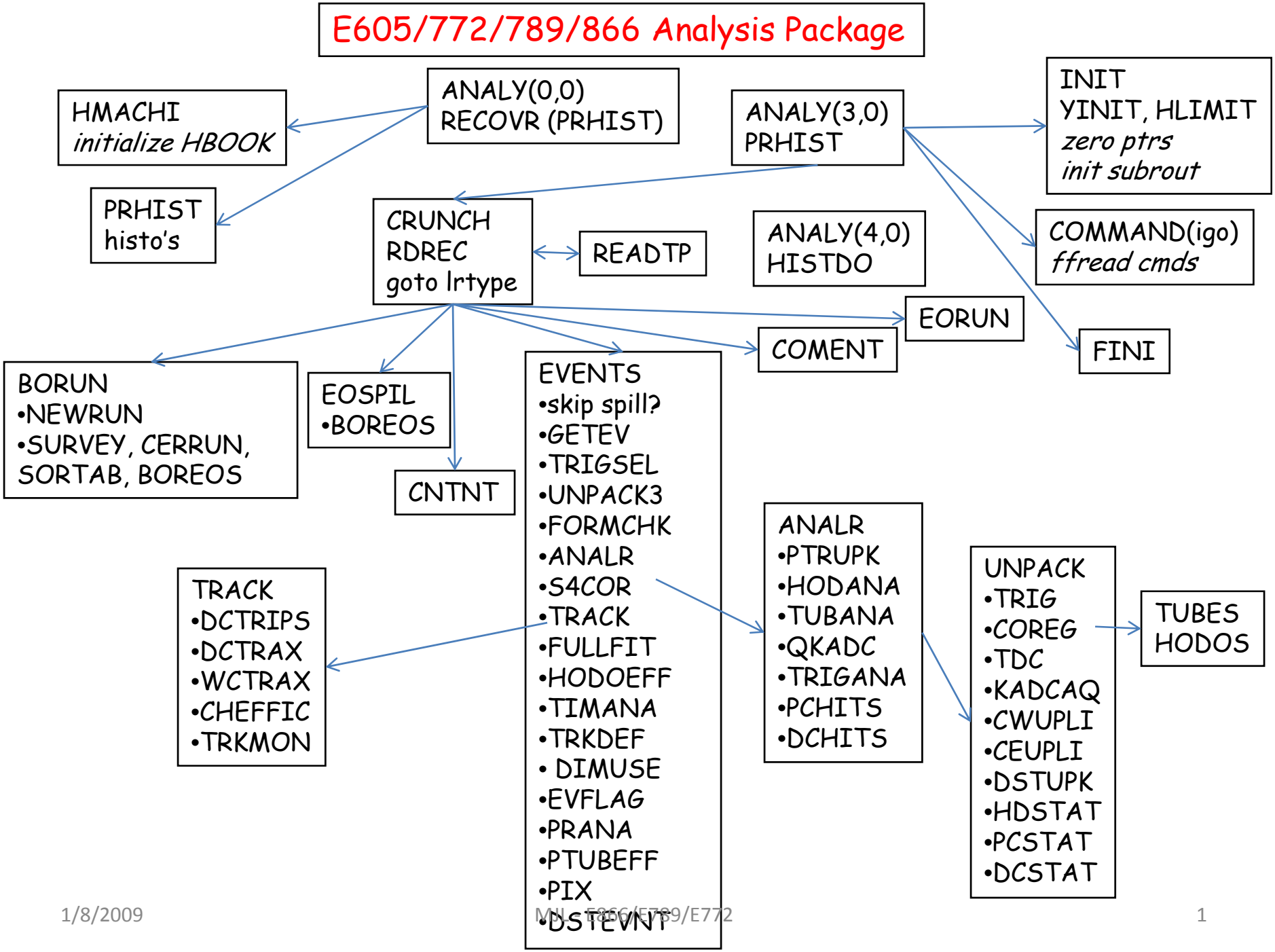
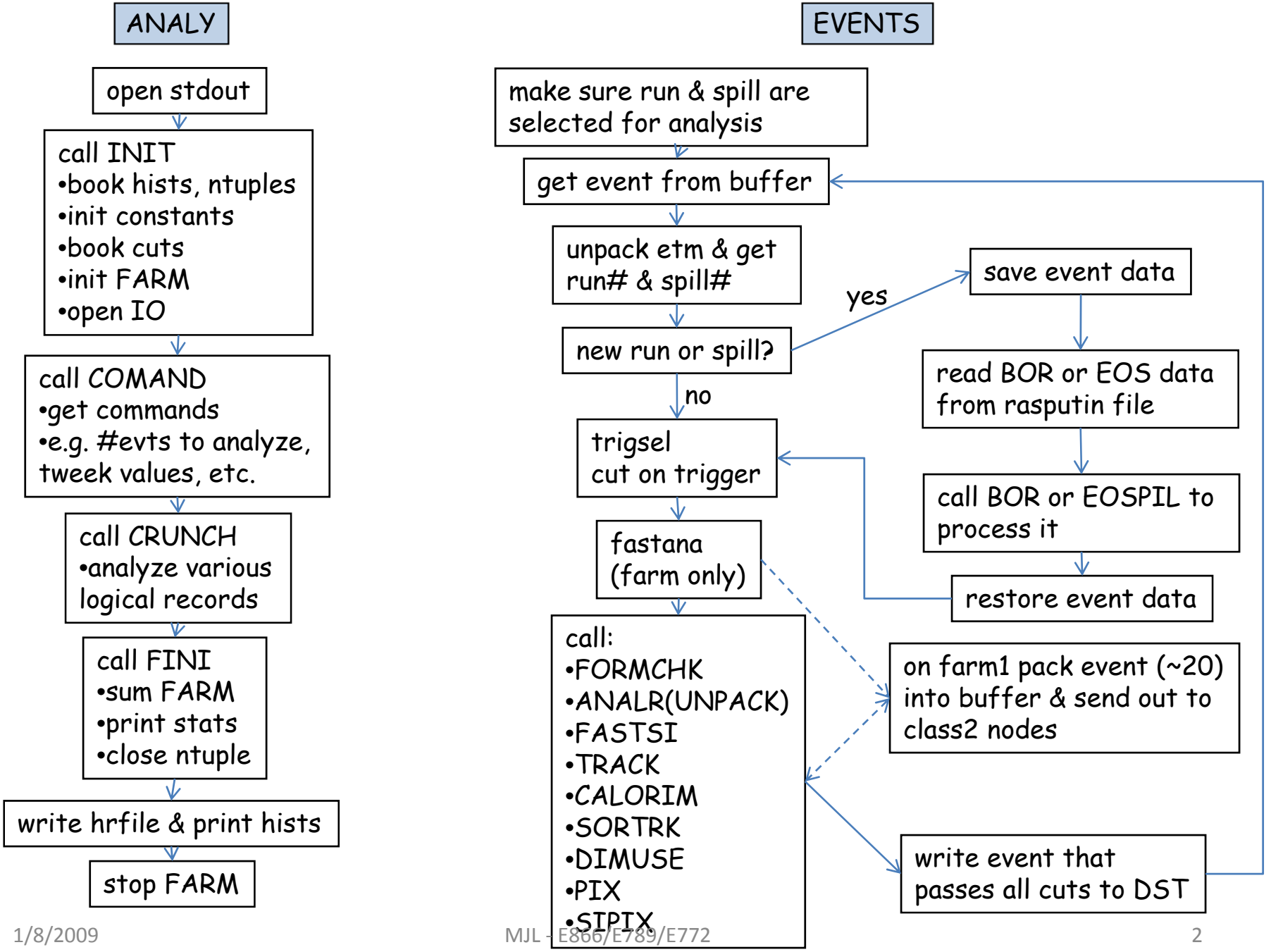
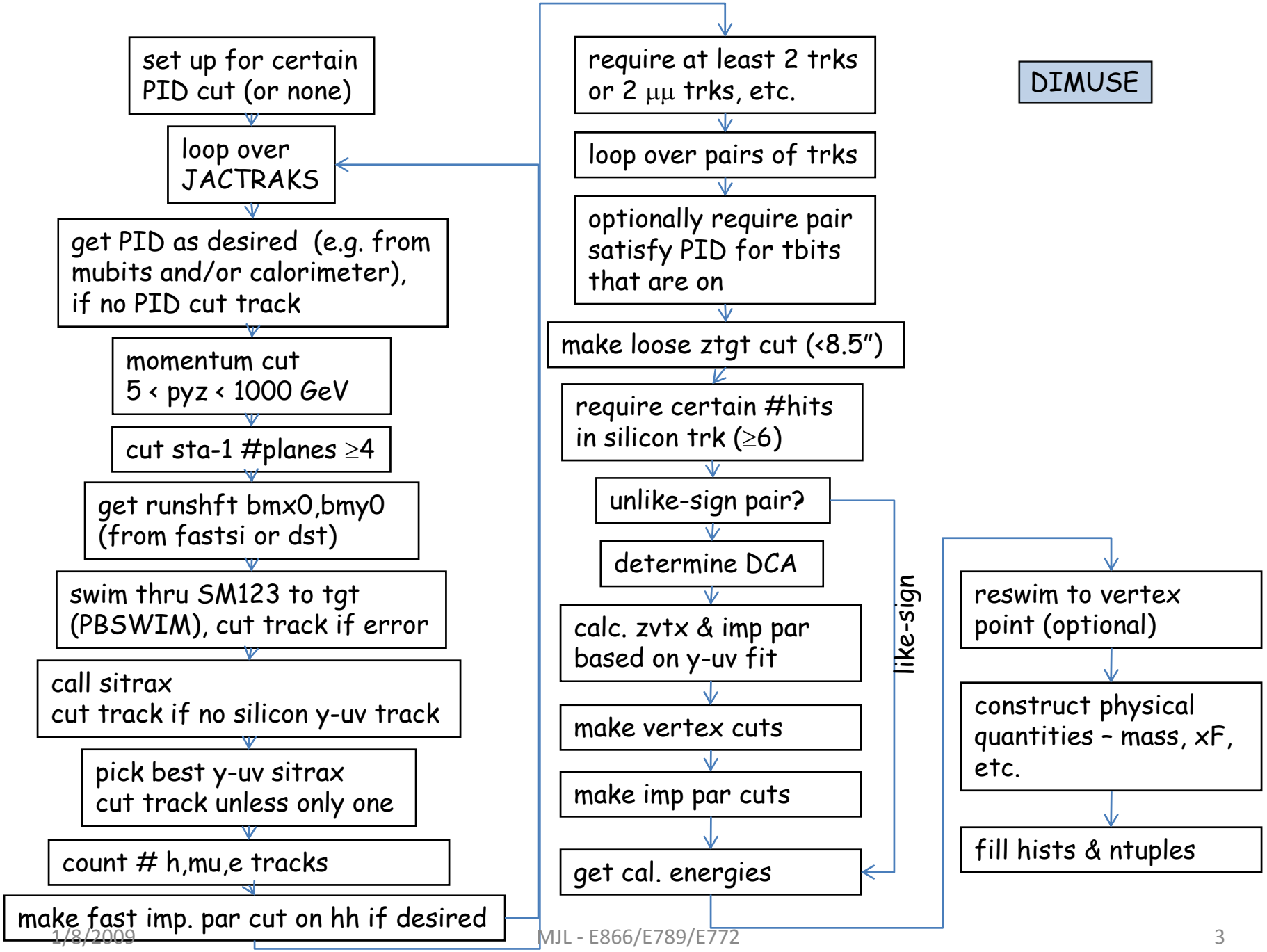

E605/772/789/866 Analysis Package
HMACHI
initialize HBOOK
ANALY(0,0)
RECOVR (PRHIST)
PRHIST
histo's
ANALY(3,0)
PRHIST
INIT
YINIT, HLIMIT
zero ptrs
init subrout
COMMAND(igo)
ffread cmds
FINI
CRUNCH
RDREC
goto lrtype
READTP
ANALY(4,0)
HISTDO
EORUN
COMENT
BORUN
•NEWRUN
•SURVEY, CERRUN,
SORTAB, BOREOS
EOSPIL
•BOREOS
CNTNT
EVENTS
•skip spill?
•GETEV
•TRIGSEL
•UNPACK3
•FORMCHK
•ANALR
•S4COR
•TRACK
•FULLFIT
•HODOEFF
•TIMANA
•TRKDEF
• DIMUSE
•EVFLAG
•PRANA
•PTUBEFF
•PIX
•DSTEVNT
TRACK
•DCTRIPS
•DCTRAX
•WCTRAX
•CHEFFIC
•TRKMON
ANALR
•PTRUPK
•HODANA
•TUBANA
•QKADC
•TRIGANA
•PCHITS
•DCHITS
UNPACK
•TRIG
•COREG
•TDC
•KADCAQ
•CWUPLI
•CEUPLI
•DSTUPK
•HDSTAT
•PCSTAT
•DCSTAT
TUBES
HODOS


ANALY
open stdout
call INIT
•book hists, ntuples
•init constants
•book cuts
•init FARM
•open IO
call COMAND
•get commands
•e.g. #evts to analyze, tweek values, etc.
call CRUNCH
•analyze various logical records
call FINI
•sum FARM
•print stats
•close ntuple
write hrfile & print hists
stop FARM
EVENTS
make sure run & spill are selected for analysis
get event from buffer
unpack etm & get run# & spill#
new run or spill?
yes
save event data
read BOR or EOS data from rasputin file
call BOR or EOSPIL to process it
restore event data
no
trigsel
cut on trigger
fastana
(farm only)
call:
•FORMCHK
•ANALR(UNPACK)
•FASTSI
•TRACK
•CALORIM
•SORTRK
•DIMUSE
•PIX
•SIPIX
on farm1 pack event (~20) into buffer & send out to class2 nodes
write event that passes all cuts to DST


DIMUSE
set up for certain PID cut (or none)
loop over JACTRAKS
get PID as desired (e.g. from mubits and/or calorimeter), if no PID cut track
momentum cut 5 < pyz < 1000 GeV
cut sta-1 #planes ≥4
get runshft bmx0,bmy0 (from fastsi or dst)
swim thru SM123 to tgt (PBSWIM), cut track if error
call sitrax
cut track if no silicon y-uv track
pick best y-uv sitrax
cut track unless only one
count # h,mu,e tracks
make fast imp. par cut on hh if desired
require at least 2 trks or 2 μμ trks, etc.
loop over pairs of trks
optionally require pair satisfy PID for tbits that are on
make loose ztgt cut (<8.5")
require certain #hits in silicon trk (≥6)
unlike-sign pair?
like-sign
determine DCA
calc. zvtx & imp par based on y-uv fit
make vertex cuts
make imp par cuts
get cal. energies
reswim to vertex point (optional)
construct physical quantities – mass, xF, etc.
fill hists & ntuples

Brief Summary of E866/NuSea Analysis Software - MJL 10/24/08
==========

- code is maintained in CMZ
  - last ran on HP-UX around 2000
  - unclear how to get out of CMZ now?
  - a CAR file is an ascii transcription of a CMZ file
  - I have e866v13.car and mc866v11+.car

- cmzlogon.kumac - file loaded when CMZ starts
  - reads user.cmz (code changed from standard) and e866v13.cmz (standard code) –
  - sets various switches, e.g. "select hp" - define compiler switches for Unix type
  - newlib - creates library, uses "cflib -p" - link - uses external script ("l866") to make executable

- similar scheme for simulation code
  - its own cmzlogon.kumac
  - reads mc866v11+.cmz and user.cmz

and see, http://p25ext.lanl.gov/e906/e906.html

- l866 - script to link executable
  - compiles kudef.cdf with Kuip (command definitions for runtime)
  - links to libuser.a (made by CMZ above)
  - links to libtrigger.a (made where?)
  - links to libbufio.a (E866 IO library, only needed to read 8mm tapes?)
  - links to many CernLibs: packlib, grafX11, kernlib, packlib

- run - script to run program with certain inputs & outputs
  - defines data or dst input file
  - defines dst output, histogram output, ntuple output files
  - defines trigger matrix dat directory
  - trigger matrix file - profile (apertures)
  - SM12 field maps - SM3 field map
  - survey (geometry)
  - runs executable (dimu)
  - with input from "in" file (run time commands)

Cookbook for building and running E866/NuSea Analysis & Simulation Software - MJL - 1 November 2008

==========

see http://p25ext.lanl.gov/e906/e906.html

analy - analysis

---

cd analy/
mkdir src

cmz
newexe
exit

nohup nice run >& run.log &

paw
hi/fi 1 run.his
hi/pl 1376(20:100)

notes:

* newexe uses:
  - e866v13.cmz (base), user.cmz (fixes)
  - libbufio, libtrigger & cernlibs
  - l866 - script to link
* run analyzes a raw data file:
  - reads nk3397s.tap (short lxf raw data file)
  - switches set in cmz: cd switches; vi switch
    - JACTRACK, ETM on
    - READDST, RETRACK off

buffio - data io library
---
cd buffio/
* compile & build as in build.csh

trigger - trigger library
---
cd trigger/
cmz
exe trigger#arc
exe trigger#library

swap - to swap bytes of tap or dst file if necessary
---
cd swap/
makefile
•see run

mclxf - simulation
---
cd mclxf/
mkdir src

cmz
newexe
exit

nohup nice run >& run.log &
* newexe uses:
  - mc866b11+.cmz, user.cmz
  - libbufio, libtrigger & cernlibs
  - lmc866 - script to link

environment

Scientific Linux 4.7 on a IBM Thinkpad T42p
Linux slinux_mjl 2.6.9-78.0.1.EL #1 Tue Aug 5 12:35:58 CDT 2008 i686 i686 i386 GNU/Linux
gcc version 3.4.6 20060404 (Red Hat 3.4.6-10)
paw - Version 2.14/04 12 January 2004
cmz - CMZ Code Manager version 1.50/14 (21/01/99)

directories
---
analy - analysis
mclxf - simulation
buffio - io library
trigger - trigger library
dat - various supporting data files (e.g. surveys)
map - magnet field maps
swap - byte swapping program for data files (little vs big endian)
trig - ?trigger files?
car2cvs - cmz -> cvs program from Atlas (not working yet)
dedx - VonGinneken dE/dx program and old files

other

---

* to see what libraries you need to link to:
  -get any small/simple dummy.f file
  - g77 -v dummy.f
  - ouput will show what libraries g77 likes to use
  - put those in your link file
  - similarly for gfortran (which the CERN libraries used)

* magnet maps are in a machine/fortran dependent format
  - use runb,bin.f to read ascii version and convert to binary version on your machine if necessary

* car files are ascii versions of cmz files

E789 ANALYSIS NOTE

JACTRACK CONTENTS - MJL, 13 NOV 1990

DST TRACK BANK:

ABC(JTRACK(I)+1)=XM3B
+2)=YM3B
+3)=ZM3B
+4)=THETAX1
+5)=THETAY1
+6)=THETAX2
+7)=THETAY2
+8)=C.L.
+9)=NDF
+10)=CHISQ/NDF
+11)=PM3
+12)=QUALITY
+13)=CHBITS
+14)=HDBITS
+15)=ID BITS
+16)=QT (total energy)
+17)=EM Fraction
+18)=E1 Fraction
+19)=OVL (overlapping)
+20)=save for later use

TRACE BANK:

------\ ABC(JTRACK(I)+JTRACE)=TRACFLG
| JTRACE+1)=XTGT ----\
| +2)=YTGT |
| +3)=ZTGT + iterated
| +4)=TANXT | swim
| +5)=TANYT ---/
+ 18-plane +6)=BMX0 ---\ runshft
| fit +7)=BMY0 ---/
| +8)= MT
| +9)= MT
| +10)= MT
| +11)=XTGT ---\
| +12)=YTGT |
---/ +13)=TANXT |
----------\ +14)=TANYT |
| +15)=Y@MSCAT |
+ calor- +16)=Y@236" + non-iterated
| imeter +17)=Y@176" | swim
-/ +18)=Y@104" |
+19)=Y@-40" -/
+20)=DIMASS

KINEMATICS:

ABC(JTRACK(I)+JKINEM)=PM12
+JKINEM+1)=PT
+2)=THTCM
+3)=PHI
+4)=???

CERENKOV:

ABC(JTRACK(I)+JCEREN)=CERENKOV-ID
+1)=CERENKOV-CL
+2)=#photons match track
+3)=#photons in event
+4)=???

ntuple contents

```
C
C *** SM3 variables ***
C x3p/n         x of track at sm3 for particle (u/d)
C y3p/n         y  "   "    "  "   "      "      "
C z3p/n         z  "   "    "  "   "      "      "
C tnx3p/n        Tangent of theta x at sm3 (incomming)
C tny3p/n          "     "   "   y  "  "       "
C tny3pp/n         "     "   "   y  "  "  (out going)
C p3p/n         Particle Momenta at sm3 **IN THE YZ PLANE**
C
C *** Target variables--Uniterated ***
C xplus/minus   x intercept of track at target
C yplus/minus   y      "     "   "    "    "
C zunin         z of closest approach of tracks near target
C
C *** Y values along the way ***
C y86p/n         y at  86 in
C y104p/n         "  " 104 in
C y236p/n         "  " 236 in
C
C *** Target variables--Iterated***
C xt            x position of interaction
C yt            y     "    "      "
C zt            z     "    "      "
C tnxtp/n       Tangent of theta x
C tnytp/n         "     "   "   y
C ptgtp/n       Momentum at target **IN THE YZ PLANE**
C ptxyp/n        transverse momentum at target
C
C *** number of  tracks ***
C mutrak         number of muon tracks in event
C *** Kinematic dimoun event variables ****
C pt            Transverse momenta
C dimom           momenta of the dimuon pair
C xf, x1, x2     xf, x1, x2
C am             invariant mass of dimuon pair
C pphi           Production phi in C-S frame
C dphi           Decay phi in C-S frame
C dtheta          Decay Theta in C-S  frame
C
C *** Event data ***
C kevcnt          event number
C hour           time in hours
C day            time in days
C tbin           trigger bits words 2, 3 (numbered from 0)
C                inputs to the triggers
C tbraw           trigger bit words 4, 5 (numbered from 0)
C                raw triggers
C tbpre           trigger bit words 6, 7 (numbered from 0)
C                prescaled triggers
C tbtgt           trigger bit word 11 (numbered from  0)
C                target position from trigger bits
C       Note on trigger bits:  The bits are packed into the lower
C                16 bits of int*4.  In the case of row wise ntuples,
C                these values are then floated into real*4 values which
C                are then entered into the ntuple.
C tbraw_ck        Don K.'s reconstructed tbraw bits
C rfscal         rfscaler
C nhodfir         number of hodoscope hits
C nevlen          raw event length
C nroad           number of matrix roads
at station 3 for dump track
```

ntuple contents - continued

C
C *** Spill data ***
C irun run number
C kspill spill number
C egs egs
C sem sem6 counts
C semsb sem6 and not busy
C amon amon
C amonsb amon and not busy
C live live time (sem6sb/sem6)
C x134l/r/lr counts in x134l,r,lr
C bpmx,y bpmx,y
C bpmxi,yi bpmxi,yi
C lamb4 Counts in lambda/4
C duty Duty factor
C tbrawh MJL simple reconstructed tbraw bits
C tgt Target position from target position scaler
C pa1,2,3,4 number of physA1/2/3/4 triggers in spill
C ic3 ic3
C ic3sb ic3sb
C tfi tfi
C tgo tgo
C goodsp 1=spill is good, 0=spill is bad
C likesn 1=analysis done on like sign pairs, 0=opposite sign
C cbm beam cerenkov adc for intime bucket
C cbmsum beam cerenkov adc sum
C cbmbavg beam cerenkov average over outtime buckets
C

C *** Monte Carlo data--all quantities are thrown/generated ***
C amth thrown mass
C xfth " xf
C ptth " pt
C [x|y|z]vth " vertex location
C p[x|y|z][1|2]th
C thrown x/y/z momenta of track 1/2
C p3yz[1|2]th generated yz momenta of track 1/2 at sm3 (compare
C with p3[p|n])
C p3[x|y|z][1|2]th generated x/y/z momenta of track 1/2 before sm3
C tn3yp[1|2]th generated yz tangent AFTER sm3 (before can be found
C from p3y1th/p3z1th)
C [x|y|z]3[1|2]th generated x/y/z location for track 1/2 at sm3 bend
C plane
C p[1|2]abs[1..8]th generated absolute momenta for track 1/2 before
C entering absorber section 1-8 (8 is actually just
C after tha absorber)
C costth thrown cos(theta)
C pphith " production phi
C dphith " decay phi
C weight[1|2] user defined quantaties (weights)

ntuple contents - continued

C *** Level 3 data ***
C l3bit level 3 result bits (0-7)
C 0 - tagging-only mode
C 1 - abort
C 2 - special test mode
C 3 - passed due to prescale
C 4 - passed mass cut
C 5 - passed pt cut
C 6 - passed xf cut
C 7 - passed other physics cut
C am_l3t maximum target mass from level 3
C pt_l3t maximum target pt from level 3
C xf_l3t maximum target xf from level 3
C nt_l3t number of target tracks from level 3
C am_l3d maximum dump mass from level 3
C pt_l3d maximum dump pt from level 3
C xf_l3d maximum dump xf from level 3
C nt_l3d number of dump tracks from level 3

C tracks 1 & 2 below are those that made the maximum mass
C p1_l3 momentum of target track 1
C p2_l3 momentum of target track 2
C p1_l3d momentum of dump track 1
C p2_l3d momentum of dump track 2
C ty1_l3 thetay of target track 1
C ty2_l3 thetay of target track 2
C ty1_l3d thetay of dump track 1
C ty2_l3d thetay of dump track 2
C y11_l3 y at station 1 for target track 1
C y21_l3 y at station 2 for target track 1
C y31_l3 y at station 3 for target track 1
C y12_l3 y at station 1 for target track 2
C y22_l3 y at station 2 for target track 2
C y32_l3 y at station 3 for target track 2
C y11_l3d y at station 1 for dump track 1
C y21_l3d y at station 2 for dump track 1
C y31_l3d y at station 3 for dump track 1
C y12_l3d y at station 1 for dump track 2
C y22_l3d y at station 2 for dump track 2
C y32_l3d y