We build romeolab with precise requirements:

- Powerful: we want to execute code on a real HPC facility, because ours works perfectly and we've got all the software already installed and supported. Where we're using a proxy for external users to access to compute nodes.
- Easy: romeolab is a modern MOOC platform making it possible to run HPC.
- Reliable: our software with graphical interface via a remote desktop.
- Pedagogic: on the same web page, student must find lessons, videos, images, ... and the edition / compilation / execution interfaces. Jupyter Notebook (figure on right) is our solution for strong interactivity.
- Multi-Application: Compiling and executing code is not enough. We must run profilers, GUIs, and other scientific software.

As described on the figure, the user:
1. creates an account and log in to the platform. By Default, no session is available;
2. reach a Session with a link or an access code provided by teacher. A session correspond to a temporal event: training, school, master degree course.
3. The user can now list available labs and their descriptions (figure above);
4. assign a temporary cluster to the romeolab-user and dynamically load initial content of the lab
5. romeolab is addressing a wide range of technologies and audience levels. We encourage mutualization, this list is growing:
   - Python, OpenMP, GPU, CUDA, OpenACC, ...
   - GPU accelerated applications: CUDA, OpenACC, Python,
   - GPU accelerated libraries: cuBLAS, cuRand, cuFFT, ...
   - Intermediate
     - OpenFOAM
     - OpenCL, CUDA Asynchronism
   - Advanced
     - Profiling: TAU, MAQAO
     - Advanced Python: Cython, Numba, Pythran
     - CUDA Optimizations
     - Multi-GPU with CUDA
     - Multi-GPU with OpenACC and MPI

Asynchronism and GPU execution interfaces.

The internal behavior of the platform:
- 4. assign a temporary cluster-user to the romeolab-user and dynamically load initial content of the lab from dedicated GT;
- 5. launch a job through the cluster workload scheduler and possibly via reserved dedicated resources;
- 6. set-up all resources parameters and start all services (notebooks, editors, VNC, ...), through the job;
- 7. probe the start of the services with websockets;
- 8. create a secured route in the proxy in order to provide a direct access to those services, once everything is started.

romeolab is a modern MOOC platform making it possible to run HPC.

OpenFOAM software.

Multi-GPU with OpenACC and MPI

GPU accelerated

Advanced

OpenACC

CUDA

Python

CUDA

Intermediates

CUDA

OpenMP

OpenCL

MPI

Python

Advanced

OpenACC

CUDA

OpenMP

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Python

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