HW8

1) List and briefly define the four main elements of a computer.

- CPU: processes data and controls the operation of the computer

- Main Memory: stores data and programs being used. Volatile memory.

- I/O devices: Peripherals which move data between the computer and the external environment such as external memory, monitors, network equipment.

- System bus: Transfers electric signals between the other components and regulates them. Communications system.

2) Define the two main categories of processor registers.

- Address register: contains the address of the data to be written or read

- Buffer register: contains the data to be read or written

3) What is an interrupt? How are multiple interrupts dealt with?

- Interrupts are when computer components interrupt the normal sequencing of the processor in order to more efficiently utilize the processor. It prevents wasting time where the processor is doing nothing waiting for I/O devices.

4) What characteristics distinguish the various elements of a memory hierarchy?

- Cost per bit

- Capacity

- Access time

- Frequency of access to the memory by the processor

5) What is cache memory? Explain the working of the cache memory in brief.

- Cache memory is a type of data storage which allows for faster access time by storing frequently accessed information nearer to the CPU than the RAM. It uses the principle of locality with small amounts of storage but fast access speeds.

6) What is the difference between a multiprocessor and a multicore system?

- Both multiprocessors and multicore systems aim to speed up computation by increasing the processing power by adding cores. A multiprocessor adds cores by adding more CPUs to the computer which are all connected to the same I/O and RAM by a complex system bus. It is a more reliable way of adding cores because failure of one processor does not stop the other processors.
- On the other hand, a multicore system is a single CPU which contains multiple cores which can process data in parallel and communicate with each other.

7) Suppose a stack is to be used by the processor to manage procedure calls and returns. Can the program counter be eliminated by using the top of the stack as a program counter?

- Yes. The program counter stores the memory address of the next instruction to be called, so if we just load the procedure calls in reverse order onto the stack, by popping off the top of the stack we can achieve the same effect as using a program counter.