Research Documentation

Hostel Room Allocation and Maintenance Management System

Course: Software Engineering

Date: December 10, 2025

Research Team: Keith Mutabvuri

---

1. Research Objectives

The research phase of this project aimed to understand the current state of hostel room allocation and maintenance management systems in educational institutions, identify pain points, and gather requirements for developing an effective solution.

Primary Research Goals:

- Understand current manual processes and their limitations
- Identify key stakeholders and their needs
- Analyze existing solutions and their effectiveness
- Gather requirements for an improved system
- Validate proposed solution approach

---

2. Research Methodology

2.1 Research Approach

The research was conducted using a combination of methods to ensure comprehensive understanding of the problem domain:

- **Literature Review**: Analysis of existing research on accommodation management systems
- **Stakeholder Interviews**: Discussions with students, hostel staff, and administrators
- **Observation**: Study of current manual processes in use
- **Competitive Analysis**: Review of existing commercial and open-source solutions
- **Requirements Gathering**: Collection of functional and non-functional requirements

2.2 Research Timeline

The research phase was conducted intensively over a one-week period, with activities organized as follows:

- **Day 1-2**: Literature review and initial problem identification
- Review of existing research on accommodation management systems
- Analysis of current manual processes
- Initial problem statement development
- **Day 3-4**: Stakeholder interviews and observation
- Interviews with students regarding their experiences
- Discussions with hostel staff and administrators
- Observation of current manual processes in use
- Identification of key pain points
- **Day 5**: Competitive analysis and solution review
- Review of existing commercial solutions
- Analysis of open-source alternatives
- Evaluation of solution effectiveness and gaps
- **Day 6**: Requirements gathering and analysis
- Collection of functional requirements from stakeholders
- Documentation of non-functional requirements
- Prioritization of features and capabilities
- **Day 7**: Analysis, documentation, and validation
- Synthesis of research findings
- Requirements documentation
- Validation of proposed solution approach
- Preparation of research report

Note: The condensed timeline required efficient coordination and focused effort from the research team to gather comprehensive information within the one-week timeframe.

---

3. Key Findings

3.1 Current State Analysis

Manual Process Challenges:

- Institutions rely heavily on spreadsheets, email communication, and paper forms
- Room allocation decisions are made manually, leading to inconsistencies
- No centralized system for tracking requests and allocations
- Maintenance requests are submitted via various channels (email, phone, in-person)
- Status updates are communicated inconsistently
- Limited transparency for students regarding allocation decisions
- No audit trail for allocation and maintenance decisions

Pain Points Identified:

For Students:

- Uncertainty about request status and timeline
- Lack of visibility into available options
- Difficulty tracking maintenance requests
- No clear communication channel with staff
- Frustration with allocation delays

For Staff:

- Time-consuming manual processes
- Difficulty managing multiple requests simultaneously
- Lack of organized system for tracking work orders
- Challenges in maintaining fair allocation policies
- Limited ability to generate reports and analytics

For Administration:

- No centralized data for decision-making
- Difficulty in planning and resource allocation
- Limited ability to analyze trends and patterns
- Compliance and audit challenges

3.2 Existing Solutions Analysis

Commercial Solutions:

- Several commercial property management systems exist but are often expensive
- Many solutions are designed for hotels, not educational institutions
- Complex features that may not be necessary for hostel management
- Limited customization options

Open-Source Solutions:

- Few open-source solutions specifically for hostel management
- Most require significant technical expertise to implement
- Limited support and documentation
- May not address all specific needs of educational institutions

Custom Solutions:

- Some institutions have developed custom solutions
- Often lack modern user interfaces
- May not be scalable or maintainable
- Limited integration capabilities

3.3 Stakeholder Requirements

Student Requirements:

- Easy-to-use interface for submitting requests
- Real-time status updates on room requests
- Simple process for reporting maintenance issues
- Transparent communication about allocation decisions
- Mobile-friendly access

Staff Requirements:

- Efficient interface for reviewing and allocating rooms
- Organized view of all pending requests
- Easy status updates for maintenance work orders
- Ability to add notes and track progress
- Quick access to student information

Administration Requirements:

- Data collection and reporting capabilities
- Audit trail for all decisions
- Analytics and trend analysis
- Integration with existing systems
- Scalable solution for future growth

---

4. Requirements Analysis

4.1 Functional Requirements

Based on research findings, the following functional requirements were identified:

Room Allocation:

- Students must be able to submit room requests with preferences
- Staff must be able to view and process pending requests
- System must track request status (Pending/Allocated/Rejected)
- Students must be notified of allocation decisions
- System must maintain allocation history

Maintenance Management:

- Students must be able to submit maintenance requests
- Requests must be categorized by type and urgency
- Staff must be able to view and update work order status
- System must track maintenance request lifecycle
- Students must be notified of status changes

User Management:

- System must support multiple user roles (Student/Staff)
- Each user must have appropriate access permissions
- User authentication and authorization required

4.2 Non-Functional Requirements

Usability:

- Interface must be intuitive and require minimal training
- Tasks must be completable by first-time users
- Consistent design and navigation throughout

Performance:

- System must respond quickly to user actions
- Page load times must be acceptable
- System must handle concurrent users

Accessibility:

- Sufficient color contrast for readability
- Keyboard navigation support
- Screen reader compatibility (future implementation)

Security:

- User data must be protected

- Access control must be enforced
- Audit trail for sensitive operations

Scalability:
- System must be able to handle growth in users and data
- Architecture must support future enhancements
- Database design must be efficient

---

5. Solution Validation

5.1 Proposed Solution

Based on research findings, a web-based prototype was proposed with the following characteristics:

- **User-Friendly Interface**: Modern, intuitive design accessible to all users
- **Role-Based Access**: Separate interfaces for students and staff
- **Transparent Processes**: Clear status tracking and communication
- **Efficient Workflows**: Streamlined processes for common tasks
- **Scalable Architecture**: Foundation for future enhancements

5.2 Validation Methods

Prototype Testing:
- Usability testing with target users
- Task completion rate measurement
- User feedback collection
- Iterative refinement based on findings

Stakeholder Feedback:
- Presentation to students and staff
- Collection of feedback and suggestions
- Validation of requirements
- Identification of additional needs

---

6. Research Conclusions

6.1 Key Insights

The research phase revealed that:

- Manual processes are a significant source of inefficiency and frustration
- There is a clear need for a centralized, user-friendly system
- Transparency and communication are critical for user satisfaction
- A prototype approach allows for early validation and feedback
- Stakeholders are receptive to technology solutions that address their pain points

6.2 Recommendations

Based on research findings, the following recommendations were made:

- Develop a web-based solution accessible from any device
- Prioritize user experience and ease of use
- Implement clear status tracking and notifications
- Design for scalability and future enhancements
- Ensure data security and access control
- Provide comprehensive documentation and training

6.3 Future Research Areas

Areas identified for future research and development:

- Automated allocation algorithms based on preferences and policies
- Integration with student information systems
- Mobile application development
- Advanced analytics and reporting
- Machine learning for predictive maintenance
- Multi-institution deployment strategies

---

7. Research Deliverables

Documentation:
- Research findings report
- Requirements specification
- Stakeholder analysis
- Competitive analysis summary

Data:
- Interview transcripts and notes
- Observation findings
- Survey results (if conducted)
- Requirements documentation

Analysis:
- Problem statement refinement
- Solution approach validation
- Requirements prioritization
- Risk assessment

---

8. References and Sources

Academic Sources:
- Research papers on accommodation management systems
- Studies on user experience in institutional systems
- Best practices in software requirements engineering

Industry Sources:
- Case studies of similar systems
- Commercial solution documentation
- Open-source project documentation

Stakeholder Input:
- Student interviews and feedback
- Staff interviews and observations
- Administrative requirements and constraints

Research Team Contributions

Keith Mutabvuri: Lead researcher, stakeholder interviews, requirements analysis, documentation, literature review, competitive analysis, data collection

---

Document Version: 1.0

Last Updated: December 10, 2025

Course: Software Engineering

Date: December 10, 2025

Team Members:

- Fabilous Lashidi (Project Manager)
- Zvinaishe Marume (System Architect)
- Promise Siafwiyo (UI Designer)
- Tapiwa Chigome (UX Designer)
- Keith Mutabvuri (Researcher)
- Carlton Kampota (Frontend Developer)
- Tivonge Kambarani (Documentation Specialist)
- Tinotenda Gozi (System Analyst)
- Gufe Makomborero (Quality Assurance)

Status: Research Phase Complete