Cloud Waves

Physical/Colo

User-configured, managed, and maintained

Virtualized

User-configured
Provider-managed and maintained

Serverless

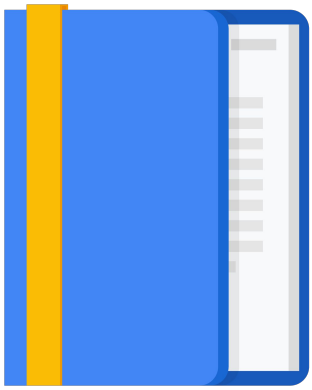
Fully automated

Agenda

Why Run Oracle on Google Cloud

Technical Specs

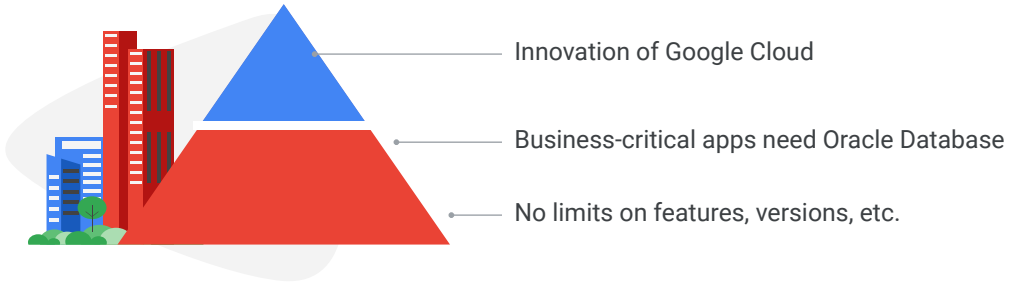
Use Cases



Google Cloud

You may have one or more Oracle servers on-premises and want to migrate them off-premises to the cloud. Google provides an excellent solution for this scenario.

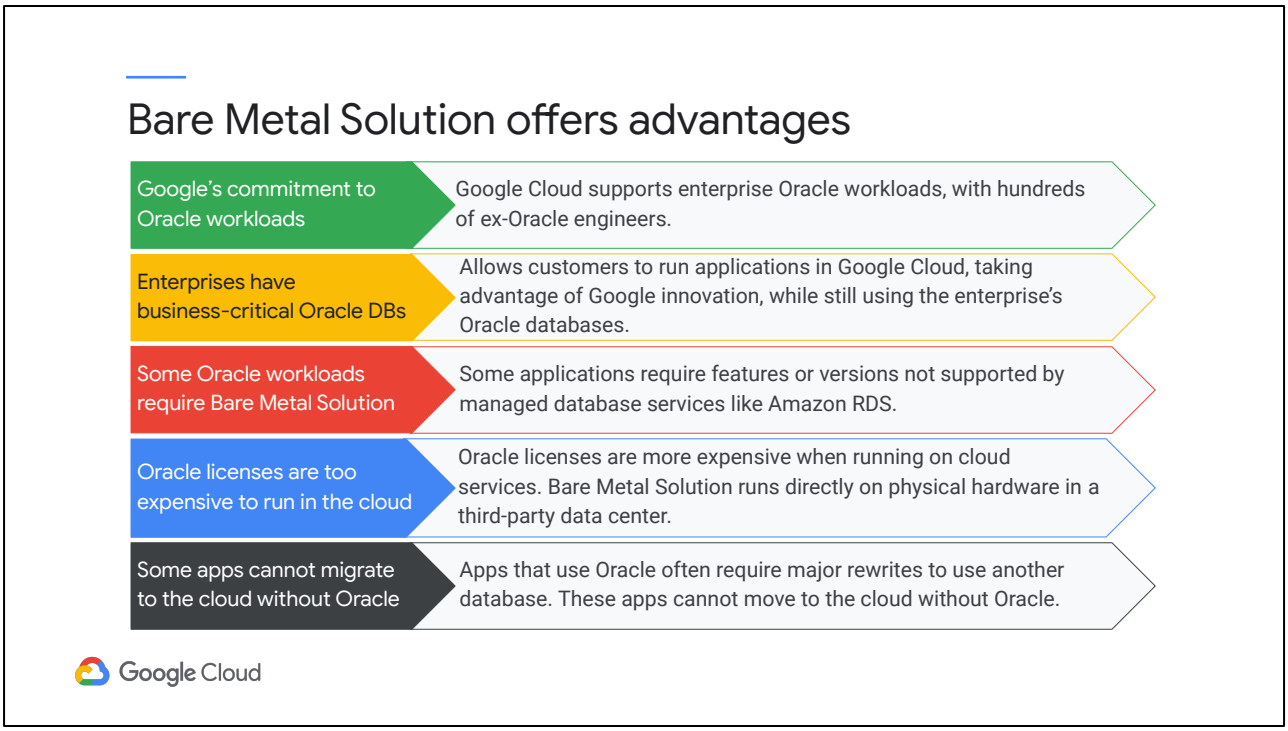
You want the innovation of Google Cloud, but your business-critical apps rely on Oracle with no limitations



Google Cloud

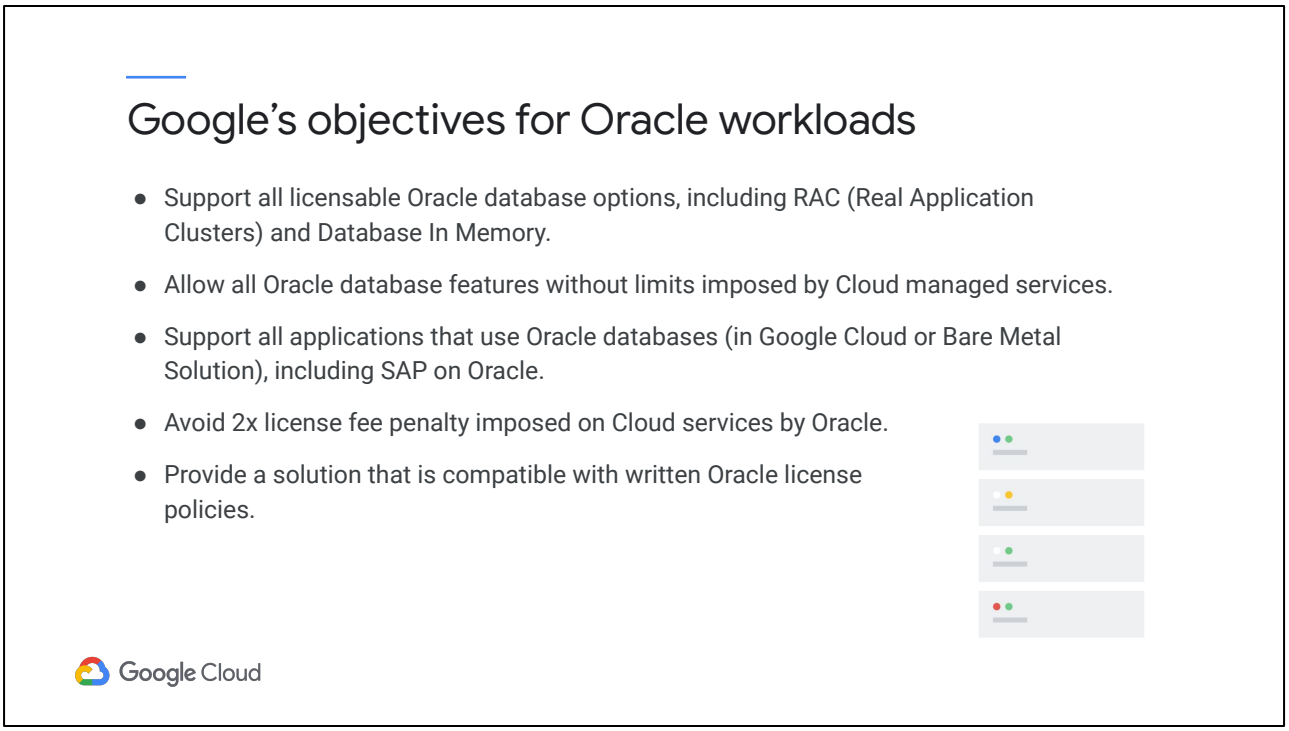
You may have existing applications that are heavily dependent on Oracle backends, and uncoupling them might be difficult. Using Cloud SQL or a SQL Server instance may not be an option.

However, you want to benefit from many of Google Cloud's features, such as off-site servers and scalability. Google has a solution that allows you to keep your Oracle database and also migrate to the cloud, with no restrictions or limitations on the Oracle side of things. It is truly a best-of-all-worlds solution.



Bare Metal Solution offers many advantages over a traditional on-premises server.

- Google is fully committed to integrating Oracle workloads into its cloud environment and employs many ex-Oracle engineers.
- Many enterprises depend on Oracle databases for their mission-critical applications. Google's solution allows customers to run applications in Google Cloud, taking advantage of Google innovation, while still using the enterprise's Oracle databases.
- Some features of Oracle require bare metal servers. So even though Cloud-based services like AWS RDS support Oracle, many Oracle features are not supported on that service.
- There is also a license penalty when running Oracle on virtual machines. When you use virtualized services like RDS, Oracle charges for licenses by the virtual CPU. That makes the licensing twice as expensive. On Bare Metal Solution, licenses are charged per physical CPU.
- Many times you can't migrate your applications until you also migrate your Oracle database, and moving to a different database might require expensive rewrites that are not practical.



Google has several key objectives for Oracle workloads.

- There must be support for all licenseable Oracle database options, including Real Application Clusters and Database In Memory.
- All Oracle database features must be supported without the limits imposed by Cloud-managed services.
- All applications that use Oracle databases, including SAP on Oracle, must be supported.
- There should be no 2x license fee penalty imposed on Cloud services by Oracle.
- Finally, Google's solution must be compatible with Oracle's license policies.

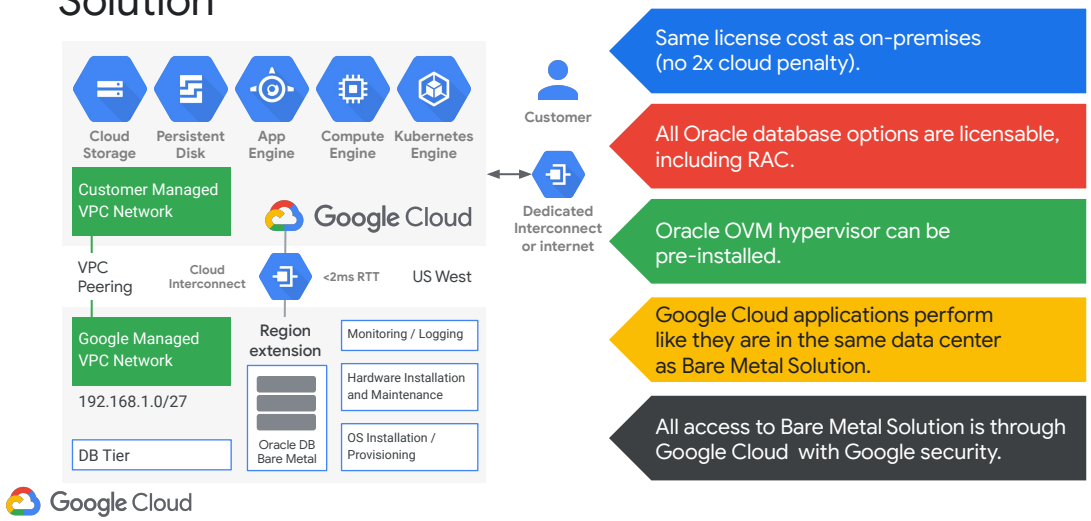
Oracle Real Application Clusters (RAC)

- Increase Oracle Database availability
- Scale database performance across multiple database servers
- Enable horizontal scalability
- Hide the impact of the outages from end users

SAP SE

- A German multinational software company
- Develops enterprise software to manage
  - business operations
  - customer relations
- The world's leading Enterprise Resource Planning (ERP) vendor

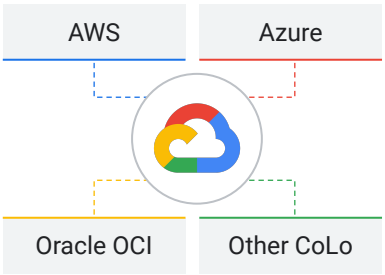
There are no limitations to Oracle on Bare Metal Solution



Bare Metal Solution has no limitations regarding Oracle versions, features, or configurations and has the same license costs as an on-premises server.

Because of the close proximity of the physical Oracle servers to the Google facilities, you get the high performance you would expect as if the servers were in the same data center. Additionally, Google handles the security through Google Cloud.

Bare Metal Solution works with other clouds



- Bare Metal Solution is the only solution that provides a colocation data center with a low-latency (< 2 millisecond RTT) connection to Google Cloud.
- Other vendors (e.g., Equinix) offer high-bandwidth connections to Google Cloud, AWS, Azure, Oracle Cloud, and other offerings.
- If you have an appliance (e.g., Exadata), you can host it in another partner data center or on-premises and have a high-bandwidth network to Google Cloud and Bare Metal Solution.

Google Cloud

Bare Metal Solution can also be used by applications running in other clouds.

Bare Metal Solution is the only solution that provides a colocation data center with a connection to Google Cloud of less than 2 milliseconds of latency.

Plus, vendors also offer high bandwidth connections to AWS, Azure, Oracle Cloud, and other colocation facilities.

Thus, you can host applications and appliances in another partner data center or on-premises and have a high bandwidth network to Google Cloud and Bare Metal Solution.

Round-trip Time (RTT)

- `Amount of time`
  - for a signal to be sent
  - `+`
  - for acknowledgement of that signal to be received

Oracle Exadata Database Machine

- A combined hardware and software platform

- is engineered to deliver dramatically
  - better performance
  - cost effectiveness
  - availability

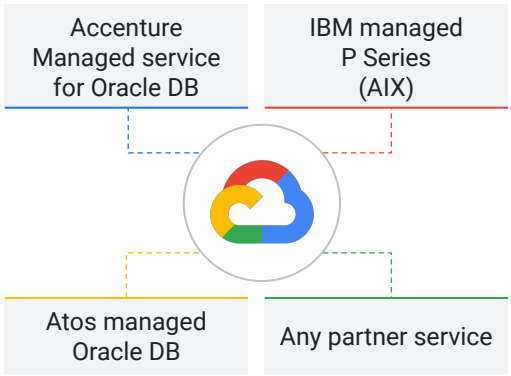
IBM POWER / AIX

- `IBM Power Systems`
  - a family of server computers that are based on its Power processors
  - created in 2008 as a merger of the System p and System i product lines

- `IBM AIX`
  - a series of proprietary Unix OS
  - developed and sold by IBM for several of its computer platforms

Bare Metal Solution works with managed partner services

- Bare Metal Solution provides customer-managed bare metal for Oracle workloads.
- Accenture, Atos, and other partners provide a managed Oracle as a service.
- Non-x86 platforms are also provided by partners (e.g., IBM POWER / AIX).
- The customer signs a separate contract directly with the partner. Costs of managed services are typically higher than self-managed offerings.



Google Cloud

Bare Metal Solution leverages other partners for managed Oracle services and hardware.

Other partners like Accenture and Atos provide managed Oracle databases.

non-x86 platforms are offered by partners like IBM.

What about Oracle support and licensing?

- Bare Metal Solution is bare metal in a subprocessor-managed data center, NOT cloud.
  - Hundreds of customers do this with Oracle in Equinix, Atos, Rackspace, etc.
- BullSequana S is officially certified by Oracle.
- The solution meets Oracle's requirements for RAC support.
  - Native storage device supported by the storage vendor (NetApp)
- We recommend engaging a third-party Oracle license compliance firm such as Palisade Compliance.
- Rely on Oracle License Management Services (LMS) or Palisade for licensing policies.
  - Not Oracle sales teams

Google Cloud

Because Bare Metal Solution uses Oracle-certified bare metal servers, there is no problem with Oracle licensing and support.

Bare Metal Solution is not a virtualized cloud solution. Thus, all Oracle versions and features are supported.

You need to provide your own Oracle licenses and ensure that you are in compliance.

You might consider using a third-party compliance firm to help ensure that you conform to license policies from Oracle.

Agenda

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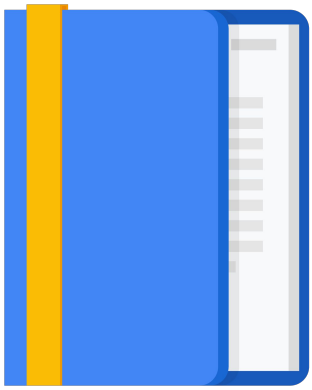
Use Cases

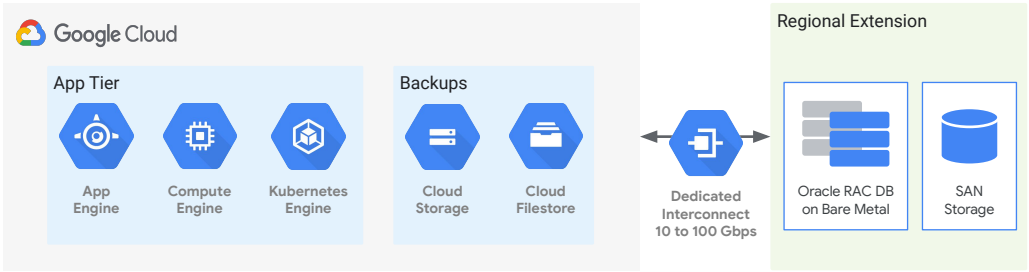


Google Cloud

So far we have been talking about running Oracle databases on Google Cloud using Bare Metal Solution.

Now, let's look into some of the technical details about how the solution is architected, some of your options, and how you connect to and administer the servers.

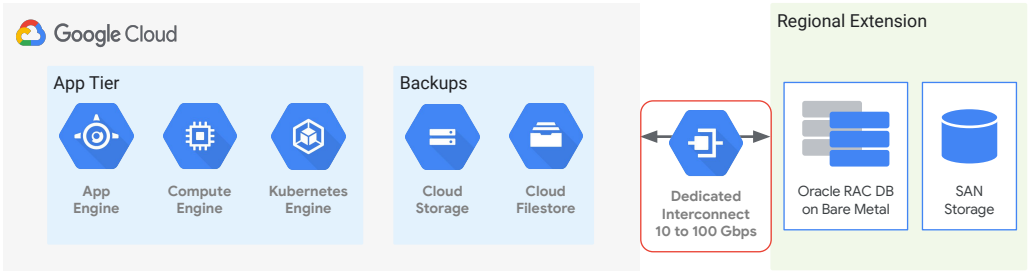
Bare Metal Solution provides physical hardware with a high-speed connection to a Google Cloud region



Google Cloud

Bare Metal Solution hardware is traditional physical hardware, except it is located close to the Google hardware and has high-speed connections to the Google Cloud region where it's located. This allows the App layer and backups to perform with the same high speed as if they were other Google-provided database solutions.

Bare Metal Solution provides physical hardware with a high-speed connection to a Google Cloud region



Google Cloud

The Oracle servers are housed in a Google partner data center. A high-speed interconnect is set up between the partner and your Google region with less than 2-millisecond latency between them.

You select the operating system to be pre-installed on your machines

- Operating system choices include:
  - Red Hat Linux 7.7, 8.1
  - Oracle Linux 7.7
  - SUSE 15
  - Windows 2016 Enterprise, 2019 Enterprise
  - Other versions of Windows and Linux can run in a hypervisor
- Hypervisors can be pre-installed
  - Oracle OVM 3.4.6 or Oracle OLVM
- OS and hypervisors are configured, managed, licensed, and patched by the customer.
- Bring your own license.

You can create an Oracle server just like you would on-premises.

- You can choose the operating system you want on your bare metal servers when you place the order. Red Hat, Oracle Linux, SUSE, and Windows are all supported.
- You can also choose whether to install hypervisors. If you do, you can also run other operating systems.
- You manage and patch your machines as you would on-premises.
- You bring your own existing licenses.

Select the server configuration that meets your database workload

Compute Machine Type	Monthly Price* (3 Year CUD)
16 Cores, 384-GB RAM Xeon Gold 3.2GHz	$2,000
24 Cores, 768-GB RAM Xeon Gold 3.0GHz	$2,400
56 Cores, 1,536-GB RAM Xeon Platinum 2.2GHz	$3,400
112 Cores, 3,072-GB RAM Xeon Platinum 2.7GHz	$6,800

***Pricing for Bucket I locations, (Bucket II to have a 10% premium)**
Bucket I: Virginia, Los Angeles, Frankfurt, London, Netherlands, Sydney, São Paulo
Bucket II: Tokyo, Singapore
(Pricing subject to change)

Google Cloud

You can choose the hardware that fits your needs. Several standard machine configurations are supported. These servers use the latest hardware and CPUs. Details are in the table shown here, but check the documentation for the latest specs and pricing.

Data storage is tuned for Oracle

- Storage is provisioned and tuned as per NetApp's best practices for Oracle database.
- Single capacity-driven metric for simplified sizing:
  - Customer specifies desired IOPS, storage requirements, and LUN configuration.
  - Quality of Service assurances of up to 400,000 IOPS.
- Use Cloud Storage for low-cost blob storage and backups.
- All data over the network and at rest is encrypted.
- Coming soon: protocol support for NFS and CiFS

Storage Type	Monthly Price (3 Year CUD)
All Flash NVMe Storage/TB	$115
All Disk Storage/TB	$60

Google Cloud

Data Storage uses NetApp best practices for tuning the storage. You specify your desired IOPS, storage requirements, and LUN configuration. Up to 400,000 IOPS is guaranteed.

You should use Cloud Storage for low-cost blob storage and backups.

All data is encrypted at rest and over the network.

Use Cloud Storage for inexpensive backup storage

- Backups can be stored in inexpensive Cloud Storage buckets, including Coldline and Archive storage classes.
- Automated periodic snapshots for database binaries and OS
  - Daily snapshots with three-day retention
  - Weekly snapshots with one-month retention
- Local disk-based storage for hot backups and blobs
- Use the Oracle backup tool of choice (RMAN, etc.)

Cloud Storage

Google Cloud

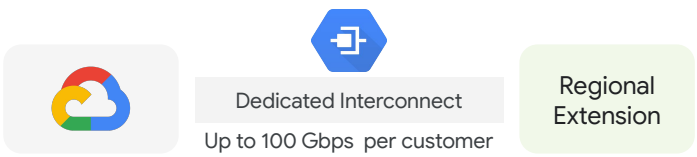
You can backup your databases to Cloud Storage for an inexpensive solution. You pick which Cloud Storage class makes sense for your backups. You can automate snapshots for the database binaries and OS and set a retention period in Cloud Storage, and you can use lifecycle rules to automatically clean up storage over time.

Hot backups can be written to local disk-based storage.

You can use any traditional Oracle backup tool.

Dedicated Interconnect provides high-speed connection from regional extension to Google

- Interconnect between Google Cloud and Region Extension: $247.00/month per 10 Gbps.
  - Up to 100 Gbps
- Network egress between Google Cloud and the Regional Extension is free.
- Network egress for data that leaves a Google Cloud region is billed at normal egress rates.



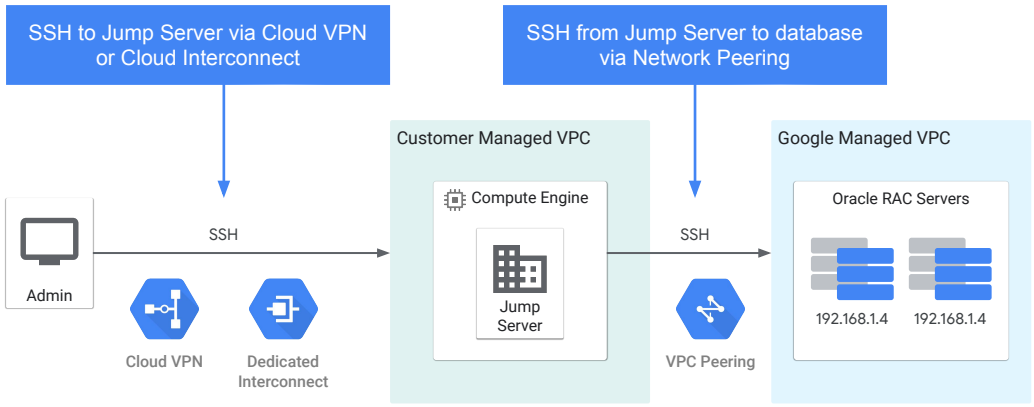
Google Cloud

There is a dedicated high-speed interconnect between the Google data center and the regional extension where the Oracle machines are located.

You choose how fast your interconnect has to be. Interconnect between Google Cloud and the Regional Extension costs $247.00/month per 10 Gbps, up to 100 Gbps.

Network egress between Google Cloud and the Regional Extension is free, and egress for data that leaves a Google Cloud region is billed at normal egress rates.

Access your Oracle Bare Metal Servers using a jump server (Bastion host) in your VPC

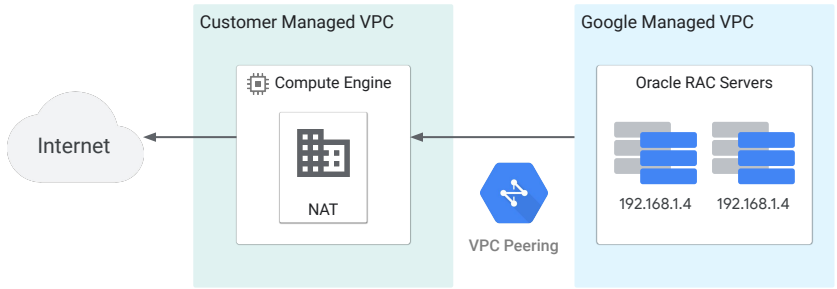


Google Cloud

Connect to a jump server in your customer managed VPC via SSH through Cloud VPN or a Dedicated Interconnect.

From the jump server, you can use SSH to connect to your Oracle servers through the VPC peering provided by Google. Google will provide the IP addresses and connection information to your servers. You can request specific IP address ranges when placing the order for the servers.

Use a NAT to provide access from the bare metal servers to the internet

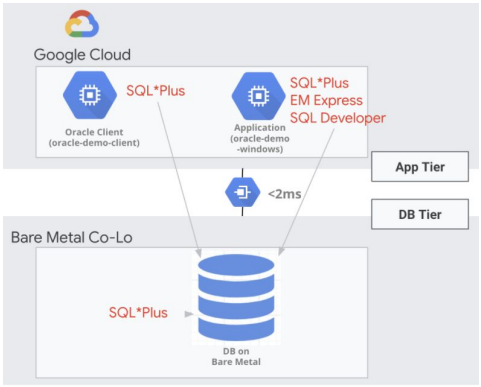


Google Cloud

If the Oracle server needs access to the internet, that can be provided through NAT. The Oracle servers themselves have no internet access or external IP addresses.

All Oracle tools, features, and options are available and work the same as on-premises

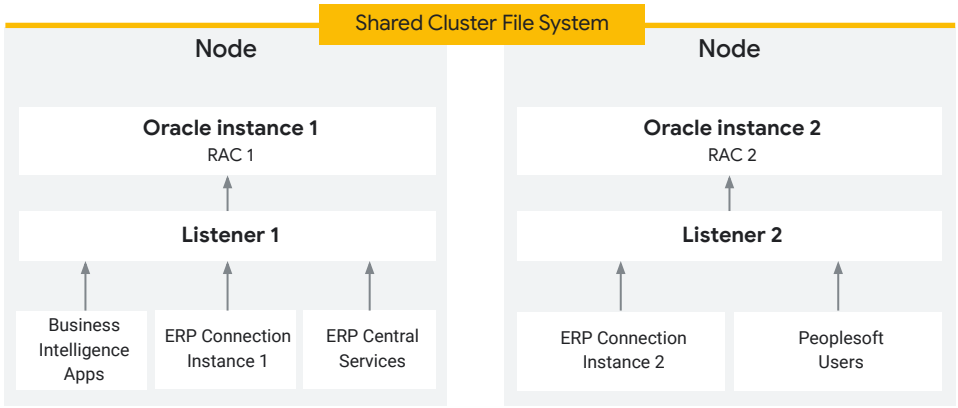
- Connect to Oracle using preferred tools:
  - Sqlplus client
  - SQL Developer/Toad
  - Oracle Enterprise Manager
  - Etc.
- Connect from any VM in your VPC using SSH or RDP.
- Create new applications using Google Cloud services and connect them to your Oracle Database.
- View Oracle OS processes and alert logs.



Google Cloud

All your familiar tools can be used to connect to the Oracle server just as if it were on-premises. You can connect any VM in your VPC, using either SSH or RDP. You can also create new applications using managed services and connect them to your Oracle server. You can monitor the Oracle processes and logs with standard methods.

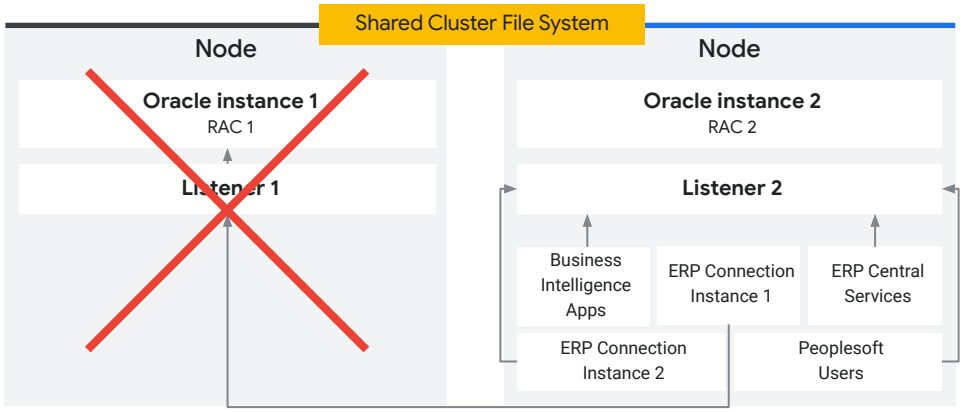
Oracle Database RAC (Real Application Clusters) can be configured for high availability



Google Cloud

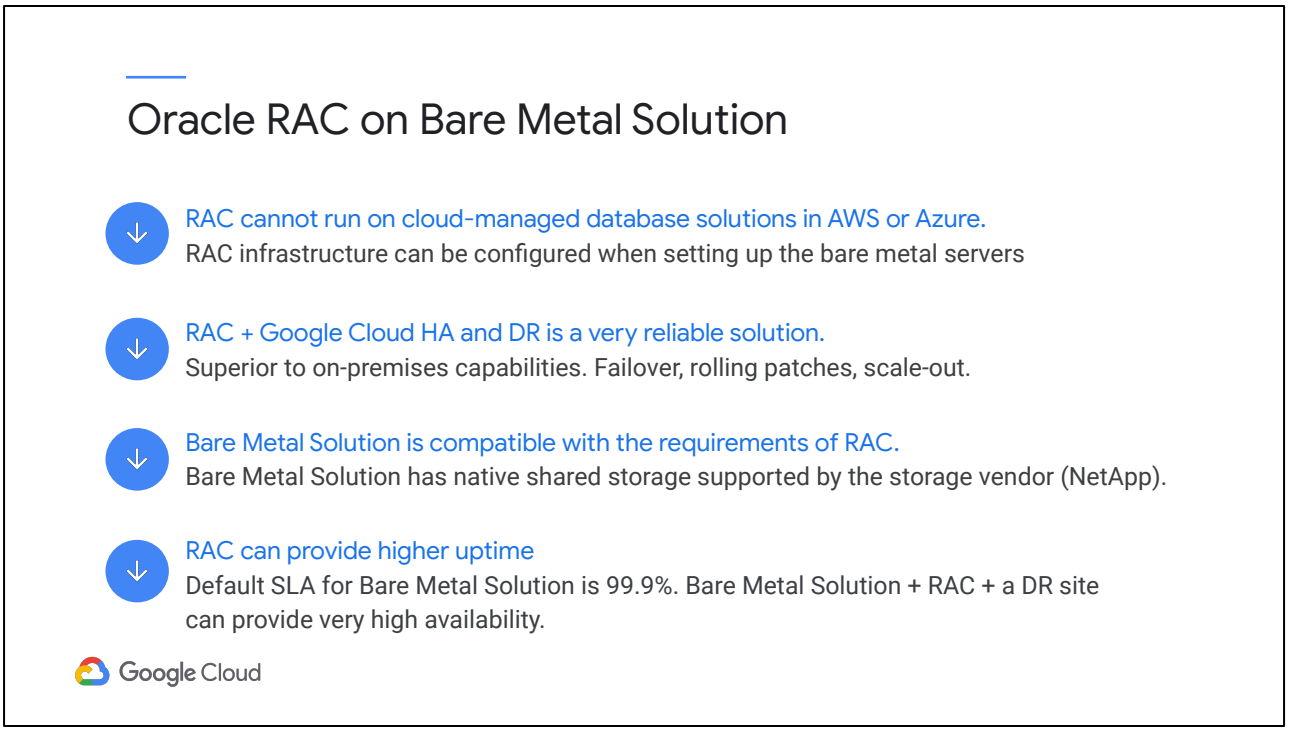
You can even configure Oracle Database RAC if you need high availability. It's exactly like doing it with your own hardware.

RAC provides automatic failover if a node crashes



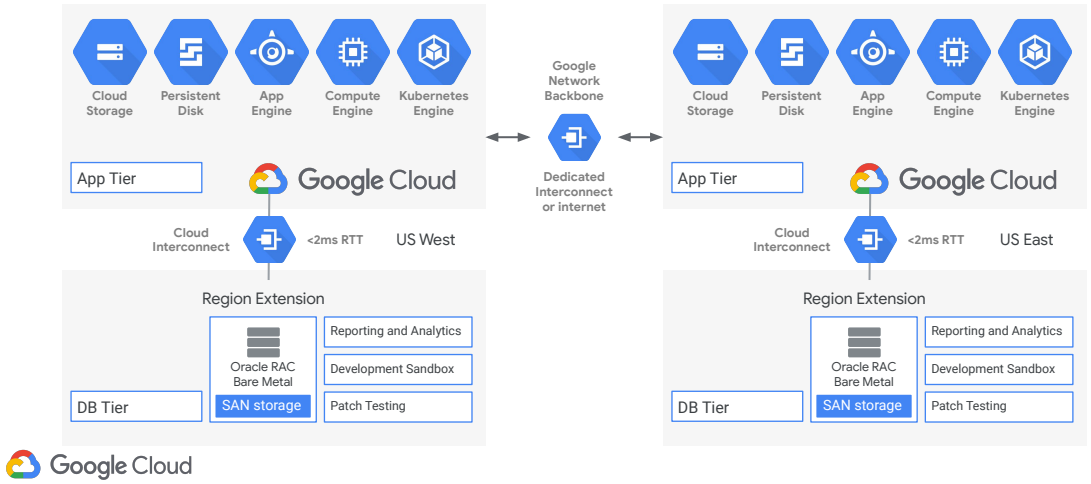
Google Cloud

RAC provides an automatic failover if your node crashes.



Because the Bare Metal Solution runs on physical machines and has shared storage provided by NetApp, RAC can run just like it would on your own hardware. This can't be done running Oracle in AWS or Azure. This allows you to create a highly available cloud-based Oracle solution.

Deploy to multiple regions for disaster recovery



Google Cloud

To make your disaster recovery solution even more robust, you can deploy the RAC to multiple regions.

Agenda

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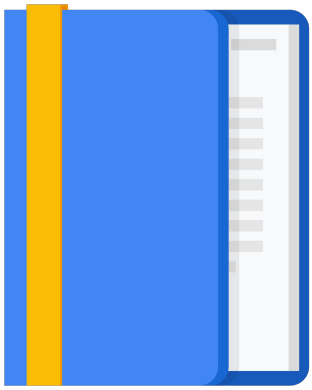
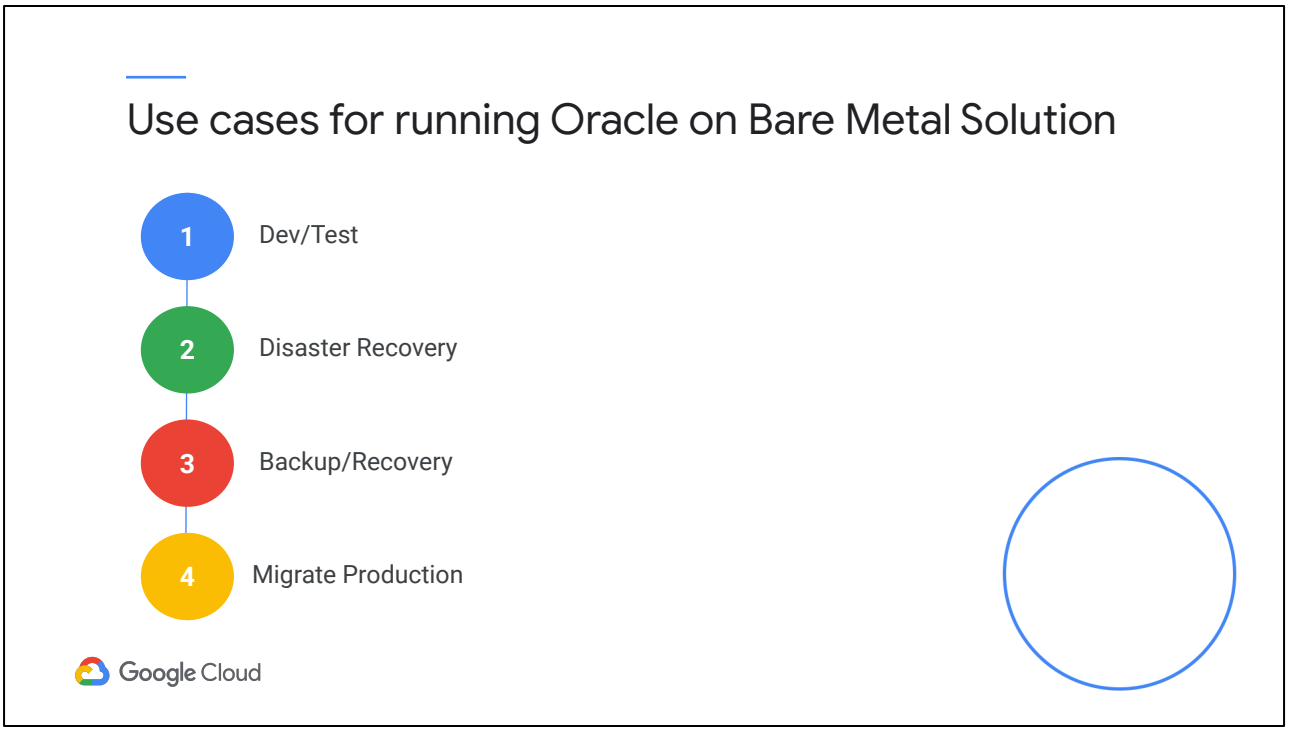


Google Cloud

Now that you understand the technical details, let’s explore some use cases.



There are many use cases for running the Oracle on Bare Metal Solution. These include development and test environments, disaster recovery, backup and recovery, and cloud migration.