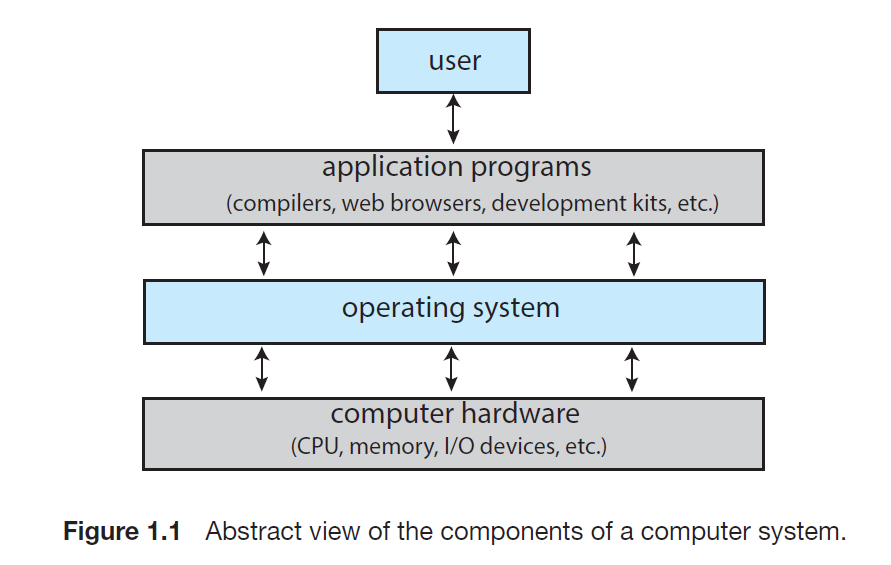
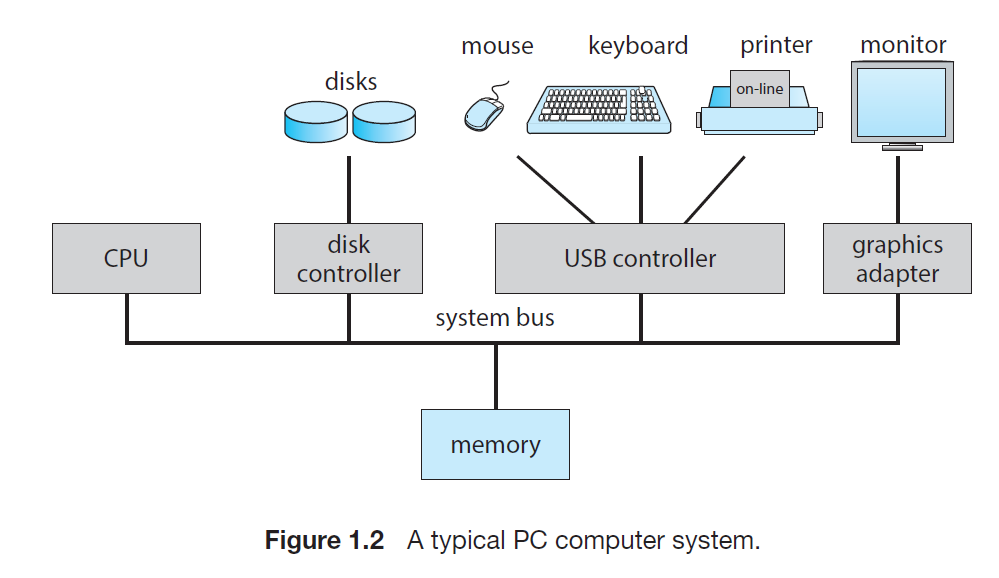
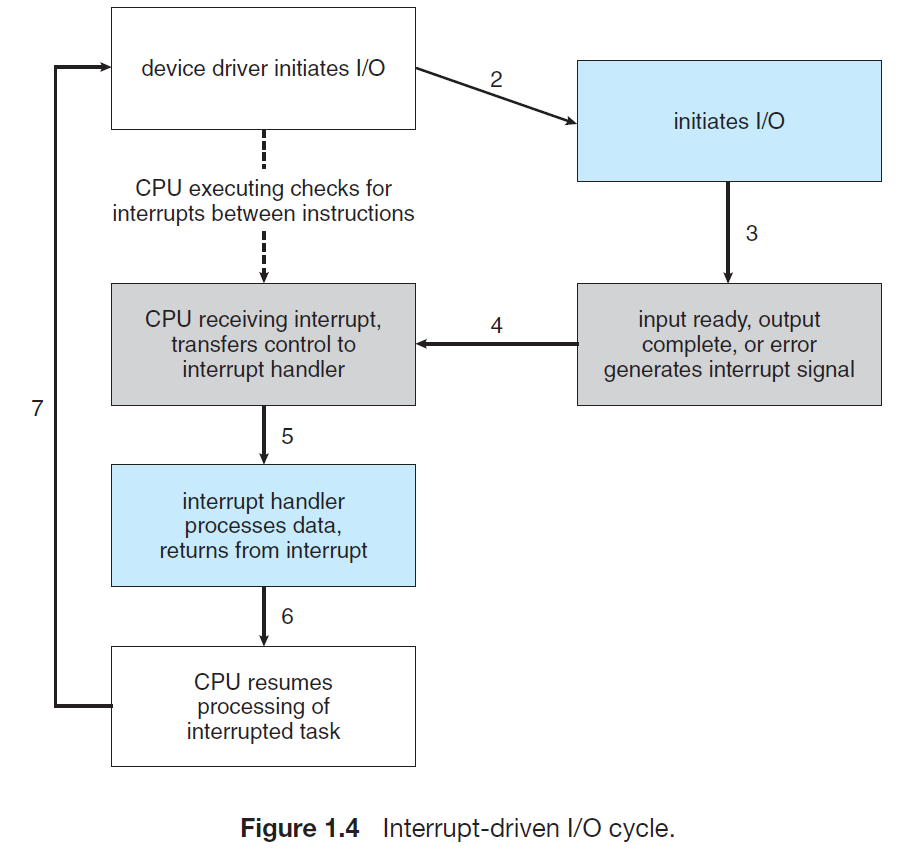
* 1. **What Operating Systems Do**
* A computer system can be roughly divided into four parts –
* hardware: CPU, memory and I/O devices
* operating system
* application programs
* user



* **Moore’s Law:** The number of transistors in an integrated circuit would double every 18 months.
  1. **Computer System Organization**
* A modern general-purpose computer system consists of one or more CPUs and several device controllers connected through a common bus that provides access between components and shared memory.



* **Device driver:** Operating systems have a device driver for each device controller. It understands the device controller and provides the rest of the operating system with a uniform interface to the device.
* **Interrupt:** Interrupts are handled as follows –
* When the CPU is interrupted, it stops what it is doing and immediately transfers execution to a fixed location.
* The fixed location contains the starting address of the interrupt service routine.
* The interrupt service routine executes.
* On completion, the CPU resumes the interrupted computation.
* **Interrupt Vector:** A table of pointers to locations that hold the addresses of the interrupt service routines for various devices.
* It is indexed by a unique number, given with the interrupt request, to provide the address of the interrupt service routine for the interrupting device.
* **Non-maskable Interrupts:** Reserved for events such as unrecoverable memory errors.
* **Maskable Interrupts:** Can be turned off by the CPU before the execution of critical instruction sequences that must not be interrupted.
* **Interrupt Chaining:** Computers have more devices (and hence, more interrupt handlers) than they have address elements in the interrupt vector. Interrupt chaining is a way in which each element in the interrupt vector points to the head of a list of interrupt handlers.
* When an interrupt is raised, the handlers on the corresponding list are called one by one, until one is found which can service the request.
* This structure is a compromise between the overhead of a huge interrupt table and the inefficiency of dispatching to a single interrupt handler.



* **Interrupt priority levels:** These levels enable the CPU to defer the handling of low-priority interrupts without masking all interrupts and makes it possible for a high-priority interrupt to pre-empt the execution of a low-priority interrupt.
* **Random Access Memory:** Main memory is implemented using a semiconductor technology called dynamic Random Access Memory (DRAM).
* **Bootstrap program:** The first program to run on computer power-on.
* **Volatile:** Loses its contents when power is turned off or otherwise lost.
* **Firmware:** Storage that is infrequently written to and is non-volatile. E.g. EEPROM (Electrically erasable programmable read-only memory).
* **Secondary Storage:** It is an extension of main memory. It is able to hold large quantities of data permanently. E.g. hard-disk drives (HDD), non-volatile memory devices (NVM). It is much slower than main memory.
* **Tertiary Memory:** Those that are slow enough and large enough that they are used as back-ups. E.g. Magnetic tapes, CD-ROM, blu-ray, etc

