

# BES environment installation

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## Abstract

In this unofficial paper, we show how to install BESIII environment outside of IHEP(Institute of High Energy of Physics, China), and in the last we will also introduce how to set/run/submit your jobs using simple examples. We will take BOSS6.1.0 (BOSS means BESIII Offline Software System) as example to describe how to install. Hope this document is useful to the beginners who want to do BESIII physics analysis.

The BESIII is a general-purpose experiment for studying electron-positron collisions at BEPCII, which is currently under construction at IHEP, Beijing. The BESIII offline software system (BOSS) is built on the Gaudi architecture. The Simulation software is developed in BOSS framework.

## I. LINUX SYSTEM AND AFS INSTALLATION

Firstly you must install the Scientific Linux 3.X version into your own computer which is the BOSS reference platform. Later you had better install the AFS (Anderw File System) client port which can let you to access to AFS server in IHEP, and later you can easily copy all the files you need. Because Scientific Linux CERN has contained AFS client port, what you need to do is the following:

1. Go to the directory 'cd /usr/vice/etc', then edit the file 'ThisCell', add 'ihep.ac.cn' into it.
2. Edit the file 'CellServDB', add the following content into it.  

```
>ihep.ac.cn #IHEP
202.122.35.122 #afsdb1.ihep.ac.cn
202.122.35.148 #afsdb2.ihep.ac.cn
202.122.35.162 #afsdb3.ihep.ac.cn
```
3. Execute '/sbin/service afs start' to startup the AFS server.

Till now, the IHEP has three AFS database (DB) servers and two AFS file servers. The Cell Name is ihep.ac.cn, and the DB servers are 202.122.35.122 (#afsdb1.ihep.ac.cn), 202.122.35.148 (#afsdb2.ihep.ac.cn), 202.122.35.162 (#afsdb3.ihep.ac.cn). When you starup the AFS server, if the system tell you, liking 'Unable to reach AFS servers. Not starting.', then you need to check the following: (1). Make sure that your FireWall is open to the port: UDP 7000-700814488750 4444 (2). Don't let your Linux system auto-updated, otherwise your AFS client port maybe can not work properly. If the system has been updated, then you have to reinstall it or you have to reinstall AFS client port. (3). When you make sure that everything is correct, you have to contact with Xu Dong(xud@mail.ihep.ac.cn) or An Dehai(adh@ihep.ac.cn) to tell them your IP address. They need to open FireWall at IHEP to your IP address.

After you can access to AFS server at IHEP, you can see the directory `'/afs/ihep.ac.cn/'`. Then later you can copy Gaudi, Boss, external libraries, etc. easily, otherwise you must have all the necessary files in hand in order to install BOSS6.1.0.

## II. SETTING UP YOUR ENVIRONMENT

You could copy all the files under the directory:  
`/afs/ihep.ac.cn/bes3/offline/template/6.1.0/cmthome/` into your workarea directory or a release area. Edit the `'requirements'` file which points out the directories to Gaudi, BOSS, etc., change the following lines:

1. set `SITEROOT` `'yoursiteroot'` (Note: `yoursiteroot` is the directory name, for example `/home/bes3/offline`)
2. set `LCG_release_area` `'yoursiteroot/sw/lcg/app/releases'`
3. macro `WorkArea` `'yourworkarea'` (Note: `yourworkarea` is the directory name, for example `/home/shencp/workarea`)

Edit the `'setupCMT.csh'` file (Here I use `tcsh`. If you use `bash`, you need to edit `'setupCMT.sh'`. The similar as following.). Change `'/afs/ihep.ac.cn/offline/tool/CMT/v1r14p20031120/mgr/setup.csh'` to `'${SITEROOT}/tool/CMT/v1r14p20031120/mgr/setup.csh'`.

Edit the `'setupCVS.csh'` file if you have a CVS (Concurrent version System) account. Change `'pserver:'$user'@koala.ihep.ac.cn:/bes/bes'` to `'pserver:'yourname'@koala.ihep.ac.cn:/bes/bes'`.

Edit the `'setup.csh'` file. Change `'setenv CMTROOT /afs/ihep.ac.cn/bes3/offline/tool/CMT/v1r14p20031120'` to `'setenv CMTROOT ${SITEROOT}/tool/CMT/v1r14p20031120'` and `'/afs/ihep.ac.cn/bes3/offline/template/6.1.0/cmthome'` to the name of your `cmthome` directory.

### III. COPY CMT, GAUDI AND BOSS PACKAGES

Configuration management tool : CMT

```
cp -rf /afs/ihep.ac.cn/bes3/offline/tool/CMT  ${SITEROOT}/tool
cd ${SITEROOT}/tool/CMT/v1r14p20031120/mgr
./INSTALL
```

Framework : Based on GAUDI\_v16r4

```
cp -rf /afs/ihep.ac.cn/bes3/offline/sw/Gaudi/slc-gcc3.2.3-clhep1.9.2.3/GAUDI_v16r4
${SITEROOT}/sw/Gaudi/slc-gcc3.2.3-clhep1.9.2.3
```

External libs:

```
cp -rf /afs/ihep.ac.cn/bes3/offline/sw/dist/bakup/sw/packages  ${SITEROOT}/sw
cp -rf /afs/ihep.ac.cn/bes3/offline/sw/dist/bakup/sw/lcg  ${SITEROOT}/sw
```

BOSS package:

```
cp -rf /afs/ihep.ac.cn/bes3/offline/sw/dist/boss/6.1.0  ${SITEROOT}/sw/dist/boss
```

After copied all the packages, you do the following before compiling Gaudi, BOSS.

```
cd cmthome (See the 'Setting up your environment' part)
source setupCMT.csh
cmt config
source setup.csh
source setupCVS.csh
```

### IV. SETTING UP YOUR DATABASE SERVER

Due to the web authorization, perhaps some people cannot use database on the machine:koala.ihep.ac.cn. So the best way is to install the database on your local machine. Firstly you need to install MySQL (for Calibration constant files' metadata) and PostgreSQL (for BESIII Geometry). It is easy in SLC system, you just need to do: **yum install**

**mysql-server** (Install MySQL) and **yum install rh-postgresql-server** (Install postgresql) under command line.

Set up PostgreSQL database server:

1. Set up a directory to hold the postgres data files

```
mkdir /usr/local/pgsql/data
```

```
chown -R postgres /usr/local/pgsql
```

2. Initialize database server:

```
cd /usr/bin
```

su postgres (Note: you need to use ROOT account to set up postgres account, and the passwd must be also postgres.)

```
./initdb -D /usr/local/pgsql/data
```

3. Startup the database server (also use postgres account):

```
./postmaster -i -D /usr/local/pgsql/data &
```

4. Set up besdb database server:

```
createdb besdb
```

5. Load the db.out file into besdb:

```
psql -d besdb -f db.out
```

Set up MySQL database server:

1. Start MySQL database server:

```
cd /etc/rc.d/init.d
```

```
./mysqld start
```

2. Set up calib database server:

```
mysql
```

```
create database calib;
```

3. Load the data file into calib database server:

```
exit
```

```
mysql calib < calib.dump
```

When you submit a job, the system will tell you the following error if you did not have database:

connection to db failed.

could not connect to server: Connection timed out

Is the server running on host "202.122.35.54" and accepting  
TCP/IP connections on port 5432?

If you have not the files db.out and calib.dump, you could contact with me or Ma Qi-  
umei(maqm@mail.ihep.ac.cn).

## V. COMPILE GAUDI AND BOSS

Compile Gaudi:

(1). Set up your LCGEnv

```
cd ${SITEROOT}/sw/Gaudi/slc-gcc3.2.3-clhep1.9.2.3/GAUDI_v16r4/LCGEnv/v35r0/cmt  
cmt br -global config  
source setup.csh
```

(2). Compile all packages of Gaudi

```
cd ${SITEROOT}/sw/Gaudi/slc-gcc3.2.3-clhep1.9.2./GAUDI_v16r4/Gaudi/v16r4/cmt  
cmt br -global gmake clean  
cmt br -global cmt config  
source setup.csh  
cmt br -global gmake
```

Compile BOSS6.1.0:

Before you can compile BOSS6.1.0, you need to copy one file libshift.so to the directory  
/usr/local/lib, otherwise when you compile BOSS6.1.0, the system will tell you the following  
error:

```
/usr/bin/ld:cannot find -lshift  
collect2:ld returned exist status  
uname  
gmake[3]:***[./i386_linux/libHbookCnv.so] Error ...
```

If you have not this file, please contact with me.

Because you can not access to CVS server at IHEP(koala.ihep.ac.cn), you have to set  
up your database server by yourself. Please see the 'Setting up your database server'

part. In order to link your own database, you need to change the IP address such as 202.122.35.\* to your own IP address in the following files. You can find these files under the directories `/${SITEROOT}/sw/dist/boss/6.1.0/Database` and `/Calibration` using the key word '202.122.35.\*', for example 'grep -i '202.122\*' \*/\*/\*.cxx'). These files are

```
**/Database/BesGeoEMC/BesGeoEMC-00-00-02/src/DB2BesGeoEMC.cxx
**/Database/BesGeoMdc/BesGeomdc-00-00-03/src/DB2BesGeoMdc.cxx
**/Database/DBBesGeoBarTOF/**/src/DB2BesGeoBarTOF.cxx
**/Database/DBBesGeoEndTOF/**/src/DB2BesGeoEndTOF.cxx
**/Database/DbGeoDeDx/DbGeoDeDx-00-00-02/src/Db2GeoDeDx.cxx
**/Calibration/CalibSvc/CalibMySQLCnv/**/src/CalibMySQLCnv.cxx
**/Calibration/CalibUtil/CalibUtil-00-00-04/CalibUtil/Metadata.h
**/Calibration/CalibSvc/**/share/job-DedxCalibData.txt
**/Calibration/CalibSvc/**/share/job-Emc.txt
**/Calibration/CalibSvc/**/share/job-MdcCalConst.txt
**/Calibration/CalibSvc/**/share/job-TofCalibData.txt
```

And there are some problems with Trigger Package in BOSS6.1.0. Before compiling the BOSS6.1.0, you had better remove some places about this package. Edit `/${SITEROOT}/sw/dist/boss/6.1.0/BesRelease/BesRelease-00-01-09/cmt/requirements` file, remove the line on Trigger. And edit `/${SITEROOT}/sw/dist/boss/6.1.0/TestRelease-00-00-24/cmt/requirements`, remove the line on Trigger.

After finished compiling BOSS6.1.0, you can copy Trigger package from BOSS6.3.0, then compile it solely. There should be no problem.

In order to compile BOSS6.1.0, you need to do:

```
cd ${SITEROOT}/sw/dist/boss/6.1.0/BesRelease/BesRelease-00-01-09/cmt
cmt br -global gmake clean
cmt br -global cmt config
source setup.csh
cmt br -global gmake
```

Compile Trigger package solely:

```
cp -rf /afs/****/bes3/offline/sw/dist/boss/6.3.0/Trigger ${SITEROOT}/sw/dist/boss/6.1.0
```

```
cd Trigger/**/cmt/  
cmt config  
gmake
```

After that, you go to the cmthome directory, and do the following:

```
cd cmthome  
source setupCMT.csh  
source setupCVS.csh  
cmt config  
source setup.csh
```

Then you will see there is a command **boss.exe** which you will use to submit the job. You can write the above command lines into your file `.tcshrc`. Then next time when you login into your computer you do not need to write them again.

Note: there is also another way to install BESIII environment with pacman, please refer to the following document:

<http://docbes3.ihep.ac.cn/cdsagenda//askArchive.php?base=agenda&categ=a0715&id=a0715s5t4/moreinfo>

However unfortunately, you also have to set up the database server by yourself if you are out of IHEP, and can not access to CVS server.

## VI. RUNNING A JOB

Before running a job, you must startup your database server firstly. We have mentioned it before. Very simply, you just need to do:

```
1. cd /usr/bin  
su postgres  
./postmaster -i -D /usr/local/pgsql/data &
```

Note: you can use `'psql besdb, \d'` to check if the PostgreSQL server is running. If you see some tables, then it is ready.

```
2. cd /etc/rc.d/init.d  
mysqld start
```

Note: you can use `'mysql(using root account), use calib, show tables;'` to check if the mysql

server is running. If you see some tables, then it is ready.

Copy the directory `${SITEROOT}/sw/dist/boss/6.1.0/TestRelease` into your workarea directory, for example `/home/shencp/workarea`. Later do:

```
cd TestRelease/*/cmt
```

```
cmt broadcast cmt config
```

```
cmt broadcast gmake
```

```
source setup.csh
```

```
cd ../run
```

```
boss.exe jobOptions_sim.txt(simulation job's name)
```

You are doing simulation work!