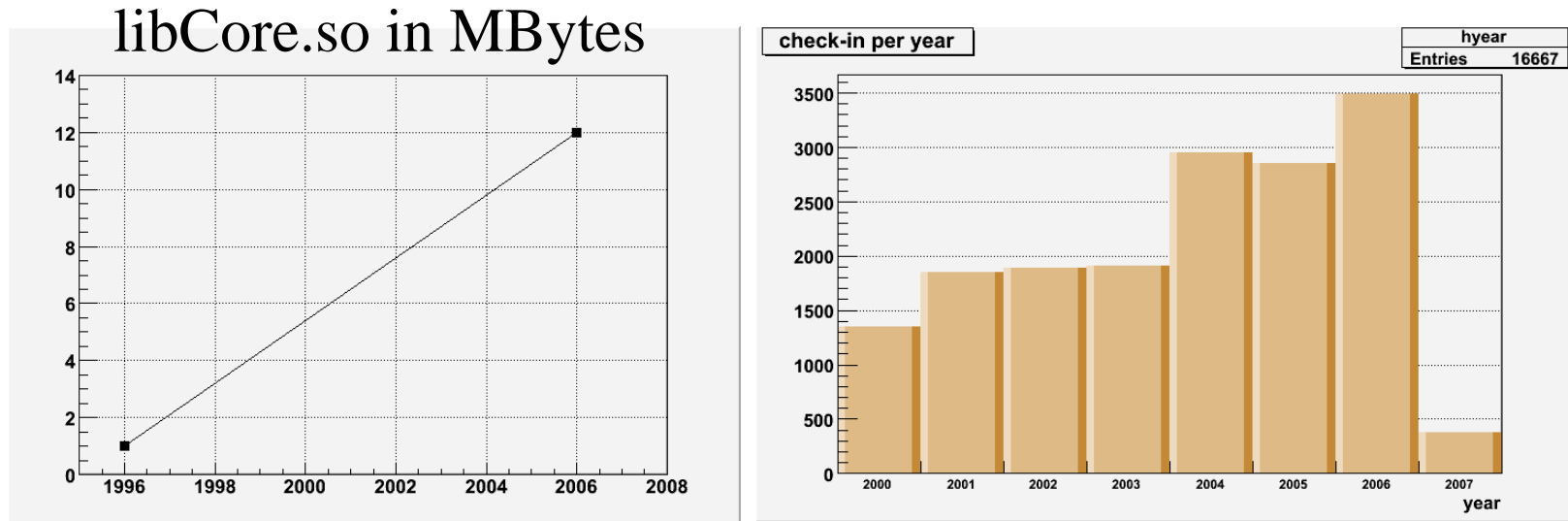# Restructuring sources and libs

Rene Brun

2 February 2007

Motivation

- Introduce a more modular structure with new subdirs "io", "math", "net"

- Reduce the size of libCore

- Reduce compilation time when changing the most important header files.

- Better documentation in sources

- In view of the removal of the G__ files

- Towards BOOT

Size of libCore

libCore.so in MBytes

5.10: Process Map (pmap) root.exe = 66 Mbytes

5.10: Process Map (pmap) root.exe -b = 58 MBytes

5.14: Process Map (pmap) root.exe = 44 MBytes

5.14: Process Map (pmap) root.exe -b = 34 Mbytes

Reducing pmap reduces startup time

Objective is to reach 15 Mbytes in two steps

Obtained by reducing size of CINT pointers tables

Main changes in the header files

- TBuffer
- TMath
- TString
- Varargs.h
- TDirectory.h
- TFile.h
- TClass
- TROOT

TMath.h

- Implement a new class TMathBase.h that is included in other important classes (like TString). This class contains only basic functions for all types (min, max, abs..) that are unfortunately not in std:: or cmath.

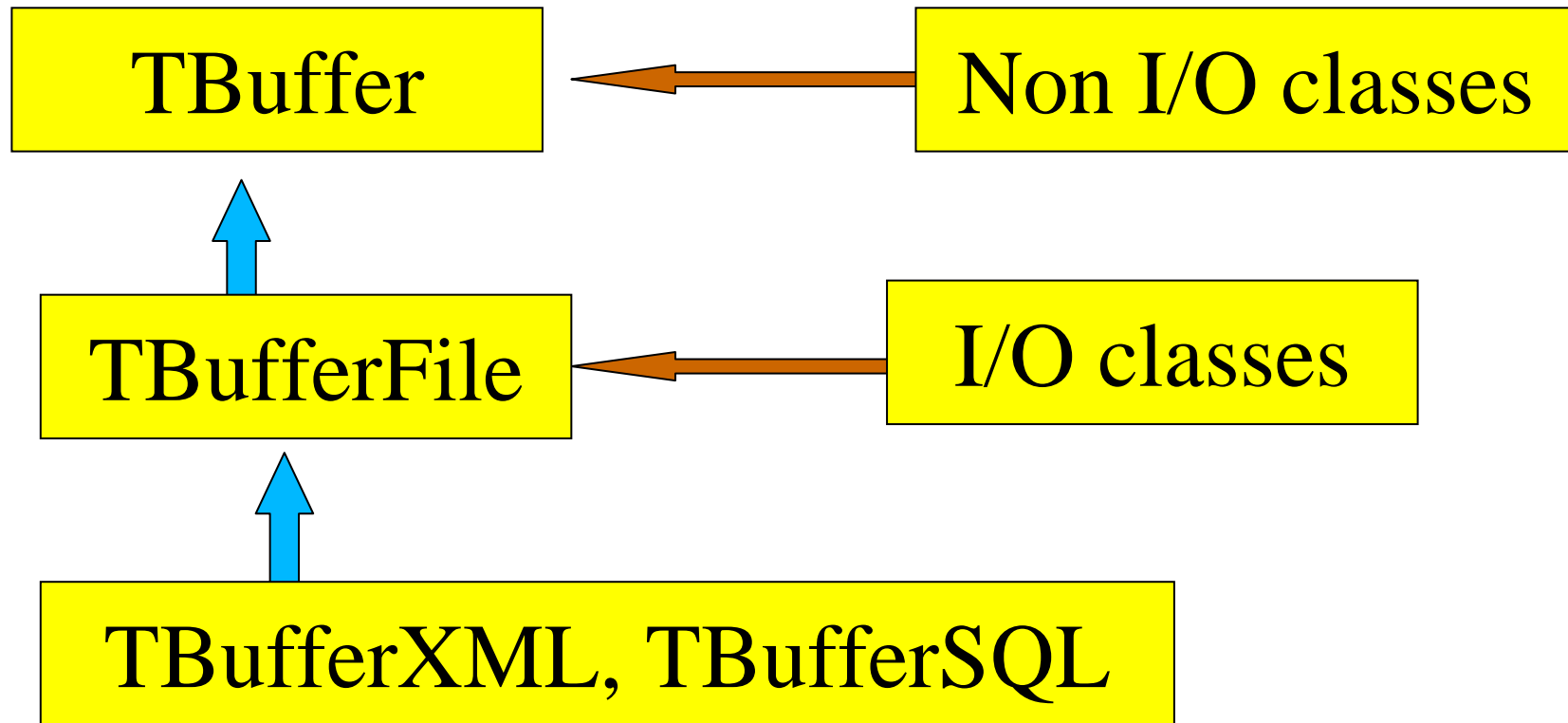- Changes in TMath.h will affect only 300 files instead of 1245.

TString.h

- Include TMathBase.h instead of TMath.h
- Do not include Vargars.h

Varargs.h

- Remove from TObject.h, TQObject.h, TError.h, TString.h

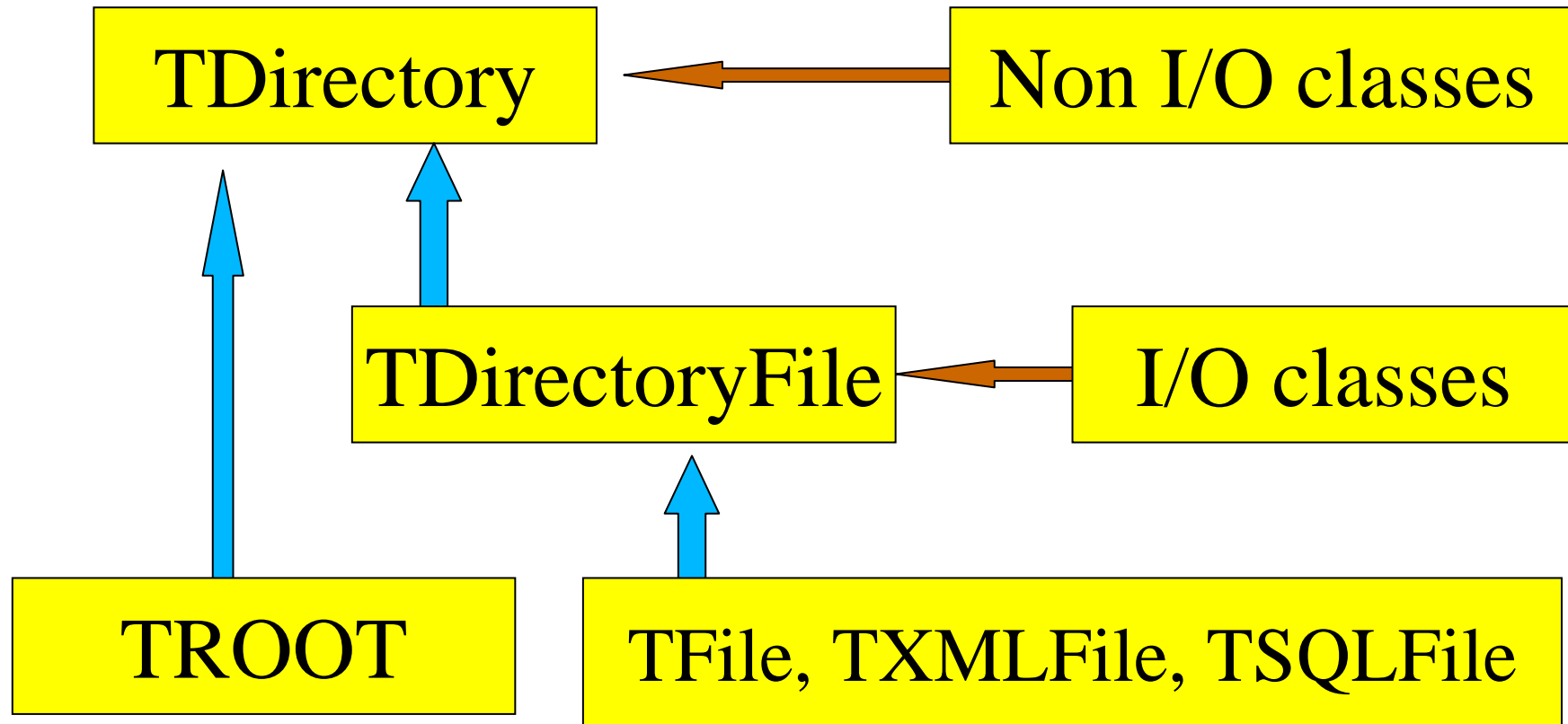- Huge gain in compilation time when changing this include.

TBuffer.h

- Abstract interface with no references to concrete I/O
- Remove "include <vector>

```
TBuffer  ⟵  Non I/O classes

TBuffer ⟵ TBufferFile  ⟵  I/O classes

TBufferFile ⟵ TBufferXML, TBufferSQL
```

TDirectory.h

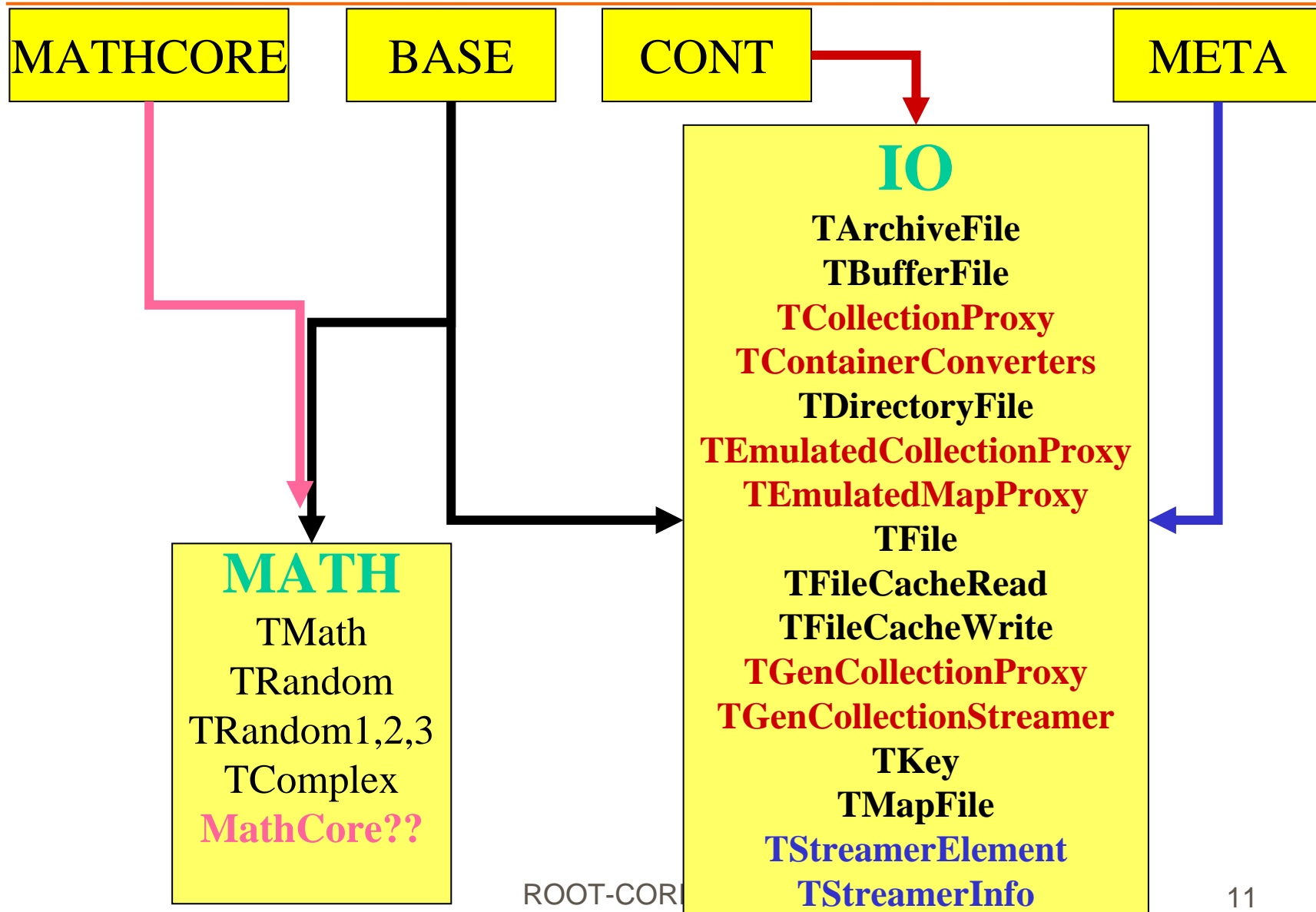- Abstract interface with no references to concrete I/O

Effect on compilation time

Time for "make –j 2" on MacBookPro when all packages are enabled (twice as long as the default ./configure)

	5.14	5.15 (CVS)
clean	20′ 43″	21′ 06″
Varargs.h	15′ 31″	7′ 16″
TQObject.h		7′ 50″
TMath.h	14′ 37″	6′ 34″
TBuffer.h	15′ 00″	14′ 46″
TBufferFile.h		1′ 44″
TDirectory.h	13′ 59″	5′ 38″
TDirectoryFile.h		1′ 57″
TROOT.h	13′ 54″	5′ 01″
TStreamerInfo.h	13′ 48″	1′ 5″
TClass.h	13′ 13″	9′ 52″
TFile.h	3′ 15″	2′ 34″
TH1.h	4′ 25″	3′ 19″

Cont/meta/base reorganization

MATHCORE   **BASE**   **CONT**   **META**

MATH
TMath
TRandom
TRandom1,2,3
TComplex
MathCore??

IO
TArchiveFile
TBufferFile
TCollectionProxy
TContainerConverters
TDirectoryFile
TEmulatedCollectionProxy
TEmulatedMapProxy
TFile
TFileCacheRead
TFileCacheWrite
TGenCollectionProxy
TGenCollectionStreamer
TKey
TMapFile
TStreamerElement
TStreamerInfo

ROOT-COR

TClass and CollectionProxys

- These classes depend heavily on I/O classes.

- Philippe is working to make a clean separation (in CVS)

- TClonesArray I/O already moved to TBufferFile.

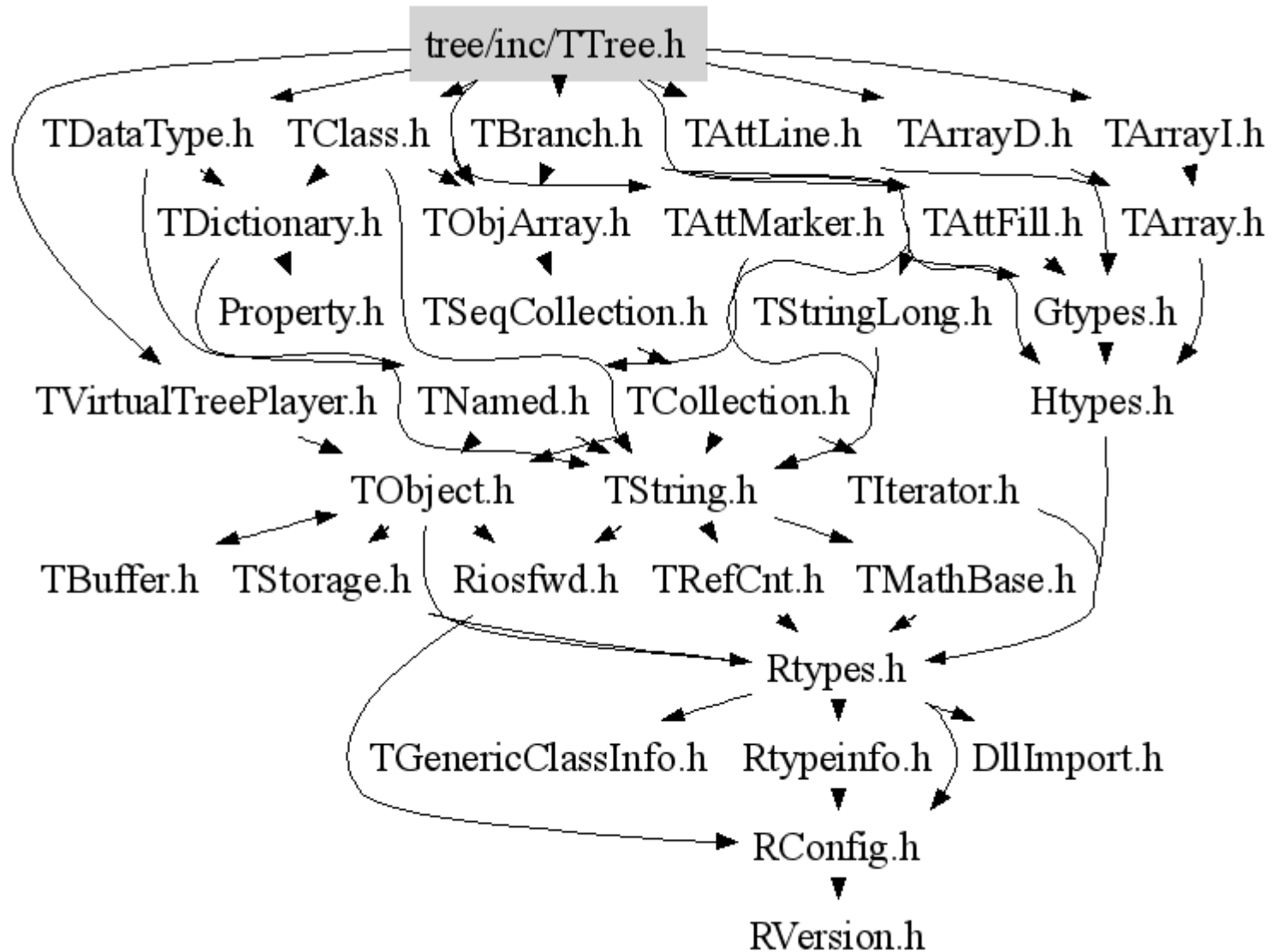- Making TClass I/O independent is going to be more work.

TROOT: Simpler & more general

- Replace all pointers (TList*) to main collections by one single TList including all the existing lists (dynamic vs static).

- Keep existing API for back compatibility.

- Internally use new functions.
  - gROOT->GetClass() ➜TClass::GetClass()
  - gROOT->GetFunction() ➜ TF1::GetFunction()
  - gROOT->GetFile() ➜ TFile::GetFile()
  - gROOT->GetColor() ➜ TColor::GetColor()

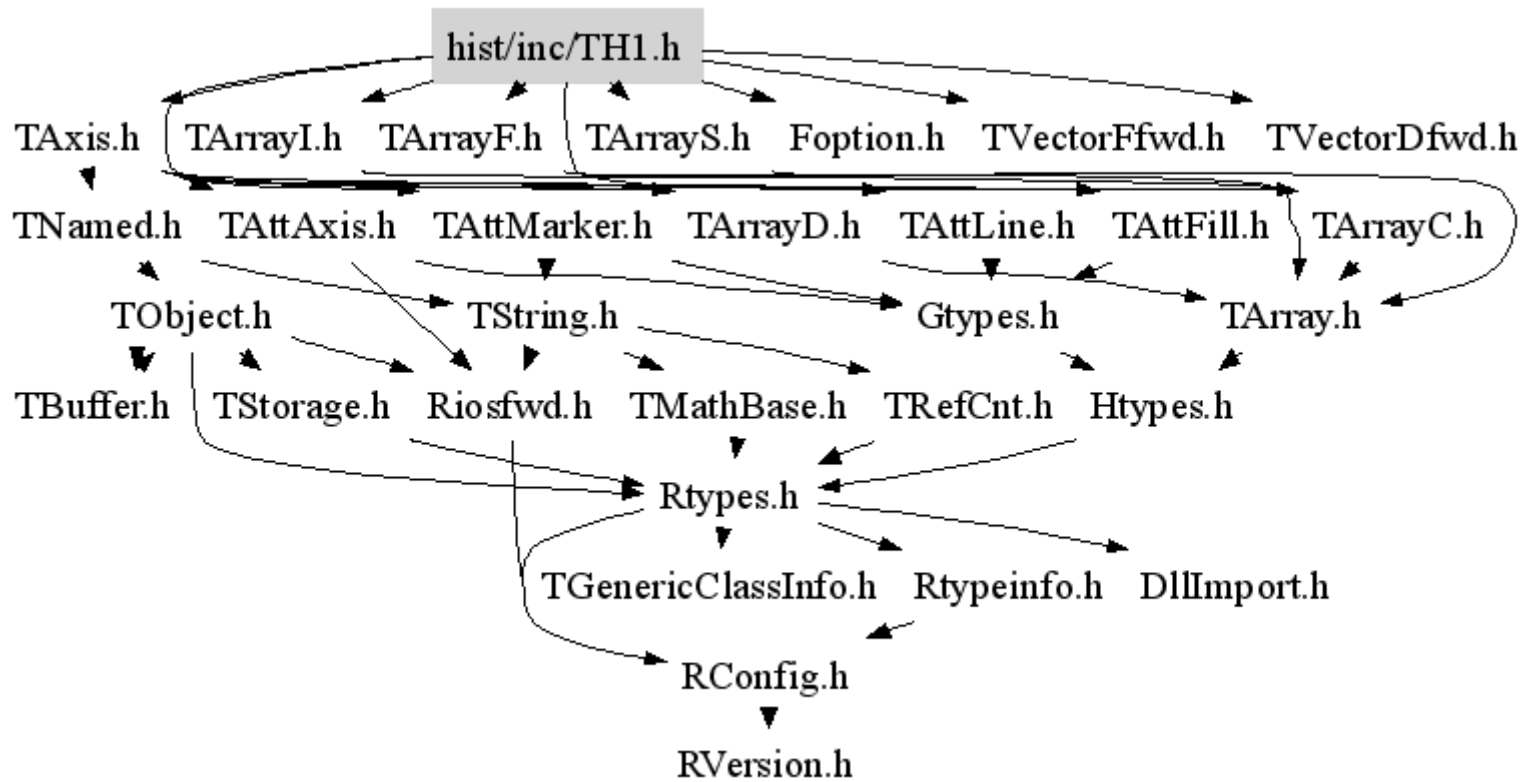# More work with headers

- Today CVS includes the most important changes in the base/cont/meta headers.
- Please update your packages to use forward declarations as much as possible.
  - In particular gui, ged, geom, gl,proof
- tmva and roofit still require a lot of work !!
- Check pre-compiled headers (Axel)

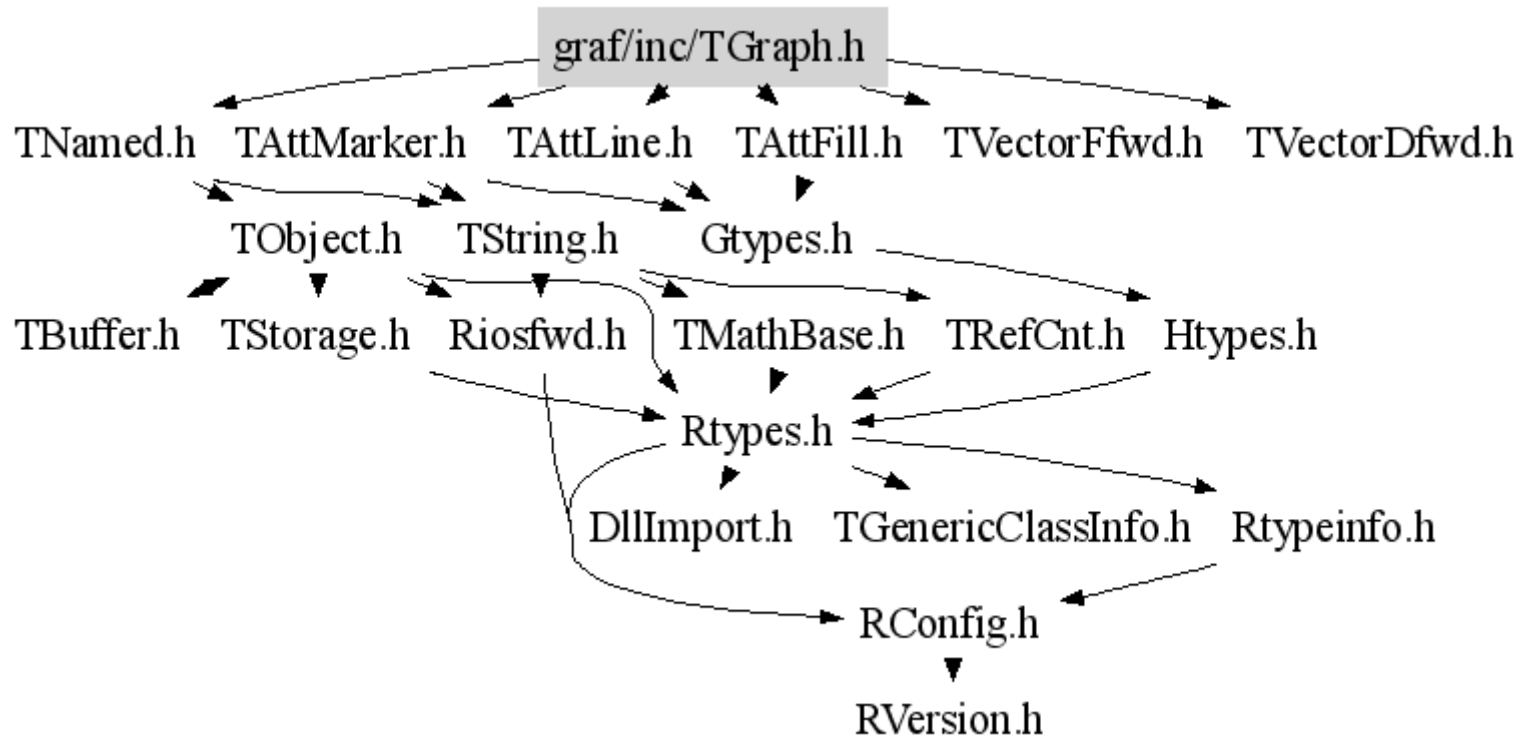# Header dependencies easier to read

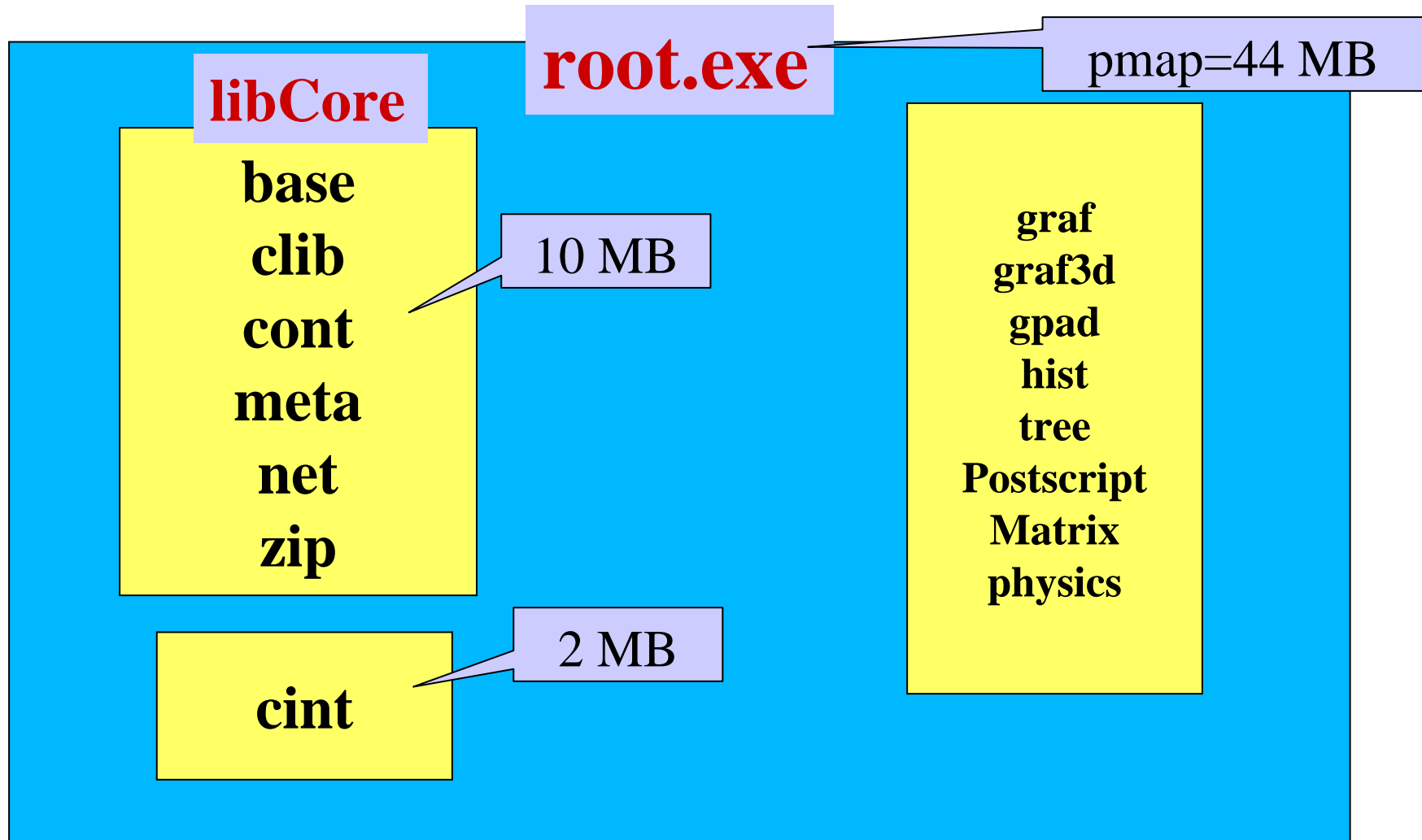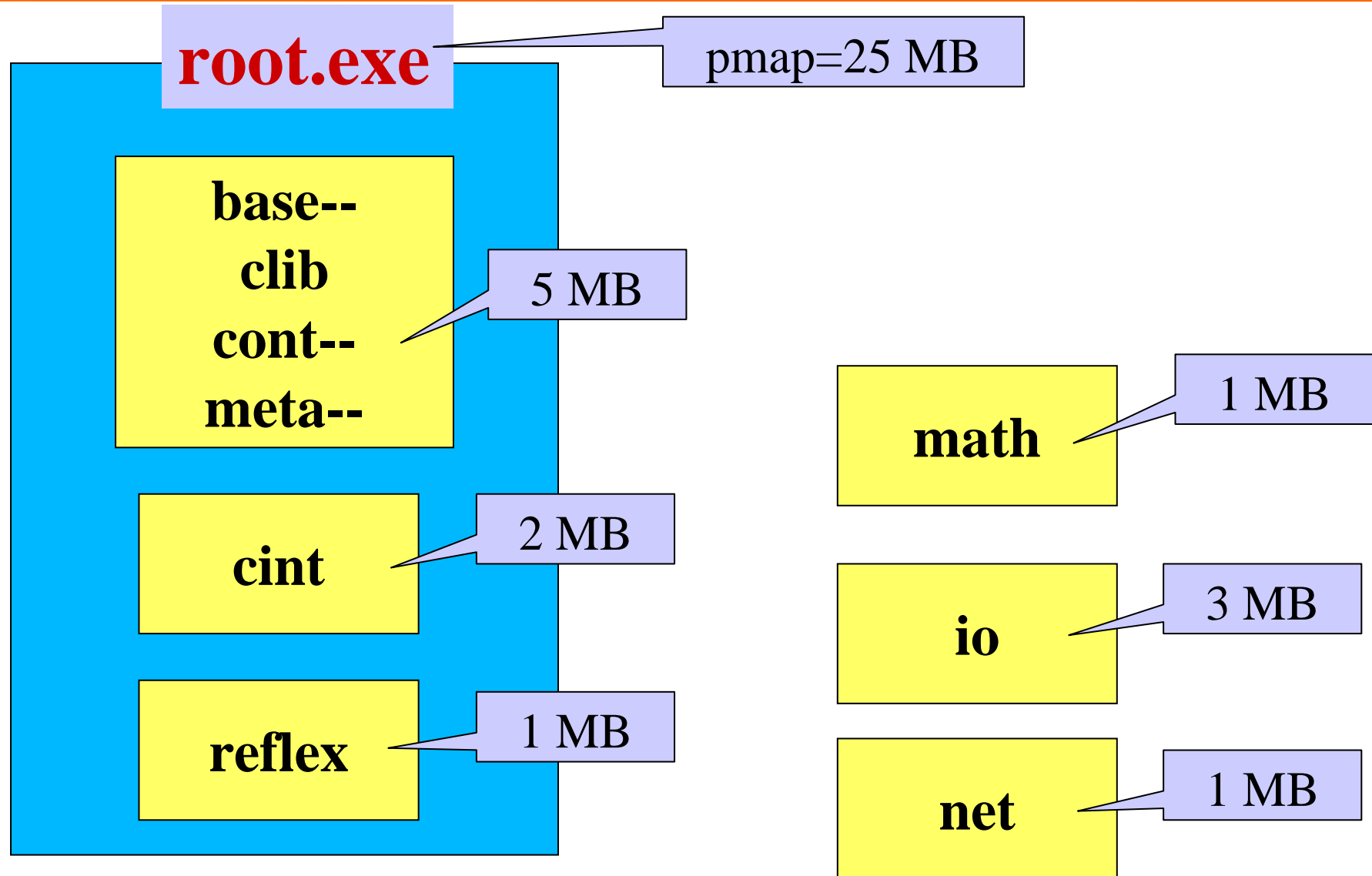# Header dependencies easier to read

Header dependencies easier to read

Libraries reorganization (5.14)

root.exe

pmap=44 MB

libCore

base
clib
cont
meta
net
zip

10 MB

cint

2 MB

graf
graf3d
gpad
hist
tree
Postscript
Matrix
physics

Libraries reorganization
(proposal phase1)

root.exe

pmap=25 MB

**base--
clib
cont--
meta--**

5 MB

cint

2 MB

reflex

1 MB

math

1 MB

io

3 MB

net

1 MB

Libraries reorganization
(proposal phase2 == BOOT phase1)

root.exe

pmap=15 MB

G___*cxx

dicts.root

base--
clib
cont--
meta--

3 MB

cint
more

reflex
more

< 1 MB

cint
core

1 MB

math

reflex
core

0.5 MB

< 2 MB

io

net

1 MB

Proposal for a new CVS structure

New THtml by Axel

- So far, I have maintained several hundred gif files in my htmldoc/gif directory. This does not scale.

- We thought check-in CVS all these gif files. But the total size is above 90 Mbytes, ie 4 times the size of the source itself.

- The new version of THtml supports 2 new instructions Begin_Macro and Begin_Latex that allows the generation of embedded graphics by executing a macro or a TLatex expression.

New THtml by Axel (2)

- Once the new version is in CVS, please make immediate use of the new great tools.

- The pictures will now be in phase with the source. The code in Begin_Macro can be inline or a macro in the package/macros directory.

- The package/doc directory can contain simple text files or html files. The text files will be htmlized by TLatex. PLEASE add your package description in this directory.

New THtml by Axel (3)

- Having the doc files in CVS in this scheme will avoid the anarchy of different conventions and should encourage the writing of the packages documentation.

- All existing documentation files (in http://root.cern.ch or seal) should be migrated to the new scheme.

- The new features in THtml are of course also interesting for collaborations using ROOT.