
**Information technology — Big data
reference architecture —**

**Part 3:
Reference architecture**

*Technologies de l'information — Architecture de référence des
mégadonnées —*

Partie 3: Architecture de référence





COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2020

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms	4
5 Conventions	5
6 Big data reference architecture concepts	5
6.1 General	5
6.2 Views	6
6.3 Overview of user view	6
6.4 Overview of functional view	7
6.5 Relationship between the user view and the functional view	8
6.6 Relationship of the user view and functional view to cross-cutting aspects	8
7 User view	9
7.1 Big data roles, sub-roles, and activities	9
7.2 Role: Big data application provider (BDAP)	10
7.2.1 General	10
7.2.2 Sub-role: big data collection provider (BDGP)	11
7.2.3 Sub-role: big data preparation provider (BDPreP)	11
7.2.4 Sub-role: big data analytics provider (BDAnP)	12
7.2.5 Sub-role: big data visualization provider (BDVP)	12
7.2.6 Sub-role: big data access provider (BDAP)	12
7.3 Role: big data framework provider (BDFP)	12
7.3.1 General	12
7.3.2 Sub-role: big data infrastructure provider (BDIP)	13
7.3.3 Sub-role: big data platform provider (BDPlaP)	13
7.3.4 Sub-role: big data processing provider (BDProP)	13
7.4 Role: big data service partner (BDSP)	14
7.4.1 General	14
7.4.2 Sub-role: big data service developer (BDSD)	15
7.4.3 Sub-role: big data auditor (BDA)	15
7.4.4 Sub-role: big data system orchestrator (BDSO)	15
7.5 Role: big data provider (BDP)	16
7.6 Role: big data consumer (BDC)	16
8 Cross-cutting aspects	17
8.1 General	17
8.2 Security and privacy	17
8.3 Management	17
8.4 Data governance	18
9 Functional view	18
9.1 Functional architecture	18
9.1.1 General	18
9.1.2 Layering architecture	19
9.1.3 Multi-layer functions	20
9.2 Functional components	20
9.2.1 General	20
9.2.2 Big data application layer functional components	21
9.2.3 Big data processing layer functional components	23
9.2.4 Big data platform layer functional components	25
9.2.5 Resource layer functional components	28

9.2.6 Multi-layer functional components 29

Annex A (informative) Mapping big data RA functional view to other system integration RA.....33

Annex B (informative) Examples of the relationship of roles in big data ecosystem.....34

Annex C (informative)35

Bibliography37

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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 42, *Artificial intelligence*.

A list of all parts in the ISO/IEC 20547 series can be found on the ISO website.

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.

Introduction

The ISO/IEC 20547 series is intended to provide users with a standardized approach to developing and implementing big data architectures and provide references for approaches. ISO/IEC TR 20547-1 provides users with an overview of the reference architecture framework described in this document and a process for applying that framework in developing an architecture. ISO/IEC TR 20547-2 provides a collection of big data use cases and decomposes those use cases into technical considerations that big data architects and system implementers can consider. This document describes the reference architecture in terms of User and Functional views. Those views can be used by the big data architect to describe their specific system. ISO/IEC 20547-4 describes the security and privacy aspects unique to big data. ISO/IEC TR 20547-5 provides a list of standards and their relationship to the reference architecture that architects and implementers can consider as part of the design and implementation of their system.

Each of these parts is built on the common vocabulary and concepts described in ISO/IEC 20546.

In general terms, reference architecture provides an authoritative source of information about a specific subject area that guides and constrains the instantiations of multiple architectures and solutions (see [3.2](#)). Reference architectures generally serve as a reference foundation for solution architectures and can also be used for comparison and alignment purposes.

The key goal of this reference architecture is to facilitate a shared understanding across multiple products, organizations, and disciplines about current architectures and future direction.

The reference architecture presented in this document provides an architecture framework for describing the big data components, processes, and systems to establish a common language for the various stakeholders named as big data reference architecture (BDRA). It does not represent the system architecture of a specific big data system. Instead, it is a tool for describing, discussing, and developing system-specific architectures using an architecture framework of reference. It provides generic high-level architectural views that are an effective tool for discussing the requirements, structures, and operations inherent to big data. The model is not tied to any specific vendor products, services or reference implementation, nor does it define prescriptive solutions that inhibit innovation.

Information technology — Big data reference architecture —

Part 3: Reference architecture

1 Scope

This document specifies the big data reference architecture (BDRA). The reference architecture includes concepts and architectural views.

The reference architecture specified in this document defines two architectural viewpoints:

- a user view defining roles/sub-roles, their relationships, and types of activities within a big data ecosystem;
- a functional view defining the architectural layers and the classes of functional components within those layers that implement the activities of the roles/sub-roles within the user view.

The BDRA is intended to:

- provide a common language for the various stakeholders;
- encourage adherence to common standards, specifications, and patterns;
- provide consistency of implementation of technology to solve similar problem sets;
- facilitate the understanding of the operational intricacies in big data;
- illustrate and understand the various big data components, processes, and systems, in the context of an overall big data conceptual model;
- provide a technical reference for government departments, agencies and other consumers to understand, discuss, categorize and compare big data solutions; and
- facilitate the analysis of candidate standards for interoperability, portability, reusability, and extendibility.

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 8000-2, *Data quality — Part 2: Vocabulary*

ISO/TS 8000-60, *Data quality — Part 60: Data quality management: Overview*

ISO 8000-61, *Data quality — Part 61: Data quality management: Process reference model*

ISO/IEC 38500, *Information technology — Governance of IT for the organization*

ISO/IEC 38505-1, *Information technology — Governance of IT — Governance of data — Part 1: Application of ISO/IEC 38500 to the governance of data*