

A quick tour through the book

Chapters 1 to 6 take the reader from the beginnings of digital computers to a description of how computer hardware and software work together to solve a problem. The ideas of programming languages and software engineering are covered in Chapter 4, and computer algorithms in Chapter 5. Chapter 6 is probably the most difficult chapter in the book as it tries to explain the fundamental theoretical insights of Alan Turing and Alonzo Church on computability and universality. This chapter can be skipped on a first reading without jeopardizing the understandability of the later chapters. For readers interested in hardware, Chapter 7 contains accounts of the discovery of the transistor and the integrated circuit or silicon chip and the origins of Moore's law, as well the quantum mechanics of semiconductors. Chapter 15 looks at the coming end of Moore's law and some future alternatives to silicon as the miniaturization level approaches atomic dimensions.

The history sections at the ends of Chapters 1 and 2 offer more background in the history of computer science, including the very early ideas of Charles Babbage and Ada Lovelace; the little-known Colossus computer, developed at the UK Post Office's Dollis Hill research laboratory for use by the code breakers at Bletchley Park; LEO, the first business computer; and the first stored-program computers, the Manchester Baby and the Cambridge EDSAC. In Chapter 8 there is also a history section describing the pioneers of interactive and personal computing.

Chapter 8 describes the development of personal computers based around microprocessors and the key roles played by Xerox PARC, IBM, Microsoft, and Apple in moving to the present era of smart phones, tablets, and touch interfaces. Chapter 9 describes the origins of computer games and computer graphics. The three key chapters about the Internet, World Wide Web, search engines, and malware are Chapters 10, 11, and 12.

Artificial intelligence and the famous Turing Test are the subject of Chapter 13, while Chapter 14 describes modern applications of machine learning technologies to computer vision, speech, and language processing. All of these things were involved in the design of IBM's Watson machine that won on the TV game show *Jeopardy!*. Chapter 16 looks to the future with an account of progress in robotics and the coming Internet of Things. The chapter ends with a discussion of Strong AI and the problem of consciousness.

Chapter 17 is an essay about computers in science fiction.

More detailed advice about ways to read this book is included at the end of the book.

