

Virtual Grid Application Development Software

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

Seven universities performing research:

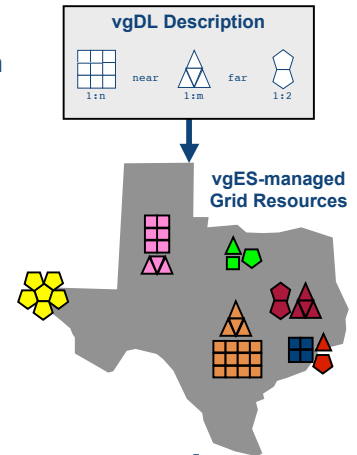


Research thrusts include defining Virtual Grids (VGs), scheduling workflows onto VGs, and application collaborations

Virtual Grids (VGs)

• Virtual Grid Description Language (vgDL) allows abstract specification of grid

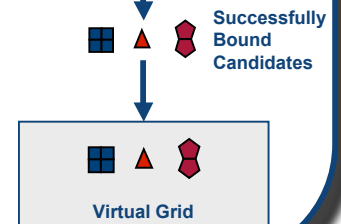
- ClusterOf, TightBagOf, LooseBagOf
- Near, Far
- Resource constraints



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

• Application uses VG as needed

- Scheduling sub-computations
- Executing components

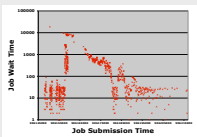


Scheduling onto VGs

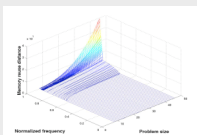
The Problem: Given a program represented as a DAG, map it to the VG and schedule the tasks

Method 1: Batch Queue Prediction

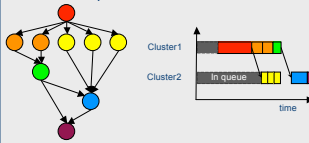
Batch queue wait time predictions derived from logs and current queue state



Computational performance models derived from training set runs and input size

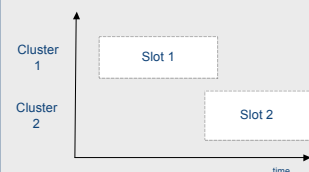


Heuristics map DAG to minimize predicted total time



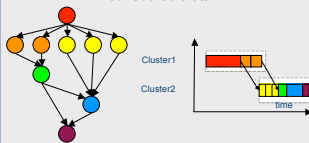
Method 2: Slot Management

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

