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Part 2: Use cases and derived requirements

Technologies de l'information — Architecture de référence des big data —

Partie 2: Cas pratiques et exigences dérivées

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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. 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).

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This document was prepared by Technical Committee ISO/IEC JTC 1, *Information Technology*.

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Introduction

This document is focuses on forming a community of interest from industry, academia, and government, with the goal of developing a consensus list of big data technical considerations across all stakeholders. This included gathering and understanding various examples of use cases from diversified areas (i.e., application domains). To achieve this goal, the following tasks were done:

— gathered input from all stakeholders regarding big data technical considerations;

— analyzed and prioritized a list of challenging use case specific technical considerations that may delay or prevent adoption of big data deployment;

— developed a comprehensive list of generalized big data technical considerations for ISO/IEC 20547-3, *Information technology – Big data reference architecture - Part 3: Reference architecture*; and

— documented the findings in this document.

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Information technology — Big data reference architecture —

Part 2: Use cases and derived requirements

1 Scope

This document provides examples of big data use cases with application domains and technical considerations derived from the contributed use cases.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 20546*Information technology — Big data — Definition and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 20546 and the following 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 Terms defined elsewhere

None.

3.2 Terms defined in this document

3.2.1
use case
typical application stated at a high level for the purposes of extracting technical considerations or comparing usages across fields

3.3 Abbreviated terms

2D	two-Dimensional
3D	three-Dimensional
6D	six-Dimensional
AOD	Analysis Object Data

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API	Application Programming Interface
ASDC	Atmospheric Science Data Center
ASTM	American Society for Testing and Materials
AWS	Amazon Web Services
BC/DR	Business Continuity and Disaster Recovery
BD	Big data
BER	Biological and Environmental Research
BNL	Brookhaven National Laboratory
CAaaS	Climate Analytics as a Service
CADRG	Compressed ARC Digitized Raster Graphics
CBSP	Cloud Brokerage Service Provider
CERES	Clouds and Earth's Radiant Energy System
CERN	European Organization for Nuclear Research
CESM	Community Earth System Model
CFTC	U.S. Commodity Futures Trading Commission
CIA	Confidentiality, Integrity, and Availability
CINET	Cyberinfrastructure for Network (Graph) Science and Analytics
CMIP	Coupled Model Intercomparison Project
CMIP5	Climate Model Intercomparison Project
CMS	Compact Muon Solenoid
COSO	Committee of Sponsoring Organizations
CPU	Central Processing Unit
CReSIS	Center for Remote Sensing of Ice Sheets
CRTS	Catalina Real-Time Transient Survey
CSP	Cloud Service Provider
CSS	Catalina Sky Survey proper
CV	Controlled Vocabulary
DFC	DataNet Federation Consortium
DHTC	Distributed High Throughput Computing
DNA	DeoxyriboNucleic Acid
DOE	U.S. Department of Energy

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DOJ	U.S. Department of Justice
DPO	Data Products Online
EBAF–TOA	Energy Balanced and Filled–Top of Atmosphere
EC2	Elastic Compute Cloud
EDT	Enterprise Data Trust
EHR	Electronic Health Record
EMR	Electronic Medical Record
EMSO	European Multidisciplinary Seafloor and Water Column Observatory
ENVRI	Common Operations of Environmental Research Infrastructures
ENVRI RM	ENVRI Reference Model
EPOS	European Plate Observing System
ESFRI	European Strategy Forum on Research Infrastructures
ESG	Earth System Grid
ESGF	Earth System Grid Federation
FDIC	U.S. Federal Deposit Insurance Corporation
FI	Financial Industries
FLUXNET	Flux Tower Network
FMV	Full Motion Video
FNAL	Fermi National Accelerator Laboratory
GAAP	U.S. Generally Accepted Accounting Principles
GB	Giga Byte
GCM	General Circulation Model
GEOS-5	Goddard Earth Observing System version 5
GeoTiff	Geo Tagged Image File Format
GEWaSC	Genome-Enabled Watershed Simulation Capability
GHG	Green House Gas
GMAO	Global Modeling and Assimilation Office
GPFS	General Parallel File System
GPS	Global Positioning System
GPU	Graphics Processing Unit
GRC	Governance, Risk management, and Compliance

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GSFC	Goddard Space Flight Center
HDF5	Hierarchical Data Format
HDFS	Hadoop Distributed File System
HPC	High-Performance Computing
HTC	High-Throughput Computing
HVS	Hosted Virtual Server
I/O	Input Output
IaaS	Infrastructure as a Service
IAGOS	In-service Aircraft for a Global Observing System
ICD	International Classification of Diseases
ICOS	Integrated Carbon Observation System
IMG	Integrated Microbial Genomes
INPC	Indiana Network for Patient Care
IPCC	Intergovernmental Panel on Climate Change
iRODS	Integrated Rule-Oriented Data System
ISACA	International Society of Auditors and Computer Analysts
isc2	International Security Computer and Systems Auditors
ISO	International Organization for Standardization
ITIL	Information Technology Infrastructure Library
JGI	Joint Genome Institute
KML	Keyhole Markup Language
kWh	kilowatt-hour
LaRC	Langley Research Center
LBNL	Lawrence Berkeley National Laboratory
LDA	latent Dirichlet allocation
LHC	Large Hadron Collider
LPL	Lunar and Planetary Laboratory
LSST	Large Synoptic Survey Telescope
MERRA	Modern Era Retrospective Analysis for Research and Applications
MERRA/AS	MERRA Analytic Services
MPI	Message Passing Interface

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MRI	Magnetic Resonance Imaging
NARA	National Archives and Records Administration
NARR	North American Regional Reanalysis
NaaS	Network as a Service
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NCBI	National Center for Biotechnology Information
NCCS	NASA Center for Climate Simulation
NERSC	National Energy Research Scientific Computing Center
NetCDF	Network Common Data Form
NEX	NASA Earth Exchange
NFS	Network File System
NIKE	NIST Integrated Knowledge Editorial Net
NIST	National Institute of Standards and Technology
NITF	National Imagery Transmission Format
NLP	Natural Language Processing
NRT	Near Real Time
NSF	National Science Foundation
ODP	Open Distributed Processing
OGC	Open Geospatial Consortium
PB	PetaByte
PCA	Principal Component Analysis
PCAOB	Public Company Accounting and Oversight Board
PID	persistent identification
PII	Personally Identifiable Information
PNNL	Pacific Northwest National Laboratory
RDBMS	relational database management system
RDF	Resource Description Framework
RECOVER	Rehabilitation Capability Convergence for Ecosystem Recovery
ROI	return on investment
RPI	Repeat Pass Interferometry

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RPO	Recovery Point Objective
RTO	Response Time Objective
SAN	storage area network
SAR	Synthetic Aperture Radar
SDN	software-defined networking
SIOS	Svalbard Integrated Arctic Earth Observing System
SPADE	Support for Provenance Auditing in Distributed Environments
SSH	Secure Shell
SSO	Single Sign-On
TB	TeraByte
tf-idf	term frequency–inverse document frequency
UA	University of Arizona
UAVSAR	Unmanned Air Vehicle Synthetic Aperture Radar
UC	Use Case
UI	User Interface
UPS	United Parcel Service
UQ	Uncertainty Quantification
VASP	Vienna Ab initio Simulation Package
vCDS	virtual Climate Data Server
VO	Virtual Observatory
VOIP	Voice over IP
WALF	Wide Area Large Format Imagery
WLCG	Worldwide LHC Computing Grid
XBRL	eXtensible Business Related Markup Language
XML	Extensible Markup Language
ZTF	Zwicky Transient Factory

4 Use case properties for survey

4.1 Overall description

— **Use case title**: Title provided by the use case author

— **Vertical (area)**: Intended to categorize the use cases. However, an ontology was not created prior to the use case submissions so this field was not used in the use case compilation.

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