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From Grid Cookbook : What grids can do for you

What Grids Can Do For You

Payoffs and Tradeoffs

Issues relating to participating in a grid.

End User perceived advantages

- Improved model resolution.
- Increased size or number of calculations or simultaneous applications.
- Access to specialized visualization resources, allowing the rendering of complex scientific results in forms more easily interpreted by researchers.
- Access to large amounts or pre-processed and well organized data across high speed networks and the ability to participate in and contribute to large, geographically dispersed research collaborations.

For an institution or department considering contributing resources to a grid, what are the benefits ?

- Access to a multiplicity of compute architectures
- Access to a larger community of potential collaborators and relationships
- Drive for increased capability and diversity can outpace local budgets and resources

Note : A reliable authentication and authorization mechanism such as the Globus Public Key Infrastructure is a key element of grids.

Some factors that help drive the acceptance of grids

- Within an institution, a group may be too small to fund needed resources
- Computing resources may only be needed infrequently
- Sponsoring agencies funding broader collaborations has led to communities of interest, practice, purpose in a particular field

Examples of Evolving Grid based Services and Environments

Aggregating Computational Resources
- TeraGrid
- SURAgrid
- Geodise
- Elastic Compute Cloud

Improved access for data intensive applications
- International Virtual Data Grid Laboratory (iVDgL)
- EU-Datagrid project → (ca. 2004) Enabling Grids for EScience

Federation of shared resources toward global services
- CCG – Computational Chemistry grid
- caBig – Cancer biomedical informatics grid
- OSG – Open Science Grid

Harnessing Unused Cycles

- SETI@home
  - Condor
  - Grid-MP

“Networks are the virtual bus for the virtual grid computer”

Two recent trends increase performance :

- High bandwidth optical networks
- Smart applications which actively evaluate network conditions and dynamically adjust

Some projects exploring innovations relevant to the advancement of grid technology :

- Enlightened Computing advanced software and technologies enabling generic software to be aware of and adapt to their network
- Optiputer exploits a new world in which the central architectural element is optical networking not computers – creating supernetworks.
- CANARIE*4 Will connect Canadian research institutions with a 10GB/sec optical network, placing dynamic allocation of network resources in the hands of users

A future view of the “the grid”

“By linking digital processors, storage systems and software on a global scale, grid tehnology is poised to transform computing from an individual and corporate activity into a general utility” - Ian Foster

Note : This chapter concludes with a hypothetical near future disaster scenario and numerous ways a regional grid cyberinfrastructure lessens the damage.