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SAP on Oracle Database 12c
Oracle Database In-Memory

SAP on Oracle Database 18c
Oracle Multitenant

SAP on Oracle Database 19c
Oracle Advanced Data Optimization
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Engineered Systems

Virtualization

Infrastructure as a Service

SAP NW Business Intelligence
Flat InfoCubes

Performance
ABAP Core Data Services

Miscellaneous Topics
SAP on Oracle Database 12c
SAP on Oracle Database 12c Release 2

Certification

Oracle Database 12c Release 2 (12.2.0.1)
Certified for SAP Business Suite based on SAP NetWeaver

- from 18 December 2017
- All platforms:
  - Oracle Cloud Infrastructure
  - On-Premise platforms
  - Oracle Engineered Systems
- Single Instance and RAC
- First Oracle release to support Microsoft Windows Server 2016

Minimum Requirements

- Oracle Database 12c Release 2 with initial SAP Bundle Patch
- Oracle Client versions 12.1 or 12.2
- Supported SAP Kernels 7.21_EXT|7.22_EXT or 7.45 and higher

For details see

- SAP Notes 2133079 and 2470660

1 AIX, HP-UX, Linux, Solaris, Windows 2 GI 12.2 with RDBMS 11.2.0.4, 12.1.0.2, 12.2.0.1 3 November 2017 SBP
SAP on Oracle Database 12c Release 2

Supported Releases | Timeline

**Supported Releases**

Support for Oracle Database 12.2.0.1

- Base release is final release for Oracle 12.2
- May 2020 SBP is most recent
  - contains April PSU for 12.2.0.1

For details see

- SAP Note 1915313

---

**Timeline**

SUPPORT TIMELINE ORACLE DATABASE 12.2.0.1

<table>
<thead>
<tr>
<th>Premier Support</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start</strong></td>
<td>1 March 2017</td>
</tr>
<tr>
<td><strong>End</strong></td>
<td>30 November 2020</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Limited Error Correction</th>
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</thead>
<tbody>
<tr>
<td><strong>Start</strong></td>
<td>1 December 2020</td>
</tr>
<tr>
<td><strong>End</strong></td>
<td>31 March 2022</td>
</tr>
</tbody>
</table>

No Extended Support offered for Oracle 12.2

---

1 Status as of April 2020

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SAP on Oracle Database 12c Release 2

**Limited Error Correction**

**Limited Error Correction**

New support model for Oracle Database 12.2

- 16 months of add’ support after end of premier
- from 1 December 2020 through 31 March 2022
- No additional support fees
- Automatic participation, no request necessary

For details see

- SAP Note 2855812

Includes:

- Severity 1 code fixes
- Security fixes via quarterly Release Update process

Limitations and Exclusions

- No P2 or P3 patches
- No functional upgrades
- Issues related with 3rd party software excluded
- No certifications for new OS versions
- …

---

1 including backports and/or workarounds for newly discovered Severity 1 production incidents  
2 for the full list of limitations and exclusions see SAP note 2855812
SAP on Oracle Database 12c Release 2

Features

DATA GUARD
- Fast Start Failover Max Protection
- DG Database Compare dbms_dbcomp.dbcomp
- DG DATA_GUARD_SYNC_LATENCY parameter

SECURITY/ENCRYPTION
- Fully Encrypted Database
  - incl. system, aux, undo tablespaces
- TDE Tablespace Live/Offline Conversion

MISCELLANEOUS
- Online Table Move
- Online Conversion Non-Partitioned Tables
- Restart Online Definition
- ILM/ADO Support with Multitenant
- Advanced Index Compression High
- RAC Multi Instance Redo Apply

and much more…
The following SAP NetWeaver-based products are certified with Oracle Database 12c:¹
See the SAP Product Availability Matrix (PAM) for product versions released with Oracle 12c

SAP NetWeaver 7.0, 7.1, 7.3, 7.4, 7.5
SAP BW 7.0/7.0X, 7.1X, 7.20, 7.3X, 7.4, 7.5
SAP ERP 6.0
SAP CRM 7.0
SAP SCM 7.0
SAP SRM 7.0
Banking Services from SAP 6.0, 7.0, 8.0, 9.0
SAP Solution Manager 7.1, 7.2
SAP NW CE 7.1, 7.20
SAP NW PI 7.1
SAP LVM 2.1 and higher

¹ including all corresponding EhPs
SAP on Oracle Database 12c
Notes & Documentation

Entry Notes

2133079 Oracle Database 12c: Integration in SAP Environment
1914631 Central Technical Note for Oracle Database 12c
  Release 1 (12.1)
2470660 Central Technical Note for Oracle Database 12c
  Release 2 (12.2)
1915313 Current Patch Set for Oracle Database 12c

Quarterly Updated
Check out regularly

1915316 Database Patches for Oracle 12.1.0.2
1888485 Database Parameter for Oracle 12.1.0.2
2507228 Database Patches for Oracle 12.2.0.1
2470718 Oracle Database Parameter (12.2)

Features

2138262 Oracle Database 12c Advanced Compression for
  SAP Systems
2178980 Using Oracle Database In-Memory with SAP NetWeaver
  based Products
2254866 Using Oracle Database 12c Advanced Data Optimization
  with SAP NetWeaver
2336881 Using Oracle Multitenant with SAP NetWeaver based
  Products

Tools

2087004 BR*Tools Support for Oracle 12c
2213142 Corrections in BR*Tools 7.40 Patch 17¹
2254836 BR*Tools Support for Oracle ADO/ILM
2333995 BR*Tools Support for Oracle Multitenant Database

¹ Introducing Oracle In-Memory support
SAP on Oracle Database 12c
Notes & Documentation

Installation and Upgrade
1915302  Database Software 12c Installation on Windows
1915301  Database Software 12c Installation on Unix
1915299  Troubleshooting Oracle Software Installation (12.1 / 12.2)

Upgrade Guides
Oracle 12c Database Upgrade:
service.sap.com/instguides
  → Database Upgrades
    → Oracle

White Papers

- Real Application Clusters (RAC)
  - Upgrade of SAP NetWeaver Installation to Oracle Grid Infrastructure 12.1.0.2 with Oracle Real Application Clusters 12c Release 1
  - Providing High Availability for SAP Resources with Oracle Clusterware 11g Release 2 and Clusterware 12c Release 1

- Exadata
  - Using SAP NetWeaver with Oracle Database 12c on Oracle Exadata

- In-Memory
  - Using SAP NetWeaver with Oracle Database In-Memory

- Advanced Data Optimization
  - Using SAP NetWeaver with Oracle Database 12c Automatic Data Optimization and Information Lifecycle Management
SAP on Oracle Database 18c
SAP on Oracle Database 18c

Certification

Oracle Database 18c (18.5.0)
Certified for SAP Business Suite based on SAP NetWeaver

- Released on
  1 March 2019

- February 2020 SBP is most recent
  - contains January PSU 18.9.0

For details see
- SAP Note 2705272

Including:
- Oracle Database 18c
- Oracle Grid Infrastructure (GI) 18c
- Oracle Real Application Clusters (RAC) 18c
- Support for
  - all On-Prem platforms
  - Oracle Cloud
  - Oracle Exadata/Supercluster
- Oracle Failsafe for Windows¹,²

¹ released for SAP mid-June 2019 ² Includes Failsafe support for Microsoft Windows 2016
SAP on Oracle Database 18c

Minimum Requirements | Timeline

**Minimum Requirements**

- Oracle Database 18c
  - Release Update (RU) 18.5.0\(^1\)

- Oracle Instant Clients 12.1 and 12.2
  - No support for client 18c

- Supported SAP Kernels:
  
  7.21_EXT|7.22_EXT or 7.49|7.53

**Timeline**

SUPPORT TIMELINE ORACLE DATABASE 18c

<table>
<thead>
<tr>
<th>Premier Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
</tr>
<tr>
<td>End</td>
</tr>
</tbody>
</table>

\(^1\) with February 2019 SAP Bundle Patch based on 18.5.0
SAP on Oracle Database 18c Features

DATABASE IN-MEMORY

2x–5x faster, extremely benefits SAP BW
- Dynamic thread-based scans
- Optimized arithmetic and native binary numbers using SIMD vectoring

PERFORMANCE

Polymorphic Table Functions\(^1\)
- “Fast Data Access” option in SAP’s FOR ALL ENTRIES
- Profile parameter:
  rsdb/preferJoinWithFda = 0|1

EXADATA

Increased Performance
- Undo Block RDMA Read
- Commit Cache

RECOVERY MANAGER (RMAN)

Easy and fast cloud migration
- DUPLICATE DATABASE [...] AS ENCRYPTED

MISCELLANEOUS

- ACFS resize and info storage
- Online merge (sub-)partition
  and much more…

\(^1\) planned for SAP
SAP on Oracle Database 18c
Notes & Documentation

Entry Notes
2705272  Oracle Database 18c: Integration in SAP Environment
2660020  Central Technical Note for Oracle Database 18c

Quarterly Updated
Check out regularly
2660044  Patches for 18c: Database
2470718  Oracle Database Parameter 12.2 / 18c

Miscellaneous
2763733  BR*Tools Support for Oracle 18c

Installation and Upgrade
2660017  Oracle Database 18c Installation on Unix
2660018  Oracle Database 18c Installation on Windows
2660027  Upgrading to Oracle Database 18c

Upgrade Guides
Oracle 18c Database Upgrade:
service.sap.com/instguides
  Database Upgrades
    Oracle
SAP on Oracle Database 19c
SAP on Oracle Database 19c

Certification

Oracle Database 19c (19.5.0)
Certified for SAP Business Suite based on SAP NetWeaver

- Released on:
  20 December 2019
- SWPM based installation since March 2020
- February 2020 SBP is most recent
  - contains January PSU 19.6.0

For details see
- SAP Note 2817074

Including:
- Oracle Database 19c
- Oracle Grid Infrastructure (GI) 19c
- Oracle Real Application Clusters (RAC) 19c
- Support for
  - all On-Prem platforms\(^2\)
  - Oracle Cloud
  - Oracle Exadata/Supercluster

Planned:
- Support for Oracle Linux 8 and RHEL 8

\(^1\) Direct upgrade possible from all Oracle database releases 11.2.0.4 through 18  \(^2\) First release to support Microsoft Windows Server 2019
SAP on Oracle Database 19c

Minimum Requirements | Timeline

**Minimum Requirements**

- Oracle Database 19c
  - Release Update (RU) 19.5.0¹
  - SWPM support with 19.6.0
- Oracle Instant Clients 12.1, 12.2 and 19c
  - No support for client 18c
- Supported SAP Kernels:
  - 7.21_EXT|7.22_EXT or 7.49|7.53

**Timeline²**

<table>
<thead>
<tr>
<th>SUPPORT TIMELINE ORACLE DATABASE 19c</th>
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</thead>
<tbody>
<tr>
<td><strong>Premier Support</strong></td>
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<tr>
<td><strong>Extended Support</strong>³</td>
</tr>
<tr>
<td>Start</td>
</tr>
<tr>
<td>End</td>
</tr>
</tbody>
</table>

¹ with November 2019 SAP Bundle Patch based on 19.5.0 ² Oracle 19c is a Long Term Support Release ³ at additional costs
SAP on Oracle Database 19c

Features

Automatic Indexing\textsuperscript{1,2}
- In addition to SAP standard index design
  - SAP standard indexes not supported to be dropped
- Ideal for customization of SAP system
  - Improves query performance and throughput for e.g. Z reports

PERFORMANCE

SQL Macros\textsuperscript{3}
- Used for SAP ABAP Core Data Services (CDS)
- Major performance improvement
- To replace specific performance-critical table functions in SAP CDS
  - allows for push-down of query filters

\textsuperscript{1} Under evaluation by SAP \textsuperscript{2} This feature is exclusively available with Exadata, Exadata Cloud Service and Exadata Cloud at Customer \textsuperscript{3} as of Oracle 19.7.0
SAP on Oracle Database 19c
Notes & Documentation

Preparatory Notes
Available already before certification
2799958  Preliminary Information about Oracle Database 19c
2478541  Operating System Requirements for Oracle Database

Entry Notes
2817074  Oracle Database 19c: Integration in SAP Environment
2799900  Central Technical Note for Oracle Database 19c

Quarterly Updated
Check out regularly
2799920  Patches for 19c: Database
2470718  Oracle Database Parameter 12.2 / 18c / 19c

Miscellaneous
2763733  BR*Tools Support for Oracle 18c and 19c
SAP on Oracle Database 19c

SAP Certification Roadmap for Oracle Databases 19c and later

SAP certification of a new Oracle database release…

- …starts with availability on all on-premise OS platforms supported by SAP¹
- …is planned within 6 months after the on-premise platform availability
- …will cover all platforms²

For details see

- SAP Note 2606828

ORACLE DATABASE AVAILABILITY TIMELINE

<table>
<thead>
<tr>
<th>Oracle Database Release</th>
<th>Availability by Oracle for On-Premise Platforms</th>
<th>SAP Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Database 19c</td>
<td>June 2019 Release Update (19.3)</td>
<td>December 2019 (19.5)</td>
</tr>
<tr>
<td>Oracle Database 20c/21c</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>

¹ Linux, Windows, Solaris, AIX, HP-UX ² Oracle Cloud Infrastructure, Engineered Systems, all on-premise platforms
Oracle Database In-Memory
Oracle Database In-Memory

Certification

Oracle Database In-Memory
Certified for SAP since 30 June 2015

Minimum Requirements

- Oracle Database 12c Release 12.1.0.2¹
  - including RAC 12c and Engineered Systems
- SAP NW 7.X with kernel 7.21_EXT
  - DDIC < 7.40 SP12 has limited IM support

SAP Products Support

- Business Suite based on SAP NetWeaver
  - ERP, CRM, SRM, SCM, BW, PI, …
  - Industry solutions
- Check SAP Product Availability Matrix (PAM) for full list

For details see

- SAP Note 2178980
- Oracle In-Memory whitepaper in SAP Community

¹ with June 2015 SAP Bundle Patch (Unix) or Database Bundle Patch 12.1.0.2.6 (Windows)
Oracle Database In-Memory

Two Approaches

APPROACH 1

Using the Database In-Memory Advisor

Situation

▪ Tables/partitions recommended/suitable for In-Memory are yet unknown

Action¹

▪ Run IM Advisor for recommendations
  – Adjusted to SAP specifications
▪ Relies on 2–3 days of Automatic Workload Repository (AWR) data

APPROACH 2

Object candidates for In-Memory are known

Situation

▪ Reports with long running queries processing large amounts of data have already been identified

Action¹

▪ Put these tables/partitions in IM column store
▪ Use SAP_IM_ADV package² for proper column store sizing

¹ See Oracle In-Memory white paper in SAP Community for detailed procedure
² included in SAP Bundle Patch
Oracle Database In-Memory

Conventions

Index Design
Changes to SAP standard\(^1\) index design are not allowed:
- No dropping
- No setting invisible or unusable

Individual Columns
All columns of SAP standard tables must be loaded into In-Memory column store
- No loading of individual columns
- No exclusion of individual columns

Database Buffer Cache
Reducing buffer cache size in favor of IM column store is not allowed
- Always use additional memory for IM

SAP BW Aggregates
Dropping all aggregates from an existing BW system is not recommended
- Aggregates are designed for providing good throughput in concurrent user environments

\(^1\) Custom indices in customer namespace are not affected, changes are allowed
Oracle Database In-Memory
Licenses

Oracle Database In-Memory requires the following licenses:

- Oracle Full Use customers:
  - Oracle Database In-Memory Option

- SAP ASFU customers:
  - SAP “Oracle In-Memory License Package”

See SAP price list for details

Oracle Database In-Memory Advisor requires the following licenses:

- Oracle Full Use customers:
  - Oracle Tuning Pack
  - Oracle Diagnostics Pack

- These packs are included in SAP ASFU license
Oracle Multitenant Certification

Oracle Multitenant
Certified for SAP since February 2017

Minimum Requirements:
- Oracle Database 12c Release 12.1.0.2¹
- SAP NetWeaver 7.40 with kernel 7.45² patch 210
- SWPM 1.0 SP19, SUM 1.0 SP19³
- BR*Tools 7.40 Patch 30
- SAP notes to apply

For details see
- SAP Note 2336881

Required licenses:
- Oracle Multitenant comes at a cost for both Oracle direct and SAP ASFU customers
  - No license required when using up to 3 PDBs per CDB
- Oracle Full Use customers need to purchase:
  - Oracle Multitenant Option
- SAP ASFU customers need to purchase:
  - SAP “Oracle Multitenant License Package”

¹ plus specific SAP Database Bundle Patch  
² Unicode only  
³ Contained in Software Logistics (SL) Tool Set 1.0 SP19
Oracle Multitenant Restrictions

Oracle Multitenant with SAP
is subject to the following restrictions:

▪ Unix: User concept “Oracle Standard” only
▪ No mix of OLTP and OLAP PDBs in same CDB

For details see
▪ SAP Note 2336881

Restrictions planned to be lifted:

▪ No RAC support. SI/FS and SI/ASM only
▪ Limited support for Engineered Systems:
  – SI/ASM only
▪ No support for
  – Windows Cluster
  – Transparent Data Encryption (TDE)
▪ Limitations regarding SAP Host Agent
Oracle Advanced Data Optimization
Oracle Advanced Data Optimization Certification

Oracle Advanced Data Optimization
Certified for SAP since 31 December 2015

Minimum Requirements and Limitations:
- Oracle Database 12c Release 12.1.0.2¹
- SAP NetWeaver 7.40 SP12, 7.50 SP2
- Oracle Hybrid Columnar Compression (HCC):
  - only in combination with ADO
  - limited to row level locking

For details see
- SAP Note 2254866
- Oracle ILM/ADO white paper in SAP Community

Required licenses:
- Oracle Full Use customers need to purchase:
  - Oracle Advanced Compression Option (ACO)
- This option is included in SAP ASFU license

¹ with May 2016 SBP for Unix/Windows Patch Bundle 1608
Engineered Systems
Engineered Systems
Exadata & Exalogic

CLUSTERED DATABASE AND STORAGE SERVER

**Oracle Exadata Database Machine X2–X8**
Support for X2-2|8 through X8-2|8
- **NEW!** X8M certified for SAP in October 2019

For details see
- SAP Note 1590515
- Oracle Exadata white paper in SAP Community

CLUSTERED APPLICATION SERVER

**Oracle Exalogic X2–X5**
Support for X2-2 through X5-2
- Only in combination with Exadata

For details see
- SAP Note 1617188
Engineered Systems
**SPARC Clusters**

**GENERAL PURPOSE ENGINEERED SYSTEM**

**Oracle SPARC SuperCluster**
Support for T4-4, T5-8, M6-32, M7 and M8

For details see
- SAP Notes 1693680

**SMALL-SCALE, GENERAL PURPOSE ENGINEERED SYSTEM**

**Oracle SPARC MiniCluster**
Support for S7-2

For details see
- SAP Note 2384855
Engineered Systems

Database Appliance (ODA) & Private Cloud Appliance (OPCA)

TWO-NODE CLUSTERED DATABASE SERVER

Oracle Database Appliance V1–X7
Support for V1, X3-2 through X7-2

- NEW! ODA X8 certification planned with 19c

For details see
- SAP Notes 1760737, 2290084, 2388511 and 2664704
- Oracle ODA white papers in SAP Community

ENGINEERED SYSTEM DESIGNED FOR VIRTUALIZATION

Oracle Private Cloud Appliance X3–X7
Support for X3-2 through X7-2

- NEW! OPCA X8 certification coming soon

For details see
- SAP Note 2052912
Virtualization
Virtualization

**Oracle Virtual Machine (VM)**

**Oracle VM**
is supported with SAP as follows¹:

- Oracle VM 3.2.1 or higher
- x86-64 platforms²

**Guest Operating Systems Support:**

- Oracle Linux 5, 6 and 7
- Oracle Solaris 10 and 11
- Microsoft Windows currently not supported
- SuSE Linux Enterprise Server currently not supported
- No RedHat Enterprise Linux Support

**SAP Products Support**

- All SAP products certified for supported guest OS
- Check PAM for OS availability for SAP product

**Oracle Database Support**

- Single Instance
  - Oracle 10.2.0.5, 11.2.0.4, 12 through 19
- Real Application Clusters (RAC)
  - Oracle 11.2.0.4, 12 through 19
  - Oracle Linux guests only

---

¹ see SAP Note 1808268 ² not with ODA
Virtualization

Microsoft Hyper-V

**Microsoft Hyper-V**
Certified with SAP since June 2013

- Windows Server 2012/R2 and 2016
- Virtual and private cloud environments

**Guest Operating Systems Support includes**

- Windows Server 2019
- Windows Server 2016
- Windows Server 2012, and R2
- Windows Server 2008 R2 Service Pack 1

**SAP Products Support**

- All SAP products certified for supported guest OS
- Check PAM for OS availability for SAP product

**Oracle Products Support**

- All Oracle products certified for Windows Server, including
  - Oracle Database 11.2 through 19
  - Oracle Instant Client 11.2, 12.1 and 19

---

1 see SAP Note 1329848 2 Oracle Database 12.2 only
Infrastructure as a Service
Infrastructure as a Service

Oracle Cloud Infrastructure Compute

Oracle Cloud Infrastructure Compute is supported with SAP as follows:

- Oracle Database 11.2.0.4, 12.1.0.2\(^1\) and 12.2.0.1, 18 and 19
- All features/options\(^2\) supported for SAP on premise are available with Oracle Cloud Infrastructure
- Oracle Linux 6 or 7\(^3\)

Supported SAP products:

- SAP NetWeaver 7.X\(^4,5\) and products based hereupon
- SAP BusinessObjects BI platform
- SAP SCM APO-liveCache

For details see:

- SAP Notes 2474949 and 2520061
- Knowledge Base Article 2650732
- Oracle white paper in SAP community

---

\(^{1}\) Minimum SAP Bundle Patch August 2017  \(^{2}\) except RAC, except ASM  \(^{3}\) both UEKR3 and UEKR4  \(^{4}\) Unicode only  
\(^{5}\) Minimum SAP Host Agent 7.21 patch level 30 for Bare Metal and patch level 35 for Virtual Machine Shapes
# Infrastructure as a Service

## Oracle Cloud Infrastructure Compute

### CERTIFIED VIRTUAL MACHINE SHAPES

<table>
<thead>
<tr>
<th>Shape</th>
<th>OCPU</th>
<th>Memory</th>
<th>Database Storage</th>
<th>SAPS</th>
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</thead>
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Infrastructure as a Service
Oracle Cloud Infrastructure Compute

CERTIFIED BARE METAL MACHINE SHAPES

<table>
<thead>
<tr>
<th>Shape</th>
<th>OCPU</th>
<th>Memory</th>
<th>Database Storage</th>
<th>SAPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM.Standard1.36</td>
<td>36</td>
<td>256 GB</td>
<td>1 PB Block Storage</td>
<td>59,370</td>
</tr>
<tr>
<td>BM.DenseIO1.36</td>
<td>36</td>
<td>512 GB</td>
<td>28.8 TB NVMe²</td>
<td>59,520</td>
</tr>
<tr>
<td>BM.Standard2.52</td>
<td>52</td>
<td>768 GB</td>
<td>1 PB Block Storage</td>
<td>72,230</td>
</tr>
<tr>
<td>BM.DenseIO2.52</td>
<td>52</td>
<td>768 GB</td>
<td>51.2 TB NVMe²</td>
<td>72,230</td>
</tr>
</tbody>
</table>

For details see
- SAP Notes 2474949 and 2520061

¹ No support for any virtualization technology on Oracle Cloud Infrastructure Bare Metal Compute instances
² Block Volume Storage (up to 1 PB) can also be used
Infrastructure as a Service

Oracle Database Exadata Cloud Service (ExaCS)

Oracle Database Exadata Cloud Service is supported with SAP as follows:

- Oracle Database 12.1.0.2 and 12.2.0.1, 18 and 19
- All features/options supported for SAP on premise are available with Oracle ExaCS\(^1\)
  - including RAC
- Oracle Linux 6 and 7

Supported SAP products (Database only):

- SAP NetWeaver 7.X\(^2,3\) and products based hereupon
- SAP BusinessObjects BI platform 4.2 and above

For details see

- SAP Note 2614028
- Oracle white paper in SAP Community

\(^1\) Minimum ExaCS release 17.4.2.2 \(^2\) Unicode only \(^3\) Minimum SAP Host Agent 7.21 Patch Level 35
# Oracle Database Exadata Cloud Service (ExaCS)

## Supported Oracle Exa-CS Shapes and Machine Types

<table>
<thead>
<tr>
<th>Shape</th>
<th># Cores per Node</th>
<th>Memory</th>
<th>Database Storage</th>
<th>SAPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exadata Half3.200/Half Rack X8-2 <strong>NEW!</strong></td>
<td>$20 \leq N \leq 200$</td>
<td>2,880 GB</td>
<td>299 TB on Storage Servers</td>
<td>$274,700 \times N / 200$</td>
</tr>
<tr>
<td>Exadata Base.48/Eighth Rack X7-2</td>
<td>$8 \leq N \leq 48$</td>
<td>720 GB</td>
<td>74.6 TB on Storage Servers</td>
<td>$60,164 \times N / 48$</td>
</tr>
<tr>
<td>Exadata Quarter2.92/Quarter Rack X7-2</td>
<td>$8 \leq N \leq 92$</td>
<td>1,440 GB</td>
<td>106 TB on Storage Servers</td>
<td>$115,315 \times N / 92$</td>
</tr>
<tr>
<td>Exadata Half2.184/Half Rack X7-2</td>
<td>$16 \leq N \leq 184$</td>
<td>2,880 GB</td>
<td>212 TB on Storage Servers</td>
<td>$209,080 \times N / 184$</td>
</tr>
<tr>
<td>Exadata Quarter1.84/Quarter Rack X6-2</td>
<td>$22 \leq N \leq 84$</td>
<td>720 GB</td>
<td>84 TB on Storage Servers</td>
<td>$119,700 \times N / 84$</td>
</tr>
</tbody>
</table>
Microsoft Azure

Microsoft Azure is supported with SAP as follows:

- Oracle Database 11.2.0.4, 12 through 19
- Single Instance only (no RAC)

Supported operating system versions:

- Microsoft Windows Server 2019\(^1\)
- Microsoft Windows Server 2016\(^2\)
- Microsoft Windows Server 2012\(^3\), R2
- Microsoft Windows Server 2008 R2 SP1
- Oracle Linux 7
  - Including Oracle ASM support

For details see

- SAP Notes 1928533 and 2039619

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\(^1\) Oracle Database 19.5.0 and higher  \(^2\) Oracle Database 12.2 and higher  \(^3\) No support for Oracle Database 19  \(^4\) No support for Oracle Database 12.2
Infrastructure as a Service

**Amazon Web Services (AWS)**

**Amazon Web Services**
are supported with SAP as follows:

- Oracle Database 11.2.0.4, 12 through 19
- Oracle Linux 6.4 or higher
- Amazon Web Services EC2 only
  - No support for AWS RDS
- Single Instance only (no RAC)

For details see

- SAP Notes 2358420 and 1656099

**Supported SAP products** (Database only):

- SAP NetWeaver 7.X and products based hereupon

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1 Amazon Machine Image (AMI) must be based on Oracle Linux 6.4 or later  
2 Unicode only
SAP NW Business Intelligence

Flat InfoCubes
Overview
Recent optimizations in SAP NetWeaver Business Intelligence:

- Flat InfoCubes
  - Standard InfoCubes
    SAP Note 2335159, 7.40 SP15, 7.50 SP04
  - Semantically Partitioned Objects (SPOs)
    SAP Note 2711358, 7.40 SP22, 7.50 SP15
  - MassConversion
    SAP Note 2523154, 7.40 SP18, 7.50 SP10

- NEW! FEMS PushDown
  SAP Note 2816467, 7.50 SP15
  - Flat Cubes
  - DataStore Objects (DSOs)

- NEW! In-Memory Dynamic Scans (18c)
  SAP Note 2335159, 7.40 SP15, 7.50 SP04

--- ALL THESE OPTIMIZATIONS ARE BASED ON ORACLE DATABASE IN-MEMORY ---
Classic InfoCubes follow SAP proprietary, extended Star schema
Optimized for row-based, classic RDBMS

- 2 fact tables
  - E fact table: Read-optimized partitioning
  - F fact table: Write/Delete-optimized partitioning
- Dimension tables
  - as grouping sets of characteristics
- Shared master tables
Flat InfoCubes are simplification of classic schema
Optimized for columnar and hybrid RDBMS

- 1 fact table
  - Write/Delete no longer harms read performance
    - No separation into E and F fact tables
  - Two-dimensionally partitioned using sub-partitioning

- No dimension tables
  - Dimensions become pure meta data
  - Obsolete need to look-up/create DIMIDs
    - strongly boosts update performance

- Much higher query and load performance
  - Due to In-Memory technology
  - Less joins; no indices on fact table

¹ SAP package dimension remains
Available from SAP NW Business Intelligence 7.40
Relies on Oracle Database In-Memory technology

- Supported from:
  - SAP NW BI 7.40 SP15
  - SAP NW BI 7.50 SP04
- Oracle Database 12c Release 1 (12.1.0.2)¹ and higher
- Oracle Database In-Memory mandatory
- Automatic mass conversion available
- Support for Semantically Partitioned Objects (SPOs)

For details see
- SAP Notes 2335159, 2523154 and 2711358

¹ requires May 2016 SAP Bundle Patch for Oracle Database, or higher
SAP NW Business Intelligence

Flat InfoCubes: Real Customer Scenario

Data Volume: 9,000,000 Rows

<table>
<thead>
<tr>
<th>STAR SCHEMA</th>
<th>FLAT SCHEMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Dimensions</td>
<td>46 Key Values</td>
</tr>
<tr>
<td>129 Measurements</td>
<td>129 Measurements</td>
</tr>
<tr>
<td>11 Join Dimensions</td>
<td>1 Join Dimension</td>
</tr>
</tbody>
</table>

In-Memory Flat Cube

Query Characteristics:

- The more data,…
- The less number of result columns,…
- The more joins,…
- The more complex the predicates,…
  …the higher the improvement!

Query:

- Many result columns
- 3 attribute tables

![Graphs showing space and query time comparison between Star Cube, Flat Cube, and In-Memory Flat Cube.](image-url)
SAP NW Business Intelligence

FEMS PushDown

**What is FEMS (Form Element Selection)?**
Converts a row-based database result into a cell-formatted (“spread sheet-like”) BI client result

- **Existing Problem:**
  - Time and I/O consuming processing on standard InfoCubes and DSOs in database
  - Large amount of data transferred between database and BW application servers
  - Complex and time consuming processing of large dataset within BW application server

- **New Solution with PushDown:**
  - Perform all required processing and formatting on Flat InfoCubes and DSOs within Database In-Memory

**Performance Improvement:** 10x for BW FEMS queries
SAP NW Business Intelligence

Oracle Database 18c In-Memory Dynamic Scans

In-Memory Dynamic Scans
Parallelization of in-memory scan using light-weight threads

- Number of active threads controlled by resource manager
- Efficient utilization of CPU resources to maximize in-memory scan performance

Performance Improvement: $2x - 3x$ for BW queries using In-Memory
Performance

ABAP Core Data Services
Performance

Paradigm Change

Application server’s purpose is to relieve the database server, but: Today the database server is no longer the critical resource!

NEW PARADIGM:

Data-Centric Approach
Push calculations/business logic from the application server down to the database server

▪ Eliminates data traffic…
▪ …and allows for local data access optimization

„Bring the Algorithm to the Data“
Performance

**ABAP Core Data Services (CDS)**

**ABAP Core Data Services**
Dynamic, database-side objects, comprising…

- Views
  - Views with parameters
    - eq. database table functions
- Scalar functions
and implementing simple to most complex business logic

**Examples:**

- **Functions:**
  - CONCAT, REPLACE, SUBSTRING, LPAD
  - UNIT_CONVERSION
  - CURRENCY_CONVERSION

- **Global Temporary Tables**\(^1\)
- **Session Variables**\(^1\)
- **Time**\(^1\) and **Timezone**\(^2\) Functions
- ...

SEE THE ABAP DOCUMENTATION FOR A FULL LIST OF CDS FUNCTIONALITY

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\(^1\) as of SAP NetWeaver 7.50  \(^2\) as of AS ABAP 7.51
Miscellaneous Topics
**SAP on Oracle Database 11g**

**Extended Support**

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**Oracle Database 11.2.0.4 Extended Support**

**EXTENDED SUPPORT TIMELINE ORACLE DATABASE 11.2.0.4**

**Extra-Charged Extended Support**

<table>
<thead>
<tr>
<th>Start</th>
<th>1 January 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>End</td>
<td>31 December 2020</td>
</tr>
</tbody>
</table>

- Official request necessary
- SAP online order form
  - see SAP Note 2699935

**CONTRACT REQUIRED FOR SBP DOWNLOAD FROM SAP MARKETPLACE!**

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**Oracle Database 12.1.0.2 Extended Support**

**EXTENDED SUPPORT TIMELINE ORACLE DATABASE 12.1.0.2**

**Extra-Charged Extended Support**

<table>
<thead>
<tr>
<th>Start</th>
<th>1 August 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>End NEW!</td>
<td>31 July 2022¹</td>
</tr>
</tbody>
</table>

- Official request necessary
- SAP online order form
  - see SAP Note 2775143

**CONTRACT REQUIRED FOR SBP DOWNLOAD FROM SAP MARKETPLACE!**

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¹ Microsoft Windows 2008 platform ends on 31 July 2021
Encrypted Tablespaces in Software Provisioning Manager

Creation of encrypted tablespaces during database installation is now integrated in SWPM

<table>
<thead>
<tr>
<th>Version</th>
<th>Supported Tablespaces</th>
<th>Release to Customer (RTC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL Tool Set 1.0 SPS 27</td>
<td>SAP User Tablespaces</td>
<td>16 September 2019</td>
</tr>
<tr>
<td>SL Tool Set 1.0 SPS 28</td>
<td>SAP User Tablespaces + SYSTEM, SYSAUX, UNDO, PSAPTEMP</td>
<td>20 January 2020</td>
</tr>
</tbody>
</table>

- Mandatory for SAP deployments in Oracle Cloud
- Oracle 18c and higher

For details see
- SAP Note 2485122
Social Media

SAP on Oracle Community

SAP on Oracle Community Page
Find news, discussions and resources related to SAP on Oracle at

go.sap.com/community/topic/oracle.html

NAVIGATION FROM SAP CORPORATE HOME PAGE

go.sap.com

→ Community

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→ Search for SAP on Oracle

1 Former SAP Community Network (SCN) was discontinued in fall 2016
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