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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

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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).

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).

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*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 18384-1 apply.

3.2 Abbreviated terms

ABB	Architectural Building Block
B2B	Business To Business
BAM	Business Activity Monitoring
BPEL	Business Process Execution Language
BPMN	Business Process Model and Notation
CEP	Complex Event Processing
CICS	Customer Information Control System
CRM	Customer Relationship Management
EA	Enterprise Architecture
EAI	Enterprise Application Integration
EJB	Enterprise Java Beans
ERP	Enterprise Resource Planning

FCAPS	Fault, Configuration, Accounting, Performance, Security
GUI	Graphical User Interface
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IDE	Integrated Development Environment
IT	Information Technology
ITIL	Information Technology Infrastructure Library
JAX-WS	Java Api For Xml Web Services
KPI	Key Performance Indicator
MDM	Master Data Management
NFR	Non Functional Requirement
POCO	Plain Old Clr Object
POJO	Plain Old Java Object
QOS	Quality Of Service
RA	Reference Architecture
RAS	Reliability Availability Scalability
SBB	Solution Building Block
SCA	Service Component Architecture
SLA	Service Level Agreement
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SQL	Database Language SQL
WSDL	Web Services Description Language
WSRP	Web Services For Remote Portlet

4 Notations

Interpretation of diagrams should be done as follows.

4.1 UML

Most diagrams are not UML. Those that are have text to that effect before the diagram identifying the type of UML diagram so that the reader knows how to interpret it.

4.2 Entity-Relationship

Entity Relationship diagrams with boxes, lines arrows and circled numbers should be interpreted according to the following rules.

— Boxes are the metamodel concepts, layers, architectural building blocks, capabilities, or components.

— Arrows are relationships between metamodel concepts, where single arrow heads show direction of relationship; double-headed arrows indicate the relationship is bidirectional.

— Relationships are named, represented as labelled lines or arrows, and no cardinality is implied.

— Cardinality indications are participation in the relationship and well known mathematical conventions are used to express them (*== 0..*; 0..1==optional and only 1; 1==required as defined in ISO/IEC 15474-1).

4.3 Flows

Flows should be interpreted with the following rules:

— boxes that are layers, architectural building blocks or components;

— directional arrows showing the direction of the flow between the boxes;

— circled numbers on the flow arrows show the sequence of the flow and are used as a point of reference in any explanatory text.

4.4 Layer Diagrams

Layer diagrams, layered boxes and arrows, layer diagrams are usually some part of the SOA RA Layer and Aspects diagram in Figure 3 and should be interpreted using the following rules.

— Boxes that are layers or capabilities with architectural building blocks as smaller boxes positioned with in them. Horizontal boxes are functional layers. Vertical boxes or underlying boxes are cross-cutting aspects.

— Arrows between layers indicate interactions between the layers; capabilities of one layer are used by another.

— Arrows between ABB boxes within layers indicate interactions between ABBs within or across layers where single arrow heads show direction of interaction and double-headed arrows indicate the interaction is bidirectional.

4.5 Capability diagrams

Capability diagrams showing larger boxes as capabilities containing smaller boxes being architectural building blocks needed to fulfil that capability should be interpreted with the following rules.

— Relative positioning of the capability boxes is not relative.

— White indicates ABBs that are defined in the current layer. Some essential ABBs owned by other layers that are used to support the capabilities of this layer are shown in darker shades of grey. Additional ABBs defined in other layers may be used as needed.

— Grey ABBs are named using the name of the layer or aspect owning the ABB as a prefix followed by a colon and then the ABB name. For example: Governance: Registry/Repository indicates that the Registry/Repository ABB is owned by the Governance Aspect and the reader can go there to find out more information about it.

5 Conventions

The introduction is followed by a high-level summary of the 10 layers and the service types defined in this part of ISO/IEC 18384 for the convenience of the reader and to allow some readers who are only looking for a high-level 'executive level' understanding to easily read 7.1, 7.2, and 7.6. Each summary in 7.5 is repeated in the clause documenting the respective layers in the first clause labelled 'summary'.

This is followed by the definition and explanation of the metamodel used in this part of ISO/IEC 18384. The metamodel defines Layer, Capabilities and ABB concepts along with other core logical concepts. ABBs and capabilities are each defined uniquely in each layer. Capabilities and ABBs may require capabilities and ABBs defined in other layers in order to do fulfil their architectural requirements. The layers, capabilities and ABBs in this part of ISO/IEC 18384 are all logical elements and any reference to these logical element 'performing', 'supporting', 'interacting', or 'responsible for' means that when a SOA solution is developed, the physical realization of the capabilities and ABBs are actually 'performing', 'supporting', 'interacting', or 'responsible for'.

Each layer of the SOA RA is documented in a separate clause, Clause 5 through Clause 14. Each Layer is documented using the same organization:

1. Name of the Layer	
1.1 Overview	
1.1.1 Summary	
1.1.2 Context and Typical Flow	
1.1.3 Capabilities	- explains capabilities supported by layer
1.2 Details of ABBs and Supported Capabilities	
1.2.1 Details of ABBs	- detailed definitions of the ABBs
1.2.2 Structural Overview of the Layer	- overview of capabilities and ABBs they support
1.3 Inter-Relationships between the ABBs	- interactions between ABBs with in the layer
1.4 Significant Intersection Points with other Layers	
1.4.1 Interaction with Cross-Cutting Aspects	- interactions with Aspects supporting layer
1.4.2 Interaction with Horizontal Layers	- interactions with functional layers
1.5 Usage implications and Guidance	- best practices and advice
1.5.1 Options and Design Decisions	- considerations

At the beginning of each layer, there is small unlabelled figure of the SOA Solution stack for this SOA RA in the upper right hand corner that indicates with dark grey which layer in the reference architecture that this clause is defining.

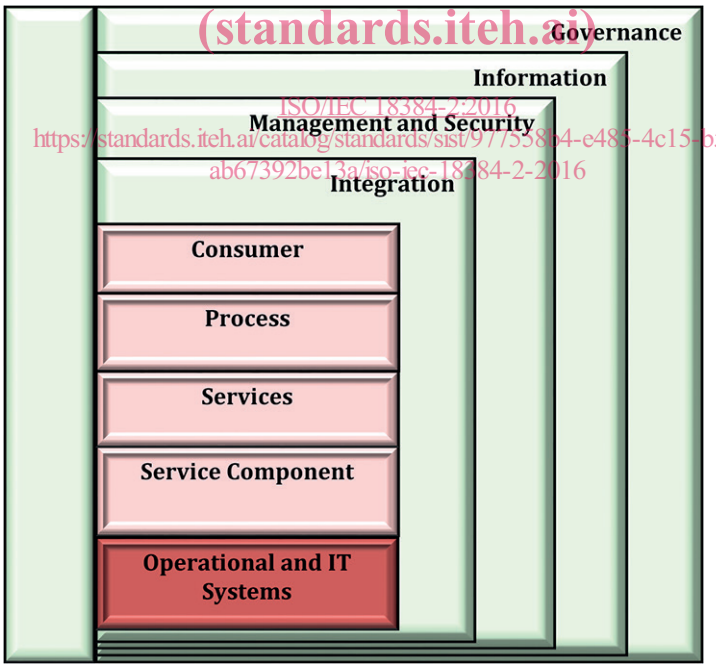

Figure 1 — SOA RA Layer/Aspect Indicator Diagram

For example, Clause 8 has Figure 1, at the beginning that indicates that the Clause is documenting the Operational and IT Systems Layer.

Clause 18 defines in detail the types of services commonly found in SOA solutions.

6 Conformance

ISO/IEC 18384 contains three parts which have different conformance requirements, as follows:

a) *Part 1: Terminology and concepts for SOA* – conformance only to terms and adherence to the semantics in the definitions;

b) *Part 2: Terminology and concepts for SOA* – conformance only to semantics of the metamodel and any Layers, ABBs, or capabilities that are used;

c) *Part 3: Service Oriented Architecture Ontology*, – conformance for OWL or non-OWL applications.

Conformance to this part of ISO/IEC 18384 is defined as follows.

This part of ISO/IEC 18384 is intended to be a set of best practices and guidance on creating successful architectures using the SOA paradigm. It is not intended to be mandatory or normative or to use for claiming conformance.

It is a qualitative standard in that users of the SOA RA may choose to deviate from the standard in certain areas. An organization may choose among the various ABBs provided by the SOA RA for conducting assessments, designing, or implementing architectures.

If a document, product or standard claims conformance with this part of ISO/IEC 18384 then it shall use the same semantics for the Metamodel, and any specific Layers, ABBs, or Capabilities used.

Some of the ABBs in the SOA RA are foundational and may be needed in most SOA solutions and others are only needed for some SOA solutions.

A service-oriented architecture or SOA solution does not conform to the partially layered architecture if there are certain things that are logically missing, then the missing building blocks that are key for the specific instance of the architecture should be identified. The corresponding Solution Building Blocks should be present.

Service-oriented architectures and SOA solutions can be different but conformant.

7 Overview

7.1 Introduction to SOA

Service Oriented Architecture (SOA) is an architectural style that supports service orientation and is a paradigm for business and IT (see ISO/IEC 18384-1:2016, 3.48). This architectural style is for designing systems in terms of services available at an interface and the outcomes of services. A service is a logical representation of a set of activities that has specified outcomes, is self-contained, may be composed of other services and is a "black box" to consumers of the service. (see ISO/IEC 18384-1:2016 ,3.20).

In common with other architectural styles, SOA

— places unique requirements on system infrastructure,

— has environment-specific implementations, constrained or enabled by context and described within that context,

— requires appropriate governance of IT and systems and EA,

— has business solutions that are designed to mirror real-world business activities, and

— provides criteria to allow consumers to determine whether the business solution offered has been properly and completely executed in accordance with their expectations.