Lesson 01:

Basic Processing Units

Basic Processing Units
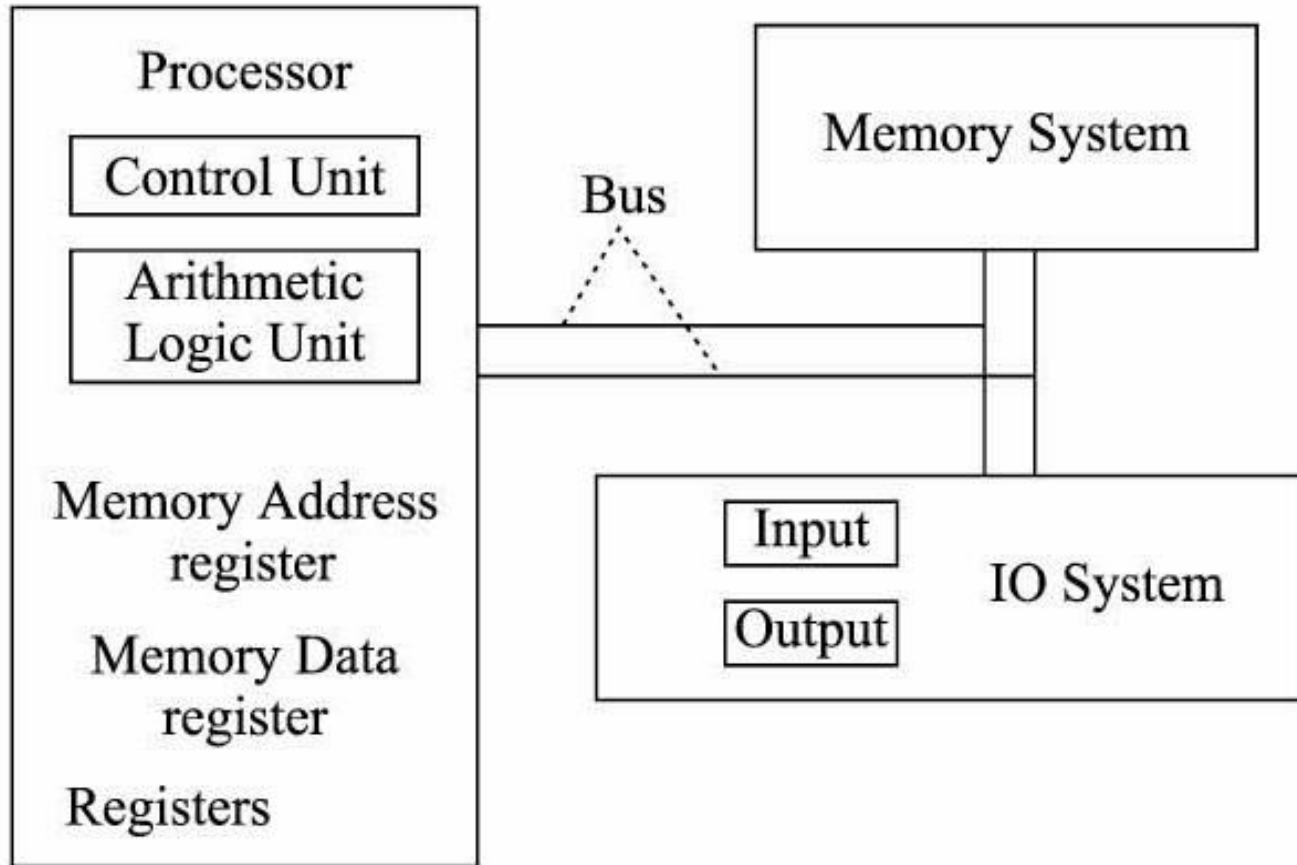
Processor Block Diagram

Data from Memory

Data to Memory   Data of Memory   Instructions From Memory

Control Signals

Control Logic Unit

Register File

Integer Unit

Floating-Point Unit
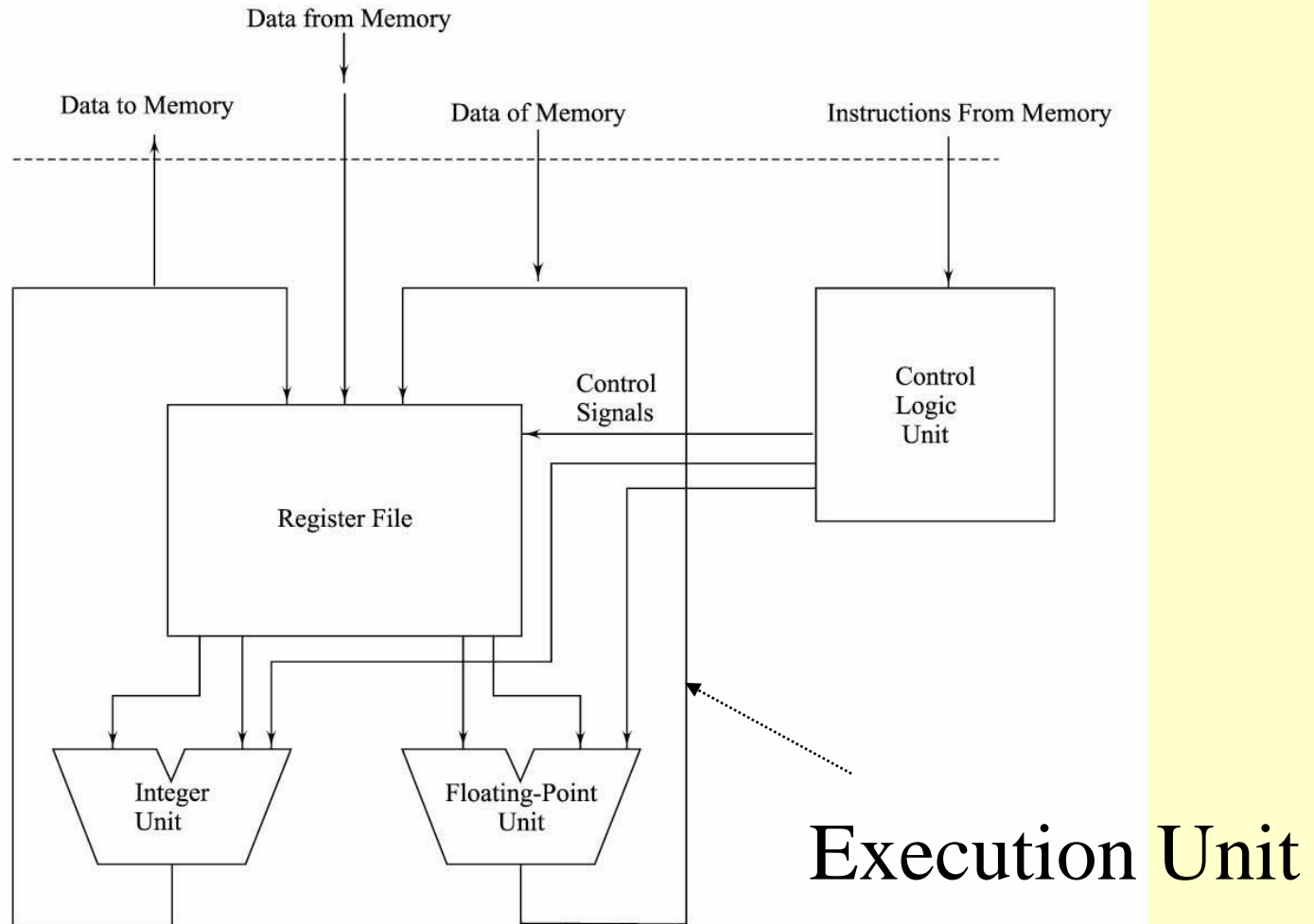
Execution Unit

1. Execution Unit

Execution unit

- Includes Arithmetic Logic Unit (ALU)
- Contains the hardware that executes instructions
- Includes the hardware that fetches and decodes instructions

Execution unit

- Does actual computation using the arithmetic logic unit(s) [ALUs]

- Contain separate execution units for integer and floating-point computations in certain processors

- Hardware required to handle the two data types, integer and floating point

- Modem processors often use multiple execution units to execute instructions in parallel to improve performance

ALU

7
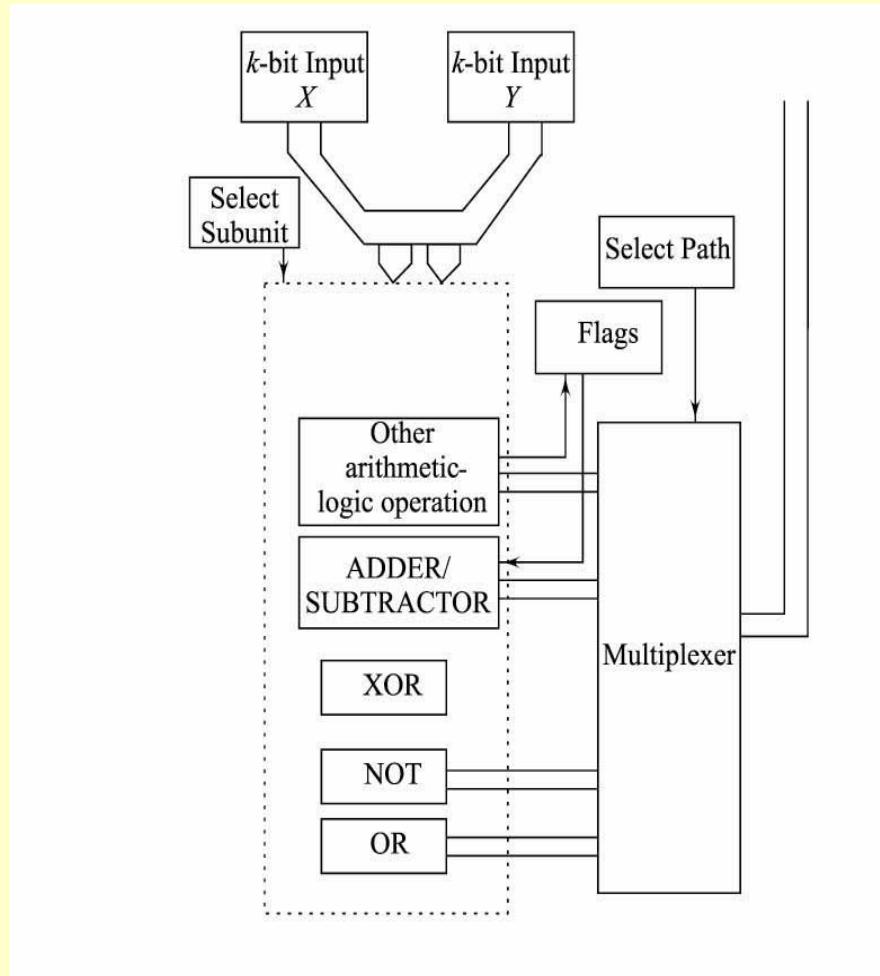
2. Register set

Current program register set used by the program

GPRs (General Purpose Registers

- Program counter

- Status register (PSW Processor Status Word)

- Other processor registers used by a program instruction

Register set used by the execution unit

- Instruction Register (IR)

- Instruction Decoder (ID)

- MAR and MDR Registers

- Other processor registers used by a program instruction

10

Register Set

- Values stored in the register accessed more quickly than data stored in the memory

- Support to simultaneous access of registers by the processor

Processor Operations using Registers

- Allows an operation, such as an addition, to read all of its inputs from the register file at the same time, rather than having to read them one at a time

3. Control Logic

Control Logic Unit

- Controls the rest of the processor, determining when instructions can be executed

- Controls what sequences of operations are required to execute each instruction.
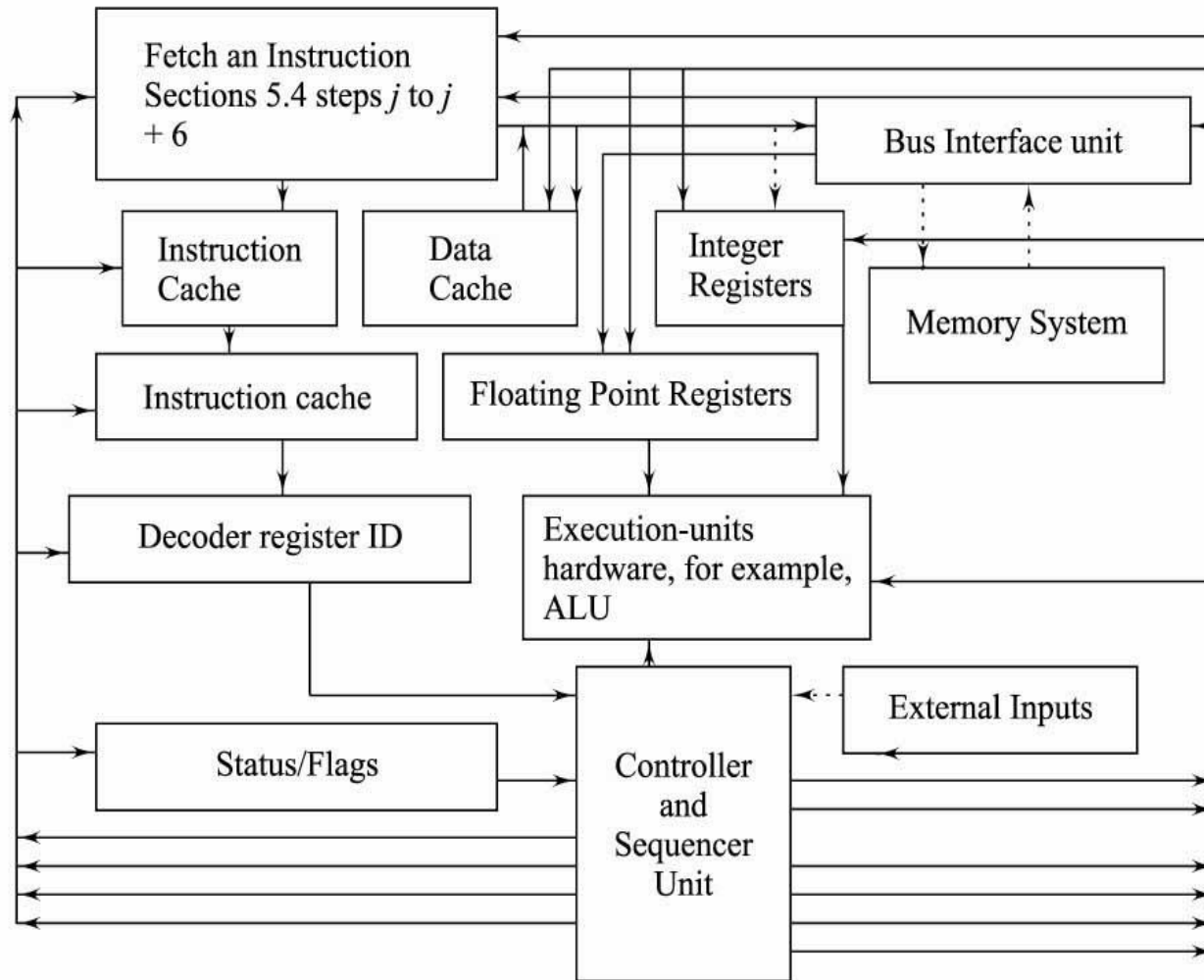
Early processors control logic

- Very small fraction of the processor hardware compared to the ALUs and the register file

New processors control logic

- Complex control unit one of the more difficult parts of a processor to design

Processor units

Summary

We learnt

Processing units of a computer —

- Processor Control unit, IR, ID, PSW, ALU, MAR, MDR, Registers

- Address, data and control buses

- Memory

- Input-Output System — Hard Disk, CD-ROM, video card, ...

We learnt

- Execution unit Includes the hardware that fetches and decodes instructions

- Does actual computation using the arithmetic logic units (ALUs)

- General Purpose registers

- Program counter

- Status register

- other registers

We learnt

- Complex control unit in a processor with multiple addressing modes and large opcodes

End of Lesson 01

on

Basic Processing Unit