BaBar's distributed development / centralized release system

A summary of

¥Tools

¥How we use them

Key elements:

¥CVS

¥SoftRelTools

scripts, directories, makefiles for building releases

¥HyperNews and BfMail

¥Automated Release process

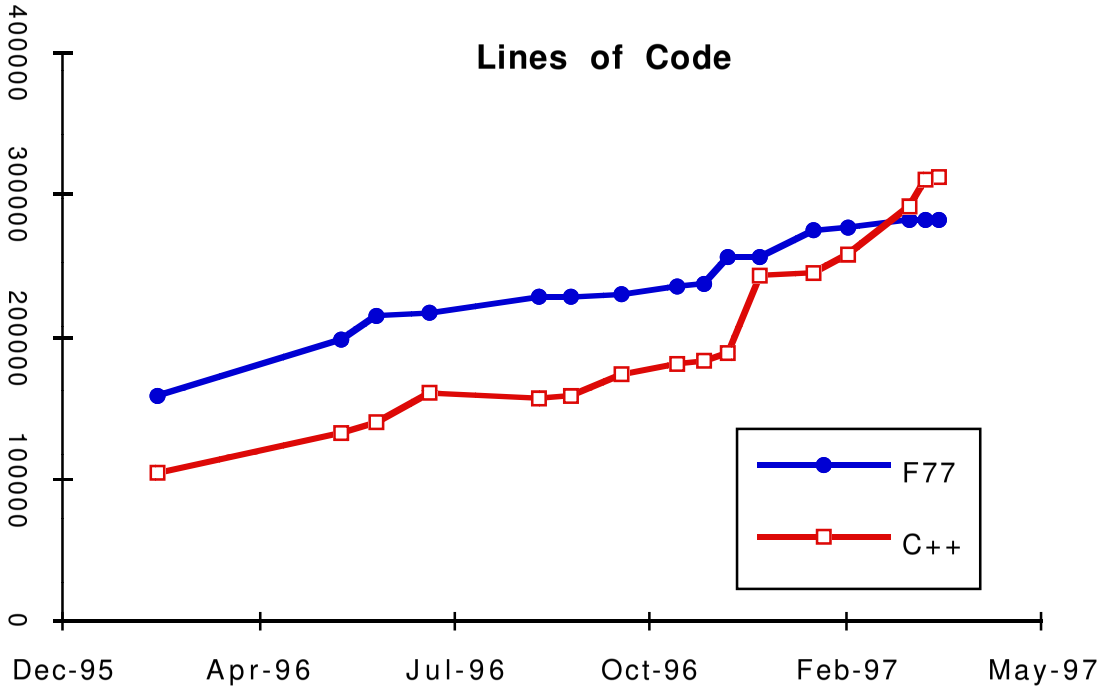
Work of Terry Hung, Doug Johnson, Hwanbae Park and others

Disclaimers:

¥I do event reconstruction, the primary OO part of BaBar so far. Other parts of the overall computing system are evolving in different ways.

¥These are my own opinions, not necessarily those of BaBar leadership.

Supporting a growing code base:



Management system(s)

Multiple goals:

- ¥Control of process
- ¥Maintaining quality
- ¥Easing development

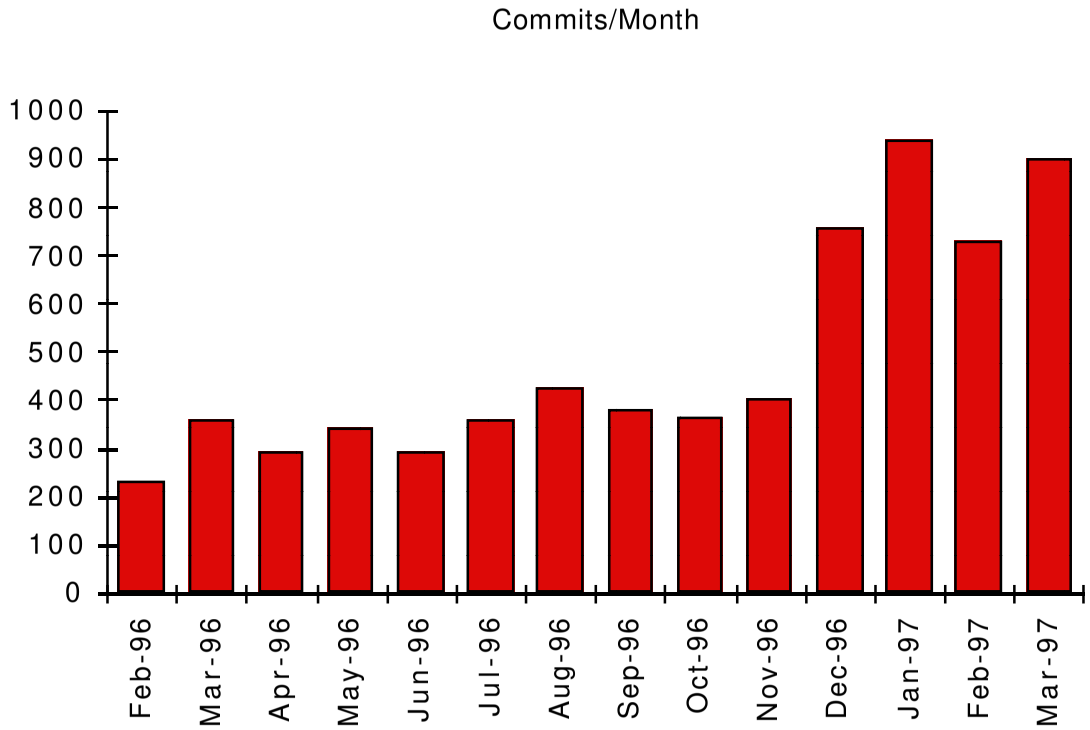
Basic unit: the package

- ¥The basic unit of testing and release
- ¥Also known as a class category , CVS module

Partitioning into packages important at many levels

- ¥Fosters design independence
- ¥Allows identification of a specific responsible person
  - package coordinators
- ¥Identified versions of packages come together to make a release
  - release coordinator

CVS Usage



Currently:

- ¥20k files, 390MB of source in 230 subdirectories
- ¥Approximately 80 active users
- ¥Averaging 30 commits per day

CVS improvements

Full logging

¥Five more logs have been added

'cvs add', 'cvs remove', 'cvs update -A', 'cvs ci' removing and adding files

¥Essential in constructing a useful history file

Prevent 'cvs add' from a tagged folder.

¥A tagged version should be frozen

¥Bypass available

Prevent 'cvs rm' from a tagged folder

¥A tagged version should be frozen.

¥Bypass available

Turn on AFS support,

¥Otherwise, lock files are account specific

EMail notification system

¥Logged into BfMail, searchable on the web

(CVS -> BfMail notification of some commit)

http://www-spires.slac.stanford.edu/FIND/BFMAIL/10188

(BFMAIL search of archive)

http://www.slac.stanford.edu/FIND/PROB?FIND+CODE=CVSNEWS+(IN+
BFMAIL+USI+WWWBRIEF+LEN+150

CVS extensions:

fixcvs

¥Used to change the information of a folder

location of repository, etc, according to the current value of $CVSROOT

¥Very useful for migrating

cvshis

¥Display CVS history in comprehensive format

¥Only way to see additional history entries

cvsck

¥Checks the integrity of files in CVS repository:

non-existing revision numbers marked by tags

out of sequence or missing revision numbers

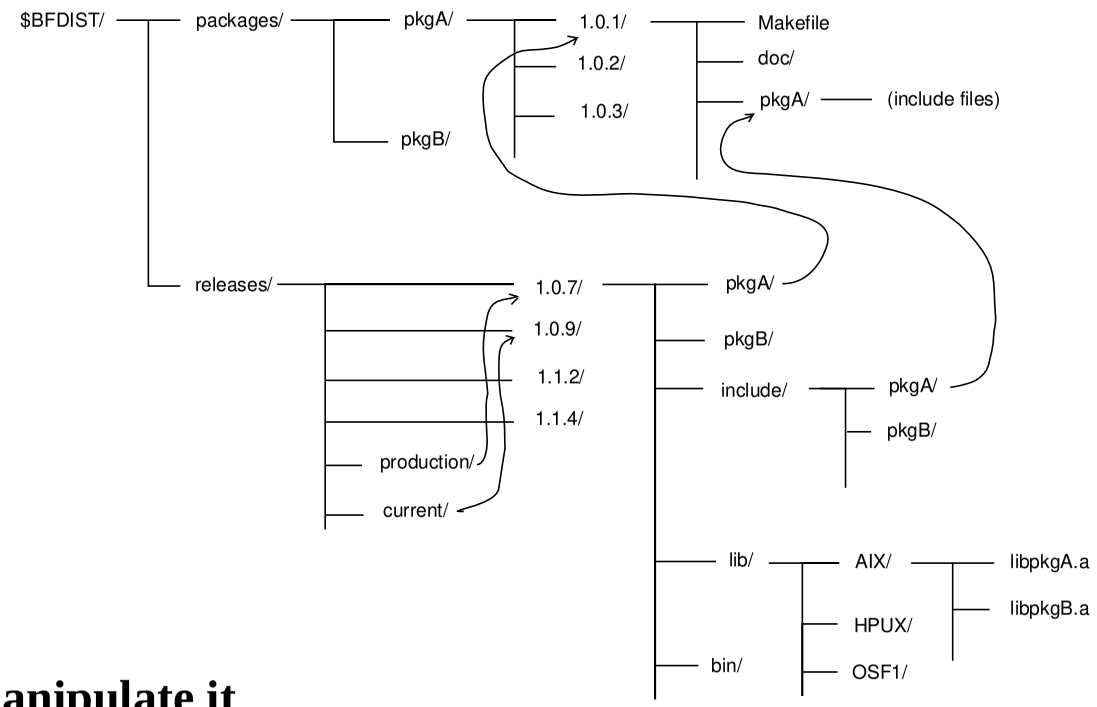
missing change record for a revision number

missing revision number for a change record

¥Trying to find creeping corruption , before its causes obscure bugs

Version system

A directory structure:



Tools to manipulate it

¥in SoftRelTools package (in CVS & $BFDIST)

¥documentation: man pages, README files, writeups, talks

Embedded in an <u>independent</u> system of policy and procedures

SoftRelTools

Provides

¥multi-platform builds

¥incremental builds of entire system

¥stable development base

Driven by scripts:

```
newrel -t 4.0.1 myRel
cd newRel
addpkg BetaUser
addpkg -h RecVtx
addpkg TrkBase V00-03-01
gmake
```

Works through CVS

Provides limited facilities for remote users

¥Local copies

¥Import and export

¥Local overrides of options

The release process

Package coordinators responsible for their packageÕs status

- ¥Changes can be committed by anybody
- ¥Coordinator tests, and corrects as needed
- ¥When changes are working, consistent, they are put into next release

WeÕre doing a bi-weekly build of everything

- ¥Microsoft s concept of the daily build
- ¥Was monthly
  - May have to go back if load too high
  - Are working on automation
- ¥Idea is to find compatibility problems early
- ¥Built release is tested on multiple platforms, distributed to users

Need to increase accountability

- ¥Formalizing acceptance and regression testing
- ¥GNATS to track reported problems

In the longer run, weÕre looking at data quality monitoring, etc

(Form requesting an automated test build)

http://www.slac.stanford.edu/BFROOT/doc/Computing/Reconstruction/CHEP97/release/packagetest.ps

(Results are returned via email)

(Check List for announcing a new public version)

http://www.slac.stanford.edu/BFROOT/doc/Computing/Reconstruction/CHEP97/release/checklist.ps

(Version announcements HyperNews discussion group)

http://www.slac.stanford.edu/BFROOT/doc/Computing/Reconstruction/CHEP97/release/pkannounce.ps

(Sample Version announcemnt)

http://www-hep.llnl.gov/HyperNews/get/babardiscuss/pkannounce/77.html

(Release announcements HyperNews discussion group)

http://www-hep.llnl.gov/HyperNews/get/babardiscuss/swannounce.html

(problem statement for a release)

http://www.slac.stanford.edu/BFROOT/doc/Computing/Reconstruction/CHEP97/release/troublemail.ps

(Release note)

http://www-hep.llnl.gov/HyperNews/get/babardiscuss/swannounce/589.html

Practical Issues

Multiple platforms increase the work

- ¥More builds
- ¥More reference platforms to be supported
  - Need to be big, fast, accessible

=> **Keep the number of platforms down!**

Its hard to get physicists to follow directions

- ¥Forms require feedback
- ¥Entries require checking
- ¥And never make them type something twice!

But they will if its worth it

- ¥Multiplatform build feedback
- ¥Automated testing

How do you measure progress quantitatively?

First, count lines of code, number of files

¥Have to start somewhere

Getting more sophisticated

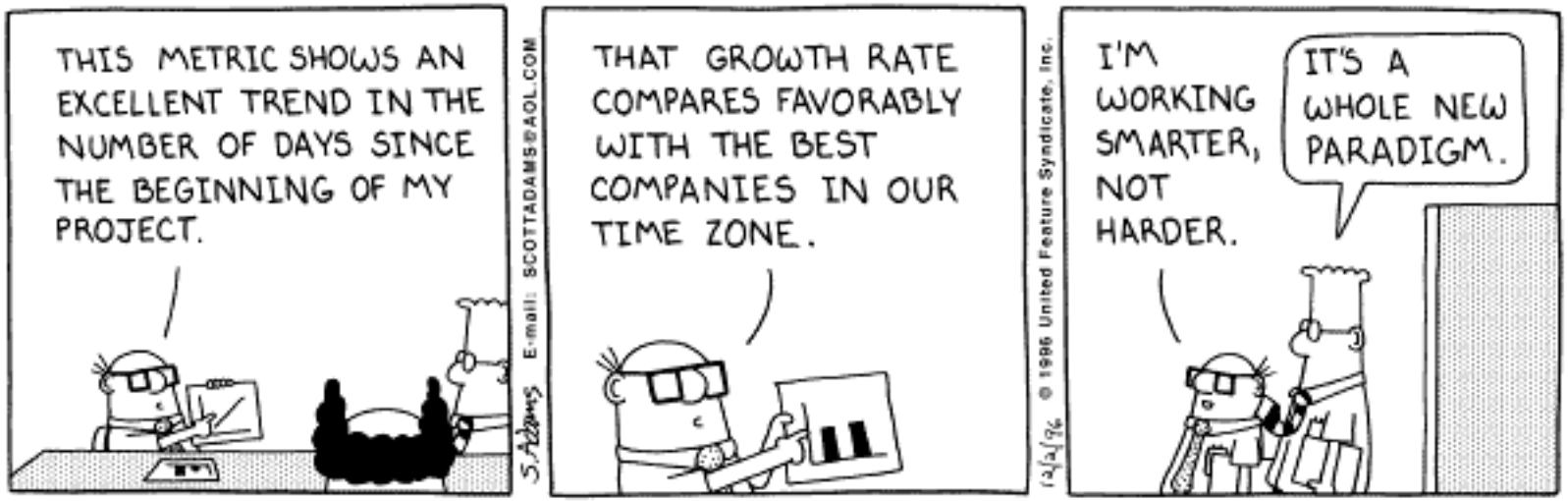
¥Package dependencies, class sizes

¥R. C. Martin s metrics toolkit

¥Number of defects found in the release process

¥GNATs to record bug reports, time to repair

Making progress, but a long struggle



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Summary

BaBar offline uses multi-part system:

- ¥CVS for source repository
- ¥SRT for creating individual releases
- ¥GNATs for bug reports
- ¥A semi-automated system for production release builds
- ¥Email and HyperNews for communications and records

A significant amount of effort needed to maintain this

- ¥Its expensive
- ¥But its also vital infrastructure
- ¥People don t always get recognition

Needs to run smoothly

- ¥Maintains consistency across developers
- ¥Acts as central force, encouraging people to work together
- ¥But must not soak up developer time

Need to continue to improve this

- ¥Can we figure out how to share?

Related Talks at CHEP97

Architecture of the BaBar Reconstruction System: Practical Issues

(Tuesday 10:30 P5)

Panel Discussion: Transition to OO?

(Wednesday AM)

The BaBar distributed development / centralized release system

(Wednesday 18:00 P3)

Applying Object-Oriented Software Engineering at the BaBar Collaboration

(Thursday 14:00 P3)

An object-oriented tracking system for BaBar

(Thursday 14:30 P5)

An object-oriented extended Kalman filter tracking algorithm

(Thursday 16:00 P5)

Beta: A high level toolkit for physics analysis

(Thursday 17:00 P5)