# Scientific and Engineering Workflows Based on Grid Services Orchestration


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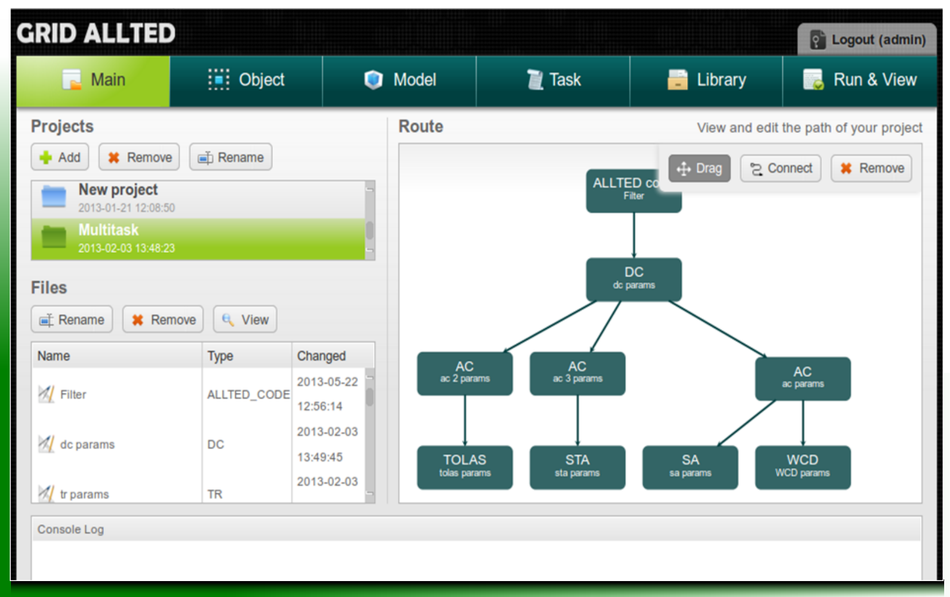
# GRIDALLTED

**Grid**-oriented **All Te**chnology **D**esigner




The initial **goal** of the project is to satisfy the needs of domestic users of Ukrainian grid for scientific and applied research tools supporting collective design and analysis of complex objects.

The basic idea of the proposed **solution** is the dynamic composition of both web and grid services for the execution of custom engineering and scientific simulation scenarios as a workflow.

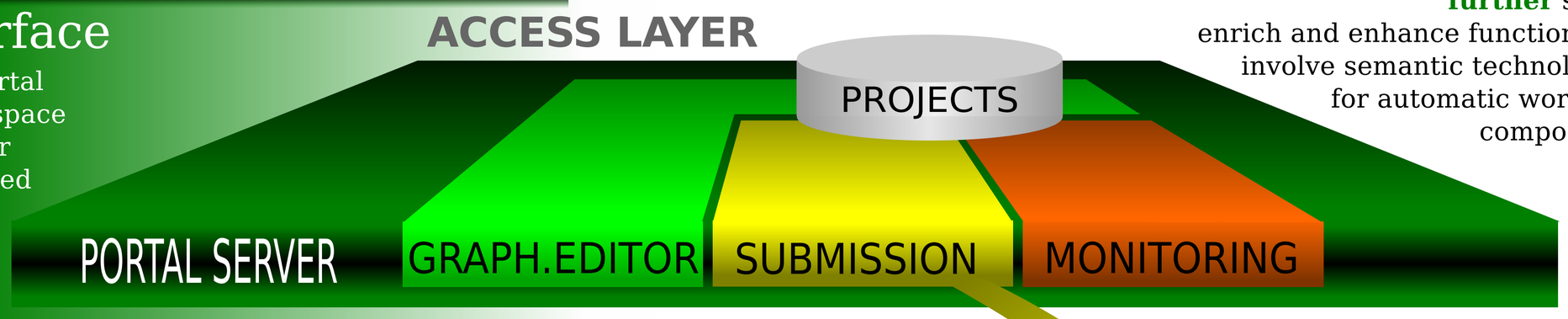
The multi-layered architecture of the grid-enabled computer simulation software presented here combine the benefits of grid computing and SOA with workflow management capabilities:

- web-accessible
- functionality is decomposed to both web and grid services
- adheres the adopted standards and protocols
- supports custom user scenario development and execution
- hides the complexity of interaction with grid and web services

**further** steps:
enrich and enhance functionality,
involve semantic technologies
for automatic workflow
composition

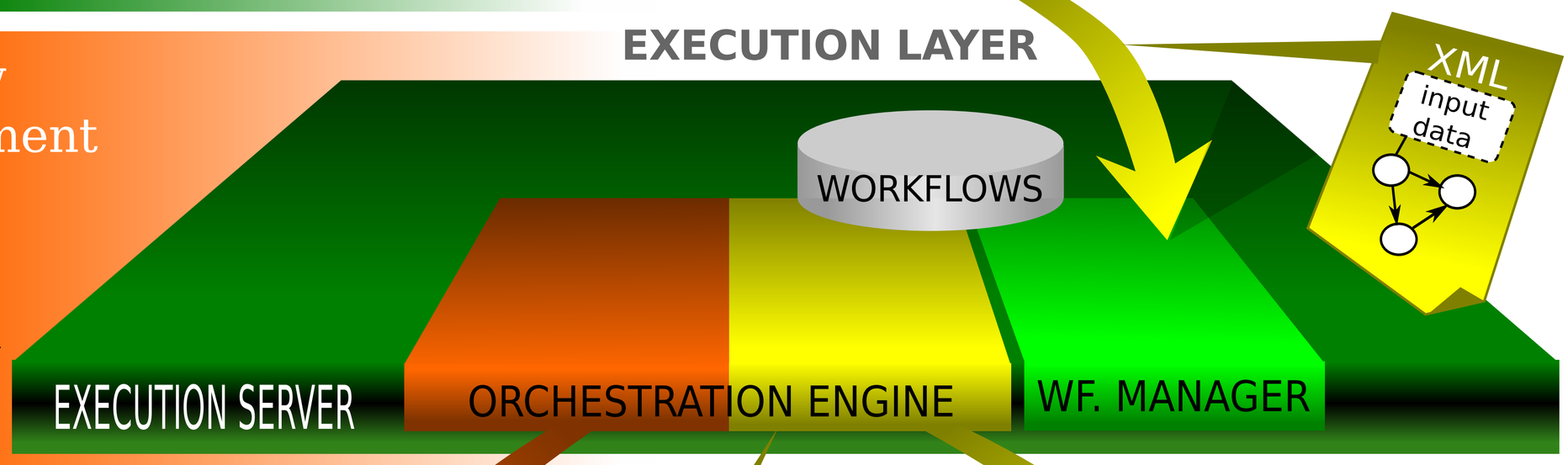
## web interface

- information portal
- personal workspace
- workflow editor
- problem-oriented editors
- results visualization



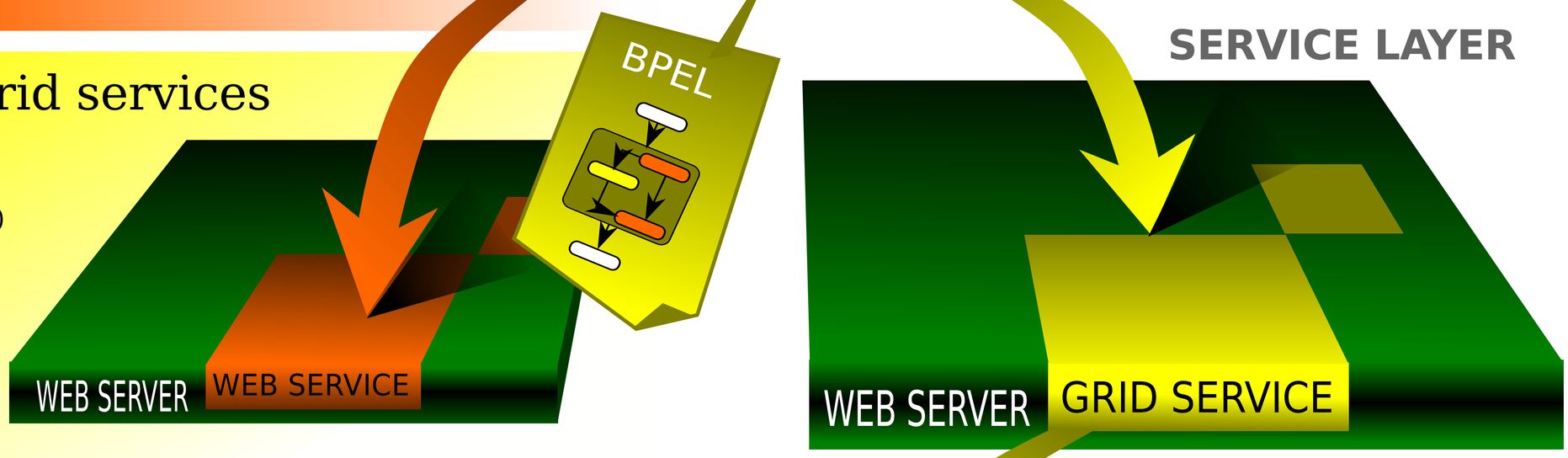

## workflow management system

- WS-BPEL 2.0 compatible engine core
- service registry
- active worfkflows database

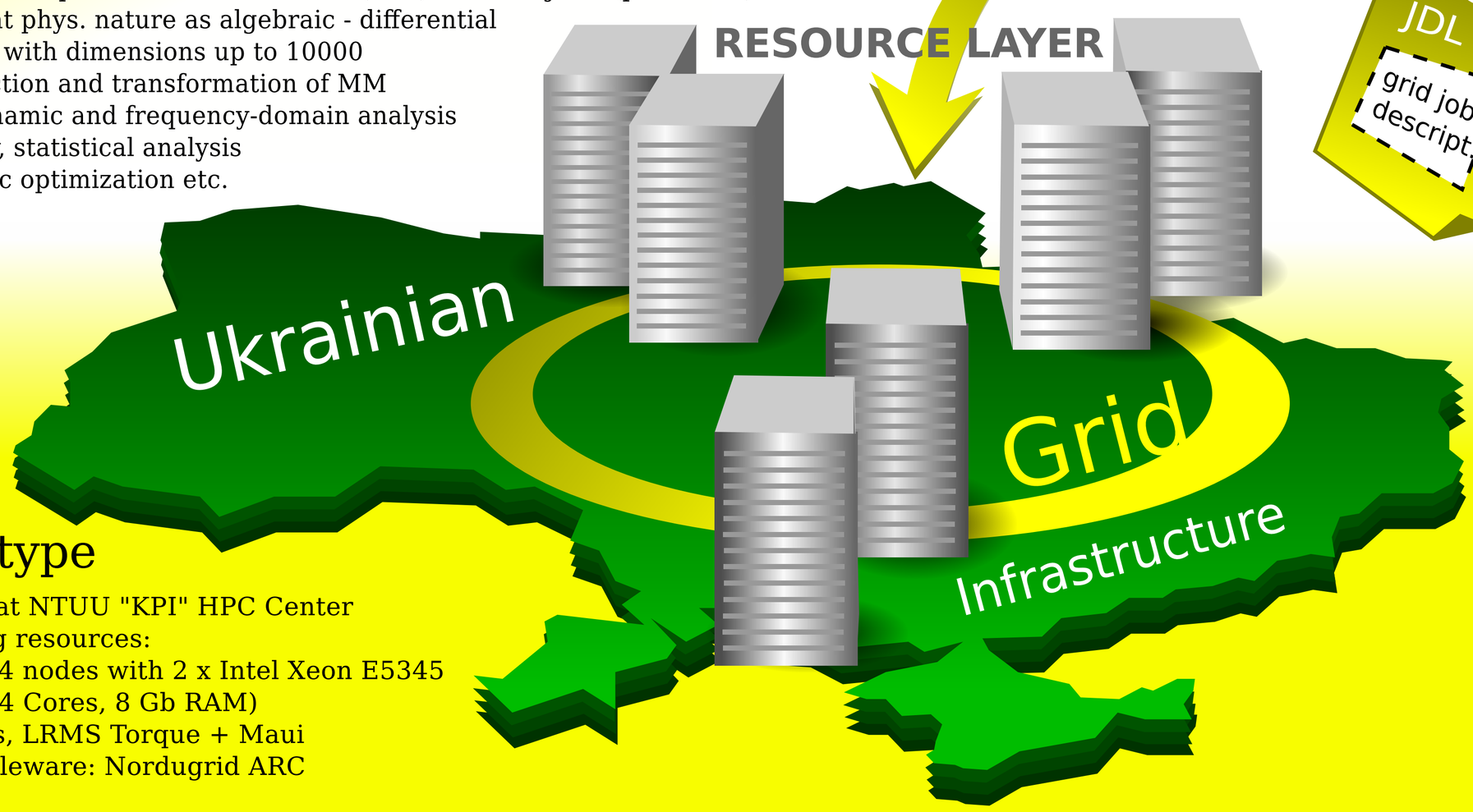



## web & grid services

- utility services (data format convertors etc.)
- functional services (AC, DC, TR, MVA analysis etc.)




**Functional services** provide the following capabilities:
- automatic composition of math. model (MM) of the objects (processes) of different phys. nature as algebraic - differential equations with dimensions up to 10000
- size reduction and transformation of MM
- static, dynamic and frequency-domain analysis
- sensitivity, statistical analysis
- parametric optimization etc.




## prototype

deployed at NTUU "KPI" HPC Center
computing resources:
32 cores (4 nodes with 2 x Intel Xeon E5345 2,33 GHz 4 Cores, 8 Gb RAM)
OS Centos, LRMS Torque + Maui
Grid middleware: Nordugrid ARC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