# Table of Contents

**Message from the General and Program Chairs** ........................................................................... xiii
**Organizing Committee** ................................................................................................................................... xiv
**Technical Program Committee** ................................................................................................................. xvi
**IEEE Computer Society Technical Committee on Services Computing** ........................................................... xx

---

### Research Session 1—Choreography of Business Process Management

- A Model for Visual Specification of E-contracts ................................................................. 1  
  *Enrique Martínez, Gregorio Díaz, M. Emilia Cambronero, and Gerardo Schneider*
- Preserving Data Flow Correctness in Process Adaptation ............................................. 9  
  *Wei Song, Xiaoxing Ma, S.C. Cheung, Hao Hu, and Jian Lü*
- Process Trace Identification from Unstructured Execution Logs .................................... 17  
  *Nirmut Desai, Anuradha Bhamidipaty, Bhuvan Sharma, Virendra K. Varshneya, Mitesh Vasa, and Shailabh Nagar*

### Research Session 2—Modeling and Abstraction of Services Process

- Dynamic Service Invocation Control in Service Composition Environments .............. 25  
  *Donghui Lin, Yohei Murakami, and Masahiro Tanaka*
- BPEL Remote Objects: Integrating BPEL Processes into Object-Oriented Applications ................................................................. 33  
  *Marvin Ferber, Thomas Rauber, and Sascha Hunold*
- Co-Taverna: A Tool Supporting Collaborative Scientific Workflows .......................... 41  
  *Jia Zhang*
Research Session 3—Business Oriented and Enabled SOA

Business Driven Consolidation of SOA Implementations .................................................................49
  Biplav Srivastava and Pietro Mazzoleni
Detection of Semantically Equivalent Fragments for Business Process Model Change Management ..........................................................................................................................57
  Christian Gerth, Markus Luckey, Jochen M. Küster, and Gregor Engels
A Novel Approach to Improving the Efficiency of Storing and Accessing Small Files on Hadoop: A Case Study by PowerPoint Files .................................................................65
  Bo Dong, Jie Qiu, Qinhua Zheng, Xiao Zhong, Jingwei Li, and Ying Li

Research Session 4—Cloud Services

A Formal Service Contract Model for Accountable SaaS and Cloud Services ............................................73
  Joe Zou, Yan Wang, and Kwei-Jay Lin
Accountability as a Service for the Cloud ..................................................................................................81
  Jinhui Yao, Shiping Chen, Chen Wang, David Levy, and John Zic
Graph-Based Cloud Service Placement ...................................................................................................89
  Anca Sailer, Michael R. Head, Andrzej Kochut, and Hidayatullah Shaikh

Research Session 5—QoS and Services Composition

Metaheuristic Optimization of Large-Scale QoS-aware Service Compositions ........................................97
  Florian Rosenberg, Max Benjamin Müller, Philipp Leitner, Anton Michlmayr,
  Athman Bouguettaya, and Schahram Dustdar
Xi-Calculus: A Calculus for Service Interactions ....................................................................................105
  Vineet Rajani, Arun Kumar, and Dharanipragada Janakiram
A Service-Oriented Framework for GNU Octave-Based Performance Prediction ........................................114
  George Kouziouris, Dimosthenis Kyriazis, Kleopatra Konstanteli, Spyridon Gogouvitis,
  Gregory Katsaros, and Theodora Varvarigou

Research Session 6—QoS Selection and Matchmaking

QoS Analysis and Service Selection for Composite Services ....................................................................122
  Huiyuan Zheng, Jian Yang, and Weiliang Zhao
A Heuristic Algorithm for Trust-Oriented Service Provider Selection in Complex Social Networks ..........................................................................................................................130
  Guanfeng Liu, Yan Wang, Mehmet A. Orgun, and Ee-Peng Lim
An Information Model for the Provisioning of Network Connections Enabling Customer-Specific End-to-End QoS Guarantees .............................................................................138
  Mark Yampolskiy, Wolfgang Hommel, Patricia Marcu, and Matthias K. Hamm
Research Session 7—Design and Modeling of SOA

SecureSOA—Modelling Security Requirements for Service-Oriented Architectures .............................................................. 146
  Michael Menzel and Christoph Meinel

Service Supervision for Service-Oriented Collective Intelligence ...................................................................................... 154
  Masahiro Tanaka, Yohei Murakami, Donghui Lin, and Toru Ishida

Research Session 8—Semantic Web Services

Meta-Modeling of Semantic Web Services ............................................................................................................. 162
  Roberto De Virgilio

Improve Service Interface Adaptation Using Sub-ontology Extraction ........................................................................... 170
  Lu Jin, Jian Wu, Jianwei Yin, Yin Li, and Shuiguang Deng

Distributed Storage and Querying Techniques for a Semantic Web of Scientific Workflow Provenance ........................................ 178
  John Abraham, Pearl Brazier, Artem Chebotko, Jaime Navarro, and Anthony Piazza

Research Session 9—Service Discovery and Delivery

Discovering Shared Services from Cross-Organizational Software Specifications .................................................................. 186
  Alexander Yale-Loehr, Ian D. Schlesinger, Aubrey J. Rembert, and M. Brian Blake

Analyzing Communities vs. Single Agent-Based Web Services: Trust Perspectives .............................................................. 194
  Babak Khosravifar, Jamal Bentahar, Ahmad Moazin, Zakaria Maamar, and Philippe Thiran

A Service Packaging Platform for Delivering Services .................................................................................................. 202
  Muhammad Adeel Talib, Alan Colman, Jun Han, Justin King, and Malinda Kapuruge

Research Session 10—Service Composition, Coordination, and Management

A Value-Driven Approach for the Determination of Global Optimization Objective of Service Composition ............................................... 210
  Zhongjie Wang, Xiaofei Xu, Dianhui Chu, and Chao Ma

Applying Bargaining Game Theory to Web Services Negotiation .......................................................................................... 218
  Xianrong Zheng, Patrick Martin, Wendy Powley, and Kathryn Brohman

A Continuous Long Running Batch Orchestration Model for Workflow Instance Migration .................................................. 226
  David Frank, Liana Fong, and Linh Lam
Application and Industry Session 1—Services Composition Methodology

Describing and Verifying Web Service Composition Using TLA Reasoning ................................................234
   Hongbing Wang, Qianzhao Zhou, and Yanqi Shi
Dynamic Composition of Services in Sensor Networks ................................................................................242
   Sahin Cem Geyik, Boleslaw K. Szymanski, Petros Zerfos, and Dinesh Verma
Discovering Business Process Model from Unstructured Activity Logs .........................................................250
   Rahul Kumar, Chiranjib Bhattacharyya, and Virendra Varshneya

Application and Industry Session 2—Services Selection and Matchmaking

Utilizing the Waiting-Time Criterion for Selecting Services in a Composition Scenario ..................................258
   Abhishek Srivastava and Paul G. Sorenson
ViPen: A Model Supporting Knowledge Provenance for Exploratory Service Composition ............................265
   Weilong Ding, Jing Wang, and Yanbo Han
A QoS Query Language for User-Centric Web Service Selection ..................................................................273
   Delnavaz Mobedpour, Chen Ding, and Chi-Hung Chi

Application and Industry Session 3—Policy Driven Business Process Generation

Analyst-Mediated Contextualization of Regulatory Policies ........................................................................281
   George Koliadis, Nirmi V. Desai, Nanjangud C. Narendra, and Aditya K. Ghose
Measuring Compliance and Deviations in a Template-Based Service Contract Development Process ........289
   Vijil Chenthamarakshan, Rafah A. Hossn, Shajith Ikbal, Nanda Kambhatla,
   Debapriyo Majumdar, and Soumitra Sarkar
Towards a Novel Web Services Standard-Supported CDN-P2P Loosely-Coupled Hybrid and Management Model .................................................................297
   ZhiHui Lu, Jie Wu, and WeiMing Fu

Application and Industry Session 4—Trust Management

Universal Identity Management Model Based on Anonymous Credentials ................................................305
   Yang Zhang and Jun-Liang Chen
A Trust Ontology for Semantic Services ........................................................................................................313
   Wanita Sherchan, Surya Nepal, Jonathon Hunklinger, and Athman Bouguettaya
Constructing an Authentication Token to Access External Services in Service Aggregation ........................321
   Peishun Wang, Yi Mu, Willy Susilo, and Jun Yan
Application and Industry Session 5—Semantic Web and Pattern

Discovering Hierarchical Patterns in Event-Based Systems .......................................................... 329
Hannes Obweger, Josef Schiefer, Peter Keplinger, and Martin Suntinger

Alternative Approaches for Workflow Similarity ........................................................................ 337
Andreas Wombacher and Chen Li

A Knowledge Acquisition Method for Improving Data Quality in Services Engagements ........... 346

Application and Industry Session 6—QoS Enforcement

Feedback Controlled Quality of Service Enforcement for Service Oriented Architectures ............ 354
Andreas Lodde, Antoine Schlechter, Pascal Bauler, Nicolas Biri, and Fernand Feltz

Defining Metrics for Loose Coupling Evaluation in Service Composition .................................. 362
Anthony Hock-koon and Mourad Oussalah

Market-Based QoS Control for Voluntary Services .................................................................. 370
Yohei Murakami, Naoki Miyata, and Toru Ishida

Application and Industry Session 7—Business Process Integration and Management

Mobile Process Management through Web Services ................................................................. 378
Massimiliano de Leoni and Massimo Mecella

Towards Green Business Process Management ....................................................................... 386
Konstantin Hoesch-Klohe, Aditya Ghose, and Lam-Son Lê

Process Behavior Analysis: Mechanism to Enable Superior Customer Experience .................... 394
Karthik Visweswariah, Om D. Deshmukh, Ashish Verma, Sai Zeng, Chitra Dorai, Maureen Rzasa, and Gary Wright

Application and Industry Session 8—Business Driven Services Composition

A Cost-Minimizing Service Composition Selection Algorithm Supporting Time-Sensitive Discounts ................................................................. 402
Lei Xu and Brendan Jennings

A Business Centric End-to-End Monitoring Approach for Service Composites ....................... 409
Geetika T. Lakshmanan, Paul Keyser, Aleksander Slominski, Francisco Curbera, and Rania Khalaf

Smarter Heuristics for Business-Driven Services Selection in Multi-services P2P Grids .............. 417
Alvaro Coêlho and Francisco Brasileiro
Application and Industry Session 9—Software Tools for Services Computing

AHA: Asset Harvester Assistant ..............................................................425
    Debdoot Mukherjee, Senthil Mani, Vibha Singhal Sinha, Rema Ananthanarayanan,
    Biplav Srivastava, Pankaj Dhoolia, and Prahlad Chowdhury

A Link Obfuscation Service to Detect Webbots .....................................433
    Douglas Brewer, Kang Li, Laksmish Ramaswamy, and Calton Pu

PRV: An Approach to Process Model Refactoring in Evolving Process-Aware
    Information Systems ..........................................................................441
    Jin Zeng, Hailong Sun, Xudong Liu, Ting Deng, and Jianing Zou

Application and Industry Session 10—Information Systems for Business
    Processes

Prospective and Retrospective Provenance Collection in Scientific Workflow
    Environments ..................................................................................449
    Chunhyeok Lim, Shiyong Lu, Artem Chebotko, and Farshad Fotouhi

Correcting Interaction Mismatches for Business Processes ....................457
    Shuai Gong, Jinhua Xiong, Zhiyong Liu, and Cheng Zhang

Using Complex Event Processing for Dynamic Business Process Adaptation
    .........................................................................................................466
    Gabriel Hermosillo, Lionel Seinturier, and Laurence Duchien

Application and Industry Session 11—Service Platform and Middleware

Message-Based Service Brokering and Dynamic Composition in the SAI
    Middleware ....................................................................................474
    Federica Paganelli, David Parlanti, and Dino Giuli

An Assessment of Middleware Platforms for Accessing Remote Services .....482
    Young-Woo Kwon, Eli Tilevich, and William R. Cook

Extensible and General Service-Oriented Platform: Experience with
    the Service Abstract Machine ..........................................................490
    Eric Simon, Jacky Estublier, and Diana Moreno-Garcia

Application and Industry Session 12—Cloud Services

Wukong: Toward a Cloud-Oriented File Service for Mobile Devices ..........498
    Huajian Mao, Nong Xiao, Weisong Shi, and Yutong Lu

X-RIME: Cloud-Based Large Scale Social Network Analysis ..................506
    Wei Xue, JuWei Shi, and Bo Yang

Online Self-Reconfiguration with Performance Guarantee for Energy-Efficient
    Large-Scale Cloud Computing Data Centers ........................................514
    Haibo Mi, Huaimin Wang, Gang Yin, Yangfan Zhou, Dianxi Shi, and Lin Yuan
Application and Industry Session 13—Cloud Computing

Resource Allocation and SLA Determination for Large Data Processing Services over Cloud .................................................................................................................................................522
  K. Hima Prasad, Tanveer A. Faruquie, L. Venkata Subramaniam, Mukesh Mohania, and Girish Venkatachalilah
Cross Enterprise Improvements Delivered via a Cloud Platform: A Game Changer for the Consumer Product and Retail Industry ..................................................................................................................530
  Trieu Chieu, Shubir Kapoor, Ajay Mohindra, and Anees Shaikh
PeopleCloud Service for Enterprise Crowdsourcing ..........................................................................................................................538
  Mariana Lopez, Maja Vukovic, and Jim Laredo

Application and Industry Session 14—SOA Management and Coordination

SOAC: A Conceptual Model for Managing Service-Oriented Authorization ..........................................................................................................................546
  Haiyang Sun, Weiliang Zhao, and Jian Yang
Legacy Asset Analysis and Integration in Model-Driven SOA Solution ..........................................................................................................................554
  Nianjun Zhou, Liang-Jie Zhang, Yi-Min Chee, and Lei Chen
Towards a Variability Model for SOA-Based Solutions ..........................................................................................................................562
  Nanjagund C. Narendra and Karthikeyan Ponnalagu

Application and Industry Session 15—SOA and Business

Aligning IT Service Levels and Business Performance: A Case Study ..........................................................................................................................570
  Thiago Barroero, Gianmario Motta, Giovanni Pignatelli, Mario Bochicchio, Antonella Longo, and Alessandra Raffone
Process as a Service—Distributed Multi-tenant Policy-Based Process Runtime Governance ..........................................................................................................................578
  MingXue Wang, Kosala Yapa Bandara, and Claus Pahl
An Ontology to Support Context-Aware B2B Services ..........................................................................................................................586
  P.S. Tan, A.E.S. Goh, and S.S.G. Lee
Business-Driven Trust Federation Management for Service Marketplaces ..........................................................................................................................594
  Ji Hu, Xiaoyi Fan, and Robin Fischer

Application and Industry Paper—SCC 2009

Towards a Unified Service Description Language for the Internet of Services: Requirements and First Developments ..........................................................................................................................602
  Jorge Cardoso, Alistair Barros, Norman May, and Uwe Kylau

Work-in-Progress Session 1—Implementation of Services Computing

Formal Passive Testing of Service-Oriented Systems ..........................................................................................................................610
  César Andrés, M. Emilia Cambronero, and Manuel Núñez
A Service Identification Framework for Legacy System Migration into SOA ..........................................................................................................................614
  Saad Alahmari, Ed Zaluska, and David De Roure
Towards a Foundation for Quantitative Service Analysis—An Approach from Business Process Models ..............................................................618
   Naveen Kulkarni, Deepthi Parachuri, and Shashank Trivedi
Towards Self-Aware Performance and Resource Management in Modern Service-Oriented Systems ..........................................................621
   Samuel Kounev, Fabian Brosig, Nikolaus Huber, and Ralf Reussner

Work-in-Progress Session 2—Data Management in Services Computing
Supporting Geosciences Web Services Metadata Management and Discovery ..........................................................625
   Pearl Brazier, Artem Chebotko, Eric Gonzalez, Andrey Kashlev, and Anthony Piazza
Utility Decomposition and Surplus Redistribution in Composite SLA Negotiation ..........................................................627
   Jan Richter, Mohan Baruwal Chhetri, Ryszard Kowalezyk, Bao Quoc Vo, Muhammed Adeel Talib, and Alan Colman
Functionality-Driven Clustering of Web Service Registries ..........................................................631
   Mohamed Sellami, Walid Gaaloul, and Samir Tata

Work-in-Progress Session 3—Management and Support of Services Computing
Toward Consistent Combination of Service Selection Methods and Process Adaptation Methods ..........................................................635
   Fuyuki Ishikawa
Task Exception Handling in the VIEW Scientific Workflow System ..........................................................637
   Dong Ruan and Shiyong Lu
A Framework for Shrink-Wrapping Security Services ..........................................................639
   Gleneesha Johnson, Ashok Agrawala, and Elodie Billionniere
Enhancing Web Service Registries with Semantics and Context Information ..........................................................641
   Lu Chen, Yan Li, and Randy Chow

Work-in-Progress Session 4—Services Delivery and Applications
Converged Service Delivery: Modeling and Engineering ..........................................................645
   Noëmie Simoni, Chunyang Yin, and Philippe Coudë
A Framework for Personalized Context-Aware Search of Ontology-Based Tagged Data ..........................................................649
   Knarig Arabshian
A Novel Software Environment for Developing Migrating Internet Applications Based on Fusion of Mobile Agent, Web Services and BPEL Technologies ..........................................................651
   J.M. Gnanasekar and Venkatesan D. Pillai

Author Index ..............................................................................................................653