Home Assignment

Question:

What is Computer Science?

Richard Feynman

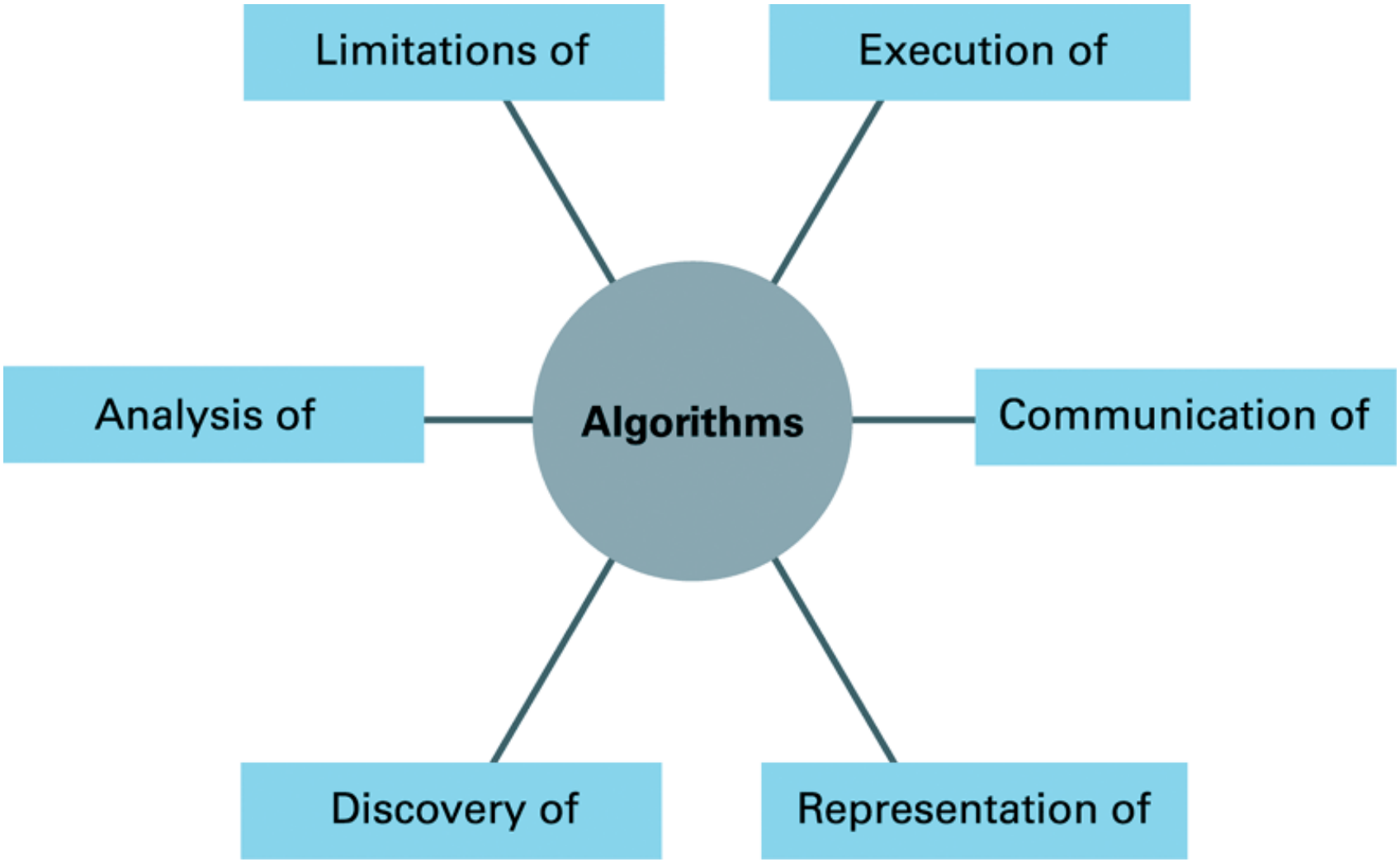
Introduction:
Computer Science - What is it? (1)

- **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":

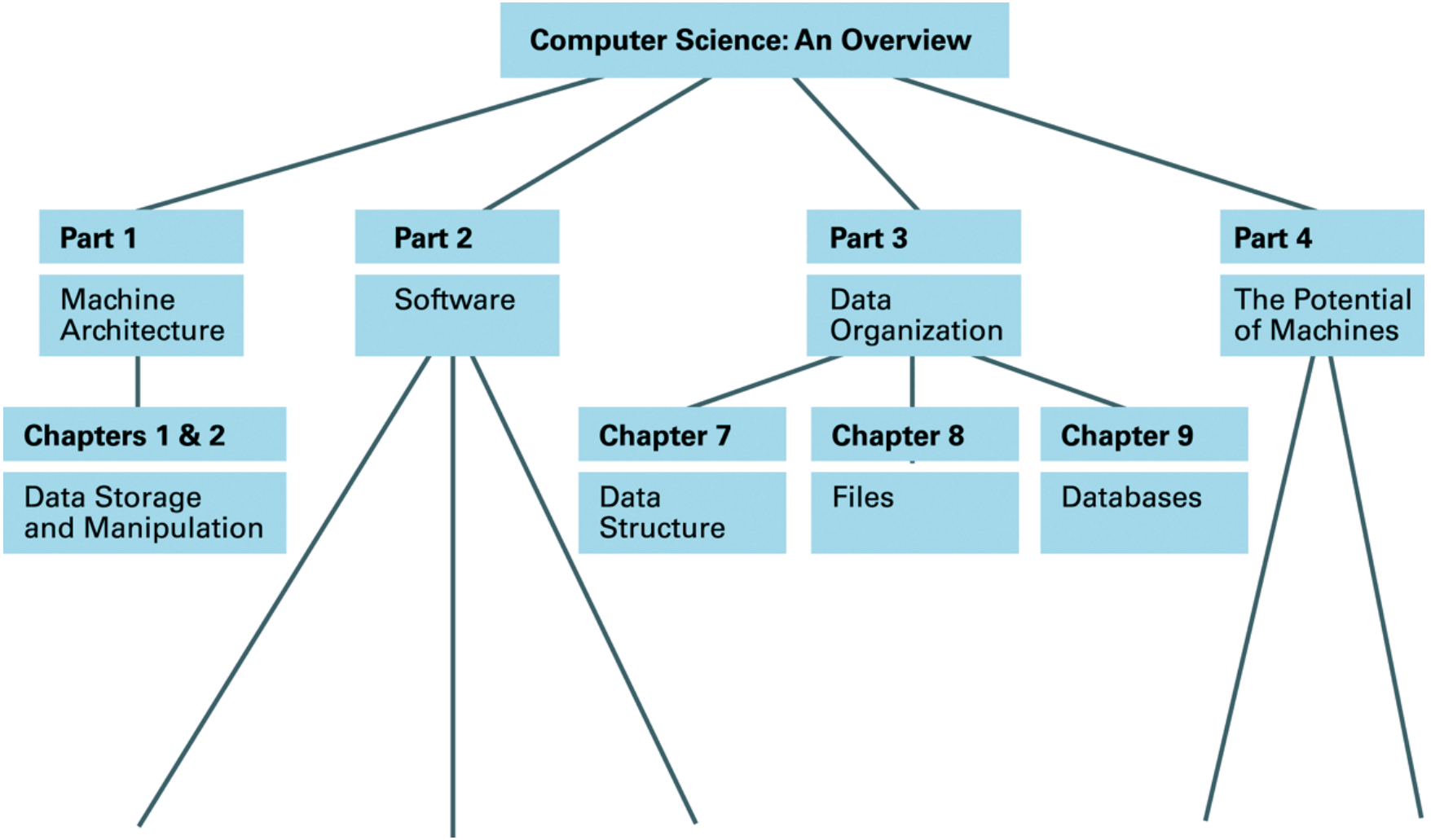
  "Any Complete study of our arithmetic system lies beyond the capabilities of algorithmic activities"

  – 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)



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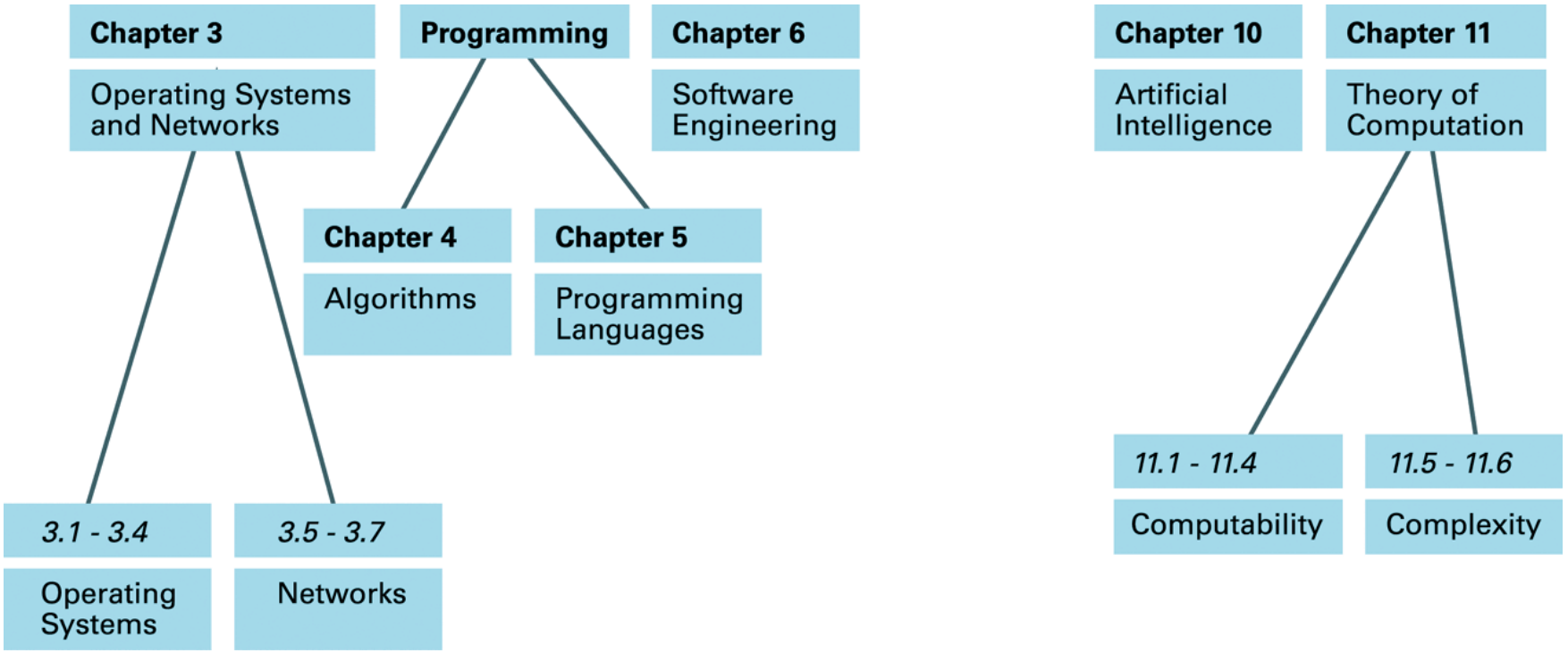

Figure 0.6: The hierarchy of abstraction in the hardware of a typical personal computer