

ICT2101/2201

Introduction to Software Engineering



# Milestone 1: Software Development Plan & Specification

for

## Airline Pilot Management System

Prepared by

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***Individual Members Task Reflections***

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# **1 Introduction**

The client has approached our team to create a workload management system. The client, an Airline company, runs regular scheduled flights every week for their customers. While the flights largely remain fixed and unchanged, the client is in charge of assigning jobs to their staff each week, as well as managing the fluctuating manpower availability of their staff. The workload management system will be a web-based system that provides an interactive and visual platform for both staff and the manager to perform workload tasks. The project aims to lighten our client's workload management capacity and improve the visibility of staff availability.

## **1.1 Product Scope**

This product will be a web-based application meant to ease the client's workload management. This product will provide an informative way for managers to have an overview of the company's manpower and be aware of staff availability, as well as provide staff with an interactive and visual way to see their job assignments, working hours, and to indicate their availability.

Managers will be able to view all staff workloads, the top three staff with the lowest workload, and all staff with over 40 hours of jobs assigned immediately upon accessing the application. They will be able to allocate jobs to staff for one week at a time and up to three staff will be shown when allocating jobs, including all relevant information to the job assignment. This includes the staff's assigned workload, job preference, location on that date and availability. Managers will also be able to view the location of a plane at any given time.

Staff will be able to view all weekly job assignments and their overall workload for the month immediately upon accessing the application. They will be able to add and edit their availability up to five weeks in advance and indicate their job preference for the coming week. They will also be able to reject job assignments, but will be warned to discuss with their manager before proceeding.

## **1.2 Related Background Literature**

Sabre AirCentre Crew Management is a suite of software solutions developed by Sabre with the specific task of maximising airline crew efficiency, and cost while maintaining compliance to legal requirements and airline policies. The specific solutions that are applicable to our project are listed below.

Sabre AirCentre AirCrew helps to plan and monitor manpower available. A key feature of this solution is the crew leave manager which calculates the leave entitlement for crew members and automates vacation allocation. Crew roster optimiser is another key feature in this solution, this feature creates monthly rosters for pilots and flight attendants based on fatigue risk management and productivity. The last key feature is known as crew training solution. This feature supports the

scheduling of crew training and crew qualification management business processes. This allows the impact of crew disruptions to be minimized.

Sabre AirCentre Crew Manager allows managers to fully customize and control schedules based on an airline's requirements. Drafted schedules can be visualized in conjunction with the rest of the confirmed schedules before being finalized and published. Managers can also create schedule templates that can be reused.

Crew Manager also has a mobile application to allow an airline crew manager to send notifications to the crew members without needing another notification platform like email. [1]

### **1.3 Intended Audience and Document Overview**

This document is intended for the client, professors and software developers. It begins with an introduction and the scope of the product in section one, followed by the overview of the product where a high level description of the functions are provided in section two. Section three provides detailed explanations of the product's requirements. Section four contains our estimations and project management details. Section five consists of the reflections of each of our team's members. Lastly, sections six and seven are appendices that contain the detailed use case descriptions and the data dictionary respectively.

This document should be read from sections one to three, following which the reader may view sections six and seven for a deeper understanding of the requirements written in section three. The reader may then continue with sections four and five.

The client may choose to pay attention to sections one, two and four. Professors should focus on section five. Sections three, six and seven are the most important sections for software developers.

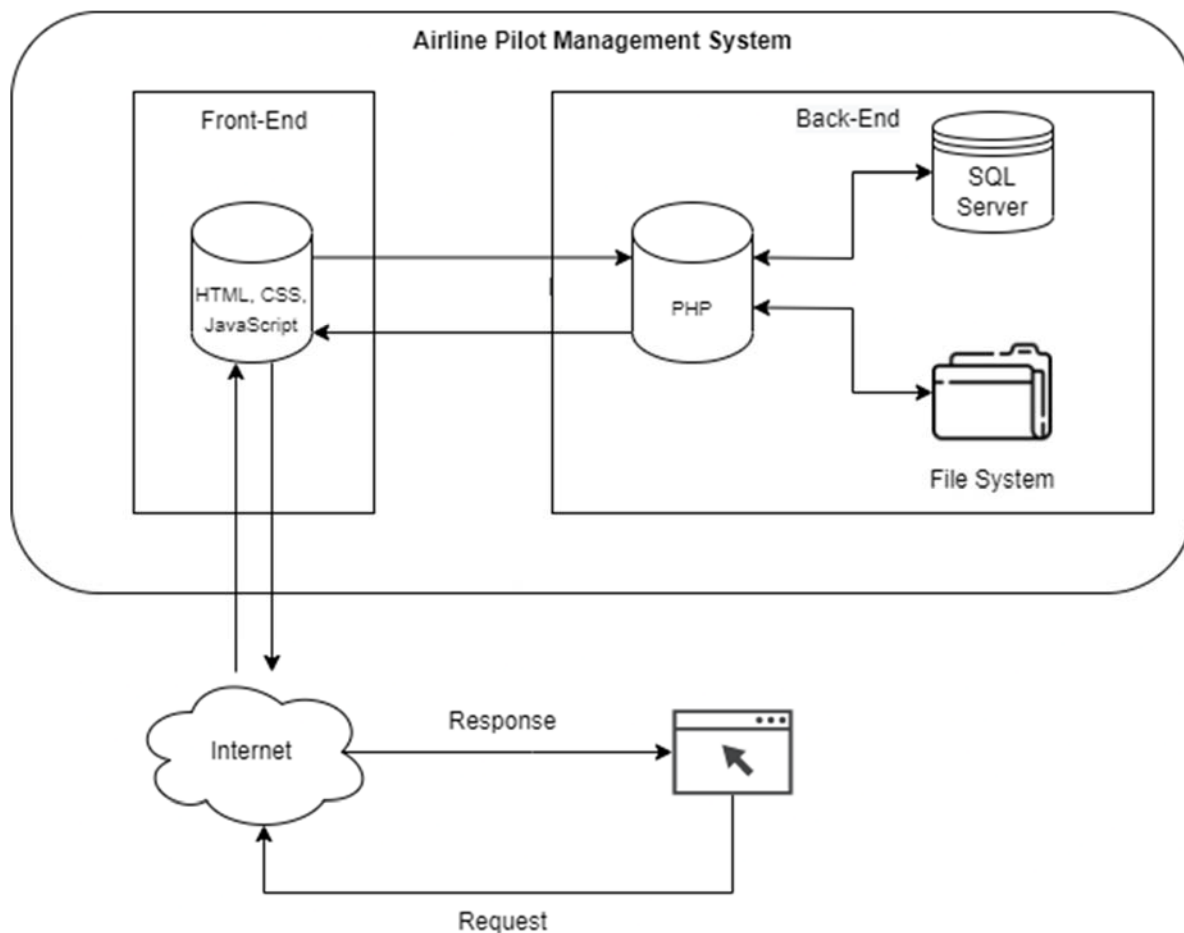
### **1.4 References and Acknowledgments**

[1] "Airline Solutions Dictionary - OPR PLF - Crew Management," *Opr Plf - Crew Management - Airline Solutions Dictionary*. [Online]. Available: <https://www.sabre.com/page/as-product-dictionary/opr-plt-crew-management/>. [Accessed: 24-Sep-2022].

## 2 Overall Description

### 2.1 Product Overview

This product will be a new, self-contained web-based application that makes use of hypertext markup language (HTML), cascading style sheet (CSS) and JavaScript for its front end, as well as PHP and MySQL database for the back end. Users will be able to access the front end of the application from a web browser and make requests on the application, which will then be reflected on the back end and information will be updated in the MySQL database.



## **2.2 Product Functionality**

**PF1:** The manager shall be able to allocate a week of jobs to all staff, based on their rank and aircraft qualification on the job allocation page.

**PF2:** The manager shall be able to search up to 3 staff with filters such as name or rank, to view their availability, preference, qualifications, location, flight timings and type of flight on the job allocation page.

**PF3:** The manager shall be able to view all staff workload for the week, with staff with over 40 hours of job highlighted on the landing page.

**PF4:** The manager shall be able to see top 3 staff with lowest workload on the landing page.

**PF5:** Staff shall be able to view their weekly job assignments and workload for the month on the landing page.

**PF6:** Staff shall be able to add and edit their availability up to 5 weeks ahead of time in the availability submission page.

**PF7:** Staff shall be able to indicate their job preference for the upcoming week.

**PF8:** Staff shall be able to reject jobs assigned to them after a discussion with their manager.

**PF9:** All staff using the system shall be identified by his/her 8 letters alphanumeric staff ID.

**PF10:** IT administrators shall be able to generate and assign staff IDs for new managers and staff to add to the system.

## **2.3 Assumptions and Dependencies**

1. Assume that all flights are fixed each week and the timings remain unchanged.
2. Assume that the Manager is in charge of all staff.
3. Assume that the Manager can view all staff's information.
4. Assume that there are no promotions of all current staff.
5. Assume that there is another system responsible for updating information such as promotions.
6. Assume that there will not be new purchases of planes.
7. Assume that IT administrators make use of the same system to add new users.





## **3 Specific Requirements**

### **3.1 User Interface Requirements**

Users will interact with the application by clicking through the menus and selecting the actions they wish to perform. On mobile devices, tapping will be the same as clicking.

### **3.2 Functional Requirements**

**FR1:** The system shall allow a manager to allocate jobs to all staff.

**FR2:** The system shall allow a manager to search for staff with filters.

**FR3:** The system shall display all staff workload for the week on the manager's landing page.

**FR4:** The system shall display the top 3 staff with the lowest workload on the manager's landing page.

**FR5:** The system shall display the weekly job assignments and workload on the staff's landing page.

**FR6:** The system shall allow staff to add and edit their availability in the availability submission page.

**FR7:** The system shall allow staff to indicate their job preference for the upcoming week.

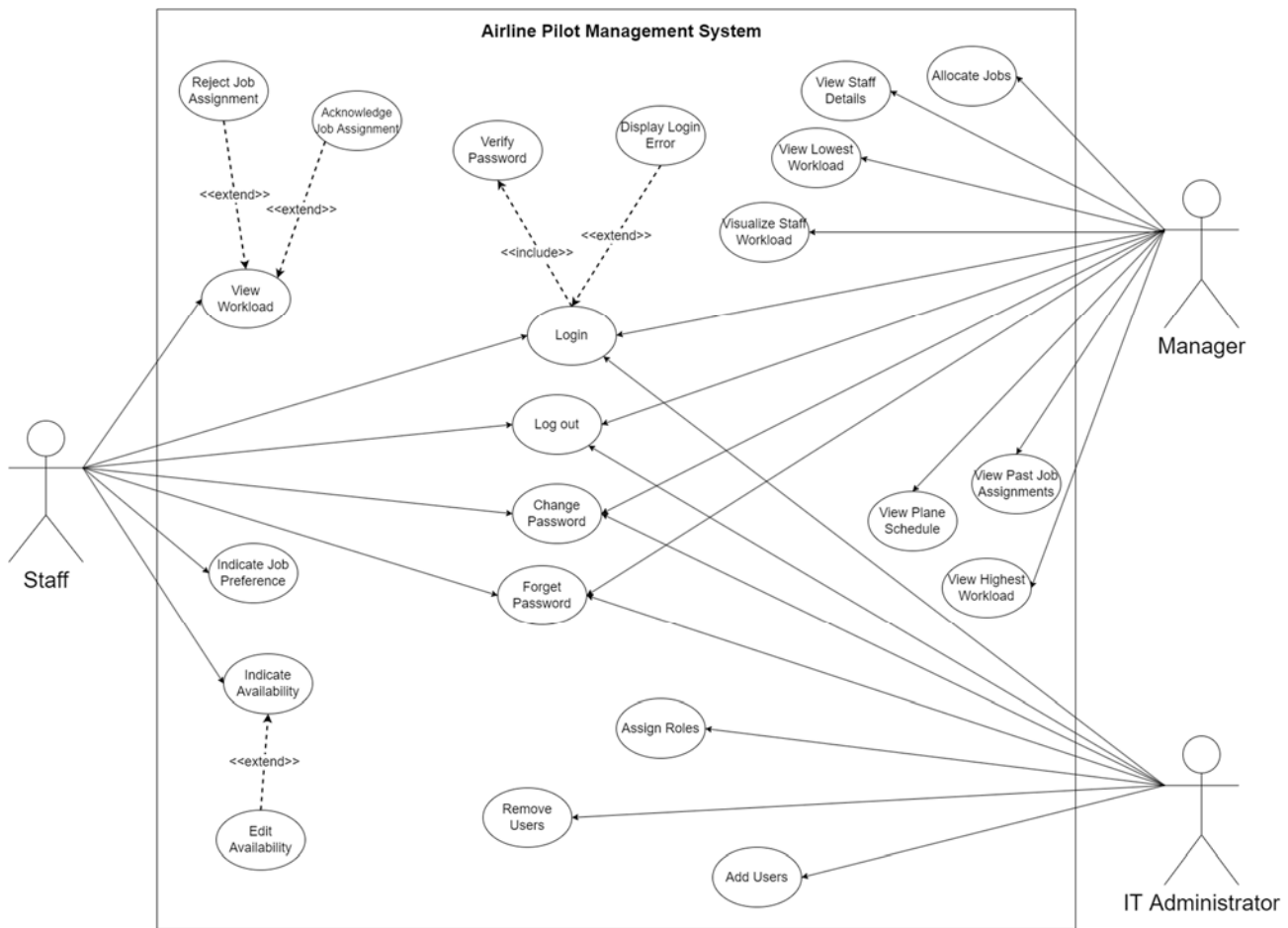
**FR8:** The system shall allow staff to reject jobs.

**FR9:** The system shall identify staff by his/her 8 letters alphanumeric staff ID.

**FR10:** The system shall allow IT administrators to generate and assign staff IDs.

**FR11:** The system shall allow staff to acknowledge jobs.

### 3.3 Use Case Model



### 3.4 Non-functional Requirements

**NFR1:** The system shall support these browsers - Google Chrome, Microsoft Edge, Mozilla Firefox, Safari.

**NFR2:** The system shall support these mobile browsers - Google Chrome, Microsoft Edge, Mozilla Firefox, Safari.

**NFR3:** The system shall be able to handle user traffic from all 74 staff at once.

**NFR4:** The system shall store all past records of job assignments indefinitely.

**NFR5:** The system shall have a 99.9% uptime.

**NFR6:** System maintenance shall be done from 3 - 5 A.M., as much as possible.

**NFR7:** All staff shall be able to use this system without any prior training.

### **3.4.1 Performance Requirements**

**NFR8:** Managers will be prompted to make job reassignments if there are no available staff when allocating jobs.

**NFR9:** Managers will be prompted to reassign planes used if there are no available planes for flights.

### **3.4.2 Safety and Security Requirements**

**NFR10:** All users shall use a password of at least twelve characters in length, including at least one number and special character.

**NFR11:** All users shall use a second form of authentication when changing their passwords.

**NFR12:** All data transmissions shall not be in plaintext.

**NFR13:** Database transactions shall use parameterized queries.

**NFR14:** Sensitive information including email and password shall not be stored in plaintext.

**NFR15:** The codebase shall be tested for security flaws before entering production.

## **3.5 Other Requirements**

**NFR16:** The system shall adhere to Personal Data Protection Act (PDPA), with regards to personal data that is processed by the system.

**NFR17:** The system shall adhere to General Data Protection Regulation (GDPR) requirements.

**NFR18:** The system shall adhere to all policies and regulatory compliances set by the company.

**NFR19:** The system shall be subjected to an annual security audit by an external contractor.



## 4 Project Estimation and Plan

### 4.1 Software Estimation

#### i. Estimation of Size

##### A. Use Cases

Use Case Number	Use Case Name	Total Transactions/Usecase (original)	Total Transactions/usecase (improved)	Complexity of a Usecase (Don't edit this)	Complexity of a Usecase (improved) - Don't edit this
1	Visualise Staff Workload	2		5	0
2	View Highest Workload	2		5	0
3	View Lowest Workload	2		5	0
4	Search Staff	2		5	0
5	View Staff Details	5		10	0
6	Allocate Jobs	6		10	0
7	View Plane Schedule	2		5	0
8	View Past Job Assignment	2		5	0
9	View Workload	2		5	0
10	Indicate Availability	3		5	0
11	Edit Availability	3		5	0
12	Indicate Job Preference	5		10	0
13	Acknowledge Job Assignm	5		10	0
14	Reject Job Assignment	5		10	0
15	Add User Account	3		5	0
16	Remove User Account	4		10	0
17	Assign Roles	5		10	0
18	Log In	3		5	0
19	Log Out	3		5	0
20	Forgot Password	5		10	0
21	Change Password	4		10	0
Total unadjusted use case weig				150	0
Adding actors weight				161	

##### B. Actors

Actor	weight	count	product
Simple	1	0	0
Medium	2	1	2
Complex	3	3	9
Total			11

##### C. Complexity Factors - WCS

Factor	Description	Weight	Assesment	Product
T1	Distributed system	2	3	6
T2	Response time/performance objectiv	1	5	5
T3	End-user efficiency	1	4	4
T4	Internal processing complexity	1	3	3
T5	Code reusability	1	1	1
T6	Easy to install	0.5	1	0.5
T7	Easy to use	0.5	4	2
T8	Portability to other platforms	2	3	6
T9	System maintenance	1	4	4
T10	Concurrent/parallel processing	1	2	2
T11	Security features	1	4	4
T12	Access for third parties	1	1	1
T13	End user training	1	4	4
Total				42.5

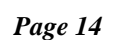
## ii. Estimation of Effort

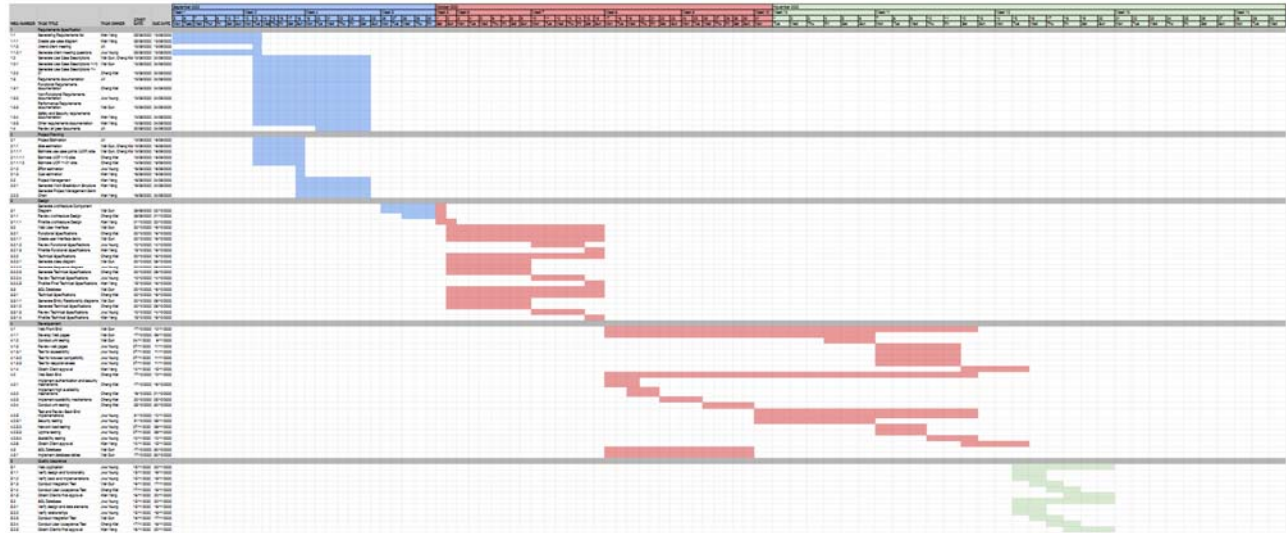
2415 hours to 4830 hours

### iii. Estimation of Cost

Cost Estimation is outside our scope of work.

## 4.2 Project Management





## **5 Individual Members Task Reflections**

### **i. Quah Kian Yang**

I assisted in the designing of the System Architecture Diagram. During the client meeting session, I was responsible for recording the meeting minutes, subsequently summarizing the important points and filing the meeting minutes on our Github project board. For the Use Case Description, I assisted in the crafting of the various scenarios. Lastly, I also helped out with the software estimation planning and tabulating the excel sheet.

I learnt about the importance of having a good software engineering plan and that software engineering is not merely about the coding and programming phases. It is important that the project team clarify any doubts the client may have so that we can ensure that the client's expectations are realistic and met. Given another chance, I think the project team could have spent more time on planning before the client meeting. This would allow the team to craft out better questions to be asked and ensure that the client's requirements are clarified.

### **ii. Low Wai Qun**

For milestone one, I assisted my team in identifying requirements, software estimation, use cases and use case descriptions. I came up with the product functionality and the use case diagram. After going through milestone one, I realised the importance of role delegation in a team. Role delegation allows for the software development process to be more efficient as each team member is aware of their responsibilities and tasks. Furthermore, less man hours could be wasted team members would spend less time waiting on other team member's work.

While creating the Use Case Diagram, it lets me have a better understanding of how a Use Case Diagram should be crafted. I have always mistaken Use Case Diagram as a sequential diagram but after going through the labtorials and lectures, I realised it is more of showing the functionalities of the system for different actors. All in all, I feel that this project has given me a better understand of a software development cycle.

### **iii. Koh Cheng Kiat**

I assisted in determining the project's functional requirements and use cases. I also created the Work Breakdown Structure (WBS) and the project management Gantt Chart. During the course of determining the functional requirements, I learnt a lot about the importance of having clear communications within our team and also with our client to ensure that we got the clearest picture of what the project requires. I also learnt about how to think of operational workflows and how it would impact what use cases this project would have.



Creating the WBS, allowed me to see the importance of breaking down a task into smaller more tasks. I gained a much better understanding of how the development process works and how each part of the process interacts with each other. From the Gantt Chart, I learnt the importance of time management during a project as I had to ensure that the team would have enough time to complete each task found in the WBS.

#### **iv. Liew Jwo Young**

I was responsible for coming up with use cases and writing their descriptions, as well as coming up with the non-functional requirements of our product. I also came up with the questions to ask during the client meeting to gather the product requirements and carried out the interview. In doing so, I was able to learn about what it is like to deal with clients, and I realised the importance of asking clear questions in a simple way so that non-technical people can easily understand me.

Given another chance, I feel that our team could have spent more time planning out the project and delegating tasks on the Github project board. This would have made working on the project less confusing and streamlined our workflow.

## 6 Appendix A – Use Case Descriptions

Use Case ID:	1
Use Case Name:	<b>Visualise Staff Workload</b>
Description:	Manager accesses the system and views the assigned workload of all staff.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager accesses the landing page for the system.</li><li>2. System displays staff workload details.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. Staff workload has not been assigned.</li><li>2ai. System prompts manager to assign jobs to staff.</li></ol>

Use Case ID:	2
Use Case Name:	<b>View Highest Workload</b>
Description:	Manager accesses the system and views all staff with over 40 hours of work for the week.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>2. Manager accesses the landing page for the system.</li><li>3. System displays a list of staff with over 40 hours of work for the week.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. There are no staff with over 40 hours of work for the week.</li><li>2ai. System displays a message stating that there are no staff with over 40 hours of work instead of the list.</li></ol>

Use Case ID:	3
Use Case Name:	<b>View Lowest Workload</b>
Description:	Manager accesses the system and views the top three staff with the least workload for the week.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager accesses the landing page for the system.</li><li>2. System displays a list of the three staff with the least workload for the week.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. There are more than three staff that have the least workload for the week due to having the same number of hours.</li><li>2ai. System displays all the staff that are tied instead of just three.</li></ol>

Use Case ID:	4
Use Case Name:	<b>Search Staff</b>
Description:	Manager accesses the system and searches for staff using their name or filters such as rank, job preference or availability.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager accesses the landing page for the system.</li><li>2. Manager selects filters to search for staff.</li><li>3. System displays staff that match the filters.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>3a. No staff match the filters set by the manager.</li><li>3ai. System displays an error message.</li></ol>

Use Case ID:	5
Use Case Name:	<b>View Staff Details</b>
Description:	Manager is able to view all staff details for specific staff after searching for them.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager accesses the landing page for the system.</li><li>2. System displays the overall landing page.</li><li>3. Manager selects filters to search for staff.</li><li>4. System displays staff that match the filters.</li><li>5. Manager views the details of the staff searched.</li><li>6. System displays the details that match the staff searched.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>4a. No staff match the filters set by the manager.<ol style="list-style-type: none"><li>4ai. System displays an error message.</li></ol></li><li>6a. No details filled in by the staff..<ol style="list-style-type: none"><li>6ai. System displays an error message.</li></ol></li></ol>

Use Case ID:	6
Use Case Name:	<b>Allocate Jobs</b>
Description:	Manager allocates a job to staff for the upcoming week.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully
Postconditions:	Staff who were assigned jobs will be notified when they access the system.
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager chooses to allocate jobs to staff.</li><li>2. System displays a list of three staff based on their job preference and availability.</li><li>3. Manager chooses the staff member to allocate the job to.</li><li>4. System sends a notification to the staff who was allocated the job.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. No staff have indicated job preference.<ol style="list-style-type: none"><li>2ai. System displays staff who are available.</li></ol></li><li>2b. No staff are available.</li></ol>

	<p>2bi. System displays an error message.</p> <p>2bii. System prompts manager to make job reallocations.</p> <p>4a. Notification was not sent.</p> <p>4ai. System displays an error message and prompts the manager to retry or quit.</p> <p>4aii. Manager can choose to either retry the job allocation or quit.</p>
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Use Case ID:	7
Use Case Name:	<b>View Plane Schedule</b>
Description:	Manager accesses the system and views the weekly schedule for planes.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager access the Plane Schedule page.</li><li>2. System displays a weekly schedule for all the planes.</li></ol>
Alternative Scenarios:	<p>2a. Manager filters for a specific time, plane or location.</p> <p>2ai. System displays weekly plane schedules for the filtered planes.</p>

Use Case ID:	8
Use Case Name:	<b>View Past Job Assignments</b>
Description:	Manager accesses the system and views the past records for job assignments.
Primary Actor:	Manager
Preconditions:	Manager must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Manager access the Past Job Assignments page.</li><li>2. System displays past job assignments for all the staff.</li></ol>
Alternative Scenarios:	<p>2a. Manager filters for a specific pilot by name, rank or employee ID.</p> <p>2ai. System displays past job assignments for the filtered pilot.</p>

Use Case ID:	9
Use Case Name:	<b>View Workload</b>
Description:	Staff accesses the system and views their workload for the week.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff accesses the landing page for the system.</li><li>2. System displays workload details.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. Staff workload has not been assigned.</li><li>2ai. System prompts manager to assign jobs to staff.</li></ol>

Use Case ID:	10
Use Case Name:	<b>Indicate Availability</b>
Description:	Staff accesses the system and indicates their availability for up to the next five weeks.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully. Time period must be within 5 weeks of the current date.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff access Availability Indication page.</li><li>2. System display Availability Indication page.</li><li>3. Staff chooses the week to indicate their availability.</li><li>4. Staff put in their availability for the week.</li><li>5. System displays confirmation to submit availability.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>5a. System unable to confirm availability.</li><li>5ai. System displays an error message and prompts staff to retry.</li></ol>

Use Case ID:	11
Use Case Name:	<b>Edit Availability</b>
Description:	Staff accesses the system and edits their availability for up to the next five weeks.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully. Staff must have indicated at least one availability for the next five weeks.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff access Availability Indication page.</li><li>2. System display Availability Indication page.</li><li>3. Staff chooses the week to edit their availability.</li><li>4. Staff edit their availability for the week.</li><li>5. System displays confirmation to submit availability.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>5a. System unable to update availability. 5ai. System displays an error message and prompts staff to retry.</li></ol>

Use Case ID:	12
Use Case Name:	<b>Indicate Job Preference</b>
Description:	Staff accesses the system and indicates their job preference for the upcoming week.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff accesses the Job Preference page.</li><li>2. System displays the Job Preference page.</li><li>3. System displays available jobs for the week.</li><li>4. Staff choose to indicate job preference.</li><li>5. Staff indicates job preference.</li><li>6. System displays confirmation to submit job preference</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>4a. Staff have no job preference 4ai. System displays that staff have no job preference</li><li>6a. System unable to confirm job preference. 6ai. System displays an error message and prompts staff to retry.</li></ol>

Use Case ID:	13
Use Case Name:	<b>Acknowledge Job Assignment</b>
Description:	Staff accesses the system, views their workload and acknowledges the job assigned to them.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully.
Postconditions:	Manager will be notified by the system of the staff who acknowledged the job assignment.
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff access the Job Assignment page.</li><li>2. System display Job Assignment page.</li><li>3. System displays staff job assignments for the next week.</li><li>4. Staff acknowledge job assignments.</li><li>5. System displays confirmation to submit acknowledgement.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>3a. Staff has no job assignments allocated.<ol style="list-style-type: none"><li>3ai. System displays no job allocation on the job allocation page.</li></ol></li><li>5a. System unable to confirm acknowledgement.<ol style="list-style-type: none"><li>5ai. System displays an error message and prompts staff to retry.</li></ol></li></ol>

Use Case ID:	14
Use Case Name:	<b>Reject Job Assignment</b>
Description:	Staff accesses the system, views their workload and rejects the job assigned to them.
Primary Actor:	Staff
Preconditions:	Staff must have logged in successfully.
Postconditions:	Manager will be notified by the system of the staff who rejected the job assignment.
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Staff access the Job Assignment page.</li><li>2. System displays the Job Assignment page.</li><li>3. System displays staff job assignments for the next week.</li><li>4. Staff reject job assignments.</li><li>5. System displays confirmation to submit rejection.</li></ol>



Alternative Scenarios:	3a. Staff has no job assignments allocated. 3ai. System displays no job assignments on the job assignment page. 5a. System unable to confirm rejection. 5ai. System displays an error message and prompts staff to retry.
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Use Case ID:	15
Use Case Name:	<b>Add User Account</b>
Description:	IT Administrator accesses the system, creates a new user account and assigns credentials to the account.
Primary Actor:	IT Administrator
Preconditions:	IT Administrator must have logged in successfully. Users to be added must be an employee.
Postconditions:	-
Main Success Scenarios:	1. IT Administrator accesses the User Management page. 2. System displays a User Management page. 3. IT Administrators generate a new employee ID. 4. IT Administrators create a new user account with employee ID. 5. System display confirmation for account creation.
Alternative Scenarios:	5a. System unable to create a new account. 5ai. System displays an error message and prompts the IT Administrator to retry.

Use Case ID:	16
Use Case Name:	<b>Remove User Account</b>
Description:	IT Administrator accesses the system and removes a user account.
Primary Actor:	IT Administrator
Preconditions:	IT Administrator must have logged in successfully. User accounts must exist.
Postconditions:	-
Main Success Scenarios:	1. IT Administrator access User Management page.

	<ol style="list-style-type: none"><li>2. System displays a User Management page.</li><li>3. IT Administrator selects filters to search for user accounts.</li><li>4. System displays the user account that matches the filters.</li><li>5. IT Administrator selects user accounts to be removed.</li><li>6. System displays confirmation for account removal.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>4a. No user account matches the filters set by the IT Administrator.<ol style="list-style-type: none"><li>4ai. System displays an error message.</li></ol></li><li>6a. System unable to remove account.<ol style="list-style-type: none"><li>6ai. System displays an error message and prompts IT Administrator to retry.</li></ol></li></ol>

Use Case ID:	17
Use Case Name:	<b>Assign Roles</b>
Description:	IT Administrator accesses the system, views a user account and assigns the manager or staff role to it.
Primary Actor:	IT Administrator
Preconditions:	IT Administrator must have logged in successfully. User accounts must exist.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. IT Administrator access User Management page.</li><li>2. System displays a User Management page.</li><li>3. IT Administrator selects filters to search for user accounts.</li><li>4. System displays the user account that matches the filters.</li><li>5. IT Administrator selects roles to assign.</li><li>6. System displays confirmation for role assignment.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>4a. No user account matches the filters set by the IT Administrator.<ol style="list-style-type: none"><li>4ai. System displays an error message.</li></ol></li><li>6a. System unable to assign roles.<ol style="list-style-type: none"><li>6ai. System displays an error message and prompts IT Administrator to retry.</li></ol></li></ol>

Use Case ID:	18
Use Case Name:	<b>Log In</b>
Description:	Users input their credentials into the system to gain access.
Primary Actor:	Users
Preconditions:	Users must have an account to log in.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. User input employee ID and password.</li><li>2. System authenticates user credentials.</li><li>3. System display landing page.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. User inputs the wrong employee ID or password.</li><li>2ai. System displays an unsuccessful login message.</li></ol>

Use Case ID:	19
Use Case Name:	<b>Log Out</b>
Description:	Users log out from the system.
Primary Actor:	Users
Preconditions:	Users must have logged in successfully.
Postconditions:	-
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. User chooses to log out from the system.</li><li>2. System displays confirmation to log out from the system.</li><li>3. System displays the login page.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>2a. System unable to log users out.</li><li>2ai. System displays an error message and prompts the user to retry.</li></ol>

Use Case ID:	20
Use Case Name:	<b>Forgot Password</b>
Description:	Users who forget their passwords can change their password after using two factor authentication to authenticate themselves.
Primary Actor:	Users
Preconditions:	Users must have an account to the system.
Postconditions:	Users need to input their new password in the link provided in the password reset email.

Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Users access the Forgot Password page.</li><li>2. System displays Forgot Password page</li><li>3. Users input employee ID or email</li><li>4. System sends password reset email to user's email</li><li>5. System displays confirmation of password reset.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>3a. User input an invalid employee ID or email.<ol style="list-style-type: none"><li>3ai. System displays an error message.</li></ol></li><li>4a. System unable to send email.<ol style="list-style-type: none"><li>4ai. System displays an error message and prompts staff to retry.</li></ol></li></ol>

Use Case ID:	21
Use Case Name:	<b>Change Password</b>
Description:	Users access the system and authenticate themselves using two factor authentication to change their passwords.
Primary Actor:	Users
Preconditions:	Users must have logged in successfully.
Postconditions:	Users' passwords will be changed and updated in the database.
Main Success Scenarios:	<ol style="list-style-type: none"><li>1. Users access the Password Reset page.</li><li>2. System displays the Password Reset page.</li><li>3. User input old password, new password and confirmation password.</li><li>4. System displays confirmation of password change.</li></ol>
Alternative Scenarios:	<ol style="list-style-type: none"><li>3a. User redirected from password reset email.<ol style="list-style-type: none"><li>3ai. User only inputs new password and confirmation password</li></ol></li><li>3b. User inputs wrong confirmation password.<ol style="list-style-type: none"><li>3bi. System displays an error message.</li></ol></li><li>4a. System unable to update password.<ol style="list-style-type: none"><li>5ai. System displays an error message and prompts staff to retry.</li></ol></li></ol>

## **7 Appendix B – Data Dictionary**

### **Manager**

*Person in charge of planning and allocation of jobs.*

### **Staff**

*Person who receives jobs.*

### **IT Administrator**

*Person in charge of managing the system.*

### **Pilot**

*Person in charge of flying the airplane.*

### **Workload**

*Overall job assignments for staff.*

### **Job**

*Flight from one place to another.*

### **Availability**

*Whether staff is free to take a job.*

### **Preference**

*Whether staff would rather take the job or not.*