Thesis for the Degree of Master of Engineering

Design and Implementation the Concept of Crowdsourcing on a Web Portal Crime

by
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Interdisciplinary Program of Information Systems
The Graduate School
Pukyong National University

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Design and Implementation the Concept of Crowdsourcing on a Web Portal Crime (웹 포털 범죄에 관한 크라우드 소싱의 개념 설계 및 구현)

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by

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웹 포털 범죄에 관한 크라우드 소싱의 개념 설계 및 구현

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요 약

상호 협력은 개인에 있어서 주위 사람들의 요청이나 문제에 대해 가치 증대 및 긍정적인 참여로 적극적인 참가가 유형이다. 적극적인 참여는 리포트 형태로 정보를 포함할 수 있다. 보고서를 제공하는 활동적인 참여 이외에도, 공공기관은 어떤 지역의 보안과 관련되어 직접적으로 모니터를 할 수 있다. 요즈음 정보와 통신 기술의 발달과 함께, 공공기관은 신속하게 그리고 실시간으로 모니터를 할 수 있다. 보안 모니터링 시스템을 구축하기 위한 가상 커뮤니티를 이용하는 생Indonesia United (IDUN)는 상호 협력 혹은 크라우드 소싱의 개념을 이용하여 전국에 위치하고 있다. 그러한 사회는 웹 기반의 Indonesia United (IDUN) 범죄 시스템을 사용하여 범죄가 발생하기 쉬운 위치에 대한 정보를 제공할 수 있다. 사용자들은 위치 기반 시스템과 정보를 공유할 수 있다. 본 시스템은 언제 어디에서든 발생할 수 있는 범죄에 대해 보고하는데 사용될 수 있다. 제안된 시스템은 외부 환경에 대한 지식이 부족한 상태로 여행하거나 낯선 지역을 방문하는 사용자들에게 아주 유용하게 적용할 수 있다.

키워드 : 웹 포털 범죄, IDUN, 구글지도, 위치 기반 서비스, 크라우드소

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Abstract

Mutual cooperation is a form of active participation of each individual to engage in value-added or positive to any object, problems or needs of the people around him. Active participation can include information in the form of a report. In addition to active participation to provide the report, the public can also monitor directly related to the security of a location. With advances in information and communication technology at this time, the public can monitor rapid and real time. Indonesia United (IDUN) utilizing virtual community to create a security monitoring system locations nationwide using the concept of mutual cooperation or crowdsourcing. The society can be provided information about their crime-prone locations using Indonesia United (IDUN) criminal system based website. Users can share information with location-based systems. This system will be use to report any crime where and when it happened. The proposed system will be very useful for users when traveling to unfamiliar areas, where they have little knowledge about the foreign environment.

Keyword: Web Portal Crime, IDUN, Google Map, LBS, Traveling Areas, Crowdsourcing

Chapter 1

Introduction

1.1. Study Background

Rapid technological development, making the exchange of information becomes faster and easier. With the advent of wireless broadband Internet can increase the activity of users to share and get information on the worldwide web. Users are connected to each other and can share their thoughts, pictures, video and a position where they are with geographic information. Advancement of technology development for the acquisition of location and wireless communication technology allows people to add location information to the social network. A user can easily share some information about some of the places or locations only through a mobile device. For example, users can leave comments on social networking when they visited several restaurants, so that other users who will visit the restaurant it will refer to the previous user comments. Location to be one of the most important components by the user in providing information.

Location-based systems is a very useful application in the location-based social networking. In particular, this system is able to recommend the location information of other users. This application will be very useful for users when traveling to unfamiliar areas or new areas, in which users have little knowledge about the foreign environment. The information provided by these systems will be able to assist the user.

This system will be applied to the website IDUN (Indonesia United) which is a national information disclosure to solve existing problems in society in mutual cooperation. IDUN is a momentum to solve the problem by empowering the community in order to build shared between the government, the public and stakeholders by promoting the spirit of mutual cooperation in the framework of self-sustainability toward a prosperous nation.

1.2.Problem Statement

Up-to-date report the data required for the proper response by user. User need a platform where these data can be viewed in some application. In this thesis will create a web-based interactive applications and mobile map-based, which can help users feel more secure with the information related to the safety-related collected by the user. This system will be design the information obtained from the application that the user is integrated with certain institutions.

1.3. Thesis Objective

This research project aims to develop a system which enables viewing of different spatial data source from multiple users.

1.4. Scope

This thesis will focused on generating location based with marker on Google Map in

IDUN Crime, specifically in Bandung Indonesia.

1.5. Thesis Outline

The structure of this thesis is divided into five chapters as follows:

Chapter 1, Introduction

Introduction consists of thesis background, problem statement, thesis objective, scope, and thesis outlines.

Chapter 2, Literature Review

Literature Review explains the theoretical supports and methods. It includes explanation about IDUN Crime systems.

Chapter 3, System Requirements and Design

This chapter contains the functional requirements and actors involved in the system.

Chapter 4, System Implementation for IDUN

System Implementation contains the process of development using ASP.NET Visual Studio for web service programming, SQL server, and Eclipse for smartphone application programming. It is also consists of the overall architecture of the system and the database schema.

Chapter 5, Conclusion and Future Work

This chapter contains conclusions and additional features that is required but not yet developed in the thesis.

Chapter 2

Literature Reviews

This thesis aimed to design and build an interactive web-based GIS system (Geographic Information System) for crime mapping. The system consists of two main components. The first is a web mapping application and the second is crime information database. This objective is to display crime-prone location information on a web mapping application depending on user demand.

2.1. Geographic Information System (GIS)

The term of GIS has been used to describe a variety of software systems. Definition of GIS in accordance with this thesis as follows: Geographic Information System (GIS) is a system for presenting all different kinds of geographical data like location, capturing, manipulating, storing, analyzing and managing data associated attributes which are spatially referenced to the earth.

GIS has a broad term and can refer to a number of different technologies, processes and methods. Because GIS has been applied to many applications related to engineering, planning, management, transportation / logistics, insurance, business, and telecommunications. For that reason GIS can be the basis for many service location services that rely on analysis and visualization.

Here is an explanation of some sort GIS system seen from different angles:

- As a map. A GIS system is often connected with the map. A GIS system used on maps that graphically display information and geographical features on the earth's surface. For example, the map can be used to provide a view of certain areas. Graphic markers like costume marker, colored dots, lines or arrow can be placed on the map to give indication like tourist Attractions, driving directions or business addresses.
- As a database. A GIS system can be viewed as a geographic information database, an information system for geography. It is based on a structured database that describes the world in geographic referenced features.

Maps in the GIS system works as a user interface so the user can work with geographic data in the system. The current geographic information system has been used in all kinds of different fields, such as:

- Environmental control. To be aware of environmental issues, then made several lists of environmental variables such as water, soil, air, or noise. So that geographic data can be obtained from measurements of environmental variables. GIS systems are used to aid the analysis of all types of environmental problems such as pollution analysis to control the situation in natural disasters.
- Public Security. Police forces have been using GIS to various operational situations. GIS systems are used such as crime mapping tools for analyzing crime patterns so

as to help reduce the crime rate. The GIS system can also provide accurate information about the crime scene and tracking the route to the location of the scene so that responding officers can save valuable time.

- Transportation. GIS system has played an important role in managing, planning, maintaining and evaluating transport systems.

2.2. Mapping Tools in GIS Systems

GIS system has two key components. The first is a database containing geographically referenced information. The second is a set of maps that refer geographic data presented. An essential part of a GIS system is to create a base map. Basic maps in the GIS system can be created using a desktop mapping program or a web mapping application.

An important component in the system is a GIS map. Map is often used as a user interface in the GIS system. Through maps Obtain GIS system users a way to work with the geographic the data in the GIS system. In GIS systems, GIS data associated with a geographic location on the map. Products in the form of a map is used more often than the GIS system.

To establish a set of maps in the system, implementation of GIS systems often involve mapping program. The easier it is to build a map service for web-based GIS system on web mapping services. External data sources can be integrated into a web mapping service that can build a complete GIS system.

To build a GIS base map, the appearance of Google Maps helps development GIS in

providing powerful web services. Google Maps offers three types of maps of the world in a variety of resolutions, namely the standard road maps, satellite maps and hybrid maps. Interactive Google Maps feature that allows users to use it, we can use the mouse to "drag and drop" on the map to do navigation on the map.

Google Maps is different with other online mapping application, Google Maps users have never experienced a "blank browser" when direct to a new map area. Google Maps can work very well in other mapping web appeal. And in fact, part of the map is always displayed quickly and the user can still interact with the application during the loading of new maps. Facts Google Maps functions on the client side make it possible for web developers to add in their own map imagery.

Among the advantages of Google Maps have, the most important for web developers is an Application Programming Interface or API offered by Google Maps. Google Maps API library consists of a number of modules JavaScript. This API library offers a method to Google maps web developer so that they can plant in their own web applications. Google Maps API is freely available to the wish to develop it.

With all the conveniences and advantages possessed by Google Maps, so it was chosen to be the development platform in this thesis.

2.3. Algorithm

Google Maps is a map service that is provided by Google. With google map we can search for locations by place name, latitude-longitude coordinates of the form. Latitude and Longitude are generally also used in GPS devices. From this coordinates, then

developed a marker. On Google map, marking a location is needed. The aim of this marker to mark the coordinates of the location on Google maps crime. To make it easier to divide the category of crime locations on a Google map, then the required custom marker.

To many marker on the map with hundreds or thousands of marker can be difficult for user to read and understand. It can make poor visual information on the map, because they are will bound to overlap each other and sluggish interaction with the map. To avoid this problem, the information on the map need optimization visual with simplified. To optimization visual can used marker management and group points which are close to each. Clustering is one of the marker management to simplify data visualization and the marker contains with some information such as the number of points.

Clustering algorithms can be categorized into several clusters models. However, there is no universally accepted clustering technique, because there is the possibility of more than 100 published grouping algorithm. Not all algorithms provide a model for their group and thus are not easily categorized. Available a variety of methods to find clusters, each cluster has its own kind. The way this method works can be divided according to three characteristics. These three characteristics are:

- Hierarchical versus Partition.
- Exclusive versus Overlapping versus Fuzzy.
- Complete versus Partial.

2.4. Method

2.4.1. Analytical Methods

The way to be able to see the effectiveness of GIS technology in law enforcement is a good understanding of the techniques and the way in which they work. For starters, there is a mathematical technique that can be used to help understand the data patterns, relationships and make projections. In the context of GIS and law enforcement, involving the analysis of statistical data interaction in a geographical setting. GIS system to process the crime rate history, incident reports today, the details of the deployment of personnel, vehicle travel route, prone locations, traffic patterns, recording cameras, and other variables which are then displayed on a map. Practitioners then use these variables to the query to produce the results of the data analysis. Law enforcement can then look at the relationship of aggregate data for the geography of the city and also to observe trends, inferences and relationships at a local level.

Officials have a number of analytical methods, the following are three commonly used:

- Hot spots. A hot spot analysis refers to the time an event is sorted by geographic region. As a simple example, when displaying the frequency of reports of graffiti throughout the city, some blocks MIGHT show a greater incidence of graffiti beyond the rationale of higher population density. Typically, the display hot spots using a statistical method called cluster analysis, which separates data into logical groups.

- Correlation. In order to understand the patterns of crime through GIS, it is important to examine the correlation or how close two separate factors. Please note whether changes in the factors that lead to other changes, may indicate it appears the relationship between the factors, although the correlation alone does not prove a causal relationship.
- Regression. Regression analysis is one of the techniques that help discover the natural relationship between the characteristics of a person learns. If the hot spot showed where something happens and correlation indicates a clear causal link between these factors, regression show why by demonstrating of how these factors interact. Although regression is important, sometimes not every technique works because of some quirks in spatially-related data.

GIS software has the ability to analytically rigorous and sophisticated. Has a lot of law enforcement officers and security that apply GIS in a number of ways. One of the goals is to use GIS to predict the location of a crime that might occur and immediately place the appropriate personnel to prevent crime. Another aim is to respond to the disaster. Official may combine the data information from officers in the field with other data such as from the agency or from social media.

2.4.2. Gamification Method

Gamification according Zichermann and Cunningham is the use of game elements and game design techniques in non-game contexts, such as health, education, politics, the

public sector and businesses. It is a new concept that emerged in recent years.

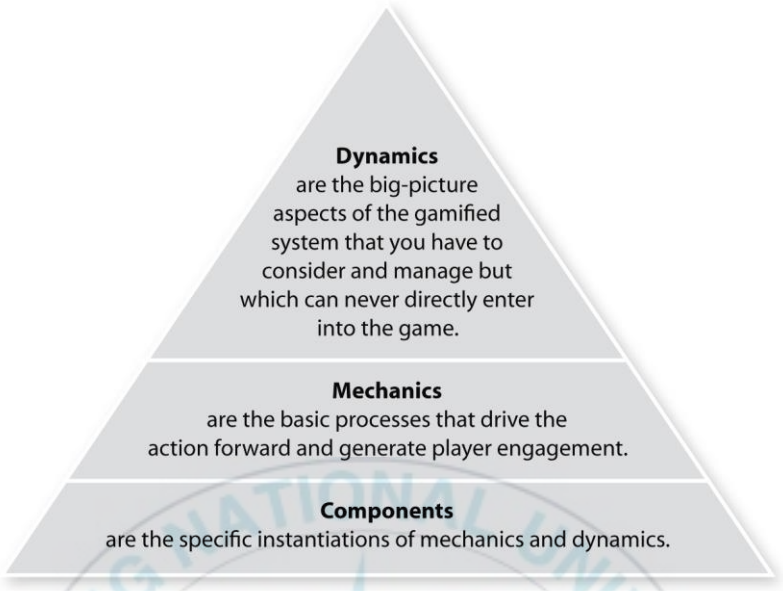


Figure 1 Pyramid gamification elements. Werbach K. and D. Hunter

Based on the pyramid image above, can be explained on the highest level, is the level of Dynamics which is a conceptual level, where constraints, emotional, narrative, development, and the relationship of gamification is decided.

The second level is the level of Mechanics which describes a process that drives the action forward, such as the challenges (challenges), opportunity (chance), competition (competition), cooperation (cooperation), feedback (feedback), rules (rules), the acquisition of resources (resource acquisition), rewards (rewards), transactions (transactions), substitutions / turns (turns), and won the game (win states).

At the lowest level, is Component, define linkages specific between Dynamics and Mechanics, such achievements (achievements), avatars, badges (badges), boss fight,

gifting, content unlocking, leaderboards, level (levels), points (points), investigation (quests), social graph (social graph), virtual goods, and others.

Person, organization, or company that is used in the gamification system is to achieve the goal is usually referred to as gamification. There are many reasons and purposes for gamification to be achieved, for example, to increase user productivity, to improve the customer's needs, or to improve product quality.

After learning the basic concept of gamification, we can apply the concept of gamification into the system using gamification design framework.

There are several steps we need to know when designing a framework gamification design. Here are six steps of gamification design framework as described by K. D. Werbach and Hunter:

1. Define business objectives. Why did you apply gamification? How hoping to benefit your business, or achieve some other goals like motivating people to change their behavior?
2. Delineate the target behaviors. What do you want your players to do? And metrics such as what will allow you to measure them? This behavior should promote the objectives of the business, although the relationship is indirect. For example, the business goal to increase sales, but the behavior of your target allows visitors to spend more time on the website. Metrics must in some fashion to provide feedback to the players, to let them know when they successfully engaged in behavior intended.

3. Describe your players. Who are the people who will participate in the activities of gamification you?, what their relationship with you?, for example, their prospective customers, employees in the organization, or other community?, and what they like?, you can describe a player using demographic (such as age and gender), psychographic (such as values and their personalities), the type of player, or some other framework.
4. Activity guide devise loops. Explore in more detail how you will motivate the player to use repeated engagement and development. First, describe the type of feedback system which offers the players to encourage further action, and explains how this feedback would work to motivate players. Second, what if all the players will advance in the system? Including how the system will get a new player moves, and how it will remain interesting for more experienced players.
5. Don't Forget the Fun. Although more abstract than some of with other elements, ensuring that the system remains fun gamification as important as any other aspect. In order to fully explore aspects of the design process, consider how the game will function without reward. Which will say it is fun ?, identifies aspects of the game can continue to motivate players to participate even without reward
6. Deploy the Appropriate tools. What are some of the elements involved in the game and what the experience would be like for a player ?, what special options that will be created in your system deployment ?, for example, you might discuss whether gamification system should be run primarily on computers, mobile devices, or some other platforms. You might also explain what feedback, rewards, and other

assistance from the player can be accepted. Finally, think about whether you've decided you back to the five other steps in the process, especially the business goals.

2.4.3. Crowdsourcing

Conventional Crowdsourcing is the act of outsourcing tasks, traditionally performed by a person to the community, through an open call. Crowdsourcing in GIS is able to generate a collective intelligence users are encouraged to receive information from individual voluntary or authoritative source with or without collateral authoritative (bottom up approach). It allows users of these systems to generate their own content with coordinated and voluntary. Crowdsourced spatial data collection is facilitated by devices such as handheld GPS devices, digital notebooks and mobile phones (equipped with open source software, photos, video, and voice-recorder). Data obtained from these users can be synchronized with a central database with or without moderation or sharable and can be accessed as a web-based database, and map services.

Crowdsourcing is now a very popular way to generate the data as needed. Crowdsourcing relies on the principle that many citizens who have knowledge of the environment they live in, which is an expert of their own local environment. Here are a few sites that utilize crowdsourcing mapping, include: Google Map Maker, OpenStreetMap project, Geo-wiki, and Wikimapia. These sites vary in terms of data entry methods, scope of geographic coverage, the data licensing arrangements, targeted end user and ease of use. They may use different methods of data at generally moderate

(verify that the data entered is valid), which affects the quality of data and speed of publication.

Crowdsourcing is one important way in which a large group of users come together to create the data, serving human as sensors. Facebook and Flickr are two examples of the potential of crowdsourcing. All this is implicitly saying that creates the data through crowdsourcing, pattern, tagging data and correlations such as social networking, taking place in different web environments that are connected to one another.

2.5. Software Development

2.5.1. Microsoft .NET

The .NET Framework is Microsoft's platform for building applications. The .NET Framework has two main components: the Common Language Runtime (CLR) and the .NET Framework Class Library (FCL). Two of these components have their respective duties. The Common Language Runtime (CLR) is responsible for memory management, thread management, and handles security and robustness issues. The Class Library is a collection of classes that development can use when developing an application.

2.5.2. Visual Studio 2012

Visual Studio is an Integrated Development Environment (IDE) from Microsoft

for .NET software. It is used to develop computer programs for Microsoft Windows, console and graphical user interface applications along with the windows forms application, as well as web sites, web applications and web services.

2.5.3. ASP.NET

ASP.NET is a part of the .NET Framework in Microsoft technology. ASP.NET is considered to be the next era of web development. ASP.NET is a successor to Microsoft's Active Server Pages (ASP) technology and is a web application framework used to build web services, dynamic web sites and to build web applications. One feature point's service of ASP.NET is web service. Web services shows several fields of application that works on the server. ASP.NET support with Extensible Markup Language (XML) for data storage, configuration and manipulating. ASP.NET is built on the Common Language Runtime (CLR) can allows programmers to write code using .NET supported language.

2.5.4. .Net Framework

The .NET Framework is a system component on Microsoft's platform that provides tools and technologies to build Networked Applications as well as Web Applications and Distributed Web Services. The .NET Framework has two main components are the Common Language Runtime (CLR) and .NET Framework Class Library (FCL).

The Common Language Runtime (CLR) is the programming that manages the execution of programs to written in any language that uses the .NET Framework, for example VB Net, C#, F# and so on.

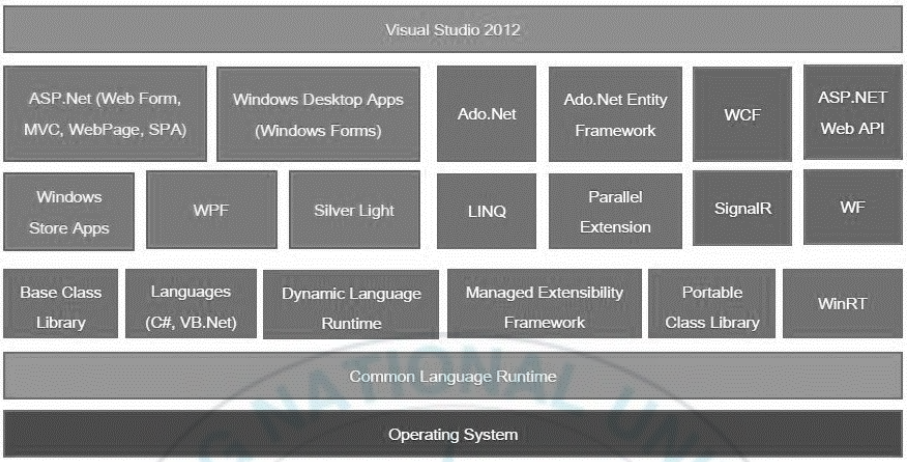


Figure 2. NET Framework 4.5 Architecture

Function of the CLR

- Convert Code into CLI
- Exception handling
- Type safety
- Memory management (using the Garbage Collector)
- Security
- Improved performance
- Language independency
- Platform independency
- Architecture independency

The Common Language Runtime (CLR) is responsible for providing core services such

as memory management, thread management and also handles securit. Class library is the other core component of the .NET Framework. The developer can use the class library to developing applications.

2.5.5. Sql Server 2008

SQL Server is a RDBMS or Relational Database Management System which developed by Microsoft and designed for the corporate environment. As a database server, is a software product that has a function to store and retrieve data on demand by other software on the same computer or other computer in a network (including the Internet).

2.6. Google Maps Implementations

In February 2005, Google Maps was introduced in a blog post on Google. This is a revolutionary development road map in a web page that works by letting the user can drag the map to navigating. This is a novelty at the time. Google Maps was first developed by Lars and Jens Rasmussen Eilstrup using C ++ program as a desktop program. They founded a company dedicated to creating a mapping solution, Where 2 Technologies. Then Google acquired the company in October 2004 and turned it into a web application.

Before Google Maps has a public API, some developers found a way to hack Google

Maps so users can combine the maps on their own sites. This makes Google draw the conclusion that require a public API, and in June 2005 immediately released and published.

Google Maps is a web desktop mapping service developed by Google. In line with its development, Google Maps has some features such as: satellite imagery, street maps, and 360-degree panoramic views of the street, Google Traffic, and route planning travel by foot, car or public transport. After a public API was released in 2005, allows Google Maps to input on third party websites. In real time satellite images on Google Maps are not updated. However, data is added to the database in Primary they do regularly. At Google's support website states that the image is not more than 3 years.

Google Maps uses a close variant of the Mercator projection. And therefore cannot accurately show the area around the poles. Redesigned version of the desktop application was made available in 2013, and in August 2013 Google Maps for mobile into the most popular applications for smartphones.

2.6.1. Marker

Map on website used for a wide variety of cases, one of which is used to indicate the location of a company or business. Point of this location can be called POI on LBS or GIS sector. In Google Maps API JavaScript, POIs or point is shown as markers. So to use a marker on the map using google.maps.LatLng and google.maps.Marker class.

A marker identifies a location on a map. By default, a marker uses a standard image.

However, this marker image can be changed according to the needs that we want. Markers are designed to be interactive. We can input this information in marker. For example, by default they receive events by “click”, so you can add an event listener to bring up an information window displaying custom information. You can move a marker on the map by setting the markers drag able property to true.

2.6.2. Clustering

To many marker on the map with hundreds or thousands of marker can be difficult for user to read and understand. It can make poor visual information on the map, because they are will bound to overlap each other and sluggish interaction with the map. To avoid this problem, the information on the map need optimization visual with simplified. To optimization visual can used marker management and group points which are close to each. Clustering is one of the marker management to simplify data visualization and the marker contains with some information such as the number of points.

A common solution for handling the lots of markers on the map like overlap each other is to cluster them. Has been many years cluster analysis studied. In general, clustering algorithms can be classified into some categories: partitioning methods, density-based methods, grid-based methods, hierarchical methods and model-based clustering methods

Chapter 3

System Requirements and Design

Crime IDUN is the website of a breakthrough in the field of security technology on a location prepared to minimize the occurrence of repeated crime at that location. This website is a pilot project that is proposed as a solution to the lack of information about the susceptibility of the crime scene in a city. In the design of the website system, each user is given the same rights to the features provided, ranging from crime-prone location information through Google Map view, the news about crime in every city, and security tips for users that can help minimize the possibility of becoming a victim of crime. Here is an explanation of the system requirements to achieve the objectives of the thesis.

3.1. System Analysis

Analysis of the application system is aimed at identifying the problems that will arise in related aspects such as availability of reliable estimation and application performance, as well as data generated from within the system. This analysis will also identify whether the requirements have the appropriate information on the system. The information needs of the user or from the database.

3.1.1. Acquisition of Information

Acquisition of information is the process of capturing all relevant information. To meet the needs of the information that has been determined, the product Indonesia United Crime implement two information acquisition strategies, using community participation (crowdsourcing), by mutual cooperation.

The main way of acquisition of the product information Indonesia United Crime is through community participation (crowdsourcing). Indonesian internet community can participate in the complete information about the events surrounding the crime happened. To be able to attract people to participate actively in the process of acquisition of information, applied gamification mechanisms.

Gamification becomes important to use the Indonesia United Crime to attract the public to participate in the share information of Crime, while the gamification required in product Indonesia United Crime Website is as:

a. can increase the intensity of the user with the system
b. can make the regulatory process to public facilities and environmental conditions such as values and symbols
c. can provide feedback from the community to the local authorities in order to improve its performance
d. can provide a sign of appreciation to the contributors Indonesia United Crime
e. the user can tie Indonesian United Crime

The fifth of the above are needed to improve the use of Indonesia United Crime impact to enrich the data and information, and the effective interaction between the user and the system.

3.1.2. Needs Analysis

Designing Indonesia United Crime so that a criminal information media effectively done with the process of analyzing the existing needs, so we get the right result to be implemented in the system and the achievement of the objectives of the development of Indonesia United Crime.

It required a great design from Indonesia United's Crime which can meet the needs that have been implied in the previous section. Great design Indonesia United Crime describe the relationship with the public via the media system that can be used to access information, but it also illustrates the application is available for various platforms. Besides the great design Indonesia United Crime describe the assets required to run the system, these assets including servers, databases and sources for data crawling. Here below is a great design from Indonesia United Crime.

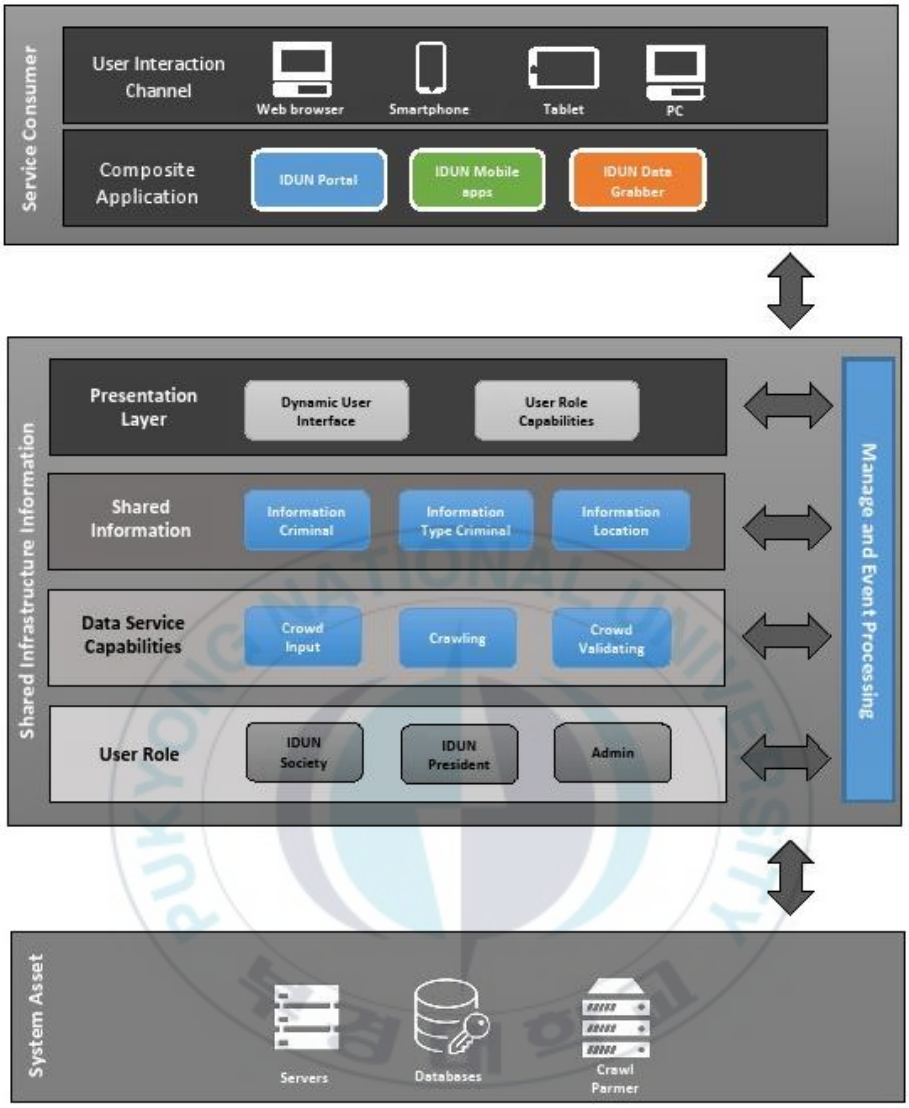


Figure 3. Design Indonesia United

3.1.3. Analysis System Requirements

IDUN system design must be able to answer the needs of users of the system. In the manufacture of IDUN system should obtain information acquisition. Indonesia United

Crime applied on two strategic acquisition of information, namely by using community participation (crowdsourcing) and mutual cooperation. The following system requirements specification that is designed and constructed:

a. This system is capable of recording user activity in the form of user reports on the crime scene to a public facility.
b. This system will be integrated with Google Maps to facilitate users to find out information about the location of the user.
c. This system will be integrated directly with local government agencies so that users can quickly accepted the report.
d. This system should provide clear information and can perceived by the user.

Existing Problem Identification

The problems that can arise as less enthusiastic than the user to utilize the application, lack of dissemination of information about the state of security around, the lack of response of the relevant institutions to report user, because this aspect will be whether the system is completely stable and can be used to perform measurements and produce estimates of real data.

3.1.4. Weakness System Analysis

Analysis of the weakness of the system was conducted to determine the needs in the

improvement and development of applications in the near future. To find a weakness in this application, will be carried out analysis and tests on the ability of the application system. This analysis is expected to be used as an indicator of whether it is in accordance with the original purpose of making an application.

3.2. System Specification

For the development of this application system IDUN Crime necessary hardware and software. The following hardware and software specifications required.

3.3.1. Hardware Requirements

Hardware is a basic need that must be available to be able to serve every user needs. Because this application runs on Windows-based servers, the hardware specifications required in table 3.1.

Table 1. Analysis of hardware requirements

Requirements	Specification
PC	- CPU 2 Ghz - Min 4GB RAM - Hard disk 1 TB 7200 RPM

3.3.2. Software Requirement

Here are some of the software needed for the development of this application:

Table 2. Analysis of software requirements

No	Requirements	Specification
1	Operating System	Windows 7 Professional 32-bit
2	Visual Studio IDE	Visual Studio 2012 Ultimate
3	.Net Framework	.Net Framework 4.5
4	SQL Server IDE	Microsoft SQL Server 2012
5	Programming	ASP.NET(C#), HTML5, CSS3, and JavaScript

3.3. System Design

3.3.1. Actor

Actor represents the role of the person or system that interacts directly with the subject (system built). The following are the actors of Indonesia United's Criminal web portal.

Table 3. Relationship summary between features, user and use case

No	Actor	Description
1	General User	General user is the entire Internet community can access the web portal united Indonesia. General users do not need to register, but has limited access.
2	IDUN Society	IDUN Society (Indonesia United) are users who have signed up previously. IDUN people have the privilege to have access to add information such as photos and videos and supervise the public information provided by another IDUN to provide notification in the form of like and dislike and can share via Facebook.
3	Government Agencies	Government Agencies are users who are responsible for responding to any reports of IDUN Society, such as crime reports or reports of public facilities.
4	Administrator	Administrators are users who are responsible for the management of users (community IDUN) and news management result of the addition of information in the form of photographs and videos, including comments from users. In addition, administrators have the right to equal access to public IDUN.

3.3.2. Diagram Use Case

Functional requirements described in this thesis by using use case diagrams. Use case diagram is one of the diagrams in UML to model the dynamic aspects of the system. Use case diagrams are used to model the behavior of a system, subsystem, or a class. Each diagram shows a set of use cases and actors and their relationships. Here is a use case identified in Indonesia United's web portal Crime.

1. Sign into society IDUN, serves to register the society in general became Indonesia United's system Crime
2. List of criminals who are still at large, functioning for all users to read information that has been posted by the administrator or user
3. See the results of the post by the community IDUN
4. See the results of the assessment results of the response-related institutions, functioning for all users to see the results of the assessment in the form of a graph
5. IDUN people can post news in the form of photos and videos crime incident reports or condition of public facilities
6. Comment on reports from posting photos and videos on community input by other IDUN
7. Provide notification in the form of like and dislike for each response related institutions
8. See the crime-prone locations through maps integrated with Google Maps, serves for IDUN society and Government agencies

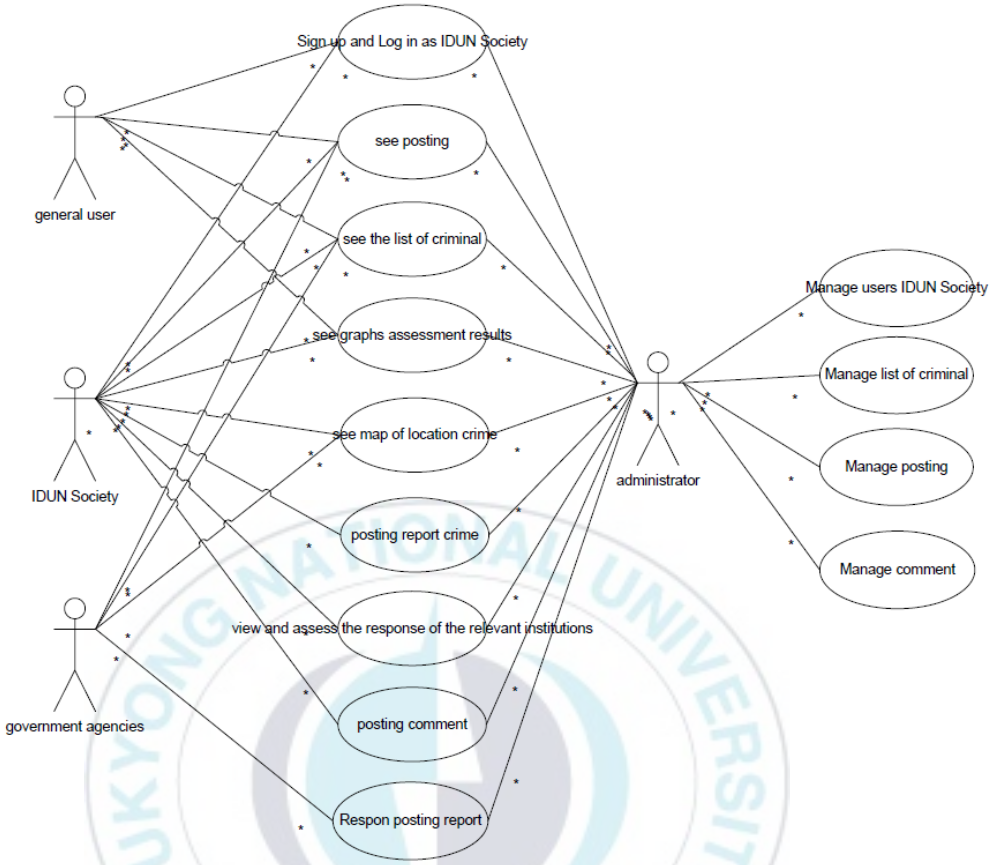


Figure 4. Use Case Diagram web portal Indonesia United Crime

3.3.3. System Architecture

Web portal Indonesia United Crime is designed to run on Windows-based server, the application server Internet Information Services (IIS). Indonesia United's web portal so that Crime can be accessed anywhere, anytime through a web browser and internet.

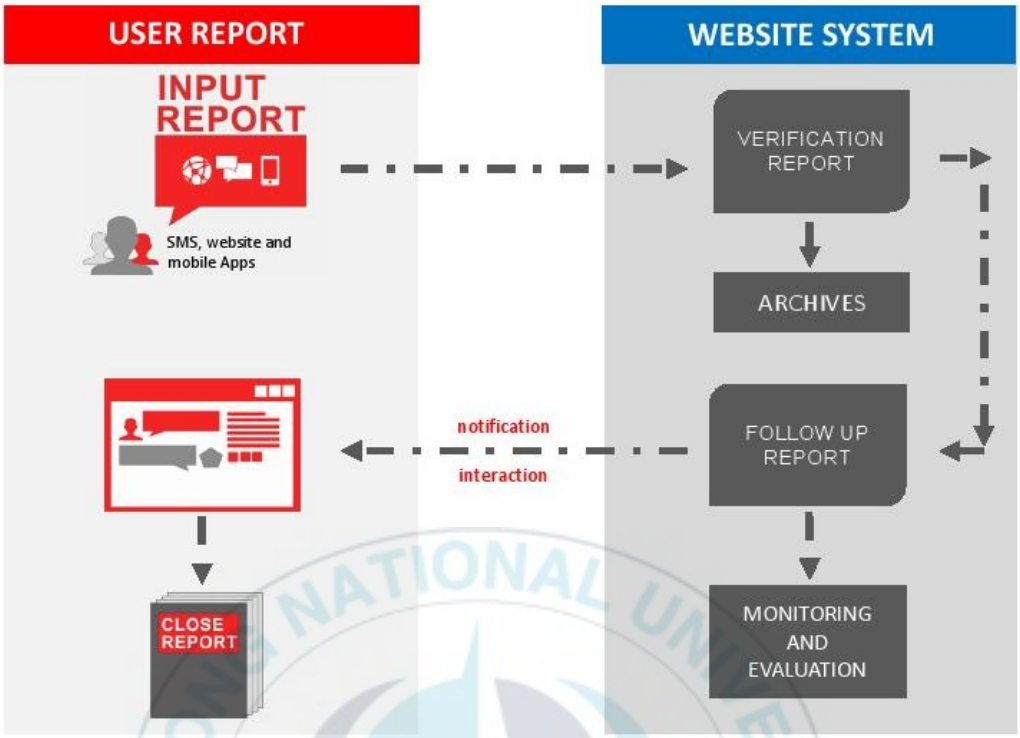


Figure 5. System Architecture

3.3.4. Class Diagram

All objects on the system Indonesia United Crime stored in one large database that can be categorized into several parts in order to simplify the explanation in this book. Every object in the Class have any connection or relation with the object in another class to his contacts in accordance with the concept of Relational Database Management System (RDBMS) that is using the primary key and foreign key.

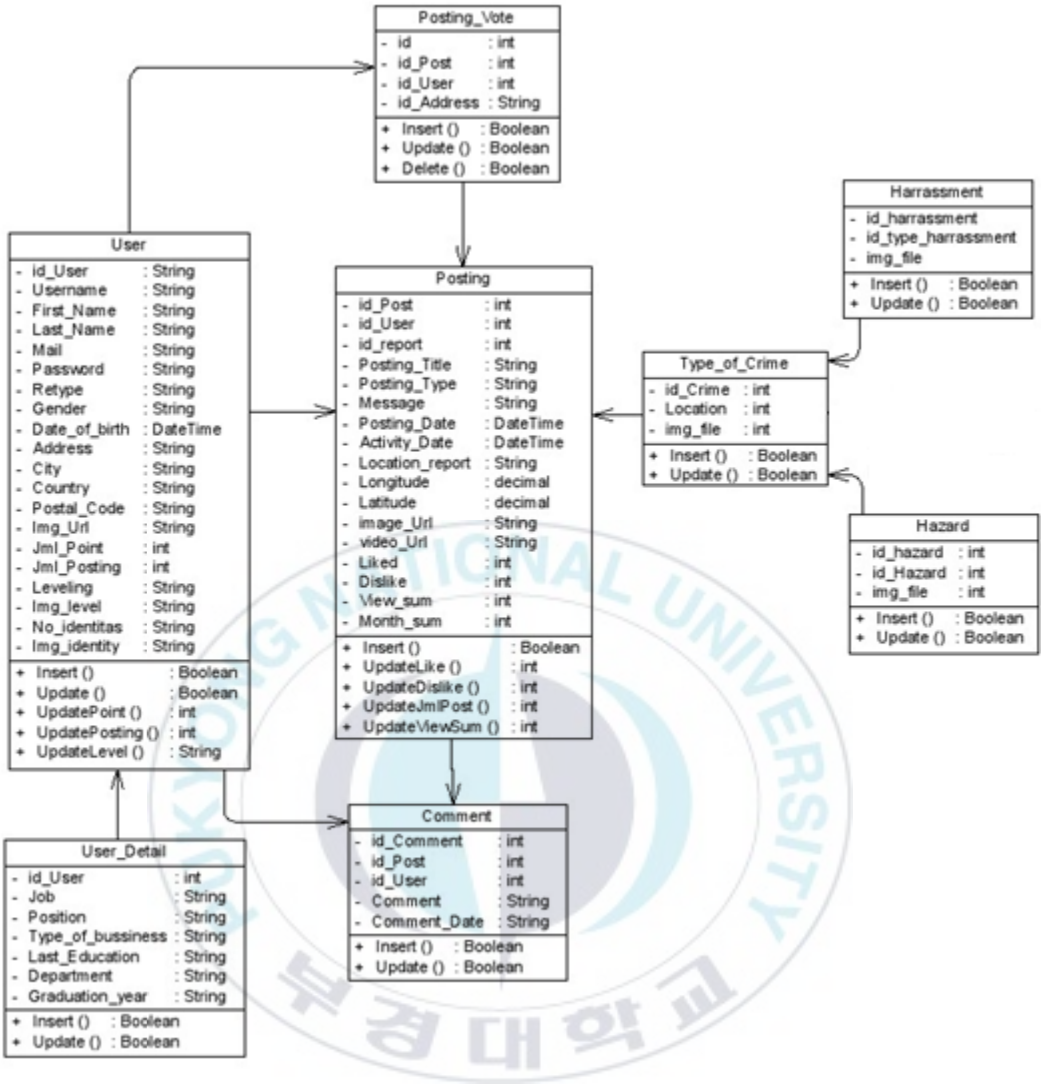


Figure 6. Class Diagram for data Indonesia United Crime

3.3.5. System Scenario

On the web portal system Indonesia United's Criminal, there are three (3) main scenarios, namely registration, posting reports, and validation of like / dislike

statements and comments. The following Use Case Scenario from every major scenario above.

Table 4. Use Case Scenario Register

Use Case ID:	1
Name of Use Case:	Register
Created By:	Fairuz Iqbal Maulana
Date Created:	01/11/2015
Actor:	IDUN Society
Description:	General users can be IDUN Society by registration through the Registration menu.
Preconditions:	1. User has not registered in the system of Indonesia United.
Postconditions:	1. Data user stored in the database, and can be entered into the system
Normal Course	**1.0 Register as a new user** 1. Users enter the registration menu 2. User includes all user information 3. The system stores user data in a database, and to update the initial point number 4. The system sends an email to the user for confirmation and user activation.
Alternative Courses	-
Exceptions	**1.0.E.1 User already registered** (in step 3) 1. The system tells users already registered. 2a. User canceled the registration 2b. Canceling system Use Case 3a. User replace User Name and Password 3b. Use Case repeating system.
Includes:	None
Priority:	High
Frequency of Use:	Approximately 20 users per day
Rules that must be fulfilled:	1. Users must fill out all the information contained in the registration process
Special needs:	1. Users can cancel the register at any time before confirming registration.
assumptions:	1. Assuming that the 10 users will be register every day.
Note:	-

Table 5. Use Case Scenario Post reports

Use Case ID:	2
Name of Use Case:	Posting report
Created By:	Fairuz Iqbal Maulana
Date Created:	01/11/2015
Actor:	User (IDUN Society)
Description:	User posting photo / video of report an event crime
Preconditions:	1. User Login to Indonesia United Criminal System. 2. Users Registered in Indonesia United Criminal System.
Postconditions:	1. Posting stored into the database. 2. User data will be updated for the number of points and the number of posts. 3. Location data will be updated for the number of posts
Normal Course	**2.0 Posting Report an Event of Crime** 1. Users select menu post reports 2. The system displays the report form 3. Users enter information about the report. 4. Users enter the area of the report. 5. System longitude and latitude. 6. Users enter the video / image report. 7. The system stores the post in the database.
Alternative Courses	-
Exceptions	**2.0.E.1 System Stores Posting** (in step 8) 1. The system tells the data has been stored into the table posting. 2a. User data to update the system to field the number of posts, and the number of points 2b. System update the report data for the number of posts
Includes:	None
Priority:	High
Frequency of Use:	Approximately 20 users per day
Rules that must be fulfilled:	
Special needs:	-
assumptions:	1. The assumption that 100 users will post the report a crime
Note:	-

Table 6. Use Case Scenario Validation (like / dislike) assessment report

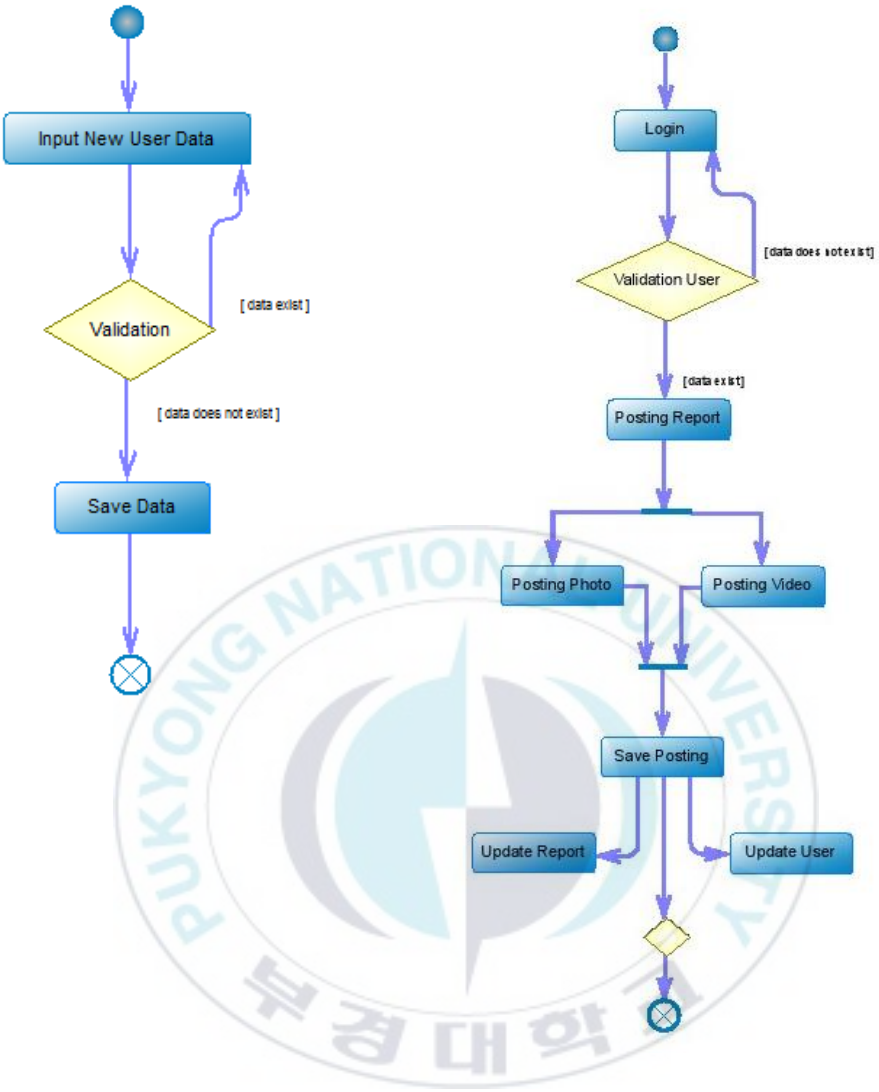
Use Case ID:	3
Name of Use Case:	Validation (like / dislike) assessment report
Created By:	Fairuz Iqbal Maulana
Date Created:	01/1/2015
Actor:	User (IDUN Society)
Description:	Users access the System Indonesia Criminal united through the web, log in, choose information report crime, then pressing like / dislike and leave a comment.
Preconditions:	1. User Login to Indonesia united Criminal System 2. Registered Users in Indonesia united Criminal system assessment process
Postconditions:	1. The data stored in the system posts. 2. Data post has a number of points in the form of user assessment results like and dislike that may continue to grow. 3. Data posts show the results of user comments
Normal Course	**3.0 Validation Like/Dislike Assessment Report** 1. Users see a menu for a specific date 2. The system displays information about crime reports for pictures and videos. 3. Users can view reports of crimes by selecting one picture or video. 4. Users can view information about the crime report. 5. The system displays information about crime reports and the number of viewers and the number of like and dislike accompanied by comments from other users. 6. Users posting comments. 7. Users can only rate one time by pressing the button like or dislike 8. The system receives a request to add a point assessment ratings on crime report data and point to the data posting 9. The system adds points to the user data 10. The system update data comments 11. The system stores user data to post the vote that the user can not perform the revaluation.
Alternative Courses	-

Table 6. Use Case Scenario Validation (like / dislike) assessment report (continue)

Exceptions	**3.0.E.1 Assessment Changes** (in step 7) 1. The system let you know that the user is doing the assessment. 2a. User canceled the assessment 2b. Use Case canceling system. 3a. Users change assessment 3b. Use Case repeating system.
Includes:	None
Priority:	High
Frequency of Use:	Approximately 20 users per day
Rules that must be fulfilled:	-
Special needs:	1. Users can see the sum of the values obtained from each post. 2. User can view all posts.
assumptions:	2. Assuming that 25% of users will make an assessment on everyday.
Note:	-

3.3.6. Activity Diagram

An activity diagram is a variation of a state machine, which is activity that represents the performance of an operation and the transition is triggered by the operation has been completed. Below can be described activity diagram of each scenario based on use case scenario.



a b

Figure 7. Activity diagram registration (a) and Activity diagram post crime reports (b)

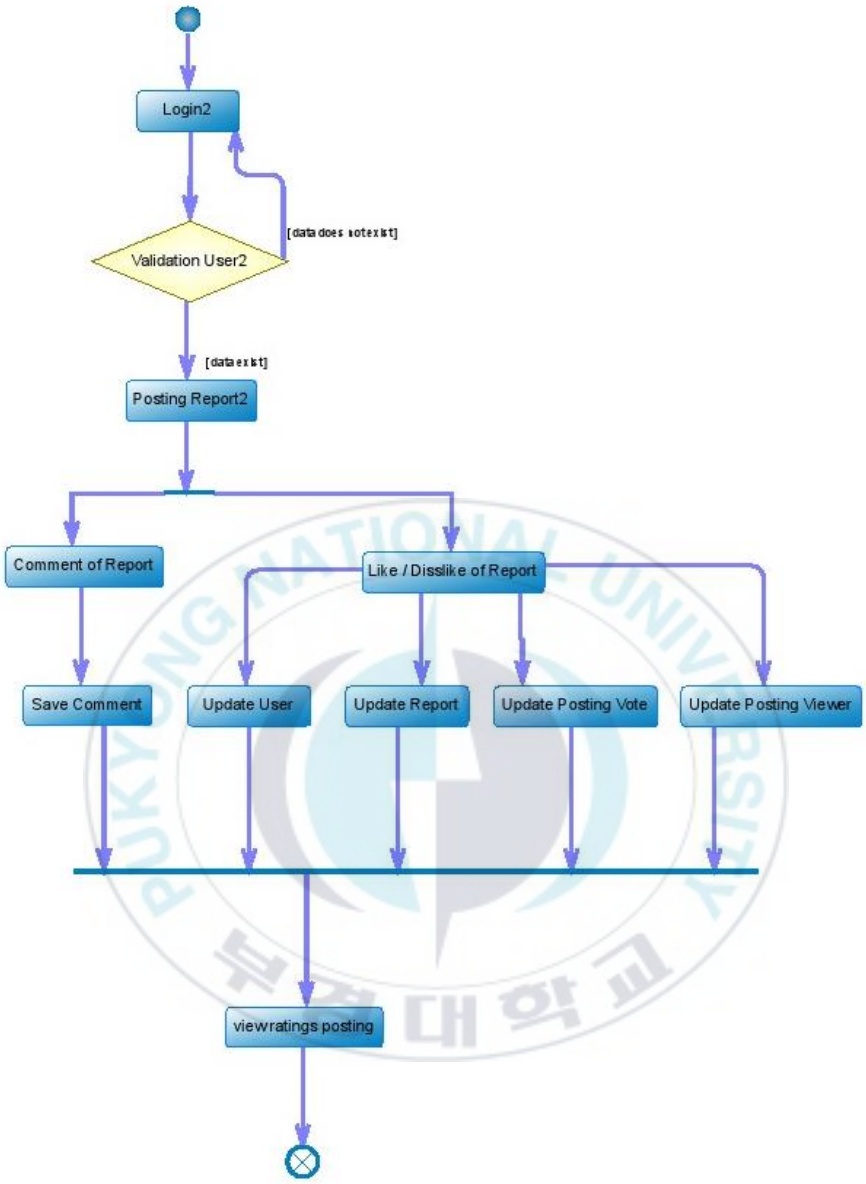


Figure 8. Activity diagram validation like / dislike crime report

3.3.7. Sequence Diagram

A sequence diagram is the easiest way and moved by habits of a system by showing the interaction between the system and its environment. Here is a sequence diagram for the three main activities in the system.

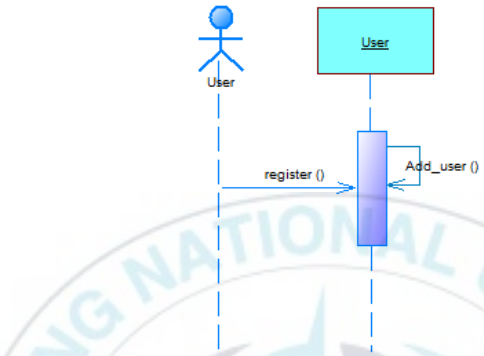


Figure 9. Sequence diagram registration

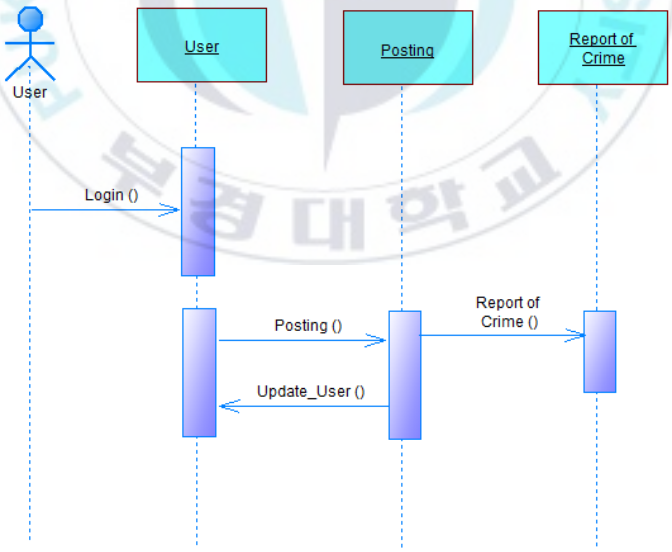


Figure 10. Sequence diagram post crime reports

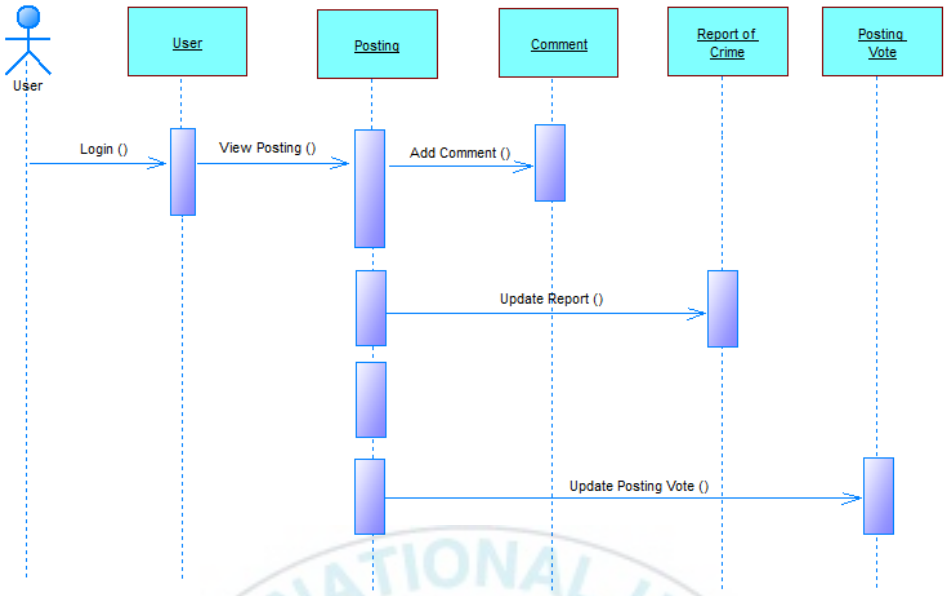


Figure 11. Sequence diagram validation like / dislike crime report

3.3.8. State Diagram

State Diagram showing the sequence of activities of an object that has value and responds to generate stimulus and messages. This can be illustrated below state diagram of each activity based on use case.

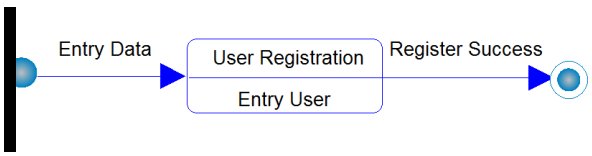


Figure 12. State diagram registration

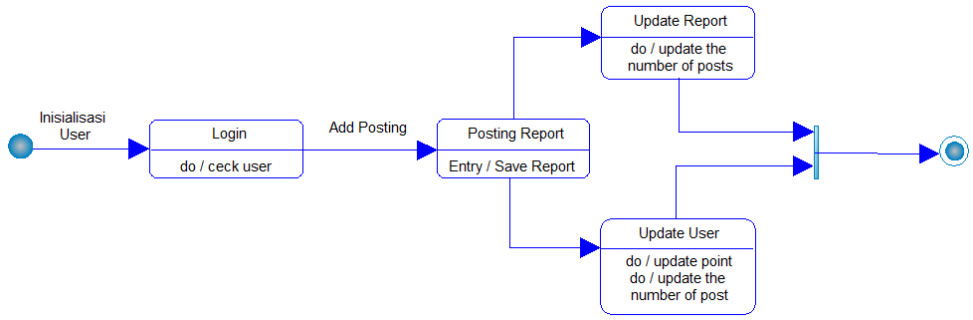


Figure 13. State diagram post crime reports

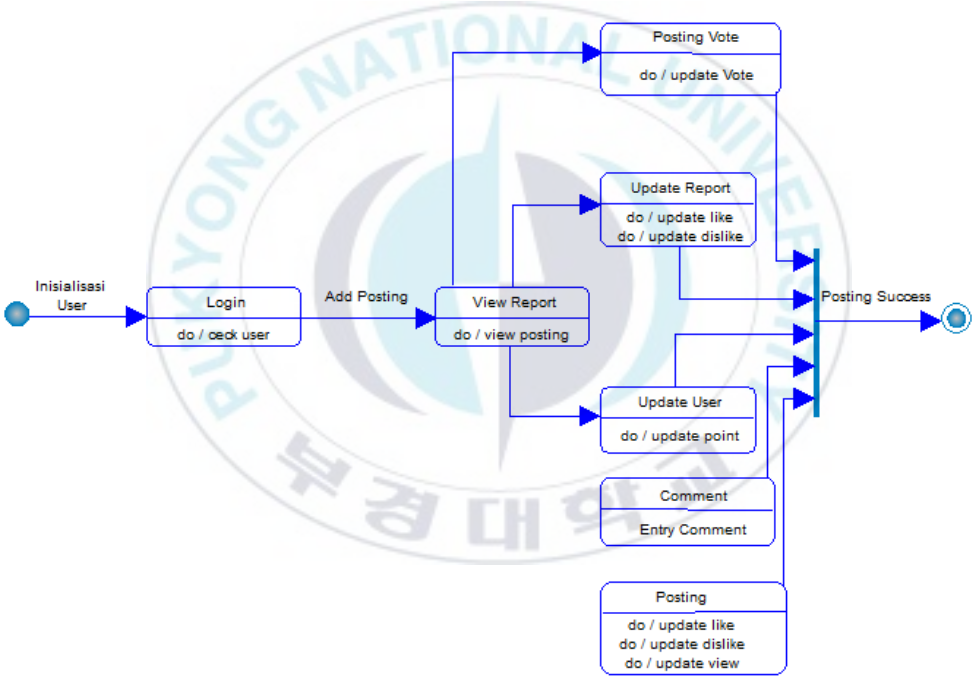


Figure 14. State diagram validation like / dislike crime report

3.3.9. Gamification Design

Application of the method gamification on crime reports are expected to be a new term known as gamification Crime Report. Here, we will see if it is possible to apply gamification in the assessment process of reporting crime?, why the assessment process can use this technique?, what the weaknesses?, and what are the advantages that can be?, in the next chapter, we can see some screenshots taken the design of the web site, which apply gamification system method to achieve the goal.

1. New Paradigm in e-Business Media

Implementation of gamification started to become a trend and many sites discuss it. It has become a new paradigm in the business of e-media. But the question must be considered, whether it is possible to adapt this technology to the field of crime reporting assessment? All sites can implement gamification using some elements of the game on it. But a more fundamental question, whether it is appropriate or not to use gamification in the assessment process of reporting crime? Gamification is not always easy to apply at all. Gamificator must know and understand about the system that will be built for the applied method of gamification. There are some basic rules you need to know and follow when trying to apply the concept of gamification in the assessment process:

- Do not force the user to perform tasks that enhance efforts to do things that are not favored users
- Do not damage the image of the product

- Manage an attractive target for users in the short, medium and long term
- Manage gamification to the most common user.

The basic rules can help gamificator to design and implement the concept of gamification correctly. If using gamification can support efforts to improve the assessment and feedback to the web system and government by the user, so that it can attract more users use the site, then gamification must be used.

2. gamification Assessment Report Location Crime

Gamification Assessment Report Location Crime is an e-media methods gamification therein. Although there are several benefits in using gamification in the assessment process, there are also some disadvantages need to be considered.

Some disadvantages gamification in the assessment process the crime scene report are:

1. Should be good in designing and implementing
2. To be really in the process of maintenance
3. be able to increase the production cost of the website / system

In addition to losses, some gains were known as gamification is used in the assessment system is a crime scene report:

1. Can increase user satisfaction in knowing the crime-prone locations
2. Can enhance user interaction with the government
3. Can improve the performance of the government in making the city better
4. Can reduce operational costs

By knowing the advantages and disadvantages of using gamification in the assessment process the crime scene report, can help gamificator to get better results.

In principle, gamification has the ability to improve retention, attention and interaction between users and systems. Gamification components that will be applied in the design consists of four, namely:

- Rules: It is an order that is used as a foundation in a game, this rule is usually used to describe what can be done and not done by the user
- Feedback: Feedback in the form of rewards obtained by the user when it has reached or accomplish something. Feedback is associated with the prizes and points, or comments from users.
- Goal: is the main thing that must be achieved by the user, and the goal can only be defined into two multiple and single only differs from the amount that must be achieved, typically when a user successfully achieve the goal of a game declared ended
- Challenge: is a challenge to test the proficiency level of the user, and an important component in the creation of the game.

Based on these components, Indonesia United Criminal formed using gamification achievement approach, with component-based gamification framework. The design results in Indonesia United's Criminal gamification is as follows:

Table 7. The design of the gasification Indonesia United Criminal

Rule : - User action - Rules of the game	**Feedback** - reward - User comments
Goal : - gameplay - Objectives to be achieved	**Challenge :** - domain issue - progress of players - progress of report

This means that each component will affect each of the other components, at the point of designing gamification shall have a relationship, especially in the context of learning that can be taken by the user. In Indonesia in the context of the United Criminal lot of learning to be conveyed to the users. For that gamification is no longer as packaging but rather to stimulate the role of the user in order to use the Indonesia united as a means of information. Departing from there to Indonesia united gamification design is made, while the representation of Indonesia United's Criminal gamification is as follows:

Table 8. Representation of gamification Indonesia United Criminal

Component	Domain	Representation
Rules	Theme of Game	Indonesia United's Criminal theme of the ga me is to become the user who reported the security conditions surrounding locations.
	Action	- registration - posting - Assessment form like / dislike - give *feedback*

	Rules of Games	- The points system multilevel - Can post multiple times - Can only register as a user - Post assessment of the results apply only to one post - A warning only for the assessment (like / dislike) - Each user role as society Idun - The status of the location of crime reports can be increased according to the points that have got
	Mechanic	- Greater gain points, the greater the chance users to level up / get a badge
Goal	Gameplay	- Users must post and provide an assessment as much to get points
	Objectives	- Register - Post the crime report - Post the URL - Provide an assessment like / dislike and leave a comment
Chalenge	Problem domain link	- Validating a post - Providing factual posts - Becoming a top user of the month - Becoming a top user of the year
	Progression	- Any level of user to get a different challenge and points terraced - Every crime report scores continue to grow when users like / dislike - The number of posts continue to grow when users post a picture or video

Feedback	Rewards	- Registration 100 points - Post crime reports 5 points to picture - Posting 10 points crime reports for video - Provide an assessment like / dislike 1 point - Top user of the month 100 points - Top user of the year 1000 points - Each user perform like will add 1 point to like, and if the dislike will add 1 point to dislike - Every user to post a picture or video, the number of posts will increase by 1 point - Each image or video that is viewed by the user will accumulate the amount of viewer

Chapter IV

System Implementation for IDUN Crime

4.1. Implementation Services

In this section will explain the implementation of web services portal Indonesia United Crime.

a. Web Indonesia Home United Crime

This service services as initial information for the general user to be able to use the application. Web start page Indonesia United Crime consists of a map view crime-prone locations and the latest news of the crime occurred.

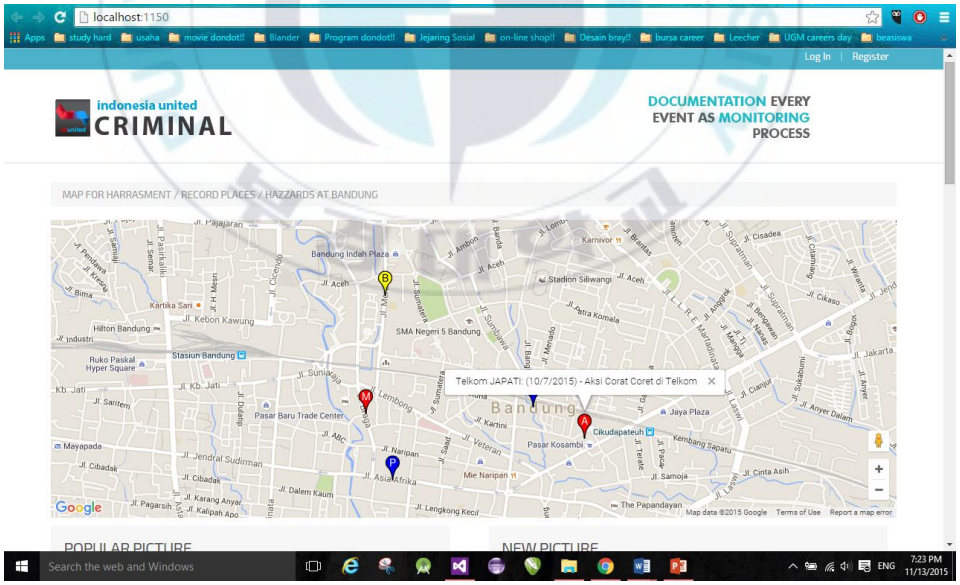


Figure 15. Home web Indonesia United Crime

b. Timeline Reports

This service displays the timeline report the crime or public facility that is uploaded into the application by the users that have been registered in the show form in Google Map Marker, equipped with a search based on the date of the activity.

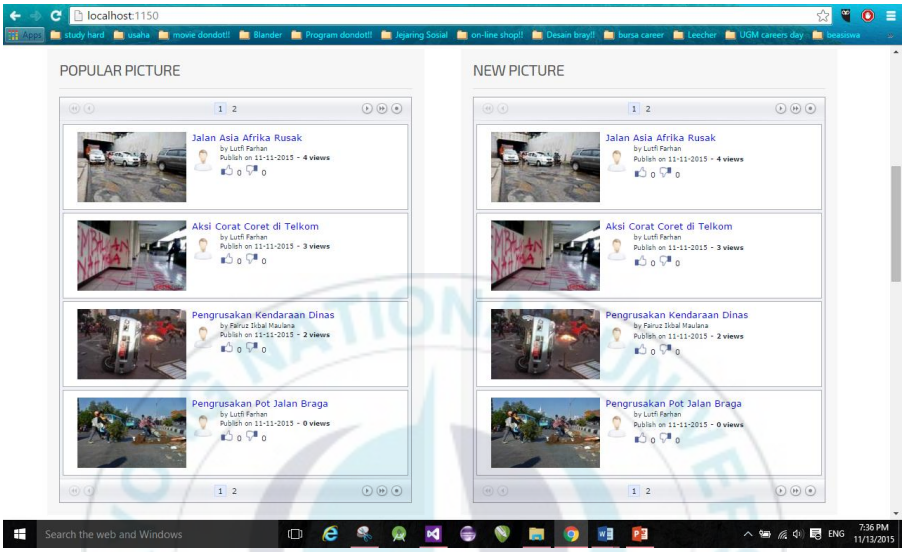


Figure 16. Timeline report

c. Graph the results of assessment to Like / Dislike

This service displays the results in the form rating by IDUN people like / dislike, accompanied by a search based on the type of crime reports and statements listed in the database.

d. Registration

This service is used to serve the common user registration into society Idun.

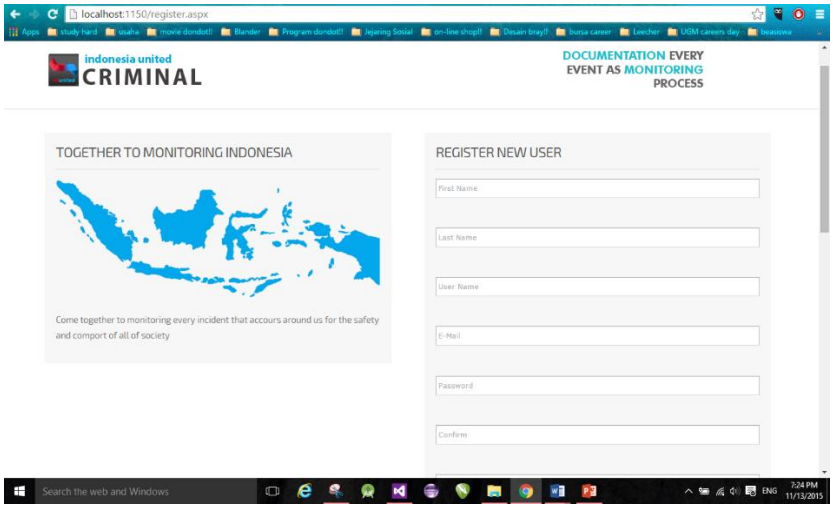


Figure 17. Registration user

e. Login

This service is used to serve users that have registered in IDUN people to be able to use the special services in applications such as Upload, judging by reports like / dislike and Comments

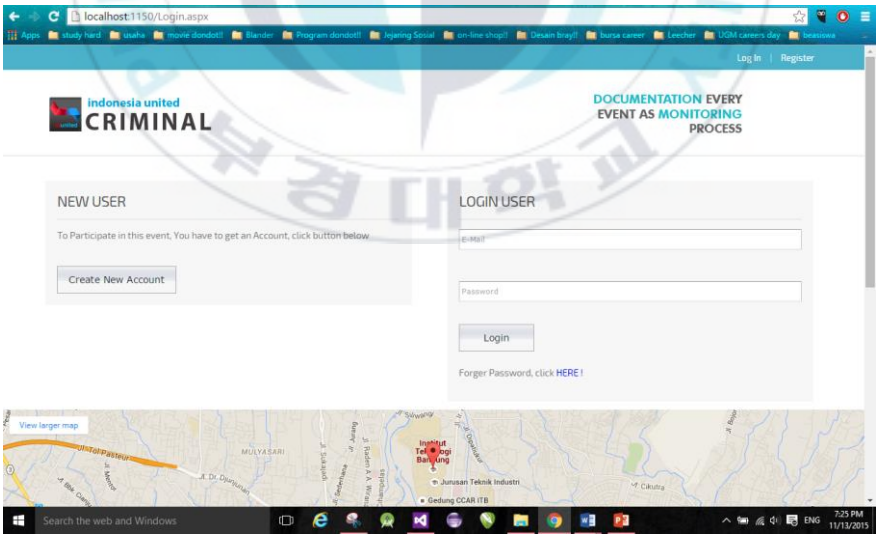


Figure 18. Login user

f. Home Users

This service is used to display the results Upload Photos and Videos by User and All Users. And displays information IDUN people already have a point and has a level of Idun People.

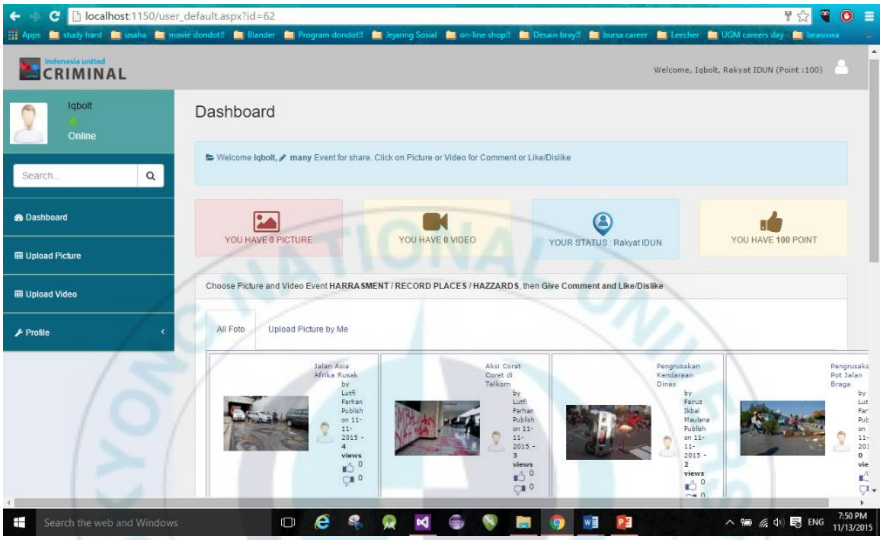


Figure 19. Home users

g. Comment

This service serves to comment on official activities such as posting photos and videos of public officials to be assessed. Can be shared via Facebook or Twitter and Google+.

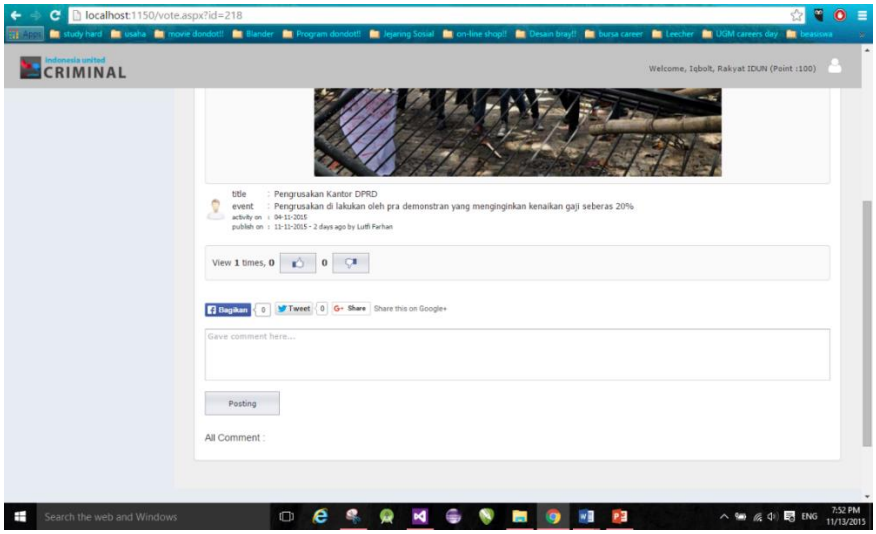


Figure 20. Comment and Like/Dislike

h. Upload Photo and Video

This service serves to provide the opportunity for the user ID to be able to save the report in the form of photos or video so that a report on the crime scene can be documented.

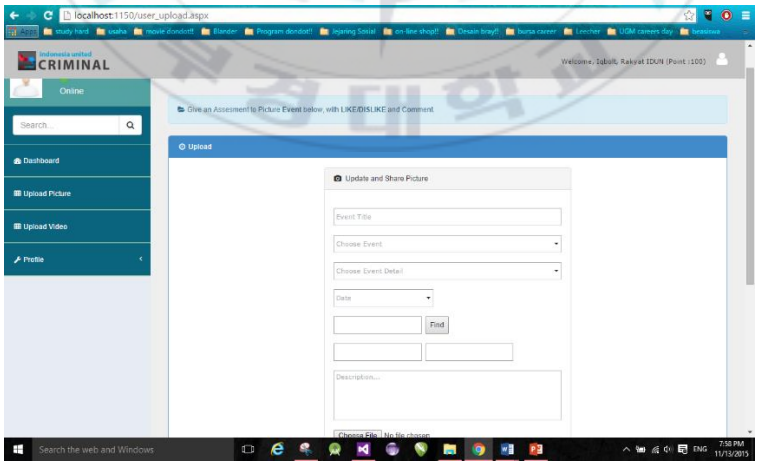


Figure 21. Form upload photo a report

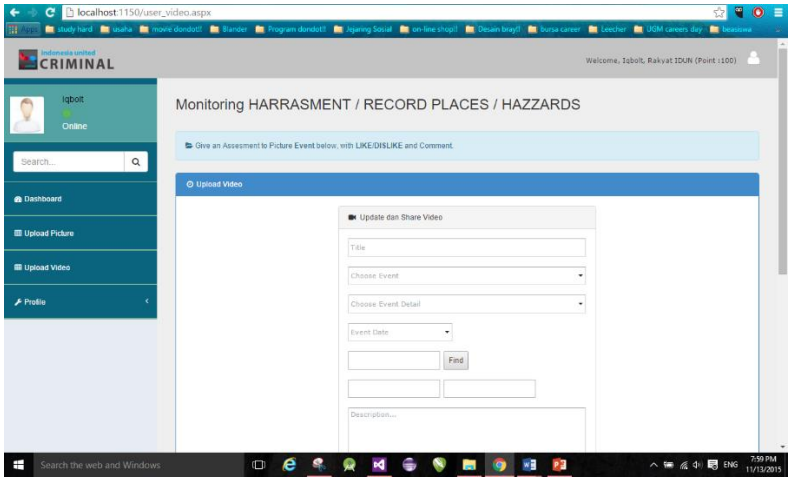


Figure 22. Form upload video a report

4.2. Testing

This section will explain the tests performed on the prototype web portal product Indonesia United Crime.

4.2.1. User Activity

Here are the results of observations of user activity

Table 9. User activity

Activity	Days :						Amount
	1	2	3	4	5	6	
User Registration	2	2	4	6	9	4	27
Upload Crime News	5	3	6	5	8	7	34

From the table above shows that in general the activity of the user who signed up to be

a total of 27 people and the amount of documentation Upload a picture as much as 34 activities.

Here is a chart of activities posts activities of public officials by the user.

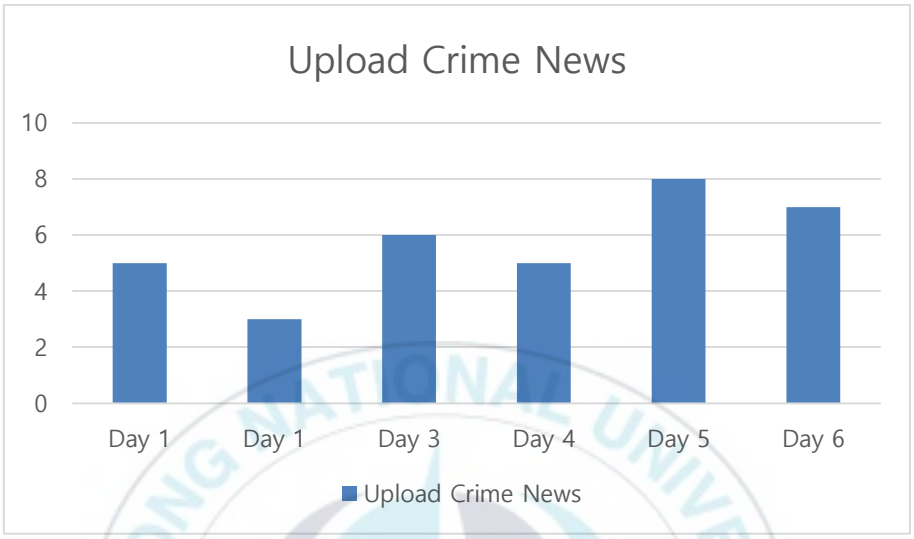


Figure 23. Graph Activity Post

The development chart is based on the results of the monitoring post in Table 4.1 appears to be rising even though there is a 1-day decline. Activity at most post was on Day 5.

Table 10. Activities posting videos and pictures

Activity	Days :						Amount	Average
	1	2	3	4	5	6		
Upload Video	0	0	0	1	1	0	2	2%
Upload Photo	5	3	6	4	7	7	32	98%

Based on table 4.2, the posting process is divided into two categories, namely images

and video, and can be seen in the graph below.

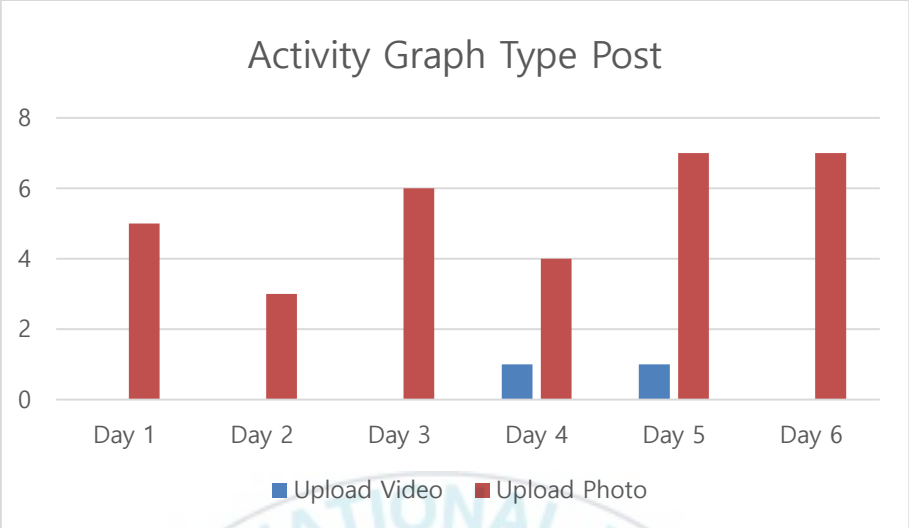


Figure 24. Activity Graph Type Post

From the chart above we can conclude that users prefer to post news of a crime by using media images compared using video. Due process of posting fairly quickly without having to wait quite a long time if using the medium of video. And can be seen as much as 98% of users prefer the image during the monitoring process the crime scene. Being the user who posted the video news crime only by 2%.

Table 11. Activity number of posts in each category of crime

No.	Category Report	Location	Posting
1	Harassment 1	Fly over Pasupati	12
2	Harassment 2	Fly over Pasupati	2
3	Harassment 3	St. Pasteur	11
4	Harassment 4	St. Cipaganti	6
5	Hazards 1	St. Dago Atas	3
6	Hazards 2	St. Tubagus Ismail	1

For posting process performed by the system user community based sample categories of crimes which are stored into the system, it can be seen that the information documented more numerous on harassment, while quite a bit of information in the post by the public to hazards.

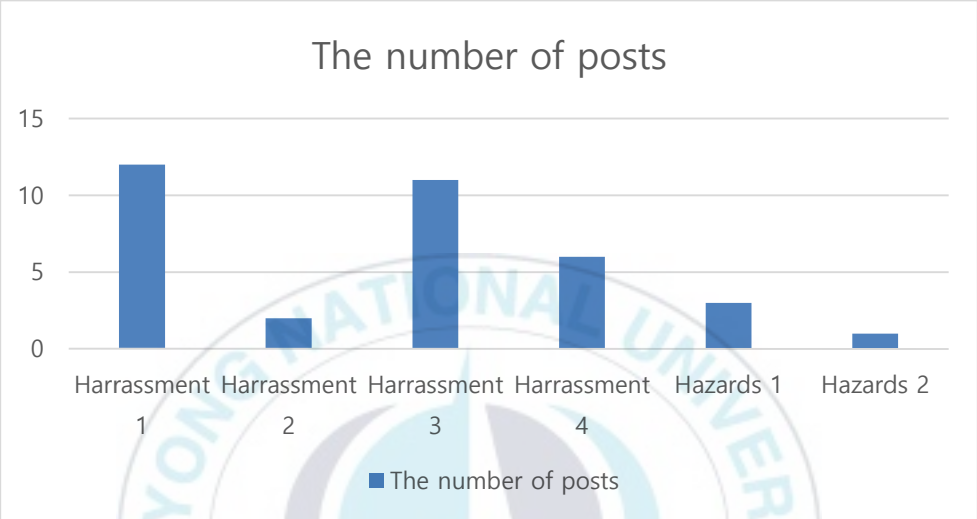


Figure 25. Graph activity total posts each category of crime

4.2.2. Developments Number of Users

Here is a graph of the number of users of web portal development of Indonesia United (IDUN) Crime is based on the observation results in Table 4.1 where there are 27 users who sign up.

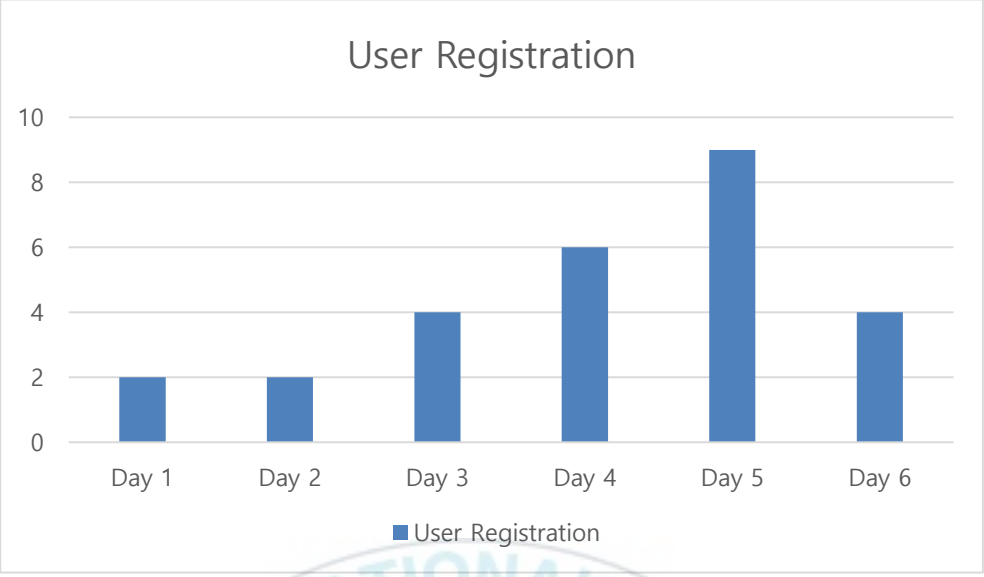


Figure 26. User registration

4.2.3. List Functionality Testing

Below are shown the results of the test site functionality for each user who uses this website.

Table 12. List functionality testing for user (unregistered)

No.	Functionally Tested	Conclusion Results
1.	See the list of categories of crime and crime data information, like / dislike.	Succeed
2.	See timeline crime reports.	Succeed
3.	See as the user most active people, which displays the number of points, symbols and status	Succeed
4.	See the latest and most popular post data	Succeed
5.	See Graph results of the assessment to like / dislike	Succeed
6.	Register as a user	Succeed

Table 13. List of testing functionalities for User ID

No.	Functionally Tested	Conclusion Results
1.	See the list of categories of crime and crime data information, like / dislike.	Succeed
2.	See timeline crime reports.	Succeed
3.	See as the user most active people, which displays the number of points, symbols and status	Succeed
4.	See the latest and most popular post data	Succeed
5.	Login to the system	Succeed
6.	Upload images a crime incident	Succeed
7.	Upload video crime incident	Succeed
8.	Displaying results uploaded every report, comment, and provide an assessment in the form of like / dislike	Succeed
9.	Editing the User Profile Data	Succeed

Table 14. List of testing functionality for Admin IDUN

No.	Functionally Tested	Conclusion Results
1.	See the list of categories of crime and crime data information, like / dislike.	Succeed
2.	See timeline crime reports.	Succeed
3.	See as the user most active people, which displays the number of points, symbols and status	Succeed
4.	See the latest and most popular post data	Succeed
5.	Login to the system	Succeed
6.	Upload images a crime incident	Succeed
7.	Upload video crime incident	Succeed
8.	Displaying results uploaded every report, comment, and provide an assessment in the form of like / dislike	Succeed
9.	Editing the User Profile Data	Succeed
10.	Managing the results of the post (images and vide o) users	Succeed
11.	Managing data on the system	Succeed
12.	Managing User / account	Succeed

4.3. Discussion and Analysis

In this discussion, will do a test online to users within a period of 6 days. Then it will do a survey of respondents and users of the application, on an assessment report on the location of the posting.

Based on the results of the test can be performed an evaluation and analysis of the results obtained and the resulting evaluation as follows:

1. The design of the target users of the system that includes a common user / community is in conformity with the community to register into the system.
2. The testing based on incident reports relating to the crime, the system is able to receive, store, and display data from monitoring and assessment.
3. Based testing system, the public can find out the location of the crime-prone through marker found on the map. And the crime-prone locations are assessed can be further improved security according to the expected community.
4. Admin can manage well for users and the results posted by the user.
5. The system can display information such as graphs assessment results to support ease of user community in using this system.

There are some system deficiencies encountered during testing was conducted in the form functionality that is not owned, namely:

1. The system is still not able to display clustering marker on the map for each category of crime reports.
2. The system cannot distinguish the criteria for the type of post that is uploaded.

Chapter 5

Comparison

Toju et al, Has two methods were adopted in this study. The first was the administration of questionnaires. A total of 66 questionnaires were administered to the Police Public Relation Officers (PPRO) while a set of 250 questionnaires were administered to gather information from the member of the public. This was done to assess the crime situation in the metropolis. The second was a stepwise method of how GIS could be used to manage crime using the spatial and attribute data collected from the field. Park proposed to construct a correlation matrix between crime and various social factors, such as population density, income, and education attainment, number of foreign residents, temperature, urbanization and alcohol consumption. According to this correlation matrix, the authors introduce a ranking criteria of crime types. Chen et al, proposed a data mining framework for detecting and predicting crimes using entity extraction and association rule mining. The proposed framework is also able to determine the relationships between crime types and data mining techniques applied in crime data analysis. Lee proposed to consider the relationship between crime and places, such as apartment complexes, low-rise multi-family housing and neighborhood parks. Nasridinov et al, proposed a method for constructing a decision tree based classification model for crime prediction. The proposed method predicts crimes by analyzing the biological data of a person that are received by various sensor in his/her body.

Table 15. Comparison method with another papers

Year	Paper Title	Publisher	Embedding Method	Study Area
2015	Design and Implementation the Concept of Crowdsourcing on a Web Portal Crime	Fairuz, et al	Spatial data mining using GIS	Bandung, Indonesia
2014	Crime Mapping in Nigeria Using GIS	Toju, et al	Questionnaires and spatial data mining using GIS	Nigeria
2013	Relationship Analysis between Crime Types and Social Attributes in South Korea	Park, Y. H	a correlation matrix between crime and various social factors	South Korea
2004	Crime data mining: a general framework and some examples	Chen, et al	Spatial data mining using GIS	Arizona
2001	Interpretation of Crime-Prone Locations through Spatial Analysis Theory: Burglary Case Studies in Apartment Complex	Lee K. W.	consider the relationship between crime and places	South Korea
1999	Crime Hotspots Analysis in South Korea: A User-Oriented Approach	Nasridinov, et al	Spatial data mining using GIS	South Korea

Chapter 6

Conclusion and Future Works

At this thesis, the author tries to implement a system based location and Google Maps service to report and obtain information about the crime as well as information about public facilities damaged around us. What, when and where it happens, we can report and share information with other users. So, another user can be more alert to their surroundings. This system is expected to be a solution to the existing problems through cooperation between the user with mutual cooperation between governments, communities and stakeholders. The main objective of the design and implementation are designing the fulfillment media information about the crime-prone locations are open for people who need information in Indonesia. The system of Indonesia United's Criminal crowdsourcing is ready for use when the website is ready for hosting online. The method of gamification, the system can provide feedback to the community and the government, in the form of a symbol of performance, comments from users and the amount of the assessment of the community. For future development, in suggest that the existing marker on the map can be lost when the crime report has been completed solved by the local government.

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