Recent Improvements in Collsoft

A. Mereghetti
Outline

- Collsoft SVN repo
- HTCondor
- Back-ups
- BeamLossPattern
- Optics checks
- CollDB check
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The Collsoft Repo

- SVN repo available to everyone, it is not amereghe's repo!
  → everyone in the team who finds problems is welcome to commit corrections!
- Aim: to store material useful to the team:
  - configuration files for (reference) simulations;
  - (official) tools for simulations: pre-/post-processing, submission, analysis, plotting, generation of aperture models...
  - Miscellanea: template of reports, machinery for generating TCT centre functions, …;
- source of reference material, to avoid:
  - avoid re-running into old problems / re-inventing the wheel;
  - use state-of-art tools / inherit recent updates;
- SVN:
  - repo on the remote server:
    - Stored at svn.cern.ch/reps/collsoft
    - can be browsed through (web browser): https://svnweb.cern.ch/cern/wsvn/collsoft;
  - repo on your local machine:
    - trunk / branches / tags;
    - keep synched with version on remote server: svn co / ci / up ;
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HTCondor - Intro

- **Upcoming** batch system, replacement of LSF;
- **More flexible** batch system: it allows to reach different computing resource (LSF, grid, BOINC, …) with only one interface;
- **Time frame:**
  - move the entire ABP group during the first half of 2017;
  - Apr – May: grace period, to move scripts and test HTCondor;
- **For collimation studies, the same approach as for LSF is used:**
  - For each run dir, an *.job* file is generated;
  - A further *htcondor.sub* has to be prepared, with general simulation settings;
  - Instead of *bsub*: `condor_submit htcondor.sub`;
- **In the following, a demo, comparing LSF and HTCondor submission, with HL-LHC taken as example (v1p2, 2σ retraction, B1H);**
HTCondor - Demo

- Extract reference input files from collsoft SVN repo:
  - https://svnweb.cern.ch/cern/wsvn/collsoft → browse to desired case;

- Prepare workspace:
  `cd /afs/cern.ch/work/a/amereghe; mkdir testCondorSubCollimation; cd testCondorSubCollimation`
  `svn co svn+ssh://svn.cern.ch/reps/collsoft/SixTrack_material/Simulation_scenarios/HLLHC/v1p2/2sigma_retraction/B1_cleaning clean_input`
  `
  tree -hC`

- Prepare input files (eg request 20 turns):
  `cd clean_input; svn status`
  `emacs fort.3`
  `svn status; svn diff | colordiff; cd -`

- Get ready to submit:
  `mkdir submitToLSF; cd submitToLSF; ln -s ../clean_input; cd -`
  `mkdir submitToHTCONDOR; cd submitToHTCONDOR; ln -s ../clean_input; cd -`
  `
  tree -hC`
HTCondor – Demo (II)

• Concerned scripts:
  emacs
  ~/private/repos/collsoft/SixTrack_material/Utilities/Submission_script/sixtrack_batch.sh &
  emacs
  ~/private/repos/collsoft/SixTrack_material/Utilities/Submission_script/htcondor.sub &

• Submit to LSF:
  cd submitToLSF ;
  ~/private/repos/collsoft/SixTrack_material/Utilities/Submission_script/sixtrack_batch.sh ; \tree -Ch ; cd - ; bjobs

• Submit to HTCondor:
  cd submitToHTCONDOR/ ;
  ~/private/repos/collsoft/SixTrack_material/Utilities/Submission_script/sixtrack_batch.sh ; \tree -Ch ; cd - ; condor_q

• Check that results are identical:
  gunzip */run0001/screenout.gz
  colordiff submitToHTCONDOR/run0001/screenout submitToLSF/run0001/screenout
  colordiff submitToHTCONDOR/run0001/coll_summary.dat submitToLSF/run0001
  colordiff submitToHTCONDOR/run0001/FirstImpacts.dat submitToLSF/run0001
  colordiff submitToHTCONDOR/run0001/impacts_real.dat submitToLSF/run0001
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Back-Ups

• Let’s try to have alternatives to external hard-drives!
• Available services:
  • CASTOR → apparently, no hard limits on user (apart from 1Mfiles in single folder);
  • EOS → with limits:
    • Max number of files in the entire user space: 1Mfiles;
    • Max occupancy in user space: 1TB;
    • No back-up on tape;
  • CERNBOX (i.e. EOS via web interface): limits of EOS + 4GB max upload per file;
• `backUp.sh` from SixDesk environment:
  • To back up a study via a simple terminal line command;
  • Synergy with simulation infrastructure for DA studies;
  • Easier to maintain a single tool;
Back-Ups - Demo

- **Script available in AFS:**
  
  `/afs/cern.ch/project/sixtrack/SixDesk_utilities/dev/utilities/bash/backUp.sh`

- **Create zip file of study:**
  
  `zip -r submitToHTCONDOR.zip submitToHTCONDOR ; \ls -ltrh`

- **Set up environments (needed not for script but for demo! – tcsh syntax):**

  - **EOS:**
    
    ```
    setenv EOS_MGM_URL root://eosuser.cern.ch
    ```

  - **CASTOR:**
    
    ```
    setenv STAGE_HOST "castorpublic"
    setenv STAGE_SVCCLASS "default"
    ```

- **Back up to CASTOR:**

  ```
  nsls -l /castor/cern.ch/user/a/amereghe
  /afs/cern.ch/project/sixtrack/SixDesk_utilities/dev/utilities/bash/backUp.sh -f submitToHTCONDOR.zip -s CASTOR:backUps
  nsls -l /castor/cern.ch/user/a/amereghe/backUps
  ```

- **Back up to EOS:**

  ```
  eos ls -l /eos/user/a/amereghe
  /afs/cern.ch/project/sixtrack/SixDesk_utilities/dev/utilities/bash/backUp.sh -f submitToHTCONDOR.zip -s EOS:backUps
  eos ls -l /eos/user/a/amereghe/backUps
  ```
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BeamLossPattern

- Recent changes:
  - Possibility to treat any accelerator length (mfiascar, 2016-02-26);
  - Effectively fitting RECTANGLE aperture type; in the past, APER(3)=0 and APER(4)=0 force the linear fitting of the circular part (RECTELLIPSE formalism) to go to 0.0;

- Changes for RECTANGLE aperture:
  - Similarly to ELLIPSE, 4 specifiers should be given → to generate the four specifiers: collsoft/SixTrack_material/Utilities/Generate_aperture/Tools/Python/modifyApertures.py
  - Updated automatic correction of aperture profiles;
  - Changes mainly in Aperture::IsLost, Aperture::GiveAperture, Aperture::PlotAperture in Aperure.cpp;
  - Previous behavior with only two specifiers kept for back-ward compatibility;

- NB: if only APER(1) and APER(2) are specified, then the aperture is RECTANGLE and not ELLIPSE, and it is NOT suitable for fitting with RECTELLIPSE!
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Optics Checks

- From time to time, it is useful to verify the optics actually used by SixTrack:
  - Check against reference given by MADX;
  - Verify optics (crossing conditions) of old simulations;
- grepOptics.sh
  - it parses the screenout and re-formats the optics table computed by SixTrack in a way more suitable for plotting;
- Found in:
  - collsoft/SixTrack_material/Utilities/Analysis_scripts/Bash
Optics Checks - Demo

- **Generate optics file:**
  
  ```bash
  mkdir analysis ; cd analysis ;
  ~/private/repos/collsoft/SixTrack_material/Utilities/Analysis_scripts/Bash/grepOptics.sh ../run0001/screenout ; head SixTrackOptics.dat
  ```

- **Plot optics:**
  
  - *Use* `checkOptics.gnu` (**gnuplot script**) in
    `collsoft/SixTrack_material/Utilities/Analysis_scripts/Gnuplot`
  
  - *Select desired column:*
    ```
    emacs
    /afs/cern.ch/user/a/amereghe/private/repos/collsoft/SixTrack_material/Utilities/Analysis_scripts/Gnuplot/checkOptics.gnu
    ```
  
  - *plot:*
    ```
    xterm ➔ gnuplot ➔ load
    `/afs/cern.ch/user/a/amereghe/private/repos/collsoft/SixTrack_material/Utilities/Analysis_scripts/Gnuplot/checkOptics.gnu`
    ```
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CollDB

• synchronization between CollPos, CollDB and twiss file not always at best;
• python script for automatically synchronizing info:
  • active collimators based on fort.3 or CollDB or CollGaps;
  • positions in CollPos synchronised with twiss file;
  • beta functions in CollDB synchronised with twiss file;
  • sorting of collimators in CollDB and CollPos based on s-coordinate;
• Demo:
  cd clean_input ; \ls -ltrh
  python2.7
    ~/private/repos/collsoft/SixTrack_material/Utilitie
    s/CollDB/collSettings_lib.py << EOF
  1
  CollDB_HL.data
twiss_hllhc_b1_round.tfs
  EOF
  \ls -ltrh
Documentation

- SixTrack for collimation studies
  - from LHC Collimation Project Web Page (user manual):
  - from SixTrack twiki page (implementation details):
    https://twiki.cern.ch/twiki/bin/viewauth/LHCAtHome/SixTrackCollimatVer

- SixTrack web page:
  http://sixtrack.web.cern.ch/SixTrack/

- Collsoft repo:
  - terminal line commands: ssh+svn://svn.cern.ch/repos/collsoft
  - Browse through repo (web browser): https://svnweb.cern.ch/cern/wsvn/collsoft

- SVN quick reference card:

- HTCondor:
  - Official website: http://research.cs.wisc.edu/htcondor/

- CASTOR:
  - official web site: http://castor.web.cern.ch/
  - quick tutorial for beginners:
    https://cern.service-now.com/service-portal/article.do?n=KB0001103

- EOS: quick tutorial for beginners:
  https://cern.service-now.com/service-portal/article.do?n=KB0001998

- CERNBOX: manual: