

# Operation and System Administration

## 1. Overview

- The system consists of a sphere surrounded by four video projectors, numbered 1 – 4 starting with the projector #1 closest to the computer and then going counterclockwise
- The video projectors are connected and driven by the primary computer
- The computer has two graphics cards to support the four projectors and a third graphics card to run the user interface
- The computer is responsible for many things, namely among them:
  - i. running the main user interface to the system
  - ii. real time data collection
  - iii. providing the interface to the automation control protocol
- All of the computers use the Linux operating system Ubuntu (11.10)
- The "hot" spare is identical to the primary computer in terms of hardware, as a backup system
- All of the software that drives and controls the SOS system is written and maintained by NOAA.

## 2. System Specifications

- The computer in the SOS system is a standard computer system with high-end graphics hardware
- The primary and spare computers are identical from a hardware perspective to allow easy swapping of components (in case of system failures)
- Projectors are “board room” projectors that work well in high duty hour environments
- The projectors are also specified so that they produce a high light output (LUMENS), mostly in the range of 3500 to 5000 LUMENS and have a minimum resolution of 1024x768

## 3. Power Down Schedule

- Both SOS computers should remain powered up all the time in order to receive real time data
- The projectors only need to be on during operation and should be powered down to save lamp life when not in use
- If a system power down is required, close the SOS software before powering down the computers

## 4. System Maintenance

- The main priority is keeping the projectors aligned
- Projector alignment should be checked frequently (once a week ideally)
- Usually, the system only gets out of alignment when there has been some disturbance to the projectors
- If the alignment is really off, it will be visible in the display of datasets

## 5. Projector Filters and Lamps

- A typical projector lamp lasts anywhere from 1500 to 3000 hours
- The projector will turn on a lamp warning light indicating a new lamp is needed
- When lamps are replaced because of age, replace all of them at the same time
  - i. The color and intensity difference between an old lamp and a new lamp will make the sphere visualization look bad
- Projector alignment will need to be adjusted after replacing the lamps
  - i. Change one lamp and then fix the alignment of that projector before moving on to the next projector
  - ii. If you replace all the lamps without adjusting the alignment along the way, then you will have to start from scratch on the alignment
- For LCD projectors, projector air filters should be checked monthly to ensure proper airflow
  - i. Dirty filters reduce cooling capacity and shorten projector lamp life
- For DLP projectors, the optics are sealed and dust is not as much of a concern
  - i. Check your specific model to determine if there is an air filter to clean

## 6. Computer Maintenance

- Computers are typically maintenance free
- Ubuntu releases operating system patches frequently and patches that affect security should be applied as needed
  - i. Notification of patches will appear in the upper right corner of the menu bar in the Ubuntu Update Manager
  - ii. If NOAA comes across an operating system patch that adversely affects system operation, sites will be informed through the SOS Yahoo Forum
- The SOS software upgrades from NOAA will also appear in the Ubuntu Update Manager
  - i. An announcement with full instructions for the upgrade and a description of the new features in the upgrade will be posted to the SOS Yahoo Forum when available
- The log files for SOS are stored in the home folder for each user in a directory called soslogs

## 7. Network

- The computers are connected via a gigabit network to enable high speed communication and data transport
- The primary and spare computers reside in a private, non-routable network space (usually in the 10.x.x.x network range)
- The primary computer, however, also usually sits on the border between the private SOS network and the sites local Intranet to enable:
  - i. Outside access for remote systems administration
  - ii. Software updates
  - iii. Download of real time data from the NOAA servers.
- If supported by the projector infrastructure, the projectors can also be connected to the private network to allow for remote power on/off

- In many cases a Wi-Fi network is also set up to allow use of the iPad/iPhone SOS Remote App
  - i. An existing Wi-Fi infrastructure can be used, or a dedicated Wi-Fi network can be set up for use with SOS.
  - ii. WPA2 encryption is probably the minimum level of encryption you will want to use
  - iii. The beacon identifier for Wi-Fi router can be turned off
  - iv. You can also limit access to the specific MAC addresses of devices

## 8. System Control

- The two options that come supported by the NOAA SOS team are the Wii remote and the iPad/iPhone app
- Through the Automation Control Protocol, it's possible for sites to create their own interfaces to control SOS
  - i. <http://sos.noaa.gov/docs/automation.html>
- The Wii remote uses a Bluetooth connection to communicate with the control computer, while the iPad uses a Wi-Fi network
- The Wii remote is required for every SOS installation and the iPad is optional, though provides many additional features not available with the Wii remote
- To control SOS with the Wii remote, it must first be paired to the SOS computer
  - i. This is setup as a security feature so that visitors with their own Wii remotes will not be able to control the SOS
- To pair a remote, launch the SOS Stream GUI
  - i. Click the Earth icon that should appear in the upper right hand menu bar
  - ii. In the popup window, select "Pair a Wiimote" and follow instructions
  - iii. Press the red button behind the battery pack and the address of the Wii remote is permanently stored and should appear in the top window of the Wii remote software
- Only remotes that are paired will connect to the system
- After pairing, the remote will need to be connected to the software each time it is started
- To connect, start the SOS Stream GUI, and press any button on the remote
- If the remote will not connect, close the SOS Stream GUI and restart it
- If it still won't connect, pull out the Bluetooth dongle and try again
- In order to connect the iPad to the SOS system, it must be on the same Wi-Fi network as the SOS system
- The SOS Remote App is freely available through the Apple App Store for download onto Apple devices with iOS version 4.2 and above
  - i. Tap on the Settings app icon on the homepage of your device, and then tap on SOS Remote located under the Apps category
  - ii. In the Name or IP field under SOS computer to control, enter the host name or IP address of your SOS computer
  - iii. Return to the homepage and tap on the SOS Remote app icon to open the application
  - iv. Tap on the Settings icon located in the tab bar to open the SOS Settings page

- v. The host name or IP address you just entered should appear under the section labeled Connection
- vi. The SOS Stream GUI must be running in order for the iPad to connect
- vii. If at any point the device is unable to connect to the SOS machine, a red badge with a question mark will automatically appear on top of the Settings tab
- Visitors have access to the SOS Remote App through the Apple App Store, but they won't be able to take control of the SOS unless they have the Wi-Fi password and the IP address of the SOS computer

## 9. Backups

- The computers are set to run backup scripts early every morning to push data from the primary computer to the spare computer
- Included in this sync are site specific data:
  - i. Custom playlist data in the SOS home directory
  - ii. The alignment configuration files that are in the home directory
  - iii. Any custom content that was developed and installed on the system
- In the case of failure, the spare is an exact duplicate of the primary computer
- Sites are still encouraged to backup site specific data on a separate system as well
- All of the content that comes preloaded on the system is always available from NOAA.
- Backups are stored on the local computer in `/shared/sos/site-backup.hostname`
  - i. Dated files for every day that contain all of the same files that are synced to the other computer, including configuration files and playlists
- Backups of the playlists are tarred every time the playlist editor is opened
  - i. `/home/sos/sosrc-backups` and `/home/sosdemo/sosrc-backups`

## 10. Site Configuration

- Projector height, distance and resolution is stored in `/home/sos/sos_stream_control.config`
- Alignment files that are stored in `/shared/sos/site-config`.
  - i. Also contains information about the paired Wii remotes
  - ii. All of these files are included in those that are backed up and synced daily

## 11. SOS Crontab

- Cron is a time-based job scheduler that is used to automate processes on the computer and the crontab is the file that contains all the information about the jobs that are scheduled
- Included in the default crontab are hourly realtime data downloads, daily data syncs and backups, and weekly downloads of new datasets
- The crontab can be configured to control projectors (tutorials online)

## 12. Remote Login

- In order facilitate support, maintenance, and troubleshooting, the SOS computers come loaded with a program called TeamViewer

- This program allows the SOS support team to logon remotely to the SOS computers and temporarily take over the desktop
- The site must launch the software and provide log in information to the SOS team in order for them to logon
- The SOS team will only log in at the request of the site and at a schedule time when it is convenient for the site

### **13. User Accounts**

- The SOS system uses two user id's: sos and sosdemo.
- The user id sos is an administrative account that has the ability to:
  - i. Download new data
  - ii. Run the alignment software
  - iii. Install updates
  - iv. Manage the real-time data downloads
- The user id sosdemo has the ability to:
  - i. Run the SOS software
  - ii. Create playlists
- The user sosdemo, which is a “safe user,” does not have permission to delete data, edit the software or run alignment
- The super user account in Linux is called "root"
  - i. It is generally considered safer, or at least a better practice, to not use root directly, but rather use the "sudo" command that temporarily raises a normal users privilege to root for the duration of a single command
  - ii. Only the sos user has sudo privileges.