Report

Laboratory Work 4

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1. Prerequisites

1.1. Passwords Index

Password Group	Login Name	Password
Operation System	root	"rootadmin"
	oracle	"oracleadmin"
Oracle System	sys	"sysadmin"
	system	"sysadmin"
Oracle Users	All DB users	"%PWD%"

1.2. Folder Paths Index

Path Group	Path Description	Path
Operation System	Oracle RDBMS – BIN	/oracle/app/oracle
	Oracle Inventory	/oracle/app/oraInventory
	Oracle Database Storage	/oracle/oradata
	Oracle Install Directory	/oracle/install
Oracle	ORACLE_BASE	/oracle/app/oracle
	ORACLE_HOME	$ORACLE_BASE/product/11.2
FTP	ftp Incoming Folder	/ftp/incoming

2. Business analyses tasks – Reports

2.1. Task 01: Create Packages for Reload Dimension from SA_*

The Main Task is to independent packages to reload dimension according your DWH solution concept which was developed on Module 6. Introduction to DWH.

Required points:

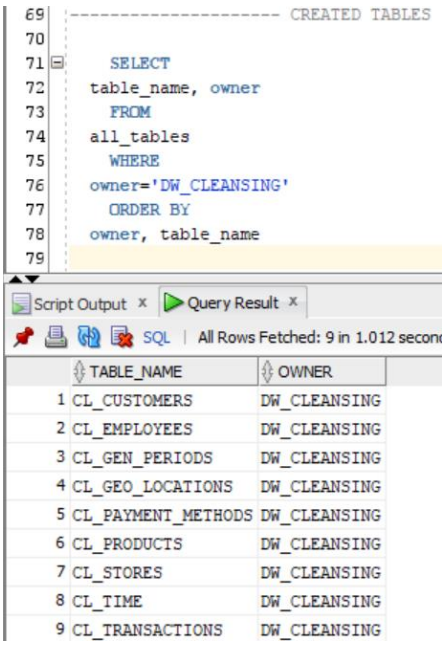
- Create all required Dim objects on DW Layer
- Grant all required Privileges to DW_CL (Cleansing Layer)
- Create Packages to reload Dim data (one package = one dimension.)
- Example future SAL.DIM_GEO_SCD will store all procedure on pkg_etl_dim_geo_dw. But this package will store all small sub dims – T_COUNTRIES, T_REGIONS etc.)
    - Use Explicit Cursor (One package)
    - Use Explicit Cursor and FORALL Bulk Insertion (One package)

- Use Variable Cursor and FORALL Bulk Insertion (One package)
- Use Merge (One packages)

Task Results:

Create required objects:

- Put objects script to Git.
- Prepare Document with Screenshot of Data on Dimensions
- Test data for consistent
- Test Procedure for Repeatable execution (Nothing should change)



Firstly, I created tables on Cleansing level

```
SELECT
        table_name, owner
FROM
        all_tables
WHERE
        owner='DW_CLEANSING'
ORDER BY
        owner, table_name
```

- CL_CUSTOMERS
- CL_EMPLOYEES
- CL_GEN_PERIODS
- CL_GEO_LOCATIONS
- CL_PAYMENT_METHODS
- CL_PRODUCTS
- CL_STORES
- CL_TIME
- CL_TRANSACTIONS

Note. All scripts stored in GitHub, exit task folder. But also duplicated in lab4 folder AS CL folder.

Then I began **creating packages**, which consist of 2 files :

- *table_name*_define.sql
- *table_name*_body.sql

SQL Worksheet | History

Worksheet | Query Builder

```
--drop package pkg_cl_transaction;
alter session set current_schema=DW_CLEANSING;
SELECT
    *
FROM
    ALL_OBJECTS
WHERE
    OBJECT_TYPE
                IN ('FUNCTION','PROCEDURE','PACKAGE')
                AND OWNER = 'DW_CLEANSING'
```

Script Output | Query Result | Query Result 1 | Query Result 2 | Query Result 3

SQL | All Rows Fetched: 8 in 0.149 seconds

	OWNER	OBJECT_NAME	SUBOBJECT_NAME	OBJECT_ID	DATA_OBJECT_ID	OBJECT_TYPE
1	DW_CLEANSING	PKG_CL_CUSTOMERS	(null)	70497	(null)	PACKAGE
2	DW_CLEANSING	PKG_CL_PAYMENT_METHODS	(null)	70499	(null)	PACKAGE
3	DW_CLEANSING	PKG_CL_LOCATIONS	(null)	70500	(null)	PACKAGE
4	DW_CLEANSING	PKG_CL_PERIODS	(null)	70501	(null)	PACKAGE
5	DW_CLEANSING	PKG_CL_PRODUCTS	(null)	70502	(null)	PACKAGE
6	DW_CLEANSING	PKG_CL_STORES	(null)	70503	(null)	PACKAGE
7	DW_CLEANSING	PKG_CL_TIME	(null)	70504	(null)	PACKAGE
8	DW_CLEANSING	PKG_CL_TRANSACTION	(null)	70505	(null)	PACKAGE

Note. Later I will show the **Data Flow Diagram** to explain how I store files / sub – folders / folders

Now let's try to create package bodies. And of course execute them to move data from SA level to CL level

```
ALTER USER DW_CLEANSING quota unlimited on TS_DW_CLEANSING;
alter session set current_schema=DW_CLEANSING;
exec pkg_cl_customers.LOAD_CLEAN_CUSTOMERS;
```

Script Output | Query Result

Task completed in 0.145 seconds

```
*Action:   Grant the user the appropriate system privileges or grant the user
           space resource on the tablespace.

User DW_CLEANSING altered.


Session altered.


PL/SQL procedure successfully completed.
```

***After almost an hour** I finally understood that it is a great idea to grant my user more space resource :)

```
70  alter session set current_schema = SA_CUSTOMERS;
71  select count (*) from sa_customers
72  commit;
```

Script Output | Query Result

Task completed in 0.07 seconds

```
 COUNT(*)
----------
      1000
```

```
69  alter session set current_schema=DW_CLEANSING;
70  select count (*) from cl_customers;
71
72
```

Script Output | Query Result

Task completed in 0.059 seconds

```
 COUNT(*)
----------
       940
```

SQL Worksheet | History

0.076 seconds

Worksheet | Query Builder

```
81
82  alter session set current_schema=DW_CLEANSING;
83  select count(*) from cl_employees;
84
85  alter session set current_schema=SA_PRODUCTS;
86  select count(*) from SA_employees;
87
88  commit;
```

Script Output

Task completed in 0.076 seconds

```
  COUNT(*)
----------
      1500


Session altered.


  COUNT(*)
----------
      1500
```

As you can see, if we **count** rows from the same tables (but on different layers(different tablespaces)) thee number of rows differs because in *.SA table were some rows with NULL values.

Note. Next I am going to make a body statements for every table (except of some(1 – 3), which are not needed to be cleansed)

Note. However, employees table **was not cleansed** because of they were created using ***NOT NULL* constraint**. It seems to be useless cleansing such

tables but if someone will change this table structure **in future** and try to use *null* values in some rows, then **it will be worthy**.

Note. I coded every package and executed their bodies before moving data from sa_* tables to cl_* tables, and generating transactions table on cleansing layer.

```
SQL Worksheet  History
Worksheet  Query Builder
66  FROM
67     DW_CLEANSING.cl_products p
68
69     CROSS JOIN DW_CLEANSING.cl_customers c
70
71         CROSS JOIN DW_CLEANSING.cl_payment_methods pm
72
73             CROSS JOIN DW_CLEANSING.CL_EMPLOYEES e
74
75             INNER JOIN DW_CLEANSING.cl_time t ON t.date_id = c.CUSTOMER_SALE_DATE
76
77  WHERE c.CUSTOMER_SALE_DATE > TO_DATE( '01.01.20', 'MM/DD/YY' )
78         AND c.CUSTOMER_SALE_DATE < TO_DATE( '01.01.22', 'MM/DD/YY' ) and
79
80         (mod(c.PHONE_CUSTOMER,2) = 0 ) and
81
82         e.phone_EMPLOYEE LIKE '2%' AND
83
84         e.FIRST_NAME_EMPLOYEE LIKE 'D%'
85                                         );
Script Output  Query Result  Query Result 1
Task completed in 15.367 seconds
2,436,480 rows inserted.
```

Note. Finally, I got ~2.5 m rows inserted into cl.transaction table fulfilled with fully cleansed data (of course with some artificial constraints)!

Note. In fact, we need to add only decision – making data. I thought that I could throw away some columns (e.g. customers/employees emails, phones etc.), but then I realised I could use it to, for example, select customers emails to target marketing content. So, anyway if I decide it is not needed, I will alter this tables.

dim_customers.sql	28-Jul-22 1:47 PM	SQL File
dim_employees.sql	27-Jul-22 8:36 AM	SQL File
dim_gen_periods.sql	27-Jul-22 7:43 AM	SQL File
dim_geo_location.sql	27-Jul-22 7:43 AM	SQL File
dim_payment_methods.sql	27-Jul-22 8:36 AM	SQL File
dim_products.sql	27-Jul-22 8:36 AM	SQL File
dim_store.sql	28-Jul-22 1:47 PM	SQL File
dim_time.sql	28-Jul-22 1:47 PM	SQL File

Note. We have created dimension tables before. Copy of dimensions creation scripts duplicated in lab4 folder.

```
DROP SEQUENCE SEQ_CUSTOMERS;
CREATE SEQUENCE SEQ_CUSTOMERS
 START WITH      1
 INCREMENT BY    1
 NOCACHE
 NOCYCLE;
```

Note. I created such sequences to auto increment primary key id's. Then again added packages using following structure :

- *table_name*_define.sql
- *table_name*_body.sql

```
Worksheet   Query Builder

CREATE OR REPLACE PACKAGE body pkg_dw_customers
 AS
   PROCEDURE LOAD_DW_CUSTOMERS
    AS
      BEGIN
      MERGE INTO DW_DATA.dim_customers A
      USING ( SELECT FIRST_NAME_CUSTOMER, LAST_NAME_CUSTOMER,COUNTRY_CITY_CUSTOMER, ADRESS_CUSTOMER, EMAIL, PHONE_CUSTOMER, AGE,IS_ACTI
              FROM DW_CLEANSING.cl_customers) B
              ON (a.PHONE_CUSTOMER = b.PHONE_CUSTOMER)
              WHEN MATCHED THEN
                 UPDATE SET a.ADRESS_CUSTOMER = b.ADRESS_CUSTOMER
              WHEN NOT MATCHED THEN
                 INSERT (a.CUSTOMER_ID, a.FIRST_NAME_CUSTOMER, a.LAST_NAME_CUSTOMER,a.COUNTRY_CITY_CUSTOMER, a.ADRESS_CUSTOMER, a.EMAIL
                 VALUES (SEQ_CUSTOMERS.NEXTVAL, b.FIRST_NAME_CUSTOMER, b.LAST_NAME_CUSTOMER,b.COUNTRY_CITY_CUSTOMER, b.ADRESS_CUSTOMER,
      COMMIT;
    END LOAD_DW_CUSTOMERS;
 END pkg_dw_customers;
```

Script Output × | Query Result ×

SQL | Fetched 50 rows in 0.038 seconds

	CUSTOMER_ID	FIRST_N...	LAST_NAME...	COUNTRY_CITY_C...	ADRESS_CUSTOMER	EMAIL	PHONE_CUSTOMER	AGE	IS_ACTIVE	CUSTOMER_SALE_DATE
1	1	Nikita...	Smith ...	Moldova Kishi...	Kosmonavtov st....	meme@g...	2090124	46	Error	31-MAR-21
2	2	Stan ...	Grey ...	UK Manchester...	Independent st....	dmdmd@...	5774337	35	yes	10-MAY-21
3	3	Nikita...	Sobolev ...	USA Californi...	Independent st....	gog@gm...	1102543	49	no	10-MAY-21
4	4	Masha ...	Lee ...	Poland Warsaw...	Independent st....	meme@g...	5768220	52	Error	10-MAY-21
5	5	Nikita...	Smith ...	Moldova Kishi...	Kosmonavtov st....	meme@g...	2090124	46	Error	27-FEB-20
6	6	Masha ...	Lee ...	Poland Warsaw...	Independent st....	meme@g...	5768220	52	Error	08-MAY-20

I used **Use Explicit Cursor** in pkg_cl_employees_body.sql

Merge in pkg_dw_employees_body.sql

Explicit Cursor and FOR ALL BLUNK Insertion in pkg_dw_stores_body.sql

```
52  select * from dim_stores;
53
```

Script Output × | Query Result ×

SQL | Fetched 50 rows in 0.028 seconds

	STORE_ID	COUNTRY_CITY	ADDRESS	PHONE
1	1	Belarus Minsk	Bogdanovicha st.	7313657
2	2	Belarus Minsk	Bogdanovicha st.	3336504
3	3	Belarus Minsk	Bogdanovicha st.	3799744
4	4	Belarus Minsk	Tiger st.	4622645
5	5	Belarus Minsk	Independent st.	6014347
6	6	Belarus Minsk	Park st.	4172971

```
13  PROCEDURE LOAD_DW_STORE
14   AS
15     BEGIN
16      DECLARE
17       TYPE CURSOR_NUMBER IS TABLE OF NUMBER;
18       TYPE CURSOR_VARCHAR IS TABLE OF VARCHAR2(20);
19       TYPE BIG_CURSOR IS REF CURSOR ;
20
21    ALL_INF BIG_CURSOR;
22
23            store_id      CURSOR_NUMBER      ;
24            country_city  CURSOR_VARCHAR     ;
25            address       CURSOR_VARCHAR     ;
26            phone_STAGE CURSOR_NUMBER        ;
27
28  BEGIN
29     OPEN ALL_INF FOR
30         SELECT
31                 source_CL.country_city AS country_city_source_CL,
32                 source_CL.address AS address_source_CL,
33                 stage.phone AS phone,
```

Laboratory Work Summary: At this laboratory work we created Cleansing and Data warehouse layers, created tables for them and practiced how using different methods we can move data from one layer to another. I used following methods for data movements between different layers:

- Explicit Cursor
- Explicit Cursor and FORALL Bulk Insertion
- Variable Cursor and FORALL Bulk Insertion
- Merge