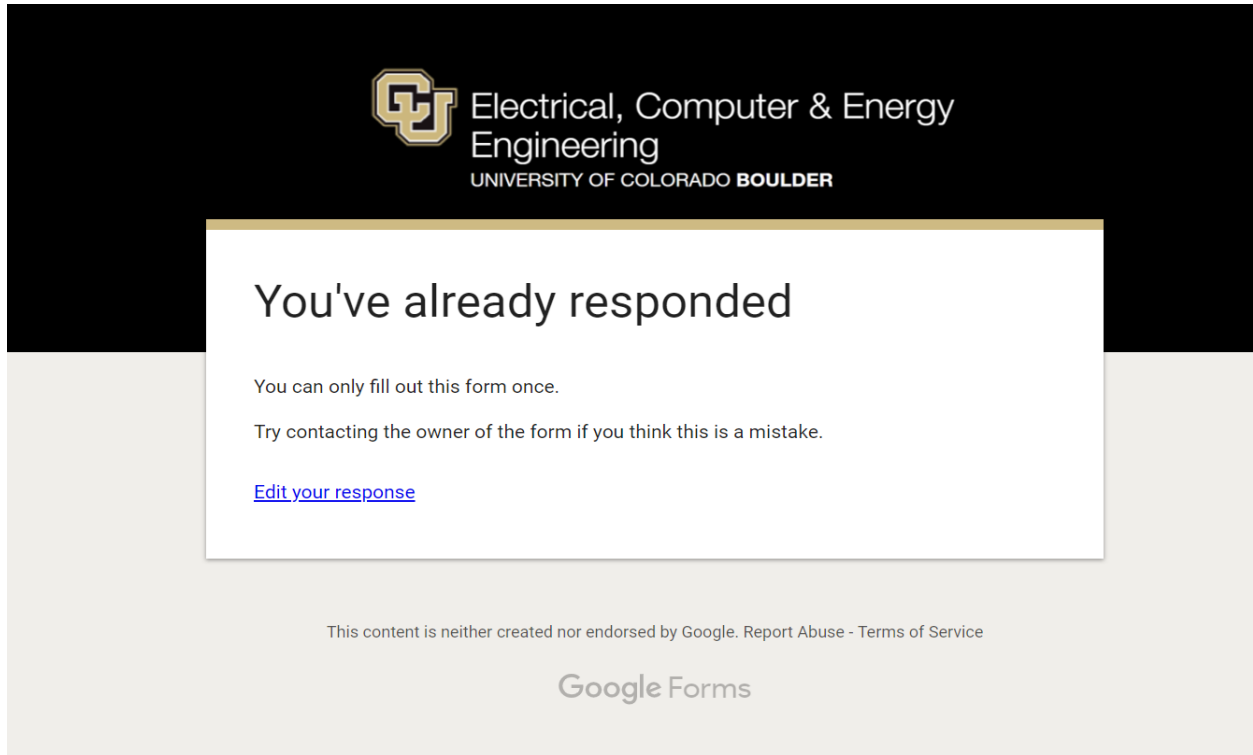


Homework 1 – Sanika Dongre

**Q1:**

**Solution:** ECEE Lab signup policy



**Q3:**

**Solution:**

Slack account set up:



**Sanika** 9:44 PM

Hi Everyone,

I am Sanika Dongre, a graduate student pursuing professional MS in Embedded Systems Engineering. I am planning to use gesture based sensors for the final project.

**Q4:**

**Solution:**

Partner for the project is Monish Nene.

**Q6:**

**Solution:**

bash:

```
echo -e "userinfo">hw1_problem6.txt
who -u>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "OS Type">>hw1_problem6.txt
uname -a>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "OS Distribution"
lsb_release -a>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "OS Version"
cat /etc/os-release>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "Kernel Version"
uname -or>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "Kernel gcc version build"
cat /proc/version>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "Kernel build time"
uname -v>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "System Architecture Information"
uname -a>>hw1_problem6.txt
echo >>hw1_problem6.txt
echo -e "Information on file System Memory"
```

```
free -m>>hw1_problem6.txt
echo >>hw1_problem6.txt
```

### Output file:

```
userinfo
sanika      :0                2019-01-30 17:37    ?                1114 (:0)

OS Type
Linux sanika-VirtualBox 4.15.0-43-generic #46-Ubuntu SMP Thu Dec 6 14:45:28
UTC 2018 x86_64 x86_64 x86_64 GNU/Linux

LSB Version:    core-9.20170808ubuntu1-noarch:security-9.20170808ubuntu1-
noarch
Distributor ID: Ubuntu
Description:    Ubuntu 18.04.1 LTS
Release:        18.04
Codename:       bionic

NAME="Ubuntu"
VERSION="18.04.1 LTS (Bionic Beaver)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 18.04.1 LTS"
VERSION_ID="18.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-
policy"
VERSION_CODENAME=bionic
UBUNTU_CODENAME=bionic

4.15.0-43-generic GNU/Linux

Linux version 4.15.0-43-generic (buildd@lgw01-amd64-001) (gcc version 7.3.0
(Ubuntu 7.3.0-16ubuntu3)) #46-Ubuntu SMP Thu Dec 6 14:45:28 UTC 2018

#46-Ubuntu SMP Thu Dec 6 14:45:28 UTC 2018

Linux sanika-VirtualBox 4.15.0-43-generic #46-Ubuntu SMP Thu Dec 6 14:45:28
UTC 2018 x86_64 x86_64 x86_64 GNU/Linux

              total            used            free            shared  buff/cache
available
Mem:          1993             1126             184             19             682
679
Swap:         1521             104             1417
```

### Q7:

#### Solution:

- 1) hello-arm-static compile and run:

```

sanika-VirtualBox sanika@:hello-arm (master) $ ./hello-arm-static
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20

```

- 2) hello-arm-shared compile and run:

```

sanika-VirtualBox sanika@:hello-arm (master) $ LD_LIBRARY_PATH=./shared ./hello
-arm-shared
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20

```

- 3) Readelf for static and shared:

```

sanika-VirtualBox sanika@:hello-arm (master) $ readelf -d hello-arm-static|grep
libtest.so

```

```

sanika-VirtualBox sanika@:hello-arm (master) $ readelf -d hello-arm-shared|grep
libtest.so
0x0000000000000001 (NEEDED)             Shared library: [libtest.so]

```

```

sanika-VirtualBox sanika@:Chapter02 (master) $ cd library
sanika-VirtualBox sanika@:library (master) $ ls
hello-arm  inc  README  shared  static
sanika-VirtualBox sanika@:library (master) $ cd hello-arm
sanika-VirtualBox sanika@:hello-arm (master) $ readelf -e hello-arm-shared | gre
p "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
sanika-VirtualBox sanika@:hello-arm (master) $ readelf -e hello-arm-shared | gre
p "Shared library"
sanika-VirtualBox sanika@:hello-arm (master) $ readelf -a hello-arm-shared | gre
p "Shared library"
0x0000000000000001 (NEEDED)             Shared library: [libtest.so]
0x0000000000000001 (NEEDED)             Shared library: [libc.so.6]

```

Q8:

Solution:

- 1) Screenshot for configuration of ARM configurations : for the arm cortex a8:

```

sanika-VirtualBox sanika@crosstool-ng (master) $ ./ct-ng show-arm-cortex_a8-linux-gnueabi
[L...] arm-cortex_a8-linux-gnueabi
  Languages      : C,C++
  OS             : linux-4.19.1
  Binutils       : binutils-2.31.1
  Compiler       : gcc-8.2.0
  C library      : glibc-2.28
  Debug tools    : duma-2_5_15 gdb-8.2 ltrace-0.7.3 strace-4.24
  Companion libs : expat-2.2.6 gettext-0.19.8.1 gmp-6.1.2 isl-0.20 libelf-0.8
.13 libiconv-1.15 mpc-1.1.0 mpfr-4.0.1 ncurses-6.1
  Companion tools : autoconf-2.69 automake-1.16.1

```

## 2) The Sysroot directory screenshot:

```

sanika-VirtualBox sanika@crosstool-ng (master) $ cd ..
sanika-VirtualBox sanika::~ $ cd x-tools
sanika-VirtualBox sanika@x-tools $ cd arm-cortex_a8-linux-gnueabihf
sanika-VirtualBox sanika@arm-cortex_a8-linux-gnueabihf $ cd arm-cortex_a8-linux-gnueabihf
sanika-VirtualBox sanika@arm-cortex_a8-linux-gnueabihf $ cd sysroot
sanika-VirtualBox sanika@sysroot $ ls
etc lib sbin usr var
sanika-VirtualBox sanika@sysroot $

```

## 3) Comparison of size: for shared and static:

```

sanika-VirtualBox sanika@hello-arm (master) $ ls -l hello-arm-s*
-rwxr-xr-x 1 sanika sanika 8416 Jan 31 00:31 hello-arm-shared
-rwxr-xr-x 1 sanika sanika 11264 Jan 31 00:31 hello-arm-static

```

## 4) GREP Command for program interpreter, shared library:

```

sanika-VirtualBox sanika@library (master) $ cd hello-arm
sanika-VirtualBox sanika@hello-arm (master) $ ls
hello-arm.c hello-arm.o hello-arm-shared hello-arm-static Makefile
sanika-VirtualBox sanika@hello-arm (master) $ readelf -e hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
sanika-VirtualBox sanika@hello-arm (master) $ readelf -e hello-arm-shared | grep "Shared library"
sanika-VirtualBox sanika@hello-arm (master) $ readelf -a hello-arm-shared | grep "Shared library"
0x0000000000000001 (NEEDED)             Shared library: [libtest.so]
0x0000000000000001 (NEEDED)             Shared library: [libc.so.6]

```

- 5) The version screenshot: It shows the version for the arm cortex a8:

Setting the path variable first

```
santika-VirtualBox santika@:~$ PATH=/x-tools/arm-cortex_a8-linux-gnueabihf/bin:$PATH
santika-VirtualBox santika@:~$ cd ~
```

The version screenshot:

The GCC version – 8.2.0

```
arm-cortex_a8-linux-gnueabihf arm-unknown-linux-gnueabi
santika-VirtualBox santika@:x-tools$ cd arm-cortex_a8-linux-gnueabihf/
santika-VirtualBox santika@:arm-cortex_a8-linux-gnueabihf$ ls
arm-cortex_a8-linux-gnueabihf bin build.log.bz2 include lib libexec share
santika-VirtualBox santika@:arm-cortex_a8-linux-gnueabihf$ cd arm-cortex_a8-linux-gnueabihf/
santika-VirtualBox santika@:arm-cortex_a8-linux-gnueabihf$ ls
bin debug-root include lib sysroot
santika-VirtualBox santika@:arm-cortex_a8-linux-gnueabihf$ arm-cortex_a8-linux-gnueabihf-gcc -v
Using built-in specs.
COLLECTJ GCC/arm-cortex_a8-linux-gnueabihf-gcc
COLLECTJ LTO WRAPPER=/home/monish/x-tools/arm-cortex_a8-linux-gnueabihf/libexec/gcc/arm-cortex_a8-linux-gnueabihf/8.2.0/lto-wrapper
Target: arm-cortex_a8-linux-gnueabihf
Configured with: /home/monish/crosstool-ng/.build/arm-cortex_a8-linux-gnueabihf/src/gcc/configure --build=x86_64-build_pc-linux-gnu --host=x86_64-build_pc-linux-gnu --target=arm-cortex_a8-linux-gnueabihf
--prefix=/home/monish/x-tools/arm-cortex_a8-linux-gnueabihf --with-sysroot=/home/monish/x-tools/arm-cortex_a8-linux-gnueabihf/sysroot --enable-languages=c,c++ --with-cpu=cort
ex-a8 --with-float=hard --with-pkgversion='crosstool-NG 1.23.0.595-e550d2c-dirty' --enable-__cxa_atexit --disable-lbmudflap --disable-lbgomp --disable-libssp --disable-libquadmath --disable-libquadmath-
support --disable-lbsanitizer --disable-lbnpix --with-gmp=/home/monish/crosstool-ng/.build/arm-cortex_a8-linux-gnueabihf/buildtools --with-mpfr=/home/monish/crosstool-ng/.build/arm-cortex_a8-linux-gnueab
ihf/buildtools --with-mpc=/home/monish/crosstool-ng/.build/arm-cortex_a8-linux-gnueabihf/buildtools --with-isl=/home/monish/crosstool-ng/.build/arm-cortex_a8-linux-gnueabihf/buildtools --enable-lto --with
- host-libstdcxx=static-libgcc -Wl,-Bstatic,-lstdc++,-Bdynamic -ln' --enable-threads=posix --enable-target-optspace --enable-plugin --enable-gold --disable-nls --disable-multilib --with-local-prefix=/hom
e/monish/x-tools/arm-cortex_a8-linux-gnueabihf/arm-cortex_a8-linux-gnueabihf/sysroot --enable-long-long
Thread model: posix
gcc version 8.2.0 (crosstool-NG 1.23.0.595-e550d2c-dirty)
```

For unknown conf: arm-unknown-linux-gnueabi:

- 1) Screenshot for the configuration of arm: for unknown configuration:

```
santika-VirtualBox santika@crosstool-ng (master)$ ./ct-ng show-arm-unknown-linux-gnueabi
[.] arm-unknown-linux-gnueabi
  Languages      : C,C++
  OS             : linux-4.19.1
  Binutils       : binutils-2.31.1
  Compiler       : gcc-8.2.0
  C library      : glibc-2.28
  Debug tools    : duma-2_5_15 gdb-8.2 ltrace-0.7.3 strace-4.24
  Companion libs : expat-2.2.6 gettext-0.19.8.1 gmp-6.1.2 isl-0.20 libelf-0.8.13 libiconv-1.15 mpc-1.1.0 mpfr-4.0.1 ncurses-6.1
  Companion tools : autoconf-2.69 automake-1.16.1
```

- 2) The sysroot directory screenshot:

```
santika-VirtualBox santika@:x-tools$ cd arm-unknown-linux-gnueabi/
santika-VirtualBox santika@:arm-unknown-linux-gnueabi$ cd arm-unknown-linux-gnueabi/
santika-VirtualBox santika@:arm-unknown-linux-gnueabi$ cd sysroot/
santika-VirtualBox santika@:sysroot$ ls
etc lib sbin usr var
santika-VirtualBox santika@:sysroot$
```

- 3) The Readelf command and grep for program interpreter:



```

sanika-VirtualBox sanika@hello-arm (master) $ readelf -d hello-arm-static | grep libtest.so
sanika-VirtualBox sanika@hello-arm (master) $ readelf -d hello-arm-shared | grep libtest.so
0x0000000000000001 (NEEDED)           Shared library: [libtest.so]
sanika-VirtualBox sanika@hello-arm (master) $ readelf -e hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
sanika-VirtualBox sanika@hello-arm (master) $ █

```

#### 4) Version: arm unknown version:

```

sanika-VirtualBox sanika@:~$ cd x-tools/arm-unknown-linux-gnueabi
sanika-VirtualBox sanika@arm-unknown-linux-gnueabi$ arm-unknown-linux-gnueabi-gcc -v
Using built-in specs.
COLLECT_GCC=arm-unknown-linux-gnueabi-gcc
COLLECT_LTO_WRAPPER=/home/monish/x-tools/arm-unknown-linux-gnueabi/libexec/gcc/arm-unknown-linux-gnueabi/8.2.0/lto-wrapper
Target: arm-unknown-linux-gnueabi
Configured with: /home/monish/crosstool-ng/build/arm-unknown-linux-gnueabi/src/gcc/configure --build=x86_64-build_pc-linux-gnu --host=x86_64-build_pc-linux-gnu --target=arm-unknown-linux-gnueabi --prefix=/home/monish/x-tools/arm-unknown-linux-gnueabi --with-sysroot=/home/monish/x-tools/arm-unknown-linux-gnueabi/arm-unknown-linux-gnueabi/sysroot --enable-languages=c,c++ --with-float=soft --with-pkgversion='crosstool-NG 1.23.0.595-e550d2c-dirty' --disable-sjlj-exceptions --enable-_cxa_atexit --disable-libmudflap --disable-libgomp --disable-libssp --disable-libquadmath --disable-libquadmath-support --disable-lto --enable-lto --with-host-libstdcxx='-static-libgcc -Wl,-Bstatic,-lstdc++,-ldynamic,-ln' --enable-threads-posix --enable-target-optspace --enable-plugin --enable-gold --disable-nls --disable-multilib --with-local-prefix=/home/monish/x-tools/arm-unknown-linux-gnueabi/arm-unknown-linux-gnueabi/sysroot --enable-long-long
Thread model: posix
gcc version 8.2.0 (crosstool-NG 1.23.0.595-e550d2c-dirty)

```