Teradata Basics

Lesson 06: Teradata Utilities Multiupload

Capgemini

Module Object

- Introduction about Teradata Utility
- About Multi load
- Supporting Environment
- Multi Load Tasks
- Multi Load Tasks-IMPORT
- Phases of Import Task
- Example of Import Task
- Multi Load Tasks-Delete
- Example of Delete Task
- DELETE Task Differences from IMPORT Task
- Restarting Multiload
- MultiLoad Commands

Introduction about Teradata Utility

- What is the need of Teradata utilities in Data ware house
  - Quick access to data for more timely decision making.
  - Solutions for the entire spectrum of load requirements from batch to near real time.
  - Unmatched scalability for large volume loads.
  - Fail-proof loads with checkpoint restart capabilities.
  - Proven technology from the data warehouse technology leader.
  - Integration with industry-leading ETL and ELT tools.
- Teradata Utilities
  - BTEQ: Help for Report formatting, Ad hoc query tool, Database administration, Best for small data volumes
  - Multi Load :High-performance data unload in client format. Fast Load: High-performance initial table load.
  - Multi Load: High-performance maintenance operations applies updates to multiple tables in single pass.
  - Apart from these teradata having other utilities like Teradata Parallel Transporter, Tpump e.t.c.

About Multi load

- Multi load is a command driven parallel load utilities , used to load high volume of data to populated or empty
  - teradata tables and views. Teradata MultiLoad executes a series of MultiLoad commands and Teradata SQL statements written in a batch mode job script or interactively entered. The MultiLoad commands provide the session control and data handling specifications for the data transfer operations.
- Features:--
  - Batch mode utility that runs on a server or host system. Supports up to five populated or empty tables.
  - Supports INSERTs, UPDATEs, DELETEs and UPSERTs; typically with batch inputs from a host file. Allows Duplicate rows.
  - Host and LAN support. Full Restart capability.
  - Error reporting via error tables.
  - Support for INMODs MULTILOAD HOST Teradata.

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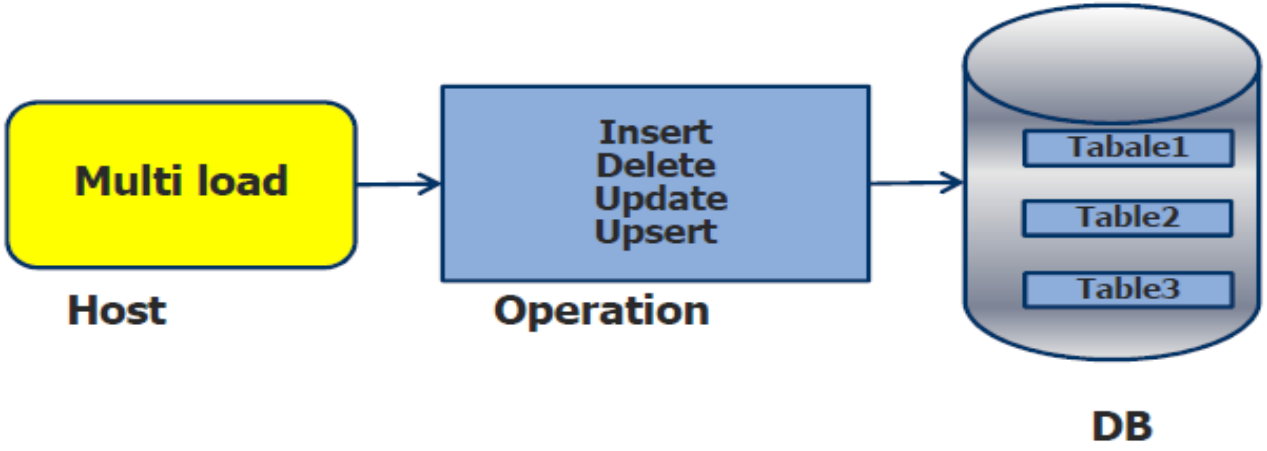


About Multi Load

- Advantages:-
  - Minimizes the use of the PEs.
  - Gets input data to the AMPs as quickly as possible.
  - Uses multiple-AMP sessions.
  - Uses the parallelism of the AMPs to apply changes.
  - Keeps BYNET activity low with AMP-local processing.
  - Avoids Transient Journaling overhead.
  - Allows Checkpoint/Restartability even with down AMPs.
  - Prevents lengthy rollbacks of aborted jobs.
  - Allows for maximum access to table during processing.
  - Posts errors to special error tables.
  - Provides extensive processing statistics

Supporting Environment

- The Multi Load utility is supported either on either the mainframe or on network attached system(LAN).
- The LAN environment supports the following Operating Systems:
  - UNIX MP-RAS
  - •Windows 2000
  - •Windows 95
  - •Windows NT
  - •UNIX HP-UX
  - •AIX
  - •Solaris SPARC
  - •Solaris Intel

Supporting Environment

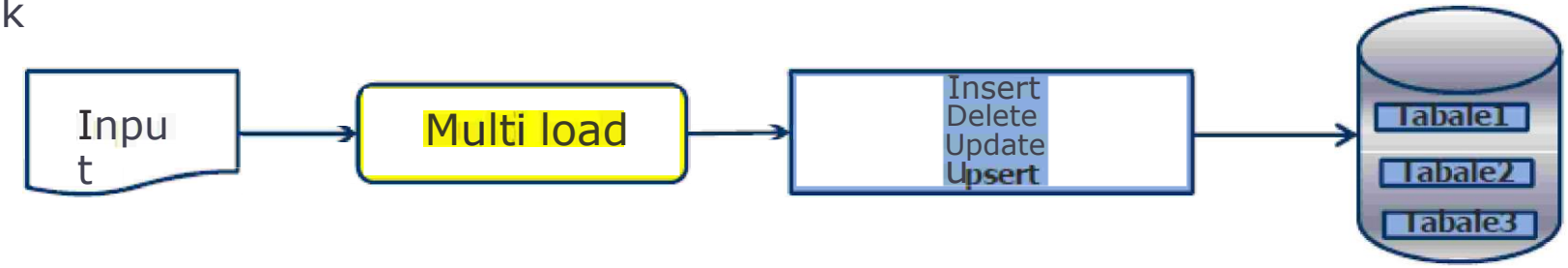
- The Mainframe (Channel Attached) environment supports the following Operating Systems:
  - MVS
  - VM

- CAUTION: The Teradata RDBMS will only support a maximum of 15 simultaneous Fast Load, Multi Load, or Fast Export utility job

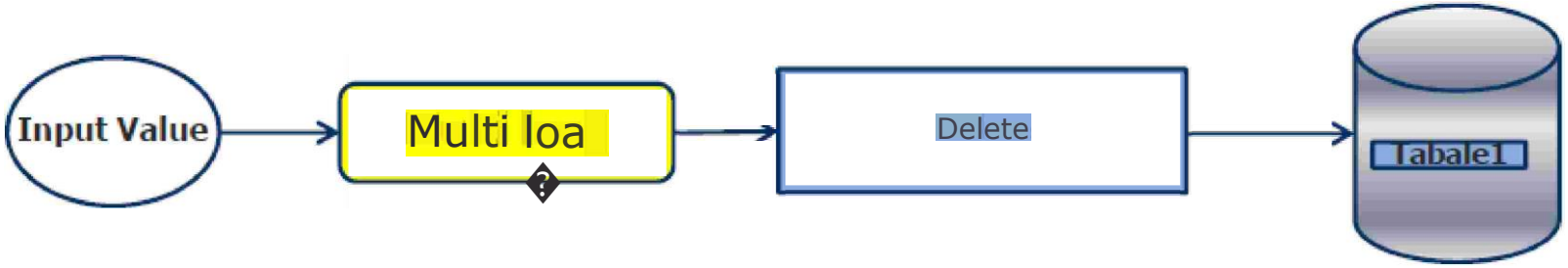
Multi Load Tasks

- Basically Multiload use the source data and do the operation like Insert, Update, Delete and Up sert and keep in Teradata table.
- There are two types of tasks that Multiload can perform.

1 Import
: Taslk



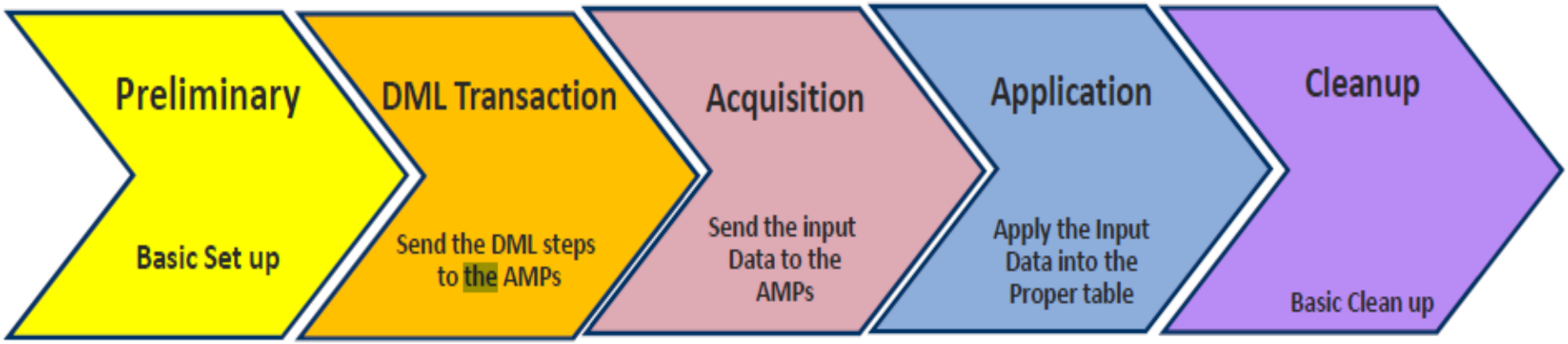
2) Delete Task



Multi Load Tasks-IMPORT

- INSERTs, DELETEs, UPDATEs and UPSERTs are allowed.
- Up to a maximum of five tables:–Empty or populated.–NUSIs permitted.
- MultiLoad Import task operations are always primary index operations - however, you are not allowed
- to change the value of a table’s primary index.
- Change the value of a column based on its current value.
- Permits non-exclusive access to target tables from other users except during Application Phase.
- Input error limits may be specified as a number or percentage.
- Allows restart and checkpoint during each operating phase.
- IMPORT tasks cannot be done on tables with USI’s, Referential Integrity, Join Indexes, Hash
- Indexes, or Triggers.–IMPORT tasks can be done on tables defined with “Soft Referential Integrity”.

Phases of Import Tasks



Multiload: Preliminary Phase

- Preliminary Phase:-
- Validate the Multi load and SQL statements.
  - The first task is to be sure that the SQL syntax and Multi Load commands are valid. Multi Load ensures that it is much better to identify any syntax errors, right up front. All the preliminary steps are automated, so no user intervention is required in this phase.

- Establish all Sessions.
  - Second, all Multi Load sessions with Teradata need to be established. The default is the number of available AMPs.

Multiload: Preliminary Phase

- Preliminary Phase:-
  - Create Work Table Multiload create a work table for its support work. Work Table hold two things: the DML tasks requested and the input data that is ready to APPLY to the AMPs. Default is in user's default database and the work table is named WT_TableName
  - Alternative may be specified as DataBaseName.WorkTableName

Example:

```
BEGIN [IMPORT] MLOAD
TABLES          Employee, Paycheck
WORKTABLES      util_db.WT_Emp ,
                util_db.WT_Pay
...
```

  - Create Error Table Multi Load requires two error tables per target table. The first error table contains constraint violations, while the second error table stores Unique Primary Index violations

Multiload: Preliminary Phase

- Preliminary Phase:-
  - Error table 1 (ET)
  - Default is the user's database and the table is named ET_Tablename.
    - Contains any errors that occur in the Acquisition Phase.
    - Contains primary index overflow errors that occur in the Application phase
  - Error table 2 (UV)
  - Default is the user's database and the table is named UV_Tablename.
    - Contains Application Phase errors.
    - Uniqueness violations
    - Constraint errors
    - Overflow errors on columns other than primary index

Multiload: Preliminary Phase

- Preliminary Phase:-
- Example

```
BEGIN [IMPORT] MLOAD
TABLES Employee, PayCheck
WORKTABLES util_db.WT_Emp, util_db.WT_Pay
ERRORTABLES util_db.ET_Emp util_db.UV_Emp,
util_db.ET_Pay util_db.UV_Pay
. . . ;
```

- Apply locks to target tables:
  - The final task of the Preliminary Phase is to apply utility locks to the target tables. Initially, access locks are placed on all target tables, allowing other users to read or write to the table for the time being. However, this lock does prevent the opportunity for a user to request an exclusive lock. Although, these locks will still allow the MultiLoad user to drop the table, no one else may DROP or ALTER a target table while it is locked for loading. This leads us to Phase 2.

Multiload: DML Transaction Phase

- DML Transaction phase:-
  - All of the SQL Data Manipulation Language (DML)
  - statements are sent ahead to Teradata.
  - •Teradata's Parsing Engine (PE) parses the DML and generates a step-by-step plan to
  - •Execute the request. This execution plan is then communicated to each AMP and stored in the appropriate worktable for each target table.
  - Add a USING modifier to the request and host to be filled in from input file.

Multiload: Acquisition Phase

Acquisition Phase:-

1Get the data from host and apply it to approprlate AMP worktables...

,/Add e.. Match T.ag" information to record,
v"'Ma◆e blocks and send "qulck path" to AMPs.
v"Deblock and resend record to "correct" A.MP

Re block and store in worktable off target table

v'Sort 1:lhe rebl ocik,edl records in1 the, w,ork, ta biles. v'Sort by [hash valu:e and sequence to be applied

Set up transition to the Application phase

v'Upg1radle locks on targ:et tables to W1rite.
v'Se,i-table headers for AiPPI'icatio1n phase.

- The llock applied during this phase is:

O A.1cquisit:ion ock
v DML. -allows all
" DDL -allows DROP only
,/

Note:: A. Errors that occur in this phase go into the Acquisition Error Table (default name is ET_tab lename).
B,,. There is no acquisition phase activity for a DELETE Task

Multiload: Acquisition Phase

- Application Phase:-
  - The purpose of this phase is to write, or APPLY, the specified changes to both the target tables and NUSI sub tables. To accomplish the substitution of data into SQL, when sending the data, the host has already attached some sequence information and five (5) match tags (describe in the next slide) to each data row. Those match tags are used to join the data with the proper SQL statement based on the SQL statement. In addition to associating each row with the correct DML statement, match tags also guarantee that no row will be updated more than once, even when a RESTART occurs.
  - Execute MLOAD for each target table as a single multi-statement request.
    - End of host interaction until end of phase.
    - AMPs independently apply changes to target tables.
    - Executed as a single transaction without rollback.
    - Restart able based on last checkpoint.
    - No transient journal needed.

Multiload: Acquisition Phase

- The lock applied during this phase is:
  - Application lock
  - DML —allows SELECT with ACCESS only
  - DDL —allows DROP only

- Note: Errors that occur in this phase go into the Application Error Table (default name is UV_tablename).

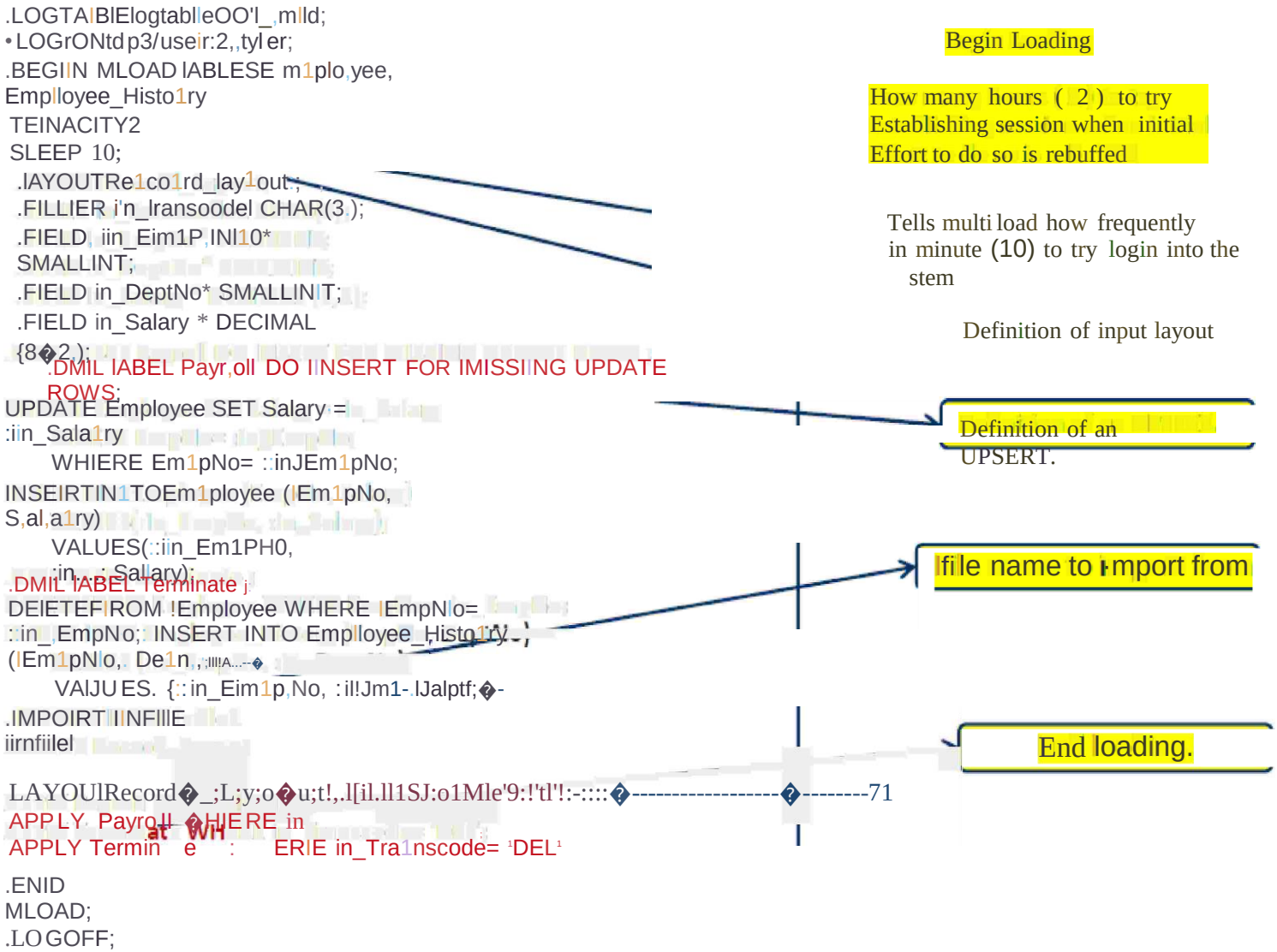
Multiload: Cleanup Phase

- Cleanup Phase:-
- If the last error code is zero (0), all of the job steps have ended successfully. If this being the case,all error tables made emptied, worktables and the log table are dropped. All locks, both Teradata and MultiLoad, are released. The statistics for the job are generated for output (SYSPRINT) and the system count variables are set. After this, each MultiLoad session is logged off. Below are the summary of the activities:

Multiload: Cleanup Phase

- All locks are released.
  - Table headers are restored across all AMPs.
  - Dictionary cache of Target Tables is spoiled.
  - Statistics are reported.
  - Final Error Code is reported.
  - Target tables are made available to other users.
  - Work Tables are dropped.
  - Empty Error Tables are dropped.
  - Log Table is dropped (if Error Code = 0).

Example of Import Task



Multi Load Delete Task

- Not part of Multiload Import, which consider the sql “Delete” statement.
- Not follow the Transient Journal like Import delete.
- No Rollback applies, when job failed.
- Follow the Restartibilty and check points
- Not consider the primary index.

Example of Delete Task

```
..LOGTABLE ILogta bl1e003_mid
.LOGON tdlp3/user2.,tyler
,. B,EGI N DELETE MLOAD TA.BLES Employee
.LA.VOUT R1emove;
.FIELD inTermdlate* INITEGER;
  DELETE FROM Employ ee WHERE le rm_date >
 :in_J◆ermdate;
. IMPORT INIFII LEinfUe2LAYOUT Remov e;
.END MI.JOA.D;
.LOGOFIF;
```

Begin stmt for delete records

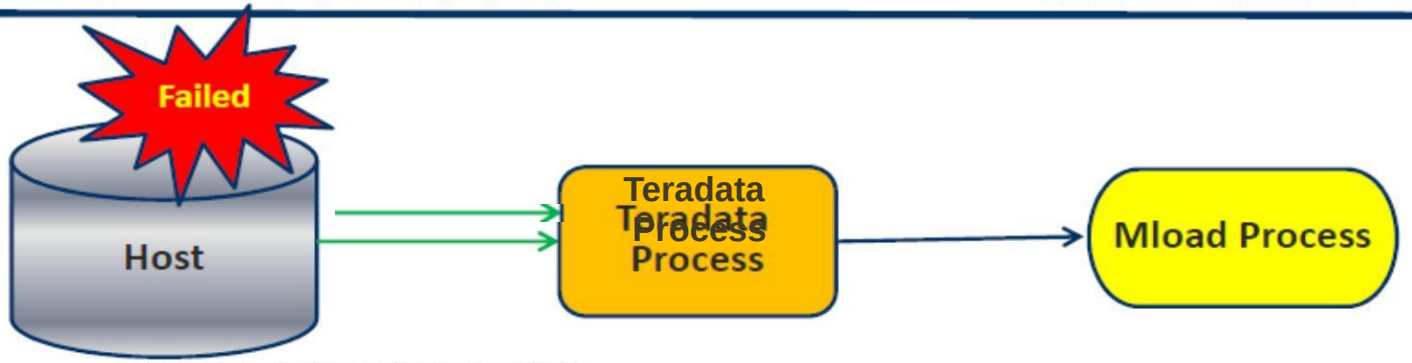
Delete stmt

End Mload

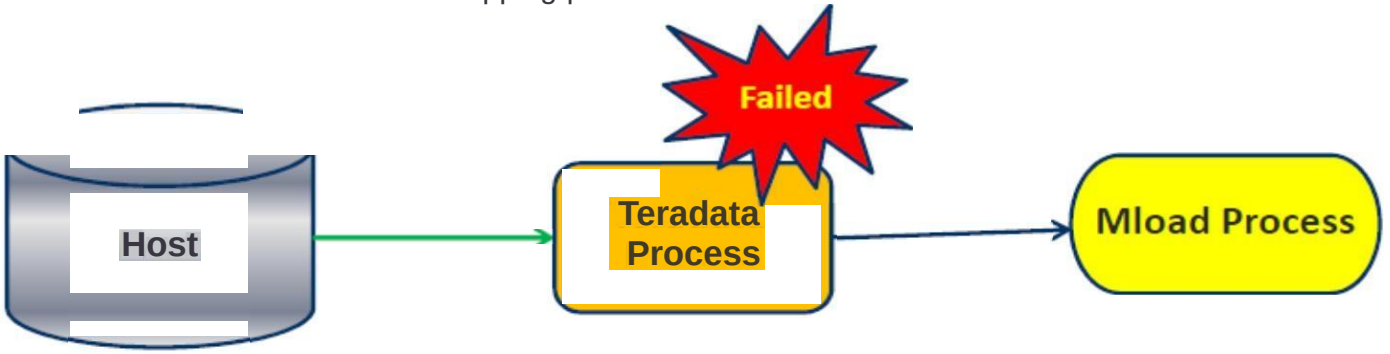
DELETE Task Differences from IMPORT Task

- DELETE tasks operate very similarly to IMPORT tasks with some differences:
  - Deleting based on a equality UPI Value is not permitted.
  - A DML DELETE statement is send to each AMP with match tag parcel.
  - No Acquisition phase.
  - Application Phase reads all target blocks and deletes qualifying rows.

- Multiload Delete vs SQL Delete.
  - Multi load Delete is Faster as compared to SQL Delete.
  - Multi load Delete is restartable.

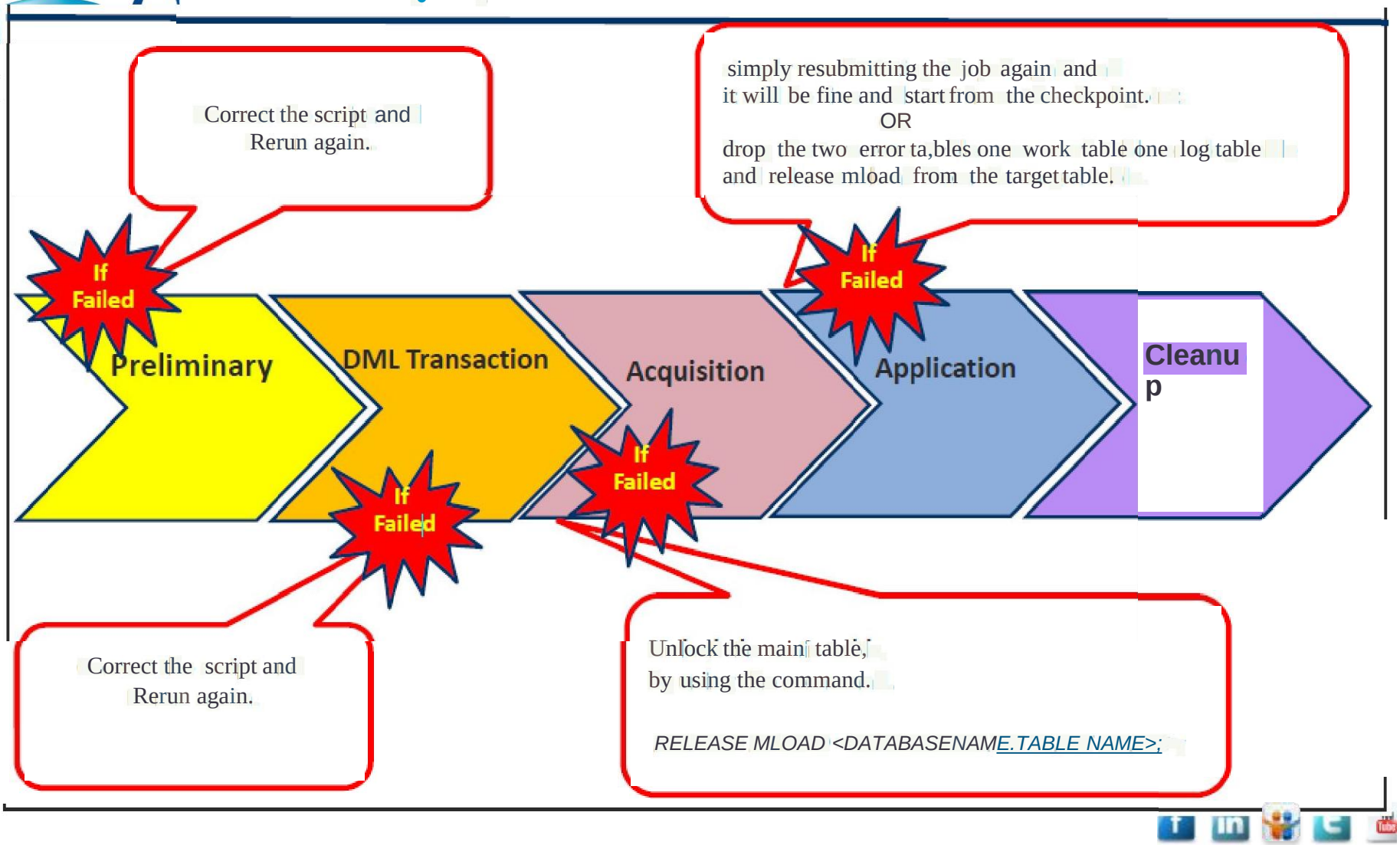


Resubmit the original script.
MLOAD determines its stopping point and restarts.



MLOAD reinitiated automatically after Teradata recovery.
Continue from checkpoint without user interaction.

Restarting Multiload



MULTILOAD COMMAND

.BEGIN =IMPORT] MLOAD .BEGIN DE1LETE MLOAD	This command communicates directmy with Te!J"'adata to specify if the MulbiLo.ad mode is going to be IMPORT or DELETE. Note that the W'ord £MPORT is. opt:ional iin ilthe synl:ax because it. iis. ·the DIE FAULT" but DELETE is required. *!Ve recomrnend usin9* Ehe. *word IMPORT* to make tine coding consistent and easier for others t:o read. Any parameters for the load, such as error limits or checkpoints will be included under the . BEGIN ccrnrnerrd, too. It is importa111t ro know which commands or parameters are optional since, if you do not include them, Mult1iLoad may supply defaults that may impact your load.
.DML LABEL	The DML IL.ABEL defines treatment options and labels for the application {APPLY) of data for tihe INSERT, UPDATE, UPSERT and DELETE op ere tioris..A LABEIL is simply a name for a requested SQL activity. The LABEL is defined first, and th12n referencsd later n the APPLY clause. This •..-..et...-, • .-lt-'e Mu!!!:iLoad to f!:n!sh the I\PDLY cper-.a tiorrs ·.dth the ch.ariges to t1,1e desiqnated databases and tables.
.FIELD	This defines *a* column of the· data sourrce record that will be sent to the Teradata database via SQL. \.i\llhen writing the script yo._1 must rnciude *a* FIELD for each data field you need in SQL. This cornrriarrd is used with the L...,YOUT command.
.FILLER	Do not assume that MultrLoad ha1s somehow uncovered rrurcb of vfi·hat y,o._, used in your terr1n papell"S at the university! FILLER defines a field that is accounted for as part of the data source's row format,, but: is *not:* sent to tlle Teradata DBS. It is used with the LAYOUT comrnarid:
.LAYOUT	LAYOUT defiines the format of the INPUT DATA record so Teradata kno rr1s what to expect. If one record 1s not: large enough,, you can concat:,enate multiple by using the LAYOUT parameter CONTINUEIF t:o tell which value to perform for the conc.atenation. Another option is INDICATORS, ri1hich is used to represent: nulls by using the bitn,ap (1 bit per field) at. the front of tlle data record.

MULTILOAD COMMAND

.LOGON	This specifies the username or LOGON string that will establish sessions for Multiload with Teradata.
.LOGTABLE	This support command names the name of the Restart Log that will be used for storing CHECKPOINT data pertaining to a load. The LOGTABLE is then used to tell Multiload where to RESTART should that be necessary. It is recommended that this command be placed before the .LOGON command.
.LOGOFF	This command terminates any sessions established by the LOGON command
.IMPORT	Defines the INPUT DATA FILE, file type, and the LAYOUT to use and where to APPLY the data to SQL.
.SET	Optionally, you can SET utility variables. An example would be {.SET DBName TO CD.ILLTest}.
.SYSTEM	This interrupts the operation of Multiload in order to issue commands to the local operating system.
.TABLE	This is a command that may be used with the .LAYOUT command. It identifies a table whose columns (name, their order and data types) are to be used as the field names and data descriptions of the data source records.

MULTILOAD Parameters

Parameter	Description
SESSIONS	This refers to the number of SESSIONS that should be established with Teradata. For Multiload, the optimal number of sessions is the number of AMPs in the system, plus two more. (One for Control functions arid other is for the backup purpose). You can also use MAX or MIN, which automatically use the maximum or minimum number of sessions to complete the job. If you specify nothing, it will default to MAX.
SLEEP	Tells MultiLoad how frequently, in minutes, to try logging on to the system.
TENACITY	Tells MultiLoad how many hours to try logging on when its initial effort to do so is rebuffed.

Limitation of MultiLoad

- Though MultiLoad is a very powerful utility; it has following limitations:
  - 1. MultiLoad Utility doesn’t support SELECT statement.
  - 2. Concatenation of multiple input data files is not allowed.
  - 3. MultiLoad doesn’t support Arithmetic Functions i.e. ABS, LOG etc. in Mload Script.
  - 4. MultiLoad doesn’t support Exponentiation and Aggregator Operators i.e. AVG, SUM
  - etc. in Mload Script.
  - MultiLoad doesn’t support USIs (Unique Secondary Indexes), Referential Integrity,
  - Join Indexes, Hash Indexes and Triggers.
  - Import task require use of PI (Primary Index).

MultiLoad Review Questions

- Answer True or False.
  - 1. With MultiLoad, you can import data from the host into populated tables.
  - 2. MultiLoad cannot process tables with USIs or Referential Integrity defined.
  - 3. MultiLoad allows changes to the value of a table's primary index.
  - 4. MultiLoad allows you to change the value of a column based on its current value.
  - 5. MultiLoad permits non-exclusive access to target tables from other users except during Application Phase

MultiLoad Review Questions

- Match the MultiLoad Phase in the first column to its corresponding task in the second column.

1._____Preliminary	A. Acquires or creates Restart Log Table.
2._____DML Transaction	B. Locks are released.
3._____Acquisition	C. Applies (loads) data to the work tables.
4._____Application	D. Execute mload for each target table as a single multi-statement request.
5._____Cleanup	Stores DML steps in work tables.

Answers of MultiLoad Review Questions

- Match the MultiLoad Phase in the first column to its corresponding task in the second column.

1.___A___Preliminary	A. Acquires or creates Restart Log Table.
2.___E____DML Transaction	B. Locks are released.
3.___C___Acquisition	C. Applies (loads) data to the work tables.
4.___D___Application	D. Execute mload for each target table as a single multi-statement request.
5.___B___Cleanup	Stores DML steps in work tables.

ANSWERS OF MULTILOAD REVIEW QUESTION

- With MultiLoad, you can import data from the host into populated tables.
  - True
- MultiLoad cannot process tables with USIs or Referential Integrity defined.
  - True
- MultiLoad allows changes to the value of a table's primary index
  - Flase
- MultiLoad allows you to change the value of a column based on its current

value.
  - True
- MultiLoad permits non-exclusive access to target tables from other users

except during Application Phase.
  - True

MultiLoad LAB Exercise

- Purpose:
  - In this lab, you will use MultiLoad utility to insert the data rows in OLAP_EXAMPLE table. We use the Linux/Unix environment to execute the script.

- What you need:
  - The required table and data file.

- Tasks:
  - 1.Prepare a MultiLoad script which inserts rows into the table using the redefinition feature of MultiLoad.

MultiLoad LAB Exercise

- Tasks:
  - 1.Prepare a MultiLoad script which inserts rows into the table using the redefinition feature of MultiLoad.
  - 2. Ensure that the table has been created in the database properly.
  - 3. Run the script.

  - Note: The Trans_Date is exported with an ANSI Date Format of 'YYYY-MM-DD' and a data type of CHAR(10).