

# Preface

Digital design of control circuits is a very important part of computer science and electronics, and its importance has increased in recent years. Nowadays, digital systems are widely present in everyone's life and they are a part of our existence. The rapid growth of silicon technology is being observed, and it causes the augmentation of the controlled systems such as data paths in digital devices, peripheral devices of the computers or the industrial electromechanical processes for which the programmable controllers are used. It causes that need for more complex and faster control units noticeable, and new design methodologies of such complex systems are required.

In this book, we present the research activities and achievements in the area of design of reconfigurable control circuits of several research teams from different countries (Poland, Belarus and Portugal) as well as the historical perspective of development of some aspects of logical control technology. The chapters of the book cover different fields of the topic, from control system specification and design to synthesis and verification. The important question of cooperation between control unit and data path is also discussed. The book focuses first of all on the parallelism in logical control, taking into account complexity of the systems under control, an unavoidable element of modern logical control algorithms. Reconfigurability is another important aspect of the approaches presented in the book; nowadays the control systems often have to be flexible, hence possibility of their partial reconfiguration during runtime is very essential. As the models of parallel control algorithms, the interpreted Petri nets and concurrent generalizations of finite-state machines are used. Various kinds of UML diagrams are used at different steps of design processes for specification and modelling. The described methodologies mostly suppose the FPGA realization of the reconfigurable control devices.

The editors of this book hope that it will be a valuable reading for both researches and students of computer science and electronics, and engineers working in the area of design of digital control and embedded systems. The reader is presumed to have a basic knowledge of digital design, automata theory and Petri nets.

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