

DIGITAL WATERMARKING

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for the degree of*

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

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DECLARATION BY THE SCHOLAR

I hereby declare that the work reported in the M-Tech thesis entitled “**Digital Watermarking**” submitted at **Jaypee University of Information Technology, Wagnaghat India**, is an authentic record of my work carried out under the supervision of **Dr. Neeru Sharma (Asst. Professor of ECE department)**. I have not submitted this work elsewhere for any other degree or diploma.

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21st May 2018

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the M-Tech. thesis entitled “**Digital Watermarking**”, submitted by **Shruti Gupta, Arpit Arora and Shaurya Mehra** at **Jaypee University of Information Technology, Wagnaghat , India** , is a bonafide record of his / her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree or diploma.

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LIST OF ACRONYMS AND ABBREVIATIONS

PHP	Personal Home Page
IDE	Integrated Development Environment
CSS	Cascading Style Sheet
HTML	Hyper Text Markup Language
JDK	Java Development Kit
JPEG	Joint Photographic Expert Group
LSB	Least Significant Bit
SDLC	System Development Life Cycle
PDF	Portable Document Format
2D-DCT	Two-Dimensional Discrete Cosine Transform
QIM	Quantization Index Modulation
HTTP	Hypertext Transfer Protocol
SVD	Solitary Esteem Deterioration
DWT	Discrete Wavelet Transform
OOPS	Object Oriented Programming System

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ABSTRACT

Undergoing project is on digital watermarking for security purposes . Many software have an allowance for image creating and designing by doing innovative design on various graphical techniques . To prevent these images to be used against the copyright issue , watermarking is done. Watermarks are stamps on the image (invisible), it displays all the graphics of the image and also prevents images to be reused. In today's timeuse of images in public without copyright is quite common. In order to prevent these and for security issues digital watermarking is done.A digital watermark is injected on the image you desire. A watermark cannot be easily been removed. In our project we make a digital watermarking code in which we put watermarks on image and then the images is left just for viewing purposes. With the help of java we can create database for our website and watermarking makes sure that nothing happens to the authenticity of images.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Today, in every field digital content is frequently used. The copying of digital content with same quality is quite easy. Due to this copying of digital contents is at risk. So, this copying of personal data must be stopped. Digital watermarking is best answer to copyright issue. In Digital watermarking, we embed some information in digital form which we have to protect from illicit duplicating. This embedded information is embedded as watermark. Digital watermarks are of different types as visible, invisible, robust, etc. It is having some other applications other than copyright protection as fingerprinting, owner identification etc.

Like conventional physical watermarking, digital watermarks are frequently just detectable under specific conditions, i.e. utilizing some algorithms. If digital watermark misrepresent the carrier signal that it can be easily detected, it is considered less effective. Conventional watermark might be connected to visible medium i.e. pictures or video, while in watermarking, the signal is in the form of audio, texts, picture etc.

Properties of a digital watermark depends on which digital watermarking is applied. For files with copyright content, a digital watermark should be robust against modified carrier signal.

1.2 OBJECTIVE OF THE PROJECT

The main purpose of our project is to identify information which will be accessed on the internet. The another purpose of this project is used to hide the information. Another purpose is to add visible watermark on the images ie in form of logo or text. It will be

used to avoid download images which are watermarked by any one. This will provide security.

1.3 INFORMATION HIDING

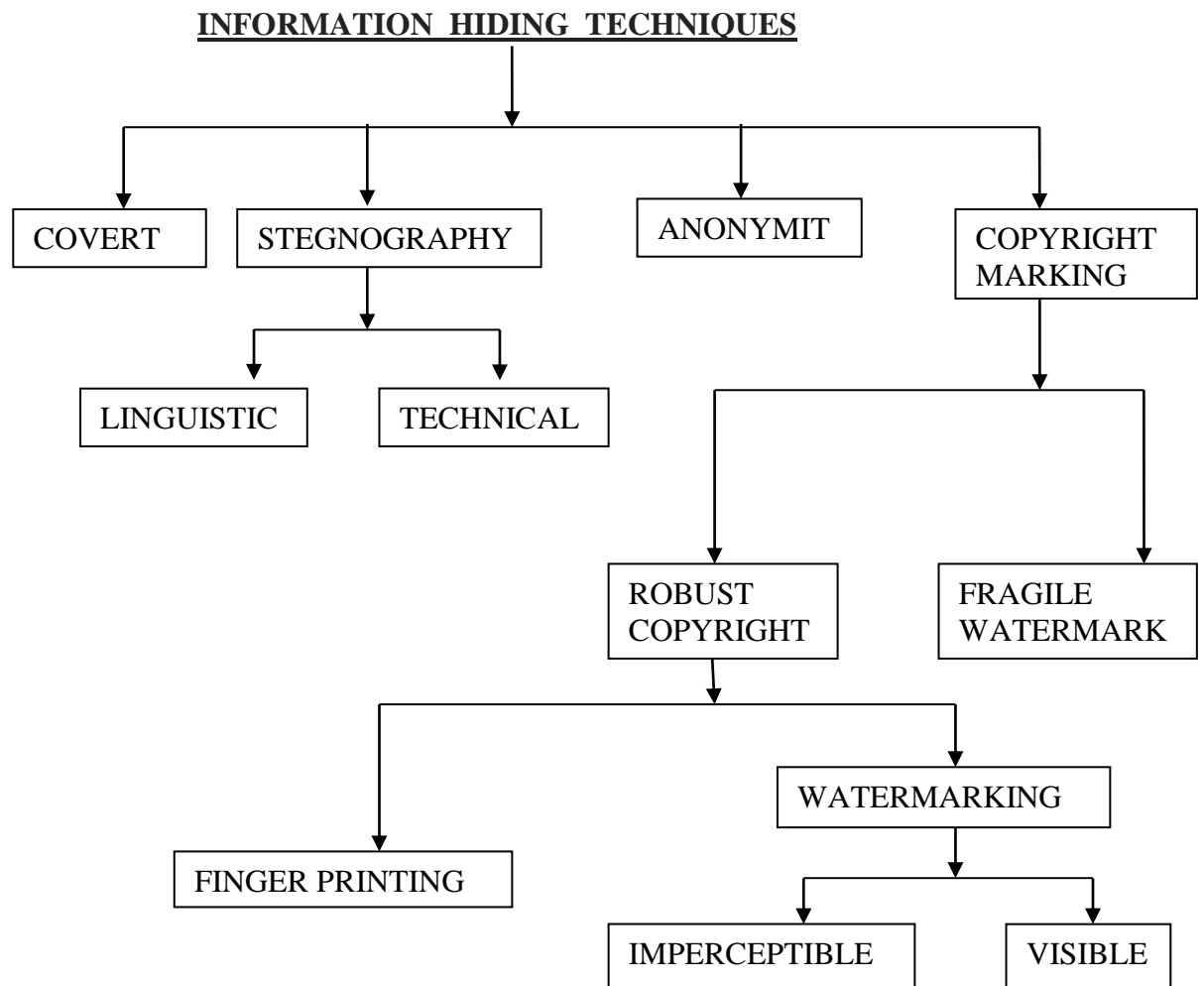


Figure 1.1 information hiding techniques

Untill now, this technique got less consideration from the research area heads and industrial area than cryptography[16]. However, that is alluring for all classes to effectively cover the concealed data from relevant identifiers. Invisible watermarking, generally utilized for copyright protection, traitor tracing, and authentication[5]. Embedding data puts little emphasis on either robustness or covertness.

1.4 APPLICATION OF INFORMATION HIDING TECHNIQUES

There are several applications of information hiding techniques:

- Criminals greatly use unobstructive communication, they use prepaid phones, mobile phones that hide their personal identity and they hack corporate switchboards through which calls are traced/routed.
- Schemes used for digital cash and digital elections use anonymous communication systems.
- Marketers utilize email forgery to send a huge number of spontaneous messages while maintaining a strategic distance from clients.

1.5 RELATION BETWEEN WATERMARKING AND COMMUNICATION SYSTEM

Digital watermarking and communication systems are very similar in many aspects such as the goal of digital watermarking and communication systems is the same. Introducing information into a medium and extracting reliable information. A watermark embedder works as a transmitter, an extractor as a receiver and the host signal is the communication channel.

Relation between elements in a watermarking system and blocks in a communication system is shown in figure 1.2.

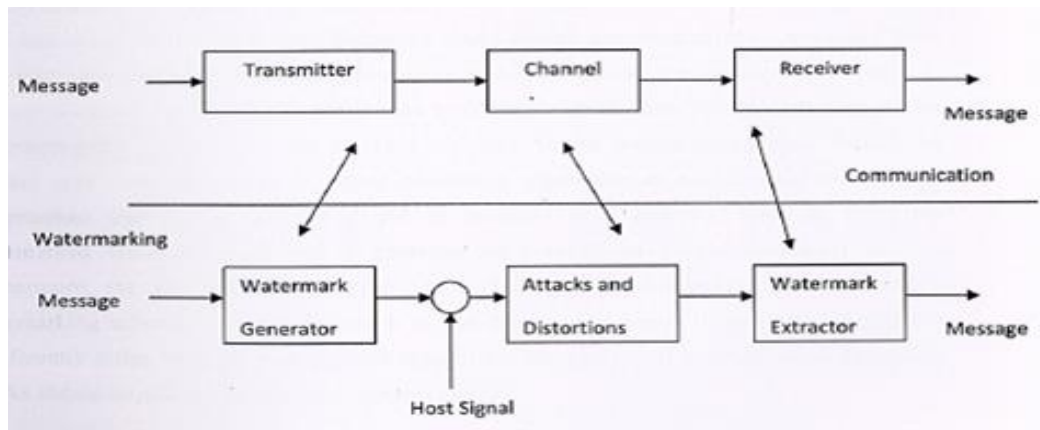


Figure 1.2 relationb/w watermarking and communication system

1.6 TYPES OF WATERMARKS

1.6.1 Visible Watermark

“Visible watermark is an augmentation of the thinking of logos. These type of watermarks are applied only to images. These logos are inserted into the image and they are transparent. These watermarks cannot be removed by removing the central part of that image[1]. Also, such watermarks are protected from theft and attacks”.[6]

The disadvantage of visible watermark is that they reduce the quality of that image. One other drawback is that identification issue. Therefore, identification through dedicated devices is not possible.



Visible Watermarking

Figure 1.3 visible watermarking

1.6.2 Invisible Watermarks

“This type of watermark is hidded in the information”. This is detected by an recognized user only. These type of watermarks are used for information and owner authentications and for detecting illegal copying.



Invisible Watermarking

Figure 1.4 invisible watermarking

1.6.3 Public Watermark

“These type of watermarks are readable and recovered by anybody utilizing some particular algorithm”. That means these watermarks are insecure. However, public watermarks are helpful for conveying IPR information.

1.6.4 Private Watermark

“Private watermarks or Secure watermarks are secured by secret key and for reading or recovering purpose secret key is required”.

1.6.5 Robust Watermarks

These watermarks can survive any processing dispensed on the original image. These watermarks are embedded such that any change in signal of reasonable strength doesnot remove the watermark. Hence a corsair willing to remove the watermark cannot do this unless they corrupt the document.

1.7 WATERMARKING APPLICATIONS

1.7.1 Broadcast Monitoring

It is very important to track a specific video which is being broadcasted by Television station. So advertising agencies want to ensure that their commercials are getting the air

time they paid for. Watermarking can be used in this. Information which is used to identify individual videos can be embedded in the videos using watermarking that makes broadcast monitoring easier.

1.7.2 Owner Identification

It is quite difficult to identify the owner of a specific video or image. So it is necessary task especially in “copyright infringement”. So, we can use digital watermarking for embedding the copyright in that image.[3]

1.7.3 Transaction Tracking

The watermark which is embedded in a digital format can be utilized for recording at least one transaction taking place in that duration of work[17]. For example, watermarking could be utilized to record beneficiary of each legal copy of movie by putting different watermarks in different copies. If the movie is leaked on the Internet, the movie producer can identify, from which source movie is leaked.

1.8 METHODOLOGY USED

Different methods are used to solve this problem –

- Collect information about the company logo or make small picture to add water mark.

Analyze data or validate data –

- Confirmation.
- Process with java algorithm.
- Choose image to which we want to add water mark.
- Show output

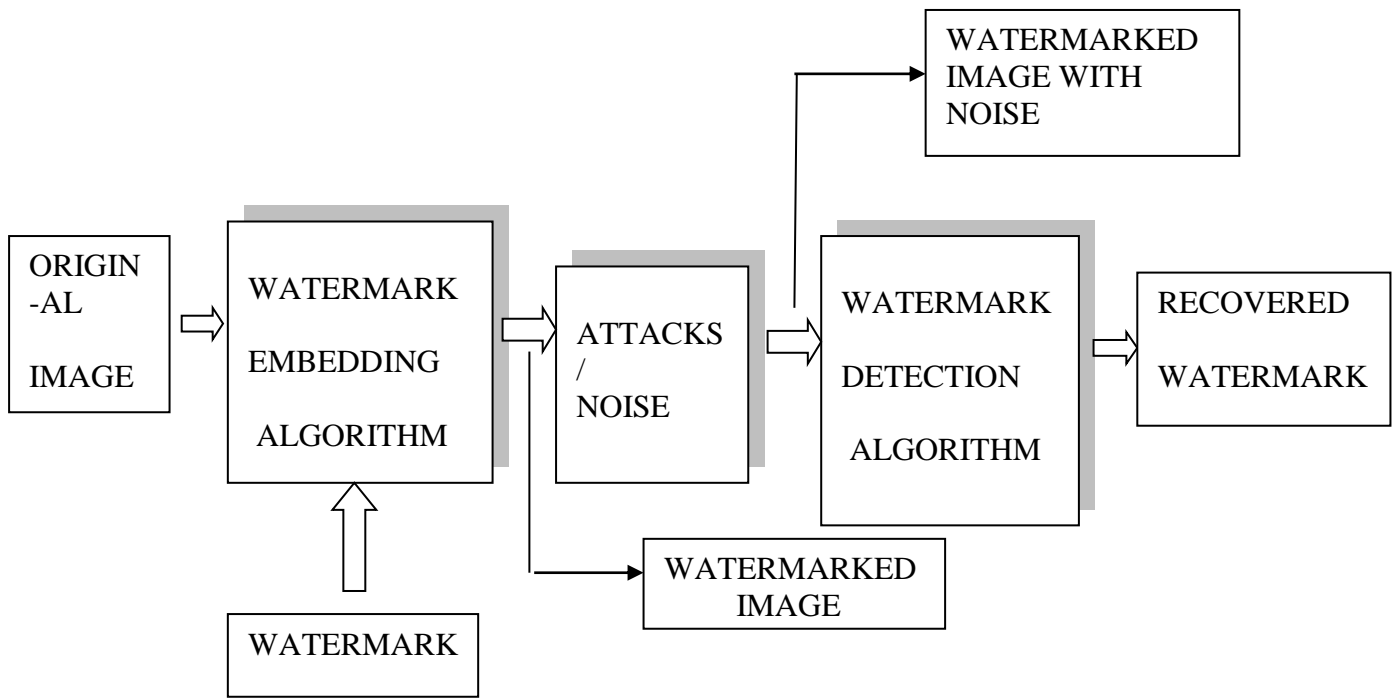


Figure 1.5 Stages In Digital Watermarking

CHAPTER 2

REVIEW OF LITERATURE

Shan Liu *et. al* (2017) , With the improvement of data innovation, the electric power framework has bit by bit entered another stage. What's more, the security issue of electric power framework has turned into an imperative research recorded. In this paper, they connected wavelet innovation and computerized watermarking calculation to enhance the security level of the electric power framework. This two innovations can finish touchy data covered up in the electric power framework. Subsequently, the vital information data can be secured during the time spent transmission.

Lakshmi Priya C V *et. al* (2017) Advanced picture watermarking process is unequivocal as to embed data of computerized into advanced flag. This is a productive answer for maintain a strategic distance from unlawful replicating of data from mixed media systems. Numerous watermarking calculations have been produced and every one of them has its own distinction due to its assortment of uses. Another calculation ready to comprehend the vast majority of the reasonable issues of watermarking is planned.

Watermarking alone isn't adequate to keep the unapproved controls of information unless an appropriate security convention is built up. An effective watermarking calculation ought to fulfill an ideal exchange off between three factors such the limit, strength and indistinctness. The proposed calculation utilizes the upside of SVD, DWT and homomorphic separating.[2] At last, the proficiency of the outcome is assessed utilizing different quality estimations and the watermarked picture is scrambled to build the security level.[4]

Mohd Aliff Faiz bin Jeffry *et. al* (2017) The quantity of online networking clients increment quickly consistently, bringing about the expanding number of pictures

transferred into web-based social networking. Some tricky issues may emerge if no safety measures were taken before transferring the photographs. The most current issues are unapproved sharing of pictures over the Internet, character misrepresentation, proprietorship, and discolored metadata from the pictures. Our proposed answer for help settle these issues is by utilizing computerized watermark with metadata. Keeping in mind the end goal to build the security of advanced watermarking system, chose metadata of the picture are utilized as the installed data for watermarking process. For experimentation purposes, an Android application, MyImage, was created to execute unmistakable and undetectable watermarking calculations, and furthermore for additionally tests and examination. These watermarked pictures will be utilized as a part of four diverse web-based social networking destinations, and afterward broke down for nearness, or changes to, the inserted metadata for every one of the watermarking systems.

Aayushi Mishra *et. al* (2017) The use of the online administrations particularly the entrance to Internet Banking administrations has developed quickly from most recent five years. The Internet Banking administrations furnish the clients with the safe and dependable condition to manage. Be that as it may, with the innovation headway, it is compulsory for the banks to try the perfect advancements or the best security systems and methods to approve or approve the inventiveness of the clients. This must be done to guarantee that the information or the data being transmitted amid any sort of exchange is sheltered and no sort of spillage or change of the data is feasible for the interloper.

This paper introduced an advanced watermark strategy for the QR Code (Quick Response Code) In this, an obvious watermark is inserted in the QR Code picture utilizing the watermark innovation (DCT) and depicts the working element of a safe approval framework by methods for QR codes and the computerized watermark for Internet Banking [8].

JitendraSaturwarD.N. Chaudhari *et. al* (2017) In this day and age of computerized communication,as innovation progresses,there is increasingly consideration required on

picture security. Many visual cryptography calculations have been recommended and advanced watermarking in relationship with visual cryptography is additionally proposed for more picture security. An picture watermarking model in light of dynamic visual cryptography is proposed to choose ideal number of offers. An examination on execution of important offers in blend with visual cryptography conspire for mystery pictures is completed for usage of calculation.

A visual cryptography systems are utilized to make important offers. In this paper examination of various calculations are performed which produces significant offers. These offers are watermarked with cover pictures. After transmission of these watermarked pictures to accepting end, the less than desirable end will extricate the offers from watermarked pictures and stacking of these separated significant offers will create the first mystery image. Combination of Digital watermarking and visual cryptography adds upgraded security to mystery pictures.

Rodrigo García-Soto *et. al* (2013) This paper proposed a sender confirmation framework for official records in PDF utilizing watermarking methods in the 2D-DCT area[13]. The proposed plot is actualized in Java Programming Language for its compactness. The primary reason for the proposed framework is distinguishing the client and the gadget data where the archive was produced. The proposed plot comprises of the sender and the collector sides. In the sender side, the watermark grouping is produced utilizing the gadget data, for example, Media Access Control address, client name, date and time when the record was created, and so forth the produced watermark arrangement is then implanted into the report document utilizing the QIM calculation. In the beneficiary side, the watermark succession is separated from the gotten watermarked record to check if the cause of the report is right or not. The proposed plot gives a high watermark intangibility and strength against JPEG pressure.

Fernando Martín-Rodríguez *et. al* (2012) This paper is around an application that tries to help individuals in their relations with their nearby government. In numerous

bureaucratic procedures, nationals are required to give duplicates of paper archives, for example, recognitions, birth declarations.

Clearly, this sort of archives can't be given on the web. Utilizing this application, clients can give the required reports on the web and the organization can check record unwavering quality to a level of security like that offered by a "face to face" conveyance.

Patrick Dymond *et. al* (2002) This paper considers the utilization of program modules and Java code (inside standard HTTP components) to serve private confidential archives safely finished the World Wide Web to a gathering of portable or generally disseminated clients. Web security components commonly require utilization of either a hidden security framework for transport system interchange servers and information streams , security-situated modules inside the program, or aide applications . The technique depicted here works by giving a for each client security instrument coded in Java which works as a component of a standard web-program condition.

This framework seems, by all accounts, to be exceptionally appropriate for serving lower-security, non-open reports, les and pictures to a gathering of heterogeneous clients over the internet. It can likewise be suitable in circumstances where the standard security instruments are not accessible. We additionally depict an adjustment which gives programmed per-client \watermarking of decoded pages to permit identification of the decoder.

CHAPTER 3 SYSTEM DEVELOPMENT

3.1 System Development Life Cycle

Two or three frameworks work better for particular kind of errands, yet in the last examination, the most essential factor for the achievement of an undertaking might be the path by which steadfastly specific strategy was taken after.

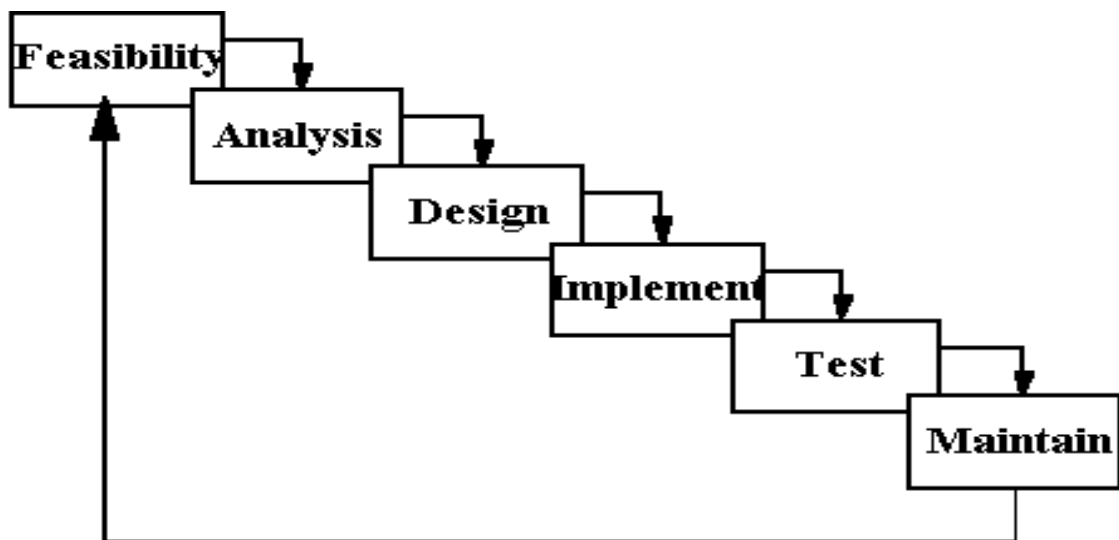


Figure 3.1

3.2 COMMUNICATION

This is the fundamental propel where the client starts the enthusiasm for a coveted programming thing. He gets master focus and tries to, coordinate terms. He acquaints his demand with the association giving relationship in made.

3.3 REQUIREMENT GATHERING

This is most imperative piece of social event data about the undertaking. For this undertaking first we gathered data from individuals who process data over the web.

At that point we assembled data about the innovation which will be reasonable for this i.e java, php and .net innovation .We comprehended the part of innovation and after that chose to deal with this task. At that point we choose to deal with java innovation which is stage autonomous dialect and clarifies the security ideas too.

3.3.1 FEATURES OF JAVA

- Simple : Java inherits syntax from c and oops concepts from c++.

c-> c++ -> JAVA

Java does not include topics of C such as pointers/structure/preprocessor/union and C++ topics multiple inheritance , friend function , friend class , virtual function , destructor , operator overloading etc

- Object oriented: Java is trully oops dialect c++ is not everything. In java everything is characterized inside the class we can not compose program without utilizing class and objects.even the principle work is additionally characterized inside a class.

Primitive data types: int, char, float :- these are not objects

```
class Xyz
{
    public static void main(String ss[])
    {
        System.out.print("hello");
    }
}
```

To compile javac compiler -javac filename.java to execute we use interpreter java classname.

3.3.2 CONVENTIONS FOR THE PROGRAM

- First Letter of Each word ought to be in capitalized for an inbuilt class.

```
class StudentInformationTech
{
}
```

- For function the rule is same however first letter of first word ought to be in bring down case.

```
CalculateMarksTotal
printStackTrace()
```

- Platform Independent : There are no confinement of any os to java byte code dos/ unix/linux/windows/Mac/AS600

- GARBAGE COLLECTION: It consequently expels the unused memory space.

```
student s1;
s1 = new student();
s1 = new student();
```

- GC [GARBAGE COLLECTOR]: It is a program that keeps running on the foundation and continue viewing unreferenced memory and naturally clears it.

- EXCEPTION HANDLING: Are run time blunders if not took care of ,may end your projects.

divide by zero 5/0

```
int a[8];  
a[12]=2;
```

- **MULTITHREADING:** Executing in excess of one a part in a program in the meantime. The program is separated into strings the strings keeps running in parallel in a round robin form.

Notepad (singlethreaded) ,ms-word(multi) ,games(multiplayer)

We can create following interfaces:

1. Distributed
2. Customer server
3. Various Customers + Various server
4. Telnet/ethernet
5. Topologies like star,ring , mesh and so forth.

- **WORLD WIDE WEB (WWW) :** Java is web based dialect and we can build up any utilization of web in java.

Like ecommerce web sites-

1. online shopping
2. online trading
3. online counselling
4. online enlistments etc.

Visit server , envoy , email server , ftp(file exchange convention) , http , tcpip , intermediary servers , against hacking softwares(kerbros,pgp).

- **SECURITY CONCEPTS :**Cryptography (encryption/decryption) , steganography etc. (hiding the information, in form of video/audio/image)[10] . Steganography technology is much important in digital watermarking which gives facility to hide information in images or in audio,video documents. We can remove the watermark on images and other documents also.

3.4 FEASIBILITY STUDY

- **Technical Feasibility :** This will give us a superior picture about the critical data of gathering who have made a stride in this endeavor ,regardless of whether it is conceivable tha they are suitably arranged on the particular upheavel or not. Every one is should have data on this endeavor et cetera associates must join to each other . We have choosen transperancy among the gathering . On the off chance that if customer needs to collaborate with the gathering he can , and particularly uncover the necessities to originators , so they can work without a significant part of the hitch in the ideas.
- **Operational Feasibility:** It will moreover help in partner with the all inclusive community who are associated particularly to interpersonal organizations i.e they work in fields, and easily interface with people and may assemble information about the assignment points. This feasibilty will decide.
- **Social Feasibility :** This feasibilty will be determining whether the proposed endeavor will be acceptable or unaccpetable . Bringing us to the conclusion that the project is socially feasible.

3.5 SYSTEM ANALYSIS

After seeing the viability of the project, we decide to bring up a map and come with the model which is most appropiate for the project. This analysis brings us information of constraints , learning framework and other related issues or corrections to be taken care in the current framework. Distinguishing and tending to the impacts of project on association and work force and so forth. The venture group breaks down the extent of the undertaking and plans the timetable .

3.6 SYSTEM DESIGN

Following step in development is to design all project's screen like Homepage of website. Then design the login, register pages and add proper css and html codes to makes the design. Then design each screen which is used in the developments with proper planning and setting all attributes which are added in the database.

It's illustrated (on next page) in Figure 3.2.

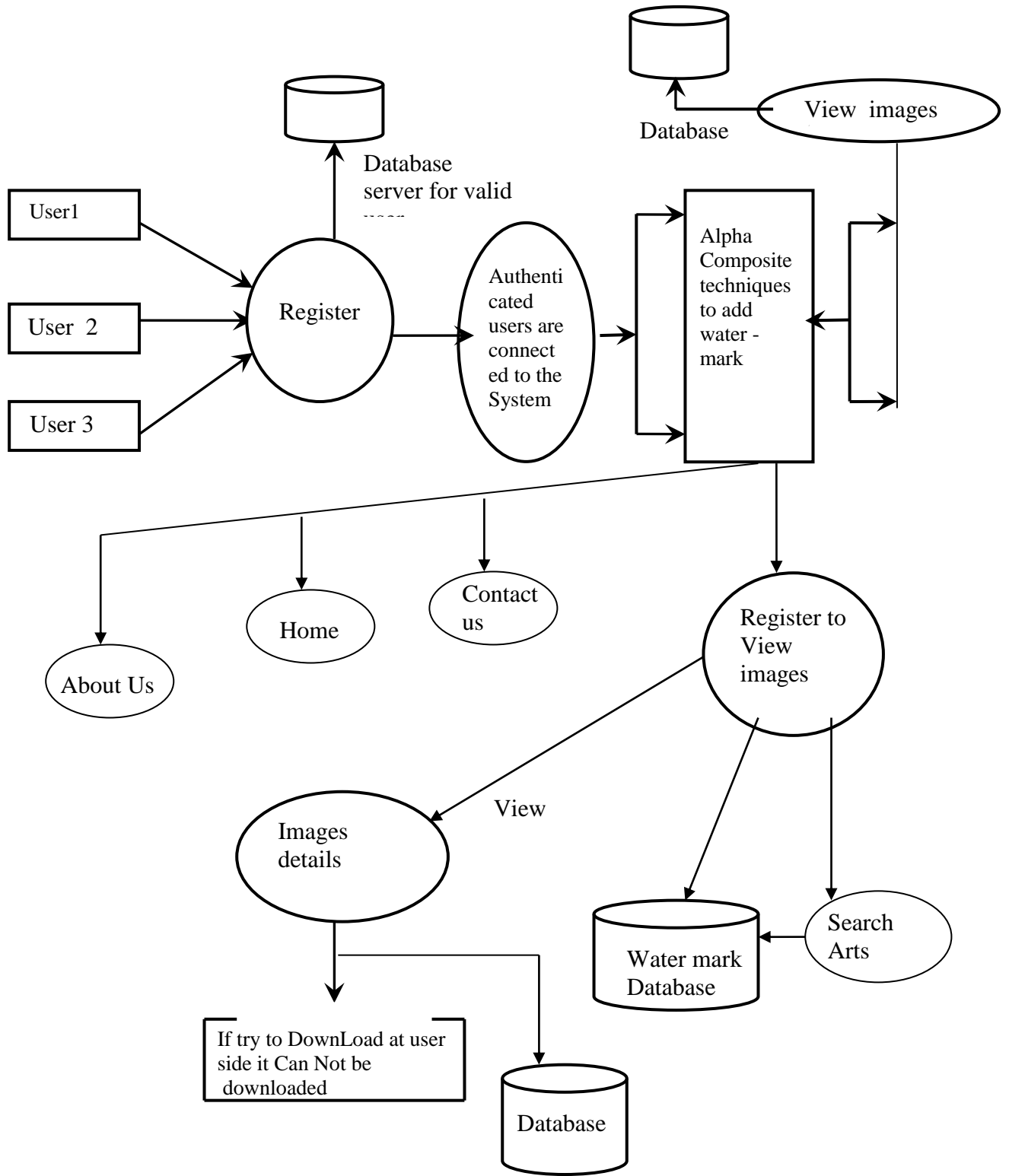


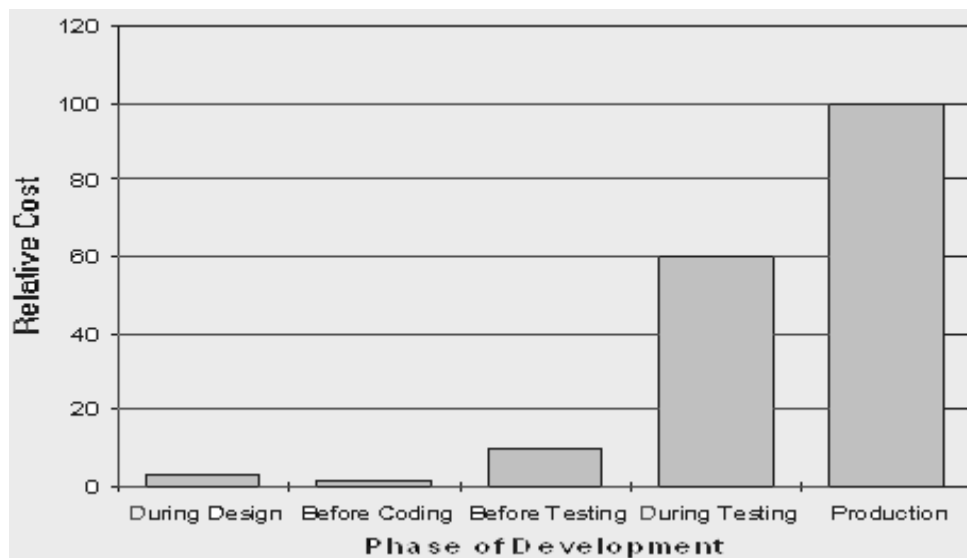
Figure 3.2 Flowchart of system design

3.7 TESTING

" Testing is a procedure and an arrangement of apparatuses to confirm the program."

Software Testing: The process by which CODE analysis can be performed and verification that meets the client's requirements and provides accurate, complete and effective result[18].

While coding is performed by engineers, tests are performed by test specialists at different stages of the code. For example, module tests and program tests. Makes the project accurate and explains the company's handicap. They are the tools that deal with the company and check each module manually by entering points of interest in the units and also indicating an error.



Graph 1. Development phase

3.7.1 BLACKBOX TESTING

Revelation TESTING, generally known as Behavioral Testing, is an item testing strategy in which tester is unaware of the internal structure/layout . These tests can be useful or non-helpful, however generally speaking useful.

This helps in discovering the mistakes made under the following classification:

- Incomplete functions
- Interface misinterpretation
- Problems in structures
- Conduct or execution mistakes

3.7.2 WHITEBOX TESTING

It implies checking the plan, inside capacities and algorithm of the undertaking. By putting forth the test defense we can check our product glitches.

Test Case I : Digital watermarking

Id 1: Digital999

Illustration :- To test the digital watermarking on the images:

1. Firstly, By clicking on login button without entering user name and password, it shows error. Therefore user have to first enter valid username and password.
2. Secondly, By checking the entered details in signup form, without complete information, it saves the incomplete information into database. Then the team corrects the information.
3. Admin can upload the data and add watermarking on the images easily and the code works fine.
4. After uploading the images we check whether image properly add into the database, works fine.

5. When user login into database , he successfully login into site. User go to it's home page and click on images menu . He can view images which are uploaded by admin of the website.
6. He can click for download, if images are watermarked then he/she can not download the images and if images are not watermark , then user can download.

3.8 INTEGRATION

Digital watermarking project is work when we intgerate all the parts uses in the process, first we have to install java library and make connection with system and environment variables. At that point intsaall IDE (netbeans) to create java venture , then associate java with mysql database and incure.lude libraries utilized as a part of the procedure.

Followed by uploading .jar files into system , this will link our project with libraries uses in the system.

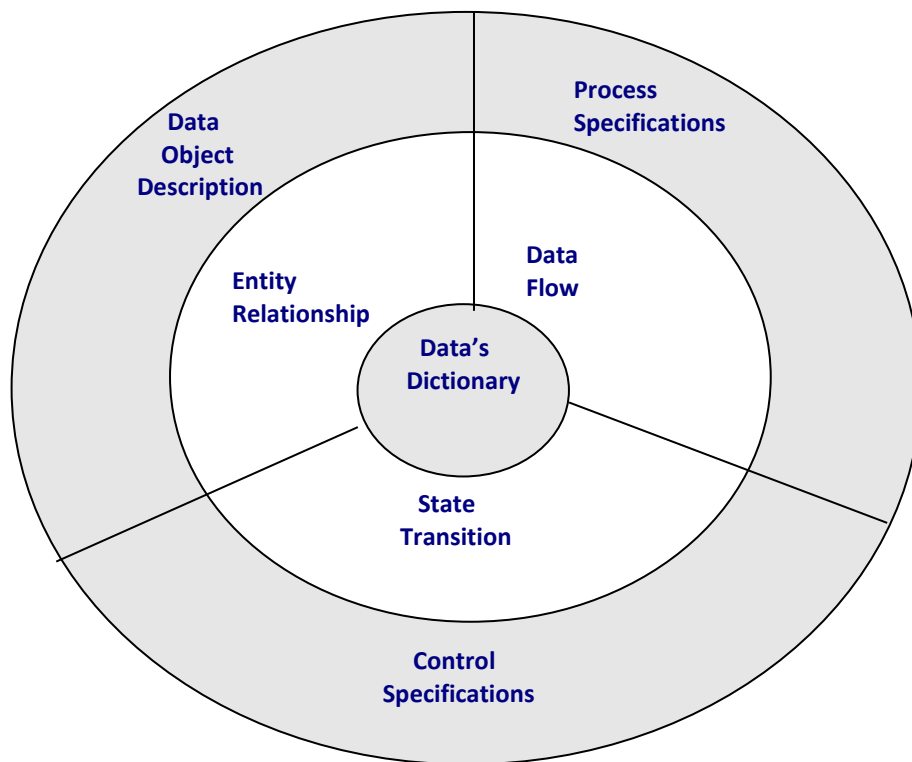
We must integrate html and css pages on proper links i.e by clicking on login page then page opens, if we click on the register page than register page will be open, otherwise error 404 will be shown to user.

3.9 IMPLEMENTATION

This means installing the software on user machines. This project will be implants onthe internet by taking domain and webhostinglike godady.com . We upload the content of our website and then link the database file into MySQL database. Then open any browser and type webaddress and access website. First we have to add personal information of user, then we get username and password of our account and then acces.[12] But on local computer , we first install netbeans software and install java software and then make project into and install wampserver for creating database and creates database . Then create tables for project.

3.10 OPERATION AND MAINTENANCE

This stage is utilized to keep up programming and to execute the technology which is in the product used. Like our product, is made from 'advance java' and 'core java'. In this we utilized jdk 8 version. In the event that new type of java will dispatch then we ought to invigorate library of our jdk in light of the way that at some point old limit put down into java program and some limit may not work after the updation so we should make updation to our item and condition uses as a piece of the structure the gathering who develop this assignment may revive their understanding to keep maintainance of this endeavor.



Graph 2. Operation And Maintenance Phase

CHAPTER 4

PERFORMANCE ANALYSIS

Digital water marking system developed in java technology, It totally based on system analysys and development life cycle.

Everything used in the project fullfill the requirement of software engineering.

This is totally a mirror software which should be used everyone. It is easy and fast system. Firstly, we collected the files and uploaded it into our system. Then we applied formula i.e. 'java code' to implement the algorithm of digital watermarking.

In this project we first make small images and upload into our website , than make logo or text images which should be added on the images. And then apply java algorithm which will add watermark on the images.

Then it will save watermark in new image and encrypt the images[15]. After encryption watermark will be added which will ensure that the user can only view the images , he or she cannot dowload or modify the image. Hence, image left only for viewing purposes[11].

RESULTS -

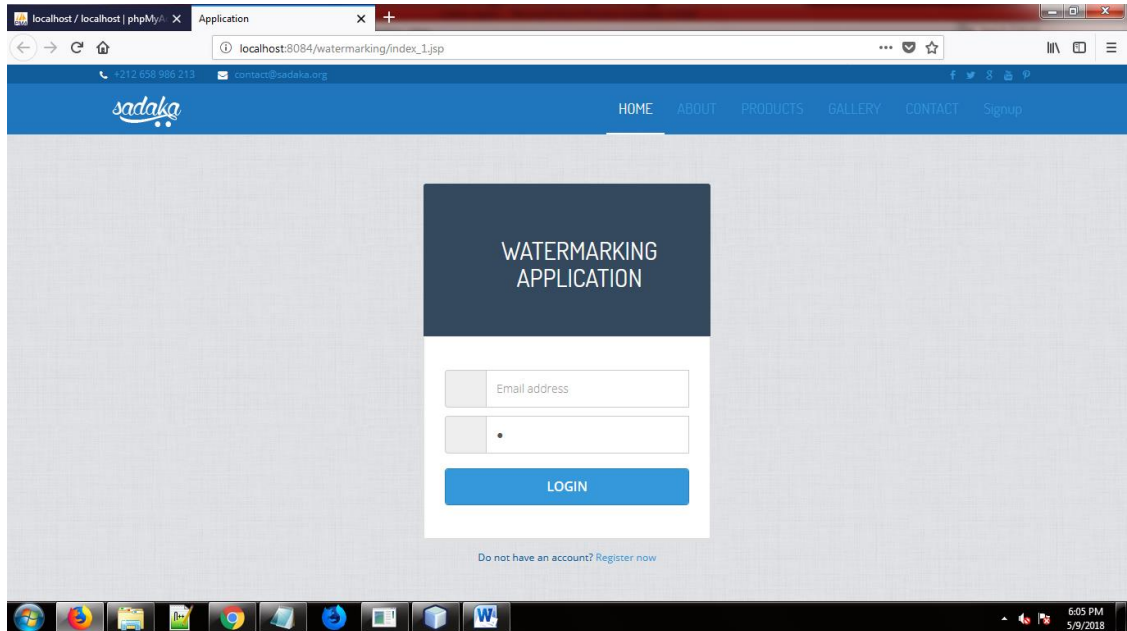


Figure 4.1 home page

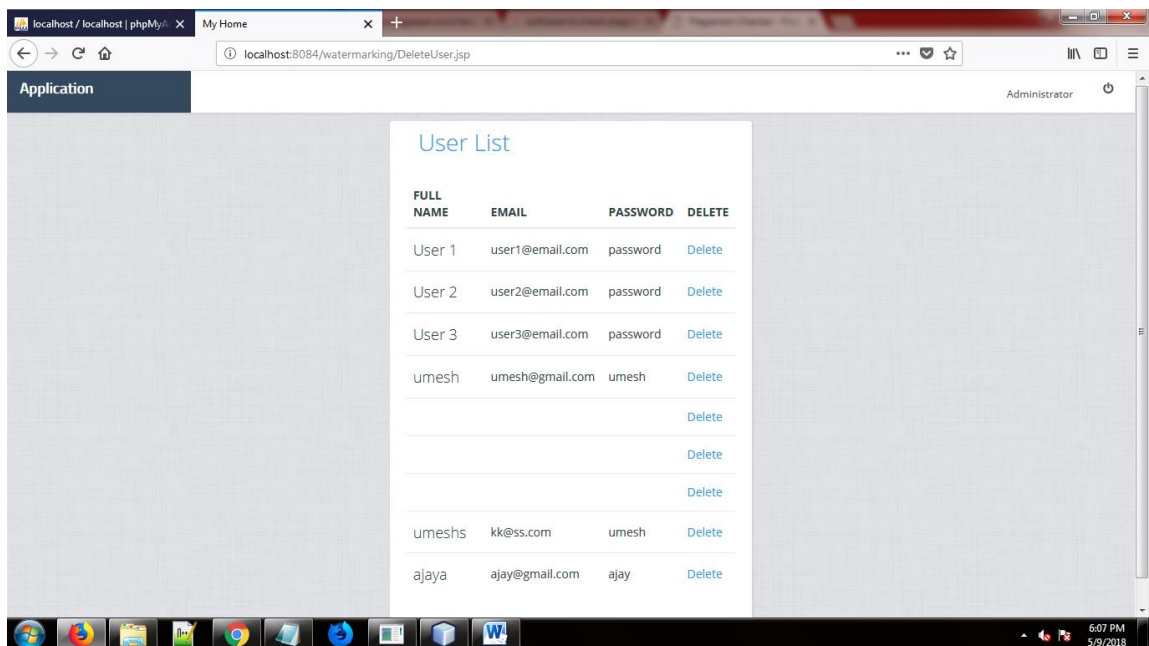


Figure 4.2 Delete User Page From List

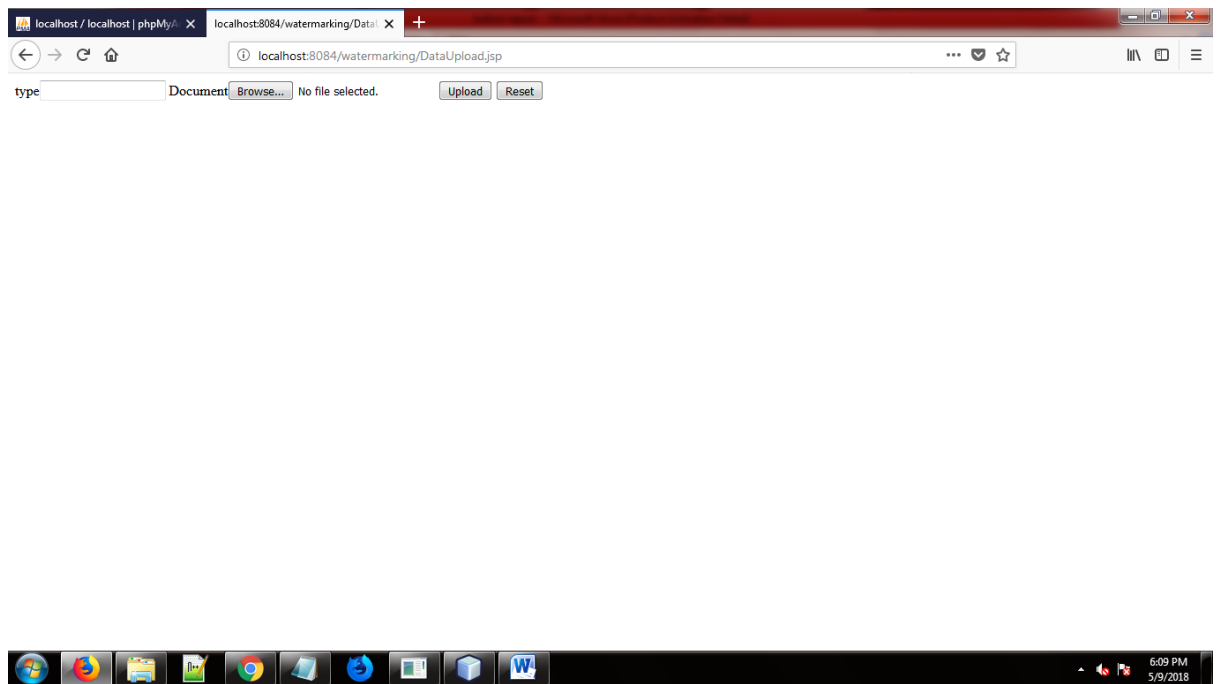


Figure 4.3 User Page

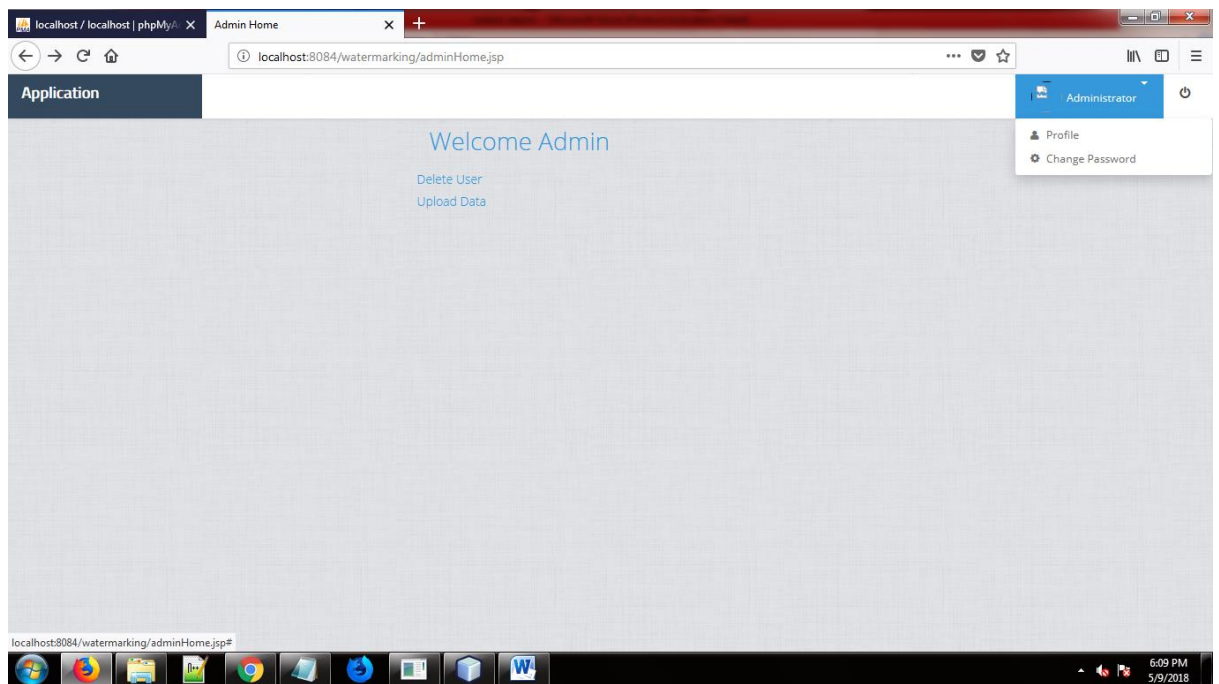


Figure 4.4 Admin Profile Page Which Can Be Edited

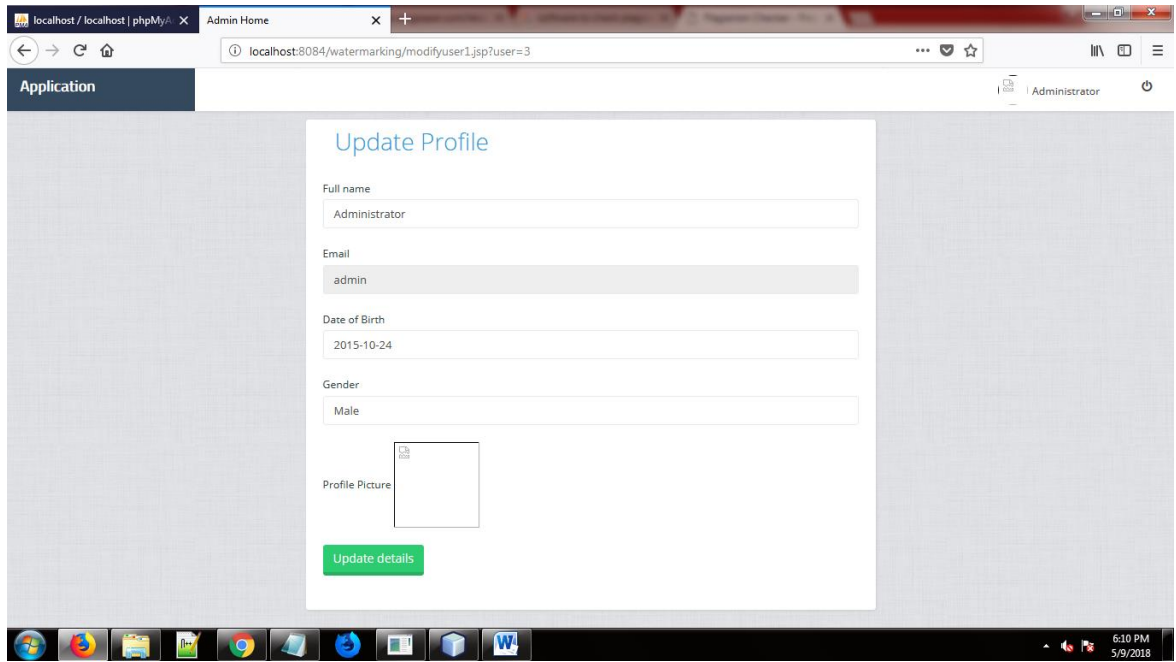


Figure 4.5 Update Profile

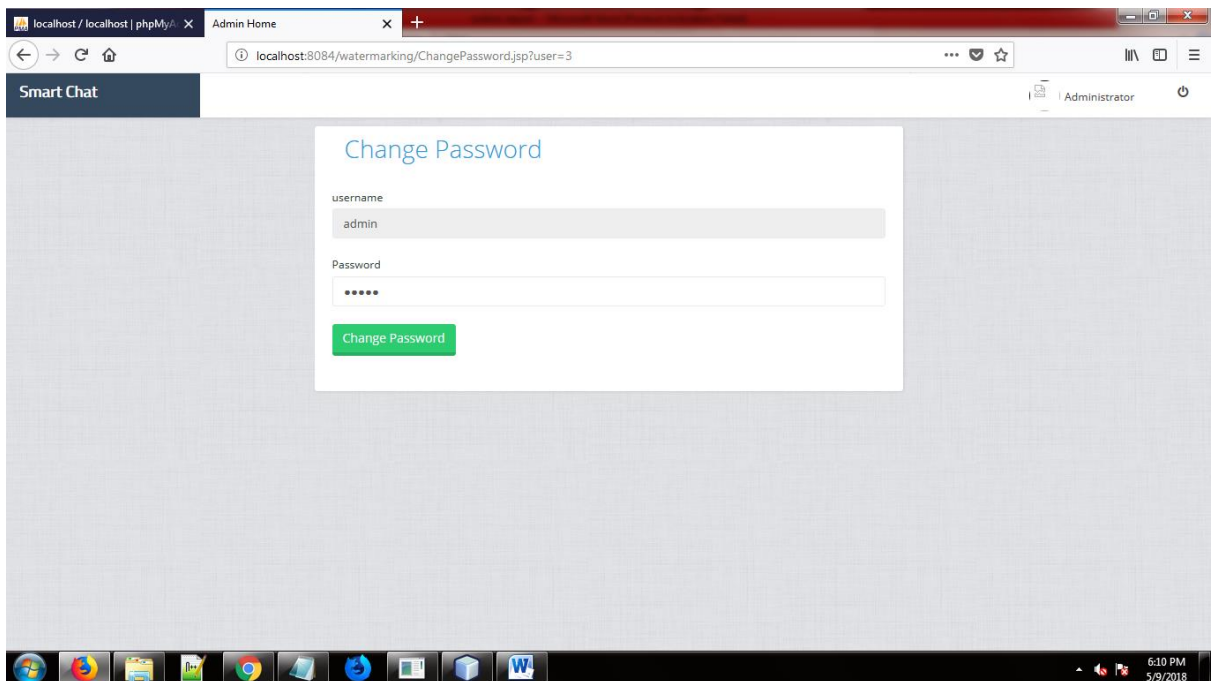


Figure 4.6 Change Password

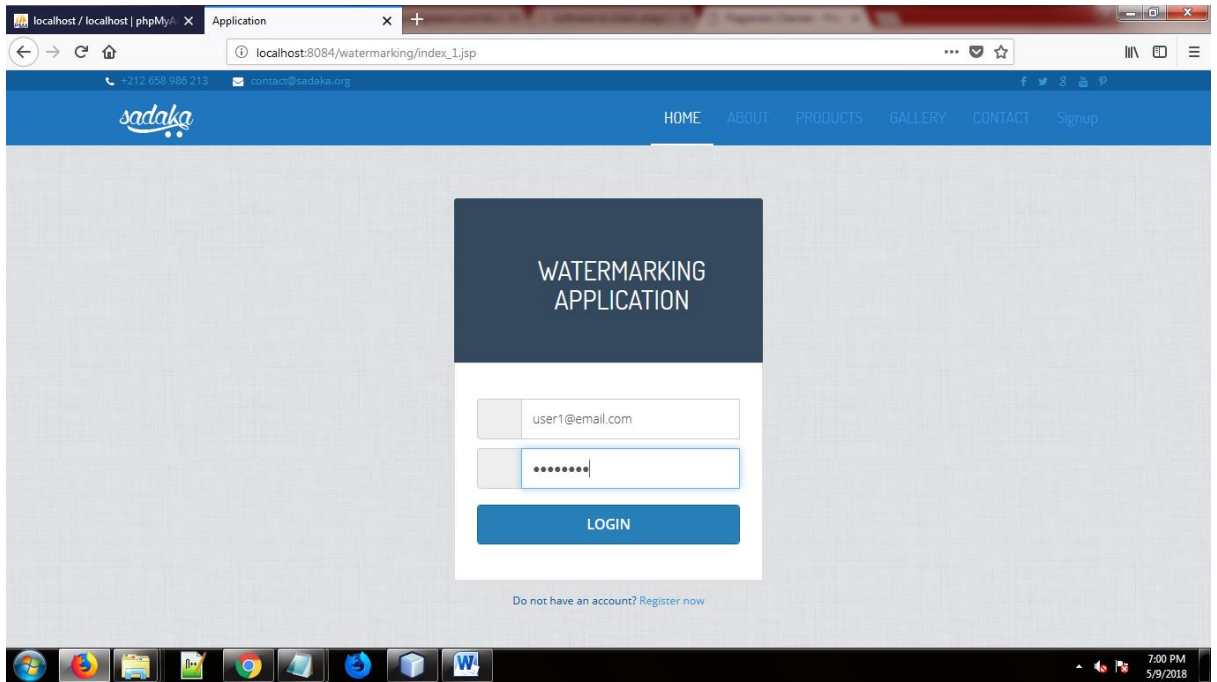


Figure 4.7 User Login Page

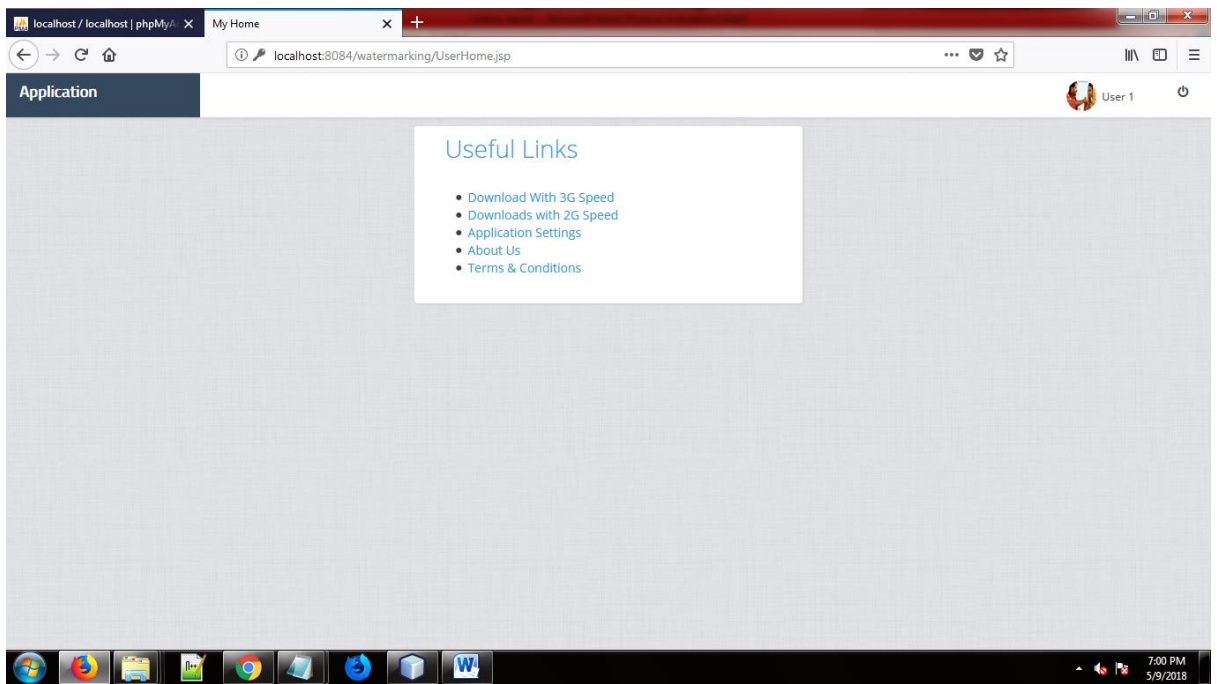


Figure 4.8 User Home Page

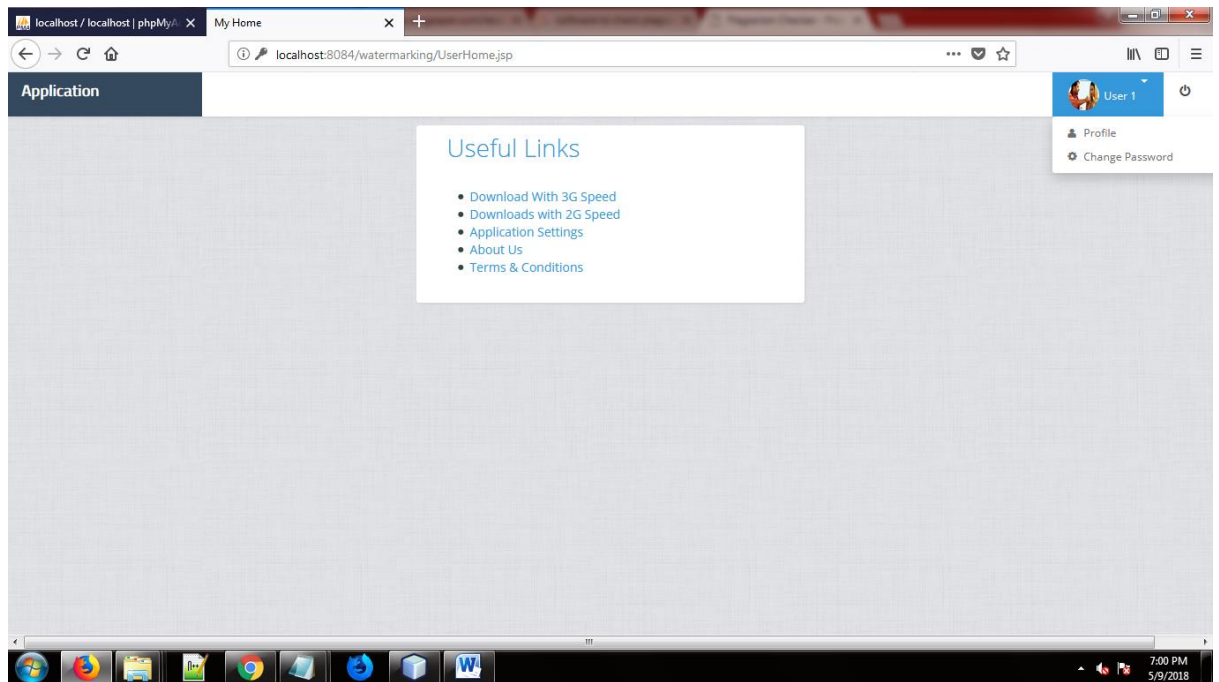


Figure 4.9 User Profile Page

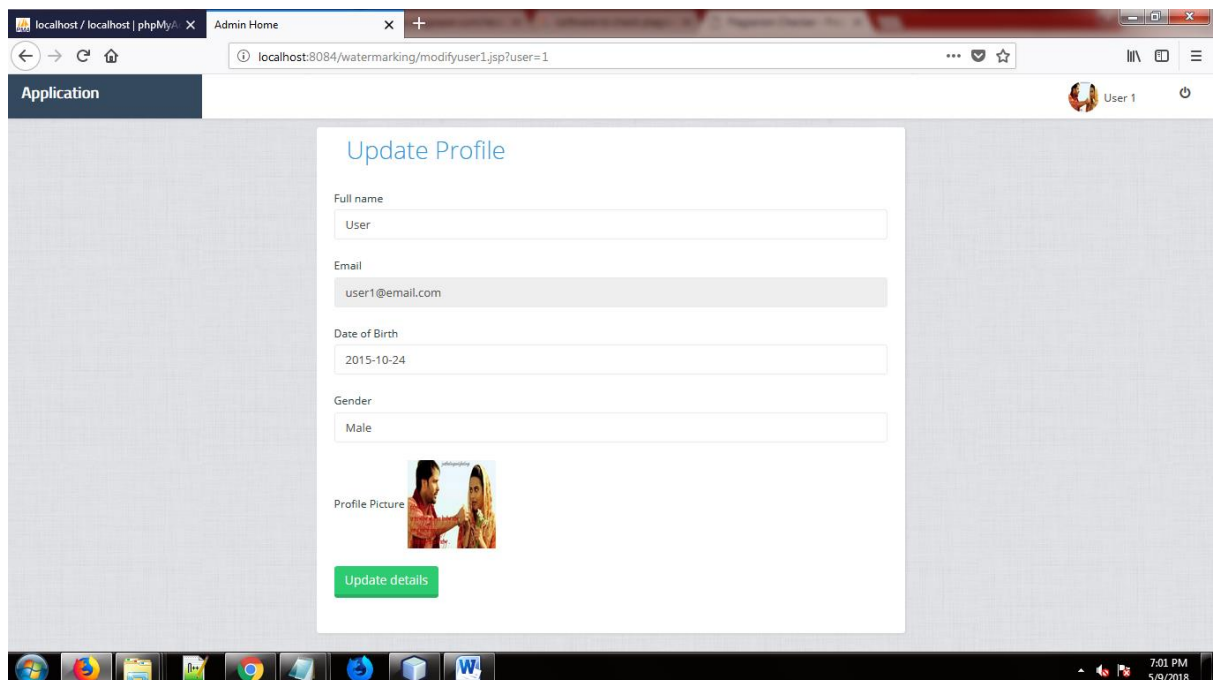


Figure 4.10 Update Profile

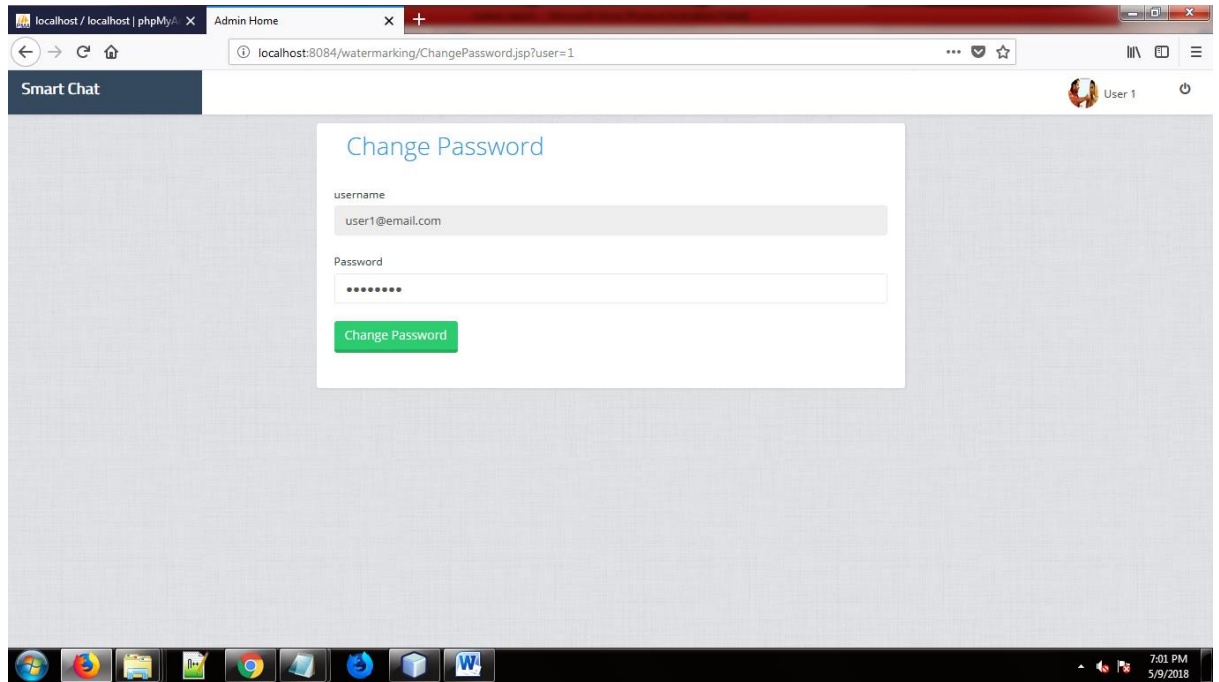


Figure 4.11 Change Password

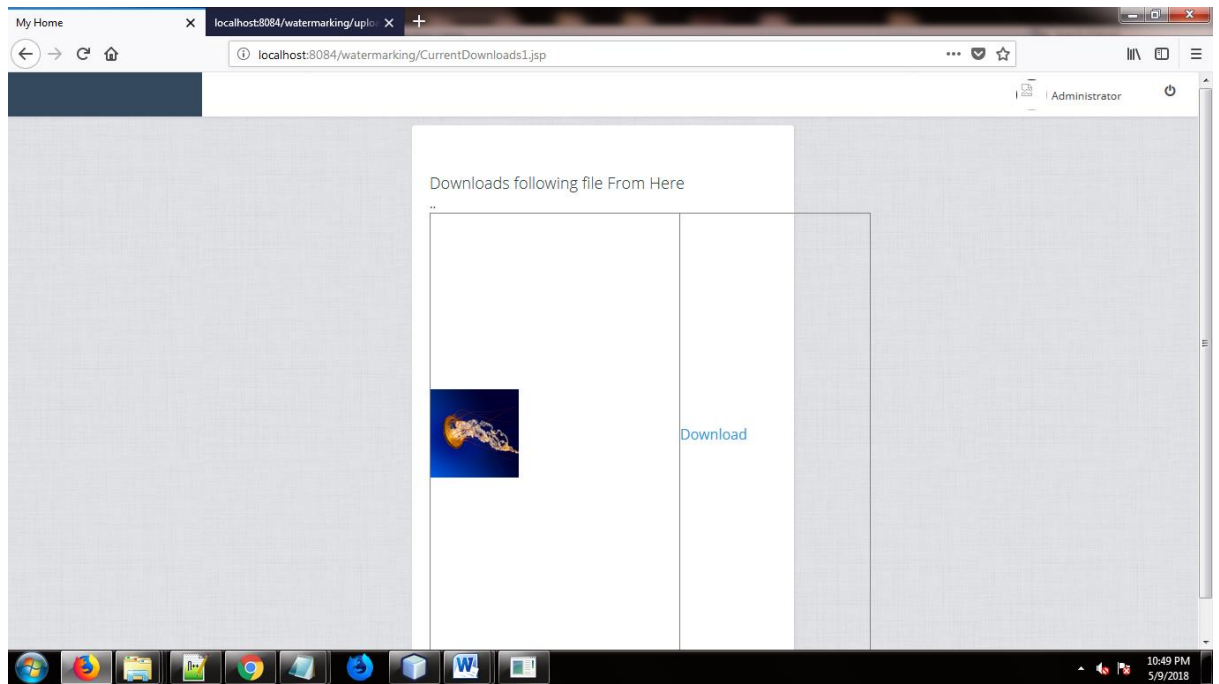


Figure 4.12 Download

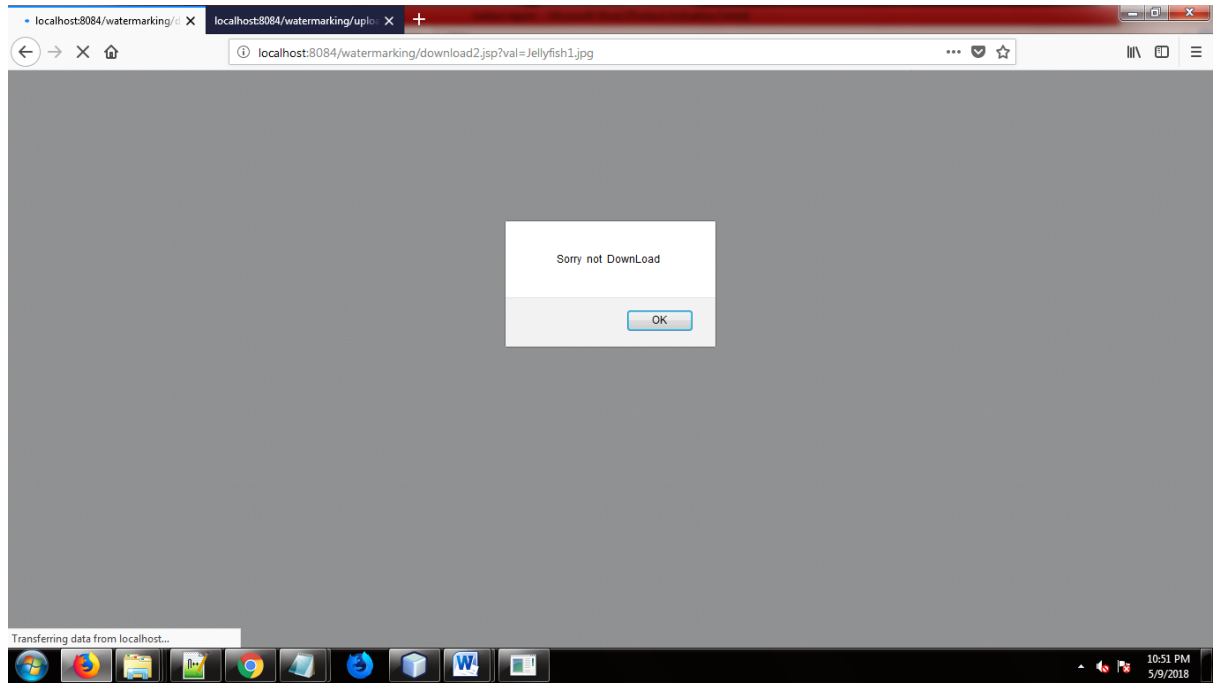


Figure 4.13 After clicking on download button

CHAPTER 5

CONCLUSION

5.1 Conclusion

These days, in each field there is visit utilization of advanced substance. The duplicating of computerized content with same quality is very simple[14]. Because of this odds increments for replicating of such computerized data. In this way, there is solid need of halting such unlawful copyright of advanced information. Advanced watermarking is the best response to this copyright issue.[7]

Despite the fact that it is a generally new field, it has created imperative calculations for concealing messages into computerized signals.

So we decided to make such a computerized system which will help users to protect information over the internet. We add security images that will help to avoid download and copyright issue. Our project will help to avoid duplicacy of images. It will add watermark on images which will be shown on internet.

Watermark embedded into pictures before being downloaded and exchanged to web based systems administration to better protect ownership and decreasing unapproved sharing pictures. Through examinations, it is exhibited that it is hard to be used in web based systems administration, where ownership features are stripped away or stained from moved pictures in their districts.

Convincingly, web-based social networking clients are asked to be more watchful in what they share on the web, or utilize an alternate administration to keep your security.

5.2 Future Scope

This will be online errand which will be gotten to through web. Everyone can get to this by making themselves an individual from this site for which they initially need to enroll. He/she gets the username and secret key for getting to data over the web.

In future , we will include encryption in our project so that our “algorithm” will be secure[9]. Nobody can copy our source code. This will be online application, which will truly take a shot at live task and if someone tries to download watermarked image it will send a alert notification to admin via mail or msg so that admin is aware of the person doing so.

This will work if you will register yourself and move toward becoming individual from our project, so use it and take benefits of including watermark and securing your record.

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APPENDIX A

Java Syntax

- **public:-** It is an entrance specifier, implies we can utilize class information inside or outside the class. In class the JVM which gives run condition to execute any java program.

- **static:-** It implies no need to make object of class.

- **void:-** It does not return any value.

- **main():-** It is entry to java program.

- **System:-** It is “java class” which connects java with our system.

- **out:-** It is member of “system class” which shows output on console window.

- **print():-** It is function which shows output.