

Some SQL Commands

1. Using Bitvise SSH Secure Shell to login to CS Systems

Note that if you do not have Bitvise ssh secure shell on your PC, you can download it from <http://www.putty.org/>.. For instructional videos on how to install the ssh clients created by CS technician Steve Karamatos, visit the CS help centre at: <http://www.help.cs.uwindsor.ca/en/servers/remote-access/secure-shell/> .

To connect to a CS server, do:

1. Launch the ssh secure shell
2. Click on Quick Connect
3. Enter Host Name eg: cs.uwindsor.ca
4. Enter User Name eg: smith
5. Port Number: 22 (default)
6. Authentication Method: <profile Setting> (default)
7. Then press ENTER
8. Enter Password eg: XXXXXX

When connected to the computer science system cs.uwindsor.ca or a specific cs server, such as alpha.cs.uwindsor.ca, you can use SQLPLUS Oracle's interactive Interface to the database server. SQL statements can be issued at the SQL> prompt and file containing SQL statements can be executed from within SQLPLUS.

2. Oracle SQLPLUS

Oracle's SQLPLUS program provides a convenient interactive environment with the Oracle Database Server. The user may type the commands directly at the SQL> prompt or have SQLPLUS execute commands residing in operating system files.

Entering and Exiting Oracle SQLPLUS

To enter the SQLPLUS environment, the sqlplus program should be executed (launched) with any of the following sqlplus commands, where <user id> is the oracle user identification and <password> is the associated password:

- sqlplus <userid>
- sqlplus

The Oracle **userid** and **password** may be different from the **userid** and **password** to get access to the server (cs.uwindsor.ca/alpha.cs.uwindsor.ca). Currently, it is the same as your UWin Password.

If the **sqlplus** program is invoked with only **<userid>**, the program prompts the user for the password.

To Exit the SQL*PLUS environment, the **exit** or **quit** command must be entered at the SQL> prompt.

SQL> quit

**

3. Basic DDL, DML, DCL operations for SQL (structured query language):

A. DDL

1. Create tables [Create Table ...]
- 2. Destroy tables [Drop Table ...]
- 3. Alter tables [Alter Table ...]
- 4. Truncate tables [Truncate Table Student]
- 5. Rename tables [Rename oldname To newname]

Examples:

1

```
CREATE TABLE student (stuid VARCHAR2(20),
name VARCHAR2 (20),
gpa NUMBER(5,2),
CONSTRAINT student_pk PRIMARY KEY (stuid));
```

When creating a table, the constraints defined on the table and its attributes can be defined using the general format:

Constraints can be named as in the following.

```
Create table tabl (
col1 VARCHAR2(10),
col2 NUMBER(4) NOT NULL,
col3 NUMBER(6) ,
col4 DATE DEFAULT SYSDATE,
col5 VARCHAR2(5),
col6 NUMBER ,
col7 VARCHAR2(5)
CONSTRAINT tab1_pk PRIMARY KEY ( col1)
CONSTRAINT tab1_zipcode_fk FOREIGN KEY ( col13) REFERENCES
zipcode(zip),
CONSTRAINT tab1_uk UNIQUE ( col5 , col6 ),
CONSTRAINT tab1_col6_chk CHECK ( cl6 < 100));
```

2. DROP TABLE Student CASCADE CONSTRAINTS

3. Altering Tables

The characteristic of an already created table can be changed using the ALTER TABLE command in conjunction with the ADD, DROP and MODIFY clauses. E.g
ALTER TABLE toy

```
ADD (manufacturer VARCHAR2(30) NOT NULL )
```

or

```
Alter table TABLE toy
```

```
ADD (manufacturer VARCHAR2(30)  
constraint toy_maun_nn NOT NULL )
```

Constraints can be added, dropped, disabled or enabled through the Alter table command. E.g.

```
ALTER TABLE Toy
```

```
ADD PRIMARY KEY (description)
```

```
Alter TABLE toy
```

```
DROP CONSTRAINT toy_pk
```

Eg.

```
Alter Table Student
```

```
Modify (studid NUMBER (9))
```

```
Alter Table Student
```

```
ADD CONSTRAINT stu_pk  
PRIMARY KEY(stuid)
```

4. The Truncate Command: deletes all rows from a table, like the Delete command, but does not allow a Where clause and it automatically issues a COMMIT.

Eg.

```
Truncate Table Student
```

5. Rename command can be used to rename tables and views as in:

```
Rename Student To New_Student
```

B: Data Manipulation Language (DML) commands allow us to query, insert, update or delete data and include the following:

- 6. Insert Data into Tables [Insert Into]
- 7. Delete Data from Tables [Delete from ...]
- 8. Update Data in Tables [Update]
- 9. Merge tables [Merge Into tablename ...]
- 10. Query Tables [Select ... from ... where ...]

- 11. Find the structure of DB, relation, view, index, etc.[querying catalogue with select * from tab; select * from cat; Desc Table; etc.]

6.

```
Insert Into Student
  (Studid, Name, gpa)
Values
  ('53666', 'Jones S', 3.4)
```

Commit

- 7 A DELETE statement may delete rows in other table if the foreign key constraint specifies the ON DELETE CASCADE option, which causes a child row (e.g., in enroll) to be automatically deleted when a parent row (e.g., in Student) is deleted.

Eg.

```
Delete from Student
  Where gpa <= 2.0
```

8. E.g.

```
Update Student
Set gpa = 3.4
Where Studid = '53831'
```

9. The Merge command allows us to perform combined Insert, Update, Delete operations using the syntax:

```
Merge Into tablename
Using {query|tablename} On (condition)
[When Matched Then Update set_clause
  [Delete condition]]
[When Not Matched Then Insert values_clause]
```

This can be used for example to merge all student rows not found in the current Student table but that are in another Student_c table with the following:

```
Merge Into Student s
Using (Select Studid, Name, gpa) c
On (s.Studid = c.Studid)
When Matched Then
  Update Set s.Name= c.Name,
           s.gpa = c.gpa
When Not Matched Then
  Insert (s.Studid, s.Name, s.gpa)
  Values (c.Studid, c.Name, c.gpa)
```

10. Query the Table using a wide variety of Select statements.
11. Query the meta data or catalogue with such select instructions as querying catalogue with `select * from tab; select * from cat; Desc Table; etc.`

C. The Data control Language commands

12. The grant command is used to give a database user access to a system privilege. Privileges can be granted individually or through a role. Example privileges on Tables are Select, Insert, Update, Delete, References, alter, Index, All. Roles are several privileges collected under one role name. Some pre-defined roles are CONNECT, RESOURCE, DBA. The CONNECT role include CREATE SESSION privilege, create tables, views and sequences, etc.
13. The Revoke Command is used to take away privileges.

Other SQL features: Outer Joins, Savepoint, Commit, Rollback

The OUTER join operator '(+)' is used to indicate that NULLs are generated for no matching rows. E.g.,

```
Select c.course_no, s.course_no, s.section_id, c.description, s.start_date_time
from course c , section s
where c.course_no = s.course_no(+)
UNION
Select c.course_no, s.course_no, s.section_id, c.description, s.start_date_time
from course c, section s
where c.course_no (+) = s.course_no
```

The first select statement performs an OUTER join on section table and the second select statement performs an outer join on the course table.

SAVEPOINT command allows you to save the result of the DML transactions temporarily.

Commit command: makes the change to the data permanent and allows other users to see the data. SQL DDL and DCL statements implicitly complete with an automatic commit but DML statements are controlled by the transaction issuing them and need to be committed explicitly.

ROLLBACK command can then refer back to a particular SAVEPOINT and roll back the transaction up to that point. E.g.

```
SAVEPOINT zip222
ROLLBACK TO SAVEPOINT zip222
```

DDL commands can not be rolled back and they COMMIT any previously issued DML statements.

Common Data Types

	Data type	Use
1	VARCHAR2	For character data and requires column length up to 4000 chars
2	CHAR	Requires fixed column length up to 2000 chars
3	LONG	Stores up to 2 gigabytes of data
4	CLOB	Stores up to 4 gigabytes of data
5	NUMBER	Can store up to 38 decimal digits of precision. It does not require a precision and scale necessarily. Used to specify real value as e.g NUMBER (5,2) for numbers, -999.99 to 999.99
6	DATE	Stores the century, year, month, day, hour, minute and second in internal format, can be displayed using different format masks.
7	BLOBS, RAW, LONG RAW, BFILE	Each of these data types points to a binary operating system files.

INDEXES

To optimize performance, you store indexes in separate tablespaces residing on different physical drives.

To create an index and place it in a tablespace called index_tx, do the following

```
CREATE INDEX sect_location_i
```

```
ON section ( location)
```

```
TABLESPACE index_tx
```

Periodically, the Oracle B-tree index needs to be re-built as:

```
ALTER INDEX stu_zip_fk_i REBUILD
```

14. User Privileges, Roles and synonyms

To establish a connection to the database using sqlplus, the user must be granted certain privileges.

A user name is created with the CREATE USER command

To create a new user first login as the user SYSTEM, default password is manager

You can login with the CONNECT(CONN) command with parameter userid/password as in.

```
CONN system/manager
```

You can also include host database string as in

```
CONN system/manager@scratchy
```

The host string is found in the tnsnames.ora file listing the server name and the database instance name.

The following creates a user MUSIC with password LISTEN

```
CREATE user music IDENTIFIED By listen
```

```
DEFAULT TABLESPACE user_data
```

```
TEMPORARY TABLESPACE temp_data
```

Although the user music is created, the user cannot start a SQLPlus session because they lack their CREATE SESSION privilege to login to the database.

A privilege is given to a user with GRANT command

A role is a collection of privileges and a user granted a role acquires all the privileges defined within the role.

The following grants some system privileges defined in the Oracle roles

```
CONNECT and RESOURCE
```

```
GRANT CONNECT,RESOURCE to music
```

Another oracle role is DBA for all system privileges

You can grant users the privileges to extend privileges they have to other WITH ADMIN option as in:

```
GRANT CONNECT TO music WITH ADMIN OPTION
```

Privileges can be taken away with the REVOKE command as in:

```
REVOKE RESOURCE FROM music
```

A user's password can be changed as:

```
ALTER USER music IDENTIFIED BY tone DEFAULT TABLESPACE users
```

A user is dropped with the following command

```
DROP USER music CASCADE
```

Object privileges can be granted on objects as tables, view, sequences to other users as in :

```
GRANT SELECT ON course TO music
```

```
GRANT ALL ON course TO music WITH GRANT OPTION
```

With the second command music is the grantee but can become a granter if the privilege is passed on to another user