Introduction to ORACLE/SQL

What is SQL?

- Structured Query Language; SEQUEL
- non-procedural language to manage relational databases Doesn't Have Repeat Loop
- used by database administrators, developers (writing data integration scripts) and data analysts (looking to set up and run analytical queries).
- was developed in the mid-70's at IBM San Jose

SQL commands:

Data Query Language (DQL)

- **SELECT** - retrieve certain records from one or more tables.

Data Manipulation Language (DML)

- **INSERT** - create a record.
- **UPDATE** - change certain records.
- **DELETE** - delete certain records.

Data Definition Language (DDL)

- **CREATE** - create a new table or a view of a table in database.
- **ALTER** - modify an existing database object, such as a table.
- **DROP** - delete an entire table or a view of a table in the database.

Data Control Language (DCL)

- **GRANT** - give a privilege to someone.
- **REVOKE** - take back privileges granted to someone.

Advantages of using SQL

- programmers do not need to know the data storage format and the complex activities happen behind the scene (*structural and data independence*)
- useful and powerful language
- easy to learn
- portable
- fast retrieval
- well defined standards established by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO)

Basic SQL commands

CREATE/INSERT/ SELECT/DELETE/DROP

Create a Table

Syntax:

```
CREATE TABLE table_name (
    column1 datatype,
    column2 datatype,
    column3 datatype,  ....);
```

```
SQL> CREATE TABLE person (
     firstname VARCHAR(20), surname CHAR(15)
     );
```

Table Name: person

Column 1: firstname

Column 2: surname

datatype: VARCHAR(20), CHAR(15)

Datatypes

The column name datatype refers to a specific storage format, constraints, and a valid range of values.

The common datatypes are as follows:

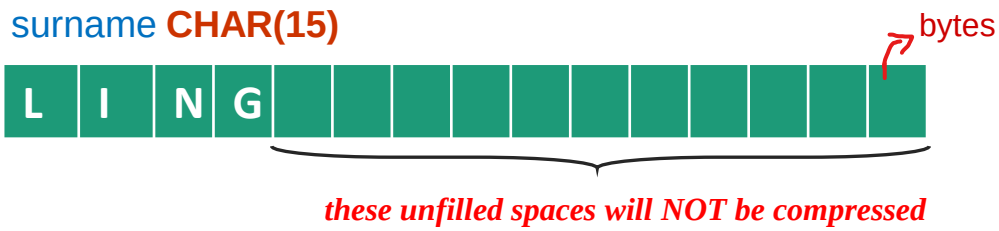
- Character
  - CHAR - stores fixed-length character strings
  - VARCHAR / VARCHAR2 - stores variable-length character strings
- Numeric
  - NUMBER - stores +ve and -ve fixed, zero, etc
- Date
  - DATE – stores the year, month, day, hours, minute, seconds

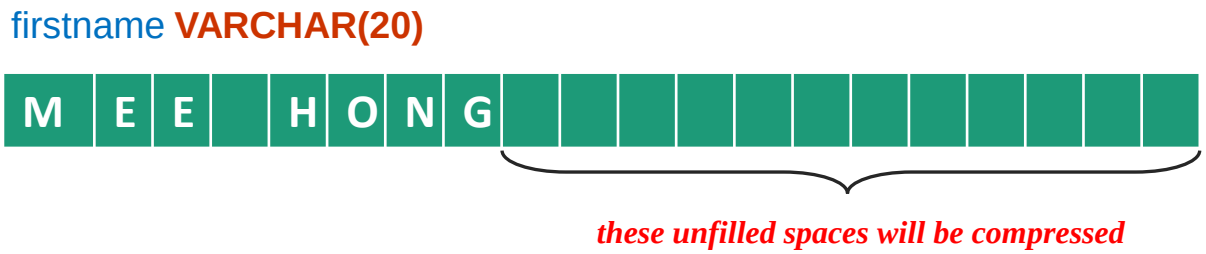
Further information on Oracle data types can be found at

https://docs.oracle.com/cd/B28359_01/server.111/b28318/datatype.htm#CNCPT012

Datatypes

- Character
  - CHAR - stores fixed-length character strings
  - VARCHAR / VARCHAR2 - stores variable-length character strings





Datatypes

- Numeric
  - NUMBER - stores +ve and -ve fixed, zero, floating-point numbers.
    NUMBER(precision, scale) *precision – total number of digits, scale – number of decimals*

Input Data	Defined As	Stored As	
7,456,123.89	NUMBER	7456123.89	A default setting – as is
7,456,123.89	NUMBER(*,1)	7456123.9	Allows only 1 decimal point with any number of digits in the number (please refer to ORACLE website for limitation)
7,456,123.89	NUMBER(9)	7456124	Allows only integer with up to a total of 9 digits in a number (please refer to ORACLE website for limitation)
7,456,123.89	NUMBER(9,2)	7456123.89	Allows only 2 decimal points with up to 9 digits in a number
7,456,123.89	NUMBER(9,1)	7456123.9	Allows only 1 decimal point with up to 9 digits in a number
7,456,123.89	NUMBER(6)	(not accepted, exceeds precision)	This value will not be stored in the table

Datatypes

- Date
  - DATE – stores the year, month, day, hours, minute, seconds
  - Standard ORACLE date format is DD-MON-YY

Possible input Data	Displayed results based on default setting DD-MON-YY	Remarks
11-Apr-2020	11-Apr-20	
11-04-2020	11-Apr-20	
11/04/2020	11-Apr-20	
11-Apr-20	11-Apr-20	
11-04-20	11-Apr-20	
11/04/20	11-Apr-20	
11-04-1920	11-Apr-20	To avoid such problem, change the default setting ALTER SESSION SET NLS_DATE_FORMAT='DD-MON-**YYYY**';
11-Apr-1920	11-Apr-20	To avoid such problem, change the default setting ALTER SESSION SET NLS_DATE_FORMAT='DD-MON-**YYYY**';

Datatypes – some examples

Column name / Attribute	Sample value	Data type
Email Address	simon@imail.sunway.edu.my	VARCHAR(40)
Name	Simon Langley	VARCHAR(60)
Age	20	NUMBER(3,0)
Avg marks	89.75	NUMBER(5,2)
Home country	Malaysia	VARCHAR(50)
Date In	6 April 2020	DATE
Student ID	19014888	NUMBER(8)
Mobile phone	60121477777	NUMBER(13)
Postcode	46150	VARCHAR(12)
Grade	A	CHAR
Course	BCS	CHAR(5)

Datatypes - Exercise

Please attempt this exercise.
Answers will be given in the live lab session

Column name / Attribute	Sample Data	Data Type
Name	Polly	VACHAR(5)
Gender	Female	VACHAR(6)
DOB	1 December 1999	DATE
Designation	Tutor	CHAR (5)
Remark	Today is Friday. I love Friday. Party Time.	VACHAR(30)
Profile	I love pets and enjoy hiking	VACHAR(28)
Year of commencement	2020	NUMBER(4)
Month salary tax	253.55	NUMBER(3,0)
Subject	SQL	CHAR(3)
Employment	Contract	CHAR(8)

Syntax:
DESC *table_name*;

DESC[RIBE] Command

- Determining a table's structure

SQL> DESC person

Syntax:
INSERT INTO *table_name*
VALUES (*value1*, *value2*, *value3*, ...);

Insert a Record

; means End SQL Command

```
SQL> INSERT INTO person VALUES ('Jane', 'Smith');
SQL> INSERT INTO person VALUES ('Jane', 'Locksmith');
SQL> INSERT INTO person VALUES ('James', 'Allen');
```

Text Data refer to Value 1, Value 2 , Value 3

- Text data is always surrounded by single quotes(').

```
CREATE TABLE person (
firstname VARCHAR(20), surname CHAR(15)
);
```

the order of the column name must match the column value

```
INSERT INTO person VALUES ('Jane', 'Smith');
INSERT INTO person VALUES ('James', 'Locksmith');
```

Select Records/view data

Syntax:
SELECT *column1*, *column2, ...*
FROM *table_name*;

(***Displaying all attributes***)

```
SQL>SELECT *   * = all attributes
        FROM person;
```

(Choosing the attributes to be displayed)

```
SQL> SELECT firstname
        FROM person;
```

(Choosing the rows to be displayed with the WHERE clause)

```
SQL> SELECT surname
        FROM person WHERE firstname='Jane';
```

Syntax:
DELETE FROM *table_name*
WHERE *condition*;

Delete record(s) in a Table

```
SQL> DELETE FROM person
       WHERE firstname='Jane';

SQL> DELETE FROM person;
```

Drop a Table

Syntax:
DROP TABLE *table_name*;

```
SQL>DROP TABLE person;
```

Hands-on

Please attempt the following Exercises 1 & 2 before attending the lab session.

Exercise 1

a) Create a table called student with the following attributes :

- *name* as a VARCHAR2 with the size of 20 characters
- *gender* as a CHAR of 6 characters
- *DOB* as a DATE
- *CGPA* as a **NUMBER** with one decimal

b) Insert the following records :

- *George, Male, 1 Jan 2001, 3.2*
- *Jane, Female, 21 Dec 1999, 2.6*

c) View the contents of the table.

e) Delete a record from the table.

f) Drop the table.

Exercise 2

a) Create a table called ***product*** with the following attributes. You are to decide the best datatype for each of them based on the sample data in part b)

- *id*
- *name*
- *description*
- *quantity*
- *price-per-unit*

b) Insert the following records :

- *B-100, book, materials for schools, 10, 1*
- *S-201, shoes, shoes for kindergarten, 300, 2.5*
- *N-122, snacks, snacks for break time, 400, 1*
- *B-101, magazine, magazine for the office, 50, 99.90*

c) View the contents of the table.

d) Delete all the records which have quantity of more than 280