

Geant4 Hadronic Validation Framework

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Overview

- Current status and motivation
- Overview of the system and proposed computing resources
- Workflow and proposed applications
- Prototypes
- Status of documents
- Summary

Current Status

- Since early days, extensive testing & validation, especially of the physics performance, is a part of the standard release procedure:
 - Extensive and versatile collection of test applications, including an impressive subset to test **hadronic physics**
- Results of high interest to the user community:
 - How close agreement with the experimental data
 - How the modeling software evolves/improves
- BUT !!! Advertising results is quite “non-uniform”



Framework: Motivation

- Looking from outside: would be great to have a procedure for consistent update/release of results
- Can be done if tests are unified into a system
- Starting with the collection of hadronic tests:
 - Complexity - typically one needs to combine several models to cover energy range of user interest
 - CPU needs among various tests differ by several orders of magnitude
- Motivation:
 - Standardize testing among hadronic model developers

Framework: Benefits

- Improve the consistency of the tests
- Completion of tests on definite timescale
- Access to the results in the central location
- Share the tools and resources
- Share the comparison reference
- Track history as the hadronic models evolve

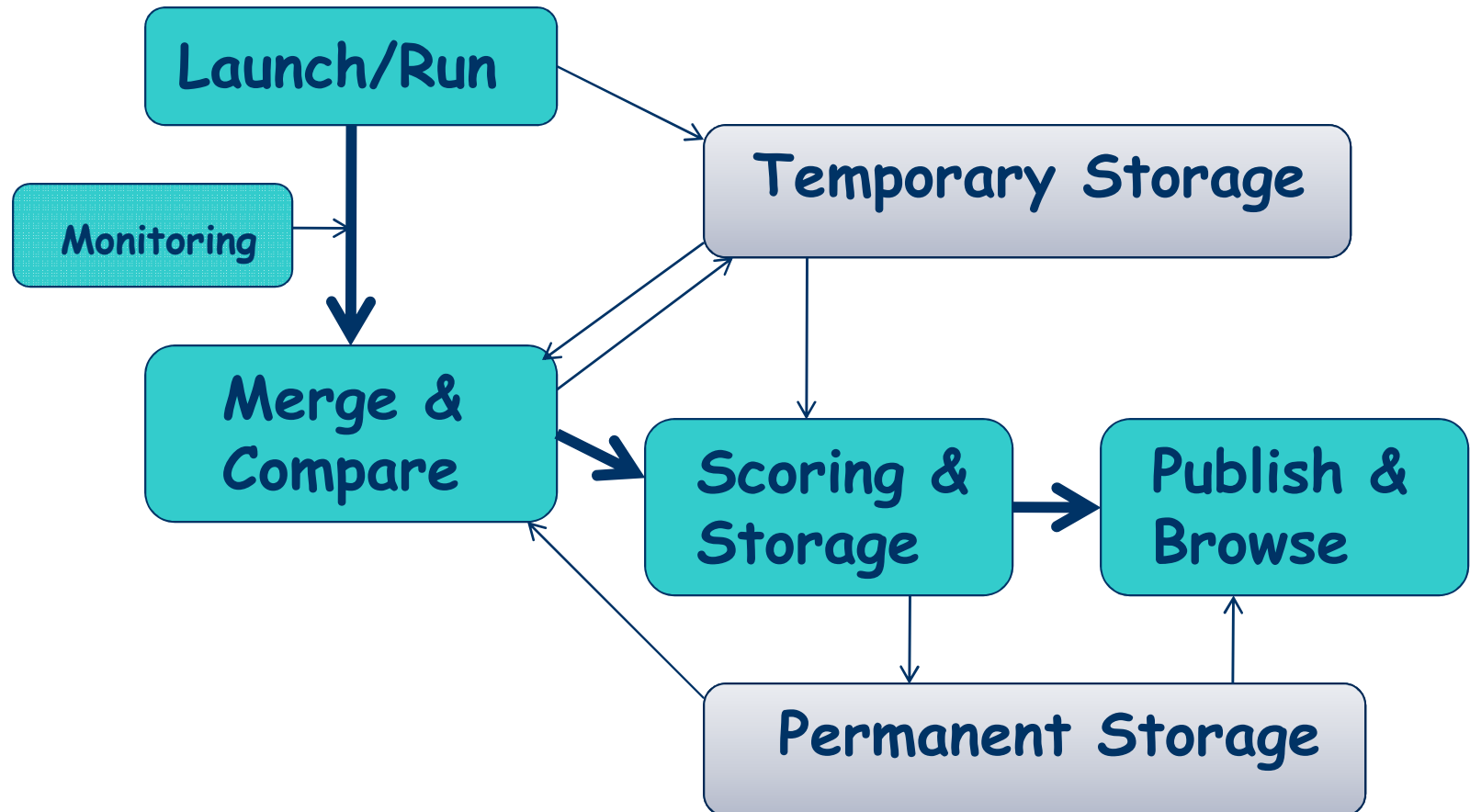
System Overview

- Geant4 application code + Ascii tables - in CVS
 - Build executables & select subset/groups or all tests
- Proposed computing resources (see next slide)
- 5 Applications to perform the following:
 - Execute (incl. parallel jobs for CPU-heavy tests)
 - Monitor if all jobs complete
 - Merge and Compare
 - Examine and (make decision to) Store
 - Publish
- Requirement Document "signed" in July 2009

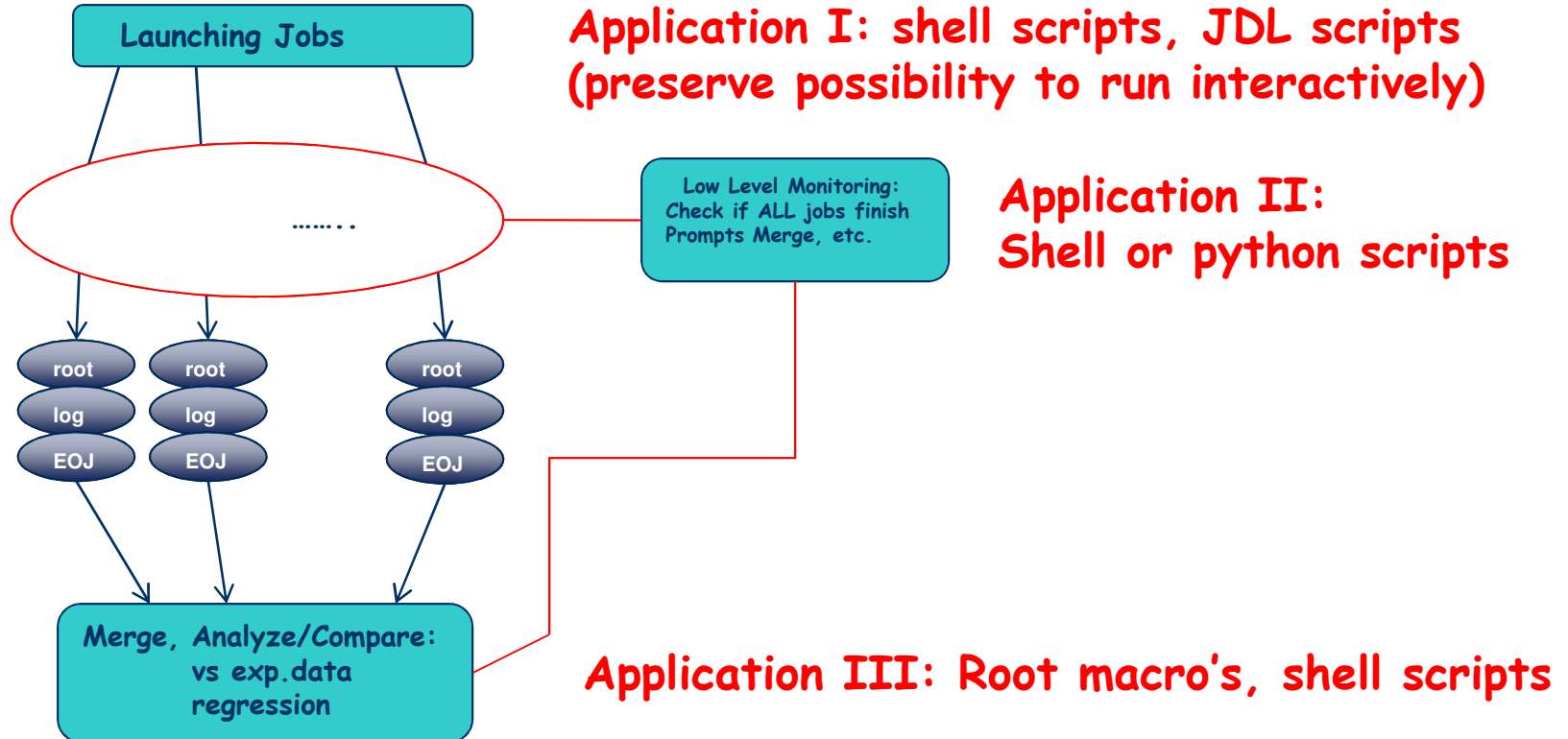
Proposed Computing Resources

- Dedicated resources where sufficient number of predefined grid slots will be allocated to the project at CERN and at Fermilab
 - Guaranteed run-time environment
 - Geant4 build provided via central install being exported to all worker nodes (e.g. /grid/app on fermigrid)
 - No matchmaking (no pilot job necessary)
 - Job monitoring and diagnostic is (relatively) easy
- Other grid sites can be added if interested
- “Opportunistic” use of resources on-site possible

Workflow and Proposed Applications



Execution, Results Collection

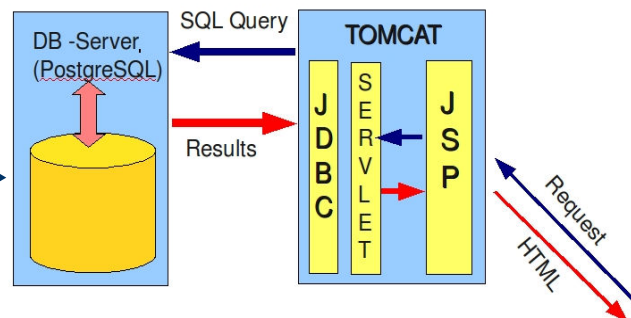


Storage and Publishing

Human: examine results, comment
make decision if to store

Storage:
Root files
Comparison plots (GIF)
ASCII files
Access ctrl

Publishing/Display

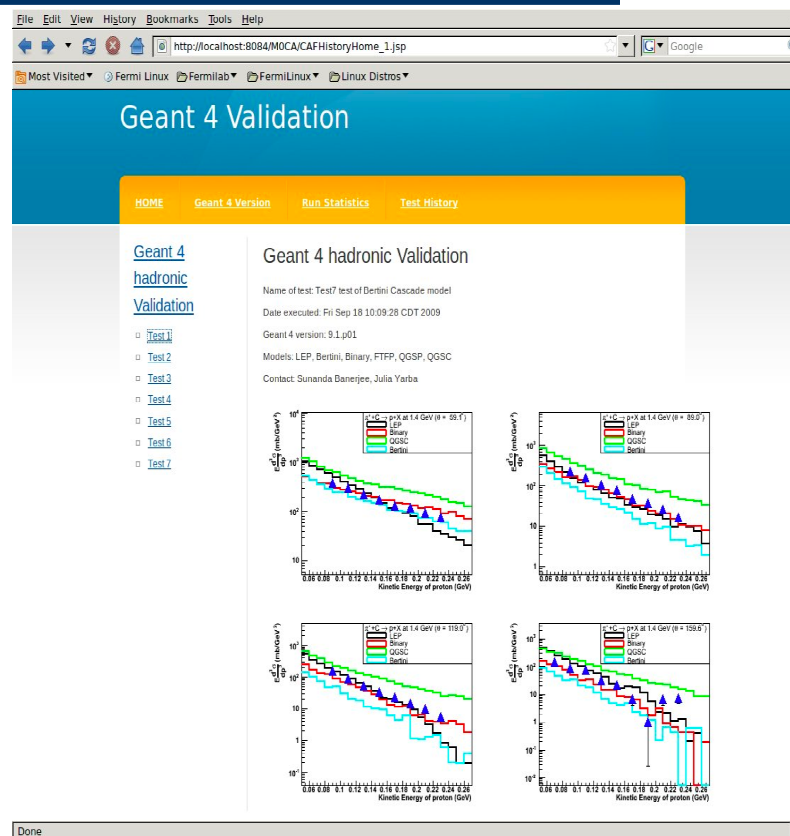


Application IV:
PostgresSQL + Web-based (JSP)

Application V:
Web-based (JSP)

Prototype

- Dedicated G4 slot on general purpose Fermigrid
- G4 & Root installs accessible from worker nodes
- /test47 as a "pilot":
 - Script to setup environment
 - Template script for parallel jobs (seeds, output name at run time)
 - JDL submission scrips (see geant4/tests/test47/grid)
- All parallel jobs finished OK
- Results collected, stored (still private development)



Documents

- Requirement Document:

http://home.fnal.gov/~yarba_j/G4-HAD-Validation-Papers/G4VRequirements.doc

- Design Outlines (still very rough):

http://home.fnal.gov/~yarba_j/G4-HAD-Validation-Papers/g4val_exec.pdf

- Application outlines
- Remarks on proposed technologies, justifications
- Low-level requirements, details, specifications
- Prototype description
- References

- Feedback most welcome any time

Summary

- Requirement Document discussed by the G4 HAD, approved, serve as guidance
- System design outlined:
 - Resources
 - Workflow and applications
 - Technology choices proposed
 - Small-scale prototype
- Design Proposal will be finalized shortly, and presented to the group for review
- If approved, will need manpower for implementation