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*Environmental Systems Research Institute, Inc.*

# **ArcSDE 9.0/9.1 and Oracle Failsafe 3.3.3 MSCS Active/Passive Cluster Configuration**

## **Systems Integration Test Report**

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## Test Objective

The objective is to document a working configuration of ESRI’s Spatial Database Engine (ArcSDE) 9.0, Oracle 9.2.0.1 Enterprise Edition and Oracle Failsafe 3.3.3, in an Active/Passive Microsoft Cluster Server (MSCS) configuration. This is in support of an ArcSDE high-availability configuration, which is required for some GIS environments. This report is not all-inclusive and is intended for technical engineers experienced with ArcSDE, Oracle 9.2.0.1, and MSCS clusters.

## Test Hardware and Software Configuration

The MSCS test cluster was located in ESRI’s Enterprise Systems Lab (ESL) and consisted of two INLINE Intel -based servers each running Windows Server 2003 Enterprise Edition. Each cluster node was configured with dual Gigabit network interface cards (NIC). One NIC was dedicated to client network communications while the other was dedicated to real-time cluster monitoring (i.e., heartbeat). The ORA Group virtual IP address and virtual server name, which are used by client application connections, are “moved” via the MSCS software or Oracle Failsafe from one cluster node to the other during a failover event. Oracle Fail Safe works with Microsoft Cluster Server (MSCS) to provide highly available business solutions on Microsoft clusters. Oracle Failsafe consists of 2 factors, Oracle Services for MSCS and Oracle Fail Safe Manager.

- Oracle Services for MSCS works with the MSCS software to configure automatic failover during planned and unplanned outages for resources.
- Oracle Fail Safe Manager consists of a GUI interface and wizards that help you to setup and manage cluster resources. There are also troubleshooting tools available to help diagnose problems.

Four public IP addresses are required for an Active/Passive MSCS/Oracle cluster configuration; two for the physical nodes, one for the Cluster Group name, and one for the ORA Group virtual server. Also, two private IP addresses are required for private network communications between the two nodes. Table 1 below contains the ESL cluster configuration.

**Table 1**  
**Cluster Server Configuration**

Configuration Item	Configuration
Make and Model	<a href="#">INLINE Corporation</a>
Operating System & Version	Windows Server 2003 Enterprise Edition
Number of CPUs & Type	2 x 3.2GHz Intel Xeon
Memory (GB)	2 1024
Node Names	ESLINLINE1 & ESLINLINE2
Network Access	Dual Gigabit NICs One set for Public network and one set for Private network
Shared Quorum Disk (Q:)	INLINE TF480 direct attached fiber channel disk array with LUN on two 146 GB 10K RPM SCSI drives (RAID-5)
Shared Data Disk (F:)	INLINE TF480 direct attached fiber channel disk array with LUN on two 146 GB 10K RPM SCSI drives (RAID-5)
Software	ArcSDE 9.0, SP1 Oracle 9.2.0.1 Enterprise Edition, Oracle Failsafe 3.3.3

## MSCS Cluster Installation and Configuration

The first part of the overall installation process is to install and configure the cluster software. For this test report the [single quorum device cluster model](#) was implemented. The cluster installation was performed using the following on-line Microsoft documentation.

- [Planning and Preparing for cluster installation](#)
- [Checklist: Planning and creating a server cluster](#)
- [Checklist: Validating your clustering system](#)

Following the completion of the MSCS installation, two cluster groups existed. The first group was the Cluster Group and it contained the default cluster resources (see Table 2). Though this group is required for the cluster, it is not used for the Oracle and ArcSDE configuration. The second group was for the shared F: disk. To support the Oracle Failsafe and ArcSDE cluster resources, a new group was created, named "ORA Group," and the F: disk was moved into it. The empty default disk groups were then removed. Table 3 contains the ORA Group prior to the Oracle and ArcSDE installation.

**Table 2**  
**Cluster Group Resources**

Resource Name	Notes
Quorum Disk (Q:)	Quorum disk used to manage cluster between nodes
Cluster Name	Default virtual server name. Not used for SQL connections
Cluster IP Address	Default virtual server IP address. Not used for SQL connections
Oracle Services for MSCS	Dependent service for Oracle Failsafe product

**Table 3**  
**ORA Group Resources**

Resource Name	Notes
Data Disk (F:)	Shared disk used to store database data and log files

## Oracle Failsafe Installation and Configuration

The Oracle Failsafe installation was performed on the ORA Group using the following on-line Oracle documentation.

- Download of Oracle Failsafe 3.3.3 product  
<http://www.oracle.com/technology/software/tech/windows/failsafe/index.html>
- Installation and Administration documentation for Oracle Failsafe 3.3.3  
<http://www.oracle.com/technology/documentation/failsafe.html>

Following the Oracle Failsafe installation, the ORA Group was automatically populated with the necessary Oracle resources. The complete ORA Group contained the resources listed in Table 4.

**Table 4****Modified ORA Group Resources**

Resource Name	Notes
Data Disk (F:)	Shared disk used to store database data files
Network IP Address	Oracle virtual server IP address
Network Name	Oracle virtual server name (i.e., the "datasource")
Oracle SID	Oracle network service or database name
Oracle TNS Listener	Oracle TNS Listener Service

## ArcSDE Cluster Installation and Configuration

To perform an ArcSDE clustered installation the software must be installed on the system disk of each node. The ArcSDE data and log files can be installed on the Oracle shared disk.

The following steps identify the ArcSDE installation and configuration procedure. The ArcSDE commands assume the default ArcSDE instance name of "esri\_sde". If a different instance name is used, be sure to include the "-i <instance>" parameter to reflect the configured instance name.

### Primary Node ArcSDE Installation Steps

1. Ensure that the ORA Group is on the primary node and install ArcSDE using standard installation procedures. For the Post Installation Setup three configurations must be performed:
  - In the "ArcSDE Setup Wizard Options" menu select the following; define database and SDE User, repository setup, and authorize ArcSDE. Do not create the ArcSDE service. This is because the default ArcSDE service contains a RDBMS dependency and will not run work properly in a clustered environment. This service will need to be created manually which is discussed in step 2.
  - For the Oracle Instance name specify the Oracle virtual server name. This should be the name that was identified during the Oracle installation.
  - Choose the shared Oracle disk for the data and log files. For this test we specified the "F:" drive.

2. Manually recreate the ArcSDE service without the database dependency. Be sure to use the Oracle virtual server name for the datasource and the "-n" argument at end of syntax.

```
sdeservice -o create -d <ORACLE9I,ORACLE_SID> -p <SDE database password> -i <sde_service> -n
```

3. For example,

```
sdeservice -o create -d ORACLE9I,ORA92 -i esri_sde -p sde -n
```

4. Prior to continuing with the secondary node installation, ensure that the ArcSDE service starts on the primary node. Once that has been verified, stop the ArcSDE service. You must stop the ArcSDE service on the primary node to allow the ORA Group to be moved to the secondary node, which is the first step of the secondary node installation process.

**Secondary Node ArcSDE Installation Steps**

1. Use the Cluster Administrator to move the ORA Group to the secondary node. Wait for this to complete before continuing.
2. Repeat steps 1 – 3 on the second node.
3. Manually create the ArcSDE service without the database dependency. Be sure to use the Oracle virtual server name for the datasource.

```
sdeservice -o create -d <ORACLE9I,ORACLE_SID> -p <SDE database password> -i <sde_service> -n
```

4. Prior to continuing the ArcSDE service in the cluster, ensure that the ArcSDE service starts on the secondary node. Once that has been verified, stop the ArcSDE service.

Within the Oracle Failsafe Manager, there are tools and processes to create the necessary clustered resources for the ORA Group. However, following the ArcSDE installation, it is necessary to manually add the ArcSDE service as a resource to the ORA Group. This is done via the Cluster Administrator by choosing to add a new resource. Table 5 lists the required parameter settings when adding the ArcSDE resource to the ORA Group. It is important to note that improper configuration of the dependencies can result in cluster failover performance degradation, or even cluster failure.

**Table 5  
ArcSDE Cluster Resource Parameters**

Resource Parameter	Setting
Name	ArcSDE Service
Description	ArcSDE Service
Resource Type	Generic Service
Possible Owners	ESLINLINE1 & ESLINLINE2
Dependencies	Oracle network service or database name
Service Name	esri_sde
All Other Settings	Defaults*

By default, the ArcSDE service name is set to “ArcSDE Service(*instance name*)”. However, the service name to use when configuring the new resource is actually what is contained only within the parenthesis, which in this case is the default instance name of esri\_sde. Attempting to use the entire name during the resource configuration will result in a cluster resource configuration error. Once the ArcSDE resource has been successfully added to the ORA Group, bring the resource online via the Cluster Administrator. This will start the ArcSDE service on the node that currently controls the ORA Group.

\* If an ArcSDE client application such as ArcIMS is going to be running on the cluster, it will be necessary to “check” the “Use Network Name for Computer Name” box located on the parameters tab of the “ArcSDE Service” resource properties. If this box is unchecked, ArcSDE applications running on the cluster may not be able to connect to ArcSDE when both services are running on the same node (following a failover event, for example). This behavior is described in the following Microsoft TechNet article:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;q198893>

## License Manager Installation and Configuration

Although ArcSDE 9.x no longer uses FlexLM, there may be instances where it would be appropriate to install the license manager (LM) on clustered nodes to support ArcGIS Desktop. Previous test with Windows 2000 indicated that the LM could not be integrated within the cluster software. However, testing with Windows Server 2003 proved that the LM can be integrated successfully into a cluster configuration. The LM was able to failover to the secondary node and fail back to the primary node. The install procedure for installing the LM is the same as a non-cluster system. The following steps show the install and cluster configuration procedure for the 8.x and 9.x LM:

1. Install the LM on the primary and secondary nodes using standard installation procedures. Using Windows "Services" set the LM service "startup type" to manual on both nodes.
2. To integrate LM with MS Cluster, create a new cluster resource and configure as a "Generic Service."
3. On client machines the license file variable needs to be configured so it points to the Oracle Instance virtual server name (VSN). For ArcGIS 8.x set ESRI\_LICENSE\_FILE to 27005@<Oracle VSN>. For ArcGIS 9.x the Desktop Administrator can be used to point to the LM using the "Oracle Instance VSN" or set the following variable; ARCGIS\_LICENSE\_FILE to 27004@<Oracle InstanceVSN>.

## Cluster Testing and Validation

Clients connecting to Oracle should use the Oracle virtual server name, or ESLORA in this case. ArcSDE connection requests will be routed to the cluster node that currently controls the ORA Group. In the event of failover, the Oracle virtual server name and associated group resources will "move" from the failed node to the surviving node. During failover, the client application will lose its connection to the ArcSDE server and it will be necessary to reconnect to the ArcSDE cluster once failover has completed. This will always be the case unless the application is specifically designed for a clustered environment.

Cluster testing was performed using ArcMap 9.0 to validate the configuration. Cluster failover was successfully executed in both directions. That is, from the primary node to the secondary node, and from the secondary node to the primary node. Upon a cluster node failure, the Cluster Administrator detected the failure and moved the Cluster Group and ORA Group to the surviving node. The client application was then able to reconnect to the surviving node via the Oracle virtual server name. The failover time, which is the time required for all the group services to register offline and transfer to the opposite node and register online, was 30-35 seconds. This is in the context of a read-only environment and therefore does not include any database rollback time that may exist in an editing environment during a failover.

## Conclusions

Testing verified that ArcSDE 9.0 could be successfully integrated and utilized with Oracle Failsafe on a Microsoft Cluster Server in a MSCS cluster configuration. However setup for this configuration may exhaust some resources on the Oracle side. Please refer to the Oracle Failsafe documentation and Oracle Metalink site for further explanations and solutions.

- [Oracle Failsafe Installation Guide](#)
- [Oracle Metalink Site](#)

## Configuration Support

It is important to realize that for enterprise configurations such as the one described in this paper, ESRI Support will typically be limited to supporting only the ESRI software components (ArcIMS, ArcSDE, etc.). ESRI Support strives to provide the best assistance possible, but problems or questions regarding third-party applications and components may require you to contact the support services provided by the respective vendor.

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