

Parking Management System Requirements

Oct 29, 2013

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Introduction

This document is a Software Requirement Specification (“SRS”) for ABC Inc.'s (“the client”) Parking Management System (“PAMS”, “system”) project, prepared by and to be implemented by Sias Inc. (“company”) or its affiliates. The document is intended to enumerate the concerns of the client (Introduction), provide a brief overview of the project and its goals (Executive Summary), detail the technical requirements of PAMS and its operating environment (System Requirements Specification, Application Context/Environmental Constraints), define the high-level priorities of the system (Software Qualities), define other needs and provide a glossary of terms (Other Requirements), identify the company's assumptions and any potential risks to the client (Assumptions/Risks), outline the deployment of the system (Priorities/Implementation Phases), and provide guidance and insight toward the future of the system (Future Directions and Expected Changes).

Overview / Executive Summary

The client is a multinational company which designs, develops, maintains, and markets shopping stores. They have five office locations and twenty store locations in the United States, each including a multi-level parking structure (three to five levels) with two entrances/exits. Parking capacity at office locations ranges from five hundred to one thousand vehicles; capacity at store locations is approximately one thousand vehicles. Both office and store parking structures have automated gates while store structures include manned kiosks. Parking is free for employees at both locations. Customers at store locations pay \$10 for all-day permits. Parking fees can be waived (validated) by any retail purchase.

The PAMS project was commissioned by the client in response to two conditions. First, employees at its five US office locations routinely spend twenty to thirty minutes finding a parking space when arriving at work. The extra time spent finding an open space is a direct result of congestion within the structure. While there are enough spaces to accommodate employees and visitors at each of the office locations, there is no current system (method or infrastructure) for streamlining the parking task. Second, a desire to implement a state-of-the-art disaster and emergency management system within PAMS has been conveyed by the client. The current system relies on standard manual fire alarms and call boxes which are underutilized due to lack of visibility.

The client requires a system which addresses both stated concerns, while preventing issues from arising at its retail locations. To this end, the client has commissioned PAMS to be implemented at all of its US office and store locations. While some requirements differ between locations (office vs store, primarily for permit/payment purposes), the system will be universal in breadth.

PAMS will function on two levels: as a parking management system and as a disaster management system. The parking management system will contain the software and hardware necessary to reduce employee and customer parking time to not more than ten minutes. It will achieve this primarily by the use of electronic billboards within the parking structure and by mobile application, both of which will enumerate available parking spaces via pressure sensors in the floor of the structure. For store locations, the system will provide for distribution of parking permits (tickets), payment of parking fees, validation of customer receipts, and verification of employee identification. For office

locations, the system will provide for verification of employee identification. The system will also include facilities to record and store parking data at all locations for use by corporate analysts.

The disaster management system will contain the software and hardware necessary to facilitate a safe and speedy exit from the structure in case of emergency. It will achieve this primarily by the use of electronic billboards, digital exit signage, mobile application, and loudspeakers. These will inform users of the emergency (loudspeakers and mobile app), illuminate exits (billboards and exit signage), and provide contact information (mobile app).

PAMS will interact with current systems and infrastructure where applicable. Office locations feature automated gates and barcode-scanning devices for employee identification and verification. Store locations feature automated gates, permit (ticket) delivery devices, barcode-scanning devices, and manned kiosks for payment of parking fees (by cash or credit card). This infrastructure will not be altered except to comply with PAMS requirements. In addition, current fire alarm and call box functionality will not be altered, but supplemented with PAMS features. The current employee permit system will be integrated where feasible and replaced where necessary.

Application Context / Environmental Constraints

There will be one web application and one mobile phone application (per platform) for access to and management of PAMS. The basic component will be available to customers and general employees while access to secure features will be restricted to management and security personnel.

The basic component of both apps must have three interfaces. First, it must display parking availability for the chosen parking structure. Second, it must display disaster/emergency notifications. Third, it must provide contact and location information (phone, hours, address, etc.)

The management component of both apps must include interfaces to: view/modify employee profiles/permits, add/remove fees/citations, initiate and terminate PAMS disaster notifications/functions, and customize PAMS functionality.

The security personnel component of both apps must include interfaces to: view employee profiles/permits, add/remove fees/citations, and initiate and terminate PAMS disaster notifications/functions.

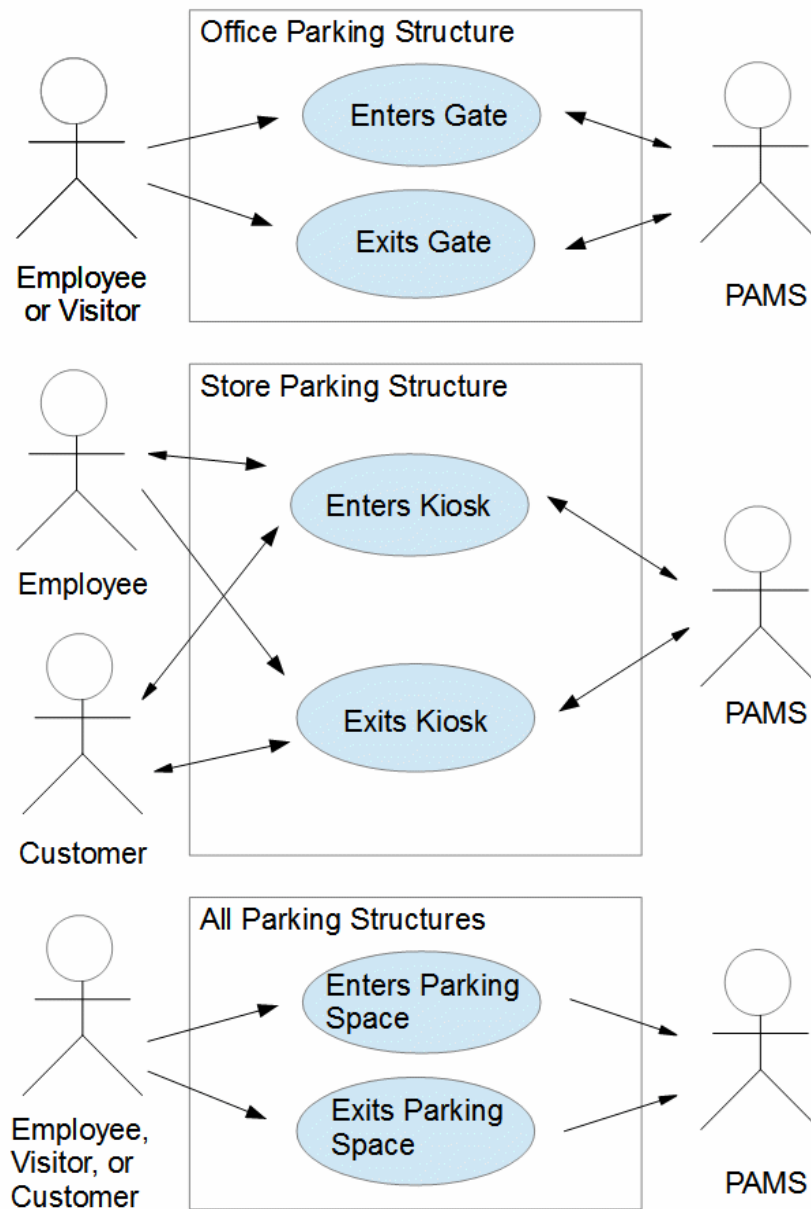
The management and security personnel components of the web app must also include an interface to receive and verify scanned data from tickets, receipts, and employee IDs, and to process payment information. This is the interface that will be used by security personnel at the kiosks.

Platforms for the mobile app must include iOS and Android. The web app must function in the client's preferred browser.

System Requirements Specification

The following use-cases constitute the functional requirements for PAMS. They are organized by interface. First are use-cases relating specifically to the parking structures. Second are use-cases relating to the mobile/web application.

Use Case Diagrams 1, 2, 3: Use Cases 1 - 8



Use Case 1: Employee/visitor enters gate at office parking structure.

Basic Flow (Main Success Scenario)

1. Employee/visitor presents barcode to scanner
2. System scans ID
3. System verifies ID
4. System activates gate immediately

Alternative Flow

3a. ID cannot be scanned or verified

1. Employee/visitor presses button for assistance

Use Case 2: Employee/visitor exits gate at office parking structure.

Basic Flow (Main Success Scenario)

1. Employee/visitor presents ID to scanner
2. System scans ID
3. System verifies ID
4. System activates gate immediately

Alternative Flow

3a. ID cannot be scanned or verified

1. Employee/visitor presses button for assistance

Use Case 3: Employee enters kiosk at store parking structure.

Basic Flow (Main Success Scenario)

1. Employee presents ID to scanner
2. System scans ID
3. System verifies ID
4. System dispenses employee ticket immediately
5. Employee takes ticket from dispenser
6. System opens transaction
7. System activates gate immediately

Alternative Flow

3a. ID cannot be scanned or verified

1. Security person verifies profile/permit information
2. Return to BF Step 4

Alternative Flow

4a. Dispenser is out of tickets

3. System notifies security person
4. Security person refills dispenser
5. Return to BF Step 4

Use Case 4: Employee exits kiosk at store parking structure.

Basic Flow (Main Success Scenario)

1. Employee presents ticket to security person
2. Employee presents ID to security person
3. Security person scans ticket
4. System verifies ticket
5. Security person scans ID

6. System verifies ID
7. System closes transaction
8. System activates gate immediately

Alternative Flow

1a. Employee lost ticket or ID

1. Security person verifies profile/permit information
2. Return to BF Step 7

Use Case 5: Customer enters kiosk at store parking structure.

Basic Flow (Main Success Scenario)

1. Customer presses button for ticket
2. System dispenses customer ticket immediately
3. Customer takes ticket from dispenser
4. System opens transaction
5. System activates gate immediately

Alternative Flow 1

1a. Employee lost ticket or ID

1. Security person verifies profile/permit information
2. Return to BF Step 7

Alternative Flow 2

2a. Dispenser is out of tickets

3. System notifies security person
4. Security person refills dispenser
5. Return to BF Step 2

Use Case 6: Customer exits kiosk at store parking structure.

Basic Flow (Main Success Scenario)

1. Customer presents ticket to security person
2. Security person scans ticket
3. System verifies ticket
4. System displays amount owed (\$10)
5. Customer presents payment
6. Security person authorizes payment
7. System prints receipt
8. System closes transaction
9. Security person activates gate

Alternative Flow 1

2a. Customer has receipt from purchase or return

1. Customer presents receipt to security person
2. Security person scans ticket
3. System verifies ticket
4. System displays amount owed
5. Attendant scans receipt
6. System verifies receipt
7. Return to BF Step 8

Alternative Flow 2

- 1a. Customer lost ticket (no receipt)
 - 1. Security person opens exception transaction
 - 2. Return to BF Step 4

Alternative Flow 3

- 1a. Customer lost ticket (has receipt)
 - 3. Customer presents receipt to security person
 - 4. Security person opens exception transaction
 - 5. Return to AF1 Step 4

Use Case 7: Employee/Customer/Visitor enters parking space at any structure.

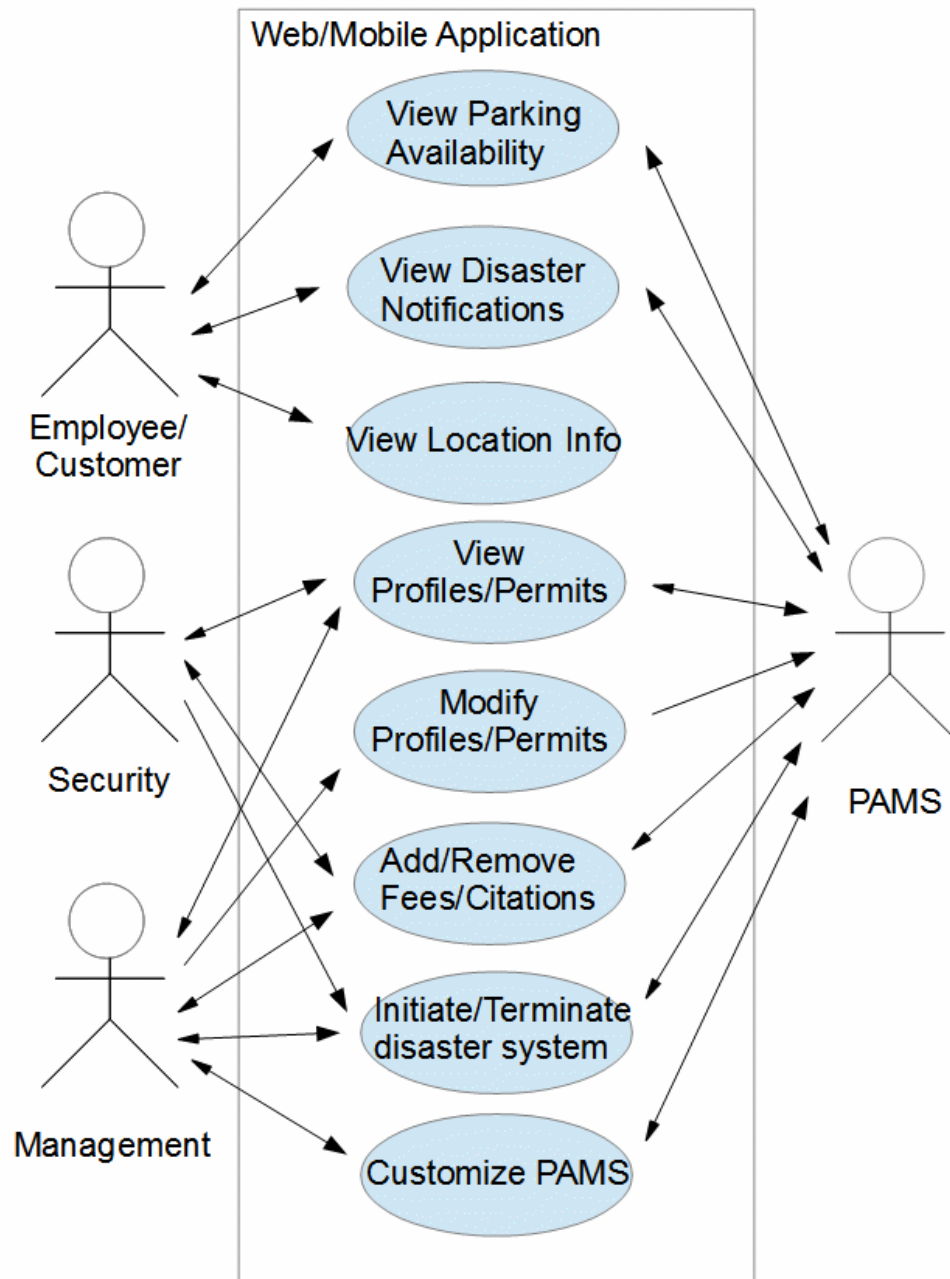
Basic Flow (Main Success Scenario)

- 1. Vehicle activates floor sensor
- 2. System updates electronic billboards within 5 seconds
- 3. System pushes updates to web/mobile app within 5 seconds
- 4. System logs transaction

Use Case 8: Employee/Customer/Visitor exits parking space at any structure.

Basic Flow (Main Success Scenario)

- 1. Vehicle deactivates floor sensor
- 2. System updates electronic billboards within 5 seconds
- 3. System pushes updates to web/mobile app within 5 seconds
- 4. System logs transaction



Use Case Diagram 4: Use Cases 9 - 15

Use Case 9: Employee/Customer views parking availability

Basic Flow (Main Success Scenario)

1. User activates interface
2. System updates interface with current conditions at thirty-second intervals

Alternative Flow

2a. System can't update interface

1. App displays message stating communication error, will retry
2. Return to BF Step 2

Use Case 10: Employee/Customer views disaster notifications

Basic Flow (Main Success Scenario)

1. User activates interface
2. System updates interface with current conditions at ten-second intervals

Alternative Flow

2a. System can't update interface

1. App displays message stating communication error, will retry
2. Return to BF Step 2

Use Case 11: Employee/Customer views location information

Basic Flow (Main Success Scenario)

1. User activates interface
2. App displays stored information

Use Case 12: Security/Management views employee profiles/permits

Basic Flow (Main Success Scenario)

1. User activates secure features interface
2. User enters credentials
3. System verifies credentials
4. System displays current information

Exception Flow

3a. Forgets/lost credentials or system can't verify credentials

1. User contacts management / IT

Use Case 13: Management modifies profiles/permits, adds/removes fees/citations, or customizes PAMS

Basic Flow (Main Success Scenario)

1. User activates secure features interface
2. User enters credentials
3. System verifies credentials
4. System displays current information
5. User edits information
6. System modifies records
7. System logs transaction
8. System displays updated information

Alternative Flow

6a. System can't modify record

1. System display error message, please try again in a minute
2. Return to BF Step 5

Exception Flow

3a. Forgets/lost credentials or system can't verify credentials

3. User contacts management / IT

Use Case 14: Security/Management initiates disaster system

Basic Flow (Main Success Scenario)

1. User activates secure features interface
2. User enters credentials
3. System verifies credentials
4. User initiates disaster system
5. System displays emergency information on electronic billboards
6. System activates exit signage
7. System activates sirens
8. System activates Loudspeakers
9. System notifies management of initiation
10. System logs transaction

Exception Flow

3a. Forgets/lost credentials or system can't verify credentials

1. User contacts management / IT

Use Case 15: Security/Management terminates disaster system

Basic Flow (Main Success Scenario)

1. User activates secure features interface
2. User enters credentials
3. System verifies credentials
4. User terminates disaster system
5. System displays parking information on electronic billboards
6. System deactivates exit signage
7. System deactivates sirens
8. System deactivates Loudspeakers
9. System notifies management of termination
10. System logs transaction

Exception Flow

3a. Forgets/lost credentials or system can't verify credentials

User contacts management / IT

End of Use Cases.

Software Qualities and Non-functional Requirements

PAMS is responsible for the smooth flow of traffic in and out of the client's parking structures. It is also responsible for proper functioning of the disaster management system. The system must therefore be as reliable as possible, lest malfunction lead to safety hazards and loss of productivity. Full functionality of the web portal and attached terminals is key. Functionality and robustness of the mobile application is secondary in importance, for it does not interfere with full operational capabilities of the system.

Usability of both the web and mobile apps should be emphasized, as each will be used by the general public as well as by the client's employees. Interfaces should be uncluttered, buttons should have precedence over dropdown menus. The secure interface, used by management and security personnel, need not be as visually intuitive, as the sheer number of options will likely preclude it.

Speed of transactions: authorizing payments, updating billboards, activating gates, updating apps with emergency information - especially in the case of all disaster-related mechanisms – should be as immediate as possible, in addition to being robust. Likewise, payment-related mechanisms should function as quickly as possible, since eliminating wasted time is one of the primary reasons for the system to exist.

Other Requirements

Redundant local and/or secure cloud storage will be required to accommodate the storage and retrieval of parking data. This data should be stored in the client's preferred format for analysis.

List of Locations

Offices	Information
Santa Monica, CA	Lot size: 500; Lot hours: 24 hrs
San Francisco, CA	Lot size: 500; Lot hours: 24 hrs
Las Vegas, NV	Lot size: 500; Lot hours: 24 hrs
New York, NY	Lot size: 1000; Lot hours: 24 hr
Portland, OR	Lot size: 500; Lot hours: 24 hrs
Stores	
San Diego, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Los Angeles, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
San Francisco, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
San Jose, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Sacramento, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Long Beach, CA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Las Vegas, NV	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Seattle, WA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Portland, OR	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm

Denver, CO	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Boston, MA	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Chicago, IL	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Charlotte, NC	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Miami, FL	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Detroit, MI	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Phoenix, AR	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Houston, TX	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
New York, NY	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Columbus, OH	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm
Washington D.C.	Lot size: 1000; Lot hours: 7am – 11pm; Store hours: 8am -10pm

Glossary of Terms

SRS	System Requirements Specification
Client	ABC, Inc.
Company	Sias Inc.
System Requirements Specification	A document which describes the functions and qualities of the proposed system and constraints which it must operate under.
PAMS	Parking Management System project
Kiosk	Manned station at entrance/exit to parking structure.
iOS	The operating system that the iPhone and iPad run
Android	Google's free operating system used on many smart phones
Use-case	A set of step-by-step scenarios detailing specific actions required to complete a task. They are often used to define the functional requirements of a system.
Basic Flow	The “happy day” scenario, in which everything goes according to plan
Alternative Flow	A deviation from the Basic Flow, which still completes the use-case objective
Exception Flow	A scenario in which the original use-case objective cannot be completed.
ID	Employee ID card or visitor pass
Permit	Information regarding which locations an ID is authorized for
Profile	Information about an employee (eg picture, name, phone, etc)
Credentials	Password and/or biometric scan and/or physical key
Electronic billboard	An electronic sign which can display digital images/text. Similary to a large flatscreen monitor.
Interface	What is displayed on the screen including elements you can interact with.
IT	The client's IT department

Assumptions / Risks

Legal risks due to malfunction or failure of the system are outside the scope of this document. Many factors can affect a system of this scope and scale, including espionage, power outtages, and natural disasters. All reasonable precautions will be taken to ensure a secure and robust system.

Financial risks include going overbudget at any or all phases of development and implementation. While most factors can be adequately budgeted and projected, addition of requirements, the fluctuating cost of labor and parts, and many other factors can affect the company's cashflow and total costs.

Priorities / Implementation Phases

All functional requirements will be implemented in Phase I. At that time, surveys will be distributed to the client's employees requesting suggestions and feedback. Any agreed upon additional functionality will be implemented in a currently unscheduled Phase II.

The parking management system component of PAMS, (excluding deployment of mobile applications) is of the highest priority for Phase I implementation.

Future Directions and Expected Changes

The mobile and web-browser landscape is in constant flux. The web and mobile application components of PAMS will require regular updates to maintain compatibility and functionality across the digital landscape. In addition, new platforms and browsers will need to be monitored and vetted for possible inclusion into the system's requirements. A Windows Phone app should be considered for Phase II implementation if employee feedback suggests it is desired.