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SPARC Servers

Lifting and Shifting Oracle Solaris Guest Domains to SPARC Servers Running Oracle Solaris 11

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Introduction

A lift and shift is a migration of a compute environment from one system to another, keeping the original runtime environment intact in the new system. This paper describes lifting and shifting an Oracle Solaris logical guest domain from an Oracle Solaris system to another Oracle Solaris system.

There are a variety of factors that drive the need to move a logical domain in an intact state, from one system to another. For example, you might perform a lift and shift to achieve one of these goals:

» Relocate the logical domain to more modern hardware
» Consolidate logical domains on fewer systems
» Accommodate a data center reconfiguration or relocation

Moving logical domains requires careful consideration, with special attention given to assessing the domain's hardware resources, software applications, data, and performance characteristics.

The configuration of logical domains differ in many aspects. This lift and shift process takes into account variations that are typically found in a virtualized compute environment. For example, the process includes assessments for identifying the domain's CPU and memory resource configuration, storage and network topologies, as well as application and database configurations.

While this paper describes the lift and shift process, the detailed step-by-step instructions are provided in the *Lift and Shift Guide - Moving Oracle Solaris 10 Guest Domains to SPARC Servers Running Oracle Solaris 11* (referred to as the Lift and Shift Guide in this paper). The Lift and Shift Guide is available at: https://docs.oracle.com/cd/E94980_01.

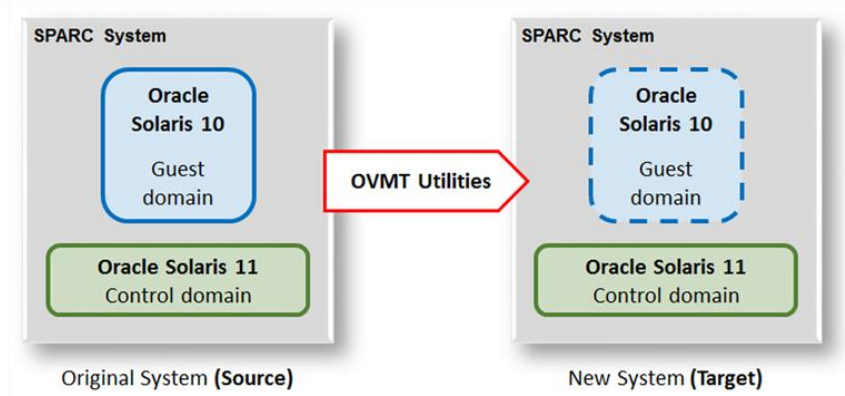# Oracle Solaris Guest Domain Lift and Shift Scenario

This paper describes the process of lifting an Oracle Solaris 10 or 11 guest domain from a SPARC system running Oracle Solaris 10 or 11, and shifting it to a SPARC system that is running Oracle Solaris 11. The guest domain retains its original Oracle Solaris OS version.

This lift and shift scenario is based on Oracle VM Server for SPARC running on SPARC sun4v architecture for both the source and target systems and applies to these three scenarios:

Scenario 1 -- **Moving an Oracle Solaris 10 Guest Domain from an Oracle Solaris 10 Control Domain to an Oracle Solaris 11 Control Domain**
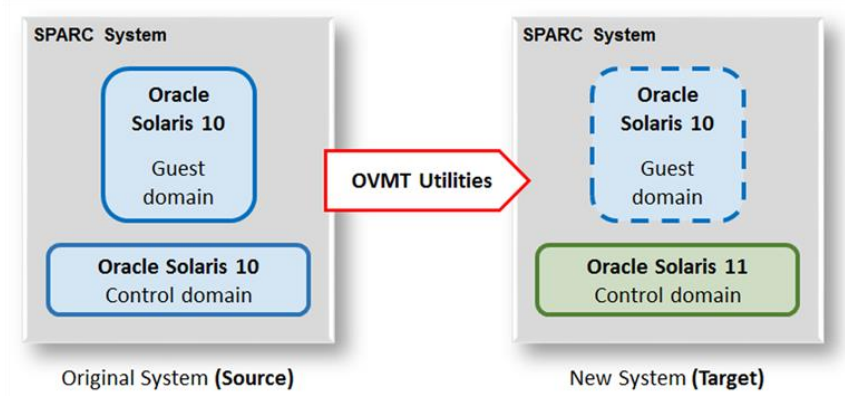
Scenario 2 -- **Moving an Oracle Solaris 10 Guest Domain from an Oracle Solaris 11 Control Domain to an Oracle Solaris 11 Control Domain**

Scenario 3 -- Moving an Oracle Solaris 11 Guest Domain from an Oracle Solaris 11 Control Domain to an Oracle Solaris 11 Control Domain
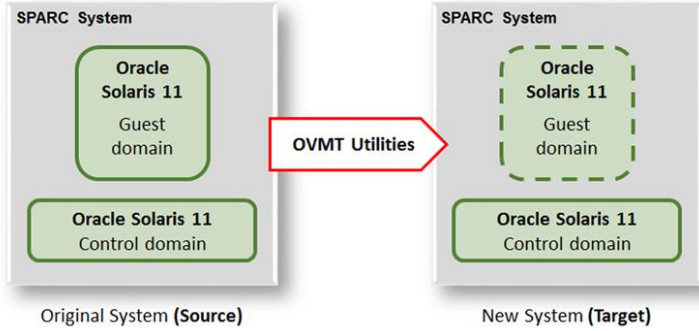
This type of lift and shift scenario is sometimes referred to as a *virtual-to-virtual* lift and shift because a virtual domain is moved from one virtual environment to another.

Once the shift is complete, the Solaris guest domain continues to provide the same compute services as before, including the Oracle Solaris OS, Oracle Database, applications, and associated data.

As shown in the following illustration, the scenarios make use of Oracle VM Template (OVMT) utilities that include tools that facilitate the lift-and-shift process.
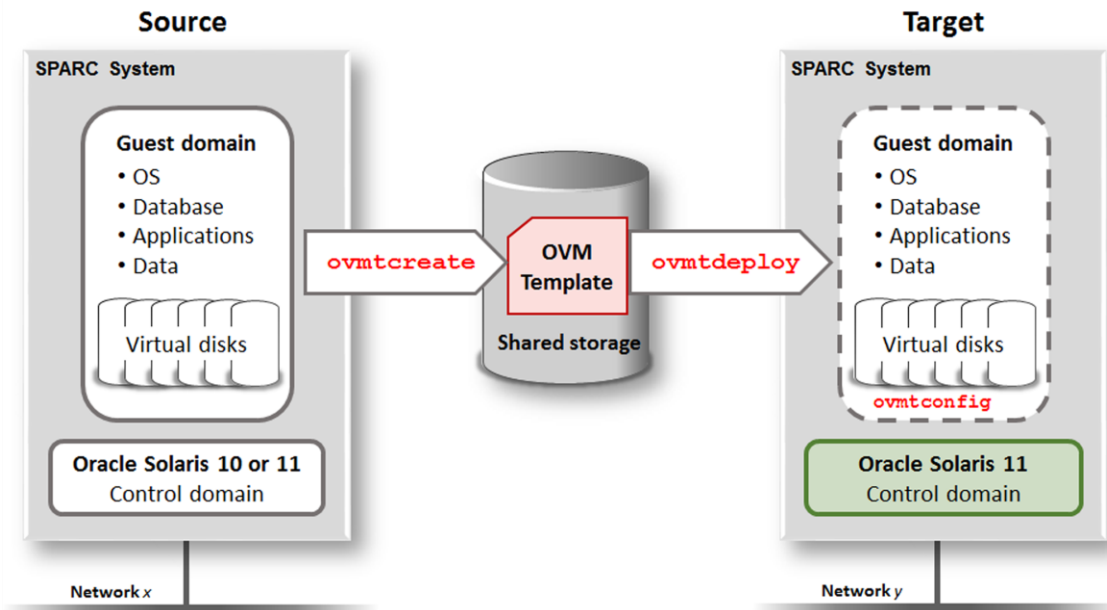
The process uses the `ovmtcreate` utility to create an OVM template that is an archive of the source guest domain. The template file is an archive of multiple files, including the guest domain's compressed virtual disk files. The template is created on storage that is shared between the source system and target system. Note that this scenario only supports guest domains that use virtual disks.

From the target system, the `ovmtdeploy` utility uses the template to deploy the guest domain on the target system. All of the guest domain's software components such as the OS, databases, applications, and data are migrated to the target system.

After the migration, you can use the `ovmtconfig` utility to reconfigure some of the guest domain's parameters such as the host name and networking parameters so that the guest domain can function in the new environment.

Requirements

To perform this lift and shift process, you must be able to meet the following requirements.

Source System

» **Control Domain OS** – The control domain can be running either of these OS versions:

   » Oracle Solaris 10 -- Must have the latest version of patch 151934 installed. The patch provides the ovmt utilities for the lift.
   » Oracle Solaris 11.3 -- Must run Oracle Solaris 11.3 with SRU 31 (or later), and include the `ovmtutils` package.
» **Working directory** – The `ovmtcreate` command requires space in a working directory where the guest domain's storage is compressed. Ensure that the working directory has an amount of free space that is at least half of the total size of the guest domain's virtual storage.

Target System

» **Control Domain OS** – Must run Oracle Solaris 11.3 with SRU 31 (or later), and include the `ovmtutils` package.
» **CPU and Memory Resources** -- Prior to the lift and shift, ensure that there are enough available CPU and memory resources to support the guest domain.
» **Virtual Disks** – The target system must be able to provide the exact same number of virtual disks with the same capacities that the guest domain has on the source system.

The Lift and Shift Guide includes instructions for satisfying most of these requirements for the scenario where the source system has a control domain running Oracle Solaris 10.

Storage Space for Creating the Guest Domain Archive

You must provide storage space for the source archive. The amount of space that will hold the source archive file should be at least half of the total storage capacity of the guest domain on the source system.

Considerations

In addition to the requirements, these considerations might influence your lift and shift plans.

Lift and Shift Duration

The lift and shift process requires the shutdown of the source guest domain during the archive creation. The Lift and Shift Guide describes ways to optimize the lift and shift to minimize the overall duration.

The duration of the lift and shift process varies based on many factors, with these factors having a significant impact on the overall duration:

» Size of the guest domain's storage – All the virtual disks are copied and compressed into an archive file. The larger the storage, the longer the compression takes to complete.

» Compute resources of the source control domain – The `ovmtcreate` command that creates the archive file, runs in the source control domain.

» Compute resources of the target control domain – The `ovmtdeploy` command that creates the guest domain, runs in the target control domain.

As an example, an in-house lift and shift of a guest domain consisting of 1.4 TB of storage took several hours to complete.

Network Configuration Differences

After the shift to the target system, the guest domain's network topology (IP addresses, DNS configuration, and so on) is the same as it was the source system, but the configuration can be changed on the target system before the domain is put into production.

Contingency Plan

After the guest domain is moved to the target system, the guest domain on the source system remains offline and the guest domain operations transition to the target system. However, in the event of an unsuccessful migration, the source guest domain can be restarted on the source system to resume the services and end the down time.

Lift and Shift Process Overview

Before and after the lift and shift process, there are administrative tasks that ensure that the deployment of the guest domain on a new system is successful. The following sections outline the typical administrative tasks as well as the lift and shift process. For detailed instructions, refer to the Lift and Shift Guide.

Assess the Source and Target Systems

Collect Performance Data on the Source System and Guest Domain

Collecting performance data before the lift and shift provides a baseline for comparison in the new environment. In particular, make note of the CPU utilization so that you can estimate the most appropriate resources that the guest domain should have in the target system.

Gather Source System and Guest Domain Configuration Details

For planning, deploying, and assessing the final lift and shift outcome, you need to know how the guest domain is configured on the source system. Depending on your compute environment, consider identifying this type of information:

» Logical domain configuration
» CPU and memory resources assigned to the domains
» Host names
» Network configuration
» Complete details about the storage configuration (disks, virtual disks assigned to guest domains, and the zpool configuration)
» Detailed information about the guest domain's applications and databases
» If possible, take data samples to compare with data samples from the shifted guest domain on the target system.

Identify the Target System's Topology

Before deploying the guest domain, identify key characteristics of the target system. This information is used to plan and prepare the target system so that it can support the incoming guest domain. Depending on your compute environment, consider identifying this type of information:

» System architecture and host name
» CPU and memory resources, used and available
» Oracle Solaris 11 SRU level
» Logical domain configuration (version of the logical domains manager, control domain services, and so on)
» Network configuration
» Details about the storage topology (version of the logical domains manager, disks, virtual disks assigned to guest domains, and the zpool configuration)

Prepare the Source and Target Systems

Prepare the Source System

These types of activities prepare the source system to enable a successful lift and shift of the guest domain.

» Apply the latest Critical Patch Updates to the guest domain.
» Ensure that any long running transactions and connections are either left to complete or terminated based on business considerations.

- » Backup any critical data before the start of this process, so that you can fall back to this system if anything goes wrong.
- » Clean up and delete unwanted data on the source guest domain.
- » Install the latest Oracle VM Server for SPARC patch 151934 (for the 64-bit platform) on the control domain of the source system. The patch is available from My Oracle Support at: https://support.oracle.com
- » Prepare a working directory that has enough space for ovmtcreate to perform the template creation.
- » If the guest domain hasn't been rebooted recently, reboot it to ensure the domain is in a healthy state.

Prepare the Target System

These types of activities prepare the target system so that it is ready to accept the guest domain.

- » The number of available virtual disks and sizes on the target must match what the guest domain has the source system.
- » There must be a suitable amount of CPU and memory resources that are not allocated to other domains, so that the incoming guest domain can be allocated the resources.

During the deployment, you can assign any amount of CPU resources to the guest domain that are appropriate for the guest domain's workload. If you are uncertain about the CPU utilization of the guest domain's workload on the target system, then the target system should provide at minimum the same available CPU and memory resources that the guest domain had on the source system. This conservative approach helps maintain the same or better performance level of the workload after the migration. On the other hand, if the CPU utilization is estimated to be significantly lower for the guest domain on the target system, for example, if the target system has faster CPUs, then the target system can provide fewer CPU resources to the guest domain. In some cases, using fewer CPU cores reduces software licensing costs.

**Prepare a Shared Storage Location for the Archive**

The storage must meet these requirements:

- » **Shared storage** – The location must be accessible to the source system and the target system. The archive file is usually large. Using storage that is shared between the source and target systems avoids having to copy the file across the network to the target system. The lift and shift guide includes instructions for preparing NFS storage on the target system, then NFS mounting the storage on the source system.
- » **Sufficient storage space** – The shared storage must have enough available storage space to store the source archive file. The file is usually very large (97 GB in this example). The archive file will contain compressed versions of the guest domain's virtual disks. As a best practice, ensure that the minimum shared storage space is half of the guest domain's virtual disk storage.

## Lift and Shift the Guest Domain

Create the Archive of the Source Guest Domain

In this phase of the lift and shift process, the guest domain is stopped because the domain must be in a bound state. Then the `ovmtcreate` command is used to create an archive file on the shared storage. The archive file contains compressed versions of the source guest domain's virtual disks and configuration files.
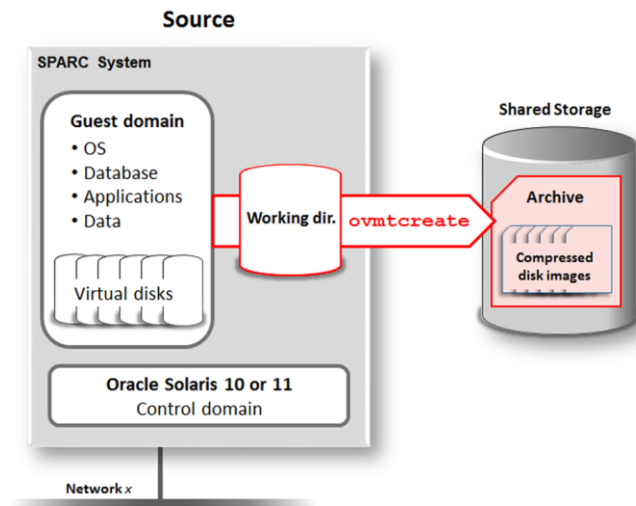
Deploy the Guest Domain on the Target System

On the target system, use the `ovmtdeploy` command to deploy the contents of the archive file onto the target system. The `ovmtdeploy` command creates an operational logical domain.
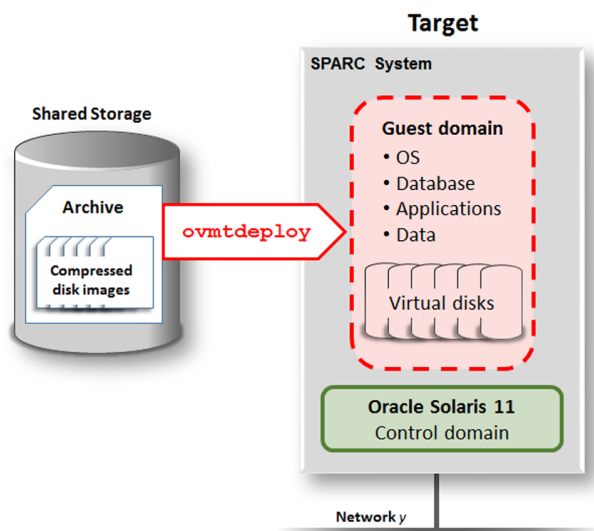
Review and Reconfigure the Shifted Guest Domain

Review the Deployed Guest Domain

Ensure that the deployment was successful and check for aspects of the configuration that might require changes to properly operate in the new environment. Examples of aspects to check:

» Guest domain status is present and running
» Storage is accessible
» Correct CPU and memory resources are assigned to the guest domain
» Host name is appropriate in the new environment
» Network configuration

Reconfigure the Target Guest Domain

Often, the migrated guest domain is in a different network on the target system. In such cases, the following configuration parameters might require reconfiguration:

» Host name
» Time zone
» root password
» Network name
» Subnet IP address
» Netmask
» Gateway
» DNS servers
» Search domains

You can use the `sys-unconfig` command to reset those parameters so that the parameters can be reconfigured using the `ovmtconfig` utility, in conjunction with a properties file.
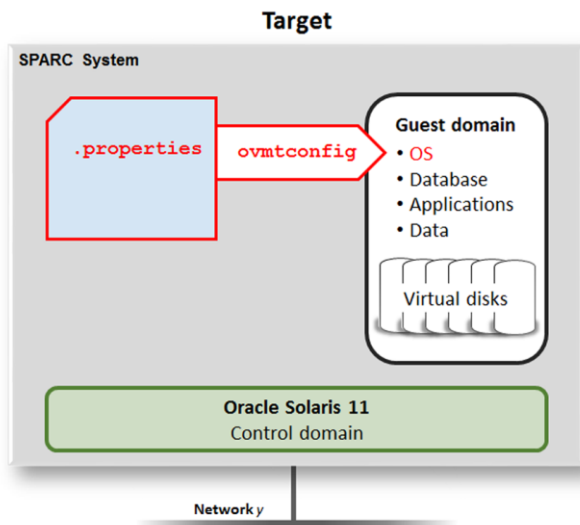
Reconfigure the Database and Applications for the New Environment

Now that the guest domain is reconfigured with a different host name and network parameters, some configuration details of the guest domain's database and applications might need to be reconfigured. Refer to the database and application documentation for further details.

Collect Performance Data on the Target System

Collect performance data and compare the data with the performance data collected on the source system. Use the same performance tools and metrics that were used to measure performance of the guest domain on the source system.

In particular, compare the CPU utilization. In some cases the new system provides improved compute performance for the workload in the target guest domain which might result in significantly lower CPU utilization than at the source system. In this case, consider assigning fewer CPU resources (preferably in core increments) to the guest domain. Doing so might also lower software license costs for the shifted guest domain.

Test and Go Live

Before going live, thoroughly test the applications and services provided by the guest domain.

Additional Resources

Lift and Shift Guide - Moving Oracle Solaris 10 Guest Domains to SPARC Servers Running Oracle Solaris 11: https://docs.oracle.com/cd/E94980_01

Oracle Solaris Documentation: https://docs.oracle.com/en/operating-systems/solaris.html

Oracle VM Server for SPARC 3.5 Documentation: https://docs.oracle.com/cd/E80106_01

Oracle VM Server for SPARC 3.4 Documentation: https://docs.oracle.com/cd/E69554_01

Oracle VM Server for SPARC 3.3 Documentation: https://docs.oracle.com/cd/E62357_01

Oracle VM Server for SPARC 3.2 Documentation: https://docs.oracle.com/cd/E48724_01

Oracle Enterprise Manager Database Express:
http://www.oracle.com/technetwork/database/manageability/emx-intro-1965965.html

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Integrated Cloud Applications & Platform Services

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