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FRQ2024001 Flight-Ready Quality Engineering

Phase 1

Test Strategy Document

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1. Introduction

1.1. Purpose

This Test Strategy document for Flight-Ready Quality Engineering supports the following objectives that define the scope, roles, and testing strategies of the project, in addition to the previous activities (if any) and general criteria.

- Identify that existing project information and software components be tested.
- List the recommended (high-level) testing requirements.
- Recommend and describe the strategies to be used.
- Identify required resources and estimate testing efforts.
- List the elements to be delivered for the testing activities.

1.2. Scope

This test plan applies to the integration and system tests that will be conducted at the release of version one of the system Flight-Ready Quality Engineering. It is assumed that previous unit tests have provided full black box testing through extensive source code coverage and testing of all module interfaces. This test strategy applies to all requirements requested by users.

1.3. Open Items

ID	Description	Status	Responsible	Due Date

2. Testing Scope

United Airlines, one of the world's largest and most respected airlines, operates a comprehensive online platform for travelers to book flights and access essential travel information. Within this digital ecosystem, the "Flights from Chicago" section plays a crucial role, serving as a gateway for passengers looking to depart from the vibrant city of Chicago.

In an era where user experience and functionality are paramount, ensuring the seamless operation of this web portal is imperative. Quality Engineering practices are pivotal components in this endeavor. This assignment challenges candidates to devise robust testing strategies, addressing a myriad of use cases and scenarios, to guarantee that the website performs optimally, provides accurate information, and adheres to stringent security standards.

2.1. Testing In-Scope

The functionality of the “Flights from Chicago” page includes:

Item	Brief Description
Search	Functionality to search flights in the system
Daily Fares for flights to San Francisco from Chicago	Flight prices from one location to another
Information Panel (airport information for example, ad-placements, weather etc.)	Summary information for users
Table of other popular deals on flights from Chicago to San Francisco	Information related to different flight options from the same destination

2.2. Testing out of Scope

Item	Brief Description
Sign Up Users	Process of sign-up users in the web site
Reports	Detailed information about the transactions
Payment process	Functionality to apply payments using credit cards

2.3. Test Environments (Infrastructure)

System Resources	
Resource	Name / Type
Database server	
— Network	10.0.93.113
— Server Name	ARGLAP2024
— Database Name	local_flights
Local Test	
— Special Requirements Configuration	Browsers: IE Explorer, Firefox, Safari Mobile Emulators: www.browserstack.com
Web Application	www.readytoflight.com

3. Testing approach

3.1. Test Execution Cycles

To this phase, it's necessary to follow the six main phases of STLC:

- Requirement Analysis.
- Test Planning.
- Test Case Development.
- Test Environment Setup.
- Test Execution.
- Test Cycle Closure.

3.2. Approach to risk-based testing

Test cases will be categorized by priority during the design phase, based on the following rules:

Priority	Description
High	A test case which validates a key feature or a high-risk requirement, measuring a positive scenario (expected behavior of application). Passing this test, it will ensure the basic expected behavior of the application is covered. Negative scenarios can be included as a High Priority; if the failure likelihood is high (unexpected behavior is very likely to occur).
Medium	A test case which validates a medium risk requirement, a feature from an end-user perspective (usability) or negative scenarios which are unlikely to occur
Low	A test case which validates a low-risk requirement, specific flow for various data combinations, or minor requirements such as Font size, Position of field, alignment etc., related to user friendliness

3.3. Test Types and Responsibilities

Type	Test Object	Owner	Applicable [y/n]	Approach
Sanity	Website	QA	Yes	Quickly system evaluation
Smoke Testing	Website	QA	Yes	Verify critical functionalities
Regression Testing	Website	QA	Yes	Ensure no new bugs on the system
Functional Testing	Website	QA	Yes	Validate requirements
Automation Testing	Website	QA	Yes	Reduce amount of human error
Performance Testing	Website	QA	Yes	Quantitative tests for real environments
Manual Testing	Website	QA	Yes	Simulate behavior of real users
Security Testing	Website	QA	Yes	DAST- Black box testing

3.4. Test Data Requirements

- Sign-up uses in the system
- Payment methods (information) available for testing environments

3.5. Test effort estimation

Module	Complexity	Functional Point
Search	Medium	2
Daily Fares	Complex	4
Information Panel	Simple	1
Popular deals on flights	Complex	4

Using Functional Points Analysis Estimation:

Total Effort = Total Functional Points x Estimate per Functional Point

TE = 11 X (2 + 8 + 1)

TE = 11 X 11

TE = 121

3.6. Test Planning

3.7. Test Automation

Test Type	Tool	Special Requirements
Automation	Cypress	
Automation	Selenium	
Automation	Cucumber	

4. Test Preparation Details

4.1. Resources

Team Resources		
Role	Required?	Responsibilities
Test Manager	Optional	<ul style="list-style-type: none">✓ Provide technical direction.✓ Acquire appropriate resources.✓ Provide management disclosure.
Test Designer	Yes	<ul style="list-style-type: none">✓ Identifies, prioritizes, and implements test cases.✓ Generate the test plan.✓ Generate the test model.✓ Evaluate the effectiveness of the testing effort.
Tester	Yes	<ul style="list-style-type: none">✓ Requests to change the document.✓ Registration results.✓ Run the tests.

Test Application Support	Optional	<ul style="list-style-type: none"> ✓ Test System availability ✓ Grant access to test environment resources
QA Automation	Yes	<ul style="list-style-type: none"> ✓ Create automated tests based on automation strategy

5. Test Scenarios and Cases

5.1. Test Scenarios

For the Flights from Chicago portal, the following test scenarios will be validated to ensure a smooth booking experience for users:

- A portal to access flights.
- Search functionality that allows users to search for flights by name, from-to airports, or flight code for checking their status and timings.
- Search results that display flight details, timings, and availability.
- Complete details of the flight should be displayed when the user clicks on a search result.
- Real-time flight status of seat availability.
- A graphical view of the airline's seating arrangement along with seat number and availability status.
- Pricing of different types of seats should be displayed to the users.
- Users should be able to select single or more than one seat.
- Users should not be permitted to select seats that are already booked or not allowed for booking.
- After selecting seats, entering passenger details, and making payment, the selected seats should get booked.
- On successful booking, the ticket should be visible and downloadable.
- The user should also receive a confirmation mail along with tickets on the email IDs provided while filling the details.
- There should be a maximum limit of seats that a user can book. Selecting more seats than permitted results in an error message.
- All the different types of payment methods should work fine.
- The user should be able to cancel the tickets booked by entering the mandatory details, and the amount after deducting the cancellation fee should get refunded back to the user.
- After cancellation, the seat's status should be updated to available.

5.2. Test Cases

Search Functionality (Happy Path, Black Box)

Test Case ID	Test Case Description	Test Steps	Expected Results
TC01	Ensure one-way flights can be listed using the search module	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select one-way type of flight in dropdown. 3. Select Chicago in the From dropdown. 4. Select San Francisco in the To dropdown. 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Prices, schedule, money conversion, flight details will be listed

		<ol style="list-style-type: none"> 5. In Departure, select February 10th. 6. Click on Search flights button 	
TC02	Ensure roundtrip flights can be listed using the search module	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select Chicago in the From dropdown. 4. Select San Francisco in the To dropdown. 5. In Departure, select February 10th. 6. In Return dropdown, select February 15th. 7. Click on Search flights button 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Prices, schedule, money conversion, flight details will be listed
TC03	Ensure multi-city flights can be listed using the search module	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select multi-city type of flight in dropdown. 3. In the new window, select flight only trip selection. 4. Select money in show price. 5. Select multi-city option. 6. Add 2 adults, 1 senior and 1 child. 7. In Destination 1 type Chicago in the From field and Dallas in To field. 8. Choose depart date February 10th. 9. In Destination 2, select Dallas in From field and San Francisco in To field. 10. Choose depart date February 12th and early morning as time of day. 11. Select Economy cabin, lowest type of fare and show all airlines flights. 12. Click on Search flights button 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Prices, schedule, money conversion, flight details will be listed
TC04	Ensure flights can be searched by travel class	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select economy as travel class 4. Select Chicago in the From dropdown. 5. Select San Francisco in the To dropdown. 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Lowest Prices, schedule, money conversion, flight details will be listed

		<ol style="list-style-type: none"> 6. In Departure, select February 10th. 7. In Return dropdown, select February 15th. 8. Click on Search flights button 	
TC05	Ensure flights can be searched by travel class	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select premium economy as travel class 4. Select Chicago in the From dropdown. 5. Select San Francisco in the To dropdown. 6. In Departure, select February 10th. 7. In Return dropdown, select February 15th. 8. Click on Search flights button 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Prices, schedule, money conversion, flight details will be listed
TC06	Ensure flights can be searched by travel class	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select business or first as travel class 4. Select Chicago in the From dropdown. 5. Select San Francisco in the To dropdown. 6. In Departure, select February 10th. 7. In Return dropdown, select February 15th. 8. Click on Search flights button 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Highest Prices, schedule, money conversion, flight details will be listed
TC07	Ensure flights can be searched by travelers	<ol style="list-style-type: none"> 1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select economy as travel class 4. Select 3 adults, 2 seniors and 1 child as travelers. 5. Select Chicago in the From dropdown. 6. Select San Francisco in the To dropdown. 7. In Departure, select February 10th. 	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Lowest Prices, schedule, money conversion, flight details will be listed for all the travelers.

		8. In Return dropdown, select February 15 th . 9. Click on Search flights button	
TC08	Ensure flights can be searched using a promotion code	1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Select roundtrip type of flight in dropdown. 3. Select economy as travel class 4. Select 1 adult as traveler. 5. Type the promotion code you have. 6. Select Chicago in the From dropdown. 7. Select San Francisco in the To dropdown. 8. In Departure, select February 10 th . 9. In Return dropdown, select February 15 th . 10. Click on Search flights button	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Lowest Prices, schedule, money conversion, flight details will be listed for all the travelers. • Discount appears because of the promotional code.
TC09	Ensure flights can be searched using miles	1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website. 2. Login into your United account (this is to validate your miles) 3. Select Book with Miles in dropdown. 4. In the new window, select flight only trip selection. 5. Select money in show price. 6. Select multi-city option. 7. Add 2 adults, 1 senior and 1 child. 8. In Destination 1 type Chicago in the From field and Dallas in To field. 9. Choose depart date February 10 th . 10. In Destination 2, select Dallas in From field and San Francisco in To field. 11. Choose depart date February 12 th and early morning as time of day. 12. Select Economy cabin, lowest type of fare and show all airlines flights. 13. Click on Search flights button	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options. • Lowest Prices, schedule, money conversion, flight details will be listed for all the travelers. • Discount appears because of the miles the logged in user has.
TC10	Ensure flights can be searched using cash	1. Launch the Cheap Flights from Chicago to San Francisco United Airlines website.	<ul style="list-style-type: none"> • Flights are listed in a new window according to the search options.

		2. Select roundtrip type of flight in dropdown. 3. Select economy as travel class 4. Select 1 adult as traveler. 5. Select Book with Cash option. 6. Select Chicago in the From dropdown. 7. Select San Francisco in the To dropdown. 8. In Departure, select February 10 th . 9. In Return dropdown, select February 15 th . 10. Click on Search flights button	<ul style="list-style-type: none"> Lowest Prices, schedule, money conversion, flight details will be listed for all the travelers.
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6. Test Execution Details

6.1. Tools

For this project, the following tools will be used:

Test Type	Tool	Special Requirements
Test Administrator	Jira	
Defect Tracking	Jira	
Test Coverage Monitor or Profiler	Programming IDE	
Mobile Testing	Browserstack	
DBMS Tools	SQLManagement Studio, MySQL	
Tools for load, stress and volume testing.	WAPTPro, JMeter	
Security Testing	OWASP, SonarQube, Veracode	

7. Defect Reporting

For a test object to pass the test, it is necessary that the errors of severity 1, 2 and 3 that have been found be removed. Errors of severity 4 will be discussed with the project manager.

7.1. Priorities in Defect Categorization

When completing defect details, it will be mandatory to complete both defect classifications Priority. This is related to the impact the defect has on testing and one of the following values needs to be assigned:

Priority	Description
1-Urgent (1) (2)	Defect stops all testing e.g., test environment unavailable. Immediate response required.
2-High	Defect stops all testing of one system/product e.g. Interface to system not functioning, unable to set up policy for product

3-Medium	Defect is a functional error affecting a system/product which impacts on majority of tests within the system/product.
4-Low (1)	Defect is a functional error affecting a system/product which has limited impact on other tests within the system/product.

7.2. Root cause analysis codes

Root cause defines where the defect originates and the cause of the error. The following causes can be defined:

- Code error
- Defect of duplicates
- Invalid test
- Environment Problem
- Change Request

8. Test Suspension Criteria

8.1. Testing Suspension

Testing activities may be partially or totally suspended if any of the following situations occur:

- Code promotion to test environments was not successful.
- Software components or files are missing from the new promotion.
- Test environments are not robust and stable enough to support testing (application and infrastructure)
- The minimum required availability of test environments necessary to complete the agreed coverage and testing schedule is not guaranteed.
- The number or severity of defects found does not allow testing to continue.
- The percentage of failed tests is more than 30% of the total executed.

8.2. Test Resumption Criteria

Testing will resume under the following circumstances:

- Code migration from development environments to test environments is successful.
- The stability of test environments is improved to the extent that effective testing can continue (application and infrastructure).
- The project manager extends the trial period to allow for the suspension period, in consultation with the QA for additional support.
- The project manager agrees to reduce the scope of testing to ensure that the original implementation deadline is met, albeit with reduced test coverage in terms of scope and volume, in consultation with development and QA vendor. Testing will need to be reprioritized and sufficient time should be allowed for proper version control of the test strategy, test plans, and test schedule to account for unscoped criteria.
- The project manager has escalated any issues related to poor availability or stability of test environments to the appropriate areas to resolve these issues and prevent further testing suspension.

- The project manager accepts the risk that poor availability or stability of test environments is likely to compromise the full completion of the test with the agreed test coverage.
- Sufficient resources have been provided for testing to resume.

9. Change Request

To manage change requests, the specifications are already defined by the product manager.

10. Test Entry and Exit Criteria

10.1. System Integration Testing and Solution System Testing – Exit criteria

Category	Criteria description	Limit value
EXIT CRITERIA		
Product delivery	Scoped functionality completed [mandatory]	100%
Test execution	System Integration Testing and System Testing execution percentage	100%
	System Integration Testing and System Testing test cases passed percentage	>95%
	Open 'critical' defects currently under review/resolution	0
	Open 'major' defects currently under review/resolution	0

10.2. User Acceptance Testing – Entry/Exit criteria

Category	Criteria description	Limit value
ENTRY CRITERIA		
Product delivery	Scoped functionality completed	100%
	Software delivered in agreed packaging format	100%
	Installation guide, user manual and operation manuals provided	100%
Deliveries from previous test level	System Integration Testing and Solution System execution percentage	100%
	System Integration Testing and Solution System test cases passed percentage	>95%
	Open 'critical' defects currently under review/resolution	0

	Open 'major' defects currently under review/resolution	0
	The previous test level has been completed and signed off	Completed and signed off
	The previous test level report	Completed and signed-off
Handover	Test level testers from both phases involved have signed and delivered the touchpoint checklist.	Checklist. signed
Test planning and preparation	User Acceptance Testing test plan	Signed off
	User Acceptance Testing test cases	Signed off
	Test scripts	Reviewed and accepted
	Testers executing the User Acceptance tests are trained	Training completed
Environmental readiness	Test environment availability, stability, performance and defect resolution SLAs have been agreed, are available and test and promotion windows for the testing types have been agreed.	Agreed
	Test environment as specified in the test strategy	Must be available
	Test data in the required quality and quantity	Must be available
	Test users (application users) with the required role and authorization	Must be available
EXIT CRITERIA		
Product delivery	Scoped functionality completed [mandatory]	100%
Test execution	User Acceptance Testing execution percentage	100%
	User Acceptance Testing test cases passed percentage	>95%
	Open 'critical' defects currently under review/resolution	0
	Open 'major' defects currently under review/resolution	0
	Any unresolved defects are fully documented, have been transferred to known errors and are agreed to be solved in later releases as change requests. An accepted work around is in place or defect is	Done

	accepted as is (Such known error should not be raised as incident in production).	
Sign-off	The fully integrated solution has been recommended as production ready by the Test Manager. The Test Summary Report for QA was signed-off.	Done

11. Test Deliverables

Work Product	When?	Trigger/Rhythm	Owner	Receiver
Test Plan	Preparation	At start of test planning	Test Manager	Project Manager
Test Cases	Preparation	Prior to start of QA execution phase	Test Manager	Project Manager Business Leads
	Execution	Test case status is part of the execution dashboard	Test Manager	Project Manager Business Leads
Test Progress Reporting (Dashboard)	Execution	Twice a week (Tuesday & Thursday)	Test Manager	Project Manager Other stream leads Business Leads
Test defect report (part of dashboard)	Execution	Twice a week (Tuesday & Thursday)	Test Manager	Project Manager Other stream leads Business Leads
Test Summary Report	Closure	At the end of testing	Test Manager	Project Manager Other stream leads Business Leads

12. Communications

During the testing phase the communication will be as follows:

QA Alignment meeting – There will be one alignment meeting with testers on a daily basis. During the meeting the following will be discussed:

- General execution progress
- Execution priority areas for the day
- Blocking issues

Alignment meeting		
Purpose	Audience	Frequency
Track execution progress, define priorities for execution, blocking issues	Testers, Test Manager, BA's on-site	Daily at 09.00

Defect Triage Meeting – There will be one triage meeting in regular basis every week. During the triage the following will be discussed:

- Any Significant / Critical defects
- Any defect in which there is a conflict.
- Any ageing defects.

Defect Triage		
Purpose	Audience	Frequency
Identify major issues, next release items, track progress of defects	Developer Lead, Test Manager, Migration Lead, FS-RI BA Lead, Finance BA Lead	Mon, Wed, 15.00

QA Exit Meeting – At the end of QA, there will be a formal meeting to discuss the testing status against each of the exit criteria. Apart from these above stated meetings, the QA Execution dashboard will be sent during testing execution.

13. Service Level Expectations

SLE	Testing Impact	Development team response expected
1	Defect halts critical testing and is impacting the testing schedule. No significant progress can be made until the defect is corrected.	Immediate response required. The required development resources are reassigned to address the defect. Off-hours work may be required.
2	Defect has significant impact on critical testing. Some progress can be made in the short term. Has the potential to impact the testing schedule if not corrected quickly.	Addressed as quickly as possible. The required development resources may be reassigned to address the defect.
3	Defect has localized impact on critical testing or significant impact on non-critical testing (e.g., testing performed ahead of schedule). Testing can continue but cannot be completed until the defect is corrected. No immediate impact to the testing schedule.	Resolution is worked into planned work for the required development resources.
4	Cosmetic level defect or defect impacts only non-critical testing.	The required development resources address the defect as time permits.

14. Assumptions and Risks

14.1. Assumptions

Testing Team Assumption	Possible Impact
Real functionality is ready for testing	UI testing can't be applied.
Registered users available in the system	UI testing can't apply all test cases created
Payment methods are defined, data for clients	Test cases can't be executed completely

Technical/Environment Assumption	Possible Impact
Stable version available for Flights from Chicago	Testing aborted
Payment platforms are available in testing environments, or a mockup was defined.	Payment gateway can't be included in the test
Communications using emails are up and stable.	QA process evidence can't be collected

Process Assumption	Possible Impact
Workflow for discount approvals is already defined	Test cases related to discounts can't be fulfilled
Daily fares are defined continuously	Functionality can't be tested
Search functionality is focused on flights from Chicago	Scope will be affected since this is a critical module

14.2. Risks

Risk	Possible Impact	Mitigation Plan
Tight timelines.	Deadline can't be reached	Prioritize test cases impact
Undefined project scope.	Testing blocked	Redefine initial scope
Insufficient resources.	Inappropriate team speed	Evaluate/include new members
Continuously changing requirements.	Test plan changing continuously	Evaluate scope and deliverables
Natural disasters.	Team not available	Reorganize task and deliverables
When software interfaces with other systems or components	Testing blocked	Monitoring dependencies
Security risks, such as data breaches and vulnerabilities	Test cases not approved	Plan to attack vulnerabilities
Inaccurate or missing data	Test results compromised	Prepare new test data
Issues related to user interfaces, user experience, and accessibility	Website might not be certified	Plan to include UX best practices

15. Metrics

16. Mandatory metrics

16.1. Defects by priority, severity and root cause

Metric	Definition	Form	Reporting
Defects by Severity	Classify defects by severity, for a component or system area, grouped by the high-level status	Column chart and table of values	Periodical report Test summary report
Defects by Priority	Classify defects by priority, for a component or system area, grouped by the high-level status		
Defect by root cause	Classify defects by root cause, for a component or system area, grouped by the high-level status		

16.2. Efficiency, effectiveness and coverage metrics

Metric	Measurement	Form	Reporting
Efficiency metrics			
Test case by status	Number of test cases having a specific status (Not run, not completed, failed, passed) against total number of planned test cases, for a project or phase	%	1. Periodical report 2. Test summary report
Effectiveness metrics			
Defect finding index	Number of defects against total number of executed test cases, for a project or phase or test team	Ratio	1. Periodical report 2. Test summary report
Coverage metrics			
Requirements coverage	Number of requirements having test cases against total number of requirements (%)	%	Test summary report
Test execution coverage	Number of requirements covered by successfully executed test cases against total number of requirements (%)	%	Test summary report