

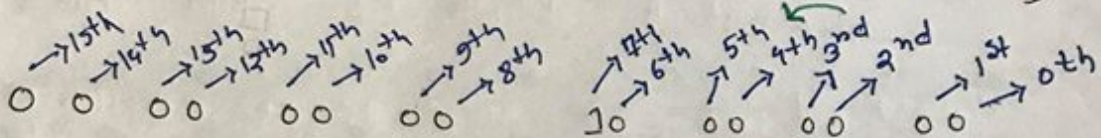
* Mov AX, 80H
ADD AX, 1H

Show Different Flag Values.

Ans:

80H = (0000 0000 10 00 00 00) B

1H = (0000 0000 00 00 00 01) B



0	0	0	0	00	00	00	00	00	00	01
0	0	0	0	00	00	10	00	00	00	01

ZF = 0 [The result is non zero]

~~AF = 0~~
AF = 0 [There is no carry from 3rd bit to 4th bit]

CF = 0 [No carry in the MSB, Considering last 8 bits]

PF = 1 [Even numbers of 1's]

SF = 0 [MSB is 0, so the result is Positive]

OF = 0 [Within Range as it's between 0 to +32767 & -1 to -32768]

(80h) = (+128)

(1h) = (+1)

+ = +129

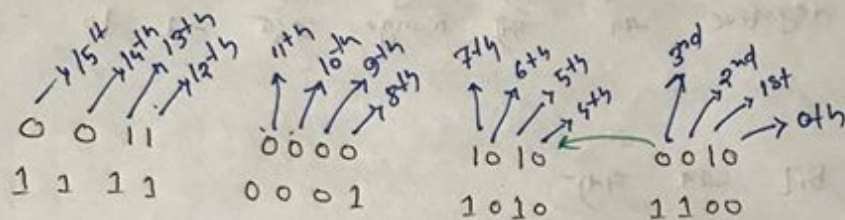
ADD AX, 30A2H
ADD AX, F1AC H

Show flag values.

Ans:

$$(30A2)_H = (0011 \ 0000 \ 1010 \ 0010)_B$$

$$(F1AC)_H = (1111 \ 0001 \ 1010 \ 1100)_B$$



① 0 0 1 0 0 0 1 0 0 1 0 0 1 1 1 0

ZF = 0 [The result is non zero]

AF = 0 [There is no carry from 3rd bit to 4th bit]

CF = 1 [There is carry in the MSB
Considering 16 bits]

PF = 1 [Even number of 1's]

SF = 0 [MSB is 0, so the result is Positive]

OF = 1 [The result is out of range,
As it's between
0 to +32767 & -1 to -32768.

$$\begin{array}{r} +32750 \\ -61868 \\ \hline -9918 \end{array}$$

8 bit এর জন্য

$$2^8 = 256$$

এস - অর্ধেক - হল Positive Numbers

এবং

বাকি - অর্ধেক - হল Negative Numbers

Positive এর জন্য Range হল +0 to +127 d

Negative এর জন্য Range হল -1 to -128 d.

16 bit এর জন্য

$$2^{16} = 65536$$

এস - অর্ধেক - হল Positive Numbers

এবং

বাকি - অর্ধেক - হল Negative Numbers

Positive এর জন্য Range হল +0 to +32767

Negative এর জন্য Range হল -1 to -32768.

Slide → 8086 Memory Segmentation.

Q Define Segment, Segmentation, Offset.

Ans:

Segment:

memory.

Segmentation:

is

called

Offset:

A segment is just an area in

The Process of dividing memory

Memory location is specified by an offset.

প্রতি segment register Memory Starting Address ধরে রাখে,

CS

DS

ES

SS

এদের প্রত্যেকের আর্দে 64 KB করে,
প্রতি location 1 byte কে নির্দেশ করে।

প্রতি segment এর offset size এর 16 bits

$$\begin{aligned} \text{অতএব Possible size (segment)} &= 2^{16} \\ &= 65536 \\ &= \frac{65536}{1024} \\ &= 64 \text{ KB} \end{aligned}$$

Q Write notes about memory segment.

Ans:

- A memory segment is a block of 64KB memory block.
- Each segment is identified by a segment number.
- A segment number is 16 bits.
- Within a segment a memory location is specified by an offset.

8086 এর চারটি segment এর

Code segment \Rightarrow CS

Data segment \Rightarrow DS

Stack segment \Rightarrow SS

Extra segment \Rightarrow ES

Q Write notes on Segment Offset

Ans:

a. Offset usually denotes the number of address locations added to a base address into order to get to a specific absolute address.

b. Sized by bytes.

Starting Segment $\Rightarrow 0000H$

Highest Segment $\Rightarrow FFFFH$

Q Why Segmentation is important.

Ans:

Segmentation is used to increase the execution speed of computer system so that the processor can able to fetch & execute the data from memory easily & quickly.

* 8086 Address Bus 20 bits \Rightarrow 1 MB Physical memory address \Rightarrow 1 MB

* 1 MB memory 16 segment \Rightarrow 64 kilo bytes size \Rightarrow 1 MB

*

Segment : Offset

→ ଏହା format ହୋଇ ଏକ Logical Address.

Logical Address ଦ୍ଵାରା Pairs.

Segment Base Address	:	Offset
16 bit	:	16 bit
CS	:	IP

8086 ଏକ Address Bus \Rightarrow 20 bits.16 bit address କୁ 20 bits ଏକ ନିମ୍ନରୂପେ କରା
4 ବାର Left Shift କରିବାକୁ.16 bit $\xrightarrow{\text{Left Shift 4 times}}$ 20 bit

* 20 bit ଏକ Address କୁ ବলাଇ ଦିଆ Physical Address.

* 16 bit ଏକ Address କୁ ବলাଇ ଦିଆ Logical Address.

* Logical Address ଏକ format ଦେଇ
Base Address : Offset.

Q. What is overlapping segment? Describe it with proper figure.

Ans:

A segment starts at a particular address & its maximum size can go up to 64 kbytes. But if another segment starts along this 64 kbytes location of the first segment, the two segments are said to be overlapping segment.

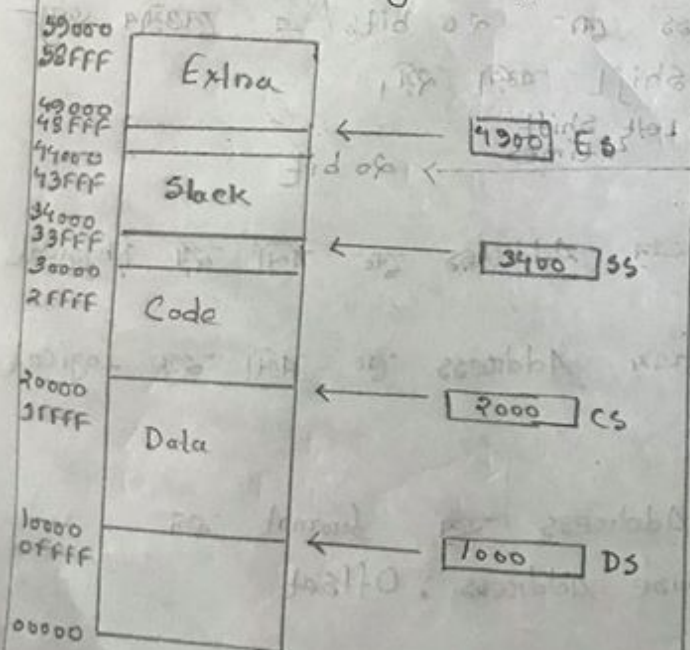


Fig: Normal

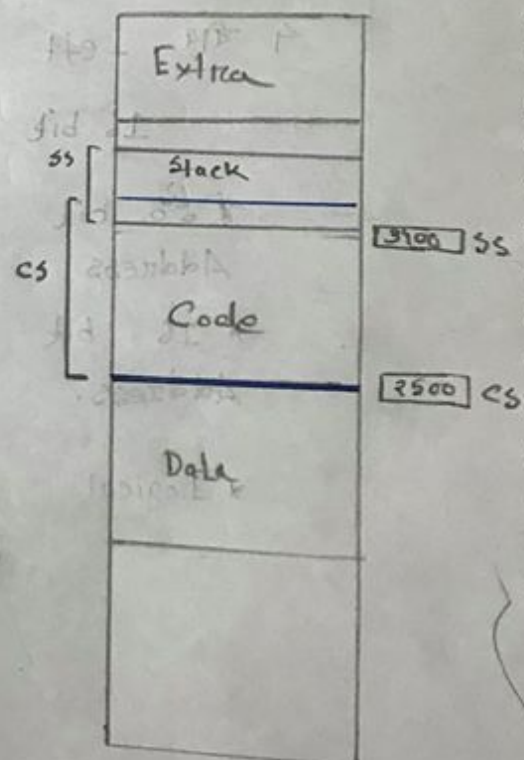
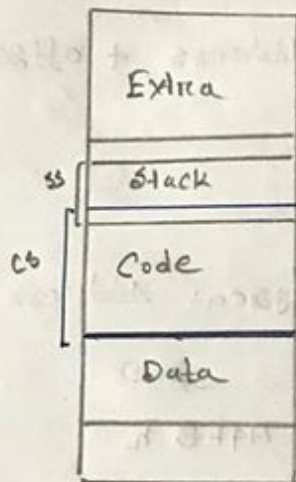


Fig: Overlapped



Code segment, Stack segment এর উপর overlap করে গেছে।

এর ফলে Code segment এর offset change হবে।
কিন্তু Physical Address change হবে না,
Logical Address change হবে।

16 bit to 20 bit

16 bit থেকে 20 bit এ নেওয়া জন্য
10H দিয়ে segment কে ঘন করতে হবে।
তাহলে আমরা লেয়ে যাব segment starting
Physical Address.

Logical Address দেওয়া আছে।

Step 1: $A4FBH: 48F2H$
 ^{segment} ^{offset}
 segment $\times 10H$

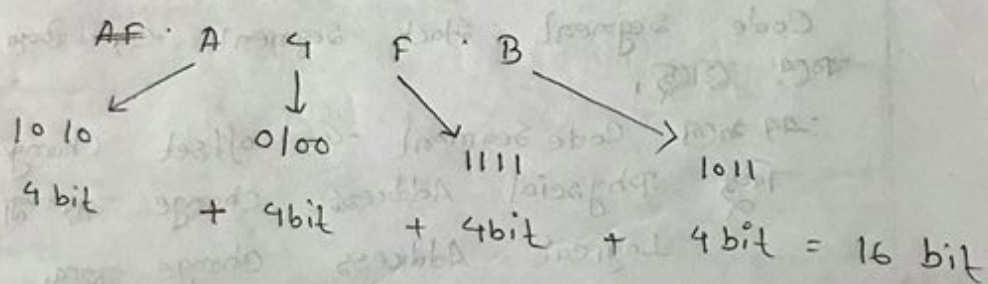
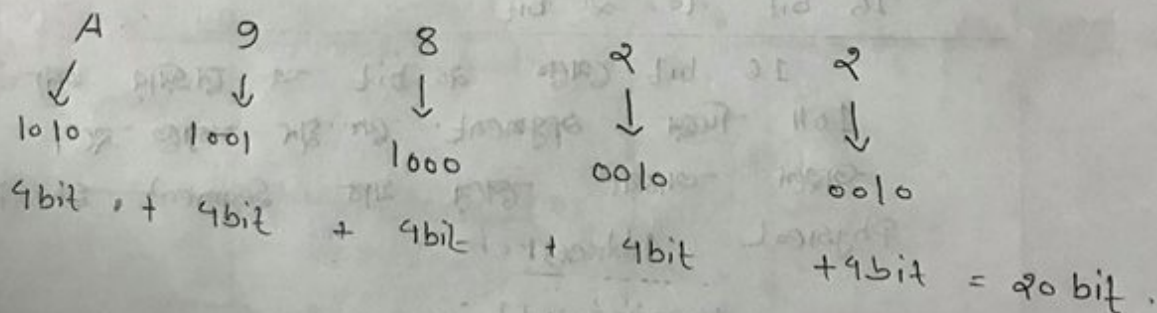
$A4FBH \times 10H = A4FB0H \leftarrow \text{Segment starting Physical Address.}$

Step 2:

Segment starting Physical Address + offset

$$\begin{array}{r}
 A4FB0\ h \\
 +\ 4872\ h \\
 \hline
 A9822\ h
 \end{array}
 \leftarrow \text{Physical Address (20 bit)}$$

- 94010 - Segment Offset - 15 bit A4FB h

Physical Address \Rightarrow A9822 h

Example: If data at any location has a logical address specified as CS: IP
 $2222H: 006H$

Then, $2222H$ is the value of Base address.

The $006H$ is the offset. Calculate the Physical address. Draw the scene.

Ans.

Given,

The value of CS is $2222H$.

Converting 16 bit Address into 20 bits = $2222H \times 10H$
 $= 22220H$

The value of IP is $006H$

The Physical Address = $22220H + 006H$
 $= 22226H$

As -

offset $= 006H$	BYTE-0	$22220H$
	BYTE-1	
	BYTE-2	
	⋮	
	Addressed Byte	$22226H$

Fig: Physical Addressing.

Q Do you think segments overlap? If yes then what would be the consequence.

Ans:

Yes, segments may overlap. As a result Segment: offset form of an address is not unique.

Q What's the relation of CS: IP?

Ans:

CS is always used with IP to address the next instruction in a program. CS defines the start of code segment. IP locates the next instruction within the code segment.

Q What's the relation between SS & BP

Ans:

Stack data are referenced through the stack segment registers (SS), at the memory location addressed by either the stack pointer (SP) or the pointer (BP).

Where To Look For The Offset

Segment	Offset Registers	Function
CS	IP	Address of the next instruction
DS	BX, DI, SI	Address of data
SS	SP, BP	Address in the stack
ES	BX, DI, SI	Address of destination data.

QUESTION

- The contents of the following registers are:
 - CS = 1111 H
 - DS = 3333 H
 - SS = 2526 H
 - IP = 1232 H
 - SP = 1100 H
 - DI = 0020 H
- Calculate the corresponding physical addresses for the address bytes in CS, DS and SS.

Ans:

(a) CS

Given CS = 1111H [Base Address of Code Segment]
 So for offset we would look at IP.

Given,

$$IP = 1232H.$$

$$\begin{aligned}\text{So, Physical Address} &= (1111H \times 10H) + 1232H \\ &= 11110H + 1232H \\ &= 12342H\end{aligned}$$

Ans:

(b) DS

Given

$$DS = 3333H$$

[Base Address of Data Segment]
 So for offset we would look at BX, DI, SI
 Here DI is available

Given,

$$DI = 0020H$$

So,

$$\begin{aligned}\text{Physical Address} &= (3333H \times 10H) + 0020H \\ &= 33330H + 0020H \\ &= 33350H\end{aligned}$$

Ans: -

© SS

Given

$$SS = 2526H \quad [\text{Base Address of Stack Segment}]$$

So for offset we would look at SP, BP

Here SP is available.

Given, $SP = 1100H$

$$\begin{aligned} \text{So, Physical Address} &= (2526H \times 10H) + 1100H \\ &= 25260H + 1100H \\ &= 26360H \end{aligned}$$

Ans. - 26360H

Example-13.1: For memory location whose physical address is specified by 1256Ah. give the address in segment: offset for segments

① 1256h & ② 1240h

Ans.

①

Given

$$\text{Physical Address} = 1256Ah$$

$$\text{Segment Number} = 1256h$$

We know

$$\text{Physical Address} = \text{segment number} \times 10h + \text{offset}$$

$$\Rightarrow 1256Ah = 1256h \times 10h + \text{offset}$$

$$\Rightarrow \text{offset} = 1256Ah - 1256h \times 10h$$

$$\Rightarrow \text{offset} = 1256\text{Ah} - 12560\text{h}$$

$$\Rightarrow \text{offset} = \text{Ah}$$

So,

$$1256\text{Ah} = 1256 : 000\text{Ah}$$

Ans.

(b) Given

$$\text{Physical Address} = 1240\text{h} \quad 1256\text{Ah}$$

$$\text{Segment Number} = 1256\text{h} \quad 1240\text{h}$$

We know

$$\text{Physical Address} = \text{Segment number} * 10\text{h} + \text{offset}$$

$$\Rightarrow 1256\text{Ah} = 1240\text{h} * 10\text{h} + \text{offset}$$

$$\Rightarrow \text{offset} = 1256\text{Ah} - 12400\text{h}$$

$$\Rightarrow \text{offset} = 16\text{Ah}$$

So,

$$1256\text{Ah} = 1240 : 016\text{Ah}$$

Ans.

Example \rightarrow 3.2 : A memory location has physical address 805D2h. In what segment does it have offset BFD2h

Ans:

Given,

Physical Address = 805D2h

Offset = BFD2h

Let

We know

Physical Address = (Segment number \times 10h) + offset

$$\Rightarrow 805D2h = (\text{Segment number} \times 10h) + BFD2h$$

$$\Rightarrow \text{Segment number} \times 10h = 805D2h - BFD2h$$

$$\Rightarrow \text{Segment number} \times 10h = F4600h$$

$$\Rightarrow \text{Segment number} = \frac{F4600h}{10h}$$

$$\Rightarrow \text{Segment number} = F460h$$

$$\text{So, } 805D2h = F460 : BFD2h$$

Ans