INTERNATIONAL STANDARD

ISO/IEC 19500-3

First edition
2012-04-15

Information technology — Object Management Group — Common Object Request Broker Architecture (CORBA) —

Part 3: **Components**

Technologies de l'information — OMG (Object Management Group) — CORBA (Common Object Request Broker Architecture) —

Partie 3: Composants

Reference number
ISO/IEC 19500-3:2012(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Table of Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 19500-3 was prepared by Technical Committee ISO/IEC JTC1, Information technology, in collaboration with the Object Management Group (OMG), following the submission and processing as a Publicly Available Specification (PAS) of the OMG Common Object Request Broker Architecture (CORBA) specification Part 3 Version 3.1 CORBA Components.

ISO/IEC 19500-3 is related to:

- ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, Information Technology - Open Distributed Processing - Reference Model: Foundations
- ITU-T Recommendation X.903 (1995) | ISO/IEC 10746-3:1996, Information Technology - Open Distributed Processing - Reference Model: Architecture
- ITU-T Recommendation X.920 (1997) | ISO/IEC 14750:1997, Information Technology - Open Distributed Processing - Interface Definition Language
- ISO/IEC 19500-2, Information Technology - Open Distributed Processing - CORBA Specification Part 1: CORBA Interfaces
- ISO/IEC 19500-3, Information Technology - Open Distributed Processing - CORBA Specification Part 2: CORBA Interoperability

ISO/IEC 19500 consists of the following parts, under the general title *Information technology - Open distributed processing - CORBA specification*:

- Part 1: CORBA Interfaces
- Part 2: CORBA Interoperability
- Part 3: CORBA Components

It is the common core of the CORBA specification. Optional parts of CORBA, such as mappings to particular programming languages, Real-time CORBA extensions, and the minimum CORBA profile for embedded systems are documented in the other specifications that together comprise the complete CORBA specification. Please visit the CORBA download page at http://www.omg.org/technology/documents/corba_spec_catalog.htm to find the complete CORBA specification set.

Apart from this Foreword, the text of this International Standard is identical with that for the OMG specification for CORBA, v3.1.1, Part 3.

Introduction

The rapid growth of distributed processing has led to a need for a coordinating framework for this standardization and ITU-T Recommendations X.901-904 | ISO/IEC 10746, the Reference Model of Open Distributed Processing (RM-ODP) provides such a framework. It defines an architecture within which support of distribution, interoperability and portability can be integrated.

RM-ODP Part 2 (ISO/IEC 10746-2) defines the foundational concepts and modeling framework for describing distributed systems. The scopes and objectives of the RM-ODP Part 2 and the UML, while related, are not the same and, in a number of cases, the RM-ODP Part 2 and the UML specification use the same term for concepts which are related but not identical (e.g., interface). Nevertheless, a specification using the Part 2 modeling concepts can be expressed using UML with appropriate extensions (using stereotypes, tags, and constraints).

RM-ODP Part 3 (ISO/IEC 10746-3) specifies a generic architecture of open distributed systems, expressed using the foundational concepts and framework defined in Part 2. Given the relation between UML as a modeling language and Part 3 of the RM-ODP standard, it is easy to show that UML is suitable as a notation for the individual viewpoint specifications defined by the RM-ODP.

This part of ISO/IEC 19500 (CORBA Components) is a standard for the technology specification of an ODP system. It defines a technology to provide the infrastructure required to support functional distribution of an ODP system, specifying functions required to manage physical distribution, communications, processing and storage, and the roles of different technology objects in supporting those functions.

Context of CORBA

The key to understanding the structure of the CORBA architecture is the Reference Model, which consists of the following components:

- **Object Request Broker**, which enables objects to transparently make and receive requests and responses in a distributed environment. It is the foundation for building applications from distributed objects and for interoperability between applications in hetero- and homogeneous environments. The architecture and specifications of the Object Request Broker are described in this manual.
- **Object Services**, a collection of services (interfaces and objects) that support basic functions for using and implementing objects. Services are necessary to construct any distributed application and are always independent of application domains. For example, the Life Cycle Service defines conventions for creating, deleting, copying, and moving objects; it does not dictate how the objects are implemented in an application. Specifications for Object Services are contained in *CORBAservices*: *Common Object Services Specification*.
- **Common Facilities**, a collection of services that many applications may share, but which are not as fundamental as the Object Services. For instance, a system management or electronic mail facility could be classified as a common facility. Information about Common Facilities will be contained in *CORBAfacilities*: *Common Facilities Architecture*.
- **Application Objects**, which are products of a single vendor on in-house development group that controls their interfaces. Application Objects correspond to the traditional notion of applications, so they are not standardized by OMG. Instead, Application Objects constitute the uppermost layer of the Reference Model.

The Object Request Broker, then, is the core of the Reference Model. It is like a telephone exchange, providing the basic mechanism for making and receiving calls. Combined with the Object Services, it ensures meaningful communication between CORBA-compliant applications.

The architecture and specifications described in this standard are aimed at software designers and developers who want to produce applications that comply with OMG specifications for the Object Request Broker (ORB), or this standard (ISO/IEC 19500). The benefit of compliance is, in general, to be able to produce interoperable applications that are based on distributed, interoperating objects. The ORB provides the mechanisms by which objects transparently make requests and receive responses. Hence, the ORB provides interoperability between applications on different machines in heterogeneous distributed environments and seamlessly interconnects multiple object systems.

This Part of this International Standard includes a non-normative annex.

Information technology - Object Management Group Common Object Request Broker Architecture (CORBA), Components

1 Scope

This part of ISO/IEC 19500 defines:

- The syntax and semantics of a component model (see Clause 6, 'Component Model'), based on CORBA IDL, and a corresponding meta-model (see Clause 11, 'Interface Repository Metamodel').
- A language to describe the structure and state of component implementations (see Clause 7, 'OMG CIDL Syntax and Semantics'), and a corresponding meta-model (see Clause 12, 'CIF Metamodel').
- A programming model for constructing component implementations (see Clause 8, 'CCM Implementation Framework').
- A runtime environment for component implementations (see Clause 9, 'The Container Programming Model').
- Interaction between components and Enterprise Java Beans (see Clause 10, 'Integrating with Enterprise JavaBeans').
- Meta-data for describing component-based applications, and interfaces for their deployment (see Clause 14, 'Deployment PSM for CCM').
- A lightweight subset of the component model, programming model and runtime environment (see Clause 13, 'Lightweight CCM Profile').

2 Conformance and Compliance

The following conformance points are defined:

1. A CORBA COS vendor shall provide the relevant changes to the Lifecycle, Transaction, and Security Services identified in "Changes to Object Services" on page 53.
2. A CORBA Component vendor shall provide a conforming implementation of the Basic Level of CORBA Components. A Lightweight CORBA Component vendor shall provide a conforming implementation of the Lightweight CCM Profile as specified in item 8 below.
3. A CORBA Component vendor may provide a conforming implementation of the Extended Level of CORBA Components.
4. To be conformant at the Basic level a non-Java product shall implement (at a minimum) the following:
   - the IDL extensions and generation rules to support the client and server side component model for basic level components.
   - CIDL. The multiple segment feature of CIDL ("Segment Definition" on page 62) need not be supported for basic components.
   - a container for hosting basic level CORBA components.

- the XML deployment descriptors and associated zip files for basic components.

Such implementations shall work on a CORBA ORB as defined in #1 above.

5. To be conformant at the Basic level a Java product shall implement (at a minimum):
   - EJB1.1, including support for the EJB 1.1 XML DTD.
   - the java to IDL mapping, also known as RMI/IIOP.
   - EJB to IDL mapping as defined in "Translation of CORBA Component requests into EJB requests" on page 157.

   Such implementations shall work in a CORBA interoperable environment, including interoperable support for IIOP CORBA transactions, and CORBA security.
6. To be conformant at the extended level, a product shall implement (at a minimum) the requirements needed to achieve Basic PLUS:
   - IDL extensions to support the client and server side component model for extended level components.
   - A container for hosting extended level CORBA components.
   - The XML deployment descriptors and associated zip files for basic and enhanced level components in the format defined in "Deployment PSM for CCM" on page 283.

   Such implementations shall work on a CORBA ORB as defined in #1 above.
7. The Lightweight CCM profile is a conformance point based on the extended model as defined above. "Lightweight CCM Profile" on page 275 defines the specific parts of this CCM specification that are impacted and the normative specific subsetting of CCM. In summary, the following general capabilities (and associated machinery) are excluded from the extended model to define this conformance point:
   - Persistence (only session and service components are supported)
   - Introspection
   - Navigation
   - Redundancies, preferring generic over specific
   - Segmentation (not allowed for session or service components)
   - Transactions
   - Security
   - Configurators
   - Proxy homes
   - Home finders
   - CIDL
   - POA related mandates
8. A CORBA Component vendor may optionally support EJB clients interacting with CORBA Components, by implementing the IDL to EJB mapping as defined in "Translation of EJB requests into CORBA Component Requests" on page 164.

3 References

3.1 Normative References

[CORBA] Object Management Group, “Common Object Request Broker Architecture,” version 3.0.3, OMG document number formal/04-03-01. Available from *http://www.omg.org/cgi-bin/doc?formal/04-03-01*

[D+C] Object Management Group, “*Deployment and Configuration of Component-based Distributed Applications Specification*,” version 1.1. OMG document number ptc/05-01-07. Available from *http://www.omg.org/cgi-bin/doc?ptc/05-01-07*

[EJB] Java Community Process, "Enterprise JavaBeans Specification - Version 1.1" (with errata), June 8, 2000. Available from *http://jcp.org/aboutJava/communityprocess/maintenance/jsr905*

[HTTP] R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, RFC 2616: “*Hypertext Transfer Protocol -- HTTP/1.1*.” June 1999. Available from *http://www.ietf.org/rfc/rfc2616.txt*

[INS] Object Management Group, “*Naming Service Specification*,” version 1.1. February 2001. OMG document number formal/01-02-65. Available from *http://www.omg.org/cgi-bin/doc?formal/01-02-65*

[JIDL] Object Management Group, “Java™ to IDL Language Mapping Specification,” version 1.3. September 2003. OMG document number formal/03-09-04. Available from *http://www.omg.org/cgi-bin/doc?formal/03-09-04*

[MDA] Object Management Group, "MDA Guide - Version 1.0.1" Available from *http://www.omg.org/cgi-bin/doc?omg/03-06-01*

[MOF1] ISO/IEC 19503:2005 Information technology -- XML Metadata Interchange (XMI)

[PSS] Object Management Group, “*Persistent State Service*,” version 2.0. September 2002. OMG document number formal/02-09-06. Available from *http://www.omg.org/cgi-bin/doc?formal/02-09-06*

[RFC2119] IETF RFC2119, "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997. Available from *http://ietf.org/rfc/rfc2119*

[SSS] Object Management Group, “*Security Service Specification*,” version 1.8. March 2002. OMG document number formal/02-03-11. Available from *http://www.omg.org/cgi-bin/doc?formal/02-03-11*

[TSS] Object Management Group, “*Transaction Service Specification*,” version 1.4. September 2003. OMG document number formal/03-09-02. Available from *http://www.omg.org/cgi-bin/doc?formal/03-09-02*

[UML1] /IEC 19501:2005 Information technology - Unified Modeling Language (UML)

[UPC] Object Management Group, "*UML™ Profile for CORBA™ Specification*," version 1.0. Adopted specification. April 2002. OMG document number formal/02-04-01. Available from *http://www.omg.org/cgi-bin/doc?formal/02-04-01*

[URI] T. Berners-Lee, R. Fielding, L. Masinter, RFC 2396: "*Uniform Resource Identifiers (URI): Generic Syntax*." August 1998, available from *http://www.ietf.org/rfc/rfc2396.txt*

[XMI] ISO/IEC 19503:2005 Information technology -- XML Metadata Interchange (XMI)

[XML] World Wide Web Consortium (W3C), "*Extensible Markup Language (XML)*," version 1.0 (second edition). W3C Recommendation, October 6, 2000. Available from *http://www.w3.org/TR/REC-xml*

[XSD] World Wide Web Consortium (W3C), "*XML Schema Part 1: Structures*." W3C Recommendation, May 2, 2001. Available from *http://www.w3.org/TR/xmlschema-1/*

World Wide Web Consortium (W3C), "*XML Schema Part 2: Datatypes*." W3C Recommendation, May 2, 2001. Available from *http://www.w3.org/2001/xmlschema-2/*

3.2 Non-normative References

[LCS] Object Management Group, "*Life Cycle Service Specification*," version 1.2. September 2002. OMG document number formal/02-09-01. Available from *http://www.omg.org/cgi-bin/doc?formal/02-09-01*

[NSS] Object Management Group, "*Notification Service Specification*," version 1.1.October 2004. OMG document number formal/04-10-11. Available from *http://www.omg.org/cgi-bin/doc?formal/04-10-11*