

# Index Management for Cisco Tidal Enterprise Scheduler Client Manager Database (TESCache)

This documents details the Database Indexes that shall be dropped and added in the TESCache Database. **The changes should be made in the test environment for 3-4 weeks and if there is no negative impact, the same shall be made in production.**

The **CM indexes** need to be maintained and reviewed regularly by DBAs and if any full table scans are happening, it shall be conveyed to Cisco Engineering through our TAC before adding any new indexes.

The step for finding the missed and unused index is available in this document for both MSSQL and Oracle DB.

**Changes indicated in this document need to be done every time when the TESCache is rebuilt.**

NOTE: 1. This document contains steps for **implementing and rolling back** the changes if you found any negative effects due to these changes.

NOTE: 2. This document also contains basic reference steps to find missing or unused indexes for both MSSQL and Oracle databases.

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## Index changes for TESCach running in MSSQL

### 1. Indexes to be dropped from TESCach

The following indexes shall be dropped from TESCach Database.

TABLENAME	INDEXNAME
jobrun	JOBRUN_INTERVALCOUNT_INDEX
jobrun	JOBRUN_RERUN_INDEX

MSSQL Command to drop these indexes.

- DROP INDEX JOBRUN\_INTERVALCOUNT\_INDEX ON TES.JOBRUN;
- DROP INDEX JOBRUN\_RERUN\_INDEX ON TES.JOBRUN;

#### Steps to Rollback:

If you want to rollback the above changes for any reason, please use the commands listed below:

- CREATE NONCLUSTERED INDEX JOBRUN\_INTERVALCOUNT\_INDEX ON TES.JOBRUN (INTERVALCOUNT, ID);
- CREATE NONCLUSTERED INDEX JOBRUN\_RERUN\_INDEX ON TES.JOBRUN (RERUN, ID);

## 2. Indexes to be added to TESCache

Indexes listed below shall be added in TESCache database.

INDEXNAME	TABLENAME	Columns	Included Columns
JOBRUN_CLICAHHELSTCHNGTM_INDEX	jobrun	CLIENTCACHELASTCHANGETIME	
JOBRUN_LASTCHANGETIME_INDEX	jobrun	LASTCHANGETIME	
JOBRUN_PARENTID_TYPE_INDEX	jobrun	PARENTID, TYPE	
JOBRUN_PRODUCTIONDATE_INDEX	jobrun	PRODUCTIONDATE	
JOBRUN_PRNTID_OWN_TYPE_INDEX	jobrun	PARENTID, OWNER, TYPE	Id, RUNDATE, PRODUCTIONDATE, DIRTY, STARTRUNDATE
JOBRUN_DIRTY_OWNERID_INDEX INCLUDE	job	DIRTY, OWNERID	ID, PARENTID, FULLPATH

MSSQL Command to add these indexes to TESCache database:

- `CREATE NONCLUSTERED INDEX JOBRUN_CLICAHHELSTCHNGTM_INDEX ON TES.JOBRUN (CLIENTCACHELASTCHANGETIME);`
- `CREATE NONCLUSTERED INDEX JOBRUN_LASTCHANGETIME_INDEX ON TES.JOBRUN (LASTCHANGETIME);`
- `CREATE NONCLUSTERED INDEX JOBRUN_PARENTID_TYPE_INDEX ON TES.JOBRUN (PARENTID, TYPE);`
- `CREATE NONCLUSTERED INDEX JOBRUN_PRODUCTIONDATE_INDEX ON TES.JOBRUN (PRODUCTIONDATE);`
- `CREATE NONCLUSTERED INDEX JOBRUN_PRNTID_OWN_TYPE_INDEX ON TES.jobrun (TYPE, PARENTID, OWNER) INCLUDE (id, RUNDATE, PRODUCTIONDATE, DIRTY, STARTRUNDATE);`
- `CREATE NONCLUSTERED INDEX JOBRUN_DIRTY_OWNERID_INDEX ON TES.job (DIRTY, OWNERID) INCLUDE (ID, PARENTID, FULLPATH);`

### Steps to Rollback:

If you want to rollback the above changes for any reason, please use the commands listed below:

- `DROP INDEX JOBRUN_CLICAHELSTCHNGTM_INDEX ON TES.JOBRUN;`
- `DROP INDEX JOBRUN_LASTCHANGETIME_INDEX ON TES.JOBRUN;`
- `DROP INDEX JOBRUN_PARENTID_TYPE_INDEX ON TES.JOBRUN;`
- `DROP INDEX JOBRUN_PRODUCTIONDATE_INDEX ON TES.JOBRUN;`
- `DROP INDEX JOBRUN_PRNTID_OWN_TYPE_INDEX ON TES.JOBRUN;`
- `DROP INDEX JOBRUN_DIRTY_OWNERID_INDEX INCLUDE ON TES.JOB;`

## Index changes for TESCachE running in Oracle

### 1. Index to be dropped from TESCachE

Indexes listed below shall be dropped from TESCachE Database.

<b>TABLENAME</b>	<b>INDEXNAME</b>
jobrun	JOBRUN_INTERVALCOUNT_INDEX
jobrun	JOBRUN_RERUN_INDEX

ORACLE Command to drop these indexes from TESCachE Database:

- `DROP INDEX JOBRUN_INTERVALCOUNT_INDEX;`
- `DROP INDEX JOBRUN_RERUN_INDEX;`

### Steps to Rollback:

If you want to rollback the above changes for any reason, please use the commands listed below:

- `CREATE INDEX JOBRUN_INTERVALCOUNT_INDEX ON TES.JOBRUN (INTERVALCOUNT, ID);`
- `CREATE INDEX JOBRUN_RERUN_INDEX ON TES.JOBRUN (RERUN, ID);`

## 2. Indexes to be added to TESCache

Indexes listed below shall be added to the TESCache Database

INDEXNAME	TABLENAME	Columns
JOBRUN_CLICACHELSTCHNGTM_INDEX	jobrun	CLIENTCACHELASTCHANGETIME
JOBRUN_LASTCHANGETIME_INDEX	jobrun	LASTCHANGETIME
JOBRUN_PARENTID_TYPE_INDEX	jobrun	PARENTID, TYPE
JOBRUN_PRODUCTIONDATE_INDEX	jobrun	PRODUCTIONDATE
JOBRUN_PRNTID_OWN_TYPE_INDEX	jobrun	PARENTID, OWNER, TYPE, Id, RUNDATE, PRODUCTIONDATE, DIRTY, STARTRUNDATE
JOBRUN_DIRTY_OWNERID_INDEX INCLUDE	job	DIRTY, OWNERID, ID, PARENTID, FULLPATH

ORACLE Command to add these indexes to TESCache:

- **CREATE INDEX** JOBRUN\_CLICACHELSTCHNGTM\_INDEX ON TES.JOBRUN (CLIENTCACHELASTCHANGETIME);
- **CREATE INDEX** JOBRUN\_LASTCHANGETIME\_INDEX ON TES.JOBRUN (LASTCHANGETIME);
- **CREATE INDEX** JOBRUN\_PARENTID\_TYPE\_INDEX ON TES.JOBRUN (PARENTID, TYPE);
- **CREATE INDEX** JOBRUN\_PRODUCTIONDATE\_INDEX ON TES.JOBRUN (PRODUCTIONDATE);
- **CREATE INDEX** JOBRUN\_PRNTID\_OWN\_TYPE\_INDEX ON TES.jobrun (TYPE, PARENTID, OWNER, id, RUNDATE, PRODUCTIONDATE, DIRTY, STARTRUNDATE);
- **CREATE INDEX** JOBRUN\_DIRTY\_OWNERID\_INDEX ON TES.job (DIRTY, OWNERID, ID, PARENTID, FULLPATH);

### Steps to Rollback:

If you want to rollback the above changes for any reason, please use the commands listed below:

- `DROP INDEX JOBRUN_CLICAHHELSTCHNGTM_INDEX ;`
- `DROP INDEX JOBRUN_LASTCHANGETIME_INDEX ;`
- `DROP INDEX JOBRUN_PARENTID_TYPE_INDEX ;`
- `DROP INDEX JOBRUN_PRODUCTIONDATE_INDEX ;`
- `DROP INDEX JOBRUN_PRNTID_OWN_TYPE_INDEX ;`
- `DROP INDEX JOBRUN_DIRTY_OWNERID_INDEX ;`

### 3. Finding Unused Indexes in MSSQL

The SQL command listed below will provide details on indexes that are not used, these indexes shall be dropped.

#### SQL statement to find unused index:

```
SELECT PVT.TABLENAME, PVT.INDEXNAME, PVT.INDEX_ID, [1] AS COL1,
[2] AS COL2, [3] AS COL3,
      [4] AS COL4, [5] AS COL5, [6] AS COL6, [7] AS COL7,
B.USER_SEEKS,
      B.USER_SCANS, B.USER_LOOKUPS
FROM   (SELECT A.NAME AS TABLENAME,
              A.OBJECT_ID,
              B.NAME AS INDEXNAME,
              B.INDEX_ID,
              D.NAME AS COLUMNNAME,
              C.KEY_ORDINAL
        FROM   SYS.OBJECTS A
              INNER JOIN SYS.INDEXES B
                    ON A.OBJECT_ID = B.OBJECT_ID
              INNER JOIN SYS.INDEX_COLUMNS C
                    ON B.OBJECT_ID = C.OBJECT_ID
                    AND B.INDEX_ID = C.INDEX_ID
              INNER JOIN SYS.COLUMNS D
                    ON C.OBJECT_ID = D.OBJECT_ID
                    AND C.COLUMN_ID = D.COLUMN_ID
        WHERE  A.TYPE <> 'S') P
PIVOT
(MIN(COLUMNNAME)
 FOR KEY_ORDINAL IN ( [1],[2],[3],[4],[5],[6],[7] ) ) AS
PVT
INNER JOIN SYS.DM_DB_INDEX_USAGE_STATS B
ON PVT.OBJECT_ID = B.OBJECT_ID
AND PVT.INDEX_ID = B.INDEX_ID
AND B.DATABASE_ID = DB_ID()
```

```

UNION
SELECT TABLENAME, INDEXNAME, INDEX_ID, [1] AS COL1, [2] AS COL2,
[3] AS COL3,
[4] AS COL4, [5] AS COL5, [6] AS COL6, [7] AS COL7, 0, 0,
0
FROM (SELECT A.NAME AS TABLENAME,
A.OBJECT_ID,
B.NAME AS INDEXNAME,
B.INDEX_ID,
D.NAME AS COLUMNNAME,
C.KEY_ORDINAL
FROM SYS.OBJECTS A
INNER JOIN SYS.INDEXES B
ON A.OBJECT_ID = B.OBJECT_ID
INNER JOIN SYS.INDEX_COLUMNS C
ON B.OBJECT_ID = C.OBJECT_ID
AND B.INDEX_ID = C.INDEX_ID
INNER JOIN SYS.COLUMNS D
ON C.OBJECT_ID = D.OBJECT_ID
AND C.COLUMN_ID = D.COLUMN_ID
WHERE A.TYPE <> 'S') P
PIVOT
(MIN(COLUMNNAME)
FOR KEY_ORDINAL IN ( [1],[2],[3],[4],[5],[6],[7] ) ) AS
PVT
WHERE NOT EXISTS (SELECT OBJECT_ID,
INDEX_ID
FROM SYS.DM_DB_INDEX_USAGE_STATS B
WHERE DATABASE_ID = DB_ID(DB_NAME())
AND PVT.OBJECT_ID = B.OBJECT_ID
AND PVT.INDEX_ID = B.INDEX_ID)
ORDER BY TABLENAME, INDEX_ID;

```

#### 4. Finding Missing Indexes in MSSQL

1. Execute the following query

```

SELECT TOP 30 *
FROM sys.dm_db_missing_index_group_stats
ORDER BY avg_total_user_cost * avg_user_impact * (user_seeks +
user_scans)DESC;

```

The result will be displayed in the format shown below

group_handle	unique_compiles	user_seeks	user_scans	last_user_seek	last_user_scan	avg_total_user_cost	avg_user_impact	sys
--------------	-----------------	------------	------------	----------------	----------------	---------------------	-----------------	-----

2. Based on the results, run the following SELECT query after replacing the **group handle value** for all the 30 rows returned. The query below will return the database and table name where an index is missing, as well as the names of the columns that need to be used for adding the index key.

```
SELECT migs.group_handle, mid.*
FROM sys.dm_db_missing_index_group_stats AS migs
INNER JOIN sys.dm_db_missing_index_groups AS mig
    ON (migs.group_handle = mig.index_group_handle)
INNER JOIN sys.dm_db_missing_index_details AS mid
    ON (mig.index_handle = mid.index_handle)
WHERE migs.group_handle = group handle value;
```

## 5. Finding Unused Indexes in Oracle

In oracle DB, the unused Indexes can be found by using the data in v\$object\_usage. Use the steps listed below for finding the unused index in TESCache.

1. Enable the index monitoring for the index in TESCache using the following commands. Primary key index is excluded here.

```
ALTER INDEX AGENTLISTJOIN_AGENTSEQ_INDEX MONITORING USAGE;
ALTER INDEX AGENTLISTJOIN_AGLISTID_INDEX MONITORING USAGE;
ALTER INDEX AGENTLISTJOIN_CONNECTID_INDEX MONITORING USAGE;
ALTER INDEX AGENTLIST_NAME_INDEX MONITORING USAGE;
ALTER INDEX AGENTLIST_OSTYPE_INDEX MONITORING USAGE;
ALTER INDEX AGENTLIST_PARENTID_INDEX MONITORING USAGE;
ALTER INDEX JOBOUTPUT_JOBUNID_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_BIZUNIT_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_DIRTY_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_FULLPATH_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_JOBID_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_NAME_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_PARENTID_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_PRODDATE_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_RUNDATE_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_STATUS_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_TYPE_INDEX MONITORING USAGE;
```



```

ALTER INDEX JOBRUN_CLICAHELSTCHNGTM_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_LASTCHANGETIME_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_PARENTID_TYPE_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_PRODUCTIONDATE_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_PRNTID_OWN_TYPE_INDEX MONITORING USAGE;
ALTER INDEX JOBRUN_DIRTY_OWNERID_INDEX MONITORING USAGE;
ALTER INDEX JOB_DIRTY_INDEX MONITORING USAGE;
ALTER INDEX JOB_FULLPATH_INDEX MONITORING USAGE;
ALTER INDEX JOB_NAME_INDEX MONITORING USAGE;
ALTER INDEX JOB_PARENTID_INDEX MONITORING USAGE;
ALTER INDEX JOB_TYPE_INDEX MONITORING USAGE;
ALTER INDEX MASTERJAVATIMEZONE_INDEX MONITORING USAGE;
ALTER INDEX MESSAGELOG_CREATEDATE_INDEX MONITORING USAGE;
ALTER INDEX MESSAGELOG_DATETYPE_INDEX MONITORING USAGE;
ALTER INDEX MESSAGELOG_JOBURNID_INDEX MONITORING USAGE;
ALTER INDEX MESSAGELOG_SERTYPE_INDEX MONITORING USAGE;
ALTER INDEX USERJOIN_USERID_INDEX MONITORING USAGE;
ALTER INDEX USERSERVICE_SERVICEID_INDEX MONITORING USAGE;
ALTER INDEX USERSERVICE_USERID_INDEX MONITORING USAGE;
ALTER INDEX WORKGROUPRUNUSER_WKGPID_INDEX MONITORING USAGE;
ALTER INDEX WORKGROUPUSERJOIN_OWNID_INDEX MONITORING USAGE;
ALTER INDEX WORKGROUPUSERJOIN_WGID_INDEX MONITORING USAGE;

```

2. Perform the regular TES operations over a period of time (3-4 weeks recommended).
3. Collect statics by using the command below:

```
select * from v$object usage;
```

4. Once statistics are gathered, disable the index monitoring using the following command:

```

ALTER INDEX AGENTLISTJOIN_AGENTSEQ_INDEX NOMONITORING
USAGE;
ALTER INDEX AGENTLISTJOIN_AGLISTID_INDEX NOMONITORING
USAGE;
ALTER INDEX AGENTLISTJOIN_CONNECTID_INDEX NOMONITORING
USAGE;
ALTER INDEX AGENTLIST_NAME_INDEX NOMONITORING USAGE;
ALTER INDEX AGENTLIST_OSTYPE_INDEX NOMONITORING USAGE;
ALTER INDEX AGENTLIST_PARENTID_INDEX NOMONITORING USAGE;
ALTER INDEX JOBOUTPUT_JOBRUNID_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_BIZUNIT_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_DIRTY_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_FULLPATH_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_JOBID_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_NAME_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_PARENTID_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_PRODDATE_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_RUNDATE_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_STATUS_INDEX NOMONITORING USAGE;

```

```

ALTER INDEX JOBRUN_TYPE_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_CLICAHELSTCHNGTM_INDEX NOMONITORING
USAGE;
ALTER INDEX JOBRUN_LASTCHANGETIME_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_PARENTID_TYPE_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_PRODUCTIONDATE_INDEX NOMONITORING USAGE;
ALTER INDEX JOBRUN_PRNTID_OWN_TYPE_INDEX NOMONITORING
USAGE;
ALTER INDEX JOBRUN_DIRTY_OWNERID_INDEX NOMONITORING USAGE;
ALTER INDEX JOB_DIRTY_INDEX NOMONITORING USAGE;
ALTER INDEX JOB_FULLPATH_INDEX NOMONITORING USAGE;
ALTER INDEX JOB_NAME_INDEX NOMONITORING USAGE;
ALTER INDEX JOB_PARENTID_INDEX NOMONITORING USAGE;
ALTER INDEX JOB_TYPE_INDEX NOMONITORING USAGE;
ALTER INDEX MASTERJAVATIMEZONE_INDEX NOMONITORING USAGE;
ALTER INDEX MESSAGELOG_CREATEDATE_INDEX NOMONITORING USAGE;
ALTER INDEX MESSAGELOG_DATATYPE_INDEX NOMONITORING USAGE;
ALTER INDEX MESSAGELOG_JOBURNID_INDEX NOMONITORING USAGE;
ALTER INDEX MESSAGELOG_SERTYPE_INDEX NOMONITORING USAGE;
ALTER INDEX USERJOIN_USERID_INDEX NOMONITORING USAGE;
ALTER INDEX USERSERVICE_SERVICEID_INDEX NOMONITORING USAGE;
ALTER INDEX USERSERVICE_USERID_INDEX NOMONITORING USAGE;
ALTER INDEX WORKGROUPRUNUSER_WKGPID_INDEX NOMONITORING
USAGE;
ALTER INDEX WORKGROUPUSERJOIN_OWNID_INDEX NOMONITORING
USAGE;
ALTER INDEX WORKGROUPUSERJOIN_WGID_INDEX NOMONITORING
USAGE;

```

## 6. Finding Missing Indexes in Oracle

In oracle DB, v\$segment\_statistics will provide us information on the tables that are having full table scans. Using this information new Indexes shall be added.

Use the following command for finding the tables having full scans:

```

select * from v$segment_statistics where statistic_name= 'logical
reads' and object_type='TABLE' and OWNER='TES' order by 3 desc ;

```