

# Chapter 02: Computer Organization

## Lesson 06:

### **Program development process and tools**

# Objective

- Understand the process of program development
- Learn what are the compilers, assemblers, linkers, debuggers and interpreter

# Process of Program development and execution

# Process of developing in a high-level language

1. Write program in high-level language



2. Compile program into assembly

# Process of developing in a high-level language

3. Assemble program into machine language



4. Link multiple machine-language programs into one application



5. Load program into computer's memory



6. Execute program

# Program development tools

# Compiler

- Convert programs from high-level languages such as C or C++ into assembly language

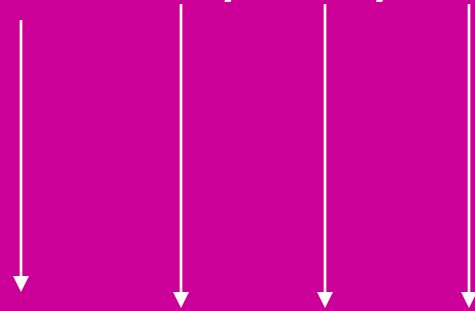
# Assembler

- Converts assembly-language instructions into the numeric representation used by the processor



# Assembly Language

Assembly Language: ADD r1, r2, r3



Machine Language: 0x04 01 02 03

# Linkers

- Join multiple machine language programs into a single executable file

# Debuggers

- Programs that display the state of another program as it executes to allow programmers to track the progress of a program and find errors.

# Interpreter

- An alternative to compiling a program
- Executes statements in the high-level language version of the program one by one
- Interpreter— a program that take high-level language programs as inputs and perform the steps defined by each instruction in the high-level language program

# Interpreter

- Generates the same result as compiling the program and then executing the compiled version
- Interpreted programs— tend to be much slower than compiled programs

# Interpreter

- The interpreter has to examine (at run time) each instruction in the source program as it occurs and then jump to a routine that performs the instruction

# Summary

# We learnt

- Programs written in high level language
- Programs compiled, assembled, linked
- Program in numeric form loaded into memory in order to execute
- Use of Interpreter



End of Lesson 6 on  
**Program development process and tools**