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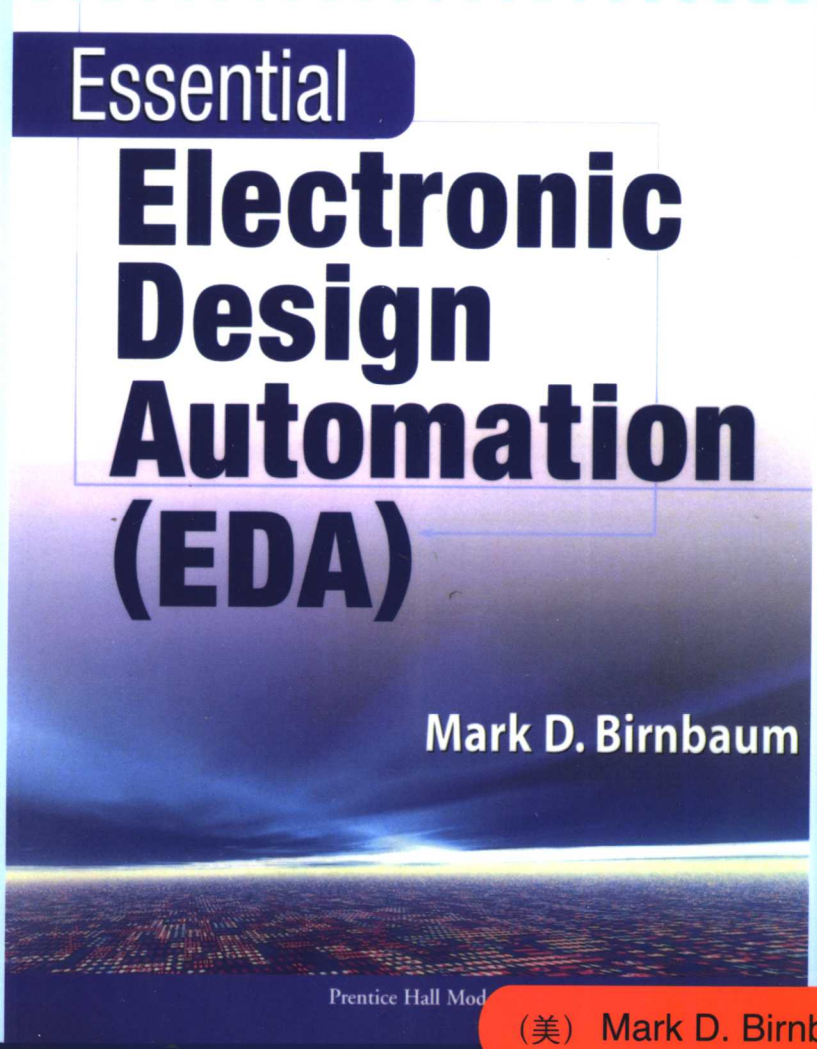
电子设计自动化基础

（英文版）



（美） Mark D. Birnbaum 著

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Essential Electronic Design Automation (EDA)

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Preface

PURPOSE OF THIS BOOK

The tremendous increase in the use of tiny electronic devices is common knowledge. We find them everywhere today, in cars, household appliances, telephones, music, and business equipment. The typical car or house uses dozens of them.

These devices are called microchips or *integrated circuits (ICs)*. Today a single IC can do more than an entire roomful of equipment just a decade ago. Integrated circuits are small enough to hold in your hand, yet contain millions of tiny electronic components.

Engineers create detailed design plans to make ICs, similar to an architect's building plans. Architects use computer tools to design a building and predict the structure's response to storms or earthquakes. Similarly, IC designers use computer program tools to design an IC, test its performance, and verify its behavior. We refer to the tools as *electronic design automation (EDA)*.

An entire industry has evolved to provide these tools to aid the IC designers. This book introduces readers to the EDA industry. It discusses both the technical and business aspects of EDA in clear non-technical language without equations. The text briefly describes the related semiconductor industry issues and evolving chip design problems addressed by the EDA tools. A unique, dialog format presents the technical material in an easy-to-read manner.

The book focuses solely on EDA for IC design, intentionally excluding other design automation areas (e.g., printed circuit boards and mechanical design). The text gives generic tool descriptions since company and product names change rapidly.

Intended Audience

The electronic product industry consists of electronic system manufacturers, semiconductor companies, and chip design houses. Semiconductor equipment providers, test equipment manufacturers, and EDA companies are also part of the industry.

In most of these firms, **over half** the employees are **non-technical** or "semi-technical." These semi-technical people are involved in the EDA or related industries. Experienced employees will have picked up some jargon and knowledge, but both they and most new employees lack an overall introduction to this highly technical field.

Sales and marketing, communications, legal, or finance personnel will find the book useful. Others in financial analysis, public relations, or publications firms also need to know about the EDA industry. Some readers will be interested only in the overview, business, or industry sections, while others will focus on particular technical EDA chapters.

Along with the **semi-technical** people, many people with **technical** backgrounds will find the book very beneficial. The technical backgrounds include computer engineering, programming, electronic testing, mechanical engineering, packaging, or academic fields. These readers may not have EDA backgrounds and so seek a simple introduction to EDA.

The book is thus helpful to new employees, both technical and non-technical. Some readers may be familiar with a portion of EDA and want to see "the big picture." Others may focus on technical areas relevant to their own work.

Faculty and **students** in universities, colleges, community colleges, and technical institutes can use the book as an introduction to the IC and EDA industries. The book will fit well in cross-discipline business/engineering courses. Technical students will find the full coverage useful and complementary to an academic course on ICs or EDA.

Non-technical readers include:

Within the organization:

- Marketing communications, sales, and marketing personnel
- Human relations, administrative personnel, and new hires
- Manufacturing, purchasing, and operations personnel
- Finance, accounting, and legal personnel

Outside the organization:

- Financial analysts, law firms
- Public relations, publications, or media representatives
- Manufacturing representatives, personnel recruiters, or technical writers

Technical readers include:

Electrical engineers new to EDA

Mechanical, packaging, and quality assurance engineers

Programmers (software engineers)

Technical marketing and support personnel

Academic fields include:

Electrical, Mechanical, Systems, and Computer Engineering

Physics

Computer Science and Programming

Business, Marketing, and Management

Organization

The book's successive chapters build on each other, forming a logical sequence. However, most chapters can be read independently. The book may also serve as a reference source, using the several appendixes.

Chapter 1 gives an overview of EDA tools, the people who use them, and the design tasks they support. (EDA tools address specific design issues, so one has to understand those problems.)

Chapter 2 describes the EDA business itself. Chapter 3 provides a user perspective on EDA technical and business issues. Chapter 4 discusses the range of EDA tools and introduces some essential concepts.

Chapters 5, 6, and 7 focus on the three major EDA design tool areas: electronic system-level, functional chip-level, and physical. System-level tools help decide what the IC will do and how it will be made. Chip-level tools help design how the IC will operate (*function*). Physical design tools help implement the actual IC physical layout.

Chapter 8 discusses EDA industry trends and related IC design issues.

Since readers have a wide range of backgrounds, several appendixes fill in the technology basics. Appendixes A, B, and C introduce (in simple English) elementary electricity, semiconductor manufacture, and computer basics.

Many technical EDA and semiconductor terms are confusing. Most terms are metrics—each with different units of measure (such as inches, mils, or microns). Some are in English units, some are in metric units, and some are in both, depending on the context. Appendix D describes and compares these metrics.

Appendix E has pointers to other EDA reference sources for the reader to explore further. These include organizations, conferences, magazines, the Internet, and universities.

Appendix F provides more depth in several areas that affect the EDA business. These include deep submicron issues, intellectual property, and system-on-chip.

Every human enterprise (such as medicine, law, or academia) has its own jargon. EDA is no exception. There is a myriad of strange terms. Many come from the semiconductor world addressed by the EDA tools. In addition, there are all sorts of abbreviations and acronyms. The text defines many terms in context, and Appendix G provides an extensive glossary/acronym list with acronym pronunciation.

In summary, readers will be introduced to both the business and technical aspects of the EDA industry. They will learn about EDA tools, the designers who use them, and their design problems. In addition, they will gain insight into the current and future role of EDA in the electronics industries.

Acknowledgements

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Contents

Chapter 6 Front-end Design Tools 99