

Linux Introduction

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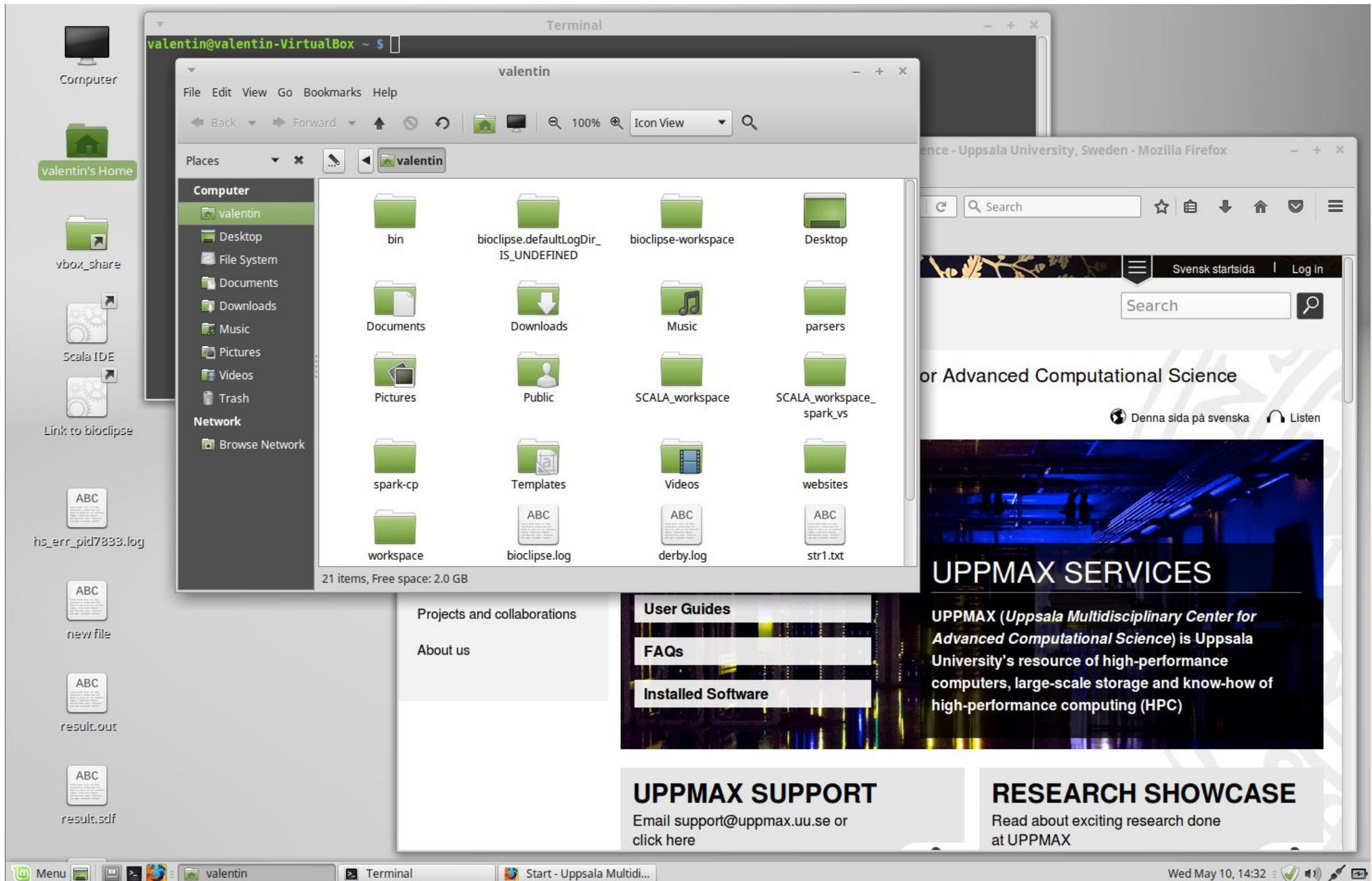
Enabler for Life Sciences

Linux Introduction

You will not learn this now.
Google it or look at lecture slides when you need it.

Practice makes perfect :)

Enabler for Life Sciences




```
-rw-r--r-- 1 valentin valentin 51709 Oct 12 2015 str1.txt
-rw-r--r-- 1 valentin valentin 126832 Oct 12 2015 str2.txt
drwxr-xr-x 2 valentin valentin 4096 Sep 1 2015 Templates
-rw-r----- 1 valentin valentin 5 May 10 14:29 .vboxclient-clipboard.pid
-rw-r----- 1 valentin valentin 5 May 10 14:29 .vboxclient-display.pid
-rw-r----- 1 valentin valentin 5 May 10 14:29 .vboxclient-draganddrop.pid
-rw-r----- 1 valentin valentin 5 May 10 14:29 .vboxclient-seamless.pid
drwxr-xr-x 2 valentin valentin 4096 Sep 1 2015 Videos
-rw----- 1 valentin valentin 4798 Feb 15 2016 .viminfo
drwxr-xr-x 3 valentin valentin 4096 Jan 11 2016 websites
drwxr-xr-x 3 valentin valentin 4096 Jun 8 2016 workspace
-rw----- 1 valentin valentin 130 May 10 14:29 .Xauthority
-rw-r--r-- 1 valentin valentin 131 Sep 2 2015 .xinputrc
-rw-r--r-- 1 valentin valentin 3197 May 10 14:31 .xsession-errors
valentin@valentin-VirtualBox ~ $ ll
total 780
drwxr-xr-x 35 valentin valentin 4096 May 10 14:30 ./
drwxr-xr-x 3 root root 4096 Sep 1 2015 ../
drwx----- 3 valentin valentin 4096 Sep 2 2015 .adobe/
-rw----- 1 valentin valentin 6412 Dec 10 11:48 .bash_history
-rw-r--r-- 1 valentin valentin 220 Sep 1 2015 .bash_logout
-rw-r--r-- 1 valentin valentin 305 Feb 15 2016 .bashrc
drwxr-xr-x 8 valentin valentin 4096 Sep 2 2015 bin/
drwxr-xr-x 2 valentin valentin 4096 Nov 3 2016 bioclipse.defaultLogDir_IS_UNDEFINED/
-rw-r--r-- 1 valentin valentin 366894 Jun 15 2016 bioclipse.log
drwxr-xr-x 9 valentin valentin 4096 Nov 3 2016 bioclipse-workspace/
drwxr-xr-x 9 valentin valentin 4096 Sep 2 2015 .cache/
drwxr-xr-x 17 valentin valentin 4096 Sep 8 2015 .config/
drwx----- 3 valentin valentin 4096 Sep 1 2015 .dbus/
-rw-r--r-- 1 valentin valentin 709 Sep 2 2015 derby.log
drwxr-xr-x 2 valentin valentin 4096 Oct 12 2015 Desktop/
-rw----- 1 valentin valentin 2 May 10 14:29 .dmrc
drwxr-xr-x 2 valentin valentin 4096 Sep 1 2015 Documents/
drwxr-xr-x 3 valentin valentin 4096 Nov 3 2016 Downloads/
drwx----- 3 valentin valentin 4096 May 10 14:29 .gconf/
-rw-r--r-- 1 valentin valentin 74 Sep 2 2015 .gitconfig
-rw-r----- 1 valentin valentin 0 Sep 1 2015 .gksu.lock
drwx----- 3 valentin valentin 4096 Sep 1 2015 .gnome/
drwx----- 4 valentin valentin 4096 Jun 15 2016 .gnome2/
drwx----- 2 valentin valentin 4096 Sep 1 2015 .gnome2_private/
-rw-r--r-- 1 valentin valentin 37 Jan 11 2016 .httrack.ini
-rw----- 1 valentin valentin 15540 May 10 14:29 .ICEauthority
drwxr-xr-x 4 valentin valentin 4096 Sep 7 2015 .java/
-rw----- 1 valentin valentin 35 Sep 2 2015 .lessht
drwxr-xr-x 4 valentin valentin 4096 Sep 1 2015 .linuxmint/
drwx----- 3 valentin valentin 4096 Sep 1 2015 .local/
drwxr-xr-x 3 valentin valentin 4096 Sep 1 2015 .m2/
drwx----- 3 valentin valentin 4096 Sep 2 2015 .macromedia/
drwxr-xr-x 4 valentin valentin 4096 Sep 1 2015 .mozilla/
drwxr-xr-x 2 valentin valentin 4096 Sep 1 2015 Music/
-rw-r--r-- 1 valentin valentin 213 Sep 2 2015 .pam_environment
drwxr-xr-x 4 valentin valentin 4096 Sep 2 2015 parsers/
```

The screenshot shows a Linux desktop environment. A file manager window is open, displaying a sidebar with icons for Downloads, Music, parsers, Desktop, Desktop/, Templates, Videos, websites, Desktop/, .dmrc, Documents/, Downloads/, bioclipse.log, derby.log, str1.txt, Templates, Videos, websites, Desktop/, .dmrc, Documents/, Downloads/, bioclipse.log, derby.log, str1.txt, User Guides, FAQs, and Installed Software. The main pane shows a file tree with folders like .adobe/, .bash_history, .bash_logout, .bashrc, bin/, bioclipse.defaultLogDir_IS_UNDEFINED/, workspace, SDALA_workspace, spark.js, .cache/, .config/, .dbus/, derby.log, Desktop/, .dmrc, Documents/, Downloads/, .gconf/, .gitconfig, .gksu.lock, .gnome/, .gnome2/, .gnome2_private/, .httrack.ini, .ICEauthority, .java/, .lessht, .linuxmint/, .local/, .m2/, .macromedia/, .mozilla/, Music/, .pam_environment, and parsers/.

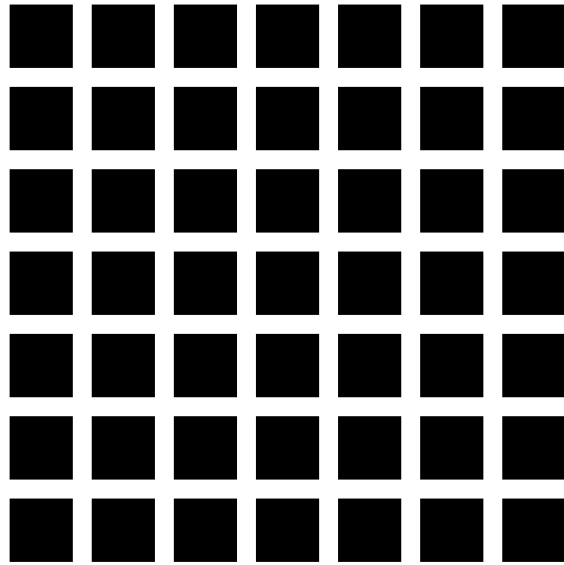
Below the file manager, there is a terminal window showing the command prompt and the output of the 'll' command. The terminal output is identical to the one shown in the text block above.

On the right side of the desktop, there is a sidebar with a search bar and a section titled 'UPPMAX SERVICES'. The 'UPPMAX SERVICES' section contains the following text: 'UPPMAX (Uppsala Multidisciplinary Center for Advanced Computational Science) is Uppsala University's resource of high-performance computers, large-scale storage and know-how of high-performance computing (HPC)'. Below this text, there are two buttons: 'UPPMAX SUPPORT' and 'RESEARCH SHOWCASE'. The 'UPPMAX SUPPORT' button has the text 'Email support@uppmax.uu.se or click here' below it. The 'RESEARCH SHOWCASE' button has the text 'Read about exciting research done at UPPMAX' below it.

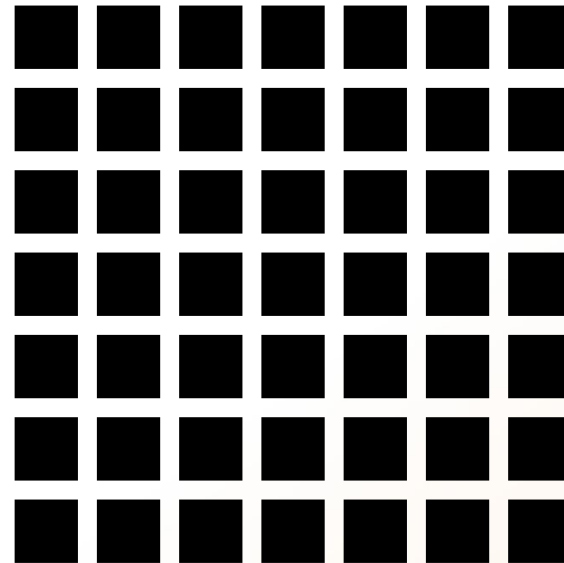
Uppsala Multidisciplinary Center for Advanced Computational Science

(Uppsala supercomputer center)

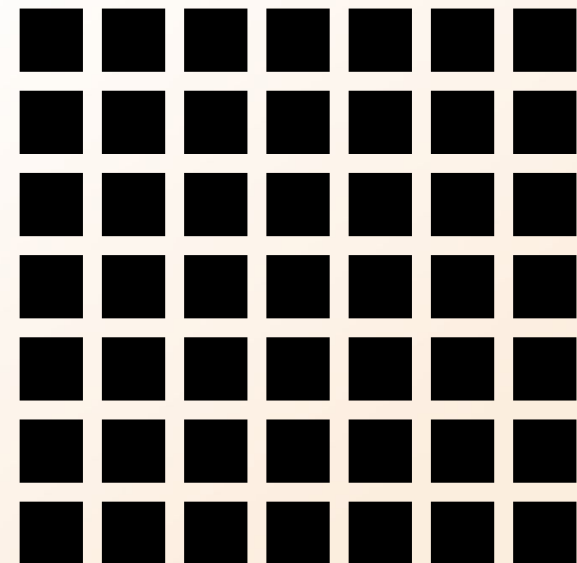
Computer clusters



Milou

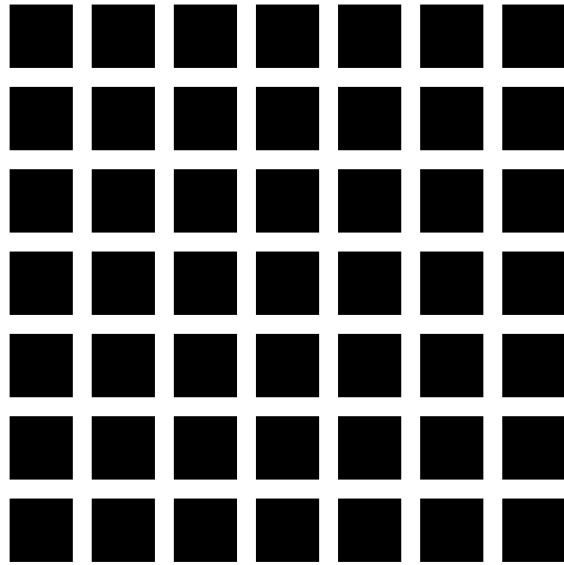


Rackham

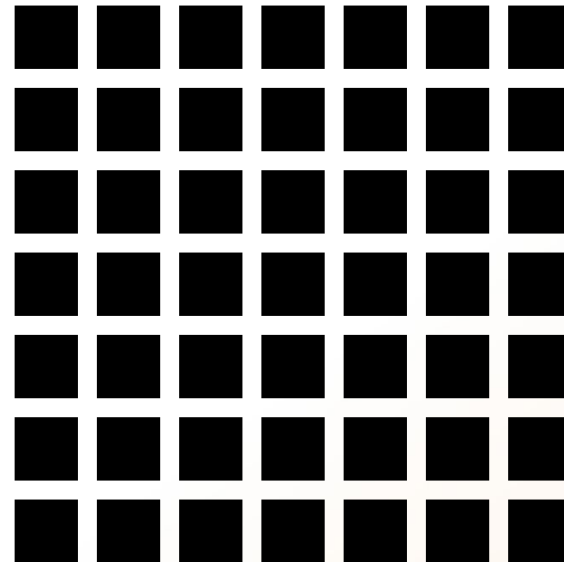


Bianca

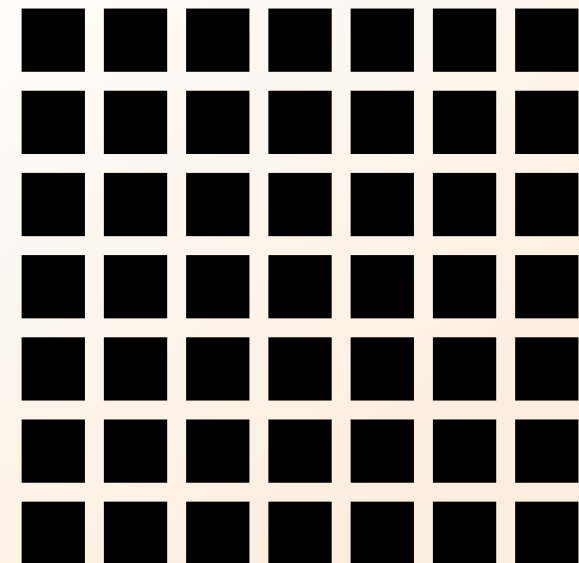
Computer clusters



Milou



Rackham

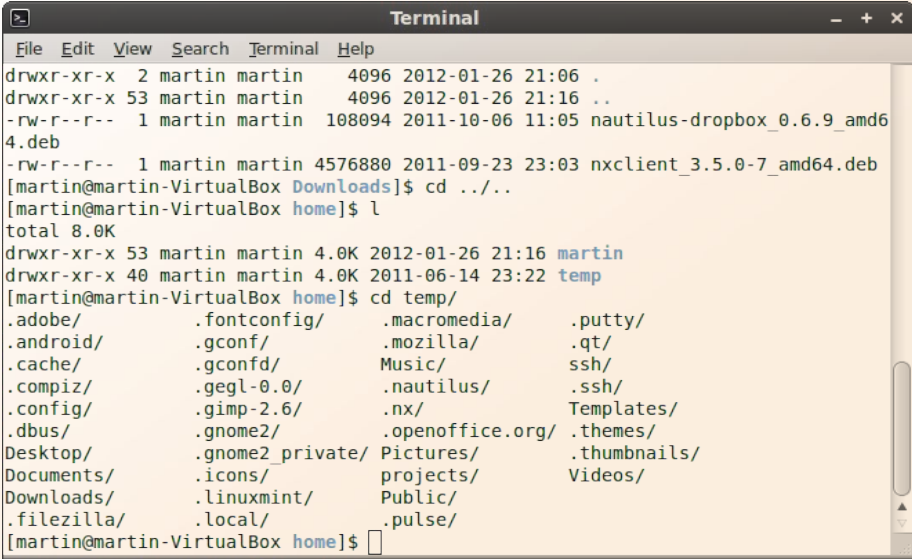


Bianca

UPPMAX is accessible over the internet

Command Line Interface (CLI)

Terminal



```
Terminal
File Edit View Search Terminal Help
drwxr-xr-x  2 martin martin   4096 2012-01-26 21:06 .
drwxr-xr-x 53 martin martin   4096 2012-01-26 21:16 ..
-rw-r--r--  1 martin martin 108094 2011-10-06 11:05 nautilus-dropbox_0.6.9_amd64.deb
-rw-r--r--  1 martin martin 4576880 2011-09-23 23:03 nxclient_3.5.0-7_amd64.deb
[martin@martin-VirtualBox Downloads]$ cd ../../
[martin@martin-VirtualBox home]$ l
total 8.0K
drwxr-xr-x 53 martin martin 4.0K 2012-01-26 21:16 martin
drwxr-xr-x 40 martin martin 4.0K 2011-06-14 23:22 temp
[martin@martin-VirtualBox home]$ cd temp/
.adobe/          .fontconfig/    .macromedia/    .putty/
.android/        .gconf/         .mozilla/       .qt/
.cache/          .gconfd/        Music/          ssh/
.compiz/         .gegl-0.0/      .nautilus/      .ssh/
.config/         .gimp-2.6/      .nx/            Templates/
.dbus/           .gnome2/        .openoffice.org/.themes/
Desktop/         .gnome2_private/Pictures/
Documents/       .icons/         projects/       .thumbnails/
Downloads/       .linuxmint/     Public/
.filezilla/      .local/         .pulse/
[martin@martin-VirtualBox home]$
```

Files and programs

Files and directories

File structure
(directory tree)

Directory tree

| Name | Size | Type | Date Modified |
|--|-----------|--------------------------|---------------------|
| + annotations | | -- folder | 2011-05-18 15:34:34 |
| - annovar | | -- folder | 2011-05-18 15:34:31 |
| + annovarFiles | | -- folder | 2011-05-18 15:34:05 |
| + compare | | -- folder | 2011-05-18 15:34:29 |
| + prepStat | | -- folder | 2011-05-18 15:34:29 |
| + statFiles | | -- folder | 2011-05-18 15:34:06 |
| - summarizePerGene | | -- folder | 2011-05-18 15:34:31 |
| - data | | -- folder | 2011-05-18 15:34:31 |
| 01 10 1.annovar | 1.4 MB | unknown | 2011-05-18 15:34:30 |
| 1.annovar.alleleFreq.pdf | 895 bytes | PDF document | 2011-05-18 15:34:30 |
| 01 10 1.annovar.exonic_variant_function | 242.9 KB | unknown | 2011-05-18 15:34:30 |
| 01 10 1.annovar.hg19_snp131_dropped | 837.2 KB | unknown | 2011-05-18 15:34:30 |
| 01 10 1.annovar.hg19_snp131_filtered | 905.6 KB | unknown | 2011-05-18 15:34:30 |
| ABC 1.annovar.log | 725 bytes | application log | 2011-05-18 15:34:30 |
| 01 10 1.annovar.stat | 938 bytes | unknown | 2011-05-18 15:34:30 |
| 01 10 1.annovar.variant_function | 2.3 MB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.non_sym_gene_list | 94.3 KB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.non_sym_gene_list_not_in_dbsnp | 78.8 KB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.stop_gain_gene_list | 4.4 KB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.stop_gain_gene_list_not_in_dbsnp | 4.3 KB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.sym_gene_list | 51.4 KB | unknown | 2011-05-18 15:34:31 |
| 01 10 1.sym_gene_list_not_in_dbsnp | 34.3 KB | unknown | 2011-05-18 15:34:31 |
| ABC test.out | 2.7 MB | out document | 2011-05-18 15:34:31 |
| 01 10 all.plot | 500 bytes | unknown | 2011-05-18 15:34:30 |
| summary.ods | 23.2 KB | OpenDocument Spreadsheet | 2011-05-18 15:34:31 |

Files and programs

programs = commands

program_name *-parameter1* *-parameter2* input_file output_file

home directory

your own (account) directory

working directory

the directory you are “sitting” in now

pwd – print working directory

```
[dahlo@kalkyl4 dir]$
```

pwd – print working directory


```
[dahlo@kalkyl4 dir]$
```

```
[dahlo@kalkyl4 dir]$ pwd  
/home/dahlo/glob/work/testarea/temp/dir
```


ls – list the content of a directory







ls – list the content of a directory

```
[dahlo@kalkyl4 dir]$
```

| Name | Size | Type | Date Modified |
|---|------|-----------|---------------------|
|  dir | | -- folder | 2012-01-05 13:44:47 |







ls – list the content of a directory

```
[dahlo@kalkyl4 dir]$ ls
anotherFile.doc  directory1  file1.txt  file2.old  secondDirectory
```

| Name | Size | Type | Date Modified |
|---|---------|---------------------|---------------------|
|  dir | | -- folder | 2012-01-05 13:44:47 |
|  directory1 | | -- folder | 2012-01-05 13:45:43 |
|  secondDirectory | | -- folder | 2012-01-05 13:46:21 |
|  anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
|  file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
|  file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

ls – list the content of a directory

```
[dahlo@kalkyl4 dir]$ ls -l
total 192
-rw-r--r-- 1 dahlo uppmx 28214 Jan  5 13:44 anotherFile.doc
drwxr-xr-x 2 dahlo uppmx  4096 Jan  5 13:45 directory1
-rw-r--r-- 1 dahlo uppmx 36458 Jan  5 13:44 file1.txt
-rw-r--r-- 1 dahlo uppmx  2273 Jan  5 13:44 file2.old
drwxr-xr-x 2 dahlo uppmx  4096 Jan  5 13:46 secondDirectory
```







| Name | Size | Type | Date Modified |
|---|---------|---------------------|---------------------|
|  dir | | -- folder | 2012-01-05 13:44:47 |
|  directory1 | | -- folder | 2012-01-05 13:45:43 |
|  secondDirectory | | -- folder | 2012-01-05 13:46:21 |
|  anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
|  file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
|  file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

Navigation Commands

cd – change working directory

`cd <directory name>` = down/forward

```
[dahlo@kalkyl4 dir]$ cd directory1  
[dahlo@kalkyl4 directory1]$
```

| Name | Size | Type | Date Modified |
|---|---------|---------------------|---------------------|
|  dir | -- | folder | 2012-01-05 13:44:47 |
|  directory1 | -- | folder | 2012-01-05 13:45:43 |
|  secondDirectory | -- | folder | 2012-01-05 13:46:21 |
|  anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
|  file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
|  file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

cd – change working directory

cd <directory name>

= down/forward

```
[dahlo@kalkyl4 dir]$ cd directory1
[dahlo@kalkyl4 directory1]$ ls -l
total 184
-rw-r--r-- 1 dahlo uppmx 56427 Jan  5 13:45 notes
-rw-r--r-- 1 dahlo uppmx 25301 Jan  5 13:45 test.txt
```

| Name | Size | Type | Date Modified |
|-----------------|---------|---------------------|---------------------|
| dir | -- | folder | 2012-01-05 13:44:47 |
| directory1 | -- | folder | 2012-01-05 13:45:43 |
| notes | 55.1 KB | unknown | 2012-01-05 13:45:43 |
| test.txt | 24.7 KB | plain text document | 2012-01-05 13:45:26 |
| secondDirectory | -- | folder | 2012-01-05 13:46:21 |
| anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
| file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
| file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

cd – change working directory

cd <directory name> = down/forward

cd .. = up/back

```
[dahlo@kalkyl4 directory1]$ cd ../secondDirectory
[dahlo@kalkyl4 secondDirectory]$ ls -l
total 252
-rw-r--r-- 1 dahlo uppmx 28214 Jan  5 13:46 bird.jpg
-rw-r--r-- 1 dahlo uppmx 112853 Jan  5 13:46 tree.jpg
```

| Name | Size | Type | Date Modified |
|-----------------|----------|---------------------|---------------------|
| dir | -- | folder | 2012-01-05 13:44:47 |
| directory1 | -- | folder | 2012-01-05 13:45:43 |
| secondDirectory | -- | folder | 2012-01-05 13:46:21 |
| bird.jpg | 27.6 KB | JPEG Image | 2012-01-05 13:46:21 |
| tree.jpg | 110.2 KB | JPEG Image | 2012-01-05 13:46:09 |
| anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
| file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
| file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

cd – change working directory

cd <directory name>

= down/forward

cd ..

= up/back

```
[dahlo@kalkyl4 secondDirectory]$ ls -l ../directory1/
total 184
-rw-r--r-- 1 dahlo uppmx 56427 Jan  5 13:45 notes
-rw-r--r-- 1 dahlo uppmx 25301 Jan  5 13:45 test.txt
```

| Name | Size | Type | Date Modified |
|-----------------|---------|---------------------|---------------------|
| dir | -- | folder | 2012-01-05 13:44:47 |
| directory1 | -- | folder | 2012-01-05 13:45:43 |
| notes | 55.1 KB | unknown | 2012-01-05 13:45:43 |
| test.txt | 24.7 KB | plain text document | 2012-01-05 13:45:26 |
| secondDirectory | -- | folder | 2012-01-05 13:46:21 |
| anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
| file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
| file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

cd – change working directory









- `cd <directory name>` = down/forward
- `cd ..` = up/back
- `cd` = go home
= `cd /home/dahlo/`

Summary

pwd – print working directory

ls – list content of directory

cd – change working directory

| Name | Size | Type | Date Modified |
|---|----------|---------------------|---------------------|
|  dir | | -- folder | 2012-01-05 13:44:47 |
|  directory1 | | -- folder | 2012-01-05 13:45:43 |
|  secondDirectory | | -- folder | 2012-01-05 13:46:21 |
|  bird.jpg | 27.6 KB | JPEG Image | 2012-01-05 13:46:21 |
|  tree.jpg | 110.2 KB | JPEG Image | 2012-01-05 13:46:09 |
|  anotherFile.doc | 27.6 KB | Word document | 2012-01-05 13:44:47 |
|  file1.txt | 35.6 KB | plain text document | 2012-01-05 13:44:15 |
|  file2.old | 2.2 KB | backup file | 2012-01-05 13:44:33 |

Interaction Commands

cp - copy a file

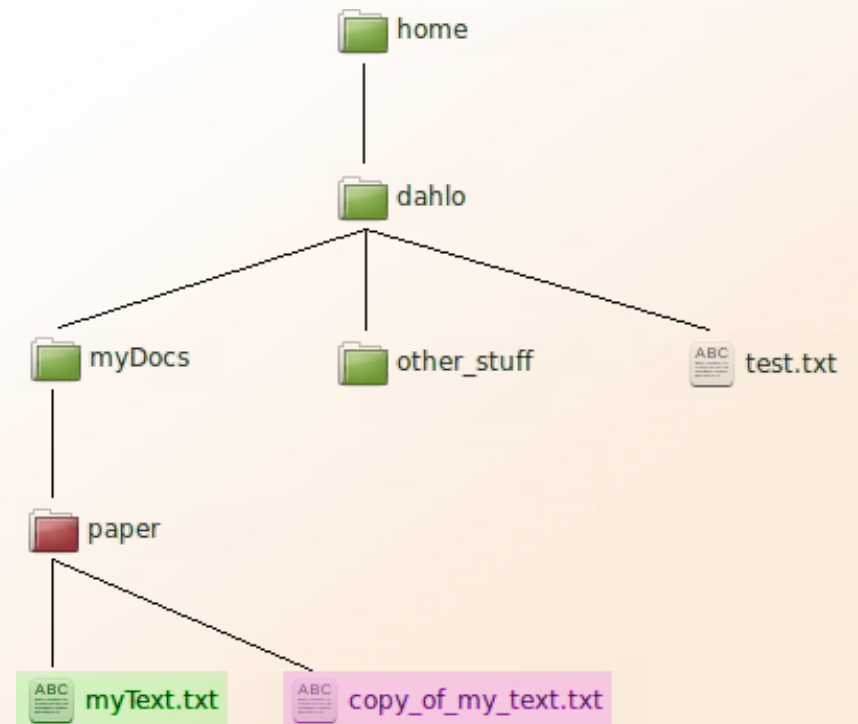
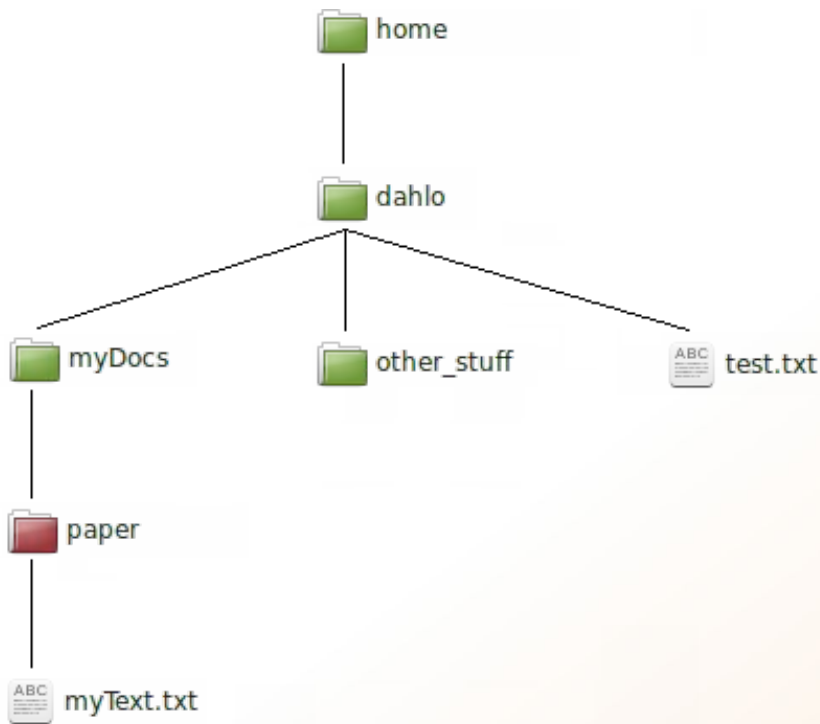
```
cp <name of original> <name of copy>
```

Interaction Commands

cp - copy a file

`cp <name of original> <name of copy>`

`cp myText.txt copy_of_my_text.txt`

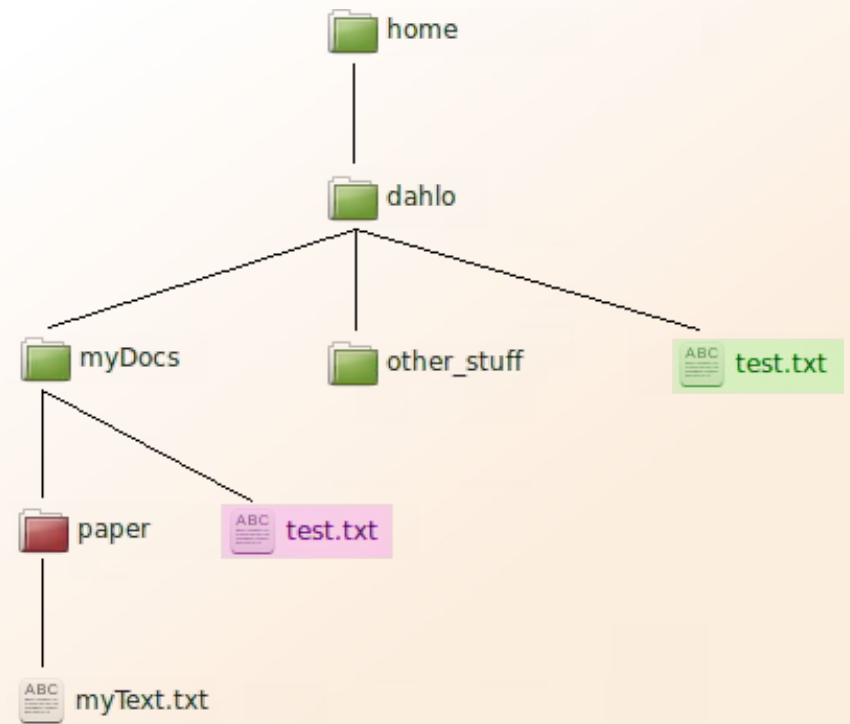
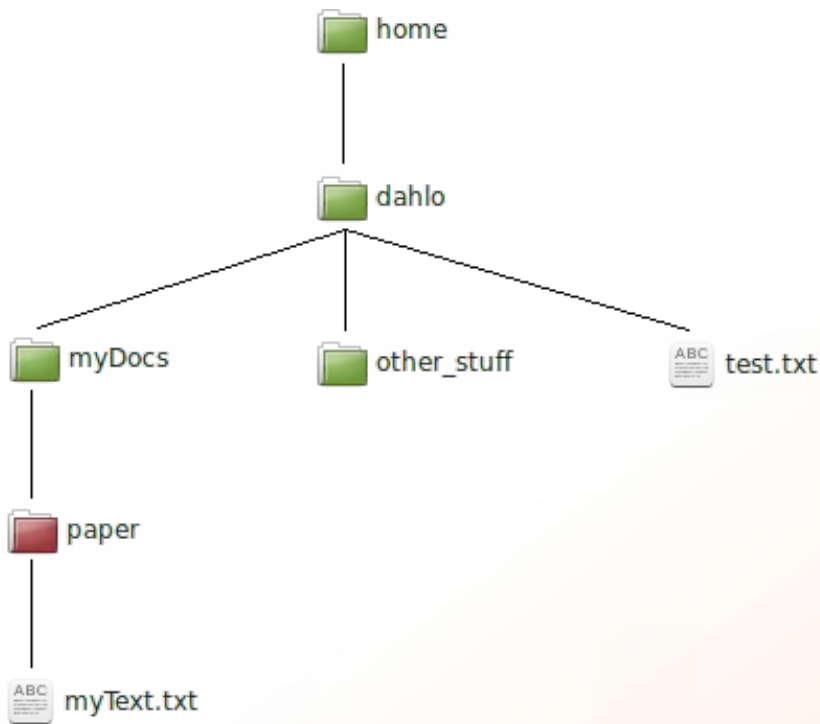


Interaction Commands

cp - copy a file

`cp <name of original> <name of copy>`

`cp /home/dahlo/test.txt ../../myDocs/`

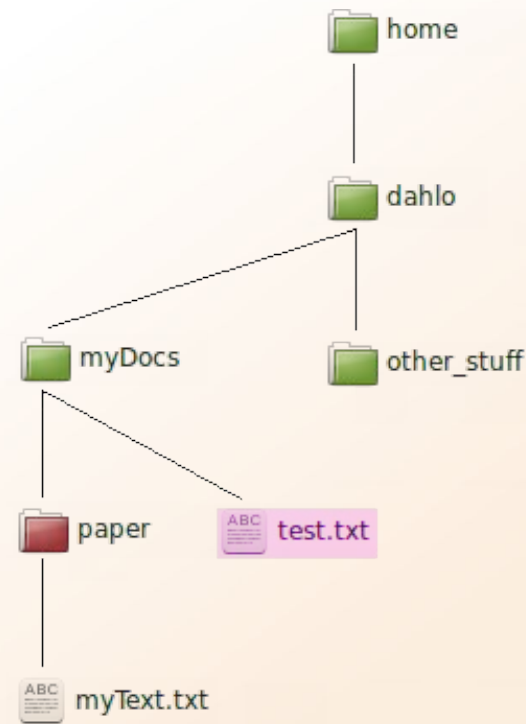
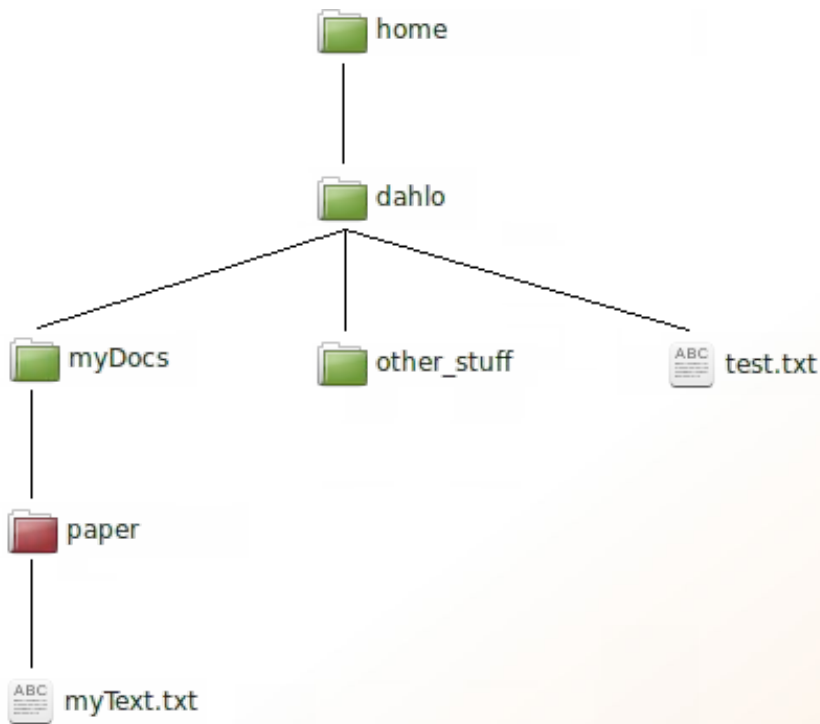


Interaction Commands

mv - move a file

`mv <name of the file> <name of the “copy”>`

`mv /home/dahlo/test.txt ../../myDocs/`

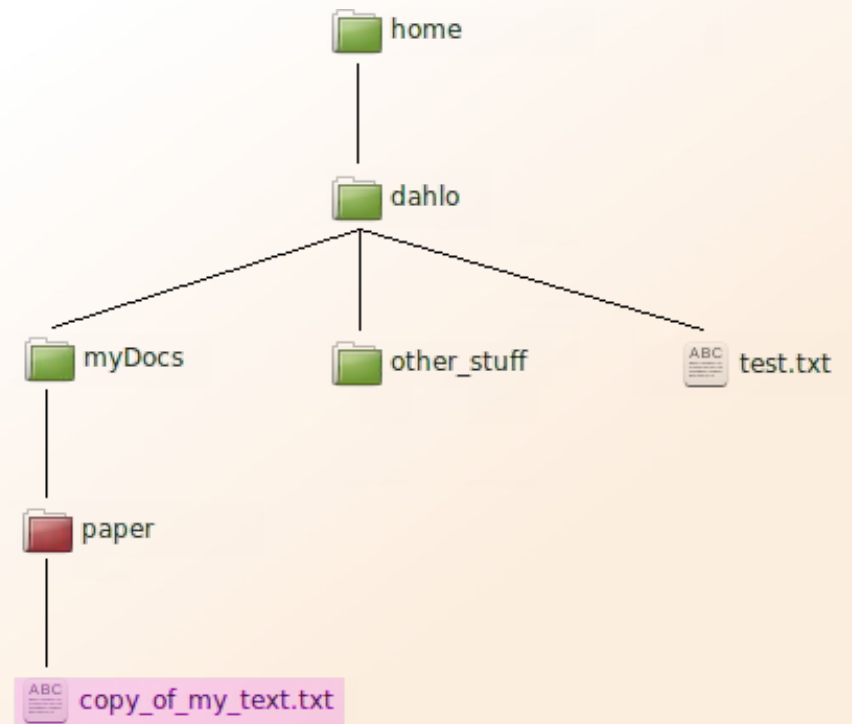
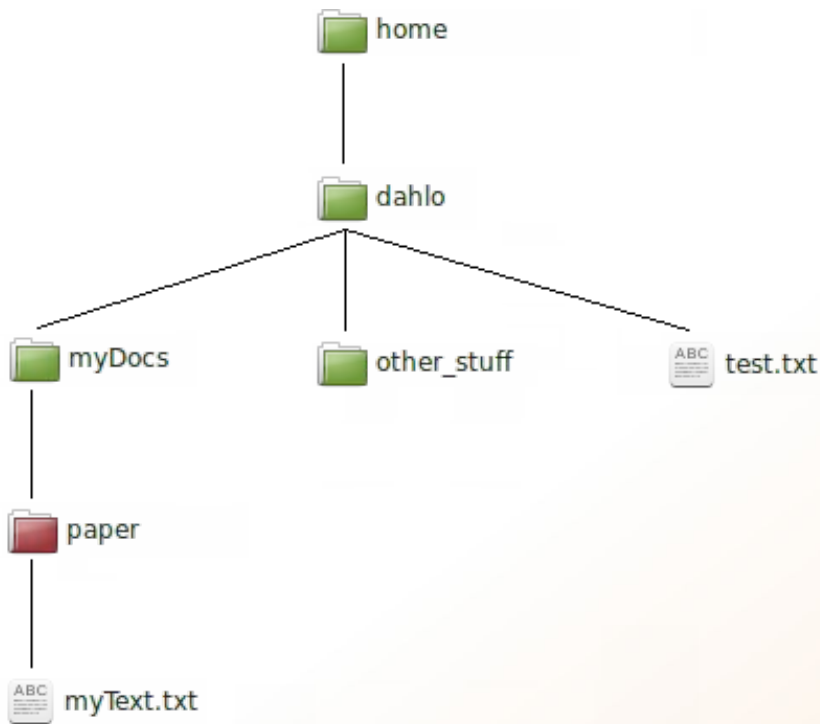


Interaction Commands

mv - rename a file

`mv <original name> <new name>`

`mv myText.txt copy_of_my_text.txt`

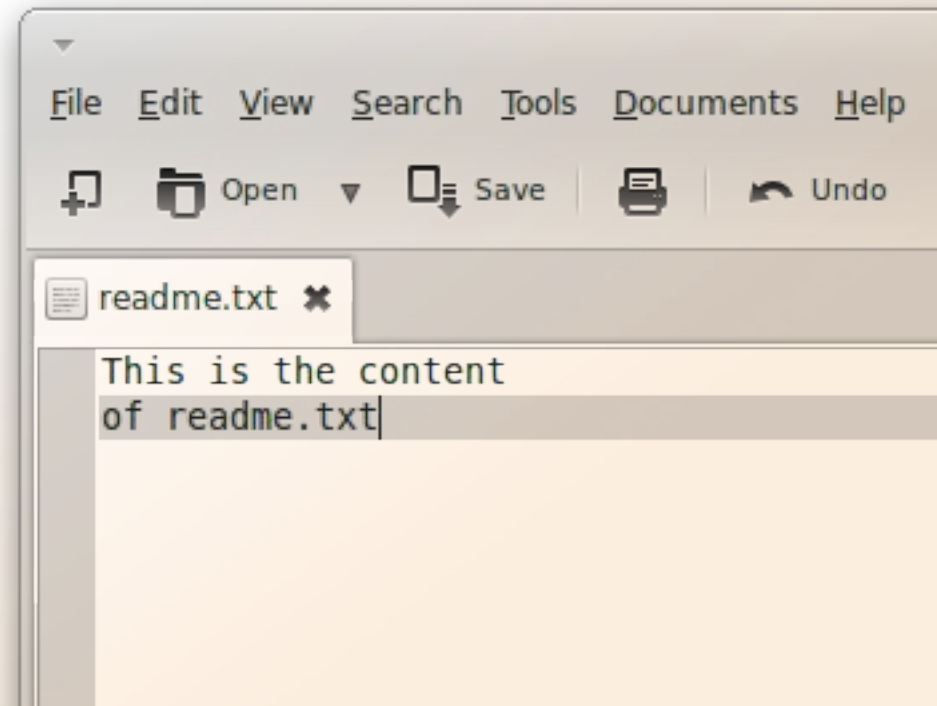


Interaction Commands

less - view content of a file

```
less <file name>
```

```
less readme.txt
```



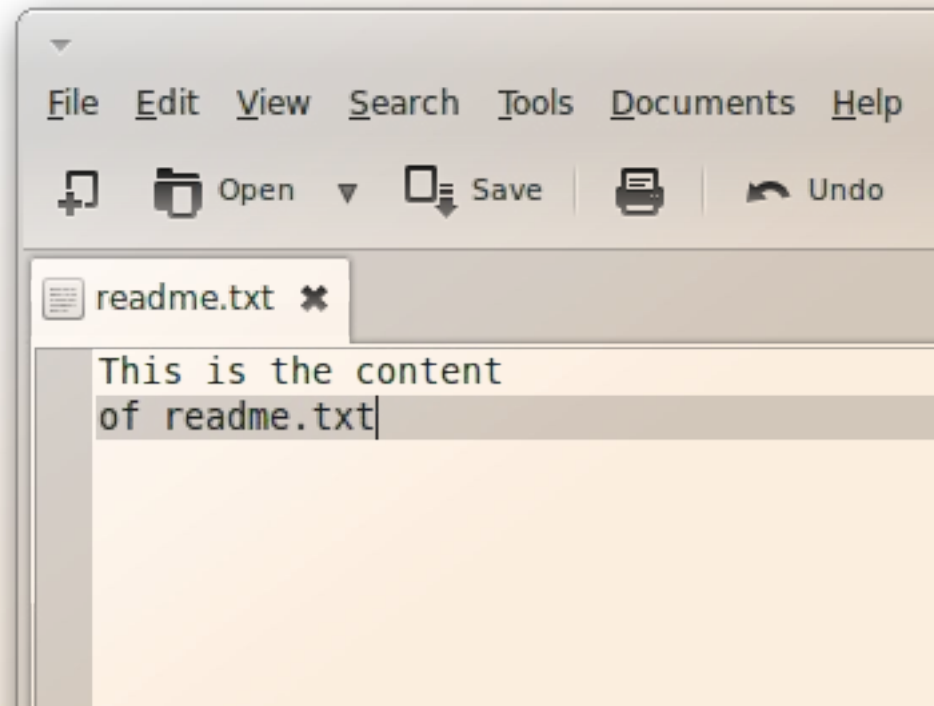
less - view content of a file

```
less <file name>
```

```
less readme.txt
```

```
This is the content  
of readme.txt
```

```
readme.txt (END)
```



Interaction Commands

less - view content of a file

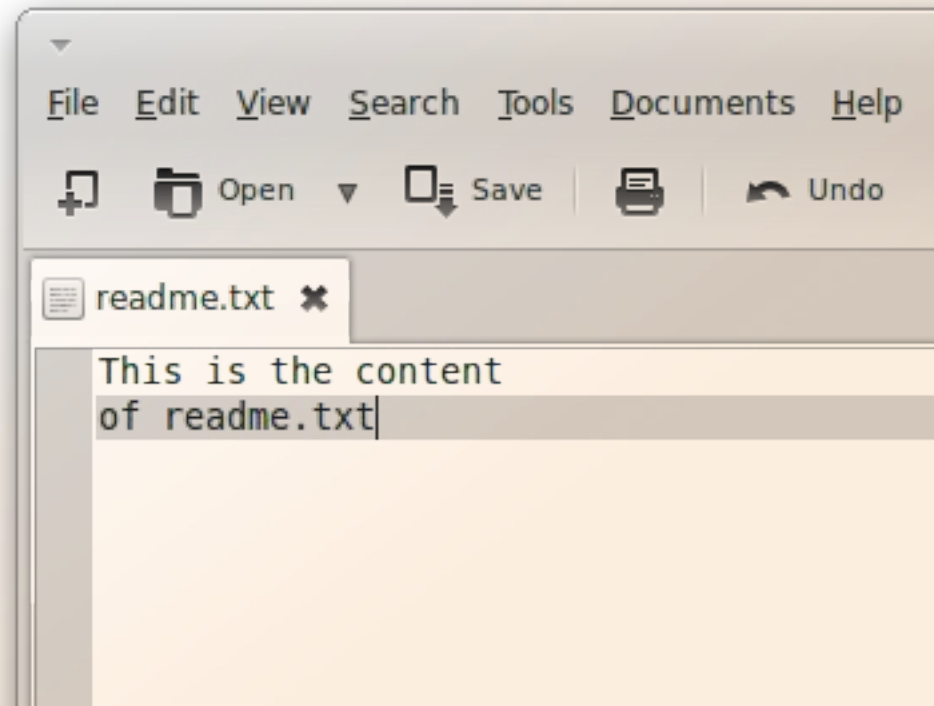
`less <file name>`

`less readme.txt`

```
This is the content  
of readme.txt
```

```
readme.txt (END)
```

press **Q** to exit less



head - view the first rows of a file

`head <filename>`

```
[dahlo@dahlo dahlo]$
```

head - view the first rows of a file
`head <filename>`

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root  0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root  0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root  0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root  0 2012-01-29 01:10 other stuff
-rwxrwxrwx 1 root root  36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
```

head - view the first rows of a file
`head <filename>`

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root 0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root 0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root 0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root 0 2012-01-29 01:10 other_stuff
-rwxrwxrwx 1 root root 36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
[dahlo@dahlo dahlo]$ head test.txt
```

head - view the first rows of a file

head <filename>

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root 0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root 0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root 0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root 0 2012-01-29 01:10 other stuff
-rwxrwxrwx 1 root root 36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
[dahlo@dahlo dahlo]$ head test.txt
This file contains any messages produced by compilers while
running configure, to aid debugging if configure makes a mistake.

It was created by PSNC DRMAA for SLURM configure 1.0.5, which was
generated by GNU Autoconf 2.67. Invocation command line was

 $ ./configure --with-slurm-inc=/usr/include/slurm --with-slurm-lib=/usr/lib64/slurm --prefix=/bubo/sw/apps/build/slurm
-drmaa/1.0.5

## ----- ##
## Platform. ##
[dahlo@dahlo dahlo]$
```

head - view the first rows of a file

`head -n <nr of lines> <filename>`

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root 0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root 0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root 0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root 0 2012-01-29 01:10 other stuff
-rwxrwxrwx 1 root root 36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
[dahlo@dahlo dahlo]$ head -n 3 test.txt
This file contains any messages produced by compilers while
running configure, to aid debugging if configure makes a mistake.
[dahlo@dahlo dahlo]$
```

tail - view the last rows of a file

`tail <filename>`

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root 0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root 0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root 0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root 0 2012-01-29 01:10 other stuff
-rwxrwxrwx 1 root root 36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
[dahlo@dahlo dahlo]$ tail test.txt
#define HAVE_STRCASECMP 1
#define HAVE_STRCHR 1
#define HAVE_STRDUP 1
#define HAVE_STRERROR 1
#define HAVE_STRNDUP 1
#define HAVE_STRSTR 1
#define HAVE_STRTOL 1
#define HAVE_VASPRINTF 1

configure: exit 0
[dahlo@dahlo dahlo]$
```

tail - view the last n rows of a file

`tail -n <nr of lines> <filename>`

```
[dahlo@dahlo dahlo]$ ls -l
total 57
drwxrwxrwx 1 root root 4096 2012-09-14 10:16 .
drwxrwxrwx 1 root root 0 2012-01-17 08:28 ..
drwxrwxrwx 1 root root 0 2012-01-28 21:41 glob
drwxrwxrwx 1 root root 0 2012-08-22 17:06 myDocs
drwxrwxrwx 1 root root 0 2012-01-29 01:10 other_stuff
-rwxrwxrwx 1 root root 36 2012-09-13 15:16 readme.txt
-rwxrwxrwx 1 root root 53027 2012-09-12 10:31 test.txt
[dahlo@dahlo dahlo]$
[dahlo@dahlo dahlo]$ tail -n 3 test.txt
#define HAVE_VASPRINTF 1

configure: exit 0
[dahlo@dahlo dahlo]$
```

nano - edit content of a file

```
nano <file name>
```

```
nano readme.txt
```


nano - edit content of a file

nano <file name>

nano readme.txt

^ = ctrl

```
GNU nano 2.2.6
```

```
File: readme.txt
```

```
This is the content  
of readme.txt
```

```
[ Read 3 lines ]
```

```
^G Get Help
```

```
^O WriteOut
```

```
^R Read File
```

```
^Y Prev Page
```

```
^K Cut Text
```

```
^C Cur Pos
```

```
^X Exit
```

```
^J Justify
```

```
^W Where Is
```

```
^V Next Page
```

```
^U UnCut Text
```

```
^T To Spell
```

rm - remove a file

```
rm <file name>
```

Ex.

```
rm readme.txt
```

```
rm ../../../../file1.txt
```

```
rm /home/dahlo/test.txt
```

There is no trash bin in CLI! Gone is gone..

*

Works with most Linux commands

```
[dahlo@dahlo dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root 0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root 2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root 0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo dir]$
```

*

Works with most Linux commands

```
[dahlo@dahlo dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root    0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root  2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root    0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo dir]$
[dahlo@dahlo dir]$ ls -l *.txt
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
[dahlo@dahlo dir]$
```

*

Works with most Linux commands

```
[dahlo@dahlo dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root 0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root 2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root 0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo dir]$
[dahlo@dahlo dir]$ ls -l *.txt
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
[dahlo@dahlo dir]$
[dahlo@dahlo dir]$ ls -l file*
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root 2273 2012-01-05 13:44 file2.old
[dahlo@dahlo dir]$ █
```

*

Works with most Linux commands

Ex:

```
cp *.txt directory1/
```

*

Works with most Linux commands

Ex:

```
rm *.tmp
```

TAB

COMPLETION

(try to) never type a path or filename without it!

TAB COMPLETION

(try to) never type a path or filename without it!

```
[dahlo@dahlo-linux dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root    0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root  2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root    0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo-linux dir]$ nano fi
```

TAB COMPLETION

(try to) never type a path or filename without it!

```
[dahlo@dahlo-linux dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root    0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root  2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root    0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo-linux dir]$ nano file█
```

TAB COMPLETION

(try to) never type a path or filename without it!

```
[dahlo@dahlo-linux dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root    0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root  2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root    0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo-linux dir]$ nano file
file1.txt file2.old
[dahlo@dahlo-linux dir]$ nano file█
```

TAB COMPLETION

(try to) never type a path or filename without it!

```
[dahlo@dahlo-linux dir]$ ls -l
total 68
-rwxrwxrwx 1 root root 28214 2012-01-05 13:44 anotherFile.doc
drwxrwxrwx 1 root root    0 2012-01-17 08:28 directory1
-rwxrwxrwx 1 root root 36458 2012-01-05 13:44 file1.txt
-rwxrwxrwx 1 root root  2273 2012-01-05 13:44 file2.old
drwxrwxrwx 1 root root    0 2012-01-17 08:28 secondDirectory
[dahlo@dahlo-linux dir]$ nano file
file1.txt file2.old
[dahlo@dahlo-linux dir]$ nano file1.txt █
```

top - how much is the computer working?

top

```
top - 21:27:48 up 37 days, 7:34, 2 users, load average: 6.38, 6.09, 6.03
Tasks: 278 total, 4 running, 274 sleeping, 0 stopped, 0 zombie
Cpu(s): 73.5%us, 1.5%sy, 0.0%ni, 24.3%id, 0.6%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 24598372k total, 17703556k used, 6894816k free, 83596k buffers
Swap: 25165816k total, 29704k used, 25136112k free, 15403636k cached
```

| PID | USER | PR | NI | VIRT | RES | SHR | S | %CPU | %MEM | TIME+ | COMMAND |
|-------|---------|----|----|-------|------|------|---|-------|------|-----------|-----------------|
| 5751 | zhibing | 20 | 0 | 1531m | 45m | 9492 | S | 100.0 | 0.2 | 679:58.20 | invaperco |
| 5755 | zhibing | 20 | 0 | 1531m | 43m | 9492 | S | 100.0 | 0.2 | 679:49.38 | invaperco |
| 5759 | zhibing | 20 | 0 | 1531m | 43m | 9480 | S | 100.0 | 0.2 | 679:56.71 | invaperco |
| 5779 | zhibing | 20 | 0 | 1531m | 44m | 9492 | S | 100.0 | 0.2 | 679:21.84 | invaperco |
| 6212 | nicusor | 20 | 0 | 451m | 377m | 3356 | R | 100.0 | 1.6 | 668:47.67 | cretin |
| 28221 | roca | 20 | 0 | 3114m | 88m | 4188 | R | 99.7 | 0.4 | 8:26.15 | seward.exe |
| 16870 | root | 20 | 0 | 0 | 0 | 0 | S | 0.7 | 0.0 | 0:13.69 | flush-8:0 |
| 1781 | root | 39 | 19 | 0 | 0 | 0 | S | 0.3 | 0.0 | 17:26.31 | kipmi0 |
| 1903 | root | 20 | 0 | 0 | 0 | 0 | S | 0.3 | 0.0 | 1:24.46 | kpanfs_dispatch |
| 28483 | dahlo | 20 | 0 | 13384 | 1292 | 884 | R | 0.3 | 0.0 | 0:00.03 | top |
| 1 | root | 20 | 0 | 21416 | 652 | 448 | S | 0.0 | 0.0 | 0:01.70 | init |
| 2 | root | 20 | 0 | 0 | 0 | 0 | S | 0.0 | 0.0 | 0:00.03 | kthreadd |
| 3 | root | RT | 0 | 0 | 0 | 0 | S | 0.0 | 0.0 | 0:00.14 | migration/0 |
| 4 | root | 20 | 0 | 0 | 0 | 0 | S | 0.0 | 0.0 | 0:01.40 | ksoftirqd/0 |
| 5 | root | RT | 0 | 0 | 0 | 0 | S | 0.0 | 0.0 | 0:00.00 | migration/0 |

Instructions how to use programs

Easy to forget syntax

Manual pages

man <program name>

Ex.

man ls

(q to quit)

```

LS(1)                                User Commands                                LS(1)

NAME
  ls - list directory contents

SYNOPSIS
  ls [OPTION]... [FILE]...

DESCRIPTION
  List information about the FILES (the current directory by default).
  Sort entries alphabetically if none of -cftuvSUX nor --sort.

  Mandatory arguments to long options are mandatory for short options
  too.

  -a, --all
        do not ignore entries starting with .

  -A, --almost-all
        do not list implied . and ..

```

:[]

How do I log out?

`exit`

Exits only the current terminal

- Summary
 - cp – copy a file
 - mv – move a file
 - less – view a file
 - nano – view and edit a file
 - rm – remove a file
 - head / tail
 - wildcards
 - tab completion – use it!!!
 - top – see active processes
 - man – manual pages
 - exit – Log out current terminal

ssh - Secure SHell connection (ssh)

```
ssh -Y <username>@milou.uppmax.uu.se
```

Ex:

```
ssh -Y dahlo@milou.uppmax.uu.se
```

Terminal in Linux and OSX

MobaXterm in Windows (<http://mobaxterm.mobatek.net/>)

Putty also alternative, but not as good..

Special for this course

`salloc -A g2017014 -t 07:00:00 -p core -n 1 --no-shell --reservation=g2017014_mon &`
 --reservation will be proj id and day

Will start a node which you have access to

Check which node with `squeue -u username`
 ssh to given node, from within UPPMAX

```
[dahlo@kalkyl1 work]$ salloc -A g2012205 -t 08:00:00 -p node --no-shell --reservation=sunday
salloc: Granted job allocation 1745256
[dahlo@kalkyl1 work]$ squeue -u dahlo
  JOBID PARTITION    NAME     USER  ST       TIME  NODES NODELIST(REASON)
1745256   devel  (null)  dahlo  R        0:13     1 q36
[dahlo@kalkyl1 work]$
[dahlo@kalkyl1 work]$ ssh -Y q36
```



Laboratory time!