

Oracle® Intelligent Agent

User's Guide

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ORACLE®

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Oracle Intelligent Agent User's Guide, Release 9.0.1

Part No. A88771-02

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Preface

Purpose of this Guide

This manual provides configuration information and answers to crucial troubleshooting questions pertaining to the Oracle Intelligent Agent. The Intelligent Agent User's Guide is directed towards users of Oracle Enterprise Manager Version 1 and Version 2, as well as other supported system management frameworks that communicate with the Oracle database through the Intelligent Agent.

Intended Audience

This manual is intended for anyone installing, configuring, or troubleshooting the Oracle Intelligent Agent on UNIX or Windows NT platforms. Under most circumstances, the Agent requires little in the way of configuration and maintenance. For this reason, the *Oracle Intelligent Agent User's Guide* should be used as a reference, rather than read sequentially.

How this Manual is Organized

- Chapter 1** Provides a functional overview to the Intelligent Agent and discovery services.
- Chapter 2** Describes Agent installation and configuration procedures.
- Chapter 3** Describes new features for the current Intelligent Agent release.
- Chapter 4** Describes Job and Event scripting using the Tool Command Language (Tcl).
- Appendix A** Describes requisite configuration files used by Oracle Enterprise Manager.
- Appendix B** Provides Intelligent Agent troubleshooting guidelines and procedures.
- Appendix C** Provides a list of general Windows keyboard shortcuts

Documentation Set

The Oracle Enterprise Manager Release 9i documentation includes the following:

- The *Oracle Enterprise Manager Readme Release 9i* provides important notes on updates to the software and other late-breaking news, as well as any differences between the product's behavior and how it is documented.
- The *Oracle Enterprise Manager Configuration Guide Release 9i* provides information about configuring the Oracle Enterprise Manager system.
- The *Oracle Enterprise Manager Concepts Guide Release 9i* provides an overview of the Enterprise Manager system.
- The *Oracle Enterprise Manager Administrator's Guide Release 9i* describes the components and features of the Oracle Enterprise Manager system.
- The *Oracle Intelligent Agent User's Guide* describes how to administer the Oracle Intelligent Agent.
- The *Oracle Enterprise Manager Messages Manual Release 9i* contains probable causes and recommended actions for Oracle Enterprise Manager errors.

In addition to the Oracle Enterprise Manager documentation set, extensive on-line help is provided for components in Oracle Enterprise Manager.

To download free release notes or installation documentation, please visit the Oracle Documentation Center at <http://docs.oracle.com/>

Printed documentation is available for sale in the Oracle Store at <http://oraclestore.oracle.com/>

Related Documents

For more information, see the following documents:

- *Oracle Enterprise Manager Configuration Guide*
- *Oracle SNMP Support Reference Guide*

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Intelligent Agent Overview

This chapter provides a brief overview of the Intelligent Agent and its characteristics.

- Oracle Intelligent Agent: An Overview
- Characteristics
- Simple Network Management Protocol Support

Oracle Intelligent Agent: An Overview

The Oracle Intelligent Agent is an autonomous process running on a remote node in the network. The Agent resides on the same target as the services it supports and performs the following functions:

- Provides local services or calling operating system dependent services to interact locally with the managed targets.
- Checks for events, and queueing the resulting event reports for Oracle Enterprise Manager.
- Runs Oracle Enterprise Manager jobs, collecting their results and output, and/or queuing the results as required.
- Handle data collection.
- Cancels jobs or events as directed by the Console or other applications.
- Handles requests to send SNMP traps for events if SNMP is supported on the Intelligent Agent's platform.

For information on configuring the Agent, see the Oracle server platform-specific installation documentation for your system.

Note: With version 9.0, the functionality of the Data Gatherer has been integrated into the Intelligent Agent and no longer exists as a separate application.

Characteristics

Intelligent Agents are autonomous because they function without requiring that the Console or Management Server be running. An Agent that services a database can run when the database is down, allowing the Agent to start up or shut down the database. The Intelligent Agents can independently perform administrative job tasks at any time, without active participation by the administrator. Similarly, the Agents can autonomously detect and react to events, allowing them to monitor the system and execute a fixit job to correct problems without the intervention of the administrator.

The Agents operate independently of the Console and Management Server and are able to execute jobs and monitor events when the administrator has logged out of the Console. The Agents queue any job or event messages destined for that

administrator, and deliver them to the Management Server. When the administrator logs in to a Console again, the Management Server delivers pending messages to the administrator who is currently logged in. Information about the state of jobs and events are stored in files on the Agent's node. These files have a ".q" extension and are stored in the `$ORACLE_HOME/network/agent` directory.

Jobs and events are implemented as Tcl scripts. When the Agent executes a job or tests for an event, it runs the appropriate Tcl script.

When the Management Server sends a message to an Agent on behalf of an administrator logged into the Console, it also sends the information about the administrator's language and character set environment. The Agent uses the NLS environment information when it performs database administration tasks on behalf of the administrator. This allows administrators to manage databases in their native languages. For example, an administrator in France can administer a database in Germany and receive messages in French.

The Intelligent Agent uses specific cartridges to collect specific types of data. For example, operating system or database information. Agents can collect statistical data for discovered services on its node. Once requested, collections occur independent of the Oracle Performance Manager and Oracle Capacity Planner. Also collected are statistical data used for evaluation of operating system and database specific metric events registered from the Enterprise Manager Console.

Integrators can write their own cartridges to collect other types of data.

Simple Network Management Protocol Support

The Agent supports Simple Network Management Protocol (SNMP), allowing third-party systems management frameworks to use SNMP to receive SNMP traps directly from the Agent. The Agent provides access to Oracle's database Management Information Base (MIB) variables. You can submit jobs or events that access Oracle MIB variables even when the database resides on a platform that does not support SNMP. For more information on SNMP, see the *Oracle SNMP Support Reference Guide*.

Installing the Intelligent Agent

This chapter covers generic setup and configuration procedures for the Intelligent Agent. The following topics are discussed:

- Installing the Intelligent Agent
- Controlling Operations of the NT Agent
- Configuring SNMP Windows NT and Windows 2000
- Controlling Operations of the UNIX Agent
- Configuring SNMP for UNIX
- Configuring the Version 9.0.1 Agent for Use with Multiple Network Cards (NIC)
- Agent Behavior when Using Multiple Network Cards
- Oracle Intelligent Agent and Oracle Names
- Roles and Users Required by the Intelligent Agent
- Auto-Discovery
- Service Discovery Process
- Upgrading from 8.0.6/8.1.6/8.1.7 Intelligent Agents to 9.0

Installing the Intelligent Agent

The Intelligent Agent is shipped with the database and can be installed on remote, managed machines under an ORACLE_HOME environment. Using the Oracle Universal Installer, the Agent can be selected for installation from one of two locations: the Enterprise Manager tree list or the database server tree list (this option installs the database and the Agent). To install the Intelligent Agent as a standalone service, select the Agent from the Enterprise Manager tree list.

Controlling Operations of the NT Agent

The following procedures are used to control the operation of the Intelligent Agent on Microsoft Windows NT system.

Starting the Intelligent Agent on Windows NT

To start the Agent on Windows NT, perform the following steps:

1. Double-click the Services icon in the Control Panel folder.
2. Select the Oracle<ORACLE_HOME_NAME>Agent service.

The Startup Type is set to Manual, which allows the Agent to be started by a user. If you want the Agent to start automatically whenever you start the system, set the Startup Type to Automatic.

- a. Click the Startup push-button. A Service Startup dialog box appears.
 - b. Choose Automatic under the Startup Type.
 - c. Click OK on the Service Startup dialog box.
3. Click the Start push-button to start the Agent.

Note: You can also start the Agent from the command line by typing the following:

```
net start oracle<ORACLE_HOME_NAME>agent
```

Stopping the Intelligent Agent on Windows NT

To stop the Agent on Windows NT, perform the following steps:

1. Double-click the Services icon in the Control Panel folder.

2. Select the OracleAgent service.
3. Click the Stop push-button to stop the Agent.

Note: You can also stop the Agent from the command line by typing the following:

```
net stop oracle<ORACLE_HOME_NAME>agent
```

Verifying that the Agent is Running

To verify that the Agent is running, look for its status in the control panel services or type `net start` at a command prompt. OracleAgent should appear in the list of running services.

You may also view the NT Task Manager to see the `dbssnmp` process information.

Creating a Windows NT User Account for Running Jobs

In order for the Agent to execute jobs on a managed node

- an NT user account must exist that has the advanced user privilege, "logon as batch job." The privilege can be assigned to an existing local or domain user, or a new NT user.
- the preferred credentials for the node must be set for that user in the Oracle Enterprise Manager console. For more information on setting preferred credentials, see the *Oracle Enterprise Manager Administrator's Guide*.
- the user that starts the Agent must have read/write permissions to `ORACLE_HOME\network` directory as well as write permissions to the `TEMP` directory or the `ORACLE_HOME` directory.

Note: If you do not set up the "logon as batch job" privilege, you will receive the "Failed to authenticate user" message when you run jobs on the managed target.

- the user must have administrator privileges in order to start up and shut down Windows NT services, such as databases and listeners.

Please follow one of the procedures listed below.

Creating a New NT User Account

To create a new Windows NT user account on the local NT machine and grant the "log in as batch jobs" privilege to this user, perform the procedure below.

1. Select the User Manager from the Administrative Tools program group. See the Windows NT documentation for information on this tool.
2. Select New User from the User menu and check for the following:
 - The "User Must Change Password at the Next Logon" option box is not checked
 - "SYSTEM" or "system" is not used for the user name.
3. Under the Policies menu of the User Manager NT utility, select the User Rights option.
4. Check the "Show Advanced User Rights" box.
5. Select "Logon as a batch job" from the list of privileges.
6. Give the selected user this privilege.

Assigning Privileges to an Existing NT User Account

To assign privileges to an existing local user account, perform the following steps.

1. Choose the user on the User Manager panel and check for the following:
 - The "User Must Change Password at the Next Logon" option box should not be checked
 - "SYSTEM" or "system" is not used for the user name.
2. Under the Policies menu of the User Manager NT utility, select the User Rights option.
3. Check the "Show Advanced User Rights" box.
4. Select "Logon as a batch job" from the list of privileges.
5. Add the advanced user right to this user.

Creating a New Windows 2000 User Account

To create a new user account on the local Windows 2000 machine and grant the "log in as batch jobs" privilege to this user, perform the procedure below.

1. Control Panel-->Administrative Tools-->Local Security Policy-->LocalPolicies-->User Rights Assignment (On the right hand side, highlight "Log on as batch job").
2. Right click on "Log on as batch job" and select Security.
3. Click on Add and select a user to add.
4. Click on Add after selecting user and click OK)

Configuring a Domain User as the Agent User

Note: Domain users are not supported with 7.3.3 and earlier versions of the Agent.

To configure a repository user as your Agent user, perform the following steps.

1. Under the Policies menu of the User Manager NT utility, select the User Rights option.
2. Check the "Show Advanced User Rights" box.
3. Select "Logon as a batch job" from the list of privileges.
4. Click the Add button.
 - a. Fill in the "List Names From" field: (choose your domain)
 - b. Click Show Users button.
 - c. In the listbox, choose the domain user.
 - d. Click Add.
 - e. Click OK.
5. In the User Rights Policy window, click OK.

Note: If you have both a local and a domain user with the same name, the local user takes precedence.

Configuring SNMP Windows NT and Windows 2000

The following procedure explains how to configure the SNMP master agent to support the sub agents on Windows NT and Windows 2000:

1. Go to the drive that contains your services file say
x:\winnt\system32\drivers\etc\services.

Change the snmp entries to:

snmp 1161/udp

snmp-trap 1162/udp
2. Go to the Peer SNMP Master Agent config file MASTER.CFG under the
ORACLE_HOME\network\admin
directory and edit the config file to add the following:
 - a. A transport entry as follows:

TRANSPORT ordinary SNMP
OVER UDP SOCKET
AT PORT 1161
 - b. An entry to indicate the community and the machine (example:
dlsun1000.us.oracle.com or an IP address) that should receive the snmp
traps:

COMMUNITY public
ALLOW ALL OPERATIONS
USE NO ENCRYPTION

MANAGER dlsun1000.us.oracle.com
SEND ALL TRAPS
WITH COMMUNITY PUBLIC
3. Start the Peer SNMP Master Agent and the encapsulator from the Services
Panel in the Control Panel.

Please note that the encapsulator is only needed when multiple sub-agents are installed and configured on the machine. The Peer SNMP Master Agent

executable is `ORACLE_HOME\bin\agent.exe` and the encapsulator executable is `ORACLE_HOME\bin\encaps.exe`.

4. Start the sub-agent (Oracle Intelligent Agent) through the Services Panel under Control Panel. The sub-agent starts and registers itself with the master agent.

The way to test Oracle's SNMP is by using a third party application which uses `snmp` to communicate with the Oracle SNMP master agent and query Oracle specific data.

Third party applications that support SNMP are listed in the Oracle SNMP Support Reference Guide

Controlling Operations of the UNIX Agent

The following procedures are used to control the operation of the Intelligent Agent on UNIX systems.

Running the `root.sh` Shell Script

After you have successfully installed the Agent, the Oracle Universal Installer prompts you to run `root.sh`.

`root.sh`, which is a shell script, updates/creates an `oratab` file. The `oratab` file is the file where the user will place references to all databases to be discovered by the Agent and controlled by the Oracle Enterprise Manager. For each database created, the entry is of the form: `<SID>:<$ORACLE_HOME>:[Y/N]`

The Agent is normally configured by `root.sh` as a `setuid` program. If `root.sh` was successful, the Agent will have been installed as `setuid root` so that the Agent can run jobs as the users whose name and password are given in the Preferred Credentials for that host.

Note: The Agent being set to `setuid root` does not have the same effect as having the `root` user start the Agent. Having the `root` user start the Agent may cause security problems. Consult your platform documentation for exact details on `setuid` programs.

The user who submits node jobs to the UNIX Agent should have read/write access to the Agent's `ORACLE_HOME`. If the `root.sh` does not have `setuid` set, then any job submitted to the Agent will run with the privileges of the user who owns

the Agent executable (`dbsnmp.exe`). `root.sh` will force the user to set the preferred credentials at the Oracle Enterprise Manager Console for any job on the Agent.

Verifying that `root.sh` has been run successfully

To verify that `root.sh` had been run successfully, check the file permissions on `dbsnmp`.

1. Enter `cd $ORACLE_HOME/bin`

This changes the directory to the `$ORACLE_HOME/bin` directory where the Agent executable resides.

2. Enter `ls -al dbsnmp`

This lists all relevant details about `dbsnmp`.

The output of the `ls -al` command for `dbsnmp` should be in the form

```
-rwsr-s--- 1 root      g651      1497980 Jun 12 21:04 dbsnmp
```

`root` is the owner. `dbsnmp` is the Agent executable. In this example, the name of the group is `g651`. If `root` is the owner and `-rwsr-s---` are the permissions, then `root.sh` had been run successfully.

Starting and Stopping the Agent on UNIX Platforms

On UNIX, the `agentctl` utility is used to start and stop the Agent. In addition, `dbsnmpwd` is run. `dbsnmpwd` is a UNIX watchdog script that is responsible for automatically restarting the Intelligent Agent if the Agent goes down. This assures that the Agent is up and running at all times unless explicitly shut down.

The relevant `agentctl` commands are listed in the table below.

If you want to...	Enter the command...
Start the Agent and <code>dbsnmpwd</code> .	<code>agentctl start agent</code>
Stop the Agent and <code>dbsnmpwd</code> .	<code>agentctl stop agent</code>
Verify status of the Agent	<code>agentctl status agent</code>

DBSNMPWD

`Dbsnmpwd` is UNIX watchdog script which ensures that `dbsnmp` (Intelligent Agent) process is always present on monitored targets. It restarts the agent when it exits abnormally i.e. exits with an unexpected return code.

The behavior of the watchdog script can be configured using the following environmental variables. These variable are contained within the script itself.

Note: Environmental variables should not be set within the `snmp_rw.ora` file.

`DBSNMP_WDLOGFILE` - Logfile where startup messages are written. It defaults to `$ORACLE_HOME/network/log/dbsnmp.nohup`

`DBSNMP_RESTART` - To disable the automatic restart mechanism set this environmental variable to 0. Default is set to 1.

`DBSNMP_MAX_ABNORMAL_EXIT` / `DBSNMP_TIME_DELTA` - These two variables help the watchdog script to determine when it would be safe to assume that the agent is thrashing (the process of starting and immediately exiting because initial conditions to start the agent successfully are not met). The default values are 3 and 60 respectively. It means if the agent exits more than 3 times within 60 seconds then it would be safe to assume that the agent is thrashing and the watchdog would not restart it.

Configuring SNMP for UNIX

On UNIX systems, when you install the Oracle Intelligent Agent (IA), the SNMP files are also automatically. To configure SNMP:

1. Install the Intelligent Agent.

Make sure there is no SNMP master agent already running (`snmpd`) on the

```
ps -ef | grep snmp
```

If there is an `snmpd` (`snmpd.cfddi` on Solaris) process running, kill it.

2. `cd $ORACLE_HOME/network/snmp/peer`
3. Edit the `config.master` script with the IP address of the machine that is running the SNMP Console in the same directory, verify that a script `start_peer` exists.
4. `su root`
5. `start_peer -a` (starts the Master Peer agent, the encapsulator and the native SNMP daemon)

6. exit from root
7. From the Enterprise Manager Console, register an event and check the box: "Enable Notifications to External Services (SNMP traps by Agent)". Traps will be sent to the SNMP Master Console for each EM event that triggers.

Note: ■

- The SNMP configuration differs from platform to platform, check the platform documentation (the Installation and Configuration Guides usually have this information)
 - Some UNIX platform do NOT offer SNMP support; check the platform documentation
 - There is no SNMP support on Windows NT prior to version 8.0.5
-
-

Third-party systems management applications use the SNMP Master Agent to communicate with the Intelligent Agent. The SNMP Master Agent and the Oracle Intelligent Agent must be configured correctly before the Oracle Intelligent Agent can communicate over SNMP to the Master Agent.

For the general procedures for configuring SNMP for Oracle databases and the Management Server, refer to the *Oracle SNMP Support Reference Guide*.

For more comprehensive configuration information, see the installation or configuration guide specific to your platform. SNMP configuration may differ depending on the platform.

Configuring the Version 9.0.1 Agent for Use with Multiple Network Cards (NIC)

As with version 8.1.7 of the Intelligent Agent, 9i Intelligent Agent users have three options to configure the Agent on a machine with multiple network cards. By default the Agent will bind to the primary NIC on its machine ('le0' on UNIX platforms and 'network0' on Windows NT platforms). The other two options are:

- a. Ability to bind to a NIC specified by the user.
- b. Ability to bind to all NICs on the machine. This option should not be used if it is not desirable to have the Agent listening on all NICs.

Note: The Agent binds to an ip address and uses that address, to listen for all incoming requests for executing EM jobs, events, and data collection requests.

The Agent will also have the capability of discovering services (listeners etc.) that are listening on an ip address/NIC that's different from the ip address/NIC being used by the Agent.

Agent Behavior when Using Multiple Network Cards

1. If no Listening Address is Specified

When no explicit listening address directives are in *snmp_rw.ora*, the Agent listens for connections via the Agent machine's primary network interface card.

2. If a listening IP Address is Specified

When an explicit listening address is specified in *snmp_rw.ora*, the Agent listens for connections on only that address.

To bind the 9i Intelligent Agent to a specific network interface card, other than the primary network card:

1. Set the `dbsnmp.hostname` parameter.

```
dbsnmp.hostname=<IPaddress of the network card>
```

2. Start the Agent by entering the following at the command line.

```
>agentctl start agent
```

3. If a hostname is Specified

If the hostname is specified in *snmp_rw.ora*, the Agent listens for connections on all the machine's network interface cards.

For pre-8.1.7 versions of the Agent (8.1.5 or higher) this is the default behavior of the Agent (since it is the default behavior of the network layer code used by the Agent) .

To bind the 9i Intelligent Agent to all network interface cards on a host:

1. Set the `dbsnmp.hostname`

```
db snmp.hostname=<name of host>
```

2. Start the Agent

4. A Windows NT FailSafe Configuration is Used

In the Windows NT FailSafe configuration, the Agent listens for connections on the IP address stored in the NT registry for the FailSafe Agent

The Agent discovers each target on a machine, regardless of which of the machine names or IP addresses is used in the target's configuration files.

Oracle Intelligent Agent and Oracle Names

If you are running Oracle Names on a machine managed by an Oracle Intelligent Agent, it is assumed that the databases have already been registered with a Names Server and their aliases are defined by the GLOBAL_DBNAME parameters in the `listener.ora` files.

The Intelligent Agent does not use Oracle Names to discover services it manages. It uses GLOBAL_DBNAME parameters in `listener.ora` files to determine which databases that listener services. This name appears in the Enterprise Manager Console Navigator as the database name to be managed.

The GLOBAL_DBNAME parameter typically describes the name of the database as it is registered with the Names Server, for example, the name and domain of the database as given in the database initialization parameter file. Values of the GLOBAL_DBNAME parameters must be unique.

When running jobs or monitoring events in this environment, the Intelligent Agent does not resolve database aliases via Oracle Names, the Agent will generate its own TNS connect string using the Bequeath Protocol.

Note: If you are planning to manage two or more Oracle databases on the same node, make sure the GLOBAL_DBNAME parameter in your `listener.ora` file is different for each database.

Roles and Users Required by the Intelligent Agent

The default database username/password for the Agent is `dbsnmp/dbsnmp`. The `catsnmp.sql` script is installed with the database. The database roles and privileges assigned to the Agent user using the `catsnmp.sql` script. When an Oracle database is installed, the `catsnmp.sql` script is automatically run by `catalog.sql`

The customer may need to change the user/password for the Intelligent Agent's database logon. To change the user name and password to something other than `dbsnmp/dbsnmp`, you need to edit `snmp_rw.ora`, adding the following parameters:

```
SNMP.CONNECT.<svcname>.NAME = <USERNAME>
SNMP.CONNECT.<svcname>.PASSWORD = <password>
```

To grant the requisite roles and users privileges to the new Agent user, run the SQL commands specified in `catsnmp.sql` referring to the new Agent user. You can use Server Manager or SQL Plus. Do not edit the `catsnmp.sql` script for this purpose.

To determine whether the `SNMPAGENT` role exists in a database, enter the following SQL command:

```
SELECT * FROM dba_roles;
```

If the `SNMPAGENT` role does not appear, run the `catsnmp.sql` script on the database.

If you already have several versions of the database running, you must run the `catsnmp.sql` script on each of these database in order to have the correct setup for all the grants and views the Agent needs to contact.

To run the script, you must log in as `SYS` or `INTERNAL`.

Note: The location of `catsnmp.sql` varies based on the database version you are running and the platform. For example, on NT for an Oracle 9.x database, the script is located at

```
ORACLE_HOME\rdbms9x\admin.
```

Auto-Discovery

The Intelligent Agent has a built-in auto-discovery feature that automatically generates the needed configuration files containing information about services to be managed, each time the process is started. The following three files are created/appended during the discovery process:

- `$ORACLE_HOME/network/admin/snmp_ro.ora`

The `snmp_ro.ora` file is a read-only file created by the Agent and contains information on services monitored by the Agent.

- `$ORACLE_HOME/network/admin/snmp_rw.ora`

The `snmp_rw.ora` file contains index information of the managed services used internally by the Agent and it also allows users to specify variables, such as tracing.

- `$ORACLE_HOME/network/agent/services.ora`

The `services.ora` file contains aliases for all services the Agent has to monitor. Only services listed in this file are monitored by the Agent. The content of this file are then sent to the console during discovery. With version 9.0, this file also contains information about the type of operating system and the operating system version of the environment in which the Agent is running.

Note: Please refer to Appendix A, "Agent Configuration Files" for more information on parameters used in these files.

When the Agent is started, the auto-discovery process reads configuration parameters from the following sources:

- `oratab` (on Unix nodes)
- Windows NT Registry (on Windows NT nodes)
- `listener.ora`
- `tnsnames.ora` (if one exists)

The discovery process extracts the services installed on that node and compiles the configuration files listed previously.

The Agent compiles SID information for each `ORACLE_HOME`, either from the `ORATAB` file (UNIX) or the NT registry. The Agent then parses the `listener.ora` files

for related SID and listener information. If the `listener.ora` contains a `GLOBAL_DBNAME` section, the Agent sets the database service name to the `GLOBAL_DBNAME` variable. If the variable does not exist, the Agent looks for a `tnsnames.ora` that contains a valid service name for the SIDs on that machine. If the Agent cannot find one, a service name called `<SID>_<HOSTNAME>` is created for each SID.

Note: If multiple aliases exist for the same instance in the `tnsnames.ora`, the Agent uses the one listed first. If you prefer to use a different alias, reorder the `tnsnames.ora` entries and restart the Agent.

Note: If you have more than one database instance on a machine and you are using `GLOBAL_DBNAME` parameter in the `listener.ora` file, these instances need to have a unique `GLOBAL_DBNAME` in the `listener.ora`. You may have to do edit the `listener.ora` manually.

Pre-requisites for Auto-Discovery

- SQL*Net V2 or Net80 TCP/IP must be present, and the necessary files must be created, prior to launching the Intelligent Agent. The only required SQL*Net (or Net8) file is `listener.ora`, but `tnsnames.ora` and `sqlnet.ora` should be configured correctly for particular service discovery. The Agent searches for these files in the `$ORACLE_HOME/network/admin` directory.

- `TNS_ADMIN` variable usage during Agent Discovery:

(UNIX) All versions of the Unix discovery script allow the use of the `TNS_ADMIN` variable to locate input configuration files (`listener.ora` and `tnsnames.ora`). Only post-8.0.3/7.3.4 versions correctly write the output files (`snmp_ro.ora` and `snmp_rw.ora`) into `TNS_ADMIN`, if this environment variable is set. If the `TNS_ADMIN` variable is not set, then the Agent will write the output files to its `$ORACLE_HOME/network/admin` directory.

(NT) In addition to the above, beginning with 8.0.5, the discovery script also reads the `TNS_ADMIN` value from the NT Registry. This variable is located as follows:

- (NT) TNS_ADMIN variable in Control Panel -> System -> Environment
- (NT) TNS_ADMIN key in the NT Registry

Service Discovery Process

When you start the Agent, the first operation it must perform is to discover what services exist on the node that it monitors. The following "discovery" algorithms document the service discovery process for the two most common platforms on which the Agent runs.

Agent Discovery Process for NT

At Intelligent Agent startup, a script is executed which reads configuration parameters from the Windows NT registry, the `listener.ora` file, and the `tnsnames.ora` file (if it exists).

The Agent discovers new services on the machine where it is installed and creates/rewrites/appends to its configuration files: `snmp_ro.ora`, `snmp_rw.ora`, and `services.ora`.

To determine what services are available on its machine (services that the Agent will manage), the Agent uses the following discovery algorithm:

1. The Agent records the ORACLE_SID and ORACLE_HOME information for each database service found in the Windows NT Registry.
2. Based on the values found in the Windows NT registry, the Agent reads the `listener.ora` files to determine which listeners service which databases. The location of the `listener.ora` configuration files is based on the SQL*Net configuration file locations. For example, the TNS_ADMIN environment variable and the location of the `$ORACLE_HOME/network/admin` directory are based on the ORACLE_HOME information found in the Windows NT registry.
3. The name of the discovered databases is based on the GLOBAL_DBNAME parameter defined in the `listener.ora` file for that database.
4. If GLOBAL_DBNAME parameters are not found in `listener.ora`, the Agent searches for a `tnsnames.ora` file using the same search methodology used to find the `listener.ora` file.
5. If the `tnsnames.ora` file is not found, the database alias, `<SID>_<hostnames>`, is assigned to a database service. The service will be known to the Agent by this alias, and it will be visible as such at the Oracle Enterprise Manager Console.

Note: If multiple aliases exist for the same instance in the `TNSNAMES.ORA` file, the Agent will use the one listed first. If you prefer to use a different alias, re-order the `TNSNAMES.ORA` file entries and restart the Agent.

If a database or any other new service is installed on the node where the Agent resides, the Agent must be restarted to add the new service to the Agent configuration files. This procedure also applies to UNIX versions of the Intelligent Agent.

Agent Discovery Process for UNIX

At startup, the Agent discovers new services on the machine where it is installed and creates its configuration files: `snmp_ro.ora`, `snmp_rw.ora`, and `services.ora`.

To determine what services are available on its machine (services that the Agent will manage), the Agent uses the following discovery algorithm

1. The Agent reads the `oratab` file for values of all the Oracle Homes and SIDs. Depending on the platform, the `oratab` file can be located in either of the following locations:
 - `/etc`
 - `/var/opt/oracle`
2. Based on the Oracle Homes values found in `oratab`, the Agent searches for the `listener.ora` files to determine which databases are serviced by which listeners.
3. The name of the discovered databases is based on the `GLOBAL_DBNAME` parameter defined in the `listener.ora` file for that database.
4. If `GLOBAL_DBNAME` parameters are not found in `listener.ora`, the Agent searches for a `tnsnames.ora` file using the same search methodology used to find the `listener.ora` file.
5. If the `tnsnames.ora` file is not found, the database alias, `<SID>_<hostnames>`, is assigned to a database service. The service will be known to the Agent by this alias, and it will be visible as such at the Oracle Enterprise Manager Console.

Upgrading from 8.0.6/8.1.6/8.1.7 Intelligent Agents to 9.0

Each release of the Intelligent Agent improves Agent performance, functionality, and reliability. We therefore recommend upgrading your Intelligent Agent to the latest version available for your platform. To make sure the transition to a newer Agent preserves your existing Enterprise Manager jobs, events, and data collections, you can use the NMUMIGR8 utility found in \$ORACLE_HOME/bin. This utility allows you to migrate existing jobs, events, and data collections to a format recognized by 9.0 version of the Intelligent Agent.

Usage:

```
nmumigr8 [-source_home <source ORACLE_HOME>] [-password <password>] [-verbose]
```

Parameters

-source_home

Source Oracle Home that contains an existing Intelligent Agent queue and data collection files. If source_home is not supplied then the value defaults to the destination Oracle Home that is the value of the ORACLE_HOME environment variable.

-password

A password used by the Intelligent Agent to encrypt its queue files. If not supplied, the default encryption password is used.

-verbose

This flag indicates that detailed migration information should be written to the trace file nmumigr8.trc located under the Agent's ORACLE_HOME/network/trace directory. If this flag is not set, only summary information is written to the trace file.

Users upgrading from earlier versions of the Intelligent Agent to the version 9.0 Intelligent Agent should follow the guidelines described in the next section.

Intelligent Agent Upgrade Guidelines

1. Install the latest Intelligent Agent under a new Oracle Home.
2. Make sure that any jobs or events you wish to keep have been saved in the job or event library respectively. To add a job/event to a job/event library, select the job/event from the job/event pane, click on the desired entry using the right mouse button and select Copy to Library from the context-sensitive menu.

3. Move any event alerts to event history. You can save the contents of the history pane or clear them.

Note: If you have events registered against multiple targets, use the Create Like menu option to create individual events for each target and save these events to the Event Library.

4. From the Enterprise Manager Console, de-register any existing events and remove any active jobs scheduled against the node on which you are upgrading the agent.
5. Shut down the old Agent.
6. Start the new Agent
7. From the OEM Console, refresh the node in the Navigator.
8. Resubmit the saved jobs and events to the new Agent.

New Agent Features for 9i

Topics covered in this document include:

- Blackouts
- New Control Utility

Blackouts

Blackouts allow Enterprise Manager users to suspend any or all management and/or data collection activity on one or more managed targets. This capability permits maintenance or emergency operations to be performed

Specifically, blackouts can suspend:

- **Events:** All events registered on a target will not be evaluated or triggered for the duration of the blackout.
- **Jobs:** All jobs submitted to a target will not be scheduled or run for the duration of the blackout. Job skipped notifications will be sent to the Enterprise Manager Console for regular interval jobs scheduled during a blackout on a target.
- **Data Collections:** All current historical data collection activities for a target are stopped. However, loading of data collected for a target **prior** to the blackout will continue as long as the database is up. New collections can be submitted but will not proceed unless the blackout ends.

Defining Blackouts

Blackouts must be created at the target-level, i.e., they must be defined on the node where the Intelligent Agent resides. Blackouts are controlled with a command line interface. The blackout subsystem associates any command line request with a special type of Agent user called the CLI user. Only one immediate blackout can be set at a time. Multiple target blackouts can exist simultaneously.

Once in effect, blackouts cannot be modified. To change the status of a particular blackout, you must first delete the existing blackout and then re-create a new blackout with the desired changes.

Important: A blackout can only be cancelled by the user who originally set it.

Blackout Command Line Interface

The blackout command line tool exists on the node where the Agent resides and can be used by administrators to set/cancel blackouts. The Intelligent Agent must be running in order to set a blackout. User commands are as follows:

Table 3–1

Blackout Action	Command
Define a blackout.	<pre>agentctl start blackout [-d [DD] HH:MM] [<target name>]</pre> <p>where the <code>-d</code> option is used to specify duration in the format <code>DD HH:MM</code> where:</p> <p><i>DD</i> indicates number of days which is optional</p> <p><i>HH</i> indicates number of hours</p> <p><i>MM</i> indicates number of minutes</p>
Remove a blackout	<pre>agentctl stop blackout [<target name>]</pre>
Display the status of a blackout (machine name, target type, and duration).	<pre>agentctl show blackout</pre>

Command Line Examples

The following examples illustrate how to use the blackout command line utility under different situations and the output generated.

Situation 1: You want to start a blackout on the target `vnukal-pc.world` for 10 minutes.

```
$ agentctl start blackout -d 0:10 vnukal-pc.world
Blackout registered on vnukal-pc.world database
```

Situation 2: You want to stop any blackout set by (the CLI user) effective on target `vnukal-pc.world`. Note: Blackouts set by other Agent users are not cancelled.

```
$ agentctl stop blackout vnukal-pc.world
Blackout canceled on vnukal-pc.world database
```

Situation 3: You want to start blackouts on all managed targets for an indefinite length of time. This is equivalent to blacking out the entire Agent.

```
$ agentctl start blackout
Do you wish to blackout the entire agent (Y/N) ? [N] y
All targets on the agent are blacked out.
```

Situation 4: You want to stop blackouts on all registered targets.

```
$ agentctl stop blackout
Do you wish to cancel blackout on all targets (Y/N) ? [N] y
Blackout canceled on all targets.
```

Situation 5: You want to know the status of blackouts on a target.

```
$ agentctl status blackout
vnukal-pc.world is blacked out. Blackout will end in 2 hours.
```

Situation 6: You want to set a blackout on a target whose name matches another target of a different type. In this case, the command line interface allows you to interactively select the desired target.

```
$ agentctl start blackout payroll
Following targets matching "payroll" have been found.
1. payRoll ( Database )
2. payRoll ( Listener )
Choose the target to blackout [1] : 2
Blackout registered on "payroll" listener
```

New Control Utility

Beginning with the 9i version of the Intelligent Agent, the Intelligent Agent has its own control utility.

If you want to...	Enter the command...
Start the Agent and <i>dbsnmpwd</i> .	<code>agentctl start agent</code>
Stop the Agent and <i>dbsnmpwd</i> .	<code>agentctl stop agent</code>
Verify status of the Agent	<code>agentctl status agent</code>

Job and Event Scripts

Topics covered in this document include:

- Scripting Language
- Server Message and Error Information
- Event to Fixit Job Tcl Array
- Use of Tcl with the Intelligent Agent
- NLS Issues and Error Messages
- OraTcl Functions and Parameters

Scripting Language

The Tcl Language with OraTcl extensions is used to write the job and events scripts. Tcl is used for the scripts because it fulfills the necessary requirements, such as:

- Host system access for handling with files and devices, launching programs, and executing operating system functions.
- SQL and PL/SQL functions for accessing the RDBMS.
- RDBMS administration functions.
- SNMP accessing, both for the database MIB variables that the Agent itself supports, and for external MIBs, like the host's or other SNMP-enabled services.
- Communication with the Oracle Intelligent Agent and other Oracle software, such as Oracle Trace.
- A syntax for describing job and event scripts that:
 - Can be used to drive the user interface.
 - Provide information on the nature of the job or event, and any input or output.
 - Allow access to the Oracle message file system for NLS support.

Tcl Language Description

Tcl originated with Dr. John Ousterhout from the University of California, Berkeley, California. Tcl, current release version 7.5, stands for *Tool Command Language*.

Tcl is both a language and a library. Tcl is a simple textual language that is intended primarily for issuing commands to interactive programs, such as text editors, debuggers, illustrators, and shells. Tcl has a simple syntax and is programmable. Tcl users can write command procedures to provide more powerful commands than those in the built-in set.

Tcl is also a library package that can be embedded in application programs. The Tcl library consists of a parser for the Tcl language, routines to implement the Tcl built-in functions, and procedures that allow each application to extend Tcl with additional commands specific to that application. The application program generates Tcl commands and passes them to the Tcl parser for execution.

Commands may be generated by reading characters from an input source, or by associating command strings with elements of the application's user interface, such as menu entries, buttons, or keystrokes. When the Tcl library receives commands it parses them into component fields and executes built-in commands directly. For

commands implemented by the application, Tcl calls back to the application to execute the commands. In many cases commands will invoke recursive invocations of the Tcl interpreter by passing in additional strings to execute. Procedures, looping commands, and conditional commands all work in this way.

An application program gains several advantages by using Tcl for its command language.

- Tcl provides a standard syntax. After you learn Tcl, you are able to issue commands easily to any Tcl-based application.
- Tcl provides programmability. All a Tcl application needs to do is to implement a few application-specific low-level commands. Tcl provides many utility commands plus a general programming interface for building up complex command procedures. By using Tcl, applications do not need to re-implement these features.
- Extensions to Tcl provide mechanisms for communicating between applications by sending Tcl commands back and forth. The common Tcl language framework makes it easier for applications to communicate.

Tcl was designed with the philosophy that one should actually use two or more languages when designing large software systems. One for manipulating complex internal data structures, or where performance is key, and another, such as Tcl, for writing small scripts that tie together the c programming pieces and provide hooks for others to extend. For the Tcl scripts, ease of learning, ease of programming and ease of integrating are more important than performance or facilities for complex data structures and algorithms. Tcl was designed to make it easy to drop into a lower language when you come across tasks that make more sense at a lower level. In this way, the basic core functionality can remain small and one need only bring along pieces that one particular wants or needs. For more information on Tcl/Tk, access the following web sites:

- <http://sunscript.sun.com/>
- <http://www.neosoft.com/tcl>
- <http://www.scripatics.com/resource/doc/papers/>

Note: World Wide Web site locations often change and the addresses may not be available in the future.

OraTcl Description

Agent jobs and event scripts require both host system access for handling files and devices, launching programs, executing operating system functions, and accessing Oracle databases. OraTcl was developed to extend Tcl for Oracle usage and SNMP accessing. The categories of OraTcl functions are:

- SQL and PL/SQL functions
- RDBMS administration functions
- SNMP accessing
- Communication with the intelligent Agent and other Oracle software
- Character set conversion and error handling verbs
- General purpose utility functions

For descriptions of the OraTcl functions and variables, see *OraTcl Functions and Parameters* on page 4-14.

Example: OraTcl Script

The following example illustrates the basic use of OraTcl.

```
#
# monthly_pay.Tcl
#
# usage: monthly_pay.Tcl [connect_string]
# or   Tcl -f monthly_pay.Tcl [connect_string]
#
# sample program for OraTcl
# Tom Poindexter
#
# example of sql, pl/sql, multiple cursors
# uses Oracle demo table SCOTT.EMP
# uses id/pass from command line,
# or "scott/tiger" if not specified
#
# this example does not illustrate efficient sql!
# a simple report is produced of the monthly payroll
# for each jobclass
#
global oramsg
set find_jobs_sql { select distinct job from SCOTT.EMP }
set monthly_pay_pl {
begin
```

```
        select sum(sal) into :monthly
        from SCOTT.EMP
        where job like :jobclass;
    end;
}
set idpass $argv
if {[string length $idpass] == 0} {
    set idpass "scott/tiger"
}
set lda [oralogon $idpass]
set curl [oraopen $lda]
set cur2 [oraopen $lda]
orasql $curl $find_jobs_sql
set job [orafetch $curl]
while {$oramsmsg(rc) == 0} {
    set total_for_job [lindex [oraplexec $cur2 $monthly_pay_pl :monthly ""
:jobclass "$job"] 0]
    puts stdout "Total monthly salary for job class $job = \$$total_for_job"
    set job [orafetch $curl]
}
oraclose $curl
oraclose $cur2
oralogoff $lda
exit
```

Server Message and Error Information

OraTcl creates and maintains a Tcl global array `oramsg` to provide feedback of Oracle server messages. `oramsg` is also used to communicate with the OraTcl interface routines to specify NULL return values and LONG limits. In all cases except for `NULLVALUE` and `MAXLONG`, each element is reset to NULL upon invocation of any OraTcl command, and any element affected by the command is set. The `oramsg` array is shared among all open OraTcl handles.

Note: `oramsg` should be defined with the global statement in any Tcl procedure that needs it.

`oramsg` Elements

The following are `oramsg` elements.

`oramsg (agent_characterset)`

The character set of the Agent, such as `US7ASCII`. This is used with the `convertin` and `convertout` verbs to convert character sets. See *convertin* on page 4-15 and *convertout* on page 4-17.

`oramsg (db_characterset)`

The character set of the database, such as `US7ASCII`. This is used with the `convertin` and `convertout` verbs to convert character sets. See *convertin* on page 4-15 and *convertout* on page 4-17. This variable can only be used after an `oralogon` function within a Tcl script.

`oramsg (collengths)`

A Tcl list of the lengths of the columns returned by `oracols`. `collengths` is only set by `oracols`.

`oramsg (colprec)`

A Tcl list of the precision of the numeric columns returned by `oracols`. `colprec` is only set by `oracols`. For non-numeric columns, the list entry is a null string.

`oramsg (colscals)`

A Tcl list of the scale of the numeric columns returned by `oracols`. `colscals` is only set by `oracols`. For non-numeric columns, the list entry is a null string.

`oramsg (coltypes)`

A Tcl list of the types of the columns returned by `oracols`. `coltypes` is only set by `oracols`. Possible types returned are: `CHAR`, `VARCHAR2` (Version 7), `NUMBER`,

LONG, rowid, DATE, RAW, LONG_RAW, MLSLABEL, RAW_MLSLABEL, or unknown.

oramsg (errortxt)

The message text associated with `rc`. Because the `oraplexec` function may invoke several SQL statements, there is a possibility that several messages may be received from the server.

oramsg (handle)

Indicates the handle of the last OraTcl function. The handle, a mapping in memory used to track commands, is set on every OraTcl command except where an invalid handle is used.

oramsg (jobid)

The job Id of the current job. Defined for job scripts only.

oramsg (language)

The NLS language of the Console, such as `AMERICAN_AMERICA.US7ASCII`.

oramsg (maxlong)

Can be set by the programmer to limit the amount of LONG or LONG RAW data returned by `orafetch`. The default is 32K Bytes. The maximum is 64K (Version 6) or 2147483647 (Version 7) bytes. Any value less than or equal to zero is ignored. Any change to `maxlong` becomes effective on the next call to `orasql`. See notes on `MAXLONG` usage with `orafetch`.

oramsg (nullvalue)

Can be set by the programmer to indicate the string value returned for any NULL result. Setting `oramsg(nullvalue)` to `DEFAULT` will return 0 for numeric null data types, such as `INTEGER`, `FLOAT`, and `MONEY`, and a NULL string for all other data types. `NULLVALUE` is initially set to `default`.

oramsg (oraobject)

Contains the object upon which this script is acting. Defined for event scripts only.

oramsg (orahome)

The `ORACLE_HOME` directory.

oramsg (oraindex)

A Tcl list of the SNMP index values from the `snmp.ora` configuration file.

oramsg (orainput)

A Tcl list that contains the names of the job's input files. Probably most jobs will not need input files, but a job which invokes SQL*Plus with a SQL script, or Export with a specification file, would use this feature. Defined for job scripts only.

oramsg (rc)

Indicates the results of the last SQL command and subsequent `orafetch` processing. `rc` is set by `orasql`, `orafetch`, `oraplexec`, and is the numeric return code from the last OCI library function called by an OraTcl command.

See the *Oracle9i Database Error Messages* for detailed information. Typical values are listed in Table 4-1, "Error Messages".

Table 4-1 Error Messages

Error	Meaning
0000	Function completed normally, without error.
0900 - 0999	Invalid SQL statement, invalid sql statements, missing keywords, invalid column names, etc.
1000 - 1099	Program interface error. For example, no sql statement, logon denied, or insufficient privileges.
1400 - 1499	Execution errors or feedback.
1403	End of data was reached on an <code>orafetch</code> command.
1406	A column fetched by <code>orafetch</code> was truncated. Can occur when fetching a LONG or LONG RAW, and the <code>maxlong</code> value is smaller than the actual data size.

oramsg (rows)

The number of rows affected by an insert, update, or delete in an `orasql` command, or the cumulative number of rows fetched by `orafetch`.

oramsg (starttime)

The time at which the job was scheduled to be started. Defined for jobs only.

Event to Fixit Job Tcl Array

OraTcl creates and maintains a Tcl global array `trigevent` to pass a Tcl array to an Enterprise Manager Fixit job. The `trigevent` array can also be used from within the Fixit job itself.

`trigevent` Element

The following are `trigevent` elements:

`trigevent (name)`

Name of the event that caused the Fixit job to be fired.

`trigevent (object)`

Target or node in your network.

`trigevent (arguments)`

Arguments to the triggering event (varies according to the event)

`trigevent (results)`

Results of the event. For example, this element returns the number 35 indicating 35 percent for the CPU Utilization event test.

`trigevent (severity)`

Severity of the event as indicated by the following numbers: -1 (*Clear*), 1 (*Warning*), 2 (*Alert*)

Warning: `trigevent` only works with Fixit jobs. If this array is passed to a non-Fixit job, `trigevent` will be undefined (NULL) and the job will fail. For this reason, the `trigevent` array should always be checked before its elements are dereferenced.

Example

The following example shows a Fixit job that implements two separate tasks:

- Tcl script using `trigevent` to pass an array to a Fixit job.

```
global trigevent
if {[info exists trigevent]} {
    puts "Event name: $trigevent(name)"
    puts "Event object: $trigevent(object)"
}
```

```

    puts "Event arguments: $trigevent(arguments)"
    puts "Event results: $trigevent(results)"
    puts "Event severity: $trigevent(severity)"
  } else {
    puts "Not a fixit"
  }
}

```

- Execution of an operating system command

```
top -dl -ocpu
```

The Fixit job in this example is associated with the CPUUTIL event test, which monitors for specific levels of CPU activity. For this event test, the parameters are set as follows:

- **Alert Threshold = 20**
- **Warning Threshold = 10**
- **Fixit Job = Option** is selected in the property sheet.

When the event containing the CPUUTIL event test is triggered, the associated Fixit job is executed. The Fixit job generates the following output:

First task executed: Information from the trigevent array is displayed.

```

Event name: /oracle/host/perf/cpuutil
Event object: aholser-sun
Event arguments: {1} {20} {10}
Event results: 63
Event severity: 2

```

Second task executed: Operating system command top -dl -ocpu is executed.

```

last pid: 26420; load averages: 0.64, 0.56, 0.48 13:16:00
111 processes: 110 sleeping, 1 on cpu

```

```

Memory: 128M real, 7080K free, 89M swap in use, 912M swap free

```

PID	USERNAME	THR	PRI	NICE	SIZE	RES	STATE	TIME	CPU	COMMAND
727	root	1	30	0	128M	19M	sleep	17:22	10.54%	Xsun
25915	aholser	4	31	0	12M	5032K	sleep	4:47	10.32%	dbsnmp
823	aholser	1	34	0	10M	4368K	sleep	2:11	7.37%	dtterm
26402	aholser	1	34	0	976K	872K	sleep	0:03	3.57%	find
26415	aholser	4	34	0	11M	4304K	sleep	0:00	3.11%	dbsnmp
26403	aholser	1	23	0	976K	872K	sleep	0:02	2.60%	grep
25914	aholser	4	34	0	11M	4832K	sleep	0:56	2.56%	dbsnmp

26419	aholser	1	-5	0	1576K	1368K	cpu	0:00	1.64%	top
894	aholser	1	33	0	5904K	3456K	sleep	7:07	0.86%	view_server
159	root	5	23	0	3176K	1976K	sleep	6:21	0.29%	automountd
26418	aholser	1	25	0	920K	760K	sleep	0:00	0.28%	sh
1007	root	3	33	0	1840K	1400K	sleep	0:40	0.06%	cachefs

Use of Tcl with the Intelligent Agent

Tcl scripts are used by the Intelligent Agent for jobs and events. While both are Tcl scripts, they are distinct in the Agent and in the user interface.

Jobs are scripts scheduled to run once or multiple times. They typically cause side-effects, such as starting up a database, performing a backup, or sending output to the screen via the `puts` command, and can potentially have long execution times. Jobs can have output files and input files, such as a SQL script, while event scripts do not. Note that output files on Unix, DOS, or OS/2 are `stdout` redirected.

Event scripts, on the other hand, are used uniquely for detecting exceptions. A Tcl event script can monitor databases, host systems, or SQL*Net services by using a variety of means. If the script determines that a certain condition has occurred, it can send a return code to the Agent that states the severity of the event. Event scripts tend to run more frequently than jobs and so they are expected to have relatively short execution times. Also, it is assumed that event scripts do not cause any side effects.

While both jobs and events use Tcl to accomplish their tasks, they are very different in nature and as such have different execution environments. Specifically, on UNIX systems, jobs are forked into a separate process, while events are usually executed in-line with the Agent code.

The Tcl interpreter state is saved between executions and the value of Tcl global variables is preserved, for inline event scripts only, to give the illusion of a virtual process. This allows an event script to maintain a history so that the event does not get raised over and over again. For example, after you have notified the console that a value has gone above 90, you can refrain from notifying it again until the value goes below 80 and then back above 90. Database connections using the `oralogon` function are cached across all inline event scripts, so that repeated event scripts that use the same connect string can utilize the same connection.

Not all commands and global variables are available to both jobs and events. Jobs will not have the `oraobject` global variable that tells an event what service it is running against. Events will not have the `orainput` global that jobs use for SQL*Plus scripts.

NLS Issues and Error Messages

When a user registers for an event or schedules a job, the user's language preference is available to the Agent. There is a special remote procedure call which reports the language and current address of each console user. The Agent proceeds to issue an ALTER SESSION command to the specified language every time the `oralogon` function is called. This means that any subsequent messages or output coming from the Oracle server will be in the user's language. In addition, character set conversion is explicitly not done on the Agent, so that the Console can do it on the user's side.

If an event script or a job script fails execution, an error message is sent back to the Console in the user's language. Typically this will be an Oracle message returned by one of the Oracle Tcl extensions, if the verb was given inadequate parameters. For example `oralogon` might return the error: "ERROR: ORA-01017: invalid username/password; logon denied" if it is given an incorrect connect string. However, the error message could also be a Tcl specific message, such as: "ERROR: Tcl-00456: division by zero error", which will be stored in a message file and thus can be returned in the user's preferred language. The default language used by the Agent will be American English if no user language preference is specified or if an error message text does not exist in the user's language.

OraTcl Functions and Parameters

This section lists the OraTcl functions and parameters. Functions or other words that appear in OraTcl syntax are shown in this font: `function`. Parameters in square brackets '`[option]`' are optional, and the '`|`' character means 'or'. All parameters are passed into the functions and are IN mode.

- SQL and PL/SQL functions

<code>oraautocom</code>	<code>oracancel</code>	<code>oraclose</code>	<code>oracols</code>	<code>oracommith</code>
<code>orafetch</code>	<code>oralogoff</code>	<code>oralogon</code>	<code>oraopen</code>	<code>oraplexec</code>
<code>orareadlong</code>	<code>oraroll</code>	<code>orasql</code>	<code>orawritelong</code>	

- RDBMS administration functions

<code>orastart</code>	<code>orastop</code>
-----------------------	----------------------

- SNMP accessing functions

<code>oradbsnmp</code>	<code>orasnmp</code>
------------------------	----------------------

- Communication with the Intelligent Agent and other Oracle software functions

<code>orafail</code>	<code>orainfo</code>	<code>orajobstat</code>	<code>orareportevent</code>
----------------------	----------------------	-------------------------	-----------------------------

- Character set conversion and error handling functions

<code>convertin</code>	<code>convertout</code>	<code>msgtxt</code>	<code>msgtxt1</code>
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- General purpose utility functions

<code>orasleep</code>	<code>orertime</code>
-----------------------	-----------------------

Common Parameters

The following parameters are used in multiple OraTcl functions and the descriptions are provided in this section.

column

The column name that is the LONG or LONG RAW column.

connect_string

A valid Oracle database connect string, in one of the forms:

name | name/password | name@n:dbname | name/password@n:dbname

destaddress

destaddress is the destination address of the Agent.

filename

The name of the file that contains the LONG or LONG RAW data to write into the column or the name of the file in which to write the LONG or LONG RAW data.

logon-handle

A valid *cursor-handle* previously opened with `oraopen`. The handle is a mapping in memory used to track functions.

rowid

The Oracle database rowid of an existing row, and must be in the format of an Oracle rowid datatype.

table

The Oracle database table name that contains the row and column.

convertin

Purpose This function converts the parameter string from the client's (Console) character set to the destination character set. The function returns the converted string.

Syntax `convertin dest_characterset string`

Parameters dest_characterset

Destination character set. For jobs or events, use `$oramsg(agent_characterset)`. See *oramsg Elements* on page 4-6.

string

The string that is converted.

Comments The client and the Agent node may use different languages or character sets. It is the responsibility of the Tcl script developer to perform the character set conversion. In general, all the job or event input parameters should be converted unless they are guaranteed to be ASCII.

convertout

Purpose This function converts the parameter string from the destination character set to the client's (Console) character set. The function returns the converted string.

Syntax `convertout dest_characterset string`

Parameters **dest_characterset**

Destination character set. For jobs or events, use `$oramsg(agent_characterset)`. See *oramsg Elements* on page 4-6.

string

The string that is converted.

Comments The client and the Agent node may use different languages or character sets. It is the Tcl script developers' responsibility to perform the character set conversion. In general all the job or event output should be converted unless they are guaranteed to be ASCII.

msgtxt

Purpose This function returns message text in the client's (Console) language and character set for the given product name, facility and message number. The output is in the format of "FACILITY-ERROR : MESSAGE TEXT".

Syntax `msgtxt product facility error_no`

Parameters **product**

Product name. For example, `rdbms`.

facility

Facility name. For example, `ora`.

error_no

Error number. For example, `1101`.

Comments This function is used to put out error messages in the job output file. The message will be displayed in the client's (Console) language.

msgtxt1

Purpose This function returns a message in the client's (Console) language for the given product name, facility and message number. The output is in the format of "MESSAGE TEXT".

Syntax `msgtxt1 product facility error_no`

Parameters **product**

Product name. For example, rdbms.

facility

Facility name. For example, ora.

error_no

Error number. For example, 1101.

Comments This function is used to put out confirmation messages in the job output file. The message will be displayed in the client's (Console) language.

oraautocom

Purpose This function enables or disables automatic commit of SQL data manipulation statements using a cursor opened through the connection specified by `logon-handle`.

Syntax `oraautocom logon-handle {on | off}`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oraautocom` raises a Tcl error if the `logon-handle` specified is not open.

Either `on` or `off` must be specified. The automatic commit feature defaults to `off`.

oracancel

Purpose This function cancels any pending results from a prior `orasql` function that use a cursor opened through the connection specified by `logon-handle`.

Syntax `oracancel logon-handle`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oracancel` raises a Tcl error if the `logon-handle` specified is not open.

oraclose

Purpose This function closes the cursor associated with `logon-handle`.

Syntax `oraclose logon-handle`

Parameters

`logon-handle`

See *Common Parameters* on page 4-14.

Comments `oraclose` raises a Tcl error if the `logon-handle` specified is not open.

oracols

Purpose This function returns the names of the columns from the last `orasql`, `orafetch`, or `oraplexec` function as a Tcl list. `oracols` may be used after `oraplexec`, in which case the bound variable names are returned.

Syntax `oracols logon-handle`

Parameters

`logon-handle`

See *Common Parameters* on page 4-14.

Comments `oracols` raises a Tcl error if the `logon-handle` specified is not open.

The `oramsg` array index `collengths` is set to a Tcl list corresponding to the lengths of the columns; index `coltypes` is set to a Tcl list corresponding to the types of the columns; index `colprecs` is set to a Tcl list corresponding to the precision of the numeric columns, other corresponding non-numeric columns are a null string (Version 7 only); index `colscopes` is set to a Tcl list corresponding to the scale of the numeric columns, other corresponding non-numeric columns are a null string (Version 7 only).

oracommmit

Purpose This function commits any pending transactions from prior `orasql` functions using a cursor opened with the connection specified by `logon-handle`.

Syntax `oracommmit logon-handle`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oracommmit` raises a Tcl error if the logon handle specified is not open.

oradbsnmp

Purpose This function retrieves SNMP MIB values.

Syntax `oradbsnmp get | getnext object_Id`

Parameters **object_Id**

`object_Id` can be either an actual MIB object Id, such as "1.3.6.1.2.1.1.1.0", or an object name with a possible index attached to it, such as "sysDescr" or "sysDescr.0".

Comments `oradbsnmp` is a function for retrieving SNMP MIB values maintained by the Agent, such as the RDBMS public MIB or the Oracle RDBMS private MIB. It does not write to the well-known UDP port for SNMP and obtains its values directly from the Agent's internal data structures. It works if the host does not have an SNMP master Agent running on it. See *orasnmp* on page 4-31 for more details on what `get` and `getnext` do. There are several reasons why `oradbsnmp` should be used instead of fetching the values from VS tables with SQL commands:

- The Agent maintains a cache of MIB values fetched from the VS tables to avoid burdening the RDBMS excessively. `oradbsnmp` is often faster than SQL and imposes less overhead on the system.
- When SGA access is implemented, it will be transparent to this function, for those MIB variables that are fetched directly from the SGA.
- In the case of `getnext`, the next `object_id` is the next `object_id` within the private and public RDBMS MIBs, and not one of another MIB. It is impossible to retrieve system-specific information using this function; use `orasnmp`.

orafail

Purpose This function forces a Tcl script to fail.

Syntax `orafail errmsg`

Parameters `errmsg`

`errmsg` can either be a quoted string of text or a string of the form: FAC-XXXXX where XXXXX is an Oracle message number for the given facility, such as VOC-99999.

Comments The error message will be used for display purposes on the client side.

orafetch

Purpose This function returns the next row from the last SQL statement executed with `orasql` as a Tcl list.

Syntax `orafetch logon-handle [commands]`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

commands

The optional `commands` allows `orafetch` to repeatedly fetch rows and execute commands for each row.

Comments `orafetch` raises a Tcl error if the `logon-handle` specified is not open.

All returned columns are converted to character strings. A null string is returned if there are no more rows in the current set of results. The Tcl list that is returned by `orafetch` contains the values of the selected columns in the order specified by `select`.

Substitutions are made on commands before passing it to `Tcl_Eval()` for each row. `orafetch` interprets `@n` in commands as a result column specification. For example, `@1`, `@2`, `@3` refer to the first, second, and third columns in the result. `@0` refers to the entire result row, as a Tcl list. Substitution columns may appear in any order, or more than once in the same command. Substituted columns are inserted into the commands string as proper list elements. For example, one space will be added before and after the substitution and column values with embedded spaces are enclosed by `{}` if needed.

A Tcl error is raised if a column substitution number is greater than the number of columns in the results. If the commands execute a break, `orafetch` execution is interrupted and returns with `Tcl_OK`. Remaining rows may be fetched with a subsequent `orafetch` function. If the commands execute return or continue, the remaining commands are skipped and `orafetch` execution continues with the next row. `orafetch` will raise a Tcl error if the commands return an error. Commands should be enclosed in `{}` or `{ }`.

OraTcl performs conversions for all data types. Raw data is returned as a hexadecimal string, without a leading "0x". Use the SQL functions to force a specific conversion.

The `oramsg` array index `rc` is set with the return code of the fetch. 0 indicates the row was fetched successfully; 1403 indicates the end of data was reached. The index of rows is set to the cumulative number of rows fetched so far.

The `oramsg` array index `maxlength` limits the amount of long or long raw data returned for each column returned. The default is 32768 bytes. The `oramsg` array index `nullvalue` can be set to specify the value returned when a column is null. The default is "0" for numeric data, and "" for other datatypes.

`destaddress` may be obtained from the `orainfo` function. Note that the address provided must be the spawn address of the Agent, the special address on which it listens for file transfer requests, and not the normal address used for all other RPCs.

Additional Information: For more information on the address of an Intelligent Agent, see the chapter on configuring the Agent in the *Oracle Enterprise Manager Installation Guide*.

orainfo

Purpose This function is used by jobs to get configuration information.

Syntax `orainfo destaddress`

Parameters

destaddress

See *Common Parameters* on page 4-14.

Comments `orainfo` fetches Agent configuration information from the Agent at `destaddress`. If `destaddress` is not present, then it is fetched from the Agent on the local machine. The Agent configuration is a Tcl list, as follows:

- A list of databases monitored by this Agent. The list includes the database name, `ORACLE_HOME`, and `SID` for each database.
- The Agent's normal RPC address, a `tnsnames (TNS)` string.
- The Agent's file transfer address, a `TNS` string.

orajobstat

Purpose This function is used by a job to send intermediate output back to the Console.

Syntax `orajobstat destaddress string`

Parameters

destaddress

See *Common Parameters* on page 4-14.

string

`string` can either be a quoted string of text or a string of the form: FAC-XXXXX where XXXXX is an Oracle message number for the given facility, such as VOC-99999. The string is used for display on the client side.

Comments `destaddress` is the address of the Agent, not the daemon. This function is issued from a job process, not from within an Agent process. The Agent's address can be obtained with `orainfo`.

oralogoff

Purpose This function logs off from the Oracle server connection associated with `logon-handle`.

Syntax `oralogoff logon-handle`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oralogoff` raises a Tcl error if the logon handle specified is not open. `oralogoff` returns a null string.

oralogon

Purpose This function connects to an Oracle server using `connect_string`.

Syntax `oralogon connect_string`

Parameters

connect_string

See *Common Parameters* on page 4-14.

Comments A `logon-handle` is returned and should be used for all other OraTcl functions using this connection that require a `logon-handle`. Multiple connections to the same or different servers are allowed.

Additional Information: When `oralogon` is used in an event script, it benefits from the connection cache. It will usually be able to reuse the connections opened by other event scripts against the same database. See *NLS Issues and Error Messages* on page 4-13 for details. `oralogon` raises a Tcl error if the connection is not made for any reason, such as login incorrect or network unavailable. If `connect_string` does not include a database specification, the value of the environment variable `ORACLE_SID` is used as the server.

oralogon_unreached

Purpose This function connects to an Oracle server using a connect string and an optional role. this connection cannot be shared.

Syntax `oralogon connect_string [AS] [SYSDBA | SYSOPER | NORMAL]`

connect_string See common parameters on *Common Parameters* on page 4-14.

Comments This verb is identical to `oralogon` except that the returned connection is not shared. Also, an optional role can be specified.

oraopen

Purpose This function opens an SQL cursor to the server. `oraopen` returns a cursor to be used on subsequent OraTcl functions that require a `logon-handle`.

Syntax `oraopen logon-handle`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oraopen` raises a Tcl error if the `logon-handle` specified is not open. Multiple cursors can be opened through the same or different logon handles, up to a maximum of 25 total cursors.

oraplexec

Purpose This function executes an anonymous PL block, optionally binding values to PL/SQL variables.

Syntax `oraplexec logon-handle pl_block [:varname value ...]`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

pl_block

`pl_block` may either be a complete PL/SQL procedure or a call to a stored procedure coded as an anonymous PL/SQL block.

:varname value

`:varname value` are optional pairs.

Comments `oraplexec` raises a Tcl error if the `logon-handle` specified is not open, or if the PL/SQL block is in error. `oraplexec` returns the contents of each `:varname` as a Tcl list upon the termination of PL/SQL block. `oraplexec` returns the result set as its return value in a Tcl list.

Optional `:varname value` pairs may follow `pl_block`. Varnames must be preceded by a colon, and match the substitution names used in the procedure. Any `:varname` that is not matched with a value is ignored. If a `:varname` is used for output, the value should be coded as a null string, "".

The `oramsg` array index `rc` contains the return code from the stored procedure.

orareadlong

Purpose This function reads the contents of a LONG or LONG RAW column and write results into a file.

Syntax `orareadlong logon-handle rowid table column filename`

Parameters

logon-handle rowid table column filename

See *Common Parameters* on page 4-14.

Comments `orareadlong` returns a decimal number upon successful completion of the number of bytes read from the LONG column.

`orareadlong` raises a Tcl error if the `logon-handle` specified is not open, or if `rowid`, `table`, or `column` are invalid, or if the row does not exist.

`orareadlong` composes and executes an SQL select statement based on the `table`, `column`, and `rowid`. A properly formatted Rowid may be obtained through a prior execution of `orasql`, such as "SELECT rowid FROM table WHERE ...".

orareporevent

Purpose This function is used by jobs to report an unsolicited event to the Agent and Event Management system in the Console. The `oemevent` executable can also be used.

Syntax `orareporevent eventname object severity message [results]`

Parameters **eventname**

`eventname` is the name of the event. This is the four-part name of the event in the form:

`/vendor/product/category/name`

You can enter any character string but all four parts and the forward slashes (/) are required.

The first two levels of name have special significance and have many predefined strings that Oracle script writers must use:

- Level one is the definer of this script, typically the integrating company name such as `oracle`, or `user` for unspecified customers.
- Level two is the name of the product to which this script is related, for example `rdbms`, `office`, `agent`, `osgeneric`, `sqlnet`, or `hpux`. All Oracle services have defined names which Oracle script writers must use.

The `eventname` is assumed to be in 7-bit ASCII, so that it never changes regardless of platform or language. See `eventdef.tcl` in the `ORACLE_HOME\net8\admin` directory (Oracle Enterprise Manager release 1.5.0 on a Windows NT platform) for a list of defined event names.

Note: The actual event script name may be shortened, upper-cased, or manipulated in other ways to make it a legal, unique filename on a given platform. The format is operating system-specific. For example, `/oracle/rdbms/security/SecurityError` can be stored as `$oracle_home/network/agent/events/oracle/rdbms/security/securityerror.tcl` on a Unix system.

object

`object` is the name of the object that the event is monitoring, such as the database or service name listed in the `snmp.visibleServices` parameter in the `snmp.ora` file, or `$oramsg(nodename)`.

severity

`severity` is the level of severity of the event. For `orareporevent`, the value is 1 (warning), 2 (alert), or -1 (clear). For `oemevent`, this is the literal text string `alert`, `warning`, or `clear`.

message

`message` is a quoted text string that is displayed in the Console, such as "File not found."

[results]

`results` is any results that may occur from the event. This is a Tcl list with the specific results for the event, such as the tablespace in error or the user who had a security violation.

Comments This is the method for any job to report an unsolicited event to the Agent, and back to the Console. For information on the Event Management system, see the *Oracle Enterprise Manager Administrator's Guide*.

oraroll

Purpose This function rolls back any pending transactions from prior `orasql` functions that use a cursor opened through the connection specified by `logon-handle`.

Syntax `oraroll logon-handle`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

Comments `oraroll` raises a Tcl error if the logon handle specified is not open.

orasleep

Purpose This function causes the Tcl script to pause for a number of seconds.

Syntax `orasleep seconds`

Parameters **seconds**

Comments `orasleep` calls `sleep()` for the required number of seconds. There is no default, minimum, or maximum value.

orasnmp

Purpose This function performs either an SNMP `get` or `getnext` operation on the object specified by `object_id`.

Syntax `orasnmp get | getnext object_Id`

Parameters `object_Id`

The `object_Id` can be either an actual MIB object Id, such as "1.3.6.1.2.1.1.0", or an object name with an index attached to it, such as "sysDescr" or "sysDescr.0".

Comments Object names come from MIB text files. A full network manager, such as OpenView, has a MIB compiler that accepts MIB files and parses the ASN.1, creating a database of all objects in all the MIBs. The Agent needs to be simpler. There is a standard configuration directory which contains one or more two-column ASCII files of the format:

```
"rdBmsDbPrivateMibOID",    "1.3.6.1.2.1.39.1.1.1.2",
"rdBmsDbVendorName",      "1.3.6.1.2.1.39.1.1.1.3",
"rdBmsDbName",            "1.3.6.1.2.1.39.1.1.1.4",
"rdBmsDbContact",         "1.3.6.1.2.1.39.1.1.1.5",
....
```

The Tcl interpreter reads these files and does a binary search on them at runtime to resolve an object name to an `object_Id`.

The index values to use for Oracle services are configured via the `snmp.ora` file. These indices can also be obtained from the `oraIndex` global variable. See *Server Message and Error Information* on page 4-6.

The result of `orasnmp` is a Tcl list of the form:

```
{object_id value}
```

where `object_Id` is the object id associated with `value`. In the case of an `orasnmp get`, `object_Id` is the same as `object`, while for a `getnext`, it would be the next logical `object_Id`. It is assumed that the `orasnmp` operation applies to the local host only. The function actually sends out an SNMP query to the well-known SNMP port on the local host, so it is possible to query MIB variables other than Oracle's, such as those of the host or other applications that support SNMP. An SNMP Master Agent needs to be running on the local host for this function to work. See *oradbsnmp* on page 4-21 for an optimized way to retrieve the Oracle database MIB objects. If the Master Agent is not running, this function fails.

orasql

Purpose This function sends the Oracle SQL statement `SQL statement` to the server.

Syntax `orasql logon-handle sql_stmt`

Parameters

logon-handle

See *Common Parameters* on page 4-14.

sql_stmt

`sql_stmt` is a single, valid SQL statement.

Comments `logon-handle` must be a valid handle previously opened with `oraopen`. `orasql` raises a Tcl error if the `logon-handle` specified is not open, or if the SQL statement is syntactically incorrect.

`orasql` will return the numeric return code 0 on successful execution of the SQL statement. The `orams` array index `rc` is set with the return code; the `rows` index is set to the number of rows affected by the SQL statement in the case of insert, update, or delete. Only a single SQL statement may be specified in `sql_stmt`. `orafetch` allows retrieval of return rows generated. `orasql` performs an implicit `oracancel` if any results are still pending from the last execution of `orasql`.

Table inserts made with `orasql` should follow conversion rules in the Oracle SQL Reference manual.

orastart

Purpose This function starts an Oracle database instance.

Syntax `orastart connect_string [init_file] [SYSDBA|SYSOPER] [RESTRICT]
[PARALLEL] [SHARED]`

Parameters

connect_string

See *Common Parameters* on page 4-14.

init_file

`init_file` is the path to the `init.ora` file to use.

Comments The default for `init_file` is:

```
ORACLE_HOME/dbs/init${ORACLE_SID}.ora
```

[SYSDBA | SYSOPER] are role flags for the user starting up the database.
[RESTRICT] [PARALLEL] [SHARED] are database options. If [RESTRICT] is specified, database is started in restricted mode.

orastop

Purpose This function stops an Oracle database instance.

Syntax `orastop connect_string [SYSDBA|SYSOPER] [IMMEDIATE|ABORT]`

Parameters

connect_string

See *Common Parameters* on page 4-14.

Comments [SYSDBA | SYSOPER] are role flags for the user shutting down the database. [IMMEDIATE | ABORT] are the shutdown mode flags.

Note: Shutdown normal might be expected to fail every time, because the Agent maintains its own connection to the database, but we send a special RPC to the Agent when this is done, which causes it to disconnect from the database.

oritime

Purpose This function returns the current date and time.

Syntax `oritime`

Parameters None

Comments None

orawritelong

Purpose This function writes the contents of a file to a LONG or LONG RAW column.

Syntax `orawritelong logon-handle rowid table column filename`

Parameters

logon-handle rowid table column filename

See *Common Parameters* on page 4-14.

Comments `orawritelong` composes and executes an SQL update statement based on the table, column, and rowid. `orawritelong` returns a decimal number upon successful completion of the number of bytes written to the LONG column. A properly formatted ROWID may be obtained through a prior execution of the `orasql` function, such as "SELECT rowid FROM table WHERE".

`orawritelong` raises a Tcl error if the `logon-handle` specified is not open, or if `rowid`, `table`, or `column` are invalid, or if the row does not exist.

Agent Configuration Files

This appendix discusses the configuration files that are generated by the intelligent agent and parameters that can be set to optimize agent operation for different system setups. The following topics are discussed:

- Configuration Files
- User-configurable Parameters
- Intelligent Agent Log Files

Configuration Files

The following files control the operation of the Intelligent Agent.

snmp_ro.ora

The `snmp_ro.ora` file is located in `$ORACLE_HOME/network/admin` or a directory specified by the `TNS_ADMIN` environment variable. Do **NOT** update this read-only file.

snmp_rw.ora

The `snmp_rw.ora` is located in the Agent's `$ORACLE_HOME\network\admin`. You can modify this read-write file, but this should be done carefully.

services.ora

The `services.ora` file is created when the Agent starts and is located in `$ORACLE_HOME\network\agent` on the Windows NT platform and `$ORACLE_HOME/network/agent` on UNIX. This file contains a list of the services, such as Oracle databases and listeners, on the node where the agent resides. Beginning with Agent version 9.0, this file also contains version and platform information about the operating system of the environment in which the Agent is running. This file is retrieved from the agent by Oracle Enterprise Manager through the Navigator Discovery menu options.

Note: Do not manually edit the `services.ora` file. The agent rewrites the file on startup.

User-configurable Parameters

These parameters are used in the `snmp_rw.ora` configuration file for the Intelligent Agent release.

AGENTCTL.TRACE_LEVEL = OFF | USER | ADMIN | nn

Turns on tracing at the specified level for the `AGENTCTL` executable. Oracle recommends that you set the trace level to 13. Level 16 produces a deluge of information, which is only useful if a bug is being investigated. With a level of 16,

you can see actual TCP/IP packet contents. With a level of 15, you can see that packets are being passed. This parameter is optional.

AGENTCTL.TRACE_DIRECTORY = *directory*

Directory where trace file is written. The setting is only relevant in conjunction with DBSNMP.TRACE_LEVEL. If omitted, trace files are written to \$ORACLE_HOME\network\trace. This parameter is optional.

AGENTCTL.TRACE_FILE = *filename*

Filename of the trace file. This parameter is optional.

AGENTCTL.TRACE_TIMESTAMP = *true/false*

When set to TRUE, inserts a timestamp after each line of trace in the trace files.

SNMP.INDEX.service_name.world = *index_number*

The unique index number of the service that the agent is monitoring. The index number can be any number. The only limitation is that if you have more than one index line, the index numbers must be unique. For example:

```
snmp.index.<service_name1>=10
snmp.index.<service_name2>=20
```

SNMP.CONNECT.<service_name>.USER = *user_name*

The username that the subagent uses to connect to the database. The default is dbsnmp. This parameter is optional. The catsnmp.sql script should be edited and reexecuted if this parameter is not the default setting.

The "subagent" refers to the Intelligent Agent. Sometimes, the Intelligent Agent is called a subagent to the master SNMP agent when configuring SNMP on a server. However, SNMP does not have to be configured on the server before the Intelligent Agent will work (except for the Netware platform). For security reasons, the customers sometimes do not want to use the default Intelligent Agent database account/password of dbsnmp/dbsnmp. The example listed should only be used if they want to change the Intelligent Agent's database logon account.

SNMP.CONNECT.<service_name>.PASSWORD = *password*

The password for the username that is used by the subagent to connect to the database. The default is dbsnmp. This parameter is optional. The catsnmp.sql script should be edited and reexecuted if this parameter is not the default setting.

The "subagent" refers to the Intelligent Agent. Sometimes, the Intelligent Agent is called a subagent to the master SNMP agent when configuring SNMP on a server. However, SNMP does not have to be configured on the server before the Intelligent Agent will work (except for the Netware platform). For security reasons, the

customers sometimes do not want to use the default Intelligent Agent database account/password of dbsnmp/dbsnmp. The example listed should only be used if they want to change the Intelligent Agent's database logon account.

SNMP.CONTACT.<service_name> = "contact_info"

A string containing contact information, such as name, phone number, and email, of the administrator responsible for the service. This parameter is optional.

DBSNMP.POLLTIME = nn

The time interval (seconds) that the agent polls the database to check whether it is down. If the database has gone down or was never connected, this is the interval between retries. The default is 30 seconds.

Note: If the intelligent agent must monitor more than two instances, you should increase the value of DBSNMP.POLLTIME proportionally with the number of monitored instances.

For example:

The agent needs to monitor 10 instances. DBSNMP.POLLTIME should be set to 150. ($10/2 * 30 = 150$)

DBSNMP.NOHEURISTIC={TRUE/FALSE}

The value of this parameter determines whether the Intelligent Agent will use a connection heuristic to ascertain the state of a monitored database (whether the database is up or down). By default, this value is set to FALSE (Agent uses the heuristic).

Note: If the monitored target is a Real Application Clusters database instance, DBSNMP.NOHEURISTIC must be set to TRUE since the heuristic does not work against Real Application Clusters database instances.

DBSNMP.TRACE_LEVEL = OFF | USER | ADMIN | nn

Turns on tracing at the specified level for the Intelligent Agent process (dbsnmp). Oracle recommends that you set the trace level to 13. Level 16 produces a deluge of information, which is only useful if a bug is being investigated. With a level of 16,

you can see actual TCP/IP packet contents. With a level of 15, you can only see that packets are being passed. This parameter is optional.

DBSNMP.TRACE_DIRECTORY = *directory*

Directory where trace file is written. The setting is only relevant in conjunction with the DBSNMP.TRACE_LEVEL. If omitted, trace files are written to \$ORACLE_HOME\network\trace. This parameter is optional.

DBSNMP.TRACE_FILE = *filename*

Filename of the trace file. This parameter is optional.

DBSNMP.TRACE_FILECNT = *nn*

Maximum number of trace files generated by the Agent. This optional parameter should be used when full tracing is desired, but disk space on the Agent machine is limited. This parameter is available beginning with version 8.1.7 of the Intelligent Agent.

DBSNMP.TRACE_FILESIZE = *nn*

Maximum size of the individual trace file (in Kilobytes) generated by the Agent. For example, a value of 1024=1 megabyte trace file. This parameter is used in conjunction with DBSNMP.TRACE_FILECNT when full tracing is desired, but disk space on the Agent machine is limited. This parameter is available beginning with version 8.1.7 of the Intelligent Agent.

DBSNMP.TRACE_UNIQUE = *true/false*

When set to TRUE, generates unique log files for each log entry.

DBSNMP.LOG_DIRECTORY = *directory*

Directory where log file is written. This parameter is optional.

DBSNMP.LOG_FILE = *filename*

Filename of the log file. This parameter is optional. On Windows NT, the filename defaults to dbsnmp.

DBSNMP.LOG_UNIQUE = *true/false*

When set to TRUE, generates unique log files for each log entry.

DBSNMP.TRACE_TIMESTAMP = *true/false*

When set to TRUE, inserts a timestamp after each line of trace in the trace files.

DBSNMP.HOSTNAME = <hostname or ip address>

Allows the Agent to bind to a particular network interface card on its machine when ip address is specified. Allows the Agent to bind to all network interface cards on its machine when hostname is specified.

DBSNMP.CS_BASE_PORT = <port number>

Overrides default ports 1808 and 1809 used by the Intelligent Agent's collection system.

Example: `dbsnmp.cs_base_port = 1700` implies usage of ports 1700 and 1701.

DBSNMP.THRESHOLD_JOB_STATUS

This sets the number of job notifications that can be queued by the Agent for the Oracle Management Server.

DBSNMP.THRESHOLD_EVOCC

Sets the number of event notifications that can be queued for the OMS.

DBSNMP.AVG_OCC_PER_EVENT

Sets number of average notifications per event.

DBSNMP.NOTIFICATIONTIMEOUT = <nn>

Sets the timeout period (nn is number of milliseconds). If the Intelligent Agent fails to deliver a notification to the Oracle Management Server within this time period, the Intelligent Agent will be automatically re-started. The default value is 6 minutes (360,000 milliseconds).

DBSNMPJ.TRACE_LEVEL = OFF | USER | ADMIN | nn

Turns on tracing at the specified level for the *dbsnmpj* process. *dbsnmpj* is spawned whenever a job is submitted to the Intelligent Agent. Oracle recommends that you set the trace level to 13. Level 16 produces a deluge of information, which is only useful if a bug is being investigated. With a level of 16, you can see actual TCP/IP packet contents. With a level of 15, you can only see that packets are being passed. This parameter is optional.

DBSNMPJ.TRACE_DIRECTORY = *directory*

Directory where trace file is written. The setting is only relevant in conjunction with the `DBSNMP.TRACE_LEVEL`. If omitted, trace files are written to `$ORACLE_HOME\network\trace`. This parameter is optional.

DBSNMPJ.TRACE_FILE = *filename*

Filename of the trace file. This parameter is optional.

DBSNMPJ.TRACE_FILECNT = *nn*

Maximum number of trace files generated by the Agent. This optional parameter should be used when full tracing is desired, but disk space on the Agent machine is limited. This parameter is available beginning with version 8.1.7 of the Intelligent Agent.

DBSNMPJ.TRACE_FILESIZE = *nn*

Maximum size of the individual trace file (in Kilobytes) generated by the Agent. For example, a value of 1024=1 megabyte trace file. This parameter is used in conjunction with DBSNMPJ.TRACE_FILECNT when full tracing is desired, but disk space on the Agent machine is limited. This parameter is available beginning with version 8.1.7 of the Intelligent Agent.

DBSNMPJ.TRACE_UNIQUE = *true/false*

When set to TRUE, generates unique trace files for each line of trace.

DBSNMPJ.LOG_DIRECTORY = *directory*

Directory where log file is written. This parameter is optional.

DBSNMPJ.LOG_FILE = *filename*

Filename of the log file. This parameter is optional. On Windows NT, the filename defaults to `dbsnmpj`.

DBSNMPJ.LOG_UNIQUE = *true/false*

When set to TRUE, generates unique log files for each log entry.

DBSNMPJ.TRACE_TIMESTAMP = *true/false*

When set to TRUE, inserts a timestamp after each line of trace in the trace files.

Note: The following addresses are automatically set by the agent. Changing the addresses makes the agent undetectable by the Enterprise Manager Console and forces a manual configuration setup.

DBSNMP.ADDRESS =(ADDRESS=(PROTOCOL=<protocol>) (HOST=<host_name>)(PORT=<port_no>))

The TNS address that the agent uses to listen for incoming requests. There should be no space or return characters in the address. This parameter is the address that the Agent listens on for network connections.

TCP/IP must be installed on the server since it is required to automatically discover services with the agent.

The agent requires `PORT=1748`. The port address 1748 is a registered TCP port granted to Oracle by the Internet Assigned Number Authority (IANA). The port address is automatically set. Changing this port makes the agent undetectable by the Enterprise Manager Console and forces a manual configuration setup.

DBSNMP.HOSTNAME = [hostname/IP address]

Allows you to bind the 9i Intelligent Agent to a specific host or to an IP address.

**DBSNMP.SPAWNADDRESS =(ADDRESS= (PROTOCOL=<protocol>)
(HOST=<host_name>)(PORT=<spnport_no>))**

The TNS address which the agent can use to accept RPC's. This address is used for file transfers. The `spnport_no` used in this parameter is different than `port_no` used in the `DBSNMP.ADDRESS` parameter.

The agent `PORT=1754`. The port address 1754 is a registered TCP port granted to Oracle by the Internet Assigned Number Authority (IANA). Changing this port makes the Agent undetectable by the Enterprise Manager Console and forces a manual configuration setup.

DBSNMP.CS_BASE_PORT = <port number>

Port number used to override the default port numbers utilized by the Agent's collection service. For example, specifying a port number of 1700 tells the Agent to use 1700 and 1701 as the designated port numbers.

Intelligent Agent Log Files

When the appropriate log file parameters are set, the following log files can be generated.

Table 4–2 Intelligent Agent Log Files

Log File	Description
<code>dbsnmp.log</code>	Logs all Intelligent Agent processes
<code>dbsnmpj.log</code>	Logs all jobs processed by the Intelligent Agent
<code>dbsnmp.nohup</code>	Logs automatic Intelligent Agent restart (<code>dbsnmpwd</code>)

Troubleshooting

This chapter covers generic troubleshooting strategies in the event your Intelligent Agent does not function properly. The following topics are discussed:

- Troubleshooting the Intelligent Agent
- Quick Checks
- Additional Checks
- Intelligent Agent Error Messages and Resolutions
- Tracing the 9i Agent
- Tracing TCL

Troubleshooting the Intelligent Agent

Under most circumstances, the Intelligent Agent itself requires very little in the way of configuration. In order to function properly, however, the Agent must be able to communicate with the managing host and managed services. If you are familiar with Oracle and your operating system, using the following abbreviated checklists will likely solve problems that can interfere with Agent operation.

Important: Because the Agent is continuously being improved from one release to the next, it is **strongly recommended** that you upgrade to the latest Agent available for your particular server release. Oftentimes, this will resolve problems you may encounter with earlier versions of the Agent.

Quick Checks

The following checklists cover the areas most likely to affect Agent operation. Agent troubleshooting checklists have been divided according to the two most common platforms on which the Agent is run: Windows NT and UNIX. The checklists are abbreviated and assume knowledge of both Oracle, the operating system, and related communication protocols. Specific troubleshooting procedures are covered in detail later in this chapter.

Quick Checks for the Windows NT Agent

If you are running an Agent on a Windows NT system, use the following checklist.

1. Make sure the Agent service is up by checking the OracleAgent service in your control panel. If the Agent did not start up, use any of the following hints listed below.
2. Check for messages written to the NT Event Viewer (under Administrative Tools) since this is where the NT Agent writes any problems associated with startup.
3. Check if `snmp_ro.ora`, `snmp_rw.ora`, and `services.ora` are created by the Agent on startup. `snmp_ro.ora` and `snmp_rw.ora` are in the `ORACLE_HOME\network\admin` directory, and `services.ora` is in the `ORACLE_HOME\network\agent` directory.

Compare the services listed with the services which are available on the machine. Please refer to Appendix A, "Agent Configuration Files" for valid sample files.

If services are missing, check the following files for inconsistency or corruption:

- listener.ora
- tnsnames.ora

4. Check that you do not have a system path set to external drives.

The Agent is a service and runs by default as SYSTEM. It also needs DLLs from the ORACLE_HOME/BIN directory. If you need mapped drives in your path, you MUST NOT set them in the SYSTEM path.

To set your own path:

- a. Move mapped drive paths out of SYSTEM path variables and into your own.
 - b. Reboot to "unset" the systems path.
- 5. Check if you have TCP/IP installed. TCP/IP is a requirement.**
- 6. If you still do not know why the Agent did not start, trace the Agent.**
- a. Set the following variables in snmp_rw.ora:
dbsnmp.trace_level=admin (or 16 if you want maximum information)
dbsnmp.trace_directory=<any directory in which the Oracle user has write privileges>
dbsnmp.trace_file=<name of the trace output file>
 - b. Restart the Agent.
 - c. Check the log files located in the oracle_home/network/log directory.
DBSNMP.LOG should show general Agent problems.
DBSNMP.NOHUP should show any errors related to the Agent's "watchdog" dbsnmpwd process.
DBSNMPCONFIG.LOG should show problems with auto-discovery.
- 7. Ensure that the DNS Host entry is set to the node name in the listener.ora and tnsnames.ora files.**
- a. Run the start button-> settings-> control panel-> network-> protocol-> TCP/IP properties.

- b. Check the DNS Host entry.

Quick Checks for UNIX Agents

If you are running an Agent on a UNIX system, use the following checklist.

1. Check the Agent's status. Enter the command:

```
agentctl dbsnmp_status
```

Alternatively, you can check to see if the Intelligent Agent is running by entering the following command:

```
ps -eaf | grep dbsnmp
```

If your Agent is running, you should see something similar to the following:

```
DBSNMP for Solaris: Version 9.0.0.0.0 - Production on 04-NOV-01 18:44:15
```

```
(c) Copyright 2001 Oracle Corporation. All rights reserved.
```

```
The db subagent is already running.
```

These checks should show that a "dbsnmp" process is running and/or "dbsnmpwd" watchdog script is running.

2. Check the `ORACLE_HOME/NETWORK/log/dbsnmp*.log` file for errors on UNIX. (nmiconf.log for discovery).
3. Check that the Oracle user has write permissions to `ORACLE_HOME/AGENT/LOG` as well as `ORACLE_HOME/NETWORK/AGENT`.
4. Check `snmp_ro.ora`, `snmp_rw.ora`, and `services.ora` for the entries created by the Agent. `snmp_ro.ora` and `snmp_rw.ora` are in the `ORACLE_HOME/NETWORK/ADMIN` directory, and `services.ora` is in the `ORACLE_HOME/NETWORK/AGENT` directory. Alternatively, you can check the directory pointed to by the `TNS_ADMIN` environment variable.

Compare the services listed with the services which are available on the machine. Please refer to Appendix A, "Agent Configuration Files" for valid sample files.

If services are missing, check the following files for inconsistency or corruption:

- `listener.ora`
- `tnsnames.ora`

- oratab
5. If you still do not know why the Agent did not start, trace the Agent by setting the following variables in `snmp_rw.ora` and then re-start the Agent.
 - `dbsnmp.trace_level=admin` (or 16 if you want more information)
 - `dbsnmp.trace_directory=<any directory which the Oracle user can write to>`
 - `dbsnmp.trace_file=agent`
 6. If you have problems running the Intelligent Agent control utility (`agentctl`), set tracing for `agentctl` as follows:
 - `agentctl:trace_level=admin`
 - `agentctl.trace_directory`
 - `agentctl.trace_file`
 7. If you have upgraded the database software and one of your machines is having problems with the generated `snmp_ro.ora`, `snmp_rw.ora` or `services.ora` file, follow the instructions below:
 - a. Run `catsnmp.sql` under the INTERNAL or SYS account (NOT the `dbsnmp` account). Normally the `catsnmp.sql` script is run from `catalog.sql` upon database creation but since this is an upgrade, you may not have run this script yet. If the necessary scripts have not been run, the `dbsnmp` account is not created.
 - b. If you have more than one SID or older SIDs referenced in the `oratab` file, run `catsnmp.sql` against each of the databases.
 - c. The `snmp_ro.ra` file is a read only file which means that all changes to the file will be overwritten each time the Agent is started. You can make changes (if needed) to the `snmp_rw.ora` file.

If you are trying to do backups, you must run `backupts.sql` with the `dbsnmp/dbsnmp` account.

Warning: Please do not modify the Tcl scripts (job and events scripts written in Tool Command Language) that come with the Agent. If you want to submit a job different from the ones that are predefined with the Agent, use the TCL Job where you are allowed to pass in arbitrary scripts and have the Agent execute them.

Additional Checks

If after going through the quick checks your Intelligent Agent still is not functioning correctly, use the following section to cover other areas of Agent operation that are less probable causes of Agent operating problems. In addition, many of the steps in the checklists are covered in greater detail for those users who may be less familiar with Oracle and/or the operating system on which the Agent is running. The following questions are covered in this section:

- Is TCP/IP configured and running correctly? on page B-6
- Do the DNS Name and the Computer Name Match? (Windows NT) on page B-8
- Are the Oracle Net configuration files correct? on page B-9
- Is Oracle Net functioning properly? on page B-10
- Did the Agent startup successfully? on page B-11
- Did the Agent connect to ALL instances on its node? on page B-13
- Is the Agent running with the correct permissions? (UNIX) on page B-13
- Does the OS user exist and does it have the correct permissions? (Windows NT) on page B-13
- Why doesn't the Agent send status notifications back to the Enterprise Manager Console even though the jobs have run? on page B-14

Note: You do not need to remove all ".q" files from the `$ORACLE_HOME/network/agent` directory in order to debug the Agent. Although this approach was recommended in the past, troubleshooting more recent versions of the Intelligent Agent no longer requires this action. There are exceptions to this rule, which will be pointed out later in the chapter.

Is TCP/IP configured and running correctly?

One of the most common problems that prevents the Agent from starting is TCP/IP configuration. To check whether your TCP/IP setup is configured correctly, issue the following commands at the command line:

- Determine if the host machine (machine on which the Agent runs) and the specified network IP address refer to the same machine. Type the following at the command line.
 1. ping <hostname>
 2. ping <IP address>
 3. Check to see if the above commands return the same information (Windows NT). For UNIX systems, you should see "<hostname> is alive" and "<IP address> is alive" respectively.
- Determine if the host machine is reachable by issuing the following command.
telnet <hostname>
- Validate whether the host machine is available on the local network and whether the machine on which you are running the Console (Management Server for the case of V2) can access the host machine.
 1. ping the machine running the Agent using its IP address from itself .
 2. ping the machine running the Agent using its IP address from the machine running the Console.
- Determine if the machine running the Console is available on the local network and whether the machine running the Agent can communicate with the Console machine.
 1. ping <IP address of the console machine>
Ping the machine running the Console from itself.
 2. ping <IP address of the console machine>
Ping the Console machine from the machine running the Agent
 3. Check to see if the steps above return the same information.

Note: To determine the hostname of a Windows NT system, type "hostname" at a command prompt.

Correcting TCP/IP configuration problems

1. (Windows NT) Edit the `WINNT\system32\drivers\etc\hosts` and `lmhosts` files.

If these files have never been used, only sample files will exist in the directory. Either rename or copy the `.sam` files to just the file name with no extension.

(UNIX) Log in as root and edit the `/etc/hosts` file.

2. Verify that the IP address and host information for each system are correct.

Example: (Windows NT)

(Replace the information in brackets with the actual host information for that system.)

HOSTS file:

```
<122.111.111.111> <hostname>
```

LMHOSTS file:

```
<122.111.111.111> <netbios name or hostname> #PRE
```

Note: You can also verify this information through the Windows NT Control Panel -> Network property sheet.

3. Delete the `$ORACLE_HOME\network\agent*.q` and `services.ora` files.

Note: The `*.q` files contain information about current jobs and events. Do not delete these files without first removing all jobs and events registered against this Agent.

4. Delete the `$ORACLE_HOME\network\admin\snmp_ro.ora` and `$ORACLE_HOME\network\admin\snmp_rw.ora` files.

5. Restart the Agent.

Do the DNS Name and the Computer Name Match? (Windows NT)

Before Release 8.0.4 of the Agent, the NT Agent required the DNS Hostname and the Computer Name to be identical. These parameters can be checked/changed from the following Windows NT Control Panel property sheets.

To verify the computer name:

- Control Panel --> Network --> Identification --> Computer Name

To verify the DNS Name:

- Control Panel --> Network --> Protocols --> TCP/IP Protocol --> Properties-->DNS --> Hostname

Are the Oracle Net configuration files correct?

In addition to proper network configuration, which allows nodes in your network to communicate, components of your Oracle environment must also be able to communicate with each other. Oracle Net provides the session and data communication medium between client machines and Oracle servers, or between Oracle servers. For this reason, proper Oracle Net configuration is a prerequisite for Agent communication. This section covers the most common problems that can occur when Agent communication fails.

Oracle Net configuration files are found in `$ORACLE_HOME/network/admin`, or `$TNS_ADMIN` (Windows NT) or `$ORACLE_HOME/network/admin` (UNIX).

Primary configuration files are:

- `listener.ora`
- `sqlnet.ora`
- `tnsnames.ora`

See Appendix A, "Agent Configuration Files" for information and examples of the above files.

TNS_ADMIN variable usage during Agent Discovery

(UNIX) All versions of the Unix discovery script allow the use of the `TNS_ADMIN` variable to locate input files (`listener.ora` and `tnsnames.ora`). Only Agent versions 7.3.4 and above correctly write the output files (`snmp_ro.ora` and `snmp_rw.ora`) into `TNS_ADMIN`, if set.

(Windows NT) Beginning with version 8.0.5, the discovery script also reads the `TNS_ADMIN` value from the NT Registry.

The Agent also uses the TNS alias information found in the `listener.ora` file. The Agent does so even within an Oracle names environment. This behavior is intentional since an Oracle Names server may be temporarily unavailable and the Agent needs to be able to resolve names at all times. Check the following to make sure the local translation of the TNS alias takes place:

1. Verify that the `listener.ora` file contains the following for each instance:
 - Two IPC entries
 - One TCP entry

Do not activate the listener on port 1748, since Agent is listening on this port. (This is the reason you can use TNSPING against the Agent; TNSPING cannot differentiate between a listener and an Agent)

The Agent requires IPC entries and TNS alias definitions on the server, in addition to alias definitions from the Console, to perform alias translations. This correct IPC entries and TNS alias definitions are essential for correct Agent/Console (V1) or Agent/Management Server (V2) communications.

2. Ensure that the DNS Host entry is set to the node name in the `listener.ora` and `tnsnames.ora` files.
 1. From the Windows NT menu bar, click Start -> Settings -> Control Panel
 2. Double-click on the Network icon
 3. Click on the Protocols tab
 4. Select TCP/IP Protocol and click Properties.
 5. Check the DNS Host entry.

Is Oracle Net functioning properly?

If your Oracle Net configuration is correct and you are still unable to contact the Agent, the next step is to determine whether services in your Oracle Net network can be reached. You can use the TNSPING utility on each database you want to access by entering the following at the command prompt:

```
tnsping <network service name>
```

If you can connect successfully from a client to a server (or from a server to a server) using TNSPING, the command will return an estimate of the round trip time (in milliseconds) it takes to reach the Oracle Net service. This indicates Oracle Net is functioning properly.

Next, add the following alias (Agent debug entry) to the Console's `tnsnames.ora` file:

```
agent_<sid>.world=  
  (DESCRIPTION =  
    (ADDRESS_LIST =
```

```

        (ADDRESS =
          (COMMUNITY =TCP.world)
          (PROTOCOL = TCP)
          (Host = <your-agent-hostname>)
          (Port = 1748)
        )
      )
    )
  )

```

Then ping the Agent from the OEM console using:

```
tnsping agent_<sid>
```

or

```
tnsping80 agent_<sid>
```

If the TNSPING command does not work, add the above alias to the Agent machine's `tnsnames.ora` file and try using TNSPING from the machine on which the Agent resides. Every Agent must be TNSPING-able using this alias.

Did the Agent startup successfully?

To check whether the Agent process is running issue the following command:

```
agentctl status agent
```

If the Agent did not start up, use any of the hints listed in the following table:

Table 4–3 Troubleshooting an Agent that Will Not Start

UNIX	Windows NT
Check the <code>ORACLE_HOME/network/log/dbsnmp*.log</code> file for errors	Check for messages written to the NT Event Viewer (under Administrative Tools) since this is where the NT Agent writes any problems associated with startup.
Check the <code>ORACLE_HOME/network/log/nmicnf.log</code> file for errors.	Check the <code>ORACLE_HOME/network/log/nmicnf.log</code> file for errors.

Table 4–3 Troubleshooting an Agent that Will Not Start

UNIX	Windows NT
<p>Check that the Oracle user has write permissions to the following directories:</p> <p>\$ORACLE_HOME/agent/log</p> <p>\$ORACLE_HOME/network/agent</p>	<p>Check the properties of the Agent Service to verify the OS account used by the Agent (default is 'System') Check that the Agent user has write permissions to the following directories:</p> <p>\$ORACLE_HOME/agent/log</p> <p>\$ORACLE_HOME/network/agent</p>
<p>Check snmp_ro.ora, snmp_rw.ora, and services.ora for the entries created by the Agent. The snmp_ro and snmp_rw.ora files are located in the \$ORACLE_HOME/network/admin directory, and services.ora is in the \$ORACLE_HOME/network/agent directory.</p>	<p>Check if snmp_ro.ora, snmp_rw.ora, and services.ora are created by the Agent on startup. The snmp_ro and snmp_rw.ora files are located in the \$ORACLE_HOME\network\admin directory, and services.ora is located in the \$ORACLE_HOME\network\agent directory.</p>
<p>Compare the services listed with the services which are available on the machine. See Appendix A for valid sample files. If services are missing, check the following files for inconsistency or corruption:</p> <ul style="list-style-type: none"> ■ listener.ora ■ tnsnames.ora ■ oratab 	<p>Compare the services listed with the services which are available on the machine. See Appendix A for valid sample files. If services are missing, check the following files for inconsistency or corruption:</p> <ul style="list-style-type: none"> ■ listener.ora ■ tnsnames.ora
<p>Check if you have TCP/IP installed. TCP/IP is a requirement. See Is TCP/IP configured and running correctly?</p>	<p>Check if you have TCP/IP installed. TCP/IP is a requirement. See Is TCP/IP configured and running correctly?</p>
<p>If you still do not know why the Agent did not start, turn on tracing. (see Tracing the Intelligent Agent)</p>	<p>Check that you DO NOT have a systems path variable containing external drives. The Agent is a service and runs by default as SYSTEM. It also needs DLLs from the \$ORACLE_HOME/bin directory. If you need external mapped drives in your path, you MUST NOT set them in the SYSTEM path. To set your own path:</p> <ol style="list-style-type: none"> 1. Move external mapped drive paths out of systems path variable and into your own. 2. Reboot to "unset" the systems path.
<p>If you still do not know why the Agent did not start, turn on tracing. For more information on setting up Agent tracing, see "Tracing the 9i Agent" on page B-23)</p>	

For both UNIX and Windows NT systems check:

\$ORACLE_HOME/network/log/dbsnmp.nohup for errors.

Did the Agent connect to ALL instances on its node?

To test whether an Agent can connect to the database(s) it monitors on a given node, try connecting to each database with the following connect string:

```
dbsnmp/dbsnmp@address_list
```

You must perform this test on the node where the Agent resides.

Note: Agents prior to 7.3.3 maintain two permanent connections to its local databases. Post 7.3.3 Agents maintain only one permanent connection.

Is the Agent running with the correct permissions? (UNIX)

To verify whether the Agent has the correct user permissions, see Installing the Intelligent Agent on page 2-2 .

Does the OS user exist and does it have the correct permissions? (Windows NT)

An OS user needs to be specified for the node and must have the following permissions:

- read/write permissions to the `$ORACLE_HOME/network` directory and all of its sub directories
- read/write permissions to the `$TEMP` directory (`$TEMP` can be found on NT by selecting Control Panel --> System). If no `$TEMP` is defined, the OS user must have read/write permissions to the Oracle Home directory where it creates a directory called "work".
- The user above needs to have write permissions to the `$ORACLE_HOME/network/agent` directory.

Are there errors?

(Windows NT) Check the NT EVENT VIEWER -> APPLICATIONS -> LOG for any errors starting the DBSNMP process.

(Windows NT and UNIX) Check the `$ORACLE_HOME/network/log/nmicnf.log` file for discovery errors.

For both UNIX and Windows NT systems check the following file for additional errors:

```
$ORACLE_HOME/network/log/dbsnmp.nohup
```

Why doesn't the Agent send status notifications back to the Enterprise Manager Console even though the jobs have run?

Most likely the job does actually run, but the Agent is unable to contact the console to send back notifications. Verify that hostname resolution can occur. Verify that the IP and hostname of the Windows NT machine running the console is in the /etc/hosts file on the Unix box or the hostname can be resolved via DNS/NIS. Retry the job.

To test the TCP/IP resolution, perform the following tests from a command prompt:

```
ping <hostname>
ping <IPaddress>
```

If the server is running telnet or ftp services(UNIX):

```
telnet <hostname>
ftp <hostname>
```

Since PING uses IP and not TCP, it is a good way of determining if the problem is in the packet routing.

To determine if the problem is actually with TCP, use the telnet or ftp utilities.

Be sure the name and IP address of the Enterprise Manager Console machine is in the /etc/hosts file on the Sun server, otherwise the Agent is not able to return messages to the console because it can not resolve the name of the machine to an IPADDRESS.

The default listening address (TNS format) is:

```
LISTENING ADDRESS = (ADDRESS=(PROTOCOL= TCP)(Host=machine_name)(Port=7770))
```

If a job stays in the scheduled status, repeatedly delete it using the DEL key. Restart the job. Sometimes it takes several submits until it starts up. A delay of up to a minute until a job starts is common, especially the first time an Agent tries to sync with the OEM console with old Agents (7.3.2)

Intelligent Agent Error Messages and Resolutions

The following error messages and resolution are categorized by operating system. Situations that apply to all systems are listed under "Generic Agent."

Generic Agent

ORA-12163: 'TNS:connect descriptor is too long' Copy the `snmp.address.<host_name>` parameter from your `$ORACLE_HOME\network\admin\snmp_ro.ora` file. Paste this address and parameter into your `$ORACLE_HOME\network\admin\snmp_rw.ora` file. In `snmp_rw.ora`, reduce the size of this connect string by removing the address entries for IPC. (NMP and SPX may also be removed.)

Shutdown/restart the Agent. See examples below.

Note: The parameter `snmp.address` is no longer found in `snmp_ro.ora` starting with the 7.3.4/8.0.3 Agents. Therefore, you will have to use this example to add a new variable to your `snmp_rw.ora`.

EXAMPLES:

Entry to be copied out of `snmp_ro.ora`:

```
snmp.address.ORCL_MACHINE-PC = (DESCRIPTION=(ADDRESS_LIST
=(ADDRESS=(PROTOCOL=IPC)(KEY=oracle.world))(ADDRESS=(PROTOCOL=IPC)(KEY=ORCL))(AD
DRESS=(COMMUNITY= TCP.world)(Host=machine-pc)
(PROTOCOL=TCP)(Port=1521))(ADDRESS=(COMMUNITY=TCP.world)(Host=machine-pc)
(PROTOCOL=TCP)(Port= 1526)))(CONNECT_DATA=(SID=ORCL)(SERVER=DEDICATED))
```

Modified entry in `snmp_rw.ora`:

```
snmp.address.ORCL machine-PC = (DESCRIPTION=(ADDRESS_LIST
=(ADDRESS=(COMMUNITY=TCP.world)(Host = machine-pc)(PROTOCOL= TCP)(Port=
1521))(ADDRESS=(COMMUNITY= TCP.world)(Host = machine-pc)(PROTOCOL=
TCP)(Port=1526)))(CONNECT_DATA=(SID=ORCL)(SERVER=DEDICATED))
```

TNS-12542: 'TNS:address already in use'

This is actually a Oracle Net Listener error.

The following is documented in the 8.0.3.0.0 Intel NT release notes for the Oracle Net Listener. When a client connects to an Oracle8 server in dedicated server mode, WINSOCK2 Shared Sockets feature is used so that the client connection is routed from the listener to the database server. This feature improves the connection time, because the client does not need to close the socket connection with the listener and establish a new connection with the database server.

With the use of Shared Sockets, threads also use the same port as the listener. If you shut down the listener and try to start it up again for the same port, the listener does not start up if the port is in use due to any open connections with the database. Ensure that no client is connected to the database before starting up the listener. Note that if you are using a listener with a different port number you are able to start it up.

Warning: Do not bring down the listener when any clients are connected to the database. If you need to listen for a new database, modify the listener.ora configuration file, and issue the reload command from the Listener Control Utility LSNRCTL80.

See *Oracle Networking Products Getting Started for Windows Platforms* for more information about the listener.ora file and the LSNRCTL80 utility. Oracle Corporation attempted to overcome the restriction by using the WINSOCK2 option to allow the re-use of a port, but the option does not work reliably. Oracle Corporation is currently working with Microsoft Corporation to resolve this issue.

For additional information about the reload command, see the *Oracle Net Administrator's Guide*.

VOC-04816 'Invalid Destination' While submitting a job, validation fails with "failed to find address for Agent_node". And then the VOC-04816 Invalid Destination. This might also be caused by an invalid address in the tnsnames.ora located on the console.

Upgrade your Agent to at least 7.3.3. or later.

Verify that your SQL*Net configuration files are correct?

'Failed to authenticate user' error when running a job In order for the Agent to execute jobs on a managed node, the following conditions must be met:

- An NT user account must exist that has the advanced user right, "logon as batch job." (Windows NT). The privilege can be assigned to an existing local or domain user (starting with 7.3.3), or a new NT user. Refer to Windows NT Specific Instructions in the Configuring the Intelligent Agent section.
- The preferred credentials for the node must be set for that user in the Oracle Enterprise Manager Console. Refer to "Setting Preferences" in the Oracle Enterprise Manager Configuration Guide.
- The user must have permissions to write to `$ORACLE_HOME/network` or `$ORACLE_HOME\network` directory.

'Login denied', 'Invalid username/password' messages in trace files This usually happens if you have a databases prior to 7.3.3 on the machine. From V7.3.3 onwards, a script called `CATSNMP.SQL` is included in the `CATALOG.SQL` dictionary script. This script is responsible for creating the DBSNMP user the Agent needs to connect. Older databases did not have this script yet.

Verify if the user 'DBSNMP' exists. If not, run the `catsnmp.sql` script.

'ORACLE_HOME does not exist' when starting the Agent This message comes from the discovery script, `nmiconf.tcl`. Make sure you have `$ORACLE_HOME` environment variable set to the `ORACLE_HOME` of the Agent and re-start the Agent.

The Agent is only finding one database on a certain node If you have more than one database on a single node, then you need to make sure that each instance has a unique `GLOBAL_DBNAME` in the `listener.ora`. You may have to define this manually in the `listener.ora`.

No `snmp_ro.ora` and `snmp_rw.ora` are generated. This error can occur if the Agent cannot write to `$ORACLE_HOME\network\admin`. Refer to the `$ORACLE_HOME\networklog\nmiconf.log` for errors. For more information on Agent startup problems, see "Did the Agent startup successfully?" on page B-11.

Not all services are discovered. Check the `services.ora` file to determine which services have been discovered.

All the services the Agent finds on a machine, must be defined in the relevant `SQL*Net/Oracle Net` configuration files. If the service(s) are not defined, service discovery will fail and, in the worst case, the Agent will hang or return errors.

Windows NT: Beginning with version 8.0.4, the Agent searches for service names that begin with 'OracleService' or 'OracleService<SID>'. Every entry

beginning with 'OracleService' is considered to be a database running on this machine. Every SID encountered by the Agent must be defined in the relevant SQL*Net/Oracle Net files.

UNIX: The `oratab` file is used to determine which SIDs are present. For 7.3.3 Agents and earlier, discovery fails if it encounters a SID that is not accurate (like in a Developer 2000 environment). To work around this problem, the environment variable `ORATAB` can be used to access an alternate `oratab` file which contains only the databases you wish the Agent to see.

For the remaining databases, check the `oratab` file, and the SQL*Net/Oracle Net files to see if these files exist and that all definitions are present. Make sure that all of the databases are listed in the `listener.ora` file. For more information, see "Are the Oracle Net configuration files correct?" on page B-9 and "Is Oracle Net functioning properly?" on page B-10.

'Invalid service name' or 'File operation error' while registering a job or event. This error is usually seen when the services on the console and the services discovered by the Agent are out of sync. For example, if you have an event registered against TESTDB and someone changes the name of the database to PRODDB, that Agent and Console are out of sync.

To fix this start by removing all job and event registrations from this service and dropping the node where the services exist from the console. Rediscover the node from the console using the auto-discovery wizard.

NOTE: With 7.3.2 the alias are case sensitive.

If you have a NT Agent please refer to 'Invalid service name' while registering a job or event.

'Transport read error' or 'Transport write error' messages This indicates a problem with the TCP/IP layer. Most obvious cause for this is that the IP address and the hostname do not reference the same physical machine.

Verify that TCP/IP is configured and running correctly. (See Is TCP/IP Installed and Running Correctly)

'Oraclogin failed in orlon' You may receive this error while executing a TCL script using the `oratcl` verb `oraclogin` through the Software Developer's Kit. "Oraclogin failed in orlon" means that the connect string is either wrong or for some reason, the account used cannot logon to the database.

NT Agent

For any NT Operating System Error when starting the Agent

If you see an OS error when starting the Agent, check to see whether it is an actual Agent error as described in snmimsg.mc. Due to one of the Windows APIs not working as documented, the Agent fails to print out the real cause of the error.

Use the Event Viewer in the Administrative tools group of Windows NT. You should find the true cause of the problem documented. The source for the Agent errors are under the service name "dbsnmp". Highlight the most recent dbsnmp entry in the list. Double click on the event to get the actual results.

In order to debug the Agent after you have received an OS error, follow the following steps:

- Launch the EVENT VIEWER. (This is in the ADMINISTRATIVE TOOLS icon group.) Click on LOG from the main menu, then choose APPLICATION. The source for the Agent errors are under the service name "dbsnmp". Highlight the most recent dbsnmp entry in the list. Double click on the event to get the actual results.
- DBSNMP.LOG and NMICONF.LOG should contain more information about the specific error that has occurred.
- Verify that snmp_ro.ora and snmp_rw.ora are in the \$ORACLE_HOME\network\admin directory and they are not zero length.
- Verify that user that started the Agent can read/write the queue files.
- Make sure that the Machine Name and the DNS Hostname are the same.
- See Verifying the DNS Name and the Computer Name on NT. Verify that SQL*Net is running.
- Verify that TCP/IP is configured and running correctly. (See Is TCP/IP Configured and Running?)
- Remove all non-essential files from the \$ORACLE_HOME/network/agent/MIB directory.
- Make sure that you have not installed OEM 1.5 on NT in the same ORACLE_HOME as a 8.0.3 database.
- If you are pre-Oracle 8.0.3, verify that you have only one Agent running. This is possible starting from Oracle 8.0.4, which creates a new Agent service(OracleAgent80). This allows a machine to have two Agent services.

- Upgrade to the 8.0.4 Agent

'Failed to connect to Agent' error. (Jobs that remain in submitted status)

There are in fact two hostname definitions on NT: One NETBios one, used for the NT's internal Named Pipes protocol, which is always installed. The other is the TCP/IP hostname, which is only configurable when you install TCP/IP on NT.

To find the NT NetBios hostname:

- Start Control Panel / Network
- The Computer Name in the dialog box is the NetBios hostname.

To find the TCP/IP hostname:

- Start Control Panel / Network / Protocols / TCP-IP / Properties / DNS
- This is the TCP/IP hostname.

On an NT server, you can 'ping' the two names, even if they are configured differently. Other clients, however, only 'ping' real TCP/IP hostnames. If the Agent is using local IPC connections, it uses Named Pipes. Therefore the NetBios name, while all external connections will use the TCP/IP name.

A mismatch in these names leads to 'unable to contact Agent', or forever pending jobs in the console. Therefore, make sure that the NetBios and the TCP/IP hostname are identical.

Receive the error failed -> 'output from job lost' while running job. The Windows NT user that you created for the Agent (see Agent Configuration, Configuration Guide) needs read/write permissions to the `$ORACLE_HOME\network\agent` directory (and TEMP directory, for some applications) and read permissions to the SYSTEM32 directory

Verify that the NT user has these permissions.

Agent finds no services after discovery This problem has been fixed for Agent versions 7.3.4 and higher. For Agent versions 7.3.3 and lower, the following workaround can be used.

Check the `listener.ora` file, and make sure that no `$ORACLE_HOME` parameter is specified in the `SID_LIST` section. Specifying an `$ORACLE_HOME` in the `SID_LIST` section prevents the Agent from finding the requisite files for service discovery.

'Invalid service name' while registering a job or event. If you have a 8.0.4 Agent, you may experience this problem. If you have a default domain other than ".world". The Agent tries to append a ".world" to the database name during discovery. For example, if your default domain is nl.oracle.com and you define your GLOBAL_DBNAME = database.nl.oracle.com, the Agent defines the database name to be database.nl.oracle.com.world. This problem only occurs when the Agent and Console reside on the same machine (they share the some configuration files).

The workaround is to append ".world" to all services that do not currently have a specified domain.

UNIX Agent

Discovery fails with no services at all

First check that all of the SQL*Net files are present and correctly defined. You can then debug discovery by editing your oratab file contains only a valid SID with a listener running. After you get this working, you can add the remaining entries in the oratab file to see which entry is causing the problem.

Check the \$ORACLE_HOME/network/log/nmiconf.log files for errors.

NMS-0308 : 'Failed to listen on address : another Agent may be running'.

There are two possible causes for this error:

1. If two Agents are installed on a machine, in two different ORACLE_HOME, then you see this message if you try to start the second Agent. This is because both Agents try to listen the same default port #1748

Only have one Agent on a machine.

2. The port 1748 where the Agent listens is being used by someone else, or is not being released by dead process that were formerly using it (unfortunately common problem on SUN) .

To confirm port is being used by someone else

1. Use this command in UNIX

```
netstat -a | grep 1748
          ^---- this is port #
```

If any result shown on screen that ends in "LISTENING" then the port is in use.

2. If the following is true :

- `netstat -a | grep 1748` ---> results in "LISTENING"
- `agentctl status agent` (results in "The db subagent is not started.")

Then do this.

- `ps -ef | grep dbsnmp`
- `kill -9 _____` (fill in process numbers)
- restart Agent with `agentctl start agent`

If it still fails to start the Agent, go through steps again, but before re-starting the AGENT, do this.

- `cd $ORACLE_HOME/network/agent`
- `rm *.q, services.ora, snmp_ro.ora, and snmp_rw.ora`
- restart Agent with `agentctl start agent`

This will re-start the Agent and remove all of the job and event queues it was using in the past.

If all else fails, re-booting the machine will free up the port.

NMS-001 while starting the Agent This message indicates that the SNMP Master Agent (the process on UNIX that controls the SNMP protocol) could not be contacted. By default the Agent listens and works over SQL*Net, but the Agent can also work over SNMP on UNIX systems.

This message can safely be ignored unless you are trying to communicate with a Master Agent.

NMS-205 while starting the Agent The 'dbsnmp' user could not be located.

Run the `catsnmp.sql` script for that database with either the SYS or INTERNAL accounts.

NMS-351 while starting the Agent This happens if there mismatches between the ID's in the '*.q' files in the `$ORACLE_HOME/network/agent` directory. Delete all the '*.q' in the `$ORACLE_HOME/network/agent` directory. Rebuild your repository. Restart the Agent.

Tracing the 9i Agent

Beginning with 7.3.3, the Agent reads information from the `snmp_ro.ora` and `snmp_rw.ora` files in the `$ORACLE_HOME\network\admin` directory.

Note: These files only exist after you have started the Agent the first time. If you want to trace the Agent the first time it is started, you can manually create a new file called `snmp_rw.ora` and add the trace parameters to this file. Otherwise, start the Agent and then modify the `snmp_rw.ora` file to add the trace information and restart the Agent.

Example of modifications of the `snmp_rw.ora` file:

```
DBSNMP.TRACE_LEVEL = (OFF | USER | ADMIN | 16 )
```

The `DBSNMP.TRACE_LEVEL` settings mirror those used for SQL*Net.

Optional:

```
DBSNMP.TRACE_FILE = agent          Default=dbsnmp.trc
```

```
DBSNMP.TRACE_DIRECTORY = /private/temp Default=$ORACLE_HOME/network/trace
```

(Any existing directory where the Agent has write permissions)

Note: Because the Data Gatherer functionality has been integrated with the 9i Agent, data collection-based tracing can be turned on as follows:

1. `setenv VP_DEBUG 1`
2. Then start the agent using `agentctl start agent`

Any collection activity will be logged in

`$ORACLE_HOME/network/log/dbsnmp.nohup`.

The log file, `$ORACLE_HOME/network/log/dbsnmp.log`, is written by the Agent on every startup, even if tracing is not turned on. It contains the name and version of the Agent and the name and location of the Agent's configuration files. If tracing is turned on, it also contains problems encountered with the database and listener connections.

The log file, `$ORACLE_HOME/network/log/nmiconf.log`, is created on the first start up of the Agent and appended to every time after that. The auto discovery is done by the Tcl script, `nmiconf.tcl` (hence, the log file name). This file is written to only during startup. `$ORACLE_HOME/agentbin/ORATCLSH` is a special-purpose TCL shell that supports all standard TCL verbs (supported in `TCL75.dll`) plus a large subset (not all) of the ORATCL verbs supported by the OEM Agent. ORATCLSH is not a general purpose utility and may only be used in combination with the OEM Agent as it depends on files and data structures maintained by the OEM Agent.

There is no documentation of ORATCLSH and it has never been part of the supported feature set of the OEM Agent. It is provided strictly as a debugging tool to help Oracle customers and developers in developing OEM job and event scripts. The executable ORATCLSH is provided for debugging your TCL scripts. Before executing ORATCLSH, set the environment variable `TCL_LIBRARY` to point to `$ORACLE_HOME/network/agent/tcl`, the location of the `init.tcl` file.

Tracing TCL

You may also turn Tcl tracing on by setting the environment variable `ORATCL_DEBUG` and turning tracing on in the `snmp_rw.ora` file. The `ORATCL_DEBUG` must be set to the `$ORACLE_HOME/network/trace` directory. You must shut down and re-start the Agent for these parameters to take effect. TCL tracing creates a file, `oratcl.trc` in the above location. Every time an event is run an entry is added to the `oratcl.trc` file.

Keyboard Shortcuts

This appendix provides a list of general Windows keyboard shortcuts. For a complete list of Windows keyboard shortcuts and navigation, refer to your operating system documentation.

Figure C-1 General Windows Keyboard Shortcuts

Key	Action
F1	Displays Help information for the active object or the window as a whole.
WINDOWS LOGO KEY OR CTRL+ESC	Opens the Start menu located on the taskbar.
CTRL+ALT+DELETE	<p>In Microsoft Windows, opens the Close Program dialog box, which contains a list box of applications to be closed and the command buttons End Task, Shut Down, and Cancel.</p> <p>In Microsoft Windows NT, opens the Windows NT Security dialog box, with the following options: Lock Workstation, Logoff, Shut Down, Change Password, Task Manager, and Cancel. If you are not logged on, opens the logon dialog box.</p>
DELETE	Deletes the selected item(s). If the items are files, moves them to the Recycle Bin.
SHIFT+DELETE	Delete the selected item(s). If the items are files, destroys them immediately without moving them to the Recycle Bin.
CTRL+N	Opens the New dialog box. (You also can choose the New command from the File menu.)
CTRL+O	Opens the Open dialog box. (You also can choose the Open command from the File menu.)
CTRL+P	Opens the Print dialog box. (You also can choose the Print command from the File menu.)
CTRL+S	Opens the Save dialog box. (You also can choose the Save command from the File menu.)
CTRL+X	Cuts the selected item(s) to the Clipboard. (You also can choose the Cut command from the Edit menu.)
CTRL+INSERT OR CTRL+C	Copies the selected item(s) to the Clipboard. (You also can choose the Copy command from the Edit menu.)
SHIFT+INSERT OR CTRL+V	Pastes the copied items(s) from the Clipboard. (You also can choose the Paste command from the Edit menu.)
ALT+BACKSPACE OR CTRL+Z	Undoes the last action. Note that not all actions, such as shutting down, can be undone. (You also can choose the Undo command from the Edit menu.)
ALT+SHIFT+BACKSPACE	Redoes the previously undone action. (You also can choose the Redo command from the Edit menu.)

Key

WINDOWS LOGO KEY+M

Action

Minimizes all open windows. The keyboard focus goes to the least recently selected icon on the desktop. Add SHIFT to expand previously opened windows and return focus to the most recently used application.

Glossary

MIB: Management Information Base.

A collection of SNMP Object ID's (OID) that are usually related

OID: SNMP Object ID

A period delimited sequence of numbers of the form `a.b.c...x.y.z`. It is a unique identifier for an item of information that is part of a MIB. Typically OIDs can have names associated with them. OIDs are hierarchical in nature. Hence `1.2.3` comes before `1.3` but after `1.2`. For example the OID that contains the number of physical reads an Oracle7 database has performed is:

`oraDbSysPhysReads, 1.3.6.1.4.1.111.4.1.1.1.8`

RDBMS Public MIB

A Standard MIB for relational databases agreed upon by the Internet Engineering Task Force (IETF). This MIB supports a variety of OIDs relating to relational databases in general such as the database name (eg. `rdbmsDbName, 1.3.6.1.3.55.1.2.1.4`)

Oracle Private MIB(s)

A MIB that is specific to Oracle products only.

SNMP: Simple Network Management Protocol.

A network protocol that manipulates OIDs. In the case of Oracle, only two primitive SNMP operations are supported: `get oid` which fetches the value of `oid` and `getnext oid` which gets the value of the next OID after `oid`.

Event

An event is a condition that can arise on either a database or a node monitored by an Intelligent Agent. For example, a database that suddenly goes down results in a DBDOWN event. Events can be detected in one of two ways: (1) By running Tcl scripts periodically that monitor for certain conditions or (2) By allowing a 3rd party to report the occurrence of an event directly to the agent.

Job

A job is a Tcl script that can be executed once or on a re-occurring schedule. Unlike events which monitor for specific conditions, jobs are expected to accomplish a certain task. Example of jobs are: backup and start database.

Fixit Job

A special kind of job that is triggered by the occurrence of an event. For example, if the tablespace full event detects that a tablespace is over 90% full, the fixit job will be run automatically to add a datafile to the tablespace.

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