SEANERGYS
Energy Efficient Exascale

SEANERGYS Towards Energy Efficient Operation of HPC and AI Supercomputers

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SC25 BoF on “Where could Europe add value?”
St. Louis, November 19, 2025

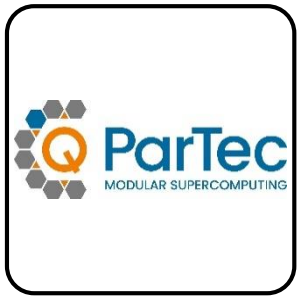
SC25
St. Louis, MO | hpc ignites.

The SEANERGYS Project

Project term: June 1, 2025 – May 31, 2025

Funding: total grant requested ~ 33 M€

Carrying on the torch from the DEEP-SEA and REGALE Projects



Red border denotes HPC centres

High−Level Objectives

- Reduce energy waste & operating costs while maximising scientific and industrial benefits for Europe's investments in HPC and AI infrastructures

- Design a production-quality SW suite for energy-efficient operation of European HPC(/AI) systems

- Validate the SEANERGYS SW suite in operational environments and make it available under permissive licenses
  - The participating centres contribute use cases, requirements and KPIs
  - Uptake of the SEANERGYS SW is expected by funding agency if requirements and KPIs are actually reached (in H1/2029)
  - Project year 4 focuses on such evaluation and validation

Approach

Close interaction of the three main modules

Monitoring

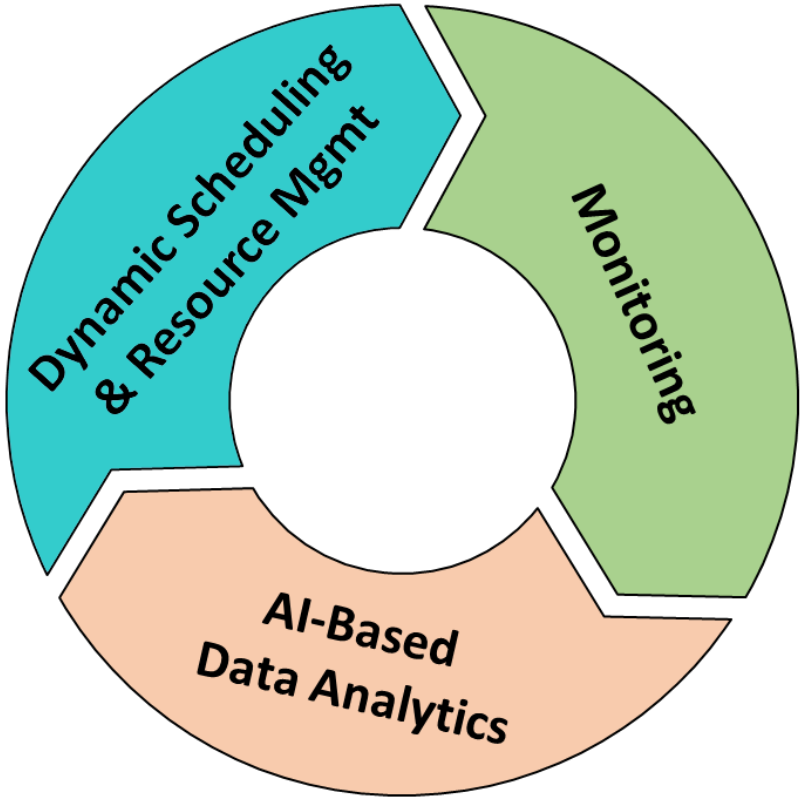
- Scalable capture of system/facility/environment data and application information
- Inclusion of non-structured data
- Establishment of a system data plane

AI-based data analytics

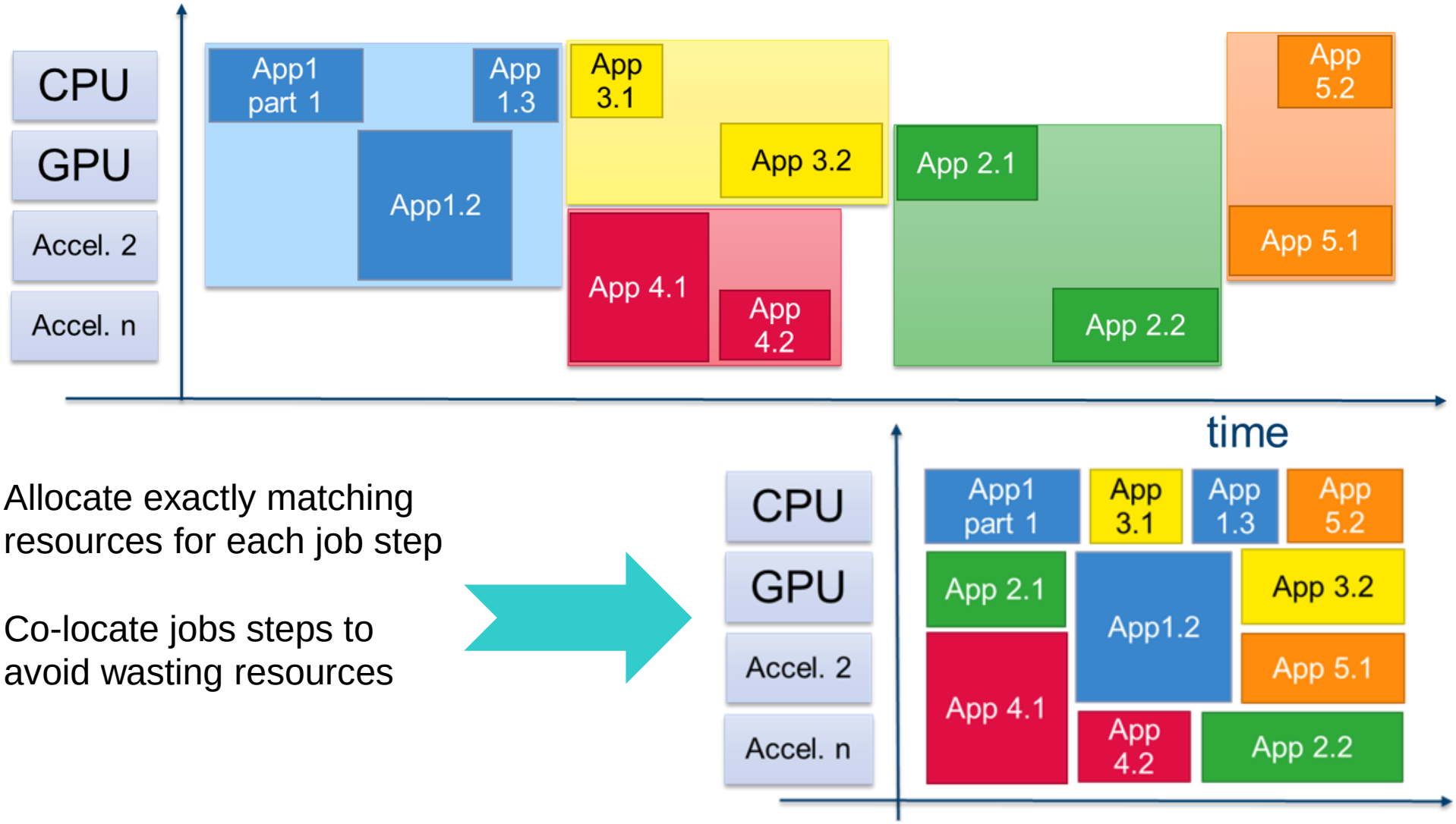
- Automatic workload characterisation and prediction
- Direction of scheduling & resource management decisions
- Actionable feedback to application developers and users

Dynamic scheduling & resource management

- Dynamically control system & facility operating points
- Exploit dynamic behavior of applications and workflows
- Right-size moldable workload resource requirements
- Use node-sharing where it makes sense



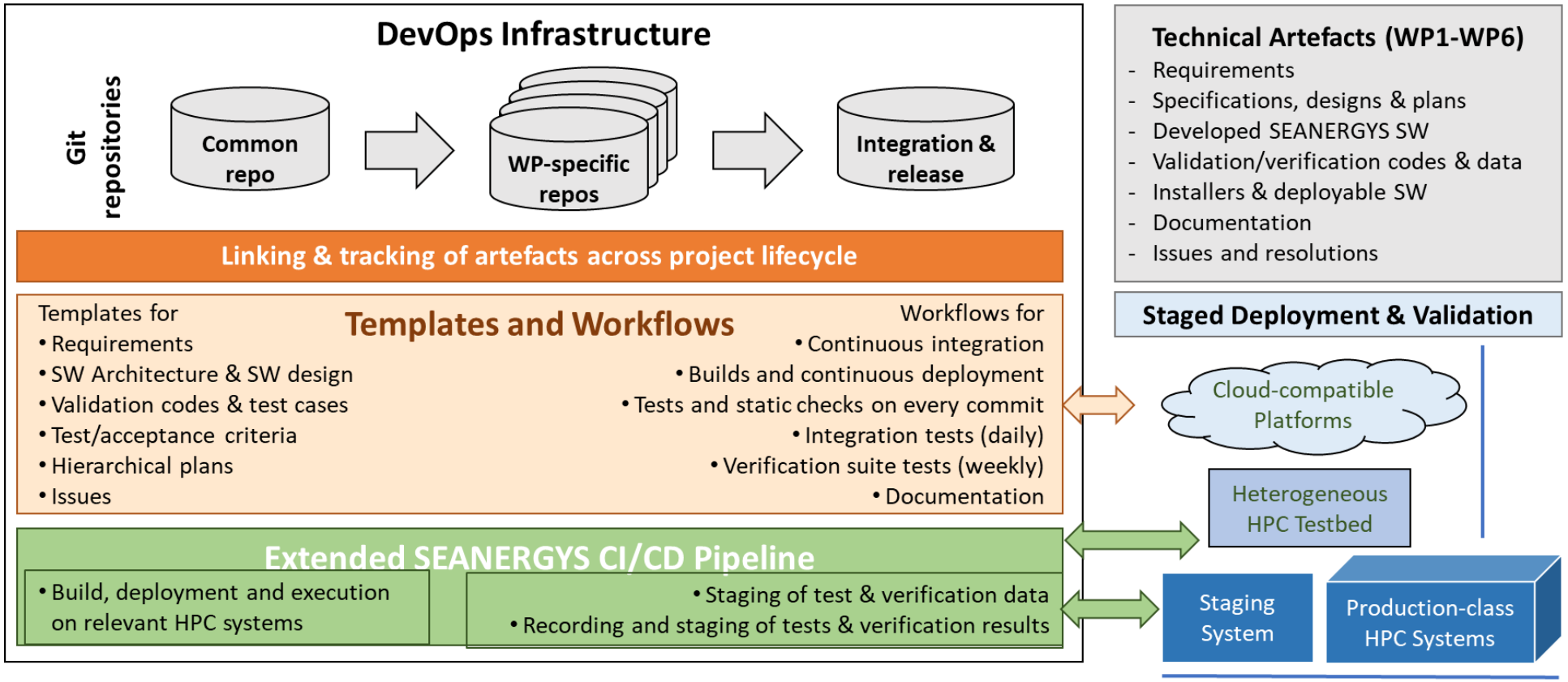
Dynamic/Adaptive Scheduling – Vision



Allocate exactly matching resources for each job step

Co-locate jobs steps to avoid wasting resources

SEANERGYS SW Development Approach



- Ensuring full “traceability” and professional development methodologies
- Project-dedicated Gitlab Premium as DevOps infrastructure (licenses funded by the project)
- Re-use and extend CI/CD pipelines from previous project

Current Status

- First six project months are dedicated to collect use cases and requirements, and prepare architecture decisions

- Agreement on formalisation of use cases, requirements and architecture decisions
  - Using the “architecture definition record” methodology
  - Discussions documented in issues, decisions expressed as merges
- Contributed use cases (~30) consolidated, cross-referenced and documented
  - Requirements and KPIs are next
- Analysis of existing SW components and strengths/weaknesses
  - Including comparison between schedulers/resource management systems (Slurm, Flux, OAR …)
- Initial decisions on key architecture elements
  - Central “data plane” connecting sources and consumers of monitoring and analytics data

Footnote | Source: XXX

Thank you for your attention!

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seanergys-project.eu

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The SEANERGYS project receives funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement no 101177590. The JU receives support from the European Union's Horizon Europe research and innovation programme and Czech Republic, France, Germany, Greece, Italy, and Spain.