

---

---

**Information technology — Reference  
Architecture for Service Oriented  
Architecture (SOA RA) —**

**Part 2:  
Reference Architecture for SOA  
Solutions**

*Technologie de l'information — Architecture de référence pour  
l'architecture orientée service (SOA RA) —*

*Partie 2: Architecture de référence pour les solutions de l'architecture  
orientée service*

**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

	Page
<b>Foreword</b> .....	<b>viii</b>
<b>Introduction</b> .....	<b>ix</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>1</b>
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	1
<b>4 Notations</b> .....	<b>2</b>
<b>5 Conventions</b> .....	<b>3</b>
<b>6 Conformance</b> .....	<b>5</b>
<b>7 Overview</b> .....	<b>5</b>
7.1 Introduction to SOA.....	5
7.2 Introduction to the SOA Reference Architecture.....	6
7.3 Metamodel.....	7
7.4 Capabilities.....	11
7.5 Reference Architecture for SOA Solutions.....	12
7.5.1 Overview of Reference Architecture.....	12
7.5.2 Operational and IT Systems Layer.....	14
7.5.3 Service Component Layer.....	14
7.5.4 Services Layer.....	15
7.5.5 Process Layer.....	16
7.5.6 Consumer Layer.....	16
7.5.7 Integration Aspect.....	17
7.5.8 Management and Security Aspect.....	18
7.5.9 Information Aspect.....	19
7.5.10 Governance Aspect.....	20
7.5.11 Development Aspect.....	20
7.6 Common Services Categories.....	21
7.7 Assumptions and Key Concepts.....	23
7.7.1 General.....	23
7.7.2 Functional and Non-functional.....	23
7.7.3 Requirements.....	23
7.7.4 Services.....	23
7.7.5 Documenting the Layers.....	24
7.7.6 Logical and Physical Elements.....	24
7.7.7 Interactions between Layers.....	25
7.7.8 Understanding ABBs.....	26
7.7.9 Provisioning Services.....	27
7.7.10 Invoking Services.....	27
7.7.11 Registries and Repositories.....	27
7.7.12 Policies and Business Rules.....	27
7.7.13 Events.....	27
7.7.14 Auditing and Logging.....	28
7.7.15 Understanding different logical elements.....	28
<b>8 Operational and IT Systems Layer</b> .....	<b>30</b>
8.1 Overview.....	30
8.1.1 Summary.....	30
8.1.2 Context and Typical Flow.....	31
8.1.3 Capabilities.....	32
8.1.4 Structural Overview of the Layer.....	33
8.2 Details of ABBs and Supported Capabilities.....	34

8.2.1	Service Delivery .....	34
8.2.2	Runtime Environment.....	35
8.2.3	Virtualization and Infrastructure Services.....	36
8.3	Inter-Relationships between the ABBs.....	36
8.4	Significant Intersection Points with other Layers.....	37
8.4.1	General.....	37
8.4.2	Intersection with the rest of the SOA RA.....	37
8.4.3	Interaction with Cross-Cutting Aspects.....	38
8.4.4	Interaction with Horizontal Layers.....	40
8.5	Usage Implications and Guidance.....	40
8.5.1	Options and Design Decisions.....	40
8.5.2	Implementation Considerations.....	41
8.5.3	Runtime and Deployment View of the SOA RA.....	42
<b>9</b>	<b>Service Component Layer.....</b>	<b>43</b>
9.1	Overview .....	43
9.1.1	Summary.....	43
9.1.2	Context and Typical Flow.....	44
9.1.3	Capabilities.....	44
9.1.4	Structural Overview of the Layer.....	45
9.2	Details of ABBs and Supported Capabilities.....	46
9.2.1	Service Realization and Implementation.....	46
9.2.2	Service Publication and Exposure.....	47
9.2.3	Service Deployment.....	47
9.2.4	Service Invocation.....	47
9.2.5	Service Binding.....	47
9.3	Inter-Relationships between the ABBs.....	48
9.4	Significant Intersection Points with other Layers.....	50
9.4.1	General.....	50
9.4.2	Interaction with Cross-Cutting Aspects.....	50
9.4.3	Interaction with Horizontal Layers.....	52
9.4.4	Interaction with the Services Layer.....	53
9.4.5	Interactions with the Operational and IT Systems Layer.....	55
9.5	Usage Implications and Guidance.....	55
9.5.1	Options and Design Decisions.....	55
9.5.2	Implementation Considerations.....	56
<b>10</b>	<b>Service Layer.....</b>	<b>58</b>
10.1	Overview .....	58
10.1.1	Summary.....	58
10.1.2	Context and Typical Flow.....	59
10.1.3	Capabilities.....	59
10.1.4	Structural Overview of the Layer.....	60
10.2	Details of ABBs and Supported Capabilities.....	62
10.2.1	Service Definition.....	62
10.2.2	Service Runtime Enablement.....	62
10.2.3	Policy Management.....	63
10.3	Inter-Relationships between the ABBs.....	63
10.4	Significant Intersection Points with other Layers.....	66
10.4.1	Interaction with Cross-Cutting Aspects.....	66
10.4.2	Interaction with Horizontal Layers.....	67
10.5	Usage Implications and Guidance.....	68
<b>11</b>	<b>Process Layer.....</b>	<b>69</b>
11.1	Overview .....	69
11.1.1	Summary.....	69
11.1.2	Context and Typical Flow.....	69
11.1.3	Capabilities.....	72
11.1.4	Structural Overview of the Layer.....	73
11.2	Details of ABBs and Supported Capabilities.....	75

11.2.1	Process Definition	75
11.2.2	Event Handling	75
11.2.3	Process Runtime Enablement	75
11.2.4	Process Information Management	76
11.2.5	Process Integration	76
11.2.6	Decision Management	76
11.2.7	Process Monitoring and Management	77
11.3	Inter-Relationships between the ABBs	77
11.4	Significant Intersection Points with other Layers	77
11.4.1	Interaction with Cross-Cutting Aspects	77
11.4.2	Interaction with Horizontal Layers	79
11.5	Usage Implications and Guidance	79
<b>12</b>	<b>Consumer Layer</b>	<b>80</b>
12.1	Overview	80
12.1.1	Summary	80
12.1.2	Context and Typical Flow	80
12.1.3	Capabilities	81
12.1.4	Structural Overview of the Layer	82
12.2	Details of ABBs and Supported Capabilities	83
12.2.1	Consumer Services	83
12.2.2	Presentation Services	84
12.2.3	Backend Integration	84
12.2.4	Caching and Streaming Content	84
12.2.5	Security and Privacy	85
12.2.6	Information Access	85
12.3	Inter-Relationships between the ABBs	85
12.4	Significant Intersection Points with other Layers	87
12.4.1	Interaction with Cross-Cutting Aspects	87
12.4.2	Interaction with Horizontal Layers	88
12.5	Usage Implications and Guidance	89
<b>13</b>	<b>Integration Aspect</b>	<b>90</b>
13.1	Overview	90
13.1.1	Summary	90
13.1.2	Context and Typical Flow	90
13.1.3	Capabilities	91
13.1.4	Structural Overview of the Layer	92
13.2	Details of ABBs and Supported Capabilities	94
13.2.1	Communication, Service Interaction and Integration	94
13.2.2	Message Processing	95
13.2.3	Security	96
13.3	Inter-Relationships between the ABBs	96
13.4	Significant Intersection Points with other Layers	98
13.4.1	Interaction with Cross-Cutting Aspects	98
13.4.2	Interaction with Horizontal Layers	99
13.5	Usage Implications and Guidance	101
<b>14</b>	<b>Management and Security (MaS) Aspect</b>	<b>101</b>
14.1	Overview	101
14.1.1	Summary	101
14.1.2	Context and Typical Flow	103
14.1.3	Capabilities	104
14.1.4	Structural Overview of the Layer	108
14.2	Details of ABBs and Supported Capabilities	109
14.2.1	Facilities Security Management	109
14.2.2	Security Management	110
14.2.3	IT Systems Monitoring and Management	111
14.2.4	SOA Solution Monitoring and Management	112
14.2.5	Business Activity Monitoring and Management	113

14.2.6	Event Management	114
14.2.7	Policy Monitoring and Enforcement	114
14.2.8	Configuration and Change Management	115
14.2.9	Registry and Repository	115
14.3	Inter-Relationships between the ABBs	116
14.4	Significant Intersection Points with other Layers	118
14.4.1	Interaction with Cross-Cutting Aspects	118
14.4.2	Interaction with Horizontal Layers	119
14.5	Usage Implications and Guidance	120
<b>15</b>	<b>Information Aspect</b>	<b>121</b>
15.1	Overview	121
15.1.1	Summary	121
15.1.2	Context and Typical Flow	122
15.1.3	Capabilities	122
15.1.4	Structural Overview of the Layer	124
15.2	Details of ABBs and Supported Capabilities	125
15.2.1	Information Service	125
15.2.2	Information Integration	126
15.2.3	Information Security and Protection	128
15.2.4	Business Information Management	128
15.2.5	Business Analytics	129
15.2.6	Information Definition and Modeling	130
15.2.7	Information Registry/Repository	130
15.3	Inter-Relationships between the ABBs	130
15.4	Significant Intersection Points with other Layers	133
15.4.1	Interaction with Cross-Cutting Aspects	134
15.4.2	Interaction with Horizontal Layers	135
15.5	Usage Implications and Guidance	135
<b>16</b>	<b>Governance Aspect</b>	<b>136</b>
16.1	Overview	136
16.1.1	Summary	136
16.1.2	Context and Typical Flow	137
16.1.3	Capabilities	138
16.1.4	Structural Overview of the Layer	140
16.2	Supported Capabilities	143
16.2.1	Governance Lifecycle	143
16.2.2	SOA Metadata Storage and Management	143
16.2.3	Rule Definition and Management	144
16.2.4	Policy Definition and Management	144
16.2.5	Monitoring	145
16.2.6	Management	145
16.2.7	Workflow	145
16.3	Inter-Relationships between the ABBs	145
16.4	Significant Intersection Points with other Layers	147
16.4.1	Interaction with Cross-Cutting Aspects	148
16.4.2	Interaction with Horizontal Layers	149
16.5	Usage Implications and Guidance	150
16.5.1	Options and Design Decisions	150
<b>17</b>	<b>Development Aspect</b>	<b>151</b>
17.1	Overview	151
17.1.1	Summary	151
17.1.2	Context and Typical Flow	152
17.1.3	Capabilities	157
17.1.4	Structural Overview of the Layer	159
17.2	Details of ABBs and Supported Capabilities	160
17.2.1	Description Development	160
17.2.2	Operations Enablement	162

17.2.3	Testing	163
17.2.4	Maintenance	164
17.2.5	Publication	164
17.2.6	Process Development	165
17.2.7	Deployment	165
17.2.8	Subscription	165
17.3	Inter-Relationships between the ABBs	166
17.4	Significant Intersection Points with other Layers	171
17.4.1	Intersection with the Rest of the SOA RA	171
17.4.2	Interaction with Cross-Cutting Aspects	171
17.4.3	Interaction with Horizontal layers	173
17.5	Usage Implications and Guidance	174
17.5.1	Options and Design Decisions	174
<b>18</b>	<b>Common Service Categories</b>	<b>179</b>
18.1	General	179
18.2	Mediation Services	180
18.3	Interaction Services	181
18.4	Process Services	181
18.5	Information Services	182
18.6	Access Services	182
18.7	Security Services	182
18.8	Partner Services	183
18.9	Lifecycle Services	183
18.10	Asset and Registry/Repository Services	184
18.11	Infrastructure Services	184
18.12	Management Services	184
18.13	Development Services	185
18.14	Strategy and Planning Services	185
18.15	Business Application Services	185
18.16	Business Services	186
18.17	Considering Implementations of Common Service Categories using Reference Architecture	186
18.18	Summary	188
<b>19</b>	<b>Related Work and Usages of the SOA RA</b>	<b>188</b>
	<b>Bibliography</b>	<b>190</b>

## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 38, *Cloud Computing and Distributed Platforms*.

ISO/IEC 18384 consists of the following parts, under the general title *Information Technology — Reference Architecture for Service Oriented Architecture (SOA RA)*:

- *Part 1: Terminology and concepts for SOA*
- *Part 2: Reference Architecture for SOA Solutions*
- *Part 3: Service Oriented Architecture Ontology*



## Introduction

Service oriented architecture (SOA) is an architectural style in which business and IT systems are designed in terms of services available at an interface and the outcomes of these services. A service (see ISO/IEC 18384-1:2016, 3.20) is a logical representation of a set of activities that has specified outcomes, is self-contained and may be composed of other services but consumers of the service need not be aware of any internal structure.

SOA uses services to create and integrate information systems so that they are suitable for a variety of business and application requirements. SOA enables interactions between businesses without needing to specify specifics of any particular business domain. Using the SOA architectural style can improve the efficiency of developing information systems and integrating and reusing IT resources. In addition, using the SOA architectural style can help enable rapid response of information systems to ever-changing business needs.

ISO/IEC 18384 is intended to be a single set of SOA technical principles, specific norms, and standards for the world-wide market to help remove confusion about SOA and improve the standardization and quality of solutions.

ISO/IEC 18384 defines the terminology, technical principles, reference architecture, standard service categories and ontology for SOA. This part of ISO/IEC 18384 can be used to introduce SOA concepts, as a guide to the development and management of SOA solutions, as well as be referenced by business and industry standards.

ISO/IEC 18384 contains three parts:

- a) ISO/IEC 18384-1, which defines the terminology, basic technical principles and concepts for SOA;
- b) ISO/IEC 18384-2, which defines the detailed SOA reference architecture layers, including a metamodel, capabilities, architectural building blocks, as well as a set of categories or types of services in SOA solutions;
- c) ISO/IEC 18384-3, which defines the core concepts of SOA and their relationships in an ontology.

The targeted audience of ISO/IEC 18384 includes, but is not limited to, standards organizations, architects, architecture methodologists, system and software designers, business people, SOA service providers, SOA solution and service developers, and SOA service consumers who are interested in adopting and developing SOA.

Users of this part of ISO/IEC 18384 will find it useful to read ISO/IEC 18384-1 for an understanding of SOA basics. ISO/IEC 18384-1 should be read before reading or applying this part of ISO/IEC 18384. For those new to the SOA reference architecture, [Clause 4](#) provides a high-level understanding of the Reference Architecture for SOA Solutions. The remaining clauses provide comprehensive details of the architectural building blocks and trade-offs needed for an SOA solution and a set of common categories (or types) of SOA services to help populate that architecture. ISO/IEC 18384-3 contains the SOA ontology, which is a formalism of the core concepts and terminology of SOA, with mappings to both UML (see Reference [\[16\]](#)) and OWL (see Reference [\[17\]](#)). ISO/IEC 18384-3 can be used independent of or in conjunction with ISO/IEC 18384-1 and this part of ISO/IEC 18384.

# Information technology — Reference Architecture for Service Oriented Architecture (SOA RA) —

## Part 2: Reference Architecture for SOA Solutions

### 1 Scope

This part of ISO/IEC 18384 describes a Reference Architecture for SOA Solutions which applies to functional design, performance, development, deployment and management of SOA Solutions. This part of ISO/IEC 18384 includes a domain-independent framework, addressing functional requirements and non-functional requirements, as well as capabilities and best practices to support those requirements.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 18384-1, *Information technology — Reference Architecture for Service Oriented Architecture (SOA RA) — Part 1: Terminology and concepts for SOA*

ISO/IEC 18384-3, *Information technology — Reference Architecture for Service Oriented Architecture (SOA) – Part 3: Service Oriented Architecture Ontology*

ISO/IEC 15474-1, *Information technology — CDIF framework — Part 1: Overview*