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Introduction to Data Dictionary Views

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Objectives

After completing this lesson, you should be able to:

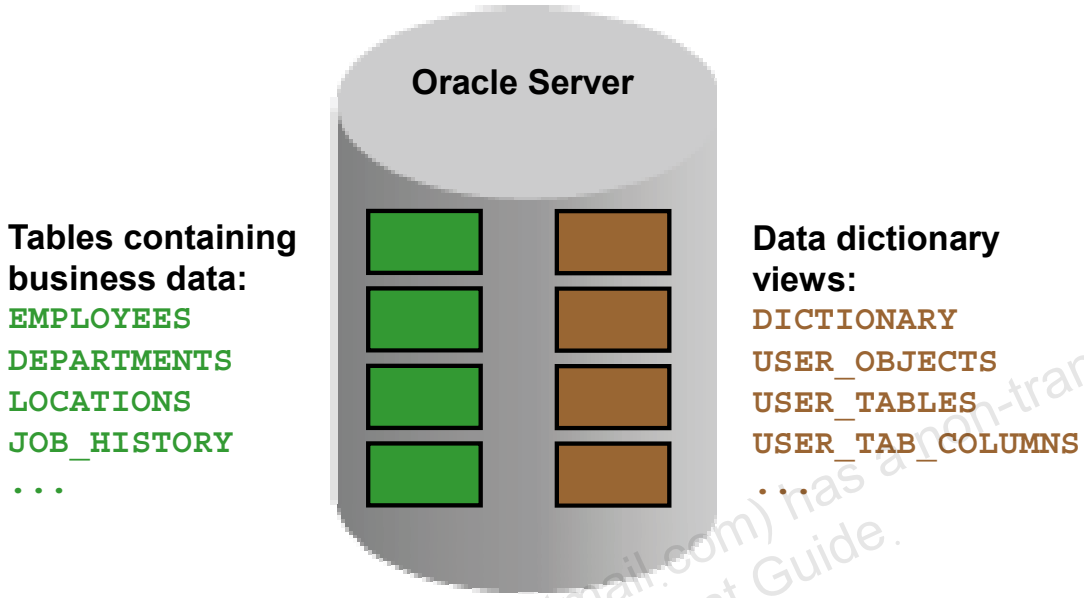
- Use the data dictionary views to research data on your objects
- Query various data dictionary views

In this lesson, you are introduced to the data dictionary views. You learn that the dictionary views can be used to retrieve metadata and create reports about your schema objects.

Lesson Agenda

- Introduction to data dictionary
- Querying the dictionary views for the following:
  - Table information
  - Column information
  - Constraint information
- Adding a comment to a table and querying the dictionary views for comment information

Data Dictionary



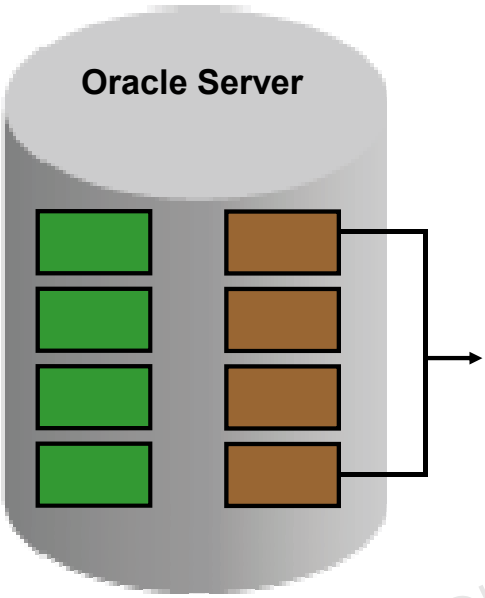
User tables are tables created by the user and contain business data, such as `EMPLOYEES`. There is another collection of tables and views in the Oracle database known as the *data dictionary*. This collection is created and maintained by the Oracle Server and contains information about the database. The data dictionary is structured in tables and views, just like other database data. Not only is the data dictionary central to every Oracle database, but it is also an important tool for all users, from end users to application designers and database administrators.

You use SQL statements to access the data dictionary. Because the data dictionary is read-only, you can issue only queries against its tables and views.

You can query the dictionary views that are based on the dictionary tables to find information such as:

- Definitions of all schema objects in the database (tables, views, indexes, synonyms, sequences, procedures, functions, packages, triggers, and so on)
- Default values for columns
- Integrity constraint information
- Names of Oracle users
- Privileges and roles that each user has been granted
- Other general database information

Data Dictionary Structure



Consists of:

- **Base tables**
- **User-accessible views**

Underlying base tables store information about the associated database. Only the Oracle Server should write to and read from these tables. You rarely access them directly.

There are several views that summarize and display the information stored in the base tables of the data dictionary. These views decode the base table data into useful information (such as user or table names) using joins and `WHERE` clauses to simplify the information. Most users are given access to the views rather than the base tables.

The Oracle user `SYS` owns all base tables and user-accessible views of the data dictionary. No Oracle user should *ever* alter (`UPDATE`, `DELETE`, or `INSERT`) any rows or schema objects contained in the `SYS` schema, because such activity can compromise data integrity.

Data Dictionary Structure

View naming convention:

View Prefix	Purpose
USER	User's view (what is in your schema; what you own)
ALL	Expanded user's view (what you can access)
DBA	Database administrator's view (what is in everyone's schemas)
V$	Performance-related data

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The data dictionary consists of sets of views. In many cases, a set consists of three views containing similar information and distinguished from each other by their prefixes. For example, there is a view named USER_OBJECTS, another named ALL_OBJECTS, and a third named DBA_OBJECTS.

These three views contain similar information about objects in the database, except that the scope is different. USER_OBJECTS contains information about objects that you own or you created. ALL_OBJECTS contains information about all objects to which you have access. DBA_OBJECTS contains information about all objects that are owned by all users. For views that are prefixed with ALL or DBA, there is usually an additional column in the view named OWNER to identify who owns the object.

There is also a set of views that is prefixed with v$. These views are dynamic in nature and hold information about performance. Dynamic performance tables are not true tables, and they should not be accessed by most users. However, database administrators can query and create views on the tables and grant access to those views to other users. This course does not go into details about these views.

How to Use the Dictionary Views

Start with DICTIONARY. It contains the names and descriptions of the dictionary tables and views.

```
DESCRIBE DICTIONARY
```

```
DESCRIBE dictionary
Name       Null Type
---------- ---- -------------
TABLE_NAME      VARCHAR2(128)
COMMENTS        VARCHAR2(4000)
```

```
SELECT *
FROM   dictionary
WHERE  table_name = 'USER_OBJECTS';
```

	TABLE_NAME	COMMENTS
1	USER_OBJECTS	Objects owned by the user

To familiarize yourself with the dictionary views, you can use the dictionary view named DICTIONARY. It contains the name and short description of each dictionary view to which you have access.

You can write queries to search for information about a particular view name, or you can search the COMMENTS column for a word or phrase. In the example shown, the DICTIONARY view is described. It has two columns. The SELECT statement retrieves information about the dictionary view named USER_OBJECTS. The USER_OBJECTS view contains information about all the objects that you own.

You can write queries to search the COMMENTS column for a word or phrase. For example, the following query returns the names of all views that you are permitted to access in which the COMMENTS column contains the word *columns*:

```
SELECT table_name
FROM dictionary
WHERE LOWER(comments) LIKE '%columns%';
```

Note: The names in the data dictionary are in uppercase.

USER_OBJECTS and ALL_OBJECTS Views

USER_OBJECTS:

- Query USER_OBJECTS to see all the objects that you own.
- Using USER_OBJECTS, you can obtain a listing of all object names and types in your schema, plus the following information:
  - Date created
  - Date of last modification
  - Status (valid or invalid)

ALL_OBJECTS:

- Query ALL_OBJECTS to see all the objects to which you have access.

You can query the USER_OBJECTS view to see the names and types of all the objects in your schema. There are several columns in this view:

- **OBJECT_NAME:** Name of the object
- **OBJECT_ID:** Dictionary object number of the object
- **OBJECT_TYPE:** Type of object (such as TABLE, VIEW, INDEX, SEQUENCE)
- **CREATED:** Time stamp for the creation of the object
- **LAST_DDL_TIME:** Time stamp for the last modification of the object resulting from a data definition language (DDL) command
- **STATUS:** Status of the object (VALID, INVALID, or N/A)
- **GENERATED:** Was the name of this object system-generated? (Y | N)

Note: This is not a complete listing of the columns. For a complete listing, see "USER_OBJECTS" in the *Oracle® Database Reference 12c Release 1*.

You can also query the ALL_OBJECTS view to see a listing of all objects to which you have access.

USER_OBJECTS View

```
SELECT object_name, object_type, created, status
FROM   user_objects
ORDER BY object_type;
```

	OBJECT_NAME	OBJECT_TYPE	CREATED	STATUS
1	JHIST_EMPLOYEE_IX	INDEX	23-AUG-12	VALID
2	EMP_DEPARTMENT_IX	INDEX	23-AUG-12	VALID
3	LOC_CITY_IX	INDEX	23-AUG-12	VALID
4	LOC_STATE_PROVINCE_IX	INDEX	23-AUG-12	VALID
5	LOC_COUNTRY_IX	INDEX	23-AUG-12	VALID
6	JHIST_DEPARTMENT_IX	INDEX	23-AUG-12	VALID
7	COUNTRY_C_ID_PK	INDEX	23-AUG-12	VALID
8	JHIST_EMP_ID_ST_DATE_PK	INDEX	23-AUG-12	VALID

…

The example shows the names, types, dates of creation, and status of all objects that are owned by this user.

The OBJECT_TYPE column holds the values of either TABLE, VIEW, SEQUENCE, INDEX, PROCEDURE, FUNCTION, PACKAGE, or TRIGGER.

The STATUS column holds a value of VALID, INVALID, or N/A. Although tables are always valid, the views, procedures, functions, packages, and triggers may be invalid.

The CAT View

For a simplified query and output, you can query the CAT view. This view contains only two columns: TABLE_NAME and TABLE_TYPE. It provides the names of all your INDEX, TABLE, CLUSTER, VIEW, SYNONYM, SEQUENCE, or UNDEFINED objects.

Note: CAT is a synonym for USER_CATALOG—a view that lists tables, views, synonyms and sequences owned by the user.

Lesson Agenda

- Introduction to data dictionary
- Querying the dictionary views for the following:
  - Table information
  - Column information
  - Constraint information
- Adding a comment to a table and querying the dictionary views for comment information

Table Information

USER_TABLES:

```
DESCRIBE user_tables
```

```
DESCRIBE user_tables
Name                  Null     Type
--------------------- -------- -------------
TABLE_NAME            NOT NULL VARCHAR2(128)
TABLESPACE_NAME                VARCHAR2(30)
CLUSTER_NAME                   VARCHAR2(128)
IOT_NAME                       VARCHAR2(128)
...
```

```
SELECT table_name
FROM   user_tables;
```

	TABLE_NAME
1	REGIONS
2	LOCATIONS
3	DEPARTMENTS
4	JOBS
5	EMPLOYEES
6	JOB_HISTORY

...

You can use the USER_TABLES view to obtain the names of all your tables. The USER_TABLES view contains information about your tables. In addition to providing the table name, it contains detailed information about the storage.

The TABS view is a synonym of the USER_TABLES view. You can query it to see a listing of tables that you own:

```
SELECT table_name
FROM  tabs;
```

Note: For a complete listing of the columns in the USER_TABLES view, see "USER_TABLES" in the *Oracle® Database Reference 12c Release 1.*

You can also query the ALL_TABLES view to see a listing of all tables to which you have access.

Column Information

USER_TAB_COLUMNS:

```
DESCRIBE user_tab_columns
```

Name	Null	Type
TABLE_NAME	NOT NULL	VARCHAR2(128)
COLUMN_NAME	NOT NULL	VARCHAR2(128)
DATA_TYPE		VARCHAR2(128)
DATA_TYPE_MOD		VARCHAR2(3)
DATA_TYPE_OWNER		VARCHAR2(128)
DATA_LENGTH	NOT NULL	NUMBER
DATA_PRECISION		NUMBER
DATA_SCALE		NUMBER
NULLABLE		VARCHAR2(1)

...

You can query the USER_TAB_COLUMNS view to find detailed information about the columns in your tables. Although the USER_TABLES view provides information about your table names and storage, detailed column information is found in the USER_TAB_COLUMNS view.

This view contains information such as:

- Column names
- Column data types
- Length of data types
- Precision and scale for NUMBER columns
- Whether nulls are allowed (Is there a NOT NULL constraint on the column?)
- Default value

Note: For a complete listing and description of the columns in the USER_TAB_COLUMNS view, see "USER_TAB_COLUMNS" in the *Oracle® Database Reference 12c Release 1.*

Column Information

```
SELECT column_name, data_type, data_length,
       data_precision, data_scale, nullable
FROM   user_tab_columns
WHERE  table_name = 'EMPLOYEES';
```

	COLUMN_NAME	DATA_TYPE	DATA_LENGTH	DATA_PRECISION	DATA_SCALE	NULLABLE
1	EMPLOYEE_ID	NUMBER	22	6	0	N
2	FIRST_NAME	VARCHAR2	20	(null)	(null)	Y
3	LAST_NAME	VARCHAR2	25	(null)	(null)	N
4	EMAIL	VARCHAR2	25	(null)	(null)	N
5	PHONE_NUMBER	VARCHAR2	20	(null)	(null)	Y
6	HIRE_DATE	DATE	7	(null)	(null)	N
7	JOB_ID	VARCHAR2	10	(null)	(null)	N
8	SALARY	NUMBER	22	8	2	Y
9	COMMISSION_PCT	NUMBER	22	2	2	Y
10	MANAGER_ID	NUMBER	22	6	0	Y
11	DEPARTMENT_ID	NUMBER	22	4	0	Y

By querying the `USER_TAB_COLUMNS` table, you can find details about your columns such as the names, data types, data type lengths, null constraints, and default value for a column.

The example shown displays the columns, data types, data lengths, and null constraints for the `EMPLOYEES` table. Note that this information is similar to the output from the `DESCRIBE` command.

To view information about columns set as unused, you use the `USER_UNUSED_COL_TABS` dictionary view.

Note: Names of the objects in Data Dictionary are in uppercase.

Constraint Information

- `USER_CONSTRAINTS` describes the constraint definitions on your tables.
- `USER_CONS_COLUMNS` describes columns that are owned by you and that are specified in constraints.

```
DESCRIBE user_constraints
```

```
DESCRIBE user_constraints
Name              Null     Type
----------------- -------- -------------
OWNER                      VARCHAR2(128)
CONSTRAINT_NAME   NOT NULL VARCHAR2(128)
CONSTRAINT_TYPE            VARCHAR2(1)
TABLE_NAME        NOT NULL VARCHAR2(128)
SEARCH_CONDITION           LONG()
R_OWNER                    VARCHAR2(128)
R_CONSTRAINT_NAME          VARCHAR2(128)
DELETE_RULE                VARCHAR2(9)
STATUS                     VARCHAR2(8)
```

...

You can find out the names of your constraints, the type of constraint, the table name to which the constraint applies, the condition for check constraints, foreign key constraint information, deletion rule for foreign key constraints, the status, and many other types of information about your constraints.

Note: For a complete listing and description of the columns in the `USER_CONSTRAINTS` view, see "`USER_CONSTRAINTS`" in the *Oracle® Database Reference 12c Release 1.*

USER_CONSTRAINTS: Example

```
SELECT constraint_name, constraint_type,
       search_condition, r_constraint_name,
       delete_rule, status
FROM   user_constraints
WHERE  table_name = 'EMPLOYEES';
```

	CONSTRAINT_NAME	CONSTRAINT_TYPE	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE	STATUS
1	EMP_MANAGER_FK	R	(null)	EMP_EMP_ID_PK	NO ACTION	ENABLED
2	EMP_JOB_FK	R	(null)	JOB_ID_PK	NO ACTION	ENABLED
3	EMP_DEPT_FK	R	(null)	DEPT_ID_PK	NO ACTION	ENABLED
4	EMP_EMP_ID_PK	P	(null)	(null)	(null)	ENABLED
5	EMP_EMAIL_UK	U	(null)	(null)	(null)	ENABLED
6	EMP_SALARY_MIN	C	salary > 0	(null)	(null)	ENABLED
7	EMP_JOB_NN	C	"JOB_ID" IS NOT NULL	(null)	(null)	ENABLED
8	EMP_HIRE_DATE_NN	C	"HIRE_DATE" IS NOT NULL	(null)	(null)	ENABLED
9	EMP_EMAIL_NN	C	"EMAIL" IS NOT NULL	(null)	(null)	ENABLED
10	EMP_LAST_NAME_NN	C	"LAST_NAME" IS NOT NULL	(null)	(null)	ENABLED

In the example shown, the USER_CONSTRAINTS view is queried to find the names, types, check conditions, name of the unique constraint that the foreign key references, deletion rule for a foreign key, and status for constraints on the EMPLOYEES table.

The CONSTRAINT_TYPE can be:

- C (check constraint on a table, or NOT NULL)
- P (primary key)
- U (unique key)
- R (referential integrity)
- V (with check option, on a view)
- O (with read-only, on a view)

The DELETE_RULE can be:

- **CASCADE:** If the parent record is deleted, the child records are deleted, too.
- **SET NULL:** If the parent record is deleted, change the respective child record to null.
- **NO ACTION:** A parent record can be deleted only if no child records exist.

The STATUS can be:

- **ENABLED:** Constraint is active.
- **DISABLED:** Constraint is made not active.

Querying USER_CONS_COLUMNS

```
DESCRIBE user_cons_columns
```

```
DESCRIBE user_cons_columns
Name            Null     Type
--------------- -------- --------------
OWNER           NOT NULL VARCHAR2(128)
CONSTRAINT_NAME NOT NULL VARCHAR2(128)
TABLE_NAME      NOT NULL VARCHAR2(128)
COLUMN_NAME              VARCHAR2(4000)
POSITION                 NUMBER
```

```
SELECT constraint_name, column_name
FROM   user_cons_columns
WHERE  table_name = 'EMPLOYEES';
```

	CONSTRAINT_NAME	COLUMN_NAME
1	EMP_LAST_NAME_NN	LAST_NAME
2	EMP_EMAIL_NN	EMAIL
3	EMP_HIRE_DATE_NN	HIRE_DATE
4	EMP_JOB_NN	JOB_ID
5	EMP_SALARY_MIN	SALARY
6	EMP_EMAIL_UK	EMAIL
7	EMP_EMP_ID_PK	EMPLOYEE_ID
8	EMP_DEPT_FK	DEPARTMENT_ID
9	EMP_JOB_FK	JOB_ID
10	EMP_MANAGER_FK	MANAGER_ID

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To find the names of the columns to which a constraint applies, query the USER_CONS_COLUMNS dictionary view. This view tells you the name of the owner of a constraint, the name of the constraint, the table that the constraint is on, the names of the columns with the constraint, and the original position of column or attribute in the definition of the object.

Note: A constraint may apply to more than one column.

You can also write a join between USER_CONSTRAINTS and USER_CONS_COLUMNS to create customized output from both tables.

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  - Constraint information
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Adding Comments to a Table

- You can add comments to a table or column by using the COMMENT statement:

```
COMMENT ON TABLE employees
IS 'Employee Information';
```

```
COMMENT ON COLUMN employees.first_name
IS 'First name of the employee';
```

- Comments can be viewed through the data dictionary views:
  - ALL_COL_COMMENTS
  - USER_COL_COMMENTS
  - ALL_TAB_COMMENTS
  - USER_TAB_COMMENTS

You can add a comment of up to 4,000 bytes about a column, table, view, or snapshot by using the COMMENT statement. The comment is stored in the data dictionary and can be viewed in one of the following data dictionary views in the COMMENTS column:

- ALL_COL_COMMENTS
- USER_COL_COMMENTS
- ALL_TAB_COMMENTS
- USER_TAB_COMMENTS

Syntax

```
COMMENT ON {TABLE table | COLUMN table.column}
    IS 'text';
```

In the syntax:

table	Is the name of the table
column	Is the name of the column in a table
text	Is the text of the comment

You can drop a comment from the database by setting it to empty string (''):

```
COMMENT ON TABLE  employees IS '';
```

Quiz

The dictionary views that are based on the dictionary tables contain information such as:

a. Definitions of all the schema objects in the database
b. Default values for the columns
c. Integrity constraint information
d. Privileges and roles that each user has been granted
e. All of the above

Answer: e

Summary

In this lesson, you should have learned how to find information about your objects through the following dictionary views:

- DICTIONARY
- USER_OBJECTS
- USER_TABLES
- USER_TAB_COLUMNS
- USER_CONSTRAINTS
- USER_CONS_COLUMNS

In this lesson, you learned about some of the dictionary views that are available to you. You can use these dictionary views to find information about your tables, constraints, views, sequences, and synonyms.

Practice 2: Overview

This practice covers the following topics:

- Querying the dictionary views for table and column information
- Querying the dictionary views for constraint information
- Adding a comment to a table and querying the dictionary views for comment information

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In this practice, you query the dictionary views to find information about objects in your schema.