MICROCONTROLLER

UNIT-IV

Lecture-3

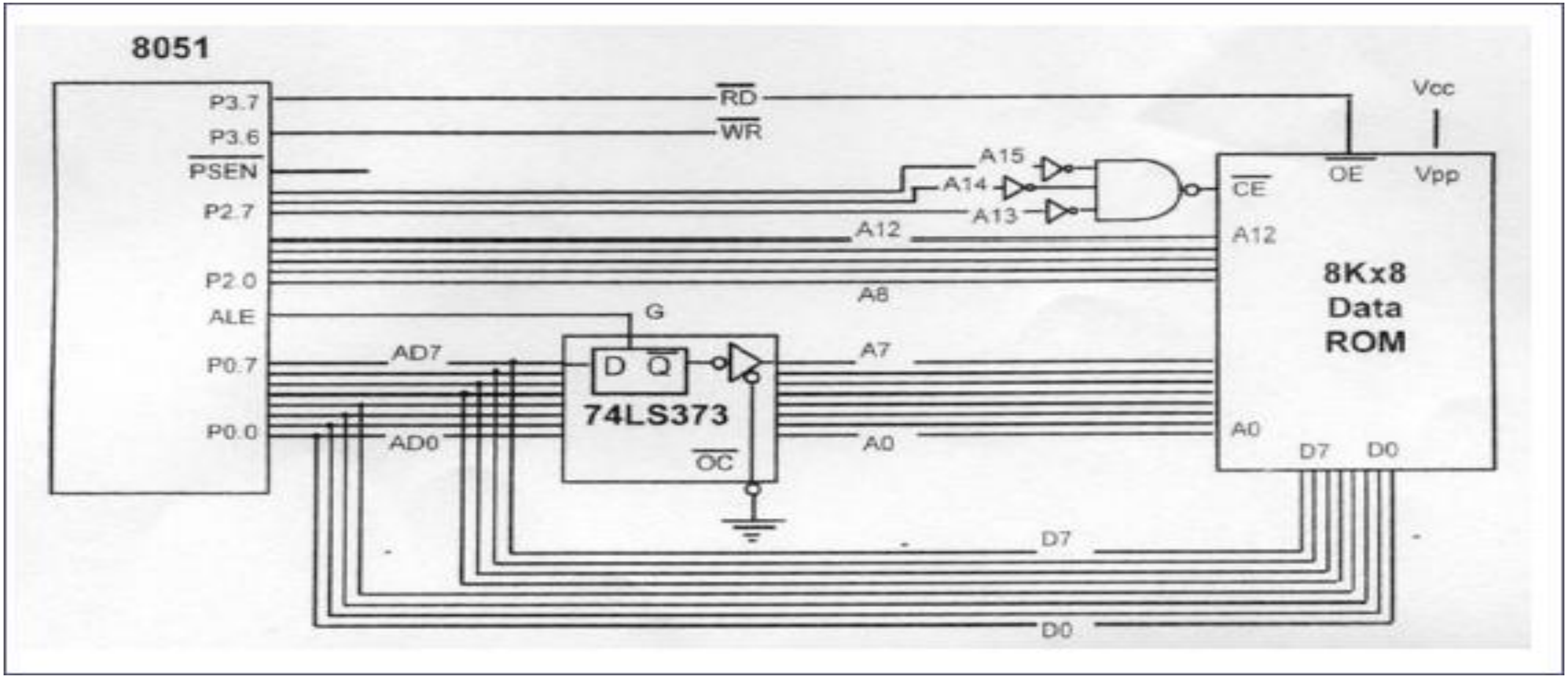
8051 DATA MEMORY SPACE

- The 8051 has 128K bytes of address space
- 64K bytes are set aside for program code
- Program space is accessed using the program counter (PC) to locate and fetch instructions
- In some example we placed data in the code space and used the instruction MOVC A,@A+DPTR to get data, where C stands for code
- The other 64K bytes are set aside for data

Contd.

- The data memory space is accessed using the DPTR register and an instruction called MOVX, where X stands for external – The data memory space must be implemented externally
- We use RD to connect the 8031/51 to external ROM containing data
- For the ROM containing the program code, PSEN is used to fetch the code

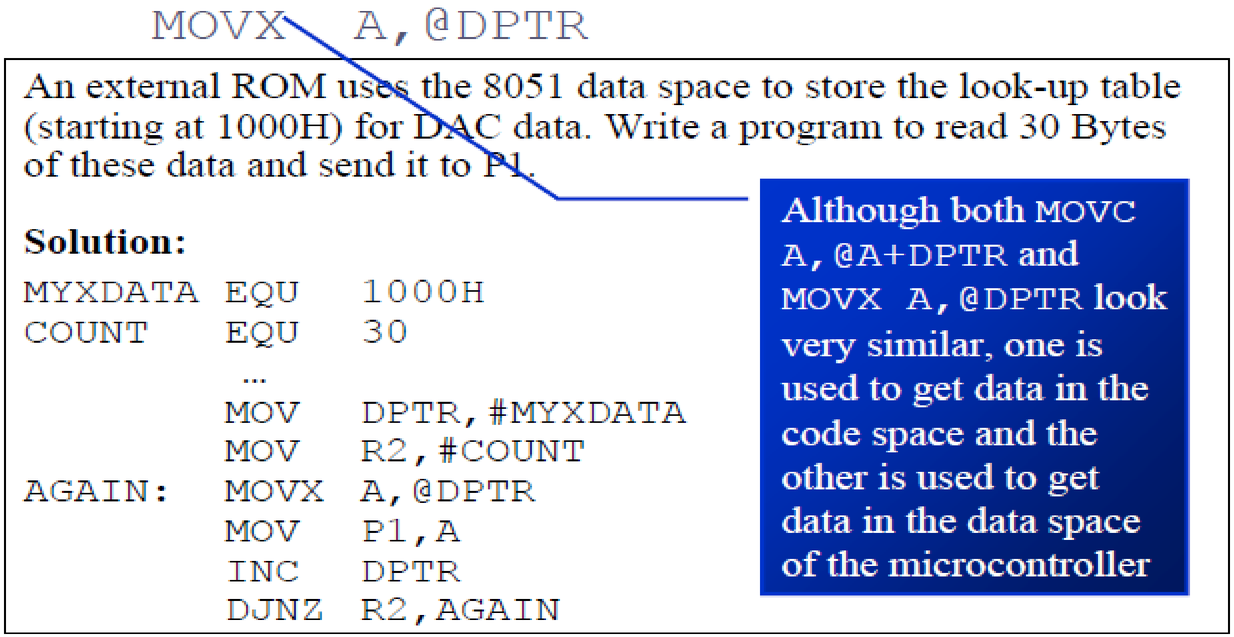
Contd.



Data ROM

Contd.

- MOVX is a widely used instruction allowing access to external data memory space
- To bring externally stored data into the CPU, we use the instruction



```
MOVX   A,@DPTR
```

An external ROM uses the 8051 data space to store the look-up table (starting at 1000H) for DAC data. Write a program to read 30 Bytes of these data and send it to P1.

Solution:

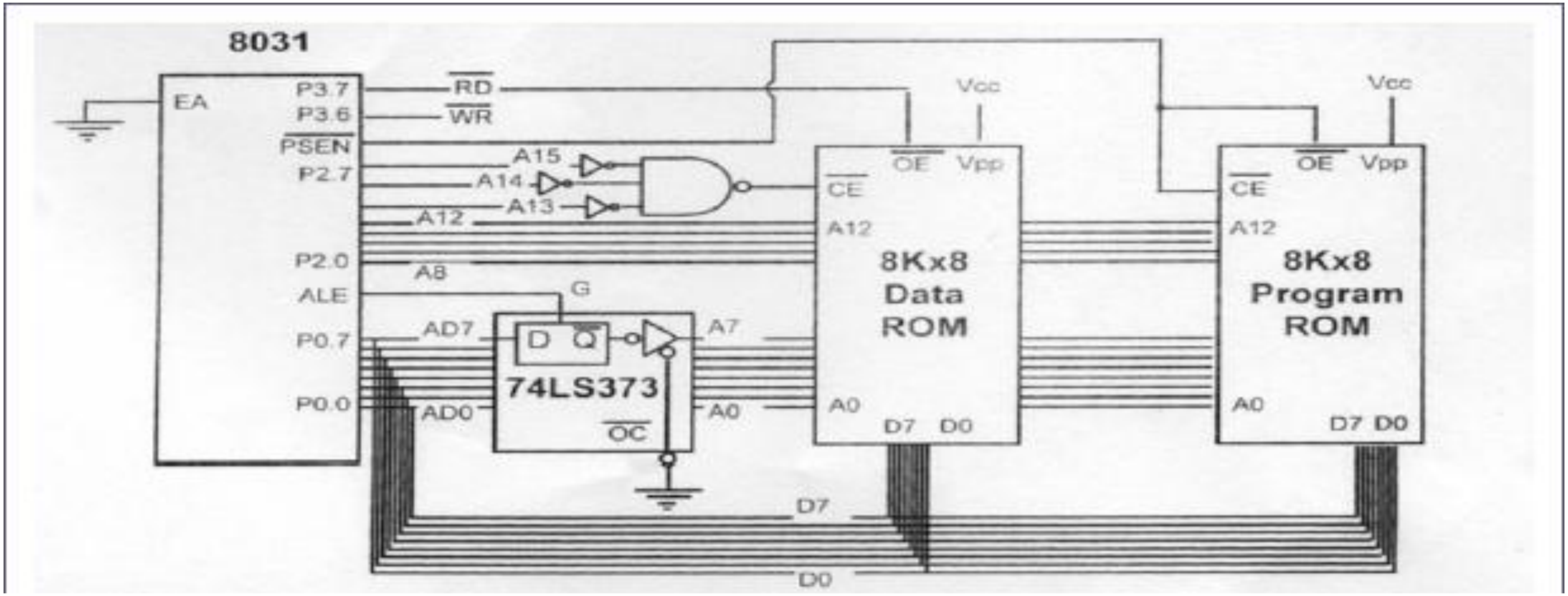
```
MYXDATA  EQU    1000H
COUNT    EQU    30
          ...
         MOV    DPTR,#MYXDATA
         MOV    R2,#COUNT
AGAIN:   MOVX   A,@DPTR
         MOV    P1,A
         INC    DPTR
         DJNZ   R2,AGAIN
```

Although both MOVC A,@A+DPTR and MOVX A,@DPTR look very similar, one is used to get data in the code space and the other is used to get data in the data space of the microcontroller

Example

- Show the design of an 8031-based system with 8K bytes of program ROM and 8K bytes of data ROM.
- **Solution:** Figure shows the design. Notice the role of PSEN and RD in each ROM. For program ROM, PSEN is used to activate both OE and CE. For data ROM, we use RD to active OE, while CE is activated by a Simple decoder.

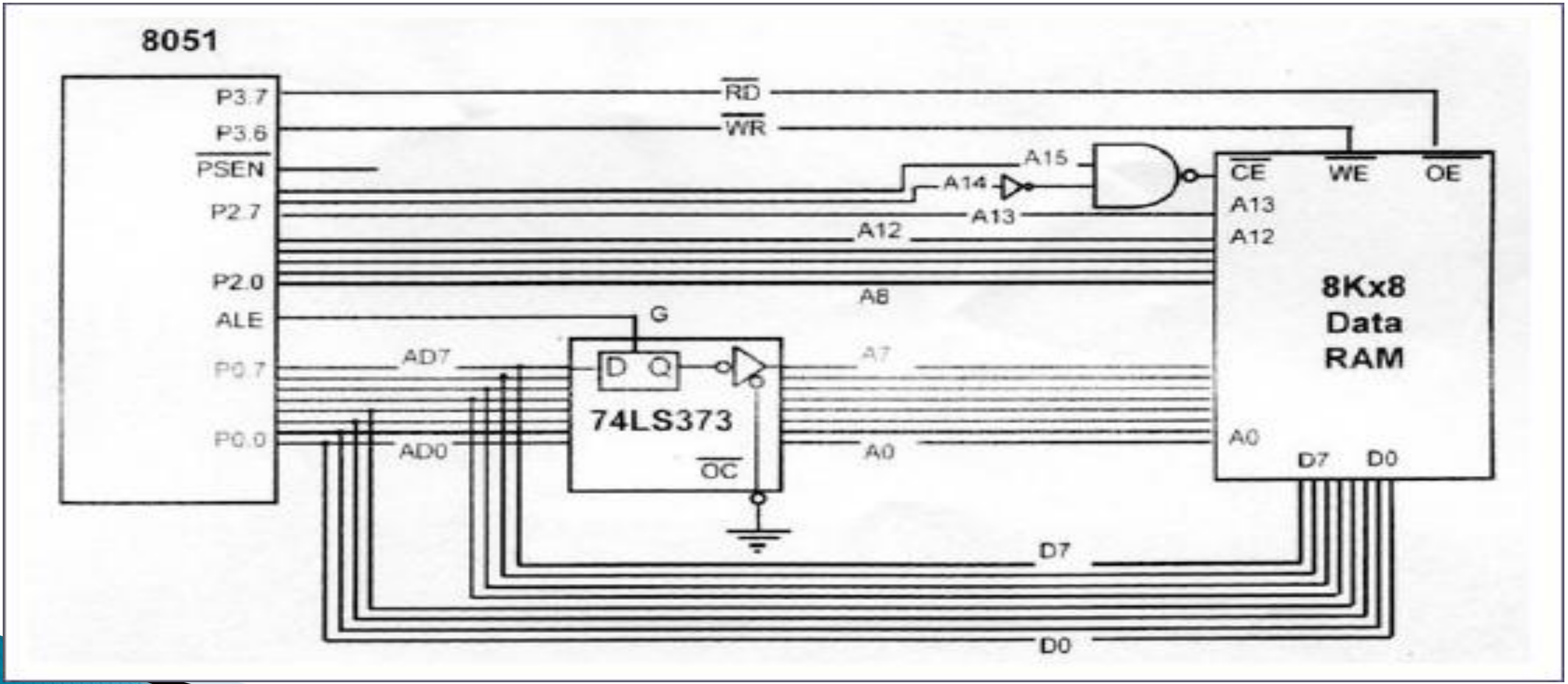
Contd.



External Program ROM

External Data RAM

- To connect the 8051 to an external SRAM, we must use both RD (P3.7) and WR (P3.6)


8051
P3.7
P3.6
PSEN
P2.7
P2.0
ALE
P0.7
P0.0
RD
WR
A15
A14
A13
A12
A8
G
AD7
AD0
D Q
74LS373
OC
A7
A0
CE
WE
OE
A13
A12
8Kx8
Data
RAM
A0
D7
D0
D7
D0