Graduate Diploma in IT

Level 7

GIT703 : System Development Integration 3

Assignment 2 : Process Report
(Worth 60% of final mark)

Final Result:_____ **Assessor Signature:**_____

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Chapter 1

Introduction

For an organization, Time tracking system can be helpful in myraid of ways which comprises keeping track of the workload, surveilling employees keystrokes and structuring work shifts for employees. This system can help the organization to perform in more efficient and organised way. This system can result in increased productivity of the employees and track the productive and non-productive time employees spent in an organization. In order to achieve the best results and accomplish the tasks or operations in target time, this system proves to be a key resource for an organisation.

We will develop a solution which will keep the record of the time for each employee and save a lot of time of the employees to clock in/out. The main needs of the business is to develop a time keeping solution which can calculate the actual labour time per operation and employee. This system should be easily integrated with the old access control system, which the Helicopter company is already using.

To develop this solution, there are some potential problems that can appear. Firstly, we have to understand how the old 'access control system' works. After this we have to develop the system which is able to merge with the old system easily. If the old system were to be scrapped, then it would be much easier to develop and install the new one. Since this is process of merging old system with new, there can be more complications which we have to face along the way.

This system will be user friendly with minimum number of steps in every function. This system will allow the users to clock-in/out, start/end time of each activity/task/operation. Apart from this, the managers will also have the access to view all reports and employees information. Quality controller will be able to approve or reject the job done by the worker.

Chapter 2

Functional and non-functional requirements

2.1 Functional requirements

2.1.1 Worker

1. System must allow to clock in and clock out
2. System must allow to scan barcode to start or finish the operation
3. System must allow to interrupt the operation
4. System must not allow to continue if there is a mistake in the previous operation
5. System must allow to choose the reason of exceeding time if it is applied.

2.1.2 Controller

1. System must allow to clock in and clock out
2. System must allow to approve or reject the worker's operation
3. System must allow to scan barcode to start or finish the operation
4. System must allow to interrupt the operation

2.1.3 Manager

1. System must allow to clock in and clock out
2. System must allow to get all reports
3. System must allow to get all information about employees

2.2 Non-functional requirements

2.2.1 Performance

1. System should integrate with Access Control system.
2. System should be user-friendly with minimum number of steps to enter the information.
3. Any interaction between the user and the system should not exceed 3 seconds.

2.2.2 Hardware

1. System must not use the mouse and keyboard to input the data

2.2.3 Safety

1. System should be calibrated (touchscreens and barcode readers should work properly)
2. System must have extra touchscreens and barcode readers to replace the damaged once.
3. System should send the information weekly to the cloud server for back up.

2.2.4 Security

1. Personal information is protected in compliance with the Data protection act.
2. All data must be encrypted.
3. The system includes all available safeguards from viruses, warm, Trojan horses etc.
4. Only the managers can have access to reports.

2.3 Assumptions

1. By reason of merging the Time Keeping system with Access Control system we must keep the manager's credentials in the system by getting his clock-in, clock-out time.
2. If the user does not pressed the "Clock in" button and then scanned his card, he cannot access to product line area.
3. If the user does not pressed "Clock out" button and scanned his card, he cannot leave the product line area.
4. If the user does not scanned the card for 30 seconds or scanned wrong card the system will be blocked for one minute and then the screen will be reloaded.
5. To finish the quality control operation the controller must scan his barcode and press "Accept" or "Reject" button.
6. If there is any mistake found by controller that will be sent to assigned worker. This mistake will be the first in the task queue of worker. Once he is finished with current process he must proceed with mistake.

7. If the employee exceeds assigned time for any task the system will ask him to choose the reason why time was exceeded.
8. Manager uses PC with Windows 10 OS to get the reports.
9. Manager uses the Windows user to protect the system reports from the employee.

Chapter 3

Design

3.1 High level design

The main components of this system are as follows:

1. 4 different GUI's for clock in, worker, quality controller and manager.
2. API
3. In-house Server
4. Database
5. Cloud
6. Access control system

This section reflects the functional design of the system, ranging from what the system will do, how it will send or receive the information. This will also show the old access system integrated with the new one.

The system will have 4 types of Graphical user interfaces which include all types of users weather it be worker, quality controller, manager or just clock in/clock out screen. Once the user clock-in and scan his card to get into Restricted area, this will send the information to the database where the records are saved for time keeping. On product line the worker GUI will have two sections on the screen showing to-do and to-correct tasks. Once they finish the task, they can mark the task as done and the system will send the operation to the quality controller for approval. If there is any task to be redone or any parts to remake the system will show the warning and these tasks before going on to next task. If the worker takes extra time to finish any task allocated to them, the system will ask for the reason why they took so long to finish this task and the worker can choose the reasons listed in the system.

The manager will be able to see all reports e.g. KPI's and list of all employees. To see the reports the manager will use the PC with Windows 10 OS, where he has to use his login and password to get start a session and get into the system. Manager will also be able to see the reports of the working hours spent on each operation, they can also view the list of assemblies to see how the operations in production line are going on.

Once the task is finished and the worker has marked it done and sent for the approval, the quality controller will check for any errors or mistakes, if everything is fine, then the QC will mark it as approved. But if a task needs to be redone, then the quality controller will reject it an send it back to the worker to the production line to remake it. The same as worker Quality controller will be asked by system to name the reason if he exceeded the time assigned for checking task.

All the users leaving Restricted area should clock out and scan their card, by this the system will keep the information about their shift time.

The old access system is integrated with the new so that the time keeping process is more efficient. The clock in/clock out information of the employees is also saved in the cloud and in-house servers.

The figure below describe the high level diagram of our system.

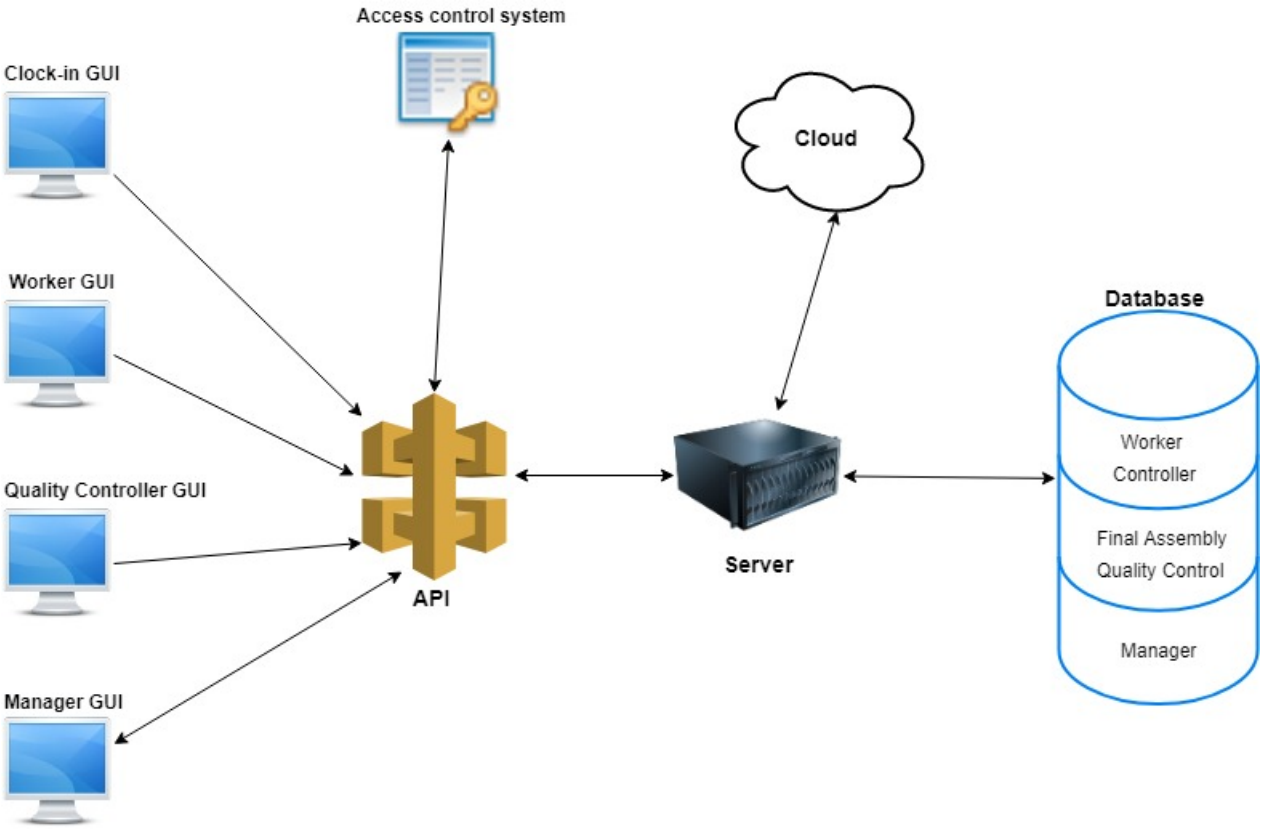

Figure 3.1: High Level diagram of the system

3.2 Use Case diagram

To create Use Case diagram we have used Microsoft Visio Professional (Microsoft, 2019).

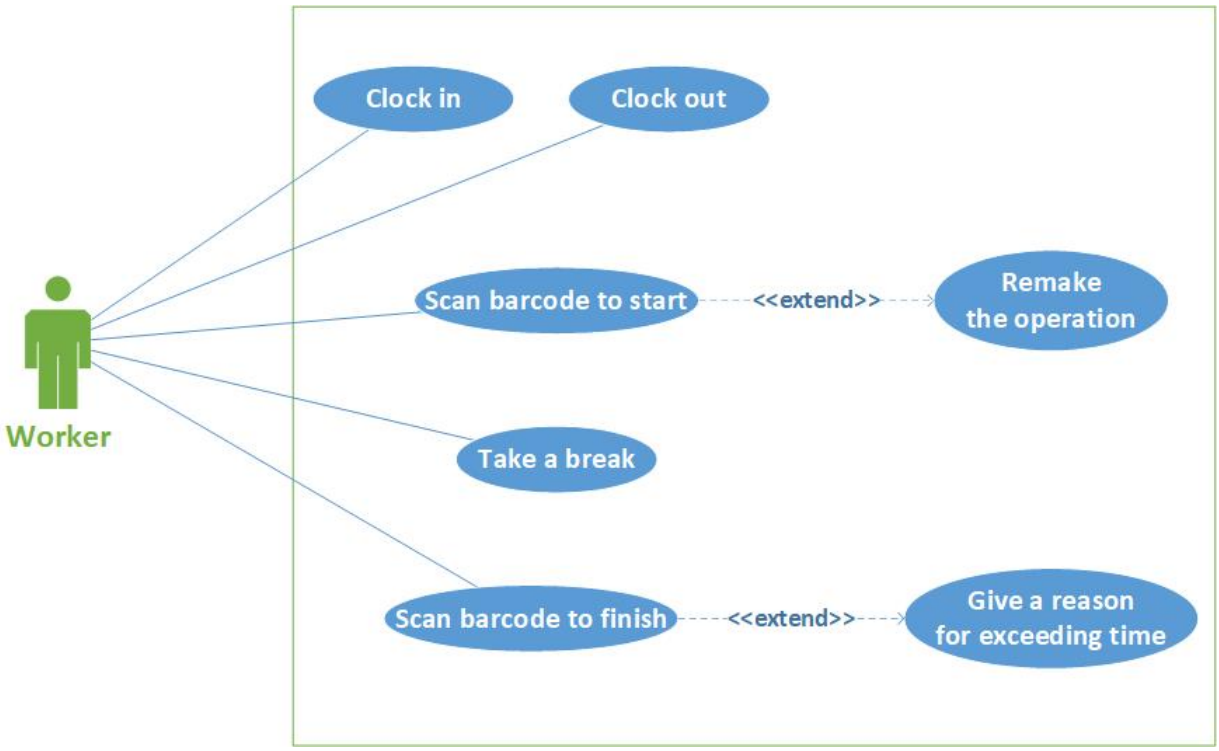

Figure 3.2: Use-case diagram for worker

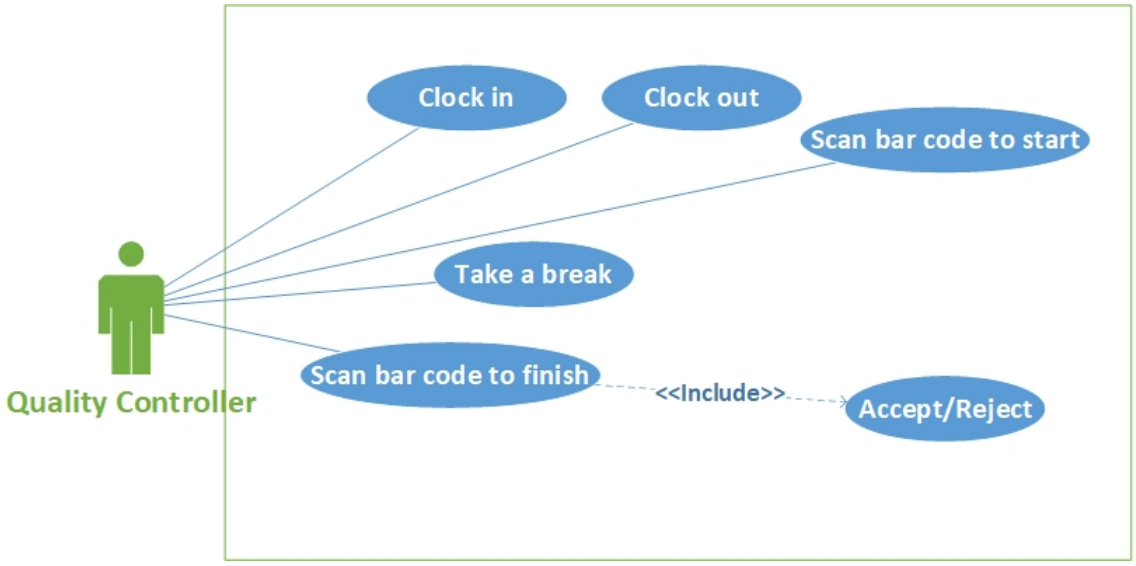

Figure 3.3: Use-case diagram for controller

Figure 3.4: Use-case diagram for manager

3.3 Activity diagrams

To create Activity diagrams we have used Microsoft Visio Professional (Microsoft, 2019).

3.3.1 Clock in/ Clock out activity diagrams

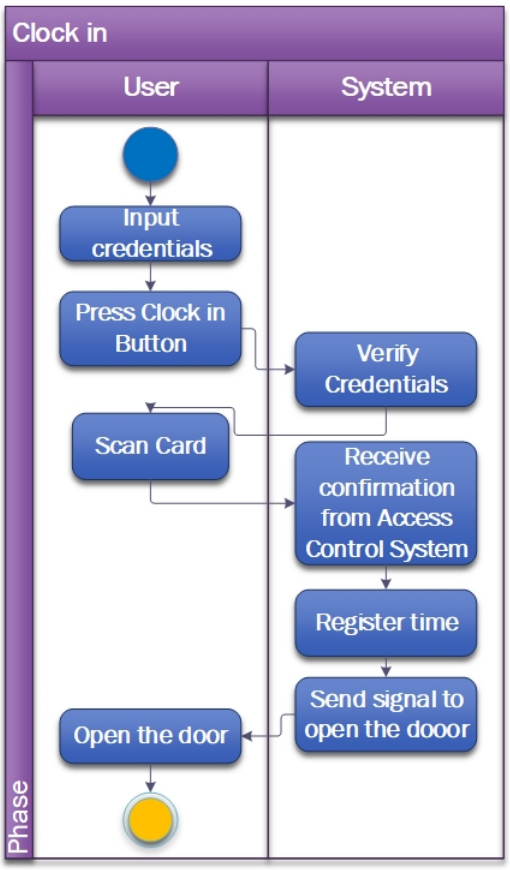

Figure 3.5: Clock in Activity diagram

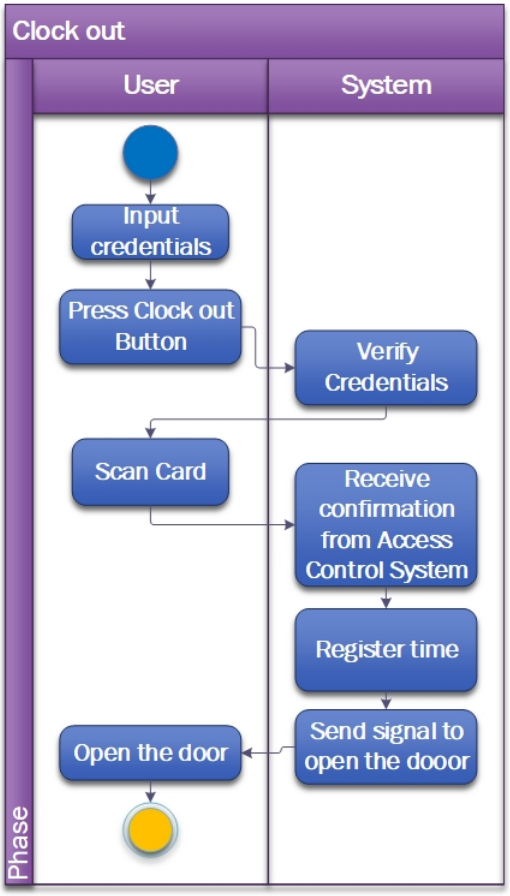

Figure 3.6: Clock out Activity diagram

3.3.2 Activity diagrams for worker and controller

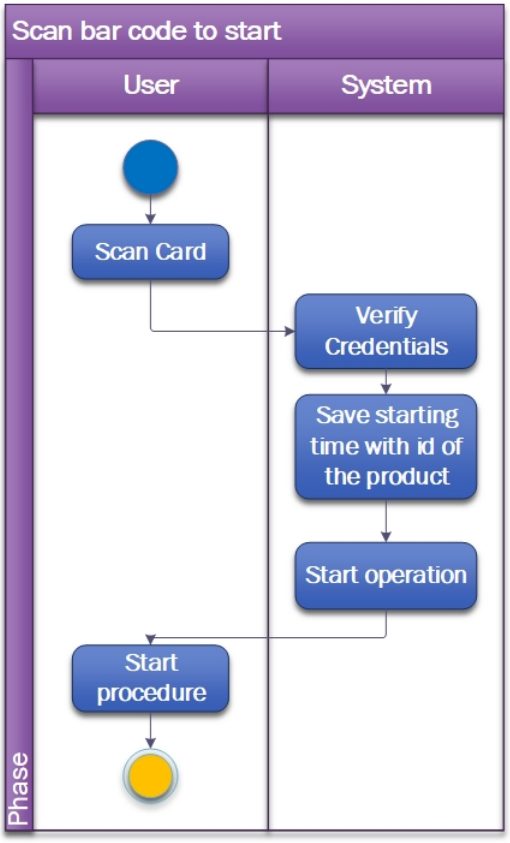

Figure 3.7: Start the operation by scanning barcode Activity diagram

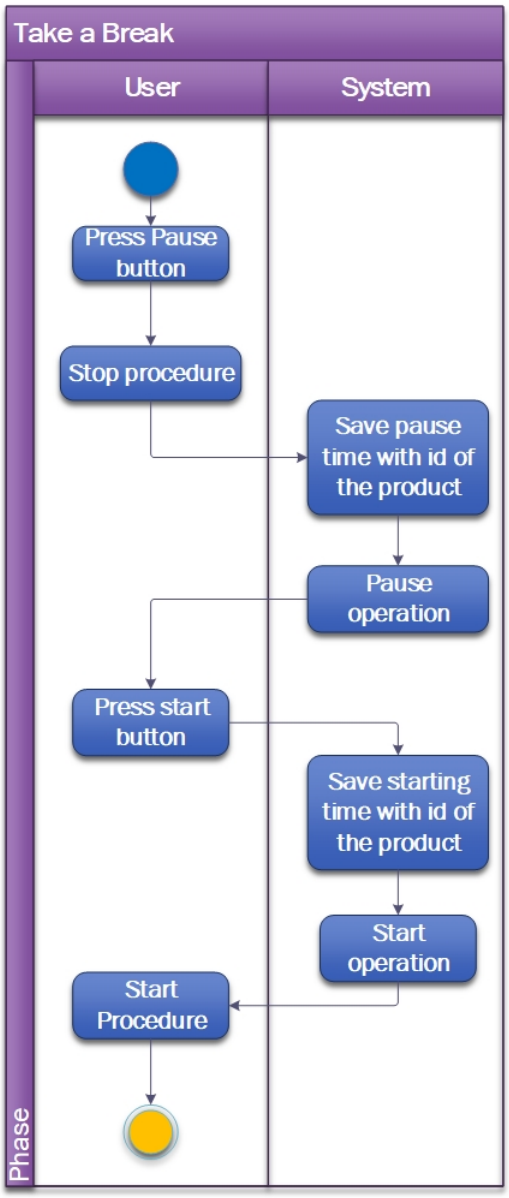

Figure 3.8: Take a break Activity diagram

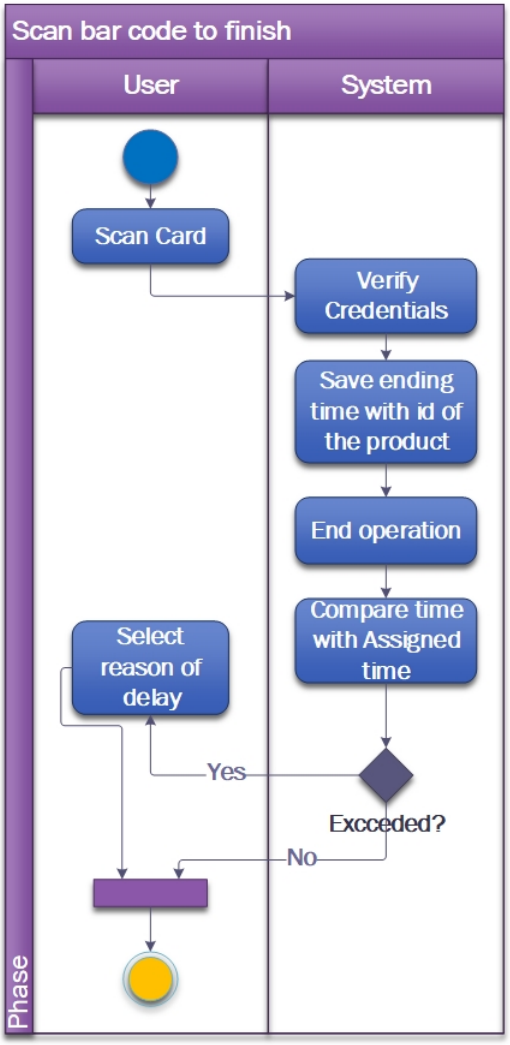

Figure 3.9: Finish the operation by scanning the barcode Activity diagram for worker

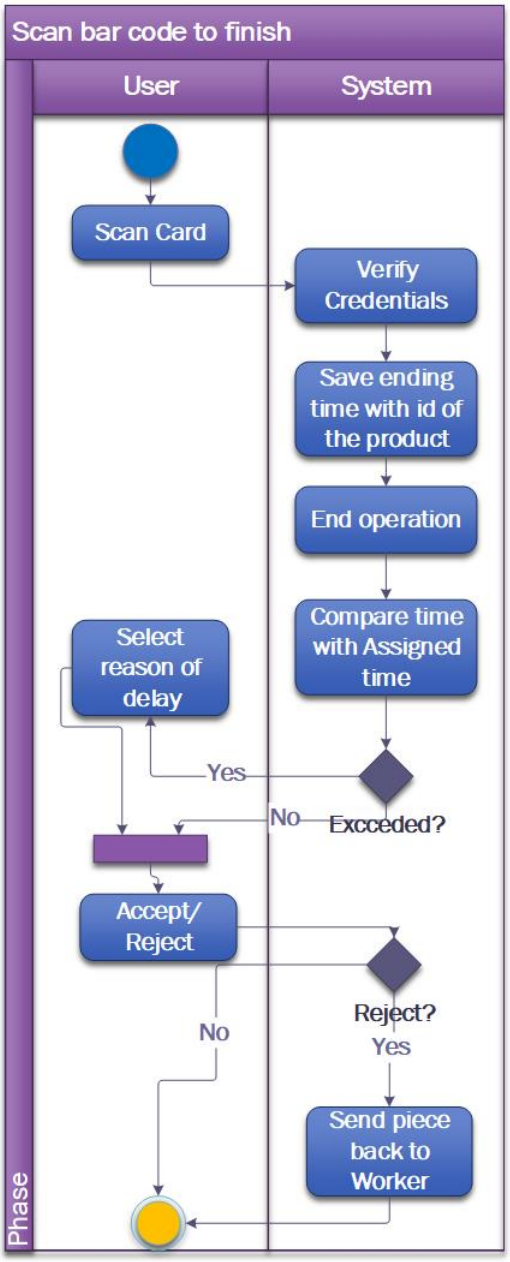

Figure 3.10: Finish the operation by scanning the barcode Activity diagram for controller

3.3.3 Activity diagrams for manager

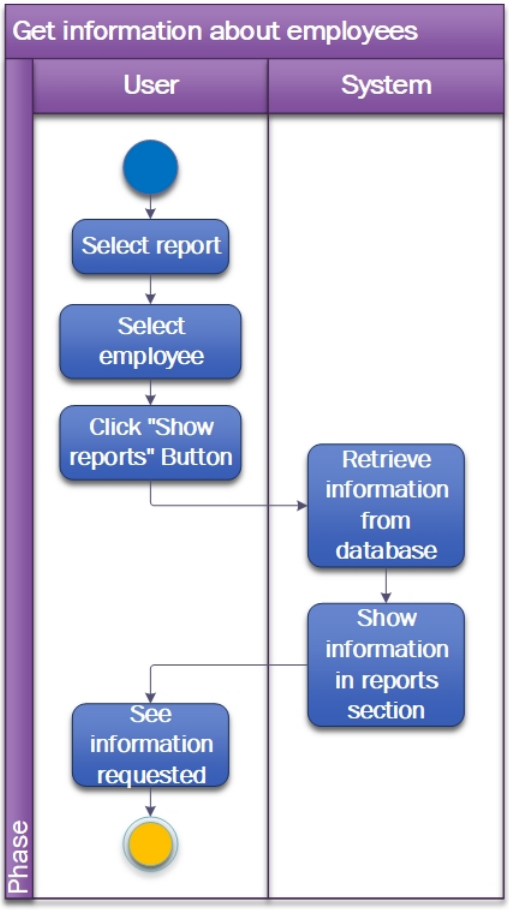

Figure 3.11: Get reports about employees Activity diagram

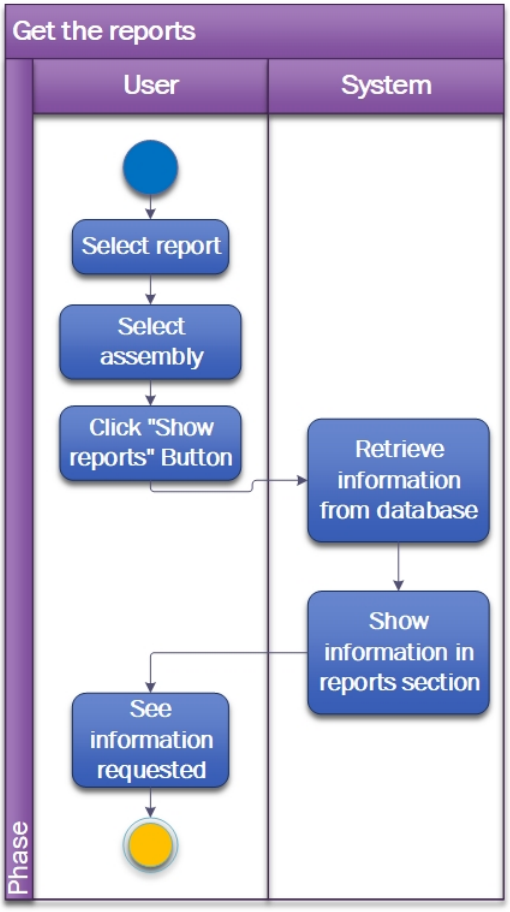

Figure 3.12: Get reports about assembly Activity diagram

3.4 Interface design

3.4.1 Screenflow

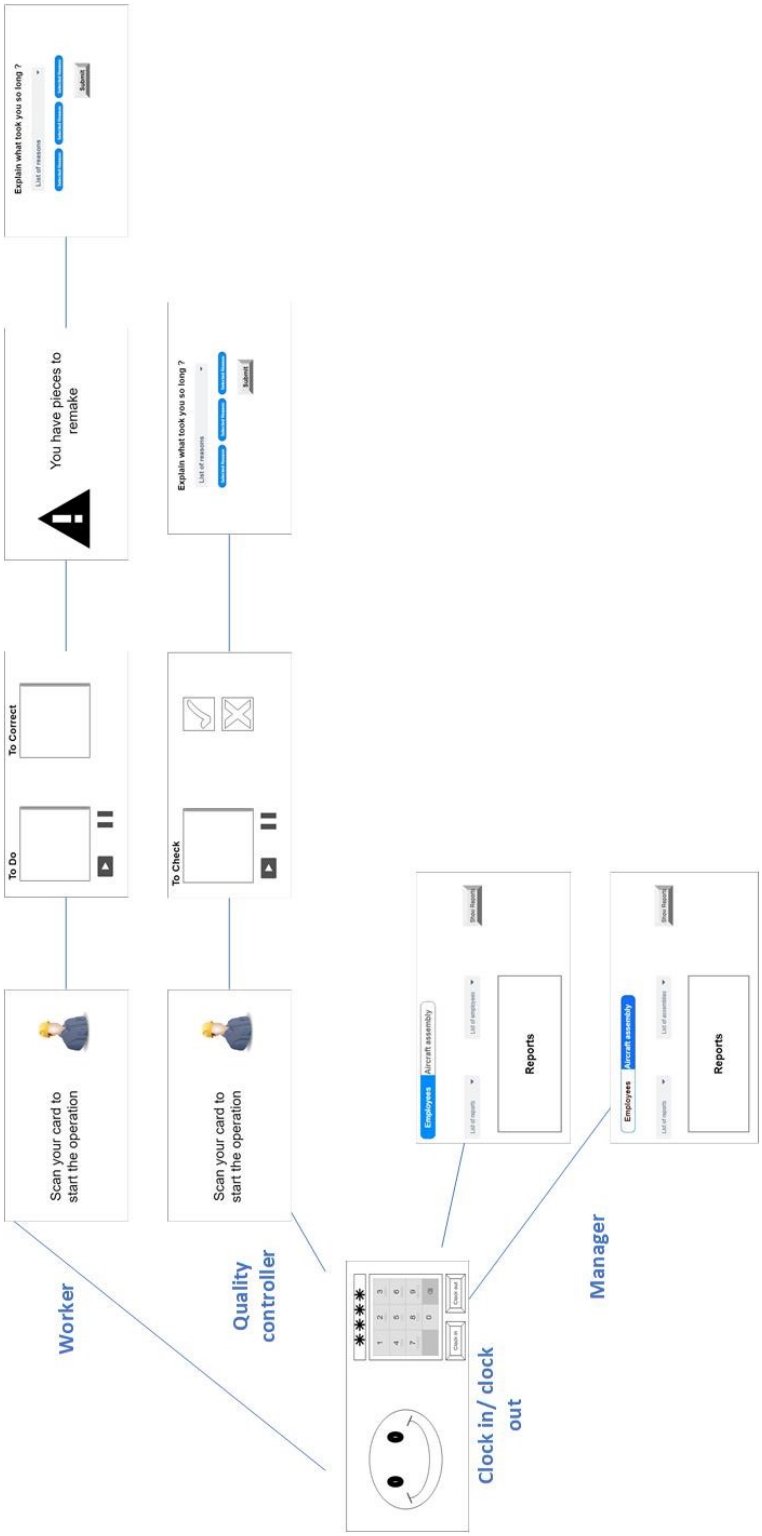

Figure 3.13: Screenflow diagram of the system

3.4.2 Wireframes

To create wireframes we have used Draw.io (Draw.io, 2019).

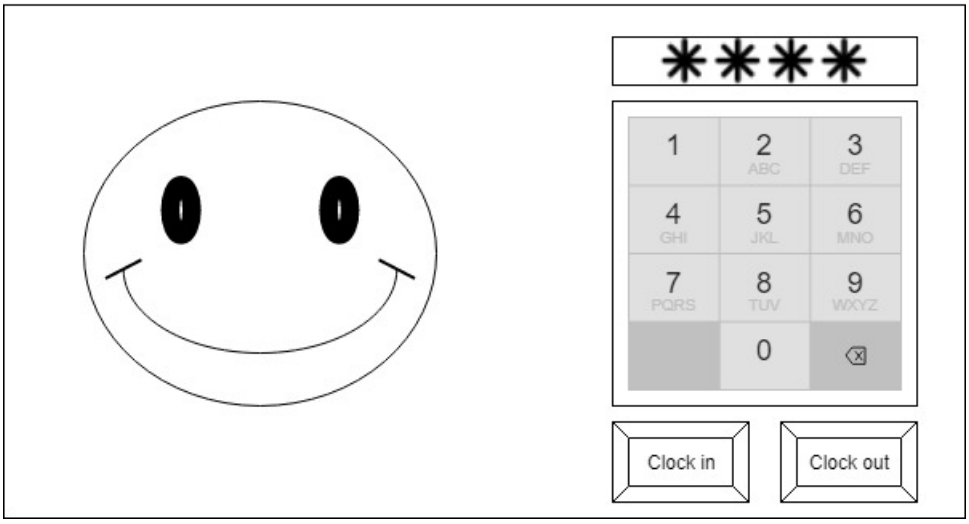

Figure 3.14: Clock in/Clock out screen

All users have to clock in or clock out before they are getting into or leaving the Restricted area. The elements of clock in/ clock out screen:

1. **Number pad**
2. **'Clock in' button**
3. **'Clock out' button**
4. **Image**

This screen is touch screen. Each user have to input their ID number and press 'Clock in' or 'Clock out' button. After that the user can scan his card to open the door.

Figure 3.15: Scan screen

The elements of Scan screen:

1. **Text information**
2. **Image**

This screen contains just information about what the employee needs to do to start the operation. This screen is touch screen, by touching it the worker or quality controller will get to their screens. This screen is used on product line for Workers and Quality Controller.

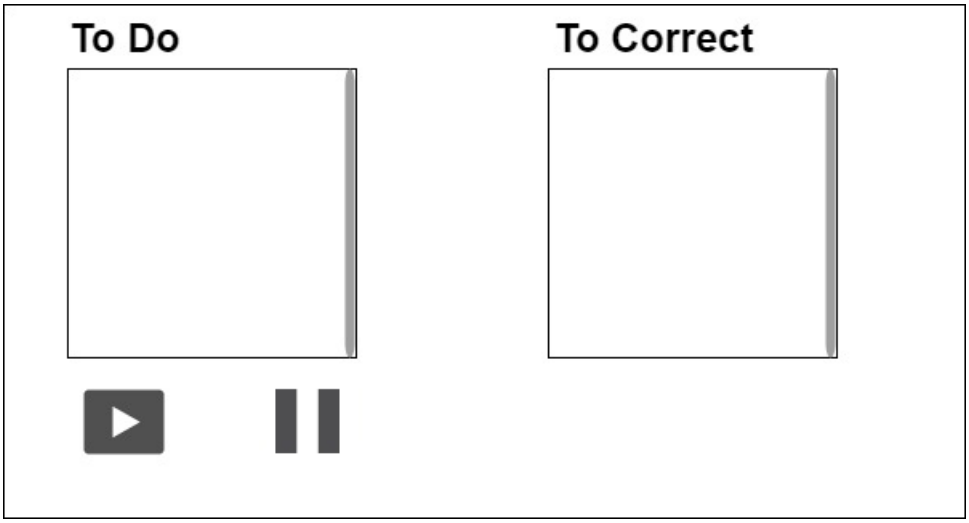

Figure 3.16: Worker operational screen

The elements of Worker operational screen:

1. **To do operations list**
2. **To correct operations list**
3. **Pause button**
4. **Restart button**

This screen is touch screen. The worker can choose from the To Do tasks list any task and by scanning his barcode he can start the operation. The system will keep worker ID, task ID and time when the operation was started.

To take a break, the worker should press the 'Pause' button. To finish his break and restart the operation he should press 'Restart' button.

To finish the operation the worker must scan his barcode. The system will keep his finish time, worker ID and task ID.

If worker exceeds the assigned time for the operation the Exceeded Time Reason screen will be shown. Once the operation is finished the system is sending this task to Quality Controller. If Quality Controller will find a mistake in operation, the system will show a warning screen to worker.

If worker receives the warning while he is doing another task, he is allowed to finish that task first. However, after finishing the last task the To Do tasks list will be disabled and worker must to correct the mistake. If there are some mistakes the worker can choose from the To Correct tasks list which operation is going to be remade.

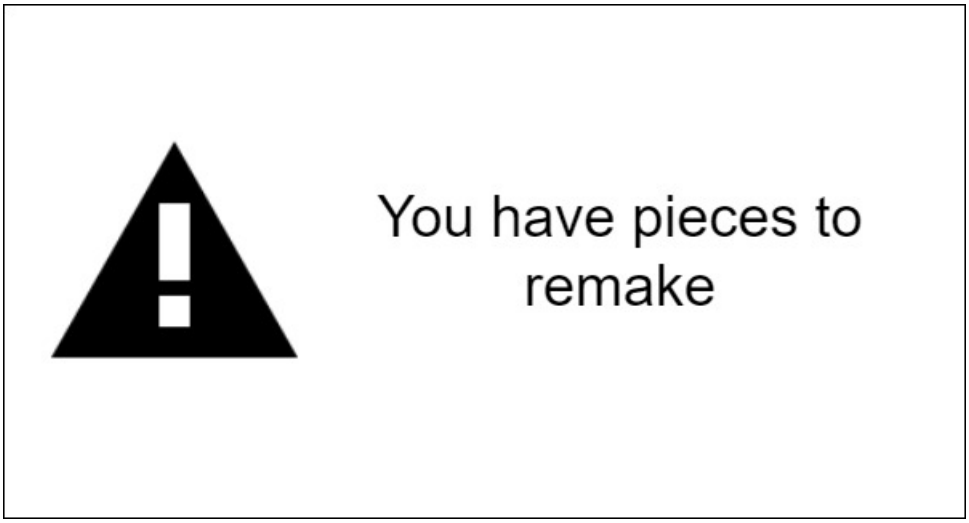

Figure 3.17: Warning about mistake in operation screen

This screen contains the information about mistake in an operation.

Figure 3.18: Exceeded Time Reason screen

The elements of Exceeded Time Reason screen:

1. **Reasons' list**
2. **Reasons as buttons**
3. **Submit button**

This screen is touch screen and it is the same screen for Worker and for Quality controller. Once the employee exceeds the assigned time for operation this screen will be shown at the end of the operation. The employee can choose various reasons from the list and then he should press 'Submit' button. The system will keep the reasons and exceeded time into the database.

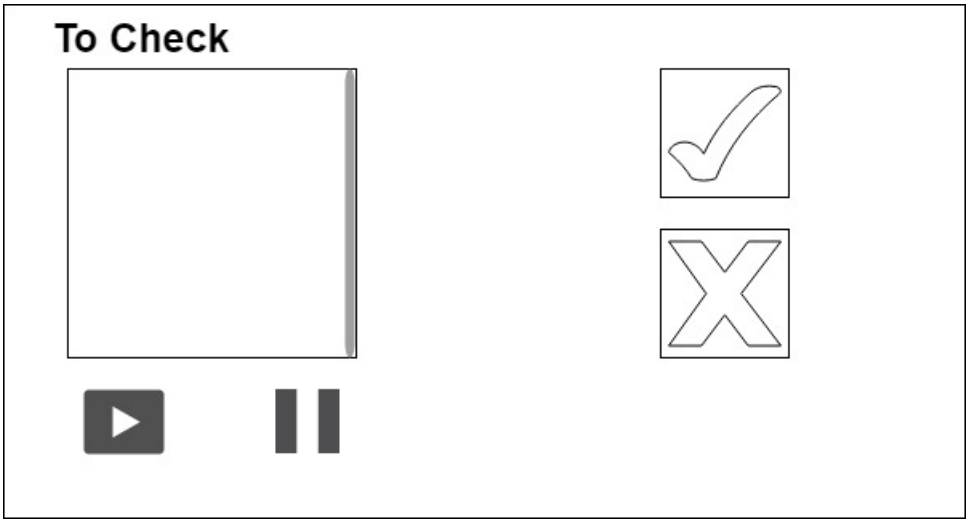

Figure 3.19: Quality Controller operational screen

The elements of Quality Controller operational screen:

1. **To check tasks list**
2. **Pause button**
3. **Restart button**
4. **Accept button**
5. **Reject button**

This screen is touch screen. The controller should choose the task from To Check list and scan his barcode to start checking the operation. To take a break controller should press 'Pause' button, to finish the break and restart checking the operation he should press 'Restart' button.

Once the Quality Controller is finished, he must scan his barcode and press either 'Accept' or 'Reject' button. The system will keep the information and time into database and in case of pressing 'Reject' button the warning and operation will be resend to worker. If the assigned time for the check of operation is exceeded the Exceeded Time Reason screen will be shown.

Figure 3.20: Manager reports about employees screen

The elements of Manager reports about employees screen:

1. **List box of reports**
2. **List box of Employees**
3. **"Show Reports" Button**
4. **Report section (Table or graphics)**

This screen is not touch screen is going to be in the personal computer restricted by Windows user. To interact with the page Manager must use Mouse and select which report he wants to get and about which employee, then click the button "Show Reports". After that system is going to retrieve information from database and display it in the Report section by a table or a graphic.

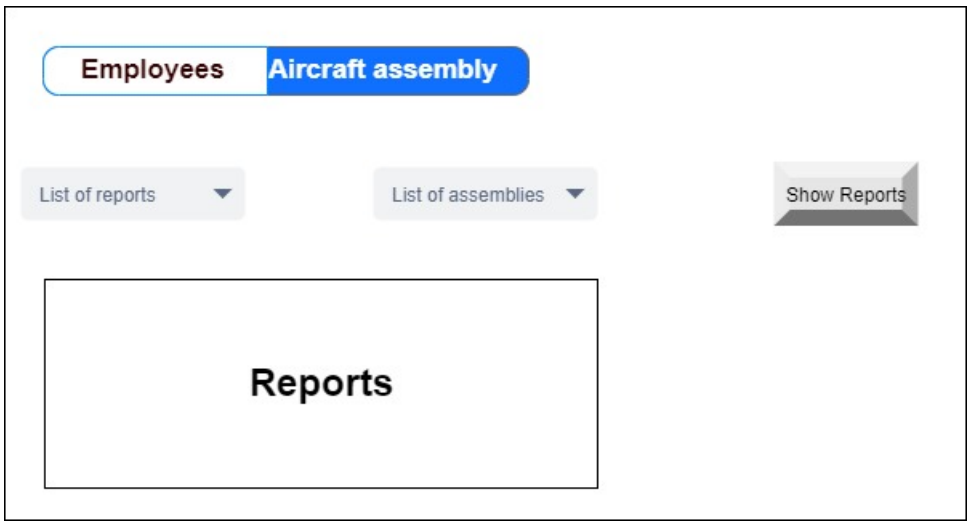

Figure 3.21: Manager reports about aircraft assemblies screen

The elements of Manager reports about aircraft assemblies screen:

1. **List box of reports**
2. **List box of Assemblies**
3. **"Show Reports" Button**
4. **Report section (Table or graphics)**

This screen is not touch screen so is going to be in the personal computer restricted by Windows user. To interact with the page Manager must use Mouse and select which report he want to know and about which Aircraft Assembly and then click the button "Show Reports". After that system is going to retrieve information from database and display that in the Report section by a table or a graphic.

Chapter 4

Testing strategy

4.1 Test Plan

Testing is a very crucial part of any development that has to be done. Without testing one would not be able to find bugs and errors in the system. These bugs can cause inconvenience to the users in long run or even cause malicious activities for the users.

We implemented manual testing to encounter bugs and errors that could have caused problems to the users. For testing we did not used any specialised applications or software because it is done manually. We have created 10 test cases and have kept them on high priority for risk. The test cases along with results can be found on excel sheet below.
Note: These test cases are exactly in same order as functional requirements.

4.1.1 Pass/Fail Criteria

This process is considered to be successful when all the tests cases are passed and all the functionalities of a system are working perfectly as planned. Although, there could be some bugs which can be neglected as they do not possess any threat to the system. If majority of the tests are passes as per their priority level, the testing is successful.

In our project all the 10 test cases were passed and the system seems to be bug free during the time of integration. Following criteria were adopted by out testing team:

1. All tests completed successfully.
2. All main functions working.
3. Error free tests were conducted.

4.2 Test cases

4.2.1 Test cases for Clock in/Clock out screen

Test Case id :	1		Case Designed By:	Gurinder Nanda
Priority:	High		Case Design Date:	18/09/2019
Test Case Title:	Clock-in		Case Executed By:	Gurinder Nanda
			Case Executed Date:	18/09/2019
Preconditions:	User credentials should be inside the database			
Postconditions:	User is able to clock-in and scan his card to enter into Restricted area			

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	The worker should first clock-in and then scan their card.	Password	Worker is able to enter into the production line.	Worker enters the production line	WORKER REQ-1	Pass
2	The quality controller first clock in and scan their card	Password	Quality controller is able to enter into the production line	QC enters the production line	QUALITY REQ-1	Pass
3	The manager clock-in and then scan their card	Password	Manager is able to enter into the production line	Manager enters the production line	MANAGER REQ-1	Pass

Figure 4.1: Test case 1: Clock in

Test Case id :	2		Case Designed By:	Gurinder Nanda
Priority:	High		Case Design Date:	18/09/2019
Test Case Title:	Clock-out		Case Executed By:	Gurinder Nanda
			Case Executed Date:	18/09/2019
Preconditions:	User credentials should be into the database			
Postconditions:	User is able to clock-out			

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	The worker should first clock-out and then scan their card.	Password	Worker is able to exit from the production line.	Worker exits from production line	WORKER REQ-1	Pass
2	The quality controller first clock-out and scan their card	Password	Quality controller is able to exit from production line	QC exits the production line	QUALITY REQ-1	Pass
3	The manager clock-out and then scan their card	Password	Manager is able to exit from the production line	Manager exits the production line	MANAGER REQ-1	Pass

Figure 4.2: Test case 2: Clock out

4.2.2 Test case to take a break for employees

Test Case id :	4			Case Designed By:	Gurinder Nanda
Priority:	High			Case Design Date:	18/09/2019
Test Case Title:	Break Operation			Case Executed By:	Gurinder Nanda
				Case Executed Date:	18/09/2019
Preconditions:	Employee must be clock-in				
Postconditions:	Employee should be able to break the operation				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Click "Pause" Button		Employee able to pause/break the operation by pressing pause button	Employee paused the operation by touching pause button	WORKER REQ - 3 QUALITY REQ - 4	Pass
2	Click "Start" Button		Employee able to Start again the operation by pressing start button	Employee start again the operation by touching start button	WORKER REQ - 3 QUALITY REQ - 4	Pass

Figure 4.3: Test case 4: Take a break

4.2.3 Test cases for Worker screens

Test Case id :	3			Case Designed By:	Gurinder Nanda
Priority:	High			Case Design Date:	18/09/2019
Test Case Title:	Start Operation			Case Executed By:	Gurinder Nanda
				Case Executed Date	18/09/2019
Preconditions:	Worker must be Clock-in				
Postconditions:	Worker must see that the Start button is disabled and the Pause button is enabled. The system saved the start time into database				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Scan bar code of card		The worker can see that the Pause button is enabled and the Start button is disabled	Worker sees the Pause button as enabled and the Start button as disabled	WORKER REQ- 2	Pass

Figure 4.4: Test case 3: Start the operation

	Test Case id :	5		Case Designed By:	Gurinder Nanda	
	Priority:	High		Case Design Date:	18/09/2019	
	Test Case Title:	Finish operation with exceeded time		Case Executed By:	Gurinder Nanda	
				Case Executed Date:	18/09/2019	
	Preconditions:	Worker scan the barcode to finish the operation				
	Postconditions:	The system has sent the task for QC approval. The information is saved into database				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	When finish, worker scan the barcode		The system compared the actual time with assigned time for this task and the screen to choose the reason for exceeded time is shown	Worker can see the screen to select the reason of extra time taken to finish the operation.	WORKER REQ - 5	Pass
2	The worker selects the reason/s to explain why he exceeded the assigned time for task		The system saved the information into the database and sent the task to QC to check it. The fist screen for worker to start any new task is shown	QC receives the task to check. The worker is redirected to the first screen	WORKER REQ - 5	Pass

Figure 4.5: Test case 5: Finish the operation with exceeded time

	Test Case id :	6		Case Designed By:	Gurinder Nanda	
	Priority:	High		Case Design Date:	18/09/2019	
	Test Case Title:	Finish Operation		Case Executed By:	Gurinder Nanda	
				Case Executed Date:	18/09/2019	
	Preconditions:	Worker must scan the barcode to finish the operation				
	Postconditions:	Task is sent to QC for approval, the information is saved into the database and the fist screen for worker is displayed				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Worker scan the barcode to finish the operation		System has sent the task to QC for approval and redirected the worker to the first page to start any new task	Task is sent successfully to QC for approval. The first screen for worker is displayed	WORKER REQ - 2	Pass

Figure 4.6: Test case 6: Finish the operation

Test Case id :	7			Case Designed By:	Gurinder Nanda
Priority:	High			Case Design Date:	18/09/2019
Test Case Title:	Correct Mistake			Case Executed By:	Gurinder Nanda
				Case Executed Date:	18/09/2019
Preconditions:	Worker has already sent the task to QC for approval				
Postconditions:	Worker must correct the mistakes to move on to next task				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Worker has got the alert about mistake		QC rejected the task and sent it back to worker to correct and the system is showing the warning about mistake to worker	Worker received the rejected task and the warning about mistake	WORKER REQ - 4	Pass
2	Worker has to remake the piece that is rejected before start any other operation		The list of To Do tasks is disabled and worker can choose the task just from the list of To Correct tasks	Worker cannot choose any task from To Do tasks list and can start the task from To Correct tasks	WORKER REQ - 4	Pass

Figure 4.7: Test case 7: Correct mistake

4.2.4 Test cases for Quality Controller screens

Test Case id :	8			Case Designed By:	Maria Medina
Priority:	High			Case Design Date:	18/09/2019
Test Case Title:	Finish operation with Accept			Case Executed By:	Maria Medina
				Case Executed Date:	18/09/2019
Preconditions:	Quality contoller is clock in in the system and the operation is started				
Postconditions:	Operation is done and information is sent to the database				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Scan card to finish operation		Operation is finished and the system is asking to Accept or Reject the piece	System stops and start to ask about the quality of piece	QUALITY REQ-2	Pass
2	Accept operation as the piece is correct		Go back to first page starting expecting to Scan the code to start a new operation	System is sending the information to the database and directing the controller to first page to start a new operation	QUALITY REQ-2	Pass

Figure 4.8: Test case 8: Finish the operation with Accept

	Test Case id :	9		Case Designed By:	Maria Medina	
	Priority:	High		Case Design Date:	18/09/2019	
	Test Case Title:	Finish operation with Reject		Case Executed By:	Maria Medina	
				Case Executed Date:	18/09/2019	
	Preconditions:	Quality contoller is clock in in the system and operation is started				
	Postconditions:	Operation is done, information is sent to the database and piece is going back to the worker				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Scan card to finish the operation		Operation is finished and the system is asking to Accept or Reject the piece	System stops and start to ask about the quality of piece	QUALITY REQ-2	Pass
2	Reject operation as the piece is not correct		Go back to first page starting expecting to Scan the code to start a new operation	System is sending information to the database, sending the piece back to worker with an alert and directing the controller to first page to start a new operation	QUALITY REQ-2	Pass

Figure 4.9: Test case 9: Finish the operation with Reject

4.2.5 Test cases for Manager screen

	Test Case id :	10		Case Designed By:	Maria Medina	
	Priority:	High		Case Design Date:	18/09/2019	
	Test Case Title:	Get reports of worker		Case Executed By:	Maria Medina	
				Case Executed Date:	18/09/2019	
	Preconditions:	Manager is clock in in the system				
	Postconditions:	Data is being showed in reports section				

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result
1	Open Admin panel		Admin panel in employees section waiting for Manager to ask for reports	Employees page in Admin panel is displayed	MANAGER REQ-3	Pass
2	Select a report and an employee and press button "Show reports"		Requested report is displayed in report section	System is getting information from database to display the report about the employee	MANAGER REQ-3	Pass

Figure 4.10: Test case 10: Get reports about worker

	Test Case id :	11		Case Designed By:	Maria Medina		
	Priority:	High		Case Design Date:	18/09/2019		
	Test Case Title:	Get reports of Aircraft assembly		Case Executed By:	Maria Medina		
				Case Executed Date:	18/09/2019		
	Preconditions:	Manager is clock in in the system					
	Postconditions:	Data is being showed in reports section					

Step No.	Test Step	Input Data	Expected Result	Actual Result	Requirement Tested	Test Step Result	Defect#
1	Open Admin panel		Admin panel in employees section waiting for Manager to ask for reports	Employees page in Admin panel is displayed	MANAGER REQ-2	Pass	
2	Go to Aircraft Assembly tab		Admin panel in Aircraft Assembly section waiting for Manager to ask for reports	Aircraft Assembly page in Admin panel is displayed	MANAGER REQ-2	Pass	
3	Select a report and an assembly and press button "Show reports"		Requested report is displayed in report section	System is getting information from database to display the report about the requested assembly	MANAGER REQ-2	Fail	Information not showed properly

Figure 4.11: Test case 11: Get reports about Aircraft Assembly

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