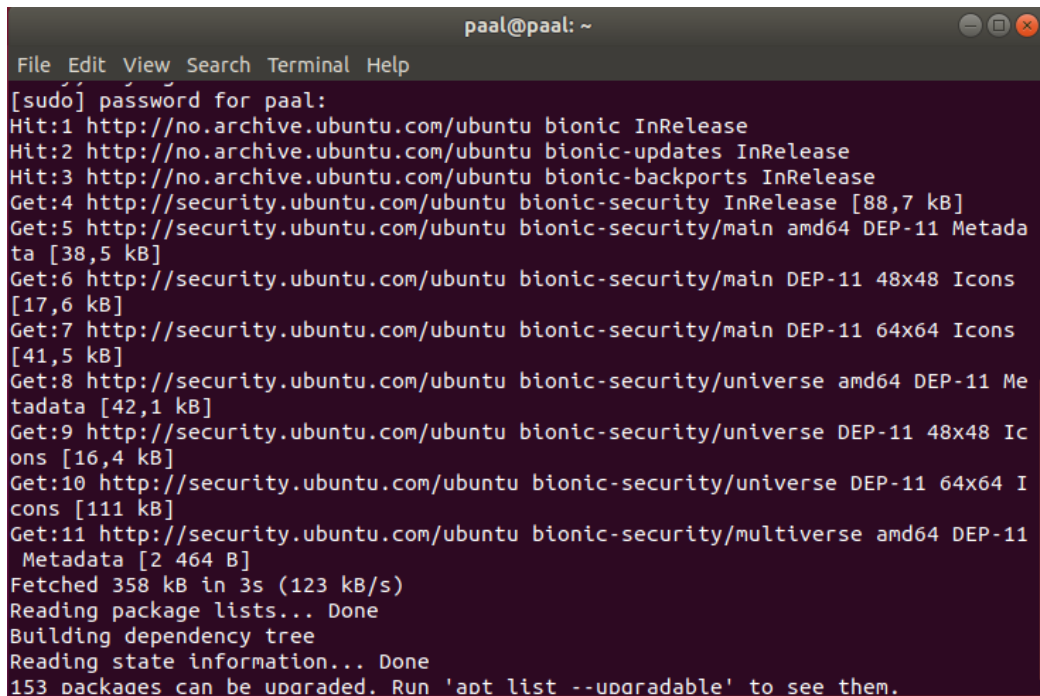


Lab 3 - linux

Oppsett:

Eg installerte Ubuntu på ein gammal pc eg hadde med og bruka Ubuntu sin egent installer.

<https://ubuntu.com/download/desktop>



```
paal@paal: ~
File Edit View Search Terminal Help
[sudo] password for paal:
Hit:1 http://no.archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://no.archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:3 http://no.archive.ubuntu.com/ubuntu bionic-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88,7 kB]
Get:5 http://security.ubuntu.com/ubuntu bionic-security/main amd64 DEP-11 Metadata [38,5 kB]
Get:6 http://security.ubuntu.com/ubuntu bionic-security/main DEP-11 48x48 Icons [17,6 kB]
Get:7 http://security.ubuntu.com/ubuntu bionic-security/main DEP-11 64x64 Icons [41,5 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 DEP-11 Metadata [42,1 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/universe DEP-11 48x48 Icons [16,4 kB]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/universe DEP-11 64x64 Icons [111 kB]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 DEP-11 Metadata [2 464 B]
Fetched 358 kB in 3s (123 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
153 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Brukte commanden «sudo apt update» for så og kjøra «sudo apt upgrade» og som du ser så blei 153 packages oppgradert.

Grunnleggende bruk:

1)

Med å bruka “ls” kan eg sjå kva mapper/filer som er inne i mappa eg er i. “pwd” bruker eg for å sjå filveien til der eg er. “cd «fil name»” bruker ein for og komme seg inn i fila ein vil og “cd ..” bruker ein for

å gå tilbake et steg.

```
paal@paal: ~  
File Edit View Search Terminal Help  
paal@paal:~$ ls  
Desktop Downloads Music Public Templates  
Documents examples.desktop Pictures 'sudo -i' Videos  
paal@paal:~$ cd Public  
paal@paal:~/Public$ ls  
paal@paal:~/Public$ cd ..  
paal@paal:~$ cd Downloads  
paal@paal:~/Downloads$ ls  
paal@paal:~/Downloads$ cd ..  
paal@paal:~$ cd Pictures  
paal@paal:~/Pictures$ ls  
'Screenshot from 2019-10-12 21-09-00.png'  
'Screenshot from 2019-10-12 21-09-21.png'  
'Screenshot from 2019-10-12 21-18-50.png'  
'Screenshot from 2019-10-12 21-19-52.png'  
'Screenshot from 2019-10-12 21-20-18.png'  
'Screenshot from 2019-10-12 21-20-43.png'  
'Screenshot from 2019-10-12 21-20-49.png'  
'Screenshot from 2019-10-12 21-21-23.png'  
'Screenshot from 2019-10-12 21-30-16.png'  
paal@paal:~/Pictures$ pwd  
/home/paal/Pictures  
paal@paal:~/Pictures$ cd ..  
paal@paal:~$
```

2) Eg brukte kommandoen «cat /proc/cpuinfo» for og finna informasjon om CPUen min

```
paal@paal: ~  
File Edit View Search Terminal Help  
processor       : 3  
vendor_id      : AuthenticAMD  
cpu family     : 21  
model          : 48  
model name     : AMD A8-7100 Radeon R5, 8 Compute Cores 4C+4G  
stepping       : 1  
microcode      : 0x6003106  
cpu MHz        : 1285.471  
cache size     : 2048 KB  
physical id    : 0  
siblings       : 4  
core id        : 3  
cpu cores      : 2  
apicid         : 19  
initial apicid : 3  
fpu            : yes  
fpu_exception  : yes  
cpuid level    : 13  
wp             : yes  
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov  
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp  
lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclm  
ulqldq monitor ssse3 fma cx16 sse4_1 sse4_2 popcnt aes xsave avx f16c lahf_lm cmp  
legacy_svm extapic cr8 legacy_ahm ssse3 misalignsse 3dnowprefetch osvw ibs xop
```

```

paal@paal: ~
File Edit View Search Terminal Help
processor      : 1
vendor_id     : AuthenticAMD
cpu family    : 21
model         : 48
model name    : AMD A8-7100 Radeon R5, 8 Compute Cores 4C+4G
stepping      : 1
microcode     : 0x6003106
cpu MHz       : 1197.362
cache size    : 2048 KB
physical id   : 0
siblings      : 4
core id       : 1
cpu cores     : 2
apicid        : 17
initial apicid : 1
fpu           : yes
fpu_exception : yes
cpuid level   : 13
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclm
ulqddq monitor ssse3 fma cx16 sse4_1 sse4_2 popcnt aes xsave avx f16c lahf_lm cmp
legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs xop

```

```

paal@paal: ~
File Edit View Search Terminal Help
processor      : 2
vendor_id     : AuthenticAMD
cpu family    : 21
model         : 48
model name    : AMD A8-7100 Radeon R5, 8 Compute Cores 4C+4G
stepping      : 1
microcode     : 0x6003106
cpu MHz       : 1324.491
cache size    : 2048 KB
physical id   : 0
siblings      : 4
core id       : 2
cpu cores     : 2
apicid        : 18
initial apicid : 2
fpu           : yes
fpu_exception : yes
cpuid level   : 13
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclm
ulqddq monitor ssse3 fma cx16 sse4_1 sse4_2 popcnt aes xsave avx f16c lahf_lm cmp
legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs xop

```

```

paal@paal: ~
File Edit View Search Terminal Help
paal@paal:~$ cat /proc/cpuinfo
processor      : 0
vendor_id     : AuthenticAMD
cpu family    : 21
model         : 48
model name    : AMD A8-7100 Radeon R5, 8 Compute Cores 4C+4G
stepping      : 1
microcode     : 0x6003106
cpu MHz       : 1185.918
cache size    : 2048 KB
physical id   : 0
siblings      : 4
core id       : 0
cpu cores     : 2
apicid        : 16
initial apicid : 0
fpu           : yes
fpu_exception : yes
cpuid level   : 13
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclm
ulqddq monitor ssse3 fma cx16 sse4_1 sse4_2 popcnt aes xsave avx f16c lahf_lm cmp

```

- 3) Bruker kommandoen «cat /proc/meminfo» for å finne informasjon om minne

```
paal@paal: ~  
File Edit View Search Terminal Help  
paal@paal:~$ cat /proc/meminfo  
MemTotal:       7062116 kB  
MemFree:        2769936 kB  
MemAvailable:   5609988 kB  
Buffers:        237064 kB  
Cached:         2748584 kB  
SwapCached:      0 kB  
Active:         1869752 kB  
Inactive:       2007372 kB  
Active(anon):    893088 kB  
Inactive(anon):  10188 kB  
Active(file):    976664 kB  
Inactive(file): 1997184 kB  
Unevictable:     32 kB  
Mlocked:         32 kB  
SwapTotal:      999420 kB  
SwapFree:       999420 kB  
Dirty:          624 kB  
Writeback:       0 kB  
AnonPages:      891596 kB  
Mapped:         279724 kB  
Shmem:          11800 kB  
KReclaimable:   170984 kB  
Slab:           213116 kB
```

Installer programmer

- 1) Brukte kommandoen "sudo apt install «program navn»" for og installere de forskjellige programene som trengs seinere i oppgave.
- 2) Her gjorde jeg som første gang og konfigurerte git

```
git config --global user.name "<your full name>"  
git config --global user.email "<your UiA e-mail address>"
```

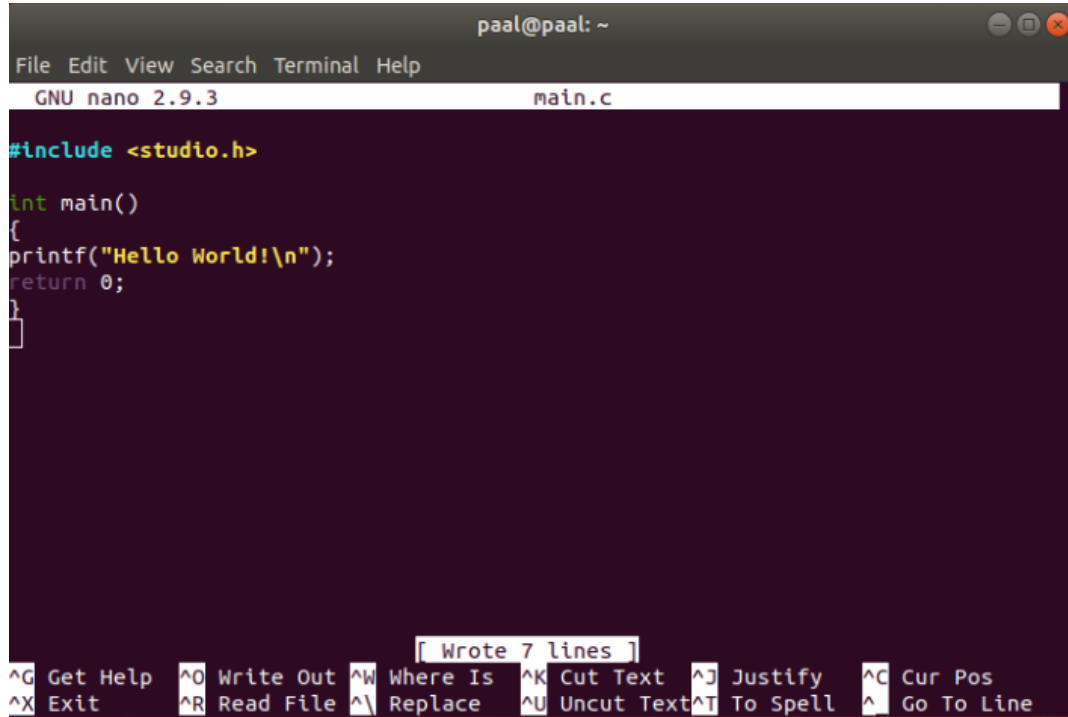
og for å sjekke at alt stemte brukte jeg "cat ~/.gitconfig". så genererte jeg en nøkkel med "ssh-keygen" og fant nøkkelen med "cat ~/.ssh/id_rsa.pub"

```
paal@paal: ~  
File Edit View Search Terminal Help  
Enter same passphrase again:  
Your identification has been saved in /home/paal/.ssh/id_rsa.  
Your public key has been saved in /home/paal/.ssh/id_rsa.pub.  
The key fingerprint is:  
SHA256:vBqo9lFWXtFxBllvBjW4TWdN/2pboEIMTQ5J2ahqF4c paal@paal  
The key's randomart image is:  
+---[RSA 2048]-----+  
|      =.O.  O=Bo|  
|      + O.  ..=O=|  
|      O      . +=+|  
|      E .. =  ...+|  
|      . O  S.+  .. |  
|      O ..  OO.... ..|  
|      . .. .O..... O|  
|      .. .O .  .O |  
|      ..... .O. |  
+---[SHA256]-----+  
paal@paal:~$ cat ~/.ssh/id_rsa.pub  
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDJrqqvqdaCW06ryaUisMCw3ti5FdJyM7MVNaY7KUXRS  
jQKA5Ce56q8vXR7W9QT3WYk0anWPZ5zx8vD/ds9moEHZZj6v4fDlvcPMfIGIM1MGSr2nIAF30EY6VZb0  
eWNlZQF7IsTOBg0iLRl+PePIsuSC/p6e0r5wKcUajXIouJYBr4p4L5AOKTHdYmCDB3QntCJDccLUBIW  
/jXGN1S7r4ETSLxMNEBQAYGMDovI+TZEgNKghsDnJUP9HieZ5ESwdDvMC6EuJHT5u0SLkL3wGrDAR0lv  
EZc10ATYu4AC1R5Yv2rSqyHArQIgl70u/tdV3o9Cj0DfIn01aR9xVCGq2+l paal@paal  
paal@paal:~$
```

så kopierte jeg nøkkelen og la den i «bitbucket»

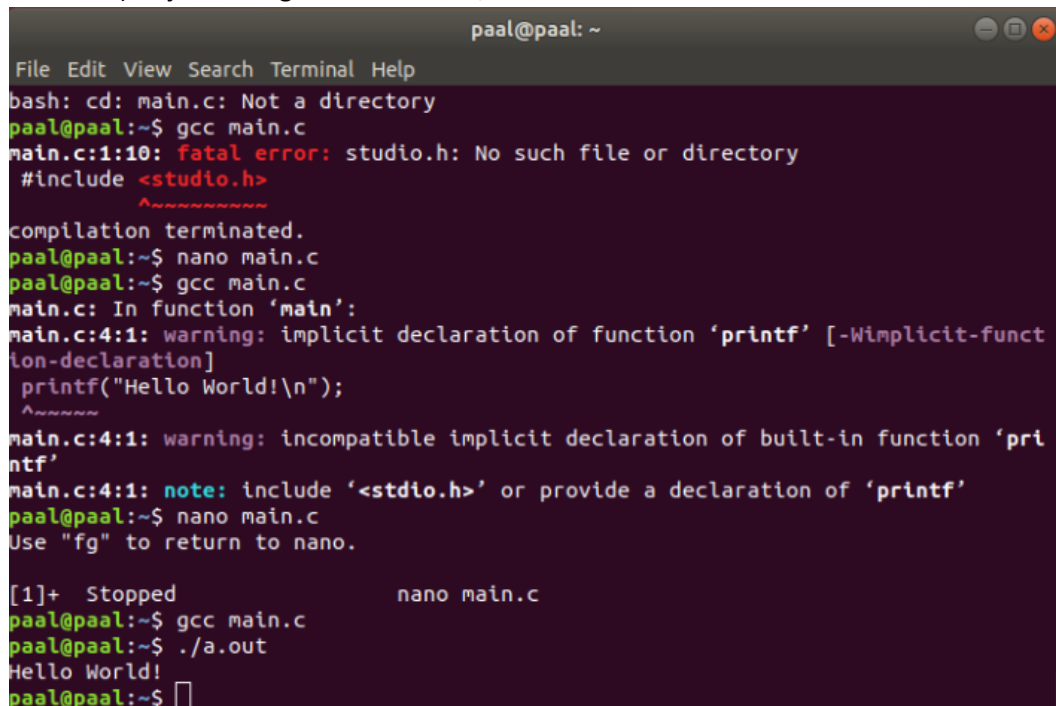
Bygg et program med kompilator direkte

- 1) Kjørte "sudo apt install nano" men viste seg eg allereie hadde programmet.
- 2) Brukte "cd" så "pwd" og fan ut at eg var i "home/paal"
- 3) Så brukte eg kommandoe "nano main.c"



```
paal@paal: ~  
File Edit View Search Terminal Help  
GNU nano 2.9.3 main.c  
  
#include <stdio.h>  
  
int main()  
{  
    printf("Hello World!\n");  
    return 0;  
}  
  
[ Wrote 7 lines ]  
^G Get Help  ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos  
^X Exit      ^R Read File  ^\ Replace    ^U Uncut Text ^T To Spell   ^_ Go To Line
```

- 4) Brukte "CTRL + S" som du ser ovanfor brukte eg 7 linjer. Så "CTRL + X" for å gå utav nano.
- 5) Kjørte så "gcc main.c" så "./a.out" som ein ser nedanfor.

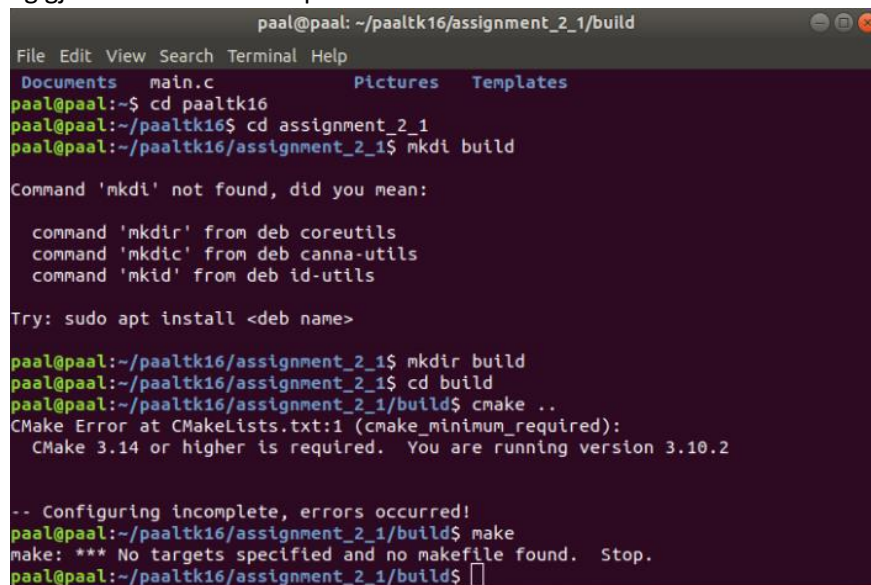


```
paal@paal: ~  
File Edit View Search Terminal Help  
bash: cd: main.c: Not a directory  
paal@paal:~$ gcc main.c  
main.c:1:10: fatal error: studio.h: No such file or directory  
#include <studio.h>  
          ^~~~~~  
compilation terminated.  
paal@paal:~$ nano main.c  
paal@paal:~$ gcc main.c  
main.c: In function 'main':  
main.c:4:1: warning: implicit declaration of function 'printf' [-Wimplicit-funct  
ion-declaration]  
    printf("Hello World!\n");  
    ^~~~~~  
main.c:4:1: warning: incompatible implicit declaration of built-in function 'pri  
ntf'  
main.c:4:1: note: include '<stdio.h>' or provide a declaration of 'printf'  
paal@paal:~$ nano main.c  
Use "fg" to return to nano.  
  
[1]+  Stopped                  nano main.c  
paal@paal:~$ gcc main.c  
paal@paal:~$ ./a.out  
Hello World!  
paal@paal:~$
```

- 6) GCC (GNU Compiler Collection) er ein rekka med kompilatorar som støtte programspråk: C, C++, Objective-C, Fortran, Ada, Go, D. Støtte og biblioteka for språk som «libstdc++, etc». Systeme GNU var bygga og er eit heilt fritt software som skal respektera brukaren sin friheit. [1]

Bygg eit program med CMake og make

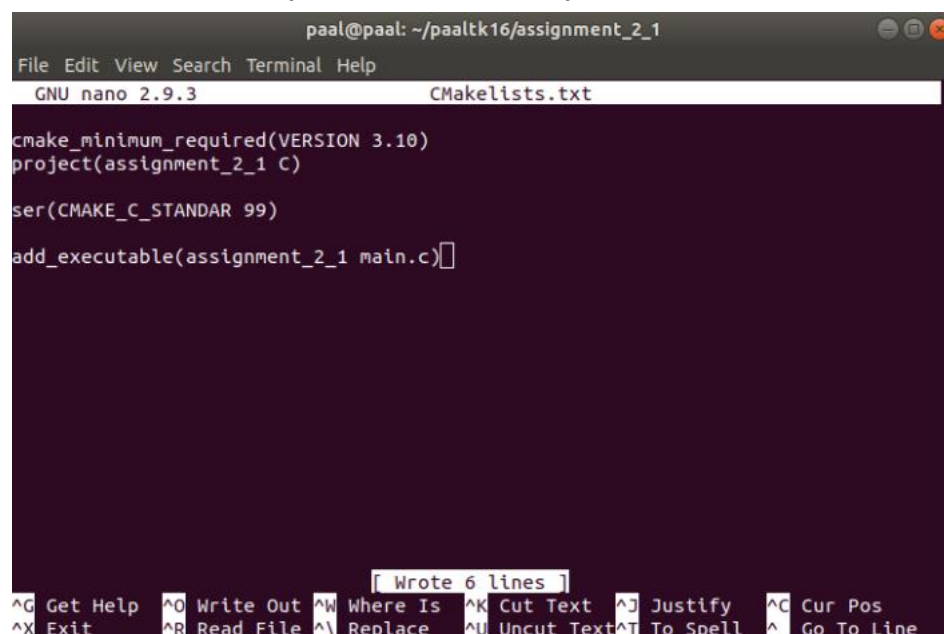
- 1) Eg gjekk innpå «Bitbucket» og fan linken min. så bruke eg kommandoen “git clone «Bitbucket linken”
- 2) Eg gjorde så som ein ser på bilde nedanfor



```
paal@paal: ~/paalTk16/assignment_2_1/build
File Edit View Search Terminal Help
Documents main.c Pictures Templates
paal@paal:~$ cd paalTk16
paal@paal:~/paalTk16$ cd assignment_2_1
paal@paal:~/paalTk16/assignment_2_1$ mkdir build
Command 'mkdir' not found, did you mean:
  command 'mkdir' from deb coreutils
  command 'mkdic' from deb canna-utils
  command 'mkid' from deb id-utils
Try: sudo apt install <deb name>
paal@paal:~/paalTk16/assignment_2_1$ mkdir build
paal@paal:~/paalTk16/assignment_2_1$ cd build
paal@paal:~/paalTk16/assignment_2_1/build$ cmake ..
CMake Error at CMakeLists.txt:1 (cmake_minimum_required):
  CMake 3.14 or higher is required. You are running version 3.10.2

-- Configuring incomplete, errors occurred!
paal@paal:~/paalTk16/assignment_2_1/build$ make
make: *** No targets specified and no makefile found. Stop.
paal@paal:~/paalTk16/assignment_2_1/build$
```

Som ein ser så fekk eg at eg hadde feil versjon så eg brukte kommandoen “nano CMakeList.txt” (NB! Husk store og små bokstaver ellers kommer ein ikkje inn på rett plass) sånn at eg kan endra minimums versjonen som krevs for å kjøra.



```
paal@paal: ~/paalTk16/assignment_2_1
File Edit View Search Terminal Help
GNU nano 2.9.3 CMakeLists.txt
cmake_minimum_required(VERSION 3.10)
project(assignment_2_1 C)

set(CMAKE_C_STANDARD 99)

add_executable(assignment_2_1 main.c)
[ Wrote 6 lines ]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line
```

som ein ser her gjorde eg feilen med å glømma stor “L” i CMakeList.txt, men eg gjekk tilbake og endra på da så fort eg fan ut.

Så prøvde eg og kjøra "cmake .." igjen

```
paal@paal: ~/paalTk16/assignment_2_1/build
File Edit View Search Terminal Help
CMake 3.14 or higher is required. You are running version 3.10.2

-- Configuring incomplete, errors occurred!
paal@paal:~/paalTk16/assignment_2_1/build$ nano CMakelist.txt
paal@paal:~/paalTk16/assignment_2_1/build$ cd ..
paal@paal:~/paalTk16/assignment_2_1$ ls
build CMakelists.txt CMakeLists.txt main.c
paal@paal:~/paalTk16/assignment_2_1$ nano CMakelist.txt
paal@paal:~/paalTk16/assignment_2_1$ nano CMakelists.txt
paal@paal:~/paalTk16/assignment_2_1$ nano CMakelists.txt
paal@paal:~/paalTk16/assignment_2_1$ cd build
paal@paal:~/paalTk16/assignment_2_1/build$ cmake ..
-- The C compiler identification is GNU 7.4.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Configuring done
-- Generating done
-- Build files have been written to: /home/paal/paalTk16/assignment_2_1/build
paal@paal:~/paalTk16/assignment_2_1/build$
```

Og brukte kommandoen "make" for å bygga programmet og "./assignment_2_1" for å kjøra programmet

```
paal@paal: ~/paalTk16/assignment_2_1/build
File Edit View Search Terminal Help
paal@paal:~/paalTk16/assignment_2_1/build$ cmake ..
-- Configuring done
-- Generating done
-- Build files have been written to: /home/paal/paalTk16/assignment_2_1/build
paal@paal:~/paalTk16/assignment_2_1/build$ make
[100%] Built target assignment_2_1
paal@paal:~/paalTk16/assignment_2_1/build$ ./assignment_2_1
Here you need to enter 5 numbers
or more until 0 is given
Please enter your numbers:
1
2
3
4
5
6
7
8
9
0
Count: 9
Sum: 45
Average: 5
paal@paal:~/paalTk16/assignment_2_1/build$
```

Cmake plassere enkle konfigureringsfile som har namnet "CMakeLists.txt" inn i alle «source directory». Dette blir brukt til å generera/laga bygg fila «makefiles». Den generere/lagar også bygg innstillinga. [2]

Make lese file kalla "Makefiles" frå «source code», disse filene fortell korleis programma skal bli utleid. Dette lar den automatisk bygga program og bibliotek som kan bli eksekvert. [3]

Referansar:

[1] G. Team, «GCC.GNU,» 19 August 2019.

<https://gcc.gnu.org/>. [Funnet 11 Oktober 2019].

[2] CMake, «CMake,»

<https://cmake.org/overview/>. [Funnet 11 Oktober 2019].

[3] «Wikipedia,» 21 September 2019.

[https://en.wikipedia.org/wiki/Make_\(software\)](https://en.wikipedia.org/wiki/Make_(software)). [Funnet 11 Oktober 2019].