

DATABASE ADMINISTRATION

Lab 7 – SQL Tuning

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1. Run the SQL Plus tool and log in to the hr user account with the oracle password. If a different password is set for the hr account, then log in to konto sys with dba permissions (sys account password: oracle) and change the password for the account hr using the alter user hr identified by oracle command; .

2. Attention! The following is an example list of SQL commands and an example scenario for performing administrative tasks related to creating SQL Tuning Sets and using SQL Tuning Advisor and SQL Access tools Advisor. The task is to create a Tuning Set for at least 3 commands and run sql Tuning Advisor and SQL Access Advisor tools for these commands. We execute a number of SQL commands. Commands must contain joins, aggregate commands . Example commands: select e.first_name, e.last_name, e.department_id, e.job_id from employees e, departments d WHERE e.department_id = d.department_id AND d.location_id IN (select location_id from locations where city = 'Seattle'); select department_id, min(salary) from employees group by department_id HAVING avg(salary) = (SELECT max(avg(salary)) from employees group by department_id); select first_name, last_name, hire_date from employees WHERE to_char(hire_date, 'DAY') = (select to_char(hire_date, 'DAY') from employees group by to_char(hire_date, 'DAY') HAVING count(employee_id) =(select max(count(employee_id)) from employees group by to_char(hire_date, 'DAY')));

3. Creating SQL Tuning Sets allows you to fine-tune SQL commands. We create datasets, specifically SQL command sets, to better tune SQL commands to work better in a real database operation environment. In order to create a dataset in the Enterprise Manager tool, on the Performance tab in the Additional Monitoring Links section, select the SQL Tuning Sets option. The SQL Tuning Sets window appears, in which we click on the Create button.

Database Instance: orcl > Logged in As HR

SQL Tuning Sets

Page Refreshed Jan 23, 2022 4:44:27 AM PST Refresh

A SQL Tuning Set is a collection of SQL Statements that can be used for tuning purposes.

Search Go
Filter on a name or partial name

Create Import

Select Name	Schema	Description	SQL Count	Created	Last Modified
No SQL Tuning Sets exist.					

Related Links

[SQL Performance Analyzer](#)

4. A window appears in which in the SQL Tuning Set Name field we enter the name of the new set, while in the Description field we give a description of the set. Then click on the Next button .

Logged in As HR

Options Load Methods Filter Options Schedule Review

Create SQL Tuning Set: Options

Database **orcl** Cancel Step 1 of 5 Next

* SQL Tuning Set Name

Owner

Description

☐ Create an empty SQL tuning set

Cancel Step 1 of 5 Next

5. A window appears in which we select the Load SQL statements one time only option and select the AWR Snapshots option from the drop-down list. We can leave the default option Last 24 hours specifying the amount of time for which the ADDM snapshots will be used. Then click on the Next button

Create SQL Tuning Set: Load Methods

Database **orcl**

[Finish](#) [Cancel](#) [Back](#) [Step 2 of 5](#) [Next](#)

Pick one of the load methods to collect and load SQL statements into the SQL tuning set.

- ☐ Incrementally capture active SQL statements over a period of time from the cursor cache

Specify the duration within which the SQL statements will be collected, and specify frequency over which the active SQL statements from the cursor cache will be collected repeatedly.

Duration [Hours](#)

Frequency [Minutes](#)

- ☒ Load SQL statements one time only

Data Source [AWR Snapshots](#)

AWR Snapshots [Last 24 hours](#)

[Finish](#) [Cancel](#) [Back](#) [Step 2 of 5](#) [Next](#)

6. A window appears in which you can define a filter that specifies the conditions that must be met by SQL commands that are part of the set. In the Parsing Schema Name row, in the Value column, enter hr. we assume that only HR chematu commands will be included in the set. Then click on the Next button

Create SQL Tuning Set: Filter Options

Database **orcl**

[Finish](#) [Cancel](#) [Back](#) [Step 3 of 5](#) [Next](#)

Total Number of SQL Statements

Top N [<ALL>](#)

Sorted By [ELAPSED_TIME](#)

Filter Conditions

Only the SQL statements that meet all the following filter conditions will be included as search results. Rows with an empty value in the 'Value' column will not be included as filter conditions in the search.

Plan Hash Value Add a Filter or Column				
Filter Attribute	Operator	Value	Show Column	Remove
Parsing Schema Name	=	<input type="text" value="HR"/>	<input checked="" type="checkbox"/>	Remove
SQL Text	LIKE	<input type="text"/>	<input checked="" type="checkbox"/>	Remove
SQL ID	=	<input type="text"/>	<input checked="" type="checkbox"/>	Remove
Elapsed Time (sec)	>=	<input type="text"/>	<input checked="" type="checkbox"/>	Remove

By default, the search returns all case-insensitive matches beginning with the string you entered. To run an exact or case-sensitive match, double-quote the search string. You can use the wildcard symbol (%) in a double-quoted string.

[Finish](#) [Cancel](#) [Back](#) [Step 3 of 5](#) [Next](#)

7. A window appears in which in the Job Name field we enter the name of the new task, while in the Description field we give a description of the task. Then we select the Immediately option and click on the Next button

Create SQL Tuning Set: Schedule

Database **orcl**

[Finish](#) [Cancel](#) [Back](#) [Step 4 of 5](#) [Next](#)

A job will be created and scheduled to collect SQL statements and load them into the new SQL tuning set.

Job Parameters

Job Name

Description

Schedule

- ☒ Immediately

- ☐ Later

Time Zone [\(UTC-08:00\) US Pacific Time](#)

Date

(example: Jan 23, 2022)

Time ☒ AM ☐ PM

[Finish](#) [Cancel](#) [Back](#) [Step 4 of 5](#) [Next](#)

8. A window appears in which we click on the Submit button.

SQL Error

ORA-13750: User "HR" has not been granted the "ADMINISTER SQL TUNING SET" privilege.

Review the SQL Tuning Set options you have selected.

SQL Tuning Set Name **TUNING_SET**
Owner **HR**
Description **TUNING_SET**
Create an empty SQL tuning set **No**
Load Methods **Load SQL statements one time only**
Data Source **AWR Snapshots**
AWR Snapshots **Last 24 hours**
Top N **<ALL>**
Filter Conditions **UPPER(PARSING_SCHEMA_NAME) = 'HR'**
Job Name **CREATE_TUNING_SET**
Description **CREATE_TUNING_SET**
Scheduled Start Time **Run Immediately**

[Show SQL](#)

[Cancel](#) [Back](#) [Step 5 of 5](#) [Submit](#)

Repeated steps as SYS, because of error.

Create SQL Tuning Set: Review

Database **orcl**

[Cancel](#) [Back](#) [Step 5 of 5](#) [Submit](#)

Review the SQL Tuning Set options you have selected.

SQL Tuning Set Name **TUNING_SET**
Owner **SYS**
Description **TUNING_SET**
Create an empty SQL tuning set **No**
Load Methods **Load SQL statements one time only**
Data Source **AWR Snapshots**
AWR Snapshots **Last 24 hours**
Top N **<ALL>**
Filter Conditions **UPPER(PARSING_SCHEMA_NAME) = 'HR'**
Job Name **CREATE_TUNING_SET**
Description **CREATE_TUNING_SET**
Scheduled Start Time **Run Immediately**

[Show SQL](#)

[Cancel](#) [Back](#) [Step 5 of 5](#) [Submit](#)

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

9. A window appears with confirmation of the successful creation of the set. The newly created set appears in the list of available sets. In this window, by clicking on the Drop button, we can remove any set from the list (provided that it was not used by SQL Tuning Advisor or SQL Access Advisor), while selecting Details button we can view the details of the selected set. Select the newly created set and click on the Details button.

Database Instance: orcl >

Logged in As SYS

Confirmation

SQL tuning set TUNING_SET has been created successfully. A job CREATE_TUNING_SET to load SQL statements into the SQL tuning set TUNING_SET has been created successfully.

[View Job Details](#)

SQL Tuning Sets

Page Refreshed Jan 23, 2022 4:56:46 AM PST [Refresh](#)

A SQL Tuning Set is a collection of SQL Statements that can be used for tuning purposes.

Search [Go](#)
Filter on a name or partial name

[Create](#) [Import](#)

<div>Details Drop Export Schedule SQL Tuning Advisor Schedule SQL Access Advisor</div>						
Select	Name	Schema	Description	SQL Count	Created	Last Modified ▾
<input checked="" type="radio"/>	TUNING SET	SYS	TUNING SET	0	1/23/22 4:56 AM	1/23/22 4:56 AM

Related Links

[SQL Performance Analyzer](#)

10. A window appears with the details of the selected set. The window lists the SQL commands that belong to the set. By clicking on the id of theia SQL commands we can view the details of this command.

Database Instance: orcl > SQL Tuning Sets > Logged in As SYS

SQL Tuning Set: TUNING_SET

Schema	SYS	Description	TUNING_SET
Created	1/23/22 4:56 AM	Last Modified	1/23/22 4:58 AM
Number of Statements	7	Total DB Time (H:M:S)	0:0:1

SQL Statements

[Schedule SQL Advisor](#)
[Search for SQL within tuning set](#)
[Add](#)

[Delete](#)

Select All | [Select None](#)

Select	SQL ID	SQL Text	Plan Hash Value	Parsing Schema	Executions	Elapsed Time (seconds)	CPU Time (seconds)	Buffer Gets	Reads
<input type="checkbox"/>	4wkd5hr84657b	CREATE TABLE JOBS_ARCH AS SELECT * FROM JOBS	4284504938	HR	1	0.06	0.03	17	
<input type="checkbox"/>	4g6zgutrkn99	select * from dba_tab_privs where grantee='JAN'	4253922410	HR	1	0.54	0.29	157	1
<input type="checkbox"/>	5j4u1abpbn4u6	SELECT * FROM DBA_TAB_PRIVS WHERE GRANTEE='JAN'	4253922410	HR	1	0.27	0.14	23	
<input type="checkbox"/>	2y5wchdm0kbnp	SELECT DEPARTMENTS.DEPARTMENT_NAME FROM DEPARTMENTS WHERE DE...	4024094692	HR	237	0.42	0.23	468	
<input type="checkbox"/>	75rj78yz1y0ts	select * from dba_role_privs where grantee='JAN'	3682590460	HR	1	1.06	0.57	172	1

11. A window appears with the details of the selected SQL command.

SQL Details: 4wkd5hr84657b

Switch to SQL ID [Go](#) View Data [Real Time: Manual Refresh](#) [Refresh](#) [SQL Worksheet](#)

Text

```
CREATE TABLE JOBS_ARCH AS SELECT * FROM JOBS
```

Details

Select the plan hash value to see the details below. Plan Hash Value

[Statistics](#)
[Activity](#)
[Plan](#)
[Plan Control](#)
[Tuning History](#)
[SQL Monitoring](#)

12. In this window on the Plan tab, we can view the plan for the execution of the selected command in graphic form or in the form of a table.

SQL Details: 4wkd5hr84657b

Switch to SQL ID [Go](#) View Data [Real Time: Manual Refresh](#) [Refresh](#) [SQL Worksheet](#) [Schedule SQL Tuning Advisor](#) [SQL Repair](#)

Text

```
CREATE TABLE JOBS_ARCH AS SELECT * FROM JOBS
```

Details

Select the plan hash value to see the details below. Plan Hash Value

[Statistics](#)
[Activity](#)
[Plan](#)
[Plan Control](#)
[Tuning History](#)
[SQL Monitoring](#)

Data Source **Unavailable** Capture Time **Unavailable** Parsing Schema Optimizer Mode **ALL_ROWS**

Additional Information

View ☐ Graph ☒ Table

[Expand All](#) [Collapse All](#)

Operation	Object	Order	Rows	Bytes	Cost	CPU (%)	Time	Query Block Name/Object Alias
CREATE TABLE STATEMENT		3	0	0	4	100	0:0:0	
LOAD AS SELECT		2	0	0	0		0:0:0	SEL\$1
TABLE ACCESS FULL	HR.JOBS	1	19	988	3	0	0:0:1	SEL\$1 / JOBS@SEL\$1

[Show Explain Rewrite](#)

13. Use SQL Tuning Advisor. The SQL Tuning Advisor tool allows you to examine the SQL command set for performance and efficient use of resources. The tool proposes some recommendations, which can then be applied by becoming an Enterprise Manager. Attention! The following is an example scenario for performing administrative tasks related to using SQL Tuning Advisor. In order to run the SQL Tuning Advisor tool on the Performance tab in the Related Links section, select the Advisor Central option. A window appears in which we select the SQL Tuning Advisor option.

SQL Advisors

The SQL Advisors address several important use cases having to do with SQL: identify physical structures optimizing a SQL workload, tune individual statements with heavy execution plans, identify and correct result set divergence, build test cases for failed SQL.

SQL Access Advisor

[SQL Access Advisor](#) Evaluate an entire workload of SQL and recommend indexes, partitioning, materialized views that will improve the collective performance of the SQL workload.

SQL Tuning Advisor

[SQL Tuning Advisor](#) Analyze individual SQL statements, and recommend SQL profiles, statistics, indexes, and restructured SQL to SQL performance.

[Automatic SQL Tuning Results](#) View the results of automated execution of SQL Tuning Advisor on observed high-load SQL.

SQL Repair Advisor

The SQL Repair Advisor can analyze and potentially patch failing SQL statements.

[SQL Incident Analysis](#) SQL incident analysis is initiated from the Support Workbench for SQL failures that are generating Support Workbench incidents.

[Click here to go to Support Workbench.](#)


[SQL Failure Analysis](#) SQL failure analysis is used for non-incident SQL failures and can be accessed through either SQL Details or SQL Worksheet.

[Click here to go to SQL Worksheet.](#)

14. A window appears in which in the Name field we enter the name of the new SQL Tuning Advisor task, while in the Description field we provide a description of the SQL Tuning Advisor task. In the SQL Tuning Set field, enter the name of the SQL Tuning Set generated in the previous steps or click on the flashlight icon and in the window containing the list of available sets, select the new created set. Then click on the Submit button.

Schedule SQL Tuning Advisor

Specify the following parameters to schedule a job to run the SQL Tuning Advisor.

* Name
Description
* SQL Tuning Set 
SQL Tuning Set Description **TUNING_SET**
SQL Statements **7**
Counts

Overview

The SQL Tuning Advisor analyzes individual SQL statements, and suggests indexes, SQL profiles, restructured SQL, and statistics that improve the performance of the SQL statements.

The SQL Tuning Advisor operates on a collection of SQL. You can choose a SQL Tuning Set to run the advisor. If you do not have a SQL Tuning Set with the desired SQL for running the advisor, you can create a new one.

You can click on one of the following sources, which will lead you to a data source where you can tune SQL statements using the SQL Tuning Advisor.

[Top Activity](#) [Historical SQL \(AWR\)](#) [SQL Tuning Sets](#)

15. A window appears stating that the task is being processed.

Processing: SQL Tuning Advisor Task SQL_TUNING_ADVISOR

The SQL Tuning Advisor task is executing. Click on the Cancel button to return to the previous page. The SQL Tuning Advisor task will continue to execute. You can check its status and view recommendations from the Advisor Central page. Click on the Interrupt button to abort the current execution.

SQL Tuning Set Owner **SYS** SQL Tuning Set Name **TUNING_SET** Time Limit (seconds) **1800**



Status **EXECUTING**

Started **Jan 23, 2022 5:39:02 AM**

Elapsed Time (seconds) **101**

✓ Creating a new SQL Tuning task

➡ 4 out of 7 SQL Statements processed.

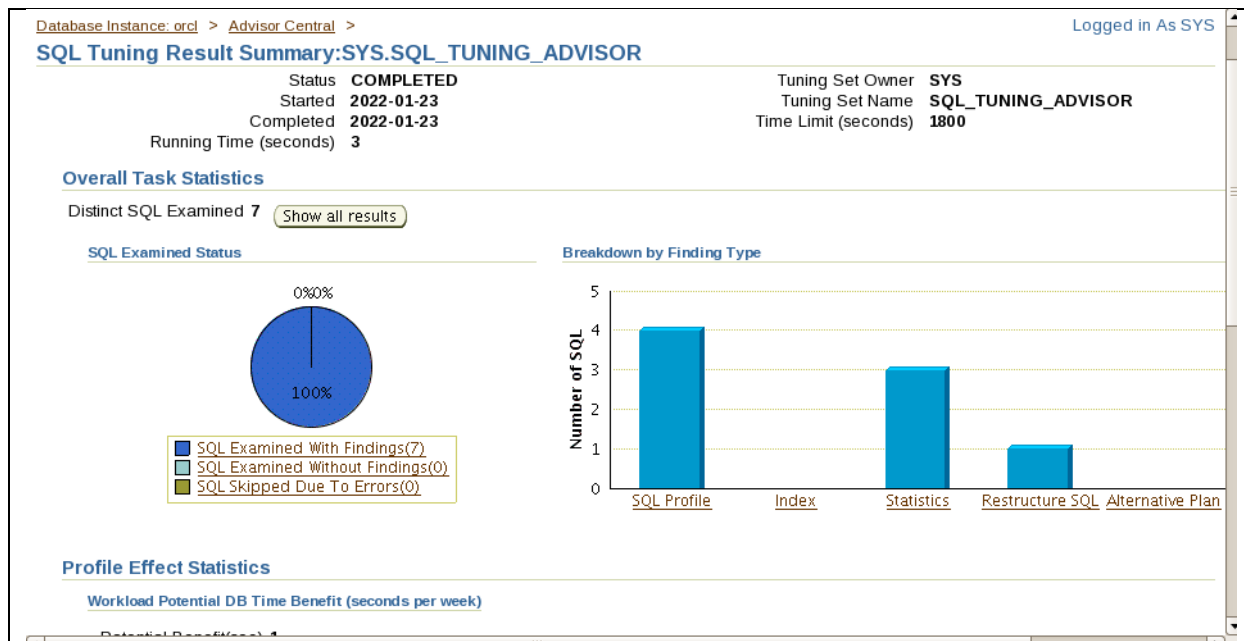
18% accumulated potential benefit has been achieved.

✓ TIP Closing the page/window does not cancel the process

[Cancel](#) [Interrupt](#)

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

16. After the task is completed, a list of recommendations appears that you can apply to improve performance or make better use of resources. Only one recommendation can be applied at a time. We can choose any recommendation from the list and click on the Implement button .



List of recommendations did not appear.

17. A window appears in which we enter the name of the new task in the Job Name field, while in the Comment field we enter the task description or comment. Then select the Immediately option and click on the OK button.

18. Use SQL Access Advisor. The SQL Access Advisor tool allows you to examine a set of SQL commands for performance and efficient use of resources. The tool proposes to create or change the existing database structures that store data. The solutions proposed by SQL Access Advisor can then be applied using Enterprise Manager. Attention! The following is an example scenario for performing administrative tasks related to using SQL Access Advisor. In order to run the SQL Access Advisor tool on the Performance tab in the Related Links section, select the Advisor Central option. A window appears in which we select the SQL Access Advisor option

SQL Advisors

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Automatic SQL Tuning Results

View the results of automated execution of SQL Tuning Advisor on observed high-load SQL.

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The SQL Repair Advisor can analyze and potentially patch failing SQL statements.

[SQL Incident Analysis](#) SQL incident analysis is initiated from the Support Workbench for SQL failures that are generating Support Workbench incidents.

[Click here to go to Support Workbench.](#)

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[Click here to go to SQL Worksheet.](#)

19. A window appears in which we select the option Recommended new access structures and select the option Inherit Options from a previously saved Task or Template. A list of templates appears, from which we select the Default Enterprise Manager task template template. We bluntly click on the Continue button.

Advisor Central > Logged in As SYS

SQL Access Advisor: Initial Options

Select a set of initial options. Cancel Continue

☐ Verify use of access structures (indexes, materialized views, partitioning, etc) only
☒ Recommend new access structures
☒ Inherit Options from a previously saved Task or Template

Overview

The SQL Access Advisor evaluates SQL statements in a workload Source, and can suggest indexes, partitioning, materialized views and materialized view logs that will improve performance of the workload as a whole.

TIP You are selecting the starting point for the wizard. All options can be changed from within the wizard. Cancel Continue

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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[About Oracle Enterprise Manager](#)

20. A window appears in which we select the Use an existing SQL Tuning Set option and in the SQL Tuning Set field enter the name of the SQL Tuning Set generated in the previous steps or click on the flashlight icon and in window containing a list of available sets select the newly created set. Then click on the Next button.

SQL Access Advisor: Workload Source

Database **orcl** Cancel Step 1 of 4 Next
 Logged In **SYS**
 As

Select the source of the workload that you want to use for the analysis. The best workload is one that fully represents all the SQL statements that access the underlying tables.

☐ Current and Recent SQL Activity
SQL will be selected from the cache.
☒ Use an existing SQL Tuning Set
 SQL Tuning Set
☐ Create a Hypothetical Workload from the Following Schemas and Tables
The advisor can create a hypothetical workload if the tables contain dimension or primary/foreign key constraints.
 Schemas and Tables Add
Comma-separated list

TIP Enter a schema name to specify all the tables belonging to that schema.

21. A window appears in which in the Access Structures to Recommend section we select the Indexes, Materialized Views and Partitioning options. Then, in the Scope section, select the Comprehensive option and click on the Next button.

Workload Source
Recommendation Options
Schedule
Review

SQL Access Advisor: Recommendation Options

Database **orcl** Cancel Back Step 2 of 4 Next
 Logged In **SYS**
 As

Access Structures to Recommend

☒ Indexes
☒ Materialized Views
☒ Partitioning

Scope

The advisor can run in one of two modes, Limited or Comprehensive. Limited Mode is meant to return quickly after processing the statements with the highest cost, potentially ignoring statements with a cost below a certain threshold. Comprehensive Mode will perform an exhaustive analysis.

☐ Limited
Analysis will focus on highest cost statements
☒ Comprehensive
Analysis will be exhaustive

Advanced Options

Cancel Back Step 2 of 4 Next

22. A window appears in which in the Task Name field we enter the name of the new SQL Access Advisor task, while in the Task Description field we provide a description of the tasks and tasks of the SQL Access Advisor tool. Then click on the Next button.

SQL Access Advisor: Schedule

Database **orcl**
Logged In As **SYS**

[Cancel](#) [Back](#) [Step 3 of 4](#) [Next](#)

Advisor Task Information

* Task Name

Task Description

Journaling Level

The level of journaling controls the amount of information that is logged to the advisor journal during execution of the task. This information appears on the Details tab when viewing task results.

* Task Expiration (days)

Number of days this task will be retained in the database before being purged

* Total Time Limit (minutes)

23. In the next window, click on the Submit button.

SQL Access Advisor: Review

Database **orcl**
Logged In As **SYS**

[Cancel](#) [Show SQL](#) [Back](#) [Step 4 of 4](#) [Submit](#)

Please review the SQL Access Advisor options and values you have selected.

Task Name **access_advisor**
Task Description **SQL Access Advisor**
Scheduled Start Time **Run Immediately**

Options

[Show All Options](#)

Modified Option	Value	Description
<input checked="" type="checkbox"/> Advisor Mode	Comprehensive	Specifies the mode in which SQL Access Advisor will operate during an analysis, either limited (quicker results) or comprehensive (higher quality recommendations)
<input checked="" type="checkbox"/> Analysis Scope	All Tuning Artifacts	The type of recommendations that are allowed
<input checked="" type="checkbox"/> SQL Tuning Set	SYS.TUNING_SET	Import Workload from SQL Repository
<input checked="" type="checkbox"/> Workload Source	SQL Tuning Set	The source of SQL statements to be used to create the workload

[Cancel](#) [Show SQL](#) [Back](#) [Step 4 of 4](#) [Submit](#)

24. A window appears informing you that the task was completed correctly. In the list of completed tasks of the SQL Access Advisor tool, select the task that has just been performed and click on the View Result button.

Database instance: orcl

Logged in As SYS

Confirmation

SQL Access Advisor task access_advisor created successfully.
[View Job Details](#)

Advisors

Checkers

View Data

Real Time: 15 Second Refresh

Advisors

[ADDM](#)

[Memory Advisors](#)

[SQL Advisors](#)

[Automatic Undo Management](#)

[MTTR Advisor](#)

[SQL Performance Analyzer](#)

[Data Recovery Advisor](#)

[Segment Advisor](#)

[Streams Performance Advisor](#)

Advisor Tasks

[Change Default Parameters](#)

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type

Task Name

Advisor Runs

Status

Go

SQL Access Advisor

Last Run

All

Go

By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.

Results

View Result

Delete

Actions

Re-schedule

Go

Select	Advisory Type	Name	Description	User	Status	Start Time	Duration (seconds)	Expires In (days)
<input checked="" type="radio"/>	SQL Access Advisor	access_advisor	SQL Access Advisor	SYS	CREATED	Jan 23, 2022 6:41:10 AM		30

Waiting for localhost...

25. A window appears with the details of the task.

[Advisor Central](#) > Logged in As SYS

Results for Task: access_advisor

Task Name	access_advisor	Started	Jan 23, 2022 6:41:17 AM PST
Status	COMPLETED	Ended	Jan 23, 2022 6:41:23 AM PST
Advisor Mode	COMPREHENSIVE	Running Time (seconds)	6
Scheduler Job	ADV_access_advisor	Total Time Limit (minutes)	10000
Publish Point	0		

Task Warning

There are no SQL statements to process for task access_advisor.

No recommendations were generated because the workload was empty. Possible causes include:

- The workload source selected yielded no SQL statements after those statements that were not eligible for tuning were discarded.
- The workload filter options specified excluded all SQL statements in the workload.

Workload and Task Options

These are the options that were selected when the advisor task was created.

26. In this window on the SQL Statements tab, we can view a list of SQL commands for which recommendations have been developed .

There is no recommendations tab.

27. We go to the Recommendations tab. On this tab we click on the Show SQL button .

28. A window appears showing the SQL commands that will be executed if we decide to implement the proposed recommendations. In this window we click on the Done button .

29. If we decide to apply the proposed recommendations, then on the Recommendations tab click on the Schedule Implementation button and in the next window we enter the name and schedule of the implementation task proposed recommendations.

30. REMARK!!! Please use SQL Tuning Advisor and SQL Access Advisor for at least 3 SQL commands.