
Experience using Geant4 on the GRID

Andrea Dotti

Witek Pokorski

Alberto Ribon

13.09.2012

Content

- Overview of the system
- Usage
- Conclusion

Setup

- **Step 0:** Assuming you have a G4 application
 - This should be non-interactive, any G4 example should work
 - On GRID we centrally provide a G4 installation via CernVM-FS
 - If you need external software (e.g. ROOT, XercesC, ...) we need to coordinate centrally (most common sw is available on the GRID via CernVM-FS)
- **Step 1:** Write a “diane master script” (see next slide)
 - Python file that defines the jobs with all the parameters (beam, energy, etc) and defines output and input
 - This is the tricky part... You want to coordinate with someone that already did it
- **Step 2:** Write a “driver script”
 - A simple bash script that set-ups the environment (you need to know where/how to find the software on a remote site, CernVM-FS here helps a lot!)
 - Last thing the script does is to start the G4 application of Step 0
 - You may want to use command line arguments to steer the G4 application options (e.g. beam energy, beam type, etc)

diane-master-app

DIANE master script

- **Start the “diane-master-app” application**
 - The application is provided by DIANE developers
 - Dedicated machine needed for this (special configuration, we have one at CERN for G4 needs)
- You need to provide the “DIANE master script”
 - It contains the definition of your jobs: how many, what they do etc
 - You probably create one script for each application you want to integrate

diane-master-app

DIANE master script

ganga job

- The “workers” is submitted to the GRID
 - “workers” submitter is provided by GANGA developers
- **Open a terminal on a GRID enabled machine (i.e. Ixplus) and use provided scripts**

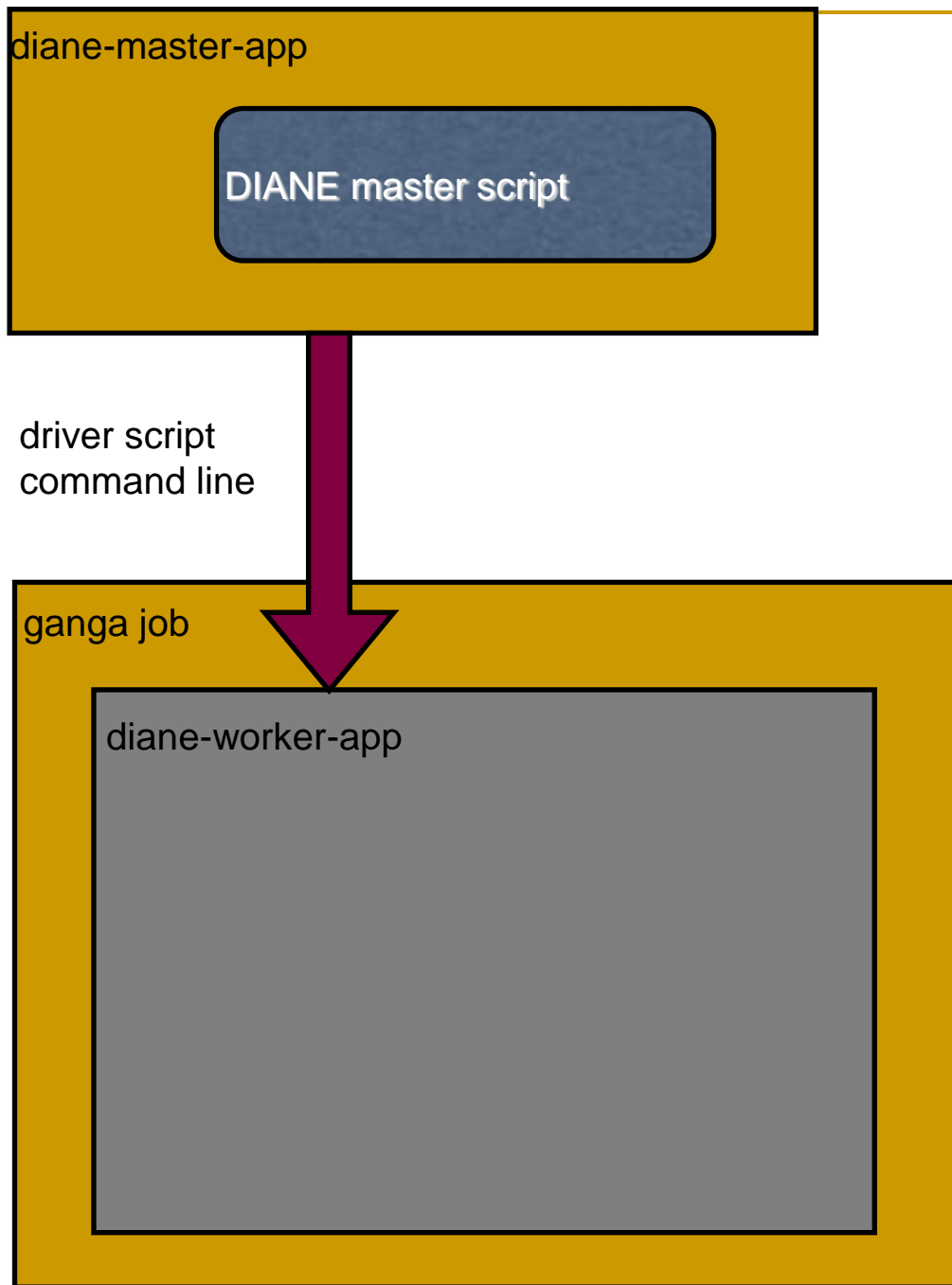
diane-master-app

DIANE master script

ganga job

diane-worker-app

- The “workers” are now in a job queue on a remote host
- When “workers” are in running state they start the “diane-worker-app”
 - “diane-worker-app” is provided by DIANE developers



- Once started, “diane-worker-app” contacts master and it asks for work
- “diane-master-app” sends the “driver script” and how to start it, i.e. the command line

diane-master-app

DIANE master script

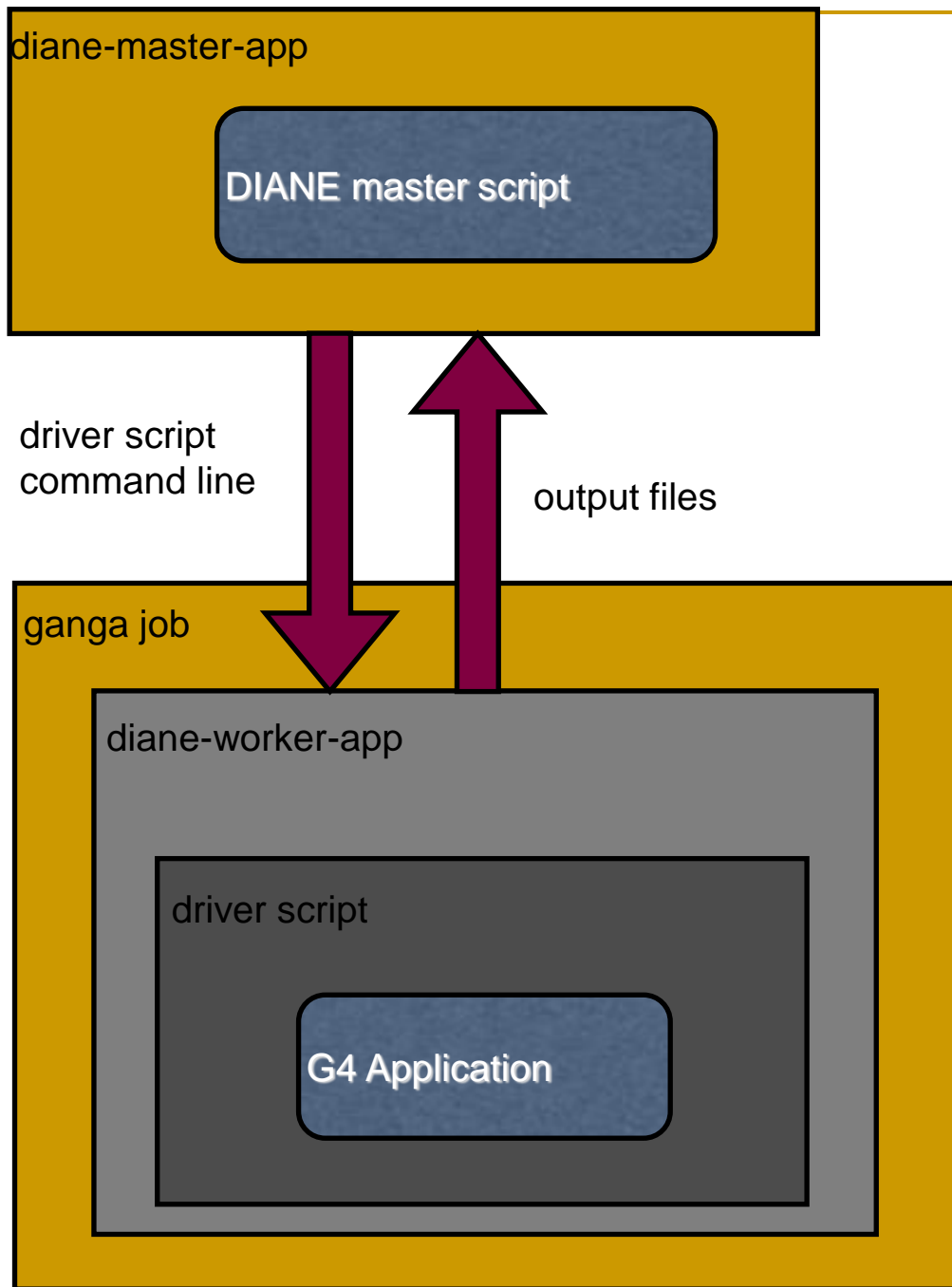
- “diane-worker-app” starts the driver script
- It also monitors its status: is it running? Is there an error?

ganga job

diane-worker-app

driver script

G4 Application



- When application is finished “diane-worker-app” sends back output files to master
- List of output files specified in “DIANE master script”
- The “diane-worker-app” asks more work (if any) to the “diane-master-app” and starts again

The good things

- Uniform work-model: can work on GRID, batch queues and even local machines (ssh enabled)
- Strongly suggest to have CernVM-FS installed on workers
 - Installation of each G4 release (including reference tags) is available
 - DIANE, GANGA and other software is available
 - We can install additional software if needed
- GANGA and DIANE provide high level tools (communication, file transfer, job submission and monitor): no need to worry about these things

The bad things

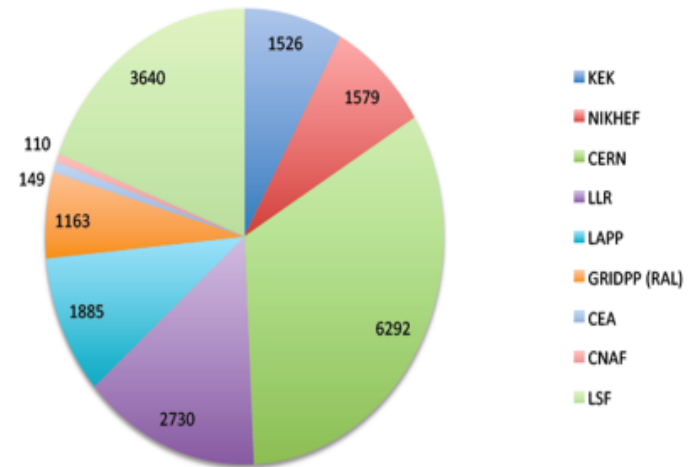
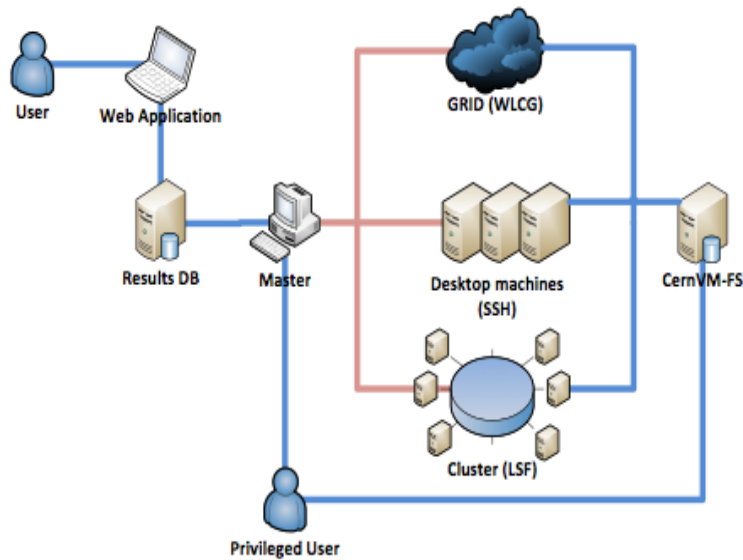
- At least two scripts to be provided
 - Some coding expertise required
 - Several steps can be tricky and need some experience
 - Several components cooperating, not always clear who does what
- Debugging of problems on the GRID is not straightforward
 - Experience is needed, steep learning curve
- DIANE support is not clear
 - We have our own installation
 - If at a certain point DIANE breaks we are alone...

Usage

- used for validation of all reference releases
 - simplified calorimeter
- number of jobs run: >2000 per month
 - around 100 million events
- time required: ~48h

Sites used

— Use of GRID tools: tailored to Geant4VO needs



32

Conclusion

- GRID has a great capacity for G4 validation
 - order of magnitude increase compared to running on local batch system at CERN
- using CERNVM FS for the distribution of Geant4 code is a huge improvement
- thanks to Andrea's work, the system has been greatly improved and automatised but further automatisation and hiding technical details from the user would be nice