The Parsl FluxExecutor

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The FluxExecutor brings Flux’s scheduling to Parsl

- Flux is a next-generation resource manager and first-class scheduler
  - Developed at LLNL
  - Plan of record is that Flux will be the system resource manager on El Capitan, LLNL’s 2023 exascale machine
  - Flux is unique in that it can run within another resource manager, like Slurm, Cobalt, or LSF

- The FluxExecutor is a Parsl Executor class that interfaces with Flux
  - Parsl apps are submitted as Flux jobs
  - Flux handles all of the scheduling and execution of the jobs and reports back to Parsl

Flux recently won a 2021 R&D 100 award
The FluxExecutor’s intended uses

- The FluxExecutor specializes in applications that require a nontrivial resource set (like MPI or other compute-intensive applications), and collections of applications with highly variable resource requirements.
  - Flux’s sophisticated scheduling will handle those applications logically and efficiently.
  - The scheduling policies are customizable.
  - By default, apps get exclusive access to the CPU and GPU resources they request.

- Flux provides a portable way to launch MPI applications
  - Except last-generation Cray MPI (Trinity/Theta)
    - Workaround is to build all applications (including mpi4py) with another MPI (e.g. OpenMPI)

- Each app passed to the executor can specify a number of options for requesting CPUs, GPUs, and MPI ranks, and also for tweaking their placement and distribution.
FluxExecutor future work

- Make Flux and the FluxExecutor widely available as part of the ExaWorks SDK
  - As it stands, users will need to build Flux themselves to use Flux and the FluxExecutor
    - Except at ORNL and LLNL, which have public Flux deployments
    - But Flux doesn’t have many dependencies

- Get the FluxExecutor in a tagged Parsl release
  - It isn’t in Parsl 1.1, the latest release

- Run some benchmarks on a large machine, like NERSC’s Perlmutter
Links


- FluxExecutor example configuration: [https://parsl.readthedocs.io/en/latest/userguide/configuring.html#toss3-llnl](https://parsl.readthedocs.io/en/latest/userguide/configuring.html#toss3-llnl)

- FluxExecutor blog post: [https://parsl-project.org/2021/06/30/Parsl-Flux.html](https://parsl-project.org/2021/06/30/Parsl-Flux.html)