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Information technology — Cloud computing — Common technologies and techniques

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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.

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).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 38, *Cloud Computing and Distributed Platforms*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Cloud computing is described at a high, conceptual level in the two foundational standards ISO/IEC 17788 [1] and ISO/IEC 17789 [2].

However, as the use of cloud computing has grown, a set of commonly used technologies has grown to support, simplify and extend the use of cloud computing alongside sets of commonly used techniques which enable the effective exploitation of the capabilities of cloud services. Many of these common technologies and techniques are aimed at developers and operations staff, increasingly linked together in a unified approach called DevOps (see 10.2). The aim is to speed and simplify the creation and operation of solutions based on the use of cloud services.

This document aims to describe the common technologies and techniques which relate to cloud computing, to describe how they relate to each other and to describe how they are used by some of the roles associated with cloud computing.

This document (a Technical Specification) addresses areas that are still developing in the industry, where it is believed that there will be a future, but not immediate, need for one or more International Standards.

This document will be of primary interest to service developers in Cloud Service Providers and to standards developers working with ISO and other organizations.

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Information technology — Cloud computing — Common technologies and techniques

1 Scope

This document provides a description of a set of common technologies and techniques used in conjunction with cloud computing. These include:

— virtual machines (VMs) and hypervisors;

— containers and container management systems (CMSs);

— serverless computing;

— microservices architecture;

— automation;

— platform as a service systems and architecture;

— storage services;

— security, scalability and networking as applied to the above cloud computing technologies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 22123-1:—[1)], *Information technology — Cloud computing — Part 1:Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22123-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
guest operating system
guest OS
operating system that runs within a virtual machine

[SOURCE: ISO/IEC 21878:2018, 3.2]

1) To be published.

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3.2
host operating system
host OS
operating system onto which virtualization software is installed

Note 1 to entry: "virtualization software" can include both hypervisor and virtual machines as well as container daemon (3.4) and containers.

3.3
serverless computing
cloud service category in which the cloud service customer can use different cloud capabilities types without the cloud service customer having to provision, deploy and manage either hardware or software resources, other than providing cloud service customer application code or providing cloud service customer data

Note 1 to entry: Serverless computing provides automatic scaling with dynamic elastic allocation of resources by the cloud service provider, automatic distribution across multiple locations, and automatic maintenance and backup.

Note 2 to entry: Serverless computing functionality is triggered by one or more cloud service customer defined events and can execute for a limited time period as required to deal with each event.

Note 3 to entry: Serverless computing functionality can be invoked by direct invocation from web and mobile applications.

3.4
container daemon
software service that executes on a host operating system (3.2) and is responsible for creating, starting and stopping containers on that system

3.5
container management system
CMS
software that provides for management and orchestration of container instances

Note 1 to entry: Capabilities include initial creation and placement, scheduling, monitoring, scaling, update and the parallel deployment of capabilities such as load balancers, firewalls, virtual networks and logging.

3.6
cloud native application
application that is explicitly designed to run within and to take advantage of the capabilities and environment of cloud services

3.7
functional decomposition
type of modular decomposition in which a system is broken down into components that correspond to system functions and subfunctions

EXAMPLE Hierarchical decomposition, stepwise refinement.

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.1695]

3.8
continuous deployment
software engineering approach in which teams produce software in short cycles such that the software can be released to production at any time and where deployment to production is itself automated

3.9
continuous delivery
continuous deployment (3.8) where the deployment stage is initiated manually

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3.10
DevOps
methodology which combines together software development and IT operations in order to shorten the development and operations lifecycle

3.11
DevSecOps
DevOps (3.10) extended to include security capabilities as an essential and integral part of the development and operations processes

3.12
orchestration
type of composition where one particular element is used by the composition to oversee and direct the other elements

Note 1 to entry: The element that directs an orchestration is not part of the orchestration (composition instance) itself.

Note 2 to entry: See ISO/IEC 18384-3:2016, 8.3.

[SOURCE: ISO/IEC 18384-1:2016, 2.16]

3.13
virtual machine image
VM image
information and executable code necessary to run a virtual machine

3.14
virtual machine metadata
VM metadata
information about the configuration and startup of a virtual machine

3.15
microservice
independently deployable artefact providing a service implementing a specific functional part of an application

3.16
microservices architecture
design approach that divides an application into a set of microservices (3.15)

3.17
functions as a service
function as a service
FaaS
cloud service category in which the capability provided to the cloud service customer is the execution of cloud service customer application code, in the form of one or more functions that are each triggered by a cloud service customer specified event

3.18
serverless database
cloud service category in which the capability provided to the cloud service customer is a fully cloud service provider managed database made available via an application programming interface

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3.19
firewall
type of security barrier placed between network environments — consisting of a dedicated device or a composite of several components and techniques — through which all traffic from one network environment traverses to another, and vice versa, and only authorized traffic, as defined by the local security policy, is allowed to pass

[SOURCE: ISO/IEC 27033-1:2015, 3.12]

3.20
container registry
component that provides the capability to store and to access container images

3.21
resource affinity
placement of two or more resources close to each other

Note 1 to entry: Closeness relates to factors such as speed of access or high bandwidth of access between the resources.

4 Symbols and abbreviated terms

API	Application programming interface
CMS	Container management system
CSC	Cloud service customer
CSP	Cloud service provider
DNS	Domain name service
GUI	Graphical user interface
HTTP	Hypertext transfer protocol
IaaS	Infrastructure as a service
IP	Internet protocol
MAC	Media access control
OCI	Open containers initiative
OS	Operating system
OVF	Open virtualization format
PaaS	Platform as a service
SaaS	Software as a service
VPN	Virtual private network

5 Overview of common technologies and techniques used in cloud computing

5.1 General

This document provides a description of a set of common technologies and techniques used in conjunction with cloud computing.

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