Status of LCG Generator

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Work Packages and Milestones

- **WP1: GENERATOR LIBRARY (GENSER).**
  - **Beta version was released on schedule (end September 2003).**
    - New version end 2003 mostly to update SCRAM configuration (I.Seluzhenkov).
    - Official Release rate 1/quarter, further unofficial releases may be prepared for beta testers
  - **First C++ Generator in GENSER (end 2003) → Delayed.**
    - Feasibility study for Sherpa inclusion (F.Krauss, S. Makarychev).
  - **LHAPDF in GENSER (end February 2004).**
    - Fermilab version (W.Giele) is now available.
    - Durham version (M.R.Whalley) will show up in next GENSER releases.
  - **COMPHEP, ALPGEN and EVTGEN in GENSER (end March 2004).**
    - Some activity already started for ALPGEN (F.Ambroglini) and COMPHEP (A.Sherstnev) inclusions.

Work Packages and Milestones

- **WP2: STORAGE, EVENT INTERFACES AND PARTICLE SERVICES**
  - **Agreement on formats for common samples (end February 2004)**
- **WP3: COMMON EVENT FILES, EVENT DATA BASE**
  - **New MCDB in production in the LCG environment (end June 2004)**
    - New project starting (L.Dudko)
  - **Proposal for event production environment (end May 2004)**
    - Dedicated LCG Generator meeting held on February 28th
- **WP4: TUNING AND VALIDATION OF EVENT GENERATORS**
  - **HIJING debug&validation**
    - Recent activity in this area (V.Uzhinsky)
  - **Proposal for validation framework (end June 2004)**
    - Will be based on existing tools: JetWeb and MC-Tester

LCG Generator Users

- Contact persons and beta testers in LHC experiments:
  - Atlas I. Hinchliffe, G. Stavropoulos
    - **GENSER beta is currently successfully used in the official production.**
  - CMS A. De Roeck, F. Moortgat
    - **GENSER beta tested with fast simulation. Switch to production soon ?**
    - **Collaboration on simple production framework.**
  - Alice A. Morsch
    - **Collaboration on HIJING Validation.**
  - LHCb N. Brook (G. Corti), F. Ranjard
    - **GENSER beta was tried. Useful feedbacks provided.**
  - PH/TH M. Mangano
    - Currently reviewing the overall project (LCG Generator review on March 25th)

The 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.

→ 2nd priority: ALPGEN, COMPHEP, DPMJET, EVTGEN, GRACE, LHAPDF, MADGRAPH, MCDB, NEXUS, PHOJET, PHOTOS, SFM & TAUOLA

→ New C++ generators (Herwig++, Pythia 7, Sherpa, ThePeg etc.)

The Generator Repository (GENSER)

- CVS repository, AFS distribution, Tarball distribution (SPI).
- SCRAM release and building tool for librarian and end users.
  - Binary distribution also provided.
- Test/Validation software (to be provided by the authors and by the users)
  - Installed in the «Example» and «Test» modules.
- Code development for WP1, WP2, WP3, WP4

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 is found taking into account the user requirements

MC Subpackage Versions and Test Code in the LCG Environment

Package versions included in GENSER_0_0_4 or pursued for inclusion in future releases 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 under request.

1) HERWIG (contact person P.Richardson): 6.500, 6.503, 6.504, 6.504b
   - Examples from http://hepwww.rl.ac.uk/theory/seymour/herwig/herwig65.html
2) PYTHIA (contact person T.Sjöstrand): 6.217, 6.220, 6.221, 6.222, 6.3xx ?
   - Examples from http://www.thep.lu.se/~torbjorn/Pythia.html
3) HIJING (contact person X.N. Wang): 1.36, 1.37, 1.383, 1.383b
   - 8 examples prepared by V.Uzhinsky (LCG Generator WP4)
4) Isajet (contact persons F.E. Paige et al.): 7.67, 7.69
   - Examples available in the Isajet distribution
5) LHAPDF (contact persons S.Mrenna, M.Whalley): 1.1, 2.0
   - Examples from http://www.physik.tu-dresden.de/~krauss/hep/index.html
6) MCDB (contact person A.Sherstnev): development
   - Examples available in the MCDB distribution

MC Subpackage Versions and Test Code in the LCG Environment (continued)

Package versions included in GENSER_0_0_4 or pursued for inclusion in future releases 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 under request.

7) ALPGEN (contact person M.Mangano): 1.3.2
   - Examples available in the ALPGEN distribution
8) COMPHEP (contact person A.Sherstnev): 4.4.0
   - Examples will be provided by the contact person
9) EvtGen (contact person A. Ryd): alpha-00-11-07
   - Examples available in the EvtGen distribution
10) Glauber Xs (contact person V.Uzhinsky): 1.0
   - Examples available in the GLAUBER distribution

GENSER_0_0_4 (Dec '03)

- Safe and flexible versioning
  - (GENSER version) x (Sub-package version)
- Requested subpackage versions introduced:
- GENSER configuration has been adapted to SCRAM version V0_20_0
- GENSER configuration has been upgraded to SCRAM toolbox LCG_22
- Dummy routines moved to a separate dir dummy
- Documentation for End-User completely rewritten and now available in LaTeX

Plans/Requests for next GENSER Releases

- Introduce requested subpackages:
  - Pythia 6.222, Herwig 6.504b (ATLAS), LHAPDF 2.0, ALPGEN 1.3.2, COMPHEP 4.4.0, EvtGen alpha-00-11-07, PDFLIB-804 (LHCb).
- Avoid code duplication in the case only GENSER (configuration) version changes (i.e. in the case of stable subpackage code).
  - Reorganization of our CVS repository will be done during the future migration on the IT/CVS service (at the end of March).
- Separate dummy from pdfdummy (LHCb)
  - Reorganized sub-package versions will have extra index "1",

ex. libdummy_pythia6_205.a → libdummy_pythia6_205.1.a

Special GENSER and Sub-package Versions

- Following a specific production request from ATLAS, Herwig 6.504b was produced in agreement with P.Richardson (the Herwig contact person) and lately made available in GENSER_0_0_4
  - Allow final states with up to 9 W/Z bosons
- GENSER_0_0_5pre1 was prepared for specific validation tests on ALPGEN (F.Ambroglini)
  - Problems with the Fortran90 compiler (from ABSOFT). Licence available only for single users. Possible alternative from GNU ? Digital F90 compiler also successfully tested by ALPGEN people.

Monte Carlo 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 CMS product fulfilling such requirements: MCDB, developed for CMS by L. Dudko et al.**
  - **http://cmsdoc.cern.ch/cms/generators/mcdb/**
- **MCDB is currently being redesigned in LCG by the same authors and will be made available to all the experiments**
  - **Draft available. LCG AA note will be published soon.**
    - L. Dudko will give a specific presentation to one LCG A.A. meeting in April
  - **Adoption of core software supported by SPI**
  - **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 or remote machine once some basic parameters have been set.**

Development of a Simple Production/validation Framework at Generator Level

- The goal is to prepare a proposal for the development of a simple production/validation framework at generator level.
  - Recommended by RTAG 9 and LCG APP Internal Review (October 2003)
- LCG generator is performing an evaluation of the existing physics simulation frameworks.

  → QUESTIONNAIRE SENT TO EXPERIMENTS
- The LCG framework would be mostly used for the generation of the common event files.
  - LCG Generator production milestone to be quoted (end of 2004 ?)
- Two spanish institutions contributing to LCG activities (IFCA-Santander and Oviedo), have recently expressed interest to work in this field.

Requirements from Experiments

- ALICE is currently relying on ROOT. Standalone generator option exists.
  - Is there an interest on common event files ?
- ATLAS is currently using a framework based on HepMC interface and AthenaPool persistency.
  - Interface available for Partonic Level Files in ASCII MC@NLO format.
  - Previous experience with using CMS files (COMPHEP/MCDB).
- CMS would like to replace the Fortran based CMKIN. Persistency should be based on POOL.
  - Partonic Level Files, Particle Level Files, Plug-in to the simulation frameworks (including fast simulation).
- LHCb is currently using a very flexible framework based on HepMC interface and POOL persistency.
  - No problem to use common event files if HepMC is adopted.

Other users

- Theoretical groups in PH also interested in a simple production/validation framework from LCG.

Software Evaluation & Design

- The LCG generator level production framework will rely on GENSER and will be interfaced to MCDB.
- HepMC (interface) and POOL (storage) seem to be the agreed candidates.
- MCDB will be used for configuration and bookkeeping
  - Possibility to store also the partonic level output in XML format exists.
- An MC expert should act as project coordinator / software designer. Candidate: Filip MoortGat.
- First priority and second priority interfaced MC.
  - May not follow the RTAG 9 hierarchy as there's a strong requirement for the production of Partonic level shared events.

Service for Nucleus-Nucleus Simulation at GENSER

V. Uzhinsky (JINR)

- Glauber Xs (cross sections evaluator)
- Bug fix version of HIJING 1.383b
- HIJING Validation Home-Page
  - http://lcgapp.cern.ch/project/simu/generator/HIJING/
- Activity documented in LCG A.A. note

1. **cross sections of beam interactions with air, materials and target**
2. **Properties of interactions - angular and energy distributions of particles, their multiplicity and composition**
3. **Analysis of results – estimation of background, comparison with previous results, systematics of data & theoretical studies**

MC Tuning And Validation

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
- JetWeb contact person (B.Waugh) expressed interest to use GENSER
- Would it be possible to include HIJING validation in JetWeb ?

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:

-- Last Thursday of the month at 5 PM in 32-1-A24

(VRVS connection in Sky, Desert or in Island room)

Special LCG Generator Meeting:

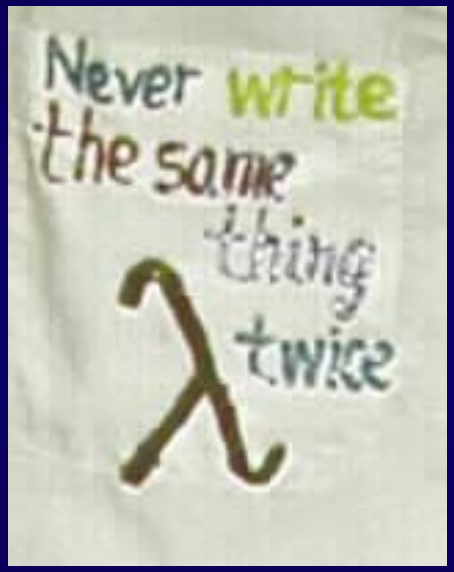
-- GENSER REVIEW 25 March 2004 from 1:30 PM in 32-1-A24

1) Current developments and future directions (LCG Generator Group)
2) User experience with GENSER (LHC Experiments)
3) Status of ongoing projects to be added soon to GENSER (Theory)

BACKUP

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