

# Contents

## Part I Cloud Computing

<b>1 Intelligent Web Data Management of Multi-tenant Data</b>	
<b>Middleware</b>	3
1.1 Introduction	3
1.1.1 Background	3
1.1.2 Challenges and Contributions	4
1.2 Related Work and Emerging Techniques	4
1.2.1 Software as a Service Maturity Model	4
1.2.2 Software as a Service Data Models	6
1.3 Requirements	9
1.3.1 Criteria of Multi-tenant Data Middleware	9
1.3.2 Requirements of Multi-tenant Data Middleware	10
1.4 Architecture	10
1.4.1 SQL Interceptor	10
1.4.2 SQL Parser	10
1.4.3 SQL Restorer	11
1.4.4 SQL Router	12
1.4.5 Data Node	12
1.4.6 Cache	13
1.4.7 Tenant Context	14
1.5 Evaluation	14
1.5.1 Cost Analysis	14
1.6 Discussion	15
1.6.1 Extensibility	15
1.6.2 Scalability	17
1.6.3 Disaster Recovery	18
1.7 Conclusions	19
References	19

## 2 Intelligent Web Data Management of NoSQL Data

<b>Warehouse</b>	21
2.1 Introduction	21
2.1.1 Background	21
2.1.2 Challenges and Contributions	22
2.2 Related Works and Emerging Techniques	23
2.2.1 Slowly Changing Dimensions of RDBMS	24
2.2.2 Slowly Changing Dimensions of NoSQL	27
2.2.3 MapReduce Framework	29
2.3 Requirements	30
2.4 Architecture	30
2.4.1 Deployment Architecture	31
2.4.2 Capture-Map-Reduce Procedure	31
2.4.3 Log-Based Capture	32
2.4.4 MapReduce	33
2.5 Evaluation	34
2.5.1 Redundancy Rate	35
2.5.2 Storage Space	36
2.5.3 Query Time of Track of History	38
2.5.4 Execution Time of Creation	39
2.6 Discussion	40
2.6.1 Effective Lifecycle Tag	40
2.6.2 Cell with Effective Lifecycle Tag	41
2.6.3 Extreme Data Storage Principles	41
2.7 Conclusions	43
References	43

## Part II Social Networking

### 3 Intelligent Web Data Management of Social Question

<b>Answering</b>	47
3.1 Introduction	47
3.1.1 Background	47
3.1.2 Challenges and Contributions	47
3.2 Related Work and Emerging Techniques	48
3.2.1 Social Question Answering	48
3.2.2 Multi-tenancy	49
3.2.3 NoSQL Storage	52
3.2.4 RESTful Web Service	52
3.3 Requirements	53
3.4 Architecture	53

3.4.1	Helper Recommendation Algorithm . . . . .	53
3.4.2	Help Feed Propagation Method . . . . .	55
3.4.3	Multi-tenancy . . . . .	56
3.4.4	Data Customizing of Tenants . . . . .	57
3.4.5	RESTful Web Service API . . . . .	58
3.5	Evaluation . . . . .	59
3.5.1	High Success Ratio . . . . .	59
3.5.2	Propagation Time . . . . .	61
3.5.3	Propagation Space . . . . .	61
3.5.4	Data Customizing of Tenants . . . . .	62
3.6	Discussions . . . . .	63
3.6.1	Preprocessing of Successful Knowledge Base . . . . .	63
3.6.2	Expert Discovery . . . . .	63
3.7	Conclusions . . . . .	63
	References . . . . .	63
<b>4</b>	<b>Intelligent Web Data Management of Content Syndication and Recommendation . . . . .</b>	<b>65</b>
4.1	Introduction . . . . .	65
4.1.1	Background . . . . .	65
4.1.2	Challenges and Contributions . . . . .	66
4.2	Related Work and Emerging Techniques . . . . .	66
4.2.1	RSS Specification . . . . .	66
4.2.2	RSS Products . . . . .	67
4.2.3	Feed Synchronization . . . . .	67
4.2.4	RSS Recommendation . . . . .	68
4.3	Requirements . . . . .	68
4.4	Architecture . . . . .	69
4.4.1	Source Listener . . . . .	69
4.4.2	Feed Search . . . . .	70
4.4.3	Feed Recommendation . . . . .	70
4.4.4	OAuth2-Authorization RESTful Feed Sharing APIs . . . . .	71
4.5	Evaluation . . . . .	72
4.5.1	Low Latency of Search . . . . .	72
4.5.2	Incremental Synchronization . . . . .	74
4.5.3	User Experience . . . . .	74
4.6	Discussions . . . . .	76
4.6.1	RSS Feeds Storage . . . . .	76
4.6.2	Interaction with Social Networking Website . . . . .	76
4.7	Conclusions . . . . .	76
	References . . . . .	76

**Part III   Monitoring**

<b>5   Intelligent Web Data Management of Infrastructure and Software Monitoring</b>	81
5.1   Introduction	81
5.1.1   Background	81
5.1.2   Challenges and Contributions	82
5.2   Related Work and Emerging Techniques	83
5.2.1   Cloud Monitoring Categories	83
5.2.2   Cloud Monitoring Methods.	84
5.2.3   Cloud Monitoring Methods.	87
5.2.4   Cloud Web Service Monitoring in the Cloud	87
5.2.5   Aspect-Oriented Programming.	88
5.3   Requirements	89
5.3.1   Hierarchy of Resource Entity Models.	89
5.3.2   Requirements of Monitoring	89
5.4   Architecture	90
5.4.1   Cloud Monitoring Architecture	90
5.4.2   Manager-Agent Architecture	91
5.5   Evaluation	92
5.5.1   Virtualization Monitoring	93
5.5.2   Service Availability Monitoring.	93
5.5.3   Performance Monitoring Module via SNMP	94
5.5.4   Application Monitoring	96
5.5.5   User Experience Tracker	97
5.5.6   Over-Commit Monitoring.	97
5.6   Discussions.	98
5.6.1   Monitoring Client of AOP Service.	101
5.6.2   Monitoring Server of AOP Service	101
5.7   Conclusions	102
References	103
<b>6   Intelligent Web Data Management of WebSocket-Based Real-Time Monitoring</b>	105
6.1   Introduction	105
6.1.1   Background	105
6.1.2   Challenges and Contributions	105
6.2   Related Work and Emerging Techniques	106
6.2.1   Networking of Intelligent Building	106
6.2.2   Classical Monitoring Methods.	108
6.2.3   Storage of Monitoring Data	110
6.3   Requirements	111
6.4   Architecture	112
6.4.1   Overview of System Architecture	112
6.4.2   WSN of Intelligent Buildings	112

6.5	Evaluation . . . . .	117
6.5.1	Fast Loading. . . . .	118
6.5.2	Low Latency . . . . .	119
6.5.3	High Concurrency . . . . .	120
6.5.4	Low Consumption. . . . .	120
6.6	Discussions. . . . .	121
6.6.1	Redundancy Rate . . . . .	121
6.6.2	Storage Space . . . . .	121
6.6.3	Query Time . . . . .	122
6.7	Conclusions . . . . .	123
	References . . . . .	124

## Part IV Literature Management

<b>7</b>	<b>Intelligent Web Data Management of Literature Validation . . . . .</b>	<b>127</b>
7.1	Introduction . . . . .	127
7.1.1	Background . . . . .	127
7.1.2	Challenges and Contributions . . . . .	127
7.2	Related Work and Emerging Techniques . . . . .	128
7.2.1	Literature Bibliography Acquisition . . . . .	128
7.2.2	DOI Content Negotiation and Resolver . . . . .	129
7.2.3	Bibliographic Model . . . . .	130
7.3	Requirements . . . . .	131
7.4	Architecture . . . . .	131
7.4.1	Bibliography Acquisition Architecture . . . . .	132
7.4.2	DOI Content Negotiation Proxy . . . . .	133
7.5	Evaluation . . . . .	134
7.5.1	DOI Content Service . . . . .	134
7.5.2	DOI Resolver Proxy . . . . .	136
7.5.3	DOI Presentation. . . . .	138
7.5.4	BibTeX Parser . . . . .	139
7.5.5	Bibliography Validation Service . . . . .	139
7.5.6	BibModel Transformation Engine . . . . .	140
7.5.7	Terminal UI . . . . .	141
7.6	Discussions. . . . .	141
7.6.1	Bibliographic Model—BibModel. . . . .	142
7.6.2	Transformation from BibModel to Bibliographic Records . . . . .	143
7.7	Conclusions . . . . .	145
	References . . . . .	146
<b>8</b>	<b>Intelligent Web Data Management of Literature Sharing. . . . .</b>	<b>147</b>
8.1	Introduction . . . . .	147
8.1.1	Background . . . . .	147
8.1.2	Challenges and Contributions . . . . .	148

8.2	Related Architecture and Emerging Techniques . . . . .	149
8.2.1	Emerging Web Technologies . . . . .	149
8.2.2	Literature Sharing . . . . .	149
8.3	Requirements . . . . .	150
8.4	Architecture . . . . .	151
8.4.1	Hierarchical Model of Bookmarklet . . . . .	151
8.4.2	System Architecture . . . . .	151
8.4.3	Literature Sharing Process . . . . .	152
8.5	Evaluation . . . . .	153
8.5.1	Bookmarklet Versus Third-Party Platform . . . . .	154
8.5.2	WebSocket Versus FlashSocket . . . . .	154
8.5.3	NoSQL Versus RDBMS . . . . .	156
8.6	Discussions . . . . .	157
8.6.1	Bookmarklet . . . . .	157
8.6.2	Cloud DOI Resolver . . . . .	158
8.6.3	Cloud Storage Engine . . . . .	159
8.6.4	Scopus API . . . . .	159
8.6.5	Academic Exchange WebSocket Server . . . . .	160
8.6.6	Sidebar . . . . .	160
8.6.7	Academic Exchange WebSocket Client . . . . .	161
8.7	Conclusions . . . . .	162
	References . . . . .	162

Intelligent Web Data Management: Software  
Architectures and Emerging Technologies

Ma, K.; Abraham, A.; Yang, B.; Sun, R.

2016, XIV, 162 p. 108 illus., 78 illus. in color., Hardcover

ISBN: 978-3-319-30191-4