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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Cloud Computing

Cloud computing infrastructure requirements

Recommendation ITU-T Y.3510



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Recommendation ITU-T Y.3510

Cloud computing infrastructure requirements

Summary

Recommendation ITU-T Y.3510 provides requirements for cloud computing infrastructure; these include the essential capabilities for processing, storage and networking resources, as well as the capabilities of resource abstraction and control.

History

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Cloud computing infrastructure requirements

1 Scope

This Recommendation identifies requirements for cloud infrastructure to support cloud services.

The scope of this Recommendation includes:

- an overview of cloud computing infrastructure;
- requirements for processing resources;
- requirements for networking resources;
- requirements for storage resources;
- requirements for resource abstraction and control.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

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|----------------|--|
| [ITU-T X.1601] | Recommendation ITU-T X.1601 (2015), <i>Security framework for cloud computing</i> . |
| [ITU-T Y.3500] | Recommendation ITU-T Y.3500 (2014) ISO/IEC 17788:2014, <i>Information technology – Cloud computing – Overview and vocabulary</i> . |
| [ITU-T Y.3501] | Recommendation ITU-T Y.3501 (2013), <i>Cloud computing framework and high-level requirements</i> . |
| [ITU-T Y.3502] | Recommendation ITU-T Y.3502 (2014) ISO/IEC 17789:2014, <i>Information technology – Cloud computing – Reference architecture</i> . |

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 cloud computing [ITU-T Y.3500]: 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.

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

3.1.2 cloud service [ITU-T Y.3500]: One or more capabilities offered via cloud computing invoked using a defined interface

3.1.3 cloud service customer [ITU-T Y.3500]: Party which is in a business relationship for the purpose of using cloud services.

NOTE – A business relationship does not necessarily imply financial agreements.

3.1.4 cloud service provider [ITU-T Y.3500]: Party which makes cloud services available.

3.1.5 emergency telecommunications (ET) [b-ITU-T Y.2205]: ET means any emergency related service that requires special handling from the NGN relative to other services. This includes government authorized emergency services and public safety services.

3.1.6 emergency telecommunications service (ETS) [b-ITU-T E.107]: A national service providing priority telecommunications to ETS authorized users in times of disaster and emergencies.

3.1.7 logical resource [b-ITU-T Y.3011]: An independently manageable partition of a physical resource, which inherits the same characteristics as the physical resource and whose capability is bound to the capability of the physical resource.

NOTE – "independently" means mutual exclusiveness among multiple partitions at the same level.

3.1.8 management system [b-ITU-T M.60]: A system with the capability and authority to exercise control over and/or collect management information from another system.

3.1.9 virtual resource [b-ITU-T Y.3011]: An abstraction of physical or logical resource, which may have different characteristics from the physical or logical resource and whose capability may not be bound to the capability of the physical or logical resource.

NOTE – "different characteristics" means simplification or extension of the resource characteristics. "different characteristics" allows the virtual resource to expose access or control methods different from the original physical or logical resource.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 hypervisor: A type of system software that allows multiple operating systems to share a single hardware host.

NOTE – Each operating system appears to have the host's processor, memory and other resources, all to itself.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CPU	Central Processing Unit
CSC	Cloud Service Customer
CSP	Cloud Service Provider
DFS	Distributed File System
DHT	Distributed Hash Table
DNS	Domain Name System
ET	Emergency Telecommunications
ETS	Emergency Telecommunications Service
I/O	Input/Output
iSCSI	Internet Small Computer System Interface
LAN	Local Area Network
NAS	Network Attached Storage
NFS	Network File System

NTP	Network Time Protocol
OS	Operating System
QoS	Quality of Service
SAN	Storage Area Network
SLA	Service Level Agreement
vCPU	virtual CPU
VI	Virtual Infrastructure
VM	Virtual Machine
VPN	Virtual Private Network

5 Conventions

In this Recommendation:

The keywords "is required" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "is prohibited" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6 Overview of cloud infrastructure

In this Recommendation, cloud infrastructure includes processing, storage, networking and other hardware resources as well as software assets.

Abstraction and control of physical resources are essential means to achieve the on-demand and elastic characteristics of cloud infrastructure. In this way, physical resources can be abstracted into virtual machines (VMs), virtual storages and virtual networks. The abstracted resources are controlled to meet cloud service customers' (CSCs) needs.

The main characteristics of cloud infrastructure are:

- Network centric: The cloud infrastructure consists of distributed resources including processing, storage and other hardware resources that are connected through the networks;
- On-demand resource provisioning: The cloud infrastructure dynamically provides resources according to CSCs' needs;
- Elasticity: The cloud infrastructure is capable of expanding or reducing its resources to accommodate the current workloads;
- High availability: The cloud infrastructure is capable of providing required resources under the conditions stated in the service level agreement (SLA);
- Resources abstraction: The underlying resources of cloud infrastructure (processing, storage, networking, etc.) are invisible to the CSCs.

NOTE – For high level cloud computing requirements, please refer to [ITU-T Y.3501].