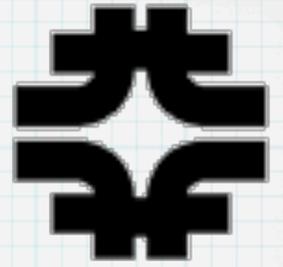




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Beam Simulations redmine projects & the code base unification

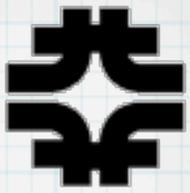
- v-Nucleus Event Generators

Robert Hatcher

Fermilab Computing Division

NuMI-X Mtg 2013-06-20

Fermilab Redmine Project

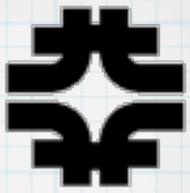


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- Redmine Project: **NuMI Beam**
 - <https://cdcvs.fnal.gov/redmine/projects/numi-beam>
 - sub-projects:
 - NuMI Beam Analysis <https://cdcvs.fnal.gov/redmine/projects/numi-beam-ana>
 - NuMI Beam Simulation <https://cdcvs.fnal.gov/redmine/projects/numi-beam-sim>
 - redmine project allow code repository and wiki for documentation
 - not the tool for presentations, long term study results, calendaring
 - i.e. this doesn't serve as a replacement for DocDB
 - Robert Hatcher serves as project “Manager”
 - Some others have been added as “Developers”
 - if you're not on the list of developers you should be contact me
 - but you must have registered with FNAL's redmine at least once beforehand
 - go to <https://cdcvs.fnal.gov/redmine/projects>
 - click “sign in” in upper right and use your Service Account name & password
 - Code repositories
 - Simulation - CVS copy w/ HEAD (MINOS), NOvA, Minerva branches
 - Analysis - none yet; SVN can be created any time
 - structure? individual/sub-project work areas?

Simulation vs. Analysis



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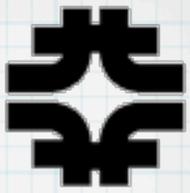


- Simulation project
 - serves for joint development of simulation code (g4numi & flugg)
 - code base is not “private” -- just like sim/reco code within an experiment is shared
 - currently CVS reflect mainline, NOvA, and Minerva branches
 - need to do a detailed “diff” to see how the code bases have diverged
 - goal: to merge the all back to a common base
 - allow temporary branches to do development work
- Analysis project
 - question of confidentiality
 - the wiki + code base are private: visible to only authorized developers
 - this is where derived weights would live until agreed upon release
 - shared analysis code as well
- Documentation
 - need for a new separate DocDB instance
 - restrict access to the same group as the Analysis project



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Wiki & Issue Tracker Demo



- <https://cdcv.s.fnal.gov/redmine/projects/numi-beam-sim/wiki>
 - show wiki

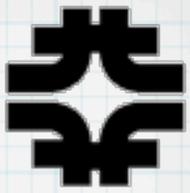
- <https://cdcv.s.fnal.gov/redmine/projects/numi-beam-sim/issues>
 - make issue for “event # = 0” problem



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Simulation Issues

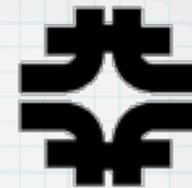


- Complete merged code
 - do full diff for various divergences
- Is the geometry the same?
 - are all the experiments using the same geometry
 - who's fixed what geometry overlaps
 - migrate code so that MINOS vs. NOvA target/horn is run-time choice
- Check ancestor lists for both g4numi & flugg
- migrate outputs to unified ntuple
- fluka11 vs. gcc version issues
- g4numi run-time decision for PhysicsList (already?)
- clean-up build mechanism
- Product-ize it into a UPS package



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A Common Code Base



- Checking out the code
 - export NUMI_BEAM_SIM_CVS=:ext:p-numi-beam-sim@cdcvns.fnal.gov/cvs/projects/numi-beam-sim
 - cvs -d \${NUMI_BEAM_SIM_CVS} checkout [-r branch] numi-beam-sim
 - use “-r nova” or “-r minerva” flags after “checkout” keyword
 - no -r is the mainline branch that is the starting version in MINOS repository
- compare with a previously checked-out copy
 - cvs -d \${NUMI_BEAM_SIM_CVS} checkout -r nova numi-beam-sim
 - mv numi-beam-sim numi-beam-sim-nova
 - diff -r --exclude=CVS numi-beam-sim-nova/ MERGE/nova_numisoft | egrep -v '[0-9]c[0-9]||[0-9][0-9]c[0-9][0-9]|\\$Id:|---|diff -r --exclude'

```

2,7d1
< Revision 1.1.2.4 2009/09/24 16:43:38 martens
< original-log: nova revision 1.3 ; 2009.09.24.16.43.38 ; martens
< First version including NuMI beamline geometry for NOvA with medium
< energy target and thinner horn 1 outer conductor
< Mike Martens Vamis Xhagjika
<
Only in numi-beam-sim-nova/fluka/src: asc2ntp.f~
Only in numi-beam-sim-nova/fluka/src: generate_asc2ntp~
< // GEANT4 tag $Name: nova $
> // GEANT4 tag $Name: $
< * Flugg tag $Name: nova $
> * Flugg tag $Name: $

```

```

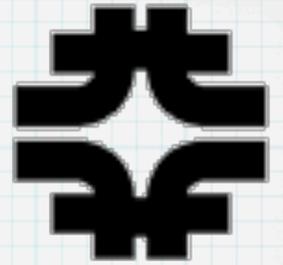
diff -r --exclude=CVS numi-beam-sim-nova/g4numi/include/NumiNuWe
1c1
< // $Id: NumiNuWeight.hh,v 1.1.2.4 2009/09/24 16:43:38 martens Ex
---
> // $Id: NumiNuWeight.hh,v 1.3 2009/09/24 16:43:38 martens Exp $

5,10d4
< * Revision 1.3.4.4 2009/09/24 16:43:40 martens
< * original-log: nova revision 1.3 ; 2009.09.24.16.43.40 ; martens
< * First version including NuMI beamline geometry for NOvA with medium
< * energy target and thinner horn 1 outer conductor
< * Mike Martens Vamis Xhagjika
< *
Only in numi-beam-sim-nova/mars/mars-NuMIprimary: mad_lattice.c.orig
Only in numi-beam-sim-nova/mars/mars-NuMIprimary: old.optics_NuMI.orig
Only in numi-beam-sim-nova/mars/mars-base: ddt.o

```



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ν -Nucleus Event Generators

Robert Hatcher

Fermilab Computing Division

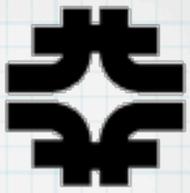
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Workshop



- Sponsored by Pitt Univ: Steve Dytman
- <http://www.pitt.edu/~dytman/NeutrinoGenerator/pittpacc-june13.htm>
- Theorists, Experimentalists in the same room
 - agree that current generators (GENIE, NEUT, NuRow, GIBUU, etc..) are lacking
 - wide range of opinions how far we can go
 - lots of concern about nuclear issues (initial state, FSI, etc)
 - NuMI energies are the most uncertain region
- Experiments vary in their needs
 - oscillation experiments are less sensitive; have issues they *should* address
 - LAr experiments are so fine grained that they almost see too much
 - exclusive states are hard (some would say impossible) to calculate
 - but detector simulations need full events, not inclusive distributions
 -

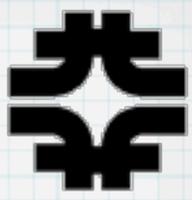


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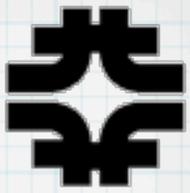
- xyzzzy

Backup / Details





Details: Building the Merging Code



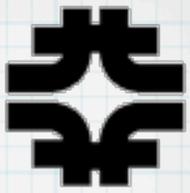
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- Start w/ a copy of the original minos repository
- Create a branch tag based on date of fork
- Process log of fork'ed copy to get list of revision and their log messages
 - logs are in order of most recent to older
 - commits need to be older to most recent
- Check out a revision on a local copy of fork
- Copy to new working area branch
 - handle addition of new directories, new files, removing files
- Check in to new repository tree
 - additional line in log message records original info (date,author, revision)
- Repeat for revisions
- Repeat for files
- Repeat for forks (nova, minerva)



Details: Building the Merging Code



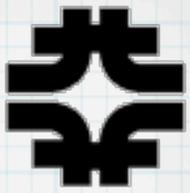
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- Oct '12 bash script took 5 hours for processing nova variant
- re-write in python (w/ objects and better control structures)
- work off copies of repositories copied from cdcvs to local laptop
- new processing took ~1 hr for nova version (less for minerva)

- many twists and gotcha's:
 - reversing log order
 - identifying new files, start/end of log messages
 - files not in original copy (some minor import logs are lost)
 - new directories; directories that are empty at the end of processing
 - files in the original copy, but not at the time of fork
 - removal is tricky
 - CVS reporting of times (on linux UTC, on OS X local + offset)
 - files w/ funky names: '(ANCSTR)' ... seriously, who does that?

Details: Adjusting Author/Date



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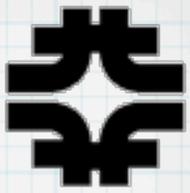
- Once the code is merged, we'd like revision logs to reflect the real date and author of that change
- Can't do this on version that was checked out
- Must be done on repository copy
 - RCS files are `repo-top/path/path/file.ext,v` (chmod to be read-only)
- Pick out old (revision,date,author) lines that were added
 - associate w/ new revision #
- Find matching new revision #'s (date,author)
- Create 'sed' (stream editor) script to edit the file

```
/^1.1.2.1$/ { N;  
  s/rhatcher/minervacvs/g;  
  s/2013.05.11.05.44.02/2010.11.01.22.40.01/g  
}  
/^commitid  .*/;$/ D  
//p
```

- Edit file `LANG=C LC_CTYPE=C sed -f sedscrip file.ext,v > file.ext,v-mod`
 - binary files create non-legal byte streams for `LANG=en_US.UTF-8`



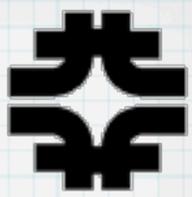
Old Stuff



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- xyzzzy



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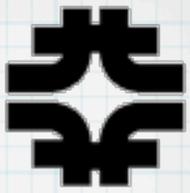
Merging CVS Repositories



- Two phases
 - create CVS repository with all versions on branches
 - fix up CVS *,v files to get commit timestamp/authors right
- First phase: done
 - complex bit of bash scripting to parse CVS log files

	RCS files	logs (dir)	commits
MINOS	1119	2451 (65)	---
NOvA	1129	3166 (15)	1458
Minerva	601	1326 (9)	831

- changed files, added file & directories, removed files
- **not as complete as I thought on Thursday (2012-10-18)**
 - revisiting ...



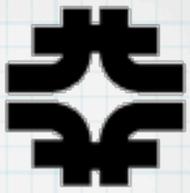
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Merging CVS Repositories



- Second phase: understood
 - complex bit of bash scripting to hack up ,v files
 - “sed” is not quite the right tool, and I’m not sure what is
 - but a bit complicated ... I found something that should work
 - `sed --copy --in-place=.sed.bak --file=${sedscrip} ${workingfile}`

```
/^1.1.2.10$/ {  
# found revision #, append a line  
N  
# find the 2nd pattern on the next line  
\ndate.*2012.10.16.20.03.12.*author.*rhatcher/ {  
# found it, now edit making the date, author right  
s/2012.10.16.20.03.12/2012.07.25.21.36.40/  
s/rhatcher/corwin/  
}  
}
```
 - need to fix problems w/ stage 1 first

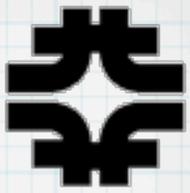


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Checkout code copy



- Ideally:
 - `export CVS_RSH=ssh`
 - `usr/bin/cvs -d :pserver:anonymous@minoscvs.fnal.gov:/cvs/minoscvs/repl \`
`checkout -d numisoft -r nova numisoft_thedancemix`
- But that is not right, so I took a copy of nusoft:
 - `/usr/bin/cvs -d :pserver:anonymous@minoscvs.fnal.gov:/cvs/minoscvs/repl \`
`checkout -d numisoft numisoft_cp_nusoft`
- -d flag, twice?
 - first flag is for `/usr/bin/cvs`, like `$CVSROOT`
 - second flag is for `checkout`, modifies output directory to different from module name



Geant 4 (Aside) Unified Beam Ntuple format



- Some recent refinements
- Added (preliminary code) to nusoft repository, as “dk2nu”
 - subdir for tree structures, GENIE interface, scripts, documents
- Proposal: [MINOS-DocDB-9070](#)
 - initial version publicly visible on 2012-05-02
 - accompanying talk [MINOS-DocDB-9084](#)
 - access changed from “beamrw” to “public”
 - also recent Joint NuMI Beam talk: [MINOS-DocDB-9453](#)