

Contents

Preface xi

1 A Brief History of the Web 1

- 1.1 A new breed of applications: the rise of the Web 2
 - 1.1.1 The arrival of the browser 2
 - 1.1.2 The flattening of the world 7
 - 1.1.3 From linking to searching 10
 - 1.1.4 Commercialization of the Web 22
 - 1.1.5 Peer-to-peer networks and free file sharing 34
- 1.2 Technological developments in a nutshell 38
 - 1.2.1 IP networking 40
 - 1.2.2 HTML and XML 42
 - 1.2.3 Web services and RSS 46
- 1.3 User participation and contribution: socialization of the Web 49
 - 1.3.1 Blogs and wikis 49
 - 1.3.2 Social networks 58
- 1.4 Merging the streams: the arrival of “Web 2.0” 64

2 A Review of the Technological Stream 69

- 2.1 Developments in Web technology 69
 - 2.1.1 HTML 71
 - 2.1.2 XML 76
 - 2.1.3 CSS 80
 - 2.1.4 Scripting technologies 87
- 2.2 Web applications of XML 102
 - 2.2.1 Web services 102
 - 2.2.2 Web feed formats 115

- 2.3 P2P 124
 - 2.3.1 P2P file-sharing networks 124
 - 2.3.2 Other P2P applications 128
- 2.4 Summary 132
- 3 Enabling Techniques and Technologies 135**
 - 3.1 Rich Internet Applications 136
 - 3.1.1 Sample RIAs: e-mail applications 137
 - 3.1.2 XMLHttpRequest, the link needed for Ajax 146
 - 3.1.3 More RIAs: Office and map applications 155
 - 3.2 APIs, WPCs, and their mash-ups 161
 - 3.2.1 The situation in Web 1.0 162
 - 3.2.2 Content syndication with Web feeds 167
 - 3.2.3 Mash-ups based on WPCs 172
 - 3.3 Tagging 183
 - 3.3.1 Flickr and tagging 185
 - 3.3.2 Social bookmarking 195
 - 3.3.3 Folksonomies 201
 - 3.4 Summary 203
- 4 Sample Frameworks for Web Application Development 205**
 - 4.1 Development methodologies 206
 - 4.2 Client-side Ajax frameworks 211
 - 4.2.1 Kabuki Ajax toolkit 212
 - 4.2.2 Development of a Zimlet using AjaxTK 216
 - 4.3 Server-side frameworks 222
 - 4.3.1 Ruby on Rails 222
 - 4.3.2 Creating a Web application with Rails 224
 - 4.4 Frameworks for other RIA technologies 232
 - 4.4.1 RIA development with OpenLaszlo 232
 - 4.4.2 Flash versus Ajax 236
 - 4.5 Summary 238
- 5 Impacts of the Next Generation of the Web 241**
 - 5.1 Business models for Internet and Web 242
 - 5.1.1 Commission-based brokerage and merchants 243
 - 5.1.2 Advertising 245
 - 5.1.3 Information intermediaries 248
 - 5.1.4 The community and the subscription models 249
 - 5.1.5 Summary 250

- 5.2 Data ownership 251
- 5.3 Software as a Service (SaaS) 254
 - 5.3.1 A look back: the ASP model 256
 - 5.3.2 The provider-oriented view 257
 - 5.3.3 The consumer-oriented view and service customization 263
- 5.4 Socialization and cocreation of content 266
 - 5.4.1 Social search 266
 - 5.4.2 Social aspects of software 271
 - 5.4.3 Impacts of online social networks 273
 - 5.4.4 User-generated content in advertising 275
 - 5.4.5 Second Life 276
- 5.5 Summary 279

6 The Semantic Web and Web 2.0 281

- 6.1 Basics 283
 - 6.1.1 Search revisited 283
 - 6.1.2 Data and information integration 287
 - 6.1.3 The Semantic Web idea 289
 - 6.1.4 The structure of the Semantic Web 292
- 6.2 Languages of the Semantic Web 295
 - 6.2.1 The Resource Description Framework (RDF) 295
 - 6.2.2 RDF Schema (RDFS) 298
 - 6.2.3 Web Ontology Language (OWL) 303
- 6.3 Ontologies 308
 - 6.3.1 Introduction 309
 - 6.3.2 Design of an ontology 310
 - 6.3.3 OntoMedia: an ontology-based personal entertainment system 320
- 6.4 From tagging to ontologies and back 323
 - 6.4.1 Micro-formats 325
 - 6.4.2 Collaborative tagging and folksonomies 328
- 6.5 Summary 334

References 337

Index 345

Index

- Action Controller, Ruby on Rails, 229–231
- Action View, Ruby on Rails, 227–229
- Active Record, Ruby on Rails, 224–227
- AdSense
 - principles, 32, 247
 - social aspects, 271
- Advertising
 - AdSense, 247
 - AdWords, 246–247
 - banner ad, 245
 - e-commerce, 31–32
 - micropayments, 248
 - paid clicks, 245–246
 - traditional features, 245
 - user-generated content, 275–276
- AdWords, principles, 32, 246–247
- Agent-based software, e-commerce, 26
- Ajax, *see also* Kabuki Ajax Toolkit
 - asynchronous page requests, 146, 148
 - evolution, 70
 - map applications, 159
 - Open Ajax Initiative, 213
 - overview, 46
 - popularity, 206
 - synchronous page requests and refreshes, 146–147
 - Web interaction model, 146, 148
 - XMLHttpRequest, 141–142, 146, 149
- AllPeers, network overview, 128–129
- Amazon Mechanical Turk, features, 263–264
- Amazon Web Services, overview, 260–261
- API, *see* Application programming interface
- Application development, *see also* Rich Internet Applications
 - agile software methods, 208–209
 - client-side Ajax frameworks, 211–222
 - server-side frameworks, 222–232
 - traditional software methods, 207–208
 - Web 2.0 overview, 209–211
- Application programming interface (API)
 - functions, 167
 - Google Maps, 175–178
 - mash-ups, *see* Mash-up
 - service calls, 66–67
- Application Service Provisioning (ASP), overview, 256–257
- Application stream
 - definition, 1
 - Web 2.0, 64
- Artificial intelligence, Semantic Web, 291, 294
- ASP, *see* Application Service Provisioning
- Asynchronous JavaScript and XML, *see* Ajax
- ATOM
 - Blogger feed creation, 118
 - OpenSearch namespace, 120–121
 - popularity, 118
 - sample code, 119–120
- Automated reasoning, Semantic Web, 294
- B2B, *see* Business-to-business
- B2C, *see* Business-to-customer
- Banner ad, overview, 245

- BitTorrent, network overview, 126–128
- Blog
 - Blogger feed creation, 118
 - code of ethics, 53
 - definition, 50
 - e-commerce items, 30–31
 - examples, 50–51
 - growth, 52
 - misuse, 53–54
 - resources, 52
 - searching, 63
 - social aspects, 272
 - trust, 53
- Bookmark, browser, 163
- Broadband, advantages and growth, 41–42
- Broker, business models, 243–244
- Browser
 - bookmarks, 163
 - historical perspective, 2–7
- Business models
 - advertising, 245–248
 - classification, 242–243
 - commission-based brokerage and merchants, 243–245
 - community model, 249–250
 - components, 242
 - information intermediaries, 248–249
 - subscription model, 250
- Business-to-business (B2B), overview, 27–28
- Business-to-customer (B2C), overview, 27–28
- C2C, *see* Customer-to-customer
- Cascading style sheet (CSS)
 - Extensible Markup Language implementation, 81–84
 - Hypertext Markup Language implementation, 84–86
 - presentation, 43
- CDnow, historical perspective, 23–24
- CGI, *see* Common Gateway Interface
- ChaCha, search interface, 284–285
- Client/server principle, 3–4
- CMS, *see* Content management systems
- Collective knowledge, definition, 329
- Commercialization, *see* E-commerce
- Commission, business models, 243
- Common Gateway Interface (CGI), server-side scripting, 88
- Common Request Broker Architecture (CORBA), Web service, 102, 104
- Community model, overview, 249–250
- Conceptual design, ontology, 314–316
- Content management systems (CMS), overview, 34
- Content syndication
 - acquiring, 168–169
 - content attribution, 172
 - permalinks, 172
 - Pipes, 170–171
 - transformation, 168–169
- CORBA, *see* Common Request Broker Architecture
- CSS, *see* Cascading style sheet
- Customer-to-customer (C2C), overview, 27–29
- DAML, OWL development, 307
- Dashboard, gadgets, 182
- Data
 - collection, 252–253
 - machine-generated data, 251–252
 - ownership, 251–254
 - responsibilities of owners, 253–254
- Data stream, Web 2.0, 67
- DCMI, *see* Dublin Core Metadata Initiative
- DCOM, *see* Distributed Component Object Model
- del.icio.us
 - social bookmarking, 196–198
 - structured tagging, 331
- DHTML, *see* Dynamic Hypertext Markup Language
- Digg, social networking, 59
- Dilbert blog, overview, 50–51
- Directory
 - overview, 19
 - search engine competition, 20
- Distributed Component Object Model (DCOM), Web service, 104
- DNS, *see* Domain Name System
- Document Type Definition (DTD), Extensible Markup Language, 79–80
- Domain Name System (DNS), function, 41

- Dot-com bubble, overview, 29
- DTD, *see* Document Type Definition
- Dublin Core Metadata Initiative (DCMI), elements, 301–302
- Dynamic Hypertext Markup Language (DHTML)
 - client-side scripting, 93–95
 - evolution, 70
- eBay, feedback, 271
- E-commerce, *see also* Business models
 - advertising and marketing, 31–32
 - classification, 27–29
 - components, 24–26
 - customer feedback and recommendations, 29–31
 - growth, 33–34
 - historical perspective, 22–23
 - payment and trusted third parties, 32–33
 - software, 26
- E-mail, Rich Internet Applications
 - comparison of services, 145–146
 - Outlook, 138–139
 - Outlook Web Access, 139–141
 - search engine mail clients, 142–144
 - Springdoo video e-mail, 144–145
 - XMLHttpRequest, 141–142, 146, 149
 - Zimbra, 144
- Enfinity Suite 6, architecture, 26–27
- Enterprise resource planning (ERP), e-commerce, 27
- Entropy Universe, features, 278
- ERP, *see* Enterprise resource planning
- Eurekster, features, 270
- Extensible Hypertext Markup Language (XHTML), overview, 80
- Extensible Markup Language (XML)
 - application- versus technology-oriented languages, 76–77
 - base technology, 76–77
 - Document Type Definition, 79–80
 - evolution, 70
 - frameworks, 77
 - language development, 43–44
 - namespace, 44
 - overview, 43
 - RSS applications, 48
 - sample code, 78–79
 - schema definition, 43–44, 79
 - tags and elements, 77
 - Web feed formats, 115–124
 - Web services, 102–115
 - Zimlet declaration, 218
- Extensible Markup Language, cascading style sheet implementation, 81–84
- Extreme Programming (XP), application development, 208–209
- Facebook, social networking, 61
- FastTrack, network overview, 126
- Flash, Rich Internet Application development, 236–238
- Flickr
 - social aspects, 272–273
 - tags, 185–191, 332–333
- Folksonomy
 - collaborative tagging and folksonomies in Semantic Web
 - collective knowledge, 329
 - overview, 328–329
 - serendipity, 330
 - structured tagging, 331–334
 - tag qualitative classes, 329–330
 - definition, 201
 - social search, 267–268
 - tagging, 201–203
- Friedman, Thomas, world flatteners, 7–9
- Friendster, social networking, 61
- Gliffy, features, 156–157
- Gnutella, principles, 35–36
- Gold Box, Amazon.com, 30
- Google Apps, overview, 258
- Google Mail, features, 142–144
- Google Maps
 - application programming interface, 175–178
 - features, 158–160
 - mash-up development, 178–181
- Grid computing, applications, 39
- hCard, features, 325–327
- HIT, *see* Human Intelligence Task

- HTML, *see* Hypertext Markup Language
- HTTP, *see* Hypertext Transfer Protocol
- Human Intelligence Task (HIT), Amazon
Mechanical Turk, 263–264
- Hyperlink
navigation, 11
overview, 10
- Hypertext Markup Language (HTML)
cascading style sheet implementation, 84–86
document type definitions, 72–73
evolution, 70
history and advantages, 4–5, 42–43
links as anchors, 10–11
sample code, 72
structure versus presentation, 74–75
tags
overview, 43, 71, 73–75
standards and development, 75–76
- Hypertext Transfer Protocol (HTTP), historical
perspective, 4–5
- ICANN, *see* Internet Corporation for Assigned
Names and Numbers
- Information broker, function, 12–13
- Information intermediary, business models,
248–249
- Internet, development stages, 40–41
- Internet Corporation for Assigned Names and
Numbers (ICANN), [V1]origins and
functions, 41
- Internet Protocol television (IPTV), prospects,
42
- IPTV, *see* Internet Protocol television
- JavaScript
client-side scripting, 45, 88–93
overview, 45
- Kabuki Ajax Toolkit
components
DHTML Widget Toolkit, 215
event model, 214
network communication, 215
overview, 213–214
Open Ajax Initiative, 213
Zimbra, 212
- Zimlet development, 216–222
- Knowledge management, social networking, 60
- Link, *see* Hyperlink
- Lixto Suite, features, 164–166
- Logical design, ontology, 316–319
- Map applications
Google Maps, 158–160
Yahoo! Maps, 157
- Mash-up
definition, 160–161
Google Maps
application programming interface,
175–178
mash-up development, 178–181
start page personalization, 181–183
tags, 191–195
Web procedure call mash-ups
overview, 172–173
styles, 173–175
wrappers as precursors, 164
- MeCommerce, definition, 265
- Merchant model, overview, 244
- Metadata, Semantic Web, 290–291
- Meta-tag, overview, 183–194
- Micro-formats, ontology, 325–328
- Mindset, overview, 16–17
- Moore's Law, 38–39
- Mosaic, historical perspective, 2–3
- MoveOn, social networking, 63
- MySpace, social networking, 59, 61
- Namespace
Extensible Markup Language, 44
Resource Description Framework Schema,
298
SOAP, 113
Web Services Description Language, 109–110
- Napster, network overview, 125
- Netscape
dot-com bubble, 29
historical perspective, 5–7
initial public offering, 6–7, 9
- Nextlinks, features, 284
- Ning, social networking, 62

- Office applications
 - Gliffy, 156–157
 - ThinkFree Office, 155–156
- OIL, *see* Ontology Interface Layer
- Ontology
 - design
 - approach, 311–312
 - conceptual design, 314–316
 - logical design, 316–319
 - multimedia data hierarchies, 314–315
 - physical design, 319
 - requirements analysis, 312–313
 - requirements specification, 313
 - running example, 311
 - software, 310
 - overview, 308–310
- Ontology Interface Layer (OIL), OWL development, 307
- OntoMedia, features, 309, 320–323
- Open access, file sharing, 37
- OpenLaszlo
 - Ajax support, 238
 - Flash utilization, 236–238
 - overview, 232–233
 - Rich Internet Applications
 - deployment, 235–236
 - development process, 233–235
 - server architecture, 236
- Outlook, features, 138–139
- Outlook Web Access (OWA), features, 139–141
- OWA, *see* Outlook Web Access
- OWL, *see* Web Ontology Language

- P2P networks, *see* Peer-to-peer networks
- Page scraping, overview, 165, 167
- Pageflakes, start page, 181–182
- PageRank, origins and function, 15–16
- Paid clicks
 - AdWords, 246–247
 - fraud, 247
 - principles, 245–246
- Pandora, user interface, 237
- PayPal, payment and trusted third parties, 32–33
- PC, *see* Personal computer
- Peer-to-peer (P2P) networks
 - examples
 - AllPeers, 128–129
 - BitTorrent, 126–128
 - FastTrack, 126
 - Napster, 125
 - Skype, 130–132
 - file sharing, 36–37
 - Gnutella, 35–36
 - open access, 37
 - overview, 34–35
- Permalink, definition, 172
- Personal computer (PC), evolution, 38–39
- PHP
 - applications, 45
 - server-side scripting, 95–101
- Physical design, ontology, 319
- Pipes, content syndication, 170–171
- Portal
 - definition, 19
 - search engine competition, 20–21
- Prefound, features, 270

- Rails, *see* Ruby on Rails
- RDF, *see* Resource Description Framework
- RDFS, *see* Resource Description Framework Schema
- RealTravel, structured tagging, 333–334
- Requirements analysis, ontology design, 312–313
- Requirements specification, ontology design, 313
- Resource Description Framework (RDF)
 - property, 295–296
 - resource, 295
 - Semantic Web, 291, 293, 295–298
- Resource Description Framework Schema (RDFS)
 - class hierarchy, 299–300
 - Dublin Core Metadata Initiative, 301–302
 - instance, 300–301
 - namespace, 298
 - property, 299
 - Semantic Web, 291, 298–302
 - Web Ontology Language class relationships, 304–305
- RIA, *see* Rich Internet Application

- Rich Internet Application (RIA)
 - desktop application comparisons, 160–161
 - Flash versus Ajax, 236–238
 - OpenLaszlo, 232–236
 - e-mail applications
 - comparison of services, 145–146
 - minimum requirements, 137–138
 - Outlook, 138–139
 - Outlook Web Access, 139–141
 - search engine mail clients, 142–144
 - Springdoo video e-mail, 144–145
 - XMLHttpRequest, 141–142, 146, 149
 - Zimbra, 144
 - map applications
 - Google Maps, 158–160
 - Yahoo! Maps, 157
 - office applications
 - Gliffy, 156–157
 - ThinkFree Office, 155–156
 - overview, 136–137
 - Web procedure call samples, 149–155
- Rollyo, features, 268–270
- RSS
 - applications, 48
 - Blogger feed creation, 118
 - overview, 48, 116
 - popularity, 118
 - promoting feeds, 122–123
 - RSS 2.0 sample code, 121–122
 - syndication feed elements, 116–118
- Ruby on Rails
 - application development
 - Action Controller, 229–231
 - Action View, 227–229
 - Active Record, 224–227
 - agility, 231–232
 - model view controller and Rails components, 223–224
 - overview, 222–223
- SaaS, *see* Software as a Service
- SCM, *see* Supply-chain management
- Scripting
 - client side versus server side, 45, 87–88
 - Common Gateway Interface, 88
 - Dynamic Hypertext Markup Language, 93–95
 - JavaScript, 45, 88–93
 - languages, 87
 - PHP, 95–101
 - synchronous versus asynchronous data processing, 46
- Search engine
 - blogs, 53
 - components, 14–15
 - historical perspective, 13–14
 - long tail of queries, 18
 - PageRank, 15–16
 - personalization, 267
 - popular searches, 17
 - prospects, 16–17
 - Semantic Web augmentation, 283–387
 - social search engines, 266–271
 - tagging, 18
- Second Life
 - applications, 277–278
 - features, 276–277
 - growth, 276
 - origins, 276
- Semantic Web
 - collaborative tagging and folksonomies
 - collective knowledge, 329
 - overview, 328–329
 - serendipity, 330
 - structured tagging, 331–334
 - tag qualitative classes, 329–330
 - integration
 - data, 287–288
 - information, 288
 - materialized integration, 288–289
 - virtual integration, 288–289
 - languages
 - Resource Description Framework, 295–298
 - Resource Description Framework Schema, 298–303
 - Web Ontology Language, 303–308
 - metadata, 290–291
 - micro-formats, 325–328
 - ontology design
 - approach, 311–312
 - conceptual design, 314–316
 - logical design, 316–319

- multimedia data hierarchies, 314–315
- overview, 308–310
- physical design, 319
- requirements analysis, 312–313
- requirements specification, 313
- running example, 311
- software, 310
- overview, 281–283
- prospects, 334–336
- search augmentation, 283–387
- structure, 292–295
- tag clouds, 324
- vision, 289–290
- Web 2.0 convergence, 335–336
- Serendipity, definition, 330
- SeRQL, Semantic Web, 296
- SGML, *see* Standard Generalized Markup Language
- Skype
 - network overview, 40, 130–132
 - social aspects, 272
- Slashdot, historical perspective, 50
- Snap, features, 284
- SOAP
 - e-commerce samples, 112, 114–115
 - namespaces, 113
 - overview, 103, 106
 - structure, 113
- Social bookmarking
 - del.icio.us, 196–198
 - overview, 195–196
 - Yahoo! MyWeb 2.0, 199–201
- Social network
 - analysis, 63–64
 - collective knowledge, 329
 - community types, 59
 - functions, 60
 - impacts, 273–274
 - MySpace, 61
 - popularity, 59
 - social search engines, 266–271
 - software
 - overview, 62
 - social aspects, 271–272
- Software as a Service (SaaS)
 - Application Service Provisioning, 256–257
 - consumer-oriented view and service customization, 263–266
 - costs, 254
 - forms, 255
 - provider-oriented view
 - application services, 258–260
 - infrastructure services, 260–262
 - service lock-in, 262
- SongBird, features, 259–260
- SPARQL, Semantic Web, 293
- Springdoo, video e-mail, 144–145
- Standard Generalized Markup Language (SGML), overview, 43
- Structured tag, overview and application, 331–334
- Subscription model, overview, 250
- Supply-chain management (SCM), e-commerce, 27
- Tagging
 - collaborative tagging and folksonomies in Semantic Web
 - collective knowledge, 329
 - overview, 328–329
 - serendipity, 330
 - structured tagging, 331–334
 - tag qualitative classes, 329–330
 - e-commerce items, 30
 - examples, 184–185
 - Flickr, 185–191
 - folksonomic tagging, 201–203
 - historical perspective, 183–184
 - mash-ups, 192–195
 - tag clouds, 324
- TCP/IP, *see* Transmission Control Protocol/Internet Protocol
- ThinkFree Office, features, 155–156
- Touchgraph, features, 284
- Transmission Control Protocol/Internet Protocol (TCP/IP), packets, 40
- Tribe, social networking, 62
- UDDI, *see* Universal Description, Discovery, and Integration
- Unicode, Semantic Web, 292

- Uniform Resource Identifier (URI), Extensible Markup Language, 44
- Universal Description, Discovery, and Integration (UDDI), Web Services Description Language, 103
- Universal resource locator (URL), definition, 11
- URI, *see* Uniform Resource Identifier
- URL, *see* Universal resource locator
- User-generated ads, features, 275–276
- User participation and contribution
 - blogs, 49–54
 - definition, 1
 - social networking, 58–64
 - wikis, 54–58
- Virtual communities, e-commerce, 30
- Voice over Internet Protocol (VoIP), principles, 40
- VoIP, *see* Voice over Internet Protocol
- W3C, *see* World Wide Web Consortium
- WDL, *see* Web Services Description Language
- Web 3.0, prospects, 68
- Web feed, *see also* RSS
 - ATOM, 118–121
 - content syndication, *see* Content syndication overview, 48
 - prospects, 123–124
 - specification and history, 115–116
 - syndication feed elements, 116–118
- WebFountain, features, 284–285
- Web Ontology Language (OWL)
 - classes, 304–306
 - inferences, 307–308
 - precursor languages, 307
 - properties
 - data type, 305
 - description, 306
 - object, 305
 - Resource Description Framework Schema
 - class relationships, 304–305
 - Semantic Web, 291, 303–308
 - sublanguages, 303–304
- Web procedure call (WPC)
 - mash-ups, *see* Mash-up
 - overview, 105–107
 - Rich Internet Applications, 149–155
 - software as a service, 255
- Web service
 - decomposition, 105
 - definition, 102
 - design, 105
 - infrastructure, 106
 - paradigm, 103
 - service-oriented architectures, 104
 - SOAP, 103, 106, 112–115
 - standards stack, 104
 - structure, 110–112
 - Web procedure calls, 105–107
 - Web Services Description Language, 103, 108–112
- Web Services Description Language (WSDL)
 - e-commerce sample, 108–109
 - namespaces, 109–110
 - overview, 103
- Widget, definition, 181
- Wiki
 - definition, 54
 - editing, 54–56
 - historical perspective, 54
 - Wikia, 56
- Wikipedia
 - accuracy, 57
 - bibliographic details, 56
 - code of ethics, 57
 - historical perspective, 56
 - social aspects, 271–272
- Wish list, e-commerce items, 31
- World Wide Web Consortium (W3C), origins and functions, 41
- WPC, *see* Web procedure call
- Wrapper
 - features, 164, 166
 - XMLHttpRequest, 205–206
- XHR, *see* XMLHttpRequest
- XHTML, *see* Extensible Hypertext Markup Language
- XML, *see* Extensible Markup Language
- XMLHttpRequest (XHR)
 - Ajax, 146, 149

- overview, 141–142
- Web procedure call samples, 149–155
- wrappers, 205–206

XP, *see* Extreme Programming

Yahoo! Mail, features, 142–144

Yahoo! Maps, features, 157

Yahoo! MyWeb 2.0, social bookmarking, 199–201

Yahoo!Search MyWeb2, features, 270

YouTube

- social impact, 274
- social networking, 63

Zimbra

- features, 144
- Kabuki Ajax Toolkit, 212

Zimlet

- content objects and applications, 216–218
- declaration in XML, 218
- Kabuki Ajax Toolkit for development, 218–222
- panel items, 216