

# Oracle for SAP Cloud Update



## DEAR SAP CUSTOMER,

The relationship of Oracle Corporation and SAP SE has been and is based on a long history, a rich heritage of joint developments and a bright future – for the benefit of our mutual customers. Both companies have had an ongoing commitment to our tens of thousands of joint customers for over 30 years.

Our longstanding reseller and support agreements provide enhanced access to Oracle Database technology, Oracle Cloud Infrastructure and world class customer support. Oracle will support SAP Business Suite and SAP BW as long as SAP will be supporting them. With every new release we will provide latest database technology and let customers make use of more and more SAP application optimizations.

Running SAP applications on **Oracle Cloud Infrastructure** has been certified for Bare Metal and Virtual Machine shapes as well as for Exadata Cloud Service and Oracle Exadata Cloud@Customer. Oracle Exadata Cloud Service is the most powerful platform to run Oracle Database in the cloud. Oracle Exadata Cloud@Customer is the Cloud version of Exadata which is located on-premise in the datacenter of the customer; both services are only available from Oracle. Both SAP Application Server ABAP/Java as well as SAP Business Objects are deployable on Oracle Cloud Infrastructure. Cloud Infrastructure combines the elasticity and utility of public cloud with the granular control, security, and predictability of on premises infrastructure to deliver high performance, high availability, and cost effective infrastructure services. Oracle Cloud Infrastructure offers a set of core infrastructure capabilities such as compute and elastic storage to provide customers the ability to run any workload in the cloud. It offers a comprehensive set of integrated, subscription based infrastructure services that enable businesses to run any workload in an enterprise grade cloud-managed, hosted, and supported by Oracle. The Oracle product strategy provides flexibility and choice across the IT infrastructure. There are several Cloud database migration techniques: R3LOAD (SAP), BRSPACE (SAP), RMAN, O2O, Triple O and Data Guard physical standby. For further details regarding cloud migration techniques, please see page 6.

The **Oracle Exadata Database Machine** is engineered to consolidate all of your SAP and non-SAP Databases into a private Database Cloud environment. It delivers the highest performance and most available platform for running the private Oracle Database Cloud for all types of database workloads; including both Online Transaction Processing (e.g. SAP ECC 6.0), and Data Warehousing (e.g. SAP BW 7.0 and higher). The Exadata Database Machine is ready to tackle your largest and most important database workload, often running them up to 10 times faster or more. It has already been deployed by many SAP customers.

**Oracle Private Cloud Appliance** is an engineered system that radically simplifies the way customers install, deploy, and manage converged infrastructures, which can be used as virtualization platform for database and application.

The **Oracle Database Appliance** is a new way to take advantage of the world's most popular Oracle Database, in a single, easy-to-deploy and easy-to-manage system. It's a complete package of software, server, storage, HA and networking that's engineered for simplicity; saving time and money by simplifying deployment, maintenance, and support of database workloads.



**Oracle Linux 8** is Oracle's latest Linux version for SAP infrastructure computing needs. It is fast, brings the latest innovations to customers and delivers best performance for SAP. It is reliable and it provides best security and data integrity. It is optimized for Oracle Database and improves application uptime.

Oracle Linux Virtualization Manager is a server virtualization management platform that can be easily deployed to configure, monitor, and manage an Oracle Linux Kernel-based Virtual Machine (KVM) environment. **Oracle Linux KVM and Oracle Linux Virtualization Manager** provide a modern, open source, high performance alternative to proprietary server virtualization solutions with zero licensing costs.

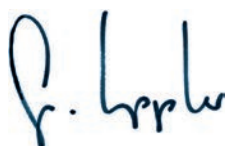
The **Oracle development teams** on site at SAP SE in Walldorf, Germany continue to work together with SAP developers to ensure that SAP customers will always have access to the latest optimized Oracle technologies, ensuring performance, reliability and innovation.

The **Oracle for SAP Service & Support** team offers Advanced Customer Services (ACS) that include health checks, workshops, database migrations, performance tuning, and ACS Oracle Solaris Services for SAP environments, including Assisted Services Engagements (Analysis/Enhancement and SAP Readiness Service for IT Infrastructure).

For more information please visit [www.oracle.com/sap](http://www.oracle.com/sap).

We welcome your comments and questions. Please contact us at: [frontdesk-walldorf\\_de@oracle.com](mailto:frontdesk-walldorf_de@oracle.com)

Sincerely,



Gerhard Kuppler

Vice President SAP Alliances  
Oracle Corporation

*ORACLE CORPORATION: US\$40B total GAAP revenue in FY 2021 • 430,000 customers in 175 countries • 20,000 partners across the globe • 133,000 employees, including: – 41,000 developers and engineers – 13,000 customer support and service specialists, speaking 29 languages - 18,000 implementation consultants • Supports thousands of educational institutions and millions of students in more than 130 countries • More than 18,500 patents worldwide • 5 million registered members of Oracle's customer and developer communities • 469 independent user communities in 97 countries representing more than 1 million members.*



# Oracle Cloud for SAP Customers

Preserve existing investments and free up resources for innovation

## Oracle Cloud: A Great Opportunity



### Same SAP Application, Same Oracle Database

No business disruption. Retain all your customizations.



### Reduce Costs

Transform Capex to Opex. Pay only for what you use.



### Improve Agility and Accelerate Innovation

Focus on SAP software deployments, not infrastructure management.



### Best Price Performance and Transparent Pricing

Get 34% lower infrastructure costs for your SAP/enterprise software data workloads vs leading cloud provider.

## Oracle Cloud: Benefits



### Optimized for Oracle Database

Oracle Database runs up to 7.8x faster on Oracle Cloud Infrastructure vs leading cloud provider.



### High and Predictable Performance

Run SAP applications and Oracle databases on bare metal and virtual machine instances. Leverage high performance resources.



### Exadata Cloud Service and Exadata Cloud@Customer

Most powerful platform to run Oracle Database in the cloud, only available from Oracle.



### Security and Control

Compute and network isolation help ensure data security. Compartment capabilities allow for control of SAP deployments.

## Oracle Cloud: Use Cases



### Dev/Test in the Cloud

Test new customizations or new software versions.



### Backup and DR in the Cloud

Independent data centers for high availability, disaster recovery. Duplicated environment in the cloud for application and database.



### Extend the Data Center to the Cloud

Transient workloads (training, demos). Rapid implementation for acquired subsidiary, Geographic expansion or separate LOB.



### Production in the Cloud

Reduce reliance on or eliminate on-premises data centers. Focus on strategic priorities and differentiation, not managing infrastructure.

## WHY MOVE SAP APPLICATIONS TO THE ORACLE CLOUD?

SAP NetWeaver-based applications are certified to run on the Oracle Cloud Infrastructure. NetWeaver-based applications represent most of the deployed SAP applications, and the majority of them are powered by Oracle databases. Indeed, while SAP is encouraging customers to move to S/4HANA, a DSAG survey\* shows that 42% of them have no plans to do so in the next years. They're unable to build a business case, deem the ROI unclear, consider S/4HANA to be an unproven, early stage product, and face significant migration & implementation costs. Most customers want instead to keep running their existing proven SAP applications that they spent years customizing to their needs. At the same time, they face pressure to reduce costs and improve agility to better support the business. Digital disruption is hard at work in all industries and organizations are looking for ways to shift resources from maintenance to innovation. Up to 80% of IT budgets can be spent on "keeping the lights on", and moving core enterprises applications to the cloud represents an attractive way to reduce costs, free up resources, and focus on higher value activities than infrastructure management.

Moving SAP applications & Oracle Databases to Oracle Cloud enables customers to preserve existing investments while accelerating innovation, relying on the only cloud architected for enterprise workloads and optimized for Oracle Database.

### Key benefits include:

- High and predictable performance for SAP/enterprise applications with dedicated bare metal instances as well as high performance network and storage resources.
- Best Oracle Database performance: As demonstrated in a recent Accenture report focused on running enterprise workloads in the cloud, Oracle databases run up to 7.8x faster on Oracle Cloud Infrastructure (OCI) vs leading cloud provider.

- Lower costs & transparency: The aforementioned Accenture report also demonstrates that customers can benefit from up to 34% lower infrastructure costs for their SAP/enterprise workloads relying on OCI vs leading cloud provider. Additionally, there are no hidden costs with Oracle Cloud, and Universal Credits allow you to benefit from simple, flexible and predictable pricing.
- Security and governance: Compute and network isolation help ensure data security; Compartment capabilities coupled with identity and access management and audit allow visibility and control for your SAP deployments.
- Exadata Cloud Service and Oracle Exadata Cloud@Customer: Most powerful platforms to run Oracle Database in the cloud, only available from Oracle. Customers running SAP applications on Exadata on-premises can move their SAP workloads to Oracle Cloud with 100% compatibility and benefit from Oracle's BYOL to PaaS program.
- Complete & integrated cloud, enabling you to leverage Oracle's most comprehensive PaaS & SaaS offering to for example connect your existing SAP applications to SaaS modules from any provider, or to extend your SAP applications with mobile interfaces or chatbots. According to the Rimini Street survey mentioned earlier, 30% of customers also look to augment their existing platforms with cloud applications for innovation.

Various resources to learn more are at your disposal, discover how you can ensure business continuity, reduce costs and accelerate innovation! And let us know if you have any question or comment.

\* [https://www.dsag.de/sites/default/files/03\\_plans\\_s4hana.jpg](https://www.dsag.de/sites/default/files/03_plans_s4hana.jpg)

Several options available for SAP-Oracle user companies to reap the benefits of the Oracle Cloud Infrastructure

## DATABASE MIGRATION TO THE ORACLE CLOUD MADE EASY

Oracle Cloud Infrastructure Services enable companies to enjoy significant benefits. Like all Oracle Cloud Services, the use of Oracle Cloud Infrastructure Services is increasing at a rapid pace.

Oracle's Cloud Infrastructure Services offer comprehensive control and the versatility to run both traditional and cloud-native workloads with predictable savings. Oracle Cloud Infrastructure, which is managed, hosted, and supported by Oracle, provides organizations with the tools needed to migrate, build, and run production, business-critical applications in the cloud.

The use of the SAP NetWeaver Application Server ABAP/Java on Oracle Cloud Infrastructure is the start of a new chapter in the long-standing partnership between Oracle and SAP. The focus here is on operating Oracle SAP databases on the basis of powerful computing, network, and storage infrastructure workload services on a secure, stable, predictable and extendable platform.

Database migration to the Oracle Cloud lies at the heart of this collaboration. Usually, this takes place after planning, preparatory work, and various precursors, such as setting up an Oracle Infrastructure account, determining an appropriate workload sizing, choosing the appropriate bare metal shape, use of Oracle Cloud Infrastructure Object Storage, and much more.

More information about database migration for Oracle-SAP customers can be found in the whitepaper „SAP NetWeaver Application Server ABAP/Java on Oracle Cloud Infrastructure“.

Please download the whitepaper:

<http://www.oracle.com/us/solutions/sap/sap-netweaver-on-oracle-cloud-wp-3931430.pdf>.

More information is available in the appropriate SAP Notes (for example 2474949 „SAP on Oracle Cloud Infrastructure“ or 2520061 „SAP on Oracle Cloud Infrastructure: Support Requisites“).

### RMAN and/or BR\*Tools

There are also several options, procedures, and methods available to SAP-Oracle customers for migrating databases or what is also known as “Lift and Shift into the Cloud” combined with the Oracle Cloud Infrastructure when using or

operating source and target platforms with Linux (Linux x86\_64).

The focus here is on five methods or procedures. The tools used will be very familiar to all Oracle-SAP customers, especially when it comes to backup, restore and recovery (both on the source and target host).

- Firstly, RMAN (Oracle Recovery Manager) Oracle Backup/Recovery Toolset is used,
- and secondly: BR\*Tools (previously sapdba) for administration and management of Oracle databases in the SAP environment.

**Procedure 1:** With the first option, the database is migrated to the Oracle Cloud using Oracle Recovery Manager via Oracle Cloud Infrastructure Object Storage. Object Storage is configured on the source host and backup/recovery is undertaken. The same procedure is followed on the target host, including recovery and restoration.

**Procedure 2:** With the second option, the database is migrated using BR\*Tools via the brbackup tool. The procedure is the same as above but also includes integration/use of BR\*Tools and the corresponding specifications of command functions on the source and target host.

**Procedure 3:** If the source platform is a Linux X86-64 and/or if the process involves a permitted combination from MOS Note 1079563.1, the RMAN command „duplicate database from active database“ can be used to produce an exact copy of the source database on the target in the cloud. If desired, the database is made available in the cloud as a Data Guard standby database so that Data Guard can be used to apply all further changes to the source database on the target database.

Migrations can therefore be almost free of interruptions. The RMAN „duplicate“ process can run with an active source database to restrict the migration „downtime“ for the database to a Data Guard role switch and/or failover. Release changes, upgrades or other changes to the configuration or database content are not possible with this option. One benefit of this procedure is that there is no need for a temporary buffer for backups, exports or data.

**Procedure 4:** If the source platform is different from the target platform in the cloud, e.g. as a result of a different endian type, and if the database is able to accept a slightly longer „downtime“, migration across all platforms can be undertaken using the RMAN „cross platform transportable tablespaces“ command. This procedure requires a new minimal database to be created in the cloud. The application data is then migrated by transferring the application tablespaces. This can be done on the basis of RMAN backups where incremental online backups can also be used to transfer subsequent changes made to the source database. Only the last backup and a meta data export have to be undertaken with the application and/or SAP stopped. With this procedure, the data (backups) have to be buffered to a filesystem that can be accessed from both the source and cloud.

**Procedure 5:** The most flexible procedure is called Oracle Lifecycle Migration Service (O2O), which is a service provided by Oracle ACS. All supported platform combinations are possible here. There are two steps to the procedure. First, a set of scripts is generated. Those scripts allow for the creation of the new target database, setup of the environment and to perform the data movement. The second step is the actual execution of those scripts to perform the migration.. Large tables are transferred using database links and smaller ones using export/import. A high degree of parallelism is possible if the hardware (compute and network) involved permit it. A new database is created in the cloud, which means that a

database upgrade can be implemented transparently as part of the migration. Changes to tablespaces and schedule as well as activation or deactivation of features, such as compression, partitioning, encryption, RAC or Database Vault, are all possible as well. The only thing which cannot be done is the SAP-based unicode conversion because this has to be done by the SAP server.

A buffer, which can be accessed from both sides, is needed for the scripts and export files. The application, i.e. SAP, has to be stopped for the duration of the migration process.

If using GoldenGate, the O2O procedure becomes the OOO procedure, and the changes made since the start of the O2O migration are recorded by GoldenGate and applied to the new database in the cloud. OOO is the online variant of O2O with which SAP can remain active with the exception of a short „downtime“ during the switchover.

More information about database migration for Oracle-SAP customers can be found in the whitepaper „SAP NetWeaver Application Server ABAP/Java on Oracle Cloud Infrastructure“.

Please download the whitepaper:

<http://www.oracle.com/us/solutions/sap/sap-netweaver-on-oracle-cloud-wp-3931430.pdf>. Further information can also be found“ in the appropriate SAP Notes (for example 2474949 „SAP on Oracle Cloud Infrastructure“ or 2520061 „SAP on Oracle Cloud Infrastructure: Support Requisites“).





## SAP NETWEAVER APPLICATION SERVER ABAP/JAVA ON ORACLE CLOUD INFRASTRUCTURE, ORACLE EXADATA CLOUD SERVICE, ORACLE EXADATA CLOUD@CUSTOMER – IMPLEMENTATION GUIDES

### Abstract:

Three technical white papers are provided as reference guides for deploying SAP NetWeaver® Application Server ABAP/Java onto the Oracle Cloud Infrastructure utilizing Bare Metal shapes, Exadata as a Service and Exadata Cloud@Customer. The guides provide suggested platform best practices as well as details about the individual components of the Oracle Cloud Infrastructure, Oracle Linux, Oracle Database instances, and SAP application instances necessary to run software products based on SAP NetWeaver Application Server ABAP/Java in the Oracle Cloud Infrastructure. The white papers assume the following knowledge:

- **You are familiar with the fundamentals of Oracle Cloud Infrastructure.**
- **You have a background in SAP NetWeaver Application Server ABAP/Java using Oracle Database and Oracle Linux. For more information, see the following resources:**
  - <http://go.sap.com/solution.html>
  - <https://www.sap.com/community/topic/oracle.html>
  - <http://docs.oracle.com/en/operating-systems/linux.html>
- **You're familiar with the product documentation for:**
  - Oracle Cloud Infrastructure
  - Oracle Database 12c, and 19c
  - Oracle Linux 6 and 7 and 8
  - SAP NetWeaver 7.x

Most of the steps described here are the same as in a traditional SAP deployment in a customer data center.

The document also includes details about how to develop a backup and high-availability plan for your SAP installation in Oracle Cloud Infrastructure. With this background and the Implementation Guide it should be no problem to install SAP applications on Oracle Cloud Infrastructure (OCI).

### Additional Training available:

For those who are working hands-on implementing SAP NetWeaver Applications on the Oracle Cloud Infrastructure, the SAPCC and Oracle Solution Center team in Walldorf have developed a Technical Training, which will be available on special request. Additional video tutorials are available with the following topics:

1. Introduction to OCI4SAP
2. Typical reference architecture for OCI4SAP
3. Terraform core setup
4. OCI4SAP Ref Arch based & deployment process
5. OCI4SAP customer prerequisites
6. OCI4SAP OCI Tenant + Virtual Cloud Network (VCN)
7. OCI4SAP Bastion Host
8. OCI4SAP Central Services Installation
9. OCI4SAP DB installation
10. CI4SAP Application server installation
11. OCI4SAP DMZ component installation: Web Dispatcher
12. OCI4SAP DMZ component installation: SAPRouter
13. OCI4SAP Final summary including checklist
14. Additional OCI key features



# SAP NetWeaver Application Server ABAP/Java on Oracle Cloud Infrastructure, Oracle Exadata Cloud Service, Oracle Exadata Cloud@Customer

## Implementation Guides



### SAP NetWeaver® Application Server ABAP/Java on Oracle Cloud Infrastructure



#### Contents:

- Overview of Oracle Cloud Infrastructure
- Overview and Architecture of SAP NetWeaver Application Server ABAP/Java
- Overview of SAP NetWeaver® Application Server ABAP/Java on Oracle Cloud Infrastructure
- Recommended Instances and Topologies for SAP NetWeaver® Application Server Installation
- Planning Your SAP Implementation
- Planning the SAP Deployment
- Implementing Your Plan
- Oracle Database in the Cloud
- Migrating to the Cloud
- High Availability in the Cloud



#### Download from:

- <https://www.sap.com/documents/2018/06/eab0396a-0c7d-0010-87a3-c30de2ffd8ff.html>
- <https://www.oracle.com/us/solutions/sap/sap-netweaver-on-oracle-cloud-wp-3931430.pdf>



### SAP NetWeaver® Application Server ABAP/Java on Oracle Database Exadata Cloud Service



#### Contents:

- Overview of Oracle Database Exadata Cloud Service
- Planning Your Exadata Cloud Services for SAP NetWeaver Application Server ABAP/Java
- Planning the SAP Deployment
- Implementing the Deployment
- SAP Bundle Patch for Oracle Database Exadata Cloud Service: Live Cycle Management for SAP Databases
- High Availability with Oracle Data Guard



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- <https://www.sap.com/documents/2020/04/5ca170cf-8f7d-0010-87a3-c30de2ffd8ff.html>
- <http://www.oracle.com/us/solutions/sap/sap-netweaver-on-exadata-cloud-wp-4428540.pdf>



### SAP NetWeaver® Application Server ABAP/Java on Oracle Exadata Cloud@Customer X9M



#### Contents:

- About Oracle Exadata Cloud@Customer X9M
- Planning the SAP Deployment
- Implementing the Deployment
- Patching Exadata Cloud@Customer X9M: Life Cycle Management for SAP Databases
- Using SAP Transaction DB13
- Migrating Databases
- Database Backup Options with Exadata Cloud@Customer
- High Availability with Oracle Data Guard



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## DETAILED COMPARISON: ORACLE VS. LEADING CLOUD PROVIDER FASTER & CHEAPER

While Accenture's previous research focused on highly transactional databases to test infrastructure performance, it did not address large databases for complex systems relying on complex data. To determine whether databases in the cloud can support critical applications, Accenture conducted another round of cloud research, this time examining Oracle Database, and associated applications and networking, in the cloud. These tests compared Oracle's cloud offerings with those of another leading cloud vendor.

**“The test results were very positive for Oracle. Using Oracle’s Cloud Infrastructure, Accenture was able to execute OLTP transactions up to 7.8 times faster, compared to the other cloud provider.”**

The results demonstrated that Oracle Cloud technology is ready to handle the large, high-powered database workloads that are fundamental to critical enterprise applications.

### Quotes from Accenture Report

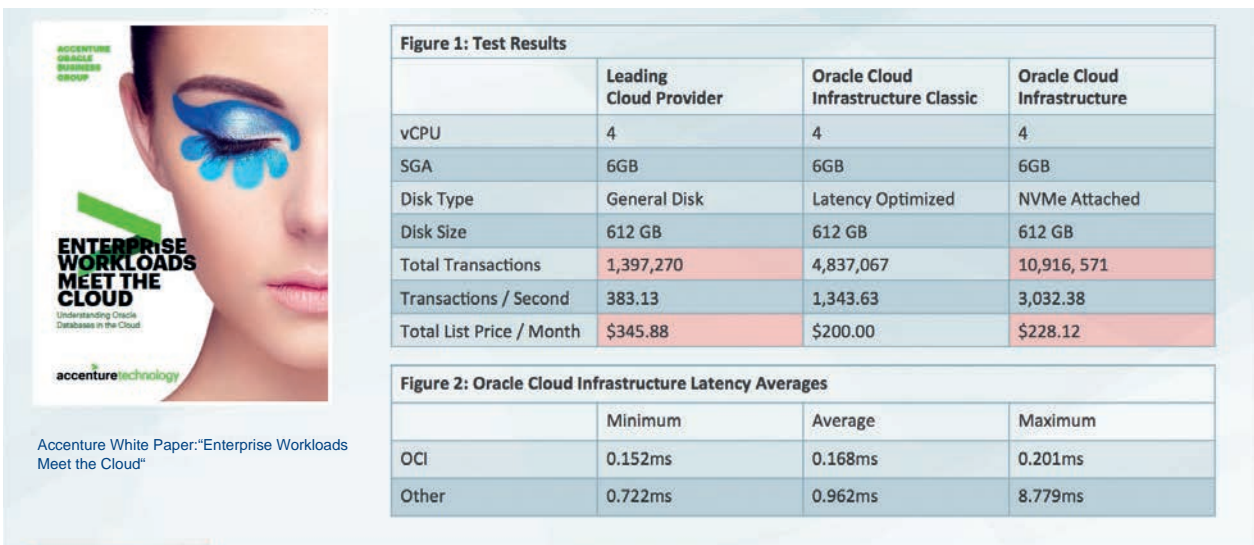
“The test results were very positive for Oracle. Using Oracle’s Cloud Infrastructure, Accenture was able to execute OLTP transactions up to 7.8 times faster, compared to the other cloud provider.”

On the other hand, when researchers attempted to replicate these tests with the other cloud provider, they were unable to achieve the same kinds of results in terms of total transactions processed. By adding more processing power, they were eventually able to do so – but the additional hardware meant significant additional expense. In the end, the tests showed that the Oracle Cloud Infrastructure can provide up to a more than eight-fold reduction in costs for a given amount of capacity, compared to the other cloud provider.

“The results demonstrated that Oracle Cloud technology is ready to handle the large, high-powered database workloads that are fundamental to critical enterprise applications.”

“Accenture researchers found that Oracle Cloud Infrastructure provided much lower latency than the other cloud when connecting between zones or different data centers within a single region. In fact, Oracle’s peak latency levels were up to nearly five times less than those of the other cloud. The Oracle technology can provide better network performance between data centers than many organizations find within a single data center.”

### Detailed Comparison: Oracle vs. Leading Cloud Provider Faster & Cheaper



## CLOUD ACCELERATION A PERFORMANCE COMPARISON OF CLOUD PROVIDERS

### Introduction

There is a large number of manufacturers on the market with portfolios containing IaaS products. In this product family, most providers also offer a number of features relating to the guaranteed performance and redundancy of stored data. Given the huge breadth of products available, it is difficult for users to find the right product to operate their database, application or other solution in the cloud.

In this manuscript, I hope to explore the capabilities of the various performance classes of cloud providers. Both synthetic and practical methods are used to collect this data.

For the analysis of IaaS product capability, the following manufacturers are used because they currently have such a dominating presence on the market:

- Microsoft Azure
- Amazon Web Services (AWS)
- Oracle Cloud

### Test environments

In order to ultimately be able to compare the test results, it is necessary to produce a target environment with a structure that can be reproduced by all cloud providers. The manufacturers offer various combinations of CPU and memory resources in what are known as shapes.

When considering the performance pattern, users must ensure that these environments are ultimately able to deliver a respectable performance. If the environment is too small, implicit queuing situations may arise, which could significantly distort the final result.

Following analysis of the manufacturers' product ranges, the following pattern was selected:

- CPU: 4 threads
- Memory: 15 GB
- Mount points: 3

### Keywords:

Cloud, IaaS, Infrastructure as a Service, Performance

It should also be noted that there is a fundamental difference among the manufacturers in how the technical capability of the CPU resource is depicted. Microsoft Azure and Amazon Web Services use the term "vCPU", which from a technical standpoint is the same as a thread for an Intel processor. In contrast, Oracle uses the OCPU unit, which is comparable with an Intel CPU core. One benefit of Oracle is that, according to their documentation, only you can use the resources you have purchased. This is not the case with other manufacturers, so it can be assumed that CPU over-provisioning applies to them.

In the array of various manufacturers, the following performance patterns were used for the performance comparison:

### Microsoft Azure

■ **Shape D4s\_v3**

- 4 vCPUs
- Intel XEON ® E5-2673 v3
- 16 GB RAM
- 32 GB SSD
- Standard Storage (HDD)

■ **Shape DS3\_v2**

- 4 vCPUs
- Intel XEON ® E5-2673 v4
- 14 GB RAM
- 28 GB SSD
- Premium Storage (SSD)

### Amazon Web Services (AWS)

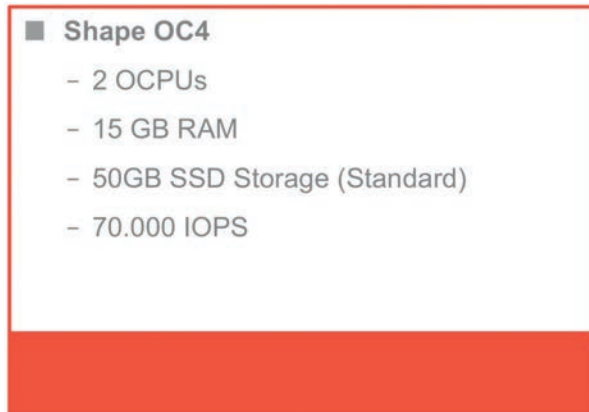
■ **Shape m3.xlarge**

- 4 vCPUs
- Intel Xeon E5-2670 v2
- 16 GB RAM
- 30 GB SSD
- 2.500 IOPS (Provisioned SSDs)

■ **Shape m4.xlarge**

- 4 vCPUs
- Intel Xeon E5-2676 v3
- 16 GB RAM
- 30 GB SSD
- 2.500 IOPS (Provisioned SSDs)

## Oracle Cloud



As you can see, with the exception of minor deviations, it was possible to reproduce the previously defined target environment with all manufacturers. In addition to the variation in CPU, different storage classes have also been included in the comparison if they were provided by the manufacturers.

### Tools for measuring performance

Since it is able to undertake detailed analysis and mapping of complex load situations, the Oracle database was selected as the central tool for the load tests.

Here are the details of the setup and configuration of the database environment:

- Oracle Database Enterprise Edition 12.2.0.1
- SGA\_TARGET = 9GB
- PGA\_AGGREGATE\_TARGET = 1GB
- FILESYSTEMIO\_OPTIONS = SETALL
- 30 GB SMALLFILE Tablespace

In order to measure the capability of the CPU resource, one of Trivadis' own benchmarks was used. This simulates a CPU's huge range of load types, including PL/SQL calculation, SQL joins, and SUM operations. The strengths and weaknesses of a processor model can thereby be established. The result of the Trivadis CPU benchmark is a CPU speed factor.

Alongside the processor performance, the performance of the connected storage sub-system must also be tested and evaluated. Two test methods are used to do this. A synthetic test was carried out to establish and compare the physical framework conditions and maximum capability. Furthermore, a reality-based and transactional I/O test is performed to be able to assess how many transactions the environment can attain and/or how the latencies of the storage system would behave under circumstances replicating reality.

To perform the synthetic I/O test, the Oracle package `DBMS_RESOURCE_MANAGER.CALIBRATE_IO` was selected. This is installed with an Oracle database as standard. Once this package is opened, random I/O access is used to an attempt to determine the theoretical maximum of the storage sub-system.

This produces the following KPIs:

- MAX\_IOPS
- LATENCY
- MAX\_MBPS

SLOB, developed and maintained by Kevin Closson, is used to perform a test replicating reality in order to evaluate the mount points available. This command line tool starts transactional processing of data, which is then measured with database tools. This process can also be performed in parallel with changes to one input parameter and the scalability of environments therefore also tested. The following test uses this tool's default settings, only the parallelism parameter is successively increased from 1 to 8.

### Results of the performance measurements

The benchmarks described in the above sections were performed on the environments of the various IaaS manufacturers and their results compared. In order to depict these comparisons in the most comprehensible manner possible, graphs and matrices were produced, and I will go into these in detail on the next pages.

First, I would like to look at the results of the Trivadis CPU benchmark. The following graph shows the price/performance ratio of the CPU resource of the environments available. The resultant CPU speed factor (Y-axis) is shown here in correlation to the hourly operating costs of the resource (X-axis). An appropriate color scheme is superimposed on the graph to make it easier to understand.



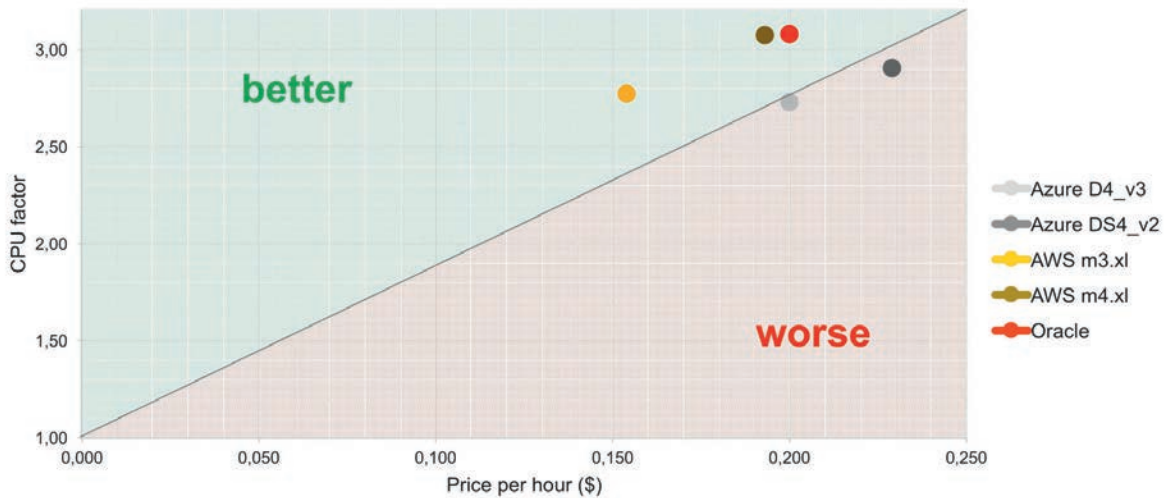


Fig. 1: Illustration of CPU price/performance ratio

I would now like to consider the capability of the storage sub-system. A priori we will start with the results of the synthetic I/O test. Given that the various storage classes of the manufacturers also differ in terms of guaranteed IOPS values, initially we will not concern ourselves with this. A better means of comparison is the latency of the I/O operations undertaken because this is a more meaningful measure of the technical setup of the storage infrastructure. The following test uses this tool's default settings, only the parallelism parameter is successively increased from 1 to 8.

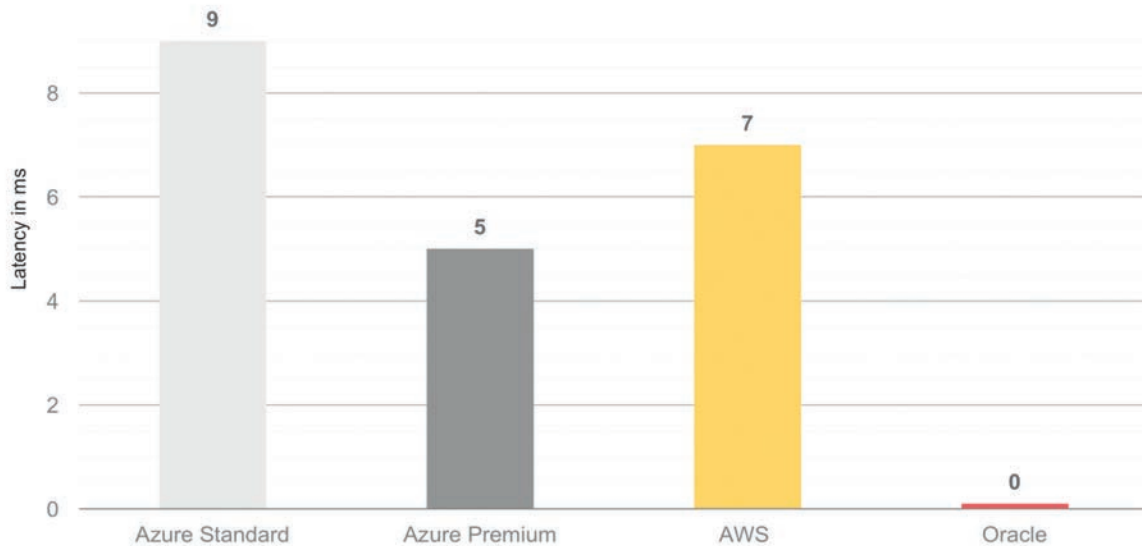


Fig. 2: Results of the synthetic I/O test

The synthetic I/O performance tests on the Oracle environment have been able to demonstrate an average response time of less than one millisecond.

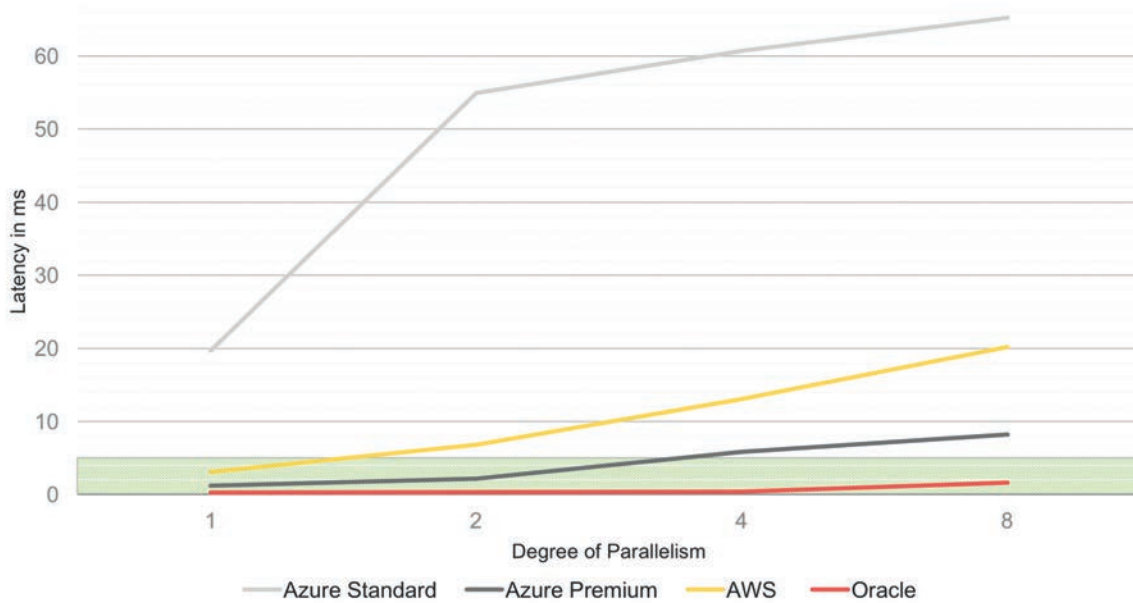


Fig. 3: Results of the I/O test replicating reality with SLOB

Now we will discuss the results of the SLOB benchmark. As previously described in the first part of this manuscript, this test was undertaken several times with various parallelism parameters. The graph below shows the results of the different environments in the various degrees of parallelism. The latency of one single block access was used as the KPI for evaluation.

### Summary

Let us now sum up the situation.

The various manufacturers offer a huge range of products in the IaaS segment. In order to find the right environment for their requirements, users have to get to grips with the terminology and documentation associated with the solutions available. For example, the difference between the terms vCPU and OCPU is important.

In terms of CPU resource, the manufacturers don't differ a great deal with respect to price/performance ratio. In contrast, when considering the various storage solutions available, there are huge and far-reaching differences, which can even determine whether a solution will operate or not in the cloud.

The key to successful cloud migration lies in testing and evaluating the solutions.

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## AMAGGI BOOSTS UPTIME BY MIGRATING KEY WORKLOADS TO ORACLE CLOUD INFRASTRUCTURE

The Brazilian agribusiness saves 20% in costs and reduces monthly close time 2X by moving to Oracle Cloud Infrastructure.

### Business challenges

Amaggi is a Brazilian agribusiness company active in large-scale soybean, corn, and cotton production with emphasis on sustainable development. The company currently has 362,000 hectares of agricultural production and sells around 16.9 million tons of grain worldwide. Amaggi is present in Argentina, Paraguay, China, the Netherlands, Switzerland, and Norway.

As a major player in the agribusiness sector, which sustains the Brazilian trade balance through exports, Amaggi invests in the development of precision agriculture-techniques that improve crop management and optimize productive areas. Every year the company wins awards and certifications for sustainable development.

With today's agribusiness driven by technology, Amaggi invests continually in integrating its systems for business efficiency. In 2022, with data center equipment and maintenance at end of life, the company decided to migrate to a more robust structure that would guarantee data security and high availability of its IT infrastructure.

**„ Agribusiness is on the cutting edge in Brazil. If you visit a farm, you will be amazed at the degree of technology. A soybean or cotton harvester is practically a computer on wheels. With OCI connectivity, we control the entire process from cultivation to export.“**

*Wagner Biasi, CSC and IT Manager, Amaggi*

### Why Amaggi chose Oracle

Amaggi ran Oracle Exadata Database Machine and associated technologies in its data center for years. While evaluating other cloud providers, Amaggi selected Oracle as a known quantity that understood the business challenge and propo-

sed the most responsive solution for the company's move to the cloud.

### Results

By migrating to Oracle Cloud Infrastructure (OCI) with Exadata Cloud Service, Amaggi reduced costs 20% by not having to refresh its data center through the arduous cycle of negotiating the purchase and delivery of expensive imported hardware.

OCI now runs the entire Amaggi production environment of 46 terabytes, including the critical grain processing, grain origination, agricultural support, weights and measures, and credit systems. The platform also supports the company's SAP enterprise resource planning (ERP) system, which was migrated over a weekend.

**„ Moving from our data center onto Oracle Cloud Infrastructure has reduced costs, eliminated hardware refresh bottlenecks, and has given our producer and logistics ecosystem a tremendous boost in availability.“**

*Wagner Biasi, CSC and IT Manager, Amaggi*

Previously hampered by database unavailability due to memory or disk space overflow, Amaggi now has 99.999% uptime through OCI's high availability, monitoring service, and load balancing. Billing disruption caused by downtime has been eliminated with OCI's high availability and lower latency, which ensures greater speed in grain shipment and delivery for Amaggi and its producers.

Efficiency gains also include 3X faster database provisioning, enabling DevOps teams to support the complex demands of crop picking, storage, loading and unloading, interconnectivity of farm machinery, logistics contractors, traceability, compliance, and cash flow.

The agricultural producer has trimmed monthly closing processes from 40 minutes to 5 minutes, positively impacting business operations that span 100 branch offices in Brazil and subsidiaries abroad.

Amaggi uses OCI FastConnect to link with its Cuiabá data center, which still runs some quality assurance, testing, and business continuity modules. Disaster recovery also sits in Cuiabá, managed by Oracle Exadata Cloud@Customer, combining the power of Exadata and Oracle Cloud. Amaggi is considering moving the environment to Oracle's São Paulo cloud region once it realizes the full benefits of OCI for its production workloads.

Oracle Cloud Governance also supports the fiscal complexity and controls Amaggi deals with in the import of farm inputs

and export of grain. International Ship and Port Facility Security Codes for receiving and shipping merchandise, bills of lading, shipping manifests, toll payments, freight payments, and more all need maximum available connectivity as well as the checks and balances within OCI governance and security.

#### Partners

Amaggi went live with OCI in six months, assisted by Oracle Consulting and Oracle Partner Lanlink.



<https://www.amaggi.com.br/>





## SAP ON ORACLE CLOUD INFRASTRUCTURE IMPROVES PERFORMANCE AND ELIMINATES \$2.5M ON-PREMISES TECHNOLOGY REFRESH

Oracle partner Cintra delivers production SAP system in the Oracle Cloud Infrastructure – and establishes repeatable RapidCloud for SAP migration process to deliver future Oracle Cloud transformations for SAP customers.

### Business problem

A B2B retailer's mission-critical SAP system was running on end-of-life technology in a data center. Replacing the technology was going to cost more than \$2.5 million. The retailer wanted to avoid this cost and move from a traditional capex cost model to an opex one.

The new platform needed to be capable of delivering high-availability, as well as the same or improved performance as on-premises.

### How we won

Customer was familiar already with Oracle Exadata – both for SAP and non-SAP databases. In order to consolidate and standardize underlying infrastructure a move to Oracle Cloud Infrastructure and Exadata as a service (ExaCS) in OCI was a natural next step. The company chose Cintra to deliver this critical transformation project due to the credibility of Cintra's RapidCloud transformation methodology, which looks after every stage of the transition, from an early discovery and assessment, through architecture design, provisioning, migration and optimization, to ongoing cloud managed services. They also recognized the additional benefit of running SAP on Exadata in Oracle Cloud Infrastructure.

With one partner to deliver the entire journey, RapidCloud makes the transformation easy for customers. Moreover, the detail and credibility of the cloud design means we avoid the need for a proof of concept (POC). With Cintra and RapidCloud, customers have the confidence to go immediately to a real project, thereby accelerating their use of Oracle Cloud Infrastructure.

The customer asked Cintra for two technology options, one using a hybrid of Oracle Cloud Infrastructure and AWS, the other using purely Oracle Cloud Infrastructure. Cintra quickly created two fully costed designs using our RapidCloud tooling, then presented them to the customer. They explained why pure Oracle Cloud Infrastructure was the best option to meet the retailer's needs. Reasons included:

- **High-availability:** The best way to achieve high-availability was using Oracle RAC, which is only available in the Oracle Cloud
- **Consolidation:** The Oracle Cloud would enable them to consolidate multiple standalone servers and RAC clusters into a single Exadata
  - **Exadata PaaS benefits:** Oracle Exadata Cloud Service has the added benefits of being a PaaS service, so the customer will not be responsible for monitoring and patching the platform, thereby freeing up valuable resources
- **Enterprise-grade cloud:** The Oracle Cloud is the only true enterprise-grade cloud, capable of running mission-critical production workloads at scale
- **Performance:** The Oracle Exadata Cloud Service would additionally provide a performance improvement, enhancing user experiences and business-critical processing

### Lessons learned

We delivered the retailer's complete SAP-to-Oracle-Cloud-Infrastructure transformation in less than 90 days. The project delivered a design and provisioned cloud in 30 days, an SAP test environment in 60 days, and the final production deployment within 90 days.

Cintra created repeatable RapidCloud designs and blueprints that can be used to move other SAP customers to the Oracle Cloud Infrastructure quickly, predictably and with minimal risk. SAP to Oracle Cloud Infrastructure transformation is now a strategic focus for Cintra.

The customer's SAP system went live on-time, and performance has been markedly better in the cloud than on-premises.

By successfully deploying SAP in the Oracle Cloud Infrastructure, we have enabled the B2B retailer to avoid its \$2.5 million legacy on-premises technology refresh costs and move to its desired opex cost model. We also paved the way to move further critical applications at this customer to Oracle Cloud

Infrastructure, which we are currently delivering.

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### Products

- Oracle Cloud Infrastructure IaaS
- Oracle Exadata Cloud PaaS services
- Oracle RAC on Exadata
- Load Balancer as a Service (LBaaS)
- Oracle Cloud archive storage

- SAP ERP 6.0
- SAP ECP - Easy Cost Planning - EHP7 (Enhancement Pack 7)
- SAP BW - Business Warehouse
- SAP Solution Manager
- SAP EP - Enterprise Portal



For more information, please contact [sales@cintra.com](mailto:sales@cintra.com)



## ENECO MOVES APPLICATIONS TO ORACLE FOR FASTER PERFORMANCE

By completing a migration to Oracle Cloud Infrastructure in just four months, the energy provider minimized business impact and cut project costs by 50%.

### Business challenges

The leader in the sustainable energy market since 2007, Eneco Group provides 2 million customers in the Netherlands with innovative energy products and services to make it easy for consumers to join in the transition to sustainable energy.

Eneco wanted to invest more in important projects, but spent too much time managing IT infrastructure. The company also faced IT lifecycle management challenges. Instead of just adopting a cloud-first strategy, like so many companies, Eneco not only embraced that strategy, but immediately began working with Capgemini, a trusted partner, to make it happen.

Three of Eneco's Oracle Exadata systems in Capgemini data centers were due for replacement. The company identified 19 mission-critical applications that make use of Oracle Database on Exadata hardware.

The energy company wanted to maintain its custom-developed billing application and associated data warehouse. Despite an established Microsoft Azure-first policy for cloud solutions, Capgemini and Eneco determined that Oracle's Exadata Cloud Service would make the best destination for these workloads.

**“ We wanted to achieve a better digital experience for our customers, and we did that by providing higher availability with better performance with Oracle Cloud Infrastructure.”**

*Mark Edelbroek, Head of BTO IT Operations, Eneco*

### Why Eneco Chose Oracle

Eneco chose Oracle for its reliable Exadata technology and reduced risk and business impact during the migration.

The company selected the Frankfurt Oracle Cloud Infrastructure region to maximize flexibility and disaster recovery

options across the three availability domains there. Eneco is also using Oracle GoldenGate for data replication.

**“ In 2019, we migrated our applications to Oracle Cloud Infrastructure. The benefits are lower costs, higher availability, better performance, and a higher degree of security. We also see increased availability for our business users, especially during patching, due to the introduction of RAC and rolling upgrades.”**

*Mario Suijkerbuijk, CIO, Eneco*

### Results

The initial project was completed over a nine-month period. Moving from one Exadata platform to another made the migration easy, and the close partnership between Capgemini and Oracle ensured that any issues encountered were quickly overcome. Capgemini was able to help Eneco migrate nine of its critical applications to Oracle Cloud Infrastructure (OCI), as well.

This enabled Eneco to use Exadata Cloud Service and reduce software licensing maintenance and support costs.

The success of the project resulted in expanded scope. Halfway through the migration, the company decided to shut down a data center that contained a small but important SAP on Oracle Database environment. It was deployed on two additional Exadata Cloud Service instances plus Oracle Cloud Infrastructure Compute instances for the SAP application servers. The migration took just four months from idea to completion.

### Products

- Oracle Cloud Infrastructure
- Oracle Exadata Cloud Service

**Partners**

Capgemini, the preferred outsourcing partner of Eneco, led the migration to Oracle Cloud Infrastructure and was vital to the successful go-live. Capgemini helped migrate the most important 32 of 54 Oracle Databases and 100 TB of data to Oracle Exadata Cloud Service.



<https://www.eneco.com>





## GOODBYE DATA CENTER, HELLO CLOUD!

### Media-Service Schlütersche strengthens performance and sustainability by migrating SAP financial applications into the Oracle Cloud

Small and medium sized businesses (SMB), often described as too hesitant and risk-averse, have put many automation projects on their agenda for the immediate future. An important topic in this context is the migration of applications and data to the cloud. The industry association Bitkom has come to the conclusion that currently around three out of four companies (73 percent) use computing power from the cloud in one form or another. However, the current digitalization report for small and medium-sized businesses has found that about two thirds of SMB in Germany are still delaying the implementation of their digitization projects. Schlütersche Media Group, or Schlütersche for short, a medium-sized media service headquartered in Hanover, wanted to position itself for the future and demonstrate their innovative strength. This is why the long-established company, founded in 1747, became the first German medium-sized company to consolidate both its Production and Development SAP ERP systems onto the Oracle Cloud Infrastructure (OCI). The project and implementation partner was DXC Technology Deutschland GmbH.

#### OCI supports future strategy

From printed hymnbooks to digital content: Schlütersche's products and services have undoubtedly changed over the past 270 years. Then as now, the company focuses strongly on the needs and requirements of its customers. The company offers Marketing and Publishing support for small and medium sized businesses in the form of industry and service directories, web publishing and online-media. In addition, Schlütersche develops cross-channel media content for subject matter experts as well as learning platforms for special interest groups, including organizing and holding networking events and meetings for their customers.

The overarching company slogan: Expert knowledge and Marketing all in one-stop. What distinguishes the publishing house are its innovative strength and the courage to venture into the digital transformation. The company has now transferred its processes controlled via SAP such as finance (FI/CO) and HR (HCM) to the Oracle Cloud. It covers financial accounting data such as dunning as well as information relating to employees such as payroll accounting and personnel administration. For Schlütersche, the SAP migration to the Oracle cloud is the first step towards departing from their own data center.

#### Optimize processes, keep costs low

For many years, Schlütersche has been increasingly asking itself how it can make its own IT more highly available, cost-efficient and reliable on its own computers in their own data center. While they were able to do so for a long time, they now felt that they were beginning to be overstretched and faced limitation of growth without major hardware investments. When it came to modernizing the SAP system, a new solution had to be found. (Background: Schlütersche uses direct Full Use Oracle licenses which were restricted to a fixed number of cores, so they could not just add more servers to the SAP systems without changing the licensed core count). The company was looking for a service provider who could provide virtual computers and thus ensure the future viability of the publisher's IT. In order to guarantee clean and transparent processes and keep costs low, the project team ultimately opted for OCI.

#### Small IT team benefits from Cloud

The DXC consultants have both SAP and Oracle know-how, which was essential for a project of this kind. Schlütersche was no longer able to carry out necessary upgrades and updates in a timely manner with the old system. A database migration to SAP HANA was discussed, but it turned out to be a complex and costly undertaking for the medium-sized publishing house. Since the existing environment ran on Oracle and a modernization was planned, the topic soon came to the Oracle cloud. With only a small IT team, the OCI advantages were convincing.

It was also the first project of this kind for DXC: „We had no previous experience with the Oracle cloud. That's why we had to familiarize ourselves with it,“ reports Antonio Steinhäuser, SAP Technical Architect for DXC Technology. He praises collaboration, test migration and integration. „Anyone who does such a project for the first time always has a few questions, but“working together with Oracle, they can be quickly resolved,“ says Antonio Steinhäuser.

#### Smooth migration

First discussions took place in December 2018. This was followed by testing of the OCI in a test environment. The project phase and installation proceeded smoothly and in a spirit of partnership. „One challenge, however, was to find a solution that matched the size and requirements of the Schlütersche,“

explains Michael Eisner, Head of IT Services Operations. Other cloud transformations were larger and more complex, and the standard timetable had to be adapted accordingly.

What was required was a more modern and significantly more powerful as well as scalable hardware. „All in all, the migration went smoothly,“ says Eisner. He also praises the cooperation with DXC and Oracle: „The support went really well.“ Overall the whole project took less than a year to close.

#### **Infrastructure as a Service (IaaS) improves flexibility**

Oracle Cloud Infrastructure (OCI) has been certified for SAP NetWeaver-based applications in 2017. This enables SAP users such as Schlütersche to deploy ERP and other Netweaver-based applications such as BI, CRM, and SCM, running on Oracle databases, in the Oracle Cloud Infrastructure (Infrastructure as a Service, IaaS). In this context, the performance of the OCI is considerably higher than the compute services of other providers. Memory processing, block storage and network processing are also significantly better.

#### **Central goal: Optimized performance**

And what had to be changed as a result of the move of the financial systems to the cloud? „For our SAP users and the business processes, nothing,“ Eisner replies. „And that’s a good thing. At the same time we improved our ability to cope with future changes and performance in general. The response times got much better“. In the long run, OCI offers Schlüterschen the opportunity to reduce operating costs. A few examples: Costs are always incurred in the data center, like power, air conditioning or maintenance. These are all investments that companies can save using the cloud.

#### **Cloud offers secure and strong IT support for SMEs**

When German SMEs are asked what is preventing them from cloud transformation, many people say that security concerns are the biggest hurdle. IT manager Eisner would like to rebut these concerns on the basis of his experience: „SMEs are always under massive cost pressure. What small and medium-sized businesses can afford in the area of security and data protection must be set in relation to what reasonable cloud providers offer. In my opinion, we are positioning ourselves well in terms of security by moving servers to the cloud, because a large provider like Oracle can offer much more in this respect than most companies can do with their know-how and their own resources. Therefore, in many cases the cloud offers even more security. The cloud is gradually replacing in-house data centers. However, this development is not negative, but above all offers advantages“. Eisner feels it is important to emphasize another aspect: „Virtualization does not cost any jobs, because the work of the IT staff is not tied to a piece of hardware. It lies in the number and com-

plexity of systems and applications“. No matter where this system runs - in their own data center or in the cloud: the support is the same. The primary goal for Schlüter’s IT is: „In the next five years, all systems, not just ERP, BI and CRM, are to be moved onto the cloud.“

Schlütersche is a good example of how a medium-sized company can automate and modernize IT and systems. Many other companies are currently in a similar situation: they need to standardize and digitize. IT should be less costly, but at the same time new, innovative leaps are always needed. Schlütersche and companies like them can rely on the ability of Oracle Cloud Infrastructure to automate tasks, scale easily, and allow IT teams to concentrate on higher, value-added activities.

#### **About Schlütersche:**

The Schlütersche Verlagsgesellschaft mbH & Co. KG, Schlütersche for short, is a media-service company for small and mid-sized customers. With its holdings and subsidiaries it forms the Schlütersche Media Group, in which about 600 employees support 70.000 customers. Schlütersche develops Advertising and Marketing concepts for those customers – in digital, print or cross-channel, all in one-stop.

Its service offerings consist of, among others, classified directories and associated online services such as website creation, search engine and social media marketing as well as digital reach. Furthermore Schlütersche offers an expert knowledge in a number of industries and branches. The portfolio consists of over 30 technical periodicals, as well as books and online media plus focused industry events and meetings and roundtables for special experts. It is the goal of Schlütersche to create an optimal Market-presence for their customers by using this industry expertise in combination with the media services mentioned. Therefore the company slogan is: Industry expertise and Marketing expertise all in one-stop.

<https://schluetersche.de/unternehmen/>

  
Marketing Services Hannover GmbH

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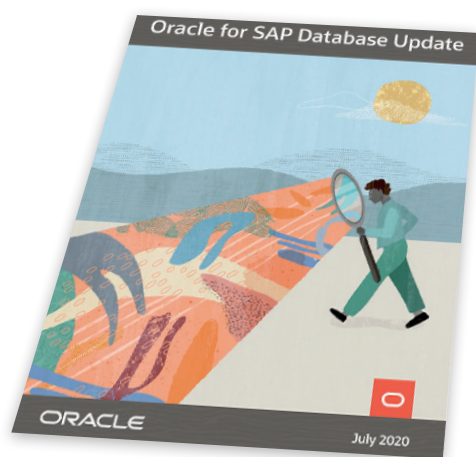
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## ORACLE-RELATED SAP NOTES (CLOUD)

Note No.	Note Title	DB Version
<b>Cloud Platforms : General Information</b>		
1380654	SAP Support in Public Cloud Environments	n/a
<b>Cloud Platforms : Oracle : Cloud Infrastructure</b>		
2474949	SAP NetWeaver on Oracle Cloud Infrastructure	12c-19c
2520061	SAP on Oracle Cloud Infrastructure – Support Prerequisites	12c-19c
2588124	How to protect against speculative execution vulnerabilities on OCI?	12c-19c
<b>Cloud Platforms : Oracle : Exadata Cloud Solutions</b>		
2614028	SAP NetWeaver on Oracle Database Exadata Cloud Service	12c-19c
2614080	SAP on Linux with Exadata Cloud Service: Enhanced Monitoring	n.a.
2799970	Oracle Exadata Cloud Service: Patches for 19c	19c
2884306	Managing SAPDATA_HOME and ORACLE_BASE on Engineered Systems	19c
2956661	SAP NetWeaver on Oracle Database Exadata Cloud@Customer	12c-19c
2992680	Managing shared and multiple Oracle Homes on Engineered Systems	12c-19c
<b>Cloud Platforms : Oracle : Non-NetWeaver-Applications</b>		
2650732	Support of SAP BusinessObjects BI Platform for Oracle Cloud	12c-19c
<b>Cloud Platforms : Non-Oracle</b>		
1656099	SAP Applications on AWS: Supported DB/OS and AWS EC2 Products	12c-19c
2039619	SAP Applications on Microsoft Azure Using the Oracle Database	12c-19c
2358420	Oracle Database Support for Amazon Web Services EC2	12c-19c
2650732	SAP Applications on Azure: Supported Products and VM Types	12c-19c



For more information on why and how to run SAP applications on Oracle Database download the Oracle for SAP Database Update from <https://www.oracle.com/a/ocom/docs/ora4sap-dbupdate-5093030.pdf>

# Oracle Database for SAP

## Same benefits ...

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**Best Support for DB Consolidation**



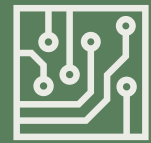
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**Best Database Security**



**Best Manageability & Self-Management**



**Best Integration of Hardware & Software**

... on Premise:



**Best Performance & Scalability**



**Best Deployment Flexibility**



**Best Availability & Reliability**



**Best Support for DB Consolidation**



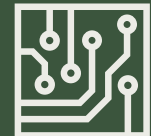
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**Best Database Security**



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