

Renéal International Education Outreach Incorporated



System Administration Manual

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Version 4.0

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Revision Log

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- In Section 3.9, added new way of typing an enye (Philippines only)
- In Section 4.1, added that there cannot be an enye used in the student list file
- In Section 8.9, made it clearer where there should be spaces in the commands that are typed for blocking and unblocking websites
- Updated Appendix A with the new capabilities of the systemCheck program
- Added Appendix B, information about the server directory structure

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- Added Section 3.5, which explains how to change the permission for a file
- In Section 4.1, added the student list format information for Tanzania schools

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- In Section 9.7.2, added a step to run a new utility, rebuildSquidCache, if the internet cannot be reached (“proxy failed” message)
- Updated Appendix A with the new capabilities of the systemCheck program
- Updated manual in several places to include arushacomputerhelp@gmail.com as a source of help in Tanzania

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1. FORMATTING CONVENTIONS

This Font	Represents
Lucida Console	User input and system output
Lucida Console Bold	User input that should be entered as shown
<i>Italics</i>	Variable text that should be replaced by the correct value

2. SYSADMIN PREREQUISITE KNOWLEDGE

2.1. Accounts and Passwords

In this manual, four types of accounts and passwords will be discussed.

Student Account: These are generic accounts with a user name of **student#** where # is the number of the computer the student is using. The password for each of these accounts is **student**. These student accounts can only access student files.

Teacher Account: These are individual accounts created for each teacher. The user name is the first initial of the teacher's first name, and underscore, and the teacher's family name. For example, a teacher named Jane Doe would have a user name of **j_doe**. The password is set as the teacher's birth date, with a format of MMDDYYYY. For example, if Jane Doe's birth date is February 7, 1980, her password is **02071980**. Teacher accounts can access their own personal files, files in the Teachers Shared area, files in the AllUsersShared area, and student files in client_home_students. There are also generic accounts with user names of **teacher#** (the password is also **teacher#**) that can be used by teachers who are guests. Students should not be allowed to use these accounts. In this manual, your own teacher's account will be referred to as your personal account.

System Administration Account: This is the account that you will use for routine system administration tasks. The user name is sysadmin. Please protect the password for sysadmin! The sysadmin password should never be shared except with those IT teachers authorized to perform system administration. The sysadmin account allows for access into all files, and thus should be used very carefully to avoid damage.

Root Account: This account should never be used unless directed so in this manual. The user name is root and the password should never be shared except with those IT teachers authorized to perform system administration. ALWAYS USE CAUTION WHEN LOGGED IN AS ROOT, and do not perform tasks other than those that are special and can only be done with the root account.

There are certain powerful commands that require you to be a "superuser", also shown as "su". First you must be logged in as sysadmin to do these. When you perform those commands, you must first type "sudo" and then the command. It will ask you for a password, and you can enter the sysadmin password. This special step of using "sudo" and entering the password helps to avoid mistakes and accidental commands. It also protects the main-server if you forget to log out from sysadmin.

2.2. Logging In and Out of the Sysadmin Account

Note: Log in as sysadmin only when you need to perform sysadmin tasks. Otherwise, use your personal account

2.2.1. Log In to the Sysadmin Account

1. Go to main-server.
2. At the log in prompt, use sysadmin as the account name.
3. At the password prompt, use the sysadmin password.

2.2.2. Log Out of the Sysadmin Account

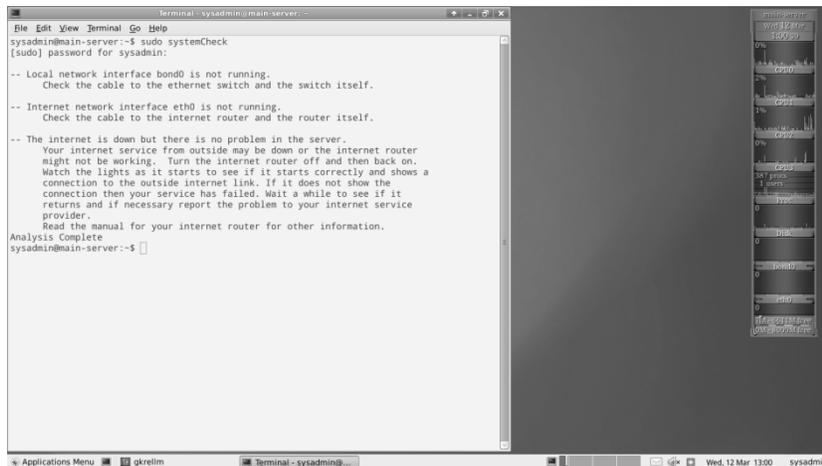
As soon as you have completed your sysadmin tasks, log out of the sysadmin account.

Caution: Never leave the sysadmin account logged on when you are not using the account. Other users may accidentally use the account and damage the system.

1. At main-server, go to the sysadmin menu at the upper right corner of the display and select Log out.

2.3. Sysadmin Desktop

When you log in as sysadmin, you will see the sysadmin desktop. This desktop has the usual applications for the system, but it also has some special features only for system administration use.



One important tool is the System Activity Monitor. This is shown at the right. It can be used to check the state-of-health of the system and also to troubleshoot problems. The four CPU graphs (CPU0, CPU1, CPU2, and CPU3) show the current processor loading. The network graphs (eth0, eth1) show the network activity on the two LAN cards within the main-server. The graph labeled “Disk” shows the disk activity.

The System Activity Monitor is a good way to identify if there is something unusual going on – either too much or too little activity for the CPU, disk, or network.

When you log in as sysadmin, the System Activity Monitor will open automatically. If it does not, you can start it from the Applications Menu , System, Gkrellm System Monitor.

2.3.1. How to Open a Terminal Window

On main-server, the terminal window is used to enter many of the sysadmin commands. The system maintains a history of the commands entered in the terminal window even after you close the terminal window or log out of the sysadmin account.

When you log in as sysadmin, the terminal window will open automatically.

If you close the terminal window or it doesn't open for some reason, you can open the terminal window. To open the terminal window:

- On the main-server desktop, click the Terminal icon (the small icon next to the Applications Menu in the lower left-hand side of the screen that looks like a monitor)

2.3.2. Cancelling a Command in the Terminal window

When entering commands in the terminal window on main-server, you may accidentally enter the wrong command or the command may generate information on the screen that you need to stop. To stop a command or a display of information:

- Press the Ctrl key and the C key at the same time (Ctrl-C).

2.3.3. How to See Commands that Have Been Entered in the Terminal Window

- At the terminal window prompt, click the Up arrow to see past commands. You can click the Up arrow as many times as you need to.

2.3.4. Repeating a Command You Have Already Used

To save time and prevent errors, you can quickly repeat a command.

1. At the terminal window prompt, click the Up arrow until you see the command you want to repeat.
2. Press Enter to run the command.

2.3.5. Editing a Command

If you repeat a command but need to change part of the command before using it or you enter a new command but notice a typo, and you haven't yet pressed Enter, you can edit the command.

At the command line, use the Left and Right arrows to go to the part of the command you want to edit.

- To delete text, use the backspace or delete key.
- To enter new text, use the Left or Right arrow to move the cursor to the correct location, then type the text.

2.3.6. Some Common Linux Commands

ls list the files in a directory

cd change directory

sudo superuser action

cp copy

rm remove (delete)

df -h check disk free space with easy-to-read file sizes

ping send a network ping

ifconfig view network interfaces

man manual listing that gives help for any command (for example, **man 1s**)

2.3.7. Editing a File in Linux

You can edit a file in Linux using a command line editor such as vi or nano. You can also use a window-based editor such as gedit.

Steps

1. Log in as sysadmin.
2. To open a file *filename*, type the command **gksudo gedit filename**
3. This will open the file. You can then edit it and save it.

2.4. Automated Backups

All user data is automatically backed up daily. At sites where computers are not shutdown every day, the backups are performed automatically at midnight. At sites where computers are shutdown at the end of the day, backups start automatically the next day when the computers are started again.

The status for the backup is reported in the log `/var/log/mirror/mirror.log`.

The following copies are made during each backup.

- sda2 to sdb2
- sdb1 to sda2
- sda1 to sdb1
- sda7 to sdb7
- sda8 to sdb8

The purpose of the backup is to allow for immediate recovery of the entire system if the main hard disk fails. It is important to note that the backup process creates an exact duplicate copy. Thus if a file is deleted, it will not be retrievable after the next backup is completed.

2.5. How to access files directly on the main-server

This is a way to access user files directly on the main-server using Linux.

1. On the main-server desktop, click the Terminal icon.
2. Type `su` (this stands for superuser)
3. Enter the sysadmin password
4. Type `cd /client_home/` (`cd` stands for “change directory”)

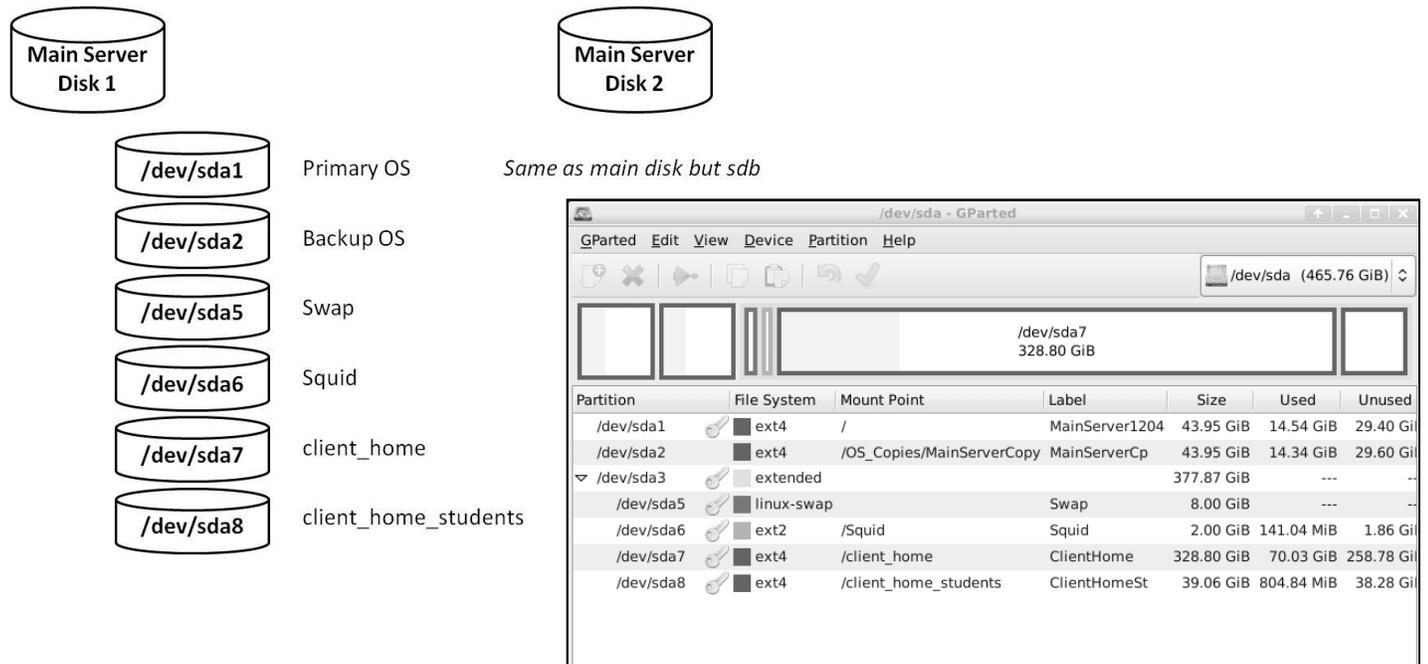
2.6. How to Stop a Linux Process or Application

Sometimes a program or process does not stop as expected which causes performance or user problems. In these cases, users can stop the process.

1. On the computer where the process is running, go to the Applications menu and select Accessories then Task Manager.
2. A new window will open. This window shows the processes that are currently running.
3. Click the left mouse button on the process that you want to end.
4. Click the right mouse button and select “Terminate”.
5. The process ends.
6. If the process does not end, log out and log back in again.
7. To restart the application, open it again.

2.7. Partition and Directory Structure

The main-server disks are partitioned in a very specific way. This is shown in the diagram below.

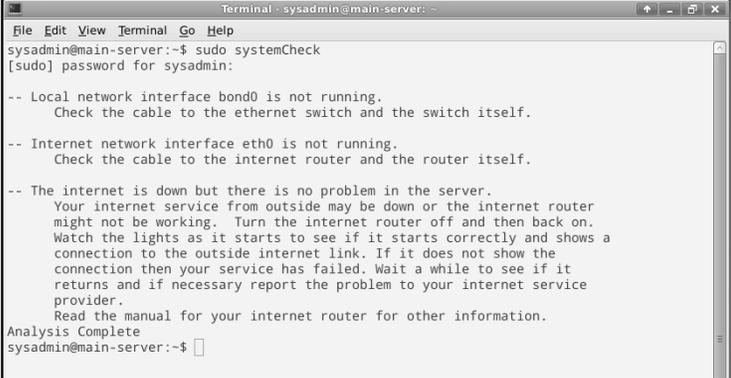


See Appendix B for more information about the directory structure for some of these partitions.

2.8. The systemCheck Command

IMPORTANT: The program systemCheck will identify and possibly fix many problems. ALWAYS TRY TO RUN THIS PROGRAM FIRST BEFORE PROCEEDING. If the main-server is running and you can log in as sysadmin, then type **sudo systemCheck** in a terminal window before other actions. See Appendix A, systemCheck Program for further details.

Below is an example output from the systemCheck command. In this example there was no network connection made to any of the LAN cards in the main-server, so systemCheck reported that fact and also that there was no internet connection. Note that the command also gives some ideas for fixing any problems that are reported.



```
Terminal - sysadmin@main-server: ~
File Edit View Terminal Go Help
sysadmin@main-server:~$ sudo systemCheck
[sudo] password for sysadmin:

-- Local network interface bond0 is not running.
    Check the cable to the ethernet switch and the switch itself.

-- Internet network interface eth0 is not running.
    Check the cable to the internet router and the router itself.

-- The internet is down but there is no problem in the server.
    Your internet service from outside may be down or the internet router
    might not be working. Turn the internet router off and then back on.
    Watch the lights as it starts to see if it starts correctly and shows a
    connection to the outside internet link. If it does not show the
    connection then your service has failed. Wait a while to see if it
    returns and if necessary report the problem to your internet service
    provider.
    Read the manual for your internet router for other information.

Analysis Complete
sysadmin@main-server:~$
```

3. TEACHER SUPPORT TASKS

Perform these tasks as needed:

3.1. Add a Teacher Account

Whenever a new teacher needs an account follow this procedure.

Before You Start

1. Log in to main-server as the sysadmin.
2. Open the terminal window if it isn't already open.

Steps

1. At the terminal window prompt, type: **sudo createTeacherAccount.py**. You will be prompted for the teacher's first name, the teacher's last name, and the teacher's birth date. The birthdate should be entered in the form MM/DD/YYYY. For example, type "Jane" when prompted for the first name, "Doe" when prompted for the last name, and "02/07/1980" when prompted for the birth date.
2. If the system prompts for the sysadmin password, type the password and press Enter.
3. The system creates the new account and displays the account name and password. The account name is the first initial of the first name followed by an underscore and the family name. (For example: j_doe) The password is the birth date, in the form MMDDYYYY. (For example: 02071980)
4. Confirm the account was created correctly:

- a. Log out of the sysadmin account.
- b. Log in to the new teacher account.
- c. Confirm the standard teacher account display appears.
- d. Open the Documents folder window by double-clicking the Documents folder.
- e. Confirm the teacher's name appears in the title of the Documents folder window.
- f. Log out of the user account.

3.2. Reset a Password for a Teacher Account

If a teacher needs a new password, follow this procedure.

Before You Start

1. Log in to main-server as the sysadmin.
2. Open the terminal window if it isn't already open.

Steps

1. At the terminal window prompt, type: `sudo passwd AccountName` and press Enter.

Where *AccountName* is the user's account name.

For example: `sudo passwd j_doe`

2. If the system prompts for the sysadmin password, type the password and press Enter.

The system displays the prompt: Enter new UNIX password

If the system displays the message `passwd: user 'AccountName' does not exist`, there was an error when you typed the user's account name. Repeat Step 1.

3. Type the new password and press Enter.

The system displays the prompt: Retype new UNIX password

4. Type the new password again and press Enter.

The system displays `passwd: password updated successfully`.

If the system displays the message `sorry passwords do not match`, there was an error when you typed the new password. Start over at Step 1.

5. Log out of the sysadmin account.

3.3. Restoring a File for a Teacher

If a teacher deleted a file since the last daily backup and needs to use it, you can restore the file for the teacher.

Note: If the teacher deleted the file before the last daily backup there is no way to recover the file.

Before You Start

1. Log in to main-server as the sysadmin.
2. Open the terminal window if it isn't already open.

Steps

1. At the terminal window prompt, type `sudo mount /OS_Copies/ClientHomeCopy` and press Enter.
2. Log out as sysadmin
3. Ask user to log in to their account.
4. Double-click the File System icon on the desktop.
5. From the File System, double-click OS_Copies.
6. From OS_Copies, double-click ClientHomeCopy.
7. Double-click user's directory.
8. Ask the user to navigate to the file they want to recover in their directory.
9. Select, right-click file and select Copy.
10. Select File System in the left navigation area of window.
11. Go to /client_home then go to the user's home directory and Paste the file.
12. Log out as the user.
13. Log in as sysadmin.
14. Terminal window prompt, `sudo umount /OS_Copies/ClientHomeCopy` and press Enter.
15. Log out.

3.4. Type an "Enye" (Philippines only)

There are two different ways to type an "enye."

Method #1

1. At the place where you need to type an enye, press the left "Window" key.
2. Type the letter "n."
3. Type the "~" character (this is just to the right of the 1 key).

Method #2

1. At the place where you need to type an enye, press and hold the right "Alt" key.
2. Type the letter "n."

You can also use Insert, Special Character in LibreOffice to select an enye.

3.5. Changing Permission for a File

Sometimes a teacher will get a message saying they do not have permission to open a file. Only the owner of the file can change the permission, so the teacher will need to ask that person to change the file permission.

To change the permission for a file, the owner of the file logs in to their account. Then they use Task Manager to navigate to the file. They must right-click on the file icon, then choose “Properties”. A new window will open, and they should choose the “Permissions” tab. This will show the current permissions and allow the owner to change them. The owner of the file is shown at the top.

The owner has the option of giving “Read only” permission or “Read & Write” permission to other teachers. First, make sure “teacher” is shown as the “Group”. The file owner can then choose either “Read only” or “Read & Write” in the “Access” option pull-down menu.

You can also do this for an entire folder, again by right-clicking on the folder, selecting “Properties”, and then the “Permissions” tab. When you select the “Access” option you want (either “Read only” or “Read & Write”), it will open a new window titled “Apply recursively?” This means, do you want to apply that permission setting to all files in the folder? Usually you would say “Yes”.

Note that if you open a file that is “Read only”, it will say so at the top beside the file name. You will not be able to make changes to a “Read only” file. However you can usually save it to another file name using the “Save as” command and then make the changes that you want.

4. STUDENT SUPPORT TASKS

Perform the following tasks as needed.

4.1. Create Student Name List for Student Account Sign-In

In order for students to be able to save their files, their names must be entered in a Student Name List. For the Philippines, these names are displayed (by Grade and by Section) whenever a student account is used to log in. For Tanzania, these names are displayed (by Form and by Stream) whenever a student account is used to log in.

This list must be in csv format. The first row of the file will be different, depending upon whether it is a school in the Philippines or Tanzania.

For the Philippines: The first row of the file must have the column names “First Name”, “Middle Name”, “Last Name”, “Grade”, and “Section” separated by commas. The grade level entered into this spreadsheet must be in the form **Grade #**, where # is the grade number (for example, **Grade 7**).

For Tanzania: The first row of the file must have the column names “First Name”, “Middle Name”, “Last Name”, “Form Level”, and “Stream” separated by commas. The form level entered into this spreadsheet must be in the form **Form X**, where X is the Form number spelled out as a word, (for example, **Form One**).

The student_list.csv file can be created in LibreOffice Calc. Use the column names as shown above and encode (or copy and paste) the student information as rows in the spreadsheet. Then just choose the .csv format when you are saving the file. You may get a message saying only one worksheet has been saved; that is okay. The file name and path should be /client_home/share/student_list.csv

You can look at this file in text editor such as gedit (Linux) or notepad (Windows). Here is an example of what the file should look like (this example uses the Philippines format).

Philippines Example:

```
First Name,Middle Name,Last Name,Grade,Section
Seanrey,,Arnado,Grade 5,Rizal
Carl,M.,Mateo,Grade 5,Rizal
Yanley,P.,Paduga,Grade 5,Bonifacio
```

Tanzania Example:

```
First Name,Middle Name,Last Name,Form Level,Stream
Upendo,M.,Mollel,Form One,A
Shadrack,,Lazaro,Form One,B
Emmanuel,Noah,Tumaini,Form Two,A
```

Note that if there is a field missing, such as a middle name, that is okay. There will just be two commas in a row for that student.

For the Philippines: Please note that student names cannot include an enye in the student list file! If an enye is included, the student's account will not work. If the student has an enye in their name, just replace it with an "n".

4.2. Add a New Student to the Student Name List

Add the new student's information (first name, middle name, etc.) to the end of the student_list.csv and save the file. You can use Calc to open the file to make these edits. If the columns do not look right when you open the file, close it and then be sure to choose only Comma in the Text Import window Separator Options that pops up first when you open the file in Calc. After you have added the student save the file as file type csv

4.3. Delete Student Directories

At the end of the school year, if you wish to remove all of the student files that were created for that year, run the following commands:

```
sudo removeAllStudentFiles.sh
```

5. PRINTER SUPPORT

5.1. Add a Printer

Before You Start

1. Log in to main-server as the sysadmin.
2. Connect the printer to main-server.
3. Turn on the printer.

Steps

1. Go to the Applications menu, select System and then Printing.

In the Printing window, the new printer appears. Typically, the printer name is the printer model number.

If the printer does not appear in the window, confirm that the connections are plugged in correctly and the printer is powered on. If you still do not see it, you may need to research it on the internet to look for a driver.

2. Click the printer once to select it. The icon is highlighted.
3. Go to the Printer menu and select Properties.
4. In the Properties window, change the Description of the printer to a name that will be easily understood by the users. For example, change MS430LAN to Room3 to indicate the printer is located in Room 3.
5. In the Properties window, click Print Test Page.
6. Confirm the test page prints.
7. In the Properties window, click Close.

5.2. Printer is Not Printing

Symptom

The printer hangs or printing jobs do not print.

Resolution Steps

1. Log in to main-server as the sysadmin.
2. Go to the Applications menu, select System and then Printing.
3. Look at the icon for the printer that is not printing.

If	Then
The printer icon has a red symbol	The printer is not connected. a. Restart the printer. If the printer doesn't power on: i. Make sure the printer is connected to power and to main-server. ii. Turn on the printer. b. Check the printer for error messages or error lights. If there are errors, perform printer maintenance. c. If the printer does not start printing jobs, go back to main-server and check the printer icon. If the icon is normal, go to Step 4.
The printer icon is normal	Go to Step 4.

4. If printer icon is normal but the printer is not printing, select the Printer menu and then select View Print Queue.
5. The print queue displays. If there are print jobs in the queue, the jobs are listed in the display. there
6. If there are jobs in the print queue, cancel all the print jobs in the queue. For each line:
 - a. Select the line.
 - b. Click the Cancel button (the button is red with a white x).
 - c. When prompted, click Cancel Job.
7. Ask users to resubmit their print requests.

5.3. User Needs to Stop a Print Job

Symptom

A user reports the printer is printing too much paper.

Resolution Steps

1. Turn off the printer.
2. Log in to main-server as the sysadmin. there
3. Go to the printer window.
4. Click the icon of the printer has the red symbol.
5. Select View Print Queue.
6. In the Print Queue window, select the first job displayed and cancel the job.
7. Check the queue to see if the job has been submitted multiple times.
8. If the same job was submitted multiple times, delete all instances of the job from the queue.
9. Turn on the printer.

6. MAINTENANCE TASKS: PERFORM WEEKLY

6.1. Run systemCheck Command

Run systemCheck weekly. This will identify disk partitions that are too full, hard disk health, backup status, and network problems.

Steps

1. Log in as sysadmin.
2. In a terminal window type the command **sudo systemCheck**
3. Enter the sysadmin password when prompted.

4. Check the output for messages about problems.

7. MAINTENANCE TASKS: PERFORM MONTHLY

7.1. Check Trash Size

Check teacher trash size for teachers that fail to empty their trash.

Steps

1. Log in as sysadmin.
2. In a terminal window type the command **sudo checkUserTrashSize.py**
3. Enter the sysadmin password when prompted.
4. The size of the trash for each teacher will be listed in descending order. If there are teachers with more than 100 or 200 MB remind the teacher to regularly empty their trash. You may wish to demonstrate how.

7.2. Check User Space

Check the space used by each teacher account. This process takes a long time to run, so should not be run frequently. It will usually only be used if the disk is getting full, as reported by the systemCheck command.

Steps

1. Log in as sysadmin.
2. In a terminal window type the command **sudo checkUserHomeSize.py**
3. Enter the sysadmin password when prompted.
4. The size of the file space of the teacher will be listed in descending order.

8. MAINTENANCE TASKS: PERFORM AS NEEDED

8.1. Start main-server

Use this procedure when you need to start main-server, for example: at the beginning of the day.

Before You Start

1. If the UPS is not on, turn it on.
2. Confirm that the internet modem is on.
3. If the switch is not on, turn it on.

Steps

1. Power on main-server.

2. Log in as sysadmin.
3. Confirm that the desktop appears as expected.
4. Confirm that you can access the internet. Use the internet browser to go to google.com.
If the google.com home page does not display, follow the appropriate troubleshooting procedure.
5. Log out.
6. Start up the client computers as required. Follow the procedure “Start a Client Computer” for all clients.

8.2. Shut Down main-server

Use this procedure when you need to shut down main-server, for example: at the end of the day, before a move, etc.

Before You Start

1. Turn off all client computers. Follow the procedure “Shut Down a Client Computer” for all clients.
2. Turn off the switch.

Steps

1. Select the “Shut Down” option in the upper right-hand corner of the main-server window. This will shut down the computer. However if a process is still active, you may need to do the following:
 - a. Log in to main-server as the sysadmin.
 - b. Select “Log Out” from the Applications Menu and then “Shut Down” from the window that appears. You will then need to enter the sysadmin password.
2. Turn off the UPS.

8.3. Client Computers

8.3.1. Start a Client Computer

Use this procedure whenever you need to start a client computer, for example: after adding or moving a client, at the start of the day, etc.

Before You Start

1. Confirm that main-server is on. If main-server is not on, follow the procedure “Start main-server.”

Steps

1. Power on the client.
2. Confirm the client starts correctly.
 - a. Log in with your personal account.
 - b. Confirm that the desktop looks correct.

- c. Start a program.
Program starts correctly.
- d. Close the program.
- e. Use the internet browser to access google.com.
The google.com page displays.
- f. Close the browser window.
- g. Log off.

8.3.2. Shut Down a Client Computer

Use this procedure whenever you need to shut down a client computer, for example: before moving a client, at the end of the day, etc.

Steps

1. If a user account is still active, log out of the user account.
2. Turn off power to the client.

8.3.3. Add a Client Computer

You can add a client computer at any time.

Before You Start

1. It is recommended that you run a memory test on the client first before you add it to the system. To do this, boot the client computer from the System Rescue CD. Choose Option A, Run system tools from floppy disk image, then choose Memtest86. You can remove the CD once the memory test starts. You will want to run at least one pass to see if there are any memory errors. If there are errors, you should repair or replace the memory.
2. Confirm that the client computer is shutdown.
3. Confirm that main-server is on. If main-server is not on, follow the procedure "Start Main-Server."
4. Confirm that the switch is on.

Steps

1. Set up the client computer where you want it.
2. Connect the network cable from the client to the switch.
3. Plug the client into power. Plug in the mouse, keyboard, and monitor cables.
4. You will need to set the Client computer's BIOS so it will boot from the network first.
 - a. The BIOS setup utility is where you change boot order settings. Turn on or restart your computer and watch for a message during the POST about a particular key, usually F1, F2, F10, or Del, that you'll need to press to enter SETUP. Press this key as soon as you see the message.

After pressing the correct keyboard command from the previous step, you will enter the BIOS Setup Utility.

- b. All BIOS utilities are a little different but no matter how your BIOS setup utility appears, they are all basically a set of menus containing many different settings for your computer's hardware. Locate the option for changing the boot order. The menu option or configuration item might be called Boot Options, Boot, Boot Order, etc. The boot order option may even be located within a general menu option like Advanced Options, Advanced BIOS Features, or Other Options.
- c. To change which device to boot from first, follow the directions on the BIOS setup utility screen to change the boot order. Make the network (might be called LAN, Network, BBS, or another name) first, then the CD, then the hard drive. Then save your settings. You might also have to enable the network/LAN and also enable the LAN ROM. Those options are sometimes found other menu options called peripherals. [For a good description of changing boot order, see <http://pcsupport.about.com/od/fixtheproblem/ss/bootorderchange.htm> or Google for the type of computer you are working with.]

5. Follow the procedure "Start a Client Computer."

8.3.4. Move One or More Client Computers

You can move a client computer at any time.

Before You Start

1. Confirm that main-server is on.
2. Follow the procedure "Shut Down a Client Computer."

Steps

1. Move the client computer to the new location.
2. Connect the network cable from the client to the switch.
3. Plug the client into power.
4. Follow the procedure "Start a Client Computer."

8.3.5. Discard a Client Computer

If a client computer is broken beyond repair, follow this procedure.

Before You Start

1. Follow the procedure "Shut Down a Client Computer."

Steps

1. Disconnect the client cables and store them.
2. Identify if there are parts that should be saved for repairing other client computers, such as memory, hard disks, or CD/DVD drives.

8.4. Rebuild All Student Home Directories

Normal rebuild is performed each time a student logs out. The main-server removes the student home directory for the student that just logged out then rebuilds a new copy. For example, when student1 logs out the directory /client_home_local/student1 is removed and rebuilt. All changes that student1 may have made to the desktop, the trash, etc. are removed. This does not remove files that the student has saved in their Documents and Project directories.

You can also rebuild all student directories at the same time manually if one or more student directories are not working properly.

Before You Start

1. Log into the system as the sysadmin.
2. Open the terminal window if it isn't already open.

Steps

1. At the terminal window prompt, type: **sudo rebuildStudentHomeDirectories.py** and press Enter.
2. If the system prompts for the sysadmin password, type the password and press Enter.

All existing student Home directories are removed then new Home directories for each student account are created.

3. Confirm that the operation completed successfully:
 - a. Log out of the sysadmin account.
 - b. Log in as one of the students.
If you cannot log in, rebuild the student home directories again.
 - c. Confirm the Applications menu shows the correct options for the students.
 - d. Log out of the student account.

8.5. Network Switch

8.5.1. Add a Switch

This might need to be done if you add more client computers and no longer have any ports available in your existing network switch.

Before You Start

1. Make sure the new switch is off.
2. Make sure the existing switch has an empty port.
3. Make sure you have Ethernet cable to use to connect the new switch to the existing switch.

Steps

1. Put the new switch where you need it.

2. Connect the new switch to the existing switch.
 - a. Connect the Ethernet cable to a port on the new switch. It is best to connect it to the highest numbered port so that each other port can be associated with consecutively numbered computers.
 - b. Connect the other end of the Ethernet cable to an empty port in the existing switch.
3. Turn on the new switch.
4. Connect devices to the new switch.
5. Confirm the new switch is working correctly. This can be done by inspecting the lights on the switch and also checking to make sure the client computers connected to the new switch are working.

8.5.2. Replace a Switch

This might need to be done if a switch fails.

Before You Start

1. Turn off the devices that are connected to the switch you want to replace.

Steps

1. Disconnect any devices connected to the switch you want to replace.
2. Turn off the switch you want to replace.
3. Remove the switch you want to replace.
4. Install the new switch.
5. Connect the new switch to all the devices disconnected from the old switch.
6. Power on the new switch.
7. Turn on the devices connected to the switch.
8. Confirm that the connections are active.

If main-server and the internet modem are connected to the switch:

- a. Log on to main-server using your personal account.
- b. Confirm that the desktop appears as expected.
- c. Use the internet browser to access google.com.
The google.com page displays.
- d. Close the browser window.
- e. Log off.

If client computers are connected to the switch:

- a. Log on to a client computer using your personal account.

- b. Confirm that the client desktop appears as expected.
- c. Use the internet browser to access google.com.
The google.com page displays.
- d. Close the browser window.
- e. Log off.

8.5.3. Remove a Switch

Before You Start

1. Turn off the devices that are connected to the switch you want to replace.
2. Turn off the switch you want to remove.

Steps

1. Disconnect any devices connected to the switch and connect them to the other switch.
2. Confirm that the devices are connected to the other switch and working properly.

If main-server and the internet modem are connected to the switch:

- f. Log on to main-server using your personal account.
- g. Confirm that the desktop appears as expected.
- h. Use the internet browser to access google.com.
The google.com page displays.
- i. Close the browser window.
- j. Log off.

If client computers are connected to the switch:

- f. Log on to a client computer using your personal account.
- g. Confirm that the client desktop appears as expected.
- h. Use the internet browser to access google.com.
The google.com page displays.
- i. Close the browser window.
- j. Log off.

3. Turn off the switch you want to remove.
4. Remove the switch.

8.6. Change the Internet Modem

Follow this procedure if you need to change the internet mode.

Before You Start

1. Read the user's manual for the internet modem to review the installation procedures of the modem.

Steps

1. Turn off the existing internet modem.
2. Disconnect all cable from the existing internet modem.
3. Remove the existing internet modem.
4. Install the new internet modem as directed by the modem user's manual.
5. Turn on the new internet modem.
6. Connect the cable from the main-server to the internet modem. Connect the cable to the Ethernet port listed as "local network," "home network," or something similar. If the modem has several ports available, you can use any port that is in the row of closely spaced ports
7. Log on to main-server using your personal account.
8. Confirm that you can access the internet.
 - a. Open an internet browser window.
 - b. Go to google.com.
 - c. Confirm that the google.com home page displays.
 - d. Close the browser window.
9. Log out of your account.

8.7. Replace a Network Card

Follow this procedure when the network card on the main-server has failed. This is not a common procedure – it has not happened yet. Make sure you have done careful troubleshooting to isolate the problem to the network card. Consider that anytime you open the computer case you might accidentally cause damage.

Before You Start

1. Shut down the main-server.
2. Unplug all cables from the main-server.

Steps

1. Open the case of the main-server.
2. Remove the defective network card.
3. Replace the defective network card with a new network card (must be a gigabit card).
4. Close the case of the main-server.

5. Plug in all cables.
6. Test to ensure the new network card is working.

8.8. Fixing an Obstructed Fan in the Computer

A cable may shift inside the case if the computer has been moved or, most likely, if the case has been opened and closed without proper care. If a cable lightly touches a fan it may cause a rattling noise. If it fully blocks the fan then the fan cannot turn. If the fan on the CPU heat sink is blocked then the computer should not start. If the computer turns on and then immediately turns off this may be the problem. This problem can occur with any computer but is most common with computers that have a fan on the side of the case.

Before You Start

1. Shut down the computer.
2. Unplug all cables from the computer.

Steps

1. Open the case of the computer.
2. Carefully examine the position of all cables. You may move the cable when you opened the case. The cable may not be blocking the fan but could still be close enough so that it does not block the fan at that moment but will when the computer is closed.
3. Move all cables away from fans. If the computer has a fan on the case side that you have removed you should experiment with opening and closing to confirm that there will not be a problem when the case is closed.
4. Close the computer case.
5. Plug in all cables but leave the computer in a position that all sides are clearly accessible.
6. Turn on the computer. It should start normally with all fans running. You can see the fans on the computer case turn and feel the air.
7. Turn off the computer, move to the normal operations positions, and restart.

8.9. Internet Filtering

There is something called "SquidGuard" which provides internet filtering to the system through the main-server. SquidGuard blocks bad sites so students cannot access them. SquidGuard is updated automatically through the internet, but IT teachers can also block additional sites that they choose.

8.9.1. Block a Web Site

Follow this procedure when you need to block a website from users.

Before You Start

1. Log in as sysadmin.

Steps

1. To open the special file that has the list of blocked websites, type the command **gksudo gedit /var/lib/squidGuard/db/blacklist/domains**
2. This will open a window requesting the sysadmin password. When the password is entered, an editor window will open for you to make changes to the file. The file is a simple list of the domain names of sites to be blocked. All sites that have the name as the main part of the domain name will be blocked. For example the entry youtube.com will also block www.youtube.com, my.youtube.com, etc.
3. Add any new domains that you want to block at the bottom of the file and then save the edited file.
4. Close the editor window.
5. Run the command **sudo squidGuard -C all**
6. This will take a short time to update all of the databases for Squid Guard.
7. Run the command **sudo service squid3 restart**
8. Test that the new domains are blocked.

8.9.2. Unblock a Web Site

Follow this procedure when you want to unblock a website that was previously in the “blocked website” list.

Before You Start

1. Log in as sysadmin.

Steps

1. To open the file, type the command **gksudo gedit /var/lib/squidGuard/db/blacklist/domains**
2. This will open a window requesting the sysadmin password. When the password is entered, an editor window will open for you to make changes to the file.
3. Delete from this list any domains that you want to unblock and then save the edited file.
4. Close the editor window.
5. Run the command **sudo squidGuard -C all**
6. This will take a short time to update all of the databases for Squid Guard.
7. Run the command **sudo service squid3 restart**
8. Test that the domains are unblocked.

9. TROUBLESHOOTING ISSUES

IMPORTANT: The program systemCheck will identify and possibly fix many problems. ALWAYS TRY TO RUN THIS PROGRAM FIRST BEFORE PROCEEDING. If the main-server is running and you can log in as sysadmin, then type **sudo systemCheck** in a terminal window before other actions. See Appendix A, systemCheck Program for further details.

Not every possible problem can be discussed in this manual. Troubleshooting is a discovery process that gets easier as you learn more. Use Google to assist, and please contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania for assistance if needed.

9.1. Main-server Issues

9.1.1. Main-Server Does Not Boot

Symptom

Main-server does not boot.

Resolution Steps

Confirm that the main-server has power and the UPS is turned on.

Check for messages displayed on main-server.

If	Then
You see the GNU menu.	Press the “Enter” key to begin boot.
Text appears but there is no menu.	Follow the procedure “Reboot main-server from the System Rescue CD.”
There is no text and the main-server lights are on.	There is a problem with the computer hardware. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding. Note: You should never take the main-server to a computer shop or technician for repair.
There is no text and the main-server lights are off.	Check the computer power cable and UPS on the main-server to make sure they are okay. If those are okay, there is a problem with the computer hardware. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding. Note: You should never take the main-server to a computer shop or technician for repair.

9.1.2. Main-server doesn’t boot with the Message “Checking filesystems”

Symptom

You see something like the following on the screen:

```
Checking filesystems
Linux contains a file system with errors, check forced
Linux:
Inodes that were part of a computed option linked list found

LINUX: UNEXPECTED INCONSISTENCY; RUN fsck MANUALLY (i.e., without -a or -p option)
[FAILED]
```

An error occurred during the file system check
 Dropping you to a shell; the system will reboot when you leave the shell

Give root password for maintenance (or type CTRL-D to continue):

The Linux system files somehow became corrupted. It is very difficult to determine why the files became corrupted. It is possible that while the computer was shutting down files were not properly saved. This most commonly happens when the computer is shutdown with the power switch or a sudden power interruption.

Resolution Steps

1. Turn off the main-server immediately. You will need to press the power switch for several seconds.
2. Reboot the main-server and choose “Main Server Disk 2 (sdb1)” from the list of OS copies.
3. Log in as sysadmin.
4. Check the normal OS on disk1. Run the command **sudo fsck -f -r /dev/sda1**
5. As the system checks the file system, it may display questions.
6. For each question, type **y** and press Enter.

Each step takes some time to finish. Be patient and let each step finish.

If	Then
You have to type y for the first step more than 5 times.	<p>The disk is probably bad.</p> <ol style="list-style-type: none"> a. Reboot main-server. b. At the GNU menu, select Main Server, Disk 2. c. Start this procedure again starting at Step 1. <p>If the problem continues, both disks are bad or there is another hardware problem. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.</p>

7. Check the client_home disk partition on disk 1. Type the command **sudo fsck -f -a /dev/sda7**
8. Check the client_home_student disk partition on disk one. Type the command **sudo fsck -f -a /dev/sda8**
9. Check that disk 1 is OK. At the terminal window prompt, type the command **sudo systemCheck**. The status of each disk displays.
10. Check the status of the disks. You will see a message if Disk 1 is bad.

If	Then
Main-server started from Disk 1 and Disk 1 is good.	You are done.
Main-server started from Disk 1 and Disk 1 is bad but Disk 2 is good.	<ol style="list-style-type: none"> a. Reboot main-server. b. At the GNU menu, select Main Server, Disk 2.
Main-server started from Disk 2 and Disk 1 is bad.	<ol style="list-style-type: none"> a. Disconnect Disk 1. b. Replace Disk 1. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.
Both Disk 1 and Disk 2 are bad.	You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.

9.1.3. Reboot main-server Using the System Rescue CD

Use this procedure only when the computer cannot boot from any of the other choices in the GNU menu.

Before You Start

1. Get the System Rescue CD.

Steps

1. Put the System Rescue CD in main-server.
2. Reboot main-server. A menu displays on a blue background.
3. At the menu, select the first option “SystemRescueCd: default boot options”.

If	Then
main-server reboots successfully.	The main-server hardware is still operational but both disks may be damaged. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.
main-server does not reboot.	There appears to be some problem with the main-server hardware. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.

9.1.4. Performance is Slow

Symptom

Computers are slow and few users are logged in.

Resolution Steps

1. If this occurs within 15 minutes of the first start of the main-server for the day the main-server may be performing disk backup. Wait 5 minutes and check again.
2. Confirm that this is happening for all client computers. Continue with these steps only if all computers are slow. If only a few are slow, restart those client computers.
3. Make sure there are no users viewing videos (that can slow down the system). If users are not viewing videos, log in to main-server as sysadmin.
4. Type **sudo systemcheck** This may tell you about a process that is running improperly and using too much computer processing.

If	Then
systemCheck shows a process that is using too much processing	a. Identify the <i>process-id</i> number from the systemCheck message. b. Stop the process. Type the command sudo kill -9 process-id c. Run systemCheck again and repeat these steps if another process is shown d. After no processes are listed check system performance.
No message from systemCheck	a. Ask all users to log out of the system. b. Reboot main-server. c. Log in to main-server as sysadmin. d. Look at the System Activity Monitor to check CPU processing rates. If CPU processing rates are low, inform users that they can start using the systems again. e. Log out of main-server.

9.1.5. Main-Server Intermittent Failures

Symptom

Main-server is not stable. The server has intermittent problems or errors.

There may be a memory problem.

Resolution Steps

Note: Perform this procedure at the end of the day when users have finished this work. One of the steps launches a test that will run overnight. Users will not be able to use the system while the test runs.

1. Reboot the main-server.
2. Use the down arrow to select "Memory test (memtest86+) then press Enter
3. Memory Test Memtest86+ starts. This test takes several hours to complete. Let the test run overnight. Return to the school early the next day to complete the procedure.
4. When you return, check the test results on the main-server monitor.
5. When the test pass number is 2 or greater, check for errors.

If	Then
There are no errors.	The main-server is not experiencing memory errors. a. Reboot main-server. b. Start the client computers. c. Notify users that they can use the system.
Error messages display.	The main-server memory is faulty. f. Write down the first 4 lines of error messages. g. Inform users that the main-server needs to be fixed. h. Repair or replace main-server memory. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.

9.1.6. Starting from a Backup Copy

You should consult with Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania first when it appears that there is a problem with the hard disks on the main-server. You should also run **sudo systemCheck** to give you information about the disks.

When the main-server first starts up, there is a menu called the GNU menu. This menu helps you choose the hard disk partition to use for the operating system. There are four options to choose from:

- Main Server 12.04 (sda1) [default choice]
- Main Server Disk 2 (sdb1) [use if disk1 has problem]
- Main Server Backup (sda2) [use if there is a problem with operating system on the default partition]
- Main Server Disk 2 Backup (sdb2) [use if the sdb1 is not working]

If you KNOW that Disk 1 has failed or systemCheck gives you the emergency message about disk failure here is how you start up from Disk 2.

- If you are able to see the GNU menu when you turn on the main-server, then choose Main Server Disk 2 (sdb1)
- If the GNU menu does not appear, you will need to try with disk 2. First try to get the Boot Device Order window. The first disk will have the letters WERA in the name, the second should have the letters ERMA (the disks are different models). If the Gnu Menu first line is Main Server Disk 2 (sdb1) you have started from the correct disk. Hit enter to continue the boot.
- Confirm that the main-server runs correctly. Let it run for several hours with normal use.
- If it runs correctly, make changes to the server to assure that it will always use Disk 2. First try changing the boot order for the disks in the BIOS menu. If this does not work and the server still tries to start from from Disk 1 you will need to open the computer and disconnect the cables from Disk 1. Disk 1 is the top disk in the computer case.

Please note though that when you start up from Disk 2, any work that was done since the last backup will be lost. Contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania immediately if you have a hard disk failure, and they can help you determine the best actions to take.

9.2. Log In Problems

9.2.1. No One Can Log In to Their Accounts

Symptom

All teachers cannot log in to their accounts but students can. This may mean that /client_home has been damaged somehow. This procedure will determine if /client_home just needs to be remounted, or if it needs to be replaced with the backup copy.

Resolution Steps

1. Log in to main-server.
2. Run **sudo systemcheck**. This may fix the problem or give more information and instructions
3. Run the command **ls /client_home**. You should see a list of the teachers' directories and the other content on /client_home. If you do not see a list, type the command **sudo mount /client_home**. Repeat the **ls /client_home** to see if the list of directories is there. If it is, continue with Step 4. If it is not, go to Step 5.
4. Try to log in as another teacher from another computer. If you are not successful, go to Step 5.
5. Shut down the main-server. Wait briefly then boot the main-server
6. As soon as the GNU menu appears, use the down arrow on the keyboard to highlight the line Main Server Backup (sda2) and press Enter. This will try using the backup operating system to see if that fixes the problem.
7. When main-server is up, log in to your personal account (not as sysadmin).

If	Then
You cannot log in using Main Server Backup (sda2)	Go to Step 8.
You can log in.	Go to Step 11.

8. Shut down the main-server. Wait briefly then boot the main-server
9. As soon as the GNU menu appears, use the down arrow on the keyboard to highlight the line Main Server Disk 2 (sdb1) and press Enter. This will try using the backup of /client_home to see if that fixes the problem.

If	Then
You cannot log in using Main Server Disk 2 (sdb1)	Go to Step 10.
You can log in.	Go to Step 14. You will need to choose Main Server Disk 2 (sdb1) from the GNU menu.

10. If you still cannot log in to your personal account, follow the procedure "Reboot main-server Using the System Rescue CD."
11. Log out of your personal account.
12. Log in to main-server as sysadmin.

13. At the terminal window prompt, type **sudo grub-install /dev/sda** and press Enter.

System displays grub installed successfully. This will change the GNU menu to boot from sda2. Reboot to check the GNU menu to make sure Main Server Backup (sda2) is highlighted and starts automatically

14. Contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania and inform them that there is a problem.

If	Then
You were able to reboot from Main-server Backup (sda2).	Contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania and inform them that sda1 appears to be damaged.
You had to reboot from Main-server Disk 2 (sdb1).	Contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania and inform them that Disk 1 appears to be damaged. a. You will need to choose Main Server Disk 2 (sdb1) from the GNU menu until you disconnect Disk 1 or disable Disk 1 in BIOS. b. Notify users that all work performed since the last daily backup (yesterday) has been lost.

9.2.2. Sysadmin Cannot Log In

Symptom

Sysadmin tries to log in and cannot.

Resolution Steps

1. Log in to main-server as the very special “root” user. At the login prompt, type ‘root’ and enter the special root password.

WARNING: Any incorrect actions you perform as root can damage the system. Perform only the commands listed here and be sure to enter them correctly.

2. In a terminal window, type **passwd sysadmin** and press Enter.
3. Enter the sysadmin password at the prompt and press Enter.
4. Enter the sysadmin password again when prompted.
5. Log out as root.
6. Log in as sysadmin using the sysadmin password.

9.3. A Power Interruption Occurred

Symptom

There was a power surge or other power interruption and devices are off.

Resolution Steps

1. Turn on the devices one at a time in order shown below.

Note: After turning on a device wait one minute before turning on the next device.

Caution: As you power on devices, if you see sparks or see or smell burning, immediately turn off and disconnect the device. Do not use the device again. Discard the device and its power cord as soon as you finish this procedure. If the main-server is the problem then it may be repaired. You should contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania before proceeding.

- a. The UPS for the main-server.
 - b. The monitor for main-server.
 - c. Main-server
 - d. All switches
 - e. Internet modem
 - f. Client computers, one at a time. Wait until main-server is fully started.
2. After all devices are powered on, log in to main-server as sysadmin.
 3. Perform a complete test of the lab to check for problems by running **sudo systemCheck**
 4. Log out of the main-server.
 5. Make sure all the client computers started successfully.
 6. If there are any problems, follow the appropriate troubleshooting procedure.

9.4. Client Computer Issues

9.4.1. A Client Computer Does Not Start: No Lights on the Computer or Monitor

Symptom

You try to start a client computer and it does not start. There are no lights on the computer or monitor. Other computers have power and start.

Resolution Steps

1. Make sure the computer is connected to power. Unplug the power cord and plug it back in again.

If the problem persists and	Then
The computer is a laptop.	Go to Step 2.
The computer is not a laptop.	Go to Step 3.

2. If the computer is a laptop:
 - a. Try a different power supply. Unplug the existing power supply and plug in a new power supply. If the laptop turns on, the first power supply is bad. Discard the bad power supply.
 - b. If the laptop does not turn on, go to Step 4.
3. If the client is not a laptop:
 - a. Check the lights on the CPU box. If the lights are not on, change the power cord. If there are still no lights on the CPU box, go to Step 4.
 - b. If the CPU box lights are on, check the lights on the monitor.

If	Then
The monitor lights are on.	Make sure the monitor cable is connected to the computer.
The monitor lights are not on.	<ol style="list-style-type: none"> Make sure the monitor power switch is on. If the monitor lights are still off, replace the monitor. If the monitor still does not turn on, replace the monitor cable.

- Check the power strip to which the computer power cord is plugged and make sure the power strip is on and receiving power.

If	Then
The power strip is on.	<ol style="list-style-type: none"> Plug the computer power cord into a different plug on the power strip. If the computer still does not turn on: Find a simple electrical device that you know works. Plug the device into the power cord and turn the device on. If the device turns on, there is a problem with the computer. If the device does not turn on, replace the power strip.
The power strip does not turn on.	Replace the power strip.

9.4.2. A Client Computer Does Not Start: Lights on the Client but No Messages

Symptom

You try to start a client and it does not start. There are lights on the client but no messages display on the screen. Other clients have power and start successfully.

The network cable may not be correctly connected to the client.

Resolution Steps

- Unplug the network cable from the client.
- Plug the cable back into the client.
- Restart the client.

If	Then
The client starts successfully.	The problem is resolved.
The Check cable connection message appears.	Follow the procedure "A Client Computer Does Not Start: Check cable connection Message."

9.4.3. A Client Computer Does Not Start: Media Test Failure message

Symptom

When starting a client system, the startup sequence does not complete and the following message is displayed on the screen: Media test failure. This message only displays briefly, so you must watch the startup sequence carefully to see it. This problem can also sometimes result in a system booting to Windows, if it is a dual boot system.

Resolution Steps

1. Check the other client systems.

If	Then
Other client systems do not start and display the same message.	Confirm that the network switch has power.
All other client systems start successfully	Go to Step 3.

2. Check the network cable to the client computer.

- a. Unplug the network cable from the client.
- b. Plug the cable back into the client.
- c. Restart the client.

If	Then
The client starts successfully.	The problem is resolved.
The Media test failure message appears.	Go to Step 3.

3. Determine whether the network cable works with a different client.

- a. Unplug the network cable from the system that displays the message (the “problem client”).
- b. Shutdown a client system that is working and whose network cable is connected to the same switch as the problem client.
- c. Unplug the network cable from the client system you just shut down (the “working client”).
- d. Take the network cable from the problem client and plug it into the working client.
- e. Restart the working client.

If	Then
The working client restarts.	The problem client is broken and needs to be repaired.
The working client does not start.	<ol style="list-style-type: none">a. Leave the working client on. Do not turn it off.b. Leave the problem client’s network cable plugged into to the working client.c. Take the working clients’ original network cable and plug the cable into the problem client.d. Restart the problem client.<ul style="list-style-type: none">• If the problem client does not restart, the problem client is broken and needs to be repaired.• If the problem client restarts successfully, there is a problem either with the cable or the switch. Go to Step 4.

4. Go to the switch and check the port light on the front of the switch. For example, if the network cable for the problem client is plugged into port 3, check the light for port 3.

If	Then
The port light for the problem client's network cable is on.	Go to Step 6.
The port light for the problem client's network cable is off.	Go to Step 5.

5. If the port light is not on, disconnect the cable from the port then reconnect the cable.

If	Then
The port light turns on.	Return to the working client and restart it. <ul style="list-style-type: none"> • If the working client restarts successfully: <ol style="list-style-type: none"> a. Disconnect the network cable from the working client and connect it to the problem client. b. Restart the problem client. If the problem client restarts successfully the problem is resolved. c. Reconnect the working client's network cable to the working client and restart the working client. • If the working client does not restart successfully, go to Step 7.
The port light does not turn on.	Go to Step 7.

6. Move the problem client's network cable to another port on the switch.

If	Then
There are unused ports on the switch.	Move the problem client's network cable to an open port.
There are no unused ports on the switch.	<ol style="list-style-type: none"> a. Shutdown one of the working clients that is connected to the switch. b. At the switch, unplug the network cable of the client you just shut down. c. Plug the problem client's network cable in the open port.

7. Check the light for the port where you just plugged in the cable.

If	Then
The port light does not turn on.	The cable may be broken. Go to Step 8.
The port light turns on.	<ol style="list-style-type: none"> a. Go back to the working client and move the network cable back to the problem client. b. Restart the problem client. <ul style="list-style-type: none"> • If the problem client starts successfully, the network cable is good but the port it was originally plugged into is bad and should not be used. • If the problem client does not start successfully, go to Step 8.

8. Replace the cable.

- a. Connect the new cable to the original port and the problem client.
- b. Restart the problem client.

If	Then
The problem client starts successfully.	The problem is resolved. a. Reconnect any working clients and network cables that were disconnected. b. Restart the working clients.
The problem client does not start successfully.	Try removing power completely from the client computer, then plugging it in again. Sometimes this will fix the problem, especially if it is a dual boot computer. If it does not, go to Step 9.

- Use Google to research the computer model to see if there are any known problems with network boot for that computer. You can also try booting from a boot CD or adding a LAN card to the computer to see if that fixes the problem.

9.4.4. All Client Computers Do Not Start and Show the Message “No Ethernet Connection”

Symptom

None of the client computers start.

Resolution Steps

- Log in as sysadmin and type **sudo systemCheck** in the terminal window.
- Make sure the network switch is on.

If	Then
The network switch is on.	Remove power from the network switch. Wait one minute and then plug it back in to restart it. Go to Step 3.
The network switch is off.	Turn on the network switch. Go to Step 3.

- Confirm the client computers are connected to the switch and reboot them by turning them off and then back on.
- Run systemCheck for further information.
- If the problem is still the same, then connect a client computer directly to main-server.
- Disconnect a client’s cable from the switch. Disconnect one of the two cables that are connected to the Ethernet cards on the main-server. Connect the end of the cable from the client to the main-server
- Confirm that the light on the main computer's interface is on. Try to start the client.
- If the client starts, replace the network switch.

9.4.5. A Client Computer Does Not Start: DHCP Message Displays for 30 seconds or more

Symptom

A client computer stops during start up and a DHCP message displays for 30 seconds or longer.

Resolution Steps

- Log in as sysadmin and type **sudo systemCheck** in the terminal window. This could restart a needed process.

2. If a process was reported as restarted, try to start the client computer again.
3. Also try the steps outlined in Section 9.4.3.

9.4.6. A Client Computer Fails to Boot (Dual Boot Computer)

A client computer may fail to boot to the network properly if it has booted to Windows or the workstation version of Linux previously. The symptom of this is that the light on the back of the client showing network activity does not light up, or lights up but then goes out.

This problem can sometimes be fixed by removing power completely from the client computer for several seconds, and then plugging it back in. However the problem will probably reappear if it boots again to Windows or the workstation version of Linux. One way to avoid the problem is to change the BIOS to boot only from the network, never from the hard disk.

9.5. Teacher-Related Issues

9.5.1. Teacher Encounters Problems when Trying to Run a Program

Symptom

While trying to use a program, the teacher gets an error that is not printer or internet related. For printer and internet problems, see other troubleshooting procedures.

Resolution Steps

1. Ask the teacher to log out of their account and to log back in again.
2. If the problem persists, ask the teacher to try to use the program on another client.

If	Then
The teacher does not encounter the same problem on the second client.	<ol style="list-style-type: none"> a. Restart the first client. b. Ask the teacher to use the program on the first client. c. If the teacher encounters the same problem, ask the teacher to experiment with their program settings to try to solve the problem.
The teacher encounters the same problem on the second client.	Go to Step 3.

3. When the teacher can recreate the problem on a second client, ask the teacher to show you the problem.
4. If this is a very common problem that many teachers see it may simply be a program bug. You can do nothing further. If the problem not common, continue with these procedures.
5. Log in to the second client using your personal account.
6. Try to recreate the problem. Note your results (you can or cannot recreate the problem).
7. Log out of the second client.
8. Go to the first client and log in using your personal account.
9. Try to recreate the problem.

If	Then
You can recreate the problem on both clients.	a. Log out of the client. b. Go to main-server and log on as sysadmin. c. Try to recreate the problem. If you can recreate the problem, follow the steps under “Sysadmin can recreate the problem on main-server” below. If you cannot recreate the problem, follow the steps under “Teacher can recreate the problem on two clients but sysadmin cannot” below.
You can recreate the problem only on the first client.	There is a problem with the first client.
You cannot recreate the problem on either client.	Follow the steps under “Teacher can recreate the problem on two clients but sysadmin cannot” below.

Sysadmin can recreate the problem on main-server

1. At the end of the day when all users have logged out but before daily backups are made, reboot main-server.
2. As soon as the GNU menu appears, select Main Server Backup Disk 1 (sda2) and press Enter.

System runs from the first backup copy on the backup server.
3. Log in as sysadmin.
4. Try to recreate the problem.

If	Then
You can recreate the problem.	Do nothing further; the problem requires Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania for further assistance. Write down your findings and contact them. Log out of the main-server and reboot normally.
You cannot recreate the problem. The program works successfully.	a. Reboot main-server and select Main Server Backup Disk 2 (sdb1) in the GNU menu. b. Run the command sudo revertOSFromCopy c. Inform Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania that you needed to run this command.

Teacher can recreate the problem on two clients but sysadmin cannot

You can try to fix the problem by copying the teacher’s home directory from the backup so that it is like the day before. You should only do this if this is the first day that the teacher has seen the problem. If they have seen in previous days then do not do this. If you will do the following procedure tell the teacher that they may lose their current day’s work if they wish to keep the changes. Ask them to copy all of their current day’s work onto a flash drive before continuing.

1. Make sure the teacher is logged out and remains logged out until you tell the teacher it is ok to log in again.

2. Log in to main-server as sysadmin
3. At the terminal window prompt, type `sudo mount /OS_Copies/ClientHomeCopy` and press Enter.
4. Make a temporary copy of the user's home directory. At the prompt, type `sudo rsync -axH /client_home/userHomeDirName /tmp`

Where *userHomeDirName* is the name of the user's home directory.

Caution: When entering the command, make sure there is a space but no slash at the end of *userHomeDirName*.

If user has many files, this may take up to 5 minutes.

5. Press Enter.
6. Reset the teacher's home directory to the system backup copy from the previous day. At the prompt, type:


```
sudo rsync -axH --delete /OS_Copies/ClientHomeCopy/userHomeDirName /client_home
```
7. Press Enter.
8. Type `sudo umount /OS_Copies/ClientHomeCopy` and press Enter.
9. Log out as sysadmin.
10. If the program still does not work for the teacher return reset the teachers home directory to the current day At the prompt, type:: `sudo rsync -axH --delete /tmp/userHomeDirName /client_home`
11. If the program works then tell the teacher that he or she can use the fixed program but that they will lose all of their work done that day if they do not have a copy elsewhere. If they do not wish to do this, reset the teacher's directory as shown is Step 10.
12. Please contact Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania for further assistance. There may be a software problem that could be fixed by them.

9.5.2. A Teacher Cannot Log In to Their Account (Wrong or Forgotten Password)

Symptom

A teacher cannot log in to their account.

Resolution Steps

1. Log in to main-server as the sysadmin.
2. Follow the procedure "Reset a Password for a Teacher Account."
3. After resetting the teacher's password, return to the terminal window.
4. At the prompt, type `su accountName` and press Enter. *accountName* is the teacher's account name.
5. At the Password prompt, enter the teacher's new password and press Enter.

The prompt changes and displays the teacher's account name.

6. At the prompt, type `cd` and press Enter.

- At the prompt, type **ls** and press Enter.

The files in the teacher’s home directory are listed. If you do not see a list of files, follow the steps for the procedure “User Cannot Access Home Directory”.

- Log out of the teacher’s account. At the prompt, type **exit** and press Enter.
- The sysadmin prompt displays.
- Provide the teacher with the new password and confirm that the teacher can log in.

9.5.3. Teacher Does Not See Their Files in File Manager

Symptom

A teacher tried to access their files using File Manager or other application and they do not see their personal files.

Resolution Steps

- At main-server, ask the teacher to log in to their account.
- Go to Applications and select File Manager.
- In the File Manager window, select File System from the left navigation area.
- Select Backup.
- In the Backup window, select `client_home`.

If	Then
The teacher’s directory is displayed in the <code>client_home</code> window.	Go to Step 6.
The teacher’s directory is not displayed in the <code>client_home</code> window.	Follow the procedure “Restore a Teacher’s Directory from Backup.”

- Right-click the teacher’s directory and select Properties.
- Select the Permissions tab.
- Look at the Ownership information. The value for User should be the teacher’s account name and the value for Group should be “teacher”. If the User and Group values are not set correctly, go to Step 9.
- Log out of the teacher’s account.
- Log in as sysadmin.
- In the terminal window, type:

```
sudo chown accountName:teacher -R /client_home/teacherDirectoryName
```

Where **teacher** is the teacher’s account name and **teacherDirectoryName** is the name of the teacher’s directory.

Caution: Be sure to use the correct directory name. If you make a mistake, you will damage the system or prevent other users from accessing their files.

12. Press Enter.

13. At the prompt, enter the teacher's password.

9.6. Hanging Program

If a program hangs, you can assist by using the Task Manager to kill the process. Note that this application uses a lot of CPU power, so be sure to choose "Quit" when you are finished.

Resolution Steps

1. Choose Accessories, Task Manager
2. Find the process that is hanging. Right-click on it and select "Kill" or "Terminate". (LibreOffice sometimes hangs, so if it does, look for LibreOffice or soffice in the list of processes.)
3. Click "Quit"

9.7. Internet and Intranet Issues

9.7.1. "Connecting" Message Displays in a Browser Tab When Users Try to Access the Internet

Symptom

Users can see the local web home page but cannot access the Internet and see the message "Connecting" in the browser tab.

Resolution Steps

Run systemCheck. This will either fix the problem or identify it.

If	Then
systemCheck reports a problem with the internet connection outside of the modem	Turn off the modem for one minute. Unplug and plug back in the cable from the ISP. Start the modem. If the modem light does not turn on after turning off the modem and turning it on again, ISP service is down. If the service is off longer than usual, report the problem to your ISP.
systemCheck reports a problem with the internet modem	Turn off the modem for one minute then start it again. Run systemCheck again to see if the modem is working. If so, wait for the internet connection light on the modem and try to use the internet. If systemCheck still reports a problem with the modem refer to the user’s manual for the modem to attempt to connect to it and run self tests on it. If this fails, repair or replace the modem.
systemCheck reports a problem with the connection to the internet modem	Unplug and replug the Ethernet cable between the modem and the main-server. Check the lights at both ends. If both are on, run systemCheck. If both lights were not on, replace the Ethernet cable with one that you know is good. Again check both lights and run systemCheck. If the modem light is out, turn off and turn on the modem. If the light on the Ethernet on the main-server is out, then reboot the main-server.
systemCheck reports that it restarted one or more processes	Rerun systemCheck to confirm that the processes did not need to be restarted again. If systemCheck reports no errors try to use internet. If it reports that it restarted the same processes again, reboot the main-server. If the problem persists after reboot, reboot the main-server using the GNU menu choice “Main Server Backup (on sda2)” at start. Inform Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania that there may be a problem with sda1.

9.7.2. “The proxy server is refusing connections” Message Displays When Users Try to Access the Internet

Symptom

Users can see the local web home page but cannot access the Internet and see the message “The proxy server is refusing connections.”

Resolution Steps

1. Run systemCheck. It should report that it restarted squid. If so then run systemCheck again to confirm that it did not need to be restarted again.
2. If systemCheck did not start squid again, force the process to be restarted. At the terminal window prompt, type **sudo /etc/init.d/squid3 restart** and press Enter.
3. If the system prompts for the sysadmin password, type the password and press Enter.

The system displays:

```
squid3 stop/waiting
squid3 start/running, process number
```

4. Try to access the internet.
5. If users still cannot access the internet, reboot the main-server and check the internet.
6. After rebooting, run systemCheck again. If systemCheck is unable to restart squid or if squid dies immediately after restarting, then type **sudo /usr/local/bin/rebuildSquidCache.py** and press Enter. This will completely erase and rebuild the squid disk partition sda6, and then it will restart squid. After this is finished, run systemCheck to confirm success. Then check the internet to see if it is now working.
7. If users still cannot access the internet, go to the troubleshooting procedure *“‘Connecting’ Message Displays in a Browser Tab When Users Try to Access the Internet”*.

9.7.3. “ERROR The requested URL could not be retrieved” Message Displays When Users Try to Access the Internet

Symptom

Users can see the local web home page but cannot access the Internet and see the message “ERROR The requested URL could not be retrieved” in the browser tab.

Resolution Steps

1. Get the full error message from the user.
2. First try to confirm that the internet is working properly. To do this, try google.com.
3. Log in as sysadmin and type the command **sudo systemCheck**. This may report that a process needed to be restarted.
4. Run **sudo systemCheck** again to confirm that the process was restarted.

9.7.4. Users Cannot View the Intranet Home Page or Access the Intranet

Symptom

Users try to access the intranet with Firefox and see the message “Unable to connect. Firefox can’t establish a connection to the server at main-server.lcl.”

Resolution Steps

1. Run the command **sudo systemCheck**. This should restart the intranet server process “apache”. Run systemCheck again to confirm that the process continues to run.
2. Try to access the intranet.

APPENDIX A: SYSTEMCHECK COMMAND

The computer program systemCheck has been created to automatically perform numerous tests to look for problems within the server and across the network. If a problem is detected that can be easily fixed, systemCheck will do so. Any problems that it finds are reported to the user along with suggestions for further problem identification and repair.

Because systemCheck can aid so much in finding and resolving problems it should be used as the first step when there is almost any problem in the computer lab. systemCheck also performs numerous computer health checks on the main-server so you should run it regularly to be warned of future problems.

To run the program you must be logged into the main-server as the user sysadmin. Then type the command **sudo systemCheck** in a terminal window. It will not run without sudo. This means that it can be run only by the sysadmin user.

systemCheck performs these actions:

- Check disk free space for all partitions and warn if any partitions are too full.
- Check disk hardware health and warn of problems.
- Check that all required disk partitions are mounted (connected to the system so that they are active). If a partition is not mounted, check and fix it if possible. If check/fix is successful remount it and confirm success.
- Check time of last successful backup and warn if too old.
- Check that all critical service processes are running. Restart any that are not running and check again to assure that the process is active.
- Check processor use of all processes on the main-server and warn of those that appear to be using too much CPU.
- Check system load monitor logs and report if the system appears to be too heavily loaded over a long period.
- Check all network interfaces for correct connection and configuration.
- Check the internal network for active computers.
- Check that the internet modem is turned on and can talk to the main-server.
- Check that packets can be sent and received from the internet.
- Check that the computer can get internet network addresses from the URL name.
- Check that normal internet communications to a known site are possible.
- Check the quality of the internet connection.

systemCheck may run for a minute or more to perform all of these checks. As it runs it will report the start of each group of tests so that you can see its progress. After it has completed all tests it will report "Completed Tests." then "Starting test result analysis".

If no problems have been found it will report “Completed test result analysis”, “No problems found”, and finally “System Check completed” This means that everything is OK.

If some problems have been found by the tests, these will be reported after “Starting test result analysis”. Each problem will be reported in one of three ways in an individual block separated by a blank line.

1. “Will attempt to fix this problem” systemCheck has discovered a problem that it can fix. The description of the fix is followed by the system command that will be run. The command will then be performed. Some commands may take a longer time. When the command completes then the result of the attempted fix will be shown. Some fixes may take several steps. The action and result of each step is given in the block.
2. “Problem>” systemCheck has found a problem that It cannot fix. After a description of the problem systemCheck gives instructions for actions that you must perform to fix the problem.
3. “WARNING: Serious Problem>>” This is a problem that will require that you perform the action given as soon as possible to prevent or minimize system damage. At this time, only disk failure or very serious file system problems are reported with this message.

If systemCheck has identified further actions that you should perform, it will describe the required actions after the line “*****Do this next and then rerun systemCheck *****”. These may be further actions to be performed in addition to any actions described in the listing of a problem.

Finally, if some problems were discovered, systemCheck will give the summary line “-- x problems found. y problems fixed.”

If any problems were discovered, rerun systemCheck after you have performed the recommended actions to confirm successful fixes.

systemCheck is an evolving program. Neal created it after the initial design of the System Administrators manual showed the need for an easy-to-use tool to automate the many tests and actions required for system problem solution and system health checks. As time permits further enhancements will be added to help a system administrator.

systemCheck – Use it early. Use it often.

APPENDIX B: KEY DISK LOCATIONS

/client_home

This is a large disk partition that contains all of the teachers' accounts, the shared storage areas, and all of the contents of Rachel and Khan Academy.

Key Directories in /client_home:

- /EducationalMaterial This contains the contents of Khan Academy and Rachel. The directory should not be changed in any way.
- /TeachersShared This contains files to be shared among teachers and is organized by subject areas. All teachers can read and write into the subject directories contained in this directory but students cannot read this directory or any contents.
- /AllUsersShared This is organized in the same way as TeachersShared. Teachers can read and write into the subject areas in this directory but students can only read. This can be used for materials that teachers wish to share with students such as readings and homework.
- All teachers home directories. The directory for a teacher contains all information and settings for that teacher. All contents are private for that teacher.

/client_home_students

This disk partition contains all of the files that the students have created or saved. Because this is a partition, no other part of the server will be affected if the students abuse their storage and completely fill the partition.

Key Directories in /client_home_students

- /guestUser – the directory where all files are stored when the student chooses “Guest” at sign-in.
- All form levels (Tanzania) or grade levels (Philippines) Each of these directories contains a directory for each teacher (Tanzania) or section (Philippines). The individual student directories are named with the student’s name and are contained in the appropriate teacher/section directory. Note: the directories are only created when the student signs in for the first time. This means that some teacher/section directories and individual student directories will not be seen when viewing this area. This is normal and is not a problem.

/client_home_local

This directory contains all of the numbered student home directories that are created with the rebuildStudentHomeDirectories.py command. These individual directories are deleted and recreated every time the student logs out. If there are any problems with some numbered student account on login you can just run the rebuild command after all students are logged out.

/etc

This directory contains many files that control the configuration of the entire server. No files in this directory should be edited or deleted without specific instruction and guidance from Neal, Sir Jade in the Philippines, or arushacomputerhelp@gmail.com in Tanzania.

/home

This directory contains the home directories for the sysadmin and master user. The master account is used only by the system creators. Local system administrators should use the sysadmin account only when necessary to perform administrative or maintenance actions.

/usr

This directory contains most of the programs, system libraries, shared system files, etc. The directory `/usr/local` contains the custom files and programs created for the servers by Reneal. The directory `/usr/local/bin` contains the custom programs. The directory `/usr/local/etc/account_templates` contains the files that are used to create the student and teacher accounts.

/var

Key areas of this directory are:

- `/var/log` This directory contains the systems log files. These are most easily read by the “Log File Viewer” in the “System” menu block. The syslog files in `/var/log` are used as the general place for most system log messages. The mirror files in `/var/log/mirror` contain information about the system backups.
- `/var/lib/tftpboot/lts/i386/lts.conf` This file may need to be edited if older low memory (256 MB) computers are added to your lab.

/OS_Copies

The directories under this directory are links to the other backup partitions. Normally they are not connected (mounted) so you will see nothing in them. If it is necessary to look in one of these backup directories (for example you need to look for or copy a damaged or erased file), you can use the command `sudo mount /OS_Copies/xxx` where xxx is the backup partition that you need to read from.

/media

This is where you will see external drives or USB flash drives after you have plugged them in. They will be in `/media/username` where username is the account name of the user logged into the computer at the time that the drive was inserted.