
**Information technology — Cloud
computing — Reference architecture**

*Technologies de l'information — Informatique en nuage — Architecture
de référence*



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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.

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

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national 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 and IEC shall not be held responsible for identifying any or all such patent rights.

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**INTERNATIONAL STANDARD
RECOMMENDATION ITU-T**

Information technology – Cloud computing – Reference architecture

1 Scope

This Recommendation | International Standard specifies the cloud computing reference architecture (CCRA). The reference architecture includes the **cloud computing roles**, **cloud computing activities**, and the **cloud computing functional components** and their relationships.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- Recommendation ITU-T Y.3500 (2014) | ISO/IEC 17788:2014, *Information technology – Cloud computing – Overview and vocabulary*.

2.2 Additional references

- ISO/IEC 29100:2011, *Information technology – Security techniques – Privacy framework*.

3 Definitions

For the purposes of this Recommendation | International Standard, the terms and definitions in Rec. ITU-T Y.3500 | ISO/IEC 17788 and the following definitions apply.

3.1 Terms defined elsewhere

The following term is defined in ISO/IEC/IEEE 42010:

3.1.1 architecture: Fundamental concepts or properties of a system in its environment embodied in its elements, relationships and in the principles of its design and evolution.

The following term is defined in ISO/IEC 29100:

3.1.2 personally identifiable information (PII): Any information that (a) can be used to identify the PII principal to whom such information relates, or (b) is or might be directly or indirectly linked to a PII principal.

NOTE – To determine whether a PII principal is identifiable, account should be taken of all the means which can reasonably be used by the privacy stakeholder holding the data, or by any other **party**, to identify that natural person.

3.2 Terms defined in this Recommendation | International Standard

This Recommendation | International Standard defines the following terms:

3.2.1 activity: A specified pursuit or set of tasks.

3.2.2 cloud service product: A cloud service, allied to the set of business terms under which the cloud service is offered.

NOTE – Business terms can include pricing, rating and service levels.

3.2.3 functional component: A functional building block needed to engage in an **activity** (clause 3.2.1), backed by an implementation.

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- 3.2.4 peer cloud service:** A **cloud service** of one **cloud service provider** which is used as part of a **cloud service** of one or more other **cloud service providers**.
- 3.2.5 peer cloud service provider:** A **cloud service provider** who provides one or more **cloud services** for use by one or more other **cloud service providers** as part of their **cloud services**.
- 3.2.6 product catalogue:** A listing of all the **cloud service products** (clause 3.2.2) which **cloud service providers** make available to **cloud service customers**.
- 3.2.7 role:** A set of **activities** (clause 3.2.1) that serves a common purpose.
- 3.2.8 service catalogue:** A listing of all the cloud services of a particular **cloud service provider**.
- 3.2.9 sub-role:** A subset of the **activities** (clause 3.2.1) of a given **role** (clause 3.2.7).

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

API	Application Programming Interface
CaaS	Communications as a Service
CCRA	Cloud Computing Reference Architecture
CPU	Central Processing Unit
CS	Cloud Service
CSC	Cloud Service Customer
CSN	Cloud Service partner
CSP	Cloud Service Provider
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
KPI	Key Performance Indicator
MSA	Master Service Agreement
NaaS	Network as a Service
PaaS	Platform as a Service
PII	Personally Identifiable Information
QoS	Quality of Service
RAM	Random Access Memory
SaaS	Software as a Service
SLA	Service Level Agreement
ToS	Terms of Service
T&C	Terms and Conditions
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
VM	Virtual Machine

5 Conventions

The following conventions apply:

- 1) Diagrams are used throughout this Recommendation | International Standard to help illustrate the CCRA. Figure 5-1 provides the conventions used regarding the content of the diagrams.

NOTE – In Figure 5-1, "Aspect" is to be understood as referring to "Cross-cutting aspect".

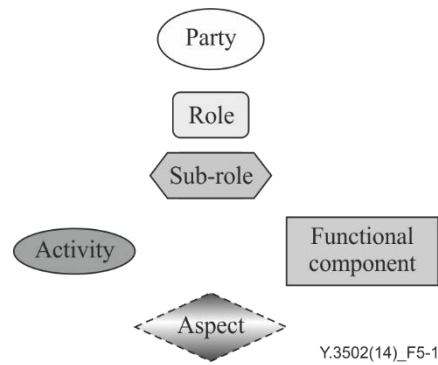


Figure 5-1 – Legend to the diagrams used throughout this Recommendation | International Standard

- 2) This CCRA uses the term "ICT" and "ICT systems", where the abbreviation ICT stands for "information and communication technology", as defined in clause 3.1332 of ISO/IEC/IEEE 24765. This term is used to make it clear that the CCRA covers not only the compute and storage technologies associated with computer systems, but also the communication networks that link systems together.
- 3) References to terms defined in clause 3 and in Rec. ITU-T Y.3500 | ISO/IEC 17788 are shown in bold.

6 Cloud computing reference architecture goals and objectives

Cloud computing is a paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on demand. See Rec. ITU-T Y.3500 | ISO/IEC 17788.

The CCRA presented in this Recommendation | International Standard provides an architectural framework that is effective for describing the **cloud computing roles**, **sub-roles**, **cloud computing activities**, cross-cutting aspects, as well as the functional architecture and **functional components** of **cloud computing**.

The CCRA serves the following goals:

- to describe the community of stakeholders for **cloud computing**;
- to describe the fundamental characteristics of **cloud computing** systems;
- to specify basic **cloud computing activities** and **functional components**, and describe their relationships to each other and to the environment;
- to identify principles guiding the design and evolution of the **CCRA**.

The CCRA supports the following important standardization objectives:

- to enable the production of a coherent set of international standards for **cloud computing**;
- to provide a technology-neutral reference point for defining standards for **cloud computing**;
- to encourage openness and transparency in the identification of **cloud computing** benefits and risks.

The CCRA focuses on the requirements of "what" **cloud services** provide and not on "how to" design cloud-based solutions and implementations. The CCRA does not represent the system architecture of a specific **cloud computing** system, although it could put constraints on a specific system. The CCRA is not tied to any specific vendor products, services or reference implementation; nor does it define prescriptive solutions that inhibit innovation.

The CCRA is also intended to:

- facilitate the understanding of the operational intricacies of **cloud computing**;
- illustrate and provide understanding of various **cloud services** and their provisioning and use;
- provide a technical reference to enable the international community to understand, discuss, categorize and compare **cloud services**;
- be a tool for describing, discussing, and for developing a system-specific architecture using a common framework of reference;
- facilitate the analysis of candidate standards in areas including security, **interoperability**, portability, **reversibility**, reliability and service management, and support analysis of reference implementations.