- Input / Output সরাসরি দেওয়া যায় না
- Input / Output [Peripheral] device গুলো খুবই slow তাই interface ব্যবহার করা হয়,
- Input / Output এর জন্য ব্যবহার করা হয় Programmable Peripheral Interface 8255

Write three major types of data transfer between micro-Processor & I/o device

Ans:

a. Programmed I/o
b. Interrupt device I/o
c. Direct Memory Access (DMA)

Why we have to use interface handware

Ans: Interface handware Provide all input & output transfer between the micro computer & Peripherals.

Type	কাজ
Programmed I/o	I/o Port এর মাধ্যমে data transfer হয়,
Interrupt device I/o	I/o device Processor কে আগে interrupt করবে.
Direct Memory Access (DMA).	Memory এবং I/o এর ভিতর microProcessor byPassing করবে।

Programmed I/O :

এই ক্ষেত্রে I/O Port এ 8 টা পিন থাকে,

1 Byte = 8 bit

1 Port = 8 Pin

8 টা পিন দিয়ে 8 টা bit পাঠাই

0 1 0 1 - 1 1 1 0

Low Voltage → 0

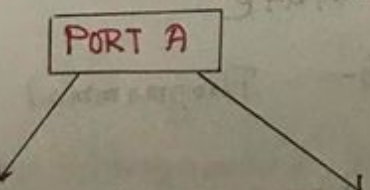
High Voltage → 1

Port গুলো হয় → PORT-A
PORT-B
PORT-C

কতগুলো PORT থাকে, তা নির্ভর করে device এর model এর উপর।

- যেকোন I/O Port এর সাথে ২টা register connected থাকে

i. Data direction register [DDRA
ii. Data register



i. Data Direction Register ii. Data Register

* I/O Port এ atleast দুইটা register লাগবেই,

- I/O Port হয় ২ ধরনের

i. Serial [Individual]
ii. Parallel

* DDRA অথবা DDRB যেকোন ১টা হবে, একসাথে ২টা হবে না,

④ Serial

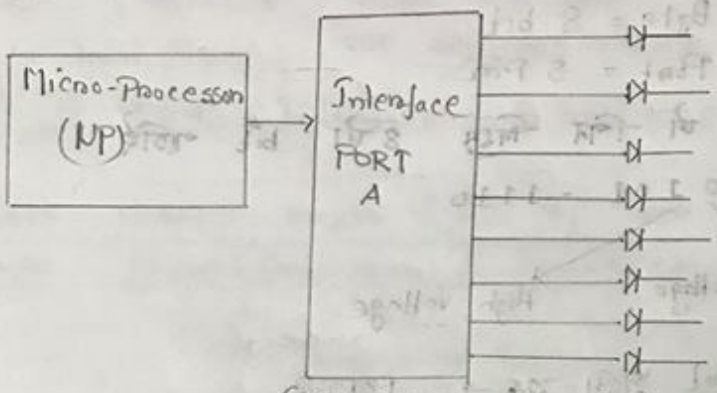


Fig: 8 LED interfacing 82c55

Data Direction Register = 8Pin
Data Register = 8Pin.

DDR → 1 মানে Output পিন
DDR → 0 মানে Input পিন

Output → High state
Input → Low state

* যেকোন device -এ- Programmed I/O [Serial] -এর ক্ষেত্রে,
১ম কাজ → DDR Set করা
২য় কাজ → DR Set করা,

* ↓: Output
* ↑: Input

=> Led [light Emitting Diode] output device

Draw Programmed I/O 8 LED Output

Ans:

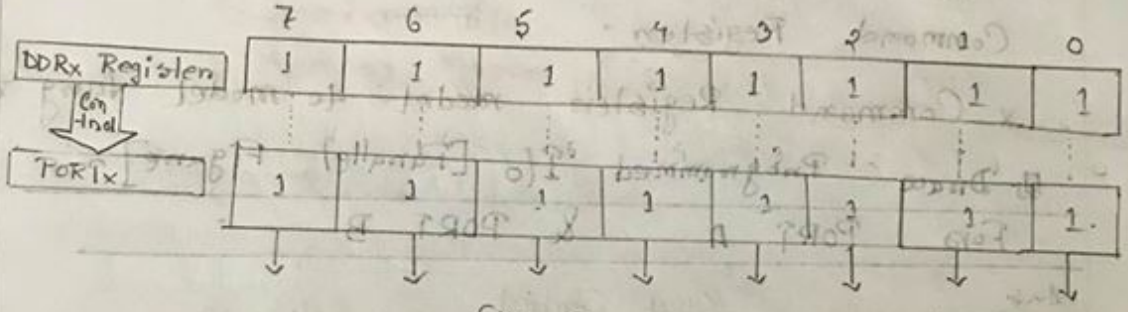


Fig: Programmed I/O 8 LED Output [Serial]

Draw Programmed I/O 8 LED Output [Even On, Odd Off]

Ans:

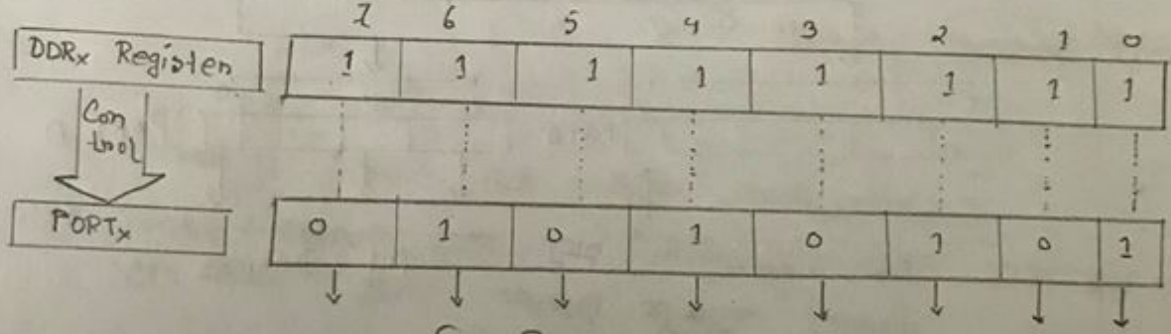


Fig: Programmed I/O 8 LED Output [Serial]
Even on Odd off

Draw Programmed I/O 8 LED Output [Even Off, Odd on]

Ans:

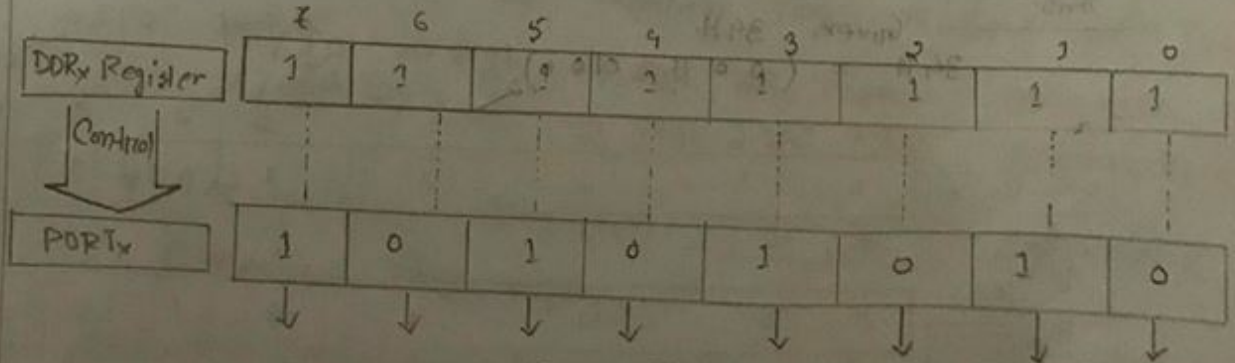


Fig: Programmed I/O 8 LED
output [Serial] Even off Odd on

* Programmed I/O [Parallel] এর একটা Data Directional Register থাকে। এটাকে বলা হয় Command Register.

* Command Register model to model vary করে।

Draw Programmed I/O [Parallel Figure]

For PORT A & PORT B

Ans:

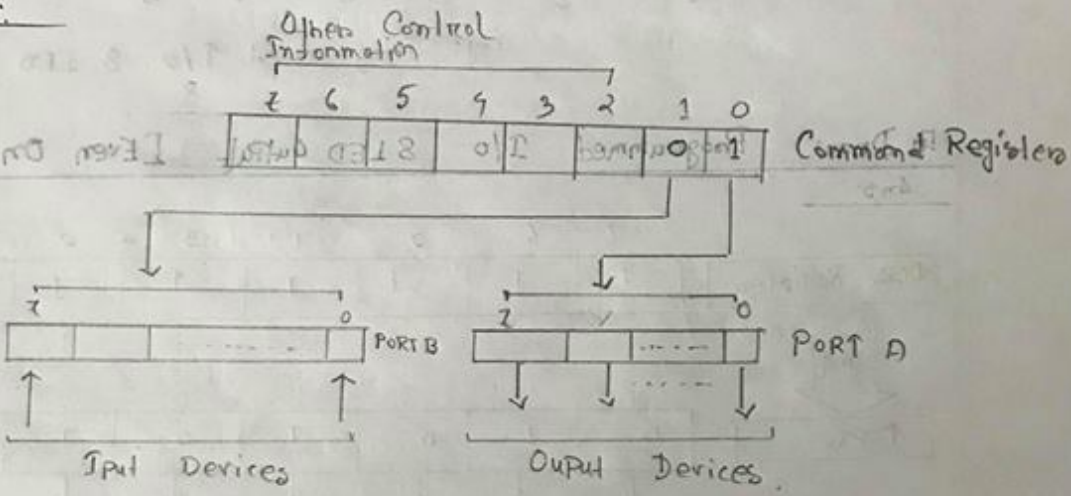


Fig: Programmed I/O [Parallel]

Put 34H in PORT A Programmable I/O [Serial] Output Pin Consideration

Ans:

Given 34H.

$34H = (0\ 0\ 1\ 1\ \ 0\ 1\ 0\ 0)_2$

0 0 1 1 → MSB

0 1 0 0 → LSB

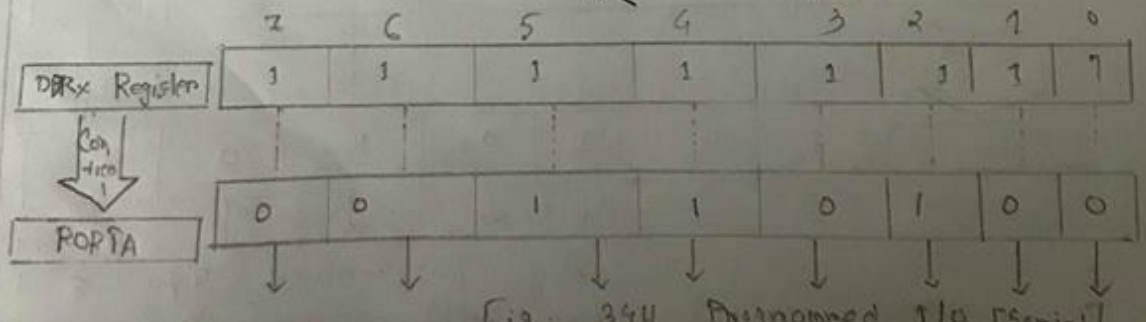


Fig: 34H Programmed I/O [Serial]

Programmed I/O Ports addressing -এর জন্য দুই ধরনের technique use করে

i. Standard I/O
ii. Memory mapped I/O

Programmable I/O Port → Serial [Individual]
Programmable I/O Port → Memory Mapped I/O

Addressing I/O Port → Standard I/O
Addressing I/O Port → Memory Mapped I/O

* Memory Space এ থাকে instructions.
* Input / Output এর যেই memory যেখানে রাখা হয় যে data গুলো আসাতে বা যাবে যেগুলো,
  - Memory Address Space => Large
  - I/O Address Space => Small
  - 8086 এর 28 Number Pin M/$\overline{IO}$ এটা I/O
    M/$\overline{IO}$ => High -> মানে হল Memory Operation
    M/$\overline{IO}$ => Low => মানে হল I/O Operation.
* Accumulator Register AX (AH | AL) Arithmetic Operation করে থাকে,
* Large Memory তে standard I/O use করা হয়,

IN AL, PORTA // PORTA থেকে data 8 bit AL register এ আসবে.

OUT PORTA, AL // 8 bit AL register থেকে data PORTA তে যাবে

ADD PORTA, 1H ⟹ এটা Valid না।

LDA 3000H // 3000h memory location এর Content accumulator এ কপি করা হবে

STA 3000H // Accumulator এ থাকা Content memory এর 3000H location এ রাখা হবে

Memory থেকে AX

AX থেকে Memory তে।

Memory Mapping এ single space share হয়।

Write the advantages of Standard I/O

Ans:

a. 1 MB memory address space is available for use with 8086 micro-Processor memory.

b. Special instructions for I/O operations maximize I/O Performance

c. Used in system where complete memory capacity is required

Write the disadvantages of standard I/O

Ans:

Data has to be transferred to the accumulator to Perform anithmetic & logic operation.

* প্রতিটা I/O device -এর জন্য memory location আলাদা।

What thing Micro-Processor does while memory mapped I/O is in use.

Ans:

In memory mapped I/O, the micro-Processor does not use the $M/\overline{IO}$ control Pin. Instead the micro-Processor uses an unused address Pin to distinguish between memory & I/O.

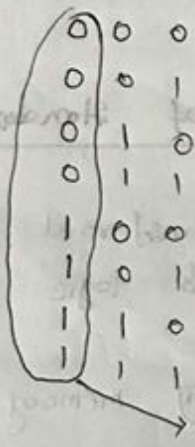
* Memory mapped I/O তে MSB দিয়ে বুঝা যায় কোনটা I/O নাকি memory operation

MSb = 1 → মানে I/O Port Selected
MSb = 0 → মানে memory location Selected

* Memory mapped I/O তে 50% I/O space এর জন্য ছেড়ে দেওয়া হয়,

* Memory mapped I/O তে I/O device এর জন্য space অপচয় হয়,

* 3 bit দিয়ে আমরা 8 টা location map করতে পারি



50% হল Memory space.

Standard Input/Output:

এর function গুলো কি

Store
Load
IN
OUT

এগুলো decode করতে কম সময় লাগে, Performance বাড়িয়ে দেয়,

Memory Mapped:

~~(i) AX, BX~~

(i) MOV AX, BX
(ii) AX, [80h]
(iii) MOV AX, 1h

অনেক slow কাজ করবে,

Write the advantages of Memory Mapped I/O

Ans:

a. All I/O locations are addressed in exactly the same manner as memory location.
b. No special instructions are required
c. Size of the instruction set is reduced.
d. All arithmetic & Logical operations can be Performed on I/O data directly.
e. Used in system where memory requirement is small.

Write the disadvantages of Memory Mapped I/O

Ans:

a. Part of memory address space is lost.
b. Memory mapped I/O instructions generally take longer to execute.

Write the differences between memory mapped I/O & Standard I/O

Ans:

Memory - mapped I/O	Standard I/O
i. No special instructions	i. Special instructions needed
ii. Loss of memory	ii. No loss of memory address to Peripherals
iii Assembly instructions involves	iii. Simpler address decoding
iv Arithmetic & Logic Operations can be Performed on data.	iv. Arithmetic & logic Operations can not be Performed on data
v. Example: ADD AX, BX	v. Example LDA 3000H

Draw Standard I/O diagram

Ans:

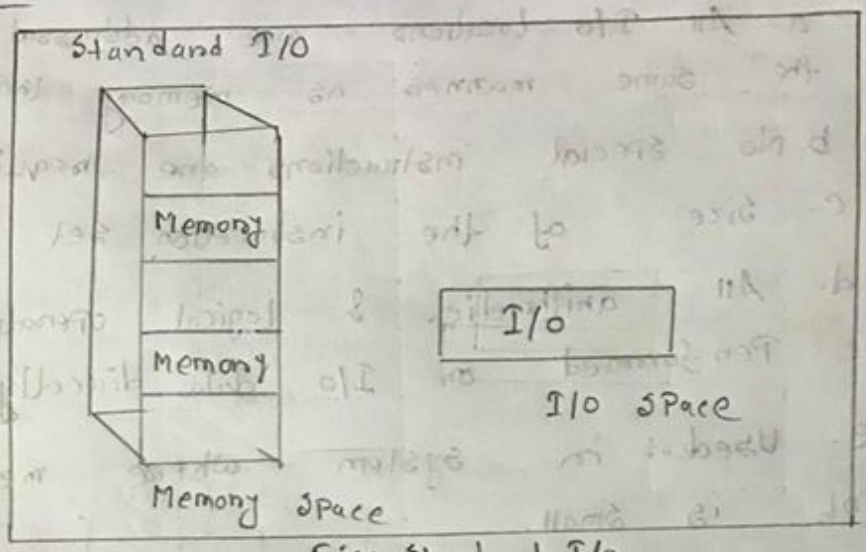


Fig: Standard I/O

Draw memory mapped I/O diagram

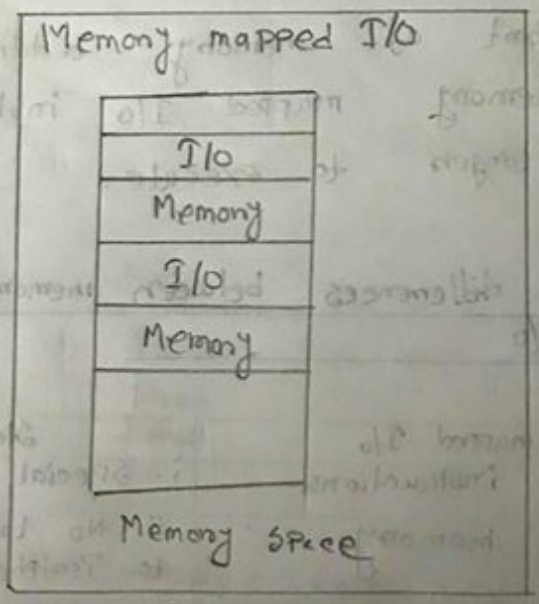


Fig: Memory mapped I/O

Draw Address Space diagram

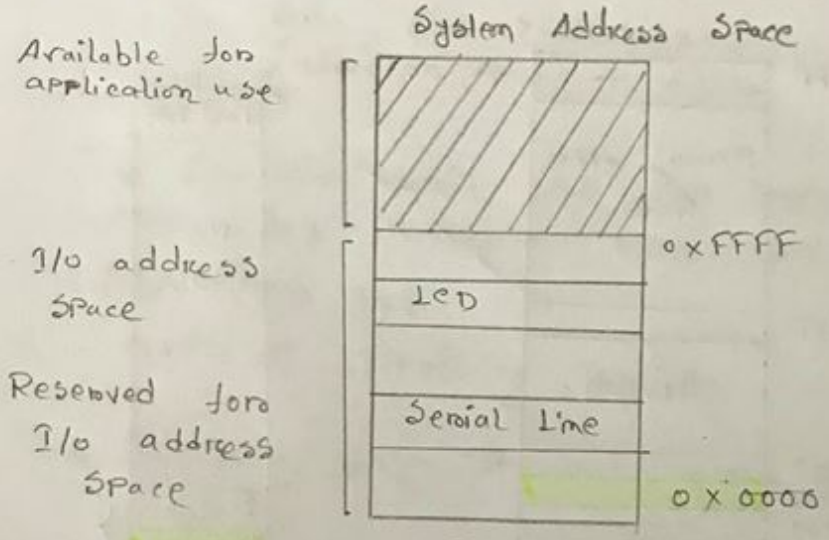
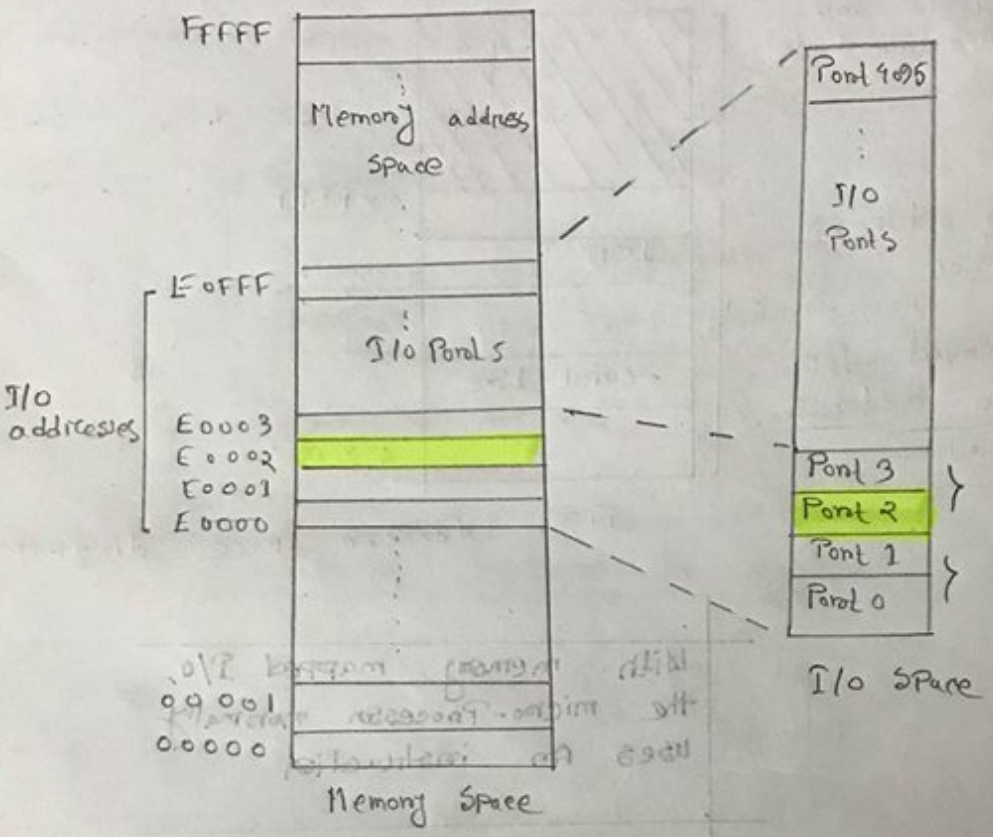


Fig: Address Space diagram

With memory mapped I/O, the micro-Processor normally uses an instruction

Mov mem, reg // Input ডিভাইস [Printer]
Mov reg, mem // Output ডিভাইস [keyboard]



keyboard connected Port 2 তে
keyboard থেকে ৪ Press করলাম
MP (MicroProcessor) [E0002] location
check করবে,
Mov AX, [E0002] এটার মাধ্যমে,
~~৪ থেকে~~ AX এর ভিতর E0002 address
এ যে ডাটা আছে ৪ কে সেখানে রাখবে,

Bus interface Unit ঃ-

Address bus → 20 bits
Data bus → 16 bits.
Instruction queue → 6 bits

Execution unit যখন কোন instruction execute করছে, Bus interface unit তখন, পরবর্তী instruction fetch করে আনে।
এটা হল Pipelining Property.

Execution Unit হল boss [Most Powerful]

Write the function of BIU

Ans:

a. The Biu sends out addresses, fetches instruction from memory, reads data from Ports & memory & writes data to Ports & memory.

b. Biu handles all transfers of data & addresses on the buses for the execution unit.

Write the function of Execution Unit

Ans:

a. It is responsible for the co-ordination of all other units of the Processor.

b. The execution unit executes while biu fetches next instruction.

c. ALU of execution unit performs various arithmetic & Logical operations over the data.