

# **Access to computational resources**

UiO / NORBIS course

IN-BIOS 5000 / 9000

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# 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://research.educloud.no/login>
- Click “Forgot your password?”
- Log in with Norwegian Digital ID (BankID, MinID, Buypass, Comfides)

# Trouble with 2FA?

- Go to <https://research.educloud.no/login>
- Click “Need a new one time code?”
- Log in with Norwegian Digital ID (BankID, MinID, Buypass, Comfides)

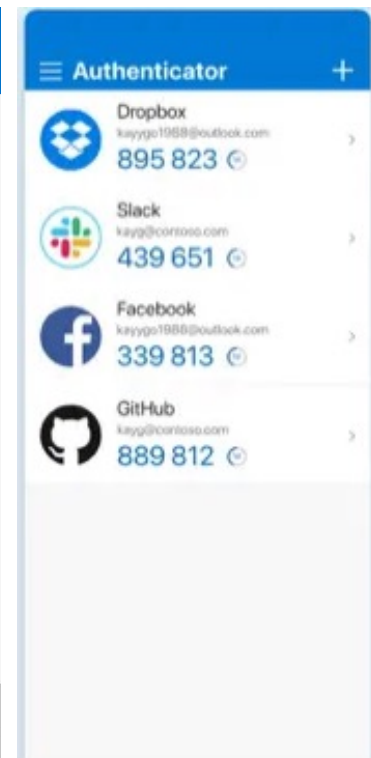
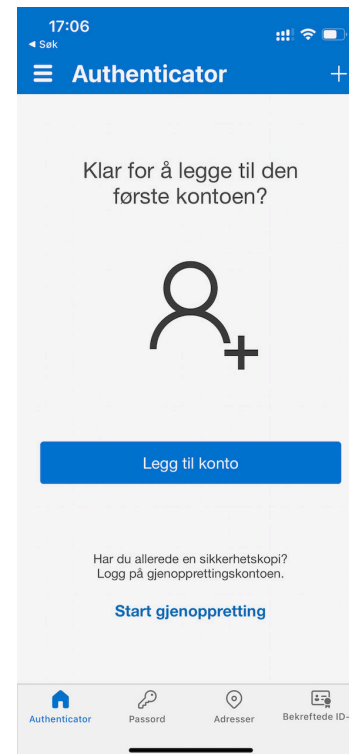
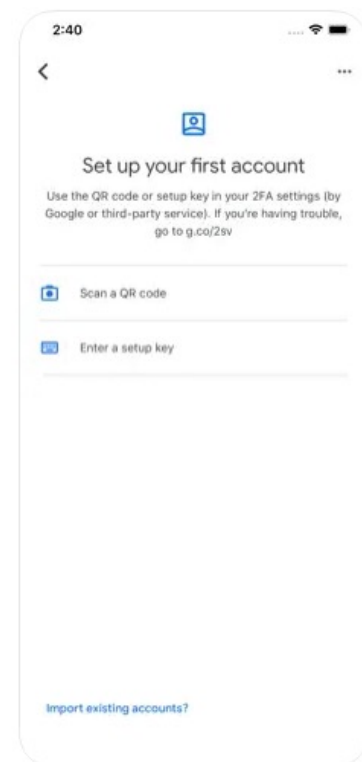
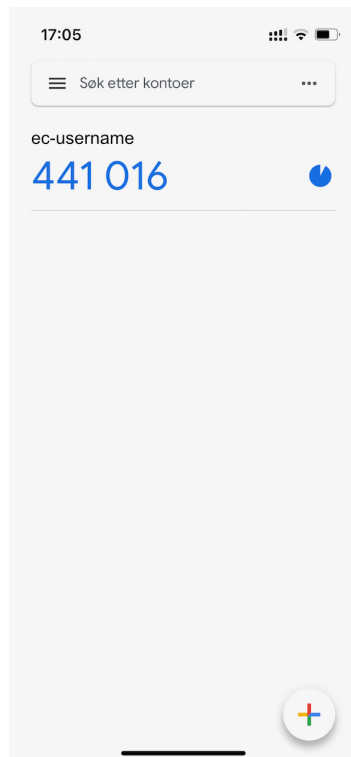
# Authenticator apps



Google  
Authenticator



Microsoft  
Authenticator





# Login message

Last login: Mon Oct 17 15:00:56 2022 from eduroam-193-157-254-175.wlan.uio.no

Welcome to

F O X

the HPC cluster in EduCloud.

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>

Current resource situation on the interactive machines, updated 2022-10-17 16:55:01:

name	memory (GiB)		load			/localscratch (GiB)		
	total	free	1-min	5-min	15-min	total	used	%used
int-1	1007	990	0.00	0.01	0.00	5959	733	13%
int-2	1007	825	0.01	0.03	0.00	5959	921	16%
int-3	1007	101	9.16	9.07	9.12	5959	180	4%
int-4	1007	117	24.13	32.17	35.00	5959	365	7%

We encourage you to choose the least busy machine.

[ec-username@login-1 ~]\$

# Course directory

## **/projects/ec34/in-biosx000**

```
[ec-username@login-3 ~]$ cd /projects/ec34/in-biosx000/  
[ec-username@login-3 in-biosx000]$ pwd  
/projects/ec34/in-biosx000  
[ec-username@login-3 in-biosx000]$ ls -lat  
total 18  
drwxrws--- 3 ec-karinlag ec34-member-group 4096 Oct 12 20:38 assembly  
drwxrws--- 4 ec-torognes ec34-member-group 4096 Oct 12 20:37 .  
drwxrws--- 7 ec-bastiaas ec34-member-group 4096 Oct 10 21:54 SNP_calling  
drwxrws--- 8 ec-torognes ec34-member-group 16384 Jun 15 12:37 ..  
[ec-username@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.



# Login nodes

When you login to fox.educloud.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-4 ~]$ module avail BWA
```

```
----- /cluster/modulefiles/all -----  
bwa-mem2/2.2.1      BWA/0.7.17-foss-2018b  BWA/0.7.17-GCCcore-11.2.0
```

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-4 ~]$
```



# Module load, list and purge

```
[ec-torognes@login-4 ~]$ module load BWA/0.7.17-GCCcore-11.2.0
```

```
[ec-torognes@login-4 ~]$ module list
```

Currently Loaded Modules:

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 1) GCCcore/11.2.0                 | 6) OpenSSL/1.1                |
| 2) zlib/1.2.11-GCCcore-11.2.0     | 7) DB/18.1.40-GCCcore-11.2.0  |
| 3) expat/2.4.1-GCCcore-11.2.0     | 8) Perl/5.34.0-GCCcore-11.2.0 |
| 4) ncurses/6.2-GCCcore-11.2.0     | 9) BWA/0.7.17-GCCcore-11.2.0  |
| 5) libreadline/8.1-GCCcore-11.2.0 |                               |

```
[ec-torognes@login-4 ~]$ module purge
```

```
[ec-torognes@login-4 ~]$ module list
```

No modules loaded

```
[ec-torognes@login-4 ~]$
```

# Course module

```
[ec-torognes@login-4 ~]$ module load IN-BIOS5000/HT-2022
```

```
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

WARNING: GATK v4.2.6.1 support for Java 11 is in beta state. Use at your own risk.

# Course module list

```
[ec-torognes@login-4 ~]$ module list
```

## Currently Loaded Modules:

- 1) FastQC/0.11.9-Java-11
- 2) Trimmomatic/0.39-Java-11
- 3) Pilon/1.24-Java-11
- 4) GCCcore/11.2.0
- 5) zlib/1.2.11-GCCcore-11.2.0
- 6) binutils/2.37-GCCcore-11.2.0
- 7) bzip2/1.0.8-GCCcore-11.2.0
- 8) ncurses/6.2-GCCcore-11.2.0
- 9) libreadline/8.1-GCCcore-11.2.0
- 10) Tcl/8.6.11-GCCcore-11.2.0
- 11) SQLite/3.36-GCCcore-11.2.0
- 12) XZ/5.2.5-GCCcore-11.2.0
- 13) GMP/6.2.1-GCCcore-11.2.0
- 14) libffi/3.4.2-GCCcore-11.2.0
- 15) OpenSSL/1.1
- 16) Python/3.9.6-GCCcore-11.2.0
- 17) GATK/4.2.6.1-GCCcore-11.2.0-Java-11
- 18) GCC/11.2.0
- 19) numactl/2.0.14-GCCcore-11.2.0
- 20) libxml2/2.9.10-GCCcore-11.2.0
- 21) libpciaccess/0.16-GCCcore-11.2.0
- 22) hwloc/2.5.0-GCCcore-11.2.0
- 23) libevent/2.1.12-GCCcore-11.2.0
- 24) UCX/1.11.2-GCCcore-11.2.0
- 25) libfabric/1.13.2-GCCcore-11.2.0
- 26) PMIx/4.1.0-GCCcore-11.2.0
- 27) OpenMPI/4.1.1-GCC-11.2.0
- 28) OpenBLAS/0.3.18-GCC-11.2.0
- 29) FlexiBLAS/3.0.4-GCC-11.2.0
- 30) gomp/2021b
- 31) FFTW/3.3.10-gomp-2021b
- 32) ScaLAPACK/2.1.0-gomp-2021b-fb
- 33) foss/2021b
- 34) pybind11/2.7.1-GCCcore-11.2.0
- 35) SciPy-bundle/2021.10-foss-2021b
- 36) libpng/1.6.37-GCCcore-11.2.0
- 37) Brotli/1.0.9-GCCcore-11.2.0
- 38) freetype/2.11.0-GCCcore-11.2.0
- 39) expat/2.4.1-GCCcore-11.2.0
- 40) util-linux/2.37-GCCcore-11.2.0
- 41) fontconfig/2.13.94-GCCcore-11.2.0
- 42) xorg-macros/1.19.3-GCCcore-11.2.0
- 43) X11/20210802-GCCcore-11.2.0
- 44) Tk/8.6.11-GCCcore-11.2.0
- 45) Tkinter/3.9.6-GCCcore-11.2.0
- 46) NASM/2.15.05-GCCcore-11.2.0
- 47) libjpeg-turbo/2.0.6-GCCcore-11.2.0
- 48) jbigkit/2.1-GCCcore-11.2.0
- 49) gzip/1.10-GCCcore-11.2.0
- 50) lz4/1.9.3-GCCcore-11.2.0
- 51) zstd/1.5.0-GCCcore-11.2.0
- 52) LibTIFF/4.3.0-GCCcore-11.2.0
- 53) Pillow/8.3.2-GCCcore-11.2.0
- 54) Qhull/2020.2-GCCcore-11.2.0
- 55) matplotlib/3.4.3-foss-2021b
- 56) libyaml/0.2.5-GCCcore-11.2.0
- 57) PyYAML/5.4.1-GCCcore-11.2.0
- 58) networkx/2.6.3-foss-2021b
- 59) MultiQC/1.12-foss-2021b
- 60) BamTools/2.5.2-GCC-11.2.0
- 61) BEDTools/2.30.0-GCC-11.2.0
- 62) DB/18.1.40-GCCcore-11.2.0
- 63) Perl/5.34.0-GCCcore-11.2.0
- 64) ICU/69.1-GCCcore-11.2.0
- 65) Boost/1.77.0-GCC-11.2.0
- 66) QUASt/5.2.0-foss-2021b
- 67) SPAdes/3.15.5-GCC-11.2.0
- 68) Velvet/1.2.10-GCC-11.2.0-mt-kmer\_191
- 69) FASTX-Toolkit/0.0.14-GCC-11.2.0
- 70) Java/11.0.2
- 71) Bowtie2/2.4.4-GCC-11.2.0
- 72) cURL/7.78.0-GCCcore-11.2.0
- 73) SAMtools/1.15-GCC-11.2.0
- 74) Racon/1.5.0-GCCcore-11.2.0
- 75) PCRE/8.45-GCCcore-11.2.0
- 76) LMDB/0.9.29-GCCcore-11.2.0
- 77) BLAST+/2.12.0-gomp-2021b
- 78) Unicycler/0.5.0-gomp-2021b
- 79) assembly-stats/0.1.4-foss-2021b-Python-3.9.6
- 80) bwa-mem2/2.2.1
- 81) GSL/2.7-GCC-11.2.0
- 82) EIGENSOFT/7.2.1-foss-2021b
- 83) BWA/0.7.17-GCCcore-11.2.0
- 84) Flye/2.9.1-GCC-11.2.0
- 85) HTSLib/1.14-GCC-11.2.0
- 86) VCFtools/0.1.16-GCC-11.2.0
- 87) PLINK/1.9b\_6.21-x86\_64
- 88) IN-BIOS5000/HT-2022

# 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>