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STAR Software Tutorials
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Basics of Running STAR Software in ROOT

- **explanation of software chain (bfc) in ROOT**
- **how to read DSTs produced by bfc in ROOT**
- **example of writing a maker and running it from a macro**

NOTE: This tutorial uses STARNEW=99f offline software library version!

ROOT in STAR

- connect simulation,reconstruction,analysis code (C++,C,fortran) to the ROOT production framework using ROOT macros (CINT — close to C++)
- also do analysis from ROOT - make ntuples, plots, analysis code etc.
- the reconstruction (or other) code runs using a ROOT macro (bfc.C) and has a "chain" of "makers". The makers drive each different piece of the software. At the end, it writes out table-based (for now) DST information to a ROOT file

Types of Chains in STAR

Standard offline simulation/reconstruction chain:

- event generator
- gstar (det. sim.)
- detector response simulations (like tfs or trs)
- reconstruction for each detector (cluster finding, hit finding, tracking)
- global reconstruction, using all detector info (global tracks, vertices)
- some physics analysis (like first pass of search for V0's)
- build the DST (Data Summary Tape) tables from above results
- write out .dst.root, xdf files with DST tables
- write out .hist.root file with histograms

Types of Chains in STAR

From real data - DAQ system chain

- read out DAQ and get raw event file
- reconstruction (cluster finding, tracking, global tracking, vertex finding)
- some physics analysis (like first pass of search for V0's)
- build the DST (Data Summary Tape) with above results
- write out .dst.root, xdf files with DST tables
- write out .hist.root file with histograms

(i.e. we don't have the first 3 steps that offline simulations has)

Run bfc.C

- log onto rlnx02 (for example)
- work area $\rightarrow$ cd $/\mathrm{scr22}/\mathrm{kathy}/\mathrm{test}$
- starnew (this will put you in 99f)
- root4star
- .x bfc.C() $\rightarrow$ gives explanation

Read DST files created from bfc.C

Macros are in $STAR/StRoot/macros directory. Copy to your work area and put in the input file to use. Kathy's examples use dst's located in /disk00000/star/test/new/ from July 21,22 which were made using starnew=99f library.

Use Macros:

- bfcread.C - reads .dst.root file and pops browser
- QA_bfcread_dst_tables.C, QA_bfcread_dst_full_tables.C - reads .dst.root files and prints out info from tables
- bfcread_hist_list.C - reads histogram file and lists histograms from all Makers

Read DST files created from bfc.C

Physics Analysis Data - from dst

- data organization defined in StEvent class
- filled from dst tables using StEventMaker class
- use doEvents.C to read .dst.root file and then run StEventMaker in chain
- now run your physics analysis makers
  (e.g. StAnalysisMaker class)

Write Maker and Run from Macro

Use the StRoot/St_QA_Maker class as an example to start from. You can check it out of CVS into your area and look for methods listed below to see how it works.

- Init method - books histograms
- Make method - fills histograms from dst tables
- Finish method - if flag set on, draws histograms to screen and send to postscript file

To use this class:
Run bfcread_dst_QAhist.C macro to read .dst.root file and then run St_QA_Maker in chain