EMC Unified Storage for SAP – Design Validation

Enabled by EMC Celerra with Oracle

EMC Global Solutions
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Overview

Purpose

This blueprint provides an overview of an EMC network-attached storage (NAS) configuration for SAP, utilizing the EMC® Celerra® unified storage platform and Oracle 10g with Linux over NFS.
The purpose of this blueprint is to validate the applicability of existing EMC Oracle design and layout recommendations to SAP ERP installations.

Blueprint definition

An EMC Global Solutions blueprint documents the interoperability, functionality, and performance test results of a combination of EMC and third-party products chosen to meet a specific customer requirement.

The business challenge

Cost-effective NAS storage systems are especially attractive to midsize enterprises running SAP. However, they still need to ensure that their SAP systems meet the performance requirements of their end users.

SAP customers running SAP on NAS storage systems face several challenges:

- Creating a storage system layout that enables them to meet the performance requirements of their end users.
- Ensuring that data protection operations don't affect production performance.
- Ensuring that non-production system refresh from production doesn't affect production performance.

These challenges amount to having a storage system that is optimally designed for performance.

Blueprint solution

This blueprint documents and validates a disk layout on a Celerra NS-480 with the NFS protocol. The data layout design described is recommended for SAP ERP in an Oracle database and Linux operating system environment.

To achieve the objective, this blueprint ensures:

- The disk layout is acceptable to an SAP environment with 1,000 simulated users, with typical SAP transactional loads; the layout achieved less than two seconds of average dialog response time.
- The impact on production performance is minimal when replicating with EMC Celerra Replicator™ while the SD workload is simulated.
## Key components

### Introduction
This section briefly describes the key solution components. For details on all of the components that make up the reference architecture, see the “Hardware and Software” section in this document.

### EMC Celerra NS-480
The EMC Celerra NS-480 unified storage system brings advanced clustering availability to multi-protocol environments. The Celerra NS-480 unified storage system delivers a single-box block and file solution offering a centralized point of management for distributed environments. This enables you to dynamically grow, share, and cost-effectively manage multi-protocol file systems as well as provide multi-protocol block access.

### EMC Celerra Replicator
EMC Celerra Replicator is an EMC Celerra Network Server software feature that enables you to easily and quickly create replicas of production file systems.

### VMware ESX
VMware ESX is the foundation for a dynamic, self-optimizing IT infrastructure. VMware ESX is a robust, production-proven virtualization layer that abstracts processor, memory, storage, and networking resources into multiple virtual machines. VMware ESX allows enterprises to dramatically reduce hardware and operating costs by sharing resources across a virtual environment.

### SAP ERP 6.0
SAP ERP 6.0 is a world-class, fully integrated solution that fulfills the core business needs of midsize and large organizations across all industries and market sectors. Together with SAP NetWeaver and a repository of enterprise services, SAP ERP 6.0 can serve as a solid business process platform that supports continued growth, innovation, and operational excellence.
Physical architecture

The following illustration depicts the overall physical architecture of the blueprint.

In this blueprint, the environment consists of three physical servers and an EMC Celerra storage array. An SAP ERP Central system is installed on one of the physical servers, which is connected to an EMC Celerra storage array with the NFS protocol, via Gigabit Ethernet LAN.

The remaining two physical servers are utilized as VMware ESX servers, and three virtual machines are configured on top of each ESX server. For each virtual machine an SAP Dialog Instance (DI) is installed for load-balancing purposes. Also, additional EMC Celerra volumes are allocated as the replication volumes.
## Environment profile

### Hardware resources

The hardware used in the blueprint is listed below.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage array</td>
<td>1</td>
<td>EMC Celerra NS-480 30 x 300 GB drives, 15 x 1 TB drives</td>
</tr>
<tr>
<td>SAP servers</td>
<td>3</td>
<td>(1) DB/CI server – 4 CPUs, 16 GB RAM (2) ESX server hosting 6 DI VMs – 2 CPUs, 16 GB RAM</td>
</tr>
</tbody>
</table>

### Software resources

The software used in the blueprint is listed below.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SuSe Linux Enterprise Server</td>
<td>10 SP2 (x86_64)</td>
<td>Central system and DI instance servers</td>
</tr>
<tr>
<td>SAP Application</td>
<td>ERP 6.0 SR2</td>
<td>ABAP Stack only</td>
</tr>
<tr>
<td>Oracle Database</td>
<td>10.2.0.2</td>
<td></td>
</tr>
<tr>
<td>VMware ESX Server</td>
<td>3.5 U3</td>
<td>Enterprise Edition</td>
</tr>
</tbody>
</table>
Design and validation

Introduction

This blueprint validates the design of the disk layout, introduced by EMC's Oracle experts, is applicable in an SAP ERP environment. To validate that performance meets SAP requirements, SAP users were simulated to concurrently produce typical SAP transaction loads. System response times are measured to ensure thresholds are not exceeded.
Disk layout

Storage configuration

Configuration steps consist of:
- RAID configuration
- EMC Celerra volumes and storage pool configurations
- File systems creation

RAID configuration

The following illustration depicts the RAID configuration of the blueprint, as shown below:

In this blueprint, 9 RAID groups (such as RG0, RG8, and RG9) are created with physical disks. Within the RAID group, EMC Celerra volumes are created and managed.

The following section discusses further details as to how EMC Celerra volumes and their corresponding file systems are configured.
EMC Celerra volumes configuration

EMC Celerra disk volumes are created and assigned to a user-defined storage pool. The storage pool is assembled with one or more RAID group; this allows the user to control exactly which RAID groups are used for a given volume.

Table 1 contains a list of the storage pools and RAID groups used in this blueprint.

File system configuration

The file systems shown in Table 1 are created and exported on the EMC Celerra, and mounted on the SAP server.

Table 1 File system layout

<table>
<thead>
<tr>
<th>File system</th>
<th>Content</th>
<th>Storage pool</th>
<th>RAID groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>/Oracle_data_EN1</td>
<td>Datafiles</td>
<td>data1_pool*</td>
<td>RGO 10, 11, 12, 13</td>
</tr>
<tr>
<td>/LogA_EN1</td>
<td>Redo log files (OriglogA, MirrlogB)</td>
<td>LogA_EN1_pool</td>
<td>RG8</td>
</tr>
<tr>
<td>/LogB_EN1</td>
<td>Online redo log files (OriglogB, MirrlogA)</td>
<td>LogB_EN1_pool</td>
<td>RG9</td>
</tr>
<tr>
<td>/SAP_EN1</td>
<td>SAP binaries, transport files</td>
<td>data1_pool*</td>
<td>RGO 10, 11, 12, 13</td>
</tr>
<tr>
<td>/Oracle_EN1</td>
<td>Oracle home, binaries</td>
<td>data1_pool*</td>
<td>RGO 10, 11, 12, 13</td>
</tr>
<tr>
<td>/ARCH_EN1</td>
<td>Archive logs</td>
<td>ARCH_pool</td>
<td>RG14</td>
</tr>
</tbody>
</table>

*Note: This storage pool contains a volume that stripes across multiple RAID Groups. File systems for SAPDATA, SAP/Oracle binaries, and SAP transports are then carved out of the storage pool.

Performance

To ensure that the disk layout is acceptable to the SAP environment, one of the typical SAP Sales and Distribution (SD) business processes, known as Sales Order Processing, was validated with 1,000 simulated users. The result was an average dialog response time of less than two seconds.

In addition, local replication within the EMC Celerra was performed during the transactional loads to ensure that there is no significant impact to dialog response time during the replication process.
Conclusion

Summary
Infrastructure design and data placement are significant factors of performance in SAP ERP systems. This blueprint provides an optimal disk layout of EMC Celerra for SAP ERP systems. This recommendation reduces risk to critical SAP operations resulting from potential storage-related performance issues.

Benefits
The SAP NAS blueprint provides the following benefits:

- Provides a validated EMC Celerra storage layout to deliver optimal performance to an SAP ERP environment.
- Validates operation of file system replication for backup purposes, or to create non-production environments during normal business hours; with minimal impact to the SAP production system.

Next steps
To learn more about this and other solutions contact an EMC representative or visit www.EMC.com/solutions/SAP.