Programming Lecture O2

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| Level | Description |
| Bits | The smallest data item in a computer can assume the value 0 or the value 1. |
| Characters | Description Digits, letters and special symbols are known as characters. |
| Fields | Field is a group of characters or bytes that conveys meaning. |
| Records | Several related fields can be used to compose a record. |
| Files | A file is a group of related records. |
| Database | A database is an electronic collection of data that is organized for easy access and manipulation. |

Software is any computer program (or any set of instructions) that guides the hardware.

The programs that control and manage the basic operations of a computer are generally referred to as system software. System software typically includes the following types of programs:

**Operating Systems:**

An operating system is the most fundamental set of programs on a computer.

**Utility Programs:**

They perform a specialized task that enhances the computer’s operation or safeguards data (e.g., virus scanners, data backup programs, etc.)

**Software Development Tools:**

The programs that programmers use to create, modify, and test software (e.g., assemblers, compilers, and interpreters).

Machine Languages

* Any computer can directly understand only its own machine language, defined by its hardware architecture.
* Usually consist of numbers (ultimately reduced to 1s and 0s).
* Cumbersome for humans.

Assembly Languages

* English-like abbreviations to represent elementary operations.
* Translator programs called assemblers convert assembly-language programs to machine language.
* Clearer to humans.

High-Level Languages

* To speed the programming process, high-level languages were developed.
* Translator programs called compilers convert high-level language programs into machine language.
* Interpreter programs were developed to execute high-level language programs directly (without the need for compilation), such as JavaScript and PHP

Typical C/C++ Program Development Environment

* C/C++ systems generally consist of several parts: (1) a program development environment, (2) the language and (3) the C/C++ Standard Library.
* C++ programs typically go through six phases:
  1. Edit
  2. Preprocess
  3. Compile
  4. Link
  5. Load
  6. And Execute.