Additional Resources

In preparation for the practical sessions you can fill out code, collect relevant information and spend time ensuring you understand how provided code works. *You do not need to use a RPi to do this*. However…

If you have a Raspberry Pi at home …

You can download the same image file as installed on the university RPis, and then follow some instructions on how to put the image onto an SD card.

Although the image is suitable for Raspberry Pi versions 2, 3 and 4, all 3 versions have different memory maps. If you do not have an RPI 3b the exercises relying on hardware will need adjusting to account for the different base addresses.

If you do not have a Raspberry Pi at home …

You can use a virtual machine to do *some* of the development at home.

Download the VMware virtual machine (7z file) which contains a VMware virtual machine (2.8 GB). The virtual machine runs a QEMU emulation of ARM and uses a Raspbian image to boot a virtual Raspberry Pi.

Download VMware Workstation Player (for Windows and Linux users) or VMware Fusion (for Mac users) and use it to open the virtual machine. Once started, login as user `student` and password `student` (if asked for credentials). Open a terminal (available from the desktop). Read the text in the terminal window to get a short description on how to start the virtual Raspberry Pi and on how to create a shared directory between your host Windows operating system and the guest (the virtual machine's) operating system so you can copy files to/from the VM (it will create a network drive called student which can be found in "This PC"). Other options for creating a shared directory can be found on the website of VMware.

Make sure you start the virtual Raspberry Pi from the terminal so that you can see when it has properly booted up. After it has booted up this way, it will ask for the credentials of the virtual Raspberry Pi to immediately create an SSH connection. When the connection is lost, you can reconnect using the command presented in the short description shown when opening a terminal (instead of the steps of 5.2 in the assignment description).

For transferring files between the virtual machine and the virtual Raspberry Pi you can still use PuTTY, but the steps are slight different than explained in 5.4 in the assignment description. You can install PuTTY on the virtual machine with the command "`sudo apt-get install putty`". To run PSFTP, use the command "`psftp -P 5022`". To connect to the virtual Raspberry Pi, use the command "`open pi@localhost`".

When using GDB, you may not be able to print the values of variables using the "print" command. Instead, you can use the "`x /f &var`" command (eXamine memory), where "f" is the size of the data and "var" is the variable name. Essentially, this command shows you the data that is in the memory starting from the address of "var" of size "f". For instance, for 5.10xi you can use the command "`x /w &array1`" instead, where "w" stands for word, and for 5.10xii you can use the command "`x /10w &array1`" instead, where "10w" stands for 10 words.

Note that the virtual Raspberry Pi does not contain a system counter or other emulated hardware. It is not possible to use the virtual machine for executing code that interacts with the Raspberry Pi hardware. This means that you can only use the virtual machine to implement up to and including assignment 5.16. For the other assignments, you can still use the virtual machine to test the basic logic of your assembly programs.