

# ILLUSTRATING ALGORITHMS IN FLOW CHARTS

Applications with complex specifications require a method of design called an ALGORITHM. An **algorithm** is a series of steps that explain how to solve a problem. An algorithm created using both English and program code is called PSEUDO CODE. Often, **pseudo code** is developed for only the more complex portions of a program. For example, in the **Drivers License** application the pseudo code for the **CHECK** button would look something like this:

```
Private Sub btnCheck_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnCheck.Click
```

```
    Get user's age from text box
    If user's age is between 1 and 15 Then
        Output message "Sorry...you are not old enough to drive!"
        Output sad image in picture box
    Else if the user's age is between 16 and 80 Then
        Output message "Congratulations...you are old enough to drive!"
        Output happy image in picture box
    Else if the user's age is greater than 80 Then
        Output message "Aren't you a little too old to be driving?"
        Output worried image in picture box
    Else
        Output error message to user
```

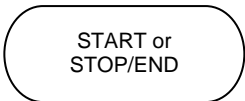
```
End Sub
```

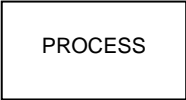

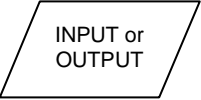
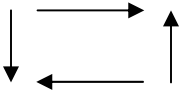
Creating an algorithm forces a programmer to think through a program before actually coding it. This is helpful in two ways. First, an algorithm is done without a computer, which usually helps a programmer focus on the overall structure of a program. Second, errors in logic are usually reduced.

## FLOW CHARTS

Other than pseudo code, a flow chart is another one of the many tools that have been developed to record algorithms. Flow charts are diagrams that use special shapes to represent different types of actions or steps in a process. Lines and arrows show the sequence of the steps, and the relationships among them.

The following is a list of the most common flowcharting symbols:

SYMBOL	DESCRIPTION
	<ul style="list-style-type: none"><li>- Flattened ellipses indicate the start or end of a processing block</li><li>- It is common practice to use the word START to denote the start of the program and END to denote stopping the program</li><li>- In Microsoft Word, this AutoShape is called TERMINATOR</li></ul>

	<ul style="list-style-type: none"> <li>- The rectangle represents an action item, which could include declaration or assignment of variables, calculation of a formula, etc.</li> <li>- In Microsoft Word, this AutoShape is called PROCESS</li> </ul>
	<ul style="list-style-type: none"> <li>- The rhombus shape indicates a decision</li> <li>- It has one entrance and only two exits</li> <li>- One exit is for the TRUE or YES result, and the other exit is for the FALSE or NO result to the question asked inside the rhombus</li> <li>- In Microsoft Word, this AutoShape is called DECISION</li> </ul>
	<ul style="list-style-type: none"> <li>- The parallelogram shape indicates data that is input to and/or output from the computer memory</li> <li>- An I/O symbol has one entrance and one exit</li> <li>- In Microsoft Word, this AutoShape is called DATA</li> </ul>
	<ul style="list-style-type: none"> <li>- Flow lines show the direction of flow</li> <li>- They are represented by straight lines and arrows</li> <li>- Flow lines are used to connect symbols by exiting from one and entering another</li> <li>- In Microsoft Word, you can find the arrows in the Drawing toolbar</li> </ul>

A flowchart for the **Drivers License** program would look something like this:

