SYSTEM DESIGN

Guyana Police Force Electronic Certificate of Character (GPF-ECC)

Prepared for

The Guyana Police Force

Prepared by

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Context Model

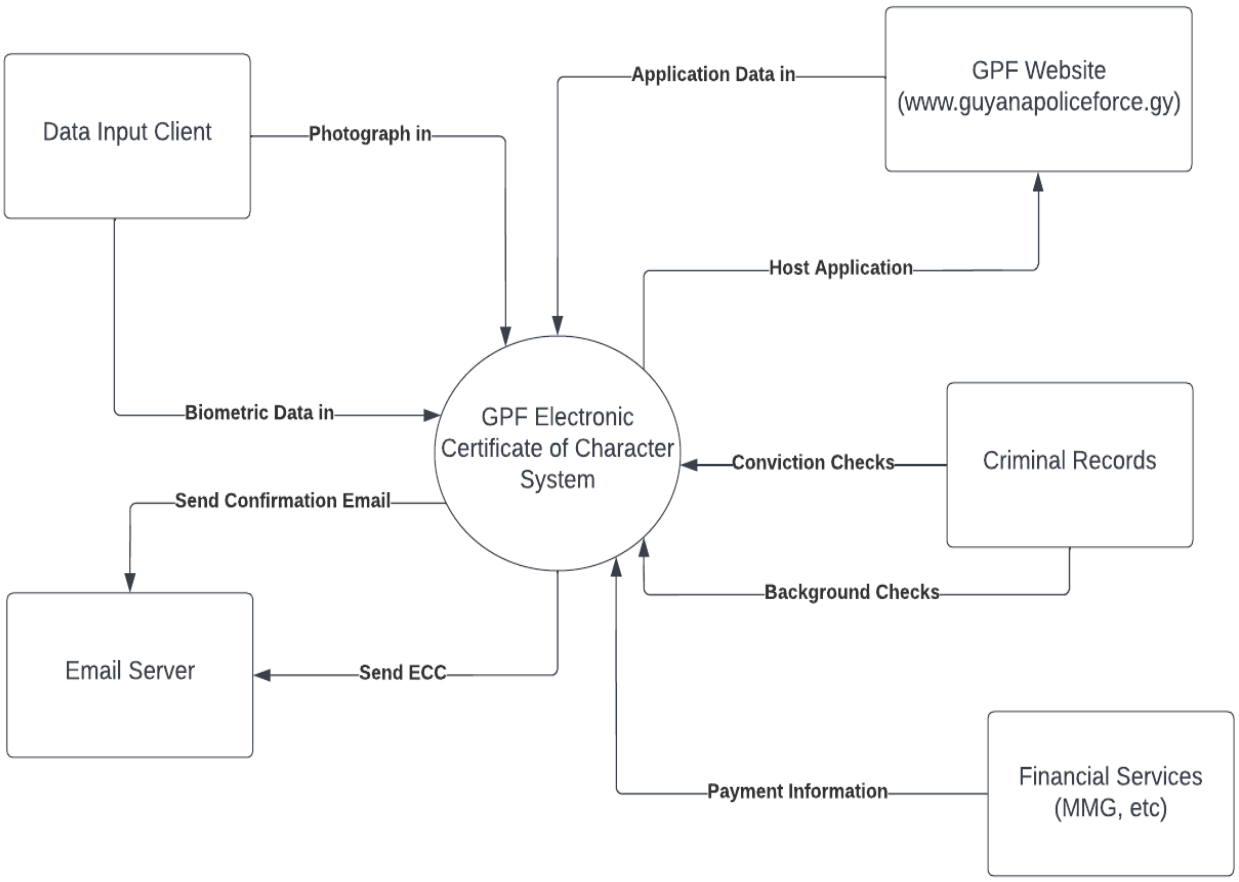

Figure 1: GPF-ECC Context Model

The Context Model Description

The Context Diagram above displays the different stakeholders and how they interact with the GPF-ECC system. As shown on the diagram, there are two stakeholders namely: GPF Website and Criminal Records. The website is used to host the application and send in application data. The Criminal Records Officer performs conviction and background checks on the individuals. Lastly, the others are systems namely: the Email Server, Data Input Client, and Financial Services which are other systems that need to work with the application. Financial Services provide different payment methodologies, the email server is used to interact with the client and the Data input client sends biometric data into the system.

Use Case Model

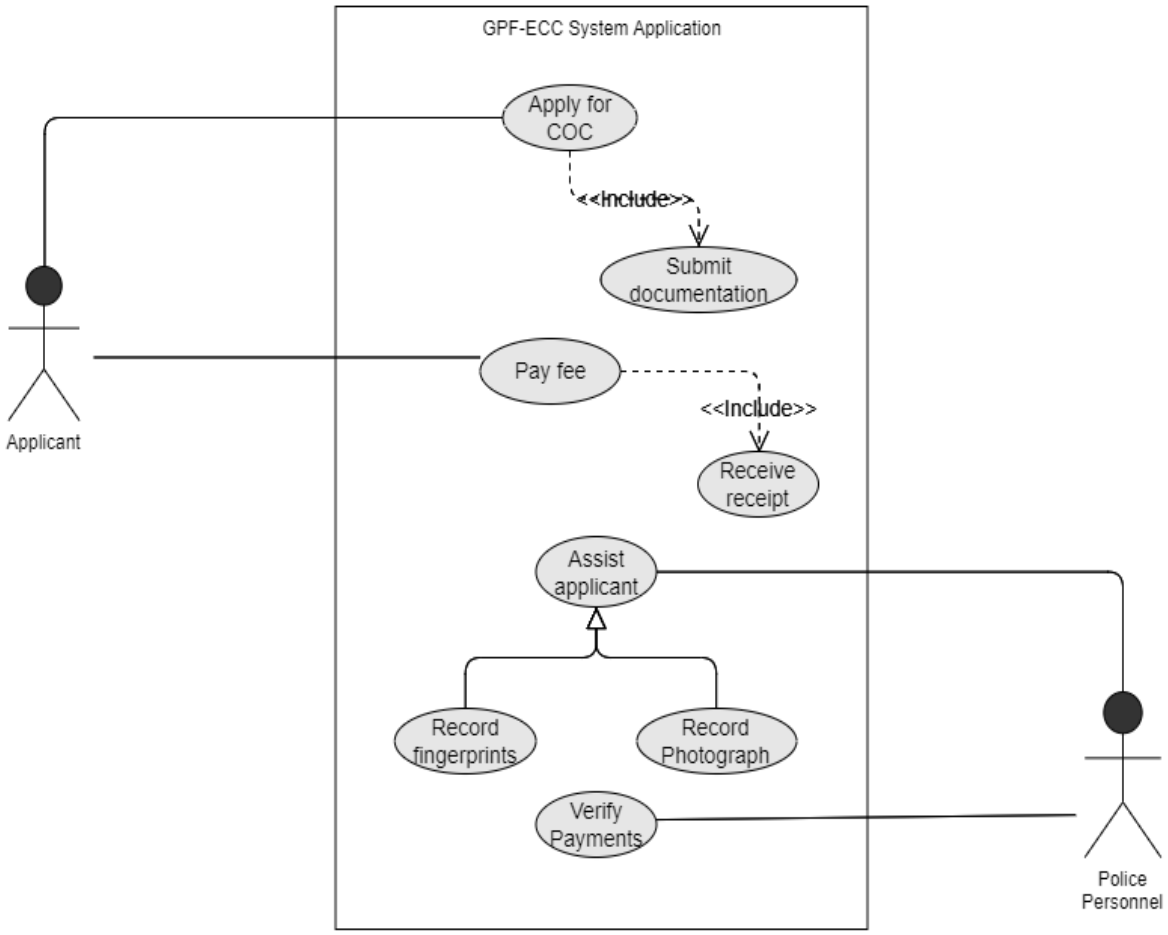

Figure 2: GPF-ECC System Application Use Case Model

The Use Case Description

The use case diagram was divided into two because they represent different functionalities, the diagram above represents the Application process. The use case diagram above represents the functional requirements for the Application process of the GPF-ECC system. This diagram consists of two actors one of which is the primary actor that initiates the use of the system and the other being the secondary actor who assists in the management of the system. The applicant seeking a Certificate of Character is the primary actor and is connected to four of the use cases. The secondary actor is the police personnel that is connected to four of the use cases. This diagram

displays the use of the following relationships: they include and, generalization. The included relationship is displayed between the "Apply for COC" and "submit documentation" because the applicants must submit the relevant documents to proceed with their application. The included relationship was also displayed between the "pay fee" and "receive receipt" use cases because it is mandatory that when a customer completes a payment, they receive a receipt. Lastly, the generalization relationship was used between “assist applicant” the parent, and the children being “record fingerprints” and “record photograph” because the children use cases that inherit the parent's behavior.

The Use Case Tables

Use case 1: Apply for COC	
Actor	Applicant
Description	The system should allow applicants to begin their application process
Pre-condition	Applicants must meet the requirements before applying
Post-condition	Proceed with submitting their documentation
Include	Submit documentation
Extend	

Use case 2: Submit Documentation	
Actor	Applicant
Description	The system enables applicants to successfully submit all necessary documentation to proceed with their application.
Pre-condition	Applicant must have all required documents
Post-condition	Proceed with payment of the fee
Include	
Extend	

Use case 3: Pay Fee	
Actor	Applicant
Description	The system allows applicants to pay the processing fee that is allocated for their Certificate of Character.
Pre-condition	Applicants must have the $500 processing fee
Post-condition	Uplift a receipt of payment
Include	Receive receipt
Extend	

Use case 4: Receive Receipt	
Actor	Applicant
Description	The system delivers a receipt as proof of payment to the applicant.
Pre-condition	Applicant must complete paying the fee
Post-condition	Uplift certificate on assigned date
Include	
Extend	

Use case 5: Assist Applicant	
Actor	Police Personnel
Description	The system would facilitate the police personnel to assist applicants at any stage throughout the application process.
Pre-condition	Applicant must be experiencing a challenge in applying
Post-condition	Ensure that applicant can complete their application
Include	
Extend	
Generalization	Record fingerprints, Record photograph

Use case 6: Record Fingerprints	
Actor	Police Personnel
Description	The system stores applicants fingerprint scans
Pre-condition	The applicant must visit a nearby police station to scan their fingerprints
Post-condition	The applicant's fingerprint is added to the system
Include	
Extend	

Use case 7: Record Photograph	
Actor	Police Personnel
Description	The system stores the applicant's photograph as a form of identification
Pre-condition	The applicant must visit a nearby police station to take their photograph
Post-condition	The applicant's photograph is added to the system
Include	
Extend	

Use case 8: Verify Payment	
Actor	Police Personnel
Description	The police personnel must ensure that the payment was receive and isn't fraudulent
Pre-condition	The applicant must select a payment method
Post-condition	The applicant receives a receipt as proof of payment
Include	
Extend	

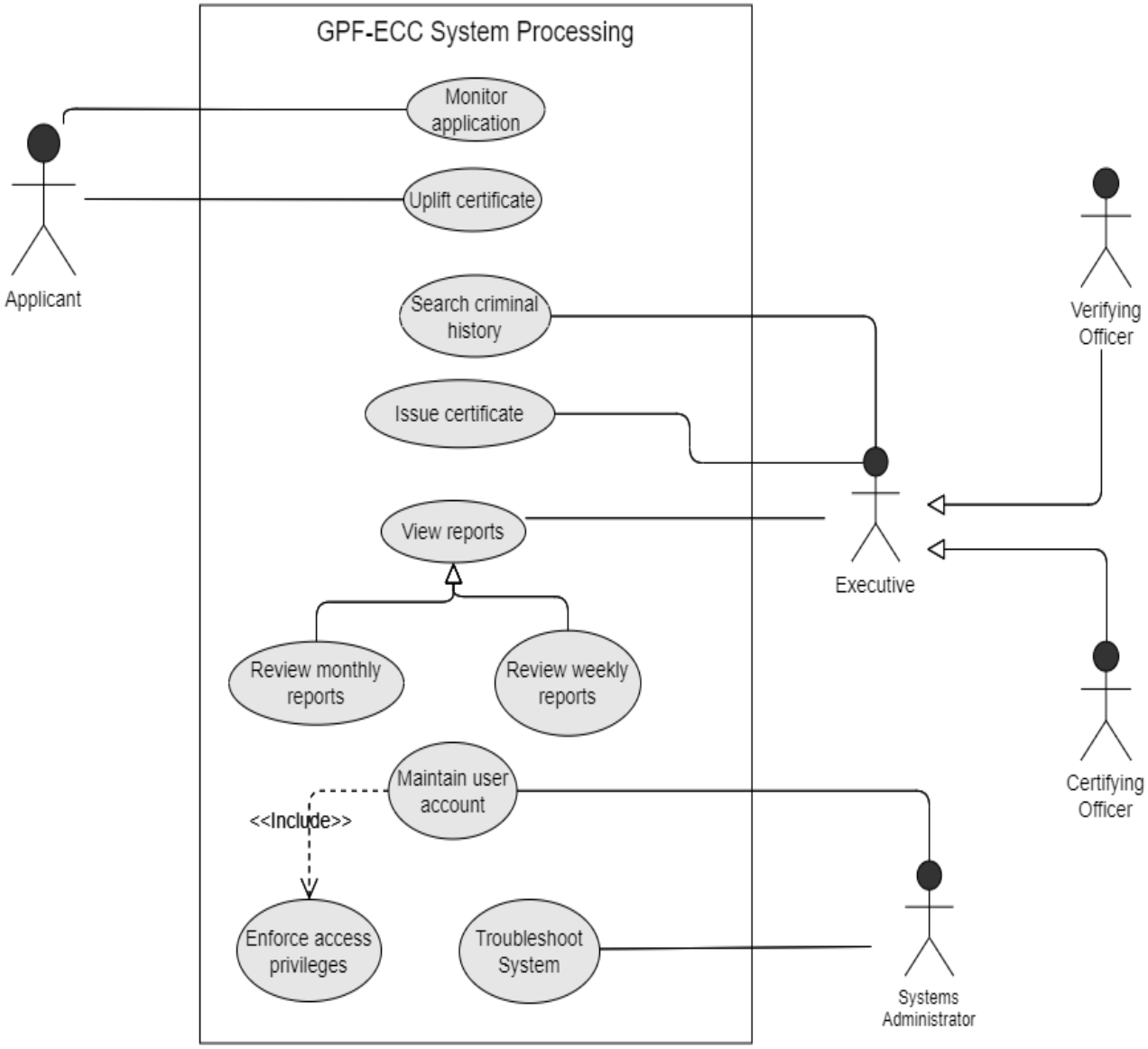

Figure 3: GPF-ECC System Processing Use Case Model

The Use Case Description

The use case diagram was divided into two because they represent different functionalities, the diagram above represents the Processing aspect of the system. The use case diagram above represents the functional requirements for the Processing aspect of the GPF-ECC system. This diagram consists of five actors one of which is the primary actor that initiates the use of the system and the others being the secondary actors who assist in the management of the system. The

applicant seeking a Certificate of Character is the primary actor and is connected to two of the use cases. The secondary actors are the Verifying officer and Certifying Officer they fall under the category of an executive. They are connected to five of the use cases then there is the systems administrator that is connected to three of the use cases. This diagram displays the use of the following relationships: include and generalization. The included relationship is displayed between the "maintain user account" and "enforce access privileges" because the system administrator must ensure that the chances of unauthorized access are reduced while supporting user accounts. The generalization relationship within the diagram occurs because the children use cases that inherit the parent's behavior. Generalization of the Actors is also displayed between the Executive, Certifying Officer, and Verifying Officer.

The Use Case Tables

Use case 1: Monitor Application	
Actor	Applicant
Description	The system should allow applicants access to see the processing stage of their application
Pre-condition	The applicant would have successfully applied for a certificate of character
Post-condition	The applicant receiving their certificate of character
Include	
Extend	

Use case 2: Uplift Certificate	
Actor	Applicant
Description	The system produces the certificate of character and it is uplifted by the applicant
Pre-condition	The applicant's criminal history is reviewed and they meet the necessary requirements for a Certificate
Post-condition	
Include	
Extend	

Use case 3: Search criminal history	
Actor	Executive (Verifying Officer, Certifying Officer)
Description	The system will facilitate easy search of an applicant's criminal history
Pre-condition	The applicants submit all the necessary personal records and the criminal records are updated
Post-condition	The applicant is issued a Certificate of Character
Include	
Extend	

Use case 4: Issue certificate	
Actor	Executive (Verifying Officer, Certifying Officer)
Description	The system produces a Certificate of Character when the approval is granted
Pre-condition	The applicants pass all the requirements for a Certificate of Character
Post-condition	The system stores the applicant's information for the allocated period
Include	
Extend	

Use case 5: View reports	
Actor	Executive (Verifying Officer, Certifying Officer)
Description	The system produces reports that can be accessed by the Authorized Executive Officers
Pre-condition	The system must compile the required figures to produce the reports
Post-condition	The details of the reports assist in decision making within the Guyana Police Force
Include	
Extend	
Generalization	Review monthly reports, Review weekly reports

Use case 6: Review Weekly reports	
Actor	Executive (Verifying Officer, Certifying Officer)
Description	The system produces the required weekly reports and it is reviewed by the authorized officers
Pre-condition	The required figures are available to compile the report
Post-condition	The system uses the figures to compile the monthly reports
Include	
Extend	

Use case 7: Review monthly reports	
Actor	Executive (Verifying Officer, Certifying Officer)
Description	The system report details are reviewed to ensure that the figures are correct
Pre-condition	The system produces the reports based on the weekly report figures
Post-condition	The report details are used for decision making and documented
Include	
Extend	

Use case 8: Maintain user account	
Actor	System Administrator
Description	The system administrator ensures that user accounts are updated and that they are operating smoothly
Pre-condition	The user(employees) must have an account
Post-condition	Ensure that the chances of unauthorized access are reduced
Include	Enforce access privileges
Extend	

Use case 9: Enforce access privilege	
Actor	System Administrator
Description	The user accounts are monitored to ensure that information is not being compromised
Pre-condition	The user accounts are maintained by the systems administrator
Post-condition	
Include	
Extend	

Use case 10: Troubleshoot system	
Actor	System Administrator
Description	The system is accessed to repair any hardware or software problems
Pre-condition	The system must have a hardware/software problem
Post-condition	The system and its components are back to working at its full potential
Include	
Extend	

Sequence Diagram

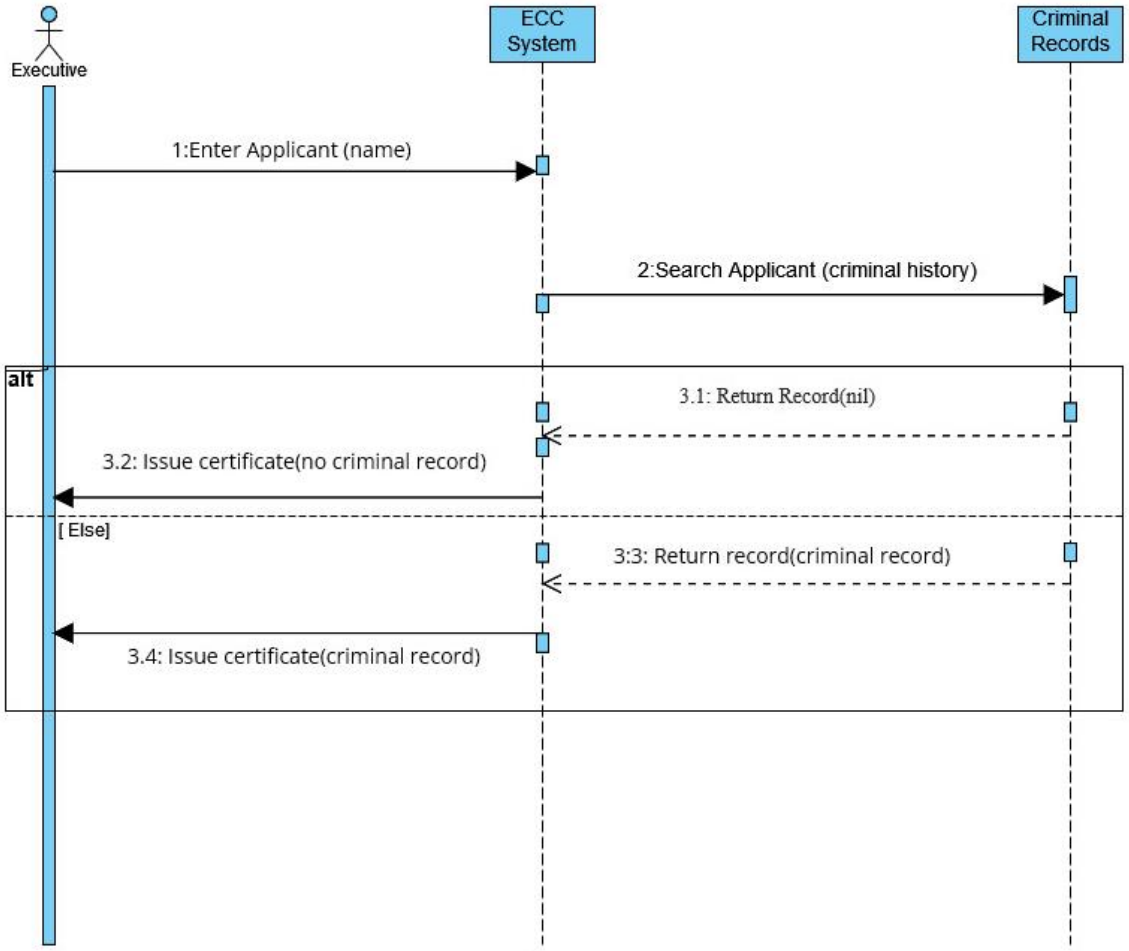

Figure 4: Sequence Diagram for the Use Cases connected to the Executive Actor

The Sequence Diagram Description

The sequence diagram above illustrates the activities done by the executive user which includes the verifying and certifying officers. Two objects were identified for the creation of the diagram, these were:

- ECC System
- Criminal Records

The lifelines situated beneath the ECC System and Criminal Records signify that these objects both play important roles in conducting the use case. The activations which consist of the thin rectangle under the Executive and the intermittent rectangle along the lifelines indicate the duration in which an object is performing a task. The executive (verifying officer) enters the applicant's name, hits search and the system shall search for the applicant's criminal history. Arrows for synchronous messages were used to display both interactions. The criminal records handle sending records back to the system. Finally, the system will issue the certificate to the executive. Some records returned might have criminal records while some may not but the certificate will still be issued by the executive. Both return records are displayed as return comments while synchronous messages are used in both instances where the certificate is issued. Since both message sequences are mutually exclusive, they are encased in a rectangular box with a dashed horizontal line, and ALT is used to divide both possible scenarios.

Class Diagram

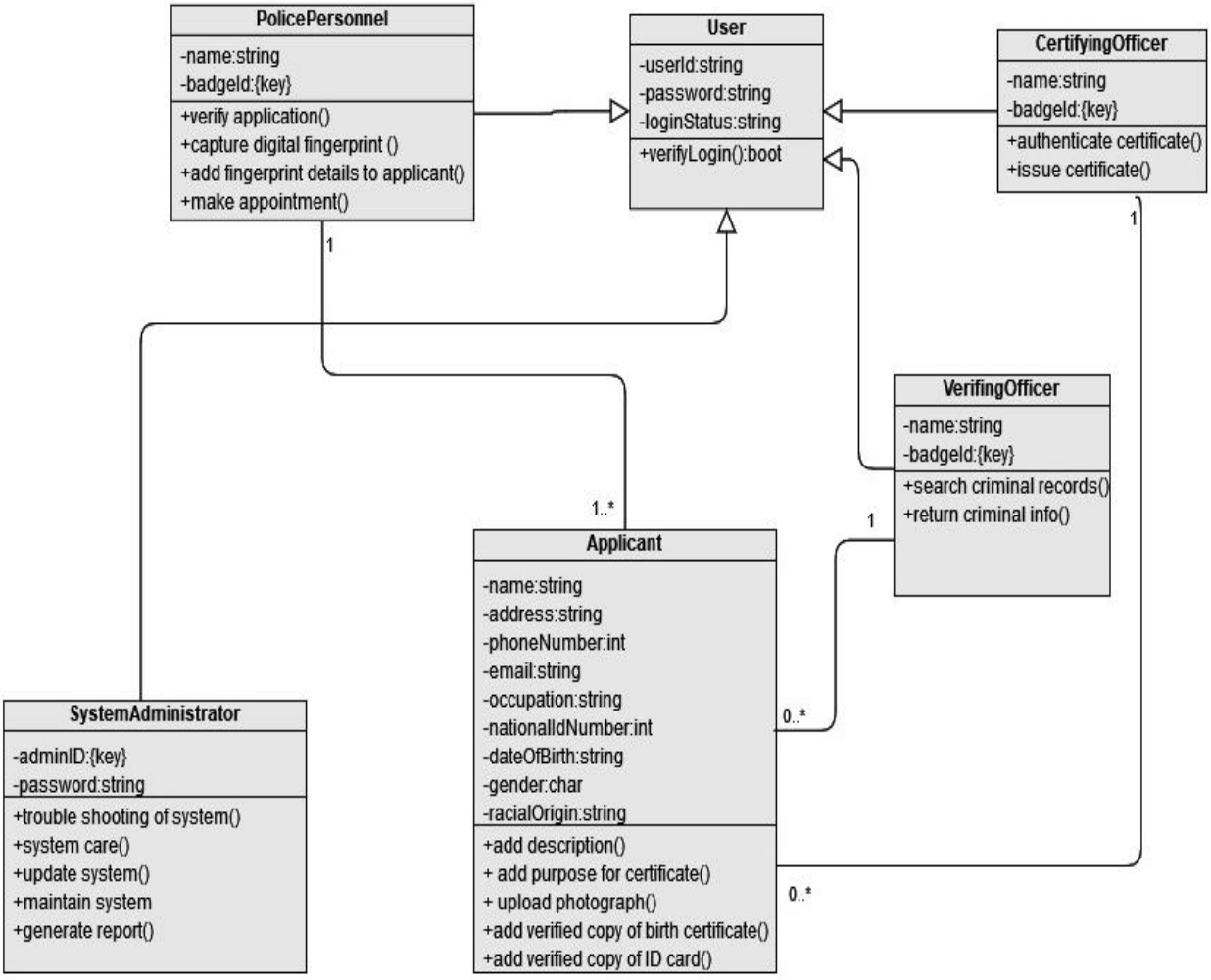

Figure 5: GPF-ECC System Class Diagram

The Class Diagram Description

This class diagram shows the relationship or association among the users of our management information system for Certificates of Character. The system classes are Users, Applicants, Verifying Officers, Certifying Officers, Police personnel, and System Administrators. The class 'User' is a parent class for the classes 'Police personnel', 'Verifying Officer', 'Certifying Officer', and 'Systems Administrator' that allows the children classes to have all the attributes of the parent. Therefore, the user police personnel, system administrator, verifying officer, and certifying officer will be allowed to create a user profile with the attributes of the class 'user'.

Further, the verifying officer will search the system for any criminal record for that applicant and return the criminal data found (nil if none is found). A certificate of character will then be created for the applicant and the certifying officer will attach all necessary signatures and stamps to authenticate the certificate and then issue the certificate to the applicant. The user applicant interacts with the system by adding data and uploading images. The system Administrator will support the system and user accounts.

Activity Diagram

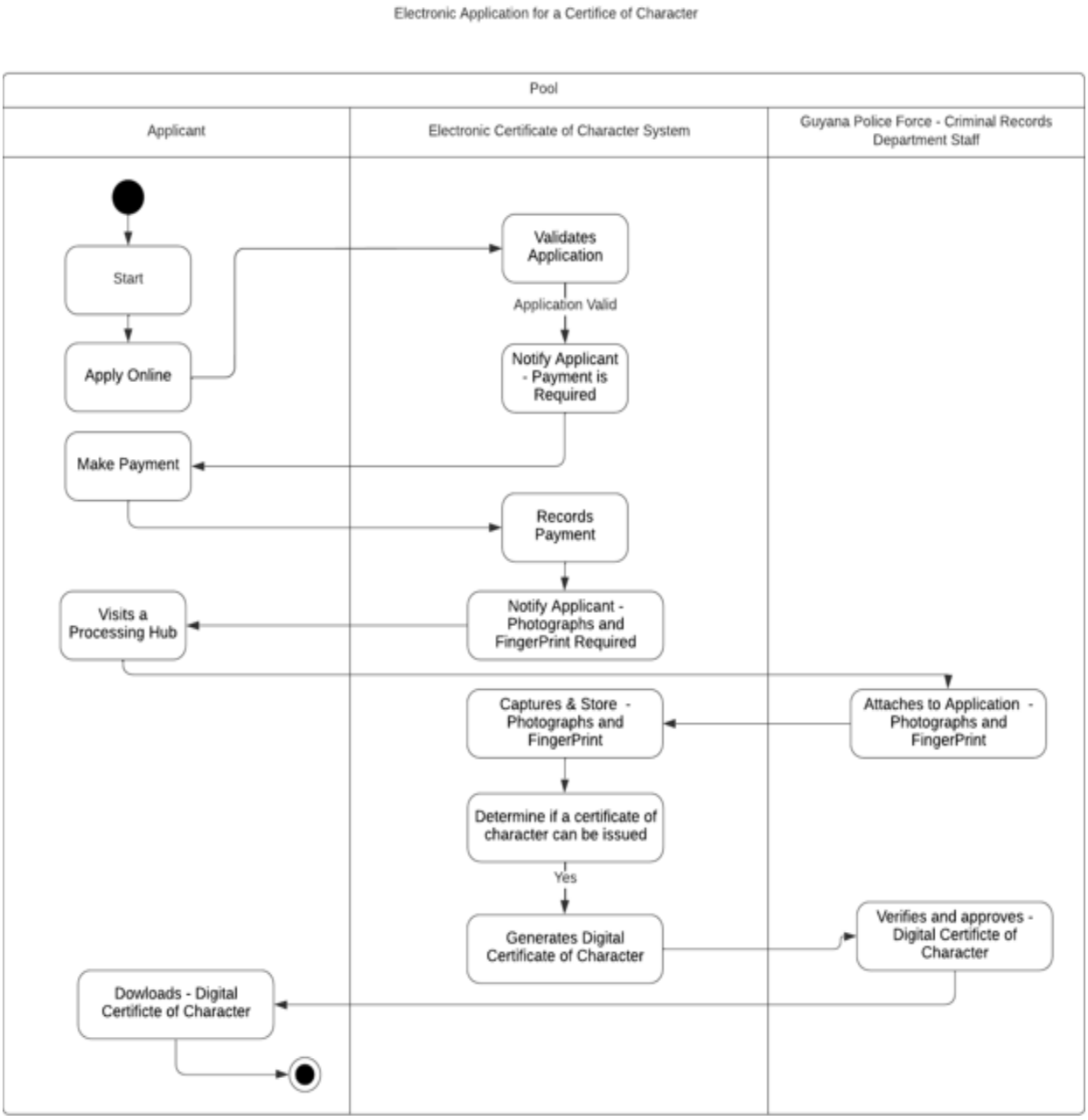

Figure 6: Electronic Application for Certificate of Character Activity Diagram

The Activity Diagram Description

This activity diagram displays the overall process of our system. The diagram consists of 13 activities along with 3 different lanes of objects/users that will be involved in the system process for different activities, these include:

- The Applicant
- Electronic Certificate of Character System
- Criminal Records Department Staff

Firstly, the applicant will begin the system process by applying for a Certificate of Character online and the system will confirm their application. The system will then inform the applicant that payment is needed and this payment will be recorded once the applicant complies. The system should then notify the applicant about the needed photographs and fingerprints, the applicant will then visit a processing hub where the Criminal Records Department Staff will attach these essentials to the application and the system will capture and store them. The system will then determine if a Certificate of Character could be issued to the applicant and if no past criminal history is detected, it will be generated digitally. The Criminal Records Department Staff will then verify and approve the Certificate of Character and finally, the applicant will be able to download it.

System Architectural Design

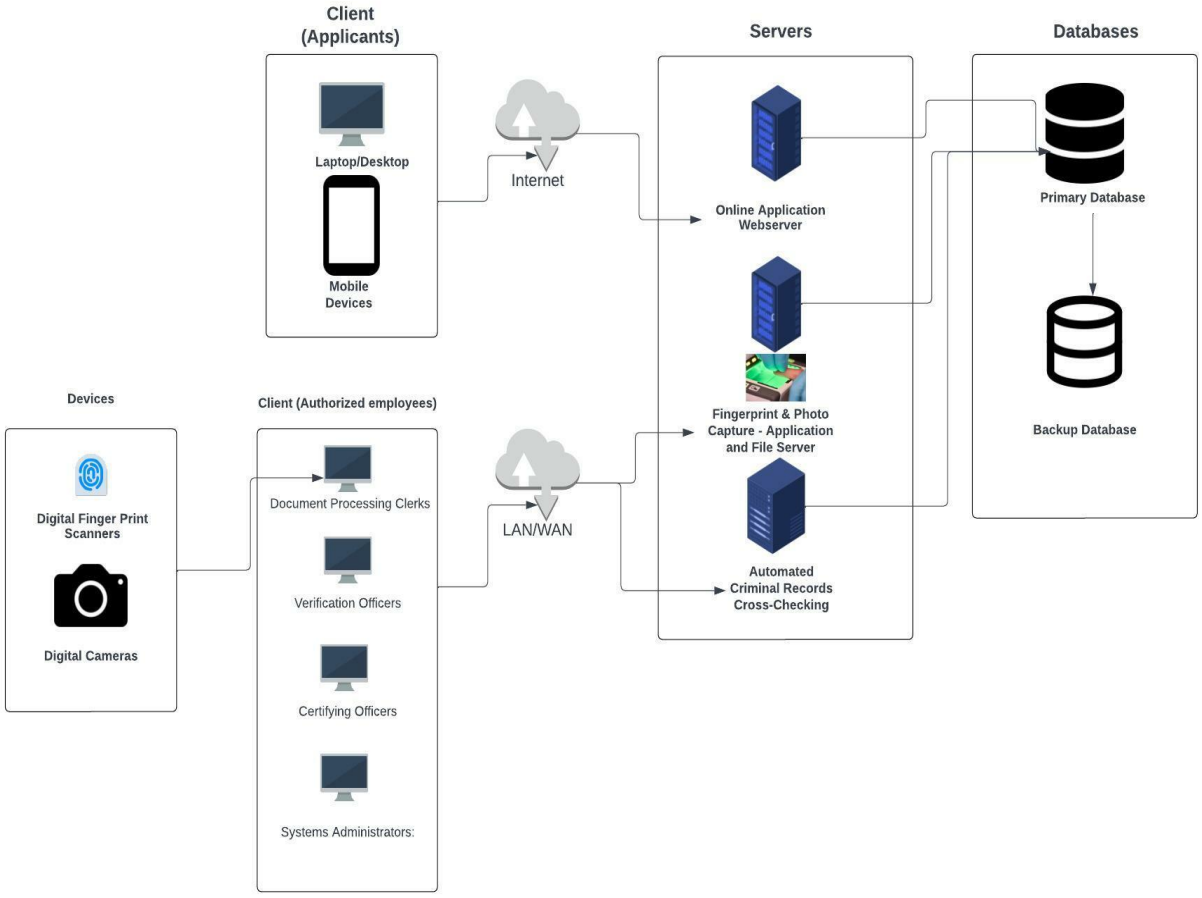

Figure 7: The Client-Server Architecture for GPF-ECC System

The information system being developed for the GPF-ECC system has three components, the clients, the server, and the network connection. In the client-server setup, the system's features are broken down into discrete "services," each of which is provided by its server. Clients are the end users who connect to servers and will access a respective service whenever required. The clients access the presentation logic of the information system while the server components are the application components responsible for system processes.

A client/server architecture uses a centralized database as such the different subcomponents of the information system will be able to share and merge as needed. The information system sub-

components known also as the server services and clients are summarized below and perform the functions as described:

1. **Clients Applicants:** These are client devices such as computers and mobile devices used by the public to apply for a Certificate of Character. These clients will be given access to the "Online Application Server" through a website interface that will submit requests to a web server sub-component of the information system allowing the following functions to be performed:

- It will allow someone to apply for a Certificate of Character
- View their Application Status
- Download their Certificate of Character if issued.

2. **Clients Authorized Employees -** These are client devices that have installed software that connects to the Fingerprint and Photo capture software and automate criminal records cross-checking software applications and Servers. They are developed as integrated applications that share inputted information through the common database. Allowing the following functions to be performed.

- **Storage of digital media files** such as the applicant's fingerprint scans, photographs taken, and external database files used in the cross-checking and verification process.

- **Automated Criminal records cross-checking** - The system performs comparisons against other database systems uploaded by the Verification Officers and the common database used by the other sub-components to determine the criminal status of the applicant.

Implementing the client/server system Architectural design provides advantages such as the database being centralized and in a single place allowing better security and data recovery.

Group Participation Report

Division of Labour:

The context model was completed by David Constantine and Khushal Lam. Shauna Lindo completed the use case model and tables. The sequence diagram was completed by Oumotia Morris, Shauna Lindo, Tyrese DeLeon, David Constantine, and Khushal Lam. The class diagram was completed by Ronaicia Stephens and Oumotia Morris. Kelvin Daly and Tyrese DeLeon completed the activity diagram. The system architecture design was selected by the group and was completed by Kelvin Daly and Ronaicia Stephens. Group Collaboration was eased with the use of Zoom, Google Docs, and WhatsApp. The online environment was excellent and it allowed us to complete tasks on schedule. The only weakness was the group members' availability. To combat the weakness previously outlined the members were briefed on the meeting and the task that they must complete.