Automation of Pathology

A PROJECT REPORT

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CERTIFICATE

Certified that **Amit Kumar Dubey (2100290140023), Aman Sinha (2100290140021), Mukul Deep (2100290140089)** has/ have carried out the project work having "**Automation of Pathology**" for Master of Computer Applications from Dr. A.P.J. Abdul Kalam Technical University (AKTU**)** (formerly UPTU), Technical University, Lucknow under my supervision. The project report embodies original work, and studies are carried out by the student himself / herself and the contents of the project report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

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ABSTRACT

The Automation of Pathology (AOP) is designed for Any Pathology Lab to replace their existing manual, paper-based system. The new system is to control the following information: patient information, room availability, staff and operating and patient invoices. These services are to be provided in an efficient, cost-effective manner, with the goal of reducing the time and resources currently required for such tasks.

A significant part of the operation of any Pathology Lab involves the acquisition, management, and timely retrieval of great volumes of information. This information typically involves patient personal information and medical history, staff information, staff scheduling and various facilities waiting lists. All of this information must be managed in an efficient and cost-wise fashion so that an institution's resources may be effectively utilized. AOP will automate the management of the Pathology Lab making it more efficient and error free. It aims at standardizing data, consolidating data ensuring data integrity and reducing inconsistencies.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

List of Abbreviations

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 PROJECT DESCRIPTION

This project has been developed to overcome the problems prevailing in the practicing manual system. This application is supported to eliminate and, in some cases, reduce the hardships faced by the existing system. Moreover, this application is designed for moving toward secure digitalization. It will enhance transparency in the work.

Documenting the assembly, maintenance use and troubleshooting of a system as complex as a Pathology system is a difficult task .A single system might combine proprietary hardware, custom operating systems and software, commodity personal computers, and pen and paper. Describing these highly varied components is one function of Pathology system documentation. But it is not only Pathology system technology that is heterogeneous; so are Pathology systems users, and the environments in which the systems are used.

Laboratories officials, management workers, and users often need guidance from documents in order to administer or use a Pathology system. In addition, Pathology system certification—the process by which a system is approved for use in state—demands evidence that a Pathology system complies with one or more sets of standards or guidelines.

Documentation provides the details that certification bodies need to evaluate the System. Taken as a whole, voting system documentation must explain the system in several ways to meet the needs of these multiple audiences.

As modern organizations are automated and computers are working as per the instructions, it becomes essential for the coordination of human beings, commodities, and computers in a modern organization.

Many big cities where life is busy need the transaction of goods within a few minutes of time. So, this online information recorded by the distributor helps him to complete this task within the time.

The administrators and all the others can communicate with the system through this project, thus facilitating effective implementation and monitoring of various activities of the voting Software.

1.2 PROJECT SCOPE

The main purpose of the project on Automation of Pathology was to reduce Manual work and support digitalization. It may help collecting perfect management in detail in a noticeably short time, collection will be obvious, simple, and sensible. It will help a person to know their past records perfectly and vividly.

The Pathology Lab currently uses a manual system for the management and maintenance of critical information. The current system requires numerous paper forms, with data stores spread throughout the Lab management infrastructure. Often information (on forms) is incomplete or does not follow management standards. Forms are often lost in transit between departments requiring a comprehensive auditing process to ensure that no vital information is lost. Multiple copies of the same information exist in the Pathology Lab and may lead to inconsistencies in data in various data stores.

The Automation of Pathology provides an online portal where their customers can book their report from anywhere, this website won't be losing any more customers to the trending online shops such as Lal Path lab. Since the application is available in the Web form and it is easily accessible and maintainable.

A significant part of the operation of any Pathology Lab involves the acquisition, management, and timely retrieval of great volumes of information. This information typically involves patient personal information and medical history, staff information, room and ward scheduling, staff scheduling, operating theater scheduling and various facilities waiting lists. All of this information must be managed in an efficient and cost-wise fashion so that an institution's resources may be effectively utilized. AOP will automate the management of the pathology lab making it more efficient and error free. It aims at standardizing data, consolidating data ensuring data integrity and reducing inconsistencies.

Our project aims at Business process automation, i.e., we have tried to computerize various processes of Pathology Management as:-

- In Computer System, it is not necessary to create the manifest, but we can directly print it, which saves us time.
- To assist the staff in capturing the effort spent on their respective working areas.
- To utilize resources in an efficient manner by increasing their productivity through automation
- Be easy to operate.
- It satisfies the user requirement.
- Have a good user interface.
- Be expandable.
- Manage the information of cost.
- Editing and updating of records is improved which results in proper resource management.

1.3 HARDWARE / SOFTWARE USED IN PROJECT

Software Requirements

- **OS -** Windows 7 and Above

- **Language –** PHP

- **Database –** MySQL

- **Frontend –** HTML, CSS, JAVA SCRIPT

- **Backend –** jQuery, Ajax

- **Framework –** BOOTSTRAP

- **Web Server –** XAMPP v3.3.0 as my local server

Hardware Requirements

- **Processor** - Intel Core i3 (6th GEN) i3-6006U Dual-Core(2.0 GHz) and above.

- **RAM** - 4 GB (DDR3L-1600) and above

- **Storage -** 500 GB HDD

- **Monitor -** 15" Color Monitor

- **Keyboard -** 122 Keys

1.4 FUNCTIONAL REQUIREMENTS

Interface of Client System

- Create an Account
- Log into the Website
- Navigate the DAD menu.
- Select an item from the menu.
- Customized options for selected item
- Add item to current service.
- Remove items/ remove all items from current service.

Main Menu of Admin System

- Add a new/update/delete client to/from the menu.
- Add a new/update/delete products category to/from the menu.
- Add a new/update/delete products item to/from the menu.
- Add a new/update/delete option for a given products item.
- Update price for a given products item.
- Update additional information for a given products item.

Requested Retrieval System

- Retrieve new services from the database.
- Display the services in an easily readable, graphical way.
- Mark and service as having been processed and remove it from the list of active services.

1.5 NON – FUNCTIONAL REQUIREMENTS

- **Portability**

    System running on one platform can easily be converted to run on another platform.

- **Reliability**

    The ability of the system to behave consistently in a user-acceptable manner when operating within the environment for which the system was intended.

- **Availability**

    The system should be available at all times, meaning the user can access it using a web browser, only restricted by the down time of the server on which the system runs.

- **Maintainability**

    A commercial database is used for maintaining the database and the application server takes care of the site.

- **Security**

    Secure access of confidential data

CHAPTER 2

FEASIBILITY STUDY

Feasibility is the determination of whether or not a project is worth doing. The process followed in making this determination is called feasibility study. This type of study determines it a project can and should be taken.

Once it has been determined that a project is feasible, the analyst can go ahead and prepare the project specification which finalizes project requirements. Generally, feasibility studies are under taken with tight time concentrations and normal constraints and normally culminate in a written and oral feasibility report.

The contents and recommendations of such a study will be used as a sound basis for deciding whether to proceed, postpone or cancel the project, thus, since the feasibility study may lead to the commitment of large resource, it becomes necessary that it should be conducted completely and that no fundamental errors or judgments are made.

Feasibility study is made to see if the project on completion will serve the purpose of the organization for the amount of work, effort and the time that spend on it. Feasibility study lets the developer foresee the future of a project and the usefulness. Thus, when a new application is proposed normally goes through a feasibility study before it's approved for development.

The document provides the feasibility of the project that is being designed and lists various areas that were considered very carefully during the feasibility study of this project such as Technical, Economic, and operational feasibilities.

A feasibility study for the automation of a pathology lab would assess the viability and potential benefits of implementing automation technologies in various processes within the lab. Here are some key considerations to include in such a study:

1. Objectives: Clearly define the objectives of automating the pathology lab. This could include improving efficiency, accuracy, turnaround time,

reducing human error, enhancing quality control, and increasing overall productivity.

2. Cost Analysis: Evaluate the financial aspects of automation, including the initial investment required for equipment, software, and infrastructure. Consider ongoing maintenance costs, upgrades, and potential savings in labor costs over time. Compare these costs with the expected benefits to determine the return on investment (ROI).

3. Workflow Assessment: Analyze the existing workflow within the lab to identify areas that could be automated. This may include sample collection and registration, specimen processing, testing, analysis, reporting, data management, and result delivery. Identify bottlenecks, manual tasks prone to error, and areas that could benefit most from automation.

4. Technology Assessment: Research and evaluate automation technologies available in the market that are applicable to pathology labs. This could include robotic process automation (RPA), laboratory information management systems (LIMS), digital imaging, artificial intelligence (AI), and machine learning (ML) algorithms for data analysis. Assess their compatibility with existing systems and infrastructure.

5. Regulatory Compliance: Consider the regulatory and accreditation requirements specific to pathology labs, such as those set by local health authorities or accrediting bodies. Ensure that any proposed automation solutions comply with these standards and guidelines.

6. Staffing and Training: Evaluate the impact of automation on the lab staff. Determine the skills and expertise required to operate and maintain automated systems. Assess the need for additional training or hiring of specialized personnel. Consider the potential impact on the existing workforce and plan for proper communication and training during the transition.

7. Benefits and Risks: Identify and quantify the potential benefits of automation, such as increased accuracy, faster turnaround time, reduced errors, improved data management, enhanced patient care, and scalability. Additionally, assess the associated risks, such as system failures,

data security and privacy concerns, and potential resistance to change from staff or patients.

8. Implementation Plan: Develop a detailed plan for implementing automation in the pathology lab. This should include a timeline, resource allocation, and a phased approach if necessary. Consider any potential disruption to lab operations during the implementation process and plan for a smooth transition.

9. Stakeholder Engagement: Involve key stakeholders, including lab staff, management, IT personnel, and relevant regulatory bodies, in the feasibility study. Obtain their input, address concerns, and gather support for the automation initiative.

10. Evaluation and Monitoring: Establish metrics and performance indicators to measure the success of automation implementation. Monitor the impact on efficiency, accuracy, quality control, and overall lab performance. Regularly assess and refine the automated processes based on feedback and data analysis.

By conducting a comprehensive feasibility study considering the above aspects, you can make an informed decision about automating your pathology lab and lay the groundwork for a successful implementation. In the conduct of feasibility studied the following feasibility:

1. Technical Feasibility
2. Operation Feasibility
3. Behaviorally Feasibility
4. Economical Feasibility

2.1 TECHNICAL FESIBILITY

This is concerned with specifying equipment and software that will successfully satisfy the user requirement. The system must be evaluated from the technical point of view first. The assessment of this feasibility must be based on an outline design of the system requirements in terms of input, output, programs, and procedures.

Having identified an outline system, the investigation must go on to suggest the type of equipment, required method developing the system, of running the system once it has been designed.

The technical needs of the system may vary considerably but might include:

- The facility to produce outputs in the given time.
- Response time under output conditions
- Ability to process a certain volume of at a particular speed.
- Facility to communicate data to distant locations.
- Technical feasibility centers on the existing computer system (hardware, software, etc. and to the extent it can support the proposed addition.
- Thus, in this aspect the main point considered are:
    i. Can the work for the project be done with the current transaction? equipment, existing Software technology and available personnel.
    ii. If new technology is needed what is the likelihood that it can be developed?

The following are the proposed hardware and software configurations:

- A computer with the proposed configuration
- UPS is required for secure working.
- Printer for printing various types of quotation

A technical feasibility study for the automation of a pathology lab focuses on evaluating the technological aspects and requirements of implementing automation. It aims to determine whether the necessary technology exists, is accessible, and can be effectively integrated into the lab's infrastructure. Here are key considerations for a technical feasibility study:

1. Infrastructure Assessment: Evaluate the existing infrastructure of the pathology lab, including the availability of power supply, network connectivity, and physical space. Determine if the infrastructure can support the additional hardware, equipment, and software required for automation. Assess any potential limitations or modifications needed to accommodate automation technologies.

2. Compatibility with Existing Systems: Assess the compatibility of automation technologies with the lab's existing systems and software. Consider the integration capabilities of automation solutions with the laboratory information management system (LIMS), electronic health record (EHR) systems, and other relevant software. Determine if automation technologies can effectively exchange data and information with the existing systems.

3. Hardware and Equipment: Evaluate the hardware and equipment requirements for automation. Identify the specific instruments, robotics, analyzers, imaging systems, and other devices needed for automating various processes within the lab. Assess the availability, reliability, and compatibility of the required hardware and equipment.

4. Software and Applications: Assess the software and applications required for automation. This may include laboratory information management software, image analysis software, data management tools, and other specialized software for automation. Evaluate the availability, functionality, and compatibility of the software solutions with the lab's requirements.

5. Data Management and Integration: Analyze the data management and integration capabilities of automation technologies. Consider how data will be collected, stored, and managed within automated processes. Evaluate the ability of automation solutions to integrate and exchange data seamlessly with other systems and software used in the lab.

6. Security and Privacy: Evaluate the security and privacy implications of implementing automation. Assess the measures in place to protect sensitive patient data, comply with privacy regulations, and safeguard against unauthorized access or data breaches. Consider the security

features of automation technologies and the ability to implement necessary security controls.

7. Scalability and Flexibility: Assess the scalability and flexibility of automation technologies to accommodate future growth and changing needs. Determine if the proposed solutions can handle increased sample volumes, new testing methods, and evolving technology standards. Evaluate the ability to upgrade or expand the automation system as required.

8. Technical Support and Maintenance: Evaluate the availability of technical support for automation technologies. Consider the level of support provided by vendors, including software updates, troubleshooting, and maintenance services. Assess the lab's internal capabilities for maintaining and troubleshooting automated systems.

9. Training and Skill Requirements: Evaluate the training and skill requirements for lab personnel to operate and maintain automation technologies. Assess if the existing staff possesses the necessary technical knowledge or if additional training is required. Consider the availability of training resources and the learning curve associated with implementing automation.

10. Interoperability and Standards: Assess the adherence of automation technologies to industry standards and interoperability protocols. Determine if the solutions follow relevant standards for data exchange, communication, and interoperability. Consider the ability of automation systems to integrate with external systems or collaborate with other healthcare providers.

By conducting a thorough technical feasibility study, you can evaluate the technological aspects of automation and determine if the necessary infrastructure, hardware, software, and support systems are available and compatible with the pathology lab's requirements. This evaluation will help ensure a successful implementation of automation technologies.

2.2 OPERATIONAL FEASIBILITY

Proposed projects are beneficial only if they can be turned into information. Systems that will meet the operating requirements of the organization. This test of feasibility asks if the system will work when it is developed and installed. It is mainly related to human organization and political aspects.

The points to be considered are:
- What changes will be brought to the system?
- What organizational structures are distributed?
- What new skill will be required?

Do the existing staff members have these skills? If not, can they be trained in due course of time? Generally, a project will not be rejected simply because of operational infeasibility but such consideration is likely critically affecting the nature and scope of the eventual recommendations.

This feasibility study is carried out by a small group of people who are familiar with information systems techniques, who understand the parts of the business that are relevant to the project and are skilled in system analysis and design process.

The operational feasibility is mainly related to human organizational and political aspects. My project "Automation of Pathology" is operationally feasible due to following reasons: -
- No existing organizational structures are disturbed.
- Basic knowledge of operating computer will be required for the end users, and it was that personnel of library were familiar with the basic operation of the computer.

Because they had little knowledge of computer on specifics like Ms-word etc. so there was only requirement of training to operate this software. It is very easy to train them within a small duration of time.

An operational feasibility study for the automation of a pathology lab assesses the practicality and operational impact of implementing automation technologies. It focuses on understanding how automation will affect the day-to-day operations of the lab and whether it is feasible to incorporate automation into the existing workflow. Here are some key considerations for an operational feasibility study:

1. Workflow Analysis: Analyze the current workflow and processes within the pathology lab. Identify the tasks and activities that can be automated, such as sample registration, specimen preparation, testing, data analysis, and result reporting. Evaluate the impact of automation on each step of the workflow and identify any potential challenges or bottlenecks.

2. Resource Availability: Assess the availability of resources required for automation, including infrastructure, equipment, and software. Consider if the lab has the necessary space, power supply, and networking capabilities to accommodate automated systems. Evaluate the compatibility of existing equipment and systems with automation technologies.

3. Integration with Existing Systems: Evaluate the compatibility and integration of automation technologies with the existing laboratory information management system (LIMS) and other software used in the lab. Determine if the automation solutions can seamlessly interface with the current systems to exchange data and information effectively.

4. Scalability: Consider the scalability of automation solutions to accommodate future growth and increasing workload. Assess if the selected automation technologies can handle higher volumes of samples and increased demands without compromising efficiency and quality.

5. Training and Skill Requirements: Evaluate the training and skill requirements for lab personnel to operate and maintain automated systems. Assess if the existing staff possesses the necessary technical skills or if additional training or hiring is required. Consider the learning curve and the time required for staff to adapt to the new technologies.

6. Impact on Staffing: Assess the potential impact of automation on the lab's staffing needs. Determine if automation will lead to a reduction in the workforce or if it will free up staff for more complex tasks. Consider how staff roles and responsibilities may change with the introduction of automation.

7. Change Management: Evaluate the readiness of the lab staff for embracing automation. Identify potential resistance to change and develop strategies to address concerns and ensure a smooth transition.

Consider the need for effective communication, training, and support to facilitate the adoption of automation.

8. Quality Control and Assurance: Evaluate how automation will impact quality control processes in the lab. Determine if automation can improve accuracy, reduce errors, and enhance the overall quality of test results. Assess the mechanisms in place to monitor and ensure the quality of automated processes.

9. Regulatory Compliance: Consider the impact of automation on compliance with regulatory standards and accreditation requirements. Ensure that the proposed automation solutions meet the necessary regulations and guidelines specific to the pathology lab.

10. Cost-Benefit Analysis: Evaluate the costs associated with automation, including equipment, software, training, and maintenance. Compare the projected costs with the expected benefits, such as increased productivity, improved accuracy, reduced turnaround time, and enhanced patient care. Assess if the benefits outweigh the costs and if automation aligns with the lab's goals and priorities.

By conducting a comprehensive operational feasibility study, you can assess the practicality of automation in your pathology lab, identify potential challenges, and determine the best approach to implementing automation technologies effectively.

2.3 BEHAVIORAL FEASIBILITY

Behavioral Feasibility is the measure of how society is looking towards our project, what is the reaction of people who are going to use this in the upcoming future.

It includes how strong the reaction of the user will be towards the development of a new system that involves computer's use in their daily life for maintaining digital records of Automation of Pathology website.

This includes the following questions:-

- Is there sufficient support for the users?
- Will the proposed system cause harm?

The project would be beneficial because it specifies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible.

A behavioral feasibility study for the automation of a pathology lab focuses on assessing the impact of automation on the people involved, including staff, patients, and other stakeholders. It examines the behavioral aspects, acceptance, and adoption of automation technologies within the lab environment. Here are key considerations for conducting a behavioral feasibility study:

1. Stakeholder Analysis: Identify and analyze the different stakeholders affected by the automation of the pathology lab. This may include lab staff, pathologists, administrators, patients, referring physicians, and regulatory bodies. Understand their roles, perspectives, and potential concerns related to automation.

2. Organizational Culture: Assess the existing organizational culture within the lab. Evaluate the lab's readiness and openness to change, innovation, and adoption of new technologies. Determine if there are any cultural barriers that may affect the acceptance and integration of automation.

3. Change Management: Evaluate the lab's capacity for managing change effectively. Identify potential resistance to change and develop strategies to address it. Consider the communication, training, and support mechanisms required to facilitate a smooth transition to automation. Involve key stakeholders in the change management process.

4. Staff Acceptance and Engagement: Assess the impact of automation on the lab staff. Understand their attitudes, concerns, and perceptions toward automation. Identify the potential benefits of automation that would be most meaningful to staff members. Provide opportunities for staff to participate in the decision-making process, offer input, and address their concerns.

5. Staff Training and Skill Development: Evaluate the training and skill requirements for lab personnel to adapt to automated systems. Identify any gaps in knowledge or competencies and plan for appropriate training programs. Ensure that staff members receive the necessary support and

resources to acquire the skills needed to operate and maintain automated technologies.

6. Job Redesign and Role Changes: Analyze how automation will impact job roles and responsibilities within the pathology lab. Determine if any job redesign is necessary and communicate the changes effectively to the staff. Assess the potential for staff members to transition to more complex and value-added tasks with the introduction of automation.

7. Patient Experience and Engagement: Consider the impact of automation on the patient experience within the pathology lab. Evaluate factors such as wait times, communication of test results, and overall satisfaction. Assess how automation can enhance patient engagement and provide opportunities for patient education and involvement.

8. Ethical and Legal Considerations: Consider ethical and legal implications related to automation in the pathology lab. Evaluate issues such as privacy, confidentiality, data security, and informed consent. Ensure that automation solutions comply with relevant regulations and ethical guidelines.

9. Collaboration and Interdisciplinary Communication: Assess the impact of automation on collaboration and communication among different healthcare professionals within and outside the pathology lab. Determine if automation will enhance interdisciplinary interactions, facilitate knowledge sharing, and improve decision-making processes.

10. Continuous Improvement and Feedback Mechanisms: Establish mechanisms for ongoing feedback and continuous improvement related to automation. Encourage staff and stakeholders to provide input, suggestions, and lessons learned. Monitor and evaluate the behavioral impact of automation over time and adjust as needed.

By conducting a comprehensive behavioral feasibility study, you can assess the human aspects of automation in the pathology lab and ensure that the introduction of automation technologies aligns with the needs and expectations of the people involved. This evaluation will help foster acceptance, engagement, and successful integration of automation within the lab environment.

2.4 ECONOMICAL FEASIBILITY

Economical is the most frequently used technique for evaluating the effectiveness of a proposed system. More commonly known as cost or benefit analysis, the procedure is to determine the benefits and saving that are expected from a proposed system and compare with cost.

It benefits out weight costs a decision taken to design and implement the system. Otherwise, further justification or alternative in the proposed system will have to be made if it is to have a chance of being approved. This is an ongoing effort that improves accuracy at each phase of the system's life cycle.

An evaluation of development cost weighed against the ultimate income of benefit derived from the development system or project among the most important information contained in feasibility study is cost benefit analysis an assessment of the economic justification for a computer-based system project.

The benefits of a project include four types:

- Cost saving benefits.
- Cost avoidances benefits.
- Improved service level benefits.
- Improved the information benefits.
- The cost of the hardware and software.
- The costs conduct a full system investigation.
- The benefits come in the form of reduced costs or fewer costly errors.

Cost-saving benefits of our projects lead to the reduction in administration & operational costs. A cost avoidance benefits our project does not require future and additional staff and also reduces any future operational cost. This project leads the quicker and enhanced administrative decision thus making improved information benefits.

An economical feasibility study for the automation of a pathology lab examines the financial viability and cost-effectiveness of implementing automation technologies. It assesses the potential economic benefits and returns on investment (ROI) associated with automation. Here are key considerations for conducting an economical feasibility study:

1. Cost Analysis: Evaluate the costs associated with implementing automation in the pathology lab. This includes the initial investment for equipment, software, infrastructure upgrades, and any required customization or integration. Consider the costs of training personnel, hiring specialized staff if necessary, and ongoing maintenance and support expenses. Calculate the total cost of ownership over the projected lifespan of the automation systems.

2. Labor Cost Savings: Assess the potential savings in labor costs resulting from automation. Determine the tasks and processes that can be automated and estimate the reduction in labor hours required. Compare the costs of manual labor with those of operating and maintaining automated systems. Consider the potential for reallocating staff to higher-value tasks and the associated cost implications.

3. Increased Efficiency and Productivity: Analyze the potential improvements in efficiency and productivity that can be achieved through automation. Estimate the reduction in turnaround time for various processes, such as sample processing, testing, analysis, and reporting. Assess the potential increase in the lab's capacity to handle higher sample volumes with automation. Consider the impact on patient wait times and the ability to serve more patients.

4. Improved Accuracy and Quality: Evaluate the potential for automation to enhance accuracy and improve the quality of test results. Consider the reduction in human errors, transcription mistakes, and variability in manual processes. Assess the impact on quality control and assurance measures. Determine the potential cost savings associated with reduced errors, retesting, and corrective actions.

5. Reduction in Turnaround Time: Analyze the impact of automation on the overall turnaround time for delivering test results to healthcare providers and patients. Consider the potential for faster sample processing, testing, analysis, and reporting with automated systems. Evaluate the economic benefits associated with shorter turnaround times, such as improved patient satisfaction, faster diagnosis, and timely treatment decisions.

6. Cost of Errors and Rework: Evaluate the financial implications of errors and rework caused by manual processes. Consider the costs associated with misdiagnosis, repeat testing, sample mix-ups, and result inaccuracies. Estimate the potential reduction in such costs with automation, including savings from avoiding legal liabilities, reputational damage, and customer dissatisfaction.

7. Equipment Utilization and Optimization: Assess the impact of automation on equipment utilization and optimization. Consider the potential to increase the throughput of automated systems and achieve higher levels of equipment utilization. Evaluate the impact on maintenance costs, equipment lifespan, and the need for backup systems or redundancy.

8. Return on Investment (ROI) Analysis: Calculate the expected return on investment for implementing automation in the pathology lab. Compare the projected cost savings, efficiency gains, and quality improvements with the initial investment and ongoing costs. Consider the payback period and the overall financial benefits over the expected lifespan of the automation systems.

9. Risk Assessment: Identify and assess the potential risks and uncertainties associated with automation. Consider the possibility of technology obsolescence, unexpected expenses, or changes in regulatory requirements. Evaluate the impact of these risks on the economic feasibility of automation and develop contingency plans to mitigate them.

10. Long-term Strategic Alignment: Evaluate how automation aligns with the long-term strategic goals and vision of the pathology lab. Consider the competitive advantage gained through automation, potential for expanding services, and the ability to adapt to future healthcare trends. Assess the economic sustainability and growth potential of the lab with automation.

By conducting a comprehensive economical feasibility study, you can assess the financial viability of automating the pathology lab and determine if the projected benefits and returns outweigh the costs. This evaluation will help make an informed decision regarding the economic feasibility of automation.

CHAPTER 3

SYSTEM ANALYSIS

System analysis of the automation of a pathology lab involves examining the current system, identifying areas for improvement, and designing an automated system that meets the lab's requirements. It focuses on understanding the processes, data flows, and interactions within the lab and determining how automation can optimize efficiency, accuracy, and quality. Here are key steps involved in system analysis for the automation of a pathology lab:

1. Current System Assessment: Analyze the existing manual system within the pathology lab. Understand the workflow, processes, and tasks involved in sample collection, processing, testing, analysis, reporting, and result management. Identify pain points, bottlenecks, and areas where automation can bring significant improvements.

2. Requirements Gathering: Identify the specific requirements and objectives for automating the pathology lab. Engage with stakeholders, including lab staff, pathologists, administrators, and IT personnel, to understand their needs and expectations. Determine the desired outcomes, such as improved turnaround time, enhanced accuracy, increased capacity, and seamless data integration.

3. Data Flow Analysis: Analyze the flow of data within the lab, including sample information, test results, patient data, and reports. Identify the sources, destinations, and transformations of data throughout the workflow. Understand the interfaces and interactions with external systems, such as the laboratory information management system (LIMS), electronic health records (EHR), and other healthcare providers.

4. Process Mapping: Create process maps or flowcharts to visualize the current and future automated processes within the lab. Document each step, activity, decision point, and data exchange. Identify dependencies, handoffs, and interactions between different processes and personnel. This

helps identify areas where automation can streamline operations and eliminate manual steps.

5. Functional Requirements Definition: Based on the current system assessment and stakeholder requirements, define the functional requirements for the automated system. Specify the desired features, capabilities, and functionalities of the automation solution. This may include sample registration, specimen handling, testing protocols, data analysis, result reporting, quality control, and audit trails.

6. Technology Selection: Evaluate available automation technologies, hardware, and software solutions that align with the defined requirements. Consider the compatibility with existing systems, scalability, vendor reputation, support services, and cost-effectiveness. Select the most suitable technologies for each aspect of automation, such as robotics, analyzers, image analysis software, and data management systems.

7. System Design: Design the automated system architecture and components. Define the hardware infrastructure, including laboratory equipment, robotic systems, imaging devices, and computer systems. Specify the required software modules, interfaces, and integrations with existing systems. Design the data storage and management system to handle the increased data volumes and ensure data integrity and security.

8. Validation and Testing: Develop a validation plan to ensure the effectiveness, accuracy, and reliability of the automated system. Conduct rigorous testing to verify that the system meets the defined requirements. Perform functional, integration, and performance testing to identify and resolve any issues or discrepancies. Validate the system against regulatory standards and guidelines.

9. Implementation Plan: Create an implementation plan that outlines the steps, timeline, and resources required to deploy the automated system. Consider factors such as staff training, system installation, data migration, and parallel operations during the transition period. Develop a change management strategy to ensure a smooth adoption of the new system.

10. Ongoing Monitoring and Evaluation: Establish mechanisms for monitoring and evaluating the automated system's performance and effectiveness. Define key performance indicators (KPIs) to measure the system's impact on turnaround time, accuracy, productivity, and other relevant metrics. Continuously collect feedback from users and stakeholders to identify areas for further improvement and optimization.

By conducting a systematic analysis of the pathology lab's current system and designing an automated system that addresses the identified needs and requirements, you can optimize the efficiency, accuracy, and quality of operations. This process ensures a successful implementation and integration of automation within the pathology lab.

3.1   EXISTING SYSTEM

Pathology Labs currently use a manual system for the management and maintenance of critical information. The current system requires numerous paper forms, with data stores spread throughout the pathology lab management infrastructure. Often information (on forms) is incomplete or does not follow management standards. Forms are often lost in transit between departments requiring a comprehensive auditing process to ensure that no vital information is lost. Multiple copies of the same information exist in the Pathology Lab and may lead to inconsistencies in data in various data stores.

3.2 PROPOSED SYSTEM

The Automation of Pathology (AOP) is designed for Any Pathology Lab to replace their existing manual, paper-based system. The new system is to control the following information: patient information, staff, and patient invoices. These services are to be provided in an efficient, cost-effective manner, with the goal of reducing the time and resources currently required for such tasks.
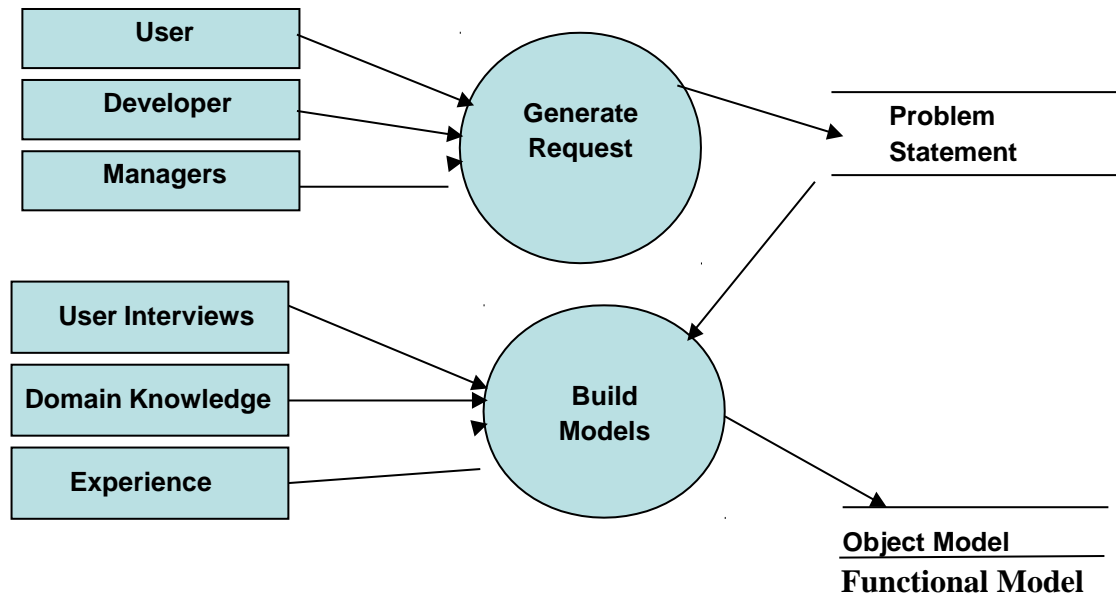
Fig: 3.2 Proposed Model System

CHAPTER 4

SOFTWARE PLANNING

4.1 Project life cycle has three stages: -

4.1.1   Project Initiation –

The development team prepares the project plans and finalizes the outcome of each phase. In this stage the team also prepares a comprehensive list of tasks involved in each phase, and the project assigns responsibilities to the team members, depending on their skills.

4.1.2   Project Execution –

In this stage, the team develops the product. This Stage consists of following phase: -

- Requirement Analysis
- High Level Design
- Low Level Design
- Construction
- Testing
- Acceptance

4.1.3   Project Completion –

In this stage, the team has to update the site regularly. Each new item has to be added by the administrator according to the needs and demands. This stage is very important to the freshness of the site. When any updating or up gradation is required for the website, the developers or maintenance team make the website up to date.

CHAPTER 5

PROJECT SCHEDULING

5.1 THE PROTOTYPE MODEL

For better development of a project, it is essential to select a relevant model. **Prototype Model** can be one of the best options for such a purpose.

Because the system is complicated and large and there is no existing system (computerized) prototyping is an attractive idea. In this situation letting the client test the prototype provides variable inputs, which help in determining the requirements of the system. It is also an effective method of demonstrating the feasibility of a certain approach.
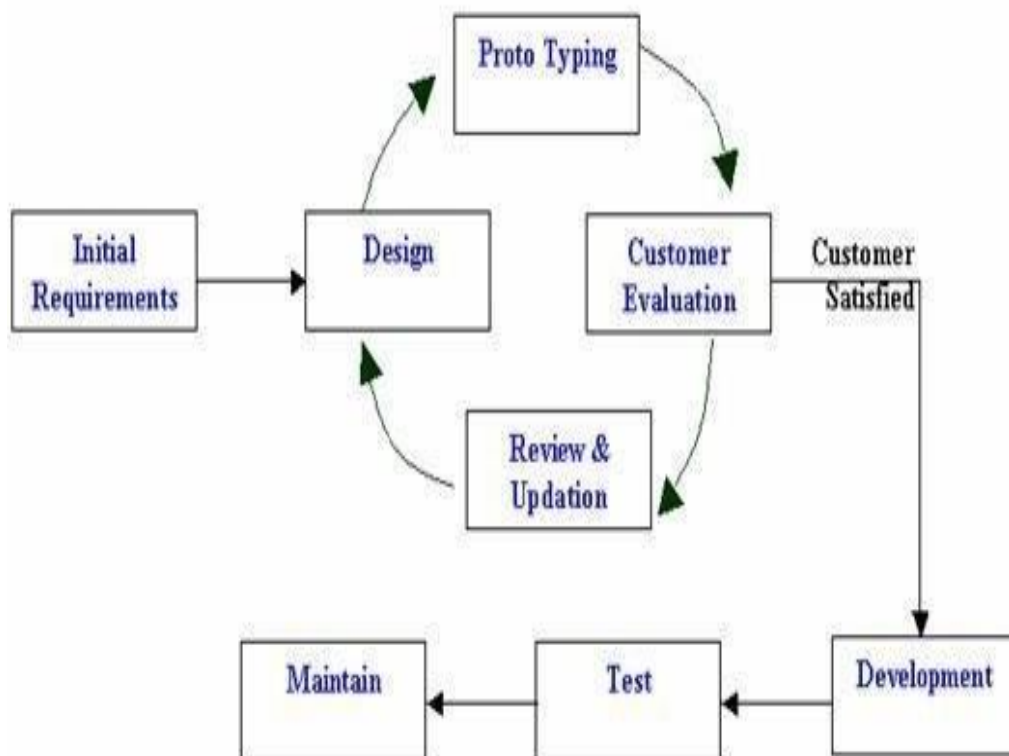
Fig: 5.1 Prototype Model

5.2 REASONS BEHIND USING PROTOTYPE MODEL

1. It helps to reduce the cost and time.

2. It improves communication with the client as after every prototype there is an interactive session with the client.

3. It provides early detection of errors.

4. It allows the developers to have greater control over the problem.

5. Because the system is complicated and large and there is no existing system (computerized) prototyping is an attractive idea. In this situation letting the client test the prototype provides variable inputs, which help in determining the requirements of the system. It is also an effective method of demonstrating the feasibility of a certain approach.

CHAPTER 6

SOFTWARE REQUIREMENTS SPECIFICATIONS

The Software Requirements Specification is produced at the culmination of the analysis task. SRS is a document that completely describes what the proposed software should do without describing how the software will do it. The basic limitation for this is that the user need keeps changing as the environment in which the system was to function changes with time. This leads to a request for requirement changes even after the requirement phase is done and the SRS is produced.

The function and performance allocated to software as part of System Engineering are refined by:

1. Establishing a complete information description of the System. A detailed functional description.

2. A representation of System behavior .

3. An indication of performance requirements and design constraints. Appropriate validation criteria.

4. Other information pertinent to requirements.

6.1 INTRODUCTION

6.1.1   Purpose

The Software is for the automation of Pathology Lab Management. It maintains two levels of users:-
- Administrator Level
- User Level(patient, doctors, receptionist)

The Software includes:-
- Maintaining Patient details.
- Providing Prescription, Precautions and Diet advice.
- Providing and maintaining all kinds of tests for a patient.
- Billing and Report generation.

6.1.2 Document Conventions

International Standards when adopted by a system for a universal level of Quality. The standards are designed to ensure the most effective, safe, efficient methods & processes. The system's compliances with international standards to measure how well key systems support to improve performance and manage risk effectively which give greater customer confidence.

6.1.3 Intended Audience and Reading Suggestions

This Software Requirements document is intended for:-
Developers who can review project's capabilities and more easily understand where their efforts should be targeted to improve or add more features to it (design and code the application – it sets the guidelines for future development).

Project testers can use this document as a base for their testing strategy as some bugs are easier to find using a requirements document. This way testing becomes more methodically organized. End users of this application wish to read about what this project can do.

6.1.4 Project Scope

This Project can be used in any Pathology labs for maintaining patient details and their test results .They have provided online chatting between patient and doctor and provide the facility to online appointment.

6.1.5 References

The official website of the project contains a brief description of the project, screenshots, links, FAQs, and a blog with all the news of the project:

- Project's development and distribution website at Source forge. It provides the project's source code, a bug reporting and tracking system, and all the available   file downloads   of   the project: https://github.com/AmitKumarDubey110/Automation-of-Pathology/tree/master

- PDF   of   synopsis: https://github.com/kietmcaproject/2022-23_KCA451_Project/tree/main/G-C19

6.2 OVERALL DESCRIPTION

6.2.1 Product Perspective

- Planned approach towards working: - The working in the organization will be well planned and organized. The data will be stored properly in data stores. Which will help in retrieval of information as well as its storage.

- Accuracy: - The level of accuracy in the proposed system will be higher. All operations would be done correctly, and it ensures that whatever information is coming from the center is accurate.

- Reliability: - The reliability of the proposed system will be high due to the above-stated reasons. The reason for the increased reliability of the system is that now there would be proper storage of information.

- No Redundancy: - In the proposed system utmost care would be that no information is repeated anywhere, in storage or otherwise. This would ensure economic use of storage space and consistency in the data stored.

- Immediate retrieval of information: - The main objective of proposed
- system is to provide for a quick and efficient retrieval of information. Any type of information would be available whenever the user requires.

- Immediate storage of information: - In the manual system there are many problems storing the largest amount of information.

- Easy to Operate: - The system should be easy to operate and should be such that it can be developed within a short period of time and fits in the limited budget of the user.

6.2.2   Product Features

This software contains the ER Diagram (Entity Relationship Diagram) and a DFD (Data Flow Diagram) with 0 and 1 level DFD. It also contains snapshots of the web pages and data tables.

- Automate the existing manual system.
- Online registration of Patient.
- Quick and fast process.
- Provide the facility to Online Appointment
- Chatting and mailing between doctor and patient.
- Patient gives this feedback according to provide services by Pathology Lab.

6.2.3 User Classes and Characteristics

This software uses five types of end user. First is the Administrator who has the right to use this software. Administrators view complaints and mark the complaint to the person complaint, can also forward the complaint to the concerned person.

User classes of system are as follows:

Administrator:-

Administrator is responsible for following activities:-
1. Add/edit doctor details.
2. Add/edit Employees details.
3. Provide shift allotment for doctors and employees.
4. Approved / Disapproved leave request of doctors and employees.
5. Approved/Disapproved Pharmacy and Accessories request.
6. Add/edit login account.

Employee:-

1. Add/edit medicine detail.
2. Check/maintain medicine stock.
3. View own leave request and shift time.
4. Add/edit login account.

Doctor:-

Doctor is responsible for following activities:-
1. Add /edit leave request.
2. View own leave request and shift duration.
3. View appointment who's approved by reception.
4. View medical history of Patients.
5. Add/edit login account**.**

Patient:-

1. View own profiles.
2. View appointment status.
3. View own reports.
4. Add/edit login account.

Reception:-

1. Add/edit accessories record.
2. Provide the medical report of patients.
3. Check/approved the appointment status.
4. Generate the discharge report and billing.
5. Add/edit login account.

6.2.4 User Characteristics

Every user should be:

- Comfortable working with a computer.
- He must have knowledge in the medical field.
- He must also have basic knowledge of English too.

6.2.5 Design and Implementation Constraints

- GUI is only in English.
- Login and password is used for identification of users and there is no facility for guests.
- This software has one major limitation i.e. It cannot be viewed and accessed by unauthorized users. It can be used for a limited number of users.

6.3 USER DOCUMENTATION

The user manual will be provided along with the project so as to help the user understand the working of the software. It provides detailed information that allow the user to follow the steps in the user manual *:-*

(i) Assumptions and Dependencies
This software has dependency on the browser that it can be best viewed only in Internet Explorer.

(ii) System Features
The services provided by this software are:-
- The complaints can be registered.
- The complaints can be attended.
- The status of the complaint can be viewed.
- Reports can be generated and viewed date-wise and branch wise.

Mode of operation:-
- The software is logged in by login page. It can be logged in by entering username and password.
- The username is entered as the patient id code and the name corresponds to the employee code that appears in the textbox.

(iii) User Class:-

- Administrator
- User (Patients, Doctor, Receptionist, etc.)

(iv) Functional Hierarchy:-

- This software states the top level in the functional hierarchy as the administrator.

6.4 EXTERNAL INTERFACE REQUIREMENTS

6.4.1 User Interfaces

User Interfaces: The System should be a Graphical User Interface that is more user friendly. Graphical user interface provides more enhanced performance.

6.4.2 Hardware Interfaces

Description	Minimum	Recommended
Processor	Intel Dual Core or equivalent with Clock Speed of 2000 MHZ	Intel Core 2 Duo or equivalent of
Primary Memory (RAM)	1 GB	2 GB
Display	1024x768, 32 bit color SVGA	1289x800, 32 bitcolorSVGA

Table No. 6.1: Hardware Interfaces Data

6.4.3 Software Interfaces

Description	Minimum	Recommended
Operating system	Win XP Service Pack-3 or higher	Win XP Service Pack-3
Front End	Visual Studio 2010 or higher	Visual Studio 2010
Back End	Version 2008 or higher	SQL Server 2008 R2

Table No. 6.2: Software Interface Data

6.5 OTHER NON-FUNCTIONAL REQUIREMENTS

6.5.1 Performance Requirements

Performance Requirements: To develop the system that is more user-friendly and more effective. The system must be flexible to cop-up with changing environment.

6.5.2 Safety Requirements

Safety Requirements: Safety requirements that are concerned with possible loss, damage, or harm that could result from the use of the product. We implement check that must be verified for performing any action over confidential data, as well as action to prevent misuse.

6.5.3 Software Quality Requirements

Software Quality Attributes: They define the properties or qualities of a product including:

- Usability
- Efficiency
- Performance
- Space
- Reliability
- Portability

CHAPTER 7

DATABASE DESIGN

Database design can be defined as a collection of tasks or processes that enhance the designing, development, implementation, and maintenance of enterprise data management system. Designing a proper database reduces the maintenance cost thereby improving data consistency and the cost-effective measures are influenced in terms of disk storage space.

Therefore, there has to be a brilliant concept of designing a database. The designer should follow the constraints and decide how the elements correlate and what kind of data must be stored.

7.1 FLOW CHART DIAGRAM

A flowchart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows.

This allows anyone to view the flowchart and logically follow the process from beginning to end. A flowchart is a powerful business tool. With proper design and construction, it communicates the steps in a process very effectively and efficiently.

Symbol	Name	Function
	Start/end	An oval represents a start or end point
→	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectagle represents a process
	Decision	A diamond indicates a decision

Fig. 7.1 : Flow Chart Symbols
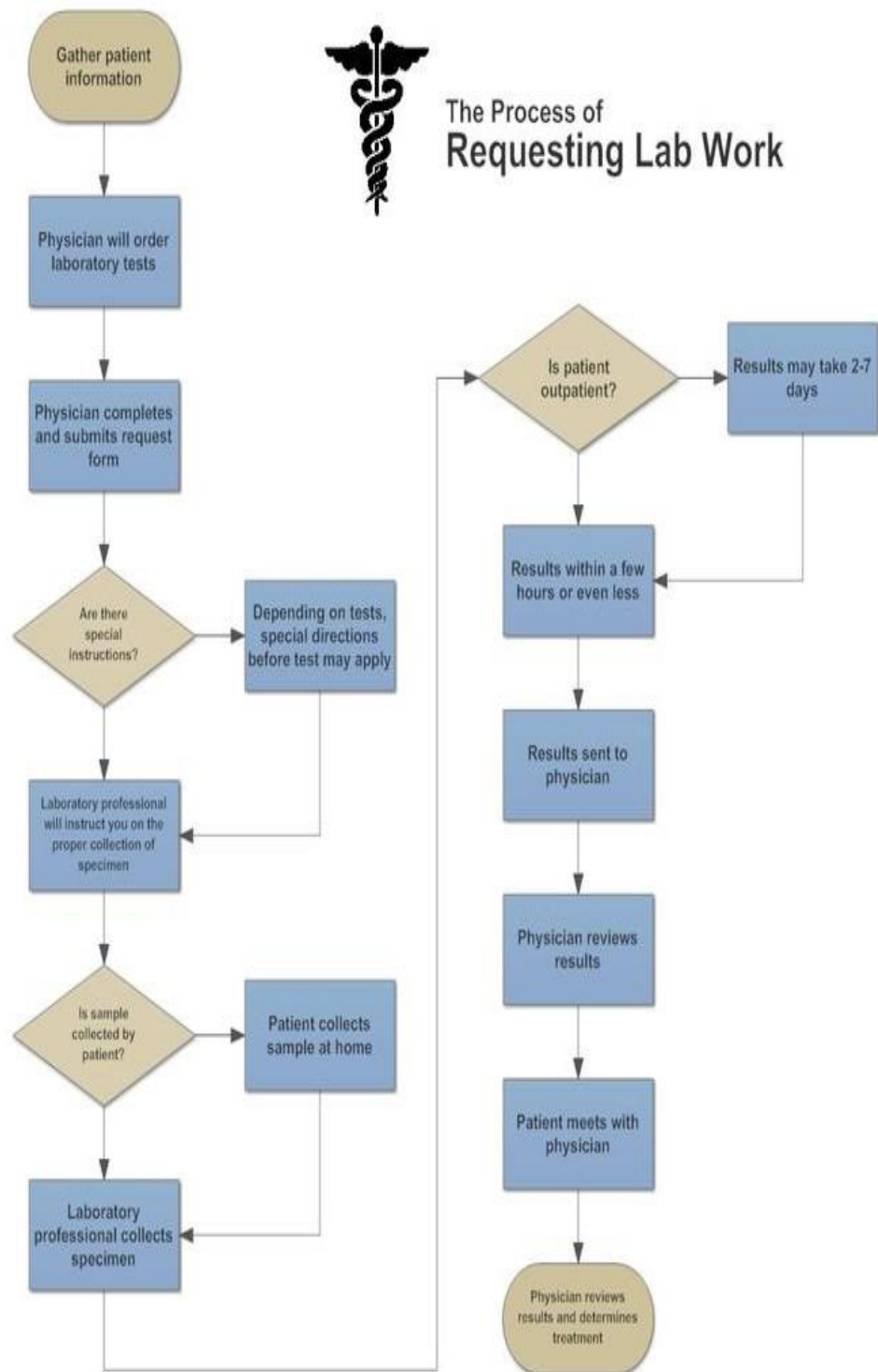
Fig. 7.2 : Flow Chart Diagram

7.2 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both. It shows how data enters and leaves the system, what changes the information, and where data is stored.

The objective of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system. The DFD is also called a data flow graph or bubble chart.
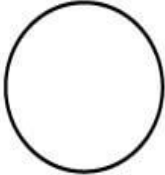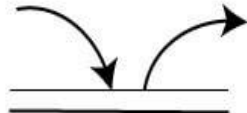
Symbol	Name	Function
	Data flow	Used to Connect Processes to each , other , to sources or Sinks; te arrow head indicates direction of data flow.
	Process	Perfroms Some transformation of Input data to yield output data.
	Source of Sink (External Entity)	A Source of System inputs or Sink of System outputs.
	Data Store	A repository of data; the arrow heads indicate net inputs and net outputs to store.

Fig. 7.3 : Data Flow Symbols

The DFD takes an input-process-output view of a system i.e., data objects flow into the software, are transformed by processing elements, and resultant data objects flow out of the software.

Data objects represented by labeled arrows and transformation are represented by circles also called bubbles. DFD is presented in a hierarchical fashion i.e., the first data flow model represents the system as a whole. Subsequent DFD refine the context diagram (level 0 DFD), providing increasing details with each subsequent level.

The DFD enables the software engineer to develop models of the information domain & functional domain at the same time. As the DFD is refined into greater levels of details, the analyst performs an implicit functional decomposition of the system. At the same time, the DFD refinement results in a corresponding refinement of the data as it moves through the process that embody the applications.

A context-level DFD for the system the primary external entities produce information for use by the system and consume information generated by the system. The labeled arrow represents data objects or object hierarchy.

The DFD may be used to perform a system or software at any level of abstraction. Infact, DFDs may be partitioned into levels that represent increasing information flow and functional detail. Levels in DFD are numbered 0, 1, 2 or beyond. Here, we will see primarily two levels in the data flow diagram, which are: 0-level DFD and 1-level DFD.

RULES FOR DFD:
- Fix the scope of the system by means of context diagrams.
- Organize the DFD so that the main sequence of the actions.
- Reads left to right and top to bottom.
- Identify all inputs and outputs.
- Identify and label each process internal to the system with Rounded circles.
- A process is required for all the data transformation and Transfers.

Therefore, never connect a data store to a data Source or the destinations. or another data store with just a <u>Data flow arrow.</u>

- Do not indicate hardware and ignore control information.
- Make sure the names of the processes accurately convey everything the process is done.
- There must not be an unnamed process.
- Indicate external sources and destinations of the data, with Squares.
- Number each occurrence of repeated external entities.
- Identify all data flows for each process step, except simple Record retrievals.
- Label data flows on each arrow.
- Use details flow on each arrow.

0-level DFD

The Level-0 DFD, also called context diagram of the result management system is shown in fig. As the bubbles are decomposed into less and less abstract bubbles, the corresponding data flow may also need to be decomposed.
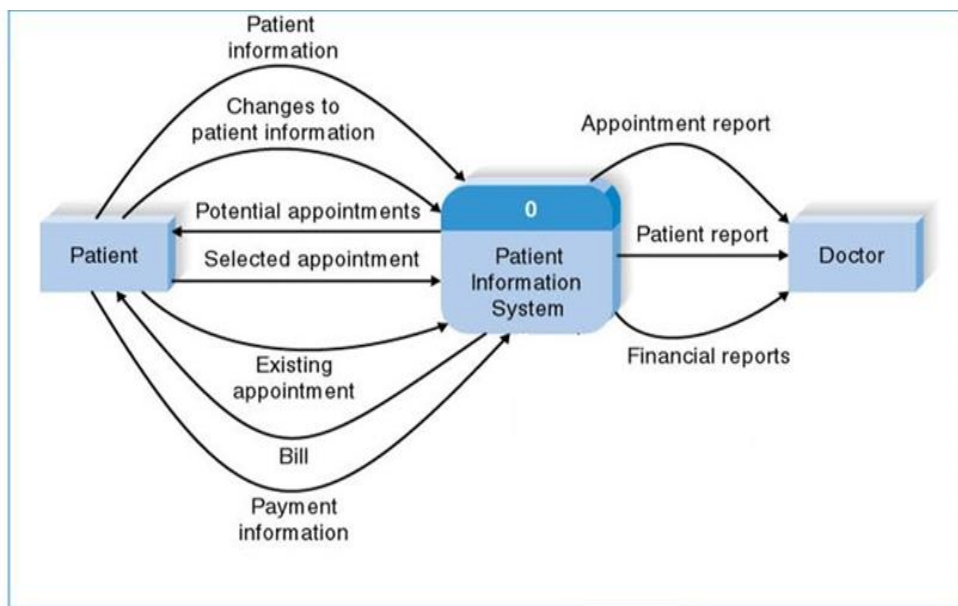
Fig. 7.4 : Level 0 DFD

1-level DFD

In 1-level DFD, a context diagram is decomposed into multiple bubbles/processes. In this level, we highlight the main objectives of the system and breakdown the high-level process of 0-level DFD into subprocesses.
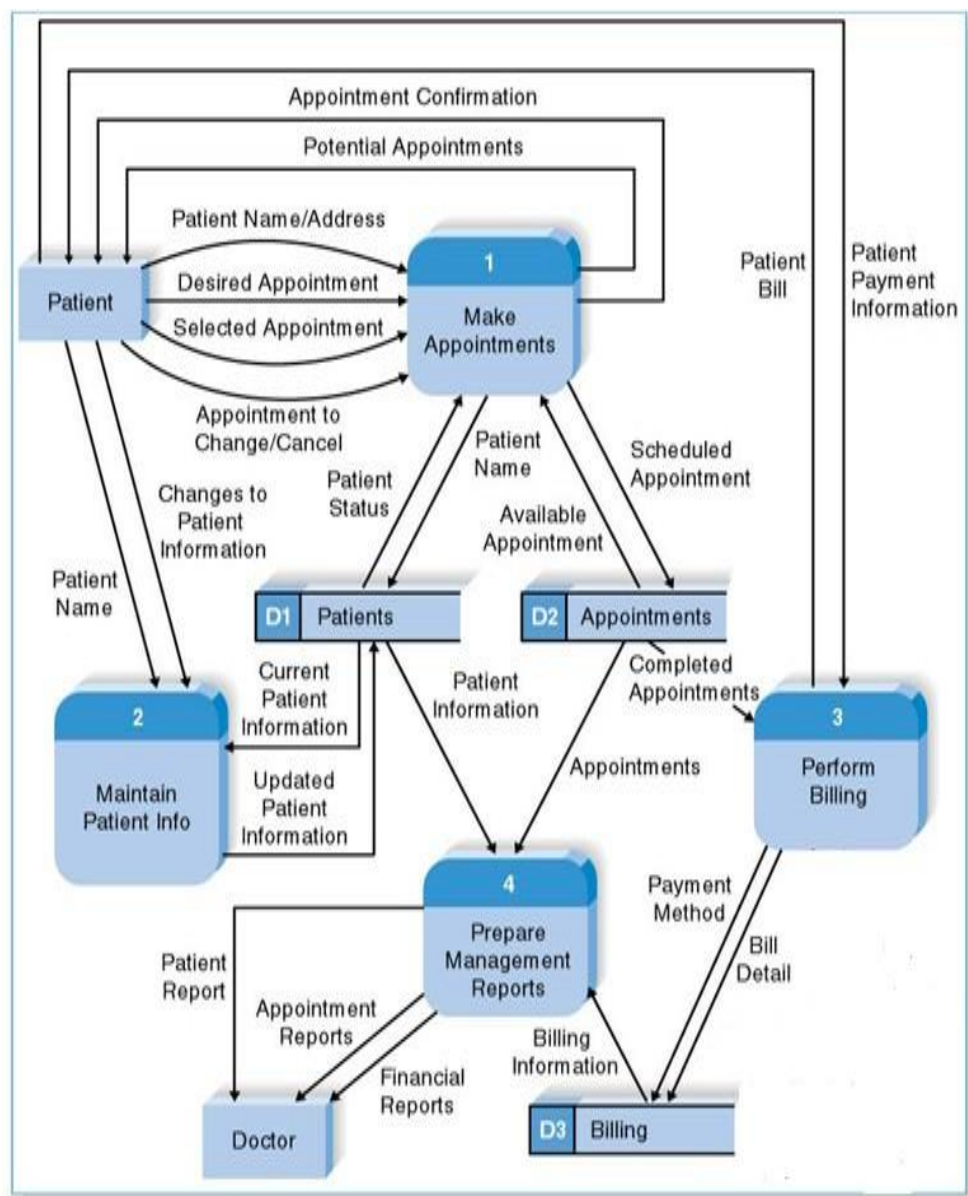
Fig. 7.5 : Level 1 DFD

7.3 ENTITY RELATIONSHIP DIAGRAM

The Entity-Relationship (ER) model was originally proposed by Peter in 1976 [Chen76] as a way to unify the network and relational database views.

Simply stated the ER model is a conceptual data model that views the real world as entities and relationships. A basic component of the model is the Entity-Relationship diagram which is used to visually represent data objects.

Since Chen wrote his paper the model has been extended and today it is commonly used for database design For the database designer, the utility of the ER model is:

- It maps well to the relational model. The constructs used in the ER model can easily be transformed into relational tables.

- It is simple and easy to understand with a minimum of training. Therefore, the model can be used by the database designer to communicate the design to the end user.

- In addition, the model can be used as a design plan by the database developer to implement a data model in a specific database management software.

Entity-Relationship model stands for an ER model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system.

It develops a conceptual design for the database. It also develops a very simple and easy to design view of data. In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

Connectivity and Cardinality

The basic types of connectivity for relations are: one-to-one, one-to-many, and many-to-many. A one-to-one (1:1) relationship is when at most one instance of an entity A is associated with one instance of entity B. For example, "employees in the company are each assigned their own office. For each employee there exists a unique office and for each office there exists a unique employee.

A *one-to-many* (1:N) relationship is when for one instance of entity A, there are zero, one, or many instances of entity B, but for one instance of entity B, there is only one instance of entity A. An example of a 1:N relationship is a department that has many employees each employee is assigned to one department.

A many-to-many (M:N) relationship, sometimes called non-specific, is when for one instance of entity A, there are zero, one, or many instances of entity B and for one instance of entity B there are zero, one, or many instances of entity A. The connectivity of a relationship describes the mapping of associated.

ER Notation

There is no standard for representing data objects in ER diagrams. Each modeling methodology uses its own notation. The original notation used by Chen is widely used in academics texts and journals but rarely seen in either CASE tools or publications by non-academics. Today, there are a number of notations used, among the more common are Bachman, crow's foot, and IDEFIX.

All notational styles represent entities as rectangular boxes and relationships as lines connecting boxes. Each style uses a special set of symbols to represent the cardinality of a connection. The notation used in this document is from Martin.

The symbols used for the basic ER constructs are:

- **Entities:** They are represented by labeled rectangles. The label is the name of the entity. Entity names should be singular nouns.
- **Relationships**: They are represented by a solid line connecting two entities. The name of the relationship is written above the line. Relationship names should be verbs.
- **Attributes:** when included, are listed inside the entity rectangle. Attributes which are identifiers are underlined. Attribute names should be singular nouns.
- **Cardinality:** It is of many is represented by a line ending in a crow's foot. If the crow's foot is omitted, the cardinality is one.
- **Existence:** It is represented by placing a circle or a perpendicular bar on the line. Mandatory existence is shown by the bar (looks like a 1) next to the entity for an instance is required. Optional existence is shown by placing a circle next to the entity that is optional.
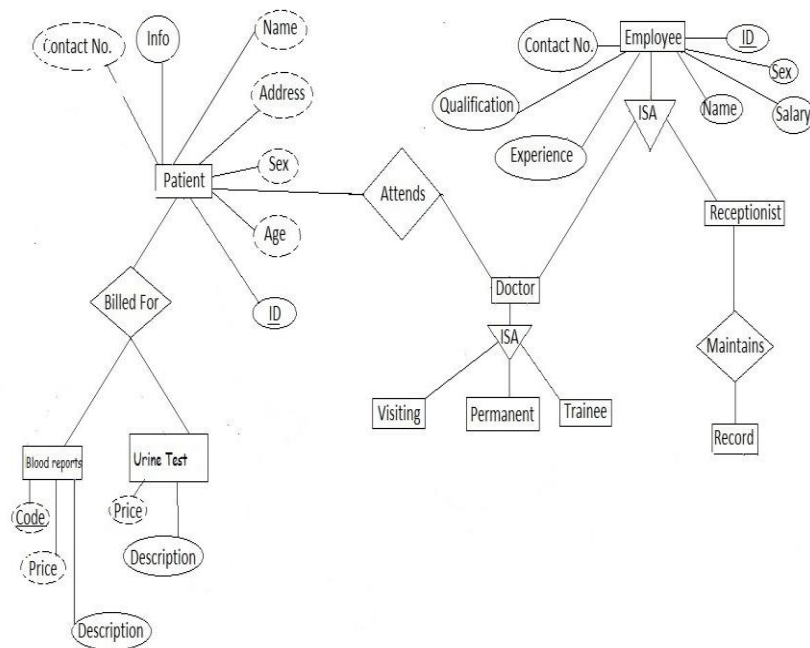
Fig. 7.6 : Entity Relationship Diagram

44

7.4 USE CASE DIAGRAM

A use case diagram (UCD) is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system.

Use case diagrams model behavior within a system and helps the developers understand of what the user require. The stick man represents what's called an actor.

A use case diagram consists of use cases and actors and shows the interaction between the use case and actors.

- The purpose is to show the interactions between the use case and actor.
- To represent the system requirements from user's perspective.
- An actor could be the end-user of the system or an external system.

A Use case is a description of set of sequence of actions Graphically it is rendered as an ellipse with solid line including only its name. Use case diagram is a behavioral diagram that shows a set of use cases and actors and their relationship. It is an association between the use cases and actors. An actor represents a real-world object.

The main purpose of a use case diagram is to portray the dynamic aspect of a system. It accumulates the system's requirements, which includes both internal as well as external influences.

It invokes persons, use cases, and several things that invoke the actors and elements accountable for the implementation of use case diagrams. It represents how an entity from the external environment can interact with a part of the system.
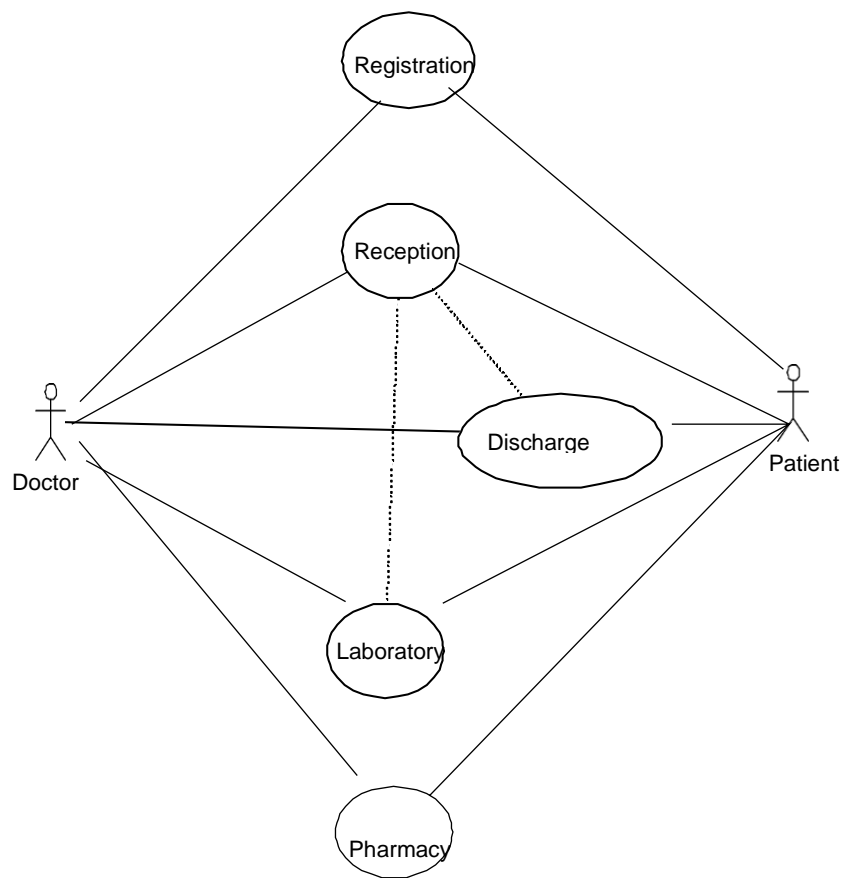
Fig. 7.7 : Use Case Diagram

7.5 SEQUENCE DIAGRAM

The sequence diagram (SD) represents the flow of messages in the system and is also termed as an event diagram. It helps in envisioning several dynamic scenarios. It portrays the communication between any two lifelines as a time-ordered sequence of events, such that these lifelines took part at the run time.

In UML, the lifeline is represented by a vertical bar, whereas the message flow is represented by a vertical dotted line that extends across the bottom of the page. It incorporates the iterations as well as branching.
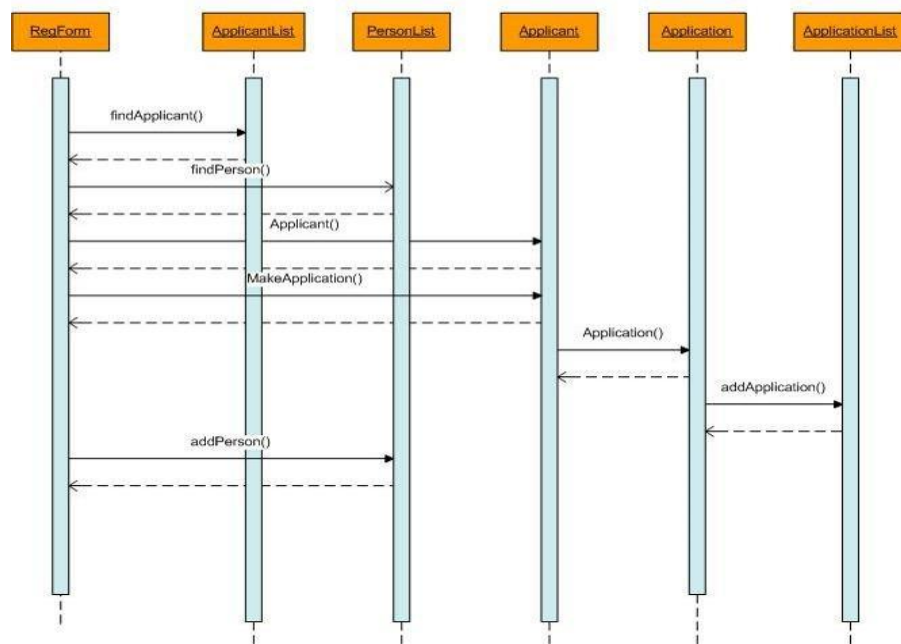
Fig. 7.8 : Sequence Diagram

7.6 CLASS DIAGRAM

Class is nothing but a structure that contains both variables and methods. The Class Diagram shows a set of classes, interfaces, and collaborations and their relating ships. There is a most common diagram in modeling object-oriented systems and are used to give the static view of a system. It shows the dependency between the classes that can be used in our system. The interactions between the modules or classes of our projects are shown below. Each block contains Class Name, Variables and Methods.

Activity Diagram:
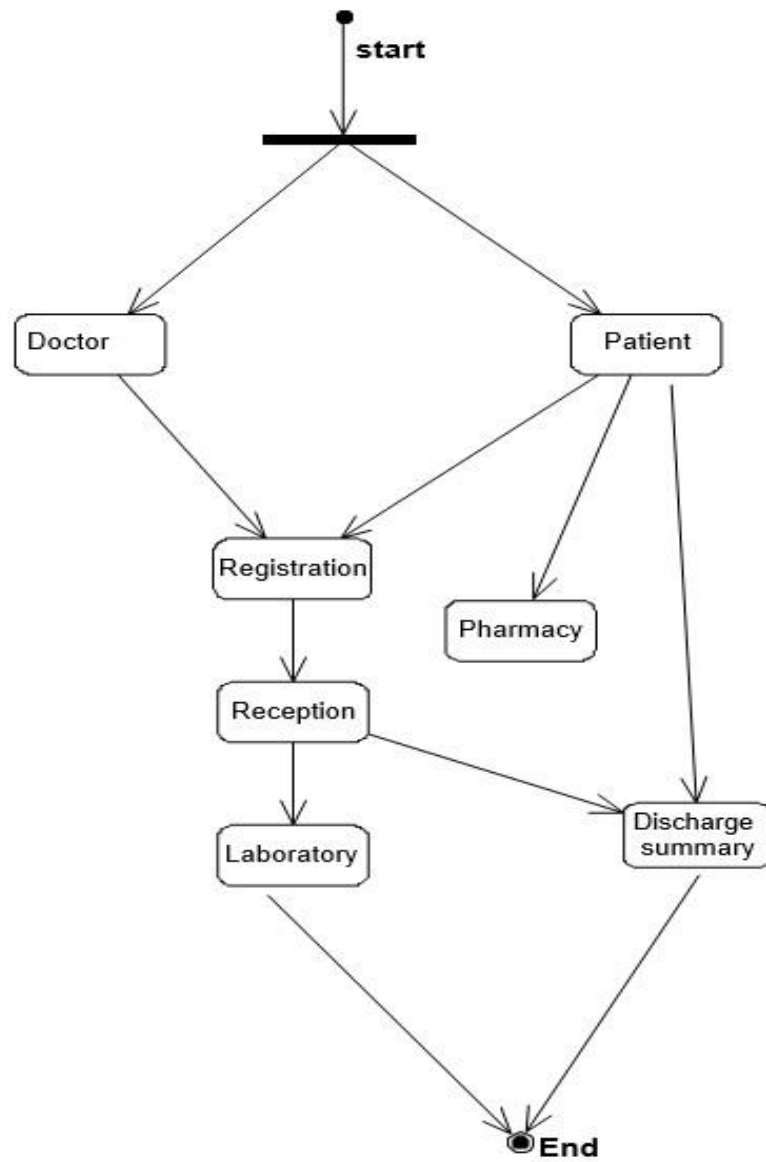
Fig: 7.9 Activity Diagram

CHAPTER 8

FORM DESIGN

8.1 LANDING PAGE

Fig. 8.1 : Admin Landing Page

Fig. 8.2 : Client Landing Page

8.2 LOGIN PAGE
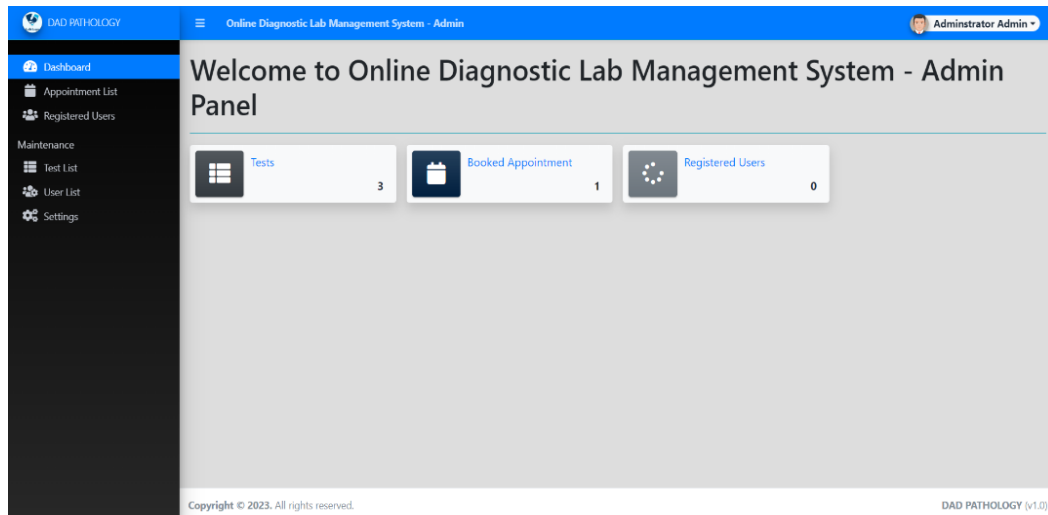
Fig. 8.3 : Login Page Dashboard Admin
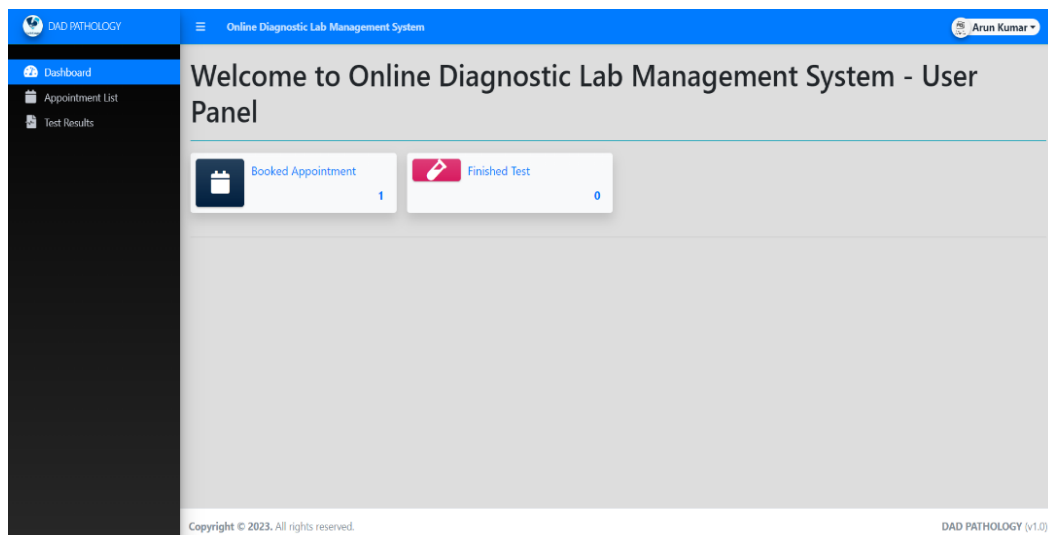
Fig. 8.4 : Login Page Dashboard Client/User

8.3 TEST LIST PAGE
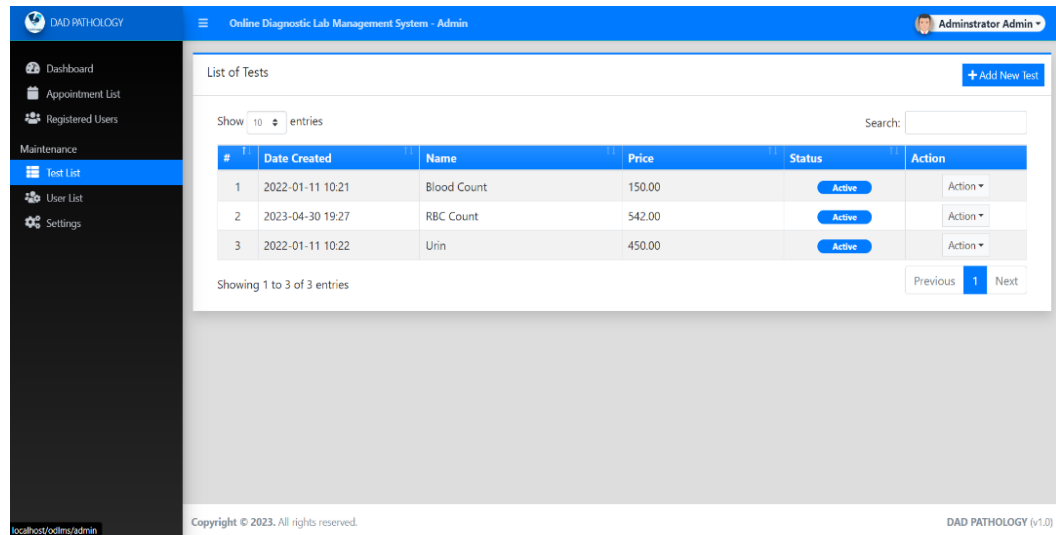
Fig. 8.5 : Test List Page Admin
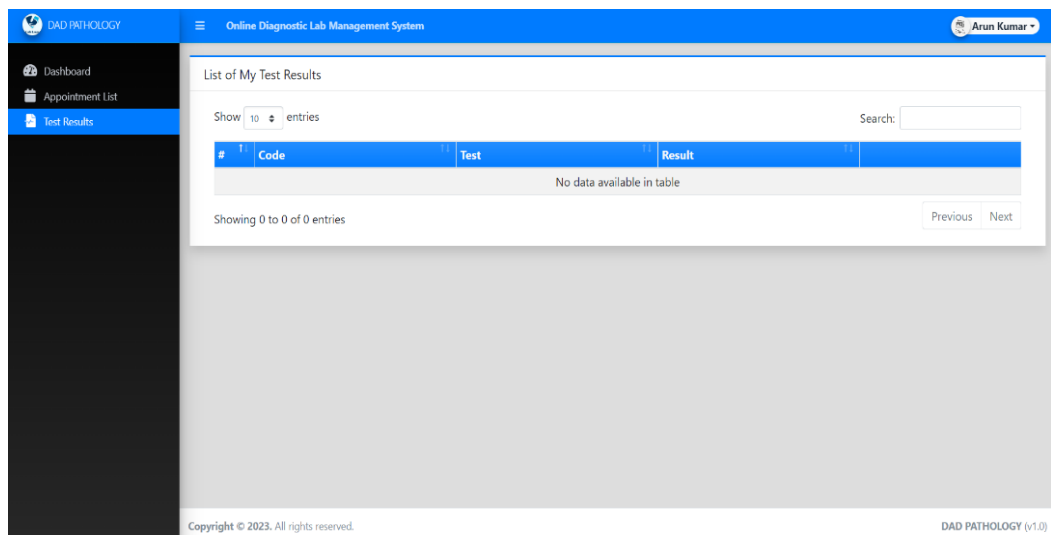
Fig. 8.6 : Test List Page Client

51

8.4 BOOKED APPOINTMENT PAGE
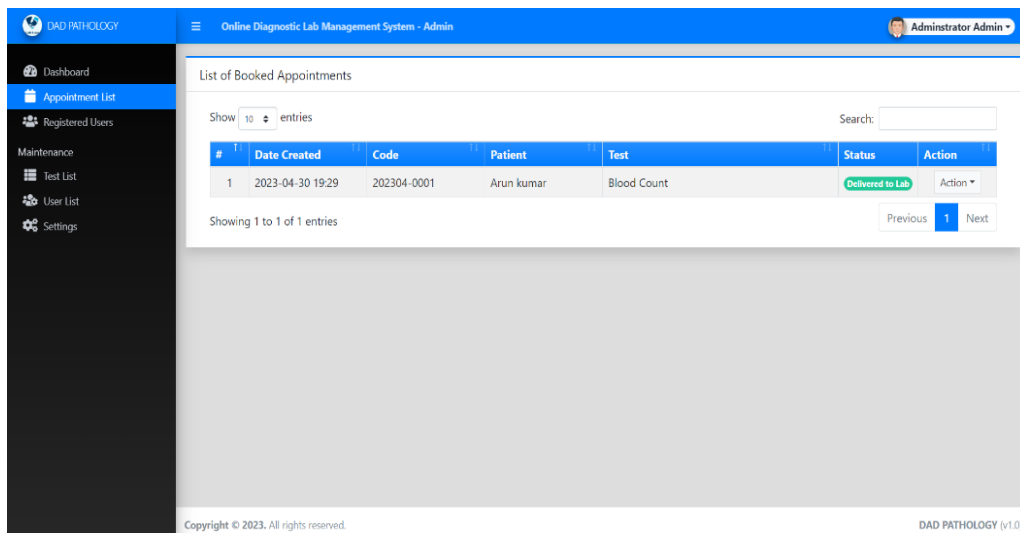
Fig. 8.7 : Booked Appointment Page Admin

Fig. 8.8 : Booked Appointment Page Client

CHAPTER 9

CODING

1. MAIN MODULE CLASS (ODLMS)

1.1.   Index Page

```php
<?php require_once('./config.php'); ?>
 <!DOCTYPE html>
<html lang="en" class="" style="height: auto;">
<?php require_once('inc/header.php') ?>
  <body class="sidebar-mini layout-fixed control-sidebar-slide-open layout-
navbar-fixed sidebar-mini-md sidebar-mini-xs" data-new-gr-c-s-check-
loaded="14.991.0" data-gr-ext-installed="" style="height: auto;">
   <div class="wrapper">
    <?php require_once('inc/topBarNav.php') ?>
    <?php require_once('inc/navigation.php') ?>
    <?php if($_settings->chk_flashdata('success')): ?>
    <script>
      alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')
    </script>
    <?php endif;?>
   <?php $page = isset($_GET['page']) ? $_GET['page'] : 'home';  ?>
   <!-- Content Wrapper. Contains page content -->
   <div class="content-wrapper pt-3" style="min-height: 567.854px;">

     <!-- Main content -->
     <section class="content ">
       <div class="container-fluid">
```

```php
        <?php
         if(!file_exists($page.".php") && !is_dir($page)){
            include '404.html';
         }else{
          if(is_dir($page))
           include $page.'/index.php';
          else
           include $page.'.php';


         }
        ?>
       </div>
      </section>
      <!-- /.content -->
  <div class="modal fade" id="confirm_modal" role='dialog'>
   <div class="modal-dialog modal-md modal-dialog-centered rounded-0"
role="document">
     <div class="modal-content">
      <div class="modal-header">
      <h5 class="modal-title">Confirmation</h5>
     </div>
     <div class="modal-body">
      <div id="delete_content"></div>
     </div>
     <div class="modal-footer">
      <button type="button" class="btn btn-primary btn-flat" id='confirm'
onclick="">Continue</button>
      <button type="button" class="btn btn-secondary btn-flat" data-
dismiss="modal">Close</button>
     </div>
     </div>
   </div>
  </div>
  <div class="modal fade rounded-0" id="uni_modal" role='dialog'>
   <div class="modal-dialog modal-md modal-dialog-centered rounded-0"
role="document">
     <div class="modal-content rounded-0">
      <div class="modal-header rounded-0">
      <h5 class="modal-title"></h5>
     </div>
     <div class="modal-body rounded-0">
     </div>
```

```html
    <div class="modal-footer">

      <button type="button" class="btn btn-primary btn-flat" id='submit'
onclick="$('#uni_modal form').submit()">Save</button>
      <button type="button" class="btn btn-secondary btn-flat" data-
dismiss="modal">Cancel</button>
    </div>
    </div>
  </div>
</div>
<div class="modal fade rounded-0" id="uni_modal_right" role='dialog'>
  <div class="modal-dialog modal-full-height  modal-md rounded-0"
role="document">
    <div class="modal-content">
      <div class="modal-header">
      <h5 class="modal-title"></h5>
      <button type="button" class="close" data-dismiss="modal" aria-
label="Close">
        <span class="fa fa-arrow-right"></span>
      </button>
    </div>
    <div class="modal-body">
    </div>
    </div>
  </div>
</div>
<div class="modal fade rounded-0" id="viewer_modal" role='dialog'>
  <div class="modal-dialog modal-md rounded-0" role="document">
    <div class="modal-content">
        <button type="button" class="btn-close" data-dismiss="modal"><span
class="fa fa-times"></span></button>
        <img src="" alt="">
    </div>
  </div>
</div>
    </div>
    <!-- /.content-wrapper -->
    <?php require_once('inc/footer.php') ?>
</body>
</html>
```

1.2. Home Page

```
<h1>Welcome to <?php echo $_settings->info('name') ?> - User Panel</h1>
<hr class="border-info">
<div class="row">
   <div class="col-12 col-sm-12 col-md-6 col-lg-3">
      <div class="info-box bg-gradient-light shadow">
         <span class="info-box-icon bg-gradient-navy elevation-1"><i class="fas
fa-calendar"></i></span>


         <div class="info-box-content">
         <span class="info-box-text"><a
href="/odlms/?page=appointments">Booked Appointment</span>
         <span class="info-box-number text-right">
            <?php
              echo $conn->query("SELECT * FROM `appointment_list` where
client_id = '{$_settings->userdata('id')}' ")->num_rows;
            ?>
         </span>
         </div>
         <!-- /.info-box-content -->
      </div>
      <!-- /.info-box -->


      <!-- /.info-box -->
   </div>
   <div class="col-12 col-sm-12 col-md-6 col-lg-3">
      <div class="info-box bg-gradient-light shadow">
         <span class="info-box-icon bg-gradient-maroon elevation-1"><i
class="fas fa-vial"></i></span>


         <div class="info-box-content">
         <span class="info-box-text"><a href="/odlms/?page=reports">Finished
Test</span>
         <span class="info-box-number text-right">
            <?php
              echo $conn->query("SELECT * FROM `appointment_list` where
client_id = '{$_settings->userdata('id')}' and status = 6 ")->num_rows;
            ?>
```

```
      </span>
      </div>
      <!-- /.info-box-content -->
    </div>
    <!-- /.info-box -->
  </div>
</div>
<hr>
```

1.3. Login Page

```php
<?php require_once('./config.php') ?>
<!DOCTYPE html>
<html lang="en" class="" style="height: auto;">
 <?php require_once('inc/header.php') ?>
<body class="hold-transition ">
 <script>
  start_loader()
 </script>
 <style>
  html, body{
   height:calc(100%) !important;
   width:calc(100%) !important;
  }
  body{
   background-image: url("<?php echo validate_image($_settings-
            >info('cover')) ?>");
   background-size:cover;
   background-repeat:no-repeat;
  }
  .login-title{
   text-shadow: 2px 2px black
  }
  #login{
   flex-direction:column !important
  }
  #logo-img{
     height:150px;
```

```
      width:150px;
      object-fit:scale-down;
      object-position:center center;
      border-radius:100%;
   }
  #login .col-7,#login .col-5{
    width: 100% !important;
    max-width:unset !important
  }
</style>
<?php if($_settings->chk_flashdata('success')): ?>
   <script>
    alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')
   </script>
   <?php endif;?>
<div class="h-100 d-flex align-items-center w-100" id="login">
  <div class="col-7 h-100 d-flex align-items-center justify-content-center">
    <div class="w-100">
      <center><img src="<?= validate_image($_settings->info('logo')) ?>" alt=""
            id="logo-img"></center>
      <h1 class="text-center py-5 login-title"><b><?php echo $_settings-
            >info('name') ?> - Client Login</b></h1>
    </div>

  </div>
  <div class="col-5 h-100 bg-gradient">
    <div class="d-flex w-100 h-100 justify-content-center align-items-center">
      <div class="card col-sm-12 col-md-6 col-lg-3 card-outline card-primary
            rounded-0 shadow">
        <div class="card-header rounded-0">
          <h4 class="text-purle text-center"><b>Login</b></h4>
        </div>
        <div class="card-body rounded-0">
          <form id="clogin-frm" action="" method="post">
            <div class="input-group mb-3">
              <input type="email" class="form-control" autofocus name="email"
                placeholder="Email">
              <div class="input-group-append">
                <div class="input-group-text">
                  <span class="fas fa-user"></span>
```

```
          </div>
         </div>
        </div>
        <div class="input-group mb-3">
          <input type="password" class="form-control" name="password"
            placeholder="Password">
          <div class="input-group-append">
            <div class="input-group-text">
              <span class="fas fa-lock"></span>
            </div>
          </div>
        </div>
        <div class="row">
          <div class="col-8">
            <a href="<?php echo base_url.'register.php' ?>">Create an
            Account</a>
          </div>
          <!-- /.col -->
          <div class="col-4">
            <button type="submit" class="btn btn-primary btn-block btn-
            flat">Sign In</button>
          </div>
          <!-- /.col -->
        </div>
      </form>
    </div>
   </div>
  </div>
 </div>

<!-- jQuery -->
<script src="plugins/jquery/jquery.min.js"></script>
<!-- Bootstrap 4 -->
<script src="plugins/bootstrap/js/bootstrap.bundle.min.js"></script>
<!-- AdminLTE App -->
<script src="dist/js/adminlte.min.js"></script>
<script>
 $(document).ready(function(){
   end_loader();
 })
</script>   </body>      </html>
```

2. ADMINN MODULE CLASS

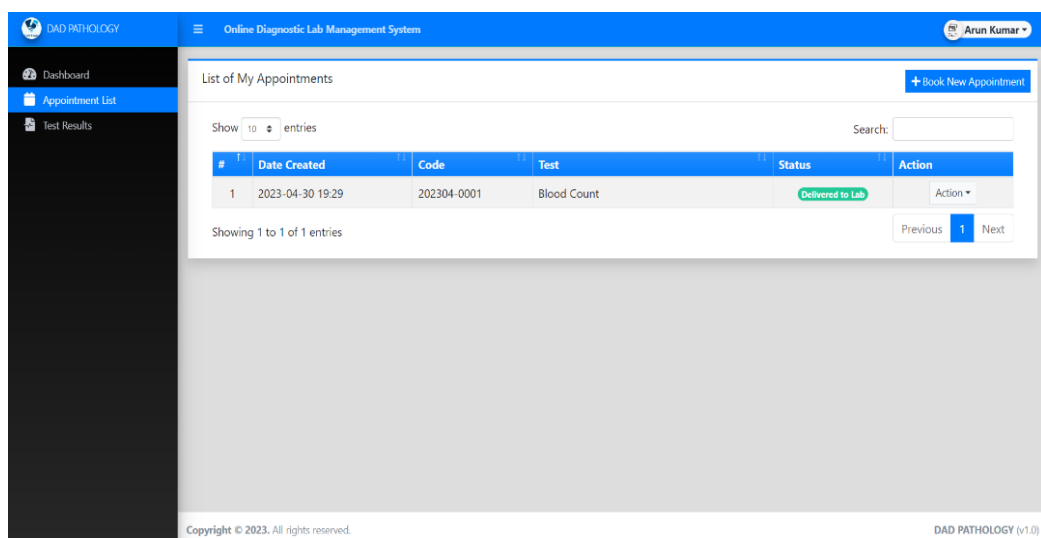## 2.1. Index Page

```php
<?php require_once('./config.php'); ?>
 <!DOCTYPE html>
<html lang="en" class="" style="height: auto;">
<?php require_once('inc/header.php') ?>
  <body class="sidebar-mini layout-fixed control-sidebar-slide-open layout-
                navbar-fixed sidebar-mini-md sidebar-mini-xs" data-new-gr-c-s-
                check-loaded="14.991.0" data-gr-ext-installed="" style="height:
                auto;">
   <div class="wrapper">
    <?php require_once('inc/topBarNav.php') ?>
    <?php require_once('inc/navigation.php') ?>
    <?php if($_settings->chk_flashdata('success')): ?>
     <script>
       alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')


     </script>
     <?php endif;?>
    <?php $page = isset($_GET['page']) ? $_GET['page'] : 'home';  ?>
    <!-- Content Wrapper. Contains page content -->
    <div class="content-wrapper pt-3" style="min-height: 567.854px;">

      <!-- Main content -->
      <section class="content ">
       <div class="container-fluid">
        <?php
         if(!file_exists($page.".php") && !is_dir($page)){
            include '404.html';
         }else{
           if(is_dir($page))
            include $page.'/index.php';
           else
            include $page.'.php';


         }
        ?>
       </div>
      </section>
```

```html
        <!-- /.content -->
    <div class="modal fade" id="confirm_modal" role='dialog'>
      <div class="modal-dialog modal-md modal-dialog-centered rounded-0"
                   role="document">
        <div class="modal-content">
          <div class="modal-header">
          <h5 class="modal-title">Confirmation</h5>
        </div>
        <div class="modal-body">
          <div id="delete_content"></div>
        </div>
        <div class="modal-footer">
          <button type="button" class="btn btn-primary btn-flat" id='confirm'
                   onclick="">Continue</button>
          <button type="button" class="btn btn-secondary btn-flat" data-
                   dismiss="modal">Close</button>
        </div>
        </div>
      </div>
</div>
  <div class="modal fade rounded-0" id="uni_modal" role='dialog'>
    <div class="modal-dialog modal-md modal-dialog-centered rounded-0"
                 role="document">
      <div class="modal-content rounded-0">
        <div class="modal-header rounded-0">
        <h5 class="modal-title"></h5>
      </div>
      <div class="modal-body rounded-0">
      </div>
      <div class="modal-footer">
        <button type="button" class="btn btn-primary btn-flat" id='submit'
                 onclick="$('#uni_modal form').submit()">Save</button>
        <button type="button" class="btn btn-secondary btn-flat" data-
                 dismiss="modal">Cancel</button>
      </div>
      </div>
    </div>
  </div>
  <div class="modal fade rounded-0" id="uni_modal_right" role='dialog'>
    <div class="modal-dialog modal-full-height  modal-md rounded-0"
                 role="document">
      <div class="modal-content">
```

```html
    <div class="modal-header">
    <h5 class="modal-title"></h5>
    <button type="button" class="close" data-dismiss="modal" aria-
            label="Close">
     <span class="fa fa-arrow-right"></span>
    </button>
   </div>
   <div class="modal-body">
   </div>
   </div>
  </div>
 </div>
 <div class="modal fade rounded-0" id="viewer_modal" role='dialog'>
  <div class="modal-dialog modal-md rounded-0" role="document">
   <div class="modal-content">
        <button type="button" class="btn-close" data-dismiss="modal"><span
            class="fa fa-times"></span></button>

        <img src="" alt="">
</div>
   </div>
 </div>
    </div>
    <!-- /.content-wrapper -->
    <?php require_once('inc/footer.php') ?>
 </body>
</html>
```

2.2. Home Page

```html
<h1>Welcome to <?php echo $_settings->info('name') ?> - User Panel</h1>
<hr class="border-info">
<div class="row">
   <div class="col-12 col-sm-12 col-md-6 col-lg-3">
     <div class="info-box bg-gradient-light shadow">
        <span class="info-box-icon bg-gradient-navy elevation-1"><i class="fas
            fa-calendar"></i></span>

        <div class="info-box-content">
```

```
<span class="info-box-text"><a href="/odlms/?page=appointments">Booked
        Appointment</span>
    <span class="info-box-number text-right">
      <?php
        echo $conn->query("SELECT * FROM `appointment_list` where
        client_id = '{$_settings->userdata('id')}' ")->num_rows;
      ?>
    </span>
    </div>
    <!-- /.info-box-content -->
  </div>
  <!-- /.info-box -->


  <!-- /.info-box -->
</div>
<div class="col-12 col-sm-12 col-md-6 col-lg-3">
  <div class="info-box bg-gradient-light shadow">
    <span class="info-box-icon bg-gradient-maroon elevation-1"><i
        class="fas fa-vial"></i></span>
    <div class="info-box-content">
    <span class="info-box-text"><a href="/odlms/?page=reports">Finished
        Test</span>
    <span class="info-box-number text-right">
      <?php
        echo $conn->query("SELECT * FROM `appointment_list` where
        client_id = '{$_settings->userdata('id')}' and status = 6 ")-
        >num_rows;
      ?>
    </span>
    </div>
    <!-- /.info-box-content -->
  </div>
  <!-- /.info-box -->
</div>
</div>
<hr>
```

3. APPOINTMENT MODULE CLASS

3.1. Index Page

```
<style>
   .img-thumb-path{
      width:100px;
      height:80px;
      object-fit:scale-down;
      object-position:center center;
   }
</style>
<div class="card card-outline card-primary rounded-0 shadow">
        <div class="card-header">
        <h3 class="card-title">List of Booked Appointments</h3>
        </div>
        <div class="card-body">
        <div class="container-fluid">
    <div class="container-fluid">
                <table class="table table-bordered table-hover table-striped">
                        <colgroup>
                                <col width="5%">
                                <col width="15%">
                                <col width="15%">
                                <col width="15%">
                                <col width="30%">
                                <col width="10%">
                                <col width="10%">
                        </colgroup>
                        <thead>
                                <tr class="bg-gradient-primary text-light">
                                        <th>#</th>
                                        <th>Date Created</th>
                                        <th>Code</th>
                                        <th>Patient</th>
                                        <th>Test</th>
                                        <th>Status</th>
                                        <th>Action</th>
                                </tr>
                        </thead>
                        <tbody>        <?php
                                $i = 1;
```

```php
                                                $patient_arr = [];
                                                $patients = $conn->query("SELECT
*,CONCAT(firstname,' ',middlename,' ', lastname) as fullname FROM
`client_list` where id in (SELECT client_id FROM
`appointment_list`)");
                                                if($patients->num_rows > 0){
                                                        $res = $patients-
>fetch_all(MYSQLI_ASSOC);
                                                        $patient_arr =
array_column($res,'fullname','id');
                                                }
                                                $qry = $conn->query("SELECT * from
`appointment_list` order by unix_timestamp(date_created) desc ");
                                                while($row = $qry->fetch_assoc()):
                $tests = $conn->query("SELECT * FROM `test_list` where id
in (SELECT test_id FROM `appointment_test_list` where
appointment_id = '{$row['id']}')");

                $test = "N/A";
                if($tests->num_rows > 0){
                    $res = $tests->fetch_all(MYSQLI_ASSOC);
                    $test_arr = array_column($res,'name');
                    $test = implode(", ",$test_arr);
                }
                                ?>
                                                <tr>
                                                        <td class="text-center"><?php
echo $i++; ?></td>
                                                        <td class=""><?php echo date("Y-
m-d H:i",strtotime($row['date_created'])) ?></td>
                                                        <td class=""><?= $row['code']
?></td>
                                                        <td class=""><p class="m-0
truncate-1"><?= isset($patient_arr[$row['client_id']]) ?
$patient_arr[$row['client_id']] : 'N/A' ?></p></td>
                                                        <td class=""><p class="m-0
truncate-1"><?= $test ?></p></td>
                                                        <td class="text-center">
                                                                <?php
                                                                        switch
($row['status'])                                                        case 0:
echo '<span class="rounded-pill badge badge-secondary ">Pending</span>';
```

```php
                break;
                    case 1:
        echo '<span class="rounded-pill badge badge-primary
        ">Approved</span>';

        break;
                    case 2:
                        echo '<span class="rounded-pill badge badge-
        warning ">Sample Collected</span>';
                            break;
                        case 3:
echo '<span class="rounded-pill badge badge-primary bg-teal ">Delivered to
        Lab</span>';
                            break;
                        case 4:
                            echo '<span class="rounded-pill badge badge-success
        ">Done</span>';
                            break;
                        case 5:
                            echo '<span class="rounded-pill badge badge-danger
        ">Cancelled</span>';
                            break;
            case 6:

        echo '<span class="rounded-pill badge-light badge border text-dark
        ">Report Uploaded</span>';
                                                break;
                                        }
        ?>
                                        </td>
                                        <td align="center">
                                                <button type="button"
        class="btn btn-flat btn-default btn-sm dropdown-toggle dropdown-
        icon" data-toggle="dropdown">
                                        Action
                            <span class="sr-only">Toggle
        Dropdown</span>
                            </button>
                            <div class="dropdown-menu" role="menu">
                                                <a
        class="dropdown-item"
        href="./?page=appointments/view_appointment&id=<?= $row['id'] ?>"
```

```
data-id ="<?php echo $row['id'] ?>"><span class="fa fa-eye text-dark"></span>
        View</a>
                                <div class="dropdown-divider"></div>
                                <a class="dropdown-item edit_data"
        href="javascript:void(0)" data-id ="<?php echo $row['id'] ?>"><span
        class="fa fa-edit text-primary"></span> Edit</a>
                                <div class="dropdown-divider"></div>
<a class="dropdown-item delete_data" href="javascript:void(0)" data-id="<?php
        echo $row['id'] ?>"><span class="fa fa-trash text-danger"></span>
        Delete</a>
                                </div>
                                </td>
                        </tr>
                        <?php endwhile; ?>
                        </tbody>
                </table>
        </div>
        </div>
        </div>
</div>
<script>
        $(document).ready(function(){
    $('#create_new').click(function(){
                uni_modal("Add New
        Appointment","appointments/manage_appointment.php",'mid-large')
        })
        $('.view_data').click(function(){
                uni_modal("Appointment
        Details","appointments/view_appointment.php?id="+$(this).attr('data-
        id'))
        })
    $('.edit_data').click(function(){
                uni_modal("Update Appointment
        Details","appointments/manage_appointment.php?id="+$(this).attr('dat
        a-id'),'mid-large')
        })
        $('.delete_data').click(function(){
                _conf("Are you sure to delete this Appointment
        permanently?","delete_appointment",[$(this).attr('data-id')])
        })
        $('.table td, .table th').addClass('py-1 px-2 align-middle')
        $('.table').dataTable({
```

```
        columnDefs: [
            { orderable: false, targets: 5 }
        ],             });
         })
          function delete_appointment($id){
           start_loader();
$.ajax({
                url:base_url+"classes/Master.php?f=delete_appointment",
                method:"POST",
                data:{id: $id},
                dataType:"json",
                error:err=>{
                        console.log(err)
                        alert_toast("An error occured.",'error');
                        end_loader();
                },
                success:function(resp){
                        if(typeof resp== 'object' && resp.status == 'success'){
                                location.reload();
                        }else{
                                alert_toast("An error occured.",'error');
                                end_loader();
                        }       }       })
            }       </script>
```

3.2.   Manage Appointment Page

```php
<?php
require_once('./../../config.php');
if(isset($_GET['id'])){
    $qry = $conn->query("SELECT * FROM `appointment_list` where id =
                '{$_GET['id']}'");
    if($qry->num_rows > 0){
        $res = $qry->fetch_array();
        foreach($res as $k => $v){
            if(!is_numeric($k))
            $$k = $v;
        }
    }
    $test_ids = [];
    if(isset($id)){
```

```php
        $atl = $conn->query("SELECT * FROM `appointment_test_list` where
                appointment_id = '{$id}' ");
        $res = $atl->fetch_all(MYSQLI_ASSOC);
        $test_ids = array_column($res,'test_id');
    }
}
?>
```
```html
<style>
            img#cimg{
                height: 17vh;
                width: 25vw;
                object-fit: scale-down;
            }
</style>
<div class="container-fluid">
    <form action="" id="appointment-form">
        <input type="hidden" name="id" value="<?php echo isset($id) ? $id : ''
            ?>">
        <div class="row">
            <div class="form-group col-md-12">
                <label for="schedule" class="control-label">Schedule</label>
                <input type="datetime-local" name="schedule" id="schedule"
                    class="form-control form-control-border" placeholder="Enter
                    appointment Schedule" value ="<?php echo isset($schedule) ?
                    date("Y-m-d\TH:i",strtotime($schedule)) : '' ?>" required>
            </div>
        </div>
        <div class="row">
            <div class="form-group col-md-12">
                <label for="test_ids" class="control-label">Test</label>
                <select name="test_ids[]" id="test_ids" class="form-control form-
                    control-border select2" placeholder="Enter appointment Name"
                    multiple required>
                <?php
                $tests = $conn->query("SELECT * FROM `test_list` where
                    delete_flag = 0 and status = 1 order by `name` asc");
                while($row= $tests->fetch_assoc()):
                ?>
                <option value="<?= $row['id'] ?>" <?= isset($test_ids) &&
                    in_array($row['id'],$test_ids) ? 'selected' : "" ?>><?= $row['name']
                    ?></option>
                <?php endwhile; ?>
```

69

```
                </select>
              </div>
            </div>
            <div class="row">
              <div class="form-group col-md-12">
                <label for="prescription" class="control-label">Prescription
                    <small><em>(If Any)</em></small></label>
                <input type="file" name="prescription" accept="application/msword,
                    .doc, .docx, .txt, application/pdf" id="prescription" class="form-
                    control form-control-border" >
              </div>
            </div>
        </form>
    </div>
</div>
<script>

    $(function(){
        $('#uni_modal').on('shown.bs.modal',function(){
            $('#test_ids').select2({
                dropdownParent: $('#uni_modal'),
                width:'100%',
                placeholder:'Please Select Test(s) Here',
            })
        })
        $('#uni_modal #appointment-form').submit(function(e){
            e.preventDefault();
            var _this = $(this)
            $('.pop-msg').remove()
            var el = $('<div>')
                el.addClass("pop-msg alert")
                el.hide()
            start_loader();
            $.ajax({
                url:base_url+"classes/Master.php?f=save_appointment",
                                data: new FormData($(this)[0]),
                cache: false,
                contentType: false,
                processData: false,
                method: 'POST',
                type: 'POST',
                dataType: 'json',
                                error:err=>{
```

```
                        console.log(err)


                                    alert_toast("An error occured",'error');
                                    end_loader();

                                },
            success:function(resp){
                if(resp.status == 'success'){
                    location.href =
                     './?page=appointments/view_appointment&id='+resp.aid;
                }else if(!!resp.msg){
                    el.addClass("alert-danger")
                    el.text(resp.msg)
                    _this.prepend(el)
                }else{
                    el.addClass("alert-danger")
                    el.text("An error occurred due to unknown reason.")
                    _this.prepend(el)
                }
                el.show('slow')
                $('html,body,.modal').animate({scrollTop:0},'fast')
                end_loader();
            }
        })
    })
})
</script>
```

4. CLIENT MODULE CLASS

4.1. Index Page

```
<style>
    .img-thumb-path{
        width:100px;
        height:80px;
        object-fit:scale-down;
        object-position:center center;
    }
</style>
```

```html
<div class="card card-outline card-primary rounded-0 shadow">
  <div class="card-header">
        <h3 class="card-title">List of Registered Users</h3>
  </div>
  <div class="card-body">
        <div class="container-fluid">
    <div class="container-fluid">
                <table class="table table-bordered table-hover table-striped">
                        <colgroup>
                                <col width="5%">
                                <col width="20%">
                                <col width="25%">
                                <col width="30%">
                                <col width="10%">
                                <col width="10%">
                        </colgroup>
                        <thead>
                                <tr class="bg-gradient-primary text-light">
                                        <th>#</th>
                                        <th>Date Registered</th>
                                        <th>Name</th>
                                        <th>Email</th>
                                        <th>Contact</th>
                                        <th>Action</th>
                                </tr>
                        </thead>
                        <tbody>
                                <?php
                                        $i = 1;

                                        $qry = $conn->query("SELECT
*,CONCAT(firstname,' ',middlename,' ', lastname) as fullname from `client_list`
order by CONCAT(firstname,' ',middlename,' ', lastname) asc ");
                                        while($row = $qry->fetch_assoc()):
                                ?>
                                        <tr>
                                                <td class="text-center"><?php
echo $i++; ?></td>
                                                <td class=""><?php echo date("Y-
m-d H:i",strtotime($row['date_created'])) ?></td>
                                                <td class=""><p class="m-0
truncate-1"><?php echo $row['fullname'] ?></p></td>
```

72

```
<td class=""><p class="m-0 truncate-1"><?php echo $row['email'] ?></p></td>
                                        <td class=""><p class="m-0
truncate-1"><?php echo $row['contact'] ?></p></td>
                                        <td align="center">
                                                <button type="button"
class="btn btn-flat btn-default btn-sm dropdown-toggle dropdown-icon" data-
toggle="dropdown">
                                        Action
                                        <span class="sr-only">Toggle
Dropdown</span>
                                        </button>
                                        <div class="dropdown-menu" role="menu">

   <a class="dropdown-item view_data" href="javascript:void(0)" data-id
="<?php echo $row['id'] ?>"><span class="fa fa-eye text-dark"></span>
View</a>
                                        <div class="dropdown-divider"></div>
                                        <a class="dropdown-item delete_data"
href="javascript:void(0)" data-id="<?php echo $row['id'] ?>"><span class="fa
fa-trash text-danger"></span> Delete</a>
                                        </div>
                                                </td>
                                        </tr>
                                <?php endwhile; ?>
                        </tbody>
                </table>



        </div>
        </div>
  </div> </div>
<script>
  $(document).ready(function(){
        $('.delete_data').click(function(){
                _conf("Are you sure to delete this User
permanently?","delete_client",[$(this).attr('data-id')])
        })
        $('.view_data').click(function(){
                uni_modal("Client
Details","clients/view_client.php?id="+$(this).attr('data-id'))
        })
        $('.table td, .table th').addClass('py-1 px-2 align-middle')
```

73

```javascript
$('.table').dataTable({
        columnDefs: [
            { orderable: false, targets: 5 }
        ],
    });  })
  function delete_client($id){
        start_loader();
        $.ajax({
                url:base_url+"classes/Users.php?f=delete_client",
                method:"POST",
                data:{id: $id},
                dataType:"json",
                error:err=>{
                        console.log(err)
                        alert_toast("An error occured.",'error');
                        end_loader();
                },
                success:function(resp){
                        if(typeof resp== 'object' && resp.status == 'success'){
                                location.reload();
                        }else{
                                alert_toast("An error occured.",'error');
                                end_loader();
                        }
                }
        })
  }
</script>
```

4.2. View Client Page

```php
<?php
require_once('./../../config.php');
if(isset($_GET['id'])){
    $qry = $conn->query("SELECT *,CONCAT(firstname,' ',middlename,' ',
lastname) as fullname FROM `client_list` where id = '{$_GET['id']}'");
    if($qry->num_rows > 0){
        $res = $qry->fetch_array();
        foreach($res as $k => $v){
            if(!is_numeric($k))
```

```php
            $$k = $v;
        }
    }
}
?>
```
```html
<style>
  #uni_modal .modal-footer{
    display:none;
  }
  #client-img{
    height:200px;
    width:200px;

object-fit: scale-down;
    object-position:center center;
  }
</style>
<div class="container-fluid">
  <div class="row justify-content-center">
    <div class="col-auto">
      <img src="<?= validate_image(isset($avatar) ? $avatar : "") ?>"
alt="Client Image" class="img-circle border bg-gradient-dark" id="client-
img">
    </div>
  </div>
  <div class="row">
    <div class="col-md-12">
      <dl>
        <dt class="text-muted">Name</dt>
        <dd class='pl-4 fs-4 fw-bold'><?= isset($fullname) ? $fullname :
'N/A' ?></dd>
        <dt class="text-muted">Gender</dt>

        <dd class='pl-4 fs-4 fw-bold'><?= isset($gender) ? $gender : 'N/A'
?></dd>
        <dt class="text-muted">Birthday</dt>
        <dd class='pl-4 fs-4 fw-bold'><?= isset($dob) ? $dob : 'N/A' ?></dd>
        <dt class="text-muted">Contact #</dt>
        <dd class='pl-4 fs-4 fw-bold'><?= isset($contact ) ? $contact  : 'N/A'
?></dd>
        <dt class="text-muted">Email</dt>
```

```
            <dd class='pl-4 fs-4 fw-bold'><?= isset($email) ? $email : 'N/A'
  ?></dd>
            <dt class="text-muted">Address</dt>
            <dd class='pl-4 fs-4 fw-bold'><?= isset($address) ? $address : 'N/A'
  ?></dd>
        </dl>
      </div>
    </div>
    <div class="text-right">
      <button class="btn btn-flat btn-dark btn-sm" type="button" data-
  dismiss="modal"><i class="fa fa-times"></i> Close</button>
    </div>
  </div>
```

5. USER MODULE CLASS

5.1. Index Page

```php
<?php
$user = $conn->query("SELECT * FROM users where id ='".$_settings-
>userdata('id')."'");
foreach($user->fetch_array() as $k =>$v){
  $meta[$k] = $v;
}
?>
<?php if($_settings->chk_flashdata('success')): ?>
<script>
  alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')
</script>
<?php endif;?>
<div class="card card-outline card-primary">
  <div class="card-body">
        <div class="container-fluid">
                <div id="msg"></div>
                <form action="" id="manage-user">
                        <input type="hidden" name="id" value="<?php echo
$_settings->userdata('id') ?>">
                        <div class="form-group">
                                <label for="name">First Name</label>
```

```
                              <input type="text" name="firstname"
id="firstname" class="form-control" value="<?php echo
isset($meta['firstname']) ? $meta['firstname']: '' ?>" required>
                    </div>
                    <div class="form-group">
                              <label for="name">Last Name</label>
                              <input type="text" name="lastname"
id="lastname" class="form-control" value="<?php echo isset($meta['lastname'])
? $meta['lastname']: '' ?>" required>
                    </div>
                    <div class="form-group">
                              <label for="username">Username</label>

<input type="text" name="username" id="username" class="form-control"
value="<?php echo isset($meta['username']) ? $meta['username']: '' ?>" required
autocomplete="off">
                    </div>
                    <div class="form-group">
                              <label for="password">Password</label>
                              <input type="password" name="password"
id="password" class="form-control" value="" autocomplete="off">
                              <small><i>Leave this blank if you dont want to
change the password.</i></small>
                    </div>
                    <div class="form-group">
                              <label for="" class="control-
label">Avatar</label>
                              <div class="custom-file">

                 <input type="file" class="custom-file-input rounded-circle"
id="customFile" name="img" onchange="displayImg(this,$(this))">
                 <label class="custom-file-label" for="customFile">Choose
file</label>
                 </div>
                    </div>
                    <div class="form-group d-flex justify-content-center">
                              <img src="<?php echo
validate_image(isset($meta['avatar']) ? $meta['avatar'] :'') ?>" alt="" id="cimg"
class="img-fluid img-thumbnail">
                    </div>
              </form>
        </div>
```

```
    </div>
    <div class="card-footer">
                    <div class="col-md-12">
                            <div class="row">
                                    <button class="btn btn-sm btn-primary"
form="manage-user">Update</button>
                            </div>
                    </div>
            </div>
</div>
<style>

img#cimg{
        height: 15vh;
        width: 15vh;
        object-fit: cover;
        border-radius: 100% 100%;
    }
</style>
<script>
    function displayImg(input,_this) {
        if (input.files && input.files[0]) {
            var reader = new FileReader();
            reader.onload = function (e) {
                $('#cimg').attr('src', e.target.result);
            }

            reader.readAsDataURL(input.files[0]);
        }
    }

    $('#manage-user').submit(function(e){
            e.preventDefault();
var _this = $(this)
            start_loader()
            $.ajax({
                    url:base_url+'classes/Users.php?f=save',
                    data: new FormData($(this)[0]),
                cache: false,
                contentType: false,
                processData: false,
                method: 'POST',
```

```
            type: 'POST',
                success:function(resp){
                        if(resp ==1){
                                location.reload()
                        }else{
                                $('#msg').html('<div class="alert alert-
    danger">Username already exist</div>')
                                end_loader()
                        }
                }
        })
    })        </script>
```

5.2. List Page

```
<?php if($_settings->chk_flashdata('success')): ?>
<script>
    alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')
</script>
<?php endif;?>

<style>
   .img-avatar{
     width:45px;
     height:45px;
     object-fit:cover;
     object-position:center center;

     border-radius:100%;
   }
</style>
<div class="card card-outline card-primary">
    <div class="card-header">
            <h3 class="card-title">List of System Users</h3>
            <div class="card-tools">
                    <a href="?page=user/manage_user" class="btn btn-flat btn-
primary"><span class="fas fa-plus"></span> Create New</a>
            </div>
    </div>
```

```html
<div class="card-body">
        <div class="container-fluid">
    <div class="container-fluid">
                <table class="table table-hover table-striped">
                    <!-- <colgroup>
                        <col width="5%">
                        <col width="10%">
                        <col width="20%">
                        <col width="20%">
                        <col width="15%">
                        <col width="15%">
                        <col width="10%">
                    </colgroup> -->
                    <thead>

                        <tr>
                            <th>#</th>
                            <th>Avatar</th>
                            <th>Name</th>
                            <th>Username</th>
                            <th>User Type</th>
                            <th>Action</th>
                        </tr>
                    </thead>
                    <tbody>
                        <?php
                            $i = 1;
                            $qry = $conn->query("SELECT *,concat(firstname,' ',lastname) as name from `users` where id != '1' order by concat(firstname,' ',lastname) asc ");
                            while($row = $qry->fetch_assoc()):
                        ?>

                            <tr>
                                <td class="text-center"><?php echo $i++; ?></td>
                                <td class="text-center"><img src="<?php echo validate_image($row['avatar']) ?>" class="img-avatar img-thumbnail p-0 border-2" alt="user_avatar"></td>
                                <td><?php echo ucwords($row['name']) ?></td>
```

```
                                                <td ><p class="m-0 truncate-
1"><?php echo $row['username'] ?></p></td>
                                                <td ><p class="m-0"><?php echo
($row['type'] == 1 )? "Adminstrator" : "Staff" ?></p></td>
                                                <td align="center">
                                                        <button type="button"
class="btn btn-flat btn-default btn-sm dropdown-toggle dropdown-icon" data-
toggle="dropdown">
                                                        Action
                                                <span class="sr-only">Toggle
Dropdown</span>
                                                </button>
                                                <div class="dropdown-menu" role="menu">

<a class="dropdown-item" href="?page=user/manage_user&id=<?php echo
$row['id'] ?>"><span class="fa fa-edit text-primary"></span> Edit</a>
                                                <div class="dropdown-divider"></div>
                                                        <?php
if($row['status'] != 1): ?>
                                                <a class="dropdown-item verify_user"
href="javascript:void(0)" data-id="<?= $row['id'] ?>"  data-name="<?=
$row['username'] ?>"><span class="fa fa-check text-primary"></span> Verify</a>
                                                <div class="dropdown-divider"></div>
                                                        <?php endif; ?>
                                                <a class="dropdown-item delete_data"
href="javascript:void(0)" data-id="<?php echo $row['id'] ?>"><span class="fa fa-
trash text-danger"></span> Delete</a>
                                                </div>

                                                </td>
                                        </tr>
                                <?php endwhile; ?>
                                </tbody>
                        </table>
                </div>
                </div>
        </div>
</div>
<script>
    $(document).ready(function(){
        $('.delete_data').click(function(){
```

81

```
                    _conf("Are you sure to delete this User
permanently?","delete_user",[$(this).attr('data-id')])
            })
            $('.table td,.table th').addClass('py-1 px-2 align-middle')
            $('.table').dataTable();
            $('.verify_user').click(function(){
                    _conf("Are you sure to verify <b>"+$(this).attr('data-
name')+"<b/>?","verify_user",[$(this).attr('data-id')])
            })
    })
    function delete_user($id){
            start_loader();
            $.ajax({

            url:base_url+"classes/Users.php?f=delete",
                    method:"POST",
                    data:{id: $id},
                    dataType:"json",
                    error:err=>{
                            console.log(err)
                            alert_toast("An error occured.",'error');
                            end_loader();
                    },
                    success:function(resp){
                            if(typeof resp== 'object' && resp.status == 'success'){
                                    location.reload();
                            }else{
                                    alert_toast("An error occured.",'error');
                                    end_loader();
                            }

                    }
            })
    }
    function verify_user($id){
            start_loader();
            $.ajax({
                    url:base_url+"classes/Users.php?f=verify_user",
                    method:"POST",
                    data:{id: $id},
                    dataType:"json",
                    error:err=>{
```

```
                        console.log(err)
                        alert_toast("An error occured.",'error');
                        end_loader();
                },
                success:function(resp){
                        if(typeof resp== 'object' && resp.status == 'success'){
                                location.reload();
                        }else{
                                alert_toast("An error occured.",'error');
                                end_loader();
                        }
                }
        })
}       </script>
```

6. TEST MODULE CLASS

6.1. Index Page

```
<style>
    .img-thumb-path{
        width:100px;
        height:80px;
        object-fit:scale-down;

 object-position:center center;
    }
</style>
<div class="card card-outline card-primary rounded-0 shadow">
    <div class="card-header">
            <h3 class="card-title">List of Tests</h3>
            <div class="card-tools">
                    <a href="javascript:void(0)" id="create_new" class="btn btn-
flat btn-sm btn-primary"><span class="fas fa-plus"></span> Add New Test</a>
            </div>
    </div>
    <div class="card-body">
            <div class="container-fluid">
```

```php
<div class="container-fluid">
    <table class="table table-bordered table-hover table-striped">
        <colgroup>
            <col width="5%">
            <col width="20%">
            <col width="25%">
            <col width="20%">
            <col width="15%">
            <col width="15%">
        </colgroup>
        <thead>
            <tr class="bg-gradient-primary text-light">
                <th>#</th>
                <th>Date Created</th>
                <th>Name</th>
                <th>Price</th>
                <th>Status</th>
                <th>Action</th>
            </tr>
        </thead>
        <tbody>
            <?php
                $i = 1;
                $qry = $conn->query("SELECT * from
`test_list` where delete_flag = 0 order by `name` asc ");
                while($row = $qry->fetch_assoc()):
            ?>
                <tr>

<td class="text-center"><?php echo $i++; ?></td>
                                    <td class=""><?php echo date("Y-
m-d H:i",strtotime($row['date_created'])) ?></td>
                                    <td class=""><p class="m-0
truncate-1"><?php echo $row['name'] ?></p></td>
                                    <td class=""><?=
number_format($row['cost'],2) ?></td>
                                    <td class="text-center">
                                        <?php
                                            switch
($row['status']){
                                                case 0:
```

```php
echo '<span class="rounded-pill badge badge-danger col-6">Inactive</span>';

break;
                                                        case 1:

echo '<span class="rounded-pill badge badge-primary col-6">Active</span>';

break;
                                                            }
                                                    ?>
                                                </td>
                                                <td align="center">
                                                    <button type="button"
class="btn btn-flat btn-default btn-sm dropdown-toggle dropdown-icon" data-
toggle="dropdown">

                                        Action
                                        <span class="sr-only">Toggle
Dropdown</span>

                                                    </button>
                                                    <div class="dropdown-menu" role="menu">
                                                            <a
class="dropdown-item view_data" href="javascript:void(0)" data-id ="<?php
echo $row['id'] ?>"><span class="fa fa-eye text-dark"></span> View</a>
                                                        <div class="dropdown-divider"></div>

<a class="dropdown-item edit_data" href="javascript:void(0)" data-id ="<?php
echo $row['id'] ?>"><span class="fa fa-edit text-primary"></span> Edit</a>
                                                        <div class="dropdown-divider"></div>
                                                        <a class="dropdown-item delete_data"
href="javascript:void(0)" data-id="<?php echo $row['id'] ?>"><span class="fa fa-
trash text-danger"></span> Delete</a>
                                                    </div>
                                                </td>
                                            </tr>
                                    <?php endwhile; ?>

                            </tbody>
                        </table>
                </div>
                </div>
        </div>
</div>
```

```
<script>
    $(document).ready(function(){
        $('#create_new').click(function(){
                    uni_modal("Add New Test","tests/manage_test.php")
            })
            $('.view_data').click(function(){
                    uni_modal("Test
Details","tests/view_test.php?id="+$(this).attr('data-id'))
            })
        $('.edit_data').click(function(){
                    uni_modal("Update Test
Details","tests/manage_test.php?id="+$(this).attr('data-id'))
            })
            $('.delete_data').click(function(){
                    _conf("Are you sure to delete this Test
permanently?","delete_test",[$(this).attr('data-id')])
            })
            $('.table td, .table th').addClass('py-1 px-2 align-middle')
            $('.table').dataTable({
        columnDefs: [
          { orderable: false, targets: 5 }
        ],
      });

})
    function delete_test($id){
            start_loader();
            $.ajax({
                    url:base_url+"classes/Master.php?f=delete_test",
                    method:"POST",
                    data:{id: $id},
                    dataType:"json",
                    error:err=>{
                            console.log(err)
                            alert_toast("An error occured.",'error');
                            end_loader();
                    },
                    success:function(resp){
                            if(typeof resp== 'object' && resp.status == 'success'){
                                    location.reload();
                            }else{
                                    alert_toast("An error occured.",'error');
```

```
                                        end_loader();
                            }
                    }
            })
        }
    </script>
```

6.2. Manage Test Page

```php
<?php
require_once('../../config.php');
if(isset($_GET['id'])){
    $qry = $conn->query("SELECT * FROM `test_list` where id = '{$_GET['id']}'");
    if($qry->num_rows > 0){
        $res = $qry->fetch_array();
        foreach($res as $k => $v){

if(!is_numeric($k))
        $$k = $v;
    }
  }
}
?>
<style>
                img#cimg{
                    height: 17vh;
                    width: 25vw;
                    object-fit: scale-down;
                }
</style>
<div class="container-fluid">
    <form action="" id="test-form">
        <input type="hidden" name="id" value="<?php echo isset($id) ? $id : '' ?>">



        <div class="form-group">
            <label for="name" class="control-label">Name</label>
            <select name="status" id="status" class="form-control form-control-border"
                    placeholder="Enter test Name" required>
```

87

```php
        <option value="1" <?= isset($status) && $status == 1 ? 'selected' : ""
            ?>>Choose one</option>
        <option value="0" <?= isset($status) && $status == 0 ? 'selected' : ""
            ?>>Blood</option>
        <option value="0" <?= isset($status) && $status == 0 ? 'selected' : ""
            ?>>Urine</option>
        <option value="0" <?= isset($status) && $status == 0 ? 'selected' : ""
            ?>>Both</option>
    </select>
    <input type="text" name="name" id="name" class="form-control form-
            control-border" placeholder="Enter Test Name" value ="<?php
            echo isset($name) ? $name : '' ?>" required>
</div>
<div class="form-group">
    <label for="cost" class="control-label">Price</label>
    <input type="number" step="any" name="cost" id="cost" class="form-
            control form-control-border text-right" value ="<?php echo
            isset($cost) ? $cost : 0 ?>" required>
</div>
<div class="form-group">
    <label for="description" class="control-label">Description</label>

<textarea rows="3" name="description" id="description" class="form-control
            form-control-sm rounded-0" required><?php echo
            isset($description) ? ($description) : '' ?></textarea>
</div>
    <div class="form-group">
        <label for="status" class="control-label">Status</label>
        <select name="status" id="status" class="form-control form-control-
                border" placeholder="Enter test Name" required>
        <option value="1" <?= isset($status) && $status == 1 ? 'selected' : ""
            ?>>Active</option>
        <option value="0" <?= isset($status) && $status == 0 ? 'selected' : ""
            ?>>Inactive</option>
        </select>
    </div>

    </form>
</div>
<script>
    function displayImg(input,_this) {
                if (input.files && input.files[0]) {
```

```javascript
                    var reader = new FileReader();
                    reader.onload = function (e) {
                            $('#cimg').attr('src', e.target.result);
                            _this.siblings('.custom-file-
                label').html(input.files[0].name)
                        }

                        reader.readAsDataURL(input.files[0]);
                    }else{
        $('#cimg').attr('src', "<?php echo validate_image(isset($image_path) ?
                $image_path : "") ?>");
        _this.siblings('.custom-file-label').html("Choose file")
    }
                }
$(function(){
    $('#uni_modal #test-form').submit(function(e){
        e.preventDefault();
        var _this = $(this)
        $('.pop-msg').remove()
                var el = $('<div>')
            el.addClass("pop-msg alert")
            el.hide()
        start_loader();
        $.ajax({
            url:base_url+"classes/Master.php?f=save_test",
                                data: new FormData($(this)[0]),
            cache: false,
            contentType: false,
            processData: false,
            method: 'POST',
            type: 'POST',
            dataType: 'json',
                                error:err=>{
                                        console.log(err)
                                        alert_toast("An error occured",'error');
                                        end_loader();
                                },
            success:function(resp){
                if(resp.status == 'success'){
                    location.reload();
                }else if(!!resp.msg){
```

```
                    el.addClass("alert-danger")
                    el.text(resp.msg)
                    _this.prepend(el)
                }else{
                    el.addClass("alert-danger")
                    el.text("An error occurred due to unknown reason.")
                    _this.prepend(el)
                }
                el.show('slow')
                $('html,body,.modal').animate({scrollTop:0},'fast')
                end_loader();
            }
        })
      })
   })
</script>
```

7. SYSTEM INFO MODULE CLASS

7.1. Index Page

```
<?php if($_settings->chk_flashdata('success')): ?>
<script>
    alert_toast("<?php echo $_settings->flashdata('success') ?>",'success')
</script>
<?php endif;?>

<style>
    img#cimg{
            height: 15vh;
            width: 15vh;
            object-fit: scale-down;
            border-radius: 100% 100%;
    }
    img#cimg2{
            height: 50vh;
```

```
        width: 100%;
                object-fit: contain;
                /* border-radius: 100% 100%; */
        }
</style>
<div class="col-lg-12">
        <div class="card card-outline card-dark rounded-0 shadow">
                <div class="card-header">
                        <h5 class="card-title">System Information</h5>
                        <!-- <div class="card-tools">
                                <a class="btn btn-block btn-sm btn-default btn-flat
border-primary new_department" href="javascript:void(0)"><i class="fa fa-
plus"></i> Add New</a>
                        </div> -->
                </div>
                <div class="card-body">
                        <form action="" id="system-frm">
                        <div id="msg" class="form-group"></div>
                        <div class="form-group">
                                <label for="name" class="control-label">System
Name</label>

                                <input type="text" class="form-control form-control-
sm" name="name" id="name" value="<?php echo $_settings->info('name') ?>">
                        </div>
                        <div class="form-group">
                                <label for="short_name" class="control-label">System
Short Name</label>
                                <input type="text" class="form-control form-control-
sm" name="short_name" id="short_name" value="<?php echo  $_settings-
>info('short_name') ?>">
                        </div>
                        <div class="form-group">
                                <label for="" class="control-label">System
Logo</label>
                                <div class="custom-file">
                    <input type="file" class="custom-file-input rounded-circle"
id="customFile" name="img" onchange="displayImg(this,$(this))">
                    <label class="custom-file-label" for="customFile">Choose
file</label>
                </div>
```

```
            </div>
                    <div class="form-group d-flex justify-content-center">
                            <img src="<?php echo validate_image($_settings-
>info('logo')) ?>" alt="" id="cimg" class="img-fluid img-thumbnail">
                    </div>
                    <div class="form-group">
                            <label for="" class="control-label">Cover</label>
                            <div class="custom-file">
            <input type="file" class="custom-file-input rounded-circle"
id="customFile" name="cover" onchange="displayImg2(this,$(this))">
            <label class="custom-file-label" for="customFile">Choose
file</label>
            </div>
                    </div>
                    <div class="form-group d-flex justify-content-center">
                            <img src="<?php echo validate_image($_settings-
>info('cover')) ?>" alt="" id="cimg2" class="img-fluid img-thumbnail bg-gradient-
dark border-dark">
                    </div>
                    </form>
            </div>
            <div class="card-footer">
                    <div class="col-md-12">
                            <div class="row">
                                    <button class="btn btn-sm btn-primary"
form="system-frm">Update</button>
                            </div>
                    </div>
            </div>

    </div>
</div>
<script>
    function displayImg(input,_this) {
       if (input.files && input.files[0]) {
          var reader = new FileReader();
          reader.onload = function (e) {
            $('#cimg').attr('src', e.target.result);
            _this.siblings('.custom-file-label').html(input.files[0].name)
          }
          reader.readAsDataURL(input.files[0]);
       }
```

```javascript
      }
      function displayImg2(input,_this) {
        if (input.files && input.files[0]) {
          var reader = new FileReader();
          reader.onload = function (e) {
            _this.siblings('.custom-file-label').html(input.files[0].name)
            $('#cimg2').attr('src', e.target.result);
          }

          reader.readAsDataURL(input.files[0]);
        }
      }
      function displayImg3(input,_this) {
        if (input.files && input.files[0]) {
          var reader = new FileReader();
          reader.onload = function (e) {


            _this.siblings('.custom-file-label').html(input.files[0].name)
            $('#cimg3').attr('src', e.target.result);
          }

          reader.readAsDataURL(input.files[0]);
        }
      }
      $(document).ready(function(){
              $('.summernote').summernote({
                  height: '60vh',
                  toolbar: [
                    [ 'style', [ 'style' ] ],
                    [ 'font', [ 'bold', 'italic', 'underline', 'strikethrough', 'superscript',
'subscript', 'clear'] ],
                    [ 'fontname', [ 'fontname' ] ],
                    [ 'fontsize', [ 'fontsize' ] ],
                    [ 'color', [ 'color' ] ],
                    [ 'para', [ 'ol', 'ul', 'paragraph', 'height' ] ],
                    [ 'table', [ 'table' ] ],
                                    ['insert', ['link', 'picture']],
                    [ 'view', [ 'undo', 'redo', 'fullscreen', 'codeview', 'help' ] ]
                  ] })     })      </script>
```

CHAPTER 10

Testing

10.1 LOGIN PAGE
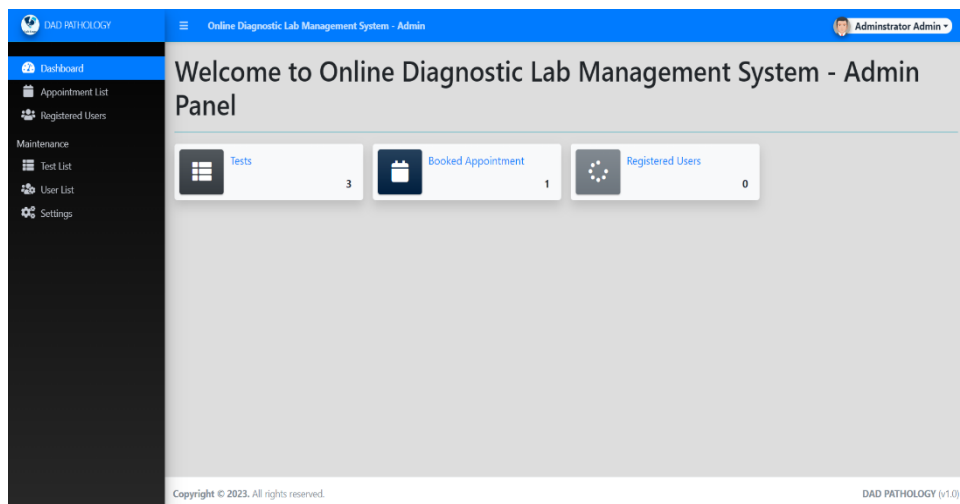
Fig. 10.1 : Login Page Interface Admin
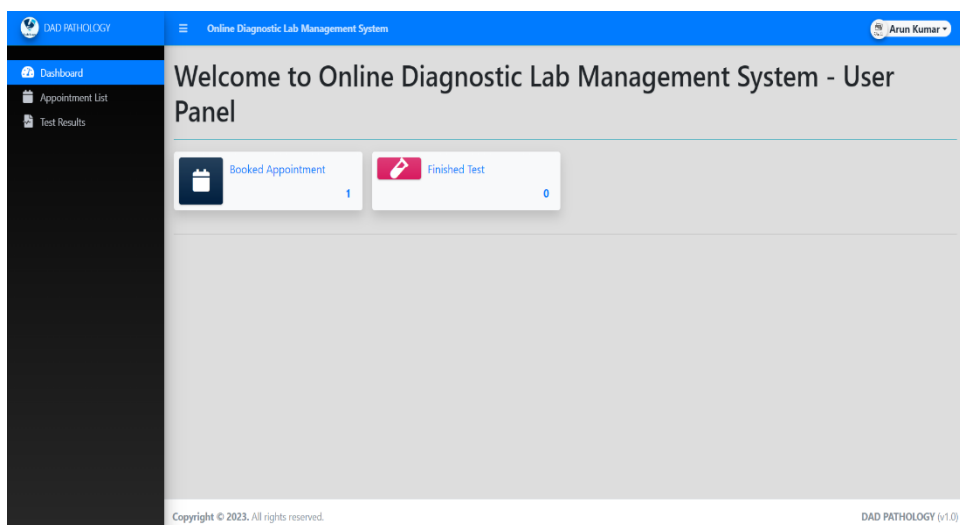
Fig. 10.2 : Login Page Interface Client

94

10.2 REGISTERED USER
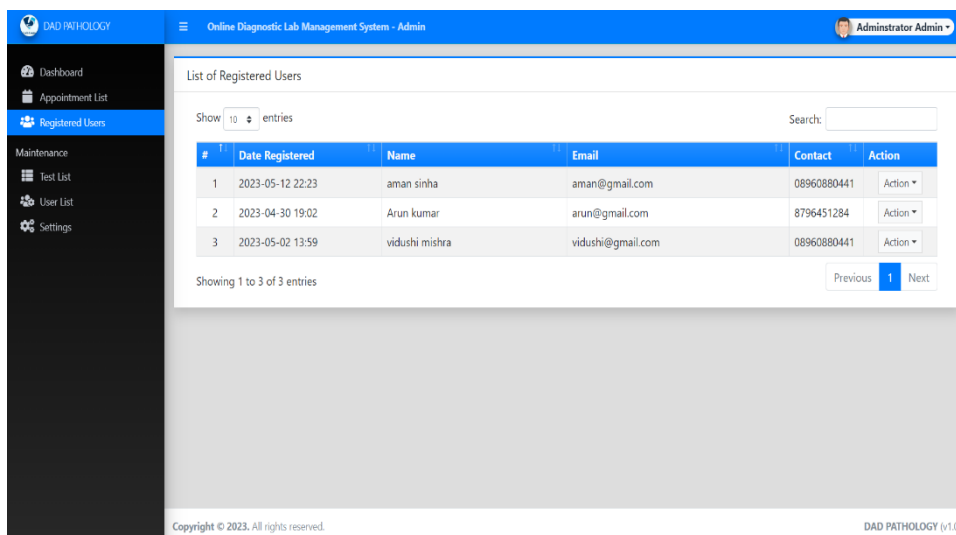
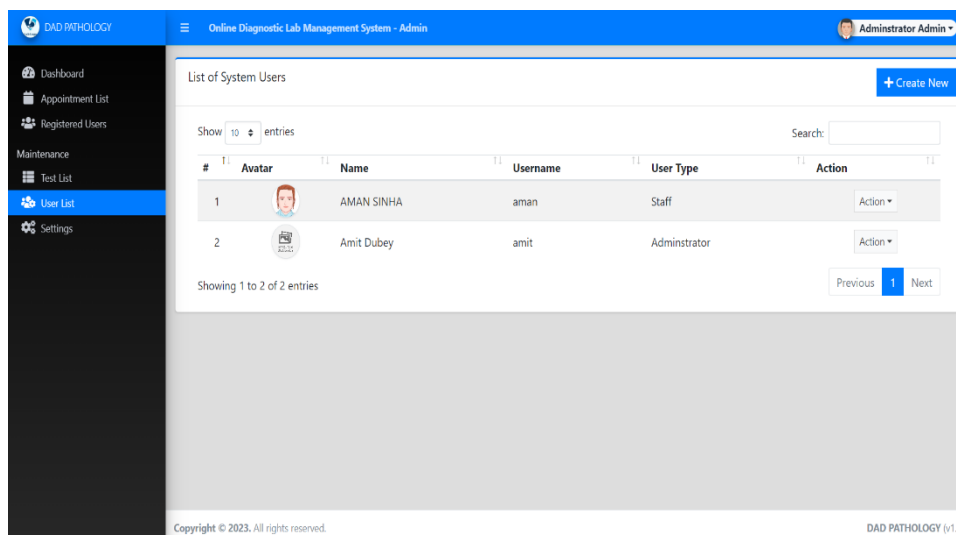**Fig. 10.3 :** Registered User Page Interface Admin

Fig. 10.4 : Registered System User Page Interface Admin
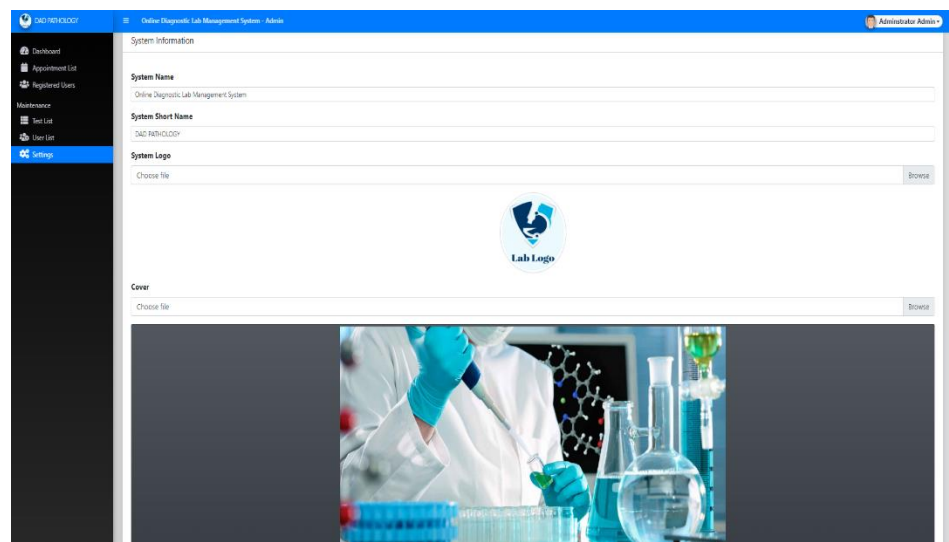
10.3 ADMIN SIDE SETTINGS

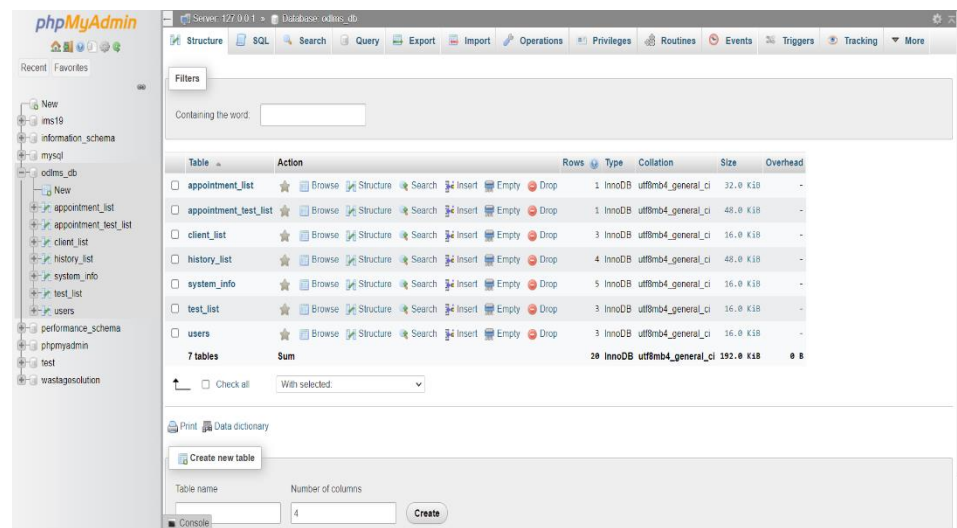**Fig. 10.5 :** Admin Side Settings Interface

10.4 DATA-BASE MANAGEMENT

Fig. 10.6 : Data Base Management Table Interface

10.5 DATA-BASE AUTHENTICATIONS

10.5.1 Appointment List Information
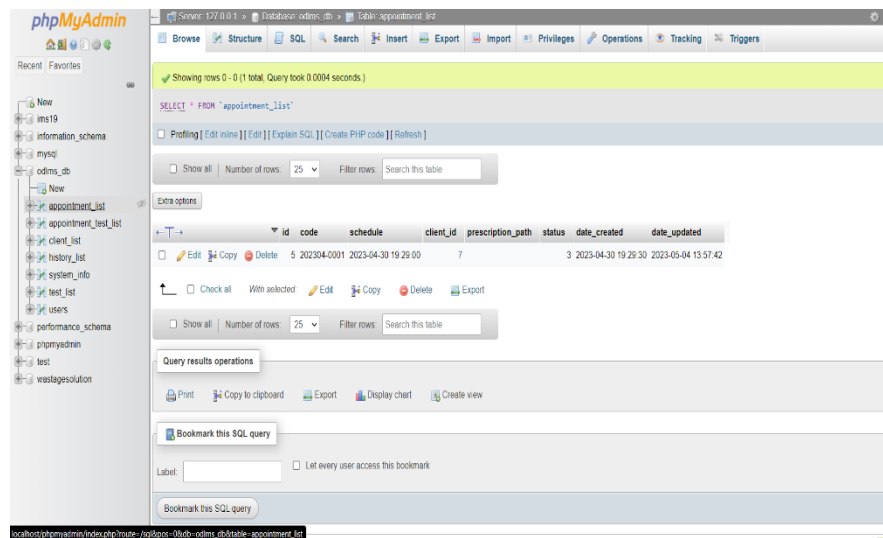
Fig. 10.7 : Appointment List Information Table Interface

10.5.2 Appointment Test Information
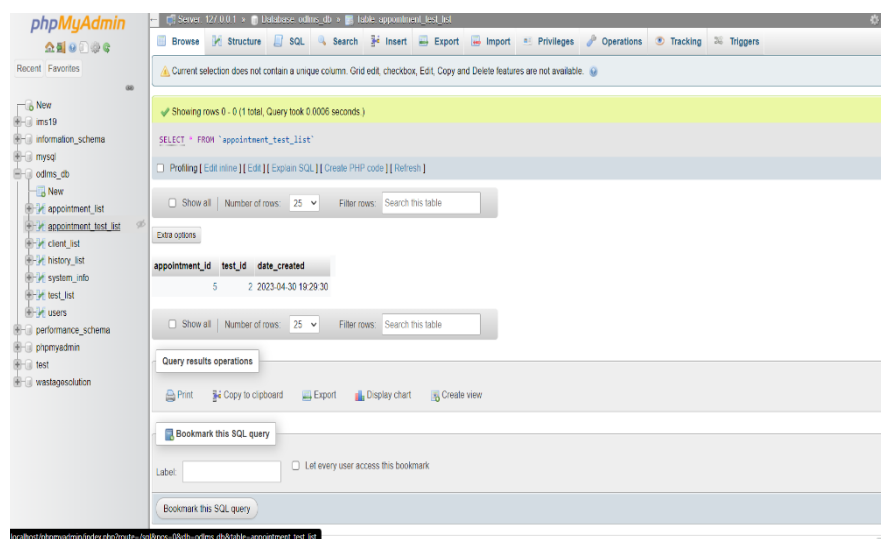
Fig. 10.8 : Appointment Test Information Table Interface

97

10.5.3 Client List Information
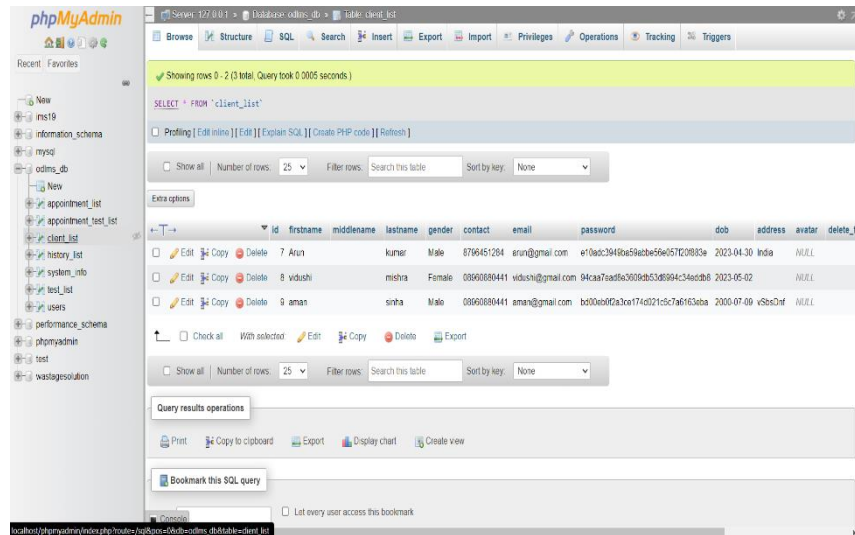
Fig.10.9 : Client List Information Table Interface

10.5.4 History List Information
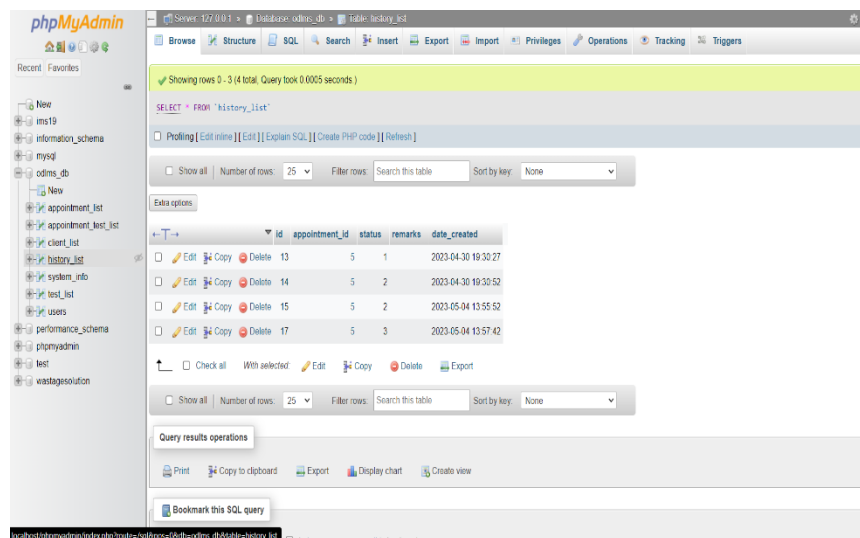
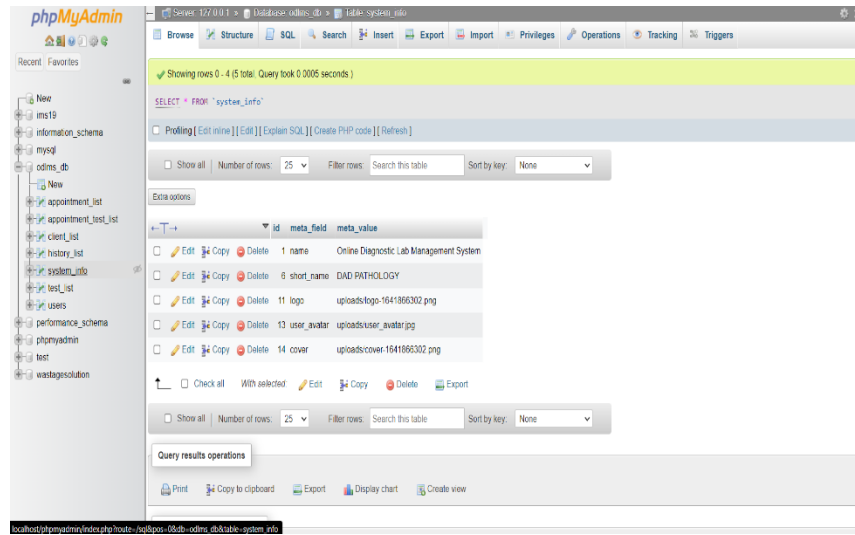**Fig. 10.10 :** History List Information Table Interface

10.5.5 System Information

Fig. 10.11 : System Information Table Interface
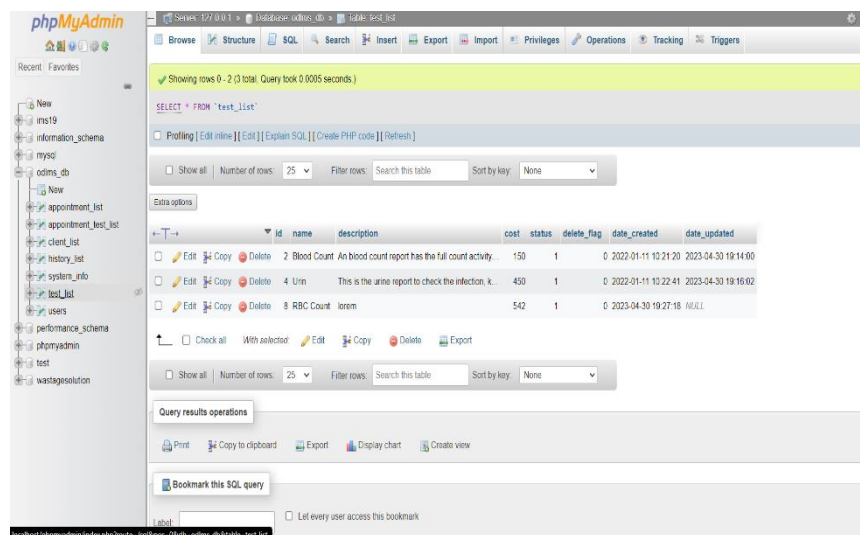
10.5.6 Test List Information

Fig. 10.12 : Test List Information Table Interface

Chapter 11

LITERETURE REVIEW

11.1 INTRODUCTION

Pathology Laboratories have a boom in the modern medical world. Pathology laboratories play a crucial role in the healthcare industry by providing accurate and timely diagnostic results. However, the traditional manual management of pathology lab processes can be time-consuming, error-prone, and inefficient. Automation of pathology lab management systems offers numerous advantages, including increased efficiency, reduced errors, improved workflow, and enhanced patient care.

This literature review aims to explore the existing research and advancements related to the automation of pathology lab management systems. The automation of pathology lab management systems has gained significant attention in recent years due to the growing demand for efficient and accurate laboratory operations. On recent advancements in digital pathology, machine learning algorithms, and artificial intelligence (AI) techniques applied to automate various aspects of pathology. However, the manual nature of traditional pathology practices often leads to challenges such as inter-observer variability, subjectivity, and time-consuming processes.

The automation of pathology has the potential to address these challenges and improve diagnostic accuracy, efficiency, and patient outcomes. Automation of Pathology means to have the pathology more efficient, easy, quick as well as in such a way that the customer and the reporter have the smooth flow of communication. The Automation of Pathology have the easy and quickly accessible interface so that everyone can have it access according to the need in much efficient way.

It is a platform where users can fulfil requirements regarding their Laboratories reports completely in a much easier and efficient way. The goal of the Automation of the Pathology is to provide complete and better report delivery to the end user so that it can save their time and money. The concept of automating pathology lab management systems involves the integration of advanced technologies to streamline and optimize various processes in pathology labs.

It aims to explore the existing research and developments in this field, including the benefits, challenges, and potential implications of implementing automation in pathology lab management. The current state of automation in pathology labs identifies key trends and advancements, and highlights areas for further research and development.

11.2 ABSTRACT

Automation has become an integral part of various industries, including healthcare. In the field of pathology, automation offers numerous benefits such as increased efficiency, accuracy, and improved turnaround time. The automation of pathology lab management systems has gained significant attention in recent years due to the growing demand for efficient and accurate laboratory operations.

Pathology laboratories play a crucial role in healthcare by providing accurate diagnostic results. The current state of research and advancements in the field of automation of pathology plays a crucial role in diagnosing and understanding diseases through examination. With the emergence of automation technologies, there has been a significant impact on various aspects of pathology, including slide preparation, specimen analysis, and data management. However, the manual nature of traditional pathology practices often leads to challenges such as inter-observer variability, subjectivity, and time-consuming processes.

The potential benefits of automation in terms of increased throughput, reduced errors, improved diagnostics, and enhanced collaboration among healthcare professionals. However, challenges such as cost, integration issues, and the need for standardized protocols must be addressed to fully realize the potential of automated pathology labs. Automation technologies offer promising solutions to enhance the efficiency, accuracy, and productivity of pathology labs.

The automation of pathology has the potential to address these challenges and improve diagnostic accuracy, efficiency, and patient outcomes. The key findings and trends in automated pathology techniques, including image analysis, artificial intelligence (AI) algorithms, digital pathology, and machine learning models. the concept of automating pathology lab management systems, which involves the integration of advanced technologies to streamline and optimize various processes in pathology labs.

11.3 CONCLUSION

The literature reviewed highlights the significant advancements in the automation of pathology labs. Automation in pathology labs offers numerous benefits, including improved efficiency, enhanced accuracy, faster turnaround times, and cost reduction. Technologies such as robotics, digital imaging, AI, and ML play pivotal roles in the automation process.

However, challenges related to standardization, validation, training, and cost must be addressed for successful implementation. Future directions focus on integrating genomic data, advancing image analysis, promoting interoperability, and exploring robotics in point-of-care settings. Further research and collaboration are necessary to realize the full potential of automation in pathology labs and enhance patient care.

This literature review aims to provide a comprehensive understanding of the current state and potential of automation in pathology labs. It identifies the benefits and challenges associated with different aspects of automation, including digital pathology, machine learning algorithms, robotic automation, laboratory information systems, workflow efficiency, diagnostic accuracy, and quality assurance. The review serves as a foundation for future research and development in the field of automated pathology labs, paving the way for improved patient care and outcomes.

In conclusion, the automation of pathology labs has revolutionized the field of healthcare by significantly improving efficiency, accuracy, and data management. Automated systems enable faster turnaround times, reduce errors, and enhance the overall quality of diagnoses. The integration of digital imaging and data integration technologies has facilitated collaboration and personalized treatment approaches. While challenges exist, the benefits of automation far outweigh the potential drawbacks. As technology continues to advance, the automation of pathology labs will play an increasingly vital role in providing efficient and accurate diagnoses, ultimately improving patient care and outcomes.

11.4 REFERENCES

The references cover various aspects of automation in pathology labs, including the use of artificial intelligence, digital pathology, implementation challenges, and future perspectives. It is important to explore additional sources beyond this list to gather a comprehensive understanding of the topic. Here are some key references that can serve as a starting point for our literature review:

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Chapter 12

CONCLUSION

The automation of pathology labs has been a transformative development in the field of healthcare. Pathology plays a crucial role in diagnosing diseases and guiding treatment decisions, and the implementation of automation technologies has greatly improved the efficiency, accuracy, and overall quality of pathological testing. This essay aims to provide a comprehensive conclusion on the automation of pathology labs and its implications for healthcare.

Automation in pathology labs involves the use of various technologies such as robotics, artificial intelligence (AI), machine learning, and digital imaging to perform tasks traditionally carried out by pathologists and lab technicians. These technologies have revolutionized the way laboratory tests are conducted, leading to faster turnaround times, reduced errors, and increased productivity. With the ability to process large volumes of samples and analyze data with speed and precision, automated pathology systems have significantly improved patient care by ensuring timely and accurate diagnoses.

One of the primary benefits of automation in pathology labs is enhanced efficiency. Automated systems can handle a high volume of samples simultaneously, allowing for faster processing and reducing turnaround times. This increased efficiency enables healthcare providers to deliver prompt and accurate diagnoses, leading to quicker treatment initiation and improved patient outcomes. Moreover, automation eliminates the repetitive and time-consuming tasks previously performed by lab technicians, allowing them to focus on more complex analyses and clinical decision-making, thereby optimizing their expertise.

Accuracy is another critical aspect of pathology that has been significantly improved through automation. Manual errors in sample handling, preparation, and interpretation can occur, potentially leading to misdiagnosis and treatment delays. However, automated systems minimize these errors by precisely executing standardized protocols and reducing human intervention. By leveraging AI and machine learning algorithms, automated pathology systems can analyze vast amounts of data, identify patterns, and provide more accurate diagnoses. This precision not only enhances patient care but also contributes to cost savings by reducing the need for retesting and unnecessary procedures.

In addition to efficiency and accuracy, automation in pathology labs has facilitated the digitization and integration of data. Digital imaging technologies, such as whole-slide imaging, enable the creation of high-resolution digital representations of microscope slides. These images can be easily stored, shared, and accessed remotely, promoting collaboration among healthcare professionals and facilitating second opinions. Furthermore, the integration of automated pathology systems with electronic health records (EHRs) streamlines data management, ensuring seamless information flow and enabling comprehensive patient profiles. This integration enhances data-driven decision-making and contributes to more personalized and targeted treatment strategies.

Despite the numerous advantages of automation in pathology labs, it is essential to acknowledge the potential challenges and limitations. The initial investment required for implementing automated systems can be substantial, and ongoing maintenance and upgrades may also incur additional costs. Moreover, there may be resistance to change from healthcare professionals who fear job displacement or a decrease in the quality of care due to reduced human involvement. Therefore, it is crucial to provide adequate training and education to ensure smooth adoption and utilization of automation technologies in pathology labs.

In conclusion, the automation of pathology labs has revolutionized the field of healthcare by significantly improving efficiency, accuracy, and data management. Automated systems enable faster turnaround times, reduce errors, and enhance the overall quality of diagnoses. The integration of digital imaging and data integration technologies has facilitated collaboration and personalized treatment approaches. While challenges exist, the benefits of automation far outweigh the potential drawbacks. As technology continues to advance, the automation of pathology labs will play an increasingly vital role in providing efficient and accurate diagnoses, ultimately improving patient care and outcomes.

Chapter 13

FUTURE SCOPE OF PROJECT

The future scope of automation in pathology labs is poised to revolutionize the field of diagnostic medicine. With advancements in technology and the increasing demand for efficient and accurate testing, automation has the potential to significantly improve the workflow, speed, and accuracy of pathology lab processes. In the coming years, we can expect automation to have a profound impact on various aspects of pathology labs, including sample handling, testing, data analysis, and reporting.

One of the primary areas where automation can bring significant benefits is in sample handling and processing. Automated systems can streamline the sample registration, tracking, and sorting processes, reducing human error and improving overall efficiency. Robots and advanced conveyor systems can transport samples to different testing areas, eliminating the need for manual handling and reducing the risk of contamination.

Automation can also enhance the testing procedures in pathology labs. Many routine tests, such as blood cell counts, can be performed by automated analyzers, which can process a large number of samples quickly and accurately. These analyzers can provide precise and standardized results, reducing the dependency on manual techniques and subjective interpretations. Additionally, automated systems can handle more complex.
Tests, such as genetic analysis and molecular diagnostics, with greater speed and accuracy.

Data analysis and interpretation are crucial components of pathology lab operations. Automation can help in this area by employing artificial intelligence (AI) algorithms to analyze test results, identify patterns, and provide valuable insights. AI-powered image analysis systems can assist pathologists in examining tissue samples, detecting abnormalities, and diagnosing diseases. This can lead to faster and more accurate diagnoses, reducing the turnaround time and improving patient outcomes.

Furthermore, automation can revolutionize the reporting process in pathology labs. Automated systems can generate comprehensive and standardized

reports, incorporating all relevant test results and clinical information. This can minimize the

chances of errors and inconsistencies in reporting and ensure that healthcare providers receive timely and accurate information for making treatment decisions. Integration electronic health record (EHR) systems can enable seamless sharing of pathology reports across healthcare networks, enhancing collaboration and continuity of care.

In addition to improving efficiency and accuracy, automation can also address challenges related to workforce shortages in pathology labs. With automated systems handling routine tasks, laboratory staff can focus on more specialized and complex procedures, as well as engage in research and development activities. This can lead to increased productivity and enable pathologists to dedicate more time to patient care and consultation.

However, it is important to acknowledge that the successful implementation of automation in pathology labs will require careful planning, training, and quality control measures. Validating and monitoring automated systems, ensuring data privacy and security, and maintaining regulatory compliance will be crucial considerations.

In conclusion, the future scope of automation in pathology labs holds immense potential. It can enhance efficiency, accuracy, and productivity, leading to improved patient care and outcomes. Automation can streamline sample handling, testing, data analysis, and reporting, transforming the way pathology labs operate. While challenges and considerations exist, the integration of automation in pathology labs is likely to be a game-changer in the field of diagnostic medicine.

CHAPTER 14

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