Crime Analysis & Security Enhancement of Forensics evidences using Block chain

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Introduction

- Crimes are one of the most predominant problems that is happening in most of the urban areas in the world. There are a lot of different types of crimes that happen, including robbery, theft of vehicles, etc. As crime increases, the investigation process gets longer and more complicated. The use of information mining methods helps in resolving most complicated criminal cases. Crime mapping is conducted and funded by the Office of Community Oriented Policing Services (COPS). Evidence based research helps in analyzing the crimes. We calculate the crime rate based on the previous data using data mining techniques. We can identify the highest risk crime zones with the help of data mining techniques.
- To identify the frequent crime pattern in a particular area for assisting police and helps in reduction and prevention of crimes by providing patrol in hotspot areas. To store details of crimes and criminal that make efficient retrieval whenever needed. In the proposed system crime records including crime name, place, date, time and details of criminal like name, photo, place etc. are given, a table displaying place and frequently occurring crime pattern on each places are predicted.
- For more security use the Block Chain technology. In this block chain based secure system for forensic evidences is proposed. All the uploaded evidences and the uploaded report are stored in block chain.

METHODOLOGY

MODULES

- Admin
- Login
- Add & Manage police & forensic
- view criminal list
- View complaints
- Allocate complaint to police

- Public User:
- Register
- Login
- View crime types
- View crimes
- View criminals
- Make a complaint
- Report a criminal found
- Upload evidence

- Police
- Login
- Manage crime types
- Add & manage criminal list
- View crime pattern
- View allocated case
- Update status
- Upload evidence
- View reported criminals

- Forensics
- Login
- View request & update status
- Report upload
- View history

Developing environment

- operating system: windows 10 & above
- front end: html, css, JavaScript
- back end: MySQL
- ide used: jetbrains pycharm, android studio
- technology used: python java
- frame work used: flask

Apriori Algorithm

Apriori is an algorithm for frequent item set mining and association rule learning over relational databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item.

Sets as those item sets appear sufficiently often in the database

Steps:

1. Computing the support for each individual item.
2. Deciding on the support threshold.
3. Selecting the frequent items.
4. Finding the support of the frequent itemsets.
5. Repeat for larger sets.
6. Generate Association Rules and compute confidence.
7. Compute lift

Block chain

- All the evidence information's are stored in block chain. Block chain **is a record-keeping technology designed to make it impossible to hack the system or forget the data stored on it, thereby making it secure and immutable.** It is a type of distributed ledger technology (DLT), a digital system for recording transactions and related data in multiple places at the same time.
- Once the information stored in block chain it is not possible to manipulate the stored information .
- It consists of an expanding list of transactions or records stored in the blocks and uses peer to peer networks. The blocks in the block chain are connected as a chain with the use of hashing algorithms.
- Blocks are stored in a decentralized network where all the blocks are present in multiple nodes. As data is decentralized the chances of data tampering and data loss is less which makes block chain more secure and transparent.
- Each block of the block chain consist of the previous block’s hash value, nonce, a timestamp, the records of the block and the hash of the current block.
- The main advantages of using block chain are decentralization, security , transparency, and immutability.

Configuration of block chain

Truffle

- Truffle is the most popular development tooling for Ethereum programmers. Easily deploy smart contracts and communicate with their underlying state without heavy client side programming. An especially useful library for the testing and iteration of Ethereum smart contracts.
- It is used to create configuration files and compile block chain.
- First install node to create files for block chain automatically. Through this create contract that contain sol files. Sol files contain the information that we want to pass into the block chain. This concept is called ***smart contracting***.

Ganache

- Ganache is a high-end development tool used to run your own local block chain for both Ethereum and Cordad App development. It act as a server to see the info that pass to the block chain.

Table Design

Login

Table Name: login
Engine: InnoDB
Database: crime
Character Set: latin1
Collation: latin1_swedish_ci

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Hide language options

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
id	int	11		☑	☑	☐	☑	☐	☐	
username	varchar	20		☐	☐	☐	☐	☐	☐	
password	varchar	20		☐	☐	☐	☐	☐	☐	
type	varchar	20		☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

signup

Table Name: signup
Engine: InnoDB
Database: criminal face identification
Character Set: latin1
Collation: latin1_swedish_ci

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Hide language options

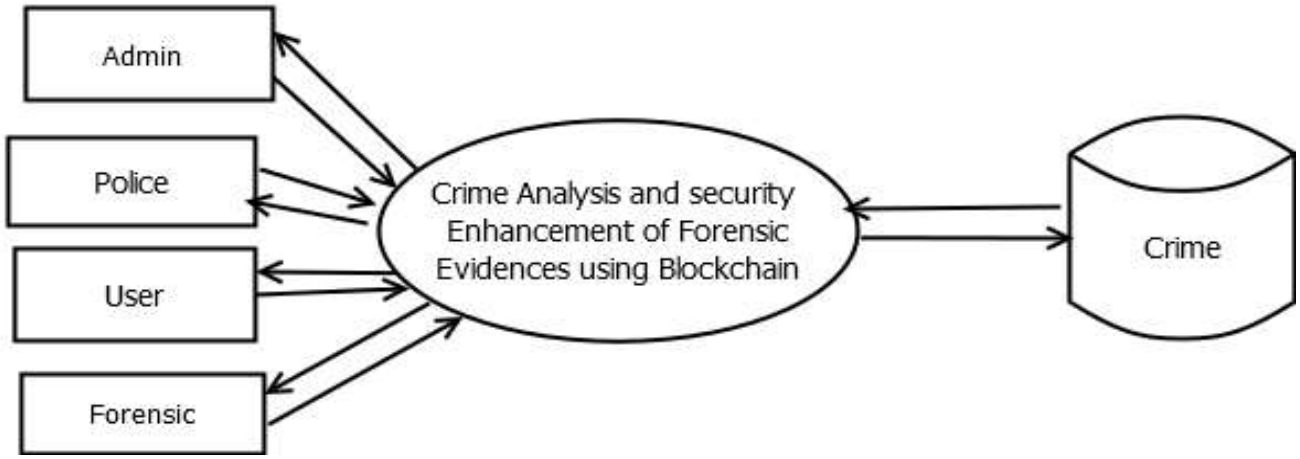
Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
id	int	10		☑	☑	☐	☑	☐	☐	
login_id	int	10		☐	☐	☐	☐	☐	☐	
fname	varchar	50		☐	☑	☐	☐	☐	☐	
gender	varchar	50		☐	☑	☐	☐	☐	☐	
place	varchar	50		☐	☑	☐	☐	☐	☐	
post	varchar	50		☐	☑	☐	☐	☐	☐	
pin	int	10		☐	☑	☐	☐	☐	☐	
email	varchar	50		☐	☑	☐	☐	☐	☐	
phone_no	bigint	20		☐	☑	☐	☐	☐	☐	
lname	varchar	60		☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Police station

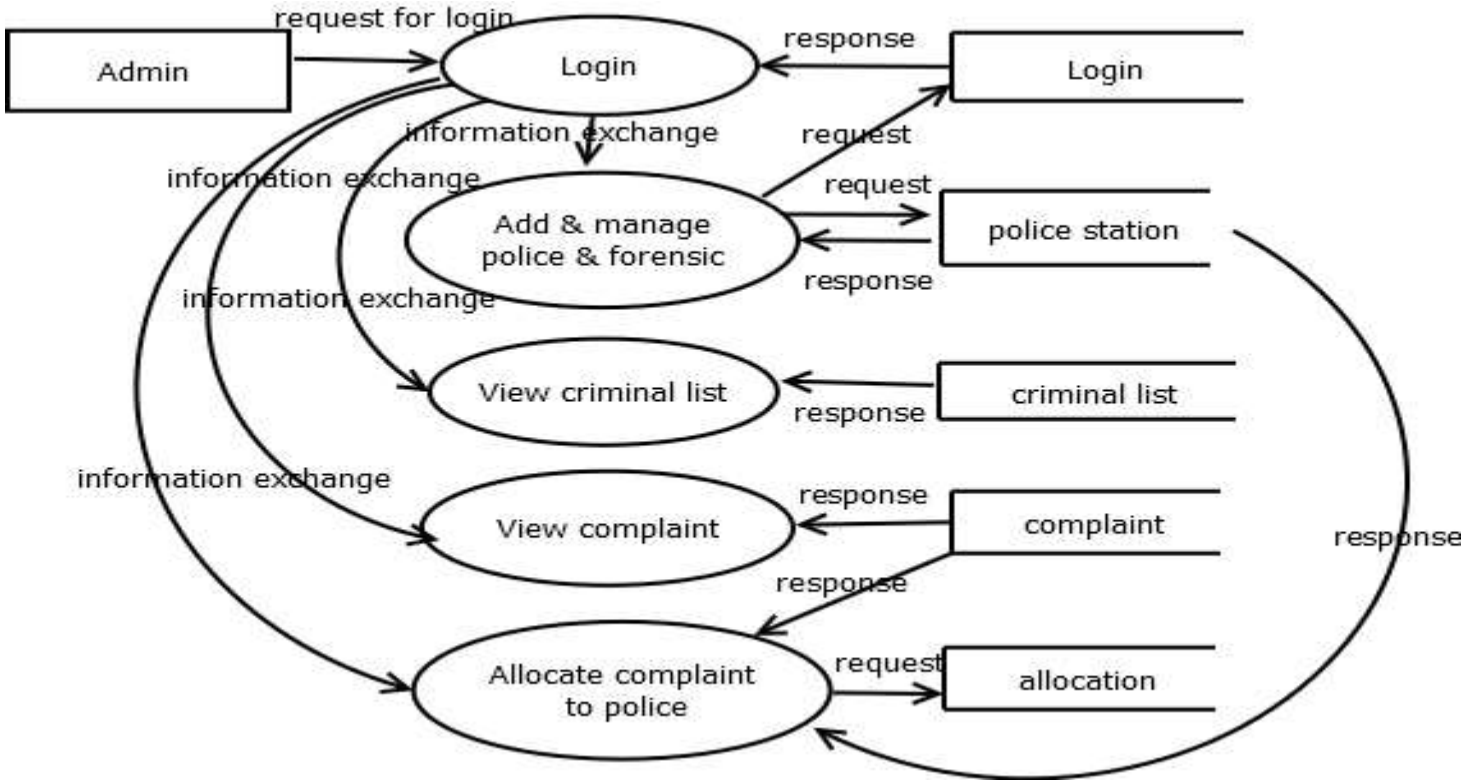
Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
p_id	int	11		✔	✔		✔			
name	varchar	50			✔					
phone	bigint	100			✔					
email	varchar	50			✔					
place	varchar	50								
pincode	varchar	25		✔	✔					
login_id	int	11								

DATA FLOW DIAGRAM

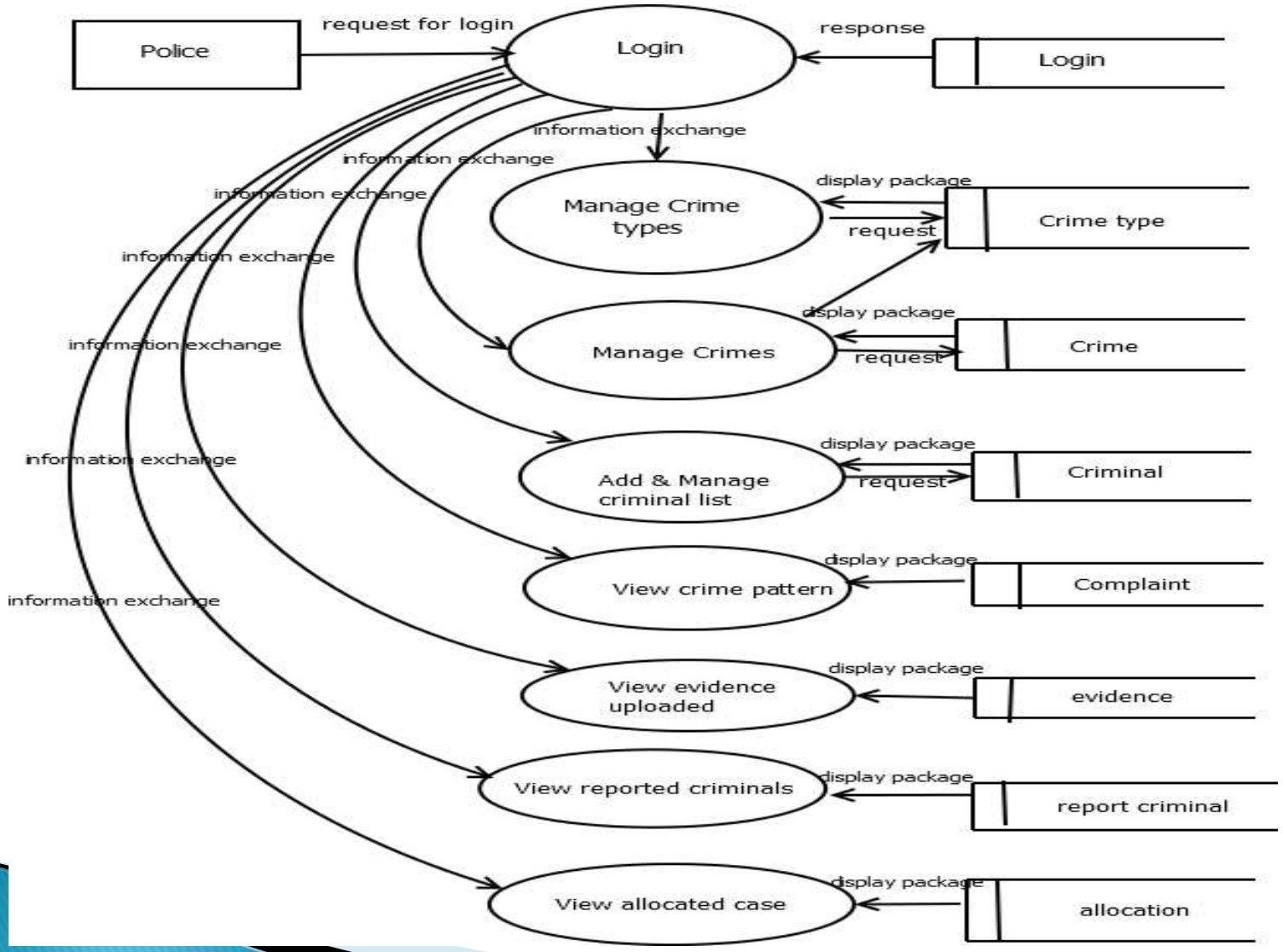
level0



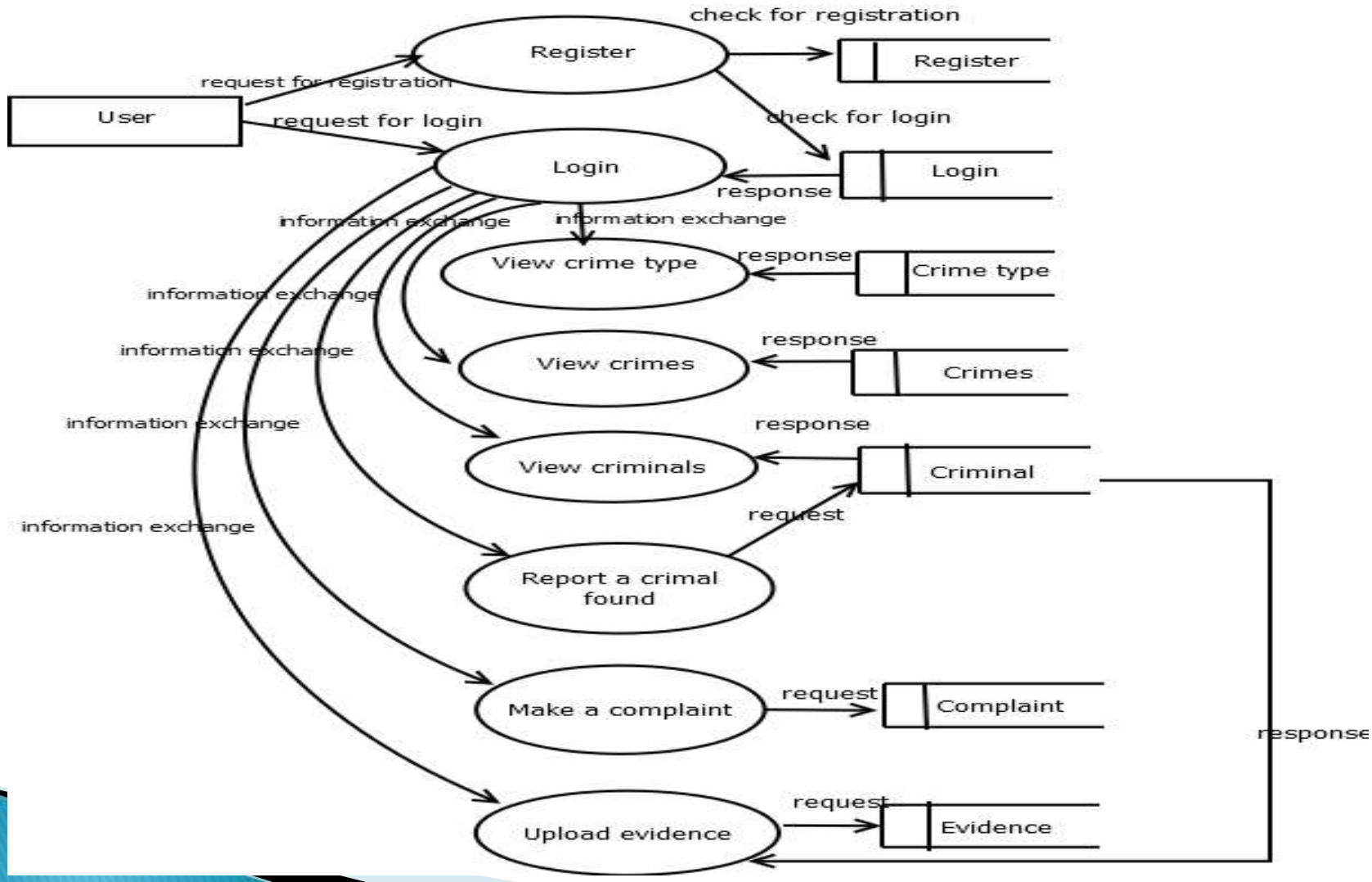
Level 1.1


request for login
Admin
Login
response
Login
information exchange
request
information exchange
request
Add & manage
police & forensic
police station
response
information exchange
View criminal list
criminal list
response
information exchange
response
View complaint
complaint
response
response
Allocate complaint
to police
request
allocation

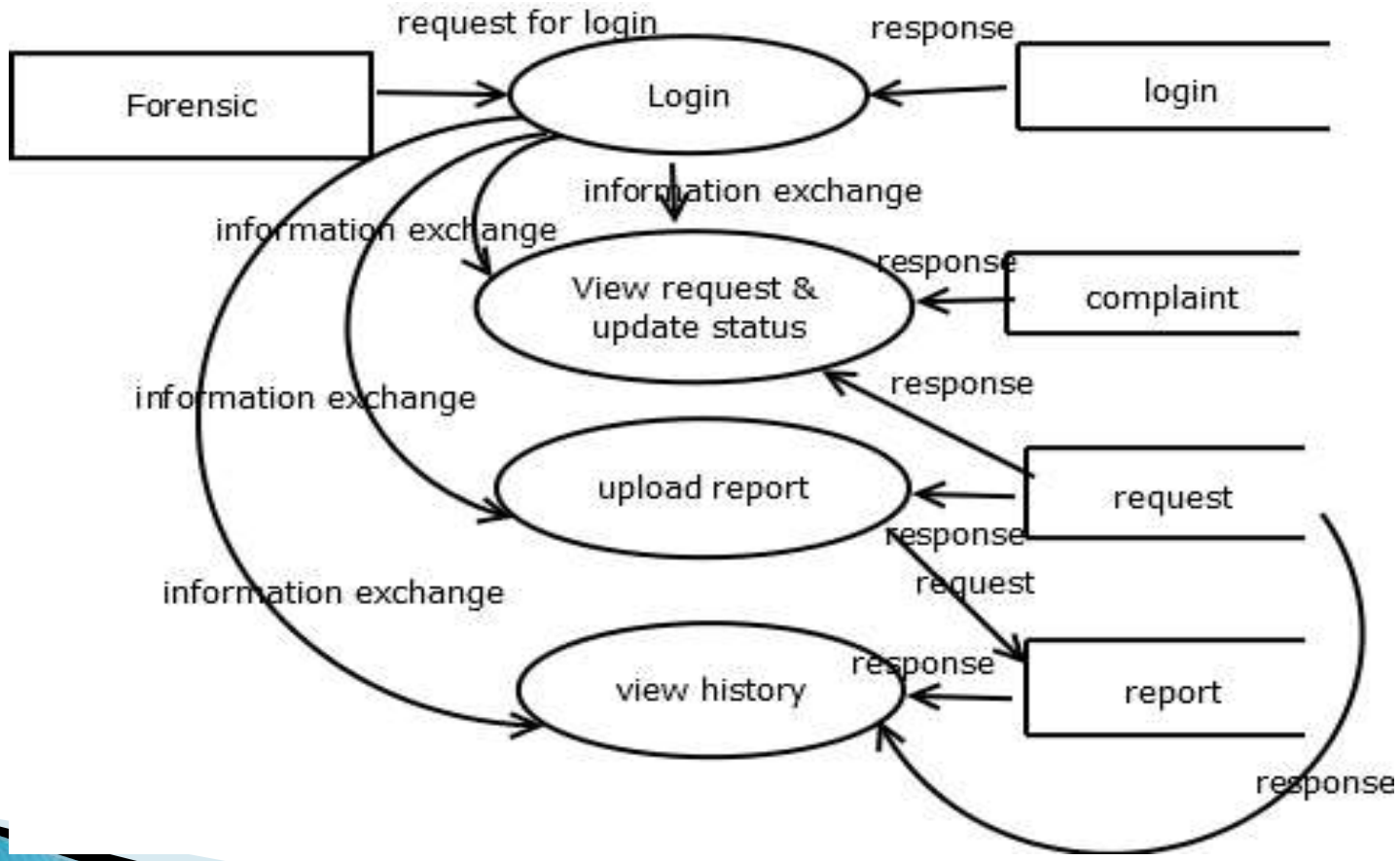
Level 1.2


Police
request for login
Login
response
Login
information exchange
information exchange
information exchange
information exchange
information exchange
information exchange
information exchange
Manage Crime types
display package
request
Crime type
Manage Crimes
display package
request
Crime
Add & Manage criminal list
display package
request
Criminal
View crime pattern
display package
Complaint
View evidence uploaded
display package
evidence
View reported criminals
display package
report criminal
View allocated case
display package
allocation

Level 1.3


check for registration
Register
Register
request for registration
User
request for login
check for login
Login
Login
response
information exchange
information exchange
View crime type
response
Crime type
information exchange
information exchange
response
View crimes
Crimes
information exchange
response
View criminals
Criminal
request
information exchange
Report a crimal found
request
Make a complaint
Complaint
response
request
Upload evidence
Evidence

Level 1.4


request for login
response
Forensic
Login
login
information exchange
information exchange
response
View request &
update status
complaint
response
information exchange
upload report
request
response
request
information exchange
response
view history
report
response

PROJECT PLAN

User Story ID	Task Name	Start Date	End Date	Hours	Status
1	Sprint 1	20-04-2022	01-05-2022	18	Completed
2		04-05-2022	12-05-2022		Completed
3	Sprint 2	15-05-2022	25-05-2022	11	Completed
4		26-05-2022	29-05-2022		Completed
5	Sprint 3	30-05-2022	02-06-2022	5	Completed
6		03-06-2022	05-06-2022		completed
7	Sprint 4	06-06-2022			In progress
8					planned
9					planned

USER STORY

User Story ID	As a<Type of User>	I Want to<Perform Some Task>	So that I can <Achieve some Goal>
1	Police	Login	Login successful with correct username and password
2	Police	Manage crime types	Add and manage crime types
3	Police	Manage crimes	Add and manage crimes
4	Police	Manage criminals	Add and manage criminal information
5	Police	View complaints	View complaints from user
6	police	View allocated case	View allocated case from admin
7	User	Registration	User registration by personal information
8	User	Login	Login by username and password
9	User	View crime types	View registered crime types
10	User	View crimes & criminals	View registered crimes
11	User	Upload evidence	Send evidences
12	User	Make a complaint	Send a new complaint

User Story ID	As a<Type of User>	I Want to<Perform Some Task>	So that I can <Achieve some Goal>
13	Admin	Login	Login successful with correct username and password
14	Admin	Add police & forensic	Add & manage police & forensic
15	Admin	View criminal list	View criminal list
16	Admin	View complaint	View complaint from user
17	Admin	Allocate complaint	Allocate complaint to police
18	Forensic	Login	Login successful with correct username and password
19	Forensic	View request & update status	View request from police & update status
20	Forensic	Upload report	Send report
21	Forensic	View history	View history

PRODUCT BACKLOG

User Story ID	Priority <High/Medium/Low >	Size (Hours)	Sprint <#>	Status <Planned/In progress/Completed >	Release Date	Release Goal
1	Medium	8	1	Completed	01-05-2022	Forensic department form designing
2	High	10		Completed	12-05-2022	Code for forensic
4	Medium	6	2	Completed	25-05-2022	Form designing for police & admin
5	High	5		Completed	29-05-2022	Add & manage police & admin
6	High	3	3	Completed	02-06-2022	Block chain management , create block chain ,
7	high	2		completed	05-06-2022	Truffle management
9	High		4	In progress		Add & management blocks to block chain
10	Medium			planned		Block chain implements to forensic & police
11	Medium			planned		

SPRINT PLAN

Backlog item	Status& Completion date	Original Estimate in hours	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
User Story #1,#2,#3		Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Table design	01-05-2022	8	1	1	1	2	0	1	1	0	1	0	0	0	0	0
Form design	12-05-2022	8	1	1	0	1	2	0	1	1	0	0	1	0	0	0
coding	25-05-2022	6	1	0	0	0	0	0	0	0	1	1	1	1	1	0
User Story #4,#5																
Add and manage operations of police & forensic	29-05-2022	5	1	1	1	0	0	1	0	0	0	1	0	0	0	0
User story #6,#7																
Block chain management	02-06-2022	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Block chain creation & implementation	05-06-2022	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0

SPRINT ACTUAL

Backlog item	Status& Completion date	Original Estimate in hours	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
User Story #1,#2,#3		Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Table design	01-05-2022	8	1	1	1	2	0	1	1	0	1	0	0	0	0	0
Form design	12-05-2022	8	1	1	0	1	2	0	1	1	0	0	1	0	0	0
coding	25-05-2022	6	1	0	0	0	0	0	0	0	1	1	1	1	1	0
User Story #4,#5																
Add and manage operations of police & forensic	29-05-2022	5	1	1	1	0	0	1	0	0	0	1	0	0	0	0
User story #6,#7																
Block chain management	02-06-2022	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Block chain creation & implementation	05-06-2022	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0

Thank you