Leveraging New Oracle Database 19c Security Features with the Oracle E-Business Suite

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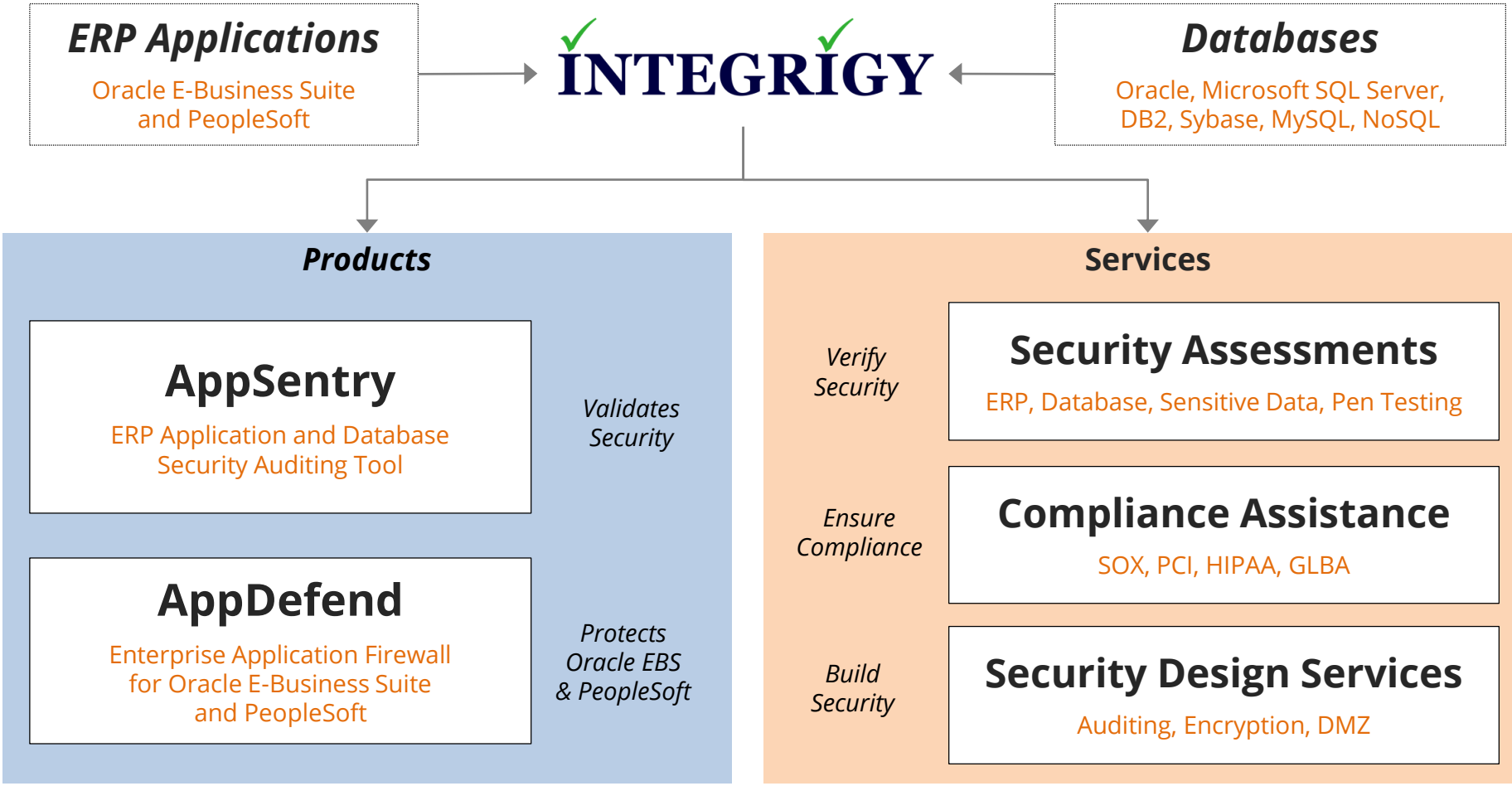
About Integrigy



Agenda

1. Oracle EBS and 19c
2. Oracle 19c Security Features Overview
3. Upgrading to 19c
4. 19c New Security Features
5. Q & A

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Oracle 12c – 19c Certifications For Oracle EBS

DB Version	EBS	DB Release Date	EBS Cert Date (Linux)
12.1.0.1	11.5.10.2 12.0.6 12.1.3 12.2.1 – 12.2.4	June 2013	Sept 2013 (11.5.10.2, 12.0.6, 12.1.3) Sept 2014 (12.2)
12.1.0.2	11.5.10.2 12.0.6 12.1.3 12.2.1 – 12.2.5	July 2014	Sept 2014 (12.1) Jan 2015 (12.2) Feb 2015 (11.5.10.2)
19.3	12.1.3 12.2.1 – 12.2.9	April 2019	Sept 2019 (12.1) Sept 2019 (12.2)
19.5 (19.3 → 19.5)	12.1.3 12.2.1 – 12.2.9	October 2019	Nov 2019 (12.1) Nov 2019 (12.2)

Notes

- No certification for Oracle Database 12.2, 18.x, or 19.4.
- Oracle Database certifications are platform and version dependent, so certifications may be staggered for some platforms. (https://blogs.oracle.com/ebstech)

Oracle Product Support

Premier	▪ Five years from release ▪ Security patches and Critical Patch Updates
Extended	▪ Three years additional ▪ Security patches and Critical Patch Updates ▪ Additional annual fee – often waived
Sustaining	▪ Indefinite as long as you pay annual maintenance and have a minimum patch level – usually terminal patchset for database ▪ **NO security patches or Critical Patch Updates**

Source – http://www.oracle.com/us/support/lifetime-support/index.html

Why Upgrade from 11.2 or 12.1?

- **11.2 enters sustaining support December 2020**
  - No security patches after October 2020
  - Extended support fees have been waived for entire time
  - Market Driven Support an option for additional fee starting 2021
- **12.1 enters sustaining support July 2021**
  - No security patches after July 2021
  - No extended support fees through December 2020 for EBS
- **19c terminal release of 12c/18c/19c**
  - Premier support through March 2023
  - Extended support through March 2026

References

- EBS Database Extended Support Fees = MOS Note ID 2522948.1
- Database 12.1 Extended Support Fees = MOS Note ID 2569754.1

Oracle Database Version Support

Major Releases	Extended Support End Date	Patchsets	CPU Support End Date
Oracle 19c	March 2026	**19.x**	**January 2026**
Oracle 12c R1	July 2021	**12.1.0.2**	**July 2021**
		12.1.0.1	**July 2016**
Oracle 11g R2	December 2020	**11.2.0.4**	**October 2020**
		~~11.2.0.3~~	~~July 2015~~
		~~11.2.0.2~~	~~January 2013~~
		~~11.2.0.1~~	~~July 2011~~
~~**Oracle 11g R1**~~	~~August 2015~~	~~11.1.0.7~~	~~July 2015~~
~~**Oracle 10g R2**~~	~~July 2013~~	~~10.2.0.5~~	~~July 2013~~
~~**Oracle 10g R1**~~	~~January 2012~~	~~10.1.0.5~~	~~January 2012~~

What Version is 19c Really?

- **With 18c, Oracle changed versioning and release schedule**
  - Versions named after years, 18c = 2018, 19c = 2019, 20c = 2020, …
  - 19c is the terminal/long term support release of 12.2
  - Release Updates (RUs) and Release Update Revisions (RURs)
  - PSU → RUR and BP → RU

Version	Old Versioning	Release Type
12.2.0.1	**12.2.0.1**	Annual release
18c	**12.2.0.2**	Annual release
19c	**12.2.0.3**	Long term support release
20c	**13.1.0.1**	Annual release

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Oracle 12c/19c Security Feature Certifications

Certified/ Supported	▪ Transparent Data Encryption (TDE) - Column and Tablespace ▪ Advanced Security Option - SQL*Net Encryption/SSL ▪ Virtual Private Database (VPD) ▪ Label Security (OLS) ▪ SecureFiles ▪ Connection Manager (12.1.0.1 only) ▪ Multitenant – single tenant only (19c only) ▪ Database Vault (12c)
Pending Certified	▪ **Database Vault (19c)** ▪ **Data Masking (19c)**
Not Certified	▪ Data Redaction

Reference – https://blogs.oracle.com/ebstech

Oracle Database 12.1 New Security Features

- **Major new security features for EBS**
  - Unified Auditing – lots of auditing changes
- **Incremental security improvements for EBS**
  - Mandatory Auditing
  - SHA-512 for password hash (12.1.0.2)
  - FIPS-140 for TDE (12.1.0.2)
  - SELECT ANY DICTIONARY no access to USER$, other tables
  - extproc run as specific OS user rather than oracle
  - READ privilege which is SELECT without locking (12.1.0.2)

Oracle Database 12.1 New Security Features

- **Unsupported by Oracle EBS**
  - Transparent Sensitive Data Protection (TSDP)
  - Real Application Security (RAS) – next-generation VPD
  - Multitenant (pluggable databases)
  - Data Redaction

- **Not directly relevant to Oracle EBS**
  - Audit trail cleanup in read-only databases (12.1.0.2)
  - Predefined Unified Audit policies for CIS and DV (12.1.0.2)

Oracle 12.2 – 19.5 Major New Security Features for EBS

12.2	▪ Automatically lock inactive database accounts ▪ Transparent Sensitive Data Protection (TSDP) works with Unified Auditing, FGA, and TDE ▪ SELECT ANY TABLE access to Unified Auditing removed
18.x	▪ **Direct integration of Active Directory** ▪ **UTL_FILE_DIR desupported** ▪ Schema only accounts ▪ Encrypt credentials in LINK$ and SCHEDULER$_CREDENTIAL tables ▪ Write Unified Audit to SYSLOG
19.x	▪ **Privilege Analysis now included in Enterprise Edition** ▪ Most default database accounts now schema only accounts ▪ Audit top-level SQL Statements

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Oracle 19c and EBS References

EBS Version	19c References
All	Database Initialization Parameters for Oracle E-Business Suite Release 12 (Doc ID 396009.1) FAQ: Oracle E-Business Suite and the Oracle Multitenant Architecture (Doc ID 2567105.1) Using UTL_FILE_DIR or Database Directories for PL/SQL File I/O in Oracle E-Business Suite Releases 12.1 and 12.2 (Doc ID 2525754.1)
12.1	Interoperability Notes: Oracle E-Business Suite Release 12.1 with Oracle Database 19c (Doc ID 2580629.1) Using Oracle 19c RAC Multitenant (Single PDB) with Oracle E-Business Suite Release 12.1 (Doc ID 2530680.1) Cloning Oracle E-Business Suite Release 12.1 with Multitenant Database using Rapid Clone (Doc ID 2560690.1)
12.2	Interoperability Notes: Oracle E-Business Suite Release 12.2 with Oracle Database 19c (Doc ID 2552181.1) Using Oracle 19c RAC Multitenant (Single PDB) with Oracle E-Business Suite Release 12.2 (Doc ID 2530665.1) Export/Import Process for Oracle E-Business Suite Release 12.2 Database Instances Using Oracle Database 19c (Doc ID 2554156.1) Cloning Oracle E-Business Suite Release 12.2 with Multitenant Database using Rapid Clone (Doc ID 2552208.1)

Upgrading Oracle EBS to Oracle 12c

- **Follow Oracle Support Note ID 2580629.1 (12.1) or 2552181.1 (12.2)**
- **19c upgrade only supported going to 19.3 then to 19.5**

12.1 Step	12.2 Step	Security Notes Regarding Step
3	**3**	▪ Allow case sensitive passwords (optional) = This step should be mandatory.
16	**18**	▪ Store the UTL_FILE_DIR parameter values = As part of update, only the EBS temp directory should be allowed. All other directories should be specifically migrated to Oracle Directory objects.
21	**21**	▪ Remove the MGDSYS schema (conditional) = Verify if MGDSYS exists and remove it.
46	**44**	▪ Apply latest Release Update (Recommended) = This step should be mandatory and the latest RU should be applied in order to have the latest security patches. ▪ As of November 2019, upgrade from 19.3 to 19.5. See latest Database Patch Availability Document (PAD)

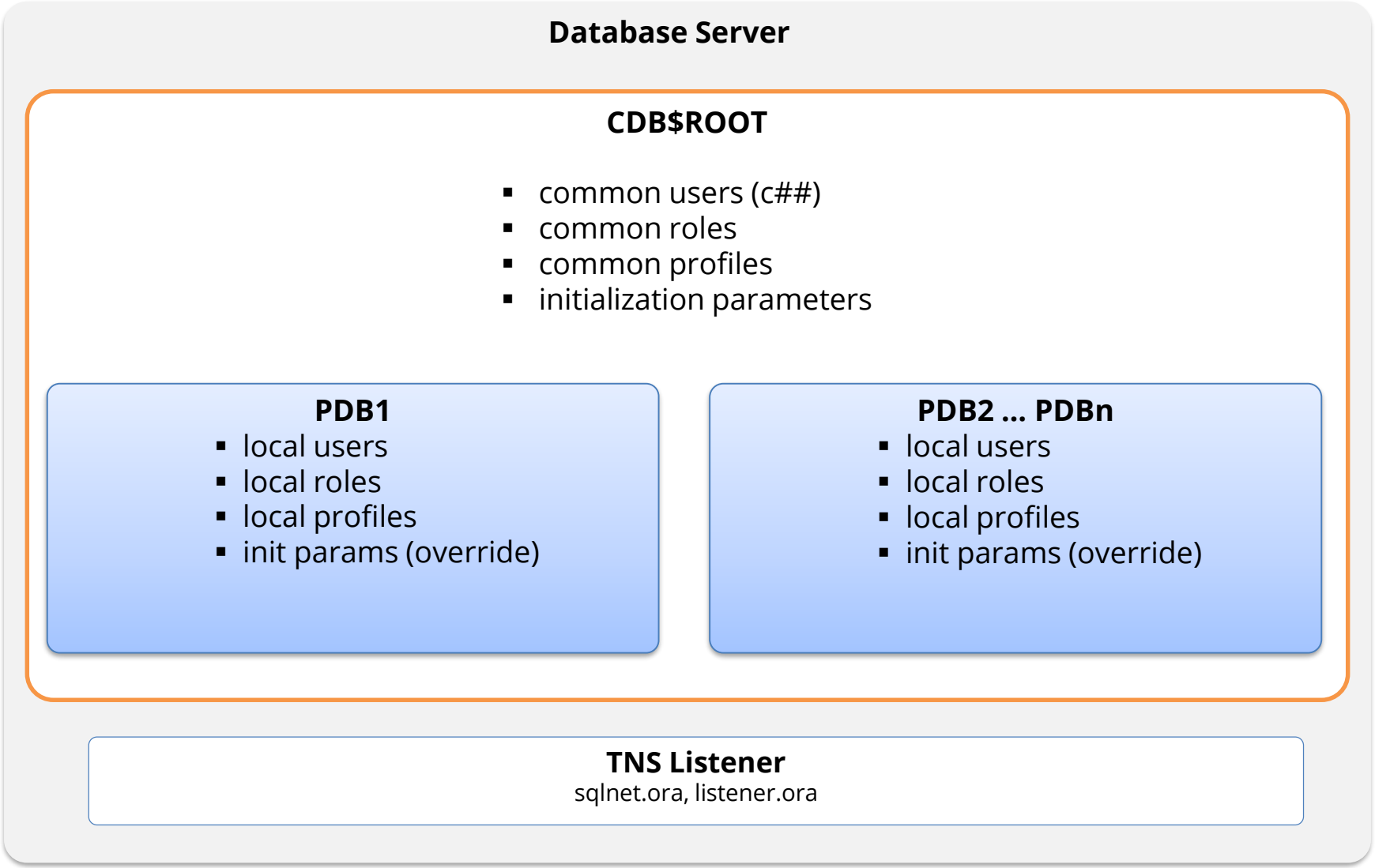
Steps and notes based on November 2019 versions of the Support Notes

Oracle Multitenant Quick Introduction

- **Oracle multitenant architecture was introduced in Oracle 12c**
  - 12c supports both multitenant and non-CDB
  - 19c deprecates non-CDB
  - 20c desupports/removes non-CDB

Container Database CDB	▪ Super database or root database ▪ Contains one or more pluggable databases (PDB) ▪ Up to 252 PBDs supported in a CDB
Pluggable Database PDB	▪ Sub database which in plugged into a container database ▪ Easy to move PDB from one CDB to another CDB

Oracle Multitenant Architecture



19c Multitenant Mandatory for EBS

- **EBS with 19c must run using Multitenant using a single tenant**
  - Multiple tenants (more than one PDBs) are not supported
  - EBS will be only PDB in the CDB
  - No additional licenses – 3 user-created PDBs allowed in Enterprise Edition
- **Database patches only applied to CDB**
- **Relocating or cloning EBS PDB is not supported**
- **See MOS Note ID 2567105.1 *FAQ: Oracle E-Business Suite and the Oracle Multitenant Architecture* for more information**

UTL_FILE_DIR

- **UTL_FILE_DIR desupported in 18c and removed in 19c**
  - 19.3 added feature to allow UTL_FILE to specify either a directory object or a physical directory which has a corresponding directory object
  - All directories in UTL_FILE_DIR accessible for reading and writing by all database accounts – a security risk
- **Custom code using UTL_FILE_DIR must be reviewed and if possible, convert custom code to use Directory objects**
- **See MOS Note ID 2525754.1 *Using UTL_FILE_DIR or Database Directories for PL/SQL File I/O in Oracle E-Business Suite Releases 12.1 and 12.2* for more information**

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Active Directory Integration for Database Accounts

- **18c adds Centrally Managed Users (CMU) for simple integration with Active Directory users and roles**
  - Requires Windows Server 2008R2 or higher
  - Replaces Enterprise User Security (EUS) and Oracle Internet Directory (OID)
  - Not intended for application or service accounts
  - Eliminates some decentralized Oracle database accounts
  - Configuration shared between CDB and EBS PDB
- **Use CMU for all named accounts including DBAs and ad-hoc users**
  - Does not replace DBA use of APPS, SYS, or SYSTEM
  - Users may be mapped to a specific account (recommended) or a shared schema account

Privilege Analysis

- **12c added Privilege Analysis to report on actual privileges used by database accounts**
  - Used to determine Least Privileges required for an account
  - Captures privilege tracking similar to auditing
  - Prior to 19c, included with Database Vault Option
- **For 19c, Privilege Analysis included with Enterprise Edition**
- **Use to analyze the privileges for custom database accounts of ad-hoc users, interfaces, 3rd applications, and other customizations**
  - Helpful for 3rd party applications that grant DBA or excessive privileges
  - Precisely define privileges for interfaces and ad-hoc accounts

Real Application Security (RAS)

- **New with Oracle 12c**
  - Next generation Virtual Private Database (VPD)
  - Ideal for APEX applications
- **Define users separately from DBA_USERS**
  - DBA_XS_USERS
  - Can directly connect to the database
  - Flag in 12.1.0.2
- **RAS role and event auditing with Unified Audit**
- **Not used by Oracle E-Business Suite**

READ Privilege (12.1.0.2)

- **READ Object**
  - READ object privilege enables users to query, but not modify database tables, views, materialized views and synonyms
  - SELECT object privilege can still be used
  - SELECT object privilege also allows users to lock rows when reading

- **READ ANY TABLE**
  - Allows user to query any table in the database
  - GRANT ALL PRIVILEGES TO user SQL also now includes the READ ANY TABLE system privilege as well as the READ object privilege

TSDP 19c Improvements

- **Transparent Sensitive Data Protection (TSDP)**
  - New functionality, views, and Cloud Control integration
- **Use TSDP to identify, create and manage policies to protect sensitive data. Use with –**
  - Oracle Data Redaction
  - Oracle Virtual Private Database (VPD)
  - Unified Auditing
  - Fine-grained Auditing (FGA)
  - Transparent Data Encryption (TDE) column encryption

Last Login Date

- Knowing when users last logged-in is required for effective user account management and auditing
- `last_login` date added to `SYS.DBA_USERS`

```
select username, account_status, common, last_login
from sys.dba_users
order by last_login asc;
```

Username	Account Status	Common	Last Login
C##INTEGRIGY	OPEN	YES	05-AUG-14 12.46.52.000000000 PM AMERICA/NEW_YORK
C##INTEGRIGY_TEST_2	OPEN	YES	02-SEP-14 12.29.04.000000000 PM AMERICA/NEW_YORK
XS$NULL	EXPIRED & LOCKED	YES	02-SEP-14 12.35.56.000000000 PM AMERICA/NEW_YORK
SYSTEM	OPEN	YES	04-SEP-14 05.03.53.000000000 PM AMERICA/NEW_YORK

Unified Auditing Super View

SYS.UNIFIED_AUDIT_TRAIL Content	# of Columns
Standard auditing including SYS audit records	44
Real Application Security (RAS) and RAS auditing	17
Oracle Label Security	14
Oracle Data Pump	2
Fine-grained Auditing (FGA)	1
Database Vault (DV)	10
Oracle RMAN	5
SQL*Loader Direct Load	1
Total	**94**

Audit Any Role

- **Any database role can be audited, including user-created roles**
  - Audits all system privileges granted to a role
  - Eliminates need to update audit policies when roles are updated

```
CREATE AUDIT POLICY role_dba_audit_pol
ROLES DBA
CONTAINER = ALL;
AUDIT POLICY role_dba_audit_pol;
```

Oracle 19c Mandatory Auditing

- **Oracle 19c always-on-auditing for SYS operations**
  - Always audited roles and users = SYS, SYSDBA, SYSOPER, SYSASM, SYSBACKUP, SYSDG, SYSKM
- **Mandatory Auditing Events –**
  - CREATE AUDIT POLICY
  - ALTER AUDIT POLICY
  - DROP AUDIT POLICY
  - AUDIT
  - NOAUDIT
  - Database Vault configurations
  - DBMS_FGA PL/SQL package
  - DBMS_AUDIT_MGMT PL/SQL package
  - ALTER TABLE attempts on the AUDSYS audit trail

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