

Chapter 01: Introduction

Lesson 03

Evolution of Computers Part 3— Second generation computers

Objective

- Understand how electronic computers evolved during the second generation of computers

Second generation Electronic Systems

- 1954-64
- Transistor circuits were first evolved for electronic circuits
- These transistor circuit based computers—*second generation computers*

Outline

- Second Generation
- IBM 1620 and IBM 7094
- Greatly reduced power dissipation, space and computation time

2nd Generation of Computers

- IBM 1620 and IBM 7094 lasted up to 1968
- Ferrite cores as main memory in place of RAM/ROM/Caches
- Added many registers in CPU
- Separate IO processors and the disk drive, tape drive and line printers for input-output operations

2nd Generation of Computers IBM 1620 and IBM 7094

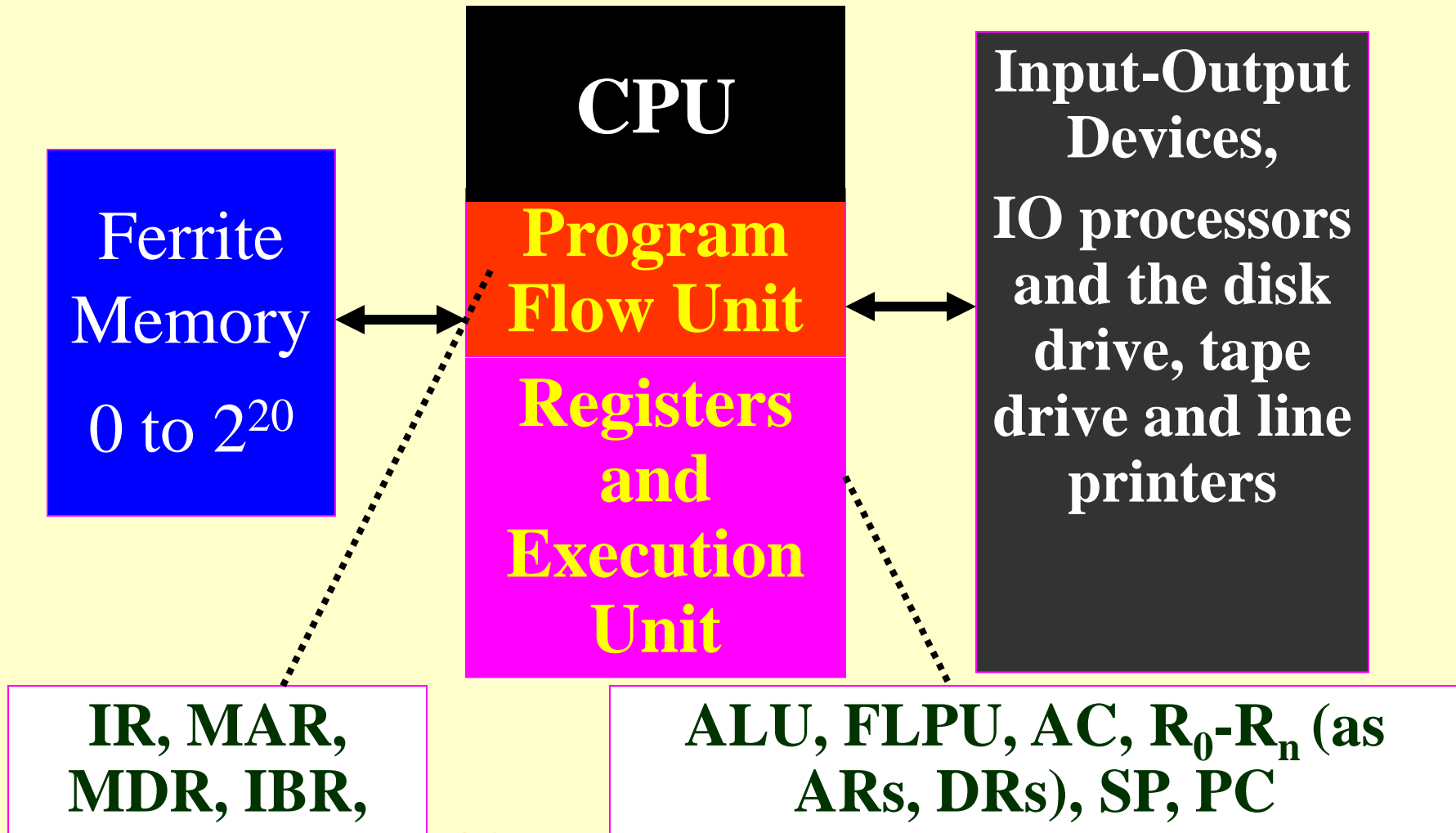
- Addition and subtraction, multiplication and division on fixed point and floating point numbers
- Several addressing modes for fetching operands
- Concept of stack and stack pointer for last-in first out (LIFO) data operations, for subroutine calls (called functions in C and methods in Java) and for nested calls

2nd Generation of Computers

IBM 1620 and IBM 7094

- Concept of batch processing.
- Programming in assembly
- Programming in high-level languages: for example, FORTRAN and COBOL

2nd Generation Computer — Architecture



Greatly Reduced Power Dissipation

- Assume— a vacuum tube valve operated at 150V and 5 mA and a transistor operated at 6V and 1mA
- Reduction in power dissipation by factor of $7500 \text{ mW} / 6 \text{ mW} = 1250$ times

Greatly Reduced Space

- Assume— a tube needed 4 cm height \times 1.5 cm² base area
- A transistor needed 0.4 cm \times 0.3 cm² base area
- There is reduction in three-dimensional space by factor of $6 \text{ cm}^3 / 36 \text{ mm}^3 = 1000/6 = 167$ times

Greatly Reduced Computational Time

- Assume— a tube switched current from state 0 to 1 in $10\ \mu\text{s}$ and a transistor in $1\ \mu\text{s}$
- There is enhancement in speed of processing by factor of $10\ \mu\text{s} / 1\ \mu\text{s} = 10$ times

Summary

We learnt

- Transistor circuits based computers
- Second generation computers
- 1954–1968
- IBM 1620 and IBM 7904
- Used Ferrite core big memories
- Used Multiple Registers
- Used Stack Pointer Used

We learnt

- Used Subroutines (functions) and nested calls
- Used Assembly and High level languages FORTRAN and COBOL
- Reduced power dissipation 1250 plus times
- Reduced space 200 times
- Reduced computational time 10 plus times

We learnt

- Stored computer concept
- Instruction format A1 A2 A3 A4 OP replaced by $-A2$ OP
- ALU, FLPU, AC, R0-Rn (as ARs, DRs), SP, PC
- A1 and A3 implicit in AC
- IR, MAR, MDR, IBR,
- A4 implicit from PC
- Registers IR, AR, IBR, PC, AC, MQ, DR, ALU

End of Lesson 03

**Evolution of Computers Part 3— Second
generation computers**