

Jupyter

JupyterHub and nbgrader: teaching Python with automatic grading

Warning: for now JupyterHub cannot be accessed from the eduroam network (might be a DNS problem).

At [this link](#) is a JupyterHub instance hosted on the Drahi.

Home Page - Select or create x +

jupyter.dix.polytechnique.fr/user/adrien.ehrhardt/tree

jupyterhub Logout Control

Files Running Formgrader IPython Clusters Courses Assignments

Select items to perform actions on them. Upload

<input type="checkbox"/> 0	Name	Last Modified
<input type="checkbox"/>	2020-admin	il y a un jour
<input type="checkbox"/>	2020-admin-copy	il y a 7 jours
<input type="checkbox"/>	cse204	il y a 7 jours
<input type="checkbox"/>	cse205	il y a 18 heures
<input type="checkbox"/>	lab_session_01	il y a 19 heures
<input type="checkbox"/>	polytechnique-cse204-2020-releases	il y a 18 heures

As the name suggests, [JupyterHub](#) is a “multi-user version of the notebook designed for companies, classrooms and research labs”. So, in other words, a Jupyter server.

The authentication works with Ecole Polytechnique’s credentials (first connection can take a while as the account and appropriate directories are created).

To synchronize your material with students, I’ve found it easy to use “nbgitpuller” links as explained [here](#) (in a nutshell: on clicking the link, a user is redirected to JupyterHub, connects; JupyterHub fetches the git repository in the user’s “home”).

Warning: nbgitpuller, as the name suggests, is a one-way street. Synchronizing notebooks with a version control system is not possible by default. I tend to work on a private repository, and then click the nbgitpuller link to synchronize stuff. However, this will fail if there are “local” (i.e. on the JupyterHub instance) changes which cannot be automerged by git. Also, for some reason, which might be related to the DNS problem mentioned above, DIX’s [Gitlab instance](#) cannot be reached from the [JupyterHub instance](#).

I have used nbgitpuller to synchronize [this git repository](#), which is used, as of now, only to provide students with a [configuration script](#).

I then ask students to run this script in JupyterHub’s terminal. The script does the following:

- Installing virtualenv & nbgrader (more on that later)
- Creating a virtualenv with all necessary packages for the course (precautionary measure if other courses use JupyterHub)
- Installing this virtualenv as a Jupyter kernel (which will be used by students running the assigned notebooks)

N.B.: the “easy” path would have been to use the global Python executable and add a cell with shell commands in the notebook (prefixed by !): students don’t have to do anything.

In JupyterHub’s home, a few tabs should have appeared thanks to [nbgrader](#): Formgrader, Assignments and Courses.

Warning: for some reason, the additional tabs appear but do not work before the server is restarted. The server WILL NOT RESTART by logging out and back in “quickly”: it must be stopped explicitly in Control Panel > Stop Server > Start Server > Launch Server (yes, cumbersome).

In Formgrader, the teacher can manage assignments: edit an assignment (i.e. creating a Jupyter Notebook with hidden cells which contain automatic tests), release it to students (without answers, obviously), collect their work, (auto)grade it and release a feedback to students (with their grade).

Warning: as of now, there cannot be several teachers (i.e. several people seeing this tab, editing and releasing assignments, etc.). It would require sharing a small database somewhere on the server hidden from students.

Home Page - Select or cre x nbgrader formgrade x +

← → ↺ jupyter.dix.polytechnique.fr/user/adrien.ehrhardt/formgrader ☆

nbgrader

Manage Assignments

- Manage Assignments
- Manual Grading
- Manage Students

Assignments

Instructions (click to expand)

Name	Due Date	Status	Edit	Generate	Preview	Release	Cc
data	None	draft					
lab_session_01	None	released					
lab_session_02	None	draft					
lab_session_03	None	draft					

In assignments, you can see a dropdown menu which lists all courses (for now only CSE204). BEWARE: the configuration thus far does not allow to hide courses from people based on teacher / student / Cycle Polytechnicien / whatever. Everybody sees all the available courses (files are shared via a folder - /srv/nbgrader/exchange - available to everyone).

For a given course, a student can see if there was any released assignment and fetch it (i.e. copy it in his / her “home”). He then works on this file (by completing the appropriate code cells) and submits his / her work, which appears as “submitted” for the teacher. Once grading has been completed, the student can get a feedback.

Home Page - Select or cre x +

← → ↺ jupyter.dix.polytechnique.fr/... ☆

jupyterhub

Logout Control Panel

Files

Running

Formgrader

Assignments

IPython Clusters

Courses

Released, downloaded, and submitted assignments for course: cse204-2020 ↻

Released assignments

There are no assignments to fetch.

Downloaded assignments

lab_session_01 ▶ cse204-2020

Submit

Submitted assignments

lab_session_01 cse204-2020

Fetch Feedback

2021-01-28 11:01:44.485162 UTC

2021-02-04 12:27:13.348961 UTC

To produce your course, you will need:

- A main course folder, e.g. “CSE204” in your home folder.
- In the “CSE204” folder: a “source” folder which will contain the teacher’s assignments
- In the “source” folder: a folder for each assignment (with a notebook created with nbgrader inside), e.g. “lab_session_01”.
- In the “CSE204” folder: a file

called “nbgrader_config.py”

(Just [email me](#) to get access to the “admin” repository mentioned above.)

The minimal content of this file is:

```
c = get_config()
c.CourseDirectory.course_id = "cse204-2020" # the ID of your course as seen e.g. in the Assignments tab
c.CourseDirectory.db_assignments = [dict(name="lab_session_01")] # replicate this line for each assignment == folder in "CSE204"
c.Exchange.path_includes_course = True
c.Exchange.root = '/srv/nbgrader/exchange' # This is where the exchange happens: *technically* everybody can see everybody's released /
```

- In the “.jupyter” folder (you can go there through the Terminal): a file called “nbgrader_config.py” (yes, again!).

The minimal content of this file is:

```
c = get_config()
c.CourseDirectory.root = "/home/jupyter-adrien.ehrhardt/CSE204"
```

Adrien Ehrhardt (subject to modification!)