

Access to computational resources

UiO / NORBIS course

IN-BIOS 5000 / 9000

29 October 2024

Torbjørn Rognes, Dept. of Informatics, University of Oslo

Wifi

- Eduroam (preferred):
 - SSID: **eduroam**
 - Example username: username@uio.no
 - Replace username with your own
 - Replace uio.no with your home institution (or use UiO account)
- Guest network:
 - SSID: **uioguest**
 - Web login form, password by SMS to your mobile phone
 - Temporary access for 12h
- Temporary eduroam account also available
 - Contact Torbjørn

Terminal, ssh & scp

Mac:

- **Terminal**

Linux:

- **gnome-terminal, console, xterm** or anything similar

Windows 10/11:

- **Command prompt / Windows Terminal**

Older windows:

- **gitbash** is recommended: <https://gitforwindows.org>
- **Putty** or other terminals may be used, but you will also need scp (secure copy)

Fox account

- If you have not yet obtained an account, please contact Torbjørn

Login to Fox from your computer

```
$ ssh ec-username@fox.educloud.no
```

```
One-Time_Code: 123456
```

```
Password: abc
```

```
Last login: ...
```

```
Welcome to
```

```
F O X
```

```
the HPC cluster in EduCloud.
```

```
...
```

Forgot your password?

- Go to <https://selfservices.educloud.no/>
- Click “Change your password”
- Log in with Norwegian Digital ID (BankID)

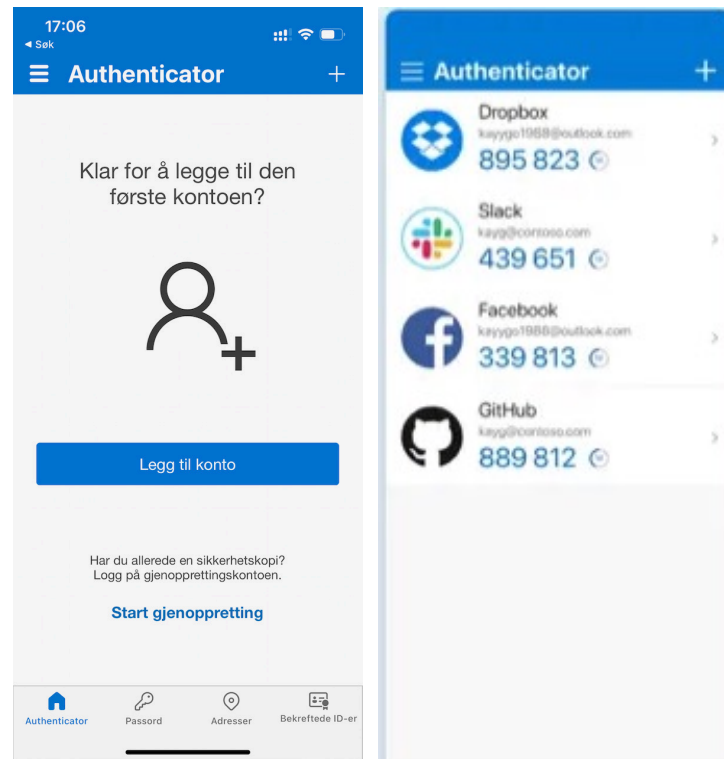
Trouble with 2FA?

- Go to <https://selfservices.educloud.no/>
- Click “Change your OTP”
- Log in with Norwegian Digital ID (BankID)

Use a genuine authenticator app



Microsoft
Authenticator



Login message

```
% ssh fox
(ec-torognes@fox.educcloud.no) One-Time_Code:
(ec-torognes@fox.educcloud.no) Password:
```

Welcome to FOX

[illegible]

The HPC Cluster in Educcloud

Please see the documentation for how to use Fox:
<https://www.uio.no/english/services/it/research/platforms/edu-research/help/hpc/docs/fox/index.md>

In addition to the compute nodes, Fox has a couple of machines for interactive use:
<https://www.uio.no/english/services/it/research/platforms/edu-research/help/hpc/docs/fox/interactive-machines.md>

For quick help to install new software or updates to existing software, we kindly ask you to fill in this form:
<https://nettskjema.no/a/usit-sw-request>

The fastest way to get other types of support is to fill in this support request form:
<https://nettskjema.no/a/hpc-support>

Current resource situation on the interactive machines, updated 2024-10-27 11:00:01:

name	memory (GiB)		load			/localscratch (GiB)		
	total	free	1-min	5-min	15-min	total	used	%used
int-1	1006	874	1.21	1.23	1.25	9595	1757	30%
int-2	1006	911	1.00	1.02	1.00	9595	1775	30%
int-3	1006	645	0.02	0.05	0.02	9595	2470	42%
int-4	1006	941	20.01	20.06	20.03	9595	2774	47%

We encourage you to choose the least busy machine.
Last login: Thu Oct 24 20:59:11 2024 from 46.227.152.15

Course directory

/projects/ec34/in-biosx000

```
[ec-torognes@login-3 ~]$ cd /projects/ec34/in-biosx000
[ec-torognes@login-3 in-biosx000]$ pwd
/projects/ec34/in-biosx000
[ec-torognes@login-3 in-biosx000]$ ls -la
total 19
drwxrws---+ 7 ec-torognes ec34-member-group 4096 Oct 15 13:34 .
drwxrws---+ 19 ec-torognes ec34-member-group 16384 Oct 13 12:50 ..
drwxr-s---+ 11 ec-karinlag ec34-member-group 4096 Oct 21 2022 assembly
drwxr-s---+ 7 ec-yingsh ec34-member-group 4096 Oct 24 2022 human_vc
drwxr-s---+ 4 ec-arvindsu ec34-member-group 4096 Oct 19 2022 preprocessing
drwxr-s---+ 4 ec-trinro ec34-member-group 4096 Oct 25 2022 smallRNA
drwxr-s---+ 6 ec-bastiaas ec34-member-group 4096 Oct 17 2022 SNP_calling
[ec-torognes@login-3 in-biosx000]$
```

The directory is shared across all nodes.

Home directory

/fp/homes01/u01/ec-username

```
[ec-torognes@login-3 ~]$ cd
[ec-torognes@login-3 ~]$ pwd
/fp/homes01/u01/ec-torognes
[ec-torognes@login-3 ~]$ ls -lat
total 155
drwx----- 16 ec-torognes ec-torognes-group 16384 Oct 17 17:16 .
-rw-----  1 ec-torognes ec-torognes-group 30317 Oct 17 17:16 .bash_history
drwxr-xr-x 677 root      root          32768 Oct 15 14:22 ..
-rw-r--r--  1 ec-torognes ec-torognes-group   138 Apr 27 11:06 .bash_profile
drwx-----  2 ec-torognes ec-torognes-group  4096 Mar  8 2022 .ssh
[ec-torognes@login-3 ~]$
```

The directory is shared across all nodes.

Copying files with scp

Secure copy command:

```
scp [username@][host:][path/]file [username@][host:][path/]file
```

source target

Examples - copy a file from fox to your laptop:

```
scp ec-username@fox.educcloud.no:/projects/ec34/in-biosx000/file .  
scp ec-username@fox.educcloud.no:yourfile .
```

Must be run on your laptop, not on Fox. The “.” means the current directory on the laptop. You’ll be asked for one-time code and password.

Login nodes

When you login to fox.educcloud.no you will actually login to one of the four login nodes:

- login-1
- login-2
- login-3
- login-4

The login nodes are for very light processing only, e.g. editing text files, listing directories, etc

Interactive nodes

Four interactive nodes are available:

- int-1
- int-2
- int-3
- int-4

Login to one of these with ssh from a login node.

Please choose one with low load (as indicated in the login message).

128 cores, 1TB RAM each

Module commands

Unload all modules

```
module purge
```

Show loaded modules

```
module list
```

Search for available modules

```
module avail <part of name>
```

Load a module

```
module load <full name of module>
```

Module avail example

```
[ec-torognes@login-3 ~]$ module avail BWA
```

```
----- /cluster/software/EL9/easybuild/modules/all -----  
BWA/GPU-0.7.17-r1198-foss-2022b      BWA/0.7.17-GCCcore-12.2.0  
BWA/0.7.17-GCCcore-11.3.0           libWallModelledLES/0.6.1-foss-2021b
```

If the avail list is too long consider trying:

"module --default avail" or "ml -d av" to just list the default modules.

"module overview" or "ml ov" to display the number of modules for each name.

Use "module spider" to find all possible modules and extensions.

Use "module keyword key1 key2 ..." to search for all possible modules matching any of the "keys".

```
[ec-torognes@login-3 ~]$
```


Module load, list and purge

```
[ec-torognes@login-3 ~]$ module load BWA/0.7.17-GCCcore-12.2.0
```

```
[ec-torognes@login-3 ~]$ module list
```

Currently Loaded Modules:

- | | |
|-----------------------------------|-------------------------------|
| 1) GCCcore/12.2.0 | 6) OpenSSL/1.1 |
| 2) zlib/1.2.12-GCCcore-12.2.0 | 7) DB/18.1.40-GCCcore-12.2.0 |
| 3) expat/2.4.9-GCCcore-12.2.0 | 8) Perl/5.36.0-GCCcore-12.2.0 |
| 4) ncurses/6.3-GCCcore-12.2.0 | 9) BWA/0.7.17-GCCcore-12.2.0 |
| 5) libreadline/8.2-GCCcore-12.2.0 | |

```
[ec-torognes@login-3 ~]$ module purge
```

```
[ec-torognes@login-3 ~]$ module list
```

No modules loaded

```
[ec-torognes@login-3 ~]$
```

Module IN-BIOS5000/HT-2024

```
[ec-torognes@login-3 ~]$ module load IN-BIOS5000/HT-2024
```

To execute Trimmomatic run: `java -jar $EBROOTTRIMMOMATIC/trimmomatic-0.39.jar`

To execute Pilon run: `java -Xmx8G -jar $EBROOTPILON/pilon.jar`

Adjust the memory value according to the size of your input files

```
[ec-torognes@login-3 ~]$
```

Course module list

```
[ec-torognes@login-3 ~]$ module list
```

Currently Loaded Modules:

- | | |
|--|---|
| 1) GCCcore/11.3.0 | 40) BEDTools/2.30.0-GCC-11.3.0 |
| 2) zlib/1.2.12-GCCcore-11.3.0 | 41) cURL/7.83.0-GCCcore-11.3.0 |
| 3) binutils/2.38-GCCcore-11.3.0 | 42) HTSLib/1.15.1-GCC-11.3.0 |
| 4) GCC/11.3.0 | 43) VCFtools/0.1.16-GCC-11.3.0 |
| 5) numactl/2.0.14-GCCcore-11.3.0 | 44) Tcl/8.6.12-GCCcore-11.3.0 |
| 6) CUDA/11.7.0 | 45) SQLite/3.38.3-GCCcore-11.3.0 |
| 7) GDRCopy/2.3-GCCcore-11.3.0 | 46) GMP/6.2.1-GCCcore-11.3.0 |
| 8) UCX/1.12.1-GCCcore-11.3.0 | 47) libffi/3.4.2-GCCcore-11.3.0 |
| 9) UCC/1.0.0-GCCcore-11.3.0 | 48) Python/3.10.4-GCCcore-11.3.0 |
| 10) OpenMPI/4.1.4-GCC-11.3.0 | 49) GATK/4.3.0.0-GCCcore-11.3.0-Java-11 |
| 11) OpenBLAS/0.3.20-GCC-11.3.0 | 50) gzip/1.12-GCCcore-11.3.0 |
| 12) FlexiBLAS/3.2.0-GCC-11.3.0 | 51) lz4/1.9.3-GCCcore-11.3.0 |
| 13) FFTW/3.3.10-GCC-11.3.0 | 52) zstd/1.5.2-GCCcore-11.3.0 |
| 14) gomp/2022a | 53) libdeflate/1.10-GCCcore-11.3.0 |
| 15) FFTW.MPI/3.3.10-gomp-2022a | 54) PLINK/2.00a3.7-foss-2022a |
| 16) ScaLAPACK/2.2.0-gomp-2022a-fb | 55) SPAdes/3.15.5-GCC-11.3.0 |
| 17) foss/2022a | 56) Trimmomatic/0.39-Java-11 |
| 18) GSL/2.7-GCC-11.3.0 | 57) Pilon/1.24-Java-11 |
| 19) expat/2.4.8-GCCcore-11.3.0 | 58) Nextflow/24.04.2 |
| 20) ncurses/6.3-GCCcore-11.3.0 | 59) pybind11/2.9.2-GCCcore-11.3.0 |
| 21) libreadline/8.1.2-GCCcore-11.3.0 | 60) SciPy-bundle/2022.05-foss-2022a |
| 22) OpenSSL/1.1 | 61) xorg-macros/1.19.3-GCCcore-11.3.0 |
| 23) DB/18.1.40-GCCcore-11.3.0 | 62) libpciaccess/0.16-GCCcore-11.3.0 |
| 24) Perl/5.34.1-GCCcore-11.3.0 | 63) X11/20220504-GCCcore-11.3.0 |
| 25) EIGENSOFT/7.2.1-foss-2022a | 64) Tk/8.6.12-GCCcore-11.3.0 |
| 26) FastQC/0.11.9-Java-11 | 65) Tkinter/3.10.4-GCCcore-11.3.0 |
| 27) bzip2/1.0.8-GCCcore-11.3.0 | 66) jbigkit/2.1-GCCcore-11.3.0 |
| 28) libpng/1.6.37-GCCcore-11.3.0 | 67) LibTIFF/4.3.0-GCCcore-11.3.0 |
| 29) Brotli/1.0.9-GCCcore-11.3.0 | 68) Pillow/9.1.1-GCCcore-11.3.0 |
| 30) freetype/2.12.1-GCCcore-11.3.0 | 69) Qhull/2020.2-GCCcore-11.3.0 |
| 31) util-linux/2.38-GCCcore-11.3.0 | 70) matplotlib/3.5.2-foss-2022a |
| 32) fontconfig/2.14.0-GCCcore-11.3.0 | 71) Java/11 -> Java/11.0.18 |
| 33) NASM/2.15.05-GCCcore-11.3.0 | 72) ICU/71.1-GCCcore-11.3.0 |
| 34) libjpeg-turbo/2.1.3-GCCcore-11.3.0 | 73) Boost/1.79.0-GCC-11.3.0 |
| 35) libgd/2.3.3-GCCcore-11.3.0 | 74) QUASt/5.2.0-foss-2022a |
| 36) GDGraph/1.56-GCCcore-11.3.0 | 75) assembly_stats/0.1.4-foss-2022a |
| 37) FASTX-Toolkit/0.0.14-GCC-11.3.0 | 76) BCFtools/1.15.1-GCC-11.3.0 |
| 38) XZ/5.2.5-GCCcore-11.3.0 | 77) BWA/0.7.17-GCCcore-11.3.0 |
| 39) BamTools/2.5.2-GCC-11.3.0 | 78) IN-BIOS5000/HT-2024 |

More info

- <https://www.uio.no/english/services/it/research/hpc/fox/index.html>
- <https://uio-in-biosx000.readthedocs.io/en/latest/>
- <https://uio-in-biosx000.readthedocs.io/en/latest/Educloud/index.html>
- <https://uio-in-biosx000.readthedocs.io/en/latest/software.html>