COSC2406/2407 **Database Systems**

Week 2 Lab Tasks

Objectives

Access your AWS linux instance
Installing MongoDB on your linux instance
Installing Apache Derby on your linux instance

AWS linux instance

We will be using the Amazon AWS cloud as our main teaching environment for the Database Systems course:

- Every student in the course will be assigned an individual machine on which to install database systems and implement database components in Java
- You will be given a key in a file called **sXXXXXXX-cosc2406.pem** that will grant you root access to your specific machine
- You are **responsible** for securely maintaining your own key and your machine
- You are also **responsible** for maintaining **backup** of any important files (in the event of a system failure you may not be able to retrieve any files on your machine)
- Keys **MUST NOT** be shared between students

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Make sure you securely save a permanent copy of your sXXXXXXX-cosc2406.pem file as you will need it every time you access your AWS instance!

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In the unlikely event that your AWS Linux VM crashes and does not reboot or if you have other similar problems, you should contact RMIT ITS support online via \url{https://rmit.service-now.com/serviceandsupport/}, and make sure you include in the **Subject field:**

"COSC2406 - Database Systems - Student VM Issue sXXXXXXX.cosc2406.route53.aws.rmit.edu.au"

Connecting to your AWS linux instance

Connecting from a Windows machine (only works while at the university):

(1) Before connecting (for the first time from Windows), you will need to convert your **sXXXXXXX-cosc2406.pem** file to a **.pkk** using puttygen.

(2) If using putty, use the following settings

- **hostname: ec2-user@sXXXXXXX.cosc2406.route53.aws.rmit.edu.au**
- **connection/ssh/auth --> point to your PPK file (private key)**
- **connection/proxy:**
  proxyType: HTTP
  proxyHostname: aproxy
  port: 8080

Please note you cannot connect to your aws instance from outside the university directly as the service is firewalled. This has been done to simplify management of security of your instance as an attacker would need to break into the university first (although that has been done before – relatively recently). For this reason it is encouraged for you to store your key on titan/jupiter/saturn and connect via there to your amazon instance.

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Connecting from titan / jupiter / saturn

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with the -i flag to the ssh command, you can use the .pem key you have been provided with to connect to your amazon instance.

For example: if your student id was 34123423:

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login to titan / jupiter or saturn using the normal way. If you have forgotten how to do this, consult the UNIX Survival guide available here:
https://jupiter.csit.rmit.edu.au/~e70949/inductionguide.pdf**Error! Hyperlink reference not valid.**

You will also need to upload the .pem key to the server and ensure its permissions are only 600 (that is, only you have read and write permissions to it – any more permissions and it won't work with ssh as it is rather strict with security). We would suggest using winscp on windows (https://winscp.net/eng/index.php) or cyberduck on the mac (https://cyberduck.io/).

Once done, change the permissions of the file using chmod:

chmod 600 pemfile

where pemfile is the name of the .pem file you have uploaded.

Enter the following command (replace the student number here with your own):
ssh -i pemfile ec2-user@s34123423.cosc2406.route53.aws.rmit.edu.au

After connecting to your AWS linux instance

When you log into your AWS instance (for the first time or when updates are available), it will prompt you to run:

sudo yum update

which you should run. This will update the database of software on the server and download the latest versions of important software.

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Installing MongoDB on your AWS linux instance

MongoDB is an example of a NoSQL database system. To read about MongoDB the documentation is at https://docs.mongodb.com/manual/ , how does it differ from a relational database?

To install MongoDB on your AWS linux instance, follow directions given at the following url:
https://docs.mongodb.org/manual/tutorial/install-mongodb-on-amazon/

If you follow the instructions on the above link, please be sure to click on the "Amazon Linux (2013.03+)" tab and not the "Amazon Linux 2" tab as the "Amazon Linux 2" instructions won't work as that's not the machine type we are using.

Some tips on the key steps.

To create the yum repo file use an editor (such as vi/vim)

sudo vim /etc/yum.repos.d/mongodb-org-4.2.repo

to insert the following 6 lines into the file

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```
[mongodb-org-4.2]
name=MongoDB Repository
baseurl=https://repo.mongodb.org/yum/amazon/2013.03/mongodb-org/4.2/x86_64/
gpgcheck=1
enabled=1
gpgkey=https://www.mongodb.org/static/pgp/server-4.2.asc
```

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Then the following command should install mongodb (it takes a little while to finish)

sudo yum install -y mongodb-org

Try running the mongodb:

sudo service mongod start

To run a mongo shell (see https://docs.mongodb.com/manual/mongo/):

mongo

If you have time, experiment with inserting a document and writing a query to retrieve it. The "help" command shows a list of commands in the mongo shell.

Installing Apache Derby on your AWS linux instance

Apache Derby is an open source relational database written in Java. You can read about its history on Wikipedia https://en.wikipedia.org/wiki/Apache_Derby. The source code is accessible – you can view the code but do not need to download it now http://svn.apache.org/repos/asf/db/derby/code/branches/10.13/java/engine/org/apache/derby/

First you need to update the java version on your AWS instance

```
sudo yum install java-1.8.0-openjdk-devel
sudo yum remove java-1.7.0-openjdk
```

Then follow these directions to install DerbyDB:

https://db.apache.org/derby/papers/DerbyTut/install_software.html

In particular, to download the bin distribution:

```
wget http://apache.mirror.amaze.com.au/db/derby/db-derby-10.14.2.0/db-derby-10.14.2.0-bin.tar.gz
```

to unpack the distribution in the directory /opt/Apache

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```
sudo mkdir /opt/Apache
sudo cp db-derby-10.14.2.0-bin.tar.gz /opt/Apache
cd /opt/Apache
sudo tar xzvf db-derby-10.14.2.0-bin.tar.gz
```

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add the following lines to the ~/.bashrc file on AWS instance:

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```
export DERBY_INSTALL=/opt/Apache/db-derby-10.14.2.0-bin
export DERBY_HOME=$DERBY_INSTALL
export CLASSPATH=$DERBY_INSTALL/lib/derby.jar:$DERBY_INSTALL/lib/derbytools.jar:.
```

and then run

```
source ~/.bashrc
```

Then to complete installation

```
cd $DERBY_INSTALL/bin
. setEmbeddedCP
```

Now to verify it works run

```
java org.apache.derby.tools.sysinfo
```

If time permits continue on to the interactive SQL tool
https://db.apache.org/derby/papers/DerbyTut/ij_intro.html

Before starting the interactive SQL return to your home directory:

```
cd
```

and the interactive SQL can be then invoked with the following command:

```
java org.apache.derby.tools.ij
```

Finally, make everything runnable by the user you logged in as:
Run the following command to change the owning user to ec2-user:

sudo chown -R ec2-user:ec2-user /opt/Apache

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