

Scuba User Guide

February 2018

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PATENT INFORMATION

The software described by this document is covered by one or more of the following patents:

US Patent Nos. 7,640,235, 7,743,420, 7,752,662, 8,024,804, 8,051,484, 8,056,141, 8,135,948, 8,181,246, 8,392,963, 8,448,233, 8,453,255, 8,713,682, 8,752,208, 8,869,279 and 8,904,558, 8,973,142, 8,984,630, 8,997,232, 9,009,832, 9,027,136, 9,027,137, 9,128,941, 9,148,440, 9,148,446 and 9,401,927.

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CHAPTER 1

Prerequisites

In order to get update notifications on new versions of Scuba, please make sure Internet access is allowed.

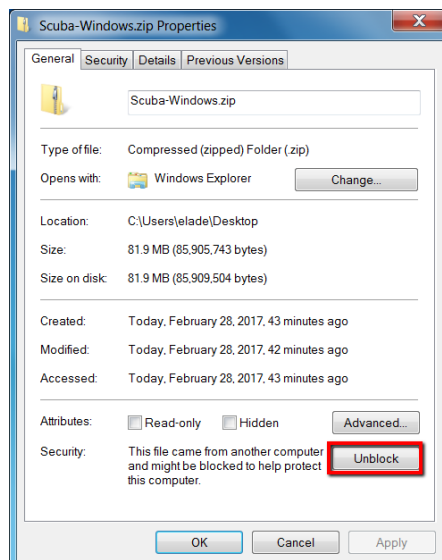
Please make sure you have a user with all required database permissions.

For the list of required permissions, please see [Required Permissions](#) on page 18.

Windows users:

Before extracting the Scuba-Windows.zip, please be sure to **unblock** it, as follows:

Right click → Properties → Unblock



CHAPTER 2

Running a Scan

This chapter describes what is required to run a scan.

Before running a scan, you need to download and execute the Scuba application. You do this as based on the host Operating System, as follows:

- Windows: Scuba.exe
- Mac: Scuba.command
- Linux: Scuba.sh

To start a scan:

1. Complete your database details as follows:
 - If you are scanning a database in your network, keep the “Local Network” option selected. Otherwise, see “Running a Cloud Database Scan”
 - Host/IP
 - Port (or use default)
 - User name
 - Password
 - Database/Instance/SID (depends on selected database)

2. Click "Go!" to start a scan.

Help


IMPERVA[®]

Scuba is a free tool that scans leading enterprise databases for security vulnerabilities and configuration flaws, including patch levels. It includes more than 2,300 assessment tests for Oracle, Microsoft SQL Server, SAP Sybase, IBM DB2 and MySQL.

With Scuba, you can uncover potential security risks undermining your database security.

 ***NEW* Scuba now supports cloud database scanning!**
[Click to learn more](#)

Please fill in your database details and click "Go!"

 Sales@imperva.com
www.imperva.com
1-866-926-4678

☒ Local Network
☐ Cloud (SSH Tunnel)

SSH Host
SSH Username
SSH Private Key ...

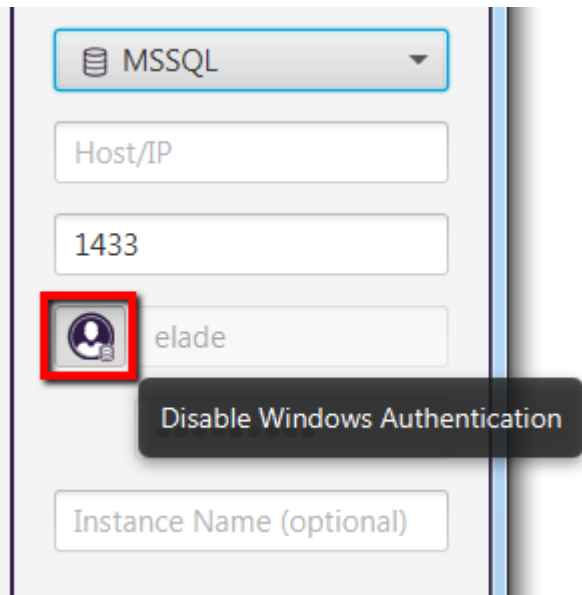
ORACLE

Host/IP
1521
User Name
Password
SID / Service

Go!

When scan ends, the application will close and results screen will open in your default browser.

Note: Microsoft SQL Server supports Windows Authentication. This is enabled by default. You can disable it and manually configure a user and password by clicking the authentication button:



The screenshot shows a configuration panel for MSSQL. At the top is a dropdown menu labeled 'MSSQL'. Below it are three input fields: 'Host/IP', '1433', and a field containing 'elade'. To the left of the 'elade' field is a small icon of a person with a key, which is highlighted by a red square. A dark grey tooltip with the text 'Disable Windows Authentication' is positioned over this icon. At the bottom of the panel is an input field labeled 'Instance Name (optional)'.

Running a Cloud Database Scan

This section describes how to run a scan on Amazon Web Services (AWS) cloud databases. Cloud database scans are run based on two models:

- Cloud databases without SSH Tunnel
- Cloud databases with SSH tunnel

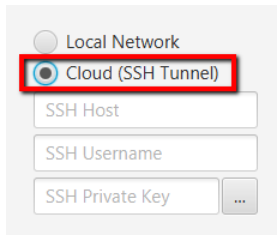
Scan a cloud database without SSH Tunnel

Cloud databases can be configured with the following network access options, without the need of SSH tunnel:

- Public Address – everyone can access the database (**not recommended**)
- Network peering (VPN to VPC peering) – a PC in your local network which can access the database
- Run Scuba on a cloud instance – remotely connect to an instance inside a VPC, with access to the scanned database (for example using Windows remote desktop connection)

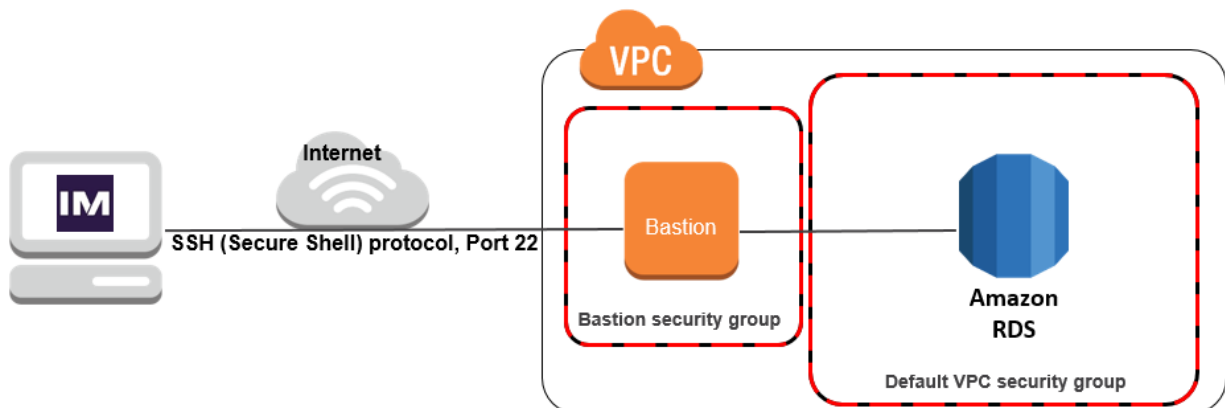
Scan a cloud database with SSH Tunnel

If the database is not accessible by the client running scuba you can use the “Cloud (SSH Tunnel)” option.



The screenshot shows a configuration window with two radio buttons at the top: 'Local Network' and 'Cloud (SSH Tunnel)'. The 'Cloud (SSH Tunnel)' option is selected and highlighted with a red rectangle. Below the radio buttons are three input fields: 'SSH Host', 'SSH Username', and 'SSH Private Key' (with a browse button).

You can scan a database using a Bastion server (also called Jump server – specially designed to reduce security risks). You can use an existing Bastion server, or create a dedicated one for the scan. The scan will be done using SSH (Secure Shell) tunnel, through the Bastion server, to the scanned database.



You can run a scan by entering:

- The Bastion details
- The database details

As follows:

The screenshot shows the Scuba application window. The title bar says "Scuba". Inside, there's a "Help" tab. The main area has the IMPERVA logo and a description of Scuba as a free tool for scanning enterprise databases. It mentions over 2,300 assessment tests for Oracle, Microsoft SQL Server, SAP Sybase, IBM DB2, and MySQL. Below this, it says "With Scuba, you can uncover potential security risks undermining your database security." There's an AWS logo and a banner that says "*NEW* Scuba now supports cloud database scanning!" with a link "Click to learn more". A large orange text prompt says "Please fill in your database details and click 'Go!'". At the bottom left, there's a contact icon and details: "Sales@imperva.com", "www.imperva.com", and "1-866-926-4678". On the right side, there's a configuration panel. It has two radio buttons: "Local Network" (unselected) and "Cloud (SSH Tunnel)" (selected). Below these are input fields for "bastion_host", "ec2-user", and "c:\my_pem.pem" (with a file selection button). A dropdown menu is set to "MYSQL". Below that are fields for "rds-host", "3306", "root", a password field (masked with dots), and "mysql". At the bottom of the right panel is a large circular button with the text "Go!".

Cloud (SSH Tunnel) Configuration

To scan a database in the cloud to which you don't have direct access to, you have to use a Bastion server. You have to verify the bastion server can access the database you want to scan. If using VPC peering, you can scan databases in multiple VPCs. Bastion server host and SSH credentials need to be provided to Scuba together with database credentials.

Cloud (SSH Tunnel) field details:

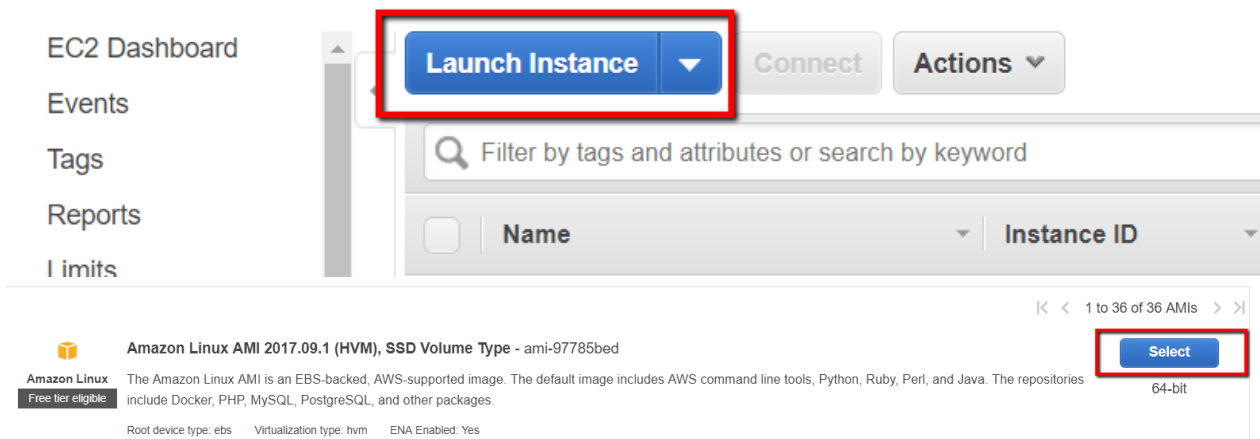
- **SSH Host:** Host name or IP of bastion server
- **SSH User:** User name for SSH authentication. If for example you are using AWS Linux, the default user name is *ec2-user*
- **SSH Private Key File Path:** PEM or PPK file used for SSH authentication. The Key Pair is chosen during the Bastion launch. The needed file is created as part of the Key Pair creation.

Create your own Bastion Server on AWS

It is possible to create a dedicated Bastion server for a scan.

To create a Bastion server on AWS:

1. Go to the EC2 console.
2. Under **Instances** choose **Launch Instance** > **Amazon Linux AMI**



3. Under **Instance Type** choose **General Purpose** > **T2.micro**.

| | | | | | | | | |
|-------------------------------------|-----------------|--------------------------------|---|---|----------|---|-----------------|-----|
| <input checked="" type="checkbox"/> | General purpose | t2.micro Free tier eligible | 1 | 1 | EBS only | - | Low to Moderate | Yes |
|-------------------------------------|-----------------|--------------------------------|---|---|----------|---|-----------------|-----|

4. Click **Next: Configure Instance Details**
5. Under **Network**, select the VPC with the database you wish to scan.
6. Set **Auto-assign Public IP** to **Enable**. Then click **Next: Add Storage**

Network ⓘ vpc-6e337117 (default) ▼

Subnet ⓘ No preference (default subnet in any Availability Zone) ▼

Auto-assign Public IP ⓘ Enable ▼

7. Click **Next: Add Tags**. The following appears.

| Key (127 characters maximum) | Value (255 characters maximum) | Instances ⓘ | Volumes ⓘ |
|------------------------------|--------------------------------|-------------------------------------|-------------------------------------|
| Name | Scuba Bastion | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

- Under **Key**, add a tag with a **Name**, and under **Value** type **Scuba Bastion**. Choose **Next: Configure Security Groups**.
- Click **Create a new security group**, then set one inbound rule with SSH Type and your public IP as the source.

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☒ Create a new security group

☐ Select an existing security group

Security group name:

Description:

| Type | Protocol | Port Range | Source | Description |
|---|----------|------------|--------|----------------------------|
| SSH | TCP | 22 | My IP | e.g. SSH for Admin Desktop |
| <input type="button" value="Add Rule"/> | | | | |

- Click **Review and Launch**, and then **Launch**. Choose a key pair, or create a new one. Verify you have a PEM file, which is needed later by Scuba.

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair

Select a key pair

☒ I acknowledge that I have access to the selected private key file (scuba_keypair.pem), and that without this file, I won't be able to log into my instance.

- Navigate to **EC2 console > Instances**. Find the new instance by typing **Scuba Bastion** in the search box. Copy its Elastic IP addresses. You will need to provide this IP to Scuba.

Allow a Bastion to access the databases

Below you can find ways to allow your Bastion server access your database. You can also read more about Security

Groups here: https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_SecurityGroups.html

Add Security Groups to Bastion

Right click the Bastion instance and choose **Networking > Change Security Groups**

Allow your Bastion to access databases by adding Security Groups. For example the default VPC security groups allow inbound traffic between its instances. You can add to scan all databases which are assigned to the default group.

Use Bastion security group

Allow all instances in the Bastion security group to access each other.

To do that:

- Add a new inbound rule for all TCP traffic and the security group ID. Navigate to **EC2 Console > Security Groups** and choose the **Scuba Bastion Group**. Choose **Edit Inbound Rules**. The following window opens.

Edit inbound rules

| Type | Protocol | Port Range | Source | Description |
|---------|----------|------------|--------|----------------------------|
| SSH | TCP | 22 | My IP | e.g. SSH for Admin Desktop |
| All TCP | TCP | 0 - 65535 | Custom | e.g. SSH for Admin Desktop |

Add Rule

sg-674fc610 - Scuba Bastion Security Group

NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.

Cancel Save

After configuring the Security Group, add the group to your scanned databases:

- **RDS instances:** navigate to the **RDS console**, choose your database, and modify it using **Instance Actions > Modify**. Then go to **Security Group** and add the **Scuba Bastion Security Group**
- **EC2 instances:** navigate to the **EC2 console**, find your instance and **right-click** it. Choose **Networking > Change Security Groups**, then add the **Scuba Bastion Security Group**

CHAPTER 3

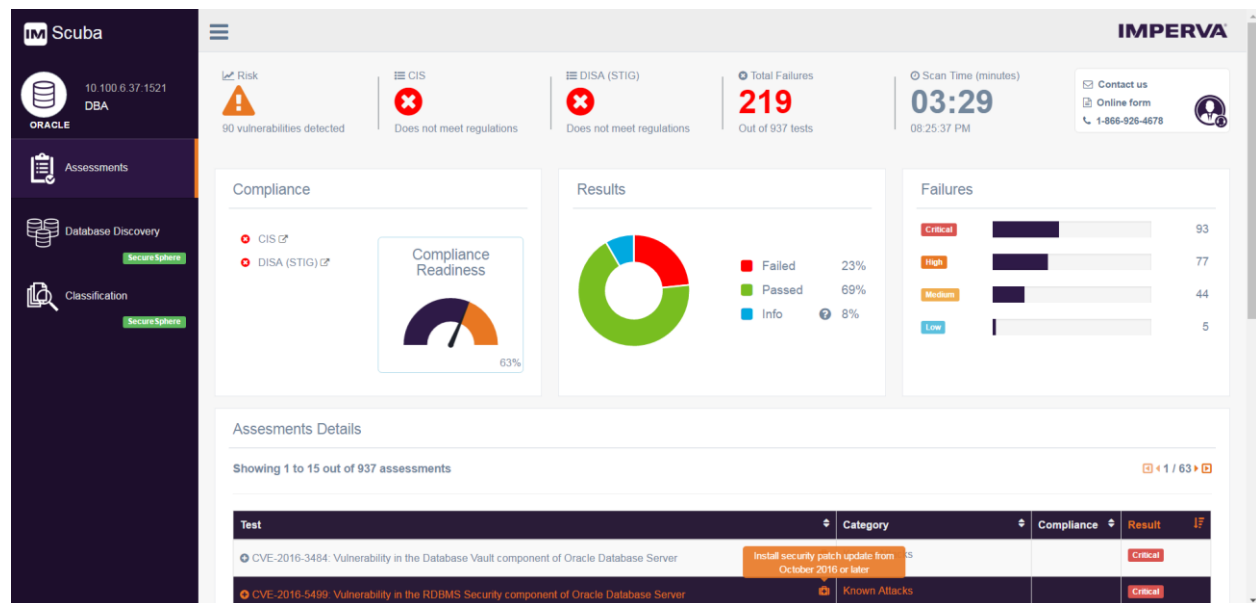
Reviewing Results

This chapter describes how to understand the results of a scan.

The summary for the scan is presented on one easy-to-read dashboard.

The top section is an executive summary, showing whether your database is vulnerable and if it meets well known industry standards (DISA STIG and CIS)

The second section shows statistics about the test – compliance, results segmentation and tests failed by category.



Assessments Table

The assessments table shows all the tests ran against the selected database.

The list can be sorted by test name, category, compliance and result.

Hovering the medical kit icon will show a quick view for remediation of the selected assessment.

Assesments Details

Showing 1 to 15 out of 937 assessments

1 / 63

| Test | | Category | Compliance | Result |
|---|--|---------------|------------|----------|
| CVE-2016-3484: Vulnerability in the Database Vault component of Oracle Database Server | | Known Attacks | | Critical |
| CVE-2016-5499: Vulnerability in the RDBMS Security component of Oracle Database Server | | Known Attacks | | Critical |
| CVE-2014-0378: Unspecified vulnerability in the Spatial component in Oracle Database | | Known Attacks | | Critical |
| CVE-2014-4294: Unspecified vulnerability in the Java VM component in Oracle Database | | Known Attacks | | Critical |
| CVE-2016-5555: Vulnerability in the OJVM component of Oracle Database Server | | Known Attacks | | Critical |
| CVE-2014-4245: Unspecified vulnerability in the Core RDBMS component in Oracle Database | | Known Attacks | | Critical |
| CVE-2014-4297: Unspecified vulnerability in the JPublisher component in Oracle Database | | Known Attacks | | Critical |

Install Oracle JavaVM Patch
Update from October 2016 or later

Assessment Drill Down

In order to better understand each one of the assessments, click an assessment row to expand its content. There you can find details about the test, its description, severity score, related data and possible remediation.

| | | | | |
|--|--|------------------------------------|-------------|----------|
| Users with Default Passwords (11g and later) | | Authentication and User Management | DISA (STIG) | Critical |
| DETAILS | | | | |
| Oracle databases have several well-known default username/password combinations. Default passwords may provide unauthorized access to the server. Default accounts should be locked and expired when they are not required for daily operations. | | | | |
| If all of the accounts listed show an account status of LOCKED & EXPIRED or LOCKED this is a Finding, but downgrade the severity Category Code to II. | | | | |
| DESCRIPTION | | | | |
| Checks for users with default passwords. | | | | |
| DATA | | | | |
| USERNAME | | ACCOUNT_STATUS | | |
| EXFSYS | | EXPIRED & LOCKED | | |
| PERFSTAT | | LOCKED | | |
| APPQOSSYS | | EXPIRED & LOCKED | | |
| ORACLE_OCM | | EXPIRED & LOCKED | | |
| SYS | | OPEN | | |
| REMEDIATION | | | | |
| Change passwords from the default. Ensure passwords meet complexity standards outlined in STIG Requirement DG0079. | | | | |

9.0

APPENDIX A

FAQs

1.

Q:

Which drivers does Scuba use to connect to a database?

A:

Scuba uses JDBC drivers in order to connect to databases. All are located under **/ODBC/Production/**

2.

Q:

Does Scuba use all possible JDBC drivers? If not, is it possible to add JDBC drivers or just update to newer versions?

A:

Scuba uses some common JDBC drivers and those that are allowed to be distributed.

In order to add or update a JDBC driver, you can add it under **/ODBC/Production/<relevant-database>/**

You can find all JDBC drivers at their vendors' websites, as follows:

- Oracle: <http://www.oracle.com/technetwork/database/features/jdbc/index-091264.html>
- SQL Server / Sybase: <https://sourceforge.net/projects/jtds/>
- MySQL: <https://dev.mysql.com/downloads/connector/j/>
- DB2: <http://www-01.ibm.com/support/docview.wss?uid=swg21363866>

3.

Q:

Which connection strings are used in order to connect to a database? Are they configurable?

A:

Connection strings are detailed in **/conf/jdbc.json**

Connection strings are configurable. There are three placeholders you can customize. They include:

- {host} (stands for host name or IP)
- {port}
- {database}

APPENDIX B

Required Permissions

To conduct assessments, Scuba requires a number of baseline permissions in order to access the relevant aspects of the databases it needs to assess. This document reviews permissions required by SecureSphere to conduct assessments, and includes the following:

- [Supported Database Types for Assessments](#)

- [Permissions for Oracle Database Assessments](#)

- [Permissions for MySQL Database Assessments](#)

- [Permissions for MSSQL 2005 and Higher Database Assessments](#)

- [Permissions for DB2 Database Assessments](#)

- [Permissions for Sybase Database Assessments](#)

- [Permissions for AWS RDS Databases](#)

Supported Database Types for Assessments

Scuba supports five primary database types that you may want to configure manually to provide access to. These include:

- DB2
- Oracle
- MySQL
- MSSQL
- Sybase
- AWS RDS

Permissions for Oracle Database Assessments

Oracle database assessments can be executed using a dedicated role that has read permissions on the relevant database objects and a user that holds the role.



Note:

- For instructions on working with Oracle 12, Oracle 12c and AWS RDS, scroll down further in this topic.

The user and role can be created using the following script:

```
create user imperva identified by assessment;
create role assessment_role;
grant assessment_role to imperva;
grant create session to assessment_role;
grant select on sys.registry$history to assessment_role;
grant select on sys.dba_db_links to assessment_role;
grant select on sys.dba_objects to assessment_role;
grant select on sys.dba_priv_audit_opts to assessment_role;
grant select on sys.dba_profiles to assessment_role;
grant select on sys.dba_role_privs to assessment_role;
grant select on sys.dba_roles to assessment_role;
grant select on sys.dba_scheduler_jobs to assessment_role;
grant select on sys.dba_stmt_audit_opts to assessment_role;
grant select on sys.dba_sys_privs to assessment_role;
grant select on sys.dba_tab_privs to assessment_role;
grant select on sys.dba_users to assessment_role;
grant select on sys.link$ to assessment_role;
grant select on sys.profile$ to assessment_role;
grant select on sys.profname$ to assessment_role;
grant select on sys.resource_map to assessment_role;
grant select on sys.role_tab_privs to assessment_role;
grant select on sys.sysauth$ to assessment_role;
grant select on sys.user$ to assessment_role;
grant select on sys.v_$controlfile to assessment_role;
grant select on sys.v_$database to assessment_role;
grant select on sys.v_$datafile to assessment_role;
grant select on sys.v_$logfile to assessment_role;
grant select on sys.v_$parameter to assessment_role;
grant select on sys.v_$pwfile_users to assessment_role;
grant select on sys.dba_data_files to assessment_role;
grant select on sys.dba_external_tables to assessment_role;
grant select on sys.dba_jobs to assessment_role;
grant select on sys.dba_obj_audit_opts to assessment_role;
grant select on sys.dba_source to assessment_role;
grant select on sys.dba_tables to assessment_role;
grant select on sys.dba_ts_quotas to assessment_role;
grant select on sys.v_$log to assessment_role;
```

```
grant select on sys.dba_registry to assessment_role;
grant select on sys.v_$fixed_table to assessment_role;
grant select on sys.proxy_users to assessment_role;
grant select on sys.dba_policies to assessment_role;
grant select on sys.dba_encrypted_columns to assessment_role;
grant select on sys.dba_indexes to assessment_role;
grant select on sys.dba_ind_partitions to assessment_role;
grant select on sys.dba_tablespace to assessment_role;
grant select on sys.dba_tab_partitions to assessment_role;
grant select on sys.dba_users_with_defpwd to assessment_role;
grant select on sys.dba_proxies to assessment_role;
grant execute on sys.dbms_crypto to assessment_role;
grant execute on sys.utl_raw to assessment_role;
grant select on sys.dba_constraints to assessment_role;
grant select on sys.DBA_FREE_SPACE to assessment_role;
grant select on sys.DBA_SEGMENTS to assessment_role;
grant select on sys.dba_tab_columns to assessment_role;
grant select on sys.audit$ to assessment_role;
grant select on SYS.default_pwd$ to assessment_role;
grant select on sys.v_$encrypted_tablespaces to assessment_role;
grant select on sys.V_$OPTION to assessment_role;
grant select on sys.v_$tablespace to assessment_role;
grant select on sys.dba_repcatlog to assessment_role;
grant select on sys.dba_libraries to assessment_role;
grant select on sys.dba_col_privs to assessment_role;
grant select on sys.obj$ to assessment_role;
grant select on sys.objauth$ to assessment_role;
```

Oracle 12

When working with Oracle 12 you need to additionally include the following permissions:

```
grant select on sys.v_$version to assessment_role;
grant select on sys.audit_unified_policies to assessment_role;
grant select on sys.audit_unified_enabled_policies to assessment_role;
grant select on sys.dba_col_privs to assessment_role;
grant select on sys.table_privilege_map to assessment_role;
grant select on sys.registry$sqlpatch to assessment_role;
grant execute on sys.dbms_qopatch to assessment_role;
grant select on sys.dba_priv_audit_opts to assessment_role;
grant select on sys.dba_obj_audit_opts to assessment_role;
grant select on sys.dba_proxies to assessment_role;
grant select on lbacsys.dba_sa_audit_options to assessment_role;
```

Oracle 12c Multitenant

When working with Oracle 12c Multitenant, you need to create a new common user and common role

```
create user c##imperva identified by assessment;
```

```
create role c##assessment_role;
grant c##assessment_role to c##imperva container=all;
grant connect to c##assessment_role container=all;
grant create session to c##assessment_role container=all;
grant select on sys.dba_priv_audit_opts to c##assessment_role container=all;
grant select on sys.dba_obj_audit_opts to c##assessment_role container=all;
grant select on sys.dba_proxies to c##assessment_role container=all;
```

Privileges must be granted to the new common role using following syntax:

```
grant select on <table_name> to c##assessment_role container=all;
```

And you must grant the following permissions:

```
grant select on sys.dba_db_links to c##assessment_role container=all;
grant select on sys.v_$parameter to c##assessment_role container=all;
grant select on sys.v_$version to c##assessment_role container=all;
grant select on sys.v_$log to c##assessment_role container=all;
grant select on sys.dba_tab_privs to c##assessment_role container=all;
grant select on sys.dba_role_privs to c##assessment_role container=all;
grant select on sys.dba_users to c##assessment_role container=all;
grant select on sys.dba_sys_privs to c##assessment_role container=all;
grant select on sys.dba_tables to c##assessment_role container=all;
grant select on sys.dba_jobs to c##assessment_role container=all;
grant select on sys.dba_scheduler_jobs to c##assessment_role container=all;
grant select on sys.dba_external_tables to c##assessment_role container=all;
grant select on sys.dba_objects to c##assessment_role container=all;
grant select on sys.profname$ to c##assessment_role container=all;
grant select on sys.dba_profiles to c##assessment_role container=all;
grant select on sys.dba_tables to c##assessment_role container=all;
grant select on sys.dba_repcatlog to c##assessment_role container=all;
grant select on sys.dba_users_with_defpwd to c##assessment_role container=all;
grant select on sys.dba_data_files to c##assessment_role container=all;
grant select on sys.dba_stmt_audit_opts to c##assessment_role container=all;
grant select on sys.audit_unified_policies to c##assessment_role container=all;
grant select on sys.audit_unified_enabled_policies to c##assessment_role
container=all;
grant select on sys.dba_roles to c##assessment_role container=all;
grant select on sys.dba_segments to c##assessment_role container=all;
grant select on sys.dba_free_space to c##assessment_role container=all;
grant select on sys.dba_tablespace to c##assessment_role container=all;
grant select on sys.v_$tablespace to c##assessment_role container=all;
grant select on sys.dba_col_privs to c##assessment_role container=all;
grant select on sys.dba_libraries to c##assessment_role container=all;
grant select on sys.user$ to c##assessment_role container=all;
grant select on sys.obj$ to c##assessment_role container=all;
grant select on sys.objauth$ to c##assessment_role container=all;
```

```
grant select on sys.table_privilege_map to c##assessment_role container=all;
grant select on sys.v_$database to c##assessment_role container=all;
grant select on sys.v_$encrypted_tablespaces to c##assessment_role container=all;
grant select on sys.dba_encrypted_columns to c##assessment_role container=all;
grant select on sys.dba_tab_columns to c##assessment_role container=all;
grant select on sys.dba_constraints to c##assessment_role container=all;
grant select on sys.default_pwd$ to c##assessment_role container=all;
grant select on sys.v_$option to c##assessment_role container=all;
grant select on lbacsys.dba_sa_audit_options to c##assessment_role container=all;
```

Permissions for MySQL Database Assessments

The following object permissions are required:

```
CREATE USER '<user_name>'@'%' IDENTIFIED BY '<password>';
grant select on *.* to '<user_name>'@'%';
```

The reason granting a select privilege on all tables in all databases is the behavior of the INFORMATION_SCHEMA. INFORMATION_SCHEMA provides access to database metadata. Each MySQL user has the right to access these tables, but can see only the rows in the tables that correspond to objects for which the user has the proper access privileges.

Permissions for MSSQL 2005 and Higher Database Assessments

Database Assessments using MSSQL 2005 can be executed using a dedicated role that has permissions on the relevant database objects and a user that holds the role. The user and role should be created for each database in the server instance. Then, those users are mapped to a login that is used for the assessment process.



Note: In the commands below, the square brackets and their contents are not variable markers but are part of the syntax of the command set.

Creating a Login

The login can be created using the following script:

```
CREATE LOGIN [SecureSphere_login] WITH PASSWORD=N'assessment123!',
DEFAULT_DATABASE=[master]
```



Note: If the database is defined as working with complex password, the password in this example will fail. In this case, you must use a complex password.

Creating Users and Roles

The user and role for each database can be created using the following script:

```
CREATE SCHEMA [SecureSphere_schema]
go
CREATE USER [SecureSphere_user] FOR LOGIN [SecureSphere_login] WITH
DEFAULT_SCHEMA=[SecureSphere_schema]
go
ALTER AUTHORIZATION ON SCHEMA::[SecureSphere_schema] TO [SecureSphere_user]
go
CREATE ROLE [SecureSphere_role] AUTHORIZATION [SecureSphere_user]
go
sp_addrolemember SecureSphere_role, SecureSphere_user
```

View Server State

When working with MSSQL 2012 Database Assessments, you additionally need to use the following script used to View Server State.

```
CREATE SERVER ROLE [SecureSphere_Server_Role]
GO
GRANT VIEW SERVER STATE TO [SecureSphere_Server_Role]
GO
ALTER SERVER ROLE [SecureSphere_Server_Role] ADD MEMBER [SecureSphere_login]
GO
```

Required Permissions for MSSQL 2005 and Higher Database Assessments

There are a number of types of required permissions for MSSQL 2005 and higher assessments. They include:

[Required Login Permissions for MSSQL 2005 and Higher](#)

[Required Permissions on Any Database on MSSQL 2005 and Higher](#)

[Required Permissions on 'msdb' Database on MSSQL 2005 and Higher](#)

[Required Permissions on 'master' database on MSSQL 2005 and Higher](#)

Required Login Permissions for MSSQL 2005 and Higher

The following permission is required in order to be able to view the metadata of all objects in the server instance:

```
grant VIEW ANY DEFINITION to SecureSphere_login
```

An alternative can be to manually grant view definition on all server and database objects, but this approach is not scalable since permission need to be maintained over time.

The function is executed during the assessment process and requires the following permission:

```
grant ALTER TRACE to SecureSphere_login
```


Required Permissions on Any Database on MSSQL 2005 and Higher

The following permissions are required on any database:

```
grant select on dbo.sysobjects to SecureSphere_role
grant select on dbo.sysprotects to SecureSphere_role
grant select on dbo.sysusers to SecureSphere_role
grant select on sys.asymmetric_keys to SecureSphere_role
grant select on sys.database_files to SecureSphere_role
grant select on sys.database_permissions to SecureSphere_role
grant select on sys.database_principals to SecureSphere_role
grant select on sys.database_role_members to SecureSphere_role
grant select on sys.key_encryptions to SecureSphere_role
grant select on sys.objects to SecureSphere_role
grant select on sys.procedures to SecureSphere_role
grant select on sys.schemas to SecureSphere_role
grant select on sys.sql_modules to SecureSphere_role
grant select on sys.symmetric_keys to SecureSphere_role
grant select on sys.system_objects to SecureSphere_role
```

Required Permissions on 'msdb' Database on MSSQL 2005 and Higher

In addition to the permissions required for any database, the following permissions are required on the 'msdb' database:

```
grant select on msdb.dbo.sysjobs to SecureSphere_role
grant select on msdb.dbo.sysproxies to SecureSphere_role
grant select on msdb.dbo.sysproxysubsystem to SecureSphere_role
grant select on msdb.dbo.sysjobhistory to SecureSphere_role
grant select on msdb.dbo.syssubsystems to SecureSphere_role
grant execute on msdb.dbo.sp_enum_login_for_proxy to SecureSphere_role
grant execute on msdb.dbo.sp_enum_proxy_for_subsystem to SecureSphere_role
```

Required Permissions on 'master' database on MSSQL 2005 and Higher

In addition to the permissions required for any database, the following permissions are needed on the 'master' database:

```
grant select on INFORMATION_SCHEMA.COLUMNS to SecureSphere_role
grant select on INFORMATION_SCHEMA.TABLE_PRIVILEGES to SecureSphere_role
grant select on sys.configurations to SecureSphere_role
grant select on sys.credentials to SecureSphere_role
grant select on sys.databases to SecureSphere_role
grant select on sys.fn_trace_geteventinfo to SecureSphere_role
grant select on sys.fn_trace_getinfo to SecureSphere_role
grant select on sys.linked_logins to SecureSphere_role
grant select on sys.master_files to SecureSphere_role
grant select on sys.master_key_passwords to SecureSphere_role
grant select on sys.server_permissions to SecureSphere_role
grant select on sys.server_principals to SecureSphere_role
grant select on sys.server_role_members to SecureSphere_role
grant select on sys.servers to SecureSphere_role
grant select on sys.service_broker_endpoints to SecureSphere_role
grant select on sys.soap_endpoints to SecureSphere_role
grant select on sys.sql_logins to SecureSphere_role
grant select on dbo.spt_values to SecureSphere_role
grant select on dbo.sysconfigures to SecureSphere_role
grant select on dbo.syscurconfigs to SecureSphere_role
grant select on dbo.sysdatabases to SecureSphere_role
grant select on dbo.syslogins to SecureSphere_role
grant select on INFORMATION_SCHEMA.SCHEMATA to SecureSphere_role
grant execute on sys.fn_isrolemember to SecureSphere_role
grant execute on sys.sp_dbfixedrolepermission to SecureSphere_role
grant execute on sys.sp_executesql to SecureSphere_role
grant execute on sys.sp_get_distributor to SecureSphere_role
grant execute on sys.sp_helpdbfixedrole to SecureSphere_role
grant execute on sys.sp_helpreplicationdboption to SecureSphere_role
grant execute on sys.sp_helprolemember to SecureSphere_role
grant execute on sys.sp_helpprotect to SecureSphere_role
grant execute on sys.sp_helpsrvrolemember to SecureSphere_role
grant execute on sys.sp_helpuser to SecureSphere_role
grant execute on sys.sp_server_info to SecureSphere_role
grant execute on sys.xp_loginconfig to SecureSphere_role
```

Permissions for DB2 Database Assessments

User authentication in DB2 is managed using an external mechanism (for example an OS), with authorization being managed internally. The examples in this document used with DB2 databases integrate a user that has been created in the external mechanism and lists the user permissions needed to perform various tasks.

While assuming the database user accessing the database for assessment is named "ASSESS", the following permissions are needed:

```
GRANT CONNECT ON DATABASE TO USER ASSESS
GRANT EXECUTE ON FUNCTION SYSPROC.ENV_GET_INST_INFO TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSTABAUTH TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSCOLAUTH TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSDBAUTH TO USER ASSESS
GRANT SELECT ON SYSIBMADM.DBMCFG TO USER ASSESS
GRANT SELECT ON SYSIBMADM.DBCFG TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSDBAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.PACKAGEAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.TBSPACEAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.DBAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.SEQUENCEAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.INDEXAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.TABLES TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSSCHEMAAUTH TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSTABAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.LIBRARYAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.TABAUTH TO USER ASSESS
GRANT SELECT ON SYSIBM.SYSROUTINEAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.SCHEMATA TO USER ASSESS
GRANT SELECT ON SYSIBM.ROUTINES TO USER ASSESS
GRANT SELECT ON SYSCAT.INDEXES TO USER ASSESS
GRANT SELECT ON SYSCAT.SCHEMAAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.PACKAGES TO USER ASSESS
GRANT SELECT ON SYSCAT.VIEWS TO USER ASSESS
GRANT SELECT ON SYSCAT.TRIGGERS TO USER ASSESS
GRANT SELECT ON SYSCAT.PASSTHROUGH AUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.ROUTINEAUTH TO USER ASSESS
GRANT SELECT ON SYSCAT.TABLESPACES TO USER ASSESS
GRANT SELECT ON SYSCAT.SEQUENCES TO USER ASSESS
GRANT SELECT ON SYSCAT.ROUTINES TO USER ASSESS
GRANT SELECT ON SYSCAT.INDEXES TO USER ASSESS
GRANT SELECT ON SYSCAT.PACKAGES TO USER ASSESS
GRANT SELECT ON SYSCAT.SCHEMATA TO USER ASSESS
GRANT SELECT ON SYSCAT.TRIGGERS TO USER ASSESS
GRANT SELECT ON SYSCAT.TABLES TO USER ASSESS
GRANT SELECT ON SYSCAT.VIEWS TO USER ASSESS
GRANT SELECT ON SYSCAT.ROUTINES TO USER ASSESS
```

Permissions for Sybase Database Assessments

Sybase database assessments can be executed using a dedicated group that has permissions on the relevant database objects and a user that holds the group. The user and group should be created for each database in the server instance. Finally, those users are mapped to a login that is used for the assessment process.

Note that several Assessments execute stored procedures can only be accessed by members of the server role 'sso_role'. The rest of the assessments can be executed using the permissions given below.

The following Assessments can be executed only if the login holds the 'sso_role':

- Default Account Set to SA
- Login Auditing Options not Set to ON
- Disk Auditing Options Set to other than ON
- Logout Auditing Option Set to other than ON
- Failed Logins Attempts

In addition, new databases added to the server instance won't be inspected until permissions are manually modified. This can also be avoided by using "sso_role".

Creating Login

The login can be created using the following script:

```
exec sp_addlogin 'SecureSphere_login', 'assessment1', @defdb = 'master'
```

Creating Users and Groups

The user and group for each database can be created using the following script:

```
exec sp_addgroup 'SecureSphere_group'
go
exec sp_adduser 'SecureSphere_login' , 'SecureSphere_user' , 'SecureSphere_group'
```

Required Permissions for Sybase

There are a number of types of required permissions for Sybase assessments. They include:

[Required Permissions on Any Database for Sybase](#)

[Required Permissions on 'master' database for Sybase](#)

[Required Permissions on 'sybtempprocs' database for Sybase](#)

[Required Permissions on 'sybsecurity' database for Sybase](#)

Required Permissions on Any Database for Sybase

The following permissions are required on any database:

```
grant select on dbo.sysusers to SecureSphere_group
grant select on dbo.sysobjects to SecureSphere_group
grant select on dbo.sysprotects to SecureSphere_group
grant select on dbo.syscomments to SecureSphere_group
grant select on dbo.sysalternates to SecureSphere_group
```

Required Permissions on 'master' database for Sybase

In addition to the permissions required for any database, the following permissions are required on the 'master' database:

```
grant select on master.dbo.spt_limit_types to SecureSphere_group
grant select on master.dbo.spt_values to SecureSphere_group
grant select on master.dbo.sysattributes to SecureSphere_group
grant select on master.dbo.sysconfigures to SecureSphere_group
grant select on master.dbo.syscurconfigs to SecureSphere_group
grant select on master.dbo.sysdatabases to SecureSphere_group
grant select on master.dbo.sysloginroles to SecureSphere_group
grant select on master.dbo.syslogins to SecureSphere_group
grant select on master.dbo.sysremotelogins to SecureSphere_group
grant select on master.dbo.sysresourcelimits to SecureSphere_group
grant select on master.dbo.sysroles to SecureSphere_group
grant select on master.dbo.sysroles to SecureSphere_group
grant select on master.dbo.sysservers to SecureSphere_group
grant select on master.dbo.syssrvroles to SecureSphere_group
```

Required Permissions on 'sybtempprocs' database for Sybase

In addition to the permissions required for any database, the following permissions are required on the 'sybtempprocs' database:

```
grant execute on sybtempprocs.dbo.sp_loginconfig to SecureSphere_group
```



Note: This permission should be granted only when Sybase is installed on Windows.

Required Permissions on 'sybsecurity' database for Sybase

In addition to the permissions required for any database, the following permissions are required on the 'sybsecurity' database:

```
grant select on dbo.systhresholds to SecureSphere_group
grant select on dbo.syssegments to SecureSphere_group
```

Permissions for AWS RDS Databases

[Permissions for Oracle on AWS \(RDS\)](#)

[Required Permissions for MsSql on AWS \(RDS\)](#)

[Required Permissions for MySql on AWS \(RDS\)](#)

Permissions for Oracle on AWS (RDS)

Oracle database assessments can be executed using a dedicated role that has read permissions on the relevant database objects and a user that holds the role.



Note:

- For instructions on working with Oracle 12 on AWS RDS, scroll down further in this topic.

The user and role can be created using the following script:

```
create user imperva identified by assessment;
create role assessment_role;
grant assessment_role to imperva;
grant create session to assessment_role;
call rdsadmin.rdsadmin_util.grant_sys_object('REGISTRY$HISTORY',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_DB_LINKS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_OBJECTS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_PRIV_AUDIT_OPTS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_PROFILES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_ROLE_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_ROLES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_SCHEDULER_JOBS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_STMT_AUDIT_OPTS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_SYS_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TAB_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_USERS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('LINK$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('PROFILE$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('PROFNAME$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('RESOURCE_MAP', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('ROLE_TAB_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
```

```
call rdsadmin.rdsadmin_util.grant_sys_object('SYSAUTH$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('USER$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$CONTROLFILE',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$DATABASE', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$DATAFILE', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$LOGFILE', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$PARAMETER', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$PWFILE_USERS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_DATA_FILES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_EXTERNAL_TABLES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_JOBS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_OBJ_AUDIT_OPTS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_SOURCE', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TABLES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TS_QUOTAS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$LOG', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_REGISTRY', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$FIXED_TABLE',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('PROXY_USERS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_POLICIES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_ENCRYPTED_COLUMNS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_INDEXES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_IND_PARTITIONS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TABLESPACES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TAB_PARTITIONS',
'ASSESSMENT_ROLE', 'SELECT');
```



```
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_USERS_WITH_DEFPWD',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_PROXIES', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBMS_CRYPT', 'ASSESSMENT_ROLE',
'EXECUTE');
call rdsadmin.rdsadmin_util.grant_sys_object('UTL_RAW', 'ASSESSMENT_ROLE',
'EXECUTE');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_CONSTRAINTS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_FREE_SPACE',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_SEGMENTS', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_TAB_COLUMNS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('AUDIT$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DEFAULT_PWD$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$ENCRYPTED_TABLESPACES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$OPTION', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('V_$TABLESPACE',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_REPCATLOG',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_LIBRARIES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_COL_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('OBJ$', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('OBJAUTH$', 'ASSESSMENT_ROLE',
'SELECT');
```

Oracle 12 on RDS

When working with Oracle 12 you need to additionally include the following permissions:

```
call rdsadmin.rdsadmin_util.grant_sys_object('V_$VERSION', 'ASSESSMENT_ROLE',
'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('AUDIT_UNIFIED_POLICIES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('AUDIT_UNIFIED_ENABLED_POLICIES',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_COL_PRIVS',
'ASSESSMENT_ROLE', 'SELECT');
call rdsadmin.rdsadmin_util.grant_sys_object('TABLE_PRIVILEGE_MAP',
'ASSESSMENT_ROLE', 'SELECT');
```

```
call rdsadmin.rdsadmin_util.grant_sys_object('REGISTRY$SQLPATCH',  
'ASSESSMENT_ROLE', 'SELECT');  
call rdsadmin.rdsadmin_util.grant_sys_object('DBMS_QOPATCH', 'ASSESSMENT_ROLE',  
'EXECUTE');  
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_PRIV_AUDIT_OPTS',  
'ASSESSMENT_ROLE', 'SELECT');  
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_OBJ_AUDIT_OPTS',  
'ASSESSMENT_ROLE', 'SELECT');  
call rdsadmin.rdsadmin_util.grant_sys_object('DBA_PROXIES', 'ASSESSMENT_ROLE',  
'SELECT');
```

Required Permissions for MsSql on AWS (RDS)

Currently MsSql on Amazon RDS can be scanned only with the **master user**, created during the database first launch. See screenshot from AWS console:

Settings

DB instance identifier [info](#)

Specify a name that is unique for all DB instances owned by your AWS account in the current region.

DB instance identifier is case insensitive, but stored as all lower-case, as in "mydbinstance".

Master username [info](#)

Specify an alphanumeric string that defines the login ID for the master user.

Master Username must start with a letter.

Master password [info](#)

Master Password must be at least eight characters long, as in "mypassword".

Confirm password [info](#)

Required Permissions for MySQL on AWS (RDS)

Permissions are the same as for non RDS databases. See [Permissions for MySQL Database Assessments](#)

APPENDIX C

Attribution List

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Angular JS 1.5.8

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JSch 0.1.50

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jtids-1.3.1.jar

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JSON

<https://github.com/stleary/JSON-java/blob/master/LICENSE>

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Launch4j (<http://launch4j.sourceforge.net/>)

Cross-platform Java application wrapper for creating Windows native executables.

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