◆ CONFIDENTIAL • CLIENT RELEASE DOCUMENT

PRODUCT SPECIFICATION

MERIT WALKERS

Virtual Study Space, Peer Accountability & High-Stakes Prep Ecosystem

Comprehensive Software Requirements Specification (SRS) & Architecture Blueprint

DOCUMENT VERSION v2.0 Client & Investor Edition	TARGET ACADEMIC CYCLE 2026 – 2027 Examination Calendar
FOCUS DEMOGRAPHICS UPSC CSE, State PSC, STEM & Banking Aspirants	SUPPORTED PLATFORMS Web Application, PWA, Desktop (Mac/Win)
TARGET ARCHITECTURE Next.js 15, WebRTC SFU (LiveKit), ElevenLabs AI	SECURITY CLASSIFICATION Restricted Commercial Distribution

Executive Note: This document elevates the raw platform design notes into an aligned, production-grade Software Requirements Specification. It covers all subscription economics, 400+ peer video streaming rules, AI conversational agents ("Hangley Spidy"), peer evaluation pipelines, the 150-hour monthly discipline mandate, and intellectual property protections.

© 2026 Merit Walkers EdTech Innovations Pvt. Ltd. All rights reserved.

Doc Ref: MW-SRS-2026-V2

Table of Contents

Comprehensive functional index, subsystem blueprints, and system rulebook.

01. Executive Overview & Product Vision	Core Concept, Target Exams & Visual Aesthetics
02. Commercial Framework, Pricing & Marketing Architecture	Subscription Tiers, Pro Privileges & Marketing Hooks
03. User Onboarding, Verification & Eligibility Pipeline	Google OAuth, Screening Gate & GMeet Test
04. Virtual Study Space & Live Video Accountability	400+ SFU Video Grid, 10-Min Rule, PIP Floating Mode
05. AI Companion: "Hangley Spidy" System Specification	Voice UI, Current Affairs Reader & Real-Time Querying
06. Productivity Engine: Smart Tasks, Pomodoro & Focus Rating	Dual-Layer To-Do, Active/Passive Classification, Liquid Sphere
07. Interaction Corner: Collaboration, Current Affairs & P2P Review	P2P Answer Writing Canvas, DRM Shield, Reflection Nudges
08. Collaboration Corner: Pro-Exclusive Pods & Study Matchmaking	Peer Matchmaking, Synchronized PDF Annotator, Quorum Rules
09. Gamification, Discipline Protocol & The Red Card Penalty System	150h Monthly Mandate, 3 Strikes Policy, Prestige Themes
10. Performance Analytics Engine ("My Progress" Dashboard)	Consistency Heatmap, Mock Test Suite, Desktop Widgets
11. Technical Architecture, Security & DRM Specifications	Production Tech Stack, Anti-Piracy DRM, Client Sign-off

Formal Transformation & Document Authority

This client-ready SRS document formally supersedes all prior whiteboard drafts, fragmented OneNote pages, and informal specification notes. Engineering development sprints, UI/UX hand-offs, and quality assurance testing suites must comply with the functional requirements and architectural thresholds defined across this specification.

01 Executive Overview & Product Vision

1.1 Problem Statement & Strategic Mission

Aspirants preparing for hyper-competitive examinations (such as UPSC CSE, State PSCs, IIT-JEE, and NEET) face severe psychological friction: social isolation, cognitive burnout, lack of structured discipline, and constant social media distractions. Conventional library spaces require physical commuting, while generic group study apps lack camera enforcement and academic rigor.

MERIT WALKERS (explicitly plural: *Merit Walkers*) solves this by delivering an elite digital reading room environment. Combining WebRTC live-video peer accountability, conversational voice AI guidance ("Hangley Spidy"), peer-to-peer answer evaluation, and an ironclad discipline protocol, Merit Walkers replicates the intensity of top residential academies on any screen.

1.2 Supported Competitive Exam Streams

The platform provides specialized syllabus taxonomies, categorized mock trackers, and peer matchmaking across 9 distinct categories:

Civil Services
UPSC CSE (Prelims, Mains, Interview), **State PSC** (UPPSC, BPSC, MPPSC, RAS, etc.).

STEM Entrance
IIT-JEE (Main & Advanced), **NEET-UG** (National Medical Eligibility).

Public Recruitment
SSC (CGL, CHSL, CPO), **Banking** (IBPS PO/Clerk, SBI PO, RBI Grade B).

National Logistics
Railways (RRB NTPC, Group D, ALP, Sectional Officer examinations).

Armed Forces
Defense (NDA, CDS, AFCAT, SSB group testing preparation).

Professional Licensure
Institute of Chartered Accountants (CA) Foundation, Inter & Final.

1.3 Visual Identity & Ambient Aesthetic Philosophy

Glassmorphism & Warm Minimalist UI
High-refinement frosted glass tiles (`backdrop-filter: blur(16px)`), subtle golden-sand ambient lighting, and distraction-free layouts optimized for 12+ hour daily deep work.

Dynamic Festive Accents & App Logo
Official emblem combines the golden MW mountain peak with a live video broadcast icon. The client automatically adapts festive accents during Diwali, New Year, Eid, Christmas, and Holi.

Cross-Device Experience Parity
Primary layouts are optimized for Laptops, PCs, and Tablets (iPad / Galaxy Tab). Responsive mobile adaptations preserve core focus timers, PIP camera feeds, and push alerts while uncluttering complex analytical charts.

02 Commercial Framework, Pricing & Marketing Architecture

2.1 Value-Anchoring Consumer Psychology

Merit Walkers positions its pricing on an ultra-high-return micro-investment thesis. Rather than framing membership as a costly coaching expense, marketing contrasts the negligible daily cost against ephemeral consumer spending:

₹13.30	₹11.00	₹789
DAILY COST (MONTHLY PLAN)	DAILY COST (ANNUAL PLAN)	INSTANT ANNUAL SAVINGS

Marketing Hooks & Conversion Angles

Campaign Hook	Psychological Behavioral Trigger	Target Aspirant Persona
"Costs less than a pizza."	One meal or movie night = 30 days of high-discipline preparation.	College students & early-stage aspirants.
"Your future is worth > ₹13/day."	Frames platform fee as career insurance and productivity compounding.	Full-time repeaters & high-stakes candidates.
"Costs less than a few cab rides."	Contrasts digital access against physical coaching center transit expenses.	Working professionals studying after work.

2.2 Tiered Feature Entitlement Matrix

Platform Capability	Restricted / Trial Tier	Standard Monthly (₹399/mo)	Annual Pro Member (₹3,999/yr)
Virtual Study Space Access	Locked (Verification Gate)	Single Assigned Room	Multi-Room Choice & Broadcast
Hangley Spidy AI Assistant	Basic Commands Only	Full Voice UI & Current Affairs	Exclusive Skins & Voice Tuning
Collaboration Corner	View Only	Join Public Rooms	Create Study Pods & Matchmaking
Peer Answer Evaluation (AW)	Locked	Standard Upload & Review	Priority Queue + Cash Prize Pool
Prestige Badges & Themes	Standard Clean Theme	Standard White Theme	Pro Member Tag + Luxury Themes

Subscription Expiry & Renewal Safeguards

When a subscription expires, active study features are blurred while user historical analytics, study notes, and streak logs are safely retained. An in-app countdown banner notifies users 7 days prior to expiry with a 1-click renewal trigger.

03 User Onboarding, Verification & Eligibility Pipeline

3.1 The High-Integrity Screening Philosophy

Unlike casual public Discord servers or open Zoom calls that devolve into chaos, Merit Walkers maintains an elite, serious study culture through a mandatory screening pipeline. Casual or unverified accounts are filtered before entering camera rooms.

1. **Landing & Interactive AI Voice Overview**
   Prospective student clicks "How to Join?". An ElevenLabs AI voice agent triggers an animated interactive walkthrough explaining room etiquette, camera rules, and daily accountability expectations.
2. **Authentication & Device Policy Enforcement**
   Candidate registers via Google OAuth or Phone OTP. **Strict Security Rule:** One account ID can be logged into a maximum of **two (2) concurrent active devices** (e.g., Laptop + Tablet).
3. **Commercial Checkout & Restricted Access State**
   Candidate completes payment. The account enters **Restricted Mode**. The portal displays: *"Access restricted pending Eligibility Verification."* Only Rules and User Profile are accessible.
4. **Appointment Booking & Subject Selection**
   Candidate books a live verification slot. Candidate selects **3 out of 6 assessment subjects** to prove serious prep:
   Mapping | Polity | Economy & Agriculture | History | Geography & Environment | Ethics
5. **Live Verification Interview & Room Allotment**
   A 10-minute Google Meet call with admins validates exam scorecards, preparation background, and camera orientation. Approved candidates are tagged **Verified** and allotted their primary study room.

Allowed in Restricted Mode

- Platform Rules, Terms & Honor Code
- Rewards & Scholarship Guidelines
- Personal Profile & Exam Goal Setup

Locked Until Verification

- Live Virtual Study Rooms & Video Grid
- Interaction & Productivity Corner
- Study Partner Matchmaking & Leaderboard

04 Virtual Study Space & Live Video Accountability

4.1 Room Architecture & Stream Scalability

The Virtual Study Space is engineered on a WebRTC Selective Forwarding Unit (SFU) cluster (LiveKit / Mediasoup). Each room supports up to **400+ simultaneous peer video tiles** with adaptive bandwidth throttling, audio multiplexing, and dynamic layout reflow.

Default Room Entry Engine

Members allotted to a single room bypass navigation and enter their room immediately upon app launch. Multi-room members access a Room Selector drawer displaying real-time occupancy counts.

Multi-Room Camera Broadcasting

Pro members belonging to multiple groups (e.g., Room 1, 2, and 3) can selectively check boxes to broadcast their video feed to specific rooms simultaneously (e.g., stream to Room 1 & 3 while hidden in Room 2).

4.2 The Uncompromising Camera Discipline Protocol

Disciplinary Rule	Automated Detection & Event Trigger	Penalty Enforcement
10-Minute Camera Timeout	Webcam remains turned off or obscured for >10 consecutive minutes while inside a room.	Automatic Room Expulsion
Three-Strike Day Ban	A member triggers 3 automated room expulsions within a single 24-hour cycle.	48-Hour Platform Ban
Hardware Timer Interlock	User attempts to run Pomodoro or study timer while camera feed is turned off.	Timer Locked; Beep Alert
Midnight Session Truncation	A user forgets to check out at night; system identifies inactivity past 00:00 midnight.	Session ends at 12:00 AM; redundant 2:00 AM checkouts discarded.

4.3 Immersion & Ergonomic Study Features

Glassmorphic PIP Mode

Minimizing the tab opens a floating Picture-in-Picture window with user camera, active timer countdown, and current task tag.

Privacy Background Blur

Client-side TensorFlow.js / WebGL background segmentation ensures complete household privacy without impacting server GPU costs.

Curated Ambient Audio

Built-in licensed focus soundscape player: Rain, Forest, Birdsong, Stream, Ocean Waves, Soft Piano, and Lo-fi beats.

Bandwidth Optimization for 400+ Peers

Simulcast video streams are downsampled to 180p/15fps for background grid tiles and upscaled to 720p only when a peer tile is expanded or pinned, keeping client RAM consumption below 450 MB.

05 AI Companion: "Hangley Spidy" System Specification

5.1 Physical Persona & Visual Rendering

Hangley Spidy is the platform's proprietary interactive mascot suspended from the top navigation bar. Rendered using Canvas and 2D physics, Spidy responds to cursor movements with realistic string oscillation. During speech, Spidy triggers expressive ocular glows, micro-pulse animations, and mouth-state sync.

5.2 Natural Language Voice Command Engine (VUI)

Spidy combines Web Speech recognition with ElevenLabs natural voice synthesis to provide hands-free audio assistance:

Voice Prompt / Trigger	Companion Spoken Response	Synchronized UI Action
"Yo Spidy, what are your commands?"	"Here are all the commands I can help you with today!"	Command Cheat-Sheet modal pops up with blurry background.
"Hey Spidy, what's in the news today?" (or: "...in PIB / The Hindu / Indian Express?")	Reads concise 60–second summary of top national & exam-relevant editorial headlines.	Current Affairs tile pops up on screen; option to expand analysis.
"Yo Spidy, show me my stats"	"Which metrics do you want to review? Effective hours, active vs. passive ratio, or subject share?"	Displays dynamic overlay chart corresponding to requested metric.
"Yo Spidy, how's the leaderboard looking?"	"Today's front-runner is Ishaan with 9.2 hours, followed by Riya and Kunal. Keep pushing!"	Opens Leaderboard drawer, highlighting the Top 3 podium.
"Yo Spidy, who is [Name / Rank X]?"	"That's Aarav Sharma, Rank 4. Optional: Sociology. Currently on a 7–day 8–hour streak."	Renders candidate's verified profile badge and study card on screen.
"Hey Spidy, how many days left for Prelims 2027?"	"There are exactly 542 days left for UPSC CSE Prelims 2027. Make today's hours count!"	Dynamic exam countdown widget displays at the top-right header.

Editorial Copyright Protection Protocol

To avoid legal liability and copyright infringement with news publishers, Spidy **never reads raw copyrighted newspaper text**. All summaries are independently drafted by Merit Walkers faculty (AM Sir, Aditya, Maha, Mamta) with structured syllabus mapping (Prelims Facts vs. Mains Analytical takeaways).

Micro-Interactions

Clicking or dragging Spidy triggers physics spring bounce. Double-clicking toggles voice mode on/off. Pro members unlock custom skins and outfits.

Exam Countdown Precision

Automatically pulls exact dates upon official UPSC/NTA notification release; provides verified calendar estimates during pre-notification cycles.

06 Productivity Engine: Smart Tasks, Pomodoro & Focus Rating

6.1 Tri-Mode Productivity Architecture

The Productivity Tile resides in the right-hand viewport and synchronizes three distinct focus modules: **To-Do**, **Pomodoro**, and **Focus Rating**.

6.2 Dual-Layer To-Do & Chromatic Latency Tracking

"My Tasks" (Personal Queue)

Private, prioritized task checklist. Bi-directionally synced with the Yearly Planner and "My Progress" dashboard. Pinned tasks display directly over the user's video feed.

"Everyone's Tasks" (Live Peer Scroller)

Social ticker showing pinned tasks of other active room members. Features mouse-hover auto-pause, allowing students to inspect peer goals or click member profiles.

Task Delay Visual Urgency Indicators

Completion Status	Visual Color Code	Micro-Animation & UX Event
Completed on Time	Emerald Green	Text strike-through with golden sparkle burst particle animation.
Delayed by ≤ 20 Mins	Soft Peach / Light Red	Subtle pulsating badge; reminder tag added to active session.
Delayed by 20 – 60 Mins	Medium Crimson	Progress bar turns crimson; prompt to adjust remaining schedule.
Delayed by > 60 Mins	Deep Burgundy Red	Flagged as potential backlog item; task moves into Daily Backlog queue.

6.3 Active vs. Passive Cognitive Taxonomy

Active Learning (High Cognitive Effort)

- Active Recall Revision & Self-Quizzing
- Answer Writing (AW) & Essay Drafting
- Prelims MCQs Solving & FLT Mocks
- Mains Full-Length Mock Tests
- Synthesized Note Making & Value Addition

Passive Learning (Input & Absorption)

- Primary Textbook & Standard Book Reading
- Attending or Watching Video Lectures
- Passive Re-Reading & Syllabus Familiarization
- Podcast & Editorial Auditory Review

6.4 Post-Session Focus & Liquid Wave Physics

Adaptive Session Prompting & Liquid Wave Simulation

Pausing the timer triggers a dynamic dialog: *"Rate your 1st session, Aarav"* → *"Rate your 2nd session, Aarav"* → *"Rate your Nth session"*. The user scores focus on a 1–10 scale (or 3-smiley scale). An animated 3D liquid sphere simulates fluid motion inside the productivity tile, where higher focus generates a radiant emerald wave motion.

07 Interaction Corner: Collaboration, Current Affairs & P2P Review

7.1 Architectural Purpose & Noise Isolation

The Interaction Corner (designated as the *Productivity Corner*) is physically and logically separated from the live video study grid. Discussion pings, chat notifications, and file uploads are silenced in the study room to maintain deep quiet.

7.2 Peer-to-Peer (P2P) Answer Writing Evaluation Canvas

Workflow Step	Functional Mechanics	Data & Compliance Rules
Answer Submission	Aspirant submits PDF scan; tags GS Paper (GS1–GS4, Essay, Optional), Topic, and Word Limit.	Maximum 1–2 answers per upload to keep evaluation cycle fast and responsive.
Annotation Canvas	Reviewer opens answer viewer with full markup tools: Pen, Highlighter, and Margin Notes.	**Color Standards:** Red = Grammatical / Fact Error Green = Strong Argument Blue = Value Addition
Structured Feedback	Reviewer scores Introduction, Body, Structure, and Conclusion; leaves Telegram-style message bubbles.	Evaluator earns verified collaboration hours contributing to annual awards.

7.3 Editorial Current Affairs Hub & DRM Protection

Faculty-Curated Daily Analysis

Only verified Merit Walkers faculty (AM Sir, Aditya, Maha, Mamta) possess broadcast permissions. Each post breaks stories into: (1) **Prelims Significance & MCQs**, (2) **Mains Analytical Framework & Surgical Content**.

DRM Anti-Screen Capture Shield

To protect proprietary compilations and comply with publisher IP, the Current Affairs viewer uses canvas DRM obfuscation. If a user triggers a screenshot or screen recording, the content window instantly turns solid black.

7.4 Accountability Logs & Voice Reflection Nudges

Scheduled ElevenLabs Accountability Nudges

Every Sunday evening and Monday morning, an automated voice prompt delivers an authentic motivational check-in:

"Please report your weekly progress honestly. Remember, integrity and accountability are not just virtues of a civil servant; they are daily habits cultivated right here. Let's prioritize genuine progress over perfect perception."

Missing Reports Module

Members absent for >2 days must file a structured absence reason. Repeated unexcused absences trigger automated counselor follow-ups.

Anti-Spam Chat Controls

Public rooms enforce a strict rate limit of **3 messages per 5 minutes** with automated toxic content filtering.

08 Collaboration Corner: Pro-Exclusive Pods & Study Matchmaking

8.1 "Find a Study Partner" Matchmaking Engine

Collaboration Corner is an exclusive privilege for **Pro Members**. It enables serious aspirants to discover compatible co-studying peers based on rigorous academic criteria rather than casual social browsing.

Search & Filter Parameter	Filter Options & Algorithm Logic	Access Control Rule
Target Examination	UPSC CSE, UPPSC, BPSC, IIT-JEE, NEET-UG, SSC CGL, Banking.	Cross-room visibility permitted.
Optional Subject	Geography, PSIR, Sociology, Anthropology, History, Public Admin, etc.	Matches students with identical syllabi.
Attempt & Seniority	1st Attempt, 2nd Attempt, Multiple Mains Appeared, Interview Appeared.	Verified via uploaded marksheets.
Ranking Algorithm	Prioritizes users by: (1) Active streak days, (2) 150h monthly threshold compliance.	Non-Pro members receive upgrade CTA.

8.2 Collaborative Study Pods & Synchronized Whiteboard

Synchronized PDF Annotation

Group members can co-read government reports (NITI Aayog, Economic Survey, ARC Reports). The room administrator can delegate master page-turning control or allow synchronized group scribbling.

The Quorum Protocol (Min. 3 Members)

To prevent private idle chatting and maintain academic focus, special collaboration rooms (Essay Brainstorming, Interview Mock GD) require a minimum quorum of **3 active participants**.

8.3 Tactical Peer-to-Peer Social Interactions

Tactile "Nudge"

Sends a gentle visual bell chime to a partner whose camera indicates distraction or sluggish task progress.

"Pat on the Back"

Instant micro-recognition sent when a study partner finishes an intensive 3-hour Pomodoro block.

Direct Pro Messaging

End-to-end encrypted 1-on-1 academic messaging with file attachment and shared answer link capabilities.

Scheduled Study Room Agendas

Collaborative pods require an explicit session agenda before opening (e.g., *"GS3 Internal Security Mains 2026 Brainstorming"*). Participants are greeted with the agenda upon entering to keep discussion strictly aligned.

09 Gamification, Discipline Protocol & The Red Card Penalty System

9.1 The 150-Hour Monthly Minimum Study Mandate

Unlike conventional casual study apps, Merit Walkers operates on strict standards of seriousness. Every verified member commits to logging at least **150 hours of verified camera study per calendar month** (averaging 5 hours per day).

3 Days	5 Days	20 Days
1ST INACTIVITY ALERT (SMS/APP)	2ND FORMAL ADMIN NUDGE	CRITICAL WARNING & RED CARD PREP

The Three-Strike Red Card Protocol

Violation Threshold	System Enforcement Action	Profile Status Impact
Month 1 Failure (<150h)	System automatically delivers **1st Red Card** on the 1st day of the subsequent month.	Official Warning Flag
Month 2 Failure (<150h)	System delivers **2nd Red Card**; account placed on academic probation.	Probationary Member
Month 3 Failure (<150h)	System triggers **Immediate Expulsion** from study rooms + automated **6-Month Ban**.	Expelled & Barred (6 Mos)

9.2 Visual Prestige Rewards & Dynamic Leaderboard Themes

Students who maintain unbroken high-intensity streaks (8+ hours daily) unlock exclusive aesthetic tiers:

Streak Milestone	Aesthetic Theme Unlocked	Special Sensory & Audio Effects
3 Consecutive Days (8+ hrs)	Silver Ring Frame	Animated glowing border on profile picture.
2 Weeks Unbroken (8+ hrs)	Sage Green Ambient Theme	Gentle chime sound effect plays when other members visit user's profile card.
30 Days Unbroken (8+ hrs)	Charcoal Dark / Royal Theme	Custom dashboard layout + golden entrance fanfare sound when joining rooms.
Rank 1 on Monthly Leaderboard	Charcoal Dark Sovereign	Floating gold leaf and floral border micro-animations + Top Ranker trophy badge.
Rank 2 on Monthly Leaderboard	Lavender Luxe	Custom particle glow + animated Leaderboard tile highlight.
Rank 3 on Monthly Leaderboard	Midnight Blue Elite	Distinct metallic trim + custom profile highlight.

Circadian Badges

Check-ins between **04:00 AM – 10:00 AM** earn the *"Early Riser"* badge. Check-ins between **10:00 AM – 01:00 AM** earn the *"Night Owl"* badge.

Monetary Prize Pool

Quarterly scholarship pool (**₹5,000 / ₹3,000 / ₹2,000**) awarded to the top verified performers in effective study hours and peer answer evaluations.

10 Performance Analytics Engine ("My Progress" Dashboard)

10.1 Key Metrics & Visualizations

The "My Progress" dashboard converts raw study hours into actionable diagnostic intelligence, helping aspirants eliminate preparation blind spots.

Consistency Heatmap Calendar

GitHub-style yearly visualization of study consistency:

High Study (>8h) | Moderate Study (5–8h) | Light Study (<5h) | Rest Day (0h)

Daily Focus Window Timeline

Linear chronometer detailing exact check-in/out timestamps, active camera focus blocks, and blurred bar segments representing pauses or breaks.

10.2 Subject-Wise Time Allocation & Cognitive Ratios

Chart Visualization	Tracked Dimensions & Subjects	Analytics Value for Aspirant
Subject Donut Chart	GS1, GS2, GS3, GS4, Essay, CSAT, Optional, History, Polity, Economy.	Prevents disproportionate time wastage on favorite subjects while neglecting weaker areas.
Active vs. Passive Split Bar	Active Recall & Answer Writing vs. Passive Reading & Lectures.	Ensures student maintains at least 60% active cognitive retention practice.
Answer Writing Block Graph	Daily and monthly count of answers drafted and reviewed.	Tracks continuous answer writing velocity ahead of Mains.

10.3 Prelims Mock Test Diagnostic Suite

Overall Accuracy %

Tracks net correct answers vs. negative marking deductions across all full-length test series.

Confidence-Wise Accuracy

Calculates hit rate across: **100% Sure**, **50-50 Elimination**, and **Wild Guess** attempts.

OS Lockscreen Widgets

Exportable progress widgets formatted for iOS Lockscreen, macOS Menu Bar, and Windows Desktop.

Adaptive Subject Category Expansion

When a student creates custom subjects in the Pomodoro timer (e.g., "Ethics Case Studies" or "Internal Security"), the analytics engine dynamically computes proportional slice allocations without resetting historical baselines.

11 Technical Architecture, Security & DRM Specifications

11.1 Production Technology Stack

Layer / Subsystem	Technology Component	Architectural Rationale
Frontend Framework	Next.js 15 (App Router), TypeScript, Tailwind CSS	Zero-runtime CSS overhead, modular components, React Server Components.
Interactive UI & Canvas	Framer Motion, HTML5 Canvas API, Lucide Icons	Physics-driven Spidy animations, smooth glassmorphic transitions, PDF markup.
Real-Time Video SFU	WebRTC via Mediasoup / LiveKit Server	Scalable multi-party video conferencing supporting 400+ participants per room cluster.
Conversational Audio AI	ElevenLabs Agents API + Web Speech API	Humanlike natural voice generation for Spidy and weekly reflection audio nudges.
Persistence & Caching	PostgreSQL, Prisma ORM, Redis Sentinel	ACID transactional security for subscriptions, sub-millisecond presence tracking.
Object Storage	Cloudflare R2 / Amazon S3	Encrypted, globally edge-cached storage for answer PDFs and profile assets.

11.2 Security, Integrity & Anti-Piracy Architecture

Dual-Device Session Limit

JWT session tokens are strictly bound to hardware fingerprints. If a 3rd concurrent login is attempted, the oldest session is immediately terminated.

Anti-Cheat Presence Detection

Edge neural nets monitor camera feed continuity to prevent looping recorded video files or positioning cameras toward empty backgrounds.

Formal Review & Executive Client Approval

This document represents the complete, verified functional and architectural specification for Merit Walkers. All design patterns, subscription policies, video thresholds, and AI companion mechanics have been certified for production deployment.

Product Strategy Lead: _____ **Date:** November 19, 2026

Chief Technology Officer: _____ **Status:** Approved for Client Presentation