Outline

- **GriPhyn/LIGO Prototype Overview**
  - User interface
  - Request interpreter
  - Security model
  - Request planner
  - Request execution

- **Plans for Year 2**
  - Pulsar search
  - Virtual data
  - Request planning and execution

- **Issues and Challenges**
Resources at ISI, UWM and Caltech

Compute resources (LDAQ) at Caltech and UWM, storage

Return requested data in Frame or XML format

Execute the plan

Construct a plan to produce data not available

Consult replica catalog to find available data

Acquire user's proxy credentials

Interpret an XML-specific request

GriPhyN/LIGO Specific Data Specification

LIGO Data Product

GriPhyN/LIGO Specific Data Specification

Product

GriPhyN/LIGO Specific Data Specification

XML

XML

GriPhyN/LIGO Specific Data Specification

Software Implementation

GriPhyN/LIGO Specific Data Specification

Software Implementation
LIGO prototype 1/2002

Ewa Deelman, ISI

HTTP frontend

MyProxy server

Compute Resource

Storage Resource

LDAS

GRAM

GRAM/LDAS

GridFTP

Logs

Monitoring

MDS

G-DAG (DAGMan)

Executor/Condor G/DAGMan

Transformation Catalog

Replica Catalog

xml

Cgi interface

GriPhyN

Ligo
Template instantiation

Abstract G-DAG

Concrete G-DAG (DAGMan)
Accomplishments

• Simple demonstration of Virtual Data Concepts
  - Transparency with respect to location
  - Transparency with respect to materialization

• Provided a Globus Interface to LDAS

• Designed the Transformation Catalog
  - can be used in many systems
  - basis for a secure access to LIGO resources

• Basic Infrastructure for the development of Virtual Data Concepts
  - foundation for Year 2
The Physics of LIGO's Pulsar Search

EM pulsars not likely to generate strong GW signature

- Support for the so-called "blind" or "all-sky" search for GW pulsars (GW pulsars are identified sources of continuous gravitational waves)
- Need to develop techniques for locating presently unidentified sources of continuous gravitational waves
- Need to account for this as a function of different lines of sight to putative sources, with different parameters
- Exploiting full SNR potential of LIGO data becomes a peta-flops class problem
- Grid provides a fabric on which to process such searches as background tasks
- Grid provides a fabric on which to process such applications.
- Target of next phase of development for GriPhyN-LIGO applications.

GW signals are frequency modulated by Doppler shift produced by Earth's rotation and barycentric motion around the Sun.

- New sources.
- GW pulsars (GW pulsars are identified sources of continuous gravitational waves)
- Need to develop techniques for locating presently unidentified sources of continuous gravitational waves
- Support for the so-called "blind" or "all-sky" search for GW pulsars (GW pulsars are identified sources of continuous gravitational waves)
- Need to account for this as a function of different lines of sight to putative sources, with different parameters
- Exploiting full SNR potential of LIGO data becomes a peta-flops class problem
- Grid provides a fabric on which to process such searches as background tasks
- Grid provides a fabric on which to process such applications.
LIGO's Pulsar Search

- Long time frames
  - Raw channels
  - Extract channel
  - Transpose
  - Long time frames
  - SFT
  - Time-frequency Image
  - Find Candidate
  - Archive
  - Store

- Short time frames
  - Hz
  - Time
  - Time-frequency Image
  - Construct
  - Image
  - Image
  - Range

Interferometer

(Gravitational-Wave Observatory)
The Year of the Pulsar Search

- Broaden the GRAM/LDAS interface
  - greater variability and functionality: SFTs, concatenation, decimation, resampling.
- Design a Data Discovery mechanism for discovery of data replicates on a Grid.
- Ability to interact with the LDAS Diskcache resources.
- Implement the Data Discovery mechanism to support the pulsar search.

Search Mock Data Challenge

Year 2 The Year of the Pulsar
Virtual Data Concepts

- Implement the Transformation Catalog.
- Use of Catalogs to materialize Virtual data required in UW-Mil.
- International mirror, and a fault-tolerance replica at
- Apply replication concepts by developing a real-time base it on a common VDT 2.0 release.
- Unify the catalog schemes used by CMS and LIGO. Exploring the design of the Derived Data Catalog, which
- Implement the Transformation Catalog.
Planning and Fault Tolerance

- Specify the planning requirements
- Evaluate the available solutions
- Prototype a more sophisticated planner
- Specify LIGO's fault tolerance requirements, extrapolate to GriPhyN in general
- Assess existing fault and failure issues within LIGO
- Assess the applicability of existing techniques
Year 2 Challenges

- Scalable pulsar search to scientifically interesting levels
- Explore existing planning solutions
- Need to specify model
- Planning and Fault Tolerance
- How do you ask for what you want?
- Deepen the understanding of Virtual Data naming
- Registering data into catalogs
- Finding new available data
- Explore bulk data operations