

Athena で LhaExt_i の sample jobOptions を動かす

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0. 序

```
[lxplus018] % echo $SHELL
/usr/local/bin/zsh                               zsh (lxplus の default)- shell は
[lxplus018] % pwd
/afs/cern.ch/user/s/sodaka                       y 直下は作ることにする
[lxplus018] % mkdir 9.0.2
```

1. CMT setup

```
[lxplus018] % cp -r sodaka/public/start_sample    私の<-sample script をコピー
[lxplus018] % cd 9.0.2
[lxplus018] /9.0.2 % cp -r ../start_sample/* .
[lxplus018] /9.0.2 % ls
cmtinit.sh    test
[lxplus018] /9.0.2 % less cmtinit.sh
. /afs/cern.ch/sw/contrib/CMT/v1r16p20040901/mgr/setup.sh  <- 中身はこれだけ
[lxplus018] /9.0.2 % echo $CMTRoot
                                     ットされていない<- CMTRoot には未だ何も
[lxplus018] /9.0.2 % . cmtinit.sh          <- 最初の一般的な
[lxplus018] /9.0.2 % echo $CMTRoot
/afs/cern.ch/sw/contrib/CMT/v1r16p20040901  <- CMTRoot がセットされたcmt コマンドが使える
[lxplus018] /9.0.2 % cd test
[lxplus018] /9.0.2/test % ls
cmt
[lxplus018] /9.0.2/test % cd cmt
[lxplus018] /9.0.2/test/cmt % ls
requirements                                irements <- user の最初の requ
[lxplus018] /9.0.2/test/cmt % less requirements
set CMTSITE CERN                            directory CERNと同じ 構造は
set CMTCONFIG i686-rh73-gcc32-dbg           Intel 686<architecture Red Hat用.に環境で gcc 3.2 を使って
build

macro ATLAS_DIST_AREA /afs/cern.ch/atlas/software/dist
macro ATLAS_RELEASE "9.0.2"                <- どの を使わre Relea

use AtlasSettings v* $(ATLAS_DIST_AREA)    <- おまじない?

macro workarea $(HOME)/9.0.2/test          <- work directory の pat
path_remove CMTPATH "$(workarea)"
path_prepend CMTPATH "$(workarea)"        path の最初に work area を付ける

set CVSROOT ":kserver:atlas-sw.cern.ch:/atlas-cvs" ICERP でやるときはいらぬ; 別途認証が必要

[lxplus018] /9.0.2/test/cmt % cmt config    <- setup script を作る
Creating setup scripts.
Creating cleanup scripts.
[lxplus018] /9.0.2/test/cmt % ls
Makefile cleanup.csh cleanup.sh requirements setup.csh setu <- setup script が出来た
[lxplus018] /9.0.2/test/cmt % echo $CMTPATH

[lxplus018] /9.0.2/test/cmt % . setup.sh    <- setup 実行
[lxplus018] /9.0.2/test/cmt % echo $CMTPATH
/afs/cern.ch/user/s/sodaka/9.0.2/test:/afs/cern.ch/atlas/software/dist/9.0.2:/afs/cern.ch/atlas/offline/
external/Gaudi/0.14.6.12-pool:/afs/cern.ch/atlas/offline/external/LGCMT/LGCMT_30
[lxplus018] /9.0.2/test/cmt %
```

2. TestRelease setup

```
[lxplus018] /9.0.2/test/cmt % cd ..
[lxplus018] /9.0.2/test % ls
cmt
```

```

[Ixplus018] /9.0.2/test % cmt co TestRelease <- TestRelease の最新版を checkout (download)
# ===== working on package TestRelease version 9.0.2-00-00-18 (At head)
# get top files
# get branches cmt doc
Creating setup scripts.
Creating cleanup scripts.
[Ixplus018] /9.0.2/test % ls
TestRelease cmt
[Ixplus018] /9.0.2/test % ls TestRelease
TestRelease-00-00-18
[Ixplus018] /9.0.2/test % ls TestRelease/TestRelease-00-00-18
CVS ChangeLog cmt doc
[Ixplus018] /9.0.2/test % cd TestRelease/TestRelease-00-00-18/cmt
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt %s
CVS Makefile cleanup.csh cleanup.sh requirements setup.csh <- setup script は出来ている
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % . setup.sh
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt %s
CVS Makefile cleanup.csh cleanup.sh requirements setup.csh
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % which athena
athena=athena.py hena command が定義された <- at
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls .
CVS ChangeLog cmt doc
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % gmake <- 実行環境構築
-----> (Makefile.header) Rebuilding constituents.make
-----> (constituents.make) Rebuilding setup.make i686-rh73-gcc32-dbg.make
CMTCONFIG=i686-rh73-gcc32-dbg
setup.make ok
i686-rh73-gcc32-dbg.make ok
-----> (constituents.make) Rebuilding library links
Symlinking /afs/cern.ch/atlas/offline/external/AVTOOLS/v2.686i-rh73-gcc32/usr/lib/libGL.so to /afs/
cern.ch/user/s/sodaka/9.0.2/test/InstallArea/i686-rh73-gcc32-dbg/lib/libGL.so
Symlinking /afs/cern.ch/atlas/offline/external/AVTOOLS/v2.686i-rh73-gcc32/usr/lib/libGLU.so to /
afs/cern.ch/user/s/sodaka/9.0.2/test/InstallArea/i686-rh73-gcc32-dbg/lib/libGLU.so
.....
Symlinking /afs/cern.ch/sw/lcg/external/XercesC/2.3.0/rh73-gcc32/lib/libxerces-c.so to /afs/cern.ch/
user/s/sodaka/9.0.2/test/InstallArea/i686-rh73-gcc32-dbg/lib/libxerces-c.so
-----> (constituents.make) Building config.make
Document config
-----> (constituents.make) Starting config
Using default action for ../TestRelease/config.h.in
-----> config.h ok
-----> (constituents.make) config done
-----> (constituents.make) all done
-----> (constituents.make) Building install_includes.make
Document install_includes
-----> (constituents.make) Starting install_includes
No standard include file area
-----> (constituents.make) install_includes done
-----> (constituents.make) Building get_files.make
Document get_files
-----> (constituents.make) Starting get_files
Finding *.DAT
Finding *.DEC
Finding *.car
.....
Finding tt.events
Finding tt_dc2_test.events
Finding wj_dc2_test.events
Copying file BmagAtlas01.data from /afs/cern.ch/atlas/offline/data
Copying file BmagAtlas02.data from /afs/cern.ch/atlas/offline/data
Copying file amdb_H.data from /afs/cern.ch/atlas/offline/data
Copying file amdb_K.data from /afs/cern.ch/atlas/offline/data
.....
Copying file tt_dc2_test.events from /afs/cern.ch/atlas/software/9.0.2
Copying file wj_dc2_test.events from /afs/cern.ch/atlas/software/9.0.2
Copying file wj_lhaext_asc.dat from /afs/cern.ch/atlas/software/9.0.2

```

```

-----> (constituents.make) get_files done
all ok.
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % ls
CVS cleanup.csh i686-rh73-gcc32-dbg.make setup.csh
Makefile cleanup.sh requirements setup.新しい file が出来ている
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % cd ..
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls
CVS ChangeLog cmt doc i686-rh73-gcc32-dbg run <- 新しい directory が出来ている
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls
TestReleasesetup.make config.make get_files.make installdoc.make
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls /9.0.2/test/
InstallArea TestRelease cmt work directory の top に InstallArea が出来てい
る
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls
i686-rh73-gcc32-dbg <- 中身はこれだけ。他の package を作ることも出来る
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls
lib library の 中身が分かる
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % ls
allArea/i686-rh73-gcc32-dbg/lib
libGL.so libHEPVisUtils.so libnzn10.
libGL.so.cmtref libHEPVisUtils.so.cmtref libnzn10.
.....
libHEPVisGeometry.so libeditor.so
libHEPVisGeometry.so.cmtref libeditor.so.cmtref
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18 % cd n r
[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % ls
.....
wj_dc2_test.events
wj_lhaext_asc.dat
xsneut95.dat
xsneut96.dat <- run の中身はいろいろな samples の元を走らせる

```

3. PYTHIA sample program を走らせる

PYTHIA を走らせるだけなら何処でも良いのだが、一応、TestRelease の run directory で走らせる。

```

[Ixplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % athena Pythia/
jobOptions.pythia.py
Athena INFO including file "AthenaCommon/Compat.py
Athena INFO including file "AthenaCommon/Bootstrap
ApplicationMgr INFO Successfully loaded modules:
ApplicationMgr INFO Application Manager Configured successfully
Athena INFO including file "AthenaCommon/AdJas.py"
Athena INFO including file "StoreGate/StoreGate.py"
ApplicationMgr INFO Successfully loaded modules: ,StoreGate
.....
AthenaEventLoopMgr DEBUG Service base class initialized success
AthenaEventLoopMgr DEBUG Creating Top Algorithm Pythia with Pythia
AthenaEventLoopMgr DEBUG Creating Top Algorithm DumpMC with DumpMC
Pythia INFO Standard Initialization actions include Inter
Pythia INFO PYTHIA INITIALISING.

Pythia INFO Command is: pysubs msel 13
Pythia INFO pysubs block msel item 13 value -1.
Pythia INFO Command is: pysubs ckin 3 18.
Pythia INFO pysubs block ckin item 3 value 18
Pythia INFO Command is: pypars mstp 43 2
Pythia INFO pypars block mstp item 43 value 2
1
*****
*****
**
**
** *.....* Monte Carlo Welcome to the Lund M
** *!!!!!!:* **
** *!!!!!!:* ***

```

```

**          *.....!!.....*           P  P  Y  Y  I      A  A  H  **
**          *.....!!.....*          PPP  YH  I  AAAAA  HHHH
**          *.....!!.....*           P    HY  I  A  T  A  H  **
**          *.....!!.....*!          P    H  YIII  A  T  A  H*
**          *.....!!.....*  !!                      **

```

```

.....
Vertex:    -612 ID:        0 (X,cT)=+9.26e-01,+2.42e-01,+1.39e+01,+
I: 1      1630          333 +1.05e+04,+2.74e+03,+1.70e+05,+2.71e+05   -612
O: 2      1651          321 +6.32e+03,+1.68e+03,+1.03e+05,+1.03e+05  (nil)
          1652          -321 +4.22e+03,+1.05e+03,+6.74e+04,+6.75e+04  (nil)

```

```

-----
AtRndmGenSvc      DEBUG   Handle EndEvent
AtRndmGenSvc      INFO    Stream =   PYTHIA, Seed1 , = Seed1 21039391214048442
AtRndmGenSvc      INFO    Stream =   PYTHIA_INIT, Seed Seed2 = 820247532
AthenaEventLoopMgr  INFO    ==>>>   end of event 4   <<==
HistorySvc        INFO    Service finalised successfully
Pythia            INFO    PYTHIA Ending.

```

```

Pythia            INFO    Call PYSTAT at endRun with level 1
1***** PYSTAT:  Statistics on Number of Events and Crosssect*****

```

```

=====
|
|          Subprocess          |  |  Number of points | |
|          |                  |  |  Sigma of         |
|-----|-----|          (mb)         |
|
| N:o Type          |  |  Generated         |  Tried
|
=====
|
|  0 All included subprocesses |  |  51.820E-05 |  24
|  15 f + fbar -> g + Z0      |  |  5.863E-06 |
|  30 f + g -> f + Z0         |  |  1.234E-05 |  3
|
|
=====

```

```

***** Fraction of events that fail fragmentation cuts 0.0000 *0*****

```

```

DumpMC            INFO >>> DumpMC from finalize
---- DumpMC World From finalize
ClassIDSvc       DEBUG finalize: wrote 10 entries to output /CLIDDBout.txt
AtRndmGenSvc     INFO FINALISING
PartPropSvc      INFO Service finalised successfully
IOVSvc           DEBUG Service finalised successfully
*****Chrono*****  INFO *****
*****Chrono*****  INFO The Final CPU consumption (Total) ordered
*****Chrono*****  INFO *****
*****Chrono*****  INFO *****
ChronoStatSvc    INFO Time User      : Tot= 2.49 [s]
*****Chrono*****  INFO *****
*****Chrono*****  INFO *****
ChronoStatSvc.f... INFO Service finalized successfully
ToolSvc          INFO Removing all tools created by ToolSvc
ToolSvc          DEBUG Tool List :
ApplicationMgr   INFO Application Manager Finalized successfully
ApplicationMgr   INFO Application Manager Terminated successfully
[!xplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %

```

何故、これで sample program が走ったか？
 上記の athena コマンドの引数 LhaExt_i/jobOptions.pythia.py が jobOptions.fの指定であることは自明。
 そこで、まず work directory /9.0.2/test の下の InstallArea/jobOptionsを探しに行く。
 これが無いので、次に最初の requirements で指定されている Software Release の InstallAreaの中の
 jobOptions directory /afs/cern.ch/atlas/software/dist/9.0.2/InstallArea/jobOptions を見に行く。
 すると、この下に Pythia_i/jobOptions.pythia.py がある。

この様な仕組みで指定した jobOptions file が探し出される。
CMT がこういう事を全てやってくれる訳である。

4. jobOptions の中身

get_files という便利なコマンドがある。
前記のような CMT の機能を使って、指定した file を探し出して持ってきてくれる。
これは jobOptions file に限らない。

```
[lXplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run get_files jobOptions.pythia.py
Finding jobOptions.pythia.py
Finding jobOptions.pythia.py
Finding jobOptions.pythia.py
Finding jobOptions.pythia.py
Copying file jobOptions.pythia.py from /afs/cern.ch/atlas/software/dist/9.0.2
[lXplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run less jobOptions.pythia.py
#####
#
# Job options file
#
#-----
# General Application Configuration options
#-----
theApp.setup( MONTECARLO )

include( "PartPropSvc/PartPropSvc.py" )

#-----
# Private Application Configuration options
#-----
theApp.Dlls += [ "TruthExamples", "Pythia_i" ]
theApp.TopAlg = ["Pythia","DumpMC"]
theApp.ExtSvc += ["AtRndmGenSvc"]
# Set output level threshold (2=DEBUG, 3=INFO, 4=WARNING, R5=ERROR, R6=CATAL )
MessageSvc = Service( "MessageSvc" )
MessageSvc.OutputLevel = 2
#-----
# Event related parameters
#-----
# Number of events to be processed (default is 10)
theApp.EvtMax = 5
#-----
# Algorithms Private Options
#-----
AtRndmGenSvc = Service( "AtRndmGenSvc" )
AtRndmGenSvc.Seeds = ["PYTHIA 4789899 989240512", "PYTHIA_INITIAL 2347532"]
# AtRndmGenSvc.ReadFromFile = true;
Pythia = Algorithm( "Pythia" )
Pythia.PythiaCommand = ["pysubs msel 13","pysubs ckin 3 18.0a1pymstp 43 2"]
#-----
# Ntuple service output
#-----
#####
#
# End of job options file
#
#####
[lXplus018] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %
```

Pythia.PythiaCommand の指定で PYTHIA の設定を変えられる。
"common_name variable_name value" あるいは "common_name array_name element_number value" で指定する。
いくつ書いても良い。
すなわち、上記の例は Fortran で

```
.....
COMMON /PYSUBS/MSEL,...., CKIN(200)
```

```

COMMON /PYPARS/MSTP(200),.....
.....
MSEL = 13                ! Z + jet production
CKIN(3) = 18.           ! pt cut = 18 GeV/c
MSTP(43) = 2            ! no Z-gamma interference
.....

```

と書いた場合と同じ設定になる。

5. 再 login してもう一度走らせる

```

[Ixplus062] % cd 9.0.2
[Ixplus062] /9.0.2 % . cmtinit.sh
[Ixplus062] /9.0.2 % cd test
[Ixplus062] /9.0.2/test % . cmt/setup.sh
[Ixplus062] /9.0.2/test % cd TestRelease/TestRelease-00-00-18/cmt
[Ixplus062] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % . setup.sh
[Ixplus062] /9.0.2/test/TestRelease/TestRelease-00-00-18/cmt % cd ../run
[Ixplus062] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % athena
jobOptions.pythia.py
Athena                               INFO including file "AthenaCommon/Compat.py
Athena                               INFO including file "AthenaCommon/Bootstrap
ApplicationMgr                       INFO Successfully loaded modules:
.....
ChronoStatSvc.f...                   INFO Service finalized succesfully
ToolSvc                              INFO Removing all tools created by ToolSvc
ToolSvc                              DEBUG Tool List :
ApplicationMgr                       INFO Application Manager Finalized successfully
ApplicationMgr                       INFO Application Manager Terminated successfully
[Ixplus062] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %

```

6. GR@PPA interface (LhaExt_i) を動かす

Editor で `jobOptions.pythia.py` の PYTHIA 設定行を書き換える。

```

[Ixplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %less jobOptions.pythia.py
#####
#
# Job options file
#
.....
#-----
# Algorithms Private Options
#-----
AtRndmGenSvc = Service( "AtRndmGenSvc" )
AtRndmGenSvc.Seeds = ["PYTHIA 4789899 989240512", "PYTHIA_INITIAL 2347532"]
# AtRndmGenSvc.ReadFromFile = true;
Pythia = Algorithm( "Pythia" )
Pythia.PythiaCommand = ["pyinit user lhaext"]
#-----
# Ntuple service output
#-----
#####
#
# End of job options file
#
#####

```

Pythia.PythiaCommand の指定で `pyinit` だけ特殊。

これは PYTHIA を initialize する subroutine の名前から来ている。

その最初の引数を 'USER' とすると、いわゆる user process を呼び出す指定に成るので上記の様に書くことに成ったのだろう。

この場合、具体的には subroutine UPINIT と UPEVNT が呼ばれる。

これらに三番目の parameter、`lhaext` が渡されて、どの user process interface を呼び出す指定がされる、という仕組みになっている。

`pyinit` を使って、この他に print out の制御などもできる。

ともかく、これで GR@PPA の sample data が PYTHIA に読み込まれて、parton shower/hadron/decay が付

け加えられる。

```
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % athena
jobOptions.pythia.py
.....
ChronoStatSvc.f...      INFO      Service finalized succesfully
ToolSvc                 INFO      Removing all tools created by ToolSvc
ToolSvc                 DEBUG      Tool List :
ApplicationMgr          INFO      Application Manager Finalizedulsyccessf
ApplicationMgr          INFO      Application Manager Terminatedulsyccess
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %
```

実は、sample jobOptions file は既に用意されている。

```
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % athena LhaExi/
jobOptions.lhaext.pythia.py
.....
ChronoStatSvc.f...      INFO      Service finalized succesfully
ToolSvc                 INFO      Removing all tools created by ToolSvc
ToolSvc                 DEBUG      Tool List :
ApplicationMgr          INFO      Application Manager Finalizedulsyccessf
ApplicationMgr          INFO      Application Manager Terminatedulsyccess
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %
```

何故、これだけで sample program が走るのか？

必要な file は既に run/ directory にコピーされている。

これが TestRelease の役割 (sample program が走る環境を用意する)。

```
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %s lharead_control.dat
lharead_control.dat      <-o1LhaExi の read contr
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %less lharead_control.dat
  0  0 ;LUNs for this file and the data file (0 = automatic sel
  1  ;IDWTUP, the event unweighting scheme (see the manual) 6.
  0  ;Number of events to skip
*** input data files ***
ascii:wj_lhaext_asc.dat
end
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %s wj_lhaext_asc.dat
wj_lhaext_asc.dat        file で指定されていis event data file
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %
```

各 event generator interface に sample jobOptions が用意されている。

```
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %s /afs/cern.ch/atlas/software/
dist/9.0.2/InstallArea/jobOptions/AlpGen_i
jobOptions.AlpGenHerwig.py      jobOptions.AlpGenPythia.py
jobOptions.AlpGenHerwig.py.cmtref  jobOptions.AlpGenPythia.py.cmtref
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run % athena AlpGei/
jobOptions.AlpGenHerwig.py
.....
ChronoStatSvc.f...      INFO      Service finalized succesfully
ToolSvc                 INFO      Removing all tools created by ToolSvc
ApplicationMgr          INFO      Application Manager Finalizedulsyccessf
ApplicationMgr          INFO      Application Manager Terminatedulsyccess
[lplus030] /9.0.2/test/TestRelease/TestRelease-00-00-18/run %
```

control file などの詳細は Web page 参照。

<http://www-theory.lbl.gov/ianh/monte/Generators/>

以上