

Warm-up : First things first

```
$ guix pull --commit=b94724e8b2102be0fe9d19e9dfe44d6f7101bd4b
```

- 1 Install the packages `git-minimal`, `nss-certs` and `which`

```
$ guix install git-minimal nss-certs which
```

- 2 Clone the repository `https://gitlab.inria.fr/guix-hpc/open-science-days-tutorial` and go inside

```
$ git clone https://gitlab.inria.fr/guix-hpc/open-science-days-tutorial  
$ cd open-science-days-tutorial
```

Warm-up : Yet another package manager

- 1 Search with the terms high-performance, dynamic, language

```
$ guix search high-performance dynamic language
```

- 2 Display the information corresponding to the Julia package

```
$ guix show julia
```

- 3 Install the Julia package and start the Julia REPL (julia, quit *Control-D*)

```
$ guix install julia  
$ julia  
julia> exit()
```

- 4 Install other Julia packages : PyPlot and DataFrames

```
$ guix install julia-pyplot julia-dataframes
```

Warm-up : Yet another package manager? 1/3

- 1 Try `guix package --list-generations`

```
$ guix package --list-generations
Generation 1          Dec 14 2022 13:08:38
  julia              1.6.7          out      /gnu/store/...-julia-1.6.7

Generation 2          Dec 14 2022 13:09:11          (current)
+ julia-dataframes    1.2.2  out  /gnu/store/...-julia-dataframes-1.2.2
+ julia-pyplot         2.10.0 out  /gnu/store/...-julia-pyplot-2.10.0
```

- 2 Remove the package `julia-pyplot`

```
$ guix remove julia-pyplot
```

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- Try `guix package --roll-back` and list again the generations

```
$ guix package --roll-back
switched from generation 3 to 2
$ guix package --list-generations
Generation 1          Dec 14 2022 13:08:38
  julia              1.6.7              out      /gnu/store/...-julia-1.6.7

Generation 2          Dec 14 2022 13:09:11      (current)
+ julia-dataframes    1.2.2              out /gnu/store/...-julia-dataframes-1.
+ julia-pyplot         2.10.0             out /gnu/store/...-julia-pyplot-2.10.0

Generation 3          Dec 14 2022 13:11:30
- julia-pyplot         2.10.0             out /gnu/store/...-julia-pyplot-2.10.0
```

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- 4 Remove PyPlot and install the Julia packages CSV and Zygote with only one command-line

```
$ guix package --remove julia-pyplot --install julia-csv julia-zygote
```

- 5 Try `guix package --list-installed`

```
$ guix package --list-installed
```

julia	1.6.7	out /gnu/store/...-julia-1.6.7
julia-pyplot	2.10.0	out /gnu/store/...-julia-pyplot-2.10.0
julia-dataframes	1.2.2	out /gnu/store/...-julia-dataframes-1.2.2

- 1 Create a shell with the Python packages Python, Pandas, Numpy and Matplotlib
Start python3 and try `import numpy`
Exit the created shell with `exit` or *Control-D*

```
$ guix shell python python-pandas python-numpy python-matplotlib  
$ python3  
>>> quit()
```

- 2 Create a manifest file containing these Python packages

```
$ guix shell python python-pandas python-numpy python-matplotlib \  
  --export-manifest
```

;; What follows is a "manifest" equivalent to the command line you gave.
;; You can store it in a file that you may then pass to any 'guix' command
;; that accepts a '--manifest' (or '-m') option.

```
(specifications->manifest  
  (list "python"  
        "python-pandas"  
        "python-numpy"  
        "python-matplotlib"))
```

```
$ guix shell python python-pandas python-numpy python-matplotlib \  
  --export-manifest > manifest.scm
```

- 3 Start a new shell using this manifest file

Run the script `python/co2.py`

Exit the created shell.

```
$ guix shell --manifest=manifest.scm  
$ python3 python/co2.py  
$ exit
```

- 4 Create a new shell and run the script with one command-line

```
$ guix shell --manifest=manifest.scm -- python3 python/co2.py
```


- 5 Create a new shell using the previous manifest file and start the IPython REPL instead. Try `%run python/co2.py` then `x.shape`, `exit` and `exit`.

```
$ guix shell -m manifest.scm python-ipython
$ ipython
In [1]: %run python/co2.py
In [2]: x.shape
Out[2]: (773,)
In [3]: quit()
$ exit
```

- ⑥ Using the previous manifest, start a new shell using the IPython REPL but unsetting all the existing environment variables
Try `which ipython`. Compare with `echo $GUIX_ENVIRONMENT`. Exit.

```
$ guix shell -m manifest.scm python-ipython --pure
$ ls
ls: command not found
$ which ipython
which: command not found
$ exit
$ guix shell -m manifest.scm python-ipython --pure which
$ which ipython
/gnu/store/3s2vfgb95x8jk3m4mac69fbmmpg5d12p-profile/bin/ipython
$ echo $GUIX_ENVIRONMENT
/gnu/store/3s2vfgb95x8jk3m4mac69fbmmpg5d12p-profile
```

- 1 Run the script `python/co2.py` inside a container.
Try `which ipython`. Try to list other directories. Exit.

```
$ guix shell -m manifest.scm python-ipython --container
$ python3 python/co2.py
$ cd $HOME/tmp
sh: cd: /home/simon/tmp: No such file or directory
$ exit
$ if [ -d $HOME/tmp ]; then echo ok; else echo ko; fi
ok
```

- 2 Create a new shell using the manifest file and adding Emacs

```
$ guix shell -m manifest.scm python-ipython emacs-minimal
```

- 3 Idem but containerized. Start Emacs. Exit.

```
$ guix shell -m manifest.scm emacs-minimal --container  
$ emacs
```

Please set the environment variable TERM; see 'tset'.

```
$ exit  
$ guix shell -m manifest.scm emacs-minimal -C --preserve=TERM  
$ emacs # exit with Control-x Control-c  
$ exit
```

- ④ Re-try considering the option `--network/-N`.
Try to preserve the environment variable `TERM` and `DISPLAY`
Start Emacs in this container. Exit.

```
$ guix shell -m manifest.scm emacs-minimal -C -N -E TERM -E DISPLAY  
$ emacs  
$ exit
```

- 1 Try to reproduce the figure

```
$ guix time-machine --commit=b94724e8b2102be0fe9d19e9dfe44d6f7101bd4b \  
  -- shell --pure -m python/manifest.scm \  
  -- python3 python/co2.py
```

Bonus : try `guix lint -c archive python-scikit-learn`
and browse <https://archive.softwareheritage.org/save/list/>

- ② Try to get the same value (see `python/co2-bis.py`)

```
$ guix time-machine --channels=python/channels.scm \
  -- shell --pure -m python/manifest.scm python-dual \
  -- python3 python/co2-bis.py
SWH: found revision 3c51f294b61044fb8e99480ca7ad9ef8c55044e0
with directory at 'https://archive.softwareheritage.org/api/1/directory/06d4371
[...]
```

fatal: could not read Username for 'https://gitlab.com': No such device or address
Failed to do a shallow fetch; retrying a full fetch...

```
SWH: found revision f2158a0d919013c4547756a920919d901ff21210
with directory at 'https://archive.softwareheritage.org/api/1/directory/f2c7181
[...]
```

Year: 2122

The channel (describing the Guix recipe of the packages `python-dual`) is unreachable, as well as the source code of this package. It is a double (recursive) fallback to Software Heritage.