Julia + VS Code on Perlmutter

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VS Code → Perlmutter

Challenges

- Running VS Code on cluster nodes
- Making the Julia extension work

Run VS Code on a cluster node via SSH

Login node

- Works great, just connect to (more later)
  - `trainXY@perlmutter.nersc.gov`

Compute node

- `SSH ProxyJump`
  - **(requires regular NERSC account, doesn’t work with training accounts 😔)**

Side comment: “remote tunnels” instead of SSH

Don’t do this now

On the target node

- Download the **code** CLI and run

  -
    ```
    code tunnel --verbose \
    --cli-data-dir=$SCRATCH/.code_cli_data_dir
    ```

Locally

- Press F1 and run the Remote Tunnels: Connect to Tunnel command.

(also works with NERSC training accounts 😄)

Julia Setup

Use standard Julia binaries or a system module.

- Regular binaries from
  - **juliaup** or **julialang.org**

- Generally, no need to compile from source.

- System module (can help you with packages)
  - **On Perlmutter:**
    - `module use /global/common/software/nersc/n9/julia/modules`
    - `module load julia`

Put the Julia depot on the parallel file system (PFS).

- PFS is often `$SCRATCH`
  - High quotas
  - Writable (also from within compute jobs)
  - No backup of redundant data

- Set **JULIA_DEPOT_PATH** environment variable

- Watch out for automatic deletion
  - Workaround: `touch` files periodically 😉

On heterogeneous clusters, use multiversioning.

- Nodes with different CPU kinds
  - re-triggering of package precompilation
- Set **JULIA_CPU_TARGET** environment variable
  - `export JULIA_CPU_TARGET="znver3;skylake,clone_all"`
  - `julia -C help`

Use a Julia wrapper for the Julia VS Code extension

- Julia: Executable Path should point to a wrapper script. For Perlmutter:

```
#!/bin/bash

# Make julia available
module use /global/common/software/nersc/n9/julia/modules
module julia

# Pass on all arguments to julia
exec julia "${@}"
```

(`julia_wrapper.sh` in the workshop repository)

Let’s do it!

Let’s run VS Code on a Perlmutter login node.

Do this now!

- Press **F1** and then run **Remote-SSH: Open SSH Host...**
- Enter: `trainXY@perlmutter.nersc.gov`
  - replace `trainXY` by your account name
- **Enter your password** in the popup input box.

Let’s prepare things on Perlmutter.

“Prepare for the workshop” part in README.md

- Clone the materials to `$SCRATCH/juliacon24-hpcworkshop`
- Prepare your `.bashrc`
- Point the VS Code Julia extension to `julia_wrapper.sh`
- Instantiate the Julia environment

We’re ready! 🎉

Fallback: Jupyter

Only use NERSC’s Jupyter as a fallback.

If VS Code (or a pure terminal approach) doesn’t work

- https://jupyter.nersc.gov/

Run `help/jupyter-kernel/install.sh` once.