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Offline Simulation Software CMSSW_1_7_7 - getting started

This document will explain how to use TOTEM offline software.

Documentation

- The CMS Offline WorkBook, especially:
 - ◆ Setting up your Computing Environment

STEP 0.

Let us login via ssh to some remote machine. It might be `lxplus`, but we will use our own PC `pctotem31.cern.ch` (4 processors, most of the time stands free).

```
ssh -X grzanka@pctotem31.cern.ch
```

My account on `pctotem31` (`grzanka`) differs from my normal CERN account (`lgrzanka`), so I will request kerberos ticket, in order to have access to distributed AFS disk space.

```
kinit lgrzanka
```

STEP 1.

Let us create some temporary directory

```
mkdir -p tmp/offlineSWTest  
cd tmp/offlineSWTest
```

We have to source default set of environment variables which are necessary for work with CMSSW. For bash shell it will be:

```
export VO_CMS_SW_DIR=/afs/cern.ch/exp/totem/scratch/Release/cmsw/  
source $VO_CMS_SW_DIR/cmsset_default.sh
```

Now we have access to `scram` command. We can check that by typing:

```
scram help
```

STEP 2a.

In this step we will compile our software from sources. In order to omit that step, and used compiled version, you can go to step 2b.

First we initialize CMSSW project area:

```
scram project CMSSW CMSSW_1_7_7
```

We can see that after that command following directory structure emerged:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > ls CMSSW_1_7_7/  
bin config doc include lib logs module python share src test
```

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Our sources shall go to `CMSSW_1_7_7/src` subdirectory, so let us copy them there:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > cp -r /afs/cern.ch/exp/totem/soft/cmssw/src/* CMSSW_1_7_7/src/
[pctotem31] /home/grzanka/tmp/offlineSWTest > ls CMSSW_1_7_7/src/
Configuration  Documentation  Geometry  IORawData  RecoTotemT1T2  SimG4Core  TotemRPValidation
DataFormats    EventFilter    IOMC      RecoTotemRP  SimG4CMS      SimTotem    TotemT1T2Validation
```

Now let us start compilation. Our machine has 4 processors, so we can run compilation in 8 threads to speedup this process. Still this will take some time (10-15 minutes).

```
cd CMSSW_1_7_7/
scram b -j 8
```

Now we need to setup runtime environment. Before executing following command be sure to be in some subdirectory of `CMSSW_1_7_7` :

```
eval `scram runtime -sh`
```

This will enable us to use `cmsRun` command.

```
cmsRun --help
```

Now we can go back to `~/tmp/offlineSWTest` directory

```
cd ~/tmp/offlineSWTest
```

STEP 2b.

Let us go to directory with compiled CMSSW modules:

```
cd /afs/cern.ch/exp/totem/soft/cmssw/compiled/CMSSW_1_7_7
```

Now we need to setup runtime environment:

```
eval `scram runtime -sh`
```

This will enable us to use `cmsRun` command.

```
cmsRun --help
```

Now we can go back to `~/tmp/offlineSWTest` directory

```
cd ~/tmp/offlineSWTest
```

STEP 3.

Let us take example configuration file:

```
cp /afs/cern.ch/exp/totem/soft/cmssw/examples/Global/pythia.cfg .
```

Check number of events to generate:

```
untracked PSet maxEvents = {untracked int32 input = 10}
```

Check output file:

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```
module ol = PoolOutputModule { untracked string fileName = "pythia.root" }
```

Check sequence of modules to execute:

```
path pl = { EnergySmeared, EnergyVertexSmeared, g4SimHits ,mix,  
  T1Digis,T2Digis, tlcluster,T2MCl, tlrechit, T2Hits, T2RoadColl,T2TrackColl,  
  tlroads,tltracks, RPSiDetDigitizer, RPClustProd, RPHeCoHitProd,  
  RPSinglTrackCandFind, RPSingleTrackCandCollFit }
```

Now we can run that file:

```
cmsRun pythia.cfg
```

If everything went OK, then we can find output file:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > ls -l *root  
-rw-rw-r-- 1 grzanka grzanka 1259467 Aug 12 15:12 pythia.root
```

All messages generated by CMSSW are stored in txt files:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > ls -l *txt  
-rw-rw-r-- 1 grzanka grzanka 11469275 Aug 12 15:12 debugmessages.txt  
-rw-rw-r-- 1 grzanka grzanka 12528 Aug 12 15:07 error.txt  
-rw-rw-r-- 1 grzanka grzanka 58725 Aug 12 15:12 info.txt  
-rw-rw-r-- 1 grzanka grzanka 14190 Aug 12 15:07 warning.txt
```

STEP 4.

Now we can generate some plots. To do that we will use different configuration file:

```
cp /afs/cern.ch/exp/totem/soft/cmssw/examples/Global/pythia.cfg .
```

Let us run that file:

```
cmsRun pythia.cfg
```

Output files are here:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > ls val*root  
valpythiaSD.root valRPHits.root valRPPlots.root valT1Plots.root valT2PlotsDigi.root valT2Plots
```

We can start root session, to see plots:

```
[pctotem31] /home/grzanka/tmp/offlineSWTest > root -l  
root [0] TBrowser t
```

-- LeszekGrzanka - 07 Aug 2009

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