Seminar 1

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Activity 1.

1. Four main differences between Von Neumann and Harvard architecture

Von Neumann	Harvard
Is a theoretical computer design based on the concept of stored-program, where programs and data are stored in the same memory	It is based on the Harvard Mark 1 relay-based computer model, which employed separate buses for data and instructions
Only has one bus for both instruction fetches and data transfer Data transfer and instruction cannot be performed simultaneously	Has separate memory space for both instructions and data. Data transfer and instruction can be performed simultaneously
Processor needs two clock cycles to execute an instruction	Processor needs one cycle to complete an instruction
Since instructions and date use the same bus in the architecture, the design and development are simplified which bring down the production costs	The production cost is higher because of Harvard complex architecture that employs two bus for instructions and data

2. Discuss advantages and disadvantages of Harvard architecture
- Advantages:
    - o Since data and instruction stored in separate buses, there are less chance of corruption
    - o The bandwidth is used for memory is more predictable.
    - o Often offer higher performance since data and instructions are kept in separate memory and travelled on different buses.
    - o Control units get data and instruction from one memory, this simplifies the architecture of the control unit.
- Disadvantages:
    - o The unoccupied data memory cannot be used by instructions and the free instruction memory cannot be used by data.
    - o The architecture is not used widely.
    - o Production of computer with 2 buses take more time to get manufactured, hence increase the production cost. The control unit also has the same scenario.

Activity 2.

1. Based on the diagram, what architecture is used in the Arduino board? Justify your answer
- The Arduino board use the Harvard architecture, since it has separate memory for data and instructions.

2. Types of memory, sorted based on speed, from fastest to lowest:
- SRAM: place where the sketch creates and manipulates variables when it runs.
- EEPROM: used to store memory that are non-volatile.
- Flash program memory: place where the sketch are stored.