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# Development Timelines

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## What We Have Today

- Prototype Testbeds with middleware
- Prototype of execution components in ScaLAPACK and Cactus
- Design for the execution environment
  - Implementation of resource specification (AART)
  - Interfaces for Scheduler/Resource Negotiator
    - Prototype resource scheduler (Dail)
    - Prototype renegotiator (Sievert)
  - Prototype Contract Monitoring System
- Grid ready libraries with performance models
- Tools for extracting information from program executables
  - For performance estimation on single nodes
- DSL design for Signal/Image Processing

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# What We Will Have on CGrADS Day One

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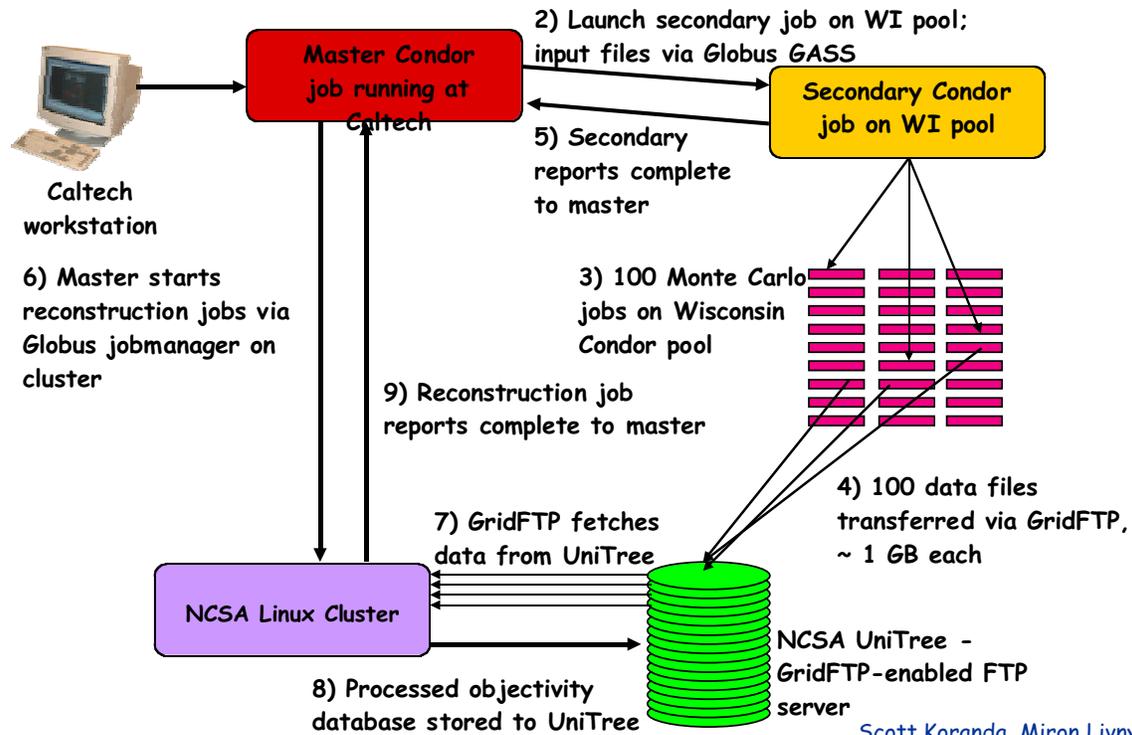
- Prototype Execution System for Heterogeneous Clusters
    - Prototype Scheduler/Resource Negotiator
    - Binder
    - Run-time system
    - Contract monitor (working together)
  - ScaLAPACK re-implemented using the prototype
  - Cactus using generic resource selector
  - Prototype automatic performance modeling for black boxes
  - Script-based application composition (without optimization)
  - Testbeds
    - Microgrid running ScaLAPACK and Cactus
    - Integrated NWS and prediction in MacroGrid and configuration tools
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## Currently Targeted Application Milestones

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- Three codes concurrently, each engaged for two-three years
  - 2002
    - Cactus: traditional PDE solver, aggressive application scenarios
    - CAPS: dynamic data acquisition and real-time data ingest
    - ChemEng Workbench: application service scenarios prototypes
  - 2003
    - Cactus: by now transitioned to operational use by application group
    - CAPS: adaptive execution for high-speed prediction
    - ChemEng Workbench: application service scenarios operational
    - CMS/GriPhyN: query estimation and dynamic scheduling
    - BIRN-like distributed bioscience: emergent behavior issues
  - 2004
    - CAPS: by now transitioned to operational use by application group
    - CMS/GriPhyN: large-scale experimentation in production settings
    - NEES: application service and real-time data analysis scenarios
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# CMS Data Reconstruction Example



## Program Preparation System Milestones

### 2002

- Preliminary automated support for performance models (black boxes)
- Binder includes local optimization, inserts probes and actuators
- Prototype DSL for signal processing
- Evaluate original COP design

### 2003

- Binder support for global optimization
- Experiment with contract monitoring/reporting in applications
- Evaluate and extend DSL support for signal processing

### 2004

- First dynamic optimizer prototype, plan for retargeting Binder
- Initial telescoping language prototype based on experience with signal processing DSL
- Whole Program Compiler generates initial COPs

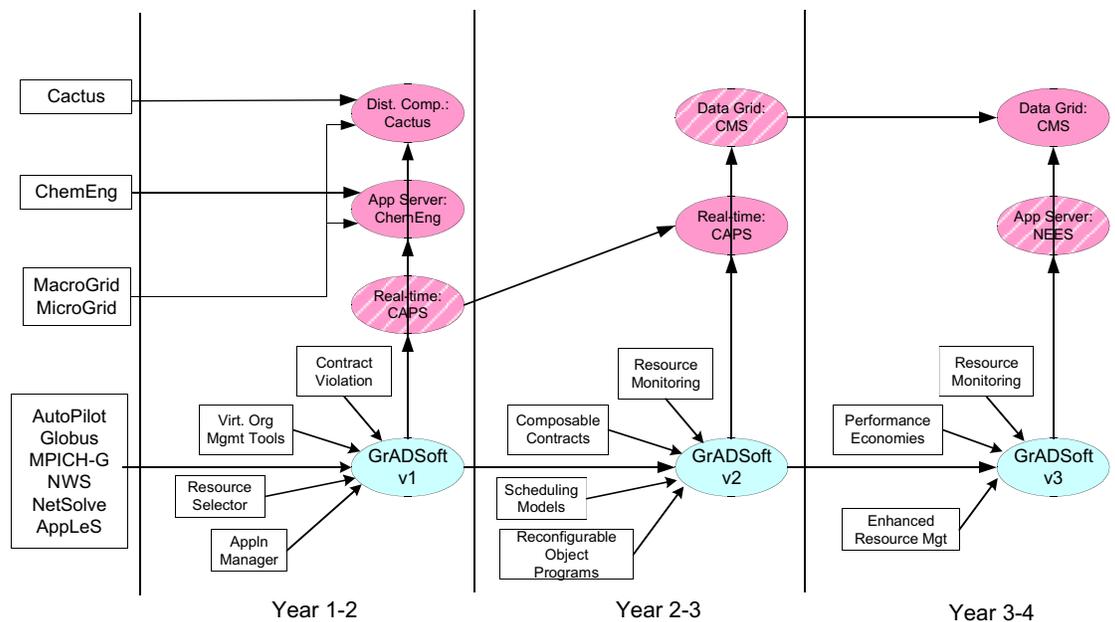
# Program Execution System Milestones

- 2002
  - Virtual organization management tools
  - Resource selector and application manager prototypes
  - Temporal contract violation specification
  - Rescheduling models including distribution costs & info quality
- 2003
  - Integrated resource monitoring and prediction prototype
  - Resource selector and application manager tools
  - Composable contract specification and tools
  - Reconfigurable object program specification
  - Scheduling models for highly parallel and data Grid applications
- 2004
  - Enhanced application and resource measurement infrastructure
  - Enhanced resource scheduling infrastructure with adv. resv., etc.
  - Performance economics for global resource scheduling

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## Execution Environment Milestones



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