Speakify - Statement of work

1. Introduction

1.1 Project Overview

Speakify is an interactive language learning platform that enables users to engage with multilingual audio content through structured playlists. The platform allows users to create and manage custom translation-based audio experiences, making language acquisition more immersive and effective. Speakify is designed for accessibility across mobile, desktop, and TV screens.

1.2 Objectives & Problematic

Speakify responds to a common struggle among language learners: the lack of time, structured practice, and contextual exposure. While many apps offer translations or word games, few provide real-life audio experiences adapted to the user's pace and learning goals.

The platform is designed to support people learning on the go — commuters, busy professionals, immigrants — by using immersive audio loops and context-driven smart playlists. The objective is to make language learning efficient, passive, and natural, with playlists that adapt to repetition needs, difficulty levels, and specific situations (e.g., airport, job interview, doctor's appointment).

This project tackles multiple constraints:

- **Time Constraint**: Users often only have 5–15 minutes per session.
- **Contextual Relevance**: Traditional flashcards lack real-world usage.
- **Accessibility**: Must support mobile, desktop, and offline usage.
- **Immersion**: Playback needs to simulate real audio conversations.

1.3 Target Audience

Speakify is designed for a wide range of users, each with specific language learning needs:

- **Busy professionals**: Individuals with limited time to study, who benefit from passive learning during daily commutes, workouts, or work breaks.

- **Immigrants and new residents**: People arriving in a new country who need to quickly acquire practical vocabulary and conversational fluency to adapt socially and professionally.

- **Educators and language tutors**: Teachers seeking structured audio tools to build exercises, assess pronunciation, or offer varied listening activities in class.

- **Students preparing for exams**: Learners who need repetition-based listening practice to reinforce grammar, vocabulary, or oral comprehension.

- **Multilingual workers and travelers**: Professionals or frequent travelers needing specialized vocabulary in industries like healthcare, tech, hospitality, or aviation.

- **Neurodiverse and auditory learners**: Individuals who learn better through audio repetition, contextual immersion, or spaced practice, including those with dyslexia or ADHD.

This broad accessibility ensures that Speakify supports inclusive, flexible, and goal-driven learning for all.

1.4 Security & Accessibility

Speakify integrates essential security and accessibility considerations from the earliest stages of development:

Security Measures

- All user interactions are processed via a secure backend API to avoid exposing sensitive data.

- Tokens are used to manage session authentication (no password stored on frontend).

- Planned support for HTTPS encryption during deployment.

- Data access is sandboxed and sanitized to prevent injection or misuse.

- User-specific playlists and progress tracking will be protected by permission-based access (for logged-in users).

Accessibility Commitments

- Speakify follows the WCAG 2.1 guidelines, prioritizing inclusive design.

- Audio content is supplemented with textual equivalents to assist users with hearing disabilities.

- The UI offers high-contrast mode and scalable font settings for visual comfort.

- Touch targets, keyboard navigation, and simplified layouts are optimized for users with motor or cognitive challenges.

- Planned compatibility with screen readers and ARIA labels for all interactive elements.

By embedding these standards into the core design, Speakify ensures a safe and inclusive experience for every user.

1.5 Data Structure & Conceptual Model (MCD)

To ensure a scalable and well-structured database, Speakify is based on a relational data model. The Modèle Conceptuel de Données (MCD) defines the key entities and relationships used across the application:

- **User**: Identified by email or session token, linked to personal playlists and saved preferences.
- **Playlist**: A custom learning session composed of one or more translation blocks.
- **Translation Block (TB)**: A sentence in a source language, linked to one or more translations.
- **Translation**: A sentence in another language, optionally linked to an audio file.
- **Schema**: A playback configuration applied to one or more playlists.
- **Language**: Lists supported languages and their codes.
- **Session**: Tracks anonymous or logged-in user activity.

Each entity is clearly normalized, with foreign keys ensuring referential integrity. The design supports multilingual expansion, offline sync, and fine-grained schema control.

A visual MCD diagram will be presented during the soutenance, showing all cardinalities (1↔N, N↔N, etc.) and table relationships with zones (user, content, metadata).

1.6 Budget & Timeline

Estimated Budget
Speakify is currently a student project developed without external funding. However, a professional implementation would involve the following approximate costs:

Category	Estimate (€)	Notes

UI/UX Design	800 – 1,200	Design of responsive interfaces
Frontend Development	1,500 – 2,000	HTML/CSS/JS, responsive views
Backend Development	1,500 – 2,000	API, database integration
Audio & TTS Services	500 – 1,000	For initial TTS/audio generation
Hosting & Infrastructure	300 – 600	12-month hosting, domain, backups
Accessibility Auditing	300 – 500	Optional third-party audit

Total Estimate: **4,900 – 7,300 €**
These estimates are for illustrative purposes only and based on standard freelance rates.

Development Timeline

Phase	Dates	Deliverables
📌 Planning & Research	Mar 25 – Mar 29	User needs, features, database schema
🔧 API & Backend	Mar 30 – Apr 5	Functional API, secure session system
🎨 Frontend (MVP)	Apr 6 – Apr 12	UI for playback, dashboard, playlist editor
🧪 Testing & QA	Apr 13 – Apr 19	Manual test cases, feedback loop, bug fixes

🚀 Finalization & Defense	Apr 20 – Apr 23	Final demo, documentation, presentation

Deadlines are based on the official project calendar and ensure all deliverables are ready by April 23rd for the soutenance.

1.7 Tools & Workflow

To ensure efficient collaboration, task tracking, and version control, the following tools were selected and integrated into the project workflow:

- **Git & GitHub**: Used for version control of both frontend and backend code. All commits are pushed with descriptive messages, and branches are used to separate feature development from stable releases.
- **Trello**: Used as a Kanban board to manage tasks across all project phases — from planning to deployment. Tasks are categorized into “To Do,” “In Progress,” “Review,” and “Done” to track progress transparently.
- **Discord**: Chosen for daily communication, quick status updates, and voice meetings. A dedicated channel was used for posting screenshots, links, and decision logs.
- **Notion**: Acts as a documentation hub for meeting notes, brainstorming, and research tracking. Also used to centralize user personas, feature specs, and content ideas.
- **Figma**: Used to design and validate wireframes and UI components. Shared prototypes helped align design vision early in development.
- **Visual Studio Code**: The main IDE for development, with extensions configured for PHP, HTML/CSS, JavaScript, Git integration, and linting.

All tools were selected based on their ease of use, accessibility, and alignment with modern agile workflows. This stack allowed solo work to remain organized and scalable — and would easily support teamwork in a larger dev team.

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2. Features & Problem Solving

2.1 Application Features

- **Multilingual Audio Playlists**: Users can create and customize playlists consisting of Playback Loops with audio files.
- **Playback Loops (PLs)**: A structured unit that contains a sentence in a source language and its equivalent translations in multiple languages, each with an associated audio file.
- **Customizable Playback Schema**: Users can define the playback sequence, repetitions, and timing of Playback Loops.
- **Cross-Device Compatibility**: Designed to work on mobile phones, desktops, and TVs for a flexible learning experience.
- **Interactive Learning**: Features like loop mode, adjustable playback speed, and pronunciation practice help reinforce learning.
- **Intensive Learning Mode**: Allows users to engage in focused and repetitive drills with accelerated playback and adaptive difficulty to enhance retention and fluency.
- **Offline Support (Planned)**: Ability to store translations and audio for offline use.
- **User Playlists Management**: Create, edit, and organize language learning sessions according to personal learning needs.
- **Playlists by Difficulty & Context**: Users can categorize playlists based on difficulty levels and specific contexts, such as professional vocabulary for various industries.
- **Learn on the Go**: Ideal for users who want to learn while walking, running, commuting on the bus or car, or even while working. Designed for people who have limited time to study.
- **Support for Immigrants**: Provides an accessible way for immigrants to quickly learn and adapt to a new language environment.
- **Future Expansion**: Potential for integration with AI-powered translation services.
- **Translation Pertinence Control**: Users can increase or decrease the pertinence level of a translation, affecting how frequently it is displayed during playback.
- **Schema Based on Pertinence**: Users can apply different playback schemas based on pertinence levels to prioritize or de-emphasize certain translations.
- **Smart Lists**:
    - **Target Word Context Lists**: Lists of sentences that include a specific word, providing real-world usage examples.
    - **Verb Conjugation Lists**: Lists of sentences using specific verbs in various conjugations and tenses.
    - **Context-Based Lists**: Playlists targeting specific circumstances (e.g., airport, hospital, restaurant).
    - **Random Sentences**: Automatically generated lists to expose learners to a wide variety of structures and vocabulary.
    - **Dialogues**: Playlists simulating real conversations to enhance comprehension and engagement.
    - **Stories**: Narrative-based playlists to promote natural learning through contextual immersion.

- **Word of the Day Lists**: Each day, Speakify suggests a new word or verb. Users can access a list of sentences that include the word of the day in real contexts, enhancing vocabulary through daily exposure.

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3. Navigation & Wireframes

3.1 User Flow Diagram

▸ **Start App**
↓

🏠 **Dashboard**
├── **Start New Session** → 🎧 *Player*
├── **Recent Playlist** → 🎧 *Player*
├── **Daily Word** → 🧠 *Smart Lists > Word of the Day*
└── **Playlists** → 📚 *Playlist Library*

📚 **Playlist Library**
├── **View Playlist** → 🎧 *Player*
├── **+ Create Playlist** → ✏️ *Playlist Editor*
│ └── **Assign Schema** → 🛠️ *Schema Selector or* ➕ *Create New Schema*
└── **Edit Schema** → 🛠️ *Schema Editor*

🛠️ **Schema Editor**
├── Define Playback Order (e.g., EN → FR → Pause → Repeat)
├── Set Repetitions per Segment
├── Adjust Delay / Speed
└── Save Schema

🧠 **Smart Lists**
├── *Word of the Day* → Contextual Sentences
├── *Verb Conjugations* → Sentences with Verb Variations
├── *Thematic Contexts* → e.g., Airport, Restaurant
└── *Dialogues / Stories* → Contextual Audio Conversations

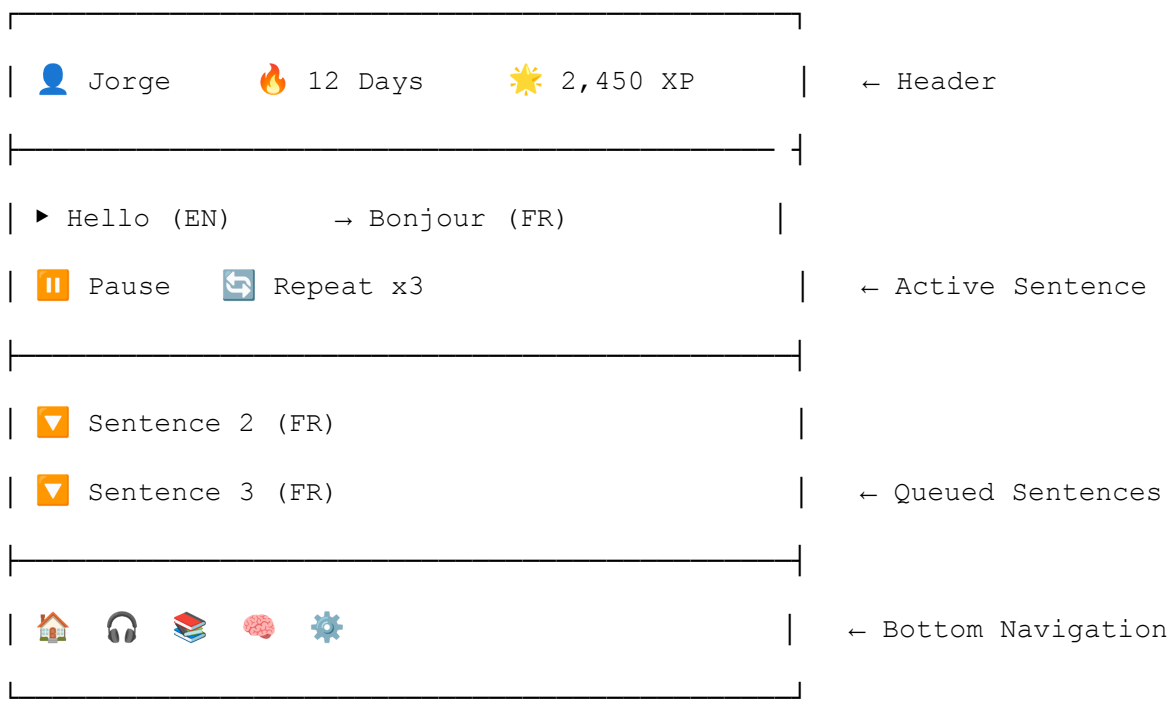
🎧 **Player**
└── Controls: *Play, Pause, Loop, Next, Previous, Speed*

⚙️ **Settings**
├── Audio Speed
├── Language Preferences
└── Offline Mode Options

🔐 **Login (Optional)**
└── *Sync Data, Save Profile, Enable Cloud Features*

3.2 Wireframes (Low-Fidelity)

🎧 Playback View



3.3 UI Screens (MVP Roadmap)

View	Status	Description
Playback View	✅ Done	Audio playback with translation sequence
Schema Editor View	➡️ Next	Create and customize playback logic
Playlist Library View	🔲 Todo	Search, browse, and manage playlists
Playlist Editor View	🔲 Todo	Create & assign schemas to playlists
Smart Lists View	🔲 Todo	Auto-generated lists (verbs, contexts, etc.)
Settings View	🔲 Todo	Speed, language, offline controls

🔮 Extra Features (Planned)

Feature	Status
Word of the Day View	🔲
Login & Profile View	🔲
Achievements & Stats View	🔲
Offline Mode View	🔲

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4. Graphical Identity (UI/UX Design)

Speakify aims to deliver a clear, immersive, and consistent visual experience across all devices — mobile, desktop, and TV. The design system prioritizes readability, focus, and user-friendliness to support long-term engagement and effective language learning.

4.1 Color Scheme & Visual Identity

Purpose	Color Name	Hex Code	Notes
Primary	Deep Blue	#0057B7	Trust, calmness, and focus on learning
Accent	Electric Green	#00E676	Highlights important actions (e.g., Play)
Background	Light Gray	#F5F7FA	Neutral, reduces eye strain
Surface	Soft White	#FFFFFF	Card and container backgrounds
Text Primary	Charcoal Black	#2E2E2E	High contrast, legible across screens
Alert / Error	Coral Red	#FF5252	For deletions, errors, or critical alerts

The interface remains predominantly calm and neutral, using vibrant colors only for essential feedback and interactive elements.

4.2 Typography

Speakify uses clean, modern, and readable fonts optimized for accessibility and multilingual content.

Use Case	Font	Fallbacks
Headings	Segoe UI Bold	system-ui, sans-serif
Body Text	Segoe UI Regular	Helvetica, Arial

UI Highlights	Antipasto Pro (Light)	Segoe UI

Fonts are chosen for their cross-platform availability and aesthetic harmony. All text is responsive and mobile-optimized.

4.3 UI Components & Layout

- Buttons: Rounded (border-radius 12px+), vibrant on hover, clean contrast.
- Cards & Containers: Soft drop shadows, consistent padding, neutral backgrounds.
- Navigation: Bottom tab navigation on mobile; top nav or side panel on desktop.
- Icons: Modern icon libraries (Lucide, Tabler, or Material Symbols).
- Animations: Light transitions only for feedback (e.g., active block expansion).
- Dark Mode: Planned as an optional setting for comfort during night use.

4.4 Consistency Across Devices

Speakify is designed as a responsive progressive web app (PWA) with consistent behavior and UI structure across:

- 📱 Mobile phones: Thumb-friendly controls, bottom navigation
- 💻 Desktops/Laptops: Scalable layout with larger reading zones
- 📺 TVs / Smart Displays: Large text, high contrast, minimal controls

Grid-based layout, shared styles, and reusable components ensure a unified experience regardless of screen size or input method.

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5. Eco-Responsibility

Speakify is committed to sustainable digital practices. As a modern, web-based language learning platform, it will be designed with eco-responsibility in mind — optimizing for low energy consumption, reduced data transfer, and efficient use of resources across devices.

5.1 Server Efficiency Considerations

To reduce the platform's environmental footprint, Speakify will prioritize:

- Lightweight backend services: Optimized APIs that serve only essential data.
- Efficient database queries: Cached lookups and pagination to reduce server load.
- Green hosting options: Preference for providers using renewable energy (e.g., Infomaniak, Scaleway Green).
- Auto-scaling infrastructure: Dynamic resource allocation based on demand, avoiding overprovisioning.

5.2 Low-Bandwidth Optimization

The frontend will be designed to work efficiently even in low-speed or unstable networks, especially for mobile users and global learners.

- **Lightweight backend services**: Optimized APIs that serve only essential data.
- **Efficient database queries**: Cached lookups and pagination to reduce server load.
- **Green hosting options**: Preference for providers using renewable energy (e.g., Infomaniak, Scaleway Green).
- **Auto-scaling infrastructure**: Dynamic resource allocation based on demand, avoiding overprovisioning.
- Minimal third-party scripts to reduce bandwidth waste.

5.3 Offline Mode Enhancements

Speakify's offline mode supports both eco-responsibility and accessibility for users with limited or costly data plans.

- **Local storage caching**: Translation blocks and audio files saved locally per playlist.
- **Download-on-demand**: Only resources the user requests will be cached.
- **Preloading control**: Users can choose when and what to make available offline.
- **Battery-aware logic (Planned)**: Defers heavy tasks on low battery conditions.

5.4 Future Improvements

- **Energy-aware dark mode**: Lower screen energy use on OLED devices.

- **Usage-based analytics**: Tracking system load to identify optimization opportunities.
- **Push for lightweight AI**: If AI features are integrated, use serverless or edge-based solutions with minimal energy impact.

By implementing these strategies, Speakify aims to align high-quality learning experiences with a responsible and sustainable digital footprint.

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6. SEO & Online Presence

To ensure Speakify reaches a global audience of language learners, educators, and multilingual professionals, a thoughtful SEO strategy will be implemented. The goal is to make the platform highly visible, searchable, and discoverable across multiple languages and regions.

6.1 SEO Strategy

The SEO approach for Speakify will focus on both technical SEO (site structure, performance) and content SEO (relevance, clarity).

- **Progressive Web App Optimization**: Ensure that the PWA is crawlable and well-structured, using server-side or dynamic rendering where necessary.
- **Clean URL Structure**: URLs will be semantic and localized (e.g. `/fr/playlists`, `/en/word-of-the-day`).
- **Meta Tags & Open Graph**: Each page will contain meaningful meta titles, descriptions, and social preview metadata.
- **Sitemaps & Robots.txt**: Automatically generated XML sitemaps and properly configured robots.txt files for optimal indexing.
- **Fast Loading Times**: Optimized asset delivery and Core Web Vitals compliance for search engine ranking benefits.

6.2 Keyword Optimization

Relevant keywords will be researched and integrated into the content, targeting different user intents and learning contexts.

Primary Keyword Targets:

- language learning app

- immersive language practice
- translation-based audio learning
- passive language listening
- learn French while commuting
- language playlist builder
- smart vocabulary trainer

Contextual Keyword Strategies:

- Long-tail keywords for specific industries (e.g., "learn medical Spanish phrases")
- Location-based or culturally sensitive terms (e.g., "daily English for immigrants in France")
- Voice search optimization (“how do I say hello in Japanese?”)

6.3 Multilingual Indexing

Since Speakify targets multilingual users worldwide, content must be accessible and indexable in multiple languages.

- **Hreflang Tags**: Used to indicate content language and regional targeting.
- **Language-specific Metadata**: Page titles, descriptions, and slugs will be localized.
- **Localized Content URLs**: `/fr`, `/en`, `/es`, etc. paths for each version of a page.
- **International Keyword Mapping**: Equivalent keywords will be identified across key target languages (EN, FR, ES, DE, etc.).

All multilingual pages will be SEO-optimized independently to improve visibility in native-language search results.

6.4 Online Presence & Brand Visibility

Beyond search indexing, Speakify will build awareness through:

- Social Media Meta Integration (OG tags, Twitter Cards)
- Schema.org Markup for rich search results (e.g., “language course”, “audio lesson”)
- App Store Optimization (if PWA is deployed as mobile wrapper)
- Google Discover Readiness: Structured articles and featured “Word of the Day” content
- Future blog or resource center to generate organic traffic with educational content

SEO is not just a discovery tool for Speakify — it’s a growth engine aligned with global accessibility and content relevance.

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7. Team & Workflow

Speakify will be developed by a lean, agile, and highly focused team, working collaboratively to deliver a polished product within a tight timeframe. The structure promotes accountability, adaptability, and continuous delivery.

7.1 Development Team

Role	Responsibility
Project Owner	Defines the product vision, prioritizes tasks, approves features
Product Manager	Manages timeline, milestones, and communication between stakeholders
Lead Developer	Oversees architecture, code quality, and core backend/frontend implementation
Frontend Developer	Builds UI components, ensures responsive and accessible design
Backend Developer	Develops API, database, and schema logic (e.g. Playback Loops, user progress)
UX/UI Designer	Creates wireframes, prototypes, visual style, and ensures cross-device UX
QA Tester	Conducts manual/automated testing, validates playback sequences and stability
Content Curator	Prepares and manages multilingual content, translations, and smart lists
DevOps (Optional)	Handles deployment pipeline, cloud sync, and hosting setup (can be part-time)

Note: Some roles may be fulfilled by the same person during the early stages (e.g., Full Stack Developer wearing multiple hats).

7.2 Project Methodology

Speakify will use a lightweight Agile methodology based on Scrum, with sprints adapted to a short development cycle.

📅 Sprint Rhythm

- Sprint Length: 1 week
- Daily Stand-ups: 10–15 mins max (asynchronous if remote)
- Weekly Planning & Review: Set priorities, review sprint results, and define upcoming goals
- Kanban Board: Used to track task flow (To Do → In Progress → Review → Done)

🛠️ Tools & Workflow

Tool	Purpose
Git + GitHub	Source control and code collaboration
Trello / Notion	Sprint planning and task tracking
Figma	UI/UX collaboration
Slack / Discord	Team communication
VS Code	Development environment

This setup encourages clarity, iteration, and accountability while staying adaptable to evolving needs.

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7. Team & Workflow

Speakify is developed to simulate a real development team structure, ensuring all roles are clearly defined and aligned with each project phase. This aligns with the certification requirement of showing how a candidate understands the full development lifecycle.

7.1 Development Team Roles

Role	Responsibility
Project Owner	Defines the product vision, prioritizes features, and oversees overall progress
Product Manager	Coordinates team members and ensures the project roadmap aligns with milestones
Lead Developer	Designs core architecture, manages code quality, and provides technical direction
Frontend Developer	Develops UI, ensures responsiveness and accessibility across devices
Backend Developer	Manages database logic, API implementation, and server-side operations
UX/UI Designer	Designs user flows, wireframes, and maintains graphical identity across all platforms
QA Tester	Validates features, runs tests, and ensures the final product meets all technical requirements
Content Curator	Prepares multilingual content and ensures linguistic quality in translation blocks
DevOps (Optional)	Manages deployment, hosting, and local/staging setup

Note: During the project's early stages, these roles may be covered by the same person (e.g., Jorge as Full Stack Developer).

7.2 Role Allocation by Project Phase

Phase	Date	Tasks	Responsible Roles
Phase 1	March 25–29, 2025	Finalize DB schema, create ER diagram	Backend Dev, Lead Dev

Phase 2	March 30–April 5	Build and test core APIs	Backend Dev, Lead Dev
Phase 3	April 6–12	UI development (Playback, Smart Lists, Schema)	Frontend Dev, UX/UI Designer
Phase 4	April 13–19	Testing, bug fixing, optimization	QA Tester, Lead Dev
Phase 5	April 20–23	Deployment, documentation	DevOps, Product Manager

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7.3 Workflow & Methodology

Speakify uses a lightweight Agile approach with:

- 1-week sprints
- Daily stand-ups (async OK)
- Weekly planning & reviews
- Kanban board for To Do → In Progress → Review → Done

Tools: GitHub, Trello, Notion, Figma, Slack/Discord, VS Code

Philosophy: Ship fast → validate → improve.

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8. Integrated Technical Specifications (Certification Requirement)

In accordance with certification requirements, the following technical specifications are explicitly integrated within this document.

8.1 System Architecture

- **Frontend**: HTML, CSS, JS (ES6+), Bootstrap, AJAX
- **Backend**: PHP 8.x APIs
- **Database**: MySQL
- **Structure**:

    - Frontend fetches and renders playlists, schemas, and translation blocks.
    - Backend serves dynamic content via API endpoints.
    - Database stores all structured content (languages, sentences, translation pairs, sources).

8.2 Database Schema Overview

Planned relational tables:

- `languages`: Available languages with ID/code/name
- `sentences`: Base sentence data with language links
- `translation_pairs`: Links two sentences as a translation pair
- `sources`: Describes translation sources (manual, API, etc.)
- `translation_pair_sources`: Links translation pairs to sources

8.3 Technology Stack

Layer	Tech	Notes
Frontend	HTML/CSS/JS	PWA structure, Bootstrap layout
Backend	PHP 8.x	REST API endpoints
Database	MySQL	Normalized schema, indexed tables
Tools	XAMPP	Local dev, Apache + MySQL
Planned API	OpenAI	Translation & TTS services (future)

8.4 API Design (Planned)

Base URL: `http://localhost/speakify/backend/api.php`

Method	Endpoint	Description
GET	?action=playlists	Retrieve playlists

GET	?action=schemas	Retrieve schemas
GET	?action=tb&id=xx	Get specific translation block
POST	TBD	Save playlist/schema

8.5 Security Notes

- MVP: No login yet
- Future: Auth (JWT or session), access control
- API sanitization planned (SQL injection/XSS prevention)

8.6 Testing

Type	Description
Manual	Playback, loop behavior, UI interactivity
Unit (planned)	Backend API (PHPUnit)
Frontend	Playback logic (Jest/Cypress planned)
Device testing	Phones, desktops, TVs

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9. Conclusion

Speakify is more than a student project — it is a concrete solution to a real-world problem: learning a new language with limited time, in real-life context, across multiple devices. It is built with immersive audio as its core mechanic, offering both structure and freedom to learners.

Throughout this Cahier des Charges, we've defined not just the functionalities, but the reasoning behind each feature:

- Why the data model is built to scale.

- Why accessibility isn’t optional.
- Why user profiles, audio schemas, and smart lists exist.
- Why Speakify fits both mobile users and classroom environments.

This document is no longer just a list of tools or features. It reflects a thoughtful, scalable architecture that balances technical precision with user empathy.

Next steps include final UI polish, live prototype walkthrough, and testing on multiple devices. A full Modèle Conceptuel de Données (MCD) will be presented visually during the soutenance to support architectural clarity.

Speakify is ready — both as a learning tool and as a product story.

Document Version: 1.2.0
Date: March 2025
Author: Jorge

Speakify - Technical Specification Document

- Project Name: Speakify
- Version: 1.0.0
- Date: March 2025
- Author(s): Jorge

Speakify is a cross-platform PWA designed to facilitate immersive language learning through structured multilingual audio playlists. It supports mobile, desktop, and TV usage, leveraging Translation Blocks (TBs) and user-defined playback schemas to deliver a customizable learning experience.

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10. System Architecture

10.1 High-Level Architecture

- Frontend (HTML/CSS/JS) serves as a dynamic PWA interface
- Backend (PHP) provides APIs for data retrieval
- JSON files simulate API data
- Database (Planned) for structured storage of translations and schemas

10.2 Component Breakdown

- Frontend:
  - HTML, CSS, Bootstrap, JS
  - AJAX loading for playlists and schemas
  - UI for Playback, Playlist Editor, Smart Lists
- Backend:
  - PHP API handler (`api.php`)
  - Handles playlist, TB, and schema retrieval
- Database:
  - Planned schema with tables for translations, languages, users, etc.
  - Support for missing translations, version control
- External Services / APIs:
  - Planned: OpenAI API for translation and TTS (text-to-speech)

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11. Technology Stack

Layer	Technology	Version	Notes
Frontend	HTML/CSS/JS	ES6+	PWA, responsive UI
Backend	PHP	8.x	Simple API endpoints
Database	MySQL (Planned)	TBD	Structured data model
APIs	OpenAI (Planned)	N/A	Translation & TTS services
DevOps/ CI	XAMPP / Manual	N/A	Local development environment

Others	JSON files	N/A	Simulated API data for dev stage

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12. Data Model & Structures

12.1 Database Schema

- Tables (Planned):
  - `languages`
  - `sentences`
  - `translation_pairs`
  - `sources`
  - `translation_pair_sources`

12.2 Example JSON Schema

```
{
  "playlist_id": "123",
  "name": "Basic French",
  "blocks": [
    {
      "tb_id": "456",
      "text_source": "Hello",
      "text_translation": "Bonjour",
      "audio_source": "hello_en.mp3",
      "audio_translation": "bonjour_fr.mp3"
    }
  ]
}
```

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13. API Endpoints

Base URL: http://localhost/speakify/backend/api.php

Method	Endpoint	Description	Auth	Parameters

GET	?action=playlists	Fetch all playlists	No	
GET	?action=schemas	Fetch all schemas	No	
GET	?action=tb&id=xxx	Get translation block	No	id
POST	TBD	Create/update playlists	Yes	playlist, schema

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14. Business Logic & Workflows

- Playback Loop (PL) logic:
  - Follows user-defined schema: order, repetitions, pause
  - Iterates through TBs in a playlist
  - Each block has source + one or more translations with audio
- Smart Lists auto-generate playlists based on specific contexts or criteria
- One play loop is expanded at a time
- Open loops show progress bars, repetitions, original and translated text
- Closed loops are summarized on a single line
- Global play/pause button controls full session playback and floats at bottom-right of the screen
- Audio and translation data dynamically loaded from `data/translations.json`

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15. Security

- No authentication in current MVP
- Future:
  - User login with JWT or session cookies
  - Access control for personal playlists
  - Basic input sanitation for API endpoints

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16. UI Structure

Page/View	Description	Components/Files
Dashboard	Entry point with shortcuts	dashboard.html
Playback	Main player interface	playback.html
Playlist Library	List of user-created playlists	playlist-library.html
Playlist Editor	Create/edit playlists	playlist-editor.html
Smart Lists	Context-based auto-playlists	smart-lists.html
Schema Editor	Define playback rules	schema-editor.html
Settings	User preferences	settings.html
Achievements	Progress tracking	achievements.html
Login/Profile	Optional authentication	login-profile.html
Offline Mode	Local file management	offline-mode.html

All HTML pages:

- Must use a consistent `<head>` with meta tags and links to `style.css` and `script.js`
- Must define `.header`, `.content`, `.footer-nav`
- `.header` includes 3 interactive icons
- Footer navigation is fixed and responsive

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17. Environments & Deployment

Environment	URL	Notes
Local	http://localhost/speakify/	XAMPP-based dev setup

Staging	TBD	For QA testing
Production	TBD	Final live deployment

---

18. Testing Plan

- Manual testing for:
  - Playback functionality
  - Loop progression
  - Playlist editing and schema linking
- Planned:
  - Unit testing for backend APIs (PHPUnit)
  - Frontend playback validation (Jest or Cypress)
- Device testing (mobile, desktop, TV)

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19. Performance & Constraints

- Responsive design for mobile-first experience
- Fixed footer and floating controls for usability
- Playback content loaded via AJAX, not hardcoded
- Lazy-loading of audio and transition effects required
- Loop completion scrolls queue and loads next
- Single loop open at a time ensures clarity
- Light, unified design ensures consistent user experience

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20. Appendix

- JSON Examples: `playlists.json`, `schemas.json`, `translations.json`
- Glossary:
  - TB = Translation Block
  - PL = Playback Loop
  - Schema = Sequence logic for playback
- External Services:
  - OpenAI API (planned)
  - TTS and translation services

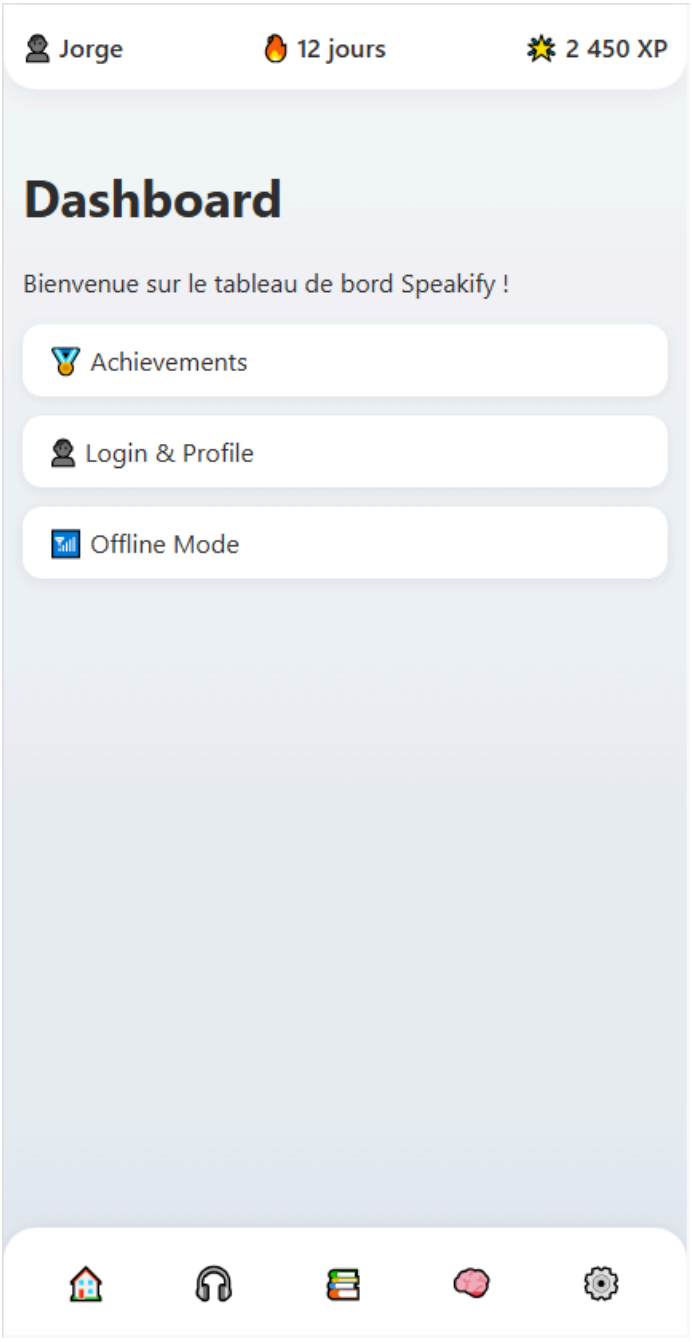
- File Organization:
    - All files in `speakify/model/`
    - Central script file: `script.js` (deferred loading)
    - Central stylesheet: `style.css` with transitions and global design

---

Appendix A: Interface Screenshots

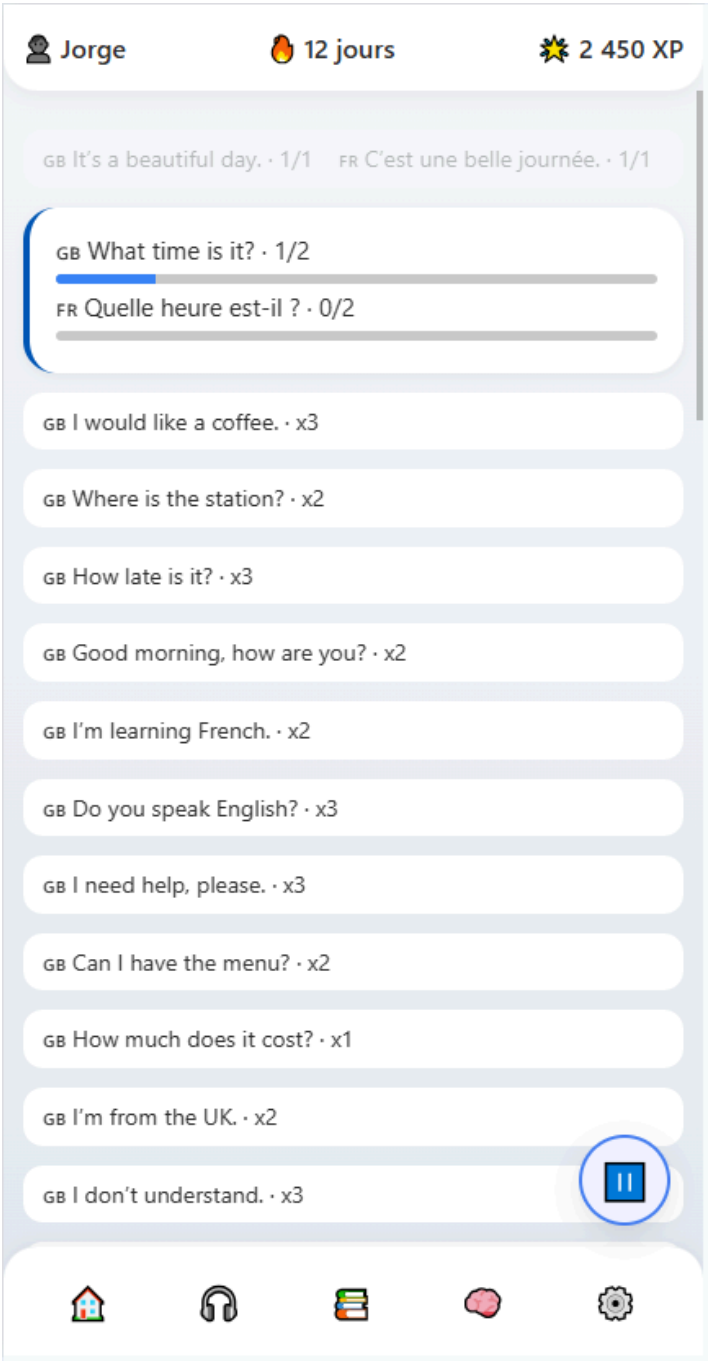
A.1 Dashboard View

This screenshot shows the Speakify dashboard with quick access to Smart Lists, Playlists, and the Player.



A.2 Playback Interface

This screenshot demonstrates the playback view with translation blocks, repeat counters, and the floating play/pause control.



A.3 Playlist Interface

This screenshot displays the Playlist Library where users can browse, create, and manage their language learning playlists. Each playlist shows its title, associated schema, and the number of translation blocks it contains.