



OpenRNR Lab
Faculty Of Computer Science
Kabul University



DAAD



ZIUK

2011

Carried By :

Asadullah (Salik)
Sayed Jamal Naser(Sahibzada)
Hasibullah (Sahibzada)

Project supervisor :

Mohammad Mussadiq Jalalzai

Department :

IT (Information Technology)

Table of Contents

Acknowledgement.....	4
Abstract.....	5
1 Introduction.....	6
1.1 Chapter overview.....	7
2 Definition of Terms.....	7
Chapter 3	9
3 Background Information.....	9
3.1 Current Situation and Problems.....	10
4 Current OpenRNR Lab Overview.....	11
4.1 Services By OpenRNR.....	11
4.2 Current OpenRNR Network Infrastructure:.....	13
5 OpenRNR lab Project Overview.....	13
5.1 OpenRNR Lab Projects provides:.....	14
6 Planning.....	14
6.1 User's Security.....	15
6.2 Availability:.....	16
7 Dynamic Time Reservation.....	17
7.1 Programming Time Reservation.....	18
7.2 Snapshot of Time reservation Script.....	18
8 Dynamic User Creation.....	18
8.1 Screenshot of Dynamic User creation.....	19
9 OpenRNR web site.....	19
9.1 Features of OpenRNR website:.....	20
9.2 Design and Development of Website:.....	21
9.3 OpenRNR Website Screenshot.....	22
9.4 Future Plans of Website:.....	22
10 OpenRNR FTP server.....	23
10.1 Features of FTP:.....	23
10.2 Scheduling Scripts:.....	24
10.3 Uploading Files to FTP:.....	24
10.4 FTP Upload Snapshot:.....	24
10.5 FTP server security:.....	25
11 Conclusion	26
11.1 Things to be Done!	26
A.3.0 AllowAll script:.....	28

A c k n o w l e d g e m e n t

We would like to acknowledge and extend my heartfelt gratitude to the following persons who have made the completion of this project possible:

- Our Dear Respected teacher Mohammad Mussadiq (Jalalzai) Who has always encouraged us to work hard and has helped us in finding the best Standards for OpenRNR Lab.
- Our Dear and supporting teacher Mr Baseer (baheer) one of the best web developer teacher in faculty of computer science, who gave us best ideas and important hints in developing OpenRNR website.
- Our Dear Respected teacher Miss Freshta Popalyar who helped us in creating and designing our documentation structure and has always given creative .
- All other Friends and class fellows who devoted their times for joining in testing scenarios and using OpenRNR lab.
- And Most specially to our Families that always created relaxed and convincing environment for us to study and get our project done!

Abstract

OpenRNR is a remote research lab which was designed on 2010 in faculty of computer science with some features.

Current OpenRNR lab in Kabul Computer Science faculty has given and provided new features and improvements for its users.

New features helps users to use Lab more reliably and securely, users shouldn't worry about their confidential data while transferring them from their PCs to Lab servers.

Users of Lab can now reserve time with methods which is a user friendly and easy to use program, This program helps users to correctly reserve time with its helpful manuals, calendar and time mapping, This program checks reserved times which will alert and prevent users from reserving that time.

Another program has been designed to create user-accounts and their passwords, this method ensures security.

OpenRNR File server is a choice for teachers and students in which teachers can easily and securely upload new Assignments, lecture notes and other case-study books, and students can download their given assignments and then upload their homework back on the server.

OpenRNR scheduling of File servers is another feature of Lab, which helps teachers to give deadlines of students homework to be uploaded on the server.

OpenRNR web site is yet another attractive improvements of Lab which has different features itself, This site contains information about File Server scheduling, tutorials, helps, current and future coming projects, active members of labs, Libraries that contains lecture notes, magazines etc.

This website is an interface to file server which helps users to graphically upload Homework on the server by giving their usernames and passwords.

Chapter 1

1 Introduction

As far as Kabul Computer Science Faculty is concerned, which for the past many years due to the lack of financial support and lack of separate building couldn't manage to build and design research and practical labs for students.

OpenRNR Lab was the first research lab built in Computer Science Faculty on 2010, students access the lab remotely via SSH to do their researches on new standards in networking devices (Routers/Switches) and test Open Source IOS features and capabilities and then compare them with other commercial IOS which are mostly closed source.

Furthermore, this lab is used to develop and test different aspects of free and open source routers. Almost all the software and routing tools used in this lab are free and Open Source, thus saving hundred thousand of US Dollars.

In addition students take benefit from the OpenRNR library that contains different material for students and teachers.

This documentation will describe new features and improvements added to OpenRNR lab and what shall be done in coming future to enhance and facilitate the Lab.

1.1 Chapter overview

Chapter 2 explains technical words and its definitions.

Chapter 3 focuses on background of Computer Science and problem statements.

Chapter 4 describes previous OpenRNR lab features and its Network Infrastructure.

Chapter 5 introduces new features and capabilities of OpenRNR lab.

Chapter 6 shows how project planning were taken and explains each of them.

Chapter 7 describes time reservation Programs.

Chapter 8 talks about User Creation .

Chapter 9 discusses OpenRNR new website.

Chapter 10 explains FTP server of OpenRNR.

Chapter 11 ends with conclusion of OpenRNR project.

Chapter 2

2 Definition of Terms

1) OpenRNR

This name is given to The Research Lab in Computer Science Faculty,
Why OpenRNR ?

OpenRNR is Derived from four distinct words (Open, Remote, Network, Research).

(Open) Term is used for Lab to indicate that Lab uses open source IOS of Routers and switches.

(Remote) means that Lab users access Lab servers remotely via SSH.

(Network Research) Describes the purpose of Lab which for networking researches purpose.

2) GNS3:

GNS3 (Graphic Network Simulator version 3) is the simulator that uses IOS of routers and switches this application is installed on OpenRNR lab servers.[1]

3) IOS :

“Cisco IOS (originally **Internetwork Operating System**) is the software used on the vast majority of [Cisco Systems routers](#) and current Cisco [network switches](#). (Earlier switches ran [CatOS](#).) IOS is a package of routing, switching, internetworking and telecommunications functions tightly integrated with a [multitasking](#) operating system.” [2]

4) Script:

A combination of commands combined in one file with execute permissions that performs a specific task.

5) CollectResInfo:

This is a name of a script used in the server which means Collect Reservation Information that collects all reservation timings of users. [Appendix A]

6) SSH:

Secure Shell is a networking program that allows users to to login to Lab servers remotely, there is SSH server and SSH client.

7) CSS:

“CSS (Cascading Style Sheets) is a language that describes the rendering of markup documents (e.g. HTML, XML) on various supports, such as screen, paper, speech”[3]

8) PHP:

“PHP (recursive acronym for *PHP: Hypertext Preprocessor*) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML. “[4]

9) CGI:

Common Gateway Interface is a program in server side which has the ability to process all user data and request.

10) HTML:

Hyper Text Markup Language is markup language used to create webPages.

11) \$1,\$2 ..

These are the first , second and other arguments of a script that a user has entered in front of the script file name.

12) Packages:

Packages are combination of programs, files that makes up a software or an application or a service, This term is widely used in Unix Operating System.

13) Terminal:

A client Program that accepts commands to communicate with Operating System.

14) Apache2:

This is a web server that is used to host websites on a server.

15) Throughput:

The amount data (bits) moving in a media per second in a specific time.

16) IS :

Information System , This is one of the Computer Science Department.

17) IT:

IT stands for Information Technology which is a separate department of Computer Science.

18) Open Source:

An application's source codes available for everyone, which can be edited by programmers.

19) \$PATH:

This is a Linux Variable which determines the command search path.

20) Finger:

This is a Linux user information lookup program. This user information can be changed by *chfn* command.

21) GPL:

“The GNU General Public License is a free, copyleft license for software and other kinds of works.”[5]

Chapter 3

3 Background Information

Computer Science department has changed the Faculty became a faculty in 2010 at KU, which resides an old building, but soon it found its status and level among other important and fast growing faculties.

Since computer science is a fast growing field in Afghanistan and in all over the world, Computer science grows fast if research facilities are provided for students, computer labs should be provided for them to do their every semester assignments and tasks which are given by their lecturers.

Computer science teachers and students should be able to get their tasks done reliably, securely and fast, they should not rely on other programmed systems or software but instead they should make their unique systems and unique software so that they could be more self confident.

In 2010 OpenRNR lab was built from scratch which helps and supports Computer science students to do their researches and assignments, before the use of OpenRNR lab teachers and students had to use Flash Disks or use email services to transfer assignments and homework in which different problems would take place like (Virus spreading, Flash malfunctioning, Data loss and other private matters) or sometimes no Internet Connection to email the homework for teacher, but OpenRNR replaces all of them with an easy solution described on other chapters,

This lab provides GNS3 as Graphical network simulator that enables students to work with different Router/Switch IOS and more than 10 users can simultaneously access each server, in which more than 80 users will be allowed to work with all servers in one lab.

Students can download books and other useful materials from the FTP server of OpenRNR Lab, but they can't upload their own materials.

3.1 *Current Situation and Problems*

Computer Science faculty still doesn't have a centralized management system in which teachers, students and other administrative staff could easily use it and manage their daily activities in it.

Currently our faculty has the following situations and problems listed bellow.

Faculty :

1. Has three main departments (IS, IT, Software Engineering)
2. Every department has teachers holding masters degree.
3. Has more than 500 students, studying in different departments.
4. Limited Internet connection for Students in the class.
5. Has nonstandard lecture rooms for students, departments for teachers.
6. Has a reconstructed building.
7. 30% electricity outage.
8. Excess amount of students in one class.
9. Limited coverage Areas of Access Points in classes.

Library of faculty:

1. Faculty has got no Library.
2. Limited text books are available for students to use.

Computer Labs of faculty:

1. Two but nonnative networking labs which is under construction.
2. No active programming lab.
3. OpenRNR lab (A simulated lab for students that uses GNS3) for network researches and practices.

Networking Devices:

1. Limited Networking devices available for large number of students.
2. Old routers and switches.
3. Some network devices fail to start normally.

Though there are other labs under construction which will provide networking practices in future but why OpenRNR lab?

Due to the problems mentioned above there are limited networking devices that all students can not work separately on each of them, but OpenRNR has another solution which is the IOS simulation of routers and switches and allow every one to reserve time and work on their desired timings.

All students can not stay too late in faculty but they need to do their practices therefore they can't stay in faculty labs, but OpenRNR lab provides remote access of devices from any part of KU network and in coming future will provide remote access to lab devices via internet allowing students to do practices and homework from their homes.

Chapter 4

4 Current OpenRNR Lab Overview

OpenRNR lab was designed and developed by Students of Computer Science in 2010 which was the first starting point of Researches and developments of Computer Science, which led students to do their researches and assignments.

4.1 Services By OpenRNR

The following services are provided by OpenRNR lab.

1:GNS(Graphical Network Simulator):

This simulator uses Real IOS of Network devices which can simulate routers, switches, firewalls and even workstations, This program can be used by students to do their researches and assignments.

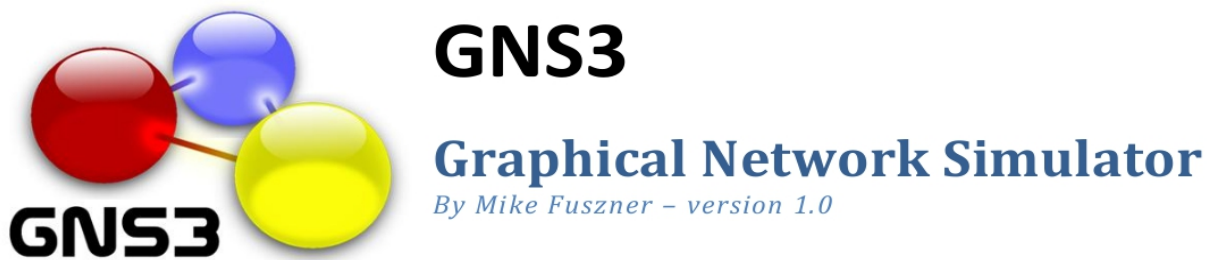


Illustration 4.1: GNS3 Logo

2:SSH services:

SSH provides best security and manageabilities for Lab users,

A) Security because all data between user and server are encrypted and can't be sniffed by sniffers.

B) Manageability because users can be allowed and denied by system Administrator easily and can be give timetable to access the server.

```

root@hasiullah-laptop: /etc# /etc/init.d/ssh restart
* Restarting OpenBSD Secure Shell server sshd [ OK ]
root@hasiullah-laptop: /etc# ssh -X hasiullah@localhost
The authenticity of host 'localhost (:::1)' can't be established.
RSA key fingerprint is 4c:1b:46:2b:db:db:5d:d1:4f:0c:ff:b4:10:66:7a:fa.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'localhost' (RSA) to the list of known hosts.
Well come to Open RNR Labs
This lab is designed for the students of computer science, That can be
accessed Via network.
You should provide correct username and password

Thanks
hasiullah@localhost's password:

```

Illustration 4.2: SSH Logging

3:File Server:

File server was designed for all 4 classes to be used by students.

Files server includes:

- 1:Books.
- 2:Teacher's Lecture notes.
- 3:Video Tutorials.

4.2 Current OpenRNR Network Infrastructure:

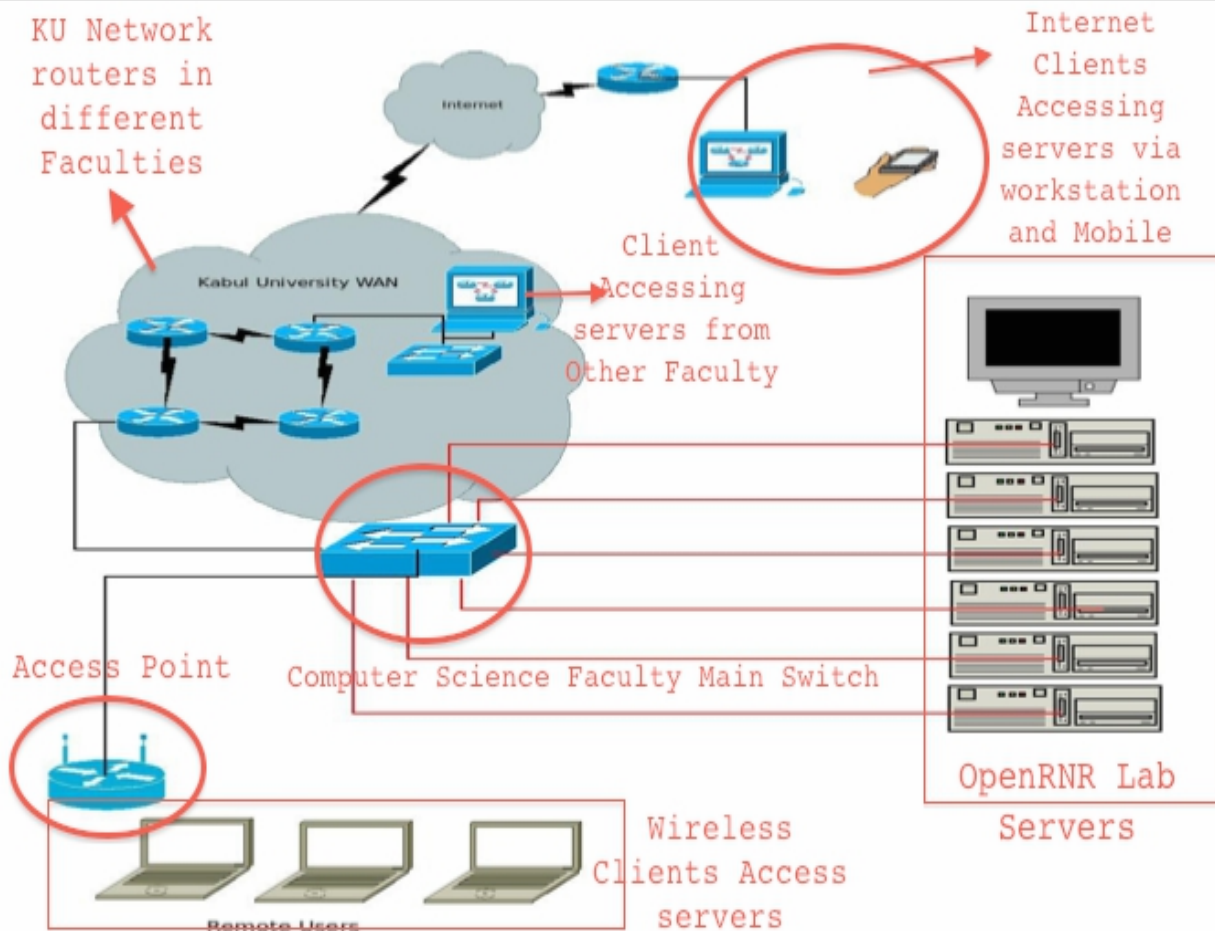


Illustration 4.3: OpenRNR Network Infrastructure

OpenRNR lab servers are connected to the main switch of Computer Science Faculty which has connection to KU network routers.

Clients can access OpenRNR servers from different locations listed below.

- 1: Computer Science Faculty: clients wired or wirelessly can connect to servers.
- 2: Other Faculties in KU : clients are able to access servers from other faculties from a different subnet.
- 3: Internet : Clients with the workstations and mobiles can gain access to lab servers from any where in the world.

Chapter 5

5 OpenRNR lab Project Overview

Current OpenRNR lab has limited features and had some problems that is solved and is surveyed for errors and has troubleshooted its problems during usage of the servers.

5.1 *OpenRNR Lab Projects provides:*

- Networking Lab with real and simulated ways.
- High Security.
- Book Libraries.
- A dynamic solution for new students (will be discussed later in this document.)
- Scheduling Homework and assignments for teachers and students.
- Remote access to lab assignments from anywhere in Internet.
- Remote secure homework uploads.
- Fast awareness of new technologies and evolves in the IT world.
- Dynamic Time reservation of Labs.
- Dynamic User account creation for new members.

Chapter 6

6 Planning

Planning is one of the important phases for a project, Everything is planned according to standards with new thoughts and innovations to let the lab be useful.

we planned the following Things for OpenRNR Lab.

6.1 *User's Security*

To ensure the best security for the servers, many things it had to have good planning in programming the methods defined in other chapters.

6.1.1 Data Security:

Any user who wants to gain access to Lab servers via SSH with their appropriate username and password. SSH fully ensures that the information being exchanged between user and server are completely encrypted and secured and sniffers can't sniff the data being transferred in network.

6.1.2 Authorization:

There are different users in the lab with different authorization, no user can read, modify or delete another user's information, users have limited access to the servers.

6.1.3 Secure Upload/Download:

Users should securely Upload and download their homework via a web browser at a fixed timing schedules.

[6][7]

6.1.4 Time Reservation:

Users now can reserve time for doing practical or research works, this method ensures that no other user can SSH server at that particular timing.

For more details see Appendix

6.1.5 Usernames & password:

Users should create their own usernames and passwords to ensure privacy which will be mentioned on 7th Chapter.

6.1.6 Server's Security:

The following things are done for sever security.

6.1.7 Authentication:

Any user who that logins to the server must provide username and password.

Any user uploads/downloads files must be authenticated.

6.1.8 Authorization:

Users are given limited access to the servers in order prevent any change to server settings.

6.1.9 Data protection:

When designing the servers with the dynamic reservation and other methods deal with Linux Programming, and Linux programming uses some common files and script files, to protect those files, they are placed in directories where a common user doesn't have access to them and those files are kept hidden from them.

6.2 Availability:

As there are different Operating systems available to be used on servers like (Microsoft Windows OS, MAC OSX, Unix OS etc) but due to different reasons mentioned below Unix OS was chosen for Lab servers.

Why Unix OS ?

Most of Unix OS are free and has GPL license and are open source like Ubuntu, KUbuntu, mint etc which are free of charge but Windows OS needs license and are very expensive to be installed on each of lab servers which could cost thousands of dollars, by other hand Unix OS are more reliable than Windows products and they have the minimum downtime than other OS.

Unix Operating system can be installed on different platforms, if the lab server's hardware changes there is no worries because Lab's OS settings will remain as the older hardware, no need of OS change nor any extra configuration is needed, but MAC OSX, Alpha and other needs dedicated hardware.

When a user's time starts or finishes from a server, lots of Services need to be restarted therefore Unix OS doesn't need to be entirely restarted which will cause other started services to be interrupted but just particular service is restarted and doesn't cause other sessions to be disconnected but Microsoft Windows OS aren't the same after any change to windows program or service it should be once restarted which is not suited for OpenRNR servers.

Computer Science faculty has 30% more electricity outlet, for power outlet UPS are installed for all servers to ensure the users to save their works, these UPS can provide more than 10 min for each of the servers in the time of electricity outlet.

Chapter 7

7 Dynamic Time Reservation

OpenRNR Lab is designed for the students of computer science in order to do their CCNA practice and research.

Due to the lack of Routers and switches in Kabul Computer Science, this lab provides Graphic Network Simulator (GNS3) in which IOS routers and switches are placed.

Students now with their usernames and passwords can login to servers and do their practice, homework and researches.

Real Routers and switches plugged to the servers via console ports will be managed by the server's users.

One logged-in user can login to console interface of the Device therefore there is the need of just one user to have access to that console interface.

To better manage login timing of users, the designed Time Reservation Method in which a user reserves a time (one or two hours) and then that user will be allowed in that specific time which he/she has reserved.

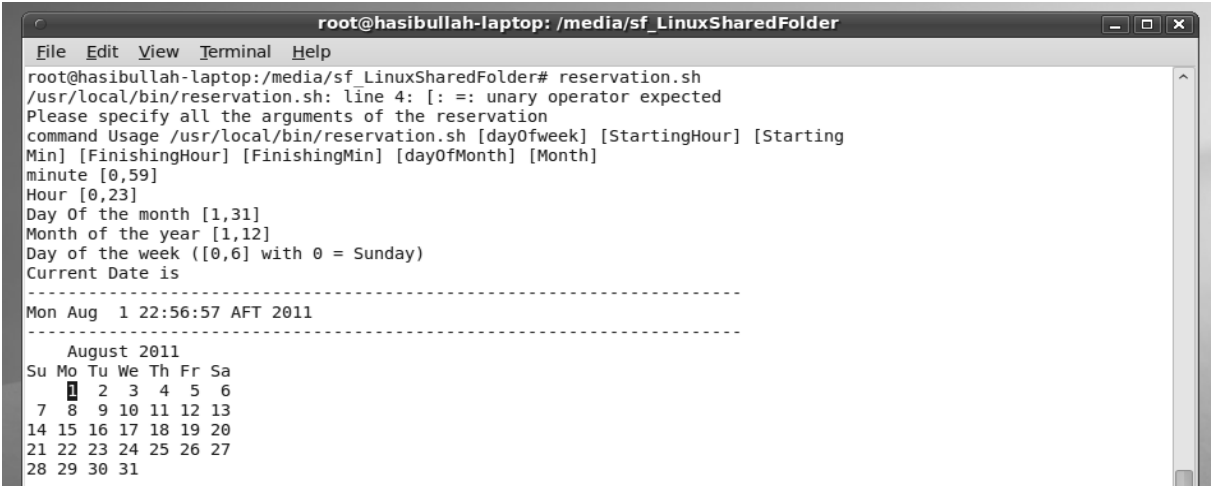
Time reservation allows one user on one server at a specific time and disallows other users to login.

7.1 Programming Time Reservation

working with Linux programming is very easy, powerful and secure.

So methods are designed and made with Linux programming language.

7.2 Snapshot of Time reservation Script



```

root@hasibullah-laptop: /media/sf_LinuxSharedFolder
File Edit View Terminal Help
root@hasibullah-laptop:/media/sf_LinuxSharedFolder# reservation.sh
/usr/local/bin/reservation.sh: line 4: [: =: unary operator expected
Please specify all the arguments of the reservation
command Usage /usr/local/bin/reservation.sh [dayOfweek] [StartingHour] [Starting
Min] [FinishingHour] [FinishingMin] [dayOfMonth] [Month]
minute [0,59]
Hour [0,23]
Day Of the month [1,31]
Month of the year [1,12]
Day of the week ([0,6] with 0 = Sunday)
Current Date is
-----
Mon Aug  1 22:56:57 AFT 2011
-----
      August 2011
Su Mo Tu We Th Fr Sa
  1  2  3  4  5  6
  7  8  9 10 11 12 13
 14 15 16 17 18 19 20
 21 22 23 24 25 26 27
 28 29 30 31

```

Illustration 7.1: Time reservation Arguments

For more details on time reservation please refer to Appendix A

Chapter 8

8 Dynamic User Creation

System users could reserve time and then their sessions would be terminated at a specific timings, but what about the New users?

A new method designed that allows new users to create their desired usernames and passwords and then change their fingers and profiles but to create these new users they should login with temporary user accounts.

Dynamic user Creation is a method that a user requests for another new user with a new password.

These all requested users will be checked for duplications and then in one or two hours those requested users will be created.

8.1 Screenshot of Dynamic User creation.

```

hasibullah@hasibullah-laptop:/usr/local/bin$ requestnewuser
.....
.....OpenRNR Lab.....
.....Welcome For new user Request.....
.....
.....This program will store your new user account request and new passwords....
.....Usernames should start with lowercase.....
User Requesting is == hasibullah
Enter your new User account: shafiullah
Your Password :
Repeat your Password:
.....
you Successfully request new useraccount
.....
Useraccount will be created in 24 hours
Thank you joining to OpenRNR Lab.
hasibullah@hasibullah-laptop:/usr/local/bin$ █

```

Illustration 8.1: Dynamic User Creation

For more details please refer to Appendix B

Chapter 9

9 OpenRNR web site

Computer science faculty is the youngest and new established faculty in Kabul University that has began its new activities in development of science and technology, with these developments fortunately this faculty was the evidence of making a research lab in 2010, this lab provided many facilities for all lecturers and students, however the lab is under extension and lots of other activities are in hand to be done, beside that it was necessary to make a website for the lab in order to achieve more facilities in case of searching the information, that from one hand show the method of mentioned lab usage and on the other hand store the related information of faculty, students and lecturers on this website. Today as it is known all the aspects are facilitated by improving technology and people can search every kind of information on the internet and all these activities take by websites and the websites are much more utilizable. Information could be shared very easily on it however without a website it would not be able to do tasks related to the lab.

This website is made to make facilities about usage of the lab, how the lab is working and how kind of information the students can get from the lab.

9.1 Features of OpenRNR website:

Below a brief introduction of the features of OpenRNR website is mentioned.

9.1.1 Fast send/receive homework for students.

This site made facilities for students to send their assignments to the lecturers on time, the lecturers give the assignments online on the website, the students download it online even when the Internet is disconnected and each student can have his/her own folder for sending/receiving the materials. So the website is linked with FTP server to provide these functions, even they can send their homework from their home if they are connected to the Internet.

9.1.2 Fast upload of Lecture notes and assignments for teachers:[7]

Every teacher in their specific department has access to Online FTP server, with their secured home folders and shared folders, and they can upload their assignments and lecture notes which are accessible by students.

9.1.3 OpenRNR Library:

This FTP server can act as a library in which different materials like (teacher's lecture notes, other important computer books, magazines, researches , Online text study tutorials, video tutorials) can be found.

A student can find all necessary things and information during his/her 4 year study.

This library is not limited only for the allowed users , all the Internet users can use this library as a good source of case study and research.

9.1.4 Schedule of Lab:

Every schedules and timetable that each teacher has, will be displayed for the convenience of the students.

Students can manage themselves according to the timetable and then they can upload / download their homework.

9.1.5 Research:

Students can improve when they do lots of researches, researches have a vital role on their knowledge and on improvements of Computer Science, so to give opportunity for searchers of computer science so a new page is added in which they can put their researches, new findings and goals and others can benefit from their researches.

9.2 Design and Development of Website:

For designing and development of the web site the following things were needed.

Tools:

- Editor for writing the codes, notepad++ for writing codes.
- Selecting languages for client sites and server sites languages, HTML, Java script and CSS for client site and PHP for server site. The presentation of the website is defined By HTML, layout of the page by Java script and CSS and for writing the CGI scripts in server site PHP is best.
- Using Photoshop program for designing the Pictures.
- Using Flash program for some animations of the pictures for external appearance of the web site.
- Using attractive colors for website.[8]

Website Sections:

1. Header: inserting logo of Open RNR.
2. Navigation: Link with all web pages.
3. Content place: Using from I Frame to show our web pages.
4. Footer: some laws and principles.

9.3 OpenRNR Website Screenshot

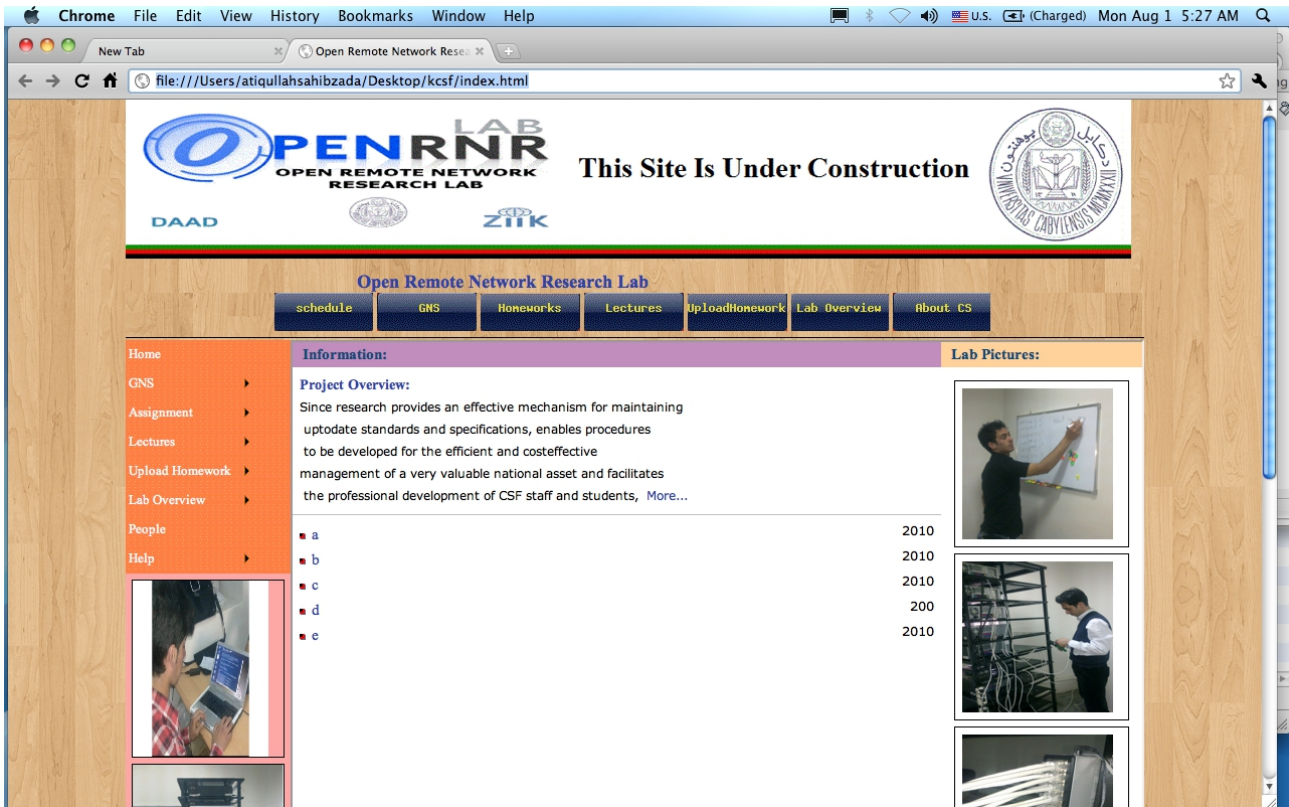


Illustration 9.1: OpenRNR website

9.4 Future Plans of Website:

We have lots of things in our minds to solve the problems in which teachers, students and departments have been facing for a long time, we can come up with it when we have an improved website.

Future goals:

1. Changing this static website to Dynamic One.
2. Creating database of teachers and students (old and new).
3. Creating email server and integrating it with our website.
4. Creating Online Examination methods for teachers.

Chapter 10

10 OpenRNR FTP server

File server is another server which is added in the lab to solve problems which teachers and students faced during their studies.

The existence of FTP server was one of the important needs of Lab, because uploading and downloading takes with the help of it.

10.1 *Features of FTP:*

FTP server is available all times for every authenticated and anonymous users, which can find things that they want.

Folders have been created for each departments of computer science, in which lectures can upload their files, assignments, lecture notes and other stuffs. And these folders will be linked to every home folder of users and then can access the files that teacher has uploaded.

Features include:

1. Dynamic scheduling of different folders
2. Security measures with Authentication.
3. ACL (Access Control List) with Authorizations.
4. Soft links of shared folders and unlinking of them in specific timing.

FTP stores:

1. Teacher's Lecture notes
2. Student's assignments.
3. Other important books.
4. Student's homework.
5. Researches of Teachers and students.

For configuration and settings please refer to Appendix C.

10.2 Scheduling Scripts:

With the help of scripts different schedules can be created that will run at teacher defined timings, and do certain tasks.

Scripts Task:

- Script run according to the schedule.
- Script links the teacher's defined folder for all defined users.
- Script unlinks all linked folders.

10.3 Uploading Files to FTP:

By default accessing ftp server via a web browser doesn't allow users to upload files, but files can be easily downloaded from it.

Files can be uploaded via command line usually (Terminal or DOS) which users have to enter FTP defined commands which is not very user friendly, and for new users it may be very hard to use FTP commands to upload their home work on the FTP server, to solve this problem a very easy method is introduced in which PHP works as a backend language and does all FTP commands for user, the user just needs to select its file from its local computer .

PHP can use FTP functions, in which it can be very easy to design all important FTP commands with PHP and give them interface with HTML which makes it very user friendly and easy to use.

10.4 FTP Upload Snapshot:

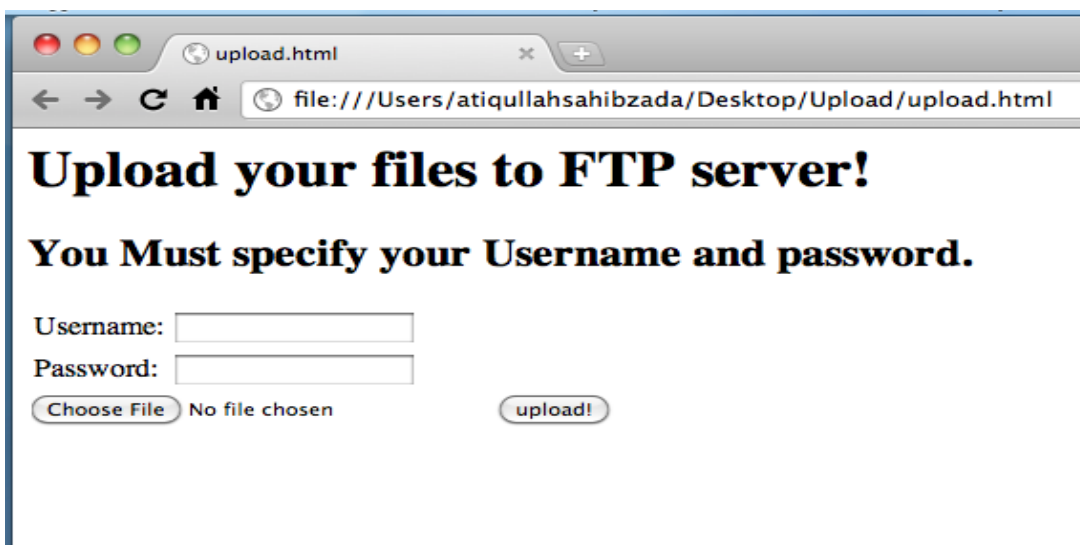


Illustration 10.1: FTP upload Page

10.5 FTP server security:

The methods working with OpenRNR FTP server discussed below are secured for teachers and students.

10.5.1 Upload Security:

Uploading files to the FTP server is secured that no one can upload files to specific folder in FTP server without entering username and password, it that insures full security.

The above illustration is a simple HTML code using form, which uses high secured method which is POST, so every file uploaded by a authenticated user is fully encrypted and encoded so no other person can sniff the student's homework.

10.5.2 Download Security:

Computer science students can download teachers' assignments files and meanwhile teacher will be able to download student's homework and their own home folder files.

They both must provide their username and password before they download any confidential file.

But some materials which are let free from authentication in which anyone (Anonymous) can download them.

These things include:

- magazines
- books
- Research reports
- Some project Documentations.
- Tutorials.
- And many more.

Chapter 11

11 Conclusion

After completion of the project , now computer science has got a research lab in which students can easily manage their Homework, and do their researches on networking Device's IOS and practice their networking tasks, Teachers can manage their assignments for students and can schedule all tasks for students to use Lab.

With the help of OpenRNR website lab members can upload and download homework and assignments easily and securely.

Now Students can dynamically reserve times in specific date and month, new users can request for new user accounts and give their own desired password.

Scheduling method is another feature that helps to manage students assignments and uploading process, and this method can help Lab administrators to easily control users while using Lab.

OpenRNR lab projects have new concepts, which join new and creative thoughts together and produce cost-effective network applications for computer science to help students and teachers easily manage faculty network lab practices or manage sending/receiving assignments and projects details.

Still this lab needs further improvements and developments and needs new findings and innovations

OpenRNR will evolve dramatically in coming future with the help of students and support of best teachers, it will be accessed widely across Internet by CS students and will give advanced functionalities, it will have advanced interface and will work with low bandwidth across Wide networks and Internet.

There are lots of things to be done in coming future and this process will continue till far future.

11.1 *Things to be Done!*

Due to the limitation of time given for this project, some of the features are left behind that should be done in future OpenRNR projects.

- ✓ Advanced Time reservation having a GUI interface.
- ✓ Creating GUI scheduling server application for teachers to easily set server timetables.
- ✓ Changing Graphical Interface of GNS3 to Command line for better performance on Internet.
- ✓ Designing and integrating physical Routers and switches with Lab servers.
- ✓ Defining access method of Lab servers via Internet by lots of users.
- ✓ Changing the static Website to Dynamic one which should automatically synchronize its information and content whenever a change occurs on Lab servers, or be more up to date.
- ✓ Website should report users reservation timing that they have defined for themselves

Appendix A

A.1.0 Reservation Script:

Script file named (reservation) that can be accessed by users is an executable file and is considered to be a separate command of Linux , this file is added in the locations where \$PATH has determined .

This method is like an question and answer method which ask the user and user answer to it questions, which helps user to feel more comfortable to reserve.

Arguments of Script:

- \$1 = day of the week
- \$2 = starting hour
- \$3 = starting min
- \$4 = Finishing hour
- \$5 = Finishing minutes
- \$6 = day of the month
- \$7 = month of the year

[9]

A.1.1 Script Functionalities:

Basically this script reserves time for the user, but how it does all the reservation is another question which are listed below.

Variables and Files:

- Uses some local variables and some files inside the system.
- Stores information about the user who has recently reserved times.
- Stores information about the timing reserved by user.
- Uses 24-hour clock timing, AM or PM is not recognized by the script
- If an incorrect timing is entered will be given an error message.
- Stores information about the starting timing and ending timings of the user.

Conditional Statements to test:

- Twice reservation of the user and discard it.
- Timings restrictions and timing overlaps.
- The parameters are written by users.
- Any other errors

A.2.0 CollectResInfo Script:

CollectResInfo mean (Collect Reservation Information).

This is a Script file for the Administrators of the Server, This script automatically collects User entered reservations.

A.2.1 Scripts functionalities:

Programming this script is very easy for a programmer but a little risky for the server, this script file is programmed to Collect all time reservation information of the users that wants to connect to the server at a specific timing, and then gives them all to the Administrator and administrator will decide when to allow which user.

Script Tasks:

- Runs when all users have finished their time reservations.
- Gives information about the each user's reservation for administrator.
- Uses loops and stores information to special files.

```

hasibullah@hasibullah-laptop: /usr/local/bin$ reservation
Befor reservation See the calender to help you reserve time
.....
      August 2011
Su Mo Tu We Th Fr Sa
   1  2  3  4  5  6
   7  8  9 10 11 12 13
  14 15 16 17 18 19 20
  21 22 23 24 25 26 27
  28 29 30 31
.....

Fri Aug 12 10:45:36 AFT 2011
Please fill all the servervation details bellow which are asked.
Starting Hour: 21
Finishing Hour: 23
Day of the Week: fri
Day of the Month: 26
Month of the Year: 8
following time entered by hasibullah
time from : fri (21:00 -- 23:00)
date = 26/8/2011
hasibullah@hasibullah-laptop: /usr/local/bin$

```

A.3.0 (AllowAll) script:

This script is designed to allow all users at a specific time.

A.3.1 Why (AllowAll) script?

Designing this kind of script is important in cases where no time restrictions are needed for

users.

But currently this script is programmed to run at the moment where all users are going to reserve times, if users aren't allowed to SSH server then how users would login to servers and how would they reserve times for themselves, now if this script allows everyone then each of the users login at RT (Reservation Time) and easily reserve future times for themselves.

A.3.2 Script Functionalities:

This script:

- Searches all users in the system.
- Adds the users to be allowed to do SSH.

A.4.0 (DenyAll) Script:

This script is programmed to Deny all the users to logon to the servers and allows only the administrator to login.

This script runs when RT (Reservation Time) is over and denies every user from accessing the server; This is a good idea for the non on-time users to be on-time for reservation.

After (DenyAll)script has finished its work, the server will allow users at their specific timings on the day.

A.4.1 Script Functionalities:

This Script:

- Searches all users in the system.
- Removes the users from SSH login allowance.

Appendix B

B.1.0 Programming Dynamic user creation method:

Whenever new users want to join the server they need one temporarily user account which will be allowed to SSH the server, with the help of this user account the new user will request for another new user-account with a new password.

so now we need three things.

- Temporarily user account.
- (CollectUser-account) Script.
- (CreateNewUser) Script.

B.2.0 Programming CreateNewUser Script:

This script is designed for new users, that doesn't need so much to know about Linux OS, they just have to enter the command (*CreateNewUser*) and then the script will automatically ask the users new user account and its new password, and done.

This script will store all the new user accounts and then will create them at a specific time or it can be created on time.

Script's functions:[10]

- Allows new users to create new User accounts
- Interacts with the user very friendly.
- Gets the Usernames and passwords.
- Doesn't allow users to create more than one user account.
- Creates the requested user accounts with the user defined passwords.

Appendix C

C.1.0 FTP Package selection:

There were different ftp packages for Linux distribution listed below.

Packages:

- PROFTPD
- FTPD
- WU-FTPD
- VSFTPD

The best of all packages that was found was VSFTPD which is very secure FTP server. VSFTPD mean (Very Secure File Transfer Protocol Daemon).

C.2.0 Server side Language Selection:

In server-side language the following software has been installed:

- PHP5

PHP5 is used for uploading user data files on the FTP server.

This php5 language uses ftp functions to upload and list users data in their home directory.

Figures

Illustration 4.1: GNS3 Logo.....	12
Illustration 4.2: SSH Logging.....	12
Illustration 4.3: OpenRNR Network Infrastructure.....	13
Illustration 7.1: Time reservation Arguments.....	18
Illustration 8.1: Dynamic User Creation.....	19
Illustration 9.1: OpenRNR website.....	22
Illustration 10.1: FTP upload Page.....	24

Bibliography

- 1: GNS3 company, GNS main page, , www.gns3.net
- 2: wikipedia, IOS defination, September 2009, http://en.wikipedia.org/wiki/Cisco_IOS
- 3: w3c group, CSS, 18 August 2011, <http://www.w3.org/TR/2011/WD-css3-speech-20110818/>
- 4: php group, What is PHP?, Fri, 19 Aug 2011, <http://www.php.net/manual/en/intro-what-is.php>
- 5: , Preamble, Version 3, 29 June 2007, <http://www.gnu.org/licenses/gpl.html>
- 5: Jonas John, FTP file upload example, 6/13/2066, <http://www.jonasjohn.de/snippets/php/ftp-example.html>
- 6: , File upload via curly, 2011, <http://www.web-development-blog.com/archives/tutorial-ftp-upload-via-curl/>
- 8: , Get HTML Color Codes by color picker, 2011, <http://www.htmlcolorcodes.com>
- 9: , Scripting Rules, February 18, 2005 1:24:10 AM, <http://www.cs.iastate.edu/~cs104/notes/scripts.html>
- 10: VIVEk GITE, How to wirte Linux scripts, 2007, <http://www.cyberciti.biz>