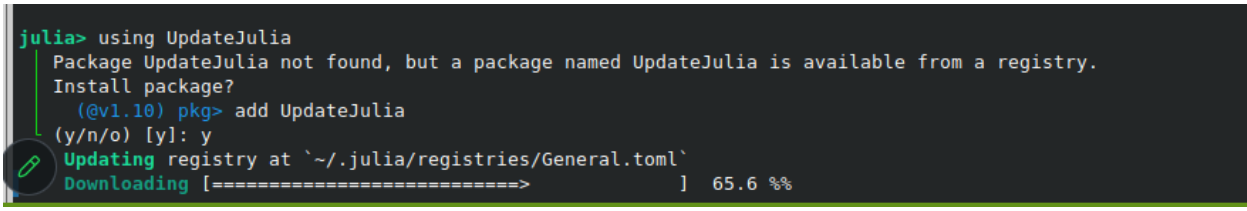
AlgebraicJulia Software Install Instructions

1. Install Julia

Go to: https://julialang.org/downloads/, and install the current stable release..

If already have some Julia installed,

- Enter Julia on the linux command line
- In normal Julia REPL, enter “using UpdateJulia”
    - If not installed, This should ask whether to install it



Note that if adding this for Jupyter notebook, likely need to add IJulia -- see below

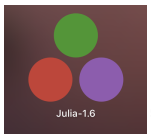
2. If anaconda navigator is not already installed, Install it

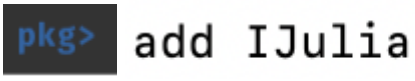
If already installed anaconda, can likely simply use.

1. **Windows**: https://docs.anaconda.com/anaconda/install/windows/
2. **MacOS**: Mac OS
3. **Linux**: https://docs.anaconda.com/anaconda/install/linux/ (note that installation here does not require sudo)
4. If you are using other Operating Systems, please go to: https://docs.anaconda.com/anaconda/install/, and choose the anaconda version most suitable:

- Installing on Windows
- Installing on macOS
- Installing on Linux
- Installing on AWS Graviton2 (arm64)
- Installing on Linux-s390x (IBM Z)
- Installing on Linux POWER
- Installing in silent mode
- Installing for multiple users
- Verifying your installation
- Anaconda installer file hashes
- Updating from older versions
- Using Anaconda on older operating systems
- Uninstalling Anaconda Distribution

3.1 Install Julia kernel used in Jupyter Notebook

- Please note that may well have to create a new command line prompt after installing julia above, so that have “path” pointing to the Julia executable available
- Open Julia command line:
    - Do this by either
        i. **Mac, Windows**: double-clicking the Julia executable 

”
        ii. **Linux**: Invoking the julia executable from its previously installed location on your computer (e.g., by entering “julia” on the command line).
    - In Pkg mode (type “]” can change to Pkg mode from Julia Mode),
      type: “add IJulia”
    - 

(Note: can use “ctrl+c” exit the Pkg mode to Julia mode; use “]” to move to Pkg mode from Julia mode.)

- build IJulia

4. Consider updating Julia packages

Go to Julia command line
type “]” to change to Pkg mode from Julia Mode
Enter “up” and press enter

4. Installing Catlab in Julia

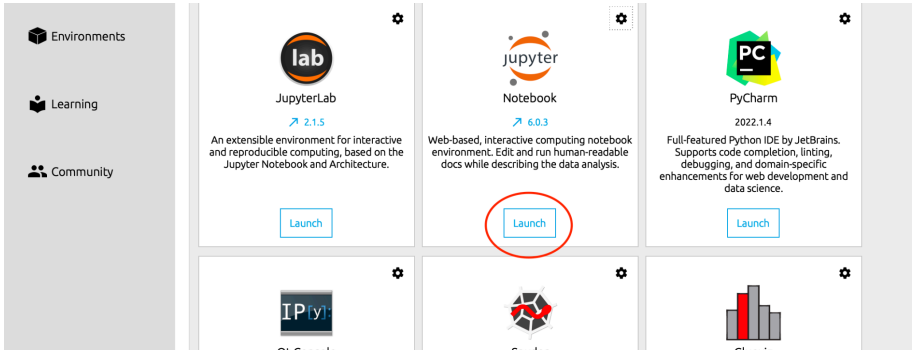
in the Julia command line, go into package manager with the “]” key, and type:

add Catlab

5. Creating a new Notebook

- Open Anaconda Navigator by double clicking the executable

, or by issuing they command “anaconda-navigator” from the command line
- On linux, you may have to find `anaconda-navigator at ~/anaconda3/bin/anaconda-navigator`
- Click “Launch” under Jupyter Notebook, such as:



- In the Notebook Dashboard, on the menu that is shown, please click “New -> Julia *X*”, where *X* is the latest version of Julia that is listed there. Please note that if no such Julia option shows up, please go to Section 3 and add IJulia

- You just created a new Jupyter Notebook with Julia kernel and can write your code in the Notebook now.

6. Optional: Easing starting Julia from the Command Line

- We can also open Julia in the Terminal command line
    - Type “julia” in terminal

Please
But, if you are using MacOS, probably you need to add the executable Julia to the path first by typing
“sudo ln -s /Applications/Julia-*X*.app/Contents/Resources/julia/bin/julia /usr/local/bin/julia”
In the terminal command line (where *X* is the latest version of Julia that is present). For example:

```
(base) xiaoyanli@MacBook-Pro ~ % sudo ln -s /Applications/Julia-1.6.app/Contents/Resources/julia/bin/julia /usr/local/bin/julia
Password:
(base) xiaoyanli@MacBook-Pro ~ % julia
               _
   _       _ _(_)_     |  Documentation: https://docs.julialang.org
  (_)     | (_) (_)    |
   _ _   _| |_  __ _   |  Type "?" for help, "]?" for Pkg help.
  | | | | | | |/ _` |  |
  | | |_| | | | (_| |  |  Version 1.6.1 (2021-04-23)
 _/ |\__'_|_|_|\__'_|  |  Official https://julialang.org/ release
|__/                   |

julia>
```

4. Optional: Installing other commonly-used packages in Julia (e.g., for StockFlow package use)

1. Choose one of two options:
    a. in the Julia command line, go into package manager with the “]” key, and type:
    [Two choices for getting StockFlow
        - To install the latest published version, if execute “add StockFlow”, it would
        - To install the latest development version, execute “add https://github.com/AlgebraicJulia/StockFlow.jl”
            - NB: If have previously executed “add StockFlow”, will need to execute “remove StockFlow”, and only then add the latest development version per the command above

    add OrdinaryDiffEq
    add LabelledArrays
    add Plots
    add Catlab
    For example:

```
(@v1.6) pkg> add LabelledArrays
```

Note that in this package mode, one can use “status *packageName*” to find out the current version of a package that one is using

b. Issue the following within the Jupyter notebook
   - import Pkg; Pkg.add("Catlab")
   - import Pkg; Pkg.add("DataMigrations")
   - import Pkg; Pkg.add("Luxor")

3.2 Optional (for those with earlier versions of Jupyter notebook installed): Delete old kernels in JupyterNotebook

List all kernels and grep the name of the kernel you want to remove
jupyter kernelspec list

Remove it
jupyter kernelspec remove <kernel_name>

```
Last login: Wed Aug 10 00:27:01 on ttys002
(base) xiaoyanli@MacBook-Pro ~ % jupyter kernelspec list
Available kernels:
  julia-1.5    /Users/xiaoyanli/Library/Jupyter/kernels/julia-1.5
  julia-1.6    /Users/xiaoyanli/Library/Jupyter/kernels/julia-1.6
  julia-1.7    /Users/xiaoyanli/Library/Jupyter/kernels/julia-1.7
  python3      /Users/xiaoyanli/opt/anaconda3/share/jupyter/kernels/python3
(base) xiaoyanli@MacBook-Pro ~ % jupyter kernelspec remove julia-1.5
Kernel specs to remove:
  julia-1.5            /Users/xiaoyanli/Library/Jupyter/kernels/julia-1.5
Remove 1 kernel specs [y/N]: y
[RemoveKernelSpec] Removed /Users/xiaoyanli/Library/Jupyter/kernels/julia-1.5
(base) xiaoyanli@MacBook-Pro ~ %
```

7. Common Problems

- If you did not find the julia kernel in Jupyter Notebook, you may find it handy to refer to the following website: https://datatofish.com/add-julia-to-jupyter/

- **Linux**: If you have problems running Anaconda navigator due to error similar to “qt.glx: qglx_findConfig: Failed to finding matching FBConfig for QSurfaceFormat”, do
    - `conda update anaconda-navigator (may need path, like “~/anaconda3/bin/conda update anaconda-navigator”)`
    - export QT_XCB_GL_INTEGRATION=none
    - edit ~/.anaconda/navigator/anaconda-navigator.ini and insert the line
      `enable_high_dpi_scaling = True`
- Error precompiling IJulia
    - ERROR: LoadError: InitError: SystemError: opening file "/usr/share/julia/cert.pem": No such file or directory
    - `sudo ln -s /etc/ssl/cert.pem /usr/share/julia/cert.pem`
        - May need to look in a different location for ceert.pem, depending on your Linux distribution.
- If the Graphs plotted using function Graph() failed to show:
    - In julia, type command: `x`
        - please make sure that the command is properly executed

      You should see the Graphviz callable:

```
julia> run(`dot -V`)
dot - graphviz version 2.44.1 (20200629.0846)
Process(`dot -V`, ProcessExited(0))
```

    - need to install graphviz, following instructions in: https://graphviz.org/download/ (when we run the GraphViz installer, in the install options step, we need to choose “Add graphViz to the system path…”, and in the next step, we do not change the default install Location.)

Provided by Dusel, John Nov.30th, 2023

Installing StockFlow.jl on Ubuntu 20.04

A pedantic guide to installing Julia, Jupyter, and StockFlow.jl from scratch.

This process amounts to installing Julia on bare-metal, then installing dependencies from the Julia REPL.

1. Install Julia

1. Download the current stable release of Julia from https://julialang.org/downloads/. This will place a file `julia-<version>-linux-x86_64.tar.gz` into the directory `/home/<user>/Downloads`. As of 2023/12/01 the current version is 1.9.4.

2. Extract the contents of that `.tar.gz` file:

   ```
   $ cd ~/Downloads
   $ tar -xvzf julia-<version>-linux-x86_64.tar.gz
   ```

3. Move the extracted directory into its proper place

   ```
   # mv julia-<version> /opt
   # chown root:root /opt/julia-<version>
   ```

   Modify permissions if necessary; the suggested permissions are:

   `drwxr-xr-x  8 root root 4.0K Nov 14 04:07 julia-1.9.4`.

4. Make Julia accessible from a terminal session by adding the following line to `~/.bashrc`:

   ```
   $ export PATH="$PATH:/opt/julia-<version>/bin"
   ```

5. Refresh your settings in the current terminal session

   ```
   $ source ~/.bashrc
   ```

   Check that Julia is installed by running `which julia`. You should see an output like `/opt/julia-<version>/bin/julia`.

2. Install dependencies in Julia

StockFlow.jl requires several packages need to be installed.
From the Julia REPL:

1. Press `]` to enter package mode (prompt will change from `julia>` to `@(v<version>) pkg>`). Backspace to exit package mode.

2. Install packages in this order:

```
@(v<version>) pkg> add StockFlow
@(v<version>) pkg> add OrdinaryDiffEq
@(v<version>) pkg> add LabelledArrays
@(v<version>) pkg> add Plots
@(v<version>) pkg> add Catlab
```

NB: Some users have observed installation errors after installing dependencies using the `Pkg` syntax, e.g.,

```
julia> using Pkg
julia> Pkg.add("StockFlow")
```

So, the package prompt is recommended.

Use Julia

1. Write a script `scriptname.jl` and execute it through the Julia REPL.

```
julia> include("scriptname.jl")
```

2. Create and interactive with a Jupyter notebook. From the Julia REPL enter

```
julia> using IJulia
julia> notebook()
```

8. Set up new julia version:
sudo rm /usr/local/bin/julia
sudo ln -s /Applications/Julia-1.11.app/Contents/Resources/julia/bin/julia /usr/local/bin/julia

Links to popular areas

Catlab GitHub site: https://github.com/AlgebraicJulia/Catlab.jl
Catlab documentation: https://algebraicjulia.github.io/Catlab.jl/dev/
Causal Loop https://github.com/AlgebraicJulia/StockFlow.jl/blob/main/src/CausalLoop.jl

StockFlow: https://github.com/AlgebraicJulia/StockFlow.jl/tree/main/examples