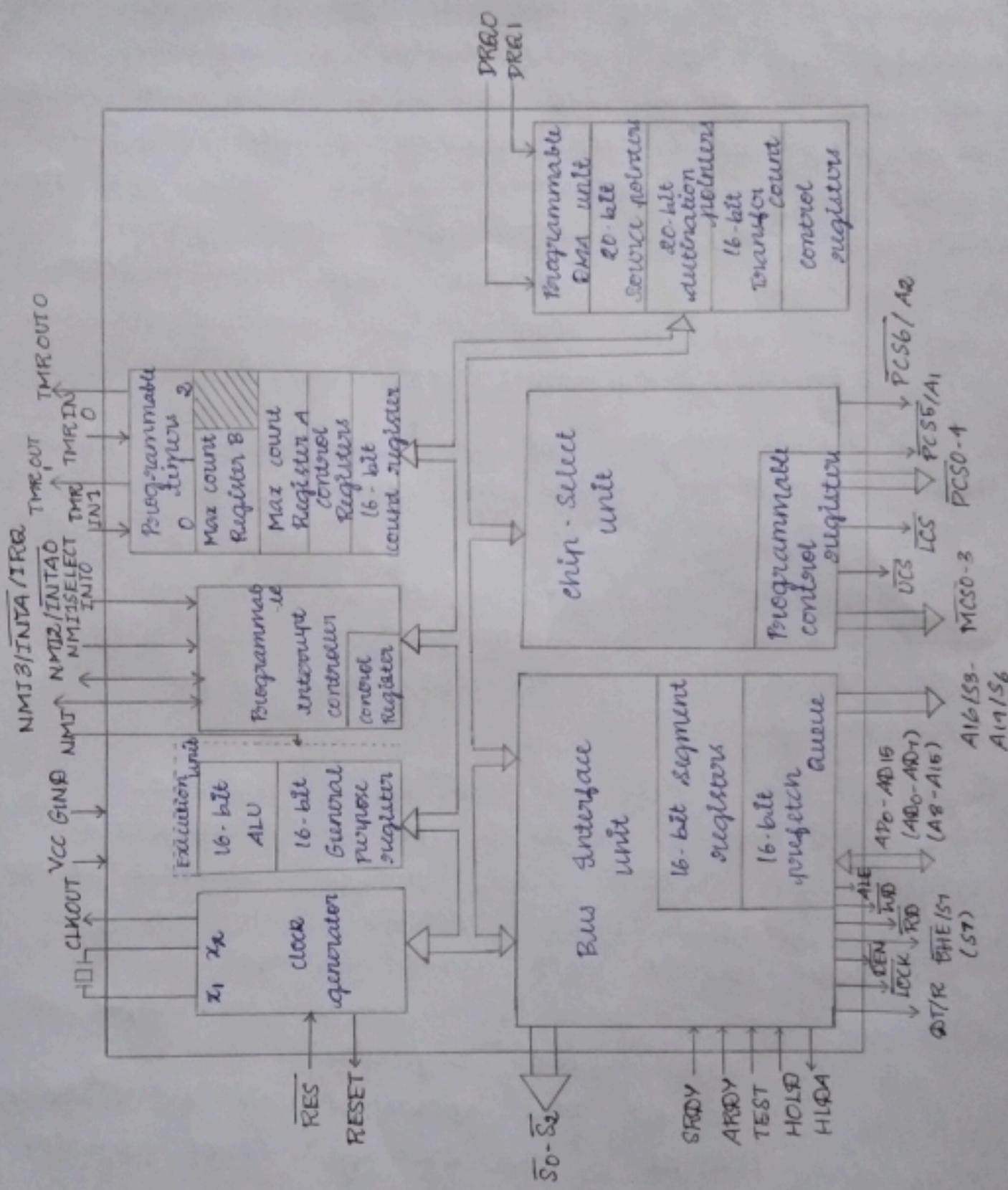


1) 80186 MICROPROCESSOR ARCHITECTURE



The Intel 8086 microprocessor is a high-performance, highly integrated 16-bit microprocessors usually. The 80186 microprocessor is intended for embedded systems, as microcontrollers with external memory to reduce the number of LSI chips in systems, it is required to include clock generator, interrupt controller, timers, wait state generator, DMA channels and external chips select lines within a chip. The 80186 is a natural successor to the 8086 in personal computers.

However, because of its integrated hardware was incompatible with the OEM hardware used in the original IBM PC.

The architecture of 80186 is common with the 8086 and 8088 microprocessors. This 80186 microprocessor is a very integrated 16-bit microprocessor.

B/W: If $\overline{B}/W = 0$, a bit will be transferred.

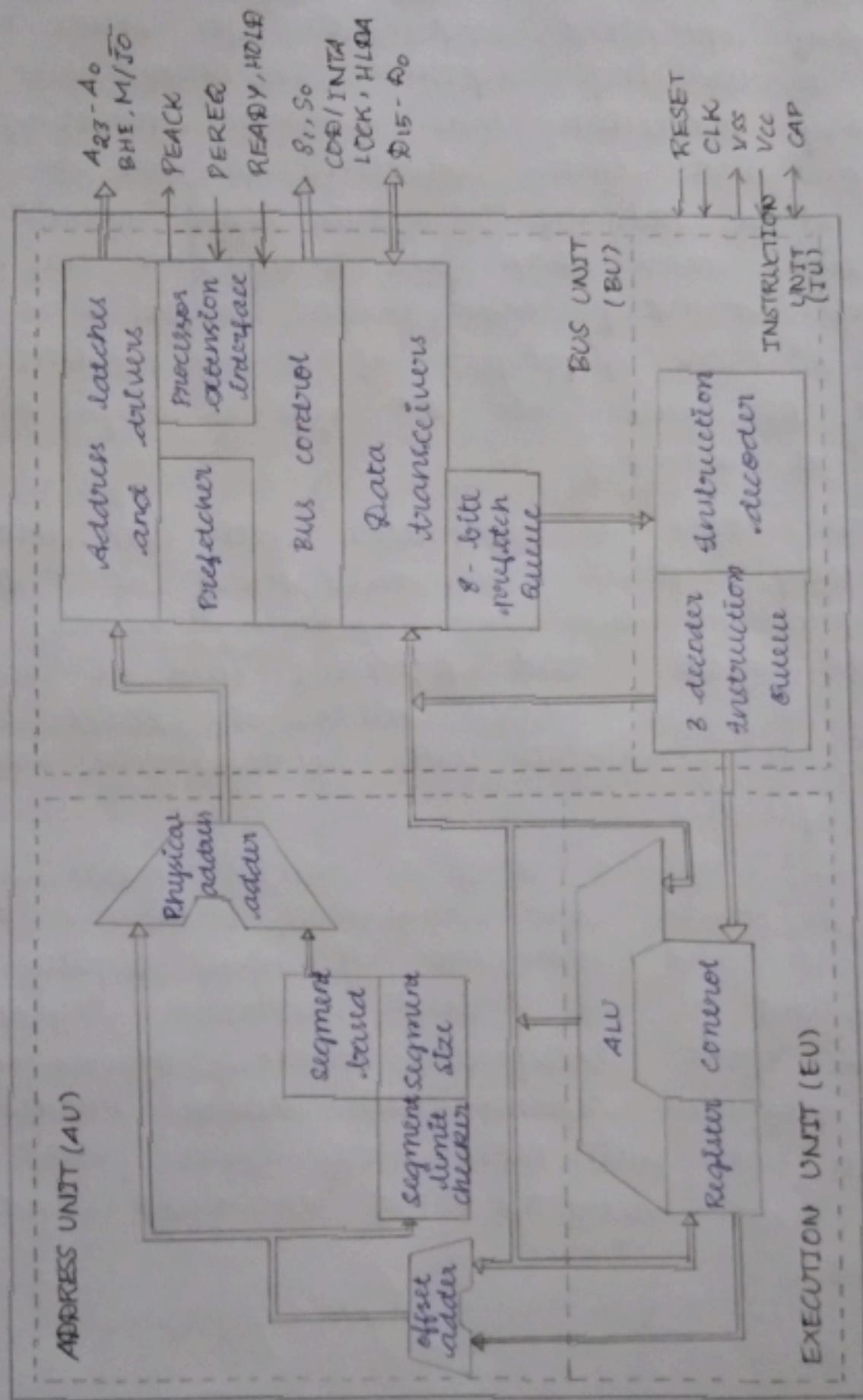
when $\overline{B}/W = 1$, a word will be transferred.

ST/STOP: When $ST/\overline{STOP} = 1$, the specified channel starts data transfer. While $ST/\overline{STOP} = 0$, the specified channel should stop data transfer.

INT: this bit is used as enable interrupt to CPU on byte count registers.

TC: while TC is set, DMA operation will be terminated if the content of the transfer count register become zero.

BIT 3: Bit 3 of DMA control register is not used.

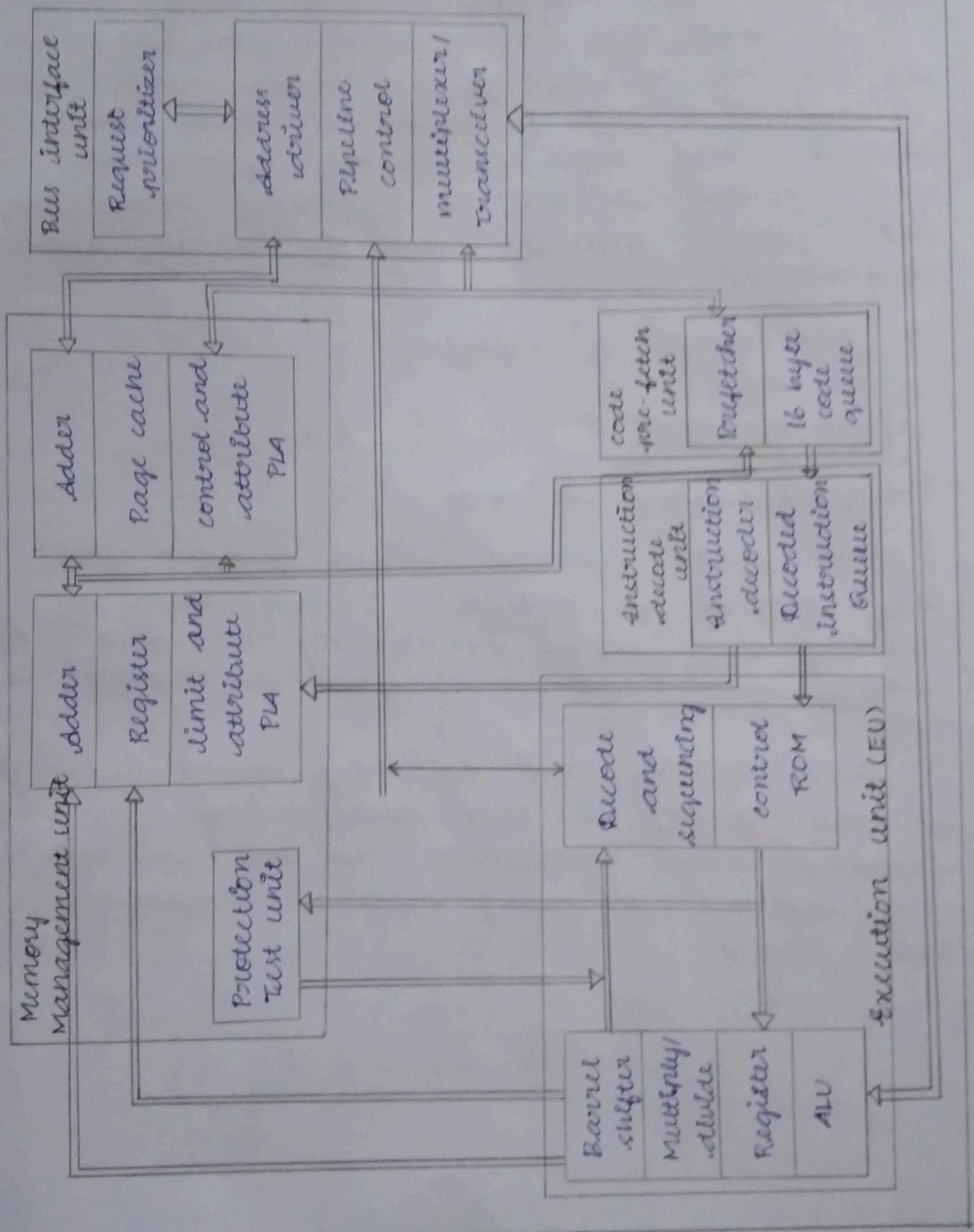


The Architecture of 80286 microprocessor is an advanced, high performance microprocessor with specially optimized capabilities for multi-user and multitasking systems. The 80286 has built-in memory protection that supports operating system and task isolation as well as program and data privacy. A 12 MHz 80286 provides about six times more than the 5MHz 8086. The 80286 includes memory management capabilities that map 2^{30} (one gigabyte) of virtual address space per task into 2^{24} bytes (16 megabytes) of physical memory.

The 80286 is compatible with 8086 and 8088 operating software. The architecture of 80286 microprocessor has two operating modes; real address mode, and protected virtual address mode. In real address mode, the 80286 is object code compatible with existing 8086 and 8088 system.

In protected virtual address mode, the 80286 is source code compatible with 8086, 8086 software and sometimes it may require upgrading to use virtual addresses supported by the 80286's integrated memory management and protection scheme. Both schemes modes operate at full 80286 performances and execute all instructions of the 8086 and 8088 processors.

8) 80386 MICROPROCESSOR MICROPROCESSOR ARCHITECTURE:



The internal architecture of 80386 processor consists of three different sections such as central processing unit (CPU), memory management unit (MMU) and bus interface unit (BIU).

The Intel 80386 microprocessor, often known as the i386, was a popular x86-based microprocessor. Its capacity to run in numerous modes, which allowed varied levels of memory management and protection, as well as backward compatibility with previous processors, was one of its primary characteristics.

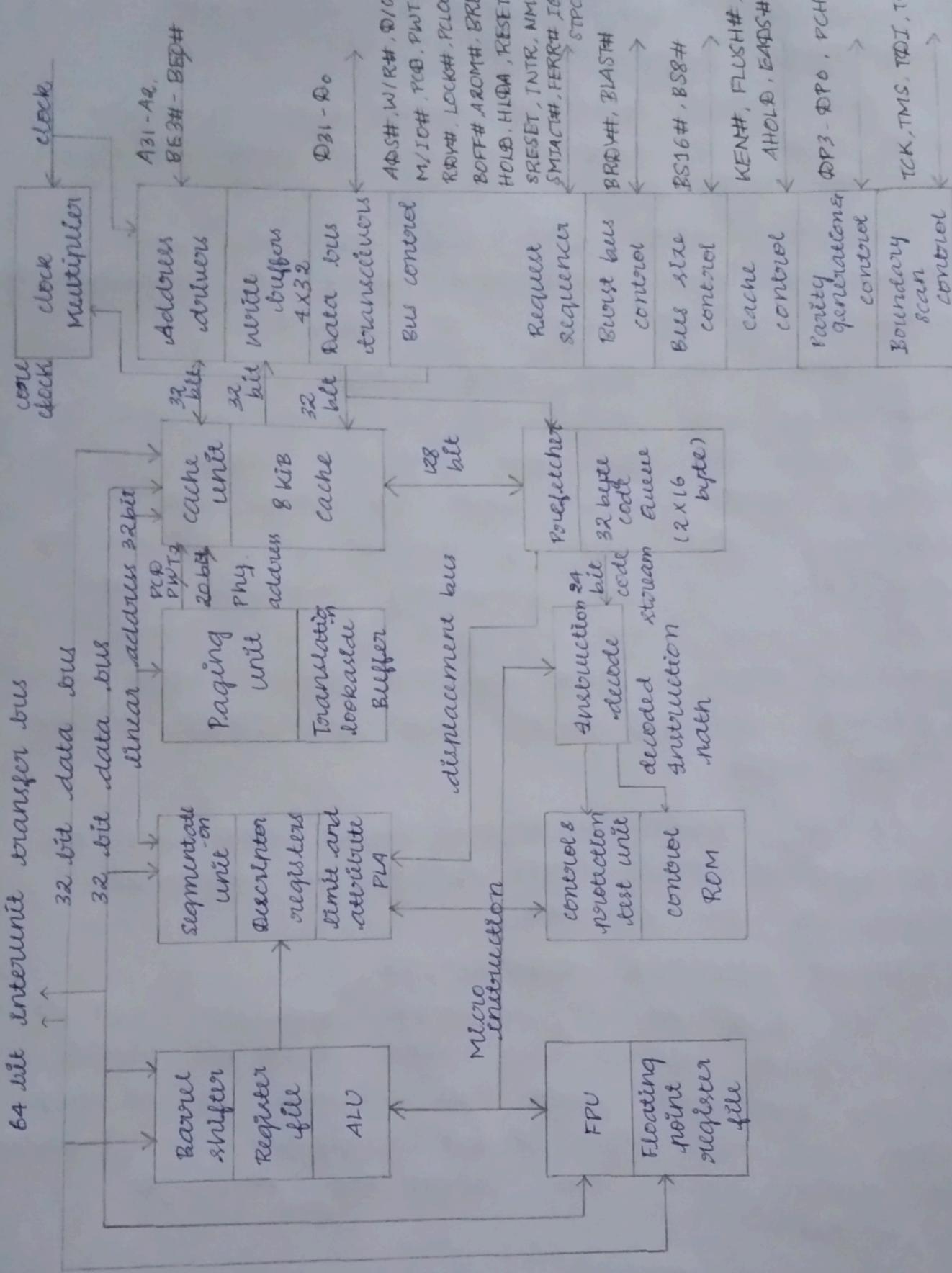
The 80³86 modes of operation:

- Real mode
- Protected mode
- Virtual 8086 mode
- System management mode

Each mode provided unique features and was designed for certain use cases, such as running older legacy applications, advanced memory management, and system management duties.

Understanding these operating modes is critical for understanding the 80386 microprocessor's capabilities and limitations, as well as how it was employed in early personal computers and servers.

4) 80486 MICROPROCESSOR ARCHITECTURE:



The successor to the 80386 processor, Intel 80486 (i486) included many changes to its micro-architecture that resulted in significant performance improvements:

Intel 80486 featured much faster transfer 1 CPU cycle as opposed to two or more CPU cycles for the 80386 bus.

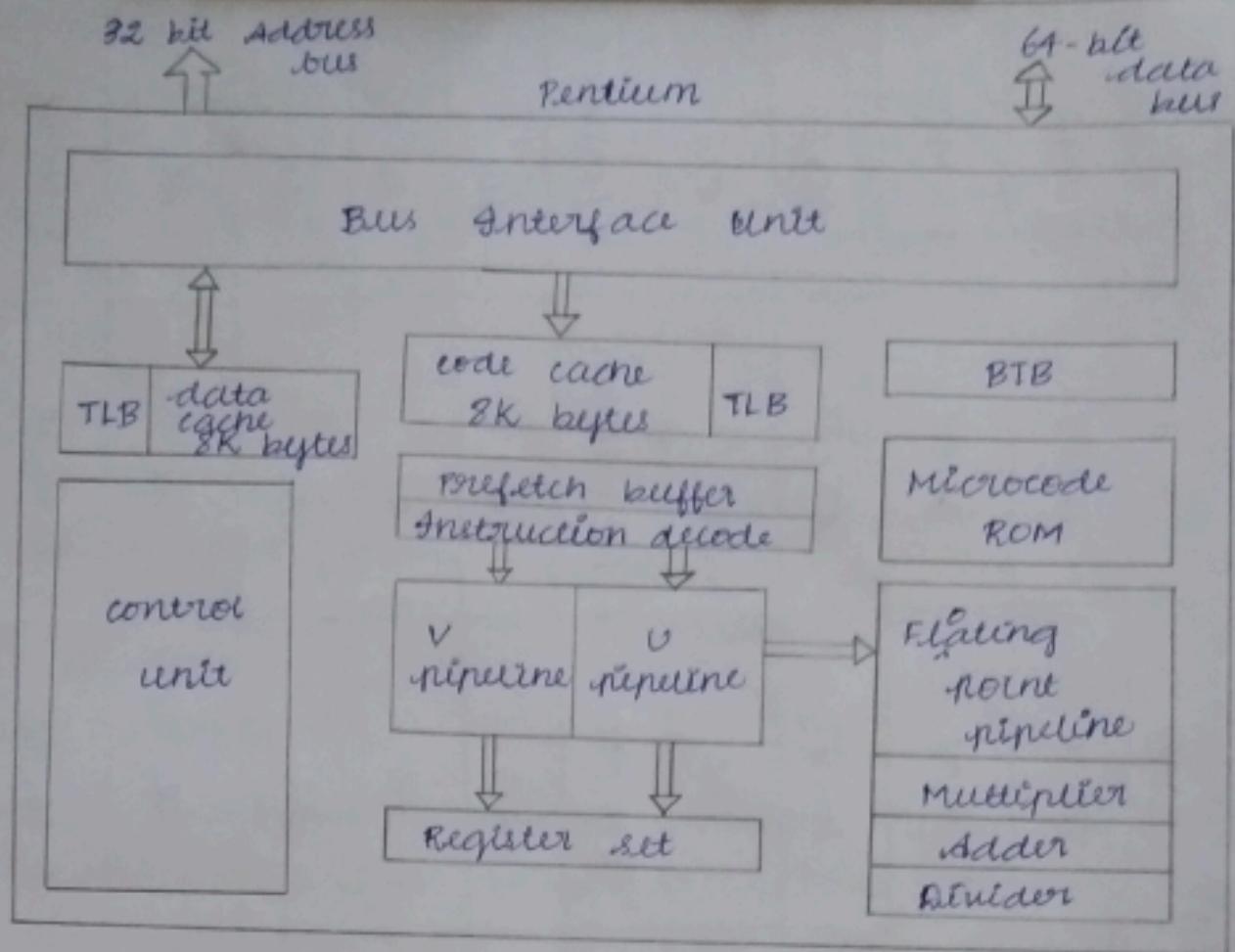
Floating-point unit was integrated into 80486DX CPUs. This eliminated delay in communication between the CPU cycles to execute.

Clock-doubling and clock-tripling technology was introduced in faster version of Intel 80486 CPU. These i486 processors could run in existing motherboards with 20-33 MHz bus frequency, while running internally at two or three times of bus frequency. 80486SX2 and 80486DX2 were clock-doubled version, and 80486DX4 was a clock-tripled version. AMD also produced 80486DX5 or x5-clock-quadrupled version of the 80486.

Power management features and system management mode (SMM) became a standard feature of the processor.

5) PENTIUM PROCESSOR ARCHITECTURE:

The Pentium is a 32-bit processor, but it has a 32-bit address bus and a 64-bit data bus. The processor's data bus serves the on-chip caches, but not the 32-bit registers. The internal and data buses are connected through the caches.



The architecture of pentium processor which consists of 8K byte code cache, 8K byte data cache, Translation look-aside buffer (TLB), Branch trace buffer (BTB), Integer pipeline V and V, floating point pipeline, microcode ROM, and control unit (CU).

There are two integer pipeline and a floating-point unit in the architecture of pentium processor.

- Prefetch (PF)
- Decode1 (D1)
- Decode2 (D2)
- Execute (E)
- write back (WB)

DIFFERENCE BETWEEN 80186, 80286, 80386, 80486 AND 80586 MICROPROCESSORS

PARAMETER	80186	80286	80386	80486	80586	PENTIUM / 80586
Year introduced	1982	1982	1985	1989	1992	
Technology	NMOS	NMOS	CMOS	CMOS	BICMOS	
Clock rate (MHz)	6-10	10-16	16-33	25-33	60,66	
Number of pins	40	68	132	168	273	
Number of translators	55,000	130,000	275,000	1.2 million	3.1 million	
Physical memory	16M	16M	4G	4G	4G	
Internal data bus	16	16	32	32	32	
External data bus	16	16	32	32	64	
Address bus	20	24	32	32	32	
Data type (bus)	16	16	16,32	16,32	16,32	8,16,32
Virtual memory	1G	1G	64T	64T	64T	64T

GENERATIONS OF MICROPROCESSORS:

1. FIRST GENERATION:

From 1971 to 1972 the era of the first generation came which brought microprocessors like INTEL 4004 Rockwell International PPS-4 INTEL 8008 etc.

2. SECOND GENERATION:

The second generation marked the development of 8-bit microprocessors from 1973 to 1978. Processors like INTEL 8085 Motorola 6800 and 6801 etc came into existence.

3. THIRD GENERATION:

The third generation brought forward the 16-bit processors like INTEL 8086/8086/80286 Motorola 68000 68010 etc. From 1979 to 1980 this generation used the HMOS technology.

4. FOURTH GENERATION:

The fourth generation came into existence from 1981 to 1995. The 32-bit processors using HMOS fabrication came into existence. INTEL 80386 and Motorola 68020 are some of the popular processors of this generation.

5. FIFTH GENERATION:

From 1995 till now we are in the fifth generation. 64-bit processors like PENTIUM, ULTRON, DUAL, QUAD, and OCTA-CORE PROCESSORS came into existence.