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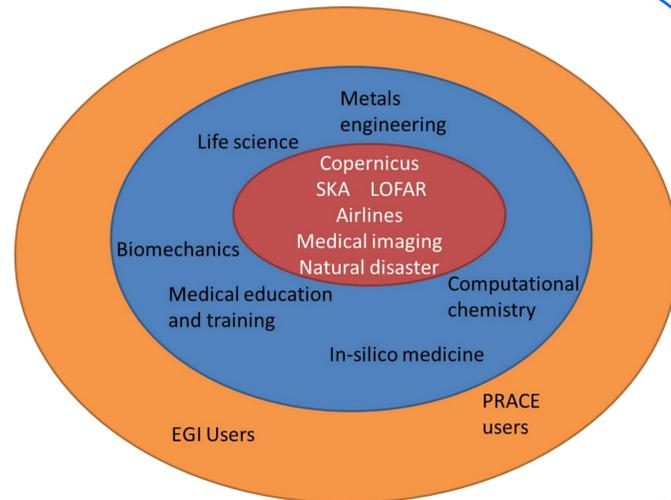
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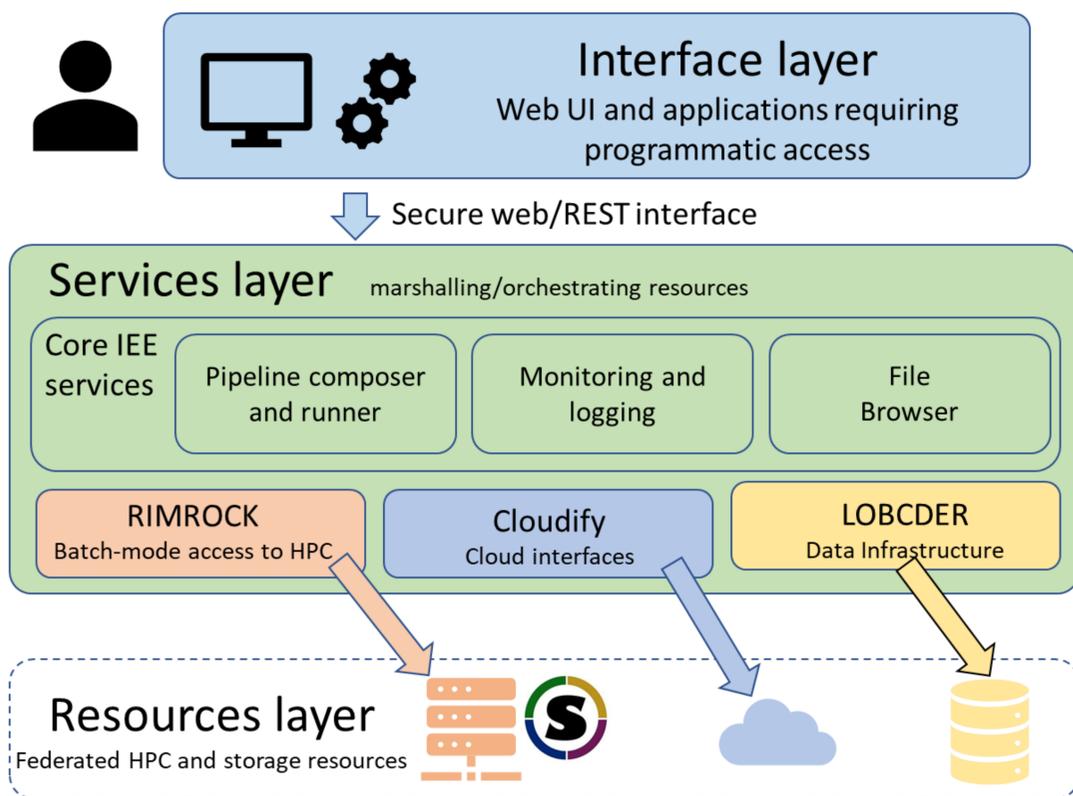
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Goals

- Provide exascale ready computational and data services that will accelerate innovation
- Validate the services in real-world settings of scientific research and in industry pilots:
 - Computation using data from the LOFAR telescope, technology preparation for the SKA challenges
 - Medical use-case utilizing AI on CPUs and GPUs for cancer diagnostic based on imaging data
 - Supporting innovation based on global disaster risk data
 - Business use-case for building models enabling revenue optimization and real-time calculations of prices
 - Agricultural simulations utilizing data from the part of Copernicus dataset collected from the Sentinel satellites



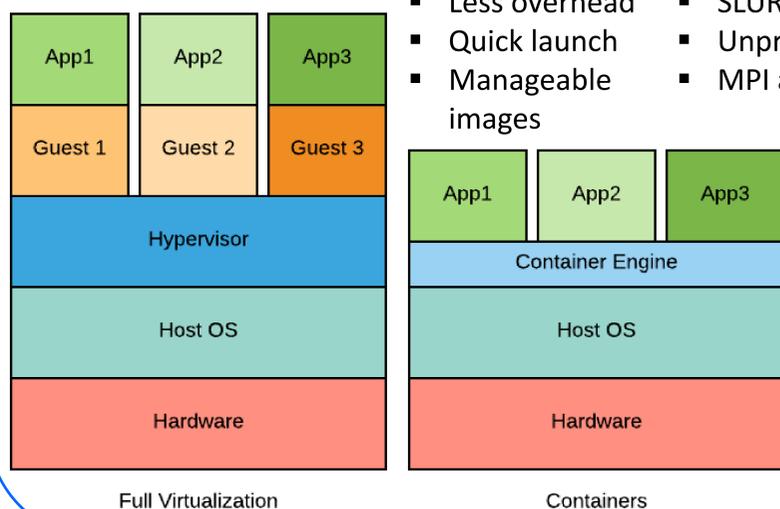
Extreme Large Scale Computing Services



- Based on “focus on services and forget about infrastructures” idea
- Support computational activities: analysis, data mining, pattern recognition, etc.
- Use heterogeneous research datasets: input and output data from modelling, simulation, visualization and other scientific applications stored in data centers and storage systems available on European e-infrastructures
- Support HPC and cloud-based computations needed for various data analyses
- Utilize Docker, Singularity or Charliecloud containers as required by the given infrastructure type and location
- Follows simplified workflow:
 - User defines pipeline/steps in IEE via web UI
 - IEE reads a computation for execution or starts it automatically (as requested)
 - Pipeline steps are executed – container steps can be scheduled as HPC jobs via Rimrock
 - HPC queues jobs (SLURM) and executes them when resources become available
 - Inside each job, the appropriate code runs embedded containers with appropriate options
- Data transfers are handled automatically by the LOBCDER component and data infrastructure

Why containers? Why Singularity?

- Small footprint
- Less overhead
- Quick launch
- Manageable images
- Built for HPC
- SLURM support
- Unprivileged
- MPI and GPUs



Conclusions and future work

- The current status of the PROCESS platform:
 - integrated solution
 - running use cases on heterogeneous e-infrastructures
 - support for a range of core technologies (HPC, Cloud)
 - applications containerized for portability
 - multiple geographical locations
- In the future we will work on:
 - further stabilization of the solution
 - making it as user friendly as possible
 - streamlining data transfers across technologies and sites
 - concurrent execution of applications on multiple sites
 - supporting a multi-node MPI on Singularity (with Horovod)
 - scaling up pipelines to run on SuperMUC-NG (TOP500 #9)
 - improving interface between IEE and the LOFAR portal

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