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| Assembly Language Programming  Chapter 3 solution  2/19/2017  CT-056 |

**Question 1. What are the main differences between the 80286 and the 8086 processors?**

Answer. 80286 and 8086 both are 16 bit microprocessor but 80286 have the following distinguish features:

1. *Two mode of operation*. The 80286 can operate in either Real address mode or protected virtual address mode. In real address mode, the 80286 behaves like the 8086, and the program for 8086 can be executed in this mode without modification. In protected, virtual address mode, also called protected mode, the 80286 supports multitasking, which is the ability to execute several programs (tasks) at the same time, and memory protection, which is the ability to protect the memory used by one program from the actions of another program. ·
2. More addressable memory. The 80286 in protected mode can address 16 megabytes of physical memory (as opposed to 1 megabyte for the 8086 and 8088).
3. Virtual memory in protected mode. This means that the 80286 can treat external storage (that is, a disk) as if it were physical memory, and therefore execute programs that are too large to be contained in physical memory; such programs can be up to 1 gigabyte (230 bytes).

Whereas, 80286 can operate faster than the 8086 (12.5 MHz versus 10 MHz).

**Question 2. What are the differences between a register and a memory location?**

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| --- | --- |
| **Register** | **Memory Location** |
| 1. It is located inside in CPU 2. It performs operations 3. It is identified by its name 4. There are fourteen 16-bit registers | 1. It is located in RAM 2. It’s operation is to store data 3. It is known by its address 4. There are 1MB 8 bit register |

**Question 3. List one special function for each of the data registers AX, BX, CX, and DX.**

Answer. One special function of each of the registers:

AX: It is used in multiplication and division operations.

BX: It serves as an address register.

CX: It serves as a loop counter.

DX: It is used in I/O operator.

**Question 4. Determine the physical address of a memory location given by OA51:CD90h.**

Answer. Where: segment= OA51, Offset=CD90

Formula: Physical address = segment\*10 + offset

Physical address = 0A51\*10 + CD90

Physical address = 0A510 + CD90

Physical address = 172A0h

**QUESTION 5: A memory location has a physical address 4A37Bh. Compute:**

1. **the offset address if the segment number is 40FFh.**
2. **the segment number if the offset address is 123Bh.**

ANSWER: Solution is:

1. Physical address=4A37Bh

Segment=40FFh

Formula: Physical address = segment\*10 + offset

4A37Bh = 40FFh\*10 + offset

4A37Bh = 40FF0h +offset

4A37Bh - 40FF0h =offset

938Bh = offset

1. Physical address=4A37Bh

Offset=123Bh

Formula: Physical address = segment\*10 + offset

4A37Bh = segment\*10 + 123Bh

4A37Bh – 123Bh = segment\*10

49140h = segment\*10

49140/10 = segment

4914h = segment

**QUESTION 6: What is a paragraph boundary?**

ANSWER: The segments start every 10h= 16 bytes and the starting addre~s of a segment always ends with a hex digit 0. We call 16 bytes a paragraph. We call an address that is divisible by 16 (ends with a hex digit 0) a paragraph boundary

**QUESTION 7: What determines how compatible an IBM PC clone is with an authentic IBM PC?**

ANSWER: The BIOS routines are used to perform I/O operations. The compatibility of PC clones with the IBM PC depends on how well their BIOS routines match those of the IBM PC.

**QUESTION 8: What is the maximum amount of memory that DOS allocates for loading run files? Assume that DOS occupies up to the byte OFFFFh.**

ANSWER: That depends on the size of RAM used. For 8086 1MB is used 10-segment to loading and running applications. These 10-segments give us 640 KB of memory. If we use 512 KB it has only 8 segments.

***Last two questions omitted as per told by the class.***