








# 4<sup>th</sup> 2017/18 GouTP @ SCEE

- *About:* Introduction to Jupyter notebooks
- *Date:* 8th of March 2018 
- *Who:* Lilian Besson 🙋

## Open source content 📄 ?

Note: slides are online: [github.com/Naereen/slides/tree/master/2018\\_03\\_\\_Jupyter\\_notebooks\\_are\\_awesome\\_\\_GouTP\\_at\\_Supelec](https://github.com/Naereen/slides/tree/master/2018_03__Jupyter_notebooks_are_awesome__GouTP_at_Supelec)

# What's a "GouTP" ?

- Internal monthly technical training session 
- Usually: on *Thursday*, at 3pm  - 3:30pm 
- With  coffee,  tea and  sweets: we relax while training !

Initiative of Quentin and Vincent  in January 2017...

Continued by Rémi, Muhammad, Rami and Lilian  !

## Not only @ SCEE ?

- Currently open to the *FAST* and *AUT* teams

# Agenda for today

**[30 min]**

1. Quick presentation of internal tools @ SCEE
2. What are the Jupyter notebook tools ?
3. Demo time
4. Sharing your notebooks online or as PDF

**[5 min]**

**[10 min]**

**[10 min]**

**[5 min]**

**Please **

Ask questions and interrupt me if you want!

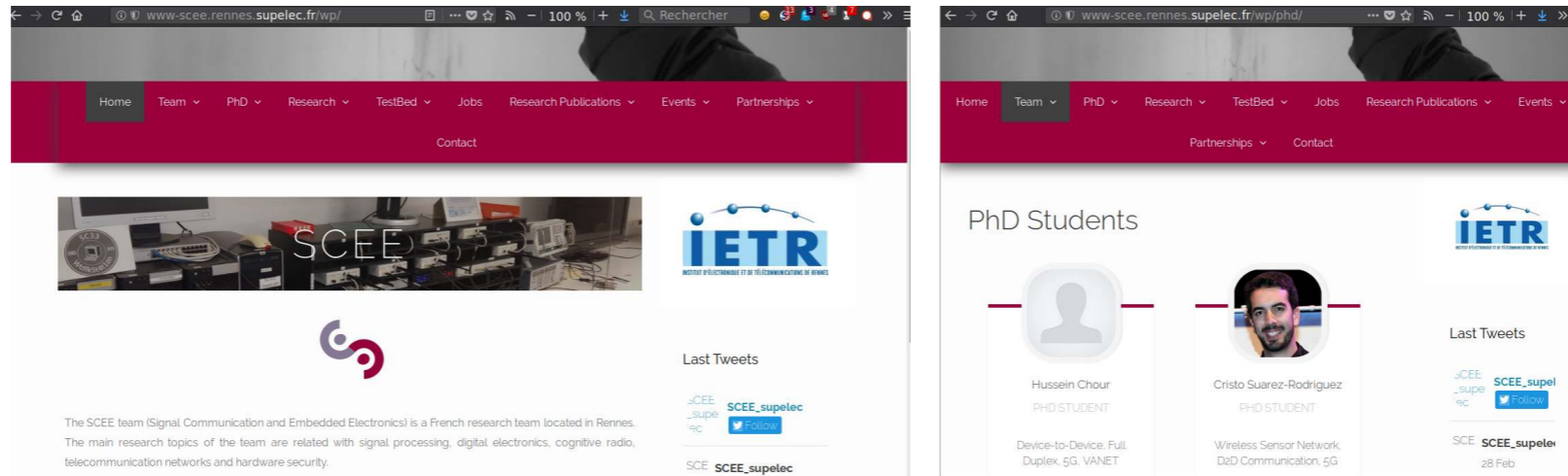
# 1. Presentation of internal tools @ SCEE

- Welcome to our new PhD student and interns 🙌 !
- You met (almost) everybody this week !
- You will become familiar with the research themes of our team...

↳ Let see a few 🔧 tools that can make your life easier!

# Website

- [www-scee.rennes.supelec.fr](http://www-scee.rennes.supelec.fr) was created by Rémi and Aymeric
- It is maintained mainly by Rémi : we need help!

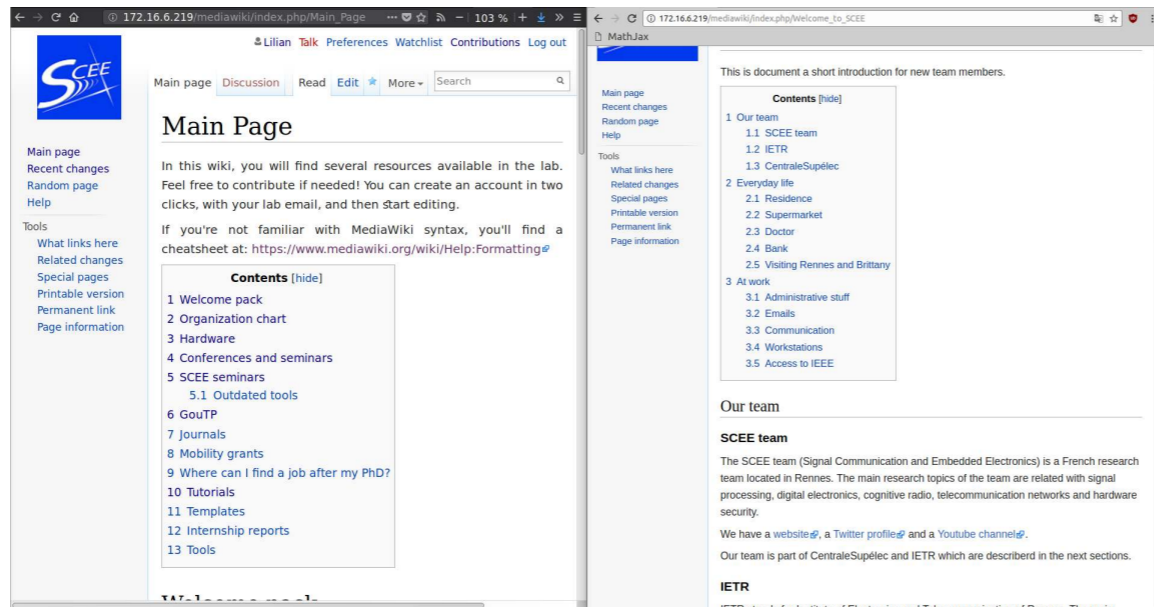


## New comers, please

- send a short summary of your research interest with links to your LinkedIn, Google Scholar profile (or other sites). Picture: *if you want*
- to Rémi and I so we add you on the website

# Internal Wiki

- We have a MediaWiki running locally on <http://172.16.6.219/>
- Welcome pack : can be useful in your first days here!  
[http://172.16.6.219/mediawiki/index.php/Welcome\\_to\\_SCEE](http://172.16.6.219/mediawiki/index.php/Welcome_to_SCEE)
- Anyone can edit, it is maintained by Rémi and I
- Participate if you have anything to change (create an account, edit!)



# Workstations (Windows & GNU/Linux)

- 2 Windows 7 workstations, with MATLAB
  - WS1 : 172.16.6.211
  - WS2 : 172.16.6.212
- 1 GNU/Linux (Ubuntu) workstation, with Python, GNU Radio...
  - WS3 : 172.16.6.213
- Powerful machines: 12 cores, 32 Gb of RAM, lots of storage...
- Monitoring 🔍 : <http://172.16.6.219:8000> (ask us for **id/passwd**)  
(please check for use load, before launching heavy simulations)

## **Ask for an account if you need**

- To run computations, or to use the TestBed
- Ask to *Muhammad* for Windows, to *me* for GNU/Linux



172.16.6.219:8000

SCEE Workstations - Bloc-notes

```

===== SCEE Workstations =====
- 172.16.6.211 : T581001 (windows7) - WS1
- 172.16.6.212 : RFDET5801 (windows7) - WS2
- 172.16.6.213 : RPDLXE501 (LinuxMate) WS3 & Testbed

+ Browse to http://172.16.6.219:8000/ for a live view
+ Browse to http://172.16.6.213/ for Munin Monitoring
Help ? If needed: @admin on https://SceeTeam.slack.com/
? Or talk directly to: Lilian or Rami

```

172.16.6.211 - Connexion Bureau à distance

Applications | Processus | Services | Performance | Networking | Users

CPU Usage: 59%

Memory: 14,7 GB

Physical Memory Usage History

Physical Memory (MB)	System
Total: 32692	Handles: 105588
Cached: 10336	Threads: 2729
Available: 17619	Processes: 169
Free: 7424	Up Time: 111:13:53:03
Kernel Memory (MB)	Commit (GB): 20 / 79
Paged: 1116	
Nonpaged: 535	

Processus: 169 | CPU Usage: 59% | Physical Memory: 46%

172.16.6.213 - Connexion Bureau à distance

Moniteur système

Processus | Ressources | Systèmes de fichiers

Historique d'utilisation du CPU

CPU1: 58,0%	CPU2: 55,6%	CPU3: 33,7%	CPU4: 43,4%
CPU5: 32,7%	CPU6: 39,0%	CPU7: 67,3%	CPU8: 58,4%
CPU9: 19,8%	CPU10: 25,7%	CPU11: 22,8%	CPU12: 28,3%

Historique d'utilisation de la mémoire physique et du fichier d'échange

Mémoire: 7,9 Gio (25,2%) sur 31,3 Gio

Swap: 0 octet (0,0%) sur 31,9 Gio

Historique du trafic réseau

Réception: 15,1 Kio/s

Envoi: 446,3 Kio/s

Total reçu: 8,3 Gio

Total envoyé: 146,5 Gio

172.16.6.212 - Connexion Bureau à distance

Applications | Processus | Services | Performance | Mise en réseau | Utilisateurs

UC utilisée: 5%

Memory: 21,1 Gio

Mémoire physique (Mo)	Système
Totale: 32692	Handles: 63353
En mémoire cache: 11254	Threads: 2223
Disponible: 11046	Processus: 148
Libre: 0	En activité: 198:08:36:05
Mémoire pour le noyau (Mo)	Valider (Go): 22 / 79

Screen Task

Open Source

IP: 172.16.6.219 - Connexion au réseau local | Port: 8000 | Take Screenshot Every:  | 500 Millisecond

URL: http://172.16.6.219:8000



# USRP TestBeds

- We have 8 USRP cards that can be used from GNU Radio Companion on the WS3
- See more on [http://172.16.6.219/mediawiki/index.php/Main\\_Page#Hardware](http://172.16.6.219/mediawiki/index.php/Main_Page#Hardware)

## Monitoring

- <http://172.16.6.213:8000> (made by Quentin)
- let you see the IP of each USRP card
- and who uses what in real time

## Advice

- If you need to use the USRP, *discuss with Rémi and Lilian before*

172.16.6.213:8000

SCEE Testbed Monitor

Kit N°1 192.168.10.101 Disconnected	Kit N°2 192.168.10.102 Disconnected	Kit N°3 192.168.10.103 Free to use	Kit N°4 192.168.10.104 Free to use	Kit N°5 192.168.10.105 Free to use
Kit N°6 192.168.10.106 Free to use	Kit N°7 192.168.10.107 Free to use	Kit N°8 192.168.10.108 Free to use	Kit N°9 192.168.10.109 Disconnected	Kit N°10 192.168.10.110 Free to use
Kit N°11 192.168.10.111 Free to use	Kit N°12 192.168.10.112 Disconnected	Kit N°13 192.168.10.113 Disconnected	Kit N°14 192.168.10.114 Disconnected	Kit N°15 192.168.10.115 Disconnected
Kit N°16 192.168.10.116 Disconnected	Kit N°17 192.168.10.117 Disconnected	Kit N°18 192.168.10.118 Disconnected	Kit N°19 192.168.10.119 Disconnected	Kit N°20 192.168.10.120 Disconnected

## 2. "Project Jupyter", [jupyter.org](http://jupyter.org)



Project Jupyter exists to develop open-source software, open-standards, and services for interactive computing across dozens of programming languages.

## 2. What are Jupyter notebooks?

### Technical aspect

1. A file format, `.ipynb` (just JSON with constraints)
2. An editor in your browser (see it during **demo time**)
3. Tools to convert `.ipynb` files to scripts, HTML, slides, PDF etc.

### Practical aspect

4. A very good way to interact with your code
5. Create smart document with text, maths, code, output and figures, **all included in one file**
6. Easy and perfect to share online and with colleagues !

# How to learn 🎓 ?

## Online 🕸

- Try without installing anything ? → At [try.jupyter.org](https://try.jupyter.org)

## On your laptop 📁

1. Install it 📦
2. Then start:

```
# from your console  
$ jupyter notebook
```

3. Then experiment, practice and learn

If you installed Python with Anaconda, it should be in your system menu *by default* (along *Spyder, IPython* and *IPython QT Console*)...

## How to install it ?

Install it (you need  Python) from <https://jupyter.org/install.html>.

```
$ conda install jupyter # if you use Anaconda/conda
$ pip install jupyter # for the system-wide Python & pip
```

## How to start it ?



```
$ jupyter notebook # from your console
...
Copy/paste this URL into your browser when you connect
for the first time, to login with a token:
http://localhost:8888/?token=44450caacdbe3ecddc21e02e66a6b5162cdd2d86dccd5264
```

- It should open <http://localhost:8888/notebooks/> in your browser
- Or open the link in your terminal

## Only for Python 🥲 ??

- No: supports naitively Julia, Python and R (**Ju + Py + R = Jupyter**)
- Dozens of "kernels" allow you to use Jupyter with *almost* any language ! (for free).  
Installation is usually simple & fast.

### Partial list

- Interpreted languages:  Bash,  Caml/OCaml, Lua etc
- 😊 and of course Wolfram Mathematica and MATLAB  
| even if they have their own notebook tools now.
- 🙄 But also compiled languages : C++, C, Go, Java !

### Complete list of "kernels"

| See [github.com/jupyter/jupyter/wiki/Jupyter-kernels](https://github.com/jupyter/jupyter/wiki/Jupyter-kernels)

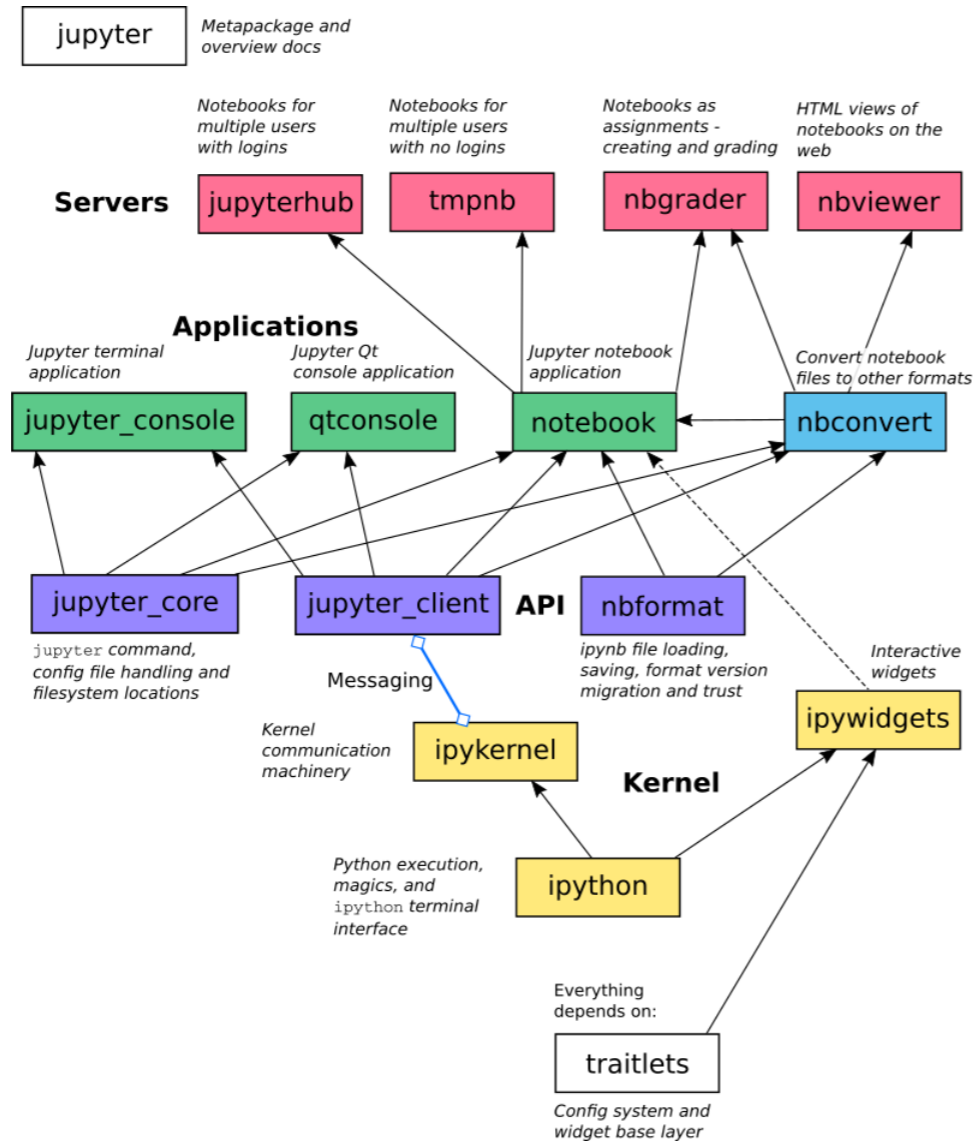


### 3. Demo time

- I will show you quickly all this...
- With an example of coding in Python.
- Reference documentation is:

[jupyter.readthedocs.io/en/latest/content-quickstart.html](http://jupyter.readthedocs.io/en/latest/content-quickstart.html)

# Internally, it's quite complicated, just don't care



# Conclusion (1/3)

## Sum-up

- I hope you got a good introduction to Jupyter 🙌
  - Official documentation: at [jupyter.rtdf.io](http://jupyter.rtdf.io)
- Also [datacamp.com/community/tutorials/tutorial-jupyter-notebook](http://datacamp.com/community/tutorials/tutorial-jupyter-notebook)

## Pointers

1. ❤️ use it and fall in love with it !
2. Use Jupyter-themes ( [github.com/dunovank/jupyter-themes](https://github.com/dunovank/jupyter-themes) )  
to customize the UI as you wish (dark themes, custom fonts etc)
3. Use extensions if you want more features,  
See [jupyter-contrib-nbextensions.rtdf.io](http://jupyter-contrib-nbextensions.rtdf.io)

# Conclusion (2/3)

## Next GouTP @ **SCEE**

- Any request or suggestion ?

## GouTP @ **FAST** or **AUT** ?

| By Pierre Haessig ?

- **Julia programming language** (~ between Python and Matlab)  
↳ see [julialang.org](http://julialang.org) if you are curious

## We need participants!


| 🙋 By *you*? Any idea is welcome! 😊

# Conclusion (3/3)

Thanks for joining 🙌 !

Contact us if you want to do a GouTP !

## Your mission, if you accept it... ✨

1. *Padawan level* : next time you program in  Python (or other language), think about **Jupyter**. Can it help you being more efficient?
2. *Jedi level* : Try to use **Jupyter** when you will have to share or show some piece of code?
3. *Master level* : From now on, try to use (only?) open-source tools for your research (Python and others)...