Oracle Database on Google Bare Metal Solution

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New Possibilities with Bare Metal Solution

Bare Metal Solution service arguably offers both technical, performance and non-functional capabilities not previously available in Google Cloud. Specifically, customers now have the ability to:

1. Provision bare metal infrastructure using Oracle certified hardware.

2. Optionally, use tooling to simplify Oracle Database software installation, patching and database creation; or manually install Oracle software and create databases, as required.

3. Have regional selectivity (for data residency requirements) and optionally implement disaster recovery solutions.

4. Have application components similarly reside on Bare Metal Solution infrastructure or other Google Cloud services (such as Google Compute Engine) with Google-managed connectivity.

5. Benefit from easy-to-understand hardware profiles, and more straightforward Oracle licensing discussions.

Thus customers moving to Google Cloud have a new option for hosting their Oracle databases, and possibly aid in other scenarios, such as when a rapid exit from an existing environment is required or to relieve pressures related to hardware upgrades / renewals and server reliability.

Considerations for migrating Oracle to Bare Metal Solution

Enterprise customers often have complex implementations and mission critical applications that run on Oracle databases. And consequently, "lift and shift" seems easy and straightforward in concept but is usually difficult to perform in the real world for Oracle database workloads.

When undertaking this migration effort these facets require detailed and thorough consideration:

1. Architectural Changes

2. Operating System and Chipset Changes

3. Database Upgrades

4. Consolidation

5. License Portability

6. Migration Downtime

Architectural Changes

Oracle guidelines state that RAC database implementations on third party clouds is not officially supported[1]. Because Oracle's official stance on this changes over time, customers should refer to Oracle's external documents and My Oracle Support (MOS) documents for the latest and most accurate information.

When migrating from Oracle RAC source databases, architecting and provisioning sufficient, but not overly-provisioned, future-state hardware can be a challenge. For example, when removing RAC, simply taking the hardware provisioned across all source RAC nodes and stacking resources (CPU and memory) to define the required BMS hardware is often erroneous.

Reducing RAC nodes typically involves actual measurements of source instance hardware usage as opposed to simply looking at what is provisioned. It may even involve application and support process adjustments. Because the existing hardware may be over-provisioned or under-provisioned, a re-alignment of hardware to actual workload requirements is likely required.

When leaving an Oracle Exadata machine for a non-Oracle cloud or Bare Metal Service, the situation is even more complex as Oracle Exadata offers unique capabilities, data access paths and I/O optimizations not available outside the Exadata hardware platform.

Regardless, a solid methodology including steps for benchmarking performance data (metrics), comparing before and after, and preserving that data for long-term analysis is essential.

Operating System and Chipset Changes

Some customers still run their Oracle databases on traditional operating systems such as Sun Solaris, HP UX, or IBM AIX – on RISC architecture and big-endian chipsets. While cloud vendors are based on CISC architecture little-endian chipsets (often Intel or AMD) running various Linux distributions or Microsoft Windows.

Converting from a big-endian chip and the Solaris operating system (as an example) to little-endian Intel chips running Linux is almost certainly a good strategic long-term choice but also introduces significant performance and licensing differences[2].

How does X Sun RISC cores translate to Intel cores? To what generation of Intel chips? What about hyper threading? How does that change the licensing position and Oracle license core factors? What about hard and

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1   https://www.oracle.com/technetwork/database/options/clustering/overview/rac-cloud-support-2843861.pdf

2   http://www.oracle.com/us/corporate/contracts/processor-core-factor-table-070634.pdf

soft CPU partitioning or CPU affinity options? How busy are the existing CPU resources and how busy do we want the target CPUs to be (versus leaving overhead for other services and growth)? All questions needing detailed analysis and comprehensive planning and testing.

Beyond performance, compatibility must be considered. Custom database management, backup, and monitoring scripts may require modifications for platform compatibility. Small nuances in operating system commands likely means that existing scripts must be tested and adjusted.

Database Upgrades

Cloud migrations are also an opportunity to upgrade the Oracle software release/versions; sometimes to reach an Oracle supported release, other times to take advantage of new features and capabilities.

This presents three options:

1. Upgrade prior to move, then migrate like-for-like.

2. Big-bang: upgrade and move in one step.

3. Migrate like-for-like and then upgrade.

Sometimes there are compelling reasons to choose one option vs. the others. For example, if using a really old version of the Oracle Database, installing and using that same version and patch level in the cloud (even on Google Bare Metal Solution where the software can be manually procured and installed) may not be possible or supported.

Specifically it may be difficult to obtain old software and patches or implement on the provided Bare Metal Solution operating systems without a complete system re-image. Instead, a local upgrade prior to move or the big-bang approach of upgrading while moving may be required.

In other scenarios, it may be influenced by balancing risk with effort. Decoupling a migration from an upgrade reduces risk and allows performance stabilization or regression to be identified as being due to one or the other. But it adds effort and testing time as both stabilization and testing has to be performed twice.

Consolidation

A cloud migration may also be a good opportunity to consolidate; either at the server level, the database level, or both.

The Google Bare Metal Solution servers are most appropriate for medium to large Oracle database workloads, as they start with 16 CPU

cores. In a simplistic example, a customer with eight 2-core servers, each running one Oracle database, could potentially consolidate at the server level and run all eight Oracle databases on the single 16 CPU core Bare Metal Solution server. (Oracle supports multiple independent databases running concurrently on a single machine.)

However, multiple independent databases consolidated on a single machine are just that – "independent" – and hence require independent management, backups, patching, upgrading, etc. To alleviate that, Oracle provides the multitenant option[3] to allow multiple independent databases to be consolidated into a single "container database". This reduces management overhead, while still preserving isolation from a performance and security perspective. It may be advantageous to use a mixture of server-level and database-level consolidation.

License Portability

Oracle licensing is a complex process that should be managed by Oracle licensing experts. Each customer's Oracle licensing position may be unique and may depend on how and when licenses were purchased (many are part of grandfathered plans) and what restrictions are associated with the available licenses.

Generally speaking, Oracle licenses are required for any location where the software runs and are typically based on the processor unit[4] (usually equivalent to a CPU core or thread.)

Migration projects often involve some degree of overlap where the original source system is used concurrently with the target environment for some period of time. The target may be used for initial functional, compatibility, and performance testing, and/or as a replication target until the migration "go-live". Thus, quite possibly requiring separate and additional licenses in the interim.

Migration Downtime

Even if all of the other challenges are addressed, sometimes the migration downtime can present a challenge. Every minute of downtime can be consequential and minimizing downtime is a priority.

"Near zero downtime" Oracle database migrations are certainly possible using replication. Physical replication options are usually far simpler, cost effective, and more reliable than logical replication options but have their limitations. For example, crossing versions or operating systems may be possible with physical replication but only to a certain degree.

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3   https://docs.oracle.com/en/database/oracle/oracle-database/19/dblic/Licensing-Information.html

4   https://www.oracle.com/assets/technology-price-list-070617.pdf

In other cases, operating system or database software version differences, the need to change database structure, desires to only migrate a subset of database data, or consolidation often result in the need for logical migration solutions - which typically require additional tooling and more effort to address the associated complexities.

Conclusion

The introduction of the Google Bare Metal Solution offers customers with Oracle in their estate exciting options for a cloud migration. But unless Oracle deployments are trivially small in size and complexity, migrating to the cloud will present some challenges. When you're ready to take advantage of Google's Bare Metal Solution, talk to Pythian. Our global team of certified service professionals has decades of

experience in Oracle, Google Cloud and all related technologies. We apply our deep expertise to engineer the optimal solution for your business, mitigating the risks of migration while maximizing throughput. Our proven approach to migration lets you move your Oracle workloads with complete confidence. Ready to start a conversation? Email us at **googlecloud@pythian.com** for more information.

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As VP of Customer Service Delivery, Rob draws on more than 30 years' experience in the data management industry to provide strategic direction to Pythian and his team. His leadership skills coupled with extensive experience in data and cloud architecture and production engineering have proved invaluable in solving complex client issues, and in establishing Pythian as a global leader in technology services. Rob and his team are committed to providing superior service delivery and helping clients optimize their revenue generating systems.

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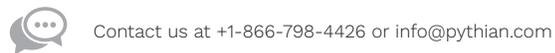
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