



**BITS Pilani**

# Microprocessors & Interfacing

## 80x86- Interfacing

Dr. Gargi Prabhu  
Department of CS & IS

# Example



;A procedure that sets the TRAP flag bit to enable trapping

```
TRON  PROC    FAR USES AX BP
```

```
    MOV  BP,SP           ;get SP
    MOV  AX[BP+8]         ;retrieve flags from stack
    OR   AH,1            ;set trap flag
    MOV  [BP+8],AX
    IRET
```

```
TRON  ENDP
```

# Alternate Method



MAIN PROC

MOV AX, @DATA ; Initialize DS to point to the data segment

MOV DS, AX

; Set the Trap Flag (TF) in FLAGS register

PUSHF ; Push FLAGS onto the stack

OR WORD PTR [SP], 0100H ; Set the 8th bit (TF) to 1

POPF ; Pop FLAGS from the stack

MOV AH, 4CH ; DOS function to terminate program

INT 21H ; Call DOS interrupt

MAIN ENDP

# The Programmable Peripheral Interface



- Has 24 pins for I/O that are programmable in groups of 12 pins, has groups that operate in three distinct modes of operation.
- The 82C55 is used for interface to the keyboard and the parallel printer port in many personal computers, but it is found as a function within a interfacing chip set.
- 8255 function in following modes:
  - I/O Modes [ Mode 0, Mode 1, Mode 2]
  - BSR (Bit Set Reset) Mode

8255A has three ports

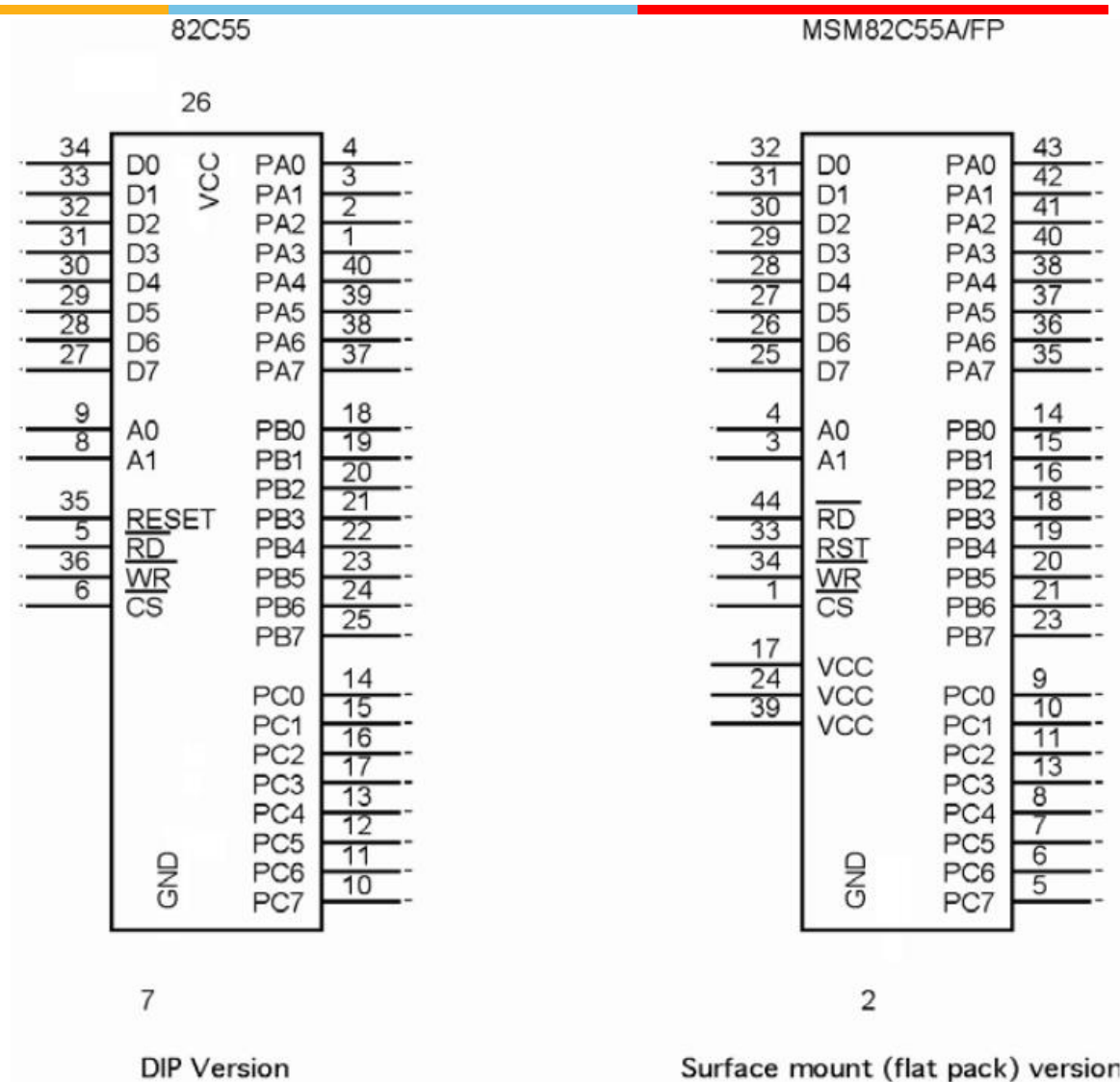
- PORT A (PA7-PA0)
- PORT B (PB7-PB0)
- PORT C (PC7-PC0)

**Port A** and **Port B** are 8 bit parallel ports.

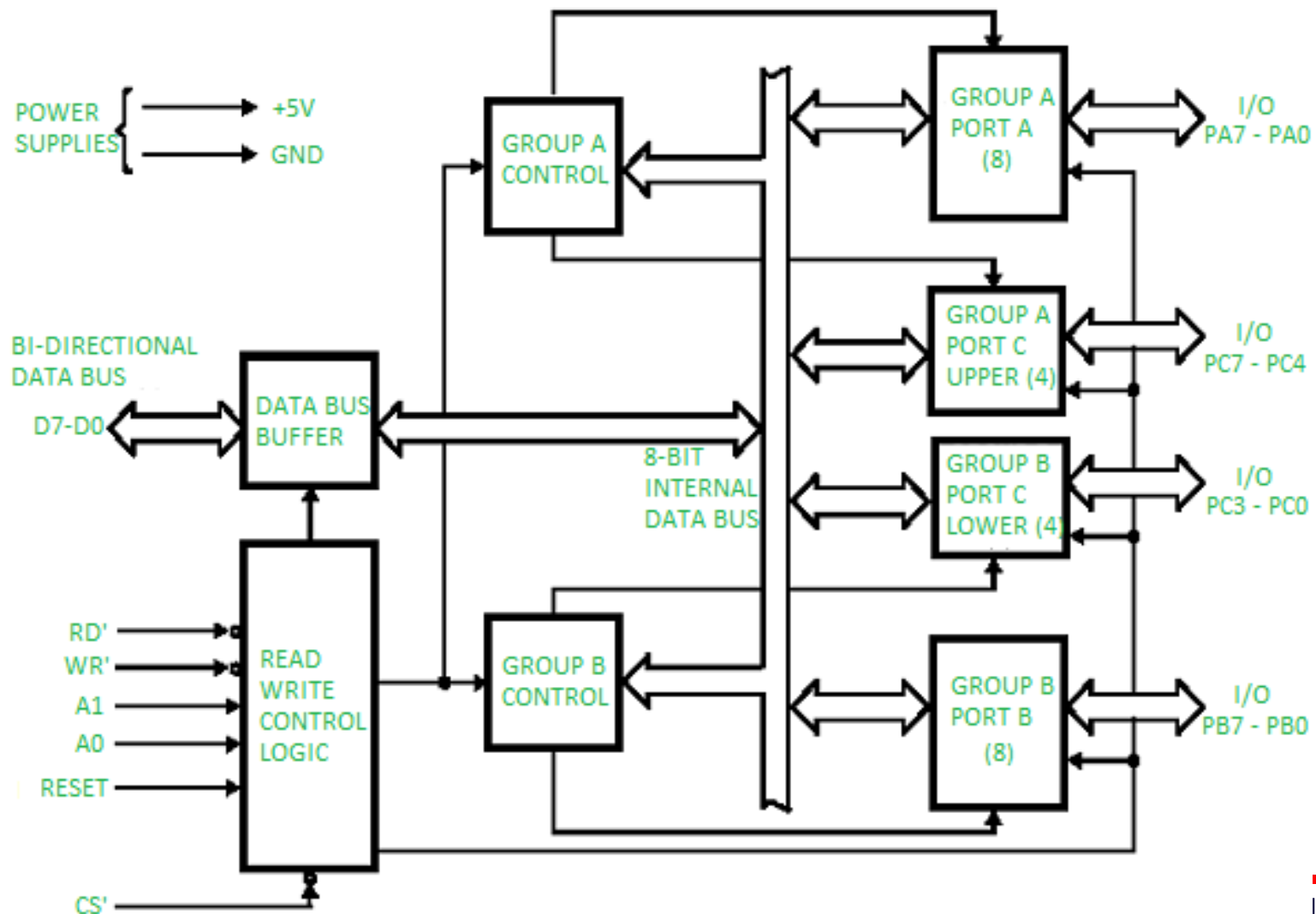
**Port C** can be split into two parts, i.e. PORT C lower (PC0-PC3) and PORT C upper (PC7-PC4) by the control word

- These three ports are further divided into two groups,
  - i.e. Group A includes PORT A and upper PORT C.
  - Group B includes PORT B and lower PORT C
- These two groups can be programmed in three different modes.

# 82C55 Pin Diagram



# Block Diagram of 82C55





# Basic Description of 82C55

- It is selected by its CS' pin
- Register selection is accomplished through A1 and A0 input pin that select internal register for programming

$A_1$	$A_0$	<i>Function</i>
0	0	Port A
0	1	Port B
1	0	Port C
1	1	Command register

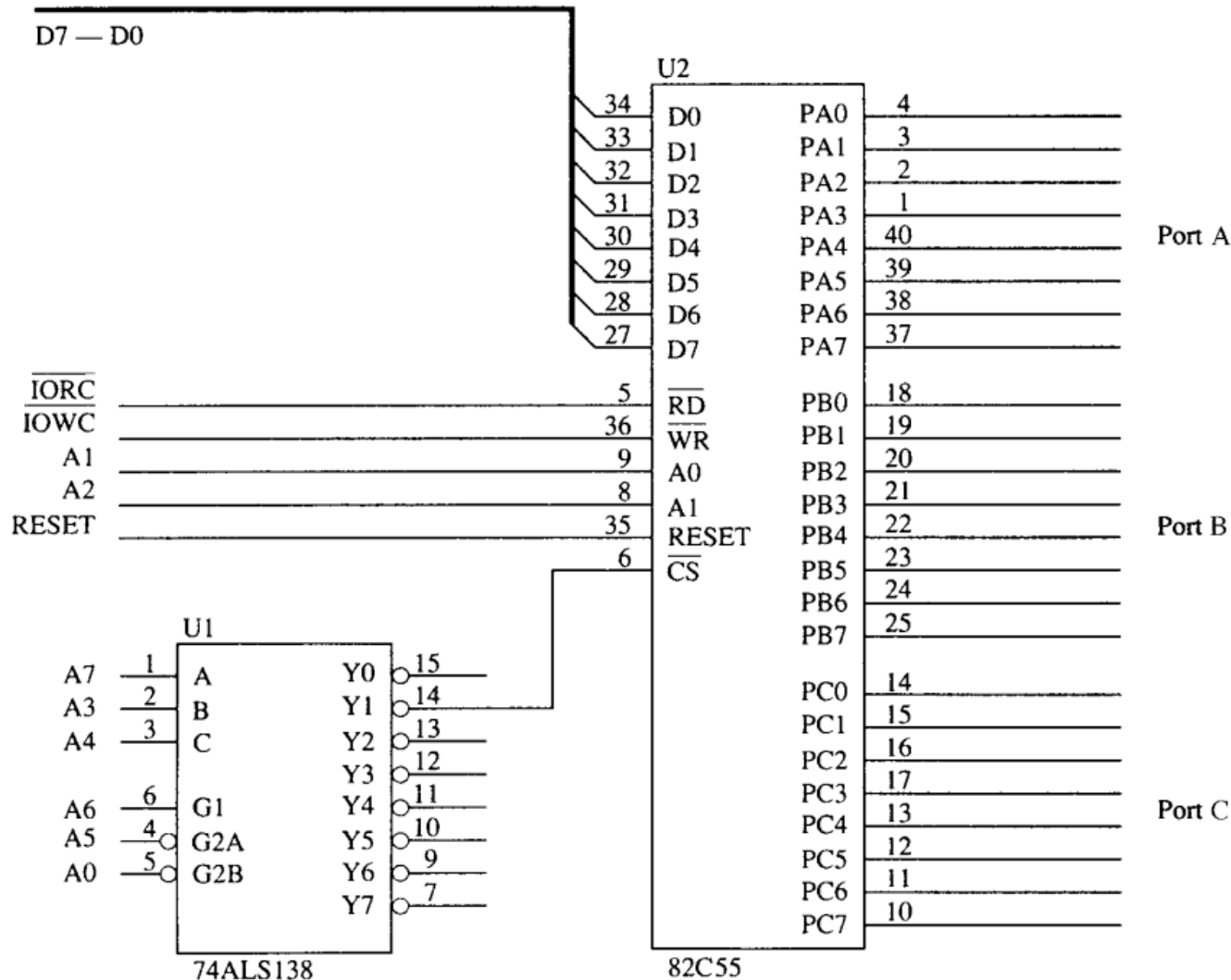
# Basic Description of 82C55

- It is selected by its CS' pin
- Register selection is accomplished through A1 and A0 input pin that select internal register for programming

$A_1$	$A_0$	<i>Function</i>
0	0	Port A
0	1	Port B
1	0	Port C
1	1	Command register

- In the personal computer a pair of 82C55s, or their equivalents, are decoded at I/O ports 60H–63H and also at ports 378H–37BH.

# 82C55 interfaced to the low bank of the 80386SX



# RESET Pin



- The RESET input to the 82C55 initializes the device whenever the microprocessor is reset.
- A RESET input to the 82C55 causes all ports to be set up as simple input ports using mode 0 operation.
- Because the port pins are internally programmed as input pins after a RESET, damage is prevented when the power is first applied to the system.
- After a RESET, no other commands are needed to program the 82C55, as long as it is used as an input device for all three ports.

# Usage



- 82C55 is interfaced to the personal computer at port addresses 60H–63H for keyboard control, and also for controlling the speaker, timer, and other internal devices such as memory expansion.
- It is also used for the parallel printer port at I/O ports 378H–37BH.

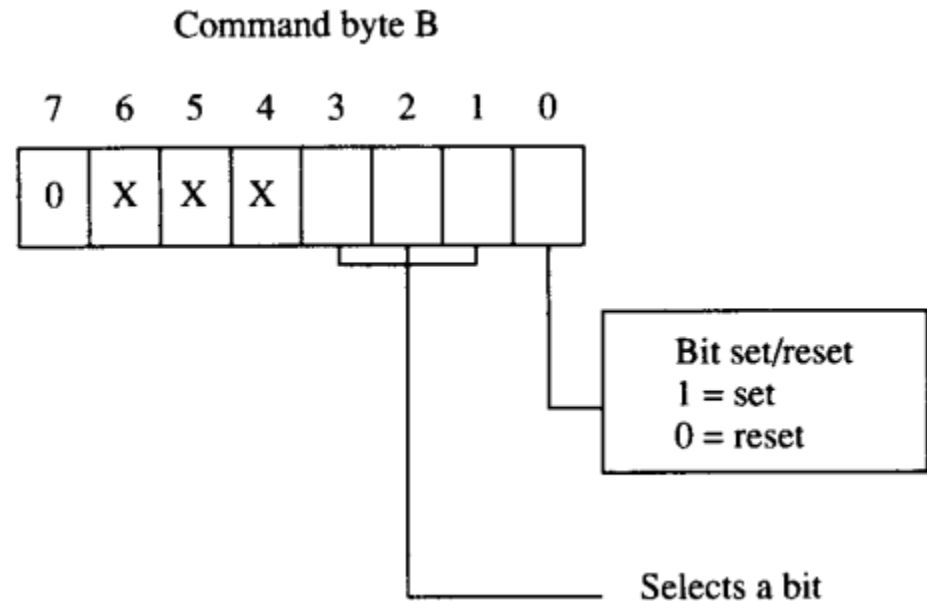
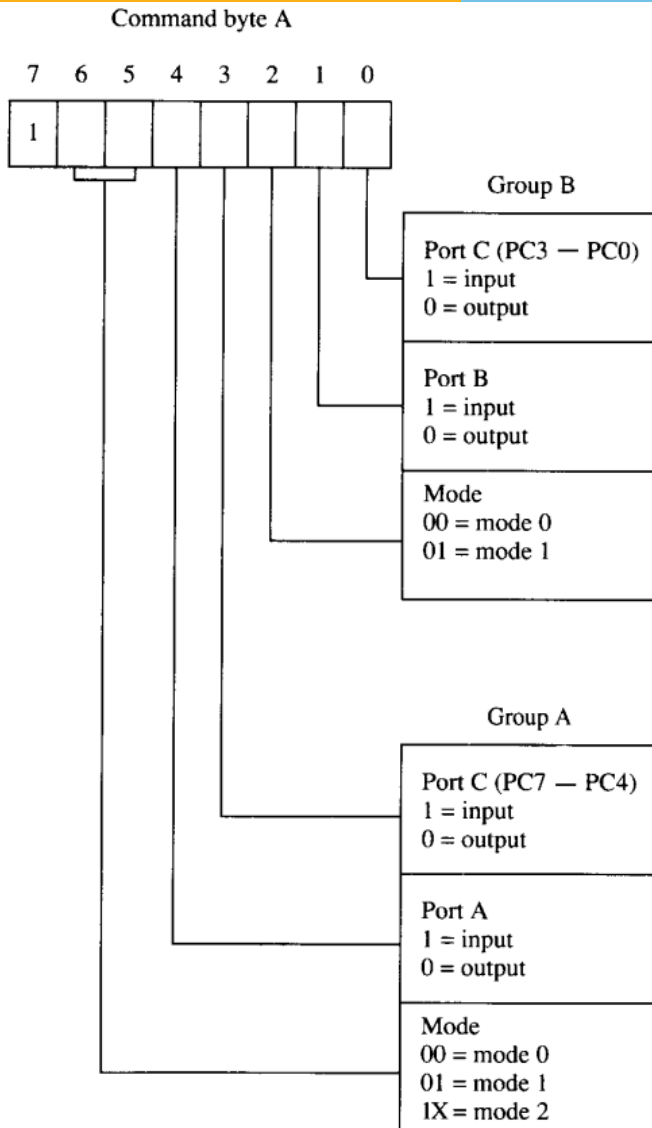
# Programming the 82C55



Three operating modes :

- Mode-0(simple I/O port) ( group B –io connection)
  - Mode-1(Handshake I/O port) ( data –through B, handshaking through C)
  - Mode-2(Bidirectional I/O port)
- 
- Group B- either input or output pins, either in mode 0 or mode 1
  - Group A- operate in mode 0, 1 , and 2

# Programming the 82C55



# Programming the 82C55

- If a 0 is placed in bit position 7 of the command byte, command byte B is selected.
- This command allows any bit of port C to be set (1) or reset (0), if the 82C55 is operated in either mode 1 or 2.
- Otherwise, this command byte is not used for programming.
- The bit set/reset feature is often used in a control system to set or clear a control bit at port C.
- The bit set/reset function is glitch-free, which means that the other port C pins will not change during the bit set/reset command.

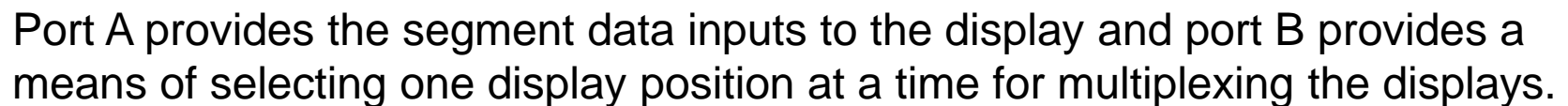


# Mode 0



- **Port A and Port B Configuration:** In Mode 0, both Port A and Port B can be configured as either input or output ports. This configuration is set by writing appropriate control words to the control register of the 8255.
- **Data Transfer:** If Port A is configured as an output port, data can be written to it via write operations from the CPU. Similarly, if Port A is configured as an input port, data can be read from it by the CPU. The same applies to Port B.
- **Port C Configuration:** Port C can be configured in two ways in Mode 0:
  - 8-bit Port: Port C can be used as a single 8-bit bidirectional port.
  - Two 4-bit Ports: Port C can be divided into two separate 4-bit ports, with each part being independently configurable as input or output.
- **Data Transfer on Port C:** Depending on its configuration, Port C can be used for data transfer just like Port A and Port B.

innovate      achieve      lead





**BITS Pilani**  
Pilani Campus



# Thank You