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Title: Cray Programming Environment Containerization

Abstract:

The Cray Programming Environment (CPE) is a set of vendor-supported packages that provide tools to the user for high performance software development. Updates to the CPE install their packages to a fixed location. While Cray nominally supports 'stacking' multiple CPE releases in the same location, this poses a challenge when upgrading since production software can break when the CPE is updated to a new release. This can extend scheduled downtimes, as substantial troubleshooting must be performed as part of the upgrade process. In order to support having multiple versions of the CPE installed without conflicts, this project aims to provide CPE images that are usable from alternate locations. New versions of the CPE come as ISO files from the vendor, and we seek to repackage them as SquashFS files so they can easily be mounted at new locations. SquashFS is a read-only, compressed filesystem which is performant at scale and can be stored as a single file, making it a good fit for applications in the HPC division. To perform the relocation, ELF executables must be modified to load libraries from the custom location, and broken symbolic links must be fixed. Then, the modified CPE directory can be saved as a SquashFS file allowing for maintainability and reproducibility of scientific workloads.