



Server Automation

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Planning Guide

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Overview

This document provides you with the information required to help you plan the SA configuration required for your facility. It also provides you with information to scale the performance of SA.

- ["SA Core configuration for your facility" on the next page](#)
- ["Customer installable SA Core configurations" on page 7](#)
- ["Configuration of additional components" on page 13](#)
- ["Performance scalability" on page 16](#)
- [Oracle setup for the Model Repository](#)

SA Core configuration for your facility

See "[Customer installable SA Core configurations](#)" for detailed descriptions of supported SA Core configurations. For performance scalability information, see "[Performance scalability](#)"

The SA Core configuration that is most appropriate for your facility will depend primarily on the number of servers that are to be managed by SA in the facility.

A typical SA Core installation has three main components. The Model Repository, the Infrastructure Component bundle and one Slice Component bundle. SA Provisioning also requires a Media Server and Boot Server. Since the Media Server and Boot Server do not generate much load and often have environmental dependencies they are not listed in the tables below. If you need more detailed information about SA Core Components, see the "SA Overview and Architecture" in the SA 10.50 Key Concepts Guide.

There is no infallible way to select hardware for an SA Core installation. However, the following two tables show a few recommended SA Core Component layouts that should perform well.

As you can see, scaling a core requires adding slices. Each slice adds highly available UI, API, OGFS, Build Manager and Gateway resources. If you have only a few core servers, you can begin with two larger servers, then increase the capacity of the core by adding additional slices.

The following abbreviations are used in the tables below:

MR: Model Repository

INFRA: Infrastructure Component bundle

Slice <x>: Slice Component bundle

OS Prov: Operating System Provisioning Component bundle

Small-to-Medium SA deployment (SA 7.80 and later)

Managed Servers	SA Component Distribution by Server		
	Server 1	Server 2	
500	MR, Infra, Slice 0, OS Prov	N/A	
1000	MR	Infra, Slice 0,	

Small-to-Medium SA deployment (SA 7.80 and later) , continued

Managed Servers	SA Component Distribution by Server	
		OS Prov
Server Configuration: 4 CPU cores, 16 GB RAM, 1 GB/s network		

Medium-to-large SA deployment (SA 7.80 and later)

Managed Servers	SA Component Distribution by Server				
	Server 1*	Server 2*	Server 3*	Server 4*	Server 5*
2000	MR	Infra, Slice 0, OS Prov	N/A	N/A	N/A
4000	MR	Infra, Slice 0, OS Prov	Slice 1	N/A	N/A
6000	MR	Infra, Slice 0, OS Prov	Slice 1	Slice 2	N/A
8000	MR	Infra, Slice 0, OS Prov	Slice 1	Slice 2	Slice 3
* Server Configuration: 8 CPU Cores, 16 GB RAM, 1 GB/s network					

For more information about performance scalability, see "[Performance scalability](#)".

Customer installable SA Core configurations

The following are SA Core configurations supported by HPE for customer installation.

1. SA Core with a local SA-supplied Oracle database

Suitable for small facilities. See [1. Core with a Local SA-supplied Database](#)

Configuration 1



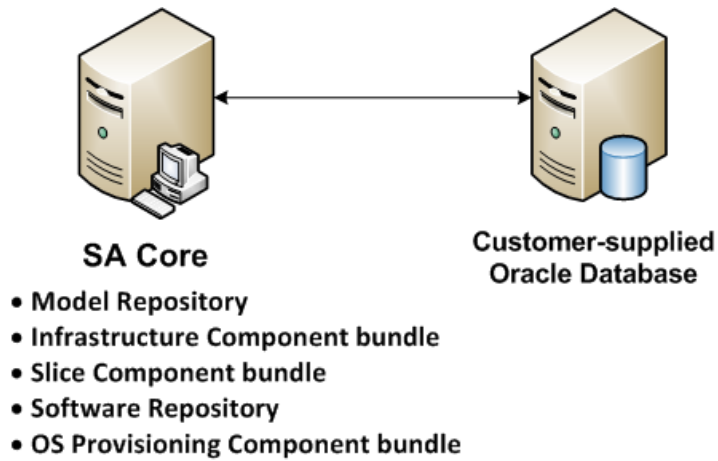
SA Core

- HP-supplied Oracle database
- Model Repository
- Infrastructure Component bundle
- Slice Component bundle
- Software Repository
- OS Provisioning Component bundle

2. SA Core with a remote customer-supplied Oracle database

Suitable for small to medium facilities. See [2. Core with a Remote Customer-supplied Oracle Database](#).

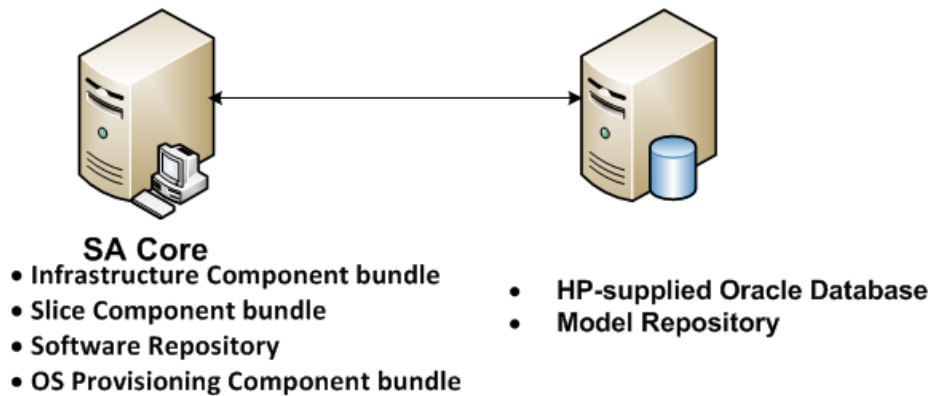
Configuration 2



3. SA Core with a remote model repository and SA-supplied Oracle database

Suitable for small to medium facilities. See [3. Core with a Remote Model Repository and Remote SA-supplied Database](#).

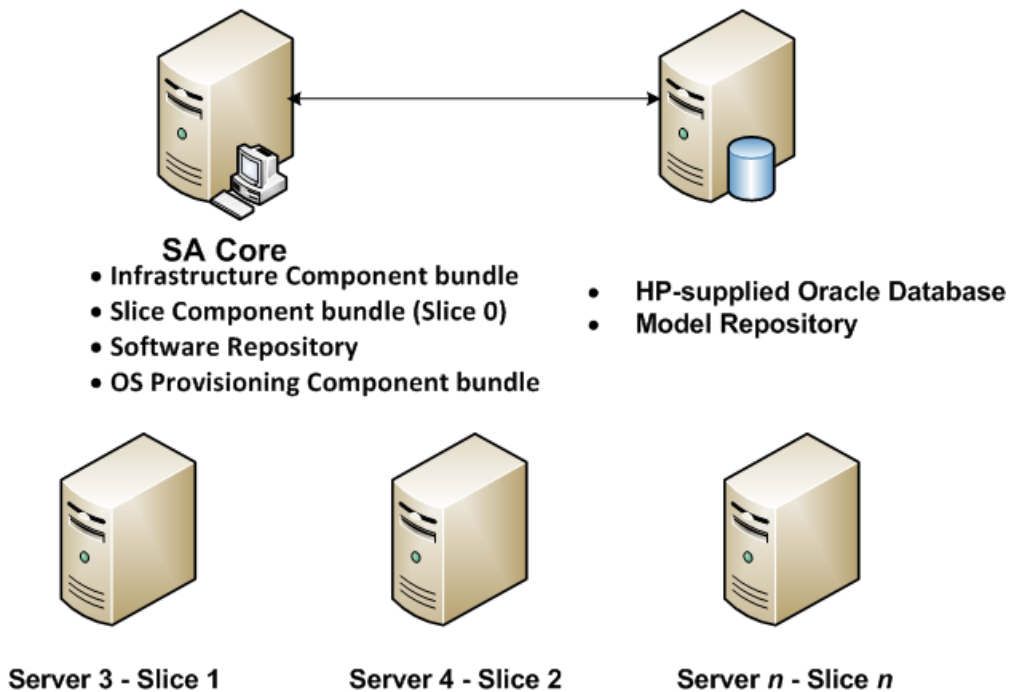
Configuration 3



4. SA Core with a remote model repository and SA-supplied Oracle database and additional slice component bundle instances

Suitable for small, medium and some larger facilities depending on the number of Slice Component bundles installed. See [4. Core with a Remote Model Repository and SA-supplied Oracle Database and Additional Slice Component Bundles](#).

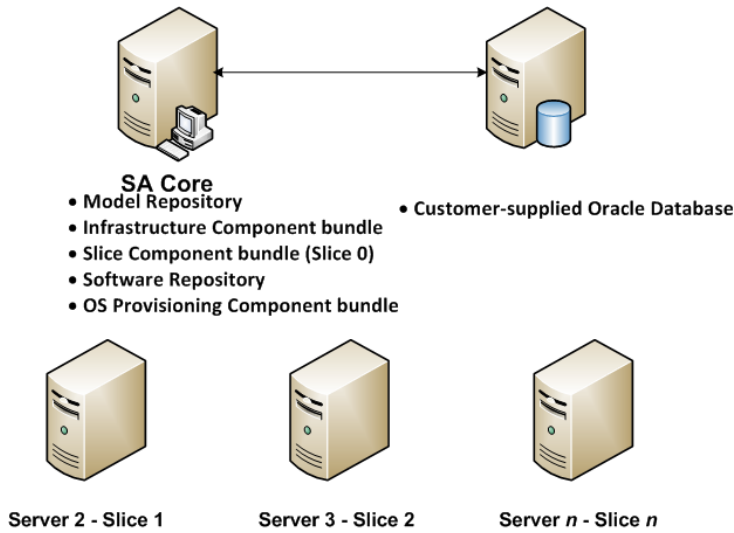
Configuration 4



5. SA Core with a remote customer-supplied Oracle database and additional slice component bundles

Suitable for small, medium and some larger facilities depending on the number of Slice Component bundles installed. See [5. Core with a Remote Customer-supplied Database and Additional Slice Component Bundles](#).

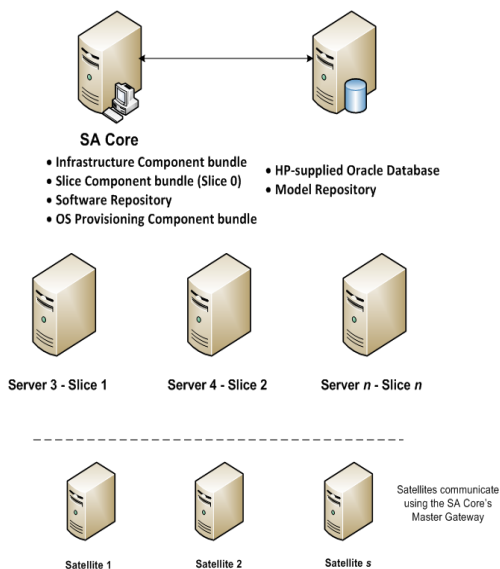
Configuration 5



6. SA Core with a remote model repository and SA-supplied Oracle database, additional slice component bundle instances and satellites

Suitable for small, medium and some larger facilities depending on the number of Slice Component bundles installed. See [6. Core with a Remote Model Repository and SA-supplied Oracle Database, Additional Slice Component Bundles and Satellites](#).

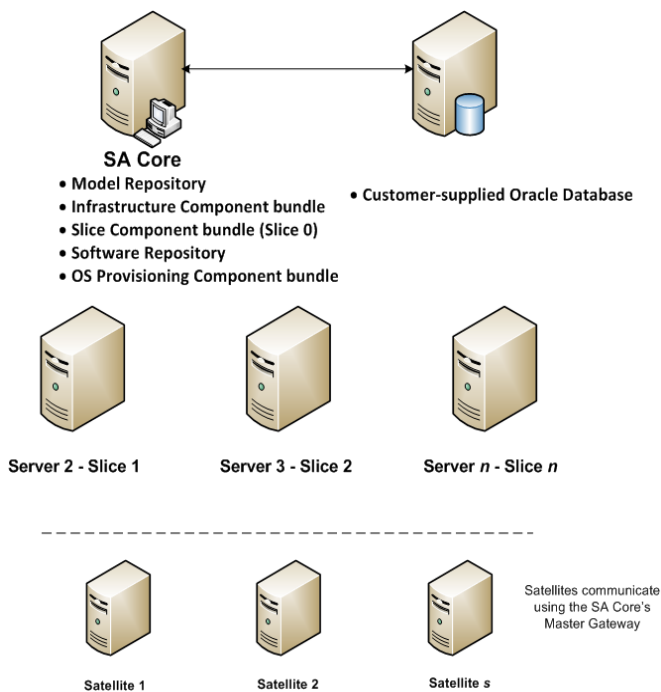
Configuration 6



7. SA Core with a remote customer-supplied Oracle database, additional slice component bundles and satellites

Suitable for small, medium and some larger facilities depending on the number of Slice Component bundles installed. Satellite installations can handle in facilities in which the number of managed servers is not large enough for a full SA Core. See [7. Core with a Remote Customer-supplied Database, Additional Slice Component Bundles and Satellites](#).

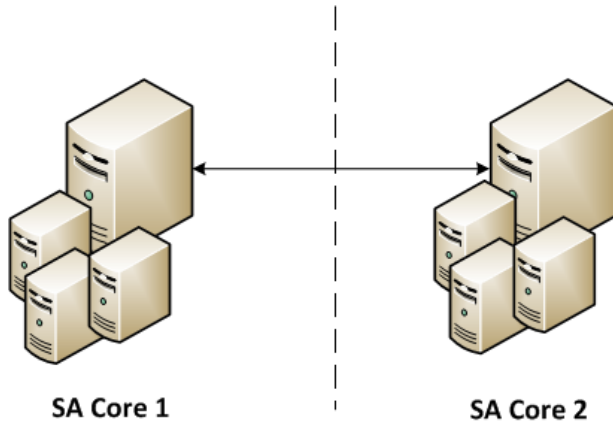
Configuration 7



8. First (Primary) Core with a Secondary Core (Multimaster Mesh)

Suitable for medium and larger facilities with a number of servers to be managed large enough to require a second core. See [8. SA First \(Primary\) Core with a Secondary Core \(Multimaster Mesh\)](#).

Configuration 8



Configuration of additional components

This section provides information about configuring the following additional components:

- ["FIPS compliance options" below](#)
- ["Enabling IPv6 networking " below](#)
- ["Cryptographic material options" on the next page](#)
- ["Mounting the SA ISO media" on the next page](#)

FIPS compliance options

HPE Server Automation (SA) complies with the Federal Information Processing Standards publication 140-2, a security standard that enables government entities to procure equipment that uses validated cryptographic modules. During installation you can choose to enable FIPS by setting the `fips.mode` parameter to **enabled**.

You will be prompted during the installation to specify whether FIPS should be enabled or not.

Under normal security conditions, HPE recommends using SHA256 with a key length of 2048. Higher security requirements could require FIPS with a key length of 4096 or other hash functions from SHA-2 family. Note that use of FIPS or other hash functions from SHA-2 family can impact core performance. Contact your Security Administrator for more information.

See [FIPS 140-2 compliance](#).

Note: In FIPS mode, sufficient entropy stemming from the character device `/dev/random` must be available on the core servers, to ensure proper startup and functionality of SA components.

Enabling IPv6 networking

To enable IPv6 networking, run the `enable_ipv6.sh` script as a post-installation or upgrade step. This enables IPv6 on the SA core and satellite gateways and OS provisioning components on SA 10.2 or later releases. The script is available on all infrastructure, slices, boot servers, and satellite systems. For more information, see [Enabling IPv6 networking post-installation](#).

For further information about IPv6 and the `enable_ipv6.sh` script, see “SA Remote Communications Administration” in the SA 10.50 Administration Guide.

For information about running the `enable_ipv6.sh` script post-installation, see [Enabling IPv6 networking post-installation](#).

Cryptographic material options

SA cryptographic material enables encrypted communications between SA Core Components. SA installs its own cryptographic material. Simply allow SA to generate its own material when prompted during installation.

As of this release, if you want to use cryptographic material from a previous SA installation (SA 10.0 or earlier), you can no longer simply copy the existing crypto file due to enhancements to the way SA handles encryption.

You can, however, copy the crypto file from an existing SA 10.1 or later SA Core. You can do so by copying the crypto file `/var/opt/opsware/crypto/cadb/realms/opsware-crypto.db.e` and the `/etc/opt/opsware/crypto/security.conf` file to the same locations on the server that will host the SA Core or First Core (Multimaster Mesh) before beginning the installation. During installation, do not have the installer generate cryptographic material and when you are prompted, provide the password for this cryptographic material.

Mounting the SA ISO media

The SA installation/upgrade media is organized into separate categories in the downloaded file structure, for example:

- `oracle_sas` (HPE Server Automation Database)
The media used to install the Oracle database
- `primary` (HPE Server Automation Product Software)
The media used to install the SA Core Components
- `upload` (HPE Server Automation Agents and Utilities)
The media used to upload and install SA Core content and tools
- `sat_base` (HPE Server Automation Satellite Base)

The media used to install the SA Satellite components, it does not include the OS Provisioning components and is therefore smaller and can be helpful when you are transferring the media over the network.

- **sat_osprov** (HPE Server Automation Satellite Base including OS Provisioning)
The media used to install the SA Satellite and the Satellite's OS Provisioning components.

Initial invocation of the `hpsa*` scripts for core install/upgrade for SA Cores must be from the primary media, Satellites from the `sat_base` or `sat_osprov` media.

The SA Installer requires that the media directory structure be maintained, for example:

```
<mountpoint>/<user_defined_prefix>-<media_name>/disk001/opsware_installer/hpsa*.sh
```

where `<user_defined_prefix>-<media_name>` is, for example, `hpsa-primary`, `hpsa-sat_base`, etc. HPE recommends the prefix `hpsa` and the media category identifiers shown above (`sat_base`, `primary`, etc.). *The hyphen after hpsa is required even if you do not append a prefix.*

SA is delivered as media that can be copied to a local disk or mounted as an NFS mount point. You must mount all media on a host where install script will be invoked. If media is mounted as follows the SA installer will auto mount it on local or remote core host(s) as needed. For example:

oracle_sas

```
mount oracle_sas.iso /<mountpoint>/hpsa-oracle_sas/
```

primary

```
mount primary.iso /<mountpoint>/hpsa-primary/
```

upload

```
mount upload.iso /<mountpoint>/hpsa-upload/
```

sat_base

```
mount upload.iso /<mountpoint>/hpsa-sat_base/
```

sat_osprov

```
mount upload.iso /<mountpoint>/hpsa-sat_osprov/
```

Where `<mountpoint>` is a media mount location of your choosing, for example `/mnt`.

If you use a different directory structure, the SA Installer will prompt you for the path each time it needs to access the media.

Performance scalability

This section provides information about improving the performance of your SA Core and its components..

You can vertically scale the SA Core Components, by adding additional CPUs and memory, or horizontally, by distributing the Core Components to multiple servers.

The "[Small-to-Medium SA deployment \(SA 7.80 and later\)](#)" and "[Medium-to-Large SA deployment \(SA 7.80 and later\)](#)" tables list the recommended distribution of SA components across multiple servers. In both tables, the bundled SA Core Components are distributed in the following way:

- MR: Model Repository
- INFRA: Infrastructure Component
 - Model Repository Multimaster Component
 - Management Gateway
 - Primary Data Access Engine
- Slice(x):
 - Agent Gateway
 - Core Gateway
 - Command Engine
 - Software Repository
 - Command Center
 - Build Manager
 - Web Services Data Access Engine
 - Secondary Data Access engine)
 - Global File System
 - Software Repository Accelerator (tsunami)
 - Memcache

Core component distribution

The introduction of bundled components requires that you consider how to distribute the SA Core components based on the hardware and memory you have available. A typical SA 7.5 or later installation now has three main components. The Model Repository, the Infrastructure Component bundle and one Slice Component bundle in addition to the Media Server and Boot Server. Since the Media Server and Boot Server do not generate much load and often have environmental dependencies they are not listed in the tables below.

There is no infallible way to select hardware for an SA installation. However, below are some recommended SA Core Component layouts that should perform well. As you can see, scaling a core requires adding slices. Each slice adds highly available UI, API, OGFS, Build Manager and Gateway resources. Consider that, when you have a small number of core servers, it may be best to begin with two larger servers, then grow the capacity of the core by adding additional slices. The following abbreviations are in the tables listed below:

- MR — Model Repository
- INFRA — Infrastructure Component bundle
- Slice <X> — Slice Component bundle
- OS Prov — Operating System Provisioning Component bundle. :

Small-to-Medium SA deployment (SA 7.80 and later)

Managed Servers	SA Component Distribution by Server		
	Server 1	Server 2	
500	MR, Infra, Slice 0, OS Prov	N/A	
1000	MR	Infra, Slice 0, OS Prov	
Server Configuration: 4 CPU cores, 16 GB RAM, 1 GB/s network			

Medium-to-Large SA deployment (SA 7.80 and later)

Managed Servers	SA Component Distribution by Server				
	Server 1*	Server 2*	Server 3*	Server 4*	Server 5*
2000	MR	Infra, Slice 0, OS Prov	N/A	N/A	N/A
4000	MR	Infra, Slice 0, OS Prov	Slice 1	N/A	N/A
6000	MR	Infra, Slice 0, OS Prov	Slice 1	Slice 2	N/A
8000	MR	Infra, Slice 0, OS Prov	Slice 1	Slice 2	Slice 3
* Server Configuration: 8 CPU Cores, 16 GB RAM, 1 GB/s network					

Factors affecting core performance

- The hardware requirements for SA vary based on these factors:
- The number of servers that SA manages
- The number and complexity of concurrent operations
- The number of concurrent users accessing the Command Center
- The number of facilities in which SA operates

Multimaster Mesh scalability

To support global scalability, you can install an SA Core in each major facility, linking the cores in a Multimaster Mesh. The size of the SA Core in each facility can be scaled according to local requirements.

Multimaster Mesh availability

In addition to Model Repository replication, a Multimaster Mesh supports the replication and caching of the packages stored in the Software Repository. Typically, the core in each facility owns the software that is uploaded to the core's Software Repository. To support availability, multiple copies of the packages can be maintained in remote Software Repositories. See the SA 10.50 Administration Guide for more information.

The bundling of the Software Repository with the Slice Component bundle and the Software Repository Store with the Infrastructure Component bundle does not affect availability. The Software Repository reads the replicator configuration file to determine how to serve files from backed up directories.

Satellite Core CPU/Memory requirements

Servers hosting SA Satellite Core installations must meet the following minimum requirement:

- 2 CPUs and 2 GB RAM per 1,500 managed servers per Satellite Core up to 4 CPUs and 4 GB RAM for 3000 managed servers per Satellite Core

The capacity of a server hosting an SA Satellite can be increased to support additional managed servers as indicated above. Workload characteristics across SA environments can vary dramatically and the carrying capacity of a given SA satellite under those workloads can vary as well. For deployments that require more than 3,000 devices behind an SA Satellite, HPE recommends that you consider deploying additional SA satellites in the same realm. This solution provides increased redundancy and additionally avoids reaching the point of diminishing return from a single SA Satellite host server which requires you to continuously increase its capacity in order to support increasing load demands.

Load balancing additional instances of core components

If SA must support a larger operational environment, you can improve performance by installing additional instances of the *Slice Component bundle* which provides you with these additional components per installation:

- Agent Gateway
- Core Gateway
- Command Center
- Software Repository
- Build Manager
- Web Services Data Access Engine
- Secondary Data Access engine
- Software Repository Accelerator (tsunami)
- Memcache

If you have installed multiple instances of the Slice Component bundle, load balancing between the instances occurs automatically as requests for load services are received by the Core Gateway. The Core Gateway handles incoming client connections and load balances them across the Slice Component bundles in the core.

You can also deploy a hardware load balancer for the servers that run additional instances of the Slice Component bundle. You can configure the load balancer for SSL session persistence (stickiness) with the least connections algorithm.

You can also put a load balancer in front of the Core Gateways, however, this will only load balance the Gateways, but with the added benefit that clients would have only one address to connect to and would failover gracefully in the event of a Slice Component bundle host failure.

Load Balancing does not affect validation of `httpProxy` certificates since the identity of the core is based on the address the clients use to connect, not the identity of the server that ultimately serves the request. All Slice Component bundles should be issued the same certificate and the hostname referenced in the certificate should match the DNS hostname that external clients use to connect. If a load balancer is used, this should be the hostname of the load balancer.

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