Operating Systems (CITS2230)

Lecturer

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Laboratory and tutorial enrollments :

Laboratory and tutorial times :

Please see the web pages. The laboratory sessions will start from the 2nd week and the tutorial classes will start from the 3rd week and will be held in every other week.
A simple machine model

- First, let us clearly specify what we mean by a machine.
- A schematic diagram of a machine is shown above. For our discussion, a machine consists of a Central Processing Unit (CPU) and a main memory connected by a bus.
- At each clock cycle, the CPU brings an instruction or data from the memory. The communication between the CPU and the memory is through the memory bus.
- A program (in a higher level language) is converted into machine language by the compiler and loaded in the memory by the loader.
Structure of the CPU

Figure 2: An overview of CPU registers.

- Let us first look at the detailed structure of the CPU.
- The registers $R1$ to $R16$ are called *general purpose registers*. They are used for storing data items, intermediate results of computations and other computational information related to the program currently being executed.
- The register $PC$ is called the *program counter*. Each instruction in a program has an address (i.e., where in memory it is located). The PC stores the address of the next instruction to be executed.
Structure of the main memory

- We can view the main memory as a series of locations where data and/or program instructions are stored.
- Each memory location has a unique address. This address is usually denoted in binary and the total number of bits in the address depends on the total size of the memory and the word size of the machine.
- We will assume for simplicity that each memory location stores one of the following: one instruction, one item of data or address of another memory location.
Structure of the main memory

Figure 3: An overview of the main memory.