Curriculum Development
Centers Program

Awardee of The Office of the National Coordinator for
Health Information Technology

Component 4: Introduction to Information and Computer Science

Unit 5: Overview of Programming
Languages, Including Basic
Programming Concepts
Lecture 2

Unit 5 Objectives

a) Define the purpose of programming languages.
b) Define the different types of programming languages.
c) Explain the continuum of programming languages from machine code and assembly languages through scripting languages and high level structured programming languages.
d) Explain the compiling and interpreting process for computer programs.
e) Use the following components of programming languages to build a simple program: variables, loops and conditional statements.
f) Introduce additional programming concepts such as objects and modularity.

Executing Programs

• Computers execute machine code
• Assemblers translate assembly language into machine code
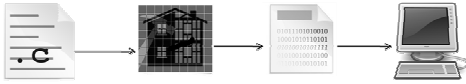• How are the higher level languages transformed into machine code?

Compiled Languages

- Program written and stored in a file(s)
- Compiler transforms the program into machine code
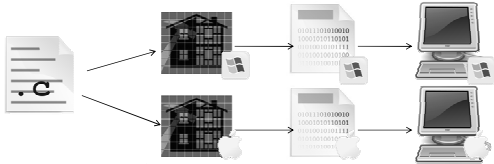- Machine code is stored in a new file and can be executed

Compiled Languages, Contd.

- Each type of computer must have its own compiler
- Every program must be compiled separately for each computer
- Examples: C, C++, FORTRAN
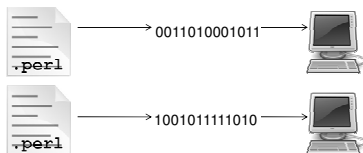
Interpreted Languages

- Interpreted languages are compiled and executed at the same time
- Each line is compiled to machine code
  - If no errors, executes and goes to next line
  - If errors, program ends

Interpreted Languages, Contd.

- The interpreter is unique to each type of computer
- Any program can be interpreted and run on any computer with an interpreter
- Many scripting languages are interpreted
- Examples:
  – BASIC, Perl, MUMPS (early version)

Hybrid Approach

- Some languages are compiled to virtual machine code then interpreted to machine code
- Combines speed of compiled language with portability of interpreted language
- Examples:
  – Java, Python
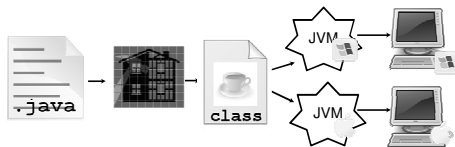
Example: Java

- Java programs are compiled to byte code
- The Java Virtual Machine (JVM) runs the byte code
  – JVM unique to each type of computer
  – Byte code is portable