

# Preface

## Overview

The objective of this book is to consider a selection of men and women who have made important contributions to the computing field. The goal is to provide brief biographical information on each selected pioneer and to give a concise account of their key contributions to the computing field.

It is clearly not feasible, due to space constraints, to consider all of those who merit inclusion, and the selection chosen inevitably reflects the bias of the author. It is the author's aspiration that the reader will find the selection interesting and will gain an insight into the work and contributions of several pivotal pioneers.

## Organization and Features

We discuss a selection of historical figures such as the Hellenistic mathematician Archimedes; the nineteenth-century English mathematician George Boole; the nineteenth-century English mathematician and inventor Charles Babbage; the seventeenth-century German mathematician and inventor Wilhelm Gottfried Leibniz; and Lady Ada Lovelace who worked with Babbage on applications of the Analytic Engine.

The selection of early computer pioneers includes Howard Aiken who developed the Mark I analog computer, John Atanasoff who developed the Atanasoff-Berry Computer, Vannevar Bush who developed the differential analyzer, Tommy Flowers who developed the Colossus computer at Bletchley Park in England, Herman Hollerith who developed tabulating machines in the late nineteenth century, John Mauchly who worked on the ENIAC in the USA, Claude Shannon who showed how Boolean algebra could be applied to the design of digital circuits, John von Neumann who made important contributions to mathematics and early computing, the English mathematician Alan Turing who did important work on theoretical

computing and defined the *Turing Test* as a way to judge machine intelligence, Sir Frederick Williams who developed the Williams tube which was used in the development of the Manchester Mark I computer and Konrad Zuse who is considered the *father of the computer* in Germany.

We discuss a selection of those who made important contributions to early commercial computing. These include figures such as Gene Amdahl who was the chief architect for the IBM/360 family of computers and who later set up the Amdahl Corporation, John Backus who developed the FORTRAN programming language at IBM, Gordon Bell who was the architect of several PDP and the VAX 11/780 series of computers at Digital Corporation, Fred Brooks who was the project manager for the IBM/360 project and later wrote an influential book *The Mythical Man Month* describing the challenge of delivering a large software project on time and on budget, Gordon Moore who was one of the co-founders of Intel and proposed Moore's law on the doubling of transistor density and William Shockley who codeveloped the transistor with others at Bell Labs.

There is a selection of those who made important contributions to later commercial computing. This includes figures such as Tim Berners-Lee who invented the World Wide Web, Vint Cerf who was one of the codevelopers of TCP/IP; Edgar Codd who developed relational databases, Don Estridge who led the team that developed the IBM personal computer, Gary Kildall who developed the first operating system for a microprocessor and Richard Stallman who has made important contributions to the *free software movement*.

We discuss a selection of those who have made important contribution to software engineering. These include Dines Bjørner who has made important contributions to VDM and RAISE, Edsger Dijkstra who developed the calculus of weakest preconditions, Tom DeMarco who is one of the developers of structured analysis in the 1970s, Michael Fagan who developed the Fagan Inspection Methodology at IBM in the 1970s, Robert Floyd who did early work on compilers and program verification in the 1960s, C.A.R. Hoare who developed the *quicksort* algorithm and axiomatic semantics, Watts Humphrey who has played a key role in developing maturity models such as the CMM and CMMI and in the management aspects of software projects, Ivar Jacobson who is one of the codevelopers of the Rational Unified Process, David Parnas who has proposed a solid engineering approach to software development and Ed Yourdon who was one of the developers of systems analysis and design methodologies.

We discuss a selection of individuals who have made important contributions to theoretical computing and programming languages. These include Noam Chomsky who has done important work on linguistics and grammars, Alonzo Church who made important contributions to logic and computability and developed the lambda calculus and formulated the *Church-Turing thesis*, James Gosling who is the father of the Java programming language and Grace Murray Hopper, a mathematician and computer pioneer, who worked with Aiken on the Harvard Mark I computer and later developed the COBOL programming language and made important contributions to early commercial computing.

Ken Iverson developed the APL programming language, and his ideas on notation as a tool of thought remain influential; Donald Knuth is considered the father of the analysis of algorithms; Dennis Ritchie codeveloped the C programming language and the UNIX operating system; Dana Scott has made important contributions to logic and to the semantics of programming languages and codeveloped denotational semantics with Christopher Strachey; Bjarne Stroustrup developed the C++ programming language; and Niklaus Wirth developed the Pascal programming language.

We discuss a selection of those who have made important contributions to artificial intelligence. These include the seventeenth-century mathematician René Descartes; John McCarthy is considered the father of AI; Marvin Minsky has made important contributions to artificial intelligence, especially in the areas of learning, knowledge representation, common-sense reasoning, neural networks and computer vision and robot manipulation; John Searle proposed the Chinese Room thought experiment as a rebuttal of strong AI; and Joseph Weizenbaum developed the ELIZA program in the 1960s and became a leading critic of AI.

A selection of computer entrepreneurs is presented. This includes Larry Ellison who is the founder and CEO of the Oracle Corporation, Bill Gates who is the founder and chairman of Microsoft, Steve Jobs who was the founder and CEO of Apple Corporation, Ken Olsen who was the founder and CEO of Digital Corporation and Thomas Watson Sr. and Jr. who were past presidents of IBM.

The selection of pioneers is presented in alphabetical order starting with Aiken and ending with Zuse.

## **Audience**

This book is suitable for computing students who are interested in knowing about the men and women who have shaped the computing field. It will also be of interest to general readers.

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