OAK RIDGE National Laboratory

A Brief Introduction to UnifyFS

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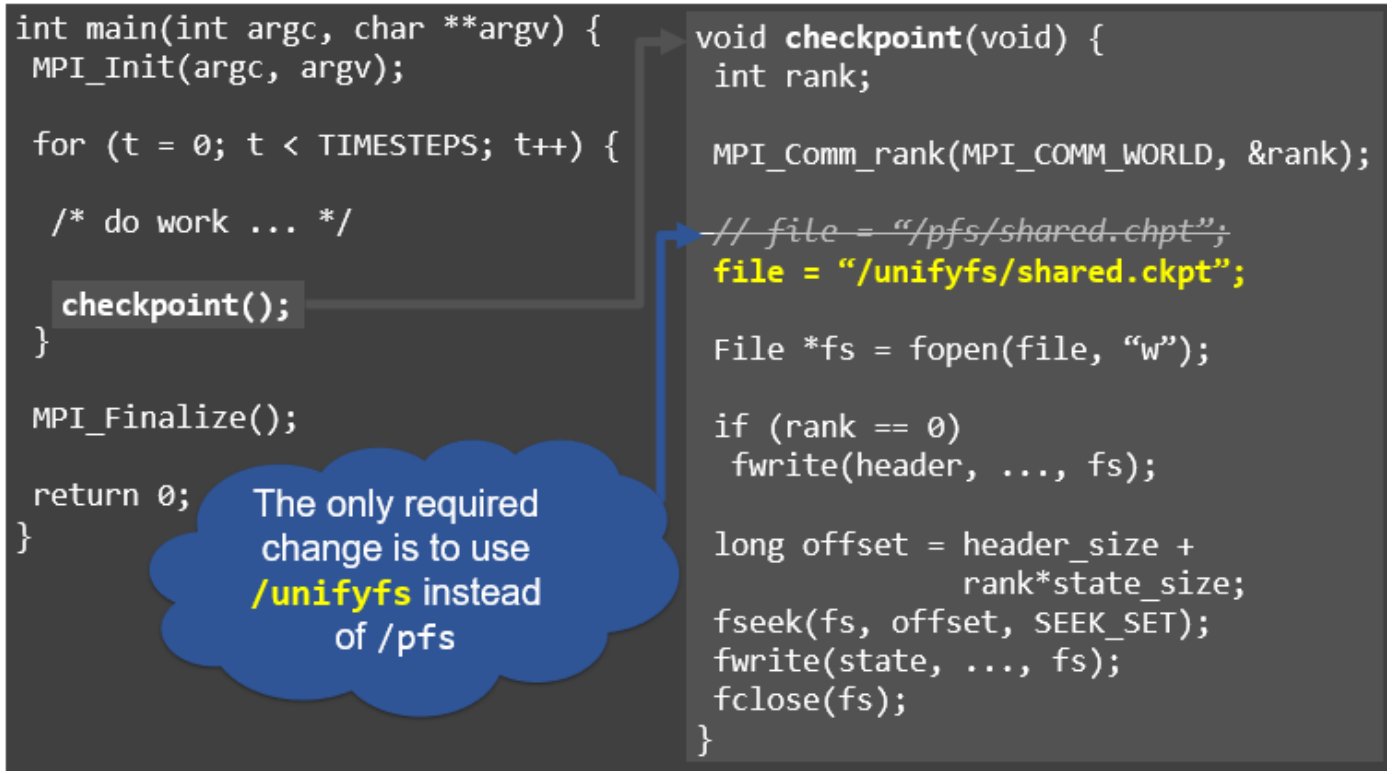
What Is UnifyFS?

- An ephemeral, user-level shared file system for node-local storage
- Our goal is to make using node-local storage on exascale systems as *easy* as writing to the parallel file system and orders of magnitude *faster*



UnifyFS Overview

- Designed for efficient use of node-local storage for applications with typical HPC bulk-synchronous I/O patterns
  - Provides unified namespace over independent node-local storage
  - supports both shared files (N-1) and file-per-process (N-N)
- Transparently intercepts I/O: POSIX, MPI-IO, HDF5
- Usage: 3 Easy Steps
  1. Update application file paths to use prefix `/unifyfs`
     - often, this does not require code changes
  2. Link application with the UnifyFS client library
  3. Update job script to start/stop UnifyFS servers at beginning/end of job (with optional stage-in and stage-out)

UnifyFS File Sharing Semantics

- Application data written to node-local storage is only visible to remote application processes after an explicit sync operation
  - POSIX I/O: `fsync()` or `close()`
  - MPI-IO: `MPI_File_sync()`
  - HDF5: `H5Fflush()`

- File Lamination: mark file as read-only, no further writes allowed
  - allows UnifyFS to optimize metadata management for faster reads
  - to laminate, use UnifyFS API or `chmod(0444)`

UnifyFS - Summit Quickstart Guide

- `module use /sw/summit/unifyfs/modulefiles`
- `module avail unifyfs/1.0.0`
- `module load unifyfs/1.0.0/xl-16.1.1-10`
- `unifyfs-help # for info on job integration and configuration`

- Modules are also available for gcc 9.1 & 10.2
- For Help/Issues/Suggestions:
  - Do **not** contact OLCF help
  - Send an email to ecp-unifyfs@exascaleproject.org

Summary

- Modules are available on Summit (and will be on Frontier)
  - Remember to run `module use /sw/summit/unifyfs/modulefiles`
- UnifyFS is **EPHEMERAL**!
  - Save any data you want to keep to the parallel filesystem **before your job ends**
  - See the man page for the unifyfs-stage command
- Detailed documentation is available at https://unifyfs.readthedocs.io/en/dev/
  - Can also run the `unifyfs-help` command for more details

Questions?

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