Radio Transients Software Install Instruction

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Software in this Document

After go through a lot of trials and errors, I find a way that could install the following 2 common Pulsar software both on **Linux OS** and **MacOS**.

- SIGPROC/SIGPYPROC
- PRESTO

Exclude the official instructions on main page of software, I was following two useful memo:

* https://docs.google.com/document/d/1v8Dm4f-SOeDQX5Yli6syek1pxtqgpw81b1cxqoqv2aU/edit#
* http://www.ljtwebdevelopment.com/pulsarref/pulsar-software-install-mac-lion.html

Which are telling us how to install PRESTO on Unbuntu and Pulsar software Suite on Mac separately. In this Memo, I quote instructions from above 2 websites in order to make a summary.

For Fast Radio Transient (FRB) search software, Vishal G. has a Sigproc Giant Pulse Search code which is modified from Sigproc source code. But Here I mainly introduce Heimdall which are running on GPU server.

Software Install On MacOS

1 Preparation for MacOS

This is got from:

http://www.ljtwebdevelopment.com/pulsarref/pulsar-software-install-mac-lion.html

1.1 Xcode and Homebrew

Install the latest version of XCode and XCode command line tools from the App store. We use *brew* to install some software from repository. Follow the install instructions on http://mxcl.github.io/homebrew/. Homebrew is installed to /usr/local by default.

1.2 Install dependencies by brew

$ brew doctor

$ brew install gfortran

$ brew install glib

$ brew install cfitsio

$ brew install pgplot

$ brew install autoconf

$ brew install automake

$ brew install libtool

$ brew install swig

$ brew install cvs

$ brew install python

$ pip install numpy

1.3 Define some environmental variables

Add the following lines to your .bash_profile file (if it doesn't exist, create it):
****

```
#Path to the pulsar software installation directory eg:
export ASTROSOFT=/Users/user/pulsar_software

# PSRCAT
export PSRCAT_RUNDIR=$ASTROSOFT/psrcat_tar
export PSRCAT_FILE=$ASTROSOFT/psrcat_tar/psrcat.db

# Tempo
export TEMPO=$ASTROSOFT/tempo

# Tempo2
```

export TEMPO2=$ASTROSOFT/tempo2/T2runtime

PGPLOT
export PGPLOT_DIR=/usr/local/Cellar/pgplot
export PGPLOT_DEV=/xwindow

PRESTO
export PRESTO=$ASTROSOFT/presto

DYLD_LIBRARY_PATH
export DYLD_LIBRARY _ PATH = $DYLD_LIBRARY_PATH:$ASTROSOFT/lib:$PRESTO/lib

PATH
Some Presto executables match sigproc executables so keep separate -
all other executables are found in $ASTROSOFT/bin
export PATH=$PATH:/usr/local/git/bin:$ASTROSOFT/bin:$PRESTO/bin
****

Then reload your .bash_profile file and check changes are taken up:

- source ∼/.bash_profile
- echo $ASTROSOFT

2 Sigproc/Sigpyproc Install on MacOs

Main page of Sigproc:
http://sigproc.sourceforge.net/

2.1 Dependencies

a. Tempo
Main Page: http://tempo.sourceforge.net/
Install:

1): git clone http://git.code.sf.net/p/tempo/tempo

2): cd tempo

3): ./prepare

4): ./configure F77=gfortran - -prefix=$ASTROSOFT

5): make

6): make install

b. (Optiion 1 Mainly Suggested)Tempo2

Main Page: http://www.atnf.csiro.au/research/pulsar/tempo2/index.php?n=Main.Download
Install:

1): git clone https://bitbucket.org/psrsoft/tempo2.git

2): cd tempo2

3): ./bootstrap

4): ./configure F77=gfortran - -prefix=$ASTROSOFT

5): make && make install

6): make plugins && make plugins-install

(Option 2)Tempo2

Main Page: http://tempo.sourceforge.net/
Install:

1): wget https://bitbucket.org/psrsoft/tempo2/downloads/tempo2-2017.03.1.tar.gz

2): tar -xf tempo2-2017.03.1.tar.gz

3): cd tempo2

4): ./bootstrap

5): ./configure F77=gfortran - -prefix=$ASTROSOFT

6): make && make install

7): make plugins && make plugins-install

c. FFTW3
Main Page: http://fftw.org/ Install:

1): wget http://fftw.org/fftw-3.3.7.tar.gz

2): tar -xf fftw-3.3.7.tar.gz

3): cd fftw-3.3.7

4): ./configure - -prefix=$ASTROSOFT

5): make

6): make install

d. Cfitsio
Already installed from *brew*. Note to specify the lib PATH of Cfitsio: /usr/local/Cellar/cfitsio/3.420/lib

e. Pgplot Already installed from *brew*. Note to specify the lib PATH of PGPlot: /usr/local/Cellar/pgplot

2.2 Trick to install Sigproc on Mac

2.2.1 Source from Michael Keith's release

a): git clone https://github.com/SixByNine/sigproc.git

b): ./bootstrap

c): (For MacOs)./configure –prefix=/Users/nch/pulsar_software –with-cfitsio-dir=/usr/local/Cellar/cfitsio/3.420 –with-fftw-dir=$ASTROSOFT F77=gfortran FC=gfortran

(For Centos)./configure –prefix=/Users/nch/pulsar_software –with-cfitsio-dir=/usr/local/Cellar/cfitsio/3.420 –with-fftw-dir=$ASTROSOFT

d): make

e): make install

2.2.2 Other Choice

1): Download source packet from main page:
http://prdownloads.sourceforge.net/sigproc/sigproc-4.3.tar.gz?download

2): tar -xf sigproc-4.3.tar.gz

3): cd sigproc-4.3

4): ./configure
Enter eg. at prompt to set the default path of the executables.

5): Edit makefile.darwin with the following:

****

a) Ensure the PGPLOT libraries in the LPGPLOT line are in the following order, and add -lpng to enable png output from PGPLOT:
-lcpgplot -lpgplot -lpng

b) Add the following line defining the fortran compiler:
FC = gfortran -ffixed-line-length-none

c) Uncomment LFITS and LFFTW and edit paths to:

LFITS = -L/path/to/lib/ -lcfitsio
LFFTW = -L/path/to/lib/ -lfftw3 -lfftw3f

Here Our path are:

LFITS = -L/usr/local/Cellar/cfitsio/3.420/lib -lcfitsio
LFFTW = -L$(ASTROSOFT)/lib -lfftw3 -lfftw3f

****

6): Remove the backslash and quote from dosearch.f (line 265):
Change from:
write(llog,*) 'DB´ s slow-but-simple harmonic summing routine'
to:
write(llog,*) 'DBs slow-but-simple harmonic summing routine'

7): Edit makefile:
****
include makefile.$(OSTYPE)

to:

include makefile.darwin

LIB = libsigproc_$(OSTYPE).a

to:

LIB = libsigproc_darwin.a
****

8): Save the file and compile it:

$ make

$ make quickplot

2.3 Use Sigproc and Sigpyproc

Following the steps above , sigproc should be work. For Sigpyproc which are a python version for sigproc, I have written a memo in the early time. you can find it from :
https://github.com/peterniuzai/Work_memo/raw/master/SIGPYPROC_MEMO.pdf
It has description for both Mac and Linux server. The manual of Sigproc could found from:
http://sigproc.sourceforge.net/sigproc.pdf
The use of Sigpyproc could found from:
http://www3.mpifr-bonn.mpg.de/staff/ebarr/sigpyproc/Introduction.html

3 Presto install on Mac

Main Page:
http://www.cv.nrao.edu/~sransom/presto/
Get the latest version of Presto from the main page:

1) git clone git://github.com/scottransom/presto.git

2) cd presto

3) git pull

3.1 Dependencies

Presto has the dependencies same as Sigproc.

3.2 Trick to install Presto on Mac

1): cd presto/src

2): Edit Makefile as follows:

a) Define paths to fftw and cfitsio includes and libs:

- FFTINC = -I$(ASTROSOFT)/include
- FFTLINK = -L$(ASTROSOFT)/lib -lfftw3f
- CFITSIOINC = -I/usr/local/Cellar/cfitsio/3.420/include
- CFITSIOLINK = -L/usr/local/Cellar/cfitsio/3.420/lib/ -lcfitsio

b) Add -lm flag to CFLAGS:
CFLAGS = -I$(PRESTO)/include $(GLIBINC) $(CFITSIOINC) $(PGPLOTINC) $(FFTINC) -DUSEFFTW -DUSEMMAP -D_LARGEFILE_SOURCE -D_FILE_OFFSET_BITS=64 -g -Wall -W -fPIC -O3 -ffast-math -Wall -W -fPIC -lm

3): Continue the build:

$ make makewisdom

$ make prep

$ make

3.3 Use Presto

There's a nice PPT to show us how to use Presto: http://www.cv.nrao.edu/~sransom/PRESTO_search_tutorial.pdf

Install Pulsar software on Linux server Ubuntu/Centos

4 Install Presto on Ubuntu

Refer from:
https://docs.google.com/document/d/1v8Dm4f-SOeDQX5Yli6syek1pxtqgpw81b1cxqoqv2aU/edit#

4.1 Get dependencies ready

sudo apt-get install git libfftw3-bin libfftw3-dbg libfftw3-dev libfftw3-doc libfftw3-double3 libfftw3-long3 libfftw3-quad3 libfftw3-single3 pgplot5 csh automake gfortran libglib2.0-dev libccfits-dev libcfitsio3 libcfitsio3-dev libx11-dev libpng12-dev nvidia-cuda-dev libcuda1-331 -y

4.2 Install steps

Step 1) git clone git://github.com/scottransom/presto.git

Step 2) git clone git://git.code.sf.net/p/tempo/tempo

Step 3) cd tempo

Step 4) ./prepare

Step 5) ./configure –prefix=/usr/local/

Step 6) make && sudo make install

Step 7) cp tempo.cfg src/

Step 8) cp tempo.hlp src/

Step 9) sudo vi /etc/environment

* TEMPO=/home/nch/work/tempo/src
* PRESTO=/home/nch/work/presto *em PGPLOT_DIR=/usr/lib/pgplot5*
* *FFTW_PATH=/usr/*
* *LD_LIBRARY_PATH=/usr/local/cuda/lib64:/usr/local/cuda/lib:/home/nch/work/presto/lib*
* *PYTHONPATH=/home/nch/work/presto/python:/home/nch/work/presto/lib/python*

Step 10) sudo reboot

Step 11) cd /Downloads/presto/src

Step 12) make makewisdom

Step 13) make prep

Step 14) make

4.3 Test Presto

$ wget http://www.cv.nrao.edu/~sransom/GBT_Lband_PSR.fil

$ readfile GBT_Lband_PSR.fil

$ rfifind -time 2.0 -o Lband GBT_Lband_PSR.fil

$ prepfold -n 64 -nsub 96 -p 0.004621638 -dm 62.0 GBT_Lband_PSR.fil

5 Install Presto on Centos

This is similar as Ubuntu. Different thing is some dependency software yum doesn't have.

1)you need install Cfitsio from https://heasarc.gsfc.nasa.gov/fitsio/
Here I use the latest version: cfitsio_latest.tar.gz

2) FFTW, you could find this from MacOS instruction.
(./configure –prefix=/usr/local/ –enable-float –enable-threads –enable-shared CFLAGS=-fPIC FFLAGS=-fPIC)

3) Install libpng-code:
urlhttp://libpng.org/pub/png/libpng.html
./configure [–prefix=/path]

make check

make install
4) PGplot

This is a tricky thing. refer to:
https://www.cnblogs.com/shaoguangleo/archive/2012/04/09/2806095.html

1) sudo yum install libX11-devel

2) sudo yum install gcc-gfortran

3) cd /usr/local/src

4) mv /Downloads/pgplot5.2.tar.gz .

5) tar zxvf pgplot5.2.tar.gz

6) mkdir /usr/local/pgplot

7) cd /usr/local/pgplot

8) cp /usr/local/src/pgplot/drivers.list .

9) Edit drives.list , Remove the "!" before :
/PS, /VPS, /CPS, /VCPS and /XServe /XWINDOW

10) Do the following command in dir: /usr/local/pgplot
/usr/local/src/pgplot/makemake /usr/local/src/pgplot linux g77_gcc_aout

11) Edit makefile :

12) Instead of FCOMPL=g77 by FCOMPL=gfortran

13) make && make cpg

14) Set the environment:

```
$ export PGPLOT_DIR=/usr/local/pgplot
$ export PGPLOT_DEV=/Xserve
```

15) Test:

```
$ /usr/local/pgplot/pgdemo1
$ /usr/local/pgplot/pgdemo2
$ ...
```

After install the dependencies above, then set the environment. Just follow the INSTALL file in PRESTO source. Remember use '–prefix=/usr/local/' when configure.

6 Common Problems

(1) "Can't find presto.so" :
Check if LD_LiBRARY_PATH variable defined.if not ,defined it in .bashrc
export LD_LIBRARY_PATH="$LD_LIBRARY_PATH:$HOME/work/sigpyproc/lib/c"

(2) "undefined reference to curl|_global_init, curl_easy_init and other function(C)"
https://stackoverflow.com/questions/16476196/undefined-reference-to-curl-global-init-cu
gcc -lcurl test.c

(3) Open un-recognized observatory:
Add observatory info in /tempo/obsys.dat
In $presto/src/ , open misc_utils.c file.
modify function: telescope_to_tempocode() , add the observatory info.
Recompile presto again.