

ECEN 5013-HW1 REPORT

Github link: https://github.com/Shreya1809/ECEN5013_AESD-S19

Q. 1 Lab Policy Agreement

Thanks for filling out [ECEE Classroom Lab Policy Agreement](#)

Here's what we got from you:

EDIT RESPONSE

ECEE Classroom Lab Policy Agreement

You will be emailed a copy of your responses. Please make sure to read and understand everything you agree to. If you violate any of the terms here, your lab access may be revoked. For any questions, email ecehelp@colorado.edu.

Your email address (shch4313@colorado.edu) was recorded when you submitted this form.

Q. 2 Slack Account

The screenshot shows a Slack workspace interface. On the left is a sidebar with a dark purple background. It includes a search bar, a 'Jump to...' dropdown, and sections for 'All Threads', 'Channels' (with #ecen5013-s19 selected), and 'Direct Messages'. The main area displays the #ecen5013-s19 channel. At the top, it shows 43 members and a search bar. The message history includes a text message from Nikhil Divekar about a final project, a reply from burin, and a message from Satya Mehta. On the right, a 'Workspace Directory' panel shows a profile card for shreya chakraborty with a green online status indicator.

Q. 4 Project Partner – Doing the project solo.

Q. 5 Environment Setup:

```
shreya1809@shreya1809:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 18.04.1 LTS
Release:        18.04
Codename:       bionic
```

Q. 6 System Information Script

There are 2 script files. One prints the information on the terminal called infoscript.sh and the other file called bashscript.sh calls the infoscript.sh in it and writes the output into a file called output.txt.

bashscript.sh:

```
#!/bin/bash
./infoscript.sh
./infoscript.sh > output.txt
```

infoscript.sh:

```
#!/bin/bash
echo "-----System Information Script-----"
echo "-----User Information-----"
w
echo
echo "-----Operating System Type-----"
hostnamectl
echo
echo "-----OS Distribution-----"
lsb_release -a
echo
echo "-----OS Version-----"
cat /etc/os-release
echo
echo "-----Kernel Version-----"
uname -r
echo
echo "-----Kernel GCC Version Build-----"
cat /proc/version
echo
echo "-----Kernel Build Time-----"
uname -v
echo
echo "-----System Architecture Info-----"
lscpu
echo
echo "-----Info on File System Memory-----"
free
echo
```

output.txt contents:

-----System Information Script-----

-----User Information-----

19:40:35 up 5:31, 1 user, load average: 0.07, 0.04, 0.01

USER	TTY	FROM	LOGIN@	IDLE	JCPU	PCPU	WHAT
------	-----	------	--------	------	------	------	------

shreya18	:0	:0	14:10 ?xdm?	2:29	0.01s		/usr/lib/gdm3/gdm-x-session --run-script env GNOME_SHELL_SESSION_MODE=ubuntu gnome-session --session=ubuntu
----------	----	----	-------------	------	-------	--	--

-----Operating System Type-----

Static hostname: shreya1809

Icon name: computer-vm

Chassis: vm

Machine ID: 8b2ef35844d246afb35cbdda3e0c8080

Boot ID: 6d1d0db647c34894afb8a76338de40b1

Virtualization: oracle

Operating System: Ubuntu 18.04.1 LTS

Kernel: Linux 4.15.0-29-generic

Architecture: x86-64

-----OS Distribution-----

Distributor ID: Ubuntu

Description: Ubuntu 18.04.1 LTS

Release: 18.04

Codename: bionic

-----OS Version-----

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

-----Kernel Version-----

4.15.0-29-generic

-----Kernel GCC Version Build-----

Linux version 4.15.0-29-generic (buildd@lgw01-amd64-057) (gcc version 7.3.0 (Ubuntu 7.3.0-16ubuntu3))
#31-Ubuntu SMP Tue Jul 17 15:39:52 UTC 2018

-----Kernel Build Time-----

#31-Ubuntu SMP Tue Jul 17 15:39:52 UTC 2018

-----System Architecture Info-----

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 1

On-line CPU(s) list: 0

Thread(s) per core: 1

Core(s) per socket: 1

Socket(s): 1

NUMA node(s): 1

Vendor ID: GenuineIntel

CPU family: 6

Model: 78

Model name: Intel(R) Core(TM) i5-6200U CPU @ 2.30GHz

Stepping: 3

CPU MHz: 2400.002

BogoMIPS: 4800.00

Hypervisor vendor: KVM

Virtualization type: full

L1d cache: 32K

L1i cache: 32K

L2 cache: 256K

L3 cache: 3072K

NUMA node0 CPU(s): 0

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 rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc cpuid pni pclmulqdq monitor ssse3 cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx rdrand hypervisor lahf_lm abm 3dnowprefetch invpcid_single pti fsgsbase avx2 invpcid rdseed clflushopt

-----Info on File System Memory-----

	total	used	free	shared	buff/cache	available
Mem:	5071924	1027824	2865232	7216	1178868	3797724
Swap:	2097148	0	2097148			

Q. 7 Shared and Static libraries built natively

1. Proof of Execution of each application

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ file hello-arm-static
hello-arm-static: ELF 64-bit LSB executable, x86-64, version 1 (GNU/Linux), statically linked, for GNU/Linux 3.2.0, BuildID[sha1]=50c29a2f6b8750a3a720bcff0103bf2cae0a73b1, with debug_info, not stripped
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ file hello-arm-shared
hello-arm-shared: ELF 64-bit LSB shared object, x86-64, version 1 (SYSV), dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, for GNU/Linux 3.2.0, BuildID[sha1]=196d5a0bcbfbbc201dfa2a64c2e1f0a5e2e2eeb2, not stripped
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$
```

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ ./hello-arm-shared
./hello-arm-shared: error while loading shared libraries: libtest.so: cannot open shared object file: No such file or directory
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ ./hello-arm-static
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$
```

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ ./hello-arm-static
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ LD_LIBRARY_PATH=./shared ./hello-arm-shared
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20
```

2. Difference in Size of the 2 applications

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/MELP/Chapter02/library/hello-arm$ ls -lh hello-arm-s*
-rwxr-xr-x 1 shreya1809 shreya1809 8.3K Jan 20 20:54 hello-arm-shared
-rwxr-xr-x 1 shreya1809 shreya1809 11K Jan 20 20:54 hello-arm-static
```

with -static argument in the makefile

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ ls -lh hello-arm-s*
-rwxr-xr-x 1 shreya1809 shreya1809 8.3K Jan 24 11:06 hello-arm-shared
-rwxr-xr-x 1 shreya1809 shreya1809 828K Jan 24 11:06 hello-arm-static
```

3. Shared library use of each executable using readelf as per MELP chapter 2 page 83

With -static in Makefile

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-shared | grep "Shared library"
0x0000000000000001 (NEEDED)             Shared library: [libtest.so]
0x0000000000000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-static | grep "Shared library"
readelf: Warning: [ 3]: Link field (0) should index a symtab section.
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q7/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-static | grep "program interpreter"
readelf: Warning: [ 3]: Link field (0) should index a symtab section.
```

Without -static in Makefile:

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-shared | grep "Shared library"
0x0000000000000001 (NEEDED)      Shared library: [libtest.so]
0x0000000000000001 (NEEDED)      Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-static | grep "Shared library"
0x0000000000000001 (NEEDED)      Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-static | grep "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/MELP/Chapter02/library/hello-arm$ readelf -a hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
```

Q. 8 Cross Building

Crosstool-NG toolchain for the Beaglebone Black

1. The version and configuration of “arm-cortex_a8-linux-gnueabi” gcc compiler:

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crosstool-ng$ arm-cortex_a8-linux-gnueabi-gcc --version
arm-cortex_a8-linux-gnueabi-gcc (crosstool-NG 1.23.0.588-0364e3c) 8.2.0
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.

shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crosstool-ng$ arm-cortex_a8-linux-gnueabi-gcc -v
Using built-in specs.
COLLECT_GCC=arm-cortex_a8-linux-gnueabi-gcc
COLLECT_LTO_WRAPPER=/home/shreya1809/x-tools/arm-cortex_a8-linux-gnueabi/libexec/gcc/arm-cortex_a8-linux-gnueabi/8.2.0/lto-wrapper
Target: arm-cortex_a8-linux-gnueabi
Configured with: /home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-cortex_a8-linux-gnueabi/8.2.0/build_pc-linux-gnu --target=arm-cortex_a8-linux-gnueabi --prefix=/home/shreya1809/x-tools/arm-cortex_a8-linux-gnueabi --enable-languages=c,c++ --with-cpu=cortex-a8 --with-fpu=neon --with-languages=c,c++ --with-mpc=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-cortex_a8-linux-gnueabi/buildtools --with-isl=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-cortex_a8-linux-gnueabi/buildtools --with-libstdc++-static=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-cortex_a8-linux-gnueabi/buildtools --enable-threads=posix --enable-target-optspace --with-local-prefix=/home/shreya1809/x-tools/arm-cortex_a8-linux-gnueabi/arm-cortex_a8-linux-gnueabi Thread model: posix
gcc version 8.2.0 (crosstool-NG 1.23.0.588-0364e3c)
```

2. The sysroot directory

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects$ arm-cortex_a8-linux-gnueabi-gcc -print-sysroot
/home/shreya1809/x-tools/arm-cortex_a8-linux-gnueabi/arm-cortex_a8-linux-gnueabi/sysroot
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects$
```

3. Compiling using the arm-cortex_a8-linux-gnueabi cross-tools


```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ file hello-arm-shared
hello-arm-shared: ELF 32-bit LSB executable, ARM, EABI5 version 1 (SYSV), dynamically linked, interpreter /lib/ld-linux-armhf.so.3, for GNU/Linux 4.19.1, with debug_info, not stripped
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ file hello-arm-static
hello-arm-static: ELF 32-bit LSB executable, ARM, EABI5 version 1 (SYSV), statically linked, for GNU/Linux 4.19.1, with debug_info, not stripped
```

4. Size of each Executable

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ ls -lh hello-arm-s*
-rwxr-xr-x 1 shreya1809 shreya1809 12K Jan 24 10:55 hello-arm-shared
-rwxr-xr-x 1 shreya1809 shreya1809 4.0M Jan 24 10:55 hello-arm-static
```

5. Shared library use of each executable

With -static in Makefile

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ arm-cortex_a8-linux-gnueabi-hf-readelf -a hello-arm-shared | grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libtest.so]
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ arm-cortex_a8-linux-gnueabi-hf-readelf -a hello-arm-static | grep "Shared library"
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ arm-cortex_a8-linux-gnueabi-hf-readelf -a hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux-armhf.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$ arm-cortex_a8-linux-gnueabi-hf-readelf -a hello-arm-static | grep "program interpreter"
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_BB/hello-arm$
```

Without -static in makefile:

```

shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library/hello-arm$ arm-cortex_a8-linux-gnueabihf-readelf -a hello-arm-shared |
grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libtest.so]
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library/hello-arm$ arm-cortex_a8-linux-gnueabihf-readelf -a hello-arm-static |
grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library/hello-arm$ arm-cortex_a8-linux-gnueabihf-readelf -a hello-arm-static |
grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux-armhf.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library/hello-arm$ arm-cortex_a8-linux-gnueabihf-readelf -a hello-arm-shared |
grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux-armhf.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library/hello-arm$

```

Crosstool-NG chain for the QEMU emulator

1. The version and configuration of “arm-unknown-linux-gnueabi” gcc compiler

```

shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crosstool-ng$ arm-unknown-linux-gnueabi-gcc --version
arm-unknown-linux-gnueabi-gcc (crosstool-NG 1.23.0.588-0364e3c) 8.2.0
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.

shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crosstool-ng$ arm-unknown-linux-gnueabi-gcc -v
Using built-in specs.
COLLECT_GCC=arm-unknown-linux-gnueabi-gcc
COLLECT_LTO_WRAPPER=/home/shreya1809/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/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-unknown-linux-gnueabi/_64-build_pc-linux-gnu --target=arm-unknown-linux-gnueabi --prefix=/home/shreya1809/x-tools/arm-unknown-linux-gnueabi --enable-languages=c,c++ --with-float=soft --with-pkgversion=crosstool-NG/1.23.0.588-0364e3c --enable-__cxa_atexit --disable-libmudflap --disable-libgomp --disable-libssp --disable-libquadmath --disable-libatomic --with-gmp=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-unknown-linux-gnueabi/buildtools --with-mpc=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-unknown-linux-gnueabi/buildtools --with-isl=/home/shreya1809/ECEN5013_AESD-S19/projects/crosstool-ng/.build/arm-unknown-linux-gnueabi/buildtools --enable-threads=posix --enable-target-optspace --enable-plugin --enable-gold --enable-lto --enable-long-long
Thread model: posix
gcc version 8.2.0 (crosstool-NG 1.23.0.588-0364e3c)
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crosstool-ng$

```

2. The sysroot directory

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/projects/crostoool-ng$ arm-unknown-linux-gnueabi-gcc -print-sysroot
/home/shreya1809/x-tools/arm-unknown-linux-gnueabi/arm-unknown-linux-gnueabi/sysroot
```

3. Compiling using the arm_unknown-linux_gnueabi cross-tools

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ file hello-arm-shared
hello-arm-shared: ELF 32-bit LSB executable, ARM, EABI5 version 1 (SYSV), dynamically linked, interpreter /lib/ld-linux.so.3, for GNU/Linux 4.19.1, with debug_info, not stripped
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ file hello-arm-static
hello-arm-static: ELF 32-bit LSB executable, ARM, EABI5 version 1 (SYSV), statically linked, for GNU/Linux 4.19.1, with debug_info, not stripped
```

4. Size of each Executable

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ ls -lh hello-arm-s*
-rwxr-xr-x 1 shreya1809 shreya1809 12K Jan 24 10:36 hello-arm-shared
-rwxr-xr-x 1 shreya1809 shreya1809 4.1M Jan 24 10:36 hello-arm-static
```

5. Shared library use of each executable

With -static in Makefile

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-shared | grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libtest.so]
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-static | grep "Shared library"
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/Homeworks/HW1/Q8/MELP-Chapter02/MELP/Chapter02/library_QEMU/hello-arm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-static | grep "program interpreter"
```

Without -static in makefile:

```
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library2/hello-a
rm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-shared | grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libtest.so]
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library2/hello-a
rm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-static | grep "Shared library"
0x00000001 (NEEDED)             Shared library: [libc.so.6]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library2/hello-a
rm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-shared | grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library2/hello-a
rm$ arm-unknown-linux-gnueabi-readelf -a hello-arm-static | grep "program interpreter"
[Requesting program interpreter: /lib/ld-linux.so.3]
shreya1809@shreya1809:~/ECEN5013_AESD-S19/proj_dir2/MELP-Chapter02/MELP/Chapter02/library2/hello-a
rm$
```