Workshop 01 - Nand2Tetris Project 01

Workshop 01

This workshop is introductory and held in the first week. The aim of this workshop is to familiarise you with some of the basic Nand2Tetris tools that will assist your learning in the course. You are expected to have read this page before attending the workshop.

Participation Marks

Up to 5 participation marks are available for every workshop, 2 for preparation, 1 for attendance and 2 for completing an activity, subject to the conditions described on the **Participation Marks (https://myuni.adelaide.edu.au/courses/54311/pages/participation-marks)** page.

Attendance

One participation mark will be awarded if your workshop attendance is recorded and you make a submission to the Workshop 01 assignment in the Web Submission System by **Friday 11.55pm** of week 1. **Do not** leave a workshop until you have checked your attendance mark.

If you are using a CAT suite computer running Linux in a timetabled workshop, your presence should be automatically recorded when you visit our **practical marker (https://cs.adelaide.edu.au/services/pracmarker/)**. If your attendance mark is not displayed when you visit our **practical marker (https://cs.adelaide.edu.au/services/pracmarker/)**, your presence will need to be manually recorded. **Do not click** on the "flag me for marking" button until a supervisor is standing next to you and is ready to record your presence. The flag is only to speed up the data entry and is only visible for 30 seconds.

Workshop 01 Background Reading

Read the first chapter of the textbook. Then read (and practice) sections I, II, and III of the tutorial on the hardware simulator and the Hardware Description Language (HDL). These can currently be found at the end of the Software page of the nand2Tetris website:

https://www.nand2tetris.org/software (https://www.nand2tetris.org/software)

Note that page 26 contains some important notes about how the simulator searches for hardware definitions.

Important: you must use our version of the nand2tetris tools which can be found on our **Nand2Tetris Resources (https://myuni.adelaide.edu.au/courses/54311/pages/nand2tetris-resources)** page.

Pencil and Paper

You will find it much easier to understand what is happening if you bring some paper and something to write with. Drawing pictures of how gates fit together and truth tables of what inputs produce what outputs can be very helpful.

Workshop 01 Preparation Task

Two participation marks will be awarded for completion of this preparation activity either before or during your workshop. For all future workshops the preparation task must be completed at least 10 minutes before the first timetabled workshop in the week, see **Participation Marks (https://myuni.adelaide.edu.au/courses/54311/pages/participation-marks)** for details.

Note: in example commands % is the shell's prompt, it is not part of the command.

Note: the web submission system will record 0 marks for completing this activity, the 2 marks are awarded later if and only if your attendance is recorded.

1. Log into linux. If you are using your own laptop you will need to install the **Nand2Tetris tools (https://myuni.adelaide.edu.au/courses/54311/pages/nand2tetris-resources)** first.
2. Create directories for every assignment, workshop project and exam in your svn repository, as described on the **Startup Files for Workshops and Assignments (https://myuni.adelaide.edu.au/courses/54311/pages/startup-files-for-workshops-and-assignments)** page.
3. Change to the workshop01 directory.

```
% cd workshop01
```

4. Copy the zip file attached below into the updates sub-directory and add it to svn. Do not unzip the file. If the zip file was named workshop01-20200702-123000.zip you would type the command:

```
% svn add updates/workshop01-20200702-123000.zip
```

5. Run the following command to place the workshop's startup files in the correct locations:

```
% make install
```

6. Add the .hdl files to your svn repository:

```
% svn add *.hdl
% svn commit -m "Workshop 01 Startup Files"
```

7. Goto the Web Submission System and make a submission to the Workshop 01 assignment. A successful submission that passes the preparation tests will complete the preparation activity.

Workshop 01 Activity

Two participation marks will be awarded for completing the following activity. This need not be completed during the workshop but no participation marks will be awarded if the task is not completed by **Friday 11.55pm** of week 1.

1. Log into linux. If you are using your own laptop you will need to install the **Nand2Tetris tools (https://myuni.adelaide.edu.au/courses/54311/pages/nand2tetris-resources)** first.
2. If required, checkout a working copy of the workshop01 directory from your svn repository.
3. Change directory to the working copy of the workshop01 directory.
4. Start the hardware simulator GUI by running the command:

```
% HardwareSimulator.sh
```

5. In the hardware simulator open up the file: *And.hdl*
6. Using the Hardware Simulator, test the *And* chip interactively. Does the *And* chip behave as expected?
7. Use the test script *And.tst* to test the *And* chip:

```
% HardwareSimulator.sh And.tst
```

   This runs the test script on the simulator, produces an output file, *And.out* and compares it to a file of expected output, *And.cmp*.

8. Run the make command with no arguments:

```
% make
```

This first checks that your startup files are up to date and then runs a script that tests all the chips using their own .tst test scripts.

9. Edit the *Not.hdl* file in your preferred editor and attempt to implement the *Not* chip using a *Nand* chip. Test your *Not* chip.

```
% make
```

   A .hdl file is just a text file and be edited in exactly the same way that you edited your .cpp and .h files in earlier programming courses.

10. Edit the *And.hdl* file in your preferred editor and attempt to implement the *And* chip using a *Nand* chip and your *Not* chip. Test your *And* chip.

```
% make
```

11. Commit the changes to your svn repository:

```
% svn commit -m workshop01-activity
```

12. Goto the Web Submission System and make a submission to the Workshop 01 assignment. A successful submission that passes the Not chip and And chip tests will complete the workshop activity.
13. If you have time you can complete the remaining gates as **Nand2Tetris Project 01 (https://myuni.adelaide.edu.au/courses/54311/pages/nand2tetris-project-01)** for additional participation marks. You are expected to know what all the chips do and how to implement them. They are the building blocks we will use to construct the Hack processor.

If you get stuck on hdl consult the Hardware Simulator Tutorial or the HDL Survival Guide on the nand2tetris website.

Startup Files

The newest of the following zip file(s) must be placed in the updates sub-directory and added to svn. When make is run, the newest zip file in the updates directory is used to update the startup files. Any files you are required to edit will not be updated but, a copy of the latest version of those files will be placed in the sub-directory originals.

- **workshop01-20200724-193240.zip (https://myuni.adelaide.edu.au/courses/54311/files/7145375/download?wrap=1)**