Using Flowcharts for Algorithms

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An Algorithm is your plan/idea (how to solve a problem)
- May be expressed in many different ways
  - Mathematical Expression
  - Pseudo Code (written text)

Pseudocode is the written expression of the Algorithm
- It is simply a description on how your program should work in plain English or another language

Code – this is what you program (Syntax) to enact your algorithms

Other notes:
- Some people are great at code
- Some are great at developing algorithms
  - Innovation really comes from great algorithms!
  - Optimization comes from great code!
Flowcharting

• Flowcharts allow one to see a pictorial representation of the process.
• They make it easier to understand the process at hand!
• MS Visio is a great tool for developing flowcharts as you can easily drag and drop the symbols.
Flowchart Symbols

- **Terminator**: Indicates the beginning or end of a program flow in your diagram.
- **Process**: Indicates any processing function.
- **Decision**: Indicates a decision point between two or more paths in a flowchart.
- **Delay**: Indicates a delay in the process.
- **Data**: Can represent any type of data in a flowchart.
- **Document**: Indicates data that can be read by people, such as printed output.
- **Multiple documents**: Indicates multiple documents.
- **Subroutine**: Indicates a predefined (named) process, such as a subroutine or a module.
- **Preparation**: Indicates a modification to a process, such as setting a switch or initializing a routine.
- **Display**: Indicates data that is displayed for people to read, such as data on a monitor or projector screen.
- **Manual input**: Indicates any operation that is performed manually (by a person).
- **Manual loop**: Indicates a sequence of commands that will continue to repeat until stopped manually.
- **Loop limit**: Indicates the start of a loop. Flip the shape vertically to indicate the end of a loop.
- **Stored data**: Indicates any type of stored data.
- **Connector**: Indicates an inspection point.
- **Off-page connector**: Use this shape to create a cross-reference and hyperlink from a process on one page to a process on another page.
- **Collate**: Indicates a step that organizes data into a standard format.
- **Sort**: Indicates a step that organizes items list sequentially.
- **Merge**: Indicates a step that combines multiple sets into one.
- **Database**: Indicates a list of information with a standard structure that allows for searching and sorting.
- **Internal storage**: Indicates an internal storage device.

Visio Basic Flowchart Shapes
MS Visio Basic Flowchart Example

http://www.sawyoo.com/postpic/2015/03/visio-flowchart-shapes_206705.png
Smartdraw Flowchart Example

1. Patient arrives
   - Patient in the system? (Yes/No)
     - No: Patient needs to complete paperwork
     - Yes: Nurse available? (Yes/No)
       - No: Waiting Room
       - Yes: Take pulse, blood pressure, weight, urine
         - Doctor available? (Yes/No)
           - No: Waiting Room
           - Yes: Patient with doctor
             - Need follow-up appointment? (Yes/No)
               - Yes: Make an appointment
               - No: Need medication? (Yes/No)
                 - Yes: Patient sent to pharmacy
                 - No: Dispense medication
                   - Patient leaves

Medical Services

- start/end
- decision
- process
Flowcharting Resources

• MS Visio 2016 Tutorial
  • https://www.youtube.com/watch?v=b09dKHvu4-4
Common Errors

• Arrows / Flow issues
  • Missing
  • Direction
  • Decision Symbols

• Incorrect Symbol usage
  • Documentation vs Process
    • Think of documentation as a special type of process that has a special symbol
  • Decision
    • Label them
    • Cleaner to use one line per joint
  • Subprocess vs Process
    • Subprocess symbols will require another flowchart

• Continuation References
  • On or off page symbols
Oh, What is a Flowchart?

- https://www.youtube.com/watch?v=2rZY8iX8Mdw