

History

- Analysis tools based on AIDA (Abstract Interfaces for Data Analysis) are used in Geant4 examples since Geant4 3.0 release (December 2000)
- No analysis code in Geant4 source (until 2010)
- The AIDA compliant tools (see in the Geant4 Guide for Application Developers):
 - JAS, iAIDA, Open Scientist Lab, rAIDA
- Not all maintained, not all implement the AIDA interfaces completely, not always easy to be installed & used

g4tools

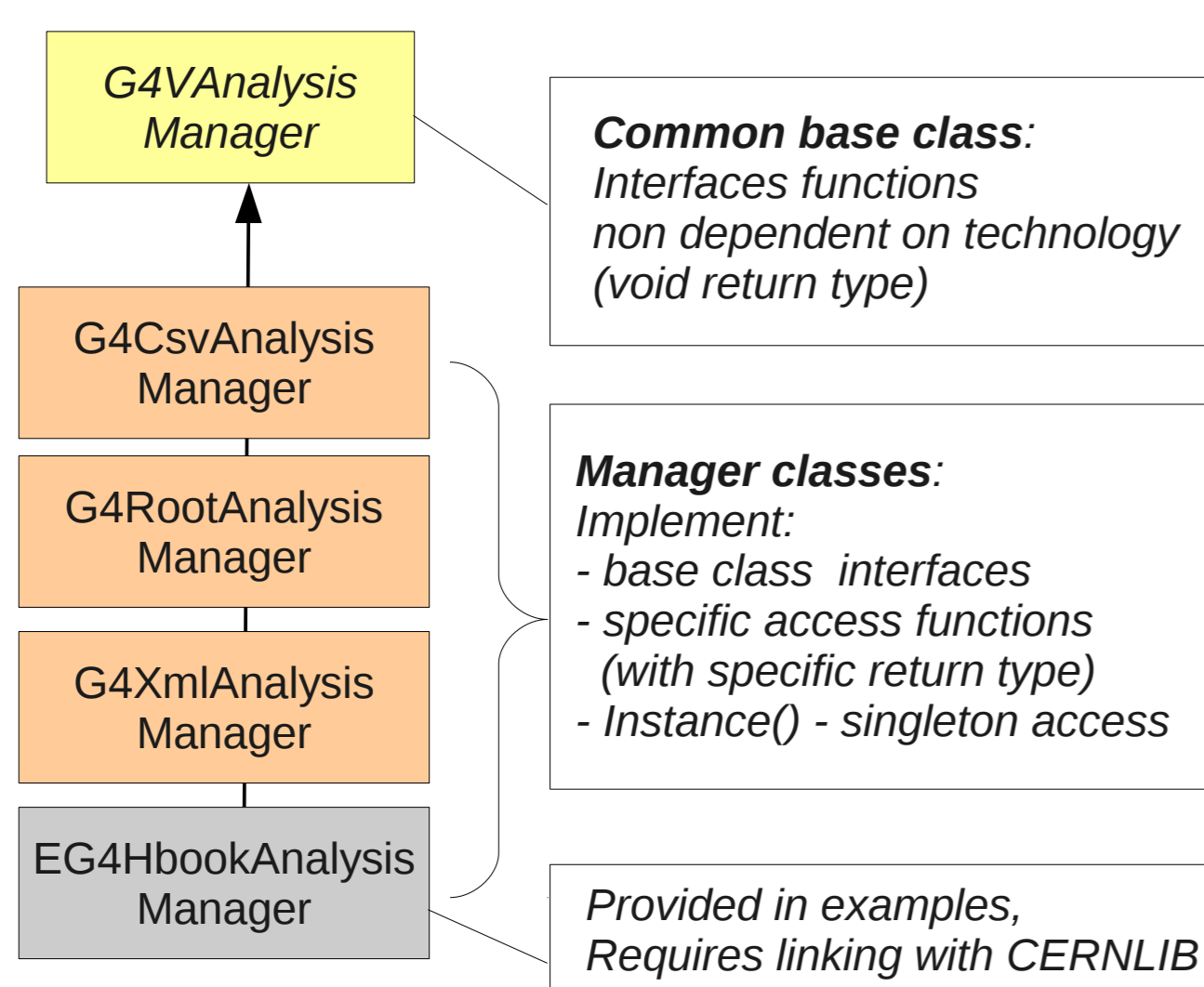
- Provides code to write histograms and "flat ntuples" (trees) in several formats:
 - ROOT, XML AIDA format, CSV (only ntuples), HBOOK
- "Pure header code" - all code is inlined
- Based on g4tools from inlib/exlib developed by G. Barrand (LAL):
 - <http://inexlib.lal.in2p3.fr/>
- Can be installed on iOS, Android, UNIXes, Windows
- Included directly in Geant4 source

Geant4 Analysis

- New analysis category in Geant4 since version 9.5 (December 2011)
- Based on g4tools
- Provides "light" analysis tools
 - Available directly with Geant4 package
 - No need to link a Geant4 application with an external analysis package
- Complete migration to g4tools in all Geant4 examples during 2013 development plan

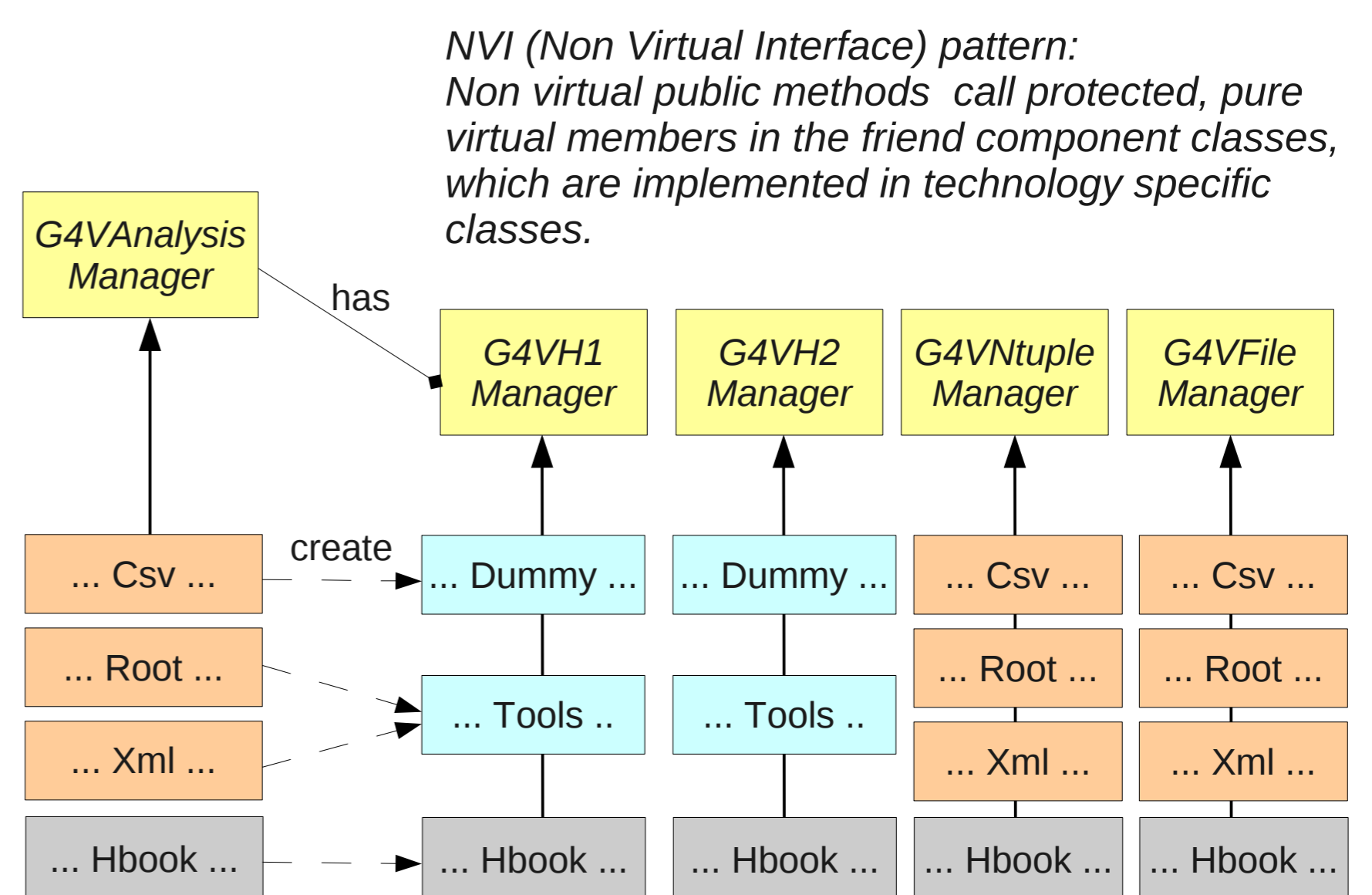
Class Design

First design (in 9.5, 9.6)



- Monolithic manager classes split into smaller managers per object
- This allows sharing implementation and avoids code duplication
 - Root and Xml use the same h1 and h2 g4tools objects
- It also facilitates future extensions
 - User request for support 1D, 2D profiles

New design (for 10.00)



Objectives

- Uniform, user-friendly interface to g4tools
 - Hiding the differences according to a selected technology (Root, XML, HBOOK) from the user
- Higher level management of g4tools objects (file, histograms, ntuples)
 - Memory management
 - Access to histograms, ntuple columns via indexes
 - Possibility to activate or inactivate selected histograms
- Integration in the Geant4 framework
 - Interactive Geant4 commands and units

New Features (for 10.00)

- ✓ Complete re-design with no impact to the user client code
- ✓ Migration to multi-threading
- ✓ Extension for handling more than one ntuple
- ✓ Support for logarithmic binning in 1D, 2D histograms
- Support for 1D, 2D profile (in development)

Multi-Threading

- The analysis manager instances are created on master and thread workers
- Depending on the output technology, the instantiated objects and selected Geant4 mode (sequential or multi-threading), several files can be created with automatically generated names
 - Histograms produced on thread workers are merged on Write() call and the result is written in the master file
 - Ntuples produced on thread workers are written on separate files. No merging is performed.
- No changes are required in the user code