Optimzation Studies of LDC/ ILD at DESY: Status and Plans in Hamburg

Philip Bechtle

DESY

October 2nd 2007

Overview of Activities and Plans

- Goal: Develop several analyses on full reconstruction using Mokka and Marlin

Overview of Activities and Plans

- Goal: Develop several analyses on full reconstruction using Mokka and Marlin
- Use these analyses for Detector optimization studies

Overview of Activities and Plans

- Goal: Develop several analyses on full reconstruction using Mokka and Marlin
- Use these analyses for Detector optimization studies
- First step: Centralized production of fully simulated and reconstructed SM background samples
- Meanwhile, select and develop the analyses

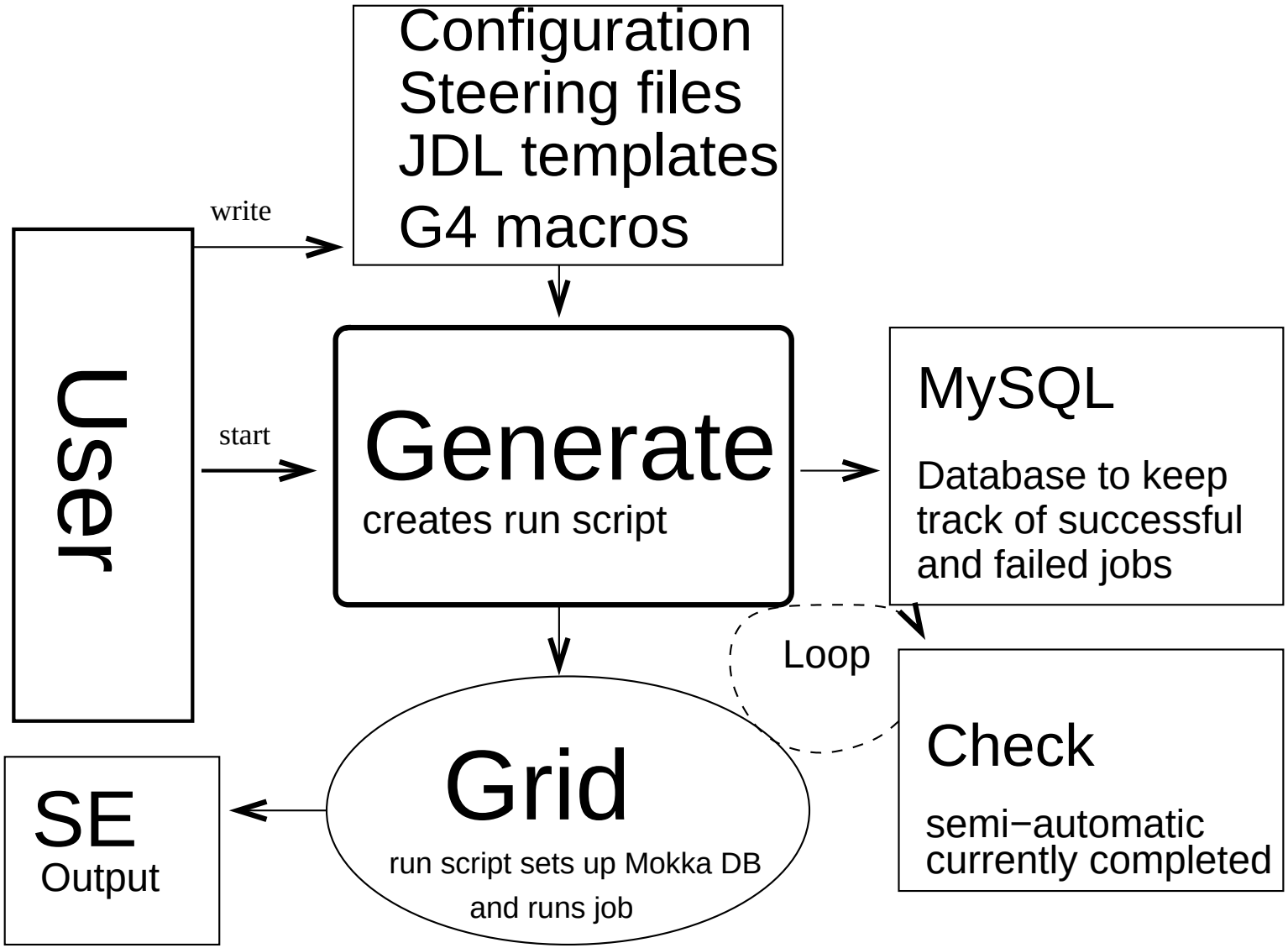
Current Activities to set up a Simulation and Reconstruction Chain

- Current goals:
  - Process a sufficiently large set of WHizard 4-vector files with Mokka on the Grid
  - Developed and tested job submission files, job control, database structures for access of the resulting `lcio` files
  - Currently: LDC Detector version 5 is implemented as a tagged Mokka Detector model, will use this for first production
- In the future:
  - make sure a realistic and complete reconstruction is available in Marlin which works with the abovementioned Detector model
  - Then also run the digitisation and lower-level reconstruction (tracking, particle flow, etc.) on the grid
- In the more distant future:
  - Use Ganga for grid job submission (Mokka & Marlin)
- Developers: Ivan Marchesini, Dennis Martsch, Jörgen Samson, Adrian Vogel, Oliver Wendt

Available Tools for the Simulation

- Databases
  - Input database: `stdhep` 4-vector input file
  - Output database: `lcio` files, physics, Mokka, Detector information, how to access the files
- "Generate script" specifies the job, takes as input:
  - `stdhep` 4-vector input file
  - No. ev. per job, no. of jobs
  - Simulation parameters (Model, physics list, Mokka DB,...)
  - Generic steering and G4 macro files
  - Information about where to store the output and what to write into the DB
- "Submission script"
  - Started by "Generate script"
  - Generates JDL and steering files
  - Writes into DB
  - Submits the job
- "Run script"
  - Started on the CE
  - Sets up a local copy of the Mokka MySQL DB on the WN

Interplay of the Tools



Present Status of the Production

- We have been testing and optimizing this setup on 400 000 events
- Some automatic checking (and if necessary resubmission) of the job output is included
- Most Grid-related problems somewhat under control
- Looking forward to a large scale production once Whizard 4vector files are available

Planned and Existing Full Sim Physics Analyses

- General consideration: Focus on Analyses related to DESY hardware activities:
  Tracking, PFlow, Forward Region

Planned and Existing Full Sim Physics Analyses

- General consideration: Focus on Analyses related to DESY hardware activities:
  Tracking, PFlow, Forward Region
- Model independent WIMP searches (Christoph Bartels)
  Hermeticity
- Polarization Measurement using $e^+e^- \rightarrow W^+W^-$ (Ivan Marchesini)
  PFlow, Hermeticity
- τ polarization measurement in $e^+e^- \rightarrow \tilde{\tau}^+\tilde{\tau}^-$ (going to be started by Peter Schade)
  Tracking at small p, Cleanliness of the events
- $e^+e^- \rightarrow \tilde{\mu}^+\tilde{\mu}^-$ (N.N.)
  Tracking
- $e^+e^- \rightarrow \tilde{\tau}^+\tilde{\tau}^-$ with very small $m_{\tilde{\tau}_1} - m_{\chi_1^0}$ (N.N.)
  Hermeticity, Tracking
- Some other not yet too far developed idea with Higgses (N.N.)
  PFlow

Production Plans for the Fully Simulated SM Sample

- Model independent WIMP searches (Christoph Bartels)
  needs all kinds of nng and gg backgrounds
- Polarization Measurement using $e^+e^- \rightarrow W^+W^-$ (Ivan Marchesini)
  needs 4f, 2f, 6f
- τ polarization measurement in $e^+e^- \rightarrow \tilde{\tau}^+\tilde{\tau}^-$ (going to be started by Peter Schade)
  needs all kinds of gg (and susy) backgrounds
- $e^+e^- \rightarrow \tilde{\mu}^+\tilde{\mu}^-$ (N.N.)
  gg(and susy) backgrounds
- $e^+e^- \rightarrow \tilde{\tau}^+\tilde{\tau}^-$ with very small $m_{\tilde{\tau}_1} - m_{\chi_1^0}$ (N.N.)
  gg etc
- Some other not yet too far developed idea with Higgses (N.N.)
  6f,4f,2f

Production Plans for the Fully Simulated SM Sample

listed in the rough order of priority:

possible signals or backgrounds:	
$ee \longrightarrow 4f$	50fb-1
$ee \longrightarrow 2f$	20fb-1
$ee \longrightarrow 6f$	20fb-1
$ee \longrightarrow hX$	50fb-1
calibration samples:	
light quark 2f at 91.2 GeV	20 000 events
tt (6f) at 350 GeV	20 000 events
backgrounds:	
$\gamma\gamma \longrightarrow X$	1fb-1
$ee \longrightarrow \gamma\gamma(n * \gamma)$	10fb-1
$\nu\nu(n * \gamma)$	20fb-1
$ee \longrightarrow ee$	0.1fb-1
$eg \longrightarrow e\gamma$	0.1fb-1
rest	1fb-1

Summary

- Will hopefully soon produce a larger set of Mokka-Simulated SM events with up-to-date (V5) LDC detector
- Goal: Develop analyses and then use them for detector optimization using physics results as benchmark
- Everybody is invited to contribute to production, setup of the reconstruction chain and analyses
- This effort will be integrated into the LDC/GLD optimization process