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Pre-Lab 2
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Part A: What is a toolchain?

1. **Define binutils, as defined in the reference.**

   The first component of a toolchain.

2. **List the two major items that comprise binutils, as defined in the reference**

   a. *as*, the assembler, that turns assembled code (generated by GCC) to binary.

   b. *ld*, the linker, that links several object code into a library, or an executable.

3. **List the first two pre-built toolchains defined in the reference.**

   a. Free Electrons

   b. Code Sourcery

4. **When talking about toolchains, what are the three machine distinctions (as defined in the reference)?**

   a. The build machine, on which the toolchain is built.

   b. The host machine, on which the toolchain is executed.

   c. The target machine, on which the toolchain generates code.

Part B: Do you know where your toolchain is?

1. **From the command line, issue the `which` command with the native `gcc` command as an argument. What is the path displayed?**

   `/usr/bin/gcc`

2. **Repeat for the ARM cross platform `arm-none-eabi-gcc`. What is the path displayed?**

   `/usr/local/arm/toolchain/bin/arm-none-eabi-gcc`

3. **Use the `ls` command to list the other toolchain programs. How many of them are there?**

   Assuming that only toolchains are in the `/usr/local/` directory, then using
   `$ ls /usr/local/ | wc -l` tells us that there are 22 toolchains.

4. **Verify that the path for ARM cross platform tools is in the linux environment, using the linux `echo` command.**

It's kinda hard to tell as there are multiple entries in PATH for the ARM cross platform directory (at the 2nd and 5th positions).

Result of `echo`:
/usr/local/openocd/0.9.0/bin:**usr/local/arm/toolchain//bin**:/home/apps/Xilinx/Vivado/
2017.3/bin:/usr/lib64/qt-3.3/bin:**/usr/local/arm/toolchain/bin**:/usr/local/bin:/usr/bin:
/usr/local/sbin:/usr/sbin:/home/apps/MATLAB/R2016a/bin:/home/JaimeGuevara/.local
/bin:/home/JaimeGuevara/bin

Part C: Toolchain versions

1. **What is the version of the native assembler on `0xdeadbeef`?**

GNU assembler version 2.27-34.base.el7

2. **What is the version of the `0xdeadbeef` ARM cross compiler assembler?**

arm-none-eabi-gcc (GNU Tools for ARM Embedded Processors) 4.9.3 20141119 (release) [ARM/embedded-4_9-branch revision 218278]

Part D: Distributions

1. **What is the URL for this tarball?**

https://launchpad.net/gcc-arm-embedded/+download

Part E: Tools studied in the lab

1. **What chapter in the course reference covers the assembler command?**

Chapter 6

2. **What chapter covers the linker command?**

Chapter 10

Part F: Interpreting block diagrams for linux commands

1. **What complete command is represented by the block diagram for the assembler? (Figure 6-4 in the course reference)**

```
$ arm-none-eabi-as prog01.s -o prog01.s.o -a=prog01.lst
```

2. **What complete command is represented by the block diagram for the gcc compiler? (Figure 17-1 in the course reference)**

```
$ gcc -o hw hw.c
```