

Preface

Recently, Peer-to-Peer (P2P), Autonomous Agents and Service Orientation are three paradigms that have been influenced heavily on the development of distributed systems especially the Internet. P2P is a class of applications that takes advantage of resources e.g. storage, cycles, content, human presence, available at the edges of the Internet. In addition, the P2P and Autonomous Agents technologies enable peers to modify the way to achieve their objectives. These technologies address the needs for autonomous agents to support self-organization of highly autonomous peers, load balancing, routing, service discovery, etc. Moreover, Service-Oriented Architectures (SOA) support of loose coupling of software components and consequently provide a high degree of interoperability and reuse. Web Service (WS) is an example of SOA that includes three main entities: Consumers, Providers, and Registers of services. These entities work in concert to provide a loosely coupled computing paradigm. WSs are self-contained, loosely coupled application modules with well described functionality that can be published, located and invoked across the Web. The growing number of WS lunched in the Web raises new challenges, such as discovery of WS. P2P and Autonomous Agents technologies are alternatives to tackle these challenges.

This book is designed to cover a wide range of topics in the field of Web services through P2P computing and Autonomous Agents. It includes four sections that cover various frameworks for developing P2P and Web service applications, development technologies for implementing Multi-Agent systems, Web service applications, context searching and Web discovering technologies. Each chapter is designed to be as a stand-alone as possible; the reader can focus on the interested topics only.

This book is intended for anyone who wants to cover a comprehensive range of topics in the field of Web Service developments, Multi-Agent Systems, Autonomous Agents and P2P computing. It is both for an academic audience (teachers, researchers and students, mainly of post-graduate studies) and professional audience (managers, software developers and IT specialists). Readers of this book are presumed familiar with the concepts and paradigms of P2P, Web Services, Multi-Agent Systems and Autonomous Agents.

This volume comprises of 12 chapters including an overview chapter providing an up-to-date and state-of-the research on the multi agent development and web services applications.

The book is divided into 4 main sections:

- **Section 1: Multi-Agent Systems Development**
- **Section 2: Context Searching**
- **Section 3: Framework Design**
- **Section 4: Web Service Applications**

Section 1 on Multi-Agent Systems Development contains four chapters that presents survey about Web services, software framework for the development of multi-agent system and multi-agent in intrusion detection system.

In **Chapter 1** “Web Services Integration in Multi-Agent Systems” by *Davide Guidi, Mauro Gaspari, and Giuseppe Profiti*, presents a survey of the current state of the art about Web services integration in open Multi-Agent Systems (MAS). The chapter identifies a set of requirements needed to achieve full integration and presents a communication infrastructure, which satisfies these requirements.

Chapter 2 “Extending the JADE Framework for Semantic Peer-to-Peer Service Based Applications” by *Agostino Poggi and Michele Tomaiuolo*, show how JADE, one of the most known and used software framework for the development of multi-agent systems, has been extended to become the main means to support legacy systems interoperability and to make the realization of scalable distributed peer-to-peer and service-oriented systems easy.

In **Chapter 3** “Adaptive Ensemble Multi-Agent Based Intrusion Detection Model” by *Tarek Helmy* presents an ensemble multi-agent-based intrusion detection model that combines anomaly, misuse and host-based detection analysis. The agents in the presented model use rules to check for intrusions, and adopt machine-learning algorithms to recognize unknown actions, and to update rules or create new ones automatically. Each agent in the presented model encapsulates a specific classification technique and gives its belief about any packet event in the network. These agents collaborate to determine the decision about any event, have the ability to generalize, and to detect novel attacks.

Chapter 4 “Towards Automatic Service Composition within ARGUGRID” by *Nabeel Azam, Vasa Curcin, Li Guo, and Moustafa Ghanem* address two challenges in developing a framework that simplifies the workflow creation process within the ARGUGRID project. This chapter focused on the use of agents in enabling automatic service compositions in ARGUGRID. Moreover, it provided the design and implementation of a run-time interaction architecture that comprise of a workflow system, registry and brokering system.

Section 2 on Context Searching contains three chapters discussing the Context Dissemination in Peer-to-Peer Networks, Request-driven Cross-Media Content Adaptation Technique and Collaborative Autonomous Interface Agent approach.

In **Chapter 5** “Context Dissemination in Peer-to-Peer Networks” by *Antje Barth, Michael Kleis, Andreas Klenk, Benoit Radier, Sanaa Elmoumouhi, Mikael Salaun, and Georg Carle* introduce context-aware computing as a one key technology to enable services and applications in the communication environment to adapt their behaviour based on the knowledge of environmental (contextual) information, thereby enhancing the system’s ability to become ever more responsive to the needs of the end-user or application domain. The chapter focus on the question: How can highly distributed context information be located and retrieved regarding small-scale as well as large-scale networks, addressing the topics of inter-domain management and scalability of context architectures.

Chapter 6 “Request-Driven Cross-Media Content Adaptation Technique” by *Mohd Farhan Md Fudzee and Jemal Abawajy* justify the need of distributed cross media content adaptation and the potential of utilizing Web Services as the adaptation providers. It introduces request-driven context to complement constraint-driven and utility-driven approaches. The chapter describes the request context mapping and propose a novel paths determination scheme for determining the optimal service proxies to facilitate the adaptation tasks.

Chapter 7 “Personalized Web Services Selection” by *Tarek Helmy and Ahmed Al-Nazer* presents a Collaborative Autonomous Interface Agent (CAIA) that collaborates with the Internet Meta search engines to support the user in finding exactly the Web services consistent with his/her needs.

Framework Design is the third section in the book. It contains four chapters discussing various frameworks design for developing P2P and Web service applications including Mobil Web Services, Java Distributed Machine, and Overlay Network for Video Streaming.

Chapter 8 “Mobile Web Services for P2P Computing” by *Fahad Aijaz* investigates the interaction, architecture and design characteristics of Mobile Web Services (MobWS) for P2P computing. The chapter presents two MobWS interaction strategies followed by the architectural discussion, enfolding server and client side components, of a resource-oriented MobWS framework. It also discussed REST design principles to propose an efficient way of architecting P2P MobWS systems, as an alternative to SOAP, enabling significant payload reduction and performance optimization in mobile servers. The detailed performance evaluation is also presented and compared to SOAP based on real-time measurements.

Chapter 9 “Peer-to-Peer Platforms for High-Quality Web Services: The Case for Load-Balanced Clustered Peer-to-Peer Systems” by *Ying Qiao, Shah Asaduzzaman, and Gregor V. Bochmann* present a clustered Peer-to-Peer system as a resource organization structure for Web-service hosting platforms where service quality such as response time and service availability are provided with assurance.

In **Chapter 10** “Distributed Libraries Management for Remote Compilation and Execution on Grid Platforms with JaDiMa,” *Jesús De Oliveira, Yudit Cardinale, Eduardo Blanco, and Carlos Figueira* describe JaDiMa (Java Distributed Machine), a collaborative framework to construct Java applications on grid platforms. JaDiMa services are implemented as Web Services following the SOA approach; library repositories are modeled as a JXTA P2P network; and semantic annotations of libraries assist developers on the tasks of discovering libraries. The chapter describes an implementation of JaDiMa as part of SUMA/G, a Globus-based grid environment.

Chapter 11 “A Self-Organized Structured Overlay Network for Video Streaming” by *Khaled Ragab* presents a self-organized structured P2P overlay network for efficient video streaming. This overlay network is organized into clusters. Each cluster contains peers where their play points located between lower and upper play point limits. Thus it enables peers in the cluster to enjoy the flexibility of watching same media file with low overhead of seek operations.

The final Section of the book deals with the **Web Service Applications**. It discusses Web Services for Quality of Service application.

Chapter 12 “Web Services for Quality of Service Based Charging” by *Evelina Pencheva and Ivaylo Atanasov* present Parlay X as a set of Web Service interfaces that are designed to provide open access to telecommunication network functions and thus to hide from application developers underlying network technology and its control protocol complexity. It presents an analysis of the interfaces and particularly the discussion about their applicability to Policy and Charging Control architecture in IMS. The usage of Web Services is exemplified with an application for charging control based on the provided QoS.

Finally, the editors are grateful to the readers for any constructive censure and indication of errors, conceptual, inattentions or in typing. We are very much grateful to the authors of this volume and to the reviewers for their great effort by reviewing and providing useful feedback to the authors.

Khaled Ragab
Tarek Helmy
Aboul Ella Hassanien
Editors