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EECS 10 DISCUSSION

7/21/12 Week4 Session2 Weiwei Chen

Discussion Outline

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- Assignment3 Feedback
- Quick Concepts Review
 - Recursion
 - Data Structures
 - Structure
 - Union
 - Enumerator
- Assignment Discussion: Pi Approximation

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Assignment3 Feedback

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- Good job!
- Some suggestions
 - Program Indentations
 - The usage of getInput() and printNumber() function
 - The difference between function parameters and arguments
- Please refer to the assignment solutions for code style and how to use functions.

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Recursion

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- Recursion is the process of repeating items in a self-similar way.
- Recursion is present in nature
 - Trees have branches, which have branches, which have branches, ... which have leaves
 - Two mirrors are exactly parallel with each other the nested images that occur are a form of infinite recursion
- Recursion in English
 - the process a procedure goes through when one of the steps of the procedure involves invoking the procedure itself.

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Recursion

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- Recursion is traversal of hierarchy
 - ▣ Traverse (climb) a tree to the top:
 - start at the root
 - at a leaf, stop
 - at a branch, traverse one branch
 - ▣ Traverse a file system on a computer
 - start at the current directory
 - at a file, process the file
 - at a directory, traverse the directory

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Recursion in programming (computer science)

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- Two properties
 - ▣ A simple base case (or cases), and
 - ▣ A set of similar rules which reduce all other cases toward the base case
- Concept of Recursion
 - ▣ Trivial *base case*
 - Return value defined for simple case
 - Example: `if(arg==0){return 1;}` //e.g. `int fct(int arg)`
 - ▣ *Recursion step*
 - Reduce the problem towards the base case
 - Make a recursive function call
 - Example: `if(arg>0){return...fct(arg-1);}` //e.g. `int fct(int arg)`

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Recursive functions

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- Recursion in English
 - ▣ A procedure that goes through recursion is said to be 'recursive'.
- Recursive in Programming
 - ▣ Recursive function
 - Function that calls itself ...
 - ... directly, or
 - ... indirectly
- *"To understand recursion, you must first understand recursion."*

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Pause and Reflect

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- Write down your understanding about recursion
- Write a recursive function to get the factorial of a positive natural number N .
- Recursion vs. Iteration
 - ▣ Please refer to the slides for lecture 8

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Data Structures

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- complex data structures using composite types
 - ANSI C provides built-in support for
 - arrays
 - **structures, unions, enumerators**
 - pointers

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Data structures

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- Structures
 - Write the definition of a structure
 - Name is S
 - has two basic variables
 - Integer number named i
 - Character named ch
 - Write the definition of two variables
 - Whose names are s1 and s2
 - Of structure type S
 - Write the C program statement to assign the i of s1 to be 0, and the ch of s2 to be 'a'.

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Data structures

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□ Unions

- Write the definition of a union
 - Name is U
 - has two mutually exclusive basic variables
 - Integer number named i
 - Character named ch
- Write the definition of two variables
 - Whose names are u1 and u2
 - Of union type U
- Write the C program statement to assign the i of u1 to be 0, and the ch of u2 to be 'a', and the ch of u1 to be 'b'.

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Data Structures

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□ Enumerators

- Write the definition of an enumerator
 - Name is Color
 - Has three members: green, red and blue
 - The value of the first member is defined to be 2
- Write the definition of two variables
 - Whose names are color1 and color2
 - Of enumerator type Color
- Write the C program statement to assign value of color1 to be red, and color2 to be green

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Assignment Discussion

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- Assignment 4, Part 2
- Extend the functions of the calculator for PI approximation

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The Muddiest Point

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- Before you leave, please write down the most confusing concept / point you have for this class so far on the index card
- Let's do it anonymously! No name / ID required!

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It is a time for programing!

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- Raise your hand if you need help

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