Status Of The Generator Project And Feedbacks From The MC4LHC Steering Group

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LCG-Generator: Work Packages and Milestones

Subproject of LCG Simulation, activities steered by MC4LHC

- WP1: GENERATOR LIBRARY
- WP2: STORAGE, EVENT INTERFACES AND PARTICLE SERVICES (INTERPLAYS)
- WP3: COMMON EVENT FILES, EVENT DATA BASE
- WP4: TUNING AND VALIDATION OF EVENT GENERATORS

- **ALPHA version of the generator repository (GENSER) ready by 06/30/2003. (OK!)**
- **Top priority packages available in LCG by 09/15/2003 → GENSER BETA.**
  - LHC experiments: How to switch from the CERNLIB to GENSER ?
- **Agreement on common event files format by 11/30/2003.**
  - Impact on existing projects (MCDB).
- **Migration of the first C++ generator in GENSER by end 2003.**

→ Ressources for the overall coordination (0.3 FTE) allocated by CMS

→ Ressources for WP1 and WP3 (1 FTE) allocated by MSU, ITEP and other Russian institutions. A.Sherstnev spent 3 months at CERN, S.Makarichev is at CERN since middle July, I.Seluzhenkov will join in October.
→ Existing UK-GRID activities in the WP4 domain might be exported in LCG Generator.
→ ATLAS traditionally does contribute to WP2.
→ Italian participation: LCG inclusion of some 2nd priority packages (WP1) is anticipated.

Generator Library Requirements

→ Quick releases decoupled from large library releases
→ Most of the versions released by the authors have to be installed, old versions have to be maintained as long as they are required by the end users
→ Maintenance for all LCG supported platforms
→ Top priority: HERWIG, HIJING, ISAJET and PYTHIA.
→ New C++ generators: Herwig++, Pythia 7, Sherpa, ThePeg etc.
→2nd priority: ALPGEN, COMPHEP, DPMJET, EVTGEN, GRACE, LHAPDF, MADGRAPH, MCDB, NEXUS, PHOJET, PHOTOS, SFM & TAUOLA

The Generator Repository (GENSER)

- CVS repository, AFS distribution.
- SCRAM release and building tool for librarian and end users.
  - Binary distribution also provided.
- Automatically generated directory structure (from original MC code).
  - Some complex package maintained externally
- Test/Validation software (provided by the authors and by the users).
  - Installed in the «Example» and «Test» modules.
- Code development for WP1, WP2, WP3, WP4 → New Modules

Subpackage versions and test code currently installed in the LCG environment

Package versions pursued for inclusion have been indicated by the contact persons in MC projects and/or by the volunteered beta testers. Further versions and test code can be installed easily

1) HERWIG (contact person P.Richardson): 6.500, 6.503, 6.504
   - Examples from http://hepwww.rl.ac.uk/theory/seymour/herwig/herwig65.html
2) PYTHIA (contact person T.Sjöstrand): 6.217, 6.220
   - Examples from http://www.thep.lu.se/~torbjorn/Pythia.html
3) HIJING (contact person X.Nian): 1.36, 1.37, 1.383
   - No examples available for the time being
4) Isajet (contact person still to be suggested by the authors): 7.67
   - Examples available in the Isajet distribution
5) Sherpa (contact person F.Krauss)
   - Examples from http://www.physik.tu-dresden.de/~krauss/hep/index.html
6) MCDB (contact person A.Sherstnev)
   - Examples available in the MCDB distribution

GENSER: Progress Report

- GENSER was the first repository in the Simulation project
  - Complete migration of MCDB
- Inclusion of the Top priority packages has been achieved
  - Convenient «compact» distribution.
  - Guaranteed installation on all the LCG supported platforms.
  - MC structure just automatically reorganised using macros, end users can patch the code.
- GENSER BETA pre-release available mid august 2003
  - Documentation: http://lcgapp.cern.ch/project/simu/generator
  - GENSER is distributed in /afs/cern.ch/sw/lcg/app/releases/GENSER
  - Currently tested by ATLAS and CMS
  - Package versions agreed by contact persons in MC projects and/or by the volunteered beta testers.
    - Simple procedure to include additional versions.
  - Today: Plans for GENSER BETA release and further technical details (S.Makarychev) and first user reports (from G. Stavropolous and F. Moortgat).

MC4LHC Recommendations

- The goals of LCG generator (in WP1, WP2, WP3, WP4), the defined milestones, the current GENSER structure and the plans for its future evolution have been approved.
- The LCG participation in the MC4LHC workshop has been appreciated. LCG Generator is contributing to advertise the new MC projects and is providing a constant forum for discussions on the generator related software.
- It is recommended to improve the collaboration with the MC authors, identifying the contact persons to monitor the inclusion of the existing packages in the LCG environment.
- The turn over and the possible loss of well trained people (for instance the librarian) can represent a big problem as all the experiments will soon rely on GENSER. Long term support to LCG Generator members has to be guaranteed by LCG.
- LCG Generator: a new multidisciplinary field ?
  - Working on the border between TH/EP/IT

Next Milestones

- **Persistency for the common event files → 11/30/2003.**
  - **Get the requirements from the LHC experiments!**
  - **Evaluate impact on existing projects (MCDB).**

- **Inclusion of the first C++ generator (Sherpa) in the LCG environment (thanks to Frank Krauss).**
  - **Evaluation of the GENSER CVS repository as possible development environment → 12/31/2003.**

- **Inclusion of 2nd priority packages in LCG → To be defined.**
  - **Creation of MC user data base.**

Next LCG Generator Meeting

(Thursday October 16th 32-1-A24 and VRVS Island)

- **Definition of environment and output stream for the generation of the common event files.**
  - **Get the requirements from the LHC experiments.**
  - **Evaluate the impact of POOL.**
  - **Review the XMLHEP proposal.**
- **Review the conclusions of the MC4LHC working groups.**
  - **Conveners are kindly requested to summarize the requests to LCG (and the software needs in general).**
- **Inputs to the MC user data base.**

Organisational Issues

WEB page:

http://lcgapp.cern.ch/project/simu/generator

-- links to relevant documents and to CVS repository

CDS Agenda Home > Projects > LHC Computing Grid > Physics Generators

-- minutes of meetings, slides of presentations

Applications area mailing list:

project-lcg-simu@cern.ch

Meetings:

-- Kick off meeting in June (mini-workshop)

-- During MC4LHC workshop (in July)

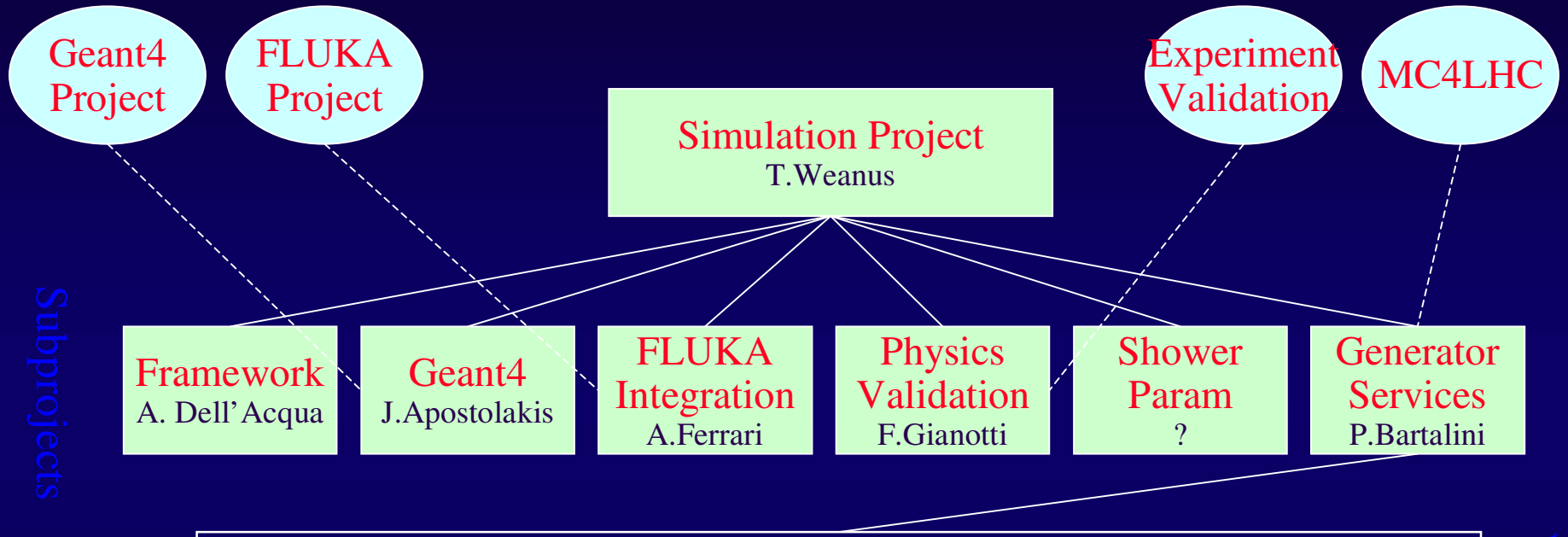
-- Last Thursday of the month at 5 PM in 32-1-A24
(VRVS connection in Desert or in Island room)

-- September meeting (tomorrow) → The GENSER beta release

-- October meeting anticipated to Thursday 16th.

Backup

Simulation project in LCG-APP



Work packages

- -- GENERATOR LIBRARY
- -- STORAGE, EVENT INTERFACES AND PARTICLE SERVICES
- -- COMMON EVENT FILES, EVENT DATA BASE
- -- TUNING AND VALIDATION OF EVENT GENERATORS

MC generator RTAG report: http://lcgapp.cern.ch/project/simu/generator/MCGenRtag.doc

Kick-off Meeting of LCG-Generator Mini w/s (20 June 2003)

17:00	Introduction (Paolo Bartalini)
17:10	GENSER, the generator repository in LCG (Alexander Sherstnev)
17:25	Parton Shower MC's (Stefan Gieseke)
17:50	Event Simulation Tools in ALICE (Andreas Morsch)
18:15	LHCb event generators status (Witek Pokorski)
18:40	CMS event generators status (Albert De Roeck)
19:05	---long coffe- / short dinner- break---
20:10	Generator support in ATLAS (Ian Hinchliffe)
20:35	HepMC Event Record - Status (Matt Dobbs)
21:00	The requirements from TH (discussion) (tba)
21:25	The MCDB project (Alexander Cherstnev)
21:40	JetWeb (Ben Waugh)
22:05	The LCG Generator subproject - organizational issues (Paolo Bartalini)

2nd LCG Generator Meeting (31 July 2003)

17:00 Introduction (Paolo Bartalini)

17:05 Tutorial on LCG tools (Alberto Aimar)

17:45 Status of GENSER (Sergey Makarychev)

18:00 XMLHEP (Alexander Sherstnev)

18:15 Status of the C++ Event Generator Packages (Alberto Ribon)

18:30 Decay Tables (Peter Z Skands)

18:45 Status of CLHEP split (Mark Fischler)

Are the MC packages inside or outside the LCG generator repository ?

- There are two possibilities for the MC generator packages.
  1) To fully store the MC generator code in GENSER defining the corresponding sub-package.
  2) To install the MC generator as external software packages in the LCG environment and to store in GENSER just tests suites and other related code (examples etc.).

Just a technical issue!

For each MC package an ad-hoc solution should be found taking into account the user requirements

GENSER as a development environment

If agreed, MC authors could use the GENSER CVS repository for the development of the MC generators code.

- **Solution rejected for most of the well assessed Fortran packages.**
- **It should apply in particular to new projects.**
- **MCDB already migrated in GENSER**
- **Feasability study for the inclusion of Sherpa will start soon.**

Advantages:

- **MC generators authors would have a convenient environment for development (SPI Tools).**
- **Coding compliance to LCG policies would be guaranteed.**
- **Release, Feedbacks and bug fixes would speed up.**

Storage, Event Interfaces And Particle Services

- The MC truth
  - HepMC
    - Problems with duplication of versions/missing translators.
    - CLHEP maintenance was not satisfactory → Split (anything else ?)
  - Structure of partonic event files: XMLHEP ?
- The modularisation
  - Basic idea in THEPEG, Pythia 7, Herwig++, Sherpa.
    What are the dependencies ?
  - EvtGen: how to reuse the Fermilab experience ?
    How to avoid duplication of versions ?
- Persistency
  - How to define the common event files ?
- Particle properties in the physics generators and in the simulation/analysis frameworks.
  - Is everybody relying on HepPDT ?

Common Event Files, Event Data Base

- Motivations
  - Some physics processes (the most difficult for generation) should be prepared by experts or MC generators authors.
  - Sharing the same generator events does simplify the comparisons and save CPU time
- There's a product fulfilling such requirements: MCDB, developed for CMS by Lev Dudko et al.
  - http://cmsdoc.cern.ch/cms/generators/mcdb/
- MCDB has interfaces of 2 different types
  - interface based on the Web: a web site with simple access to the available event samples with relative bookkeeping.
  - handy programming interface: automatic generation from local machine once some basic parameters have been set.
- It would be desirable to study how to extend this model to the new ME+PS packages

Tuning And Validation Of Event Generators

New Fitting/Tuning Tool: JetWeb

- Based on HERA HZTOOL package – updated to include Minimum Bias data, Tevatron Jets…[J.M.Butterworth and S.Butterworth hep-ph/0210404] also submitted to Comput. Phys. Commun.
- Web page - http://jetweb.hep.ucl.ac.uk/
- Database of data, MC and comparisons
- Web interface allows access to DB and submission of jobs to generate MC plots
- Good starting point for the LCG-Generator Validation working package

Workshop on MC's for the LHC (MC4LHC), CERN, 7 july - 2 august 2003

- Web page
  http://mlm.home.cern.ch/mlm/mcwshop03/mcwshop.html
- Seminars from program authors; working groups etc.

1. Matrix element generators (the 4 weeks)
2. N(N)LO tools (7-12 july)
3. Tools for electroweak physics (the 4 weeks)
4. Parton Distribution Functions (weeks 3 and 4)
5. MC's for new physics (9-16 july)
6. Heavy quark and tau decay packages (22-29 july)
7. Minimum bias, Underlying event, and MC tunings (27 july - 2 august)
8. Tools for Heavy Ion Physics (8-11 july)
9. CLHEP and related tools (14-16 july)
10. Herwig++, Pythia++ (21-25 july)

Between Two Worlds

- Small TH groups
- Old/Huge Fortran packages still in development
- Cannot spend all the time to give user support

LCG Generator

- Large Experiments
- C++ Frameworks
- Challenging requirements