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D3PD making and luminosity calculation using D3PD

Introduction

This is part of Atlas offline software tutorials held at CERN.

Setup for release 15.6.10.6

Assumptions:

you are logged in on `lxplus` at CERN
you are using `bash`
you have some space (at least 100 MB)

Setup instructions

```
mkdir D3PDMakingExample
cd D3PDMakingExample
```

AtlasSetup

```
export AtlasSetup=/afs/cern.ch/atlas/software/dist/AtlasSetup
alias asetup='source $AtlasSetup/scripts/asetup.sh'
asetup 15.6.10.6 --testarea $PWD
mkdir $TestArea
cd $TestArea
```

Old(AtlasLogin)

```
source /afs/cern.ch/sw/contrib/CMT/v1r20p20090520/mgr/setup.sh
```

`requirements` file

```
#-----------------------------------------------------------------------
set CMTSITE CERN
set SITEROOT /afs/cern.ch
macro ATLAS_DIST_AREA /afs/cern.ch/atlas/software/dist
macro ATLAS_TEST_AREA ${PWD}
apply_tag setup
apply_tag oneTest
use AtlasLogin AtlasLogin-* $(ATLAS_DIST_AREA)
#-----------------------------------------------------------------------
```

```
cmt config
source setup.sh -tag=15.6.10.6,AtlasProduction,runtime
```

D3PD making

Make a test directory

- `mkdir run; cd run`

Get one test Pool file(have to setup Grid certification).

```
dq2-get -f data10_7TeV.00153565.physics_L1Calo.merge.AOD.f251_m466._lb1197-lb1201._0001
```

`mv data10_7TeV.00153565.physics_L1Calo.merge.AOD.f251_m466._lb1197-lb1201._00 AOD.pool.root`

or you can simply `cp /afs/cern.ch/user/h/haifeng/public/D3PDMakingExample/run/AOD.pool.root ./`

Get Top Job Option from Athena release

- `get_files AODToEgammaD3PD.py`

Run D3PD making job

- `athena AODToEgammaD3PD.py`

Enjoy your D3PD.

It's so simple to run a D3PD making job.

Content of D3PD

```
$ root -l egamma.root
root [1] .ls
TFile**      egamma.root   D3PD
 TFile*      egamma.root   D3PD
  KEY: TDirectoryFile   egammaMeta;1   egammaMeta
  KEY: TDirectoryFile   Lumi;1   Lumi
  KEY: TTree   CollectionTree;1   CollectionTree
  KEY: TTree   egamma;1   egamma
```

`egammaMeta` : trigger meta data.
`Lumi` : Lumi meta data.
`CollectionTree` : default TTree. (not used)
`egamma` : TTree you want.

Modified D3PD making

Check out `D3PDMakerConfig` package

```
cd $TestArea
cmt co -r D3PDMakerConfig-00-01-82  PhysicsAnalysis/D3PDMaker/D3PDMakerConfig  ;
```

`cat PhysicsAnalysis/D3PDMaker/D3PDMakerConfig/python/egammaD3PD.py`

```
from EventCommonD3PDMaker.EventInfoD3PDObject import EventInfoD3PDObject
# PhysicsAnalysis/D3PDMaker/EventCommonD3PDMaker
from egammaD3PDMaker.ElectronD3PDObject       import ElectronD3PDObject
# PhysicsAnalysis/D3PDMaker/egammaD3PDMaker
from egammaD3PDMaker.PhotonD3PDObject         import PhotonD3PDObject
from MuonD3PDMaker.MuonD3PDObject             import MuonD3PDObject
# PhysicsAnalysis/D3PDMaker/MuonD3PDMaker
from JetD3PDObject                            import JetD3PDObject
from METD3PDObject                            import METD3PDObject

....
    alg += EventInfoD3PDObject        (**_args (level, 'EventInfo', kw))
    alg += ElectronD3PDObject         (**_args (level, 'Electron', kw))
    alg += PhotonD3PDObject           (**_args (level, 'Photon', kw))
    alg += MuonD3PDObject             (**_args (level, 'Muon', kw))
    alg += JetD3PDObject              (**_args (level, 'Jet', kw))
    alg += METD3PDObject              (**_args (level, 'MET', kw))
....
```

You can comment out some of these Objects or you can change the detail level. Now it's 10. If you don't need MET, then you can do

```
  #alg += METD3PDObject              (**_args (level, 'MET', kw))
```

After modification, you have to compile `D3PDMakerConfig` package.

```
cd $TestArea/PhysicsAnalysis/D3PDMaker/D3PDMakerConfig/cmt
cmt config; source setup.sh
cmt make;
```

Run your making job.

Go back to the original directory where you ran the initial example.

```
cd $TestArea/run
athena AODToEgammaD3PD.py
```

Modified D3PD making(Go to Object level)

Take egammaD3PD object as an example. Electron object is filed by egammaD3PDMaker from this line

```
from egammaD3PDMaker.ElectronD3PDObject       import ElectronD3PDObject
```

Check out egammaD3PDMaker

```
cd $TestArea;
cmt co -r egammaD3PDMaker-00-01-77  PhysicsAnalysis/D3PDMaker/egammaD3PDMaker
```

Look at the Python configuration file

```
PhysicsAnalysis/D3PDMaker/egammaD3PDMaker/python/ElectronD3PDObject.py
```

The file is very long.

```
ElectronD3PDObject.defineBlock (0, 'Charge',
                                EventCommonD3PDMaker.ChargeFillerTool)
ElectronD3PDObject.defineBlock (0, 'Author',
                                egammaD3PDMaker.egammaAuthorFillerTool)
ElectronD3PDObject.defineBlock (0, 'IsEM',
                                egammaD3PDMaker.egammaIsEMoneFillerTool
                                )
ElectronD3PDObject.defineBlock (1, 'Iso',
                                egammaD3PDMaker.egammaDetailFillerTool,
                                Details = [egammaParameters.r33over37allcalo,
                                           'rphiallcalo',
                                           egammaParameters.etcone,
                                           'Etcone45',
                                           egammaParameters.etcone20,
                                           'Etcone20',
                                           egammaParameters.etcone30,
                                           'Etcone30',
                                           egammaParameters.etcone40,
                                           'Etcone40',
                                           egammaParameters.ptcone30,
                                           'ptcone30',
                                           ])
```

You can change the variables in `define block` function.
After modification, compile it.

```
cd  $TestArea/PhysicsAnalysis/D3PDMaker/egammaD3PDMaker/cmt/
cmt config; source setup.sh
cmt make
```

Run your making job.

```
cd $TestArea/run
athena AODToEgammaD3PD.py
```

Luminosity calculation based on D3PD

Under Athena 16.0.1

```
asetup 16.0.1
cp /afs/cern.ch/user/h/haifeng/public/D3PDMakingExample/run/NTUP_EGAM.133538._000275.root  ./
iLumiCalc.exe -t L1_EM2 --d3pd_dir="Lumi" --root=NTUP_EGAM.133538._000275.root --lumitag=OflLumi-
```

Major updates:
-- HaifengLi - 30-Apr-2010

Responsible: HaifengLi
Last reviewed by: **Never reviewed**

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