ORCInternational

Time Savings and Ease of Deployment Comparison Study

Oracle Database Appliance
vs.
Microsoft SQL Server

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ORC*International*

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Executive Summary

As the amount and importance of corporate data grows, companies of all sizes are finding that they increasingly need to deploy high-availability database solutions to support their business-critical applications. High DBA workloads have made the ease with which these systems can be installed, administered and supported an important consideration in their selection.

The purpose of this study was to conduct comparison testing between Oracle Database Appliance and Microsoft SQL Server in order to determine the productivity differences between these two solutions. A significant portion of the cost of owning a DBMS is the cost in time and dollars of performing daily management. This study focused on Oracle's answer to these issues with the recent addition to its family of engineered systems, Oracle Database Appliance. This two-node clustered database server seeks to reduce, and even remove, the primary cost factors of installation and initial deployment, maintenance, and support. ORC had a unique opportunity to evaluate this product in its early rollout stages and measured the amount of time savings this appliance gives back to an administration team, while still maintaining high availability within a database infrastructure.

ORC's research determined that a DBA would save 835 hours in the first year of system implementation using Oracle Database Appliance rather than SQL Server, and 669 hours in each subsequent year of the system's life. Given these dramatic productivity savings, Oracle Database Appliance is a choice that makes sense for any organization looking to increase the availability of its databases. Table 1 below summarizes the report's findings, and highlights how much more effective a DBA is when operating Oracle Database Appliance rather than SQL Server. As the table below shows, the time savings provided by Oracle Database Appliance were particularly striking in the critical area of ongoing system maintenance.

Table 1 - Summary of Testing Results

Task	Description	Time (Mins)	
		Oracle	SQL Server
A. Installation and Initial Deployment (Hours)		4.0	194.5
1	Sizing (Choose Hardware type, CPU, IO, Memory, etc.)	60	2400
2	Order (Hardware, Storage, Internal Networking, etc.)	60	1200
3	Research and Best Practices	0	2400
4	Deployment	120	867
5	Test Unique Configuration	0	2400
6	Resolve Interoperability Issues	0	2400
B. Maintenance (Hours)		19.8	592.8
7	Verify Patch Compatibility	0	60
8	Run Database Appliance Manager Patch	100	0
9	Patch and Verify Firmware	0	120
10	Patch and Verify OS	0	286
11	Patch and Verify RDBMS	0	98
12	Test Unique Configuration	0	2400
C. Support (Hours)		12.0	76.0
13	Run Database Appliance Manager Diagnostics and Support	60	0

14	Call Vendor Support to Verify Environment	0	240
15	Local Log Files for Each Component / Vendor	0	120
16	Send Log Files to Each Vendor	0	0

This study did not focus on day-to-day manageability of the two database platforms. A detailed comparison of the database administration capabilities of Oracle Database and SQL Server can be found in the companion ORC white paper, *"Database Manageability and Productivity Cost Comparison Study: Oracle Database 11g Release 2 vs. SQL Server 2008 Release 2".* That report found that Oracle Database's superior manageability offered customers increased productivity and cost savings over SQL Server.

While the version of SQL Server evaluated in this study was SQL Server 2008 Enterprise Edition Release 2, ORC had an opportunity to evaluate SQL Server 2012 Community Technology Preview 3. It's the determination of ORC that while SQL Server 2012 does have significant improvements in the area of high availability with the introduction of AlwaysOn Availability Groups, it still requires tremendous effort and knowledge to configure, implement and support it. It is therefore ORC's professional opinion that all the conclusions presented in this document remain relevant when comparing Oracle Database Appliance and SQL Server 2012.

Study Background

This in-depth study compared the ease of deployment and management capabilities of Oracle Database Appliance and Microsoft SQL Server, employing pre-defined tasks and steps that DBAs perform daily or regularly on a high availability platform. The study focused on three key areas:

- Installation and Initial Deployment
- Maintenance
- Support

For this study, the tools provided out of the box with each platform were the only ones used to complete assigned tasks, and no third-party tools were used. In the few instances where a tool was not available, the task was completed using a SQL command rather than a GUI-based tool.

Oracle Database Appliance hardware consists of a single 4U rack mountable chassis containing two Oracle Linux server nodes, each with two 6-core Intel Xeon processors and 96 GB of memory. The two server nodes are connected via an internal redundant gigabit Ethernet (GbE) interconnect for cluster communication, and each provides both 1 GbE and 10 GbE external networking connectivity.   The appliance contains 12 TB of raw storage that's triple-mirrored, offering 4 TB of usable database storage. The appliance is designed with mission-critical requirements in mind, with hot-swappable and redundant components.

To help customers easily deploy and manage their databases, Oracle Database Appliance includes Oracle Database Appliance Manager. This software provides one-button automation to provision, patch, and diagnose Oracle Database Appliance.

Testing Methodology

Several DBAs in multiple disciplines and environments were interviewed to determine the weighting of the testing subject areas. The tasks to be tested were chosen by a team of database experts and identified as the most time-consuming areas for a DBA. The categories and tasks evaluated were:

- Installation and Initial Deployment
    - Sizing
    - Ordering of Components
    - Research
    - Deployment
    - Testing the Unique Configuration
    - Resolving Interoperability Issues
- Maintenance
    - Verifying Patch Compatibility
    - Running Oracle Database Appliance Manager to Apply Patches
    - Patching and Verifying Firmware
    - Patching and Verifying the OS
    - Patching and Verifying the RDBMS
    - Testing the Unique Configuration
- Support
    - Running Oracle Database Appliance Manager for Diagnostics and Support
    - Communicating with Vendors to Verify the Environment
    - Locating Log Files for Each Component and Vendor
    - Sending Logs with Details to Each Vendor

Several of these tasks included assumptions based on feedback from interviewed DBAs. These assumptions will be noted throughout the report.

Every task was broken into steps, each of which required a user action to continue the workflow. Timing methods were applied to track the time and number of steps required to complete each task. Time was measured from the start of a given task, when the mouse began to move to complete the task. Whenever possible, defaults were selected in all test cases, and at the first sign of a "Finish", "OK" or "Submit" button, that button was selected. For tasks that could run in the background, time was measured when the job or process was submitted to the DBMS. The job was tracked as a subtask and the run time was recorded independent of the task that required the DBA's attention. Tasks were tracked individually for time and step count, so results were available at both the detail and aggregate level.

Comparison Tests

Test: Installation and Initial Deployment

The tasks covered in this test including everything from evaluating requirements to the actual installation of the system. The amount of time it took to complete each of the tasks in this category is shown in Table 2 below:

Table 2 - Test: Installation and Initial Deployment Tasks

	A. Installation and Initial Deployment	Time (Minutes)	
		Oracle	SQL Srv
1	Sizing (Choosing hardware, CPU, I/O, Memory)	60	2400
2	Ordering (Hardware, Storage, Internal Networking)	60	1200
3	Research and Best Practices (OS, Storage, Grid Infrastructure, Database)	0	2400
4	Deployment	120	867
5	Testing the Unique Configuration	0	2400
6	Resolving Interoperability Issues	0	2400
	Total (Hours)	4.0	194.5

We'll now look at each of these tasks in detail.

Sizing

The sizing task took into account the selection of hardware, CPU, memory, I/O and other various components to ensure that the system could perform as expected and handle the required load.

Oracle Database Appliance comes in standard configurations, with all required hardware already pre-configured for a fail-over solution. When defining the configuration of a comparable SQL Server-based solution, it was determined that approximately a week was needed to define an appropriate configuration, communicate the available options to decision-makers and make a selection.

Ordering

Since Oracle Database Appliance comes in pre-determined configurations, ordering is straightforward. For this reason, it was determined that the decision for choosing a configuration and ordering it would take approximately an hour.

In the case of assembling a SQL Server-based high-availability solution, ORC concluded that coordinating the ordering of hardware, software, disk, and networking from different vendors would take approximately twenty hours. In this scenario, time must be attributed to the coordination of various vendor deliveries to ensure the effective use of an administrator's time in the data center. Careful attention must also be paid to the review of confirmation letters or emails to ensure the order was placed correctly, since a single component being ordered or keyed in incorrectly could be costly to the overall project.

Research and Best Practices

A major cost factor in planning for a high availability system is conducting research. It can take hours of research to determine the best hardware available and identify known configuration issues. ORC determined that an analyst or administrator assigned to design a required high-availability configuration would spend forty hours performing this research. This figure assumes that a company has the required expertise in-house, and does not require the support of outside consultants, which would significantly increase costs and time.

Oracle Database Appliance removes the need for this research since Oracle has already assembled the best possible components for a high availability solution. With Oracle Database Appliance, there's no need to conduct any research to determine what components work with various operating systems or database platforms, since that's already been designed into the system.

Deployment

Deployment was a task that ORC was able to capture timings against. During the deployment of SQL Server, ORC made several assumptions. We assumed it would take two hours to unpack, rack, and hook up all cables for two database servers. We also assumed it would take four hours to unpack, rack, hook up all cables and configure storage for a clustered environment. We timed the installation of the operating system (Windows Server Enterprise Edition) on both the primary and secondary nodes, the configuration of the storage at the operating system level, installation of SQL Server, and bringing all nodes up to the latest patch level. Overall, the SQL Server deployment took 14.5 hours to complete.

Conversely, we were able to fully deploy Oracle Database Appliance in just under two hours. The required tasks for our administrators were to unpack, rack and plug cables into the appliance, and run Oracle Database Appliance Manager.

Testing the Unique Configuration

Before a high availability solution can be deployed in production, many testing scenarios have to be analyzed. Administrators and business stakeholders must have a high level of comfort prior to allowing a new solution to be operationally deployed. Ensuring that there are no issues can take anywhere from 40 to 120 hours. ORC determined that for the purposes of this test, 40 hours would be used. At ORC we realize that this is a conservative estimate, especially when one considers the personnel with various roles and responsibilities (e.g. DBAs, storage experts, operations, management) that must be involved in any testing scenarios.

The configuration of Oracle Database Appliance has already been tested and approved by Oracle, so there's no need for an organization to test anything in relation to a unique configuration. However, ORC recognizes that best practices usually dictate fully testing a product after deployment to ensure its proper operation.

Resolving Interoperability Issues

Failures between the various components of multi-vendor solutions will invariably occur. Discovery and resolution of these, sometimes unique, issues can be quite costly. The employment of technology specialists within an organization to discover and solve these issues is the primary cost in this area. We again made the assumption that 40 hours are required to locate, diagnose, and resolve these issues. As previously stated, it's important to remember that this estimate is again conservative, especially when one considers that many employees will be involved in this task.

Oracle Database Appliance removes this pitfall altogether. Because of the nature of having an appliance solution, interoperability issues no longer exist, since all components have been tested prior to the complete system being delivered to the customer.

Test: Maintenance

While installation is an important task, ongoing maintenance is where DBAs spend the majority of their time. In our testing we assumed that there would be only a single issue of maintenance per month. We realize this is probably too ideal a situation, considering that vendors do not coordinate the release of their various patches with concern to the operating system, database, or firmware. The maintenance tasks that we evaluated are listed in the table below:

Table 3 - Test: Maintenance Tasks

	B. Maintenance Tasks	Time (Minutes)	
		Oracle	SQL Srv
7	Verifying Patch Compatibility	0	60
8	Running Oracle Database Appliance Manager to Apply Patches	100	0
9	Patching and Verifying Firmware	0	120
10	Patching and Verifying OS	0	286
11	Patching and Verifying RDBMS	0	98
12	Testing the Unique Configuration	0	2400
	Total (Hours)	19.8	592.8

Note: Maintenance multiplier of 12 applied for single maintenance instance per month

Verifying Patch Compatibility

Before installing any patch within an existing high availability infrastructure, it's imperative that administrators evaluate the patch's compatibility with the current configuration. Upgrading an operating system or piece of firmware could have a disastrous impact on another component, leading to node, or even entire system failure. Performing the proper research on each patch is therefore very important. For example, the Windows Automatic Updates patching system is not cluster-aware, and cannot recognize that a SQL Server database is part of a clustered environment. While this will change in the upcoming Windows Server 8 operating system, for most production environments today a cluster-aware Windows Automatic Update is not available; therefore Windows Automatic Update has to be disabled on any production servers.

Validation of patches is not only complex for the operating system or attached storage, but also for the firmware and SQL Server. Each patch needs to be analyzed and confirmed. We assumed that during each patch cycle an analyst or administrator would need to spend one hour validating the patch's compatibility with the unique configuration. Assuming only twelve of these per year is conservative, considering the rate at which patches are produced for Microsoft products.

Since all patches are analyzed and tested prior to shipping based on pre-defined Oracle Database Appliance configurations, patches never need to be verified or validated for a unique configuration. However, as in the case of deployments, ORC recognizes that best practices often dictate fully testing a product after patching. Tools such as Oracle Real Application Testing can be used to perform this type of testing.

Running Oracle Database Appliance Manager to Apply Patches

One software program that we found very useful for patching was Oracle Database Appliance Manager. Oracle Database Appliance Manager consolidates operating system, firmware, and RDBMS patching into a single command. This utility looks at the current configuration and automatically brings it up to the

proper patch level. Rather than babysitting the application of all patches, executing this command allows the DBA to walk away and leave this process unattended. By using Oracle Database Appliance Manager, an exhaustive patch that updated disks, controller, operating system and Oracle Database took only 1 hour and 40 minutes to complete.

Microsoft SQL Server does not have a similar patching manager. Patching is therefore potentially problematic, resource intensive and time consuming.

Patching and Verifying Firmware

The process of validating firmware patches is just as time intensive as verifying the compatibility of a given patch. Since firmware patches are not cluster-aware, special consideration must be taken into account before performing any firmware patch upgrade. We therefore assumed two hours for this process in a Windows Server environment. This includes making any configuration changes that are needed in the cluster, and actually applying and validating the patch.

With Oracle Database Appliance, firmware patching is easily accomplished through the Oracle Database Appliance Manager.

Patch and Verifying the OS

In order to patch the Windows Server environment, we ran the Automatic Update process in order to bring it to the latest patch level, selecting all "Important" options available, and selecting all "Optional" updates that were related to the operating system. The process, including configuration, download time, installation, reboot, and validation (on a 100MB dedicated internet trunk at a Tier 1 facility) took a total of 286 minutes to complete. This time accounted for the work required for both nodes.

With Oracle Database Appliance, operating system patching is taken care of by the Oracle Database Appliance Manager.

Patching and Verifying the RDBMS

For this test, we applied Service Pack 1 to an existing SQL Server 2008 EE installation. This patch took 49 minutes to apply to each node. Unlike the operating system, SQL Server service packs are cluster aware, therefore making it easier to apply a patch to SQL Server than Windows Server.

Still, it's worth noting that it took longer to apply the SQL Server patch than it did to patch the entire Oracle Database Appliance.

Testing the Unique Configuration

After applying a set of patches, it's best practice to test the configuration that's been deployed. For most organizations this includes enlisting technologists from the Quality Assurance, Operations and DBA departments. Additional management personnel or business stakeholders that might need to sign off on the patch for release into production may also need to be included. We again chose a conservative figure of forty hours for performing this task in a Windows Server environment running SQL Server.

With Oracle Database Appliance, all configurations have already been tested prior to being delivered to the customer. Oracle Database Appliance has already gone through rigorous testing by Oracle to ensure there are no compatibility issues between its various components.

Test: Support

Backup and recovery are vitally important to a DBMS platform and not surprisingly, both solutions were able to perform these tasks. However, Oracle Database Appliance showed significant productivity gains over Microsoft SQL Server. The table below outlines the tasks performed:

Table 4 - Test: Support Tasks

	C. Support Tasks	Time (Minutes)	
		Oracle	**SQL Srv**
13	**Running Oracle Database Appliance Manager for Diagnostics and Support**	60	0
14	**Communicating with Vendors to Verify the Environment**	0	240
15	**Locating Log Files for Each Component and Vendor**	0	120
16	**Sending Logs with Details to Each Vendor**	0	20
	Total (Hours)	**12.0**	**76.0**

Note: Support multiplier of 12 applied for single support instance per month

Running Oracle Database Appliance Manager for Diagnostics and Support

Oracle Database Appliance Manager continued to prove its value in this phase of testing. In under an hour, it was able to validate the environment and gather all necessary log files for Oracle Support. Its ability to analyze the entire environment in regards to firmware, hardware, operating system and RDBMS showed the long-term value of this tool in resolving support issues.

In contrast to Oracle Database Appliance, Microsoft does not have a similar support tool available for Windows Server and SQL Server.

Communication with Vendors to Verify the Environment

A multi-vendor high availability solution like one based on SQL Server makes resolution of support issues more difficult. Coordinating communication between all of these vendors can be an arduous task, especially when one considers that various department heads may also have to be included for these conversations. Each vendor may also require a customer to supply different documentation regarding their environment. Given the time necessary for communication and assembling documentation, we made an assumption that four hours were needed per every support occurrence.

Since Oracle Database Appliance is a pre-configured solution, Oracle Support already knows every detail of its configuration.

Locating Log Files for Each Component and Vendor

While the log files for Windows Server and SQL Server are in commonly known locations, log files for firmware and other components may not be so easy to locate. Assembling these and deciding what exactly needs to be sent to the vendor can be time-consuming and difficult. If a customer sends too much information it could slow the issue resolution process, and if they send too little, a customer may have to start the problem resolution process over again.

With Oracle Database Appliance, all log file locations are known to Oracle Database Appliance Manager and log files can therefore be easily located and assembled for shipping to Oracle Support.

Sending Logs with Details to Each Vendor

ORC assumed in this study that for each support issue, emails containing the various log files necessary for problem resolution would need to be sent to each vendor. We assumed 20 minutes would be needed for drafting, attaching, reviewing and sending an email to a vendor. This length of time also includes gathering input from various technologists or department heads to ensure that the email correctly explains the issue.

In contrast to SQL Server, Oracle Database Appliance Manager automatically takes care of sending log files to Oracle Support, after it has run diagnostics and verified the environment.

Conclusion

Based on its research, ORC has concluded that Oracle Database Appliance provides significant time savings over Microsoft SQL Server when performing DBMS deployment, maintenance and support tasks. ORC found that Oracle Database Appliance is able to achieve these time savings because its pre-configured nature and unique manageability tools greatly simplify many time-consuming DBA tasks. Below is a summary of ORC's findings in three important areas DBAs have responsibility for:

- Installation and Deployment – In performing installation tasks, ORC found that since Oracle Database Appliance comes with all required hardware already pre-configured for a fail-over solution, deployment took just under 2 hours. In contrast, the deployment of a comparable SQL Server-based solution took 14.5 hours.

- Maintenance – From a maintenance perspective, ORC found that Oracle Database Appliance Manager's ability to determine the current configuration and automatically bring it up to the proper patch level gave it a very significant time savings advantage over SQL Server.

- Support – Oracle Database Appliance Manager was able to validate an environment and gather all necessary log files for Oracle Support in under an hour, while assembling and communicating this information for a SQL Server environment was a time-consuming process.

Oracle Database Appliance therefore saves customers significant time compared to SQL Server by greatly simplifying previously time-consuming DBA tasks. It offers high availability and reliability to customers for their mission-critical business applications, while at the same time providing exceptional ease of use.