

IOOS Coastal Modeling Cloud Sandbox

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Background

Development began around 2018 by IOOS and its partners to evaluate commercial cloud use for regional coastal modeling.

Fully Tested Models:

- Operational NOSOFS ROMS and FVCOM Models
- LiveOcean – University of Washington
- WRF/ROMS ESMF Coupled (Hurricane Irene test case)
- ADCIRC (Hurricane Florence test case)
- WRF/ROMS/SWAN



Sandbox Goals



Access



Connect



Collaborate



R2O2R



Reduce Cost



Reduce Effort

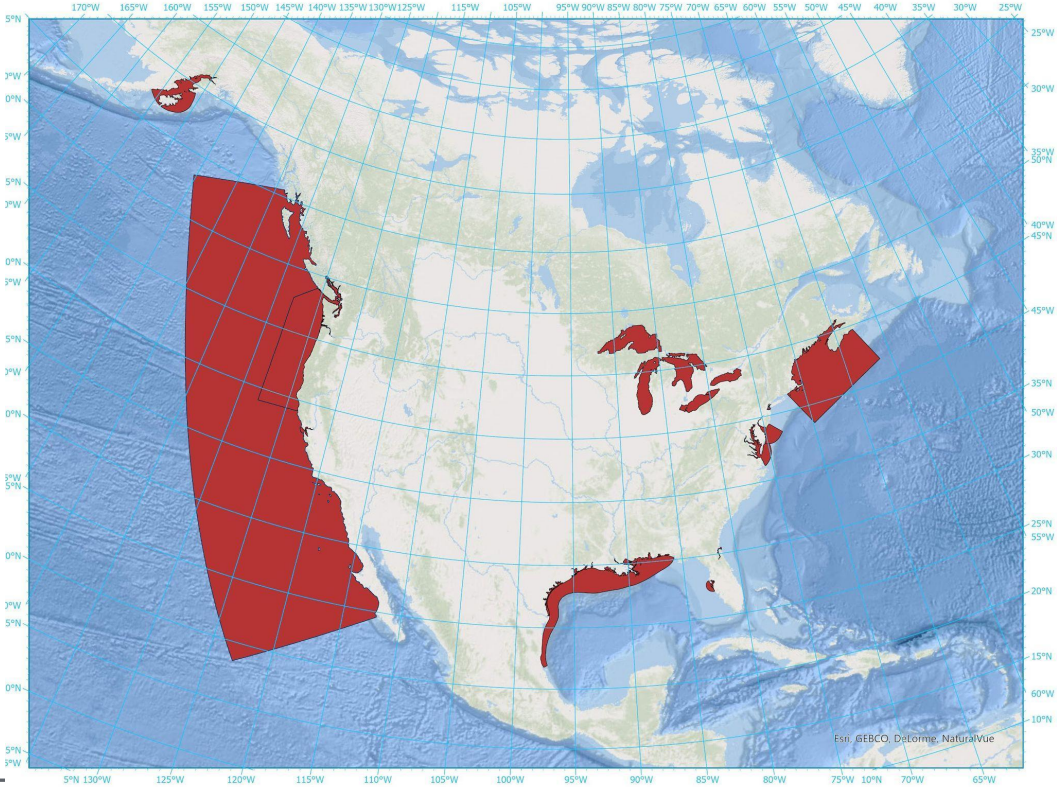


Governance

- Provide easier access to HPC systems
- Encourage community development of models
- Make it easier to deploy HPC environments in the cloud
- Ensure computational costs are allocated to various projects appropriately

Workhorse for NOS models & model uses

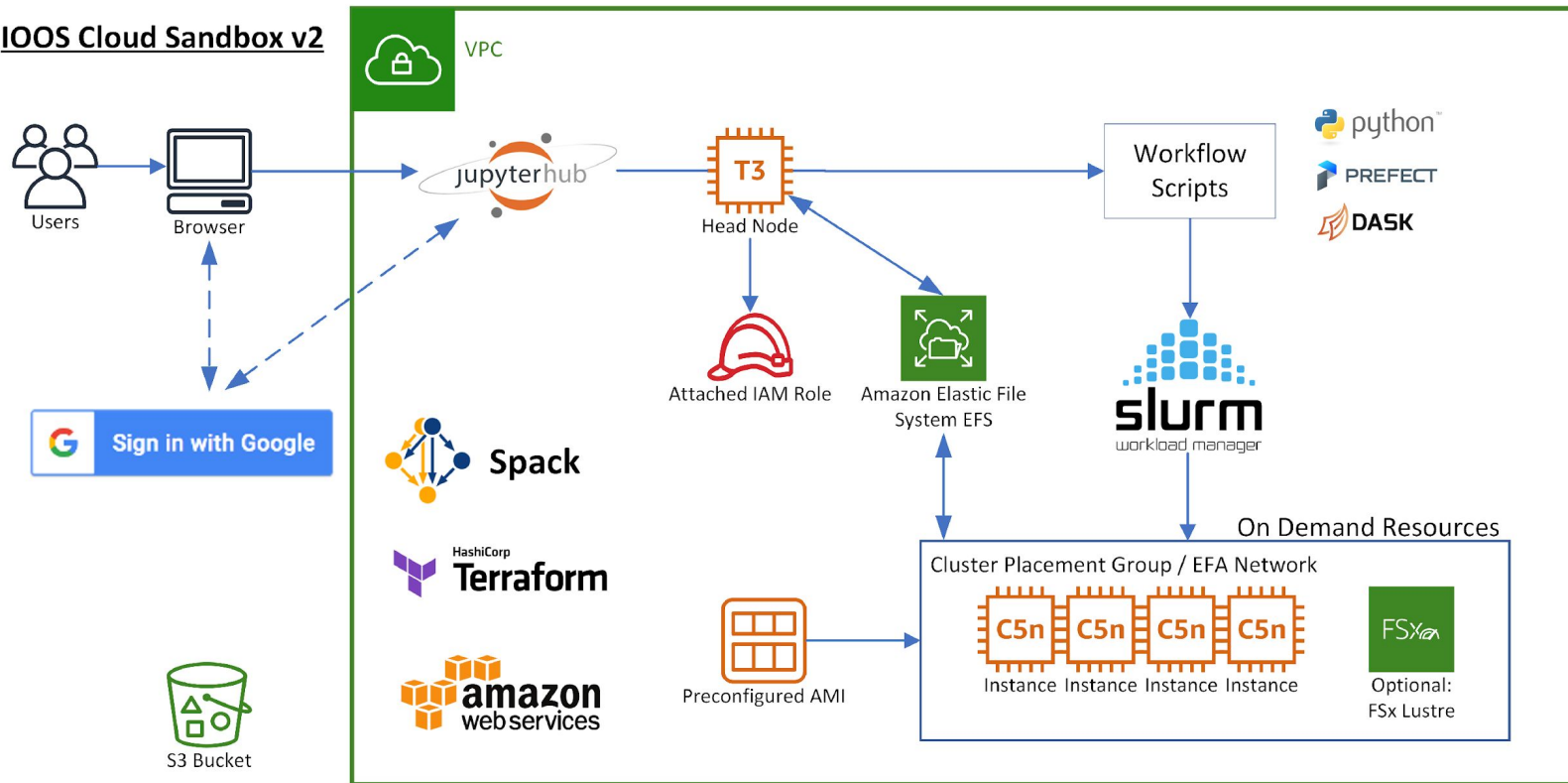
 **OFS**
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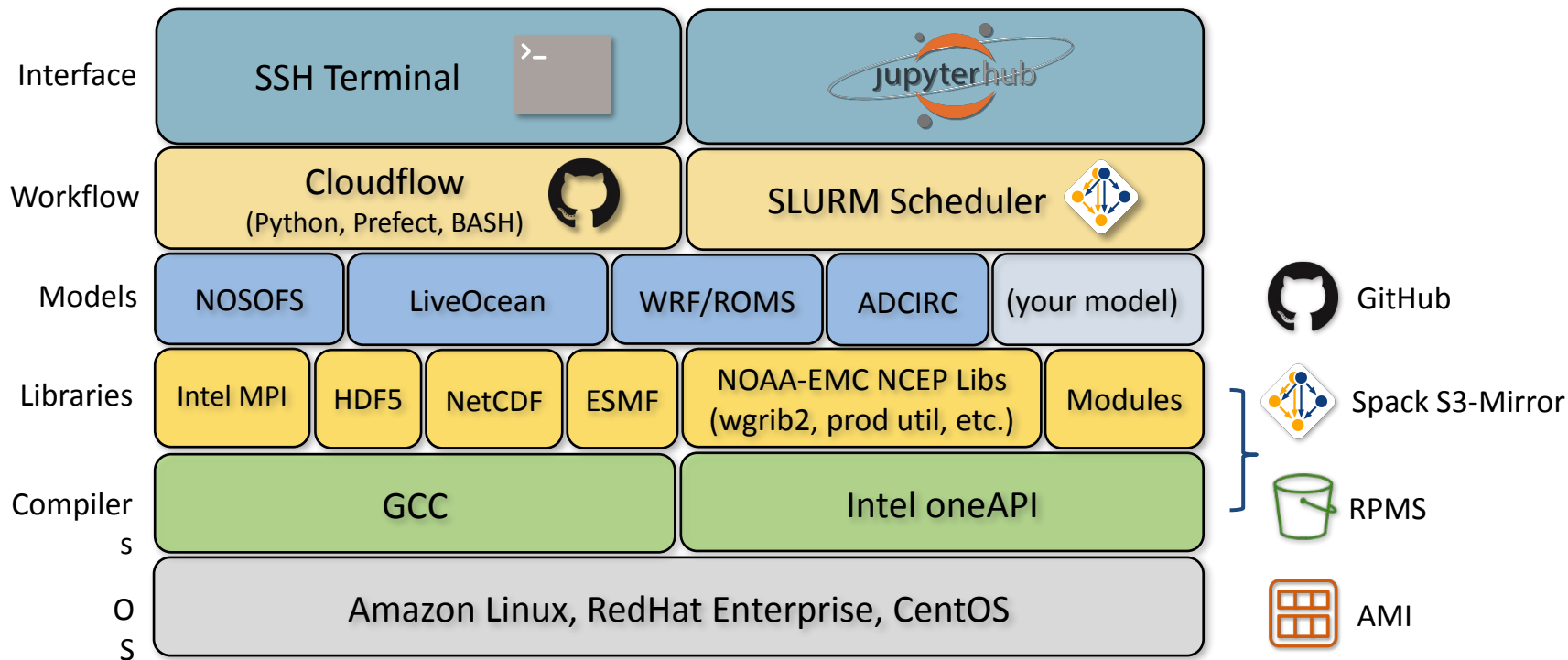
Sandbox v2

- Infrastructure as Code – Terraform
- SLURM Workload Manager
- Spack Package Manager

IOOS Cloud Sandbox v2



Modeling Software Stack



ROMS: CBOFS, CIOFS, DBOFS, GoMOFS, TBOFS, LiveOcean

FVCOM: LEOFS, LMHOFS, LSOFS, LOOFS, NGOFS2, NWGOFS

Other: ESMF WRF/ROMS Irene, ADCIRC Florence, SWAN/ROMS New York Harbor

NOAA Cloud Sandbox Deployment

In 2023 Lynker was awarded a contract to deploy the IOOS Cloud Sandbox on the NOAA cloud.

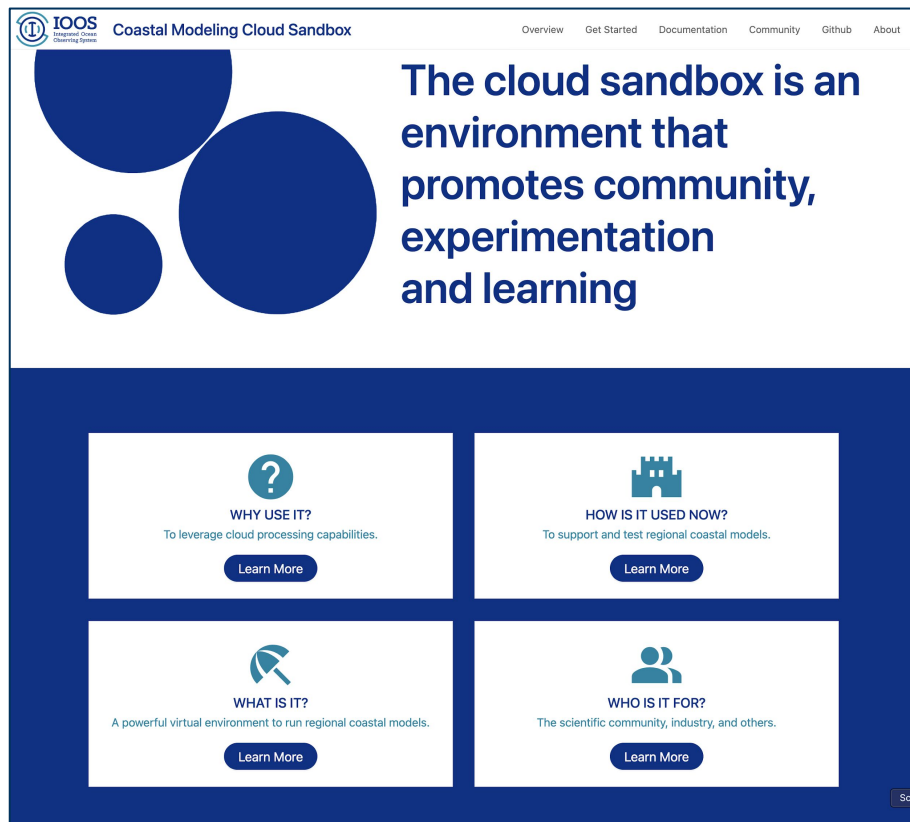
- Secure environment compliant with the Federal Information Security Modernization Act (FISMA)
- Weekly working group meetings.
- Live demonstrations.

IOOS Cloud Sandbox Updates

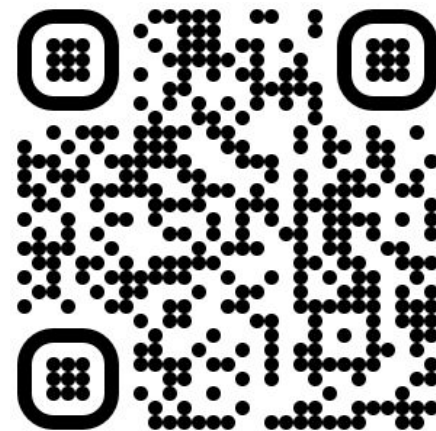
- 3-Clause BSD Open Source license applied to the source code
 - Permissive, free and open-source software (FOSS)
- Updating operating system from CentOS 7 to CentOS Stream
- Updated LiveOcean model to the current operational version
- Improvements to the JupyterHub deployment scripts
- Parallel work on NCDIS 40-year reanalysis project
 - Nebari cluster, Kubernetes auto scaling

Future/In-Progress

- NOAA Cloud Sandbox deployment
- Refactoring and code improvements
- Documentation cleanup and updates
- Updated OS
- Updating compilers, libraries, etc.
- Slurm power management
- Slurm accounting Database
- Quicker setup using pre-built AMIs?



Links, Q & A



Links:

<https://www-sandbox.ioos.us>

<https://github.com/ioos/Cloud-Sandbox>

<https://github.com/asascience/2022-NOS-Code-Delivery-to-NCO> (v 3.5.0)

<https://github.com/asascience/LiveOcean> - Scripts to build and setup test

<https://ioos.github.io/Cloud-Sandbox/> - Workflow API reference