



Rapporti Tecnici INAF INAF Technical Reports

Number	49
Publication Year	2020
Acceptance in OA@INAF	2020-11-05T09:38:09Z
Title	AGILE Real-Time Analysis Setup
Authors	PARMIGGIANI, NICOLO, BULGARELLI, ANDREA, Tampieri, Simone, BARONCELLI, LEONARDO, ADDIS, ANTONIO
Affiliation of first author	OAS Bologna
Handle	http://hdl.handle.net/20.500.12386/28151 , http://dx.doi.org/10.20371/INAF/TechRep/49

AGILE Real-Time Analysis Pipeline Setup

N.Parmiggiani⁽¹⁾, A. Bulgarelli⁽¹⁾, S. Tampieri⁽¹⁾, L. Baroncelli⁽¹⁾, A. Addis⁽¹⁾

⁽¹⁾INAF/OAS – Bologna, Via P. Gobetti 93/3, 40129 Bologna

Change history:

Version	Date	Notes
1.0	Jan 23 th , 2019	
1.1	Sep 18 th , 2020	Update of procedures

Table of contents

1. Introduction	4
2. Containers: layers	4
3. Installation of basic packages inside the container	5
3.1. Anaconda3	5
3.2. Services	5
3.3. Daemons with crontab	7
3.4. Add diskusage scripts	8
4. AGILE DeepVar Installation	8
5. Science GUI dependencies	10
6. APPENDIX: installation procedure for old pipelines	11
6.1. Installation of AGILE pipelines	11
6.1.1. AGILE ALERT PIPE	11
6.1.2. Anaconda2	11
6.1.3. MCAL results DB	12
6.1.4. GCN DAEMON	13
6.1.5. AGILE MCAL PIPE 2	13

1. Introduction

AGILE pipelines setup

AGILE pipelines can be downloaded with this setup <https://github.com/AGILESCIENCE/rta-sci-agile-Setup>

2. Containers: layers

AGILE pipelines are deployed into a Singularity container environment.

To build the containers, download this repository: <https://github.com/ASTRO-EDU/AGILE-containers>

Each container has four files.

- .build is used to build a layer.
- .start file is used to start a container and contains different commands.
- .simg is the container image.
- .recipe contains all commands needed to build the container

The container environment is created with different layers, each with a specific function.

- 1) Operative system and base libraries
- 2) Science tools installation
- 3) System services
- 4) Dummy
- 5) Pipeline installation
- 6) Layer with aspecific configuration for a particular machine (IP, port etc)

To build the container, the user can be root inside the machine and can use the script buildall.sh, which contains a list of commands. Each command runs the build of a single layer.

```
sh agile_layer1_core.build
sh agile_layer2_scitools.build
sh agile_layer3_service.build
sh agile_layer5_instance.build
sh agile_layer6_[machine]_[user]_instance.build
```

3. Installation of basic packages inside the container

The following commands can be performed into a machine or written into the recipe to build a container.

3.1. Anaconda3

Install anaconda3 <https://www.anaconda.com/download/#linux>

Install Manually:

```
root@machine# cd ..
root@machine# wget https://repo.anaconda.com/archive/Anaconda3-5.3.0-Linux-x86_64.sh
Execute installer
Setup install directory when program ask for: /opt/prod/anaconda3
root@machine# bash Anaconda3-5.3.0-Linux-x86_64.sh
```

Create /opt/prod/modulefiles/anaconda-3.6

```
root@machine# vim /opt/prod/modulefiles/anaconda-3.6
```

```
##%Module
set path /opt/prod/anaconda3
prepend-path PATH $path/bin
unsetenv PYTHONPATH
prepend-path LD_LIBRARY_PATH $path/lib
```

Create environment

```
rt@machine$ module load anaconda-3.6
rt@machine$ conda create -n pipe_manager_py36 python=3.6 astropy=3.0 lxml=4.1.1
mysql-connector-python=2.0.4
```

3.2. Services

SETUP MySQL /etc/my.cnf

```
[mysqld]
sql_mode =
'NO_ZERO_IN_DATE,NO_ZERO_DATE,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGI
NE_SUBSTITUTION'
```

```
default-character-set=utf8
federated
symbolic-links=0
bind-address = 0.0.0.0
innodb_buffer_pool_size=1024M
innodb_log_file_size=64M
max_connections = 500
query_cache_size = 64M
slow_query_log = ON
query_cache_type = 1
max_heap_table_size = 64M
tmp_table_size = 64M
query_cache_limit= 64M
slow_query_log=ON
log_output=TABLE
event_scheduler=ON
```

Restart mysql

```
root@agilepipe# systemctl restart mysqld
```

If not restart check /var/log/mysqld.log

SETUP pipeline_manager database

```
rt@machine$ cd /opt/prod/pipeline_manager/scripts
rt@machine$ cp conf.py.default conf.py
rt@machine$ vim conf.py
rt@machine$ cp repository.conf.default repository.conf
rt@machine$ vim repository.conf
```

Setup conf.py and repository.conf -> look specific pipe manual

Setup Slurm

Install slurm <https://www.slothparadise.com/how-to-install-slurm-on-centos-7-cluster/>

```
rt@machine$ cd ../slurm
root@machine# cp slurm.conf /etc/slurm/slurm.conf
root@machine# cp slurmdbd.conf /etc/slurm/slurmdbd.conf
```

Configure the last two files.

Follow this tutorial <https://slurm.schedmd.com/accounting.html>

Create database, cluster and user

```
rt@machine$ mysql -uroot -p --execute="create database slurm_acct_db;"
root@machine# sacctmgr add cluster [clustername]
root@machine# sacctmgr create user name=rt cluster=[clustername] account=root
rt@machine$ cd /opt/prod/pipeline_manager/database
rt@machine$ cp trigger_slurm_status_update.sql.default trigger_slurm_status_update.sql
Open the trigger and change pipe-db name for each pipe to connect
rt@machine$ mysql -uroot -p slurm_acct_db < trigger_slurm_status_update.sql
```

Create reservation if needed

```
rt@machine$ vim slurm_init.sh
Update info
root@machine# sh slurm_init.sh
```

Setup website optionally

```
rt@machine$ cd /opt/prod/pipeline_manager/website
rt@machine$ cp config.php.default config.php
Update config
root@machine# ln -s /opt/prod/pipeline_manager/website /var/www/html/website
```

3.3. Daemons with crontab

Add following lines to crontab

```
PIPEMANAGER = /opt/prod/pipeline_manager/scripts

#### PIPE MANAGER

# update repository
* * * * * pgrep -u "$(whoami)" -xf "python ./update_repository.py 1" > /dev/null || (. ~/.bashrc ; date >>
$LOG/update_repository.log ; cd $PIPEMANAGER ; source ../skeleton.ll ; python ./update_repository.py 1
>> $LOG/update_repository.log 2>&1)

# submit run
* * * * * pgrep -u "$(whoami)" -xf "python ./submit_run.py 1" > /dev/null || (. ~/.bashrc ; date >>
$LOG/pipe_manager_submit.log ; cd $PIPEMANAGER ; source ../skeleton.ll ; python ./submit_run.py 1 >>
$LOG/pipe_manager_submit.log 2>&1)

# cancel run
* * * * * pgrep -u "$(whoami)" -xf "python ./cancel_run.py 1" > /dev/null || (. ~/.bashrc ; date >>
$LOG/pipe_manager_cancel.log ; cd $PIPEMANAGER ; source ../skeleton.ll ; python ./cancel_run.py 1 >>
$LOG/pipe_manager_cancel.log 2>&1)
```

3.4. Add diskusage scripts

In root crontab add the following line

```
0 */2 * * * /root/scripts/diskusagealert.sh > /dev/null 2>&1
```

The script /root/scripts/diskusagealert.sh is the following:

Chmod u+x /root/scripts/diskusagealert.sh

```
#!/bin/bash

ADMIN="[email]"
THRESHOLD=90
TMP_THRESHOLD=10000

df -PkH | grep -vE '^Filesystem|tmpfs|cdrom|media' | awk '{ print $5 " " $6 }' | while read output;
do
    usep=$(echo $output | awk '{ print $1}' | cut -d'%' -f1 )
    partition=$(echo $output | awk '{print $2}')
    if [ $usep -ge $THRESHOLD ] ; then
        echo "$(df -h)" |
        mail -s "Alert from $(hostname): disk usage $usep% on partition $partition" $ADMIN
    fi
done

tmp_mb=$(du -sm /tmp/ | cut -f1)
if [ $tmp_mb -ge $TMP_THRESHOLD ] ; then
    echo "$(du -sh /tmp)" |
    mail -s "Alert from $(hostname): /tmp usage above $TMP_THRESHOLD MB" $ADMIN
fi
```

4. AGILE DeepVar Installation

Download DeepVar BUILD repository

```
rt@machine $ cd /opt/prod
rt@machine $ git clone https://[user]@github.com/ASTRO-EDU/DeepVar.git DeepVar_B1
rt@machine $ cd DeepVar_B1
rt@machine $ git checkout BUILD1
rt@machine $ ./download_modules.sh [git username] -t
```

Create deepvar_build1

```
root@machine# module av
root@machine# vim [module path]/deepvar_b1
```

```
#%Module
module load agile-B25-r5
setenv DEEPVAR /opt/prod/DeepVar_B1
```

Download cat2 scripts

```
rt@machine $ cd /home/rt/builds
rt@machine $ git clone https://github.com/ASTRO-EDU/AGILE-GRID-scripts-cat2.git
rt@machine $ cd AGILE-GRID-scripts-cat
rt@machine $ git checkout v1.0.1
rt@machine $ module load deepvar_b1
rt@machine $ ./install.sh
```

Create link for website

Create deepvar_build1

```
root@machine# cd /var/www/html
root@machine# module load deepvar_b1
root@machine# ln -s $DEEPVAR/website spot6
```

Create Database

```
rt@machine $ cd $DEEPVAR/database
rt@machine $ mysql -uroot -p --execute='create database cat2'
rt@machine $ mysql -uroot -p --execute='create database deepsearch1'
rt@machine $ mysql -uroot -p --execute='create database spot6'
rt@machine $ mysql -uroot -p cat2 < cat2_schema.sql
rt@machine $ mysql -uroot -p deepsearch1 < cat2_schema.sql
rt@machine $ mysql -uroot -p spot6 < spot6_schema-28-2-18.sql
```

Create rt user and grant permission to these databases

```
rt@machine $ mysql -uroot -p --execute='CREATE USER rt@% IDENTIFIED BY '[PASS]';'
rt@machine $ mysql -uroot -p --execute='GRANT ALL PRIVILEGES ON cat2.* TO 'rt'@'%';'
rt@machine $ mysql -uroot -p --execute='GRANT ALL PRIVILEGES ON deepsearch1.* TO 'rt'@'%';'
rt@machine $ mysql -uroot -p --execute='GRANT ALL PRIVILEGES ON spot6.* TO 'rt'@'%';'
rt@machine $ mysql -urt -p cat2 < sqrrts_radius.sql
```

```
rt@machine $ mysql -urt -p deepsearch1 < sqrtts_radius.sql
rt@machine $ mysql -urt -p cat2 < import_source.sql
rt@machine $ mysql -urt -p cat2 < import_source.sql
rt@machine $ cd $DEEPVAR/generate_lightcurves/utilities/chi_square/
rt@machine $ ruby import_chi_square.rb [host] [user] [pass] [database]
```

Create config file

```
rt@machine $ cd $DEEPVAR/website/cat2
rt@machine $ cp config.php.default config.php
rt@machine $ cp config.php.default deepsearch1.php
Vim to modify
```

```
rt@machine $ cd $DEEPVAR/import/
rt@machine $ cp config.rb.default config.rb
Vim to modify
```

Start daemon for upload command from website

```
#submit run from cat2
* * * * * pgrep -xf "ruby ./command_daemon.rb" > /dev/null || (. ~/.bashrc ; .
/usr/share/Modules/init/bash ; date >> $LOG/daemon_cat2.lo ; cd
/opt/prod/DeepVar/website/cat2/backend/ ; ruby ./command_daemon.rb >> $LOG/daemon_cat2.log
2>&1)

### import spot6 on agilehost1
*/15 * * * * pgrep -xf "ruby ./check_for_import_spot6.rb" > /dev/null || (. ~/.bashrc ; date >>
$LOG/check_import.log ; cd $PIPE/crontab/ ; pwd >> $LOG/check_import.log ; ruby
./check_for_import_spot6.rb >> $LOG/check_import.log 2>&1)
#
```

5. Science GUI dependencies

dependencies:

1. jquery-3.0.0
2. bootstrap-3.3.7
3. datatables-1.10.12
4. d3-3.5.17

5. celestial-0.6.5
6. plotly-1.38.3

Custom JS9 parameters:

Edit the following file: /var/www/html/js9/js9prefs.js

The js9prefs.js "keys" option values can be found at js9.js or via the display plugin View->Preferences.

6. APPENDIX: installation procedure for old pipelines

The new installation procedures are inside the singularity recipes.

6.1. Installation of AGILE pipelines

6.1.1. AGILE ALERT PIPE

6.1.2. Anaconda2

Install Anaconda 2 <https://conda.io/docs/user-guide/install/linux.html>

Install Manually:

```
root@machine# cd ..
root@machine# wget https://repo.anaconda.com/archive/Anaconda2-5.3.0-Linux-x86_64.sh
Execute installer
Setup install directory when program ask for: /opt/prod/anaconda2
root@machine# bash Anaconda2-5.3.0-Linux-x86_64.sh
```

Create module /opt/prod/modulefiles/anaconda-2.7

```
#!/Module
set path /opt/prod/anaconda2
prepend-path PATH $path/bin
unsetenv PYTHONPATH
prepend-path LD_LIBRARY_PATH $path/lib
```

Create module /opt/prod/modulefiles/alert_pipe_27

```
#!/Module
module load anaconda-2.7
setenv ALERTPIPE /opt/prod/AGILEPIPE/
prepend-path PYTHONPATH $/opt/prod/pipeline_manager:$env(ALERTPIPE)
```

Create environment

```
rt@agilepipe $ module load alert_pipe_27
rt@agilepipe $ conda create -n py_alert_pipe_27 python=2.7.5 numpy=1.12 matplotlib=2.0.2
astropy=2.0.3 scipy=0.18.1 pytest=3.8.0 mysql-connector-python=2.0.4
rt@agilepipe $ source activate py_alert_pipe_27
rt@agilepipe $ pip install healpy==1.11.0
rt@agilepipe $ pip install pyastronomy==0.12.0
```

Clone the AGILE-ALERT-PIPE repository

6.1.3. MCAL results DB

Create database for MCAL results

```
rt@agilepipe$ cd AGILE-ALERT-PIPE/database
rt@agilepipe $ mysql -uroot -p [pipe db] < init_pipe_database.sql
rt@agilepipe$ mysql -uroot -p --execute='create database rt_alert_results_db;'
rt@agilepipe $ mysql -uroot -p rt_alert_results_db <
AGILE-MCAL-PIPE/database/mcal_results_db_schema_alert.sql
Check if exist mcal_notice_db or create it
rt@agilepipe $ mysql -uroot -p --execute='create database mcal_notice_db'
rt@agilepipe $ cd /opt/prod/AGILE-MCAL-PIPE/database
rt@agilepipe $ mysql -uroot -p mcal_notice_db < mcal_notice_db_schema.sql
If AGILE pipe Check that in database the instrument TEST and network TEST have the id = 0
```

Setup cluster table in database

Check and change the database data if needed to setup all configuration.

Add the configuration to update tstop of EVT, LOG, 3908, 3916, 3913 e 3201 on database

```
rt@agilepipe$ cd /opt/prod/pipeline_manager/scripts/
rt@agilepipe$ cp repository.conf.default repository.conf
rt@agilepipe$ vim repository.conf
Add this row: ALERT /opt/prod/AGILEPIPE/update_alert_repo/update_repository.py 1
rt@agilepipe$ cd /opt/prod/AGILEPIPE/update_alert_repo
rt@agilepipe$ cp conf.py.default conf.py
rt@agilepipe$ vim conf.py
```

6.1.4. GCN DAEMON

```
rt@agilepipe$ cd /opt/prod/AGILEPIPE/gcn
rt@agilepipe$ make
rt@agilepipe$ cp conf.txt.default conf.txt
rt@agilepipe$ vim conf.txt
```

6.1.5. AGILE MCAL PIPE 2

Check that this module exists:

```
[rt@agilepipedev ~]$ cat /opt/prod/modulefiles/root_v5.34.24
#%Module

setenv ROOTSYS  "/opt/prod/root/root_v5.34.24_py"

prepend-path PATH          $env(ROOTSYS)/bin

set libs          "/usr/lib64:/usr/lib:$env(ROOTSYS)/lib"
prepend-path LD_LIBRARY_PATH  $libs
prepend-path SHLIB_PATH      $libs
prepend-path LIBPATH        $libs
prepend-path PYTHONPATH     $libs

prepend-path MANPATH        $env(ROOTSYS)/man
```

If there is no root _py copy it from another machine, install it and change the module

```
root@vm # rsync -av rt@[machine]:/opt/prod/root/root_v5.34.24_py .
```

Install Anaconda 2 <https://conda.io/docs/user-guide/install/linux.html>

Create /opt/prod/modulefiles/anaconda-2.7

```
#%Module
set path /opt/prod/anaconda2
prepend-path PATH $path/bin
unsetenv PYTHONPATH
prepend-path LD_LIBRARY_PATH $path/lib
```

Create module /opt/prod/modulefiles/mcal_pipe_2.0

```
#%Module
module load anaconda-2.7
```

```
setenv MCALPIPE /opt/prod/AGILE-MCAL-PIPE/pipe2
prepend-path PYTHONPATH $/opt/prod/pipeline_manager:$env(MCALPIPE)
```

Create environment

```
rt@agilepipe $ module load anaconda-2.7
rt@agilepipe $ conda create -n py_mcal_27 python=2.7.5 scipy=0.18.1 numpy=1.12 matplotlib=2.0.2
basemap=1.0.7 lxml=3.2.1 mysql-connector-python=2.0.4 astropy=2.0.3
rt@agilepipe $ source activate py_mcal_27
rt@agilepipe $ pip install pyastronomy==0.12.0
```

Create pipe database from schema in pipeline_manager repository (check relative manual).

```
rt@agilepipe$ cd pipeline_manager/database
rt@agilepipe $ mysql -uroot -p --execute='create database mcal_pipe_db'
rt@agilepipe $ mysql -uroot -p mcal_pipe_db < pipe-db-schema.sql
rt@agilepipe $ mysql -uroot -p --execute='create database mcal_notice_db'
rt@agilepipe $ mysql -uroot -p mcal_notice_db < mcal_notice_db_schema.sql
rt@agilepipe $ cd AGILE-MCAL-PIPE/database
rt@agilepipe $ mysql -uroot -p mcal_pipe_db < initialize_database_pipe.sql
```

Add this row in pipe_manager database with right path

```
mcal_pipe      localhost      [user] [password]      mcal_pipe_db_test
/opt/prod/AGILE-MCAL-PIPE/pipe2      /opt/prod/AGILE-MCAL-PIPE/pipe2/skeleton.ll  1
```

Insert default value for this pipe

```
rt@agilepipe$ cd AGILE-MCAL-PIPE/pipe2/database
rt@agilepipe $ mysql -uroot -p --execute='create database mcal_results_db;'
For next step check the foreignkey database name
rt@agilepipe $ mysql -uroot -p mcal_results_db < mcal_results_db_schema.sql
```

Check and change the database data if needed to setup all configuration.

Setup cluster table in database

Add the configuration to update tstop of 3908 and 3916 on database

```
rt@agilepipe$ vim /opt/prod/pipeline_manager/scripts/repository.conf
```

```
rt@agilepipe$ cd /opt/prod/AGILE-MCAL-PIPE/pipe
rt@agilepipe$ cp conf.py.default conf.py
rt@agilepipe$ vim conf.py
Add this row to pipeline_manger repository.txt MCAL
/opt/prod/AGILE-MCAL-PIPE/pipe/update_repository.py 1
```

Setup website

```
rt@agilepipe$ cd /opt/prod/AGILE-MCAL-PIPE/website
rt@agilepipe $ cp config.php.default config.php
Setup config.php
$base_results_dir = "/data01/ANALYSIS3.local":
$web_results_dir = "../analysis/";

root@machine# cd /var/www/html
root@machine# ln -s /opt/prod/AGILE-MCAL-PIPE/website agilemcal
```