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**VIRTUALIZING ORACLE DATABASE10G/11G ON VMWARE INFRASTRUCTURE**

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## МАТЕМАТИКА, ФИЗИКА, СТРОИТЕЛЬСТВО, АРХИТЕКТУРА, ТЕХНИЧЕСКИЕ НАУКИ

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VMware Inc. offer three different solutions for virtualizing Oracle database servers on VMware Infrastructure and EMC Celerra storage:

1. Oracle Database on VMware Infrastructure using a pure NFS storage design (on a single VMware® ESX host).
2. Oracle Database on VMware Infrastructure using a pure NFS storage design with a four-node VMware® High Availability (HA)/VMware® Distributed Resource Scheduler (DRS) cluster solution (using multiple ESX servers).
3. Oracle Database on VMware Infrastructure using a blended FCP/NFS storage design (on a single ESX server).

We consider only the second point.

This configuration is very similar to the Configuration 1 in terms of storage architecture, but now introduces the notion of using a set of ESX servers that all belong to a cluster of ESX hosts. The ESX cluster shows how the previous configuration, which used only a single ESX server for consolidation, can be scaled to multiple ESX hosts to accommodate larger database consolidation projects. This configuration was tested using a total of four ESX servers, each running two Oracle database virtual machines.

The ESX cluster also introduces functionality for providing Oracle database high availability using VMware HA. With VMware HA, in the event of a server hardware failure, all virtual machines running on that ESX server will be automatically restarted on a surviving ESX server in the cluster.

This is how the VMware approach can provide a high availability alternative to RAC clustering with less complexity.

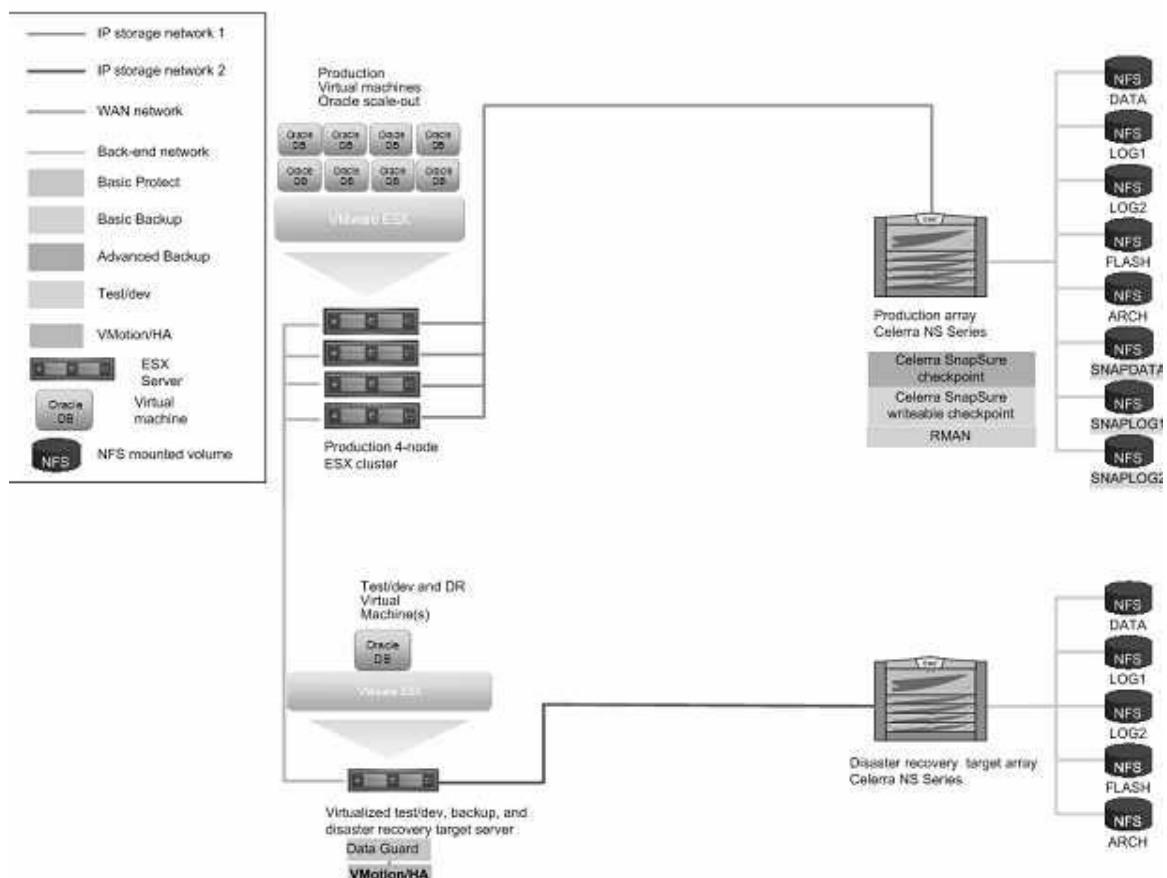


Table 1 describes the solution features that have been validated for the pure NFS HA cluster solution.

**Table 1.** Oracle Solution Features and Capabilities

<b>Solution Features</b>	<b>Description</b>
Scale-Out OLTP	Real-world performance and capacity testing. Utilizes an industry-standard OLTP database performance benchmark, while providing only real-world tuning on a reasonably priced and configured platform. Scalability is provided by adding additional database instances that are not clustered and that access their own physical database. This assumes that the database application can be broken down into many small, independent databases, and that no single user needs to see the data of any other user outside of the database associated with that user. A typical example would be Software as a Service (SaaS).
Basic Backup and Recovery	Uses only the functionality provided by the database server and the operating system software to perform backup and recovery. Uses the database server's CPU, memory, and I/O channels for all backup, restore, and recovery operations.
Advanced Backup and Recovery (snapshot)	Uses additional software components at the storage layer to free up the database server's CPU, memory, and I/O channels from the effects of operations relating to backup, restore, and recovery. Provides high-performance backup and restore operations, improved space efficiency, or other benefits in comparison to Basic Backup and Recovery.
Basic Protect	Uses tools provided by the operating system and database server software (in the same sense as basic backup) to provide disaster recovery. Uses the database server's CPU, memory, and I/O channels for all operations relating to the disaster recovery configuration.
Advanced Protect	Uses additional hardware or software components at the storage layer to enable disaster recovery, thereby freeing up the database server's CPU, memory, and I/O channels from the effects of these operations. Enables the creation of a writeable copy of the production database on the disaster recovery target, allowing this database to be used for operations such as backup, test/dev, and data warehouse staging.
Resiliency	Every significant layer of the solution is tested by introducing faults in an effort to cause the solution to fail. In the process, the entire solution is shown to be resilient to faults at every layer, including database clustering, networking, and storage.
Test/dev	A running production OLTP database is cloned with minimal, if any, performance impact on the production server, as well as no downtime. The resulting dataset is provisioned on another server for use for testing and development.
VMware VMotion	VMware VMotion was used to move live Oracle virtual machines from primary ESX host to secondary ESX host while subjected to load testing.
VMware HA	VMware HA was tested and validated to provide protection from server hardware failure.

### Conclusion

Enterprises must get the maximum possible value from their IT infrastructure to stay in business in today's competitive landscape. VMware Infrastructure helps them to do that-particularly, by hosting multiple Oracle databases together on the VMware Infrastructure 3 platform. This provides the following benefits:

- Reduced costs through server consolidation that uses fewer servers.
- Higher availability through automatic restart of critical servers.
- Better load balancing.
- No downtime for maintenance through the use of VMotion to evacuate servers when fixes are required.
- Easier planning and implementation of disaster recovery.

This paper provided details on one designs of the server and storage layout for a virtualized set of Oracle databases. Each configuration was also tested with solutions for Basic and Advanced backup, as well as disaster recovery and test/dev functionality using various EMC, VMware and Oracle data protection and high availability tools. This testing should give customers additional confidence to virtualize their own Oracle database environments and also enable DBAs to see exactly what kind of technical choices they can make to optimize the use of their IT infrastructure. For most, if not all, of the enterprise Oracle database implementations that currently exist, there should be no obstacles to running those systems on VMware Infrastructure and achieving the benefits that come with it [1, p. 1, 18, 26, 27].

### References

1. **VMware Inc.** Virtualizing Oracle Database 10g/11g on VMware Infrastructure [Electronic Resource]. URL: [www.vmware.com/.../pdf/.../oracle/vmw-oracle-virtualizing-oracle-db10g11g-vmware-on-infrastructure.pdf](http://www.vmware.com/.../pdf/.../oracle/vmw-oracle-virtualizing-oracle-db10g11g-vmware-on-infrastructure.pdf)