Preface

Recently, the rapid and fundamental advances in computing technologies have been driving the role and scope of software systems to a new level. A number of new types of software systems are emerging, among which service based systems, cloud computing, pervasive computing, and Internet of Things are eminent examples. For these systems, availability of sound software engineering principles, methodology and tool support is mission-critical. However, traditional software engineering approaches are not fully appropriate for their development and evolution. The limitations of traditional methods in the context of these emerging software systems have led to many advances of software engineering as a specialist discipline, but research and development in this context is still immature and many open issues remain. There is an urgent need for research community and industry practitioners to develop comprehensive engineering principles, methodologies, and tool support for the entire software development lifecycle of these emerging software systems.

Service-Oriented Computing is a computing paradigm that exploits both web services and Service-Oriented Architecture (SOA) as fundamental elements for developing software systems. This paradigm changes the way software systems are designed, architected, delivered and consumed. The service-oriented paradigm is emerging as a new way to engineer systems that are composed of and exposed as services for use through standardized protocols.

Cloud Computing is rapidly emerging as the new computing paradigm of the coming decade. The idea of virtualizing not just hardware but software resources as well has attracted the attention of academicians as well as the industry. Cloud computing not only offers a viable solution to the problem of addressing scalability and availability concerns for large-scale applications but also displays the promise of sharing resources to reduce cost of ownership. The concept has evolved over the years starting from data centers to present day infrastructure virtualization.

Pervasive and ubiquitous computing are recently emerging paradigms that allow computer sciences and telecommunication techniques to converge towards ambient intelligence. Here we will focus on software engineering as a complete and rational production process. We are interested in theoretical foundations, methodologies, new programming paradigms, solid architectures and middleware, new technical solutions for the development of user interfaces, and new modalities of interaction.

The “Internet of Things” (IoT) has added a new dimension to the world of information and communication technologies: next to any-place connectivity for anyone, we will have connectivity to anything. “Things” are potentially all objects we encounter in our everyday lives. The IoT connects “Things” and devices to large databases and networks. “Things” carry embedded intelligence, using for example RFID (Radio Frequency IDentification) as identification system and sensor technologies to detect changes in their physical status and environment. Future success of the IoT depends not only on technical innova-
tions in the underlying hardware (wireless sensors, nanotechnology, low power devices, RFIDs), but also on appropriate software methodologies, technologies, and tools in fields such as operating systems, middleware, and ubiquitous and pervasive computing technology.

This book of research aims to be the first book that systematically collects the above new approaches and resultant tools. The book will promote the acceptance and foster further developments of these new approaches and tools; it will meanwhile speed up the process of commercialization, i.e., pushing the approaches and tool to industry and market.

The book is helpful to clarify the present chaotic literature of the current state of art and knowledge in the areas of the design and engineering of those emerging software systems. The book will facilitate the exchange and evolution of the above software engineering advances among multiple disciplines, research, industry, and user communities. The book will systematically expand the knowledge of the readers with novel approaches and tools on the engineering of the four types of emerging software systems, their best application practice and future trends. It will trigger further ideas on research, development, and commercialization.

The book targets a spectrum of readers, including researchers, practitioners, educators and students and even part of the end users in software engineering, computing, networks and distributed systems, and information systems.

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