UNIT CODE: PRT631

Information System Practice

Assignment 02

Digital Stall Management System

Mindil Beach Sunset Market

Submitted To:

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Executive Summary

The Mindil Beach Digital Stall Management System (DSMS) is a transformative solution for Darwin's cultural hub that contributes over 1.5 million annually to the NT tourism sector. It has been in operation for more than 30 years with 200 vendor stalls attracting thousands of visitors per event, the market currently suffers from manual processes which are creating 3–5-day approval delays. This cloud-based web solution will achieve 80% reduction in processing times, increased vendor satisfaction by 50%, and 36% increase in stall operation while preserving the market's cultural heritage. The new system will generate a monthly revenue of over 10 000 Australian dollars, positioning Mindil Beach competitively against digitally advanced markets like Queen Victoria Market.

Project Definition

Problem Statement

Despite generating over AUD 15 million annually to the NT economy and supporting over 1,000 local jobs, Mindil Beach manual stall allocation creates significant inefficiencies such as:

- Email-based booking conflicts which accumulates about 13% error rates and double-bookings.
- Vendor frustration and missed revenue opportunities due to multi-day processing delays.
- Communication between organizers and the vendor is currently fragment.
- Suboptimal 70% capacity utilization due to administrative holdups.

Proposed Solution

A cloud-based web platform that will integrate core modules for vendor registration, real-time stall booking, automated payment processing, and analytics dashboard.

The key features will include:

- Interactive stall mapping with instant confirmation
- Integrated payment processing with automated invoicing
- Vendor portal with ARB verification and permit tracking
- Communication hub with real-time notifications

System Boundaries:

- IN SCOPE: the system will include Vendor registration, stall booking, payment processing, compliance tracking
- OUT OF SCOPE: The system will not include weather monitoring, entertainment booking, food safety inspections
- ASSUMPTIONS: Basic vendor digital literacy, reliable internet connectivity

Background

Current Pain Points

Existing manual processes create significant operational challenges:

- Paper-based applications which have no availability or current status.
- No centralized database leading to data loss
- Reactive communication through phone/email which creates bottlenecks

Digital Transformation Drivers

Post-pandemic regulatory changes now require enhanced digital check-ins, sanitation controls, and crowd flow regulation. Northern Territory tourism strategies emphasize

smart market systems, while consumer expectations shift toward contactless experiences.

Competitive pressure intensifies as major Australian markets adopt digital systems: Queen Victoria Market now offer integrated booking and payment platforms.

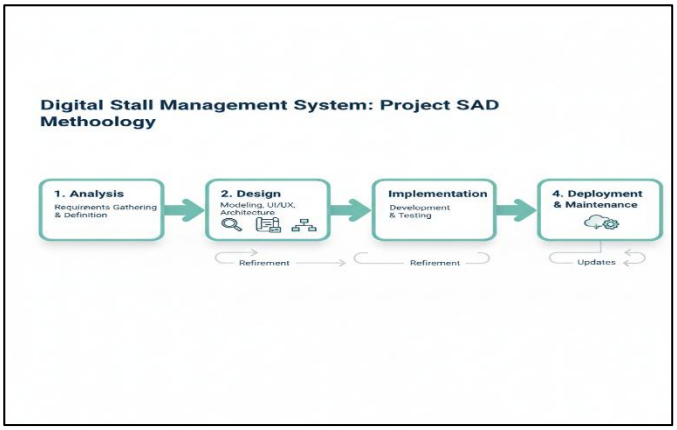
Project Approach

The project adopts a **structured System Analysis and Design (SAD)** approach. This methodology is characterized by a methodical, phased process that prioritizes thorough planning and analysis before development begins. The documents indicate that this is a deliberate choice, as the approach relies on various modeling techniques to ensure the final solution is both functional and sustainable. Key to this approach is the principle of first defining what the system needs to accomplish ("what") before determining how it will be built ("how").

The management methodology is not a single framework like Agile or Waterfall. Instead, it is a practical, sequential application of SAD principles. This is evidenced by the project's progression through distinct stages:

Analysis: This phase focuses on understanding stakeholder needs and defining the system's boundaries.

Design: This stage involves modeling data and workflows, as well as designing the user interface and system architecture.



This structured progression, moving from high-level requirements to detailed design, suggests a linear and deliberate management style. The project's documentation, including entity relationship diagrams (ERDs), data flow diagrams (DFDs), and user flow diagrams, serves as the blueprint for execution, minimizing ambiguity and ensuring all project members are aligned on the plan before coding begins.

Project Objectives

- The project aims operational Efficiency through reduced stall booking processing time from 3-5 days to 24 hours. This will be Measurable through system analytics and vendor feedback.
- Increased vendor experience by Increasing vendor satisfaction scores from 6/10 to 9/10 within 6 months measured by quarterly surveys with standardized scoring methodology.
- Increased stall utilization from 70% to 95% within 12 months through automated scheduling and bottleneck elimination measured by daily occupancy tracking and performance reporting
- System Performance of 99.9% system uptime during market operating season with maximum 8 hours downtime per season through cloud redundance measured through continuous monitoring with automated alert systems.
- Extensive Digital Accessibility by ensuring 100% mobile accessibility with WCAG 2.1 AA compliance by launch with a mobile-responsive design supporting diverse vendor demographics. Measured through automated accessibility testing and user validation
- Achieve 85% vendor adoption within 3 months through comprehensive training and Phased onboarding with multilingual support for NT communities. This will be measured by platform usage analytics tracking registration and engagement

Project Outcomes

The project is designed to deliver several significant outcomes that address the market's current operational challenges. The final report emphasizes that the DSMS will be an efficient, transparent, and enjoyable platform for both visitors and vendors. The key outcomes are:

Efficiency: By digitalizing and automating processes that were once manual, such as stallholder onboarding and allocation, the system will significantly reduce delays and inaccuracies.

Transparency and Fairness: Stallholders will gain a clear view of their application and booking status, as they can track approvals in real-time. The system's support for real-time updates on stall availability also ensures that the limited space at the market is allocated fairly, especially during peak periods.

Enhanced User Experience: By providing a unified platform for all interactions, the DSMS aims to improve the overall experience for vendors and visitors, making it easier to manage stalls and interact with the market.

Improved Management: The system will provide administrators with the tools needed for better oversight, including the ability to generate reports for data-driven decision-making.
In summary, the DSMS project is a carefully planned initiative using a structured SAD approach to deliver a functional and efficient digital platform. Its scope covers the core needs of vendors, customers, and administrators, and its outcomes are focused on improving efficiency, transparency, and fairness while enhancing the overall market experience.

Project Scope

The project's scope is to create a comprehensive **Digital Stall Management System (DSMS)**. The system's central purpose is to solve the operational challenges of the Mindil Beach Sunset Market, where stall management is currently manual and disjointed. The DSMS is intended to be a centralized, cloud-based online platform that serves three key user groups: vendors, customers, and administrators.
The scope of the system includes a range of functionalities for each user type:

For Vendors: The system will handle all aspects of vendor interaction, including a streamlined registration process, the ability to view and book available stalls, and secure online payment processing.

For Customers: While customers don't directly manage stalls, the system's scope includes a feedback mechanism that allows them to provide input, which contributes to overall market improvement.

For Administrators: The system's administrative functions are extensive. Administrators will use the platform to manage vendors, approve bookings, and oversee stalls. The system will also allow for the uploading of stall information and the generation of essential reports for administrative oversight.
The scope also explicitly addresses the need for the system to be interconnected with a payment gateway, confirming that it will handle financial transactions securely. This is a crucial part of the project's technical scope.

Assumptions

The following assumptions are made to ensure the successful design, development, and implementation of the DSMS:

- **Technology Availability:** Reliable cloud infrastructure and high-speed internet connectivity will be consistently available during market operations.
- **User Adoption:** Stallholders and market administrators will be open to transitioning from manual processes to digital platforms.

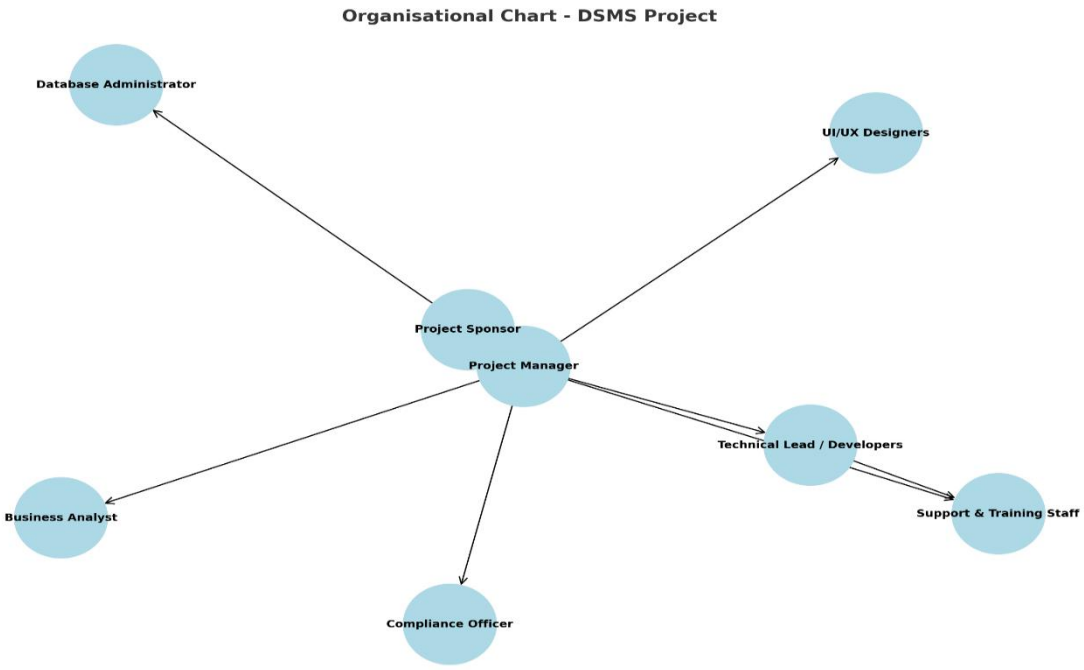
- **Device Accessibility:** Visitors and stallholders will have access to smartphones, tablets, or kiosks to use the system effectively.
- **Financial Resources:** Adequate funding is allocated for software development, system maintenance, and staff training.
- **Stakeholder Commitment:** The Mindil Beach Sunset Market Committee and administrators will provide timely feedback and approvals during project phases.
- **Regulatory Stability:** No major changes in Australian data protection or Northern Territory safety regulations will occur during the project lifecycle.

Organisational Chart

The DSMS implementation will require clear role allocation. The following chart outlines the organizational structure:

Project Governance Structure

- **Project Sponsor:** Mindil Beach Sunset Market Committee
- **Project Manager:** Oversees planning, coordination, and delivery
- **Business Analyst:** Gathers requirements and ensures stakeholder alignment
- **Technical Lead / Developers:** Build and integrate system modules (applications, payments, maps, analytics)
- **UI/UX Designers:** Ensure accessibility and user-friendly design for stallholders, administrators, and visitors
- **Database Administrator:** Manages relational and NoSQL data environments
- **Support & Training Staff:** Provide helpdesk support during operations and train users
- **Compliance Officer:** Ensures data privacy and regulatory adherence



Project Approach

Project Management Methodology

The project will follow a hybrid Agile–Waterfall methodology, combining structured planning with iterative development. This approach ensures the system is delivered on time, within budget, and aligned with vendor and customer needs.

Initiation **Define project scope, objectives, and stakeholders. A feasibility and cost–benefit analysis is conducted to ensure project viability.** **Deliverables: Project charter, stakeholder register.**
Planning **A detailed plan is created to guide development. This includes schedules, risk identification, and resource allocation. Waterfall methods ensure clear structure.** **Deliverables: Project plan, Gantt chart, risk register.**
Analysis & Design **Requirements are gathered from vendors, administrators, and customers. UML diagrams (use case, sequence, domain model) guide the system design. Agile workshops ensure feedback-driven improvements.** **Deliverables: Requirements specification, design documents.**
Development **The system is built in Agile sprints, delivering small, functional modules such as registration, stall booking, payments, and feedback. Each sprint ends with review and refinement.** **Deliverables: Working software modules.**
Testing **Unit, integration, and user acceptance testing (UAT) ensure functionality, security, and usability. Vendors and admins participate in UAT for real-world validation.** **Deliverables: Test reports, acceptance sign-off.**
Implementation **The system is deployed on a live server with a pilot rollout before full launch. Vendors and administrators receive training and support materials.** **Deliverables: Live system, training guides.**
Monitoring & Control **Progress is tracked through Agile stand-up meetings and Waterfall progress reviews. Risks, budget, and quality are continuously monitored.** **Deliverables: Status updates, corrective actions.**
Closure **The project concludes with a formal handover, evaluation, and documentation of lessons learned. Future enhancements are identified.** **Deliverables: Final project report, closure document.**

Resourcing Planning

Resourcing for DSMS is divided into **human, technical, and financial resources**:

Human Resources

- **Development Team:** 2–3 software developers, 1 technical architect, 1 database administrator
- **Business & Operations:** 1 business analyst, 1 compliance officer, 1 finance coordinator
- **Support Staff:** 2 technical support members available during market hours
- **Trainers:** 1–2 trainers to onboard stallholders and administrators

Technical Resources

- Cloud hosting subscription (scalable)
- Workstations and test devices (smartphones, tablets, kiosks)
- Licensed tools for workflow automation, payment integration, and GIS mapping

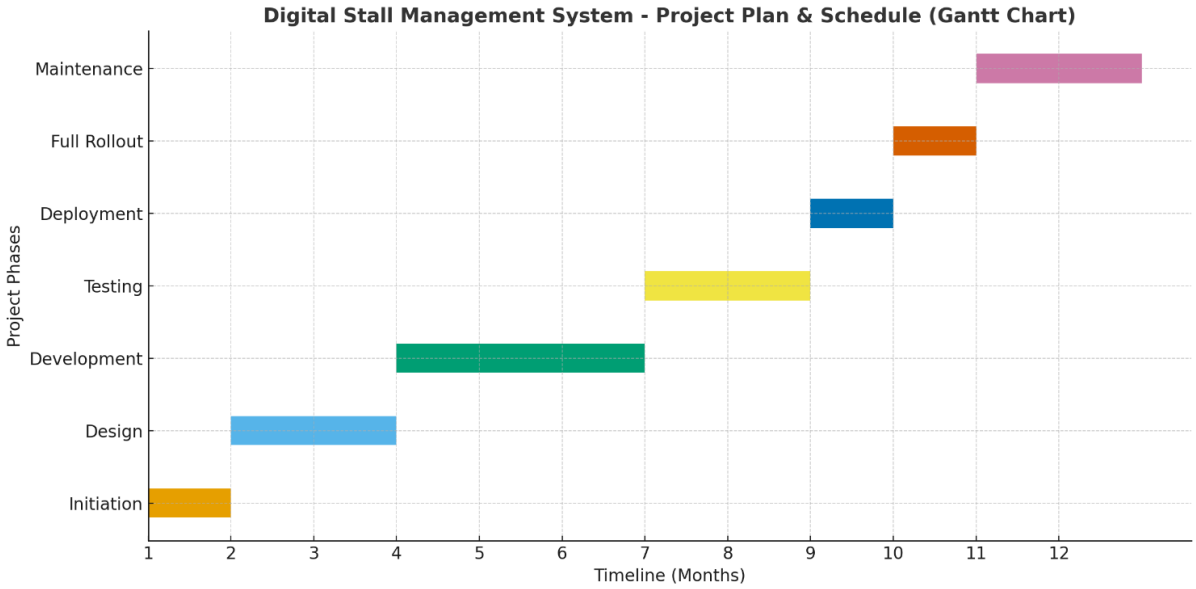
Financial Resources

- Development budget: estimated AU$250,000 for Phase 1
- Annual maintenance and hosting costs: ~AU$50,000
- Training and user adoption initiatives: AU$20,000

Business Case

Project Plan and Schedule

The DSMS will follow a phased rollout to minimize risks and ensure smooth adoption:



Milestones

The **Mindil Beach Sunset Market**, a Darwin cultural icon, features food vendors, artisans, and performers that bring together a multicultural and diverse community. Currently, stall management systems that might include registration, booking, and feedback are largely manual or disjointed and non-interconnected. The proposed **Digital Stall Management System (DSMS)** aims to streamline operations by automating vendor registration, stall booking, payment, and feedback processes via a cloud-based platform, which allows the market to process everything in an effective way.

The project will require an approximate total estimated budget of **AUD 48,000** for system development, testing, hosting, personnel, and marketing. We structured the budget basically for a **12-month development and deployment cycle**, and we are expecting that the system will begin generating revenue

Timeline (12 Months)

Stage	Duration	Activities
Phase 1: Planning	Month 1	Stakeholder meetings set other requirements, set the boundaries, and take other initiatives.
Phase 2: Design	Month 2	UI/UX design, determine the focus point, set the scheme, and system architecture blueprint.

Phase 3: Development	Months 3–6	Server-side of web development and frontend development, collecting data from different sources.
Phase 4: Testing	Month 7	Functional testing, nonfunctional testing, UAT (User Acceptance Testing)
Phase 5: Deployment	Month 8	Cloud deployment (AWS/Azure), launch
Phase 6: Training & Support	Month 9	Vendor training, user manual, employee training, and support system setup structure
Phase 7: Marketing & Promotion	Months 10–11	Community outreach, social media marketing, and grouping, target customer selection
Phase 8: Review & Scale	Month 12	Performance analysis, set a benchmark, and future enhancements, and take feedback.

Estimated Cost

Category	Estimated Cost (AUD)	Description
System Development	18,000	Full-stack development: seller module and proper management, booking engine, feedback and evaluation system
UI/UX Design	3,000	User-friendly design, mobile-friendly user interfaces
Cloud Hosting (AWS/Azure)	2,500	12-month hosting, backup, and domain costs, including registration fee.
Database Licensing	1,500	PostgreSQL and MongoDB setup/licensing
Security & Compliance	2,000	SSL, a data security measure, and penetration testing are used to protect sensitive data.

Testing & QA	2,000	Test cases, debugging, UAT rounds
Marketing & Promotions	4,000	Social media, flyers, email marketing campaigns, supplier onboarding document
Training & Documentation	1,500	Instruction manuals, tutorials, workshops
Support & Maintenance (6 months)	5,000	Customer support, bug fixes, patch upgrades
Project Management	3,500	Scheduling, resource distribution and management, and keeping track.
Contingency Fund (10%)	5,000	Unexpected costs or scope changes
Project Management	3,500	Scheduling, resource proper allocation and management, and monitoring
Contingency Fund (10%)	5,000	Unforeseen costs or modification costs, and re-scoping
TOTAL	**AUD 48,000**	

Cost–Benefit Analysis

Costs (AUD)

Category	Description	Estimated Cost
Development Costs	Software design, coding, testing	$25,000
Hardware & Hosting	Server, cloud hosting, backups	$8,000
Software Licenses	Database, security tools, APIs	$5,000
Training	Training vendors, staff, and admin users	$3,000
Maintenance & Support	Annual maintenance, bug fixes, and upgrades	$7,000/year
Marketing & Onboarding	Vendor awareness campaigns, workshops	$2,500

Contingency Reserve (10%)	Buffer for unforeseen issues	$5,000
Total Initial Investment		**$48,500**

Benefits (Annual in AUD)

Benefit Type	Description	Estimated Value
Operational Efficiency	Reduced manual stall allocation, faster approvals	$20,000
Revenue Growth	More vendors due to streamlined booking	$30,000
Customer Satisfaction	Better feedback handling, more repeat visitors	$15,000
Cost Savings	Lower admin overhead, less paperwork	$10,000
Total Annual Benefits		**$75,000**

Net Benefit Analysis

- Initial Cost: **$48,500**
- Annual Benefit: **$75,000**
- Payback Period: **Less than 1 year**
- ROI (Return on Investment):

ROI=75,000−48,50048,500×100=54.6%ROI = \frac{75,000 - 48,500}{48,500} \times 100 = 54.6\%ROI=48,50075,000−48,500×100=54.6%

Break-even achieved within the first year.

Risk Assessment

Risk	Likelihood	Impact	Mitigation Strategy
Low Vendor Adoption	Medium	High	Conduct early vendor engagement, build trust, offer free trials, showcase ease of use

Technical Delays	Medium	Medium	Use agile procedure, mitigate buffer time in the timeline, and maintain contingency funds.
Data Breach/Security Issues	Low	High	Employ SSL encryption, security checking, 2-factor authentication, and regular penetration testing.
Overbudgeting	Medium	Medium	Maintain 10-15% contingency fund, regular financial reviews, and allocate wisely.
User Resistance to Technology	Medium	Medium	Offer training workshops, a user-friendly interface, support hotline.
Internet Downtime	Low	Medium	Host system on cloud platforms with 99.99% uptime guarantees.
Regulatory Changes	Low	Medium	Ensure compliance with Australian data protection and privacy laws and proper legal actions.
Negative Feedback or Technical Bugs	Medium	Medium	Ongoing QA testing, friendly support team, and feedback loop integration.

Risk Mitigation Plan

Risk Category	Description	Mitigation Strategy
Technical Risks	System downtime, bugs, data loss	Use cloud redundancy, frequent testing, backups
Financial Risks	Overbudgeting, low vendor adoption	Strict budget control, phased rollout, vendor training
Operational Risks	Resistance from vendors/admins	Conduct training, provide user manuals, 24/7 support
Cybersecurity Risks	Data breaches, payment fraud	Encrypt data, integrate secure payment gateway (PCI-DSS)
Market Risks	Vendors reluctant to pay fees for system use	Offer free trial, promotional discounts, awareness

Regulatory Risks	Compliance with Australian privacy & GST rules	Regular legal review, ensure compliance with laws

Risk Matrix

Risk	Likelihood	Impact	Level	Mitigation Action
System downtime	Medium	High	**High**	Cloud backup, SLA with hosting provider
Budget overrun	Medium	Medium	**Medium**	Regular reviews, contingency fund
Data breach	Low	High	**High**	Firewalls, encryption, security audits
Vendor resistance	High	Medium	**High**	Training, incentives, communication workshops
Payment gateway fail	Low	High	**High**	Dual payment gateways, transaction monitoring
Regulatory changes	Low	Medium	**Medium**	Legal compliance monitoring, flexible contracts

Risk Rating Key:

- Low: Minimal threat, easy to manage
- Medium: Requires monitoring, may affect cost/time
- High: Critical, requires proactive mitigation

Requirements

The Darwin Mindil Beach Sunset Market is one of the most popular cultural tourist attractions in the Northern Territory, with an annual attendance rate of 400 000 visitors and over 150 food, art, and craft stalls (Luckman, 2011). The Digital Stall Management System (DSMS) proposal will upgrade market activities and create one unified platform that can be more efficient, transparent, and enjoyable for the visitors (Dash et al., 2024).

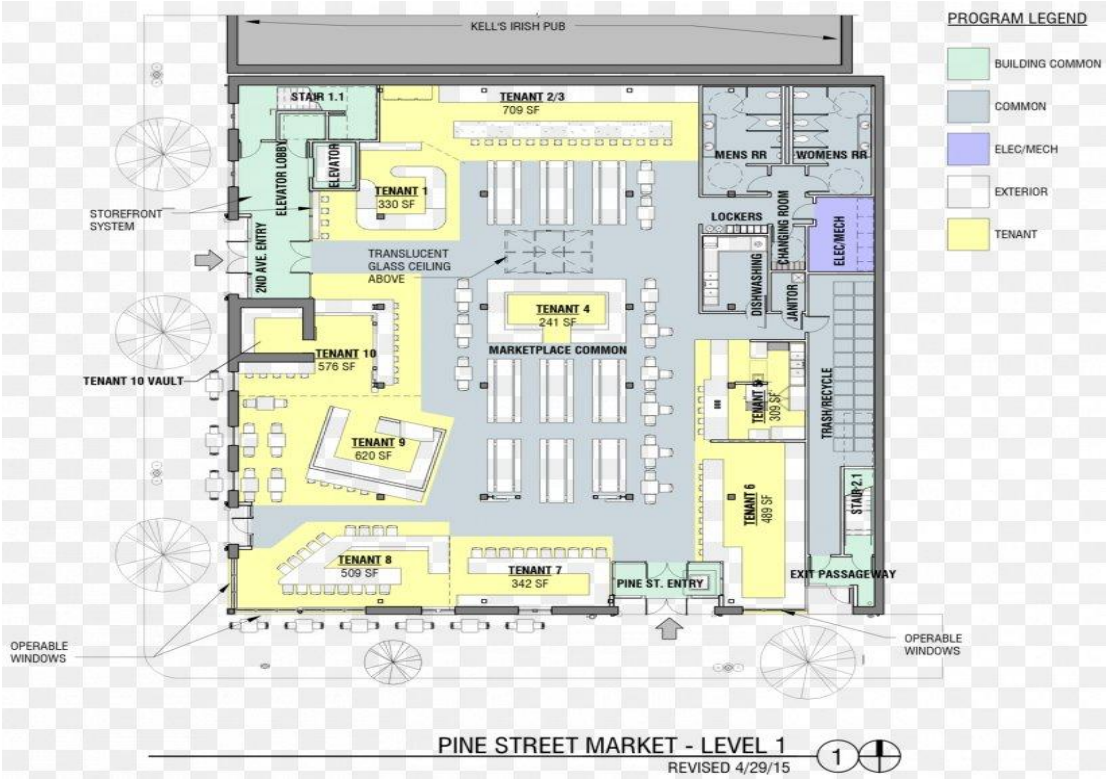


Figure 1: Pine Street Market - Level 1

1.0 Business Requirements

The DSMS needs to fulfill a central business imperative to make stallholder onboarding and allocation easier, previously performed via manual applications and literal scheduling. By digitalizing this procedure, administrators can decrease delays and inaccuracies and stallholders can follow approvals as they happen (Yang et al., 2018). The system should also support real-time updates on stall availability and inventory, ensuring that limited space is allocated fairly during peak periods when over 10,000 visitors may attend on a single evening.

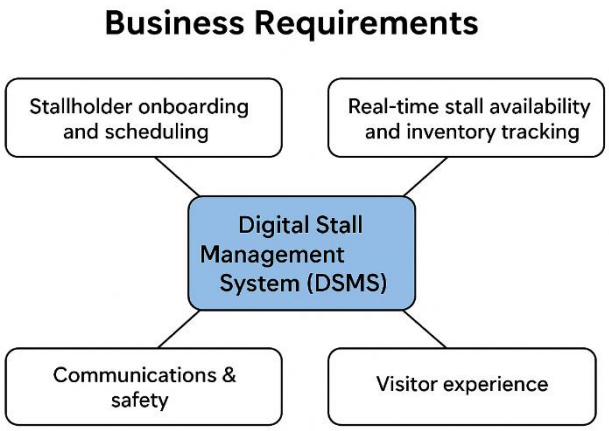


Figure 2: Business Requirements

In addition to efficiency in the operation, it will also enhance visitor experience by providing digital maps, stall directory, and schedules of events that portray the variety of products and cuisines available (Hudson and Hudson, 2023).

2.0 Functional Requirements

The DSMS functional scope includes various user modules of administrators, stallholders and visitors. For stallholders, the system must provide portals to submit applications, track approvals, make payments, and view their allocated slots on a calendar. Administrators will need dashboards offering analytics on visitor counts, transaction values, and stall occupancy to aid in planning and decision-making. Visitors should be able to use a responsive mobile interface to locate stalls, navigate through interactive maps, and view cultural events (Genctürk, 2024).

3.0 Non-Functional Requirements

Beyond core functions, the DSMS must deliver non-functional performance expectations such as high reliability and scalability. It should be capable of handling thousands of concurrent logins during peak hours while maintaining fast response times. Reliability is critical, with a target of 99.9 percent uptime during the market's evening operating hours (Doganaksoy, Meeker and Hahn, 2021). Usability is equally important, as the system must accommodate a diverse group of users ranging from tech-savvy tourists to small business operators with limited digital skills.

4.0 Technical Requirements

The DSMS will be built on a cloud-based architecture that ensures scalability and remote accessibility. The backend should rely on a relational database for transactions

and stall allocations, supported by NoSQL components for caching and faster data retrieval. A mobile-first frontend design will allow both visitors and stallholders to interact seamlessly with the platform, whether through smartphones, tablets, or dedicated kiosks (Genctürk, 2024).

5.0 Report Requirements

The report documenting the DSMS must be structured to present all requirements in detail and include visual diagrams such as process workflows and system interaction models. It should reference real-world statistics to highlight the importance of the market and its scale, including stall counts, visitor numbers, and annual economic contributions (Pacifico, Luca Mulazzani and Giulio Malorgio, 2025). 8.0 Regulatory & Compliance Requirements

The system must comply with Australian privacy laws governing data collection and storage, ensuring that stallholder and visitor information remains secure. It should also align with Northern Territory safety regulations concerning crowd control, fire safety, and emergency protocols (Neale, 2023).

6.0 User Stories

User stories highlight the system's value from different perspectives. A stallholder should be able to apply online, pay fees securely, and confirm their allocated slot without delays, thereby reducing uncertainty and improving preparation. An administrator should have the ability to monitor stall occupancy and generate real-time reports on attendance and revenue trends, supporting better decision-making.

Functional Requirement ID	User Story ID	Title	User Story	Acceptance Criteria	Priority	Dependence	Estimation	Description
FR-001	US-01	Stallholder Application	As a Stallholder, I want to apply for a	1. Application form must validate required	High	Linked to Approval Workflow	5	Digital form to replace manual stallholder

			stall online so that I can participate in the market easily.	fields.2. Display confirmation ID upon submission.3. Error messages shown for incomplete/invalid entries.				applications.
FR-002	US-02	Stall Approval & Allocation	As an Administrator, I want to approve applications and assign stalls digitally so that scheduling is efficient.	1. Stall availability displayed in real time.2. Admin can approve/deny requests with one click.3. Confirmation email/SMS sent to stallholder automatically.	High	Depends on FR-001	8	Ensures fair stall allocation and quick approvals.
FR-003	US-03	Visitor Interac	As a Visitor, I want an	1. Map should display all	Moderate	Depends on Real-	8	Enhances visitor experien

		tive Map	interactive map of stalls and events so that I can navigate the market easily.	active stalls with categories .2. Users can search stalls by name or product.3. Event schedule visible on the map with live updates.		time Data (FR-006)		ce and reduces congestion.
FR-004	US-04	Real-Time Notifications	As a Visitor, I want to receive notifications of safety updates or weather alerts so that I feel secure.	1. Notifications delivered via SMS, app, and display boards.2. Alerts triggered automatically by admin or system.3. Multilingual support available.	High	Infrastructure Integration	5	Improves communication and ensures safety compliance.

FR-005	US-05	Payment Processing	As a Stallholder, I want to pay stall fees online so that I do not need to handle cash during setup.	1. Integration with secure payment gateways. 2. Confirmation receipt emailed instantly.3. Payment status visible in stallholder dashboard.	High	Linked to FR-001 and FR-002	8	Eliminates manual payments and reduces errors.
FR-006	US-06	Visitor Analytics Dashboard	As an Administrator, I want to see real-time visitor counts so that I can make better decisions.	1. Dashboard displays current visitor numbers. 2. Historical trend analysis available. 3. Export function to Excel/PDF for reporting.	Moderate	Requires IoT/Wi-Fi Integration	13	Supports planning and optimization of stall layout and resources.

A visitor should be able to explore a live map of stalls and events, creating a smoother and more engaging market experience.

7.0 Operational Requirements

Operationally, the DSMS should include maintenance windows after-market hours, supported by a technical helpdesk during live events (O'Toole, 2022). Staff should be trained to resolve issues quickly, ensuring continuity of service.

Table 1 : Operational Requirements Table – DSMS

Strategy	Tactics	Operation	Requirements
Increase number of stallholders	Simplify registration through digital onboarding.	Online forms with automated validation and real-time approvals.	Cloud platform, database integration, mobile-friendly user interface.
Increase recurring revenues	Enable cashless payments for stallholders and visitors.	POS integration with QR, card, and mobile wallet payments.	PCI-compliant payment gateway, strong internet connectivity.
Improve visitor experience	Deploy an interactive stall and event map.	Mobile-friendly navigation with live updates of events and stall locations.	GIS-enabled map interface, real-time data feed, multilingual support.
Reduce operational costs	Automate stall allocation and reporting.	Workflow automation for approvals, notifications, and daily performance logs.	Workflow engine, SMS/email notification system, automated reporting tools.
Ensure regulatory compliance	Adhere to data protection, privacy, and safety regulations.	Secure data storage, CCTV and emergency alert integration.	Compliance with Privacy Act, GDPR principles, IoT devices, role-based access.

System Analysis and design

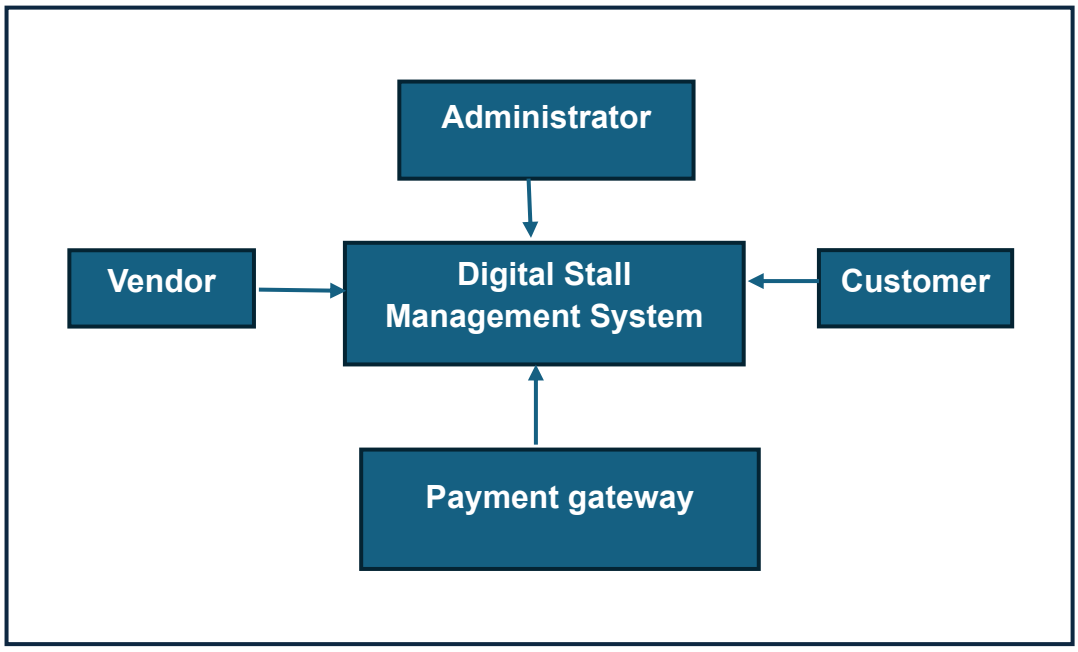
The **Mindil Beach Sunset Market**, a Darwin cultural icon, features food vendors, artisans, and performers that bring together a multicultural and diverse community. Currently, stall management systems that might include registration, booking, and feedback are largely manual or disjointed and non-interconnected. The proposed **Digital Stall Management System (DSMS)** aims to streamline operations by automating vendor registration, stall booking, payment, and feedback processes via a cloud-based platform, which allows the market to process everything in an effective way.

The **Digital Stall Management System (DSMS)** is proposed to point these issues, and it will provide a centralized online platform for vendors, administrators, and customers to interact actively. The system will support vendor registration, stall booking, payment processing, and customer feedback. This section presents a structured **System Analysis and Design (SAD)** which use modelling techniques to ensure the solution is both functional and sustainable.

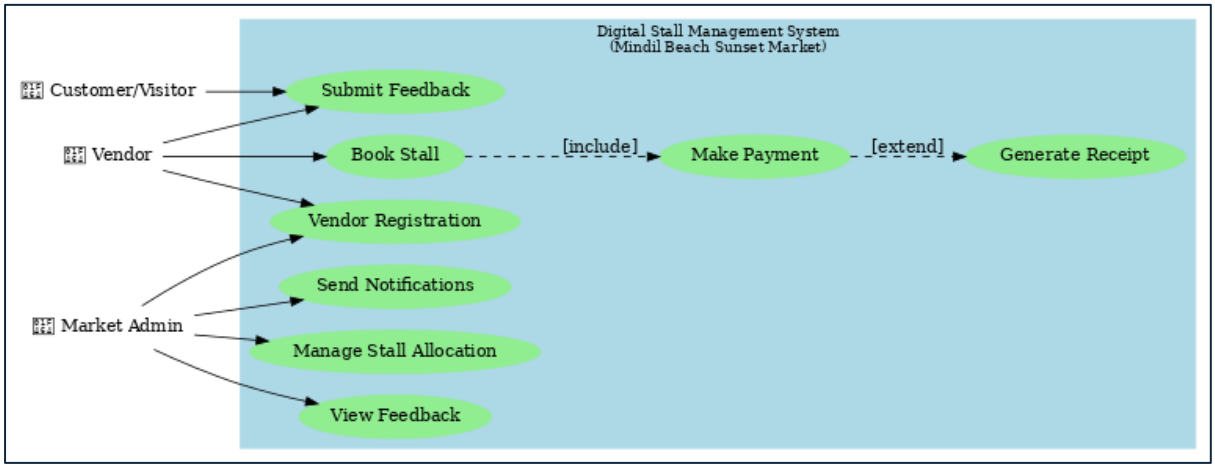
System analysis identifies the system goals, actors, and their interactions. It defines what the system needs to do rather than how it should be built.

Objectives of Analysis

- Understand stakeholder needs (vendors, administrators, customers).
- Define system boundaries and scope.
- Represent interactions through use cases.
- Model data and workflows using diagrams.



Use Case Descriptions (Key Examples)



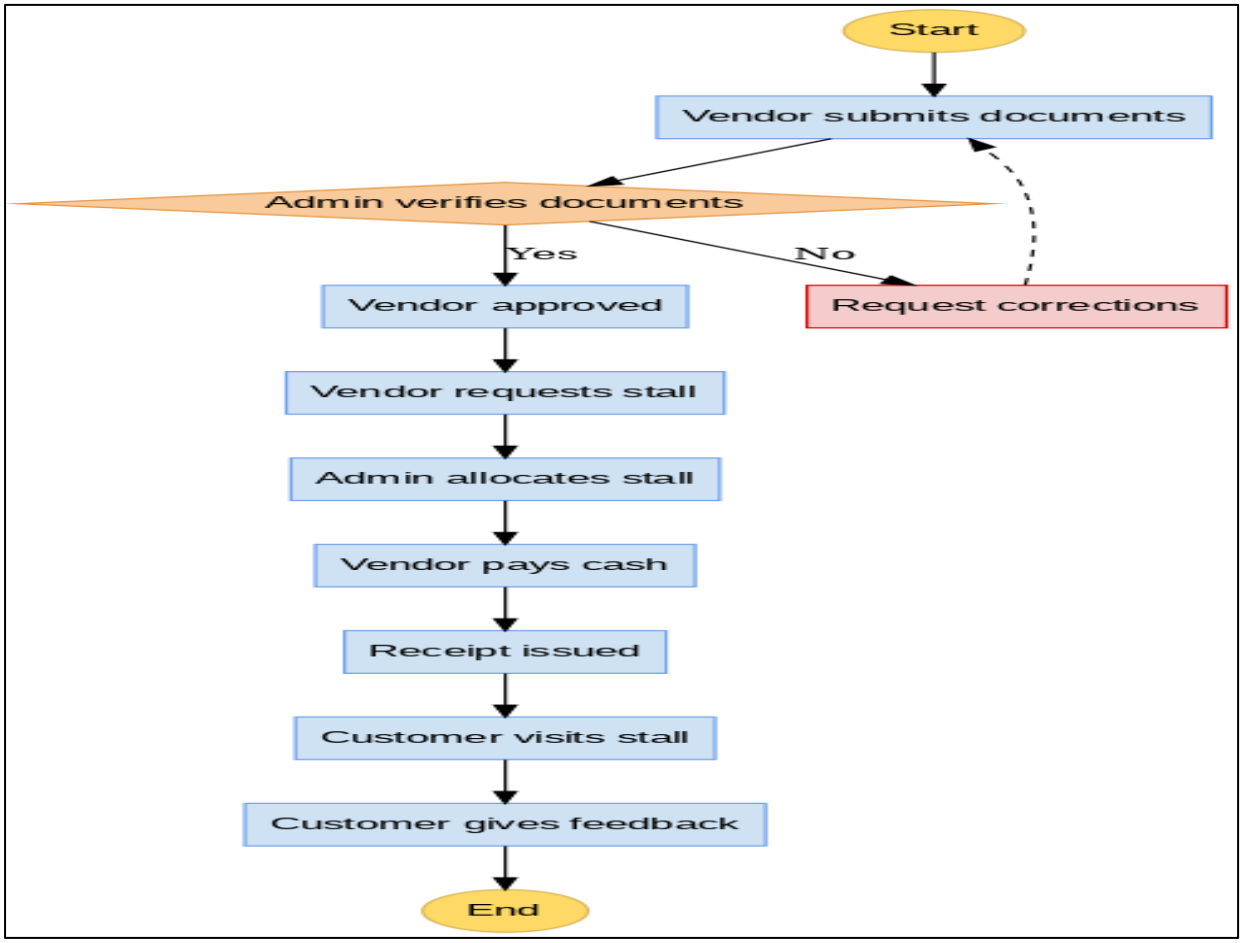
Use Case 1: Vendor Registration • **Actors:** Vendor, Admin • **Description:** Vendor creates an account, submits documents; Admin approves. • **Precondition:** Vendor has valid details. • **Postcondition:** Vendor is added to the system.	**Use Case 2: Stall Booking** • **Actors:** Vendor, Payment System • **Description:** Vendor logs in, selects stall, pays online. • **Precondition:** Vendor must be approved. • **Postcondition:** Stall reserved, confirmation sent.
Use Case 3: Feedback Submission • **Actors:** Customer • **Description:** Customers submit reviews after visiting stalls. • **Precondition:** Customer has access to the platform. • **Postcondition:** Feedback stored in database.	**Use Case 4: Approval & Stall Allocation** • **Actors:** Admin • **Description:** Admin reviews registrations and assigns stalls. • **Precondition:** Vendor request submitted. • **Postcondition:** Vendor approved, stall allocated.

Activity Diagram Description – Digital Stall Management System

The activity diagram represents the workflow of stall management at Mindil Beach Sunset Market. It visualizes the sequential activities, decisions, and flow of information from stallholder registration to event day participation. The diagram has two perspectives: the **As-Is process** (current manual system) and the **To-Be process** (proposed digital system).

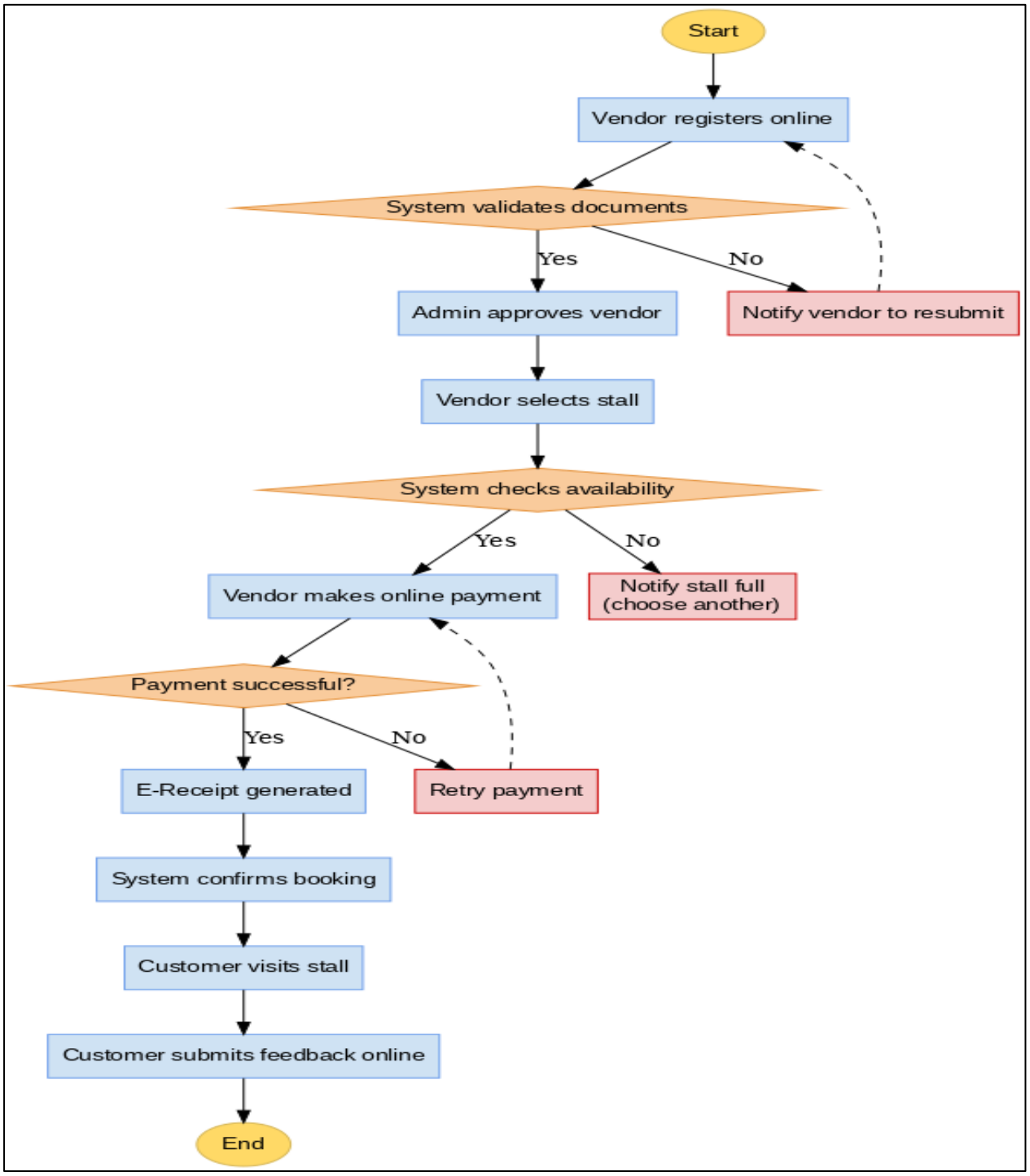
As-Is Process (Current Manual System)

The current stall management process at the Mindil Beach Sunset Market is mostly manual and requires significant administrative effort. Stallholders begin by making inquiries and then proceed with manual registration through paper forms and physical submission of documents. Stall allocation is done using manual records, often leading to confusion or delays in confirming availability. Payments are typically collected in cash or through bank transfers, with receipts being recorded by hand. On the event day, stallholders check in through a printed attendance list, which often causes long queues, delays, and difficulties in managing last-minute changes. This manual approach is inefficient, lacks transparency, and increases the chances of administrative errors, making the overall process challenging for both stallholders and organizers.



To-Be Process (Proposed Digital System)

The proposed digital stall management system introduces a streamlined and automated process designed to improve efficiency and enhance stallholder experience. Stallholders will be able to log in through a dedicated web or mobile portal to complete online registration and upload required documents. The system will support automated verification, allowing errors to be flagged instantly and reducing the burden on administrators.

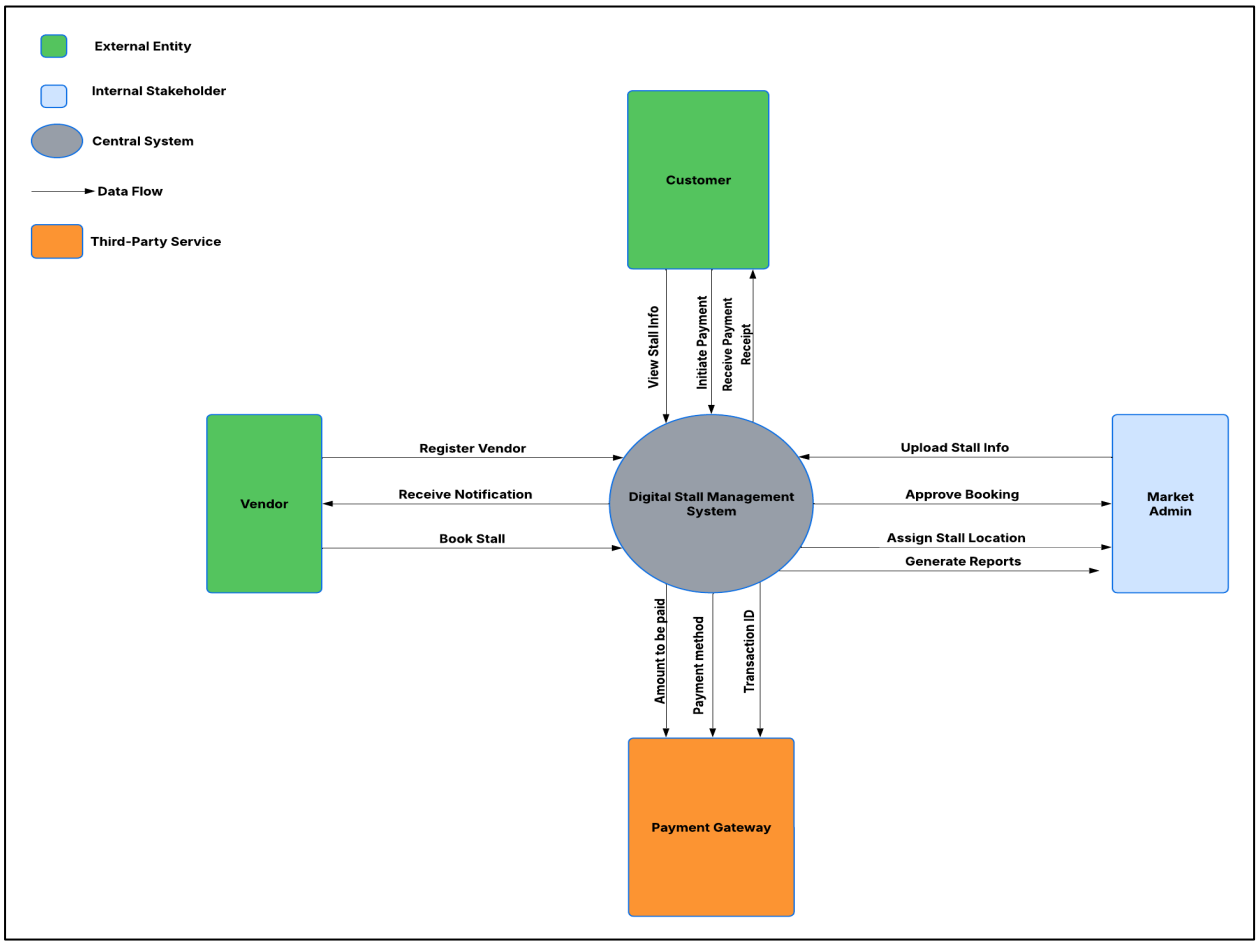


Stallholders can then book their stalls digitally using an interactive map that shows real-time availability. Payments will be processed securely online through multiple methods, and digital receipts will be generated automatically. Upon successful registration and payment, stallholders will receive electronic confirmation along with a QR code, which can be scanned on the event day for quick and seamless check-in. This digital approach ensures accuracy, reduces manual effort, eliminates long queues, and provides a more transparent and user-friendly experience for both stallholders and event organizers.

Enterprise Architecture Overview

The DSMS adopts a layered enterprise architecture separating presentation, application services, domain, and data layers. This ensures scalability, maintainability, and security. The presentation layer supports responsive web and mobile apps; the application layer handles registration, booking, payments, and feedback; the domain layer models entities like Vendor, Stall, Booking; and the data layer relies on relational storage. The system aligns with TOGAF principles (The Open Group, 2018) and emphasizes availability (99.9% uptime), scalability, and usability.

Data flow diagram level 0



Description	Data sent to the system	Data received from the system
1)Customer (The Customer, an external user, interacts with the system to browse and book stalls.)	The Customer sends a request to "View Stall Info," indicating they are browsing available stalls.	The Customer receives instructions to "Initiate Payment" to complete a booking, and a "Payment Receipt" upon a successful transaction.
2)Vendor (The Vendor, an external user, is the one who sells goods and services.)	The Vendor sends a request to "Register Vendor" to join the system and then sends "Book Stall" data to reserve a stall.	The Vendor receives a "Notification," which could be a booking confirmation or other updates.
3)Market Admin (The Market Admin is an internal stakeholder who manages the system and stalls.)	The Admin performs management actions such as "Upload Stall Info" (adding new stalls), "Approve Booking" (confirming a vendor's booking), and "Assign Stall Location."	The Admin requests and receives a "Generate Reports" data flow for administrative oversight.
4)Payment Gateway (This is a third-party service that handles financial transactions.)	The Payment Gateway sends a "Transaction ID" back to the system, confirming that a payment has been processed.	The system sends the "Amount to be paid" and "Payment method" to the gateway to initiate a transaction.

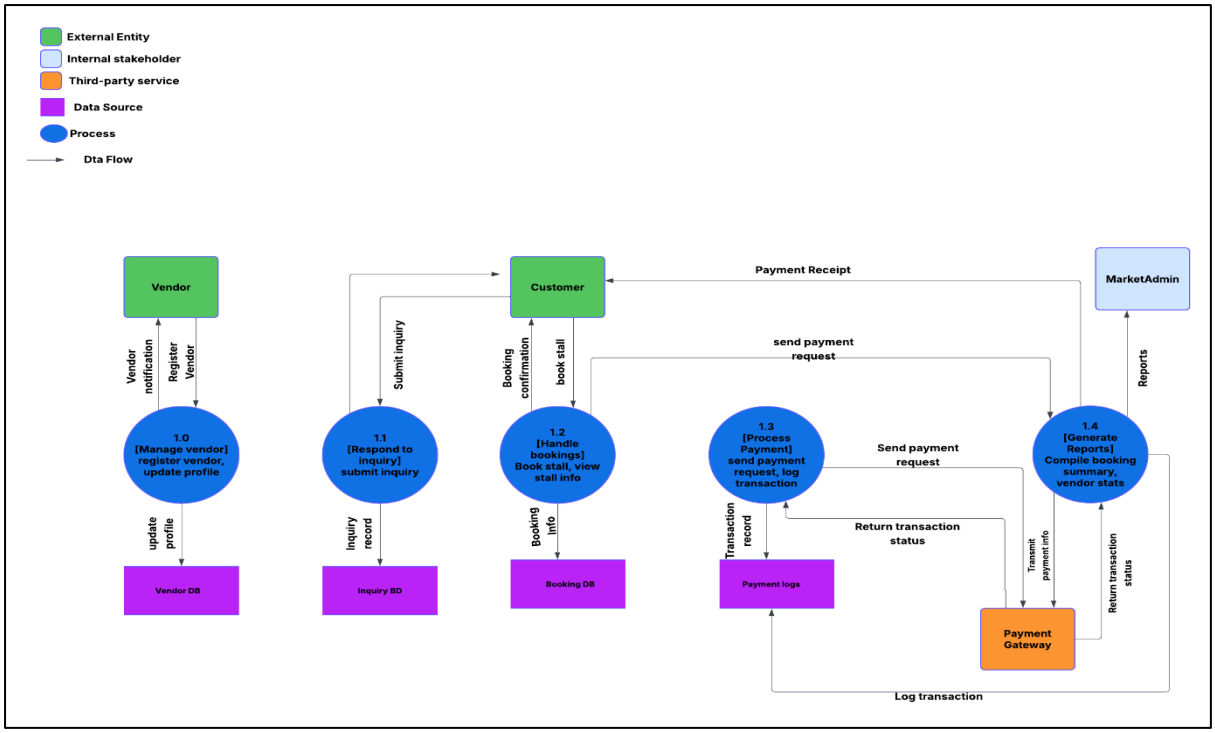
Data flow diagram level 1

Processes

1.0 [Manage Vendor]: This process is responsible for all vendor-related information management. It receives register vendor and update profile data flows from the Vendor external entity and stores them in the Vendor DB. It also sends Vendor notification back to the Vendor.

1.1 [Respond to inquiry]: This process handles customer questions. It takes Submit inquiry from the Customer and stores the Inquiry record in the Inquiry DB.

1.2 [Handle Booking]: This is the core booking logic. It receives booking confirmation and book stall, view stall info from the Customer. It then stores this Booking info in the Booking DB and sends a send payment request to the Process Payment process (1.3).



1.3 [Process Payment]: This process manages all payment-related activities. It receives a send payment request from the Handle Booking process (1.2). It sends a send payment request to the Payment Gateway and logs the result (Log transaction) in the Payment logs data store. It also receives a return transaction status from the Payment Gateway.

1.4 [Generate Reports]: This process is for administrative functions. It receives a request for Reports from the MarketAdmin internal stakeholder. It compiles data from the system, such as Compile booking summary and vendor stats, to produce and send Reports back to the MarketAdmin. It also receives payment information from the Payment Gateway to be included in the reports.

Data Stores

Vendor DB: Stores all information related to vendors.

Inquiry BD: Stores all customer inquiry records.

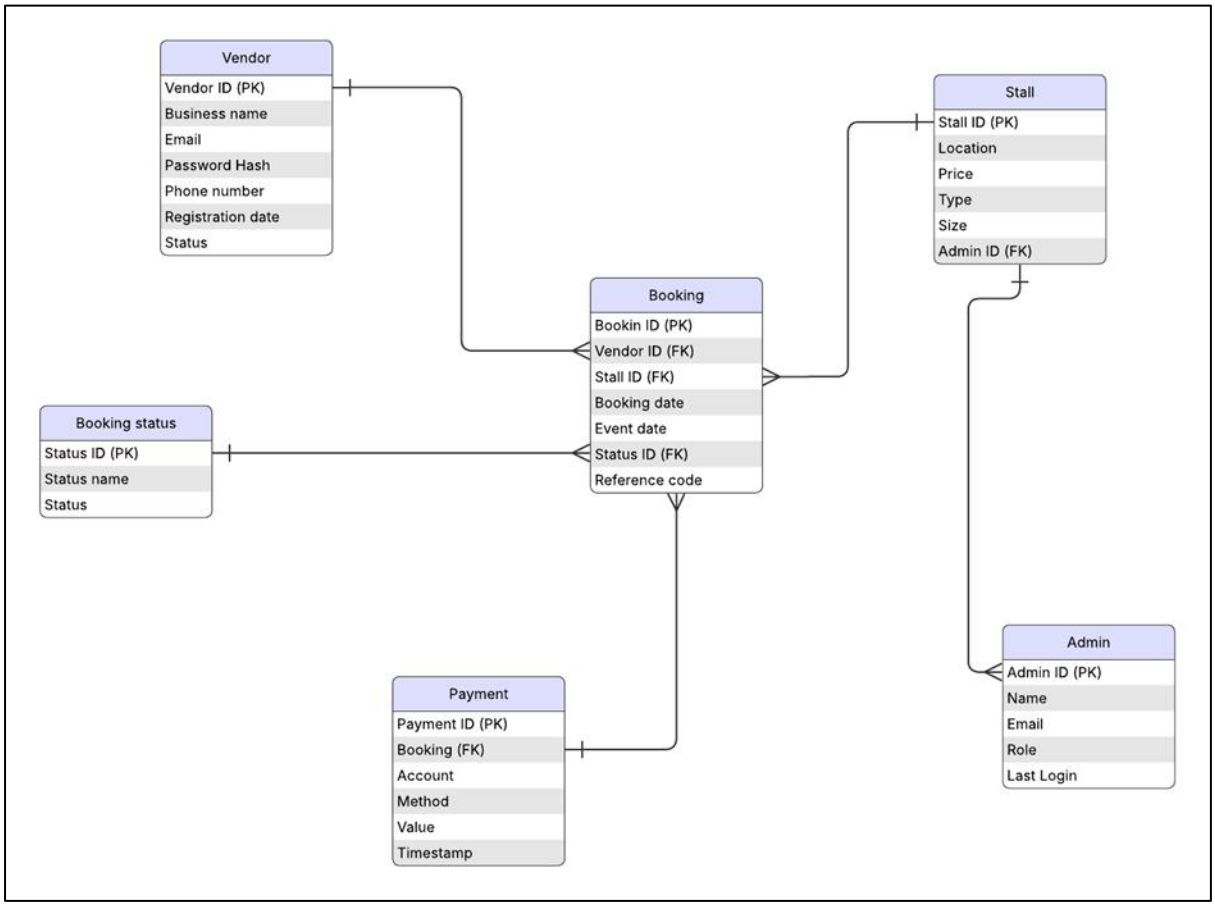
Booking DB: Stores the core booking information, linking vendors to stalls.

Payment logs: Stores a record of all transactions processed by the system.

External Entities & Internal Stakeholders

The Vendor, Customer, Market Admin, and Payment Gateway interact with the relevant processes as described above, serving as the sources and destinations for data flows.

ERD and description



No.	Entity	Purpose	Key Attributes
1	Vendor	Stores information about a business or individual that books a stall.	Vendor ID (PK), Business name, Email, Password Hash, Phone number, Registration date, Status
2	Stall	Represents the physical locations that are available for booking.	Stall ID (PK), Location, Price, Type, Size, Admin ID (FK)
3	Admin	Stores details for administrators who manage the stalls.	Admin ID (PK), Name, Email, Role, Last Login
4	Booking	Links a vendor to a specific stall for a given event date. It is the central record for a booking.	Booking ID (PK), Vendor ID (FK), Stall ID (FK), Booking date, Event date, Status ID (FK), Reference code
5	Booking status	A lookup table containing all possible statuses for a booking (e.g., 'Pending', 'Confirmed').	Status ID (PK), Status name, Status
6	Payment	Records financial transactions made for a booking.	Payment ID (PK), Booking (FK), Account, Method, Value, Timestamp

Data Dictionary

1. Vendor Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Vendor_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique identifier for each vendor	System-generated, immutable
Business_Name	VARCHAR	100	NOT NULL	Official business or individual name	Must be unique, 2-100 characters
Email	VARCHAR	255	NOT NULL, UNIQUE	Contact email address	Valid email format, used for login
Password_Hash	VARCHAR	255	NOT NULL	Encrypted password storage	SHA-256 hash, minimum 8 char original
Phone_Number	VARCHAR	20	NOT NULL	Contact phone number	International format accepted
Registration_Date	DATETIME	-	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Account creation timestamp	System-generated
Status	ENUM	-	NOT NULL, DEFAULT 'Active'	Account status	Values: 'Active', 'Suspended', 'Pending'

2. Stall Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Stall_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique stall identifier	System-generated, immutable
Location	VARCHAR	50	NOT NULL	Physical stall location	Format: "Section-Row-Number"
Price	DECIMAL	10,2	NOT NULL, CHECK (Price > 0)	Rental price per event	Must be positive value
Type	ENUM	-	NOT NULL	Stall category	Values: 'Food', 'Retail', 'Service', 'Craft'
Size	ENUM	-	NOT NULL	Physical dimensions	Values: 'Small', 'Medium', 'Large'
Admin_ID	INT	-	FOREIGN KEY, NOT NULL	Managing administrator	References Admin.Admin_ID

3. Admin Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Admin_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique administrator identifier	System-generated, immutable
Name	VARCHAR	100	NOT NULL	Administrator full name	2-100 characters

Email	VARCHAR	255	NOT NULL, UNIQUE	Administrative contact email	Valid email format, login credential
Role	ENUM	-	NOT NULL	Administrative role level	Values: 'Super Admin', 'Manager', 'Staff'
Last_Login	DATETIME	-	NULL	Recent login timestamp	Updated on each login

4. Booking Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Booking_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique booking identifier	System-generated, immutable
Vendor_ID	INT	-	FOREIGN KEY, NOT NULL	Booking vendor	References Vendor.Vendor_ID
Stall_ID	INT	-	FOREIGN KEY, NOT NULL	Reserved stall	References Stall.Stall_ID
Booking_Date	DATETIME	-	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Booking creation date	System-generated
Event_Date	DATE	-	NOT NULL	Scheduled event date	Must be future date
Status_ID	INT	-	FOREIGN KEY, NOT NULL	Current booking status	References Booking_Status.Status_ID

Reference_Code	VARCHAR	20	NOT NULL, UNIQUE	Customer reference identifier	Format: "BK" + timestamp + random

5. Booking_Status Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Status_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique status identifier	System-generated, immutable
Status_Name	VARCHAR	50	NOT NULL, UNIQUE	Status description	Values: 'Pending', 'Confirmed', 'Cancelled', 'Completed'
Status_Description	TEXT	-	NULL	Detailed status explanation	Optional business context

6. Payment Entity

Attribute	Data Type	Length	Constraints	Description	Business Rules
Payment_ID	INT	-	PRIMARY KEY, NOT NULL, AUTO_INCREMENT	Unique payment identifier	System-generated, immutable
Booking_ID	INT	-	FOREIGN KEY, NOT NULL	Associated booking	References Booking.Booking_ID

Account	VARCHAR	100	NOT NULL	Payment account/card reference	Masked for security
Method	ENUM	-	NOT NULL	Payment method used	Values: 'Credit Card', 'Bank Transfer', 'Cash', 'Digital Wallet'
Value	DECIMAL	10,2	NOT NULL, CHECK (Value > 0)	Payment amount	Must match stall price
Timestamp	DATETIME	-	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Payment processing time	Transaction completion time

Data Validation Rules

Cross-Entity Constraints

- **Booking.Event_Date** must be ≥≥ current date + 1 day
- **Payment.Value** must equal **Stall.Price** for the associated booking
- One active booking per **Vendor_ID + Event_Date** combination
- **Admin.Role** determines stall management permissions

Business Logic Rules

Vendors with 'Suspended' status cannot create new bookings s

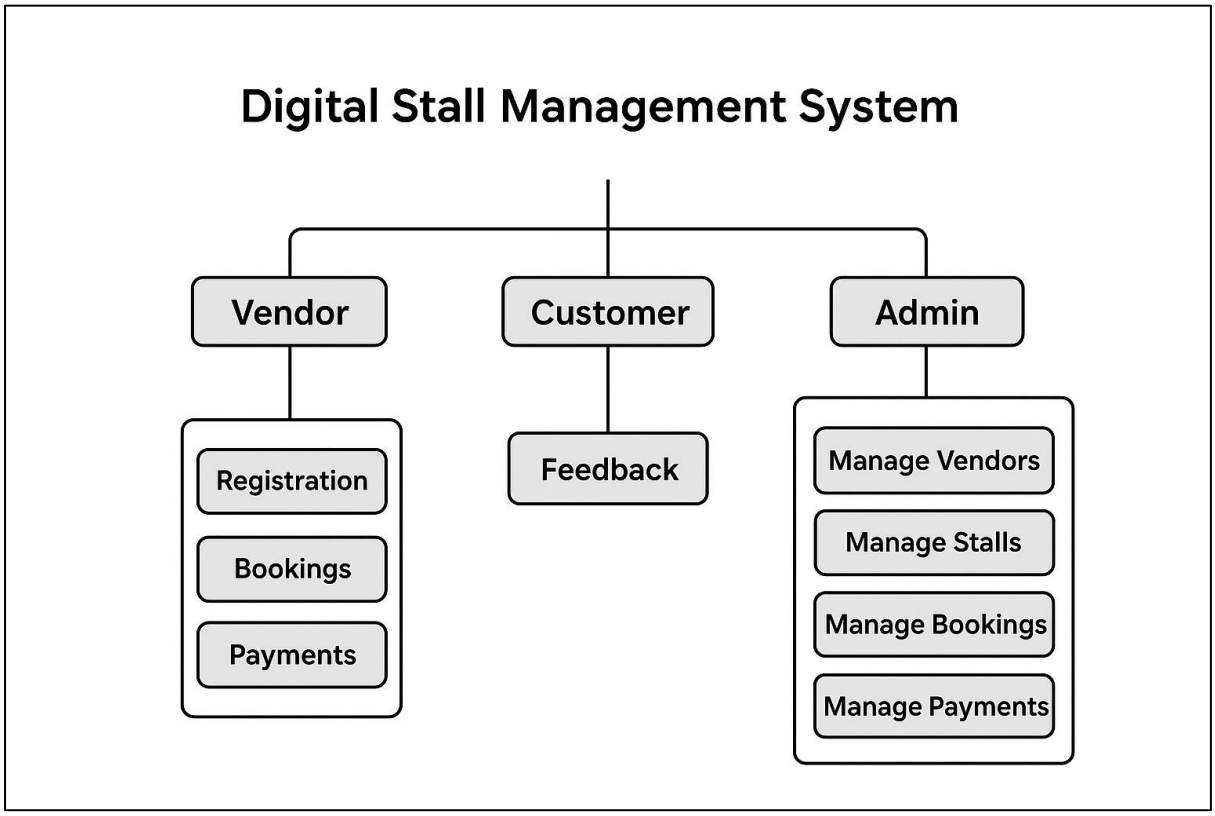
Payments must be completed before booking status changes to 'Confirmed' s

Reference codes must be generated using format: "BK" + YYYYMMDD + 4-digit random number.

UXUI

Site Map

We'll structure it like a family tree to clearly show the hierarchy of system pages.



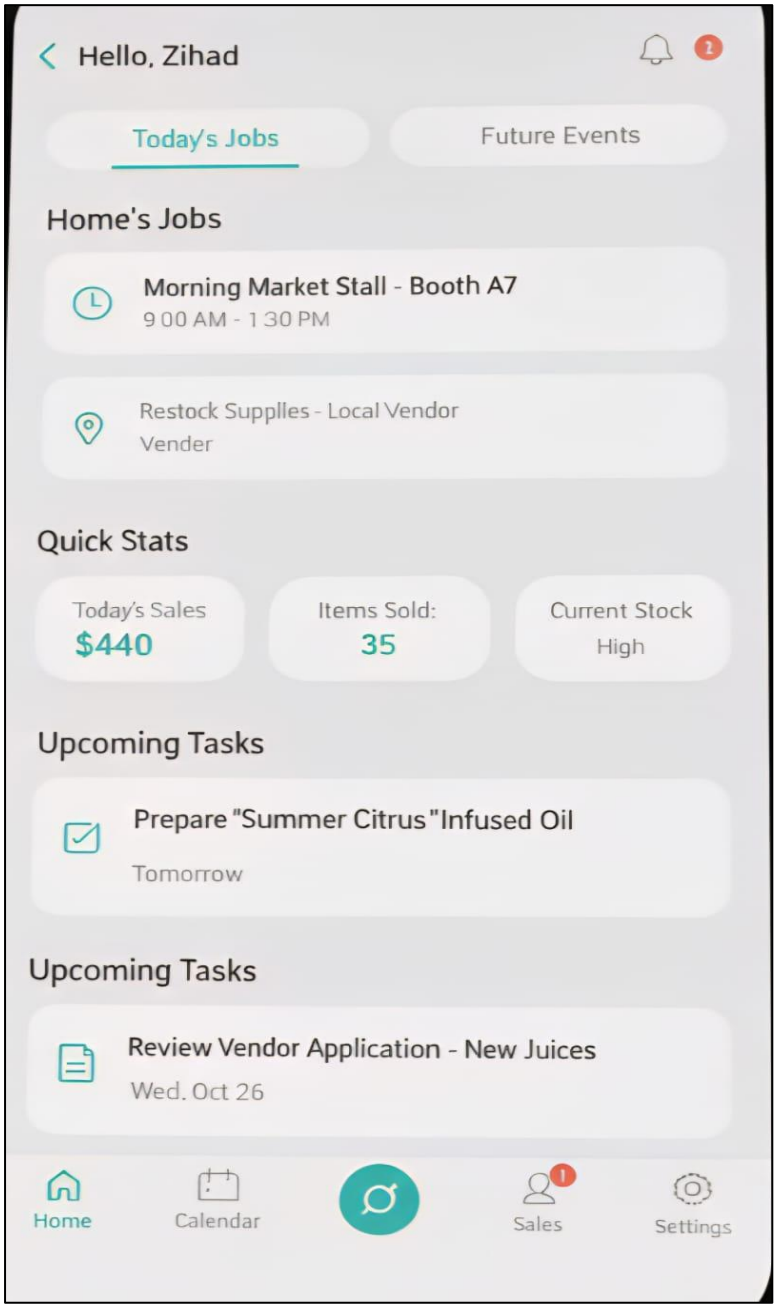
The site map illustrates the high-level navigation of DSMS. Vendors have access to **registration, bookings, and payments**. Customers can provide **feedback**. Admins have broader privileges, including managing **vendors, stalls, bookings, and payments**. This tree-like representation shows which user group can access specific features, ensuring clarity in system navigation.

Wireframes

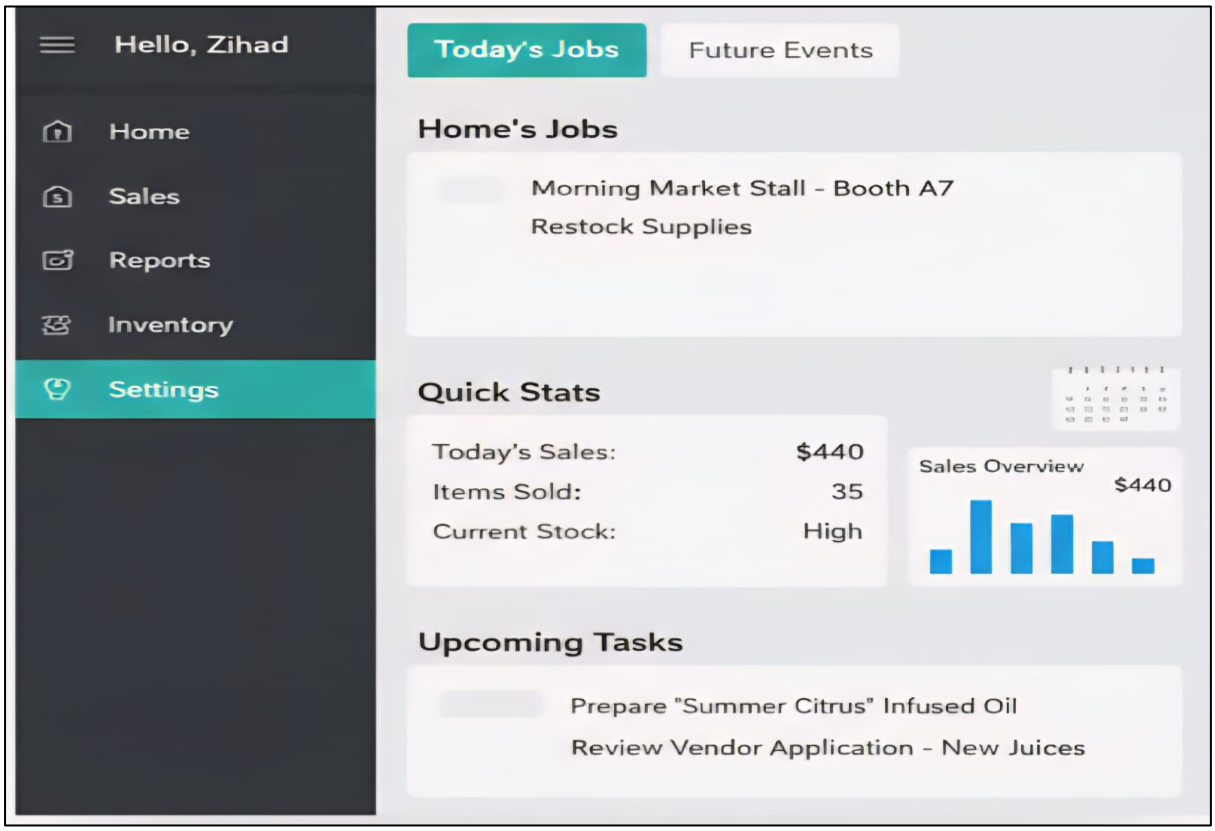
These are **sketches** of the app/web pages.

- Show where the buttons go, where the forms are, where menus are placed.
- Not final design, just the layout idea.

Mobile Phone Interface



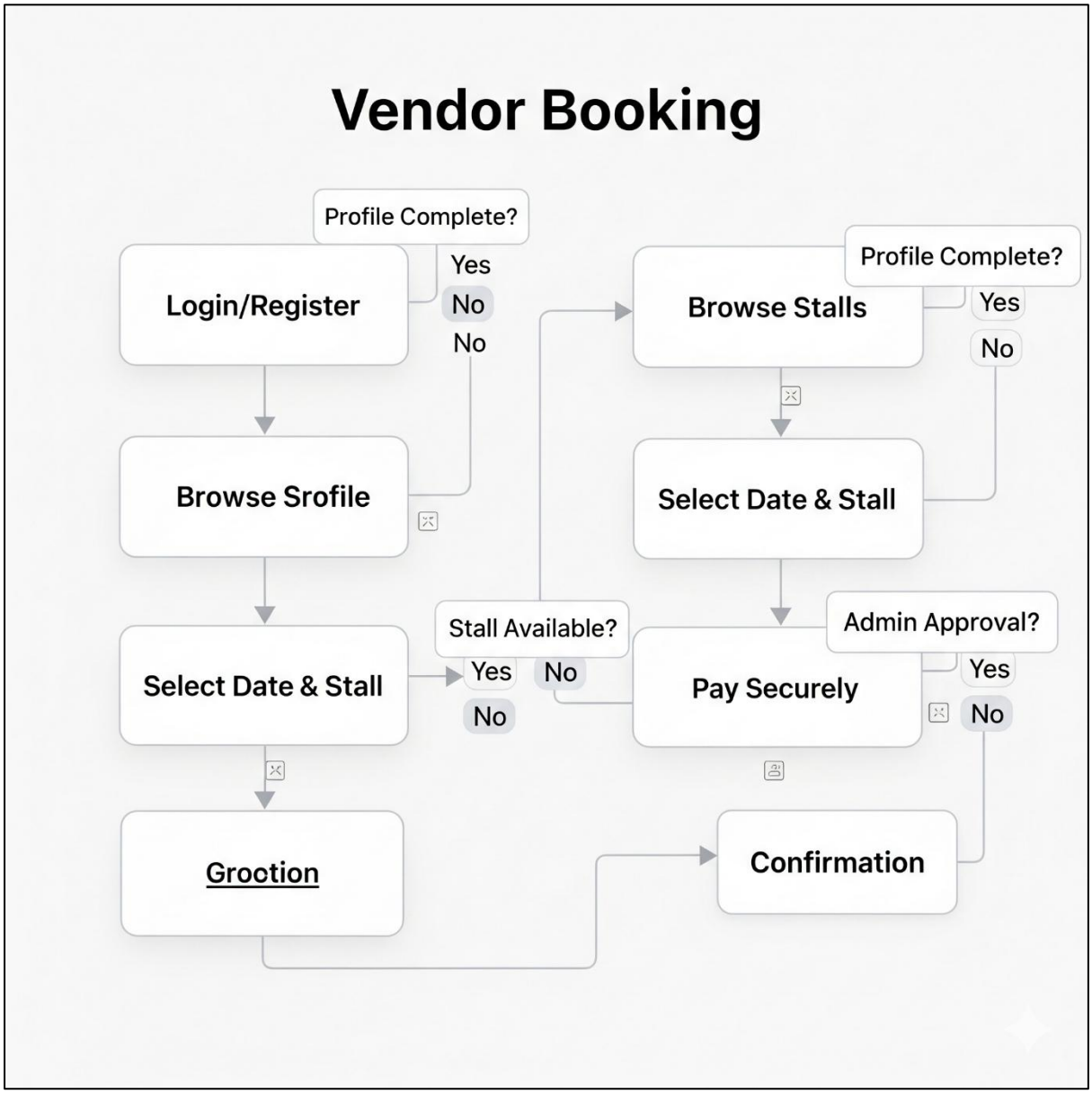
Desktop Interface



The wireframe is a simple black-and-white layout showing the structure of a mobile app interface, with clear sections for the header, navigation, content area, and footer. It uses boxes and placeholders to represent images, buttons, and text, keeping the design minimal and easy to follow for planning the app's functionality.

User Flow Diagram

Vendor Booking Flow:



Description:

The user flow shows the **step-by-step decision process** a vendor follows. If a stall is unavailable, they must select another. If payment fails, they retry until they are successful. Once payment is confirmed, the booking is finalized. Using “Yes/No” branches make the process easy to understand and highlights possible decision points.

Conclusion

The design integrates enterprise architecture, process modeling, ERD, data dictionary, and UX/UI considerations. This holistic approach ensures the DSMS is scalable, usable, and reliable, supporting both vendors and visitors of the Mindil Beach Sunset Market.

References

Dash, A. *et al.* (2024) 'Business Proposal for an E-Accommodation Platform in Bangladesh: A Market Analysis and Opportunities', *Proceedings of the International Conference on Industrial Engineering and Operations Management* [Preprint]. Available at: https://doi.org/10.46254/ba07.20240092.

Doganaksoy, N., Meeker, W.Q. and Hahn, G.J. (2021) 'Achieving Product Reliability'. Available at: https://doi.org/10.1201/9781003181361.

Genctürk, I. (2024) *Development of a Location Based Interactive Mobile Web Application For Enriching Visitors' Knowledge And Experience*. Available at: https://www.tkgm.gov.tr/sites/default/files/2024-07/Masters_Thesis_Gencturk.pdf.

Genctürk, I. (2024) *Development of a Location Based Interactive Mobile Web Application For Enriching Visitors' Knowledge And Experience*. Available at: https://www.tkgm.gov.tr/sites/default/files/2024-07/Masters_Thesis_Gencturk.pdf.

Hudson, S. and Hudson, L. (2023) *Marketing for Tourism, Hospitality & Events*. SAGE Publications Limited.

Luckman, S. (2011) 'Tropical cosmopolitanism and outdoor food markets in (post)colonial Australia', *Continuum*, 25(5), pp. 653–667. Available at: https://doi.org/10.1080/10304312.2011.597845.

Neale, T. (2023) 'Performing control', *American Ethnologist*, 50(4), pp. 568–581. Available at: https://doi.org/10.1111/amet.13218.

O'Toole, C. (2022) *Examining the Impact of a Virtual Parent Training on the Perceived Stress Levels of Parents who have Children with Autism Spectrum Disorder*, *Tdl.org*. Available at: https://ttu-ir.tdl.org/items/89723d32-792d-4414-9dd6-96911f6be414 (Accessed: 27 August 2025).

Pacifico, A.M., Luca Mulazzani and Giulio Malorgio (2025) 'Are the economic valuations of marine and coastal ecosystem services supporting policymakers? A systematic review and remaining gaps and challenges', *Frontiers in Marine Science*, 11. Available at: https://doi.org/10.3389/fmars.2024.1501812.

Yang, F. *et al.* (2018) 'A Cloud-Based Digital Farm Management System for Vegetable Production Process Management and Quality Traceability', *Sustainability*, 10(11), p. 4007. Available at: https://doi.org/10.3390/su10114007.

Ablanedo-Rosas, J. H., Gao, H., Alidaee, B., & Teng, W. G. (2019). Using information systems to improve market management: A case study in vendor stall allocation. *Journal of Information Systems and Technology Management, 16*(3), 1–15. https://doi.org/10.4301/S1807-1775201916003

Dennis, A., Wixom, B. H., & Roth, R. M. (2021). *Systems analysis and design* (7th ed.). Wiley.

Kendall, K. E., & Kendall, J. E. (2019). *Systems analysis and design* (10th ed.). Pearson.

Mindil Beach Sunset Market. (2023). *About the market*. Retrieved from https://mindil.com.au/

Satzinger, J. W., Jackson, R. B., & Burd, S. D. (2020). *Systems analysis and design in a changing world* (8th ed.). Cengage Learning.

Stair, R., & Reynolds, G. (2020). *Principles of information systems* (14th ed.). Cengage Learning.

Broome, W. C. H. P. D. A. (2025, June 10). Mindil Beach Sunset Market. *Defender Adventure*. https://defenderadventure.com.au/mindil-beach-sunset-market/

Mindil Beach Sunset Market. (n.d.). Mindil Beach Sunset Market. https://mindil.com.au/

Mindil Beach Sunset Market | Discover Darwin. (2001, October 30). https://discover.darwin.nt.gov.au/events/mindil-beach-sunset-market-0