CS & IT ENGINEERING

Computer Organization & Architecture

Secondry Memory & I/O Interface

DDP Discussion Notes

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01 Question

02 Discussion

Q.1

Which of the following is/are not the major functions for an IO module?

[MCQ]

A. Control and timing

B. Error détection

C. Processor communication

D. Single instruction multiple data stream (SIMD)

Ans (D)

Q.2

Consider a system with data transfer rate is 10 KBPS. Data are exchanged between the processor and I/O interface. The performance gain when IO device is operating under interrupt mode over programmed IO mode) 6.66.

[NAT]

Note (Interrupt interface over head is 15 μsec)

(round off 1 decimal places)

Ans (6.66)

Programmed I/O : 10 KB/s

In Programmed I/O Speed of CPU Depends on I/O Device

10K B ——— 1 Sec

1 Byte ——— $\frac{1}{10K}$ Sec $= 10^{-4}$ Sec $=$ 100 usec

$ET_{Prog\ I/O} = 100$ usec

Performance $\propto \frac{1}{ET}$

$ET_{Interrupt} = 15$ usec

$$S = \frac{\text{Performance of Interrupt}}{\text{Performance of Program Driven}}$$

$$= \frac{\frac{1}{ET_{Interrupt}}}{\frac{1}{ET_{Prog}}} \Rightarrow \frac{ET_{Prog}}{ET_{Interrupt}}$$

$$= \frac{100 \text{ usec}}{15 \text{ usec}} = 6.66 \text{ Ans}$$

Q.3 In programmed I/O execution, the transfer time depends on ____.

[MSQ]

A. I/O speed

B. Data size

C. Latency of I/O interface chip

D. None of these

Any (A) & (B)

In Programmed CPU time Depends on
Speed of I/o Devices
& Amount of Data.

· No High Speed Interface Chip is Used

I/o speed

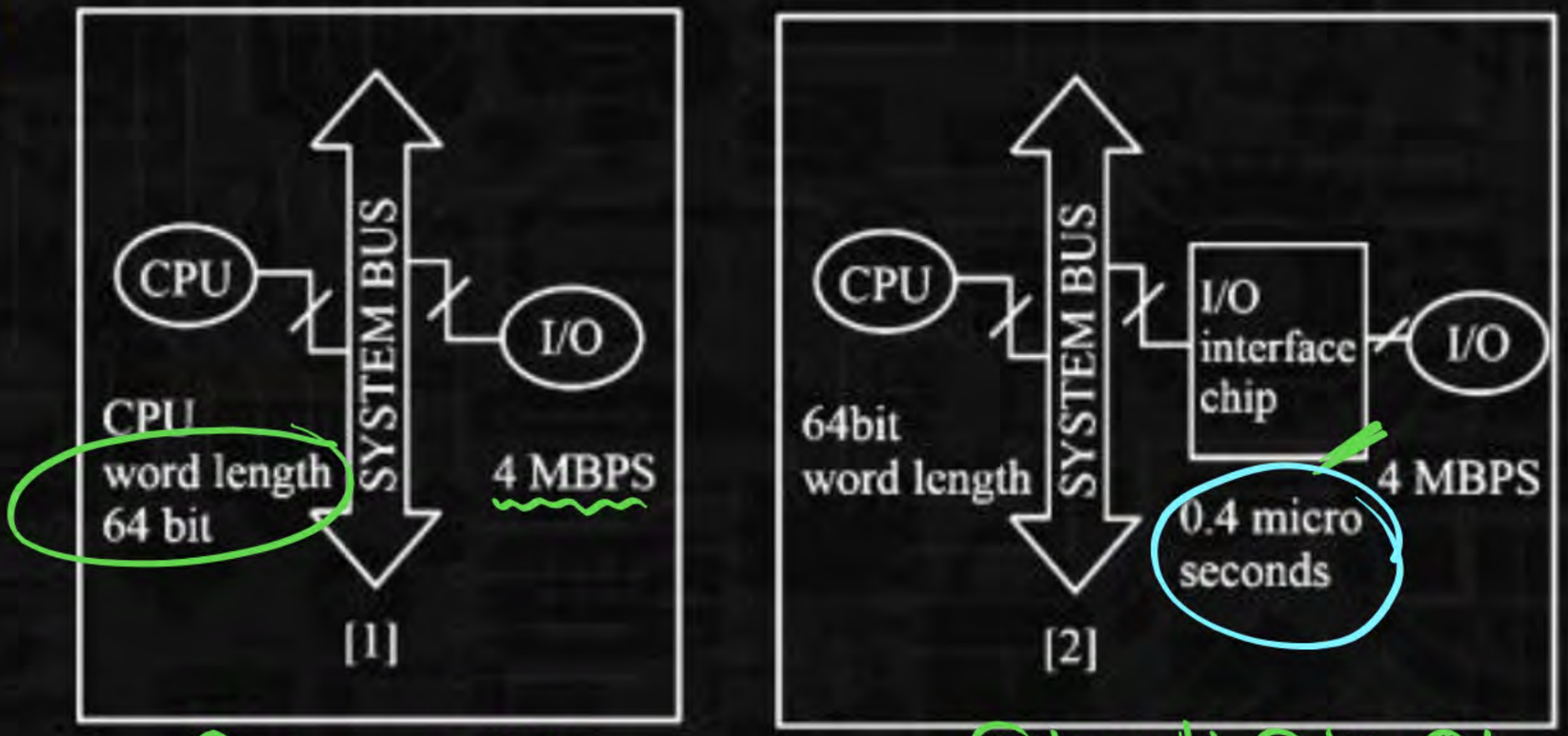
(ee) 1KBps ⇒ 1KB — 1sec

1Byte — $\frac{1}{1K}$ sec = 10^{-3} sec = 1milli Second

x Byte ⇒ x x 1msec

Q.4

Consider the following scenario



Programmed IO

Interrupt Driven I/O

Ans(0.2)

Calculate the speedup when I/O device is operating under programmed I/O over interrupt mode 0.2 Ans [NAT]

Programmed I/O

CPU time Depends on Speed of I/O Device

I/O Speed: 4 MBps Word length = 64 bit ⇒ 8 Byte

4 MByte ⟶ 1 Sec.

8 Byte ⟶ $\frac{8 \text{ Byte}}{4 \text{ MByte}}$ Sec $\Rightarrow 2 \times 10^{-6}$ Sec

$ET_{Prog\ I/O} = 2$ usec.

$ET_{Interrupt\ I/O} = 0.4$ usec. CPU Time Depends on Speed of I/O Interface.

Speed up Factor (Performance Gain) $= \frac{\text{Performance of Prog I/O}}{\text{Performance of Interrupt I/O}} = \frac{0.4}{2} = 0.2$ Ans

$\Rightarrow \frac{ET_{Int\ I/O}}{ET_{Prog\ I/O}}$

Q.5

Which of the following interrupts are caused by software instructions are known as ?

[MCQ]

A. Hardware interrupt

B. Exception interrupt

C. Maskable interrupt

D. Normal interrupt

Ans (D)

Q.6

Consider 16 MBPS I/O device interfaced to 32-bit CPU using DMA interface. DMA contain 16-bit count register, 32 bit data register and five, 8 bit address register. Data file size is 512 kB. How many DMA cycles are required to transfer the file? [NAT]

2 Ans

Ans (2)

Count Register = 16bit

Word Length = 32bit
= 4 Byte.

Maximum Data transfer in one DMA Cycle = 2^{16} Words
= 65536 Words

Data file Size = 512 kByte

$= 2^{16}$ Words [1 Word = 4 Byte]

$= 2^{16} \times 4$ Byte

2^{18} Byte = 256 kB in one DMA Cycle.

Number of DMA Cycle Required = $\frac{512\,kB}{256\,kB} = 2$ Ans

Q.7

A processor can support a maximum memory of 32 GB, where the memory is word addressable (a word consist of 2 bytes). The size of the address bus of the processor is at least 34 bits.

[NAT]

Ans (34)

32 G Byte

$2^5 . 2^{30}$ Byte

2^{35} Byte

Address = 35 bit X

But this is Not Correct

Because Memory is Word Addressable & Word Size is also given.

Memory is Word Addressable.

1 Word = 2 Byte

Cell 0	2 Byte	1 W
Cell 1	2 Byte	1 W

32 G Byte

$\frac{32\text{G Byte}}{2\text{ Byte}}$ Words

16 G Words

16 G × 2 Byte

16 G Word

16 G Words

$2^4 2^{30}$ W.

2^{34} Words

Address = 34 bit Ans

Q.8

A hard disk has 32 sectors per track, 10 platters each with 2 recording surface and 500 cylinders.

The address of a sector is given as a triple <c, h, s>, where c is cylinder number, h is surface number and s is the sector number. Thus the 0^{th} sector is addressed as <0, 0, 0>, the 1^{st} sector as <0, 0, 1> and so on. The address of the <20, 10, 3> corresponds to sector number? 13123 Ans

[NAT]

Ans(13,123)

32 sector per track

10 platter, each with 2 record surface

$10 \times 2 = 20$

500 cylinder

<0,0,0> 1st sector

<0,0,1> 2nd sector

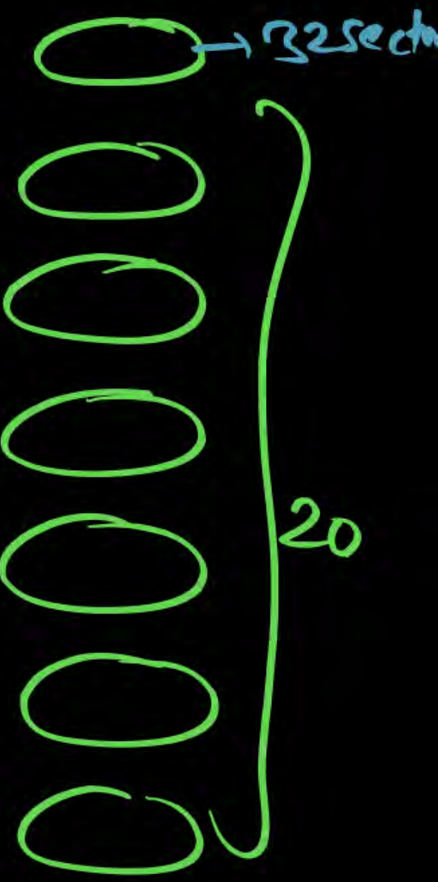
<C, h, S>

C → cylinder, h → surface, S → sector

<20, 10, 3>

To Reach At this cylinder No. Cross 20 cylinder [0-19]

$= 20 \times 10 \times 2 \times 32$



10th surface $\Rightarrow$ 10×32

Cross 3 sector [0, 1, 2] $= 3$

Sector Number $= 20 \times 20 \times 32 + 10 \times 32 + 3$

$\Rightarrow 12800 + 320 + 3$

$= 13123$ Ans


THANK YOU GW
SOLDIERS !