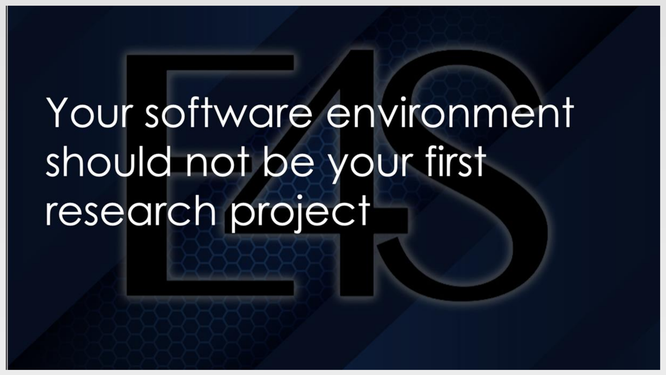
E4S: An HPC-AI Software Ecosystem for Science

https://pesoproject.org



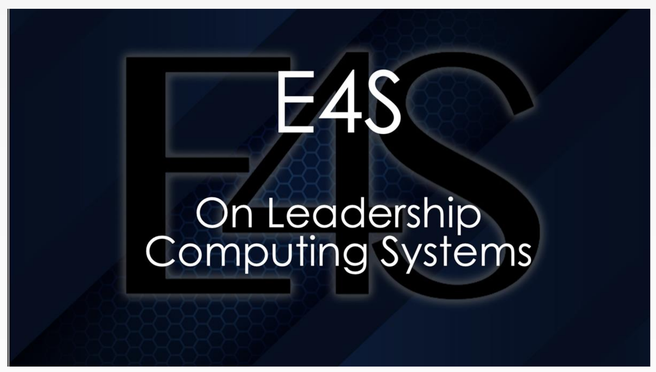
- Complex HPC software stacks can take days—or weeks—to configure correctly.
- Compilers, libraries, programming models, and dependencies must work together across diverse systems.
- E4S provides a curated, tested, and interoperable scientific software ecosystem.
- Spack-based deployment makes environments reproducible, portable, and customizable.
- Prebuilt containers and facility-ready installations accelerate onboarding.
- Researchers spend less time configuring software—and more time advancing science.

- More than 100 open-source libraries, tools, and applications for scientific computing.
- Broad support for NVIDIA, AMD, and Intel GPU architectures.
- Performance-portable programming models enable one code base across diverse systems.
- Includes math libraries, data and visualization tools, performance tools, programming systems, and AI/ML software.
- Curated and tested for interoperability across the scientific software stack.
- Built through collaboration among DOE laboratories, universities, vendors, and open-source communities.

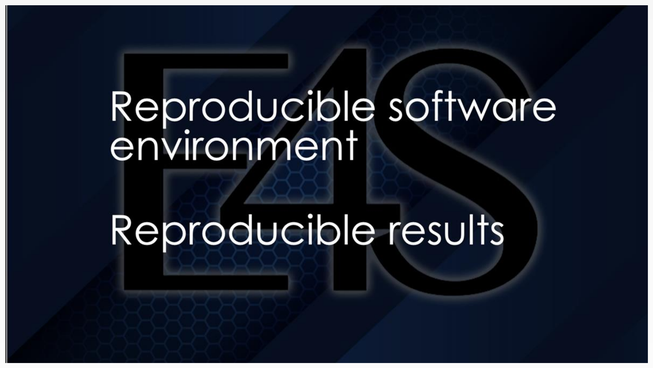
- Deploy complete scientific software environments without building every dependency from scratch.
- Use prebuilt containers, binaries, and Spack environments to get started quickly.
- Reproduce validated configurations across development, testing, and production systems.
- Reduce platform-specific setup and troubleshooting.
- Help new team members become productive sooner.
- Move more rapidly from installation to simulation, analysis, and discovery.

- Start quickly with ready-to-use scientific software environments.
- Reduce time spent resolving dependencies and platform-specific configuration issues.
- Use tested combinations of libraries, tools, compilers, and programming models.
- Move environments reproducibly across laptops, clusters, clouds, and leadership-class systems.
- Access optimized software for CPUs and GPUs from multiple vendors.
- Focus researcher effort on simulation, analysis, AI, and scientific insight.

https://e4s.io



- Deployed and tested on DOE leadership-class computing platforms.
- Supports major CPU and GPU architectures from AMD, Intel, and NVIDIA.
- Provides consistent software environments across facilities and systems.
- Works with facility modules, Spack installations, containers, and user environments.
- Continuous integration helps identify portability and interoperability issues early.
- Enables scientific teams to move applications more readily between development systems and production supercomputers.



- Capture complete software environments—including versions, variants, compilers, and dependencies.
- Recreate validated configurations across systems, facilities, and project teams.
- Use Spack environments, lockfiles, containers, and build metadata to preserve provenance.
- Reduce variation caused by undocumented or changing software dependencies.
- Make computational results easier to verify, compare, and reproduce.
- Support long-term reuse of scientific workflows as platforms evolve.

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