WIRED 4 Event Display

Linear Collider Simulation Workshop
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WIRED 4

- Why version 4?
  - Rewrite from scratch
  - Ideas from WIRED 3 and LCDWIRED
  - More maintainable

- Features
  - Framework for Event Display
  - Implemented as JAS 3 plugin based on FreeHEP
  - HepRep 2 format
  - Experiment & Data format independent
  - Portable: Windows, MacOs X, Linux … (pure Java)
  - User extensibility
WIRED 4 Event Display Features

- Access to HepRep data (versions 1 and 2)
- Projections
- Undo / Redo functionality
- Direct and Indirect Interactivity
- Animated Feedback on User’s actions
- Enhanced (filtered) picking mode
- Physics attributes associated with display
- Detector and Event visibility selection
- High Quality Vector Graphics Output
JAS 3 and the WIRED 4 plugin

- Easy to install and upgrade
- Uses standard interface and facilities of JAS 3
WIRED 4 uses HepRep 2

- Data representation for Event Displays
  - HepRep 1
    - consists of information such as tracks and hits
    - adds representations: lines, cylinders, …
    - adds attributes: drawing properties, physics info…
    - XML, CORBA, RMI, etc

- Added in HepRep 2
  - data is typed using a hierarchical types
  - geometry and event data can be separated to persist geometry while scanning events
Data Compatibility

- Linear Collider:
  - LCIO
  - org.lcsim
  - Geant4
  - HepRep 1 XML and HepRep 2 XML

- Others:
  - GLAST
  - HepRep 2 XML and HepRep 2 CORBA
  - BaBar
  - HepRep 1 XML and HepRep 1 CORBA
  - Any Experiment
    - Can create HepRep2 XML files
    - Write custom data format plugin
Projections

- Parallel
  - Scaling, Rotation and Translation
- Cylindrical Fish-Eye
  - Enlarges the center region, while compressing outer regions
- ρ-Z
  - Cuts detector along Z-Axis and folds up upper and lower half, displaying the result as two halves
- Composite
  - Combination of any of the projections

- Can easily be extended and combined by the user
Parallel Projection
Fish Eye Projection
ρ-Z Projection
Graphics Engine

- Simple and composite projections
  - Normal (Parallel) as well as Special (Fish-Eye)
- Layered model
  - Hits on top of Tracks, on top of Geometry

- Used also, without final on-screen drawing:
  - to find bounding box
  - to find nearest object to cursor
  - to find objects within a shape

- No more intermediate storage (as in WIRED 3)
  - rendering straight from HepRep2 data.
- Fast and Smart iterator
  - with filter for Picking
Interactivity

- Toolbar
  - Direct Actions
  - Mode Selection
  - Quality

- Control Panels
  - Panel Selection
  - Additional Selection
  - Additional Information

- Views
  - Picking Selection
  - Popup Menu
Scaling, Rotation and Translation
Picking single items

Objects

Attributes
Picking multiple items

Objects

Attributes
Picking Implementation

- Picking uses graphics engine “redraw” to mark objects which are:
  - nearest to cursor
  - within a shape
- A filter can be applied to the “redraw” to only pick from:
  - specified layers
  - specified object types
- A real “redraw” will then “highlight” the picked objects in the view and show them in a table

- Additional User filters are possible
Visibility Selection

- HepRep Type Tree
- Individual visibility of certain types
- Group visibility
- Hide below a certain level
- Persistent across events
Output

- Copy (and Paste)
  - Vector Graphics
    - on Windows in EMF
    - on Mac in PDF
  - BitMap
    - on Linux in PNG or GIF

- Save as...
  - HepRep 2 XML
    - to read back later...
  - Vector Graphics Formats
    - PostScript, PDF, EMF
    - SVG, SWF and CGM
  - BitMap Formats
    - GIF, PNG, …
Extending WIRED 4

● By implementing services:
  ● Edit (undoable actions)
  ● Projection
  ● Representation
  ● InteractionHandler
  ● Plot
  ● GraphicsEngine
  ● ExportFormat

● By writing scripts:
  ● Java, Python, Pnuts, …
Plans

- Parameter settings on Projections
- Scripting
- Filters / Cuts
- Coloring
- Labels
- Scales
Status and Conclusions

- WIRED 4.0 Beta 2 is out (needs JAS 0.8)
  - Feedback welcome
- Rewrite made it extensible
- Use of JAS 3 as a Framework made it quite a bit smaller (and maintainable)
- Still a number of improvements to be made
References

- WIRED 4 — http://wired4.freehep.org
- JAS 3 — http://jas.freehep.org/jas3
- Forum — http://forum.freehep.org
- Bug Tracking — http://bugs.freehep.org