DEPLOYING SUN JAVA ENTERPRISE SYSTEM ON THE SUN FIRE T2000 SERVER USING SOLARIS CONTAINERS

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Introduction

Improving the manageability and efficiency of enterprise infrastructure services poses a significant challenge to many organizations. The problem is compounded by the proliferation of individual servers used to run key enterprise applications including directory, portal, identity, mail, and calendar services. A recent Gartner report [4] indicates that the power, space, and heat requirements of rackmounted servers are limiting growth and cost efficiency among 80 percent of enterprise data centers.

Consolidating enterprise infrastructure services that run on multiple servers to the Sun Fire™ T2000 platform using the Sun Java™ Enterprise System (Java ES) and Solaris™ Containers can simplify management, improve performance, and increase the efficiency of delivering enterprise infrastructure services.

This paper discusses how to consolidate enterprise infrastructure services onto a single Sun Fire T2000 server using Java ES software. In addition, this paper describes best practices that have resulted from performance testing different deployment scenarios of the Java ES on a Sun Fire T2000 server. Tests show that deploying the Java ES using Solaris Containers can support nearly three times the number of users supported by a deployment that does not use Solaris Containers.

This paper contains the following sections:

Who Should Read This Paper

The paper is intended for the following readers:

- Customers who want to reduce the operating costs of running their key enterprise productivity applications including portal, directory, identity, mail, and calendar services, and who are interested in consolidating all of these applications in a single Sun Fire T2000 server.
- System Administrators and installation technicians who need to install and tune Java ES software.

About the Sun Fire T2000 Server

The Sun Fire T2000 server is a high-density compute server platform based on the UltraSPARC® T1 processor. The major benefits of this platform are high aggregate throughput performance with very efficient power, cooling, and space consumption.

At the center of this new platform is the UltraSPARC T1 processor, which combines chip multiprocessing and hardware multithreading to provide a thread-rich environment for improved scalability for many applications. This new processor hardware architecture has the following features in a single-chip package:

- Eight cores or individual execution pipelines
- Four threads per core providing a total of 32 active thread contexts
- Each core has separate level 1 Instruction and data caches shared by the four threads
- All eight cores share a unified level 2 cache on chip
- Memory is unified to provide low latency to all cores
- The processor is fully SPARC V7, V8, and V9 binary compatible

In addition to the UltraSPARC T1, the Sun Fire T2000 platform supports up to 32 Gbytes of DDR2 SDRAM memory, four 1000 BASE-T on-board network interfaces, and up to four 73-Gbyte SAS disk drives. In a rack-optimized 2RU enclosure that typically draws 325 watts of power, the Sun Fire T2000 provides a high-performance, low-power alternative to many of the x64-based systems.

About Sun Java Enterprise System Software

Many enterprise computing environments utilize a variety of products from a number of vendors to deliver infrastructure services such as directory, email, calendar, identity, and portal services. This can result in a host of potential problems, including high acquisition costs, unnecessary deployment delays, compatibility and interoperability issues, unpredictable schedules, expensive licensing agreements, complicated version control and release schedules, and more.

Sun has taken a radical new approach to software infrastructure to help reduce costs throughout the IT project life cycle from acquisition, through deployment, and on to operation and maintenance. The Sun Java Enterprise System (Java ES) offers a single, comprehensive software system containing all of the critical enterprise infrastructure components every business needs to build applications and services. Java ES is an open, integrated enterprise-infrastructure software suite that offers customers unique advantages, including the following:

- Seamless integration of many important infrastructure software components, resulting in substantial time savings from evaluation, integration, and configuration issues, and enabling better focus on business problems.
- Open standards-based software components.
- A common installer, which makes it easy to install and configure the software components.
- An attractive price point for all software components.

About Solaris Containers

Today, application services are commonly comprised of components that are distributed across multiple servers. Managing these types of solutions is increasingly expensive both in terms of energy and administrative overhead. To reduce these costs, organizations are looking for ways to consolidate application services in fewer systems.

For consolidation to be effective, applications must be managed independently. This requires the ability to control resource utilization, isolate faults, and manage security between multiple applications on the same server. Such management requires the establishment of virtual server boundaries within the server. Server virtualization is a technique that allows large servers to be flexibly partitioned into independent execution environments that provide total isolation within the same server.

Solaris Containers technology—a foundation of Sun's virtualization portfolio—consists of several technologies that work together to foster improved resource management and virtualize the environment. With Solaris Containers, organizations can determine how to allocate resources among applications and services and ensure they are isolated from one another. Isolating applications is made possible by a Solaris Container technology called Solaris™ Zones, which provides separate environments on a given machine that isolate applications from one another. Each application receives a dedicated namespace in which to run, and cannot see, monitor, or affect applications running in another zone.

Deploying Java ES 2005-Q4 on a Sun Fire T2000 Using Solaris Zones

When used together, the UltraSPARC T1 processor, Solaris Containers, and Sun Java Enterprise System technologies can greatly improve the management, performance, and efficiency of an enterprise infrastructure. This section describes a particular methodology for using Java ES and Solaris Containers to consolidate key enterprise applications onto a single Sun Fire T2000 server.

Several Java ES servers are essentially web applications that need an underlying web container. Deploying these applications on a single web container is not a scalable solution. Testing, which is discussed later in this paper, clearly shows that such deployment cannot make full use of the vast compute and memory resources offered by the Sun Fire T2000 platform. Zones offer an easy way to deploy these applications on different web containers, each web container, in turn, hosted on a different zone. In other words, each of the Java ES applications that needs an underlying web container is deployed on a different instance of a web container. When deployed in different web containers, the Java ES applications do not contend with each other for heap space. This deployment allows good utilization of compute and memory resources offered by the Sun Fire T2000 server. Testing shows that such deployment can support nearly three times as many users compared to the number of users supported on a deployment with a single web container.

The consolidation project discussed in this paper uses six unique zones, with each zone configured to host a Java ES component (see Figure 1). Java ES components were assigned to the following zones.

- Zone1: Directory server
- Zone2: Access Manager (identity server)

- Zone3: Portal server
- Zone4: Messaging server (including the message transfer agent [MTA])
- Zone5: Calendar server
- Zone6: Communications Express

The following shows the architecture of the Java ES deployment using Solaris Zones. Arrows indicate the flow of requests among the Java ES components. Blue arrows indicate LDAP requests.

Figure 1. Java ES Deployment on Solaris Zones
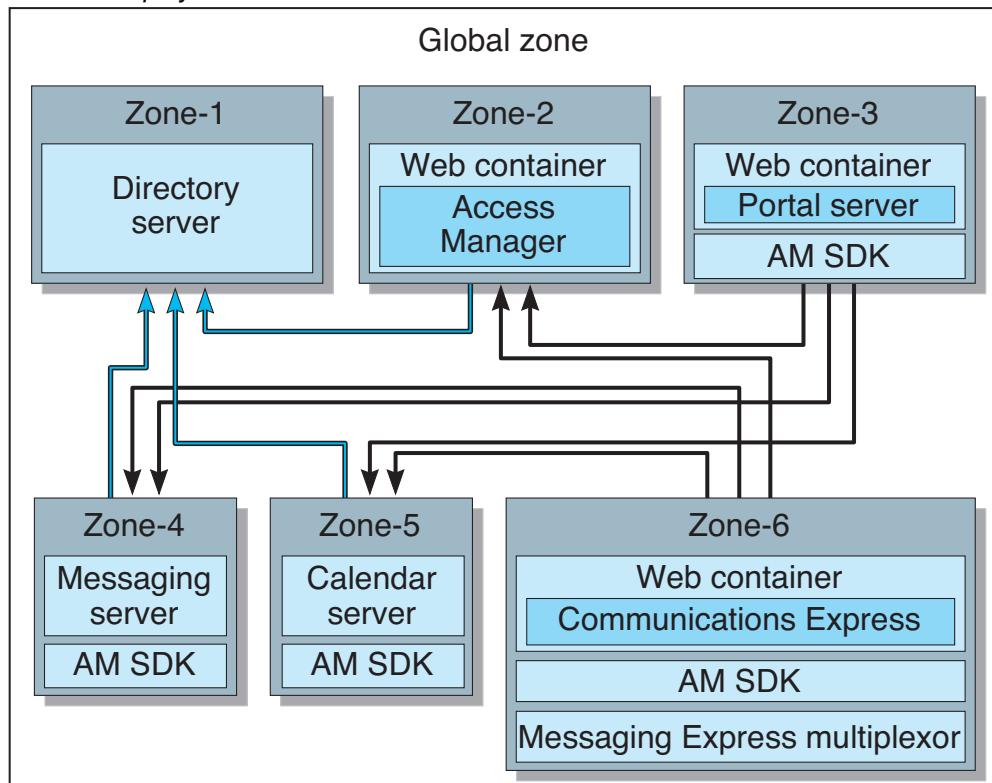
While Solaris Zones provide a virtual environment to shield each of the Java ES components, by default all zones have access to the full set of logical CPUs enabled in the system. To ensure that no single zone utilizes excessive CPU cycles, Solaris provides the capability to create and bind resource pools to each zone. Testing showed the default configuration to be adequate for this Java ES deployment.

The following sections provide the commands used to create Solaris Zones and the methodology used to deploy Java ES on Solaris Zones.

To Configure Solaris Zones

The following steps illustrate how to configure the zones used in this deployment. For more detailed information on configuring zones, see the *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*[2].

1. Create a zone for each Java ES component by using the `zonecfg` utility. This example creates a zone named `jes_zone1`.

```
global # zonecfg -z jes_zone1
jes_zone1: No such zone configured
Use 'create' to begin configuring a new zone.
zonecfg:jes_zone1> create
zonecfg:jes_zone1> set zonepath=/export/home/zones/jes_zone1
zonecfg:jes_zone1> set autoboot=true
zonecfg:jes_zone1> add fs
zonecfg:jes_zone1:fs> set dir=/export/home/public
zonecfg:jes_zone1:fs> set special=/export/home/public
zonecfg:jes_zone1:fs> set type=lofs
zonecfg:jes_zone1:fs> end
zonecfg:jes_zone1> add fs
zonecfg:jes_zone1:fs> set dir=/data
zonecfg:jes_zone1:fs> set special=/data
zonecfg:jes_zone1:fs> set type=lofs
zonecfg:jes_zone1:fs> end
zonecfg:jes_zone1> add net
zonecfg:jes_zone1:net> set address=10.6.221.115
zonecfg:jes_zone1:net> set physical=ipge0
zonecfg:jes_zone1:net> end
zonecfg:jes_zone1> add attr
zonecfg:jes_zone1:attr> set name=comment
zonecfg:jes_zone1:attr> set type=string
zonecfg:jes_zone1:attr> set value="JES Zone 1"
zonecfg:jes_zone1:attr> end
zonecfg:jes_zone1> remove inherit-pkg-dir dir=/lib
zonecfg:jes_zone1> remove inherit-pkg-dir dir=/platform
zonecfg:jes_zone1> remove inherit-pkg-dir dir=/sbin
zonecfg:jes_zone1> remove inherit-pkg-dir dir=/usr
zonecfg:jes_zone1> verify
zonecfg:jes_zone1> commit
zonecfg:jes_zone1> exit
```

The `zonepath` parameter specifies where the local zone root file system is created. Although sparse zones are used by default, you need to use whole-root zones to install and configure Java ES 2005-Q4 on zones. A whole-root zone takes up much more space than a sparse zone, but it provides a great deal of flexibility. Inside whole-root zones you can easily remove files and packages, which isn't always possible within sparse zones.

The `remove` commands used in the preceding example enable you to configure whole-root zones. Note that the physical devices specified for each net resource configured for the new local zone were already configured in the global zone with a separate IP address. When the zone is booted, the `ifconfig` utility reports the new interface as `ipge0:1`. In the global zone, both interfaces `ipge0` and `ipge0:1` are reported, however, only `ipge0:1` is visible in the local zone. The `/data` file system can be used for storage purposes such as Java ES configuration data and user calendar and mail data.

2. Install and boot the zone by using the `zoneadm` utility as follows:

```
global # zoneadm -z jes_zone1 install
Preparing to install zone <jes_zone1>.
Creating list of files to copy from the global zone.
...

global # zoneadm -z jes_zone1 ready

global # zoneadm -z jes_zone1 boot
```

3. Log in to the new zone using the console option and configure the name and password information for this zone. In the following example, the host name is set to jes-zone1.

Note – Use DNS service when you configure the zones for Java ES instead of NIS.

```
global # zlogin -C jes_zone1

SunOS Release 5.10 Version Generic_118822-22 64-bit
Copyright 1983-2005 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.
Hostname: jes-zone1

jes-zone1 console login:
```

4. Repeat Steps 1 through 3 to create the zones jes_zone2, jes_zone3, jes_zone4, jes_zone5 and jes_zone6 (note that the parameters for the net resource must be changed for each zone).

    The Sun Fire T2000 server is configured with four onboard controllers named ipge0 through ipge3. This deployment uses only one network interface. However, based on the deployment requirement, you can use all of the network interfaces. For instance, you could use interface ipge0 interface for portal server traffic, and interface ipge1 for messaging server traffic. Doing this enables you to get better network throughput and improve overall performance. (One gigabit network interface was adequate for this example deployment.)

5. Verify that the zones are ready for Java ES deployment by using the zoneadm utility as shown in the following example:

```
global # zoneadm list -cv
 ID NAME             STATUS         PATH
  0 global           running        /
  1 jes_zone3        running        /export/home/zones/jes_zone3
  2 jes_zone2        running        /export/home/zones/jes_zone2
  3 jes_zone6        running        /export/home/zones/jes_zone6
  4 jes_zone1        running        /export/home/zones/jes_zone1
  5 jes_zone5        running        /export/home/zones/jes_zone5
  6 jes_zone4        running        /export/home/zones/jes_zone4
```

6. Log in to any of the newly created zones and verify that each has a network interface and that the mount points `/export/home/public` and `/data` are visible. This deployment stores all the configuration and user data including user mail files in the `/data` directory.

```
global # zlogin jes_zone1
[Connected to zone 'jes_zone1' pts/2]
Last login: Sun Nov  6 09:23:20 on pts/3
Sun Microsystems Inc.   SunOS 5.10      Generic January 2005

#  zonename
jes_zone1

# ifconfig -a
lo0:1: flags=2001000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4,VIRTUAL> mtu 8232 index 1
        inet 127.0.0.1 netmask ff000000
ipge0:1: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 2
        inet 10.6.221.115 netmask ffffff00 broadcast 10.6.221.255

# df -kl
Filesystem            kbytes     used    avail capacity  Mounted on
/                   42342570 20667793 21251352    50%    /
/dev                42342570 20667793 21251352    50%    /dev
/export/home/public 42342570 20667793 21251352    50%    /export/home/public
/data              206448473 98558248 105825741   49%    /data
proc                       0        0        0     0%    /proc
ctfs                       0        0        0     0%    /system/contract
swap                18027624      272 18027352     1%    /etc/svc/volatile
mnttab                     0        0        0     0%    /etc/mnttab
fd                         0        0        0     0%    /dev/fd
swap                18027424       72 18027352     1%    /tmp
swap                18027376       24 18027352     1%    /var/run
```

To Monitor and Manage Zones

The Solaris Operating System (Solaris OS) contains a number of utilities that are Zones aware, which enables you to efficiently monitor and manage CPU resources. Use the `prstat` and `mpstat` facilities to report the CPU utilization for each zone. For example:

```
global # prstat -Z
   PID USERNAME   SIZE   RSS STATE   PRI NICE     TIME  CPU PROCESS/NLWP
 29096 root      3525M 2293M cpu24   49    0   2:01:09  27% webservd/958
 29007 root       279M  229M cpu26   53    0   2:28:44  23% ns-slapd/54
 29251 root      3507M 1559M run     49    0   0:44:06 7.4% webservd/500
 29046 root      3177M 1937M cpu7    54    0   0:39:18 5.3% webservd/598
 29101 bs202758   192M  100M cpu7    59    0   0:12:16 2.5% imapd/9
 29098 bs202758   184M   92M run     40    0   0:11:55 2.5% imapd/6
 29099 bs202758   187M   95M run     40    0   0:11:50 2.5% imapd/6
 29102 bs202758   187M   95M cpu22   40    0   0:11:47 2.2% imapd/6
 29095 bs202758   186M   90M cpu10   40    0   0:11:50 2.1% imapd/6
 29100 bs202758   186M   96M sleep   55    0   0:11:40 1.9% imapd/6
 29132 bs202758   172M  141M cpu3    52    0   0:08:45 1.6% cshttpd/34
 29133 bs202758   176M  145M cpu4    59    0   0:08:38 1.2% cshttpd/38
 29130 bs202758   176M  145M cpu1    59    0   0:08:50 1.1% cshttpd/41
 29131 bs202758   180M  149M sleep   59    0   0:08:55 0.9% cshttpd/40
 29126 bs202758   172M  142M run     41    0   0:08:46 0.9% cshttpd/38
 29134 bs202758   172M  141M sleep   59    0   0:08:18 0.7% cshttpd/36
 29111 bs202758    59M   29M sleep   59    0   0:02:05 0.4% csadmind/9
 29116 bs202758   233M  140M cpu5    59    0   0:01:57 0.3% mshttpd/8
 29114 bs202758   234M  139M cpu25   60    0   0:01:51 0.3% mshttpd/11
 29107 bs202758   212M  115M sleep   59    0   0:01:43 0.2% mshttpd/8
 29115 bs202758   242M  143M sleep   59    0   0:01:54 0.2% mshttpd/8
 ZONEID   NPROC  SIZE   RSS MEMORY     TIME  CPU ZONE
      2      38 4312M 2466M   7.6%  2:04:11  27% jes_zone3
      1      34 1019M  372M   1.1%  2:30:25  23% jes_zone1
      6      92 5673M 2928M   9.0%  1:47:09  15% jes_zone4
      3      41 4591M 1817M   5.6%  0:48:46 7.5% jes_zone6
      5      41 1889M 1074M   3.3%  0:56:03 6.7% jes_zone5
      4      34 3939M 2105M   6.5%  0:41:12 5.4% jes_zone2
      0      48  206M   58M   0.1%  0:01:02 0.0% global
Total: 328 processes, 3988 lwps, load averages: 44.00, 38.04, 25.79
```

Overview of Deploying Sun Java Enterprise System 2005-Q4 on Solaris Zones

The instructions in this section are not intended to act as a replacement for the individual component documentation, or the Java ES documentation, but merely to serve as a guide. For more detailed instructions or information on different deployment scenarios refer to the Sun Java Enterprise System Documentation [1].

This deployment uses Java Enterprise System 2005-Q4. Performance testing was done on the following Java ES components:

- Sun Java System Messaging Server 6 2005-Q4
- Sun Java System Calendar Server 6 2005-Q4
- Sun Java System Portal Server 6 2005-Q4
- Sun Java System Communications Express 6 2005-Q4
- Sun Java System Directory Preparation Tool
- Communication Services Delegated Administrator 6 2005-Q4
- Sun Java System Web Server 6.1 SP5 2005-Q4
- Sun Java Access Manager 7 2005-Q4

- Sun Java System Directory Server 5 2005-Q4
- Sun Java System Administration Server 5 2005-Q4

The following sections guide you through the various stages involved in Java ES deployment. The example installation described in this paper uses the following example data that must be changed according to your installation:

- Domain name: map.beta.com
- Zone host name(s): `jes-zone1, jes-zone2, ..` through `jes-zone6`
- Password: password used for all passwords except the `amldapuser` password

To Deploy Directory Server in zone-1

1. Log in to zone-1 as root and start the Java ES installer as follows:

```
jes-zone1# installer
```

2. Select the following products to install:
   - Sun Java System Directory Preparation Tool
   - Sun Java System Directory Server 5 2005-Q4

3. Select the common server settings as shown in the following table during the installation.

Option	[Default Value]	Enter:
Installation type	Custom installation	accept default
Common server settings		
Host name	jes-zone1	accept default
DNS domain name	map.beta.com	accept default
Host IP address	Machine IP address	Verify correct address
Admin user ID	admin	accept default
Admin passwd	--	password
System user	root	root
System group	other	root

4. Select the directory server settings shown in the following table during the installation.

Option	[Default Value]	Enter:
Admin user ID	admin	accept default
Password	--	password
Directory manager DN	[cn=Directory Manager]	accept default
Directory manager password	--	password
Directory server root	[/var/opt/mps/serverroot]	accept default

Option	[Default Value]	Enter:
Server identifier	[jes-zone1]	accept default
Server port	[389]	accept default
Suffix	[dc=map,dc=beta,dc=com]	accept default
Administration domain	[map.beta.com]	accept default
System user	[root]	root
System group	[root]	root
Directory to store config data	[Store Config Data on this server]	accept default
Directory to store user and group info	[Store user data and group data on this server]	accept default
Populate suffix	[Populate with Sample Data]	accept default.

5. Start the directory server as follows and ensure that it starts successfully.

```
jes-zone1# cd /var/opt/mps/serverroot/slapd-jes-zone1
jes-zone1# ./start-slapd
```

To Deploy Access Manager in zone-2

1. Log in to `zone-2` as root and start the Java ES installer as follows.

```
jes-zone2# installer
```

2. Select the following products to install:
    *   Sun Java System Web Server 6.1 SP5 2005-Q4
    *   Sun Java Access Manager 7 2005-Q4 and all supporting software
    *   Communication Services Delegated Administrator 2005-Q4
    *   Deselect Sun Java System Directory Server 5 2005-Q4 (Use the remote directory server installed on `jes-zone1`)

3. Select common server settings (refer to the steps described in "To Deploy Directory Server in zone-1" on page 9).

4. Select the web server settings shown in the following table during the installation.

Option	[Default Value]	Enter:
Admin user ID	admin	accept default
Admin passwd	--	password
Web server host	jes-zone2.map.beta.com	accept default
Admin port	8888	accept default
Admin runtime user ID	root	accept default

Option	[Default Value]	Enter:
Web server runtime user ID	webservd	root
Web server runtime group ID	webservd	root
HTTP port	80	accept default
Document root directory	[/opt/SUNWwbsvr/docs]	accept default
Web server start on boot	[yes]	no

Note – Changing the web server's runtime `userID` and `groupID` was necessary because we wanted to run Access Manager using this same instance of the web server.

5. Select the Access Manger settings shown in the following table during the installation.

Option	[Default Value]	Enter:
Admin user ID	amadmin	accept default
Password	--	password
LDAP user ID	amldapuser	accept default
LDAP password	--	password1
Password encryption key	87dfjkauefjkdafdadf...	password
Install type	Legacy Mode(version 6.x style)	accept default
Access Manager web container options	--	Choose Sun Java System Web Server
Hostname	[jes-zone2.map.beta.com]	`jes-zone2.map.beta.com`
Web server port	[80]	accept default
Web server instance directory	[/opt/SUNWwbsvr/https-jes-zone2.map.beta.com]	`/opt/SUNWwbsvr/https-jes-zone2.map.beta.com`
Web server document directory	[/opt/SUNWwbsvr/docs]	`/opt/SUNWwbsvr/docs`
Is server instance port secure	[No]	accept default
Web container host	[jes-zone2.map.beta.com]	accept default
Services deployment URI	[amserver]	accept default
Common domain deployment URI	[amcommon]	accept default
Cookie domain	[.beta.com]	.map.beta.com
Administration console	Deploy new console	accept default
Console deployment URI	[amconsole]	accept default
Password deployment URI	[ampassword]	accept default
Console host name	[jes-zone2.map.beta.com]	`jes-zone2.map.beta.com`

Option	[Default Value]	Enter:
Console port	[80]	accept default
Directory server host		`jes-zone1.map.beta.com`
Port		389
Access Manager directory root suffix	[dc=map,dc=beta,dc=com]	dc=map,dc=beta,dc=com
Directory manager	[cn=Directory Manager]	accept default
Password	--	password
Directory server provisioned with user data?	[No]	No

6. Start the web server as follows and verify that it starts successfully.

```
jes-zone2# cd /opt/SUNWwbsvr/https-jes-zone2.map.beta.com
jes-zone2# ./start
```

Note – Verify that the Access Manager web modules including `amserver` and `amconsole` are loaded during the web server startup.

To Deploy the Portal Server in zone-3

1. Log in to `zone-3` as root and start the Java ES installer as follows:

```
jes-zone3# installer
```

2. Select the following products to install:
    *   Sun Java System Web Server 6.1 SP5 2005-Q4
    *   Sun Java System Portal Server 6 2005-Q4
    *   Sun Java Access Manager 7 2005-Q4 (select only the Access Manager SDK, deselect the other Access Manager components.)
    *   Deselect Sun Java System Directory Server 5 2005-Q4 (use the remote directory server installed on `jes-zone1`)

3. Select the common server settings (refer to the steps described in).

4. Select the web server settings as shown in the following table during the installation.

Option	[Default Value]	Enter:
Admin user ID	admin	accept default
Admin passwd	--	password
Web server host	jes-zone3.map.beta.com	accept default
Admin port	8888	accept default
Admin runtime user ID	root	accept default
Web server runtime user ID	webservd	root
Web server runtime group ID	webservd	root
HTTP port	80	accept default
Document root directory	[/opt/SUNWwbsvr/docs]	accept default
Web server start on boot	[yes]	no

5. Select the Access Manger settings as shown in the following table during the installation.

Option	[Default Value]	Enter:
Admin user ID	amadmin	accept default
Password	--	password
LDAP user ID	amldapuser	accept default
LDAP password	--	password1
Password encryption key	87dfjkauefjkdafdadf...	password
Install type	Legacy Mode(version 6.x style)	accept default
Access Manager: Directory Server Settings		
Directory server host		`jes-zone1.map.beta.com`
Port		80
Access Manager directory root suffix	[dc=map,dc=beta,dc=com]	dc=map,dc=beta,dc=com
Directory manager	[cn=Directory Manager]	accept default
Password	--	password
Directory server provisioned with user data?	[Yes]	Yes
Access Manager: Web Container for Running Access Manager Services		
Host		`jes-zone2.map.beta.com`
Services deployment URI	[amserver]	accept default

Option	[Default Value]	Enter:
Cookie domain	[.beta.com]	.map.beta.com
Services port	[80]	accept default
Server protocol	[HTTP]	accept default

6. Select the Portal Server: Web Container settings shown in the following table during the installation.

Option	[Default Value]	Enter:
Web container	Sun Java System Web Server	Sun Java System Web Server
Installation directory	[/opt/SUNWwbsvr]	accept default
Server instance	[jes-zone3.map.beta.com]	accept default
Server instance port	[80]	accept default
Server document root	[/opt/SUNWwbsvr/docs]	accept default
Secure server instance port	[No]	accept default
Load balancer controlling multiple portal servers	[No]	accept default
Load balancer protocol		accept default
Load balancer host		accept default
Load balancer port		accept default
Deployment URI	[/portal]	accept default
Install sample portal	--	Install the sample portal

7. Start the web server and verify that it starts successfully.

```
jes-zone3# cd /opt/SUNWwbsvr/https-jes-zone3.map.beta.com
jes-zone3# ./start
```

Note – Check that the PS web modules including portal are loaded during the web server startup.

To Prepare Directory Server (for Messaging and Calendar Server Installations)

1. Log in to `zone1`, then change to the directory where the `comm_dssetup` script is stored, and run it as follows:

```
jes-zone1# cd /opt/SUNWcomds/sbin
jes-zone1# /var/opt/mps/serverroot/bin/slapd/admin/bin/perl comm_dssetup.pl
```

The perl script prompts for a series of options. The following table shows how to respond to the prompts.

Option	[Default Value]	Enter:
Directory server root	[/var/opt/mps/serverroot]	accept default
Directory server instance	slapd-jes-zone1	accept default
Directory manager DN	[cn=Directory Manager]	accept default
Directory manager password	--	password
Use directory server for users/groups	[Yes]	accept default.
Users/groups base suffix	[dc=map,dc=beta,dc=com]	accept default.
Schema type?	[2]	accept default
Update the schema files?	[yes]	accept default
Configure new indexes?	[yes]	accept default.
Reindex new indexes?	[yes]	accept default.

2. Confirm your choices and `comm_dssetup` proceeds. Continue with the next step after `comm_dssetup` completes.

To Configure Delegated Admin and Communications CLI for Creating Users

1. Log in to `zone-2` as root, change to the directory where the configuration script was installed, and execute the configuration script as shown here.

```
jes-zone2# cd /opt/SUNWcomm/sbin
jes-zone2# ./config-commda
```

The script prompts for a series of options. The following table shows how to respond to the prompts.

Option	[Default Value]	Enter:
Directory to store user mgt data files	[/var/opt/SUNWcomm]	accept default
Install delegated admin utility, console and server		Select all
AM hostname	[jes-zone2.map.beta.com]	accept default
AM port	[8080]	80

Option	[Default Value]	Enter:
Default domain	[map.beta.com]	map.beta.com
Default SSL port	[443]	accept default
Web container	[Web Server]	Web Server
Web server root directory	[/opt/SUNWwbsvr]	accept default
Web server instance identifier	[jes-zone2.map.beta.com]	accept default
Web virtual server identifier	[https-jes-zone2.map.beta.com]	accept default
Web server HTTP port	[80]	80
Default domain separator	[@]	accept default
Access Manager base directory	[/opt/SUNWam]	accept default
Web server root directory	[/opt/SUNWwbsvr]	accept default
Web server instance identifier	[jes-zone2.map.beta.com]	accept default
Web virtual server identifier	[https-jes-zone2.map.beta.com]	accept default
Web server HTTP port	[80]	80
URL of directory server	[ldap://jes-zone2.map.beta.com:389/]	ldap://jes-zone1.map.beta.com:389/
Bind as	[cn=Directory Manager]	accept default.
Password	--	password
AM top level admin	[amadmin]	accept default
AM admin passwd	--	password
Access Manager internal LDAP auth username	amldapuser	accept default
AM internal LDAP auth passwd for amldapuser	--	password1
Organization DN	[o=map.beta.com,dc=map,dc=beta,dc=com]	o=map.beta.com,dc=map,dc=beta,dc=com
Top level admin for default organization	[admin]	accept default
Password	--	password
Load sample service packages	--	Yes (Checked)
Load sample organizations	--	Yes (Checked)
Preferred mailhost for sample	[jes-zone2.map.beta.com]	jes-zone4.map.beta.com

2. Restart the web server as follows.

```
jes-zone2# cd /opt/SUNWwbsvr/https-jes-zone2.map.beta.com
jes-zone2# ./stop
jes-zone2# ./start
```

3. Modify the domains and create sample users as shown in the following example.

```
jes-zone2# cd /opt/SUNWcomm/bin
jes-zone2# /opt/SUNWcomm/bin/commadmin domain modify -D admin -w password -X jes-
zone2.map.beta.com -n map.beta.com -p 80 -d map.beta.com -S mail,cal -H jes-zone4.map.beta.com

jes-zone2# /opt/SUNWcomm/bin/commadmin user create -D admin -F John -l jdoe -L Doe -n
map.beta.com -p 80 -w password -W password -X jes-zone2.map.beta.com -S mail,cal -E
jdoe@map.beta.com -H jes-zone4.map.beta.com -k legacy

jes-zone2# /opt/SUNWcomm/bin/commadmin user create -D admin -F Calendar -l calmaster -L Master
-n map.beta.com -p 80 -w password -W password -X jes-zone2.map.beta.com -S mail,cal -E
calmaster@map.beta.com -H jes-zone4.map.beta.com -k legacy
```

To Deploy the Messaging Server in zone-4

1. Log in to `zone-4` as root.
2. Stop the sendmail daemon as follows:

```
jes-zone4# /etc/init.d/sendmail stop
```

3. Start the Java ES installer as follows:

```
jes-zone4# installer
```

4. Select the following products to install:
   - Sun Java System Messaging Server 6 2005-Q4
   - Sun Java Access Manager 7 2005-Q4 (select only the Access Manager SDK, deselect the other Access Manager components.)
   - Deselect Sun Java System Directory Server 5 2005-Q4 (use the remote directory server installed on `jes-zone1`.)
5. Select Common Server Settings (refer to the steps described in).

6. Select the administration server and Access Manager settings.

Option	[Default Value]	Enter:
Server Root	[/var/opt/mps/serverroot]	accept default
Admin Port	390	accept default
Admin Domain	map.beta.com	accept default
System User	[root]	root
System Group	[root]	root
Administration Server: **Configuration Directory Server Settings**		
Admin User ID	admin	accept default
Admin Password	--	password
Directory Server Host	[jes-zone4.map.beta.com]	jes-zone1.map.beta.com
Directory Server Port	389	accept default
Access Manager: **Administration Settings**		
Admin User ID	amadmin	accept default
Password	--	password
LDAP User ID	amldapuser	accept default
LDAP Password	--	password1
Password Encryption Key	87dfjkauefjkdafdadf...	password
Install type	Legacy Mode(version 6.x style)	accept default
Access Manager: **Directory Server Settings**		
Directory Server Host		jes-zone1.map.beta.com
Port		389
Access Manager directory root suffix	[dc=map,dc=beta,dc=com]	dc=map,dc=beta,dc=com
Directory Manager DN	[cn=Directory Manager]	accept default
Password	--	password
Directory server provisioned with user data?	[Yes]	Yes
Access Manager: **Web Container for Running Access Manager Services**		
Host		jes-zone2.map.beta.com
Services deployment URI	[amserver]	accept default
Cookie domain	[.beta.com]	.map.beta.com
Services port	[80]	accept default
Server protocol	[HTTP]	accept default

7. Configure the messaging server as follows:

```
jes-zone4# cd /opt/SUNWmsgsr/sbin
jes-zone4# ./configure
```

- • Specify the fully qualified host name of the messaging server, FQHN:
  [jes-zone4.map.beta.com].
- • Define the directory to store configuration/data files [/var/opt/SUNWmsgsr].
- • Install MTA, MS store, and Messenger Express (there is no need to install multiplexor).
- • Provide the name of the mail server user and group: UNIX username [mailsrv], UNIX group
  [mail].

The installation script prompts for a series of options. The following table shows how to respond to the configuration options.

Option	[Default Value]	Enter:
URL of directory server	[ldap://jes-zone1.map.beta.com:389]	accept default.
Bind as	[cn=Directory Manager]	accept default.
Password	--	password
User/group server LDAP	[ldap://jes-zone1.map.beta.com:389]	accept default.
Bind as	[cn=Directory Manager]	accept default.
Password	--	password
Postmaster email address	--	foo@jes-zone4.map.beta.com
Password for messaging server accounts	--	password
Default email domain	[map.beta.com]	map.beta.com
Organization DN	[o=map.beta.com,dc=map,dc=beta,dc=com]	o=map.beta.com, dc=map,dc=beta,dc=com

8. Start the messaging server as follows:

```
jes-zone4# /opt/SUNWmsgsr/sbin/start-msg
```

To Deploy Calendar Server in Zone-5

1. Log in to zone-5 as root and start the Java ES installer as follows:

```
jes-zone5# installer
```

2. Start the Java ES installer and select the following products to install:
    •   Sun Java System Calendar Server 6 2005-Q4
    •   Sun Java Access Manager 7 2005-Q4 (select only the Access Manager SDK, deselect the other Access Manager components.)
    •   Deselect Sun Java System Directory Server 5 2005-Q4 (use the remote directory server installed on `jes-zone1`).
3. Select the common server settings (refer to the steps described in).
4. Select the administration server and Access Manager settings shown in the following table.

Option	[Default Value]	Enter:
Access Manager: Administration Settings		
Admin user ID	amadmin	accept default
Password	--	password
LDAP user ID	amldapuser	accept default
LDAP password	--	password1
Password encryption key	87dfjkauefjkdafdadf...	password
Install type	Legacy Mode(version 6.x style)	accept default
Access Manager: Directory Server Settings		
Directory server host		jes-zone1.map.beta.com
Port		389
Access Manager directory root suffix	[dc=map,dc=beta,dc=com]	dc=map,dc=beta,dc=com
Directory manager DN	[cn=Directory Manager]	accept default
Password	--	password
Directory server provisioned with user data?	[Yes]	Yes
Access Manager: Web Container for Running Access Manager Services		
Host		jes-zone2.map.beta.com
Services deployment URI	[amserver]	accept default
Cookie domain	[.beta.com]	.map.beta.com
Services port	[80]	accept default
Server protocol	[HTTP]	accept default

5. Configure the calendar server as follows:

```
jes-zone5# cd /opt/SUNWics5/cal/sbin
jes-zone5# ./csconfigurator.sh
```

   a. Enter the LDAP server host name `jes-zone1.map.beta.com`.
   b. Enter the LDAP server port as `389`.
   c. Enter the Directory Manager DN as `cn=Directory Manager` and the password as `password`.
   d. The Base DN should be `o=map.beta.com,dc=map,dc=beta,dc=com` (this may require editing).
   e. Enter the Calendar Server Administrator User ID as `calmaster`, password as `password`.
   f. Enable email alarms.
   g. Set the administrator email address to `root@jes-zone4.map.beta.com`.
   h. Set the SMTP Host Name to `jes-zone4.map.beta.com`.
   i. Choose the runtime configuration. Choose the default values of Service Port, Runtime User ID, and Runtime Group ID. Change `Max Sessions` to `10000`, `Max Threads` to `64`, and `Max Processes` to `4`.
   j. Choose the default values for the rest of the settings.

6. Start the calendar server as follows:

```
jes-zone5# /opt/SUNWics5/cal/sbin/start-cal
```

To Install Communications Express and Messenger Express in zone-6

1. Log in to `zone-6` as `root` and start the Java ES installer as follows:

```
jes-zone6# installer
```

2. Select the following products to install:
    •   Sun Java System Web Server 6.1 SP5 2005-Q4
    •   Sun Java System Communications Express 6 2005-Q4
    •   Sun Java System Messaging Server 6 2005-Q4
    •   Sun Java Access Manager 7 2005-Q4 (select only the Access Manager SDK, deselect the other Access Manager components).
    •   Deselect Sun Java System Directory Server 5 2005-Q4 (use the remote directory server installed on `jes-zone1`).

3. Select the common server settings (refer to the steps described in).

4. Select the administration server settings shown in the following table.

Option	[Default Value]	Enter:
Server Root	[/var/opt/mps/serverroot]	accept default
Admin Port	390	accept default
Admin Domain	map.beta.com	accept default
System User	[root]	root
System Group	[root]	root
Administration Server: **Configuration Directory Server Settings**		
Admin User ID	admin	accept default
Admin Password	--	password
Directory Server Host	[jes-zone4.map.beta.com]	jes-zone1.map.beta.com
Directory Server Port	389	accept default

5. Select the web server settings shown in the following table.

Option	[Default Value]	Enter:
Admin user ID	admin	accept default
Admin passwd	--	password
Web server host	jes-zone6.map.beta.com	accept default
Admin port	8888	accept default
Admin runtime user ID	root	accept default
Web server runtime user ID	webservd	root
Web server runtime group ID	webservd	root
HTTP Port	80	accept default
Document root directory	[/opt/SUNWwbsvr/docs]	accept default
Web server start on boot	[yes]	no

6. Select the administration server and Access Manager settings shown in the following table:

Option	[Default Value]	Enter:
Access Manager: **Administration Settings**		
Admin user ID	amadmin	accept default
Password	--	password
LDAP user ID	amldapuser	accept default
LDAP password	--	password1

Option	[Default Value]	Enter:
Password encryption key	87dfjkauefjkdafdadf...	password
Install type	Legacy Mode(version 6.x style)	accept default
Access Manager: **Directory Server Settings**		
Directory server host		jes-zone1.map.beta.com
Port		80
Access Manager directory root suffix	[dc=map,dc=beta,dc=com]	dc=map,dc=beta,dc=com
Directory manager DN	[cn=Directory Manager]	accept default
Password	--	password
Directory server provisioned with user data?	[Yes]	Yes
Access Manager: **Web Container for Running Access Manager Services**		
Host		jes-zone2.map.beta.com
Services deployment URI	[amserver]	accept default
Cookie domain	[.beta.com]	.map.beta.com
Services port	[80]	accept default
Server protocol	[HTTP]	accept default

To Deploy Messenger Express in zone-6

Communications Express requires that Messenger Express multiplexor (MEM) component be configured on the same zone. Perform the following tasks to configure and deploy MEM on `zone-6`.

1. Stop the sendmail daemon as follows:

```
jes-zone6# /etc/init.d/sendmail stop
```

2. Configure MEM as follows:

```
jes-zone6# cd /opt/SUNWmsgsr/sbin
jes-zone6# ./configure
```

   a. Specify the fully qualified host name of the messaging server, FQHN:
      [jes-zone6.map.beta.com]
   b. Define the directory to store configuration/data files [/var/opt/SUNWmsgsr]
   c. Select only Messenger Express. There is no need to install MTA, MS store, and multiplexor.
   d. Provide the name of the mail server user and group: UNIX username [mailsrv], UNIX group
      [mail]

The installation script prompts for a series of options. The following table shows how to respond to the configuration options:

Option	[Default Value]	Enter:
URL of directory server	[ldap://jes-zone1.map.beta.com:389]	accept default
Bind as	[cn=Directory Manager]	accept default
Password	--	password
User/group server LDAP	[ldap://jes-zone1.map.beta.com:389]	accept default
Bind as	[cn=Directory Manager]	accept default
Password	--	password
Postmaster email address	--	foo@jes-zone4.map.beta.com
Password for messaging server accounts	--	password
Default email domain	[map.beta.com]	map.beta.com
Organization DN	[o=map.beta.com,dc=map,dc=beta,dc=com]	o=map.beta.com, dc=map,dc=beta,dc=com

3. Configure the MEM in proxy mode and start the MEM. Note that the MEM will be running on port 2080, so UWC can use the port 80.

```
jes-zone6# cd /opt/SUNWmsgsr/sbin
jes-zone6# ./configutil -o local.service.http.proxy -v 1
jes-zone6# ./configutil -o local.service.http.proxy.admin -v admin
jes-zone6# ./configutil -o local.service.http.proxy.admin.jes-zone4 -v admin
jes-zone6# ./configutil -o local.service.http.proxy.adminpass -v password
jes-zone6# ./configutil -o local.service.http.proxy.adminpass.jes-zone4 -v password
jes-zone6# ./configutil -o local.service.http.proxy.port.jes-zone4.map.beta.com -v 80
jes-zone6# ./configutil -o service.http.allowadminproxy -v no
jes-zone6# ./configutil -o service.http.ipsecurity -v no
jes-zone6# ./configutil -o service.http.port -v 2080
jes-zone6# /opt/SUNWmsgsr/sbin/start-msg
```

4. Configure the back-end messaging server to allow proxy logins. To do so, log in to zone-4 (where the back-end messaging server is deployed), and execute the following commands, then restart the back-end messaging server.

```
jes-zone4# cd /opt/SUNWmsgsr/sbin
jes-zone4# ./configutil -o service.http.allowadminproxy -v 1
jes-zone4# /opt/SUNWmsgsr/sbin/stop-msg
jes-zone4# /opt/SUNWmsgsr/sbin/start-msg
```

To Deploy Communications Express in zone-6

After you configure Messenger Express multiplexor (MEM), follow the steps in this section to configure and deploy UWC on `zone-6`.

1. Start the web server container as follows:

```
jes-zone6# cd /opt/SUNWwbsvr/https-jes-zone6.map.beta.com
jes-zone6# ./start
```

2. Configure the Access Manager SDK as follows:

    a. Change to the directory that contains the amconfig input file template, `amsamplesilent`. Copy the input template file to a new file.

```
jes-zone6# cd /opt/SUNWam/bin
jes-zone6# cp amsamplesilent amsamplesilent.uwc
```

    b. Edit the `amsamplesilent.uwc` file to set the Access Manager SDK configuration parameters as follows:

```
DEPLOY_LEVEL=4
SERVER_NAME=jes-zone2
SERVER_HOST=jes-zone2.map.beta.com
SERVER_PORT=80
ADMIN_PORT=8888
DS_HOST=jes-zone1.map.beta.com
DS_DIRMGRPASSWD=password
ROOT_SUFFIX="dc=map,dc=beta,dc=com"
ADMINPASSWD=password
AMLDAPUSERPASSWD=password1
COOKIE_DOMAIN=.map.beta.com
AM_ENC_PWD="password"
NEW_OWNER=root
NEW_GROUP=root
PAM_SERVICE_NAME=other
WEB_CONTAINER=WS6
DIRECTORY_MODE=4
AM_REALM=disabled
WS61_INSTANCE=https-jes-zone6.map.beta.com
WS61_HOST=jes-zone6
```

    c. Run the `amconfig` command using the edited file.

```
jes-zone6# ./amconfig -s amsamplesilent.uwc
```

    d. Restart the web server.

```
jes-zone6# cd /opt/SUNWwbsvr/https-jes-zone6.map.beta.com
jes-zone6# ./stop
jes-zone6# ./start
```

3. Configure Communications Express.

```
jes-zone6# cd /opt/SUNWuwc/sbin
jes-zone6# ./config-uwc
```

The installation script prompts for a series of options. The following table shows how to respond to the configuration options.

Option	[Default Value]	Enter:
Directory to store config/ data files	[/var/opt/SUNWuwc]	accept default
Install mail/calendar components		select both
Hostname	[jes-zone6]	accept default
DNS domain	[map.beta.com]	accept default
Web container	[Web Server]	accept default
Web server root directory	[/opt/SUNWwbsvr]	accept default
Web server instance identifier	[jes-zone6.map.beta.com]	accept default
Virtual server identifier	[https-jes-zone6.map.beta.com]	accept default
HTTP port	[80]	accept default
Web container user ID	[webservd]	root
Web container group IP	[webservd]	root
URI path	[/uwc]	accept default
Hosted domain support	[No]	accept default
URL of directory server	[ldap://jes-zone6.map.beta.com:389/]	[ldap://jes-zone1.map.beta.com:389/]
Bind DN	[cn=Directory Manager]	accept default.
Password	--	password
DC tree suffix	[dc=map,dc=betat,dc=com]	accept default.
Default domain	[map.beta.com]	accept default
IS login URL	[http://jes-zone6.map.beta.com:80/ amserver/UI/Login]	[http://jes-zone2.map.beta.com:80/ amserver/UI/Login]
IS administrator DN	--	uid=amadmin,ou=people,dc=map,dc=beta,dc=com

Option	[Default Value]	Enter:
IS administrator password	--	password
Messenger Express port	[80]	2080
Calendar server hostname	[jes-zone6.map.beta.com]	jes-zone5.map.beta.com
Calendar server port	[9004]	80
Calendar admin user ID	[calmaster]	accept default
Calendar administrator user password	--	password
URL of PAB directory derver	[ldap://jes-zone1.map.beta.com:389]	accept default
Bind as	[cn=Directory Manager]	accept default
Password	--	password

4. Restart the web server container as follows:

```
jes-zone6# cd /opt/SUNWwbsvr/https-jes-zone6.map.beta.com
jes-zone6# ./stop
jes-zone6# ./start
```

To Configure Single Sign-On for Communications Services Products

To set up single sign-on for Communications Express, Access Manager, the messaging server, and the calendar server, follow these steps:

1. Specify the Communications Express settings on `zone-6` by verifying the following settings in `/var/opt/SUNWuwc/WEB-INF/config/uwcauth.properties`:

   a. Set `uwcauth.identity.enabled` to `true`
   b. Set `uwcauth.identity.login.url` to `http://jes-zone2.map.beta.com:80/amserver/UI/Login`
   c. Set `uwcauth.identity.cookiename` to `iPlanetDirectoryPro`
   d. Set `uwcauth.identity.binddn` to `uid=amadmin,ou=people,dc=map,dc=beta,dc=com`
   e. Set `uwcauth.identity.bindcred` to `password`
   f. Set `uwcauth.http.port` to `80`
   g. Set `uwcauth.https.port` to `443`

Note – Restart the web server if you changed any of the preceding settings.

---

2. Specify the messaging server settings on `zone-4` and `zone-6`.

   To enable Communications Express users to access Messenger Express using the Access Manager session, run the `configutil` commands as shown in the following example on `zone-4` (where the back-end messaging server is deployed) and `zone-6` (where MEM is deployed), and restart the servers.

```
# cd /opt/SUNWmsgsr/sbin
# ./configutil -o local.webmail.sso.amnamingurl -v http://jes-zone2.map.beta.com:80/amserver/
namingservice
# ./configutil -o local.webmail.sso.uwcenabled -v 1
# ./configutil -o local.webmail.sso.uwclogouturl -v http://jes-zone6.map.beta.com:80/uwc/base/
UWCMain\?op=logout
# ./configutil -o local.webmail.sso.uwcport -v 80
# ./configutil -o local.webmail.sso.uwccontexturi -v "uwc"
# ./configutil -o local.webmail.sso.amcookiename -v iPlanetDirectoryPro
# ./configutil -o local.webmail.sso.uwchome -v http://jes-zone6.map.beta.com/uwc
# ./configutil -o local.webmail.sso.enable -v 0
```

3. Specify the calendar server settings on `zone-5`.

    To set up single sign-on for the calendar server, follow these steps:

    a. Stop the calendar server on `zone-5`.
    b. Open `/opt/SUNWics5/cal/config/ics.conf` in an editor (such as vi).
    c. Set `service.http.allowadminproxy` to `yes`.
    d. Set `local.calendar.sso.amnamingurl` to `http://jes-zone2.map.beta.com:80/amserver/namingservice`.
    e. Set `local.calendar.sso.singlesignoff` to `yes`.
    f. Set `local.calendar.sso.amcookiename` to `iPlanetDirectoryPro`.
    g. Set `local.calendar.sso.logname` to `am_sso.log`.
    h. Set `service.calendarsearch.ldap` to `no`.
    i. Set `service.http.ipsecurity` to `no`.
    j. Start the calendar server.

Tuning Sun Java Enterprise System Software for Improved Performance

The default out-of-box Java ES configuration does not effectively utilize the compute and memory resources of the Sun Fire T2000 platform. The following sections focus on some minimal tunings that enable you to improve performance on the Sun Fire T2000 platform. Note that this is by no means an exhaustive list. For the most optimal tunings, refer to the individual product reference and performance guides.

To Tune the Directory Server

1. Increase the directory server database cache size.

    Each directory server uses a database cache that holds pages from the database containing indexes and entries. The database cache size (`nsslapd-dbcachesize`) is specified in bytes, and the cache space is allocated at server startup.

2. Increase the directory server entry cache size.

    The entry cache holds recently accessed entries, formatted for delivery to client applications. The entry cache size for a suffix (`nsslapd-cachememsize`) is specified in bytes, and the entry cache is allocated as needed.

The following example illustrates the preceding recommendations. The values that are edited are highlighted. Be sure to shut down the directory server before making these changes.

In the `dse.ldif` file (in the `config` directory of the directory server):

```
dn: cn=config,cn=ldbm database,cn=plugins,cn=config
nsslapd-dbcachesize: 54580838

n: cn=userRoot,cn=ldbm database,cn=plugins,cn=config
nsslapd-cachememsize: 126292787
```

3. Isolate databases and logs (including the transaction log and access log) on different disks.

To Tune a Web Container

Tune the Sun™ Open Net Environment (Sun™ ONE) Web Server (web container) in all the zones including `zone-2` (where Access Manager is deployed), `zone-3` (where the portal server is deployed), and `zone-6` (where Communications Express is deployed). Edit the `magnus.conf` and `server.xml` files in the web server `config` directory using the following tunings.

1. Increase the Sun ONE Web Server `ListenQ` size.

    This parameter and the related `Solaris tcp_conn_req_max_q` and `tcp_conn_req_max_q0` settings should match the throughput of the Sun One Web Server HTTP server. These queues act as a buffer to manage the irregular rate of connections coming from web users.

2. Improve the server thread concurrency.

    Increasing the number of active HTTP threads that handle the incoming HTTP requests can increase the concurrency and thereby improve the performance of the web server. The '`RQThrottle`' setting in the `magnus.conf` file specifies the maximum number of request processing threads in the web server.

3. Increase the number of acceptor threads and connection queue size.

    Acceptor threads are threads that wait for connections. These threads accept connections and put them in a connection queue where they are then picked up by request processing threads.

4. Tune the Java VM.

    Increase the Java VM heap size from the default 256 Mbytes to make best use of the memory resources available on the Sun Fire T2000 platform. Also, apply the GC (garbage collection) tunings.

The following examples summarize these tuning changes. The values that are added or changed are highlighted.

In the `magnus.conf` file:

```
RqThrottle 512
RqThrottleMin 128
ThreadIncrement 64
ConnQueueSize 8192
ListenQ 8192
```

In the `server.xml` file:

```
<SERVER qosactive="false">
    <LS id="ls1" port="80" servername="jes-zone2.sfbay.sun.com"
defaultvs="https-jes-zone2.sfbay.sun.com" ip="any" security="off"
blocking="no" acceptorthreads="4"
</SERVER>
 <JAVA javahome="....>
        < JVMOPTIONS>-Xms3136M -Xmx3136M</JVMOPTIONS>
        <JVMOPTIONS>-server</JVMOPTIONS>
        <JVMOPTIONS>-XX:+DisableExplicitGC</JVMOPTIONS>
        <JVMOPTIONS>-XX:+UseMPSS</JVMOPTIONS>
        <JVMOPTIONS>-XX:+UseParallelOldGC</JVMOPTIONS>
        <JVMOPTIONS>-XX:+UseParallelGC</JVMOPTIONS>
        <JVMOPTIONS>-XX:ParallelGCThreads=8</JVMOPTIONS>
        <JVMOPTIONS>-XX:+PrintGCTimeStamps</JVMOPTIONS>
        <JVMOPTIONS>-XX:+PrintGCDetails</JVMOPTIONS>
</JAVA>
```

Note – Restart the web server after applying the preceding recommendations.

To Tune Access Manager

1. Apply all the tuning recommendations in "To Tune a Web Container" on page 29.

2. Apply patch 120954-02 as follows to fix bugs and improve the performance of the Access Manager server.

```
jes-zone2# patchadd -G 120954-02
```

Note – After adding the patch, do not forget to follow the post-patch instructions, which primarily involves running the `amconfig` command.

3. Increase the sizes of the notification thread pool and the task queue length.

   The parameter `threadpool.size` specifies the size of the notification thread pool (total number of threads), and the `threadpool.threshold` parameter specifies the maximum task queue length. If the task queue reaches the maximum length, further incoming requests will be rejected along with a `ThreadPoolException` until the queue has vacancy. These errors will be logged in the `amSession` file in the Access Manager debug (`/var/opt/SUNWam/debug`) directory.

4. Consider increasing the number of allowed sessions and the size of the SDK cache.

   Monitor the stats directory (`/var/opt/SUNWam/stats`) to find information on the `Max sessions in session table` and SDK cache hits. Consider increasing the values of both parameters.

5. Increase the size of the LDAP connection pool.

The following examples illustrate these tuning changes. The values that are added or changed are highlighted.

In the `AMConfig.properties` file (in the `/etc/opt/SUNWam/config` directory) make the following changes.

```
com.iplanet.am.notification.threadpool.size=32
com.iplanet.am.notification.threadpool.threshold=50000
com.iplanet.am.sdk.cache.maxSize=100000
com.iplanet.am.session.maxSessions=25000
```

In the `serverconfig.xml` file (in the `/etc/opt/SUNWam/config` directory), specify the following values.

```
<ServerGroup name="default" minConnPool="130" maxConnPool="130">
```

In the Access Manager console, perform the following tasks:

1. Log in to the Access Manager console as `amadmin`.
2. Select the `Service Configuration` tab.
3. Click `Core` under `Authentication Modules`.
4. Edit the Default LDAP Connection Pool Size to be `130:130`.
5. Click `Save`.

`Note –` Restart the web server after applying the above recommendations.

To Tune the Portal Server

1. Apply all the tuning recommendations in "To Tune a Web Container" on page 29.
2. Apply the Access Manager patch 120954-02 as follows:

```
jes-zone3# patchadd -G 120954-02
```

3. Tune the AM SDK.

   Edit the `AMConfig.properties` and `serverconfig.xml` files as described in "To Tune Access Manager". The files can be found in the `/etc/opt/SUNWam/config` directory.

4. Tune the caller pool and template scan interval.

The default caller pool settings force the portal server to create a new thread for every channel rendered rather than using a thread pool. Also consider adjusting the template scan interval time.

In the file `/etc/opt/SUNWps/desktop/desktopconfig.properties` edit the following properties:

```
callerPoolMinSize=128
callerPoolMaxSize=256
callerPoolPartitionSize=32
templateScanInterval=3600
```

5. Tune the portal channels and containers by removing the channels and containers you do not need for better performance.

    Perform the following tasks on the Access Manager console:

    a. Log in to the Access Manager console as `amadmin`.
    b. Select the `Identity Management` tab.
    c. Select `View -> Services`.
    d. Click `Portal Desktop` (under `Portal Server Config`).
    e. Click `Manage Channels and Containers`.
    f. Click `JSPTabContainer` (the master container) to view all the containers that are visible on the portal desktop. Remove the unused containers. This deployment used only `MyFrontPagetabPanelContainer`. If you remove any containers, click `Save` under `Channel Management`.
    g. Click `MyFrontPageTabPanelContainer` to view all the channels visible on the portal desktop. Remove the channels you do not need (for example, `SampleXML`). This deployment used five channels including `UserInfo`, `App`, `BookMark`, `BookMark2`, and `SampleJSP`. If you remove any channels, click `Save` under `Channel Management`.

`Note –` Restart the web server after applying any of the preceding recommendations.

To Tune the Messaging Server

1. Increase the default number of the IMAP, HTTP and POP processes as shown in the following example:

```
jes-zone4# cd /opt/SUNWmsgsr/sbin
jes-zone4# ./configutil -o service.pop.numprocesses -v 8
jes-zone4# ./configutil -o service.imap.numprocesses -v 8
jes-zone4# ./configutil -o service.http.numprocesses -v 8
```

2. Increase the number of dispatcher processes and the size of the job queue as shown in the following examples. The values that are to be edited are highlighted.

    In the `job_controller.cnf` file (in the `config` directory of the messaging server), specify the following values:

```
[POOL=DEFAULT]
job_limit=10
```

In the `dispatcher.cnf` file (in the `config` directory of the messaging server), specify the following values:

```
MIN_PROCS=8
MAX_PROCS=32
```

Note – Restart the messaging server after making the preceding changes.

3. Use RAID technology for Message Store.

   If your message store requires multiple disks, use redundant array of independent disks (RAID) technology to simplify the management of multiple disks. With RAID technology, you can spread data across a series of disks but the disks appear as one logical disk volume so disk management is simplified. This deployment used a Sun StorageTek™ 3510 FC Array (with 12 *36GB 15K rpm disk drives) and Solaris™ Volume Manager to create the RAID-0 volume.

4. Apply Access Manager patch 120954-02 as follows:

```
jes-zone4# patchadd -G 120954-02
```

To Tune the Calendar Server

1. Tune the number of calendar server processes and increase the maximum calendar sessions. Restart the calendar server after the changes.

In the `ics.conf` file (in the `config` directory of the calendar server), specify the following values.

```
service.http.maxsessions = "10000"
service.http.numprocesses = "6"
service.http.maxthreads = "64"
```

2. Apply Access Manager patch 120954-02.

```
jes-zone5# patchadd -G 120954-02
```

To Tune Communications Express

1. Apply all the tuning recommendations in "To Tune a Web Container" on page 29.
2. Tune the AM SDK.

   Edit the `AMConfig.properties` and `serverconfig.xml` files as described in "To Tune Access Manager" on page 30. The files can be found in the `/etc/opt/SUNWam/config` directory.

3. Restart the web server after the changes.

4. Apply Access Manager patch 120954-02 as follows:

```
jes-zone6# patchadd -G 120954-02
```

To Tune the Solaris Operating System

1. Increase the file descriptor limits.

    Increase the values of `rlim_fd_max` and rlim_fd_cur in the file `/etc/system` to increase the
    number of file descriptors for all the Java ES components.

```
set rlim_fd_max=65536
set rlim_fd_cur=65536
```

Note – Reboot the system after editing the `/etc/system` file.

2. Increase the settings for Solaris TCP/IP listen queues.

    The queue `tcp_conn_req_max_q` determines the number of completed connections waiting to
    return from an `accept()` call, and the `queue tcp_conn_req_max_q0` determines the maximum
    number of connections with the handshake incomplete.

```
/usr/sbin/ndd -set  /dev/tcp  tcp_conn_req_max_q  8192
/usr/sbin/ndd -set  /dev/tcp  tcp_conn_req_max_q0  8192
```

Note – To automatically have these `ndd` commands executed after each system reboot, place them in a
file such as `/etc/rc2.d/network-tuning`.

Sun Java Enterprise System Performance Test Case

The performance of the Java Enterprise System with the suggested tuning parameters was tested on a
test Sun Fire T2000 platform. The JESMark benchmark was used as the workload.

JESMark is a Sun internal benchmark designed to test the performance of the Java Enterprise System as
a whole. The Java Enterprise System offers virtually endless deployment scenarios. It is impractical to test
all the facets of the Java ES software suite with a single benchmark. JESMark attempts to stress
commonly used features and integration scenarios which cover the majority of customer deployments.

The core components of the Java ES that were tested include:

• Sun Java System Directory Server
• Sun Java System Access Manager
• Sun Java System Portal Server

- Sun Java System Messaging Server
- Sun Java System Calendar Server
- Sun Java Communications Express

Overview of JESMark

The JESMark benchmark models an employee portal of a large corporation. The portal serves as a launching pad for all employee services such as email and calendar services. Once launched, the e-mail and calendar services run as separate applications in a browser window. Accordingly, the JESMark benchmark comprises different subbenchmarks that test mail, calendar, and portal services. The following sections briefly describe the various subbenchmarks.

Portal Workload

The portal is the central point of access. Employees log in to the portal to find information and use links in the portal to access various other services. The authentication is then propagated to the other services invoked or launched by the portal. The portal subbenchmark attempts to test the page-rendering performance and resource handling of the portal server. The subbenchmark also tests how well several standard portal channels are integrated with other services.

The main Java ES components that are stressed include the portal server, Access Manager, and the directory server. The interactions between the portal server and messaging/calendar servers are also tested.

Calendar Workload

Employees have a calendar channel on their portal, which allows them to see new calendar events. However, employees still use either a separate web browser window (Communications Express client) or a separate calendar client (Outlook Express) to manage their calendars.

This subbenchmark emulates both Outlook Express clients and Communications Express clients that access the calendar server. The transactions include common operations such as creating, reading and deleting calendar events, and accessing the month/day/week view of all the calendar events.

This subbenchmark primarily stresses the functionalities of the calendar server, Communications Express, and their interactions with back-end servers, Access Manager, and the directory server.

Email Workload

Employees commonly have an email channel on their portal, which allows them to see new messages and their headers. However, employees still use their favorite mail client (using protocols such as POP or IMAP) or a separate web browser window (HTTP) to manage their email.

This subbenchmark emulates all email clients including POP3, IMAP, and Webmail clients. The transactions include common operations such as reading, deleting, saving, and sending email.

This subbenchmark primarily stresses the functionalities of the messaging server, Communications Express, and their interactions with back-end servers, Access Manager, and the directory server.

Logical Architecture

The following figure shows the various client drivers that comprise the JESMark and Java Enterprise System components that they stress. It also shows the interactions among the Java ES components. Arrows indicate the flow of requests.

Figure 2. Client Drivers Comprising JESMark and Java ES
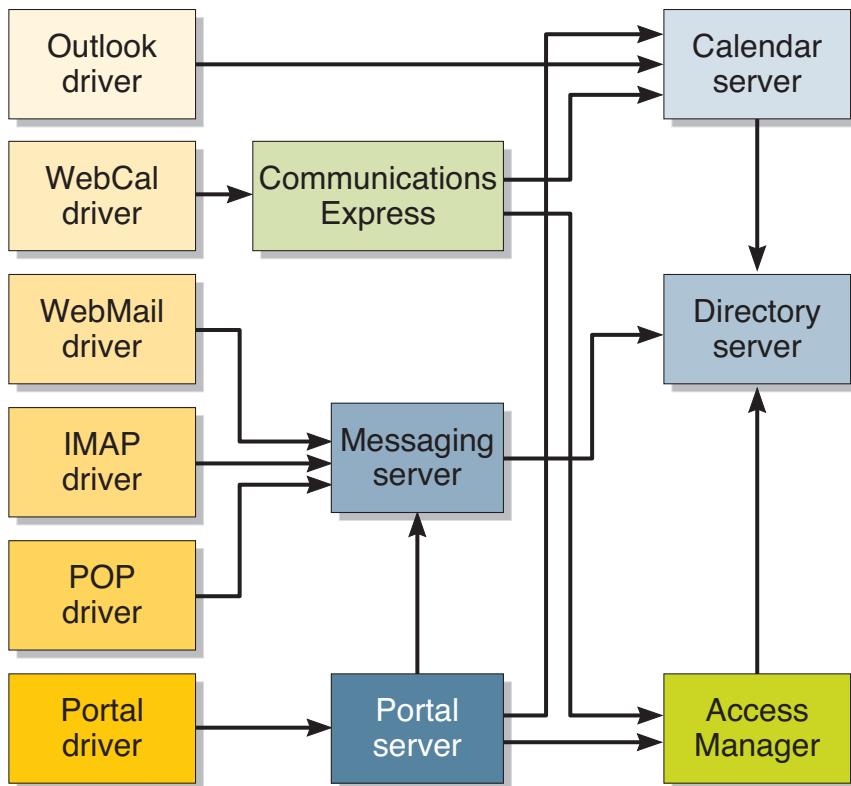
Testing Scenario

The Sun Fire T2000 server used in the performance tests featured an eight-core UltraSPARC T1 processor, 32 Gbytes of main memory, four 1000 BASE-T onboard network interfaces, one Sun StorageTek 3510 FC array (with 12 *36GB 15K rpm disk drives), and one 73 Gbyte SAS disk drive. This system was installed with the Solaris 10 (1/06) OS.

Java ES deployment scenarios were tested with and without using Solaris Zones software. In the first test scenario, all the components of the Java Enterprise System 2005-Q4 were deployed in the default global zone. In the second test scenario, the system was configured with six local Solaris Zones using the Solaris Containers technology. Each of the six zones hosted a component of the Java Enterprise System 2005-Q4. The Java ES components are assigned to zones as follows:

- Zone1 : Directory server
- Zone2 : Access Manager (Identity Server)
- Zone3 : Portal server
- Zone4 : Messaging server (including MTA)

- Zone5 : Calendar server
- Zone6 : Communications Express and Messenger Express Multiplexor

The test setup described in this paper used eight Sun Fire™ 280R servers (2 X UltraSPARC-III+, 8 Gbytes of memory) as the client systems for running all the client drivers.

Performance Results

The following table shows the results of the JESMark tests evaluating the performance of Java Enterprise System on a Sun Fire T2000 server.

System	Users	JESMark op/s	CPU Utilization	Free Memory
Sun Fire T2000	1000	71	20.00%	25 GB
Sun Fire T2000 /Solaris Zones	2500	208	85.00%	20 GB

As shown in the preceding table, in the first test configuration, the Java ES deployment could not make use of the vast compute and memory resources offered by the Sun Fire T2000 platform. The system could only sustain the load of 1000 users despite the fact that 80 percent of the CPU resources were available. This limitation of performance was a result of scalability issues with the web container. There was severe contention from the portal server, Access Manager and Communications Express applications, all of which competed for heap/memory resources of a single web-container instance.

In the second test configuration, there was no such contention because each of the Java ES components was deployed in different web container instances, each of which was hosted on a different Solaris Zone. This deployment makes good use of the memory and compute resources offered by the Sun Fire T2000 platform. As shown in the preceding table, the Java ES deployment that uses Solaris Container technology is capable of supporting nearly three times the number of users supported by the first configuration, which did not use Solaris Containers.

Conclusions

This paper demonstrates how the Sun Fire T2000 server using Sun Java Enterprise System and Solaris Containers technology can be used as an effective consolidation platform to deliver all the enterprise infrastructure services.

Sun Java Enterprise System provides a seamless integration of many important infrastructure services, which can greatly reduce the requirement for customers to evaluate, integrate, and deal with configuration issues. Solaris Containers technology enables Java Enterprise System web applications to run in their own isolated web-container execution environment, and using a single operating system reduces complexity and simplifies system administration. Furthermore, consolidating all enterprise infrastructure services onto a single energy-efficient platform like the Sun Fire T2000 can provide energy usage and space saving advantages over running enterprise infrastructure services on multiple individual servers.

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   ```
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   ```

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   ```
   http://www.gartner.com
   ```

About the Author

Sreekanth Setty is a member of Performance, Availability, and Architecture Engineering (PAE) group at Sun Microsystems. During his 10 years at Sun, Sreekanth has focused on performance analysis, tuning, prototyping, benchmarking, and sizing in various tiers of enterprise infrastructure, with an emphasis on web (SSL) servers, middleware servers, database servers, and messaging servers.

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