

1. Record Nr.	UNINA9910392741103321
Autore	Zulehner Alwin
Titolo	Introducing Design Automation for Quantum Computing // by Alwin Zulehner, Robert Wille
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2020
ISBN	3-030-41753-0
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (X, 222 p. 65 illus., 14 illus. in color.)
Disciplina	006.3843
Soggetti	Electronic circuits Microprocessors Quantum computers Circuits and Systems Processor Architectures Quantum Computing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Introduction -- Quantum Computing -- Design Automation Methods for Conventional Systems -- Quantum-Circuit Simulation Overview -- Decision Diagram-based Simulation -- Combining Operations in DD-based Simulation -- Efficient Implementation of the Proposed DDs -- Accuracy and Compactness of the Proposed DDs -- Design of Boolean Components for Quantum Circuits -- Functional Synthesis -- One-pass Design Flow -- Mapping Quantum Circuits to NISQ Devices -- Minimal and Close-to-minimal Approaches -- Heuristic Approach -- A Dedicated Heuristic Approach for SU(4) Quantum Circuits -- Conclusion.
Sommario/riassunto	This book offers readers an easy introduction into quantum computing as well as into the design for corresponding devices. The authors cover several design tasks which are important for quantum computing and introduce corresponding solutions. A special feature of the book is that those tasks and solutions are explicitly discussed from a design automation perspective, i.e., utilizing clever algorithms and data structures which have been developed by the design automation

community for conventional logic (i.e., for electronic devices and systems) and are now applied for this new technology. By this, relevant design tasks can be conducted in a much more efficient fashion than before – leading to improvements of several orders of magnitude (with respect to runtime and other design objectives). Describes the current state of the art for designing quantum circuits, for simulating them, and for mapping them to real hardware; Provides a first comprehensive introduction into design automation for quantum computing that tackles practically relevant tasks; Targets the quantum computing community as well as the design automation community, showing both perspectives to quantum computing, and what impressive improvements are possible when combining the knowledge of both communities.
