

Chapter 8

Register Transfer Level

Digital System

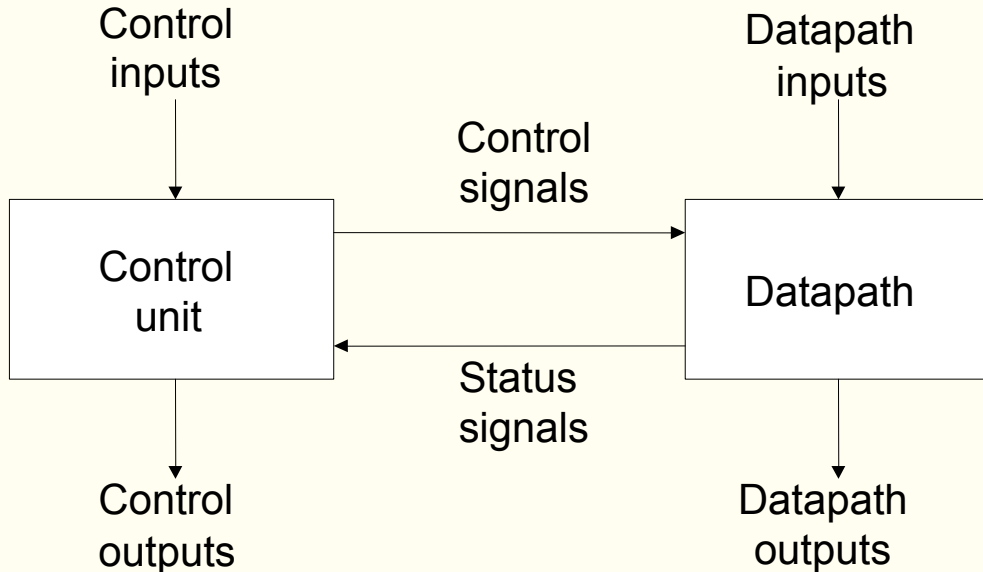
- A digital system is a sequential logic system constructed with flip-flops and gates.
 - To specify a large digital system with a state table is very difficult .
 - Modular subsystems
 - Registers, decoders, multiplexers, arithmetic elements and control logic.
 - They are interconnected with datapaths and control signals.

Register Transfer Level (RTL) Notation

- A digital system is represented at the register transfer level (RTL) when it is specified by the following three components:
 - The set of registers in the system.
 - The operations that are performed on the data stored in the registers.
 - The control that supervises the sequence of operations in the system.

Modern Design (1/3)

Modern design is composed of (1) Datapath and
(2) Controller (control unit or control path)



(Note)

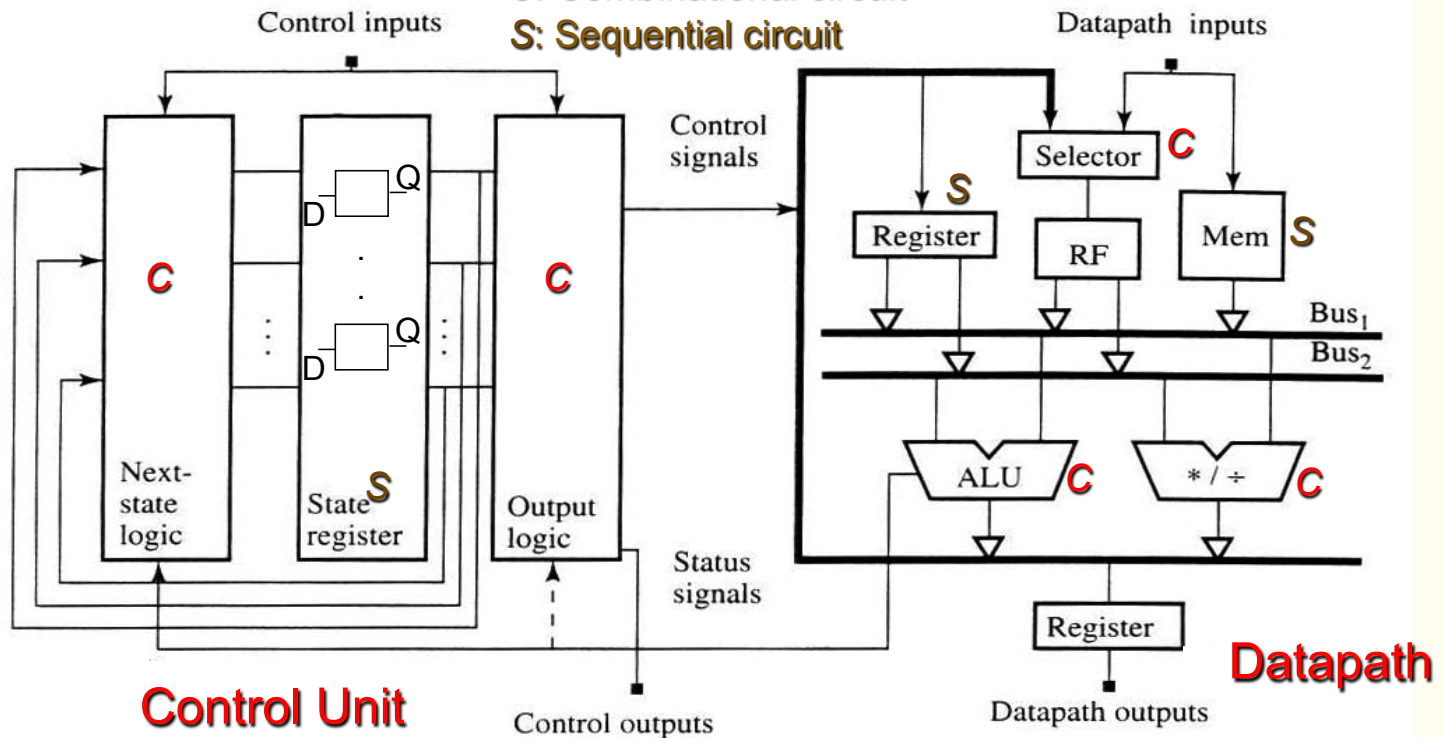
High-level block diagram

Modern Design (2/3)

Register-transfer-level block diagram

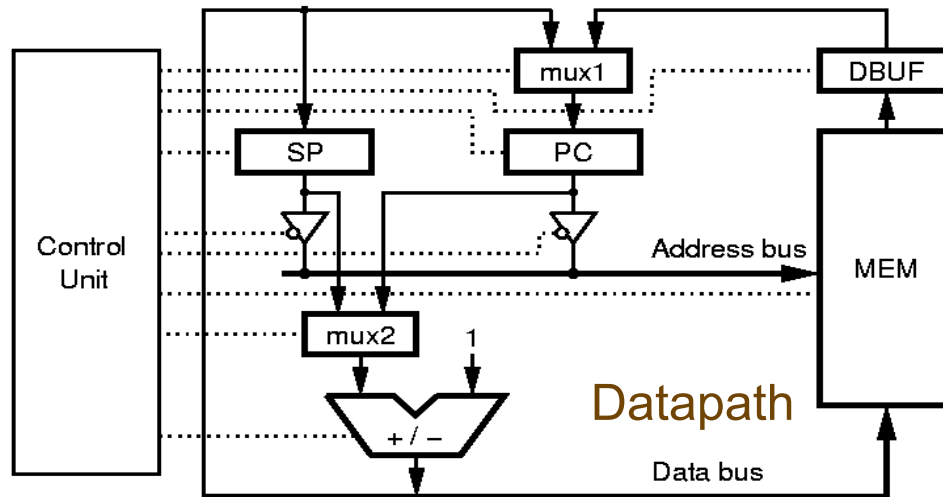
C: Combinational circuit

S: Sequential circuit



Modern Design (3/3)

```
if IR(3) = '0' then
    PC      := PC + 1;
else
    DBUF    := MEM(PC);
    MEM(SP) := PC + 1;
    SP      := SP - 1;
    PC      := DBUF;
end if;
```



STRUCTURE