DISCOS NOTO 0.2

Release 0.6

Marco Bartolini, Andrea Orlati

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Welcome to the documentation of DISCOS setup for NOTO radiotelescope. DISCOS is the *Development of italian Single-Disch COntrol System* which permits the radiotelescope to be used by astronomers in single dish observations. The system is the analogous of Nuraghe, installed at SRT, and ESCS installed at Medicina.

1 DISCOS NOTO 0.2 CONFIGURATION AND SETUP

As DISCOS development goes, on a new release, namely **noto 0.2**, has been installed at the Noto Radiotelescope. This internal report describes how the discos version is configured in terms of hardware and software, enabling future users to install a specular system.

1.1 DISCOS Version

The installed version of the control system is **noto-0.2** and can be downloaded from belzebu svn repository at:

```
svn+ssh://belzebu.oa-cagliari.inaf.it/repos/ACS/tags/noto-0.2
```

1.2 Documentation on Github

Documentation of the whole installation configuration in a human readable form is hosted on github under the DISCOS organization page at:

```
http://github.com/discos/noto-conf/
```

2 Machines

The installation is composed of 2 physical machines Here follows a brief description:

- *escs* (page 2): the node running ACS daemons as well as common services and all of the control system
- *euser* (page 4): the node providing access to the system by operators for accessing the system, will have **IDL**, **basie** and **QuickLook** tools installed

2.1 escs

This machine is the main responsible of the running system and the most critical possible point of failure. It is its responsibility to:

- run the ACS framework and the control system
- export data via NFS

PARAMETER	VALUE
hardware	PC Tower
CPU	Intel(R) Quad Core(TM) i3 CPU 540 @ 3.07GHz
RAM	8GB
OS	Scientific Linux 5.3 i386 (32 bit)
Kernel	2.6.18-398.el5PAE
hostname	escs.noto.ira.inaf.it
eth1	192.167.187.17

OS installation

Escs is installed on a 2TB hard disk so partitioned:

```
[root@escs ~]# fdisk -l

Disco /dev/sda: 2000.3 GB, 2000398934016 byte

255 heads, 63 sectors/track, 243201 cylinders
Unità = cilindri di 16065 * 512 = 8225280 byte

Dispositivo Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1       63741   511999551   83  Linux
```

```
/dev/sda2            63742       65781    16386300   82  Linux swap / Solaris
/dev/sda3            65782      243201  1425126150   83  Linux
```

and:

```
[root@escs ~]# mount
/dev/sda1 on / type ext3 (rw)
/dev/sda3 on /archive type ext3 (rw)
```

Provisioning

Packages, users, groups and ACS are installed using BASIE provisioning scripts.

ACS Temporary Data

ACS needs to store log informations for each process running inside the system. this is true for every container, daemon, manager ecc... This files can be very large and sometimes they can flood the disk space resulting in wrong ACS behaviors, so we decided to store these files into a local directory on each machine:

```
[manager@escs ~] vim ~/.bashrc
...
export ACS_TMP=/data/ACSTMP
```

And we create the necessary directory setting owner and group to the ones used by ACS processes:

```
[manager@escs ~] cd /data
[manager@escs data/] mkdir ACSTMP
[manager@escs data/] chown manager:escs ACSTMP
```

NTP

Ntp service for system clock synchronization is configured via */etc/ntp.conf* and */etc/ntp/ntpservers* connecting to the station server **192.167.187.78**:

```
[root@escs /]# mkdir /var/log/ntpstats
[root@escs /]# chown ntp:ntp /var/log/ntpstats
[root@escs /]# service ntpd start
[root@escs /]# chkconfig ntpd on
```

NFS

NFS is used in order to export archived data.

First, we create the exported filesystem directories:

```
[root@escs /]# mkdir /exports
[root@escs /]# mkdir /exports/archive
```

Then we bind the filesystem to the exported directories modifying the */etc/fstab* file adding the following lines:

```
/archive                  /exports/archive          none    bind            0 0
```

Now the OS must be instructed to export the bound filesystems:

```
[root@escs /]# cat /etc/exports
/exports         192.167.187.0/24(rw,fsid=0,insecure,no_subtree_check,sync,no_root_squash)
/exports/archive    192.167.187.0/24(rw,nohide,insecure,no_subtree_check,sync,no_root_squash)
[root@escs /]# exportfs -rv
```

And we start the nfs server:

```
[root@escs /]# service nfs start
[root@escs /]# chkconf nfs on
```

DATA BACKUP

Data backup is realized on IRA-Bologna servers via rsync. we thus must authorize IRA server to use rsync service on escs which is the public access point of the control system and enable rsync service on the machine itself:

```
[root@escs /]# vim /etc/rsyncd.conf
[Area-Med-Arc]
    comment=archivio osservazioni single dish di Noto
    path=/archive/data
    read only = yes
    list = yes
    host allow =
    192.167.165.0/255.255.255.0
    uid = 3060
    gid = 335

[root@escs /]# vim /etc/xinetd.d/rsync
# default: off
# description: The rsync server is a good addition to an ftp server, as it \
#       allows crc checksumming etc.
service rsync
{
    disable = no
    socket_type     = stream
    wait            = no
    user            = root
    server          = /usr/bin/rsync
    server_args     = --daemon
    log_on_failure  += USERID
}
```

Service can be started and monitored using:

```
[root@escs /]# service xinted start|stop|status|restart
```

2.2 euser

The euser machine is directly connected to a monitor in the control room and is intended to be used by observers in order to run auxiliary observation tools such as **quicklook** the **Imager** and **Basie**.

The machine main configuration parameters are the following:

PARAMETER	VALUE
hardware	Tower PC
CPU	Intel(R) Core(TM) i5-4690K CPU @ 3.50GHz
RAM	8GB
OS	CentOS Linux release 7.2.1511 (Core)
Kernel	3.10.0-327.36.3.el7.x86_64
hostname	euser.noto.ira.inaf.it
eth0	192.167.187.16

USERS AND GROUPS

Users and groups are defined so that data access is possible to the observers and according to the escs machine schema, this permits to mount NFS filesystems from escs machine without issues.

We have user **euser** belonging to group **acs**, and acs id is **335**

NFS

The **/archive** filesystem from escs machine is mounted via NFS into this machine. The binding is realized via fstab:

```
192.167.187.17:/exports/archive /archive        nfs     rw,soft,auto,intr,proto=tcp,port=2049,users,e
```

IDL

This is the only machine running **IDL 8.3** in this setup. IDL is installed via original CD-ROM available at Medicina station and install location is the one suggested by default:

```
/usr/local/exelis
```

We then created a directory for IDL third party libraries in:

```
/usr/local/idllib
```

and installed there **Coyote** and **astron** libraries. You can find original versions of the libraries at the following links:

- http://www.idlcoyote.com/programs/zip_files/coyoteprograms.zip
- http://idlastro.gsfc.nasa.gov/ftp/astron.tar.gz

Remember to add th edirectory to the IDL path and to include all subdirectories recursively, the easiest way to do that is via idlde->window->preferences.

SDI and Quicklook

The *Single dish imager* can be downloaded from the SRT scicom wiki page at http://scicomsrt.pbworks.com/w/page/54294508/IMAGING%20ANALYSIS and has been extracted to the same location in:

```
/usr/local/idllib/SDI
```

SDI has **ds9** as a dependency, which can be download from http://hea-www.harvard.edu/RD/ds9/site/Download.html or you can find in /root/software/ directory. Extract ds9 and copy it in:

```
/usr/local/bin
```

You can find the **fits_look.pro** idl procedure in /root/software directory. The procedure has been copied in */usr/local/idllib/* as the rest of custom idl programs.

3 Locations

All the hardware involved in the ESCS deploy is located in the control room of the radio telescope. PCs are tower PC with terminals on the table facing the window, just next to the AS control panel.