Tasks Undertaken/ Approaches

1. Requirements Analysis

The project began with a thorough analysis of the systems requirements. This involved identifying the essential functionalities including managing patient demographics, diagnostic history, phenotypic traits, and genetic mutations. The requirements also emphasized robust search capabilities, secure role-based access, and the ability to generate individual and general reports exportable in PDF format. Additionally, the system was designed to ensure data privacy and regulatory compliance.

2. Database Design

A normalised database schema was developed to store patient related data efficiently while ensuring integrity and scalability. The database was normalised to the Third Normal Form (3NF) to eliminate redundancy and ensure data consistency. The key table included: Patient, Phenotypes, Diagnostics, Mutations, Clinician, Reports, and Category. Each table was designed with appropriate primary and foreign keys to enforce relationships. There was constraints like NOT NULL, CHECK, and ENUM were applied to ensure data quality. For instance, the Sex column in the Patient table accepts only predefined values (Male, Female, Other), and the CategoryType column in the Category table is restricted to Diagnostics, Phenotypes, or Mutations.

3. Web Functionality

The systems' functionality was implemented using HTML, PHP, JavaScript, AJAX and SQL. There was secure login and registration pages that were created to authenticate users and provide role-based access. A dynamic form was developed for adding and updating patient records including details like diagnostics, phenotypes and genetic mutations. Clinicians could also search for patients using criteria like name, diagnosis and categorize patients based on their medical conditions. Individual and general patient reports were dynamically generated, formatted and exported in PDF format.

4. User Interface Design

The web interface had included CSS to provide a seamless experience for clinicians. There was a clear navigation menu that allowed users to move between functionalities like patient search, data entry and generating reports.

5. Testing and Debugging

There was rigorous testing that was conducted to ensure the system's reliability such as each module such as patient insertion and PDF generation was tested independently to verify functionality. The interaction between the database, server-side scripts and front-end components was validated to ensure smooth data flow. There were common user errors like missing fields or incorrect input formats were identified and addressed through validation and error messages.

6. Security and Data Integrity

There were security measures that were implemented to protect patient data such as users are authenticated based on roles e.g. clinician to ensure access to authorised functionalities. A UserActivity table was created to log login times, actions performed and logout times ensuring accountability.

7. Documentation

The final phase involves preparing documentation and presenting the system through user manual where detailed instructions on how to use the system and sample login credentials are provided.

8. Conclusion

The structured approach ensured the successful implementation of a system that demonstrated clinical workflow while maintaining data privacy. Through focusing on core functionalities, robust database design and user-friendly interfaces the project met its objectives effectively.