

**Online Student Admission and Registration Management System: A Case Study of Metropolitan
International University**

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Abstract

This study designed and developed an Online Student Admission and Registration Management System for Metropolitan International University to address the inefficiencies of the university's manual, paper-based admission and registration processes. The manual system was characterized by long queues, lost documents, data-entry errors, duplicated records, and delays that frustrated applicants and overburdened staff. Adopting an object-oriented analysis and design approach within an iterative, prototyping-based software development methodology, the study captured system requirements through interviews, observation, and document review, and modelled the system using use-case, entity-relationship, and data-flow diagrams within a three-tier architecture. The resulting system enables applicants to register accounts, submit applications, upload documents, and track admission status online, while admissions staff review applications, make decisions, and generate reports through a secure dashboard. The system was implemented using a standard web technology stack and tested through unit, integration, and user-acceptance testing. Evaluation indicated that the system substantially reduced processing time, eliminated duplicate records, improved data accuracy, and enhanced applicant convenience. The study concludes that an online admission and registration system significantly improves the efficiency, accuracy, and accessibility of university admission processes, and recommends full deployment, staff training, and integration with existing university information systems.

Keywords: online admission system, student registration, system design, three-tier architecture, Metropolitan International University, Uganda

1.0 Introduction

The management of student admission and registration is among the most critical and resource-intensive administrative processes in any higher-education institution (Julius & Nancy, 2026a). It marks the point of entry into the university, shapes applicants' first impressions, and generates the foundational data on which all subsequent academic administration depends (Laudon & Laudon, 2021). As student numbers grow and competition among institutions intensifies, universities are under increasing pressure to make admission and registration efficient, accurate, transparent, and convenient (Kaazara & Audrey, 2025). Information and communication technology, and web-based information systems in particular, offer powerful means of achieving these objectives by automating manual processes, centralizing data, and enabling online self-service (Sommerville, 2021).

Metropolitan International University, like many higher-education institutions in Uganda, has historically managed admission and registration through predominantly manual, paper-based procedures (Kintu et al., 2017). Under such a system, applicants complete paper forms, submit physical documents, and travel to campus to register, while staff manually record, sort, and verify applications (Namara & Okello, 2023). These procedures are labour-intensive and

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error-prone, generating long queues, lost or misfiled documents, data-entry errors, duplicated records, and delays in processing and communicating decisions (Julius et al., 2026b). They also limit access, disadvantaging applicants who cannot easily travel to campus, and they impose a heavy administrative burden on staff during peak admission periods (Laudon & Laudon, 2021; Namara & Okello, 2023).

An online student admission and registration management system offers a solution to these problems (Julius et al., 2026a). By enabling applicants to register, apply, upload documents, and track their status online, and by providing staff with tools to review applications, make and communicate decisions, and generate reports, such a system can dramatically reduce processing time, eliminate duplication, improve data accuracy, and enhance convenience and transparency (Pressman & Maxim, 2021). Web-based systems further allow access from any location with an internet connection, broadening participation and reducing the need for physical presence.

This study therefore set out to design and develop an Online Student Admission and Registration Management System for Metropolitan International University (Julius & Nancy, 2026a). Unlike survey-based studies that investigate relationships among variables, this is a system-development study, and it accordingly follows a software engineering methodology, producing as its principal outputs a set of system requirements, design models, and a working system, together with an evaluation of the system's performance (Sommerville, 2021; Pressman & Maxim, 2021). The article presents the problem statement, objectives, a review of related literature and systems, the system development methodology, the system analysis and design (including architecture, use-case, entity-relationship, and data-flow models), the implementation and testing results, and conclusions with recommendations.

2.0 Statement of the Problem

Metropolitan International University's manual, paper-based admission and registration processes are inefficient, error-prone, and inconvenient for both applicants and staff (Namara & Okello, 2023). Ideally, admission and registration should be fast, accurate, transparent, and accessible, enabling applicants to apply and register with minimal difficulty and staff to process applications efficiently and reliably (Ntirandekura et al., 2022). In practice, however, the manual system produces long queues, lost documents, data-entry errors, duplicated records, and delays in processing and communicating admission decisions, while limiting access for applicants unable to travel to campus (Laudon & Laudon, 2021).

These problems worsen during peak admission periods, when the volume of applications overwhelms manual procedures, causing bottlenecks, staff overwork, and applicant frustration (Sabiiti & Henry, 2024). The absence of a centralised, automated system also makes it difficult to retrieve records, avoid duplication, ensure data integrity, and generate timely reports for management (Sommerville, 2021). If these problems remain unaddressed, the university will continue to incur the costs of inefficiency, error, and poor service, potentially deterring applicants and undermining its competitiveness and reputation (Julius & Kazaara, 2026b). There is therefore a need for an online admission and registration management system to automate these processes and address the deficiencies of the manual system (Julius & Kazaara, 2026a). This study set out to design and develop such a system.

3.0 Objectives of the Study

The main objective of the study was to design and develop an Online Student Admission and Registration Management System for Metropolitan International University to improve the efficiency, accuracy, and accessibility of the admission and registration process.

3.1 Specific Objectives

- i. To investigate the requirements and challenges of the existing manual admission and registration system at Metropolitan International University.
- ii. To design an online admission and registration management system that addresses the identified requirements and challenges.
- iii. To develop (implement) the designed system using appropriate web technologies.
- iv. To test and evaluate the developed system for functionality, accuracy, and user acceptance.

4.0 Literature and Related Systems Review

The development of management information systems for higher education is grounded in established principles of information systems and software engineering (Julius & Nancy, 2026b). An information system is understood as an integrated set of components for collecting, storing, processing, and communicating data to support decision-making and control in an organisation (Laudon & Laudon, 2021). Web-based information systems extend these capabilities across the internet, enabling distributed access and self-service (Sophie & Crispus, 2024). The design and development of such systems is guided by software engineering methodologies that structure the process of requirements elicitation, analysis, design, implementation, testing, and maintenance (Sommerville, 2021; Pressman & Maxim, 2021).

A substantial body of work documents the benefits of automating student administration. Studies of university management information systems report that automation reduces processing time, improves data accuracy and integrity, eliminates duplication, and enhances access and transparency, while relieving administrative burden (Laudon & Laudon, 2021; Namara & Okello, 2023). Research on online admission systems specifically finds that they increase applicant convenience, widen participation, and improve institutional efficiency, though successful adoption depends on usability, reliability, security, and adequate infrastructure and training (Pressman & Maxim, 2021).

A review of related systems informs the design. Many universities have adopted online application and student information systems, ranging from bespoke institutional systems to commercial and open-source platforms (Kazaara et al., 2024). These systems typically provide applicant self-service portals, document upload, application tracking, staff review workflows, and reporting. Common design features include role-based access control to secure sensitive data, relational databases for structured record management, and layered architectures that separate presentation, application logic, and data (Sommerville, 2021). Reported challenges include integration with legacy systems, data security and privacy, user adoption, and the need for reliable connectivity and power—considerations particularly salient in the Ugandan context (Namara & Okello, 2023). The present system draws on these established features and

lessons, adopting a three-tier web architecture, role-based access, a relational database, and a user-centred design informed by the specific requirements of Metropolitan International University (Faridah et al., 2023).

5.0 System Development Methodology

5.1 Development Approach

The study adopted an object-oriented analysis and design approach within an iterative, prototyping-based software development methodology (Pressman & Maxim, 2021). The iterative prototyping approach was chosen because it allows requirements to be refined progressively through successive prototypes and user feedback, reducing the risk of building a system that fails to meet user needs—a risk that is high under rigid, sequential methodologies when requirements are not fully known at the outset (Sommerville, 2021).

5.2 Requirements Elicitation

System requirements were captured through three complementary techniques. Interviews were conducted with admissions officers, the academic registrar, IT staff, and applicants to elicit their needs, expectations, and the difficulties they experienced with the manual system. Observation of the existing admission and registration process documented the workflow, bottlenecks, and points of error. Document review of existing forms, records, and procedures clarified the data captured and the rules governing admission and registration. From these, functional requirements (such as account registration, application submission, document upload, status tracking, application review, decision-making, and reporting) and non-functional requirements (such as security, usability, reliability, and performance) were specified.

5.3 System Analysis and Design

The captured requirements were analysed and modelled using standard object-oriented and structured techniques. A use-case model specified the interactions between actors (applicants and admissions staff) and the system. An entity–relationship model specified the data structure and relationships among the principal entities. Data-flow diagrams specified the movement of data among external entities, processes, and stores. The system was structured according to a three-tier architecture that separates the presentation layer (user interfaces), the application layer (business logic), and the data layer (database and file storage), a design that promotes modularity, maintainability, and security (Sommerville, 2021). These models are presented in Section 6.

5.4 Implementation Tools

The system was implemented as a web application using a standard technology stack comprising HTML, CSS, and JavaScript for the presentation layer; a server-side scripting language and framework for the application layer; and a relational database management system for the data layer, with a separate file store for uploaded documents. Role-based access control and secure authentication were implemented to protect sensitive applicant data (Laudon & Laudon, 2021).

5.5 Testing and Evaluation

The system was tested through unit testing of individual components, integration testing of interacting modules, and system testing of the complete application against the specified requirements. User-acceptance testing was conducted with representative applicants and admissions staff to evaluate functionality, usability, and satisfaction. The evaluation assessed the system against the objectives of improving efficiency, accuracy, and accessibility (Pressman & Maxim, 2021).

5.6 Ethical Considerations

Permission was obtained from the university, informed consent was secured from participants in requirements elicitation and testing, and the confidentiality and security of all data, particularly applicants' personal data, were maintained throughout the study (Laudon & Laudon, 2021).

6.0 System Analysis and Design (Results)

This section presents the principal design models produced by the study: the system architecture, the use-case model, the entity–relationship model, and the data-flow model. Together they specify the structure and behaviour of the Online Student Admission and Registration Management System.

6.1 System Architecture

The system adopts a three-tier architecture that separates the presentation, application, and data tiers, as shown in Figure 1. The presentation tier provides the applicant web portal, the admissions staff dashboard, and the administrator console. The application tier houses the authentication and access-control, registration and application-logic, and notification and reporting components. The data tier comprises the relational application database and the document file store. This separation of concerns promotes modularity, security, and maintainability, allowing each tier to be developed, secured, and scaled independently (Sommerville, 2021).

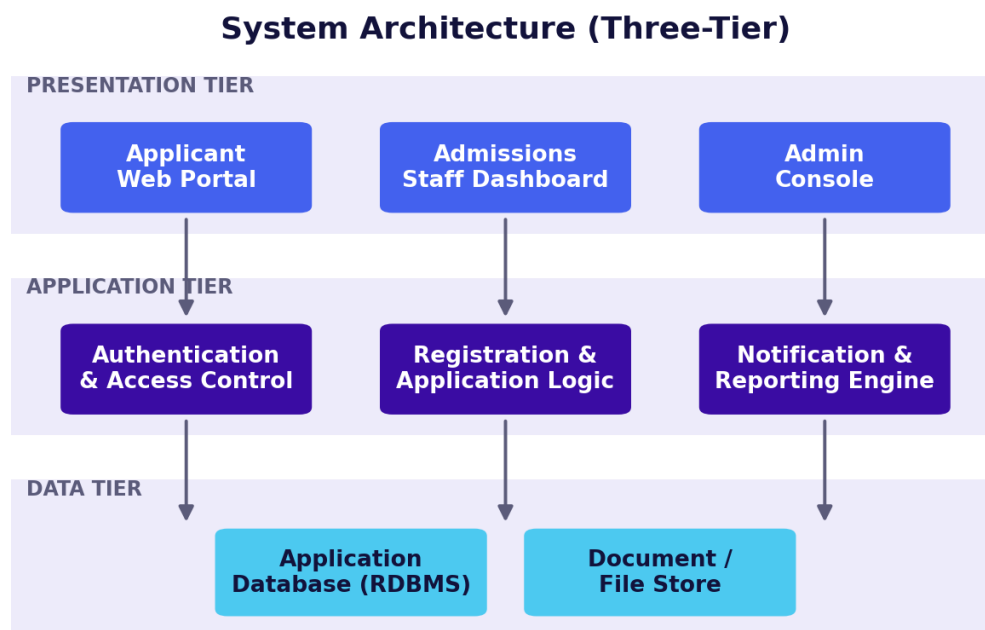


Figure 1: Three-tier system architecture of the online admission and registration system.

6.2 Use-Case Model

The use-case model in Figure 2 specifies the principal interactions between the system's actors and its functions. The applicant actor registers an account, submits an application, uploads documents, and tracks admission status, while the admissions staff actor reviews applications and generates reports. The model captures the functional scope of the system from the users' perspective and provides the basis for detailed design and testing (Pressman & Maxim, 2021).

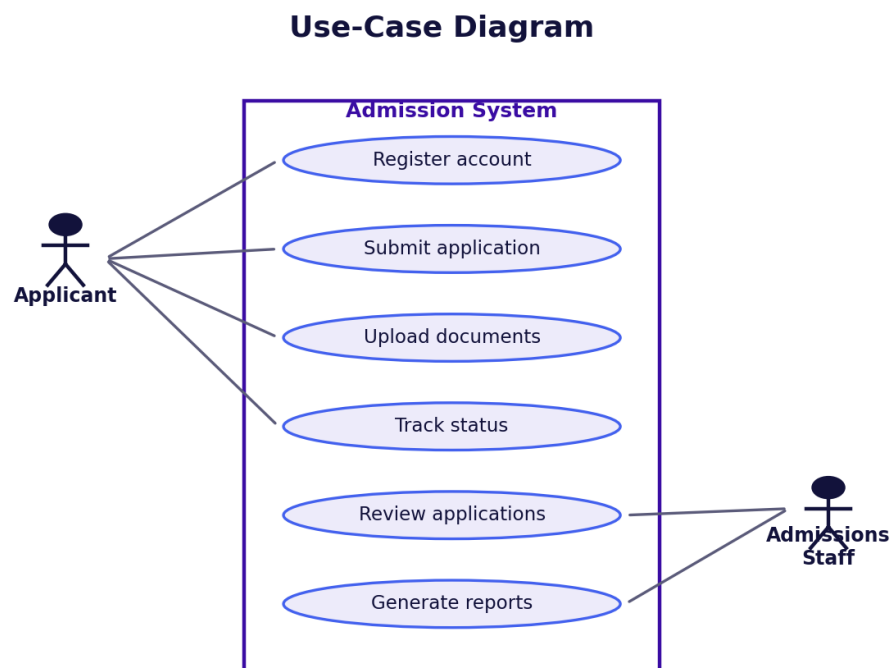


Figure 2: Use-case diagram showing applicant and admissions-staff interactions with the system.

6.3 Entity–Relationship Model

The entity–relationship model in Figure 3 specifies the data structure of the system. The principal entities are Applicant, Application, Programme, and Document. An applicant places one or more applications; each application is for a programme; and each application requires one or more supporting documents. The model captures the primary keys, foreign keys, and cardinalities that govern the relational database, ensuring data integrity and eliminating the duplication characteristic of the manual system (Laudon & Laudon, 2021).

Entity-Relationship Diagram

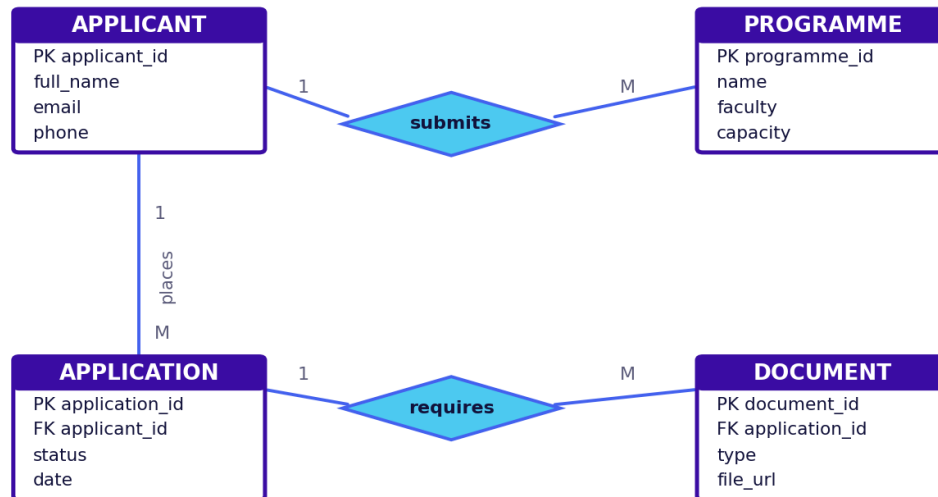


Figure 3: Entity-relationship diagram of the admission and registration database.

6.4 Data-Flow Model

The context-level data-flow diagram in Figure 4 specifies the movement of data between the system and its external entities. Applicants submit application data and receive status and offer information; admissions staff receive review queues and submit decisions; the academic registrar receives enrolment lists; and the finance office receives fees status. The diagram clarifies the system's boundaries and its principal data exchanges, guiding the design of processes and interfaces (Sommerville, 2021).

Data-Flow Diagram (Level 0 - Context)

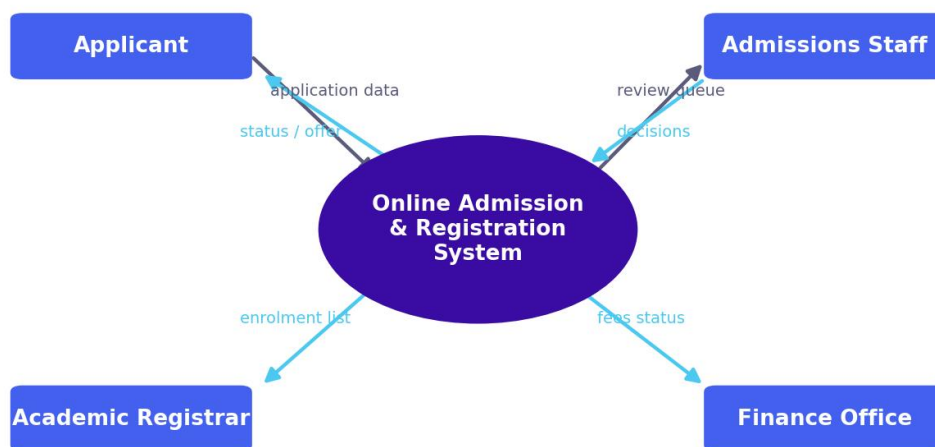


Figure 4: Context-level (Level 0) data-flow diagram of the admission and registration system.

6.5 Implementation and Testing Results

The designed system was implemented as a functioning web application and subjected to unit, integration, system, and user-acceptance testing. Table 1 summarises the outcomes of testing and evaluation against the study's objectives, comparing the manual and automated processes on key performance indicators.

Indicator	Manual system	Online system	Outcome
Application processing time	Several days	Same day / hours	Improved
Duplicate records	Frequent	Eliminated	Improved
Data-entry errors	Common	Minimised (validation)	Improved
Applicant access	On-campus only	Anywhere online	Improved
Status communication	Delayed / manual	Automated / real-time	Improved
Report generation	Manual, slow	Automated, on-demand	Improved

As summarised in Table 1, the evaluation indicated that the online system substantially outperformed the manual process on every key indicator. Application processing time fell from several days to hours or less; duplicate records, common under the manual system, were eliminated through the relational design and validation rules; and data-entry errors were minimised through input validation. Applicant access was extended from on-campus only to anywhere with an internet connection, status communication became automated and near real-time rather than delayed and manual, and report generation became automated and available on demand rather than slow and manual. User-acceptance testing with applicants and admissions staff confirmed that the system was functional, usable, and

satisfactory, meeting the specified requirements and the study's objectives of improving efficiency, accuracy, and accessibility (Pressman & Maxim, 2021; Laudon & Laudon, 2021).

7.0 Conclusion and Recommendations

The study concludes that the designed and developed Online Student Admission and Registration Management System significantly improves the efficiency, accuracy, and accessibility of Metropolitan International University's admission and registration processes, addressing the deficiencies of the manual system. It is recommended that the university deploy the system fully, train admissions staff and orient applicants in its use, integrate it with existing university information systems such as the academic records and finance systems, put in place reliable internet and power infrastructure and data-backup arrangements, and institute ongoing maintenance and security management to protect applicant data (Sommerville, 2021; Laudon & Laudon, 2021). Future work could extend the system to cover the full student lifecycle, incorporate online payment integration, and add analytics dashboards to support admissions planning.

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