VGrADS is an NSF project creating higher-level abstractions for grid programs.

Seven universities performing research:

Research thrusts include defining Virtual Grids (VGs), scheduling workflows onto VGs, and application collaborations.

**Virtual Grid Application Development Software**

**Virtual Grids (VGs)**

- **Virtual Grid Description Language (vgDL)** allows abstract specification of grid
  - Cluster0F, TightBagOf, LooseBagOf
  - Near, Far
  - Resource constraints

- **Virtual Grid Execution System (vgES)** finds and binds candidate resources into a VG

- **Application uses VG as needed**
  - Scheduling sub-computations
  - Executing components

**Scheduling onto VGs**

The Problem: Given a program represented as a DAG, map it to the VG and schedule the tasks.

**Method 1: Batch Queue Prediction**

- Batch queue wait time predictions derived from logs and current queue state
- Computational performance models derived from training set runs and input size
- Heuristics map DAG to minimize predicted total time

**Method 2: Slot Management**

- Request “slots” (dedicated time periods) on resources
- Slots can be obtained by advanced reservation (e.g. Maui scheduler) or batch queue prediction (see Method 1)
- Heuristics fit DAG nodes within scheduled slots

Both methods are now supported by vgES.

**VGs for LEAD**

See our demonstration of VG scheduling for LEAD, an atmospheric science code.

VGrADS is supported by the National Science Foundation under Cooperative Agreement No. CCR-0331654.