INTERNATIONAL STANDARD

ISO/IEC 19941

First edition
2017-12

Information technology — Cloud computing — Interoperability and portability

Technologies de l'information — Informatique en nuage — Interopérabilité et portabilité

Reference number
ISO/IEC 19941:2017(E)

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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

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Introduction

This document is intended to establish a common understanding of cloud computing interoperability and portability. In particular, it is of interest to cloud stakeholders focusing on cloud service agreements concerning interoperability or portability between cloud services.

Cloud computing is defined as 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. ISO/IEC 17788 and ISO/IEC 17789 provide a starting point for understanding of different types of interoperability and portability, relationships with activities and roles and cloud capabilities types. Interoperability, data portability and application portability are essential to the use of cloud services. The goal of interoperability is to enable the interaction between non-cloud and cloud services, as well as between cloud services, in addition to enabling composition of new services from multiple services. The goal of portability is to enable cloud service customers (CSCs) to move their data or applications between non-cloud and one or more cloud services and between cloud services. The benefits of interoperability include lower costs of integration and increasing the value of services through enrichment or new functionality provided by composing cloud services. The benefits of portability include greater efficiency by lowering the costs of migration. Both interoperability and portability offer more choices to CSCs by limiting the effects of being locked in to any cloud service or cloud service provider (CSP). While there is no disagreement that interoperability and portability are advantages to cloud computing, there is no single way of handling either capability. Declaring interoperability or portability without doing a detailed analysis of what specifically is to be ported or is to be made interoperable is meaningless and does not lead to cloud solutions that meet the CSC's and CSP's business goals, which has led to significant and on-going confusion in the industry and needs to be resolved.

Interoperability is the ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged. In the context of cloud computing, interoperability should be viewed as the capability of public cloud services, private cloud services and other cloud service customer systems to understand each other's interfaces, configuration, forms of authentication and authorization, etc. in order to cooperate and work with each other.

Interoperability is a complex subject in the context of cloud computing because of the number of interactions involved and the potential variations for each interaction. While interoperability and standards add significant value and are advantageous to cloud computing, there are no comprehensive solutions. Many existing IT standards contribute to enabling interoperability between CSC applications and cloud services and between cloud services themselves. Using standards can be one way to build interoperable cloud services. Other techniques such as well-documented API specifications can also help.

Cloud computing services that enable portability using defined policies, standards or documented formats can ensure that CSCs are able to get their data into or out of cloud services in a reasonably easy and cost-effective manner, as this allows CSCs to move to a cloud service of another CSP and also to drive integration of heterogeneous cloud services.

As presented in ISO/IEC 17788, portability is the ability of a CSC to move their data or their applications between two different cloud services at a low cost and with minimal disruption. Portability is significant in cloud computing since CSCs are interested in avoiding lock-in when they choose to use cloud services. Therefore, in the context of cloud computing, portability can have multiple aspects depending on what is being ported (moved) and which cloud services are involved. For portability, there are no specific requirements for the source and target systems to be directly connected.

Portability in a cloud computing environment is not a binary concept. It would be a mistake to think of cloud services and the associated cloud applications and data as being either 100% portable or not portable at all. Almost all applications running in a cloud service can be ported to another cloud service offering equivalent capabilities if enough resources are invested. The critical considerations for portability discussions are the porting cost, the risks associated with the porting and how to control the costs and risks compared to the expected benefits.

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Information technology — Cloud computing — Interoperability and portability

1 Scope

This document specifies cloud computing interoperability and portability types, the relationship and interactions between these two cross-cutting aspects of cloud computing and common terminology and concepts used to discuss interoperability and portability, particularly relating to cloud services.

This document is related to other standards, namely, ISO/IEC 17788, ISO/IEC 17789, ISO/IEC 19086-1, ISO/IEC 19944, and in particular, references the cross-cutting aspects and components identified in ISO/IEC 17788 and ISO/IEC 17789 respectively.

The goal of this document is to ensure that all parties involved in cloud computing, particularly CSCs, CSPs and cloud service partners (CSNs) acting as cloud service developers, have a common understanding of interoperability and portability for their specific needs. This common understanding helps to achieve interoperability and portability in cloud computing by establishing common terminology and concepts.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1 Interoperability terms

3.1.1
interoperability
ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged

[SOURCE: ISO/IEC 17788:2014, 3.1.5]

3.1.2
cloud interoperability
ability of a CSC's system to interact with a cloud service or the ability for one cloud service to interact with other cloud services by exchanging information according to a prescribed method to obtain predictable results

Note 1 to entry: Cloud service to cloud service interactions occur through a CSP: inter-cloud provider relationship.

3.1.3
transport interoperability
interoperability (3.1.1) where information exchange uses an established communication infrastructure between the participating systems

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3.1.4
syntactic interoperability
interoperability (3.1.1) such that the formats of the exchanged information can be understood by the participating systems

3.1.5
semantic data interoperability
interoperability (3.1.1) so that the meaning of the data model within the context of a subject area is understood by the participating systems

3.1.6
behavioural interoperability
interoperability (3.1.1) so that the actual result of the exchange achieves the expected outcome

3.1.7
policy interoperability
interoperability (3.1.1) while complying with the legal, organizational and policy frameworks applicable to the participating systems

3.2 Data portability terms

3.2.1
data portability
ability to easily transfer data from one system to another without being required to re-enter data

Note 1 to entry: It is the ease of moving the data that is the essence here. This might be achieved by the source system supplying the data in exactly the format that is accepted by the target system. But even if the formats do not match, the transformation between them may be simple and straightforward to achieve with commonly available tools. On the other hand, a process of printing out the data and rekeying it for the target system could not be described as "easy".

[SOURCE: ISO/IEC 17788:2014, 3.2.21]

3.2.2
cloud data portability
data portability (3.2.1) from one cloud service to another cloud service or between a CSC's system and a cloud service

[SOURCE: ISO/IEC 17788:2014, 3.2.6, modified — "or between a CSC's system and a cloud service" has been added.]

3.2.3
data syntactic portability
data portability (3.2.1) using data formats that can be decoded on the target

3.2.4
data semantic portability
data portability (3.2.1) such that the meaning of the data model is understood within the context of a subject area by the target

3.2.5
data policy portability
data portability (3.2.1) while complying with the legal, organizational and policy frameworks applicable to both the source and target

3.3 Application portability terms

3.3.1
application portability
ability to migrate an application from a source system to a target system

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3.3.2
cloud application portability
ability to migrate an application from one cloud service to another cloud service or between a CSC's system and a cloud service

[SOURCE: ISO/IEC 17788:2014, 3.2.2, modified — "or between a CSC's system and a cloud service" has been added.]

3.3.3
application syntactic portability
application portability (3.3.1) where the format of the application artefacts can be decoded on the target

3.3.4
application instruction portability
application portability (3.3.1) so that the application's instruction set executes on the target

3.3.5
application metadata portability
application portability (3.3.1) so that the application's metadata is retained and understood on the target

3.3.6
application behaviour portability
application portability (3.3.1) so that execution on the target produces equivalent results to those produced on the source

3.3.7
application policy portability
application portability (3.3.1) while complying with the legal, organizational and policy frameworks applicable to the source and target

4 Abbreviated terms

API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
ASN.1	Abstract Syntax Notation 1
BPEL	Business Process Execution Language
BPML	Business Process Management Language
CRM	Customer Relationship Management
CSC	Cloud Service Customer
CSN	Cloud Service Partner
CSP	Cloud Service Provider
CSV	Comma-separated values
ERP	Enterprise Resource Planning
ESB	Enterprise Service Bus
HCM	Human Capital Management
HTTP	Hyper Text Transfer Protocol

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