



Microprocessor Programming and Interfacing

Lecture-1 : Introduction

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About the Course

Course No. : CS/ECE/EEE/INSTR F241

Course Title : Microprocessor Programming & Interfacing

Lecture Class Timings : **Tue, Thus, Sat** 9:00 to 9:50 AM

Tutorial Timing : **Mon, Tue, Wed** 8.00 AM

Lab Timings : Mon, Tue, Wed, Thus, Fri 14:00 to 16:00
Mon, Wed, **Fri - 11:00 AM to 1:00 PM**

Google Class Code : 4n5fmjk

Course description

- Study of Programmer model of X86 processors, processor architecture, addressing modes and instructions set of X86 processors.
- Assembly programming using different instructions, subroutines and macros etc.
- Concept of Interrupts.
- Memory Interfacing.
- Programmable peripheral devices.

Text Books

Text Book:

Barry B Brey, The Intel Microprocessors .Pearson, Eight Ed. 2009.

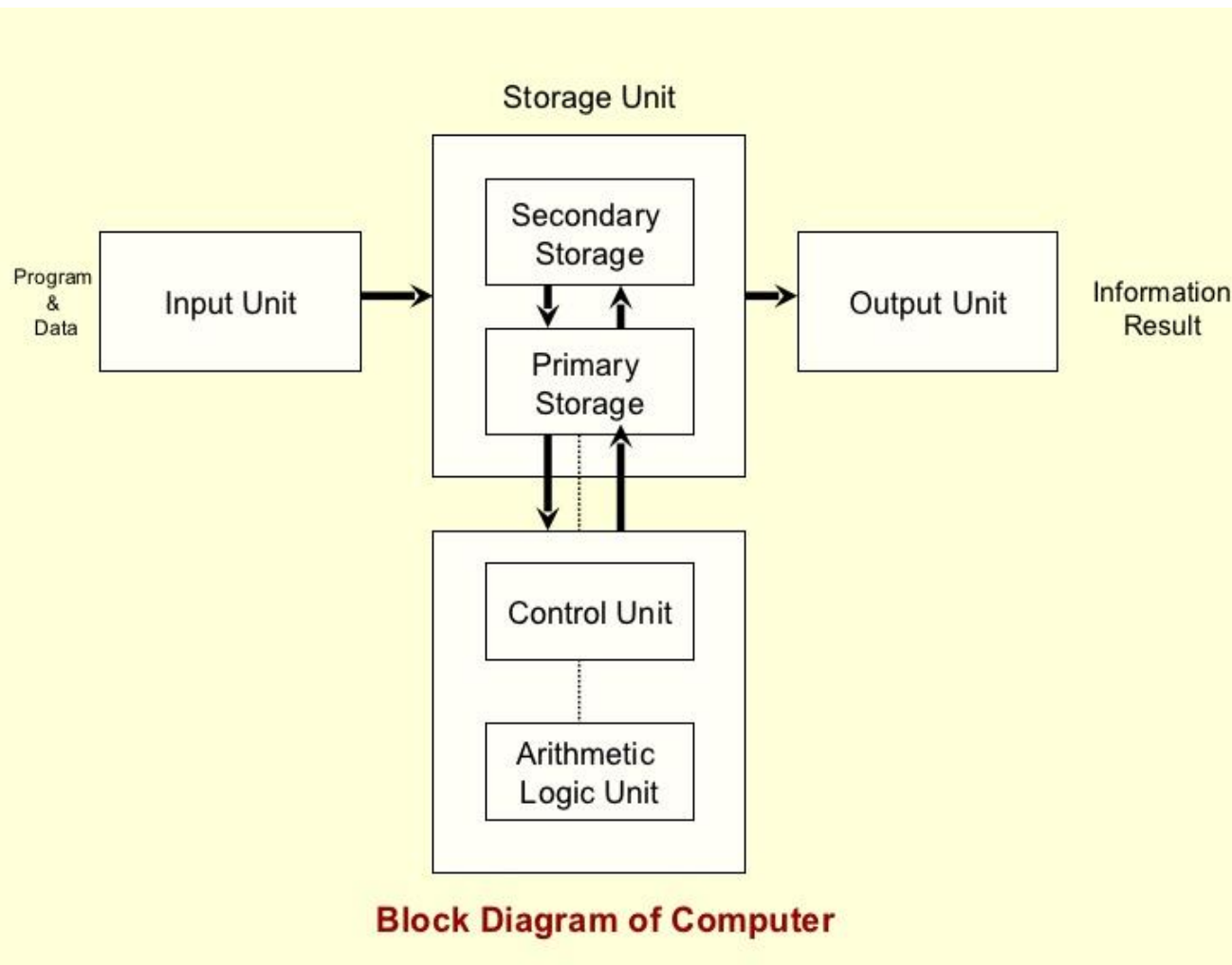
Reference Book:

Douglas V Hall, Microprocessor and Interfacing, TMH, Second Edition.

Motivation to Study Microprocessors

- Microprocessor is the heart of all Computers
- Microprocessors/Micro-controllers can be programmed to do a wide variety of practical-oriented tasks. (Automation)

Introduction to Microprocessors



History

- First general-purpose, programmable electronic computer system developed in 1946. (at University of Pennsylvania)

⌘ **Electronic Numerical Integrator and Calculator (ENIAC), a huge machine.**

- × over 17,000 vacuum tubes;
- × 500 miles of wires
- × weighed over 30 tons
- × about 100,000 operations per second



History

- ⌘ Programmed by rewiring its circuits.
 - ✧ process took many workers several days
 - ✧ workers changed electrical connections on plug-boards like early telephone switchboards
- ⌘ Required frequent maintenance.
 - ✧ vacuum tube service life a problem

History

- ⌘ December 23, 1947, John Bardeen, William Shockley, and Walter Brattain develop the **Transistor** at Bell Labs.

History

The First Integrated Circuit – Jack Kilby, Texas Instruments

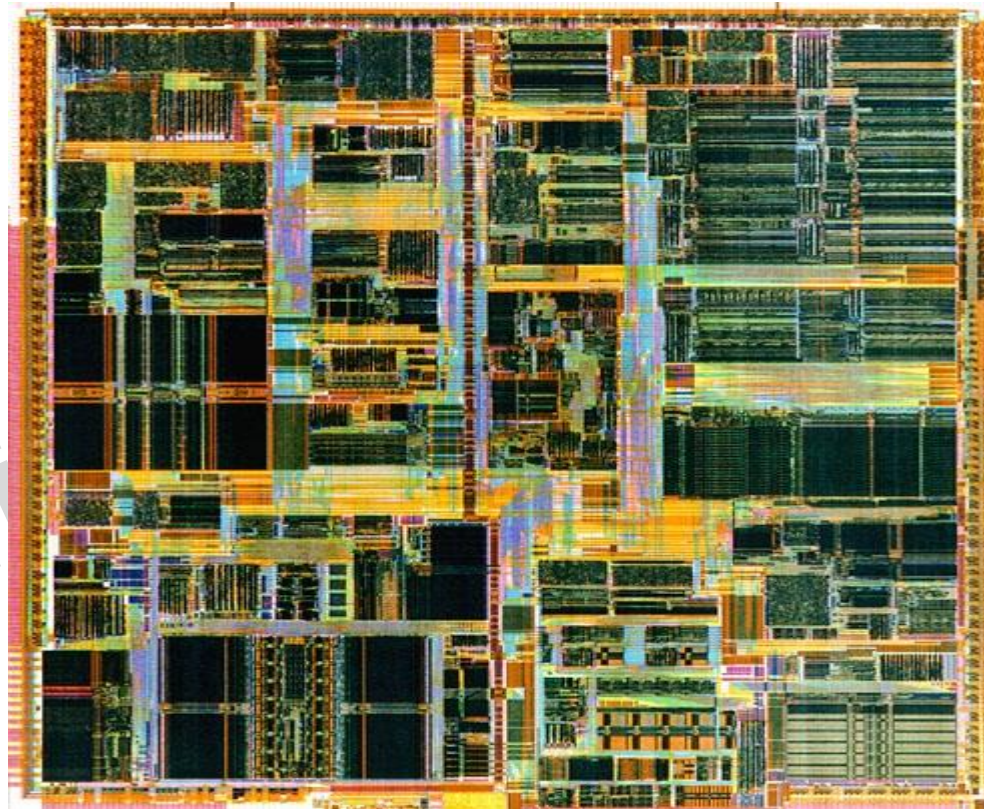
1 Transistor and 4 Other Devices on 1 Chip

In the year 1958

Sanjayvidhyaan.in

History

In the early 1970s, CMOS technology replaced NMOS-only logic which started suffering from high power consumption. Ever since, CMOS has been the dominant digital technology.

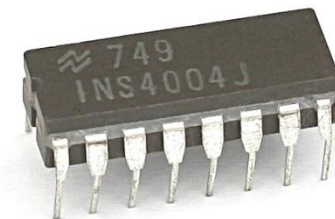
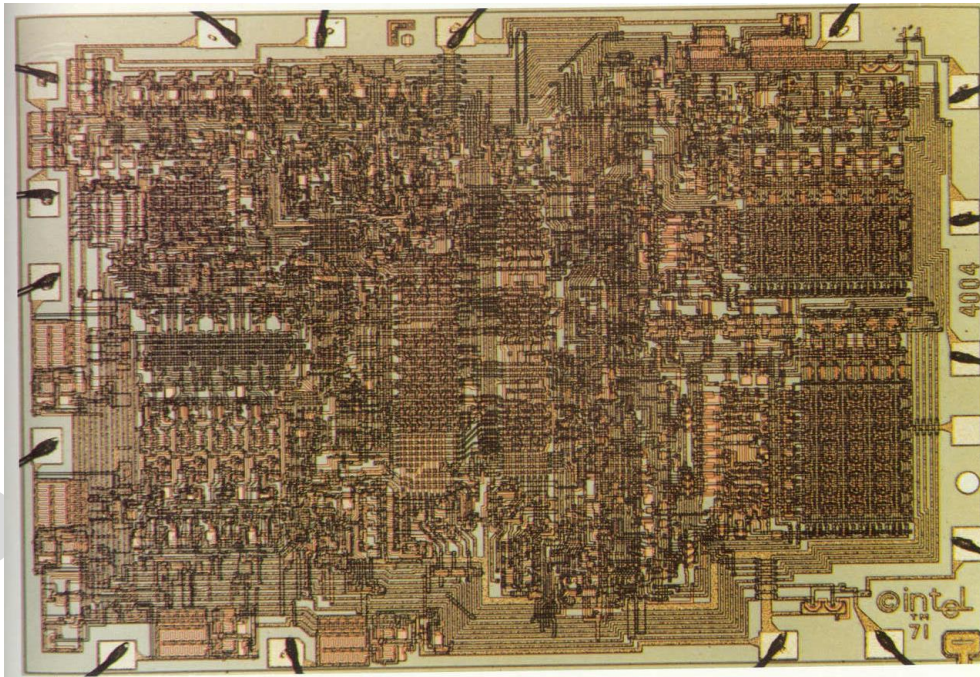


The First Microprocessor -- 1971

The Intel 4004 – 2,300 Transistors, 1 MHz operation

THE FIRST COMPUTER ON A SINGLE CHIP

BEGINNING OF LARGE SCALE INTEGRATION TECHNOLOGY



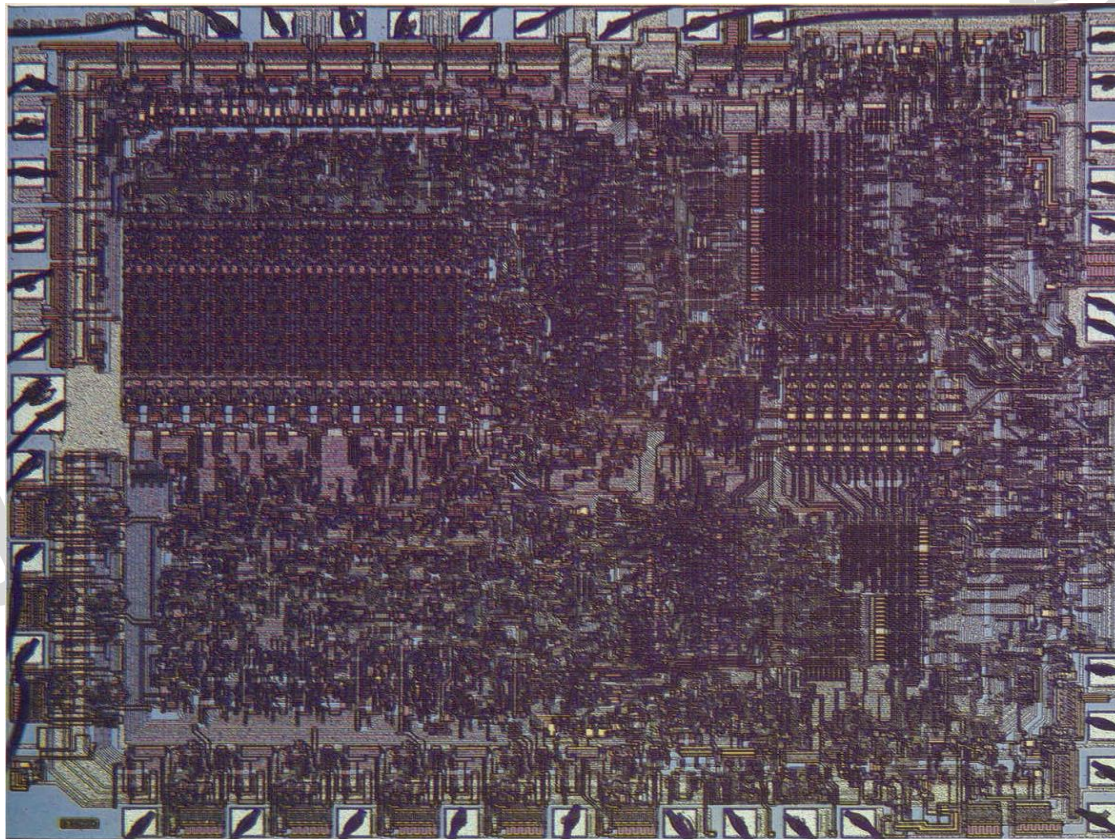
10 μ m process

The First Microprocessor -- 1971

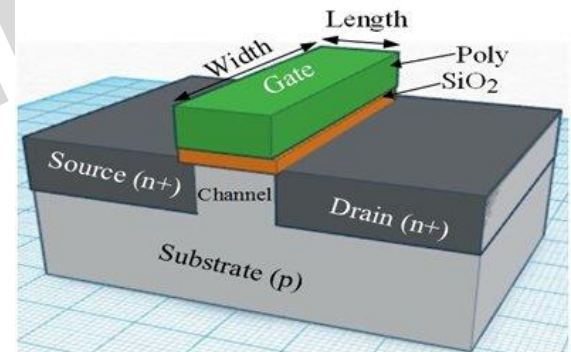
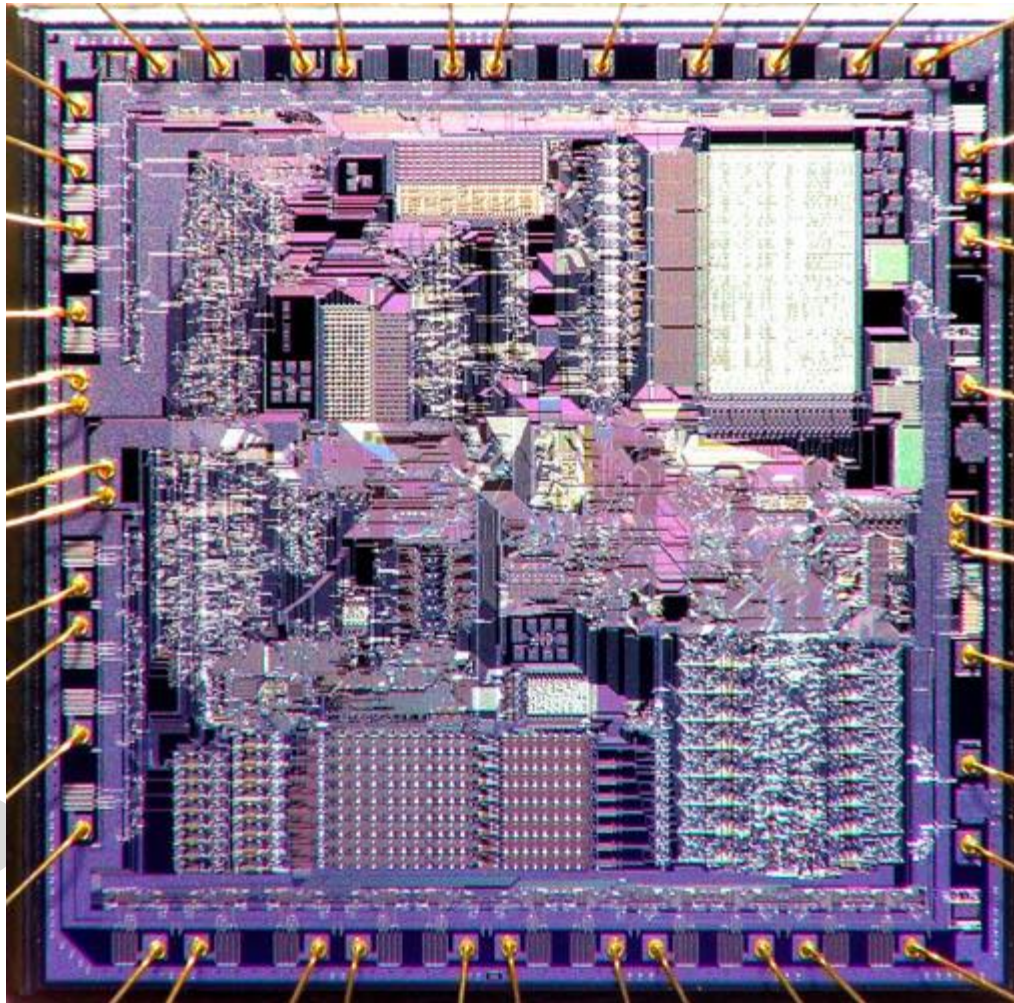
- The world's first microprocessor, the Intel 4004, was a 4-bit microprocessor—a programmable controller on a chip.
- It addressed a mere 4096 (12 address lines).
- Its instruction set contained only 45 different instructions.

First General-Purpose Microprocessor -- 1974

8-Bit Intel 8080 and 8085 , Intel Corporation – 4,500 Transistors



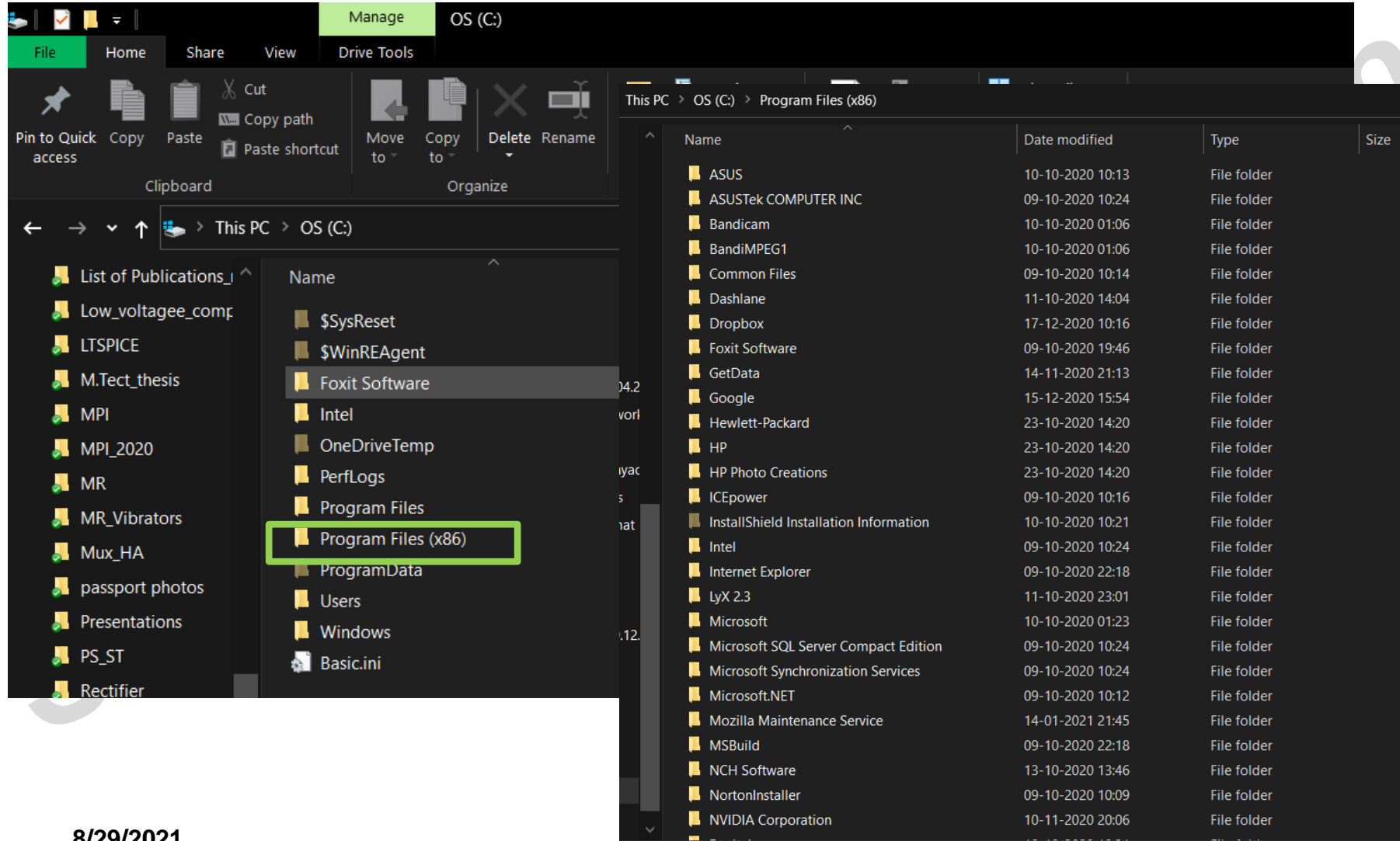
Intel 8086 microprocessor (1978)



[3 \$\mu\$ m process](#)

Advancement in Microprocessors

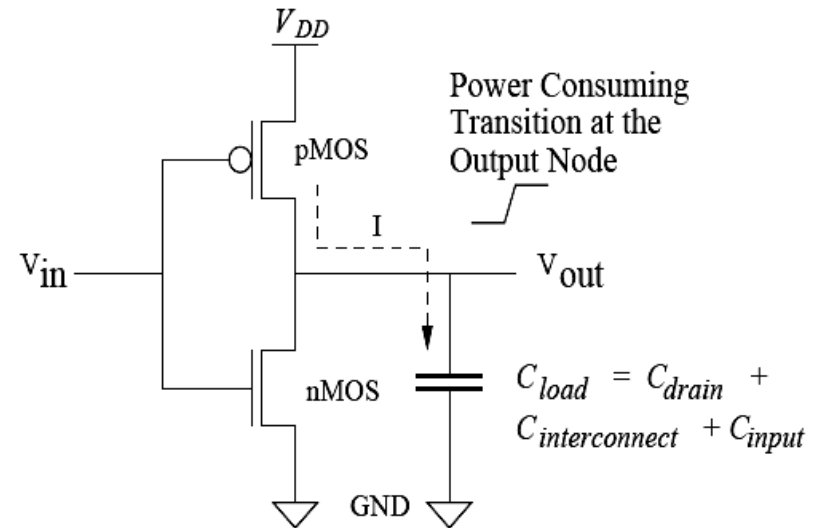
- Microprocessors that are common today include the 8086/8088, which were the first 16-bit microprocessors.
- Following these early 16-bit machines were the 80286, 80386, 80486, Pentium, Pentium Pro, Pentium II, Pentium III, Pentium 4, and Core2 processors.
- The architecture has changed from 16 bits to 32 bits and to 64 bits. **32-bit is also an 86 series architecture. Max RAM supported in 32-bit architecture is 4 GB.**



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Advantages of CMOS Scaling

- Faster
- Lower Power
- Higher packing density



Limitations of CMOS Scaling

- High Power

Increase in Freq due to improvement in :
Technology + Architecture

Higher Packing Density due to improvement in :
Technology + Routing Algo

- Low Noise Margins



Limitations of CMOS Scaling

