Index

activity diagram, 134
   decision node, 138–139
   guard, 138
acyclic well-structured process (AWSP), 48
acyclic Petri net, 108
aggregation function, 105
Amazon EC2, 192
API, 121, see also Application Programming Interface
Application Programming Interface (API), 121
assembly Petri net, 108
association rule mining, 210–211
automatic service composition, 75, 100, 125
availability, 104–105

big data, 224
binary mutual exclusion (BME), 154
BioCatalogue, 197
BPEL, see also Business Process Execution Language
Business Process Execution Language (BPEL), 15–16
CPN formalism for BPEL, 70, 74 example, 17
business process management (BPM), 5
   business process improvement (BPI), 6
   business process reengineering (BPR), 6
   business process outsourcing (BPO), 222
business rule management system (BRMS), 7
callback function, 34
caBIG, see also cancer Biomedical Informatics Grid
cancer Biomedical Informatics Grid (caBIG), 166
canGIRD, see also cancer Grid
cancer Grid (caGRID), 166
canGIRD Workflow Toolkit, 174
element workflows, 183–187
choreography, 100
CIMFlow-System, 123
circuit, 108
cloud computing, 222
CodeBook, 198
colored Petri nets (CPN), see also Petri nets
   communicating reachability graph (CRG), 68, 81–82
   method to construct CRG, 82–83
   example, 83–84
   composite service, 133
computer-supported cooperative work (CSCW), 7
cost, 104–105
cost model, 105
cf, 9
configuration process (CP), 111
cost, 104–105
CP, 111, see also configuration process
CPN, see also colored Petri nets
data driven composition rules, 45
   sequential, 46
parallel, 46
choice, 47
decision node, 138–139
disassembly Petri net, 107
   leaf, 107
root, 107
   initial marking, 108
   final marking, 107
disaster, 225
domain preference, 136, 137
dual attribute optimization, 118
Dummy Web services, 105, 108
e-Science, 162
Emergency Workflow, 225
Enterprise resource planning (ERP), 7
Extensible Markup Language, see also XML
Examples
   JavaScript Object Notation (JSON), 9
   example, 10
online appointment registration, 152
   online drug purchase, 148
   online shopping, 155
Facebook, 190
final marking, 107
global optimization, 125
Globus Toolkit, 165
Google, 190
guard, 138
IBM, International Business Machines, 18
   IBM Business Process Manager, 18, 40, 93
initial marking, 108
JavaScript Object Notation (JSON), 9
   example, 10
LinkedIn, 190
leaf, 107
local optimization, 125
MADM, 116, see also multi-attribute decision-making
   matrix, 214
   adjacent matrix, 214–215
   reachability matrix, 215–216
   transfer matrix, 216–217
mediation, see also mediator
   mediator, 76
   types of mediator, 88–89
   generation, 90–92
MethodBox, 197
multi-attribute decision-making (MADM), 116
multiset, 35
myExperiment, 182, 191, 194–197
   workflow network, 199–206
   operation network, 212–219
myGrid, 195
non-dummy Web services, 104
orchestration, 100, 123
online appointment registration, 152
online drug purchase, 148
online shopping, 155
Ontology Web Language–Service (OWL-S), 18
optimization, 125
   global optimization, 125
   local optimization, 125
Oracle, 18
   Oracle SOA Suite, 18
Pajek, 200
parallel structure, 153
Petri nets, 29–30
   colored Petri nets, CPN, 36–37, 41
   CPN formalism for BPEL, 70, 74
   comparison with CPN, 38
   execution rule, 30–31
   properties: reachability, boundedness, and liveness, 31
   reachability graph, 31
   process mining, 198
   processing preference with conditional expression (PPCE), 139, 142
processing preference with multiple cases (PPMC), 139, 145
processing preference with priority (PPP), 139, 147

Quality of Service (QoS), 99
QoS attributes, 104–105
aggregation function, 104–105
availability, 104–105
cost, 104–105
reliability, 104
successful execution rate, 104
QoS modeling, 99
QoS specification, 99
realizable configuration process, 111
reliability, 104
Representational State Transfer (REST), 14
example, 15
root, 107

SAP, 18
SCA, see also Service Component Architecture
SC-net, 103, see also service configuration net
scientific workflow, 26, 169
systems, 170
SDG, 102, see also service dependency graph
service, see also Web service
service community, 139
Service Component Architecture (SCA), 18, 101
Service Data Object (SDO), 18
service composition, 75, 100, 125
compatibility of service composition, 77
Service composition planner (SCP), 139
service configuration manager, 121–122
service configuration net (SC-net), 103
service configuration planner, 121–122
service configuration optimizer, 121–122
service dependency graph (SDG), 102
service functional configuration (SFC), 102
ServiceMap, 182, 207
Service Net, 49
Reduced Service Net (RSN), 51
decomposition of RSN, 54–55
service-oriented architecture (SOA), 1
eight principles of, 2
service-oriented science, 163
examples, 166
Service request, see also user’s request
Service set, 108
Service Workflow Net (SWF-net), 70–71
example, 71–72
composition of SWF-nets, 75
SFC, 102, see also service functional configuration
SSE, 112, see also solution of state-shift equation
Simple Object Access Protocol (SOAP), 2, 13, 122
example, 13–14
Six Sigma, 7
SOA, see also service-oriented architecture
social computing, 190
and workflows, 223
social network services (SNS), 190
for scientists, 191–194
software as a service (SaaS), 222
Solution of State-shift Equation (SSE), 112, 114, 115
Spring Framework, 122
state-shift equation, 110, 112
successful execution rate, 104

Taverna workbench, 171
comparison with BPEL, 173
TF-IDF: term frequency–inverse document frequency, 212
tModel, 124
total quality management (TQM), 7
Trident, the scientific workflow tool, 165
Twitter, 190
UML class diagram, 41
aggregation relation, 41
generalization relation, 41
generation relation, 41
realization relation, 42–43
CPN representation, 43–44
Universal Description, Discovery, and
Integration (UDDI), 3, 10–11, 121–122
user preference, 134, 137
user’s request, 139

Web 3C, 2
Web service, 2–3
related standards, 8
service client, registry, and
provider, 3–4
WS-Policy, WS-Addressing, WS-
Transfer, WS-Enumeration, 19
Web Services Choreography Description
Language (WS-CDL), 17
Web service composition, 100, 125,
see also service composition and
automatic service composition
Web service configuration, 100, 116
example, 102, 117–118

Web Service Definition Language
(WSDL), 3, 11, 121
example, 12
Web service discovery, 125–126
Web Services Resource Framework
(WSRF), 166
Weka: the data mining software,
210
wisdom of crowds, 191
Workflow, 4, 137, 225
engine, 19
glossary, 4–5
reference model, 4, 19
scientific workflow, see also scientific
workflow
workflow-as-a-service, 222
workflow management, 225
Workflow Net, 32
soundness, 34

XML, 3, 9, 122
example, 10
XML Process Definition Language
(XPDL), 20

Yahoo Pipes, 192