Introduction to Computer Programming

22.901 Introduction to Computer Programming for Nuclear Engineers

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Massachusetts Institute of Technology

Outline

Programming Languages - Nuclear Perpsective

- Numerical Programming Languages
  - Fortran, C, C++, etc.
  - compiled languages
  - very fast, low-level programming
- Scripting Languages
  - Python, Perl, Visual Basic,etc.
  - interpreted languges
  - good for data/file manipulation
  - not as fast, high-level programming
- Developmental Languages
  - MATLAB, Python, etc.
  - great enviorment for algorithm development
  - excellent post-processing capability
  - recommend for HWs and projects

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Coding Jargon

- Source Code - an ASCII text file development by the programmer with code in it
- Compiler - the program that converts the source code to machine code
  - C compilers - gcc, icc ...
  - C++ compilers - g++ ...
  - Fortran compilers - f77, g77, f90, f95, gfortran, ifort ...
- Program - the compiled source code

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Fortran Programming Language

- In this course we will focus of Fortran
- Many nuclear engineering codes are *still* developed in Fortran!

- Classical Fortran
  - FORTRAN II-IV and Fortran 66 (1958-1966)
  - FORTRAN 77 - standard programming language (still seen today!)

- Modern Fortran
  - Fortran 90,95,2003,2008
  - free format source code, structures, dynamic memory allocation

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How can I use Fortran?

- Windows - Download Cygwin and get the gfortran compilers
- Mac/Linux - Download gfortran compilers
- In 22.901 we will SSH to the department's linux cluster
  - Windows - download SecureFX/SecureCRT from MIT IST site
  - Mac/Linux - SSH right from the terminal
- To Login the following info is needed for SecureCRT
  - hostname: `cheezit.mit.edu`
  - username: `fortran12`
  - passowrd: `22.901IAP2012`
  - Mac/Linux: `ssh fortran12@cheezit.mit.edu`
- see Stellar document about navigating a Linux shell

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The Simplest Fortran Code

EXAMPLE 1