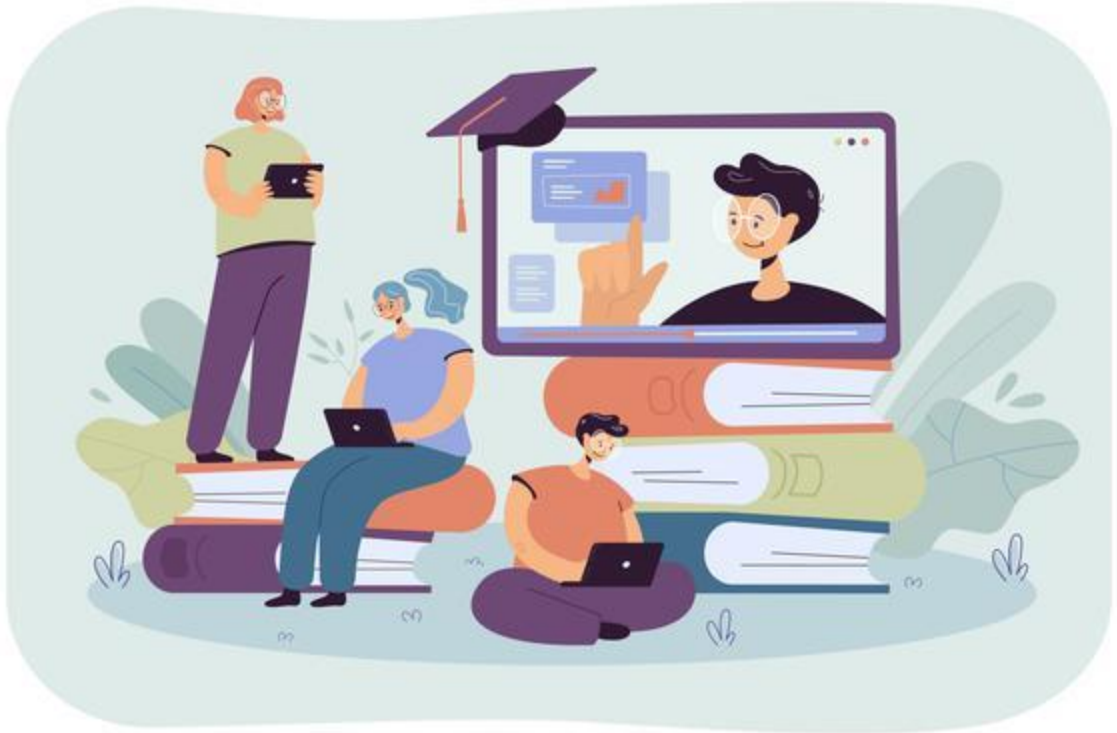
Innovation and Information Technology for Educational Communication and Learning

นวัตกรรมและเทคโนโลยีสารสนเทศ
เพื่อการสื่อสารการศึกษาและการเรียนรู้



Basic knowledge in computer program usage and computer application related to the field of study, skills essential to the capability and efficiency of the information technology, computer networks and the internet usage

Introduction to Technology

* Meaning of technology
* Evolution of technology
  - Modern technology

Meaning of Technology

Science or knowledge put into practical use

- To solve problems
- To invent useful things.

Evolution of Technology

Data & Media

- Equipment
- Processing
- Communication
- Others

Data & Media

Computer

Text >> Multimedia

Optical Medias

Magnetic Medias

Multi-media

- Text
- picture
- Video
- Sound & voice

Book

- Text
- picture

Papyrus

Stone inscriptions

Equipments

Calculator

+

Typewriter

Computer

Processing methods

Natural Language

Instruction

Manual

Program

Machine learning

Communication

Telephone

Mobile phone

Internet

Sattelite

Smart mobile

5G

Fiber optic cable

Other technologies

Nano-technology

Big Data

Robot

Cryptocurrency

Automation system

Block chain

Digital technologies

- Computer & Computer system
- Data storage & processing
- Communication
- Artificial Intelligence (AI)

1940 : 1st Computer Era

Manual Batch system

The Complex Number Calculator (CNC) is completed

- *Computers*

In 1939, Bell Telephone Laboratories completes this calculator, designed by scientist George Stibitz. In 1940, Stibitz demonstrated the CNC at an American Mathematical Society conference held at Dartmouth College. Stibitz stunned the group by performing calculations remotely on the CNC (located in New York City) using a Teletype terminal connected via to New York over special telephone lines. This is likely the first example of remote access computing.

1950 : 2nd Computer Era

Mono-programming

ERA 1101 introduced

- *Computers*

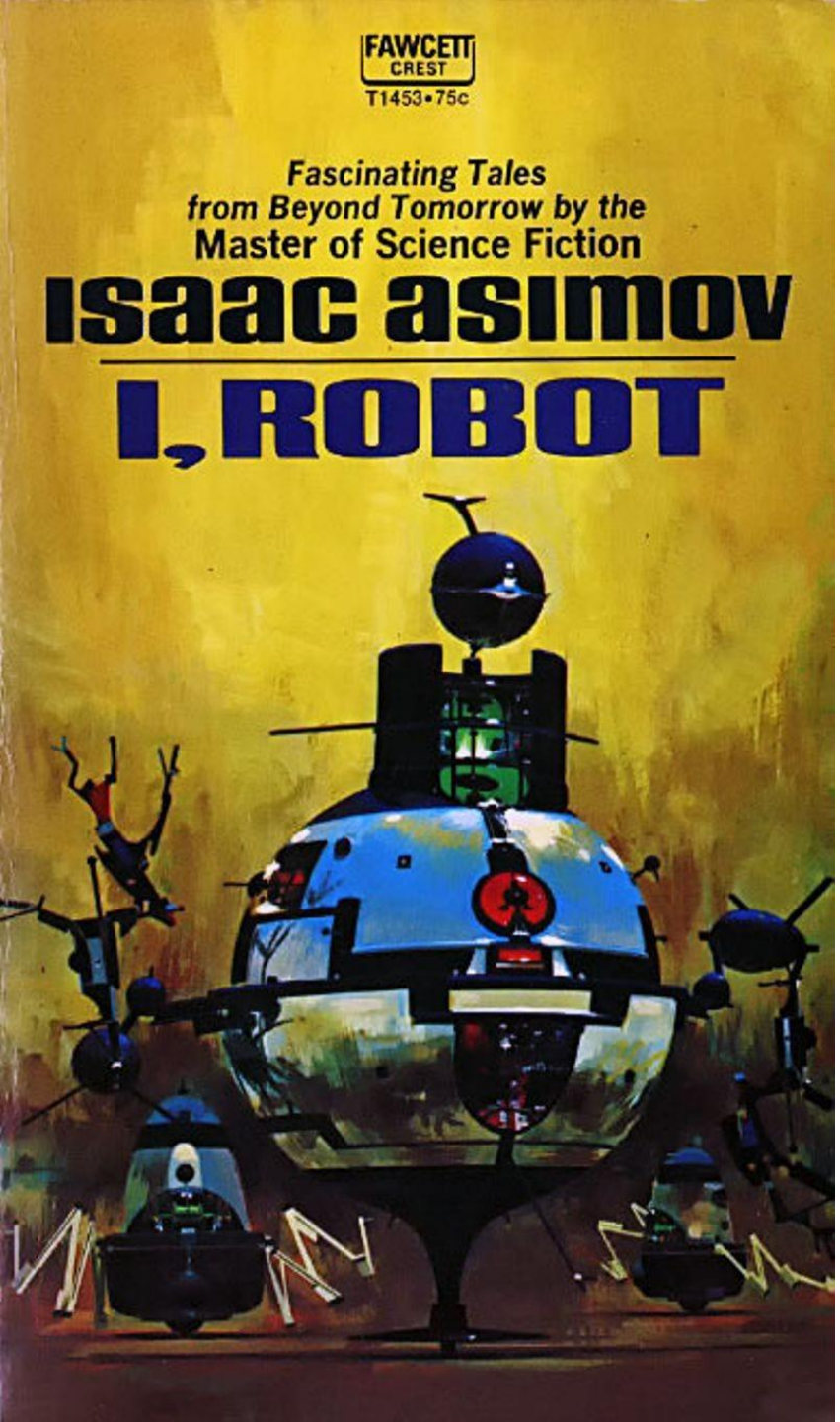
One of the first commercially produced computers, the company´s first customer was the US Navy. The 1101, designed by ERA but built by Remington-Rand, was intended for high-speed computing and stored 1 million bits on its magnetic drum, one of the earliest magnetic storage devices and a technology which ERA had done much to perfect in its own laboratories. Many of the 1101's basic architectural details were used again in later Remington-Rand computers until the 1960s.

Grey Walter working with Elsie

Grey Walter's Elsie

• *AI & Robotics*

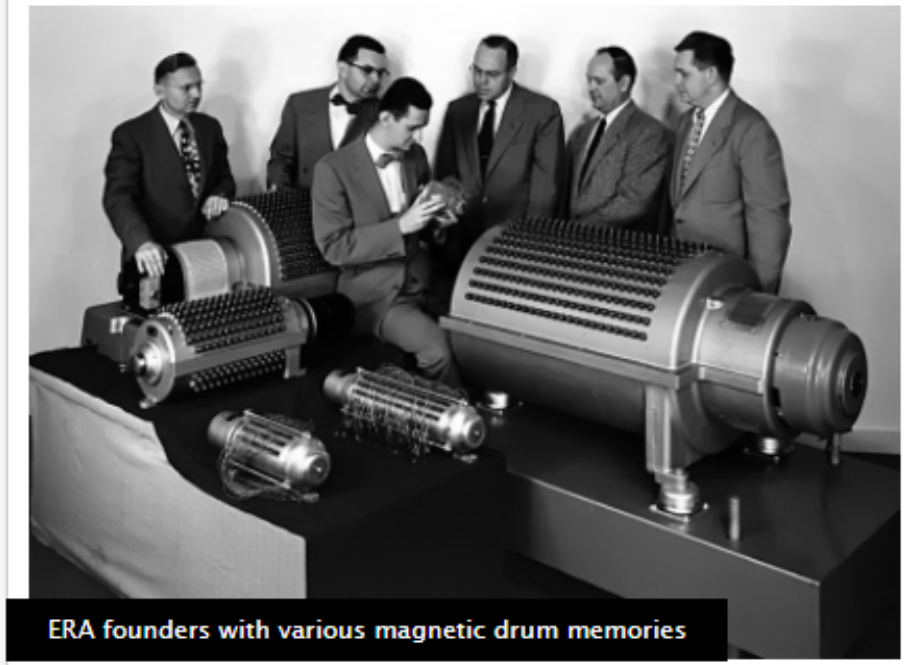
A neurophysiologist, Walter built wheeled automatons in order to experiment with goal-seeking behavior. His best known robot, Elsie, used photoelectric cells to seek moderate light while avoiding both strong light and darkness—which made it peculiarly attracted to women's stockings.



Isaac Asimov's *I, Robot*

- *AI & Robotics*

Isaac Asimov's *I, Robot* is published. Perhaps in reaction to earlier dangerous fictional robots, Asimov's creations must obey the "Three Laws of Robotics" (1941) to assure they are no threat to humans or each other. The book consisted of nine science fiction short stories.



ERA founders with various magnetic drum memories

Magnetic drum memory

- *Memory & Storage*

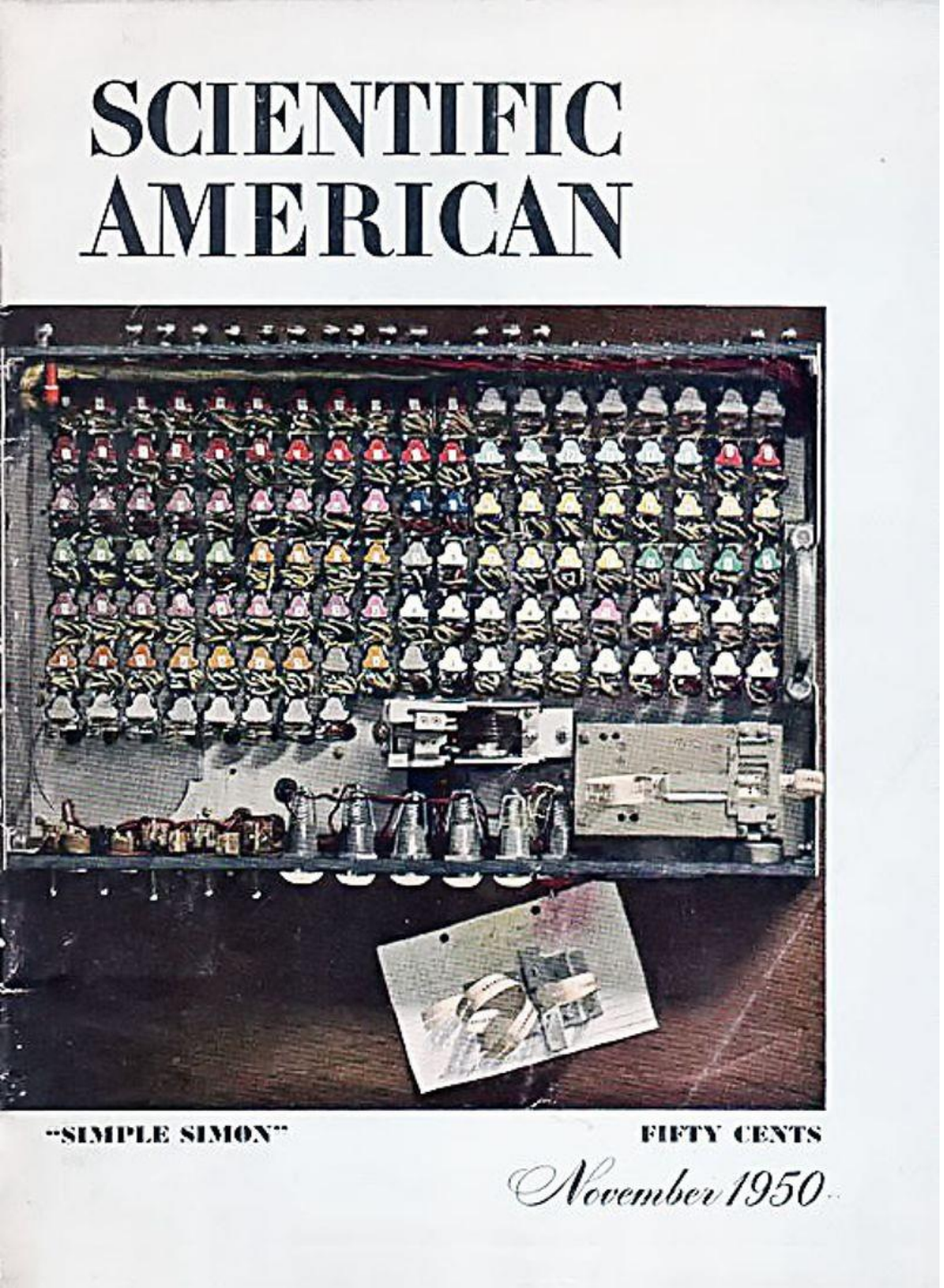
Eager to enhance America's codebreaking capabilities, the US Navy contracts with Engineering Research Associates (ERA) for a stored program computer. The result was Atlas, completed in 1950. Atlas used magnetic drum memory, which stored information on the outside of a rotating cylinder coated with ferromagnetic material and circled by read/write heads in fixed positions. ERA successfully sold a commercial version of the Atlas, the ERA 1103.

Pilot ACE

NPL Pilot ACE completed

- *Computers*

Based on ideas from Alan Turing, Britain´s Pilot ACE computer is constructed at the National Physical Laboratory. "We are trying to build a machine to do all kinds of different things simply by programming rather than by the addition of extra apparatus," Turing said at a symposium on large-scale digital calculating machinery in 1947 in Cambridge, Massachusetts. The design packed 800 vacuum tubes into a relatively compact 12 square feet.



Plans to build the Simon 1 relay logic machine are published

- *Computers*

The hobbyist magazine *Radio Electronics* publishes Edmund Berkeley's design for the Simon 1 relay computer from 1950 to 1951. The Simon 1 used relay logic and cost about $600 to build. In his book *Giant Brains*, Berkeley noted - "We shall now consider how we can design a very simple machine that will think. Let us call it Simon, because of its predecessor, Simple Simon... Simon is so simple and so small in fact that it could be built to fill up less space than a grocery-store box; about four cubic feet."

SEAC and SWAC completed

Computers

The Standards Eastern Automatic Computer (SEAC) is among the first stored program computers completed in the United States. It was built in Washington DC as a test-bed for evaluating components and systems as well as for setting computer standards. It was also one of the first computers to use all-diode logic, a technology more reliable than vacuum tubes. The world's first scanned image was made on SEAC by engineer Russell Kirsch in 1957.

The NBS also built the Standards Western Automatic Computer (SWAC) at the Institute for Numerical Analysis on the UCLA campus. Rather than testing components like the SEAC, the SWAC was built using already-developed technology. SWAC was used to solve problems in numerical analysis, including developing climate models and discovering five previously unknown Mersenne prime numbers.

Spooling & Buffering

Magnetic media

Computer

Spooling

Buffer

Program

Data

•Data
•Program

Printer

1960 : 3rd Computer Era

Multi-programming

- Time sharing/Time slice
- Multi-programming
- Multi- users
- Realtime

- Super computer
- Mainframe
- Mini-computer

Terminal

- Micro-computer
- Personal computer

Participants in COBOL's 25th Anniversary Celebration at The Computer Museum on May 16, 1985, surround the COBOL Tombstone, a gift in 1960 from Howard Bromberg (far right) to the COBOL Committee."

COBOL (Common Business-Oriented Language)

- *Software & Languages*

A team drawn from several computer manufacturers and the Pentagon develop COBOL—an acronym for Common Business-Oriented Language. Many of its specifications borrow heavily from the earlier FLOW-MATIC language. Designed for business use, early COBOL efforts aimed for easy readability of computer programs and as much machine independence as possible. Designers hoped a COBOL program would run on any computer for which a compiler existed with only minimal modifications.

Howard Bromberg, an impatient member of the committee in charge of creating COBOL, had this tombstone made out of fear that the language had no future. However, COBOL survives to this day. A study in 1997 estimated that over 200 billion lines of COBOL code was still in existence, accounting for 80% of all business software code.

Ed Fredkin at DEC PDP-1

DEC PDP-1 introduced

- *Computers*

The typical PDP-1 computer system, which sells for about $120,000, includes a cathode ray tube graphic display, paper tape input/output, needs no air conditioning and requires only one operator; all of which become standards for minicomputers. Its large scope intrigued early hackers at MIT, who wrote the first computerized video game, *SpaceWar!*, as well as programs to play music. More than 50 PDP-1s were sold.

NEAC 2203 transistorized computer

NEAC 2203 goes online

Computers

An early transistorized computer, the NEAC (Nippon Electric Automatic Computer) includes a CPU, console, paper tape reader and punch, printer and magnetic tape units. It was sold exclusively in Japan, but could process alphabetic and Japanese kana characters. Only about thirty NEACs were sold. It managed Japan's first on-line, real-time reservation system for Kinki Nippon Railways in 1960. The last one was decommissioned in 1979.

Quicksort algorithm

- *AI & Robotics*

While studying machine translation of languages in Moscow, C. A. R. Hoare develops Quicksort, an algorithm that would become one of the most used sorting methods in the world. Later, Hoare went to work for the British computer company Elliott Brothers, where he designed the first commercial Algol 60 compiler. Queen Elizabeth II knighted C.A.R. Hoare in 2000.

Gene Amdahl with 470V/6 model

Amdahl Corporation introduces the Amdahl 470

- *Computers*

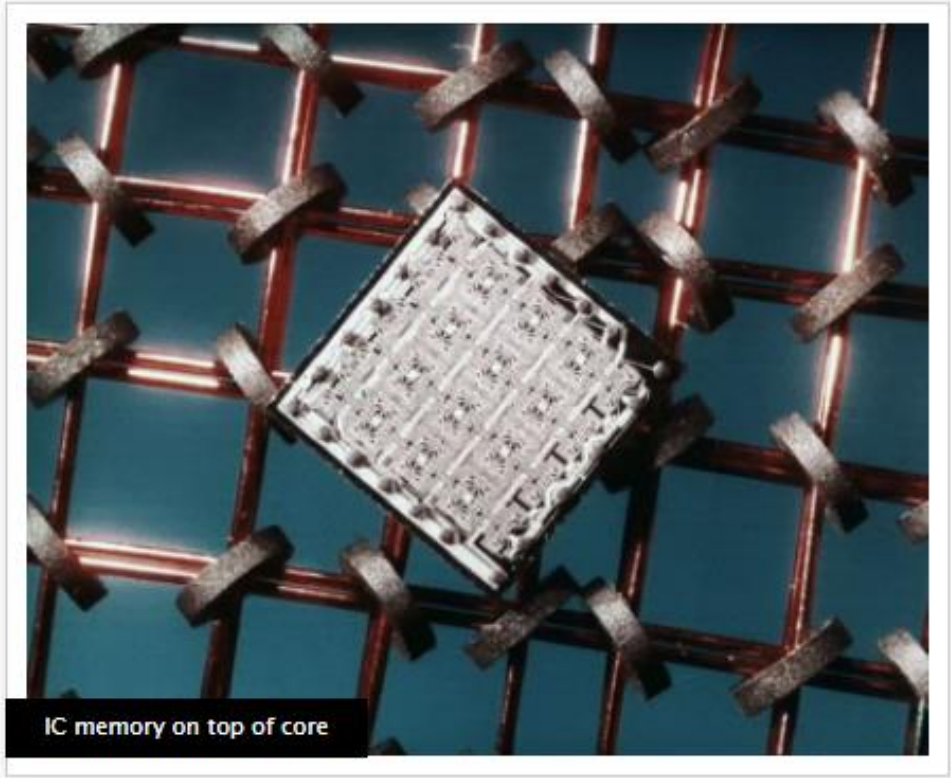
Gene Amdahl, father of the IBM System/360, starts his own company, Amdahl Corporation, to compete with IBM in mainframe computer systems. The 470V/6 was the company's first product and ran the same software as IBM System/370 computers but cost less and was smaller and faster.

Tillie the Teller, Wells Fargo Bank

Banking Automation Reaches the Customer

- *Networking & The Web*

The ERMA system had revolutionized behind-the-scenes check processing in the 1950s, spawning the funny letters still at the bottom of checks today. During the 1960s researchers in various countries have been working on bringing automation – and online transactions – to customers in the form of an Automated Teller Machine (ATM). Barclay's Bank in the UK has likely been the first to put one in operation, in 1967. By decade's end many systems are up or being planned in Europe and North America. The paper used by some of the first ATMs is slightly radioactive, to be machine readable. The 1970s will also see rapid growth in behind-the-scenes financial transaction networks, like SWIFT for wire transfers.



IC memory on top of core

First IBM computer to use semiconductor memory

- *Memory & Storage*

In a departure from using magnetic core memory technology, IBM introduces the System 370 Model 145 mainframe computer, the company's first all-semiconductor memory computer. The Model 145 could store an equivalent amount of data in half the space, compared to a computer using core memory.

Pascal is introduced

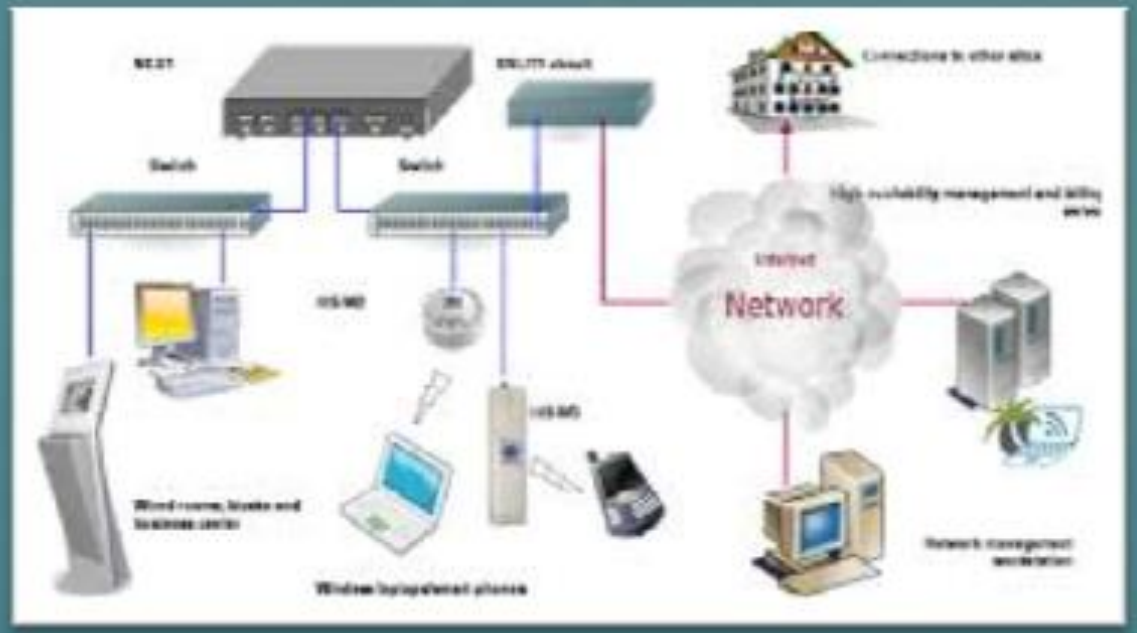
Software & Languages

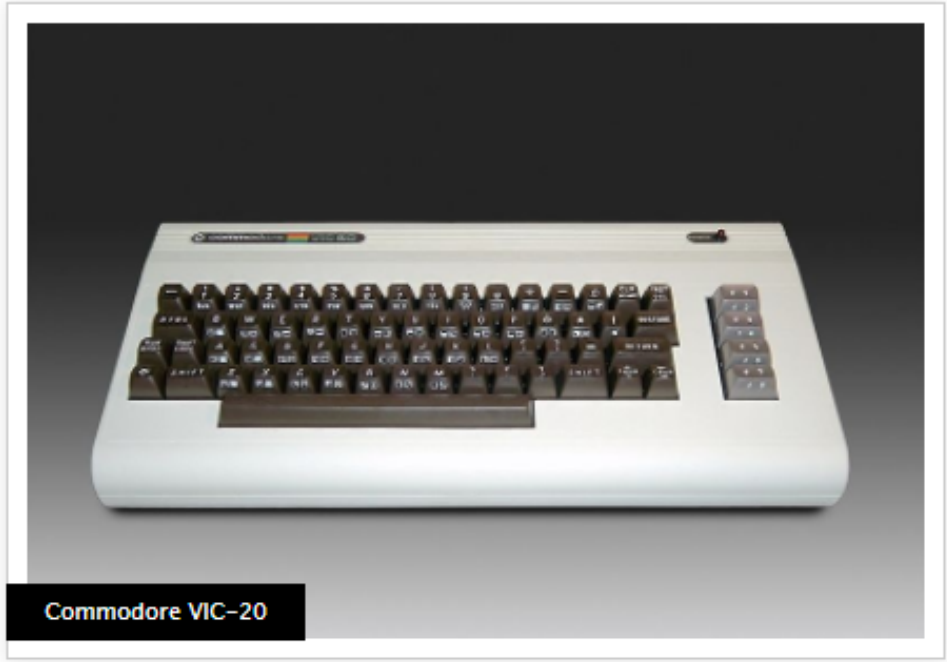
The Pascal programming language, named after Blaise Pascal, a French physicist, mathematician and inventor turned philosopher, is introduced by Professor Niklaus Wirth. His aim with Pascal was to develop a programming language applicable to both commercial and scientific applications, and which could also be used to teach programming techniques to college students. It was closely based on ALGOL 60, which Wirth had also helped to develop.

1980 : 4th Computer Era

Network system

- Networking
- Internet
- Online
- Cloud services
- E-business
- Multi-media



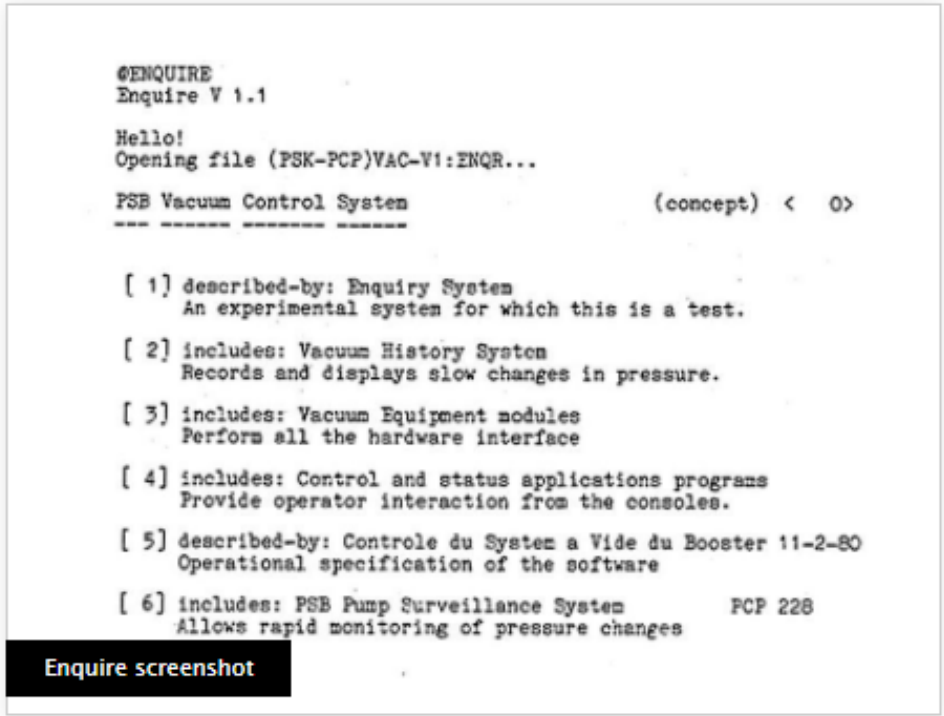


Commodore VIC-20

Commodore introduces the VIC-20

Computers

Commodore releases the VIC-20 home computer as the successor to the Commodore PET personal computer. Intended to be a less expensive alternative to the PET, the VIC-20 was highly successful, becoming the first computer to sell more than a million units. Commodore even used Star Trek television star William Shatner in advertisements.



Enquire screenshot

Enquire

- *Networking & The Web*

In 1980 Tim Berners-Lee at the CERN physics laboratory creates Enquire, a networked hypertext system used for project management but with far greater ambitions. It seeks to categorize hyperlinks in a way that can be read by computers as well as people. He later claims he hadn't been aware of earlier hypertext work at the time, so it may be an independent reinvention. He names the program after a Victorian advice book and encyclopedia he had loved as a child, *Enquire Within (about Everything)." Berners-Lee will go on to invent the World Wide Web, partly based on Enquire.

ST506 5MB HDD

Seagate ST506 hard disk drive

- *Memory & Storage*

Seagate Technology creates the first hard disk drive for microcomputers, the ST506. The disk held 5 megabytes of data, five times as much as a standard floppy disk, and fit in the space of a floppy disk drive. The hard disk drive itself was a rigid metallic platter coated on both sides with a thin layer of magnetic material that stores digital data.

Seagate Technology grew out of a 1979 conversation between Alan Shugart and Finis Conner, who had worked together at Memorex. The two men decided to found the company after developing the idea of scaling down a hard disk drive to the same size as the then-standard 5 ¼-inch floppies. Upon releasing its first product, Seagate quickly drew such big-name customers as Apple Computer and IBM. Within a few years, it sold 4 million units.

Sinclair ZX80

The Sinclair ZX80 introduced

Computers

This very small home computer is available in the UK as a kit for £79 or pre-assembled for £99. Inside was a Z80 microprocessor and a built-in BASIC language interpreter. Output was displayed on the user's home TV screen through use of an adapter. About 50,000 were sold in Britain, primarily to hobbyists, and initially there was a long waiting list for the system.

Computer System

- Hardware
- Software
- Peopleware
- .....

Computer hardware

- CPU
- Ram
- I/O devices
- .....

Computer platform?

Computer software (program)

Computer System

- Hardware
- Software
- Peopleware
- .....

- **System software**
  - OS
  - Driver
- **Application software**
  - Word processing => Word
  - Spread sheet => Excel
  - Presentation => Powerpoint
  - Database management => Access, Oracle
  - Graphic design => Photoshop
  - Animation => Animaker, Maya
  - Create Web => Dreamweaver, Wordpress
  - Create App => Corona SDK
  - .....

All softwares created by Computer languages

Computer System

- Hardware
- Software
- Peopleware
- .....

Peopleware

- Engineer
- System analyst
- Programmer
- Operator

Computer language

Computer System

- Hardware
- Software
- Peopleware
- .....

- Assembly
- Visual Basic
- C, C++, C#
- JAVA
- Python
- R
- SQL

Natural language ???

Data storage & processing

- File
- Database
- Data warehouse
- Data mining
- Big data
- Cloud storage
- Cloud computing

Communication

- 5G > 6G
- Internet > IOT (Internet of things)

The evolution of our cellular connection

1G

2G

3G

4G

5G

AI (Artificial Intelligence)

- Natural language
- Robot
- Machine Learning
- Expert system

Trend of digital technology

- Computer hardware
- Data processing
- Communication
- Artificial Intelligence (AI)