

COMP 264 Intro to Assembly Language

Fall 2020

1 Intro

In this activity, we're going to build on what you learned in the first two chapters of the Raspberry Pi assembly book by learning some new arithmetic instructions that do things other than add. You will also get practice writing Makefiles.

2 Subraction

First, we're going to write a new program that's similar to the example in Chapter 2 that will subtract two numbers instead of adding them. On your pi, create a new empty directory for this project called `subtest` and `cd` into that directory:

```
rambler@ubuntu:~$ mkdir subtest
rambler@ubuntu:~$ cd subtest
rambler@ubuntu:~$ nano subtest.s
```

Now type in a program that subtracts two numbers, using the `sub` instruction instead of `add`:

```
.global main
.func main
main:
    mov r0,100
    mov r1,10
    sub r0,r1
    bx lr
```

Compile and run:

```
rambler@ubuntu:~$ gcc -o subtest subtest.s
rambler@ubuntu:~$ ./subtest
```

Write a Makefile that can automatically compile your program.

3 Multiplication using Shifts

The `lsl` instruction can be used to shift a value left. For example, suppose we have a value in register `r1` that we want to shift left by two bits. We can use the instruction:

```
lsl r1,#2
```

Write a new program that loads a number into `r0` and multiplies it by 8 using bit shifts.