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PEMROGRAMAN KOMPUTER

Sejarah Komputer

Pemrograman Komputer 2

1. PENDAHULUAN & SEJARAH ...

1. Sejarah Menghitung
 - ◆ Mekanisasi aritmetika
 - ◆ Konsep simpan program
 - ◆ Komputer mekanis
 - ◆ Komputer elektronis awal
 - ◆ Komputer modern
 - ◆ Perangkat lunak komputer

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Pemrograman Komputer

• Mekanisasi aritmetika

Peradaban manusia kuno telah menggunakan alat-alat bantu hitung mekanis:

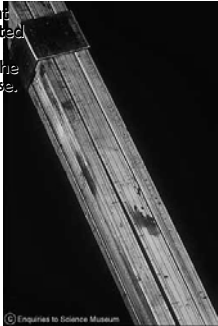
- ◆ Abacus (sempoa – Cina)
- ◆ Stonehenge – Inggris
- ◆ Quipus – Suku Indian Inca di Amerika Selatan
- ◆ Napier's bones, Tabel logaritma – John Napier (Scottish)
- ◆ Mistar hitung
- ◆ Pascal's adder – Blaise Pascal (1623-1662)
- ◆ Mesin Leibniz – Gottfried Wilhelm von Leibniz (1646-1716)

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Slide Rule by Robert Bissaker 1654

- This is the earliest-known dated straight slide rule. When logarithms were invented in 1614 they stimulated new designs of instrument to exploit their usefulness. The slide rule was the most enduring of these. Introduced in a circular form in 1622, it survived as a tool of engineers and scientists until the 1970s.
- The use of logarithmic scales reduces multiplication and division to addition and subtraction respectively. Bissaker worked in Radcliffe, now east London, specialising in wooden instruments for seamen and navigators.

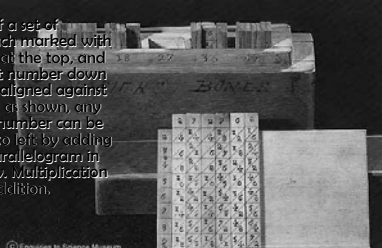


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Napier's Bones 1690

- John Napier, the inventor of logarithms, also invented this aid to calculation known as 'Napier's Bones' in 1617.
- The 'bones' consist of a set of rectangular rods, each marked with a counting number at the top, and the multiples of that number down their lengths. When aligned against the row of multiples as shown, any multiple of the top number can be read off from right to left by adding the digits in each parallelogram in the appropriate row. Multiplication is thus reduced to addition.



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• Konsep simpan program

- Satu contoh populer dari konsep ini diciptakan oleh seorang Perancis Joseph Marie Jacquard (1752-1834), untuk mengontrol mesin tenun secara otomatis
- Program ini berupa lempengan baja berlubang untuk memosisikan benang dalam proses tenun
- Mesin tenun semacam ini masih digunakan sampai sekarang dan dikontrol dengan program yang disimpan di disket, bukan dengan lempeng baja lagi.

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- **Komputer mekanis ...**
 - Kedua hal di atas yaitu mekanisasi aritmetika dan simpan program dikombinasikan oleh Charles Babbage (1792-1871) – Inggris
 - Pada 1822, dia mulai membuat “Difference Engine” yang digunakan untuk menghitung polinomial untuk persiapan membuat tabel matematik
 - Mesin ini digunakan pula dalam aplikasi kemiliteran.

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Pemrograman Komputer

- **... Komputer mekanis**
 - Babbage menciptakan mesin kedua yang lebih canggih disebut “Analytical Engine”
 - Mesin ini mempunyai beberapa komponen khusus yang diciptakan untuk bekerja sama
 - ◆ bagian “mesin” mengerjakan hitungan aritmatika
 - ◆ bagian “penyimpan” digunakan untuk menyimpan data dan hasil-hasil antara
 - ◆ bagian “lain” diciptakan untuk input dan output, serta untuk transfer informasi antar bagian mesin
 - Mesin ini dioperasikan secara otomatis dengan “punch card.”

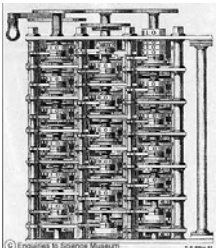
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Babbage's Calculating Engine; 1832-71

- Charles Babbage's calculating engines are among the most celebrated icons in the prehistory of computing. His Difference Engine No. 1 was the first successful automatic calculator and remains one of the finest examples of precision engineering of the time.
- The portion shown was assembled in 1832 by Babbage's engineer, Joseph Clement. It consists of about 2000 parts and represents one-seventh of the complete engine. This 'finished portion' of the unfinished engine' was demonstrated to some acclaim by Babbage, and functions impeccably to this day. The engine was never completed and most of the 12 000 parts manufactured were later melted for scrap.




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Manchester Differential Analyser 1935

- The Manchester Differential Analyser is an analogue computer designed to solve a class of mathematical functions called differential equations. This machine was built by the Metropolitan-Vickers Electrical Company and completed in 1935 for the Physics Department at Manchester University.
- The machine was based on an American design, powered by electric motors, and uses mechanical components to model mathematical relationships. The central device is a disc-and-wheel device integrator which performs mathematical integration.




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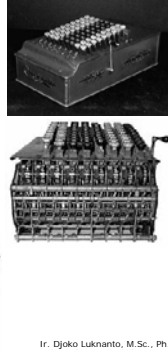
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Mesin Hitung (Comptometer)



- **The Comptometer is a remarkable achievement of the Victorian era when the economic of Europe and America were exploiting the industrial opportunities; provided by the arrival of interchangeable parts.**



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- **... Komputer mekanis**
 - di Amerika Serikat, Herman Hollerith, matematikawan dari Biro Sensus menciptakan mesin penghitung Sensus Penduduk 1890, yang dikontrol dengan “punch card”
 - sensor elektronik digunakan untuk intepretasi informasi yang ada dalam “punch card”
 - di tahun 1896, keluar dari Biro Sensus, dan membentuk International Business Machine Corporation (IBM)

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Mesin Hollerith

1890 Census Bureau selects Hollerith tabulator


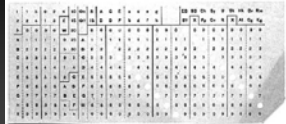
The U.S. Census Bureau adopts the Hollerith Punch Card, Tabulating Machine and Sorter to compile results of the 1890 census, reducing an almost-ten-year process to two and a half years and saving \$5 million. Inventor Herman Hollerith, a Census Bureau statistician, forms the Tabulating Machine Company in 1896. Tabulators and sorters become the main source of business for the combined Computing-Tabulating-Recording Co., and later, IBM.

(c) IBM

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Hollerith Punch Card

- Hollerith's punch cards and tabulating machines were a step toward automated computation. His device could automatically read information which had been punched onto card. He got the idea, and then saw Jacquard's punchcard. Punch card technology was used in computers up until the late 1970s. Computer "punched cards" were read electronically, the cards moved between brass rods, and the holes in the cards, created a electric current where the rods would touch.

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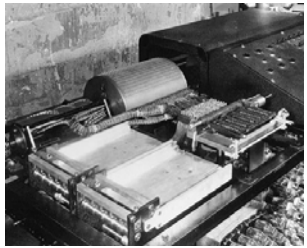
- ... Komputer mekanis**
 - perkembangan alat hitung di Amerika Serikat pesat sekali.
 - para pioneer di bidang ini adalah Howard Aiken, John Atanasoff, J.P. Eckert, J.W. Mauchly, dan John von Neumann
 - Mengulang pekerjaan Babbage, Aiken merancang suatu sistem yang terdiri dari beberapa calculator mekanis yang bekerja bersama.
 - pekerjaan ini didukung oleh IBM, sehingga tercipta komputer elektromekanis yang pertama yaitu Mark I (1944)

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Atanasoff-Berry Computer

- John Vincent Atanasoff and the Birth of the Digital Computer**
The Atanasoff-Berry Computer was the world's first electronic digital computer. It was built by John Vincent Atanasoff and Clifford Berry at Iowa State University during 1937-42.



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IBM Mark I

1944 Mark I, IBM's first large-scale calculating computer

Developed in cooperation with Harvard University, the Automatic Sequence Controlled Calculator, or Mark I, is the first machine to execute long computations automatically. More than 50 feet long, eight feet high, and weighing almost five tons, the Mark I uses electromechanical relays to solve addition problems in less than a second. It takes about six seconds for multiplication, and twice as long for division -- far slower than any pocket calculator today.

(c) IBM

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- Komputer elektronis awal**
 - komputer elektronis paling awal diciptakan oleh John Atanasoff di Iowa State Univ. (1939, 1942)
 - komputer elektronis awal yang paling terkenal adalah ENIAC (Electronic Numerical Integrator and Computer) dibangun pada tahun 1946 oleh J.P. Eckert, J.W. Mauchly dari Univ. of Pennsylvania
 - ENIAC merupakan komputer yang besar sekali terdiri atas 18.000 tabung vakum dan 1.500 relay, serta membutuhkan ruangan ukuran 10x20 m².

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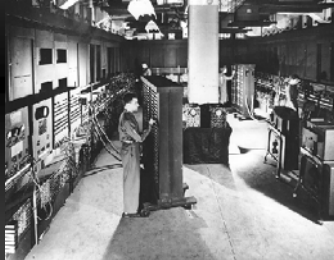
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- ... Komputer elektronis awal ...
 - ENIAC dapat menghitung perkalian dengan kecepatan 1.000 kali Mark I
 - Aplikasi dari ENIAC sangat terbatas saat itu yaitu untuk menghitung tabel dan gerak parabola dari pelbagai jenis meriam tembak
 - Eckert-Mauchly keluar dari UP untuk membuat perusahaan yang kemudian membuat UNIVAC (Universal Automatic Computer)
 - Komputer pertama kali dirancang untuk aplikasi "science and business" dan diproduksi secara komersial.

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ENIAC 1946




- The ENIAC machine occupied a room thirty by fifty feet. The controls are at the left, and a small part of the output device is seen at the right. The two men in uniform were being trained to maintain the machine after it was turned over to the Ordnance Department (which sponsored the development of the ENIAC). The two women were assistants on the staff of the Moore School who helped program the ENIAC.

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UNIVAC 1951



- **The first UNIVAC computer** was delivered to the Census Bureau in June 1951. Unlike the ENIAC, the UNIVAC processed each digit serially. But its much higher design speed permitted it to add two ten-digit numbers at a rate of almost 100,000 additions per second. Internally, the UNIVAC operated at a clock frequency of 2.25 MHz, which was no mean feat for vacuum tube circuits.

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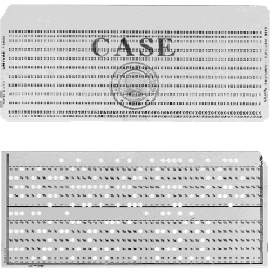
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- ... Komputer elektronis awal ...
 - Program yang mengontrol ENIAC dibuat dengan cara mengubah kabel-kabel yang ada didalamnya
 - Proses ini sangat rumit dan menghabiskan waktu, kadang dibutuhkan beberapa orang dan beberapa hari untuk mengubah kabel-kabel tsb. Selama itu pula komputer tidak bisa dimanfaatkan
 - Pada masa itu, perintah komputer disimpan di luar komputer berupa "punch card" atau media lain, dan diproses komputer satu per satu untuk diterjemahkan komputer dan dieksekusi.

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Punc Card Gallery



- **Case Institute of Technology Computing Center**
These cards were sold at the main office of the Andrew R. Jennings Computing Center of the Case Institute of Technology, and a generation punched their first programs onto them, usually written in Algol for the **Case UNIVAC 1107**.
- **90 Column Cards**
In the electromechanical tabulator era, long before electronic computers, IBM locked up Herman Hollerith's patents on the punch card.

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- ... Komputer elektronis awal ...
 - Sebuah konsep baru dikenalkan oleh matematikawan Princeton, John von Neumann, perintah komputer disimpan didalam komputer itu sendiri
 - Konsep ini membutuhkan waktu lebih cepat, dan komputer dapat mengubah perintah itu sendiri, karena perintah tersebut tersimpan didalam komputer
 - Konsep ini yang akhirnya digunakan sampai sekarang.

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● Komputer modern ...

- Beberapa generasi komputer dapat dibedakan dari komponen pembentuknya:
 - ◆ Generasi 1: ENIAC–1946 dan UNIVAC, menggunakan tabung vakum
 - ◆ Generasi 2: IBM 7090 (1958-1965), PDP-8 minikomputer (1963) menggunakan tabung vakum dan transistor
 - ◆ Generasi 3: IBM System/360 (1964), menggunakan IC (integrated circuit)
 - ◆ Generasi 4: menggunakan VLSI (very large-scale integrated circuit)

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The Digital Equipment Corporation PDP-8, 1965




- In 1957, Ken Olsen and Harlan Anderson founded a company called Digital Equipment Corporation (DEC) with the goal of manufacturing and selling high-speed digital circuits. By 1959, the company was well established, and it introduced its first computer, the PDP-1 (The letters stood for "Programmed Data Processor"). The PDP-1 incorporated some of the engineering advances that would later characterize minicomputers, especially in its internal design and attractive packaging.

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IBM System/360



1964
System/360

The computer industry is transformed by this first compatible "family" of computers. Fortune magazine dubs it "Tom Watson Jr.'s \$5 billion gamble." Software and peripherals work virtually interchangeably. Customers can choose from five processors and 19 combinations of power, speed and memory. By the end of the decade, System/360 computers are used in all parts of the world.

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Pemrograman Komputer 28


● ... Komputer modern ...

- Sebuah chip silikon VLSI setara dengan ribuan transistor.
- Salah satu perintis pengembangan transistor Robert Noyce, adalah salah satu pendiri Intel Corporation, yang mengenalkan mikroprosesor 4004 pada tahun 1971
- Pada 1977, salah satu komputer pribadi paling populer, Apple II, diciptakan di garasi oleh oleh Steven Jobs (21 th) dan Steve Wozniak (26 th), pendiri Apple Computer Company
- Pada 1981, IBM membuat komputer pribadi yang pertama IBM's PCs.

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Apple II 1977




- Built in 1977, the Apple II was based on Wozniak's Apple I design, but with several additions. The first was the design of a plastic case--a rarity at the time--which was painted beige. The second was the ability to display color graphics--a holy grail in the industry. The Apple II also included a larger ROM, more expandable RAM (4K to start), and 8 expansion slots. It had integer BASIC hard-coded on the ROM for easier programming, and included two game paddles and a demo cassette for \$1,298. In early 1978 Apple also released a disk drive for the machine, one of the most inexpensive available. The Apple II remained on the Apple product list until 1980. It was also repackaged in a black case and sold to educational markets by Bell & Howell.

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Radio Shack TRS-80, 1977



- ... Eventually the company relented and in the summer of 1977 introduced the TRS-80, at a base price of only \$400. It was indeed a complete machine, although the base model had only 4K bytes of memory and could not handle lowercase letters. One could expand its storage and input/output by purchasing an Expansion Interface at additional cost. But it did work as advertised, and the TRS-80 easily met Tandy's sales projections. The company soon introduced advanced models with more internal memory and disk drives instead of cassettes for entering programs.

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1981 IBM PC

IBM



1981 IBM PC

Although it enters an already-crowded field, the IBM PC, or Personal Computer, becomes an overnight sensation. In the first year and a half, 136,000 IBM PCs are sold. For the first time, IBM uses outside distributors, including Sears, Roebuck & Co. and ComputerLand to sell its products. Also for the first time, IBM builds a product made almost entirely from other companies' components, such as the 8088 processor from Intel and the Disk Operating System from Microsoft. The PC is equipped with 16 kilobytes of memory expandable to 256k, and one or two 160k floppy disk drives. Optional equipment includes a printer and color monitor. Prices start at \$1,565. The popularity of the PC spawns successors from IBM, including the PCjr, XT and AT, and a whole industry of clone computers classified as "IBM-compatible."

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