Introduction to Computing

Lecture No. 1

Reference:

Computer Science an overview by J. Glenn Brookshear. Chapter 0: Introduction

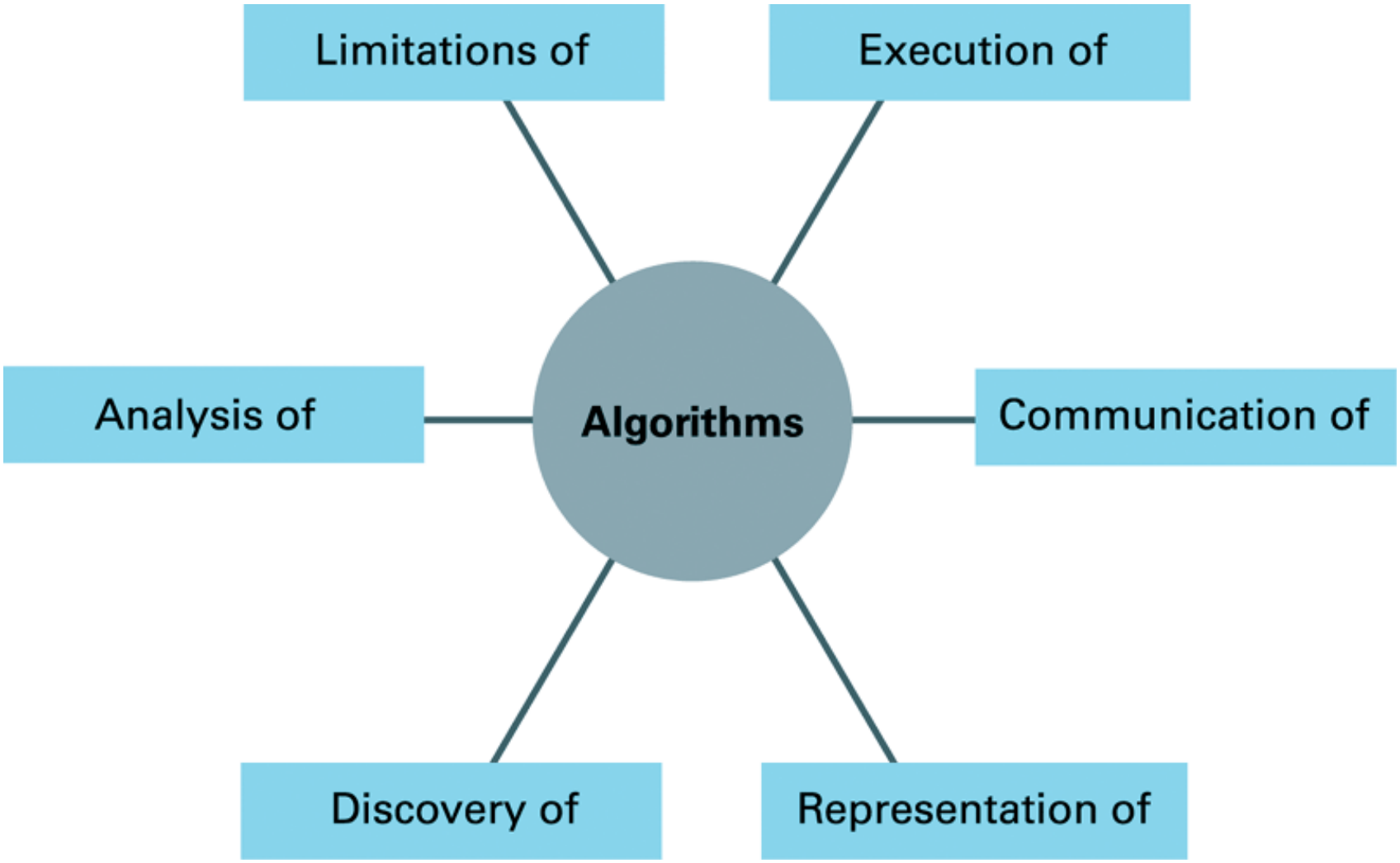
Introduction:
Computer Science - What is it? (1)

- **A combination of many things...**
  - includes a.o.:
    - (1) hardware design, (2) programming, (3) human computer interaction, (4) artificial intelligence, etc...
  - in other words:
    - mathematics, engineering, psychology, linguistics, biology, business administration, ethics, sociology, …
- **Certainly not:**
  - ‘science’ of computer applications
  - ‘science’ of programming in language ‘X’

Introduction:
Computer Science - What is it? (2)

- **Science of algorithms:**
  - algorithm (informally):
    - set of steps that defines how a task is performed
    - Our Knowledge of algorithms would be the main driving force behind modern technology and this book
  - machine-compatible representation = ‘program’
  - central issues:
    - (1) algorithm discovery
    - (2) algorithm representation
    - (3) handling complex collections of algorithms
    - (4) hardware implications, ...

The central role of algorithms in computer science



Orientation of Book

- **Discovery**
  - Discover solution of a problem **- Chapter 4**
- **Representation**
  - Communication to Machine-Programming Languages
  - Programming Languages are based on programming paradigms or processes**- Chapter 5**
- **Communication**
  - Communication among the algorithms **- Chapter 10**
  - Interaction among the components **- Chapter 6**
  - Computer Architecture – Data storage, presentation, manipulation and Retrieval **- Chapters 1, 2, 7, 8 & 9**

Orientation of Book (2)

- **Execution**
  - The design of large software system involve more development of individual algorithms for performing the required activities.
  - Software Engineering - Project management, Personal management and programming language design.
  - Software Engineering also deals with the development of the tools **- Chapter 6**
  - How algorithms will be stored in machine? How algorithms will be executed by machine **- Chapter 3**
  - Human intelligence is and will be simulated to machines so that machine can perform more activities like humans. **Chapter 10**

Orientation of Book (3)

- **Limitations**

  In Early 1900 Kurt Godel proposed "incompleteness theory":

  "Any Complete study of our arithmetic system lies beyond the capabilities of algorithmic activities"

  – Limitation of algorithms study limits the mathematical studies to design hypothetical machines- **Chapter 11**

- **Analysis**

  – Analysis of algorithms is important to know which algorithm is more efficient and correct **- Chapter 4**

Figure 0.7: Viewing this text, itself, as a hierarchy of abstract tools (continued)

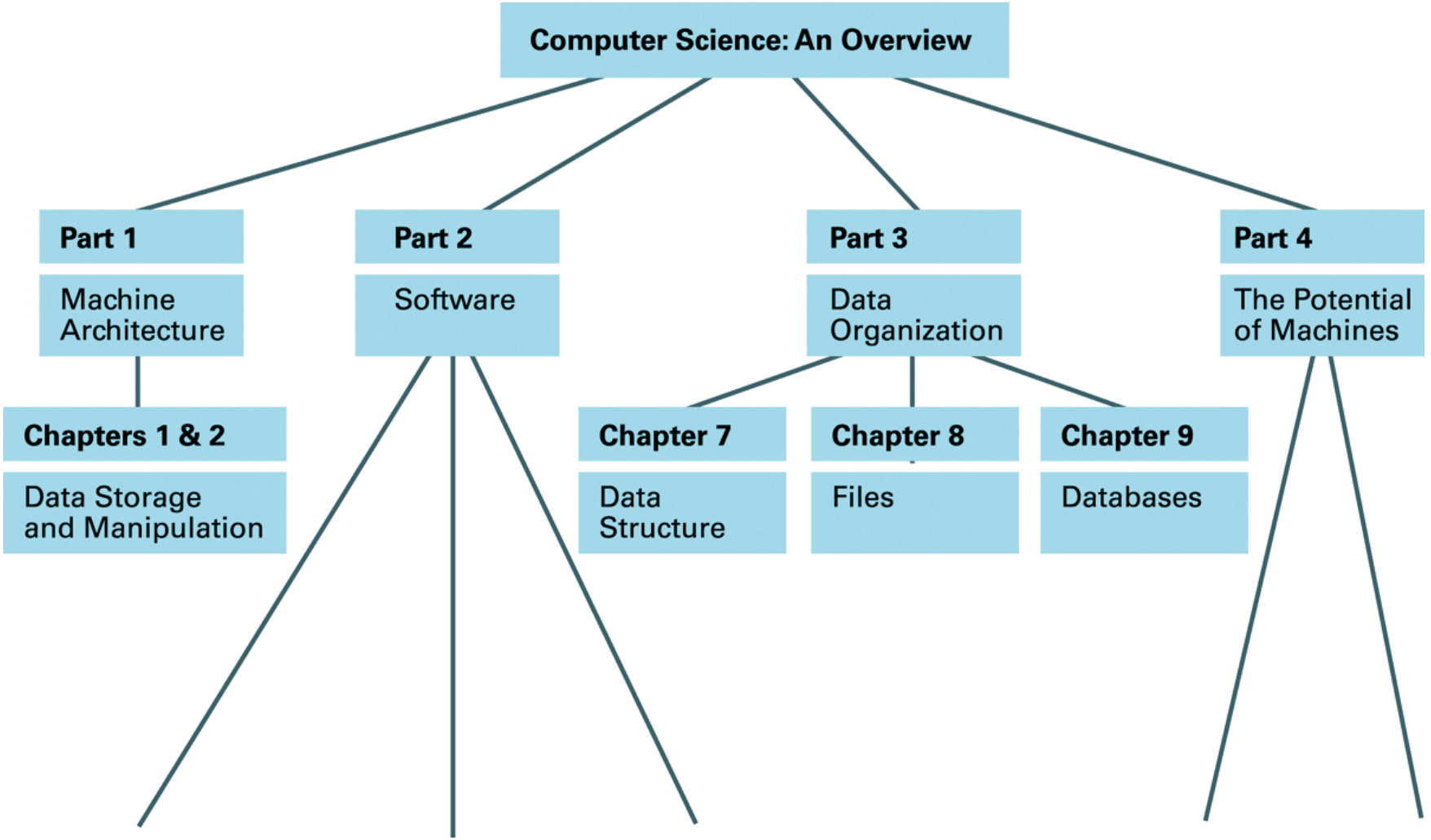


Figure 0.7: Viewing this text, itself, as a hierarchy of abstract tools

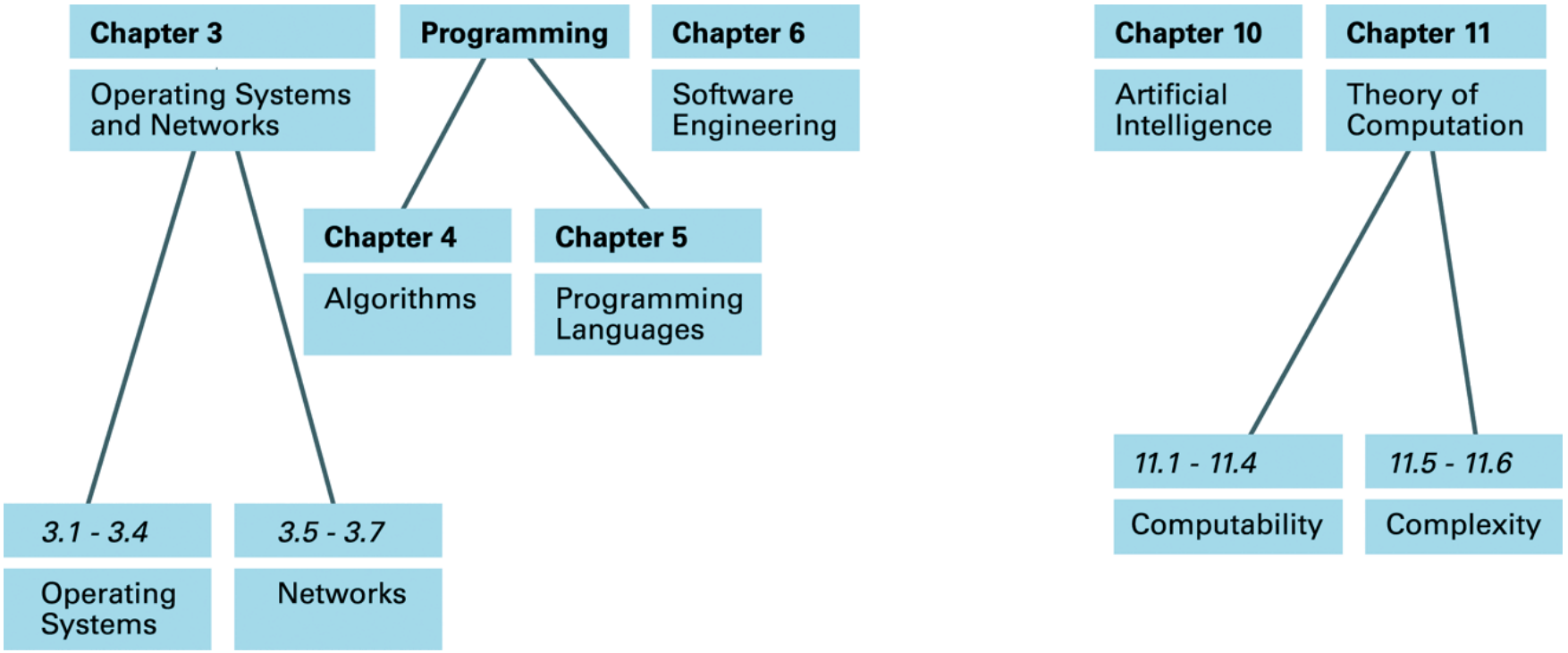
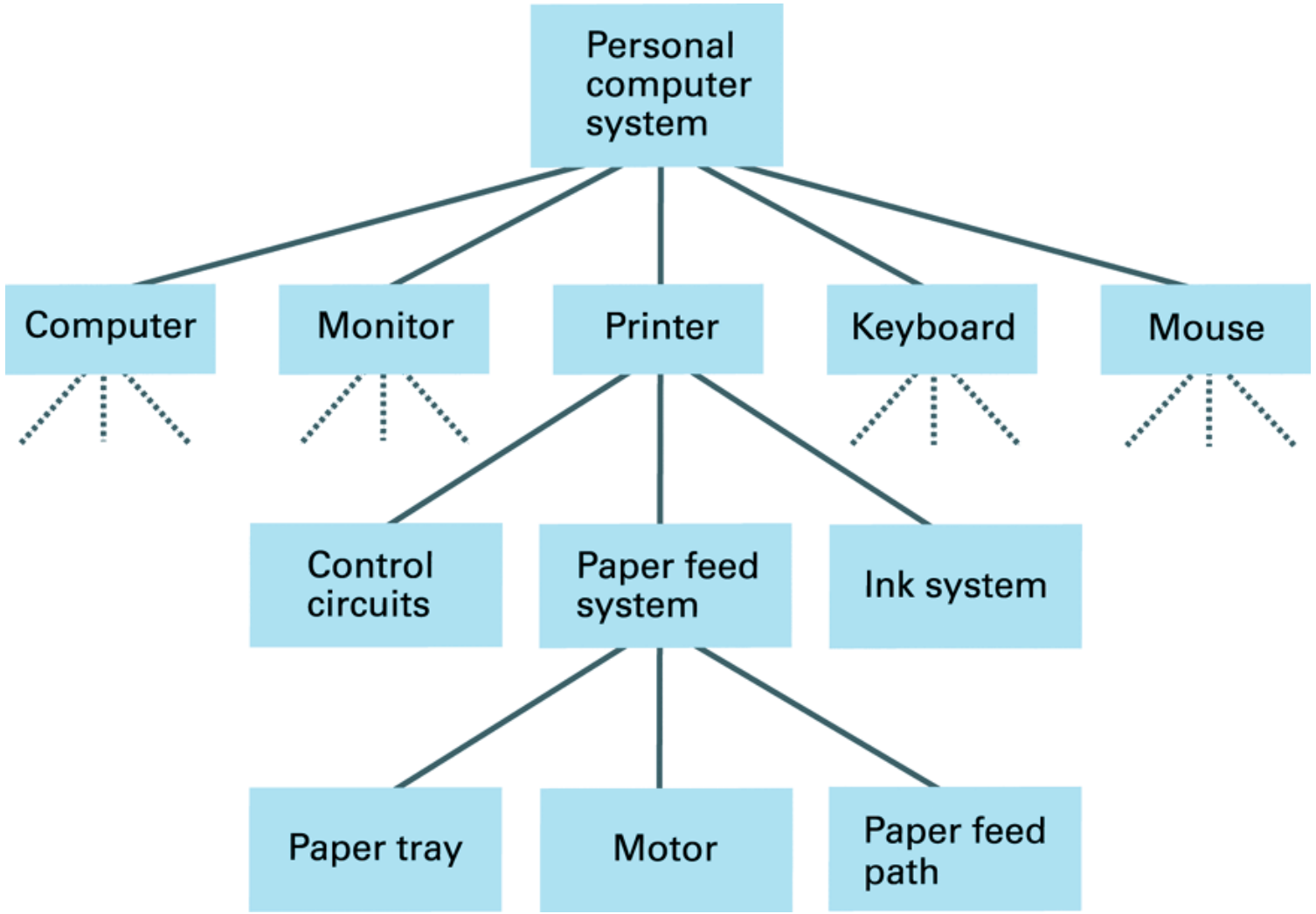


Figure 0.6: The hierarchy of abstraction in the hardware of a typical personal computer

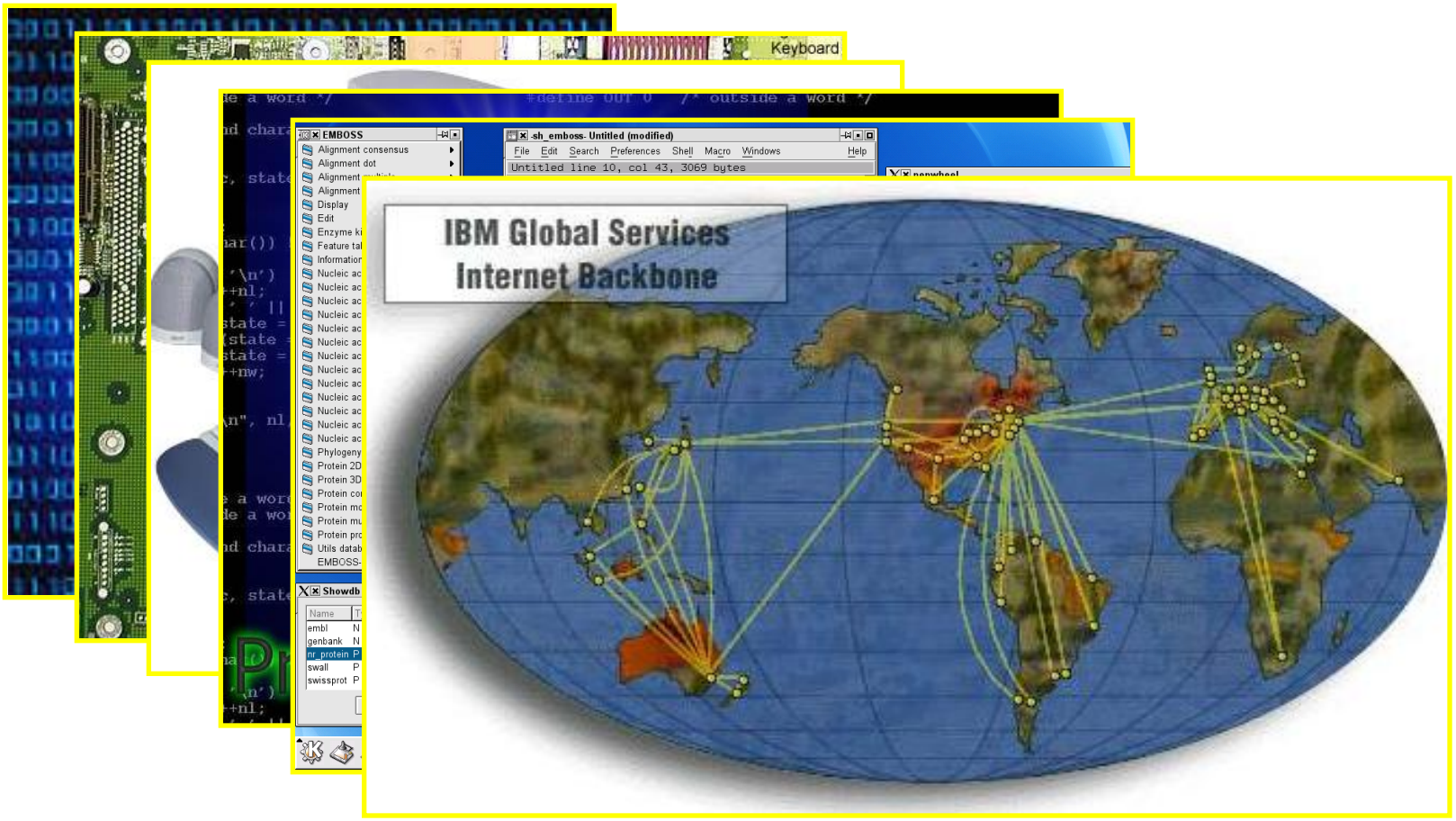


Introduction:
Computer Science - What is it? (3)

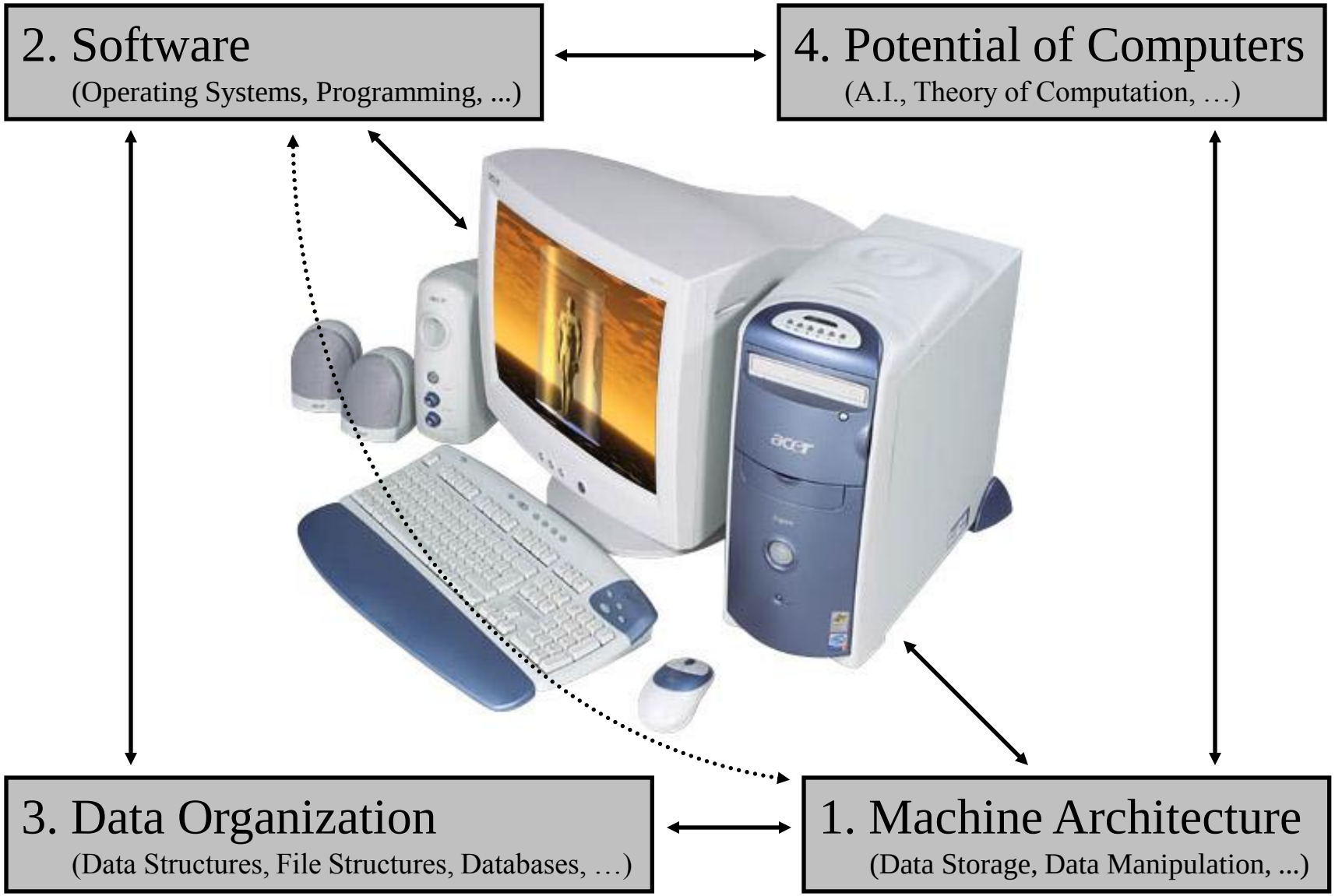
- **Science of 'abstraction':**
  - obtaining *external* properties of an entity, by hiding its *internal* details.

Introduction:
Computer Science - What is it? (4)

- **Abstraction... on abstraction... on...**



Computer Science in relation to desktop PC...



The origin of computing machines

- First Computing device: Abacus
- Mechanical Devices before the invent of Electricity
  - Efforts by Pascal, Leibuiz and Charles babbage
  - Babbage's machine was programmable
    - Augusta Ada is considered first programmer

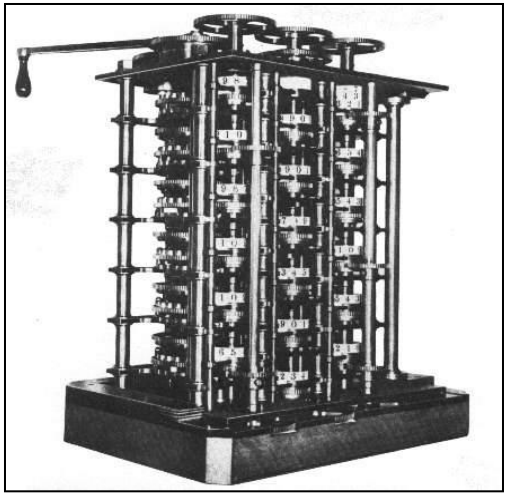
After the invention of electricity

- 1944- **Mark I** at Harvard university
- Obsoleted soon, because work on vacuum tube technology has been done to construct Electronic Digital Computers

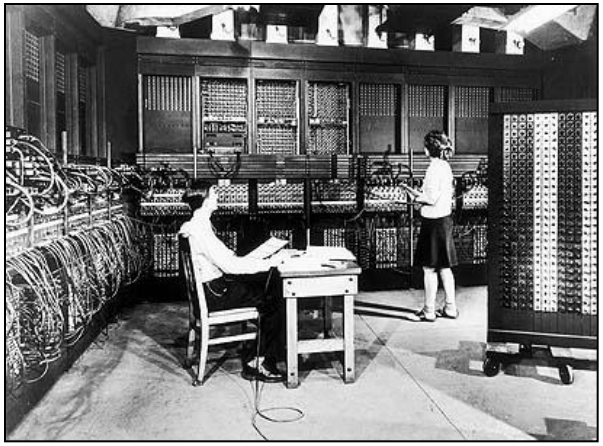
  1945- **ENIAC**- Electronic Numerical Integrator Calculator
- 1981- **PC**- IBM first personal Computer, software by Microsoft

Central issues identical in the past...

- Abacus (ca. 50 BC)



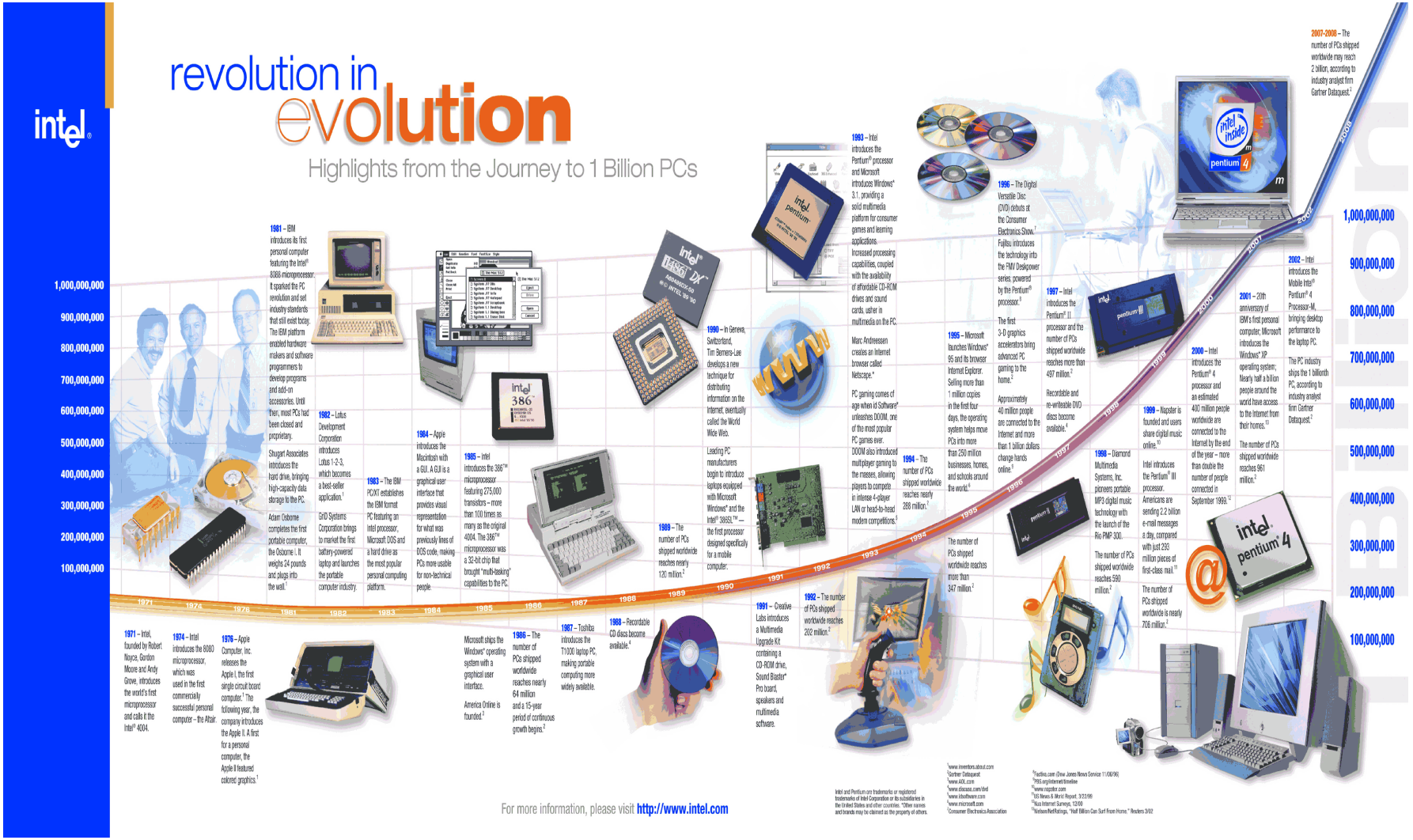
- Difference Engine (Babbage, ca. 1822)



- ENIAC (Univ. of Pennsylvania, 1945)

The Evolution of Computers: Then & Now

Time Line of Intel Processor



Questions:

- Can you think of any other common computing device other than computers?

Mobiles
Correct Answer
But Why?

Computing Device: Mobiles in the Past

Today Mobiles and Devices

Today Mobiles and Devices

Future?

FROM HEAD TO TOE WEARABLE TECHNOLOGY

SHIRT
Conductive thread means a computer is literally built into the fabric of the shirt, providing the processing power for all the other wearable gadgets.

WRISTBAND
A sensor that tracks movement to determine the number of steps taken through the day – 10,000 is ideal – and how much sleep the wearer gets at night.

TROUSERS
Also made with conductive thread, the trousers take the energy generated by movement and use it to power the other gadgets.

GLASSES
Overlays navigation directions and information about points of interest directly on to the wearer's field of vision.

WRISTWATCH
Vibrates when a message arrives and displays it on the watch face. Tells the time too.

HAND
Embedded under the skin is a chip containing medical records, passport data and credit records. Information is transferred by waving the hand over a suitable scanner.

SHOES
GPS chip provides directions using LED lights in each shoe: the left shoe indicates direction, while the right shows distance.

GRAPHIC: JOHN BRADLEY

Dream Smartphone Device s| Intelligent Personnel Assistant Mobile

- No need to take tension about its charging time. it can be charge from body heat or electromagnetic waves.
- it check my mood and set the wallpaper of mobile phone according to my mood.
- Make a record of my decision and give me opinion is my every day problem.
- Detecting your Geo location and hence providing you help like mulch-language translation support and best traffic routing via GPS.
- Direct satellite connection for 24/7 uninterrupted service/internet connection.
- Looking at your schedule and replying to an incoming invitation for a party/get together.
- Fully voice functional.
- Ability to provide you suggestion about your schedule/adjusting your schedule as it best fits.
- Behavior based detection of messages hence informing you about the important ones only.
- Practically 100% unbreakable and stealth proof/secure

Last topic of Chapter 0: Introduction

- Ethical, Social and Legal Repercussions
  - Home work
  - Verbal presentation in the next class

Any Questions?

Home Assignment

Question:

What is Computer Science?