Isaac Newton Group

NAOMI Software Trouble Shooting Guide

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Table of Contents

Chapter 1 Introduction

The intended purpose of this document is to provide the reader with assistance in order to troubleshoot some of the problems that may occur with the NAOMI software system. It is intended in the first case to be used by software engineers in order to assist NAOMI users in the case of failure of the software system.

Chapter 2 Troubleshooting NAOMI

2.1 Troubleshooting the WHTOCS

There are a number of components of the NAOMI system which run on the **whtics** computer **taurus** and are essential for *observing* but **not** for the actual operation of NAOMI.

The highest level software runs on **taurus** and is otherwise known as the observer level software. This software includes the following software components.

- NAOMI Observer Level GUI

- Lyot Stop Control Daemon

- Packet collection tasks for NAOMI science camera and instrumentation

- Seeing logger

- NAOMI Mimic application

- OCSEPMBridge

- NAOMI dither application

- OCSHTTPServer

A general purpose script called **naomi** is provided which can be used for restarting most of the NAOMI software running on **taurus**. The application takes a single argument which can be one of **restart**, **stop**, **start**. This application will, depending on the argument specified, will stop, start or restart most of the applications listed above. For example, to restart the NAOMI related software on taurus the following command can be used

```
naomi restart
```

The purpose of the above applications as well as some of the problems are detailed in the following sections.

2.1.1 NAOMI Observer Level GUI

The purpose of this GUI is to provide both high level status information and high level control of the NAOMI system to the observer.

A brief summary of it's functionality follows;

- Allows fine manipulation of the position of the WFS pickoff probe

- Provides a trace of the seeing as calculated by the NAOMI system. This is dependent on the **seeingLogger** (see 2.1.4) in order to function correctly.

- Provides WFS pickoff probe and telescope positioning based on science object coordinates input by user.

- Provides control of the OSCA coronagraph.

- Facilitates guide star acquisition. This facility is, as yet, uncommissioned.

What follows is a list of problems that can possibly occur with the application and how they may be solved.

2.1.1.1 Starting the software

The software can be started by executing the following at the command line

```
naomiInterface &
```

2.1.1.2 Unable to Move WFS Pickoff Probe

Ensure that the **OCSEPMBridge** (see 2.1.6) software is running on navis. Ensure that the NAOMI **sequencer** (see 2.3.3) software is running on navis and that the NAOMI mechanism control VxWorks crate **naomiomc** is functioning correctly. This can be verified from the TopGui application which can be run from the navis console.

2.1.1.3 Unable to Offset WFS pickoff Probe Correctly

The WFS pickoff probe moves but does not seem to offset to the correct position. This is most likely due to the astronomers **not** entering the WFS pickoff calibration offsets into TopGui. These offsets should be re−calculated each time any engineering work is performed on NAOMI. The offsets are used as part of the calculation which the NAOMI sequencer performs when an application in the WHTOCS requests a move of the WFS pickoff probe in arc−secs.

The offsets are entered into the system via the WFS page which can be found in the TopGui application. Note that the offsets are not saved automatically and need to be saved manually after being entered.

2.1.1.4 Seeing Trace is Not Functioning

Ensure that the **OCSEPMBridge** software (see 2.1.6) is running on navis and that the **seeingLogger** (see 2.1.4) is also running on **taurus**. Also ensure that the **sequencer** and the **EPM** applications are running on navis (see 2.3.1)

2.1.1.5 Unable to control OSCA mechanisms

Ensure that the OSCA EPICS crate is functioning correctly. The user should review the status panel on the OSCA control page in the **naomiInterface** application to ascertain if the mechanisms are in an error state. If any of the mechanisms are in an error state, the controls on the OSCA control page pertaining to that mechanism will be **disabled**. Should there be an error with the mechanisms, re−initialise them. It should be noted that it can take up to six minutes to re−initialise the Lyot Stop mechanism.

The name of the OSCA crate is **osca**.

2.1.1.6 Unable to Load Guide Star Files

Ensure that the syntax of the guide star file that has been selected conforms to the standards outlined in WHT−NAOMI−15.

2.1.1.7 NAOMI Status panels are red

Ensure that the **EPM** and the **sequencer** are running on navis and restart if necessary (see 2.3.1). Also ensure that the OCSEPMBridge software is running on navis (see 2.1.6).

2.1.1.8 Unable to Offset Telescope to Science Object

Ensure that the TCS is tracking before attempting to perform the *Offset Telescope To Science Object* operation. The software requests a **blind−offset** of the TCS and if the telescope is not tracking, attempt to blind offset the telescope will cause an error. It should be noted that this feature has not been commissioned on sky as yet.

2.1.2 Lyot Stop Control Daemon

The purpose of this DRAMA application is monitor the parallatic angle of the telescope and alter the angle of the Lyot stop correspondingly. It is reliant on both the TCS and the OSCA EPICS system running correctly.

The application can be started at the **whtobs** command line by executing the following.

```
LyotStopAngleUpdate &
```

2.1.2.1 Lyot Stop Position Fails to Update

Perform the following checks

- The Lyot stop update daemon is running on **taurus** by executing a **tasks** command from the **whtobs** command line.

- The TCS is running.

- That the update of the Lyot stop mechanism has been enabled through the OSCA control page in the **naomiInterface** application.

- The OSCA EPICS system is running okay and that mechanisms are not in an error state. This can be checked through the OSCA control page in **naomiInterface**.

2.1.2.2 Stopping the Automatic Update of Lyot Stop

This can be accomplished by pressing the **TCS–Lyot Stop Disable** button on the OSCA control panel in the **naomiInterface** application.

2.1.3 Packet Collection Tasks

When the NAOMI software is started on **taurus**, a number of packet collection tasks are started. These applications are DRAMA servers for the UltraDAS camera server application and are used to fetch headers which are later incorporated into the FITS files which are generated by the camera server.

On start up of a NAOMI based observing system, a packet collection task to collect headers from NAOMI and OSCA will be started automatically. Furthermore, if the camera in use is INGRID, another packet collection task will be started which collects headers relating to the INGRID instrumentation.

2.1.3.1 Restarting the tasks

The packet collection tasks are normally started as part of the observing system but if there is a need to start them individually the following commands can be used. These tasks have proved to be very reliable and any failing of them is normally due to the DRAMA system or on a system upon which they are dependant.

In order to restart the NAOMI packet collection task:

```
packetCollection –subsystem NAOMIPKT –packetfilename
                  /wht/etc/NAOMI.pdf
```

In order to restart the OSCA packet collection task :

```
packetCollection –subsystem OSCAPKT –packetfilename /wht/etc/OSCA.pdf
```

In order to restart the INGRID packet collection task :

```
packetCollection -subsystem INGRIDPKT -packetfilename
                /wht/etc/INGRIDCASS.pdf
```

You can monitor whether or not the tasks are running by executing the command **tasks** from the **whtobs** command line. The tasks should be registered with the names as described by the −*subsystem* keyword.

2.1.3.2 Headers Are Not Being Collected

Ensure that all of the header collection tasks are running as described above. If they are not all running then start them as described in the above section or alternatively restart the observing system.

If the **NAOMIPKT** task is running but NAOMI headers are still not being collected, ensure that the **EPM** and the **sequencer** are running on navis (see 2.3.1).

If the OSCA headers are not being collected but the **OSCAPKT** packetCollection task is running, ensure that the OSCA EPICS system is functioning correctly running. The syslog will contain errors to that affect if this indeed is the problem. The OSCA control panel in the **naomiInterface** will give an indication as to the current health status of the crate .

If the INGRID headers are not being collected but the **INGRIDPKT** packetCollection task is running, ensure that the INGRID EPICS system is functioning correctly running. Check the INGRID mimic in order to establish if the INGRID EPICS system is functioning correctly and reboot it if necessary.

2.1.4 The SeeingLogger

This task runs on **taurus** and extracts seeing data from the NAOMI EPM which is located on navis. This data is then written to a file on **taurus** and subsequently read and plotted by the **naomiInterface** application.

2.1.4.1 Starting the application

This application should normally be started as part of the observing system but if it is found not to be running, it can be restarted by hand using the following command.

```
seeingLogger&
```

2.1.4.2 Seeing Trace Not Updating in naomiInterface Application

This may be due to the seeing logger application not running in which case it should be restarted as described in the above section. If it is found to be running, the engineer should ensure that the **EPM** task running on navis (see 2.3.1) is functioning correctly and that seeing data is being written to the appropriate status values. By virtue of the fact that the navis based NAOMI system itself is functioning okay is normally enough to ensure that the EPM is running.

An alternative method for checking the health status of the EPM system is by entering the following URL into the URL entry box on a web browser and a status page should be reported showing all of the current values which are being held in the NAOMI EPM. If the status page is **not** returned it is an indication that the NAOMI system itself has failed in some way and should be investigated.

http://navis.ing.iac.es:40000/NAOMI/status/off

2.1.5 Mimic Application

The mimic application is used to monitor the status of systems and provides and has been configured to display status information from the NAOMI and OSCA subsystem. The mimic at this point is not started as part of the observing system and can be started from the command line as follows;

```
mimic&
```

In order for the mimic system to work correctly, all software and hardware systems for which it displays status information, should be enabled and functioning correctly. Any status which is displayed by the system which is found to be bad will be displayed in red.

2.1.6 The OCSEPMBridge Application

This is the only part of the WHT observing system **not** developed by Durham which runs on navis. The purpose of the software, as the name suggests, is to provide a bridge between the communication protocols on navis and the communication protocols used in the WHTICS. Therefore this is a **crucial** part of the observing system and without it, the NAOMI part of the WHTOCS will **not** function correctly.

The OCSEPMBridge can be started on navis from the **naomi** account and is started by default when the NAOMI control system is started on navis. A quick test in order to establish if it is functioning okay is point a web browser at the following URL

http://navis.ing.iac.es:40000/NAOMI/status/off

If the status page is displayed correctly then one can assume that this task is functioning correctly.

In order to start the task by hand, the user must execute the command **OCSEPMBridge** whilst logged onto navis as user **naomi**.

2.1.7 The Dither Script

The NAOMI dither script can be used to perform dithered observations combining the AO system and the telescope. It is started from the command line by the observer and the command line arguments associated with the script are documented in WHT–NAOMI–15.

2.1.7.1 Starting the script in the background

The script sends output to the **stdout** and in certain cases expects input from the user so there fore it is not recommended that the user starts the application in the background using the **&** symbol.

If this happens it can be rectified by executing the **jobs** command from the command line and then typing

```
fg <job number corresponding to dither script>
```

which will bring the application back to the foreground.

2.1.7.2 Telescope or WFS pickoff probe is not moving

You must ensure that the sequencer and the NAOMI mechanism control VME system is functioning correctly and that the TCS is up and running in order for the dither script to work correctly.

2.1.8 The OCSHTTPServer Application

This application is a DRAMA based HTTP server which runs on taurus and whose purpose is to allow the simplexing application on **naomi** to access the UDAS camera servers to perform the image grabs with which it performs the mirror flattening.

2.1.8.1 Starting the application

The application is started as part of the observing system and resides in the background. It can be started using the following command :

```
httpd.tcl –config /wht/etc/tclhttpd.rc –library
        ${OBSSYS}/lib/OCSHTTPServer/ &
```

One can check if the application is running by executing the command **tasks** from the command line and seeing if the application **OCSHTTPSERV** is registered with the DRAMA messaging system.

2.1.8.2 Simplexing Application Fails To Work

If the simplexing application fails to execute on *navis,* the user should check that the OCSHTTPServer application is running on *taurus* (see 2.1.8) and that the camera server that the user is trying to fetch images from is running. At present, the AO system is only configured to grab images from the INGRID camera server which is expected to be running on *crater*.

If this fails to resolve the problem, this could be due to a DRAMA error which can be resolved by restarting the observing system on **both** *taurus* and on the INGRID camera server *crater*.

2.2 Troubleshooting the NAOMI System

The core system which is used to control NAOMI is located outside of the WHTOCS in a bespoke system which was developed by Durham and the ATC.

2.2.1 NAOMI Hardware Core Components

The core NAOMI system is deployed on a number of processors the details of which are outlined in the following sections.

2.2.2 Navis

This is an UltraSparc 60 from where a significant amount of the high level Durham supplied NAOMI specific software runs.

2.2.2.1 Navis Log files Filling Up Disk Space

One of the outstanding problems with navis is the ability to, when running the fisba camera, to fill up the syslog files with entries relating to FTP transfers. The files which are normally stored in *var/adm* can be truncated using the system command **nulladm** should this problem occur. You must be setuid **root** in order to execute this command.

2.2.3 Embedded Solaris SPARC aocontrol1

This is an embedded SPARC running Solaris, which is located in the NAOMI 19" hardware racks. The purpose of **aocontrol1** is to provide a bridge between the DSP ring which performs the real–time correction and the navis computer.

Currently there are no known problems affecting the operation of this subsystem.

Care should be exhibited when closing this system down. The user should ensure that the **shut** account is used before the power is switched off to the crate otherwise there is a risk of damage to the file system.

2.2.4 The NAOMI Mechanism Control VME System

This is an EPICS based VxWorks system which is used to control NAOMI's mechanisms. The name of the system is **naomiomc.ing.iac.es** and is booted from navis. At this point in time there are no known problems affecting the control of the mechanisms at the EPICS level relating to the VME system.

2.2.5 The NAOMI SDSU VME Control System

This is a VxWorks based system which is used to control the SDSU controllers which constitute the WFS camera system. This system is an unknown quantity, Durham are best consulted in the event of a failure of this system.

2.3 The NAOMI Software System

All of the software associated with the core NAOMI system can be started and stopped from the NAOMI console. The user must be logged into the system as user **naomi** in order to perform the starting and stopping of the software.

2.3.1 Restarting Core NAOMI Software

The entire core NAOMI software can be restarted using the following command. This will result in **all** of the software running on the VxWorks systems, aocontrol1, the DSP ring and navis being restarted.

The command to use is as follows;

```
naomiRestart
```

This command will take sometime to complete and there is a known case when the DSP ring will not come up successfully. If this happens, execute the command a second time. In order to check that the software systems have restarted successfully, the user should check the status displays provided by the TopGui application which should be started as part of the **naomiRestart** command.

Should it be necessary to simply restart **only** the EPM and the sequencer, the user should use the following incantation :

```
naomiRestart –slave
```

2.3.2 The Sequencer Software

All control of the NAOMI hardware is performed through an application known as the **sequencer**. If no control at all can be affected on **any** components of the NAOMI system through TopGui, the engineer should ensure that the sequencer software is running correctly.

This can be done by performing a command **ps −Aef | grep sequencer** on navis. Should it be found to have failed then it can be restarted using the **naomiRestart** command.

2.3.3 The EPM Software

The EPM system provides a *status monitor* for the NAOMI system. All status values used and created by the NAOMI system are stored in the EPM. It is used by several systems including TopGui and the NAOMI Observer Interface to reflect status to the user.

Should this system fail, a symptom of this will be that the status panel on the left of the NAOMI Observer Interface application will turn red. In order to restart the software, the engineer should examine if the software is still running using the **ps −Aef | grep EPM** command in order to see if the process is alive. Should it be found to have failed then it can be restarted using the **naomiRestart** command as detailed above.

2.3.4 The TopGui Software

The TopGui software is the main engineering application which is used by the AO expert to configure NAOMI for observing. The application is improving in reliability but is still prone to the occasional failure.

The application is started as part of the start up sequence of NAOMI but it may be started by hand at the command line by executing the following command :

```
TopGui&
```

2.3.5 The Simplexing Application

This application is used to flatten the mirror and is used as part of the setup sequence of NAOMI prior to an evening's observing. The name of the application is IngridAlign.py and may be started from the navis command line whilst logged in as user **naomi**.

2.3.5.1 Unable to Perform Simplex

If the application refuses to simplex the mirror with errors to the effect of "*Unable to communicate with the camera server*", the engineer should ensure that the observing system is running on taurus **and** that the INGRID camera server is running on the crater computer. If both the observing system and the INGRID camera server are found to be working but the application still fails to function correctly, the engineer should then restart **both** the observing system on **taurus** and the observing system on **crater**.

The key component on **taurus** which the engineer should ensure is functioning correctly is the **OCSHTTPServer** the details of which can be found in section 2.1.8.

It is a requirement that the AO DSP ring is running correctly in order to perform a simplex of the mirror.