Instructions for viewing Julia notebooks

As part of digitalization efforts for the course EL2450 Hybrid and Embedded Systems, we will be publishing Julia notebooks to illustrate and visualize various concepts studied throughout the course in an interactive manner. Viewing these requires installing the Julia programming language and Jupyter notebooks on your laptop. The following provides the instructions necessary to start viewing the notebooks on a Linux operating system, and should take roughly 15-20 minutes.

For any questions regarding the notebooks or any errors encountered while setting up the environment, please **contact Peter Varnai (varnai@kth.se)**.

1 Installing Jupyter lab

First, install the Jupyter Lab notebook environment:

- Run the command `pip install jupyterlab` from a terminal.

  NOTE: In case you get a message requesting Python 3.5, make sure such a version of Python is installed on your computer and instead run `pip3 install jupyterlab`.

2 Installing the Julia programming environment

1. Downloaded the latest version of Julia (currently v1.5.3) from https://julialang.org/downloads/. You probably need either the 32- or 64-bit x86 Linux version depending on your computer.

2. Extract the contents to a folder on your computer, and open a terminal navigating to the directory which contains the `julia-1.5.3` folder.

3. Copy the `julia-1.5.3` folder to your `/opt` folder using the command `sudo mv julia-1.5.3/ /opt/julia-1.5.3`

4. Install Atom by following the instructions for Linux on the main website. (Run the commands to add the package repository to your system, followed by simply `sudo apt-get install atom`.)

5. Open Atom, navigate to Edit/Preferences/Install, and find and install the "uber-juno" package for Julia support. This will take a while and install various Julia related packages.

6. Atom should have a "Juno" tab after the installation is complete. Go to its Settings, and change the Julia Path to "/opt/julia-1.5.3/bin/julia".

7. On the REPL tab of the Atom editor (Juno/Open REPL from the navigation bar), press [ENTER] to start a Julia session. Packages should be automatically set up, and Julia 1.5.3 should be ready to use.

3 Viewing Jupyter notebooks

There are many packages that extend the functionality of the Julia programming language. At any point if you try to use a functionality whose required package is not contained, Julia will notify you about this in an error message, along with instructions on how to add the package.

In order to link Julia with the Jupyter notebook environment, we need to install the IJulia package. This can be done as follows from the Julia REPL:

1. Press "]" to enter package mode
2. Execute the command `add IJulia`
3. Press [BACKSPACE] to exit the package mode

Jupyter should now see the Julia programming language as a kernel which is available for execution. To verify this, open a command prompt, and start a jupyter session by typing the command `jupyter lab`. A tab should open on your web browser, and you should see "Julia 1.5.3" available as kernel for creating notebooks.

To run the provided Julia notebooks, open them after launching jupyter lab and run the cells in order by pressing [SHIFT]+[ENTER]. It is important to note that first-time use loading times will be relatively high, as well as initial loading times later when launching kernels. Thus, in order to experience these loading times only once while working with julia notebooks, aim to avoid restarting the kernel.