

Walkable MVP Functional Testing Roadmap

This document outlines the detailed functional testing roadmap for the Walkable MVP, breaking down each phase into manageable tasks and subtasks, identifying dependencies, and suggesting improvements for implementation and testing.

Phase 1 – User Authentication

Goal:

Implement and thoroughly test user authentication functionalities, including sign-up, login, and logout, along with an authentication-aware navigation bar.

Tasks:

- **Task 1.1: Backend User Authentication API Development**
 - **Subtask 1.1.1:** Design and implement user model (username, email, password hash).
 - **Subtask 1.1.2:** Develop API endpoint for user registration (POST /api/register).
 - **Subtask 1.1.3:** Develop API endpoint for user login (POST /api/login) with JWT or session management.
 - **Subtask 1.1.4:** Develop API endpoint for user logout (POST /api/logout).
 - **Subtask 1.1.5:** Implement password hashing and salting (e.g., bcrypt).
 - **Subtask 1.1.6:** Implement JWT token generation and validation for authenticated requests.
 - **Subtask 1.1.7:** Write unit tests for all authentication API endpoints.
- **Task 1.2: Frontend User Authentication UI Development**
 - **Subtask 1.2.1:** Design and implement user registration form.
 - **Subtask 1.2.2:** Design and implement user login form.
 - **Subtask 1.2.3:** Integrate registration form with backend API.
 - **Subtask 1.2.4:** Integrate login form with backend API, storing JWT/session token securely.
 - **Subtask 1.2.5:** Implement client-side validation for forms.

- **Task 1.3: Auth-aware Navbar Implementation**

- **Subtask 1.3.1:** Implement conditional rendering for navigation links (Login/Signup vs. Profile/Logout) based on authentication status.
- **Subtask 1.3.2:** Implement logout functionality in the navbar, clearing client-side tokens/sessions.

- **Task 1.4: Integration Testing (Phase 1)**

- **Subtask 1.4.1:** Test end-to-end user registration flow.
- **Subtask 1.4.2:** Test end-to-end user login flow.
- **Subtask 1.4.3:** Test end-to-end user logout flow.
- **Subtask 1.4.4:** Verify navbar state changes correctly upon login/logout.
- **Subtask 1.4.5:** Test authentication persistence across page refreshes.

Dependencies:

- Task 1.2 depends on Task 1.1 (Frontend UI needs Backend API).
- Task 1.3 depends on Task 1.2 (Navbar needs authentication status from frontend).
- Task 1.4 depends on Tasks 1.1, 1.2, and 1.3 (Integration testing requires all components to be in place).

Improvements/Suggestions:

- Consider adding

email verification for new user registrations to enhance security and prevent spam accounts.

- * Implement 'Forgot Password' functionality with secure password reset tokens.
- * Utilize environment variables for sensitive information like JWT secrets.

Phase 2 – Discover Page + Map

Goal:

Develop an interactive map-based discover page that displays nearby tours and the user's current location.

Tasks:

- **Task 2.1: Map Integration**

- **Subtask 2.1.1:** Integrate Leaflet.js library into the frontend.

- **Subtask 2.1.2:** Initialize and display a basic interactive map.
- **Task 2.2: Geolocation Implementation**
 - **Subtask 2.2.1:** Implement browser Geolocation API to get user's current location.
 - **Subtask 2.2.2:** Display user's location on the map with a custom marker.
 - **Subtask 2.2.3:** Handle geolocation permissions and errors gracefully.
- **Task 2.3: Tour Data Display on Map**
 - **Subtask 2.3.1:** Design backend API endpoint to fetch nearby tours (e.g., GET / api/tours/nearby?lat=&lon=&radius=).
 - **Subtask 2.3.2:** Implement frontend logic to call the nearby tours API based on user's location.
 - **Subtask 2.3.3:** Parse tour data and display tour pins/markers on the Leaflet map.
 - **Subtask 2.3.4:** Implement basic popup/tooltip for tour pins showing tour title.
- **Task 2.4: Integration Testing (Phase 2)**
 - **Subtask 2.4.1:** Verify map loads correctly.
 - **Subtask 2.4.2:** Test user geolocation accuracy and marker display.
 - **Subtask 2.4.3:** Test fetching and displaying nearby tours.
 - **Subtask 2.4.4:** Verify tour pin popups work as expected.

Dependencies:

- Task 2.3 depends on Task 2.1 and Task 2.2 (Displaying tours requires a map and user location).

Improvements/Suggestions:

- Implement clustering for tour pins when there are many tours in a small area to improve map readability.
- Add a search bar to allow users to search for tours by location or keywords, not just nearby.
- Consider using a geocoding service for more precise location handling and address-to-coordinate conversion.

Phase 3 – Create Tour Flow

Goal:

Enable creators to create and upload new audio tours, including tour details, map placement, and audio files.

Tasks:

- **Task 3.1: Tour Creation Form Development**
 - **Subtask 3.1.1:** Design and implement a multi-step form for tour creation (title, description, category).
 - **Subtask 3.1.2:** Implement client-side validation for form fields.
- **Task 3.2: Map Integration for Tour Placement**
 - **Subtask 3.2.1:** Integrate map (Leaflet) into the tour creation form.
 - **Subtask 3.2.2:** Implement address search functionality (geocoding API integration).
 - **Subtask 3.2.3:** Allow clickable pin placement on the map to set tour location.
 - **Subtask 3.2.4:** Store selected coordinates with the tour data.
- **Task 3.3: Audio File Upload**
 - **Subtask 3.3.1:** Implement file input for audio file uploads.
 - **Subtask 3.3.2:** Develop backend API endpoint for secure audio file storage (e.g., POST /api/tours/upload-audio).
 - **Subtask 3.3.3:** Implement frontend logic to upload audio files to the backend.
 - **Subtask 3.3.4:** Handle file size limits and accepted audio formats.
- **Task 3.4: Tour Data Submission**
 - **Subtask 3.4.1:** Develop backend API endpoint to receive and save complete tour data (POST /api/tours).
 - **Subtask 3.4.2:** Implement frontend logic to submit all tour data (text, coordinates, audio file references) to the backend.
 - **Subtask 3.4.3:** Associate the created tour with the authenticated creator's user ID.
- **Task 3.5: Integration Testing (Phase 3)**
 - **Subtask 3.5.1:** Test end-to-end tour creation flow, including form submission.

- **Subtask 3.5.2:** Verify map address search and pin placement accuracy.
- **Subtask 3.5.3:** Test audio file upload functionality and storage.
- **Subtask 3.5.4:** Confirm tour data is correctly saved and associated with the creator.

Dependencies:

- Task 3.2 depends on Task 3.1 (Map for placement is part of the form).
- Task 3.3 depends on Task 3.1 (Audio upload is part of the form).
- Task 3.4 depends on Tasks 3.1, 3.2, and 3.3 (Submission requires all data to be collected).

Improvements/Suggestions:

- Implement a progress bar for audio file uploads, especially for larger files.
- Add functionality to allow creators to upload multiple audio segments for a single tour, perhaps tied to specific points on the map.
- Consider integrating with a cloud storage service (e.g., AWS S3, Google Cloud Storage) for scalable and secure audio file storage.

Phase 4 – Tour Discovery Experience

Goal:

Enhance the discover page to fetch and display real tour data, implement filtering/searching, and create a detailed tour page with playable audio.

Tasks:

- **Task 4.1: Discover Page Data Fetching**
 - **Subtask 4.1.1:** Modify existing discover page to fetch actual tour data from the backend (GET /api/tours).
 - **Subtask 4.1.2:** Display tour listings with relevant information (title, description snippet, creator).
- **Task 4.2: Filter and Search Functionality**
 - **Subtask 4.2.1:** Implement search bar for tour titles and descriptions.
 - **Subtask 4.2.2:** Implement filtering options (e.g., by category, duration).
 - **Subtask 4.2.3:** Develop backend API to support filtered and searched queries (e.g., GET /api/tours?search=&category=).

- **Subtask 4.2.4:** Integrate frontend search/filter with backend API.
- **Task 4.3: Tour Detail Page Development**
 - **Subtask 4.3.1:** Design and implement a dedicated tour detail page (e.g., /tours/:id).
 - **Subtask 4.3.2:** Fetch complete tour details from backend (GET /api/tours/:id).
 - **Subtask 4.3.3:** Display tour title, full description, creator info, and map with tour pin.
 - **Subtask 4.3.4:** Integrate an audio player to play the tour's audio file.
- **Task 4.4: Integration Testing (Phase 4)**
 - **Subtask 4.4.1:** Test discover page displaying real tour data.
 - **Subtask 4.4.2:** Verify search and filter functionality works correctly.
 - **Subtask 4.4.3:** Test navigation to tour detail page.
 - **Subtask 4.4.4:** Verify all tour details are displayed accurately on the detail page.
 - **Subtask 4.4.5:** Test audio playback on the tour detail page.

Dependencies:

- Task 4.1 depends on Task 3.4 (Need existing tour data to fetch).
- Task 4.2 depends on Task 4.1 (Filtering/searching applies to fetched data).
- Task 4.3 depends on Task 3.4 (Tour detail page needs complete tour data).

Improvements/Suggestions:

- Implement pagination or infinite scrolling for the discover page to handle a large number of tours efficiently.
- Add user reviews and ratings for tours.
- Consider implementing a recommendation engine based on user preferences or listening history.

Phase 5 – User & Creator Profiles

Goal:

Create profile pages for users and creators, displaying relevant information such as uploaded tours or completed tours.

Tasks:

- **Task 5.1: Profile Page Backend API**

- **Subtask 5.1.1:** Develop backend API endpoint to fetch user/creator profile data (e.g., GET /api/users/:id/profile).
- **Subtask 5.1.2:** Develop backend API endpoint to fetch tours uploaded by a specific creator (e.g., GET /api/users/:id/tours).
- **Subtask 5.1.3:** Develop backend API endpoint to fetch tours completed/listened to by a user (e.g., GET /api/users/:id/completed-tours).

- **Task 5.2: Profile Page Frontend Development**

- **Subtask 5.2.1:** Design and implement a generic profile page template.
- **Subtask 5.2.2:** Display basic editable user information (e.g., username, email).
- **Subtask 5.2.3:** Implement logic to display uploaded tours for creators.
- **Subtask 5.2.4:** Implement logic to display completed/listened tours for users.
- **Subtask 5.2.5:** Add a simple

form for editing basic profile information.

- **Task 5.3: Profile Editing Functionality**

- **Subtask 5.3.1:** Develop backend API endpoint to update user profile information (e.g., PUT /api/users/:id/profile).
- **Subtask 5.3.2:** Integrate frontend editing form with the backend update API.

- **Task 5.4: Integration Testing (Phase 5)**

- **Subtask 5.4.1:** Test profile page display for both users and creators.
- **Subtask 5.4.2:** Verify uploaded tours are correctly listed on creator profiles.
- **Subtask 5.4.3:** Verify completed tours are correctly listed on user profiles (if tracking is implemented).
- **Subtask 5.4.4:** Test profile information editing functionality.

Dependencies:

- Task 5.2 depends on Task 5.1 (Frontend needs backend data).
- Task 5.3 depends on Task 5.1 and 5.2 (Editing requires existing profile data and UI).

Improvements/Suggestions:

- Allow users to upload a profile picture.

- Implement a follow system for creators.
- Add a section for user-saved/favorite tours.

Phase 6 – Monetization (Mock Only)

Goal:

Implement a mock Stripe integration for pay-per-tour or tipping functionality to demonstrate the flow, without actual payment processing.

Tasks:

- **Task 6.1: Mock Stripe Flow Design**
 - **Subtask 6.1.1:** Define the user flow for pay-per-tour (e.g., selecting a tour, proceeding to a mock payment page).
 - **Subtask 6.1.2:** Define the user flow for tipping a creator (e.g., a tip button on the tour detail page or creator profile).
- **Task 6.2: Mock Payment UI Development**
 - **Subtask 6.2.1:** Create a mock payment page that simulates Stripe Checkout or Elements.
 - **Subtask 6.2.2:** Include fields for mock payment details (e.g., dummy card number).
 - **Subtask 6.2.3:** Implement buttons for

successful and failed mock payments.
- **Task 6.3: Backend Mock Payment Handling**
 - **Subtask 6.3.1:** Develop a mock backend API endpoint to simulate payment processing (e.g., POST /api/mock-payment).
 - **Subtask 6.3.2:** This endpoint should return a success or failure response based on mock payment details.
 - **Subtask 6.3.3:** For pay-per-tour, update the user's access to the tour upon mock payment success.
- **Task 6.4: Integration Testing (Phase 6)**
 - **Subtask 6.4.1:** Test the complete mock payment flow for pay-per-tour.
 - **Subtask 6.4.2:** Test the complete mock payment flow for tipping.

- **Subtask 6.4.3:** Verify that tour access is granted/denied based on mock payment outcome.

Dependencies:

- Task 6.2 depends on Task 6.1 (UI needs flow definition).
- Task 6.3 depends on Task 6.2 (Backend needs UI to send mock payment data).

Improvements/Suggestions:

- Explore Stripe Connect for creator payouts if a real monetization model is pursued.
- Consider different monetization strategies like subscriptions or ad-supported models.

Phase 7 – Final Testing & Deployment

Goal:

Conduct comprehensive testing across various devices and deploy the MVP publicly.

Tasks:

- **Task 7.1: Cross-Browser and Device Testing**
 - **Subtask 7.1.1:** Test the web application on major desktop browsers (Chrome, Firefox, Edge, Safari).
 - **Subtask 7.1.2:** Test the web application on various mobile devices and screen sizes (iOS, Android).
 - **Subtask 7.1.3:** Ensure responsive design and touch interactions work correctly.
- **Task 7.2: Bug Fix Tracking and Resolution**
 - **Subtask 7.2.1:** Set up a bug tracking system (e.g., simple spreadsheet, GitHub Issues).
 - **Subtask 7.2.2:** Log all identified bugs with clear descriptions, reproduction steps, and severity.
 - **Subtask 7.2.3:** Prioritize and resolve bugs, retesting after fixes.
- **Task 7.3: Performance Optimization**
 - **Subtask 7.3.1:** Optimize image and audio assets for faster loading times.
 - **Subtask 7.3.2:** Implement code splitting and lazy loading for frontend assets.

- **Subtask 7.3.3:** Optimize backend queries and database performance.
- **Task 7.4: Deployment Preparation**
 - **Subtask 7.4.1:** Configure environment variables for production.
 - **Subtask 7.4.2:** Set up continuous integration/continuous deployment (CI/CD) pipeline (optional for MVP, but recommended).
 - **Subtask 7.4.3:** Prepare deployment scripts or configurations for the chosen hosting platform (e.g., Replit deployment, Vercel, Netlify, Heroku).
- **Task 7.5: Public MVP Deployment**
 - **Subtask 7.5.1:** Deploy the frontend application to a public URL.
 - **Subtask 7.5.2:** Deploy the backend API to a public URL.
 - **Subtask 7.5.3:** Perform final smoke tests on the live environment.

Dependencies:

- Task 7.2 depends on Task 7.1 (Bugs are found during testing).
- Task 7.3 depends on all previous phases (Optimization applies to the entire application).
- Task 7.5 depends on Task 7.4 (Deployment requires preparation).

Improvements/Suggestions:

- Implement analytics to track user engagement and identify areas for improvement.
- Set up monitoring and alerting for production errors and performance issues.
- Plan for regular backups of the database and uploaded content.