Introduction to Conda on Ibex

CS323: Deep Learning for Visual Computing

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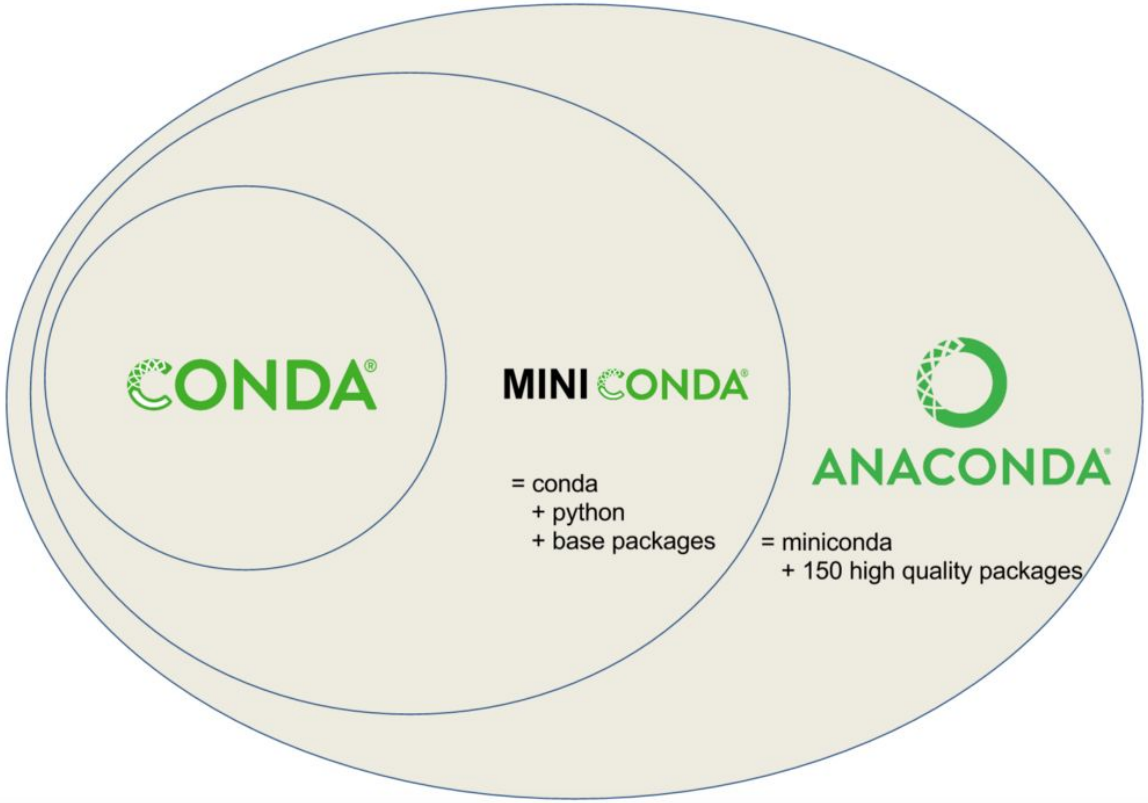
What is CONDA?

- Conda is an open source package and environment management system.
- Conda can quickly install, run, and update packages and associated dependencies.
- Conda can create, save, load, and switch between project specific software environments on your local computer.

The CONDA Family



What is Ibex?

- Ibex is a computational cluster that contains different architectures of CPUs and GPUs.
- In our course we will be interested in using GPUs for that we will access ibex as follows:

ssh username@glogin.ibex.kaust.edu.sa

- **glogin** will allow us to access the GPU nodes. On the other hand, CPU only nodes are accessed with **ilogin**.

Accessing your Ibex account

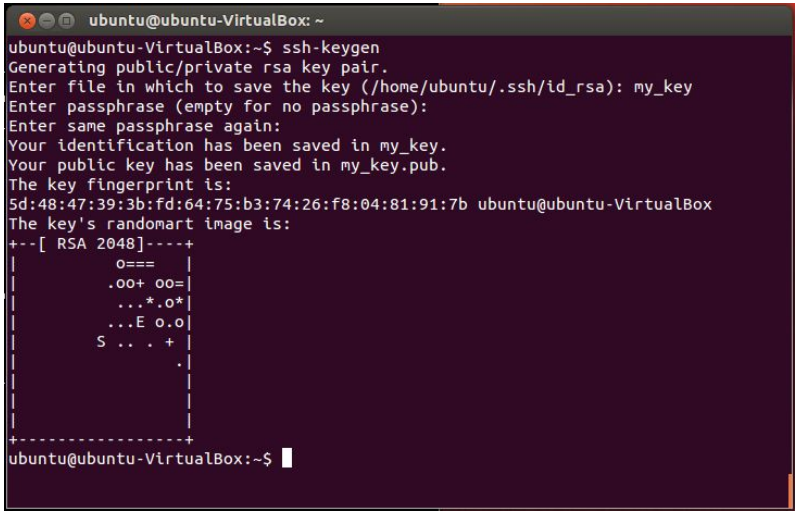
ssh username@glogin.ibex.kaust.edu.sa

-> Requires you to type in your password.

-> Anything easier we can do ?

ssh-keygen

1. Run ssh-keygen
2. This command will generate a public key and a private key. You should not share your private key with anyone.
3. Go to home directory (you can run “cd” to do so)
4. cd .ssh/
5. vim id_rsa.pub <- your public key



ssh-keygen

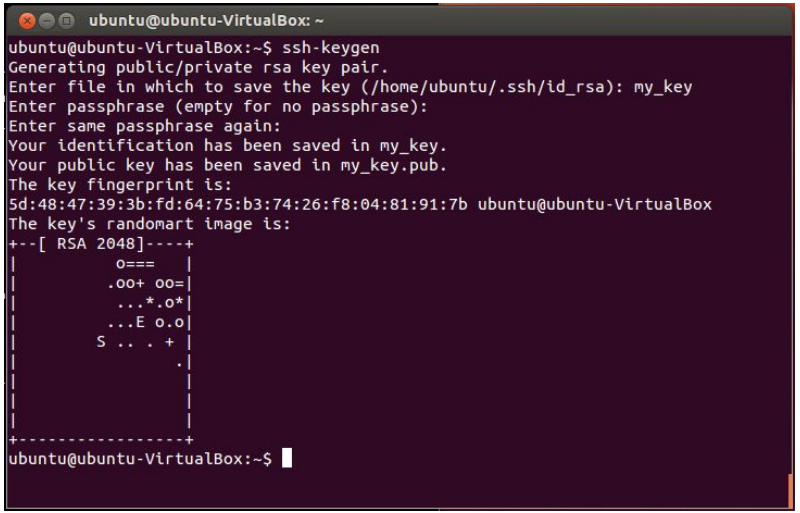
6. Copy your ssh-key and leave it aside.

7. ssh to your Ibex account (ssh username@glogin.ibex.kaust.edu.sa)

8. cd .ssh

9. vim authorized_keys

10. Paste your public ID



config

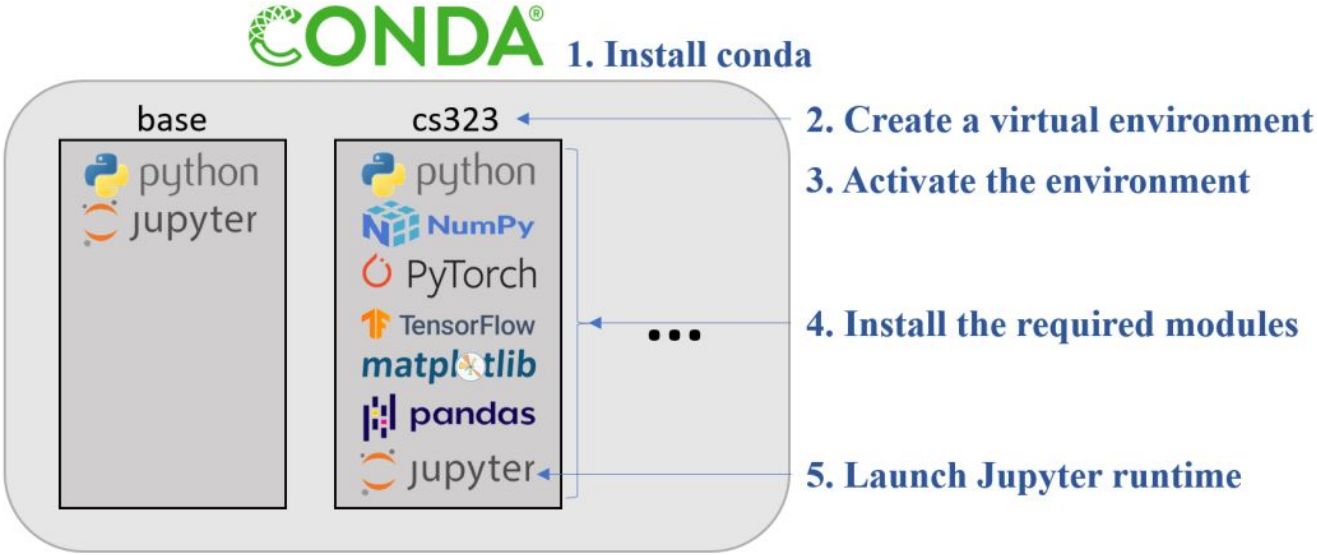
1. Go to your home directory
2. Again cd .ssh/
3. vim config

   And write the following

```
# Read more about SSH config files: https://linux.die.net/man/5/ssh_config
Host ibex
    HostName glogin.ibex.kaust.edu.sa
    User username
```

4. You can now ssh to your Ibex account simply by writing ssh ibex!

Our Ibex is set … Let's Install Conda!



1. Install Conda

- **Download the installer script**

  wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh

- **Run the Installer:**

  bash Miniconda3-latest-Linux-x86_64.sh -b

- **Verify Installation:**

  ~/miniconda3/bin/conda init bash && source ~/.bashrc && conda config --set auto_activate_base false

2. Create Your Environment

Create environment called cs323 with python version 3.9.1

conda create -n cs323 python=3.9.1 -y

You can conda env list to see available environments

3. Activate Your Conda Environment

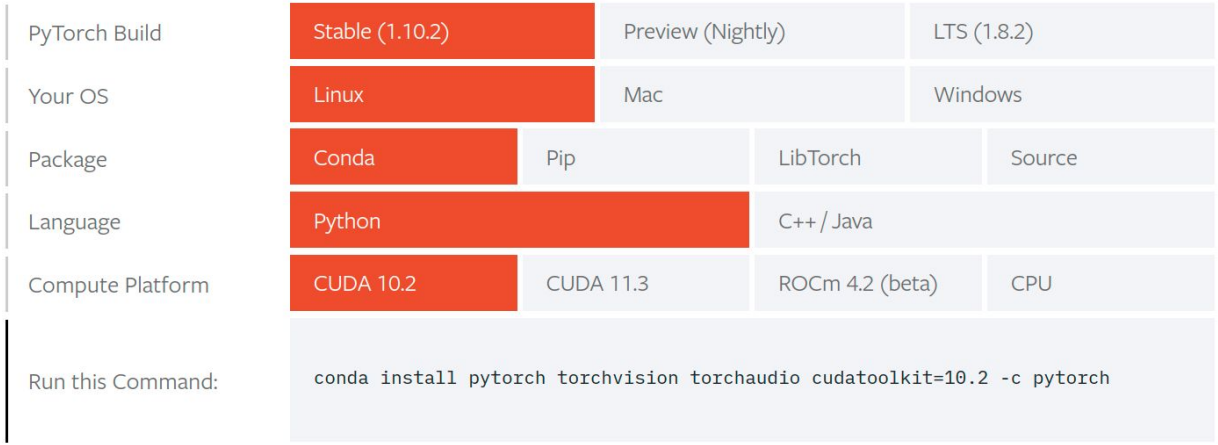
Activate your environment using

conda activate cs323

4. Install Required Packages

- conda install matplotlib
- conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch
- conda install jupyter -y

https://pytorch.org/get-started/locally/



PIP vs CONDA

- pip is a package manager that facilitates installation, upgrade, and uninstallation of **python packages**. It also works with virtual **python** environments.
- conda is a package manager for **any software** (installation, upgrade and uninstallation). It also works with virtual **system** environments.

	conda	pip
install python package	✅	✅
create virtual environment	✅, built-in	❌, requires `virtualenv` or `venv`
package format	`.tar.bz2` , `.conda`	`.whl` , `.tar.gz`
manages	binaries	wheel or source
can require compilers	❌	✅
package types	any	Python-only
dependency checks	✅	❌
package sources	Anaconda repo and Anaconda cloud	PyPI

5. Running Jupyter Notebook on Ibex

1. **Allocate a computational node:**

   srun --time=00:30:00 --gres gpu:1 --mem=10G --resv-ports=1 --pty /bin/bash -l

2. **Active your environment:** conda activate cs323
3. **Set your Jupyter Directory [optional]:**
   export JUPYTER_RUNTIME_DIR=/tmp
4. **Get node IP:** hostname -I
5. **Open Jupyter Notebook instance:**
   jupyter notebook --no-browser --ip=0.0.0.0 --port=$SLURM_STEP_RESV_PORTS

5. Running Jupyter Notebook on Ibex

6. You will get a link of the form: http://gpu211-06:12787/?token=9a1vd6....

Simply replace gpu211-06 by the IP obtained from running hostname -I and paste the link into your browser!

Tip: Moving Files from Local Machine to Ibex

scp /file/directory/notebook.ipynb ibex:/home/username/folder/

or folder

scp -r /folder/directory/ ibex:/home/username/

Or **Termius**

Using Ibex .. A step further

Generate bash scripts for running jobs on Ibex using :
https://www.hpc.kaust.edu.sa/ibex/job

```
#!/bin/bash
#SBATCH -N 1
#SBATCH --partition=batch
#SBATCH -J MyJob                  # Job Name
#SBATCH -o MyJob.%J.out           # Output Log File Format
#SBATCH -e MyJob.%J.err           # Error Log File Format
#SBATCH --time=01:30:00           # Job Run Time
#SBATCH --mem=100M                # RAM Needed
#SBATCH --gres=gpu:v100:2         # GPU Type and Count

#run the application:
conda activate cs323
python main.py
```

You will save this file as in sh format, e.g bash.sh and then run it with the command sbatch bash.sh

There are many things to learn …

- Ibex is an amazing computational cluster which we should respectfully use. There are many things to learn such as running parameter search, using argparser or config files with Ibex, …
- Make sure to join Ibex Slack channel to ask any questions you might have.
- You can also reach out to me on Slack if you have any questions (:

What's Next?

- sshfs: this command allows you to mount your Ibex directory onto your workstation. This you to move your files around easily without scp.
- srun –jobid XXXXX nvidia-smi : allows you to view the GPU utilization of a running job.
- Bash scripting to run hyperparameter search e.g
  - for lr in 0.01 0.001 0.0001
    do
        sbatch run.sh –lr ${lr}
    done
- Using ssh platforms like Termius
- Using VSCode on Ibex
- Accessing debugging nodes

Thank you and Remember …