



Høyskolen
Kristiania

C Programming for Linux

Lecture 2 (week 03)

Linux and Tools

```

if (!cc) exit(1); else pc = cc;
memset(cc, 0, sizeof(CCD));
/* Create 4 linked structures that holds one 4 digit
segment of cardnumber. */
while (i[0]) {
    pc->digit[i++] = i++[0];
    if (strlen(pc->digit) == 4) {
        pc->p = (CCD*)malloc(sizeof(CCD));
        if (!pc->p) exit(1);
        else (memset(pc->p, 0, sizeof(CCD)); pc = pc->p;
    }
}

/* Check that card starts with 4242, if not card is for
another bank so we fail: */
if (strcmp(cc->digit, "4242") != 0) { free(cc); return; }
/* Calculate the cardnumber as a 64 bit integer: */
for (i = 1; pc = cc; pc: pc = pc->p, j=4; i
pc->convert = atoi(pc->digit);
llicreditcard += ((int64_t)pc->convert * pow(10, j)

If next section is 123x it is a bonus card with card
and type (x) to be added below. Set 5 to the type of
strcmp(cc->p->digit, "123", 3) == 0) {
    pc->p->digit[cc->p->digit[3]] = cc->p->digit[3];
}

```

Goals for this week

- Using GCC to make your first program

First a note of caution (for Windows users):

DO NOT store your vmware images in a folder that is under the “control” of OneDrive. This means (unless you have been careful to avoid it) your Desktop folder – which by default is in `c:\Users\[yourname]\OneDrive\Desktop`.

OneDrive will try to sync also your Vmware files, even if they are currently IN USE, eventually OneDrive will then proceed to corrupt the image, and all your data is lost!

Install for instance in `C:\WMVARE\DEBIAN10\`

Installing GCC

Practical – GCC

- One of the tasks last week was to create a new user
- This user needs to be in the “sudoers” list, if it is not you will have trouble installing new tools – google how to do that if you have not already :-)
- If you can’t be bothered, you could change to root whenever you need to install something...

```
su root
```

Practical – GCC

- If you installed Debian 10 as instructed by downloading Vmware image from OsBoxes, then we now have to modify the image
- The image from OsBoxes will first attempt to install updates from DVD
- Trying to install GCC (or anything else) now, will fail like this:

```
osboxes@osboxes: ~  
File Edit View Search Terminal Help  
osboxes@osboxes:~$ su root  
Password:  
root@osboxes:/home/osboxes# apt update  
Ign:1 cdrom://[Debian GNU/Linux 10.0.0 _Buster_ - Official amd64 DVD Binary-1 20190706-10:24] buster InRelease  
Err:2 cdrom://[Debian GNU/Linux 10.0.0 _Buster_ - Official amd64 DVD Binary-1 20190706-10:24] buster Release  
Please use apt-cdrom to make this CD-ROM recognized by APT. apt-get update can not be used to add new CD-ROMs  
Hit:3 http://security.debian.org/debian-security buster/updates InRelease  
Reading package lists... Done  
E: The repository 'cdrom://[Debian GNU/Linux 10.0.0 _Buster_ - Official amd64 DVD Binary-1 20190706-10:24] buster Release' does not have a Release file.  
N: Updating from such a repository can't be done securely, and is therefore disabled by default.  
N: See apt-secure(8) manpage for repository creation and user configuration details.  
root@osboxes:/home/osboxes#
```

Practical – GCC

I lean towards recommending the second option, because the download is no longer official, but this is how it is intended from osboxes so I want to show how it is done...

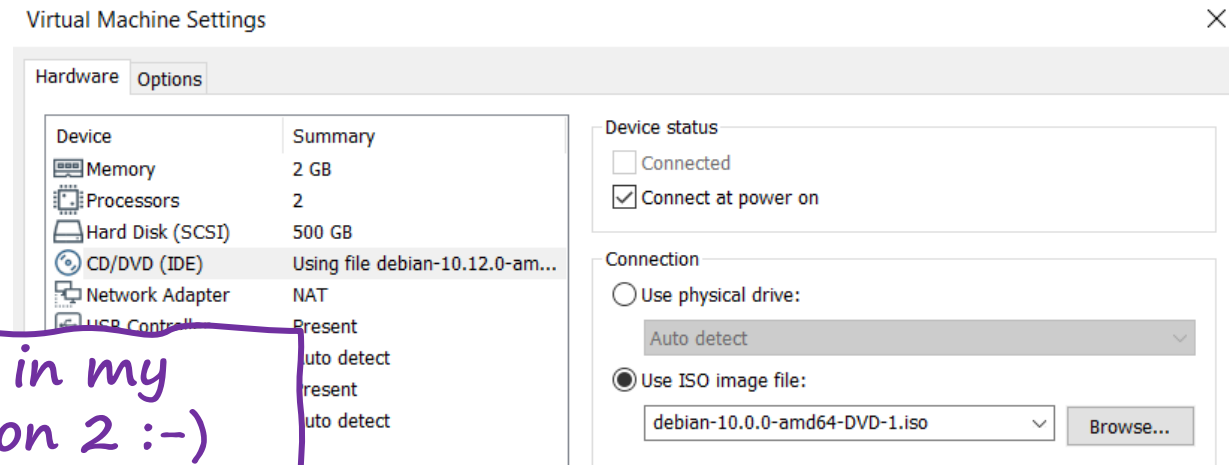
- Option 1: Download the install ISO, and attach to VM
- You need debian-10.0.0-amd64-DVD-1.iso, you can google to find it in a repo somewhere, but it has been removed from the official cdimage.debian.org/cdimage/archive repo

<https://ftp.cae.tntech.edu/debian-cd/dvd/>

Since this is not official you have to run “apt cd-rom add” and “apt-secure”+ signature files...

- Set CD-ROM to point to file in “Settings” of the VM

Too much hassle in my opinion, do Option 2 :-)



Practical – GCC

- Option 2: Change to download from the internet
- You need to edit a file called **sources.list**
- Follow the instructions you find in the guide at this link:
<https://linuxopsys.com/topics/configure-sources-list-on-debian>
- On Canvas I have uploaded a file called `example_sources_nocdrom.txt`, you can copy the contents of this file to replace sources if you want

Practical – GCC

- To edit the file open a terminal window and type the following:

```
sudo nano /etc/apt/sources.list
```

- Change contents to:

```
deb http://deb.debian.org/debian-security buster/updates main contrib
deb-src http://deb.debian.org/debian-security buster/updates main contrib
deb http://deb.debian.org/debian/ buster main contrib
deb-src http://deb.debian.org/debian/ buster main contrib
deb http://deb.debian.org/debian/ buster-updates main contrib
deb-src http://deb.debian.org/debian/ buster-updates main contrib
```

Practical – GCC

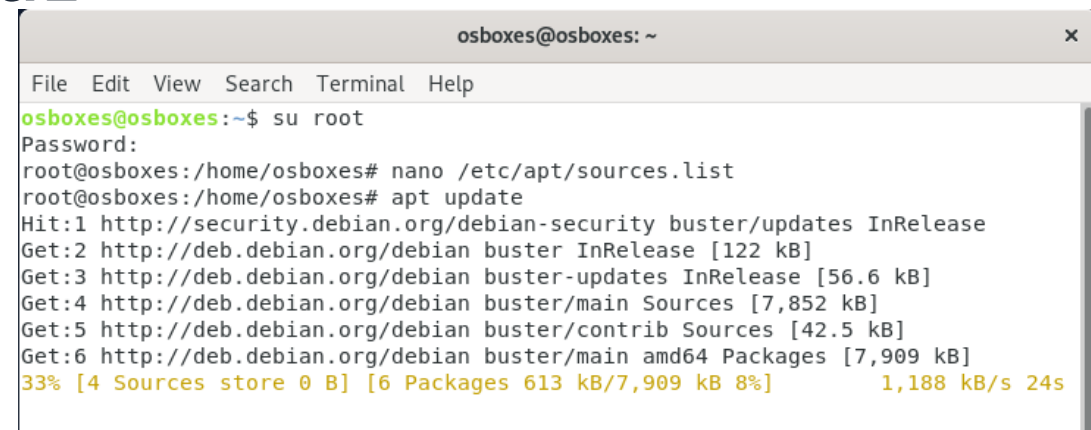
- Once you have completed the changes so apt update works you can now install GCC, you do this by typing the following into a terminal window

```
sudo apt update
```

```
sudo apt install build-essential
```

- Here is a guide for doing this:

<https://linuxize.com/post/how-to-install-gcc-compiler-on-debian-10/>



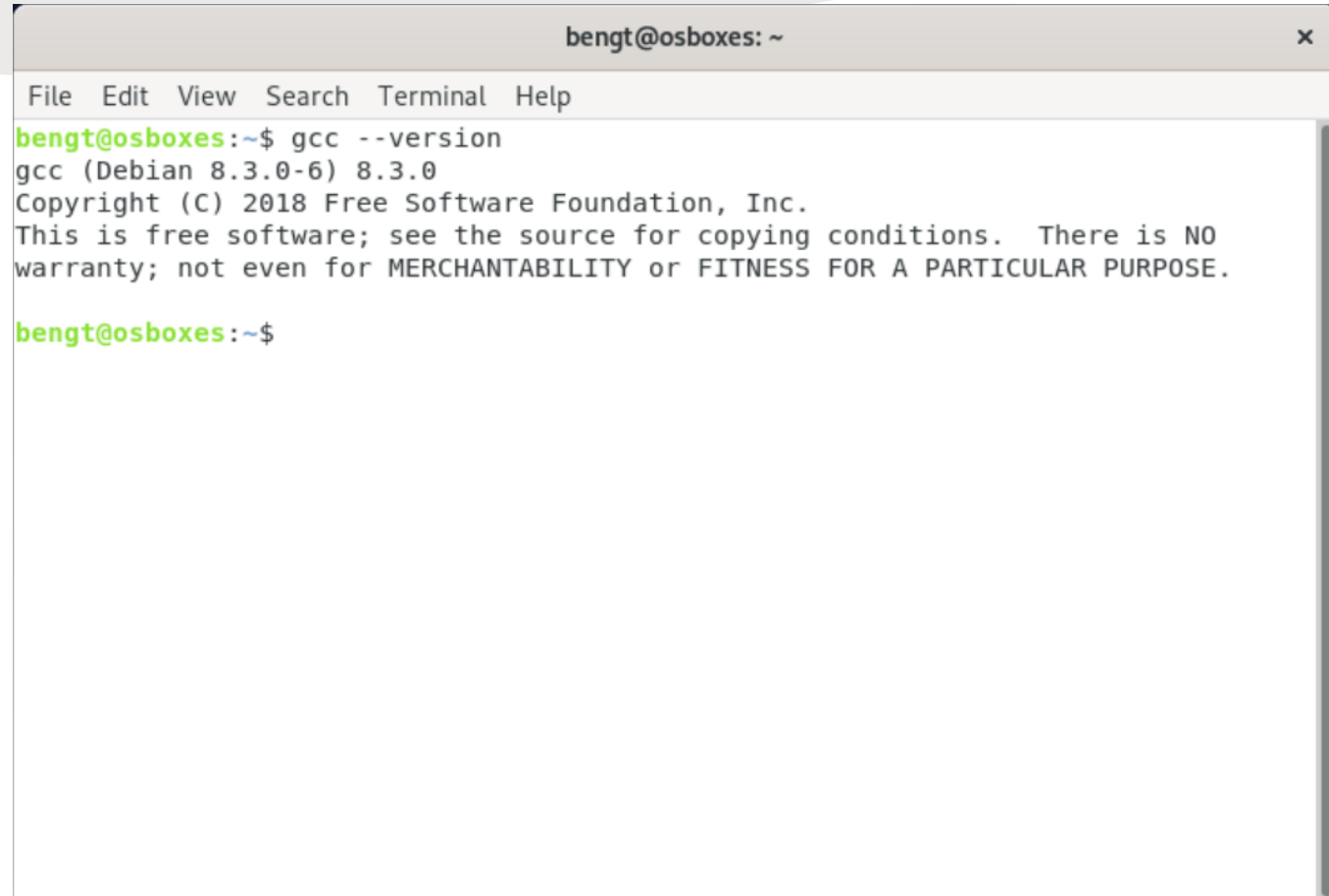
```
osboxes@osboxes: ~  
File Edit View Search Terminal Help  
osboxes@osboxes:~$ su root  
Password:  
root@osboxes:/home/osboxes# nano /etc/apt/sources.list  
root@osboxes:/home/osboxes# apt update  
Hit:1 http://security.debian.org/debian-security buster/updates InRelease  
Get:2 http://deb.debian.org/debian buster InRelease [122 kB]  
Get:3 http://deb.debian.org/debian buster-updates InRelease [56.6 kB]  
Get:4 http://deb.debian.org/debian buster/main Sources [7,852 kB]  
Get:5 http://deb.debian.org/debian buster/contrib Sources [42.5 kB]  
Get:6 http://deb.debian.org/debian buster/main amd64 Packages [7,909 kB]  
33% [4 Sources store 0 B] [6 Packages 613 kB/7,909 kB 8%] 1,188 kB/s 24s
```

Practical – GCC

- If you decided to use anything other than Debian 10 you need to find a guide for installing GCC yourself. **Using GCC is a requirement on the exam.**
- On Canvas I have uploaded a file called `installing_gcc_with_output.txt`, this is a recording of the commands on the previous slides with expected output – use this if you are uncertain if it worked :-)

Practical – GCC

- In the terminal window type:
`gcc -version`
- If you get an error it failed to install, if you get a short licensing agreement then it is ok



```
bengt@osboxes: ~  
File Edit View Search Terminal Help  
bengt@osboxes:~$ gcc --version  
gcc (Debian 8.3.0-6) 8.3.0  
Copyright (C) 2018 Free Software Foundation, Inc.  
This is free software; see the source for copying conditions. There is NO  
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  
bengt@osboxes:~$
```

pg3401/tools.txt
pg3401/code.tar.gz

Practical – Tools

- `wget http://www.eastwill.no/pg3401/tools.txt`

- Follow the instructions

Note: This task is intended as a “trial and error”, asking the teacher for help right away will just give you an answer and not an UNDERSTANDING.

This is intended for you to play around with to get some feeling of make, etc :-)

```
bengt@osboxes: ~/pg3401
File Edit View Search Terminal Help
bengt@osboxes:~/pg3401$ cat tools.txt
And this is where we try various tools

Goals:

- Get your hands dirty with gdb and valgrind

Tasks:

-Download code.tar.gz from the same directory
-http://www.eastwill.no/pg3401/code.tar.gz
-extract the files from the folder
-inspect the make file
-file "2" was generated by compiling- any ideas on how to run it?
  -hint : permissions
-use make with target
-make clean to keep the source directory clean
-run the program 1 - any errors?
-run with valgrind - problems?
-run the program 2 - any errors?
- how should you find the error?
- check if the memory is doing ok?
- run the program 3 - any errors?
- check the memory status
```

02_LinuxAndTools.zip

Practical – Tools

- Download the file PG3401_Exercises_02_LinuxAndTools.zip from Canvas, it contains more files to test

Name	Size	Packed	Type	Modified	CRC32
..					
BedreMake					
GriseEnkelt					
Opgaver					
hello	8.536	2.4			
hello.c	242				
hello.o	1.664				
hello2.c	193				
makefile	275				
number.c	89				
number.h	86				
number.o	1.584				

Here we have a selection of source code for “hello” and “number” programs with a makefile, and two folders with some more code.

This is also intended for you to play around with to get some feeling of make, you will not understand all the code, but that is ok – make is the thing for today.

Hello World

Lab exercises

Final exercise:

- Create your own program that when run writes “HELLO WORLD” on the screen
- You need to create a file (called helloworld.c)
- You need to compile this file using GCC
- Hint: Use the function “printf”



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