COM1013
INTRODUCTION TO COMPUTER SCIENCE

Lecturer: Begüm MUTLU BİLGE, PhD

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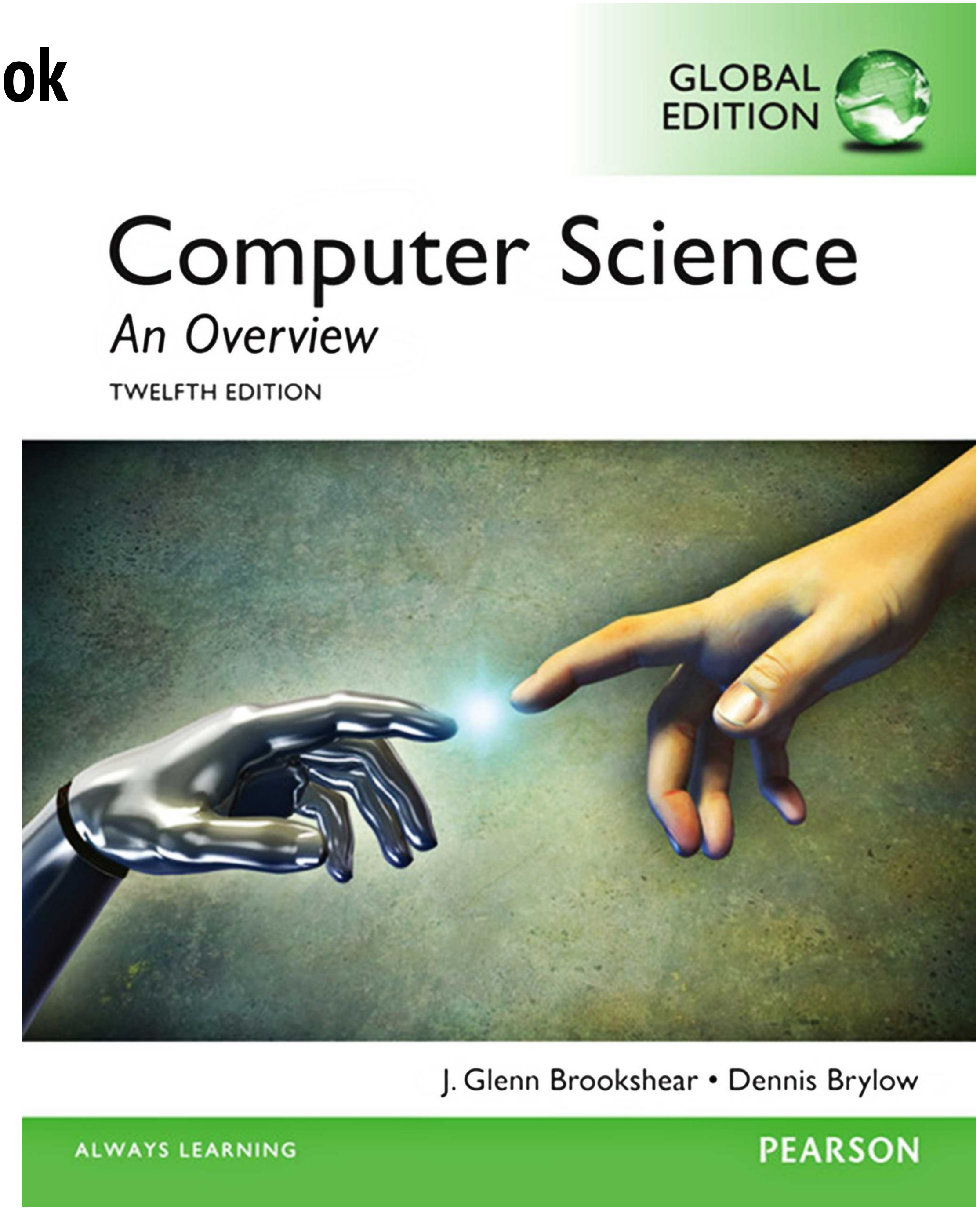
COM1013 Overview

1. Introduction
2. Data Storage
3. Data Manipulation
4. Operating Systems
5. Networking and the Internet
6. Algorithms
7. Programming Languages
8. Software Engineering
9. Data Abstractions
10. Database Systems
11. Computer Graphics
12. Artificial Intelligence
13. Theory of Computation

Course Book


GLOBAL
EDITION
Computer Science
An Overview
TWELFTH EDITION
J. Glenn Brookshear • Dennis Brylow
ALWAYS LEARNING
PEARSON

Google Classroom

bzkbk7e

Assessment Plan

	Numbers	Total Weighting (%)
Midterm Exam	1	15
Assignment	[5-10]	5
Research Project	1	15
Quiz	0	0
Final Exam	1	60
Attendance	14	5
Percent of in-term studies (%)		**40**
Percentage of final exam to total score (%)		**60**

Assessment Plan

Score	Letter Grade	Coefficient
90-100	A	4.00
85-89	B1	3.50
80-84	B2	3.25
75-79	B3	3.00
70-74	C1	2.75
65-69	C2	2.50
60-64	C3	2.00
50-59	F1	1.50
49 and less	F2	0.00
	F3	0.00
	F4	0.00

Exams

Midterm and Final Exams are scheduled by the Computer Engineering Department.

Face-to-face exams

Assignments

Reading assignments will be given during lecture.

They must be hand-delivered at **the next week's lecture**.

They should summarize the given chapter in at most **2 pages (in 1 paper)**.

They should be **handwritten**.

- Just to be sure you involve the process even if you accidentally use LLMs. :)

The template for reading assignments:

https://docs.google.com/document/d/1i1tU3AdIvPgRxqzGmXrsnVVCRXws5V3caDTCPMbPJ_0/edit?usp=sharing

Project (Research)

Teams of 3 or 4 students

- Team members will be randomly assigned by lecturer
- A team leader will be selected by team members

Each team will have 3 weeks for prepare their project

- The theme of the research project will be given by lecturer three weeks in advance
- The team will conduct research on
  - The general information related to the research topic
  - Current developments,
  - State-of-the-art analysis
  - Challenges in the field, etc.

Project (Research)

- The findings of the research will be presented as
  - A project presentation (.pptx)
  - A project report (.pdf)
- Presentations will be in class.
  - 10 minutes per each group.
- Each group will submit these documents at the end of their presentation week.
  - Submission will be done by the team lead.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Grasp Computer Science Fundamentals: Understand core principles and foundational concepts.
- Explore Computing History and Evolution: Trace the historical development of computing.
- Learn Programming Fundamentals: Develop basic programming skills and problem-solving abilities.
- Discover Data Structures and Algorithms: Understand fundamental data structures and algorithms.
- Examine Operating Systems: Gain insight into the role and functioning of operating systems.
- Dive into Networking and the Internet: Explore computer networking and internet architecture.
- Appreciate Ethical and Social Implications: Analyze ethical and societal issues in computer science.

CHAPTER

0

Introduction

In this preliminary chapter we consider the scope of computer science, develop a historical perspective, and establish a foundation from which to launch our study.

Computer Science

Computer science is the discipline that seeks to build a scientific foundation for such topics as

- computer design,
- computer programming,
- information processing,
- algorithmic solutions of problems, and
- the algorithmic process itself.

The Role of Algorithms

An **algorithm** is a set of steps that defines how a task is performed.

A representation of an algorithm is called a **program**.

The process of developing a program, encoding it in machine-compatible form, and inserting it into a machine is called **programming**.

Programs → Software

Machine itself → Hardware

Effect: The performer places some cards from a normal deck of playing cards face down on a table and mixes them thoroughly while spreading them out on the table. Then, as the audience requests either red or black cards, the performer turns over cards of the requested color.

Secret and Patter:

Step 1. From a normal deck of cards, select ten red cards and ten black cards. Deal these cards face up in two piles on the table according to color.

Step 2. Announce that you have selected some red cards and some black cards.

Step 3. Pick up the red cards. Under the pretense of aligning them into a small deck, hold them face down in your left hand and, with the thumb and first finger of your right hand, pull back on each end of the deck so that each card is given a slightly *backward* curve. Then place the deck of red cards face down on the table as you say, "Here are the red cards in this stack."

Step 4. Pick up the black cards. In a manner similar to that in step 3, give these cards a slight *forward* curve. Then return these cards to the table in a face-down deck as you say, "And here are the black cards in this stack."

Step 5. Immediately after returning the black cards to the table, use both hands to mix the red and black cards (still face down) as you spread them out on the tabletop. Explain that you are thoroughly mixing the cards.

Step 6. As long as there are face-down cards on the table, repeatedly execute the following steps:

6.1. Ask the audience to request either a red or a black card.

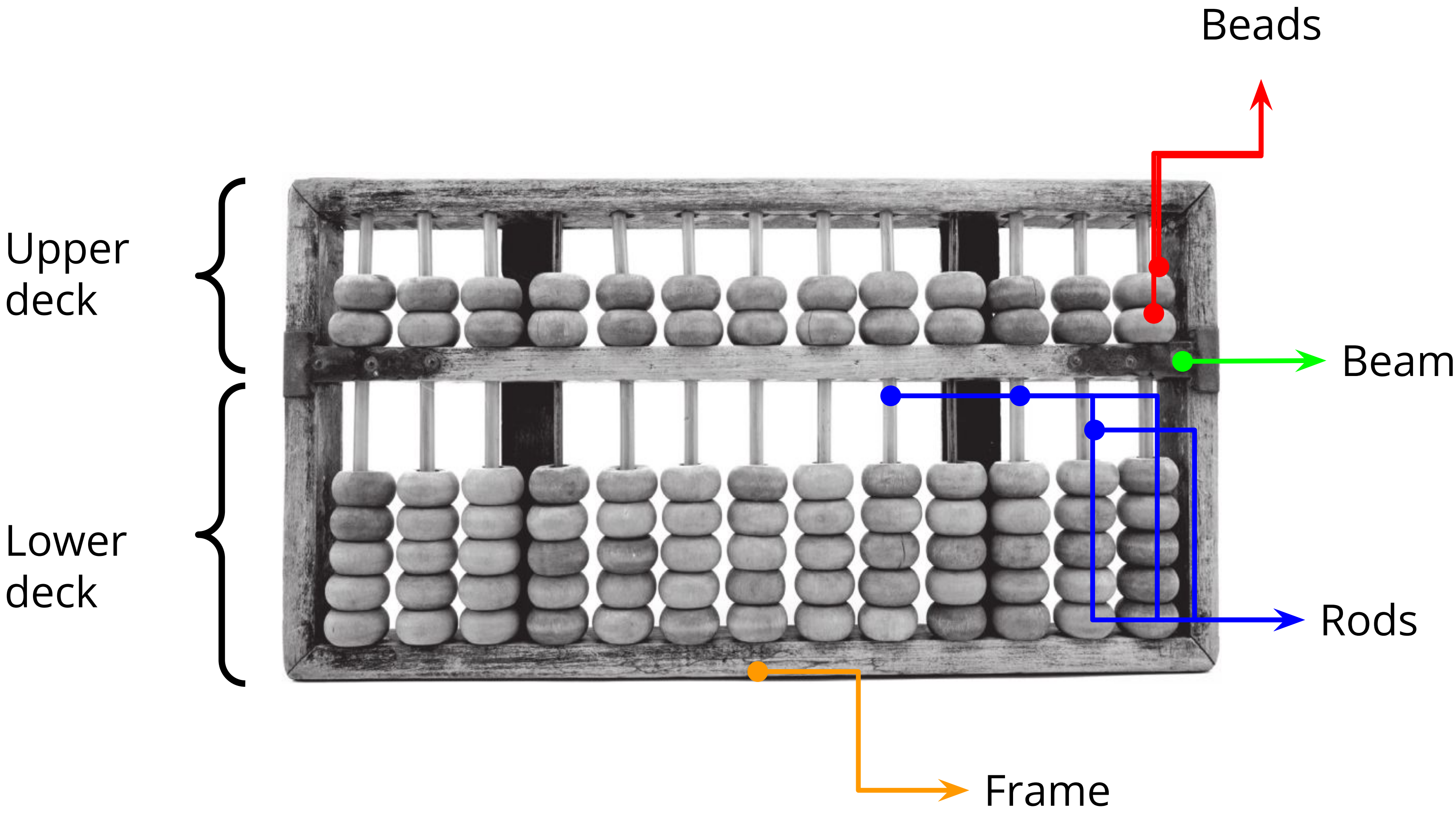
6.2. If the color requested is red and there is a face-down card with a concave appearance, turn over such a card while saying, "Here is a red card."

6.3. If the color requested is black and there is a face-down card with a convex appearance, turn over such a card while saying, "Here is a black card."

6.4. Otherwise, state that there are no more cards of the requested color and turn over the remaining cards to prove your claim.

Figure 0.1. An algorithm of a magic trick.

The History of Computing



The History of Computing

After the Middle Ages and before the Modern Era, the quest for more sophisticated computing machines was seeded

A few inventors began to experiment with the technology of gears.

Blaise Pascal

(1623–1662)

France,

Gottfried Wilhelm Leibniz

(1646–1716)

Germany,

Charles Babbage

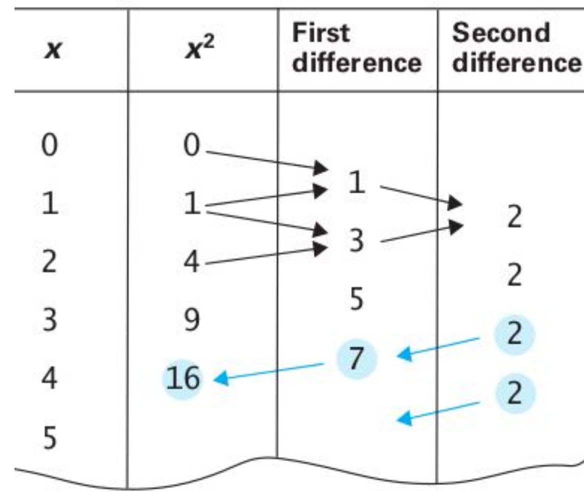
(1792–1871)

England.

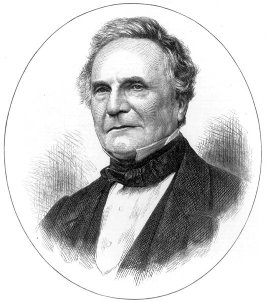
The History of Computing

Babbage's Difference Engine

The machines designed by Charles Babbage were truly the forerunners of modern computer design. If technology had been able to produce his machines in an economically feasible manner and if the data processing demands of commerce and government had been on the scale of today's requirements, Babbage's ideas could have led to a computer revolution in the 1800s. As it was, only a demonstration model of his Difference Engine was constructed in his lifetime. This machine determined numerical values by computing "successive differences." We can gain an insight to this technique by considering the problem of computing the squares of the integers. We begin with the knowledge that the square of 0 is 0, the square of 1 is 1, the square of 2 is 4, and the square of 3 is 9. With this, we can determine the square of 4 in the following manner (see the following diagram). We first compute the differences of the squares we already know: $1^2 - 0^2 = 1$, $2^2 - 1^2 = 3$, and $3^2 - 2^2 = 5$. Then we compute the differences of these results: $3 - 1 = 2$, and $5 - 3 = 2$. Note that these differences are both 2. Assuming that this consistency continues (mathematics can show that it does), we conclude that the difference between the value $(4^2 - 3^2)$ and the value $(3^2 - 2^2)$ must also be 2. Hence $(4^2 - 3^2)$ must be 2 greater than $(3^2 - 2^2)$, so $4^2 - 3^2 = 7$ and thus $4^2 = 3^2 + 7 = 16$. Now that we know the square of 4, we could continue our procedure to compute the square of 5 based on the values of 1^2, 2^2, 3^2, and 4^2. (Although a more in–depth discussion of successive differences is beyond the scope of our current study, students of calculus may wish to observe that the preceding example is based on the fact that the derivative of $y = x^2$ is a straight line with a slope of 2.)

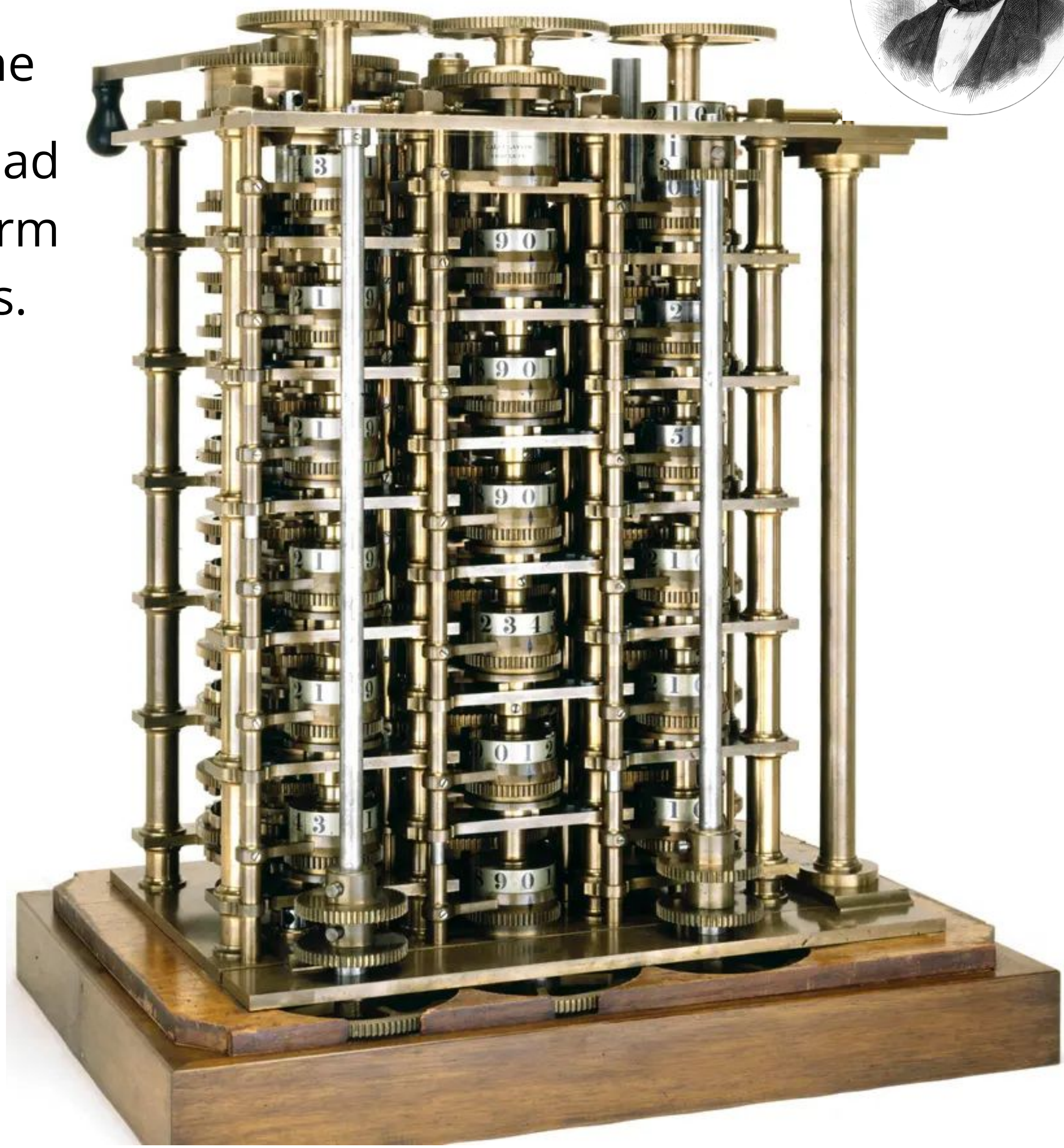


The History of Computing



Babbage’s Analytical Engine

- Designed to read instructions in the form of holes in paper cards.



The History of Computing

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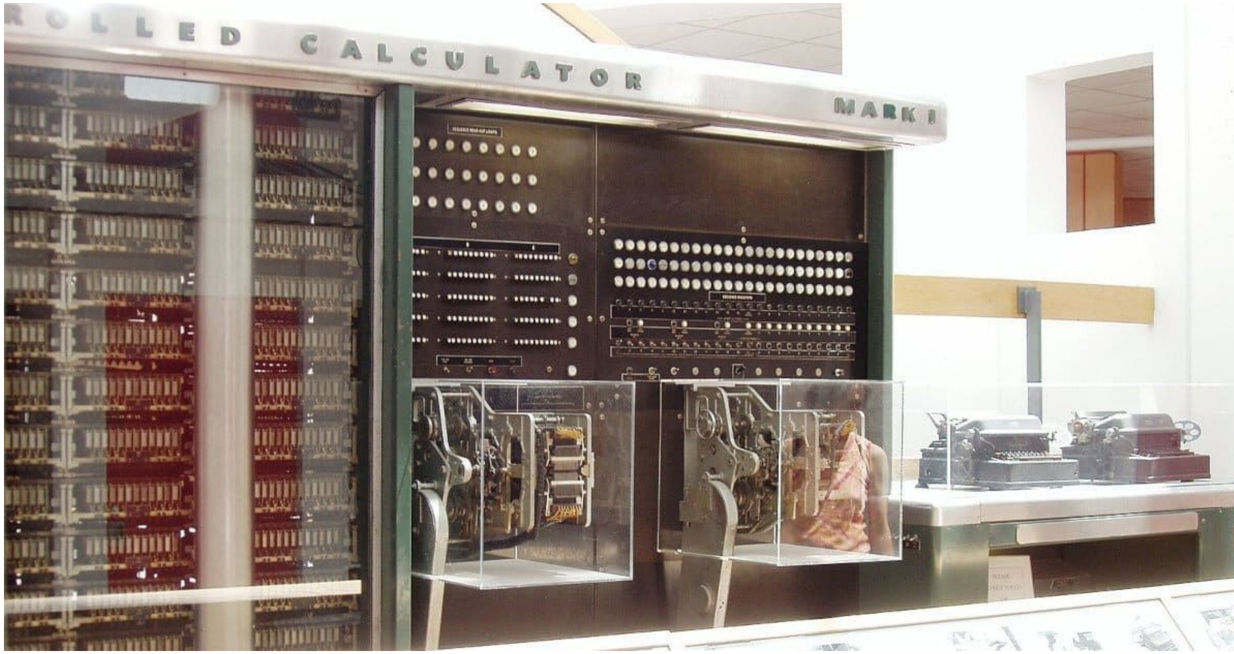
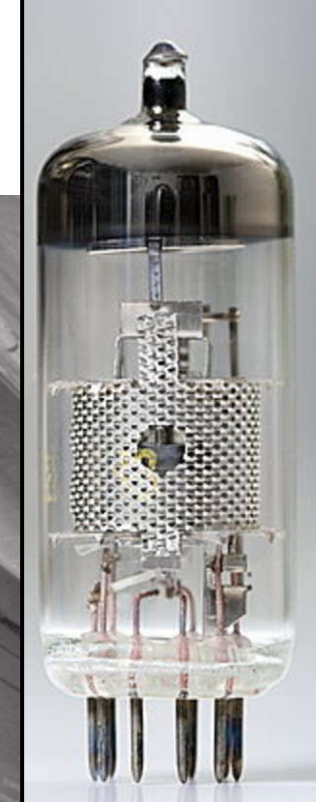
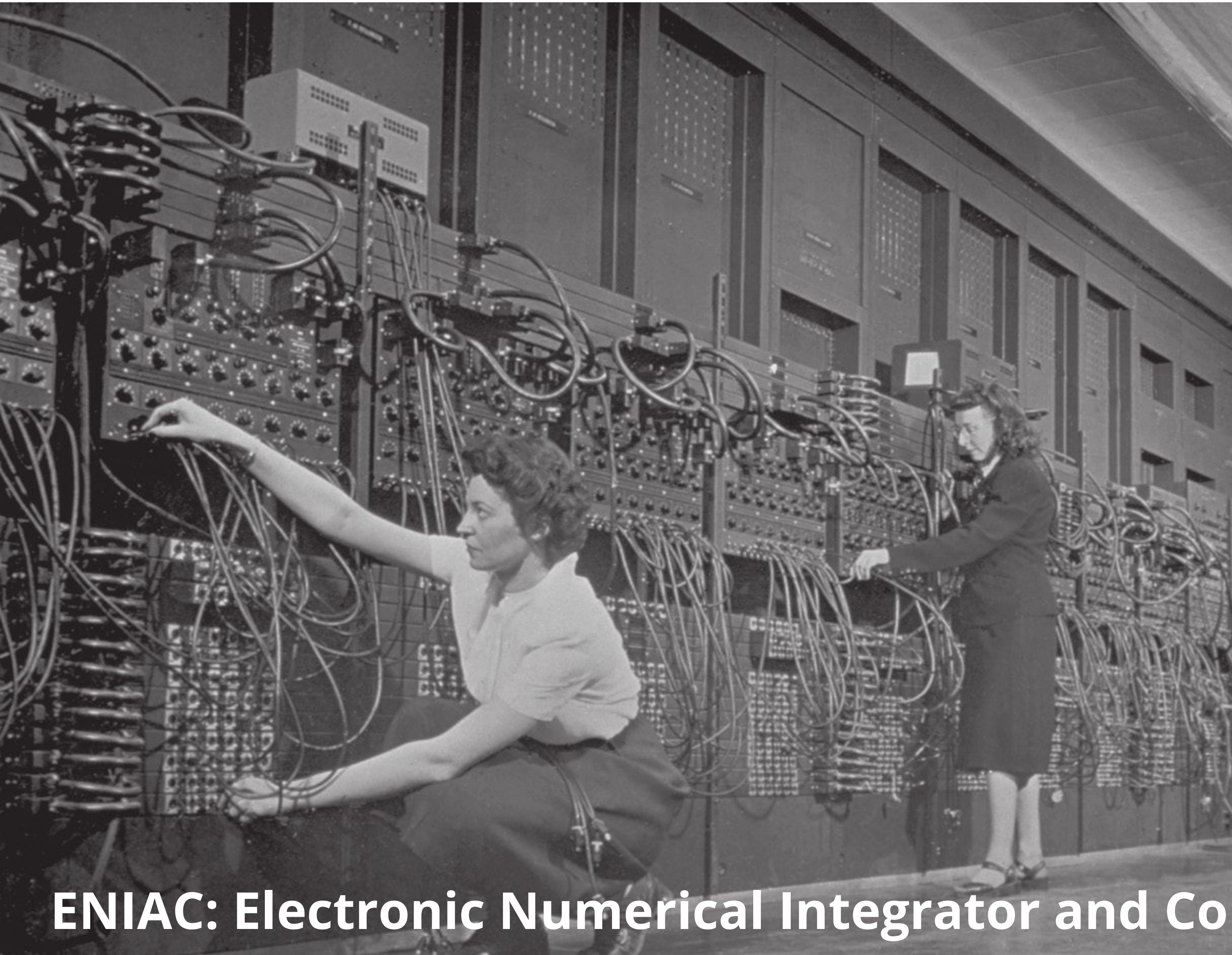


- The Harvard Mark 1 weighed nearly five tons and was over 50 feet long.
- The Harvard Mark 1 was the first computer that could be programmed to solve any number of problems, rather than built to solve one specific thing.
- The Harvard Mark 1 was used continuously by the US Navy until it was dismantled in 1959.

The History of Computing





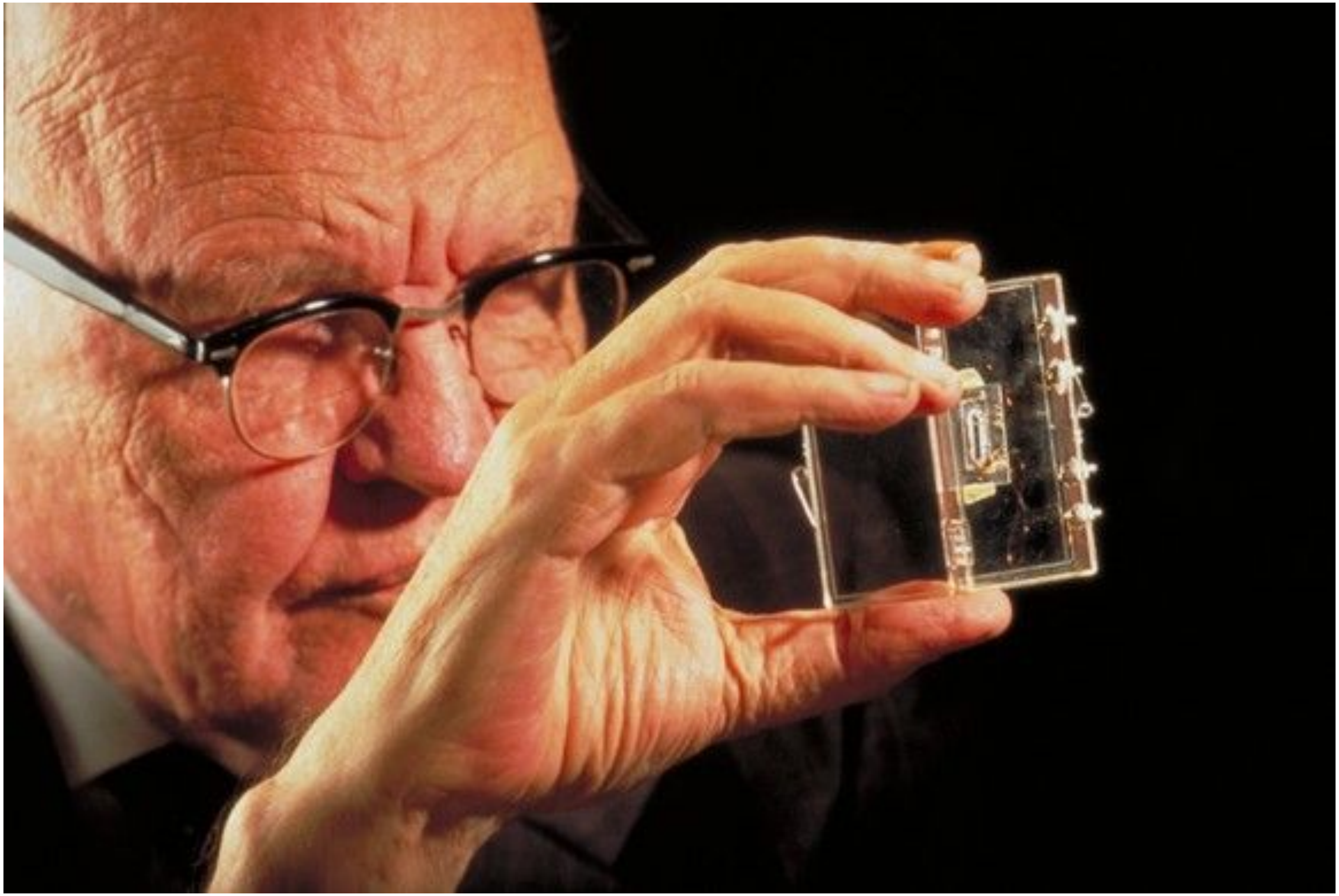
ENIAC: Electronic Numerical Integrator and Computer

The History of Computing

The invention of transistors.

Physicists William Shockley, John Bardeen, and Walter Brattain were awarded a Nobel Prize

The History of Computing



Late in his life, Jack Kilby holds his first integrated circuit, microchip, which is encased in plastic.

The History of Computing

Apple Computer, Inc.

Steve Jobs and Stephen Wozniak

The History of Computing

Apple Computer, Inc.

HEATHKIT

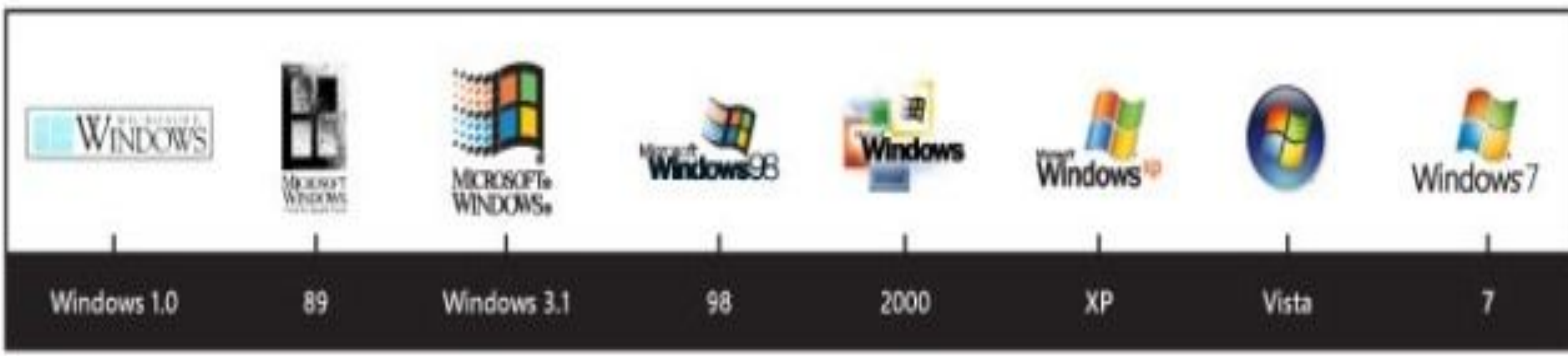
commodore
COMPUTER

RadioShack®

The History of Computing

In 1981, IBM introduced its first desktop computer, called the personal computer, or **PC**,

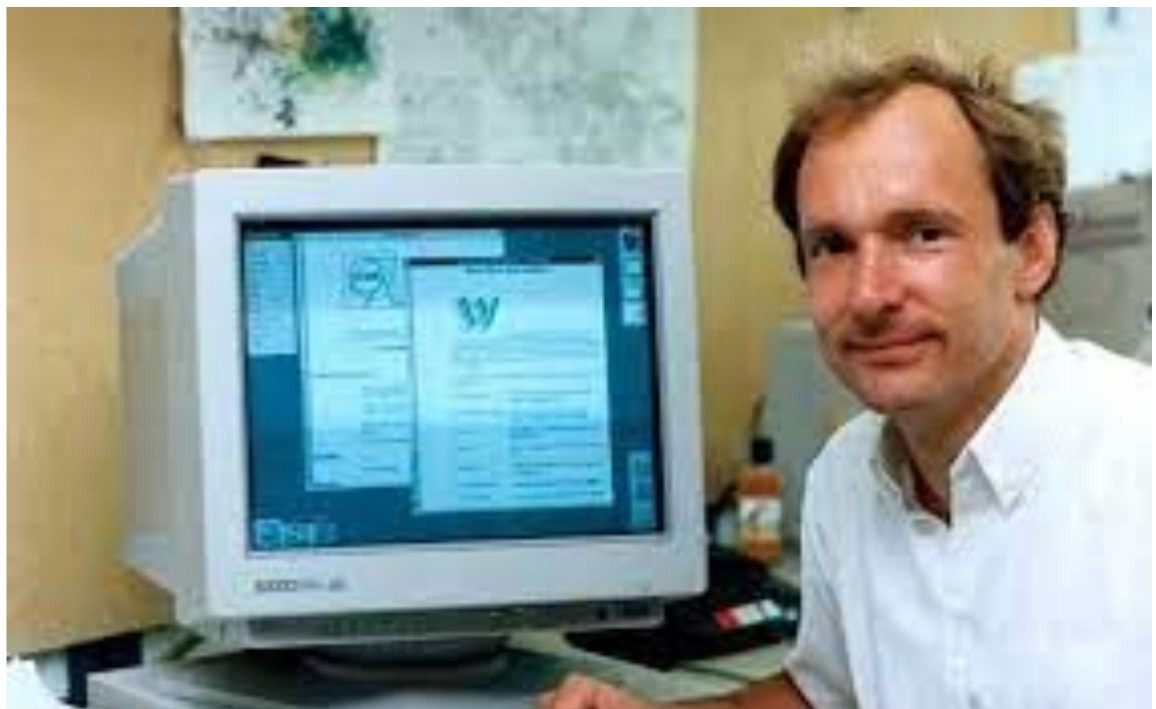
- The underlying software was developed by a newly formed company known as Microsoft.



The History of Computing

As the twentieth century drew to a close,

- The **Internet**, the ability to connect individual computers in a world-wide system
- Tim Berners-Lee proposed **World Wide Web**



The History of Computing

To make the information on the Web accessible **search engines** were developed

Major players in this field are Google, Yahoo, and Microsoft.

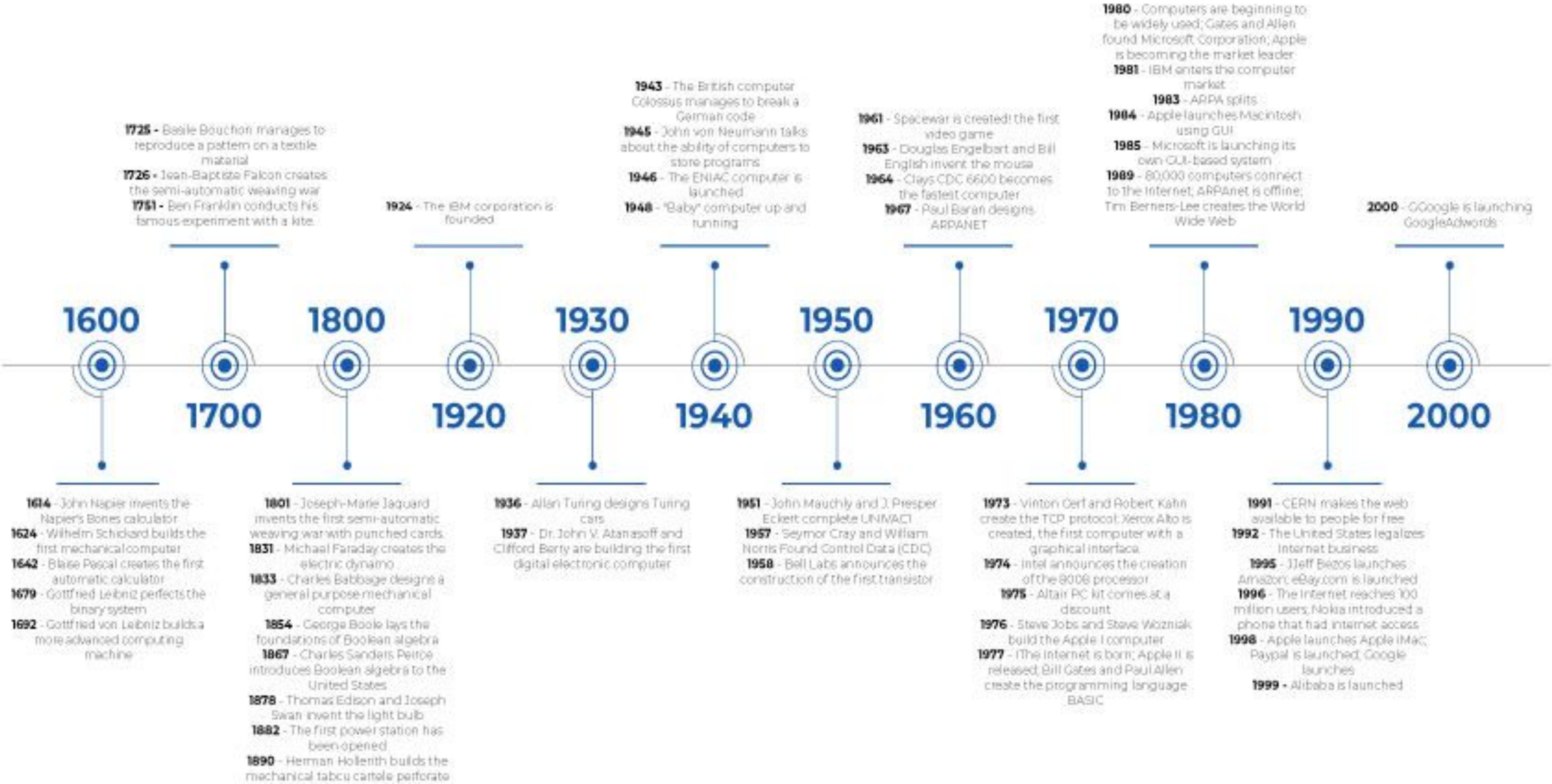
The History of Computing

The miniaturization of computing machines have been continued.

The most revolutionary application of computer miniaturization is found in the expanding capabilities of **smartphones**, hand-held general-purpose computers on which telephony is only one of many applications.

Many argue that the smartphone is having a **greater effect** on global society t**han the PC revolution**.

The History of Computing



Source: www.stackup.ro/en/timeline-important-points-in-computer-history/

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