Extended Execution Support for Scientific Applications in Grid Environments

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Execution Environments: Motivation

- Starting point: Message Passing Interface (MPI)
  - Different implementations, parameters
  - Needed: abstraction, nice user interface
- More generally:
  - Different execution modes (e.g. testing, production, timed)
  - Setup additional required software tools (e.g. DEISA modules)
- Modes and tools may require additional configuration
  - Depends on the exact use case
  - Cannot be done by administrators
- Common Solution: wrapper scripts
  - Inconvenient, require scripting skills
  - Platform dependent, not reusable

Execution Environments: Solution

- Idea: configurable execution environments
  - Defined by administrator on per-site basis
  - Administrator knows available execution modes, software tools, and their configuration
  - Provide abstraction from particular tool version
  - End user chooses and configures
- Pre-/postcommands reduce need for wrapper scripts further

Execution Environments: Implementation

- Extension of the incarnation database (IDB)
- Published to the client via resource property
- UNICORE Rich Client builds configuration GUI dynamically
- Extension of the job description (JSDL)
- Interpretation and incarnation of the execution environment by UNICORE server (XNJS, IDB)

Execution Environments: Example

```
<ee:ExecutionEnvironment>
  <ee:Name>OpenMPI</ee:Name>
  <ee:Version>1.0</ee:Version>
  <ee:ExecutableName>/vsgc/software/openmpi/bin/mpiexec</ee:ExecutableName>
  <ee:CommandlineTemplate>#EXECUTABLE #ARGS #USERCOMMAND</ee:CommandlineTemplate>
  <ee:Argument>
    <ee:Name>Processes</ee:Name>
    <ee:IncarnatedValue>-np </ee:IncarnatedValue>
    <ee:ArgumentMetadata>
      <ee:Description>The number of processes to be started</ee:Description>
      <ee:Type>double</ee:Type>
      <ee:ValidValue>[1,20]</ee:ValidValue>
    </ee:ArgumentMetadata>
  </ee:Argument>
  <ee:Option>
    <ee:Name>VERBOSE</ee:Name>
    <ee:IncarnatedValue>-v</ee:IncarnatedValue>
  </ee:Option>
</ee:ExecutionEnvironment>
```

New Generic Grid Bean

- Developed: dynamic GUI building from typed parameters
- Can be used to set up applications, too
- Created a new Generic Grid Bean
  - More user friendly
  - 100 % SWT-based
  - Special support for custom executables
- Will be presented in our demo as well

Demo