Center for Internet Security Benchmark for Oracle 9i/10g

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Introduction

This document is derived from research conducted utilizing the Oracle 10g program, the Oracle's Technology Network (otn.oracle.com), various published books and the Oracle 9i Database baseline document. This document provides the necessary settings and procedures for the secure installation, setup, configuration, and operation of an Oracle 10g database environment. Targeted for newly established and/or deployed Oracle 10g database in Unix or Windows operating system platforms. With the use of the settings and procedures in this document, an Oracle database may be secured from conventional "out of the box" threats. Recognizing the nature of security cannot and should not be limited to only the application, the scope of this document is not limited to only Oracle specific settings or configurations, but also addresses backups, archive logs, "best practices" processes and procedures that are applicable to general software and hardware security.

New to the 10g baseline document is organization into chapters based on logical groupings. Within chapters, items are organized by level. All items function on layer 7, the Application layer of the OSI model, or, as in the case of many policy items, are not applicable to the OSI model. Therefore, groupings via the OSI model would not be relevant.

Applicable items were verified and tested against an Oracle 10g default install on both a default Windows 2000 Server and a Solaris 9 Unix machine. The Oracle version used was 10.0.1.2 install disks, patched up to 10.0.1.3. Where the default setting is less secure then the recommended setting a caution has been provided in the comment section below the separator bar or as a note below a chapter heading. Default installs for both the operating system and the database may differ dependent on versions and options installed so this is to be used as a general guide only. Unix settings should translate to other varieties of Unix, but were only tested against Solaris 9. If any differences are found, please contact the CIS team.

Under the Level heading, scoring data has been included:

S – To be scored.
N – Not to be scored.
R – Reportable, but not to be scored.

This information indicates how the CIS Oracle Scoring tool will handle this specific setting.

The Level column indicates the following:

> Level 1 settings are generally considered "safe" to apply to most systems. The use of these configuration recommendations is not likely to have a negative impact on performance or functionality unless otherwise noted in the Comments.

> Level 2 settings provide a higher level of security, but will result in a negative impact to performance and functionality.

It is extremely important to conduct testing of security configurations on non-production systems prior to implementing them on production systems.

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
1.01	Windows platform	Do not install Oracle on a domain controller	Oracle must only be installed on a domain member server or a standalone server.	10g,9i	√		1
1.02	Windows Services	Disable or remove unnecessary Windows services.	Refer to Appendix B for which Windows 2000 Services must be disabled.	10g,9i	√		1
1.03	Windows Networking	Remove all unnecessary protocol stacks except TCP/IP.	Have only TCP/IP available.	10g,9i	√		1
1.04	Windows Administrator's Account	Rename the local computer's Administrator account	Do not use the default name.	10g,9i	√		1
1.05	Windows Oracle Account	Use local administrator account	Run the Oracle services using a local administrator account created specifically for Oracle. Use the account created to install the product. Deny log on locally to this account.	10g,9i	√		1
1.06	Windows Oracle Domain Account	Use restricted service account (RSA)	If the Oracle services require domain resources, then the server must be a domain server and the Oracle services must be run using a restricted service account (RSA), i.e., restricted domain user account. It must be added to the local administrators group on the server running the Oracle services.	10g,9i	√		1
1.07	Windows Oracle Domain Global Group	Create a global group for the RSA and make it the RSA's primary group	The RSA account is not an account that should have access to resources that all domain users have a need to access. Note: Do not assign any rights to the group.	10g,9i	√		1
1.08	Windows Oracle Account Domain Users Group Membership	Remove the RSA from the Domain Users group	The RSA must have limited access requirements.	10g,9i	√		1
1.09	Windows Oracle Domain Network Resource Permissions	Verify and set permissions as needed	Give the appropriate permissions to the RSA or global group for the network resources that are required. The RSA must have limited access requirements.	10g,9i	√		1
1.10	Windows Oracle Domain Account Logon to… Value	Limit to machine running Oracle services	Configure the RSA to only log on to the computer that is running the Oracle services and on the actual computer deny the right to log on locally as the RSA.	10g,9i	√		1

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
1.11	Windows Local Users Group Membership	Remove Domain Users from Users group	If the server is a domain server, then remove the Domain Users group from the local computer's Users group.	10g,9i	√		1
1.12	Windows Directory Permissions	Verify and set permissions as needed	Remove the Everyone Group from the installation drive or partition and give System and local Administrators Full Control.	10g,9i	√		1
1.13	Windows Program Folder Permissions	Verify and set permissions as needed	Remove permissions for the Users group from the [OS drive]:\Program Files\Oracle folder. The Oracle program installation folder must allow only limited access.	10g,9i	√		1
1.14	Windows Tools Permissions	Verify and set permissions as needed	Tighten the permission on tools (*.exe) in the WINNT and System32 folders, e.g., only Administrators should have permissions on these files; however, deny access to the Oracle service account. The Oracle service account is an administrator account, but also must be denied access to executables.	10g,9i	√		1
1.15	Windows HKLM Registry Key Permissions	Remove the Everyone group on the HKLM key.	The Everyone group must not be able review registry settings.	10g,9i	√		1
1.16	Windows Oracle Registry Key Permissions	Verify and set permissions as needed	Give Full Control over the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE key to the account that will run the Oracle services and remove the local Users group if it's not required. Give read permissions to those users that require it. Access to the Oracle registry key must be limited to those users that require it.	10g,9i	√		1
1.17	Windows Oracle Registry Key Setting	Set OSAUTH_ PREFIX_DOMAIN registry value to TRUE	This registry value must be created or updated in HKEY_LOCAL_MACHINE\ SOFTWARE\ORACLE\ALL_HOMES	10g,9i	√		1
1.18	Windows registry	use_shared_socket=TRUE	Add this to the HKEY_LOCAL_MACHINE\ SOFTWARE\ORACLE\HOME<#> registry key if random port reassignment is undesired, such as if there is a need to pipe through a firewall. See Oracle Metalink note 124140.1 for details.	10g,9i	√		2

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
1.19	Oracle software owner host account	Lock account	On Unix systems, lock the Oracle software owner account. If the account cannot be locked, use a very strong password for the account. Account can be unlocked if system maintenance is required. This is not recommended for Windows environments.	10g,9i		√	2
1.20	All associated application files	Verify permissions	Check the file permissions for all application files for proper ownership and minimal file permissions. This includes all 3rd party application files on the server that access the database. Any 3rd party applications must be installed on a separate server from the database. If this is not possible in the environment, ensure that the 3rd party applications are installed on separate partitions from the Oracle software and associated datafiles.	10g,9i	√	√	2

			2. Installation and Patch				

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
2.01	Installation	Try to ensure that no other users are connected while installing Oracle 10g.	The Oracle 10g installer application could potentially create files in a temporary directory with public privileges. It would be possible for any local user to delete, overwrite or corrupt these files during the installation process. Try to ensure that no other users are connected while installing Oracle 10g. Also set the $TMP and $TMPDIR environment variables to a protected directory with access given only to the Oracle software owner and the ORA_INSTALL group.	10g	√	√	1
2.02	Version/Patches	Ensure the latest version of Oracle software is being used, and that the latest patches from Oracle Metalink have been applied.	It would be counterproductive to state specific version and patch levels in this document. Since they change on a regular basis, the version stated in here might be outdated by the time this document is being used. Check Oracle's site to ensure the latest versions: http://www.oracle.com/technology/software/index.html and latest patches: http://metalink.oracle.com/metalink/plsql/ml2_gui.startup	10g,9i	√	√	1
2.03	tkprof	Remove from system	The tkprof utility must be removed from production environments. If tkprof must remain on the production system, it must be protected. Set file permissions of 0750 or less on Unix systems. On Windows systems, restrict access to only those users requiring access and verify that "Everyone" does not have access. By default tkprof is installed. Be aware, default permissions are set as: Windows: Default is sufficient	10g,9i	√	√	1 S
2.04	listener.ora	Change default name of listener	The listener must not be called by the default name. A distinct name must be selected.	10g,9i	√	√	1 S
2.05	listener.ora	Use IP addresses rather than hostnames	IP addresses instead of host names in the listener.ora file must be used. Host names are used by default.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
2.06	otrace	Disable	Go to the $ORACLE_HOME/otrace/admin directory of your instance and remove or delete the dat files related to otrace. Do this for all *.dat files in this directory.	10g,9i	√	√	1 S
			Note that this directory is installed for the Enterprise Manager Grid Controller. It is not installed with a default 10g database installation.				
2.07	Listener password	Encrypt the Listener Password	Set an encrypted password for the listener. By default, the listener password is not set.	9i	√	√	1 S
		Use Integrated Authentication	By default, the listener uses integrated authentication for Administrators (Windows), root (Unix), and the process owner. If additional users require access, set an encrypted password for the listener.	10g			
2.08	Default Accounts (created by Oracle)	The following actions are recommended in order of preference for default accounts: 1. Drop the user 2. Lock the user account 3. Change the default password	Depending on the Oracle version specific environment, on the default accounts either drop the user, lock the user account, or change the default password.	10g,9i	√	√	2 S
2.09	OEM objects	Remove if OEM not used (see comments)	Execute $ORACLE_HOME/rdbms/admin/ catnsnmp.sql to remove all the objects and delete the file $ORACLE_HOME/bin/dbsnmp. NOTE: database statistics will be unavailable in Enterprise Manager if this is set.	10g,9i	√	√	2 S
2.10	listener.ora	Change standard ports	Standard ports are well known and can be used by attackers to verify applications running on a server.	10g,9i	√	√	2 S
2.11	Third party default passwords	Set all default account passwords to non-default strong passwords	When installed, some third party applications create well-known default accounts in an Oracle database. The default password for these accounts must be changed or the account must be locked.	10g,9i	√	√	2 S
2.12	Service or SID name	Non-default	Do not use the default SID or service name of ORCL.	10g,9i	√	√	1 S
2.13	Oracle Installation	Oracle software owner account name NOT 'oracle'	Do not name the Oracle software owner account 'oracle' as it is very well known.	10g,9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
2.14	Oracle Installation	Separate users for different components of Oracle	For Unix systems, create unique user accounts for each Oracle process/service in order to differentiate accountability and file access controls. The user for the intelligent agent, the listener, and the database must be separated. This is not recommended for Windows environments.	10g,9i		√	2

Note: The Oracle software owner in Windows is the account used to install the product. This account must be a member of the local Administrators group. The Windows System account is granted access to Oracle files/directories/registry keys. This account is not restated in the comments section below, but must not be removed. Removal of the System account will cause Oracle to stop functioning.

Note: Some Unix operating systems make use of extended ACL's which may contain permission more secure then the recommendations listed here. Please be sure to fully examine and test permission before implementing them on production systems.

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
3.01	Files in $ORACLE_HOME/bin	Verify and set ownership	All files in the $ORACLE_HOME/bin must be owned by the Oracle software account. In Windows, this account must be part of the Administrators group.	10g,9i	√	√	1 S
3.02	Files in $ORACLE_HOME/bin	Permissions set to 0755 or less on Unix systems	All files in the $ORACLE_HOME/bin directory must have permissions set to 0755 or less.	10g,9i		√	1 S
3.03	Files in $ORACLE_HOME (not including $ORACLE_HOME/bin)	Permissions set to 0750 or less on Unix systems	All files in $ORACLE_HOME directories (except for $ORACLE_HOME/bin) must have permission set to 0750 or less.	10g,9i		√	1 S
3.04	Oracle account .profile file	Unix systems umask 022	Ensure the umask value is 022 for the owner of the Oracle software before installing Oracle. Regardless of where the umask is set, umask must be set to 022 before installing Oracle.	10g,9i		√	1
3.05	init.ora	Verify and restrict as needed permissions	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.06	spfile.ora	Verify and restrict as needed permissions	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.07	Database datafiles	Verify and restrict as needed permissions	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.08	init.ora	Verify permissions of file referenced by ifile parameter	If the ifile functionality is used, the file permissions of the referenced ifile must be restricted to the Oracle software owner and the dba group.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
3.09	init.ora	audit_file_dest parameter settings	The destination for the audit file must be set to a valid directory owned by oracle and set with owner read/write permissions only.	10g,9i	√	√	1 S
3.10	init.ora	user_dump_dest parameter settings	The destination for the user dump must be set to a valid directory with permissions restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.11	init.ora	background_dump_dest parameter settings	The destination for the background_dump must be set to a valid directory with permissions restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.12	init.ora	core_dump_dest parameter settings	The destination for the core_dump must be set to a valid directory with permissions restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.13	init.ora	control_files parameter settings	The permissions must be restricted to only the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.14	init.ora	log_archive_dest _n parameter settings	File permissions must be restricted to the owner of the Oracle software and the dba group. For complex configurations where different groups need access to the directory, access control lists must be used. Note: If Oracle Enterprise Edition is installed, and no log_archive_dest_n parameters are set, the deprecated form of log_archive_dest must be used. Default is " " (A null string) for all. Must configure and set paths, then ensure those directories are secure.	10g,9i	√	√	1 S
3.15	Files in $ORACLE_HOME/ network/admin directory	Verify and set permissions as needed	Permissions for all files must be restricted to the owner of the Oracle software and the dba group. Note: If an application that requires access to the database is also installed on the database server, the user the application runs as must have read access to the tnsnames.ora and sqlnet.ora files.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
3.16	webcache.xml	Verify and set permissions as needed	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1
			Installed with Enterprise Manager Grid Control software.				S
3.17	snmp_ro.ora	Verify and set permissions as needed	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1
			Not installed in default installation.				S
3.18	snmp_rw.ora	Verify and set permissions as needed	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1
			Not installed in default installation.				S
3.19	sqlnet.ora	Verify and set permissions as needed with read permissions for everyone.	The sqlnet.ora contains the configuration files for the communication between the user and the server including the level of required encryption.	10g,9i	√	√	1
							S
3.20	sqlnet.ora	log_directory_client parameter settings	The log_directory_client must be set to a valid directory owned by the Oracle account and permissions restricted to read/write only for the owner and dba group.	10g,9i	√	√	1
			By default this is not set.				S
3.21	sqlnet.ora	log_directory_server parameter settings	The log_directory_server must be set to a valid directory owned by the Oracle account and set with owner and group read/write permissions only.	10g,9i	√	√	1
			By default this is not set.				S
3.22	sqlnet.ora	trace_directory_client parameter settings	The trace_directory_client parameter settings must be set to a valid directory owned by the Oracle account and permissions restricted to read/write only for the owner and dba group.	10g,9i	√	√	1
			By default this is not set. Be aware, this is usually set to $ORACLE_HOME/network/trace, with permissions set as:				S
3.23	sqlnet.ora	trace_directory_server parameter settings	The trace_directory_server must be set to a valid directory owned by the Oracle account and permissions restricted to read/write only for the owner and dba group.	10g,9i	√	√	1
			By default this is not set. Be aware, this is usually set to $ORACLE_HOME/network/trace.				S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
3.24	listener.ora	Verify and set permissions as needed	File permissions must be restricted to the owner of the Oracle software and the dba group. If backup copies of the listener.ora file are created these backup files must be removed or they must have their permissions restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.25	listener.ora	log_file_listener parameter settings	The log_file_listener file must be set to a valid directory owned by the Oracle account and permissions restricted to read/write only for the owner and dba group. By default this is not set. Be aware, this is usually set to $ORACLE_HOME/network/log/listener.log.	10g,9i	√	√	1 S
3.26	listener.ora	trace_directory_*listener_name* parameter settings	The trace_directory_listener_name must be set to a valid directory owned by the Oracle account and permissions restricted to read/write only for the owner and dba group. By default this is not set. Be aware, this is usually set to $ORACLE_HOME/network/trace.	10g,9i	√	√	1 S
3.27	listener.ora	trace_file_*listener_name* parameter settings	This file must be owned by the Oracle account and permissions restricted to read/write only for the owner and dba group. By default this is not set. Be aware, this is usually set to $ORACLE_HOME/network/trace.	10g,9i	√	√	1 S
3.28	sqlplus	Verify and set permissions as needed.	The permissions of the binaries for sqlplus on the server must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S
3.29	htaccess	Verify and set permissions as needed.	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1
3.30	wdbsvr.app	Verify and set permissions as needed.	File permissions must be restricted to the owner of the Oracle software and the dba group.	9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
3.31	xsqlconfig.xml	Verify and set permissions as needed.	File permissions must be restricted to the owner of the Oracle software and the dba group.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
4.01	init.ora	_trace_files_public= FALSE	Prevents users from having the ability to read trace files. NOTE: This is an internal Oracle parameter. Do NOT use it unless instructed to do so by Oracle Support. Default is FALSE.	10g,9i	√	√	1 S
4.02	init.ora	global_names= TRUE	Ensures that Oracle will check that the name of a database link is the same as that of the remote database. Default is FALSE.	10g,9i	√	√	1 S
4.03	init.ora	max_enabled_roles=30	This must be limited as much as possible. Typically SYS gets 20 roles by default. Default is 150.	10g,9i	√	√	1 S
4.04	init.ora	remote_os_authent= FALSE	Connection without a password must be prevented. Default is FALSE.	10g,9i	√	√	1 S
4.05	init.ora	remote_os_roles= FALSE	Connection spoofing must be prevented. Default is FALSE.	10g,9i	√	√	1 S
4.06	init.ora	remote_listener=" " (A null string)	Prevent the use of a listener on a remote machine separate from the database instance. Default is " " (A null string) NOTE: the field should be left empty. A space is not a null string.	10g,9i	√	√	1 S
4.07	init.ora	Audit_trail parameter set to OS, DB, or TRUE	Ensures that basic audit features are used. Recommend setting audit_trail to OS as it reduces the likelihood of a Denial of Service attack and it is easier to secure the audit trail. OS is required if the auditor is distinct from the DBA. Any auditing information stored in the database is viewable and modifiable by the DBA. Even with the AUDIT_TRAIL value set to FALSE, an audit session will report, "Audit succeeded." Default=NONE.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
4.08	init.ora	os_authent_prefix=" " (A null string)	It must be set to limit the external use of an account to an IDENTIFIED EXTERNALLY specified user.	10g,9i	√	√	1
			Default is set to OPS$, which is for backward compatibility to previous versions. Null is recommended.				S
4.09	init.ora	os_roles=FALSE	O/S roles are subject to control outside the database. The duties and responsibilities of DBAs and system administrators must be separated.	10g,9i	√	√	1
			Default is FALSE.				S
4.10	init.ora	Avoid using utl_file_dir parameters	Do not use the utl_file_dir parameter. Specify directories using CREATE DIRECTORY.	10g,9i	√	√	1
			Default is not to have it set.				S
4.11	init.ora	Establish redundant physically separate locations for redo log files. Use "LOG_ARCHIVE_DUPLEX_DEST" to establish a redundant location for the redo logs.	Redundancy for the redo logs can prevent catastrophic loss in the event of a single physical drive failure. If this parameter is used, it must be set to a valid directory owned by oracle set with owner and group read/write permissions only. For complex configurations where different groups need access to the directory, access control lists must be used.	10g,9i	√	√	1
			Default is " " (A null string). Not set up by default.				S
4.12		Specify redo logging must be successful. Use "LOG_ARCHIVE_MIN_SUCCEED_DEST" to ensure the successful logging of the redo files.	Specifying that the logging must succeed in one or more locations ensures redundancy of the redo logs.	10g,9i	√	√	1
	init.ora		Default is 1				S
4.13	init.ora	sql92_security= TRUE	Enforce the requirement that a user must have SELECT privilege on a table in order to be able to execute UPDATE and DELETE statements using WHERE clauses on a given table.	10g,9i	√	√	1
			Default is FALSE				S
4.14	listener.ora	admin_restrictions_*listener_name*=on	Replace *listener_name* with the actual name of your listener(s) for this parameter setting.	10g,9i	√	√	1
			Not set and turned off by default.				S
4.15	listener.ora	logging_listener=ON	This must remain set to ON.	10g,9i	√	√	1
			Not set, but turned on by default.				S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
4.16	Data logs	Use "ARCHIVELOG" mode for data logs by the command "ALTER DATABASE ARCHIVELOG".	Prior to 10g log files were not archived automatically and required the setting "LOG_ARCHIVE_START=TRUE", which has been deprecated in 10g. Windows Event Logs and Unix System logs must be regularly monitored for errors related to the Oracle database. While deprecated, setting still exists.	10g,9i	√	√	1 S
4.17	SQL key word "NOLOGGING"	Be aware of the potential for malicious code that can be performed without an audit trail under the key word "NOLOGGING".	Note that "UNRECOVERABLE", which was replaced by "NOLOGGING" is no longer supported in 10g.	10g, 9i	√	√	1 S
4.18	init.ora	o7_dictionary_ accessibility= FALSE	Prevents users or roles granted SELECT ANY TABLE from accessing the data dictionary. Not set by default.	10g,9i	√	√	2 S
4.19	init.ora	Remove the following line from the init.ora or spfile: dispatcher= (PROTOCOL= TCP) (SERVICE= <oracle_sid>XDB)	This will disable default ports ftp: 2100 and http: 8080 which are configured in the default installation starting with Oracle 9iR2. By default this is set in the spfile in 10g and 9i.	10g,9i	√	√	2 S
4.20	Init.ora	AUDIT_SYS_OPERATIONS =TRUE	Auditing of the users authenticated as the SYSDBA or the SYSOPER provides an oversight of the most privileged of users. Note: It is important that the database user should not have access to the system directories where the audits will be recorded. Ensure this by setting the AUDIT_SYS_OPERATIONS to TRUE. Default is FALSE. Set in spfile. Set AUDIT_FILE DEST to where you want the logs to be. Windows: Default is Event Viewer log file Unix: Default is $ORACLE_HOME/rdbms/audit	10g,9i	√	√	2 S
4.21	listener.ora	inbound_connect_ timeout_*listener*=2	Suggestion is to set to a low initial value and adjust upward if normal clients are unable to connect within the time allocated. Not set by default.	10g,9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
4.22	sqlnet.ora	tcp.validnode_ checking= YES	Set this parameter in the $ORACLE_HOME/network/admin/sqlnet.ora file. Not set by default.	10g,9i	√	√	2 S
4.23	sqlnet.ora	Set tcp.invited_nodes to valid values	Use IP addresses of authorized hosts to set this parameter in the sqlnet.ora file. Not set by default.	10g,9i	√	√	2 S
4.24	sqlnet.ora	Set tcp.excluded_nodes to valid values	Use IP addresses of unauthorized hosts to set this parameter in the sqlnet.ora file. Note: if the tcp.invited_nodes is set, the tcp.excluded_nodes values are ignored. Not set by default.	10g,9i	√	√	2 S
4.25	sqlnet.ora	sqlnet.inbound_ connect_timeout=3	Suggestion is to set to a low initial value and adjust upward if normal clients are unable to connect within the time allocated. Not set by default.	10g,9i	√	√	2 S
4.26	sqlnet.ora	sqlnet.expire_time= 10	If this is not set in the sqlnet.ora file, the default is never to expire. Not set by default.	10g,9i	√	√	2 S
4.27	Accounts	Lock account access for application schema owners	Lock the account for the application schema owner. Users must not connect to the database as the application owner.	10g,9i	√	√	2 S
4.28	init.ora	remote_login_passwordfile=none	See tables below for detailed configuration recommendations.	10g,9i	√	√	2 S
4.29	$ORACLE_HOME/ bin/extproc	Remove binary from host	If extproc functionality is not required, remove this binary. If extproc functionality is required, refer to Oracle Metalink Security Alert 57 (244523.1) for instructions on securing extproc.	9i	√	√	2 S
4.30	tnsnames.ora	Remove extproc entry	If extproc functionality is not required, remove this entry. If extproc functionality is required, refer to Oracle Metalink Security Alert 57 (244523.1) for instructions on securing extproc.	9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
4.31	listener.ora	Remove extproc entry	ExtProc functionality allows external C and Java functions to be called from within PL/SQL. If extproc functionality is not required, remove this entry. If extproc functionality is required, refer to Oracle Metalink Security Alert 57 (244523.1) for instructions on securing extproc. In short, create a new listener specifically for extproc. This listener must run as an unprivileged OS user.	9i	√	√	2

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5. Encryption Specific Settings

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
5.01	OAS - General	Review requirement for integrity and confidentiality requirements.	Only implement OAS if a local integrity/encryption policy does not already exist, e.g., IPSec or other means for providing integrity/confidentiality services.	10g,9i*	√	√	2 S
5.02	OAS – Encryption Type	SQLNET.ENCRYPTION_SERVER=REQUIRED	This ensures that regardless of the settings on the user, if communication takes place it must be encrypted.	10g,9i*	√	√	2 S
5.03	OAS – Encryption Type	SQLNET.ENCRYPTION_CLIENT=(ACCEPTED|REQUESTED|REQUIRED)	Communication is only possible on the basis of an agreement between the client and the server regarding the connection encryption. To ensure encrypted communcation, set the value to "REQUIRED." With the server set to "REQUIRED" the client must match the encryption for valid communcation to take place. NOTE: failure to specify one of the values will result in an error when an attempt is made to connect to a FIPS 140-1 compliant server.	10g,9i*	√	√	2 S
5.04	OAS – Encryption Seed	SQLNET.CRYPTO_SEED=some70charValue	Where possible use the maximum seed value (70 characters). Please be aware that in 9i and early version of 10g, the CRYPTO_SEED does not take the following characters: single quote('), double quote("), space, number sign(#), equal sign(=), right or left paranthesis (()), comma(,), or backslash(\). Please see Metalink article 281928.1 for more information.	10g,9i*	√	√	2 S
5.05	OAS – FIPS Compliance	SQLNET.FIPS_140=TRUE	For FIPS 140-1 compliance, the FIPS value must be set to "TRUE." The default value for this setting is "FALSE." NOTE: This value is not settable using the Oracle Net Manager. To set this value you must use a text editor and modify the sqlnet.ora file.	10g,9i*	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
5.06	OAS – Encryption Method (FIPS 140)	SQLNET.ENCRYPTION_TYPES_SERVER=(DES|DES40)	To satisfy the FIPS 140-1 criterion in Oracle, only DES or DES40 may be used and there must be an agreement between the SERVER and the CLIENT. NOTE: These encryption standards do not meet the newer FIPS 140-2 standard.	10g,9i*	√	√	2 S
5.07	OAS – Encryption Methods	In decending order of preference encryption keys for both client and server must be set to the maximum feasible value. Example: "sqlnet.encryption_types_server =(RC4_256, AES256, AES192)" "sqlnet.encryption_types_client= (RC4_256, AES256, AES192)" Available values with =>128 bit key encryption include: RC4 256 bit key - RC4_256 AES 256 bit key - AES256 AES 192 bit key- AES192 3 Key Triple DES 168 bit effective key size - 3DES168 RC4 128 bit key- RC4_128 AES 128 bit key - AES128 Available values with less than 128 bit key encryption include: 2 Key Triple DES 112 bit effective key size - 3DES112 RC4 56 bit key - RC4_56 1 Key DES 56 bit effective key size - DES RC4 40 bit key - RC4_40 DES40 40 bit effective key size - DES40	At a minimum, use 128 bit key encryption. Note: There are publicly available attacks that allow a Pentium III to crack 40 and 56 bit key encryptions. Encryption below 128 bit keys should be considered minimally effective. Unfortunately without the use of a third party encryption method, with the FIPS value set to TRUE, only DES and DES40 are allowed as legal values. This sets the database to the standard of FIPS140-1 and not to the standard of FIPS140-2. For more information about FIPS 140-2 issues, please see Appendix C.	10g,9i*	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
5.08	OAS – Integrity Protection	Integrity check for communication between the server and the client must be established. "SQLNET.CRYPTO_CHECKSUM_SERVER=REQUIRED" "SQLNET.CRYPTO_CHECKSUM_CLIENT=REQUIRED"	The integrity check for communication can prevent data modifications. Two check sum algorithms are available; SHA-1 and MD5. Oracle's implementation of this setting also offers protection against replay attacks. Reference Oracle Metalink 76637 for more information.	10g,9i*	√	√	2 S
5.09	OAS – Integrity Protection	Set SQLNET.CRYPTO_CHECKSUM_TYPES_SERVER=(SHA1)	If possible, use SHA1 instead of MD5.	10g,9i*	√	√	2 S
5.10	OAS – Oracle Wallet Owner Permissions	Set configuration method for Oracle Wallet. Ensure only the appropriate Oracle user account has access to the wallet.	The Oracle service account must have access to the wallet.	10g,9i*	√	√	2 S
5.11	OAS – Oracle Wallet Trusted Certificates	Remove certificate authorities (CAs) that are not required.	Trust only those CAs that are required by clients and servers.	10g,9i*	√	√	2 S
5.12	OAS – Oracle Wallet Trusted Certificates Import	When adding CAs, verify fingerprint of CA certificates.	When adding CA certificates via out-of-band methods, use fingerprints to verify the certificate.	10g,9i*	√	√	2 S
5.13	OAS – Certificate Request Key Size	Request the maximum key size available.	Select the largest key size available that is compatible with the network environment.	10g,9i*	√	√	2 S
5.14	OAS – Server Oracle Wallet Auto Login	Allow Auto Login for the server's Oracle Wallet	For Windows Oracle database servers, SSL will not work unless Auto Login is set.	10g,9i*	√	√	2 S
5.15	OAS – SSL Tab	SSL is preferred method. If PKI not possible, use OAS Integrity/Encryption.	OAS Integrity/Encryption should only be used if required because of non-SSL clients.	10g,9i*	√	√	2 S
5.16	OAS – SSL Version	Set SSL version. SSL_VERSION = 3.0	Do not set this parameter with "Any".	10g,9i*	√	√	2 S
5.17	OAS – SSL Cipher Suite	Set SSL Cipher Suite. SSL_CIPHER_ SUITES = SSL_ RSA_ WITH_3DES_ EDE_ CBC_SHA)	At a minimum, triple DES should be supported. Add SSL_RSA_WITH_RC4_128_SHA or SSL_RSA_WITH_RC4_128_MD5 only if clients don't support the recommended value.	10g,9i*	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
5.18	OAS – SSL Client DN Match	Set tnsnames file to include SSL_SERVER_ CERT_DN parameter with the distinguished name (DN) of the certificate.	This will reduce possibility of certificate masquerading.	10g,9i*	√	√	2 S
5.19	OAS – SSL Client Authentication	SSL_CLIENT_ AUTHENTICATION=TRUE	If client certificates are not supported in the enterprise, then set to FALSE.	10g,9i*	√	√	2 S
5.20	OAS – Encryption Tab	Use OAS encryption only if SSL is not feasible.	OAS Integrity/Encryption should only be used if required because of non-SSL clients.	10g,9i*	√	√	2 S
5.21	Encryption	Where possible, use a procedure that employs a content data element as the encryption key that is unique for each record.	By employing a procedure that uses data elements that change for each record the resulting ciphertext will be unique. As an example if the same value, key, and encryption are used for a value in a record the resulting ciphertext will be identical. Someone knowing the value of one of the records independent of the ciphertext can by inference know the value of other records that display the same ciphertext.	10g,9i	√	√	2 S
5.22	Encryption	Use RAW or BLOB for the storage of encrypted data.	Storing data in CLOB may result in a failure in decryption if the same number letter symbol set is not used. The use of RAW or BLOBs prevents this error and preserves the data.	10g,9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	UnIx	Level If known
5.23	Encryption	Use a virtual private database (VPD) to protect rows by implementing Oracle Label Security(OLS). If keys are stored in a table with the database, access to the keys should be limited and under the protection of a secure role with fine grain auditing in place for the table. The column name should be obscure and should not reveal the role of the column. Rows should be protected with both VPD and OLS (OLS included VPD) and the keys themselves should be encrypted with a master key. If the keys are managed by an application or generated as computed keys the procedures should be wrapped. All package bodies, procedures, and functions should be wrapped.	Assign multiple layers of protection, within the limits of what can be managed, to ensure the security of the encryption keys. The combination of methods will be dependent on how and where the keys are stored. Use multiple layers of protection when storing keys with the data in a separate database. Employ wrapping to protect all code used to protect, generate keys for, or encrypt keys. If security dictates, hardware devices can be used for encryption key storage. Keys, at minimum, should follow password selection standards in areas of minimum length, use of special characters and non-dictionary words.	10g,9i	√	√	2 S
5.24	Encryption	Revoke the PUBLIC execute privileges from the DBMS_OBFUSCATION_TOOL KIT.	The DBMS_OBFUSCATION_TOOLKIT has been replaced with the DBMS_CRYPTO package, but the DBMS_OBFUSCATION_TOOLKIT is still needed for some tasks that are not available in the DBMS_CRYPTO package. As an example; the generation of a pseudorandom string requires the DBMS_OBFUSCATION_TOOLKIT. By removing public access to the DBMS_OBFUSCATION_TOOLKIT the means to decrypt the data is not available for malicious use.	10g,9i	√	√	2 S

	6. Startup and Shutdown

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
6.01	Advanced queuing in asynchronous messaging	Empty queue at shut down of Oracle.	Information in queue may be accessed outside of Oracle and beyond the control of the security parameters. It should be subject to the same security precautions as other tables.	10g,9i	√	√	1 S
6.02	Cache	Cache must be emptied at shut down of Oracle.	Information in caches may be accessed outside of Oracle and beyond the controls of the security parameters.	10g,9i	√	√	1 S
6.03	ASM	Ensure that the ASM is started first and shut down last	Ensure that the Automated Storage Management (ASM), new to Oracle 10g, is started first and shut down last. Databases cannot mount their data files until the ASM instance is started, and will crash if the ASM instance is shut down before dependent databases are unmounted. This could cause loss of availability and possible database corruption. Note that this problem is fixed by patching to version 10.1.0.3 or higher.	10g	√	√	2 S

7. Backup and Disaster Recovery

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
7.01	Redo logs	Mirror	The on-line redo logs must be mirrored and more than one group must exist.	10g,9i	√	√	1 S
7.02	Control files	Multiplex control files to multiple physical disks.	Redundancy for the control files can prevent catastrophic loss in the event of a single physical drive failure.	10g,9i	√	√	1
7.03	Control files	Mirror	The control files must be mirrored.	10g,9i	√	√	1 S
7.04	Archive logs	Ensure there is sufficient space for the archive logging process.	Without adequate space for the archive logs the system will hang.	10g,9i	√	√	1
7.05	Redo logs	Multiplex redo logs to multiple physical disks.	Redundancy for the redo logs can prevent catastrophic loss in the event of a single physical drive failure.	10g,9i	√	√	1
7.06	Archive log files	Backup	If archivelog mode is used the archive log files must be saved on tape or to a separate disk. File permissions must be restricted to the owner of the Oracle software and the dba group. The archive logs must be secured.	10g,9i	√	√	1 N
7.07	Backup	Automated backups should be verified.	Oracle 10g streamlines backups with new automated services. Backups should be verified by performing recoveries to ensure newer automated backups function properly. Failure to ensure this could cause inability to recover data, leading to data loss. The improved RMAN (Recovery Manager) capabilities (i.e., incremental backup process) can be used to facilitate backups and recovery.	10g	√	√	1
7.08	Failsafe	Failsafe must be engaged.	Failsafe uses the cluster server interface to provide the failover protection previously provided by hardware interfaces.	9i	√		2

			8. Oracle Profile (User) Setup Settings				

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
8.01	Database Profiles	failed_login_attempts=3	Local policy may override the recommended setting. This setting may not be applicable for middle tier application accounts that access the database. Application accounts must be set for failed_login_attempts=1.	10g,9i	√	√	1
			Create a profile then assign it to a user account. Default profile has this setting at 10.				S
8.02	Database Profiles	password_life_time= 90	Local policy may not override the setting. This setting may not be applicable for middle tier application accounts that access the database.	10g,9i	√	√	1
			Create a profile then assign it to a user account. Default profile has this setting not set.				S
8.03	Database Profiles	password_reuse_ max=20	Local policy may override the recommended setting. This setting may not be applicable for middle tier application accounts that access the database.	10g,9i	√	√	1
			Create a profile then assign it to a user account. Default profile has this setting not set.				S
8.04	Database Profiles	password_reuse_ time= 365	Local policy may not override the setting. This setting must be set to unlimited if a password_reuse_max value other than unlimited is defined for Oracle versions earlier than 9i. See Metalink DocID 228991.1 to see the Oracle version-specific relationship of this setting with the password_reuse_max setting.	10g,9i	√	√	1
			Create a profile then assign it to a user account. Default profile has this setting not set.				S
8.05	Database Profiles	password_lock_time=1	Local policy may not override the setting. This setting may not be applicable for middle tier application accounts that access the database.	10g,9i	√	√	1
			Create a profile then assign it to a user account. Default profile has this set to unlimited.				S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
8.06	Database Profiles	password_grace_time=3	Local policy may not override the setting. This setting may not be applicable for middle tier application accounts that access the database.	10g,9i	√	√	1 S
			Create a profile then assign it to a user account. Default profile has this setting not set.				
8.07	Database Profiles	Review accounts where PASSWORD= 'EXTERNAL'	Check and review any user who has password='EXTERNAL'. Do not allow remote OS authentication to the database.	10g,9i	√	√	2 R
8.08	Database Profiles	Set password_verify_function to a verification function	Allows password verification function to be called when passwords are changed. This always works for password changes via the "password" command at an SQL prompt. It may or may not work with the ALTER USER command. This setting may not be applicable for middle tier application accounts that access the database. Oracle provides utlpwdmg.sql which can be used to create a password verification function. If using this script to create a password verification function, make the following changes at the bottom of the utlpwdmg.sql file: PASSWORD_GRACE_TIME 3 PASSWORD_REUSE_TIME 365 PASSWORD_REUSE_MAX 20 FAILED_LOGIN_ATTEMPTS 3 PASSWORD_LOCK_TIME 1 Modify the line: IF length(password) < 4 by changing the minimum password length to 8.	10g,9i	√	√	2 S
8.09	Database Profiles	Set CPU_PER_ SESSION as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application.	10g,9i	√	√	2 R
8.10	Database Profiles	Set PRIVATE_SGA as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application. This only applies when shared/multi-threaded server is in use.	10g,9i	√	√	2 R
8.11	Database Profiles	Set LOGICAL_READS_ PER_SESSION as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application.	10g,9i	√	√	2 R
8.12	Database Profiles	Set SESSIONS_PER_ USER as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application.	10g,9i	√	√	2 R
8.13	Database Profiles	Set CONNECT_TIME as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application.	10g,9i	√	√	2 R

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
8.14	Database Profiles	Set IDLE_TIME as appropriate	Ensure that users profile settings have appropriate values set for the particular database and application.	10g,9i	√	√	2 R

9. Oracle Profile (User) Access Settings

Note: Security recommendations for Tablespaces, Tables, Views, Roles, Synonyms, Privileges, Roles and Packages need to be followed for all new users that might be created. By default SYS and DBA have most of these accesses and privileges, and should be the only user with them.

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
9.01	Tablespaces	Do not have default_tablespace set to SYSTEM for user accounts	Only SYS should have a default tablespace of SYSTEM. It may be difficult or impossible to move some objects.	10g,9i	√	√	1 S
9.02	Tablespaces	Ensure application users have not been granted quotas on tablespaces.	Set quotas for developers on shared production/development systems to prevent space resource contentions.	10g,9i	√	√	1 S
9.03	Any dictionary object	Review access and revoke access as possible	Check for any user that has access to any dictionary object and revoke where possible.	10g,9i	√	√	1 R
9.04	Tables	Prevent access to SYS.AUD$	Check for any user accounts that have access and revoke where possible. This is only applicable if the audit trail parameter is set to DB or TRUE.	10g,9i	√	√	1 S
9.05	Tables	Prevent access to SYS.USER_HISTORY$	Revoke access to this table from all users and roles except for SYS and DBA accounts.	10g,9i	√	√	1 S
9.06	Tables	Prevent access to SYS.LINK$	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.07	Tables	Prevent access to SYS.USER$	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.08	Tables	Prevent access to SYS.SOURCE$	Check for any user accounts that have access and revoke where possible.	10g,9i	√	√	1 S
9.09	Tables	Prevent access to PERFSTAT.STATS$SQLTEXT	Check for any user that has access and revoke where possible	10g,9i	√	√	1 S
9.10	Tables	Prevent access to PERFSTAT.STATS$SQL_SUMMARY	Check for any user that has access and revoke where possible	10g,9i	√	√	1 S
9.11	Tables	Prevent access to any X$ table	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.12	Views	Prevent access to any DBA_ views	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
9.13	Views	Prevent access to any V_$ views	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.14	Views	Prevent access to ALL_SOURCE	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.15	Views	Prevent access to DBA_ROLES	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.16	Views	Prevent access to DBA_SYS_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.17	Views	Prevent access to DBA_ROLE_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.18	Views	Prevent access to DBA_TAB_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.19	Views	Prevent access to DBA_USERS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.20	Views	Prevent access to ROLE_ROLE_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.21	Views	Prevent access to USER_TAB_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.22	Views	Prevent access to USER_ROLE_PRIVS	Restrict access to this view to all users except SYS and DBAs.	10g,9i	√	√	1 S
9.23	Roles	Prevent assignment of roles that have _CATALOG_	Revoke any catalog roles from those roles and users that do not need them. These roles are SELECT_CATALOG_ROLE, EXECUTE_CATALOG_ROLE, DELETE_CATALOG_ROLE, and RECOVERY_CATALOG_OWNER.	10g,9i	√	√	1 R
9.24	Synonyms	Prevent access to any V$ synonym	Check for any user that has access and revoke where possible.	10g,9i	√	√	1 S
9.25	Synonyms	When dropping synonyms, ensure privileges granted to the synonyms, if not required, are removed from the base objects.	Granting privileges to synonyms actually grants privileges to the base objects. If necessary, ensure that privileges from the base objects are removed when the synonyms are dropped.	10g,9i	√	√	1
9.26	Privileges	Restrict system privileges	All system privileges except for CREATE SESSION must be restricted to DBAs, application object owner accounts/schemas (locked accounts) and default Oracle accounts. Developers may be granted limited system privileges as required on development databases.	10g,9i	√	√	1 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
9.27	Privileges	Prevent granting of privileges that contain the keyword ANY	Check for any user or role that has the "ANY" keyword and revoke this role where possible.	10g,9i	√	√	1 S
9.28	Privileges	Prevent granting of ALL PRIVILEGES	The GRANT ALL PRIVILEGES must not be used.	10g,9i	√	√	1 N
9.29	Privileges	Prevent granting of EXEMPT ACCESS POLICY (EAP)	Revoke this privilege if not necessary. The EAP privilege provides access to all rows regardless of Row Level Security assigned to specific rows.	10g,9i	√	√	1 S
9.30	Privileges	Prevent granting of privileges that have WITH ADMIN	Check for any user or role that has been granted privileges "with admin" and revoke where possible.	10g,9i	√	√	1 S
9.31	Privileges	Prevent granting of privileges that have WITH GRANT	Check for any user or role that has been granted privileges "with grant" and revoke where possible.	10g,9i	√	√	1 S
9.32	Privileges	Prevent granting of privileges that have CREATE	Check for any user that has object creation privileges and revoke where possible.	10g,9i	√	√	1 S
9.33	Privileges	Prevent granting of CREATE LIBRARY	Check for any user or role that has this privilege and revoke where possible.	10g,9i	√	√	1 S
9.34	Privileges	Prevent granting of ALTER SYSTEM	Check for any user or role that has this privilege and revoke where possible.	10g,9i	√	√	1 S
9.35	Privileges	Prevent granting of CREATE PROCEDURE	Check for any user or role that has this privilege and revoke where possible.	10g,9i	√	√	1 S
9.36	Privileges	Prevent granting of BECOME USER	Check for any user or role that has this privilege and revoke where possible.	10g,9i	√	√	1 S
9.37	Privileges	Prevent granting of SELECT ANY TABLE	Check for any user that has access and revoke where possible. If application data is sensitive, and it is possible, revoke this privilege from the DBA accounts as well.	10g,9i	√	√	1 S
9.38	Privileges	Prevent granting of AUDIT SYSTEM	Review which users have audit system privileges and limit as much as possible to ensure audit commands are not revoked.	10g,9i	√	√	1 S
9.39	Privileges	Grant privileges only to roles.	Grant privileges only to roles. Do not grant privileges to individual users.	10g,9i	√	√	1 S
9.40	Privileges	Review privileges granted to PUBLIC	Review all privileges granted to PUBLIC. Limit or revoke unnecessary PUBLIC privileges.	10g,9i	√	√	1 R
9.41	Roles	Prevent assignment of RESOURCE	Revoke the resource role from normal application user accounts.	10g,9i	√	√	1 S
9.42	Roles	Prevent assignment of CONNECT	Revoke connect role from normal application user accounts.	10g,9i	√	√	1 S
9.43	Roles	Prevent assignment of DBA	Revoke dba role from users who do not require it.	10g,9i	√	√	1 R

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
9.44	Packages	Deny access to UTL_FILE	Revoke the public execute privilege on utl_file as it can be used to access O/S	10g,9i	√	√	1
			Only sys has privilege by default.				S
9.45	Packages	Deny access to UTL_TCP	Revoke the public execute privilege on utl_tcp as it can write and read sockets.	10g,9i	√	√	1
			Only sys has privilege by default.				S
9.46	Packages	Deny access to UTL_HTTP	Revoke the public execute privilege on utl_http as it can write content to a web browser.	10g,9i	√	√	1
			Only sys has privilege by default.				S
9.47	Packages	Deny access to UTL_SMTP	Revoke the public execute privilege on utl_smtp as it can send mail from the database server.	10g,9i	√	√	1
			Only sys has privilege by default.				S
9.48	Packages	Deny access to DBMS_LOB	Revoke the public execute privilege.	10g,9i	√	√	1 S
9.49	Packages	Deny access to DBMS_SYS_SQL	Revoke the public execute privilege.	10g,9i	√	√	1
							S
9.50	Packages	Deny access to DBMS_JOB	Revoke the public execute privilege.	10g,9i	√	√	1 S
9.51	Proxy Authentication	Limit the user schema privileges to "CREATE SESSION" only.	The proxy account should only have the ability to connect to the database. No other privileges should be granted to this account.	10g,9i	√	√	1
			Set when creating the proxy account.				
9.52	Proxy role	Restrict the roles that can be enabled when privileges are granted in the database. As an example; "CREATE ROLE 'X'" " "GRANT 'X' TO JOHN_SMITH" "ALTER USER JOHN_SMITH DEFAULT ROLE ALL EXCEPT X"	Assuming John Smith needs only the role of 'X', then all other roles are prevented from being enabled.	10g,9i	√	√	1
9.53	Tables	Do not store passwords in clear text in Oracle tables	Passwords stored by applications in the database tables must be encrypted. Access to these tables must be limited.	10g,9i	√	√	2
							N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
9.54	Tables	Encrypt critical data	Critical data must be encrypted to prevent the DBA from accessing it. Alternately, audit key tables. This does not prevent the DBA from viewing the data, but would create a record of the activity. Management of the encryption key must be done carefully as exposure of the key will render the encryption moot.	10g,9i	√	√	2 N
9.55	Views	Revoke public access to all public views that start with ALL_	Revoke access to these views when possible. This may interfere with some applications.	10g,9i	√	√	2 S
9.56	Roles	Password protect roles	Role passwords are useful when an application controls whether or not a role is turned on. This prevents a user directly accessing the database via SQL (rather than through the application) from being able to enable the privileges associated with the role.	10g,9i	√	√	2 S
9.57	Roles and Privileges	When dropping a user, ensure roles and privileges created by that user, if not required, are deleted.	If a user is dropped, ensure that the roles and privileges created by that user, if not required, are deleted. Dropping a user (i.e., DROP USER X CASCADE) doesn't delete roles and privileges created by the user.	10g,9i	√	√	2
9.58	Packages	Limit or deny access to dbms_backup_restore	Provides file system functions such as copying files, altering control files, accessing devices, and deleting files.	10g,9i	√	√	2 S
9.59	Packages	Limit or deny access to DBMS_RANDOM	Revoke the public execute privilege.	10g,9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
10.01	Enterprise Management studio mode	Access to the enterprise management in studio must be limited.	Without limitations on the enterprise management access to the remote agents is virtually unlimited.	10g,9i	√	√	1
10.02	Enterprise Manager Agent File uploads	Monitor the size of file uploads from the enterprise agent.	The following lines are some of the output from the ./emctl status agent command containing information regarding the agents uploading files: Total Megabytes of XML files uploaded so far : Number of XML files pending upload: Size of XML files pending upload(MB): Discovering unusual or increased size of file uploads could indicate a malicious agent.	10g	√	√	1
10.03	Enterprise Manager Framework Security	Where possible, utilize Enterprise Manager Framework Security Functionality.	Enterprise Manager Framework security employs secure communication between the various Enterprise Manager Components, i.e., HTTPS between management agents and management services.	10g	√	√	1
10.04	Grid Control TimeOut Value	Configure an appropriate value for Grid Control Timeout value in the Oracle Application Server. File: IAS_HOME/sysman/config/emo ms.properties Value: oracle.sysman.eml.maxInactiveT ime=time_in_minutes	To prevent unauthorized access to the Grid Control via browser, set an appropriate timeout value. A value of 30 minutes or less is recommended. The default is 45 minutes.	10g	√	√	1

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
10.05	Enterprise Manager Framework Security	In command line mode, avoid using commands that contain passwords in the arguments.	While registering an agent to utilize the enterprise manager framework security, avoid using the complete command line arguments for the emctl command. The command can be captured by other users with access to unix (via ps) command or can be prone to shoulder surfing.	10g	√	√	1
10.06	Oracle Installation	Separate user account for Management/Intelligent Agent	For Unix systems, create a unique user account for the management/Intelligent Agent process in order to differentiate accountability and file access controls. The agent database accounts must be separated. Separate accounts are not recommended for Windows environments.	10g,9i		√	2

11. 10g Specific Systems							

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	W I n d o w s	U n I x	Level If known
11.01	ADDM	Verify ADDM suggestions	Oracle 10g's new automated diagnostics through the Automatic Database Diagnostic Monitor (ADDM), should not blindly replace the DBA's knowledge. DBA's should verify the applicability of ADDM suggestions based on their knowledge of the database.	10g	√	√	1
11.02	AMM	Monitor AMM	Oracle 10g's new Automated Memory Manager (AMM), should not blindly replace the DBA's knowledge. DBA's should monitor AMM to ensure memory is being properly allocated.	10g	√	√	1
11.03	AWR	Implement AWR to record all database performance statistics (related to object usage, SQL statement efficiency, session history, etc) over a defined time period.	Automatic Workload repository (AWR) is central to the whole framework of self and automatic management. It works with internal Oracle database components to process, maintain, and access performance statistics for problem detection and self-tuning. The statistics are available to external users or performance monitoring tools, routines, or scripts. Trends analysis can be done with AWR data. Queries that overtax the system could be a security threat.	10g	√	√	1
11.04	Fine grained access	Use fine grain access control within objects.	Fine grained access control can provide both column and row level security. This can provide an additional layer of access control to objects by limiting the access (select, update, insert, delete) within the object and should be used wherever possible. For fine grained access to function properly, use the cost-based optimizer.	10g	√	√	2

	12. General Policy and Procedures							

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.01	Oracle alert log file	Review contents	The Oracle alert log file must be regularly reviewed for errors.	10g,9i	√	√	1 N
12.02	Database creation scripts on host	Remove or secure	After the database has been created, remove the scripts or at a minimum move them to a safe repository area.	10g,9i	√	√	1 S
12.03	Unix root group members on host	Disallow 'oracle' as member of root group	The Oracle software owner account must not be a member of the root group on Unix systems.	10g,9i		√	1
12.04	Oracle DBA group membership on host	Review	Review the membership of the DBA group on the host to ensure that only authorized accounts are included. This must be limited to users who require DBA access.	10g,9i	√	√	1 R
12.05	Sensitive information in process list on host	Avoid or encrypt	An enforced policy must exist to ensure that no scripts are running that display sensitive information in the process list such as the Oracle username and password. A privileged process must be used to get and decrypt encrypted passwords.	10g,9i	√	√	1 N
12.06	Sensitive information in cron jobs on host	Avoid or encrypt	An enforced policy must exist to ensure that no cron jobs have sensitive information such as database username and passwords. A privileged process must be used to get and decrypt encrypted passwords.	10g,9i		√	1
12.07	Sensitive information in at jobs (or jobs in Windows scheduler) on host	Avoid or encrypt	An enforced policy must exist to ensure that no at jobs (or jobs in Windows scheduler) has sensitive information such as database username and passwords. A privileged process must be used to get and decrypt encrypted passwords.	10g,9i	√	√	1
12.08	Sensitive information in environment variables on host	Avoid or encrypt	An enforced policy must exist to ensure that no users have unencrypted sensitive information such as database username and passwords set in environment variables. A privileged process must be used to get and decrypt encrypted passwords.	10g,9i	√	√	1 N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.09	Sensitive information in batch files on host	Avoid or encrypt	An enforced policy must exist to ensure that no batch files have unencrypted sensitive information such as database username and passwords. A privileged process must be used to get and decrypt encrypted passwords.	10g,9i	√	√	1 N
12.10	Oracle file locations	Separate for performance	Split the location of the Oracle software distribution, redo logs, data files, and indexes onto separate disks and controllers for resilience.	10g,9i	√	√	1 Y
12.11	File systems	Separate Oracle files from non-Oracle files	Only put database files on file systems exclusively used by Oracle. Oracle files must not be on the same partition as the operating system.	10g,9i	√	√	1 Y
12.12	Optimal Flexible Architecture	Implement	Follow the Oracle Optimal Flexible Architecture guidelines to provide for consistency and ease of administration.	10g,9i	√	√	1 N
12.13	Checksum PL/SQL code	Implement	Store the checksum results and periodically check for alterations.	10g,9i	√	√	1 N
12.14	All database objects	Monitor	Store the results of the time stamps of the creation, reload, and compilation of database objects and review the results regularly to ensure no unauthorized changes have occurred.	10g,9i	√	√	1 N
12.15	Ad-hoc queries on production databases	Avoid	Disallow ad-hoc queries on production databases. This recommendation may not be suitable for all environments, for example, data warehouses.	10g,9i	√	√	1 N
12.16	Media integrity	Verify	Backup media integrity must be checked regularly.	10g,9i	√	√	1 N
12.17	Remote shell access on host	Encrypt session	If remote shell access is required, use ssh or a VPN solution to ensure that session traffic is encrypted. In a cluster environment (RAC or OPS) rsh and rcp are required between the nodes for the Oracle software owner. In the case of a cluster environment, the access must be restricted by user and host.	10g,9i	√	√	1 N
12.18	Applications with database access	Review	Review and control which applications access the database.	10g,9i	√	√	1 N
12.19	Location of development database	Separate server from production database	Test and development databases must not be located on the same server as the production system.	10g,9i	√	√	1 N
12.20	Network location of production and development databases	Separate	If possible, place production databases on a different network segment from test and development databases.	10g,9i	√	√	1 N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.21	Monitor for development on production databases	Prevent development on production databases	Check for evidence of development occurring on production databases.	10g,9i	√	√	1 N
12.22	Access to production databases	Avoid access from development or test databases	Database access from development and test databases to production databases must be prohibited.	10g,9i	√	√	1 N
12.23	Developer access to production databases	Disallow	Developers must not have direct access to production databases.	10g,9i	√	√	1 N
12.24	Developer accounts on production databases	Remove	Remove any developer accounts that exist in the production database.	10g,9i	√	√	1 N
12.25	Databases created from production exports	Change passwords	If test or development databases are created from backups or exports of the production system, all passwords must be changed before granting access to developers or testers.	10g,9i	√	√	1 N
12.26	Databases created from production systems	Remove sensitive data	If test or development databases are created from backups or exports of the production system, all sensitive data (such as payroll information) must be removed before granting access to developers or testers.	10g,9i	√	√	1 N
12.27	Account Management	Document and enforce account management procedures	Create and regularly review procedures for account management. This must include the creation of new user accounts, moving a user to a new group or role, and handling of dormant or inactive accounts.	10g,9i	√	√	1 N
12.28	Change Control	Document and enforce change control procedures	Create and regularly review procedures for new applications that access the database and change control management procedures for releasing development code into production. Monitor the addition of new users and access rights.	10g,9i	√	√	1 N
12.29	Disaster recovery procedures	Review	Disaster recovery procedures must be fully documented and regularly tested.	10g,9i	√	√	1 N
12.30	Backdoors	Eliminate	Tight change control management procedures and checksums of the source code can help prevent backdoors into the database.	10g,9i	√	√	1 N
12.31	Public dissemination of database information	Disallow	The posting database information such as SIDs, hostnames, and IP addresses to newsgroups and mailing lists must not be allowed.	10g,9i	√	√	1 N
12.32	Screen saver	Set screen saver/lock with password protection of 15 minutes.	If an organizational policy does not exist, 15 minutes must be set as the standard.	10g,9i	√	√	1 N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.33	Distribution of tnsnames.ora files to clients	Include only necessary tnsnames.ora when distributing to clients	If clients connect to the database using tnsnames.ora files, ensure that only necessary entries are included in the file when distributing to clients.	10g,9i	√	√	1 N
12.34	Put database in archivelog mode (if appropriate to database function).	If the database was not created in archivelog mode, start the database in mount mode, and issue: alter database achivelog;	If archive log mode is used, transmission of archive logs must be secured as LogMiner could be used to extract database information from the archive logs.	10g,9i	√	√	1 S
12.35	Event and System Logs	Monitor	Windows Event Logs and Unix System logs must be regularly monitored for errors related to the Oracle database.	10g,9i	√	√	1
12.36	Access to database objects by a fixed user link	Disallow	Fixed user database links that have a hard coded username and password must be avoided.	10g,9i	√	√	1 S
12.37	Oracle Installation	Oracle software owner account name NOT 'oracle'	Do not name the Oracle software owner account 'oracle' as it is very well known.	10g,9i	√	√	2 S
12.38	Oracle Installation	Separate users for different components of Oracle	For Unix systems, create unique user accounts for each Oracle process/service in order to differentiate accountability and file access controls. The listener, the Oracle http server, and the database process accounts must be separate. Separate accounts are not recommended for Windows environments. The requirement for the Management/Intelligent Agent process is listed in section 10 of this document.	10g,9i		√	2
12.39	Alerts on high priority incidents	Create processes to alert	Create processes to monitor and alert of high priority incidents.	10g,9i	√	√	2 N
12.40	Intelligent agent	Do not use	If the database server is accessible via the Internet, do not use the Intelligent Agent. This may not be practical for OEM or SNMP monitored databases.	10g,9i	√	√	2 S
12.41	Oracle Advanced Security	Implement if appropriate	If appropriate to the environment, implement Oracle Advanced Security to encrypt all traffic between the client and server.	10g,9i	√	√	2 S
12.42	Application PL/SQL code	Wrap	The wrap program provided by Oracle encodes the PL/SQL source code but does not encrypt it.	10g,9i	√	√	2 S
12.43	PL/SQL code variables and constants	Obscure	The wrap program does not encode variables and constants.	10g,9i	√	√	2 N
12.44	Hard coded data in PL/SQL code	Avoid or encrypt	Do not use unencrypted hard coded usernames, passwords, or other critical data in the PL/SQL code.	10g,9i	√	√	2 N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.45	Decommissioned applications	Remove all components	Ensure that all associated binaries, users, batch process, and access rights are removed when applications are decommissioned.	10g,9i	√	√	2 N
12.46	Usernames and passwords	Do not hardcode in application source code	Do not hard code usernames and passwords in application source code. Set username and passwords in an encrypted external file or database table.	10g,9i	√	√	2 N
12.47	DDL statements in application	Disallow	Applications must not alter the database schema.	10g,9i	√	√	2 N
12.48	Reporting tool interface and authentication	Review	Any remote access to the database host must be controlled by an application level firewall.	10g,9i	√	√	2 N
12.49	Enabling of batch process account	Time enabled	The account that is used to run batch processes must be enabled only during the time that the batch processes run.	10g,9i	√	√	2 N
12.50	Passwords for batch processes	Secure	Passwords for batch processes must not be a command line parameter or an environment variable.	10g,9i	√	√	2 N
12.51	External account access for batch processes	Disallow	External accounts used for batch processes allow a simple way to access the database.	10g,9i	√	√	2 N
12.52	Object and table owners	Review	Identify the owner of all objects and tables that make up an application.	10g,9i	√	√	2 R
12.53	Data in development database	Protect	If data is imported from a production database to development or test databases, ensure that any sensitive data (i.e. payroll information) is not accessible to users of the development or test databases.	10g,9i	√	√	2 N
12.54	Database links to production databases	Avoid links from development database	Database links from development and test databases to production databases must be forbidden.	10g,9i	√	√	2 N
12.55	User permissions	Review	Review and test development databases for users with excess permissions not granted in production.	10g,9i	√	√	2 N
12.56	Procedures for backup tape retrieval	Review	Ensure the procedures for backup tape retrieval are documented and are adequate to prevent social engineering attacks to steal data.	10g,9i	√	√	2 N
12.57	Intrusion detection system on host	Utilize	Use a host based Intrusion Detection System on the server hosting the Oracle database.	10g,9i	√	√	2 N

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
12.58	Multiple listeners	Create separate listeners for clients and administration. Protect the administrative listener with IPSec ESP or OAS SSL and a personal firewall.	An administrative listener, protected by IPSec, could allow administrators access to the server if the client listener(s) are taken down. Preference of implementation is IPSec ESP, otherwise SSL and personal firewall. If SSL is not possible, use OAS native encryption/integrity with a personal firewall, otherwise use a personal firewall. Access must be limited to specific administrative workstations.	10g,9i	√	√	2 N
12.59	Remote Administration of Listener	Configure listener to have an SSL port.	If remote administration of a listener via the listener utility is required, e.g., no administration through SSH or MS Terminal Server, configure the listener to have a TCPS (SSL) port. If the listener is configured to use multiple protocols, set the SSL protocol as the first protocol in listener.ora.	10g,9i	√	√	2 N
12.60	Policy Caching	Policy caches must be purged.	Policy caches can potentially store information that could be used to compromise the database and may accessible outside of Oracle and beyond the control of the security parameters. Hence this can defeat row level security.	10g,9i	√	√	2
12.61	Policy Functions	Users should not have execute, alter or drop privileges on policy functions.	The ability to manipulate policy functions could be used to defeat row level security.	10g,9i	√	√	2
12.62	Passwords	Remove password parameters from configuration files utilized for Silent Installations.	Whenever utilizing silent installs, i.e., Oracle Installer, ensure configuration files do not contain password values after the installation completes.	10g,9i	√	√	2
12.63	Security of transmitted data	Any data sent over a network must be secure or must be sent via a secure protocol.	Data sent over a network can reveal significant information. Any data should be secure. If the network structure itself is not secure, data must be sent via a secure protocol.	10g	√	√	2

Note: By default all auditing is turned off except auditing of the sys account. Fine Grain auditing is off by default.

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
13.01	Auditing	Unused schemas should be dropped	Unused schemas should be first audited to ensure that they are in fact unused. After verification, they should be dropped.	10g,9i	√	√	2
13.02	Auditing	Trap autonomous transactions	This will ensure that audit captures actions performed by users even if they are later rolled back.	10g,9i	√	√	2
13.03	Auditing	Audit all log ons and log offs.	This is the minimum of auditing and the auditing must be configured to show who logged on/off.	10g,9i	√	√	2
13.04	Auditing	Audit for unsuccessful attempts. Audit by "ACCESS WHENEVER NOT SUCCESSFUL".	Auditing by SESSION will only show a single audit event for an attempt. By logging unsuccessful attempts any SQL statement attempting to access the table will be recorded. This could provide a record of unauthorized attempts to access sensitive data.	10g,9i	√	√	2
13.05	Auditing	Where appropriate or required by security or legal requirements, engage and use the Fine-Grained Auditing feature.	Because the FGA record entry can be pre-qualified, it should not add a significant burden to the size of audit records. The flexibility, column specific sensitivity, capture of the SQL, and the event handler combine to make it a valuable asset.	10g,9i	√	√	2
13.06	Auditing	Where appropriate or required by security or legal requirements, use enhanced capabilities of Fine-Grained Auditing.	Fine Grain Auditing (FGA) in Oracle 10g can now audit all types of Data Manipulation Language (DML) statements, not just SELECT. Consider using this to enhance current auditing capabilities. FGA can also optionally execute procedures. For instance, a procedure could perform an action such as sending an e-mail alert to an auditor when a user selects a certain row from a table, or it could write to a different audit trail.	10g	√	√	2
13.07	Auditing	Audit ALTER ANY TABLE	Audit the use of ALTER ANY TABLE.	10g,9i	√	√	2 S
13.08	Auditing	Audit ALTER USER	Audit the use of ALTER USER.	10g,9i	√	√	2 S
13.09	Auditing	Audit any CREATE statement	Audit the use of any CREATE statement.	10g,9i	√	√	2 S
13.10	Auditing	Audit CREATE ROLE	Audit the use of CREATE ROLE.	10g,9i	√	√	2 S
13.11	Auditing	Audit CREATE USER	Audit the use of CREATE USER.	10g,9i	√	√	2 S

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
13.12	Auditing	Audit CREATE SESSION	Audit the use of CREATE SESSION for successful or unsuccessful operations.	10g,9i	√	√	2 S
13.13	Auditing	Audit any DROP statement	Audit the use of any DROP statement.	10g,9i	√	√	2 S
13.14	Auditing	Audit DROP ANY PROCEDURE	Audit the use of DROP ANY PROCEDURE.	10g,9i	√	√	2 S
13.15	Auditing	Audit DROP ANY TABLE	Audit the use of DROP ANY TABLE.	10g,9i	√	√	2 S
13.16	Auditing	Audit GRANT ANY PRIVILEGE	Audit the use of GRANT ANY PRIVILEGE.	10g,9i	√	√	2 S
13.17	Auditing	Audit GRANT ANY ROLE	Audit the use of GRANT ANY ROLE.	10g,9i	√	√	2 S
13.18	Auditing	Audit INSERT failures	Audit INSERT failures attempted into critical data objects.	10g,9i	√	√	2 S
13.19	Auditing	Logon, logoff, database start or stop, and other information.	Create triggers against all tables and system events that are meaningful to the database and application.	10g,9i	√	√	2 N
13.20	Auditing	Use triggers to implement row level auditing	Use triggers to enforce row level auditing for important data.	10g,9i	√	√	2 N
13.21	Auditing	Review procedures and reports to review audit logs	Regular, timely reviews of the collected audit information must be done.	10g,9i	√	√	2 N
13.22	Auditing	Set AUDIT ALL ON SYS.AUD$ BY ACCESS	By setting AUDIT ALL ON SYS.AUD$ BY ACCESS, attempts to alter the audit trail will be audited. Only applicable if the audit trail parameter is set to DB or TRUE.	10g,9i	√	√	2 S
13.23	Auditing	Regularly purge the audit trail	Review the purging procedures to ensure that the audit trail is purged regularly.	10g,9i	√	√	2 N

Appendix A – Additional Settings (not scored)

Note: The default 10g database installation does not install Oracle label Security (OLS). OLS must be installed by selecting a custom installation and manually selecting it.

Oracle Advanced Security (OAS) is installed with Oracle 10g. It is available for 9i as well, but as an extra charge. For 9i, OAS items are not scored and are considered additional settings, please see section 3 for those settings.

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	W I n d o w s	U n I x	Level If known
14.01	Oracle Label Security	Where possible use Oracle Label Security.	OLS is a strong additional layer of security (and can be implemented without significant Oracle experience.) Do we really want to say this? I would suggest: OLS is a strong additional layer of security that can be used to create a Virtual Private database (VPD). OLS allows data of varying sensitivies to be stored in a single database and access to the data to be restricted using security clearances as defined by role level.	10g,9i	√	√	2
14.02	Oracle Label Security	Where possible, when using OLS, hide the label column. This can be done by passing the "HIDE" directive to the "DEFAULT_OPTIONS" parameter of the "SA_SYSDBA.CREATE_POLICY" (globally) or to the "TABLE_OPTIONS" parameter of the "APPLY_TABLE_POLICY" proceedure (for a specific table). Note: After applying a OLS policy to a table, the hidden status of the labels cannot be revoked without the loss of the labels.	If the status of the hidden label column needs to be changed, the values of the label column may be copied to an added column, then the hidden column can be removed, the column copied, then remove the policy dropping the row label column. Reinstate the policy and then copy the values from the added column to the row label column and then remove the added column.	10g,9i	√	√	2

Item #	Configuration Item	Action / Recommended Parameters	Comments	Version 10g / 9i	Windows	Unix	Level If known
14.03	Oracle Label Security	Include the LABEL_UPDATE as a value for table_options parameter when the OLS policy is applied to a table.	This ensures the user cannot reclassify the data in the record by changing the label.	10g,9i	√	√	2
14.04	Oracle Label Security	Where possible, use a trusted procedure to limit and control the manipulation of the labels.	By the creation of a procedure, direct manipulation by database users of the labels is prevented and an additional level of security is provided. This can provide a separation of responsibility between the DBA and the security administrators.	10g,9i	√	√	2
14.05	Oracle Label Security	Have a secure and separate data copy before implementing OLS.	OLS introduces an additional hidden column into a table. For some tables the addition of a column or a hidden column may render the table unusable. For applications that expect to see all the data, OLS may be interpreted as corrupt data.	10g,9i	√	√	2
14.06	Oracle Label Security	Where applicable and possible, store labels in the Oracle Internet Directory (OID).	In the context of Enterprise User Security option this provides a centralized management method for user passwords, enterprise roles, and OLS authorization. Under the control of the OID, policies cannot be manipulated within the databases.	10g,9i	√	√	2
14.07	RAID file systems	Implement	File systems holding the Oracle data should be on RAID volumes for resilience.	10g,9i	√	√	2
14.08	Magnetically wipe failed disks	Implement	Magnetically wipe old, no longer used, or failed disks. This issue is most likely handled by system administrators.	10g,9i	√	√	2
14.09	Backups on system disks	Verify permissions	In many environments, database backups are written to system disks. In this type of environment, ensure that the backup files are protected. Files should be owned by oracle software owner set with owner read/write permissions only.	10g,9i	√	√	2
14.10	Off site backup storage	Implement	Implement off site backup storage procedures.	10g,9i	√	√	2
14.11	Recovery procedures	Document and Test	Ensure that database recovery procedures are fully documented and regularly tested.	10g,9i	√	√	2
14.12	Backup and restore procedures	Document and Test	Ensure that database backup and restore procedures are fully documented and regularly tested.	10g,9i	√	√	2
14.13	Screening router	Implement to restrict access to database host	Implement a screening router to restrict access to the database host.	10g,9i	√	√	2
14.14	Personal fiirewall	Implement on database administration machines	Use a personal firewall on all computers used to administer databases.	10g,9i	√	√	2

Appendix B – Disabled Windows 2000 Services

This appendix contains a list of services that, if not needed should be disabled on a Windows 2000 server running Oracle. This is intended as a guide to be used in disabling Windows services.

Windows 2000 Service
Alerter
ClipBook Server
Computer Browser
DHCP Client
Distributed File System
Fax Service
Internet Connection Sharing
IPSEC Policy Agent (Disable unless IPSEC policies will be used.)
License Logging Service
Logical Disk Manager Administrative Service
Messenger
NetMeeting Remote Desktop Sharing
Network DDE
Network DDE DSDM
OracleOraHome90HTTPServer (Disable unless iSQL or other web resource is required.) Note: may have a different name.
Print Spooler
Remote Access Auto Connection Manager
Remote Access Connection Manager
Remote Registry Service (Disable unless running hfnetchk or similar utilities.)
Removable Storage
RunAs Service
Smart Card
Smart Card Helper
Telephony
Telnet
Windows Installer
Workstation (Disable unless the server will be part of a domain.)

Appendix C – FIPS140-2 Issues

User communities implementing an Oracle 10g database that are required to meet the FIPS140-2 standard of encryption are facing a unique problem. To set the Oracle 10g software to the FIPS140 standard requires the SQLNET.FIPS_140 setting be set to TRUE and in turn the SQLNET.ENCRYPTION_TYPES_SERVER setting be set to DES|DES40. With the SQLNET_140 set to TRUE any setting other than DES|DES40 for the SQLNET.ENCRYPTION_TYPES_SERVER may cause an error, but the DES or DES40 standard for encryption are at best weak standards and are already subject to several known compromises. See notes 5.02 and 5.03.

Even as DES is an accepted standard for legacy systems under current FIPS140-2 standards, if FIPS140 compliance is mandated and a stronger encryption standard is required, then a third party encryption system must be used.

Third party encryption resources for Oracle include:

Relational Database Consultants;
http://www.relationalwizards.com/html/ora_products.html

Semantica Software;
http://www.semantica.nl/en/products/plcrypt/about.html

NEC Tricryption
http://www.necsam.com/tricryption

Ingrian Networks;
http://www.ingrian.com/products/#prodline

Each of these encryption providers products encrypt the databases at a file, row or field level without requiring the setting of the SQLNET.FIPS_140 value to TRUE or the setting of the SQLNET.ENCRYPTION_TYPES_SERVER to DES|DES140. They also offer encryption using 3DES, AES, and additional algorithms.

Appendix D – Waivers and Exceptions

Waiver or exception procedure
The goal for the waiver or exception to the baseline is not to exempt or negate security considerations, but rather provide a means for the maintenance of the security standards outside of the mandated means.

Compensation for the waiver or exemption
The steps taken to compensate for the waiver or the exemption should equal or surpass the standard for security of the affected element. Further, the compensation must not be in conflict with or any way jeopardize existing security measures.

Documentation of the waiver or exception
Because security methodologies are both contextual and interrelated, a waiver or exception cannot exist in isolation from the scope of other security methodologies and cannot be executed without at least the awareness and/or understanding of all other security agents functioning under the same security hierarchy. Toward insuring all other security agents are informed of the waiver or exception, detailed documentation of the waiver or exception should be made and circulated. At a minimum the documentation should include a detailed description of the justification/s, nature, scope, duration, and means of compensation for the waiver or exception.

Justification
By their nature, the justifications for waivers or exception cannot be predicted. Reasons might include situations where compliance with the standard would adversely affect the accomplishment of the mission of the computer system, or where compliance with the standard would cause a major financial impact on the operator, which is not offset by concurrent or subsequent cost of a security breach.

Nature
The nature of the waiver or exception delineates where within the hierarchy of software, hardware, physical, infrastructure, or personnel the exemption will be effected. If the deviation from the standards of the baseline is of a scope to cover multiple elements, then the effect on each element must be documented.

Scope
The scope of the waiver or exception provides the range to which operating system/s, application/s, machine/s, network/s, person/s or procedures will be covered by the exemption.

Compensation
The compensation of the waiver or exception details what will be put in place as a substitute for the mandated settings, procedures or protocols. The explanation of the compensation must include how it will meet or exceed the existing standards for security.

Duration
The duration of the waiver or exception explains how long the exemption will be in effect.

Importance of duration
In almost all cases, a waiver or exception should not be accepted as a static modification, but should be considered as an exemption of fixed duration that will be resolved by the restoration of the software, hardware, procedure, personnel, or other security element/s to the defined security standard.

Steps at the expiration of the duration

At the expiration of the duration, the waiver or exception to should be reviewed for means to return the software, hardware, procedure, personnel, or other security element/s to the defined security standard. This is not a renewal process, but must include a re-examination of the justification, nature, scope, and duration of the waiver or exception.

Appendix E – Using Enterprise Manager Grid Control for Patch Management and Policy Violations

The Oracle 10g Enterprise Manager Grid Control application has two functions directly related to securing Oracle and its host. If the Oracle Enterprise Manager Grid Control application is deployed, follow these recommendations. For more detailed information of this functionality please refer to the Oracle documentation, *Oracle® Enterprise Manager Concepts 10g Release 1 (10.1) Part No. B12016-02* and *Oracle® Enterprise Manager Advanced Configuration 10g Release 1 (10.1) Part No. B12013-03.*

Patching Setup:

The Oracle 10g Enterprise Manager Grid Control application can be set up to automatically access Oracle MetaLink to search for and download any new patches available for your Oracle install. The administrator can then schedule and apply the patch(es) to any host in the enterprise.

Policy Violations:

The Oracle 10g Enterprise Manager Grid Control application can show policy violations for any database or host in the enterprise. The violations can be fixed or ignored so they will not show up in future reports.

Appendix F – Revision History

Version 2.01
       added DBA account to note at beginning of Section 9
       removed DBA from several items since it is now mentioned in the note.