



Enabling Grids for E-science

# Plans for activities of II-SAS in AA cluster

*Ladislav Hluchy, Jan Aсталos, Viet Tran*  
*Institute of Informatics*  
*Slovak Academy of Sciences*

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- **Gridification of applications**
- **Tools and services**
- **Support and Testing activities**

- **Refinement of the cosmological scenario of the solar-system formation**
- **Users:**
  - Astronomical Institute of the Slovak Academy of Sciences (AI SAS), Slovakia
  - Catania Astrophysical Observatory, Italy,
  - Astronomical Observatory of the A. Mickiewicz University Poznan, Poland
- **Description:**
  - Last stage of the formation of jovian planets or revisiting the “Nice model”; formation of the Oort cloud and Kuiper belt within a unique theory. It is a simulation of the evolutionary scenario of the reservoirs of small bodies in the outer region of the solar system.
- **Characteristics:**
  - The computation consists of a sequence of sub-simulations, each for a defined period of the small-body-orbit evolution, whereby there are a lot of independent tasks within every sequence. Computation must be repeated with different input parameters.

- **Explanation of the observed structures of meteoroid streams via simulations of their dynamical evolution**
- **Users: AI SAS**
- **Description:**
  - Study of the fine structure of streams and answering the questions concerning their origin and relationship with the comets and asteroids. This application comprises partial studies of individual meteoroid streams, whereby two kinds of tasks are solved:
    - structure of meteorid stream
    - the searching for an asteroidal or cometary parent body of the stream
- **Characteristics:**
  - structure of meteorid stream: The computation consists of a sequence of sub-simulations, each for a defined period of the small-body-orbit evolution, with a lot of independent tasks within every sequence.
  - the searching for an asteroidal or cometary parent body of the stream: The computation consists of a lot of individual tasks, i.e. experiments the agreement of each of which with the observations is evaluated.

- **Solving the problem of the migration of comets and asteroids in the solar system**
- **Users: AI SAS**
- **Description:**
  - Studies of the transitions of among long-period, Halley-type, and Jupiter-family comet populations, as well as another weird migrations of comets and asteroids in the solar system during its existence. This application comprises partial studies of dynamical evolution of small bodies in various source regions.
- **Characteristics:**
  - Typically, the computation consists of a lot of individual tasks, i.e. experiments the agreement of each of which with the observations is evaluated. The result with the best agreement is accepted, the other results are discarded.

- **Dynamical evolution of irregularly shaped and composite cosmic dust particles**
- **Users:**
  - Astronomical Institute of the Slovak Academy of Sciences
  - University of Vienna, Austria
  - University of Muenster, Germany
  - US Army Research Laboratory, USA
- **Description:**
  - Study of the motion of microscopic dust particles, in the stellar envelopes, under an action of gravity, electromagnetic stellar radiation, Lorentz force, and other non-gravitational effects. This application comprises the study of the dynamical evolution of a set of microscopic dust particles, each having a unique shape and composition. Besides the gravity, the motion of the particle is typically influenced by several non-gravitational forces.
- **Characteristics:**
  - The computation of the dynamical behaviour of each particle can be regarded as a separate, independent task and sent to a single CPU in the GRID.

- **Tools for reliable execution of large number of tasks in parameter studies**
  - Manage a large number of independent tasks
  - Provide load-balancing and fault-tolerance
  - Simple setup and use
  - Required by many AA applications
- **Workflow management for AA applications**
  - Manage workflow with specific AA requirements (data movement, access to special resources, ...)
  - Some phases in the workflow may have a large number of independent tasks => WMs should have built-in or support tools for parametric studies
  - May consider the use of web services for abstractions of non-standard jobs (e.g. access to special resources, parametric study)
- **Other tools can be supported on requests**

- **II SAS has experience with variety of Grid technologies from participation in Grid projects:**
  - Development and customisation of scientific Grid portals
  - Porting of advanced applications to Grid - workflow, MPI
  - Data management - metadata management, relational and XML database access (OGSA-DAI)
  - Interactive Grid applications
  - Visualisation of Grid applications
- **Projects:**
  - CrossGrid project - <http://www.crossgrid.org>
  - KWfGrid project - <http://www.kwfgrid.eu>
  - MediGrid project - <http://www.eu-medigrid.org>
  - Int.eu.grid – <http://www.interactive-grid.eu>



- **Testing AA applications**
  - Testing functionalities: If the application work
  - Testing reliabilities: stress testing
- **Testing selected tools and services:**
  - Creating sample test cases for developers
  - Testing tools developed within AA cluster
  - Testing tools developed by other but used by AA

- **Planned contributions of II-SAS**
  - 4 AA applications
  - 2 tools and services
  - Testing activities
- **Should collaborate with other partners in AA cluster:**
  - Support other applications and tools
  - Sharing efforts on porting, development and testing
  - Sharing knowledge and expertise
  - Coordination