Bedir Tekinerdogan
Yingwei Wang
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Internet of Things – ICIOT 2022

7th International Conference
Held as Part of the Services Conference Federation, SCF 2022
Honolulu, HI, USA, December 10–14, 2022, Proceedings

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Preface

With the rapid advancements of the mobile Internet, cloud computing and Big Data, the device-centric traditional Internet of Things (IoT) is now moving into a new era which is termed as Internet of Things Services (IoTS). In this era, sensors and other types of sensing devices, wired and wireless networks, platforms and tools, data processing/visualization/analysis and integration engines, and other components of traditional IoT are interconnected through innovative services to realize the value of connected things, people, and virtual Internet spaces. The way of building new IoT applications is changing. We indeed need creative thinking, long-term visions, and innovative methodologies to respond to such change. The ICIOT 2022 conference was organized to promote research and application innovations around the world.

ICIOT 2022 was one of the events of the Services Conference Federation event (SCF 2022), which had the following 10 collocated service-oriented sister conferences: the International Conference on Web Services (ICWS 2022), the International Conference on Cloud Computing (CLOUD 2022), the International Conference on Services Computing (SCC 2022), the International Conference on Big Data (BigData 2022), the International Conference on AI & Mobile Services (AIMS 2022), the International Conference on Metaverse (METAVERSE 2022), the International Conference on Internet of Things (ICIOT 2022), the International Conference on Cognitive Computing (ICCC 2022), the International Conference on Edge Computing (EDGE 2022), and the International Conference on Blockchain (ICBC 2022).

This volume presents the papers accepted at ICIOT 2022, There were 17 submissions and we accepted 9 papers for the proceedings. Each was reviewed and selected by at least three independent members of the Program Committee.

We are pleased to thank the authors whose submissions and participation made this conference possible. We also want to express our thanks to the Organizing Committee and Program Committee members, for their dedication in helping to organize the conference and review the submissions.

December 2022

Bedir Tekinerdogan
Yingwei Wang
Liang-Jie Zhang

Organization

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Services Society

The Services Society (S2) is a non-profit professional organization that was created to promote worldwide research and technical collaboration in services innovations among academia and industrial professionals. Its members are volunteers from industry and academia with common interests. S2 is registered in the USA as a "501(c) organization", which means that it is an American tax-exempt nonprofit organization. S2 collaborates with other professional organizations to sponsor or co-sponsor conferences and to promote an effective services curriculum in colleges and universities. S2 initiates and promotes a "Services University" program worldwide to bridge the gap between industrial needs and university instruction.

The Services Society has formed Special Interest Groups (SIGs) to support technology- and domain-specific professional activities:

- Special Interest Group on Web Services (SIG-WS)
- Special Interest Group on Services Computing (SIG-SC)
- Special Interest Group on Services Industry (SIG-SI)
- Special Interest Group on Big Data (SIG-BD)
- Special Interest Group on Cloud Computing (SIG-CLOUD)
- Special Interest Group on Artificial Intelligence (SIG-AI)
- Special Interest Group on Edge Computing (SIG-EC)
- Special Interest Group on Cognitive Computing (SIG-CC)
- Special Interest Group on Blockchain (SIG-BC)
- Special Interest Group on Internet of Things (SIG-IOT)
- Special Interest Group on Metaverse (SIG-Metaverse)

Services Conference Federation (SCF)

As the founding member of SCF, the first International Conference on Web Services (ICWS) was held in June 2003 in Las Vegas, USA. The First International Conference on Web Services - Europe 2003 (ICWS-Europe'03) was held in Germany in October 2003. ICWS-Europe'03 was an extended event of the 2003 International Conference on Web Services (ICWS 2003) in Europe. In 2004 ICWS-Europe changed to the European Conference on Web Services (ECOWS), which was held in Erfurt, Germany.

SCF 2019 was held successfully during June 25–30, 2019 in San Diego, USA. Affected by COVID-19, SCF 2020 was held online successfully during September 18–20, 2020, and SCF 2021 was held virtually during December 10–14, 2021.

Celebrating its 20-year birthday, the 2022 Services Conference Federation (SCF 2022, www.icws.org) was a hybrid conference with a physical onsite in Honolulu, Hawaii, USA, satellite sessions in Shenzhen, Guangdong, China, and also online sessions for those who could not attend onsite. All virtual conference presentations were given via prerecorded videos in December 10–14, 2022 through the BigMarker Video Broadcasting Platform: https://www.bigmarker.com/series/services-conference-federati/series_summit.

Just like SCF 2022, SCF 2023 will most likely be a hybrid conference with physical onsite and virtual sessions online, it will be held in September 2023.

To present a new format and to improve the impact of the conference, we are also planning an Automatic Webinar which will be presented by experts in various fields. All the invited talks will be given via prerecorded videos and will be broadcast in a live-like format recursively by two session channels during the conference period. Each invited talk will be converted into an on-demand webinar right after the conference.

In the past 19 years, the ICWS community has expanded from Web engineering innovations to scientific research for the whole services industry. Service delivery platforms have been expanded to mobile platforms, the Internet of Things, cloud computing, and edge computing. The services ecosystem has been enabled gradually, with value added and intelligence embedded through enabling technologies such as Big Data, artificial intelligence, and cognitive computing. In the coming years, all transactions involving multiple parties will be transformed to blockchain.

Based on technology trends and best practices in the field, the Services Conference Federation (SCF) will continue to serve as a forum for all services-related conferences. SCF 2022 defined the future of the new ABCDE (AI, Blockchain, Cloud, Big Data & IOT). We are very proud to announce that SCF 2023's 10 colocated theme topic conferences will all center around "services", while each will focus on exploring different themes (Web-based services, cloud-based services, Big Data-based services, services innovation lifecycles, AI-driven ubiquitous services, blockchain-driven trust service ecosystems, Metaverse services and applications, and emerging service-oriented technologies).

The 10 colocated SCF 2023 conferences will be sponsored by the Services Society, the world-leading not-for-profit organization dedicated to serving more than 30,000

services computing researchers and practitioners worldwide. A bigger platform means bigger opportunities for all volunteers, authors, and participants. Meanwhile, Springer will provide sponsorship for Best Paper Awards. All 10 conference proceedings of SCF 2023 will be published by Springer, and to date the SCF proceedings have been indexed in the ISI Conference Proceedings Citation Index (included in the Web of Science), the Engineering Index EI (Compendex and Inspec databases), DBLP, Google Scholar, IO-Port, MathSciNet, Scopus, and ZbMath.

SCF 2023 will continue to leverage the invented Conference Blockchain Model (CBM) to innovate the organizing practices for all 10 conferences. Senior researchers in the field are welcome to submit proposals to serve as CBM ambassadors for individual conferences.

SCF 2023 Events

The 2023 edition of the Services Conference Federation (SCF) will include 10 service-oriented conferences: ICWS, CLOUD, SCC, BigData Congress, AIMS, METAVERSE, ICIOT, EDGE, ICCC and ICBC.

The 2023 International Conference on Web Services (ICWS 2023, http://icws.org/2023) will be the flagship theme-topic conference for Web-centric services, enabling technologies and applications.

The 2023 International Conference on Cloud Computing (CLOUD 2023, http://thecloudcomputing.org/2023) will be the flagship theme-topic conference for resource sharing, utility-like usage models, IaaS, PaaS, and SaaS.

The 2023 International Conference on Big Data (BigData 2023, http://bigdatacongress.org/2023) will be the theme-topic conference for data sourcing, data processing, data analysis, data-driven decision-making, and data-centric applications.

The 2023 International Conference on Services Computing (SCC 2023, http://thescc.org/2023) will be the flagship theme-topic conference for leveraging the latest computing technologies to design, develop, deploy, operate, manage, modernize, and redesign business services.

The 2023 International Conference on AI & Mobile Services (AIMS 2023, http://ai1000.org/2023) will be a theme-topic conference for artificial intelligence, neural networks, machine learning, training data sets, AI scenarios, AI delivery channels, and AI supporting infrastructures, as well as mobile Internet services. AIMS will bring AI to mobile devices and other channels.

The 2023 International Conference on Metaverse (Metaverse 2023, http://www.metaverse1000.org/2023) will focus on innovations of the services industry, including financial services, education services, transportation services, energy services, government services, manufacturing services, consulting services, and other industry services.

The 2023 International Conference on Cognitive Computing (ICCC 2023, http://thecognitivecomputing.org/2023) will focus on leveraging the latest computing technologies to simulate, model, implement, and realize cognitive sensing and brain operating systems.

The 2023 International Conference on Internet of Things (ICIOT 2023, http://iciot.org/2023) will focus on the science, technology, and applications of IOT device innovations as well as IOT services in various solution scenarios.

The 2023 International Conference on Edge Computing (EDGE 2023, http://theedgecomputing.org/2023) will be a theme-topic conference for leveraging the latest computing technologies to enable localized device connections, edge gateways, edge applications, edge-cloud interactions, edge-user experiences, and edge business models.

The 2023 International Conference on Blockchain (ICBC 2023, http://blockchain1000.org/2023) will concentrate on all aspects of blockchain, including digital currencies, distributed application development, industry-specific blockchains, public blockchains, community blockchains, private blockchains, blockchain-based services, and enabling technologies.

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