Preface

Service is the lifeblood for individuals, industry, community, and society; demand-driven services are paramount. An industry is inevitably defined by customer demands. Similarly, citizen and community demand inevitably define the government in a country. Therefore, meeting the demand from government, community, and customers at a social level is a grand challenge for computing, service, and management in the Internet age. Meeting the demand from individuals, businesses, transactions, and projects at an activity level is also a grand challenge for services, analytics services, mobile services, e-services, cloud services, and social networking services in the Internet age. With these challenges in mind, Demand-Driven Web Services will address the following significant issues arising in the smarter customers-driven age. What are the demands of governments for Web services? What are the demands of communities for Web services? What are the demands of organizations in general, and specific enterprises for Web services? What are the demands of customers’ Web services? Taking these demands into account, what are the Web services that can meet each of these mentioned demands?

Web services are playing a pivotal role in service computing, mobile computing, analytics computing, cloud computing, and social computing (for short SMACS computing); for all these computing, e or electronic is at the center over the past decade. This is also the case in the traditional FREG (Foods, Resources, Energy, and Goods) services, because almost all traditional services are fully or partially replaced or improved by Web services. Demand-driven Web services as a computing paradigm, a service paradigm, and a management paradigm is becoming important for service computing, mobile computing, Web computing, cloud computing, and social computing. However, many fundamental issues in developing demand-driven Web services remain open. For example, what are the theory and technologies of demand-driven Web services? How should real world demands be classified? How should Web services be classified? How can an ontology of Web services be developed? How can we combine the theory and technologies of demand-driven Web services with real-world applications including e-supply chain, e-marketing, e-commerce and e-government, cloud services, big data management, and social networking services.

In tandem with resolving these issues, this book on demand-driven Web services can meet the demand of various professionals’ understanding of Web services in the Internet age more comprehensively. More specifically, this book will address these above-mentioned issues by exploring the theory of demand and various demands from governments, communities, organizations, and individuals, and then look at the various demand-driven Web services. This book further provides applications of the proposed theory, technologies, and methodologies to successful demand-driven Web services in the real world. The approach proposed in this book will expand the field of mobile services, e-business services, Web services, cloud services, and social networking services through the proposed theory, technologies,
and methodologies of demand-driven Web services with applications. The proposed approaches will facilitate research and development of electronic computing, mobile computing, analytics computing, cloud computing, and social computing (for short, eSMACS computing). The proposed approach in this book will also benefit readers by providing an understanding of demand-driven Web services and their impacts on e-commerce, e-services and e-government, and cloud computing.

In the past two decades, commerce has evolved from traditional commerce through e-commerce to smarter commerce thanks to the dramatic development of the Internet and the Web. In the meantime, services have also evolved from traditional services through electronic services to Web services. Currently, Web services emphasize e-services, smarter services, mobile services, analytics services, cloud services, and (online) social networking services (for short, eSMACS services). However, demand is the driver of the economy, marketing, and any business/services activities. Demand-driven Web services are the effective computing, management, and service paradigm, and provide significant solutions to business, marketing, and services through effective theory, technologies, methodologies, and applications. This book is the first book to reveal the cutting-edge theory, technologies, methodologies, and applications of demand-driven Web services in the Internet age in an integrated way. This is also the first book demonstrating that demand-driven Web services are an important computing, management, and service paradigm for developing smarter commerce, business, and services in the digital age.

There are a large number of books on Web services and e-services. They focus either on describing a few global successful companies in Web services in the world or on exploring technological Web services. Unlike the existing books, this book will explore the cutting-edge theory, technologies, methodologies, and applications of demand-driven Web services using the novel classification of demands and Web services and their interrelationships based on the effective contributions of international scholars from a perspective of computing, service, business, and management. The emerging mobile services, analytics services, cloud services, and social networking services are centered in the current Web services. More real world Web services will be examined in this book because of the characteristics of this book and the contribution of international peers.

This book’s primary aim is to convey the ideas, thoughts, and methods as well as results of demand-driven Web services to scientists, engineers, educators and university students, business, service and management professionals, policy makers and decision makers, and others who have interest in traditional services, e-services, mobile services, analytics services, cloud services, social networking services, and Web services. Primary audiences for this book are undergraduate, postgraduate students, and variety of professionals in the fields of computing, commerce, business, services, management, and governance. The secondary audience(s) for this book is the variety of readers in the fields of government, business, and trade as well as the readers from all the social strata.

This book presents a collection or original, rigorous, and significant contributions on demand-driven Web services. Nineteen chapters are selected and included in this book after double anonymously blinded reviewing by the international peers due to the limitation of the allotted pages published. The chapters are organized into three sections: Section 1: “Theory of Demand-Driven Web Services,” Section 2: “Technology of Demand-Driven Web Services,” Section 3: “Applications of Demand-Driven Web Services.” In what follows, we briefly summarize each chapter included in each section.
Section 1: Theory of Demand-Driven Web Services

Section 1: “Theory of Demand-Driven Web Services” consists of four chapters.

Chapter 1, by Zhaohao Sun and John Yearwood, provides a theoretical foundation of demand-driven Web services. More specifically, this chapter addresses two fundamental issues: what is the unified perspective to the state-of-the-art of Web services? What is the foundation of Demand-Driven Web Services (DDWS)? Chapter 1 answers these questions by examining the state-of-the-art of Web services and proposing a theoretical and technological foundation for demand-driven Web services with applications. This chapter also presents an extended Service-Oriented Architecture (SOA), eSMACS SOA, and examined main players in this architecture. This chapter then classifies demand-driven Web services as government demand-driven Web services, organizational demand-driven Web services, enterprise demand-driven Web services, customer demand-driven Web services, and citizen demand-driven Web services, and looks at the corresponding Web services. Finally, this chapter examines the theoretical, technical foundations for demand-driven Web services with applications.

Chapter 2, by Kenneth David Strang, explores marketing theories to model business Web service procurement behavior. This chapter provides literature-grounded definitions of contemporary Web services and marketing theories, which can model business demand through procurement decision-making behavior. The constructed grounded theory method was applied by interviewing Chief Information Officers (CIO) at large organizations across four industries in the USA: healthcare, higher education, energy creation, and banking. The purpose was to determine which marketing theories could effectively model their Web service procurement behavior. An empirical procurement decision-making model was developed and fitted with data collected from the participants. The results indicated that Web service procurement decision-making behavior in businesses could easily be modeled, and this was ratified by the CIOs. The chapter proposes a state-of-the-art ontology and model for continued empirical research about organizational procurement decision-making behavior for Web services or other products.

Chapter 3, by Jannick Kirk Sørensen and Anders Henten, examines co-creation of innovations in ICT-based service encounters. Innovations in services often emanate from the service encounters (i.e. the touch points between the service producers and the customers). This chapter deals with two different types of service encounters: face-to-face and ICT-based service encounters, and examines the specific conditions for innovations from ICT-based service encounters. This chapter establishes a conceptual foundation for innovations in ICT-based service encounters.

Chapter 4, by Enrico Franchi, Agostino Poggi, and Michele Tomaiuolo, looks at multi-agent active services for online social networks. This chapter demonstrates how multi-agent systems can be a suitable means for supporting the development and the composition of services in dynamic and complex environments. In particular, this chapter addresses the problem of developing services in the field of social networks. After an introduction to the relationships between multi-agent systems, services, and social networks, this chapter describes how multi-agent systems can support the interaction and the collaboration among the members of a social network through a set of active services.
Section 2: Technologies of Demand-Driven Web Services

Section 2: “Technologies of Demand-Driven Web Services” consists of seven chapters.

Chapter 5, by Mihai Horia Zaharia, examines generalized demand-driven Web services through proposing a novel approach for overcoming the differences between real life services and software services. Using the design approaches for the current service-oriented architecture, a solution that can be implemented in open source systems has been proposed. As a result, a new approach to creating an agent for service composition is introduced. The agent itself is created by service composition too.

Chapter 6, by Zakaria Maamar, Noura Faci, Ejub Kajan, and Emir Ugljanin, examines Social Web services management. This chapter sheds light on some criteria that help Web services select a certain network to sign up over another. These criteria are driven by the security means that each network deploys to ensure the safety and privacy of its members from potential attacks. When a Web service signs up in a network, it becomes exposed to both the authority of the network and the existing members in the network as well. These two can check and alter the Web service’s credentials, which may jeopardize its reputation and correctness levels.

Chapter 7, by Evan Morrison, Aditya Ghose, Hoa Dam, et al, looks at declarative service modeling through adaptive case management. Adaptive Case Management addresses the shift away from the prescriptive process-centric view of operations towards a declarative framework for operational descriptions that promotes dynamic task selection in knowledge-intensive operations. By taking an adaptive case management approach to knowledge intensive services, it is possible to model and execute workflows such as medical protocols that have previously been too difficult to describe with typical BPM frameworks. This chapter proposes an approach to design level adaptive case management leveraging off existing repositories’ semantically annotated business process models.

Chapter 8, by Evelina Pencheva, discusses design of Web services for mobile monitoring and access to measurements. Provisioning of applications and value added services for mobile (remote) monitoring and access to measurements data is supported by advanced communication models such as Internet of Things (IoT). IoT provides ubiquitous connectivity at any time and with anything. IoT applications are able to communicate with the environment, to receive information about its status, to exchange and use the information. This chapter presents an approach to design Web services Application Programming Interfaces (API) for mobile monitoring and database access, discusses the aspects of the Web services implementation, and describes a traffic model of Web services application server. The Web services application server handles traffic of different priorities generated by third party applications and by processes at the database server’s side. The traffic model takes into account the distributed structure of the Web services application server and applies mechanisms for adaptive admission control and load balancing to prevent overload. This chapter also evaluates the utilization of Web services application server through simulation.

Chapter 9, by Te Fu Chen, develops a new revenue business model in social network through a case study of Facebook and discusses its potential monetization business model. The study reviews five business models including: 1) social media startups, 2) social networks face challenging: must monetize or die, 3) a case study of the new effective social business model – Facebook, 4) monetization: Facebook revenue and business model, and 5) a discussion of monetizing social networks: the four dominant business models and how one should implement them in the future. Through the above comprehensive
review, this chapter proposes a social media monetization model as the reference for firms to implement new business models of social networking.

Chapter 10, by Chengcheng Huang, Phil Smith, and Zhaohao Sun, examines secure network solutions for enterprise cloud services. Securing a cloud network is an important challenge for delivering cloud services to enterprises cloud. There are a number of secure network protocols, such as VPN protocols, currently available to provide different secure network solutions for enterprise clouds. For example, PPTP, IPSec, and SSL/TLS are the most widely used VPN protocols in today’s securing network solutions. However, there are some significant challenges in the implementation stage. For example, which VPN solution is easy to deploy in delivering cloud services? Which VPN solution is most user-friendly in enterprise clouds? This chapter explores these issues by implementing different VPNs in a virtual cloud network environment using open source software and tools. This chapter also reviews cloud computing and cloud services and looks at their relationships.

Chapter 11, by Chellammal Surianarayanan, Gopinath Ganapathy, and Manikandan Sethunarayanan Ramasamy, proposes a practical approach to enhancement of accuracy of similarity model using WordNet towards semantic service discovery. Semantic Web service discovery provides high retrieval accuracy. However, it imposes an implicit constraint to service clients that the clients must express their queries with the same domain ontologies as used by the service providers. Fulfilling this criterion is very tedious. Hence, a WordNet (general ontology)-based similarity model is proposed for service discovery, and its accuracy is enhanced to a level comparable to the accuracy of computing similarity using service-specific ontologies. This is done by optimizing similarity threshold, which refers to a minimum similarity that is required to decide whether a given pair of services is similar or not. The proposed model is implemented and results are presented in this chapter. The approach warrants clients to express their queries without specifying any ontology and alleviates the problem of maintaining complex domain ontologies.

Section 3: Applications of Demand-Driven Web Services

Section 3: “Applications of Demand-Driven Web Services” consists of eight chapters.

Chapter 12, by Dong Dong, Lizhe Sun, and Zhaohao Sun, examines Web services in China. More specifically, this chapter examines the state-of-the-art of China’s Web services in terms of cloud services, mobile services, and social networking services through exploring several leading Web service providers in the ICT industry, including Alibaba, Tencent, China Mobile, and Huawei. This research reveals that the Chinese culture has played an important role in the success of China’s Web services. The trade-off idea and communication conventions from Chinese traditional culture, as well as Mao Zedong thought, have greatly influenced the development of the China’s Web services. The findings of this chapter might facilitate the research and development of Web services and better understanding of the growth in China’s ICT industry as well as future trends.

Chapter 13, by Mohd Hisham Mohd Sharif, Indrit Troshani, and Robyn Davidson, discusses adoption of social media services using the case of local government organizations in Australia. The increasing diffusion of social media is attracting government organizations worldwide, including local government. Social media can help local government improve the manner in which it is engaged with community and its responsiveness whilst offering cost savings and flexibility. Yet, there is paucity of research in
relation to the adoption of social media Web services in local government organizations. This chapter aims to investigate the factors that drive the adoption of social media Web services within Australian local government. Using qualitative evidence, this chapter finds technological, organizational, and environmental factors that drive the decision of local government organization to adopt social media Web services. In addition to extending the existing body of knowledge, this chapter also offers insight concerning important managerial implications for helping local government to better understand social media adoption in their organizations.

Chapter 14, by Juan Boubeta-Puig, Guadalupe Ortiz, and Inmaculada Medina-Bulo, examines approaching the Internet of Things (IoT) through integrating Service-Oriented Architectures (SOA) and Complex Event Processing (CEP). IoT provides a large amount of data, which can be shared or consumed by thousands of individuals and organizations around the world. These organizations can be connected using SOA; however, SOA do not provide an efficient solution to consume IoT data for those systems requiring on-demand detection of significant or exceptional situations. In this regard, CEP technology continuously processes and correlates huge amounts of events to detect and respond to changing business processes. This chapter proposes the use of CEP to facilitate the demand-driven detection of relevant situations. This is achieved by aggregating simple events generated by an IoT platform in an event-driven SOA, which makes use of an enterprise service bus for the integration of IoT, CEP, and SOA. This chapter illustrates the proposed approach through the implementation of a case study. The research results confirm that CEP provides a suitable solution for the case study problem statement.

Chapter 15, by Shah Jahan Miah, discusses demand-driven cloud-based business intelligence for healthcare decision-making. More specifically, this chapter introduces a combined requirement of developing intelligent decision support approach through the application of business intelligence and cloud-based functionalities. Both technological approaches demonstrate their usage to meet growing end users’ demand through their innovative features in healthcare. As such, the main emphasis in this chapter goes after outlining a conceptual approach of demand-driven cloud-based business intelligence for meeting the decision support needs in a hypothetical problem domain in healthcare industry, specially focusing on decision support system development within a non-clinical context for individual end-users or patients who need decision support for their well-being and independent everyday living.

Chapter 16, by Patrizia Lombardi, Andrea Acquaviva, Enrico Macii, et al., examines Web and cloud management for building energy reduction toward a smart district information modeling. This chapter illustrates the development of a Web service-oriented, open platform with capabilities of real-time district-level data processing and visualization. The platform will allow open access with personal devices and A/R visualization of energy-related information to client applications for energy and cost-analysis, tariff planning and evaluation, failure identification and maintenance, and energy information sharing. The expected results are a consistent reduction in both energy consumption and CO2 emissions by enabling more efficient energy distribution policies, according to the actual characteristics of district buildings and inhabitants as well as a more efficient utilization and maintenance of the energy distribution network, based on social behaviour, user lifestyles, and singular demands.

Chapter 17, by Edwin I. Achugbue, examines e-business in education, with emphasis on the case of the Delta State University Abraka, Delta State, Nigeria. This chapter focuses on the concept of e-business, e-business in education, and explores the various educational routines, such as e-learning, tele-learning, research, and administration. The study also examines classification of e-business and e-business tools,
such as e-mail, Websites, message boards, online catalogs, and telephone and e-business activities in education. This chapter focuses on e-payment of fees, students’ registration, checking of results, and online application as part of e-business routines in administration. Finally, this chapter looks at the barriers to e-business adoption in education using diffusion theory of innovation.

Chapter 18, by Sijin He, Li Guo, and Yike Guo, examines an Elastic Application Container (EAC) system. EAC system is a technology that delivers a lightweight virtual resource unit for better resource efficiency and more scalable Web applications in the cloud. It allows multiple application providers to concurrently run their Web applications on this technology without worrying the demand change of their Web applications. This is because the EAC system constantly monitors the resource usage of all hosting Web applications and automatically reacts to the resource usage change of Web applications (i.e. it automatically handles resource provisioning of the Web applications, such as scaling of the Web applications according to the demand). This chapter describes the architecture, its components of the EAC system, in order to give a brief overview of technologies involved in the system. It then presents, explains, and evaluates resource-provisioning algorithms and techniques used in the EAC system for demand-driven Web applications. Finally, this chapter compares this EAC system technology with other cloud technologies in terms of flexibility and resource efficiency.

Chapter 19, by Tianxing Cai, discusses the artificial neural network for industrial and environmental research via air quality monitoring network. Industrial and environmental research will always involve the study of the cause-effect relationship between the emission and the surrounding environment. The techniques of artificial intelligence such as artificial neural network can be applied in the industrial and environmental research. Chemical facilities have high risks to originate air emission events (e.g. intensive flaring and toxic gas release). They are caused by various uncertainties like equipment failure, false operation, nature disaster, or terrorist attack. Through air-quality monitoring network, this chapter applies the data integration to identify the possible emission source and dynamic emission profiles. This chapter also provides valuable information for accidental investigations and root cause analysis for an emission event; meanwhile, it helps evaluate the regional air quality impact caused by such an emission event as well.

It clearly is impossible to cover the full range of issues related to demand-driven Web services theory, technologies, and applications in a single book, and hence, no attempt has been made to do so. We hope that the readers will find some interesting and valuable ideas, methods, techniques, models, and insights for stimulating new research and development of demand-driven Web services.

Demand-driven Web services is still an emerging area for research and development in terms of eMACS computing. There are still many issues that need to be addressed in the near future, for example, fundamental concepts, models, architectures, frameworks, schemes, or theories for planning, designing, building, operating, or evaluating, managing demand-driven Web services. As technologies for demand-driven Web services, AI-based technologies, including rule-based systems, ontology-development systems, machine learning techniques, multi-agent systems techniques, neural networks systems, fuzzy logic systems, cased-based reasoning systems, genetic algorithms techniques, data mining algorithms, intelligent agents, user intelligent interfaces, Web technologies, service technologies, social networking technologies, decision-making technologies, DSS technologies, need to be incorporated into demand-driven Web services. As applications of demand-driven Web services, case studies and applications in using the above-mentioned technologies and fundamental theory in the representative service domains
such as: e-business services, mobile services, social networking services, cloud services, financial services, legal services, healthcare services, logistics services, educational services, e-FREG services, and military services taking into account demands from government, organization, enterprise, community, individual, customer, and citizen, need to be undertaken. Finally, trends and challenges on demand-driven Web services include emergent AI-based technologies, big data technologies, social networking services, integrations of these technologies, and the implications, challenges for demand-driven Web services, emerging demands, emerging technologies, including human computation and big data management, methodologies for demand-driven Web services, require more attention in research and development.

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