Universal Software-Driven Constraint Tracking Form

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Purpose:

- This document captures constraints originating from the StudyPilot software architecture, including performance limits, API usage policies, data handling restrictions, and UI behavior boundaries.
- These constraints apply to the StudyPilot web application and relate to performance, security, API dependencies, and usability expectations.
- Traceability to IEEE 29148 (SRS), GDPR (privacy), and ISO/IEC 25010 (quality) is supported.

CONSTRAINT TABLE

Constraint ID	Category	Constraint Description	Design Rationale	Owner	Impacted Requirements	Domain Application(s)	Impacted Components	Associated Standard(s)	Verification Method	Risk Impact	Status
SWC-01	Performance	Dashboard load time must not exceed 2 seconds	Ensures responsiveness and smooth study flow	Frontend Lead	NFR-PERF-01	Web App	Dashboard, Task Loader, API Handlers	ISO/IEC 25010 (Performance Efficiency)	Browser Performance Test	Medium	Active
SWC-02	External API Usage	Spotify API requests limited to 30	Spotify API rate limits; prevents throttling	Backend Lead	REQ-SPOT-04	Web App	Spotify Service, Music	Spotify Web API Terms	Rate-limit simulation	Medium	Active

ID	Category	Constraint	Rationale	Owner	Source	Platform	Component	Standard	Verification	Priority	Status
		requests/min					Controller				
SWC-03	External API Usage	Weather API refresh interval ≥ 10 minutes	OpenWeatherMap free-tier call limits	Backend Developer	REQ-WEATH-03	Web App	Weather Service	OpenWeatherMap API Policy	API logging validation	Low	Active
SWC-04	Security	No sensitive user data stored outside browser localStorage	Avoids server-side security issues; privacy-first design	Security Architect	NFR-SEC-02	Web App	Storage Manager	GDPR (Data Minimization)	Code review & static analysis	High	Active
SWC-05	Usability	Pomodoro timer drift must remain < 100ms per 25-minute cycle	Supports focus accuracy, avoids user trust issues	Frontend Developer	REQ-POMO-05	Web, Mobile	Timer Engine	ISO/IEC 25010 (Usability)	Manual timer drift test	Medium	Proposed
SWC-06	UI Responsiveness	Layout must adapt correctly to 320px–1600px screen widths	Ensures universal device compatibility	UI/UX Lead	NFR-UI-01	Web App	UI Layout, CSS Grid System	WCAG 2.1, ISO 9241	Responsive UI Test	Low	Active

ID	Component	Constraint	Rationale	Owner	Requirement	Platform	Responsible	Standard	Validation	Priority	Status
SWC-07	Data Handling	Local task data size must not exceed 1 MB	Prevents localStorage overflow; maintains performance	Backend Lead	REQ-TASK-07	Web App	Task Manager	HTML5 Storage Standards	Storage load test	Medium	Active
SWC-08	Analytics Calculation	Statistics update frequency limited to once per minute	Prevents unnecessary CPU use, preserves battery	Frontend Dev	REQ-STAT-03	Web App	Analytics Engine	ISO/IEC 25010	CPU profiling	Low	Active
SWC-09	Notification Behavior	Notifications only triggered when browser tab is visible or via scheduled reminders	Prevents notification spamming or browser restrictions	QA Lead	REQ-NOTIF-02	Web App	Notification Manager	Browser Notification API Guidelines	Functional test	Low	Active

Notes

- These constraints are determined based on the StudyPilot system architecture, API limitations, UI requirements, and expected performance targets.
- Each constraint maps to a software requirement described in the SRS.
- Software engineering validates these constraints through testing, API monitoring, profiling, and UI analysis.

Traceability Reference

This document supports:

- StudyPilot Software Requirements Document (SRD)
- Product Assurance & Compliance Documentation
- MÜDEK Outcome: Interdisciplinary Integration & Constraint Awareness

Approval & Control

Role	Name	Signature	Date
Project Manager	Emin Arslan		
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