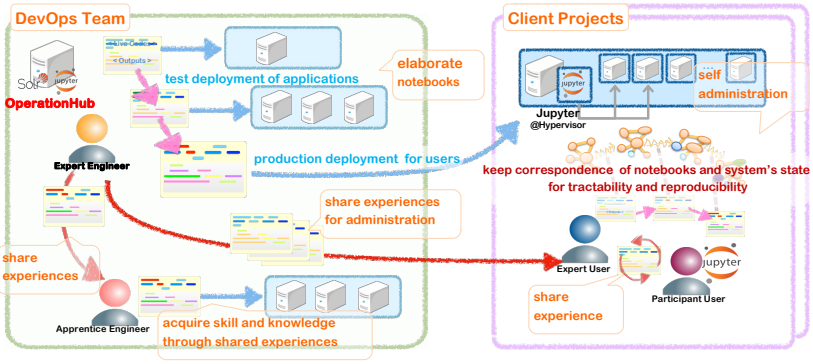
Literate Computing for Reproducible Infrastructure

Literate Computing for Reproducible Infrastructure

Reproducibility Extensions for Jupyter Notebook

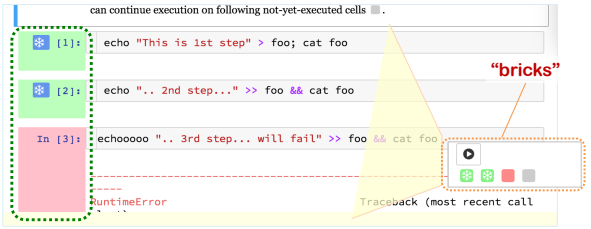
Literate Computing for Reproducible Infrastructure (LC4RI) is our daily practice to manage IT infrastructure. NII cloud operation team, a small DevOps group, manages more than 350+ nodes built on OpenStack and provides Cloud computing and Storage stacks as services. For reproducible research, it is as essential to share infrastructure design and elaborated IT workflows with participants as to automate complex operations.

LC4RI is an approach to describe automated operations as live code and share reproducible outcomes among expert and apprentice participants as **Jupyter Notebook**. It helps to share experiences within a DevOps team and hand out reproducible research environments and setups for client projects.



Reproducibility Extensions for Jupyter Notebook: Jupyter Notebook is designed initially as a non-linear explorative computing tool, typically for data-driven scientists. Using Jupyter Notebook for robust, traceable, and reproducible IT Operations, our extensions align arbitrary Cell's execution into semi-linear orders and secure throughout loggings.

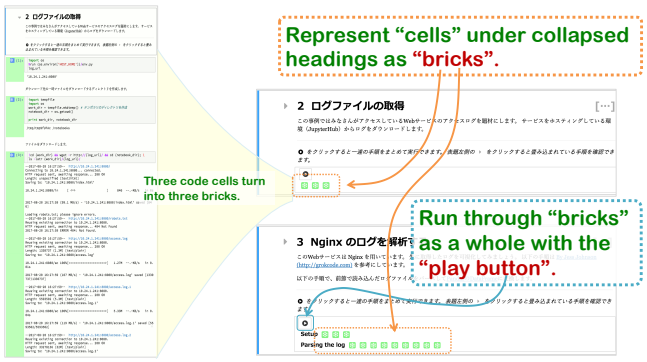
Semi-Linear Extension for Robust Operation



: The light green bricks indicate successfull completion.
: The third light coral brick indicates some error.

: The snowflake indicates those bricks are frozen. Executions and edits are prohibited.
The " " will unfreeze bricks.
Success cells will be automatically frozen in order to prevent accidental duplicate operations. Error cells remain unfreeze so you can fix errors and re-execute the cell. You can continue execution on following not-yet-executed cells .

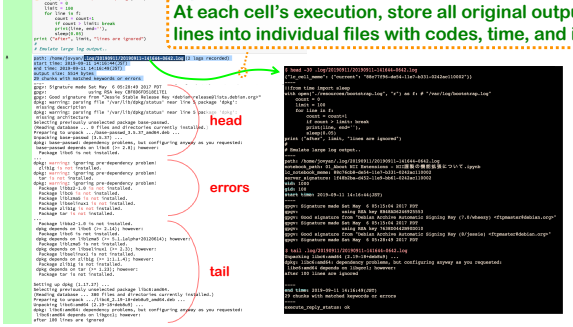
Enhanced Collapsible Headings for Linear Run through



Throughout Loggings for Operation Trails

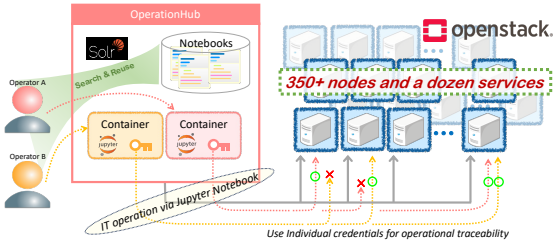
!! Summarizes massive output lines on GUI.

At each cell's execution, store all original output lines into individual files with codes, time, and id.



350+ nodes are managed via OperationHub

OperationHub is a tailored JupyterHub for DevOps instead of *sshd* on the management server. It provides segregated Jupyter containers for individual operators and mechanisms for Notebook sharing and reuse.



Try on MyBinder

https://mybinder.org/v2/gh/NII-cloud-operation/Jupyter-LC_docker/sc-demo?urlpath=tree