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Advanced Computer Architecture: A Comprehensive Approach to Parallelism, Scalability, and Programmability The field of computer architecture has witnessed tremendous advancements over the last two decades, driven by significant improvements in technologies such as VLSI, communication, storage, graphics, and others. High-performance computing, once reserved for large-scale research projects, is now more affordable and widely applied across various industries. The digital revolution in communication technology, the emergence of the world wide web, and increased user awareness of computers' capabilities have contributed significantly to the growth in computer applications. This book delves into advanced computer architecture and parallel programming techniques, offering a balanced treatment of theory, technology, architecture, and software used in cutting-edge computer systems. The book focuses on state-of-the-art principles and techniques for designing and programming parallel, vector, and scalable computer systems, with an emphasis on parallelism, scalability, and programmability. It presents the analysis of scalability, issues related to instruction-level parallelism, processor clock speed, and power consumption, as well as important topics like processor design, control units, input/output interfaces, and parallel buses. The book covers various key areas, including pipelining hazards, data hazards, control hazards, PCI Bus and PCI Express, interconnection networks, cluster computers, MPI, openMP, PVM, Pthreads, multicore processors, impact of technology, stream processing, programming language Chapel, and updated coverage of recent processors and systems. The book features several pedagogical elements, including background material on OLC, diagrams illustrating basic concepts, case studies, solved problems, exercise and review problems at the end of chapters, tables, solved examples, and exercise problems. edited by Kai Hwang, author={Kai Hwang}, year={1992}, url={ 267844929} This text highlights the latest advancements in parallel processing and high-performance computing. It offers a comprehensive study of computer hardware and software systems, making it suitable for courses in computer science, engineering, or electrical engineering departments.