New User Training

CFD-LAB

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Topics

- KDE Desktop
- Passwords
- Updates, Reboot (Encrypted Home)
- Command Line
    - Aliases
    - Backup
    - CiscoVPN
    - Remote Connection
        - Data transfer
        - Desktop
- Code Running Rules (separate hand-out)

KDE Desktop

- Take the time to customize the many options in **KMenu/Settings/Configure Desktop**.
- **Personalization/Regional Settings:** modify Time and Measurements. Apply.
- **Personalization/Regional Settings/Spell Check:** change the Default Language to **Canadian English** and uncheck **Skip run-together words** (and, if you like, enable Automatic spell checking by default). Apply.
- **Screen Lock**: To change the time or to disable screen locking in
    - KDE: Open **KMenu / Settings / Configure Desktop**.
    - ICEWM: Open **SUSE / KDE System Settings**.
        - Under **Workspace Behavior / Screen Locking** and change the time or uncheck **Lock screen automatically:**.
- **Power Management: Important!** To prevent desktop suspend on all desktops:
    - **Hardware / Power Management** uncheck **Suspend session.** (all desktops are "servers" that may need to be accessed remotely)

KDE Desktop

- Set **KWallet** either when asked or at *KMenu/System/KWalletManager* to store passwords securely and select **Classic, blowfish encrypted file**. Next.

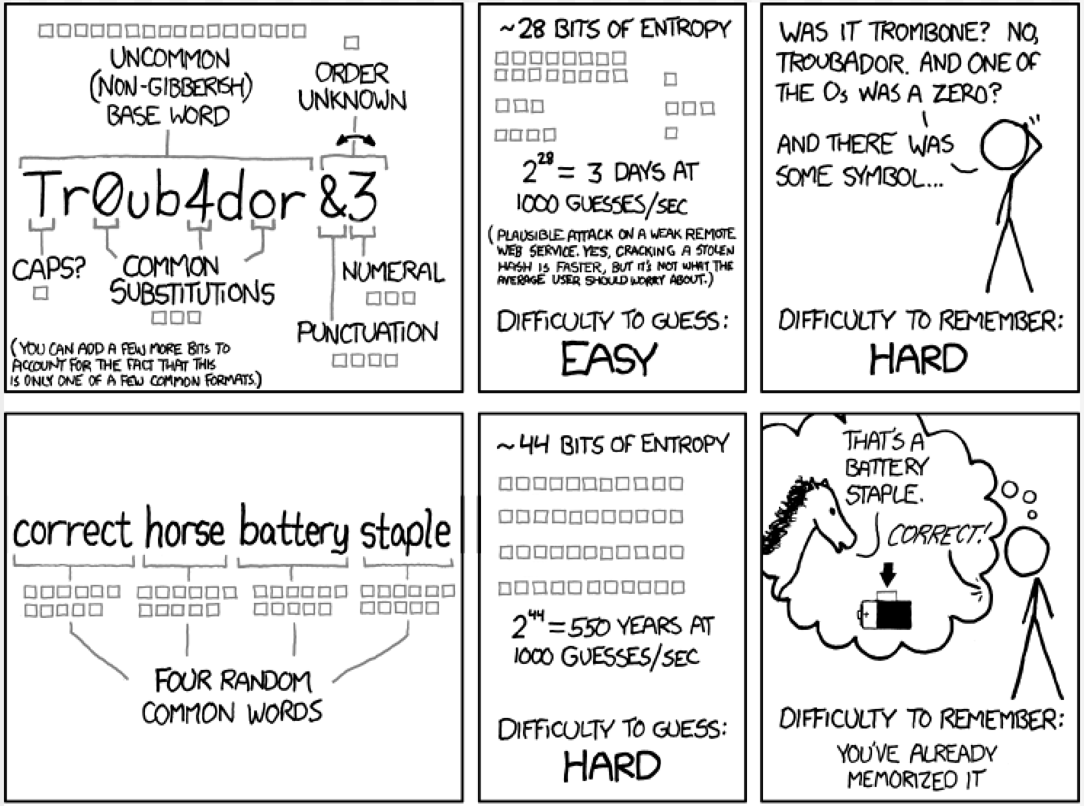
- **Firefox**: To save passwords securely: (*Edit/Settings/Privacy&Security*) If you allow Firefox to **Remember Passwords**, then make sure to **Use a master password**, so that URLs and passwords are encrypted.

- **Chromium and Chrome**: To save passwords in Google's Chromium or Chrome go to *Settings*, then click on *Sync and Google services*. Set Encryption options with **Encrypt synced passwords with your Google Account**.

Passwords

Speaking of passwords, make sure to use a good, long password that is easy to remember, but hard to crack.

Equations and quotes are good for that.


UNCOMMON (NON-GIBBERISH) BASE WORD
ORDER UNKNOWN
Tr0ub4dor &3
CAPS?
COMMON SUBSTITUTIONS
NUMERAL
PUNCTUATION
(YOU CAN ADD A FEW MORE BITS TO ACCOUNT FOR THE FACT THAT THIS IS ONLY ONE OF A FEW COMMON FORMATS.)
~28 BITS OF ENTROPY
2^28 = 3 DAYS AT 1000 GUESSES/SEC
(PLAUSIBLE ATTACK ON A WEAK REMOTE WEB SERVICE. YES, CRACKING A STOLEN HASH IS FASTER, BUT IT'S NOT WHAT THE AVERAGE USER SHOULD WORRY ABOUT.)
DIFFICULTY TO GUESS: EASY
WAS IT TROMBONE? NO, TROUBADOR. AND ONE OF THE Os WAS A ZERO?
AND THERE WAS SOME SYMBOL...
DIFFICULTY TO REMEMBER: HARD
correct horse battery staple
FOUR RANDOM COMMON WORDS
~44 BITS OF ENTROPY
2^44 = 550 YEARS AT 1000 GUESSES/SEC
DIFFICULTY TO GUESS: HARD
THAT'S A BATTERY STAPLE.
CORRECT!
DIFFICULTY TO REMEMBER: YOU'VE ALREADY MEMORIZED IT

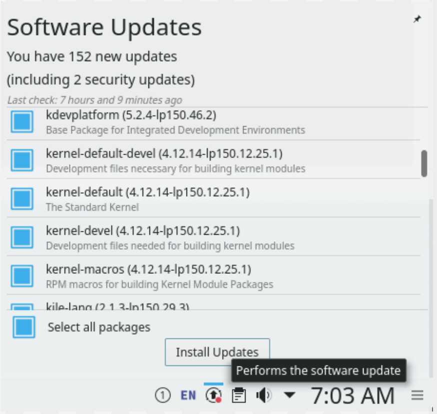
THROUGH 20 YEARS OF EFFORT, WE'VE SUCCESSFULLY TRAINED EVERYONE TO USE PASSWORDS THAT ARE HARD FOR HUMANS TO REMEMBER, BUT EASY FOR COMPUTERS TO GUESS.

Lock screen, Logout

- Linux is very secure, with safe file permissions and essentially no malware. But this only applies, if the intruder can’t log into the system.
- Do not allow non-lab members to use your login. Ask Dr. Lange to grant them a login, if you want to offer them access to your machine.
- When leaving your desk unattended for a period, say over lunch, **always lock your screen**. You can set your screen to lock automatically (in *System Settings/Workspace/Desktop Behavior Screen Locking*) or, better, you can lock it directly (*KMenu/Leave/Lock*).
- At the end of the day or when leaving for a long period, **log out**. Someone else may need to use the machine while you are away, e.g. for system maintenance, and they will not know if you are running some important program that cannot be interrupted.
- **Do not turn off or reboot your machine**, unless it is needed. All Linux workstations are servers that may be used remotely and should stay on all the time.

Updates, Reboot

- When KDE indicates there are updates, then it is safe to "Install Updates", preferably at the end of your work, before you log out.
- Sometimes a system patch is installed that requires reboot, or another reason (repair, moving) requires you to turn off your machine. Make sure to check, if someone else is logged in and possibly running code in your machine with the commands `w` and `top`.
- After reboot, enter the passphrase for the encrypted Home partition. All user data are stored in an encrypted partition to preserve confidential data.
- If the reboot happened unattended, the encrypted partition was not mounted. Reboot again and enter the passphrase.



Software Updates

You have 152 new updates

(including 2 security updates)

Last check: 7 hours and 9 minutes ago

☑ kdevplatform (5.2.4-lp150.46.2)
Base Package for Integrated Development Environments

☑ kernel-default-devel (4.12.14-lp150.12.25.1)
Development files necessary for building kernel modules

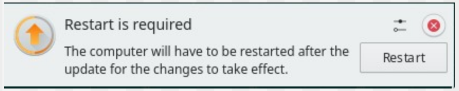
☑ kernel-default (4.12.14-lp150.12.25.1)
The Standard Kernel

☑ kernel-devel (4.12.14-lp150.12.25.1)
Development files needed for building kernel modules

☑ kernel-macros (4.12.14-lp150.12.25.1)
RPM macros for building Kernel Module Packages

☑ kile-lang (2.1.3-lp150.29.3)

☑ Select all packages



Restart is required

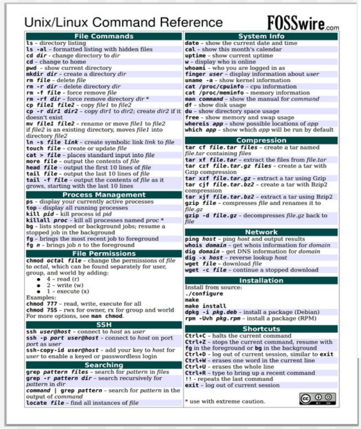
The computer will have to be restarted after the update for the changes to take effect.

Command Line

- A lot of work in Linux is done in the Command Line. It is the only way to access remote super-computers, such as Digital Research Alliance. It is a very powerful and fast environment, once you get used to it. Use **Konsole** as the terminal.

- Some useful command shortcuts have been installed in your home as aliases: `less .alias`

- See a list of useful commands in the Linux Cheat Sheet.



Unix/Linux Command Reference FOSSwire.com

File Commands

ls – directory listing
ls -al – formatted listing with hidden files
cd *dir* - change directory to *dir*
cd – change to home
pwd – show current directory
mkdir *dir* – create a directory *dir*
rm *file* – delete *file*
rm -r *dir* – delete directory *dir*
rm -f *file* – force remove *file*
rm -rf *dir* – force remove directory *dir* *
cp *file1 file2* – copy *file1* to *file2*
cp -r *dir1 dir2* – copy *dir1* to *dir2*; create *dir2* if it doesn't exist
mv *file1 file2* – rename or move *file1* to *file2* if *file2* is an existing directory, moves *file1* into directory *file2*
ln -s *file link* – create symbolic link *link* to *file*
touch *file* – create or update *file*
cat > *file* – places standard input into *file*
more *file* – output the contents of *file*
head *file* – output the first 10 lines of *file*
tail *file* – output the last 10 lines of *file*
tail -f *file* – output the contents of *file* as it grows, starting with the last 10 lines

Process Management

ps – display your currently active processes
top – display all running processes
kill *pid* – kill process id *pid*
killall *proc* – kill all processes named *proc* *
bg – lists stopped or background jobs; resume a stopped job in the background
fg – brings the most recent job to foreground
fg *n* – brings job *n* to the foreground

File Permissions

chmod *octal file* – change the permissions of *file* to *octal*, which can be found separately for user, group, and world by adding:

- 4 – read (r)
- 2 – write (w)
- 1 – execute (x)

Examples:
chmod 777 – read, write, execute for all
chmod 755 – rwx for owner, rx for group and world
For more options, see **man chmod**.

SSH

ssh *user@host* – connect to *host* as *user*
ssh -p *port user@host* – connect to *host* on port *port* as *user*
ssh-copy-id *user@host* – add your key to *host* for *user* to enable a keyed or passwordless login

Searching

grep *pattern files* – search for *pattern* in *files*
grep -r *pattern dir* – search recursively for *pattern* in *dir*
command* | grep *pattern – search for *pattern* in the output of *command*
locate *file* – find all instances of *file*

System Info

date – show the current date and time
cal – show this month's calendar
uptime – show current uptime
w – display who is online
whoami – who you are logged in as
finger *user* – display information about *user*
uname -a – show kernel information
cat /proc/cpuinfo – cpu information
cat /proc/meminfo – memory information
man *command* – show the manual for *command*
df – show disk usage
du – show directory space usage
free – show memory and swap usage
whereis *app* – show possible locations of *app*
which *app* – show which *app* will be run by default

Compression

tar cf *file.tar files* – create a tar named *file.tar* containing *files*
tar xf *file.tar* – extract the files from *file.tar*
tar czf *file.tar.gz files* – create a tar with Gzip compression
tar xzf *file.tar.gz* – extract a tar using Gzip
tar cjf *file.tar.bz2* – create a tar with Bzip2 compression
tar xjf *file.tar.bz2* – extract a tar using Bzip2
gzip *file* – compresses *file* and renames it to *file.gz*
gzip -d *file.gz* – decompresses *file.gz* back to *file*

Network

ping *host* – ping *host* and output results
whois *domain* – get whois information for *domain*
dig *domain* – get DNS information for *domain*
dig -x *host* – reverse lookup *host*
wget *file* – download *file*
wget -c *file* – continue a stopped download

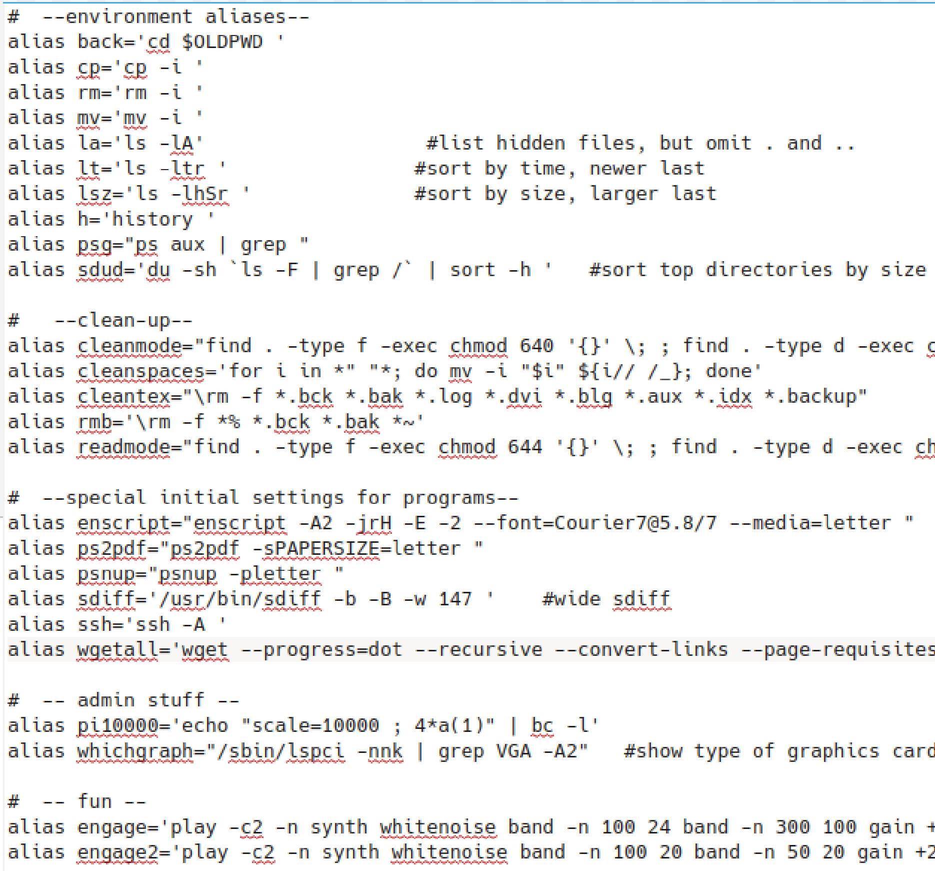
Installation

Install from source:
./configure
make
make install
dpkg -i *pkg.deb* – install a package (Debian)
rpm -Uvh *pkg.rpm* – install a package (RPM)

Shortcuts

Ctrl+C – halts the current command
Ctrl+Z – stops the current command, resume with **fg** in the foreground or **bg** in the background
Ctrl+D – log out of current session, similar to **exit**
Ctrl+W – erases one word in the current line
Ctrl+U – erases the whole line
Ctrl+R – type to bring up a recent command
!! - repeats the last command
exit – log out of current session

* use with extreme caution.



```
#  --environment aliases--
alias back='cd $OLDPWD '
alias cp='cp -i '
alias rm='rm -i '
alias mv='mv -i '
alias la='ls -lA'                           #list hidden files, but omit . and ..
alias lt='ls -ltr '                        #sort by time, newer last
alias lsz='ls -lhSr '                      #sort by size, larger last
alias h='history '
alias psg="ps aux | grep "
alias sdud='du -sh `ls -F | grep /` | sort -h '   #sort top directories by size

#   --clean-up--
alias cleanmode="find . -type f -exec chmod 640 '{}' \; ; find . -type d -exec c
alias cleanspaces='for i in *" "*; do mv -i "$i" ${i// /_}; done'
alias cleantex="\rm -f *.bck *.bak *.log *.dvi *.blg *.aux *.idx *.backup"
alias rmb='\rm -f *% *.bck *.bak *~'
alias readmode="find . -type f -exec chmod 644 '{}' \; ; find . -type d -exec ch

#  --special initial settings for programs--
alias enscript="enscript -A2 -jrH -E -2 --font=Courier7@5.8/7 --media=letter "
alias ps2pdf="ps2pdf -sPAPERSIZE=letter "
alias psnup="psnup -pletter "
alias sdiff='/usr/bin/sdiff -b -B -w 147 '    #wide sdiff
alias ssh='ssh -A '
alias wgetall='wget --progress=dot --recursive --convert-links --page-requisites

#  -- admin stuff --
alias pi10000='echo "scale=10000 ; 4*a(1)" | bc -l'
alias whichgraph="/sbin/lspci -nnk | grep VGA -A2"   #show type of graphics card

#  -- fun --
alias engage='play -c2 -n synth whitenoise band -n 100 24 band -n 300 100 gain +
alias engage2='play -c2 -n synth whitenoise band -n 100 20 band -n 50 20 gain +2
```

Command Line

Some useful aliases are:

- `cleanspace`: When you receive files that contain space character in the name, or when you create a file or folder name with spaces, you can replace the spaces with underscore using this command alias.
  - Spaces in file names create all sort of problems in CFD programs and scripts. This is why they should be avoided.
  - If you are using the Dolphin file browser, you can open a terminal with **F4**.
- `cleanmode`: When you copy files from a Windows USB, the detailed permissions used in Linux are not set. This alias makes files readable, but not executable and sets proper permissions in folders.
- `rmb`: Delete all types of backup copies of files to clean up a folder.

Backup

- Each user is responsible for backing up her/his data.
- Backup is the single most important system maintenance activity for the user and it can save many days, sometimes weeks, of work in case of hardware failure.
- Create a habit of regularly backing up **locally and off-site** your most important data, specially during heavy work periods.

Backup

- Each CFD-Lab user is entitled to means for regular local backup (weekly is recommended).
- This is specially important for very large files and simulation results files. The current means of local backup is:
    - an external hard-disk that is connected to the machine through the external disk bay. All permanent backup disks shall be stored in the fireproof safe in the CFD-Lab (MEC 4-18).
- In addition to the local backup, each user should use their own means for regular off-site backup (daily is recommended).
- Examples of backup media are: large USB memory keys, external hard-disks, or synchronization to an external machine or to the cloud.
- Confidential data should only be stored in encrypted media: https://sites.ualberta.ca/~clange/Linux/openSUSE/15.4/instructions/openSUSE15_user.html#crypt

Backup Commands

For full copy use the following standard Linux commands:

- `cp -a <orig> <dest>`
  - (local backup)
- `scp -rp <orig> <remote-mach:dest>`
  - (remote backup)
- `tar zcvf <filename.tar.gz> <orig>`
  - (creates a single packed and compressed tar-file (similar to ZIP, but preserving all attributes))

Backup Commands

- To generate a compressed tar-ball, containing only new and modified files in a directory (folder) after a certain date, that can be easily stored in a small memory stick, use the **backupfromdate** script.
- For example, to backup all new and modified files from the past 24h in a directory use:
  - `backupfromdate yesterday directory`
- This creates a **tar.bz2** file that can be restored later running from the top directory:
  - `tar jxpf file.tar.bz2`
- Description and another example can be found running `backupfromdate --help`.

Backup Commands

- For efficient **incremental synchronization**, the best command is **rsync**.
- Because of the complexity of the this command, we recommend the use of the following scripts for directory (folder) synchronization:
  - `syncsend <directory> <remote-mach:>`
  - `syncget <directory> <remote-mach:>`
    - which are used to send and receive updated data between two **active** machines (ex. laptop and desktop).
  - `syncsendauto <directory> <remote-mach:>`
  - `syncgetauto <directory> <remote-mach:>`
    - which are used to send updates from a machine to a **passive** backup destination (ex. external hard disk).
- These scripts also accept **local** parent directories (use full path starting with /) as destinations (ex.: `syncsendauto Thesis/ /media/disk/user/`).

Remote Connection

- CiscoVPN is required to connect to the workstations and servers in the CFD-Lab from outside the University and from the UWS wireless network.
- It creates a tunnel that encrypts all communications with the machines, including the passwords used.
- Make sure to install a CiscoVPN client and to create a connection using the *KMenu/Internet/Cisco Anyconnect Secure Mobility Client* and connect to **`vpn.ualberta.ca`** using your CCID as: ***`ccid`*****`@Engg`**
- When connecting the first time:
  - Open *Preferences* (gear icon) and set **Disable Captive Portal Detection** and unset **Block connections to untrusted servers**.
  - At the *Security Warning: Untrusted Server Certificate!* click on **Always connect**.
- Once the CiscoVPN connection is established, you can transfer data between machines and run codes remotely.

Remote Connection

- To login to a remote machine, use
  - `ssh <machine.name>`
- See a list of machines in the Code Running Rules.
- Data Transfer:
  - Use the backup scripts `syncsend` and `syncget` to transfer incrementally full project folders between machines.
  - Use Dolphin *Network/Add Network Folder* to graphically exchange data between two machines. Then select *Secure Shell (ssh)*, Next. Enter a nickname for the connection, user login, and server name or IP address. *Save&Connect*. You can *Split* the window for easier exchange.
  - On MacOS you should be able to install and use the `syncsend` and `syncget` scripts as well.
  - On Windows, use WinSCP (winscp.net) to transfer data graphically and PuTTY (www.putty.org) for command shell and sftp data transfer.

Remote Connection

- **X2Go Client** (*KMenu/Lost&Found/X2Go Client*):
- To access your desktop remotely or to run single applications use the X2Go Client for best results.
- To access your complete desktop on a remote machine:
  - Start a New Session (**Session / New Session**) and enter Server Host name and Login.
  - **Important**: Change the Session type to **ICEWM**, because X2Go has problems supporting the KDE Plasma desktop.
  - In the other tabs you can adjust the connection speed, size of display window, media sound support, and shared folders, if needed. OK.
  - Once logged into ICEWM, if the desktop is very slow you need to deactivate compositing. Go to *KMenu/Display&Monitor/Compositor*: uncheck both options to disable compositing.

Remote Connection

- **X2Go Client**:
- Once the session started, you can close the session window or the client window and the session (and any running program) will continue to run in the remote server.
    - At the end of a session, **do not forget to logout** from within the session (**openSUSE Menu / Logout**), to actually terminate the session in the server.
- To access a particular application on a remote machine:
    - Start a New Session as above and set the Session type to Single application, then enter the application call in the Command field. OK.
    - Note: Matlab must be called from a terminal window that remains open, such as **xterm -e matlab**.
    - At the end of a session, **do not forget to quit** the application as usual.

Future Topics

- Command Line Tricks:
  - Midnight Commander (mc)
  - Aliases
  - Scripting (ExplainShell)
- KDE Virtual Desktops/Activities
- Info Center, Directory overview/stats
- LibreOffice
- PDF Annotation
- Engauge Digitizer
- LaTeX+BibTeX (Kile)
- Reference Manager – Zotero/Mendeley
- Project Management - ProjectLibre