ORACLE

Hyperion EPM on Oracle Cloud Infrastructure

Validated Solution Guide

Version 1.01

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Due to the nature of the product architecture, it may not be possible to safely include all features described in this document without risking significant destabilization of the code.

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SOLUTION OVERVIEW

For over 20 years, Hyperion customers have been reaping the benefits of a mature market-leading product portfolio to solve specific performance management challenges, spanning strategic and financial planning, and consolidation, close and reporting needs. You may have considered moving to the cloud but may have felt you are not ready to move to SaaS. Oracle has a validated cloud solution for you.

This guide was created based on prior experience successfully migrating customer environments. It addresses the key implementation concerns, technical requirements, and existing business challenges that must be addressed as part of the migration. Additionally, it summarizes the supporting cloud services, third-party integrations, and deployment practices that can best align with your application environment and requirements. It provides reference architectures across several use cases that have been validated by prior successful deployments.

Audience

This guide is appropriate for any company that has an on-premises Hyperion deployment and is considering one of the following actions:

- Migrating their deployment to leverage the dynamic nature of cloud to enhance the agility of their business and increase their price-versus-performance efficiency
- Extending their deployment into the cloud

It's also appropriate for customers who already have Hyperion deployments in the cloud and want to increase price-performance or are interested in a multi-cloud strategy.

If you're reading this, your organization is probably already using Hyperion. Your solution might have been customized to fit your exact needs and might be deeply integrated with other applications and frameworks. Therefore, it might not make sense to start from scratch, re-architect, and retrain employees with a new platform as a service (PaaS) or software as a service (SaaS) solution. The flexibility to accommodate everything you already do with Hyperion is the strength of using an infrastructure as a service (IaaS) solution. With Oracle Cloud Infrastructure, you have granular control over your Hyperion EPM environment and can use the same software, licenses, and training that your staff and end users use today. In addition, only Oracle offers consistent high performance at guaranteed service levels.

Top-Level Value Proposition

Most on-premises Hyperion deployments can be migrated to run on Oracle Cloud Infrastructure without requiring significant configuration, integration, or process changes. The resulting implementation will be more flexible and more reliable, perform better, and cost less than on-premises or other cloud deployments.

Oracle has a validated solution to accomplish these goals, quickly and reliably. This solution includes procedures, supporting Oracle Cloud Infrastructure platform services, and reference architectures. These consider real production needs, like security, network configuration, high availability (HA), disaster recovery (DR), identity integration, and cost management.

- 39% lower total cost of ownership (TCO) than on-premises deployments and 17% lower TCO than AWS
- Managing and reducing CAPEX, and ensuring that the data centers you maintain are efficient, while eliminating server hardware, and taking advantage of cloud flexibility where possible
- Rapid in-place technology refresh and patching
- Proactive monitoring of usage and costs
- Near-instant scaling up or down to handle business growth or workload bursts
- Federated identity with your existing systems
- Rapid deployment that leverages Terraform templates, to deploy a Hyperion cluster in minutes instead of days

TCO Analysis

Beyond the benefits of being straightforward to migrate, easier to manage, and more flexible to scale, running Hyperion on Oracle Cloud Infrastructure is cheaper than running it on premises or in another cloud.

No two Hyperionl implementations look alike. However, the estimated TCO of this solution can be 39% less than running Hyperion on premises and 17% less than running on AWS, based on the following assumptions:

- Four environments: two for development, testing, and QA, and two for production
- Five servers: two per development, testing, and QA environment, and three servers per production environment
- Oracle Cloud Infrastructure deployment with 80 Standard and 16 EPYC cores per environment, 1.55 TB of block storage, 1-Gbps FastConnect connection, 5 TB object storage and backups, 500 GB outbound data transfer, and a 25% cloud discount
- On-premises deployment with 10 separate servers (these can be consolidated into fewer servers on-premises if you want) with 96 total cores ranging from 4 to 16 per server, RAM from 32 GB to 240 GB, 2.325 TB SAN storage, 5 TB backups
- Cloud deployment on AWS with the same resources as Oracle Cloud Infrastructure, I3en and R5 1-year no-upfront reserved instances for production, on-demand for rest, 7% EA discount

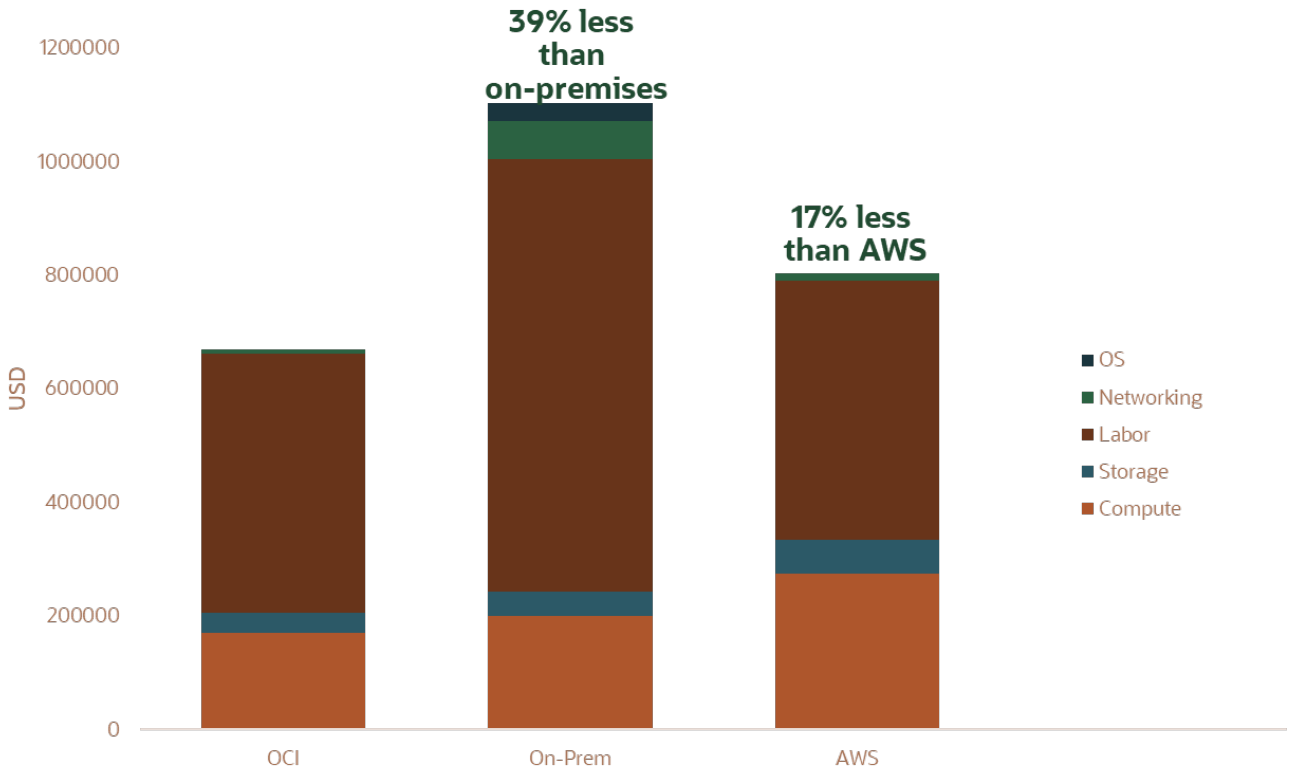

Figure 1: *TCO Analysis Comparing On-Premises, AWS, and Oracle Cloud*

Infrastructure and Tools

Oracle Cloud Infrastructure was designed to support workloads like Hyperion. Oracle Cloud Infrastructure delivers higher-performance compute, storage, networking, and managed database instances that result in a better experience for your users at a lower cost of operation. Oracle Cloud Infrastructure is the only cloud where you can run Hyperion with Oracle RAC or Exadata. Other clouds are limited to less robust configurations.

Oracle provides Hyperion-specific tooling and automation to streamline deployment, migration, upgrading, and maintenance of your implementation, reducing the time, expertise, risk, and cost of migration and day-to-day operations.

- Hyperion Terraform Templates: Terraform, or open-source infrastructure as code, allows users to quickly and easily deploy Hyperion on Microsoft Windows servers in Oracle Cloud Infrastructure. For convenience, stack templates will be made available within the Oracle Cloud Infrastructure Console without the need to get Terraform scripts from GitHub.

- Cross-Cloud Option Between Oracle Cloud Infrastructure and Microsoft Azure: Customers can migrate and run mission-critical enterprise workloads across Microsoft Azure and Oracle Cloud Infrastructure. Customer's on-premises network is directly connected to Oracle Cloud Infrastructure through FastConnect and to Azure through ExpressRoute, and there's a direct interconnection between the two clouds. Users located in the on-premises network can access Hyperion applications (web tier and app tier) directly within Azure through ExpressRoute. The applications then access the data tier located in Oracle Cloud Infrastructure. Azure and Oracle Cloud Infrastructure offer customers a one-stop shop for all the cloud services and applications that they need to run their entire business.

Proven Customer Success

Alliance Data Systems, a leading loyalty and marketing services company, has been a long-time Oracle customer. They leverage Oracle PeopleSoft to manage human resources for all 20,000 employees as well as the company's financials, including Order to Cash, Record to Report, and financial reporting. Oracle also enables Alliance Data Systems critical insight into the future with Oracle Hyperion Planning and Oracle Business Intelligence Enterprise Edition (OBIEE) for forecasting, planning and reporting. These applications, as well as their development environments, are trusted to run on Exadata; enabling maximum uptime and availability.

Alliance Data Systems realized that it was no longer strategic to maintain their own hardware, and they no longer wanted to struggle with capacity planning. The decision was made to move their enterprise applications and reporting to the cloud. After considering multiple cloud vendors, in the end, Alliance Data Systems decided that migrating to Oracle Cloud Infrastructure was the best path forward. Their experience had proven time and time again that their database portfolio runs best on Exadata, and only Oracle Cloud Infrastructure offered them the same Exadata platform.

Moving to Oracle Cloud Infrastructure enabled the customer to achieve the following goals:

- Unmatched database performance with Exadata
- $1M in overall savings in first year
- Half the cost to run Hyperion versus with competing cloud
- Consolidated three on-premises Exadata Quarter racks to two in the cloud
- Larsen & Toubro Infotech partner tools reduced turnaround time by 40%, through auto-provisioning of application environments, and trimmed the time to cloud readiness by 60% without impacting business operations

The following diagram represents the customer's Hyperion deployment in Oracle Cloud Infrastructure:

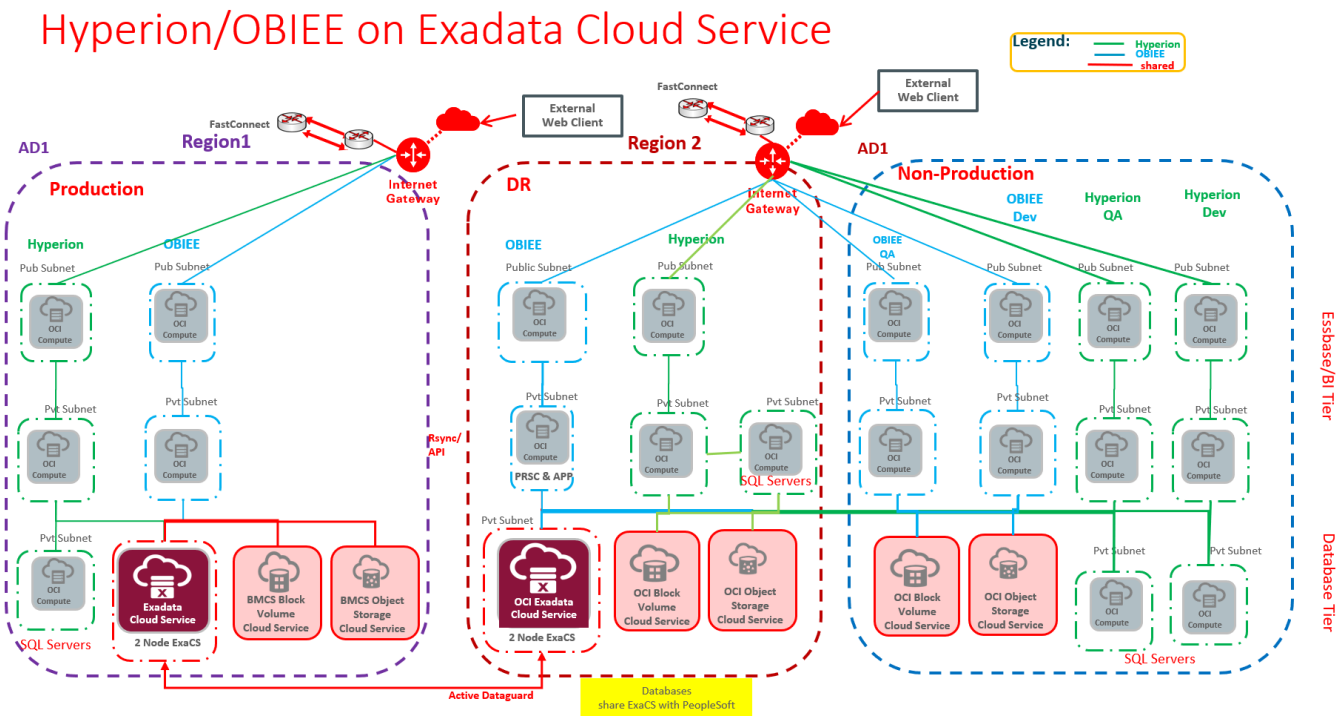

Figure 2: *Customer's Hyperion Deployment on Oracle Cloud Infrastructure*

Validated Solutions That Address Your Business Requirements

Because Oracle Cloud Infrastructure was built for the usage patterns of enterprise production applications, existing Hyperion deployments can be easily moved to—and even improved in—Oracle Cloud Infrastructure. Oracle provides architectural patterns that meet all your networking, connectivity, performance, HA, DR, and multiple-region requirements. In fact, most customers find that the performance of Hyperion on Oracle Cloud Infrastructure exceeds the performance of their on-premises deployments.

In this Validated Solution Guide, Oracle provides a baseline architecture that takes best advantage of Oracle Cloud Infrastructure capabilities and addresses most of the important technical and business requirements. This allows you to be confident that you will be successful in achieving your deployment objectives without investing in a long analysis project.

Oracle has also developed Terraform templates for rapid deployment and configuration of Hyperion on Oracle Cloud Infrastructure. These templates reduce the complexity and time to provision Hyperion on Oracle Cloud Infrastructure, resulting in frameworks that customers can customize and leverage to streamline Hyperion migrations or deployments.

CONSIDERATIONS FOR MOVING TO THE CLOUD

Your strategy for moving your on-premises Hyperion EPM to the cloud depends on your environment, customized configurations, and the applications that use your data sources. For any special requirements that are not covered by this reference architecture, other design choices are possible. We expect that the design process for any changes is easier when starting from a reference architecture.

Many customers who run Hyperion have similar questions when exploring a migration to the cloud:

- How do we deploy, or migrate, Hyperion to the cloud?
- How do we secure Hyperion in the cloud?
- How do we implement HA and DR for Hyperion in the cloud?
- How do we achieve similar performance for Hyperion deployments in the cloud compared to on-premises?
- How do we track and manage our costs while deploying multiple environments?

This section provides Oracle Cloud Infrastructure's answers to these questions.

Deployment on Oracle Cloud Infrastructure

When you subscribe to Oracle's infrastructure as a service (IaaS), you have access to all the compute, storage, and network services associated with it. Deployments on Oracle Cloud Infrastructure are just like on-premises deployments, in that the same versions and features are available for each Hyperion distribution.

Terraform and Resource Manager

Oracle Cloud Infrastructure engineering teams have enabled deployment that leverages Terraform. Terraform allows you to deploy infrastructure as code (IaC), and this includes all aspects of a Hyperion ecosystem, from networking (virtual cloud networks, subnets, VNICs) and security access control lists, to compute and storage provisioning. Terraform is flexible, highly scalable, and a standard among many cloud providers. For more information, see the Appendix.

You can choose whether to use these templates as a framework for deploying Hyperion on Oracle Cloud Infrastructure, or you can stay with existing deployment tooling that you used on-premises. Both methods are valid.

If you want to use Terraform to deploy Hyperion, consider using Oracle Resource Manager. Following are the key benefits of using Resource Manager:

- Terraform state metadata is kept in a highly available location.
- Access to Resource Manager can be managed with the same security and audit tooling included for other Oracle Cloud Infrastructure services.
- Resource Manager removes the complexity associated with configuring Terraform for deployment on Oracle Cloud Infrastructure.

The Resource Manager interface supports YAML-based schema files populated with expected values for stack variables. This lets you define the shapes, software versions, and other parameters that are allowed for each variable in the stack.

After the schema file is populated, values are shown in an easy-to-use UI. The schema file lets you have drop-down lists with these values, as well as custom entry fields where users can type or paste input.

Fields in the schema file can also have dependencies, so that if a user chooses a value in one field, other fields are shown or hidden based on that choice.

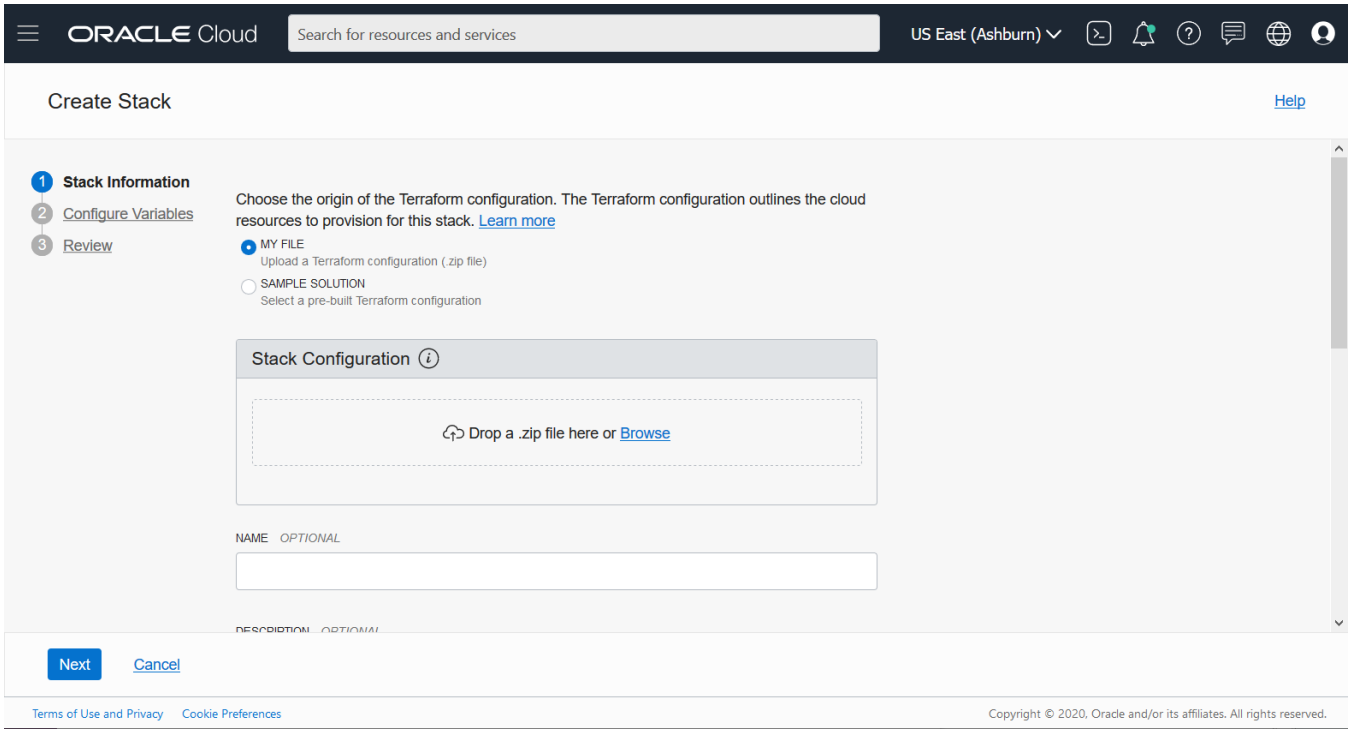

***Figure 3**: Resource Manager UI*

Migrating Hyperion to Oracle Cloud Infrastructure

Customers face multiple reasons to move to a cloud computing environment, business agility, high efficiency, scalability, and availability that the pooling of elastic computing resources provides, along with significant cost reductions and support for business growth. The question remains; "What is the correct solution for my environment?" Customers that take advantage of deploying their solutions on Oracle Cloud Infrastructure gain a huge benefit from the fact that they have now have access to Oracle's entire technology stack in the cloud, just as they did in on-premises deployments and more. Understanding "How do I move data, metadata, and configuration with minimum risk?" is a key question for Oracle to answer for its customers.

Migrating Oracle Databases is a critical component of all application migrations. Oracle Cloud offers the most complete Oracle Database deployment options – the right cloud database for every use case. The deployment options span from managed databases on cost effective VMs, to dedicated 'bare-metal', to engineered Exadata systems for maximum performance and consolidation, and autonomous transactional and analytics database systems for fully autonomous operation, dynamic scalability.

Selecting the correct migration method is dependent on several factors; source platform, DB vendor and version and OS along with current version of Hyperion. Important is an understanding of the current or source hardware performance characteristics as compared to the new Oracle Cloud Infrastructure platform architecture for sizing. Additionally, there can be multi-step upgrades process required prior to the actual migration.

Once an understanding of the full environment is made, there are several options available for migration:

- **Oracle Data Pump - Offline Migration:** Easiest way to migrate, if updates can be stopped during the migration process. The benefits of this approach are that it is simple to use and understand, and you can move databases from the broadest range of sources to the broadest range of targets. The source database is halted from receiving transactions from applications. An exact copy from on premises is created to the target database. After the migration, the applications must be redirected to the target (new) database so they can go live again.
- **Zero Downtime Migration (ZDM) - Online Migration:** Easiest way to migrate, if applications need to continue operating during the migration. A cloud-replica of the on premises (source) database is created while continuing to run applications and accept transactions. Once the source and target are in sync, the applications are switched to the new cloud-based database, without ever having to interrupt the operations of the applications. ZDM leverages Oracle Maximum Availability Architecture (MAA) technologies such as Oracle Active Data Guard and Oracle Golden Gate to minimize or eliminate downtime during migrations. This option has more restrictions about which sources can be migrated to which targets.
- **Other Migration Tools:** There are many additional database migration tools for other specific use cases. There are also Oracle consulting and partner migration resources available to migrate your databases to OCI from on-premises or other cloud providers

Security Considerations

Security in the cloud is especially important for Hyperion, and there are many ways to ensure that your deployment on Oracle Cloud Infrastructure remains secure. First consider some Oracle Cloud Infrastructure-specific security controls:

- Leverage Identity and Access Management (IAM) to control who has access to cloud resources, what type of access a group of users has, and to which specific resources. This architecture can provide the following outcomes:
    - Securely isolate cloud resources based on organizational structure
    - Authenticate users to access cloud services via a browser interface, REST API, SDK, or CLI
    - Authorize groups of users to perform actions on appropriate cloud resources
    - Federation with existing identity providers
    - Enable a managed service provider (MSP) or systems integrator (SI) to manage infrastructure assets while still allowing your operators to access resources
    - Authorize application instances to make API calls against cloud services
- Audit security lists for all networks in the virtual cloud network (VCN). Make these rules as restrictive as possible and allow only trusted traffic into internet-facing subnets.
- Enable host firewalls on internet-facing hosts and allow only necessary traffic.
- Consider using security auditing regularly.

For additional reference links, see the Appendix.

Network Security

Because of the open nature of Hyperion and security considerations, most customers prefer to deploy their Hyperion cluster in a private subnet. Access to cluster services is then available only by using edge nodes, load balancing access to UIs, APIs, and service dashboards, or by direct access through FastConnect VPN or SSH tunneling through an edge proxy.

Public subnets augment the cluster deployment for edge nodes and utility nodes, which run internet-facing services (like Cloudera Manager or Ambari). This is entirely optional. You can choose to leverage FastConnect VPN and run your entire deployment as an extension of your on-premises network topology. That requires only a customer-routable private IP segment, which is associated at the VCN level and then split into appropriate subnets in Oracle Cloud Infrastructure. Access is controlled using security lists, which apply at the subnet level. The best practice is to group resources that have similar access requirements into the same subnets.

SUBNET TOPOLOGY

The VCN covers a single, contiguous IPv4 CIDR block of your choice. Inside the VCN, individual IPv4 subnets can be deployed for cluster hosts. Access into each subnet is controlled by security lists. Additional security is controlled at the host level by firewalls.

The best practice is to segregate Hyperion cluster resources into a private subnet that is not directly accessible from the internet. Access to the cluster should be controlled through additional hosts in public-facing subnets and secured using appropriate security list rules to govern traffic between the public and private network segments. This model provides the best security for your Hyperion cluster.

- Public subnets can be used for edge nodes (user access) and for any services that need to expose a UI or API for external access.
- Private subnets should be used for cluster hosts (master, worker) and are not directly accessible from the internet. Instead, these require an intermediary host in a public subnet for access, a load balancer, or direct access via VPN, FastConnect, or SSH proxy.

SECURITY LISTS

Security lists control ingress and egress traffic at the subnet level. For Hyperion, it's best to have full unrestricted bi-directional access between subnets with cluster hosts for both TCP and UDP traffic. Public subnets should have highly restrictive security lists to allow only trusted ports (and even source IP addresses) for access to APIs and UIs.

FastConnect

Oracle Cloud Infrastructure has direct connectivity options for customers who want to directly connect their on-premises infrastructure to an Oracle Cloud Infrastructure region. For more information, see the FastConnect documentation.

The proximity of the customer data center to an Oracle Cloud Infrastructure region, and the capabilities of the supported Oracle/third-party provider, determines the speed and latency for FastConnect.

If FastConnect is an option for you, it's possible to deploy Hyperion in only private network segments and isolate cluster access to FastConnect network segments. This eliminates internet exposure and essentially extends your data center directly into Oracle Cloud Infrastructure. This option is attractive for customers with strict governance requirements.

High Availability

Oracle Cloud Infrastructure's resiliency and high availability (HA) architecture builds a secure, reliable, and resilient application topology for Hyperion EPM and its backend datasets in the cloud.

Select a Region

Oracle Cloud Infrastructure services are offered globally in multiple independent geographic areas, called regions. Each region in Oracle Cloud Infrastructure consists of one or more availability domains, each of which is an isolated data center. Each availability domain also consists of three fault domains, which enable you to distribute compute instances across isolated server hardware. For details, see Regions and Availability Domains in the documentation.

Choose a home region that is close to you and your business resources (like your data center). The composition of the region that you choose determines whether you can use a single-availability-domain deployment or a multiple-availability-domain deployment.

SINGLE-AVAILABILITY-DOMAIN DEPLOYMENT

Single-availability-domain deployment is recommended for Hyperion deployments on Oracle Cloud Infrastructure. This deployment model is the most performant from a network perspective because intracluster traffic is contained to local network segments, which maintains low latency and high throughput. Resources in the availability domain are striped between fault domains to achieve HA of physical infrastructure.

A fault domain is a grouping of hardware and infrastructure within an availability domain. Each availability domain contains three fault domains. Fault domains let you distribute your instances so that they aren't on the same physical hardware within a single availability domain. A hardware failure or compute hardware maintenance that affects one fault domain doesn't affect instances in other fault domains.

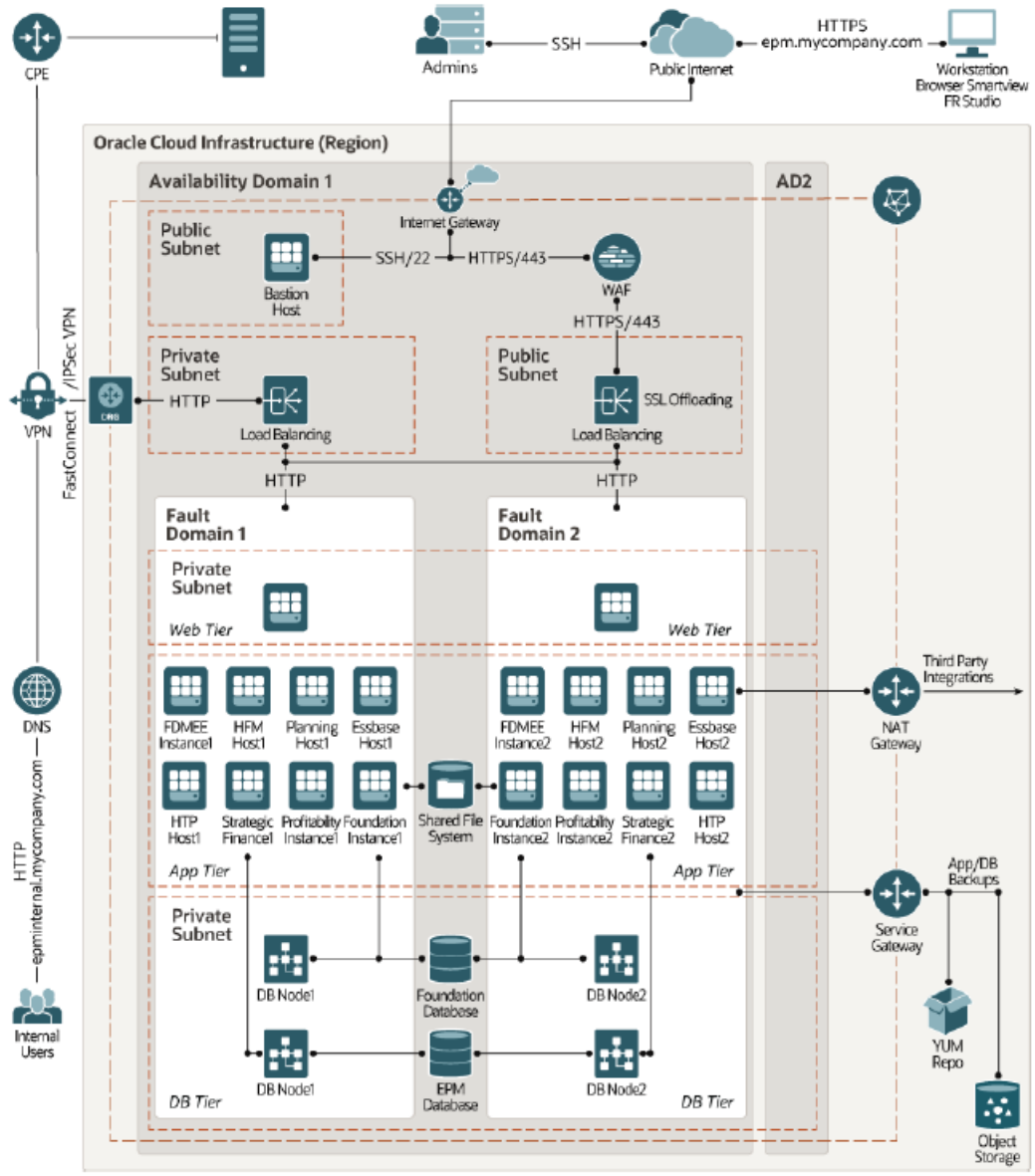

***Figure 4**: Single-Availability-Domain Deployment*

MULTIPLE-AVAILABILITY-DOMAIN DEPLOYMENT

In this architecture, the web tier, application tier, and database tier are deployed in an availability domain that's designated as the primary (active) environment. A passive replica of the topology is deployed as a standby (non-active) environment in another availability domain in the same region.

The physical resources in each availability domain are isolated from the other availability domain in the region, and the availability domains don't share infrastructure. If an outage occurs in one availability domain, the application instances in the other availability domain can take over the workload. The availability domains within a region are interconnected using a high-bandwidth network, which enables efficient cross- availability domain replication.

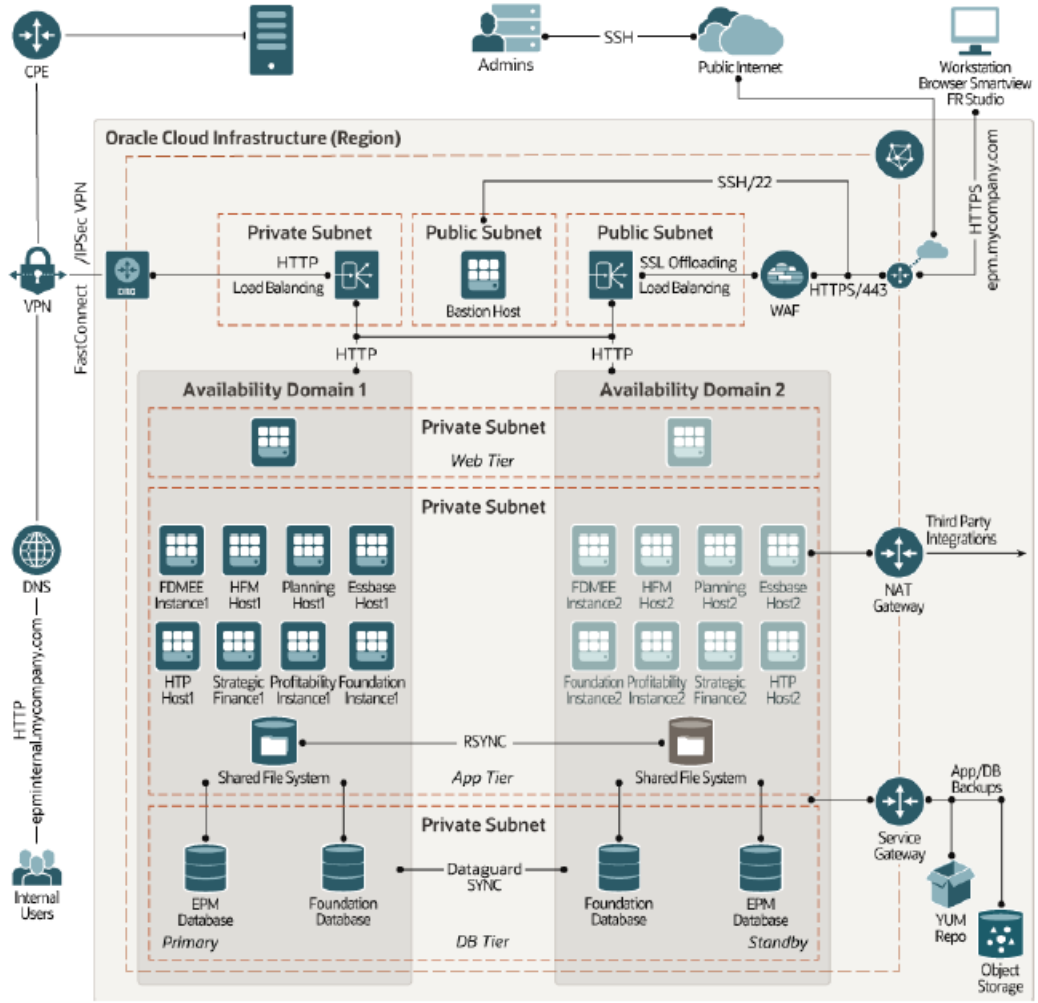

***Figure 5**: Multiple-Availability-Domain Deployment*

Disaster Recovery

Disaster recovery (DR) in Oracle Cloud Infrastructure depends directly on your Recovery Point Objective (RPO) and Recovery Time Objective (RTO) requirements. If either the RPO or the RTO is near real-time, then your only option for Hyperion is to create a DR cluster in another availability domain or region, and then replicate data between the production and DR clusters.

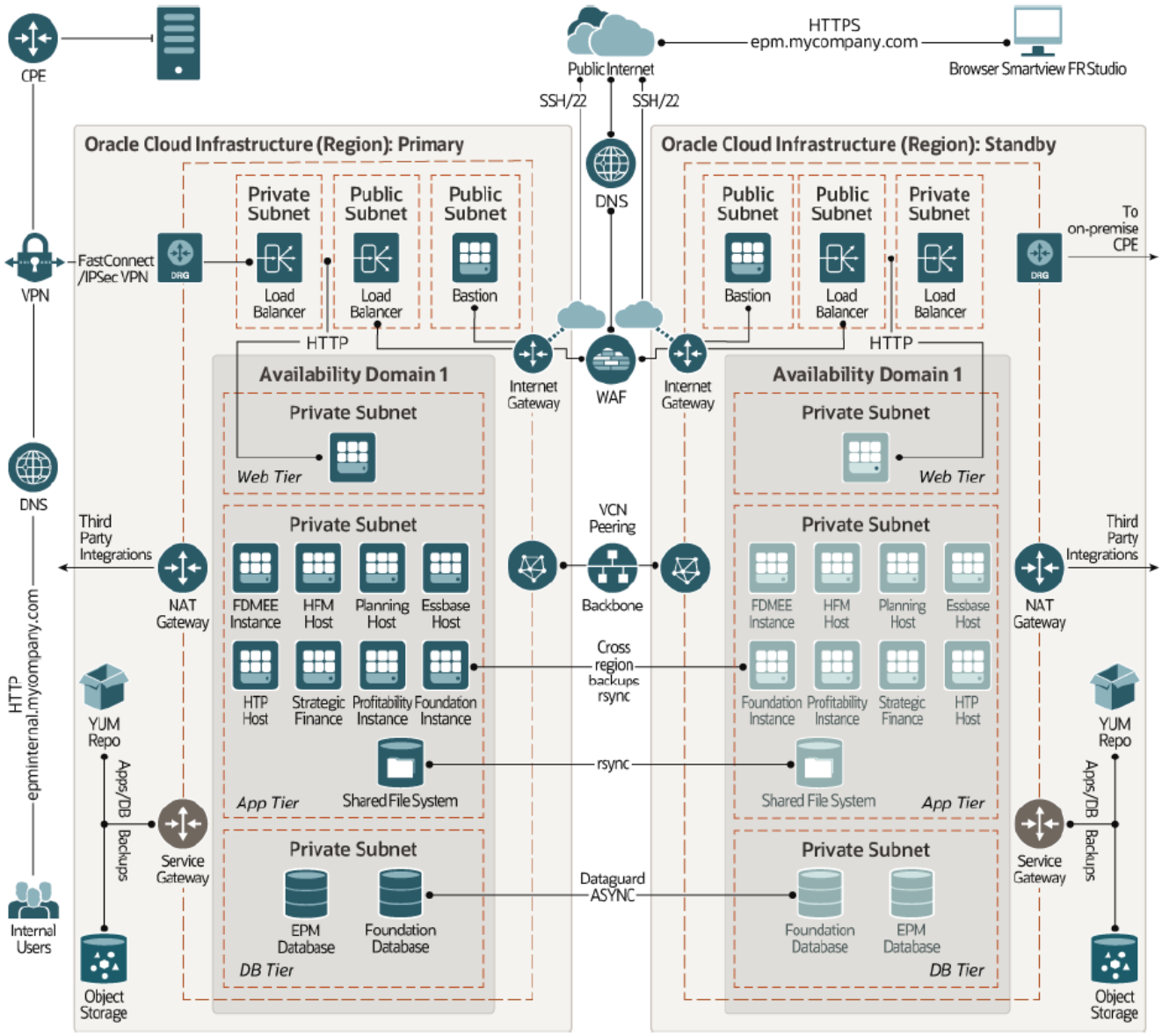

***Figure 6**: Multi-Region DR Architecture*

If your DR requirements specify georedundancy for data that a single region can't provide, you can also copy data in Object Storage between regions. If a disaster occurs, consider using Terraform to quickly provision resources in another availability domain (either in the same region or a different region) and rehydrate the DR cluster from data in Object Storage.

Performance Considerations

Oracle Cloud Infrastructure provides different form factors of compute solutions. The optimal compute solution for a system can vary based on application design, usage patterns, and configuration settings. Select a compute configuration that results in optimal performance and cost.

Oracle Cloud Infrastructure Compute provides bare metal and virtual machine (VM) compute capacity that delivers performance, flexibility, and control without compromise. It's powered by Oracle's next generation, internet-scale infrastructure, designed to help you develop and run your most demanding applications and workloads in the cloud.

- Oracle Cloud Infrastructure Compute Bare Metal:
  A Bare Metal compute instance gives you dedicated physical server access for highest performance and strong isolation.
- Oracle Cloud Infrastructure Compute Virtual Machine:
  A virtual machine (VM) is an independent computing environment that runs on top of physical bare metal hardware. The virtualization makes it possible to run multiple VMs that are isolated from each other. VMs are ideal for running applications that do not require the performance and resources (CPU, memory, network bandwidth, storage) of an entire physical machine.

Compute Instance Selection

Oracle Cloud Infrastructure Compute instances are available in different shapes. A shape is a template that determines the number of CPUs, amount of memory, and other resources allocated to a newly created instance.

- Standard Shapes
  Designed for general purpose workloads and suitable for a wide range of applications and use cases. Standard shapes provide a balance of cores, memory, and network resources. Standard shapes are available with Intel or AMD processors.
- Dense I/O Shapes
  Designed for large databases, big data workloads, and applications that require high-performance local storage. DenseIO shapes include locally-attached NVMe-based SSDs.
- GPU Shapes
  Designed for hardware-accelerated workloads. GPU shapes include Intel CPUs and NVIDIA graphics processors.
- HPC Shapes
  Designed for high-performance computing workloads that require high frequency processor cores and cluster networking for massively parallel HPC workloads.

The following shapes are available for bare metal instances: Standard, Dense I/O, GPU, and HPC.

The following shapes are available for Virtual Machines: Standard, Dense I/O, and GPU.

Network Considerations

The primary objective for the networking and connectivity architecture is to provide secure, high-speed connectivity between your cloud resources and any users and systems that need to access those resources.

When running Hyperion on Oracle Cloud Infrastructure, the networking and connectivity architecture meets these objectives:

- Access from corporate campuses to the application through private network links
- Encrypted links over the public internet (optionally, you can deploy FastConnect for dedicated private connectivity to your deployment in Oracle Cloud Infrastructure)
- Public internet endpoints
- Private network connectivity to other systems or services hosted on Oracle Cloud Infrastructure
- Network-level isolation between application tiers
- Monitoring and management access to all application and database tiers
- Load balancing across multiple application nodes for performance and availability
- Isolation from other customers and your other workloads
- Low network latency in remote data centers

Evaluate your application and understand how network-related decisions impact its performance. Understand the available networking products and how they can impact network performance. Measure the impact of these features through testing, metrics, and analysis.

- Compute Shapes:
  A shape is a template that determines the number of CPUs, amount of memory, and other resources allocated to a newly created instance. Each compute shape has a pre-defined maximum network bandwidth. Understand and choose your compute shapes based upon the required network throughput.
- Service Gateway:
  A service gateway lets your virtual cloud network (VCN) privately access specific Oracle services without exposing the data to the public internet. No internet gateway or NAT is required to reach those specific services. The resources in the VCN can be in a private subnet and use only private IP addresses. The traffic from the VCN to the Oracle service travels over the Oracle network fabric and never traverses the internet.
- FastConnect:
  A dedicated connectivity to your on-premises data center. If you require reliable consistent network performance, choose FastConnect over VPN solutions.

Storage Considerations

Identify the storage performance metrics and different characteristics (for example, the file size, access patterns, latency, throughput, and persistence of data) that matter for your workload, and implement a data-driven approach, using benchmarking or load testing. Use this data to identify where your storage solution is constrained and examine configuration options that could address this.

Available storage options:

- Oracle Cloud Infrastructure Local NVMe disks:
  Some instance shapes in Oracle Cloud Infrastructure include locally attached NVMe devices. These devices provide extremely low latency, high performance block storage. These devices are not protected in any way by Oracle Cloud Infrastructure; they are individual devices locally installed on your instance. It is your responsibility to protect and manage the durability the data on these devices.
- Oracle Cloud Infrastructure Block Volumes:
  This service lets you dynamically provision and manage block storage volumes. All volumes have built-in durability and run on redundant hardware within a single AD. It provides integrated features to back up your data to Object Storage. The backups can be used for business continuity and disaster recovery.
- Oracle Cloud Infrastructure File Storage:
  This service provides a durable, scalable, secure, enterprise-grade network file system. It is a shared file system. Data is replicated for durability within each availability domain.
- Oracle Cloud Infrastructure Object Storage:
  This service provides a highly durable and available (across multiple ADs in a multi-AD region and across multiple FDs in a one-AD region), internet scale and high-performance storage for your unstructured data. There are two tiers available based upon the frequency of accessing data (Standard and archive data tiers).

OBJECT STORAGE

Oracle Cloud Infrastructure offers two distinct storage class tiers to address the need for both performant, frequently accessed "hot" storage, and less frequently accessed "cold" storage. Storage tiers help you maximize performance where appropriate and minimize costs where possible.

- Use Object Storage for data to which you need fast, immediate, and frequent access. Data accessibility and performance justifies a higher price to store data in the Object Storage tier.
- Use Archive Storage for data to which you seldom or rarely access, but that must be retained and preserved for long periods of time. The cost efficiency of the Archive Storage tier offsets the long lead time required to access the data.

DATA TIERING

Data might not always fall neatly or permanently into the hot and cold categories. Data that starts its lifecycle being hot (needing to be accessed frequently or quickly) can decrease in demand as it ages (and be suitable for archival cold storage). At some point, it might make sense to purge data to keep storage costs in check. Actively managing data placement across its lifecycle can significantly reduce overall storage costs.

Oracle Cloud Infrastructure's Object Lifecycle Management functionality lets you define a lifecycle policy on a bucket, letting you control how objects stored in a bucket will be automatically managed for you over time. You can create up to 1000 distinct rules for each bucket that govern the lifecycle management of your objects. Object Lifecycle Management offers two types of rules: those that archive your objects for you, and those that delete your objects for you. With the first, Object Storage changes the storage tier of an object from standard Object Storage to Archive Storage based on the object's age in days. Rules that delete objects work in the same way, except that your specified data is deleted after it ages beyond a specified number of days. You can define rules that apply to all objects stored in the bucket, or rules that operate on only on a subset of objects that contain a specified object name prefix pattern.

You can combine all the preceding storage options when you use Hyperion, Cloudera, or Hortonworks to create a robust data tiering (heterogenous) storage model. You can also use data lifecycle management to push data from one storage tier to another as data ages, to optimize HDFS storage costs.

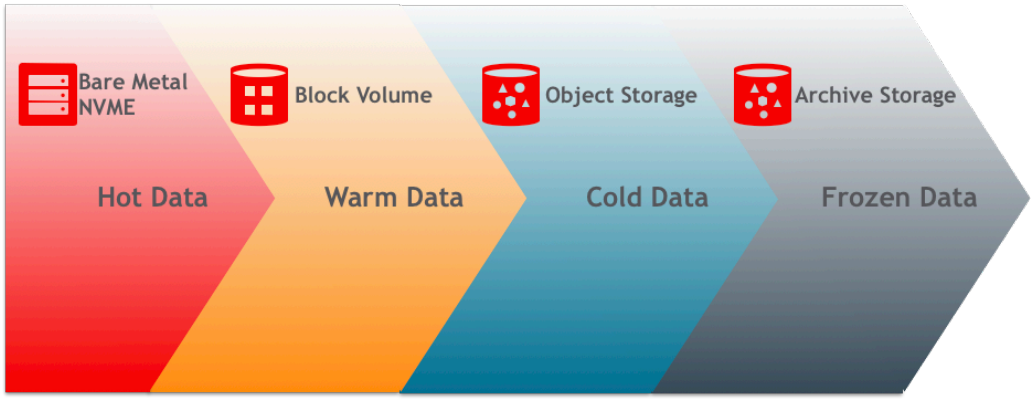

Figure 7: *Data Lifecycle Management*

Monitoring Performance

The Oracle Cloud Infrastructure Monitoring service lets you actively and passively monitor your cloud resources by using the Metrics and Alarms features. Setting alarms to notify when you hit performance or capacity thresholds is a great way to leverage Oracle Cloud Infrastructure native tools to manage your infrastructure.

For details, see the Monitoring Overview topic and the Announcing Oracle Cloud Infrastructure Monitoring blog post.

Managing Cost

As detailed in the previous sections, there are several ways to "right-size" the compute versus storage requirements to reduce your infrastructure costs. In addition, Oracle Cloud Infrastructure has many tools to help you manage the cost associated with a Hyperion deployment.

- You can leverage tagging for your deployments to make it easier to track consumption.
- You can set quotas at the compartment level to limit consumption by different lines of business. Consider using multiple compartments to manage production, QA, and development environments, and restrict the quotas as appropriate.

For more information about these topics, see the following blog posts:

- How to Get Control of Your Spending in Oracle Cloud Infrastructure
- Tracking Costs with Oracle Cloud Infrastructure Tagging

Leveraging the dynamic nature of cloud is also great for environments that might not need to be persistent. If you're using Object Storage as a backup (or data lake) for your data, it's easy to create environments when you need them by using Terraform, rehydrate HDFS with data from Object Storage, and destroy the environment when you no longer need it.

VM environments with block volumes can also be paused to halt Compute billing, and you are charged only for storage consumption.

CONCLUSION

Our IaaS hardware choices and core platform design are built for running enterprise workloads, which makes Oracle Cloud Infrastructure the best place to host applications like Hyperion.

Migrating your existing Hyperion workloads to Oracle Cloud Infrastructure helps you:

- Manage solutions and applications, not infrastructure
- Focus on your core business, not on IT
- Improve performance and availability
- Reduce costs

Several architecture configurations are available to match your current on-premises design. Several supported solutions are also available for migrating data from on-premises to Oracle Cloud Infrastructure. Oracle Cloud Infrastructure is also very cost-effective for rapid deployment and removal of lower QA/test Hyperion environments.

For additional documentation resources, see the Appendix.

APPENDIX

This section contains supplemental information and links to reference documentation.

Terraform Deployment Reference

You can find Terraform templates for each Hyperion ISV on the Oracle GitHub page.

Identity and Access Management

- Best Practices for Identity and Access Management Service on Oracle Cloud Infrastructure
- Oracle Cloud Infrastructure Identity and Access Management Guide

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