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Assignment 2

1) **Real Address Mode:** In Real mode, 80286 acts like a 8086 processor. Just it is upto 6 times faster than 8086. All memory management (descriptors) and protection mechanisms (privilege level) are disabled in Real mode. 80286 its object code or machine code compatible with 8086.

Protected Virtual Address Mode: When PE is set, this mode is enabled. In this mode, 80286 works with all of its memory management and protection capabilities with the advanced instruction set. This mode is source code compatible with 8086.

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2) Address bus of 80286 is of 24 bit. So to utilize this 24 bit or to access more physical memory, there comes the necessity of using Selectors and descriptors in 80286. Also the data bus or general purpose registers are of 16 bits. In the segment register, segment address is replaced by a Selector which selects a descriptor from a descriptor table. The descriptor describes memory segment's location, length and access rights. Thus, 80286 utilize the 24 bit address bus and access more physical memory.

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3) By using privilege levels, 80286 ensures protection of memory segment. If the privilege level of the target location is higher than the requester, then this request will not get access right.

4) If TS is set, it allows task switching within same process. Task switching means the operating system switches from one task to another. If TS=0, there is no task switching. On the other hand, NT is set indicates that one system task invoked another through a call so that it can return to previous task. In this case

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Stack is used. For multitasking this can be manipulated to our advantage.

5) Virtual memory means the maximum accessible memory address of the processor. It is implemented by using the secondary storage device called Hard Disk. This virtual memory address is the combination of segment address and offset address. From the 16 bit segment address 14 bit is used and full 16 bit offset is used to address a memory location. Thus, 80286 can access $2^{14} \times 2^{16} = 2^{30}$ bytes or 1GB of virtual memory.

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6) ~~Selector~~ When 80286 in protected mode, selector is defined by higher 14 bit in the segment oregister. The 14 bit selector selects a descriptor from 8192 descriptors of two descriptor table (GDT/LDT). This descriptors contains the Base address, Limit of the segment and access right to describe the memory segments location, length and access rights. When, access is accepted it adds the offset address with base address and gets the actual physical memory location. In this way, selector and descriptor work to address location of memory.

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