HiPCAT, The Texas HPC and Grid Organization

4th DOSAR Workshop
Iowa State University

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HiPCAT **HIGH PERFORMANCE COMPUTING ACROSS TEXAS**

What is HiPCAT?

- Stands for <u>Hi</u>gh <u>P</u>erformance <u>C</u>omputer <u>A</u>cross <u>T</u>exas

  - HPC systems, Clusters, and advanced visualization

  - Grids and Massive data storage

  - Scientific Computing and Projects

- Initiated by five Texas higher education institutions' CSE and HPC colleagues

  - UT Austin, Texas A&M, Rice, U. of Houston and Texas Tech

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What is HiPCAT?

- Grew into a total of 10 institutions
  - UT Arlington, Baylor School of Medicine, UT SW Medical, UTSA Medical, UT El Paso

- Multidisciplinary HPC and grid computing organization
  - Close collaboration between HEP, CSE and Medical researchers

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What does HiPCAT do?

- Promote interactions and collaborations on HPC in Texas Higher Education Institutions
  - To improve effectiveness and efficiencies of HPC systems
  - Exchange information on HPC technologies
  - Inform each other with available resources
  - Share educational resources and talents
    - Multi-institutional lecture series

- Interact with nationwide and worldwide distributed and HPC community and bring the technology closer to Texas higher education institutions

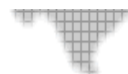HIGH PERFORMANCE
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What does HiPCAT do?

- Interact with infrastructure organizations and help defining and estimating the needs
  - Interaction with LEARN project
  - Provides needs for research network bandwidth
    - HEP anticipated needs
    - Medical usage
  - Level of quality of services
- Close interaction with state and federal government organizations

LEARN Status

LEARN Fiber IRU ——————

LEARN Leased
Service ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪

FutureLEARN
Leased Service ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪

Commited Future
Network ——————

Network Needs for HEP

- For current experiments

  - DØ Regional Center Resources

    - 200k SI2000 (UTA) ➜ 125Mbit/s peak and 30Mbits/sec average

  - Other experiments ➜ 155 Mbits/s average

- For future experiments

  - Anticipated needs to support all experiments on 2008 ➜ Optimal average bandwidth 622Mbit/s

  - Additional needs if large hubs get located in Texas

    - Anticipated future ATLAS tier 2 resources

      - 2005: 300k SI2000

      - 2008 and future: 3000k SI2000

    - ALICE Tier one will add just as much as ATLAS does

  - Optimal average: 1 – 2 Gbit/s

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What does HiPCAT do?

- Identify and support new project
  - Not all HiPCAT members must participate in a given project
  - Projects may (but need not) apply for external funding
- Currently existing projects
  - TIGRE
    - Texas Internet Grid for Research and Education
  - THEGrid
    - Texas High Energy Grid (Physics)
  - CDLT
    - Collaborative and Distance Learning Technology
- Involved in TeraGrid project

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TIGRE

- Two year construction project involving: Rice, TAMU, TTU, UH, and UT.

- Funding began in May 2005. Project funds 2 FTE people at each of the above institutions.

- TIGRE will develop a grid software stack and policies and procedures to facilitate Texas grid computing efforts.

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TIGRE Targeted Applications

- Three areas of focus: Biomedicine, Energy Exploration, Atmospheric/Climate Modeling.

- These areas are targeted in order to provide specific topics of focus to develop the grid.

- TIGRE will also be open to and support other "grid-ready" apps.

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THEGrid

- Formed in 2004 to be a user group for TIGRE involving UT Arlington, TTU, TAMU, Rice, UH.

- Intended to provide a model for domain-specific virtual organizations using grids in Texas.

- Several workshops held.

- Currently awaiting completion of TIGRE.

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Other Hipcat/TIGRE Apps

- Some Apps are bandwidth intensive
  - Real Time Visualization
- Some Apps are compute intensive
  - Computational Chemistry and Cryptography
- Some are both
  - Genomics and Physics

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Summary

- HiPCAT intends to be a general forum for communication and discussion on high performance computing topics in Texas.

- HiPCAT is open to and supportive of the DOSAR goals and to working with you as needed.

- Excellent example of grass root effort in bringing frontier technology down to education and to the fabric of society

HiPCAT and DOSAR

- DOSAR spans beyond the state boundary and boundary of disciplines

- DOSAR must interact closely with state grid organizations and connect the dots

- Meet the ultimate goal of bringing computing grid technology to everyday use

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