

Geometry

Summary of Parallel Session 5-B



Gabriele Cosmo – CERN PH/SFT

Parallel Session 5-B



- ☞ “Unified Solids”
 - ☞ by Marek Gayer (*CERN/EU-AIDA*)

- ☞ “CAD to GDML Converter”
 - ☞ By Emmanuel Delage (*LPC/IN2P3*)

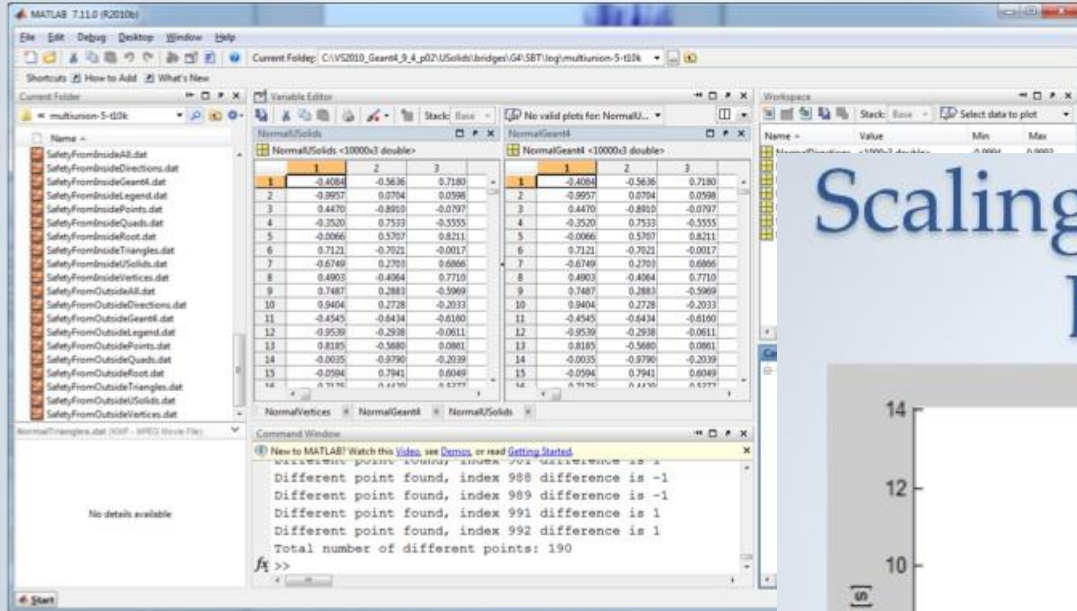
- ☞ “Surface-normal on global coordinates issue”
 - ☞ By John Apostolakis (*CERN*)

- ☞ “Thread-safety for sharable data in geometry classes”
 - ☞ By John Apostolakis (*CERN*)

Unified Solids

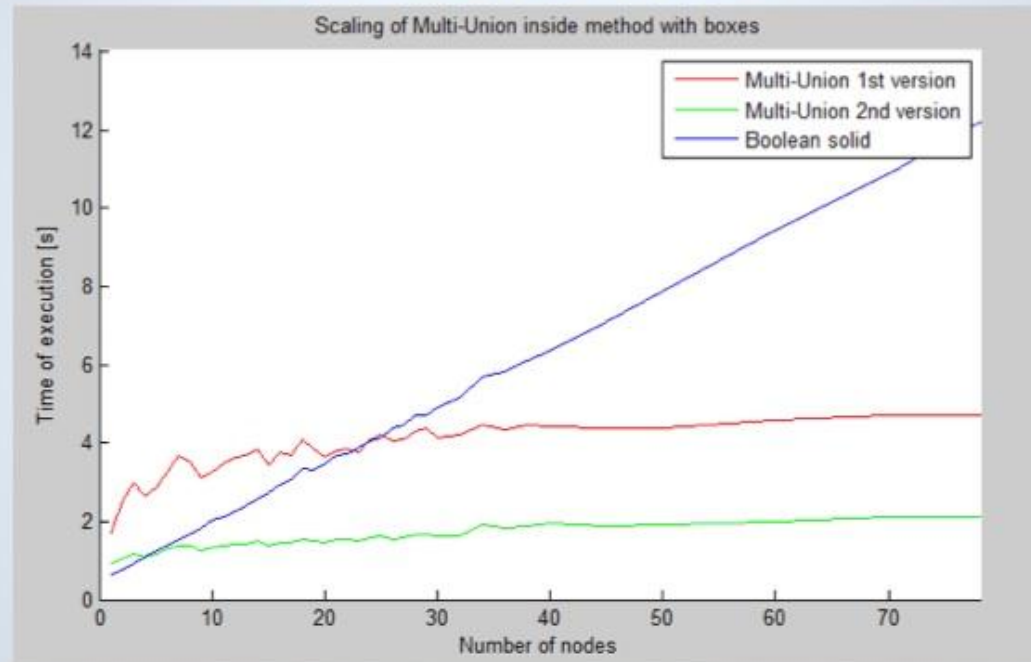
by Marek Gayer

Inspection of values and differences of scalar and vector data sets



- *Comprehensive testing suite developed to benchmark and check correctness*
- *Including also new developments: e.g. multi-union solid*

Scaling of Multi-Union vs. Boolean solid



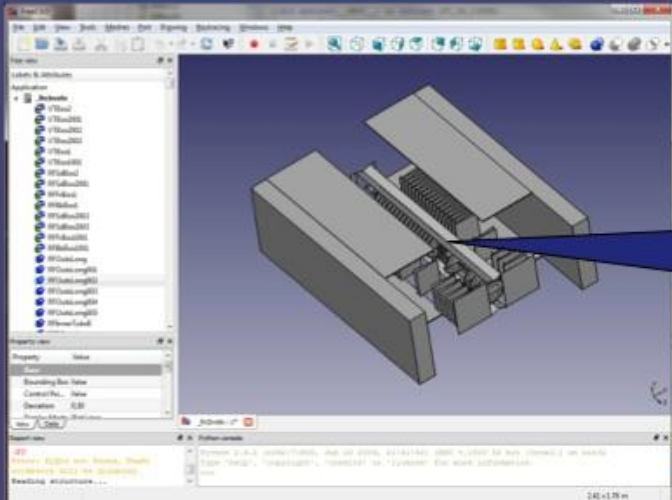
- *Complete by Geant4 release X*

CAD to GDML Converter

by Emmanuel Delage

FreeCAD Development

- Open source CAD software
- Efficient modularity, reactive forum, easy to dev.
- Languages: C++ and Python
- Libraries: OpenCascade, Coin3D, Qt, XercesC...
- Supported platforms: Windows, Linux, Mac OSX



• *Future evolution is not at all clear, though ...*

17th Geant4 Collaboration Meeting, Chartres (France)

- *Open source tool based on FreeCAD under development*
- *Promising tool for translating to GDML as original geometrical primitives CAD geometries, keeping alive volume's hierarchy*

Possible steps and scheduling

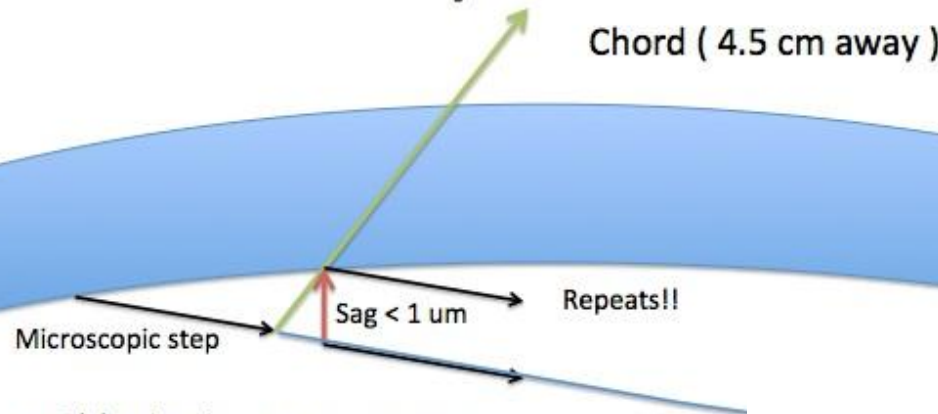
	FTE (months)
↳ <u>Verbosity implementation</u>	0.5
↳ <u>Prevent unrecognized solids</u>	0.5
↳ <u>Boolean solids implementation</u>	1
↳ <u>Write a developer documentation.</u>	1
↳ <u>STEP, STL or PLY to GDML conversion (tessellated solids only).</u>	1
↳ <u>Hierarchy and material implementation</u>	6
↳ <u>Full GEANT4 geometry implementation...</u>	x

Need further investigation to be correctly estimated

Surface-normal on global coordinates issue

by John Apostolakis

Track Stuck on volume boundary



- Old criterion to converge
Sagitta < 1 micron
- Never entered steel
 - Momentum unchanged

- Improvement
 - track point

• *Fix on the way, requiring migration of specific user's code*

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- *Modifications included in release 9.5 and 9.4.p03 to resolve long-standing problem with stuck tracks on boundaries flagged by ATLAS*
- *Side effect: wrong computation of normal in coincident surfaces...*

Current status

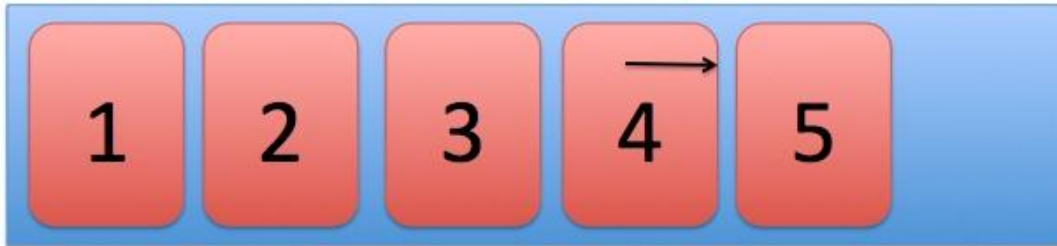
- **Fix:** store the exit normal in Global coordinates
 - Right away – when the vector and reference frame are in sync.
- **Status:** trial of fixes (Peter G.)
 - First trial – situation is improved
 - **Open:** the 'valid' flag is currently set to false.
- **Fix** and a tag are under preparation

Thread-safety for sharable data in geometry classes

by John Apostolakis

Use in Tracking – after relocation

Logical View – Replica or Parameterised Volume



View in Memory – Geant4 objects



- *To be studied for Geant4 release X*

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- *Reviewed main cases of RW data in the geometry classes and solution implemented in Geant4-MT*
- *Presented ideas to alternatively eliminate RW data from the geometry instances*

Tentative Plans

- Goal: Reduce or eliminate RW information in 'live' geometry tree
 - Keep all information about current volume only in `G4TouchableHistory`
- Can it be done without breaking interfaces?
- Challenge: What about existing uses of key methods?
 - in `PhysicalVolume->GetLogicalVolume`
 - `logicaVolume->Get(Solid,Material, ..)`