with default schemas provided by oracle 11g.
- Understand of Sql statements.
- Apply DML statements in default schemas.
- Apply queries in schema.

Tools and Technologies

- Microsoft Access.

Schemas

A schema is the set of metadata (data dictionary) used by the database, typically generated using DDL. A schema defines attributes of the database, such as tables, columns, and properties. A database schema is a description of the data in a database.

Most Oracle database installations traditionally come with a default schema called HR, Scott etc., after the installation process has set up the sample tables.

HR Schema

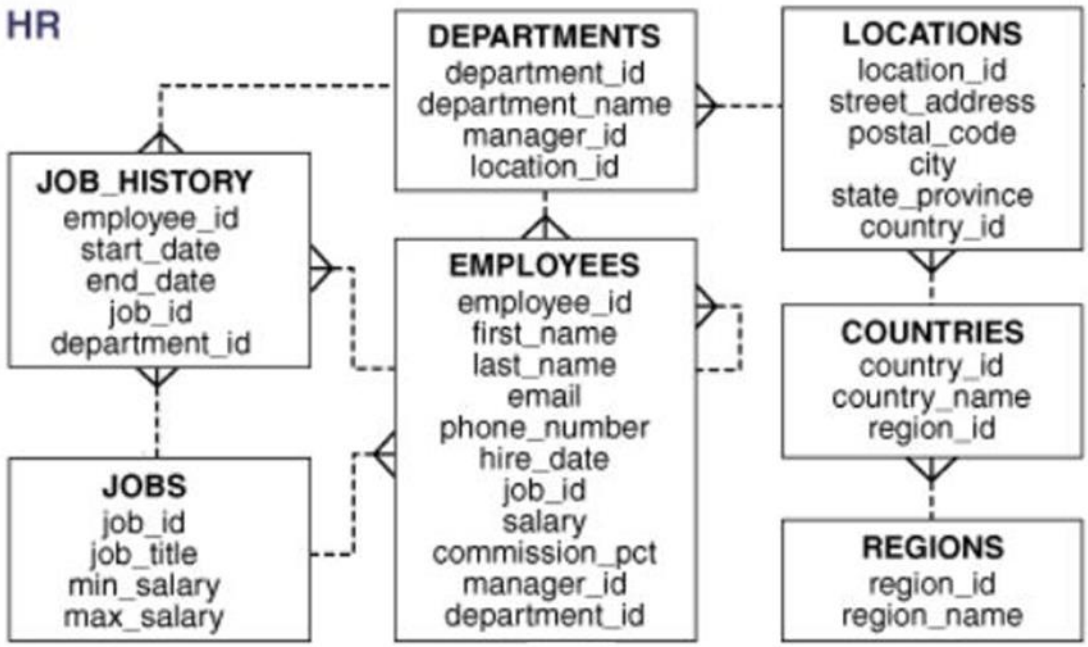
During the course/lab we would be using HR Schema. Its better to take an insight of HR Schema first. In the Human Resource (HR) records, each employee has an identification number, e-mail address, job identification code, salary, and manager. Some employees earn commissions in addition to their salary.

The company also tracks information about jobs within the organization. Each job has an identification code, job title, and a minimum and maximum salary range for the job.

Some employees have been with the company for a long time and have held different positions within the company. When an employee resigns, the duration the employee was working, the job identification number, and the department are recorded.

The sample company is regionally diverse, so it tracks the locations of its warehouses and departments. Each employee is assigned to a department, and each department is identified either by a unique department number or a short name. Each department is associated with one location, and each location has a full address that includes the street name, postal code, city, state or province, and the country code.

In places where the departments and warehouses are located, the company records details such as the country name, currency symbol, currency name, and the region where the country is located geographically.



HR Table Descriptions

Table **COUNTRIES**

Name	Null?	Type
COUNTRY_ID	NOT NULL	CHAR(2)
COUNTRY_NAME		VARCHAR2(40)
REGION_ID		NUMBER

Table **DEPARTMENTS**

Name	Null?	Type
DEPARTMENT_ID	NOT NULL	NUMBER(4)
DEPARTMENT_NAME	NOT NULL	VARCHAR2(30)
MANAGER ID		NUMBER(6)
LOCATION ID		NUMBER(4)

Table **EMPLOYEES**

Name	Null?	Type
EMPLOYEE_ID	NOT NULL	NUMBER(6)
FIRST_NAME		VARCHAR2(20)
LAST NAME	NOT NULL	VARCHAR2(25)
EMAIL	NOT NULL	VARCHAR2(25)
PHONE_NUMBER		VARCHAR2(20)
HIRE_DATE		NOT NULL DATE
JOB_ID		NOT NULL VARCHAR2(10)
SALARY		NUMBER(8,2)
COMMISSION PCT		NUMBER(2,2)
MANAGER ID		NUMBER(6)
DEPARTMENT_ID		NUMBER(4)

Table JOBS

Name	Null?	Type
JOB_ID	NOT NULL	VARCHAR2(10)
JOB_TITLE	NOT NULL	VARCHAR2(35)
MIN_SALARY		NUMBER(6)
MAX_SALARY		NUMBER(6)

Table JOB_HISTORY

Name	Null?	Type
EMPLOYEE_ID	NOT NULL	NUMBER(6)
START_DATE	NOT NULL	DATE
END_DATE	NOT NULL	DATE
JOB_ID	NOT NULL	VARCHAR2(10)
DEPARTMENT_ID		NUMBER(4)

Table LOCATIONS

Name	Null?	Type
LOCATION_ID	NOT NULL	NUMBER(4)
STREET_ADDRESS		VARCHAR2(40)
POSTAL_CODE		VARCHAR2(12)
CITY	NOT NULL	VARCHAR2(30)
STATE_PROVINCE		VARCHAR2(25)
COUNTRY_ID		CHAR(2)

Table REGIONS

Name	Null?	Type
REGION_ID	NOT NULL	NUMBER
REGION_NAME		VARCHAR2(25)

Write SQL statements are not case sensitive.

- SQL statements can be on one or more lines.
- Keywords cannot be abbreviated or split across lines.
- Clauses are usually placed on separate lines.
- Tabs and indents are used to enhance readability Basic SQL Statements.

Executing SQL Statements

- Place a semicolon (;) at the end of the last clause.
- Place a slash on the last line in the buffer.
- Place a slash at the SQL prompt.

Tables/Views with in a schema

To view all tables and views with in a schema.

SELECT * FROM tab

Selecting all Columns

You can display all columns of data in a table by following the SELECT keyword with an asterisk (*).

SELECT * FROM employees;
Or
SELECT * FROM
departments;

Selecting specific Columns

You can use the SELECT statement to display specific columns of the table by specifying the column names, separated by commas.

e.g

SELECT department_id, department_name
FROM departments;

Arithmetic expressions

- You may need to modify the way in which data is displayed, perform calculation, or look at what-if scenarios. This is possible using arithmetic expressions. An arithmetic expression may contain column names, constant numeric values, and the arithmetic operators.
- List of arithmetic operators available in SQL are + Add, - Subtract, * Multiply, / Divide
- You can use arithmetic operators in any clause of a SQL statement except the FROM clause.
- If an arithmetic expression contains more than one operator then multiplication and division are evaluated first.
- If operators within an expression are of same priority, then evaluation is done from left to right.
- You can use parentheses to force the expression within parentheses to be evaluated first.

Example

SELECT Employee_ID, First_Name, Salary, 12*Salary+100 from employees;
will give different result from

SELECT **Employee_ID, First_Name, Salary, 12*(Salary+100) from employees;**

Null value

If a row lacks the data value for a particular column, that value is said to be null, or to contain null. A null value is a value that is unavailable, unassigned. unknown, or inapplicable. A null value is not the same as zero or a space. Zero is a number and space is a character.

If any column value is an arithmetic expression is null, the result is null. For e.g, if you attempt to perform division with zero, you get an error. However if you divide a number by null, the result is a null or unknown.

Column alias

Specify the alias after the column in the SELECT list using space as a separator. By default alias heading appear in uppercase. If the alias contains spaces, special character (such as # or $), or is case sensitive, enclose the alias in double quotation marks (“ “).

Example

```
SELECT first_name AS Name from employees;
SELECT first_name “Name”, salary*12 “Annual Salary” from employees;
```

Eliminating duplicate rows

To eliminate duplicate rows in the result, include the DISTINCT keyword in the SELECT clause immediately after the SELECT keyword.

Example

```
Display the all unique department number from employees table
SELECT DISTINCT department_id from employees;
```

Displaying table structure

In SQL* Plus you can display the structure of a table using the DESCRIBE command.

```
DESCRIBE employees;
```

Limiting rows selected

You can restrict the rows returned from the query by using the **WHERE clause**.A WHERE clause contains a condition that must be met and it directly follows the FORM clause.

The WHERE clause can compare values in columns, literal values, arithmetic expressions or functions. The WHERE clause consists of three elements: Column name, Comparison operator, Column name, constant or list of values

Display the first name, job title, department number for those employees whose job tile is 'AD_PRES'

Example

```
SELECT first_name, job_id, department_id
FROM employees
WHERE job_id='AD_PRES';
```

Character strings and dates in the WHERE clause must be enclosed in single quotation marks (' ') Number constants however should not. All character searches are case sensitive.
The default date display is DD-MON-YY.

Comparison operators

Comparison operators are used in conditions that compare one expression to another.

The operators are

- = Equal to
- >Greater than
- >= Greater than or equal to
- < Less than
- <= Less than or equal to
- < > Not equal to

They are used in the WHERE clause in following format.

Syntax

WHERE expr operator value

Write a query to display the first name, salary for those employees whose salary is less than 10000.

Example

```
SELECT first_name, salary from employees where salary<=10000;
```

Other comparison operators

- BETWEEN …AND…. Between two values (inclusive)
- IN (list) Match any of a list of values
- LIKE Match a character pattern
- IS NULL Is a null value

You can display rows based on a range of values using the BETWEEN operator. The range that you specify contains a lower range and an upper range.
Example

```
SELECT first_name, salary from
employees
where salary between 1000 and
1500;
```

To test for values in a specified list use the IN.

Example

Create a report to display the employee number, first name, salary and manager for the employees with the manager number in 100,102 and 103.

```
SELECT employee_id,first_name, salary,manager_id from
employees where manager_id in (100,102,103);
```

You can select rows that match a character pattern by using the LIKE operator. The character pattern-matching operation is referred to as wild card search. Two symbols can be used to construct the search string.

- *Represents any sequence of zero or more character.
- ?Represents any single character.

Example

SELECT first_name from employees where first_name like 'S*';
SELECT first_name from employees where first_name like '?A*';

Null operator

The IS NULL operator tests for values that are null. A null value means the value is unavailable, unassigned, unknown or inapplicable. Therefore you cannot test with (=) because a null value cannot be equal or unequal to any value.

Example

SELECT first_name,manager_id from employees where manager_id is null;

Lab Exercise

Q1 You are required to read the lab manual and implement all the queries mentioned in the manual. (5 marks)

Q2 Display all records whose first name contains ‘a’; (2 marks)

Q3 Write a query to display employee number, salary and manager number of those employees Whose salary range 2000 to 8000 (3 marks)

Q4 Show all employee record whose salary in less than 5000. (2 marks)

Q5 Display job number, employee id and salary of those employee whose salary is 2000, 5000 and 8000 (3 marks).

Q6 Show joining date of those employees whose department number is null (3 marks)

Q7 Write a query to display all records in countries table.

Lab Instructor:

Qazi Shuja ud Din (Riphah International University)
Email: qazi.shujauddin@riphah.edu.pk

Contents

Data visualization

Learning Objective

Topic covered in this lab.

- How to import dataset in Kaggale
- How to use pandas libraires
- How to visualize data using pandas libraires

1. Introduction:

Certainly! Pandas is a powerful and widely used open-source data manipulation and analysis library for Python. It provides data structures and functions designed to make working with structured data quick, easy, and intuitive.

2. Key Features

1. DataFrame: Pandas introduces a DataFrame object, which is a two-dimensional tabular, mutable data structure with labeled axes (rows and columns).

2. Data Input and Output: Pandas has robust capabilities for reading and writing data from different file formats such as CSV, Excel, SQL, JSON, and more.

3. Data Selection and Manipulation: Pandas allows for easy data selection, slicing, filtering, and manipulation using various methods like indexing, boolean indexing, and merging of datasets.

4. Data Aggregation and Grouping: Pandas provides functionality for grouping data, aggregating results, and performing operations on groups of data.

5. Handling Missing Data: It offers methods to identify and handle missing or NaN values within datasets.

6. Time Series Analysis: Pandas has dedicated support for working with time series data, making it a popular choice for financial and economic data analysis.

7. Data Visualization: While not a primary focus, Pandas provides basic plotting and visualization tools for quick data exploration.

Overall, Pandas is widely used in data science, machine learning, financial analysis, and other domains where data manipulation and analysis are an essential part of the workflow. Its ease of use and extensive capabilities make it a popular choice for data handling in Python.

3. Reading and Writing Data

- Reading and Writing CSV Files:
  - `pandas.read_csv`: Read data from a CSV file into a DataFrame.
  - `DataFrame.to_csv`: Write DataFrame to a CSV file.

- Reading and Writing Excel Files:
  - `pandas.read_excel`: Read data from an Excel file into a DataFrame.
  - `DataFrame.to_excel`: Write DataFrame to an Excel file.

- Reading and Writing JSON Files:
  - `pandas.read_json`: Read data from a JSON file into a DataFrame.
  - `DataFrame.to_json`: Write DataFrame to a JSON file.

- Reading and Writing SQL Database:
  - `pandas.read_sql`: Read data from a SQL database into a DataFrame.
  - `DataFrame.to_sql`: Write DataFrame to a SQL database.

- Reading and Writing HTML:
  - `pandas.read_html`: Read HTML tables into a list of DataFrame objects.
  - `DataFrame.to_html`: Render a DataFrame as an HTML table.

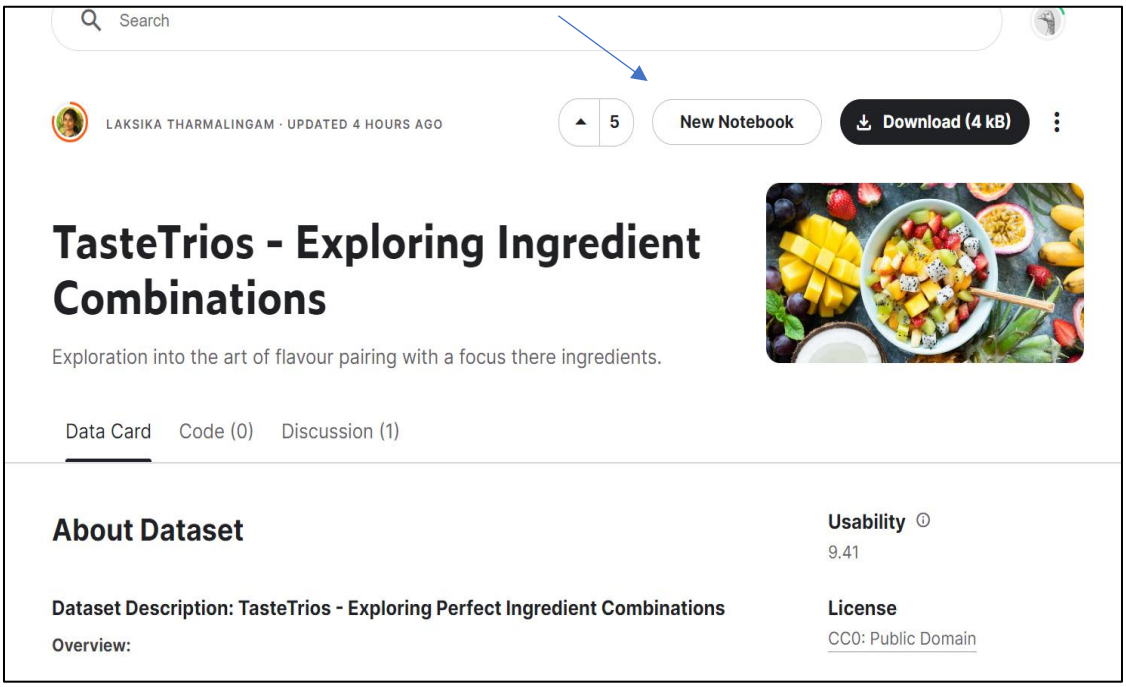
- 6. Reading and Writing Parquet Files:
  - `pandas.read_parquet`: Read data from a Parquet file into a DataFrame.
  - `DataFrame.to_parquet`: Write DataFrame to a Parquet file.

- Reading and Writing Feather Files:
    - `pandas.read_feather`: Read data from a Feather binary file into a DataFrame.
    - `DataFrame.to_feather`: Write DataFrame to a Feather binary file.

These capabilities make `pandas` a versatile library for working with data from various sources, including flat files, databases, and web-based data formats. The functions provide a consistent and easy-to-use interface for data input and output, making data manipulation and analysis more accessible and efficient.

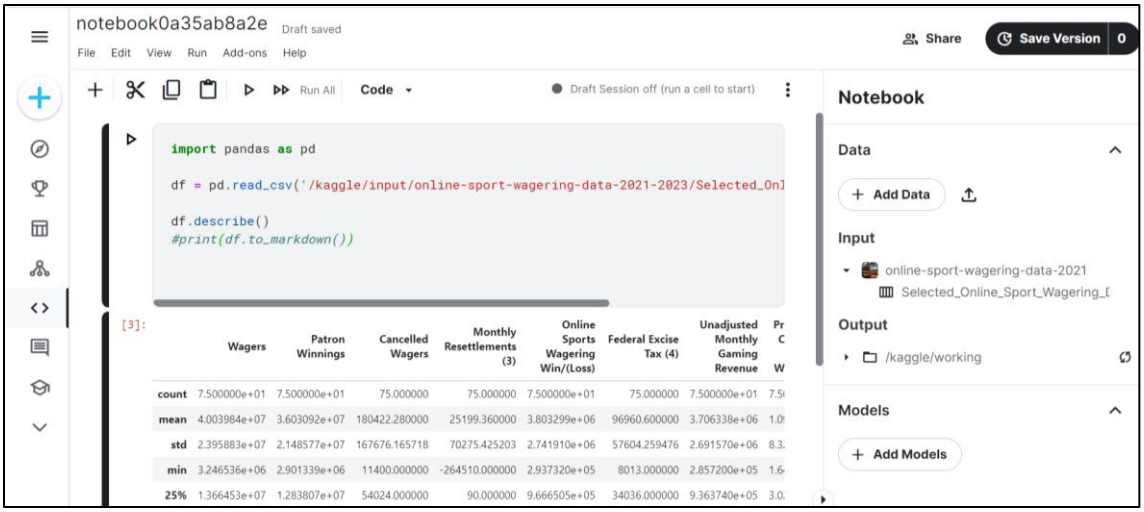
4. Import Csv file through Kaggle

- Open the data set in the Kaggle.
- Top right creates new Notebook.



Create New Notebook

- On right side clik the input dataset and copy the pate and place it into pd.read.csv
df = pd.read_csv('/kaggle/input/tastetrios-exploring-ingredient-combinations/TasteTrios - Sheet1.csv')



5. Panda's functions

Data Exploration:

- `Head`: Return the first n rows of the DataFrame.
- `Tail`: Return the last n rows of the DataFrame.
- `Info`: Print a concise summary of the DataFrame, including the index dtype and column dtypes, non-null values, and memory usage.

Data Selection and Indexing

- `loc`: Access a group of rows and columns by label(s) or a boolean array.
- `iloc`: Purely integer-location based indexing for selection by position.
- `at`: Access a single value for a row/column label pair.
- `iat`: Access a single value for a row/column pair by integer position.

Data Manipulation and Analysis

- `merge`: Merge DataFrames using a database-style join.
- `concat`: Concatenate pandas objects along a particular axis.
- `groupby`: Group DataFrame using a mapper or by a Series of columns.
- `pivot_table`: Create a spreadsheet-style pivot table as a DataFrame.

Data Visualization:

- `plot`: Make plots of Series or DataFrame.
- `hist`: Draw histogram of the input Series.
- `boxplot`: Make a box plot from DataFrame columns.

Lab Task

Open your excel data set in Kaggle analyze you data using pandas libraries.

Contents

HTML

Learning objective

Topic covered in this lab.

- Introduction to html
- Html file extension.
- IDE use for html
- Html basic layout
- Introduction to Html tags
- How to design forms using html
- HTML elements
- Introduction to HTML 5
- Semantic Tags

1. Introduction

HTML, which stands for Hypertext Markup Language, is the standard markup language used to create and design web pages. It is the backbone of most websites, providing the structure and content for the web pages you see on the internet. HTML is not a programming language; instead, it is a markup language that uses tags to define elements within a document.

Here are some key concepts to understand about HTML:

Extension of HTML file

HTML files typically have a file extension of ".html". This extension is used to identify and differentiate HTML files from other types of files. For example:

2. HTML Document Structure

```
<!DOCTYPE html>

<html>

<head>

   <title>Your Page Title</title>
```

```
</head>
<body>
  <!-- Content goes here -->
</body>
</html>
```

- <!DOCTYPE html>: This declaration defines the document type and version of HTML being used (in this case, HTML5).
- <html>: The root element that wraps all the content on the page.
- <head>: Contains meta-information about the HTML document, such as the title.
- <title>: Sets the title of the HTML document (displayed on the browser tab).
- <body>: Contains the main content of the HTML document.

3. HTML Tags:

Tags are used to define HTML elements. They are enclosed in angle brackets (<>). Tags often come in pairs, with an opening tag and a closing tag. The content is placed between the opening and closing tags.

Example

```
<h1>This is a Heading</h1>
<p>This is a paragraph.</p>
```

4. Common HTML Elements

- <h1>, <h2>, ..., <h6>: Headings of different levels.
- <p>: Paragraph.
- <a>: Anchor, used for creating hyperlinks.
- <img>: Image.
- , <ol>, <li>: Unordered list, ordered list, list item.
- : Division, used for grouping content.
- : Inline container.
-
: Line break.
- <hr>: Horizontal rule.

5. HTML Attributes

HTML tags can have attributes that provide additional information about the element. Attributes are included in the opening tag and are usually in name/value pairs.

Example:

```
<a href="https://www.example.com">Visit Example.com</a>

<img src="image.jpg" alt="Description">
```

6. HTML Forms

HTML forms are used to collect user input on a web page. They allow users to enter data, make selections, and submit that information to a server for processing. Forms are a crucial part of web development, enabling various types of interactions such as user authentication, data submission, and more. Here's a basic example of an HTML form:

```
!DOCTYPE html>

<html>

<head>

  <title>Simple Form Example</title>

</head>

<body>


  <h2>Contact Us</h2>


  <form action="/submit_form" method="post">

    <!-- Text Input -->

    <label for="name">Name:</label>

    <input type="text" id="name" name="name" required>


    <br>
```

```
<!-- Email Input -->
<label for="email">Email:</label>
<input type="email" id="email" name="email" required>

<br>
<!-- Radio Buttons -->
<label>Gender:</label>
<input type="radio" id="male" name="gender" value="male">
<label for="male">Male</label>
<input type="radio" id="female" name="gender" value="female">
<label for="female">Female</label>
<br>
<!-- Dropdown (Select) -->
<label for="country">Country:</label>
<select id="country" name="country">
   <option value="usa">United States</option>
   <option value="canada">Canada</option>
   <option value="uk">United Kingdom</option>
</select>

<br>

<!-- Checkbox -->
<input type="checkbox" id="subscribe" name="subscribe" value="yes">
<label for="subscribe">Subscribe to newsletter</label>

<br>

<!-- Textarea for Longer Text -->
```

```
    <label for="message">Message:</label>
    <textarea id="message" name="message" rows="4" cols="50" required></textarea>
    <br>
    <!-- Submit Button -->
    <input type="submit" value="Submit">
  </form>

</body>
</html>
```

Lab Task

Open w3schools.com and implement all tags.

Contents

HTML

Learning objective

Topic covered in this lab.

- Layout in HTML
- Introduction to HTML 5
- Semantic Tags

1. Layout In HTML

1.1 Div Tag

In HTML, the tag is a block-level container element that is commonly used to group together and structure content on a web page. It stands for "division" and is often used to create a container for styling purposes or to group together related elements. The tag itself does not provide any specific styling or visual representation but is instead used as a building block for organizing and structuring the content of a webpage.

```
<div>
  <!-- Content goes here -->
</div>
```

- You can also assign a class or an ID to a element for styling or scripting purposes:

```
<div class="my-container">
  <!-- Content goes here -->
</div>


<div id="unique-container">
  <!-- Content goes here -->
</div>
```

- And you can nest elements to create a hierarchical structure:

```
<div class="outer-container">
 <!-- Outer container content -->

 <div class="inner-container">
  <!-- Inner container content -->
 </div>

 <!-- More outer container content -->
</div>
```

By using the tag strategically and applying CSS styles, you can create well-organized and visually appealing layouts for your web pages.

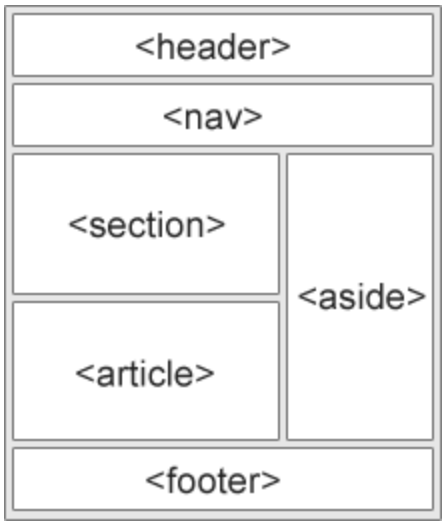
2. Introduction to HTML 5

HTML5, or HyperText Markup Language version 5, is the latest revision of the standard markup language used to create and design content on the World Wide Web. It is a key technology in web development and provides a variety of new features, capabilities, and improvements over its predecessor, HTML4.

- Semantic Elements
- Multimedia Support
- Canvas and SVG
- Form Enhancements.
- Local Storage and Web Storage
- Geolocation API:

2.1 Semantic Elements

HTML5 introduces several new semantic elements that provide a clearer structure for web documents. Examples include **<header>, <nav>, <article>**, **<section>**, **<footer>**, and **<figure>**. These elements help define the structure of a web page in a more meaningful way, making it easier for both developers and browsers to understand the content.



1 Page Layout Structure Using HTML 5.0

2.1.1 Header Tag

Represents the header of a section or a page and can contain headings, subheadings, and introductory content.

A <header> element typically contains:

- one or more heading elements (<h1> - <h6>)
- logo or icon
- authorship information

2.1.2 Navigation Tag

The <nav> tag in HTML is a semantic element introduced in HTML5 to define a section of a document that contains navigation links. It is used to mark up the navigation menu or links that allow users to navigate to different pages or sections within a website. The <nav> element is helpful for accessibility and SEO, as it indicates to browsers and assistive technologies that the enclosed content is navigation related.

```
<nav>
  <a href="/html/">HTML</a> |
  <a href="/css/">CSS</a> |
  <a href="/js/">JavaScript</a> |
  <a href="/python/">Python</a>
</nav>
```

2.1.3 Section Tag

The <section> tag in HTML is a semantic element introduced in HTML5 to define a thematic grouping or section of content within a document. It is used to help structure a webpage by grouping related content together, making it easier to understand the organization of the page.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>My Website</title>
</head>
<body>
<header>
  <h1>My Website</h1>
</header>

<nav>
  <ul>
    <li><a href="#home">Home</a></li>
    <li><a href="#about">About</a></li>
    <li><a href="#services">Services</a></li>
    <li><a href="#contact">Contact</a></li>
  </ul>
</nav>

<section id="home">
  <h2>Welcome to My Website!</h2>
  <p>This is the home section of the website.</p>
</section>

<section id="about">
  <h2>About Us</h2>
  <p>Learn more about our company and mission.</p>
```

```
</section>
<section id="services">
  <h2>Our Services</h2>
  <p>Discover the services we offer to our clients.</p>
</section>
<section id="contact">
  <h2>Contact Us</h2>
  <p>Get in touch with us for more information.</p>
</section>
<footer>
  <p>&copy; 2023 My Website. All rights reserved.</p>
</footer>


</body>
</html>
```

2.1.4 Article Tag

The <article> element specifies independent, self-contained content.

An article should make sense on its own, and it should be possible to distribute it independently from the rest of the web site.

Examples of where the <article> element can be used:

- Forum posts
- Blog posts
- User comments
- Product cards
- Newspaper articles

```
<article>
<h2>Google Chrome</h2>
<p>Google Chrome is a web browser developed by Google, released in 2008.
Chrome is the world's most popular web browser today!</p>
</article>

<article>
<h2>Mozilla Firefox</h2>
<p>Mozilla Firefox is an open-source web browser developed by Mozilla.
Firefox has been the second most popular web browser since January,
2018.</p>
</article>

<article>
<h2>Microsoft Edge</h2>
<p>Microsoft Edge is a web browser developed by Microsoft, released in
2015. Microsoft Edge replaced Internet Explorer.</p>
</article>
```

2.1.5 Aside Tag

The <aside> tag in HTML is a semantic element introduced in HTML5 to define content that is tangentially related to the content around it. It is often used for sidebars or content that is considered separate from the main content but is still related to it. The content inside an <aside> element could be considered a sidebar, a pull quote, an advertisement, or any content that is not the primary focus but enhances the context.

Tags are used to define HTML elements. They are enclosed in angle brackets (<>). Tags often come in pairs, with an opening tag and a closing tag. The content is placed between the opening and closing tags.

Example

```
<p>My family and I visited The Epcot center this summer. The weather
was nice, and Epcot was amazing! I had a great summer together with my
family!</p>

<aside>
<h4>Epcot Center</h4>
<p>Epcot is a theme park at Walt Disney World Resort featuring exciting
attractions, international pavilions, award-winning fireworks and
seasonal special events.</p>
</aside>
```

3. Lab task

Q1 Create a webpage layout using various HTML tags, incorporating the tag to structure and organize the content effectively.

Q2 Construct a webpage layout by utilizing a variety of HTML tags, integrating all semantic tags to effectively structure and organize the content.