1. What is a Microprocessor?

* A microprocessor is a **computer processor** where the data processing logic and control is included on a **single integrated circuit (IC)**, or a small number of ICs. The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer’s central processing unit (CPU).

1. Define bit, byte and word.

* A **bit** is a single binary digit, 0 or 1. A **byte** is 8 bits side by side. A **word** is 2 bytes side by side.

1. What are the different functional units in 80386?

* The internal architecture of the 80386 consists of six functional units that operate in parallel: Bus Interface Unit, Code Prefetch Unit, Instruction Decode Unit, Execution Unit, Segmentation Unit and Paging Unit.

1. What is the function of BIU?

* The Bus Interface Unit (BIU) interfaces the 80386 processor with memory and I/O devices. [To fetch instructions and transfer data from code fetcher unit, the processor provides address, data and control signals through BIU**1**](https://www.eeeguide.com/internal-architecture-of-80386-microprocessor/).

1. What is the function of EU?

* The Execution Unit (EU) is responsible for executing instructions[**2**](https://www.geeksforgeeks.org/architecture-of-8086/).

1. Size of one segment is 4GB maximum

* 4gb = 4 \* 2^10 MB

= 4 \* 2^10 \* 2^10 KB

= 4 \* 2^10\* 2^10\* 2^10 Bytes

= 2^32 Bytes

1. What is general purpose registers in 80386?

* The general-purpose registers of the 80386 are the 32-bit registers EAX, EBX, ECX, EDX, EBP, ESP, ESI, and EDI. These registers are used interchangeably to contain the operands of logical and arithmetic operations. [They may also be used interchangeably for operands of address computations (except that ESP cannot be used as an index operand)**1**](https://css.csail.mit.edu/6.858/2014/readings/i386/s02_03.htm).

1. What is segment address in 80386?

* Applications programmers view the logical address space of the 80386 as a collection of up to 16,383 one-dimensional subspaces, each with a specified length. Each of these linear subspaces is called a segment. A segment is a unit of contiguous address space.

1. What is offset?

* An offset is a value that represents the distance from the beginning of a memory segment to a specific location within that segment.

1. What are the flags in 80386?

* The flags in the 80386 microprocessor are stored in the EFLAGS register. The EFLAGS register contains status flags, control flags, and system flags. The status flags reflect the state of a particular program. The control flags directly affect the operation of a few instructions. [The system flags reflect the current status of the machine and are usually used by operating systems rather than by application programs**1**](https://www.geeksforgeeks.org/eflags-registers-of-80386-microprocessor/).

1. Difference between maskable interrupts and non maskable interrupts.

* A maskable interrupt is an interrupt that can be ignored or delayed by the processor if interrupts are disabled or if the interrupt has a lower priority than another interrupt that is currently being serviced. A non-maskable interrupt (NMI), on the other hand, is an interrupt that cannot be ignored or delayed by the processor.

1. What are Different types of addressing modes?

* Addressing modes are the ways in which an instruction can specify the location of an operand. Some common addressing modes include immediate, register, direct, indirect, indexed, and base-plus-indexed addressing.

1. What is assembly language?

* Assembly language is a low-level programming language that has a very strong correspondence between the instructions in the language and the architecture’s machine code instructions. [It uses mnemonic codes to represent machine language instructions, making it more readable than machine code**1**](https://en.wikipedia.org/wiki/Assembly_language).

1. Differentiate between i/o mapping and memory mapping.

* I/O mapping and memory mapping are two methods used by a processor to communicate with peripheral devices. I/O mapping uses a dedicated address space for I/O devices, separate from the memory address space. Memory mapping, on the other hand, maps the registers of I/O devices into the memory address space, allowing the processor to access them as if they were memory locations.

1. What are the operating modes in 80386?

* The 80386 microprocessor has three operating modes: Real mode, Protected mode, and Virtual 8086 mode. Real mode is used for compatibility with older software and provides a programming environment similar to that of the 8086 processor. Protected mode provides advanced features such as memory protection and multitasking. Virtual 8086 mode allows multiple virtual 8086 environments to run simultaneously on a single processor.

1. What is descriptors and selectors?

* In the 80386 microprocessor, descriptors are data structures that provide the processor with the information it needs to map a logical address into a linear address. Descriptors are stored in descriptor tables, such as the Global Descriptor Table (GDT) and the Local Descriptor Table (LDT). [A selector is a value that is used to select a descriptor from a descriptor table**1**](https://pdos.csail.mit.edu/6.828/2007/readings/i386/s05_01.htm).

1. What is instruction set?

* An instruction set is the set of basic instructions that a microprocessor can understand and execute. The instruction set defines the operations that the processor can perform, such as arithmetic operations, data movement, and control flow operations.

1. What are the features of 80386?

* The 80386 microprocessor has many features, including support for virtual memory, memory protection, multitasking, and multiple operating modes. It also has an advanced instruction set that includes support for floating-point operations and advanced addressing modes.

1. What is logical address?

* A logical address, also known as a virtual address, is an address generated by the CPU during program execution. It is the address seen by the process and is relative to the program’s address space. The process accesses memory using logical addresses, which are translated by the operating system into physical addresses[**1**](https://www.geeksforgeeks.org/logical-and-physical-address-in-operating-system/).

1. What is effective address?

* The effective address is the final memory address that is used to access data after all addressing mode calculations have been performed.

1. What is linear address?

* A linear address is an intermediate address used by the 80386 microprocessor during the process of translating a logical address into a physical address. The processor uses segment descriptors and selectors to translate a logical address into a linear address, which is then translated into a physical address using paging.

1. What is bus in 80386?

* In the context of the 80386 microprocessor, a bus is a communication system that transfers data between components inside the processor or between the processor and external devices. The 80386 has a 32-bit data bus and a 32-bit address bus[**1**](https://en.wikipedia.org/wiki/I386).

1. What are the various segment registers in 80386?

* The 80386 microprocessor has several segment registers, including CS (code segment), DS (data segment), SS (stack segment), ES (extra segment), FS, and GS. These registers are used to hold the selectors for the corresponding segments.

1. What is mean by interrupts?

* An interrupt is a signal sent to the processor that temporarily halts the current execution of instructions and transfers control to an interrupt handler routine. Interrupts can be generated by hardware devices or by software.

1. What are the opcode and operands?

* An opcode is a code that specifies the operation that an instruction should perform. An operand is a value or a memory location that is used as an input to an operation.

1. What are the different types of descriptors?

* In the 80386 microprocessor, there are five types of descriptors: Code or data segment descriptors, System descriptors, Local descriptors, TSS (Task State segment) descriptors, and GATE descriptors[**1**](https://www.eeeguide.com/operating-modes-of-80386-microprocessor/).

1. What is the difference between microprocessor and microcontroller?

* A microprocessor is a central processing unit (CPU) on a single integrated circuit (IC), while a microcontroller is a small computer on a single IC that contains a CPU, memory, and programmable input/output peripherals.

1. What is the use of HLDA?

* HLDA (Hold Acknowledge) is a signal used in microprocessors to indicate that the processor has relinquished control of the bus to another device.

1. Difference between shift and rotate

* Shift and rotate are two types of bitwise operations. A shift operation moves the bits of a binary number to the left or right by a specified number of positions, while a rotate operation moves the bits to the left or right by a specified number of positions, with the bits that fall off one end being reinserted at the other end.

1. Explain about .MODEL SMALL?

* .MODEL SMALL is a directive used in x86 assembly language programming to specify that the small memory model should be used. In the small memory model, the code and data segments are limited to a maximum size of 64KB each. This model is suitable for programs that require a small amount of memory and is widely used in DOS programming.

1. What is the main use of ready pin?

* The READY pin is used by microprocessors to determine whether a peripheral device is ready to accept or send data. When the READY pin is asserted, it indicates that the device is ready for data transfer.

1. What is Software and Hardware?

* Software refers to the programs and other operating information used by a computer, while hardware refers to the physical components of a computer system, such as the central processing unit (CPU), memory, and storage devices.

1. Why data bus is bi-directional?

* The data bus is bi-directional because it is used to transfer data between the microprocessor and memory or I/O devices in both directions. This allows the microprocessor to read data from memory or I/O devices and write data to memory or I/O devices.

1. Why address bus is unidirectional?

* The address bus is unidirectional because it is used by the microprocessor to specify the memory location where data can be found or where an instruction should be executed. The address bus only needs to send information from the microprocessor to memory or I/O devices, so it is unidirectional[**1**](https://profoundtips.com/guidelines/why-is-the-address-bus-unidirectional-in-microprocessor/).

1. Explain the function of M/IO in 8086

* The M/IO pin on the 8086 microprocessor is used to distinguish between memory and I/O operations. When the M/IO pin is asserted, it indicates that the current operation is a memory operation. When the M/IO pin is not asserted, it indicates that the current operation is an I/O operation.

1. What is DMA?

* DMA (Direct Memory Access) is a method of transferring data between a peripheral device and memory without involving the microprocessor. This allows the microprocessor to perform other tasks while data is being transferred.

1. What is fetch and execute cycle?

* The fetch-execute cycle, also known as the fetch-decode-execute cycle or the instruction cycle, is the basic operation of a computer. It is the sequence of steps that the CPU follows to process instructions. [The cycle consists of three main stages: fetching the instruction from memory, decoding it, and executing it**1**](https://en.wikipedia.org/wiki/Instruction_cycle). During the fetch stage, the CPU retrieves the instruction from memory and stores it in its instruction register. In the decode stage, the CPU determines what operation the instruction represents and prepares any necessary data. In the execute stage, the CPU performs the operation specified by the instruction.

1. What are the CMP, ADC, DIV instructions?

* CMP, ADC, and DIV are all instructions used by the 8086 microprocessor.
* CMP (Compare) instruction compares the data of two operands and sets the flags based on the result. The destination operand remains unchanged[**1**](https://microcontrollerslab.com/8086-logical-instructions-assembly-examples/).
* ADC (Add with Carry) instruction adds the source operand, the destination operand, and the carry flag (CF) together. [The result is stored in the destination operand**2**](https://stackoverflow.com/questions/2688248/adc-instruction-in-asm-8086).
* DIV (Divide) instruction divides an unsigned word by a byte or an unsigned double word by a word. [The dividend is stored in the AX register for word division or the DX:AX register pair for double-word division**3**](https://microcontrollerslab.com/8086-integer-division-instructions-assembly-programming/).

1. How many bit 8086 processor is?

* The 8086 microprocessor is a 16-bit processor.

1. What is meant by LATCH?

* A latch is a type of digital circuit that has two stable states and can be used to store state information. It can be used to hold data temporarily in a digital system.

1. Differentiate between RAM and ROM?

* RAM (Random Access Memory) and ROM (Read-Only Memory) are two types of memory used in computer systems.
* RAM is a type of volatile memory that can be read from and written to by the microprocessor. It is used to store data and instructions that are currently being used by the microprocessor.
* ROM is a type of non-volatile memory that can only be read by the microprocessor. It is used to store data and instructions that do not change, such as firmware or system boot code.

1. Differentiate between procedure and macro

* A procedure and a macro are both used to achieve modular programming by allowing a set of instructions to be reused multiple times within a program.
* A procedure is a set of instructions that performs a specific task. It is typically used for larger sets of instructions and follows a call-return method, where the procedure is called, executed, and control is returned to the calling program.
* A macro, on the other hand, is typically used for smaller sets of instructions. When a macro is called, its instructions are directly inserted into the program at the point of the call, rather than being executed as a separate entity like a procedure.

1. What is the function of 01h of int 21h?

* INT 21h is an interrupt used by DOS for handling various system services. The function of INT 21h with AH=01h is to read a character from standard input (usually the keyboard) with echo. This means that when this function is called, it waits for the user to press a key, displays the character on the screen, and returns the ASCII code of the character in the AL register.

1. What do you mean by loader?

* A loader is a program that loads an executable file into memory and prepares it for execution. It reads the file header to determine the size and location of the code and data segments, allocates memory for them, and copies their contents from the file into memory. The loader also resolves any external references and sets up the initial values of registers before transferring control to the start of the program.

1. What do you mean by linker?

* A linker is a program that combines multiple object files into a single executable file. It resolves external references between object files by matching symbol definitions with symbol references and adjusting their addresses accordingly. The linker also combines the code and data segments from each object file into a single code and data segment in the executable file.

1. What do you mean by debugger?

* A debugger is a software tool used by programmers to test and debug a program. It allows the programmer to monitor the execution of a program, stop it, restart it, set breakpoints, and change values in memory. Debuggers can help identify coding errors at various stages of development and can be used to analyze a test run to see what lines of code were not executed[**1**](https://en.wikipedia.org/wiki/Debugging)[**2**](https://www.techtarget.com/searchsoftwarequality/definition/debugging).

1. Can you perform 32-bit operation with 8086?

* No, the 8086 microprocessor is a 16-bit processor and cannot perform 32-bit operations natively.

1. What is physical address?

* A physical address is an address that corresponds to a specific location in the computer’s physical memory. It is used by the memory controller to access data stored in memory.

1. What are the peripheral devices?

* Peripheral devices are hardware devices that are connected to a computer system and are used to input, output or store data. Examples of peripheral devices include keyboards, mice, printers, scanners, and external storage devices.

1. What is accumulator in microprocessor?

* An accumulator is a register in a microprocessor that is used as the default location for performing arithmetic and logical operations. In many microprocessors, including the 8086, the accumulator register is designated as the AX register.