

## High Energy Physics

Application porting to the grid was successfully accomplished in several cases using Ganga, a user interface developed to provide a homogeneous environment for processing data on heterogeneous resources. Ganga is used by several projects ranging from image processing to medical physics in addition to its main use within the LHCb and ATLAS collaborations. The required effort will focus on enabling Ganga to support a sharp increase in the number of user communities and of users within the existing communities. The following tasks are foreseen (involved partners in parenthesis):

- Integration of the Ganga documentation and release process (CERN)
- Adaptation of Ganga to fully exploit multi-core processors, cloud computing, parallel systems and a unified middleware stack. Integration of data management aspects to interact with grid storage solutions. Inclusion of support for web based interfaces (BHAM, CERN, IC, UIO).
- Creation of sustainable Ganga user communities via support forums and tutorials. This also includes the implementation in Ganga of new functionality required for the evolution of their use cases. (BHAM, IC, UIO).
- ~~Adoption of existing Grid components for user analysis (Ganga, AMGA [???) and integration of job submission and monitoring framework into the grid (DESY).~~

A significant effort will also be devoted to maintain and adapt the experiment frameworks to new middleware components, to optimize resource usage by production and analysis workflows and to improve fault tolerance in data management. More in detail:

- Adaptation of experiment services to use the CREAM CE and the coming WMS command line interface in place of the python APIs (CERN, INFN).
- Improvement of the integration of the experiment production frameworks with tape-based mass storage systems (CERN, INFN).
- Enhancement of physics analysis tools to support more complex workflows and to better exploit distributed resources (CERN, INFN).
- Improvement of redundancy mechanisms in data placement and transfer (CERN, INFN).