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TEST PLAN

Part 1: Overall Test Plan

Our testing strategies for the project will be comprehensive, covering various aspects such as functionality, performance, security, and user experience:

Functional Testing: This phase involves testing the fundamental functionalities of the voice assistant, including voice recognition, synthesis, natural language processing, and ChatGPT integration. Test cases should cover a wide range of scenarios, from simple commands to complex conversational interactions.

Performance Testing: To guarantee the voice assistant's responsiveness and reliability, performance testing is essential. This involves assessing the system's speed, scalability, and resource usage under various conditions. Performance testing should include stress testing to determine the assistant's limits, load testing to assess its response under normal and peak loads, and scalability testing to ensure it can handle an increasing number of users without degradation in performance.

Security Testing: Given the sensitive nature of voice data and the potential privacy risks associated with AI-driven technologies, security testing is paramount. This includes evaluating the system for vulnerabilities in data storage, transmission, and access control. Additionally, testing should cover potential risks related to voice cloning, deepfake attacks, and unauthorized access to personal information. Regular security audits and penetration testing can help identify and address potential security loopholes.

User Experience (UX) Testing: A crucial aspect of the voice assistant's success lies in providing a positive and intuitive user experience. UX testing involves assessing the interface design, ease of use, and overall satisfaction of users interacting with the assistant. It is important to gather feedback from a diverse user base to ensure that the assistant is culturally inclusive and meets the needs and expectations of different user demographics.

Part 2: Test Cases

1. **Test Case Identifier: T001**

- Purpose of Test: Validate voice recognition accuracy.
- Description of Test: Speak a series of 8 predefined commands: “Hello”, “My name is John”, “How are you doing today?”, “How is the weather today?”, “What time is it?”, “What is your name?”, “How old are you”, “I hope that you are doing very well,” and assess if the voice assistant accurately recognizes and interprets the inputs.
- Inputs Used for Test: Predefined voice commands.
- Expected Outputs/Results: Correct interpretation of spoken commands.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: The program manages to accurately recognize and interpret all of the 8 predefined commands. This proves that the voice recognition function of the program runs well and can accurately interpret the inputs.

2. **Test Case Identifier: T002**

- Purpose of Test: Evaluate ChatGPT integration.
- Description of Test: Engage in a conversation with the assistant: “Hello ChatGPT”, “Can you tell me who is the current president of the United States?”, “Can you tell me how far is it from Cincinnati to Hanoi, Vietnam?” and assess the coherence and relevance of responses generated by the ChatGPT model.
- Inputs Used for Test: Varied conversational queries.
- Expected Outputs/Results: Contextually relevant and coherent responses.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Integration.

Result: ChatGPT API returns very accurate and up-to-date answers to the 2 questions above. This is because we are using the ChatGPT 4.0 model, so its knowledge is updated to 2023.

3. Test Case Identifier: T003

- Purpose of Test: Assess user privacy features.
- Description of Test: Analyze the assistant's handling of sensitive information and verify that it complies with privacy regulations by checking whether it has access to user's sensitive information.
- Inputs Used for Test: Simulated user data with sensitive information.
- Expected Outputs/Results: Secure handling of sensitive information, adherence to privacy regulations.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: It has been verified that the program only has access to the user's microphone and speaker thus confirming that it cannot access user's data.

4. Test Case Identifier: T004

- Purpose of Test: Evaluate multilingual support.
- Description of Test: Test the voice assistant's ability to understand and respond appropriately to commands and queries in different languages.
- Inputs Used for Test: Commands and queries in multiple languages.
- Expected Outputs/Results: Accurate interpretation and response in the respective languages.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Integration.

Result: Unfortunately, the program can only interact with English as of the current moment. Other languages have not been supported yet.

5. Test Case Identifier: T005

- Purpose of Test: Assess system scalability.
- Description of Test: Simulate a high volume of user requests to evaluate the assistant's performance under peak loads.
- Inputs Used for Test: Simulated user requests.
- Expected Outputs/Results: Stable performance under peak loads without degradation.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Performance.
- Unit/Integration Test Indication: Integration.

Result: Since the program is set to handle one request at a time, it will process the first command that it receives before proceeding to the next one. The program runs smoothly under more load; however, it does take time to go through all of the requests.

6. Test Case Identifier: T006

- Purpose of Test: Test for voice synthesis accuracy.
- Description of Test: Evaluate the quality and clarity of synthesized voice responses generated by the assistant.
- Inputs Used for Test: Varied responses requiring voice synthesis.
- Expected Outputs/Results: Clear and natural-sounding voice responses.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: The assistant has a very clear and easy to understand voice. It is also very soothing and not too fast.

7. Test Case Identifier: T007

- Purpose of Test: Test for response time.
- Description of Test: Measure the time taken by the assistant to respond to user queries under normal and peak load conditions.
- Inputs Used for Test: Varied user queries.
- Expected Outputs/Results: Timely responses within acceptable thresholds.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Performance.
- Unit/Integration Test Indication: Integration.

Result: Under normal load, the program can handle user's query in a matter of milliseconds. The same applied when under heavier load, since the program is set to handle one query at a time, this does not affect the time it takes to respond to each question but does affect the total time it takes to handle a lot of queries.

8. Test Case Identifier: T008

- Purpose of Test: Evaluate error handling.
- Description of Test: Intentionally provide incorrect or ambiguous inputs to assess how well the assistant handles and communicates errors.
- Inputs Used for Test: Incorrect or ambiguous queries.
- Expected Outputs/Results: Clear error messages and guidance for the user.
- Normal/Abnormal/Boundary Case Indication: Abnormal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: Whenever the assistant is provided with an ambiguous input, it asks the user to provide a more clearly defined version instead. This is for it to respond more accurately.

9. Test Case Identifier: T009

- Purpose of Test: Check for accessibility.
- Description of Test: Evaluate the voice assistant's accessibility features, ensuring it can be used effectively by individuals with disabilities.
- Inputs Used for Test: Voice commands and queries from users with various accessibility needs.
- Expected Outputs/Results: Successful interpretation and response to diverse accessibility-Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: The user can interact with the assistant using either voice or keyboard. This ensures that if you can't talk, you can still use ALICE, and if you can't type, you still have the option to talk.

10. Test Case Identifier: T010

- Purpose of Test: Test for continuous learning.
- Description of Test: Assess the assistant's ability to learn from user interactions and improve over time.
- Inputs Used for Test: Varied user queries and commands over an extended period.
- Expected Outputs/Results: Demonstrate improved accuracy and relevance in responses over time.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Integration.

Result: This is true for each session of the Assistant. If the assistant is restarted, then it would forget about the previous conversations with the user.

11. Test Case Identifier: T011

- Purpose of Test: Validate offline functionality.
- Description of Test: Simulate scenarios where the voice assistant operates in an offline mode, evaluating its ability to provide basic functionalities without an internet connection.
- Inputs Used for Test: Disconnected internet or simulated offline mode.
- Expected Outputs/Results: Successful execution of basic commands and responses in the absence of an internet connection.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Unit.

Result: Unfortunately, in order to use the ChatGPT API, the program must be connected to the Internet. Therefore, there is no way for the user to run this program offline.

12. Test Case Identifier: T012

- Purpose of Test: Evaluate cross-device compatibility.
- Description of Test: Test the voice assistant's performance and functionality across various devices, including smartphones, smart speakers, and other compatible platforms.
- Inputs Used for Test: Commands and queries from different devices.
- Expected Outputs/Results: Consistent and reliable performance across diverse devices.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.

- Unit/Integration Test Indication: Integration.

Result: For now, ALICE is an exclusive Voice Assistant for Windows. Therefore, it cannot be run on other platforms like iOS or Android.

13. Test Case Identifier: T013

- Purpose of Test: Assess third-party integrations.
- Description of Test: Test the voice assistant's compatibility and functionality when integrated with third-party applications or services.
- Inputs Used for Test: Commands involving third-party integrations.
- Expected Outputs/Results: Seamless interaction and successful execution of commands with third-party integrations.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Integration.

Result: Alice can only provide answers to user's questions, it does not have the ability to interact with 3rd-party apps.

14. Test Case Identifier: T014

- Purpose of Test: Validate continuous integration and deployment.
- Description of Test: Implement automated testing in the CI/CD pipeline to ensure that new code changes do not introduce regressions and can be seamlessly deployed.
- Inputs Used for Test: New code changes.
- Expected Outputs/Results: Automated tests pass without issues, and deployment occurs successfully.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Whitebox.
- Functional/Performance Test Indication: Functional.

- Unit/Integration Test Indication: Integration.

Result: It has been verified that with changes in the code base, the production of the executable file will not be hindered.

15. Test Case Identifier: T015

- Purpose of Test: Validate backward compatibility.
- Description of Test: Test the voice assistant's compatibility with previous versions, ensuring that updates or improvements do not negatively impact existing functionalities.
- Inputs Used for Test: Commands and queries from the previous version.
- Expected Outputs/Results: Successful execution of commands without adverse effects on existing functionalities.
- Normal/Abnormal/Boundary Case Indication: Normal.
- Blackbox/Whitebox Test Indication: Blackbox.
- Functional/Performance Test Indication: Functional.
- Unit/Integration Test Indication: Integration.

Result: It has been verified that the newly added functions of the program will not conflict with the existing functions.

Part 3: Test Case Matrix

	Normal/ Abnormal	Blackbox/ Whitebox	Functional/ Performance	Unit/ Integration
T001	Normal	Blackbox	Functional	Unit
T002	Normal	Blackbox	Functional	Integration
T003	Normal	Blackbox	Functional	Unit
T004	Normal	Blackbox	Functional	Integration
T005	Normal	Blackbox	Performance	Integration
T006	Normal	Blackbox	Functional	Unit
T007	Normal	Blackbox	Performance	Integration
T008	Abnormal	Blackbox	Functional	Unit
T009	Normal	Blackbox	Functional	Unit
T010	Normal	Blackbox	Functional	Integration
T011	Normal	Blackbox	Functional	Unit
T012	Normal	Blackbox	Functional	Integration
T013	Normal	Blackbox	Functional	Integration
T014	Normal	Whitebox	Functional	Integration
T015	Normal	Blackbox	Functional	Integration