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# CS 241

## Control Structures

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## Lecture 4b

# Overview of CS 241: Writing a Complete Program

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# Overview

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- Reading
  - Nance textbook Pages 109-154
- Writing a Complete Program
  - Program Style
  - Beginning/Novice Programmer Errors
  - Debugging Techniques

# Programming Style

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- Programs should include both internal and external documentation through the use of comments
- Why utilize or be concerned with comments?
- Comments are non executable statements that:
  - make a program more readable
  - Provide program documentation
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# Programming Style Comments

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- Additional uses of comments within a program
- To define and/or establish a descriptive variable dictionary
  - E.g.
    - { Variable Dictionary }
    - { Average – Average of results
    - Score1 - First score
    - Sum - Sum of results
    - }

# Programming Style Comments (Cont)

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- To describe specific sections of code
  - E.g.
    - { Constant Definitions }
    - { Variable Declarations }
    - { Executable Section }
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# Programming Style Comments (Cont)

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- To describe complex sections of the implementation of the algorithm
  - E.g.
    - { Acquire data input }
    - { Compute results }
    - { Output report }

# Beginning/Novice Programmer Errors

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- Two Types of programming errors
  - Syntactical Errors (Mechanical) typically identified at compile time by the compiler
  - Semantic Errors (Logical) typically identified at run time by testing

# Syntactical Errors

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- Typically
  - Discovered during compilation
  - Can be punctuation errors
  - Can be identifier spelling errors
  - Can be type mismatch errors
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# Semantic Errors

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- Typically
  - Discovered at runtime
  - Can be the result of
    - Design errors in algorithm
    - Logical errors in implementation
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# Debugging Techniques

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- Program walk thru (manual tracing)
  - Only useful for small programs
- Echo checking
  - Automated tracing of programs by utilizing standard output statements within the code
- See illustrations on Pg 141 of Text