

---

---

**Information technology — Cloud  
computing —**

**Part 3:  
Reference architecture**

*Technologies de l'information — Informatique en nuage —  
Partie 3: Architecture de référence*





**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

|   | Page      |
|---|-----------|
| Foreword.....   | v         |
| <b>1 Scope.....</b>   | <b>1</b>  |
| <b>2 Normative references.....</b>  | <b>1</b>  |
| <b>3 Terms and definitions.....</b>   | <b>1</b>  |
| 3.1 Terms related to security and privacy.....                                      | 1         |
| 3.2 Terms relating to architecture.....   | 1         |
| <b>4 Symbols and abbreviated terms.....</b>   | <b>2</b>  |
| <b>5 Conventions.....</b>   | <b>2</b>  |
| <b>6 Cloud computing reference architecture goals and objectives.....</b>           | <b>2</b>  |
| <b>7 CCRA viewpoints.....</b>   | <b>3</b>  |
| 7.1 General.....  | 3         |
| 7.2 CCRA architectural views.....   | 3         |
| 7.3 User view of cloud computing.....   | 5         |
| 7.3.1 General.....  | 5         |
| 7.3.2 Cloud computing activities.....   | 6         |
| 7.3.3 Parties.....  | 6         |
| 7.3.4 Roles and sub-roles.....  | 6         |
| 7.3.5 Cloud services.....   | 7         |
| 7.3.6 Cloud deployment models.....  | 7         |
| 7.3.7 Cloud computing cross-cutting aspects.....                                    | 8         |
| 7.4 Functional view of cloud computing.....   | 8         |
| 7.4.1 General.....  | 8         |
| 7.4.2 Functional components.....  | 9         |
| 7.4.3 Functional layers.....  | 9         |
| 7.4.4 Multi-layer functions.....  | 9         |
| 7.5 Relationship between the user view and the functional view.....                 | 10        |
| 7.6 Relationship of the user view and functional view to cross-cutting aspects..... | 10        |
| 7.7 Implementation view of cloud computing.....                                     | 10        |
| 7.8 Deployment view of cloud computing.....   | 11        |
| <b>8 User view.....</b>   | <b>11</b> |
| 8.1 Cloud computing roles and sub-roles.....  | 11        |
| 8.1.1 General.....  | 11        |
| 8.1.2 Cloud service customer role.....  | 12        |
| 8.1.3 Cloud service provider role.....  | 14        |
| 8.1.4 Cloud service partner role.....   | 17        |
| 8.2 Cloud computing activities.....   | 19        |
| 8.2.1 General.....  | 19        |
| 8.2.2 Activities associated with the CSC role.....                                  | 19        |
| 8.2.3 Activities associated with the CSP role.....                                  | 22        |
| 8.2.4 Activities associated with the CSN role.....                                  | 28        |
| 8.3 Cross-cutting aspects.....  | 29        |
| 8.3.1 General.....  | 29        |
| 8.3.2 Auditability.....   | 30        |
| 8.3.3 Governance.....   | 30        |
| 8.3.4 Interoperability.....   | 30        |
| 8.3.5 Maintenance and versioning.....   | 30        |
| 8.3.6 Performance.....  | 31        |
| 8.3.7 Portability.....  | 31        |
| 8.3.8 Protection of Personally Identifiable Information.....                        | 32        |
| 8.3.9 Reversibility.....  | 32        |
| 8.3.10 Security.....  | 32        |
| 8.3.11 Service levels and service level agreements.....                             | 34        |

|  |   |           |
|--|---|-----------|
| <b>9</b>   | <b>Functional view</b> .....  | <b>35</b> |
| 9.1  | Functional architecture.....  | 35        |
| 9.1.1  | General.....  | 35        |
| 9.1.2  | Layering framework.....   | 35        |
| 9.2  | Functional components.....  | 37        |
| 9.2.1  | General.....  | 37        |
| 9.2.2  | User layer functional components.....                                   | 38        |
| 9.2.3  | Access layer functional components.....                                 | 38        |
| 9.2.4  | Service layer functional components.....                                | 39        |
| 9.2.5  | Resource layer functional components.....                               | 40        |
| 9.2.6  | Multi-layer functions.....  | 41        |
| <b>10</b>  | <b>Relationship between the user view and the functional view</b> ..... | <b>47</b> |
| 10.1   | General.....  | 47        |
| 10.2   | Overview.....   | 48        |
| 10.2.1   | Service capabilities functional component.....                          | 48        |
| 10.2.2   | Common roles, activities and functional components.....                 | 48        |
| 10.2.3   | Multi-tenancy and isolation.....  | 49        |
| <b>Annex A (informative) Further details regarding the user view and functional view</b> ..... |   | <b>50</b> |
| <b>Bibliography</b> .....  |   | <b>59</b> |

## 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](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents) and <https://patents.iec.ch>. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://www.iec.ch/understanding-standards).

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 38, *Cloud computing and distributed platforms*.

This first edition of ISO/IEC 22123-3 cancels and replaces ISO/IEC 17789:2014, which has been technically revised.

The main changes are as follows:

- added differentiation between cloud computing parties and role;
- Figures 13, 14, and 15 were removed.

A list of all parts in the ISO/IEC 22123 series can be found on the ISO and IEC websites.

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](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).



# Information technology — Cloud computing —

## Part 3: Reference architecture

### 1 Scope

This document specifies the cloud computing reference architecture (CCRA).

### 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 22123-2, *Information technology — Cloud computing — Concepts*