



Service Oriented Architecture Reference Model

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Editors:

C. Matthew MacKenzie, Adobe Systems Incorporated, mattm@adobe.com

Rebekah Metz, Booz Allen Hamilton, metz_rebekah@bah.com

Christopher Bashioum, Mitre Corporation, cbashioum@mitre.org

Wesley McGregor, GoC(ed: ?), McGregor.Wesley@tbs-sct.gc.ca

Francis McCabe, Fujitsu (Soft? Consult?), fgm@fla.fujitsu.com

Don Flinn, Individual, flinn@alum.mit.edu

Peter Brown, Individual, peter@justbrown.net

Abstract:

This Service Oriented Architecture Reference Model is an abstract framework for understanding significant entities and relationships amongst them within a service-oriented environment, and for the development of consistent standards or specifications supporting that environment. It is based on unifying concepts of SOA and may be used by architects developing specific services oriented architectures or for education and explaining SOA. A reference model is not directly tied to any standards, technologies or other concrete implementation details, but it does seek to provide a common semantics that can be used unambiguously across and between different implementations.

While service orientation may be a concept in architectures for a vast array of applications, this reference model scopes itself to the field of software architecture.

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45

46

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68 1 Introduction

69 Service Oriented Architecture (SOA) as a term is being used in an increasing number of contexts
70 and specific technology implementations, sometimes with differing - or worse, conflicting -
71 understandings of implicit terminology and components. This Reference Model was developed to
72 encourage the continued growth of different and specialized SOA implementations whilst
73 preserving a common layer of understanding about what SOA is. The Reference Model allows
74 this knowledge to be shared and understood between multiple SOA implementations. This
75 Reference model is abstract in nature and does not contain the necessary level of detail to be
76 implemented.

77

78 [Note: value of a ref model is to guide architects into making consistent logical divisions/groupings
79 /layering of functionality]

80

81 1.1 Audience

82 1.2 How to Use the Reference Model

83

84 [placeholder] This is a section where we explain to people (see title)

85 1.3 Notational Conventions

86 The key words *must*, *must not*, *required*, *shall*, *shall not*, *should*, *should not*, *recommended*, *may*,
87 and *optional* in this document are to be interpreted as described in [RFC2119].

88 1.4 Relationships to Other Standards

89

90 Due to its nature, this reference model may have an implied relationship with any group that: a/
91 considers its' work "Service Oriented"; and/or b/ declares an adoption statement to use the SOA
92 reference model of this TC as a base for their work when complete.

93

94 Additionally, there are a large number of standards and technologies that are related by the fact
95 they claim to be or are "service oriented".

96

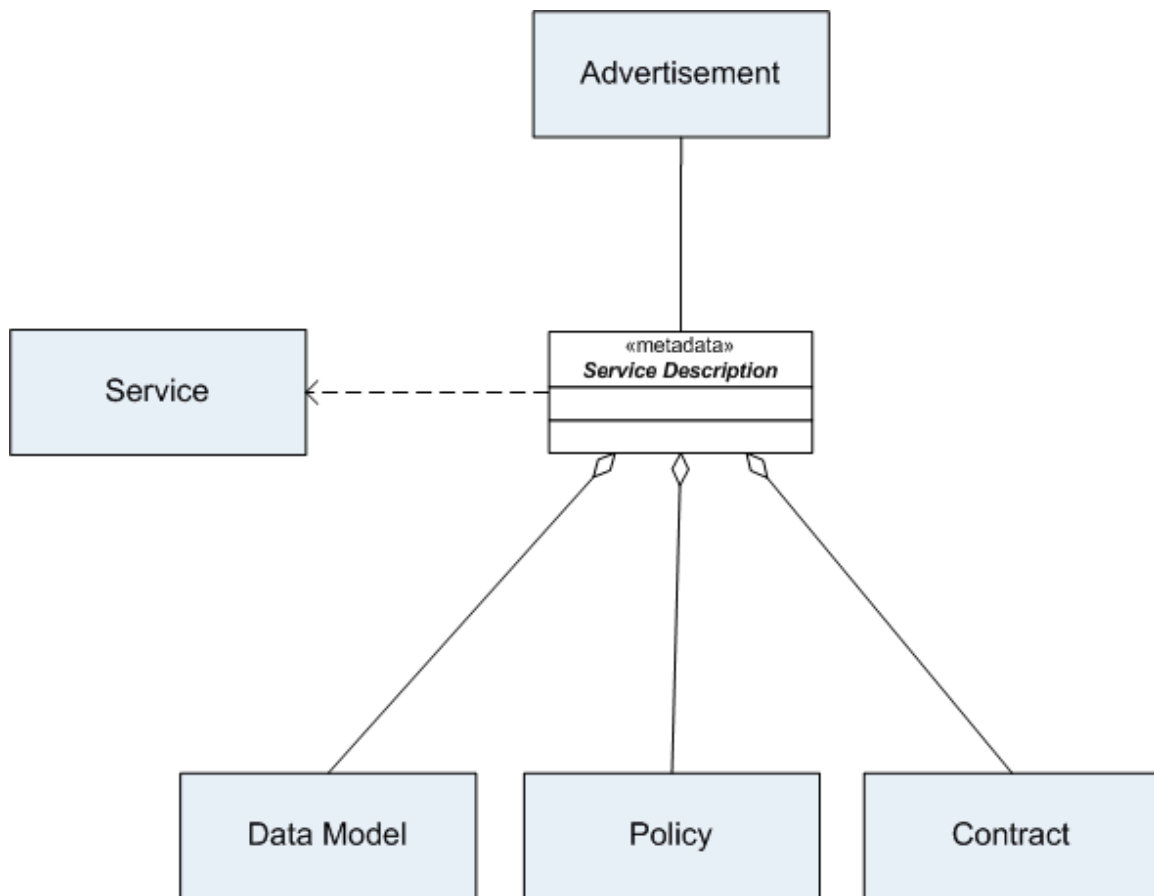
97 Any work that aligns with the functional areas of SOA such as the service, service description,
98 advertising mechanism, service data model or service contract are likely to be directly related.

99

2 The Reference Model

100
101
102
103
104

The following figure introduces the core elements of service oriented architecture. NOTE: This is draft and subject to change.



105
106
107

Figure 1 - SOA Architectural Model (ED: NEED BETTER GRAPHIC)

2.1 Services

108
109
110

A Service is a set of functionality provided by one entity for the use of others.

111

112 There is no need to make architectural distinctions between services that are consumed as part
113 of a process vs. ones that are not.

114

115 Services are autonomous (self sufficient) by nature.

116

117 There is not a one to one correlation between requests to invoke a service and instances of a
118 service being consumed.

119

120 2.1.1 Service Composition

121

122 Since services are opaque, a Service Consumer cannot see anything beyond it. If one service is
123 actually consuming and aggregating two other services, the Service Consumer cannot and
124 should not know such. Whether a Service's functions are mapped to a set of classes in some
125 native language or another service is not important or relevant (other than the service metadata
126 stating what invoking the service means or does)

127



128

129 *Figure 2 - Service Composition*

130

131 Examining Figure 2 - Service Composition above, the service function (for service A) is described
132 in the service description specific to that service. If completing the function depends on two or
133 more serial or parallel paths of execution successfully completing behind the service interface
134 (like calling services B and C) within a certain time frame, that is not relevant to state in the
135 service description for service A. The service consumer is only concerned with the service's
136 ultimate success or failure. Mapping the functionality to success and failure is the responsibility of
137 the service provider. This is necessary to preserve the axiom of opacity.

138

139 The functionality described above is mandatory to comply with the notion of service autonomy. A
140 service alone must determine whether an invocation request succeeds or fails.

141

142 Note (non-normative) If a service consumer can see any specifics behind the service, this violates
143 several of the core principles of SOA. If visibility beyond the offered service is required, then the

144 service does not meet the demand of the service consumer. Accordingly, the service provider and
145 consumer should discuss and re engineer the service.

146

147 Note

148 When implementing, more complex patterns of service invocation can be
149 facilitated while keeping these three axioms. If a transaction sequence is needed,
150 a service interface can offer two services - a put() and a commit().

151

152 2.1.2 Service Description

153 Each logical Service has exactly one canonical Service Description.

154

155 A Service Description is comprised of three logical parts

156

- 157 a. Data Model - The logical expression of a set of information items associated with the
158 consumption of a service or services;
- 159 b. Policy - Assertions and obligations that service consumers and/or providers must adhere
160 to or provide; and
- 161 c. Contract (and/or offer thereof) - the syntactic, semantic and logical constraints governing
162 on the use of a service.

163

164 2.2 Policy

165

166 [contracts are associated with policy.]

167 [policy umbrella for contract(s)]

168 [exam. All that policy applies to, and no spitting on the wall]

169 [Group policy, individual service policy, uber policy, policy eval priority]

170 [explicit vs, implicit]

171 [policy not exhaustive listing of security]

172 A Service's Policy reference is part of the Service's Metadata (aka "Service Description")

173

174 A service's Policy is the set of assertions that service consumers and/or providers must adhere
175 to.

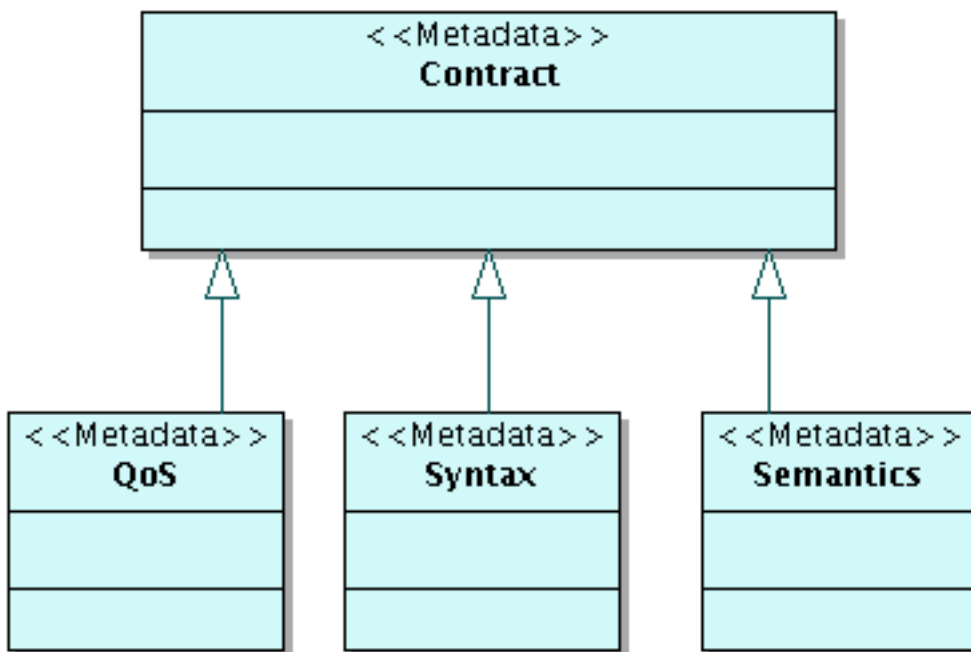
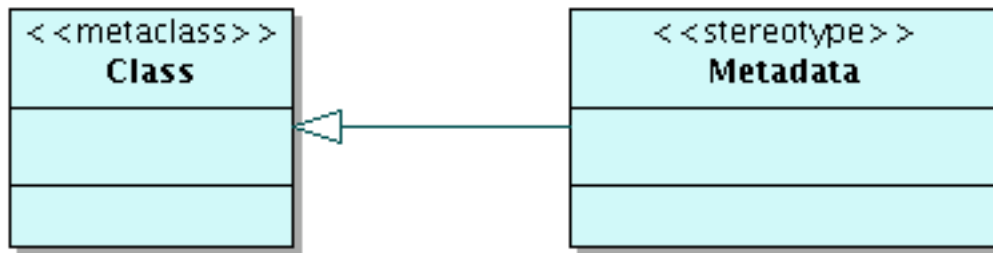
176

177 Policies may be set by the requester or provider and may require or permit negotiation.

178

179 Policies may be in the form of permissions and/or obligations.

180
181 Policies may contain constraints and or assumptions.
182
183 A policy may contain substantially nothing.
184
185 Service Policy may mandate requirements to be met, and if they are not, interaction (with the
186 service) may be refused.
187
188 Consumer may refuse use of service based on policy.
189
190
191 [Notes:QoS, Contract. Do security.]
192
193 [Operational Description, Terms of Use, Method of Use, Required Security, etc]
194



195
196
197
198
199
200
201

Figure 3 - Service Description

202 2.3 Semantics

203 2.3.1 Data/Information Model

204

205 **2.4 Discovery, Presence and Availability**

206

207 [ed: title was changed, text below needs to jive.]

208

209 The main concept is a methodology or mechanism to convey awareness of (the existence of) a
210 service(s) to all consumers on a fabric.

211

212 Advertising makes discovery possible.

213

214 A Service Description is advertised to consumers on a fabric to make it discoverable.

215

216 Discovery does not constitute authorization to execute against the service.

217

218 [from W3C WSA] Discovery is the act of locating a resource description

219

220 Discovery involves matching a set of functional and other criteria with a set of resource
221 descriptions.

222

223 Discovery may be performed by an agent, or by an end-user

224

225 Discovery may be realized using a discovery service [end W3C WSA]

226

227

228 **3 Conformance Guidelines**

229

230 [Thoughts: mapping to architecture?]

231 **4 References**

232 **4.1 Normative**

233 **[RFC2119]** S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*,
234 <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.
235

236 **Appendix A. Glossary**

237 Several terms are used within this Reference Model are also used in other specifications. This
238 glossary locally scopes the semantics of those terms where ambiguity exists or overrides those
239 definitions.

240

241 **Advertising**

242

243 A methodology to convey awareness of (the existence of) a service(s) to all consumers on a
244 fabric. Advertising makes discovery possible.

245

246 **Agent (requester or provider)**

247

248 An entity acting on behalf of another entity to fulfill a task.

249

250 **Architecture**

251

252 Software architecture for a system is the structure or structures of the system, which consist of
253 elements and their externally visible properties, and the relationships among them.

254

255 **Service Consumer**

256

257 An entity which makes use of a service.

258

259 **Contract**

260

261 The syntactic, semantic and logical constraints governing on the use of a service.

262

263 **Data Model**

264

265 The logical expression of a set of information items associated with the consumption of a service.

266

267 **Discovery**

268

269 The act of gaining knowledge of a logical service, its existence and details of how to use it.

270

271

272 **Interface**

273

274 A named set of operations that characterize the behavior of an entity.

275

276 **Message**

277

278 A serialized set of data that is used to convey a request or response from one party to another.

279

280 **Policy**

281

282 Policy is a statement of obligations, constraints or other conditions of service use.

283

284 A contract is formed when a specific set of entities accept a policy.

285

286 **Requester or provider**

287

288 Person or organization involved in an SOA transaction an agent that interacts with a service in
289 order to achieve a goal

290

291 **Security**

292

293 Computer security is the effort to create a secure computing platform, designed so that agents
294 (users or programs) can only perform actions that have been allowed. This involves specifying
295 and implementing a security policy. The actions in question can be reduced to operations of
296 access, modification and deletion. Computer security can be seen as a subfield of security
297 engineering, which looks at broader security issues in addition to computer security. (from
298 Wikipedia)

299

300 **Semantics**

301

302 Shared conceptualization of the implied meaning of information. Represents a contract governing
303 the meaning and purpose.

304

305 **Service**

306

307 A behavior, or set of behaviors provided for use by another entity.

308

309

310

311

312 **Service description**

313

314 A specification of the information necessary to a) allow a potential consumer to determine
315 whether or not this service is applicable, and b) facilitate invocation.

316

317 **Service Oriented Architecture (SOA)**

318

319 A form of Enterprise Architecture. The difference between Enterprise Architecture and SOA lies
320 mostly in the fact that EA is specific to an enterprise, while SOA can be abstracted out of a given
321 Enterprise, and collected along with other SOA components so abstracted to form a registry of
322 available services SOA is potentially a specialization of a combination of many things - interface
323 based design (IBD), component architecture (CA), OO methodology etc.

324

325 **Service Oriented Architecture Reference Model (SOA-RM)**

326

327 A reference model is an abstract framework for understanding significant relationships among the
328 entities of some environment, and for the development of consistent standards or specifications
329 supporting that environment. A reference model is based on a small number of unifying concepts.
330 A reference model is not directly tied to any standards, technologies or other concrete
331 implementation details, but it does seek to provide a common semantics that can be used
332 unambiguously across and between different implementations. Is not architecture for a single
333 implementation. Is a model for developing a range of Service Oriented Architectures and
334 analysis/comparison thereof. Is a framework for understanding significant relationships among
335 the entities in an SOA environment. DISCUSSION POINT: should the word "elements" be used in
336 place of "entities" above? Is based on a small number of unifying concepts of all SOAs. A
337 Reference Model is the best mechanism to define SOA.

338

339 **Appendix B. Use Cases and Examples (Non-**
340 **Normative)**
341

342 **Appendix C. Acknowledgments**

343 The following individuals were members of the committee during the development of this
344 specification:

345 [TODO: insert cte. Members]

346

347

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