Final Project 2023S SSW567-WS

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Part4- Test Planning
Team: C

Test Planners
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Part4- Test Planning:

1. **Introduction:** Machine Readable Travel Documents (MRTDs) include official travel documents such as passports and visas. MRTDs have a Visual Inspection Zone (VIZ) and a Machine Readable Zone (MRZ). The VIZ displays holder information and a photograph, while the MRZ presents this data in an easily computer-readable format. This report outlines a plan to test a system for verifying the accuracy of VIZ and MRZ data encoding and decoding.

   Development Approach: Considering the high stakes of MRTD processing and rigid requirements, a plan-driven approach like the waterfall model is suitable. This approach allows for robust test planning and simultaneous execution of testing and development tasks.

2. **Reference Material:** The system will adhere to ICAO's "Doc 9303, Machine Readable Travel Documents, Eight Edition, 2021 Part 3: Specifications Common to all MRTDs." Key information includes ERZ dimensions, OCR-B typeface, nationality codes, checksum calculation, and character restrictions in the MRZ.

3. **Testing Scope:** The testing team will focus on the following objectives:

    1. Test the reliability of the MRTD encoding/decoding algorithm.
    2. Ensure the algorithm effectively translates VIZ information into valid MRZ format.
    3. Validate the algorithm's ability to decipher MRZ and output readable data.
    4. Note that the scalability of the system is not tested but a system to read and write MRTDs would be in use in every country following the ICAO standard for MRTDs.
    5. Test the system's load capacity and other aspects beyond our scope.

Out-of-scope objectives include:

1. Scalability testing of the system.
   1.1. Designing and testing a robust deployment strategy for global use is outside the testing scope.

2. Evaluating the reliance of human immigration officers.
   2.1. Training, maintenance, and employment of immigration officers are beyond the scope of the testing team.

Task Prioritization Strategy: To effectively prioritize tasks, we will rate their importance during the requirements testing phase. This will help the team focus on tasks aligning with the project scope and ensure crucial tasks are completed first. Requirements should be small enough to correspond to a single task.

4. Testing Approach:
Key Factors:

1. System Accuracy: Proper MRTD encoding/decoding
2. System Reliability: Consistent performance
3. System Feedback Speed
4. Document Features
5. Document Plagiarism

Key Risks:

1. Security: Test for vulnerabilities and potential breaches
2. Data Integrity: Ensure accurate and consistent data encoding/decoding
3. Usability: Assess user interface for ease of use
4. Maintenance: Evaluate code maintainability and upgradability

Success Criteria: Project completion on time, under budget, and with 80%+ accuracy.

Current accuracy: 100%.

Contingency Plans:

1. Secure authentication for accessing encoded passport data
2. Accurate passport data encoding/decoding tests
3. Efficient and reliable scanning process
4. Error management plan for passport scanning and encoding/decoding

Pass/Fail Criteria:

- Record error rate: acceptable system accuracy is 99.9999999% (nine-nines)

Entry/Exit Criteria:

- Entry: valid MRTD in possession, not expired, recent photo in VIZ
- Exit: officer access to passport validity, travel history, and VIS information

Deliverables: Reports detailing work, decisions, and results for each stage. Includes success metrics, reflections, and next steps.

Checkpoints:

- Test Planning: Test Planning Document
- Requirements Testing: Requirements
- Unit Testing: MRTDTest.py and Unit Testing Report
- Mutation Testing: Mutation Testing Score and Report
- Performance Testing: Performance.py and Performance Testing Report
- Acceptance Testing: User Interviews and Usability Testing Report

Budget: $250,000 total, with $100,000 allocated for testing and the remainder for design and development.

Resources:

- 3 Testing Engineers
- 1 QA Engineer
- 1 Team Manager

Man Hours:

- 40 hours/week

Testing Tools & Techniques:

- Unit testing: unit test, mutation testing, PyLint

Automation Strategy: Utilize Unit, Performance, and Functional Testing to ensure system functionality without flaws.

Unit Testing: Tests individual components of Passport Scan's encode and decode functionality, verifying proper operation and output accuracy.

Performance Testing: Assesses system performance under various conditions, such as differing throughputs, to confirm expected behavior.

Functional Testing: Examines overall functionality, ensuring correct encoding and decoding of data and the absence of system issues. Automation expedites testing and development processes with automated tools for correctness and completeness checks.

Testing types, methodologies, and techniques:

1. **Requirement Reviews:** Requirements gathered from the assignment and PDF include decoding strings, check-digit algorithm implementation, and encoding strings.
2. **Design Reviews:** Module designed with decode() and encode() functions to fulfill requirements.
3. **Unit Testing:** Unit test cases created for full functionality coverage using Unittest and Mutation testing.
4. **Usability Testing:** Ensured code and unit test comprehensibility and ease of execution through teammate code reviews and repeated test cases, maintaining a Test Execution Report.
5. **Performance Testing:** Conducted by writing a new program, incorporating time library functions in a CSV file, and generating an Excel file.
6. **System Testing:** Ensures code integration with other systems and compliance with integration requirements. Evaluates end-to-end behavior of software and hardware components under various conditions.

Test Platform: Utilized MacOS and Windows systems running Python 3.10 for Passport Scan testing. Employed unit test library for unit test cases and performance library for code performance measurement. A mock-production environment will be established during the final testing stages.

Progress Measurement Plan:

1. **Test Case Execution Report:** Overview of executed test cases and results, including passed, failed, blocked, and unexecuted tests are provided below:

   https://docs.google.com/spreadsheets/d/15pS2TivFYKdCJhm4jdnkQ07_5TdAByRjGje3CSKdkI0/edit?usp=sharing

2. **Test Coverage Report:** Overview of code coverage achieved by tests, detailing the number of lines of code executed, and the percentage of code covered by the tests. An example of a test coverage report is provided in the below figure.

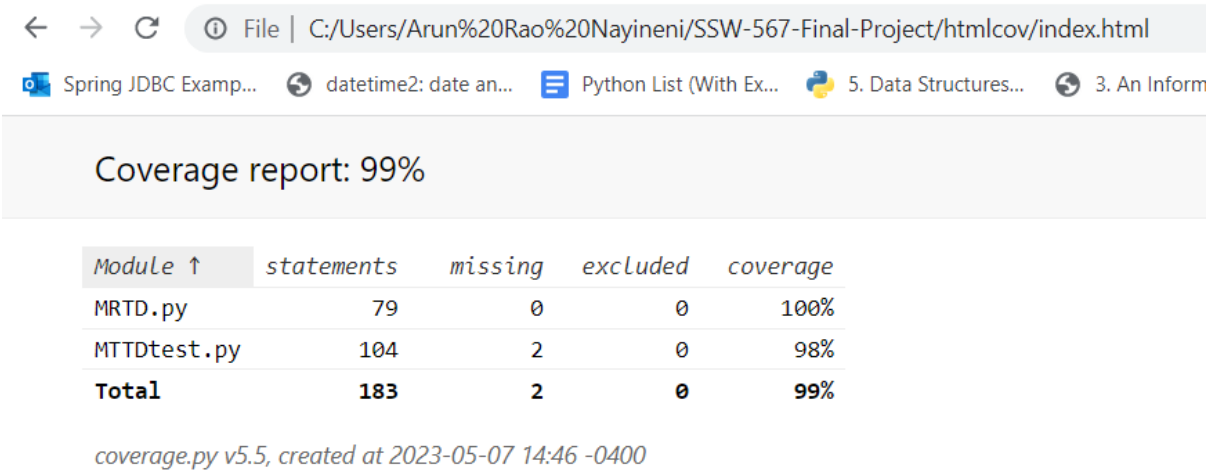

Figure: Snapshot of Coverage Report

3. **Defect Report:** This report summarizes defects detected during testing, including defect count, severity, and resolutions.

TestCaseNo	Scenario	Test Result	Proposed Solution	Test Result
1	Exception decoding file: records_encode.js. (extract1 functionality: decode failed to read data)	Fail	Adjusted code for missing middle name (handles both first and middle names given)	Pass

4. **Performance Report:** Provides an overview of system performance, covering response time, throughput, memory usage, and CPU utilization. An in-depth analysis is needed, considering the deployment environment. Preliminary local device testing offers performance insights.

Lines read (n)	Encode Performance (s)	Decode Performance (s)
100	0.00368379200	0.00323529200
1,000	0.03592770800	0.03185566700
2,000	0.07190883400	0.06399629200
3,000	0.10682275000	0.09675112500
4,000	0.14279737500	0.12927483300
5,000	0.17801850000	0.15994108400
6,000	0.21418037500	0.19589658300
7,000	0.24956683400	0.22731129100
8,000	0.28483079100	0.26147708400
9,000	0.32003737500	0.28104670800
10,000	0.35544920900	0.31050629100

System Readiness: The system is ready for shipping upon completion of all test cases, bug fixes, acceptable code coverage, and performance tests.

5. **Schedule:**

Date	Task
15-Apr-23	Project Start
19-Apr-23	Requirement Gathering
24-Apr-23	System Design
29-Apr-23	Development begins
29-May-23	Alpha testing
29-Jun-23	Beta Testing
15-Jul-23	User Acceptance Testing
29-Jul-23	System Testing
14-Aug-23	Integration Testing
28-Aug-23	Security Testing
13-Sep-23	Regression Testing
27-Sep-23	Security Testing
12-Oct-23	Performance Testing
26-Oct-23	Scalability Testing
11-Nov-23	Stress Testing
25-Nov-23	Final System Testing
11-Dec-23	Final Delivery
12-Dec-23	Post-Implementation Review

6. **Approvals:**
    1. **Project Manager:** Ensures project success and plan feasibility.
    2. **Funding Agency:** Verifies project meets funding criteria and objectives.
    3. **Technical Experts:** Confirm technical soundness and feasibility.
    4. **End-User Representatives:** Validate alignment with target audience needs.
    5. **Regulatory Agencies:** Ensure compliance with regulations.
    6. **Senior Management:** Confirm alignment with organizational strategy.
    7. **Product Owner:** Approve test plan according to product requirements and customer needs.
    8. **Development Team:** Verify test plan covers product development cycle aspects.
    9. **QA Team:** Ensure the test plan includes appropriate test cases and risk coverage.
    10. **Customers:** Approve plan based on product fit and testing suitability.