



Dept. Of Computer Science & Engineering

Assignment-01

of Team Bratva

Course Code: CSE-3523

Course Title: Microprocessor, Microcontrollers & Embedded System

Submitted to-

Md. Safayat Hossen

Assistant Lecturer, Dept. of CSE, IIUC

Cell: 01736161688, safayathossen@iut-dhaka.edu

Assignment's Topics are:

An overview of

- a. Intel 80186,
 - b. Intel 80286,
 - c. Intel 80386,
 - d. Intel 80486, and
 - e. Pentium microprocessor;
 - f. Advanced microprocessor:
-
- i. Embedded microprocessor,
 - ii. Bit slice microprocessor,
 - iii. Arithmetic processor,
 - iv. Multitasking,
 - v. Itanium, and Merced Microprocessor

Submitted by-

Mostafa Shahriar Asif

Matric ID: **C201014**

Md. Shahin Shah

Matric ID: **C201035**

Section: 5AM, 5th Sem., Department of CSE, IIUC

Sorowar Mahabub

Matric ID: **C201032**

Emdadul Islam

Matric ID: **C201041**

An overview of Intel 80186

The Intel 80186 is an improved version of the 8086 microprocessor.

80186 is a 16-bit microprocessor with a 16-bit data bus and a 20-bit address bus. It has a programmable peripheral device

integrated into the same package. The instruction set of the 80186 is a superset of the instruction set of the 8086. The term super-set means that all of the 8086 instructions will execute properly on an 80186, but the 80186 has a few additional instructions.

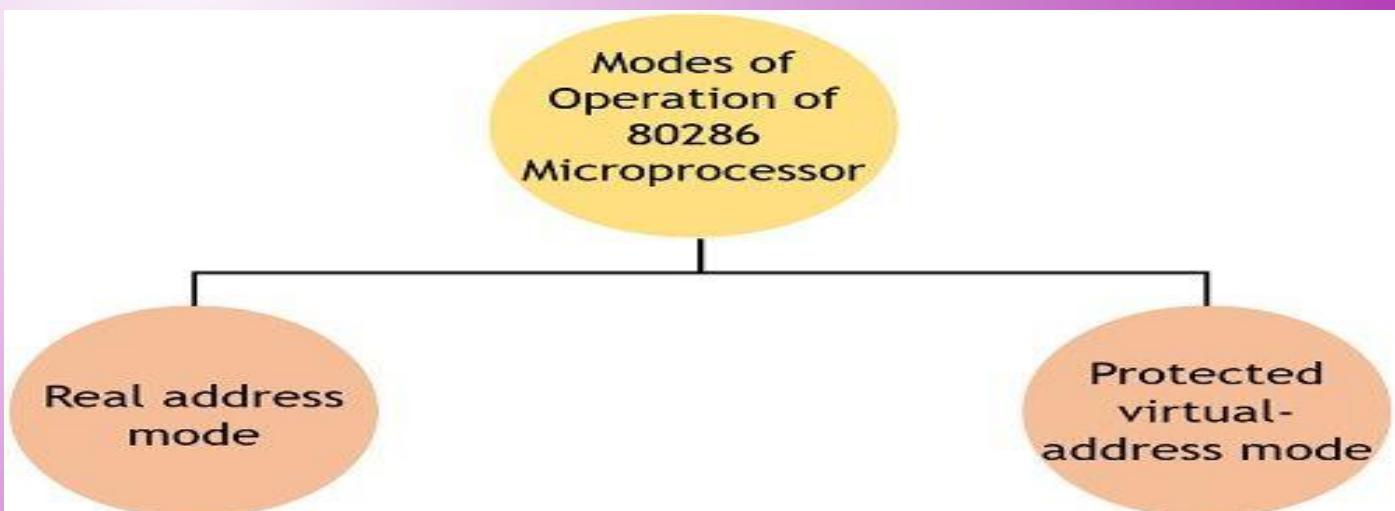
The CPU is divided into seven independent functional parts are-

- ✓ The Bus Interface Unit (BIU)
- ✓ Execution Unit (EU)
- ✓ Clock Generator
- ✓ Programmable interrupt controller
- ✓ Programmable Chip Select Unit (CSU)
- ✓ Programmable DMA Unit
- ✓ Programmable counter/timers



An overview of Intel 80286 (Part-01)

The second generation of x86 16-bit processors, Intel 80286, was released in 1982. The major new feature of the 80286 microprocessor was protected mode. When switched to this mode, the CPU could address up to 16 MB of operating memory (*previous generation of 8086/8088 microprocessors was limited to 1 MB*). In the protected mode it was possible to protect memory and other system resources from user programs - this feature was necessary for real program multitasking.



An overview of Intel 80286 (Part-02)

Now the question arises what are the factors that make 80286 more advantageous than 8086 microprocessor?



- It has non-multiplexed address and data bus that reduces operational speed.
- The addressable memory in case of 80286 is 16 MB.
- It offers an additional adder for address calculation.
- 80286 has faster multipliers that lead to quick operation.
- The performance per clock cycle of 80286 is almost twice when compared with 8086 or 8088.

An overview of Intel 80386

The 80386 was a family of **32-bit 3rd-generation x86 microprocessors** introduced by Intel in 1985 as a successor to 80286. These processors provided were fully backwards compatible with previous generations of x86 processors but **introduced a number of major new features** including enhancements to **protected mode** and **virtual 8086 mode**.



Features of 80386

- ✓ As it is a 32-bit microprocessor. Thus has a 32-bit ALU.
- ✓ 80386 has a data bus of 32-bit.
- ✓ It holds an address bus of 32 bit.
- ✓ It supports physical memory addressability of 4 GB and virtual memory addressability of 64 TB.

- ✓ 80386 supports a variety of operating clock frequencies, which are 16 MHz, 20 MHz, 25 MHz, and 33 MHz
- ✓ It offers 3 stage pipeline: fetch, decode and execute. As it supports simultaneous fetching, decoding, and execution inside the system.

An overview of Intel 80486

A computer processor developed by Intel as an upgrade to the 386 processor series and commonly referred to as the 486 or i486. The **80486 has 128 k of memory cache built into the processor with 32-bit data bus architecture and was available in clock rates ranging from 20 MHz to 33 MHz.** The picture is an example of the Intel i486 SX processor with the Overdrive socket.



Features of 80486

- ✓ It has complete 32-bit architecture which can support 8-bit, 16-bit and 32-bit data types.
- ✓ Intel 80486 operates at much faster bus transfers.
- ✓ This processor retains all complex instruction sets of 80386, and more pipelining has been introduced to improve performance in speed.
- ✓ Power management and System Management Mode (SMM) of 80486 became a standard feature of the processor.

An overview of Pentium Microprocessor

Pentium Microprocessor is one of the powerful family members of Intel's X86 microprocessor. It is an advanced superscalar 32-bit microprocessor, introduced in the year 1993 that contains around 3.1 million transistors.

It has a 64-bit data bus and a 32-bit address bus that offers 4 Gb of physical memory space. While the maximum clock rating offered is around 60 to 233 MHz.



Features of Pentium Microprocessor

- ✓ Superscalar architecture
- ✓ Separate data and instruction caches
- ✓ Bus cycle pipelining
- ✓ Execution tracing
- ✓ 64-bit data bus

- ✓ Internal parity checking
- ✓ Dynamic branch prediction
- ✓ Dual processing support
- ✓ Performance monitoring
- ✓ Super fast

An overview of Embedded Microprocessor (P-01)

An embedded microprocessor is a computer chip used inside several devices and equipment's to provide added functionality. A microprocessor is a digital-electronic component with transistors integrated on a single semiconductor IC that is small and consumes less power. Due to flexibility, cost, programmability and adaptability microcontrollers are popular to implement various types of controllers that we know from the electronics history. The functions of the microprocessor include fetching, decoding and processing the data.



Its importance includes:

- ✓ Handling many functions like calculations and word processing at higher speeds
- ✓ Performing operations for the repetitive, continuous, progressive and sequential functions without human labor
- ✓ Communicating with the internet, telephones and other interfacing devices

Types of Microprocessors:

The classification of embedded-microprocessor depends on several factors like computing performance, availability of memory, type of application, etc., and some of these microprocessors include:

- Complex instruction set microprocessors**
- Reduced instruction set microprocessors**
- Superscalar microprocessors**
- Application specific integrated circuit (ASIC)**
- Digital signal microprocessors (DSPs)**

A microprocessor chip is built by using semiconductor devices wherein thousands of transistors are integrated into a single chip for better performance. The major microprocessor's parts include:

- ALU (Arithmetic Logic Unit)
- Memory unit
- Control Unit
- Registers
- System Bus

An overview of BSM Microprocessor

A bit-slice microprocessor (BSM) is a microprocessor designed as a module with the primary purpose of being able to assemble multiple identical such microprocessors to form a larger processor of some desired word size. Bit-slice microprocessors can be cascaded to produce any conventional (e.g. 4-bit, 8-bit, 16-bit) as well as unconventional word sizes (e.g. 10-bit, 12-bit, 18-bit). A notable advantage of a BSM over discrete logic components is the fact that most connections are internal to the chip with only few connections being external.

Bit-slice microprocessors are the answer to the prayer of the engineer who needs to build a computer with greater power than that offered by today's microprocessors at a cost comparable with microprocessor systems

An overview of Arithmetic Processor

A processor if devoted exclusively to arithmetic functions can be used to implement a full variety of arithmetic functions in hardware at a relatively low cost. This can be done in a single Integrated Circuit. So a special purpose arithmetic processor for performing only arithmetic operations can be constructed. This processor physically may be separate however can be utilized by CPU to execute complex arithmetic instructions. Please note in the absence of arithmetic processors these instructions can be executed using slower software routines by the CPU itself. So this auxiliary processor improves the speed of execution of programs having several complex arithmetic computations.

An arithmetic processor also assists in reducing program complexity as it provides a richer instruction set for a machine.

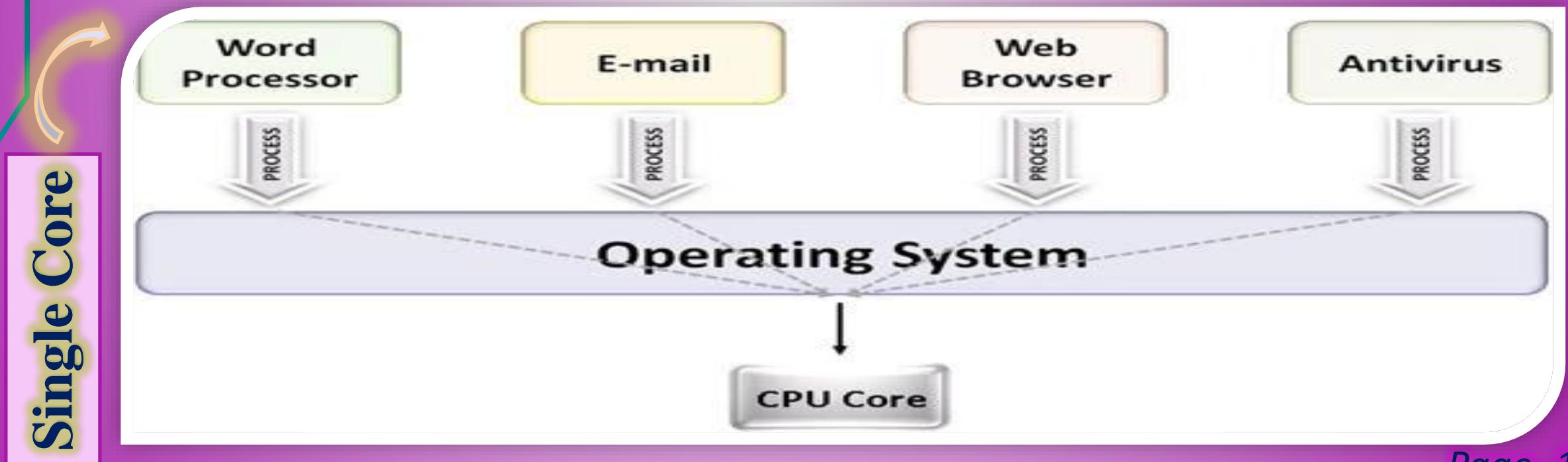
An overview of Multitasking Processor (P-01)

In computing, multitasking is a method by which multiple tasks, also known as processes, share common processing resources such as a CPU. With a multitasking OS, such as Windows XP, you can simultaneously run multiple applications. Multitasking refers to the ability of the OS to quickly switch between each computing task to give the impression the different applications are executing multiple actions simultaneously.

As CPU clock speeds have increased steadily over time, not only do applications run faster, but OSs can switch between applications more quickly. This provides better overall performance. Many actions can happen at once on a computer, and individual applications can run faster.

An overview of Multitasking Processor (P-02)

In the case of a computer with a single CPU core, only one task runs at any point in time, meaning that the CPU is actively executing instructions for that task. Multitasking solves this problem by scheduling which task may run at any given time and when another waiting task gets a turn.



An overview of Multitasking Processor (P-03)

When running on a multicore system, multitasking OSs can truly execute multiple tasks concurrently. The multiple computing engines work independently on different tasks.

For example, on a dual-core system, four applications - such as word processing, e-mail, Web browsing, and antivirus software - can each access a separate processor core at the same time. You can multitask by checking e-mail and typing a letter simultaneously, thus improving overall performance for applications.

Multi Core



An overview of Itanium & Merced Microprocessor

Itanium (the brand name for Merced, which was the original code name) is a **64-bit microprocessor** jointly developed by Intel and Hewlett-Packard. Itanium is manufactured with a 0.18-micron process and contains tens of millions of transistors. While Itanium is able to run software written for the x86 processor architecture, it uses a new architecture, officially known as Intel Architecture-64 (IA-64). The name IA-64 refers to the fact that 64 bits of data can be processed during one clock cycle. Other Intel chips are based around a 32-bit architecture. Itanium is a complete 64-bit processor.

Itanium is the first in a series of processors based on the new architecture. Itanium and its successors are being designed to perform comparably to and compete directly with chips such as Sun's UltraSPARC and Compaq's Alpha.

Ending Slide of Assignment

If any mistake found or any update is needed, you're requested to know us, We'll update it according to the requirements, In Shaa Allah.

- Sorowar Mahabub, Team Leader, Team bratva

Done & submitted by-

Mostafa Shahriar Asif

Matric ID: [C201014](#)

Md. Shahin Shah

Matric ID: [C201035](#)

Section: 5AM, 5th Sem., Department of CSE, IIUC

Sorowar Mahabub

Matric ID: [C201032](#)

Emdadul Islam

Matric ID: [C201041](#)

Assalamualaikum Waa Rahmatullah to All, Thank You!

This is The End.