Crime Investigation System

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DECLARATION

We, student of Jahangirnagar University, in Computer Science and Engineering department. Here by declare that all the whole work described in this project book is our own, except where explicitly indicated otherwise. Wherever information from other sources is included, the references material source is also given. This thesis is being submitted to Department of Computer Science and Engineering, Jahangirnagar University , Savar, Dhaka.

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APPROVAL   OF ACCEPTANCE

A project report written by Sadia Afrin Shabnam and Md. Ferdos Kabir entitled
" Crime Investigation System" is submitted to the Honors final year project of
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Dhaka in partial fulfillment of the requirements for the requirements for the Degree
of Honors in Computer Science and Engineering. The project is done under the
supervision of Tahsina Hashem, Lecturer Department of Computer Science and
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ABSTRACT

Crime investigation management system is a progressive website in the replacement of the traditional procedure of investigation system. This is a web based application combined with server side programming which provide functionalities such as interacting with users and generating results to browsers. In this project, admin can add case , add officer, add officer to case, view suspect, view evidence, predict result etc easily. On the contrary, officer can add suspect, add evidence, add case history, view suspect, view evidence, view case history and so on.

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Chapter 1

Introduction

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1.1 Introduction

Web development is a broad term for the work involved in developing a web site for the Internet or an intranet . Web development can range from developing the simplest static single page of plain text to the most complex web-based internet applications, electronic businesses, and social network services. Nowadays, almost all the popular website is based on web based language like PHP, ASP etc. In this project, we present a website on Crime Investigation Management System. It helps the admin and officer to make the criminal charge sheet procedures easier. This project presents a website with no possibility of errors.

1.2 Objectives

The main objective of this Crime Investigation Management System is to easy add of the criminal information and process Criminal Investigation in a dynamic way. The objectives of this project are as follows:

- To improve the Crime Investigation System
- To control access based on two roles (admin & officer).
- Control of data validity and compliance.
- Aid in easy storage and retrieval of data.
- To make easier and error free system.

1.3 Aim of the Project

The aim of the project is to make easier and error free crime investigation management system. This Crime Investigation Management System is being used to add case, add officer, add officer to case, add suspect ,add evidence, view case history and predict result. This asp.net programmed system works to maintain all the records for managing crime and predict the expected suspect. Implementation of a Crime investigation Management System helps the officer to get useful information on individuals with crime records.

1.4   System Architecture

The web based project is a client-server based project, which maintains the following layers:

i)   User interface
ii)   Internet layer
iii)   Communication layer
iv)   Functional service layer
v)   Data layer

Input or data transfers happen in both directions in the system. The user input is transmitted using an internet browser. This data then associates to the system through the internet.

 During internet connection, the data is required to pass through the systems firewall for security purposes, in order to connecting to the web server. Admin once tenabled within the system, will be connected directly to the application server. In the functional services layer, the data input or request routed to the appropriate functional module in accordance with the database via SQL server.

1.5   Methodology

Software life cycle models describe phases of the software cycle and the order in which those phases are executed. Each phase produces deliverables required by the next phase in the life cycle. Requirements are translated into design. The analyst must develop from one stage to another systematically and achieving in each stage. A process model for software engineering is chosen based on the project and application, the methods and tools to be used and the controls and deliverables that are required, the stages of software development are:

➢   Feasibility study
➢   Recognition of need
➢   Requirement analysis
➢   Design
➢   Implementation
➢   Post-implementation and maintenance

Requirement Analysis

2.1   Analysis of Requirements

Requirements analysis encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product or project, taking account of the possibly conflicting requirements of the various stakeholders, analyzing, documenting, validating and managing software or system requirements. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design. Analysis models and the requirements specification provide the developer and the customer to assess the quality of the software. Analyst should model what is known and use that model as the basis for design of the software.

Different types of models:

   i)   analysis model
   ii) design model
   iii) construction model

Based on our analysis of the project, we found the following works in different workgroup:

Admin works:

   —   add case.
   —   add officer.
   —   add officer to case.
   —   predict result.
   —   add result.
   —   view suspects.
   —   view evidence.
   —   view case history.

Officer work:

- add suspect.
- add evidence .
- add case history .
- view suspects.
- view evidence.
- view case history.

2.2 Analysis Model

Objectives:

• Describe the requirements

 • Establish the foundation for design and implementation

• Define the verification and validation suites

Two types of analysis:

i) domain analysis
ii) application analysis

Domain Analysis

• Understand the background information so that we can understand the problem.

• Acquiring the general information about the domain

• Knowing the players and their attributes

• Getting to know the environment

• Examining the current practice

• Understanding generic versus specific

• Familiarizing with the competitors

2.2.1 Analysis Modelling

Two types:

i) structured analysis
ii) object-oriented (OO) analysis

Structured analysis

– Separate data from process.

- • Data Dictionary

Data model → ERD, Semantic object diagram (SOD)

- • Flow-oriented model → Data flow diagram (DFD), Control-flow diagram

- • Behavioral model → State diagram

- • Scenario-based model →Process narrative

OO analysis

Concentration on the definition of classes and the manner in which they collaborate.

2.2.2   Data Modelling

• Analyzing data objects independently from processes

• Focusing on the data domain

• Be at the same abstraction level as stakeholder

• Pointing out the relationship among data objects

Data Objects

- Data Object is something that described by a set of attributes (data item) and that will be manipulated in the system (or software).
- It is a representation of any composite information having a number of different properties or attributes, understood by software.
- e.g. dimension (height, width and depth).
- Encapsulates data only, no reference to operations
- Can be represented as a table.

Rules of data object identification

– External entities (printer, user, sensor)

– Things (report, display, signal)

– Occurrences or events (alarm, telephone call)

 – Roles (manager, clerk)

– Organization units (Accounting Dept, R & D)

– Places (building, manufacturing floor)

– Structures (employee records)

Cardinality

The elements of data modeling:

• Data Objects

• Data Attributes

• Relationships

> ♦ It is the specification of the number of occurrences of one object that can be related to the number of occurrences of another object.
> ♦ Data modeling tools can be used to represent data objects, their characteristics and their relationships.
> ♦ Tools provide an automated means for creating entity-relationship (ER) diagram, data object dictionaries, and related models.

2.3   Different Types of Requirements

Different types of requirements are as follows:

2.3.1   Functional Requirements

- These are statements of services the system should provide,
- how the system should react to particular inputs, and how the system should behave in particular situations.
- For a system, it describes the functionality or services that the system is expected to provide.
- The functional requirements specification of a system should be both complete and consistent.

2.3.2   Non-functional Requirements

- These are not directly concerned with the specific functions delivered by the system.
- They may relate to emergent system properties: reliability, response time and store occupancy.
- They may define constraints of the system: capability, store occupancy etc.
  Different types:
  - i) product requirement
  - ii) Organizational and
  - iii) external requirements.

2.3.3 Domain Requirements

- These are derived from the application domain of the system

  e.g. constrain existing functional requirements or set out how particular computations must be carried out.

2.3.4 User Requirements

- They describe the functional and non-functional requirements to be understandable by the system users.
- The requirements must be written using natural language, forms and simple diagrams.

2.3.5 System Requirements

- It is a complete and consistent specification of the whole system
- System requirement specification may include different models of the system, e.g., object model, data-flow model etc.
- It states what the system should do.

2.4 Strategies of Information Processing

The strategies of information processing and knowledge ordering, used in a variety of fields including software, humanistic and scientific theories, and management and organization, are:

i. Top-down approach
ii. Bottom-up approach

In practice, they can be seen as a style of thinking and teaching.

2.5 Top-down Approach

A top-down (also known as stepwise design and in some cases used as a synonym of decomposition) approach is essentially the breaking down of a system to gain insight into its compositional sub-systems in a reverse engineering fashion. In a top-down approach an overview of the system is formulated, specifying, but not detailing, any first-level subsystems. Each subsystem is then refined in yet greater detail, sometimes in many additional subsystem levels, until the entire specification is reduced to base elements. However, black boxes may fail to clarify elementary mechanisms or be detailed enough to realistically validate the model. Top down approach starts with the big picture. It breaks down from there into smaller segments.

Features of Top-down Approach

- Tactical, limited coverage
- Delayed return on investment
- Lower impact to overall organization
- Higher deployment costs

Advantages of Top-down Approach

- realizes a focused use of resources from the individual managed application.
- The first implementation becomes a showcase for the identity management solution.
- When the phases are completed for the managed application, developers have implemented a deeper, more mature implementation of the identity management solution.
- Operation and maintenance resources are not initially impacted as severely as with the bottom-up approach.

Disadvantages of Top-down Approach

- The solution provides limited coverage in the first phases.
- A minimal percentage of user accounts are managed in the first phases.
- Developing custom adapters at an early stage.
- The support and overall business will not realize the benefit of the solution as rapidly.
- The implementation cost is likely to be higher.

In our project, we use the top-down approach for the software implementation. First we design the Graphical User Interface (GUI) and then we develop the programming.

2.6   Limitation of Manual System

Normally it has been done manually. It will save many times of people if it is done digitally. In an investigation , case diary must be maintained and it is done manually. Sending case diary to court is mandatory . If it is done digitally it will save many times and expedite the investigation. If the accused is taken under remand then chalan and forwarding must be sent to higher authority and court as well. All chalan and forwarding are written in paper. If we send it digitally then it will make the investigation process smooth. Statement of witnesses is recorded manually. But it can be digital. In Financial and cyber crime digital system must be useful for investigation. There are many problems of management in police station. Among these they commonly faces three problems.

     i. Lack of logistics
    ii. Lack of manpower
   iii. Difficulties in finding witness. people are not interested to give their statements.

2.7   Required Tools

To establish the project the following term is necessary:

- Microsoft Visual studio 2013
- Microsoft SQL Server 2012
- ASP.NET
- C#
- Bootstrap

The details of each term are given in below:

2.7.1   Microsoft Visual Studio 2013

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silver light. Visual Studio supports different programming languages and allows the code editor and debugger to support (to varying degrees) nearly any programming language, provided a language-specific service exists. Built-in languages include C C++ and C++/CLI (via Visual C++), VB.NET (via Visual Basic .NET), C# (via Visual C#).

2.7.2   Microsoft SQL Server 2012

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet). SQL Server 2012's new features and enhancements include Always On SQL Server Failover Cluster Instances and Availability Groups which provides a set of options to improve database availability, Contained Databases which simplify the moving of databases between instances, new and modified Dynamic Management Views and Functions, programmability enhancements including new spatial features, metadata discovery, sequence objects and the THROW statement, performance enhancements such as Column Store Indexes as well as improvements to Online and partition level operations and security enhancements including provisioning during setup, new permissions, improved role management, and default schema assignment for groups.

2.7.3 ASP.NET

ASP.NET is an open-source server-side web application framework designed for web development to produce dynamic web pages. It was developed by Microsoft to allow programmers to build dynamic web sites, web applications and web services. ASP.NET's successor is ASP.NET Core. It is a re-implementation of ASP.NET as a modular web framework, together with other frameworks like Entity Framework. The new framework uses the new open-source .NET Compiler Platform and is cross platform. ASP.NET MVC, ASP.NET Web API, and ASP.NET Web Pages have merged into a unified MVC 6.

Important Advantages ASP.NET Offers over Other Web Development Models

- The Web server continuously monitors the pages, components and applications running on it. If it notices any memory leaks, infinite loops, other illegal activities, it immediately destroys those activities and restarts itself.
- ASP.NET drastically reduces the amount of code required to build large applications.
- With built-in Windows authentication and per-application configuration, your applications are safe and secured.
- The ASP.NET framework is complemented by a rich toolbox and designer in the Visual Studio integrated development environment. WYSIWYG editing, drag-and-drop server controls, and automatic deployment are just a few of the features this powerful tool provides.
- Provides simplicity as ASP.NET makes it easy to perform common tasks, from simple form submission and client authentication to deployment and site configuration.
- The source code and HTML are together therefore ASP.NET pages are easy to maintain and write. Also the source code is executed on the server. This provides a lot of power and flexibility to the web pages.
- All the processes are closely monitored and managed by the ASP.NET runtime, so that if process is dead, a new process can be created in its place, which helps keep your application constantly available to handle requests.
- It is purely server-side technology so, ASP.NET code executes on the server before it is sent to the browser.
- Being language-independent, it allows you to choose the language that best applies to your application or partition your application across many languages.
- ASP.NET makes for easy deployment. There is no need to register components because the configuration information is built-in.
- It provides better performance by taking advantage of early binding, just-in- time compilation, native optimization, and caching services right out of the box.

2.7.4 C# Language

The C# is intended to be suitable for writing applications for both hosted and embedded systems, ranging from the very large that use sophisticated operating systems, down to the very small having dedicated functions.

Features of C#

- ➢ Implicitly typed local variables
- ➢ Static classes
- ➢ Method and function
- ➢ Namespace
- ➢ Memory Access
- ➢ Polymorphism
- ➢ Meta Programming
- ➢ Anonymous types

2.7.5 Bootstrap

Bootstrap is a free and open-source front-end web framework for
designing websites and web applications .It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. Unlike many web frameworks, it concerns itself with front-end development only. It is a free and open-source collection of tools for creating websites and web applications. It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. It aims to ease the development of dynamic websites and web applications.

Feature of Bootstrap

- ➢ Bootstrap is a front end framework, that is, an interface for the user, unlike the server-side code which resides on the "back end" or server.
- ➢ The version 4.0 alpha release added Sass and Flex box support.
- ➢ Bootstrap is open source and available on GitHub. Developers are encouraged to participate in the project and make their own contributions to develop their project.
- ➢ Bootstrap is compatible with the latest versions of the Google Chrome, Firefox, Internet Explorer, Opera, and Safari browsers.
- ➢ Since version 2.0 it also supports responsive web design.
- ➢ Starting with version 3.0, Bootstrap adopted a mobile first design philosophy, emphasizing responsive design by default.

Chapter 3
System Analysis

3.1   Introduction

The process of studying a procedure or business in order to identify its goals and purposes and create systems and procedures that will achieve them in an efficient way. Another view sees systems analysis as a problem solving technique that decomposes a system into its component pieces for the purpose of the studying how well those component parts work. Analysis and synthesis, as scientific methods, always go hand in hand; they complement one another. Every synthesis builds upon the results of a preceding analysis, and every analysis requires a subsequent synthesis in order to verify and correct its results.

The field of systems analysis relates closely to requirements analysis or to operations research. It is also "an explicit formal inquiry carried out to help a decision maker identify a better course of action and make a better decision than she might otherwise have made.

3.2   System Analysis

A system is a set of interacting or interdependent component parts forming a complex/intricate whole. Every system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose and expressed in its functioning. It is derived from a Greek word. A system is a set of detailed methods, procedures and routines established or formulation to carry out specify activity, perform a duty or solve a problem. It is a detailed study of various operations performed by a system and their relationships within and outside of the system.

3.3   Necessity of System Analysis

To computerize a system, as a requirement of the data processing or the information need, it is necessary to analyze the system from different angles. While satisfying such need, the analysis of the system is the basic necessity for an efficient system design. The need for analysis stems from the following point of view.

System Objective: It is necessary to define the system objective. Many a times, it is observed that the systems are historically in operation and have lost their main purpose of achievement of the objectives.

System Boundaries: It is necessary to establish the system boundaries which would define the scope and the coverage of the system. This helps to sort out and understand the functional boundaries of the system, the department boundaries in the system.

System Importance: It is necessary to understand the importance of the system in the organization. This would throw more light on its utility and would help the designer to decide the design features of the system.

Nature of The System: The analysis of the system will help the system designer to conclude whether the system is the closed type or open, and a deterministic or probabilistic. Such an understanding of the system is necessary.

3.4   Role of System Analyst

A systems analyst is an information technology professional who specializes in analyzing, designing and implementing information systems. Systems analysts assess the suitability of information systems in terms of their intended outcomes and liaise with end users, software vendors and programmers in order to achieve these outcomes. A systems analyst is a person who uses analysis and design techniques to solve business problems using information technology. Systems analysts may serve as change agents who identify the organizational improvements needed, design systems to implement those changes, and train and motivate others to use the systems.

A systems analyst may:

- Identify, understand and plan for organizational and human impacts of planned systems, and ensure that new technical requirements are properly integrated with existing processes and skill sets.
- Plan a system flow from the ground up.
- Interact with internal users and customers to learn and document requirements that are then used to produce business requirements documents.
- Write technical requirement from a critical phase.
- Interact with designers to understand software limitations.

- Help programmers during system development, e.g. provide use case , flow chat or even database design.
- Perform system testing.
- Deploy the completed system.
- Document requirements or contribute to user manuals.
- Whenever a development process is conducted, the system analyst is responsible. for designing components and providing that information to the developer.

Most desired skill and Qualities of system analyst:

- Excellent communication abilities
- Problem solving.
- Understanding of the potential of computer technology.
- Appreciation for the business's objectives.
- Ability to guide people through periods of change.
- Creativity.

3.5 Steps of Analysis Process

Analysis strategy: Strategic analysis is the use of various tools to prepare business strategies by evaluating the opportunities.

Requirements gathering: Requirements gathering is an essential part of any project and project management. Understanding fully what a project will deliver is critical to its success.

System proposal: A Systems Proposal is usually offered as both a written report and as a presentation . Its purpose is to convince the client's decision makers to proceed with the project, and to gain their consensus about the best way to proceed.

3.6 Tools of Information Gathering

There are many tools used for information gathering. Some of them are given below

- ➢ Interview
- ➢ Procedure and forms
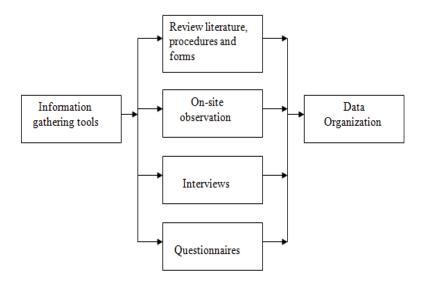- ➢ Document Analysis
- ➢ Observation
- ➢ Questionnaires

Fig: Information Gathering Tools

3.7   System Planning

Two stages of system planning

i) Feasibility study
ii) Work plan

3.7.1   Feasibility Study

- It is a test of a system design according to its workability, impact on the organization, ability to meet user needs, and effective use of resources.

- A feasibility study aims to objectively and rationally uncover the strengths and weaknesses of an existing business or proposed venture, opportunities and threats present in the environment, the resources required to carry through, and ultimately the prospects for success. In its simplest terms, the two criteria to judge feasibility are cost required and value to be attained.

3.7.1.1   Operational Feasibility

The operational feasibility assessment focuses on the degree to which the proposed development projects fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture, and existing business processes. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design. Therefore, operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phases.

3.7.1.2   Technical Feasibility

This assessment is based on an outline design of system requirements, to determine whether the company has the technical expertise to handle completion of the project. When writing a feasibility report, the following should be taken to consideration:

- ➢ A brief description of the business to assess more possible factors which could affect the study
- ➢ The part of the business being examined
- ➢ The human and economic factor
- ➢ The possible solutions to the problem

3.7.1.3   Schedule Feasibility

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Schedule feasibility is a measure of how reasonable the project timetable is. Given our technical expertise, are the project deadlines reasonable? Some projects are initiated with specific deadlines. It is necessary to determine whether the deadlines are mandatory or desirable.

3.7.1.4   Economic Feasibility

The purpose of the economic feasibility assessment is to determine the positive economic benefits to the organization that the proposed system will provide. It includes quantification and identification of all the benefits expected. This assessment typically involves a cost/ benefits analysis.

3.7.2   Work Plan

A work plan is an outline of a set of goals and processes by which a team and/or person can accomplish those goals, and offering the reader a better understanding of the scope of the project. Work plans, whether used in professional or academic life, help to stay organized while working on projects.

3.8   Generic Software Process Models

- The waterfall model
    - Separate and distinct phases of specification and development.
- Evolutionary development
    - Specification, development and validation are interleaved.
- Component-based software engineering
    - The system is assembled from existing components.

3.9   Waterfall model

First published model of the software development process.

Stages: [Fig. 3-1]

    i)   Requirements analysis and definition
    ii)   System and software design
    iii) Implementation and unit testing
    iv) Integration and system testing
    v)   Operation and maintenance

- ◆ Requirements analysis and definition:
  - System's services, constraints and goals are established consulting with system users
- They are defined in detail and used as a system specification

- ◆ System and software design :
- System design process partitions the requirements to hardware and software systems, and establishes an overall system architecture
- Software design involves identifying and describing the fundamental software system abstraction, and their relationships

- ◆ Implementation and unit testing:
- The software is constructed by the set of programs or program units which are obtained by translating the design models using programming language, database tools.
- Unit testing is performed to verify that each unit meets its specification

- ◆ Integration and system testing:
- The unit tested program units or programs are integrated and tested to ensure that the software meets its requirements

- Operation and maintenance
- The system is installed and put into use.
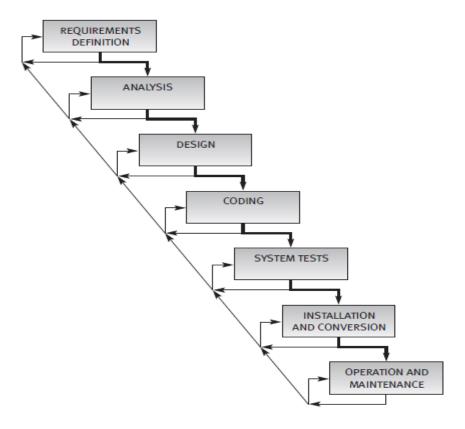- Errors are corrected during maintenance

Fig. 3-1 Waterfall Model

Disadvantages

- Inflexible partitioning of the project.
- It is difficult to respond to changing customer requirements.

3.10 UML Diagrams

The Unified Modeling Language (UML) is a general-purpose, developmental, modeling language in the field of software engineering that is intended to provide a standard way to visualize the design of a system.

UML is a standard visual modeling language intended to be used for modeling business and similar processes, analysis, design, and implementation of software-based systems.UML is a common language for business analysts, software architects and developers used to describe, specify, design, and document existing or new business processes, structure and behavior of artifacts of software systems. UML can be applied to diverse application domains (e.g., banking, finance, internet, aerospace, healthcare, etc.) It can be used with all major object and component software development methods and for various implementation platforms (e.g., J2EE)

Features of UML Diagrams

UML stands for Unified Modeling Language which is used in object oriented software engineering. Although typically used in software engineering it is a rich language that can be used to model an application structures, behavior and even business processes. They can be divided into two main categories; structure diagrams and behavioral diagrams.

- give guidance as to the order of a team's activities,
- fix what artifacts should be developed,
- directs the tasks of individual developers and the team as a whole and offers criteria for monitoring and measuring a project's products and activities.
-

3.10.1   Use Case Diagrams

Use case diagrams are usually referred to as behavior diagrams used to describe a set of actions (use cases) that some system or systems (subject) should or can perform in collaboration with one or more external users of the system (actors).

- Use Case Diagrams have only 4 major elements:
- The actors that the system you are describing interacts with,
- the system boundary itself, Identify an implicit separation between actors (external to the system) and use cases (internal to the system)
- the use cases, or services, that the system knows how to perform, and
- the lines that represent relationships between these elements.
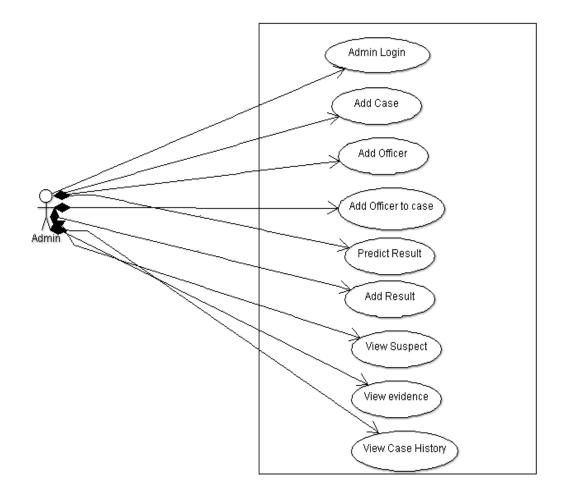
i.   Use Case Diagram for Admin

Fig. 3-2 Use Case Diagram for Admin

Procedures: [Fig. 3-2]

1.   add case.
2.   add officer.
3.   add officer to case.
4.   predict result.
5.   add result.
6.   view suspects.
7.   view evidence.
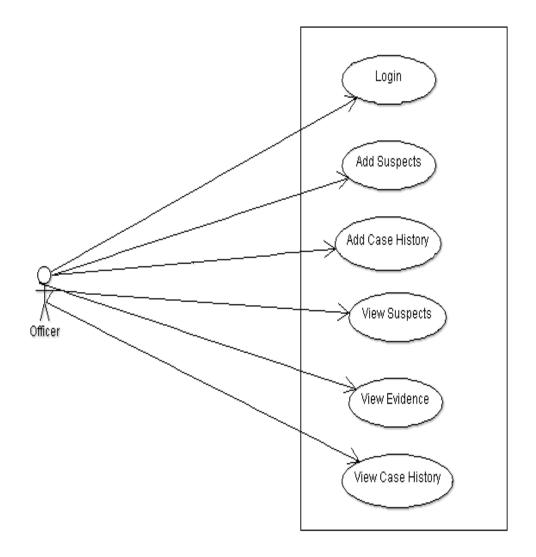8.   view case history.

ii. Use Case Diagram for officer

Fig. 3-3 Use Case Diagram for Chairman

Procedures: [Fig. 3-3]

1. add suspect.
2. add evidence .
3. add case history .
4. view suspects.
5. view evidence.
6. view case history.

System Design

4.1 Introduction

- Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. It is concerned with how the system functionality is to be provided by the different components of the system.

Software Design

- Software design is the process by which an agent creates a specification of a software artifact, intended to accomplish goals, using a set of primitive components and subject to constraints.
- The design is represented at a high level of abstraction.
- Software design usually involves problem solving and planning a software solution. This includes both a low-level component and algorithm design and a high-level, architecture design.

4.2 Activities of System Designing

System design is concerned with how the system functionality is to be provided by the different components of the system.

- The following activities are involved: [Fig. 4-1]
  i. Partition requirements: The requirements are analyzed and collected into groups.
  ii. Identify subsystems: Different sub-systems that can individually or collectively meet the requirements are identified.
  iii. Assign requirements to sub-systems: The requirements are assigned to subsystems.
  iv. Specify sub-system functionality: The specific functions provided by each subsystem are specified.
  v. Define sub-system interfaces: It defines the interfaces that are provided and required by each subsystem.
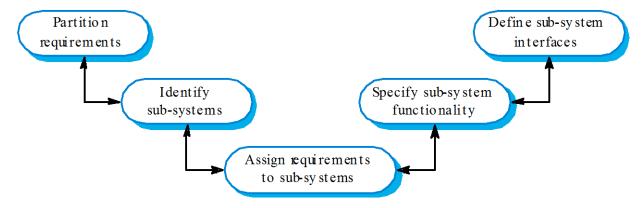
Fig. 4-1 System Design Process

4.3   System Designing Criteria

Design criteria can be divided into primary and secondary criteria. Primary criteria are those that constitute a successful project; the project will be unsuccessful if it does not meet these goals. Secondary criteria are those features that are highly desirable but not absolutely essential. Separating primary and secondary criteria establishes a clear hierarchy in design choices. Often, implementing one criterion makes the implementation of another infeasible or costly, or a secondary criterion may be sacrificed in favor of a primary criterion.

Quality Design features

- Design should exhibit an standard architecture
- It should be modular
- Should contain distinct representation of data, architecture, interfaces, and components
- Should lead to components that lead to independent functional characteristics

Design concepts

- Abstraction: at lower level, a procedural orientation is take.
- Architecture: represents the overall structure of the software, and the conceptual integrity of the system
- Refinement: process of elaboration
- Modularity: the property that establishes that software is divided into separately named and addressable components called modules

4.4   Design Model

Data Design:

Transforms information domain model into data structures required to implement software.

Architectural Design:

Define relationship among the major structural element of a software.

Interface Design:

Describes how the software communicates with systems that interact with it and with humans.

Procedural Design:

Transforms structural elements of the architecture into a procedural description of software components.

4.5   Software Architecture

Software architecture refers to the fundamental structures of a software system, the discipline of creating such structures, and the documentation of these structures. These structures are needed to reason about the software system.

- Considers two level of design:
i) Data design: focuses on the design of data structure, data bases, data warehouses
ii) architectural design

Architectural Design

 A software architect typically works with project managers, discusses architecturally significant requirements with stakeholders, designs a software architecture, evaluates a design, communicates with designers and stakeholders, documents the architectural design and more. There are four core activities in software architecture design. These core architecture activities are performed iteratively and at different stages of the initial software development life-cycle, as well as over the evolution of a system.

Architectural Analysis is the process of understanding the environment in which a proposed system or systems will operate and determining the requirements for the system.

Activities of Architectural Design

- **System structuring:** The candidate system is structured into a number of principal subsystems, and the communication between these subsystems is identified.
- **Control modeling:** A general model of the control relationships between the parts of the system is established.
- **Modular decomposition:** Each of the subsystems is decomposed into modules.

Representing Architectural Design

- The software to be developed must be put into context, i.e., the design should define the external entities
- The structural, functional and material honesty design value.
- The simplicity and minimalism design value.
- Nature and organic design value.

4.6   Class Design

Object-oriented design patterns typically show relationships and interactions between classes or objects, without specifying the final application classes or objects that are involved. Patterns that imply mutable state may be unsuited for functional programming languages, some patterns can be rendered unnecessary in languages that have built-in support for solving the problem they are trying to solve, and object-oriented patterns are not necessarily suitable for non-object-oriented languages.

Design patterns may be viewed as a structured approach to computer programming intermediate between the levels of a programming paradigm and a concrete algorithm.

- The objective is to
  - To introduce the process of software design
  - To describe the different stages in this design process
  - To show how object-oriented and functional design strategies are complementary
  - To discuss some design quality attributes

Steps of Class Design
- ➤ Bridge the gap between high level requirements to low-level services
- ➤ Realize use cases with operations

- ➢ Formulate an algorithm for each operation
- ➢ Recurs downward to design operations that support higher level operations
- ➢ Refractor the model for a cleaner design
- ➢ Optimize access paths to data
- ➢ Adjust class structure to increase inheritance
- ➢ Organize classes and associations

4.7   Class Diagrams

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

- ▪ shows the elements
- Classes
- Attributes
- Operations (or methods),
- Relationships among the classes.
- A class diagram depicts classes and their interrelationships and used for describing structure and behavior in the use cases.It provides a conceptual model of the system in terms of entities and their relationships.
- Used for requirement capture, end-user interaction and detailed class diagrams are used for developers

Elements of a UML Class Diagram
- Class
- Attributes
- Operations
- Relationships
- – Associations
- – Generalization
- – Realization
- – Dependency
- Constraint Rules and Notes

Class

classes are represented with boxes that contain three compartments:

- The top compartment contains the name of the class. It is printed in bold and centered, and the first letter is capitalized.
- The middle compartment contains the attributes of the class. They are left-aligned and the first letter is lowercase.
- The bottom compartment contains the operations the class can execute. They are also left-aligned and the first letter is lowercase.

- Describes a set of objects having similar:
  – Attributes (status)
  – Operations (behavior)
  – Relationships with other classes

- Graphically, a class is rendered as a rectangle, usually including its name, attributes, and operations in separate, designated compartments.

Class Attributes and Operations

- An attribute is a named property of a class that describes the object being modeled. In the class diagram, attributes appear in the second compartment just below the name-compartment.
- Attributes can be:
  o + public
  o # protected
  o private
- Attributes are usually listed in the form:
    - Attribute Name: Type
- Operations describe the class behavior and appear in the third compartment.

Class Attributes

- The attribute type is shown after the colon.
- Attributes map onto member variables in code.

Class Operations (Methods)

- The type of method parameters are shown after the colon following the parameter name. Operations map onto class methods in code
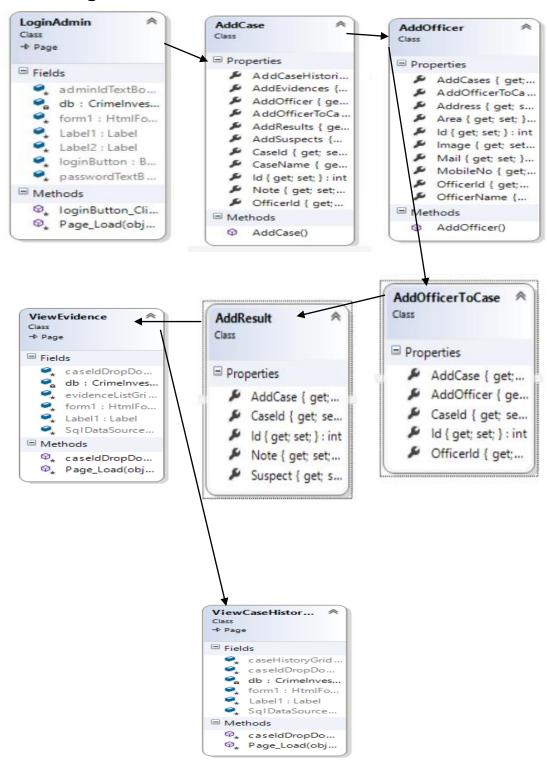
Class Diagram for Admin:

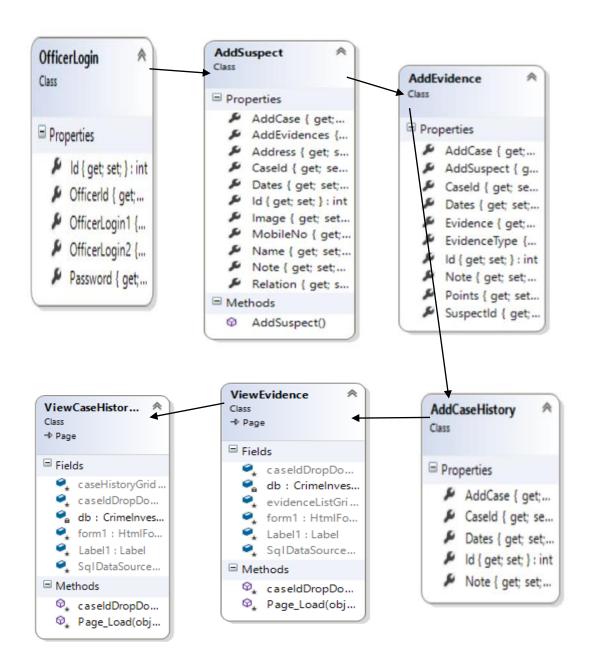Fig. 4-2 Class Diagram for admin

Class Diagram for officer:

Fig. 4-3 Class Diagram for officer

Chapter 5
Software Processes

5.1　The Software Process

- A software development methodology (also known as a system development methodology, software development life cycle, software development process, software process) is a splitting of software development work into distinct phases (or stages) containing activities with the intent of better planning and management. It is often considered a subset of the systems development life cycle. The methodology may include the pre-definition of specific deliverables and artifacts that are created and completed by a project team to develop or maintain an application.
- Software development has a sequence of well-defined stages:
- Each stage/phase performs a set of well-defined activities with specific Input/output.

  i.　System conception
  ii.　Analysis
  iii.　System design
  iv.　Class design
  v.　Implementation
  vi.　Testing
  vii.　Training
  viii.　Deployment
  ix.　Maintenance

5.2　Software Specification

A software requirements specification (SRS) is a description of a software system to be developed. It lays out functional and non-functional requirements, and may include a set of use cases that describe user interactions that the software must provide.

- Requirements engineering process
- Feasibility study
- Requirements elicitation and analysis
- Requirements specification
- Requirements validation.

5.3   Software Design and Implementation

• Software design and implementation is the stage in the software engineering process at which an executable software system is developed.

 • Software design and implementation activities are invariably inter-leaved. − Software design is a creative activity in which you identify software components and their relationships, based on a customer's requirements. − Implementation is the process of realizing the design as a program.

5.4   Software Validation

- Verification and Validation (V&V) is the process of checking that a software system meets specifications and that it fulfills its intended purpose. It may also be referred to as software quality control.

- Validation checks that the product design satisfies or fits the intended use (high-level checking), i.e., the software meets the user requirements.
- System testing involves executing the system with test cases that are derived from the specification of the real data.

5.5   Software Evolution

- Software evolution is the term used in software engineering (specifically software maintenance) to refer to the process of developing software initially, then repeatedly updating it for various reasons.
- Software maintenance address bug fixes and minor enhancements and software evolution focus on adaptation and migration.
- Software is inherently flexible and can change.
- The aim of software evolution would be to implement (and revalidate) the possible major changes to the system without being able a priori to predict how user requirements will evolve.

Database Design

6.1 Database

- A database is an organized collection of data. It is the collection of schemas, tables, queries, reports, views, and other objects. The data are typically organized to model aspects of reality in a way that supports processes requiring information.

- A database management system (DBMS) is a computer software application that interacts with the user, other applications, and the database itself to capture and analyze data. A general-purpose DBMS is designed to allow the definition, creation, querying, update, and administration of databases.

Objectives of database

- Provide for efficient storage, update, and retrieval of data.
- Provide high integrity to promote user trust in the data.
- Be adaptable to and scalable to new and unforeseen business requirements and applications.
- A database is a collection of interrelated data stored with minimum redundancy.
- The general objective is to make information access easy, quick, inexpensive and flexible for the user.
- Other objectives:
  i. Controlled redundancy
  ii. Ease of learning and use
  iii. Data independence
  iv. More information at low cost
  v. Accuracy and integrity
  vi. Recovery from failure
  vii. Privacy and Security Performance.

6.2 Database Design

. A Database design is the process of producing a detailed data model of database. This data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a data definition language, which can then be

used to create a database fully attributed data model contains detailed attributes for each entity.

The process of doing database design generally consists of a number of steps which will be carried out by the database designer. Usually, the designer must:

- Determine the data to be stored in the database.
- Determine the relationships between the different data elements.
- Superimpose a logical structure upon the data on the basis of these relationships.

Key terms for Database Design

- Terms:

  i) Users view

  ii) Processing

  iii) Data model

  iv) Data file: Area where the actual files are stored.

- DBMS ;stores and manages data using the following procedures:
- DML: It manipulates data, and specifies what is required.
- DDL: It describes how data are stored.

Logical and physical view of data

- This process is one which is generally considered part of requirements analysis, and requires skill on the part of the database designer to elicit the needed information from those with the domain knowledge.

- A database designer is aware of the data which is to be stored within the database, they must then determine where dependency is within the data.

- The physical view is the way data exist in physical storage.

6.3   The Database Design Process

The design process consists of the following steps:

- To determine the purpose of the database.
- To find and organize the information required.
- To convert information items into columns.
- To set up the table relationships.
- To refine the design.

6.4   Database Design For Our Project:

A database is designed for this web application project named "CrimeInvestigationDB".This database contain 19 tables. The name of the tables are as follows:

® AddCase

® AddCaseHistory
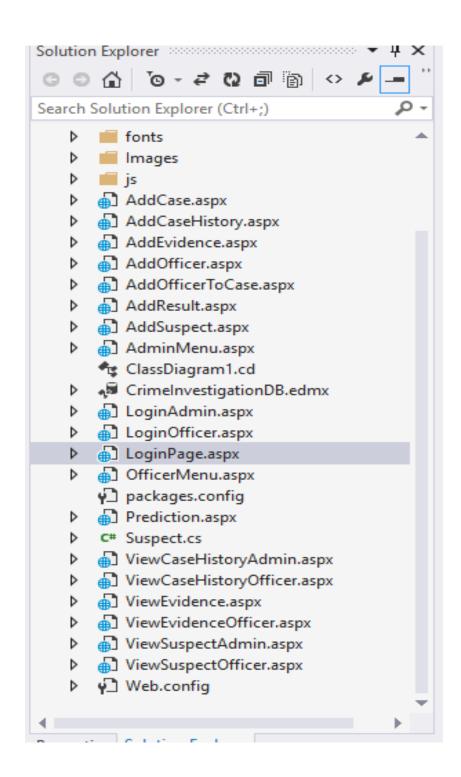
® AddEvidence

® AddOfficer

® AddOfficerToCas

® AddResult

® AddSuspect

® AdminMenu

® LoginAdmin

® LoginOfficer

® LoginPage

® OfficerMenu

® Prediction

® ViewCaseHistoryAdmin

® ViewCaseHistoryofficer

® ViewEvidence

® ViewEvidenceOfficer

® ViewSuspectAdmin

® ViewSuspectOfficer

Fig. 6-1 CrimeInvestigationDB database
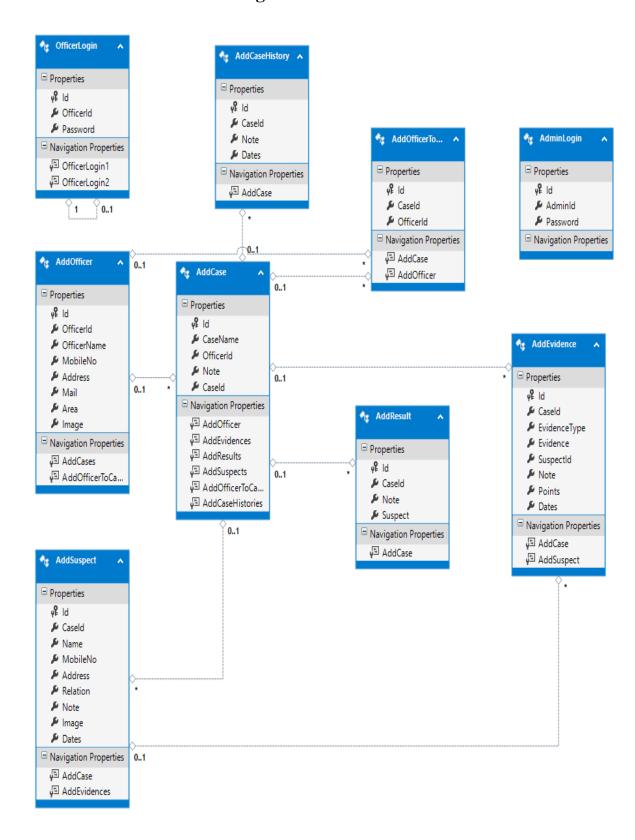
6.5   EDMX Database Diagram

Fig. 6-2 CrimeInvestigationDB edmx Diagrum

Chapter 7

System Development

7.1 Environmental Setup

We have downloaded the visual studio 2013 for developing our project. For backend database we have install Microsoft SQL Server 2012.

Visual Studio 2013 download link:

https://www.visualstudio.com/en-us/downloads/download-visual-studio-vs.aspx

SQL Server 2012 download link:

http://filehippo.com/download_sql_server_studio/

7.2 System Development

The systems development life cycle (SDLC), also referred to as the application development life-cycle , is a term used in systems engineering , information systems and software engineering to describe a process for planning, creating , testing , and deploying an information system. The systems development life-cycle concept applies to a range of hardware and software configurations , as a system can be composed of hardware only, software only, or a combination of both. Systems development is the process of defining, designing, testing, and implementing a new software application or program. It could include the internal development of customized systems, the creation of database systems, or the acquisition of third party developed software.. The organization's management must define and implement standards and adopt an appropriate system development life cycle methodology governing the process of developing, acquiring, implementing, and maintaining computerized information systems and related technology.

7.3 Development Environment

We organized our system according to three tier architecture [Fig. 7-1].

- The bottom tier is a warehouse database server that is almost always a relational database system. Data from operational databases and external sources are extracted using application program interfaces known as gateways.
- The middle tier is an OLAP server that is typically implemented using 1) a relational OLAP (ROLAP) model 2) a multidimensional OLAP model.
- The top tier is a client, which contains query and reporting tools, analysis tools, and/or data mining tools.
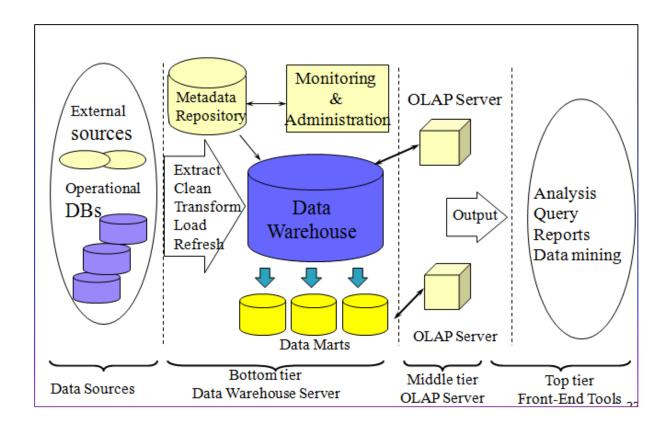
Fig. 7-1 Three Tier Architecture

7.4   Stages of System Development

Realizing   the system development we need to recognition that a candidate system has a life cycle just like a new product.

The phases of software development are :

- ➢ Recognition of need
- ➢ Planning
- ➢ Feasibility study
- ➢ System analysis
- ➢ System design
- ➢ Implementation
- ➢ Testing
- ➢ Installation

The analyst must develop from one stage to another stage systematically answering key and gaining results in each stage.

7.5 Implementation of the System

Implementation is the realization of an application, or execution of a plan, idea, model, design, specification, standard, algorithm ,or policy. System Implementation   is the construction of the new system and the delivery of that system into production.

Implementation is the process of:

> ➤ defining how the information system should be built (i.e., physical system design),
> ➤ ensuring that the information system is operational and used,
> ➤ ensuring that the information system meets quality standard (i.e., quality assurance).

System implementation generally benefits from high levels of user involvement and management support. User participation in the design and operation of information systems has several positive results. First, if users are heavily involved in systems design, they move opportunities to mold the system according to their priorities and business requirements, and more opportunities to control the outcome. Second, they are more likely to react positively to the change process. Incorporating user knowledge and expertise leads to better solutions. The most crucial stage in achieving a new successful system is that it will work effectively and efficiently.

7.6 System Testing

System testing

System testing of software or hardware is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. System testing falls within the scope of black box testing, and as such, should require no knowledge of the inner design of the code or logic. In this, the accuracy of the program will be tested with some varying data. This will give the assurance that the new system has achieved its purpose and objectives.

- Testing of the system as a whole.
- Testing of emergent properties is particularly important.

Acceptance testing

- Testing with customer data to check that the system meets the customer's needs.

We have tried to describe a detail about the project .It is difficult to find out own project faults but we tried our best in this case. Our supervisor was always with us to help us in this kind of situation. Software testing involves more than just running a program to see whether it works.

7.7   The System/Folder

App_code

The App_code folder contains several important files that control our configuration option. Datasets files of our project are Stored there.

Assets

This folder contains the bootstrap files, image, JavaScript files.

Bin

AjaxControlToolkit.dll, Interop.Microsoft.Office.Interop.Word.dll and many other files are there.

Master_pages

Contains the master pages we used in different pages.

Reports

This folder was used to keep different . rdlc files of that we used while working with report viewer.

Admin

Admin folder contains the pages that will be used in the admin module of our project. Some of them are add case, add officer, add officer to case and so on.

Officer

Chairman folder contains the pages that will be used in the chairman module of our project. Some of them are add suspect, add evidence ,view suspect and so on.

GUI Design

8.1 Coding Procedure of the Project

In login Page there are two types of login. Admin Login and Officer Login. When a Admin /Officer enters user name and password an click on the Log In button, the system will verify the the user.After verification, the registered user can be logged in.

```csharp
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace CrimeInvestigationSystemWeb
{
    1 reference
    public partial class LoginPage : System.Web.UI.Page
    {
        0 references
        protected void Page_Load(object sender, EventArgs e)
        {

        }

        0 references
        protected void adminLoginButton_Click(object sender, EventArgs e)
        {
            Response.Redirect("LoginAdmin.aspx");
        }

        0 references
        protected void officerLoginButton_Click(object sender, EventArgs e)
        {
            Response.Redirect("LoginOfficer.aspx");
        }
    }
}
```

Fig: 8.1 Login Page code

8.2 Home Page of Our Project

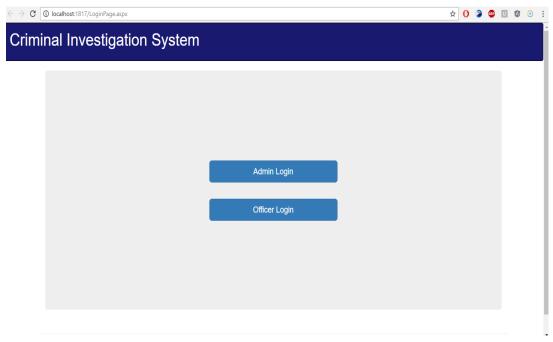This is the Home page of our project. There are two panel in home page . admin and officer.
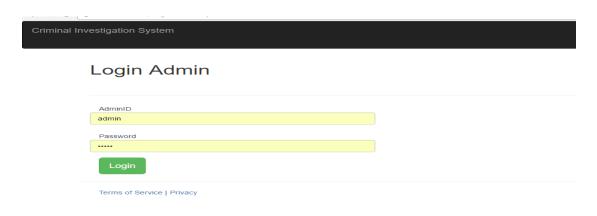

Fig : 8.2   Home Page
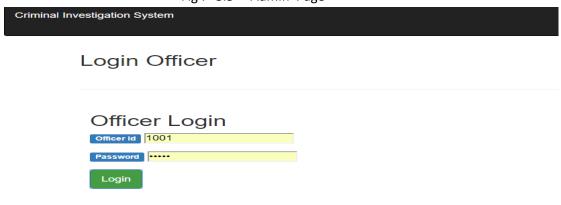

Fig : 8.3   Admin Page

Fig : 8.4   officer Page

8.3 Admin Panel

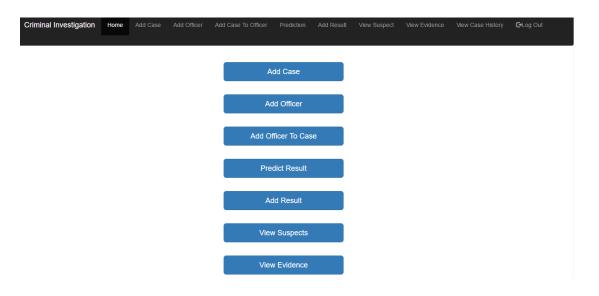Fig 8.5 Shows the admin panel where the function are shown.

Fig : 8.5   Admin panel

Here is the page where case is add by admin

Fig : 8.6   Add Case

Here is the page where officer is add by admin

Add Officer

Officer Id	
Name	1001
Password	•••••
Mobile No	
Adress	
Mail	
Area	
Image	Choose File No file chosen

Save

Fig : 8.7   Add Officer

Here is the page where officer is add for a case

Add Officer To Case

Case Id	201 ▼
Case Name	
Officer Id	1001 ▼
Officer Name	

Save

Fig : 8.8   Add Officer to Case

[49]

Here is the page where Predict Result

Prediction

CaseId	202
Case Name	eve teasing
Suspect	Biru

Points	8

Fig : 8.9 Prediction

Here is the page where Add Result

Add Result

Case ID	201
Case Name	
Suspects	
Note	

Save

Fig : 8.10   Add Result

Here is the page where View Suspect

Fig : 8.11   View Suspect

Here is the page where View Evidence

Fig : 8.12   View Evidence

Here is the page where View Case History

View Case History

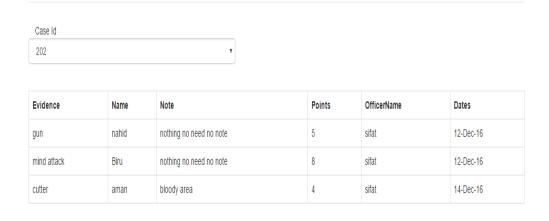| CaseId	CaseName	Note	Dates
202	eve teasing	for this case there r three suspect	12-Dec-16

Case Id: 202

Fig : 8.12   View Case History

8.5   Officer Panel

Fig 8.13   Shows the officer panel where the function are shown.

OfficerID : 1001

- Add Suspect
- Add Evidence
- Add Case History
- View Suspects
- View Evidence
- View Case History
- Log Out

Fig : 8.13   officer

Here is the page where Add Suspect by officer

Fig : 8.14   Add Suspect

Here is the page where Add Evidence by officer

Fig : 8.15   Add Evidence

Here is the page where View Evidence

View Evidence

CaseId	Evidence	Name	Note	Points	Dates
201	mind attack	abid	mad	8	12-Dec-16
201	knife	abid	no note	7	12-Dec-16

Fig : 8.16   View Evidence

Here is the page where View Suspect

View Suspect

Case Id	Image	Name	Mobile No	Address	Relation	Note	Date
201		abid	0124586783	savar,dhaka	brother	found some clues	12-Dec-16
201		Biru	0147852369	nepal	uncle	nothing no need no note	12-Dec-16

Fig : 8.17   View Suspect

Here is the page where Add Case History By Officer

Add Case History

Case Id	201
Note	

Save

Fig : 8.18   Add Case History

Here is the page where View Case History

View Case History

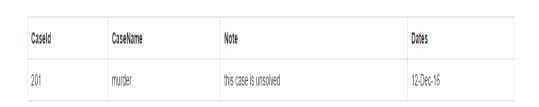| CaseId	CaseName	Note	Dates
201	murder	this case is unsolved	12-Dec-16

Fig : 8.19   View Case Histor

Conclusion

9.1 Introduction

The project built with the concept of crime investigation management system website. It aids the admin and officer to add case, add suspect, add evidence, view evidece and so on easier. This project presents a website with no possibility of errors. Our system is a method that provides a collection of action managing work flow in a collaborative environment.

9.2 Project Benefits

Our manual system of crime investigation management system is time-consuming. All of the documents have to be checked for preparing a single report. On the contrary, the system we develop can be used to add case, add suspect, view suspect, etc on a single click. , the admin can add officer, add case and add officer to case . Also the officer can add suspect, add evidence, add case history etc. In our project, admin will view suspect, evidence as same as the officer does.

9.3 Future Work

- In future system will provide more user friendly interface, more fields to store ,each and every information regarding crime.
- In future system will allow user to register complains online.
- Users can view the progress of their complaint online.
- The project entitled "online crime investigation "was successfully designed develop.
- The method of video conferencing ca e added to make the project livelier.
- By the future technology user can view the case details and progress of the complaints on their mobile phones.

9.4 Developer's Achievement

- At the time of developing the project we have got a scope to work with C#.
- In this project we have used ASP.NET which is an open-source server-side.
- While working in database design we have got a scope to know how to work with Microsoft SQL server 2012
- We have worked with bootstrap for designing our website UI.
- In future we will be able to use our experience in our professional field.

9.5 Conclusion

In the modern world, the use of computers and mobile phones is becoming rampant. As a result the, crime investigation system needs to embrace these new technologies. This system has presented a simple, convenient, cost effective and intelligible web interface. Whereby it can be accessed at any time provided there is internet connection.