
CS 241

Control Structures

Christopher A. Gantz

SPS Undergraduate Program
Regis University
cgantz@regis.edu

Lecture 1c

Overview of CS 241: Problem Solving

Christopher A. Gantz
School of Professional Studies
Regis University
cgantz@regis.edu

Overview

- Reading
 - Nance textbook Pages 17-27
- Problem Solving
 - Program Development
 - Software Engineering
 - Software System Life Cycle

Program Development

- How do we solve a problem w/ SW?
 - Comprehensively understand the problem
 - Develop a solution/algorithm
 - Implement the solution/algorithm
- Why solving problems w/ SW is challenging!
 - Upfront planing is critical
 - Appropriate time management allocation to the process
 - Process execution requires a significant commitment to extreme precision and attention to detail

Program Development (Cont.)

- 6 ad hoc implementation best practices
 - Thorough and complete analysis of the problem
 - Design and development of an algorithm
 - Implementation of the algorithm as a SW program
 - Execution of the resulting SW program
 - Testing and verification of the functionality of the SW Program
 - Thorough internal and external documentation of the SW programs usage and functionality

Program Development (Cont.)

- What methodologies, tools and/or mechanisms exists to facilitate good program development?
 - Top Down design methodology
 - Process of continually subdividing the solution of the problem into subcomponents which represent a related collection of tasks and subtasks
 - Where each successive subdivision is referred to as a stepwise refinement
 - Process results in the identification of modules which are the tasks determined at stepwise refinement

Program Development (Cont.)

- Valuable artifacts of this methodology are:
 - Structure charts
 - Graphical representation that illustrates the relationship between modules
 - Identification of modules
 - Module specifications – formal descriptions of modules defining the following attributes
 - Data received (i.e. Input data)
 - Information returned (i.e. Output data)
 - Logic utilized to transform the input to output

Program Development (Cont.)

- Module specifications – formal descriptions of modules defining the following attributes (Cont.)
 - Logical assertions that define valid data states of the module
 - Pre-conditions
 - Post-conditions
 - Invariant

SW Engineering

- Process deployed to develop and maintain very large software systems
- Primarily used for software that is developed in teams
- Focuses on addressing large project
 - Management
 - Coordination
 - Design & Implementation

SW Engineering (Cont.)

- Benefits of deploying SW Engineering principles, methodologies, techniques and corresponding tools are:
 - Functionality
 - Maintainability
 - Reliability
 - Availability
 - Serviceability
 - Economic feasibility

SW Life Cycle

- A SW Life Cycle defines the following phases that all major SW systems experience
 - Analysis
 - Design
 - Coding/Implementation
 - Testing/Verification
 - Maintenance
 - Obsolescence [End of Life(EOL)]

Program Development Summary

- Successful SW development that implements a solution to a problem requires:
 - Significant and meticulous planning in order to understand the problem
 - Starting of the process as early as possible
 - Extreme precision and formality
 - Attention to detail with respect to design and implementation