

Government Degree College:: Khairatabad

**A.Y. 2018-19
TO
2022-2023**



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Department of Computer Science & Applications

Student Study Projects

SN O	A.Y.	TITLE OF THE PROJECT	Name of the students studied course on experiential learning through Project Work	Name of The Project Guide
1	2022-23	Data Analysis Of Supermarket Sales	K. Meenakshi Sowmya, P. Sanjay,P. BheemRaj,R. Vinod Gou,K. Harini	B. Rajitha Rani
		Social Media Marketing	M.Navya,N. Srikanth,,N. Rani,P.Chaithanya N.Ashok	Jagadeeshwar P
		The Effect Of The Word Of Mouth On Consumer Purchasing Decision	G.Chandra Shekar,G.Rajesh,M.FaizKhan, Ch.Latha, G.Jagadeeshwari.	G.Radhika
		Jignasa" Library Management System"	Mudassir Uddin,Sk.Altaf,Hattim Siddiqui,Sk.Faheem,Sahil Khan.	CH.Madhavi.
		BMI Calculator Using Python	V.Jahnavi,V.Abhinav,B.Uma Rani,A.Divya,A.Kousar	B.Lavanya
2	2021-22	Auto Capture Selfie By Detecting Smile App	P.Hari Prasad,P.Baby shalini,P.Naveen kumar,Y.Prashanth	Dr.S.Srinivasu
		"Jignasa Student study Project WORAL"	R.Nikhil, S.Swathi, M.Naveen Kumar, K.SaiTeja Reddy, G.Alekhyia	G.Radhika
		A Report on Movie Reviews Classification	K.Santhosh,V.Srujana,P.Ganesh,J.Vaibhavi,. B.Nagasai	CH.Madhavi
		Designing and Planning a Campus Wireless Local Area Network	V.Narsimha,P.Bhavana,P.Chaitanya,T.Sanja na ,S.Hemanth	Jagadeeshwar P
		National flag Design Using CSS	Md Mahaboob,Siva Kumar, Pooja, Bhoomika, Durga.	B.Lavanya
		A Comparison of Software Architectures for E-business Applications	D. Rahul,G Ravi,K Prasad, Kuruva Jyothi, Sony Kumari.	M.Ravi
		Generate QR Code in Python	S. Nisha, MD Hameedduin, J.Sowmya, T.Anusha ,B.Mahalaxmi	B. Rajitha Rani
3	2019-20	Location Identification Services Through Web Based Smart Phone Gadgets	K.Karan, R.Mahesh Kumar, K.SonaliBendre S.Neha, G.Durga Prasad Goud	G.Radhika
4	2018-19	Revenue Generation Through Digital Advertising	V.ShivaNath, K.DavidAppash, Yousuf, B.Gopal	G.Radhika

Government Degree College:: Khairatabad

A.Y. 2022-23



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

“BMI Calculator using Python”

By

114020614006 - V.Jashnavi

114020618001 - V.Abhinav

114020450001 - B.Umarani

114021450001 - A.Divya

114021450002 - A.Kousar

**Under the supervision of
B. Lavanya**

**Department of Computer Science &
Applications**

B. Lavanya



Table of Contents

1. Introduction
2. Understanding the body mass index
3. Understanding the working of BMI calculator
4. Creating BMI calculator using Python
5. Source code

Introduction

In this, we will understand how to create a Body Mass Index (BMI) Calculator with the help of the Python programming language. But we get started creating one; let us briefly discuss what Body Mass Index (BMI) is.

Understanding the Body Mass Index (BMI)

BMI, short for **Body Mass Index**, is a measure of relative weight based on the mass and height of an individual. We generally use the Body Mass Index in order to categorize people on the basis of their **height** and **weight**. These categories are **underweight**, **healthy**, **overweight**, and even **obesity**. Moreover, it is also adopted by various countries in order to promote healthy eating.

We can consider Body Mass Index (BMI) as a substitute for direct measurements of body fat. Besides, BMI is a low-cost and easy-to-perform method of screening for weight classes that may cause health-related problems.

Understanding the working of BMI Calculator

A BMI Calculator accepts the weight and height of an individual and calculates the Body Mass Index (BMI) of that person.

For Example, if the height and weight of a person are 155 cm and 57 kg. The BMI of that person will be 23.73 (approx.), which signifies that the person is healthy.

Body Mass Index (BMI) is a measure of body fat on the basis of height and weight, respectively.

On the basis of the BMI of an individual, the calculator returns a statement stating the overall health of the person.

The following table shows how the classification of BMI is done in order to identify the health status of a person.

S. No.	BMI	Weight Status
1	Below 18.5	Underweight
2	18.5 - 24.9	Normal
3	25.0 - 29.9	Overweight
4	30.0 and above	Obese

Now, let us begin coding the project.

Creating BMI Calculator using Python

As the first step, we will create a New Python program file and name it **BMI_Calculator.py**. Within this file, we will begin by creating a block of code to ask the user their height and weight. We can easily accomplish this using the **input()** function.

```
# asking for input from the users

the_height = float(input("Enter the height in cm: "))

the_weight = float(input("Enter the weight in kg: "))
```

asking **for** input from the users

1. the_height = **float**(input("Enter the height in cm: "))
2. the_weight = **float**(input("Enter the weight in kg: "))

Explanation:

In the above snippet of code, we have defined two variables as **the_height** and **the_weight** which uses the **input()** function to accept input from the user. We have also included the **float()** function outside the **input()** function in order to

convert the input string into the float data type so that we can perform calculations with it.

Next, we will calculate the Body Mass Index.

We will use the following formula in order to calculate BMI.

$$BMI = \frac{\text{weight (kg)}}{\{\text{height (m)}\}^2}$$

Let us implement the above formula in the Python program.

```
# defining a function for BMI  
the_BMI = the_weight / (the_height/100)**2
```

Explanation:

In the above snippet of code, we have printed a statement stating BMI of the person.

Now, we will print the statement stating the present health of the user based on their BMI. This block of code will be quite simplified for better understanding.

We will use the **if-elif-else** conditions for classification.

```
# using the if-elif-else conditions  
if the_BMI <= 18.5:  
    print("Oops! You are underweight.")  
elif the_BMI <= 24.9:  
    print("Awesome! You are healthy.")  
elif the_BMI <= 29.9:  
    the_print("Eee! You are overweight.")  
else:  
    print("Seesh! You are obese.")
```

Explanation:

In the above snippet of code, we have used the value of the variable **the_BMI** in the **if-elif-else** statement to check if the BMI of the person lies within one of the categories.

The program will print the statement on the following basis:

1. If BMI is less than or equal to **18.5** then the program returns the condition for **underweight**.
2. If BMI is less than or equal to **24.9** then the program returns the condition for **Healthy**.
3. If BMI is less than or equal to **29.9** then the program returns the condition for **overweight**.
4. If none of the above conditions are **True** then the program returns the condition for **obese**.

Hence, the program is completed.

Let us see the complete source code for the program and output for the same.

Source Code

```
# asking for input from the users

the_height = float(input("Enter the height in cm: "))
the_weight = float(input("Enter the weight in kg: "))

# defining a function for BMI

the_BMI = the_weight / (the_height/100)**2

# printing the BMI

print("Your Body Mass Index is", the_BMI)

# using the if-elif-else conditions

if the_BMI <= 18.5:

    print("Oops! You are underweight.")
```

```
elif the_BMI <= 24.9:  
    print("Awesome! You are healthy.")  
elif the_BMI <= 29.9:  
    the_print("Eee! You are over weight.")  
else:  
    print("Seesh! You are obese.")
```

OutPut:

```
Enter the height in cm: 146  
Enter the weight in kg: 45  
Your Body Mass Index is 21.110902608369305  
Awesome! You are healthy.
```

Thank You.....

Government Degree College:: Khairatabad

A.Y. 2022-23



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

**“The effect of word of mouth on consumer
purchasing decision”**

By

G.Chandra Shekar

C.Rajesh

M.Faiz Khan

CH.Latha

G.Jagadeeshwari

**Department of Computer Science &
Applications**



Radhika

Table of Contents

1. Synopsis
2. Introduction
3. Objectives of the Study
4. Hypothesis
5. Literature Review
6. Result & Discussion
7. Conclusion
8. References

SYNOPSIS

TITLE:

“The Effect of Word of Mouth on Consumer Purchasing Decision”

ABSTRACT

The purpose of this study is to define how word of mouth influence consumer's buying behavior. Word of mouth is becoming a strong tool for building brand in present time. The research used primary and secondary data for analysis. In primary data, 500 respondents' data were collected and Microsoft excel used for analysis. The findings recommend that word of mouth has impact on consumer buying behavior. The results suggest that word of mouth built by trust and loyalty. The findings are based on small sample size however; the framework may be used for future research. The significance of word of mouth, particularly consumer buying behavior, is increased rapidly. The paper will give marketers a better understanding of word of mouth as well as consumer perceptions.

Introduction

Consumer behavior is a young discipline; the earlier books were written in 1960's however, its intellectual forefathers are much older. Understanding of consumers is the consumption process provides a number of benefits. These benefits include assisting the manager in decision making and providing the marketing research with a theoretical base from which to analyse consumers in making better purchase decision. The study of consumer can help to understand more about psychological, sociological and economics factors that influence human behavior. A general knowledge of consumer behaviors also has personal value. It can help people to become better consumers by informing them of the way in which they and others go about their consumption activities. In addition it can assist consumers in the buying process by informing them about some of the strategies used by companies to market their products.

The field of consumer behavior explores why people make certain purchasing decisions, what products and services they buy, where they buy them, how they use them, the frequency with which they purchase them, and the consumer decision process in action. In this context, consumer behavior has been defined as the activities of people engaged in actual or potential use of market items-whether products, services, retail environment, or ideas.

One of the important means of dissemination for information is word of mouth. Word of mouth both negative and positive can have a profound impact on consumer behavior. If utilized correctly, it can go a long way to promote products or service and build a perception created through this method can persist for a long time and adversely effect to the marketing. Therefore the effect of word of mouth can be harsh as well as beneficial. Word-of-Mouth Marketing progress align advertising campaign messaging and product releases with local market influencers, Trendsetters, and Tastemakers to craft mass opinion and purchase behavior.

Effective word of mouth marketing campaign connects with Influencers and Trendsetters who initiate consumer trends (e.g. Fashion trend, automobile purchase trends, consumer product trends, entertainment trends, and beverage consumption trends) that are followed by mainstream consumers. Consumers value word-of-mouth twice as much as they value advertising. In a world in which we all are bombarded with advertising all day (and all night), what is the first thing we usually do to learn more about a business, a restaurant for example? We try to find someone we know who has been there, or someone who knows someone who's been there. It's true. Word of mouth does have more credibility than advertisers can even imagine, much less conjure up. And yet word of mouth suffers from the same virtue that makes it so strong. It is personal and therefore, limited in its reach.

This paper does not include all dimensions and factors of the consumer buying behavior but limited to the following key terms:

•Consumer Behavior:

According to Loudon and Bitta (1994); the decision process and psychosocial activity individuals engage in, when evaluating, acquiring, using or disposing off goods and services. With growing numbers of consumers suffering from ‘confusion by over-choice’ and distrusting product claims, cutting through advertising “clutter” with a credible message has never been more important.

•Word of Mouth:

It is not Street teaming, where people hand out freebies or flyers to you while you’re walking down the street. Word of mouth is not Shill marketing, where companies hire actors to create staged conversation with consumers, without telling consumers they’re staged (also known as “reaching marketing”). Word of mouth is not fake online marketing, where people send e-mails to individuals who don’t want them, or companies post fake opinions online in chat rooms, or review sites like Word of mouth is honest, real and powerful. Its something we all do everyday – it’s the way we communicate. It’s part of our social fabric. Word of mouth is shared opinion about a product or services between two or more people. Share your honest opinion, and you’re creating word of mouth.

Viral Marketing:

It is the most effective when promoting experiential, complex, premium, quirky and cool products. Given that most packaged goods products do not meet these criteria, marketers will benefit from devising campaigns that enhance consumers’ involvement in general product purchases and their emotional attachment.

Objectives of the Study

The more specific objectives are:

1. To study the influence of word of mouth marketing on the buying decision and individuals.
2. To gather firsthand knowledge about the influence of other's opinions, this at times can be more powerful than one's own
3. To study the relationship between influencer and the
4. To see whether consumers are likely to pay more attention to negative word of mouth rather than positive
5. To understand which situations are more likely to be influenced by word of mouth?

Hypothesis

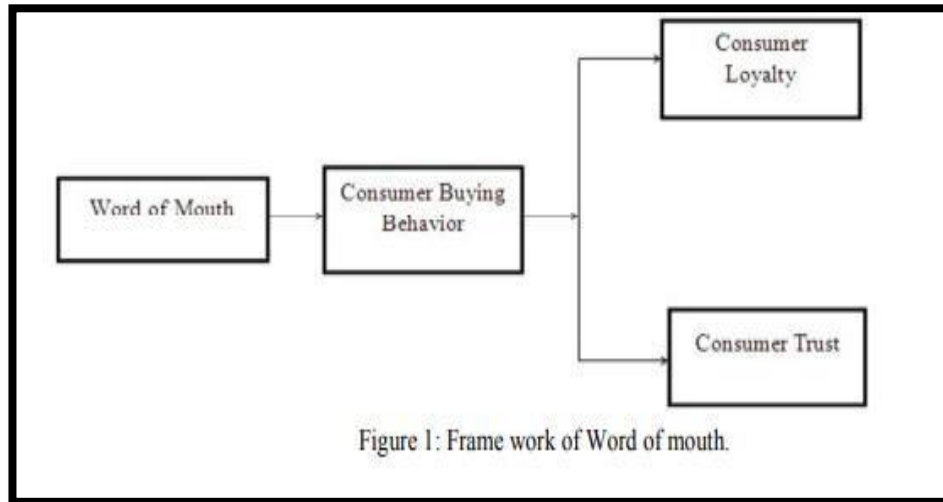
Based on the above objectives, the present study seeks to test the following hypothesis:

- H1: A previous bad experience of a particular product/service leads to negative word-of-mouth.
- H2: International word-of-mouth campaigns started by marketers can be beneficial for them.
- H3: Word-of-mouth regarding a particular product/service provided by a reliable source carries greater credibility.
- H4: People learn from others' experience and forward that information through word-of-mouth and
- H5: Viral marketing leads to word-of-mouth both online as well as offline.

Literature Review

2.1 Word of Mouth

Word of mouth has been considered one of the major influential sources of information for the consumers. Because consumers are willing to share and discuss about their products / services, brands with each other. The significance of word of mouth is revealed on a study based on effects of word of mouth on consumer purchasing decisions. Word of mouth is like an informal communications among the consumers regarding the character of a product or service. Word of mouth can be both positive and negative impact in consumer mind. Positive word of mouth occurs when consumers give favorable respond towards the product or service and when they unfavorable respond then it becomes negative word of mouth. Word of mouth has better influence that's way marketers give more emphasize on word of mouth than traditional marketing communication tools because traditional marketing communication tools trailing its efficiency. Word of mouth is one of the key components in buying decision.



2.2 Consumer Buying Behavior

Understanding consumers is the first step of marketing management (Kotler, 2008). Consumer buying behavior is depending on the approaches of an individual choose of buying, uses of goods and services for satisfying needs and wants (Solomon, 2006). Consumer behavior depends on how consumers make decisions for spending their resources for the consumption (Schiffman & Kanuk, 2012). Consumer buying behavior is a concept that try to find out the answers of 5W's i.e. what, when, why, who & where a consumer buys a product or service. Before purchasing a product or service what a consumer thinks, feels about the product or service is known as consumer buying behavior (Khaniwale, 2015). Consumer buying behavior has encouraging influence by word of mouth to satisfy consumer (Taghizadeh, Taghipouriand & Khazaei, 2012). Consumer buying behavior also depends on some internal and external factors.

Consumer Buying Behavior Factors	
Internal factors <ul style="list-style-type: none"> - Psychological - Beliefs - Attitudes - Income - Awareness - Individuality - Lifestyle 	External factors <ul style="list-style-type: none"> - Marketing mix - Demographic - Economic - Social - Cultural

Figure 2: The Model of Consumer Behavior, Keegan, Moriarty & Duncan, 1992.

H: 1. Word of mouth has positive impact on consumer buying behavior.

2.3 Consumer Loyalty

Consumer loyalty has become one of the most valuable intangible assets in an organization. Consumer loyalty means when a consumer hold a deep commitment with a product or service again and again in that way reasoning a tedious purchase of same brand (Oliver,1999). There is a connection between consumer loyalty and consumer satisfaction found by researchers (Hallowell, 1996). Although consumer loyalty is a long term process but once a brand gets consumer loyalty, consumer stands with brand in a long run, which is the indispensable motive of any brand. Consumer loyalty is an organization's advantage that increases repeat business with the same customers (Anderson& Jacobsen, 2000). By constructive experience, satisfaction and apparent value got by customer then the organization could have loyal customer for a long run. Satisfied customers become loyal customer easily if the organizations give proper value of the customers.

New approaches come concerning the dimension of brand loyalty, (Baldinger & Rubinson, 1996), where the researchers focused on attitudinal information on customer loyalty. Customer loyalty has linked with business performance (Reichheld, 2003) and it is a significant forecaster of long term productivity (Salegna & Goodwin, 2005). Researchers now put emphasis on the good relationship between consumer loyalty and business efficiency (Reichheld & Sasser, 1990). Consumer loyalty occurs when satisfactory result gets from the product or service and then the consumers stay with the brand in a long run.

H: 2 Consumer loyalties depend on consumer buying behavior through word of mouth.

2.4 Consumer Trust

For consumer buying behavior, trust is one of the essential elements which diminish risk and dissatisfaction from consumer mind (Kolsaker, Kelley, Ching, 2004). Consumer trusts is extremely important to build good relationship. Trust has been a significant factor for consumer to stay with the organization and getting trust is like having a place in consumer mind. Because of that many organization has a management team for managing the customer trust. Consumer trust plays a vital role beyond consumer satisfaction to keep the consumers in a long run (Morgan & Hunt 1994) not only that consumer trust is being to be a well-built method for consumer maintenance (Ranaweera & Prabhu, 2003).

H: 3. Consumer trust has positive impact on word of mouth.

3. Result and discussion

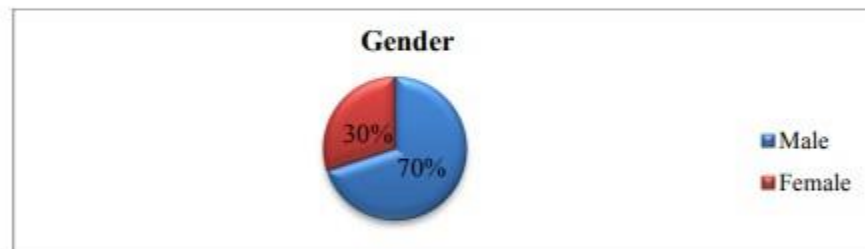
To collect data, the questionnaires were spread among 500 respondents. And the respondents were randomly selected. By the analysis of data, Microsoft Excel was used.

3.1 Results

The outcomes of the research are given below:

Table: 01 Results of Respondents Segment for the Gender (N= 500)

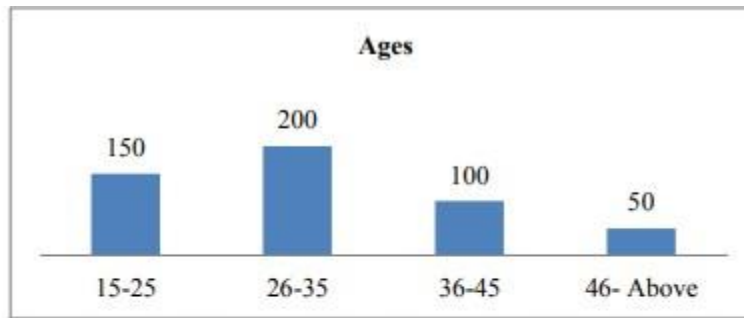
Gender	Respondents	Percentage	Position
Male	350	70 %	1
Female	150	30 %	2
Total	500	100%	



In respect to gender (total sample size were 500), the respondent distribution result is, Male respondents contained 70% and 30% contained by female. Both male and female were selected for different points of views about the topic.

Table: 02 Results of Respondents for the ages (N= 500)

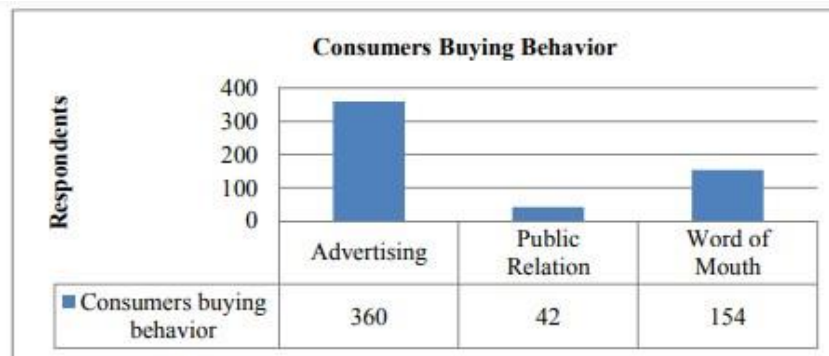
Age	Respondents	Percentage	Position
15 – 25	150	30 %	2
26 - 35	200	40 %	1
36 - 45	100	20%	3
46 - Above	50	10%	4
Total	500	100%	



In this total sample size, 40% of the respondents i.e. 200 were fitted in 26 to 35. About 30% of the respondents were fitted in 15 to 25. And other 20% and 10% fitted between 36 to 45 and 46 & above respectively. Numerous ages of respondents used for collecting data to get the different point of view.

Table: 03 Results of Respondents Segment for Consumers buying behavior (N=500)

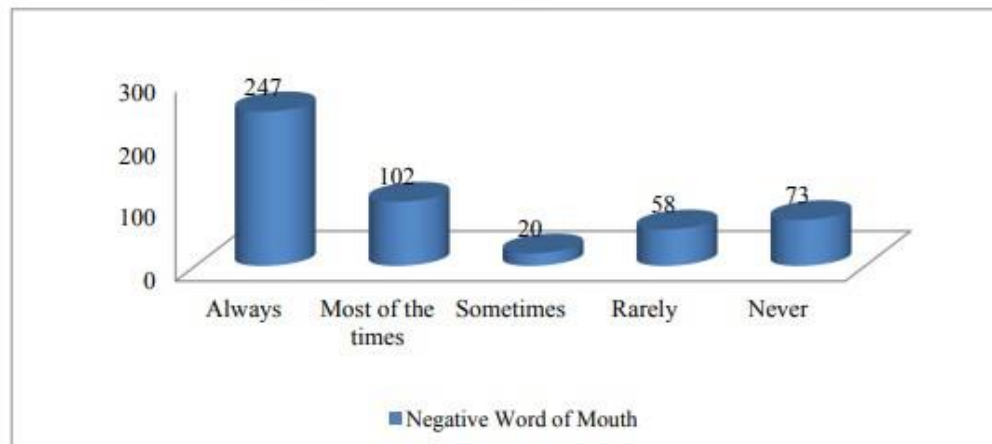
Responses	Respondents	Percentage	Position
Advertising	306	61 %	1
Public Relation	42	8%	3
Word of mouth	154	31%	2
Total	500	100%	



Which marketing tools affect most consumers buying decision when the question was asked to the respondents, 61% chosen advertng is the most effective tools for marketing after that word of mouth and public relation contained 31% and 8% separately. By getting 31%, word of mouth also an important tool for the organization associate to advertising.

Table: 04 Results of Respondents segment with respect to bad or dissatisfactory experience.

Responses	Respondents	Percentage	Position
Always	247	49 %	1
Most of the times	102	20%	2
Sometimes	20	4%	5
Rarely	58	12%	4
Never	73	15%	3
Total	500	100%	

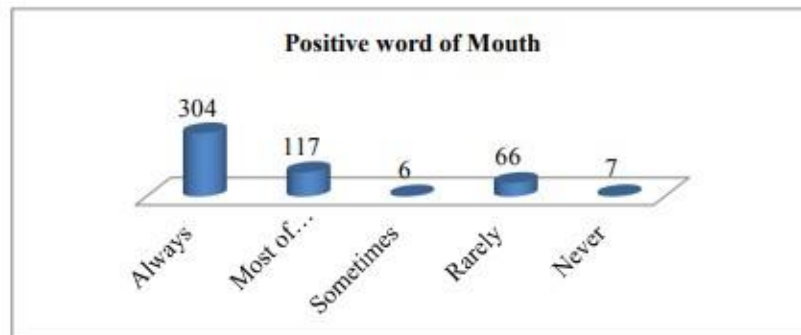


When respondents were asked, did they inform others when they had dissatisfactory experience about the product or service. Approximately 69% of the total respondents agreed, 4% stood sometimes. But other 27% disagree with the question they did not share the experience with others.

With refer to the analysis it could be assumed people share their bad and dissatisfactory experiences with their community as well as social network.

Table: 05 Results of Respondents segment with respect to good or satisfactory experience.

Responses	Respondents	Percentage	Position
Always	304	61 %	1
Most of the times	117	23%	2
Sometimes	6	1%	5
Rarely	66	13%	3
Never	7	1%	4
Total	500	100%	

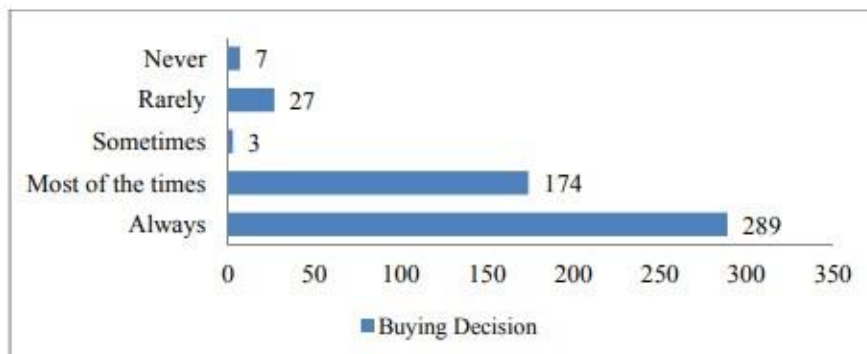


When the question asked, did they inform others when they had good or satisfactory experience. Around 84 % of the total respondents agreed. They shared their experiences to others, especially inside their network. Other 1% gave sometimes and rest of them around 14% disagreed with the question, they did not share the experience with others.

In the above analysis, it could be assumed people are used share their good and satisfactory experience with their community as well as social network.

Table: 06 Results of Respondents segment with respect to buying decision of a product or service.

Responses	Respondents	Percentage	Position
Always	289	58 %	1
Most of the times	174	35%	2
Sometimes	3	1%	5
Rarely	27	13%	3
Never	7	1%	4
Total	500	100%	

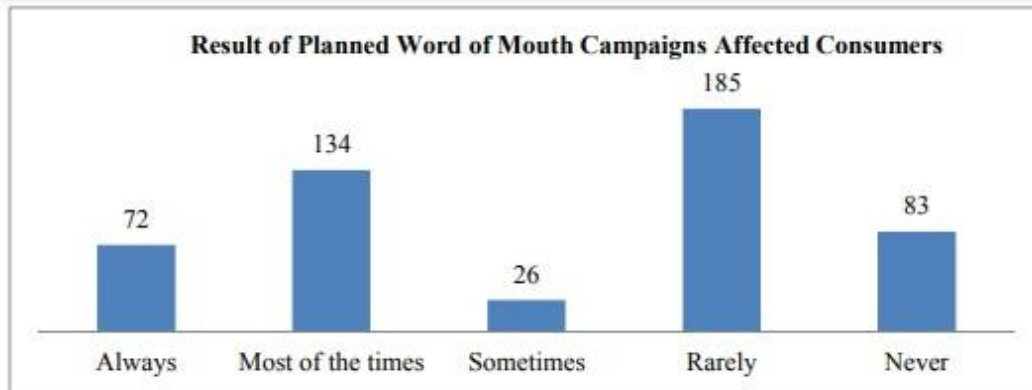


Respondents agreed, when they got referred from their friends and family members. Approximately 93% of total respondents agreed with the question, 1% stood at sometimes and 14% disagreed with the question.

In the analysis with, it is seen that consumers prefer friends and family member's reviews in their buying decision.

Table: 07 Results of Respondents segment with respect to marketers planned word of mouth campaigns affected consumers.

Responses	Respondents	Percentage	Position
Always	72	14 %	4
Most of the times	134	27%	2
Sometimes	26	5%	5
Rarely	185	37%	1
Never	83	17%	3
Total	500	100%	

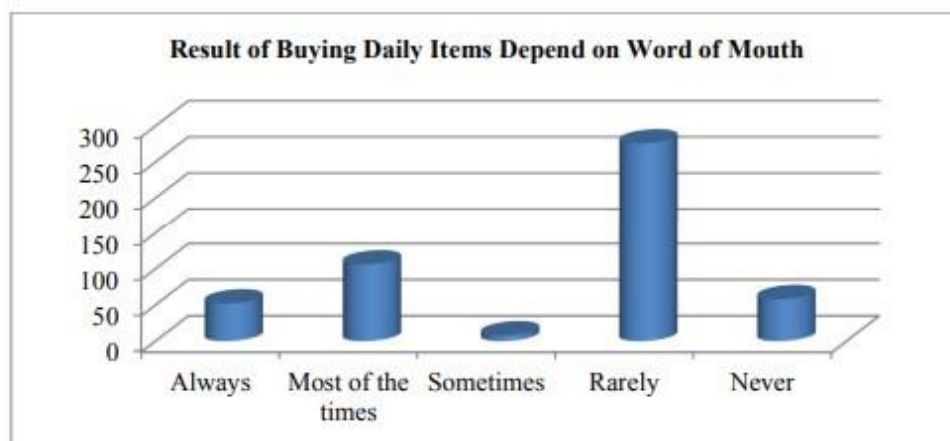


When respondents asked do marketers planned word of mouth campaigns affected consumers, around 54% of the total respondents disagreed, 5% stood sometimes and 41% agreed.

In the above analysis, marketers planned word of mouth campaigns mostly did not affected on consumers. But if the campaigns made awareness to the consumer then it could affect consumers.

Table: 08 Results of Respondents segment with respect to buying daily items depend on word of mouth.

Responses	Respondents	Percentage	Position
Always	52	10%	4
Most of the times	106	21%	2
Sometimes	8	2%	5
Rarely	276	55%	1
Never	58	12%	3
Total	500	100%	

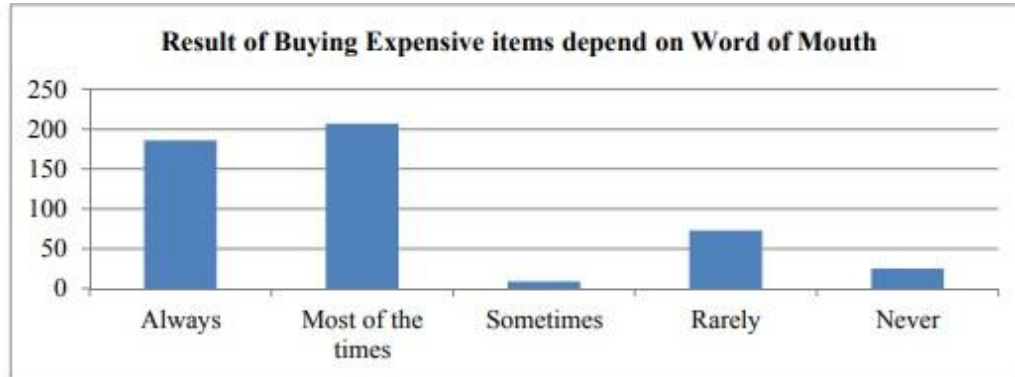


Respondents remarkably disagreed when they asked “Did buying daily items depend on word of mouth?” Approximately 67% of the total sample disagreed, 8% stood neutral and 21% agreed with the question.

In the above analysis, consumers’ daily items buying decision didn’t depend on word of mouth but if it was expensive then consumer collected information and reviews about the product or service.

Table: 09 Results of Respondents segment with respect to buying expensive items depend on word of mouth.

Responses	Respondents	Percentage	Position
Always	186	37%	2
Most of the times	207	41%	1
Sometimes	9	2%	5
Rarely	73	15%	3
Never	25	5%	4
Total	500	100%	



Respondents agreed when they asked “Did buying expensive items depend on word of mouth?” Around 78% of the total respondents agreed with the question, 9% stood sometimes and 20% disagreed with the question.

In the above analysis, it could be assumed word of mouth has a great impact on the expensive items.

3.2 Discussion

Word of mouth is becomes one of the vital tools for marketers. By the positive word of mouth an organization can easily place in consumer mind. The research made up with 500 respondents in different age, gender and background. With the help of three variables and 8 questions regarding this, we could find our objective. With the two questions of word of mouth, we have analysis how positive and negative review’s influence consumers buying behavior, with the two questions of consumer loyalty, we have analysis how consumer share their experiences with other when they got satisfactory and dissatisfactory experiences and with the four questions of consumer trust, we have analysis how consumer word of mouth plays role in consumer mind. By the overall analysis we find, consumers don’t do survey in low cost or daily buying decision but in terms of high cost spending or luxury product / service consumer can survey especially word of mouth from the existing sources.

3.3 Recommendation: After analysis and interact with the respondent the followings suggestions need to focus;

- Planned word of mouth should not be done by the marketers.
- Marketers should focus on building consumer loyalty and consumer trust.
- Consumers should share their experiences with others.
- Social media should be used for communication.

Conclusion

The objective of finding does word of mouth has any impact on the consumer buying decision and the findings has found. Word of mouth has both positive and negative impact on consumer buying behavior. The final outcomes found by different ages, genders, and backgrounds people. After concluded the research, it is found that word of mouth is one of the essential elements of marketing tools to create good relationship with the customer and get competitive advantage from the competitors. If an organization uses the word of mouth correctly, it's also can make respectable brand identity and brand image. Word of mouth has a prodigious influence in consumer buying decision because word of mouth gives consumer trust and loyalty. For long term relationship with consumer it is very imperative for any organizations to use positive word of mouth by giving good product or service.

References

1. Anderson. H & Jacobsen P.N 2000, Creating Loyalty, Customer Relationship Management, 55-67.
2. Arndt, J., Barksdale, H. C and Perreault, W.D. (1982) Comparative Study of Attitudes Towards Marketing, Consumerism and Government Regulation. In H.K. Hunt and R. L. Day (eds) New findings on Consumer Dissatisfaction and Complaining. Bloomington.
3. Baldinger, A.L. & Rubinson, J. 1996, Brand loyalty, The Link Between Attitude & Behavior, 22-36.
4. Berger, J. 2014, Word of Mouth and Impersonal Communication: A Review & Directions for Future Research. Journal of Consumer Psychology, 24(4), 586-607.
5. Bolting, C.P., 1989, How do Customers Express Dissatisfaction and What Can Service Marketers Do About it? Journal of Services Marketing, 5-23.
6. Chevalier, Judith A. & Mayzlin, Dina, 2006, The Effect of Word of Mouth on Sales; Online Book Reviews, Journal of Marketing Research, 345-354.
7. De Matos, C.A & Rossi, C. A. V. 2008, Word of Mouth Communications in Marketing: A MetaAnalytic review of the Antecedents and Moderators. Journal of the Academy of Marketing Science, 36 (4), 578-596.

Government Degree College :: Khairatabad

A.Y. 2022-23



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On
"SOCIAL MEDIA MARKETING"**

By

114020405243 MURARISHETTI NAVYA
114020405247 NALLA SRIKANTH
114020405255 NENAVATH ASHOK
114020405257 NETHAGIRI RANI
114020405265 PANDUGA CHAITANYA

**Under the supervision of
Jagadeeshwar. P**



Abstract

With the speedy social and economic development networks have been progressing rapidly. But the current local area network couldn't meet users' demands to certain extent especially on campus. The aim of the study was to get full knowledge of WLANs and the basic processes of designing a campus WLAN.

This paper introduced the theoretical part of WLANs, including advantages and limitations of WLANs, protocol standards of WLANs, components of WLANs, different topologies of WLANs and also the security of WLANs. The contents also included the basic process of planning a campus WLAN, designing a topology by using VISIO and planning APs by using HiveManager NG and Floorplanner tools, and also list hardware and the budgets with theselected components.

In the end, the thesis is good for studying the basic idea about WLAN design but not enough for the real environment. With the complexity of the wireless network, IT groups should spend more time and consider more aspects about the WLAN design process.

CONTENTS

- 1 INTRODUCTION
- 2 THEORY OF WIRELESS LOCAL AREA NETWORKS
 - Definition of Wireless Local Area Networks
 - Advantages of Wireless Local Area Networks
 - Limitation of Wireless Local Area Networks
 - Wireless LAN Transmission Media
 - Technical Standards of Wireless Local Area Network
 - Wireless Network Components
 - Channel
 - Wireless Local Area Network Topologies
 - WLAN Security
- 3 PRACTICAL PART
 - Background of the School
 - Request Analysis
 - WLAN Topology AP Management
 - Security of the WLAN
 - Lists of Hardware and Budgets
- 4 CONCLUSION
- 5 REFERENCE

Along with the constant development of social economy, computer networks have changed people's lifestyle in many aspects. Local area network, which is widely applied, plays a more and more important role in medical treatment, military, education and science. Not only enterprises and companies build LANs, but also families and schools establish their own small LANs.

With LANs, work and study efficiency is improved, but it also brings some problems. Wired local area networks couldn't work without the cable, which means that we couldn't change the structure of networks casually according to actual situations. Therefore, we cannot implement mobile office and studies. Therefore, the current local area network couldn't meet users' demands to certain extent. In order to make users access data at any place and at any time, networks should develop from being wired and fixed to being wireless and mobile.

Compared with local area networks, wireless local area networks offer advantages at different places. One of the advantage of a wireless local area network is that if there is coverage of WLAN, users can move anywhere they want with their devices and transmit data at the same time. Other advantages include easy installation, effective expansion, flexibility and cost savings.

In terms of campuses, most campuses now have their own wired local area network, but teachers and students need a more convenient way to access the network. According to my survey in WUHAN, over 90 percent of the high schools didn't have their WLAN right now but only some of the international schools have the WLAN. With WLAN, teachers and students can use the same device to get connected to the network at anytime and anywhere. Therefore, in that case, WLAN is the most efficient way to extend the wired local area network, especially on campus.

In this project, I will design a WLAN for my high school. I will introduce basic knowledge of wireless LAN, designing and planning a wireless local area network based on the actual situation of my high school. And, I will also introduce

the topology, AP management, channel management and which way I decided to use for the security part. Most of my planning bases on the hardware part of campus the wireless LAN.

The aim of the study is to get knowledge of the definition, background, characteristics and technical standards of WLAN, to understand the advantages and limitations of WLAN and to get to know the basic process of designing a campus WLAN. I will introduce the theory of wireless local area networks in the first part of the paper and describe the basic process of designing a campus WLAN in the second part of the paper. Then, I have a conclusion for the thesis.

2 THEORY OF WIRELESS LOCAL AREA NETWORKS

This chapter will define what WLAN is. The advantages and limitations of WLAN and the technical standards and components of WLAN are introduced. This chapter will also define different topologies, channel and authentication methods in WLAN.

Definition of Wireless Local Area Networks

There are many different kinds of computer networks in the world, as shown in Figure 1, including global area network (GAN), wide area network (WAN), metropolitan area network (MAN) and local area network (LAN). Among them, wireless local area network is one type of LAN.

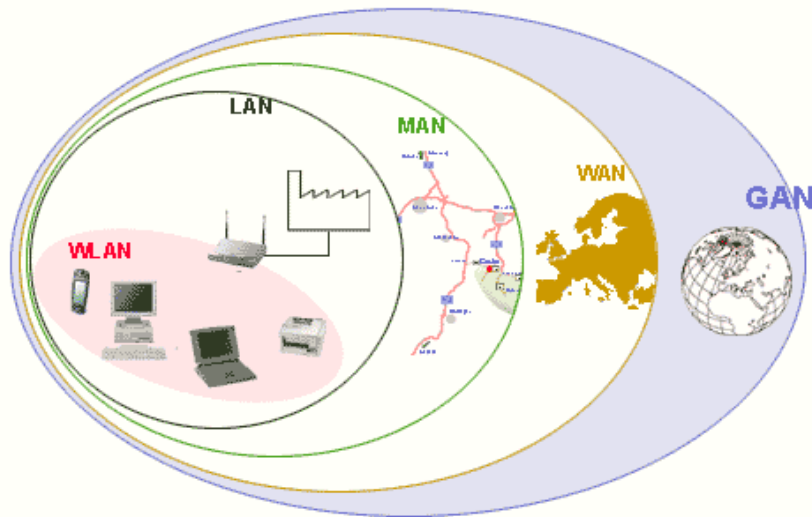


Figure 1. Different networks (Animasigaia 2014)

Wireless local area networks use infrared or radio waves to provide network for wireless devices and allow users to transmit data between each other in the coverage area without the limitation of wire and cable. WLANs have different wireless network protocols, such as IEEE802.11, Bluetooth, HomeRF and HiperLAN. Many wireless devices support WLAN, including mobile phones, game consoles, some cameras, tablets and also GPS systems. WLANs may contain two devices or up to one hundred and more. (Bradley 2016.)

Advantages of Wireless Local Area Networks

Wireless local area networks have unique advantages in many places. Firstly, wireless local area networks are more flexible and mobile than the wired ones and they will not be limited by cables. Users may have access to or receive information at any network coverages in real time. Secondly, WLANs have good scalability. Users can add more APs to effectively expand the network so as to meet the needs of specific applications and installations. Thirdly, WLANs no longer require a lot of wires and cables, which will reduce the workload of network cabling. Finally, it is easier to set up a WLAN than a wired one and it cannot be easily affected by the natural environment or disasters.

Limitation of Wireless Local Area Networks

There are also limitations of WLANs. Firstly, WLANs are based on radio frequency for data transmission. Walls or buildings will block the transmission of radio frequency, reduce the signal and then influence the performance of WLANs. Secondly, some of the devices have the same frequency as 802.11 series and it may cause radio signal interference. Thirdly, wireless LANs are less secure than wired LANs. When LANs travel through the air, it might be intercepted at the same time. Some unauthorized devices may use user's WLAN at the same time. Fourthly, the coverage areas of WLAN is limited, WLANs have a certain range of coverage, increasing the coverage area needed to increase the wireless hot spots at the same time, therefore the cost will increase at the same time. What's more, if some wireless devices hack into the user's network, their bandwidth will be stolen at the same time. (Bradley 2016.)

Wireless LAN Transmission Media

There are three main transmission media for WLANs. The first one is microwave and the range of frequencies is 1GHz to 40GHz. Microwave is not a true sense of the LAN technology, it is used to interconnect the buildings' local area network. It is suitable for point-to-point transmission and also satellite communications. The second media is radio and the range of frequencies is 3KHz to 300GHz. This transmission media is currently widely used, because the radio wave has wide coverage. It is suitable for all the applications. The difference between broadcast radio and microwave is that the radio didn't require antennas. And, the radio's former is omnidirectional and the microwave's former is directional. The third one is infrared. The infrared uses transmitter and receiver to modulate non-coherent infrared light. The difference between infrared and microwave transmission is that infrared will not penetrate walls. And, there is no frequency allocation problem for the infrared, because it doesn't required license. (Vittorio2008.)

Technical Standards of Wireless Local Area Network

Users have many choices when they are looking for network gear. Many products conform to the 802.11 series wireless standards, also known as Wi-Fi technologies. There are also various other wireless technologies, such as Bluetooth, HomeRF and HiperLAN. They are designed for specific networking applications.

802.11 Series

According to Microsoft, the IEEE 802 standards define two separate layers for the Data-Link layer of the OSI model. The one is Logical Link Control Layer and the other is media access control Layer. As shown in Figure 2, the IEEE 802.11 wireless standard defines the specification of the physical layer and the media access control layer that communicate up to the LLC layer. The components of the 802.11 architecture will fall into physical layer or media access control layer.

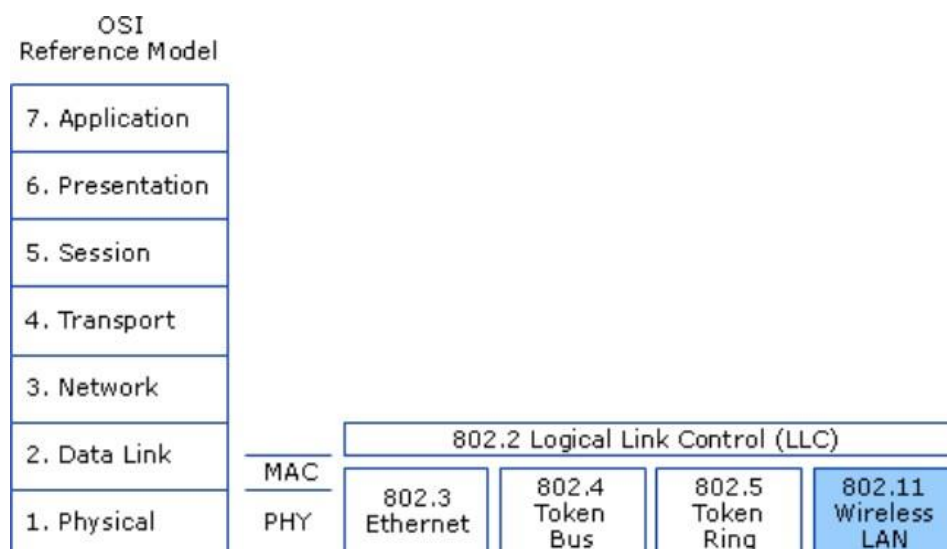


Figure 2. OSI model and 802.11 (Microsoft 2003)

The first standard of the 802.11 series appeared in 1997 and it was created by the institute of Electrical and Electronics Engineers. The 802.11 only supports 2Mbps bandwidth and it can't meet the demands of the users anymore.

The 802.11b version was introduced in 1999. It supports 11Mbps bandwidth and it uses direct sequence spread spectrum technology. The 802.21b uses 2.4GHz frequency and some of the devices will interference 802.11b, if they work at the same frequency, like microwave. The effective range for indoor place is about 100 meters, for outdoor place about 300 meters. The cost of 802.11b is lower than the later version 802.11a and the signal range is better than the 802.11a, but the speed is slower than the 802.11a. The 802.11b uses Direct Sequence Spread Spectrum for modulation.

The 802.11a version was created at the same time as 802.11b. It uses orthog- onal frequency division multiplexing for data modulation. It supports voice, data and image transmission. It also supports 54 Mbps bandwidth and is suitable for big business market while 802.11b is suitable for users' home market at that time. 802.11a uses Orthogonal Frequency-Division Multiplexing technology for modulation. OFDM is a coding technique that splits the radio signal into several sub signals before they reach a receiver. Using OFDM will reduce the interfer- ence between signals. The 802.11a has higher speed and frequency than 802.11b, but 802.11a has short range signal and it's easily obstructed. (National Instruments 2015.)

The 802.11g version appeared in 2002. It supports 54 Mbps bandwidth and 2.4 GHz frequency. It was created to come up with the interoperability between 802.11a and 802.11b. 802.11g uses OFDM technology. According to Bradley, the 802.11 g was designed for cross compatibility, the devices can join the net- works, even the APs running at a different 802.11 version.

The 802.11n version was the development of 802.11g. The rate was increased to 600Mbps. And, it supports 2.4GHz and 5GHz frequency. 802.11n can im- prove the quality of wireless transmission. It combines MIMO and OFDM tech- nologies. MIMO means multiple in multiple out and it is commonly used in home routers for coordinated use of the multiple radio antennas in wireless network. The MIMO technology can increase the bandwidth and the range of the network.(Bradley 2017.)

The 802.11ac version is popular one in the market. It appeared in 2012. It is a faster and scalable version than 802.11n. 802.11ac supports 1Gbps data rate and 5GHz frequency. The comparison between different 802.11 WLAN technol- ogies is in Table 1.

Table 1. 802.11 Wireless Standards

IEEE Standard	802.11b	802.11a	802.11g	802.11n	802.11ac
Release Year	1999	1999	2003	2009	2012
Frequency	2.4GHz	5GHz	2.4GHz	2.4or5GHz	5GHz
Data Rate	11Mbps	54Mbps	54Mbps	600Mbps	1Gbps
Modula- tion	DSSS	OFDM	DSSS,OFDM	OFDM	OFDM

It's clearly that the data rate has become faster with time going by. The 802.11 series use different frequency and modulation to meet different situations.

Bluetooth

Bluetooth is a wireless communication protocol created in 1994 by Ericsson company and used for connecting devices through the air. It is slower than WIFI, but it is easy to set up and usually used for data transfer between devices. It can help devices transmit data between each other within 10 meters. It works at the frequency of 2.4GHz and the data rate is about 1Mb/s. Bluetooth is most commonly used between mobile phones for photos or files transfer. According to Samraiz(2014), there are number of Bluetooth versions which all are being developed to meet the particular requirements of the time. All the updated versions of Bluetooth offer backward version compatible. This means whichever newer version you are using then it is compatible with the older version as well. Users may also transfer data through WLAN. But there are differences between WLAN and Bluetooth. The Bluetooth works in lower distance range than in WLANs. The WLANs are also faster than Bluetooth. But sometimes Bluetooth is a better option when users need to transfer data between mobile phones. Table 2 shows about the comparison between 802.11b and Bluetooth.

Table 2. Comparison between 802.11b and Bluetooth

	Wireless LAN	Bluetooth
Definition	Wireless LAN stands for Wireless Local Area Network. It refers to a network that connects two or more devices by using wireless data connections over short distances.	Bluetooth is a short range technology standard which allows devices to communicate in a wireless manner.
Distance Range	Up to 200 feet	Less than 30 feet
Bandwidth	High	Low
Security issues	Can occur, still controllable	Minimum
Speed	Comparatively more	Comparatively less
Central Access Point	Required	Not required
Identification of the network	By locating a central router of a wireless network switch.	By checking out the Bluetooth control panel (on phone or computer)

Even Bluetooth is a short range technology and the bandwidth is lower than WLAN but it's still an important wireless technology for users to transfer data between devices.

HomeRF

HomeRF was designed for home users to enable wireless communication between computers and other wireless devices in 1998 by the Home Radio Frequency Working Group. It works at the frequency band of 2.4GHz and the data rate is about 1Mb/s. The communication range for HomeRF is about 50 meters and the main purpose is to establish an interoperable network for families.

There are something in common between HomeRF and Bluetooth technologies. Both of them operate at the frequency band of 2.4GHz and all of them are designed for short-range, low-power applications. There are also difference between these two technologies. HomeRF was designed for home networking environments but Bluetooth technology is optimized for mobile phones. The communication range of HomeRF is about 50 meters and for Bluetooth is about 10 meters. Both of these two technologies have similar rate at about 1Mbps but HomeRF version 2.0 has data rate up to 10Mbps, so HomeRF require more power than Bluetooth. (Brent 2011.) 32

Wireless Network Components

The main components of WLANs including client devices, access point, wireless network adapters, wireless routers, wireless controller and wireless antennas. Client devices are also known as stations. All the end devices with wireless capabilities will act as client devices, for example, mobile phones, laptops and PDA.

The network interface cards, also known as wireless adapters, act as the interfaces of WLAN, and they are required for the devices when they want to access the WLANs. There are three different types of network interface cards, including PCMCIA, PCI and USB. The PCMCIA cards are designed for the laptops and supports hot swapping, it means that users can replace or add the network interface cards without shut down the devices. The PCI cards are suitable for desktop computers while the USB sticks are suitable for both desktop computers and laptops.

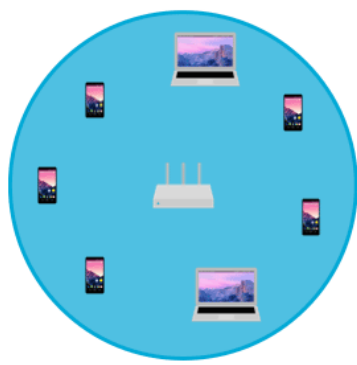
The wireless router can function as a normal router or a access point. Most of the wireless routers are designed for home users. The wireless routers have firewall inside in order to protect home users from being hacked. Even if wireless routers differ in many different ways, normally just one router is required for an entire family.

The access point acts as a bridge between wireless devices and wired networks. APs are commonly used in large buildings in order to create a wireless local area network that expands to a wide range of area. Home users can add an AP but not router if they want to expand their network, while office users can add more than one APs to expand the network to the whole building.

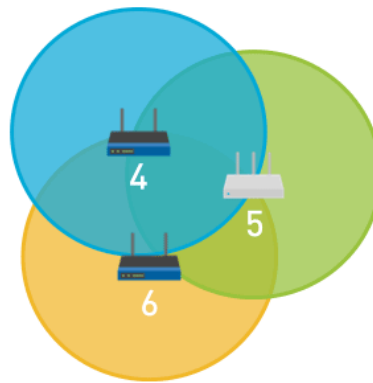
The wireless controllers used to automatically manage and configure a set of APs. The features of the wireless controllers including load balancing, coverage hole detection and correction and interference detection and avoidance. (Wikipedia 2017) What's more, there are also antennas in WLANs. The function of antennas is to transmit and receive electromagnetic waves, users can expand the coverage of wireless LAN by using antennas. The transmission rate is significantly reduced when wireless devices are far from the AP or other devices, and antennas will come in handy to enhance the signal and speed up the transmit rate at the same time.

Channel

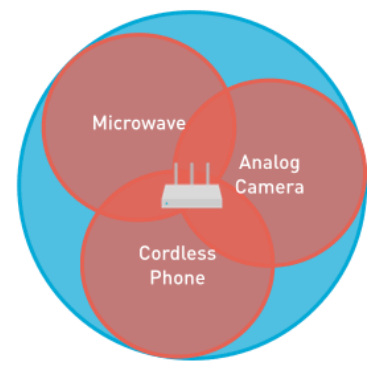
The interference is an issue which will influence users' WLANs performance. The three main causes of the interferences are: Co-Channel, Adjacent-Channel and Non-Wi-Fi, as shown in Figure 2. And, the channel related interferences can be reduced or eliminated by selecting the proper channels for the networks. (Metageek no date.)



Every client and access point on the same channel competes for time to talk.



Every client and access point on overlapping channels talk over each other.



Non-802.11 devices compete for medium access.

Figure 3. The three main causes of WiFi interference (Metageek no date)

The IEEE divides 14 channels for 2.4GHz band. As shown in Figure 8, the distance between each channel is 5MHz and they may overlap frequency, because each of the channel is 22MHz wide and the entire spectrum is 100 MHz (Aldxn- dra 2015). Only channels 1,6 and 11 will not overlap each other.

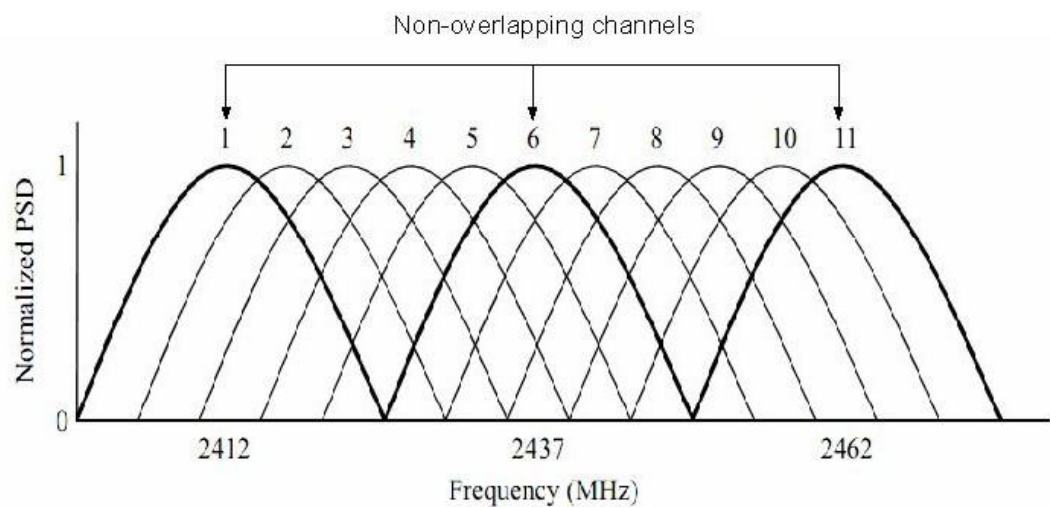


Figure 4. 2.4GHz band channel (Stefan & Vladimir 2012)

Selecting the right channels will reduce the interference and increase the network performance.

Wireless Local Area Network Topologies

There are three different kinds of WLAN topologies, including IBSS, BSS and ESS. The IBSS refers to Independent Service Sets, also known as ad-hoc network. As shown in Figure 2, users can directly transmit data between each other without access points. At least two wireless stations are needed for each topology. We can easily build a small WLAN in an office by using IBSS topology. But all the nodes have to use the same channel.

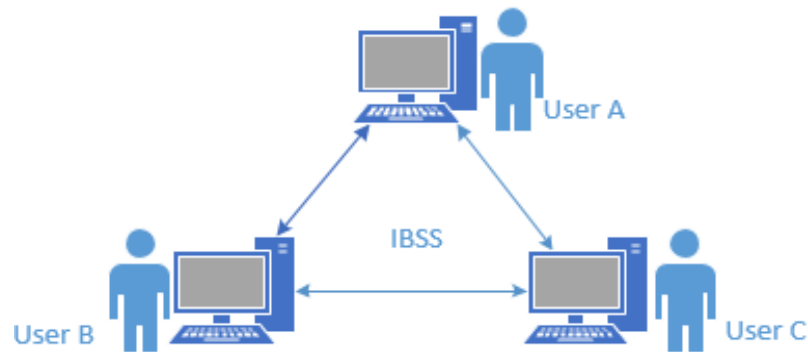


Figure 5. Independent basic service sets

The BSS refers to Basic Service Set, also known as Infrastructure BSS. It requires an access point when users want to communicate with each other, as shown in Figure 3.

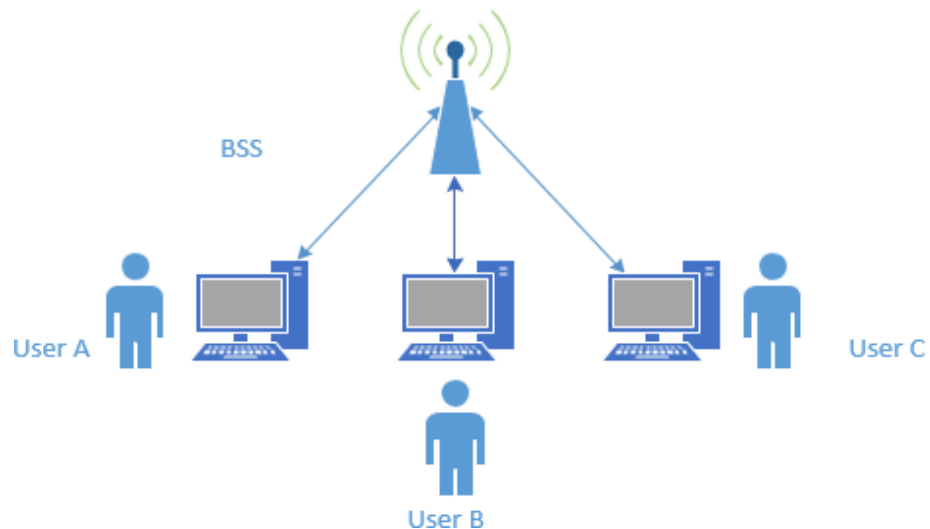
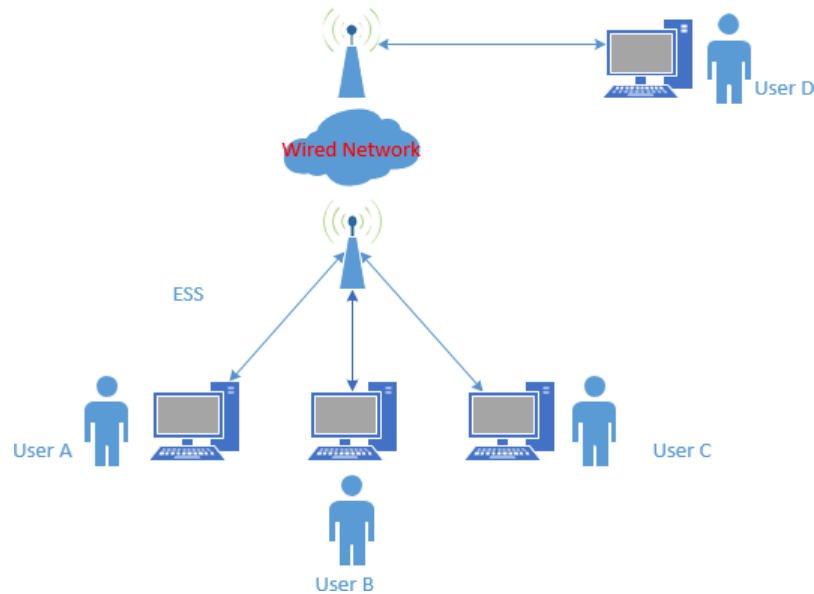


Figure 6. Basic service set

The ESS refers to Extended Service Set. It can be regarded as combining multiple BSSs together with a distribution system on the same network, as shown

Figure 7. Extended service set



IBSSs are suitable for huge enterprises because they need many devices and all the devices need high speed transmission. BSSs are suitable for home users because the devices don't need high speed data transmission.

WLAN Security

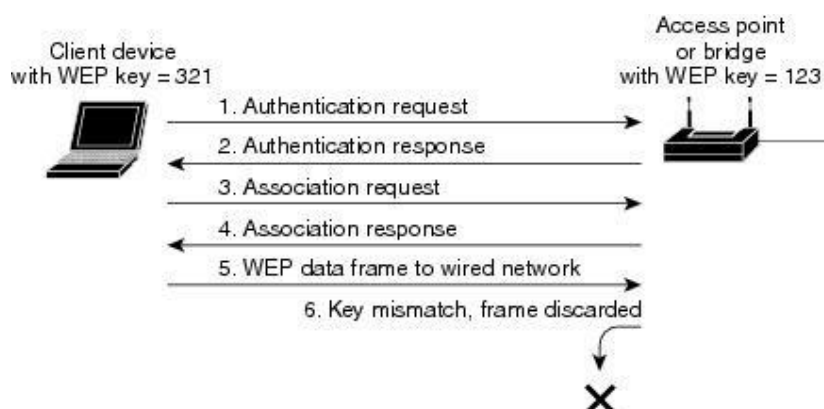
Security has always been an important part of wired or wireless network. As time goes by, threats for all privacy information transferred from client devices through WLAN are growing. It's time to protect WLAN from being attacked. At very beginning, WLANs use Service Set Identifier for their security. Clients use SSID to join WLAN. Some WLANs will enter the media access control in access point to control access devices. Both of these two methods are not good solutions for security anymore.

Open Authentication

There are different ways for WLAN authentication. The open authentication method is the the default and easiest way for authentication in 802.11 standards. This method allows any workstations access the AP. Users send an authentication request to the access point to get an authentication response from the access point.

After that process users can access the AP successfully. This method can be easily used for unauthorized access. But if the device wants to pass data, its Wired Equivalent Privacy keys must match the access point's Wired Equivalent Privacy keys. As shown in Figure 5, the device's WEP key does not match the access point's key, it means that the device can authenticate but can not transfer data.(Cisco 2009.)

Figure 8. Open Authentication (Cisco 2009)



Now, most of the enterprises and schools will not use the open authentication for security any more.

Shared Key Authentication

The shared key authentication, as shown in Figure 6, The users send an authentication request to the AP and when the AP received request it will send a challenge text back to the user, then the user encrypts the text and sends the text to the AP. And, the AP will authenticate the user after AP decrypt the text successfully and match the text to the original one. The user can access to the AP after these process.

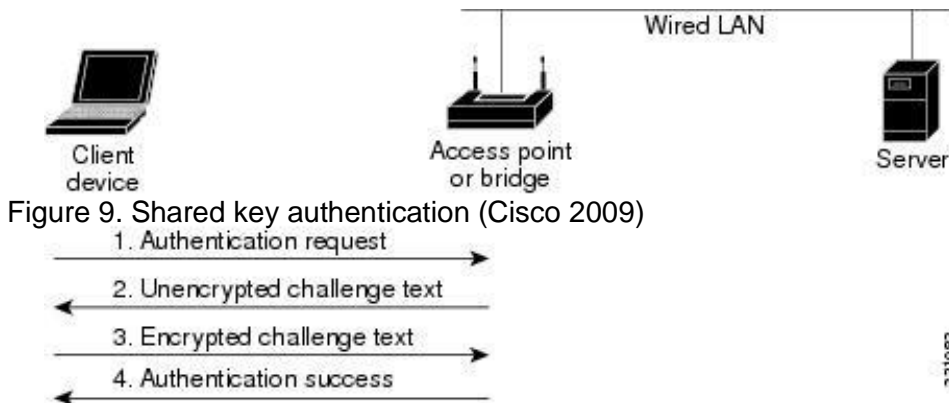


Figure 9. Shared key authentication (Cisco 2009)

The shared key authentication will cause problem. Because both the unencrypted challenge text and the encrypted challenge can be monitored, it means that the hacker can calculate the WEP key by comparing the unencrypted and encrypted text to attack the APs, so the shared key authentication can be less secure than open authentication. (Cisco 2009.)

2.9.4 EAP Authentication

The EAP authentication will provide the highest level of security for the wireless network. The wireless device and the RADIUS server will mutual authentication by using EAP authentication. The process of EAP authentication are shown in Figure 9.

The EAP authentication will provide the highest level of security for the wireless network. The wireless device and the RADIUS server will mutual authentication

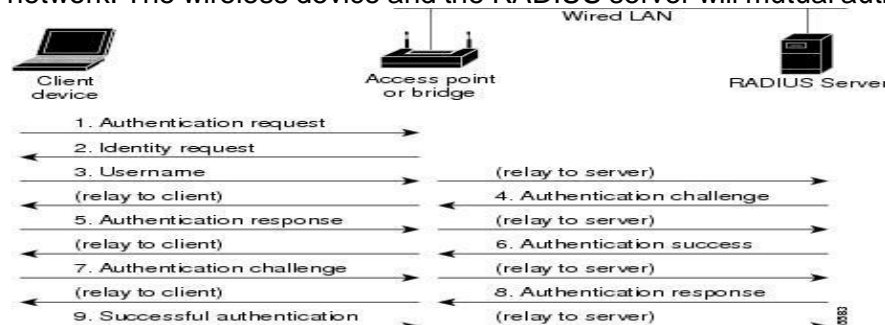


Figure 10. EAP authentication (Cisco 2009)

The client devices will send a authentication to the access point, then the access point will identify the request, after the client send the username and the AP relay it to the RADIUS server, the RADIUS server will send an authentication challenge back to the client. The client will use a one-way encryption of the password to give a response to the challenge then send the response to the RADIUS server. The RADIUS server will create it's own response and compare with the client's response. When the RADIUS server authenticates the client, the authentication is completed. The client and the RADIUS server will create a unique WEP key for the client to access the appropriate level of network. Then the client will use the key for logon session. During the logon session, the RADIUS server will encrypt the WEP/session key then send it to the access point. The access point will encrypt its broadcast key and also the session key then send the encrypted broadcast key to the client, the client will use the session key to decrypt it. The client and AP will use the session and broadcast WEP keys for all communications. Even there are many different types of EAP authentication, but the access point has the same behaves. The AP will relay authentication messages from the wireless client to the RADIUS server and also from the RADIUS server to the wireless client. (Cisco 2009.)

WEP

WEP refers to Wired Equivalent Privacy and it was introduced in 1999. It's a security protocol in order to protect the wireless network from being attacked. As shown in Figure 7, WEP utilizes RC4 encryption algorithm to encrypt data. WEP supported encryption keys of 40 bits and 24 additional bits of system-generated data, the length of the key is 64 bits. Later WEP extended to support longer keys including 104-bit, 128-bit and 232-bit variations. WEP is unsafety and useless because it's easy for hacker to determine the WEP key in several minutes by using simple tools. (Bradley 2017.)

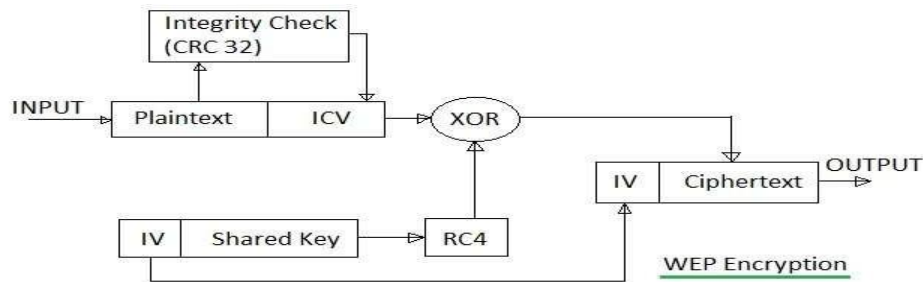


Figure 11. WEP encryption (RF Wireless World 2012)

WPA/WPA2

WEP is the weakest method for the security of the WLAN compare to WPA and WPA2, so it was replaced by WPA in 2003. The are different kinds of WPA and WPA2 mode types, as shown in Table 2.

Table 3. Comparison of WPA and WPA2 Mode Types

	WPA	WPA2
Enterprise Mode (Business, Government, Education)	<ul style="list-style-type: none"> • Authentication: IEEE802.1X/EAP • Encryption: TKIP/MIC 	<ul style="list-style-type: none"> • Authentication: IEEE802.1X/EAP • Encryption: AES-CCMP
Personal Mode (SOHO, Home/Personal)	<ul style="list-style-type: none"> • Authentication: PSK • Encryption: TKIP/MIC 	<ul style="list-style-type: none"> • Authentication: PSK • Encryption: AES-CCMP

WPA stands for Wi-Fi Protected Access. WPA is also known as the draft IEEE 802.11i standard. It provides stronger encryption than WEP by using temporal key integrity protocol and advanced encryption standard technologies. WPA designed for home user is called WPA-PSK. It's the most simplified and powerful form of WPA. A person who uses WPA-PSK will configure a static key for security. And, WPA uses the Temporal Key Integrity Protocol to generate the encryption key. WPA2 is another version of WPA to security the network and WPA2-PSK a simple and safety choice for most of the home users. But WPA2 will decrease the performance of the network because encryption and decryption process are needed. (Bardley 2017.)

3 PRACTICAL PART

In the practical part, the main purpose is to introduce the basic process of the campus WLAN design. I will introduce the background of the school, the request analysis of the school, the topology of the WLAN, the channels and APs management of the WLAN, the security of the WLAN and the hardware of the WLAN.

Background of the School

The campus is a special place for the students to learn something new and campus network has become an important platform to gain deeper knowledge. Due to this, the construction of the network in the campus environment has become an important necessity. The number of students who uses their own device is increasing rapidly, this increase the stress on the network. Only using the devices available on the campus is not enough and it cannot meet the requirement of the students. Many universities have switched to wireless network, which is easy to access and cost efficient. The advantages of the wireless network cannot be matched by the wired network.

In this project, I will design a WLAN for my high school. The actual situations of the campus should be considered before designing the WLAN. This school has one main building, one student dormitory, one complex building, one gym and one laboratory building. About 2,000 students are studying and 250 teachers are working there.

Request Analysis

In this project, the basic goal is using wireless network technology to expand teaching area network and make it possible for students connect to the network at anytime and anywhere. In the real environment, it's impossible to expand signals to every corner by using wired networks, that's one of the reason why we need WLAN.

The goals of campus WLAN should focus on efficiency, stability and safety. And, easy to install, maintain and manage. The WLAN should have a better performance and low cost at the same time. It should provide teachers a flexible teaching platform and students an effective study environment. The establishment of campus WLAN mainly consider about the following aspects of requirements. The first is the teacher's teaching requirements. WLAN will make full use of the multimedia resources, so the teachers can use the WLAN at any time to obtain the relevant teaching resources and course information, then all the valuable information will pass to the students clearly and accurately. The second

is the student's learning requirements. Students can access information resources, submit assignments or conduct group activities in a WLAN environment. The third is the number of ports requirements. There are many of the existing network terminal equipment in campus. And, there are large demand of network ports in library or classroom environment. The WLAN will meet the needs of information points. The fourth is the construction wiring requirements. The WLAN allows smooth communication between various buildings in campus. The wireless networks can coverage the signals to the places where there are difficult to arrangement of wires.

I will design WLAN for five different buildings and one outdoor area. The buildings include the main building, complex building, dormitory, cafeteria and the laboratory building, as shown in Figure 12.

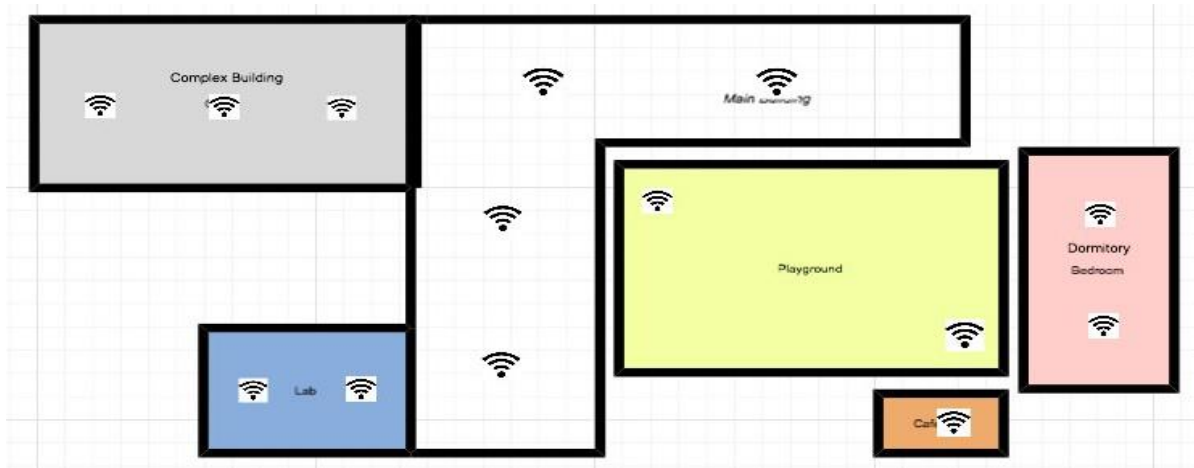


Figure 12. The plan of the campus

There are six floors in the main building, consisting of classrooms and offices. And, there are eleven floors in the complex building, consisting of the library and activity rooms. What's more, there are six floors in the dormitory, two floors in the cafeteria and eight floors in the laboratory building.

WLAN Topology

In this part I planned a basic topology for the WLAN, as shown in Figure 13.

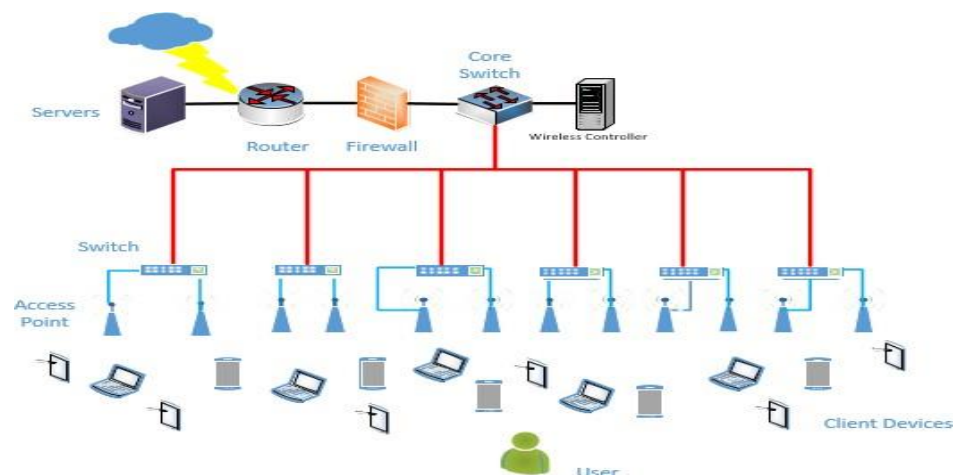


Figure 13. WLAN topology

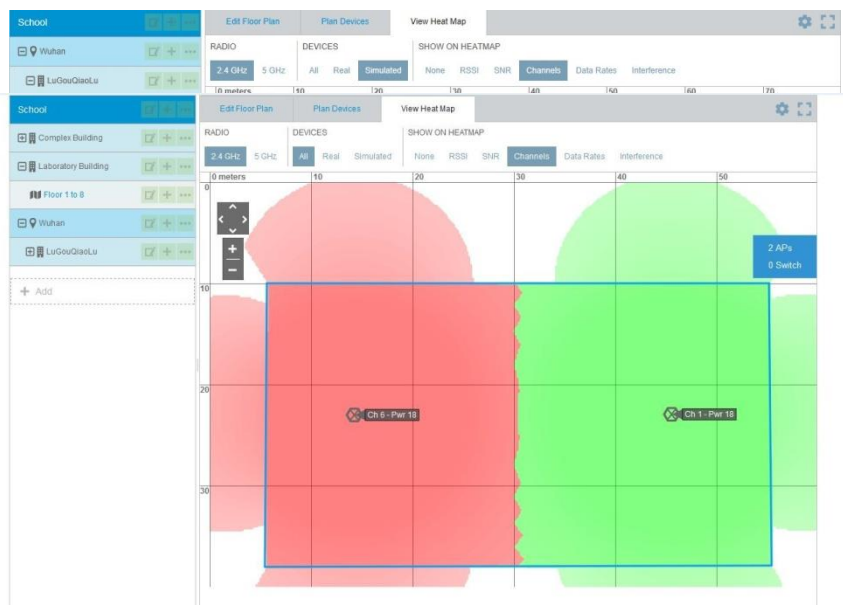
In this figure, the core of the campus network is the network center. The router is connected to the external network and firewall. There are different kinds of servers connect to the router. I used one core switch connected to the wired network and the wireless controller connected to the core switch. Then I have several PoE switches connected to the core switch and access point connect to the PoE switches. PoE refers to Power over Ethernet and it is a technology that lets network cables carry electrical power. It means that only one cable is enough for the PoE switch to provide network and power connection at the same time. Then the APs will spread out the wireless signals so that all the clients in the coverage area are able to access the WLAN.

Channel Management

I introduced channels in the theory part and here I will elaborate which channel I will use for each building by using the HiveManager NG tool. And, I will also explain why I select that channel. Here I planned channels for each building. For the main building, each floor uses 4 APs and all the APs work on the 2.4GHz bandwidth, so I used the channels 1, 6 and 11. As shown in Figure 14, channels will not overlap each other. What's more, I used different permutations to manage the APs for each floor. It means that I used different channels for the same locations of the neighboring floors. I will also use this method for other buildings.

Figure 14. Channel management for the main building

For the laboratory building, each floor uses 2 APs and all the APs work on the 2.4GHz bandwidth, so I selected channel 1 and channel 6. As shown in Figure 15,

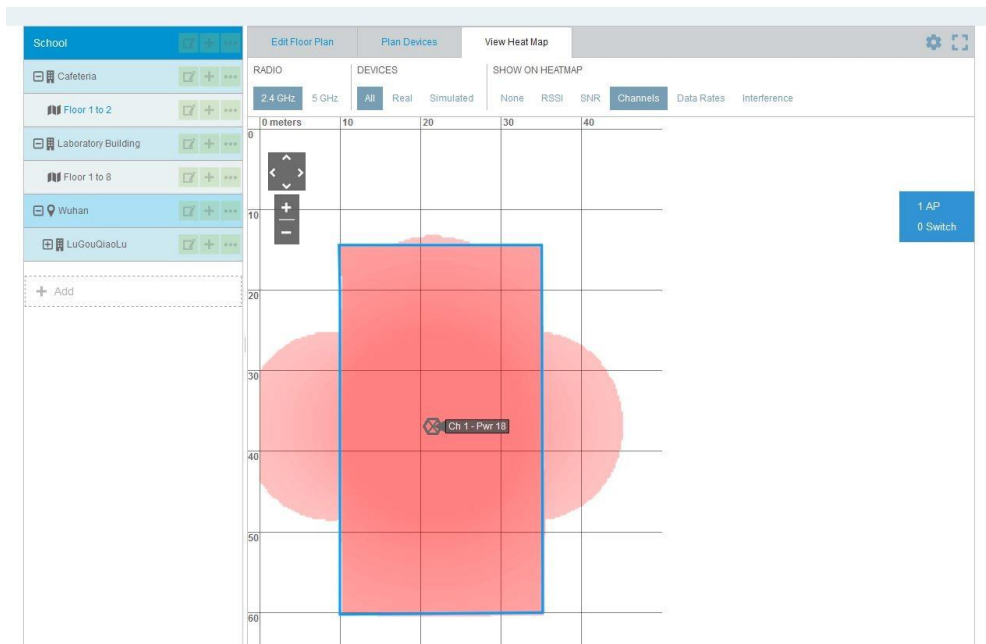


red and green colors show that the channels will not overlapping each other.

Figure 15. Channel Management for Laboratory Building

For the cafeteria, one AP is required for each floor and I used different channels in different floors. I used channel 1 for the first floor, as shown in Figure 16 and I use channel 6 for the second floor. So the channels will not overlapping each other.

Figure 16. Channel Management for Cafeteria



For the dormitory building, each floor uses 2 APs and all the APs work on the 2.4GHz bandwidth, so I decided to use channel 1 and channel 6. As shown in Figure 17, red and green colors show that the channels will not overlap each other.

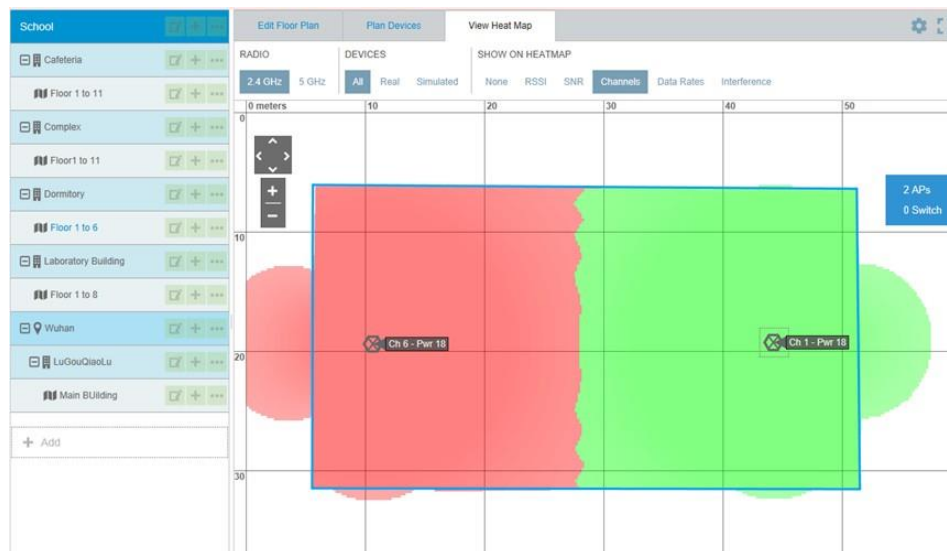


Figure 17. Channel Management for Dormitory

For the complex building, each floor uses 3 APs and all the APs work on 2.4GHz bandwidth, so I decide to use channel 1, channel 6 and channel 11. As shown in Figure 18, different colors clearly show that the channels will not overlap each other.

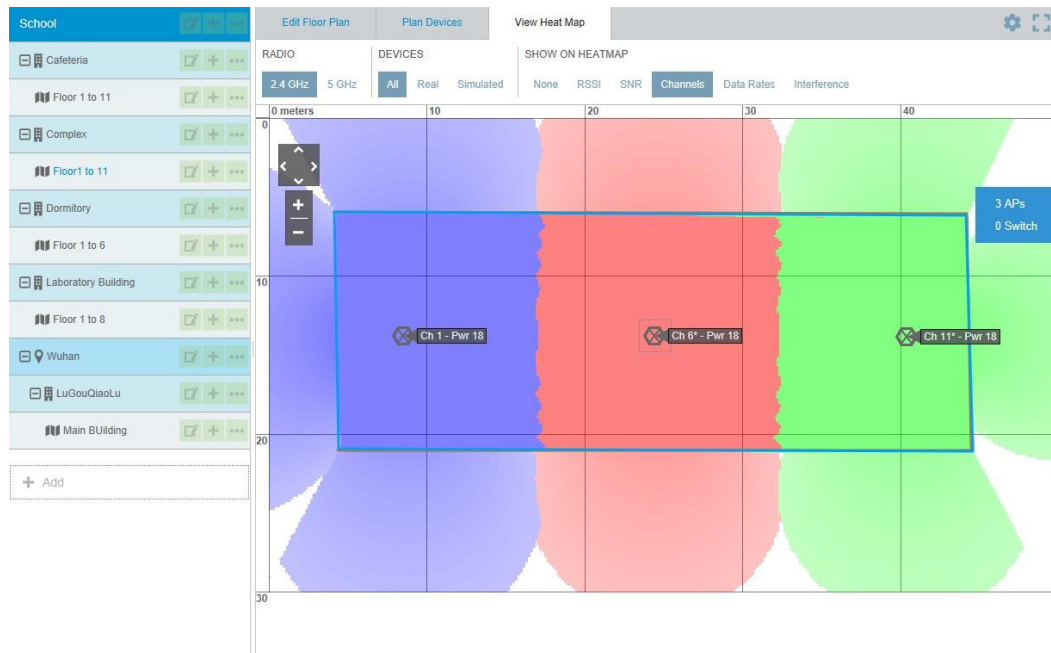


Figure 18. Channel Management for Complex Building

If there are channels that overlap each other, it will cause interference between signals. Then there is slower throughput and packet loss at the same time. That's the reason why channel management is needed here.

AP Management

In this part I will introduce how many APs are used for each building and where I decided to place them. The 2.4GHz frequency is used for each APs, because there are many walls or other objects in each building and I need better coverage of the WLAN. What's more, in the campus environment, I don't need to care about some 2.4GHz household appliances interfering the network. Floor-planner and HiveManager NG are used in this chapter for AP management.

For the main building, the main coverages of the networks are classrooms. In this case, I used ceiling APs and planned 4 APs for each floor, as shown in Figure 19. The model of the AP is TL-AP1750C-PoE from TP link company. It's

easy for IT managers to manage the APs, if all the APs are of the same model. So, I used the same model for all indoor places. This model of AP has a built-in directional antenna and it can improve the signal quality of the coverage area, especially where there is a need for penetration. Each AP can support 80 clients' access in the network at the same time. I decided to install the APs on the ceiling of the corridor, near the window or the door of the classrooms.

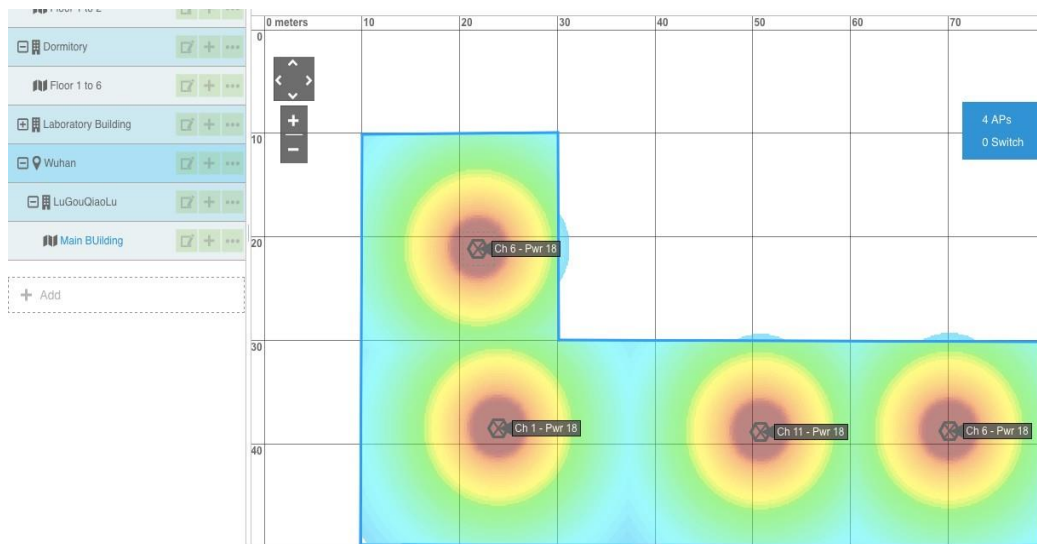
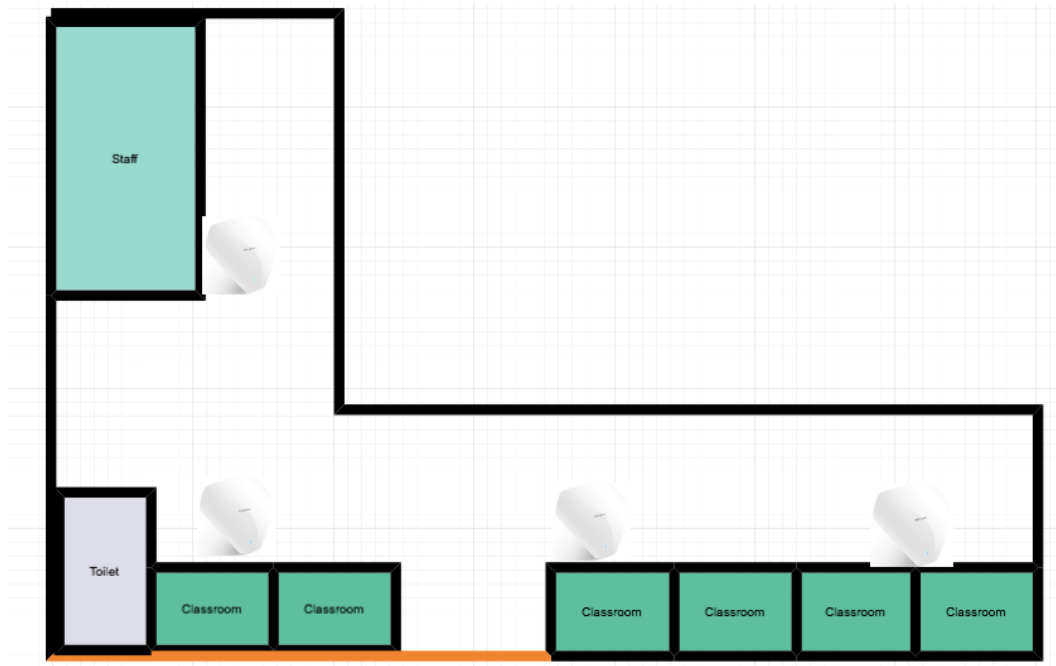


Figure 19. AP Management for the Main Building

The lab building has seven floors. I used 2 APs for each floor, as shown in Figure 20. The model of the AP is TL-AP1750C-PoE. The main coverage areas

are each laboratory and corridors. I decided to install the APs on the ceiling of the corridor, close to the laboratory. Some specific needs have to be determined according to the network cabling situation.



Figure 20. AP Management for the Laboratory

The cafeteria has two floors. I used one AP for each floor, as shown in Figure 21. The signal will transmit well, because there is a large open area in the cafeteria. The type of the AP is ceiling AP and the model is TL-AP1750C-PoE. I

decided to install the APs in the middle of the ceiling. One AP used, full coverage achieved.

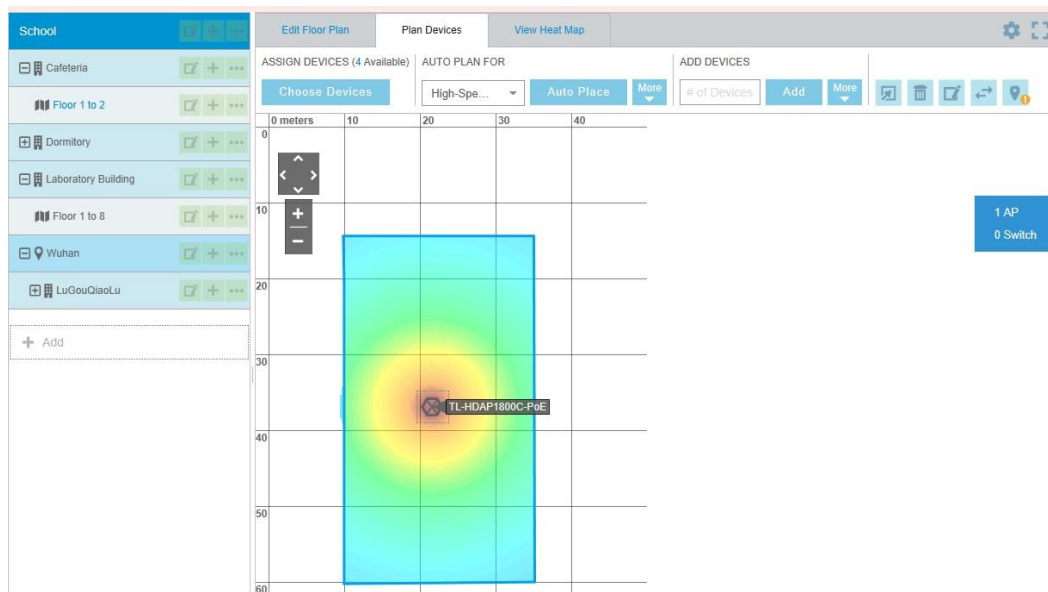
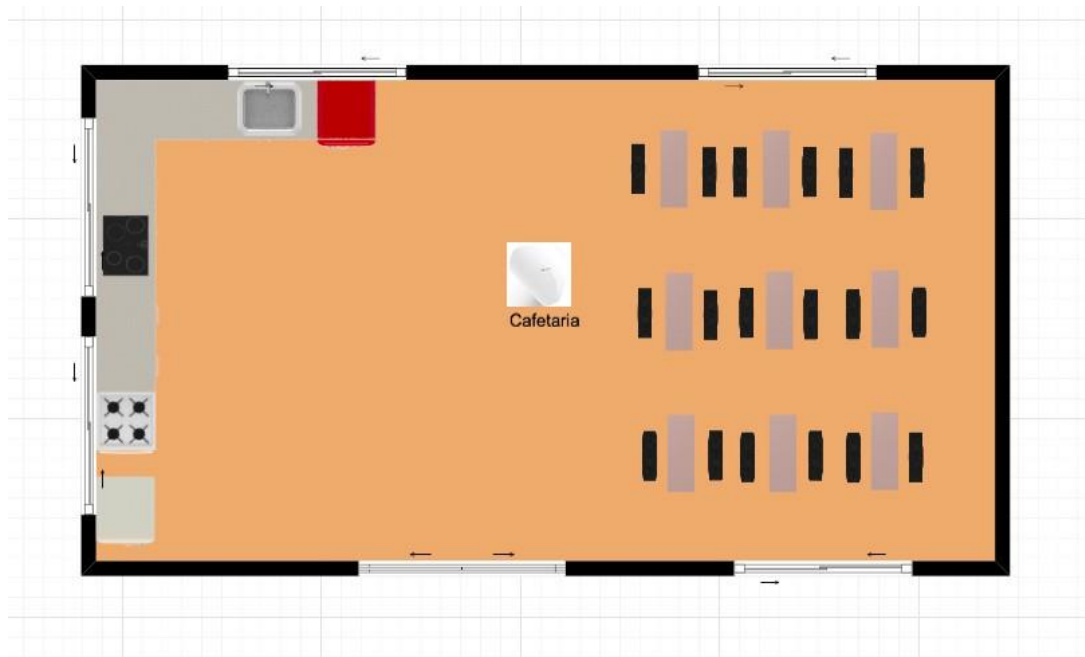


Figure 21. AP Management for the Cafeteria

The complex building has 11 floors and it is the second biggest building in the campus. The library and some wide range activities room is inside the building. In this case, I put 3 APs for each floor, as shown in Figure 22. The model of the AP is TL-AP1750C-PoE. I decided to install the APs in the ceilings, depending on the environment of each floor.

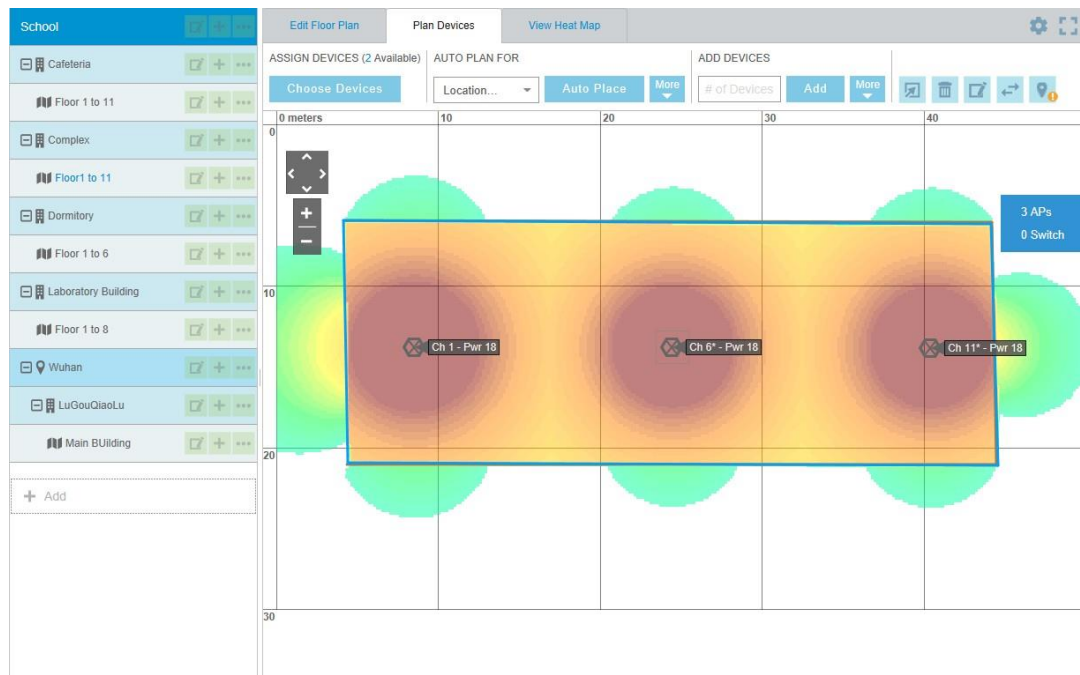
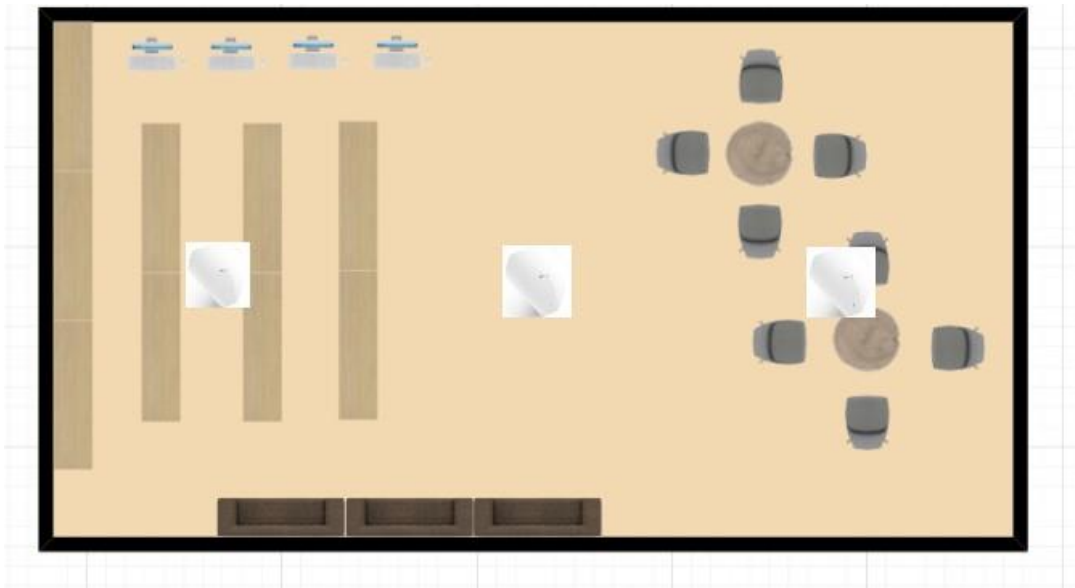


Figure 22. AP Management for the Complex Building

For the dormitory, I considered the coverage of each room. Actually I planned two ways to place the APs. The first one is by using ceiling APs in the aisle and the other is by using panel APs in every room. Considering the budgets and the real situation, I found that I didn't need that many APs. Only ceiling APs are enough for the network coverage. So, in this building I used 2 ceiling APs for

each floor, as shown in Figure 23. The model of the APs is TL-AP1750C-PoE. Because of It's stronger penetration.

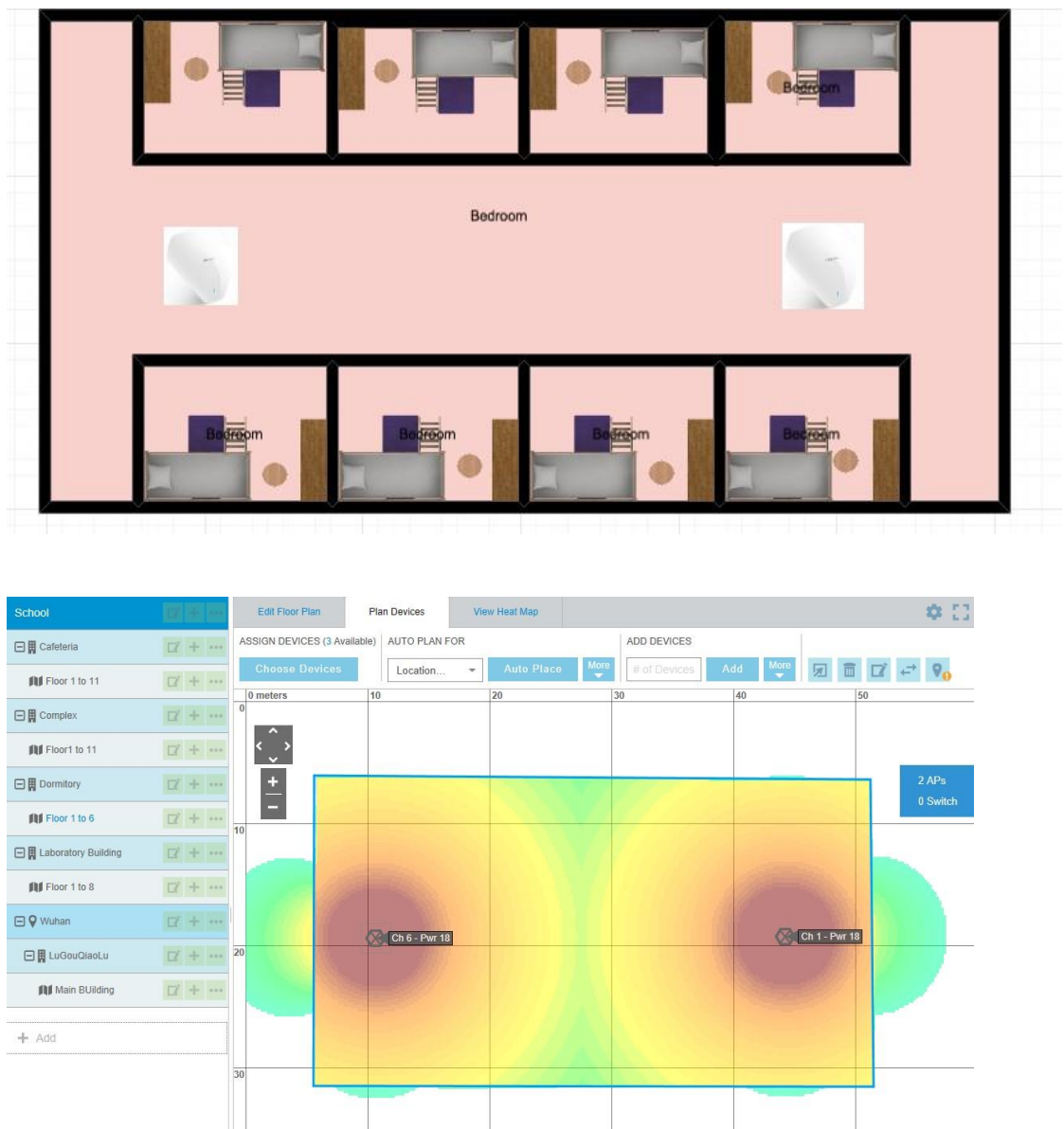


Figure 23. AP Management for the Dormitory

The last coverage area is outdoor place. When I selected an outdoor AP, I had to consider the location, the range of service, the power supply, the coverage of the network, the rate of the network and whether it would be easy to install and manage. The model I used is TL-AP300P from the TP-LINK company. The TL-AP300P is a high power AP for the outdoor place and it can work at any harsh environment. I will introduce the model in later chapters. I decided to use the 5GHz band for the outdoor place, because there are no obstacles. I decided

to install the APs at the diagonal corner of the playground, as shown in Figure 24.

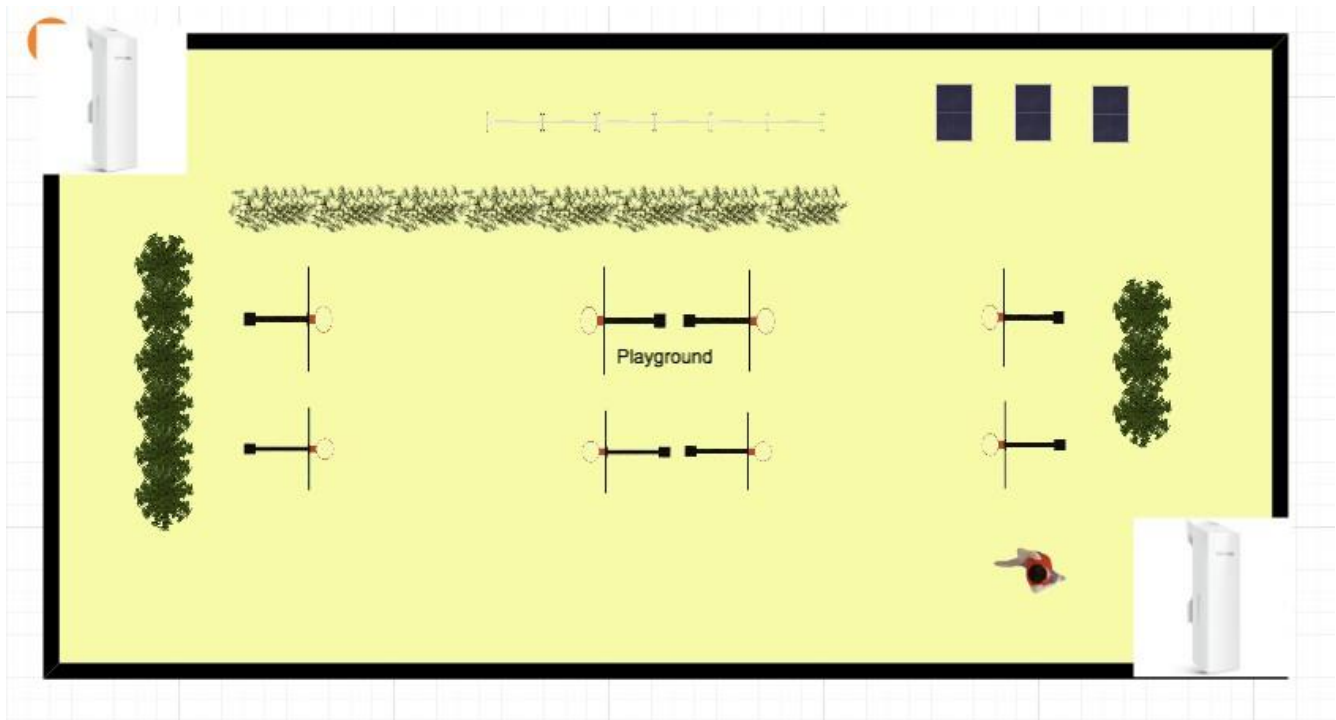


Figure 24. AP management for the playground

Security of the WLAN

The use of broadcast in WLAN may cause a security problem. Planning for the security of the campus wireless local area network is a complex thing. Some of the hackers might corrupt data without promise. To solve the problem, WLANs always need user authentication and data privacy. Securing the network protects the organizations from threats and controls who can access the network. So, for the security part, I will assign VLAN for each building, and then I will use portal authentication to control the access to the WLAN. As Table 4 shows, each building has its own VLAN number and I also configure IP for each place, but I still need discuss it with the school, if I can use these IPs or not. The table clearly shows how many floors I have for each building and how many APs I used for each floor.

Table 4. Division of VLAN

Building	VLAN	IP	Gateway	Floor	AP
Main Building	101	192.168.101.0	192.168.101.254	1	4
				2	4
				3	4
				4	4
				5	4
				6	4
Complex Building	102	192.168.102.0	192.168.102.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
				7	2
				8	2
				9	2
				10	2
				11	2
Laboratory Building	103	192.168.103.0	192.168.103.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
				7	2
				8	2
Dormitory	104	192.168.104.0	192.168.104.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
Cafeteria	105	192.168.105.0	192.168.105.254	1	1
				2	1
Playground	106	192.168.106.0	192.168.106.254	1	2
Total					78

For the authentication, I used the portal authentication to control the access to the network. With portal authentication, all the students and teachers must log in to the portal website, and then each of them might access the portal website. And if they want to access the internet, they have to pass the portal authentication on the portal website. The benefit is that it authenticates clients directly through the web page, without the use of any client software. It's for the IT manager to manage the clients.

Lists of Hardware and Budgets

For the campus WLAN, I have to consider about the hardware from all sides. When selecting the APs, I considered the following sides: the first ones are the environmental characteristics, whether the AP is used in an indoor area or an outdoor area. The second is the way of installation, whether to install on the ceiling or panel. The third is the power supply, whether it is standard PoE or passive PoE. The fourth is the coverage of the WLAN, whether it is a single room or multiple rooms. How many clients will access each AP. All of the hardware is manufactured by the TP-LINK company from China, as they are much suitable for the real situation of this project.

I selected TL-AP1750C-PoE as the model of indoor AP, as shown in Figure 25. TL-AP1750C-PoE is one kind of ceiling AP from the TP-LINK company. It can work in 2.4GHz or 5GHz bands and more clients are allowed to access the AP than the parity price of the other APs. This model of AP has built-in directional antenna in order to improve the signal quality of the coverage area. In the complex environment, we can increase the AP transmit power to enhance the coverage effect of the WLAN. According to the needs of the building, this model of AP can be installed on the ceiling or wall. It uses standard PoE for power supply and each AP only need one network cable. It is convenient for construction. The price of this model is EUR 120.



Figure 25. TL-AP1750C-PoE AP (TP-LINK 20173

The hardware specifications and software specifications of the model TL-AP1750C-PoE AP are shown in Table 5.

Table 5. Hardware and software specifications of TL-AP1750C-PoE

Hardware specifications

Product number	<ul style="list-style-type: none"> • TL-AP1750C-PoE
Installation	<ul style="list-style-type: none"> • Ceiling Mounting
Size	<ul style="list-style-type: none"> • 264 * 241 * 55mm
Wireless	<ul style="list-style-type: none"> • 2.4GHz Frequency Band: 450Mbps • 5GHz Frequency Band: 1300Mbps
Port	<ul style="list-style-type: none"> • One 10/100 / 1000M RJ45 port
Power supply	<ul style="list-style-type: none"> • PoE Power
Supply Total power consumption	<ul style="list-style-type: none"> • 15.31W
Use of the environment	<ul style="list-style-type: none"> • Operating Temperature: 0 °C ~ 40 °C • Operating Humidity: 10% to 90% RH Non-condensing • Storage Temperature: -40 °C ~ 70 °C • Storage Humidity: 5% to 90% RH Non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> • SSID Broadcast: Supported • Network Type: Guest network, Employee network • Wireless Encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User Isolation: Isolation between wireless networks, AP in-ternal isolation • VLAN Settings: support SSID and Tag VLAN binding • Transmit Power Setting: Supports 1dBm linear regulation
The number of clients that can be associated	<ul style="list-style-type: none"> • Number of Wireless clients: Restricted • 100
System management	<ul style="list-style-type: none"> • System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported • Software Upgrade: Support

I selected TL-AP300P as the outdoor AP for the WLAN, as shown in Figure 26. TL-AP300P is a model of high power AP for outdoor place. It uses ASA outdoor plastic shell and professional components in order to possessing good proper- ties for damp-proof, dustproof, anti-statics, shocking-resistance and lightning protection. It will adapt to wind, sun, rain, snow and other harsh environments. It will operate properly even in the extreme high and low temperature (-30 ° C ~ 70 ° C) environment. TL-AP300P provides 300Mbps transmission rate and it has built-in 9dBi high-gain dual-polarized antenna, so that it has stronger signal and a wider range covering area. TL-AP300P has 500mW emissive power and

-95dBm acceptance sensitivity, and is especially suitable for outdoor long-distance WLAN applications. It uses passive PoE cable for power supply and 60 meters electric power transmission. The price of the model is EUR 70.



Figure 26. TL-AP300P AP (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AP300P AP are shown in Table 6.

Table 6. Hardware and software specifications of TL-AP300P AP

Hardware specifications

Product number	<ul style="list-style-type: none"> • TL-AP300P
Installation	<ul style="list-style-type: none"> • Pole installation
Size	<ul style="list-style-type: none"> • 224 * 79 * 60mm
Wireless	<ul style="list-style-type: none"> • Working frequency band: 2.4GHz-2.483GHz (China) Wireless rate: 300Mbps
Power supply	<ul style="list-style-type: none"> • 24VDC / 1A Passive PoE power supply, distance of 60M
Environmental protection	<ul style="list-style-type: none"> • 6kV lightning protection, 15kV ESD protection • ASA engineering plastic housing, IP55 grade dustproof, waterproof
Use of the environment	<ul style="list-style-type: none"> • Operating temperature: -30 °C ~ 70 °C • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> • SSID Broadcast: Supported • Network type: Guest network, employee network • Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User isolation: isolation between wireless networks, AP internal isolation • VLAN settings: support SSID and Tag VLAN binding • Transmit power setting: Supports 1dBm linear regulation
The number of clients that can be associated	<ul style="list-style-type: none"> • 100
System management	<ul style="list-style-type: none"> • System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported

I selected TL-SL1218MP as the model of access switch, as shown in Figure 27. TL-SL1218MP is a PoE switch designed by the TP-LINK company. It will provide standard switching, video monitoring and VLAN isolation. The management and maintenance of the switch is simple. And, It's designed to meet the requirements of a medium sized enterprise, community, hotel, office network and campus to set up their cost-effective network. The price of the PoE switch is EUR 150.



Figure 27. TL-SL1218MP switch (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AP300P AP are shown in Table 7.

Table 7. Hardware and software specifications of TL-AP1750C-PoE

Hardware specifications

Product number	• TL-SG5428
Size	• 290* 180* 44 mm
Port	<ul style="list-style-type: none"> • 16 10 / 100Mbps RJ45 ports, support PoE power supply • 2 10/100 / 1000Mbps RJ45 ports • Operating temperature: 0 °C ~ 40 °C
Use of the environment	<ul style="list-style-type: none"> • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Basic features	<ul style="list-style-type: none"> • M1: Standard switching • M2: Video monitoring • M3: VLAN isolation
----------------	--

I selected TL-AC100 as the wireless controller of the WLAN, as shown in Figure

28. TL-AC100 is one of the TP-LINK wireless controller products designed for hotels, enterprises, schools, shopping malls and restaurants. And, it can be unified to manage up to 100 TP-LINK ceiling APs and panel APs. It can meet a wide range of wireless engineering requirements. TL-AC100 regularly collects

the working status of each AP, and, as all the APs' working state will be displayed on the interface in an intuitive way, it's easy for IT managers to manage the APs. IT managers can unified upgrade all the APs' software through TL-AC100 in order to avoid the trouble of a separate upgrade. It will reduce the complexity of maintenance. In my case, I have 78 APs for the campus, so it's a good idea to select TL-AC100 as the wireless controller when considering the efficiency and cost at the same time. The price of the wireless controller is EUR50.



Figure 28. TL-AC100 wireless controller (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AC100 wireless controller are shown in Table 8.

Table 8. Hardware and software specifications of TL-AC100

Hardware specifications

Product number	• TL-AC100
Size	• 209* 126 * 26mm
Port	<ul style="list-style-type: none"> • 5 10/100M RJ45 ports • Operating temperature: 0 °C ~ 40 °C
Use of the environment	<ul style="list-style-type: none"> • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> • SSID Broadcast: Supported • Network type: Guest network, employee network • Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User isolation: isolation between wireless networks, AP internal isolation • VLAN settings: support SSID and Tag VLAN binding • Transmit power setting: Supports 1dBm linear regulation
The number of clients that can be associated	<ul style="list-style-type: none"> • 100
System Management	<ul style="list-style-type: none"> • System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported • Software Upgrade: Support

I selected the TL-SG5428 as the core switch of the WLAN, as shown in Figure

29. The TL-SG5428 is a gigabit three-tier network management switches that TP-LINK company designed for high-security high-performance network. It supports RIP, static routing, DHCP server, DHCP relay, ARP proxy. It will provides comprehensive security policy, perfect QoS strategy and VLAN function. It is easy to manage and maintenance. It can be acts as the core switch of medium enterprises, residential, hotel and campus network, in order to meet the high performance, stable, reliable and affordable network needs. The price of this model is EUR 350.

Figure 29. TL-SG5428 core switch (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-SG5428 core switch are shown in Table 8.



Table 9. Hardware and software specifications of TL-SG5428 core switch

Hardware specifications

Product number	• TL-SG5428
Size	• 440* 180* 26mm
Port	• 5 10/100M RJ45 ports
Use of the environment	• Operating temperature: 0 °C ~ 40 °C
	• Operating humidity: 10% to 90% RH non-condensing
	• Storage temperature: -40 °C ~ 70 °C
	• Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	• SSID Broadcast: Supported
	• Network type: Guest network, employee network
	• Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK
	• User isolation: isolation between wireless networks, AP internal isolation
The number of clients that can be associated	• VLAN settings: support SSID and Tag VLAN binding
	• Transmit power setting: Supports 1dBm linear regulation
System Management	• 100
	• System Log: Yes
	• Factory Reset: Supported
	• Backup Configuration: Supported
	• Import Configuration: Supported
	• Software Upgrade: Support

4 CONCLUSION

We are now in a new era of information and it has become the core factor of social and economic development. Information technology has become the trend of the world. The use of the networks is more closely linked to human society, political, economic and daily work, and all aspects of life. What's more, the computer networks will be destined to become the most important infra- structure for the 21st century global information society.

The WLAN is the product that combine computer technology and wireless communication technology. It brings a lot of convenience to people's lives. The aim of the project was to create a WLAN for campus. In theory part I gained deep knowledge of the features of WLANs, including the advantages and limitations of WLANs, technical standards of WLANs, security and authentications of WLANs, components of WLANs and different kind topologies of WLANs. After that, I successfully built a topology for the WLAN in the practical part by using the VISIO tool. I also managed channels and APs by using HiveManager NG. Then, I selected the suitable security methods and hardware for the WLAN.

There were still some difficulties left during the implementation of this project. For example, how to deploy APs in a real environment, how to calculate the attenuation power according to the material of the barrier and what kinds of software should be installed in the WLAN? What's more, in this project I just defined an abstract concept for WLAN. If you want to build WLANs, you need an IT group to discuss and consider more about the project, it is not an easy job in the real environment, you have to consider about all the hardware and soft- ware at the same time. With the progress and continuous innovation of network technology, WLANs still play an important role in our daily life for many aspect.

REFERENCE

Bradley, M. 2017. Wireless Standards 802.11a, 802.11b/g/n, and 802.11ac. WWW document. Available at: <https://www.lifewire.com/wireless-standards-802-11a-802-11b-g-n-and-802-11ac-816553>[Accessed 01 April 2017].

Bradley, M. 2017. What Hardware Is Required to Build a Wireless Network? WWW document. Available at: <https://www.lifewire.com/required-to-build-wireless-networks-816542> [Accessed 01 April 2017].

Karen, S and Derrick, D. 2007. Wireless Network Security for IEEE 802.11a/b/g and Bluetooth. PDF document. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.109.6200&rep=rep1&type=pdf> [Accessed 01 April 2017].

Abdelkarim, R. 2006. Security in Wireless Data Networks: A Survey Paper. WWW document. Available at http://www.cs.wustl.edu/~jain/cse574-06/ftp/wireless_security/index.html[Accessed 20 April 2017].

Stefan, P and Vladimir, W. 2012. Wireless Mesh Networks - Efficient Link Scheduling, Channel Assignment and Network Planning Strategies. WWW Document. Available at :<http://www.intechopen.com/books/wireless-mesh-networks-efficient-link-scheduling-channel-assignment-and-network-planning-strategies/channel-assignment-schemes-optimization-for-multi-interface-wireless-mesh-networks-based-on-link-loa> [Accessed 08 March 2017].

Cisco. 2008. Authentication Types for Wireless Devices. WWW document. Available at :<http://www.cisco.com/c/en/us/td/docs/routers/access/wireless/software/guide/SecurityAuthenticationTypes.html> [Accessed 25 April 2017].

Alexandra, G. 2015. Getting Familiar with Wi-Fi Channels? WLAN Back to Basics. WWW document. Available at :<http://boundless.aerohive.com/experts/WLAN-Channels-Explained.html>[Accessed 26 March 2017].

Cisco. 2011. Wireless LAN Controller Web Authentication Configuration Example. WWW document. Available at :<http://www.cisco.com/c/en/us/support/docs/wireless-mobility/wlan-security/69340-web-auth-config.html> [Accessed 20 April 2017].

H3C. Portal Authentication Technology White Paper. WWW document. Available at :http://www.h3c.com.hk/Products_Technology/Technology/Security_and_VPN/Technology_White_Paper/200809/617218_57_0.htm[Accessed 08 March 2017].

RF Wireless World. no date. WEP vs WPA vs WPA2 . WWW Document. Available at: <http://www.rfwireless-world.com/Terminology/WEP-vs-WPA-vs-WPA2.html>[Accessed 02 April 2017].

Difference Between. no date. Difference between Wireless LAN and Bluetooth. WWW Document. Available at:<http://www.differencebetween.info/difference-between-wireless-lan-and-bluetooth> [Accessed 12 March 2017].

Abby, S. 2014. WHAT IS A WLAN CONTROLLER (PART 1) . WWW Document. Available at: <http://boundless.aerohive.com/blog/what-is-a-wlan-controller-part-1.html>[Accessed 12 April 2017].

Brent, A. 2001. HomeRF and Bluetooth Wireless Communication Compared. WWW Document. Available at: <http://www.informit.com/articles/article.aspx?p=24265&seqNum=4>[Accessed 02 April 2017].

National Instruments. 2015. WLAN - 802.11 a, b, g and n. WWW Document. Available at:<http://www.ni.com/tutorial/7131/en/>[Accessed 08 March 2017].

Mark, C. 2013. CWNA Guide to Wireless LANs. WWW Document. Available at: https://books.google.fi/books?id=VbAKAAAAQ-BAJ&pg=PA168&lpg=PA168&dq=FHSS+DSSS+WLAN&source=bl&ots=8uVKcTskBr&sig=EXwMq0qaDGrsO5jZrTUUIq2cbtU&hl=zh-CN&sa=X&ved=0ahUKEwjw_b_7p6fTAhWC3iwKHxsxCfcQ6AEIcjAJ#v=onepage&q=FHSS%20DSSS%20WLAN&f=false [Accessed 26 March 2017].

Samraiz, T. 2014. Bluetooth. WWW Document. Available at: <https://www.sli-deshare.net/Samraiz1/bluetooth-32312039>[Accessed 02 April 2017].

Animasigaia. 2014. NETWORKING AND COMMUNICATIONS. WWW Document. Available at: <https://animasigaia.wordpress.com/2014/11/26/networking-and-communications/> [Accessed 28 April 2017].

Wikipedia. 2017. Wireless LAN controller. WWW Document. Available at: https://en.wikipedia.org/wiki/Wireless_LAN_controller [Accessed 28 April 2017].

Microsoft. 2003. How 802.11 Wireless Works. WWW Document. Available at: [https://technet.microsoft.com/en-us/library/cc757419\(v=ws.10\).aspx](https://technet.microsoft.com/en-us/library/cc757419(v=ws.10).aspx) [Accessed 28 April 2017].

Metageek. no date. Why Channels 1, 6 and 11? WWW Document. Available at: http://metageek.com/training/resources/why-channels-1-6-11-2.html?utm_expid=190328-189.BCYMV3QrTsW_IMQM0PlqcA.1&utm_referrer=https%3A%2F%2Fwww.google.fr%2F [Accessed 28 April 2017].

TP-LINK. 2017. Product World. WWW Document. Available at: <http://www.tp-link.com.cn> [Accessed 05 May 2017].

Government Degree College:: Khairatabad

A.Y. 2022-23



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

**“DATA ANALYSIS OF SUPERMARKET
SALES”**

By

114021539018-K. Meenakshi Sowmya

114021539040-P. Sanjay

114021539038-P. BheemRaj

114021539043-R. Vinod Goud

114021539026-K. Harini

**Under the supervision of
B. Rajitha Rani**

**Department of Computer Science &
Applications**


B. Rajitha Rani



TABLE OF CONTENT

- **Abstract**
- **Introduction**
- **Motive**
- **Libraries used**
- **Exploring data**
- **Analysis**
- **Conclusion**
- **References**

ABSTRACT

This Paper presents a data analysis project focused on exploring the potential of python to analyze data from a variety of sources. We will use python programming language to create a comprehensive data analysis program that can extract, process and visualize, manipulate data from multiple sources. We will explore the capabilities of several existing python libraries such as "Pandas, Numpy, Matplotlib & Seaborn" to create efficient and easy to use data analysis tools. We will also discuss the challenges encountered in creating a data analysis pipeline and the strategies used to address them. Finally we will present findings and conclusions regarding the efficiency of python for data analysis.

INTRODUCTION

In this Project we will analyse the dataset of a supermarket sales. We will use a variety of methods to explore the dataset including descriptive statistics, data manipulation, data visualization.

Our analysis should provide valuable insight into customers preferences, needs etc.,. additionally this project will demonstrate our understanding of data analysis, techniques such as cleaning and exploring data.

MOTIVE

The main goal of this data visualization project is to make it easier to identify patterns, trends & outliers in large dataset and to gain insight into customer behaviour and preferences in order to take decisions about product design.

Through analysing the data we hope to uncover the trends that can help the supermarket in understanding and serving the customer in a better way.

LIBRARIES USED

- **Pandas # for Data Manipulation**
- **Matplotlib # for Data Visualization**
- **Seaborn # for Data Visualization**

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
```

- Firstly we have to import the supermarket sales csv dataset using read method.

In [2]:

```
Supermarket_Sales=pd.read_csv("MarketSales1.csv")
Supermarket_Sales
```

Out[2]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	3.8200	80
2	631-41-3108	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	16.2155	340
3	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.2880	489
4	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634
...
494	437-53-3084	B	Mandalay	Normal	Male	Fashion accessories	99.89	2	9.9890	209
495	632-32-4574	B	Mandalay	Normal	Male	Sports and travel	75.92	8	30.3680	637
496	556-97-7101	C	Naypyitaw	Normal	Female	Electronic accessories	63.22	2	6.3220	132
497	862-59-8517	C	Naypyitaw	Normal	Female	Food and beverages	90.24	6	27.0720	568
498	401-18-8016	B	Mandalay	Member	Female	Sports and travel	98.13	1	4.9065	103

499 rows x 17 columns



To display all the rows in a dataset, we are using the below mentioned syntax

In [3]:

```
pd.options.display.max_rows=500
```

```
Supermarket_Sales
```

Out[4]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total	
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715	01
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	3.8200	80.2200	03
2	631-41-	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	16.2155	340.5255	03
3	123-19-	A	Yangon	Member	Male	Health and	58.22	8	23.2880	489.0480	1/27/
4	373-73-	A	Yangon	Normal	Male	Sports and	86.31	7	30.2085	634.3785	02
5	699-14-	C	Naypyitaw	Normal	Male	Electronic	85.39	7	29.8865	627.6165	3/25/

To view the top 5 rows of a DataFrame, we use `head()` method

In [5]:

```
Supermarket_Sales.head()
```

Out[5]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	To
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.97
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	3.8200	80.22
2	631-41-3108	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	16.2155	340.52
3	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.2880	489.04
4	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.37

To view the bottom 5 rows of a DataFrame, we use `tail()` method

```
Supermarket_Sales.tail()
```

Out[6]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	
494	437-53-3084	B	Mandalay	Normal	Male	Fashion accessories	99.89	2	9.9890	209
495	632-32-4574	B	Mandalay	Normal	Male	Sports and travel	75.92	8	30.3680	637
496	556-97-7101	C	Naypyitaw	Normal	Female	Electronic accessories	63.22	2	6.3220	132
497	862-59-8517	C	Naypyitaw	Normal	Female	Food and beverages	90.24	6	27.0720	568
498	401-18-8016	B	Mandalay	Member	Female	Sports and travel	98.13	1	4.9065	103

To view all the column titles of a DataFrame, we use columns method

In [7]:

```
Supermarket_Sales.columns
```

Out[7]:

```
Index(['Invoice ID', 'Branch', 'City', 'Customer type', 'Gender',
      'Product line', 'Unit price', 'Quantity', 'Tax 5%', 'Total', 'Date',
      'Time', 'Payment', 'cogs', 'gross margin percentage', 'gross income',
      'Rating'],
      dtype='object')
```

To view the complete information of the DataFrame, we use info() method

In [8]:

```
Supermarket_Sales.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 499 entries, 0 to 498
```

Data columns (total 17 columns):

#	Column	Non-Null Count	Dtype
0	Invoice ID	499 non-null	object
1	Branch	499 non-null	object
2	City	499 non-null	object
3	Customer type	499 non-null	object
4	Gender	499 non-null	object
5	Product line	499 non-null	object
6	Unit price	499 non-null	float64
7	Quantity	499 non-null	int64
8	Tax 5%	499 non-null	float64
9	Total	499 non-null	float64
10	Date	499 non-null	object
11	Time	499 non-null	object
12	Payment	499 non-null	object
13	cogs	499 non-null	float64
14	gross margin percentage	499 non-null	float64
15	gross income	499 non-null	float64
16	Rating	499 non-null	float64

dtypes: float64(7), int64(1), object(9)

memory usage: 66.4+ KB

ANALYSIS

1Q. How many male customers in Yangon city bought products using Credit cards?

- We used loc method to return a single or multiple specified rows.

In [9]:

```
Male_customers=(Supermarket_Sales.loc[(Supermarket_Sales.City=="Yangon")&(Supermarket_Sales
Male_customers
```


Out[9]:

	City	Gender	Payment	Quantity	cogs
2	Yangon	Male	Credit card	7	324.31
17	Yangon	Male	Credit card	6	435.66
18	Yangon	Male	Credit card	3	164.01
33	Yangon	Male	Credit card	2	193.16
63	Yangon	Male	Credit card	10	158.10
87	Yangon	Male	Credit card	7	345.66
149	Yangon	Male	Credit card	8	259.68
152	Yangon	Male	Credit card	9	749.16
155	Yangon	Male	Credit card	5	461.45
162	Yangon	Male	Credit card	7	320.53
167	Yangon	Male	Credit card	10	989.80
169	Yangon	Male	Credit card	7	486.64
176	Yangon	Male	Credit card	8	177.36
194	Yangon	Male	Credit card	5	163.55
215	Yangon	Male	Credit card	1	18.28
240	Yangon	Male	Credit card	9	224.46
241	Yangon	Male	Credit card	2	119.54
248	Yangon	Male	Credit card	4	310.88
256	Yangon	Male	Credit card	1	66.35
268	Yangon	Male	Credit card	4	282.96
279	Yangon	Male	Credit card	10	440.20
324	Yangon	Male	Credit card	6	129.12
331	Yangon	Male	Credit card	3	98.70
333	Yangon	Male	Credit card	2	46.96
360	Yangon	Male	Credit card	8	647.68
369	Yangon	Male	Credit card	9	193.50
380	Yangon	Male	Credit card	4	329.32
405	Yangon	Male	Credit card	4	269.04
406	Yangon	Male	Credit card	5	68.95
437	Yangon	Male	Credit card	6	203.94
464	Yangon	Male	Credit card	5	256.70
472	Yangon	Male	Credit card	10	431.30
475	Yangon	Male	Credit card	3	195.54

From the above DataFrame we can observe that a total of 33 male customers have bought the products using Credit cards.

2Q. Give a brief sketch of products bought by customers in all the cities?

- We used `groupby()` method which allows us to group your data and execute functions on these groups.
- We used `count()` method that returns the count of values of all the columns at once.
- We used `unstack()` method that converts the specified row levels to column levels.

In [10]:

```
Supermarket_Sales.groupby(["City", "Gender", "Product line"])["City"].count().unstack()
```

Out[10]:

	Product line	Electronic accessories	Fashion accessories	Food and beverages	Health and beauty	Home and lifestyle	Sports and travel
City	Gender						
Mandalay	Female	11	20	14	12	6	14
	Male	12	13	8	16	16	16
Naypyitaw	Female	19	17	22	13	12	15
	Male	13	19	17	10	10	8
Yangon	Female	14	8	7	11	17	13
	Male	17	8	18	15	20	18

In the above DataFrame, it is clearly displayed the complete sketch of the products brought by the customers in all the cities from different category of accessories.

3Q. What is the average gross income of all the branches?

- We used `mean()` method which returns the mean of values over requested axis.
- We used `groupby()` method which allows us to group your data and execute functions on these groups.

In [11]:

```
Supermarket_Sales.groupby("Branch")[["gross income"]].mean()
```

Out[11]:

	gross income
Branch	
A	15.216750
B	15.885835
C	16.002800

From the above DataFrame, we can observe that the average gross income of Branch A is 15.2167, Branch B is 15.8858 and Branch B is 16.0028.

4Q. Give a Detailed analysis of all the payment methods used by male and female customers?

- We used groupby() method which allows us to group your data and execute functions on these groups.
- We used describe() method which returns some statistical details like percentage, mean, standard deviation, count, maximum and minimum values etc.

In [12]:

```
Supermarket_Sales.groupby(["Payment", "Gender"])[["Unit price", "Quantity"]].describe()
```

Out[12]:

		Unit price								
Payment	Gender	count	mean	std	min	25%	50%	75%	max	count
Cash	Female	96.0	55.312708	28.681538	12.03	28.8225	54.705	81.4700	99.69	96.0
	Male	90.0	53.659667	23.758991	11.81	32.8450	52.540	74.5475	99.78	90.0
Credit card	Female	76.0	51.773158	27.424834	10.59	29.3650	45.820	74.0475	99.73	76.0
	Male	77.0	53.284675	25.494503	13.79	33.2000	49.040	71.8600	99.96	77.0
Ewallet	Female	73.0	58.746438	26.778614	10.96	34.7000	60.880	79.7400	99.71	73.0
	Male	87.0	56.413678	28.830931	12.78	27.6750	53.440	85.7150	99.89	87.0

In the above DataFrame we can clearly observe the complete analysis of the payment methods used by all the customers.

5Q. Give the statistical data of total Unit price?

- We used describe() method which returns some statistical details like percentage, mean, standard deviation, count, maximum and minimum values etc.

In [13]:

```
Supermarket_Sales["Unit price"].describe()
```

Out[13]:

```
count    499.000000
mean     54.856814
std      26.875044
min      10.590000
25%     30.510000
50%     52.590000
75%     77.825000
max      99.960000
Name: Unit price, dtype: float64
```

In the above DataFrame, it is clearly displayed the statistics of Unit price.

6Q. List out the top ten sales with highest gross income?

70

- We used `sort_values()` method that sorts the DataFrame by the specified label.

In [14]:

```
highest_gross_income=Supermarket_Sales.sort_values("gross income",ascending=False).head(10)
highest_gross_income
```

Out[14]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	
350	860-79-0874	C	Naypyitaw	Member	Female	Fashion accessories	99.30	10	49.6500	104
167	687-47-8271	A	Yangon	Normal	Male	Fashion accessories	98.98	10	49.4900	103
422	271-88-8734	C	Naypyitaw	Member	Female	Fashion accessories	97.21	10	48.6050	102
166	234-65-2137	C	Naypyitaw	Normal	Male	Home and lifestyle	95.58	10	47.7900	100
357	554-42-2417	C	Naypyitaw	Normal	Female	Sports and travel	95.44	10	47.7200	100
429	325-77-6186	C	Naypyitaw	Normal	Female	Sports and travel	95.44	10	47.7200	100
141	280-17-4359	A	Yangon	Member	Female	Home and lifestyle	90.65	10	45.3250	95
122	219-22-9386	C	Naypyitaw	Member	Male	Health and beauty	90.50	10	45.2500	95
140	731-81-9469	B	Mandalay	Member	Male	Sports and travel	99.96	9	44.9820	94
209	817-69-8206	C	Naypyitaw	Member	Female	Sports and travel	89.80	10	44.9000	94
		B	Mandalay	Normal	Female	Electronic accessories	99.73	9	44.8785	94

In the above DataFrame, we can see that it is clearly sorted the top ten sales with highest gross income.

7Q . What is the total Unit price, Quantity, Gross income in each city?

- We used `groupby()` method which allows us to group your data and execute functions on these groups. We used
- `sum()` method that returns the total sum of values over requested axis.

In [15]:

```
city_sales=Supermarket_Sales.groupby("City").sum()
city_sales[["Unit price","Quantity","gross income"]]
```

Out[15]:

	Unit price	Quantity	gross income
City			
Mandalay	8813.28	898	2509.9620
Naypyitaw	9758.62	976	2800.4900
Yangon	8801.65	964	2525.9805

From the above DataFrame, we observe the total Unit prices, Quantity, Gross income of the 3 cities.

8Q. List out the total no.of sales in each category?

- We used groupby() method which allows us to group your data and execute functions on these groups.
- We used count() method that returns the count of values of all the columns at once.

In [16]:

```
Category_of_Accessories=Supermarket_Sales.groupby("Product line").count()
Category_of_Accessories[["Invoice ID","Total"]]
```

Out[16]:

	Invoice ID	Total
Product line		
Electronic accessories	86	86
Fashion accessories	85	85
Food and beverages	86	86
Health and beauty	77	77
Home and lifestyle	81	81
Sports and travel	84	84

In the above DataFrame, it clearly shows the list of total no.of sales in each category.

9Q. Plot the Gross income of top 15 sales of the DataFrame using line graph?

- Here head() method returns the first 15 sales of the DataFrame.

In [17]:

```
First_15_sales=Supermarket_Sales["gross income"].head(15)
First_15_sales
```

Out[17]:

```
0    26.1415
1     3.8200
2    16.2155
3    23.2880
4    30.2085
5    29.8865
6    20.6520
7    36.7800
8     3.6260
9     8.2260
10   2.8960
11   5.1020
12  11.7375
13  21.5950
14  35.6900
Name: gross income, dtype: float64
```

- We used `figsize()` method for adjusting the size of the graph
- We used `plot()` method for plotting the graph
- In `plot()` method we have used the parameters like; `marker` for styling the point in the graph, `color` to adjust the color of the lines in the graph, `mec` to give the edge color of the point in the graph.
- Here `xlabel()`, `ylabel()` methods are used to label the x-axis and y-axis.
- We used `title()` method that returns the title of the graph.
- We used `grid()` method that adds the grid lines to the graph.
- we used `legend()` method that adds the list of explanation for each wedge.
- `show()` method is used to display the graph.

In [18]:

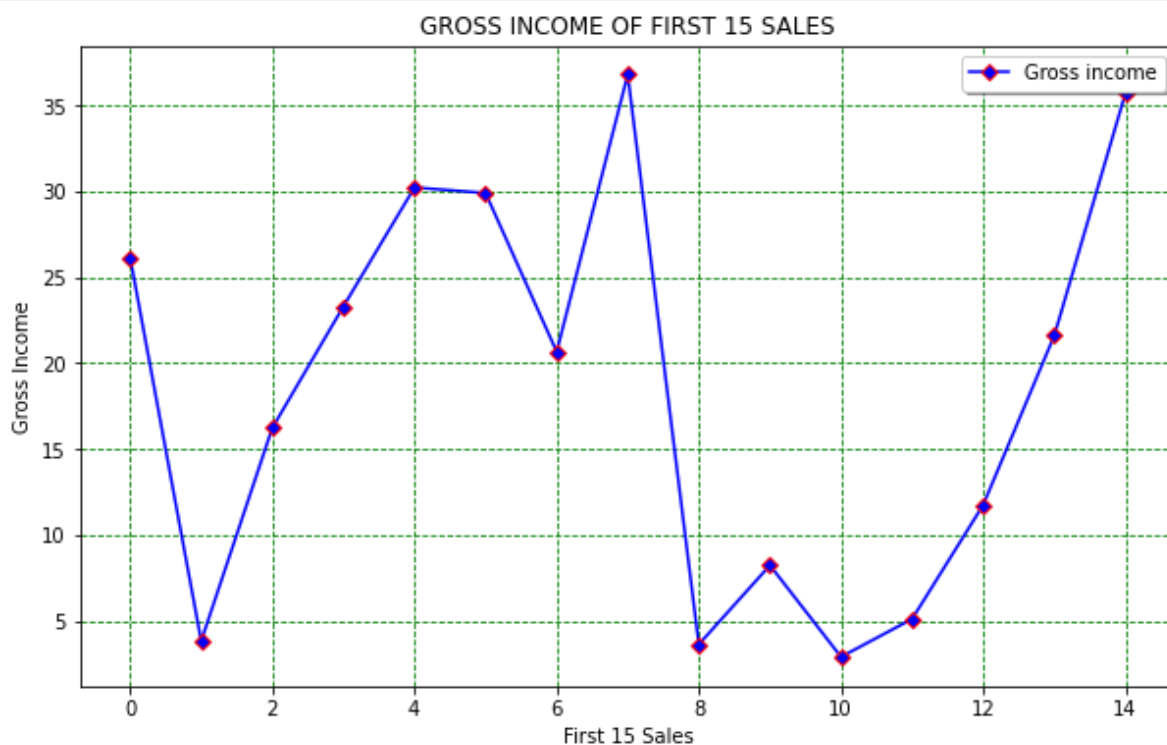
```
plt.figure(figsize=(10,6))

plt.plot(First_15_sales,marker="D",color="b",mec="r")
plt.xlabel("First 15 Sales")

plt.ylabel("Gross Income")

plt.title("GROSS INCOME OF FIRST 15 SALES")

plt.grid(color="g", linestyle="--")
```



10Q. Plot all the category of sales based on the total no.of units sold.

- Here `unique()` method finds the unique elements of an array and returns these unique elements as a sorted array.

In [19]:

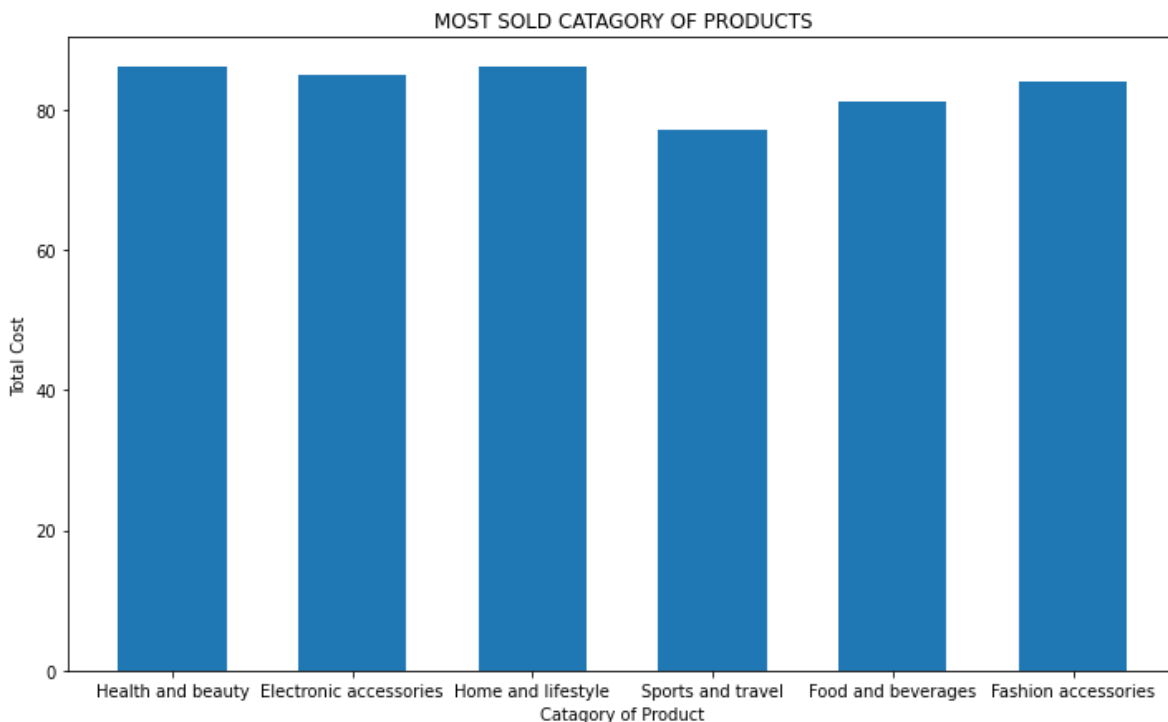
```
category_of_Accessories=Supermarket_Sales["Product line"].unique()
category_of_Accessories
```

```
array(['Health and beauty', 'Electronic accessories',
      'Home and lifestyle', 'Sports and travel', 'Food and beverages',
      'Fashion accessories'], dtype=object)
```

- We used figsize() method for adjusting the size of the graph.
- Here we used bar() method to represent the data in the form of bar graph.
- Here xlabel(), ylabel() methods are used to label the x-axis and y-axis.
- We used title() method that returns the title of the graph.
- show() method is used to display the graph.

In [20]:

```
plt.figure(figsize=(12,7))
plt.bar(category_of_Accessories,Catagory_of_Accessories["Total"],width=0.6)
plt.xlabel("Catagory of Product")
plt.ylabel("Total Cost")
plt.title("MOST SOLD CATAGORY OF PRODUCTS")
```



11Q. Plot the percentage of shares of Branches' A, B & C using Pie Chart.

- We used loc method to return a single or multiple specified rows.
- We used count() method that returns the count of values of all the columns at once.

In [21]:

```
data1=Supermarket_Sales.loc[Supermarket_Sales["Branch"]=="A"].count()[0]
data2=Supermarket_Sales.loc[Supermarket_Sales["Branch"]=="B"].count()[0]
data3=Supermarket_Sales.loc[Supermarket_Sales["Branch"]=="C"].count()[0]
```

- we used figsize() method for adjusting the size of the graph
- Here we used pie() method to represent the data in the form of pie chart.
-

we used title() method that returns the title of the graph.
 we used legend() method that adds the list of explanation for each wedge.show() method is used to display the graph

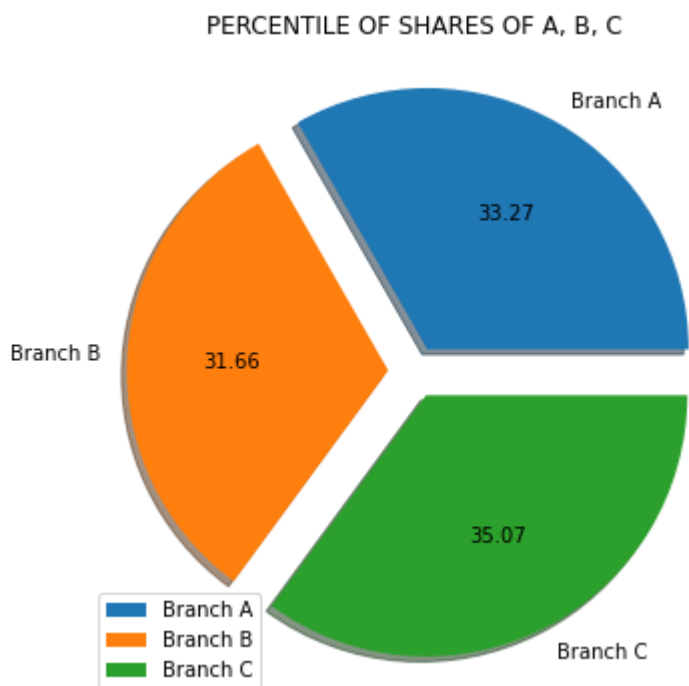
In [22]:

```
names=["Branch A","Branch B","Branch C"]
expand=[.1,.1,.1]

plt.figure(figsize=(8,6))

plt.pie([data1,data2,data3],labels=names,explode=expand,autopct="%.2f",shadow=True)
plt.title("PERCENTILE OF SHARES OF A, B, C")

plt.legend()
```



12Q. Compare the Gross income of Naypyitaw and Yangon using Box plot.

- we are using loc method to return a single or multiple specified rows.

In [23]:

```
Naypyitaw=Supermarket_Sales.loc[Supermarket_Sales["City"]=="Naypyitaw"]["gross income"]
Yangon=Supermarket_Sales.loc[Supermarket_Sales["City"]=="Yangon"]["gross income"]
```

- We used figsize() method for adjusting the size of the graph.
- Here we used boxplot() method to represent the data in the form of box plot.
- In boxplot() method, we have used the parameters like; labels to label the plots, patch_artist, which is used to fill the boxplot with colors and notch used to narrow the box around the median of the box plot.
- We used title() method that returns the title of the graph.
- show() method is used to display the graph.

In [24]:

```

labels=["Naypyitaw","Yangon"]
plt.figure(figsize=(7,9))

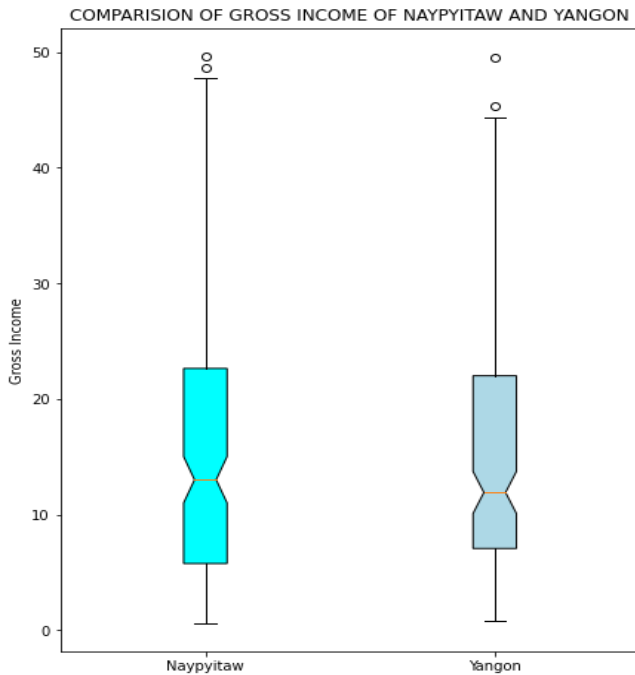
box=plt.boxplot([Naypyitaw,Yangon],labels=labels,patch_artist=True,notch=True)
plt.ylabel("Gross Income")

plt.title("COMPARISION OF GROSS INCOME OF NAYPYITAW AND YANGON")

colors = ['cyan', 'lightblue']

for notch, color in zip(box['boxes'], colors):

```



13Q. Plot the top 5 sales based on total revenue in bar plot.

- Here, we used `sort_values()` method that sorts the DataFrame by the specified label.

In [25]:

```

Highest_Citysales=Supermarket_Sales[["Invoice ID","Branch","City","Quantity","Total"]].sort
Highest_Citysales

```

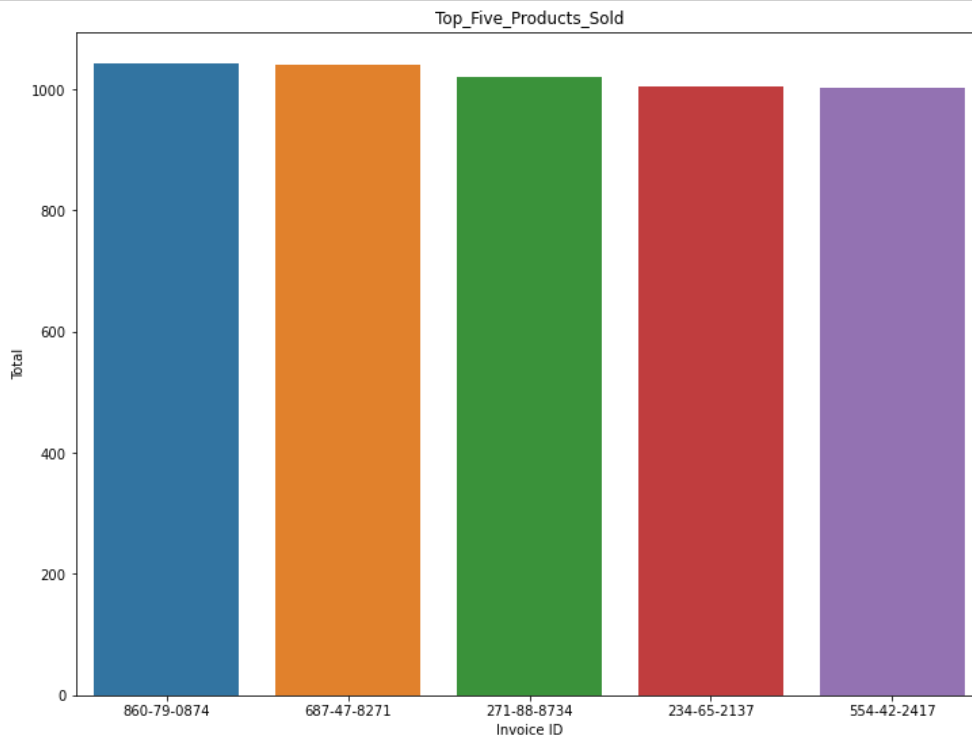
Out[25]:

	Invoice ID	Branch	City	Quantity	Total
350	860-79-0874	C	Naypyitaw	10	1042.650
167	687-47-8271	A	Yangon	10	1039.290
422	271-88-8734	C	Naypyitaw	10	1020.705
166	234-65-2137	C	Naypyitaw	10	1003.590
357	554-42-2417	C	Naypyitaw	10	1002.120

- We used `figsize()` method for adjusting the size of the graph.
- We used `title()` method that returns the title of the graph.
- `show()` method is used to display the graph.

In [26]:

```
plt.figure(figsize=(12,9))
sns.barplot(y="Total",x="Invoice ID",data=Highest_Citysales)
plt.title("Top_Five_Products_Sold")
```

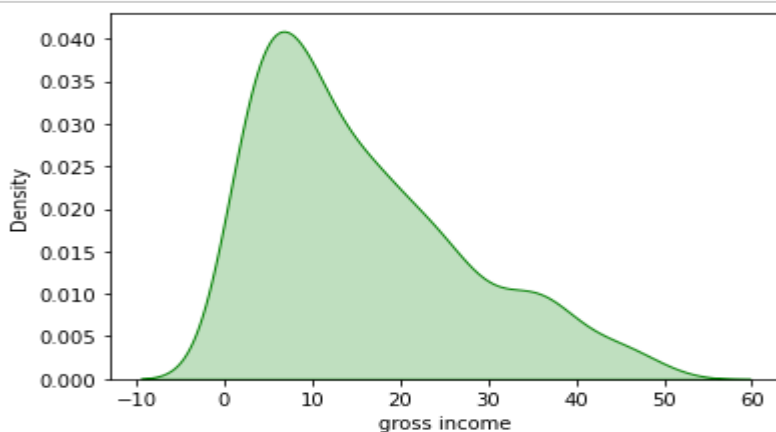


14Q. Plot the Gross income using Kdeplot.

- Here we used `kdeplot()` method to represent the graph in the form of kdeplot.
- In method `kdeplot()`, we have used the parameters like `color` used to give the color to the plot and `shade` is used to fill the area covered by curve in the graph.
- `show()` method is used to display the graph.

In [27]:

```
sns.kdeplot(x="gross income",data=Supermarket_Sales,color="green",shade=True)
plt.show()
```



15Q. Plot the total no.of sales of each city using Count plot.

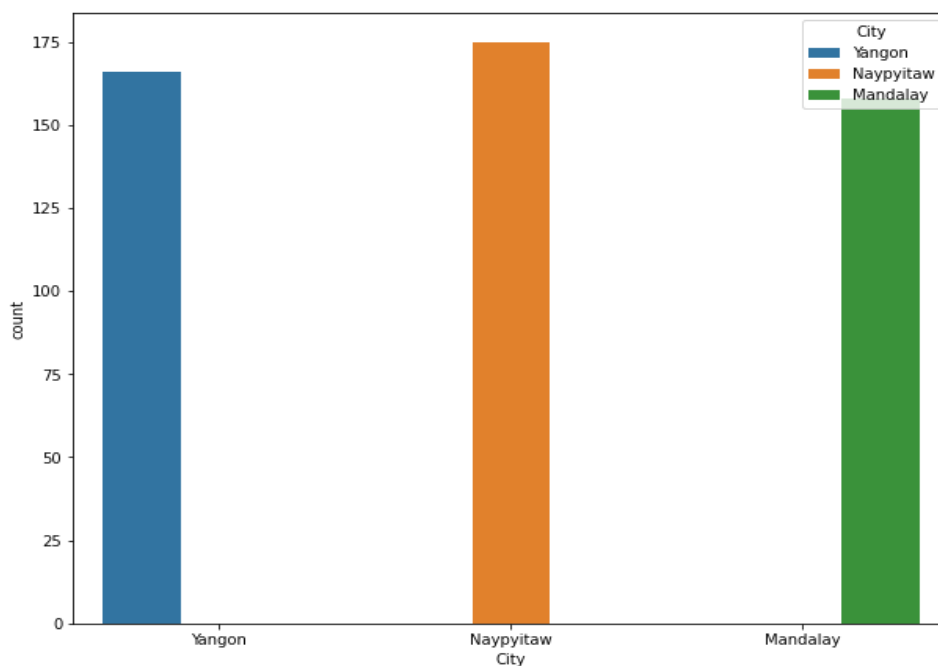
- We used `figsize()` method for adjusting the size of the graph.
- We used `countplot()` method to represent the data in the form of Count Plot.
- `show()` method is used to display the graph.

In [28]:

```
plt.figure(figsize=(10,8))
sns.countplot("City",data=Supermarket_Sales,hue="City")
plt.show()
```

C:\Users\Sanjay\anaconda3\lib\site-packages\seaborn_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

```
warnings.warn(
```

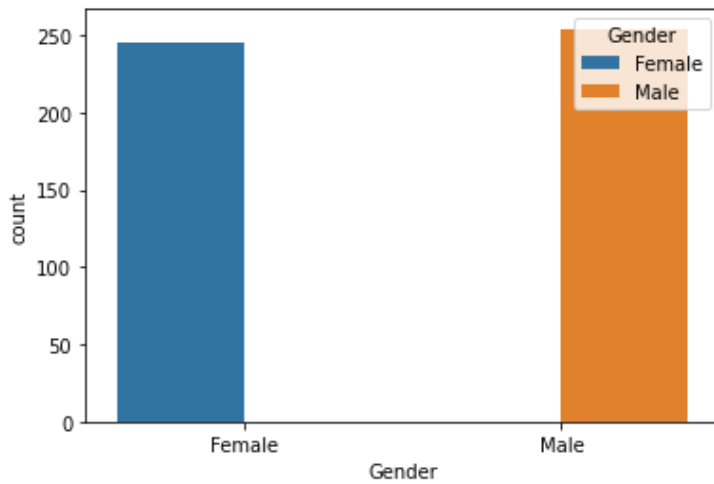


16Q. Plot the total no. of sales done by male and female customers using Countplot.

- We used `countplot()` method to represent the data in the form of Count Plot.
- `show()` method is used to display the graph.

In [29]:

```
sns.countplot(x="Gender",data=Supermarket_Sales,hue="Gender")
plt.show()
```



CONCLUSION

By this Data Analysis Project of Supermarket Sales using python, we have been able to provide a valuable insights into the sales pattern of source.

We have been able to identify the most profitable items, least profitable items and regional variations according to the Branches', Payment method, City, Customer Type, Quantity, Product Line, Gender, and ratings of customers and it has also been able to identify future sales using this project.

With this project, the store can adjust the pricing, category of sales depending upon the locality and they can likewise further develop their marketing strategies to maximize the sales and profits.

This data analysis helped them to understanding their sales and made them to take portful choices for what's to come.

Finally, as opposed to using various technologies, this project can help you in getting the precise report in a brief time frame on the most proficient method to continue further.

REFERENCES

- <https://www.google.co.in> (<https://www.google.co.in>)
- <https://www.kaggle.com> (<https://www.kaggle.com>)
- <https://github.com> (<https://github.com>)

GOVERNMENT DEGREE COLLEGE

KHAIRATABAD.

Dept of Computer Science & Applications

Student Study Project

LIBRARY MANAGEMENT SYSTEM

By

Mudassir Uddin

Shaik Altaf

Mohammed Hatim Siddiqui

Shaik Faheem

Sahil Khan

Under the supervision of

CH.MADHAVI

**Department of Computer Science &
Applications**

Mudassir

CH.MADHAVI

“LIBRARY MANAGEMENT SYSTEM”

PROJECT REPORT

Submitted by

MUDASSIR UDDIN – III B.com (CA) - 1140-2040-5241

SHAIK FAHEEM - III B.COM (CA) - 1140-2040-5327

SHAIK ALTAF - III B.COM (CA) - 1140-2040-5325

SAHIL KHAN - III B.COM (CA) - 1140-2040-5310

MOHAMMED HATIM SIDDIQUE - III B.COM (CA) - 1140-2040-5226

Under the supervision of

CH.MADHAVI

LECTURER IN COMPUTER SCIENCE & APPLICATIONS



GOVERNMENT DEGREE COLLEGE, KHAIRATABAD

Affiliated to Osmania University

Re-Accredited with 'B+' Grade by NAAC.

ACKNOWLEDGEMENT

We are greatly proud of our GOVERNMENT DEGREE COLLEGE, KHAIRATABAD, HYDERABAD, for providing us the needful education. We are very much thankful to our Principal, Dr.B.Rajendra Kumar Sir for encouraging us in the successful completion of the project work.

We also thank our Head of the Department of Computer Science and Applications Dr.S.Srinivasu, who has provided us a chance to do this project. We also feel very much proud to have her with us in our successful completion of the project under her excellent supervision. We are also very much thankful to all our faculty members of Departments of Computers who gave us valuable suggestions for the successful completion of this project.

Student Signatures:

- 1.
- 2.
- 3.
- 4.
- 5.

GOVERNMENT DEGREE COLLEGE, KHAIRATABAD

HYDERABAD

Affiliated to Osmania University

Re-Accredited with 'B+' Grade by NAAC



CERTIFICATE

This is to certify that Mudassir uddin – III B.com (CA) - 1140-2040-5241, Shaik Faheem - III B.COM (CA) - 1140-2040-5327, Shaik Altaf - III B.COM (CA) - 1140-2040-5325, Sahil Khan - III B.COM (CA) - 1140-2040-5310, Mohammed Hatim Siddique - III B.COM (CA) - 1140-2040-5226 of Government Degree College, Khairatabad, Hyderabad submitted the Project Work on "Library Management System " to JIGNASA STUDENT STUDY PROJECTS- 2023.

Supervisor

External Examiner

Head of the Department of Computer & Applications

Principal

CONTENTS

S.No.	Topic	PAGE NO.
1	Introduction	5-5
2	Objectives	6-6
3	Scope	7-7
4	Overview Of Current Library Management Process	7-8
5	Class Diagram	9
6	Explanation Of The Different Classes And Their Relationships	9-12
7	Reports And Analytics:	12-13
8	Background And Motivation For The Project	13-14
9	Overview Of The Technologies Used (Python Tkinter And Sqlite3)	16-17
10	Overview Of The Rest Of The Document	17-18
11	System Analysis And Design	19-20
12	Problem Statement And Requirements Gathering	21-21
13	Challenges Faced By The Library	22-23
14	Goals And Requirements Of The System	23-25
15	Conclusion Of The Project	33-33
16	Bibliography	33-33

1. INTRODUCTION

A library management system is a software application that is designed to manage the various activities that take place in a library. These activities include book and member management, borrowing and returning of books, and generating reports. A library management system helps automate these activities, making it easier and more efficient for library staff to manage the library.

Python `tkinter` is a powerful toolkit that is used for developing graphical user interfaces (GUI) in Python. It provides a set of tools and widgets that can be used to create rich and interactive GUI applications. When used in combination with `SQLite3`, a lightweight and efficient database management system, Python `tkinter` can be used to create a robust library management system that can handle all of the tasks required to manage a library.

In summary, a library management system created using Python `tkinter` is a powerful software application that can help automate the various tasks required to manage a library. By leveraging the power of Python `tkinter` and `SQLite3`, library staff can easily manage books and members, process book borrowing and returns, and generate reports, all through an intuitive and user-friendly graphical interface.

2.OBJECTIVES:

Automate the management of library resources and related activities, such as book acquisition, circulation, cataloging, and inventory management.

Facilitate the searching, borrowing, returning, and renewing of books by users.

Provide administrative tools for library staff to monitor and control library operations, such as issuing fines, generating reports, and analyzing usage statistics.

Improve the accuracy and efficiency of data entry, processing, and retrieval by using a computerized system instead of manual methods.

Enhance the user experience by offering personalized services, such as recommendations, alerts, and notifications.

Ensure the security and privacy of library data and users' information by implementing appropriate access controls and encryption techniques.

Integrate with external systems and services, such as online databases, e-book providers, and library consortia, to expand the scope and accessibility of the library resources.

3.Scope:

User registration and login: Allow users to create and access their accounts, manage their personal information, and view their borrowing history and status.

Book management: Enable librarians to add, edit, delete, and search for books in the library's collection, and assign them to specific categories, genres, authors, and publishers.

Circulation management: Support the circulation of books by issuing, renewing, and returning them, and applying rules and policies related to loan periods, fines, reservations, and holds.

4.Overview of the current library management process

Login and Authentication:

The library management system starts with a login screen where the user needs to enter a valid username and password.

If the user is authenticated successfully, they can access the system's features, and if the authentication fails, the user will be prompted to enter their credentials again.

Book Catalogue:

The library management system provides a book catalogue that lists all the books available in the library.

The user can search for a particular book using various search criteria, including book title, author name, ISBN, and publication date.

The system displays the book's details, including title, author, ISBN, publisher, and number of copies available.

Book Borrowing and Returning:

The library management system allows users to borrow and return books.

The user can select the book they want to borrow, and the system checks the availability of the book.

The user can borrow the book if it is available and the system updates the book's status to "issued."

The user can return the book once they are done reading it, and the system updates the book's status to "available."

Fine Management:

The library management system tracks fines for overdue books.

The system calculates the fine amount based on the due date and the actual return date of the book.

The user can view their fine details and pay the fine using the payment gateway provided by the system.

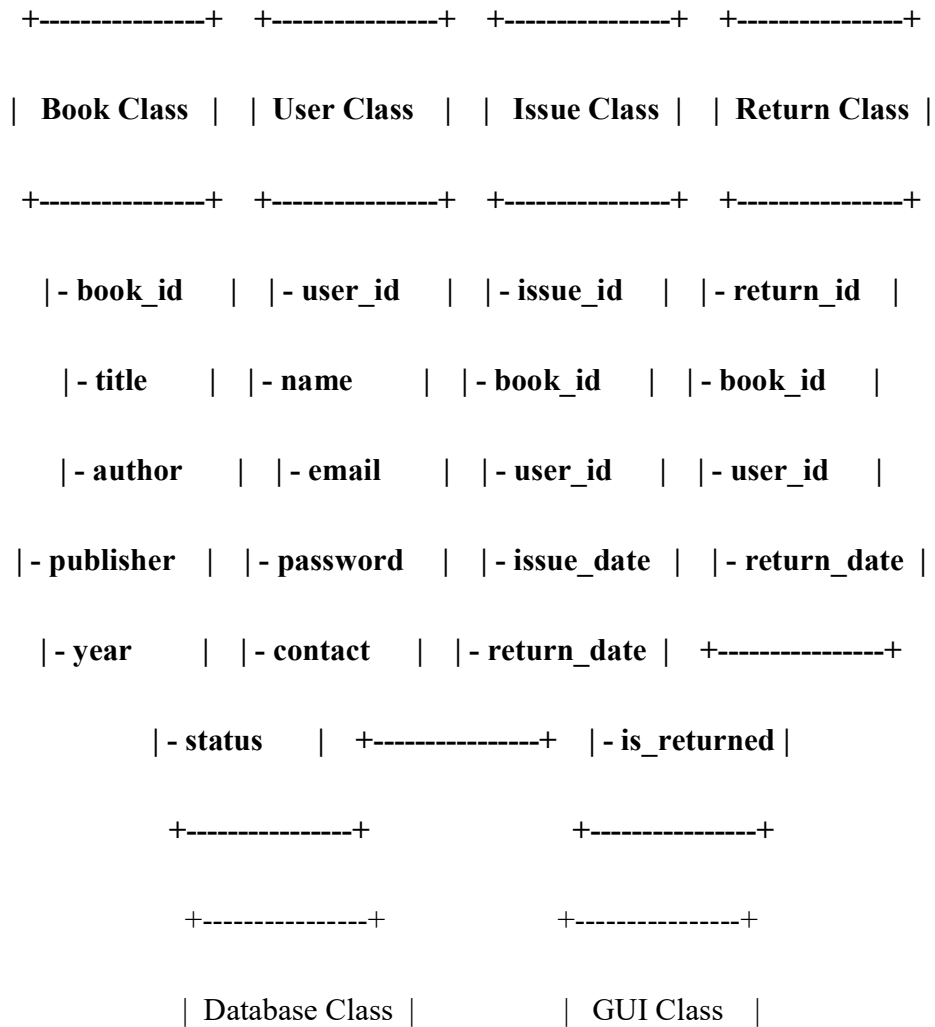
User Management:

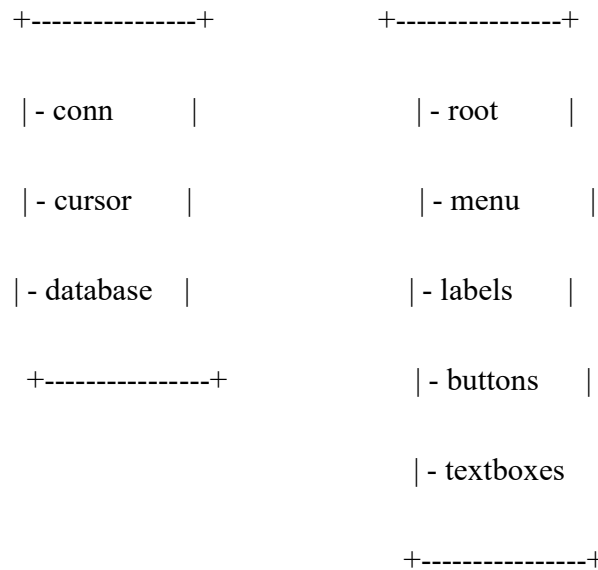
The library management system maintains user records, including their personal details and borrowing history.

The user can view their borrowing history and check their account balance.

The system provides the admin with the ability to add or remove users and edit their personal details.

5. Class diagram





6.Explanation of the different classes and their relationships

Book Class:

Represents a book in the library.

Has private properties such as book_id, title, author, publisher, year, and status.

book_id is a unique identifier for each book.

title, author, publisher, and year represent the basic details of the book.

status indicates whether the book is available or not.

User Class:

Represents a library user.

Has private properties such as user_id, name, email, password, and contact.

user_id is a unique identifier for each user.

name, email, and contact represent the user's basic details.

password is used for authentication purposes.

Issue Class:

Represents a book issued to a user.

Has private properties such as `issue_id`, `book_id`, `user_id`, `issue_date`, `return_date`, and `is_returned`.

`issue_id` is a unique identifier for each issue.

`book_id` and `user_id` represent the book and user associated with the issue.

`issue_date` and `return_date` represent the date the book was issued and the date it is due to be returned.

`is_returned` is a flag indicating whether the book has been returned or not.

Return Class:

Represents a book returned by a user.

Has private properties such as `return_id`, `book_id`, `user_id`, and `return_date`.

`return_id` is a unique identifier for each return.

`book_id` and `user_id` represent the book and user associated with the return.

`return_date` represents the date the book was returned.

Database Class:

Represents the database used to store book, user, issue, and return data.

Has private properties such as conn, cursor, and database.

conn is the connection object used to connect to the SQLite database.

cursor is the object used to execute SQL queries.

database is the name of the database file.

GUI Class:

Represents the graphical user interface used to interact with the library management system.

Has private properties such as root, menu, labels, buttons, and textboxes.

root is the main window of the application.

menu is the menu bar containing options such as "Add Book", "Issue Book", "Return Book", "View Books", "Search Books", and "Exit".

labels, buttons, and textboxes are the various widgets used to display and input data.

7. Reports and Analytics:

The library management system provides reports and analytics to help the admin understand the library's performance.

The system generates reports on book circulation, most popular books, most borrowed books, overdue books, and user borrowing patterns.

The admin can use these reports to make informed decisions and improve the library's performance.

Overall, the current library management process created using Python Tkinter and SQLite3 is user-friendly, efficient, and provides a comprehensive set of features for both users and admins. The system's features, including login and authentication, book catalogue, book borrowing and returning, fine management, user management, and reports and analytics, help simplify the library management process and improve the user's experience.

8. Background and motivation for the project

Background:

Traditional library operations are manual, time-consuming, and error-prone. Librarians have to manage the catalog of books, keep track of lending and returning activities, and update membership information manually.

Existing library management software solutions can be costly and complex to use, especially for smaller libraries with limited resources.

Python is a popular programming language for creating desktop applications due to its ease of use, versatility, and large community support.

Tkinter is a built-in Python module for creating graphical user interfaces (GUIs), providing a straightforward way to design and customize the application's appearance.

SQLite3 is a lightweight, file-based relational database management system (RDBMS) that can store and manipulate data effectively, making it suitable for small-scale applications like library management.

Motivation:

A desktop application for library management using Python, Tkinter, and SQLite3 can simplify and automate library operations, reducing manual workloads and increasing efficiency.

The application can help librarians to manage and organize the library's resources, such as books, magazines, and online materials, in a centralized and accessible way.

With the application, librarians can monitor the lending and returning activities in real-time, update member information automatically, and generate reports on the library's performance.

The application's use of Tkinter can provide an intuitive and user-friendly interface for librarians to interact with the application's features and functionality.

SQLite3's ability to store and manipulate data effectively can ensure that the application can handle large volumes of data while maintaining data integrity and consistency.

Overall, a desktop application for library management using Python, Tkinter, and SQLite3 can benefit librarians and library users, making library operations more efficient and accessible while minimizing costs and complexity.

Advantages of Library Management System using Python Tkinter and SQLite3:

User-friendly interface: With the use of Python Tkinter, it is easier to create a user-friendly interface, which is beneficial for both staff and library users.

Easy to develop: Python is an easy-to-learn programming language, and with the use of libraries like Tkinter, creating a library management system is much easier than with other languages.

Customizable: The flexibility of Python and Tkinter makes it possible to create a system that is customized to the specific needs of the library, which can lead to greater efficiency.

Cost-effective: Python is an open-source language, and using it to create a library management system can be more cost-effective than using proprietary software.

Portable: The library management system created with Python and Tkinter is portable, meaning that it can be used on different operating systems, making it more accessible to users.

Robust: With the use of SQLite3 database, the system becomes more robust, providing a secure and reliable way to store and manage data.

Disadvantages of Library Management System using Python Tkinter and SQLite3:

Limited scalability: While the system can handle the needs of small to medium-sized libraries, it may become less efficient as the library grows, and may not be able to handle large-scale data.

Limited functionality: As Python is primarily a scripting language, it may not have the full range of functions and features available in other programming languages, which may limit the functionality of the system.

Security concerns: While SQLite3 is a secure database management system, there may be concerns about the security of the system if not implemented properly, including potential vulnerabilities or risks of data breaches.

Technical expertise: The development and maintenance of the system may require technical expertise, which may be a challenge for libraries without dedicated IT staff or resources.

Limited support: Compared to proprietary software, the availability of technical support and assistance may be more limited with open-source solutions like Python and Tkinter.

9. Overview of the technologies used (Python tkinter and SQLite3)

Python:

Python is a popular high-level programming language known for its simplicity, readability, and versatility.

Python is easy to learn and use, making it an excellent choice for beginners and experienced programmers alike.

Python has a large community of developers, which provides extensive support, libraries, and frameworks for various applications, including desktop applications.

Tkinter:

Tkinter is a built-in Python module used to create graphical user interfaces (GUIs) for desktop applications.

Tkinter provides a set of widgets (GUI components), such as buttons, labels, and text boxes, that can be used to design the application's user interface.

Tkinter allows developers to customize the widgets' appearance and behavior, making it easy to create visually appealing and functional GUIs.

SQLite3:

SQLite3 is a lightweight, file-based relational database management system (RDBMS).

SQLite3 can store and manipulate data effectively, making it suitable for small-scale applications like desktop applications.

SQLite3 is easy to integrate with Python, making it an excellent choice for storing and managing application data.

SQLite3 provides features such as transaction support, atomic commit and rollback, and encryption, which help ensure data integrity, consistency, and security.

Overall, using Python, Tkinter, and SQLite3 provides a comprehensive set of technologies for creating desktop applications. Python provides the programming language's simplicity and versatility, while Tkinter provides the tools for creating visually appealing and functional GUIs. SQLite3 provides an easy-to-use and reliable database management system for storing and managing application data. Together, these technologies can help developers create powerful and user-friendly desktop applications.

10. Overview of the rest of the document

Introduction: Provide a brief background and context of the LMS, including its purpose, scope, and objectives. Explain why a computerized system is needed for managing library resources, and how the LMS can benefit librarians, users, and stakeholders. Outline the main features and functionalities of the LMS, and how they can be implemented using Python Tkinter.

User requirements: Describe the main user groups and their roles and responsibilities in the LMS, such as librarians, users, administrators, and technical support staff. Identify their specific needs, preferences, and expectations regarding the LMS features and functions, and how they can be addressed using Python Tkinter. Collect feedback and suggestions from users through

surveys, interviews, or usability testing, and incorporate them into the LMS design and development.

System design: Present the overall architecture and design of the LMS, including the software and hardware components, the data model, and the user interface. Use diagrams, flowcharts, and mockups to illustrate the different modules and screens of the LMS, and how they interact with each other. Explain the design principles and patterns used in the LMS, such as MVC, OOP, and event-driven programming, and how they can be implemented using Python Tkinter.

System implementation: Describe the technical aspects of implementing the LMS using Python Tkinter, such as the software development lifecycle, the programming languages and frameworks used, the database and file system integration, and the testing and debugging methodologies. Provide sample code snippets or pseudocode to illustrate the key functions and methods of the LMS, and how they can be implemented using Python Tkinter. Explain the deployment and maintenance procedures of the LMS, such as installation, configuration, backup, and security.

User manual: Provide a step-by-step guide on how to use the LMS, including how to perform common tasks, such as searching for books, borrowing and returning books, managing user accounts, and generating reports. Use screenshots, videos, or animations to illustrate the different steps and options of the LMS, and provide tips and shortcuts for improving the user experience. Include troubleshooting and FAQ sections to address common issues and questions.

Conclusion: Summarize the main achievements and challenges of the LMS project, and how they relate to the original objectives and scope. Reflect on the lessons learned and the best practices identified during the design and implementation phases, and how they can be applied to future LMS projects or other software development projects. Acknowledge the contributions and feedback of the users, stakeholders, and team members, and provide recommendations for further improvements and enhancements.

11. System Analysis and Design

System Analysis:

System Analysis is the process of understanding the requirements and constraints of the system to be developed.

System Analysis involves gathering, analyzing, and defining the user's needs and expectations from the application.

During System Analysis, the developer must understand the problem domain, identify the system's stakeholders, and establish the functional and non-functional requirements.

System Design:

System Design is the process of defining the system architecture, components, and interfaces.

System Design involves creating a blueprint for the system's construction, including data flow diagrams, data models, and user interface mockups.

During System Design, the developer must consider the technical and functional requirements, the system's scalability and maintainability, and the user interface's usability and accessibility.

Implementation:

Implementation is the process of translating the system design into code using the chosen programming language and tools.

Implementation involves coding the system's functionality, creating the user interface, and integrating the SQLite3 database.

During Implementation, the developer must test and debug the code, ensure data integrity and consistency in the database, and provide a user-friendly interface for the end-users.

Testing and Deployment:

Testing and Deployment are the processes of verifying the system's functionality and deploying the application to the end-users.

Testing involves validating the system's behavior against the functional and non-functional requirements and ensuring the system's reliability, performance, and security.

Deployment involves packaging and distributing the application to the end-users, including installing the application and its dependencies, configuring the system, and providing user documentation.

Overall, System Analysis and Design are critical components of developing a desktop application using Python, Tkinter, and SQLite3. By following the System Analysis and Design process, developers can ensure that the application meets the user's needs, is easy to use, and provides reliable and secure data management capabilities.

12. Problem statement and requirements gathering

Problem Statement:

The library management system is an essential tool for any library, helping to manage the circulation of books, the collection of fines, and the maintenance of library resources. However, many libraries still rely on manual systems for managing their resources, which can be time-consuming and error-prone. This project aims to develop a library management system using Python Tkinter that can automate many of the tasks involved in managing a library.

Requirements Gathering:

Book Management: The system should allow librarians to manage the library's collection, including book titles, authors, ISBN numbers, and publication information.

Borrowing and Returning Books: The system should allow users to borrow and return books easily, with the ability to check the availability of books and place holds on books that are currently checked out.

Fines and Fees: The system should calculate fines and fees for late returns, lost books, and other penalties, with the ability to accept payments and generate receipts.

Reports and Analytics: The system should generate reports on book circulation, user activity, overdue books, and other metrics to help librarians manage the library more efficiently.

User Interface: The system should have a user-friendly interface that is easy to navigate and use, with clear instructions and error messages.

Security and Privacy: The system should maintain user privacy and security, with secure login and password protection for librarians and users.

Scalability: The system should be scalable and able to handle a large number of users and books, with the ability to add new features and functionalities as needed.

13. Challenges faced by the library

Data management:

One of the biggest challenges is managing the vast amount of data that libraries have to deal with. This includes managing the books, users, and transactions in the library.

Security:

Libraries have to ensure that their systems are secure, and user data is protected from unauthorized access. This includes implementing authentication and authorization mechanisms, securing the network, and using encryption where necessary.

System reliability:

Library management systems need to be reliable and stable, as they handle critical functions such as book borrowing and returning, managing fines and fees, and keeping track of inventory. Any system downtime can result in inconvenience to users and financial losses to the library.

User interface:

The user interface of a library management system needs to be intuitive and user-friendly, allowing users to quickly and easily perform the functions they need to. This includes search and browse functions for books, as well as functions for borrowing, returning, and renewing books.

Integration with other systems:

Libraries may need to integrate their management system with other systems, such as accounting or student information systems, to ensure smooth operation and accurate reporting.

Technical expertise:

Libraries may not have the technical expertise necessary to develop and maintain their management systems. This can result in a reliance on third-party vendors, who may not provide the level of support required, or may be expensive to work with.

Training and support:

Libraries need to ensure that their staff members are trained on the management system and are able to use it effectively. They also need to provide ongoing support to users who may have questions or issues with the system.

14.Goals and requirements of the system

Goals:

The main goals of the library management system created using Python, Tkinter, and SQLite3 are:

To provide a user-friendly interface for managing library operations.

To simplify the book borrowing and returning process for users.

To automate routine tasks to reduce the workload of librarians.

To provide up-to-date information on book availability and circulation.

To ensure the security and privacy of user data.

To generate reports and analytics to help the library admin make informed decisions.

Requirements:

To achieve these goals, the library management system must fulfill the following

User authentication:

The system must provide a secure login system to ensure the security and privacy of user data.

Book cataloging:

The system must maintain an up-to-date catalog of all books available in the library, including their details such as title, author, ISBN, and publisher.

Book borrowing and returning:

The system must allow users to borrow and return books and update the book's status accordingly.

Fine management:

The system must track and manage fines for overdue books.

User management:

The system must maintain user records and allow the admin to add, remove, or edit user details.

Reporting:

The system must generate reports on book circulation, overdue books, fines, and other relevant data to help the admin make informed decisions.

Search functionality:

The system must provide a search function that allows users to find books by various criteria, such as title, author, or ISBN.

Notification system:

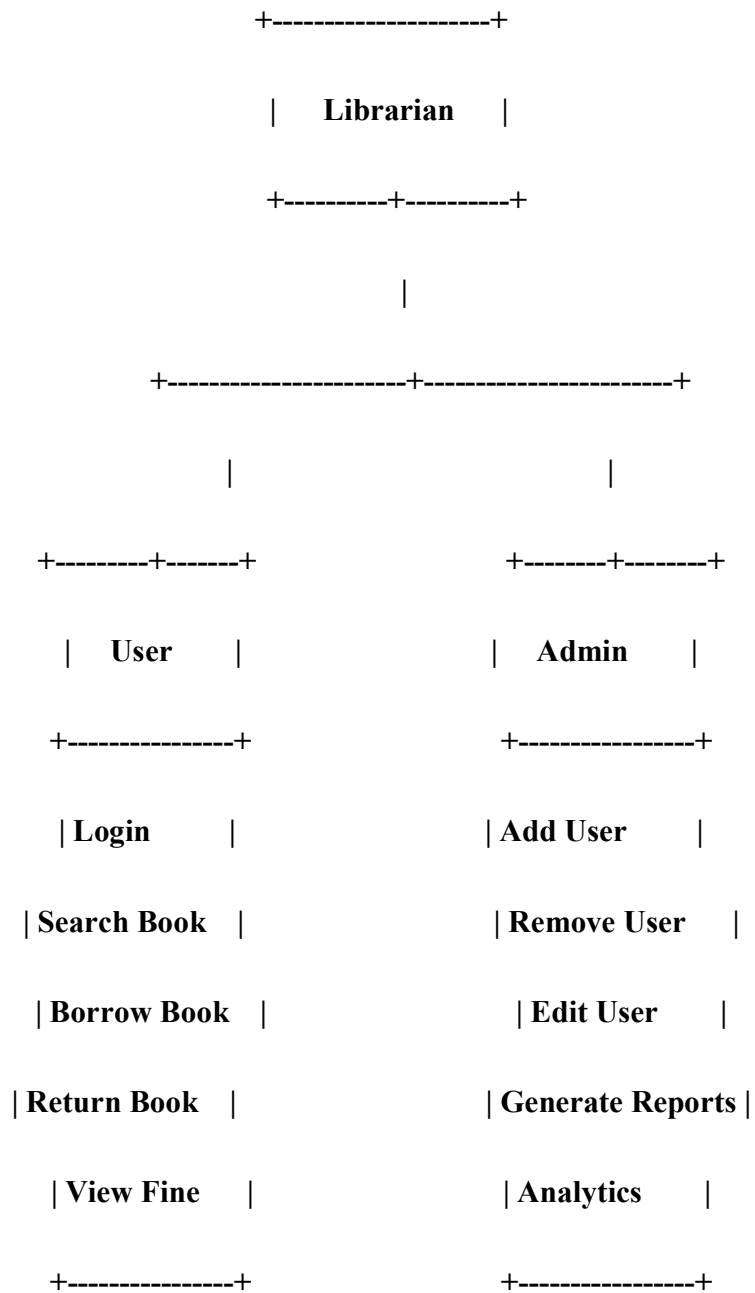
The system should be able to send notifications to users regarding overdue books, fines, and other relevant information.

Backup and restore:

The system should allow for backup and restore functionalities, to ensure the safety of the data in case of system failure or other issues.

By meeting these requirements, the library management system created using Python, Tkinter, and SQLite3 can provide an efficient and user-friendly solution for managing library operations.

Use case diagram



Explanation of the different use cases

Login:

This use case allows a user or an admin to log in to the system with their credentials.

Search Book:

This use case allows the user or admin to search for a book using various search criteria, such as book title, author, or ISBN.

Borrow Book:

This use case allows the user to borrow a book from the library. The system updates the book status to "borrowed" and records the borrower's information.

Return Book:

This use case allows the user to return a borrowed book. The system updates the book status to "available" and records the return date.

View Fine:

This use case allows the user to view their fines for overdue books.

Add User:

This use case allows the admin to add a new user to the system.

Remove User:

This use case allows the admin to remove a user from the system.

Edit User:

This use case allows the admin to edit a user's information, such as their name or contact details.

Generate Reports:

This use case allows the admin to generate reports on various aspects of the library management system, such as book circulation, overdue books, and fines.

Analytics:

This use case allows the admin to analyze the data collected by the system and gain insights into the library's performance.

Each of these use cases is essential for the library management system's proper functioning. By logging in, users and admins can access the system's various features and functionalities, such as searching for books, borrowing and returning books, viewing fines, and managing user accounts.

The admin-specific use cases, such as adding, removing, and editing users, allow the admin to manage the system's users efficiently. The generate reports and analytics use cases provide the admin with insights into the library's performance, enabling them to make data-driven decisions to improve the library's operations.

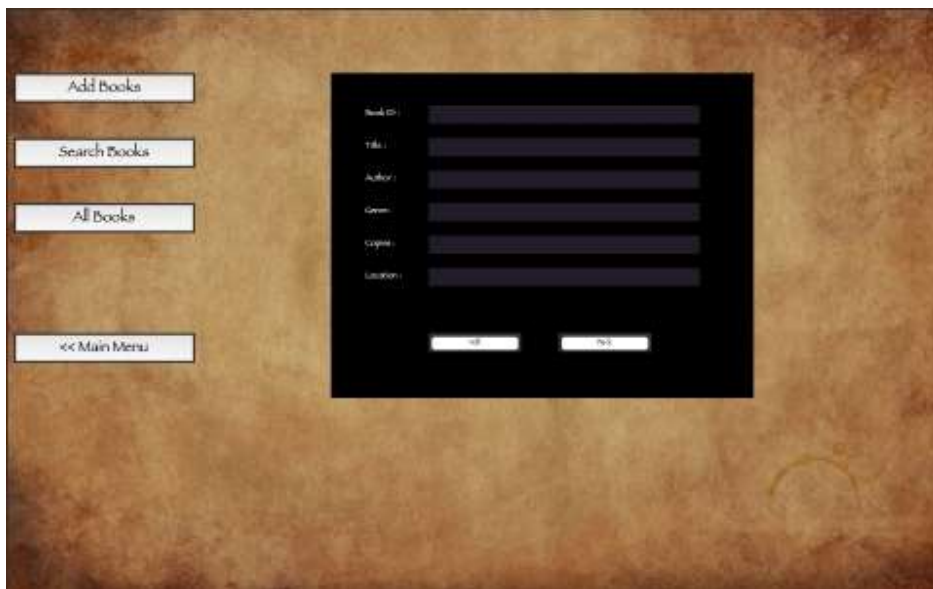
Overall, the different use cases work together to provide a comprehensive and efficient library management system.

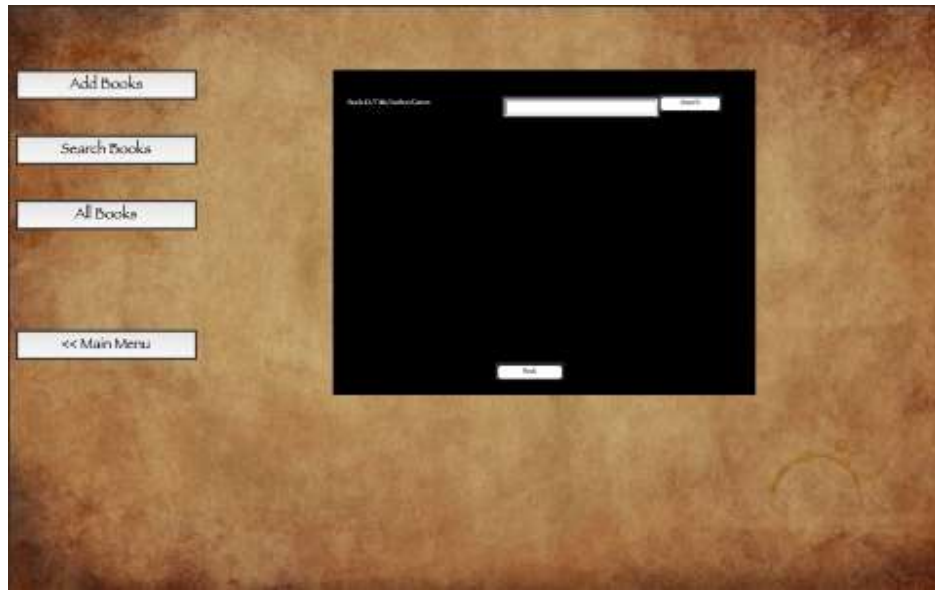
Pictures of the Project

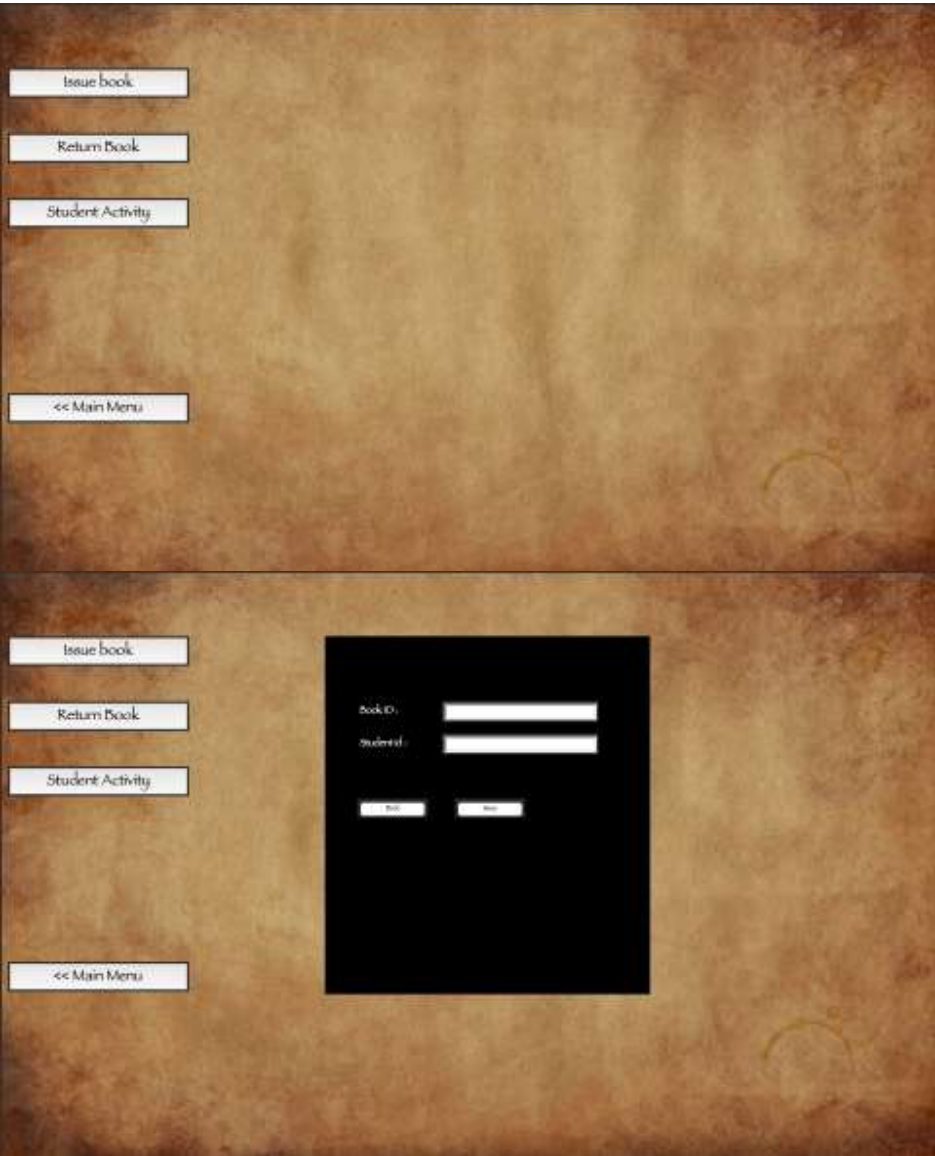
Login



Book data









Student data

15. Conclusion of the Project

In conclusion, creating a Library Management System using Python Tkinter and SQLite3 has several advantages, including a user-friendly interface, ease of development, customization, cost-effectiveness, portability, and robustness. However, there are also some potential disadvantages to consider, including limited scalability, functionality, security concerns, technical expertise, and support. Overall, the success of the system will depend on the specific needs and resources of the library, as well as the expertise of the development team in implementing and maintaining the system

16. Bibliography:

1. Jenny Bryan, Jim Hester, and STAT545 Teaching Assistants. Happy git and GitHubfortheuser.
2. Damien Irving, Kate Hertweck, Luke Johnston, Joel Ostblom, Charlotte Wickham, and Greg Wilson. *Research Software Engineering with Python*. Chapman and Hall/CRC, 2021.
3. Hadley Wickham and Jenny Bryan. *R Packages*. O'Reilly Media, Inc., 2015.
4. Charles R. Harris, K. Jarrod Millman, Stéfan J. van der Walt, Ralf Gommers,
5. J. D. Hunter. Matplotlib: a 2d graphics environment. *Computing in Science & Engineering*, 9(3):90–95, 2007.
6. Davide Fucci, Hakan Erdogmus, Burak Turhan, Markku Oivo, and Natalia Juristo. A dissection of the test-driven development process: does it really matter to test-first or to test-last? *IEEE Transactions on Software Engineering*, 43(7):597–614, 2016.





GOVERNMENT DEGREE COLLEGE::KHAIRATABAD

A.Y.2021-22

Student Study Project



Auto-capture Selfie by Detecting Smile App

Submitted By

114020467053 P HARI PRASAD REDDY
114020467055 P BABY SHALINI
114020467056 P NAVEEN KUMAR
114020467061 Y PRASHANTH

**Under the Supervision of
Dr.S.Srinivasu**

**Department of Computer Science &
Applications**



**GOVERNMENT DEGREE COLLEGE
Khairatabad**



DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

CERTIFICATE

This is to certify that Student Study Project on **“Auto-capture Selfie by Detecting Smile App”** prepared by 114020467053- P Hari Prasad Reddy, 114020467055 -P Baby Shalini, 114020467056- P Naveen Kumar, 114020467061-Y Prashanth of II B.Sc(MSCs) during the Academic Year 2021-22.

Supervisor

H.O.D.

Auto-capture Selfie by Detecting Smile App

1) Background/ Problem Statement

Gestures are the expressive and important body development that speaks through the message or data. Gestures are necessary for hearing and disclosure hindered; they pass on their message to others just with the assistance of motions.

Image-based approach manages to take the snap automatically once the specified face expression is recognized. Everyone loves a smiling picture, so we will develop a project which will capture images every time you smile. Our Auto-capture Selfie by Detecting Smile App will detect the smile and automatically capture the selfie.

The front-end involves Html, CSS, and JavaScript and the back-end involves Python. The framework used is Django and the database is MySQL. The algorithm used here is the Haar cascade. This algorithm is not so complex and can run in real-time. The library used is OpenCV.

2) Working of the Project

To log in to the system, the user will first need to register their account with their basic details. This system uses the Haar cascade, which is an algorithm that can detect objects in images, irrespective of their scale in image and location. The system can automatically capture the selfie.

As the user proceeds to take selfies, this system will detect the smile in real-time and auto-capture the selfie. Using OpenCV libraries it is possible to build an application that can capture selfies. The concept involved here is to identify the mouth region, measure the distance between the corners of the lips when the user smile and immediately capture a picture.

3) Advantages

- It is easy to maintain.
- It is user-friendly.
- Automatically detects selfies from a smile.
- The user will not need to hold the device for longer to capture a selfie.

4) System Description

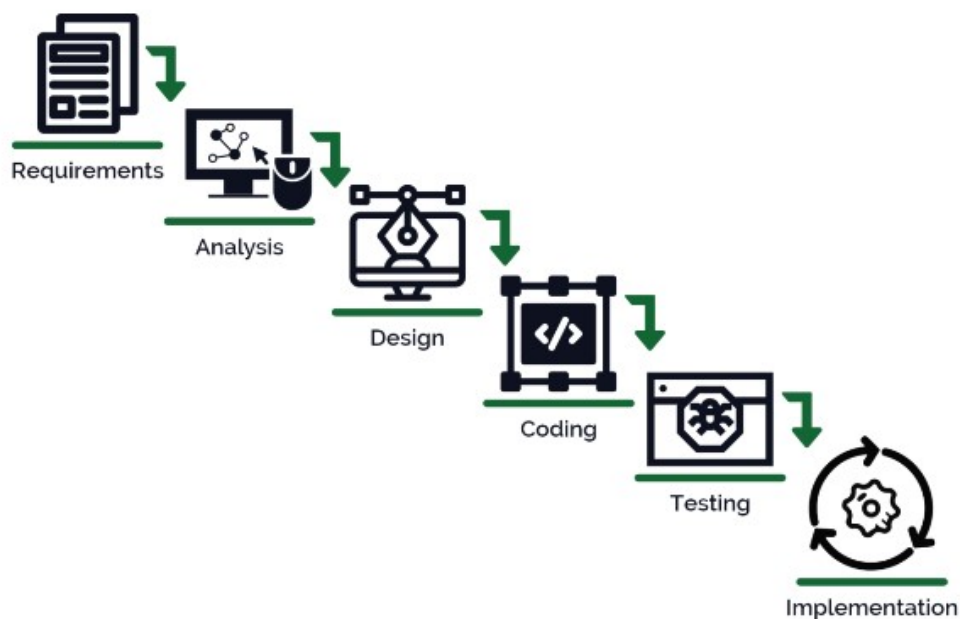
The system comprises 1 major module with their sub-modules as follows:

USER

- **Registration**
 - The user will need to register first to log.
 - The details will include name, age, gender, address, phone number, email ID, and folder name.
- **Login**
 - They can log in to the system using a username and password.
- **Take Selfie**
 - The user can proceed for taking selfies from their device.
- **View Selfies**
 - As the user's smile is detected, it will capture a selfie.
 - Here, the system will auto-capture a selfie.

5) Project Life Cycle

The waterfall model is a classical model used in the system development life cycle to create a system with a linear and sequential approach. It is termed a waterfall because the model develops systematically from one phase to another in a downward fashion. The waterfall approach does not define the process to go back to the previous phase to handle changes in requirements. The waterfall approach is the earliest approach that was used for software development.



6) System Requirements

I. Hardware Requirement

i. Laptop or PC

- Windows 7 or higher
- I3 processor system or higher
- 4 GB RAM or higher
- 100 GB ROM or higher

II. Software Requirement

ii. Laptop or PC

- Python
- Sublime Text Editor
- XAMP Server

7) Limitation/Disadvantages

- The system will only capture the selfie automatically if it detects the smile.

8) Application – This application helps to take selfies without facing any difficulty.

9) Reference

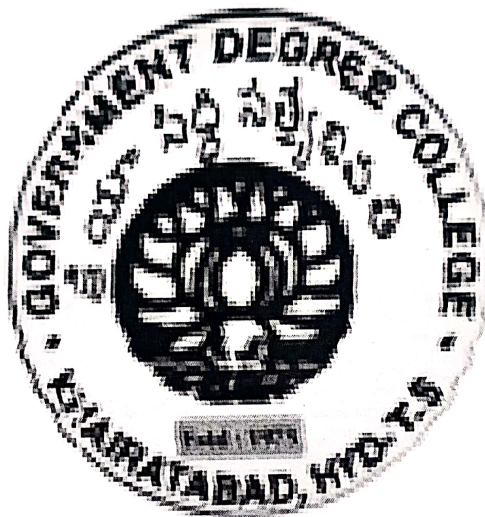
- <https://www.researchgate.net/publication/336236676> Real-Time Smile Detection using Deep Learning
- <http://14.99.188.242:8080/jspui/bitstream/123456789/12656/1/1NH16CS112.pdf>
- <https://affect.media.mit.edu/pdfs/15.jaques-chen-picard-CHI.pdf>



GOVERNMENT DEGREE COLLEGE

KHAIRATABAD, HYDERABAD -500004

DEPARTMENT OF COMPUTER SCIENCE AND
APPLICATIONS



STUDENT PROJECTS

2021-22



Government Degree College:: Khairatabad

A.Y. 2021-22



Student Study Projects

**Department of Computer Science &
Applications**



Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

“Generate QR Code in Python”

By

114020539048-S.Nisha

114020539033-Mohd.Hameeddudduin

114020539020-J.Sowmya

114020539049-T.Anusha

114020539008-B.MahaLaxmi

Under the supervision of

B. Rajitha Rani

**Department of Computer Science &
Applications**

B. Rajitha Rani



Table of Contents

1. Introduction
2. Generate QR Code
3. Generate QR Code with links
4. Styling your QR code
5. Generating QR Code with user input data
6. Read QR Code data using Python
7. Source code



Introduction

QR Code was firstly designed in 1994 in Japan in the automotive industry. It is a type of barcode matrix that can help us to store the details. In this tutorial, we are going to see how to generate QR Code in python.

We can store every detail of us in the form of QR Code that may be personal details, Product details, and other intro. We can share the QR Code with others easily. To read QR Codes you need to install QR Code scanners from play store or IOS Store.

How to generate QR Code in python

This is a very simple step by step guide to generating QR Code in python. We will discuss

- Generate QR Code
- Generate QR Code with links
- Styling your QR code
- Generating QR Code with user input data
- Read QR Code data using Python

Generate QR Code

Generate a QR Code in python is very simple. Before we generate our QR Code, We need to install these below packages.

```
Pip install qrcode # to generate QR code
```

```
Pip install pillow # To manage images
```

Now create a new python file and write the below lines

```
import qrcode
```

```
data="gdck "
```

```
qr=qrcode.make(data)
```

```
qr.save("hello.png")
```

```
qr.show()
```

We import qrcode module, and create qrcode.make("gdck") generate the QR Code.



`Qr.show()` will show the QR code directly in our system.
`Qr.save("hello.png")` save the QR code image in our local directly.

Now run the code in our prompt, it will open and generate QR Code. Congratulations we generate QR Code in python few lines.

Generate QR Code with links:

Let take this a little bit forward, generate QR Code with hyperlinks

```
import qrcode
data="www.youtube.com"
qr=qrcode.make(data)
qr.save("youtube.png")
qr.show()
```

Now run this file on prompt and get new QR Code with "youtube.com". This QR Code holds the link that we mentioned above.

Styling Your QR Code:

Well, we generate QR Code with default colors like background white and fore ground with black. Let's start our styling QR Code in python

```
import qrcode
data="www.youtube.com"
qr=qrcode.QRCode(
    version=5,
    box_size=5,
    border=5
)
qr.add_data(data)
qr.make(fit=True)
img=qr.make_image(fill_color="green",back_color="black")
img.save("college.png")
img.show()
```




Here, `qrcode.QRCode()` will take 3 parameters like `version`, `box_size`, `border`.

Version represents the size of the QR Code. It is a range of 1 to 40.

Border represents the border of the QR code.

Box_size represents the box size of the QR Code

`Qr.make_image(fill_color="green",back_color="black")` take 2 parameters. Here we can stylish our QR Code.

Fill_color represents the foreground color i.e., pattern of QR Code.

Back_color represents the back ground color.

Generate QR Code with user input data:

Generate QR Code by taking user input data

```
import qrcode
name=input("enter your name:")
age=int(input("enter age:"))
group=input("enter your group")
sem=input("enter your semester")
data={"name":name,"age":age,"group":group,"sem":sem}
qr=qrcode.QRCode(
    version=2,
    box_size=5,
    border=5
)
qr.add_data(data)
```



```
qr.make(fit=True)
img=qr.make_image(fill_color="blue",back_color="yellow")
img.save('college.png')
img.show()
```

It will ask you for the inputs as you mentioned above lines. We take all the data in the dictionary format and store into QR Code. It saves the image as college.png in your local directory.

Read QR Code data using python:

I stored my data in my QR Code. But how can I verify it? you know it's very general in our society.

We see in local pubs and college events and offices, they scan your ID which consists of QR Code, whether you are a verified person or not for that event or authorized employee.

Lets read QR Code data using python, we are taking the above **college.png** image.

For that, we need to import 3 other libraries as below.

```
import qrcode
from pyzbar.pyzbar import decode
from PIL import Image
import ast
data = decode(Image.open("college.png"))
info = data[0].data.decode("ascii")
data=ast.literal_eval(info)
print(data["name"].upper())
print(data["age"])
print(data["group"].upper())
print(data["sem"])
```

pyzbar helps us to decode our QR Code

ast help us to convert string to dictionary format.

Pillow helps us to manage our images

Our QR Code data encoded as binary code so we need to decode it by using **pyzbar**. Our data as in string format but we have to separate our data like name, age, and Edu. So we need to convert that output string to a dictionary. So we use **ast**.

It will print the data stored in the **college.png** image.

Source code:

```
import qrcode

name=input("enter your name:")
age=int(input("enter age:"))
group=input("enter your group")
sem=input("enter your semister")
data={"name":name,"age":age,"group":group,"sem":sem}
qr=qrcode.QRCode(
    version=2,
    box_size=5,
    border=5
)
qr.add_data(data)
qr.make(fit=True)
img=qr.make_image(fill_color="blue",back_color="yellow")
img.save("college.png")
img.show()
```


Output:

enter your name : hameed
enter age: 18
enter your group: msds
enter your semester : 3

Thank You....

Pg

Ch

Government Degree College:: Khairatabad

A.Y. 2021-22



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

“A Report on Movie Reviews Classification ”

By

114021468057-K. Santhosh

114021468116-V. Srujana

114020468101-P.Ganesh

114020468054-J.Vaibhavi

114020468006-B.Nagasai

**Under the supervision of
CH.MADHAVI**

**Department of Computer Science &
Applications**

Madhavi

[Signature]

Problem:

To implement the k-Nearest Neighbor Classifier to predict the sentiment for 18,000 reviews for various products in e-commerce applications

Process followed:

Step: 1 – Loading the data :

Loaded the train and test data using Pandas Dataframe, since the given data doesn't have column names, column names have been assigned to both test and train data sets.

Step: 2 – Pre-processing the data

Given data has a lot of noise which includes html tags, string accents, numbers, stop words, symbols. In order to eliminate the noisy data, I have followed the below steps.

1. I have parsed the given data using BeautifulSoup library, it pulls the data using `get_text()` method
2. In order to remove the punctuations from the text data, I have used regular expressions
3. In order to remove the string accents, I have used `Unicode.normalize()` method to remove the string accents. The result has to be decoded back to string, since the `encode()` method creates a byte string, which cannot be joined with a normal string.
4. Tokenization:
I have chosen the `tokTokTokenizer` method to convert the given text into tokens.
5. Lemmatization:
I have chosen Lemmatization instead of stemming, as stemming may lead to a loss of meaning of the word.

Below is the example

Example word: Caring

Lemmatization: Care

Stemming: Cari

6. To Remove stop words: I have used `nltk stopwords` module to remove the stop words like 'a', 'the', 'is', 'the'

Step3: Text Vectorization:

I have used Term Frequency-inverse document frequency (TF-IDF) text Vectorization to convert the text data into numerical data. It gives the rare term high weight and gives the common term the low weight. So that we can remove the less important words for the analysis. It even normalizes the term weights, so the longer documents are not unfairly given more weight. My observation while performing Vectorization is a number of tokens for the test and train data should be same, or else the dataset wouldn't go through the cosine_similarity function, since the vector count would be different.

Step4: Similarity:

In order to find the similarity between the vectors, cosine similarity is used. It is the distance metric. Cosine similarity to measure the cosine of the angle between two vectors projected. Smaller the angle between the two vectors, the more similar the vectors be. Cosine similarity has the values of the angle between the vectors, higher the value, more similar the vectors. In this phase, every document in the test file would have got the cosine similarity values against the vectors in the train data, which are used to find the sentiment of the review.

Step 5: K-Nearest Neighbors Algorithm:

After getting the similarities from the cosine similarity function, the values have been sorted and their indices have been stored to lookup up the sentiment of the corresponding document and took the k-nearest neighbors and now the majority of the sentiment is considered and predicted the sentiment of the test data.

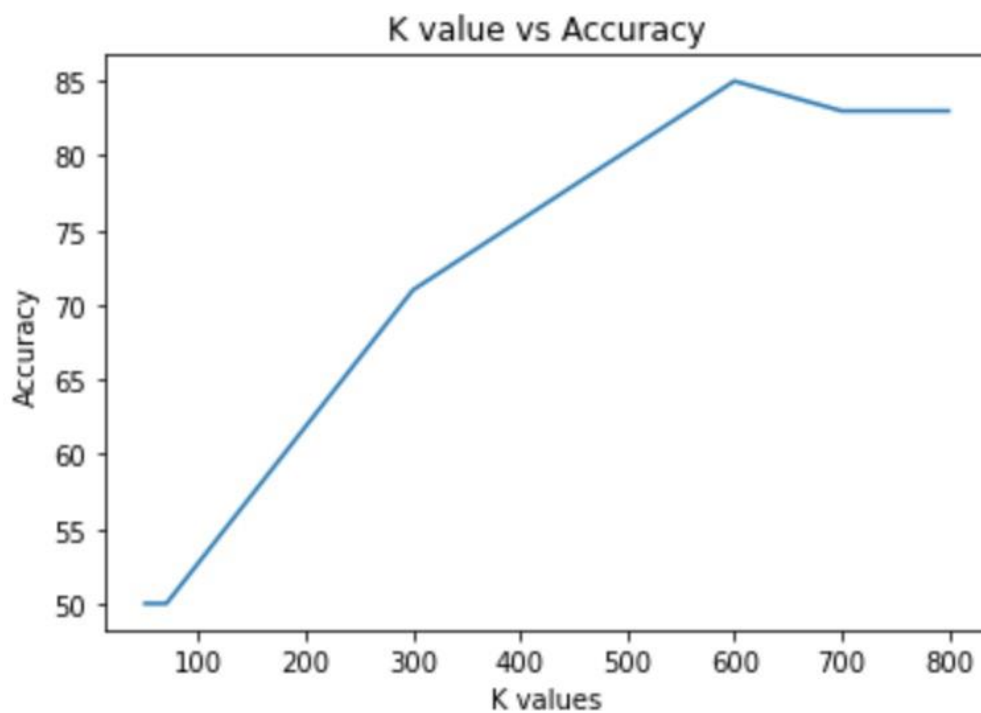
Output:

The goal of the project has been achieved, developed the KNN model. As, accuracy is the metric used for performance evaluation. The model has secured an accuracy of 83%.

Difficulties faced during the process:

- Choosing the correct vectorizer, I have used TF-IDF Vectorizer instead of count vectorizer because Count vectorizer only counts the number of times a word appears in the document, whereas TF-IDF Vectorizer not only calculates term frequency but also provides the importance of the words.
- I have observed that pre-processing has not affected the accuracy greatly.
- I have observed that the accuracy is maximum when chosen k values lies in the range 600 – 800.

K Value vs Accuracy:



GOVERNMENT DEGREE COLLEGE

KHAIRATABAD, HYDERABAD -500004

DEPARTMENT OF COMPUTER SCIENCE AND
APPLICATIONS



STUDENT PROJECTS

2021-22

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On
National Flag Design Using CSS**

By

Md Mahaboob

Shiva kumar

Pooja

Bhoomika

Durga

**Under the Supervision of
B.Lavanya**

**Department of Computer Science &
Applications**

B.Lavanya

[Signature]

Name : Mohammed Mahboob
Roll. No. 114020405320
Subject : web technology
Mobile no : 8686388312
Batch-2
Lecturer Name: lavanya ma'am

Date :13-05-2022

Q) How to create a simple calculator using java script ?

Step-1: using java script we can creating a simple calculator by using html tags, adding background colours and font size and text align to make it more colour full simple calculator.

```
<html>
<head>
<style>
.b
{
    background-color:brown;
    color:yellow;
    padding: 15px 30px;
    text-align:center;
    font-size:25px;
}
.t
{
    font-size:25px;
}
.h
{
    background-color:green;
    color:white;
}
</style>
```

Step-2 : using java script and function keys to make more easier by the using of an a calculator through ac function to clear all the text bar and getting results by using(=) symbol.

```
<script>
function ac()
{
    document.getElementById("res").value="";
}
function show(input)
```

16/

```
<html>
<head>
<title>
Flag
</title>
</head>
<body>
<center>  </center>
</body>
</html>
```

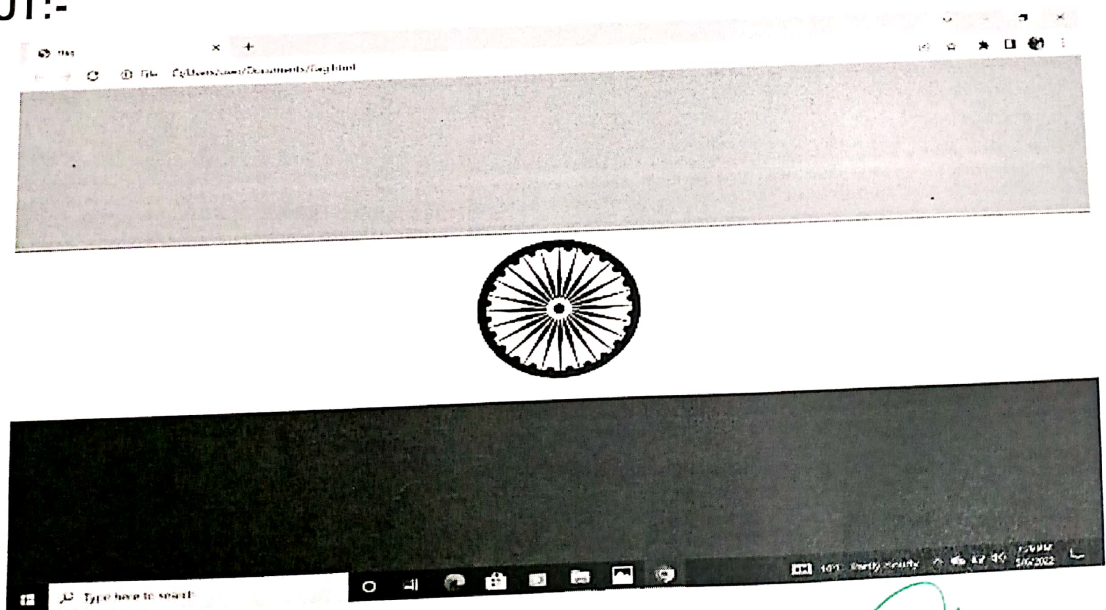
STEP3:- Create a html document with background color Green and save it as Green.html

```
<html>
<head>
<title>
Flag
</title>
</head>
<body bgcolor=green>
</body>
</html>
```

STEP 4:- Create a frameset with above files and save it as Indian Flag.html

```
<html>  
<head>  
<title>  
Flag  
</title>  
</head>  
<frameset rows=33%,34%,33%>  
<frame src=orange.html>  
<frame src=white.html>  
<frame src=green.html>  
</frameset>  
</html>
```

OUTPUT:-



Box

Signature

Government Degree College :: Khairatabad

A.Y. 2021-22



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

“Designing and Planning a Campus Wireless Local Area Network”

By

114020405251 NARSIMHA VORSA
114020405261 PAI BHAVANA
114020405265 PANDUGA CHAITANYA
114020405319 SANJANA THAKUR
114020405336 SOMA HEMANTH

**Under the supervision of
Jagadeeshwar. P**



Abstract

With the speedy social and economic development networks have been progressing rapidly. But the current local area network couldn't meet users' demands to certain extent especially on campus. The aim of the study was to get full knowledge of WLANs and the basic processes of designing a campus WLAN.

This paper introduced the theoretical part of WLANs, including advantages and limitations of WLANs, protocol standards of WLANs, components of WLANs, different topologies of WLANs and also the security of WLANs. The contents also included the basic process of planning a campus WLAN, designing a topology by using VISIO and planning APs by using HiveManager NG and Floorplanner tools, and also list hardware and the budgets with theselected components.

In the end, the thesis is good for studying the basic idea about WLAN design but not enough for the real environment. With the complexity of the wireless network, IT groups should spend more time and consider more aspects about the WLAN design process.

CONTENTS

- 1 INTRODUCTION
- 2 THEORY OF WIRELESS LOCAL AREA NETWORKS
 - Definition of Wireless Local Area Networks
 - Advantages of Wireless Local Area Networks
 - Limitation of Wireless Local Area Networks
 - Wireless LAN Transmission Media
 - Technical Standards of Wireless Local Area Network
 - Wireless Network Components
 - Channel
 - Wireless Local Area Network Topologies
 - WLAN Security
- 3 PRACTICAL PART
 - Background of the School
 - Request Analysis
 - WLAN Topology AP Management
 - Security of the WLAN
 - Lists of Hardware and Budgets
- 4 CONCLUSION
- 5 REFERENCE

Along with the constant development of social economy, computer networks have changed people's lifestyle in many aspects. Local area network, which is widely applied, plays a more and more important role in medical treatment, military, education and science. Not only enterprises and companies build LANs, but also families and schools establish their own small LANs.

With LANs, work and study efficiency is improved, but it also brings some problems. Wired local area networks couldn't work without the cable, which means that we couldn't change the structure of networks casually according to actual situations. Therefore, we cannot implement mobile office and studies. Therefore, the current local area network couldn't meet users' demands to certain extent. In order to make users access data at any place and at any time, networks should develop from being wired and fixed to being wireless and mobile.

Compared with local area networks, wireless local area networks offer advantages at different places. One of the advantage of a wireless local area network is that if there is coverage of WLAN, users can move anywhere they want with their devices and transmit data at the same time. Other advantages include easy installation, effective expansion, flexibility and cost savings.

In terms of campuses, most campuses now have their own wired local area network, but teachers and students need a more convenient way to access the network. According to my survey in WUHAN, over 90 percent of the high schools didn't have their WLAN right now but only some of the international schools have the WLAN. With WLAN, teachers and students can use the same device to get connected to the network at anytime and anywhere. Therefore, in that case, WLAN is the most efficient way to extend the wired local area network, especially on campus.

In this project, I will design a WLAN for my high school. I will introduce basic knowledge of wireless LAN, designing and planning a wireless local area network based on the actual situation of my high school. And, I will also introduce

the topology, AP management, channel management and which way I decided to use for the security part. Most of my planning bases on the hardware part of campus the wireless LAN.

The aim of the study is to get knowledge of the definition, background, characteristics and technical standards of WLAN, to understand the advantages and limitations of WLAN and to get to know the basic process of designing a campus WLAN. I will introduce the theory of wireless local area networks in the first part of the paper and describe the basic process of designing a campus WLAN in the second part of the paper. Then, I have a conclusion for the thesis.

2 THEORY OF WIRELESS LOCAL AREA NETWORKS

This chapter will define what WLAN is. The advantages and limitations of WLAN and the technical standards and components of WLAN are introduced. This chapter will also define different topologies, channel and authentication methods in WLAN.

Definition of Wireless Local Area Networks

There are many different kinds of computer networks in the world, as shown in Figure 1, including global area network (GAN), wide area network (WAN), metropolitan area network (MAN) and local area network (LAN). Among them, wireless local area network is one type of LAN.

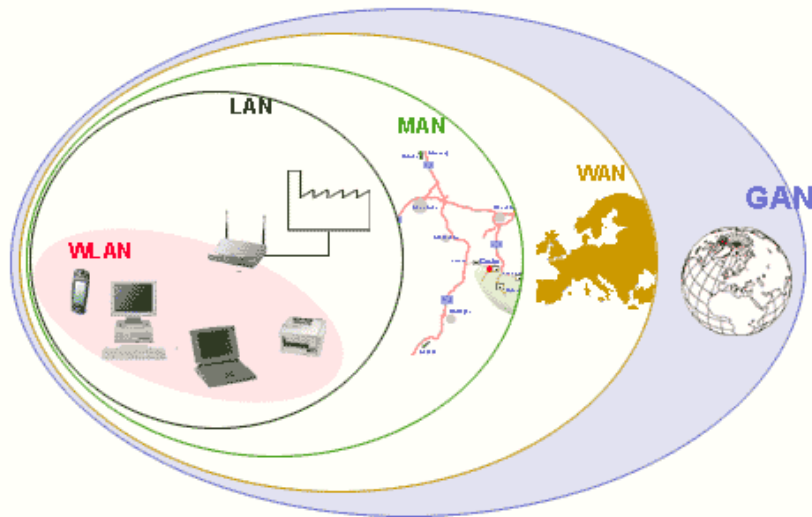


Figure 1. Different networks (Animasigaia 2014)

Wireless local area networks use infrared or radio waves to provide network for wireless devices and allow users to transmit data between each other in the coverage area without the limitation of wire and cable. WLANs have different wireless network protocols, such as IEEE802.11, Bluetooth, HomeRF and HiperLAN. Many wireless devices support WLAN, including mobile phones, game consoles, some cameras, tablets and also GPS systems. WLANs may contain two devices or up to one hundred and more. (Bradley 2016.)

Advantages of Wireless Local Area Networks

Wireless local area networks have unique advantages in many places. Firstly, wireless local area networks are more flexible and mobile than the wired ones and they will not be limited by cables. Users may have access to or receive information at any network coverages in real time. Secondly, WLANs have good scalability. Users can add more APs to effectively expand the network so as to meet the needs of specific applications and installations. Thirdly, WLANs no longer require a lot of wires and cables, which will reduce the workload of network cabling. Finally, it is easier to set up a WLAN than a wired one and it cannot be easily affected by the natural environment or disasters.

Limitation of Wireless Local Area Networks

There are also limitations of WLANs. Firstly, WLANs are based on radio frequency for data transmission. Walls or buildings will block the transmission of radio frequency, reduce the signal and then influence the performance of WLANs. Secondly, some of the devices have the same frequency as 802.11 series and it may cause radio signal interference. Thirdly, wireless LANs are less secure than wired LANs. When LANs travel through the air, it might be intercepted at the same time. Some unauthorized devices may use user's WLAN at the same time. Fourthly, the coverage areas of WLAN is limited, WLANs have a certain range of coverage, increasing the coverage area needed to increase the wireless hot spots at the same time, therefore the cost will increase at the same time. What's more, if some wireless devices hack into the user's network, their bandwidth will be stolen at the same time. (Bradley 2016.)

Wireless LAN Transmission Media

There are three main transmission media for WLANs. The first one is microwave and the range of frequencies is 1GHz to 40GHz. Microwave is not a true sense of the LAN technology, it is used to interconnect the buildings' local area network. It is suitable for point-to-point transmission and also satellite communications. The second media is radio and the range of frequencies is 3KHz to 300GHz. This transmission media is currently widely used, because the radio wave has wide coverage. It is suitable for all the applications. The difference between broadcast radio and microwave is that the radio didn't require antennas. And, the radio's former is omnidirectional and the microwave's former is directional. The third one is infrared. The infrared uses transmitter and receiver to modulate non-coherent infrared light. The difference between infrared and microwave transmission is that infrared will not penetrate walls. And, there is no frequency allocation problem for the infrared, because it doesn't required license. (Vittorio2008.)

Technical Standards of Wireless Local Area Network

Users have many choices when they are looking for network gear. Many products conform to the 802.11 series wireless standards, also known as Wi-Fi technologies. There are also various other wireless technologies, such as Bluetooth, HomeRF and HiperLAN. They are designed for specific networking applications.

802.11 Series

According to Microsoft, the IEEE 802 standards define two separate layers for the Data-Link layer of the OSI model. The one is Logical Link Control Layer and the other is media access control Layer. As shown in Figure 2, the IEEE 802.11 wireless standard defines the specification of the physical layer and the media access control layer that communicate up to the LLC layer. The components of the 802.11 architecture will fall into physical layer or media access control layer.

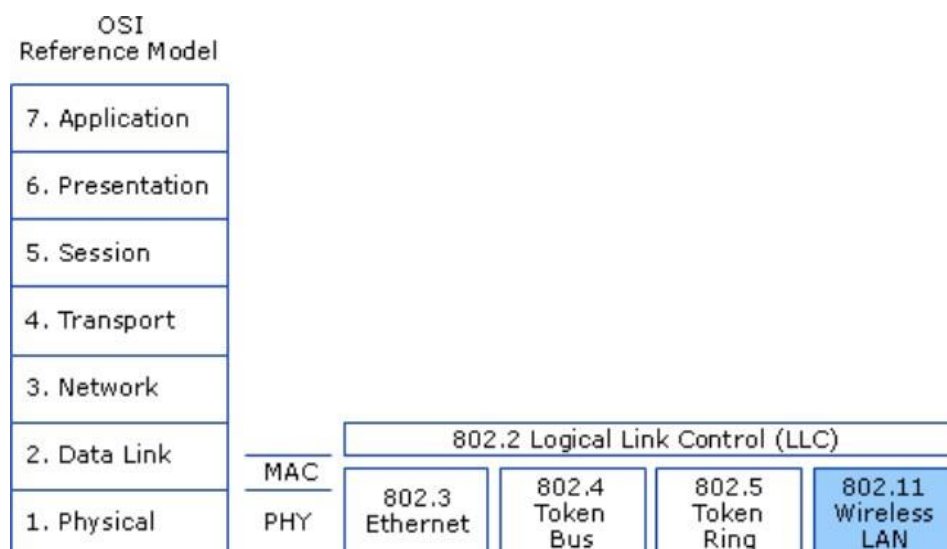


Figure 2. OSI model and 802.11 (Microsoft 2003)

The first standard of the 802.11 series appeared in 1997 and it was created by the institute of Electrical and Electronics Engineers. The 802.11 only supports 2Mbps bandwidth and it can't meet the demands of the users anymore.

The 802.11b version was introduced in 1999. It supports 11Mbps bandwidth and it uses direct sequence spread spectrum technology. The 802.11b uses 2.4GHz frequency and some of the devices will interfere with 802.11b, if they work at the same frequency, like microwave. The effective range for indoor place is about 100 meters, for outdoor place about 300 meters. The cost of 802.11b is lower than the later version 802.11a and the signal range is better than the 802.11a, but the speed is slower than the 802.11a. The 802.11b uses Direct Sequence Spread Spectrum for modulation.

The 802.11a version was created at the same time as 802.11b. It uses orthogonal frequency division multiplexing for data modulation. It supports voice, data and image transmission. It also supports 54 Mbps bandwidth and is suitable for big business market while 802.11b is suitable for users' home market at that time. 802.11a uses Orthogonal Frequency-Division Multiplexing technology for modulation. OFDM is a coding technique that splits the radio signal into several sub signals before they reach a receiver. Using OFDM will reduce the interference between signals. The 802.11a has higher speed and frequency than

802.11b, but 802.11a has short range signal and it's easily obstructed. (National Instruments 2015.)

The 802.11g version appeared in 2002. It supports 54 Mbps bandwidth and 2.4GHz frequency. It was created to come up with the interoperability between 802.11a and 802.11b. 802.11g uses OFDM technology. According to Bradley, the 802.11g was designed for cross compatibility, the devices can join the networks, even the APs running at a different 802.11 version.

The 802.11n version was the development of 802.11g. The rate was increased to 600Mbps. And, it supports 2.4GHz and 5GHz frequency. 802.11n can improve the quality of wireless transmission. It combines MIMO and OFDM technologies. MIMO means multiple in multiple out and it is commonly used in home routers for coordinated use of the multiple radio antennas in wireless network. The MIMO technology can increase the bandwidth and the range of the network. (Bradley 2017.)

The 802.11ac version is popular one in the market. It appeared in 2012. It is a faster and scalable version than 802.11n. 802.11ac supports 1Gbps data rate and 5GHz frequency. The comparison between different 802.11 WLAN technologies is in Table 1.

Table 1. 802.11 Wireless Standards

IEEE Standard	802.11b	802.11a	802.11g	802.11n	802.11ac
Release Year	1999	1999	2003	2009	2012
Frequency	2.4GHz	5GHz	2.4GHz	2.4or5GHz	5GHz
Data Rate	11Mbps	54Mbps	54Mbps	600Mbps	1Gbps
Modulation	DSSS	OFDM	DSSS,OFDM	OFDM	OFDM

It's clearly that the data rate has become faster with time going by. The 802.11 series use different frequency and modulation to meet different situations.

Bluetooth

Bluetooth is a wireless communication protocol created in 1994 by Ericsson company and used for connecting devices through the air. It is slower than WIFI, but it is easy to set up and usually used for data transfer between devices. It can help devices transmit data between each other within 10 meters. It works at the frequency of 2.4GHz and the data rate is about 1Mb/s. Bluetooth is most commonly used between mobile phones for photos or files transfer. According to Samraiz(2014), there are number of Bluetooth versions which all are being developed to meet the particular requirements of the time. All the updated versions of Bluetooth offer backward version compatible. This means whichever newer version you are using then it is compatible with the older version as well. Users may also transfer data through WLAN. But there are differences between WLAN and Bluetooth. The Bluetooth works in lower distance range than in WLANs. The WLANs are also faster than Bluetooth. But sometimes Bluetooth is a better option when users need to transfer data between mobile phones. Table 2 shows about the comparison between 802.11b and Bluetooth.

Table 2. Comparison between 802.11b and Bluetooth

	Wireless LAN	Bluetooth
Definition	Wireless LAN stands for Wireless Local Area Network. It refers to a network that connects two or more devices by using wireless data connections over short distances.	Bluetooth is a short range technology standard which allows devices to communicate in a wireless manner.
Distance Range	Up to 200 feet	Less than 30 feet
Bandwidth	High	Low
Security issues	Can occur, still controllable	Minimum
Speed	Comparatively more	Comparatively less
Central Access Point	Required	Not required
Identification of the network	By locating a central router or a wireless network switch.	By checking out the Bluetooth control panel (on phone or computer)

Even Bluetooth is a short range technology and the bandwidth is lower than WLAN but it's still an important wireless technology for users to transfer data between devices.

HomeRF

HomeRF was designed for home users to enable wireless communication between computers and other wireless devices in 1998 by the Home Radio Frequency Working Group. It works at the frequency band of 2.4GHz and the data rate is about 1Mb/s. The communication range for HomeRF is about 50 meters and the main purpose is to establish an interoperable network for families.

There are something in common between HomeRF and Bluetooth technologies. Both of them operate at the frequency band of 2.4GHz and all of them are designed for short-range, low-power applications. There are also difference between these two technologies. HomeRF was designed for home networking environments but Bluetooth technology is optimized for mobile phones. The communication range of HomeRF is about 50 meters and for Bluetooth is about 10 meters. Both of these two technologies have similar rate at about 1Mbps but HomeRF version 2.0 has data rate up to 10Mbps, so HomeRF require more power than Bluetooth. (Brent 2011.) 10

Wireless Network Components

The main components of WLANs including client devices, access point, wireless network adapters, wireless routers, wireless controller and wireless antennas. Client devices are also known as stations. All the end devices with wireless capabilities will act as client devices, for example, mobile phones, laptops and PDA.

The network interface cards, also known as wireless adapters, act as the interfaces of WLAN, and they are required for the devices when they want to access the WLANs. There are three different types of network interface cards, including PCMCIA, PCI and USB. The PCMCIA cards are designed for the laptops and supports hot swapping, it means that users can replace or add the network interface cards without shut down the devices. The PCI cards are suitable for desktop computers while the USB sticks are suitable for both desktop computers and laptops.

The wireless router can function as a normal router or a access point. Most of the wireless routers are designed for home users. The wireless routers have firewall inside in order to protect home users from being hacked. Even if wireless routers differ in many different ways, normally just one router is required for an entire family.

The access point acts as a bridge between wireless devices and wired networks. APs are commonly used in large buildings in order to create a wireless local area network that expands to a wide range of area. Home users can add an AP but not router if they want to expand their network, while office users can add more than one APs to expand the network to the whole building.

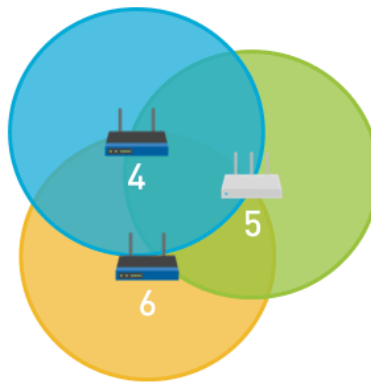
The wireless controllers used to automatically manage and configure a set of APs. The features of the wireless controllers including load balancing, coverage hole detection and correction and interference detection and avoidance. (Wikipedia 2017) What's more, there are also antennas in WLANs. The function of antennas is to transmit and receive electromagnetic waves, users can expand the coverage of wireless LAN by using antennas. The transmission rate is significantly reduced when wireless devices are far from the AP or other devices, and antennas will come in handy to enhance the signal and speed up the transmission rate at the same time.

Channel

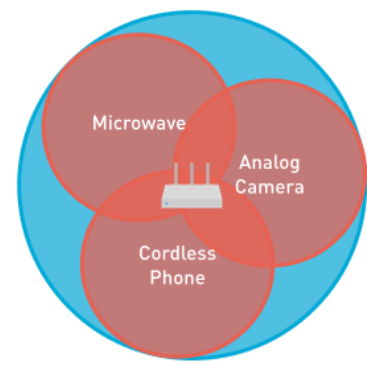
The interference is an issue which will influence users' WLANs performance. The three main causes of the interferences are: Co-Channel, Adjacent-Channel and Non-Wi-Fi, as shown in Figure 2. And, the channel related interferences can be reduced or eliminated by selecting the proper channels for the networks. (Metageek no date.)



Every client and access point on the same channel competes for time to talk.



Every client and access point on overlapping channels talk over each other.



Non-802.11 devices compete for medium access.

Figure 3. The three main causes of WiFi interference (Metageek no date)

The IEEE divides 14 channels for 2.4GHz band. As shown in Figure 8, the distance between each channel is 5MHz and they may overlap frequency, because each of the channel is 22MHz wide and the entire spectrum is 100 MHz (Aldxn-dra 2015). Only channels 1,6 and 11 will not overlap each other.

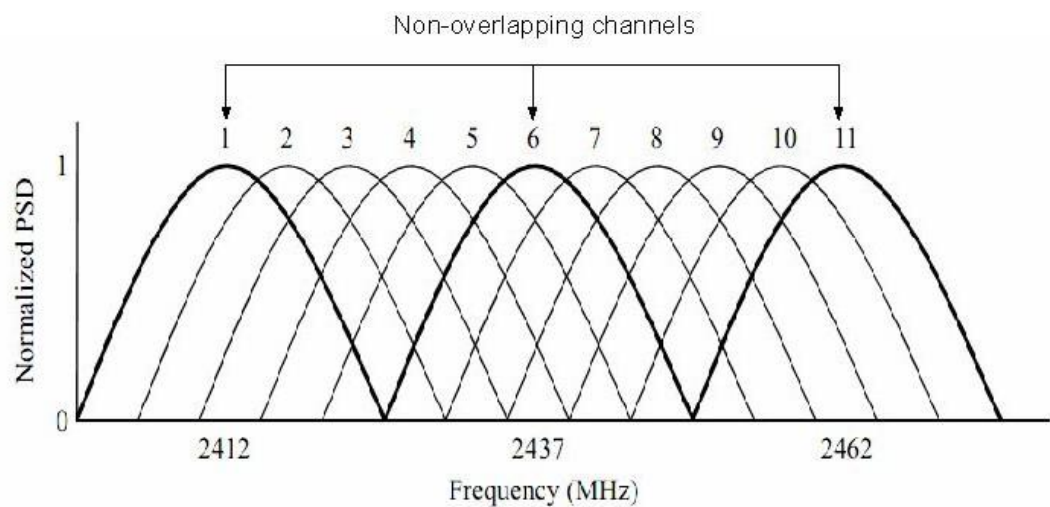


Figure 4. 2.4GHz band channel (Stefan & Vladimir 2012)

Selecting the right channels will reduce the interference and increase the network performance.

Wireless Local Area Network Topologies

There are three different kinds of WLAN topologies, including IBSS, BSS and ESS. The IBSS refers to Independent Service Sets, also known as ad-hoc network. As shown in Figure 2, users can directly transmit data between each other without access points. At least two wireless stations are needed for each topology. We can easily build a small WLAN in an office by using IBSS topology. But all the nodes have to use the same channel.

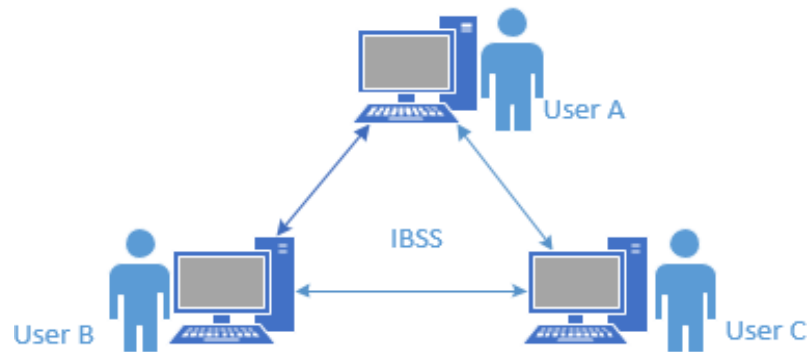


Figure 5. Independent basic service sets

The BSS refers to Basic Service Set, also known as Infrastructure BSS. It requires an access point when users want to communicate with each other, as shown in Figure 3.

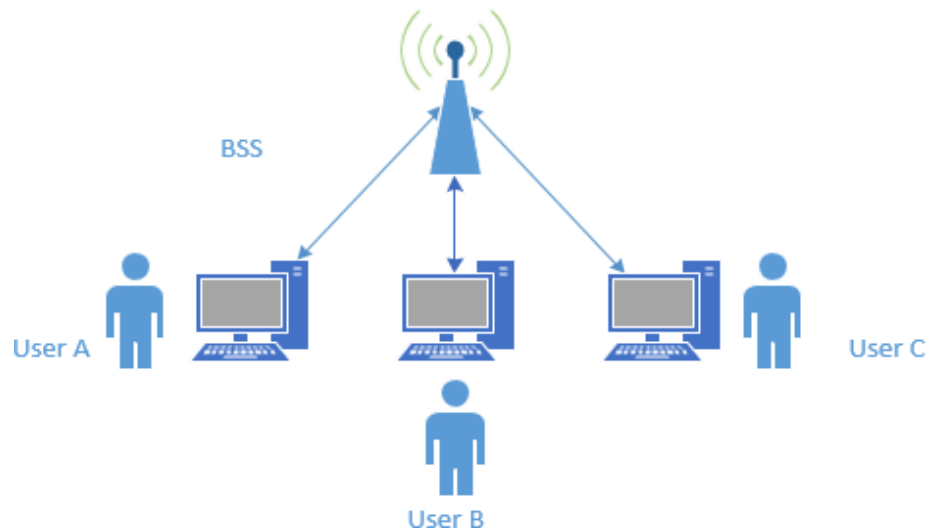
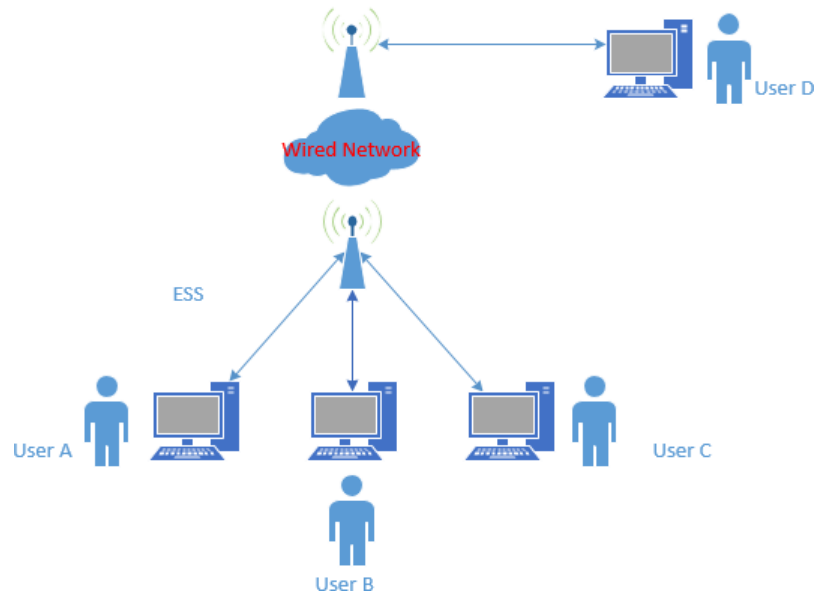


Figure 6. Basic service set

The ESS refers to Extended Service Set. It can be regarded as combining multiple BSSs together with a distribution system on the same network, as shown

Figure 7. Extended service set



IBSSs are suitable for huge enterprises because they need many devices and all the devices need high speed transmission. BSSs are suitable for home users because the devices don't need high speed data transmission.

WLAN Security

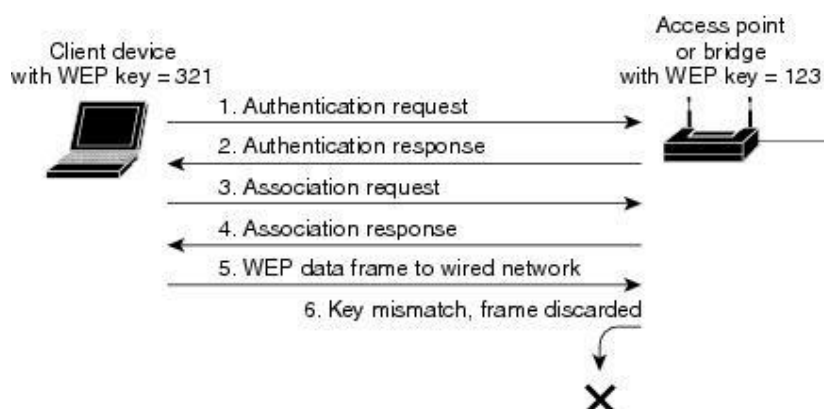
Security has always been an important part of wired or wireless network. As time goes by, threats for all privacy information transferred from client devices through WLAN are growing. It's time to protect WLAN from being attacked. At very beginning, WLANs use Service Set Identifier for their security. Clients use SSID to join WLAN. Some WLANs will enter the media access control in access point to control access devices. Both of these two methods are not good solutions for security anymore.

Open Authentication

There are different ways for WLAN authentication. The open authentication method is the the default and easiest way for authentication in 802.11 standards. This method allows any workstations access the AP. Users send an authentication request to the access point to get an authentication response from the access point.

After that process users can access the AP successfully. This method can be easily used for unauthorized access. But if the device wants to pass data, its Wired Equivalent Privacy keys must match the access point's Wired Equivalent Privacy keys. As shown in Figure 5, the device's WEP key does not match the access point's key, it means that the device can authenticate but can not transfer data. (Cisco 2009.)

Figure 8. Open Authentication (Cisco 2009)



Now, most of the enterprises and schools will not use the open authentication for security any more.

Shared Key Authentication

The shared key authentication, as shown in Figure 6, The users send an authentication request to the AP and when the AP received request it will send a challenge text back to the user, then the user encrypts the text and sends the text to the AP. And, the AP will authenticate the user after AP decrypt the text successfully and match the text to the original one. The user can access to the AP after these process.

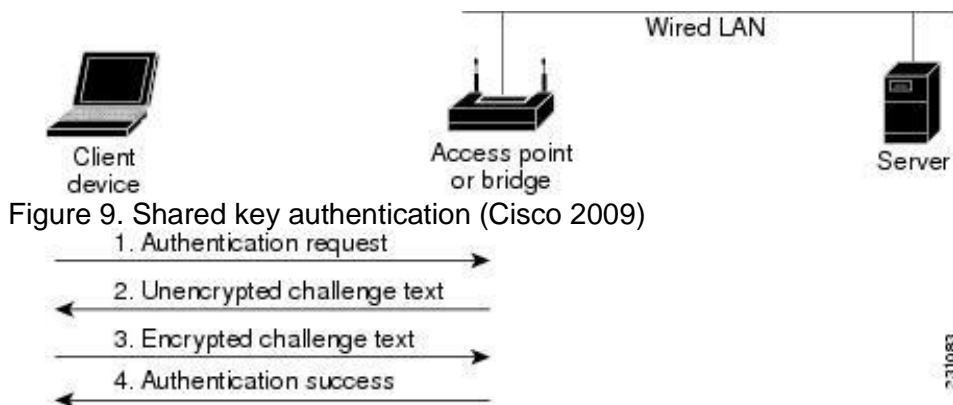


Figure 9. Shared key authentication (Cisco 2009)

The shared key authentication will cause problem. Because both the unencrypted challenge text and the encrypted challenge can be monitored, it means that the hacker can calculate the WEP key by comparing the unencrypted and encrypted text to attack the APs, so the shared key authentication can be less secure than open authentication. (Cisco 2009.)

2.9.4 EAP Authentication

The EAP authentication will provide the highest level of security for the wireless network. The wireless device and the RADIUS server will mutual authentication by using EAP authentication. The process of EAP authentication are shown in Figure 9.

The EAP authentication will provide the highest level of security for the wireless network. The wireless device and the RADIUS server will mutual authentication

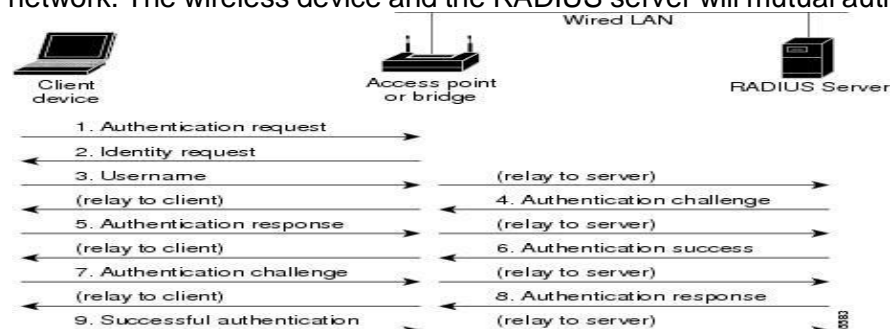


Figure 10. EAP authentication (Cisco 2009)

The client devices will send a authentication to the access point, then the access point will identify the request, after the client send the username and the AP relay it to the RADIUS server, the RADIUS server will send an authentication challenge back to the client. The client will use a one-way encryption of the password to give a response to the challenge then send the response to the RADIUS server. The RADIUS server will create it's own response and compare with the client's response. When the RADIUS server authenticates the client, the authentication is completed. The client and the RADIUS server will create a unique WEP key for the client to access the appropriate level of network. Then the client will use the key for logon session. During the logon session, the RADIUS server will encrypt the WEP/session key then send it to the access point. The access point will encrypt its broadcast key and also the session key then send the encrypted broadcast key to the client, the client will use the session key to decrypt it. The client and AP will use the session and broadcast WEP keys for all communications. Even there are many different types of EAP authentication, but the access point has the same behaves. The AP will relay authentication messages from the wireless client to the RADIUS server and also from the RADIUS server to the wireless client. (Cisco 2009.)

WEP

WEP refers to Wired Equivalent Privacy and it was introduced in 1999. It's a security protocol in order to protect the wireless network from being attacked. As shown in Figure 7, WEP utilizes RC4 encryption algorithm to encrypt data. WEP supported encryption keys of 40 bits and 24 additional bits of system-generated data, the length of the key is 64 bits. Later WEP extended to support longer keys including 104-bit, 128-bit and 232-bit variations. WEP is unsafety and useless because it's easy for hacker to determine the WEP key in several minutes by using simple tools. (Bradley 2017.)

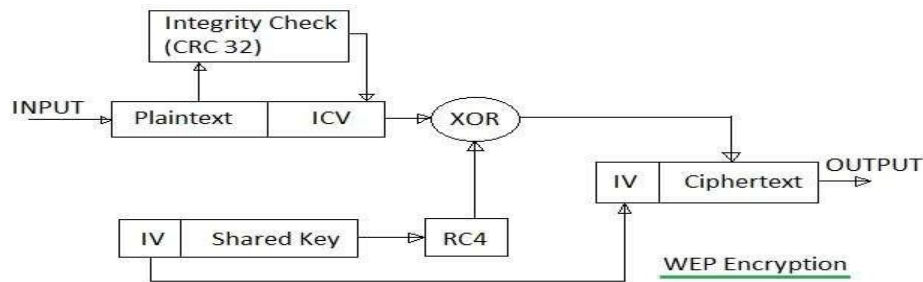


Figure 11. WEP encryption (RF Wireless World 2012)

WPA/WPA2

WEP is the weakest method for the security of the WLAN compare to WPA and WPA2, so it was replaced by WPA in 2003. The are different kinds of WPA and WPA2 mode types, as shown in Table 2.

Table 3. Comparison of WPA and WPA2 Mode Types

	WPA	WPA2
Enterprise Mode (Business, Government, Education)	<ul style="list-style-type: none"> • Authentication: IEEE 802.1X/EAP • Encryption: TKIP/MIC 	<ul style="list-style-type: none"> • Authentication: IEEE 802.1X/EAP • Encryption: AES-CCMP
Personal Mode (SOHO, Home/Personal)	<ul style="list-style-type: none"> • Authentication: PSK • Encryption: TKIP/MIC 	<ul style="list-style-type: none"> • Authentication: PSK • Encryption: AES-CCMP

WPA stands for Wi-Fi Protected Access. WPA is also known as the draft IEEE 802.11i standard. It provides stronger encryption than WEP by using temporal key integrity protocol and advanced encryption standard technologies. WPA designed for home user is called WPA-PSK. It's the most simplified and powerful form of WPA. A person who uses WPA-PSK will configure a static key for security. And, WPA uses the Temporal Key Integrity Protocol to generate the encryption key. WPA2 is another version of WPA to security the network and WPA2-PSK a simple and safety choice for most of the home users. But WPA2 will decrease the performance of the network because encryption and decryption process are needed. (Bardley 2017.)

3 PRACTICAL PART

In the practical part, the main purpose is to introduce the basic process of the campus WLAN design. I will introduce the background of the school, the request analysis of the school, the topology of the WLAN, the channels and APs management of the WLAN, the security of the WLAN and the hardware of the WLAN.

Background of the School

The campus is a special place for the students to learn something new and campus network has become an important platform to gain deeper knowledge. Due to this, the construction of the network in the campus environment has become an important necessity. The number of students who uses their own device is increasing rapidly, this increase the stress on the network. Only using the devices available on the campus is not enough and it cannot meet the requirement of the students. Many universities have switched to wireless network, which is easy to access and cost efficient. The advantages of the wireless network cannot be matched by the wired network.

In this project, I will design a WLAN for my high school. The actual situations of the campus should be considered before designing the WLAN. This school has one main building, one student dormitory, one complex building, one gym and one laboratory building. About 2,000 students are studying and 250 teachers are working there.

Request Analysis

In this project, the basic goal is using wireless network technology to expand teaching area network and make it possible for students connect to the network at anytime and anywhere. In the real environment, it's impossible to expand signals to every corner by using wired networks, that's one of the reason why we need WLAN.

The goals of campus WLAN should focus on efficiency, stability and safety. And, easy to install, maintain and manage. The WLAN should have a better performance and low cost at the same time. It should provide teachers a flexible teaching platform and students an effective study environment. The establishment of campus WLAN mainly consider about the following aspects of requirements. The first is the teacher's teaching requirements. WLAN will make full use of the multimedia resources, so the teachers can use the WLAN at any time to obtain the relevant teaching resources and course information, then all the valuable information will pass to the students clearly and accurately. The second

is the student's learning requirements. Students can access information resources, submit assignments or conduct group activities in a WLAN environment. The third is the number of ports requirements. There are many of the existing network terminal equipment in campus. And, there are large demand of network ports in library or classroom environment. The WLAN will meet the needs of information points. The fourth is the construction wiring requirements. The WLAN allows smooth communication between various buildings in campus. The wireless networks can coverage the signals to the places where there are difficult to arrangement of wires.

I will design WLAN for five different buildings and one outdoor area. The buildings include the main building, complex building, dormitory, cafeteria and the laboratory building, as shown in Figure 12.

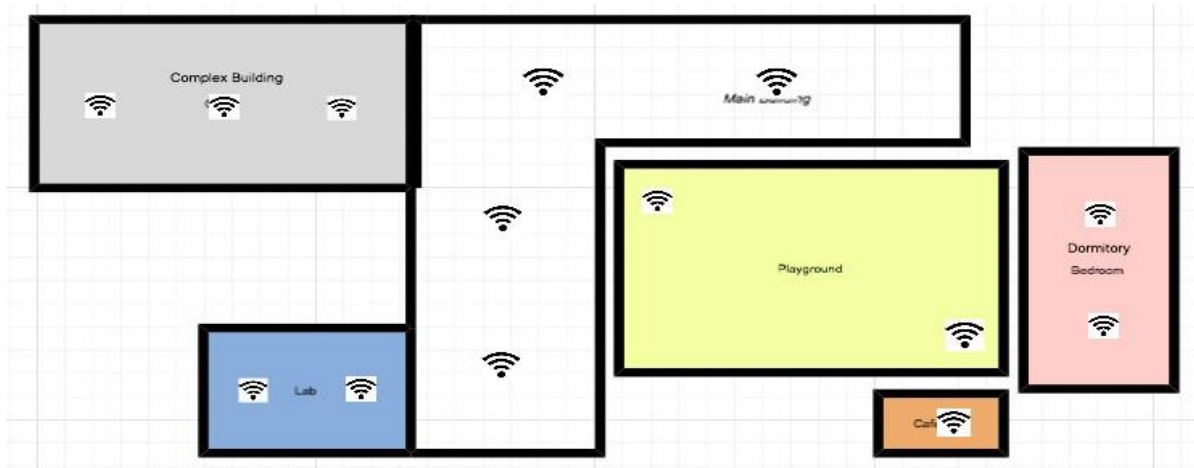


Figure 12. The plan of the campus

There are six floors in the main building, consisting of classrooms and offices. And, there are eleven floors in the complex building, consisting of the library and activity rooms. What's more, there are six floors in the dormitory, two floors in the cafeteria and eight floors in the laboratory building.

WLAN Topology

In this part I planned a basic topology for the WLAN, as shown in Figure 13.

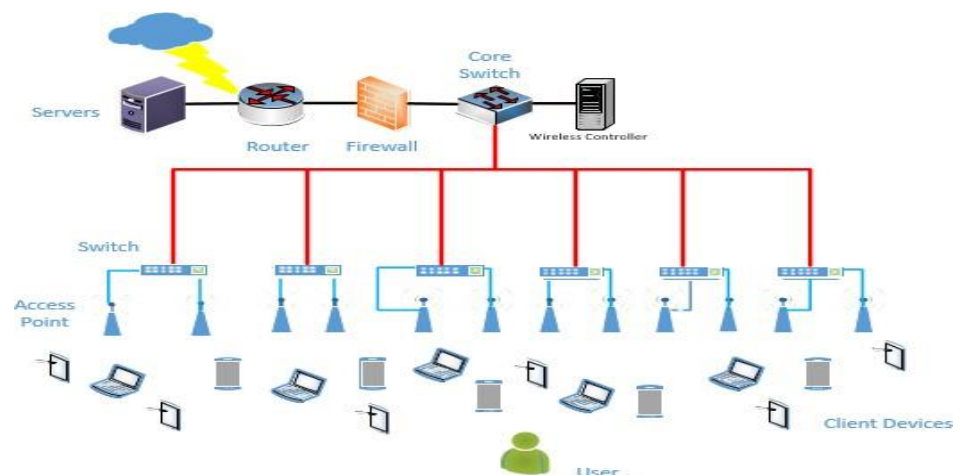


Figure 13. WLAN topology

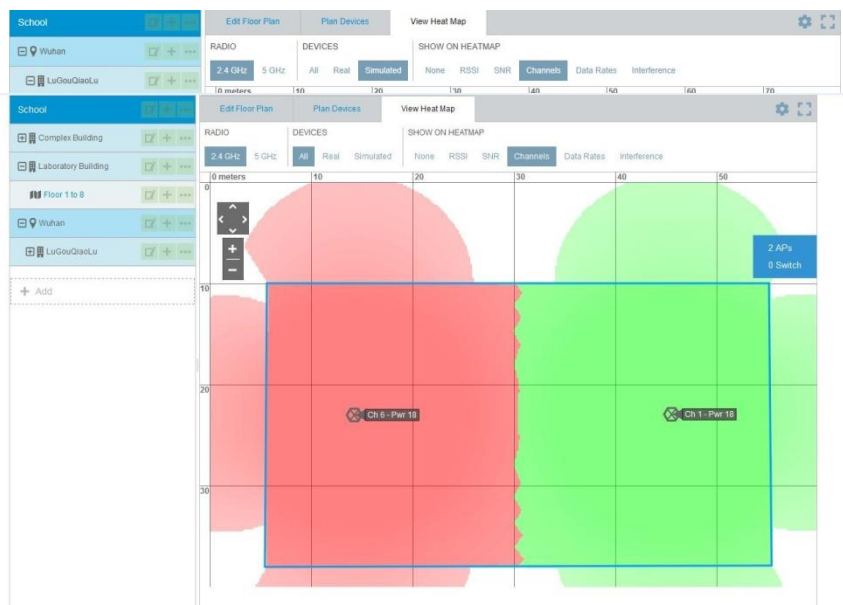
In this figure, the core of the campus network is the network center. The router is connected to the external network and firewall. There are different kinds of servers connect to the router. I used one core switch connected to the wired network and the wireless controller connected to the core switch. Then I have several PoE switches connected to the core switch and access point connect to the PoE switches. PoE refers to Power over Ethernet and it is a technology that lets network cables carry electrical power. It means that only one cable is enough for the PoE switch to provide network and power connection at the same time. Then the APs will spread out the wireless signals so that all the clients in the coverage area are able to access the WLAN.

Channel Management

I introduced channels in the theory part and here I will elaborate which channel will use for each building by using the HiveManager NG tool. And, I will also explain why I select that channel. Here I planned channels for each building. For the main building, each floor uses 4 APs and all the APs work on the 2.4GHz bandwidth, so I used the channels 1, 6 and 11. As shown in Figure 14, channels will not overlap each other. What's more, I used different permutations to manage the APs for each floor. It means that I used different channels for the same locations of the neighboring floors. I will also use this method for other buildings.

Figure 14. Channel management for the main building

For the laboratory building, each floor uses 2 APs and all the APs work on the 2.4GHz bandwidth, so I selected channel 1 and channel 6. As shown in Figure 15,

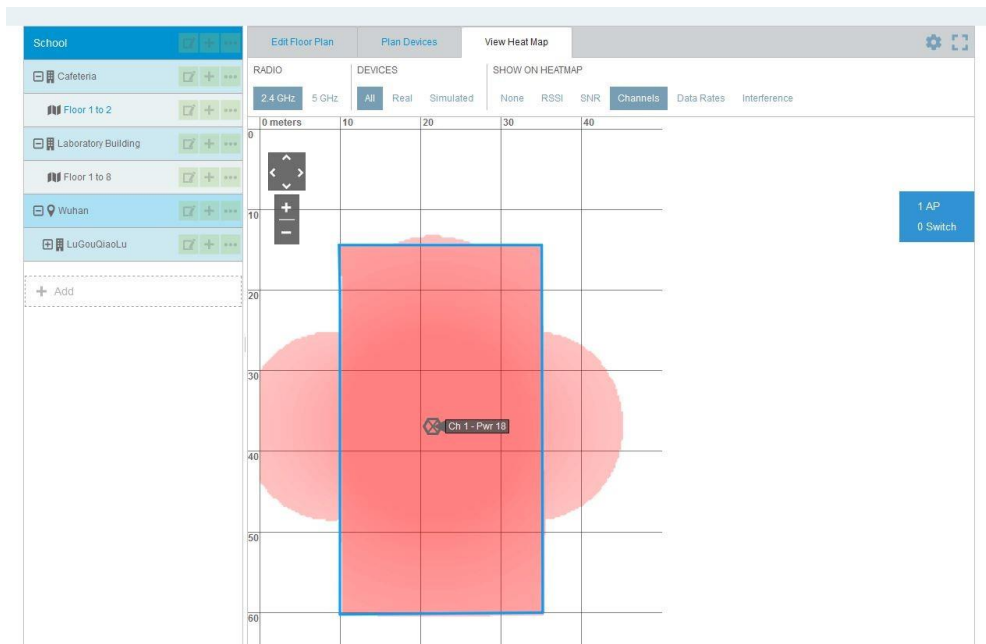


red and green colors show that the channels will not overlapping each other.

Figure 15. Channel Management for Laboratory Building

For the cafeteria, one AP is required for each floor and I used different channels in different floors. I used channel 1 for the first floor, as shown in Figure 16 and I use channel 6 for the second floor. So the channels will not overlapping each other.

Figure 16. Channel Management for Cafeteria



For the dormitory building, each floor uses 2 APs and all the APs work on the 2.4GHz bandwidth, so I decided to use channel 1 and channel 6. As shown in Figure 17, red and green colors show that the channels will not overlap each other.

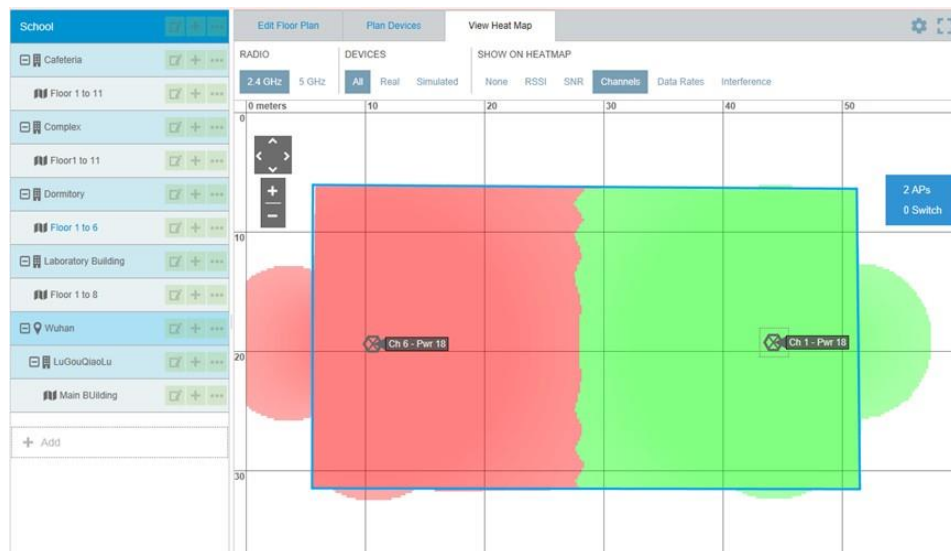


Figure 17. Channel Management for Dormitory

For the complex building, each floor uses 3 APs and all the APs work on 2.4GHz bandwidth, so I decide to use channel 1, channel 6 and channel 11. As shown in Figure 18, different colors clearly show that the channels will not overlap each other.

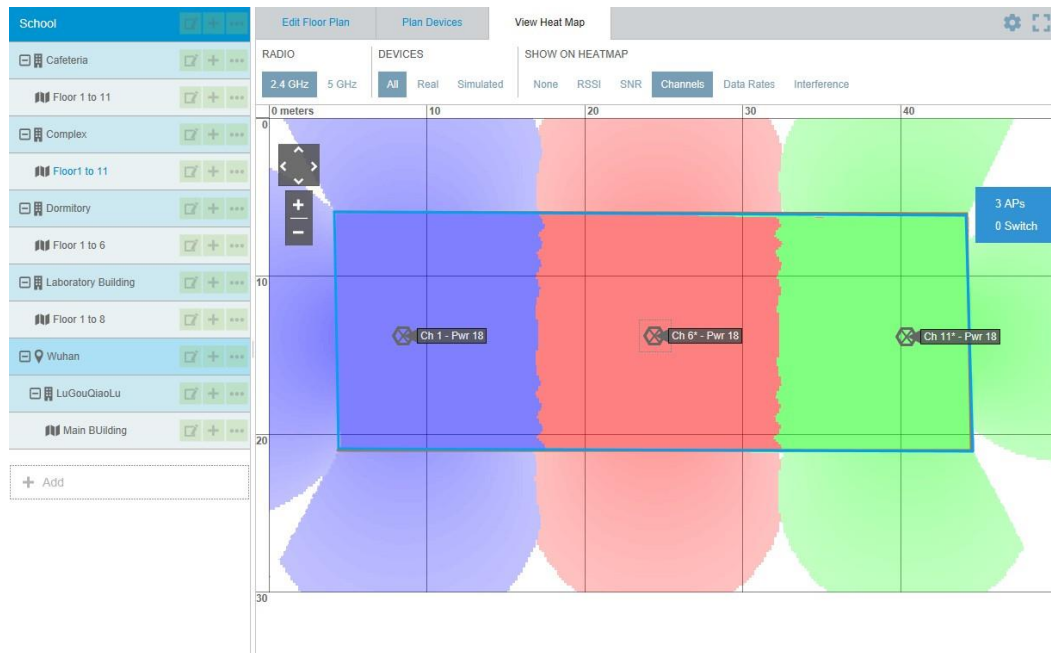


Figure 18. Channel Management for Complex Building

If there are channels that overlap each other, it will cause interference between signals. Then there is slower throughput and packet loss at the same time. That's the reason why channel management is needed here.

AP Management

In this part I will introduce how many APs are used for each building and where I decided to place them. The 2.4GHz frequency is used for each APs, because there are many walls or other objects in each building and I need better coverage of the WLAN. What's more, in the campus environment, I don't need to care about some 2.4GHz household appliances interfering the network. Floor-planner and HiveManager NG are used in this chapter for AP management.

For the main building, the main coverages of the networks are classrooms. In this case, I used ceiling APs and planned 4 APs for each floor, as shown in Figure 19. The model of the AP is TL-AP1750C-PoE from TP link company. It's

easy for IT managers to manage the APs, if all the APs are of the same model. So, I used the same model for all indoor places. This model of AP has a built-indirectional antenna and it can improve the signal quality of the coverage area, especially where there is a need for penetration. Each AP can support 80 clients' access in the network at the same time. I decided to install the APs on the ceiling of the corridor, near the window or the door of the classrooms.

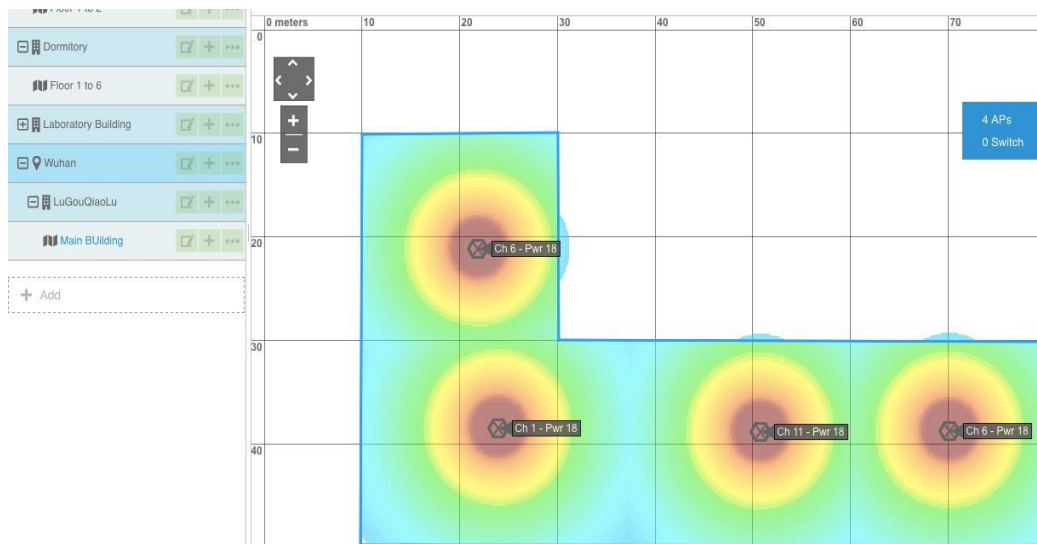
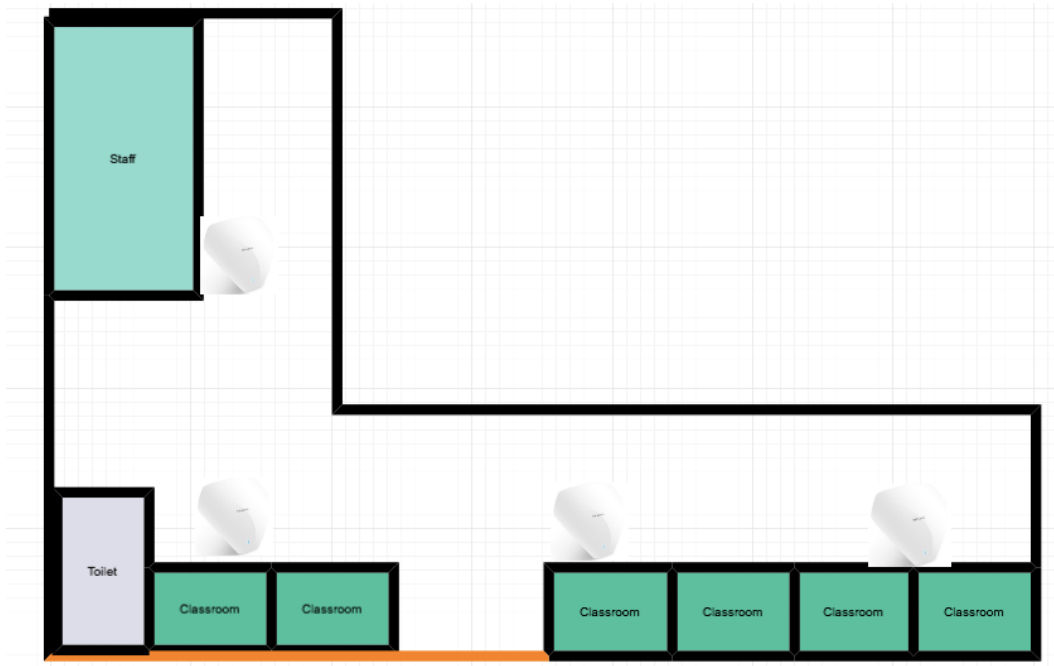


Figure 19. AP Management for the Main Building

The lab building has seven floors. I used 2 APs for each floor, as shown in Figure 20. The model of the AP is TL-AP1750C-PoE. The main coverage areas

are each laboratory and corridors. I decided to install the APs on the ceiling of the corridor, close to the laboratory. Some specific needs have to be determined according to the network cabling situation.



Figure 20. AP Management for the Laboratory

The cafeteria has two floors. I used one AP for each floor, as shown in Figure 21. The signal will transmit well, because there is a large open area in the cafeteria. The type of the AP is ceiling AP and the model is TL-AP1750C-PoE. I

decided to install the APs in the middle of the ceiling. One AP used, full coverage achieved.

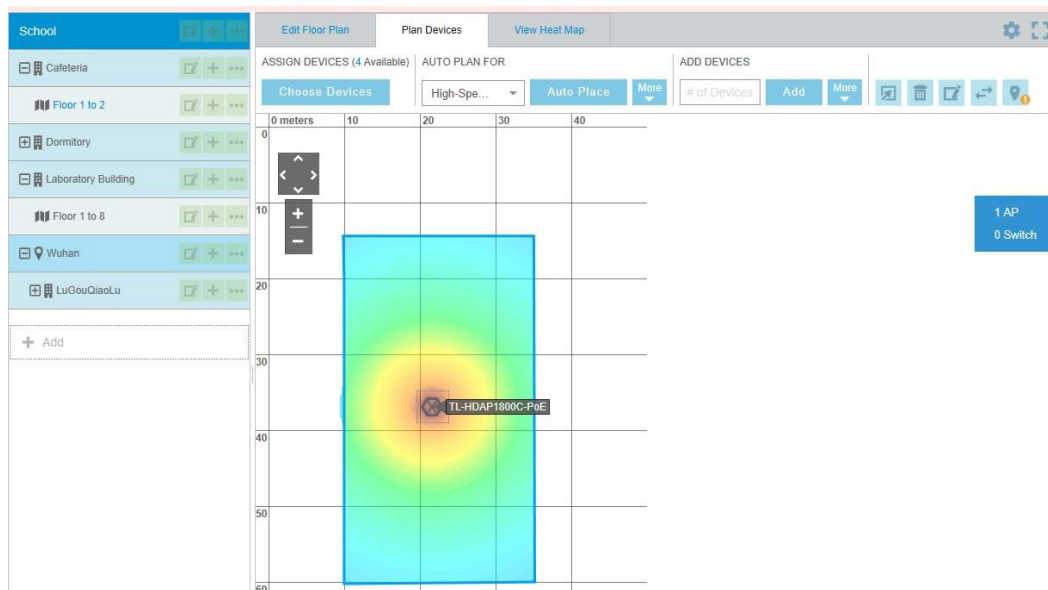
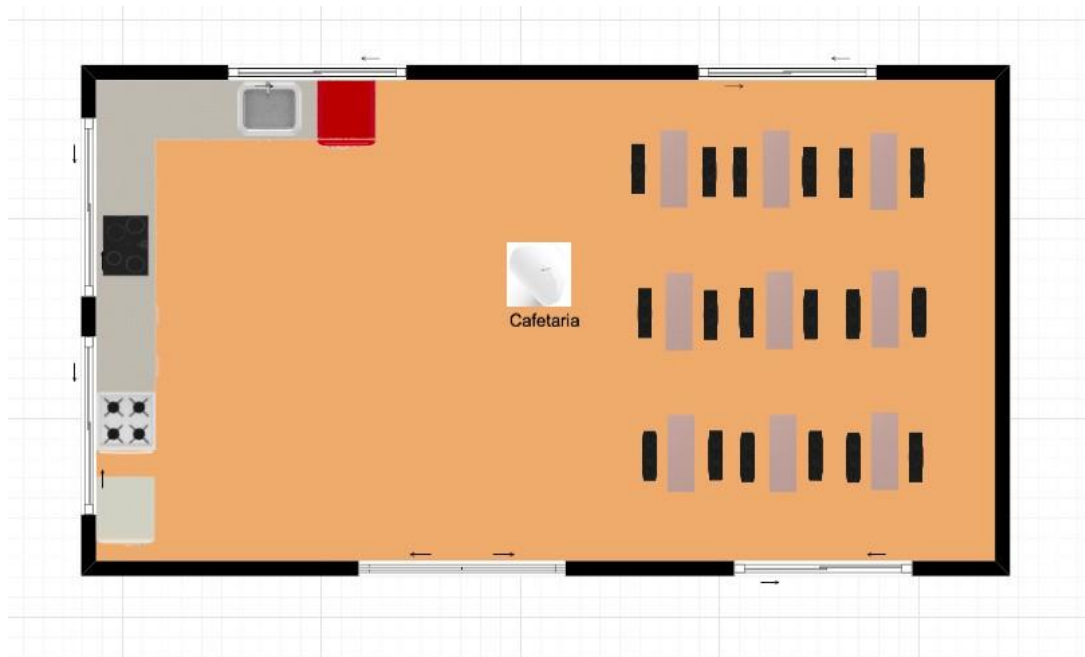


Figure 21. AP Management for the Cafeteria

The complex building has 11 floors and it is the second biggest building in the campus. The library and some wide range activities room is inside the building. In this case, I put 3 APs for each floor, as shown in Figure 22. The model of the AP is TL-AP1750C-PoE. I decided to install the APs in the ceilings, depending on the environment of each floor.

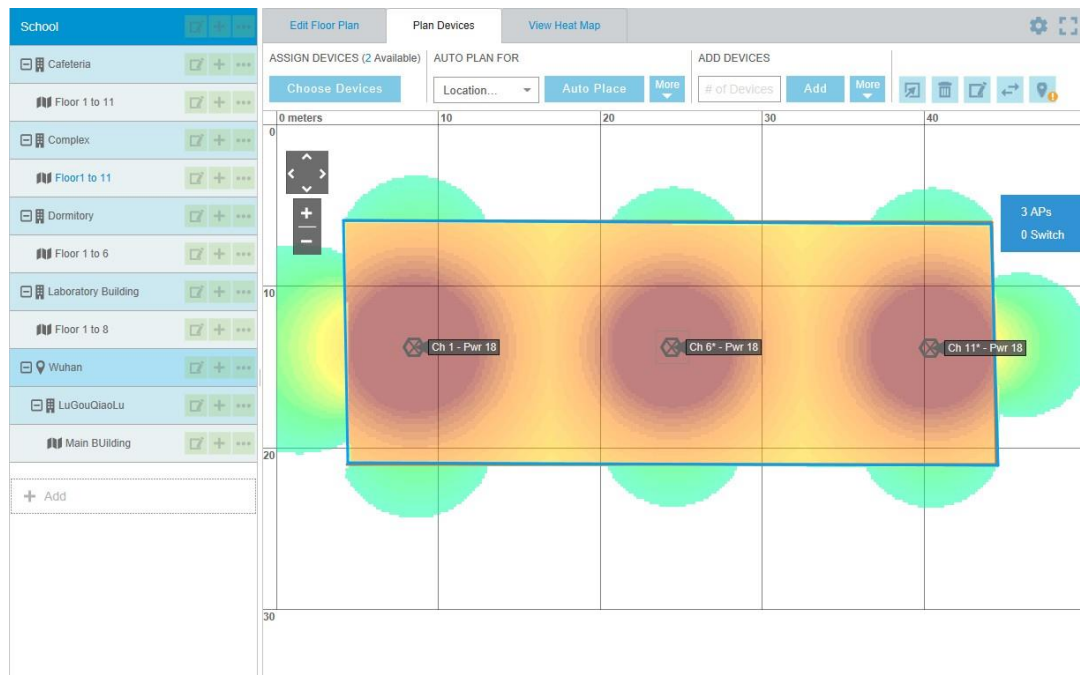
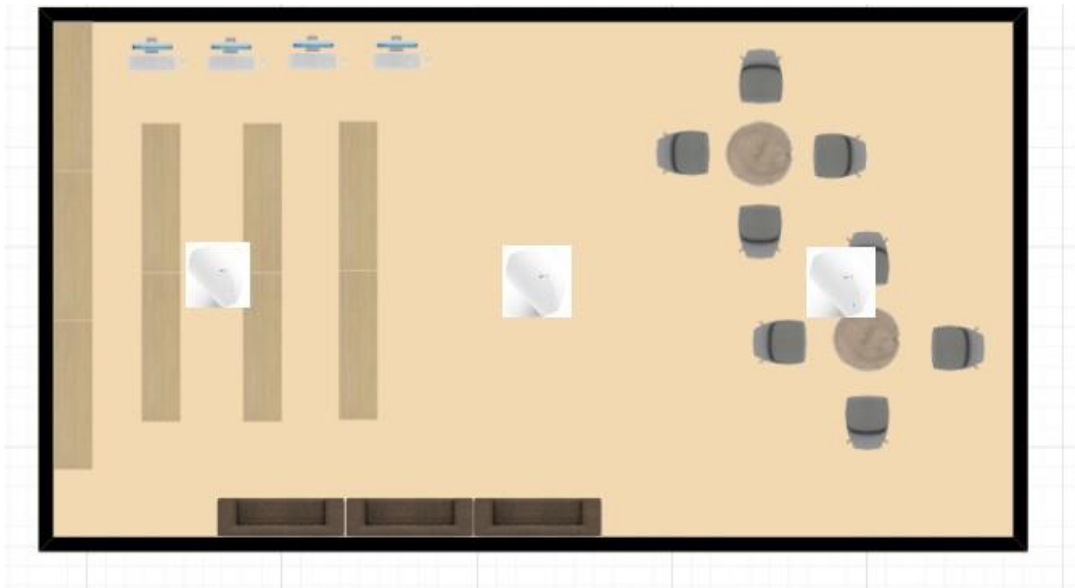


Figure 22. AP Management for the Complex Building

For the dormitory, I considered the coverage of each room. Actually I planned two ways to place the APs. The first one is by using ceiling APs in the aisle and the other is by using panel APs in every room. Considering the budgets and the real situation, I found that I didn't need that many APs. Only ceiling APs are enough for the network coverage. So, in this building I used 2 ceiling APs for

each floor, as shown in Figure 23. The model of the APs is TL-AP1750C-PoE. Because of It's stronger penetration.

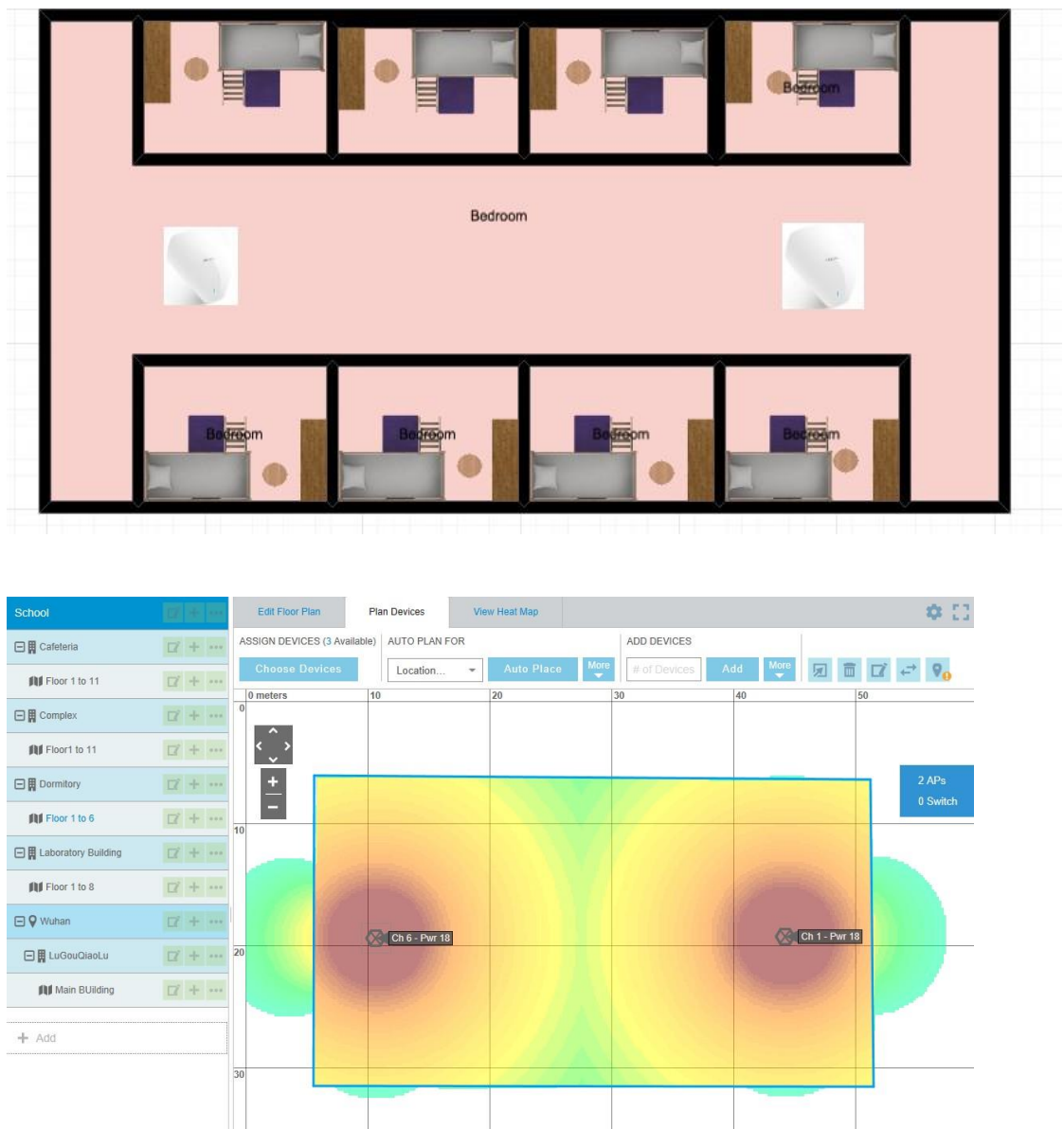


Figure 23. AP Management for the Dormitory

The last coverage area is outdoor place. When I selected an outdoor AP, I had to consider the location, the range of service, the power supply, the coverage of the network, the rate of the network and whether it would be easy to install and manage. The model I used is TL-AP300P from the TP-LINK company. The TL-AP300P is a high power AP for the outdoor place and it can work at any harsh environment. I will introduce the model in later chapters. I decided to use the 5GHz band for the outdoor place, because there are no obstacles. I decided

to install the APs at the diagonal corner of the playground, as shown in Figure 24.

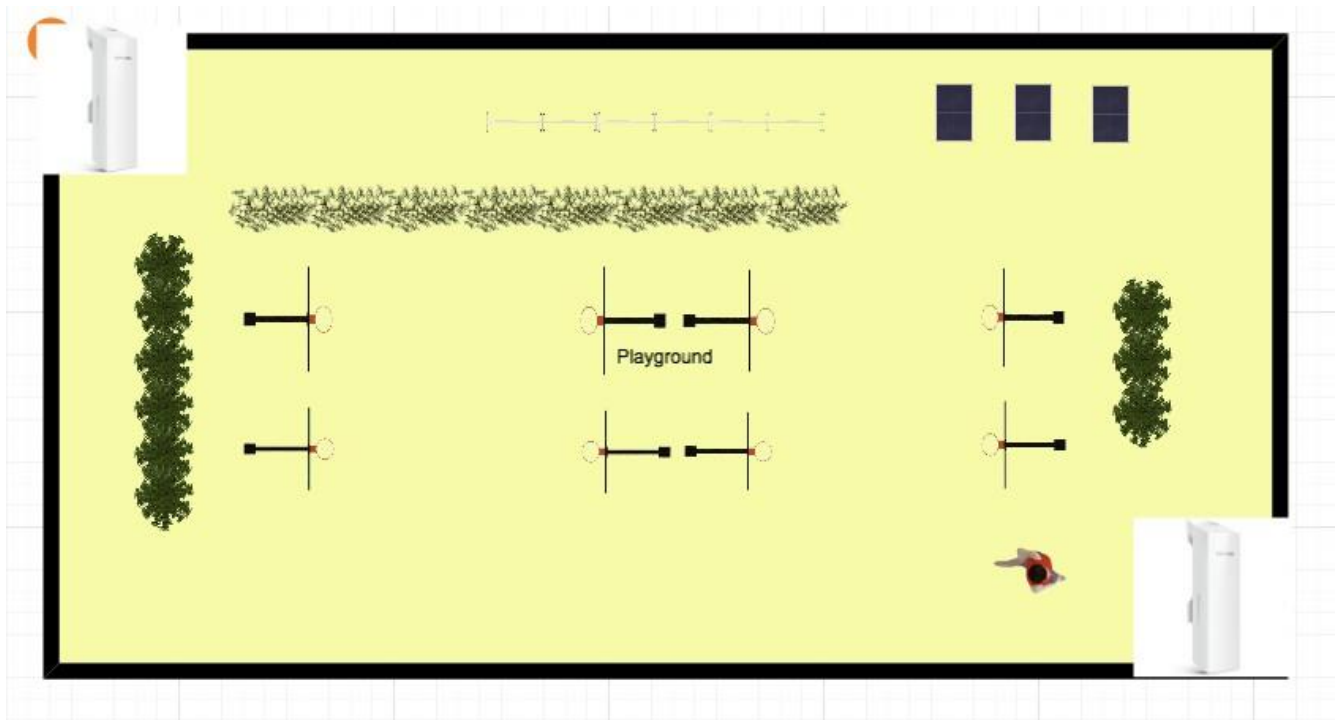


Figure 24. AP management for the playground

Security of the WLAN

The use of broadcast in WLAN may cause a security problem. Planning for the security of the campus wireless local area network is a complex thing. Some of the hackers might corrupt data without promise. To solve the problem, WLANs always need user authentication and data privacy. Securing the network protects the organizations from threats and controls who can access the network. So, for the security part, I will assign VLAN for each building, and then I will use portal authentication to control the access to the WLAN. As Table 4 shows, each building has its own VLAN number and I also configure IP for each place, but I still need discuss it with the school, if I can use these IPs or not. The table clearly shows how many floors I have for each building and how many APs I used for each floor.

Table 4. Division of VLAN

Building	VLAN	IP	Gateway	Floor	AP
Main Building	101	192.168.101.0	192.168.101.254	1	4
				2	4
				3	4
				4	4
				5	4
				6	4
Complex Building	102	192.168.102.0	192.168.102.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
				7	2
				8	2
				9	2
				10	2
				11	2
Laboratory Building	103	192.168.103.0	192.168.103.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
				7	2
				8	2
Dormitory	104	192.168.104.0	192.168.104.254	1	2
				2	2
				3	2
				4	2
				5	2
				6	2
Cafeteria	105	192.168.105.0	192.168.105.254	1	1
				2	1
Playground	106	192.168.106.0	192.168.106.254	1	2
Total					78

For the authentication, I used the portal authentication to control the access to the network. With portal authentication, all the students and teachers must log in to the portal website, and then each of them might access the portal website. And if they want to access the internet, they have to pass the portal authentication on the portal website. The benefit is that it authenticates clients directly through the web page, without the use of any client software. It's for the IT manager to manage the clients.

Lists of Hardware and Budgets

For the campus WLAN, I have to consider about the hardware from all sides. When selecting the APs, I considered the following sides: the first ones are the environmental characteristics, whether the AP is used in an indoor area or an outdoor area. The second is the way of installation, whether to install on the ceiling or panel. The third is the power supply, whether it is standard PoE or passive PoE. The fourth is the coverage of the WLAN, whether it is a single room or multiple rooms. How many clients will access each AP. All of the hardware is manufactured by the TP-LINK company from China, as they are much suitable for the real situation of this project.

I selected TL-AP1750C-PoE as the model of indoor AP, as shown in Figure 25. TL-AP1750C-PoE is one kind of ceiling AP from the TP-LINK company. It can work in 2.4GHz or 5GHz bands and more clients are allowed to access the AP than the parity price of the other APs. This model of AP has built-in directional antenna in order to improve the signal quality of the coverage area. In the complex environment, we can increase the AP transmit power to enhance the coverage effect of the WLAN. According to the needs of the building, this model of AP can be installed on the ceiling or wall. It uses standard PoE for power supply and each AP only need one network cable. It is convenient for construction. The price of this model is EUR 120.



Figure 25. TL-AP1750C-PoE AP (TP-LINK 20173)

The hardware specifications and software specifications of the model TL-AP1750C-PoE AP are shown in Table 5.

Table 5. Hardware and software specifications of TL-AP1750C-PoE

Hardware specifications

Product number	<ul style="list-style-type: none"> TL-AP1750C-PoE
Installation	<ul style="list-style-type: none"> Ceiling Mounting
Size	<ul style="list-style-type: none"> 264 * 241 * 55mm
Wireless	<ul style="list-style-type: none"> 2.4GHz Frequency Band: 450Mbps 5GHz Frequency Band: 1300Mbps
Port	<ul style="list-style-type: none"> One 10/100 / 1000M RJ45 port
Power supply	<ul style="list-style-type: none"> PoE Power
Supply Total power consumption	<ul style="list-style-type: none"> 15.31W
Use of the environment	<ul style="list-style-type: none"> Operating Temperature: 0 °C ~ 40 °C Operating Humidity: 10% to 90% RH Non-condensing Storage Temperature: -40 °C ~ 70 °C Storage Humidity: 5% to 90% RH Non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> SSID Broadcast: Supported Network Type: Guest network, Employee network Wireless Encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK User Isolation: Isolation between wireless networks, AP in-ternal isolation VLAN Settings: support SSID and Tag VLAN binding Transmit Power Setting: Supports 1dBm linear regulation
The number of clients that can be associated	<ul style="list-style-type: none"> Number of Wireless clients: Restricted 100 System Log: Yes Factory Reset: Supported Backup Configuration: Supported
System management	<ul style="list-style-type: none"> Import Configuration: Supported Software Upgrade: Support

I selected TL-AP300P as the outdoor AP for the WLAN, as shown in Figure 26. TL-AP300P is a model of high power AP for outdoor place. It uses ASA outdoor plastic shell and professional components in order to possessing good proper-ties for damp-proof, dustproof, anti-statics, shocking-resistance and lightning protection. It will adapt to wind, sun, rain, snow and other harsh environments. It will operate properly even in the extreme high and low temperature (-30 ° C ~ 70 ° C) environment. TL-AP300P provides 300Mbps transmission rate and it has built-in 9dBi high-gain dual-polarized antenna, so that it has stronger signal and a wider range covering area. TL-AP300P has 500mW emissive power and

-95dBm acceptance sensitivity, and is especially suitable for outdoor long-distance WLAN applications. It uses passive PoE cable for power supply and 60 meters electric power transmission. The price of the model is EUR 70.



Figure 26. TL-AP300P AP (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AP300P AP are shown in Table 6.

Table 6. Hardware and software specifications of TL-AP300P AP

Hardware specifications

Product number	• TL-AP300P
Installation	• Pole installation
Size	• 224 * 79 * 60mm
Wireless	• Working frequency band: 2.4GHz-2.483GHz (China) Wireless rate: 300Mbps
Power supply	• 24VDC / 1A Passive PoE power supply, distance of 60M
Environmental protection	• 6kV lightning protection, 15kV ESD protection ASA engineering plastic housing, IP55 grade dustproof, waterproof
Use of the environment	• Operating temperature: -30 °C ~ 70 °C • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	• SSID Broadcast: Supported • Network type: Guest network, employee network • Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User isolation: isolation between wireless networks, AP internal isolation • VLAN settings: support SSID and Tag VLAN binding • Transmit power setting: Supports 1dBm linear regulation
The number of clients that can be associated	• 100
System management	• System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported

I selected TL-SL1218MP as the model of access switch, as shown in Figure 27. TL-SL1218MP is a PoE switch designed by the TP-LINK company. It will provide standard switching, video monitoring and VLAN isolation. The management and maintenance of the switch is simple. And, It's designed to meet the requirements of a medium sized enterprise, community, hotel, office network and campus to set up their cost-effective network. The price of the PoE switch is EUR 150.



Figure 27. TL-SL1218MP switch (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AP300P AP are shown in Table 7.

Table 7. Hardware and software specifications of TL-AP1750C-PoE

Hardware specifications

Product number	• TL-SG5428
Size	• 290* 180* 44 mm
Port	<ul style="list-style-type: none"> • 16 10 / 100Mbps RJ45 ports, support PoE power supply • 2 10/100 / 1000Mbps RJ45 ports • Operating temperature: 0 °C ~ 40 °C
Use of the environment	<ul style="list-style-type: none"> • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Basic features	<ul style="list-style-type: none"> • M1: Standard switching • M2: Video monitoring • M3: VLAN isolation
----------------	--

I selected TL-AC100 as the wireless controller of the WLAN, as shown in Figure

28. TL-AC100 is one of the TP-LINK wireless controller products designed for hotels, enterprises, schools, shopping malls and restaurants. And, it can be unified to manage up to 100 TP-LINK ceiling APs and panel APs. It can meet a wide range of wireless engineering requirements. TL-AC100 regularly collects

the working status of each AP, and, as all the APs' working state will be displayed on the interface in an intuitive way, it's easy for IT managers to manage the APs. IT managers can unified upgrade all the APs' software through TL-AC100 in order to avoid the trouble of a separate upgrade. It will reduce the complexity of maintenance. In my case, I have 78 APs for the campus, so it's a good idea to select TL-AC100 as the wireless controller when considering the efficiency and cost at the same time. The price of the wireless controller is EUR50.



Figure 28. TL-AC100 wireless controller (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-AC100 wireless controller are shown in Table 8.

Table 8. Hardware and software specifications of TL-AC100

Hardware specifications

Product number	• TL-AC100
Size	• 209* 126 * 26mm
Port	<ul style="list-style-type: none"> • 5 10/100M RJ45 ports • Operating temperature: 0 °C ~ 40 °C
Use of the environment	<ul style="list-style-type: none"> • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> • SSID Broadcast: Supported • Network type: Guest network, employee network • Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User isolation: isolation between wireless networks, AP internal isolation • VLAN settings: support SSID and Tag VLAN binding • Transmit power setting: Supports 1dBm linear regulation
The number of clients that can be associated	• 100
System Management	<ul style="list-style-type: none"> • System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported • Software Upgrade: Support

I selected the TL-SG5428 as the core switch of the WLAN, as shown in Figure

29. The TL-SG5428 is a gigabit three-tier network management switches that TP-LINK company designed for high-security high-performance network. It supports RIP, static routing, DHCP server, DHCP relay, ARP proxy. It will provides comprehensive security policy, perfect QoS strategy and VLAN function. It is easy to manage and maintenance. It can be acts as the core switch of medium enterprises, residential, hotel and campus network, in order to meet the high performance, stable, reliable and affordable network needs. The price of this model is EUR 350.

Figure 29. TL-SG5428 core switch (TP-LINK 2017)

The hardware specifications and software specifications of the model TL-SG5428 core switch are shown in Table 8.



Table 9. Hardware and software specifications of TL-SG5428 core switch

Hardware specifications

Product number	<ul style="list-style-type: none"> • TL-SG5428
Size	<ul style="list-style-type: none"> • 440* 180* 26mm
Port	<ul style="list-style-type: none"> • 5 10/100M RJ45 ports • Operating temperature: 0 °C ~ 40 °C
Use of the environment	<ul style="list-style-type: none"> • Operating humidity: 10% to 90% RH non-condensing • Storage temperature: -40 °C ~ 70 °C • Storage humidity: 5% to 90% RH non-condensing

Software specifications

Wireless	<ul style="list-style-type: none"> • SSID Broadcast: Supported • Network type: Guest network, employee network • Wireless encryption: WEP, WPA, WPA2, WPA-PSK, WPA2-PSK • User isolation: isolation between wireless networks, AP internal isolation • VLAN settings: support SSID and Tag VLAN binding • Transmit power setting: Supports 1dBm linear regulation
The number of clients that can be associated	<ul style="list-style-type: none"> • 100
System Management	<ul style="list-style-type: none"> • System Log: Yes • Factory Reset: Supported • Backup Configuration: Supported • Import Configuration: Supported • Software Upgrade: Support

4 CONCLUSION

We are now in a new era of information and it has become the core factor of social and economic development. Information technology has become the trend of the world. The use of the networks is more closely linked to human society, political, economic and daily work, and all aspects of life. What's more, the computer networks will be destined to become the most important infra-structure for the 21st century global information society.

The WLAN is the product that combine computer technology and wireless communication technology. It brings a lot of convenience to people's lives. The aim of the project was to create a WLAN for campus. In theory part I gained deep knowledge of the features of WLANs, including the advantages and limitations of WLANs, technical standards of WLANs, security and authentications of WLANs, components of WLANs and different kind topologies of WLANs. After that, I successfully built a topology for the WLAN in the practical part by using the VISIO tool. I also managed channels and APs by using HiveManager NG. Then, I selected the suitable security methods and hardware for the WLAN.

There were still some difficulties left during the implementation of this project. For example, how to deploy APs in a real environment, how to calculate the attenuation power according to the material of the barrier and what kinds of software should be installed in the WLAN? What's more, in this project I just defined an abstract concept for WLAN. If you want to build WLANs, you need an IT group to discuss and consider more about the project, it is not an easy job in the real environment, you have to consider about all the hardware and software at the same time. With the progress and continuous innovation of network technology, WLANs still play an important role in our daily life for many aspect.

REFERENCE

Bradley, M. 2017. Wireless Standards 802.11a, 802.11b/g/n, and 802.11ac. WWW document. Available at: <https://www.lifewire.com/wireless-standards-802-11a-802-11b-g-n-and-802-11ac-816553>[Accessed 01 April 2017].

Bradley, M. 2017. What Hardware Is Required to Build a Wireless Network? WWW document. Available at: <https://www.lifewire.com/required-to-build-wireless-networks-816542> [Accessed 01 April 2017].

Karen, S and Derrick, D. 2007. Wireless Network Security for IEEE 802.11a/b/g and Bluetooth. PDF document. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.109.6200&rep=rep1&type=pdf> [Accessed 01 April 2017].

Abdelkarim, R. 2006. Security in Wireless Data Networks: A Survey Paper. WWW document. Available at http://www.cs.wustl.edu/~jain/cse574-06/ftp/wireless_security/index.html[Accessed 20 April 2017].

Stefan, P and Vladimir, W. 2012. Wireless Mesh Networks - Efficient Link Scheduling, Channel Assignment and Network Planning Strategies. WWW Document. Available at :<http://www.intechopen.com/books/wireless-mesh-networks-efficient-link-scheduling-channel-assignment-and-network-planning-strategies/channel-assignment-schemes-optimization-for-multi-interface-wireless-mesh-networks-based-on-link-loa> [Accessed 08 March 2017].

Cisco. 2008. Authentication Types for Wireless Devices. WWW document. Available at :<http://www.cisco.com/c/en/us/td/docs/routers/access/wireless/software/guide/SecurityAuthenticationTypes.html> [Accessed 25 April 2017].

Alexandra, G. 2015. Getting Familiar with Wi-Fi Channels? WLAN Back to Basics. WWW document. Available at :<http://boundless.aerohive.com/experts/WLAN-Channels-Explained.html>[Accessed 26 March 2017].

Cisco. 2011. Wireless LAN Controller Web Authentication Configuration Example. WWW document. Available at :<http://www.cisco.com/c/en/us/support/docs/wireless-mobility/wlan-security/69340-web-auth-config.html> [Accessed 20 April 2017].

H3C. Portal Authentication Technology White Paper. WWW document. Available at :http://www.h3c.com.hk/Products_Technology/Technology/Security_and_VPN/Technology_White_Paper/200809/617218_57_0.htm[Accessed 08 March 2017].

RF Wireless World. no date. WEP vs WPA vs WPA2 . WWW Document. Available at: <http://www.rfwireless-world.com/Terminology/WEP-vs-WPA-vs-WPA2.html>[Accessed 02 April 2017].

Difference Between. no date. Difference between Wireless LAN and Bluetooth. WWW Document. Available at:<http://www.differencebetween.info/difference-between-wireless-lan-and-bluetooth> [Accessed 12 March 2017].

Abby, S. 2014. WHAT IS A WLAN CONTROLLER (PART 1) . WWW Document. Available at: <http://boundless.aerohive.com/blog/what-is-a-wlan-controller-part-1.html>[Accessed 12 April 2017].

Brent, A. 2001. HomeRF and Bluetooth Wireless Communication Compared. WWW Document. Available at: <http://www.informit.com/articles/article.aspx?p=24265&seqNum=4>[Accessed 02 April 2017].

National Instruments. 2015. WLAN - 802.11 a, b, g and n. WWW Document. Available at:<http://www.ni.com/tutorial/7131/en/>[Accessed 08 March 2017].

Mark, C. 2013. CWNA Guide to Wireless LANs. WWW Document. Available at: https://books.google.fi/books?id=VbAKAAAAQ-BAJ&pg=PA168&lpg=PA168&dq=FHSS+DSSS+WLAN&source=bl&ots=8uVKcTskBr&sig=EXwMq0qaDGrsO5jZrTUUIq2cbtU&hl=zh-CN&sa=X&ved=0ahUKEwjw_b_7p6fTAhWC3iwKHxsxCfcQ6AEIcjAJ#v=onepage&q=FHSS%20DSSS%20WLAN&f=false [Accessed 26 March 2017].

Samraiz, T. 2014. Bluetooth. WWW Document. Available at: <https://www.sli-deshare.net/Samraiz1/bluetooth-32312039>[Accessed 02 April 2017].

Animasigaia. 2014. NETWORKING AND COMMUNICATIONS. WWW Document. Available at: <https://animasigaia.wordpress.com/2014/11/26/networking-and-communications/> [Accessed 28 April 2017].

Wikipedia. 2017. Wireless LAN controller. WWW Document. Available at: https://en.wikipedia.org/wiki/Wireless_LAN_controller [Accessed 28 April 2017].

Microsoft. 2003. How 802.11 Wireless Works. WWW Document. Available at: [https://technet.microsoft.com/en-us/library/cc757419\(v=ws.10\).aspx](https://technet.microsoft.com/en-us/library/cc757419(v=ws.10).aspx) [Accessed 28 April 2017].

Metageek. no date. Why Channels 1, 6 and 11? WWW Document. Available at: http://metageek.com/training/resources/why-channels-1-6-11-2.html?utm_expid=190328-189.BCYMV3QrTsW_IMQM0PlqcA.1&utm_referrer=https%3A%2F%2Fwww.google.fr%2F [Accessed 28 April 2017].

TP-LINK. 2017. Product World. WWW Document. Available at: <http://www.tp-link.com.cn> [Accessed 05 May 2017].

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On
“WORAL: A Witness Oriented Secure
Location Provenance Framework for
Mobile Devices”**

By

114019405326 - R. NIKHIL

114019405341 - S. SWATHI

114019405236 - M. NAVEEN KUMAR

114019405187 - K. SAI TEJA REDDY

114019405127 - G. ALEKHYA

**Under the supervision of
G. Radhika**

**Department of Computer Science &
Applications**

Radhika

[Signature]

Table of Contents

1. Synopsis
2. Introduction
3. Woral Architecture
4. Analysis
5. Implementation
6. Conclusion
7. References

SYNOPSIS

TITLE:

WORAL: A Witness Oriented Secure Location Provenance Framework for Mobile Devices

ABSTRACT:

Location-based services allow mobile device users to access various services based on the users' current physical location information. Path-critical applications, such as supply chain verification, require a chronological ordering of location proofs. It is a significant challenge in distributed and user-centric architectures for users to prove their presence and the path of traveling a privacy-protected and secure manner. So far, proposed schemes for secure location proofs are mostly subject to tampering, not resistant to collusion attacks, do not offer preservation of the provenance, and are not flexible enough for users to prove their provenance of location proofs. In this paper, we present WORAL, a complete ready-to-deploy framework for generating and validating witness oriented asserted location provenance records. The WORAL framework is based on the asserted location proof protocol and the OTIT model for generating secure location provenance on the mobile devices. WORAL allows user-centric, collusion resistant, tamper-evident, privacy protected, verifiable, and provenance preserving location proofs for mobile devices. This paper presents the schematic development, feasibility of usage, comparative advantage over similar protocols, and implementation of WORAL for android device users including a Google Glass-based client for enhanced usability.

I. INTRODUCTION

Mobile devices have enhanced the use of location-based services (LBS) using the geographical locations of the devices. LBS use location tags, such as in social networks, shopping coupons, traffic alerts, and travel logs. However, LBS dependent on location proofs collected by the user have more interesting features and applications. An auditor can later verify the claim of presence with respect to the user's identity, the location in question, and the time when the user was present at that location. However, untrustworthy location reporting has implications ranging from trivial cases, such as, cheating in social-games to national security issues.

Self-reported location presence using Global Positioning System (GPS) coordinates, cell triangulation in mobile phones, and IP address tracking are all susceptible to manipulated and false location claims. Continuous tracking of users by service providers including third-party applications violates the users' privacy, allows traceable identities, and makes the users defenseless against untrusted service providers. The service providers may also sell the location data of their users taking advantage of the small-text in the service agreements. Buggy and insecure implementations aggravate the situation even further.

Provenance of information is important for tracing the authenticity of the data back to its source. The provenance of location is a crucial requirement in path critical scenarios. A valid claim of travel path needs to be verified in terms of the location provenance. The integrity of a product may be highly justified by the supply chain and the inter- mediate locations which the product travels through. Provenance for location is a continuous process and is required to be preserved as the user travels around collecting location proofs. Unlike general data items, the sequence in which the locations are traveled needs to be preserved in chronological order within the provenance chain. As a result, location provenance portrays a greater challenge than that for general data items. There have been numerous proposals for allowing user initiated location proof generation.

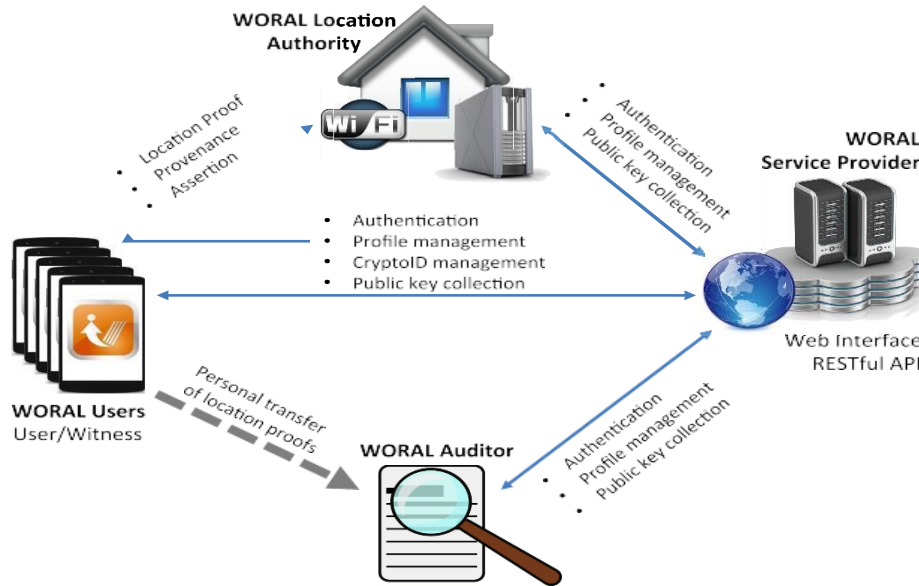
A localization authority covering the area utilizes some secure distance-bounding mechanism to ensure the user's presence when the user requests for a location proof. However, existing mechanisms overlook collusion attacks as well as the provenance of the location proofs. Related works thus far have not considered third- party endorsement and the chronological ordering for secure location proofs together, which makes the schemes vulnerable to collusion attacks and tampering with the order of the proofs. The following illustrates the practicality of a secure and asserted location provenance framework.

In this Project, we present the Witness Oriented Asserted Location provenance (WORAL) framework. The system is based on the Asserted Location Proof (ALP) protocol and incorporates the OTIT model for secure location provenance. The WORAL framework is a complete suite of production-ready applications, featuring a web-based service provider, a desktop-based location authority server, an Android-based user app, a Google Glass-based client, and a desktop-based auditor.

II. WORAL ARCHITECTURE

Four entities are involved in the WORAL framework: the WORAL mobile device users (user/witness), the *LA*, auditor, and the *SP*. In the secure asserted location provenance

protocol, a user U visits a site S , which is maintained by an LA . Additionally, there are a number of witness devices W , which are registered with the LA , and are willing to serve in asserting the location provenance items. The SP is the only centralized entity in the WORAL architecture, which is responsible to manage the accounts of the other three entities, provide authentication, and distribute public keys. Figure 1 depicts the overview of the proposed architecture.



A. DEPENDENCIES ON SERVICE PROVIDER

1) ACCOUNT CREATION AND AUTHENTICATION

In the WORAL framework, users, witnesses, LAs , and auditors need to create an account with the SP using a unique identification criteria. Such systems can include the Social Security Number, passport number, driving license, trade license, or anything else which unambiguously identifies the person or the organization. While setting up the account, each entity needs to provide a unique username/password, which is later used as login credentials for all the entities.

As the LA and auditor need to be authorized entities, there is an account verification stage for these two entities. The SP verifies the LA and auditor account requests and sends them a service code. LAs and auditors cannot access their accounts until the accounts are activated using the service code received from the SP .

2) CRYPTOID AND KEY DISTRIBUTION

The SP is responsible for providing access to public keys in different stages of the protocol. There are two different approaches to generate the private-public key pair for LAs and for users (user/witness).

An *LA* needs to provide a human readable unique identity (location-ID) at the time of account creation. Once the account gets activated, the *SP* generates a private-public key- pair, which is identified by the location-ID. *LAs* need to collect the private key and store it on the local server. Upon receiving a request for the public key for a particular *LA* (location-ID), the *SP* sends the appropriate public key to the requestor.

Privacy is crucial for users (user/witness) to ensure non- traceable provenance against an attacker. In WORAL, we use a cryptographic identity (Crypto-ID) for users. The Crypto- ID hides the actual identity of user/witness within the location provenance records. A user can create multiple Crypto-IDs for WORAL and the user can choose a different one at different times on the mobile device while requesting the location proof. Hence, an external attacker cannot track the location of user/witness from a list of location provenance records. Users (user/witness) can generate a Crypto-ID on the mobile device and a private-public key pair will be created and saved for the

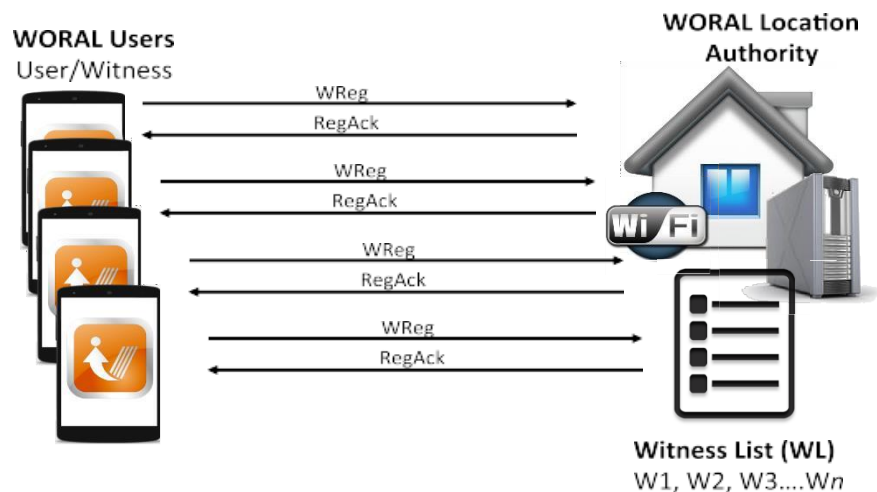
B. LOCATION AUTHORITY DISCOVERY

The user and witness need the IP address of the *LA* to establish TCP connection with the *LA*. They also require the unique location-ID to access public key of the *LA*. The IP and identifier is made available to the user and witness through the *LA* discovery protocol using broadcast messages.

When a user or witness needs the *LA*'s information, it broadcasts a UDP packet to a specific port requesting the information of *LA*. The *LA* always listens for new UDP broadcast packets. If the packet matches with some certain criteria (in our case, request for *LA*'s information), the *LA* sends a UDP packet as a response that contains its location ID. After receiving the response sent by the *LA*, the user/witness can extract the identity and IP address of the *LA* from the received UDP packet.

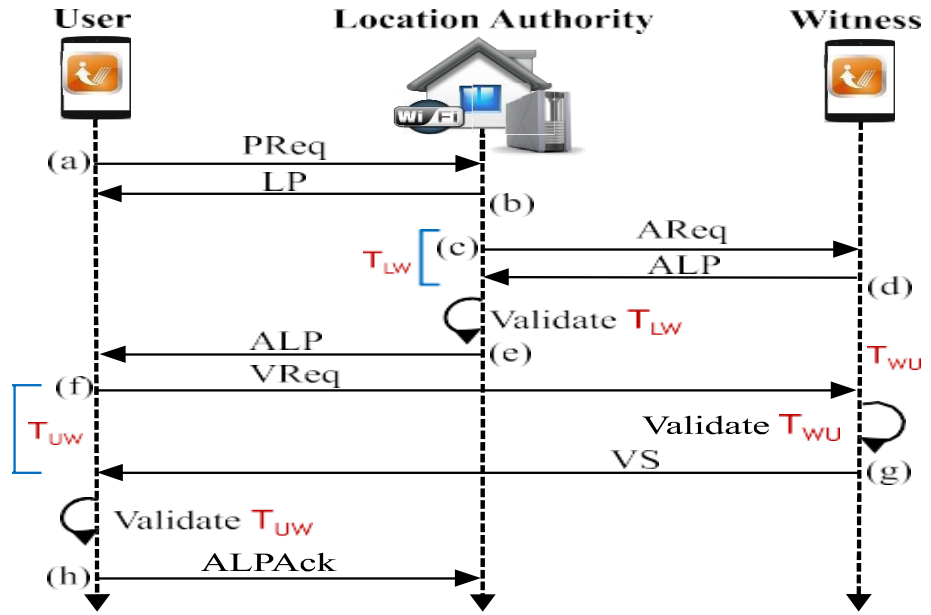
C. WITNESS REGISTRATION

The *LA* needs to maintain a list of available co-located WORAL mobile users who are interested to serve as witnesses. The registration process is shown in Figure. A WORAL mobile user expresses his willingness to serve as a witness by sending a witness registration message *WReg* to the *LA* and is defined as:



A. SECURE LOCATION PROVENANCE PROTOCOL

The sequence of interaction among the entities for creating an asserted location proof with provenance preservation is illustrated in Figure and described as follows:



III. ANALYSIS

The protocol design and performance evaluation was performed and presented in details in the Asserted Location Proof paper. The performance evaluation and comparison for the different provenance models were presented in OTIT. This section presents a discussion on the proposed protocol including a comparison to other similar technologies.

A. COLLUSION ATTACKS

We define the following symbols: honest and malicious users U and \bar{U} honest and malicious location authorities L and \bar{L} honest and malicious witnesses W and \bar{W} . The eight different combinations and corresponding possible collusion attacks are presented in Table. WORAL enforces mutual communication and detection of any colluded fake proof generation. A security analysis of WORAL for each collusion model is presented as follows:

TABLE 1. Collusion models and corresponding threats.

Notation	Attack(s)
$U L W$	No collusion
$\bar{U} L W$	False proof, reordering, DoS, proof switch, relay attack
$U \bar{L} W$	DoS, implication
$U L \bar{W}$	False endorsement, privacy
$U \bar{L} \bar{W}$	Implication, relay attack, replay attack
$\bar{U} L \bar{W}$	False endorsement, relay attack, Sybil attack [52]
$\bar{U} \bar{L} W$	False location proofs, relay attack, replay attack
$\bar{U} \bar{L} \bar{W}$	False proofs.

B. SYSTEM VULNERABILITY ANALYSIS

Someone willing to share the private keys in public-key cryptography, or a general internet user willing to publicly share the secret password, does not allow any system to be secure. As a result, it is not very useful to discuss any situation where all the given entities are malicious. Increasing the number of entities in a system also increases the number of attack surfaces. Any two-entity based location proof protocol has four different collusion combinations. A two-party protocol will have at least one combination which the system will be vulnerable to, where both the parties are malicious. As shown in Table 2, the combination of a malicious location authority \bar{L} and a malicious user U^- will make the protocol invalid. Therefore, any such a protocol is 25% vulnerable in the best-case.

C. SECURE PROVENANCE GENERATION

Next, we present the security lemmas and propositions for secure location provenance schemes.

Lemma 1: A location proof is a securely generated data item for user U , which validly verifies the presence of user U at location L_i , where $i \in \{1, 2, \dots, n\}$.

Lemma 2: A location provenance chain C is a record of location proofs for locations L_i , where $i \in \{1, 2, \dots, n\}$, and presence at each location L is verified using a location proof $Proof(L)$ for that location.

TABLE 3. Comparison of location proof provenance approaches: hash chains (HC), block-hash chains (BC), bloom filter (BF), shadow hash chain (SH), multi-link hashing (MH), and RSA chaining (RC) [2].

Properties	HC	BC	BF	SH	MH	RC
P1	✓	✓	✓	✓	✓	✓
P2	✓	✓	✓	✓	✓	✓
P3	✓	✓	✓	✓	✓	✓
P4	✓	✓	✓	✓	✓	✓

P5				✓		✓
P6			✓			
P7						✓
P8		✓	✓		✓	

D. EVALUATION OF PROTOCOL CHARACTERISTICS

Different models have tried to solve the location proof problem from different perspectives. A comparison of these characteristics for different location proof models is presented in Table 4. The comparison is based on the most important characteristics for location provenance schemes and is summarized as follows:

TABLE 4. Comparative evaluation of protocol characteristics: proactive location proof (PLP) [14], APPLAUS [45], STAMP [46], and the proposed WORAL protocol.

Features	PLP	APPLAUS	STAMP	WORAL
Time to generate proof (sec)	≤ 0.5 (10-20m)	≤ 10 (10m)	3 (10-20m)	≤ 1 (10-20m)
Max. distance tested (m)	N/A	10	20	40
Proof size (bits)	≈ 1000	N/A	≈ 1300	≈ 2000
Number of entities involved	2	Multiple	Multiple	3
Malicious LA	No	Partial	Partial	Yes
Vulnerability (%)	75	≥ 75	≥ 75	12.5
Collusion detection rate (%)	N/A	90	90 ($\bar{U} - W$), 100 ($\bar{U} - \bar{U}$)	100

1) TIME TO GENERATE PROOF

Time to complete the whole location proof generation process is a very crucial factor in terms of usability and feasibility. The user might stay at some point for a very short period of time. Moreover, the users, and especially the witnesses might lose interest in using any such system if it takes a longer time for completion. Since the time increases with the distance among users and witnesses, we have provided the distance information along with the time to generate the proof.

2) MAXIMUM DISTANCE TESTED

Based on the underlying technology being used in the protocol, the maximum distance supported by the system may vary. For example, the maximum possible distance covered by APPLAUS [45] is only 10 meters, since it uses Bluetooth technology. For other protocols, we have provided the maximum distance for which the system has been simulated for testing.

3) PROOF SIZE

Since the location proofs are being generated by mobile devices, the reasonable size of the proof is important for ensuring efficient computation and storage operations.

4) NUMBER OF ENTITIES INVOLVED

Increased number of entities increases the validity of the proof. But it comes with several trade-offs. Models involving more entities normally require more time. Moreover, it also increases the dimension of threats.

5) MALICIOUS LA

This is a crucial consideration in terms of secure design. Most models inherently assume that the LA can never be malicious. Though location authorities are a bit more reliable than the volatile nature of the user and witness, it is still a very strong assumption, and is not considered in our design.

6) VULNERABILITY

We have tried to generate a vulnerability matrix for all given models. For any given model, the vulnerability percentage implies the number of scenarios where generation of invalid proofs is possible. For example, in case of the 2-entity proactive location proof protocol (PLP) [14], there are 4 possible scenarios (UW , $U\bar{W}$, $\bar{U}W$, $\bar{U}\bar{W}$). This protocol guarantees the creation of valid proofs only when both U and W are trusted (UW), and thus having 75% of vulnerability. Since STAMP [46] and APPLAUS [45] can have any number of entities, the exact number of possible scenarios is not fixed and the percentage of vulnerability will vary based on the number of entities involved. If we consider 2 entities, the percentage of vulnerability will be 75% (works for 1 out of 4 possible scenarios); considering 3 entities, it will be 87.5% (works for 1 out of 8 possible scenarios), and so on.

7) COLLUSION DETECTION RATE

Theoretical proof or simulation results are used to illustrate the detection rate in case of different types of collusions, given that an attack has already been executed. In general, a higher detection rate implies a better security model. In summary, vulnerability implies the possibility of attack on a given scenario, while the collusion detection rate signifies the chances of successful detection of the given attack.

8) SYSTEM OVERHEAD FOR LOCATION AUTHORITY

We evaluated the system overhead while running the WORAL LA server. The LA server was deployed on a dual-core Intel Q9550 2.83GHz desktop PC with 4GB RAM and Ubuntu operating system. We performed the system performance evaluation using Sysbench¹ version 0.4.10, a cross-platform and multi-threaded benchmark tool for evaluating CPU performance.

For calculating the relative performance overhead, we first measured the CPU performance without the LA server running. Subsequently, we measured the CPU performance with the LA server running, and varying the number of consecutive proof requests made to the LA. The relative ratio for the different conditions for the approximate measurements (95 percentile) is shown in Figure 4. The average overhead ratio for all the conditions was at **0.045**, and the maximum value is seen to be **0.075**. As it can be seen, the LA server accounts for a nominal overhead ratio and does not have many changes with the increase of the number of concurrent requests. The results imply that the LA is not a major resource-consuming process and can be handled in regular desktop machines. We posit that the LA can therefore be easily deployed by small businesses and shops, most of whom already own their local computer to run the surveillance system, billing system, etc.

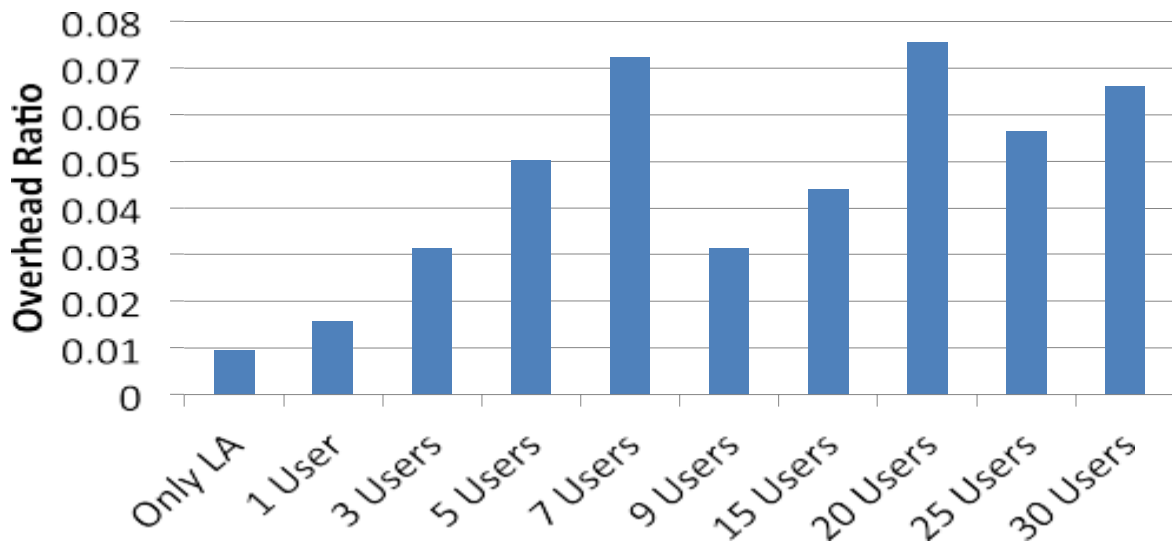


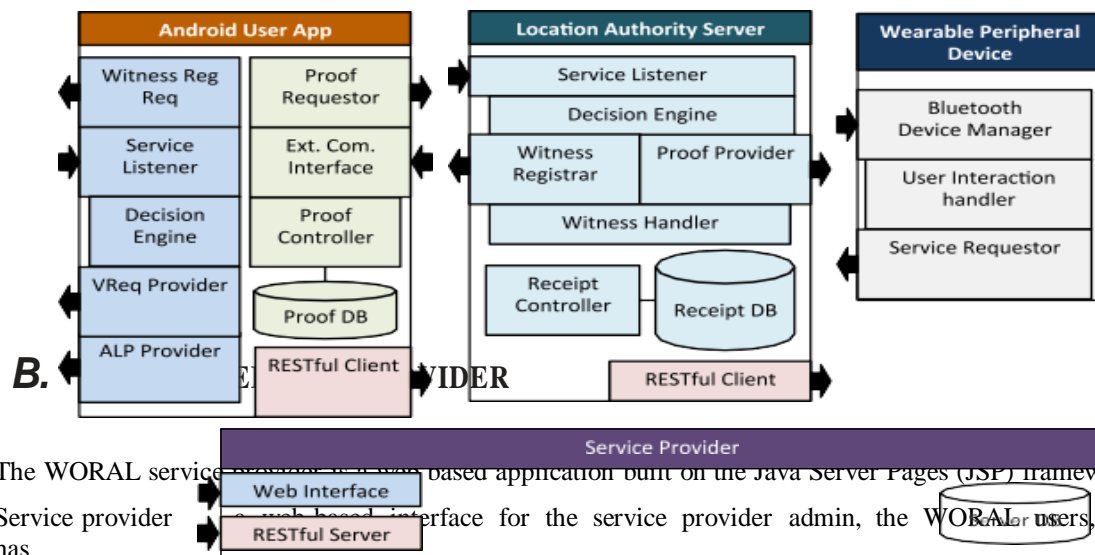
FIGURE 4. Approximate (95 percentile) system overhead ratio.

IV. IMPLEMENTATION

In this section, we present the implementation for a *ready-to-deploy* WORAL framework based on the proposed schematic description for the secure location provenance protocol.

A. COMPONENT ARCHITECTURE

The component architecture of the WORAL framework is shown in Figure. The inward and outward arrows show the components which are in listening mode for accepting messages or are responsible for sending a message. We used the RSA (2048 bit) for generating signatures and for allencryption and decryption of the packets. Additionally, we used the SHA-2 hash function with digest sizes 256 and 512 for generating the hash messages in the protocol and for storing private information on the databases (e.g. passwords, PIN) respectively.



The WORAL service provider is a web-based application built on the Java Server Pages (JSP) framework. The Service provider has a web-based interface for the service provider admin, the WORAL users, Location

Authorities and auditors.

TABLE 5. WORAL service provider web UI services.

Entities	Services
Admin	No registration required (activated via configuration script of web application), Dashboard, View used/unused service codes, Generate new service codes, View registered users/location authorities/auditors, View active inactive location authorities/auditors
User	Registration, Dashboard, View profile settings, View available crypto-IDs, Enable/Disable witness feature, Change password, Update/Save profile, Auto-sync with mobile app

Location Authority	Registration, Dashboard, Profile activation, View profile settings, Profile Activation, Private-key generated during activation, Download private-key, Change password
Auditor	Registration, Dashboard, Profile activation, View profile settings, Profile Activation, Change password

TABLE 6. WORAL service provider RESTful services.

URL	Parameters
<i>https://ip:8443/woral</i>	
<i>/Authenticate</i>	<i>username, password</i>
Desc: User mobile app, location authority, and auditor uses to login. Response: Success or failure (with reason).	
<i>/UserProfile</i>	<i>username, password</i>
Desc: User invokes to load profile from server. Response: Current user profile in XML.	
<i>/UserProfileUpdate</i>	<i>username, password, isWitness, provenanceScheme</i>
Desc: User invokes to sync profile with server after updating on mobile device. Response: Success or failure (with reason).	
<i>/LAProfile</i>	<i>username, password</i>
Desc: LA invokes to load profile from server. Response: Current LA profile in XML.	
<i>/CryptoIDList</i>	<i>username, password</i>
Desc: User mobile app uses to download generated crypto-IDs, Response: Username and list of crypto-IDs in XML.	
<i>/PublicKey</i>	<i>crypto-ID or location-ID</i>
Desc: User app, location authority, and auditor uses to collect public keys of users or location authorities. Response: Username, modulus, and exponent in XML.	
<i>/PublicKeyUpload</i>	<i>username, password, crypto-ID, key modulus, key exponent</i>
Desc: Users generate crypto-ID on the mobile app and uploads the public key. Response: Success or failure (with reason).	

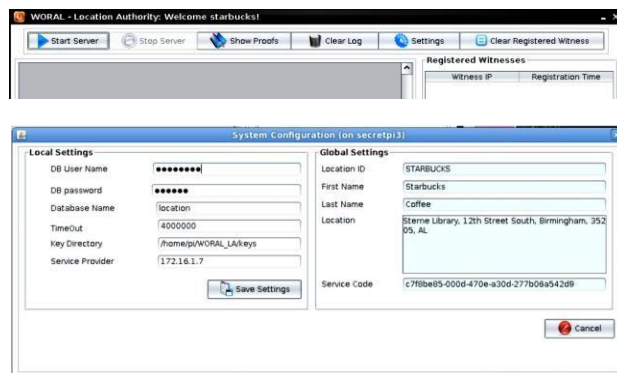


FIGURE 6. Location authority application panels. (a) Top controlbar. (b) Settings tab.

C. WORAL LOCATION AUTHORITY

The LA server is a Java-based application communicating with the service provider and the user app. logs in and displays the service window. The control tabs on the top of the window is illustrated in Figure 6a. The operator can use the buttons to start and stop the server, and view the current list of location proof receipts. The ongoing messages for the protocol are displayed on the logging window. The LA can also use the setting tab to update the local settings, illustrated in Figure 6b. The global settings are downloaded from the SP and are not modifiable once a LA is verified and activated. The local settings are set and saved on the local machine running the LA service. Additionally, we have created a *plug-n-play* LA using Model-B Raspberry Pi with 512 MB RAM, along with a customized Raspian image. The simulation test-bed for WORAL using five *plug-n-play* Raspberry Pi LAs is shown in Figure 7.



FIGURE 7. *Plug-n-Play* location authorities using raspberry Pi-s.

A. WORAL USERS

The WORAL Android user application is used for both requesting location proofs as well as for asserting other users' location proofs as a witness. The home screen after the user logs in is illustrated in Figure 8a. The home screen allows the user to select a crypto-ID for the current location proof request or generate new crypto-ID keys, and update/modify the settings. The settings screen for the user app is shown in Figure 8b. In the settings mode allows the user to select the

Background witness service features, as well as the external communication feature for wearable peripheral devices. The settings are automatically synced with the service provider. The list of currently collected proofs can be viewed as shown in Figure 8c. Additionally, the user can selectively or collectively export or delete the proofs. The exported proofs have the desired level of granularity of information as selected by the users and is shown in Figure 8d. The exported proofs are saved as a text file on the mobile device, which can then be sent personally to the auditor by the user (e.g. email, file transfer). We have tested our application on LG Nexus 4, Samsung Galaxy Nexus, Samsung Galaxy S4, Motorola XT875, HTC 1X, HTC Evo 4G, and Motorola Moto G phones with Android version 2.3 and higher.

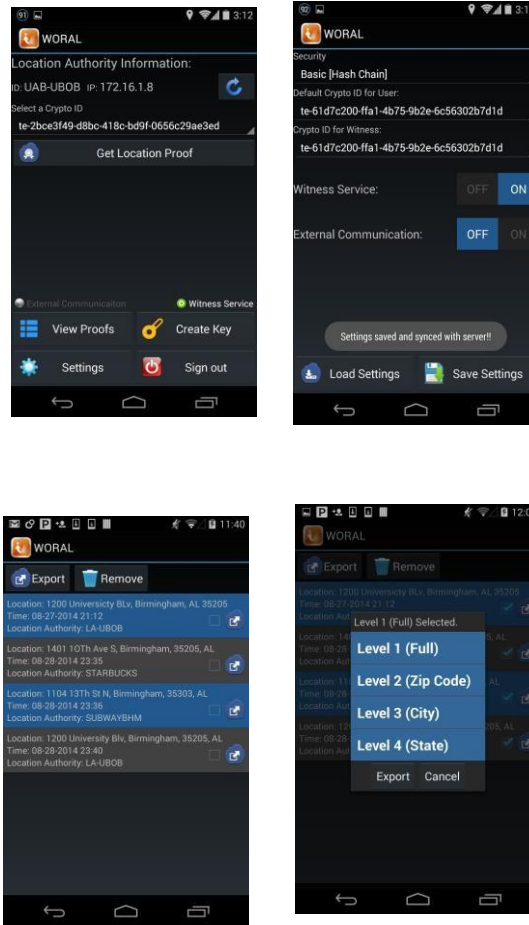
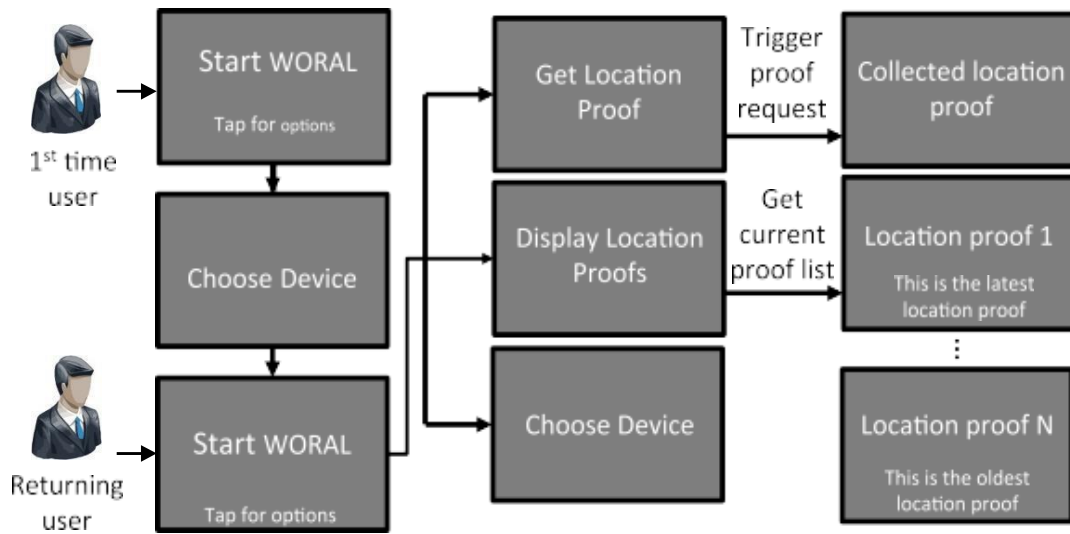


FIGURE 8. Android user application. (a) Home screen. (b) Settings. (c) Proof list. (d) Export proofs.

A. WORAL WEARABLE DEVICE EXTENSION

Wearable peripheral devices, such as the Google Glass, are ubiquitous devices with networking capability. Such devices allow seamless interaction and privacy of display for the users. We extended our WORAL framework by implementing a Google Glass based interface for the WORAL Android user app. The wearable device extension greatly enhances the usability of the system by allowing a user to non-intrusively interact with the WORAL framework without any physical operation on the mobile device. The glassware communicates with the WORAL app running on the paired Android phone over Bluetooth. The user can switch on the *external communication* feature on the mobile app to be able to use the WORAL Google Glass extension. The UI flow for the Google Glass is illustrated in Figure 9. Current implementation allows a user wearing the Google Glass to request for location proofs and display the list of currently available location proofs from the mobile device.



A. WORAL AUDITOR

The WORAL auditor is a standalone Java desktop application communicating with the service provider. The user presents an exported proof (or list of proofs) and the auditor imports the file to verify the location proof(s) and their provenance. Two of the panels from the auditor window, for the LA provided information and for the witness assertion, is shown in Figure 10a and Figure 10b respectively. Any mismatched information is marked on the corresponding panels, as seen from Figures 10a and 10b. It therefore depends on the auditor to either accept or reject the location provenance claim by the user.

```

LA Provided Proof
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:STARBUCKS
Location:1401 10Th Ave S, Birmingham, 35205, AL
LA Proof Time:08-28-2014 23:35
=====
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:SUBWAYBHM
Location:1104 13Th St N, Birmingham, 35303, AL
LA Proof Time:08-28-2014 23:36
=====
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:LA-UBOB
Location:1200 University Blv, Birmingham, 35205, AL
LA Proof Time:08-28-2014 23:40
=====
  
```

```

Witness Asserted Proof
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:STARBUCKS
Location:1401 10Th Ave S, Birmingham, 35205, AL
Witness:sh-1cb6ee6f-2227-4998-93fa-7a46fbe07dd7
Assertion Time:08-28-2014 23:35
=====
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:SUBWAYBHM
Location:1104 13Th St N, Birmingham, 35303, AL
Witness:sh-1cb6ee6f-2227-4998-93fa-7a46fbe07dd7
Assertion Time:08-28-2014 23:37
=====
User:kh-dfec0e35-8e67-4725-a5fc-c39960170640
LA:LA-UBOB
Location:1200 University Blv, Birmingham, 35205, AL
Witness:sh-1cb6ee6f-2227-4998-93fa-7a46fbe07dd7
Assertion Time:08-28-2014 23:40
=====
  
```

CONCLUSION

Evolving location-based services have created a need for secure and trustworthy location provenance mechanisms. Collection and verification of location proofs and the preservation of the chronological order has significant real life applications. In this project, we introduce WORAL, a ready- to-deploy framework for secure, witness-oriented, and provenance preserving location proofs. WORAL allows generating secure and tamper-evident location provenance items from a given location authority, which have been asserted by a spatio-temporally co-located witness. WORAL is based on the Asserted Location Proof protocol and is enhanced with provenance preservation based on the OTIT model. The WORAL framework features a web-based service provider, desktop-based location authority server, an Android-based user application including a Google Glass client for the mobile app, and an auditor application for location provenance validation.

REFERENCES

- [1] R. Khan, S. Zawoad, M. M. Haque, and R. Hasan, “‘Who, when, and where?’ Location proof assertion for mobile devices,” in *Proc. 28th Annu. IFIP DBSec*, Jul. 2014, pp. 146–162.
- [2] R. Khan, S. Zawoad, M. M. Haque, and R. Hasan, “OTIT: Towards secure provenance modeling for location proofs,” in *Proc. ASIACCS*, 2014, pp. 87–98.
- [3] S. Saroiu and A. Wolman, “Enabling new mobile applications with location proofs,” in *Proc. HotMobile*, 2009, pp. 1–6.
- [4] J. VanGrove. (Apr. 2010). *Foursquare Cracks Down on Cheaters*. [Online]. Available: <http://mashable.com/2010/04/07/foursquare-cheaters/>
- [5] I. Maduako. (Jul. 2012). *Wanna Hack a Drone? Possible With Geo-Location Spoofing!* [Online]. Available: <http://geoawesomeness.com/?p=893>
- [6] N. O. Tippenhauer, K. B. Rasmussen, C. Popper, and S. Capkun, “iPhone and iPod location spoofing: Attacks on public WLAN-based positioning systems,” System Security Group, ETH Zürich Univ., Zürich, Switzerland, Tech. Rep. 599, Apr. 2008.
- [7] A. J. Blumberg and P. Eckersley. (Aug. 2009). *On Locational Privacy, and How to Avoid Losing it Forever*. [Online]. Available: <https://www.eff.org/wp/locational-privacy>
- [8] J. McDermott. (Jul. 2013). *Foursquare Selling Its Location Data Through Ad Targeting Firm Turn*. [Online]. Available: <http://adage.com/article/digital/foursquare-selling-data-ad-targeting-firm-turn/243398/>
- [9] Y. L. Simmhan, B. Plale, and D. Gannon, “A survey of data provenance in e-science,” *ACM SIGMOD Rec.*, vol. 34, no. 3, pp. 31–36, Sep. 2005.
- [10] R. Hasan, R. Sion, and M. Winslett, “The case of the fake Picasso: Preventing history forgery with secure provenance,” in *Proc. 7th Conf. FAST*, 2009, pp. 1–12.
- [11] R. Khan, M. Haque, and R. Hasan, “A secure location proof generation scheme for supply chain integrity preservation,” in *Proc. HST*, 2013, pp. 446–450.

Government Degree College :: Khairatabad

A.Y. 2021-22



Student Study Projects

**Department of Computer Science &
Applications**

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On**

**“A Comparison of Software
Architectures for E-business
Applications”**

By

114019467023 Dudapaka Rahul
114019467030 G Ravi
114019467040 K Prasad
114019467045 Kuruva Jyothi
114019467073 Sony Kumari

**Under the supervision of
M.Ravi**

Abstract

As dynamic content has become more prevalent on the Web, a number of standard mechanisms have evolved to generate such dynamic content. We study three specific mechanisms in common use: PHP, Java servlets, and Enterprise Java Beans (EJB). PHP and Java servlets require a direct encoding of the database queries in the application logic. EJB provides a level of indirection, allowing the application logic to call bean methods that then perform database queries. Unlike PHP, which typically executes on the same machine as the Web server, Java servlets and EJB allow the application logic to execute on different machines, including the machine on which the database executes or a completely separate (set of) machine(s).

We present a comparison of the performance of these three systems in different configurations for two application benchmarks: an auction site and an online bookstore. We choose these two applications because they impose vastly different loads on the sub-systems: the auction site stresses the Web server front-end while the online bookstore stresses the database. We use open-source software in common use in all of our experiments (the Apache Web server, Tomcat servlet server, Jonas EJB server, and MySQL relational database).

The computational demands of Java servlets are modestly higher than those of PHP. The ability, however, of locating the servlets on a machine different from the Web server results in better performance for Java servlets than for PHP in the case that the application imposes a significant load on the front-end Web server.

The computational demands of EJB are much higher than those of PHP and Java servlets. As with Java servlets, we can alleviate EJB's performance problems by putting them on a separate machine, but the resulting overall performance remains inferior to that of the other two systems.

1. Introduction

Web content is increasingly generated dynamically, a departure from the early days of the Web when virtually all content consisted of static HTML or image files. Dynamic Web content is typically generated by a front-end Web server and a back-end database (see figure 1). The (dynamic) content of the site is stored in the database. The application logic provides access to that content. The client sends an HTTP request to the Web server containing the appropriate URL and some parameters. The Web server causes the application logic to be executed. Typically, the application logic issues a number of queries to the database and formats the results as an HTML page. The Web server finally returns this page as an HTTP response to the client.

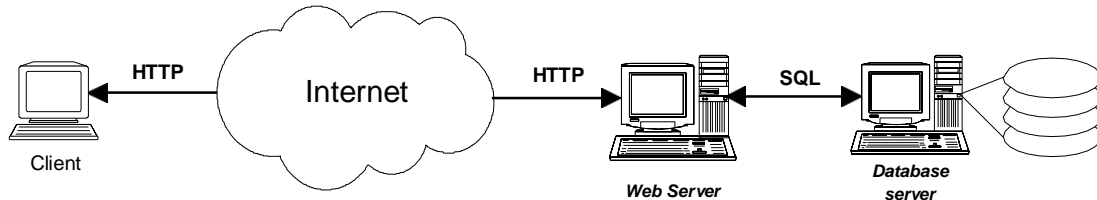


Figure 1. Typical Configuration of a Dynamic Content Web Site

The application logic may take various forms, including scripting languages such as PHP [13], that execute as a module in the Apache Web server [3], Microsoft Active Server pages [10] that are integrated with Microsoft's IIS server [11], and Java-based systems that execute in a separate Java virtual machine. We concentrate here on three software systems for writing application content: PHP, Java servlets [6], and Java servlets used in combination with Enterprise Java Beans (EJB) [1].

PHP is a scripting language in which SQL queries can be embedded. Similarly, Java servlets allow SQL queries to be embedded in Java code. In both PHP and Java servlets, the application programmer writes the SQL queries. The situation is different with EJB. A number of beans are defined, which, roughly speaking, represent items in the database. The Java servlets call bean methods, which then in turn issue SQL queries to the database. EJB therefore provides a level of indirection between the application and the database. PHP executes as a module in the Web server. The two Java-based systems execute in a separate Java virtual machine. This allows an extra degree of freedom in configuring the system: the servlets can be located on a machine different from the Web server machine, either on the database machine or on a separate machine.

Although the computational demands of Java servlets are higher than those of the corresponding PHP scripts, we demonstrate that this extra degree of freedom can be used to improve the performance of Java servlets compared to PHP. In particular, we show that for applications that put significant load on the front-end Web server, better performance can be achieved by locating Java servlets on the database machine or on a separate machine. The introduction of EJB, however, adds a degree of inefficiency that cannot be overcome by putting the servlets or the EJBs on a separate machine.

We use two benchmarks to demonstrate these results, an auction site modeled after eBay.com [5] and an online bookstore modeled after TPC-W [20]. We use a 1.33GHz AMD Athlon with 768MB memory and a 60GB disk for each machine. The machines are connected to each other and to a set of machines running client emulation software by a switched 100Mbps Ethernet. The auction site puts more load on the Web server, while for the online bookstore the database CPU is the bottleneck. In all but one of the experiments we find the memory, the disk or the network not to be a bottleneck.

The outline of the rest of this paper is as follows. Section 2 provides some background on PHP, Java servlets, and EJB. Section 3 describes the two benchmarks that we use to evaluate these systems. Section 4 describes our experimental environment and our measurement methodology. Sections 5 and 6 discuss the results of our experiments with the auction site and the online bookstore benchmarks, respectively. Section 7 discusses related work. Section 8 concludes the paper.

2. Background

PHP (Hypertext Preprocessor)

PHP [13] is a scripting language that can be seen as an extension of the HTML language: PHP code can be directly embedded into an HTML page. Built as an HTTP server module, PHP is executed within a Web server process and does not incur any inter-process communication overhead. When the HTTP server identifies a PHP tag, it invokes the PHP interpreter that executes the script. Requests to the database are performed using an ad hoc interface.

Java HTTP Servlets

An HTTP servlet [6] is a Java class that can be dynamically loaded by a servlet server and runs in a Java Virtual Machine (JVM). After the initial load, the server invokes the servlet using a lightweight method invocation, but since the JVM is a separate process from the Web server, inter-process communication takes place for each request. Concurrent requests are handled by separate threads. Servlets access the database using the standard JDBC interface, supported by all major databases.

Enterprise Java Beans

The purpose of an Enterprise Java Beans (EJB [1]) server is to abstract the application business logic from the underlying middleware. There are two types of EJB: entity beans that map data stored in the database (usually one entity bean instance per database table row), and session beans that are used to perform temporary operations (stateless session beans) or represent temporary objects (stateful session beans). The EJB server is responsible for providing services such as database access (JDBC), transactions (JTA), security (JMS), naming (JNDI) or management support (JMX).

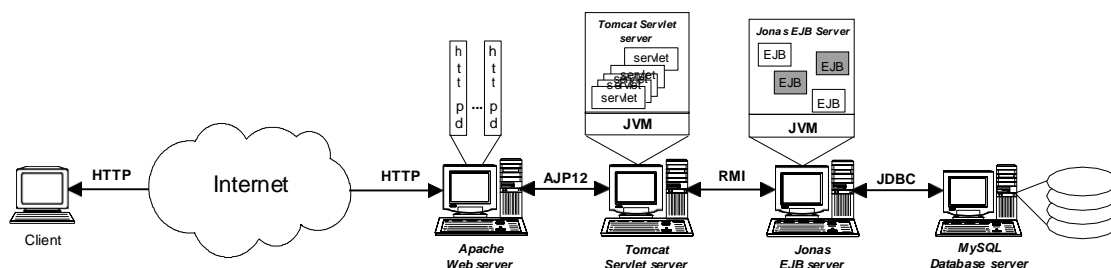


Figure 2. Enterprise Java Bean integration in the e-business architecture

Figure 2 shows an example of an architecture including an EJB server. First, a client sends a request to the HTTP server. The HTTP server invokes the servlet server using a well-defined protocol (AJP12). The servlet queries the EJB server (using RMI) to retrieve the information needed from the database in order to generate the HTML reply. The EJB server calls the database.

Summary

PHP scripts are easy to write and reasonably efficient, but the database interfaces are ad hoc. This makes code maintenance awkward, because new code needs to be written for each new database to which the scripts need to access. PHP scripts execute in the same process (address space) as the Web server, thereby minimizing communication overheads between the Web server and the scripts.

HTTP Java servlets interface to the database using JDBC. This makes them easily portable between databases. Contrary to the PHP interpreter, the servlet server runs in a JVM as a separate process from the Web server. On the plus side, this implies that it can be placed on a machine different from the Web server to balance the load. On the minus side, servlets incur the overhead of the JVM. In addition, they incur the cost of inter-process communications with the Web server, especially when they execute on a separate machine.

The EJB architecture abstracts the application logic from any specific platform, protocol, or middleware infrastructure. In particular, the bean methods can be called through a Web interface or from an arbitrary program.

3. Benchmarks

We describe the two benchmarks we use to compare PHP, HTTP Java servlets, and EJB. We chose one benchmark that puts significant load on the Web server (an auction site) and another benchmark that puts significant load on the database (an online bookstore).

Auction Site Benchmark

Our auction site benchmark implements the core functionality of an auction site: selling, browsing and bidding. We do not implement complementary services like instant messaging or newsgroups. We distinguish between three kinds of user sessions: visitor, buyer, and seller. For a visitor session, users need not register but are only allowed to browse. Buyer and seller sessions require registration. In addition to the functionality provided during visitor sessions, during a buyer session users can bid on items and consult a summary of their current bids, rating and comments left by other users. Seller sessions require a fee before a user is allowed to put up an item for sale. An auction starts immediately and lasts typically for no more than a week. The seller can specify a reserve (minimum) price for an item.

The database contains seven tables: users, items, bids, buy_now, comments, categories and regions. The users table records contain the user's name, nickname, password, region, rating and balance. Besides the category and the seller's nickname, the items table contains the name that briefly describes the item and a more extensive description, usually an HTML file. Every bid is stored in the bids table, which includes the seller, the bid, and a max_bid value used by the proxy bidder (a tool that bids automatically on behalf of a user). Items that are directly bought without any auction are stored in the buy_now table. The comments table records comments from one user about another. As an optimization, the number of bids and the amount of the current maximum bid are stored with each item to prevent many expensive lookups of the bids table. This redundant information is necessary to keep an acceptable response time for browsing requests. As users only browse and bid on items that are currently for sale, we split the item table in a new and an old item table. The very vast majority of the requests access the new items table, thus considerably reducing the working set used by the database.

Our auction site defines 26 interactions that can be performed from the client's Web browser. Among the most important ones are browsing items by category or region, bidding, buying or selling items, leaving comments on other users and consulting one's own user page (known as myEbay on eBay [5]). Browsing items also includes consulting the bid history and the seller's

information. We define two workload mixes: a browsing mix made up of only read-only interactions and a bidding mix that includes 15% read-write interactions. The bidding mix is the most representative of an auction site workload.

We sized our system according to some observations found on the eBay Web site. We always have about 33,000 items for sale, distributed among eBay's 40 categories and 62 regions. We keep a history of 500,000 auctions in the old-items table. There is an average of 10 bids per item, or 330,000 entries in the bids table. The buy_now table is small, because less than 10% of the items are sold without auction. The users table has 1 million entries. We assume that users give feedback (comments) for 95% of the transactions. The new and old comments tables contain about 31,500 and 475,000 comments, respectively. The total size of the database, including indices, is 1.4GB.

Online Bookstore Benchmark

The TPC-W benchmark from the Transaction Processing Council [20] is a transactional Web benchmark specifically designed for evaluating e-commerce systems. Our online bookstore benchmark is modeled after TPC-W. It implements all the functionality specified in TPC-W that has an impact on performance, including transactional consistency and support for secure transactions. It does not implement some functionality specified in TPC-W that has an impact only on price and not on performance, such as the requirement to provide enough storage for 180 days of operation.

All persistent data, with the exception of the images used with each book, is stored in the database. The database contains eight tables: customers, address, orders, order_line, credit_info, items, authors, and countries. The order_line, orders and credit_info tables store information about orders that have been placed, in particular: the book ordered, the quantity and discount (table order_line), the customer identifier, date of order, information about the amount paid, shipping address and status (table orders), and credit card information such as type, number and expiry date (table credit_info). The items and authors tables contain information about the books and their authors. Customer information, including real name and user name, contact information (email, address), and password, is obtained via a customer registration form and maintained in the customers and address tables.

The inventory images, totaling 183 MB of data, are resident on the Web server. We implemented the 14 different interactions specified in the TPC-W benchmark specification. Of the 14 scripts, 6 are read-only, while 8 cause the database to be updated. The read-only interactions include access to the home page, listing of new products and best sellers, requests for product detail, and two interactions involving searches. Read-write interactions include user registration, updates of the shopping cart, two interactions involving purchases, two involving order inquiry and display, and two involving administrative tasks. We use the same distribution of script execution as specified in TPC-W. An interaction may also involve requests for multiple embedded images, each image corresponding to an item in the inventory. With one exception, all interactions query the database server.

We implement a Payment Gateway Emulator (PGE) that represents an external system that authorizes payment of funds during purchasing interactions [20, clause 6.4]. The Web server contacts the PGE using an SSL session to send the credit card information. The PGE replies with a message containing the authorization number. The PGE is not part of the benchmarked system.

TPC-W specifies three different workload mixes, differing in the ratio of read-only to read-write scripts. The browsing mix contains 95% read-only scripts, the shopping mix 80%, and the ordering mix 50%. We have experimented with two different database sizes, 350MB and 3.5GB.

4. Hardware and Software Environment

Client Emulation Implementation

We implement a client-browser emulator. A session is a sequence of interactions for the same customer. For each customer session, the client emulator opens a persistent HTTP connection to the Web server and closes it at the end of the session. Each emulated client waits for a certain think time before initiating the next interaction. The next interaction is determined by a state transition matrix that specifies the probability to go from one interaction to another one.

The think time and session time for all benchmarks are generated from a negative exponential distribution with a mean of 7 seconds and 15 minutes, respectively. These numbers conform to clauses 5.3.1.1 and 6.2.1.2 of the TPC-W v1.65 specification. We vary the load on the site by varying the number of clients. We have verified that in none of the experiments the clients are the bottleneck.

Application Logic Implementation

In PHP and Java servlets, the application programmer is responsible for writing the SQL queries. In order to arrive at a fair comparison, we use exactly the same queries to the database in both environments

EJB containers automatically manage bean persistence, relieving the programmer of writing SQL code. We use these facilities to implement entity beans with container-managed persistence. However, as we use the EJB 1.1 CMP model, we use session beans for complex queries that require joins on several database tables. The Java servlets are used only as the presentation tier as defined in [1], to generate the HTML reply from the information retrieved from the bean.

Software Environment

We use Apache v.1.3.22 as the Web server, configured with the PHP v.4.0.6 module, mod_ssl version 2.8.5 and openssl 0.9.5a. We increase the maximum number of Apache processes to 512. We observe that with that value, the number of Apache processes is never a limit on performance.

The servlet server is Jakarta Tomcat v3.2.4 [19], running on Sun JDK 1.3.1. The EJB server is JOnAS v2.4 [7], an Open Source Java implementation of the EJB specification. We use this EJB server because, to the best of our knowledge, it is the fastest open source implementation, and its performance has been found to be comparable to some commercial implementations [14]. JOnAS is also integrated in Lutris Enhydra Application Server [9] and Libelis Orcas [8].

We use MySQL v.3.23.43-max [12] as our database server with the MyISAM non-transactional tables. The MM-MySQL v2.04 type 4 JDBC driver is used for both the servlet and EJB servers.

All machines run the 2.4.12 Linux kernel.

Hardware Platform

The Web server and the database server run on an AMD Athlon 1.33GHz CPU with 768MB SDRAM, and a Maxtor 60GB 5,400rpm disk drive. A number of 800MHz AMD Athlon machines run the client emulation software. We use enough client emulation machines to make sure that the clients do not become a bottleneck in any of our experiments. All machines are connected through a switched 100Mbps Ethernet LAN.

Measurement Methodology

Each experiment is composed of 3 phases. A warm-up phase initializes the system until it reaches a steady-state throughput level. We then switch to the steady-state phase during which we perform all our measurements. Finally, a cool-down phase slows down the incoming request flow until the end of the experiment. For all experiments with a particular application we use the same length of time for each phase, but the duration of each phase is different for different applications. The online bookstore uses 1 minute, 10 minutes and 10 seconds for the warm-up, the steady-state and the cool-down phase, respectively. The auction site uses 5, 30 and 5 minutes. These lengths of time were chosen based on observation of when the experiment reaches a steady state, and the length of time necessary to obtain reproducible results.

To measure the load on each machine, we use the *Sysstat* utility [18] that collects CPU, memory, network and disk usage from the Linux kernel every second. The resulting data files are analyzed post-mortem to minimize system perturbation during the experiments.

Configurations

We use a total of five configurations to evaluate the different e-business software architectures defined in Section 2. (1) PHP running on the same machine as the Web server, (2) Java servlets running on the same machine as the Web server, (3) Java servlets running on the same machine as the database, (4) Java servlets running on a dedicated machine, and (5) Web server, servlet server, EJB server, and database server each running on different machines.

5. Experimental Results for Auction Site

Configurations using PHP and Java Servlets

Figure 3 reports the throughput in interactions per minute as a function of number of clients for the browsing mix workload, using PHP and Java servlets, respectively. Running the Java servlets on the Web server machine results in the lowest performance, with a peak throughput of 6,840 interactions per minute, reached for 700 clients. PHP peaks at 8,520 interactions per minute with 800 clients. Even better results, however, are achieved by running the Java servlets on the database machine or on a dedicated machine. These configurations result in 10,200 and 12,000 interactions per minute, for 1,000 and 1,200 clients, respectively.

Figure 5 shows the throughput in interactions per minute as a function of number of clients for the bidding mix, using PHP and Java servlets. The ordering of the different configurations in terms of performance is different. In particular, putting Java servlets on the database machine is now the worst performer, reaching a peak of 6,480 interactions per minute with 700 clients. Servlets on the Web server achieves a peak 7,380 interactions per minute with 700 clients. PHP peaks at 9,780 clients per second with 1,100 clients. The best configuration remains the one in which the servlets run on a dedicated machine, with 10,440 interactions per minute at 1,200 clients.

These results can be explained by looking at figure 4 and figure 6 that report the CPU utilization for each of the machines in the various configurations, for the browsing and the bidding mix, respectively. Let us first compare the configurations in which the application logic, whether implemented by PHP or by Java servlets, runs on the Web server. For both the browsing and the bidding mix, the Web server CPU is the bottleneck with 100% CPU utilization. PHP is more efficient than Java servlets for this application. We attribute this difference in part to the extra communication between the Web server and the servlet server that, unlike PHP, execute in separate processes. While the database machine CPU is not a bottleneck in these configurations, its utilization is substantially lower for the browsing mix than for the bidding mix. In particular, for the Java servlets configuration, it is 21% for the browsing mix and 45% for the bidding mix.

This difference explains why moving the servlets to the database machine results in substantially better performance for the browsing mix than for the bidding mix. The third set of bars in figure 4 and figure 6 shows that, for both mixes, when the servlets execute on the database machine, the database machine CPU becomes 100% utilized. The resulting bottleneck is, however, much more severe for the bidding mix than for the browsing mix. This can be derived from the fact that the Web server CPU utilization is much higher for the browsing mix (81%) than for the bidding mix (34%). The configuration with the servlets executing on the same machine as the database leads to a relatively well balanced CPU load on the two machines for the browsing mix, and therefore good performance, but a poorly balanced situation for the bidding mix, and therefore inferior performance. Finally, when a dedicated machine is used for the servlets, the best performance is achieved for both mixes. The benefit of an extra CPU outweighs the extra communication costs resulting from putting the servlet server on a separate machine. Communication between the servlet server and the database is modest at an average of 1.8Mb/s.

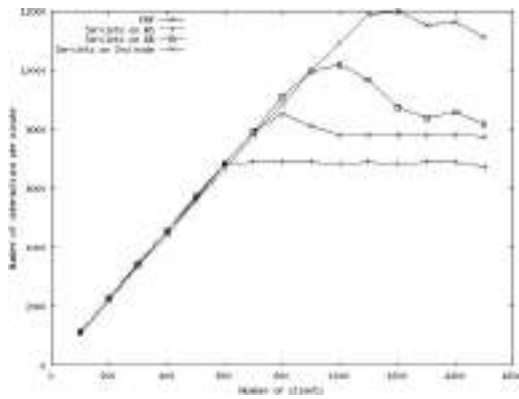


Figure 3. Auction site throughput in interactions per minute as a function of number of clients for the browsing mix using PHP and Java servlets.

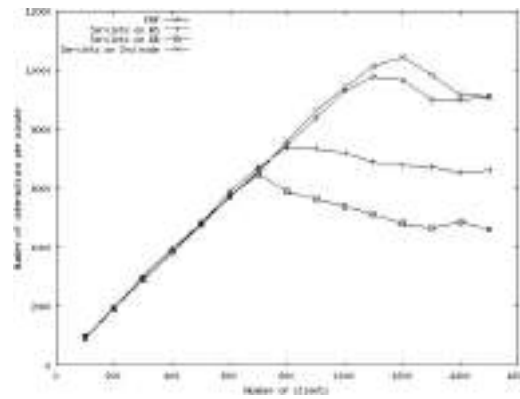


Figure 5. Auction site throughput in interactions per minute as a function of number of clients for the bidding mix using PHP and Java servlets.

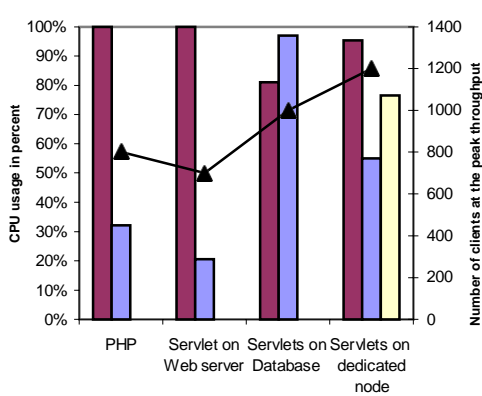


Figure 4. Number of clients and processor usage in percent at the peak throughput for the browsing mix using PHP and Java servlets.

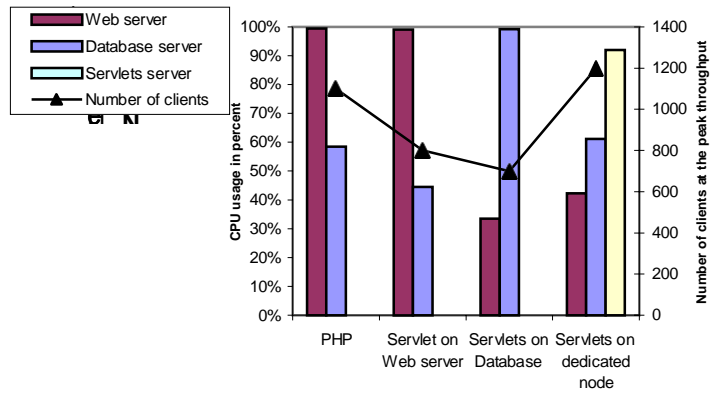


Figure 6. Number of clients and processor usage in percent at the peak throughput for the bidding mix using PHP and Java servlets.

With one exception, none of the other resources (memory, disk, network) are the bottleneck for any of these configurations. The one exception is the case of the browsing mix in the configuration with a dedicated machine for the servlet server. In this configuration the network traffic on the Web server reaches 94Mb/s (80Mb/s to clients and 14Mb/s from the servlet server).

Memory and disk usage are never the bottleneck in any of these experiments. For instance, for the bidding mix, which has the highest memory and disk requirements, we observe a maximum memory usage of 110MB, 95MB, and 390MB on the Web server, the servlet server and the database server, respectively. Although the database is much larger than that, most accesses are to records relating to new auctions, which is a small subset. Disk usage is initially high, to load these records into memory, but then drops off to an average of 0.4 MB/s.

Configurations using PHP, Java Servlets and EJB

Figure 7 and figure 8 compare the throughput of EJB in interactions per minute as a function of number of clients with that of PHP and Java servlets. In this comparison, the servlet server and the EJB server execute on a dedicated machine. For the browsing mix, EJB throughput initially grows linearly with the number of client, but stagnates around 80 clients to reach its peak at 850 interactions per minute with 100 clients, and remains constant after that. The curve for the bidding mix is similar, but achieves a slightly higher peak at 1,051 interactions per minute with 140 clients. In the linear part of both curves, the throughput of PHP and Java servlets is identical to that of EJB. Beyond that point, however, throughput of PHP and Java servlets continues to increase to achieve their peaks at client loads and throughput value an order-of-magnitude higher.

Figure 9 clearly shows that the CPU on the EJB server is the bottleneck resource with an average 99% utilization for both mixes. CPU utilization on all other machines is very modest: 23% for the browsing mix and 32% for the bidding mix on the servlet server, 17% for both mixes on the database server, and 4% and 6% for the browsing and bidding mix on the Web server.

As before, memory usage and disk usage are not bottlenecks. The EJB server uses about 190MB of memory. Network bandwidth is not a bottleneck either, although it is interesting to note that a very large number of small packets are exchanged between the EJB server and the database server (an average of 2,000 packets per second for a total bandwidth of 0.5Mb/s). This large number of small messages results from accesses to fields in the beans that require a single value from a row in the database.

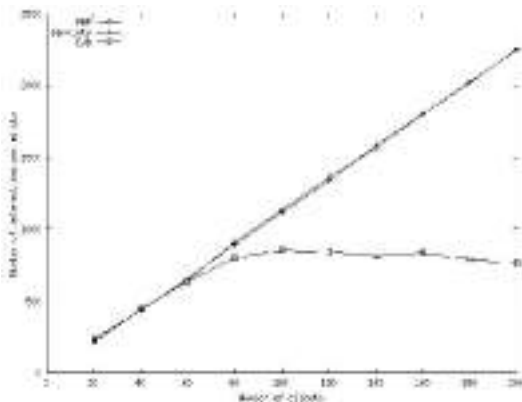


Figure 7. Auction site throughput in interactions per minute as a function of number of clients for the browsing mix using PHP, Java servlets and EJB.

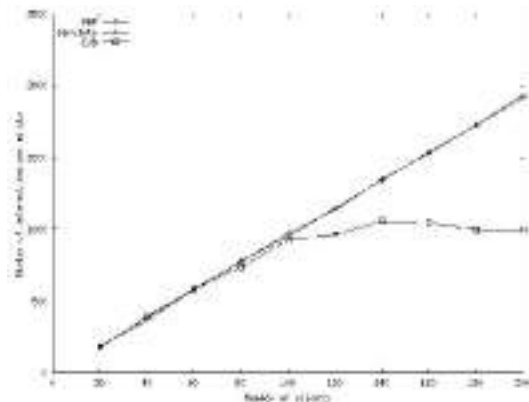


Figure 8. Auction site throughput in interactions per minute as a function of number of clients for the bidding mix using PHP, Java servlets and EJB.

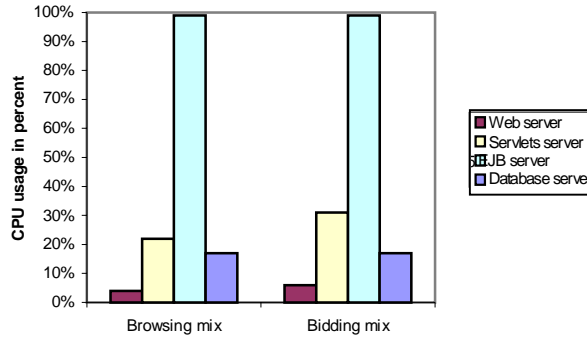


Figure 9. Auction site processor usage in percent at the peak throughput for the browsing and bidding mixes using EJB.

We have experimented with co-locating the EJB server with the servlet server or the database server, and found that both these configurations result in lower performance. Thus, reducing or avoiding network communication with the EJB server does not have a beneficial impact since CPU usage bounds the throughput.

Summary

PHP consumes less CPU time than servlets. We attribute this primarily to the fact that it executes in the same process as the Web server. While an advantage in terms of execution overhead, it restricts PHP to being co-located with the Web server on the same machine. If the Web server is the bottleneck and substantial unused CPU time is available on the database machine, then with the same number of machines, better overall performance is achieved by moving the servlet server to the database machine. Java servlets can also take advantage of the availability of a dedicated machine, leading to even better performance. EJB offers the most flexible architecture, allowing the Web server, the servlet server, the EJB server, and the database to execute on four different machines. The overhead of the EJB server is, however, so high that, even with the extra machine for the EJB server the overall performance remains much below that of PHP and Java servlets.

6. Online Bookstore

Configurations using PHP and Java Servlets

Figure 10 reports the online bookstore throughput in interactions per minute as a function of the number of clients for the shopping mix, which is the most representative mix for this benchmark, using PHP and Java servlets. The throughput is approximately the same for all three configurations (Web server with PHP, Web server with Java servlets on the same machine, and Web server and Java servlets on separate machines). In particular, initially, with a small number of clients, the throughput is identical. The three curves reach very slightly different peaks at approximately the same number of clients, and then start dropping off. In particular, locating the Java servlets on the Web server results in the lowest performance with a peak throughput of 497 interactions per minute reached with 70 clients. Next, locating the Java servlets on a dedicated machine peaks at 504 interactions per minute with 70 clients, which is also close to the peak of 532 interactions per minute obtained by PHP with 70 clients.

Figure 11 shows that the CPU utilization on each of the machines for each of the configurations, and figure 12 shows the CPU utilization on the Web server and the database server as a function of time, at the peak throughput for the configuration using PHP. The results are similar for the other configurations. The conclusion to draw from the combination of these two figures is that the

database CPU is the bottleneck. Although the average database CPU utilization ranges from 65% to 82% without reaching 100% in any of the configurations, figure 12 shows that the database CPU utilization in fact oscillates between 0% and 100%, resulting in an average utilization below 100%. The CPU on the Web server, however, never reaches 100%. The oscillations in the database CPU utilization are a result of the fact that for this application the different database queries differ in execution time by two orders of magnitude. Our conclusion that the database CPU is the bottleneck is further corroborated by the data shown in figure 13, which shows that the database CPU utilization beyond the peak throughput point for PHP (at 90 clients). Here, the average database CPU utilization approaches 100%. MySQL performance drops sharply when the load is that high, and this drop is reflected in the decline of the overall throughput in figure 10.

Memory is never the bottleneck resource, and remains stable after the initialization phase at 65MB and 110MB for the Java servlet and the database server, respectively. Memory usage on the Web server increases over time as the static images get read into the Linux buffer cache. The memory footprint of the Web server user processes remains as low as 70MB.

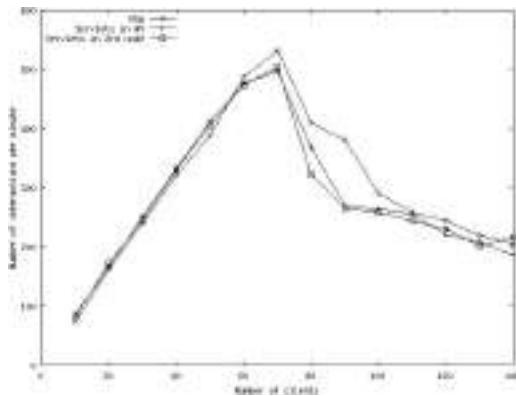


Figure 10. Online bookstore throughput in interactions per minute as a function of number of clients using PHP and Java servlets.

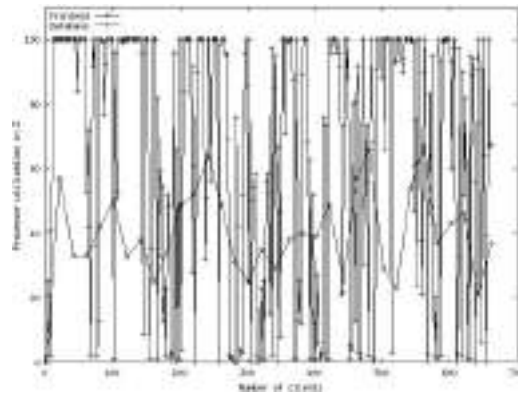


Figure 12. Online bookstore processor usage on the Web and database servers at the peak throughput for the shopping mix using PHP.

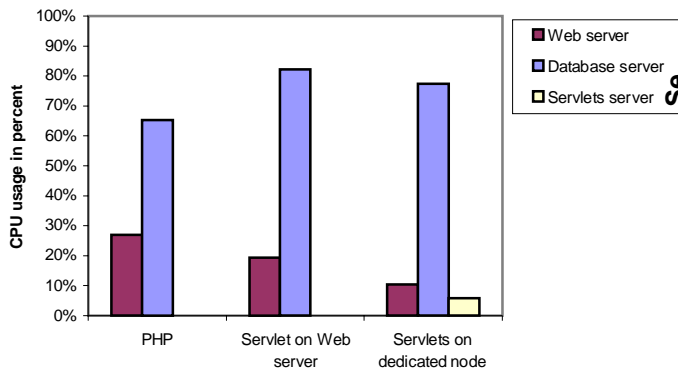


Figure 11. Online bookstore processor usage in percent at the peak throughput using PHP and Java servlets.

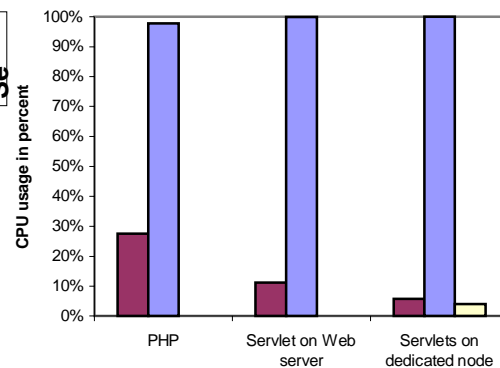


Figure 13. Online bookstore processor usage in percent with 90 clients using PHP and Java servlets.

Network bandwidth is not a bottleneck either for this experiment. The traffic related to the generation of the dynamic pages, between the Web server, the servlet server, and the database

server, is very low. Most of the traffic flowing from the Web server to the clients stems from the static images. At its maximum, it is around 2.5Mb/s.

The browsing and ordering mixes exhibit similar behavior to the shopping mix. The throughputs for PHP and Java servlets (in two different configurations) are very close when the database is lightly loaded and then vary slightly with the database approaching saturation. The reason is the same as for the shopping mix. The database CPU remains the bottleneck for these workload mixes, albeit with somewhat different values of peak throughput and number of clients at which peak throughput is achieved. All results reported in this section are for the smaller database. The database CPU remains the bottleneck, and the comparisons remain the same for the experiments with the larger database.

Configuration including PHP, Java Servlets and EJB

Figure 14 compares the throughput of the EJB implementation of the online bookstore with the PHP and Java servlets on a dedicated node versions. The throughput is given in interactions per minute as a function of number of clients. The EJB version peaks at 92 interactions per minute with 20 clients whereas the PHP and Java servlets implementation throughput increases linearly to much larger values with much larger numbers of clients.

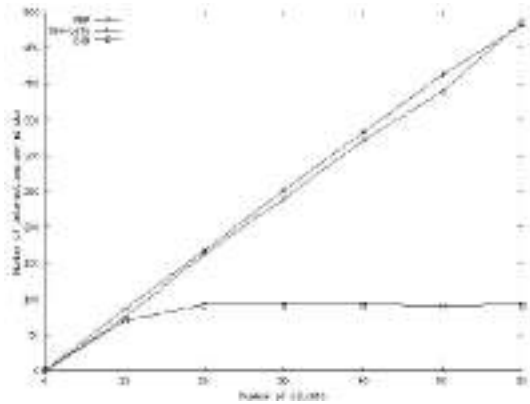


Figure 14. Online bookstore throughput in interactions per minute as a function of number of clients using PHP, Java servlets on a dedicated node and EJB.

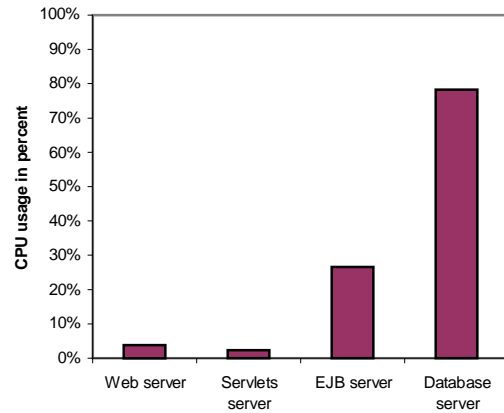


Figure 15. Online bookstore percentage CPU utilization at the peak throughput using EJB.

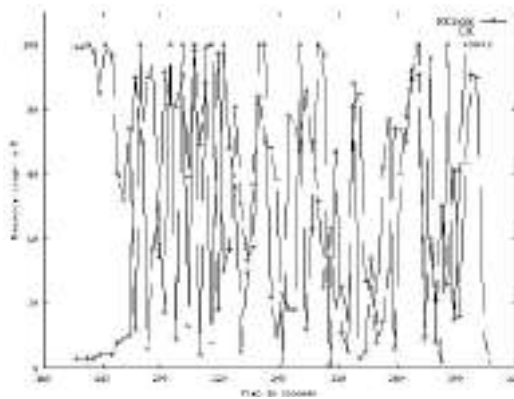


Figure 16. Online bookstore database and EJB server percentage CPU utilization as a function of time during steady state using EJB.

Unlike for the auction site, the CPU on the EJB server is not the sole bottleneck. As shown by figure 15, the CPU utilization is higher on the database server (78%) than on the EJB server (27%). Figure 16 shows the CPU utilization on the EJB server and the database server over time. When the database CPU is 100% utilized, the EJB server CPU is almost idle. When CPU usage drops on the database, CPU utilization on the EJB server rises up to 100%. Both the database and the EJB servers CPU are alternatively the bottleneck resources limiting the throughput to less than 100 interactions per minute.

With this very low throughput, network activity is not significant and can in no case become the bottleneck. Memory usage on each server is low as well, 50MB on the servlet server, 70MB on the Web server, 105MB on the EJB server, and 155MB on the database server.

Summary

With the database CPU being the bottleneck for the online bookstore, the differences between PHP and Java servlets is minimal. In this case, it is not possible to use the fact that servlets can be offloaded from the Web server to a different machine to increase throughput. The throughput of EJB remains problematic. Although the EJB server CPU and the database server CPU alternate in terms of being the bottleneck, overall performance remains considerably lower than with PHP or with Java servlets.

7. Related Work

Cain et al. [4] present a detailed architectural evaluation of TPC-W implemented using Java servlets. They investigate the impact of Java servlets on the memory system, the branch predictor, and the effectiveness of coarse-grain multithreading. Our study is aimed at studying the overall system and at studying differences between different software and system architectures.

Wu et al. compare PHP, Java servlets and CGI as approaches for web-to-database applications [21]. Their benchmark test is restricted to data retrieval (read) operations, while we use more realistic benchmarks with various. They only use a configuration where the Java servlet server runs on the Web server, and even with this configuration, servlets outperform the two scripting languages. However, they use PHP3 while we use PHP v4.0.6 that includes a lot of improvements. We have shown that Java servlets have a slightly larger overhead than PHP, but the flexibility of servlets allows architectures where the load is balanced among several servers.

The functionalities of Java servlets, PHP and CGI/Perl are compared in Sun's white paper [15]. They analyze the server-side mechanisms provided by each architecture. They conclude that Perl or PHP can help meet short-term goals but present the long-term benefits of using Java servlets for Web-based development, such as platform- and server-independent methods, and portable and reusable logic components. We propose a complementary comparison, focusing on performance in addition to functionality, and also including EJB.

The ECperf specification [16] is a first attempt at standardizing the evaluation of EJB servers. Only one result [17] has been published as of this writing, using an 8-way and a 4-way SMP node for the J2EE server and the database server, respectively. The reported throughput of 5961.77 BBops/min (Benchmark Business OPERATIONs per minute) is modest in view of the hardware platform used to achieve it. This confirms the large software overhead of the currently available implementations of EJB.

In our own earlier work [2], we analyze implementations of three benchmarks (an online bookstore, an auction site, and a bulletin board site) using PHP with the goal of discovering the bottlenecks in each benchmark. In this paper, we extend this work to a comparison of PHP with Java servlets and EJB on two of the benchmarks. The Web server CPU is the bottleneck for the

bulletin board. Therefore, we expect the comparison for the bulletin board to come out similar to the one for the auction site.

8. Conclusions

We compare three common systems for generating dynamic content for e-business sites: PHP, Java servlets, and Enterprise Java Beans (EJB). In terms of portability, Java servlets provide independence from the particular database used by performing all database operations through JDBC. The database interfaces in PHP are ad hoc. EJB goes one step further in that the bean methods are independent from the middleware platform, and can be called by any application, be it a Web server, servlets, or a completely different application.

In terms of programmability, the number of lines of code in our implementation with Java servlets is higher for the auction site than in the PHP implementation, and about the same for the online bookstore. The presence of the Java tools and the safety properties of the language help in debugging, but the safety properties also necessitate many re-cast's, reflecting well-known trade-offs between typed and untyped (scripting) languages. EJB is easy to use, in that it does not require SQL queries to be written, but our implementation requires more lines of (Java) code than servlets because of the many interfaces that need to be implemented.

In terms of performance, if the database is the bottleneck, then there is no difference between PHP and Java servlets. If the front-end Web server and/or the business logic are the bottleneck, then the Java servlets can be re-located to the database machine or to a separate machine to increase performance over PHP. If the Web server and the business logic run on the same machine, PHP is somewhat faster than Java servlets. Under all circumstances, EJB is considerably slower than PHP and Java servlets, even when an extra machine is dedicated as an EJB server.

References

- [1] Rahim Adatia et al. – *Professional EJB – Wrox Press, ISBN 1-861005-08-3*, 2001.
- [2] Cristiana Amza, Emmanuel Cecchet, Anupam Chanda, Alan L. Cox, Sameh Elnikety, Romer Gil, Julie Marguerite, Karthick Rajamani and Willy Zwaenepoel – *Bottleneck Characterization of Dynamic Web Server Benchmarks* – submitted for publication, 2001.
- [3] The Apache Software Foundation – <http://www.apache.org/>.
- [4] Harold W. Cain, Ravi Rajwar, Morris Marden and Mikko H. Lipasti – *An Architectural Evaluation of Java TPC-W – Proceedings of the Seventh International Symposium on High-Performance Computer Architecture*, 2001.
- [5] eBay – <http://www.ebay.com/>.
- [6] Jason Hunter and William Crawford – *Java Servlet Programming 2nd edition – O'Reilly, ISBN 0-596-00040-5*, 2001.
- [7] JOnAS Open Source EJB Server – <http://www.objectweb.org>.
- [8] Libelis Orcas – <http://www.libelis.com>.
- [9] Lutris Enhydra Application Server – <http://www.lutris.com>.
- [10] Microsoft Active Server Pages – <http://www.asp.net>.
- [11] Microsoft Internet Information server – <http://www.microsoft.com/iis>.
- [12] MySQL Reference Manual v3.23.36 – <http://www.mysql.com/documentation/>.
- [13] PHP Hypertext Preprocessor – <http://www.php.net/>.
- [14] Guillaume Rivière – *JOnAS performance results compared to JBoss and WebLogic – Evidian Technical Report*, 2001.
- [15] Sun Microsystems - *Comparing Methods For Server-Side Dynamic Content White Paper* – <http://java.sun.com>, 2000.
- [16] Sun Microsystems – *ECperf specification* - <http://java.sun.com/j2ee/ecperf/>, 2001.

- [17] Sun Microsystems – ECperf Benchmark for SUN Fire V880 running Borland AppServer 4.5 and Sun Enterprise 450 running Oracle 8i - <http://ecperf.theserverside.com/ecperf/>, 2001.
- [18] Sysstat package – <http://freshmeat.net/projects/sysstat/>.
- [19] Jakarta Tomcat servlet container – <http://jakarta.apache.org/tomcat/>.
- [20] Transaction Processing Performance Council– <http://www.tpc.org/>.
- [21] Amanda Wu, Haibo Wang and Dawn Wilkins – Performance Comparison of Alternative Solutions For Web-To-Database Applications – *Proceedings of the Southern Conference on Computing*, 2000.

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On
“Revenue Generation through Digital
Advertising”**

By

**V.ShivaNath
K.David
Appash
Yousuf
B.Gopal**

**Under the Supervision of
Ms.G.Radhika, M.Sc(IS)**

**Department of Computer Science &
Applications**



GOVERNMENT DEGREE COLLEGE, KHAIRATABAD, HYDERABAD

DEPARTMENT OF COMPUTER APPLICATIONS

**STUDENT STUDY PROJECT
ON
REVENUE GENERATION THROUGH DIGITAL ADVERTISING**



STUDENTS: V.Shiva Nath, K.David, Appash, Yousuf, B.Gopal

SUPERVISOR: Ms. G.Radhika

TABLE OF CONTENTS

CHAPTERS	TITLE	PAGE NUMBER
Chapter-1	INTRODUCTION 1. NEED OF THE STUDY 2. OBJECTIVES OF THR STUDY 3. SCOPE OF THE STUDY 4. RESEARCH METHODOLOGY 5. LIMITATIONS	1-11
Chapter-2	LITERATURE REVIEW	12-17
Chapter-3	INDUSTRY & COMPANY PROFILE	18-35
Chapter-4	DATA ANALYSIS AND INTERPRETATION	36-45
Chapter-5	SUGGESTIONS AND CONCLUSION. 5.1 SUMMARY. 5.2 FINDINGS. 5.3 CONCLUSIONS. 5.4 SUGGESTIONS.	46-48
	BIBLIOGRPHY	49
	APPENDICES	
	Appendix A: Rate card	50
	Appendix B: Release order	51

SYNOPSIS

TITLE:

Revenue Generation Through Digital Advertising

ABSTRACT:

In the present scenario marketing and sales is a major challenge for seasoned professional and it is no surprise that marketing is a tough concept to understand. Marketing is the activity, set of institutions and processes for creating, communicating, delivering and exchanging offerings and exchanging the offerings that have value for clients, customers, partners and societies at large.

The project report consists of detailed study of “*Revenue Generating Process OF Media through Advertising*” of TV5 NEWS. A sincere effort has been made to analyze the working pattern of the marketing department.

The report further provides information regarding the working of various divisions under the marketing and sales department, relationship management, sources of revenue.

1. INTRODUCTION.

MARKETING:

According to AMERICAN MARKETING ASSOCIATION defined marketing as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large”.

For a broadcasting company, marketing is the only department that generates revenue. Marketing department covers the entire price ellipse while the other departments i.e. Graphics, editing, reporting etc. form the cost ellipse. The major objective of marketing department is to generate revenue. The marketing department focuses on sales (advertisements). The rate of the advertisement varies with respect to the volume of the business. The target market depends on the seasons. A year is divided into 4 quarters and the target markets are identified accordingly.

ADVERTISEING:

Advertising is a means of communication with the users of a product or service. Advertisements are messages paid for by those who send them and are intended to inform or influence people who receive them,

The advertising industry is made of companies that advertise, agencies that create the advertisements, media that carries the ads, and a host of people like copy editors, visualizers, brand managers, researchers, creative heads and designers who take it the last mile to the customer or receiver. A company that needs to advertise itself and/or its products hires an advertising agency. The company briefs the agency on the brand, its imagery, the ideals and values behind it, the target segments and so on. The agencies convert the ideas and concepts to create the visuals, text, layouts and themes to communicate with the user. After approval from the client, the ads go on air, as per the bookings done by the agency's media buying unit.

Broadcast Advertising Costs:

As an advertiser, you will pay for a spot based on multiple considerations, including length, the time the spot goes out, which channel it is on, and most importantly, which show is airing at that time.

This purchase will be handled by the media department [of an advertising agency](#), or [a media buying agency](#), whose job is to negotiate the [best rates](#) and times for the commercials.

Spots can vary in length, some being just 5-10 seconds, others going as long as the whole commercial break. However, most spots are either 30 or 60 seconds on television.

A spot airing in the commercial break of a prime-time show will be very expensive, whereas spots that air on lesser watched channels after 12am will be much more affordable, with the price of \$5 per 1000 viewers being typical. But, you will get fewer eyeballs on your ad. If you want a massive audience, a [Super Bowl](#) spot is the way to go, but the cost of just 30 seconds is going to run around \$1-\$2 million!

These days television ads are prepared by advertising agencies for their clients. They understand the need of the client and make the commercial keeping in mind the current state of affairs. Broadcast advertising has become a very essential part of marketing in recent times. Companies allocate specific budget television ads and make an estimate of how much revenue they can earn through broadcast advertising. For example, marketing consultants are hired to determine the return on investment (ROI) for spending on radio and television ads. Sometimes the marketing consultants of these businesses run sample ads to judge its popularity among the viewers.

Spots are sold for a specific day part. A day part is the time that a certain audience demographic is viewing or listening. Spots are also geared toward a certain demographic. A demographic is a group of people generally the same age, sex, and income. One or two demographics make up the target audience or the main demographic you wish to reach with your advertising. Others who may be listening or viewing, but don't fall into the target audience are considered the shadow audience.

Stations, networks, and advertising agencies know who is watching or listening in each day part. The commercial is always geared to that audience. For example, toys are advertised when children are generally watching. You wouldn't advertise toys

during a football game.

The popularity of programming is measured by Rating. The total audience watching a program for five or more minutes. The percentage of total households using television (HUT) reached by a station.

If a certain time is not preferred, the spot will run ROS or run of schedule. This means the spots can run anytime during the day or night. This is generally cheaper, but a specific audience is not targeted. If a spot doesn't run for some reason a make good is run at a later time. Television relies on visual stimulation primarily; radio has to rely on audio only. Part of a sales presentation for television is a storyboard. A storyboard includes the audio portion of a commercial with the main video scenes. It lets the advertiser know how the spot will look and serves as a guide for a production crew. Storyboards are used in many television productions.

Advertising is a tried and precise enterprise. The smallest detail is never neglected. Commercials have to have an angle in order to sell. Animals and kids are frequently used in commercials because they are often able to tug the viewer or listener's

heartstrings and sell products. The look has to be right.

A number of options are available to advertisers that choose to use TV as part of their media mix. They can purchase time in a variety of program formats that appeal to various types and sizes of audiences. They can purchase time on a national, regional, or local basis. Or they can sponsor an entire program, participate in the sponsorship, or use spot announcements during or between programs. The purchase of TV advertising time is a highly specialized phase of the advertising business, particularly for large companies spending huge sums of money. Large advertisers that do a lot of TV advertising generally use agency media specialists or specialized media buying services to arrange the media schedule and purchase TV time. Decisions have to be made regarding national or network versus local or spot purchases, selection of specific stations, sponsorship versus participation, different classes of time, and appropriate programs. Local advertisers may not have to deal with the first decision, but they do face all the others.

A basic decision for all advertisers is allocating their TV media budgets to network versus local or spot announcements. Most national advertisers use network schedules to provide national coverage and supplement this with regional or local spot

purchases to reach markets where additional coverage is desired.

In addition to deciding whether to use network versus spot advertising, advertisers must decide whether to sponsor an entire program, participate in a program, or use spot announcements between programs

Most advertisers either cannot afford the costs of sponsorship or want greater flexibility than sole sponsorship permits. Nearly 90 percent of network advertising time is sold as participations, with several advertisers buying commercial time or spots on a particular program. An advertiser can participate in a certain program once or several times on a regular or irregular basis. Participating advertisers have no financial responsibility for production of the program; this is assumed by the network or individual station that sells and controls the commercial time. There are several advantages to participations. First, the advertiser has no long-term commitment to a program, and expenditures can be adjusted to buy whatever number of participation spots fits within the budget. This is particularly important to small advertisers with a limited budget. The second advantage is that the TV budget can be spread over a number of programs, thereby providing for greater reach in the media schedule.

Selecting Time Periods and Programs Another consideration in buying TV time is selecting the right period and program for the advertiser's commercial messages. The cost of TV advertising time varies depending on the time of day and the particular program, since audience size varies as a function of these two factors. TV time periods are divided into dayparts, which are specific segments of a broadcast day. The time segments that make up the programming day vary from station to station. The various daypart segments attract different audiences in both size and nature, so advertising rates vary accordingly. Prime time draws the largest audiences, with 8:30 to 9 P.M. being the most watched half-hour time period and Sunday the most popular night for television. Since firms that advertise during prime time must pay premium rates, this daypart is dominated by the large national advertisers.

Advantages of broadcasting advertising:

Convenient and Flexible

The television is a convenient and flexible advertising medium, owing to its widespread popularity and the ease with which a message can reach millions of viewers internationally and nationally. Television advertising allows advertisers the flexibility to use various approaches and different combinations of audio, video and text to make ads memorable and emotional, depending on the product or service or the target audience.

Strong Impact

Television advertising uses audio and visual effects to create a lasting impact. Marketers interact color, sound, sight, drama and motion to ensure that their message is strong and persuasive. Additional tactics and props, such as attractive models, elaborative sets, enchanting graphics and audio-visual effects further enhance impact.

Mass Coverage

According to an article published in the New York Times, 96.7 percent of American households own television sets. This amounts to more than 300 million people who have access to television. Cable networks, 24-hour programs and satellite channels have further hiked television viewership in the country, making the television a substantially lucrative mode of conveying an advertisement.

Demonstration

The advertisers can place the advertisement and demonstrate the functioning of the product when the customer is relatively free and in a mood of leisure. At this time, there is less form of distractions and the company can easily connect with them.

Repetition

The advertisement can be repeated many times to make it sure that consumer has recognized the product and recall at the time of purchase.

CHALLENGES:

As consumer behavior and the changing way people are consuming content, Viewers no longer solely want a passive experience with a TV programme in their front room. They want to watch catch-up TV on a laptop, download a phone app on the move engage with content on a tablet or talk about their experiences on social media sites. They want different experiences on each platform, different flavors of content, and they want it all on their personal schedules.

An 'access anywhere, any time and on any platform' consumer is having a profound impact on broadcasters, content owners and post houses – and they need to radically re-think how they set up and integrate their workflows and business processes.

While it's clear that a multi-screen environment brings a wealth of opportunities for content owners, it also brings many challenges.

1.1 NEED OF THE STUDY:

Success of a business depends upon its ability to attract and retain customers who are willing to purchase advertisements at prices that are profitable to the company. There are many kinds of industries such as manufacturing, trading, and service sectors. Under service sector there are various industries like hospitality, mass communication etc. This study gives detailed information of the revenue generating department i.e. marketing where the other departments are expenditure generators. The report outlines the way advertisements generate revenue. this study is done to understand the pricing strategy of advertisement slots and the market conditions , how the company is able to withstand the competition from the rivals. selling of the time slots to the clients has become the major job to advertising department, it is very difficult to choose the appropriate channel to advertise for that, client need to understand the demand of that particular channel and also the programme that is being telecasted during that ad which ultimately reflects the demand of viewers watch.

To improve selling activities:

It also studies effectiveness of a sales force. It helps in identifying sales territories. Such information helps the companies in identifying areas of shortcoming in sales.

To determine needs and wants of customers:

Due to increase in large scale production there is a need for mass distribution which needs multiple channels of distribution due to which there is an information gap. Marketing research helps in collecting information of the clients from structured distribution research and helps in making market customer oriented.

To identify opportunities and threats in the market:

It helps in identifying market opportunities from existing and new advertising patterns. It provides information on market share, nature of competition, customer satisfaction levels, sales performances and channel of distribution. This helps the firms in solving problems.

To facilitate smooth introduction of new products:

This helps in finding out client's response to new ads and develop a suitable marketing mix. It reveals the problems of the clients regarding new advertising patterns. Thus, it controls the risk involved in introducing a new advertisement or a channel

1.2 OBJECTIVE OF THE STUDY:

The objective behind this report is to study about the process of revenue generation in a broadcasting company.

- 🕒 To study the process of revenue generation(advertising) in broadcasting company.
- 🕒 To understand the pricing strategy for various types of advertisements of TV5
- 🕒 To understand the trend analysis of the revenue generated through different advertisements patterns
- 🕒 To determine the demand of highest selling advertisement pattern and also to determine the advertisement pattern that contributes to maximum revenue.

1.3 SCOPE OF THE STUDY:

The scope of the study is limited to data of clients of TV5 and to find amount of revenue that is being generated annual through the sale of different advertisement patterns and to know the demand of the slots.

1.4 RESEARCH METHODOLOGY

Exploratory type of research designs is adopted for the study. Descriptive research includes surveys and fact-finding inquirer of different kindsthe major purpose of exploratory research is to find out the current state and knowing the pricing strategy of various advertisement patterns,clients and their demand. client's data is collected from the release orders.

Primary data: Primary data are those data which are collected for the first time and thus happens to be original in nature. In this study, primary data is collected from the marketing department of tv5 that provides a complete data relating to the release orders and the clients.

Secondary data:Secondary Data is the data collected by someone else for some other purpose (but being utilized by the investigator for another purpose). The secondary data is obtained from magazines, books and online sites.secondary data is collected by face to face dealings with clients during ad placements and feedback, just dial Shreya media,and through various other articles available on internet.

1.5 LIMITATIONS:

Since the study relates to the marketing department of the broadcasting company

1. the scope of study is limited to advertising and media partners. Nothing can be experimented in this department
2. The study is limited only for two telugu speaking
3. states i.eTelangana and Andhra Pradesh.

Media Revenue Models



REVIEW OF LITERATURE

[Ross Dawson](#), author and blogger, has been working to create a **Media Revenue Models framework** in an effort to give companies a sample of what is available.

Media Revenue Models

At the core of the framework is the concept that the more value added the more revenue that can be generated. While most newspapers offer the same types of revenue-generating formats from classifieds to subscriptions, in order to successfully benefit from them, it's important to

know which are valuable to users.

In his article, [Media Revenue Models Framework: 12 categories of income sources for media companies](#), Dawson outlines a draft of the values publishers and content creators can seek to

incorporate, as well as the different ways from which revenue can be generated. Dawson says the lists aims to “help executives to think in new ways about their own business.”

His article, [Creating the Future of Media: 4 Driving Forces, 4 Strategic Issues, 4 Essential Capabilities](#) Dawson goes into much further detail, examining the most central driving forces, strategic issues and capabilities in the evolving media landscape.

He provides yet another framework outlines [social media strategies](#):



Dawson's mission is to create models that articulate not only the directive but the course of action as well. With the challenges being faced by magazines, newspapers and online media, sometimes we are quick to judge, suggesting obvious options and changes, that may not be as obvious as we think.

Media is valuable purely because it's information. But in a global economy and with web that encompasses a mass of information, greater than any media organization can appropriately aggregate and synthesize, some media is more valuable than others.

Evolving at the Right Pace:

As many others and we have pointed out before, it's about experimentation. Finding a new niche audience or investing in a new technology doesn't happen overnight. In an era of rapid technological advancements, it often seems unnecessary to work so hard and wait so long for the payoff.

Johannes Gutenberg invented the printing press in 1440. But it wasn't until the 1500s that the printing press proved successful. And even then, it took centuries for print publishing to be refined and profitable. Those that continue to experiment and challenge current revenue models, will see the media landscape evolve, improve and profit from the value added.

Even under duress, advertising remains by far the most critical revenue stream for the U.S. news media as a whole.

~~More than two-thirds (69%) of all domestic news revenue is derived from advertising. That amounts to roughly \$43 billion of the \$63 billion accounted for in this report, according to the most recent annual figures.~~

Legacy media, which for much of the 20th century were the de facto way for advertisers to reach consumers, still command the majority of ad dollars.

Daily newspaper advertising—print and digital combined—represents more than half (58%) of all the known advertising revenue tied to journalism, about \$25.2 billion according to the Newspaper Association of America (2012 figures). Still, the total is only about half of what it was in 2005, when advertising dollars peaked for the newspaper industry at \$49 billion (and 82% of total newspaper revenue).

Nearly a third of the total advertising revenue tied to journalism comes from television. Revenues generated by news programming on cable and broadcast, including national and local network affiliates, and their websites, now total roughly \$12.8 billion annually with more than two-thirds coming from local TV. That represents 30% of the total news-related ad revenue identified by Pew Research analysts, and includes estimates for digital revenue tied to the legacy product.

Local TV, buoyed by stabilizing audiences and big increases in the money spent on political ads, took in \$17 billion in advertising revenue alone in 2012, among the more than 800 news-producing stations that were identified for this analysis.

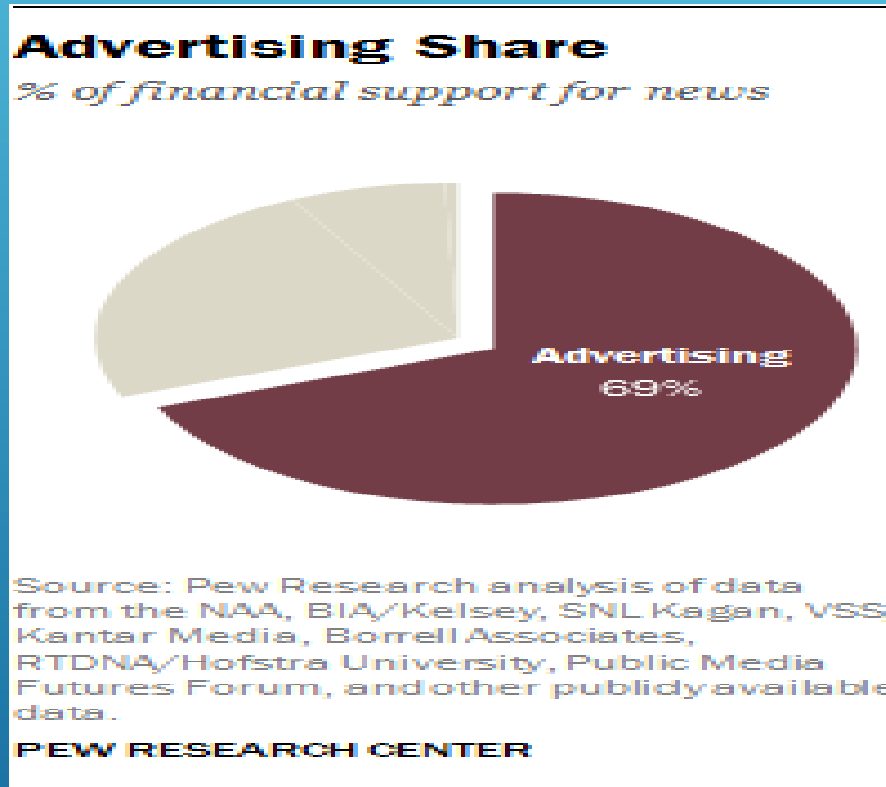
Pew Research estimates that \$8.4 billion of that sum is tied to news—a number that is closer to \$8.8 billion when digital advertising estimates are factored in.

About \$1.9 billion is generated from advertising on the three major broadcast network newscasts, according to custom data provided to Pew Research by Kantar Media, along with digital projections for broadcast networks by VSS

A number of for-profit digital news operations, whose businesses are based largely on advertising, have released their own internal overall revenue figures—\$175 million at Vice Media, upwards of \$20 million at Business Insider, \$10 million to \$15 million at Mashable. For other digital news properties, market research firms and financial journalists have estimated annual intake—\$100 million at The Huffington Post, \$60 million at BuzzFeed, \$15 million to \$20 million at Gawker, and so on. Other attempts have been made to assess the revenues generated by the much longer tail of small, local and hyperlocal digital news outlets. The most in-depth attempt to date—a [survey](#) by journalist Michele McLellan—found that among 44 such sites (excluding nonprofits), 2013 revenues amounted to about a combined \$5 million.

All told, analysts identified roughly \$500 million in annual ad revenue for these for-profit digital news outlets.

There are three other news media sectors where revenue figures of any kind—let alone advertising estimates—were simply not obtainable: local cable news operations, city and regional magazines, and news organizations geared toward specific ethnic groups.



Advertisements are an important source of revenue in media and broadcasting, as the data and reports available on the advertising industry substantiate. In 2014, online advertising revenue in the United States increased to a record total of \$49.45 billion, a 15.6 percent increase over the 2013 revenue (Interactive Advertising Bureau and PricewaterhouseCoopers 2015). Nevertheless, as Lunden (2015) discusses, a Strategy Analytics report suggested that, despite the massive growth in digital media, television (TV) would account for the largest share in total advertisement spending in 2015. The cited report estimates that TV's share will stand at 42 percent—approximately \$79 billion of the total estimated advertisement spending of \$187 billion. As is apparent from the data, maximizing advertising revenue is an important objective for both the broadcasting and Internet industries.

Over the five years to 2017, the Television Broadcasting industry has struggled somewhat to attract viewers and generate advertising revenue, though industry revenue has increased. Companies have continued to invest in advertisements for certain programs, such as professional and collegiate sports. Yet, as consumers quickly adopted mobile devices, thereby increasing their ability to subscribe to online streaming platforms, advertisers lowered their spending on broadcast television and increased their efforts on digital and online media. Over the five years to 2022, television broadcasters will respond to a shifting media environment by restructuring their business models to better integrate programming with digital platforms.

For a broadcasting company, marketing is the only department that generates revenue. Marketing department covers the entire price ellipse while the other departments i.e. Graphics, editing, reporting etc. form the cost ellipse. The major objective of marketing department is to generate revenue. The marketing department focuses on sales (advertisements). The project report includes the working of various divisions of marketing and the various sources of revenue. This internship also focuses on the way the relations that the company maintains with the buyers (the products and services which have to be advertised)

The main objective of marketing department is to generate revenue. For a half an hour program, the program will be telecasted for 10 minutes and a 3 minutes break and 1 min promos are telecasted. The program will be telecasted from 15th minute to 25th minute and a 3 minutes break and 1 min promos are telecasted and the remaining program is followed. On an average, the corbid is telecasted for 21 minutes and advertisements (FCT) for 8 minutes and promos for 2 minutes.

Since, TV5 is a broadcasting channel it becomes a medium through which the other companies advertise their products, brands and services and the revenue is generated. AD Revenue is of two types. They are distribution revenue and channel

subscription revenue. Distribution revenue is generated through advertisements and channel subscription revenue is collected by the cable TV.

The major divisions of marketing department are:

- Sales
- Scheduling
- AD Accounts

1. Sale: Advertisement revenue is collected from the regional and national market. Regional branches include Hyderabad, Vijayawada, Vizag, and Warangal. National branches include Bombay, Hyderabad, Chennai, and Kolkata. The company receives a release order which states when, how many times the advertisement has to be telecasted. The marketing manager makes an agreement with respect to the price.

To make sales, managers approach the companies with the FPC, Rate card and types of ads.

- Fixed programme chart: FPC shows all the list of programs telecasted with their timings.
- **RATE CARD:** Rate card shows all the types of advertisements and their rate per 10 seconds or 1 hour.

A **rate card** is a document containing prices and descriptions for the various advertisement placement options available from a media outlet. There are many

websites and companies which sell rate cards or advertise them. This is because they have already done the research to see which rate works the best in the media

Advertisers and companies looking to make a profit turn to the rate card to see how much they will need to be spending to get their message across to consumers.

A rate card is a document provided by a print publication featuring the organization's rate for advertising. It may also detail any deadlines, demographics, policies, additional fees and artwork requirements. The smaller the publication, the less information that may be available in the rate card. Rate cards help the retailer understand what types of ad sizes, discounts and other advertising the publication has to offer. When choosing a media, you can use rate cards to compare ad rates based on circulation before you buy advertising space. Before placing an ad, be sure you understand the terms and conditions of advertising with the publication.

A **Fixed programme** chart is a chart that contains a detail of the programme that are telecasted at the respective time and it also gives the demand of the particular program so that the clients place the advertisement slot.

TYPES OF ADVERTISEMENTS:

- **Spot ads/FCT (free commercial time):** These advertisements are telecasted between the programs. They are usually for 30 seconds or less than a minute. They are costly as compared to others. Rate is for every 10 seconds.
- **Slot ads:** These ads are very long. They are either live or recorded. They are telecasted for half an hour or more. Rate is for every half an hour.
- **Brand builders:** They are telecasted continuously during the program and during the breaks. On the screen to the left there will be a block that keeps moving either clockwise or anti clockwise. Rate is for every hour.
- **Aston Bands:** Rectangular boxes above the headlines are Aston bands. They are telecasted continuously during the program and during the breaks. Rate is for every hour.

- L shape ads: These advertisements are L-shaped. They are telecasted during the programs. Rate is for every 10 seconds.
- Scrolling: There are 2 types of scrolls namely, unlimited and regular scrolls. Unlimited scrolls are telecasted from 7 am to 11 pm. Rate is for every 1 scroll. It's usually Rs 500 per scroll.
- Squeeze ads: When such kinds of ads are telecasted the screen squeezes which enable the advertisements look bigger.
- Upper ticker: Rectangular boxes on the top of the screen are Aston bands. They are telecasted continuously during the program and during the breaks. Rate is for every hour.
- Innovation: These kinds of ads are seasonal and they are telecasted during special occasions like Ganesh nimanjan etc.

There are two sources of advertisements. They are either from direct client or agencies. Direct client approaches for only one advertisement while agencies hold many clients. The marketing head of the company approaches other companies which a FCT and a rate card to telecast their advertisements and make proposals. The price is dependent on the volume of the business

1. **RELEASE ORDER:** Advertisement revenue is collected from the regional and national market. Regional branches include Hyderabad, Vijayawada, Vizag, and Warangal. National branches include Bombay, Hyderabad, Chennai, and Kolkata. The company sends a release

order which states the type, telecast timing, telecast period, payment details etc. The marketing manager makes an agreement with respect to the price.

It contains the complete details regarding the client or agency name, type of advertisement they are placing, time duration, mode of payment, address, remarks etc

SCHEDULING: Ty5 news has self-developed software in which the release order (RO) is entered and it randomly generates the time the advertisement will be telecasted and the changes are made accordingly. The process of making the entry is called capsuling and the sheet is called Capsuling sheet. This sheet is sent to MCR (department which finally telecasts). After the entries are made an excel format will be generated. This helps to verify if any advertisements were missed. The revenue will not be received if the similar products of same company are advertised together or if the competitor 's products are telecasted together. Scheduling helps to check if any such error can take place and prevents them.

1. **TELECAST CERTIFICATE:** The MCR sends a sheet which displays the list of telecasted advertisements. It also sends the recorded clip of the program. The marketing department verifies if the respective advertisements are telecasted or missed. The emails 14 are sent to the agents with regard to the same. If the agents accept for the change in the timings or slots, the advertisements will be telecasted. If the advertisements are not telecasted, the payment will be made. If the advertisements are telecasted, an email will be sent (telecast certificate).
2. **BILLING:** TV5 NEWS follows fortnight billing. For the first 15 days, a bill will be made and for the next 15 days a separate bill is made. The billing is done per every second the advertisement is telecasted. If the billing is not made within the span of 15 days billing department sends an invoice details n last date of payment, even after if the client refuses to pay the agency has all the rights to cancel their respective advertisement slot. The billing is as follows if the source is:
 - a. **DIRECT CHANNEL:** 100% expenses + service tax
 - b. **AGENCIES:** (100% expenses – 15%discount) + service tax.

5.PAYMENT: An invoice will be generated with respect to the telecast certificate and the payment is adjusted. payment mode totally depends on the release order form as it contains the payment option details. It can be through chequecash, digital transfer, online payments, net banking.

1. **AD ACCOUNTS:** AD account department does the auditing of the advertisements telecasted. The adjustment will be made by the ad accounts department if the advertisements to be telecasted are missed. If advertisements are missed the immediate information is passed on to the client and also the advertising department at their respective mail ids. After the client's approval only the payments are audited. Henceforth, the payment is adjusted.

Porters five force model:

THREAT OF NEW ENTRANTS:

- A. Engagements based on long term relationships
- B. Attracting, nurturing &retention of creative talents is expensive &challenging.

A. Difficult to attain deep connect with regional demographics, behaviors, attitudes and values

B. Constraints in getting access to key media channels or space

CONCLUSION: THREAT OF NEW ENTRANTS IS LOW

THREATS OF SUBTITUTE SERVICES:

A. No absolute substitute for an Ad-Campaign

B. Constant evolution of technology such as e-commerce, social media tools etc. offer new channels for forwarding integration with low switching costs

CONCLUSION: THREAT OF SUBSTITUTES IS LOW.

BARGAINING POWER OF BUYERS

A. Long term relationships with static fee structure

BARGAINING POWER OF BUYERS

- A. Long term relationships with static fee structure
- B. Buyers are large and can demand concessions
- C. Identity of buyer's adds prestige to sellers list of customers
- D. Backward integration by buyers not possible.
- E. Bargaining power of buyers are high

CONCLUSION: BARGAINING POWER OF SUPPLIER IS HIGH.

BARGAINING POWER OF SUPPLIERS:

- A. Premium ad Spaces are limited and supply is less compared to demand.
- B. Seasonal campaigns put's pressure on supply.
- C. service launches demand's better integration with the supplier.
- D. Supplier's concentration to firm concentration ratio.
- E. Forward integration is a possibility.

CONCLUSION: BARGAINING POWER OF SUPPLIER IS HIGH.

RIVALRY AMONG EXISTING COMPETITORS:

- A. High stakes with each campaign to build credibility
- B. Large budgets for ad campaigns
- C. High profile client base adds to premium
- D. High premium on scarce resource.

CONCLUSION: RIVALRY AMONG EXISTING COMPITITORS IS HIGH.



➤ **SWOT Analysis:**

Strengths of tv5 media: it is the number 1 news channel in both telugu speaking states. They have a self-developed software to enter the release orders

Weakness of tv5 media: limited time slots with high demand and supply

Opportunity for Tv5 media: to face the competition in the advertising world they started with a new channel i.e.Hindudramam.

Threats of tv 5 media: the media advertising market is unstable because of which the media cannot implement the long term strategic visions. And competitors like tv9, v6, Ntvetc.

➤ **Check list of advertising:**

In the design of an advertising flyer you should always pay attention to the following:

- Is the layout aimed at the target audience?
- Is the font and font size easy to read?
- Has a maximum of two different fonts been used?
- Has the corporate design been considered during the design of the advertising flyer?
- Do the text and image elements work in harmony?
- Has enough space been left between image and text?
- Have elements been added which introduce variety to the overall picture?
- Have important statements been particularly highlighted?
- Have high-quality images been used?
- Is the image section in tune with the overall impression of the image?

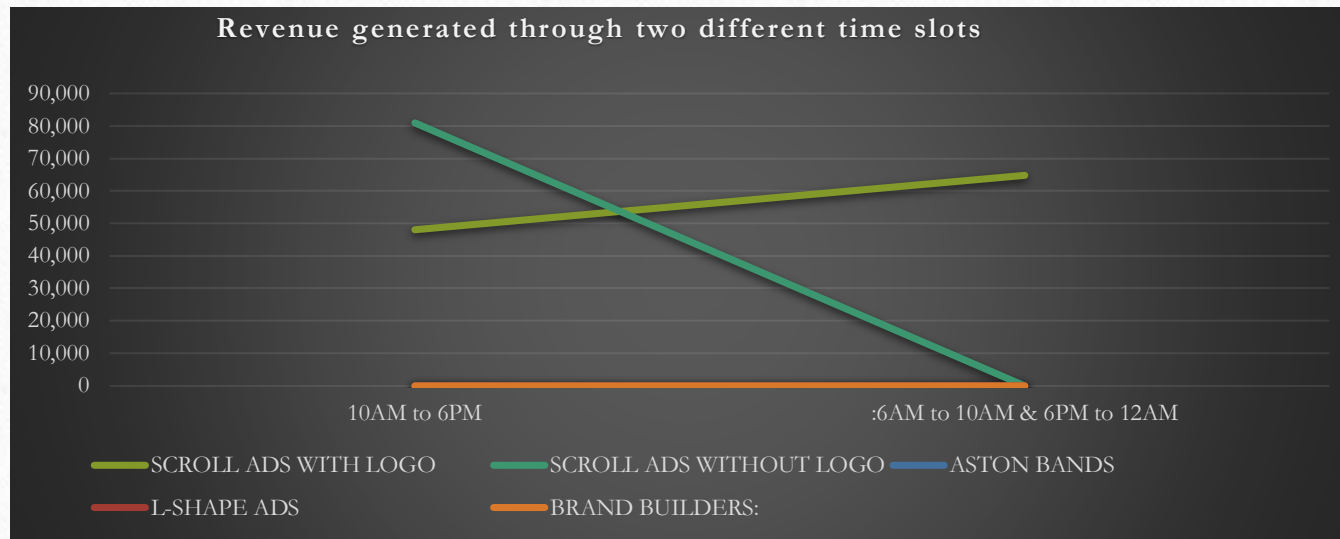
4.DATA ANALYSIS&INTERPRETATION

Data analysis of revenue generated through various advertisement patterns of 2017

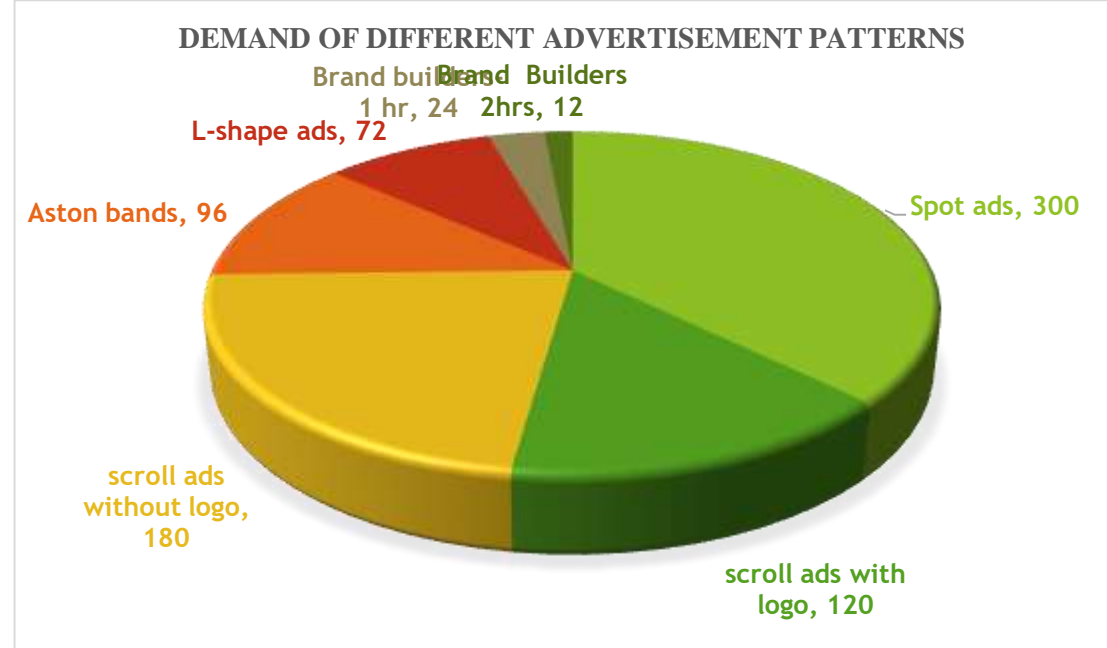
Table 1: REGIONAL REVENUE GENERATED THROUGH DIFFERENT PATTERNS OF ADVERTISING:

TYPES OF ADS	Timing:10AM to 6PM	Timing:6AM to 10AM
		6PM to 12AM
SPOT ADS	300*5000=15,00,000	420*10000=42,00,000
SCROLL ADS LOGO WITH LOGO	120*400=48,000	144*450=64,800
SCROLL ADS WITHOUT LOGO	180*450=81,000	216*500=1,08,000
INNOVATIVE ADS:		
ASTON BANDS	96*2000=1,92,000	120*2500=3,00,000
L-SHAPE ADS	72*3000=2,16,000	96*3500=3,36,000
BRAND BUILDERS:		
1 HR ADS	24*35000=8,40,000	36*45000=16,20,000
TOTAL	287,000	387,000
	NO OF ADS PLACED	*RATE OF AD PER SEC/MIN/HOUR

	SPOT ADS	SCROLL ADS WITH LOGO	SCROLL ADS WITHOUT LOGO	ASTON BANDS	L-SHAPE ADS	BRAND BUILDERS: 1 HR ADS
10AM to 6PM	15,00,000	48,000	81,000	1,92,000	2,16,000	8,40,000
6AM to 10AM & 6PM to 12AM	42,00,000	64,800	1,08,000	3,00,000	3,36,000	16,20,000



From the above table we can see that the advertising revenue from timing 10 am to 6pm is comparatively less than timing 6am to 10am & 6pm to 12 am because of the effectiveness of the viewers watch. Based on the viewers the programmes are fixed and ads slot are announced.



INTERPRETATION: The demand of spot ads is high compared to other ads as these ads are repeated for many times during the break and the scope of reaching the target audience is also very high

SEASONAL DEMAND ADS:

Apart from all other type of advertising patterns seasonal advertisements are of only limited period i.e. for few days or months.

these seasonal ads are of very high demand and supply of these ads is served on first come first basis.

Examples of these ads are:

- Fans and AC in summer

Clients are Simphon, Lloyd, Superior

- Ganesh nimanjan

Clients are Ambujacement, various universities

- Year ending promotions of various colleges

Clients are SriChaitanya, Narayana, Amity, Lovely.

TABLE 6: Clients information

TYPES OF ADVERTISEMENTS	CLIENTS
Spot ads	<ol style="list-style-type: none"> 1. Business accounting software 2. Lufthansa flights 3. Tata glucose 4. MTR products 5. TATA products 6. DR. ortho 7. Wipro garnet (lights) 8. Hot star
scroll ads with logo	<ol style="list-style-type: none"> 1. Homeo care international 2. Vignan's university 3. K.L university 4. Narayana IAS academy
scroll ads without LOGOS	<ol style="list-style-type: none"> 1. Patanjali products 2. Hot star 3. Ceattyres
Aston bands	<ol style="list-style-type: none"> 1. Quick heal 2. Indigo paints 3. University ads
L-shape ads	<ol style="list-style-type: none"> 1. Ambuja cements 2. Sri Chaitanya college 3. Simphoni-air conditioners(seasonal)
Brand builders- 1 hr.	<ol style="list-style-type: none"> 1. Homeo care international 2. M21 3. Divya Diamonds 4. Positive homeo

5. SUMMARY & CONCLUSIONS

5.1 SUMMARY

For a broadcasting company, marketing is the only department that generates revenue. Marketing department covers the entire price ellipse while the other departments i.e. Graphics, editing, reporting etc. form the cost ellipse. The major objective of marketing department is to generate revenue. The marketing department focuses on sales (advertisements). The project report includes the working of various divisions of marketing and the various sources of revenue. This Project also focuses on the way the relations that the company maintains with the buyers (the products and services which have to be advertised). There are various divisions within the marketing department namely, sales, scheduling, AD accounts. The sources of the sales are clients and the agency (many clients). The marketing department sends its rate card and FPC (fixed program chart) to make business. The marketing department receives RO (Release order).

There are various kinds of advertisements like spot ads, slot ads, brand builder, Aston bands, L- shape, scrolling, squeeze, upper ticker, innovation. The company has a self-generated software which facilitates the easy entry of RO and thereby scheduling according to the availability and it automatically generates excel sheets. The company advertises on the legal terms (does not advertise tobacco, liquor etc.). Fortnight billing is followed as per the government regulations. The other responsibility of the marketing department I to see that the competitor's ads are not telecasted back to back and the products belonging to same product line of the same company shouldn't be advertised back to back. The methodologies used were live demonstrations, interview.

The main objective of the marketing and sales department is to generate revenue. The report outlines how revenue is generated in the organization.

5.2 FINDINGS.

1. Demand and revenue of ads during second half of the time slot is higher than first half i.e.

6AM TO 10AM & 6PM TO 10PM > 10AM TO 6PM.

1. Spot ads have higher demand compared to other ads but Maximum revenue is generated from brand builders as its for long time.
2. From the trend analysis, it is observed that year on growth is increased from 2015 to 2016 and 2016 to 2017.
3. Demand for the scroll ads with logos has reduced in 2017 and demand of scroll ads without logos has increased.
4. Demand of brand builders is constant in past two years but the revenue has increased compared to 2015, because of the sudden demand of long ads.
5. Demand of L-shape ads are same over the years as these ads are mostly seasonal based. Scroll ads with logos are mostly preferred by universities.
6. Spot ads demand is increasingly tremendously as these ads are telecasted for n number of times throughout the day.
7. Company maintains the client relationships by sending available advertisement time slots and offers to their email.

5.3 CONCLUSION

TV5 Media generates more than half of their revenue through advertising. the time slots are divided into two based on the demand of viewers watch. The second half of the time slot contributes maximum to the total revenue generated. the demand of the spot ads remains very high irrespective of the seasonal demands. The audit department determines the year ending sale reports based on which advertising department changes the price of ads to continue growth in the next financial year. brand builder ads are of long time and the demand for these ads is constant. All other departments of marketing contribute their maximum extent to maintain the continues trend of growth year by year by introducing the new clients and advertising patterns.

5.4 SUGGESTIONS

1. Instead of direct client dealings, tv5 can go for contract agencies or third-party vendors.
2. Decrease in the rate of brand builders may increase the revenue.
3. Client relationships can be maintained with the help of attractive offers and discounts for seasonal demands.
4. Existing clients should be given an opportunity to telecast their respective ads in the newly established channel i.e. hindudharmam.
5. The self-generated software must be immediately applied for copy right.

BIBLIOGRAPHY

- Company-information(2007) viewed at http://www.tv5news.in/Aboutus.aspxhttps://www.zaubacorp.com/company/SHREYA-BROADCASTING-PRIVATE-LIMITED/U92141TG2006PTC051348_
- shreya broadcasting agency (2017) viewed at https://www.justdial.com/Hyderabad/TV-5-Shreya-Broadcasting-Pvt-Ltd-Jubilee-Hills/040P5477732_BZDET
- Introduction of new channel viewed at http://www.indiantelevision.com/television/tv-channels/specialised-and-niche/tv5-launches-devotional-channel-in-ap-telangana-dth-dist-plan-under-way-170330_
- Broad casting advertising over view viewed at <https://www.thebalance.com/what-exactly-is-broadcast-advertising-38483>
- Generation of revenue by media viewed at <https://www.cmswire.com/cms/web-publishing/how-media-companies-can-generate-revenue-006988.php>

Marisa Peacock(How Media Companies Can Generate Revenue)

- pew research center (2014) <http://www.journalism.org/2014/03/26/revenue-sources-a-heavy-dependence-on-advertising>
- 12 ways digital news organizations can generate revenue viewed at <https://ijnet.org/en/blog/12-ways-digital-news-organizations-can-generate-revenue>
- Belch (Advertising and promotions),7TH Addition by Published by MC Graw companies. evolution of broad casting media

Government Degree College::Khairatabad

Student Study Projects

**Project Report
On
“Location Identification Services
through Web Based Smart Phone
Gadgets”**

By

114017405014 – K.Karan

114017405030 – R.Mahesh Kumar

114017405019 – K.SonaliBendre

114017405038 – V.Shivanath

114017405033 – S.Neha

114017405011– G.Durga Prasad Goud

**Under the Supervision of
Ms.G.Radhika, M.Sc(IS)**

**Department of Computer Science &
Applications**



1. INTRODUCTION

Versatile registering is the teach for making a data administration stage, which is free from spatial and worldly imperatives. The flexibility from these requirements enables its clients to access and process wanted data from any place in the space. The condition of the client, static or portable, does not influence the data administration capacity of the versatile stage. A client can proceed to get to and control wanted information while going on plane, in auto, on dispatch, and so forth. Along these lines, the teach makes a deception that the coveted information and adequate preparing power are accessible on the spot, where as a general rule they far away. Generally Mobile figuring is a non specific term used to allude to an assortment of gadgets that enable individuals to get to information and data from any place they are, Structure of portable registering. Diverse kinds of gadgets utilized for the versatile figuring Personal computerized right hand/endeavor advanced partner.

- i. Smart Phones
- ii. Tablet PCs
- iii. Ultra-versatile PCs
- iv. Wearable PCs

1.1 PURPOSE

Utilization of Mobile Computing. Utilization of navigation system on travel applience exact matchable destination. In this scenarios categorized as,

Vehicles

Tomorrow's autos will involve numerous remote correspondence frameworks and versatility mindful applications. Music, news, street conditions, climate reports, and other communicate data are gotten by means of advanced sound telecom (DAB) with 1.5 M-bits/s. For individual correspondence, a worldwide framework for portable interchanges (GSM) telephone may be accessible offering voice and information network with 384 k-bits/s. For remote regions satellite correspondence can be utilized, while the present position of the auto is resolved by means of worldwide situating framework (GPS). Moreover, autos driving in a similar territory construct a nearby specially appointed system for quick data trade in crisis circumstances or to help each other keeping a

sheltered separation. In the event of a mishap, will the airbag be activated, as well as a crisis call to a specialist advising emergency vehicle and police. Autos with this innovation are as of now accessible. Future autos will likewise educate different autos about mishaps by means of the specially appointed system to enable them to back off in time, even before a driver can perceive the mischance. Transports, trucks, and prepare are as of now transmitting support and strategic data to their home base, which enables o to enhance association, and in this manner spare time and cash.

1.3 SCOPE

Portable registering has changed the total scene of individual life. Scope of creating an traversal environment and reasonable favorable circumstances of Mobile Computing.

1.4 OVERVIEW

This has empowered client to work from anyplace insofar as there is an association set up. A client can work without being in a settled position. Their portability guarantees that they can do various assignments in the meantime play out their expressed occupations.

The time expended or squandered by going from various areas or to the work place and back, have been cut. One would now be able to get to all the imperative reports and documents over a protected channel or entry and work as though they were on their PC. It has upgraded working from home in numerous organizations. This likewise diminishes pointless costs that may be acquired.

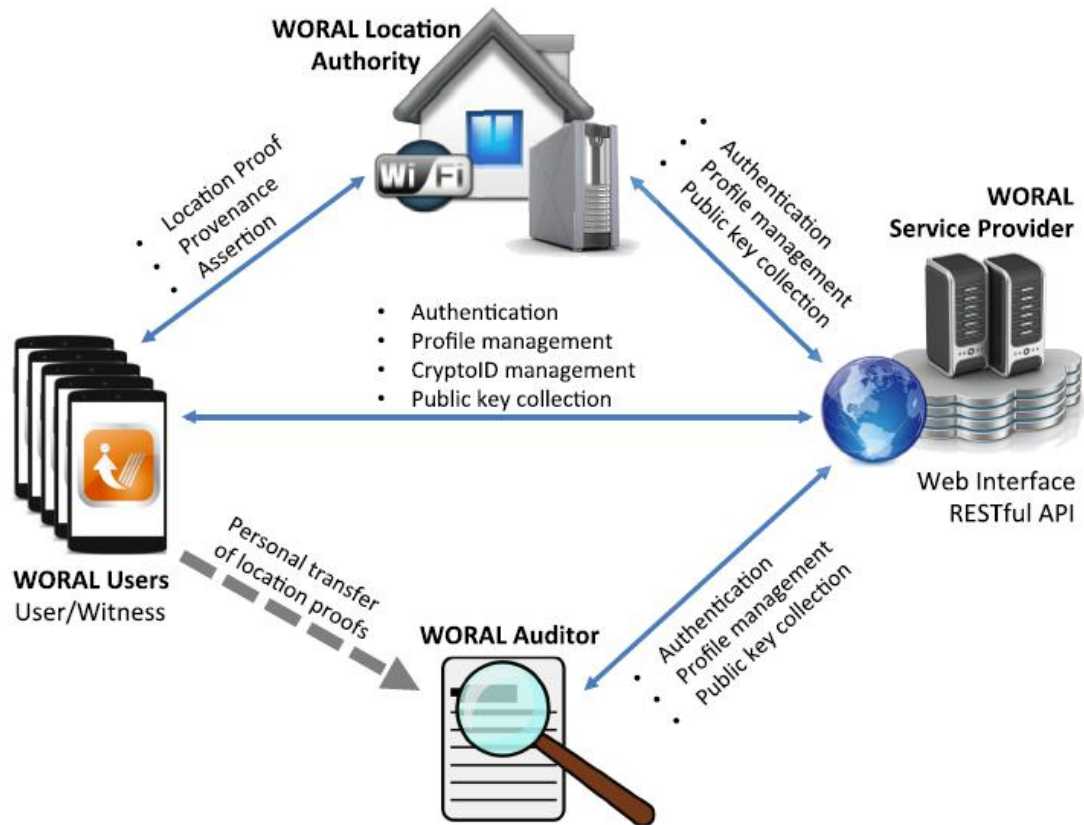


Fig 1.1 Model Diagram

Profitable nature has been helped by the way that a laborer can basically work productively and adequately from which ever area they see agreeable and appropriate. Clients can work with agreeable situations.

Research has been influenced simpler, since clients to will go to the field and look for actualities and nourish them back to the framework. It has additionally made it simpler for field officer and specialists to gather and bolster information from wherever they without making pointless excursion to and from the workplace to the field.

Video and sound accounts would now be able to be spilled in a hurry utilizing portable registering. It's anything but difficult to get to a wide assortment of films, instructive and educational material. With the change and accessibility of fast information associations at impressive costs, one can get all the stimulation they need as they program the web for gushed information. One can have the capacity to watch news, motion pictures, and

documentaries among other diversion offers over the web. This was not such before versatile processing unfolded on the registering scene.

Business forms are presently effortlessly accessible through secured associations. Basing on the factor of security, satisfactory measures have been set up to guarantee verification and approval of the client getting to those administrations.

Some business capacities can be keep running over secure connections and furthermore the sharing of data between business accomplices. Likewise it's significant that extensive voyaging has been decreased, since there is the utilization of7 voice and video conferencing. Gatherings, classes and other instructive administrations can be led utilizing the video and voice conferencing. This eliminates travel time and consumption.

2. LITERATURE SURVEY

WRITING SURVEY

This framework has been composed in view of the accompanying overview has been led with the different areas and different customers prerequisites as per the current circumstance of way travel administration of an area based clients.

1. Who, when, and where?' Location affirmation explanation for PDAs'

Makers: R. Khan, S. Zawoad, M. M. Haque, and R. Hasan

Starting late, territory of PDAs has transformed into a basic factor. Mobile phone customers can without quite a bit of a stretch access distinctive adjusted applications from the expert associations in perspective of the current physical zone information. Regardless, it is a vital test in spread structures for customers to show their pith at a particular region in a security guaranteed and anchored way. As of not long ago, researchers have proposed different plans to execute a secured territory prove gathering segment. In any case, such zone affirmation designs are obligated to changing and not impenetrable to course of action attacks. Also, the region master giving a territory affirmation is believed to be clear reliably. In this paper, we display the essential requirements of any zone affirmation age plot, and speak to the potential strikes possible in such non-bound together circumstances. In light of our recognitions, we present a thought of witness arranged backings, and portray an understanding safe tradition for expressed zone proofs. We give an exhaustive security examination of the proposed configuration, in perspective of all possible scheme models among the customer, region master, and witness. We furthermore present a model execution and expansive exploratory results to change unmistakable utmost regards and framework the feasibility of sending the tradition in standard contraptions for utilitarian use.

2. OTIT: 'Towards secure provenance showing for zone confirmations'

Makers: R. Khan, S. Zawoad, M. M. Haque, and R. Hasan,

Singular phones and zone based organizations are grabbing acclaim reliably. Since the territory based organizations are much of the time adjusted in perspective of the zone

information, it is basic to securely make, ensure, and affirm the case of substance at a given region at a given time and region provenance - the chronicled background of regions for a mobile phone customer over a given period. Region provenance needs to gather secure and consecutive asking for of territory proofs, which can be successfully affirmed at a later time. Something unique, the territory based organizations can be easily personification by contaminated region history. In this paper, we demonstrate OTIT - a model for arranging secure region provenance. We formalized the features and characteristics for the space of secure zone provenance designs, using formal propositional justification and intelligible checks. We furthermore demonstrate a couple of plans, which can be used as a piece of various modes to give secure zone provenance organizations. In light of the characteristics described in OTIT, we have separated different plans to show their adherence to the desired features of secure region provenance. In addition, we show exploratory results on the execution of the diverse plans, similar to time and limit, to exhibit a comparative pertinence examination. We set that OTIT will fill in as an extensive benchmark structure to survey the models for secure zone provenance.

3) iPhone and iPod region deriding: Attacks on open WLAN-based arranging structures

Makers: N. O. Tippenhauer, K. B. Rasmussen, C. Popper, and S. Capkun,

In this work, we consider the security of open WLAN-based arranging systems. Specifically, we inquire about the Sky-catch arranging structure, open on PCs and used on different compact stages, including Apple's iPod contact and iPhone. We display that this structure is helpless against territory deriding and zone database control attacks. We also discuss approachs for anchoring Skyhook and equivalent WLAN-based arranging structures.

2.1 ABOUT THE BASE PAPER

RAGIB HASAN, RASIB KHAN, SHAMS ZAWOAD, AND MD MUNIRUL HAQUE these are the creators are executed this base paper in Secure and Trustworthy registering Laboratory, Department of Computer and Information Sciences, at

College of Alabama at Birmingham,

Ardagna displayed a work on area based access control (LBAC) [26], where, the requester, the entrance control motor, and the area benefit permits assessment of LBAC strategies for getting to assets and services, according to the area of the client concerning a specific region. El Defrawy proposed ALARM, an area helped directing convention, which utilizes current area of hubs to develop the system topology and forward.

Demonstrating the WORAL Framework

In this segment, we present the phrasings and the models for building up the WORAL structure for provenance saving secure area proofs. In this unique situation, we define security as guaranteeing the respectability and protection of the area provenance records that has been created at a specific area for a client.

Intrigue Attacks

We did the accompanying images: legitimate and malignant clients U and N U, fair and vindictive area experts L and N L, genuine and malevolent observes W and N W. The eight unique mixes and comparing conceivable plot assaults are introduced in WORAL upholds shared correspondence and discovery of any connived counterfeit confirmation age.

Framework Vulnerability Analysis

Somebody willing to share the private keys out in the open key cryptography, or a general web client willing to freely share the mystery secret key, does not enable any

framework to be secure. Accordingly, it isn't exceptionally valuable to talk about any circumstance where all the given elements are malevolent. Expanding the quantity of elements in a framework additionally builds the quantity of assault surfaces. Any two-element based area verification convention has four diverse conspiracy blends. A two-party convention will have at least one blend which the framework will be defenseless against, where both the gatherings are vindictive.

Time to Generate Proof

Time to finish the entire area verification age process is an extremely critical factor as far as convenience and achievability. The client may remain sooner or later for a brief timeframe. In addition, the clients, and particularly the witnesses may lose enthusiasm for utilizing any such framework on the off chance that it requires a more extended investment for consummation.

WORAL wearable gadget expansion

Wearable fringe gadgets, for example, the Google Glass, are universal gadgets with systems administration ability. Such gadgets permit consistent communication and protection of showcase for the clients. We expanded our WORAL structure by executing a Google Glass based interface for the WORAL Android client application.

2.2 TECHNOLOGIES USED

WEB-FORMS

ASP.NET Web Forms suggest you to build dynamic and most effective websites using a familiar technique drag-and-drop and event-driven model. A design platform, hundreds of controls and components let you rapidly build sophisticated, interactive UI-driven web sites with data access. ASP.NET Web Forms is a web application framework and one of several programming models supported by the Microsoft ASP.NET technology. Web Forms applications can be written in any programming language which supports the Common Language Runtime, known as C#. Main building partition of Web Forms pages are server side controls, which are

reusable components responsible for rendering HTML markup and responding to events. A technique called view state is a state management technique used to persist the state of server controls between normally stateless HTTP requests.

Master Pages

Master pages support you to create a consistent look, uniform appearance and behavior for all the pages or group of pages in your project. A master page acts as a template for other pages, with shared layout and functionality. The master page defines placeholders for the content, which can be overridden by content pages. The rendered result is a combination of the master page and the content page.

The content pages contain the content you want to display. When users request the content page, ASP.NET merges the pages to produce output that combines the layout of the master page with the content of the content page. A Master Page is simply a single page that captured the structure of your Web site. The files are designated with a .master file extension and are imported into content pages through the Master PageFile property of the @Page directive of the content pages. They are meant to provide the template that all of your pages will use throughout the site. They are not really meant to hold the content of an individual page or, even, the stylistic definitions of the page. They are meant to provide a blueprint of what your site should look like and then connect that template to style rules set in detached CSS files.

Nested master page

Many websites have an overarching site design as well as more customized designs specific to certain types of pages. For instance, in our demo web application we have created a rudimentary Administration section (the pages in the ~/Admin folder). Currently the web pages in the ~/Admin folder use the same master page as those pages not in the administration section namely, Site.master or Alternate.master, depending on the user's selection.

You can nest master pages so that each page can have a flexible layout but also retain a consistent look on a Web site. For example, you could create a parent master page that has a company banner at the top and site navigation controls in a side column. You could then create a child master page for a specific department or product that uses the parent master page. It could also act as a master page for all other related department

or product pages. In this manner, each product line or department would have a consistent look, and all pages would have a consistent overall look by using the parent master page. For more information about master pages, see ASP.NET Master Pages.

Master pages can be nested, with one master page referencing another as its master. Nested master pages allow you to create componentized master pages. For example, a large site might contain an overall master page that defines the look of the site. Different site content partners can then define their own child master pages that reference the site master and that in turn define the look for that partner's content.

A child master page has the file name extension .master, as with any master page. The child master page typically contains content controls that are mapped to content placeholders on the parent master page. In this respect, the child master page is laid out like any content page. However, the child master page also has content placeholders of its own to display content supplied by its own child pages. The following three page listings show a simple nested master page configuration.

The Benefits of Nested Master Pages

Many websites have an overarching site design as well as more customized design specific to certain types of pages.

- Nested master page is mainly useful for design a portion of a page.
- This is pretty cool , powerful, and allows arbitrary levels of nesting.

The ASP.NET have following files and its extension,

File type	Extension	Description
<u>.asax</u>	Application root.	Typically a Global. <u>asax</u> file that represents the application class (event handlers) that run at various points in the application life cycle.
<u>.ascx</u>	Application root/a subdirectory.	A Web user control file that defines a custom functionality that you can add to any ASP.NET Web Forms page.

The Benefits of Nested Master Pages

Numerous sites have a larger site configuration and more altered outlines particular to specific kinds of pages.

Nested ace page is mostly valuable for outline a segment of a page.

This is quite cool , ground-breaking, and permits subjective levels of settling.

The ASP.NET have following documents and its expansion,,

File type	Extension	Description
<code>.asax</code>	Application root.	Typically a Global <code>asax</code> file that represents the application class (event handlers) that run at various points in the application life cycle.
<code>.ascx</code>	Application root/a subdirectory.	A Web user control file that defines a custom functionality that you can add to any ASP.NET Web Forms page.
<code>.ashx</code>	Application root/ a subdirectory.	A handler file that is invoked in response to a Web request in order to generate dynamic content. For more information,
<code>.asmx</code>	Application root /a subdirectory.	An XML Web services file that contains classes and methods that can be invoked by other Web applications.
<code>.aspx</code>	Application root / a subdirectory.	An ASP.NET Web Forms page that can contain Web controls and presentation and business logic.

AJAX

The ASP.NET AJAX Control Toolkit is a collection of samples and components that show you some of the experiences you can create with ASP.NET AJAX controls and extenders. The Control Toolkit provides samples and a powerful SDK to make it simple to create and reuse custom controls and extenders. The ASP.NET AJAX Control Toolkit is community supported. .NET AJAX is a free framework for quickly creating efficient and interactive Web applications that work across all popular browsers. Enhance existing pages using powerful AJAX controls with support for all modern browsers.

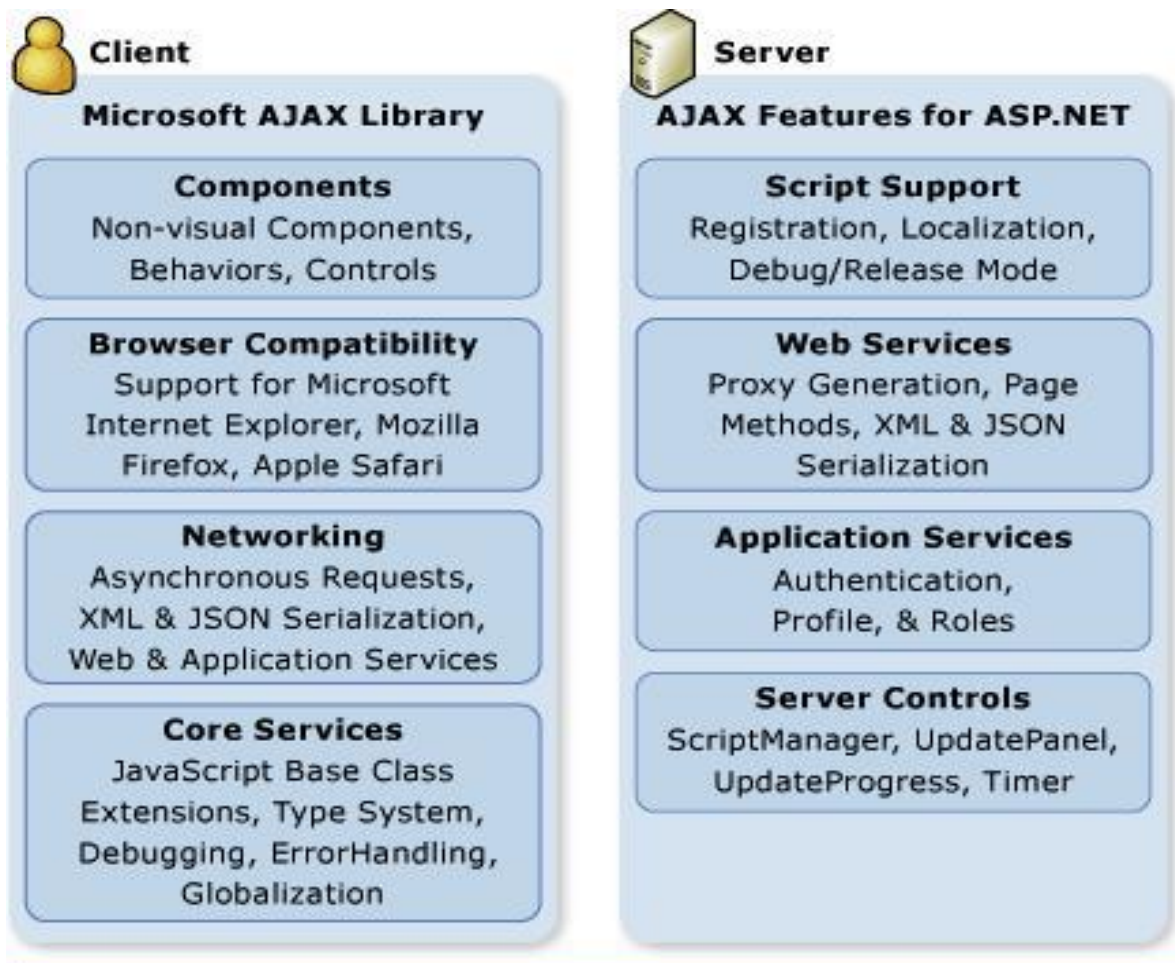


Fig 2.1 ASP.NET AJAX

Script Manager

Manages script resources for client components, partial-page rendering, localization, globalization, and custom user scripts. The ScriptManager control is required in order to use the UpdatePanel, UpdateProgress, and Timer controls.

Update Panel

Enables you to refresh selected parts of the page, instead of refreshing the whole page by using a synchronous postback.

Update Progress

Provides status information about partial-page updates in UpdatePanel controls.

Timer

Performs postbacks at defined intervals. You can use the Timer control to post the whole page, or use it together with the UpdatePanel control to perform partial-page updates at a defined interval.

.NET Official Provider

MANAGE NUGET Package is the official tools provider for Microsoft .NET. This package additionally used for installation library, supporting files and other third party drivers. Microsoft .NET have a strong XML support, HTML support and cross platform.

Microsoft SQL SERVER

SQL SERVER is a data base provider for .NET and its applications. It will store large amount of data to the clients and business requirements. In this application we mainly used for storing client details, location details and Administrator information. Microsft commands eliminates the duplication deatails and duplication of client ID's.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

There have been various recommendations for permitting client started area confirmation age. Ananthanarayanan. exhibited StarTrack, a system where the arrangement of a client's area and time passages are put away in tracks. While tracks are like area provenance chains, security issues are not considered here making tracks powerless against assaults by vindictive clients. Zugenmaier et al. presented the idea of area stamps for PDAs to give evidence of the area to the client at a specific time. Gonzalez-Tablas et al. built up the thought of Path-stamps for making a hash-chain of area proofs.

3.1.1 Disadvantages Of Existing System

- Trust worthy area announcing has suggestions running from inconsequential cases, for example, swindling in social-recreations, to national security issues.
- Existing instruments disregard trick ambushes and the provenance of the region proofs..
- Related works up to this point have not considered third assembling endorsing and the consecutive asking for secure region proofs together, which makes the arrangements powerless against intrigue attacks and adjusting the demand of the confirmations.

3.2 PROBLEM STATEMENT

Initial days the problem arises with the travel management environment users or passengers could not know about the new area and new environment how could they going to be their destination. A problem statement is a clear concise description of the issues that needs to be teach by a problem solving team. It is utilized to focus and center the group toward the starting, keep the improvement group on track amid the exertion.

We designed a frame work for a gadget users to solve such type of problem using a mobile computing environment.

3.3 PROPOSED SYSTEM

In this paper, we present the Witness ORiented Asserted Location provenance (WORAL) framework. The system relies upon the Asserted Location Proof (ALP) tradition and breaks the OTIT appear for secure zone provenance. The WORAL structure is an aggregate suite of creation arranged applications, featuring an online master association, a work region based region master server, an Android-based customer application, a Google Glass-based client, and a work region based commentator. We have displayed a novel response for getting client driven, witness bolstered, provenance sparing, and secure zone proofs for PDAs without the need of having a united model.

We have shown the WORAL framework use; an aggregate arranged to-pass on suite of employments, supporting Android based contraptions to accumulate and toll zone proofs, including wearable periphery devices, for instance, Google Glass. We developed the protected tradition for WORAL in perspective of our earlier work on secure region proofs and extended the tradition using secure territory provenance preservation. We have moreover shown an exchange and a relative examination of similar traditions and a practicability examination in light of the proper application districts.

3.4 ADVANTAGES

- Broadening the possibility of zones and verified affirmation of value, casual networks and such gathering arranged stages have open entryways for completing such plans as well.
- A secure evidence of quality with provenance safeguarding can be utilized to frame specially appointed interpersonal organizations and group systems.
- Therefore, a protected, robotized, and non-nosy area evidence age conspire fits superbly as the hidden component for every such Lab.

C#.NET additionally bolsters multithreading. An application that backings multithreading can deal with numerous assignments all the while, we can utilize multithreading to diminish the time taken by an application to react to client collaboration.

4. SYSTEM REQUIREMENTS SPECIFICATION

4.1 FUNCTIONAL REQUIREMENTS

This project deals about the E- rating mechanism in order to work with this project it is a web based platform so every and all technical platform will support. credential of data to be entered into the system. Each screen performs various operations work-flows performed by the each system is that is from frontend inputs to information stored in the database like SQL SERVER management studio. system shows some reports to the output. sophisticated users should also be enter the data into the system. this framework meets to material administrative necessities. The Functional Requirements Specification is intended to be perused by a general gathering of people. Perusers ought to comprehend the framework, yet no specific specialized information ought to be required to comprehend the archive.

Interface Requirements

Many clients rated users can interact with this system, just they could know about the registration part. Sophisticated users can easily handle this type of project. Interface is a state management Technique it can depict about the users how they are going to be interact with our system. A minimum valid details should have to be provide inorder to work with. The order of information that should have to provide in sequential manner. This frame work is designed a free and highly utilized manner.

Security Requirements

Duplication of ratings might not be possible. Because of the reason a unique credential details that should have to specified for a specific user. An administrator is going to be validate based on their specified deatails. Security is the high concern mechanism of the project. It determines the product features. 3. It is defined by the users. It is easy to test the functional requirements.

4.2 NON-FUNCTIONAL REQUIREMENTS

Platform Constraints

Web based platform depicts run this project. Services and function support all modules but cannot run on like IOS, android smart phone devices.

Portability

The effort required to transform the software to a different required platform. The measurement is most generally couple of time period requires, modules that need to changing. This project mainly suggest you to cross platform. Cross platform is a mechanism posting of data target platform. The .NET framework suggest the code to be transfer other platform using some gitub tools.

Throughput

Together with WIP (work in progress) and cycle time, they constitute the Little's Law to describe the predictability of movement inside a queue.

Service Availability

An enhanced implementation of acivity location recognozation for smart phone devices, is project that service is available for every individual clients and users

Reliability of the System

This system is more reliable because of the reason web based platform deals such type of problems.

4.3 HARDWARE REQUIREMENTS

- System : Pentium IV 2.4 GHz.
- Hard Disk : 40 GB.
- Floppy Drive : 1.44 Mb.
- Monitor : 15 VGA Color.
- Mouse : Logitech
- Ram : 512 Mb.

4.4 SOFTWARE REQUIREMENTS

- Operating framework : Windows 7.
- Coding Language : ASP.NET, C#NET
- Tool : Visual Studio 2015
- Database : SQL SERVER 2014

5. SYSTEM DESIGN

5.1 SYSTEM SPECIFICATIONS

Moreover, SRS can be used like Functional Specification Document (FSD) or Product Requirement Document (PRD). SRS includes requirements that help write Functional Specification Document and can even include FSD, SRS describes all functionalities and explains how the functionality will inside a given system as a part of a larger system or as an independent system. FSD is the software-only part of an SRS document. Indeed, an SRS may contain hardware requirements, system interaction requirements as well.

5.2 SYSTEM COMPONENTS

- I. Account Creation and Authentication
- II. CryptoID and Key Distribution
- III. Location Authority Discovery
- IV. Witness Registration
- V. Proof and Provenance Verification

DESCRIPTION

Record Creation and Authentication

In the WORAL structure, clients, witnesses, LAs, and reviewers need to make a record with the SP utilizing one of a kind distinguishing proof criteria. Such frameworks can incorporate the Social Security Number, travel permit number, driving permit, exchange permit, or whatever else which unambiguously distinguishes the individual or the association. While setting up the record, every element needs to give a novel username/secret word, which is later utilized as login certifications for every one of the elements. As the LA and inspector should be approved elements, there is a record check organize for these two substances. The SP checks the LA and reviewer account asks for and sends them an administration code. LAs and reviewers can't get to their records until the point when the records are enacted utilizing the administration code got from the SP.

CryptoID and Key Distribution

The SP is in charge of giving access to open keys in various phases of the convention. There are two distinctive ways to deal with create the private-open key

combine for LAs and for clients (client/witness). A LA needs to give a comprehensible exceptional character (area ID) at the season of record creation. Once the record gets enacted, the SP produces a private-open key match, which is distinguished by the area ID. LAs need to gather the private key and store it on the neighborhood server. After accepting a demand for people in general key for a specific LA (area ID), the SP sends the proper open key to the requestor. Protection is critical for clients (client/witness) to guarantee no traceable provenance against an assailant. In WORAL, we utilize a cryptographic personality (Crypto-ID) for clients. The Crypto-ID shrouds the real personality of client/witness inside the area provenance records. A client can make numerous Crypto-IDs for WORAL and the client can pick an alternate one at various circumstances on the cell phone while asking for the area verification. Henceforth, an outside aggressor can't track the area of client/witness from a rundown of area provenance records. Clients (client/witness) can produce a Crypto-ID on the cell phone and a private-open key match will be made and put something aside for the Crypto-ID on the cell phone. The client/witness needs to transfer general society key to the SP, which will be distinguished by the comparing Crypto-ID. Afterward, a demand for the general population key of client/witness for a specific Crypto-ID will be served by the SP.

Area Authority Discovery

The client and witness require the IP deliver of the LA to set up a TCP association with the LA. They likewise require the extraordinary area ID to get to open key of the LA. The IP and identifier is made accessible to the client and observer through the LA revelation convention utilizing communicate messages. At the point when a client or witness needs the LA's data, it communicates a UDP parcel to a particular port asking for the data of LA. The LA dependably tunes in for new UDP communicate bundles. On the off chance that the parcel matches with some specific criteria (for our situation, ask for LA's data), the LA sends a UDP bundle as a reaction that contains its area ID. In the wake of accepting the reaction sent by the LA, the client/witness can extricate the character and IP address of the LA from the got UDP parcel.

Witness Registration

The LA needs to keep up a rundown of accessible co-found WORAL portable clients who are intrigued to fill in as witnesses. A WORAL versatile clients express his

readiness to fill in as an observer by sending a witness enrollment message WReg to the LA. In the wake of accepting WReg from the witness, the LA includes the witness data (CIDW and witness' IP address) to the accessible witness list (WL) and sends an affirmation message RegAck to the witness.

Evidence and Provenance Verification:

At the point when the area of U at a specific time is being referred to, U needs to send the area proofs put away in her gadget to a SP checked inspector. A sent out verification by U from the cell phone contains the accompanying things: Plain-content data, LA-Signature, Witness-Signature.

Granularity of the area that shows up in the sent out evidence depends on U's determination. As U has control over the put away data, a noxious client can attempt to alter the plain-content data. Notwithstanding, notwithstanding when the client has connived with the LA or the witness, the client can't the change both the marks. While checking the area proofs gave by the client, the reviewer contrasts the plaintext data and the data that is marked by the LA and the W. Any inconsistencies, with the marked data can be effortlessly identified by an examiner. Next, contingent upon the chose provenance plot PS, the inspector will run the suitable provenance confirmation calculation and check the area provenance guaranteed by the client U.

5.3 DFD DIAGRAMS

- The DFD is likewise called as air pocket graph.
- The information stream outline (DFD) is a standout amongst the most essential displaying instruments.

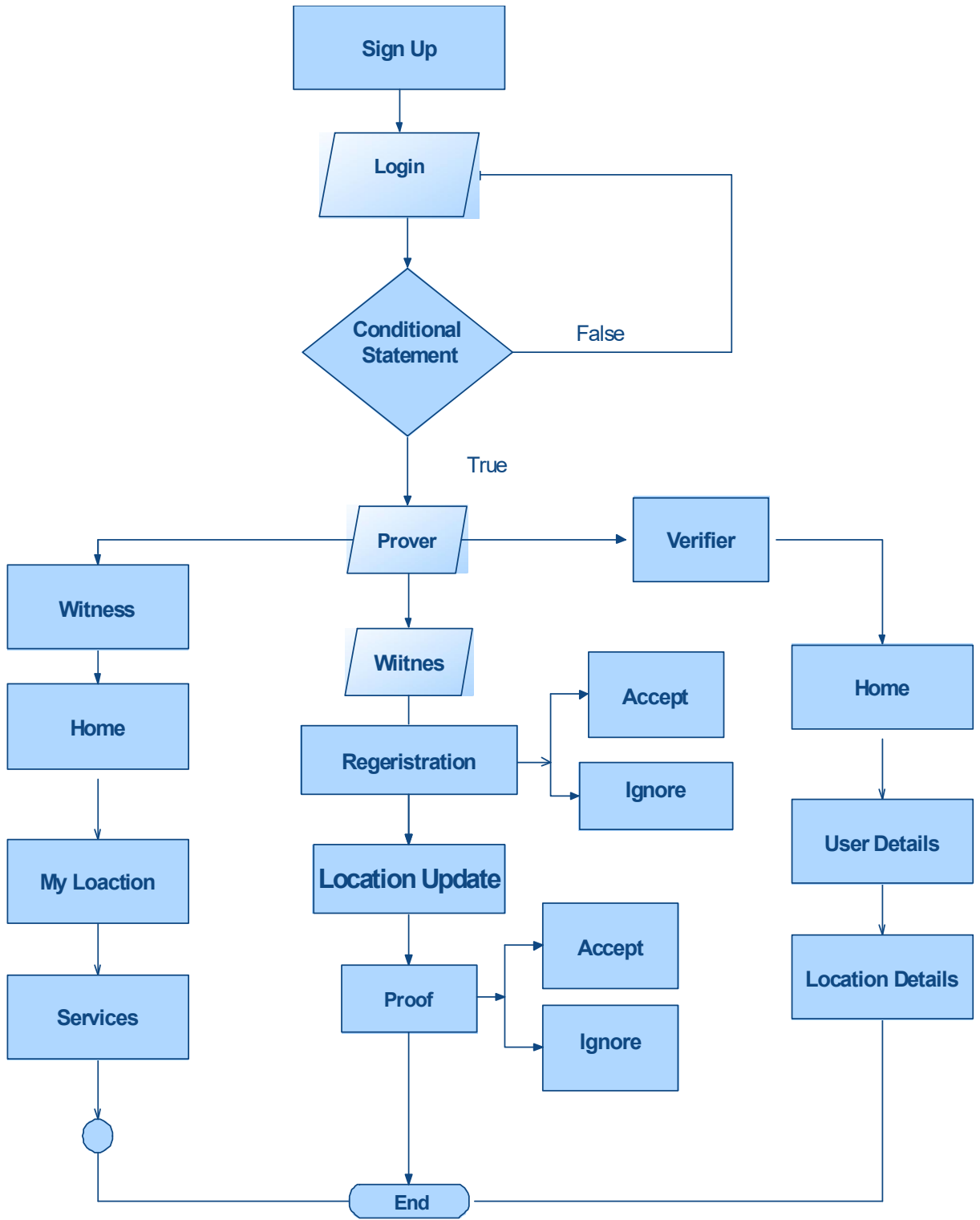


Fig 5.1 DFD Diagram

UML remains for Unified Modeling Language. UML is an institutionalized universally useful demonstrating dialect in the field of question situated programming designing. The standard is overseen, and was made by, the Object Management Group. The objective is for UML to end up a typical dialect for making models of protest situated PC programming. In its present shape UML is contained two noteworthy segments: a Meta-demonstrate and a documentation. Later on, some type of technique or process may likewise be added to; or connected with, UML. The Unified Modeling Language is a standard dialect for indicating, Visualization, Constructing and archiving the relics of programming framework, and in addition for business demonstrating and other non-programming frameworks.

The UML speaks to an accumulation of best designing practices that have demonstrated fruitful in the displaying of extensive and complex frameworks. The UML is a vital piece of creating objects arranged programming and the product advancement process. The UML utilizes for the most part graphical documentations to express the plan of programming ventures.

An utilization case chart in the Unified Modeling Language (UML) is a sort of behavioral outline characterized by and made from a Use-case investigation. Its motivation is to show a graphical outline of the usefulness gave by a framework regarding on-screen characters, their objectives (spoke to as utilize cases), and any conditions between those utilization cases. The fundamental reason for an utilization case chart is to demonstrate what framework capacities are performed for which on-screen character. Parts of the on-screen characters in the framework can be portrayed.

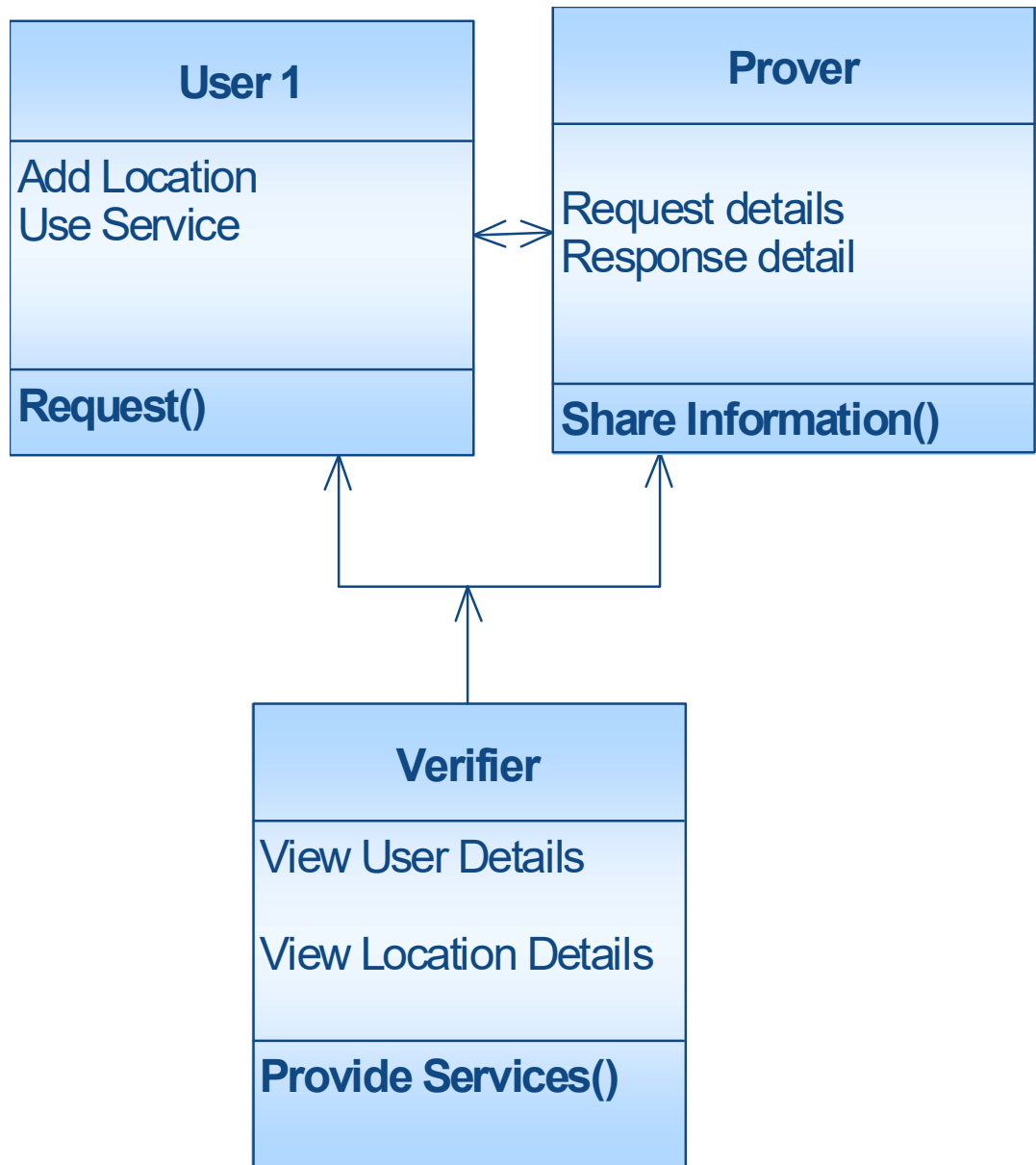


Fig 5.2 Class diagram

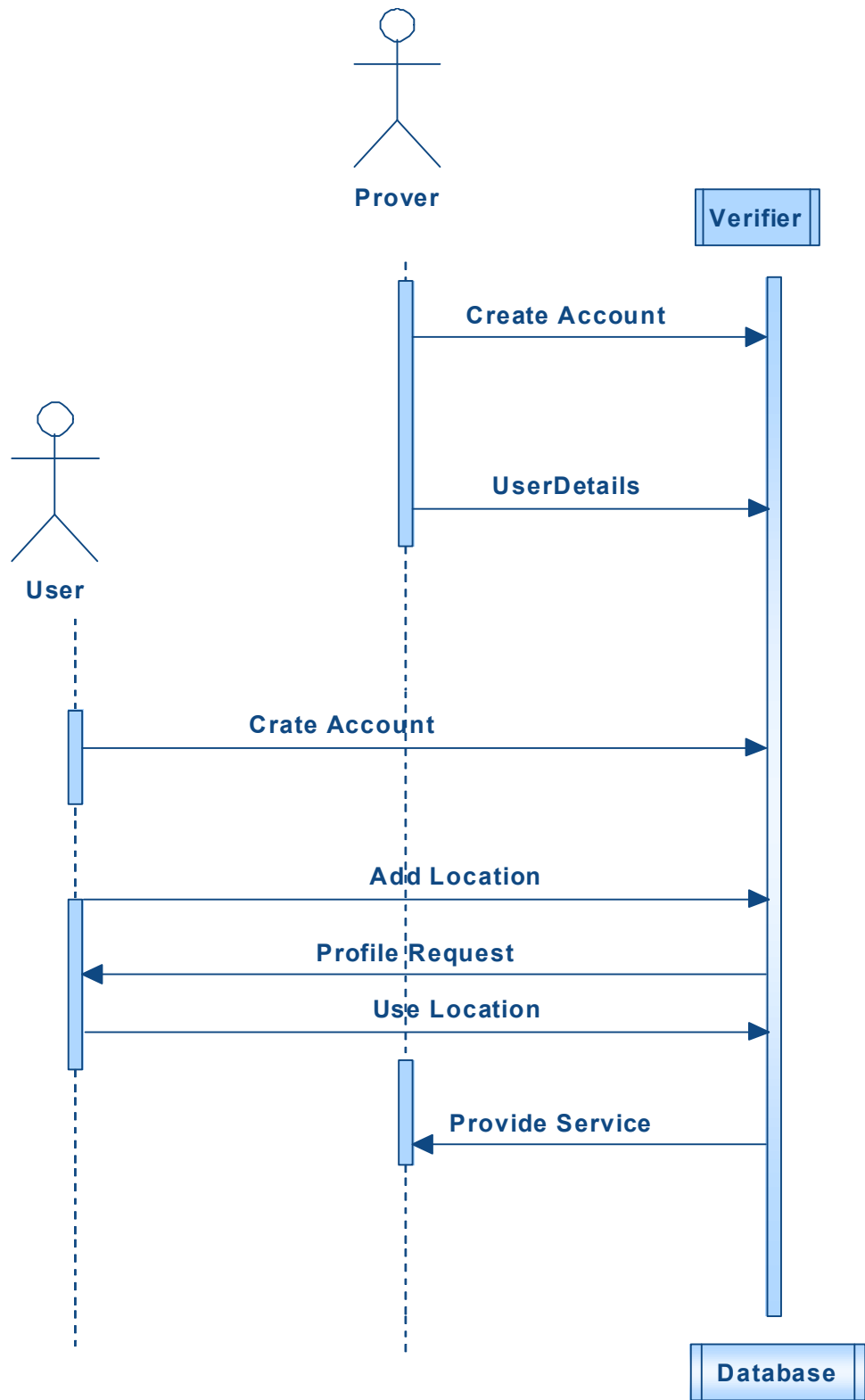


Fig 5.3 Sequence Diagram:

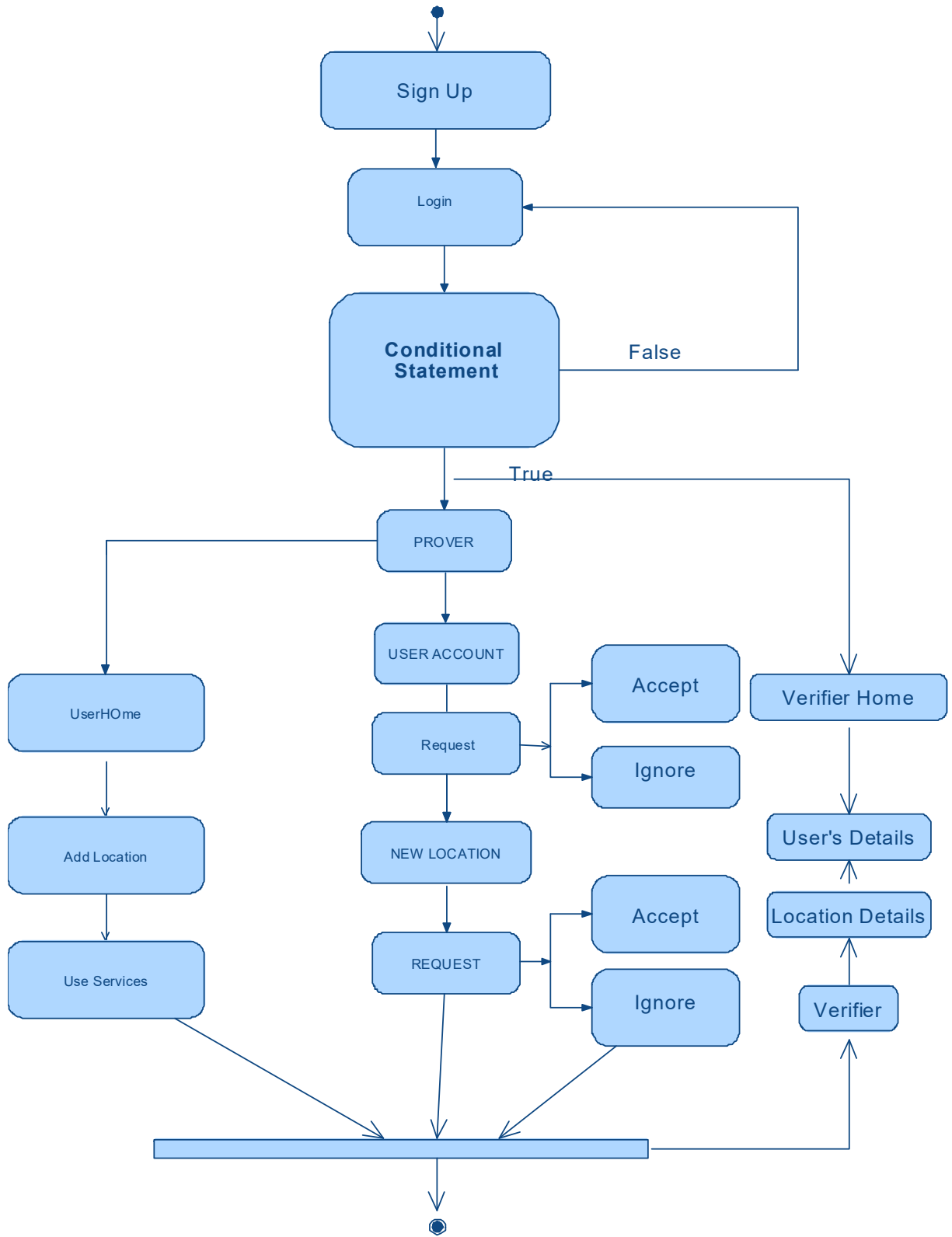


Fig 5.4 Information input and output design

Information Design

The information configuration is the connection between the data framework and the client. It involves the creating particular and methods for information planning and those means are important to put exchange information in to a usable shape for handling can be accomplished by reviewing the PC to peruse information from a composed or printed report or it can happen by having individuals entering the information straightforwardly into the framework. The plan of information centers around controlling the measure of info required, controlling the mistakes, maintaining a strategic distance from delay, dodging additional means and keeping the procedure basic. The info is planned in such a route in this way, to the point that it furnishes security and usability with holding the protection. Info Design thought about the accompanying things:

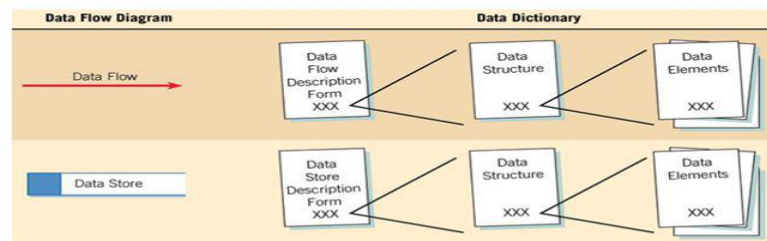
- What information ought to be given as information?
- How the information ought to be organized or coded?
- The exchange to control the working faculty in giving information.
- Methods for getting ready information approvals and ventures to take after when mistake happen.

5.4 DATA DICTIONARY

- A data dictionary is a file or a set of files that contains a database's metadata. The data dictionary contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data.
- The data dictionary is a crucial component of any relational database. Ironically, because of its importance, it is invisible to most database users. Typically, only database administrators interact with the data dictionary.
- **Active Data Dictionary**
- The DBMS software manages the active data dictionary automatically. The modification is an automatic task and most RDBMS has active data dictionary. It is also called integrated data dictionary.

DATA DICTIONARIES

- The data dictionary may be used for the following reasons:
 - Provide documentation
 - Eliminate redundancy
 - Validate the data flow diagram for completeness and accuracy
 - Provide a starting point for developing screens and reports
 - Determine the contents of data that is stored



3

Software Project Management

Maria Petridou

Fig 5.5 Data dictionary

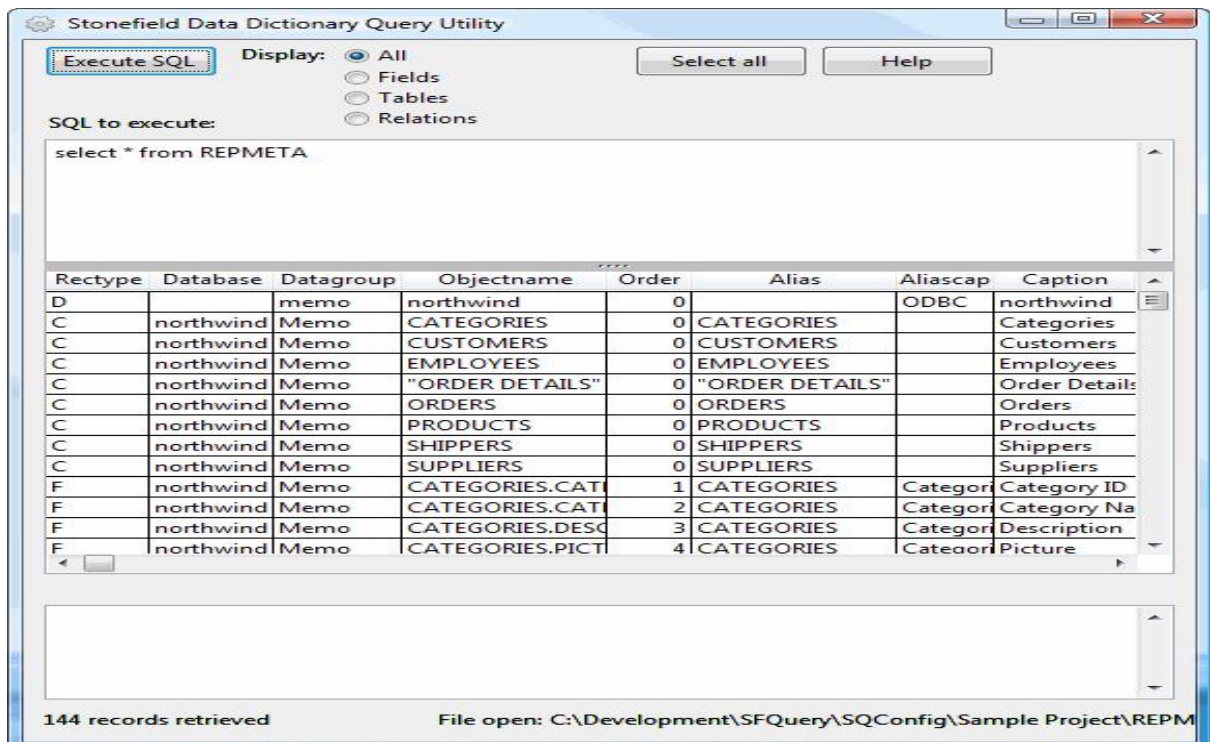


Fig 5.6 SQL Data dictionary

6. IMPLEMENTATION

Connection Method

Connection mode is SQL SERVER that is visual studio will establish a connection with the SQL SERVER Based on authentication type that is windows authentication and SQL SERVER authentication.

Connection String

Web config file deals about the global connection based on connection settings that is The connection method is SQL SERVER which is provide a data base of this project.

```
<add name="Socialcon" connectionString="Data Source=.\SQLSERVER;Initial
Catalog=Social Users;Integrated Security=True"
providerName="System.Data.SqlClient"/>
</connectionStrings>
```

6.1 SAMPLE CODE

```
<%@ Master Language="C#" AutoEventWireup="true" CodeFile="Prover.master.cs"
Inherits="Prover" %>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head id="Head1" runat="server">
<title>WORAL: A Witness Oriented Secure Location Provenance Framework for Mobile
Devices</title>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<link href="css/style.css" rel="stylesheet" type="text/css" />
<link rel="stylesheet" type="text/css" href="css/coin-slider.css" />
<script type="text/javascript" src="js/cufon-yui.js"></script>
<script type="text/javascript" src="js/droid_sans_400-droid_sans_700.font.js"></script>
<script type="text/javascript" src="js/jquery-1.4.2.min.js"></script>
<script type="text/javascript" src="js/script.js"></script>
<script type="text/javascript" src="js/coin-slider.min.js"></script>
```


7. SYSTEM TESTING

The reason for testing is to find blunders. Testing is the way toward attempting to find each possible blame or shortcoming in a work item. It gives an approach to check the usefulness of parts, sub congregations, gatherings as well as a completed item. It is the way toward practicing programming with the goal of guaranteeing that the Programming framework lives up to its necessities and client desires and does not bomb in an inadmissible way. There are different sorts of test. Each test compose addresses a particular testing prerequisite.

Kinds of Test

Unit Testing

Unit testing includes the outline of experiments that approve that the inner program rationale is working legitimately, and that program inputs deliver substantial yields. All choice branches and inward code stream ought to be approved. It is the trying of individual programming units of the application. It is done after the finishing of an individual unit before mix. This is a basic testing, that depends on learning of its development and is obtrusive. Unit tests perform fundamental tests at part level and test a particular business process, application, as well as framework design. Unit tests guarantee that every exceptional way of a business procedure ixperforms precisely to the archived determinations and contains unmistakably characterized inputs and expected outcomes.

Mix Testing

Mix tests are intended to test incorporated programming segments to decide whether they really keep running as one program. Testing is occasion driven and is more worried about the essential result of screens or fields. Mix tests exhibit that in spite of the fact that the segments were separately fulfillment, as appeared by effectively unit testing, the blend

Practical testing is focused on the accompanying things:

Legitimate Input : recognized classes of substantial info must be acknowledged

Invalid Input : recognized classes of invalid information must be rejected

Capacities : recognized capacities must be worked out.

Yield : distinguished classes of utilization yields must be worked out.

Frameworks/Procedures: interfacing frameworks or methodology must be summoned.

Framework Test

Framework testing guarantees that the whole incorporated programming framework meets necessities. It tests a setup to guarantee known and unsurprising outcomes. A case of framework testing is the arrangement situated framework reconciliation test. Framework testing depends on process depictions and streams, underscoring pre-driven process connections and joining focuses.

White Box Testing

White Box Testing is a trying in which in which the product analyzer knows about the internal workings, structure and dialect of the product, or possibly its motivation. It is reason. It is utilized to test territories that can't be come to from a discovery level.

Test destinations

- All field sections must work appropriately.
- Pages must be enacted from the distinguished connection.
- The passage screen, messages and reactions must not be postponed.

Highlights to be tried

- Verify that the passages are of the right organization
- No copy sections ought to be permitted

7.2 TEST CASES

Table 7.1 Test case for Register

Test Case Id #:1 Priority(H,L):High	
Test objective: Register	
Test Description: User must be register to login into the system	
Requirements Verified : Register	
Expected Results Actual Results	
Field must be enter	Registration completed
Test Case Status : High Test Priority : High	

Table 7.2 Test case for Login

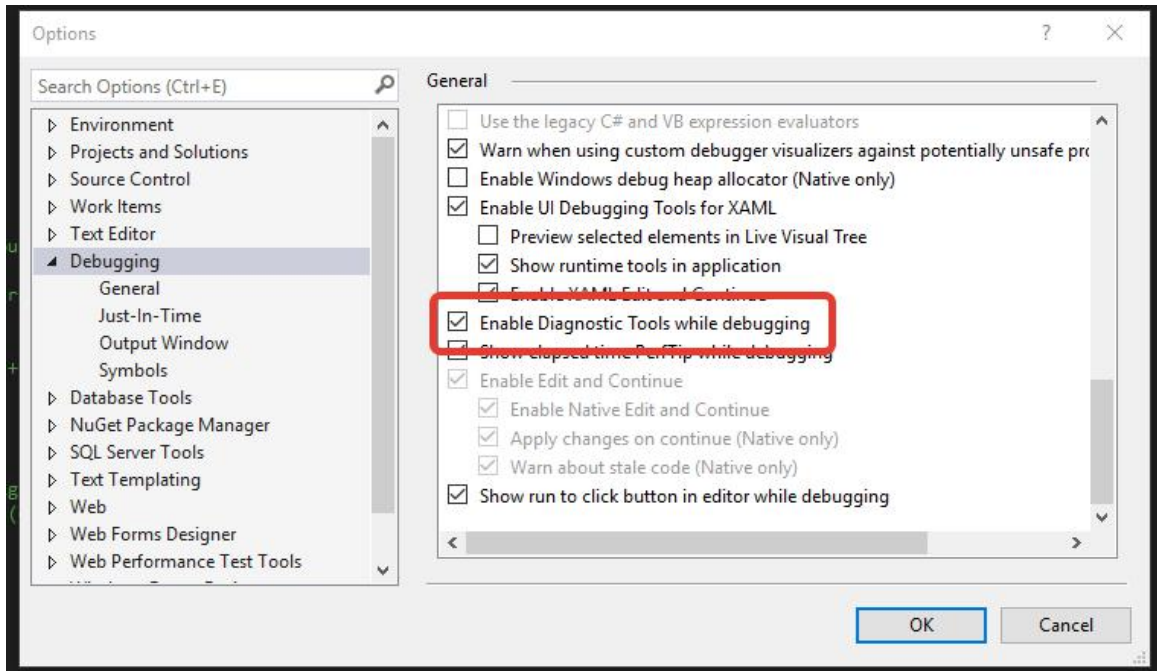
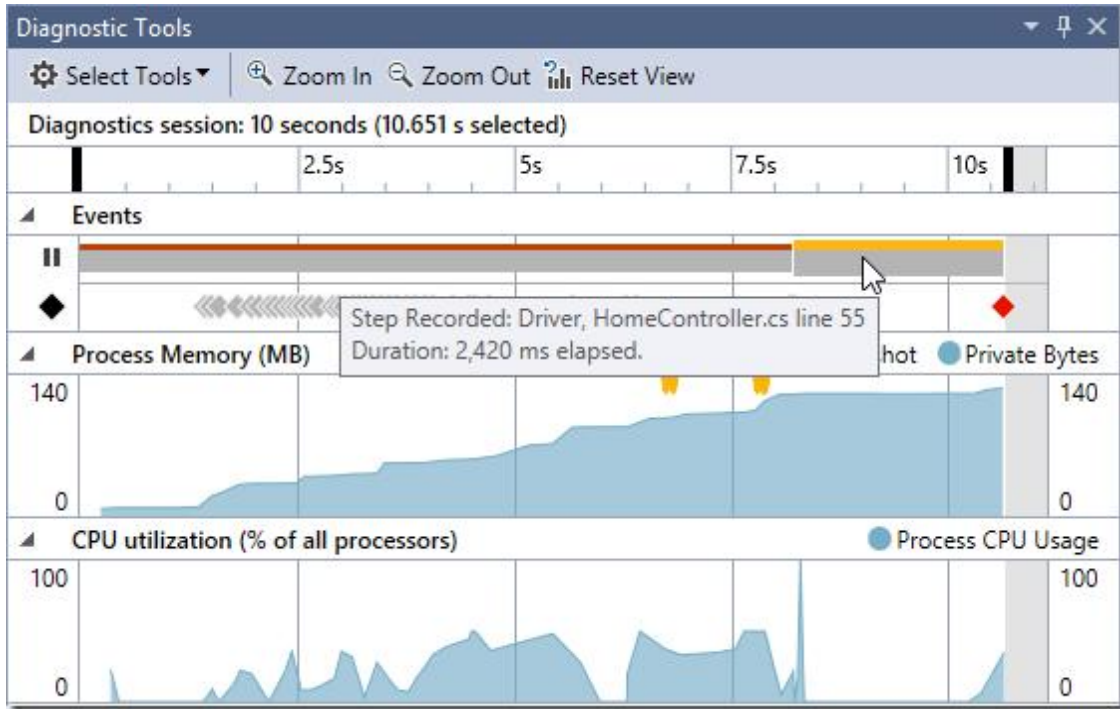
Test Case Id #:2 Priority(H,L):High	
Test objective: Verifying the User valid or not	
Test Description: User must be register to login into the system	
Requirements Verified : Login	
Expected Results Actual Results	
Display message like “fail” Login successfully and Display the home page of login user	
Test Case Status : High Test Priority : High	

Table 7.3 Test case for Admin Login

Test Case Id #:2 Priority(H,L):High	
Test objective: Verifying the Admin valid or not	
Test Description: Admin must be login into the system	
Requirements Verified : Login	
Expected Results	Actual Results
Display message like "fail" Login successfully and Display the home page of login Admin	
Test Case Status : High Test Priority : High	

Table 7.4 Test case for validate users

Test Case Id #:2 Priority(H,L):High	
Test objective: Verifying the User valid or not	
Test Description: Validating users based on registered values	
Requirements Verified : Yes	
Expected Results	Actual Results
Display message like providing <u>cryptographic ID</u>	
Test Case Status : High Test Priority : High	



7.3 DISCUSSION OF RESULTS

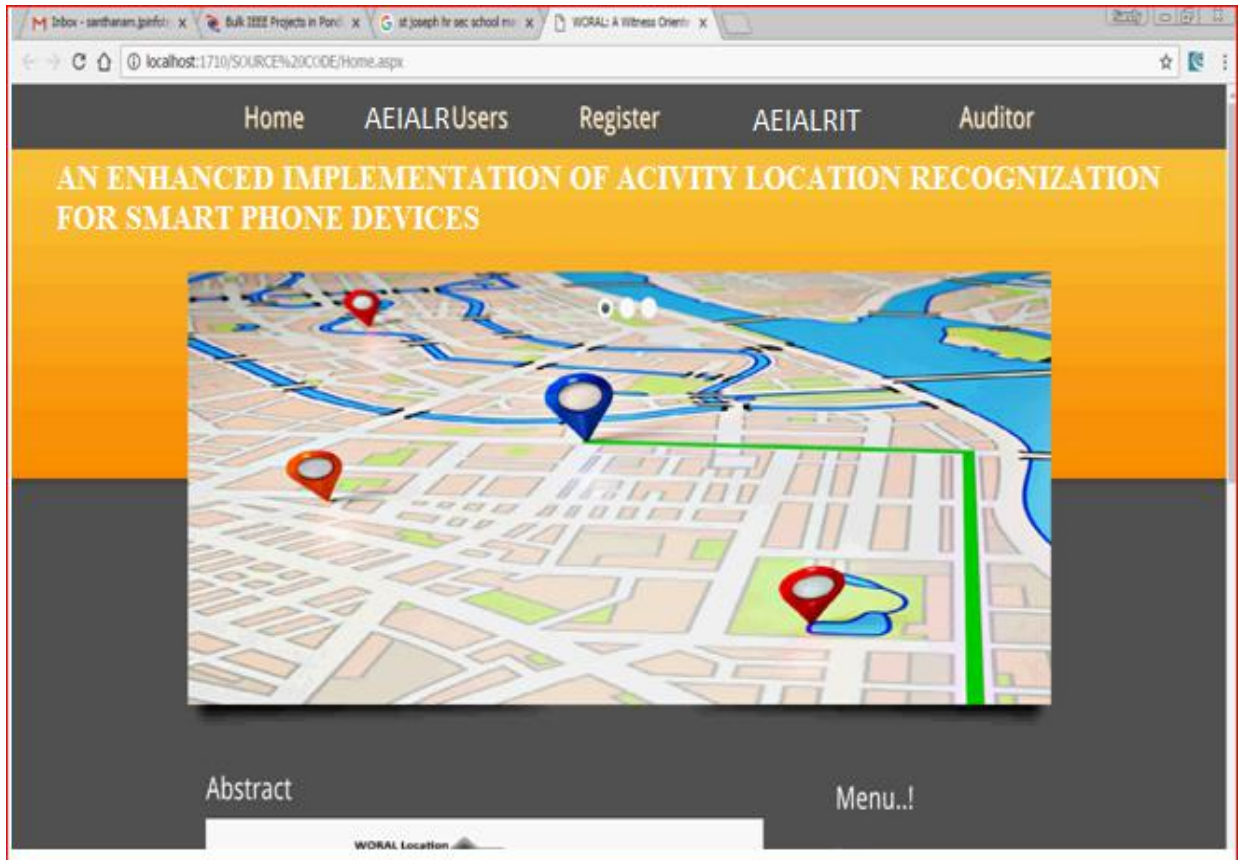


Fig 7.5 Home page

- User should be login with the details called user name and password.
- These details always stored in the database table data.
- These details like name , password, email, address etc.

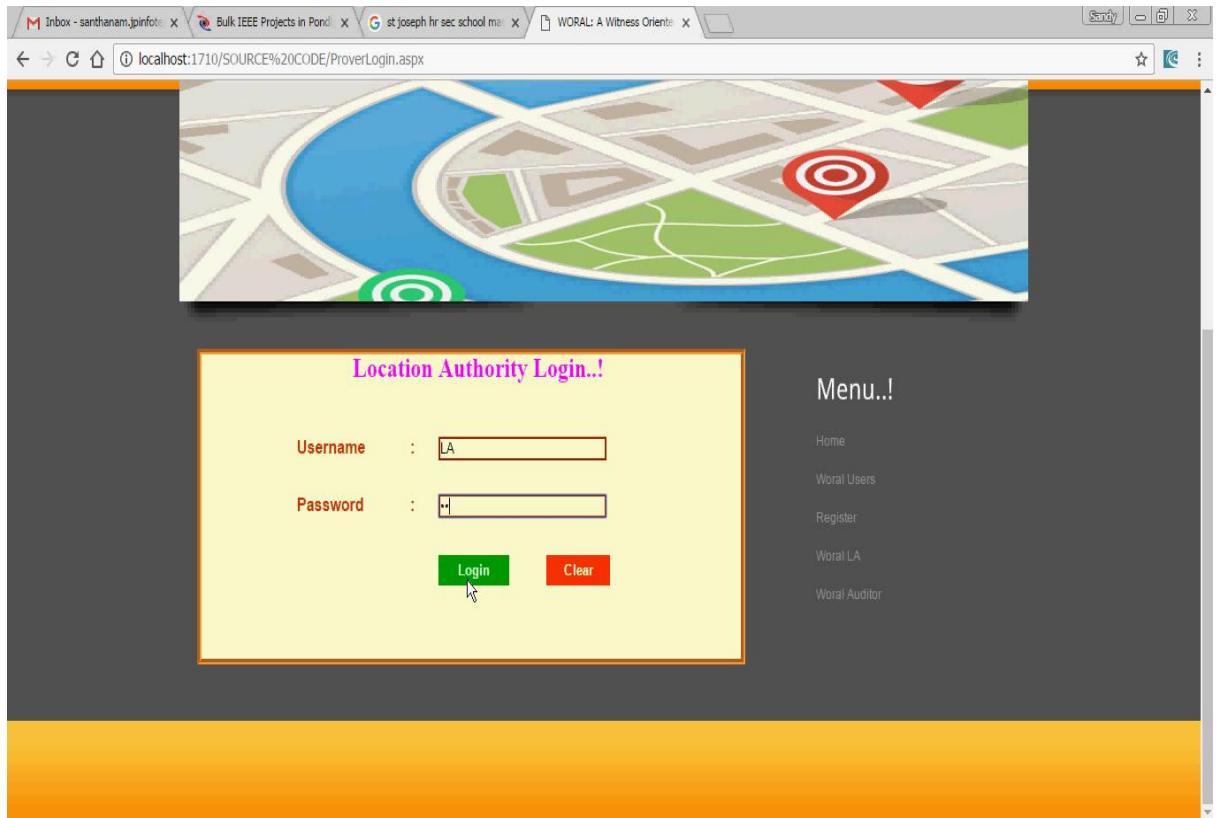


Fig 7.2 Location authority login

- Location authority should be login with the details called user name and password.
- These details always stored in the database table data.
- The frontend details transmitted to the database called SQL SERVER.

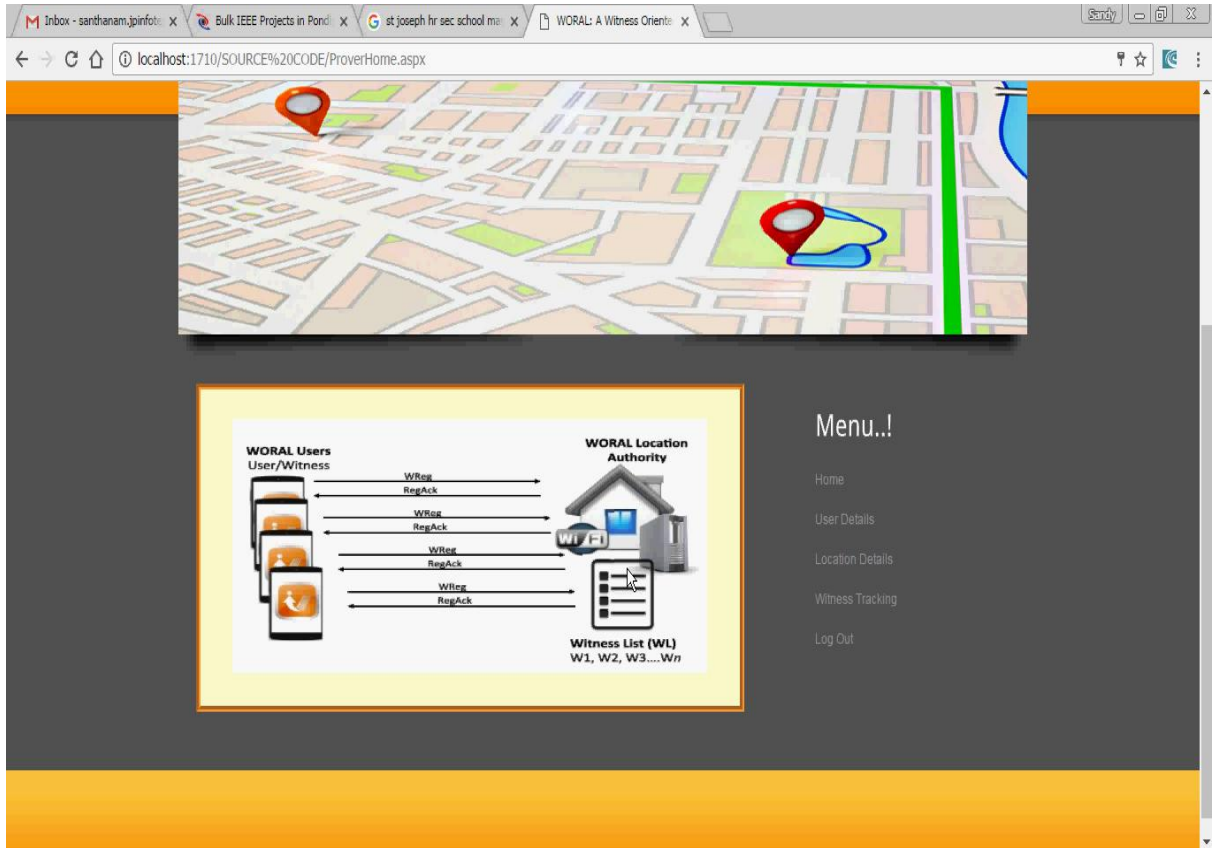


Fig 7.3 Location pointing

- This screen should have displayed for a specific user.
- Witness users they can access our system and their location.
- These location mainly based on on ID. This ID should be unique.

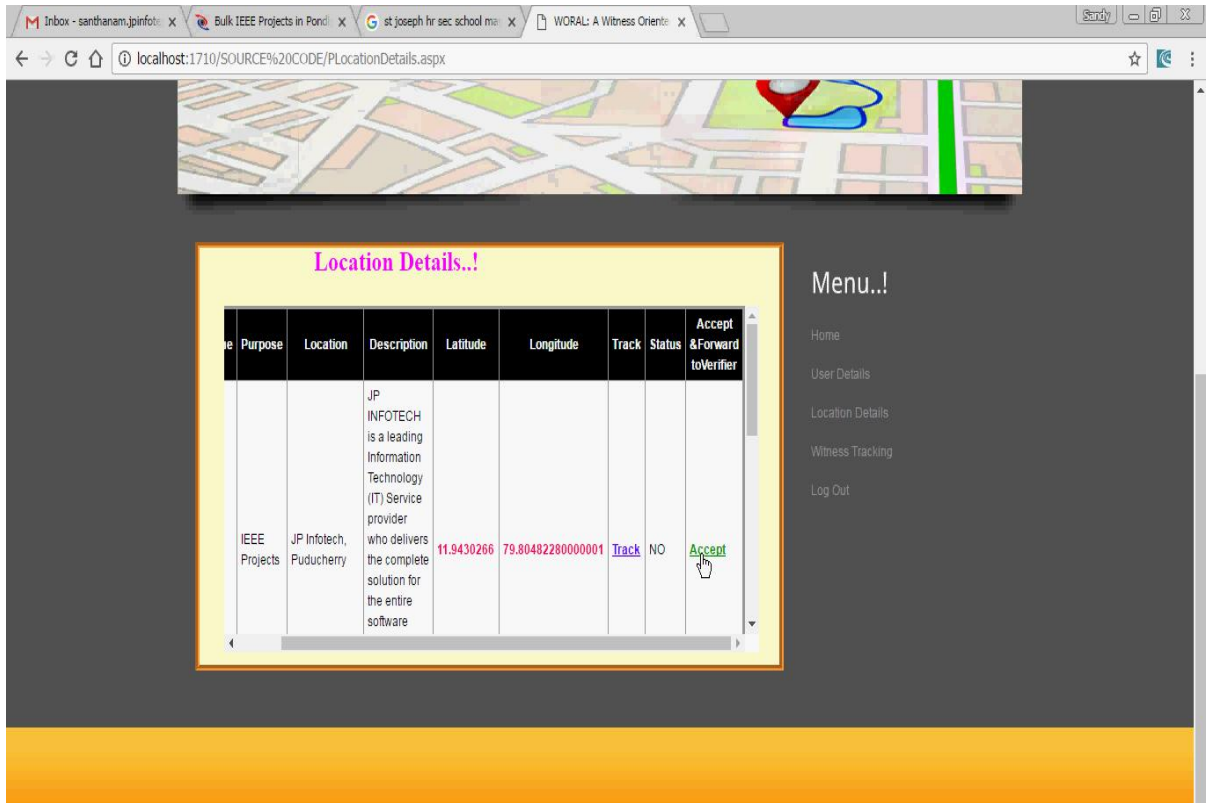


Fig 7.4 Location Details

- The screen display about the particular location details of a user.
- These location details should be displayed based on longitude latitude.
- These information should be accepted based on a track number.

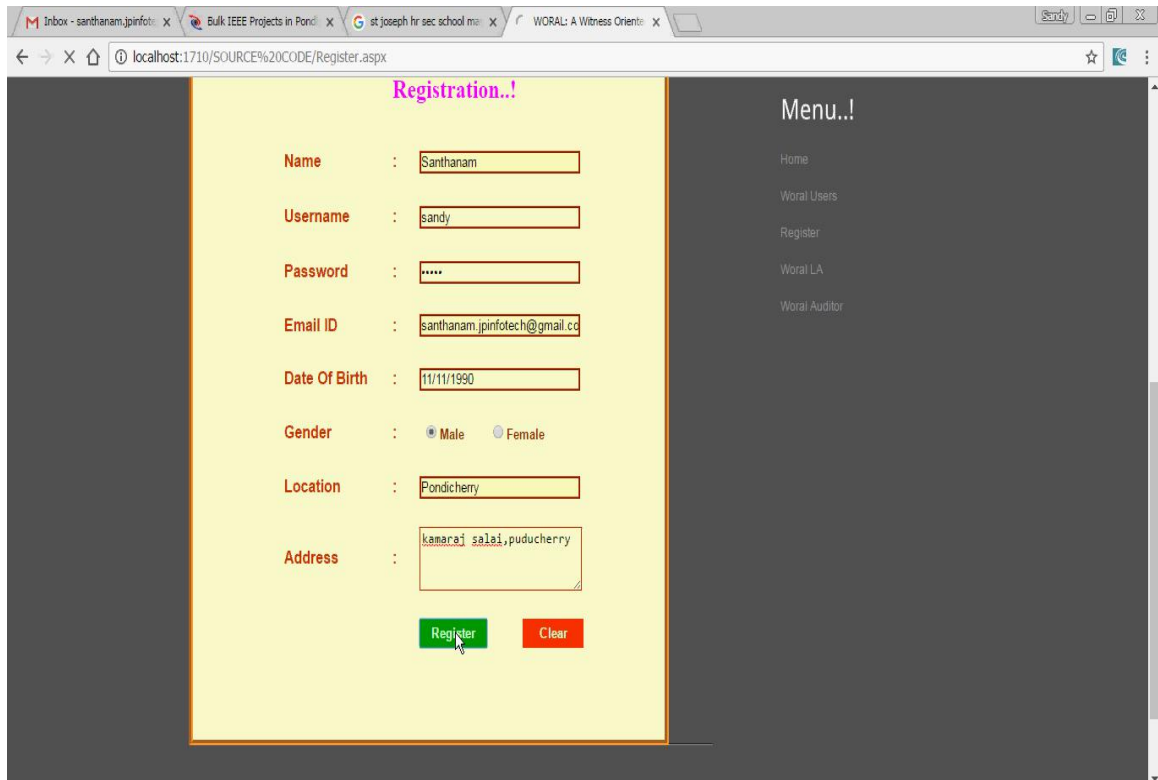


Fig 7.5 Registration page

- The above page deals about the registration user. The above listed events should have to provide a user.
- The path traveler initially has to submit their details .
- These details like name , password, email, address etc.

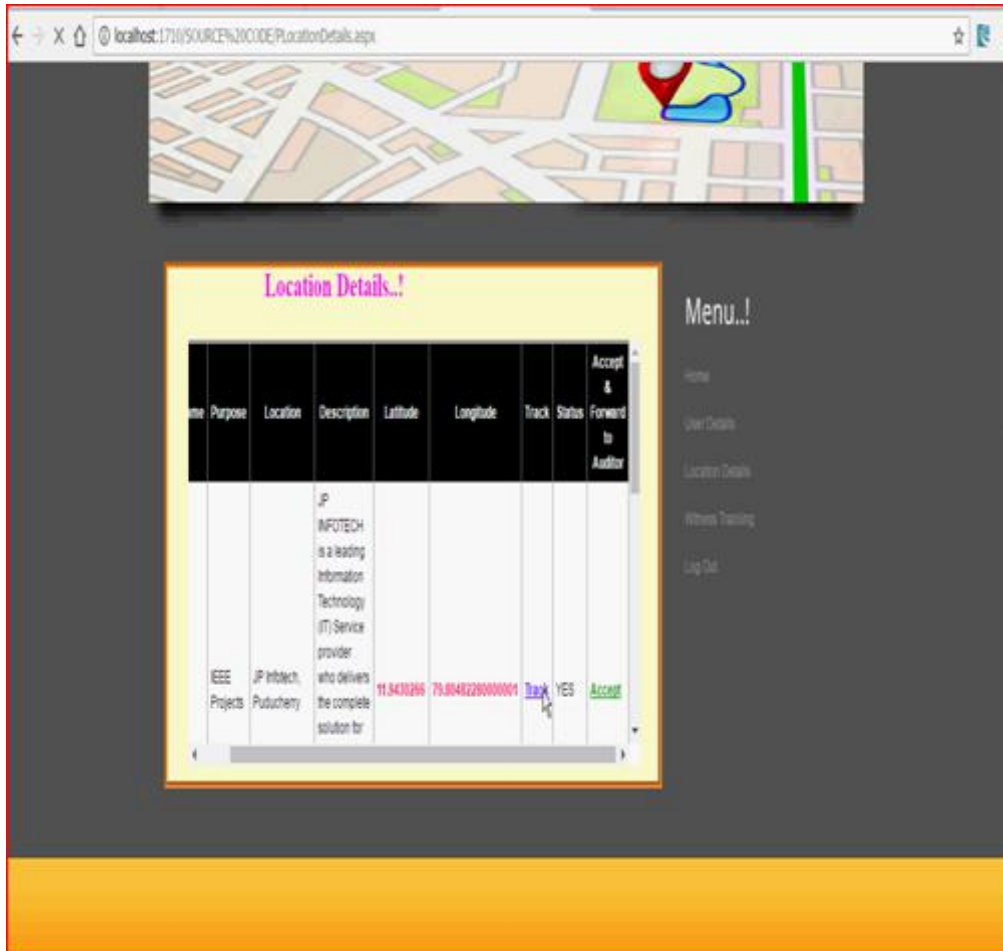


Fig 7.6 Registration details page

- this screen will display about user details.
- These location details should be displayed based on longitude latitude.
- The path traveler initially has to submit their details .

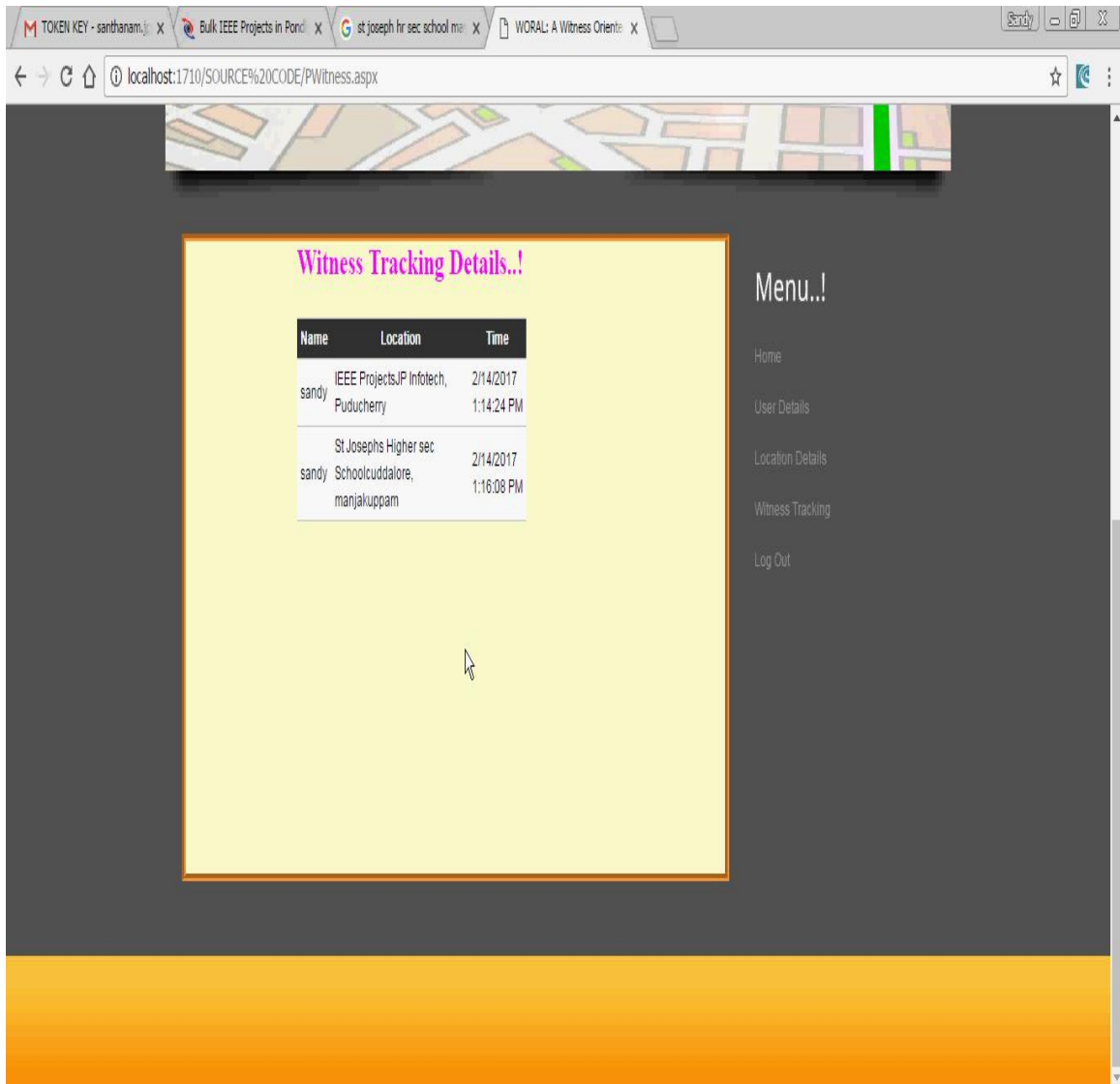


Fig 7.7 Tracking details

- This screen will show about tracking details
- The location which the user travelled will shown in this

8. CONCLUSION AND FUTURE ENHANCEMENTS

IT Administration zone based organizations have made a necessity for secure and solid zone provenance parts. Collection and check of zone proofs and the protection of the consecutive demand has enormous honest to goodness applications. In this paper, we present WORAL, an arranged to-send framework for secure, witness-arranged, and provenance protecting region proofs. WORAL grants making secure and modify evident zone provenance things from a given region authority, which have been proclaimed by a spatio-momentarily help establish witness. The WORAL structure incorporates an online master association, work territory based zone master server, an Android-based customer application including a Google Glass client for the convenient application, and an overseer application for region provenance endorsement.

The vital components, which give the high grounds over others in the market, may be slated as:

- Performance
- Pioneering tries
- Client satisfaction
- Innovative thoughts
- Constant Evaluations
- Improvisation
- Cost Effectiveness

8.1 FUTURE ENHANCEMENTS

The web is based on registration while voyaging it will make you simple adventure by close area and simple land marks. It has less impediments when contrast with Google maps Though Google it won't indicate correct area and furthermore demonstrates wrong area. We are expect to give one of a kind ID which will be open source to all site pages where each innovation can utilize our maps effectively. Our maps are straightforward and simple to utilize which will indicate correct area will simple land marks it is free administration simply enlist and make the most of our application.