



Interconnected E-Court System

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Dedication

For my Parents...

Acknowledgements

This work would not have been possible without the support of all the lecturers and staff at E-Soft Metro Campus, Kandy. I am especially indebted to Mr. Dimuthu Thammitage, who has been supportive throughout the project. Most importantly, I wish to thank my parents and sibling for guidance and care. Last but not least, to my friends for unending inspiration.

Abstract

This final report set out how this project was done in detail and final evaluation on the project. This final report is the third report from the series of reports, namely, project proposal, interim report. Through the project proposal it was proposed to develop a system that can be used in judicial adjudication process, to remedy inherent drawbacks of the traditional court system; including, but not limited to less opportunity for the marginalized groups to access, high costs, use of pressure; inducement and threat in investigations by the law enforcement authorities.

The massive development in the information technology field paved the way for new innovative measures that all of the mentioned issues were capable of satisfactorily answered. Even though, the developed states were swift to adapt new technology to courts. The developing countries like Sri Lanka are far behind introducing technology to the judiciary system. In Sri Lanka, the current backlog of cases is massive and system is costly; due to those, the access to justice is limited. The author has elaborated in detail with substantial evidence the reasons for those issues in the report.

As a remedy for current issues prevailing in the court system; the author purposes an interconnected e-court system. The proposed system allows most of the government authorities involved from an institution of a case to the end to deliver all its tasks through this system. As a result, time taken is reduced, costs are reduced and as the flow of information between authorities increase the possibility of government authorities acting in a manner that is detrimental to citizens is also eliminated.

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Abbreviations

ADR	Alternative Dispute Resolution Methods
ATM	Asynchronous Transfer Mode
ATOMS	Automated Traffic Offence Management System
BENI	Broadband Enterprise Network Infrastructure
CEIS	Civil Electronic Information System
Gbps	Giga Bytes per Second
Kbps	Kilo Bytes per Second
Mbps	Mega Byte per Second
ICMS	Integrated Case Management System
IT	Information Technology
IEEE	Institute of Electrical and Electronics Engineers.
ICT	Information and communication technology
JUSTIN	Justice Information System
NJDG	National Judicial Data Grid
PKI	Public Key Infrastructure
WAN	Wide Area Network
WebCATS	Web- based Court of Appeal Tracking System

Chapter 01

Introduction

This project was developed as the final year individual project of the undergraduate degree program and this final report is written as the last report of series of reports created throughout the development process. Firstly, prior to this report a project proposal was submitted to get the acceptance for the commencement of the project. Secondly, an interim report was submitted to communicate the status of the project at the middle of the development process. Through this final report an analysis of the whole project is expected to be done. This chapter contains a comprehensive analysis of the project including goals, motivation, method and overview.

1.1 Goals

As a means of increasing efficiency of the Sri Lankan court system an interconnected E-Court System was proposed by the author of this final report through the project proposal. The system that the writer wishes to develop can be viewed as a more simple and limited system that can be used to develop a more complex system. Due to the limitation of resources at the disposal of the author a complex system that can be immediately adapted in the real court system is not feasible.

The Proposed “E-Court system” will increase: the transparency; access to justice; efficiency; document security. And decrease the costs involved; eliminate discrimination, enhance equal protection of law etc.

The main aims of this Project can be listed as:

- A research will be conducted and the data collected from the research will be analyzed to identify the root causes of the delays and other problems that associated with the court system;
- Based on the findings of the above, critically evaluate how delays can be remedied. Rather than focusing on other procedural remedies priority will be given to reach a remedy that can be achieved through the use of Information Technology;
- Conduct a feasibility study pertaining to the proposed system;
- A requirement analysis will be conducted;
- The interconnected e-court system will be design;
- Coding and Implementation of the court system;
- Testing the system;
- Evaluating the usability and success of the proposed system;
- Based on the above, changing the proposed system as required; and
- Preparing final documents analyzing every aspect of the problem domain and proposed solution.

1.2 Motivation

The issue selected to be inquired is, more sensitive and of paramount importance as not only a single person or entity will be benefitted through remedying this issue, but whole society will be immensely benefitted. The use of technology in Sri Lankan court system is inadequate, but the positive changes that can be achieved through adopting technology are immense.

As the writer elsewhere mentioned in this report, the access to justice is fundamental for every society. Any disputes arise in a civilized society is expected to be solved through judicial adjudication. With high number of disputes resorted for adjudication through judiciary. Delays in the court system exist as unprecedented. As solutions for delays - alternative dispute resolution methods (hereinafter referred to as "ADR") and digitalization of the court system are proposed and utilize in every country. Nonetheless, the uses of ADR methods are limited as it can only be used as a supplementary method, not as a substitute for judicial adjudication. On the other hand, almost in every country of the world access to justice is available as a right and ADR methods cannot be utilize in a manner that curtails, the right of access to justice. On such a backdrop the digitalization of the court system, and its process is the more democratically favored solution to increase efficiency of the court system.

The problems to which the author of this report endeavors to find answers can be discussed under few sub-topics. While, there are innumerable problems associated with the main problem, the discussion will be only limited to discuss the most crucial ones.

Access to Justice

Accessibility to justice covers a wide area from educating people on their rights to eliminating discrimination. Similarly, the access to justice not only covers the rights of suspects or victims, but also lawyers.

In Sri Lanka most of the harassments and minor offences are unreported and unheard. Due to people are unaware about their rights and inability to access information. A system that educates people at the correct instant will work proactively in remedying aforementioned defects.

Right to appear in court is a part and parcel of right to access justice. All parties involved must be fully aware about the date on which the case is called and the current status of the case. If the relevant parties are unaware about the date on which the case is heard and absent on a mandatory , then in a civil case the case might proceed only hearing one party as an ex-parte case.

High legal fees and costs involved negatively affect access to justice. If the involved costs are reduced that will also increase access to justice.

Also, the geographical barrier impacts negatively on access to justice. As an example: under the current system even to check the court journals lawyers should reach the court house and with the new corona pandemic as less people can be in a small room. It is required to get an appointment. A system that will allow lawyer to check the journals from their offices will positively impact.

As citizens get the opportunity to access some of the services provided by the courts 24/7, which are currently only accessible by reaching the court, more people will get the opportunity receive services provided by the courts.

Delays

The one main issue to which the writer of this report endeavors to find solution is the reduction of delays in the justice system, which is increasing day by day throughout the whole court system. From a philosophical point of view it is well acquainted fact that as stated in the famous Latin maxim (*Iustitia dilata est iustitia negata*) “justice delayed is justice denied.”

In Sri Lanka currently there are 54 judicial districts, and more than 200 courts established. A complete system that interconnects all these courts with other law enforcement agencies, relevant government agencies will immensely reduce the time taken for communication between these agencies.

It was reported that there was a backlog of 750,000 pending cases (Thilakawardene, 2021) before the covid19 pandemic and it doesn't take a genius to understand the fact that post- pandemic backlog is much more worse. Further, the Sectoral Oversight committee on Legal Affairs (anti-corruption) & Media, issuing recommendations pertaining to the Expeditious and Efficient Administration of Criminal Justice stated that the average length of time from the date of occurrence of commission of a serious criminal offence that should be prosecuted at the High Court, till the date of the conclusion of prosecution at the High Court is 10.2 years (Sectoral Oversight Committee on Legal Affairs (Anti-Corruption) and Media, 2017). However, the public perception and the experience of the writer of this proposal is that more complex court proceedings with appeals take up to 20+ years to fully reach the end.

An e-court system will increase the number of cases a judge can within a one day, which will directly increase the efficiency and productivity of judges, thereby reduce the backlog of cases.

Costs

Through digitalization the current paper based system will be turned to paperless system. The costs involved with storing large storage areas to keep files and then maintaining staff to guard those files in every court house throughout the country can be reduced. The number of staff members involved can be drastically reduced.

The number of cases a judge can take up per day will be increase as information is accessible through an online system. Also, the productivity of the other judicial staff members will be increased. The increased productivity and efficiency at the end of the day will result in more work is done by a reduced staff.

The prison department transports hundreds of prisoners from prisons to the respective courts where cases are being heard and this process wastes millions of tax payers' money. An interconnected system that allows prison officers to present prisoners electronically will save the transport costs.

As a result not only the time taken, but also associated costs government spends on the justice system will be drastically reduced.

Transparency and Accountability

Right to information is enshrined as a fundamental right in Article 14A of the Constitution. The general public has the right to know information hold by public authorities. Through the proposed system, public will be able to access some of the court journals which will result in implementing the right to information. Also, 24/7 access to the proposed system will implement equal protection of the law which is guaranteed under Article 12. (1) of the Constitution. Also, a transparent court process clearly in line with the dictum "Justice must not only be done, but must also be seen to be done".

As the public participation in the court process increases and process become more open through the proposed online system, that will eliminate the countless forms of corruption and malpractices, which will result in judicial officers becoming more accountable and transparent. On the other hand, a streamlined, cost effective and transparent process will increase public trust in the judicial adjudication process and enhance direct involvement of the general public in the court process.

1.3 Method

The project was conducted in the strict conformity with the project management concepts. Initially a research was done to decide on an area to do the project. When deciding different areas were considered and the author particularly interested in selecting an area which is not very common among the final year students. At the end of the initial research an e-court system was selected. The article written by Shiranee Thilakawardena on digitalization to the digital transformation of the justice system (Thilakawardene, 2021) was highly influential.

The second most important decision that had to be decided was pertaining to the technical aspect of the project. The technologies and the language to use were decided based on the perceived functional and non-functional characteristics of the system to be built like security, modularity and maintainability. As an example as security was a major concerned visual studio framework that easily allows to implement applications on the MVC framework was used.

After taking the acceptance for the project, using the project management techniques a comprehensive project plan was drawn and efforts were made to strictly guide by the guidelines. However, due to unexpected emergencies that occur in some instances the dates allocated for a specific task had to be adjusted.

1.4 Overview

As mentioned in the preceding section when deciding on the technical areas of the system the non-functional and functional characteristics of the system was considered. And in this section a brief summary is provided as to the technical area of the system.

As object oriented programming method was used mainly due to the inherent advantages of the object oriented programming which enhances the reuse, modularity, flexibility through polymorphism and effective problem solving ability.

As the software development method agile scrum was used, though the development was mainly done by only a person. The scrum method was selected mainly because at the end of the every sprint a working product is created and in any time consuming project the author of this report is of the view that scrum development is the best approach to use.

The system was developed using visual studio which is a very user-friendly integrated developing environment and the Visual Studio Code.

Chapter 02

Background and Problem Statement

02.01 Introduction

In any civilized society people are expected to solve issues that arise among them through the court system. However, due to the very high number of cases referred for adjudication the number of cases that can be solved are very less, and as elsewhere mentioned in this report the backlog amounts to about 800,000 cases in 2020. Furthermore, it takes about ten years for a case to reach an end. Though there are different strategies that utilized in Sri Lanka with the intention of speeding the court process, none of them have proven successful. In such a backdrop the utilization of technology has proven successful in many other countries.

The Information Technology can be utilized to minimize delays and remedy most of the short comings of a traditional legal system. A system that interconnects from court staff to all other stakeholders will not only speed up the process but also achieve many other positive changes to the system.

In this section of the report the details about the problem domain will be discussed with the technological implementations in other countries.

02.02 Literature Review

In this part of the report the author will discuss the academic work available that deals with the same question author intends to answer and the 'state-of-the-art' of product/systems in this area. Although, the research conducted by other scholars cannot be directly adapted to Sri Lankan context or to this project, there is no doubt that when implementing and designing the project any such knowledge will be invaluable. Hereafter, author will discuss scholarly articles on, the reasons for the digitalization, its impact on the traditional methods of justice and facts that must be considered to get the maximum benefits from digitalization.

What is digitalization?

The word “**digitalization**” is vague, and takes the meaning depending on the context which it has been used. In simple terms, in the context of the judiciary digitalization mean the transfer of information or processes to digital form (Bradautanu et al., 2020a).

Why digitalize the justice system?

Professor Richard Susskind, IT adviser to the UK lord chief justice, provides four reasons why judiciary should be digitalize, “The system is costly for users; it’s usually too time consuming; it’s largely unintelligible; and it also seems out of step in the internet society” (Online justice: why courts should explore emerging digital possibilities, 2021a). Most of the literature available reaches the same points stated by Professor Richard Susskind, as reasons for the judicial digitalization. The main objective of digitalization is enhancing the access to justice. While speeding up proceedings and reducing reliance on paper-based cases are other desirable outcomes, the establishment of online courts or systems should not be viewed as a means of prioritizing efficiency over justice (Bradautanu et al., 2020b). As the author mentioned number of instances throughout this report, the dominant reason for digitalization of court processors is the backlog of cases. However, apart from that common reason there are other reasons that can be highlighted. As an international conventional obligation, including Sri Lanka, 193 countries of the world are duty bound to realize Sustainable Development goals (United Nations, n.d.). From the seventeen sustainable goals, 16th goal is to promote just, peaceful and inclusive societies. In order to achieve this goal rule of law must be enforced. To enforce the rule of law access to justice is a necessity. In order to ease the access to justice- as mentioned in this report digitalization of justice system is a well-reputed solution.

Philosophical Background

The most crucial fact that has been dealt by most of the legal literature is the relationship between law and technology. Some of the institutions that the author proposed to digitalize are the oldest institution of human history. Any changes introduced must be preserved the respect and importance of its historic values. Law, as a subject entangled with traditions and formalities inclines to be a subject that not entirely in line with the ends technology pursue to achieve. While law’s main objective is the legitimacy of actions (legal/illegal), technology’s logic is based on functioning (works/does not work). As a result, an e-justice service may be functional and efficient from a technological point of view, but not legally valid (Lupo and Bailey, 2014a). The author will not delved into philosophical conflict between digitalizing courts of law, as the proposed solutions will not proposed any Artificial Intelligent agents to the present court process, and any technology that try to substitute human touch needs to be thoroughly debated before implementing.

Desirable Features of an E-Justice System

In the article Designing and Implementing e-Justice Systems: Some Lessons Learned from EU and Canadian Examples. The authors have stated that when developing a system the prime focus should be on accessibility and simplicity, adaptability and modularization. As simple system will attract people, it is necessary any system to be simplistic. However, a system must not be over simplistic. Right balance between a system’s maximum level of feasible simplicity and its maximum level of manageable complexity must be achieved. As systems that are simplified to a point that undermines

the functionalities, value, usefulness, and legal validity of a procedure are highly unlikely to attract users (Lupo and Bailey, 2014b). The new system must be able to adapt to changing user requirements, unless the system is adaptable the system will not be able to establish as a trustworthy system in the long run. Modularization will reduce inter dependencies and costs involved in system maintenance.

Technology and Marginal Communities

It must also be noted that using technology to enhance access to justice might be futile or further distance people from the justice system. As per the data available on the World Bank website in Sri Lanka, as a percentage of the population, only 34.11% (2017), (data.worldbank.org, n.d.) had access to Internet. Fully digitalizing and offering services in digital mediums will further distance the marginal groups of the society. Disadvantaged or marginalized groups based on factors such as ethnicity, and accessibility challenges faced by persons with disabilities must be taken in to consideration and shall not be left out when designing and implementing e-justice systems. Therefore, it is prudent only to introduce the new system to coexist with the traditional system.

Things to Consider When Implementing the System

Thomson Reuters' in its research paper published on the topic; lessons learned in courts digitization, provides that their experience demonstrates the significant value of standardizing processes before implementing digitization, particularly when moving from a paper-based system to online system (Reuters, 2015a). Justifying its findings, the research paper presents abandonment of State of California state-wide case management system after having incurred over \$300m, and delays in the State of Victoria's state-wide Integrated Courts Management System as the effects of non-standardization. Further, following factors are recognized as lessons learned; spreading key deliverables out over a phased implementation schedule reduces the risk associated with a 'big bang' roll-out: Change management and product development need to happen in tandem, based on a prioritized road map that delivers the largest efficiencies soonest: detailed internal planning of all relevant levels: practice proper cost control: involving with the chosen vendor in identifying system requirements, rather than relying solely on external management consultancy(Reuters, 2015b).

Merely, implementing new systems will not achieve the desired results. More time must be devoted to cultural and organization readiness (gov.bc.ca, 2019). All legislative changes required must be passed in the parliament and enacted as a law before the implementing the system. Assured budgets for the court digital transformation strategy are needed.

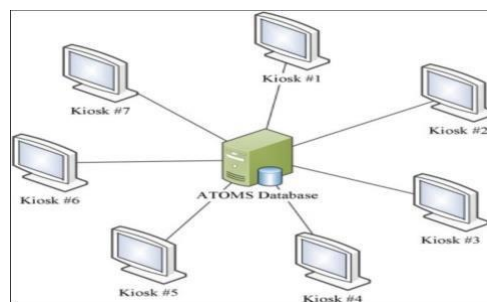
Judicial Digitalization in Other Countries

The legal systems of countries are heterogeneous, and digitalization is being done differently. Australian federal court was the first to introduced electronic court files and now steps are being taken to embed electronic files in other courts. In Netherlands, an automated system has been introduced to provide legal guidance for matrimonial disputes and matters of custody and maintenance. (Online justice: why courts should explore emerging digital possibilities, 2021). Likewise, countries have started the digitalization process from different points, based on the suitability to ground realities. Furthermore, in most countries different systems have been implemented to manage different areas of the judicial process. As an example: South Korean system comprised of Electronic Case Filling system, Judge Support system and Case management system. Therefore, rather than a single system there is a cluster of systems that work together.

Singapore

In general, Singapore is considered as the first country to design and implement an information system for the justice system (Rosa, Teixeira and Sousa Pinto, 2021a). Singapore's digitalization was systematic and initially only certain services related to traffic offences were done on a digital forum. With time more technology was introduced.

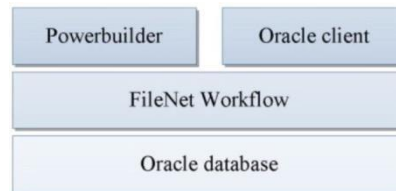
In 1991, Singapore's justice system faced the backlog of cases and as a solution digitalization was started. Initially, some of the services were digitally restructured by implementing a new information system. The centralized system, where all multimedia kiosks are linked to ATOMS (Automated Traffic Offence Management System) database, which manages the offender's information enabled citizens to pay their fines, or consulting cases in other locations, without addressing to the court (Rosa, Teixeira and Sousa Pinto, 2013b).



ATOMS architecture

Diagram 1: (Rosa, Teixeira and Sousa Pinto, 2021c)

In 1999 web-based applications were replaced by desktop applications. This second generation of information systems uses a typical 3-tier layer using Oracle databases, FileNet workflow systems and Powerbuilder or Oracle client software (Rosa, Teixeira and Sousa Pinto, 2013d).



Three Tier Architecture

Diagram 2: (Rosa, Teixeira and Sousa Pinto, 2021e)

In the latter part of 1999, EFS (Electronic Filing System) was developed. This information system was developed for civil matters, allowing lawyers to file electronic documents and providing real-time information to all involved entities. In 2002 ICJS (Integrated Criminal Justice System) was launched. Also, network infrastructure, creating the BENI (Broadband Enterprise Network Infrastructure) based on ATM (Asynchronous Transfer Mode) technology was developed, which supported data transfer speed of 622 Mbps, scalable up to 2.1 Gbps, supported by WAN (Wide Area Network) segments of 45 Mbps each, connecting the different locations where justice entities operated. To improve the security in these information systems, authorities implemented a PKI (Public Key Infrastructure). As a result now signed court documents can be issued electronically

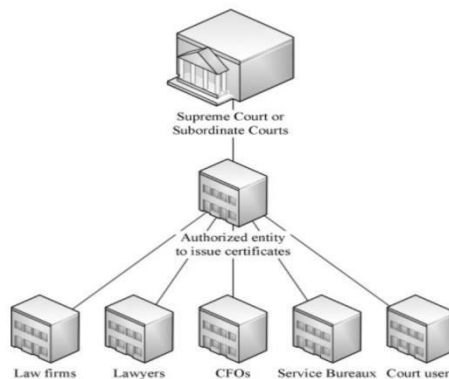


Diagram 3: PKI Infrastructure

(Rosa, Teixeira and Sousa Pinto, 2021f)

The Singapore digitalization project spans well-over 2 decades and still there are proposals for further development. This manifests that digitalization is a process, not an end.

E-court system of Republic of Korean

The Republic of Korea started digitalization in 1980's and continued to develop its systems ever since. The support of the central government is immense, for example in 2012, of the \$1.8 billion budget for the Korean judiciary; \$180 million went to information and communication technology development pertaining to the e-court system. Korean e-court system encompasses features dedicated to help judges (case management system and judge support system), facilitate the filing of cases for litigants (e-filing) and inform the public (publication of cases), (World Bank, n.d.).



Diagram 4: Features of South Korea
(World Bank, n.d.a)

Experiences with e-courts in Korea show that: (a). The system must be user friendly and adapt in response to comments from users; a thorough needs analysis is required. (b). The information technology budget should take into account costs of data preservation and system maintenance. (c). Users should receive adequate training. (d). Cases covering various subject matters should be integrated. (e). Systems in other economies can offer useful guidance (World Bank, n.d.b).

Canadian (British Columbia) e-court system

British Columbian authorities started computerizing court systems in 2001, with the (Minister of Justice and Attorney General, 2012) Justice Information System (JUSTIN). JUSTIN is an integrated criminal case management system used in BC's provincial and superior courts.

The Civil Electronic Information System (CEIS) was introduced in 2003, and in 2004 Web-based Court of Appeal Tracking System (WebCATS) was implemented. CEIS is a customized case management system facilitating information management for civil, family, and estates cases in the superior and provincial courts of BC. The Web-based Court of Appeal Tracking System (WebCATS) allows for tracking and management of cases in the BC Court of Appeal.

The British Columbia courts now capable of hearing fully online cases. The BC Supreme Court held its first fully electronic proceeding in 2011, while the BC Court of Appeal conducted its first entirely electronic appeal in 2012.

Indian e-court system

In 2005, National Policy and Action Plan for Implementation of information and communication technology (ICT) presented its standing on the e-court project. The main objective of the e-Courts project was to bring more transparency in judicial matters and to bring the judiciary closer to the common litigant of India, (Verma, 2018). Rather than implementing comprehensive information systems or databases like in other countries the main focus of attention has been establishing technical infrastructure.

Many new features were introduced for the existing system. The court houses have been upgraded with LCD screens and multimedia projectors that allow Lawyers to conduct cases online. Among other innovative measure most laudable feature is the ability to serve summons through SMS. This clearly eliminates the delays delivering summons in traditional method. The National Judicial Data Grid (NJDG) came into existence in November, 2015. This grid provides real-time information to around 25 million Indian courts on various levels. The NJDG program holds details on pending proceedings, discarded proceedings and complete cases under various headings (Sehgal, 2020). The Judgment Information System, provide all the judgments that have been delivered by the Supreme Court and various High Courts.

Sri Lankan e-filing system

The existing e-filing system which can be accessed through: <http://efiling.supremecourt.lk/>, only allows filing fundamental rights cases, and check the status of pending Fundamental rights cases. To use the site an attorney or law firm can create an account. The User interfaces are very basic. The grave concern of the writer about this site is that the connection to the site is not secured. Any sensitive information transacted through this site is at the risk. When compared with e-court systems of other countries the existing filing system is far behind in every aspect.

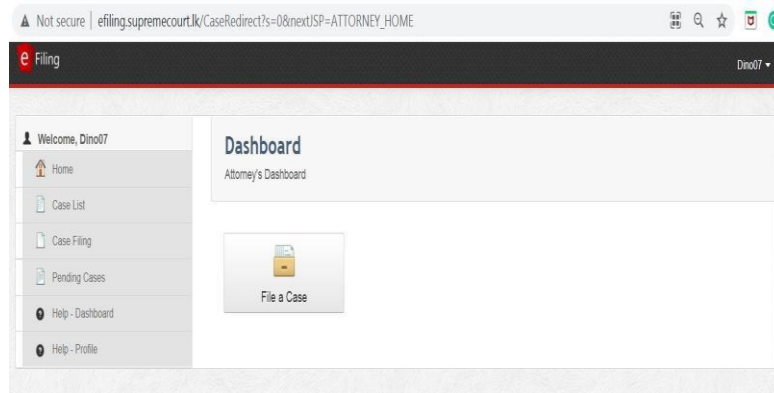


Diagram 5: Home Screen of the e-filing system

As the starting point the supreme courts issued new guidelines regarding e-filing and virtual courts and noticed that those may come into force in 15 February 2021. Furthermore, first ever virtual court session via video conferencing was conducted on 20th May 2021. Inmates were produced before court from the technology unit of the Welikada prison instead of being brought to court,” the justice ministry said in a statement. Hearings were conducted using a special software, the statement added (News First, nd).

02.03 Problem Statement

The access to justice is of paramount importance for a healthy democracy and public participation in governance. The traditional legal procedures are very much outdated and have been in use for years with its inherent limitations that fails to increase access to justice, speedy delivery of justice or active public participation. It was reported that there was a backlog of 750,000 pending cases (Thilakawardene, 2021) before the covid19 pandemic. A digital system that interconnects all the stakeholders including interconnect law enforcement authorities, judiciary and public is required that will facilitate all the judicial process and also eliminate the inherent drawbacks of the existing legal system.

Chapter 03

Project Management

03.01 Approach

A project is a temporary endeavor undertaken to accomplish a unique purpose. The unique purpose was implementing a system as more fully described in the project proposal. Initially, a decision was taken regarding the three constraints of a project, namely, schedule, cost and scope. As this project is developed as an individual project within a specific time period the most crucial factor was the time management. Therefore, among three main constraints the time factor was given more importance. To manage time efficiently a Gantt chart was drawn and time was allocated based on the available time period. Moreover, the nine knowledge areas of the project management were duly considered and in this part of the project details will be provided in detail regarding the project management aspects of the project.

03.02 Initial Project Plan

A Gantt chart is a type of bar chart that depicts the project schedule. The project planning was initiated with the announcement of the project details and the initial project planning was expected to be completed within 15 days. From the Initial project proposal submission date of 28/03/2021, the final project deliverables was to be delivered within 154 days as shown in the Gantt chart.

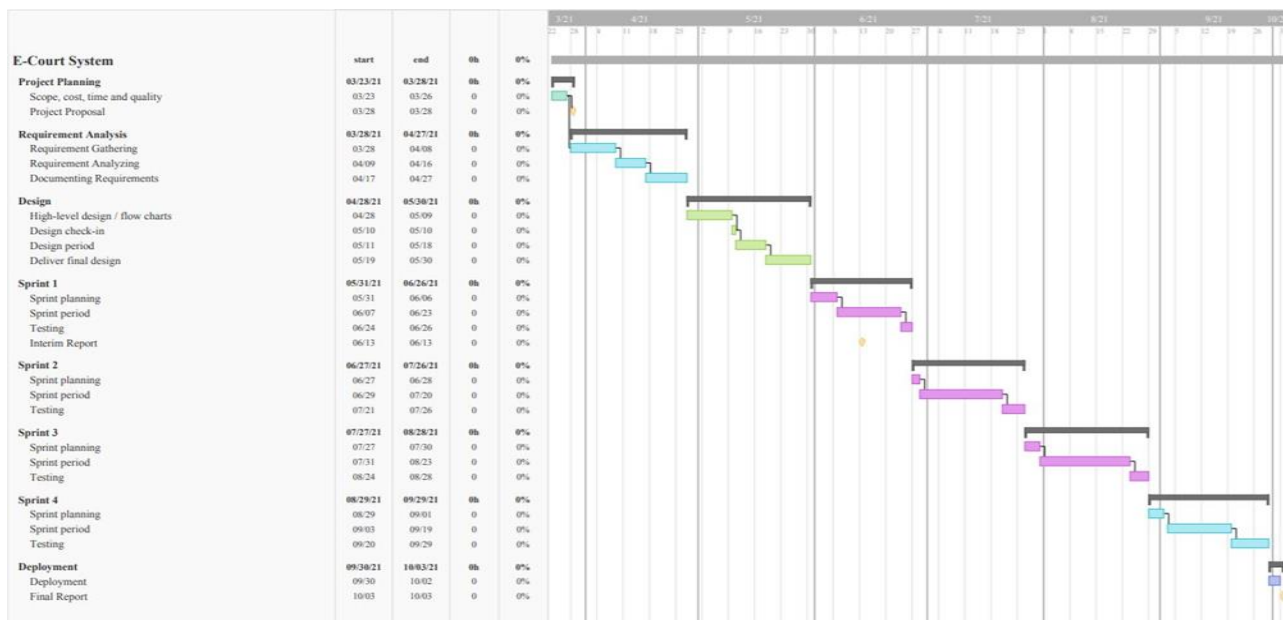


Diagram 6: Initial Project Gantt chart

03.03 Problems and Changes to the Plan

Changes to the project plan

Initial project plan had to be changed and in some modules certain new functions were added and removed. The reason for the most of the changes was the extensions granted for the project and the project plan had to be changed accordingly.

Initially the project deadline was 03rd of October, which was later extended till the 13th of November. This extension of time allowed adding another sprint as the sprint 05 that covered the last part of the project. Most of the tasks pertaining to development were able to be completed within this time period.



Diagram 7: Project Gantt chart with the later changes to the Gantt chart

Changes to Modules

The project were designed to be used by 6 actors, namely, Police; Accused Person; Attorney-at-law; Administrator; Judicial Officer and General Public. However, the final system is not accessible for general public as the features designed for the general public was not implemented. The main reason for not to implement the feature was that the facility to download judgments already exists in the current Supreme Court and court of appeal website, which is accessible via <http://www.supremecourt.lk/>.

Initially, though it was planned to use a mobile OTP for user authorization that step was abandoned due to the costs involved.

03.04 Final Project Record

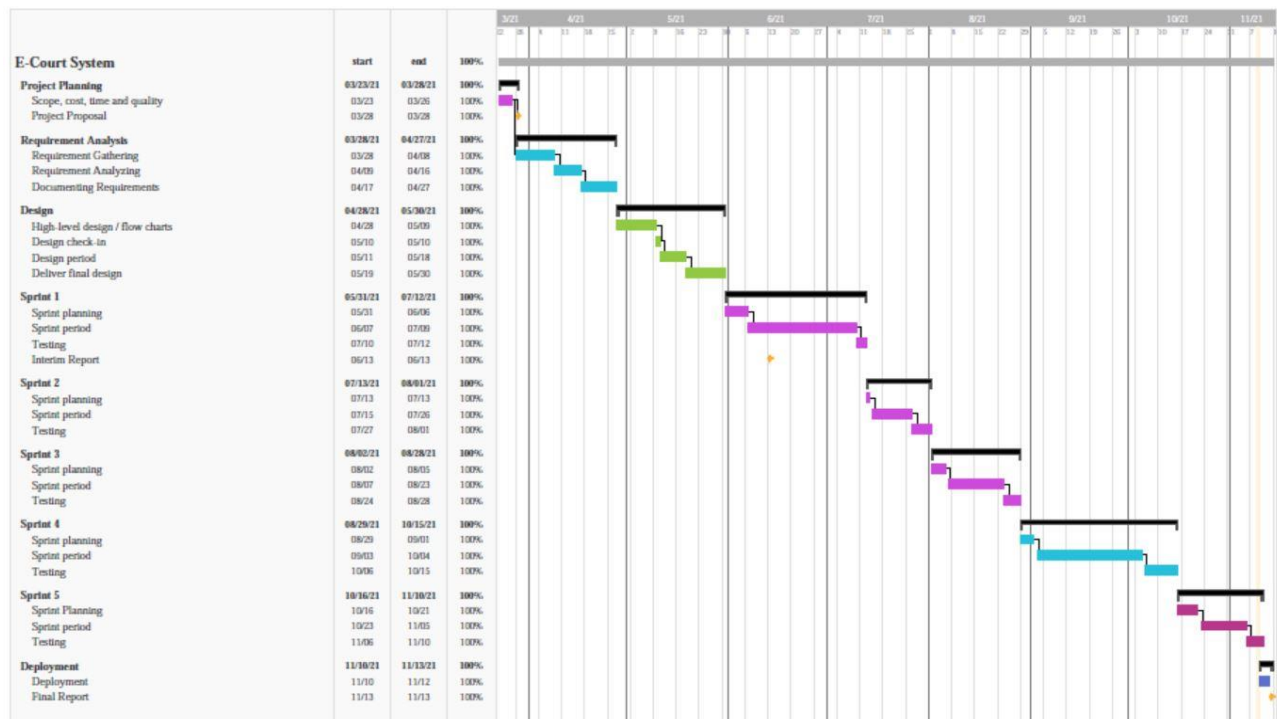


Diagram 8: Final Project Gantt chart

Above the project Gantt chart that was amended and finally used.

E-Court System	start	end	100%
Project Planning	03/23/21	03/28/21	100%
Scope, cost, time and quality	03/23	03/26	100%
Project Proposal	03/28	03/28	100%
Requirement Analysis	03/28/21	04/27/21	100%
Requirement Gathering	03/28	04/08	100%
Requirement Analyzing	04/09	04/16	100%
Documenting Requirements	04/17	04/27	100%
Design	04/28/21	05/30/21	100%
High-level design / flow charts	04/28	05/09	100%
Design check-in	05/10	05/10	100%
Design period	05/11	05/18	100%
Deliver final design	05/19	05/30	100%
Sprint 1	05/31/21	07/12/21	100%
Sprint planning	05/31	06/06	100%
Sprint period	06/07	07/09	100%
Testing	07/10	07/12	100%
Interim Report	06/13	06/13	100%
Sprint 2	07/13/21	08/01/21	100%
Sprint planning	07/13	07/13	100%
Sprint period	07/15	07/26	100%
Testing	07/27	08/01	100%
Sprint 3	08/02/21	08/28/21	100%
Sprint planning	08/02	08/05	100%
Sprint period	08/07	08/23	100%
Testing	08/24	08/28	100%
Sprint 4	08/29/21	10/15/21	100%
Sprint planning	08/29	09/01	100%
Sprint period	09/03	10/04	100%
Testing	10/06	10/15	100%
Sprint 5	10/16/21	11/10/21	100%
Sprint Planning	10/16	10/21	100%
Sprint period	10/23	11/05	100%
Testing	11/06	11/10	100%
Deployment	11/10/21	11/13/21	100%
Deployment	11/10	11/12	100%
Final Report	11/13	11/13	100%

Diagram 9: Dates chart

Chapter 04

Feasibility Study

04.01 Time Feasibility

The Gantt chart above provides the steps that will be undertaken to deliver the project and how the time management is done. The project planning was initiated with the announcement of the project details and the initial project planning is expected to be completed within 15 days. From the Initial project proposal submission date of 28/03/2021, the final project deliverables will be delivered within 154 days as shown in the Gantt chart. The implementation is divided into 4 sprints. As shown, the majority of the project time period will be sacrificed for implementation (Four sprints). Requirement Analysis and design procedure have been allocated with consecutively 30 days and 33 days.

04.02 Cost Feasibility

WBS	DURATION	BUDGET
Project Planning	4 day	Rs. 10,000
- Scope	1 day	Rs. 2500
- Time	1 day	Rs.2500
- Cost	1 day	Rs.2500
- Quality	1 day	Rs.2500
	30 days	
Requirement Analysis	11 days	Rs. 30,000
- Requirement Gathering	8 days	Rs. 11,000
- Requirement Analysing	11 days	Rs. 8,000
- Documenting Requirements		Rs. 11,000
Design	33 days	Rs. 33,000
- High level design	12 days	Rs. 12,000
- Design check-in	1 days	Rs. 1000
- Design Period	8 days	Rs. 8000
- Deliver Final Design	12 days	Rs. 12,000
Implementation	89 days	Rs. 89,000
- Sprint 01	20 days	Rs. 20,000
- Sprint 02	21 days	Rs. 21,000
- Sprint 03	25 days	Rs. 25,000

- Sprint 04	23 days	Rs. 23,000
- Sprint 05	20 days	Rs. 11,000
Deployment	2 days	Rs. 2,000
- Deployment		
Total : Rs. 164,000		

01. Table: Cost estimation

Costs are estimated based on the work brake down structure, using the bottom-up technique. This technique involves estimating the cost of individual activity and then adding the individual techniques to get a project total. This technique is selected because the project of this nature in the Sri Lankan context is completely novel and no historical data is available.

The most of the costs will be associated with the implementation process and to establish the infrastructure required (in reality the costs involved to implement a system that cover whole court system will amount to USD Millions as it is required to establish infrastructure at police stations, court houses and other relevant government departments). The client and the server applications will be hosted through as web application and it is required to bear the associated hosting costs. When the operation is operational monthly charges are required to be paid for Internet Service Providers. The bandwidth required is high and conventional copper cables are not satisfactory. The use of fibre optical connection is recommended. Also, a substantial amount will be allocated for maintenance and testing.

However, the benefits accrued after the adaptation will able to be calculated in multi-millions. The number of human working hours that will save through the system is immense. Most importantly the backlog of cases will be reduced drastically.

04.03 Scope Feasibility

The main objective is to build a comprehensive system that deals with the recognized features as clearly described in the project proposal. The boundaries of the project are well settled and clearly stated as a result of that the scope of the project would not change throughout the project.

04.04 Technical Feasibility

This application as a web application is associated with following technologies and techniques. All this technologies are freely available and can access without any subscription plans or costs, as open

sources. The application will be developed using HTML, CSS and C#. The data bases are developed using SQLite.

The application is using the .net visual studio IDE and the comprehensive developing environment is user-friendly and there are reference material and support that can be easily found online.

04.05 Economic Feasibility

The infrastructure needed is already established as there are computers and the ability to access internet in most of the court houses and other authorities. The fibre optical access is available in most part of the country. When compared other than the costs required for developing the web application the costs for infrastructure development will be minimum (**development costs and setup costs**). In the operation phrase when implementing a system, it will be required to train the staff or appointing new staff members, which will increase the costs drastically (**operational cost**). However, the monthly salaries and the costs involved in maintaining staff will be as same as the staff required in a non-digitalize court system.

The final product will continue to produce results for ages. As elsewhere mentioned in this report this system will reduced the staff requirements. The government will be able to save millions spend on salaries. As the number of papers used by the court system reduces that will directly reduce the costs and as less papers will be used (**direct benefits**).

The impact on the environment is also positive as fewer resources will be wasted. As the government uses less resource on the system the relevant government fee and stamp charges can be reduced. (As per the present law every proxy and other documents must stamped based on the value of the case) (**Assessable indirect benefits**).

The author of this report is of the view that the **intangible benefits** of implementing this project will surpass the tangible benefits. Under the international conventions it is required to increase use of technology in our day-to-day lives. By digitalizing our court system the image boost received by the country will create new opportunities and position Sri Lanka as a favourable country to do international trade and business. The countries ease of doing business rank will reduced as any issue is capable of solving within a very short period of time. The image boost country accumulates is harder to estimate or measured.

As the proposed system reduce the backlog of cases that will increase the efficiency of the court system. Less Judges and police officers are required to maintain the court system. Overall, the efficacy of human working hours will be considerably increased.

The most valuable advantage of all the advantages will be cultural effect on the society. As cases are solved within a short period of time more and more people will resort to solving cases through judiciary, which will result in a paradigm change on how people react in problematic situations (access to justice will increase).

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Chapter 05

Design

In this chapter the details pertaining to the design phrase will be discussed in detail and any relevant diagrams will be presented with explanations. In summary during this design phrase, the design document is produced from the output of the requirement analysis stage. **05.01. Network System and Architecture**

The integrated e-court system is developed as a web application that can be access via the World Wide Web. There isn't a necessary to install any new software as the services can be accessible via the normal browsers.

The frontend is developed using HTML, CSS, and Java Script technologies and the backend is developed using C#. The data bases will be developed using the SQLite .For optimal performance the application is designed to work best over networks that have the following elements:

- Bandwidth greater than 50 KBps (400 kbps)
- Latency under 150 ms

MVC Architecture

As any web-application the architecture design of the proposed application is client server architecture. Nevertheless, as Pressman and Maxim states in their book Software engineering: a practitioner's approach. A three-layer design architecture that decouples interface from navigation and from application behavior by keeping interface, application, and navigation separate simplifies implementation and enhances reuse (Pressman, 2021). Therefore, the Model – View – Controller architecture is selected for the proposed system.

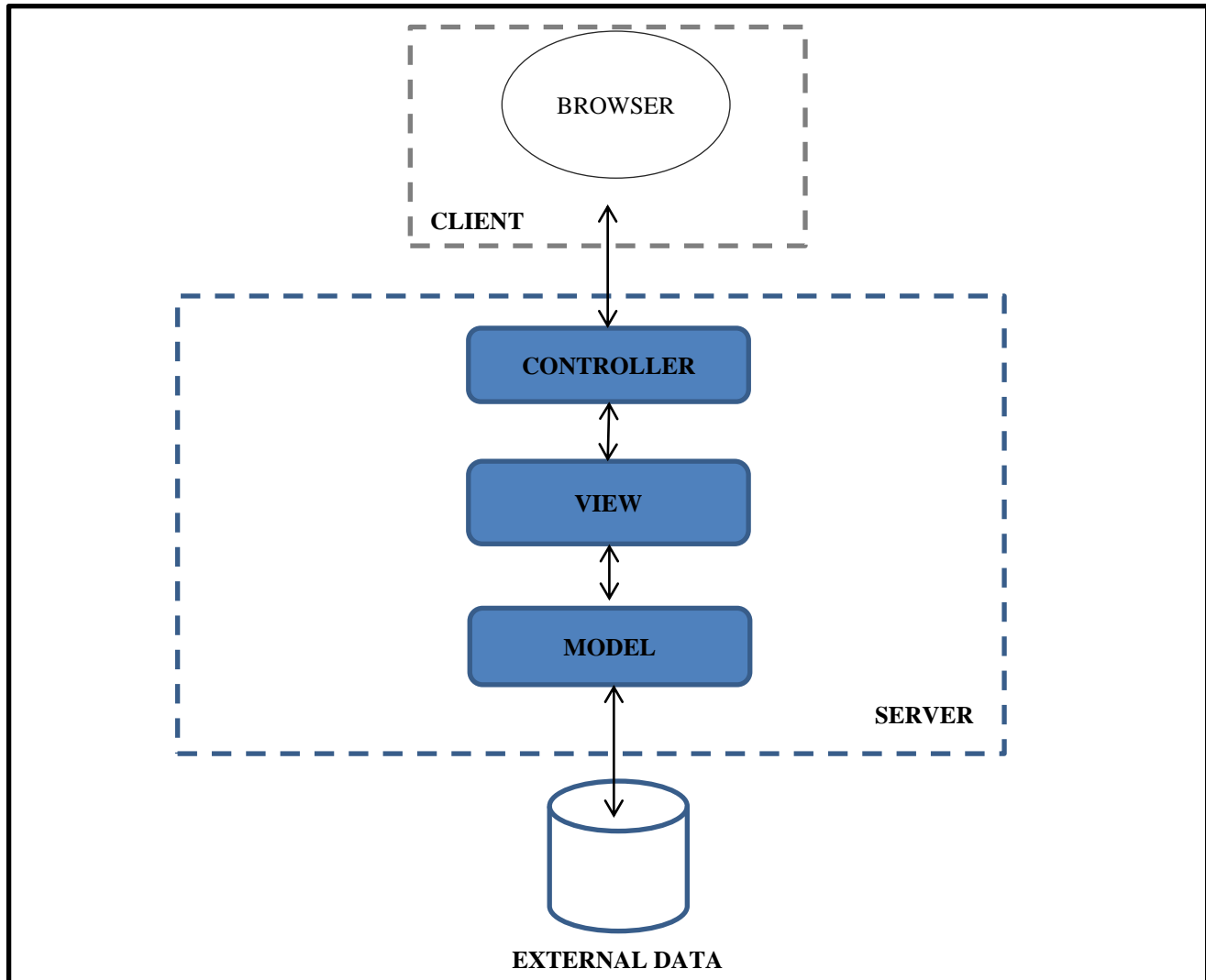


Diagram 10: Software Architecture

Model is the core component of the architecture, and contains all the data and logic. The View element comprised of the Graphical user interfaces, and only capable of accessing data in the model through the controller. The main reason for using this architecture is the security as the user can only access the view. This pattern is more suitable for an application pertaining to the judiciary. Also, asynchronous technique makes it possible to work with PDF files, site-specific browsers, and also with desktop widgets. Also, due to the ability to load the application fast that will save the time. Saving time is the most prominent aim of this project. Also, though not relevant to this project, in a project more than one developer is involved using this pattern will allow developers to develop the view, control and model simultaneously.

05.02. Hardware and software requirements

Software Requirement

The application is run on a browser and a browser with latest version is required.

The system is accessible via any types of the browsers above mentioned:

- Microsoft Edge (latest publicly-released version)
- Mozilla Firefox (latest publicly-released version)
- Google Chrome (latest publicly-released version)
- Apple Safari (latest publicly-released version)

Hardware Requirements

Component	Minimum	Recommended
Processor	1.9 gigahertz (GHz) x86- or x64-bit dual core processor with SSE2 instruction set	3.3 gigahertz (GHz) or faster 64-bit dual core processor with SSE2 instruction set
Memory	2-GB RAM	4-GB RAM or more
Display	Super VGA with a resolution of 1024 x 768	Super VGA with a resolution of 1024 x 768

Diagram 11: Hardware Requirements

05.03. Evaluating of solutions

At the inception of this project Sri Lankan court system only provided two services over the World Wide Web. I). all the judgments were issued as PDF's by the Supreme Court and court of appeal website. II). the possibility of filing Fundamental rights cases. However, from the month of June this year virtual hearings were started. The web application developed by the author of this report provides the facilities for any other procedures.

As the current paper based system everything is done manually and considerable amount of money is spent for paper, as an example the main law enforcement agency of the government files cases in the magistrate's courts through a manual paper based system which required carrying files from court to police stations on a daily basis. However, with the system developed now the police could file the documents through this system that eliminate the need to transport files from place to place.

The prevailing system allows checking the court documents by visiting the court and especially during the covid-19 outbreak only small number of lawyers was allowed to check the files at a given time. Also the relevant parties to a case are required to check any documents by visiting the relevant police station or any courts documents through a lawyer. But with the system developed relevant parties get the opportunity to check any relevant documents through the system. This provides the benefit of accessing the documents for a low cost.

At present to know the next date or the current status of the case relevant parties should pay check any relevant documents through a lawyer and there are instances in which parties missed the remedies provided by the law due to mistakes pertaining to the errors by lawyers and relevant parties.

In general overall the easy access will enhance the access to justice and the right to information of the citizens. Other than those the costs and the time taken for a case will increase as the time taken for a case will gradually decrease. In summary all the objectives that were planned to achieve through this system have been successfully achieved.

Chapter 6

Implementation

This chapter contains details pertaining to the system developed including the details pertaining to the software development process and diagrams like the class diagram and database schemas an explanation about the system with screenshots.

Software Development Life Cycle

As the Software Development life model Scrum method is adapted but as this project was done as an individual project the scrum approached was used in a manner optimized for an individual project with the focus on agile principles. Therefore, there wasn't any coordinating work and no Daily Standups, Iteration Planning was help. Scrum is an agile software development method that was conceived by Jeff Sutherland and his development team in the early 1990s. Scrum principles are consistent with the agile manifesto and are used to guide development activities within a process that incorporates the following framework activities: requirements, analysis, design, evolution, and delivery. Work tasks occur within a process pattern called a sprint, which consist of the phrases shown in the diagram bellow. There were altogether five sprints in this project.



Diagram 12: Software Architecture

At the end of each sprint a demo with certain functionalities is developed. The Scrum process is

selected because it can be used for a software development with a tight timelines with changing requirements and business criticality.

Input for the implementation stage

When implementing the project the diagrams that generated from the requirement analysis phase and design phase was used to get a comprehensive idea before starting on system development. As the first step a use case diagram was drawn and the use case diagram is given below. Moreover, use case description was drawn. Finally, as in any agile method development is done based on the user stories.

Use Case Diagram

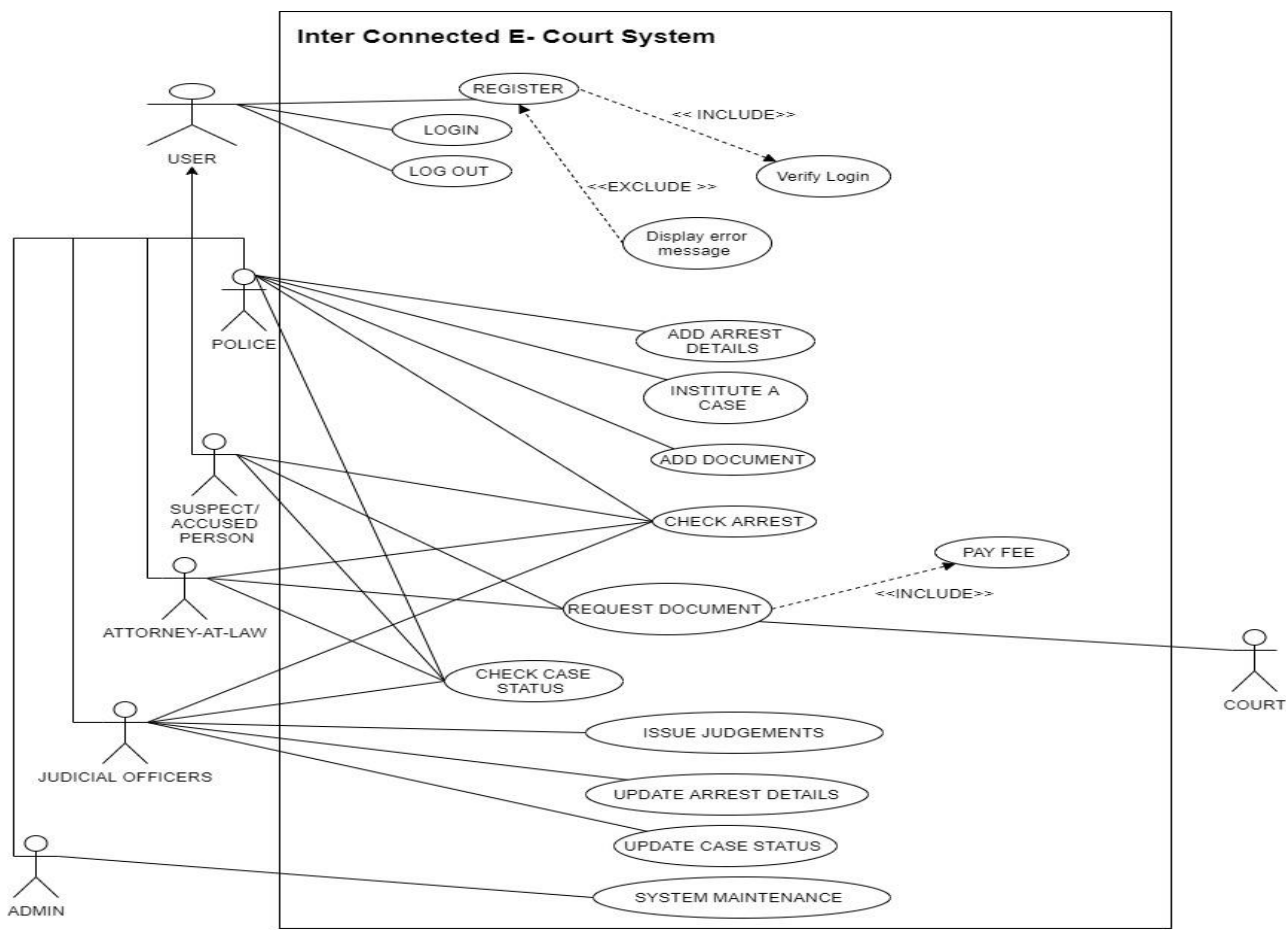


Diagram 13: User Case Diagram

Use Case Description

Use case: Register

Description	The relevant actors must register to access the system.
Actors	Police, Accused Person, Judicial Officers (Admin) and Attorney-at-law
Pre-Condition	Accused person must have a charge sheet filed relevant to a crime. Attorney-at-Law must be a registered as an attorney.
Post-Condition	A username and a password are Generated.

Main Success Path The Actor upon filling relevant details a username and the password are generated.

Actor Actions	System Responses
1. Add username and email (Accused Person). Add username and email (Attorney at law). Add username, and email (Police Officer). Add username and email (Judicial Officers).	1.1 System verifies NIC number and Attorney Number. 1.2 Sends an OTP to the phone number.

Exception Path 01 The Actor upon filling relevant details if any of the provided details are incorrect.

Actor Actions	System Responses
1. Add email and Phone password (Accused Person). Add email and password (Attorney at law). Add email, and password (Police Officer). Add email and password (Judicial Officer).	1.1 System verifies details. 1.2 Display the error message.

Use case: Login

Description	The relevant actors must login to the system by proving the given Username and the Password.
Actors	Police, Accused Person, Judicial Officers, Admin and Attorney-at-law
Pre-Condition	The Actor is already registered as a user
Post-Condition	The Actor directs to the Dashboard

Main Success Path The Actor upon filling username and the password directs to the main Dashboard

Actor Actions	System Responses
1. Add Username and Password	1.1 System verifies details 1.2 Directs to the Main Dashboard

Exception Path The Actor upon filling wrong username and/or the password. Access to the system is denied

Actor Actions	System Responses
1. Add Username and Password	1.1 System verifies details 1.2 Display the error message

Use case: Log Out

Description The registered users shall log-out from the system
Actors Police, Accused Person, Judicial Officers, Admin and Attorney-at-law
Pre-Condition The Actor is login to the system.
Post-Condition The Actor directs to the login screen

Main Success Path Press the log-out button

Actor Actions	System Responses
1. Press the log out button	1.1 Directs to the Login Screen

Use case: Add Arrest Details

Description The Police can add details pertaining to an arrest.
Actors Police.
Pre-Condition The Actor must be registered with the system.
Post-Condition New arrest details file is created.

Main Success Path The Actor adds all relevant details.

Actor Actions	System Responses
1. Add all required details of the arrest of the person arrested and the details of the officers involved.	1.1 System saves details to the database. 1.2 A number is generated. 1.3 Display successful message with the number.

Exception Path The Actor **doesn't** add all relevant details.

Actor Actions	System Responses
1. Add only some details of the arrest of the person arrested and the details of the officers involved.	1.1 Display the error message.

Use case: Institute a Case

Description The Police can file a case.
Actors Police
Pre-Condition The Actor must be registered with the system.

Post-Condition New case file is created.

Main Success Path The Actor adds all relevant details. Once added the system will share the added details with a judicial officer. Once the judicial officer accepts the case. A message will be sent to the inbox of the police inbox and registered users will be able to see the progress under the check case details tab.

Actor Actions	System Responses
1. Add all required details of the case.	1.1 System saves details to the database.

Exception Path The Actor **doesn't** add all relevant details. The system will display a message stating relevant information to be added. Also, if a judicial offer rejects the case based on a reason that reason with details will be sent to the police inbox and request to re-file.

Actor Actions	System Responses
1. Add only some details of the case.	1.1 Display the error message.

Use case: Add Document

Description The relevant actors can use this feature file any additional documents as requested by the court.

Actors Police.

Pre-Condition The Actor must be registered with the system.

Post-Condition New Document uploaded.

Main Success Path The Actor adds documents.

Actor Actions	System Responses
1. Upload document.	1.1 System saves details to the database. 1.2 Display successful message with a number.

Use case: Check Case status

Description The relevant actors can use this feature check the status of an ongoing case.

Actors Police, Accused Person and Attorney-at-Law.

Pre-Condition The Actor must be registered with the system.

Post-Condition Case status is shown.

Main Success Path The Actor can check the status of an ongoing case. The Actor must be registered to check the status.

Actor Actions	System Responses
1. Enter the case number.	1.1 System retrieves data from the database. 1.2 Display the relevant file.

Use case: Request Document

Description	The relevant actors can use this feature to request documents, upon paying relevant fees. The court will then check the possibility of issuing document and may issue the document.
Actors	Accused Person and Attorney-at-Law.
Pre-Condition	The Actor must be registered with the system.
Post-Condition	Request will be sent to the Judicial officers.

Main Success Path The Actor request documents, upon paying relevant fees.

Actor Actions	System Responses
1. Actor requests Documents of a particular case.	1.1 System sends the details to the judicial officers.

Use case: Check Arrest

Description	The relevant actors can use this feature check the status of an arrest.
Actors	Police, Accused Person and Attorney-at-Law.
Pre-Condition	The Actor must be registered with the system.
Post-Condition	Arrest status is shown.

Use case: Update Case Status

Description	The relevant actors can use this feature to update the progress of a case.
Actors	Judicial Officers
Pre-Condition	Must login.
Post-Condition	Case status is updated.

Main Success Path The relevant actors can use this feature to update the progress of a case.

Actor Actions	System Responses
1. Enter the case number.	1.1 System retrieves data from the database. 1.2 Display the relevant file.
2. Click on add tab to update the details and save.	2.1 Updated information saved to the database.

Use case: System Maintenance

Description	The relevant actors can use this feature to add, delete or edit any information, file or any other thing in the system.
--------------------	---

Actors Administrator.
Pre-Condition Logged in to the system.
Post-Condition Intended changes will take place.

Main Success Path System admin can use this feature to make changes in the system.

Actor Actions	System Responses
1. Do changes.	1.1 System saves the file/information. 1.2 Successful message appears.

Use case: Update Arrest/case/closed case Status

Description The relevant actors can use this feature to update the progress after Arresting a person.

Actors Judicial Officer.
Pre-Condition Must login.
Post-Condition Arrest status is updated.

Main Success Path The relevant actors can use this feature to update the progress after Arresting a person.

Actor Actions	System Responses
3. Click the edit icon	1.1 System retrieves data from the database. 1.2 Display the relevant file.
4. Click on add tab to update the details and save.	2.1 Updated information saved to the database.

User Story

Actor: Police Officer

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to add details pertaining to arrests.
05. As a user I need to file new case cases.
06. As a user I need to check arrest details, so I can become aware of the status of an arrest.
07. As a user I need to check case details, so I can become aware of the status of a case.
08. As a user I want to add documents requested by the court.

Actor: Suspect/Accused Person

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest pertaining to me.
05. As a user I need to check request document from the court in a case pertaining to me, so that I can receive soft or hard copies.
06. As a user I need to check case details, so I can become aware of the status of a case pertaining to me.

Actor: Attorney-at-Law

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest.
05. As a user I need to check request document from the court, so that I can receive soft or hard copies.
06. As a user I need to check case details, so I can become aware of the status of a case.

Actor: Judicial Officer

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest.
05. As a user I need to check case details, so I can become aware of the status of a case.
06. As a user I need to edit arrest details, so I can update b the status of an arrest.
07. As a user I need to edit case details, so I can update the status of a case.

Actor: Admin

01. As a user I need to do basic system maintenance.
02. As a user I should be able to edit/add/delete any case/arrest/closed case details.

Other than these class diagram was used to develop the relevant classes and database schema to develop databases.

Class Diagram

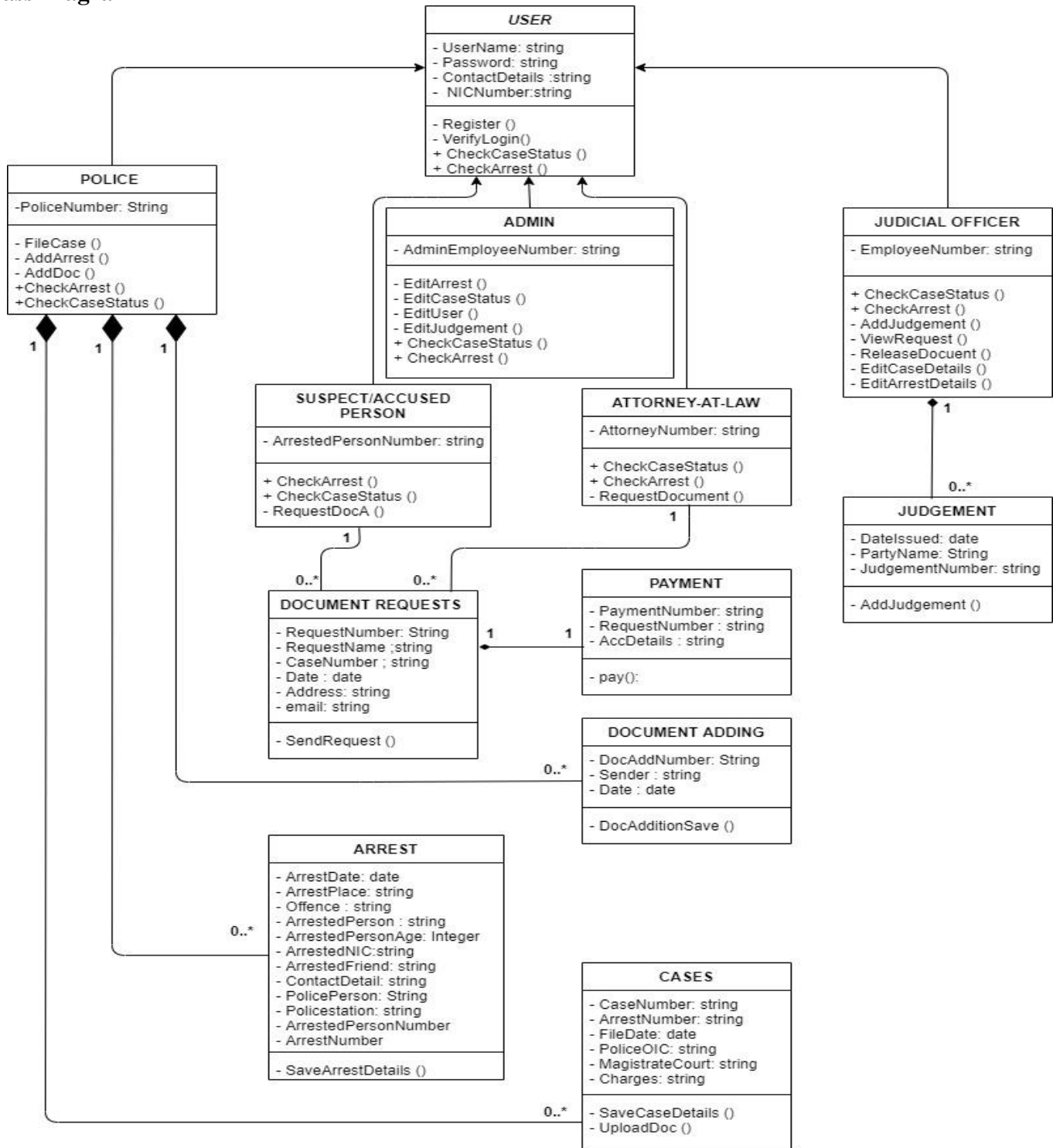


Diagram 14: Class Diagram

Entity Relationship Diagram

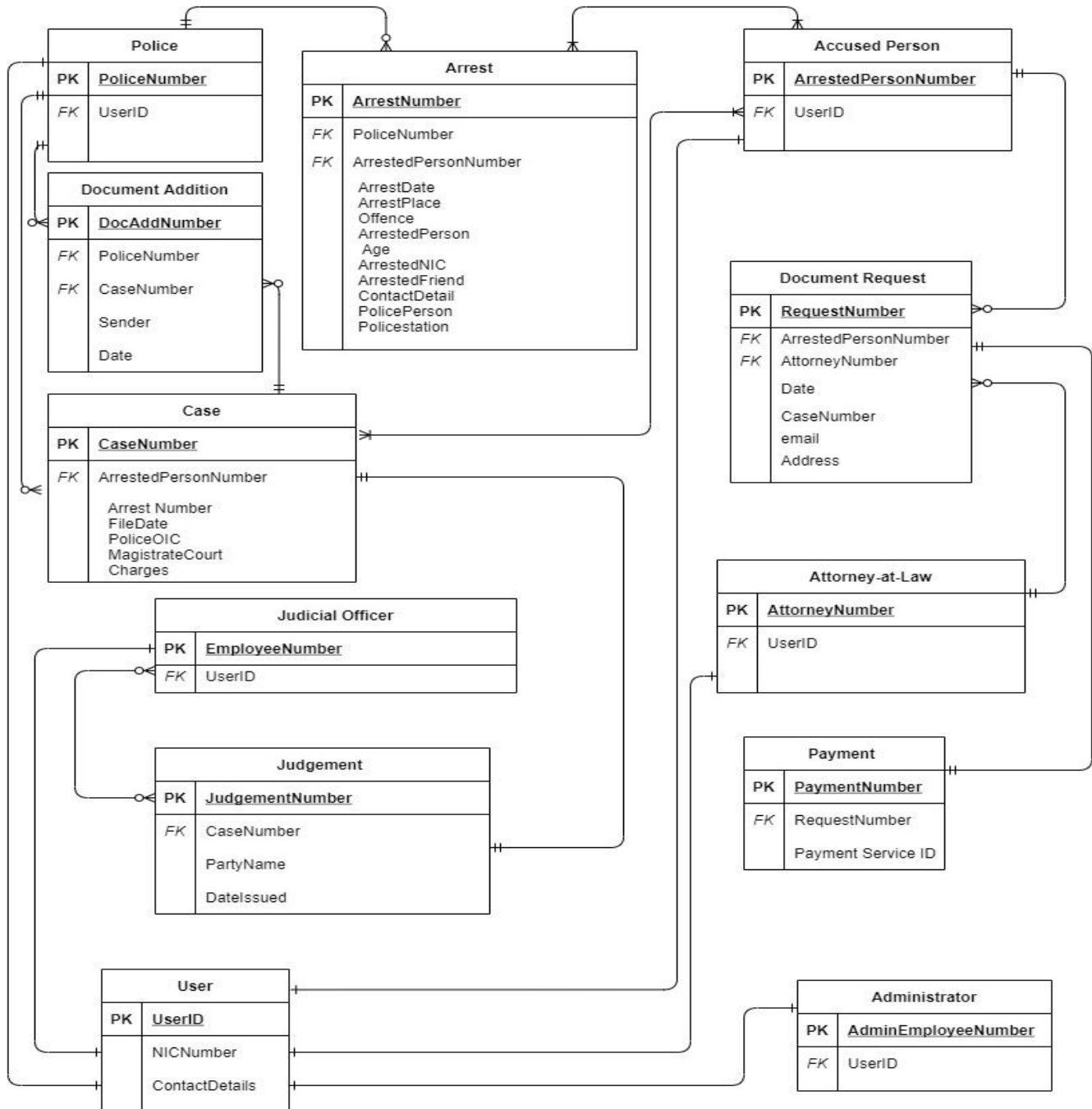


Diagram 15: Data base ER

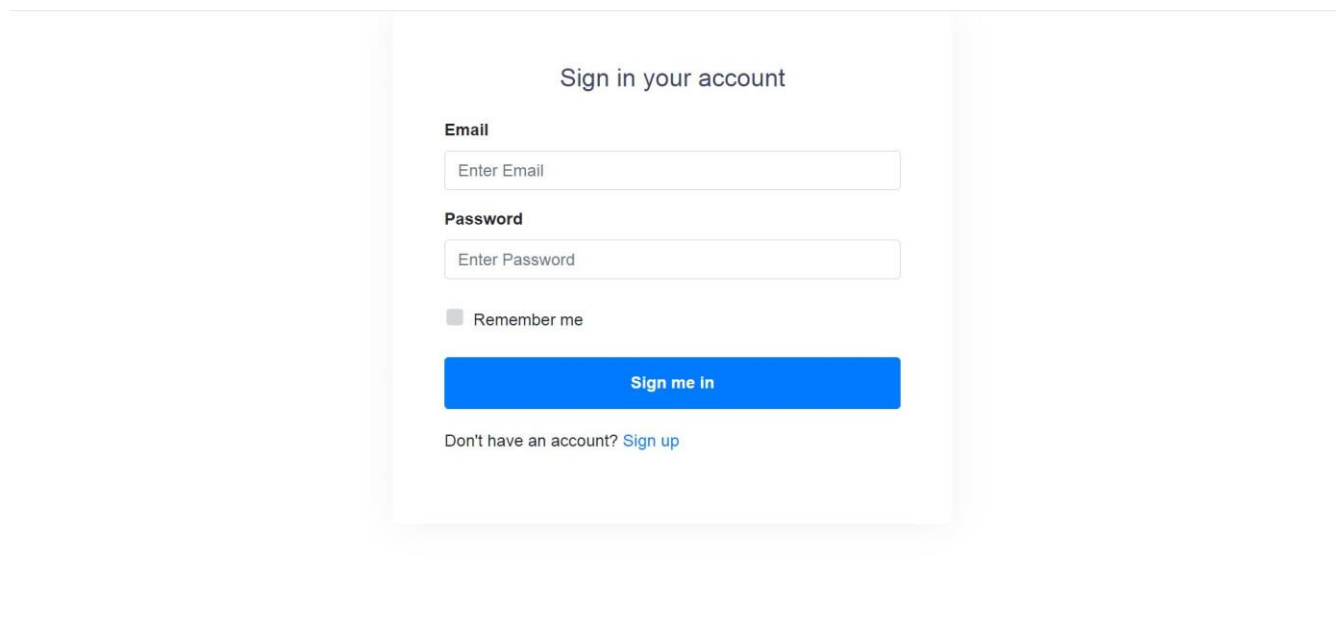
System Demonstration

This part of the report comprise of the screenshots from the system developed and relevant explanations

Admin is the role that has all the capabilities within the system and some of the capabilities of an admin will not be available to other roles. When the admin/viewer or any other roel enters correct details for the sign up and password next screen will be the main dashboard.

Common Features of the system

01 Sign in Page

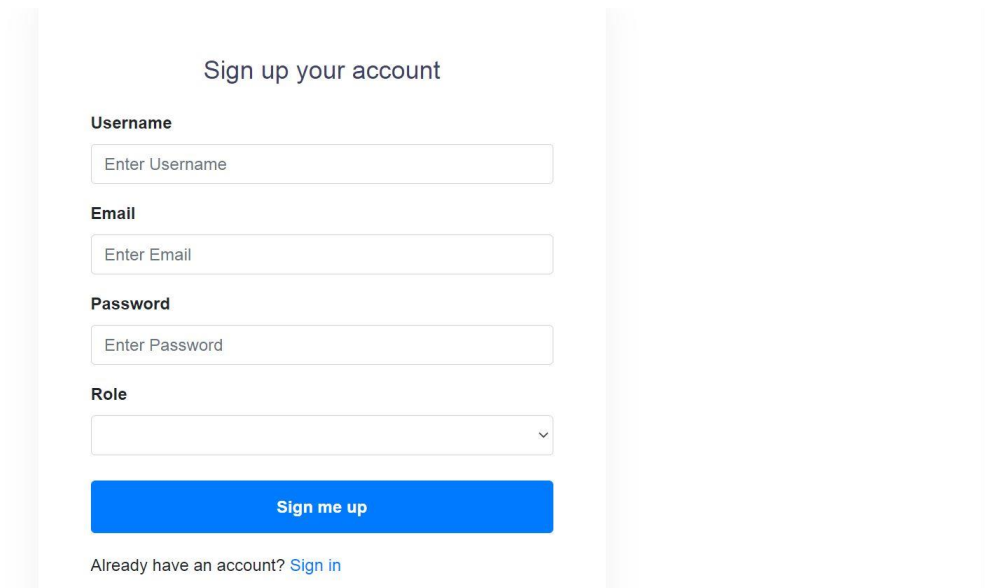


The screenshot shows a 'Sign in your account' form. It includes an 'Email' field with the placeholder 'Enter Email', a 'Password' field with the placeholder 'Enter Password', a 'Remember me' checkbox, a blue 'Sign me in' button, and a link for 'Don't have an account? Sign up'.

Diagram 16: Sign In page

This is the first screen that appears when the application is launched. In the first screen there will be email and password boxes. Also, for a new user there will be a sign up button

02 Sign Up page

A screenshot of a web form titled "Sign up your account". The form is centered on a light gray background. It contains four input fields: "Username" with placeholder text "Enter Username", "Email" with placeholder text "Enter Email", "Password" with placeholder text "Enter Password", and a "Role" dropdown menu. Below these fields is a blue button labeled "Sign me up". At the bottom, there is a link that says "Already have an account? Sign in".

Sign up your account

Username

Email

Password

Role

▼

Sign me up

Already have an account? [Sign in](#)

Diagram 17: Sign up screen

In the sign Up page user is required to add a username with a capital letter and a valid email address. The password field must be comprised of capital and simple letters as well as numbers and signs. In the dropdown menu the user is required to select relevant roles.

For all the users this step will be the same and from the sign up page onward the users will be provided with different level of clearance and capabilities.

Sign up your account

Username
Enter Username

Email
Enter Email

Password
Enter Password

Role

- Admin
- Police
- Judicial
- Attorney at Law
- Viewer

Diagram 18: Sign up screen with the drop down list

03 Main Dashboard

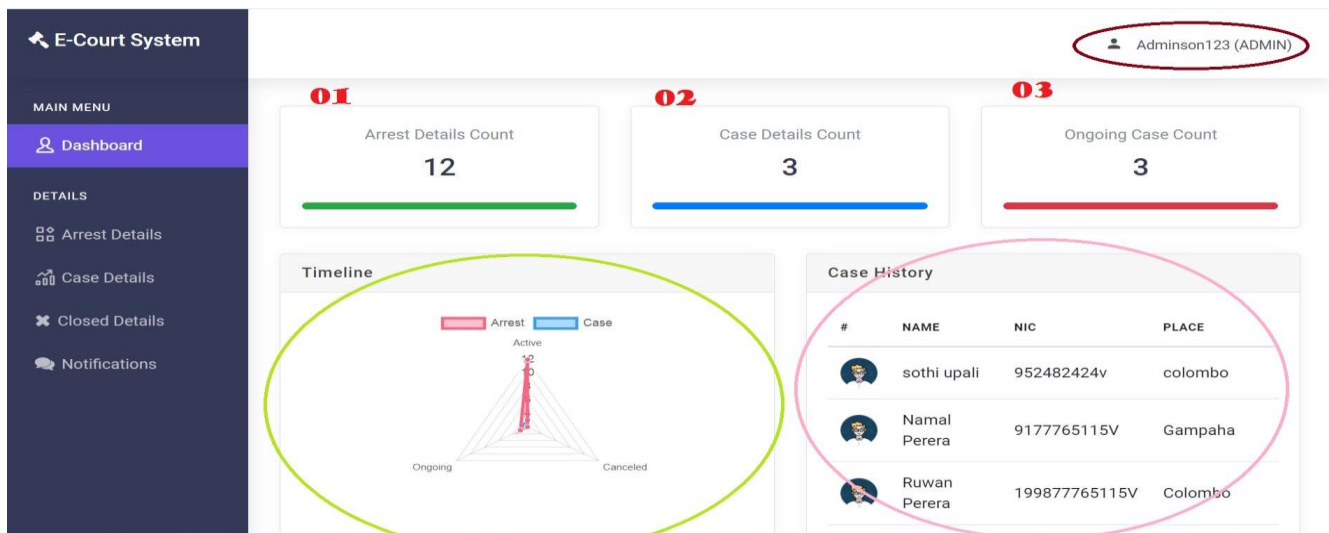


Diagram 19: Dashboard

As shown in the above screen by the brown colored circle the username of the user and the role will be displayed. The screen color circle depicts the graph that shown all the details in the 3D mode and any admin can get a comprehensive look from this graph.

From the numbers:

01. In the arrest details count there will be the number of total arrests counts in the system.

02. Cases details counter shows the total number of cases that are currently active.
03. Closed cases that are counted

The main navigation bar on the left of the screen can be used for navigation among the different pages.

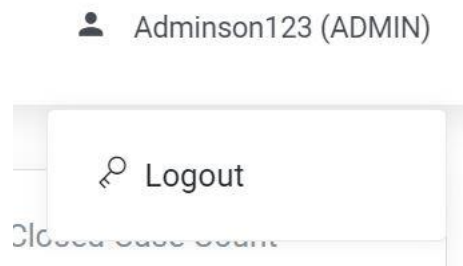


Diagram 20: Logout

When click on the area circled by the brown color in the main dashboard image the logout button will be appear in a dropdown list. To log out from the system it is required to click on that log out icon.

04

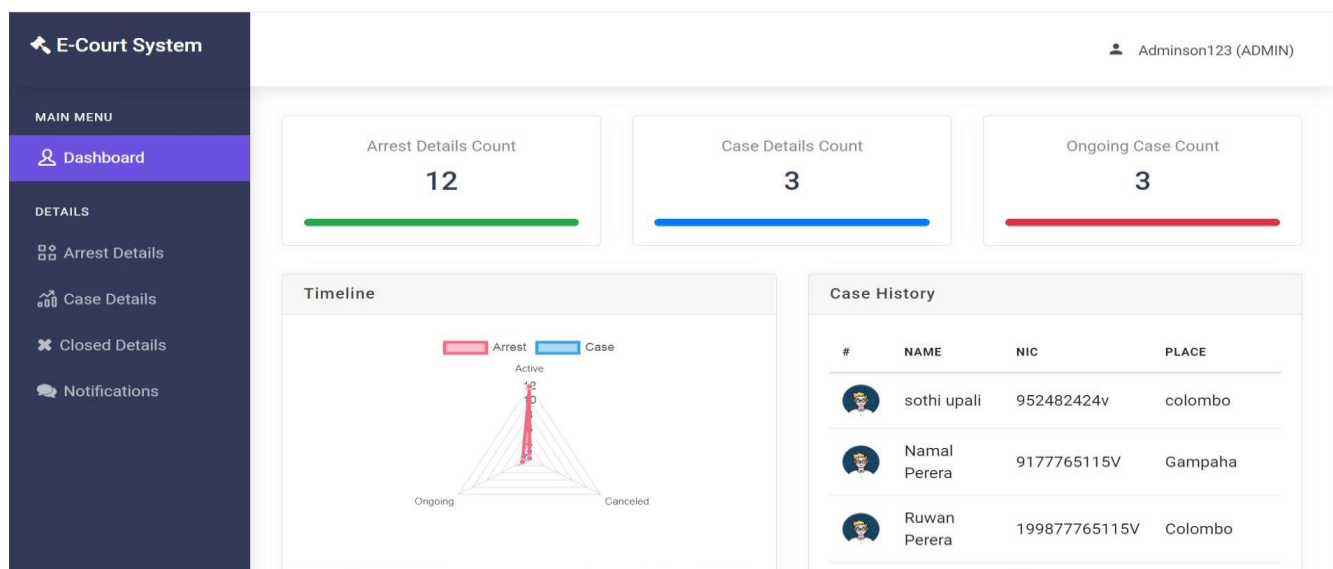


Diagram 21: Main dashboard

In the main dashboard there will be a navigation panel to access relevant pages as shown in the below image.

The notification tab will be only visible for attorney/viewer/judicial officer and the admin.

05

E-Court System Adminson123 (ADMIN)

MAIN MENU

- Dashboard

DETAILS

- Arrest Details**
- Case Details
- Closed Details
- Notifications

Arrest Details List

#	NAME	NIC	PLACE	REASON	REMARK	OFFICER	DATE	STATUS
1	Namal Perera	9177765115V	Gampaha	Public nuisance (Section 261)	Released on Bail - 2021/11/12	Sunil Perera IP	Nov 11, 2021	Active
2	Ruwan Perera	199877765115V	Colombo	Disobedience to a quarantine rule (Section	Arrested - 2021/10/11 Produced before the magistrate - 2021/10/12 Remanded by the magistrate	Sunil Shantha IP	Nov 11, 2021	Active

Diagram 22: Arrest details

In order to add arrest details the admin can press the, add new arrest details list as shown in the top left red circle. Furthermore to change the status and edit or delete these inputs the user can click on the icons shown.

Admin is the only person that has capabilities to change status, edit and delete. Viewer can only check the relevant arrest for him and attorneys can check all the arrests. Judicial officers can edit this and add but not delete.

06

Add New Arrest Data

First Name: Last Name:

NIC Number: Place:

Reason:

Officer Name:

Remark:

DATE	STATUS	
Nov 11, 2021	Active	
Nov 11, 2021	Active	

Diagram 23: Details adding page

When click on the above mentioned button the above screen will appear to add the details. Only Police/Judiciary and admin have the capabilities to add new arrest details.

07

Case Details List

#	NAME	NIC	PLACE	REASON	REMARK	OFFICER	DATE	STATUS
1	Sarath Fernando	98888766V	Kelaniya	Theft (Section 366)	Arrested - 2020/10/12 Produced before the magistrate - 2020/10/12 Remanded by the Magistrate until - 2020/10/24 (1) day - 2021/03/12 - Parties didn't appear and fixed for the next date - 2021/06/12 (2) day - 2021/06/12 - Case was fixed for - 2021/12/28	Kelum Navarathne SI	Nov 11, 2021	Active

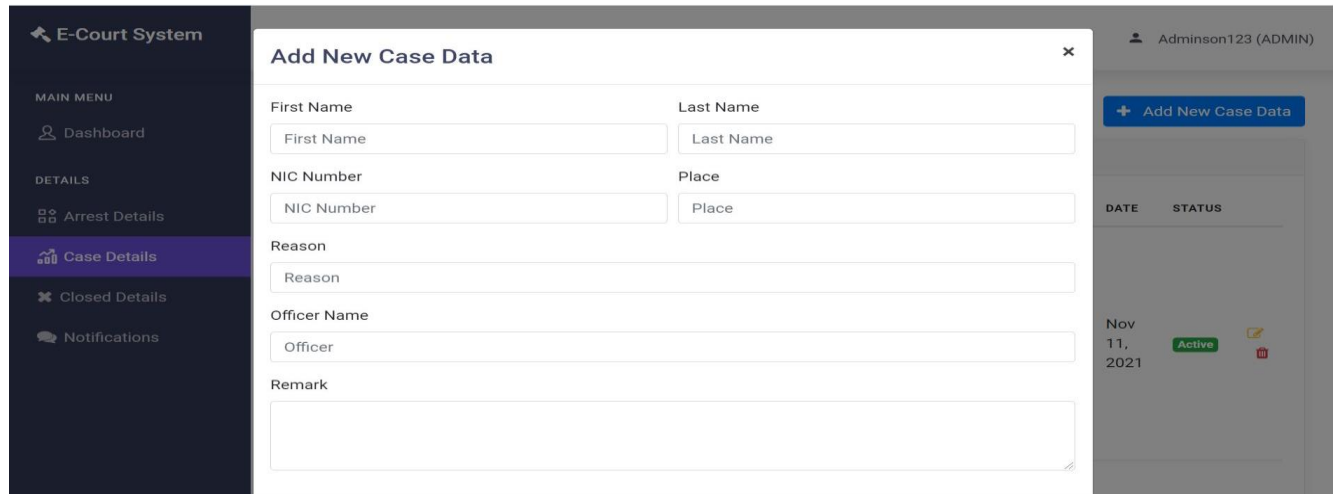
Arrested - 2020/10/12

Diagram 24: Case details main page

In order to add case details the admin can press the, add new arrest details list as shown in the top left red circle.

Furthermore to change the status and edit or delete these inputs the user can click on the icons shown. Admin is the only person that has capabilities to change status, edit and delete. Viewer can only check the relevant arrest for him and attorneys can check all the arrests. Judicial officers can edit this and add but not delete.

08



E-Court System

MAIN MENU

- Dashboard

DETAILS

- Arrest Details
- Case Details**
- Closed Details
- Notifications

Add New Case Data

First Name: Last Name:

NIC Number: Place:

Reason:

Officer Name:

Remark:

Adminson123 (ADMIN)

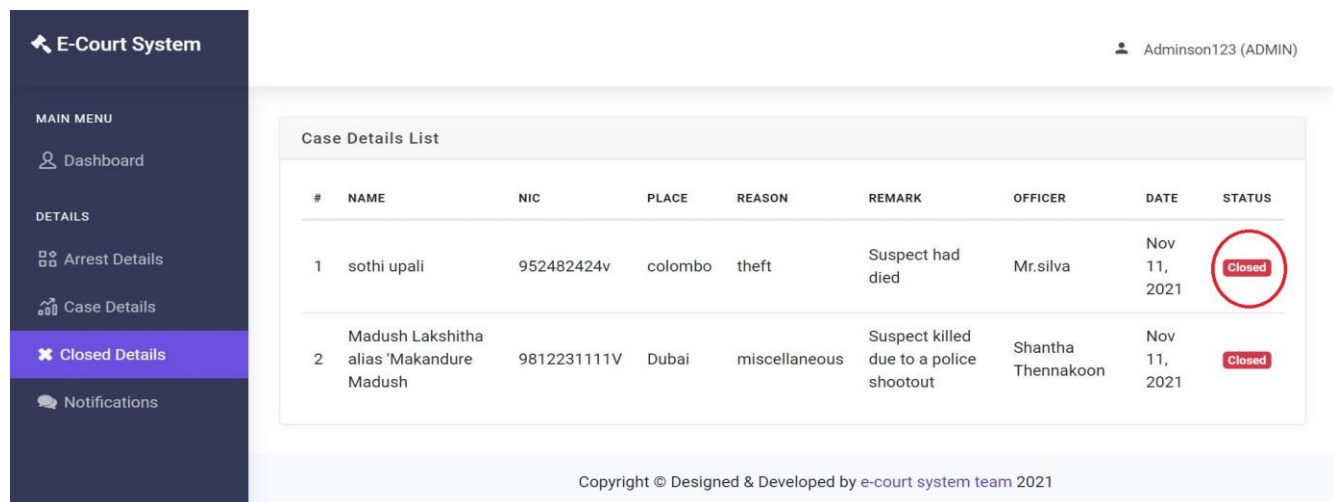
+ Add New Case Data

DATE	STATUS
Nov 11, 2021	Active

Diagram 25: Case details

When click on the above mentioned add case data button the above screen will appear to add the details. Only Police/Judiciary and admin have the capabilities to add new arrest details.

09



E-Court System

Adminson123 (ADMIN)

MAIN MENU

- Dashboard

DETAILS

- Arrest Details
- Case Details
- Closed Details**
- Notifications

Case Details List

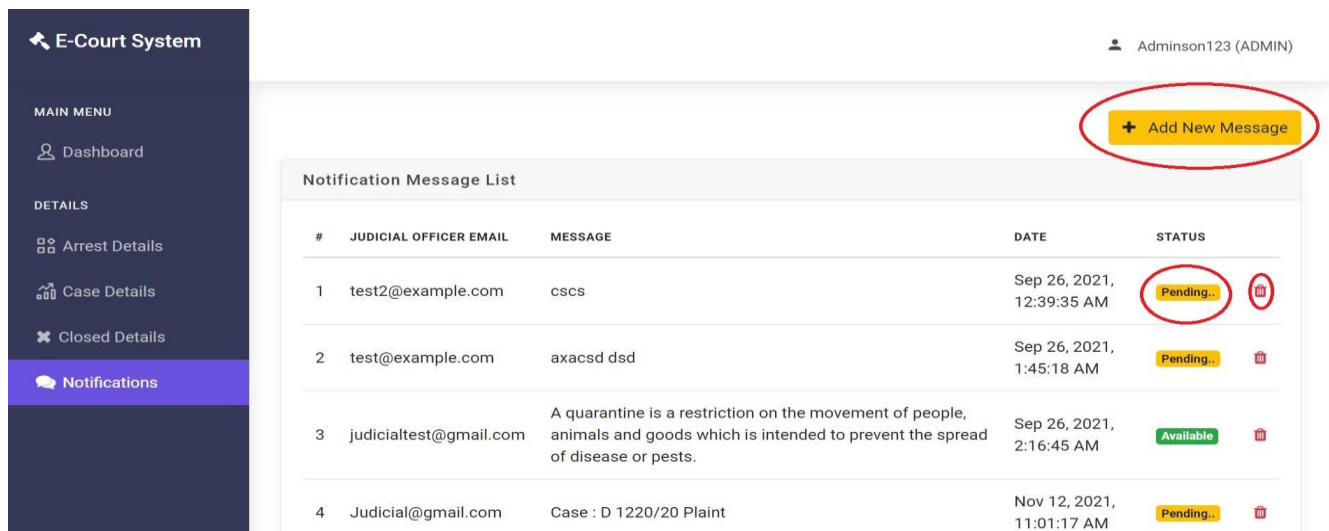
#	NAME	NIC	PLACE	REASON	REMARK	OFFICER	DATE	STATUS
1	sothi upali	952482424v	colombo	theft	Suspect had died	Mr.silva	Nov 11, 2021	Closed
2	Madush Lakshitha alias 'Makandure Madush	9812231111V	Dubai	miscellaneous	Suspect killed due to a police shootout	Shantha Thennakoon	Nov 11, 2021	Closed

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Diagram 26: Closed Case details

In order to move a case back to active cases admin can press on the close icon and select arrest or case from the dropdown list. And admin is the only role that can do this.

10



E-Court System

Adminson123 (ADMIN)

MAIN MENU

- Dashboard

DETAILS

- Arrest Details
- Case Details
- Closed Details
- Notifications

Notification Message List

#	JUDICIAL OFFICER EMAIL	MESSAGE	DATE	STATUS
1	test2@example.com	cscs	Sep 26, 2021, 12:39:35 AM	Pending..
2	test@example.com	axacsd dsd	Sep 26, 2021, 1:45:18 AM	Pending..
3	judicialtest@gmail.com	A quarantine is a restriction on the movement of people, animals and goods which is intended to prevent the spread of disease or pests.	Sep 26, 2021, 2:16:45 AM	Available
4	Judicial@gmail.com	Case : D 1220/20 Plaint	Nov 12, 2021, 11:01:17 AM	Pending..

Diagram 27: Notification details i

Admin/viewer/ Attorney can add a message and all the messages will be appear in the list. This feature can be used to request any information from the court clerk. To contact a specific court clerk it is required to select the specific clerk from the list as shown in below.

11

Add New Message

Judicial Officer
Choose Judicial Officer

Message

Add New Message

#	JUDICIAL OFFICER EMAIL	MESSAGE	DATE	STATUS
3	judicialtest@gmail.com	A quarantine is a restriction on the movement of people, animals and goods which is intended to prevent the spread of disease or pests.	Sep 26, 2021, 2:16:45 AM	Available
4	Judicial@gmail.com	Case : D 1220/20 Plaint	Nov 12, 2021,	Pending..

Diagram 28: Notification details ii

Once the message is added it will be appear in the relevant judicial officers' message list.

Only admin can delete the messages from the red bin icon. And the relevant judicial officer or the admin can change the status to available or not available.

12

Notification Message List

#	JUDICIAL OFFICER EMAIL	MESSAGE	DATE	STATUS
1	Judicial@gmail.com	Case : D 1220/20 Plaint	Nov 12, 2021, 11:01:17 AM	Pending..

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Diagram 29: Notification details ii

When a judicial officer receives a message it will be shown in the relevant officers' inbox as above.

13

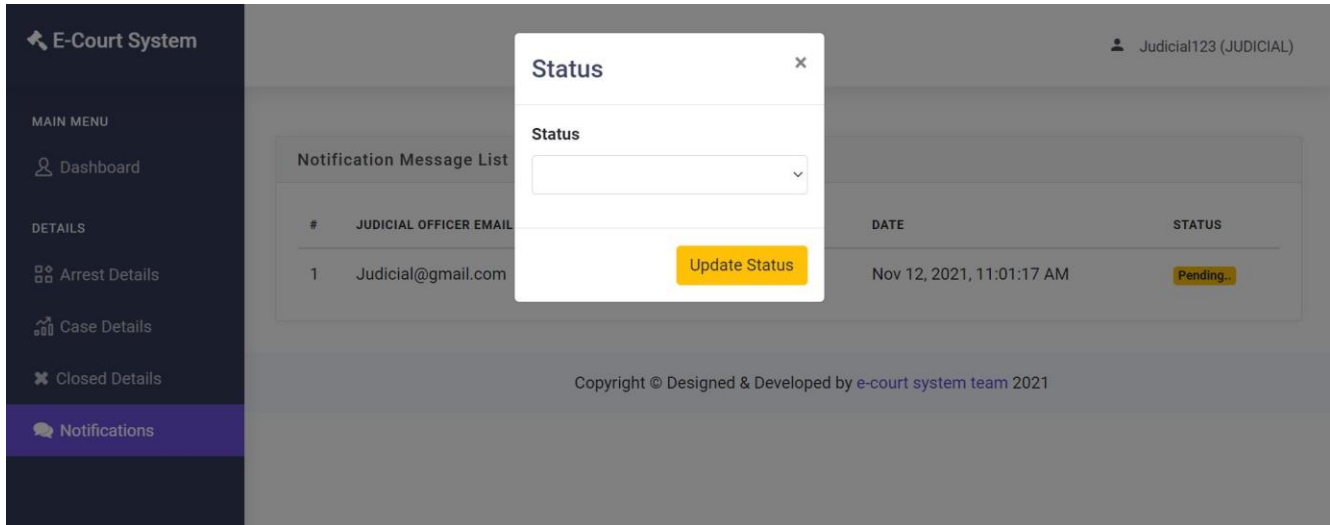


Diagram 30: Notification details iv

The judicial officer can either change status to available if the requested document is available or not available.

Chapter 7

Testing and Verification

The software being developed must comply with the relevant quality attributes. The Test phrase ensures that all the bugs are remedied before the software is delivered to the client. Throughout this project IEEE 829 standard for software testing is followed. As prescribed in the standard the following deliverables are necessary: test plan, test design specification, test case specification, test procedure specification, test item transmittal report, test log, test incident report, test summary report. However, due to the space and tie constraints not all documents will be created. The test cases will be created per every sprint and will be provided under the implementation phrase.

Type of Testing

Unit testing, Integration testing, system testing and acceptance testing will be conducted during each print, as agile development scrum practice is followed. All frontend and backend coding will be manually tested.

Also, white box testing is carried out as the main test method rather than black box or grey box testing. In white box testing the application's internal coding is tested. This testing is done by the developers because a programming language is needed for doing this kind of testing. This is also called structural testing as the structure of the program is concerned in this testing. Further, acceptance testing is too done. This is the final testing done for an application; this test is conducted right before the application is handed over to the client. This is to ensure that the application is completed with all the requirements asked by the client. There are three types of acceptance tastings according the type of person that conducts the testing.

- i).Internal Acceptance Testing - the developer does the internal acceptance testing
- ii).External Acceptance Testing - the client will do the external acceptance testing
- ii).User Acceptance Testing -the end users of the application will do the user acceptance testing

Test Environments

This application will be tested on following software and hardware configuration.

- Software: Windows 8.1 OS with a Chrome browser of the Version 91.0.4472.114 (Official Build) (64-bit).
- Hardware: Intel 64 bit- 2.40 GHz processor with 8 GB Ram.

Features not to be tested during the course of all sprints

- It will not be tested whether this application's features runs on different operating systems. Only whether this application is capable of running Windows 8 OS with 64 bit processor is tested.

Test Cases

No	Test Case Name	Steps	Expected Result	Status
1	Verify the User Registration for the Police	1. User launch the app by clicking on the app icon 2. click on the 'Sign-up' Link in the welcome Screen 3. Below fields should be displayed in the 'Sign-up' page as Mandatory <ul style="list-style-type: none"> User Name Email Username Password User fill up all the fields 4. User should be able to click the Sign Up button	Application should be launched User should be able to click on the Sign-up link and should be re-directed to 'Sign-Up' page Fields should be displayed as below, <ul style="list-style-type: none"> Email – Should be a text field with the length of 50 characters User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer Username- – Should be a text field with the length of 100 characters Password-should be a text field with 10 characters Once these are filled out 'Sign Up' button should be enabled User should be able to click on the 'Next Button' User should be directed to the main dashboard	PASSED

2	Verify the User Registration for an Accused Person	<p>1. User launch the app by clicking on the app icon</p> <p>2. click on the 'Sign-up' Link in the welcome Screen</p> <p>3. Below fields should be displayed in the 'Sign-up' page as Mandatory</p> <ul style="list-style-type: none"> • User Name • Email • Username • Password <p>User fill up all the fields</p> <p>Application should be launched</p> <p>User should be able to click on the Sign-up link and should be re-directed to 'Sign-Up' page</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Email – Should be a text field with the length of 50 characters • User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer • Username- – Should be a text field with the length of 100 characters • Password-should be a text field with 10 characters <p>Once these are filled out 'Sign Up' button should be enabled</p> <p>4. User should be able to click the Sign Up button</p> <p>User should be able to click on the 'Sign Up'</p> <p>User should be directed to the dashboard</p>	PASSED
3	Verify the User Registration for an Attorney-at law	<p>1. User launch the app by clicking on the app icon</p> <p>2. click on the 'Sign-up' Link in the welcome Screen</p> <p>Application should be launched</p> <p>User should be able to click on the Sign-up link and should be re-directed to 'Sign-Up' page</p>	PASSED

3. Below fields should be displayed in the 'Sign-up' page as Mandatory

- User Name
- Email
- Username
- Password

User fill up all the fields

Fields should be displayed as below,

- Email – Should be a text field with the length of 50 characters
- User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer
- Username- – Should be a text field with the length of 100 characters
- Password-should be a text field with 10 characters

Once these are filled out 'Next' button should be enabled

4. User should be able to click the Sign Up button

User should be able to click on the 'Sign Up Button'

4 Verify the User Registration for a Judicial Officer

1. User launch the app by clicking on the app icon
2. click on the 'Sign-up' Link in the welcome Screen

3. Below fields should be displayed in the 'Sign-up' page as Mandatory

- User Name
- Email
- Username
- Password

User fill up all the fields

Application should be launched

User should be able to click on the Sign-up link and should be re-directed to 'Sign-Up' page

Fields should be displayed as below,

- Email – Should be a text field with the length of 50 characters
- User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer
- Username- – Should be a text field with the length of 100

PASSED

			<p>characters</p> <ul style="list-style-type: none"> • Password-should be a text field with 10 characters <p>Once these are filled out 'Sign Up' button should be enabled</p>	
		4. User should be able to click the Next button	User should be able to click on the 'Sign Up'	
5	Verify Login as a Police Officer	<p>1. User launch the app by clicking on the app icon</p> <p>2. Below fields should be displayed in the Login page as mandatory Username: Password: - Login Button</p> <p>User should enter the username and password</p> <p>3. User clicks on the login button</p>	<p>Application should be launched</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Username- – Should be a text field with the length of 10 characters • Password-should be a text field with 10 characters <p>System should authenticate the User</p> <p>If username and Password is correct user should be re-directed to the Dashboard.</p>	PASSED
6	Verify Login as an accused Person	<p>1. User launch the app by clicking on the app icon</p> <p>2. Below fields should be displayed in the Login page as mandatory Username: Password: - Login Button</p> <p>User should enter the username and password</p>	<p>Application should be launched</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Username- – Should be a text field with the length of 10 characters • Password-should be a text field with 10 characters 	PASSED

		3. User clicks on the login button	System should authenticate the User If username and Password is correct user should be re-directed to the Dashboard	
7	Verify Login as an Attorney-at-law	<p>1. User launch the app by clicking on the app icon</p> <p>2. Below fields should be displayed in the Login page as mandatory Username: Password: - Login Button</p> <p>User should enter the username and password</p> <p>4. User clicks on the login button</p>	<p>Application should be launched</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Username- – Should be a text field with the length of 10 characters • Password-should be a text field with 10 characters <p>System should authenticate the User</p> <p>If username and Password is correct user should be re-directed to the Dashboard</p>	PASSED
8	Verify login as a Judicial Officer	<p>1. User launch the app by clicking on the app icon</p> <p>2. Below fields should be displayed in the Login page as mandatory Username: Password: - Login Button</p> <p>User should enter the username and password</p> <p>3. User clicks on the login button</p>	<p>Application should be launched</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Username- – Should be a text field with the length of 10 characters • Password-should be a text field with 10 characters <p>System should authenticate the User</p> <p>If username and Password is correct user should be re-directed to the Dashboard</p>	PASSED

<p>9 Verify login as a System Administrator</p>	<p>1. User launch the app by clicking on the app icon 2. Below fields should be displayed in the Login page as mandatory Username: Password: - Login Button</p> <p>User should enter the username and password</p> <p>3. User clicks on the login button</p>	<p>Application should be launched Fields should be displayed as below,</p> <ul style="list-style-type: none"> • Username- – Should be a text field with the length of 10 characters • Password-should be a text field with 10 characters <p>System should authenticate the User</p> <p>If username and Password is correct user should be re-directed to the Dashboard.</p>	<p>PASSED</p>
<p>10. Verifying Police ability to open arrest details page</p>	<p>Click on the add arrest button on the navigation panel</p>	<p>The arrest details page should appear</p>	<p>PASSED</p>
<p>11. Verifying Police ability to add details of arrest</p>	<p>Click on the add arrest details button on top</p>	<p>New Window with arrest details appear</p>	<p>PASSED</p>
<p>12. Verifying Police ability to save details of arrest</p>	<p>Click on the save button</p>	<p>Details should appear on the arrest details list</p>	<p>PASSED</p>
<p>13. Verifying Police ability to edit details of arrest</p>	<p>Click on the edit icon</p>	<p>The relevant details should appear in a new window</p>	<p>PASSED</p>
<p>14. Verifying Police ability to delete details of arrest</p>	<p>Click on the delete icon</p>	<p>Relevant item should be delete from the list</p>	<p>PASSED</p>
<p>15. Verifying Police ability to click on the status</p>	<p>1. Click on the case icon</p>	<p>1. Relevant item should move to case list</p>	<p>PASSED</p>

	button and change status	2. Click on the close item	2. Relevant item should move to close cases list	
17.	Verifying Police ability to open case details page	Click on the add case button on the navigation panel	The case details page should appear	PASSED
18.	Verifying Police ability to add details of cases	Click on the add case details button on top	New Window with case details appear	PASSED
19.	Verifying Police ability to save details of cases	Click on the save button	Details should appear on the case detail list	PASSED
20.	Verifying Police ability to edit details of cases	Click on the edit icon	The relevant details should appear in a new window	PASSED
21.	Verifying Police ability to delete details of cases	Click on the delete icon	Relevant item should be delete from the list	PASSED
22.	Verifying Police ability to click on the status button and change status	1. Click on the case icon 2. Click on the close item	1. Relevant item should move to case list 2. Relevant item should move to close cases list	PASSED PASSED
23.	Verifying the police ability to click on the closed cases button and open the page	Click on the relevant item from the navigation tab	Open the closed case list	PASSED
24.	Verifying Police ability to click on the status button and change status in the close cases list	1. Click on the arrest icon 2. Click on the closed icon	1. Relevant item should move to the arrest list 2. Relevant item should move to the closed list	PASSED PASSED
				PASSED

- | | | | |
|-----|---|---|--|
| 25. | Verifying Police ability to click on the dashboard button and access the dashboard | Click on the dashboard item from the navigation list | Main dashboard should appear |
| 26. | Verifying Police ability to click on the log out button and log out | Click on the name button and then on the log out button | Direct to the login page |
| 27. | Verifying judicial ability to open arrest list | Click on the arrest list button to open the list | Direct to the arrest list page |
| 29. | Verifying judicial ability to open case list | Click the case list button to open the list | Direct to the case list page |
| 28. | Verifying judicial ability to open closed case list | Click the closed case list button to open the list | Direct to the closed case list page |
| 29. | Verifying judicial ability to open dashboard | Click the dashboard button in the navigation panel | Direct to the dashboard page |
| 30. | Verifying judicial ability to open notifications | Click the notification button in the navigation panel | Direct to the dashboard page |
| 31. | Verifying Judicial ability to edit details of arrests | Click on the edit icon | The relevant details should appear in a new window |
| 32. | Verifying judicial ability to click on the status button and change status in the arrest list | 1. Click on the case icon
2. Click on the close icon | 1. Relevant item should move to case list
2. Relevant item should move to closed cases list |

PASSED

PASSED

PASSED

PASSED

PASSED

PASSED

PASSED

PASSED

PASSED

33.	Verifying Judicial ability to edit details of cases	Click on the edit icon	The relevant details should appear in a new window	PASSED
34.	Verifying judicial ability to click on the status button and change status in the cases list	1. Click on the case icon 2. Click on the close icon	1. Relevant item should move to case list 2. Relevant item should move to closed cases list	PASSED
35.	Verifying judicial ability to click on the status button and change status in the pending notification list	1. Click on the status button 2. Click on the relevant status	1. The status window should appear 2. The status should change accordingly	PASSED
36.	Verifying Judicial ability to click on the log out button and log out	Click on the name button and then on the log out button	Direct to the login page	PASSED
37.	Verifying attorney's ability to open the arrest list	Click on the arrest list button on the navigation to open the	Direct to the arrest list page	PASSED
38.	Verifying attorney's ability to open the case list	Click the case list button to open the case list	Direct to the case list page	PASSED
39.	Verifying attorney's ability to open the closed case list	Click the closed case list button on the navigation panel to open the list	Direct to the closed case list page	PASSED
40.	Verifying attorney's ability to open the dashboard	Click the dashboard button in the navigation panel	Direct to the dashboard page	PASSED

41.	Verifying attorney's ability to open the notifications	Click the notification button in the navigation panel	Direct to the notification page	PASSED
42.	Verifying attorney's ability to click on the log out button and log out	Click on the name button and then on the log out button	Direct to the login page	PASSED
43.	Verifying attorney's ability to open notification page and send a notification	1. Click on the add notification list 2. enter the message and press the send button	1. Open the message page 2. Message appears on the relevant judicial officers notification list	PASSED
44.	Verifying admin's ability to open arrest details page	Click on the add arrest button on the navigation panel	The arrest details page should appear	PASSED
45.	Verifying admin's ability to add details of arrest	Click on the add arrest details button on top	New Window with arrest details appear	PASSED
46.	Verifying admin's ability to save details of arrest	Click on the save button	Details should appear on the arrest details list	PASSED
47.	Verifying admin's ability to edit details of arrest	Click on the edit icon	The relevant details should appear in a new window	PASSED
48.	Verify admin's ability to delete details of arrest	Click on the delete icon	Relevant item should be removed from the list	PASSED
49.	Verifying admin's ability to delete details of arrest	Click on the delete icon	Relevant item should be delete from the list	PASSED

		1. Click on the case icon	2. Click on the close item	PASSED
50.	Verifying admin's ability to click on the status button and change status	1. Relevant item should move to case list	2. Relevant item should move to close cases list	PASSED
51.	Verifying admin's ability to open case details page	Click on the add case button on the navigation panel	The case details page should appear	PASSED
52.	Verifying admin's ability to add details of cases	Click on the add case details button on top	New Window with case details appear	PASSED
53.	Verifying admin's ability to save details of cases	Click on the save button	Details should appear on the case detail list	PASSED
54.	Verifying admin's ability to edit details of cases	Click on the edit icon	The relevant details should appear in a new window	PASSED
55.	Verifying admin's ability to delete details of cases	Click on the delete icon	The relevant details should be deleted	PASSED
56.	Verifying admin's ability to delete details of cases	Click on the delete icon	Relevant item should be delete from the list	PASSED
56	Verifying admin's ability to click on the status button and change status	1. Click on the case icon 1. Relevant item should move to case list	2. Click on the close item 2. Relevant item should move to close cases list	PASSED
57.	Verifying admin's ability to click on the dashboard button and	Click on the dashboard item from the navigation list	Main dashboard should appear	PASSED

access the dashboard

58.	Verifying admin's ability to click on the log out button and log out	Click on the name button and then on the log out button	Direct to the login page	PASSED
59.	Verify admin's ability to open the closed case list	Click on the closed case list button	Direct to the closed case page	PASSED
60.	Verify admin's ability to change the status of a closed case	Click on the status icon	Relevant case appear on open cases list or arrest list	PASSED
61.	Verifying admin's ability to open notification page and change status of a notification	1. Click on the status icon 2. select relevant icon from the dropdown list	1. dropdown list should appear 2. Status pending will appear to be available or unavailable	PASSED
62.	Verifying admin's ability to delete notifications	Click on the relevant bin button	Relevant item will be deleted from the list	PASSED
63.	Verifying viewer's ability to open arrest list	Click on the arrest list button to open the list	Direct to the arrest list page	PASSED
64.	Verifying viewer's ability to open case list	Click the case list button to open the list	Direct to the case list page	PASSED
65.	Verifying viewer's ability to open closed case list	Click the closed case list button to open the list	Direct to the closed case list page	PASSED
66.	Verifying viewer's ability to open dashboard	Click the dashboard button in the navigation panel	Direct to the dashboard page	PASSED

67.	Verifying viewer's ability to open notifications	Click the notification button in the navigation panel	Direct to the dashboard page	PASSED
68.	Verifying viewer's ability to click on the log out button and log out	Click on the name button and then on the log out button	Direct to the login page	PASSED
69.	Verifying viewer's ability to open notification page and send a notification	1. Click on the add notification list 2. enter the message and press the send button	1. Open the message page 2. Message appears on the relevant judicial officers notification list	PASSED

Table 02: Test Cases

Chapter 08

Evaluation and Conclusion

The aim of the project was to develop a system that would interconnect all the main stakeholders of a judicial system. First a research was done was to get a comprehensive idea on the project and how digitalization has been done in other countries. Then the current context of the Sri Lankan court system was analyzed and through the project proposal the areas that can be further developed through digitalization was proposed.

The project was started soon after the submission of the final project proposal, the work was started and the project deadline was 11th of November 2021. Initially, after following project management techniques to finalize on the scope, cost and the schedule of the project, requirements analysis phase was started as the first step of the software development process. After completing the initial steps though failed to complete certain steps within the prescribed time period in some instances, and despite few unexpected errors and the calculation mistakes pertaining to the scope of the project. The project was successfully managed to be completed on time.

From the undergraduates perspective this research paved the way to enhance the understanding and the knowledge on different web technologies, integrated developing environments like Visual Studio and programming languages including, HTML, CSS, JS and C# is substantial. And the author is confident that it will be immensely useful in the future.

The solutions predicted are proved to be achievable and recommended to be implemented in a nationwide system that will immensely benefit the ordinary citizen and remedy the inherent limitations of the traditional legal system.

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Appendices

Interim Progress Reports



Interim Report

Interconnected E-Court System

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Declaration

Module: FC6P01

Deadline: Tuesday 13th July 2021 at 23.58 pm

Module Leader: Dimuthu Thammitage

Student ID: LMU 20048281

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Dedication

For my Parents...

Acknowledgements

This work would not have been possible without the support of all the lecturers and staff at E-Soft Metro Campus, Kandy. I am especially indebted to Mr. Dimuthu Thammitage, who has been supportive throughout the project. Most importantly, I wish to thank my parents and sibling for guidance and care. Last but not least, to my friends for unending inspiration.

Abstract

A civilized society encourages its citizens to solve any conflict arises among them through the court system. However, with the increase in the number of conflicts referred to courts to be solved through judicial adjudication. The time taken to reach an end gradually increased, to a point where citizens looked upon the judicial adjudicatory system as an archaic form of adjudication. So as the time-consuming process, the traditional court system consists of several defects that are inherent to it; including, but not limited to less opportunities for the marginalized groups to access, high costs, use of pressure; inducement, and threat in investigations by the law enforcement authorities. Though, methods of alternative disputes resolution were introduced to reduce the huge backlog of cases. Alternative dispute resolution methods are only an alternative, not a substitute for the traditional judiciary system. On the other hand, all other drawbacks except reducing delays, were unsolved by alternative resolution methods for decades. Due to the fact that alternative dispute resolution methods are not a substitute for the traditional method, the most favorable solutions for the mentioned issues lie with mechanisms that increase the efficiency of the judicial system.

The massive development in the information technology field paved the way for new innovative measures that all of the mentioned issues were capable of satisfactorily answered. Even though, the developed states were swift to adopt new technology to courts. The developing counties like Sri Lanka are far behind in introducing technology to the judiciary system. In Sri Lanka, the current backlog of cases is massive and the system is costly; due to those, access to justice has been limited. The author has elaborated in detail with substantial evidence the reasons for those issues in the report.

As a remedy for current issues prevailing in the court system; the author proposes an interconnected e-court system. The proposed system allows most of the government authorities involved from an institution of a case to the end; to deliver all its tasks through this system. As a result, time taken is reduced, costs are reduced, and as the speed of flow of information between authorities increases the possibility of government authorities acting in a manner that is detrimental to citizens is also eliminated.

This interim report contains all the diagrams and descriptions develop during the requirement gathering and the designing phrases. Based on the requirements gathered and the design, the Agile development scrum approach is followed to develop the system, and CSS, HTML, JAVA SCRIPT languages are used to develop the front end, while C# is used to develop the back end. The MVC architecture is the architecture of the proposed system. The final system is delivered within 154 days from the project start date of March 28th 2021. This interim report is presented in the course of the development to communicate the current details about the development of the system.

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Abbreviations

ADR	Alternative Dispute Resolution Methods
ATM	Asynchronous Transfer Mode
ATOMS	Automated Traffic Offence Management System
BENI	Broadband Enterprise Network Infrastructure
CEIS	Civil Electronic Information System
ICMS	Integrated Case Management System
IT	Information Technology
ICT	Information and communication technology
JUSTIN	Justice Information System
NJDG	National Judicial Data Grid
PKI	Public Key Infrastructure
WAN	Wide Area Network
WebCATS	Web- based Court of Appeal Tracking System

1. Introduction

Information Technology (hereinafter referred to as “IT”) now plays a wider role than what it was initially expected to play in the society. The ability to use IT to make our day-to-day lives more comfortable and easy is evident to any human being. Though, the private sector and businesses are very sensitive to maximize its profits and enhance the ease of doing business, by utilizing technology. The state sector in any country is far behind satisfactorily utilizing technology; when compared with the private sector. The project proposed is directly connected with the e- governance initiatives and focus on enhancing the efficiency of the court system.

Through this report, details will be provided as to the work in progress regarding the E-Court system. To get a full idea regarding the project it would be prudent to read this Interim report with the project proposal submitted. The Chapter 02 furnishes details regarding the e-court systems that have been implemented in the world and its success or failures. Also, details pertaining to those systems will be compared with the functions of the proposed systems and a comparative analysis will be drawn. In other words a detail analysis will be conducted on the e-court systems of South Korean, India, Singapore and Canada. The prevailing e-filing system pertaining to filling fundamental petitions will also be discussed. There is rich legal literature shaped by E- justice scholars that focuses on the philosophical aspects of adapting technology to law. The author will extract and elaborate on it, where it is necessary to understand the functions of the proposed system. Further, this Interim project report is prepared to communicate up to date details- what has been achieved and what are the milestones couldn’t achieve, with reasons, specifically in Chapters 03, 04 or 05. Any revisions regarding the project plan will be dealt in Chapter 05, and a detail analysis will be provided on the effect of such changes.

1.1 Aim and Objectives

As a means of increasing efficiency of the Sri Lankan court system an interconnected E-Court System was proposed by the author of this Interim report through the project proposal. The system that the writer wishes to develop can be viewed as a more simple and limited system that can be used to develop a more complex system. Due to the limitation of resources at the disposal of the author a complex system that can be immediately adapted in the real court system is not feasible.

The Proposed “E-Court system” will increase: the transparency; access to justice; efficiency; document security. And decrease the costs involved; eliminate discrimination, enhance equal protection of law etc.

The main aims of this Project can be listed as:

- A research will be conducted and the data collected from the research will be analyzed to identify the root causes of the delays and other problems that associated with the court system;

- Based on the findings of the above, critically evaluate how delays can be remedied. Rather than focusing on other procedural remedies priority will be given to reach a remedy that can be achieved through the use of Information Technology;
- Conduct a feasibility study pertaining to the proposed system;
- A requirement analysis will be conducted;
- The interconnected e-court system will be designed;
- Coding and Implementation of the court system;
- Testing the system;
- Evaluating the usability and success of the proposed system;
- Based on the above, changing the proposed system as required; and
- Preparing final documents analyzing every aspect of the problem domain and proposed solution.

1.2 Motivation

The issue selected to be inquired is, more sensitive and of paramount importance as not only a single person or entity will be benefitted through remedying this issue, but whole society will be immensely benefitted. The use of technology in Sri Lankan court system is inadequate, but the positive changes that can be achieved through adopting technology are immense.

As the writer elsewhere mentioned in this report, the access to justice is fundamental for every society. Any disputes arise in a civilized society is expected to be solved through judicial adjudication. With high number of disputes resorted for adjudication through judiciary. Delays in the court system exist as unprecedented. As solutions for delays - alternative dispute resolution methods (hereinafter referred to as “ADR”) and digitalization of the court system are proposed and utilize in every country. Nonetheless, the uses of ADR methods are limited as it can only be used as a supplementary method, not as a substitute for judicial adjudication. On the other hand, almost in every country of the world access to justice is available as a right and ADR methods cannot be utilize in a manner that curtails, the right of access to justice. On such a backdrop the digitalization of the court system and its process is the more democratically favored solution to increase efficiency of the court system.

The digitalization of the court doesn’t mean that whole process pertaining to litigation; from instituting a case to pronouncing a judgment will be conducted through a digital platform and it is against the essence of justice to implement such a system, because some steps pertaining to litigation such as leading evidence, cross examination shall only be done in an open court. Through, digitalization only few tasks like document filing, issuing court orders, and checking court journals will be implemented in a digital forum.

1.3 Problem

The problems to which the author of this report endeavors to find answers can be discussed under few sub-topics. While, there are innumerable problems associated with the main problem, the discussion will be only limited to discuss the most crucial ones.

Police Brutality (Torture in Custody)

Police torture is a common occurrence in Sri Lanka. Torture is used as the most common method of criminal investigation. Under the Convention Against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment Act No 22 of 1994. Torture is an offence that is punishable with imprisonment of either description for a term not less than seven years and not exceeding ten years. Be that as it may, following figure shows the complaints received by the Human Rights Commission to the Committee against Torture pertaining to the torture relation to the police custody.

Office	2010	2011	2012	2013	2014	2015	2016**
Head Office	369	358	389	380	329	315	160
Ampara	15	17	07	15	06	02	02
Anuradhapura	59	58	40	69	53	40	14
Badulla	04	12	01	19	11	-	01
Batticaloa	-	03	03	04	-	07	05
Kalmunai	02	04	07	07	09	03	03
Jaffna	02	03	04	-	02	-	02
Kandy	29	35	28	28	28	18	04
Matara	75	81	59	63	28	23	10
Trincomalee	05	07	02	10	02	02	03
Vavuniya	06	01	02	05	21	10	04
Total	566	579	542	600	489	420	208

**From 01.01.2016 to 31.08.2016

Diagram 01: Torture in Custody
(Report of the Human Rights Commission to the Committee against Torture, 2021)

However, above details is just a fraction of total number of torture incidents as most of the incidents are unreported. Not only torture is widely used, most police officers publically acknowledge and recognize torture as a method of police interrogation. The inability or the secretive environment the torture takes place is a factor that acts as a hindrance when exposing and remedying torture. The following figure is an excerpt from a research conducted in Sri Lanka that provides a complete picture of the incidents related to torture.

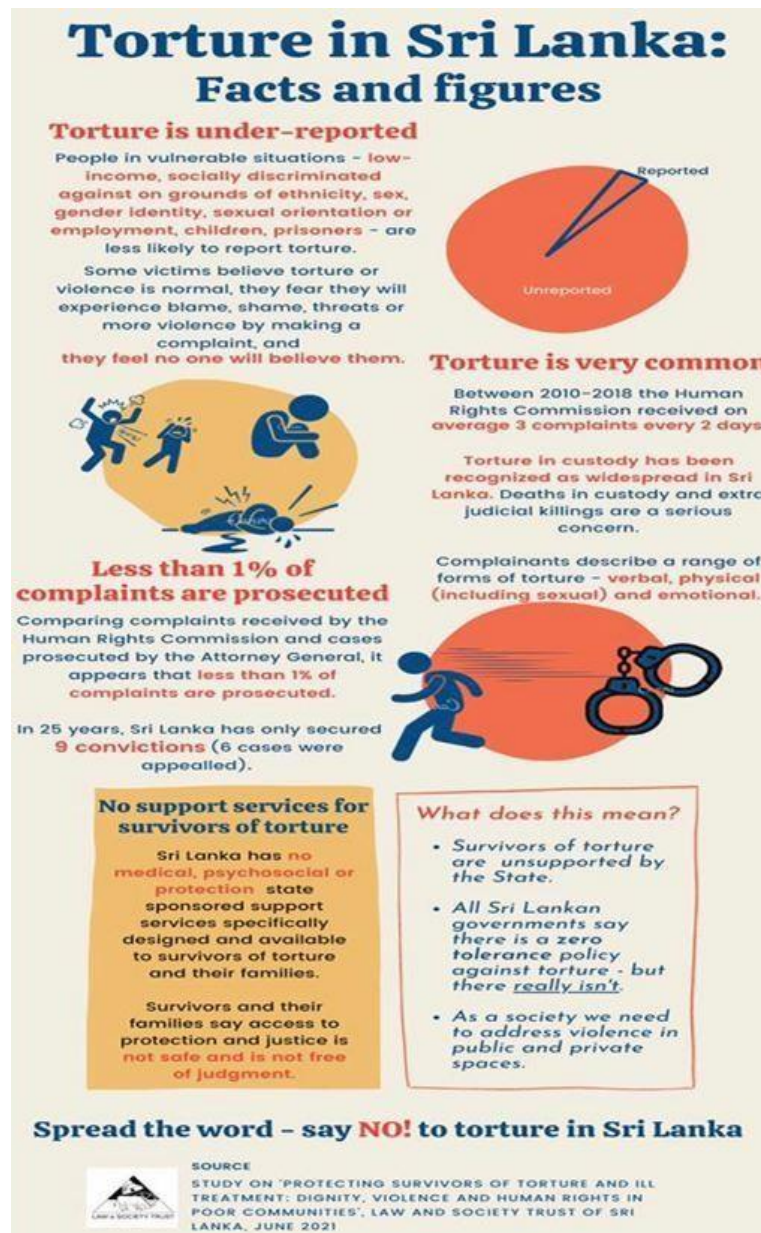


Diagram 02: Torture in Sri Lanka

(Protecting Survivors of Torture and ill treatment: dignity, violence and human rights in Poor communities, 2021)

The proposed E-Court system hopes to remedy torture by establishing a requirement of contacting a close relative, friend or a lawyer of the suspect at the time of arresting and making it mandatory to include data about the arrested person to the proposed system. Thereby, uncertainty remains from the time of arrest and producing before the magistrate is eliminated. Also, the right of a suspect to access to justice, which is already a right recognize under the law can be successfully implemented - the Inspector General of Police made rules under the Police Ordinance cited as Police (Appearances of Attorneys-at-Law at Police Stations) Rules 2012 recognizing the right of a lawyer to represent his/her client at a police station and requiring the officer in charge of the police station to facilitate such representation.

Access to Justice

Accessibility to justice covers a wide area from educating people on their rights to eliminating discrimination. Similarly, the access to justice not only covers the rights of suspects or victims, but also lawyers.

In Sri Lanka most of the harassments and minor offences are unreported and unheard. Due to people are unaware about their rights and inability to access information. A system that educates people at the correct instant will work proactively in remedying aforementioned defects.

Right to appear in court is a part and parcel of right to access justice. All parties involved must be fully aware about the date on which the case is called and the current status of the case. If the relevant parties are unaware about the date on which the case is heard and absent on a mandatory , then in a civil case the case might proceed only hearing one party as an ex-parte case.

High legal fees and costs involved negatively affect access to justice. If the involved costs are reduced that will also increase access to justice.

Also, the geographical barrier impacts negatively on access to justice. As an example: under the current system even to check the court journals lawyers should reach the court house and with the new corona pandemic as less people can be in a small room. It is required to get an appointment. A system that will allow lawyer to check the journals from their offices will positively impact.

As citizens get the opportunity to access some of the services provided by the courts 24/7, which are currently only accessible by reaching the court, more people will get the opportunity receive services provided by the courts.

Delays

The one main issue to which the writer of this report endeavors to find solution is the reduction of delays in the justice system, which is increasing day by day throughout the whole court system. From a philosophical point of view it is well acquainted fact that as stated in the famous Latin maxim (*Iustitia dilata est iustitia negata*) “justice delayed is justice denied.”

In Sri Lanka currently there are 54 judicial districts, and more than 200 courts established. A complete system that interconnects all these courts with other law enforcement agencies, relevant government agencies will immensely reduce the time taken for communication between these agencies.

It was reported that there was a backlog of 750,000 pending cases (Thilakawardene, 2021) before the covid19 pandemic and it doesn't take a genius to understand the fact that post- pandemic backlog is much more worse. Further, the Sectoral Oversight committee on Legal Affairs

(anti-corruption) & Media, issuing recommendations pertaining to the Expeditious and Efficient Administration of Criminal Justice stated that the average length of time from the date of occurrence of commission of a serious criminal offence that should be prosecuted at the High Court, till the date of the conclusion of prosecution at the High Court is 10.2 years (Sectoral Oversight Committee on Legal Affairs (Anti-Corruption) and Media, 2017). However, the public perception and the experience of the writer of this proposal is that more complex court proceedings with appeals take up to 20+ years to fully reach the end.

An e-court system will increase the number of cases a judge can within a one day, which will directly increase the efficiency and productivity of judges, thereby reduce the backlog of cases.

Costs

Through digitalization the current paper based system will be turned to paperless system. The costs involved with storing large storage areas to keep files and then maintaining staff to guard those files in every court house throughout the country can be reduced. The number of staff members involved can be drastically reduced.

The number of cases a judge can take up per day will be increase as information is accessible through an online system. Also, the productivity of the other judicial staff members will be increased. The increased productivity and efficiency at the end of the day will result in more work is done by a reduced staff.

The prison department transports hundreds of prisoners from prisons to the respective courts where cases are being heard and this process wastes millions of tax payers' money. An interconnected system that allows prison officers to present prisoners electronically will save the transport costs.

As a result not only the time taken, but also associated costs government spends on the justice system will be drastically reduced.

Transparency and Accountability

Right to information is enshrined as a fundamental right in Article 14A of the Constitution. The general public has the right to know information hold by public authorities. Through the proposed system, public will be able to access some of the court journals which will result in implementing the right to information. Also, 24/7 access to the proposed system will implement equal protection of the law which is guaranteed under Article 12. (1) of the Constitution. Also, a transparent court process clearly in line with the dictum "Justice must not only be done, but must also be seen to be done".

As the public participation in the court process increases and process become more open through the proposed online system, that will eliminate the countless forms of corruption and malpractices, which will result in judicial officers becoming more accountable and transparent. On the other hand, a streamlined, cost effective and transparent process will increase public trust in the judicial adjudication process and enhance direct involvement of the general public in the court process.

02. Background

02.01 Literature Survey

In this part of the report the author will discuss the academic work available that deals with the same question author intends to answer. Although, the research conducted by other scholars cannot be directly adapted to Sri Lankan context or to this project, there is no doubt that when implementing and designing the project any such knowledge will be invaluable. Hereafter, author will discuss scholarly articles on, the reasons for the digitalization, its impact on the traditional methods of justice and facts that must be considered to get the maximum benefits from digitalization.

What is digitalization?

The word “**digitalization**” is vague, and takes the meaning depending on the context which it has been used. In simple terms, in the context of the judiciary digitalization mean the transfer of information or processes to digital form (Bradautanu et al., 2020a).

Why digitalize the justice system?

Professor Richard Susskind, IT adviser to the UK lord chief justice, provides four reasons why judiciary should be digitalize, “The system is costly for users; it’s usually too time consuming; it’s largely unintelligible; and it also seems out of step in the internet society” (Online justice: why courts should explore emerging digital possibilities, 2021a). Most of the literature available reaches the same points stated by Professor Richard Susskind, as reasons for the judicial digitalization. The main objective of digitalization is enhancing the access to justice. While speeding up proceedings and reducing reliance on paper-based cases are other desirable outcomes, the establishment of online courts or systems should not be viewed as a means of prioritizing efficiency over justice (Bradautanu et al., 2020b). As the author mentioned number of instances throughout this report, the dominant reason for digitalization of court processors is the backlog of cases. However, apart from that common reason there are other reasons that can be highlighted. As an international conventional obligation, including Sri Lanka, 193 countries of the world are duty bound to realize Sustainable Development goals (United Nations, n.d.). From the seventeen sustainable goals, 16th goal is to promote just, peaceful and inclusive societies. In order to achieve this goal rule of law must be enforced. To enforce the rule of law access to justice is a necessity. In order to ease the access to justice- as mentioned in this report digitalization of justice system is a well-reputed solution.

Philosophical Background

The most crucial fact that has been dealt by most of the legal literature is the relationship between law and technology. Some of the institutions that the author proposed to digitalize are the oldest institution of human history. Any changes introduced must be preserved the respect and

importance of its historic values. Law, as a subject entangled with traditions and formalities inclines to be a subject that not entirely in line with the ends technology pursue to achieve. While law's main objective is the legitimacy of actions (legal/illegal), technology's logic is based on functioning (works/does not work). As a result, an e-justice service may be functional and efficient from a technological point of view, but not legally valid (Lupo and Bailey, 2014a). The author will not delve into philosophical conflict between digitalizing courts of law, as the proposed solutions will not proposed any Artificial Intelligent agents to the present court process, and any technology that try to substitute human touch needs to be thoroughly debated before implementing.

Desirable Features of an E-Justice System

In the article Designing and Implementing e-Justice Systems: Some Lessons Learned from EU and Canadian Examples. The authors have stated that when developing a system the prime focus should be on accessibility and simplicity, adaptability and modularization. As simple system will attract people, it is necessary any system to be simplistic. However, a system must not be over simplistic. Right balance between a system's maximum level of feasible simplicity and its maximum level of manageable complexity must be achieved. As systems that are simplified to a point that undermines the functionalities, value, usefulness, and legal validity of a procedure are highly unlikely to attract users (Lupo and Bailey, 2014b). The new system must be able to adapt to changing user requirements, unless the system is adaptable the system will not be able to establish as a trustworthy system in the long run. Modularization will reduce inter dependencies and costs involved in system maintenance.

Technology and Marginal Communities

It must also be noted that using technology to enhance access to justice might be futile or further distance people from the justice system. As per the data available on the World Bank website in Sri Lanka, as a percentage of the population, only 34.11% (2017), (data.worldbank.org, n.d.) had access to Internet. Fully digitalizing and offering services in digital mediums will further distance the marginal groups of the society. Disadvantaged or marginalized groups based on factors such as ethnicity, and accessibility challenges faced by persons with disabilities must be taken in to consideration and shall not be left out when designing and implementing e-justice systems. Therefore, it is prudent only to introduce the new system to coexist with the traditional system.

Things to Consider When Implementing the System

Thomson Reuters' in its research paper published on the topic; lessons learned in courts digitization, provides that their experience demonstrates the significant value of standardizing processes before implementing digitization, particularly when moving from a paper-based system to online system (Reuters, 2015a). Justifying its findings, the research paper presents abandonment of State of California state-wide case management system after having incurred over \$300m, and delays in the State of Victoria's state-wide Integrated

Courts Management System as the effects of non-standardization. Further, following factors are recognized as lessons learned; spreading key deliverables out over a phased implementation schedule reduces the risk associated with a „big bang“ roll-out: Change management and product development need to happen in tandem, based on a prioritized road map that delivers the largest efficiencies soonest: detailed internal planning of all relevant levels: practice proper cost control: involving with the chosen vendor in identifying system requirements, rather than relying solely on external management consultancy(Reuters, 2015b).

Merely, implementing new systems will not achieve the desired results. More time must be devoted to cultural and organization readiness (gov.bc.ca, 2019). All legislative changes required must be passed in the parliament and enacted as a law before the implementing the system. Assured budgets for the court digital transformation strategy are needed.

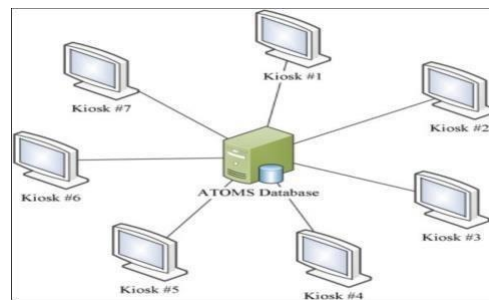
Judicial Digitalization in Other Countries

The legal systems of countries are heterogeneous, and digitalization is being done differently. Australian federal court was the first to introduced electronic court files and now steps are being taken to embed electronic files in other courts. In Netherlands, an automated system has been introduced to provide legal guidance for matrimonial disputes and matters of custody and maintenance. (Online justice: why courts should explore emerging digital possibilities, 2021). Likewise, countries have started the digitalization process from different points, based on the suitability to ground realities. Furthermore, in most countries different systems have been implemented to manage different areas of the judicial process. As an example: South Korean system comprised of Electronic Case Filing system, Judge Support system and Case management system. Therefore, rather than a single system there is a cluster of systems that work together.

Singapore

In general, Singapore is considered as the first country to design and implement an information system for the justice system (Rosa, Teixeira and Sousa Pinto, 2021a). Singapore's digitalization was systematic and initially only certain services related to traffic offences were done on a digital forum. With time more technology was introduced.

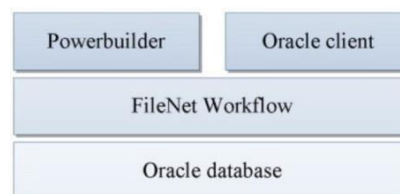
In 1991, Singapore's justice system faced the backlog of cases and as a solution digitalization was started. Initially, some of the services were digitally restructured by implementing a new information system. The centralized system, where all multimedia kiosks are linked to ATOMS (Automated Traffic Offence Management System) database, which manages the offender's information enabled citizens to pay their fines, or consulting cases in other locations, without addressing to the court (Rosa, Teixeira and Sousa Pinto, 2013b).



ATOMS architecture

Diagram 3: (Rosa, Teixeira and Sousa Pinto, 2021c)

In 1999 web-based applications were replaced by desktop applications. This second generation of information systems uses a typical 3-tier layer using Oracle databases, FileNet workflow systems and Powerbuilder or Oracle client software (Rosa, Teixeira and Sousa Pinto, 2013d).



Three Tier Architecture

Diagram 4: (Rosa, Teixeira and Sousa Pinto, 2021e)

In the latter part of 1999, EFS (Electronic Filing System) was developed. This information system was developed for civil matters, allowing lawyers to file electronic documents and providing real-time information to all involved entities. In 2002 ICJS (Integrated Criminal Justice System) was launched. Also, network infrastructure, creating the BENI (Broadband Enterprise Network Infrastructure) based on ATM (Asynchronous Transfer Mode) technology was developed, which supported data transfer speed of 622 Mbps, scalable up to 2.1 Gbps, supported by WAN (Wide Area Network) segments of 45 Mbps each, connecting the different locations where justice entities operated. To improve the security in these information systems, authorities implemented a PKI (Public Key Infrastructure). As a result now signed court documents can be issued electronically

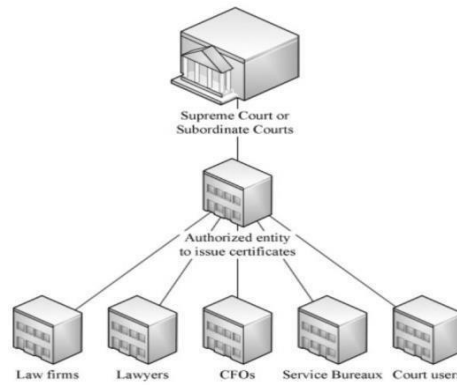


Diagram 5: PKI Infrastructure (Rosa, Teixeira and Sousa Pinto, 2021f)

The Singapore digitalization project spans well-over 2 decades and still there are proposals for further development. This manifests that digitalization is a process, not an end.

E-court system of Republic of Korean

The Republic of Korea started digitalization in 1980's and continued to develop its systems ever since. The support of the central government is immense, for example in 2012, of the \$1.8 billion budget for the Korean judiciary; \$180 million went to information and communication technology development pertaining to the e-court system. Korean e-court system encompasses features dedicated to help judges (case management system and judge support system), facilitate the filing of cases for litigants (e-filing) and inform the public (publication of cases), (World Bank, n.d.).

Case Management System		E-courts System	
<ul style="list-style-type: none"> • Docket System • Case Allocation System • Case Filing System • Calendaring System • Service System • Payment System • Deposit System • Case Files Archiving • Common Service System 		ECF	E-Courtroom
		<ul style="list-style-type: none"> • Electronic Money Claim • Electronic Entrusting • Electronic Property Inquiry 	<ul style="list-style-type: none"> • Standard E-Courtroom • Audio Video Recording, Video-Conferencing
Judge Support System		Public Information Service	
Case Workflow System Groupware Decision Support System Law Search		<ul style="list-style-type: none"> • Court Homepage • Case Information • Certificate Issuance • Law Search • Self Help Center 	
Information Exchange			

Diagram 6: Features of South Korea(World Bank, n.d.a)

Experiences with e-courts in Korea show that: (a). the system must be user friendly and adapt in response to comments from users; a thorough needs analysis is required. (b). the information technology budget should take into account costs of data preservation and system maintenance. (c). Users should receive adequate training. (d). Cases covering various subject matters should be integrated. (e). Systems in other economies can offer useful guidance (World Bank, n.d.b).

Canadian (British Columbia) e-court system

British Columbian authorities started computerizing court systems in 2001, with the (Minister of Justice and Attorney General, 2012) Justice Information System (JUSTIN). JUSTIN is an integrated criminal case management system used in BC's provincial and superior courts.

The Civil Electronic Information System (CEIS) was introduced in 2003, and in 2004 Web-based Court of Appeal Tracking System (WebCATS) was implemented. CEIS is a customized case management system facilitating information management for civil, family, and estates cases in the superior and provincial courts of BC. The Web-based Court of Appeal Tracking System (WebCATS) allows for tracking and management of cases in the BC Court of Appeal.

The British Columbia courts now capable of hearing fully online cases. The BC Supreme Court held its first fully electronic proceeding in 2011, while the BC Court of Appeal conducted its first entirely electronic appeal in 2012.

Indian e-court system

In 2005, National Policy and Action Plan for Implementation of information and communication technology (ICT) presented its standing on the e-court project. The main objective of the e-Courts project was to bring more transparency in judicial matters and to bring the judiciary closer to the common litigant of India, (Verma, 2018). Rather than implementing comprehensive information systems or databases like in other countries the main focus of attention has been establishing technical infrastructure.

Many new features were introduced for the existing system. The court houses have been upgraded with LCD screens and multimedia projectors that allow Lawyers to conduct cases online. Among other innovative measure most laudable feature is the ability to serve summons through SMS. This clearly eliminates the delays delivering summons in traditional method. The National Judicial Data Grid (NJDG) came into existence in November, 2015. This grid provides real-time information to around 25 million Indian courts on various levels. The NJDG program holds details on pending proceedings, discarded proceedings and complete cases under various headings (Sehgal, 2020). The Judgment Information System, provide all the judgments that have been delivered by the Supreme Court and various High Courts.

Sri Lankan e-filing system

The existing e-filing system which can be accessed through: <http://efiling.supremecourt.lk/>, only allows filing fundamental rights cases, and check the status of pending Fundamental rights cases. To use the site an attorney or law firm can create an account. The User interfaces are very basic. The grave concern of the writer about this site is that the connection to the site is not secured. Any sensitive information transacted through this site is at the risk. When compared with e-court systems of other countries the existing filing system is far behind in every aspect.

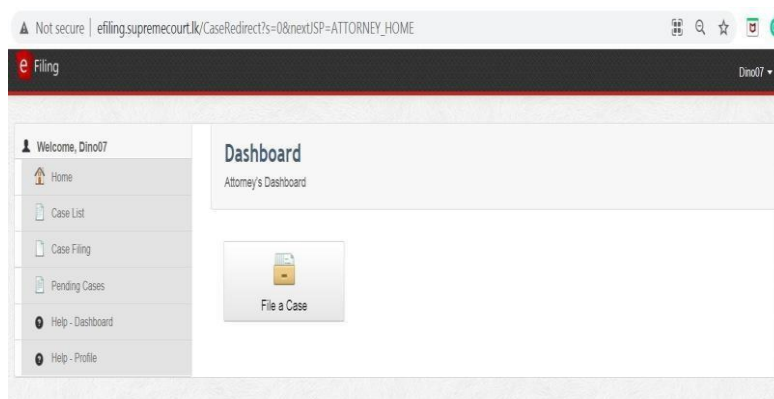


Diagram 07: Home Screen of the e-filing system

02.02 Similar System

In the first few following paragraphs the writer will endeavor to ascertain the details pertaining to Integrated Case Management System (ICMS) of Singapore and South Korea.

ICMS of Singapore

This system can be accessed via the URL: <https://www.statecourts.gov.sg/cws/CriminalCase/Pages/The-ICMS-portal.aspx>. This internet-based system came into existence only in 2013. This system links different agencies related to the administration of criminal cases, and is being used from the start of prosecution process to the issuance of verdict.

There are three types of users to this system: Law Firm User: Accused person and other authorized users.

ICMS is mainly used for three purposes. They are Case Filling Management, Case Management and Document Management.

Case Filing Management

- File case and court documents electronically.
- Users can request and extract records electronically.

Case Management

- Governs all the activities pertaining to a case. From case institution to tracking to post-judgment activities.
- Workflows are defined and the case is automatically routed to the respective court.

Document Management

- Electronic Service of Documents and share documents to other agencies / lawyers.

ECFS of South Korea

Electronic Case Filing System (ECFS) is accessible through the URL: <https://ecfs.scourt.go.kr/ecf/ecf800/ECF830.jsp?&url=https%3A%2F%2Fecfs.scourt.go.kr%2Fecf%2Findex.jsp> . Through this system lawyers can file cases and relevant documents. All case management is done electronically. This new system converted the already existing paper based system to a paperless system.

Currently, only litigants or their attorneys can access this system.

ECFS System Chart

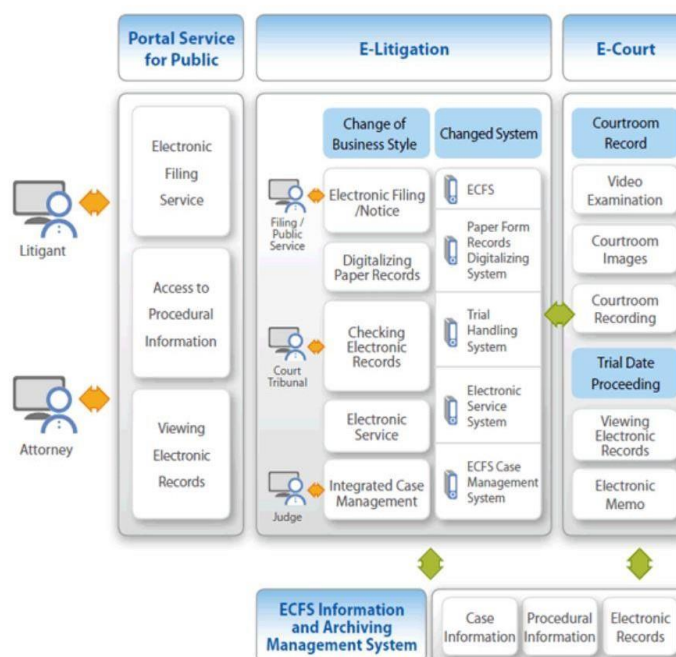


Diagram 08: ECFS of South Korea(World Bank, n.d.)

02.03 Proposed System

Mainly, there will be 6 actors that can use this web application. Namely, Police; Accused Person; Attorney-at-law; Administrator; Judicial Officer and General Public.

The Actors will be able to perform the following functions through the system. Except for downloading judgments it will be required to login to the system to perform the following functions:

a). Police

- Officers shall be able to add details about the persons arrested and based on the offence committed application will request further information. Set of predetermined information will be shared with relevant magistrate court. Automatically, a number for the arrest will be generated. Depending on the offence alleged to be committed – an automated message will be sent to a relative/friend/attorney-at-law that contains the relevant court to which the suspect will be produced and the further steps that they can take.
- Police shall be able to file cases. At the time of filing the case an automatic number is generated by the system.
- Police shall be able file documents through this system.
- Police shall be able view arrest details and case details.

b). Attorney-at-law

- Attorneys shall be able view arrest details and case details, upon furnishing relevant numbers.
- Request documents through the judicial officers.

c). Accused Person

- Accused Person will be able view arrest details and case details, registered under his NIC number.
- Request documents through the judicial officers on cases under his NIC number.

d). Judicial Officers

- Judicial Officers shall be able to add the current status of the pending cases, arrest details.
- Check arrest and Case details.
- Upload documents requested by the system.
- Upload judgments to the system.

e). General public

- General public will be able to download the judgments without login to the system the system.

f). Administrator

- All system maintenance.

All these parties will use the application using a Graphical User Interface. And the details entered will be stored in the database. There will be an intermediate layer which handles requests from users, processes the entered data, and renders a response back to the users. This system will be

designed as a web-based application that can be accessed using normal browsers. Also, when implementing the process maximum security will be taken in to consideration.

Use Case Diagram

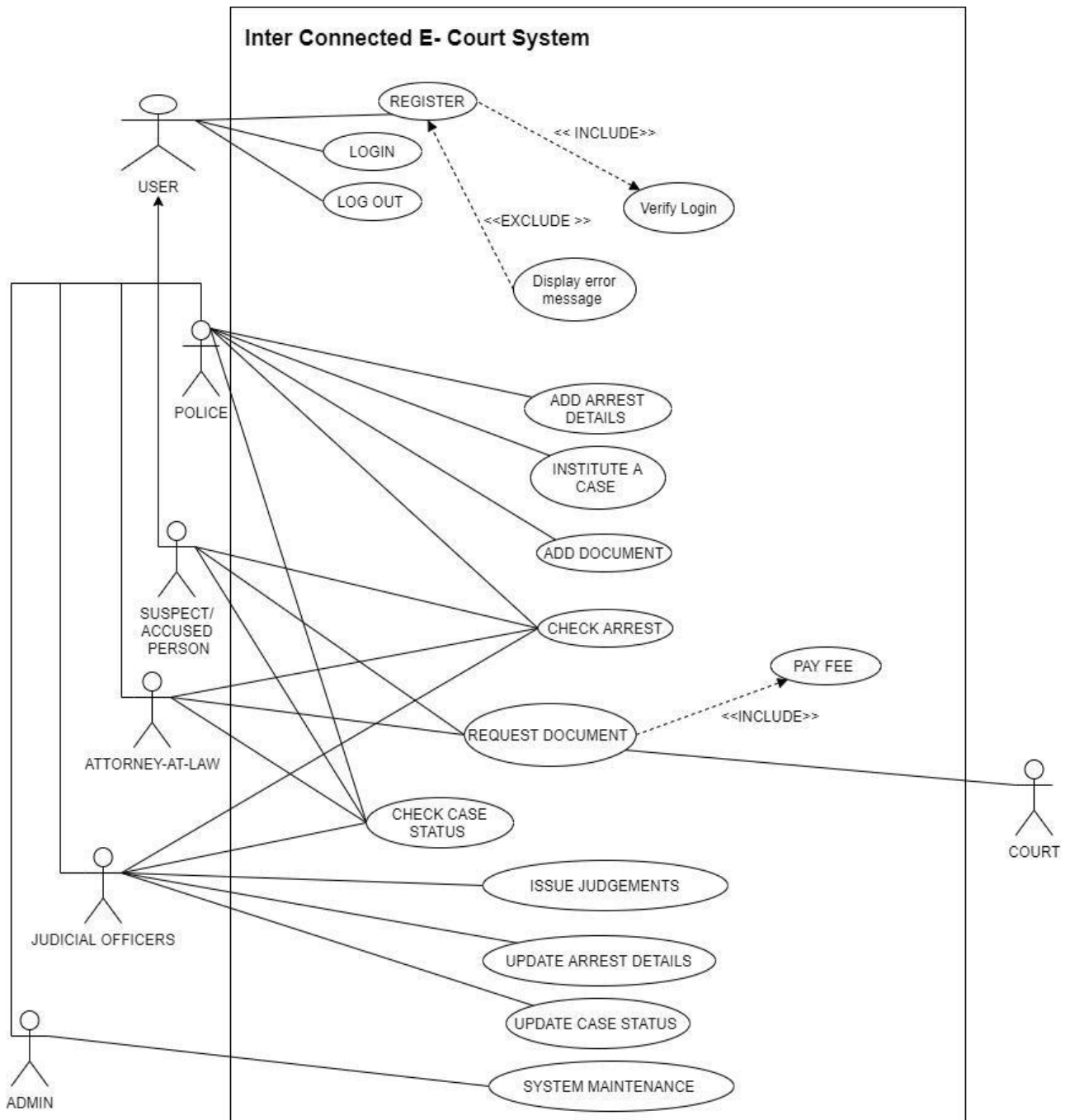


Diagram 09: User Case Diagram

User Story

Actor: Police Officer

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to add details pertaining to arrests, so that magistrate receives details.
05. As a user I need to file new cases, so that magistrate receives them.
06. As a user I need to check arrest details, so I can become aware of the status of an arrest.
07. As a user I need to check case details, so I can become aware of the status of a case.
08. As a user I want to add documents requested by the court.

Actor: Suspect/Accused Person

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest pertaining to me.
05. As a user I need to check request document from the court in a case pertaining to me, so that I can receive soft or hard copies.
06. As a user I need to check case details, so I can become aware of the status of a case pertaining to me.

Actor: Attorney-at-Law

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest.
05. As a user I need to check request document from the court, so that I can receive soft or hard copies.
06. As a user I need to check case details, so I can become aware of the status of a case.

Actor: Judicial Officer

01. As a first time user I want to download the app from the app store/ apple store and register in the application.
02. As a first time user I need to create a profile.
03. As a user I need to login to the application and use the services provided.
04. As a user I need to check arrest details, so I can become aware of the status of an arrest.
05. As a user I need to issue judgments, so that other users can download.
06. As a user I need to check case details, so I can become aware of the status of a case.
07. As a user I need to edit arrest details, so I can update b the status of an arrest.
08. As a user I need to edit case details, so I can update the status of a case.

Actor: Admin

01. As a user I need to do basic system maintenance, so I can maintain the system.

Use Case Description

Use case: Register

Description	The relevant actors must register to access the system.
Actors	Police, Accused Person, Judicial Officers (Admin) and Attorney-at-law
Pre-Condition	Accused person must have a charge sheet filed relevant to a crime.
	Attorney-at-Law must be a registered as an attorney.
Post-Condition	A username and a password are Generated.

Main Success Path The Actor upon filling relevant details a username and the password are generated.

Actor Actions	System Responses
1. Add NIC number and Phone Number (Accused Person).	1.1 System verifies NIC number and Attorney Number.
Add Attorney Number and Phone Number (Attorney at law).	1.2 Sends an OTP to the phone number.
Add police person number, and Phone Number (Police Officer).	
Add number issued by Judiciary and Phone Number (Judicial Officers).	
2. Enter the OTP and Create an Account Button.	2.1 System Verifies the OTP.
	2.2 Generate a new username and Password.
	2.3 Send details (username and password) to the phone number.
	2.4 Display the please login to continue message.

Exception Path 01 The Actor upon filling relevant details if any of the provided details are incorrect.

Actor Actions	System Responses
1. Add NIC number and Phone Number (Accused Person). Add Attorney Number and Phone Number (Attorney at law). Add police person number, and PhoneNumber (Police Officer). Add number issued by Judiciary and PhoneNumber.	1.1 System verifies details. 1.2 Display the error message.

Exception Path 02 The Actor upon filling wrong OTP code.

Actor Actions	System Responses
1. Add NIC number and Phone Number (Accused Person). Add Attorney Number and Phone Number (Attorney at law). Add police person number, and PhoneNumber (Police Officer). Add number issued by Judiciary and PhoneNumber.	1.1 System verifies NIC/Attorney number/police person number and Judicial officers' number. 1.2 Sends an OTP to the phone number.
2. Enter the OTP. 2.2 Display an error message with Resend code button.	2.1 System Verifies the OTP.

Use case: Login

Description	The relevant actors must login to the system by proving the given Username and the Password.
Actors	Police, Accused Person, Judicial Officers, Admin and Attorney-at-law
Pre-Condition	The Actor is already registered as a user
Post-Condition	The Actor directs to the Dashboard

Main Success Path The Actor upon filling username and the password directs to the main Dashboard

Actor Actions	System Responses
1. Add Username and Password 1.2 Directs to the Main Dashboard	1.1 System verifies details

Exception Path The Actor upon filling wrong username and/or the password. Access to the system is denied

Actor Actions	System Responses
1. Add Username and Password 1.2 Display the error message	1.1 System verifies details

Use case: Log Out

Description	The registered users shall log-out from the system
Actors	Police, Accused Person, Judicial Officers, Admin and Attorney-at-law
Pre-Condition	The Actor is login to the system.
Post-Condition	The Actor directs to the login screen

Main Success Path Press the log-out button

Actor Actions	System Responses
1. Press the log out button	1.1 Directs to the Login Screen

Use case: Add Arrest Details

Description	The Police can add details pertaining to an arrest.
Actors	Police.
Pre-Condition	The Actor must be registered with the system.
Post-Condition	New arrest details file is created.

Main Success Path The Actor adds all relevant details.

Actor Actions	System Responses
1. Add all required details of the arrest of the person arrested and the details of the officers involved.	1.1 System saves details to the database. 1.2 A number is generated. 1.3 Display successful message with the number.

Exception Path The Actor **doesn't** add all relevant details.

Actor Actions	System Responses
1. Add only some details of the arrest of the person arrested and the details of the officers involved.	1.1 Display the error message.

Use case: Institute a Case

Description	The Police can file a case.
Actors	Police
Pre-Condition	The Actor must be registered with the system.
Post-Condition	New case file is created.

Main Success Path The Actor adds all relevant details. Once added the system will share the added details with a judicial officer. Once the judicial officer accepts the case. A message will be sent to the inbox of the police inbox and registered users will be able to see the progress under the check case details tab.

1. Add all required details of the case.	1.1 System saves details to the database.
Actor Actions	System Responses

- 1.2 A number is generated.
1.3 Display successful message with the number.

Exception Path The Actor **doesn't** add all relevant details. The system will display a message stating relevant information to be added. Also, if a judicial offer rejects the case based on a reason that reason with details will be sent to the police inbox and request to re-file.

1. Add only some details of the case.	1.1 Display the error message.
Actor Actions	System Responses

Use case: Add Document

Description The relevant actors can use this feature file any additional documents as requested by the court.

Actors Police.

Pre-Condition The Actor must be registered with the system.

Post-Condition New Document uploaded.

Main Success Path The Actor adds documents.

Actor Actions	System Responses
1. Upload document.	1.1 System saves details to the database.
1.2 Display successful message with a number.	

Use case: Check Case status

Description The relevant actors can use this feature check the status of an ongoing case.

Actors Police, Accused Person and Attorney-at-Law.

Pre-Condition The Actor must be registered with the system.

Post-Condition Case status is shown.

Main Success Path The Actor can check the status of an ongoing case. The Actor must be registered to check the status.

Actor Actions	System Responses
1. Enter the case number.	1.1 System retrieves data from the database.
1.2 Display the relevant file.	

Use case: Request Document

Description The relevant actors can use this feature to request documents, upon paying relevant fees. The court will then check the possibility of issuing document and may issue the document.

Actors Accused Person and Attorney-at-Law.

Pre-Condition The Actor must be registered with the system.

Post-Condition Request will be sent to the Judicial officers.

Main Success Path The Actor request documents, upon paying relevant fees.

Actor Actions	System Responses
1. Actor requests Documents of a particular case.	1.1 System sends the details to the judicial officers.
1.2 Navigate to the payment portal.	
2. Enter payment details	2.1 Complete the transaction. 2.2 Return to the dash board.

Use case: Check Arrest

Description The relevant actors can use this feature check the status of an arrest.
Actors Police, Accused Person and Attorney-at-Law.
Pre-Condition The Actor must be registered with the system.
Post-Condition Arrest status is shown.

Main Success Path The relevant actors can use this feature check the status of an arrest.

Actor Actions	System Responses
1. Enter the Accused NIC number.	1.1 System retrieves data from the database.
1.2 Display the relevant file.	

Use case: Update Case Status

Description The relevant actors can use this feature to update the progress of a case.
Actors Judicial Officers
Pre-Condition Must login.
Post-Condition Case status is updated.

Main Success Path The relevant actors can use this feature to update the progress of a case.

Actor Actions	System Responses
1. Enter the case number.	1.1 System retrieves data from the database.
1.2 Display the relevant file.	
2. Click on add tab to update the details and save.	2.1 Updated information saved to the database.

Use case: Issue Judgment

Description The relevant actors can use this feature to issue judgments.
Actors Judicial officer

Pre-Condition Logged in to the system
Post-Condition Judgment will appear on the judgment list

Main Success Path The Actor request documents, upon paying relevant fees.

Actor Actions	System Responses
1. Submit the relevant judgment.	1.1 System saves the file.
1.2 Successful message appear.	

Use case: System Maintenance

Description The relevant actors can use this feature to add, delete or edit any information, file or any other thing in the system.
Actors Administrator.
Pre-Condition Logged in to the system.
Post-Condition Intended changes will take place.

Main Success Path System admin can use this feature to make changes in the system.

Actor Actions	System Responses
1. Do changes.	1.1 System saves the file/information.
1.2 Successful message appears.	

Use case: Update Arrest Status

Description The relevant actors can use this feature to update the progress after Arresting a person.
Actors Judicial Officer.
Pre-Condition Must login.
Post-Condition Arrest status is updated.

Main Success Path The relevant actors can use this feature to update the progress after Arresting a person.

Actor Actions	System Responses
3. Enter the Arrest number.	1.1 System retrieves data from the database.
1.2 Display the relevant file.	
4. Click on add tab to update the details and save.	2.1 Updated information saved to the database.

03. Work Completed

03.01 Project Management

Managing an IT project involves managing nine knowledge areas of project management. Under this part in detail discussion will be provided on the core knowledge areas of project management. Namely: scope management, time management, cost management and quality management. Though, project integration management and other facilitating knowledge areas of project are also relevant, due to the fact that this project is being done as an individual project not much attention is given.

Scope Management

Scope management involves initiation, scope planning, scope definition, scope verification and scope change control.

The final objective of this project is to build an interconnected E-Court System. An E-Court system that interconnects most of the actors of a court system will increase the ease of access and reduce the time taken pertaining to judicial activities. However, the prominence will be given to delivering justice and project will not include anything that will hinder the delivery of justice.

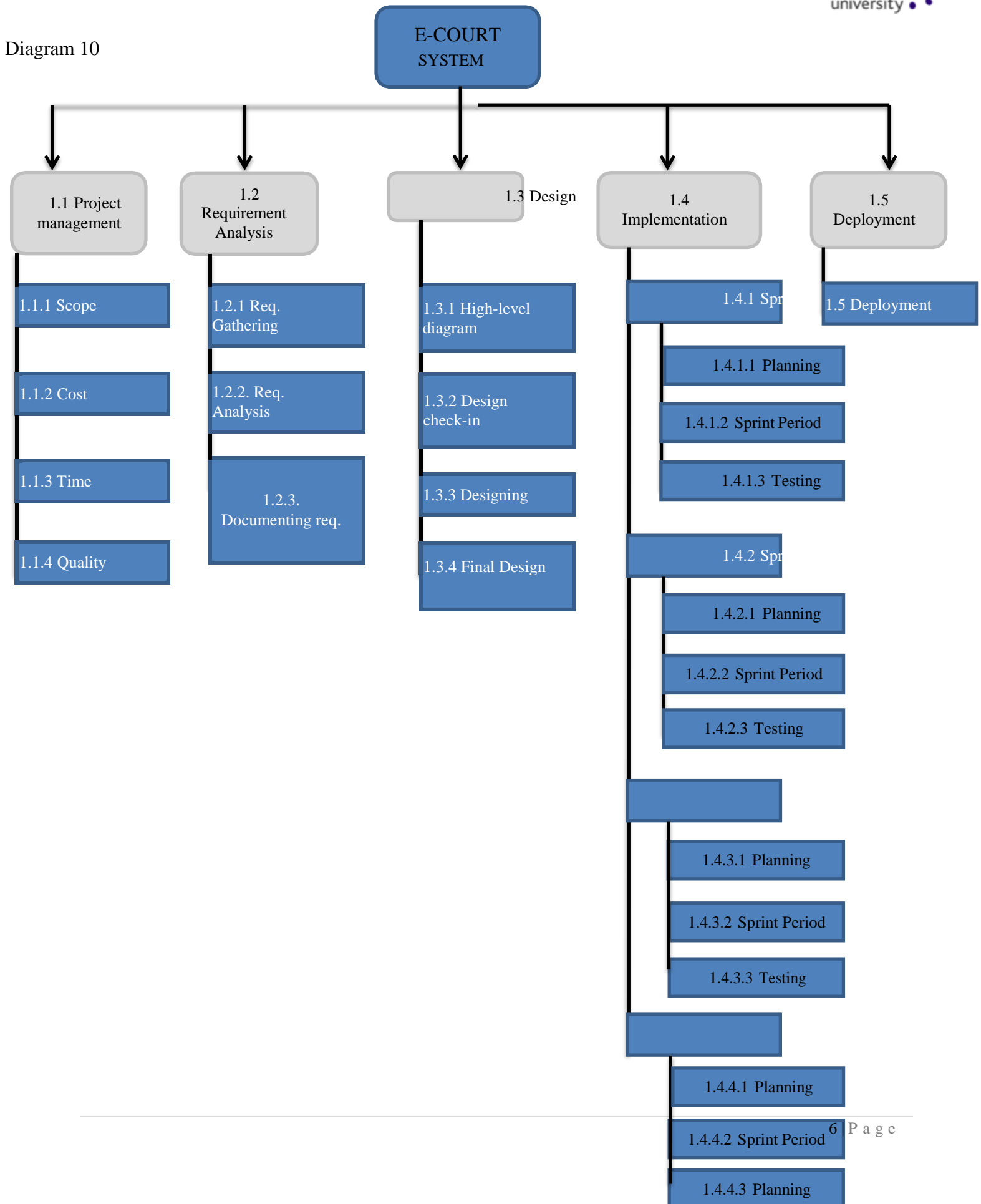
There shall be four main parties that will be able to access the proposed system: **(a)**. Law enforcement officers will be able to add details about the persons arrested and based on the offence committed application will request further information. Set of predetermined information will be shared with relevant magistrate court. **(b)**. Attorneys will be able to file litigations and pay stamp fee. **(c)**. Judicial Officers will be able to add the current status of the pending cases. **(d)**. Members of the general public, who is a plaintiff, accused, suspect or defendant will be able to check the status of the relevant cases and download the judgment.

The main aims of this Project can be listed as:

- a. A research will be conducted and the data collected from the research will be analyzed to identify the root causes of the delays in the court system;
- b. Based on the findings of (a) above, critically evaluate how delays can be remedied. Rather than focusing on other procedural remedies priority will be given to reach a remedy that can be achieved through the use of Information Technology;
- c. Developing an interconnected system that will reduce delays and increase ease of access to justice;
- d. Evaluating the usability and success of the proposed system;
- e. Based on the (d) above, changing the proposed system as required; and
- f. Preparing final documents analyzing every aspect of the problem domain and proposed solution.

The Final system is achieved through the following the below work breakdown structure.

Diagram 10



03.02 Time Management

Gantt chart

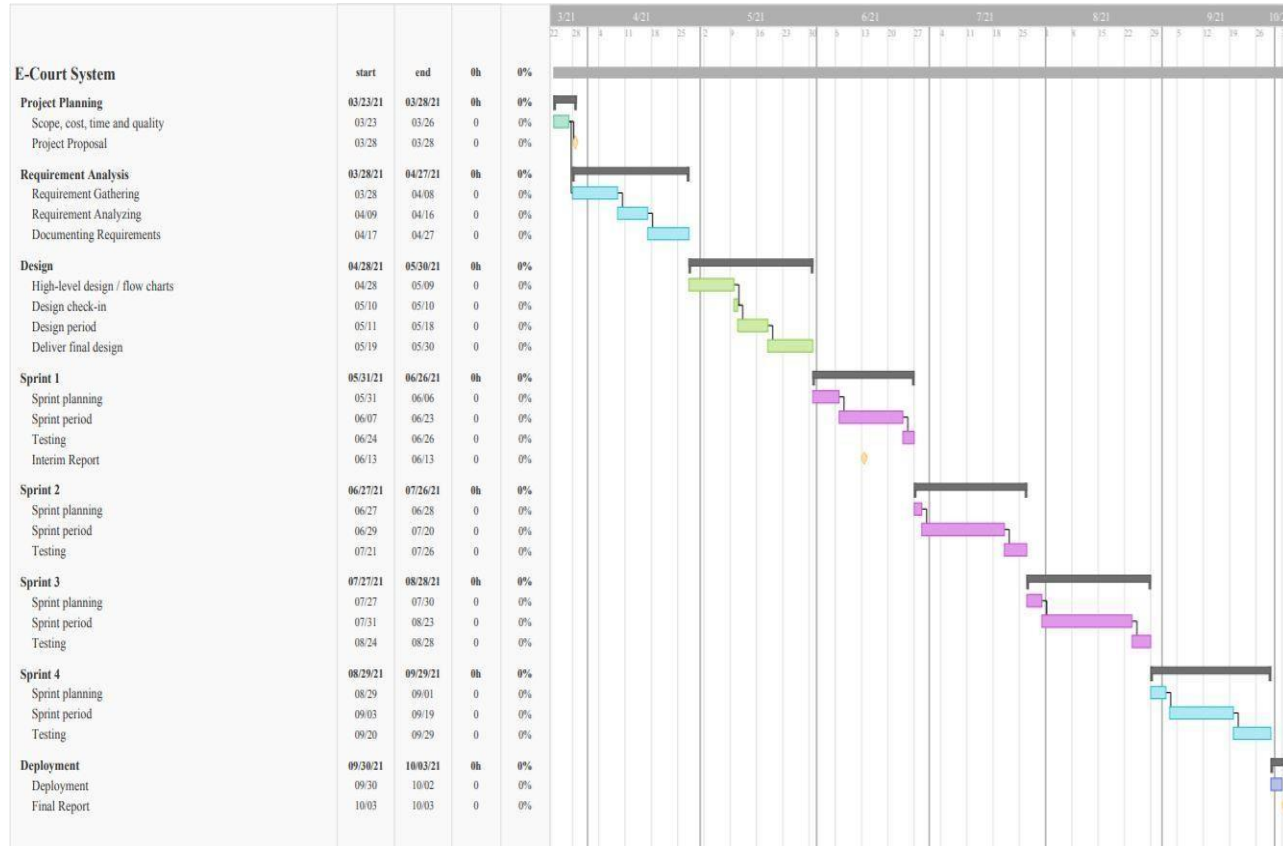


Diagram 11: Project Gantt chart

The Gantt chart above provides the steps that will be undertaken to deliver the project and how the **time management** is done. The project planning was initiated with the announcement of the project details and the initial project planning is expected to be completed within 15 days. From the Initial project proposal submission date of 28/03/2021, the final project deliverables will be delivered within 154 days as shown in the Gantt chart. The implementation is divided into 4 sprints. As shown, the majority of the project time period will be sacrificed for implementation (Four sprints). Requirement Analysis and design procedure have been allocated with consecutively 30 days and 33 days.

Please note that these time periods and dates may be subjected to changes due to unavoidable reasons and if required, the changed Gantt chart will be provided in the Final Project Report.

Cost Management

Work Brake Down Structure

WBS	DURATION	BUDGET	
Project Planning	4 day	Rs. 10,000	
- Scope	1 day	Rs. 2500	
- Time	1 day	Rs.2500	
- Cost	1 day	Rs.2500	
- Quality	1 day	Rs.2500	
	30 days		
Requirement Analysis	11 days	Rs. 30,000	
- Requirement Gathering	8 days		Rs. 11,000
- Requirement Analysing	11 days	Rs. 8,000	
- Documenting Requirements		Rs. 11,000	
Design	33 days	Rs. 33,000	
- High level design	12 days	Rs. 12,000	
- Design check-in	1 days	Rs. 1000	
- Design Period	8 days	Rs. 8000	
- Deliver Final Design	12 days	Rs. 12,000	
Implementation	89 days	Rs. 89,000	
- Sprint 01	20 days	Rs. 20,000	
- Sprint 02	21 days	Rs. 21,000	
- Sprint 03	25 days	Rs. 25,000	
- Sprint 04	23 days	Rs. 23,000	
Deployment	2 days	Rs. 2,000	
- Deployment			
			Total : Rs. 164,000

Costs are estimated based on the work brake down structure, using the bottom-up technique. This technique involves estimating the cost of individual activity and then adding the individual techniques to get a project total. This technique is selected because the project of this nature in the Sri Lankan context is completely novel and no historical data is available.

Quality Management

Software quality management involves three components: quality planning, quality assurance and quality control. A test plan is developed that focuses on all the functional and non-functional areas of the system to make sure the final product clearly in line with the objectives of the project.

Quality Plan

Throughout, the implementation procedure an eye is kept open for quality. The ISO/IEC 15504 (SPICE) standard is followed regarding the software process to make sure an effective software process is followed.

The software quality components (Operation quality, revision quality and transition quality) developed by James A. McCall are followed regarding the specific product qualities.

Operation Quality

FACTORS	COMMENT
Correctness the correctness.	White box testing and black box testing will be used to test
Reliability done to check the system and system runs within a minimum down time.	Feature testing, regression testing and load testing will be
Efficiency advanced and reputed hardware.	The system is implemented using the most technological
Integrity Relevant ISO standards will be followed.	The website will be hosted through https:
This factor deals with security. Different users will only be able to access different level of information. As an example: general public will be only given the read permit not the write permit. But, court staff will be provided with the opportunity to both read and write.	
Usability for system maintenance (if necessary) a training program will be conducted.	A user manual will be provided. Staff will be trained and

Revision Quality

FACTORS	COMMENT
Maintainability maintainability will be ensured.	Through iterative development and regular review
The coding will be done in a maintainability oriented manner.	
Flexibility the program will be flexible.	Due to the practices like encapsulation and de-composition
Testability the end of the every sprint a testing will be done. Also, a live test will be done at the end.	As the agile scrum method is followed to development at

Transition Quality

FACTORS	COMMENT
Portability capable of running in any operating system.	As the system is developed to run on a web browser, the
Reusability cohesion, loose- coupling and test class.	Codes will be developed based on modularity, high-
Interoperability common standards. And compatibility tests will be conducted to make sure the interoperability.	System will be developed using the same language or

Quality Control

The software process will be checked against the ISO/IEC 15504 (SPICE) standard to make sure an effective software process is followed.

In each and every sprint the quality is tested. This is mainly comprised of, functional testing and regression testing. **a).** Functional testing will ensure that all functional/system requirements of the system documented in requirement specification documents are accurately and fully implemented. **b).** Regression testing will ensure that the modifications are not having any impact to existing functionalities.

And live testing is done, once the software is live.

Quality Assurance

A quality audit is done to make sure relevant quality standards are followed. Under quality assurance, requirement standards are audited and result from quality control measurements are considered to ensure relevant quality standards are followed. This will facilitate the improvement of the quality processes.

03.03 Feasibility Study

Costs

The most of the costs will be associated with the implementation process and to establish the infrastructure required (in reality the costs involved to implement a system that covers whole court system will amount to USD Millions as it is required to establish infrastructure at police stations, court houses and other relevant government departments). The client and the server applications will be hosted through as web application and it is required to bear the associated hosting costs. When the operation is operational monthly charges are required to be paid for Internet Service Providers. The bandwidth required is high and conventional copper cables are not satisfactory. The use of fibre optical connection is recommended. Also, a substantial amount will be allocated for maintenance and testing.

However, the benefits accrued after the adaptation will be able to be calculated in multi-millions. The number of human working hours that will be saved through the system is immense. Most importantly the backlog of cases will be reduced drastically.

Economic Feasibility

The infrastructure needed is already established as there are computers and the ability to access internet in most of the court houses and other authorities. The fiber optical access is available in most part of the country. When compared other than the costs required for developing the web application the costs for infrastructure development will be minimum (**development costs and set up costs**). In the operation phase when implementing a system, it will be required to train the staff or appointing new staff members, which will increase the costs drastically (**operational cost**). However, the monthly salaries and the costs involved in maintaining staff will be as same as the staff required in a non-digitalized court system.

The final product will continue to produce results for ages. As elsewhere mentioned in this report this system will reduce the staff requirements. The government will be able to save millions spent on salaries. As the number of papers used by the court system reduces that will directly reduce the costs and as less papers will be used (**direct benefits**).

The impact on the environment is also positive as fewer resources will be wasted. As the government uses less resources on the system the relevant government fee and stamp charges can be reduced. (As per the present law every proxy and other documents must be stamped based on the value of the case) (**Assessable indirect benefits**).

The author of this report is of the view that the **intangible benefits** of implementing this project will surpass the tangible benefits. Under the international conventions it is required to increase use of

technology in our day-to-day lives. By digitalizing our court system the image boost received by the country will create new opportunities and position Sri Lanka as a favourable country to do international trade and business. The country's ease of doing business rank will be reduced as any issue is being capable of solved within a very short period of time. The image boost country accumulates is harder to estimate or measure.

As the proposed system reduce the backlog of cases that will increase the efficiency of the court system. Less Judges and police officers are required to maintain the court system. Overall, the efficacy of human working hours will be considerably increased.

The most valuable advantage of all the advantages will be cultural effect on the society. As cases are solved within a short period of time more and more people will resort to solving cases through judiciary, which will result in a paradigm change on how people react in problematic situations (access to justice will increase).

Technical Feasibility

This application as a web application is associated with following technologies and techniques. All this technologies are freely available and can access without any subscription plans or costs, as open sources. The application will be developed using HTML, CSS and C#. The data bases are developed using MySQL.

3.4 Design

3.4.1 Software Development Process

As the Software Development life model Scrum method is adapted. Scrum is an agile software development method that was conceived by Jeff Sutherland and his development team in the early 1990s. Scrum principles are consistent with the agile manifesto and are used to guide development activities within a process that incorporates the following framework activities: requirements, analysis, design, evolution, and delivery. Work tasks occur within a process pattern called a sprint. At the end of each sprint a demo with certain functionalities is developed. The Scrum process is selected because it can be used for a software development with a tight timelines with changing requirements and business criticality. This project is very time sensitive as it is required to deliver the final delivery within 154 days.

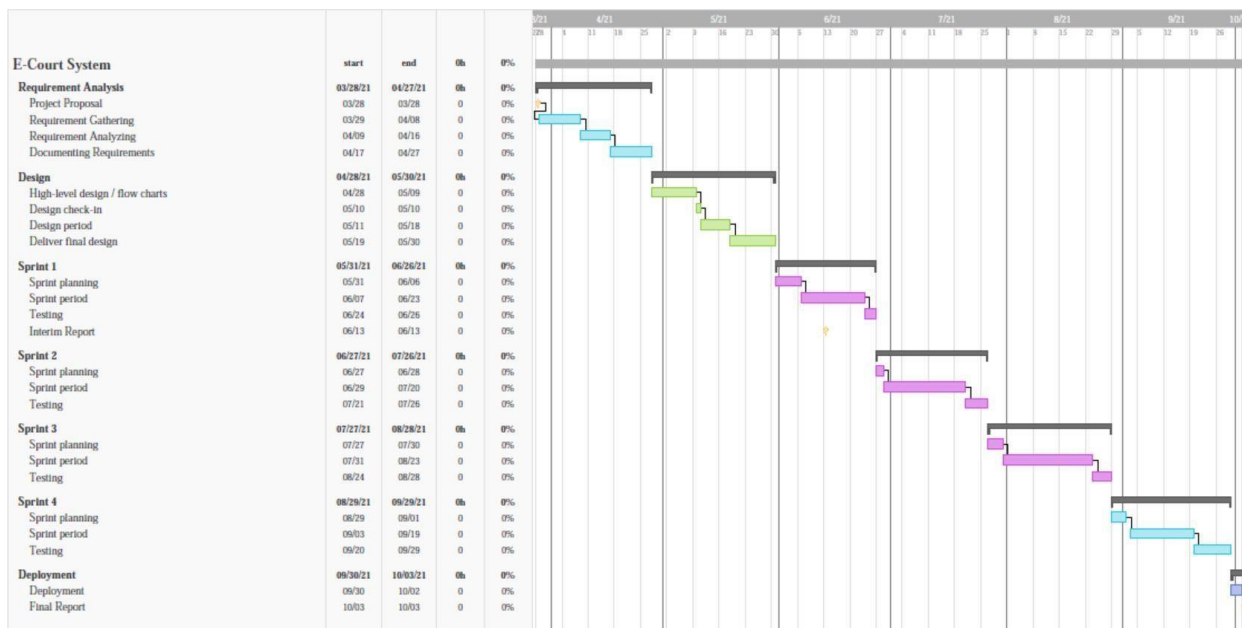


Diagram 12: Software Development Life Cycle

The development process consists of 4 sprints. 20 days allocated for sprint 01. 21 days allocated for sprint 02. 25 days allocated for sprint 03 and 23 days allocated for sprint 04. Unlike in the waterfall model of software development, Scrum enables an iterative and incremental development process, which allows to deliver a usable product to the customer. This is advantages because any gaps between customer requirements and the final delivery can be eliminated.

3.4.2 Architectural Pattern

As any web-application the architecture design of the proposed application is client server architecture. Nevertheless, as Pressman and Maxim states in their book Software engineering: a practitioner's approach. A three-layer design architecture that decouples interface from navigation and from application behavior by keeping interface, application, and navigation separate simplifies implementation and enhances reuse (Pressman, 2021). Therefore, the Model – View – Controller architecture is selected for the proposed system.

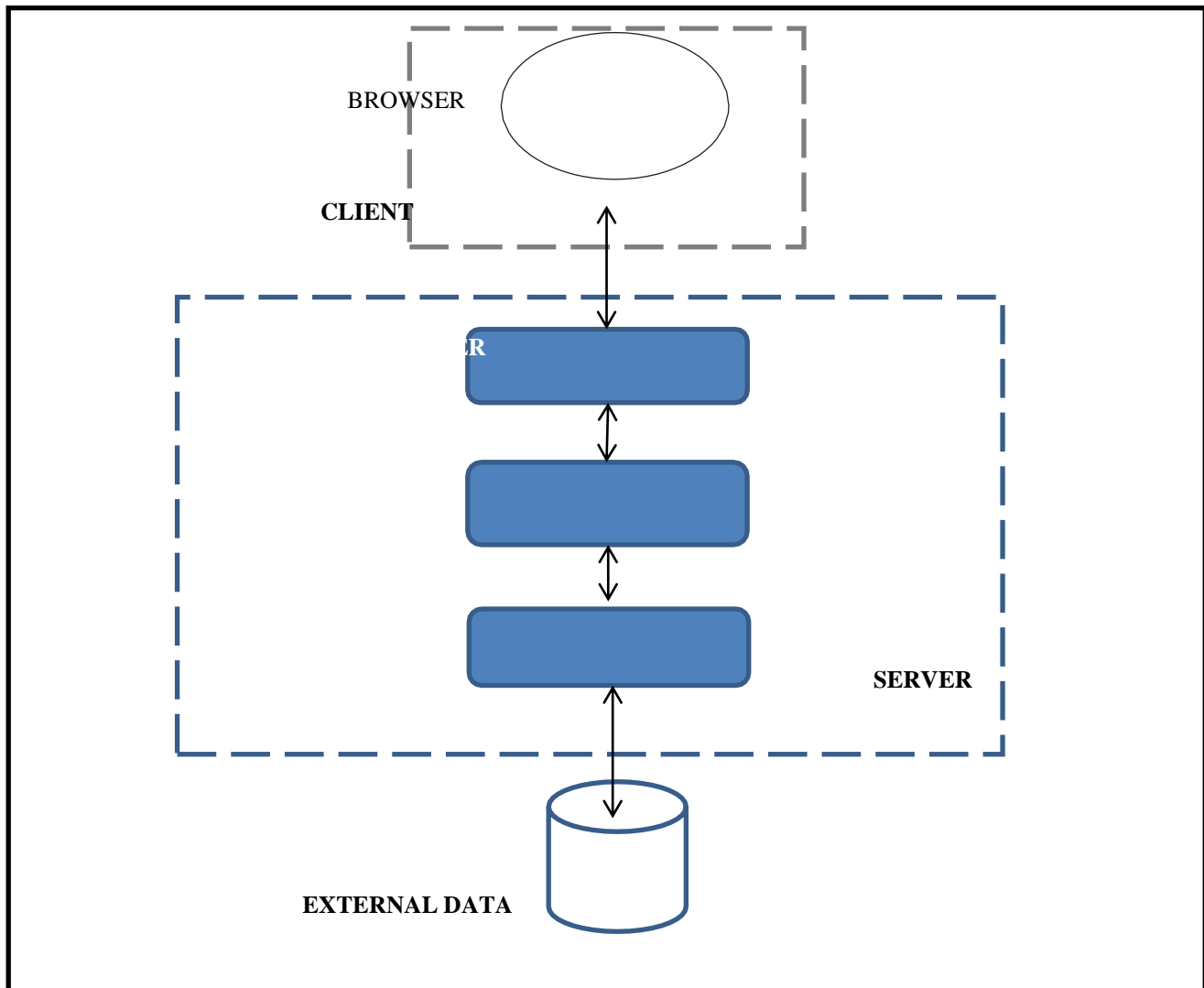


Diagram 13: Software Architecture

Model is the core component of the architecture, and contains all the data and logic. The View element comprised of the Graphical user interfaces, and only capable of accessing data in the model through the controller. The main reason for using this architecture is the security as the user can only access the view. This pattern is more suitable for an application pertaining to the judiciary. Also, asynchronous

technique makes it possible to work with PDF files, site-specific browsers, and also with desktop widgets. Also, due to the ability to load the application fast that will save the time. Saving time is the most prominent aim of this project. Also, though not relevant to this project, in a project more than one developer is involved using this pattern will allow developers to develop the view, control and model simultaneously.

3.4.3 Class Diagram

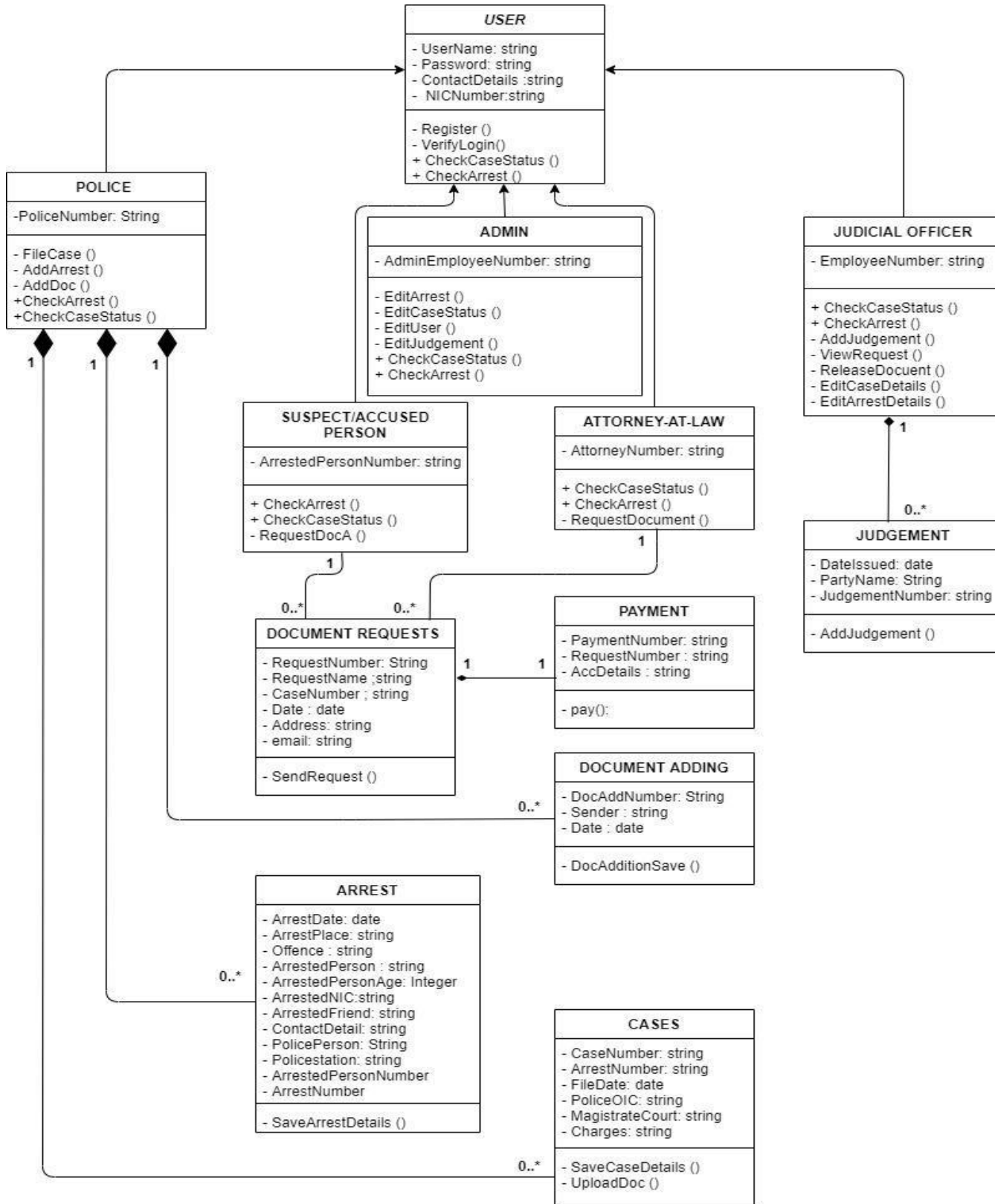


Diagram 14

3.4.4 Entity Relationship Diagram

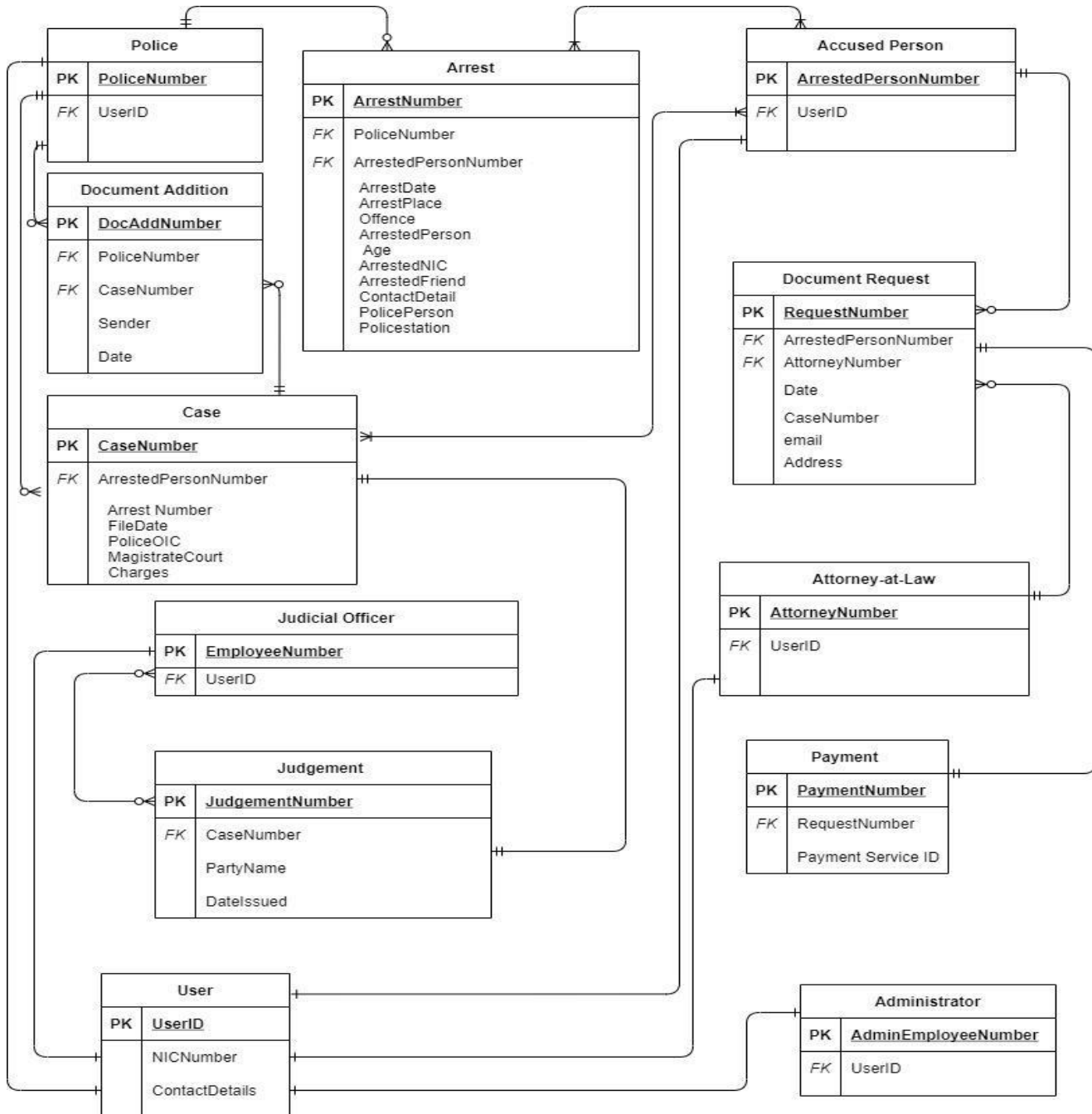


Diagram 15

3.5 Implementation

Sprint 01

- **User Stories**

Actor: Police, Accused Person, Judicial Officers (including Admin) and Attorney-at-law. (As all Actors should follow this process word “User” has been used to denote all Actors mentioned herein).

01. Scenario:

Signup / register

As a first time user I should be able to download the app and register in the application.

Success:

1. As a user I should be able to open the app by clicking the app icon.
2. As a user I should be navigated to the welcome screen.
3. As a user I should be able to click signup now icon
4. As a user I should be navigated to sign up page.
5. As a user I should be able to go back to the previous screen by clicking the back icon.
6. As a first time user I should be able to enter my NIC Number, Police Number, Employee Number or the Attorney number on the registration page with other details (First Name, Last Name and Address).
8. As a first time user I should be able to click the next button.
9. As a first time user I should be navigated to the next screen (OTP code page).
10. As a first time user I should be able to add my mobile phone number and get a four digit OTP code to the given mobile number.
11. As a first time user I should be able to enter the four digit OTP code
12. As a first time user I should be able to click the Resend button.
13. As a first time user I should be able to see a countdown from 10 seconds to 0 when the user clicks the resend button.
14. As a first time user I should get a notification when clicks the resend button “OTP code has been send to your phone number”.
15. As a first time user I should be able to get another OTP code to my phone number
16. As a first time user I should be able to go back to the previous screen by clicking the back icon
17. As a first time user I should be able to click the verify OTP button.
18. As a first time user when I click the verify button, I should get a system generated username and password to the mobile phone number provided. Also, I should get message ““Registration is successful” message.
19. As a first time user I should be navigated to a first time screen.

Failure:

1. As a user system should display an error message if i don't enter any phone number and other requested details and clicks the next button - “Please enter your mobile number”.
2. As a user system should highlight and notify me the areas that I have left blank - “Please fill xxx field”.
3. As a user application should pop ups an error if I enter a wrong phone number - “Please enter a valid phone number”.

4. As a user I should be get an error message if I entered an incorrect OTP code - “Invalid OTP code, Please try again”.

02. Scenario:

Login

As a registered user I should be able log in to the application.

Actor: Police, Accused Person, Judicial Officers (including Admin) and Attorney-at-law.

Success:

1. As a registered user I should be able to open the app by clicking the app icon.
2. As a registered user I should be navigated to the welcome screen.
3. As a registered user I should be able to select the type of the Account (Police, Accused Person, Judicial Officers (including Admin) and Attorney-at-law).
4. As a registered user I should be able to click Log In page.
5. As a registered user I should be able to add username and password and click the login button.
6. As a registered user I should be able to go back to the previous screen by clicking the back icon.
7. As a registered user I should be navigated to the relevant dashboard based on the role.

Failure:

1. As a registered user system should display an error message, if I don't enter the correct Username or password or select wrong type of Account.

• Test Cases

No	Test Case Name	Steps	Expected Result	Status
1	Verify the User Registration for the Police	<ol style="list-style-type: none"> 1. User launch the app by clicking on the app icon 2. click on the „Sign-up“ Link in the welcome Screen 3. Below fields should be displayed in the „Sign-up“ page as Mandatory <ul style="list-style-type: none"> • First Name • Last Name • Address • User Type • Police No • Mobile No: • Username 	<p>Application should be launched</p> <p>User should be able to click on the Sign-up link and should be re-directed to „Sign-Up“ page</p> <p>Fields should be displayed as below,</p> <ul style="list-style-type: none"> • First Name – Should be a text field with the length of 50 characters • Last Name- – Should be a text field with the length of 50 characters • Address – Should be a 	

- Password

text field with the length of 200 characters

- User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer
- Police No: - Should be displayed only if the user Type is „Police“ as a text field with the length of 50 characters
- Mobile No: Should be a text field with the length of 50 characters
- Username- – Should be a text field with the length of 100 characters
- Password-should be a text field with 10 characters

Once these are filled out „Next“ button should be enabled

User should be able to click on the „Next Button“

4. User should be able to click the Next button

User should receive a verification code to his Mobile after clicking the „Next“ button

should be redirected to „Verify Mobile No“ Page User should be able to enter the verification code and that should be validated

5. User should be able to enter the verification code in this page

„Registration Successful“ confirmation message should

be displayed

- | | |
|---|---|
| <p>2 Verify the User Registration for an Accused Person</p> | <ol style="list-style-type: none"> 1. User launch the app by clicking on the app icon Application should be launched 2. click on the „Sign-up“ Link in the welcome Screen User should be able to click on the Sign-up link and should be re-directed to „Sign-Up“ page 3. Below fields should be displayed in the „Sign-up“ page as Mandatory Fields should be displayed as below, <ul style="list-style-type: none"> • First Name • Last Name • Address • User Type • National ID No • Mobile No: • Username • Password <p style="margin-left: 40px;">User fill up all the fields</p> |
|---|---|
- First Name – Should be a text field with the length of 50 characters
 - Last Name- – Should be a text field with the length of 50 characters
 - Address – Should be a text field with the length of 200 characters
 - User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer
 - National ID No: - Should be displayed only if the user type is „Accused“ as a textfield with the length of 50 characters
 - Mobile No: Should be a text field with the length of 50 characters
 - Username- – Should be a text field with the length of 100 characters
 - Password-should be a text field with 10 characters

		Once these are filled out „Next“ button should be enabled
	4. User should be able to click the Next button	User should be able to clickon the „Next Button“
		User should receive a verification code to his Mobile after clicking the „Next“ button
		should be redirected to „Verify Mobile No“ Page User
	5. User should be able to enter the verification code in verification code and that this page should be validated	
		„Registration Successful“ confirmation message shouldbe displayed
3	Verify the User Registration for an Attorney-at law	
	1. User launch the app by clicking on the app icon	Application should be launched
	2. click on the „Sign-up“ Link in the welcome Screen	User should be able to clickon the Sign-up link and should be re-directed to „Sign-Up“ page
	3. Below fields should be displayed in the „Sign-up“ page as Mandatory	Fields should be displayed as below,
	<ul style="list-style-type: none"> • First Name • Last Name • Address • User Type • Bar association • Registration No • Mobile No: • Username • Password 	<ul style="list-style-type: none"> • First Name – Should be a text field with the length of 100 characters • Last Name- – Should be a text field with the length of 100 characters • Address – Should be a text field with the length of 200 characters • User Type – Should be a dropdown field with values: Police, Attorney, Accused
	User fill up all the fields	

and Judicial Officer

„Attorney-at-law“ as a text field with the length of 50 characters

- Bar association
Registration No: -
Should be displayed
only if the user type is
- Mobile No: Should be
a text field with the
length of 50
characters
- Username- – Should
be a text field with the
length of 100
characters
- Password-should be a
text field with 10
characters

Once these are filled out
„Next“ button should be
enabled

4. User should be able to
click the Next button

User should be able to click on
the „Next Button“

User should receive a
verification code to his
Mobile after clicking the
„Next“ button

should be redirected to
„Verify Mobile No“ Page User

5. User should be able to enter the
verification code in verification code and that
this page should be validated

„Registration Successful“
confirmation message should be
displayed

4 Verify the User
Registration for a
Judicial Officer

1. User launch the app by
clicking on the app icon Application should be
launched
2. click on the „Sign-up“ User should be able to click on
Link in the welcome Screen the Sign-up link and

should be re-directed to
„Sign-Up“ page

3. Below fields should be displayed as
displayed in the „Sign-up“ below,

- page as Mandatory
- First Name
 - Last Name
 - Address
 - User Type
 - Employee No
 - Mobile No:
 - Username
 - Password
- First Name – Should be a text field with the length of 100 characters
 - Last Name- – Should be a text field with the length of 100 characters
 - Address – Should be a text field with the length of 200 characters
 - User Type – Should be a dropdown field with values: Police, Attorney, Accused and Judicial Officer
 - Employee No: - Should be displayed only if the user type is

„Judicial Officer“ as a text field
with the length of 50 characters

- Mobile No: Should be a text field with the length of 50 characters
- Username- – Should be a text field with the length of 100 characters
- Password-should be a text field with 10 characters

User fill up all the fields

Once these are filled out
„Next“ button should be enabled

4. User should be able to User should be able to click

click the Next button

on the „Next Button“

User should receive a verification code to his Mobile after clicking the „Next“ button

should be redirected to
„Verify Mobile No“ Page User

5. User should be able to enter the verification code in verification code and that this page should be validated

„Registration Successful“
confirmation message should be displayed

5 Verify Login as a Police Officer

1. User launch the app by clicking on the app icon
2. click on the „Sign-In“ Link in the welcome Screen on the Sign-In link and should be re-directed to „Login“ page
3. Below fields should be displayed in the Login page as mandatory

Username:
Password: - Login
Button

User should enter the username and password

Application should be launched
User should be able to click on the Sign-In link and should be re-directed to „Login“ page
Fields should be displayed as below,

- Username- – Should be a text field with the length of 10 characters
- Password-should be a text field with 10 characters

4. User clicks on the login button User should authenticate the System

If username and Password is correct user should be re-directed to the Dashboard.

6 Verify Login as an accused Person

1. User launch the app by clicking on the app icon
2. click on the „Sign-In“ Link in the welcome Screen on the Sign-In link and should be re-directed to „Login“ page.

Application should be launched
User should be able to click on the Sign-In link and should be re-directed to „Login“ page.

3. Below fields should be displayed as
displayed in the Login page below,
as mandatory

- Username- – Should be a text field with the length of 10 characters
- Password-should be a text field with 10 characters

Username: Password: - Login Button

User should enter the username and password

4. User clicks on the login System should authenticatethe
button User

If username and Password is
correct user should be re-
directed to the Dashboard

7 Verify Login as an
Attorney-at-law

1. User launch the app by
clicking on the app icon

Application should be
launched

2. click on the „Sign-In“ Link
in the welcome Screen

User should be able to click
on the Sign-In link and
should be re-directed to
„Login“ page

3. Below fields should be
displayed in the Login page
as mandatory

Fields should be displayed as
below,

Username: Password: -
Login Button

User should enter the
username and password

- Username- – Should be a text field with the length of 10 characters
- Password-should be a text field with 10 characters

4. User clicks on the login System should authenticatethe
button User

If username and Password is
correct user should be re-
directed to the Dashboard

8 Verify login as a
Judicial Officer

1. User launch the app by
clicking on the app icon

Application should be
launched

2. click on the „Sign-In“ Link
in the welcome Screen

User should be able to click
on the Sign-In link and
should be re-directed to
„Login“ page

3. Below fields should be displayed as
displayed in the Login page below,
as mandatory

- Username- – Should be a text field with the length of 10 characters
- Password-should be a text field with 10 characters

Username: Password: - Login Button

User should enter the username and password

4. User clicks on the login System should authenticatethe
button User

If username and Password is
correct user should be re-
directed to the Dashboard

9 Verify login as a
System Administrator

1. User launch the app by
clicking on the app icon

Application should be
launched

2. click on the „Sign-In“ Link
in the welcome Screen

User should be able to click
on the Sign-In link and
should be re-directed to
„Login“ page

3. Below fields should be
displayed in the Login page
as mandatory

Fields should be displayed as
below,

Username:
Password: - Login
Button

- Username- – Should be a text field with the length of 10 characters
- Password-should be a text field with 10 characters

User should enter the
username and password

4. User clicks on the login System should authenticatethe
button User

If username and Password is
correct user should be re-
directed to the Dashboard.

3.6 Testing and Verification

The software being developed must comply with the relevant quality attributes. The Test phase ensures that all the bugs are remedied before the software is delivered to the client. Throughout this project IEEE 829 standard for software testing is followed. As prescribed in the standard the following deliverables are necessary: test plan, test design specification, test case specification, test procedure specification, test item transmittal report, test log, test incident report, test summary report. However, due to the space and time constraints not all documents will be created. The test cases will be created per every sprint and will be provided under the implementation phase.

Type of Testing

Unit testing, Integration testing, system testing and acceptance testing will be conducted during each print, as agile development scrum practice is followed. All frontend and backend coding will be manually tested.

Test Environments

This application will be tested on following software and hardware configuration.

Software: Windows 8.1 OS with a Chrome browser of the Version 91.0.4472.114 (Official Build) (64-bit).

Hardware: Intel 64 bit- 2.40 GHz processor with 8 GB Ram.

Features to be tested during the course of all sprints

Following functionalities will be tested when logged-in as Police.

1. Registration
2. Login
3. Dashboard
- 3.1. Adding arrest details.
- 3.2. Adding new case details.
- 3.3. Viewing arrest details.
- 3.4. Viewing case details.
- 3.5. Adding documents.
4. Logout

Following functionalities will be tested when logged-in as a Suspect/Accused.

1. Registration
2. Login
3. Dashboard
 - 3.1 Viewing arrest details.
 - 3.2 Viewing case details.
 - 3.3 Requesting documents.
4. Logout

Following functionalities will be tested when logged-in as Attorney.

1. Registration
2. Login
3. Dashboard
 - 3.1 Viewing arrest details.
 - 3.2 Viewing case details.
 - 3.3 Requesting documents.
4. Logout

Following functionalities will be tested when logged-in as Judicial Officer.

1. Registration
2. Login
3. Dashboard
 - 3.1 Viewing arrest details.
 - 3.2 Viewing case details.
 - 3.3 Issue documents.
 - 3.4 Update arrest details.
 - 3.2 Update case details.
4. Logout

Features not to be tested during the course of all sprints

1. It will not be tested whether this application's features runs on different operating systems. Only whether this application is capable of running Windows 8 OS with 64 bit processor is tested.

04. Evaluation and Conclusion

The project was started soon after the submission of the final project proposal. As shown in the diagram below; it is planned to complete the project on or before 03rd of October 2021. By the time this interim report is submitted (Yellow horizontal line on the following Gantt chart [Diagram 15]) the initial evaluation was to complete half of the sprint 02. However, it was only managed to complete the sprint planning phrase of the Sprint 01 (check Diagram 16), which means only 29% of the sprint 01 has been completed. As a percentage, only 39% from the total project work has been completed.

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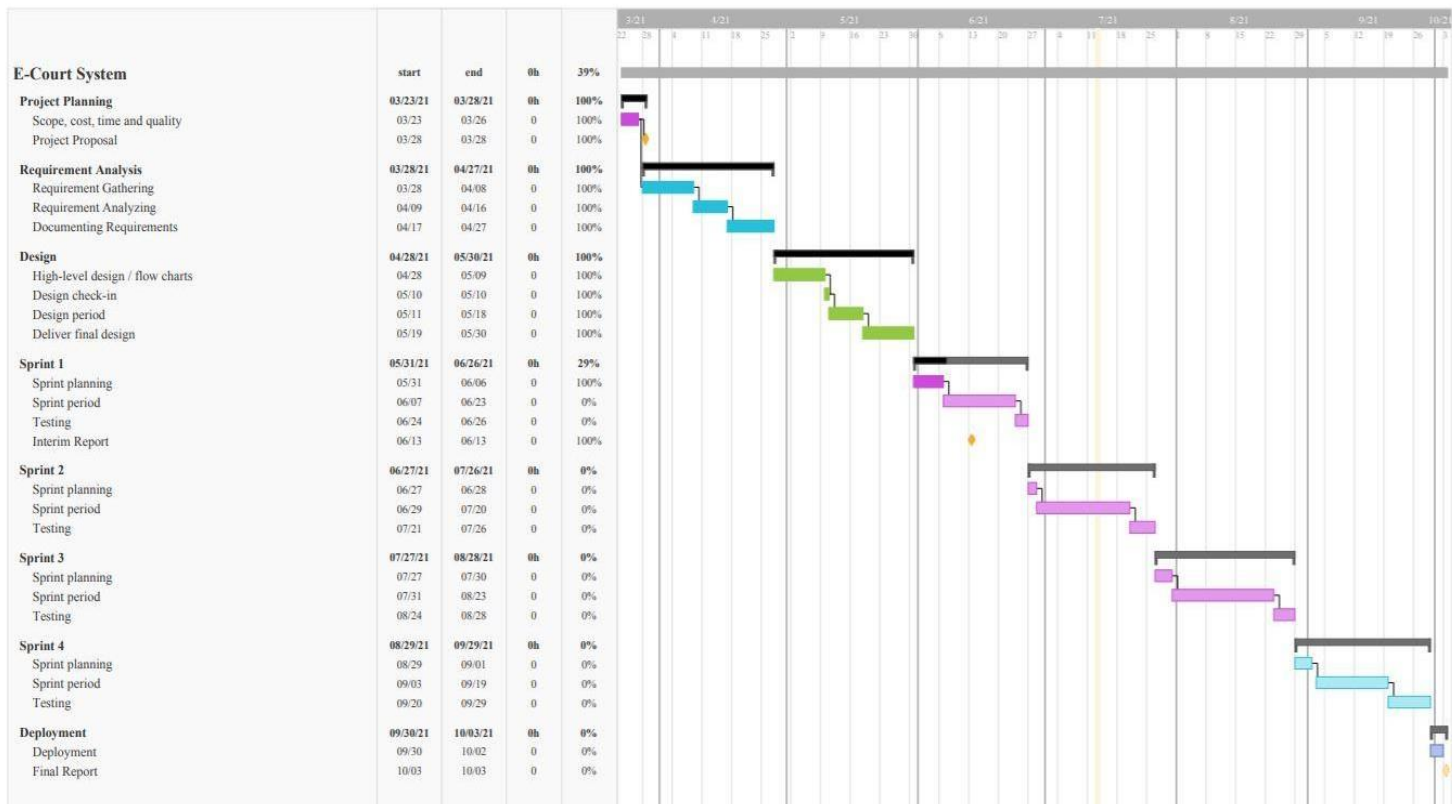


Diagram 16: Project Gantt chart

As a percentage, 61% of the total project work has to be completed before 03rd of October. Mainly this includes remaining three sprints and the remaining half of the sprint 01. All the remaining work is pertaining to the implementation phrase of the project.

E-Court System				
	start	end	0h	39%
Project Planning	03/23/21	03/28/21	0h	100%
Scope, cost, time and quality	03/23	03/26	0	100%
Project Proposal	03/28	03/28	0	100%
Requirement Analysis	03/28/21	04/27/21	0h	100%
Requirement Gathering	03/28	04/08	0	100%
Requirement Analyzing	04/09	04/16	0	100%
Documenting Requirements	04/17	04/27	0	100%
Design	04/28/21	05/30/21	0h	100%
High-level design / flow charts	04/28	05/09	0	100%
Design check-in	05/10	05/10	0	100%
Design period	05/11	05/18	0	100%
Deliver final design	05/19	05/30	0	100%
Sprint 1	05/31/21	06/26/21	0h	29%
Sprint planning	05/31	06/06	0	100%
Sprint period	06/07	06/23	0	0%
Testing	06/24	06/26	0	0%
Interim Report	06/13	06/13	0	100%
Sprint 2	06/27/21	07/26/21	0h	0%
Sprint planning	06/27	06/28	0	0%
Sprint period	06/29	07/20	0	0%
Testing	07/21	07/26	0	0%
Sprint 3	07/27/21	08/28/21	0h	0%
Sprint planning	07/27	07/30	0	0%
Sprint period	07/31	08/23	0	0%
Testing	08/24	08/28	0	0%
Sprint 4	08/29/21	09/29/21	0h	0%
Sprint planning	08/29	09/01	0	0%
Sprint period	09/03	09/19	0	0%
Testing	09/20	09/29	0	0%
Deployment	09/30/21	10/03/21	0h	0%
Deployment	09/30	10/02	0	0%
Final Report	10/03	10/03	0	0%

Diagram 17: Project Status

The main reason for not being able to achieve the expected target was the wrong calculation pertaining to the time taken for the designing process and requirement analysis. The time had allocated for the designing and requirement gathering was in adequate as during the designing process number of diagrams had to be drawn. Also, from the start of the project, it had been forgotten to decide on the number of hours that needed to sacrifice for this project on a daily basis or weekly basis. Ultimately that resulted in a massive backlog of work.

Nevertheless, author of this report is still optimistic that the project will be able to complete within the relevant time period. To eliminate the backlog of work, more time will be sacrificed in a daily basis, until the project is back on time.

Progress approval form



Monitoring the Progress of Final Year Projects *Final Project Log Sheet*

London Met BSc.(Hons) / BEng.(Hons)

Project Title:

Interconnected E-Court System

Name of the Student:

Dinesh Madugalle

Name of the Supervisor:

Dimuthu Thammitage

To be filled and signed by the supervisor

Minimum 2 meetings per month

Meeting	Criteria	Suggestions	Actions	Date	Signature
<i>Proposal Stage</i>					
1.	Project topic approval				
2.	Project proposal approval				
<i>Interim & Final Stage</i>					
3.	Literature review (Gathered resource documents)				

4.	Literature review (Report)	Suggested to include information from other countries and elaborate the approach	The literature review was further developed with reference to other countries	2021/06/19	
5.	Approach (Users, Input, Output, Technologies Used)				
6.	Project Design	Advised to include class and ER diagrams	Class diagram and ER were added	2021/07/03	
7.	Implementation (Algorithms, Flow charts, System, etc.)	Advised to speed up the implementation	Allocated more time	2021/08/21	
8.					

9.					
10.	Evaluation (Testing evidence)				
11.	Conclusion (Result interpretation, Achievement of objectives, Limitations)& Further work				
12.	Guidance for the final viva				

