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Manage your public
cloud infrastructure



Understand the
value of IaaS



Lawrence Miller, CISSP

Oracle 3rd Special Edition

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Oracle Cloud is an enterprise cloud that delivers powerful compute and networking performance and a comprehensive portfolio of infrastructure and platform cloud services. Built from the ground up to meet the needs of mission-critical applications, Oracle Cloud supports all legacy workloads while delivering modern cloud development tools, so enterprises can bring forward their past as they build their future.

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Introduction

To succeed in today's competitive reality, businesses need to free themselves from the limitations of legacy IT infrastructure. The days of purchasing hardware and maintaining massive data centers to run IT must come to an end. Managing and maintaining your infrastructure is simply too expensive.

According to the “RightScale: 2019 State of the Cloud Report,” from Flexera, 31 percent of enterprises saw public cloud as their top priority and many companies are taking a balanced approach, with 28 percent prioritizing hybrid cloud and an additional 17 percent prioritizing public and private cloud equally. Utilizing an infrastructure with an elastic, pay-as-you-go service model not only reduces costs and worries, but also frees IT organizations to innovate in ways that will enhance business growth.

Foolish Assumptions

It has been said that most assumptions have outlived their usefulness, but I assume a couple things nonetheless:

- » You work as a CIO, CTO, SVP, VP, director, or enterprise architect, and you're responsible for some or all IT infrastructure components (such as compute,

storage, and networking) in an enterprise that has already adopted — or is currently developing — a cloud computing strategy.

- » You have some familiarity with popular public cloud offerings, such as Amazon Web Services (AWS) and Microsoft Azure, but you're less aware of Oracle's cloud and portfolio of enterprise solutions.

Icons Used in This Book

Throughout this book, I occasionally use icons to call out important information. Here's what to expect.



REMEMBER

This icon points out information you should commit to memory.



TECHNICAL
STUFF

This icon explains the jargon beneath the jargon.



TIP

This icon points out helpful suggestions and useful nuggets of information.

Beyond the Book

There's only so much I can cover in 64 short pages, so if you find yourself at the end of this book thinking, "Where can I learn more?," just go to www.oracle.com/cloud. There, you can learn more about IaaS and the Oracle Cloud Infrastructure. You can give IaaS a try at www.oracle.com/cloud/free.

IN THIS CHAPTER

- » Getting started with a few cloud definitions
- » Addressing enterprise workload requirements
- » Realizing cost and convenience benefits in IaaS
- » Discovering Oracle Cloud Infrastructure

Chapter 1

Challenges and Opportunities

In this chapter, you learn about the basics of IaaS and cloud computing, what defines an enterprise workload, and the value IaaS provides to businesses seeking to deliver more innovation and agility in their markets.

Defining Cloud Computing Fundamentals

The “cloud” has recently become a part of our modern IT lexicon, and there are many definitions and distinctions of different cloud deployment and service models. To try to cut down a bit on the *cloudwashing* (a term Gartner uses to refer to the marketing practice of adding the word *cloud* to practically any technology product or service), let’s keep it simple.

There are five essential characteristics of the cloud (as defined by the National Institute of Standards and Technology, or NIST):

- » On-demand self-service
- » Broad network access
- » Resource pooling
- » Rapid elasticity
- » Measured service

There are three basic cloud deployment models:

- » Public
- » Private
- » Hybrid

Finally, there are three basic cloud service models: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

A key difference between SaaS, PaaS, and IaaS is the level of control that the enterprise has in the cloud stack. The demarcation line for IaaS is typically at the operating system: The cloud provider manages the virtualization, servers, storage, networking, and data center, while the enterprise is responsible for configuring and maintaining software at the operating system layer and above, including middleware, runtime environments, data, and application software (see Figure 1-1).

Second-generation IaaS offerings extend customer control deeper into the cloud stack, with the option to manage virtualization, servers, and storage, while simultaneously offering higher levels of predictable performance, control, and security than first-generation IaaS platforms. Whereas first-generation IaaS offerings provide cloud-based virtual machines (VMs) in a multitenant environment (meaning several customers may share resources on the same server, while only being able to access the portion of the server that is allocated for their usage), second-generation IaaS offerings can additionally provide on-demand, single-tenant “bare metal” machines (each physical server is dedicated solely to one customer).



TIP

You learn more about second-generation IaaS offerings in Chapter 2.

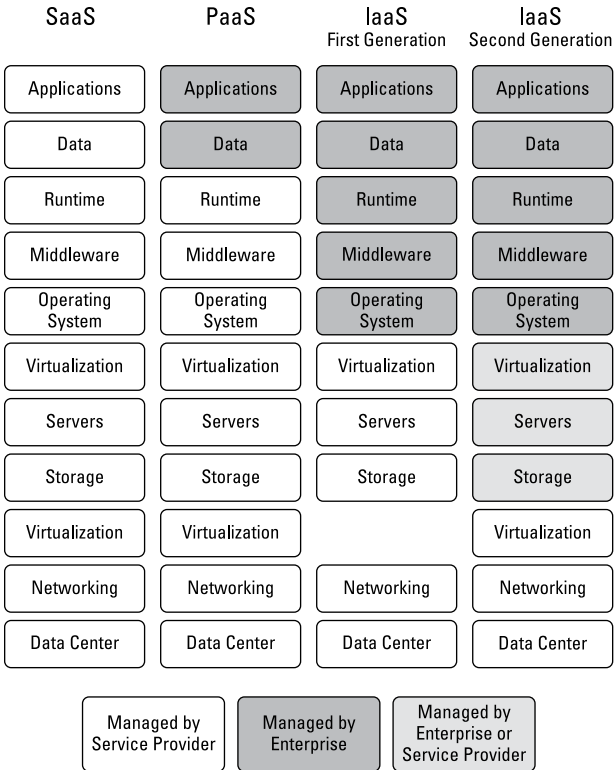


FIGURE 1-1: Different cloud service models provide different levels of control for the enterprise.

Characterizing the Enterprise Workload

Enterprise applications run the business. They range from core mission-critical systems to customer relationship management to social and mobile platforms, to name just a few. Every business is different, but at a very high level, common expectations for enterprise workloads in the cloud include the following:

- » **Elasticity and massive scalability:** No resource is infinite or unlimited, but a world-class cloud service provider has more available capacity than enterprises, so resource utilization can be perfectly balanced in the cloud, where you can automatically scale up, out, and down as needed (provided you've architected your applications appropriately).
- » **Predictability:** Enterprises are constantly tweaking infrastructure to provide consistent performance for their mission-critical applications. Though many first-generation IaaS cloud platforms don't offer this capability, it's key to successfully running enterprise workloads in the public cloud.
- » **High performance:** Enterprise applications typically require very low latency, high throughput, and high input/output operations per second (IOPS).

» **Open standards and workload/data portability:**

In the cloud, there are no industry standards governing things like application programming interfaces (APIs), management, and orchestration. Thus, some clouds are quite proprietary and you risk getting “locked in” with a single provider. Also, with some providers, although it’s relatively easy to move your applications and data to the cloud, moving them (or even the data they utilize) back can be very difficult if your cloud strategy or needs change.

» **Security and trustworthiness:** There are many layers to security in the cloud that need to be considered, and enterprises must feel confident that their workloads and data are secure.

» **Service-level agreements (SLAs):** SLAs vary widely in terms of the uptime and performance guarantees, as well as the remediation provided should an SLA violation occur.

Enterprises also expect to be able to extend their governance models to the public cloud. IT leaders have been managing on-premises environments for years. They require visibility into who is accessing which resources and when, and they’re accustomed to delegating permissions and granting access to resources. Systems of record and governance simply do not change overnight. Your cloud provider should offer the ability to extend

governance to the cloud natively with the following capabilities:

- » **Identity and access management (IAM):** Authorize who can perform specific actions on specific resources, with full control and visibility to centrally manage cloud resources.
- » **Role-based access controls (RBAC):** Different levels of controls for providing access to various types of infrastructure resources at the account, sub-account, or resource level.
- » **Resource visibility:** When IAM and RBAC are utilized and resources are logically defined, a unified view of permissions and security policies becomes available to IT administrators.
- » **Quotas:** Limit which resources are available and when, based on specific criteria defined by the organization.
- » **Showback/chargeback:** Audit trails allow infrastructure usage costs to be allocated to departments, business units, or individual users.
- » **Tagging:** Enables users to search, control access, and do bulk actions on a set of resources based on the tag. For example, you can add tags to describe the business organizations that are responsible for a resource.

Understanding the Value of IaaS in the Enterprise

The motivations for businesses to adopt IaaS are diverse, and can be broadly organized as follows:

- » **Reducing dependence on the corporate data center:** Moving centralized IT workloads off-premises and lowering or eliminating the need to manage facilities and infrastructure
- » **Using IaaS for specific initiatives:** Responding to line of business requests for on-demand infrastructure to support new application initiatives
- » **Developing cloud-native applications:** Developing and deploying new applications using native cloud infrastructure capabilities and more agile technologies like containers

IaaS provides increased speed and agility by offering on-demand, self-service access to compute, storage, and networking resources in the cloud. Developers and application owners can get access to infrastructure to run their applications in minutes, and the cloud provides resource elasticity to scale up and down, providing significant flexibility that isn't typically possible in an on-premises environment. IaaS can enable significant IT cost savings

by reducing hardware and data center management overhead while offering a pay-only-for-what-you-use pricing model. This is in contrast to procuring hardware for peak capacity requirements and paying for idle capacity that is underutilized during nonpeak times.

Introducing Oracle Cloud Infrastructure

Enterprises need a cloud environment that replicates their on-premises data center environment — whether for business applications, mission-critical databases on a dedicated cluster, or a fully integrated and managed solution — while also providing all the benefits of the public cloud.

Oracle Cloud Infrastructure (OCI) lets enterprises manage their cloud-based workloads in the same way they do their on-premises workloads, and many existing on-premises applications can be quickly migrated without making changes to the applications themselves.

In the Oracle Cloud, organizations get all the benefits of the cloud with the same control, isolation, security, and predictable performance as their on-premises data centers.

Oracle's IaaS offering includes the following types of services:

- » **Compute:** Whether a workload requires a single VM or demands the high performance, consistency, and isolation offered by bare-metal servers, Oracle offers a broad spectrum of cloud compute options. Oracle's compute options include VMs, bare-metal instances, and GPUs with bare-metal or VMs.
- » **Storage:** Secure and scalable cloud-based storage solutions ideal for storing and accessing data from any environment connected to the Internet. Offerings include local Non-Volatile Memory Express (NVMe) flash storage, network file storage, network block storage, object storage, archive storage, database backup storage, data transfer service, and even a software storage gateway.
- » **Network:** Any on-premises data center can be connected to OCI via VPN or FastConnect, allowing organizations to have a private, secure, high-bandwidth, dedicated link between their on-premises data center and the Oracle Cloud.

Oracle Cloud Infrastructure provides comprehensive networking and load balancing capabilities. Oracle's Virtual Cloud Network features enable organizations to deploy highly available, secure network topologies and match on-premises setups,

thus not having to rewrite networking specifications within applications.

- » **Edge and connectivity:** Oracle also provides network edge services such as DNS. To enable hybrid deployments, Oracle offers dedicated connectivity between Oracle cloud regions and on-premises data centers via FastConnect, and secure Internet connectivity via VPN services.
- » **Containers:** Oracle offers a production-grade environment to run container-based applications. Whether customers want to bring their own infrastructure or leverage Oracle's managed Kubernetes service, applications can benefit from the high-performance, highly available infrastructure.
- » **Autonomous Database:** Oracle Cloud Infrastructure's Autonomous Database is a fully managed, preconfigured database environment with two workload types available — Autonomous Transaction Processing and Autonomous Data Warehouse. You don't need to configure or manage any hardware or install any software. After provisioning, you can scale the number of CPU cores or the storage capacity of the database at any time without impacting availability or performance.



TIP

According to 451 Research, “There is now a strong public cloud option for almost every kind of application and computing workload. An entire generation of IT talent has now effectively grown up with the IaaS model.” Whether your business is already headed to the cloud or not, it’s a safe bet that your competition is!

IN THIS CHAPTER

- » Calculating compute choices
- » Weighing storage options
- » Selecting network services

Chapter 2

Exploring Oracle Cloud Infrastructure

In this chapter, you learn about the capabilities, features, and competitive differentiators of Oracle's IaaS offerings, called Oracle Cloud Infrastructure (OCI).

Oracle Cloud Infrastructure Compute

The Oracle Cloud offers a variety of compute options to suit your organization's needs with a resilient infrastructure service that provides rapidly provisioned virtual and bare-metal machines in multitenant and single-tenant configurations, respectively.



REMEMBER

In the cloud, a *single-tenant environment* is a host machine dedicated entirely to a single customer, whereas a *multitenant environment* is a host machine in a virtual machine model that often hosts multiple customers.

Many factors must be considered when determining which compute options are right for your organization's needs:

- » **Available CPU sizes:** How much processing power do your applications and workloads require?
- » **Available GPUs:** How much graphical processing power do your workloads require?
- » **Metered versus unmetered pricing:** Do you need a "pay-as-you-go" option or the option to pay for unlimited usage over a specific period?

- » **Single tenant or multitenant:** Do your security and compliance requirements necessitate infrastructure that is dedicated solely to your organization?
- » **Support for containers:** Are your developers actively writing next-generation applications utilizing Docker as their primary container?



TIP

The table at www.oracle.com/cloud/compute/pricing.html will help you match the best Compute Service options to your organization's needs, based on your answers to the preceding questions.

Oracle Cloud Infrastructure offers virtualized CPU instances with from 1 to 24 OCPU, memory from 8GB to 320GB, networking from 700 Mbps to 240 Gbps, and remote block storage or even 25.6TB of direct-attached NVMe flash storage.

For even higher performance, Oracle Cloud Infrastructure provides bare-metal instances from 36 to 64 OCPU, memory from 384GB to 768GB, networking from single 25 Gbps to dual 25 Gbps to 100 Gbps ultra-low-latency RDMA, and storage options including 51.2TB of NVMe flash storage.

For workloads that require them, Oracle Cloud Infrastructure also offers a range of GPUs in both virtualized and bare-metal configurations with a range of memory,

storage, and networking — even including the GPU-specific NVLINK.



TECHNICAL
STUFF

OCPU is defined as the CPU capacity equivalent of one physical core of an Intel Xeon processor with hyper threading enabled. For Intel Xeon processor each OCPU corresponds to two hardware execution threads, known as vCPUs.

I cover your Compute options in the following sections.

Oracle Cloud Infrastructure Compute

By moving the virtualization layer off the server and onto the network (referred to as “off-box virtualization”), bare-metal instances avoid the *hypervisor tax* (the performance degradation or overhead typically associated with virtualized compute infrastructure offered by first-generation cloud providers), thereby enabling extremely high levels of raw and consistent performance — comparable to dedicated on-premises servers.

Oracle provides two compute offerings for flexibility to run your most demanding workloads, as well as less performance-intensive applications, in a secure and highly available cloud environment:

- » **Bare-metal instances:** For I/O-intensive web applications (such as real-time analysis) or big data workloads (such as batch processing), bare-metal servers are an ideal match. Oracle provides a fully dedicated bare-metal server on a software-defined network, combining the power of bare-metal servers (physical servers assigned to only one customer) with a secure, isolated Virtual Cloud Network (VCN, described later in this chapter). Bare-metal servers provide extreme raw performance, including servers with the latest generation Non-Volatile Memory Express (NVMe) drives delivering stellar input/output per second (IOPS).
- » **Virtual machines:** For workloads that don't require dedicated physical servers or the extreme performance of bare metal, VM instances are offered in different sizes, supporting many common workloads. VMs are offered with local NVMe storage (with optional network block storage), or network block storage only.
- » **GPUs:** GPU compute, which are optimized for workloads like high-performance computing (HPC) and machine learning, are available as bare-metal instances or virtual machines. GPU compute is offered with different numbers of GPUs, different numbers of CPUs, and network block storage.



TIP

Choose bare-metal compute instances when single-tenancy is important and you need the highest performance and resilience for your production workloads.

Oracle Cloud Native Services

Cloud native technologies are characterized by the use of containers, microservices, serverless functions, development pipelines, infrastructure expressed as code, event-driven applications, and application programming interfaces (APIs). Cloud native enables faster software development and the ability to build applications that are resilient, manageable, observable, and dynamically scalable to global enterprise levels.

Oracle Container Engine for Kubernetes is a developer-friendly and enterprise-ready managed service that runs highly available Kubernetes clusters with the control, security, and performance of Oracle Cloud Infrastructure. And because the Container Engine uses standard, certified Kubernetes by the Cloud Native Computing Foundation, you're guaranteed portability across clouds and on-premises deployments.

Other Oracle Cloud Native Services include the following:

- » **Oracle Cloud Infrastructure Registry** allows you to store and share container images.

- »» **Oracle Cloud Infrastructure Resource Manager** can provision all Oracle Cloud Infrastructure resources with Terraform.
- »» **Oracle Cloud Infrastructure Streaming** platform makes it easy to collect and manage streaming data for applications such as Internet of Things (IoT), security, and so on.
- »» **Oracle Cloud Infrastructure Monitoring** services provide health, performance, and capacity metrics with dashboards and alerts.
- »» **Oracle Cloud Infrastructure Notifications** is a publish-subscribe system to send automated notifications via services such as email or PagerDuty.
- »» **Oracle Functions** are the next level of development abstraction after containers. Functions, which run in containers, are snippets of code that can be executed based on events and API calls. Oracle Functions are based off the open-source Fn Project. Oracle Functions leverages containers and provides hybrid and multi-cloud portability. Users pay only for the compute time of the functions and pay nothing when the functions aren't being used.
- »» **Oracle Cloud Infrastructure Events** enable users to react to changes in the state of Oracle Cloud Infrastructure resources, whether by system or

user actions. Events can trigger alerts or any specified functions.

- » **Oracle Cloud Infrastructure API Gateway** is a highly available managed gateway to create HTTP/S interfaces for other services.
- » **Oracle Cloud Infrastructure Logging** is a highly scalable single pane of glass for all of your logs. (Limited availability as of December 2019.)



TIP

Take advantage of the full suite of Cloud Native services when developing applications on Oracle Cloud Infrastructure.

Platform services

Combine OCI services with offerings like Database Cloud Service to provide integrated building blocks for enterprise applications. Services integrated into OCI include: Java Cloud Service (CS), DataHub CS, BigData (CE) CS, SOA CS, Integration CS, Analytics CS, GoldenGate CS, Application Container, Data Integration Platform, Autonomous Data Warehouse Cloud, and Visual Builder CS.

Migration Services

Oracle Cloud Infrastructure is developing new services to greatly simplify the process of moving on-premises databases to Oracle Cloud, including Application Migration

Service, Database Migration Service, Zero Downtime Migration Service, and Data Migration Service.

Oracle Cloud Infrastructure Storage

All organizations back up and archive their data. Oracle offers a wide spectrum of storage and database solutions designed to meet your specific data requirements. I cover your options in the following sections.

Local NVMe storage

NVMe flash drives provide the highest-performance storage, with millions of IOPS for compute instances in the Oracle Cloud. Local NVMe storage shapes are offered in 12.8TB and up to 51.2TB options.

Block Volumes

All-flash Block Volumes offer high-speed network storage capacity with seamless data protection and recovery. Network-attached Block Volumes deliver low latency and tens of thousands of IOPS per compute instance. Block volumes can scale up to 1PB per compute instance and offer consistent high-performance and scalable capacity as your data needs grow.



TIP

Oracle Database Cloud Service can be run on bare-metal compute with NVMe, or on VMs with network block storage.

File Storage

OCI File Storage is a fully managed, persistent shared file system. With just a few clicks, companies can create and mount a file system accessible by a handful, or thousands, of compute resources within a region. This service supports NFSv3 and most third-party on-premises appliances, offering a seamless way to manage files in the cloud.

Object Storage

Object Storage offers virtually unlimited amounts of capacity, automatically replicating and healing data across multiple fault domains for high durability and data integrity. Running on the same low-latency network as compute, the object storage service also provides a Hadoop Distributed File System (HDFS) interface for big data and data lake use cases.

Archive Storage

The OCI Archive Storage service provides cost-effective archive storage for infrequently accessed, large-scale data sets, long-term data retention, rich media content, and scientific research archives, with enterprise-grade

security, resilience, and elastic scalability. Elasticity and scalability are coupled with pay-as-you-go and subscription-based models, so you can choose to pay only for what you use or take advantage of reduced rates for longer commitments. You can monitor key storage metrics and manage users and roles using a web-based graphical console.

Data Transfer Appliance

OCI Data Transfer Appliance is a petabyte-scale offline data transfer service. You can now use an Oracle-branded, purpose-built storage appliance to cost-effectively and easily migrate your data to the cloud. Each transfer appliance supports migrating up to 150TB of data. To migrate petabyte-scale data sets, you can simply order multiple transfer appliances. And it's all free — Oracle even pays for the shipping.

Database Cloud Service

OCI's Database Cloud Service is optimized for Oracle Databases. Supported versions include 11g, 12c, 18c, and the recently announced Autonomous Data Warehouse. Databases can be run on bare-metal or virtual machines in real application cluster (RAC) configurations or on Exadata, where DBs can be deployed in multiple availability domains with Active Data Guard for high availability.

Autonomous Database Services

The Oracle Autonomous Database is the flagship of Oracle's complete data management services, which includes data integration, data management, and data analytics. With Autonomous Database, Oracle fully manages the life cycle; this automation allows customers to innovate more, pay less, and ensure that their data is more secure.

And, what makes it so innovative are these core attributes:

- » It's **self-driving**, which means it automatically provisions, secures, monitors, and tunes.
- » It's **self-securing**, automatically applying security patches with no downtime.
- » It's **self-repairing**, maximizing uptime and productivity with less than two and a half minutes of both planned *and* unplanned downtime a month.

So, how does it work? There are six key elements in the life cycle of a database that are absolutely unique to Oracle:

- » **Provisioning** to rapidly and easily create mission-critical databases.
- » **Security** for encrypting all data by default and managing privileges with Database Vault.

- » **Management**, which automates all infrastructure and database management. It patches all software online and diagnoses all problems using artificial intelligence (AI) and machine learning (ML).
- » **Protection** to recover from any failure without downtime.
- » **Scaling** to scale online for highest performance and lowest cost, enabling instant online elasticity and pay-per-use.
- » **Optimization**, where ML optimizes the database for each workload. It can optimize data formats, indexes for analytics, or online transactional processing (OLTP).

Database Backup Service

The OCI Oracle Database Backup Service is a reliable and scalable object storage solution and data protection service designed for the unique needs of Oracle Database customers. It provides direct, cost-effective integration with Oracle Recovery Manager (RMAN) so you can take advantage of cloud-based data protection with your current IT processes and staff.

Oracle Cloud Infrastructure Networking

Networking services provide organizations with connectivity *to* the cloud and *in* the cloud. In Chapter 3, you learn how to securely connect your organization to OCI with Oracle FastConnect and Oracle VPN. An Oracle Virtual Cloud Network (VCN) extends your IT infrastructure into the Oracle Cloud with highly customizable private networks. A VCN is a private network that you set up on OCI, with firewall rules and specific types of communication gateways that you choose. Within this network, you launch your virtual instances or access bare-metal (single-tenant) resources.

Just like a traditional data center network, a VCN provides complete control over your network environment. You can customize your VCNs to mirror your internal networks, or build new network topologies with granular control, including assigning your own private IP address space, creating subnets, creating route tables, and configuring stateful firewalls. A single tenant can have multiple VCNs, thereby providing grouping and isolation of related resources.

Key VCN features include the following:

- » **Customizable VCNs:** Fully configurable IP addresses, subnets, routing, and firewalls support

new or existing private networks for rapid flexibility and scalability.

- » **End-to-end security:** Multiple security layers, including packet encapsulation, in-flight encryption, and IPsec VPN connectivity.
- » **High performance:** A high-bandwidth, micro-second latency network enables high performance. Oracle's flat network design limits the number of "hops" (a hop occurs when network traffic traverses a device such as router or switch), which permits real-time application workload processing (such as batch jobs and applications requiring real-time querying).
- » **High availability:** Active and passive logical and physical network redundancy.



REMEMBER

Oracle's OCI Compute, Storage, and Network Service offerings provide customers with choice and flexibility to run their enterprise workloads in a scalable, fast, predictable, and resilient platform in the public cloud.

IN THIS CHAPTER

- » Looking at options for connecting to the cloud
- » Recognizing the need for a dedicated connection
- » Leveraging a virtual private network over the Internet

Chapter 3

Connecting to Oracle Cloud Infrastructure

Oracle Cloud Infrastructure (OCI) offers connectivity options with high-throughput, enterprise-grade security, and performance predictability, enabling your cloud workloads to deliver business results. In this chapter, you learn about your options for connecting your enterprise to the Oracle Cloud.

Enterprise Requirements for Connecting to the Cloud

When extending your enterprise workloads to the cloud, how you connect your on-premises environments to the cloud matters. The challenge for enterprises is to find a path to the cloud that meets current needs, preserves the usefulness and value of their existing investments, and provides options for the future. Technical challenges for connecting to the cloud include the following:

- » The Internet is shared, consistent bandwidth is unpredictable, and the Internet by itself does not provide security.
- » Applications that have consistent transaction requirements and/or need to transfer large volumes of data require higher sustained networking bandwidth than others.
- » High-transaction applications are sensitive to network latency, large volumes of data transfers, or communication require consistent bandwidth.

Enterprises are looking to cloud providers to offer access to computing resources that behave as if they're simply extensions of their own corporate data centers. In connecting on-premises data centers to cloud, two key considerations are data transfer speed and security. OCI offers solutions to meet both needs (see Figure 3-1):

- » **Oracle FastConnect** links your data center and the Oracle Cloud, using a direct, private connection (circuit) provided by a networking partner (network service provider or data center provider).
- » **Oracle VPN Connect** links your data center and the Oracle Cloud using your Internet connection by establishing an IPsec VPN (virtual private network) connection that links your data center and the Oracle Cloud, using an encrypted tunnel (IPsec) over the public Internet.

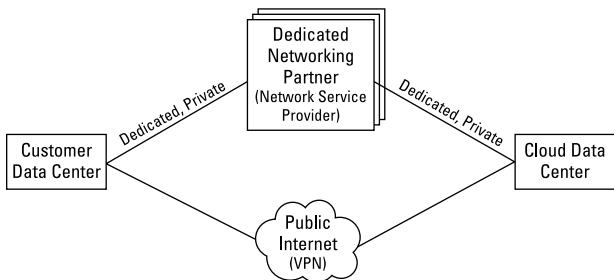


FIGURE 3-1: Two options for connecting on-premises to the cloud.



TIP

VPN solutions typically offer a lower-cost alternative, but a dedicated private network (FastConnect) is a better choice for businesses that transfer high volumes of data

over dedicated connections and require a consistent use of bandwidth. FastConnect does not traverse the public Internet.

Oracle FastConnect

Oracle FastConnect extends enterprise workloads via a dedicated connection between your data center and the Oracle Cloud. To set up FastConnect, you provision a private, dedicated circuit from your network service provider (such as AT&T, CenturyLink, Verizon, and others) to connect your locations and/or data centers to the Oracle Cloud.

The most common use cases for FastConnect (or any dedicated private circuit, for that matter) include the following:

- » **Bidirectional transfer of large volumes of data (batch jobs):** The unpredictable nature of the Internet often results in significantly lower batch job performance, or batch jobs not completing in time due to latency issues beyond your control. FastConnect overcomes this problem by moving traffic over a dedicated path, thus allowing batch processing to occur at the speed required by your applications.

- » **Applications that require consistent latency and network performance:** Many enterprise applications are very sensitive to latency and any variations in latency. Applications often time out when the underlying request made by the application fails to get a timely response, due to latency somewhere in the network. If your application requires real-time, or very near real-time, responsiveness you need a dedicated, private networking solution like FastConnect.
- » **Sensitive data transfers that can't traverse the public Internet:** If your data must never leave trusted boundaries, then a direct connection is needed. Although data can be encrypted over the Internet, it can still take unexpected hops (for example, to a router in a foreign country) on its way to its destination. A dedicated connection like FastConnect provides a direct, secure connection (with optional encryption for additional security) from one endpoint to the other.



TIP

Use a dedicated connection (like FastConnect) if you transfer large volumes of data over your network, have an application that requires consistent (and/or low) latency, or have sensitive data.

Key FastConnect features include the following:

- » **Multiple port speeds:** You can choose port speeds ranging from 100Mbps to 10Gbps, depending on your use case and the amount of data you expect to transfer on a monthly basis. Choose the option that corresponds to the amount of traffic your applications produce to maintain the optimal balance between cost and throughput.
- » **Standard Layer 3 routing:** FastConnect leverages industry-standard Border Gateway Protocol (BGP) routing to manage the exchange of data between the Oracle Cloud and your network. BGP offers many benefits, but perhaps the most important features are that it automatically finds the fastest route for your data to travel from one point to another, and it allows you to advertise routes across other provider networks so you can leverage two different network service providers (such as AT&T and Verizon) for network resilience.
- » **Redundancy:** FastConnect can be configured as a fully redundant service with two physical connections from your network edge to the Oracle Cloud Platform network edge for high availability.
- » **Cost:** Unlike other cloud providers with similar services to FastConnect, Oracle FastConnect does not charge additional fees for data ingress or egress.

FastConnect fees are based on port hour consumption.



TIP

Knowing how much data your application generates is imperative. There are lots of third-party software tools you can use to accurately measure and monitor the amount of data your applications generate. With Oracle FastConnect, you aren't charged for the amount of data transferred; instead, you pay only for the port speed you've chosen.

If your enterprise data center happens to be in one of the same data centers as the Oracle Cloud, FastConnect enables you to access and manage your Oracle Dedicated Compute Service as an extension of your private network. Oracle is continuing to expand its number of dedicated networking partners; today it has more than 50 different partners to choose from (see www.oracle.com/cloud/networking/fastconnect-providers.html for more).



REMEMBER

Some important factors that affect network latency include the distance between your data center and the Oracle Cloud, as well as the connectivity type. Cost is driven by the speed of your network service provider's circuit and the Oracle FastConnect port speed that you choose.

Oracle VPN Connect

A VPN creates an encrypted connection to another network over the Internet using the IP Security (IPSec) protocol. Benefits of a VPN include the following:

- » Lower cost than dedicated private connections
- » Ease of implementation
- » Flexible deployment to any location

However, there are some important drawbacks associated with VPNs that an enterprise must consider:

- » Variable bandwidth
- » Lower reliability (relies on the availability of the public Internet) than dedicated private connections
- » Higher latency (inherent on the public Internet) than dedicated private connections

Thus, VPN connections are appropriate for enterprises that have highly fluctuating data requirements, or relatively low data volumes.

Oracle offers a site-to-site IPSec VPN for enterprises to securely connect their data centers to the Oracle Cloud Platform. Oracle VPN Connect solution supports industry-standard encryption and authentication protocol

with IKEv2 and NAT-T. Key Oracle VPN for Compute features include the following:

- » **Data encryption:** 256-bit, 192-bit, and 128-bit Advanced Encryption Standard (AES) encryption is used to secure data between an enterprise's data center and the Oracle Cloud.
- » **Authentication Algorithm:** Hashing algorithms for phase 1 and phase 2.
- » **Configurable pre-shared key:** Symmetric key encryption using a pre-shared key enhances security and overall performance. Enterprises can manage and change their own keys. Additional key exchanges with support of Diffie-Hellman Groups 1, 2, 5, 14, 19, and 20.
- » **Multiple tunnels:** Enterprises can set up multiple tunnels within the Virtual Cloud Network (see Chapter 2). This can be useful if you need to isolate a specific network path for certain traffic. For example, you might define a private network tunnel for an application calling back to a database to gather specific customer data, and that tunnel is never accessible from the Internet.
- » **Configurable subnets:** Enterprises can configure a range of IP addresses for compute instances. This allows you to group virtual instances and/or create multiple groups of instances, all with predefined IP addresses.

- » **Built-in redundancy:** Enterprises can benefit from utilizing multiple VPN connections to ensure redundancy and availability.
- » **Dynamic and static routing options with BGP support for dynamic routing.**
- » **Third-party hardware VPN support:** Oracle VPN supports many of the third-party VPN solutions that enterprises often deploy.



REMEMBER

There are two primary methods for extending your workloads to the Oracle Cloud. You can utilize a direct private, dedicated connection (Oracle FastConnect), or you can choose to route encrypted traffic over a VPN (Oracle VPN). When you're connected to the Oracle Cloud, you can leverage Oracle Virtual Cloud Network (VCN, discussed in Chapter 2) to customize your private network and the extremely high performance, predictability, and availability of Oracle's flat network design (see Chapter 5).

IN THIS CHAPTER

- » Leveraging high performance in the cloud
- » Keeping your archives in the cloud
- » Working with cloud-native applications
- » Taking your on-premises data center to the cloud
- » Looking at lift and shift use cases

Chapter 4

Examining IaaS Use Cases and Success Stories

In this chapter, you learn about common IaaS use cases and how customers are using Oracle Cloud Infrastructure (OCI) to address real-world challenges and achieve their strategic goals.

Lifting and Shifting Oracle Applications to the Cloud

Lifting and shifting refers to moving a workload (virtual machine or application) from an on-premises data center to the cloud. Many companies find that lifting and shifting existing workloads to the cloud enables IT to be more responsive to the business.

MARITZ

Maritz is a privately held holdings company that has been in business for over 100 years. It operates three major business units, as well as several smaller ones, all specializing in offering sales and marketing services to Fortune 100 companies.

Challenges

Maritz's on-premises applications supported critical back-office operations that were running on aging Sun Microsystems hardware. The hardware was over nine years old, and as the business grew, it struggled to keep up with the ever-growing workloads. What's more, the infrastructure had grown so complicated that executing failovers for disaster recovery (DR) was

now overly cumbersome, often taking 72 hours to complete a failover.

Solutions

Within a nine-month period, Maritz and its implementation partner, Keste, migrated sandbox, dev/test, production, and disaster recovery environments for E-Business Suite and an additional 25+ applications running on an Oracle back end to Oracle Cloud Infrastructure.

Results

- Ten times improvement in performance
- Concurrent financial processes that used to take two hours are now completed in ten minutes
- Reduced DR window from 72 hours to 4 hours
- Enhanced security posture with all data encrypted at rest

“The story with Oracle Cloud Infrastructure is that it’s better, cheaper, and faster than what we had on-premises,” explains Ron Hunsaker, VP of Enterprise Application Services. “We’re seeing jobs that used to take a couple hours to run getting completed in minutes now on Oracle Cloud Infrastructure.”

ALLIANCE DATA SYSTEMS

Alliance Data Systems is a publicly traded loyalty and marketing services company headquartered in Plano, Texas. It operates three lines of business:

- Alliance Data Card Services, which manages credit card programs for retail brands such as Pottery Barn and Walgreens
- LoyaltyOne, which offers loyalty marketing programs
- Epsilon, which provides a broad range of marketing services

Challenges

Alliance Data Systems's IT team faced a challenge that is common among modern businesses: renewing their current data center agreement or moving to the cloud. After a thorough investigation, they realized that it was no longer strategic to maintain their own hardware, and they no longer wanted to struggle with capacity planning.

Solutions

Alliance Data Systems considered multiple cloud vendors, including Amazon Web Services (AWS). It compared each vendor's offerings, cost, and the ability to keep its enterprise systems secure and available. However, it also knew from experience that its business had greatly benefited from the performance, scalability, and reliability of its Exadata database platform, and leaving that platform was risky and could affect the service it delivered to its customers. In the end, Alliance Data Systems decided that migrating to Oracle Cloud Infrastructure was the best path forward. Its experience had proven time and time again that its database portfolio runs best on Exadata, and only Oracle Cloud Infrastructure offered the same Exadata platform.

Results

- One million dollars in overall savings in the first year.
- Running Hyperion was half the cost of the competing cloud.

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- Exceptional support for Oracle applications.
- Unmatched database performance with Exadata.
- Consolidated three on-premises Exadata Quarter racks to two in the cloud.
- Mission-critical systems addressing compliance needs in the public cloud.

“Oracle and LTI (Larsen & Toubro Infotech) were with us every step of the way during the migration,” said Suresh Tripathi, Director of IT, Software Engineering at Alliance Data Systems. “Originally, we were only going to migrate PeopleSoft, but we later decided to move all our Oracle Applications. We had many sessions with Oracle to look at each application and compared all different deployment options. This is the best support I’ve ever seen.”

Utilizing High-Performance Computing

Some of the most difficult workloads to successfully execute in the public cloud are those that require massive amounts of dedicated computing power (CPU cycles).

Often “noisy neighbors” in a multitenant environment will limit the amount of CPU an application can use. OCI offers single-tenant, “bare-metal” options where servers are dedicated entirely to one customer and, thus, CPU cycles are never compromised. You can even utilize ultra-high-performance graphics processing units (GPUs) for specialized HPC applications.

ZENOTECH

Zenotech delivers innovative, high-performance computing (HPC) cloud-based solutions for computational fluid dynamics, such as the simulation of airflow over airplane wings and water flow around bridge structures.

Challenges

Zenotech is always on the lookout for new computing resources that offer more performance, flexibility, or security. Running on shared infrastructure raises issues such as data security and ensuring that “noisy neighbors” don’t impact performance and cost. Some customers require special platform characteristics that Zenotech could not fill in traditional cloud offerings with virtualized infrastructure.

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Solutions

Oracle Cloud Infrastructure virtual machine and bare-metal compute instances provide Zenotech with very large memory nodes, suitable for the generation of computational fluid dynamics (CFD) meshes, connected on a predictable low-latency network. Zenotech is currently scaling up to 30 Oracle Cloud Infrastructure bare-metal compute instances, each with 36 cores and 356GB of RAM. In the future, Zenotech is exploring moving product development and more internal HPC projects to OCI, which will make use of new capabilities such as Nvidia P100 GPUs and Kubernetes support.

Results

During the proof-of-concept phase, Zenotech ran its xCFD benchmark with NASA Common Research Model (CRM) data to test performance in a standardized test. With 1,296 cores across three availability domains, it achieved 76 percent of the theoretical maximum efficiency — a similar performance to the University of Cambridge Darwin HPC Cluster.

“Performance has been fantastic,” said Mike Turner, Product Lead at Zenotech. “Our benchmarks illustrate the cloud solution can perform as well as specialized HPC systems. Oracle is investing in some of the latest hardware available anywhere in the world. By working with Oracle, the tools we offer our customers run with performance that rivals specialist HPC clusters.”

Building and Deploying Cloud Native Apps

Many businesses are turning to the public cloud to support Agile application development methodologies and DevOps environments. IaaS provides development teams with the most control of infrastructure in the public cloud, without requiring extensive hardware knowledge, and rapid, self-service provisioning with “pay-only-for-what-you-use” subscription-based pricing enabled DevOps environments.

AGROSCOUT

AgroScout developed the first “self-service” AI app for the early discovery of pests and diseases in agriculture by relying purely on user-generated content and user-owned drones. The process of detecting disease and pests in crops involves uploading images collected by drones into a web/mobile app. Using AI algorithms, AgroScout then identifies those parts of the field that are affected so that appropriate pesticides can be applied. This reduces the use of pesticides, thereby reducing costs and improving quality of fruits and vegetables.

Challenges

AgroScout previously used another major cloud vendor but that vendor didn't offer the expertise and capability that AgroScout needed. In addition, the AI environment was scaling rapidly and on-premises servers were inefficient and inadequate.

Solutions

Leverage Oracle Cloud for AI and aerial imaging technologies that proactively detect and eliminate crop disease.

Results

AgroScout has seen significant improvements in

- **Performance:** The speed of downloading images, of which there are thousands, has been reduced from minutes to a few seconds. Tagging, viewing, and working with images are much faster, which improves the overall user experience.
- **Agility:** Oracle Cloud systems engineers and technology have made the process of committing code, building, and delivering new releases automatic. Prior manual processes would take at least a day and included no capability for notifications. AgroScout personnel now gets notified right away on their cellphones and can fix bugs much faster.

Previously AgroScout ran as a monolithic Heroku PaaS on AWS. As part of the transition to OCI, AgroScout decoupled its services and containerized each one. With Oracle Cloud, AgroScout can scale dynamically based on its demand. It expects to have tens of thousands of users in the next two to five years.

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According to AgroScout CEO Simcha Shore, “The users before had challenges even working with our software. Oracle helped us address major issues on cloud native, containers, and DevOps. Deployment time has reduced from 24 hours to minutes and development velocity has increased by 5X.”

Running Custom Apps on OCI

Many businesses are turning to the public cloud to deliver large-scale, high-performance services to their customers. Oracle Cloud Infrastructure combines the performance and control of bare-metal instances and industry-leading storage and networking with the scale and flexibility of the cloud, allowing these businesses to deliver performance-intensive services to customers around the world.

CISCO TETRATION

Cisco Tetration offers application workload security for multicloud data centers by enabling a Zero Trust model using micro-segmentation, identifying workload behavior anomalies, and reducing the attack surface. The Cisco Tetration platform uses workload and network telemetry data to perform advanced analytics using an algorithmic approach (machine learning and behavioral analysis) and provides comprehensive workload protection for a multicloud data center.

Challenges

Cisco wanted to deliver its Tetration technology as a cloud service, and it built out its first offering on a traditional multi-tenant cloud offering. Unfortunately, the high performance demands of its application were a bad fit in a multi-tenant, highly virtualized cloud. Its CPU utilization was very low, noisy neighbors impacted CPU and network performance, and its data access times were inconsistent due to random VM placement

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(AI needs to be close to the data). Cisco found that it kept having to spin up additional VMs to get the performance it needed. That led to very high cloud infrastructure costs, which it had to pass on to its customers.

Solutions

With Oracle Cloud Infrastructure, Cisco could place the images on bare metal. It could orchestrate everything itself and have complete control. No noisy neighbors, no VMs, data right next to the CPU. Each Cisco Tetration cluster is 36 physical machines, with 1.8PB of storage. There are now 40 clusters, and Cisco is continuing to ramp up. The first instance was brought up and went live in two months.

Results

- CPU utilization went up from 5 percent or 10 percent to 75 percent.
- Sixty times application performance improvement over other clouds.
- Two and a half times performance compared to on-premises.

- Higher CPU utilization lowered the cost structure, allowing Cisco to open up its offering to smaller businesses at lower price points.
- No noisy neighbors means consistent performance. Cisco can now provide performance service-level agreements (SLAs) to its customers.

According to Navindra Yada, head of Tetration Engineering and Cisco Fellow, “I asked my engineer team, ‘Are we running all our tests right?’ We were seeing 75 percent CPU utilization and 60 times — not 60 percent but 60 times — performance over our other cloud offerings.”

MCAFEE

McAfee and Oracle have jointly announced a joint partnership in delivering the new cloud-native McAfee Enterprise Security Manager (ESM) leveraging the Oracle Cloud Infrastructure. Security information and event management (SIEM) is the foundation of an effective security framework. McAfee Enterprise Security

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Manager, the core of the McAfee SIEM solution, delivers performance, actionable intelligence, and solution integration at the speed and scale required for security organizations. It allows you to quickly prioritize, investigate, and respond to hidden threats and meet compliance requirements.

Challenges

- Managing security infrastructure with an ever-increasing volume of security events from mounting numbers of data sources.
- Cyberattacks increasing in volume and sophistication.
- More mission-critical workloads and sensitive data residing in the cloud.
- Traditional cloud offerings can't provide the performance and scale to support hundreds of thousands of sources or ingest 150,000+ events per second.
- Traditional cloud offerings can't provide McAfee with the control and visibility of the infrastructure required to maintain the performance and security of the SIEM offering.

Solutions

- McAfee SIEM deployed on Oracle Cloud Infrastructure bare-metal instances.
- Record-breaking events per second ingest performance.
- Real-time visibility.
- Advanced threat intelligence.

Results

- Huge cost savings compared to on-premises or other public cloud solutions — one-quarter the cost of other cloud offerings.
- Record-breaking performance, regardless of initial topology — up to 500,000 events per second across 600,000 data sources.
- Decreased time of implementation — just 3 days on OCI compared to 35 to 40 days on-premises.

According to McAfee CEO Chris Young, “During our evaluation discussion, the team asked for our requirements and how we could jointly build a cloud-scale solution. We were blunt and stated that we need a next-generation infrastructure that must scale. We were amazed when we had a proof of concept running in a matter of weeks showing over 165,000 events per second.”

IN THIS CHAPTER

- » Delivering performance and predictability
- » Leveraging an open and flexible cloud platform
- » Ensuring visibility and control
- » Optimizing for Oracle applications and databases
- » Choosing a complete solution

Chapter 5

Ten Advantages of Oracle Cloud Infrastructure

In this chapter, I describe ten key advantages of the Oracle Cloud Infrastructure (OCI) that enable organizations to migrate and extend their enterprise workloads to the public cloud.

Performance

Application performance is often characterized by latency, input/output operations per second (IOPS), and throughput. Different applications and architectures require different levels of each — at the right cost point. First-generation clouds are primarily hypervisor based and biased toward scale-out applications, thus forcing compromises when attempting to run more traditional scale-up applications, and often requiring a substantial level of rearchitecting or replatforming.

Enterprise back-office applications, high-performance computing (HPC), transactional database applications, real-time analytics, and many other applications require a level of peak performance and predictability that is unavailable in first-generation cloud providers. These cloud providers offer hypervisor-based compute options that are prone to noisy neighbors. OCI is purpose-built to achieve and sustain millions of transactions per second within a single compute instance at a significantly superior price per transaction. Consistent high performance means customers can run mission-critical applications with confidence, and run new high-performance applications they can't run anywhere else.



TIP

OCI is built on servers with local storage providing a cumulative total of more than 5.5 million read and 2 million write IOPS per bare-metal instance.

Predictability

Enterprises have spent many years tuning their on-premises environments to meet the exacting standards of predictability and reliability that their most critical applications require. Unfortunately, early adopters of the public cloud have had to give up much of that hard-earned experience, particularly for traditional scale-up application architectures.

But you don't have to sacrifice predictability to take advantage of the public cloud. Oracle offers the benefits of on-demand access, self-service, and scalability, with the dependability of dedicated resources. Oracle has built a next-generation cloud environment to provide each tenant with compute, storage, and networking capabilities that deliver predictable performance that often matches or exceeds enterprise on-premises environments.

Availability

Oracle is built on an enterprise-grade, fault-tolerant infrastructure that provides high availability with cross-availability-domain replication and recovery. Users first select what region of the world they want to have their workload hosted within — for example, the Western United States. After they've chosen the region, there are multiple data centers — known as *availability domains* (ADs) — within each region in which cloud workloads

can be deployed. Each availability domain is connected by a high-speed network backbone.

This approach to providing worldwide infrastructure availability provides the highest levels of failure protection and availability for the most demanding cloud applications that Oracle Cloud customers deploy and operate.



REMEMBER

Applications are becoming more complex and more distributed, thus elevating your business's need to run on a high-performance, fault-tolerant platform.

Each resource within an AD is connected by a flat network design that minimizes the number of hops, reducing the latency between compute and storage nodes and offering highly consistent performance (see Figure 5-1). Low-latency, high-bandwidth network connections include 25 gigabit per second (Gbps) links between hosts in an AD with less than 100 microsecond (μ s) latency.

Oracle ADs are stand-alone structures, each with its own independent and redundant power and cooling systems. At least three ADs, located within approximately 20 to 25 miles of each other, are interconnected with a low-latency network to make up a single cloud computing region.

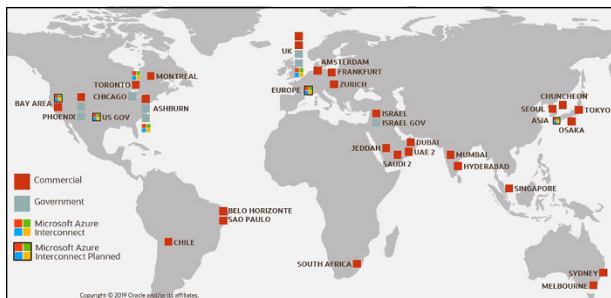


FIGURE 5-1: OCI — regions and availability domains (www.oracle.com/cloud/data-regions.html).



TIP

A good example of how Oracle’s AD architecture can help deliver fault tolerance is databases. ADs provide a fault-tolerant foundation for traditional active/passive and active/active availability configurations (for example, Oracle Dataguard for Oracle Database).

Openness

Customers are choosing a variety of technology approaches to meet their needs, often with open-source technologies or custom applications. Oracle’s approach to the cloud gives customers the flexibility to run a broad array of applications natively on its infrastructure. Whether it’s other types of databases like Apache Cassandra, big data frameworks like Hadoop, or container

orchestration technologies like Kubernetes, OCI has demonstrated the capability to run these technologies natively, with superior performance to other cloud providers. Oracle is a Platinum member of the Cloud Native Computing Foundation (CNCF), which oversees several projects. The CNCF states that “cloud native technologies enable software developers to build great products faster.” This support of upstream open source, along with the support of a range of programming languages, middleware, major operating systems (OSes), and even hypervisors, demonstrates Oracle’s commitment to solving customer problems while limiting lock-in and the associated overhead.

Versatility

Oracle offers the most versatility in the public cloud, allowing companies to run traditional and cloud-native workloads on the same platform, reducing operational overhead and costs, and enabling connectivity and shared data between these workloads.

Oracle provides the broadest variety of deployment options from a single vendor in market today — bare-metal servers, virtual machines, graphics processing units (GPUs), Autonomous Database, Oracle RAC, Exadata, cloud-native technologies, even high-performance computing with high-performance cluster networks.

Visibility

First-generation cloud providers offered services targeted to cloud-native applications or pilot projects where flexibility and scalability were top of mind and the “customer” was as likely to be an individual developer as a senior IT professional.

Instead of designing its cloud for individual users, Oracle started with complex organizations in mind, and implemented the logical tools to make resources easier to segregate, provision, monitor, and audit. For example, compartments enable customers to assign access policies, usage quotas, and budget, on a per-project or group basis. IT administrators can manage multiple environments via a single policy and gain visibility into who is consuming what resources. Usage is rolled up under a single account structure, so IT doesn't have to aggregate dozens or hundreds of accounts.

Control

Some enterprises choose to run their workloads within their own data centers to meet business, legislative, and regulatory reasons. For example, some companies and government agencies must keep their application development and data processing behind corporate firewalls to comply with security mandates or abide by data governance and compliance regulations.

To serve enterprises looking for the cloud's agility, automation, extensibility, and portability, in an on-premises environment under their control, Oracle Database Cloud Exadata Service at Customer places the same hardware, software, and operational services available in Oracle's public cloud directly into enterprise data centers.

Oracle Database Cloud Exadata at Customer is a tightly integrated service designed from the ground up to deliver the world's most advanced database by combining the world's number-one database technology and Exadata, the most powerful database platform, with the simplicity, agility, and elasticity of a cloud-based deployment. But this offering resides completely within an organization's data center and is fully managed by Oracle.

In addition, Oracle supports a range of bare-metal instances, giving customers exceptional isolation, visibility, and control of their applications. Or if choosing to run in virtual machines, the VM instances run on the same type of servers as bare-metal instances. OCI VMs leverage the same cloud-optimized hardware, firmware, software stack, and networking infrastructure to deliver unrivaled performance and strong isolation. You can also run your VM instances on a dedicated VM host, a physical server dedicated to your organization, which provides the same isolation benefits of bare-metal compute instances, but for your VM compute instances.

Oracle Cloud Infrastructure Virtual Cloud Network (VCN) is a customizable and private network. As with your on-premises network, you have complete control. This includes assigning your own private IP address space, creating subnets and route tables, and configuring stateful firewalls.



REMEMBER

Oracle Database Cloud Exadata at Customer makes Oracle's Exadata offerings available to enterprises in an on-premises environment, in a subscription model.

Management

Moving to the cloud can also mean changes to the tools and processes you use to manage and maintain your IT infrastructure. There's a good chance you're currently managing both legacy systems and cloud-based assets.

Oracle Cloud Management and Governance Services eliminate the human effort associated with traditional solutions for monitoring, managing, and governing applications and infrastructure. Customers can leverage different combinations of these services against the full breadth of the operational data set as appropriate for managing on-premises environments, Oracle Cloud environments, hybrid cloud environments, and multi-cloud environments.



REMEMBER

Oracle Cloud Management's unified platform helps enterprises improve IT stability, prevent application outages, increase agility, and harden security across their entire application and infrastructure portfolio, both on premises and in the cloud.

Scalability

One of the key advantages of the public cloud is massive on-demand scalability. OCI provides enterprises with scale-up and scale-out compute and storage capacity for their most demanding workloads and applications. Customers pay only for what they use, and can scale down and in when their compute and storage needs change.

ADs (discussed in the “Availability” section) are also excellent for scale-out availability configurations that often require odd numbers of sites for quorums. (A *quorum* is the minimum number of votes that a distributed transaction must obtain to be allowed to perform an operation in a distributed system.) Object (file) storage nodes are automatically and seamlessly replicated across three fault-independent ADs per region. Finally, each AD accommodates up to a million servers with on-demand elasticity and scalability to meet enterprise demands.

Optimized for Oracle Applications and Databases

OCI has a number of unique features and tools that are geared to migrate and/or run Oracle's databases and business applications portfolio with unmatched scalability and reliability. Minimal architecture changes, coupled with automated migration tools, reduce the cost and length of time required to migrate to the cloud.

Proven technologies like Oracle Real Application Clusters (RAC) and Oracle Exadata are supported, retaining best practices and offering the same levels of confidence often experienced on-premises. Furthermore, the latest hardware and technologies are available, improving database and application performance and results.



TIP

Go to <https://cloud.oracle.com/tryit> to experience the Oracle Cloud Platform for free.

Notes

Notes

ORACLE CUSTOMERS SHARE THEIR IaaS EXPERIENCES

“We don’t need that much hardware all the time, so it would never have been cost-effective to purchase it all. When we started exploring Oracle’s cloud, everything just worked — it was easy to get our Java 8 streaming API and Ubuntu environment up and running in minutes. We started in March, and by June we demonstrated the live solution running in real-time, displaying spacecraft trajectories to the audience, selecting and modifying them from a tablet.”

—Sean M Phillips, Principal Software Engineer, A.I Solutions

“ICAT is in the catastrophe insurance business, so we’re very sensitive to risk and business continuity. We’ve run our mission-critical policy administration application on-premises with Oracle Database for years, but keeping up with business growth was a challenge. The Oracle Database Cloud Service on bare metal exceeded our performance requirements and made a move to the Oracle Cloud feasible. The ability to quickly scale up processing power, as well as leverage Oracle RAC in the cloud, gives us great confidence that we will be able to offer our customers the service and reliability necessary with our new cloud-based system.”

—Mike Ferber, CIO, ICAT

“Oracle Cloud took a burden off our shoulders—our tech infrastructure is finally totally secure, not vulnerable to unexpected events. With Oracle IaaS, our enterprise resource planning system became more agile and efficient, and we saved 35% of costs for a physical tech infrastructure upgrade.”

—Cecilia Bengozi, IT Manager, Isapa

“Having a strong partnership with Oracle is very important, because we sometimes hit limits in our work that Oracle helps us to overcome.”

—Frédéric Hemmer, IT Department Head, CERN

“With the support of Oracle Cloud Infrastructure, we are accelerating our ability to meet our complex regulatory and compliance requirements to satisfy our global donor base.”

—Madhu Deshmukh, Senior Director, Care USA

“By accessing the power of Oracle Cloud Infrastructure we have been able to render in half the time that we have been able to see with other providers.”

—Simon Ponsford, Chief Technical Officer, Yellowdog

Run enterprise workloads on the Oracle Cloud® Infrastructure

To succeed in today's competitive markets, enterprises need to free themselves from the traditional IT infrastructure shackles that hinder business agility and growth. Infrastructure as a Service (IaaS) provides exactly this — on-demand access to IT infrastructure resources in the public cloud. Oracle Cloud Infrastructure offers a scalable, resilient, next-generation infrastructure, purpose-built for running enterprise workloads. *IaaS For Dummies* explains how Oracle offers an unmatched breadth of computing options to suit your needs.

Inside...

- Find out more about IaaS and how it can benefit your business
- Consider common IaaS use cases and real-world business successes
- Discover the benefits of Oracle IaaS and how it is different from the rest

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