General Computer Science for Engineers CISC 106 Lecture 03

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Lecture Overview

- More on Functions
  - Overview
  - Calling functions from another function

  M-files
  - Scripts versus functions

Functions

- Analogous to mathematical functions
  - f(x) = x + 1
- Independent of the other code
- Each function is like a mini-program within the larger program itself
- Key to breaking problems down

Functions

- In MATLAB, the first line of a function takes the following form:

function <return value> = <name>(<arguments>)

Functions cont.

- The first line of a function:

function <return value> = <name>(<arguments>)

- The return value can be a number, a string, a matrix, etc.
- Arguments
  - Can be a list of zero or more variables
  - Can also be numbers, strings, matrices

Functions

- Functions can call other functions
- Your program is the main function, calling smaller functions to solve subproblems
- Like in class on Friday:

```
function outputValue = ringArea(rad_1, rad_2)
 outputValue = circleArea(rad_1) - circleArea(rad_2);
```

Functions

- In this class you will have to design programs to solve problems
- These problems will be best solved (most easily and cleanly) by breaking down into smaller subproblems
- The subproblems will be solved using functions
- How big/small should a function be?
- No more than one page or screen of text

Problem Solving

- Examples of big problems and how we might break them down
- Scheduling (next slide)
- Facebook
  - user login, ways to store user info, recommend friends
- MP3 player
- Store song lists, store playlists, import/ export songs, shuffle play, repeat play, etc.

Problem solving

- Let's think about some example problems and how we might break them down
- How to automatically generate a schedule for an airline/business/school etc.

Course Scheduling Software

- What are inputs and outputs?
- Inputs: Resources (teachers, students, office staff, classes)
- Output: Schedule of where and when everything and everyone needs to be

Course Scheduling example

- What functions might we need?
  - How many classrooms available?
  - How much demand is there for each room?
  - Course requirements?
- Break it down even more?

M-files

- An m-file is also called a script file
- Store commands in
- Running a script file (m-file)
- A function file
  - Special type of m-file
  - Contains a function name, arguments, etc., and implementation

Scripts vs. functions

- Functions have input and output parameters
- Scripts cannot

- Functions are more flexible
- Function files have one function per file