Using DDL Statements
to Create and Manage Tables
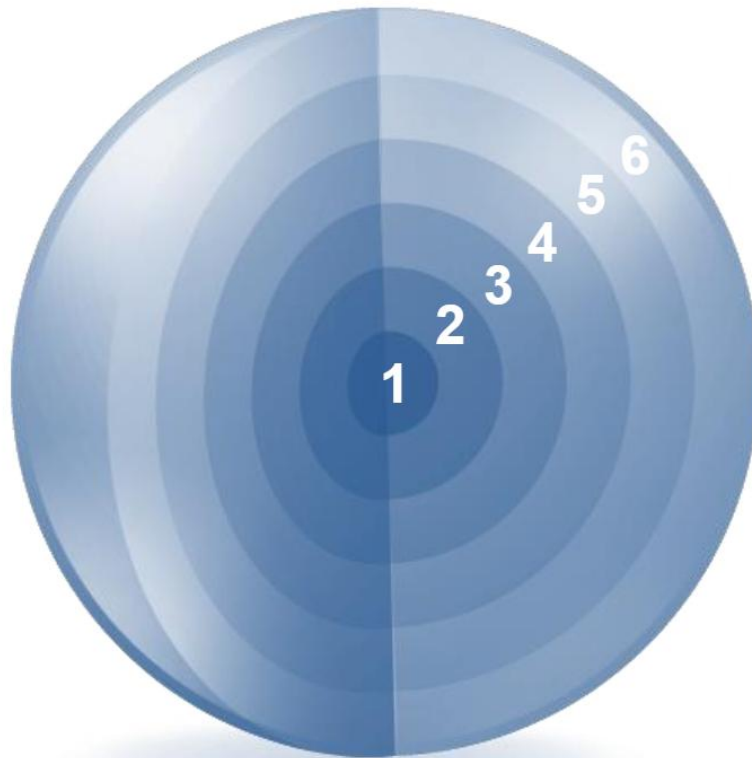
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Session Summary

1. **Categorize the main database objects**

2. **Review the table structure**

3. **List the data types that are available for columns**

4. **Create a simple table**

5. **Explain how constraints are created at the time of table creation**
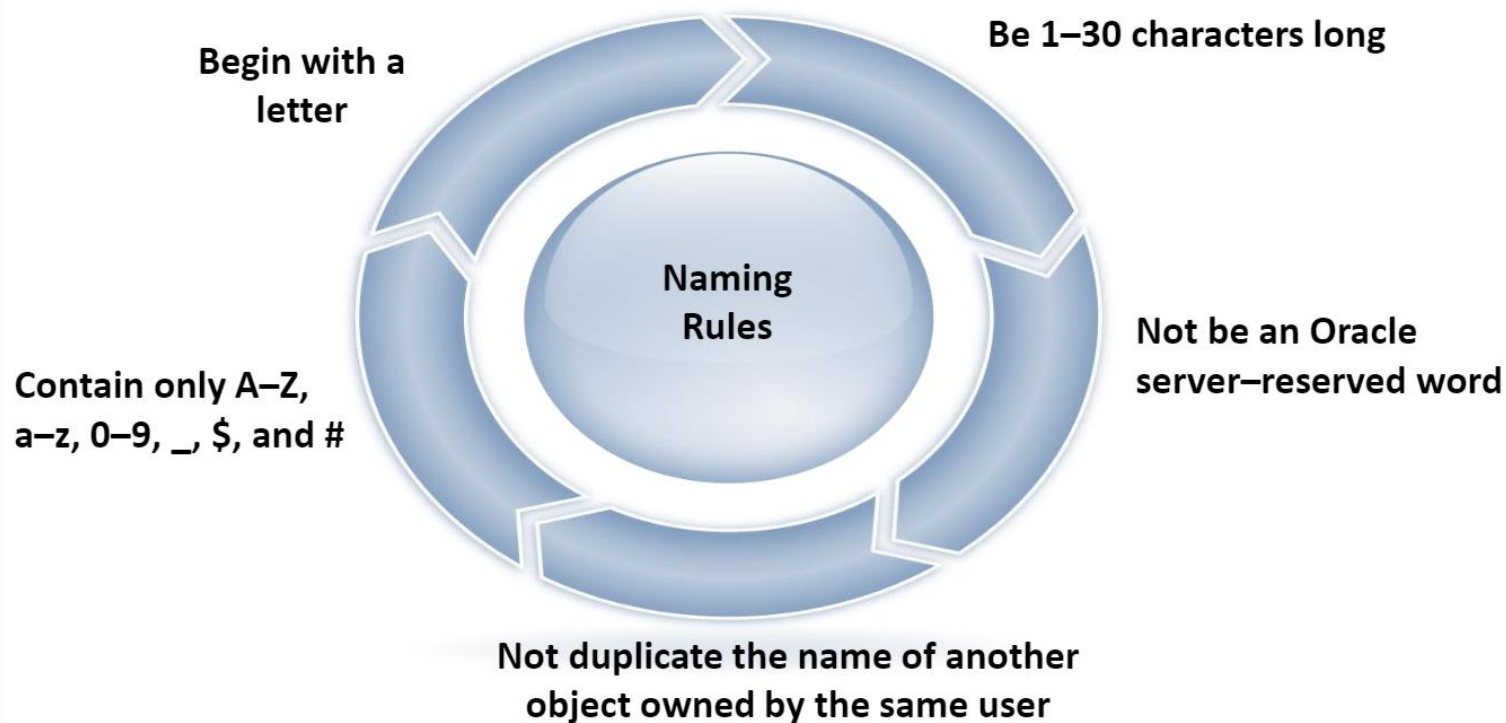
6. **Describe how schema objects work**

Object	Description
Table	Basic unit of storage; composed of rows
View	Logically represents subsets of data from one or more tables
Sequence	Generates numeric values
Index	Improves the performance of some queries
Synonym	Gives alternative name to an object

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Table names and column names must:

Begin with a letter

Be 1–30 characters long

Naming Rules

Contain only A–Z, a–z, 0–9, _, $, and #

Not be an Oracle server–reserved word

Not duplicate the name of another object owned by the same user

– You must have:

- The CREATE TABLE privilege
- A storage area

```
CREATE TABLE [schema.]table
        (column datatype [DEFAULT expr][, ...]);
```
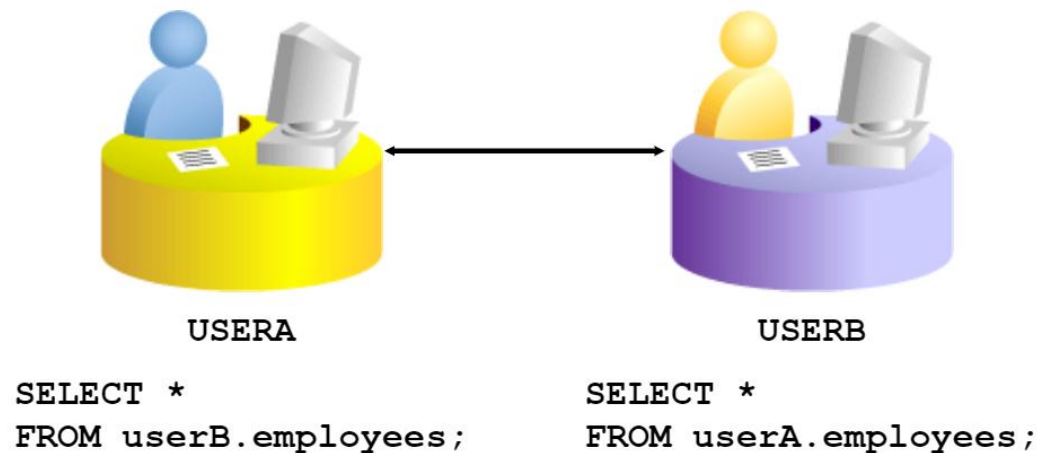
– You specify:

- The table name
- The column name, column data type, and column size

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- Tables belonging to other users are not in the user's schema.
- You should use the owner's name as a prefix to those tables.


```
        USERA                        USERB

SELECT *                      SELECT *
FROM userB.employees;         FROM userA.employees;
```

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- Specify a default value for a column during an insert.

```
... hire_date DATE DEFAULT SYSDATE, ...
```

- Literal values, expressions, or SQL functions are legal values.
- Another column's name or a pseudocolumn are illegal values.
- The default data type must match the column data type.

```
CREATE TABLE hire_dates
        (id            NUMBER(8),
         hire_date DATE DEFAULT SYSDATE);
```

CREATE TABLE succeeded.

– Create the table:

```
CREATE  TABLE  ord
      ( ID  NUMBER (3),
        quantity  NUMBER (3),
        ord_date  DATE  DEFAULT  SYSDATE) ;
```

CREATE TABLE succeeded.

– Confirm table creation:

```
DESCRIBE   ord ;
```

```
Name       Null Type
--------   ---- ---------
ID              NUMBER(3)
QUANTITY        NUMBER(3)
ORD_DATE        DATE
```

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Data Type	Description
VARCHAR2(size)	Variable-length character data
CHAR(size)	Fixed-length character data
NUMBER(p,s)	Variable-length numeric data
DATE	Date and time values
LONG	Variable-length character data (up to 2 GB)
CLOB	Character data (up to 4 GB)
RAW and LONG RAW	Raw binary data
BLOB	Binary data (up to 4 GB)
BFILE	Binary data stored in an external file (up to 4 GB)
ROWID	A base-64 number system representing the unique address of a row in its table

You can use several datetime data types:

Data Type	Description
TIMESTAMP	Date with fractional seconds
INTERVAL YEAR TO MONTH	Stored as an interval of years and months
INTERVAL DAY TO SECOND	Stored as an interval of days, hours, minutes, and seconds

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Constraints enforce rules at the table level.

Constraints prevent the deletion of a table if there are dependencies.

The following constraint types are valid:

> NOT NULL
>
> UNIQUE
>
> PRIMARY KEY
>
> FOREIGN KEY
>
> CHECK

Constraint Guidelines

You can name a constraint, or the Oracle server generates a name by using the SYS_C*n* format.

Create a constraint at either of the following times:
- At the same time as the creation of the table
- After the creation of the table

Define a constraint at the column or table level.

View a constraint in the data dictionary.

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– Syntax:

```
CREATE TABLE [schema.]table
    (column datatype [DEFAULT expr]
    [column_constraint],
    ...
    [table_constraint][,...]);
```

– Column-level constraint syntax:

```
column [CONSTRAINT constraint_name] constraint_type,
```

– Table-level constraint syntax:

```
column,...
  [CONSTRAINT constraint_name] constraint_type
  (column, ...),
```

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Defining Constraints

- – Example of a column-level constraint:

```
CREATE TABLE orders(
  order_id  NUMBER(4)
    CONSTRAINT ord_ord_id_pk PRIMARY KEY,
  order_mode   VARCHAR2(20),
  ...);
```

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- – Example of a table-level constraint:

```
CREATE TABLE orders(
  order_id  NUMBER(6),
  order_mode   VARCHAR2(20),
  ...
  customer_id  VARCHAR2(10) NOT NULL,
  CONSTRAINT ord_ord_id_pk
    PRIMARY KEY (ORDER_ID));
```

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NOT NULL Constraint **Orders table**

	ORDER_ID	ORDER_DATE	ORDER_MODE	CUSTOMER_ID	ORDER_STATUS	ORDER_TOTAL	SALES_REP_ID	PROMOTION_ID
1	2458	20-NOV-99 04.11.54.696211000 AM	direct	102	0	70647.34	153	(null)
2	2397	20-NOV-99 04.11.54.696211000 AM	direct	102	1	42283.2	154	(null)
3	2454	03-OCT-99 05.19.34.678340000 AM	direct	103	1	6653.4	154	(null)
4	2354	15-JUL-00 05.48.23.234567000 AM	direct	104	0	46257	155	(null)
5	2358	09-JAN-00 06.33.12.654278000 AM	direct	105	2	7826	155	(null)
6	2381	15-MAY-00 08.29.08.843679000 AM	direct	106	3	23034.6	156	(null)
7	2440	01-SEP-99 09.23.06.008765000 AM	direct	107	3	63695.66	156	(null)
8	2357	09-JAN-98 09.49.44.123456000 AM	direct	108	5	59872.4	158	(null)
9	2394	11-FEB-00 10.52.35.564789000 AM	direct	109	5	21863	158	(null)
10	2435	03-SEP-99 10.52.53.134567000 AM	direct	144	6	62303	159	(null)
11	2455	20-SEP-99 11.04.11.456789000 PM	direct	145	7	14087.5	160	(null)
12	2379	16-MAY-99 01.52.24.234567000 PM	direct	146	8	17848.2	161	(null)
13	2396	02-FEB-98 03.04.56.345678000 PM	direct	147	8	34930	161	(null)
14	2443	13-SEP-99 05.19.30.647893000 PM	direct	149	8	242458.25	161	(null)
15	2436	02-SEP-99 05.48.04.378034000 PM	direct	116	8	6394.8	161	(null)
16	2446	27-JUL-99 06.33.08.302945000 PM	direct	117	8	93570.57	161	(null)
17	2447	27-JUL-00 08.29.10.223344000 PM	direct	101	8	33893.6	161	(null)
18	2432	14-SEP-99 09.23.40.223345000 PM	direct	102	10	10523	163	(null)
19	2355	26-JAN-98 10.52.51.962632000 PM	online	104	8	94513.5	(null)	(null)
20	2356	26-JAN-00 10.52.41.934562000 PM	online	105	5	29473.8	(null)	(null)

**NOT NULL constraint
(Primary Key enforces
NOT NULL constraint.)**

**NOT NULL
constraint**

**Absence of NOT NULL constraint
(Any row can contain a null
value for this column.)**

UNIQUE **constraint**

EMPLOYEES

	EMPLOYEE_ID	LAST_NAME	EMAIL
1	100	King	SKING
2	101	Kochhar	NKOCHHAR
3	102	De Haan	LDEHAAN
4	103	Hunold	AHUNOLD
5	104	Ernst	BERNST
6	107	Lorentz	DLORENTZ

...

INSERT INTO

208	SMITH	JSMITH

⟵ **Allowed**

209	SMITH	JSMITH

⟵ **Not allowed: already exists**
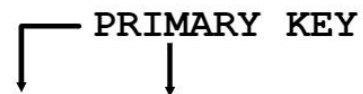
Defined at either the table level or the column level:

```
CREATE TABLE orders(
    order_id          NUMBER(4),
    order_mode        VARCHAR2(25) NOT NULL,
    order_status      CHAR(2),
    customer_id       NUMBER(8,2),
    order_date        DATE NOT NULL,
...
    CONSTRAINT ord_id_uk UNIQUE(order_id));
```
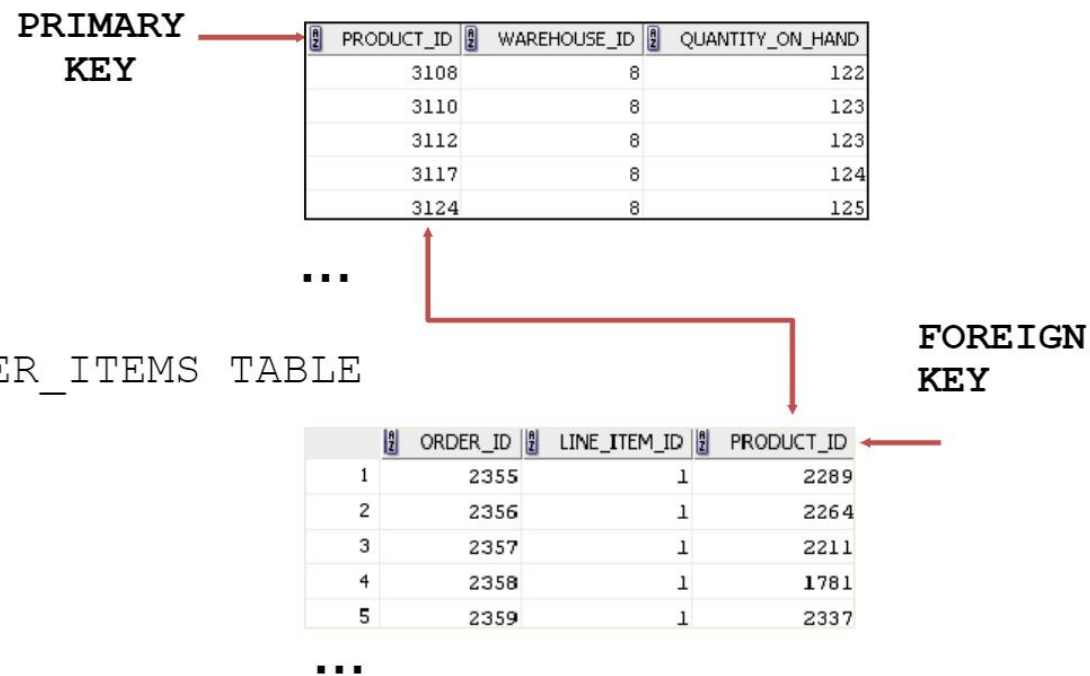
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PRIMARY KEY Constraint

ORDER_ITEMS

PRIMARY KEY

	ORDER_ID	LINE_ITEM_ID	PRODUCT_ID	UNIT_PRICE	QUANTITY
1	2355	1	2289	46	200
2	2356	1	2264	199.1	38
3	2357	1	2211	3.3	140
4	2358	1	1781	226.6	9
5	2359	1	2337	270.6	1
6	2361	1	2289	46	180
7	2362	1	2289	48	200
8	2363	1	2264	199.1	9
9	2364	1	1910	14	6
10	2365	1	2289	48	92

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Defined at either the table level or the column level:

```
CREATE TABLE orders(
    order_id          NUMBER(4),
    order_mode        VARCHAR2(25) NOT NULL,
    order_status      CHAR(2),
    customer_id       NUMBER(8,2),
    order_date        DATE NOT NULL,
...

CONSTRAINT ord_inv_fk FOREIGN KEY (order_id)
    REFERENCES inventories(order_id));
```

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`FOREIGN KEY` Constraint: Keywords

FOREIGN KEY: Defines the column in the child table at the table-constraint level

REFERENCES: Identifies the table and column in the parent table

ON DELETE CASCADE:

Deletes the dependent rows in the child table when a row in the parent table is deleted

ON DELETE SET NULL:

Converts dependent foreign key values to null

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Defines a condition that each row must satisfy

The following expressions are not allowed:

➤References to CURRVAL, NEXTVAL, LEVEL, and ROWNUM pseudo columns

➤Calls to SYSDATE, UID, USER, and USERENV functions

➤Queries that refer to other values in other rows

```
..., order_status NUMBER(2)
        CONSTRAINT ord_status_btw
                CHECK (order_status BETWEEN 0 AND 10),...
```

```
CREATE    TABLE    customers

        ( customer_id         NUMBER(6)
        , cust_first_name     VARCHAR2(20)
            CONSTRAINT cust_fname_nn NOT NULL
        , cust_last_name      VARCHAR2(20)
            CONSTRAINT cust_lname_nn NOT NULL
        , cust_address        cust_address_typ
        , phone_numbers       phone_list_typ
        , nls_language        VARCHAR2(3)
        , nls_territory       VARCHAR2(30)
        , credit_limit        NUMBER(9,2)
        , cust_email          VARCHAR2(30)
        , account_mgr_id      NUMBER(6)
        ,       CONSTRAINT       customer_credit_limit_max
                            CHECK (credit_limit <= 5000)
        ,       CONSTRAINT       customer_id_min
                            CHECK (customer_id > 0)

    ) ;
```

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```
UPDATE  employees
SET     department_id = 55
WHERE   department_id = 110;
```

```
Error starting at line 1 in command:
UPDATE employees
SET    department_id = 55
WHERE  department_id = 110
Error report:
SQL Error: ORA-02291: integrity constraint (ORA1.EMP_DEPT_FK) violated - parent key not found
02291. 00000 - "integrity constraint (%s.%s) violated - parent key not found"
*Cause:    A foreign key value has no matching primary key value.
```

Department 55 does not exist.

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You cannot delete a row that contains a primary key that is used as a foreign key in another table.

```
DELETE FROM departments
WHERE department_id = 60;
```

```
Error starting at line 1 in command:
DELETE FROM departments
WHERE department_id = 60
Error report:
SQL Error: ORA-02292: integrity constraint (ORA1.JHIST_DEPT_FK) violated - child record found
02292. 00000 - "integrity constraint (%s.%s) violated - child record found"
*Cause:    attempted to delete a parent key value that had a foreign
           dependency.
*Action:   delete dependencies first then parent or disable constraint.
```

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- Create a table and insert rows by combining the CREATE TABLE statement and the AS *subquery* option.

```
CREATE TABLE table
        [(column, column...)]
AS subquery;
```

- Match the number of specified columns to the number of subquery columns.

- Define columns with column names and default values.

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```
CREATE  TABLE   ord2458
 AS
    SELECT  order_id ,  order_date ,
            order_status ,
            customer_id
    FROM   orders
    WHERE   order_id  =  2458 ;
```

```
CREATE TABLE succeeded.
```

```
DESCRIBE   ord2458 ;
```

```
Name            Null      Type
-----------     --------  --------------------------------
ORDER_ID                  NUMBER(12)
ORDER_DATE      NOT NULL  TIMESTAMP(6) WITH LOCAL TIME ZONE
ORDER_STATUS              NUMBER(2)
CUSTOMER_ID     NOT NULL  NUMBER(6)
```

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Moves a table to the recycle bin

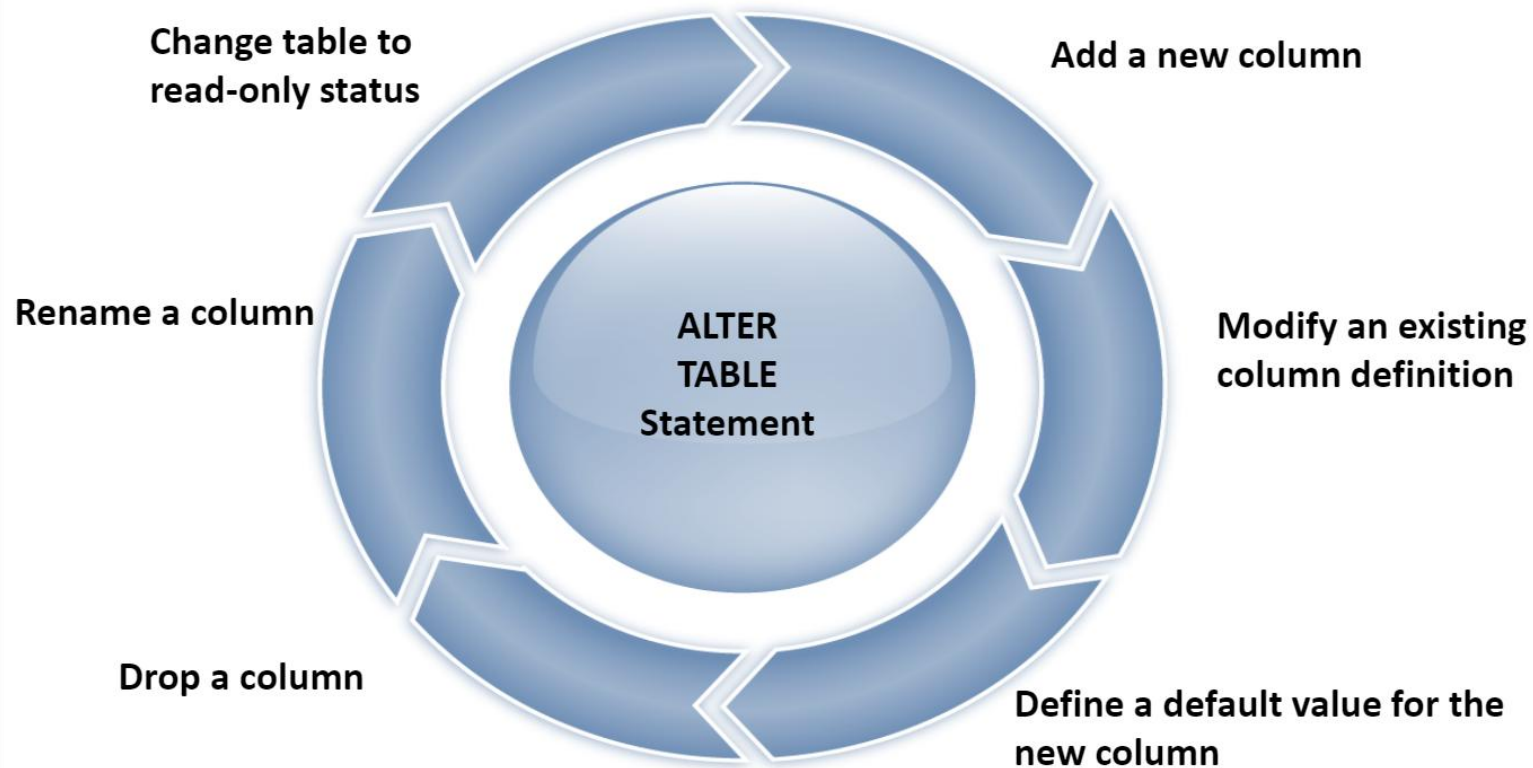Removes the table and all its data entirely if the PURGE
clause is specified

Invalidates dependent objects and removes object
privileges on the table

```
DROP TABLE ord2458;
```

```
DROP TABLE dept80 succeeded.
```

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ALTER TABLE Statement

Use the ALTER TABLE statement to:

Change table to read-only status

Add a new column

Rename a column

ALTER TABLE Statement

Modify an existing column definition

Drop a column

Define a default value for the new column

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Put a table into read-only mode, which prevents DDL or DML changes during table maintenance

Put the table back into read/write mode

```
ALTER  TABLE  orders  READ  ONLY ;

-- perform table maintenance and then
-- return table back to read/write mode

ALTER  TABLE  orders  READ  WRITE ;
```
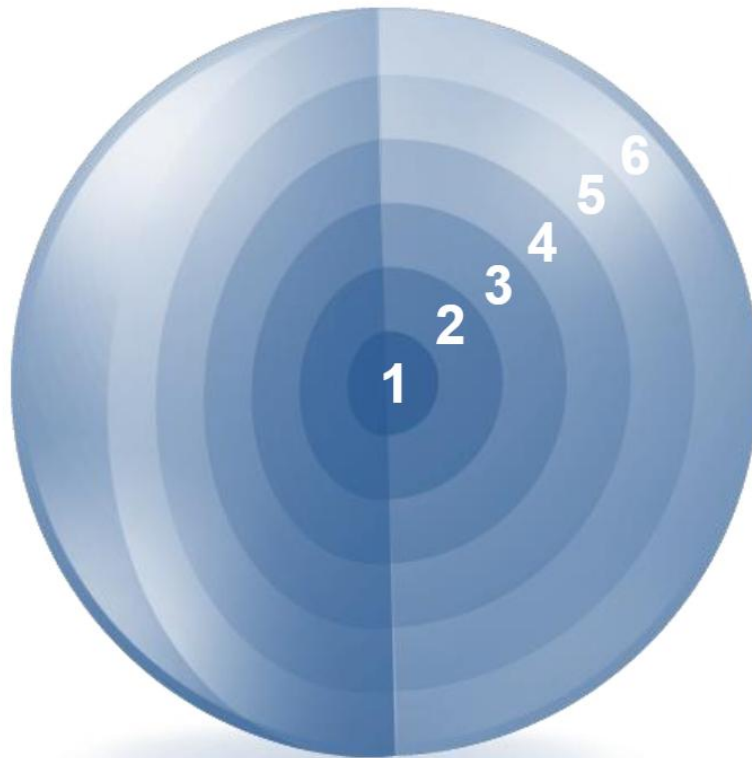
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You can use constraints to do the following:

1. Enforce rules on the data in a table whenever a row is inserted, updated, or deleted.
2. Prevent the deletion of a table.
3. Prevent the creation of a table.
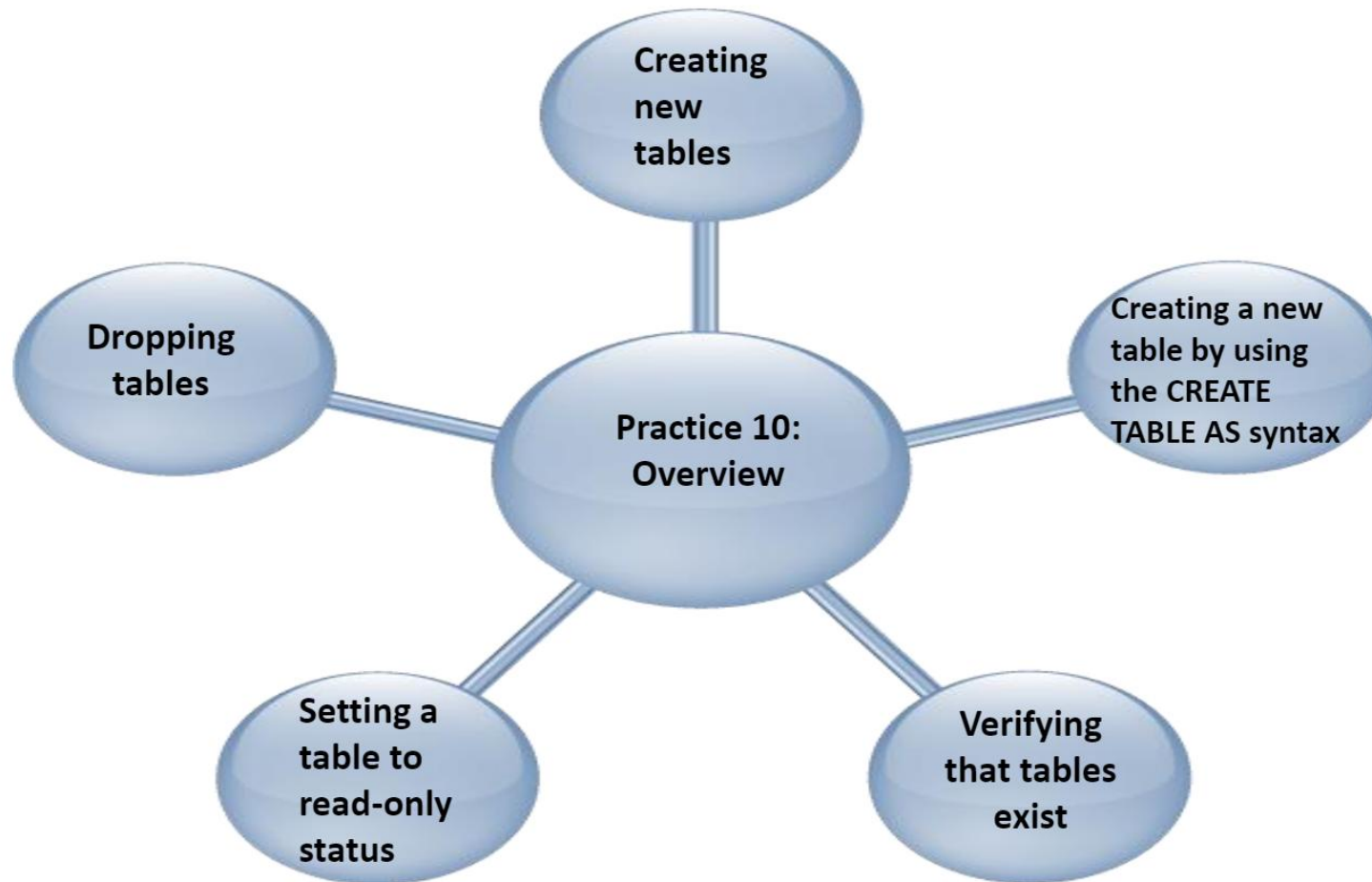4. Prevent the creation of data in a table.

Session Summary

1. Categorize the main database objects

2. Review the table structure

3. List the data types that are available for columns

4. Create a simple table

5. Explain how constraints are created at the time of table creation

6. Describe how schema objects work

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