CPS101

INTRODUCTORY COMPUTER TECHNOLOGY

3UNITS

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Overview of Computers & Programming Languages

Chapter 1

Chapter Contents

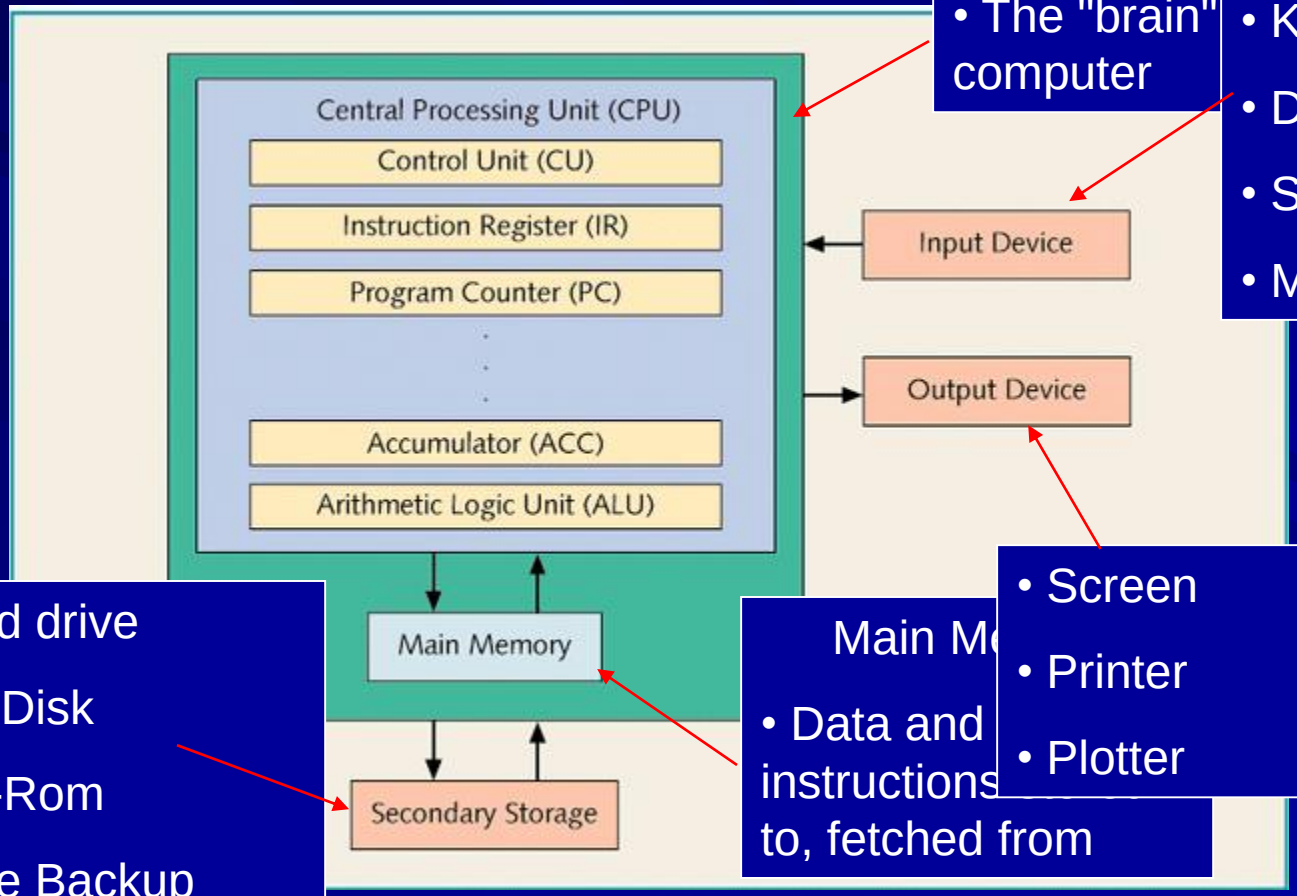
- Computer History
- Elements of a Computer System
  - Hardware
  - Software
- Language of a Computer
- Evolution of Programming Languages
- High Level Languages
- Analysis-Coding-Execution
- Object Oriented Programming

Computer History

- 1950's
  - Large devices, accessible to few people
- 1960's
  - Commercial usage emerges
  - Operated by experts
- 1970's
  - Computers cheaper, smaller
- 1990's
  - Computers fast, small, inexpensive
  - Owned and used by many people

Elements of a Computer System

Hardware



CPU

- The "brain" computer

- Keyboard
- Disk drive
- Scanner
- Mouse

- Hard drive
- Zip-Disk
- CD-Rom
- Tape Backup

Main M

- Data and instructions to, fetched from

- Screen
- Printer
- Plotter

Elements of a Computer System

Software

- Systems programs
  - Control the computer
  - Includes Operating System
- Applications programs
  - Word processors
  - Compilers
  - Spreadsheets
  - Data Bases

The Language of a Computer

- Uses digital signals
  - all 0's and 1's (binary)
  - bits (BInary digiTs)
- Data and commands stored in binary
  - 8 bits in a byte
  - ASCII character stored in a byte
  - Integers stored in 2 or 4 bytes

Evolution of Programming Languages

- Early computers programmed in machine languages
  - All binary numbers

- Assembly language used mnemonic codes
  - Codes translated into machine language by a program called the "assembler"

Assembly Language	Machine Language
LOAD	100100
STOR	100010
MULT	100110
ADD	100101
SUB	100011

Evolution of Programming Languages

- High level languages read like combination of English and algebra

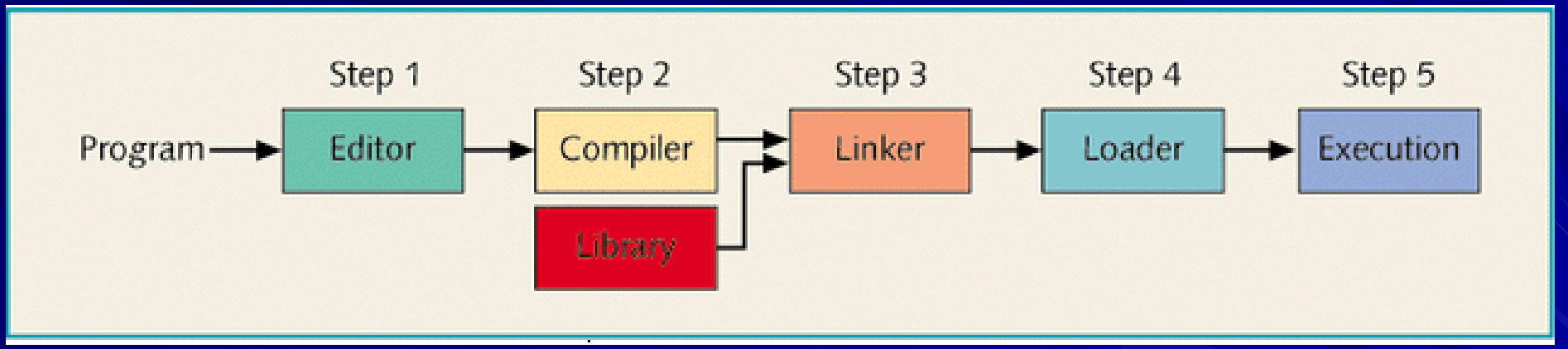
```
write_string (outfile,cust_name,'1',23);
first_line = 1;
ord.read_order(infile);
while (!ord.done())
{
  if ( !first_line) write_string (outfile,"  ",'1',23);
 ord.print_order (outfile,part_list);
 first_line = 0;
 ord.read_order(infile);
}
```

  - Translated into machine language by a program called a compiler

Processing a High-Level Language Program

1. Source program created with an editor
2. Source code translated into machine language by compiler
   - results in a .obj file (object code)
3. Linker combines common library routines with object code
   - Results in a .exe file (executable code)
4. Loader brings executable code into memory and it is run

Processing a High-Level Language Program



Analysis-Coding-Execution

- Algorithm :
  A step-by-step problem-solving process in which a solution is arrived at in a finite amount of time
  - Steps must be simple, unambiguous
  - Steps must be performed in specified order
  - Steps must solve the problem

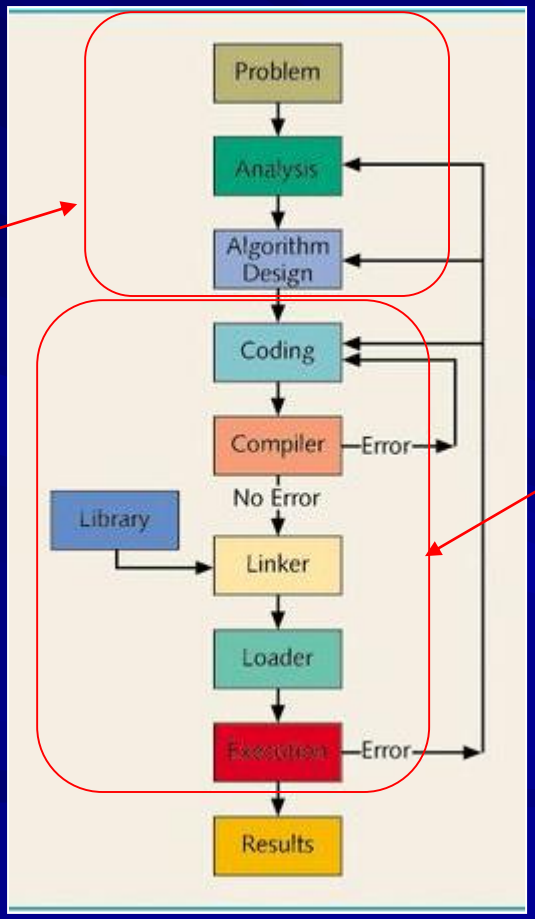
Analysis-Coding-Execution

Problem solving process

1. Analyze problem, design solution algorithm
2. Implement algorithm in a programming language, verify
3. Maintain program, adapting it to changes in problem requirements

Analysis-Coding-Execution

Analysis and algorithm design done apart from any specific programming language



Processing of the high-level language programming language

Structured Programming

- Thoroughly understand the problem
- Determine
  - the output desired
  - the required input
  - processing that will occur
- Divide the problem into sub-problems

- Other names for this process
  - structured design
  - top-down design
  - stepwise refinement
  - modular programming

Object-Oriented Programming

- Identify components of the problem which are objects
  - Usually these are the nouns in the program description
- Identify operations which are performed on the objects
  - Often these are the verbs in the program description