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# Information technology — Cloud computing — Overview of platform capabilities type and platform as a service

*Technologies de l'information — Informatique en nuage — Vue d'ensemble des types de ressources et des services de plateformes à la demande*

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# Contents

Page

**Foreword** ..... **vi**
**Introduction** ..... **vii**
**1 Scope** ..... **1**
**2 Normative references** ..... **1**
**3 Terms and definitions** ..... **1**
**4 Abbreviated terms** ..... **3**
**5 Overview of platform capabilities type** ..... **4**
5.1 General ..... 4
5.2 Examples of capabilities ..... 4
5.3 Capabilities not included in the platform capabilities type ..... 5
5.4 The legal status of CSC-provided code as customer data ..... 5
5.5 Intellectual property considerations ..... 5
5.6 Cloud service agreement elements for the platform capabilities type ..... 6
**6 The cloud service developer sub-role (CSD)** ..... **7**
6.1 The definition of cloud service developer ..... 7
6.2 CSD activities ..... 7
6.3 CSDs and the CSC application code lifecycle ..... 7
**7 Platform as a Service (PaaS) concepts** ..... **8**
7.1 PaaS as a cloud service category ..... 8
7.2 Benefits of choosing PaaS ..... 8
7.2.1 General ..... 8
7.2.2 Reduced maintenance ..... 8
7.2.3 Scalability ..... 8
7.2.4 Access to advanced features ..... 8
7.3 The “fuzzy” boundaries between IaaS, PaaS, and SaaS ..... 9
7.3.1 General ..... 9
7.3.2 IaaS vs PaaS ..... 11
7.3.3 PaaS vs SaaS ..... 11
7.3.4 DSaaS as an example ..... 11
7.3.5 Relevance of the boundaries ..... 12
7.3.6 Selective use of the boundaries ..... 12
7.3.7 Implications ..... 12
7.4 Common functions included within a PaaS ..... 12
7.4.1 General ..... 12
7.4.2 Documentation of CSP-provided interfaces ..... 12
7.4.3 CSC-provided code lifecycle management ..... 13
7.4.4 Identity and access management (IAM) ..... 13
7.4.5 Message queuing ..... 13
7.4.6 Load balancing ..... 13
7.5 Life-cycle of a CSC application on PaaS ..... 14
7.5.1 General ..... 14
7.5.2 Conceptualisation ..... 14
7.5.3 Requirements analysis ..... 14
7.5.4 Code development ..... 14
7.5.5 Application integration ..... 14
7.5.6 Staging and Deployment of an application on PaaS ..... 15
7.5.7 Operation of an application on PaaS ..... 15
7.5.8 Scaling of an application on PaaS ..... 15
7.5.9 Maintenance of an application running on PaaS ..... 16
7.5.10 Disposal of an application running on PaaS ..... 16
7.5.11 Evolution of a CSC application over time ..... 17
7.6 Evolution of a PaaS cloud service implementation over time ..... 17

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7.7 The use of PaaS to build SaaS offerings for others ... 17

**8 Architectures for PaaS ... 17**
8.1 PaaS as a category of pure platform cloud service ... 17
8.1.1 General ... 17
8.1.2 General layering ... 18
8.1.3 Generic architecture for PaaS cloud services ... 18
8.1.4 Example illustration of the generic PaaS architecture using Kubernetes ... 19
8.2 Microservice architectures ... 20
8.3 Native PaaS ... 21
8.4 PaaS over an IaaS ... 21
8.5 PaaS within a SaaS ... 21
8.6 PaaS linked with a SaaS ... 21
8.7 User interfaces for PaaS ... 21

**9 Serverless architectures ... 22**
9.1 General ... 22
9.2 Function as a Service (FaaS) ... 22
9.3 Stateless functions ... 22

**10 Applications that leverage cloud native computing ... 23**
10.1 Background ... 23
10.2 Intended Advantages ... 23
10.3 Orchestration ... 23
10.4 Architecture ... 23

**11 General considerations for platform capabilities and PaaS ... 24**
11.1 General ... 24
11.2 Auditability ... 24
11.3 Availability ... 24
11.4 Governance ... 24
11.5 Interoperability ... 24
11.6 Maintenance and Versioning ... 25
11.7 Performance ... 25
11.8 Portability ... 25
11.9 Protection of PII (privacy) ... 25
11.10 Regulatory ... 25
11.11 Resiliency ... 25
11.12 Reversibility ... 25
11.13 Security ... 25
11.13.1 General ... 25
11.13.2 Malware avoidance ... 26
11.13.3 Code access to resources ... 26
11.14 Service levels and service level agreements ... 26
11.15 Sustainability ... 26

**12 Portability between PaaS Cloud services ... 26**
12.1 General ... 26
12.2 Endpoint identification ... 26
12.3 Portability-ready development ... 27
12.4 Addressing “Exit strategy” requirements ... 27
12.5 Portability through container orchestration ... 27

**13 Related technologies and platform capabilities type ... 28**
13.1 General ... 28
13.2 Artificial Intelligence (AI) ... 28
13.3 PaaS and generative AI ... 29
13.4 Quantum Computing (QC) ... 30

**14 Other cloud services exhibiting the platform capabilities type ... 31**
14.1 General ... 31
14.2 Table of examples ... 31

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**15 Recommendations for CSPs and CSCs** ..... **31**
15.1 Transparency of status and rights pertaining to CSC or CSN sourced artefacts ..... 31
15.2 Performance reporting ..... 31
15.3 Security reporting ..... 32
15.4 Accessibility of CSD-created user interfaces ..... 32
**Annex A** (Informative) **Platform as a Service in a multiple CSP environment** ..... **33**
**Annex B** (Informative) **Example of cloud native computing using Docker and Kubernetes** ..... **36**
**Bibliography** ..... **38**

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# Foreword

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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*.

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# Introduction

Many cloud services allow a cloud service customer (CSC) to develop, upload, and execute their own code, rather than uploading a complete virtual machine image, or being confined to software provided by the cloud service provider.

This ability to write and execute their own code allows CSCs and others to develop or customise their own applications without having to run their own private datacentres, and without having to install, patch and manage operating systems and other elements typically required in legacy IaaS services. This approach allows the CSC to concentrate on the code that directly meets their business need rather than having to create a lot of peripheral code just to make things work.

While some cloud services are specifically designed as Platform as a Service (PaaS) wherein the execution of CSC-provided code is the primary purpose of the cloud service, others include a greater or lesser amount of "platform capabilities type" as a feature or supplement to the main function of the cloud service. These platform capabilities can be as basic as telephone call routing scripts or database stored procedures or can be as extensive as large function libraries or microservices for use in other applications. The full range of possibilities is too extensive to list exhaustively and is constantly growing as new ideas emerge.

In addition, the world of cloud computing is seeing wholly new developments and technologies added all the time. Many of these include the execution of CSC-provided code, or its equivalent for a different paradigm. For example, Artificial Intelligence (AI) services (e.g. machine learning) can be deployed as cloud services, and in this case the "CSC-provided code" can include both training data and procedural code. As another example, the world is preparing for the availability of Quantum Computing (QC) technology which (like AI) will probably be exposed to CSCs as various forms of cloud services. Both AI and QC technologies appear as services that can be incorporated within more traditional application designs, thus contributing their specialised and unique capabilities.

It is therefore useful to describe both the purpose-built PaaS concept, and the more general "platform capabilities type" as it appears in other cloud services beyond PaaS. This document explains the differences between PaaS and other services, the types of CSC-provided code that such platforms can support, the general approaches to development of code for such services, common platform architectural approaches, and how cloud computing platforms can support new technology paradigms such as AI and QC in a consistent manner.

In particular, this document provides an introduction to the "cloud native computing" concept as a pattern of platform capabilities type, providing an architectural pattern that is focused on cloud-first development and that offers greater flexibility and modularity than many older software design patterns.

It is also important to define some general recommendations to promote good practice in the provision and use of digital technology platforms of these kinds especially with respect to transparency of platform service offerings to existing and potential CSCs.

Throughout this document, unless otherwise explicitly stated, the term "platform" is always used in the engineering sense, specifically referring to the "digital technology platform" in accordance with ISO/IEC TS 5928 as implemented in cloud services, edge services, mobile services, and other distributed platforms.

The common engineering usage of "digital technology platform" includes:

— operating systems,

— "platform as a service" cloud services in accordance with ISO/IEC 22123-1,

— other cloud services that exhibit "platform capabilities type" in accordance with ISO/IEC 22123-2.

As such, this usage of platform refers to cloud services that enable a CSC to create and maintain their own hosted application, rather than using digital technology for the creation of a multi-sided market as typically used by economists and competition regulators.

However, as described in ISO/IEC TS 5928, some types of cloud services (typically various forms of SaaS) that are implemented on top of the digital technology platform can also exhibit the characteristics of

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a digital economic platform by creating a multi-sided market. Such SaaS implementations by CSCs of the digital technology platform are generally outside the control and responsibility of the digital technology platform service operator.

The intended audience for this document is:

— businesses considering the use of technology platform capabilities for new cloud applications (both as CSDs and as purchasers of installable cloud software)

— for those seeking to understand or describe the various cloud application development options available

— for those seeking to clearly describe digital technology platform services that they offer to CSCs

— for those developing governmental or procurement policies covering CSC-provided cloud applications

— those developing other standards that need to reference cloud technology platform capabilities and approaches.

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# Information technology — Cloud computing — Overview of platform capabilities type and platform as a service

## 1 Scope

Within the context of digital technology platforms as defined in ISO/IEC TS 5928, this document provides:

— a description of the concepts of the platform capabilities type as it appears in various cloud service categories;

— a description of the specific cloud service category of platform as a service (PaaS);

— descriptions of common technology platform architectures, development approaches, and life cycles of elements of technology platform services, including a high-level description of the popular cloud native computing concept;

— recommendations for cloud services that include platform capabilities, including but not limited to PaaS.

## 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, *Information technology — Cloud computing — Part 1: Vocabulary*

ISO/IEC/TS 5928, *Taxonomy for digital platforms*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22123-1, ISO/IEC/TS 5928 and the following apply.

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

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

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

**3.1**
**platform capabilities type**
cloud capabilities type in which the cloud service customer can deploy, manage and run customer-created or customer-acquired applications using one or more programming languages and one or more execution environments supported by the cloud service provider

Note 1 to entry: In this context “applications” can include programs, software components (such as containers, code, function libraries, and microservices, etc.), unfinished or incomplete programs (such as test versions or prototypes), and other forms of source code or executable software code artefacts, with or without a user interface being included.

Note 2 to entry: This does not include any minimal scripting capability internal to a single application, such as simple macros within a spreadsheet.

[SOURCE: ISO/IEC 22123-1:2023, 3.5.4, modified — Notes 1 and 2 to entry have been added.]

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**3.2**
**CSC-provided code**
software code artefacts created by CSDs acting on the CSC's behalf, that are designed to execute within a cloud service to meet the needs of the CSC

Note 1 to entry: Such code artefacts can be supplemented by data or metadata.

Note 2 to entry: The CSDs creating the code can be employees or contractors of the CSC, or of another organization such as a vendor, partner, or contractor to the CSC.

**3.3**
**metadata**
data that defines and describes other data

Note 1 to entry: Metadata can include many different kinds of attributes of the data it describes. Some metadata fields are almost universal, such as date of creation and last change, type of file or object, permissions, and ownership. Other metadata can be specific to the type of object, such as the camera settings of a digital image, the author's name for a document, the version of a code artefact, etc.

Note 2 to entry: Some metadata may be directly attached to (or embedded within) the data to which it relates and will always move with it. Other metadata may be stored separately and associated with the data by reference or other means.

[SOURCE: ISO/IEC 11179-3:2022, 3.2.30, modified — The notes to entry have been added.]

**3.4**
**cloud native**
**cloud native computing**
approach and practices for developing, deploying, and running applications and services in cloud computing systems with specific **platform capabilities type** which offer features such as functional decomposition, containerization, orchestration, microservices for applications, automation, monitoring and logging, and continuous operation

Note 1 to entry: Additional tools and technologies that support these capabilities include DevOps, CI-CD tools, automation of orchestration etc., which individually and collectively, enable autoscaling, resilience, superior performance, ease of portability and interoperability and ease of maintenance among other benefits.

Note 2 to entry: Orchestration refers to automatic or semi-automatic deployment, instantiation, interconnection, and management of containerised software.

Note 3 to entry: This approach contrasts with more traditional virtualisation-based approaches based largely on customer-managed Virtual Machines.

Note 4 to entry: See also Clause 10.

**3.5**
**jurisdiction**
geographical or corporate area over which a cloud computing policy extends

Note 1 to entry: In a government policy context this will generally be the geographical area over which the body enacting the policy has legal authority either as government or as authorised regulator. However, in an enterprise or government agency environment, the jurisdiction of a policy might cover a business function, department, agency, or other organisational area of responsibility not tied to geography.

[SOURCE: ISO/IEC TR 22678:2019, 3.2]

**3.6**
**cloud service developer**
sub-role of the cloud service partner role, with the responsibility for designing, developing, testing and maintaining the implementation of software that is either part of a cloud service, or is designed to run on a cloud service

Note 1 to entry: The cloud service developer sub-role can be performed by any party, including CSN, CSP, and CSC.

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