

CPSC 304 Software Guide

Jason Hall, 23-02-03

Contents

1	How to log in to the CS servers (ssh)	1
2	How to launch SQL Plus	3
2.1	Setting up the SQL Plus environment	3
3	How to create or edit a text file on the server	5
4	How to transfer files (SQL scripts) to the server (scp)	6
5	How to run the script in SQL Plus	7

1 How to log in to the CS servers (ssh)

The same general procedure can be used to access other linux/unix machines on which you have an account.

Access to the servers is via the command line.

UBC CS instructions are located at: <https://my.cs.ubc.ca/docs/connecting-department-unix-servers>

A terminal emulator is required - On MacOS or Linux, open 'Terminal' - On Windows, open 'Command Prompt'

If ssh does not seem to be available on your computer, or to use a different option, here are two more...

- The UBC CS instructions mention Xmanager. It's commercial software available free for UBC students and provides much more functionality than what is required for our purposes. (<https://my.cs.ubc.ca/docs/free-terminal-emulation-software-xmanager>)
- PuTTY is a popular and effective terminal emulator that's been around since 1999. (<https://www.putty.org>)

When your terminal emulator is open, a prompt will be available for commands. This is the command prompt on your computer and will appear differently on different machines. Typically some variation of these:

- On MacOS:

```
YOURUSERNAME@HOSTNAME ~ %
```

- On Windows:

```
C:\Users \YOURUSERNAME>
```

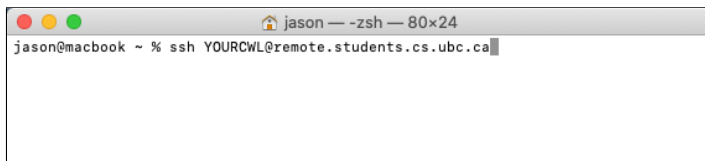
- On Linux:

```
[YOURUSERNAME@HOSTNAME ~]$
```

Run the command:

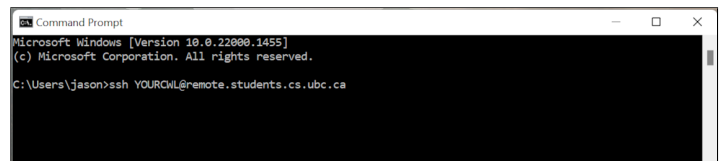
```
ssh YOURCWL@remote.students.cs.ubc.ca
```

Change YOURCWL to your CWL username



```
jason@macbook ~ % ssh YOURCWL@remote.students.cs.ubc.ca
```

(a) Mac: Command prompt

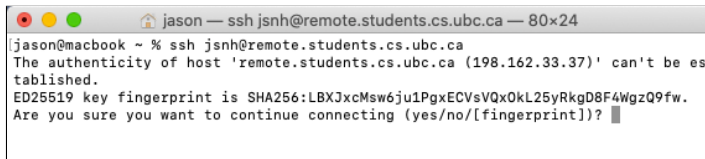


```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jason>ssh YOURCWL@remote.students.cs.ubc.ca
```

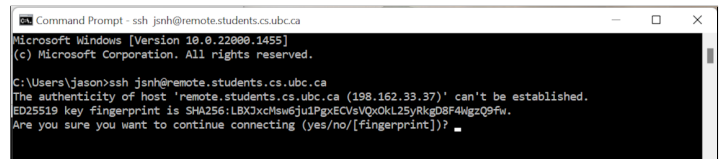
(b) Windows: Command prompt

The first time this connection is attempted, an additional prompt will appear. Type 'yes' to allow the connection and the fingerprint will be saved for later connections



```
jason@macbook ~ % ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be es
tablished.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

(a) MacOS: Key fingerprint

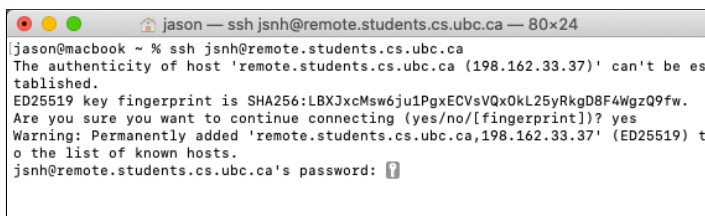


```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jason>ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be established.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

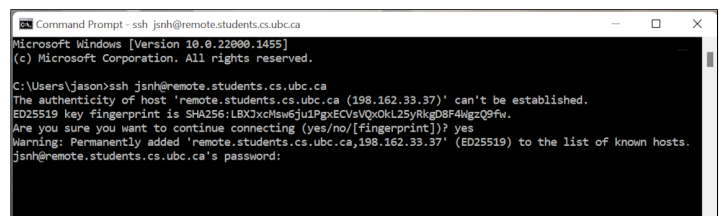
(b) Windows: Key fingerprint

At the password prompt, enter your CWL password



```
jason@macbook ~ % ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be es
tablished.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'remote.students.cs.ubc.ca,198.162.33.37' (ED25519) t
o the list of known hosts.
jsnh@remote.students.cs.ubc.ca's password: 
```

(a) MacOS: Enter your password



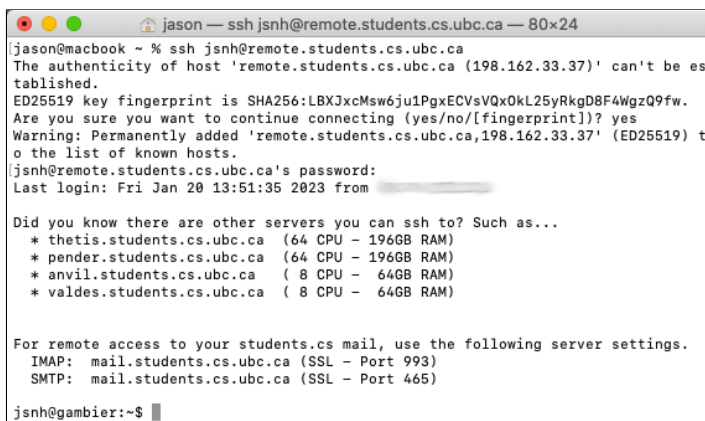
```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jason>ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be established.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'remote.students.cs.ubc.ca,198.162.33.37' (ED25519) to the list of known hosts.
jsnh@remote.students.cs.ubc.ca's password: 
```

(b) Windows: Enter your password

Once connected, a prompt will be available for commands. This is the command prompt on the server.

`YOURCWL@SERVERNAME:~$`



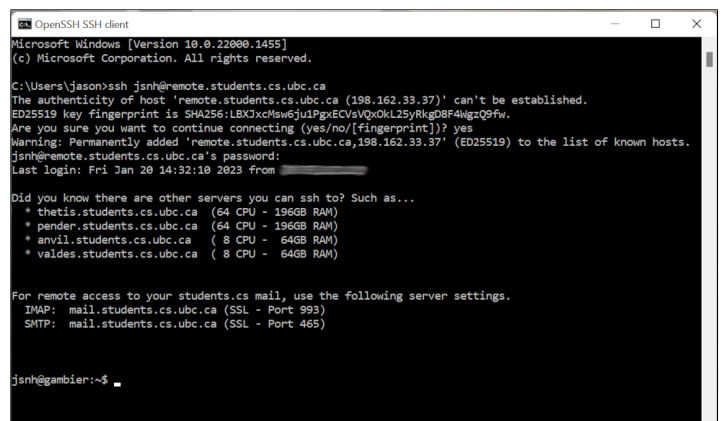
```
jason@macbook ~ % ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be es
tablished.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'remote.students.cs.ubc.ca,198.162.33.37' (ED25519) t
o the list of known hosts.
jsnh@remote.students.cs.ubc.ca's password:
Last login: Fri Jan 20 13:51:35 2023 from [redacted]

Did you know there are other servers you can ssh to? Such as...
* thetis.students.cs.ubc.ca (64 CPU - 196GB RAM)
* pender.students.cs.ubc.ca (64 CPU - 196GB RAM)
* anvil.students.cs.ubc.ca (8 CPU - 64GB RAM)
* valdes.students.cs.ubc.ca (8 CPU - 64GB RAM)

For remote access to your students.cs mail, use the following server settings.
IMAP: mail.students.cs.ubc.ca (SSL - Port 993)
SMTP: mail.students.cs.ubc.ca (SSL - Port 465)

jsnh@gambier:~$
```

(a) MacOS: Logged in



```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jason>ssh jsnh@remote.students.cs.ubc.ca
The authenticity of host 'remote.students.cs.ubc.ca (198.162.33.37)' can't be established.
ED25519 key fingerprint is SHA256:LBXJxcMsw6ju1PgxEcVsVQxOkL25yRkgD8F4WgzQ9fw.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'remote.students.cs.ubc.ca,198.162.33.37' (ED25519) to the list of known hosts.
Last login: Fri Jan 20 14:32:10 2023 from [redacted]

Did you know there are other servers you can ssh to? Such as...
* thetis.students.cs.ubc.ca (64 CPU - 196GB RAM)
* pender.students.cs.ubc.ca (64 CPU - 196GB RAM)
* anvil.students.cs.ubc.ca (8 CPU - 64GB RAM)
* valdes.students.cs.ubc.ca (8 CPU - 64GB RAM)

For remote access to your students.cs mail, use the following server settings.
IMAP: mail.students.cs.ubc.ca (SSL - Port 993)
SMTP: mail.students.cs.ubc.ca (SSL - Port 465)

jsnh@gambier:~$
```

(b) Windows: Logged in

Enter Linux commands here, such as `ls -l` to see the contents of your home directory

When you want to leave the server, enter the command `exit` or on Mac or Linux, use the key combination `ctrl-D`

2 How to launch SQL Plus

SQL Plus can be used from the server command prompt

ssh to the server, as illustrated above

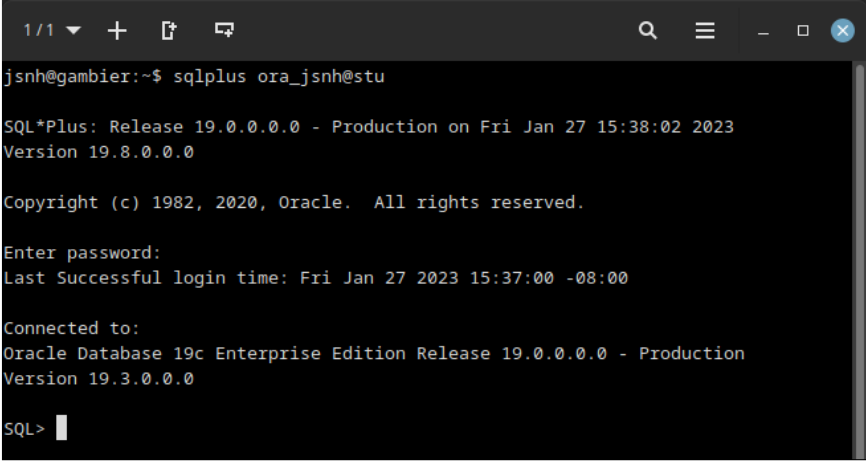
In this course, we are using the 'stu' database on Oracle

Student accounts will be created as 'ora_YOURCWL' using your own CWL username

At the command prompt, enter:

```
sqlplus ora_YOURCWL@stu
```

Your password is 'a' followed by your student number (Sally, with CWL 'notbob' and student number 12345 would log in with: 'sqlplus ora_notbob@stu' and 'a12345')

A screenshot of a terminal window with a dark background. The prompt is 'jsnh@gambier:~\$'. The command 'sqlplus ora_jsnh@stu' has been entered. The output shows 'SQL*Plus: Release 19.0.0.0.0 - Production on Fri Jan 27 15:38:02 2023', 'Version 19.8.0.0.0', and 'Copyright (c) 1982, 2020, Oracle. All rights reserved.' It then prompts 'Enter password:' and shows 'Last Successful login time: Fri Jan 27 2023 15:37:00 -08:00'. Below that, it says 'Connected to: Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production Version 19.3.0.0.0'. The prompt is now 'SQL>' with a cursor.

(a) SQLPlus logged in

Important note: This server allows only two simultaneous connections per user. If you cannot log in, check that you do not already have two open connections.)

To quit and log out of SQL Plus, enter the command `exit` or `quit`

2.1 Setting up the SQL Plus environment

Setting up the environment for your account needs to be done once.

Information about SQL Plus and some instructions are at: <https://www.students.cs.ubc.ca/~cs-304/resources/sql-plus-resources/sql-plus-setup.html>

The following instructions are similar to the instructions on the resource page linked above though include more details:

ssh to the server, as illustrated above

Check if the setup has been done by running the command:

```
cat .bashrc
```

Look for lines beginning with...

```
ORACLE_HOME=...
```

```
export ORACLE_SID=...
```

```
export LD_LIBRARY_PATH=...  
export PATH=...
```

If those lines are missing, copy each of the following lines into the command prompt, hitting enter after each line:

If you're unfamiliar with editing text files on the server, see the next section "How to create or edit a script on the server"

```
echo export ORACLE_HOME=/home/o/oracle >> ~/.bashrc  
echo export ORACLE_SID=ug >> ~/.bashrc  
echo export LD_LIBRARY_PATH=/home/o/oracle/lib32 >> ~/.bashrc  
echo export PATH=$PATH:/home/o/oracle/bin >> ~/.bashrc
```

Optionally check the .bashrc file again and the new lines should be added at the bottom

```
cat .bashrc
```

Have the server reprocess the .bashrc file by running:

```
source .bashrc
```

The one-time setup is complete.

3 How to create or edit a text file on the server

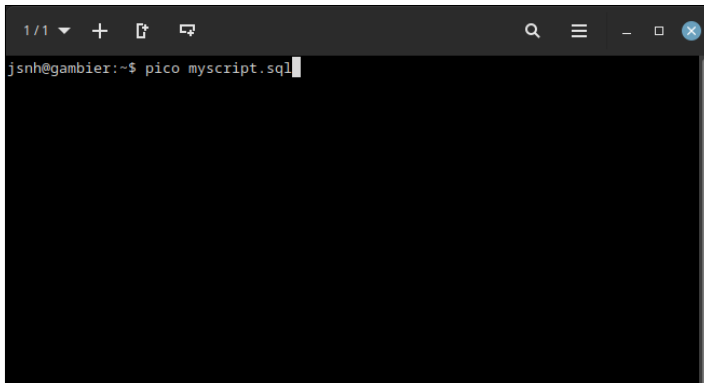
A text file, such as an SQL script, can be created or edited directly on the server.

ssh to the server, as illustrated above

We'll use pico for simplicity, though any installed text editor works just as well

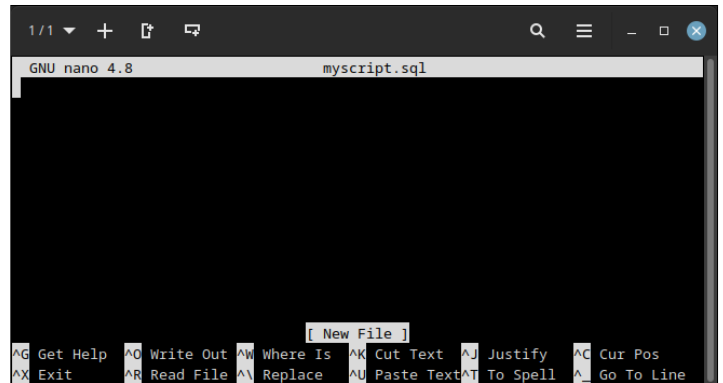
Optionally add the filename to the pico command

pico myscript.sql or just pico



```
jsnh@gambier:~$ pico myscript.sql
```

(a) Run Pico



```
GNU nano 4.8 myscript.sql
```

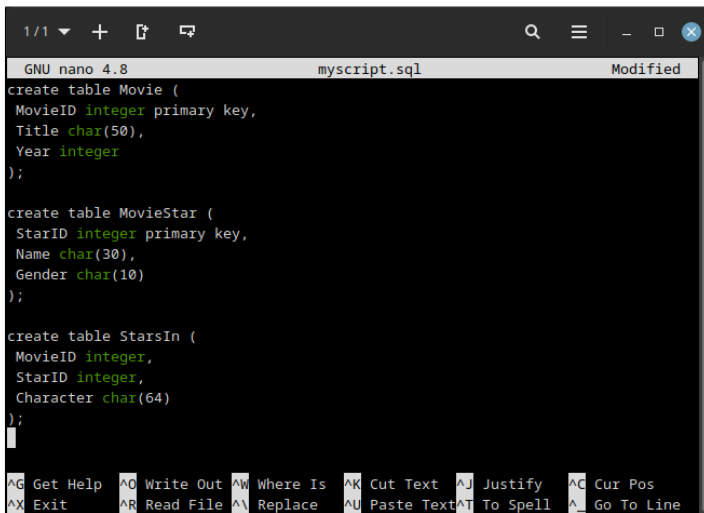
```
[ New File ]
```

```
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell ^_ Go To Line
```

(b) Pico is open

Add text or edit as necessary

Close pico with Ctrl-x and a prompt will ask about saving the file



```
GNU nano 4.8 myscript.sql Modified
```

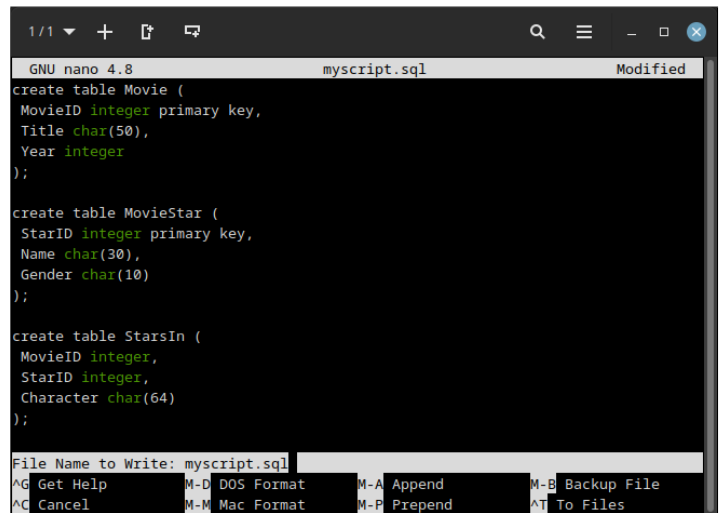
```
create table Movie (
  MovieID integer primary key,
  Title char(50),
  Year integer
);

create table MovieStar (
  StarID integer primary key,
  Name char(30),
  Gender char(10)
);

create table StarsIn (
  MovieID integer,
  StarID integer,
  Character char(64)
);
```

```
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell ^_ Go To Line
```

(a) Add text in Pico



```
GNU nano 4.8 myscript.sql Modified
```

```
create table Movie (
  MovieID integer primary key,
  Title char(50),
  Year integer
);

create table MovieStar (
  StarID integer primary key,
  Name char(30),
  Gender char(10)
);

create table StarsIn (
  MovieID integer,
  StarID integer,
  Character char(64)
);
```

```
File Name to Write: myscript.sql
```

```
^G Get Help ^M-D DOS Format ^M-A Append ^M-B Backup File
^C Cancel ^M-M Mac Format ^M-P Prepend ^T To Files
```

(b) Save in Pico

4 How to transfer files (SQL scripts) to the server (scp)

SCP (Secure Copy) is a command line tool for transferring files between computers. (Like ssh, it should already be available on your computer.)

Transfers can be between any two machines on which we have access.

In this case, we'll transfer from the local machine to the remote server.

Get the all.sql file from the references page

- <https://www.students.cs.ubc.ca/~cs-304/resources.html>
- .sql files are just text files of SQL statements and commands and can be opened with any text editor
- all.sql contains data that is used for some examples in this course and could be used for practice

Start from the command line on your computer (not ssh to the server)

The SCP command needs:

- source - the file to be transferred, including the path if it's not in the current working directory
- server - like ssh, it will require the format: YOURCWL@remote.students.cs.ubc.ca
- destination directory - (optional) target directory on the remote server; default is your home directory

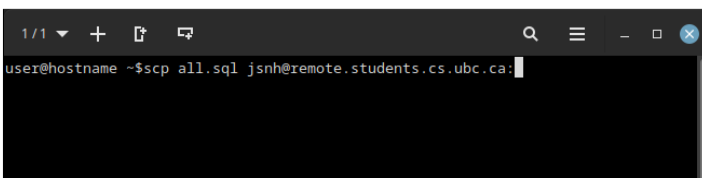
The format of the command is:

```
scp PATH/FILE YOURCWL@SERVER:DESTPATH
```

In our case (if all.sql is in the current directory):

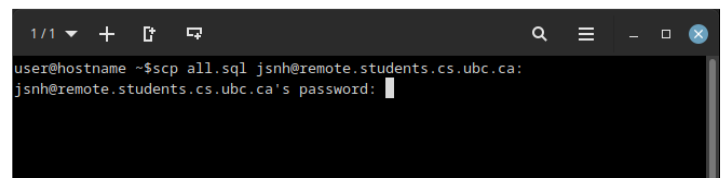
```
scp all.sql YOURCWL@remote.students.cs.ubc.ca:
```

Enter your CWL password when prompted.



```
user@hostname ~$scp all.sql jsnh@remote.students.cs.ubc.ca:
```

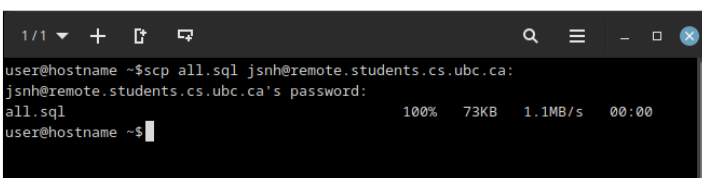
(a) SCP command



```
user@hostname ~$scp all.sql jsnh@remote.students.cs.ubc.ca:
jsnh@remote.students.cs.ubc.ca's password:
```

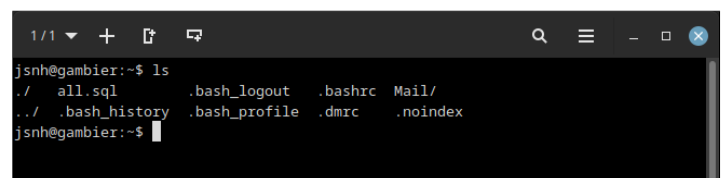
(b) Enter your password

Now, from the command line on the server (ssh), the file should be listed in your home directory



```
user@hostname ~$scp all.sql jsnh@remote.students.cs.ubc.ca:
jsnh@remote.students.cs.ubc.ca's password:
all.sql                                100% 73KB 1.1MB/s 00:00
user@hostname ~$
```

(a) The file is copied



```
jsnh@gambier:~$ ls
./ all.sql      .bash_logout  .bashrc  Mail/
./ .bash_history .bash_profile .dirc  .noindex
jsnh@gambier:~$
```

(b) The file is now on the server

5 How to run the script in SQL Plus


ssh to the server, as illustrated above

Run SQLPlus as described above

To run a script of SQL commands, use:

```
start all.sql
```

The script will run and provide some feedback

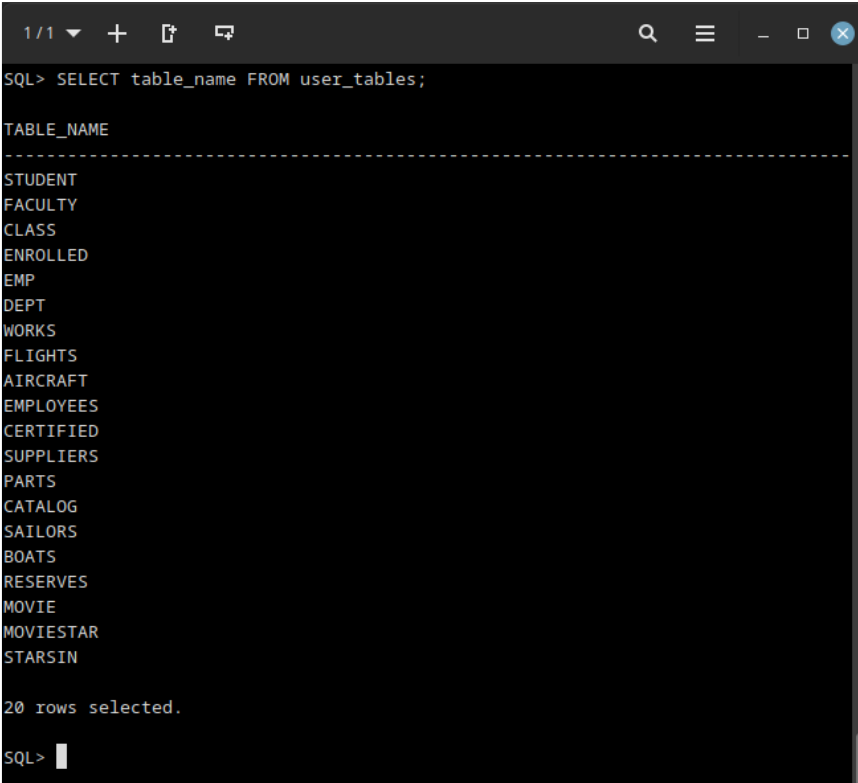
A screenshot of a SQLPlus terminal window. The window has a dark background and a light-colored title bar with standard window controls. The terminal shows the prompt 'SQL>' followed by the command 'start myscript.sql'. Below this, the output shows 'Table created.' three times, indicating that three tables were successfully created by the script. The prompt 'SQL>' is visible at the bottom of the terminal, ready for the next command.

```
1/1  +  [icon] [icon]
SQL> start myscript.sql
Table created.
Table created.
Table created.
SQL>
```

(a) SQLPlus script run

To see a list of tables in your database, enter this query into SQL Plus and hit enter:

```
SELECT table_name FROM user_tables;
```

A screenshot of a SQLPlus terminal window. The window has a dark background and a light-colored title bar with standard window controls. The terminal shows the prompt 'SQL>' followed by the command 'SELECT table_name FROM user_tables;'. Below this, the output shows a list of table names: STUDENT, FACULTY, CLASS, ENROLLED, EMP, DEPT, WORKS, FLIGHTS, AIRCRAFT, EMPLOYEES, CERTIFIED, SUPPLIERS, PARTS, CATALOG, SAILORS, BOATS, RESERVES, MOVIE, MOVIESTAR, and STARSIN. The list is preceded by a dashed line and the header 'TABLE_NAME'. At the bottom of the list, it says '20 rows selected.' The prompt 'SQL>' is visible at the bottom of the terminal, ready for the next command.

```
1/1  +  [icon] [icon]
SQL> SELECT table_name FROM user_tables;
TABLE_NAME
-----
STUDENT
FACULTY
CLASS
ENROLLED
EMP
DEPT
WORKS
FLIGHTS
AIRCRAFT
EMPLOYEES
CERTIFIED
SUPPLIERS
PARTS
CATALOG
SAILORS
BOATS
RESERVES
MOVIE
MOVIESTAR
STARSIN
20 rows selected.
SQL>
```

(a) SQLPlus list tables

To run SQL queries with SQL Plus, either pre-write the queries into .sql files to run with `start` or simply enter the query within SQL Plus