SCHOOL OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

G51CSA Lecture Notes #2

Reading: reference A Chapter 2 + reference B Chapter 1 + relevant Chapters in reference C

1. Computer Systems Hierarchy

A. Instructions, Languages, Levels and virtual machines
B. Modern multilevel machines

2. A brief History of Computers

The first Generation - Vacuum Tubes (1945 -1955)

A. ENIAC (1943 - 1946)
- Intended for calculating range tables of aiming artillery
- Consisted of 18000 tubes, 1500 relays, weight 30 tons, consumed 140 KW
- Decimal machine
- Each digit represented by a ring of 10 vacuum tubes.
- Designed for artillery range table, but used to perform complex calculations to help determine the feasibility of H bomb - general purpose computer
- Programmed with multiposition switches and jumper cables.

B. John von Neumann (1945 -1952)
- Originally a member of the ENIAC development team.
- First to use binary arithmetic
- Architecture consists of : Memory, ALU, Program control, Input, Output
- Stored-program concept - main memory store both data and instructions
- Instruction cycle

The Second Generation - Transistors (1955 -1965)

C. Transistors
- Transistor was invented in 1948 at Bell Labs by John Barden, Walter Brattain amd William Shockley
- TX-0 (Transistorised eXperimental computer 0), first transistor computer, build at MIT Lincoln Labs
- DEC PDP-1, first affordable microcomputer ($120,000), performance half that of IBM 7090 (the fastest computer in the world at that time, which cost millions)
- PDP-8, cheap ($16,000), the first to use single bus

D. CDC 6600 (1964)
- an order of magnitide faster than the mighty IBM 7094
- First highly parallelized machine (up to 10 instructions in parallel)
- Separate computational and control units

E. Burroughs B5000
- First to emphasise software and high level programming languages (Algol 60)

The Third Generation - Integrated Circuits (1965 -1980)

F. IBM System/360

- Family of machines with same assembly language
- Designed for both scientific and commercial computing
- First to allowed microprogramming

G. DEC PDP-11
- Was to System/360 what PDP-8 was to 7090
- Very popular with universities, maintained DEC's lead in microcomputer market

The Fourth Generation - VLSI (1980 - ?)
- Lead to PC revolution
- High performance, low cost