



An Introduction to Working with the SmartEST Sim Lab

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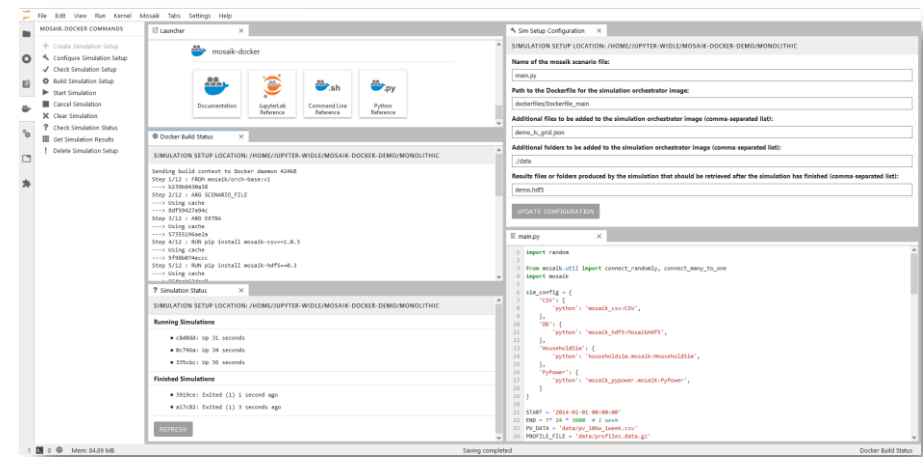
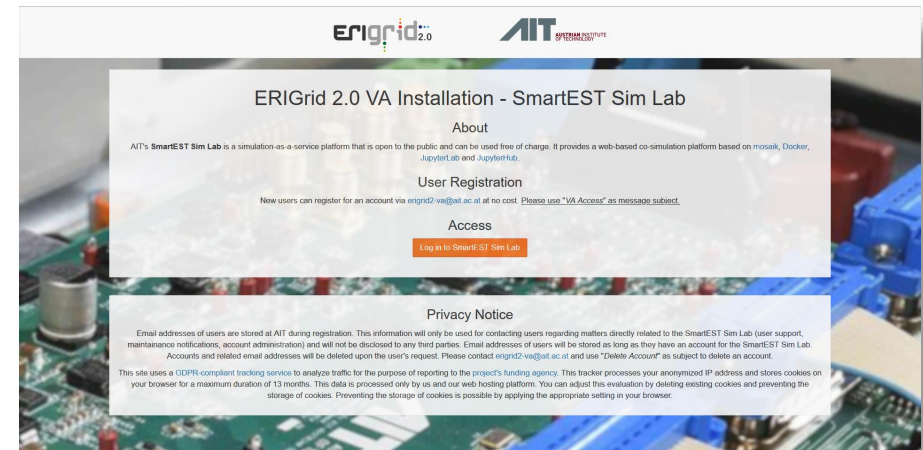
SmartEST Sim Lab for ERIGrid 2.0

Virtual access

- *simulation-as-a-service* platform
- provided as *open access* service
- <https://smartest-sim-lab.erigrad2.eu>

Main features

- configure setups for the *mosaik co-simulation framework*
- run mosaik and simulators as *Docker containers*
- complete workflow supported via *graphical user interface*



Prerequisites

- In the following, basic knowledge about the following is assumed

- **mosaik co-simulation framework**

→ <https://mosaik.offis.de/>



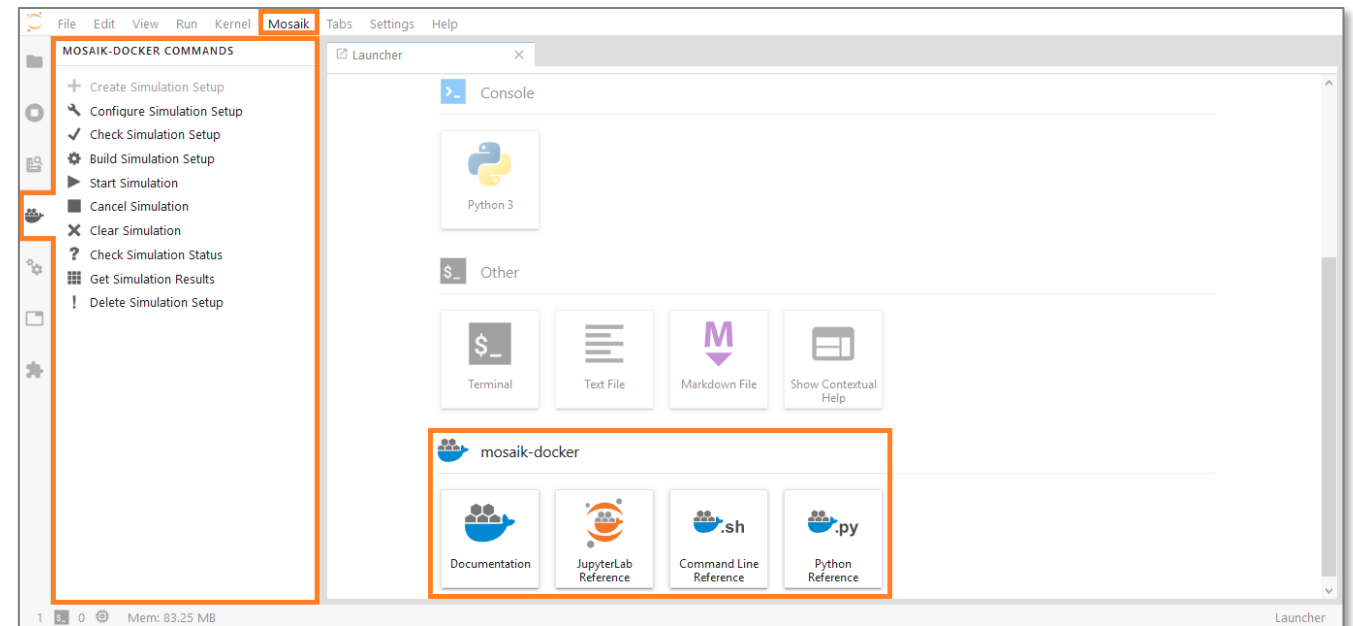
- **Docker**

→ <https://docs.docker.com/>



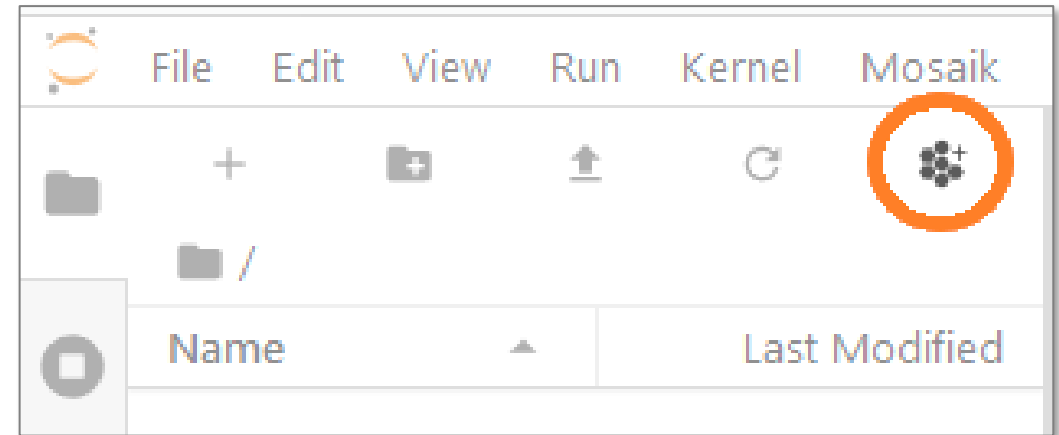
Basics

- In JupyterLab, you can execute *commands* in two ways
 - via a *side tab* to the left
 - via a *drop-down menu* in the menu bar on the top
- In addition, you can find links to the *documentation* and other resources on the bottom of the main Launcher tab



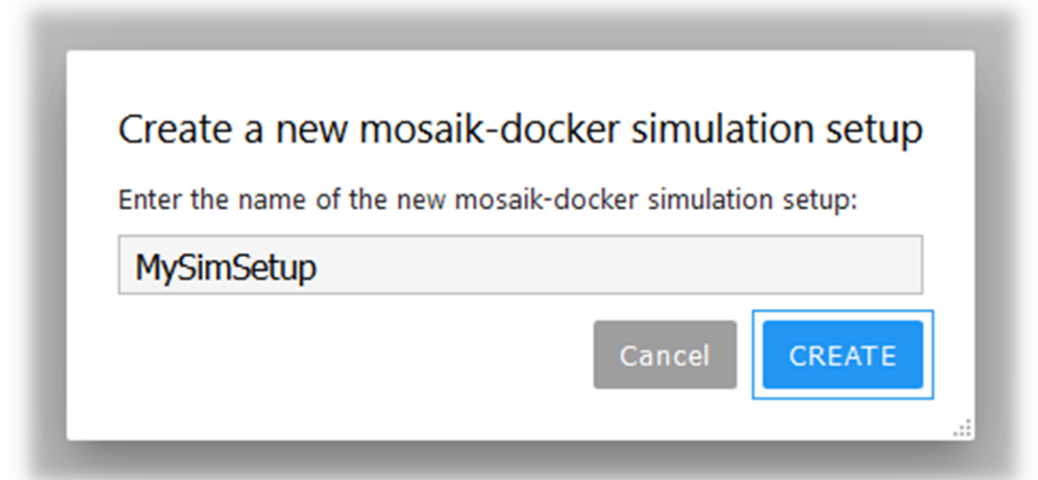
Create a simulation setup (1/3)

- A *simulation setup* is a directory that contains all necessary scripts and configuration files for a simulation
- You have several possibilities to create a new simulation setup
 - select command **Create Simulation Setup** from the *side tab*
 - select command **Create Simulation Setup** from the *drop-down menu*
 - use the *dedicated button* in JupyterLab's file browser (see image)



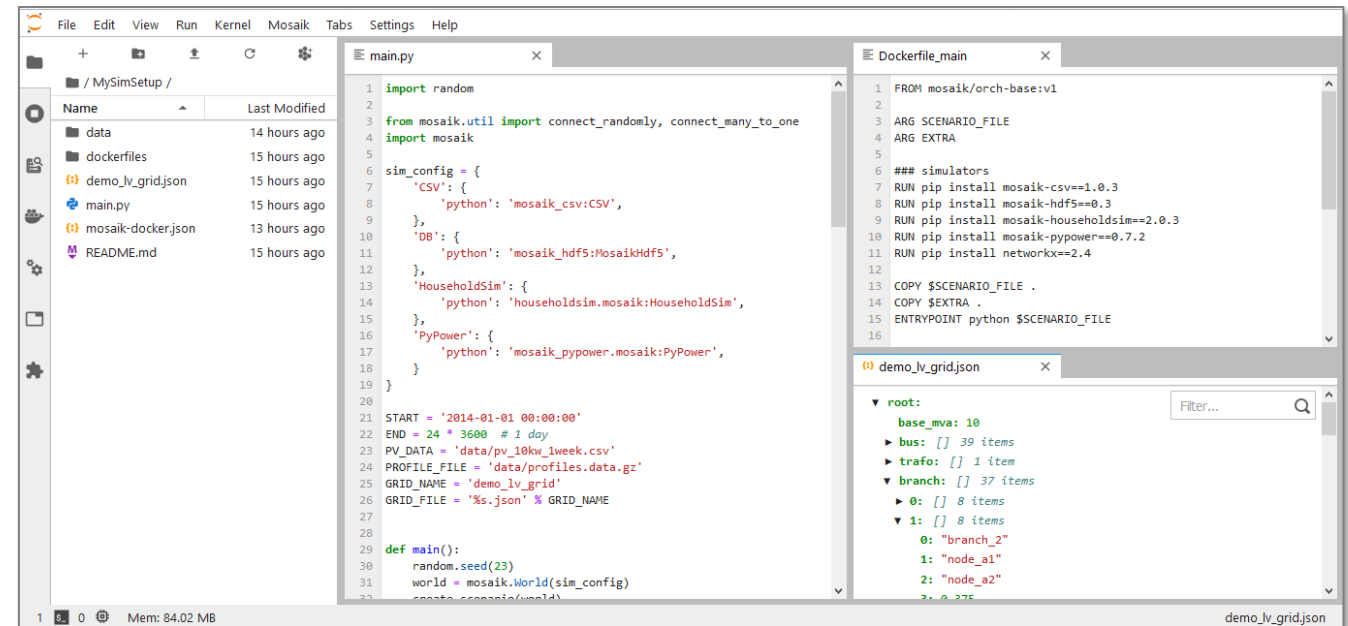
Create a simulation setup (2/3)

- The new simulation setup will be created in the *current working directory*
- To *change the working directory*, navigate to another directory in the JupyterLab file browser
- When creating a new simulation setup you will be *prompted for its name*
- **NOTE:** It is not recommended to create nested simulation setups; hence, the command to create a new simulation setup is greyed out when your working directory is a simulation setup (or a sub-directory)



Create a simulation setup (3/3)

- A new simulation setup contains
 - a *config file*
 - `mosaik-docker.json`
 - a minimal *Dockerfile* for the *mosaik orchestrator*
 - `Dockerfile_main` in sub-folder `dockerfiles`
- To run a simulation, you need to add your own *simulation scenario file* and optionally some *data*



The screenshot shows an IDE with three main windows:

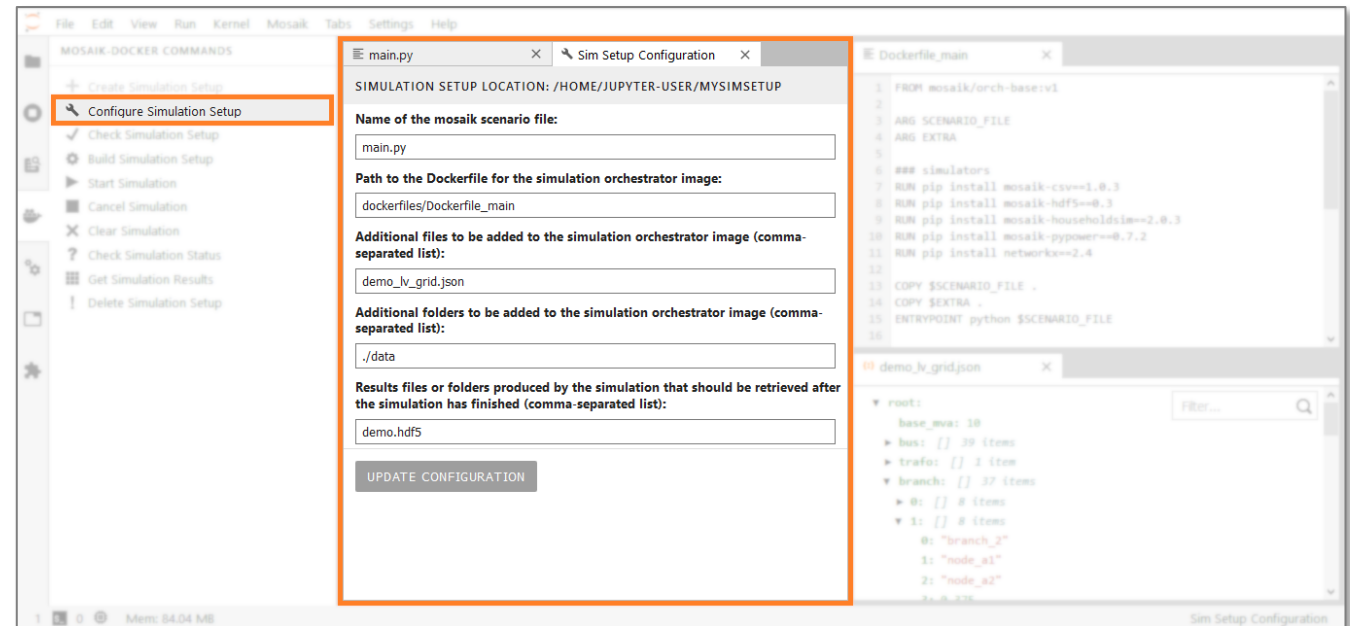
- File Explorer:** Shows a directory structure for `/MySimSetup/` with files like `data`, `dockerfiles`, `demo_lv_grid.json`, `main.py`, `mosaik-docker.json`, and `README.md`.
- main.py:** Contains Python code for simulation configuration and execution. It defines `sim_config` with parameters for CSV, HDF5, HouseholdSim, and PyPower. It also sets simulation parameters like `START`, `END`, `PV_DATA`, `PROFILE_FILE`, `GRID_NAME`, and `GRID_FILE`. A `def main():` function is defined at the bottom.
- Dockerfile_main:** Contains a Dockerfile for the `mosaik orchestrator`. It starts with `FROM mosaik/orch-base:v1` and includes instructions to install dependencies like `mosaik-csv`, `mosaik-hdf5`, `mosaik-householdsim`, and `mosaik-pypower`. It also sets `COPY` instructions for `$SCENARIO_FILE` and `$EXTRA`, and an `ENTRYPOINT` to run the simulation.

As a starting point you can use one of the simulation setup examples provided at:

<https://github.com/ERIGrid2/mosaik-docker-demo>

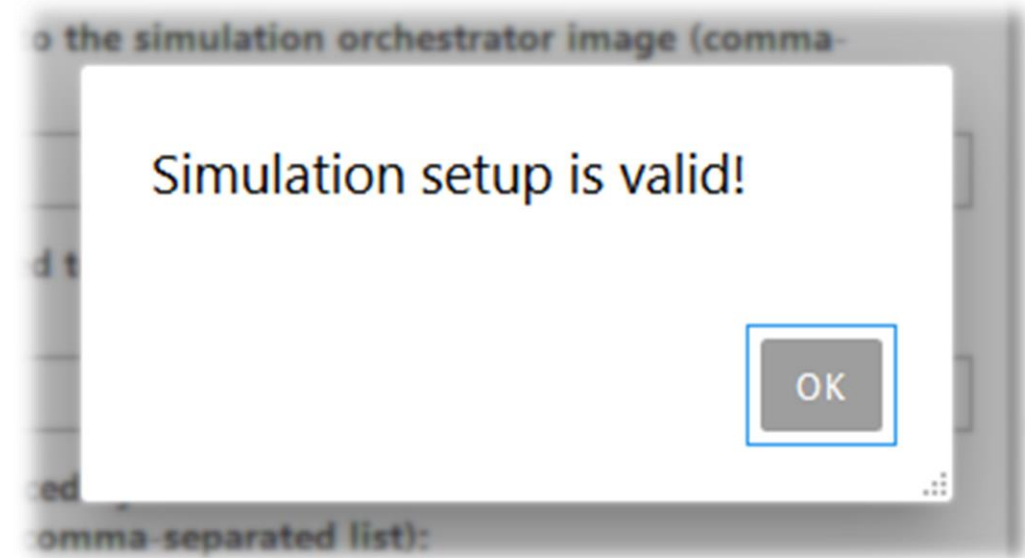
Configure simulation setup

- Use command **Configure Simulation Setup** from the side tab or the drop-down menu
 - path to *mosaik scenario file*
 - path to *Dockerfile* for mosaik sim manager
 - *input files* and/or *folders* (optional)
 - *output files* (optional)
- Save this information via the **UPDATE CONFIGURATION** button on the bottom right of the configuration tab



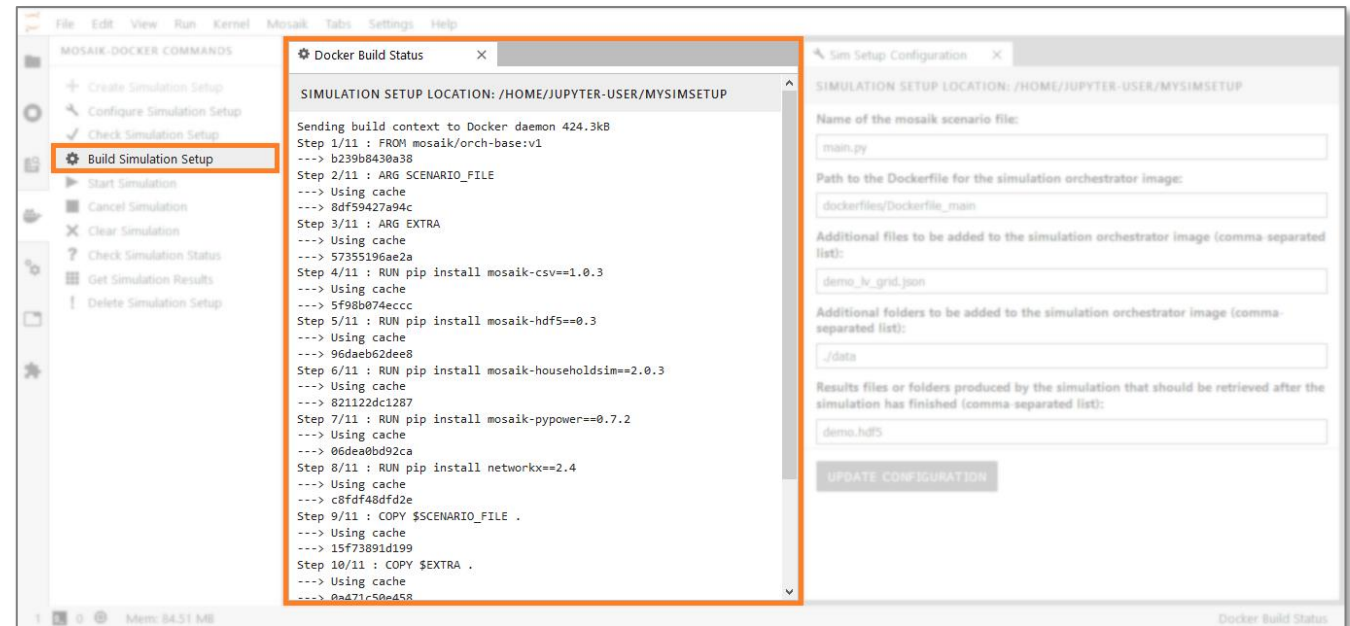
Check simulation setup

- You can use command **Check Simulation Setup** to check if your simulation setup is valid



Build simulation setup

- Once your setup seems to be fine, you can use command **Build Simulation Setup** to *build the Docker images* for running your simulation
- This will bring up a new tab, on which you can see the output from the Docker *image build process*



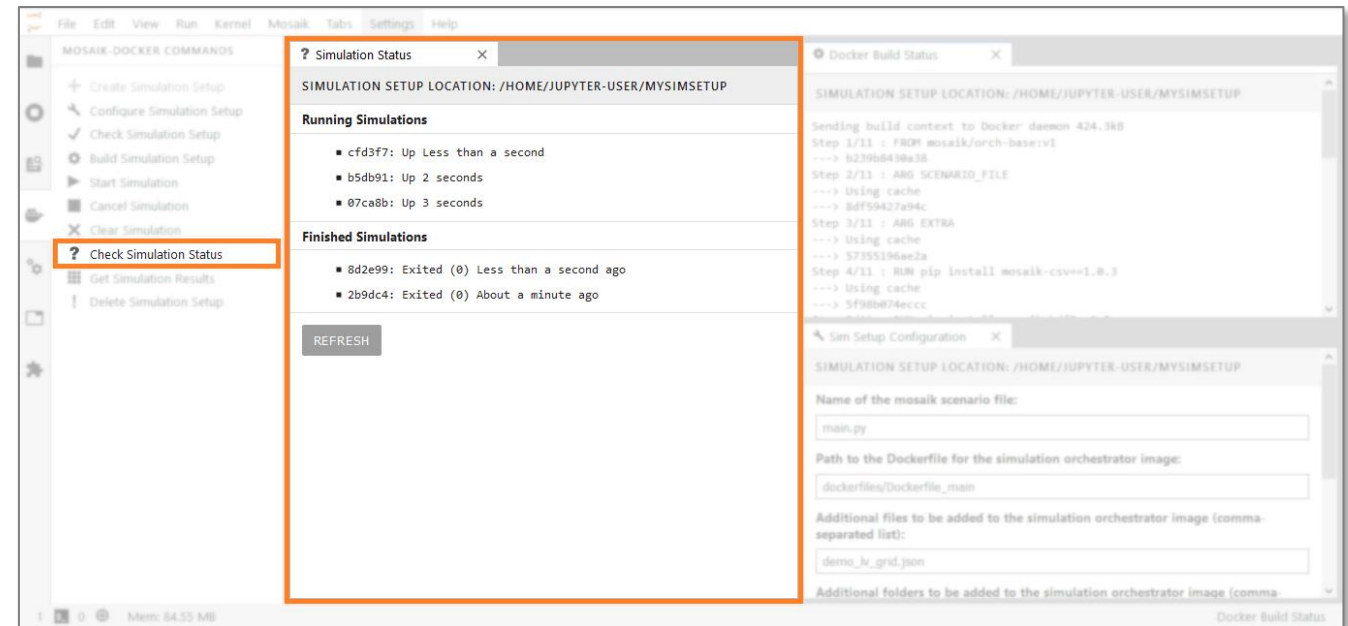
Run simulations

- Once the Docker images have been successfully built, you can use command `Start Simulation` to *start new simulation runs*
- Simulations are *assigned an ID* that allows to refer to them for monitoring and further interaction (get results, cancel, clear)
- Starting a new simulation will bring up a *notification* showing its ID



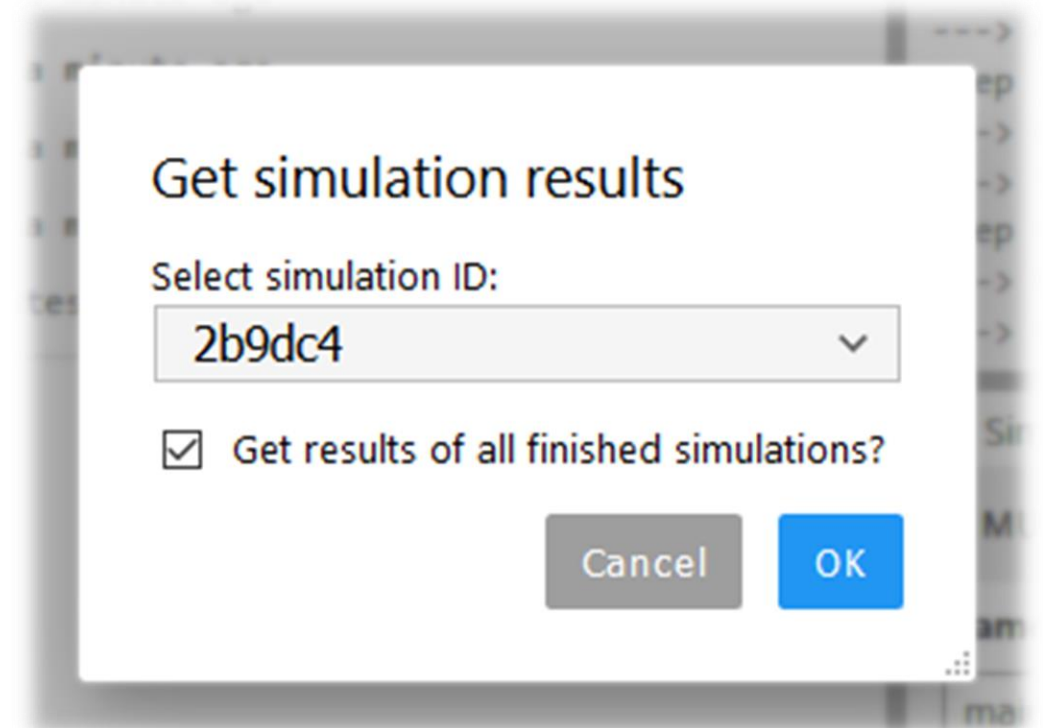
Check simulation status

- Use command **Check Simulation Status** to *check the status* of your simulations
- This will bring up a new tab *listing the running and finished simulations* (based on simulation IDs)



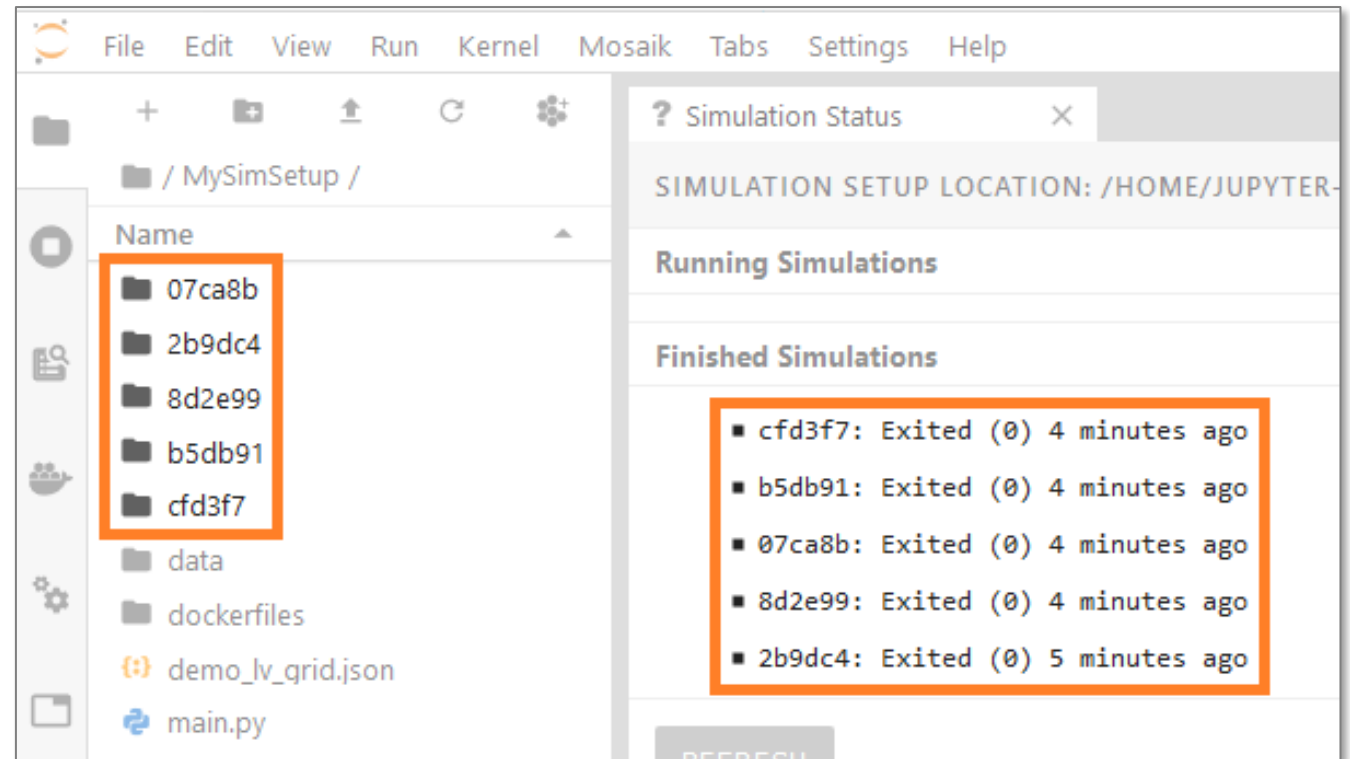
Retrieve simulation results (1/2)

- After a simulation has successfully finished, you can use command **Get Simulation Results** to *retrieve the corresponding results*
- This will bring up a panel that lets you *select to retrieve the results*
 - either from a specific simulation (drop down menu)
 - or from all (checkbox)



Retrieve simulation results (2/2)

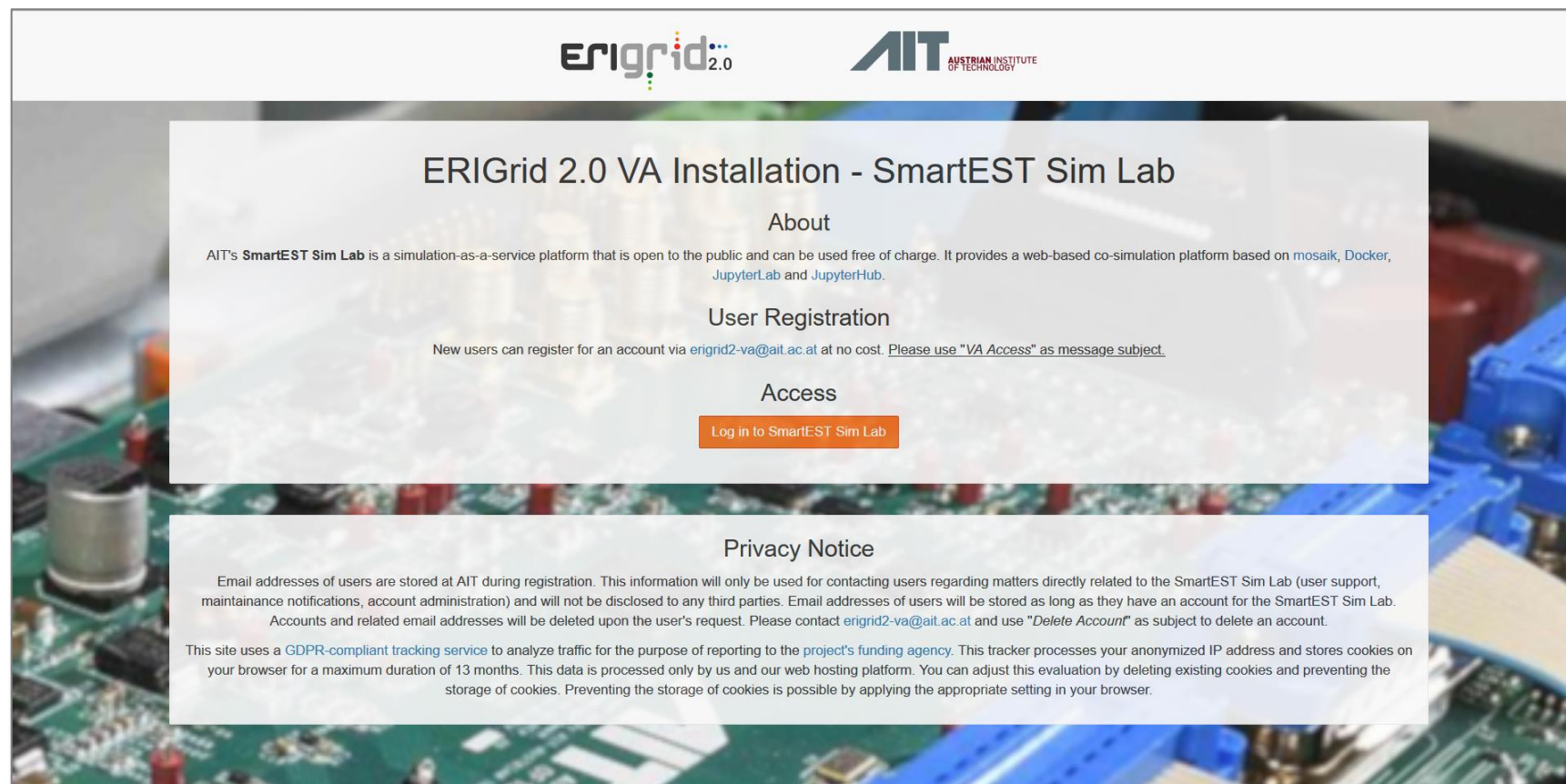
- For each selected simulation, the *output files* specified in the simulation setup configuration (see above) will be *copied* from the corresponding Docker container to a sub-directory named according to the simulation ID



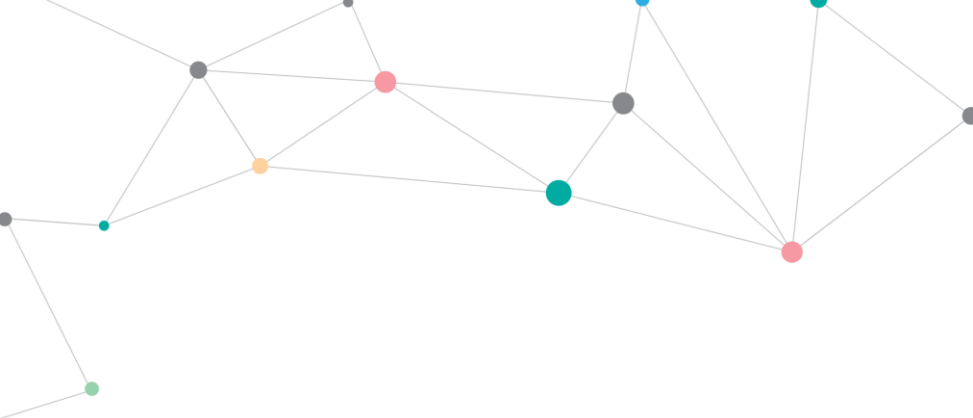
Usage via terminal or Jupyter notebooks

- Alternative usage
 - **mosaik-docker command line interface**
 - start a new terminal from JupyterLab's Launcher tab
 - command reference: <https://mosaik-docker.readthedocs.io/en/latest/cli-reference.html>
 - **mosaik-docker Python API**
 - especially useful for automating your workflow
 - start a new Python notebook from JupyterLab's Launcher tab and import package `mosaik_docker.cli`
 - command reference: <https://mosaik-docker.readthedocs.io/en/latest/api-reference.html>

Visit and register at <https://smartest-sim-lab.erigrd2.eu>



The screenshot shows the website for ERIGrid 2.0 VA Installation - SmartEST Sim Lab. At the top, there are logos for ERIGrid 2.0 and AIT (Austrian Institute of Technology). The main heading is "ERIGrid 2.0 VA Installation - SmartEST Sim Lab". Below this, there are sections for "About", "User Registration", and "Access". The "About" section describes the platform as a simulation-as-a-service platform. The "User Registration" section provides instructions on how to register. The "Access" section has a button that says "Log in to SmartEST Sim Lab". There is also a "Privacy Notice" section at the bottom of the screenshot, which details the data handling policies.



www.erigrd2.eu



@ERIGrid 2.0 Project

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