EsbRootView
status report

ESSnuSB 4-th Annual Meeting
25 November 2021

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EsbRootView / main ideas

- Started begin 2019 after the Athens meeting.
- C++ (still on C++-98).
- Target high portability and most of the interactive devices: macOS, Linux, Windows, but also iOS, Android and now WebAssembly.
- Arrange to use as much as possible native graphics systems.
- Read the geo_full.root/evetest.root produced from the simulation and the EsbRoot framework by using the softinex inlib/rroot classes (only 20kloc).
- Representations done by using the inlib/sg scene graph classes. (Something similar to OpenInventor).
- Rendering done using GL-ES (supported by all providers) (~Apple?) and WebGL for WebAssembly.
- GUI done also with inlib/sg: unified graphics.
- bash-like scripting with insh (3kloc).

EsbRootView / 4.0.0 / models

- the event model is today contained in one event_model file.
- neard, fard: MCTrack, WCDetectorPoint.
- fgd: DetectorPoints, Hits.
- Geometries read straight from TGeo objects found in geo_full.root files and represented by using a generic inlib/hep/polyhedron scene graph node (code borrowed from Geant4/vis).
- We can have various representations of a model item; for example a MCTrack shown as a point or as an arrow (starting point+impulse).
- Obviously, we can specify colour, line width, text font, etc…
- The construction of a scene is fully (insh) scripted. (startup.insh, event.insh files).

Paper, outreach

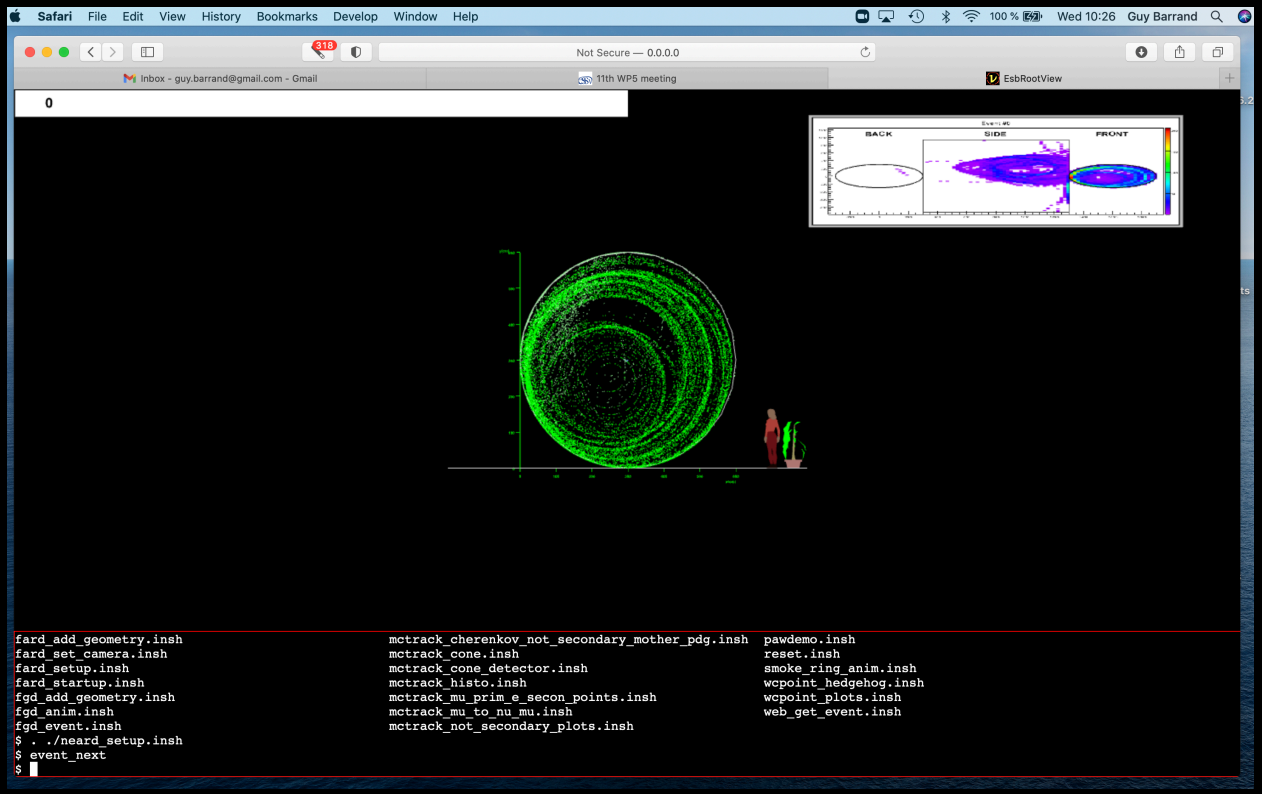
Main page from: https://gbarrand.github.io

EsbRootView vCHEP-2021 paper now published:
https://doi.org/10.1051/epjconf/202125101002
See it for available features and more informations.

EsbRootView has an animation mechanism. Used to see Cherenkov smoke rings in the nice outreach ESSnuSB Design Study Project video (found on YouTube or from the main ESSnuSB page).

More…

- 4.0.0 comes with a lot of commands related to “analysis”: histogramming, ntupling, plotting, fitting. (Generic commands shared with other apps as my Geant4 ones).
- WebAssembly: it comes with the terminal mode:



Doc

- All commands have a help text, for example:

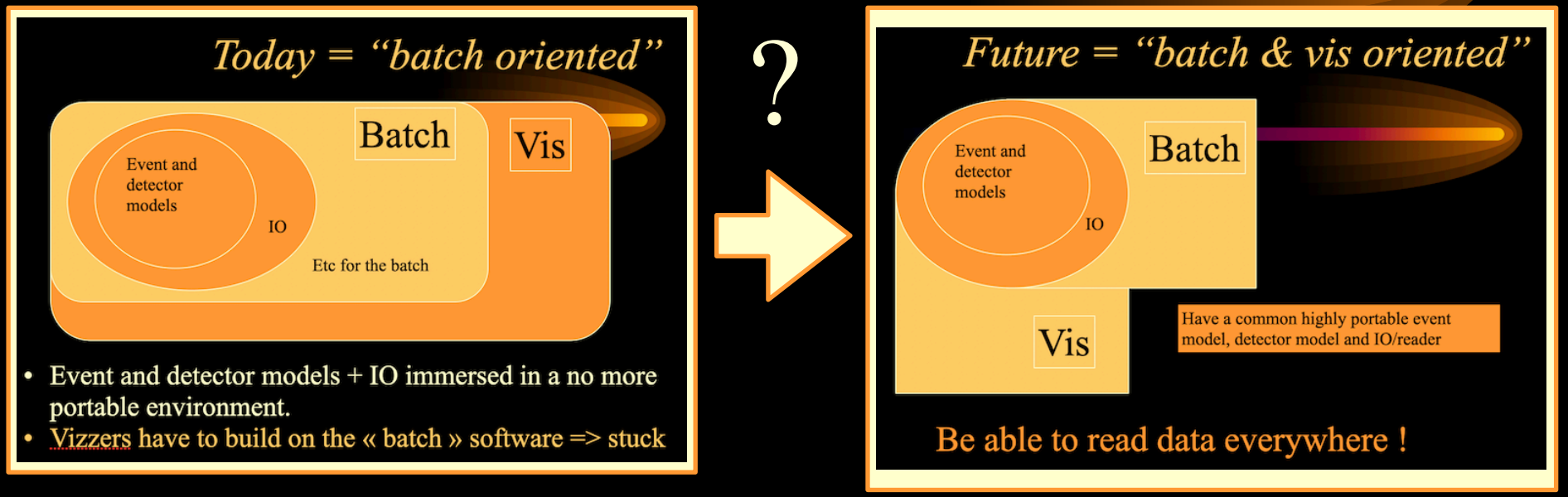
```
$ help event_model
$ help MCTrack_vis
$ help MCTrack_plot
```

- I arrange to have the default scripts readable.
- BUT ok, some (online) tutorial has yet to be done… (Especially knowing that we have the online WebAssembly version!).
- Now that the overall layout of this display is here, I can raise the priority for this.

A design issue

- Today the event models classes are not shared with the EsbRoot framework.
- If, in the future, much more models are added for the detectors and their events, it will be important to share them.

Shown at Uppsala (2017)



- It is a common HEP problem!
- HSF? I have no hope on this side 😕. Where is a standalone ROOT/IO package?
- A Second Foundation? 😉
- ESSnuSB may have the time line to do that! (Software for the FCC? Then for 2050)

Else, relationship to Geant4

- Next Geant4 (major) release will come with a G4/vis ToolsSG driver based on the same inlib/sg technology.
- The inlib plotting will be integrated too: a first time in Geant4!
- Knowing that the inlib/wroot,rroot classes are already used in G4/analysis category to read/write at the root format (without having to tie to the whole ROOT (and cling interpreter)).

- I can build Geant4 apps similar to the EsbRootView one (see my MEMPHYS_vis app on gbarrand/github). (G4 appears to be very portable!). We may think to have some EsbGeant4Vis done with the same technology (and sharing a lot of code with EsbRootView).

Conclusions

- A lot of progress since Athens (and Uppsala in fact!)
- A solid grounding exists now in EsbRootView. (And, I daresay, not found elsewhere!). It gives a lot of ideas…
- I am very happy of the WebAssembly version.

- A lot of things still happen in computing (for exa the amazing Apple M processors). Visualisation and “interactivity” have fine days ahead of them, it will be a bad point to ignore these.
- I have still the strong conviction that HEP, as a community, does not point yet in the right direction with its software for the next ten/twenty years.
- Can ESSnuSB help to shake things?