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Computational Methods for Systems and Control Theory

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Scientific Computing 1
1st Tutorial
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Hint: If you are not sure what a command does, or what the right parameters are, use `man command`, `apropos` or `info` to get help.

Exercise 1:

Download VirtualBox: http://www.virtualbox.org and install it on your computer. If your are using an Linux computer already you should also be able to install it from your systems package management system directly.
Download the appliance for our lectures virtual machine (VM) from the lecture web page. http://www.mpi-magdeburg.mpg.de/mpcsc/lehre/2012_WS_SC/data/lubuntu1204_x86.ova
Import the virtual machine into VirtualBox. ("File→Import Appliance" and select the downloaded file.)
Afterwards try to start the VM.

Exercise 2:

Start a terminal (like "LXTerminal" on the desktop) and make yourself familiar with the command line. Try the following actions and check the current results using `ls`:

a.) Print the current directory.

b.) Create a new directory with an arbitrary name and change into it.

c.) Check if this was successful by printing the current directory again.

d.) Create an empty file called `firstfile.txt` inside this directory.

e.) Write "Hello World" to the screen.

f.) Copy the file to the subordinate directory.

g.) Remove the file from the current directory.

h.) Change to the subordinate directory and rename the file to an arbitrary filename.

i.) Print the renamed file to the screen.

j.) Remove the previously created directory.

Exercise 3:

- `find` and `locate` are two powerful tools to search for files. Search for a file called `GPL-2` beginning in the root of the file system. If you found a file copy it to your home directory.

- Search for a directory named `common-licenses` beginning in the root of the file system. Check in the man page of `find` how it is possible to search only for directories.

  If you found a directory create a hard- and a soft-link to it in your home directory. What happens in the case of the hard-link? What does `ls -l` display when it recognizes a link.

Exercise 4:

Access rights and permissions to files are managed using `chmod`, `chown` and `chgrp`. The current permissions and owner are displayed by `ls -l`. Play arround with these three tools and try:

a.) Allow only yourself to read and write a file.

b.) Allow yourself to read and write a file and the group to only read it.

c.) Set the group access rights to the same as the user has.

d.) Change the group of a file to `adm`.

e.) Check if is possible to remove all permissions from a file and reassign them later.

f.) Try to change the owner of a file to `root`. Why is this behavior useful?

g.) Set the executable bit for all users and leave all other bits untouched. What changes in the `ls` output.

Exercise 5:

Create some files with arbitrary content (using `echo`).

a.) Create a `.tar` archive of them.

b.) Create a `.tar.gz` archive of them.

c.) Create a `.tar.bz2` archive of them.

d.) Extract the three archives to different directories.

e.) Use the `diff` command to check if the extracted files are the same as the originals.

Exercise 6:

a.) Start the Chromium browser and figure out its process ID. Terminate the browser using the `kill` command.

b.) Open `top` and try to:

   1.) sort the processes by the user name.

   2.) sort the processes by the command in descending order.

   3.) change the refresh time to 1s.