ITEC102 – INFORMATION TECHNOLOGIES

LECTURE 5 –ALGORITHMS AND FLOW CHARTS

EASTERN MEDITERRANEAN UNIVERSITY

SCHOOL OF COMPUTING AND TECHNOLOGY

Aim of the course

Aim of this course to have information about,

- defining algorithms
- tools for algorithms
- flowcharts
- flowcharting shapes
- pseudocodes
- Microsoft Visio 2013

Expected properties of a program

A well designed program must be:

- **Correct and accurate**
- **Easy to understand**
- **Easy to maintain and update**
- **Efficient**
- **Reliable**
- **Flexible**

Steps involved in programming

1. **Requirement Specification:**
   - Eliminate ambiguities
   - Clearly understand the problem
2. **Analyze the problem :**
   - Understand the **inputs**, **outputs** and **processes** used for manipulating the data, formulas and constraints
3. **Design:**
   - Write the algorithm (**flowchart** or **pseudocode**) to represent the solution
4. **Testing and verification :**
   - Check the algorithm.
5. **Implement the algorithm :**
   - Write a program
6. **Testing and Verification:**
   - Check the program
7. **Documentation**

What is an Algorithm?

An algorithm is the plan for writing a program.

Steps required for solving a problem are listed by using an algorithm tool.

Algorithm tools make program solutions more clear, more understandable, and easier to remember.

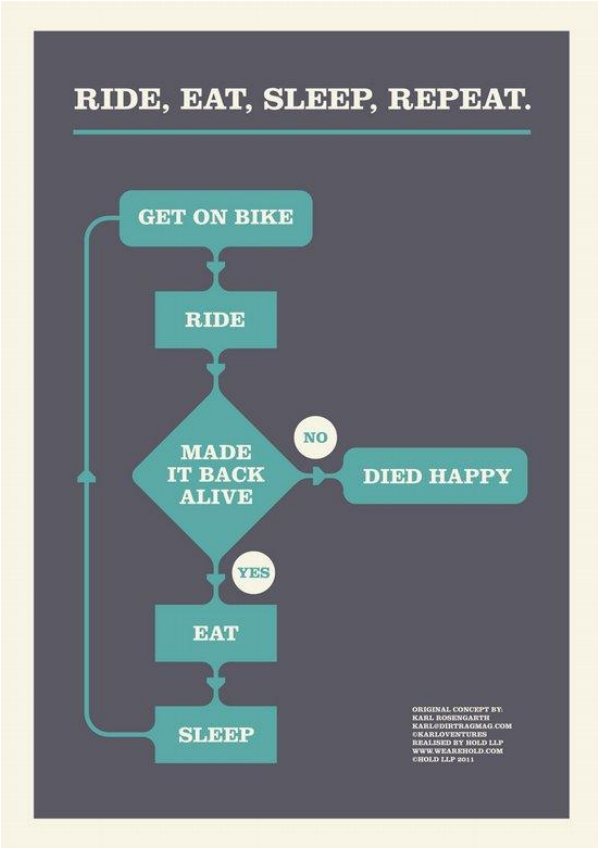
Algorithms are written according to rules so that other programmers are also able to read and understand the solution easily.

Tools of algorithms

There are many Algorithm tools in use, but the most popular ones are Pseudo-Codes and Flowcharts.

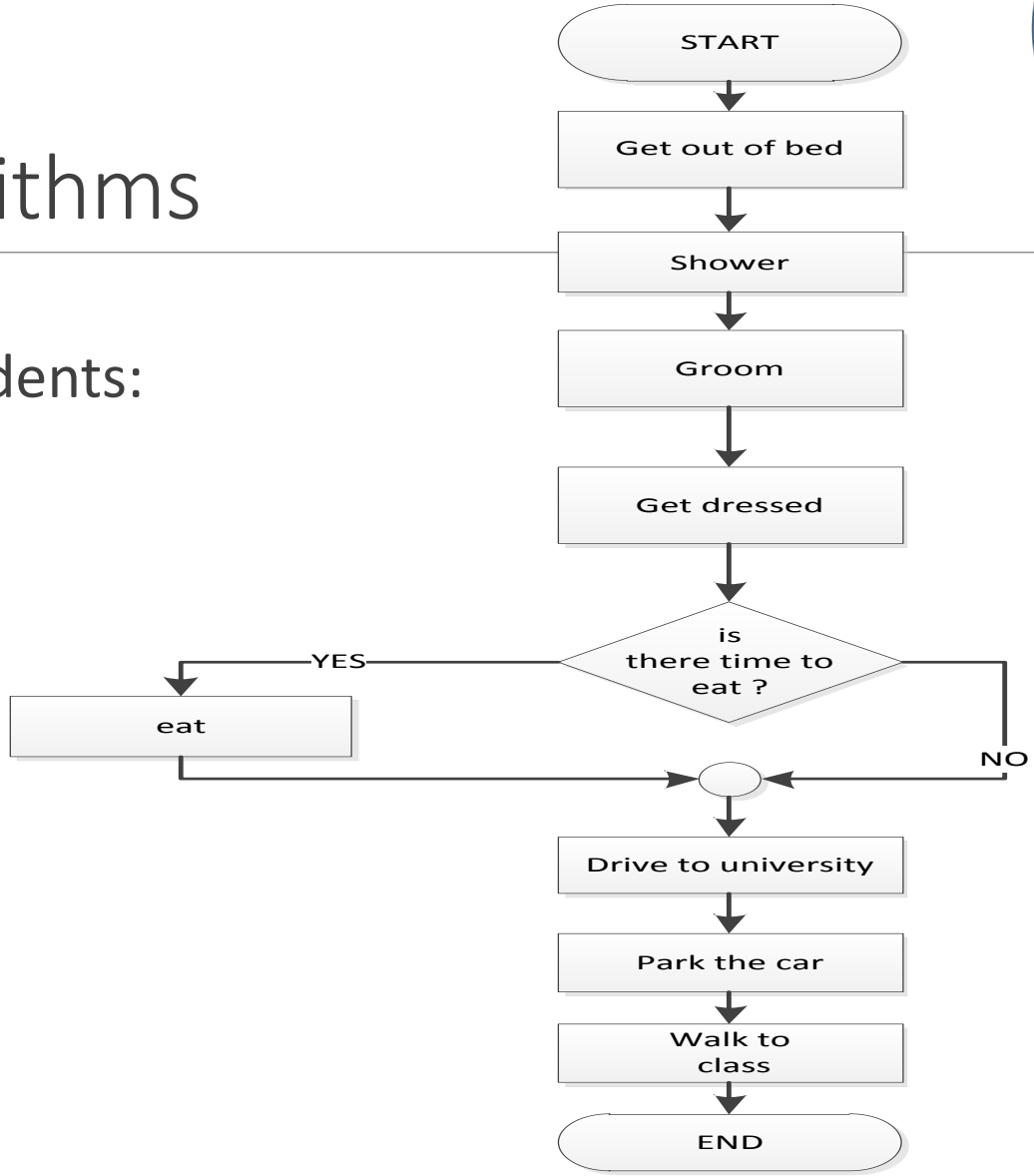
For this section we will focus on flowcharts such as;

Biker's Dream Life:



Tools of algorithms

Daily routine of students:



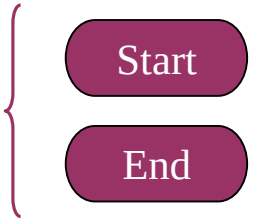
Flowcharts

Flowcharts are graphical tools, containing a set of shapes, each expressing a different action in a sequence of program execution.

There are many different shapes that are used for specific purposes, to avoid complexity, in this course, only a limited subset of these shapes will be shown and used in applications.

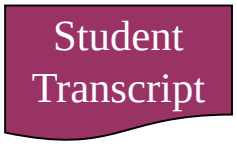
Flowcharting Shapes

Every flowchart has to start with a TERMINAL shape containing the caption *START* and has to end with another TERMINAL shape containing the caption of *END*.



INPUT shape is used to indicate manual input or reading values from keyboard.

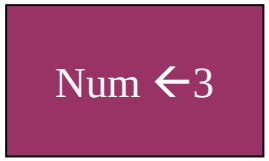
OUTPUT shape is used to indicate producing printed output to the user.



DISPLAY shape is used to indicate that a value is sent to the monitor.

Flowcharting Shapes

PROCESS shape is used to represent assignments and manipulations of data such as arithmetic operations.

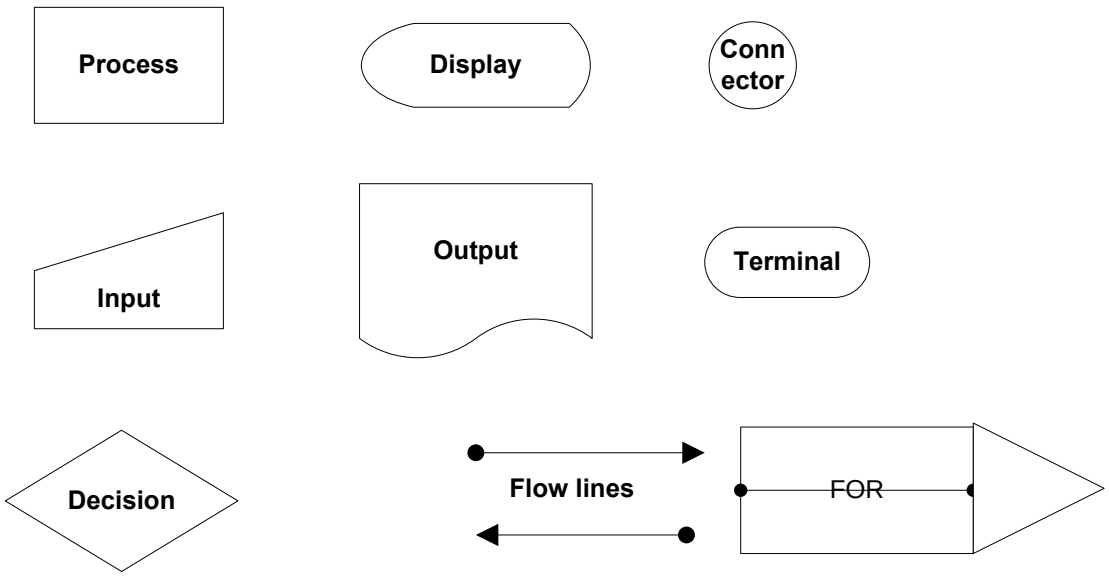


DECISION shape represents the comparison of two values. Alternating course of actions is followed depending on the result of the criteria.

CONNECTOR symbol is used to show the connections of two pages, when your design occupies more then one page. Also used to collect together flow lines of decision shape.

FLOWLINE symbol is used to show the direction of the program flow between other symbols.

Flowcharting Shapes



Pseudocode

Pseudocode is structured english that is used as an alternative method to flowcharts for planning structured programs.

There are no general accepted standards for pseudocodes.

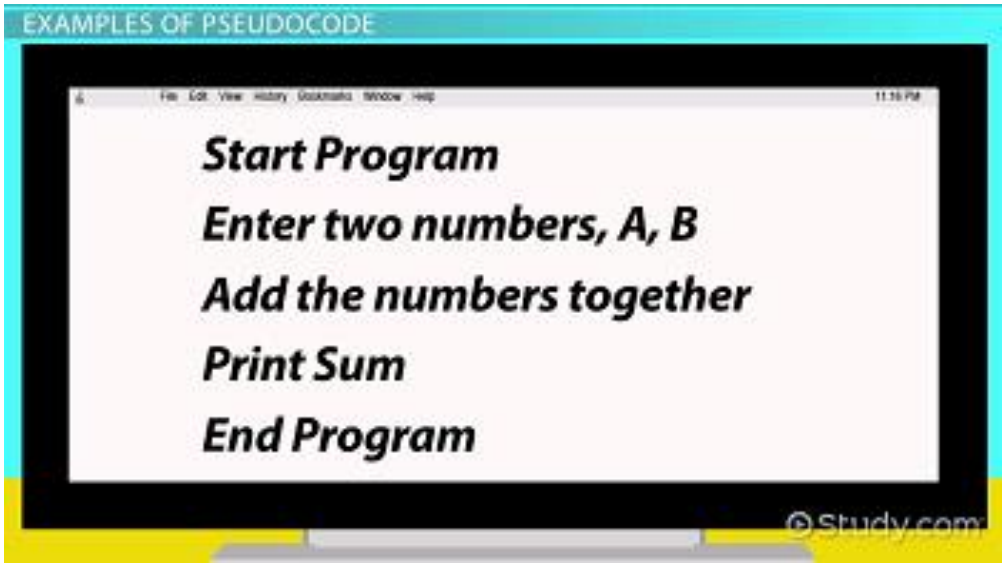
Pseudo-code instructions are written in English,

- **they can be easily understood and reviewed by users.**

The only syntax rules to be concerned with involve the LOOP and SELECTION structures.

- **They must be used as *CAPITALISED* words.**

Pseudocode


EXAMPLES OF PSEUDOCODE
Start Program
Enter two numbers, A, B
Add the numbers together
Print Sum
End Program
©Study.com

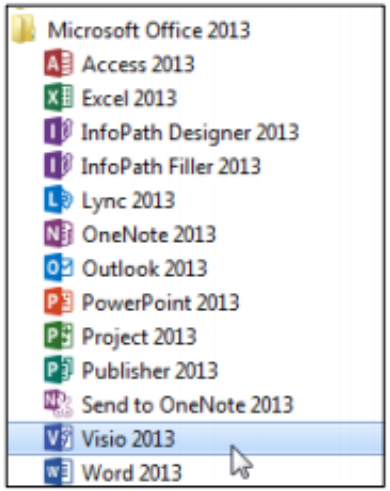
Microsoft Visio 2013

Microsoft Visio 2013

Microsoft Visio is the premier application for creating business diagrams of all types, ranging from flowcharts, network diagrams, and organization charts, to floor plans and brainstorming diagrams.

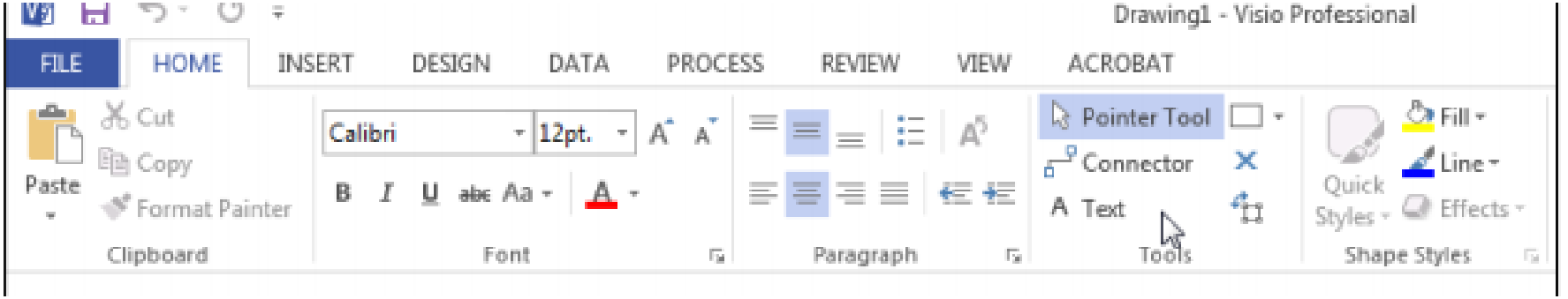
Microsoft Visio 2013

1. Select **Start>>All Programs>>Microsoft Office>>Visio 2013**



Microsoft Visio 2013

Microsoft Visio 2013 continues the use of the fluent user interface (UI), otherwise known as the ribbon.



Getting Started With Visio 2013

Getting Started With Visio 2013

In the narrower left column is a list of recently opened diagrams. Clicking any diagram name opens it again.

If you want to open a diagram that is not on the Recent list, click the Open Other Drawings button at the bottom of the list and Visio will take you to the Open page that is described in the next section.

In the wider right column is a collection of thumbnails representing recently used or recommended templates.

Above the template thumbnails are four important ways to find Visio templates.

- You can type any words into the Search for online templates box and Visio will present templates that match your keywords.
- You can click any word in the Suggested searches list to initiate an online search for matching templates.

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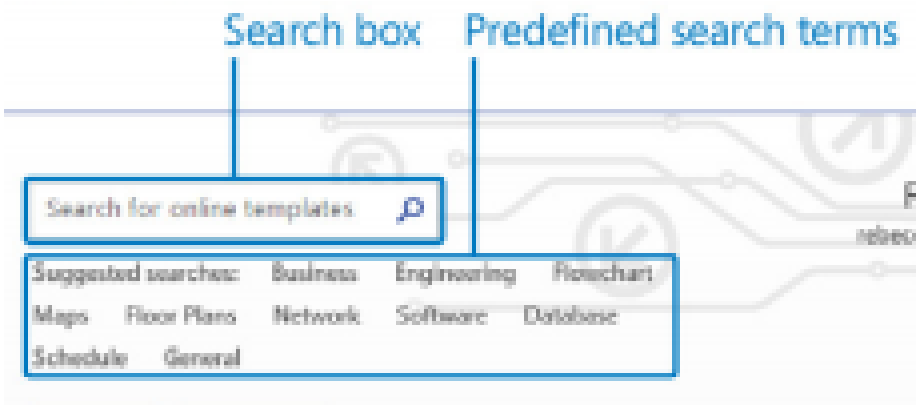
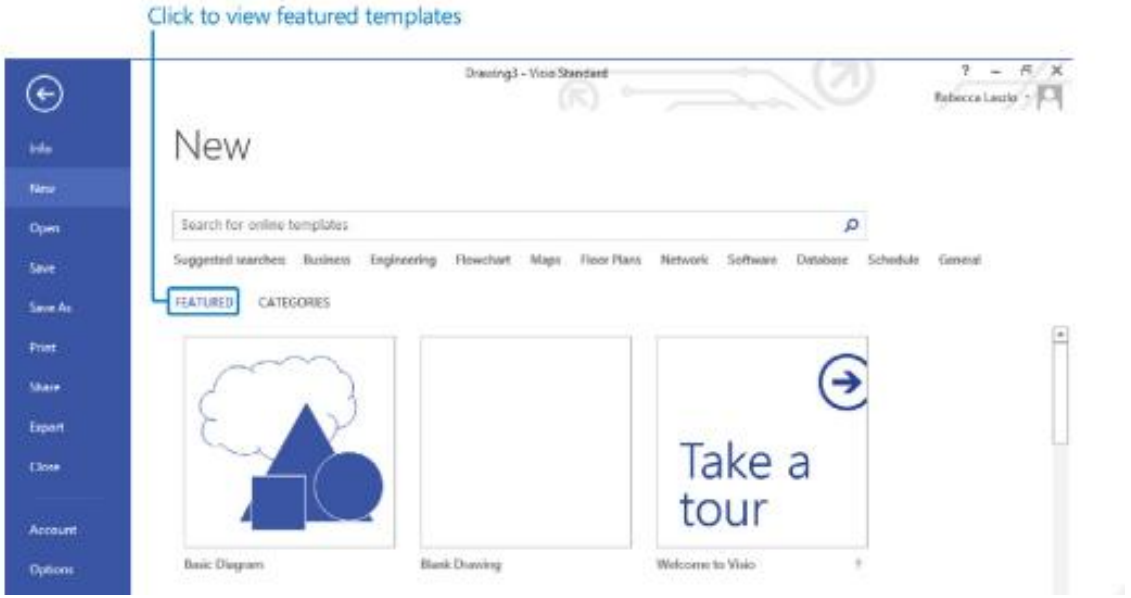


Getting Started With Visio 2013

- **Featured** is the default selection for the template thumbnails that appear in the main part of the page (refer to the preceding graphic). The presentation of thumbnails is dynamic; the templates you use most frequently will rise to the top.
- Clicking **Categories** presents a set of template categories that are the same as the categories in previous versions of Visio: Business, Flowchart, General, Maps and Floor Plans, Network, and Schedule. The Professional edition also includes Engineering, and Software and Database categories.

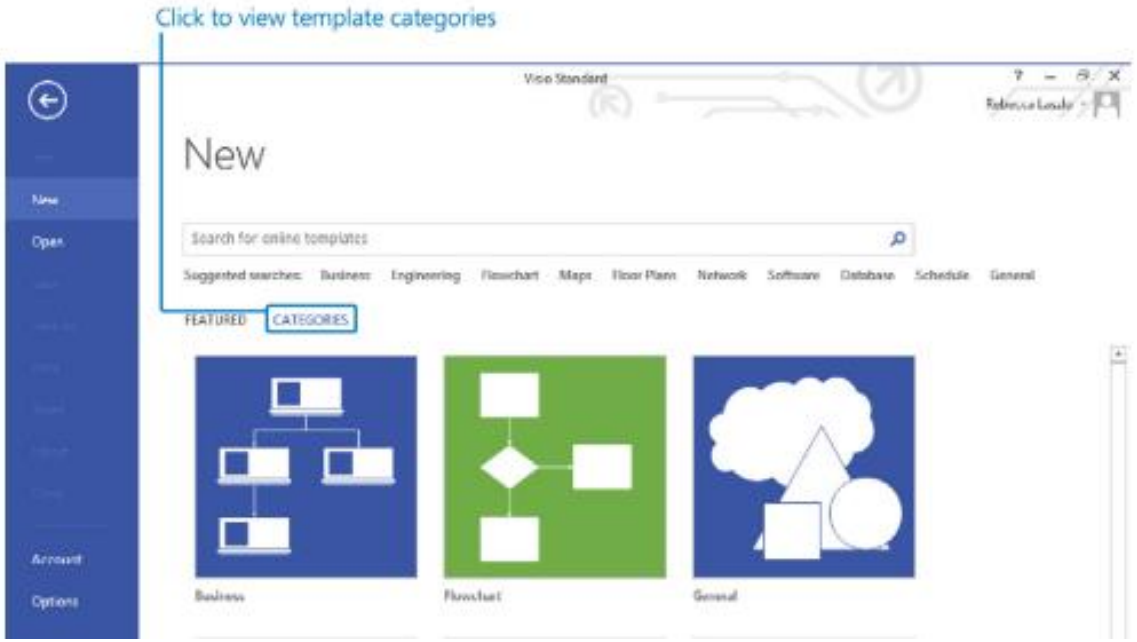
Getting Started With Visio 2013

The **New** page provides access to both built-in templates and online templates. You access built-in templates by clicking a diagram thumbnail in the lower part of the page.



Getting Started With Visio 2013

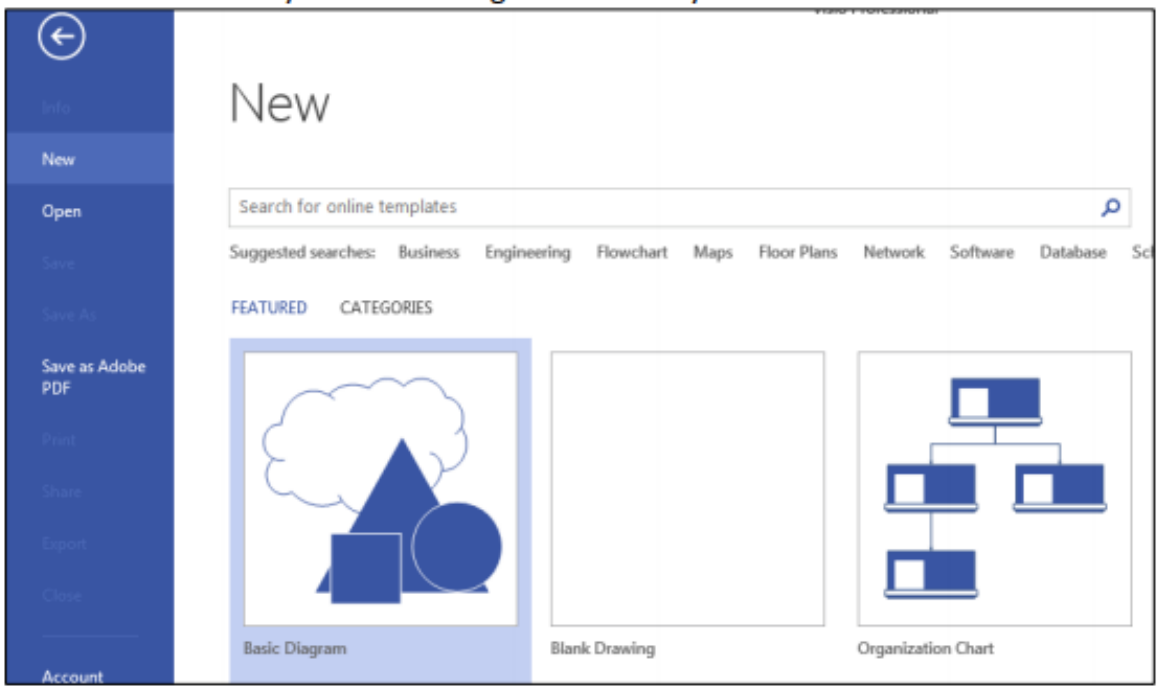
Clicking any template category displays thumbnails for the diagrams in that category.



Exploring the Visio 2013 Interface

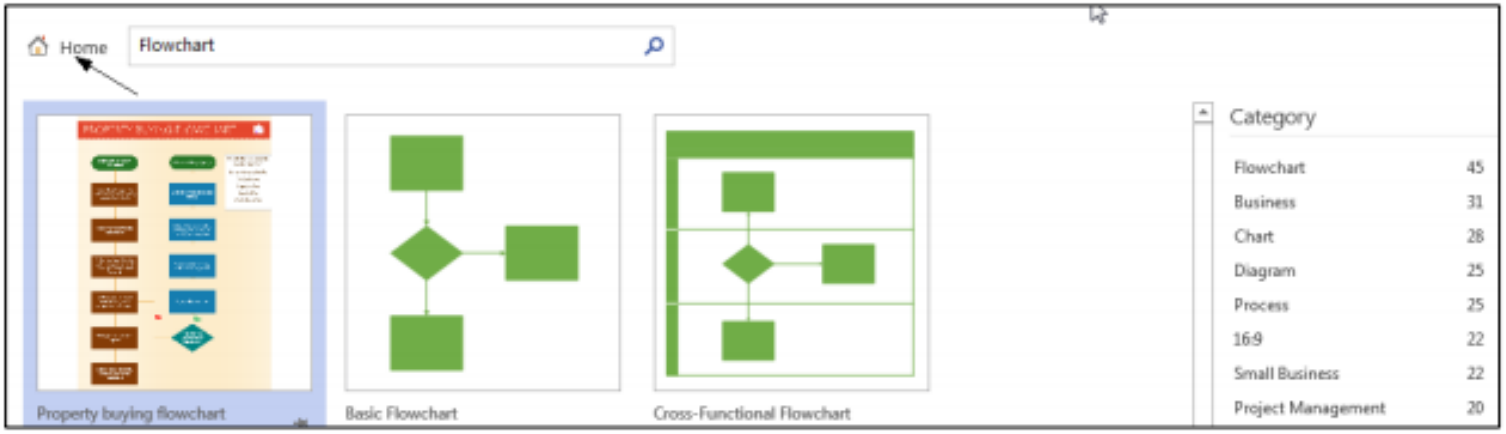
1. There are many templates for organizational charts in Visio 2013. You can select one that is close to your needs and then adapt it using the Visio tools.

   Click File>>New and you will see diagrams for many different work needs.



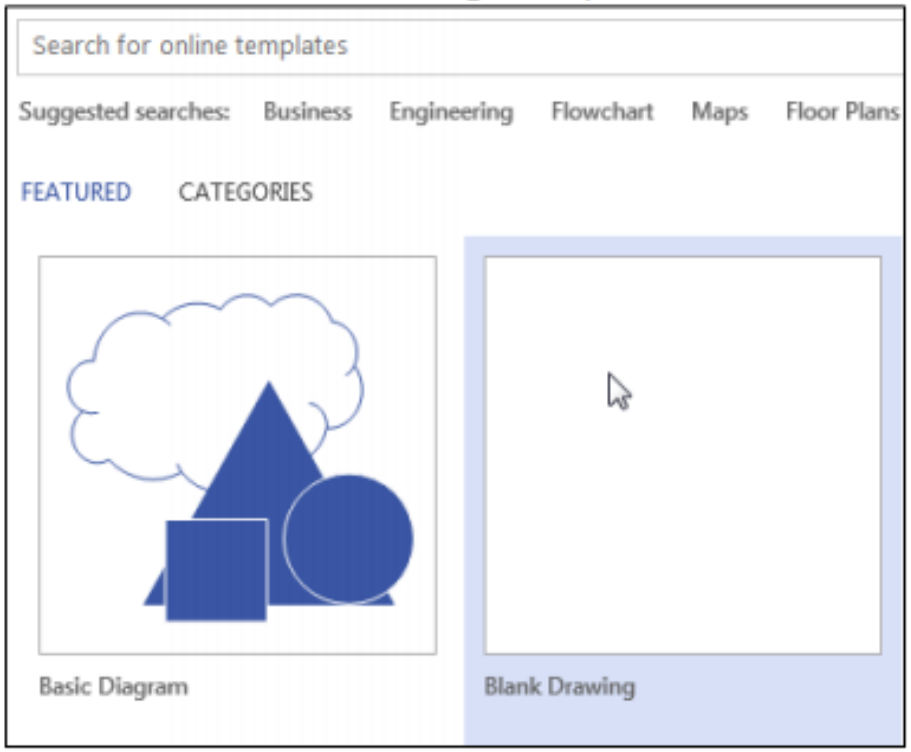
Exploring the Visio 2013 Interface

2. You can search for templates or use the suggested searches. If you select "Flowchart" you will get many different types of flow charts with categories on the side. Click the **Home** link to go back.



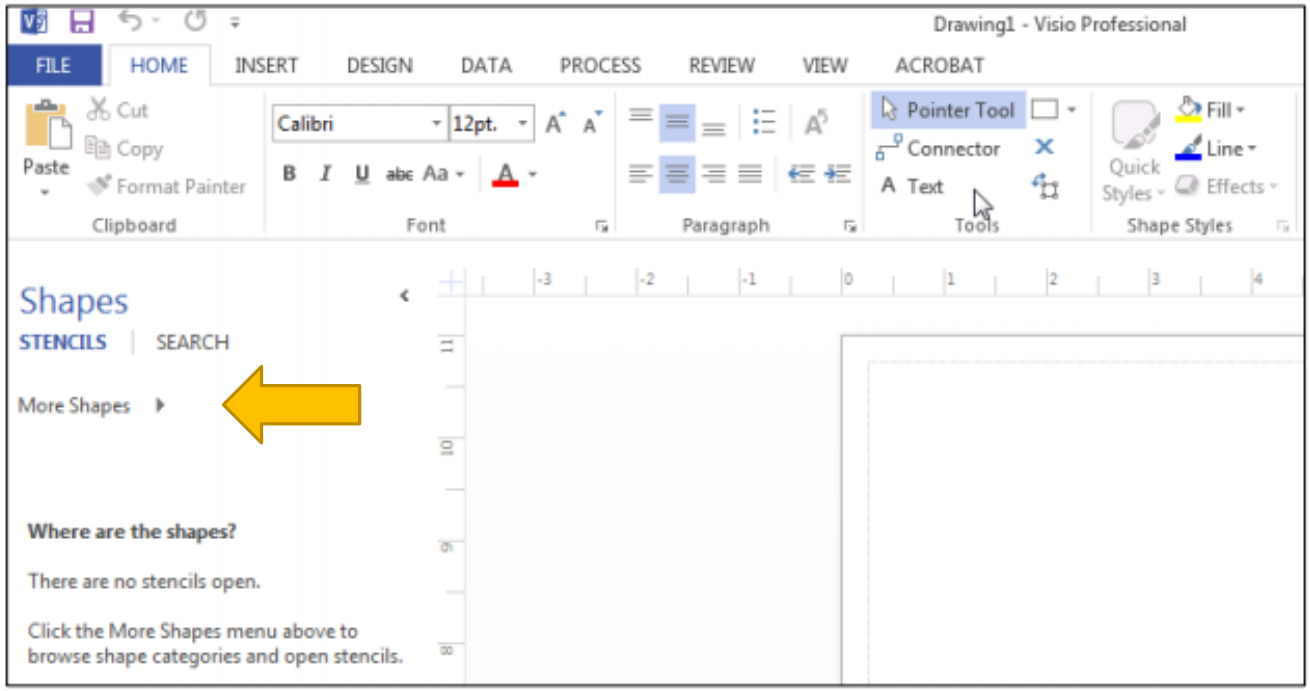
Exploring the Visio 2013 Interface

3. We will select a "blank drawing" to explore the toolbars.



Exploring the Visio 2013 Interface

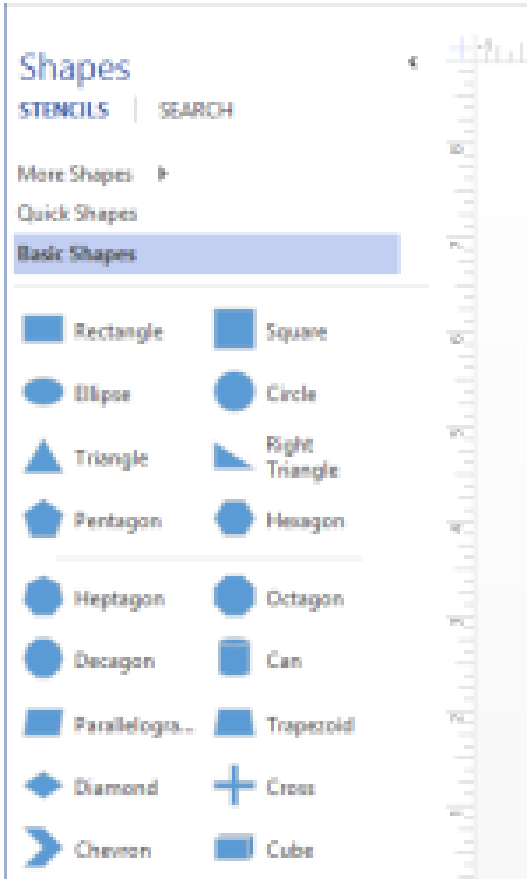
4. The Home ribbon is very similar to the MS Word ribbon with Font, Paragraph, Tools but there is a Shapes Stencils area on the left we will explore



Exploring the Drawing Window

When you start Visio, two windows normally appear below the ribbon. The ***shapes window*** on the left hand side and the large ***drawing window*** on the right hand side.

Exploring the Drawing Window



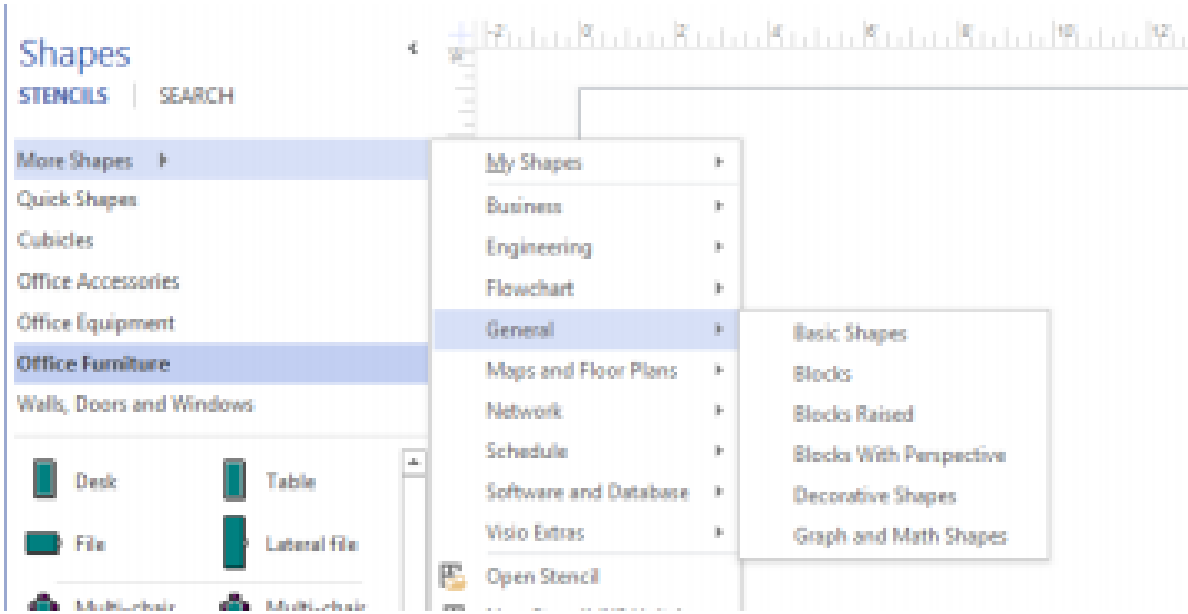
The Shapes window on the left contains one or more stencils, each represented by a header bar containing the name of the stencil. Depending on the number of open stencils in the Shapes window, a scroll bar might appear at the right of the headers.

Exploring the Drawing Window

The larger window on the right is called the drawing window because it contains the drawing page. The drawing window is bounded on the top and left by rulers that display inches, millimeters, or whatever units you have selected (or your template has selected) for measuring page dimensions.

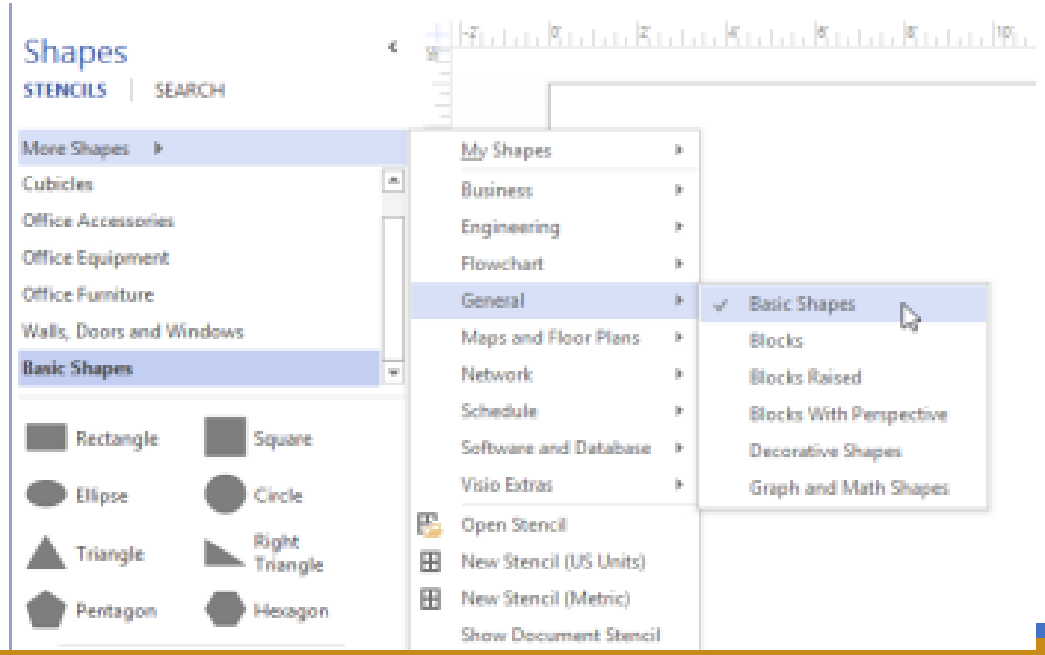
Exploring the Drawing Window

To access more shapes; in the **Shapes window**, click **More Shapes**, and then point to **General**. (Do not click any stencils in the **General** group yet.) A fly-out menu containing stencil names appears. In the following graphic, the collection of stencils in the **General** group is visible.



Exploring the Drawing Window

With the cascading menus open from previous action, click **Basic Shapes**. Visio opens the **Basic Shapes** stencil. In a behavior change from Visio 2010, a check mark appears to the left of the stencil you selected, but the fly-out menus remain open, allowing you to select additional stencils from the same or another stencil family.



Exploring the Drawing Window

Click anywhere in the Visio window to close the cascading menus.

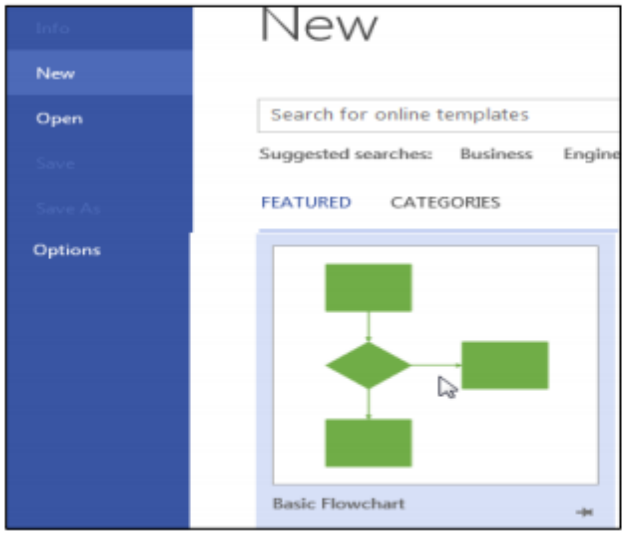
It’s helpful to know how to close stencils you no longer need. In order to close Right-click **Basic Shapes**, and then click **Close**.

Creating a New Flow Chart Diagram using a Template

Rather than creating a new diagram completely from scratch, it is very easy to select a template and then adapt it to your needs.

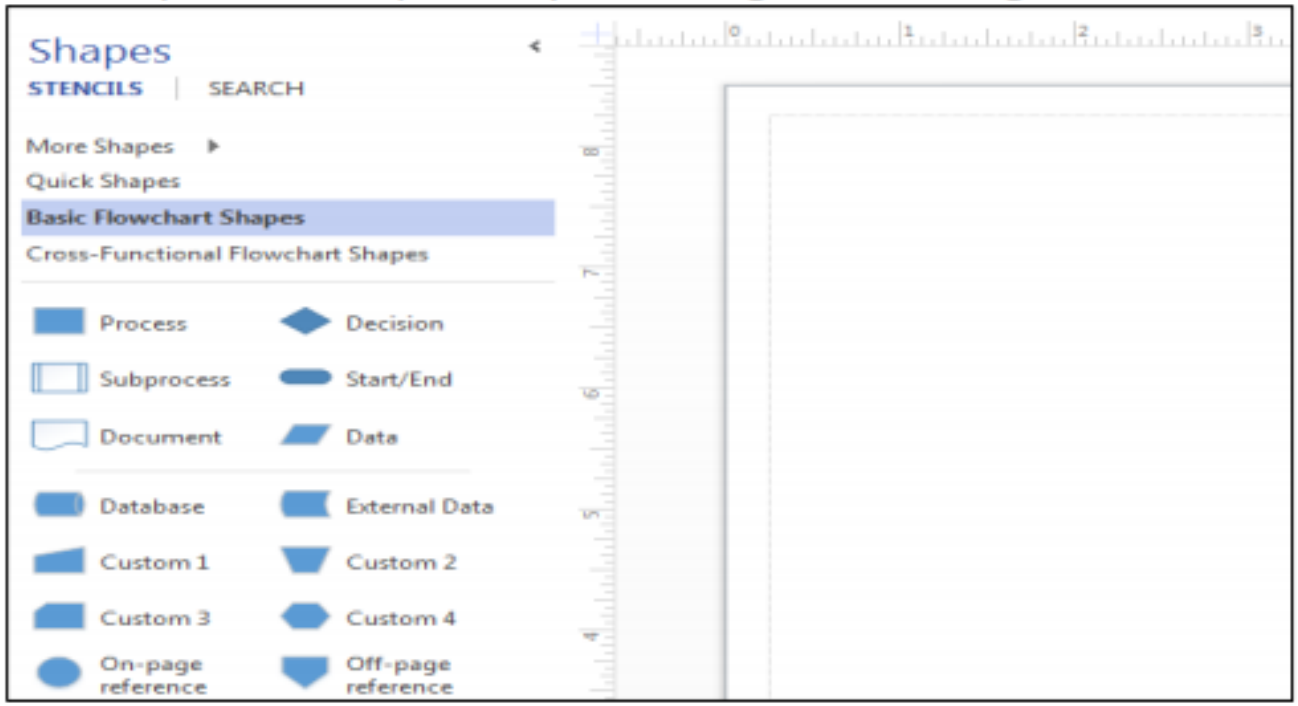
Steps:

1. Select **File>>New** and you will see many templates that you can use. We will start with a basic flow chart. Select the basic flowchart and click Create.



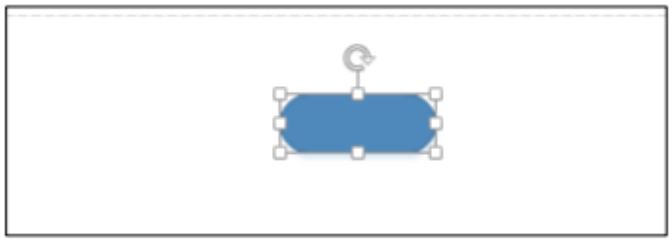
Creating a New Flow Chart Diagram using a Template

2. Visio opens with shapes that you can drag onto the design area.

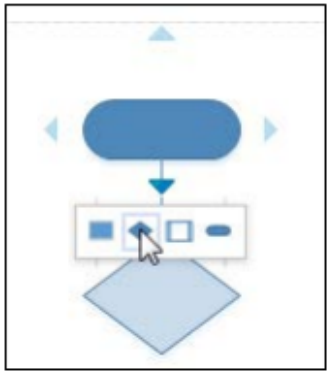


Creating a New Flow Chart Diagram using a Template

3. We will add a Start shape. Click and drag it to the design area. You will see handles you can use to expand or compact it as well as new tools in the ribbon to change its color.

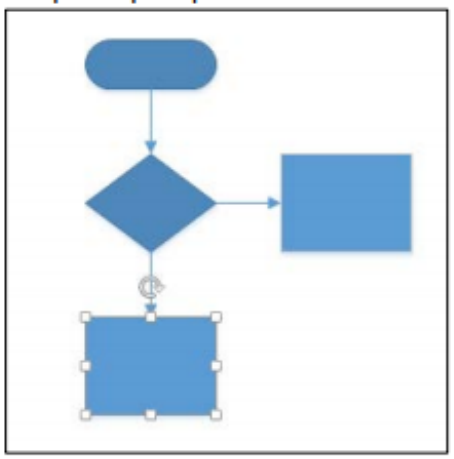


4. You can move your mouse over the middle bottom handle and an arrow will appear. If you move over the area a quick shape box appears and you can add perhaps a decision.

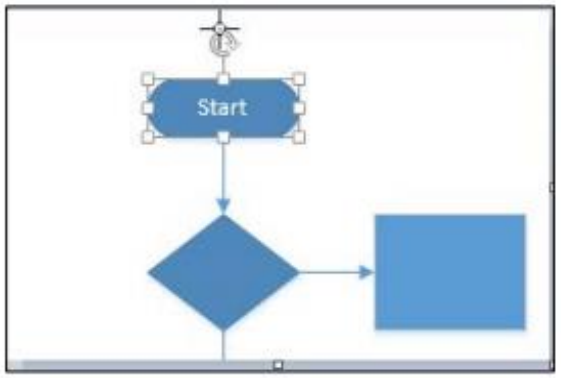


Creating a New Flow Chart Diagram using a Template

5. If you move to the side of the decision shape you will see an arrow and then can add perhaps a process.

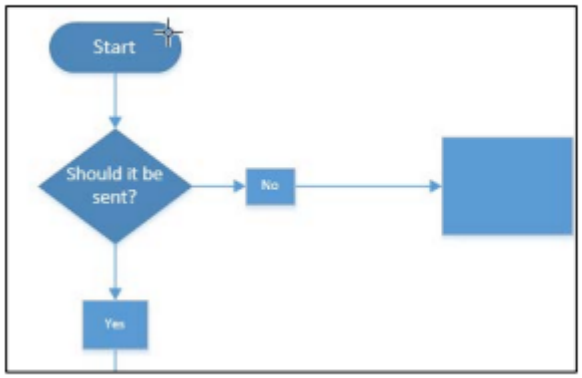


6. You can click inside a shape to open it to add text. You can easily change the font size and color as well as adjust the size of the shapes.



Creating a New Flow Chart Diagram using a Template

7. You could add decision answers on the arrows.



8. Continue with your flow chart as long as the process continues then place the end shape.