

Tables

In this lecture

- Different table types.
- Useful system tables: data dictionary.

Teradata Data Dictionary

- Teradata data dictionary tables are metadata tables present in the DBC database.
- It can be used for variety of things such as checking table size, query bottleneck and database size etc.

Derived Table

- Derived tables are created, used and dropped within a query.
- These are used to store intermediate results.

Example

The following example builds a derived table `EmpSal`

```
SELECT  
Emp.EmployeeNo,  
Emp.FirstName,  
Empsal.NetPay  
FROM  
Employee Emp,  
(select EmployeeNo , NetPay  
from Salary  
where NetPay >= 75000) EmpSal  
where Emp.EmployeeNo=Empsal.EmployeeNo;
```

Volatile Table

- Created, used and dropped within a user session.
- Their definition is not stored in data dictionary.
- They hold intermediate data of the query which is frequently used.

```
CREATE [SET|MULTISET] VOALTILE TABLE tablename  
<table definitions>  
<column definitions>  
<index definitions>  
ON COMMIT [DELETE|PRESERVE] ROWS
```

Example

```
CREATE VOLATILE TABLE dept_stat  
(  
  dept_no INTEGER,  
  avg_salary INTEGER,  
  max_salary INTEGER,  
  min_salary INTEGER  
)  
PRIMARY INDEX(dept_no)  
ON COMMIT PRESERVE ROWS;
```

Global Temporary Table

- The definition of Global Temporary table is stored in data dictionary and they can be used by many users/sessions.
- Data loaded into global temporary table is retained only during the session.
- You can materialize up to 2000 global temporary tables per session.

```
CREATE [SET|MULTISET] GLOBAL TEMPORARY TABLE tablename  
<table definitions>  
<column definitions>  
<index definitions>
```


Example

```
CREATE SET GLOBAL TEMPORARY TABLE dept_stat  
(  
  dept_no INTEGER,  
  avg_salary INTEGER,  
  max_salary INTEGER,  
  min_salary INTEGER  
)  
PRIMARY INDEX(dept_no);
```

SET VS MULTISET

- Teradata classifies the tables as `SET` or `MULTISET` tables based on how the duplicate records are handled.
- A table defined as `SET` table doesn't store the duplicate records.
- A `MULTISET` table can store duplicate records.
- **Tip:** If you are sure rows *will* be unique, you can set the table as multiset. This avoids unnecessary uniqueness checks, for instance, for `INSERT` .

CREATE TABLE

The syntax is:

```
CREATE <SET/MULTISET> TABLE <Tablename>  
< Table Options>  
<Column Definitions>  
<Index Definitions>;
```

Syntax decoded

- `<Table Options>` specifies the physical attributes of the table such as `JOURNAL` and `FALLBACK`.
 - `JOURNAL` : Maintain data integrity in the event of component or process failure (restore to prescribed point in time).
 - `FALLBACK` : Storing a second copy of each row on a different AMP.
- `<Column Definitions>` specifies the list of columns, data types and their attributes.
- `<Index Definitions>` additional indexing options such as Primary Index.

Example

```
CREATE SET TABLE EMPLOYEE, Fallback
(
    EmployeeNo INTEGER,
    FirstName VARCHAR(30) ,
    LastName VARCHAR(30) ,
    DOB DATE FORMAT 'YYYY-MM-DD',
    JoinedDate DATE FORMAT 'YYYY-MM-DD',
    DepartmentNo BYTEINT
)
UNIQUE PRIMARY INDEX ( EmployeeNo );
```

SHOW TABLE

```
SHOW TABLE Employee;  
*** Text of DDL statement returned.  
*** Total elapsed time was 1 second.
```

```
CREATE SET TABLE EMPLOYEE ,FALLBACK ,  
    NO BEFORE JOURNAL,  
    NO AFTER JOURNAL,  
    CHECKSUM = DEFAULT,  
    DEFAULT MERGEBLOCKRATIO  
    (  
        EmployeeNo INTEGER,  
        FirstName VARCHAR(30),  
        LastName VARCHAR(30),  
        DOB DATE FORMAT 'YYYY-MM-DD',  
        JoinedDate DATE FORMAT 'YYYY-MM-DD',  
        DepartmentNo BYTEINT)  
    UNIQUE PRIMARY INDEX ( EmployeeNo );
```

ALTER TABLE

```
ALTER TABLE <tablename>  
ADD <columnname> <column attributes>  
DROP <columnname>;
```

Example:

```
ALTER TABLE employee  
ADD BirthDate DATE FORMAT 'YYYY-MM-DD',  
DROP DOB;
```

DROP TABLE

- `DROP TABLE <tablename>;`
- `DROP TABLE IF EXISTS <tablename>;` sadly not existent.
- From Teradata 13.10, you can use BTEQ syntax in SQLA:

```
SELECT 1 FROM dbc.TablesV
WHERE databaseName = <your db>
AND TableName = '<table>';
.if activitycount = 0 then GoTo ok
DROP TABLE <table>;
.label ok
```


In general:

- ALTER
- CREATE
- DROP
- MODIFY
- RENAME
- REPLACE
- SET ROLE , SET SESSION , SET TIME ZONE

VIEWS

- Same DDL commands apply to **views**.
- Views are queries build on demand, they are useful to restrict data to a level of aggregation.

Example

```
CREATE VIEW products_more_than_3_sold AS
SELECT productid, productname, productprice
FROM product
WHERE productid IN (
    SELECT productid
    FROM soldvia
    GROUP BY productid
    HAVING SUM(noofitems) > 3);
```

Useful system tables

Useful tables

- **dbc.tables:** Objects present in a database and their related information
- **dbc.columns:** Column information of tables, views, join index & hash index etc.
- **dbc.indices:** Stores all the index related information for tables, views, join index , hash index & secondary index etc.
- **dbc.errormsgs:** To error message for an error code.

Table / Database size

- **Table Size:** Table size can be determined from multiple tables for example : `dbc.allspace` & `dbc.tablespace` .
- **Database Size:** Database size can determined using `Dbc.Diskspace`.

Nodes and AMP info

*/*Number of Nodes*/*

```
SELECT COUNT(DISTINCT nodeid) FROM dbc.resusagescpu;
```

*/*Number of Amps on each Node*/*

```
SELECT nodeid, COUNT(DISTINCT vproc) number_of_amps  
FROM dbc.ResCpuUsageByAmpView  
GROUP BY nodeid;
```

*/*Number of AMPs in the system*/*

```
SELECT HASHAMP()+1;
```

- Number of rows in each AMP for a specific table:

```
SELECT  
HASHAMP(HASHBUCKET(HASHROW(Picolumn))), COUNT(*)  
FROM tablename GROUP BY 1;
```

Skew factor

- Parallelism is good: many processes working at once. Right?
- **Dark side:** the task is completed when the slowest member has finished.
- If all AMPs have similar amount of work, task will finish sooner than if only few AMPs are working.
- For this we check the *skew factor*:

$$100 \times \left(1 - \frac{AVG(CurrentPerm)}{MAX(CurrentPerm)} \right)$$

- Recommended: Skew factor of 10 or less.

Example

```
SELECT  TABLENAME,  
        SUM(CURRENTPERM) CURRENTPERM,  
        SUM(PEAKPERM) PEAKPERM,  
        CAST(100 * (1 - (AVG(CURRENTPERM) / MAX(CURRENTPERM)))  
        AS DECIMAL(5, 2))  
        "SKEWFACTOR(%)"  
FROM DBC.TABLESIZE  
WHERE DATABASENAME = 'MY_DB'  
GROUP BY TABLENAME  
ORDER BY TABLENAME  
;
```


Exercise

Write queries to:

- Find number of tables in database.
- Find tables with specific column name.
- List all columns in specific table.
- Find a table by the name in Teradata database.
- Find tables with specific word in name.