UNIVERSITY OF
BRADFORD
MAKING KNOWLEDGE WORK™

Final Year Project (CS)

Namal Remote Server Monitoring System

Portfolio

Submitted by: Khizar Farooq

UOB: 15026422

Supervisor: Dr. Adnan Iqbal

Co-Supervisor: Dr. Noman

NAMAL COLLEGE
MIANWALI

Abstract

According to the first principle of project management, planning plays a very important role to complete the project successfully. The project can execute rapidly and easily if it is well planned. Otherwise, we are not sure our project will complete in the future or not. So, I had planned this project first and defined steps before start designing and implementation. Given below is the phase that I had planned before starting the project and how I followed to successfully complete this project.

Acknowledgment

Before saying anything, I would like to thank Almighty Allah to give me strength and patience throughout this project, it's because of Allah that I have kept myself motivated to complete this project and don't loose hope. I had faced many difficulties until it's completion but he helped me at every moment.

I also would like to avail this opportunity to thank Dr. Adnan Iqbal, my FYP supervisor who has supported me at every moment to complete this project. Without his motivational talk and support, this project would never have achieved its target.

Big thanks to my family who had been continuously praying for me which helps me to successfully complete this project.

Table of contents

Introduction

This document will describe all phase of how the project has been developed from start to end. It explains many phases. For instance, learning phases, meeting minutes, design phase, development phase, and testing phase.

Project Plan

Project proposal and Presentation

After deciding project, I had sent the project proposal to my FYP Supervisor and coordinator. Then, I had successfully defended it after a lot of discussion on it with supervisor and coordinator.

Project Brief Document

After defending the proposal, I had started working on the project brief document before starting the designing phase of the project. In this document, I had defined a few things and steps that were very important to define before start this project. Given below box is the project brief document.

Project Brief Document
Remote Server Monitoring System

Project Synopsis

In most national and international organizations there are great datacenters, with many different server types, hosting countless apps. Monitoring the functionality of each and every server is always a major issue. The purpose of this project to develop a smart cloud-based server monitoring system for a big organization to monitor remotely the behavior of these type of serves (Web, DNS, Proxy) and their services through active monitoring technique according to network engineers' configuration(Mathapati and Aswatha, 2013). Moreover, this system should be able to instantly alert the network engineer's before user complains in case of hardware or service failure.

Business Case/Project Benefits

Many organizations have not this type of tool to monitor the behavior of the server and their services automatically. Some of them have this type of systems but they are very limited in functionality. That's why there is a need to develop an efficient system which solves this problem.

Objective

Given below are some key objectives of this system.

- Monitor the behavior of these multiple servers (Web, DNS, Proxy) and their services at the time.
- Allow admin user to view the current status and edit configuration of all monitoring of servers through delivering a user-friendly interface.

- Allow local user to view the current status and edit configuration of that monitoring servers who he/she has access from the admin.
- Allow admin to add new users and configure their information.
- Allow admin or local user to view alert of monitoring servers in case of issue happened on a graphical interface.
- Allow admin or local user to receive alerts on their email address.

End Result

The end result of this project will be a full-fledged system having all functionalities which are mentioned above.

Constraints

Just like another project, this project is also linked with the money, time and further resources.

Time

Time of completion of this project should be the mid of May 2019 including all the feature that is mentioned above. But, as I have said earlier, it is depending on the availability of time.

Cost

It does not seem to be a constraint that can stop the completion of this project. But, one thing can be costly that is the deployment of this system on cloud to access from anywhere.

Resources:

Actually, this is an individual project. Manpower is also the resource to complete this project and it should not be a constraint in completion.

Documentation:

Documentation has also a major role in the development of software engineering product. So, this project is also completed with feedback and reporting technique. There is a timetable of a weekly meeting with the supervisor and monthly meeting with co-supervisor. This project will be well documented in form of a proposal, project brief document and a report which cover all the aspect of the project including the prototyping, different components of the system, user manual and system testing.

Project Supervisor:

Dr. Adnan Iqbal (Supervisor)
Dr. Noman Javed (Co- Supervisor)

Technologies' Selection:

I had many options to choose different technologies, but after the detailed discussion with my supervisor, I had selected a few technologies which are given below in the table.

Technologies	Description
Java	The programming language that I have used for the backend development of this project due to its huge support
PHP	Scripting and programming language used for web development
Bootstrap	Used for the front end of web app
JavaScript	Used in the project where it's fulfilled needs
MySQL	Backend database

Learning Stage

After taking the decision to work on the above-mentioned technologies, I had started to learn these technologies to initiate the development part of the project. Moreover, I had also learned a lot of other things during the learning phase. In the beginning, I had started to learn java. After felt comfortable in Java, I moved to learn PHP. Then, I had started to learn bootstrap and JavaScript. In the end, I had learned MySQL.

Designing

In this phase, I had worked on the design of this software. I had designed a digital prototype of this system using very efficient tool names balsamic. Because the digital prototype is too much easier to just think in mind and make it. It has been explained in the description in the report document. So, here I will just attach one snapshot of this prototype.

I had completed the designing phase after creating a finalized version of the prototype with the help of continuous feedback from my supervisor. Given below snapshot in "Figure 1" was designed for the user dashboard. It is the most important part of the system which facilitates the user to view the current status of the monitoring server. It is also that screen which appears in front of the user after successfully logged into the system. It also displays a side navigation bar which has different features that move to the user on different screen after clicking. And, they have been elaborated in the latter part.
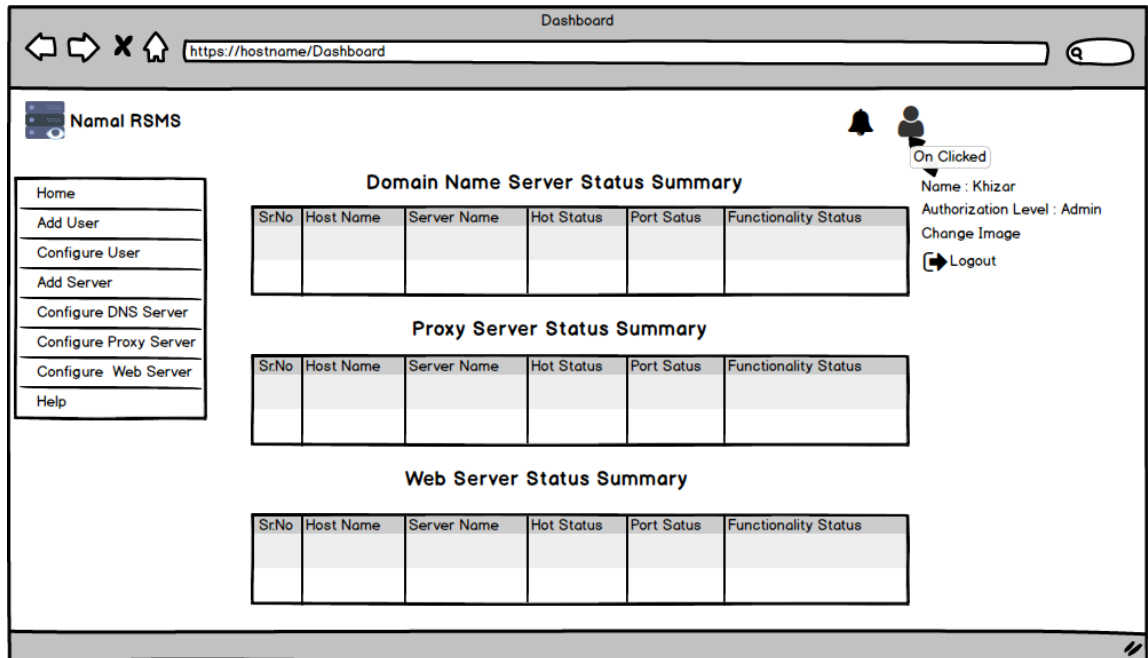
Figure 1: Digital Prototype of Dashboard

Development Phase

In this phase, I had completely developed this system which I had decided earlier. Given below snapshot in "Figure 2" is the architecture of this system which shows us an overview of this system how it works.
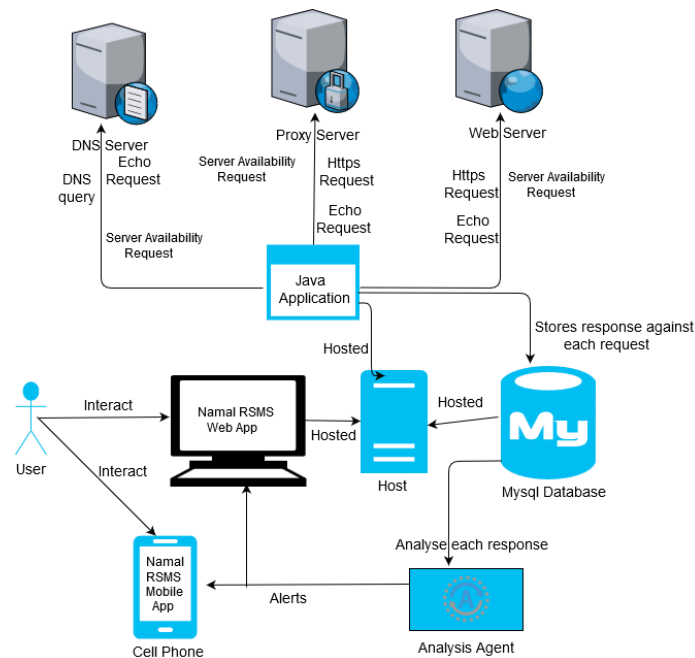

Figure 2: System Architecture Design

Mid-semester Presentation

I had presented the user interface of this system in front of supervisor and co-supervisor in the mid-semester presentation. To develop the user interface of this system, I had used Html and bootstrap. During this presentation, teachers had suggested to be relevant to design and I had modified it after the presentation. Given below snapshot in "Figure 3" show the front page of this system during the presentation.
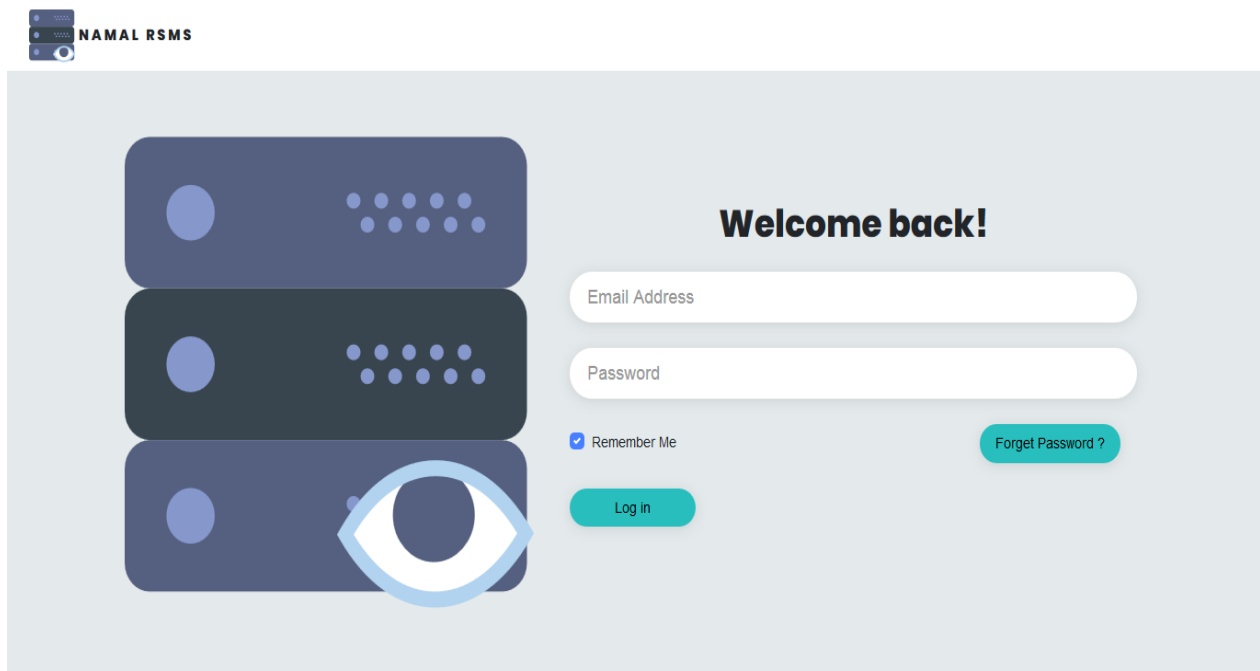

Figure 3: Front Page of system

Development After Mid-Semester Presentation

The designing phase of this system had been completed in the first semester. So, most of the implementation phase done during the second semester.
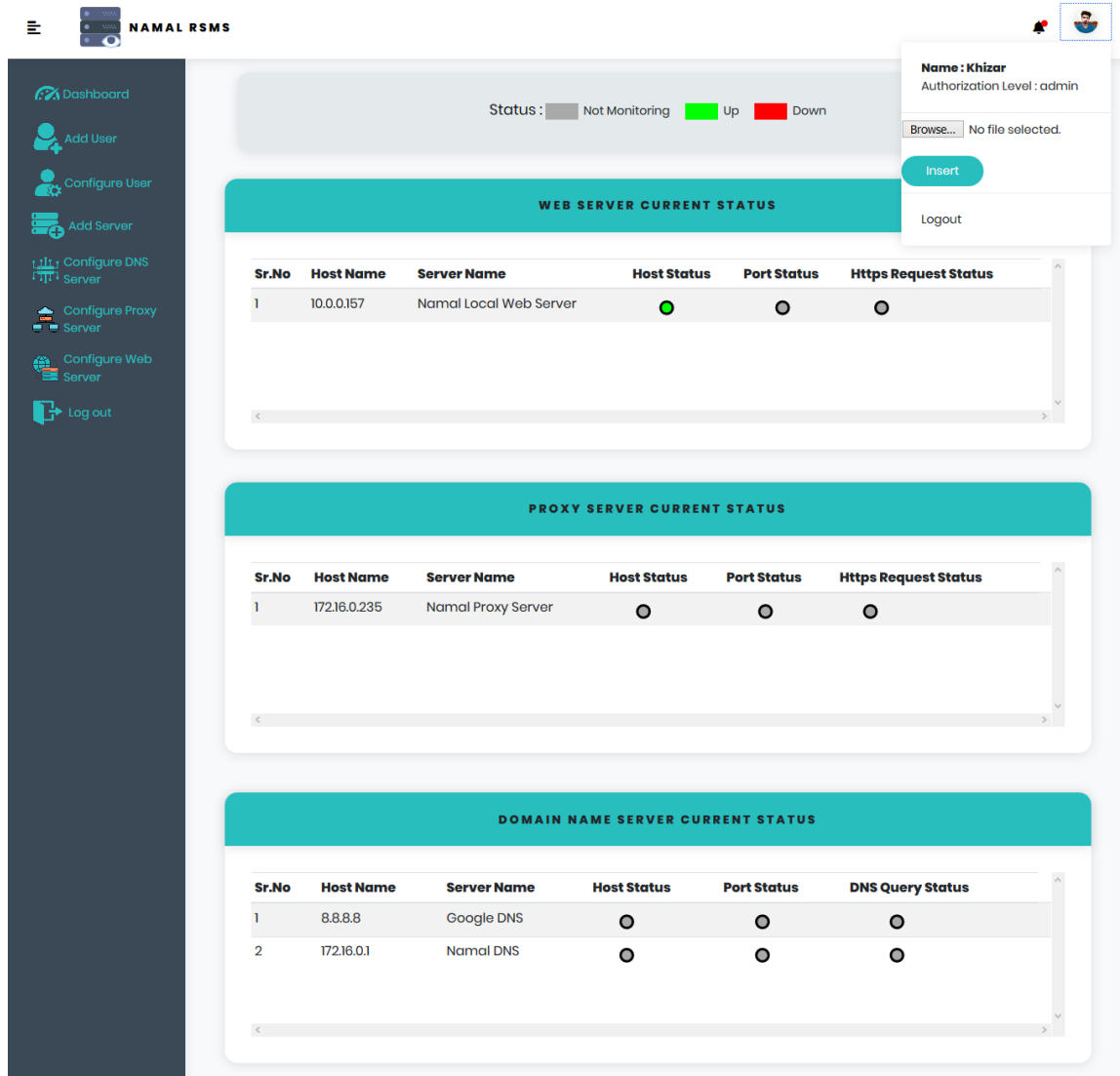
Figure 4: Admin Level User System Feature

The above snapshot in "Figure 4" is the admin level feature of this system. All system features had been developed using sublime, IntelliJ during the second phase of development. During the second semester, I had implemented all the front-end and backend of this system. In backend implementation, I had created artificial traffic accordingly to active monitoring technique to monitor servers and their services status and imbedded rest API in my system to inject generated artificial traffic in server and to received responses against it(Andreozzi, Ciuffoletti and Ghiselli, 2019)(Cottrell, 2001).

Open House

I was ready to demonstrate the project on the open house after completely developed this system. Many well-known software houses came to the open house to demonstrate the project. The response of the audience was very splendid and incredible. Most of them liked the

background motivation of this project. Overall, this event was very successful event. Given below poster in "Figure 5" that I had used in this event to explain project.
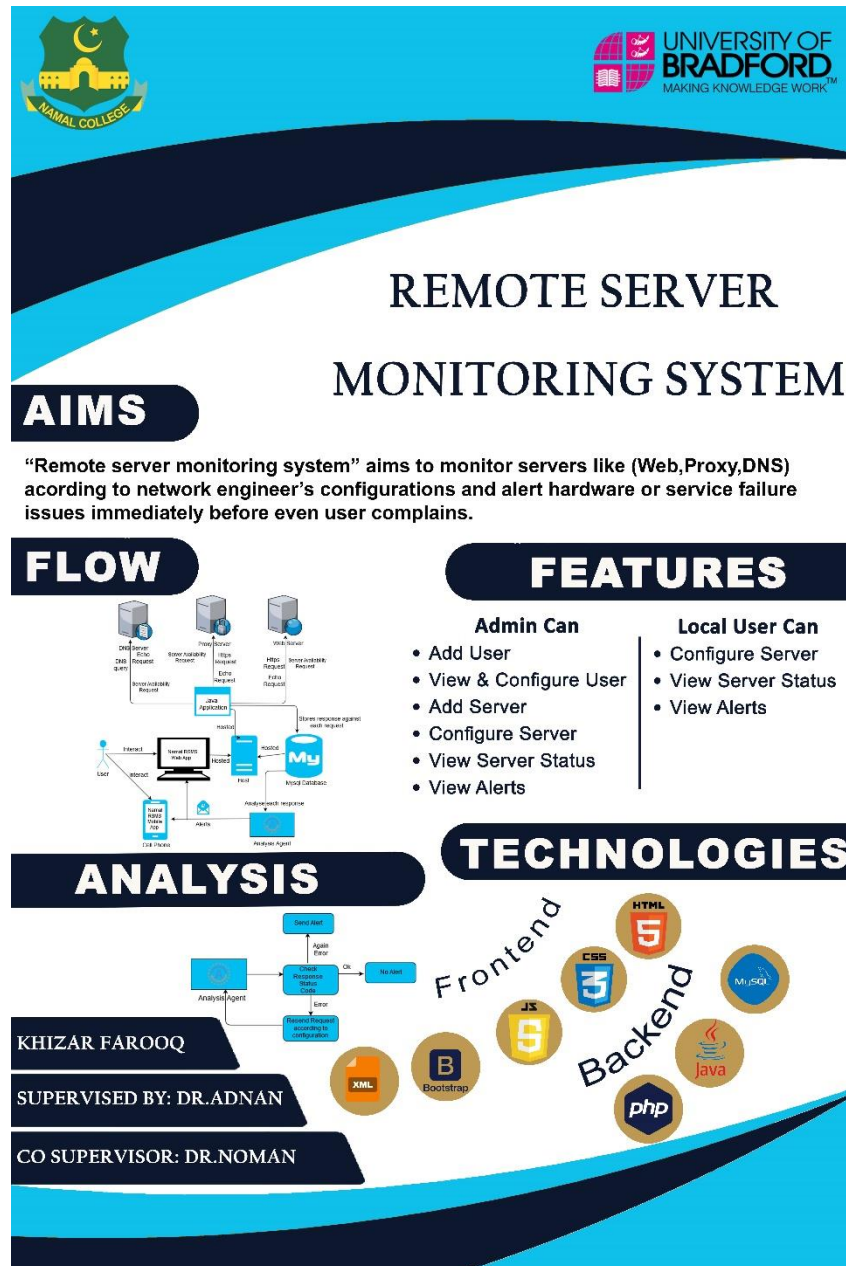
Figure 5: Poster design of the project

Testing and Documentation

After successful demonstrate project on the open house, I had started finalization of the project by testing and documenting. For testing, I had requested to NAMAL ITSC department to test the functionality of this system. They were very impressed after testing the functionality of this system and also appreciate me to develop this system for them. I had also tested the feature of application with the help of unit testing.

Meeting with Supervisor

During the development of this project, I had done a lot of meetings with my supervisor to discuss the progress of the project. We also had discussed how we successfully develop this product before the deadline. Given below are some of the meetings that I had with my Supervisor's.

Meeting 1

Time: 9:00 AM - 9:30 AM

Date: Oct 5, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Brief discussion relevant to the project proposal.
Conclusion	Meeting finished with the acceptance of the proposal of the project with little bit other changes suggestion.
Next Mission	Defend project proposal

Meeting 2

Time: 9:00 AM - 9:30 AM

Date: Oct 14, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq, Dr. Noman, and Dr. Adnan Iqbal

Action Name	Description
Agenda	Defend the project proposal in front of the faculty.
Conclusion	Meeting finished with a couple of teacher's suggestions on how we can define project scope in an effective way.
Next Mission	System design phase

Meeting 3

Time: 9:00 AM – 9:30 AM

Date: Oct 24, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Brief discussion relevant to the system design phase.
Conclusion	In this meeting, we have finalized the architecture design of this project.
Next Mission	Prototype design

Meeting 4

Time: 9:00 AM - 9:30 AM

Date: Nov 15, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discussion on the progress of prototype design.
Conclusion	In this meeting, we have finalized prototype design and decided to develop a system user interface accordingly.
Next Mission	Decision of technologies

Meeting 5

Time: 9:00 AM - 9:30 AM

Date: Nov 20, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Selection of Technologies
Conclusion	Meeting came to end with selecting the technologies HTML, Bootstrap, JavaScript, PHP, Java, MySQL for web portal and Android for the mobile application of this system.
Next Mission	Start learning phase

Meeting 6

Time: 9:00 AM - 9:30 AM

Date: Dec 15, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discuss the progress update on learning technologies.
Conclusion	In this meeting, we discuss how much I have learned above-mentioned technologies. After discussion, we came to the end to start the development phase.
Next Mission	Start development of system user interface.

Meeting 7

Time: 9:00 AM - 9:30 AM

Date: Dec 30, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	The agenda of this meeting was to show the running prototype of the system.
Conclusion	In this meeting, we came up to a conclusion to increase the speed of front-end development phase and decided to start report writing. Because we can prepare our self to represent the project in the mid-semester presentation.
Next Mission	Present work in Mid-Semester presentation.

Meeting 8

Time: 9:00 AM - 9:30 AM

Date: Jan 16, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Present project in mid-semester presentation.
Conclusion	In this presentation, we discussed the progress so far relevant to user interface design and concluded with a few changes that we can do to make it more user-friendly.
Next Mission	Next step was to start backend development.

Meeting 9
Time: 9:00 AM - 9:30 AM

Date: Jan 25, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discuss progress on backend development and how to generate artificial traffic and inject into servers.
Conclusion	In this meeting, we discussed the progress so far and decided how we can generate a request in the form of packets artificially to monitor servers and their services.
Next Mission	Next step to generate artificial traffic.

Meeting 10
Time: 9:00 AM - 9:30 AM

Date: Feb 10, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discuss updated progress on backend development phase and what methodology we should use to analyses responses of generated requests.
Conclusion	In this meeting, we discussed the progress so far relevant to artificial traffic and we should create an analysis agent to analyze responses.
Next Mission	Next step to develop analysis agent.

Meeting 11

Time: 9:00 AM - 9:30 AM

Date: Feb 20, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discuss update progress relevant to the analysis agent and how to alert the user in case of server and the failure of their services.
Conclusion	In this meeting, we discussed analysis agent progress in detail and we had decided to use Gmail API to generate and send an email alert to the user.
Next Mission	Next step to embed Gmail API in the system.

Meeting 12

Time: 9:00 AM - 9:30 AM

Date: Feb 30, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discussion about the progress on the generation of alert and how to connect front-end with back-end.
Conclusion	We discussed the progress so far and decided that REST API should be used to establish connection b/w front-end and back-end.
Next Mission	Embed REST API in the system.

Meeting 13

Time: 9:00 AM - 9:30 AM

Date: Mar 12, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discussion about the progress to embed REST API and how to visualize the status of the server to the user.
Conclusion	In this meeting, we discussed the progress so far and decided we should show the status of servers and their services in the form of unique color.
Next Mission	Start work on server status visualization.

Meeting 14

Time: 9:00 AM - 9:30 AM

Date: Mar 20, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Discussion on the progress of server status visualization and development of this system hybrid android application.
Conclusion	In this meeting, we discussed the progress so far and we have decided to develop this system hybrid android application.
Next Mission	Development of this system android portal

Meeting 15

Time: 9:00 AM - 9:30 AM

Date: Apr 10, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Connect hybrid application with the server where web portal of this system host.
Conclusion	In this meeting, we decided how to connect the android application with the server.
Next Mission	Establish connection b/w android application and server.

Meeting 16

Time: 9:00 AM - 9:30 AM

Date: Apr 15, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	The agenda of this meeting was to show update progress of the mobile application and take suggestion on any modification required.
Conclusion	In this meeting, we discussed the current status of this project and discussed how to finalize the web app and Android app of this system to be displayed on Open House.
Next Mission	Start preparation to present a project at an open house.

Meeting 17

Time: 9:00 AM - 9:30 AM

Date: Apr 20, 2018

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	The agenda of this meeting was to show update progress of the mobile application and take suggestion on any modification required.
Conclusion	In this meeting, we discussed the current status of this project and discussed how to finalize the web app and Android app of this system to be displayed on Open House.
Next Mission	Start preparation to present a project at an open house.

Meeting 18

Time: 9:00 AM - 9:30 AM

Date: Apr 30, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	The agenda of this meeting was to discuss reviews of people in the open house and future work.
Conclusion	In this meeting, we discussed reviews of this system got in Open House and also decide to start testing and documentation phase in parallel.
Next Mission	Start testing and resume documentation phase

Meeting 19

Time: 9:00 AM - 9:30 AM

Date: Apr 10, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	The agenda of this meeting was to discuss the progress of testing and documentation.
Conclusion	In this meeting, we had discussed the results after testing of this system.
Next Mission	Make project ready for final submission.

Meeting 20

Time: 9:00 AM - 9:30 AM

Date: Apr 12, 2019

Venue: Faculty Lounge

Attendees: Khizar Farooq and Dr. Adnan Iqbal

Action Name	Description
Agenda	Last detailed discussion on the overall project
Conclusion	In this meeting, we had discussed overall achievement during the development of this project and decided to prepare the project for final submission.
Next Mission	Final submission of the project.

Personal Development

Personal development is a long-lasting process which provides a way for persons to find out their skills, qualities and also set a target and aims in life in order to put their potential for them.

I have felt a lot of improvement in myself after complete my undergrad from this university. I know, when I came into this university, I was very less confident who want to stay alone and hide. But university life totally changes me. Final year put a very important role in myself-grooming not only relevant to develop the project in a good way but also upgrade my professional perspective. Currently, technical skills are very important for any domain's person. So, I have polished my already learned skills including soft skill and learned an advanced skill that has a great market demand and value. I have also improved my project planning with the help of the development cycle. It also helped me to secure a better position in the industrial market through learning new industrial development technique.

I had faced many ups and down during university life. But, I'm not that guy now who was very shy before came to university. Now, I have improved a lot my presentation, communication, technical and soft skills. Moreover, my management skills have enhanced during volunteer work in different societies and the development of this project. Briefly, I would like to thank Namal which provide me that platform which helped me to shape myself for a better future.

Given below is my updated resume that I have progressively improved during my bachelor degree program.

Khizar Farooq
Software Developer

A SELF-MOTIVATED, PROBLEM SOLVER HAVING EXPERTISE IN NETWORK ADMINISTRATION, ANDROID AND WEB DEVELOPMENT. I WANT TO BE A PART OF ORGANIZATION WHERE MY KNOWLEDGE AND SKILLS CAN BE UTILIZED EFFECTIVELY,PROVIDING ME GROWTH OPPORTUNITY TO LEARN NEW SKILLS.

- ✉ khizardogar6@gmail.com
- 📍 House#88,Street#11,Kot Nihal Singh, Okara, Pakistan
- github.com/khizarFarooq
- 📱 3065969263
- f facebook.com/khizar.dogar.77

PROFESSIONAL EDUCATION

BS HONS Computer Science
Institution/Place of Education

09/2015 – 05/2019

Courses

- AI for Games
- Large Scale Data Driven Application
- Discrete Mathematics
- Computer Architecture and System Software
- Database System and Fundamentals of Internet Technology
- Software Verification
- Mobile Application Development
- Data Structure and Algorithim
- Computer Communication and Networks
- Software Engineering(with group project) and Development

WORK EXPERIENCE

Marketing Member
Namal Education Foundation, Lahore

07/2017 – 08/2017

Achievements/Tasks

- Provide awareness among the people about Namal College Mianwali and organize different fundraising activities for it.

IT Assistant (Work Study)
Namal Information Technology Support Center (ITSC)

02/2018 – 05/2018

Achievements/Tasks

- Deployed Window Server(Active Directory, DNS)

Contact: Maqsood – Maqsood.Haider@namal.edu.pk

SKILLS

`Java` `C++` `OOP` `PHP` `JavaScript` `HTML` `CSS` `Bootstrap` `PostgreSql` `Mysql` `Matlab` `Android Studio` `Intellij` `Linux` `Teaching` `Python`

PERSONAL PROJECTS

Remote Server Monitoring System (09/2018 – Present)
- A system which will monitor these servers(Web, DNS, Proxy) in real time and alert to network/system engineer to take corrective action against hardware or service failure issue immediately.

Snails Game AI
- Implemented Snails AI game using minmax algorithm.

Captcha Solver (2017)
- It is an independent software which is complete in its functionality. It is mainly made for those who want to check the capability of their captchas or build interesting software's taking this captcha solver as the base.

Book Bank (2018)
- Android application which help peoples to find out their interested books easily through post and view requests.

Personal Academic Tutor
- A management system to assign a personal academic adviser to each student of Namal College, Mianwali.

CERTIFICATES

Intro to Cyber Security (05/2018 – 06/2018)

Networking Essentials (06/2018 – 07/2018)

REFERENCES

Dr. Adnan Iqbal | Associate Profesor |Dept.of CS | adnan.iqbal@namal.edu.pk

References

Andreozzi, S., Ciuffoletti, A. and Ghiselli, A. (2019) 'ON THE INTEGRATION OF PASSIVE AND ACTIVE NETWORK MONITORING IN GRID SYSTEMS'.

Cottrell, L. (2001) 'Passive and Active Monitoring on a High-performance g p Network', (February), pp. 1–35.

Mathapati, V. and Aswatha, A. R. (2013) 'Performance Analysis of System Resources By Server Monitoring', *International Journal of Innovative Research in Science, Engineering and Technology*, 2(7), pp. 3153–3157. Available at: www.ijirset.com.