AutomaSpec

AI-Powered Test Specification Management System

Student: Aliaksandr Samatyia

Group: Js

Supervisor: Volha Kuznetsova

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The Problem: Testing Fragmentation

Who suffers?

QA Engineers, Developers, and Product Managers in fast-paced teams.

The Reality:

- ❌ **Disconnected Workflows:** Requirements live in docs, tests live in code. Links are manual and fragile.
- ❌ **Visibility Black Holes:** Stakeholders cannot verify if a specific requirement is actually covered by a passing test.
- ❌ **Stale Documentation:** Test cases often lag behind code changes, leading to false confidence.
- ❌ **Manual & Slow:** Meaningful reporting requires manual spreadsheet updates.

> *"We don't know if we broke the feature until users tell us."*

The Solution: Unified Test Lifecycle

How AutomaSpec solves it:

AutomaSpec acts as the **central nervous system** for quality assurance, syncing code, tests, and requirements.

Key Capabilities:

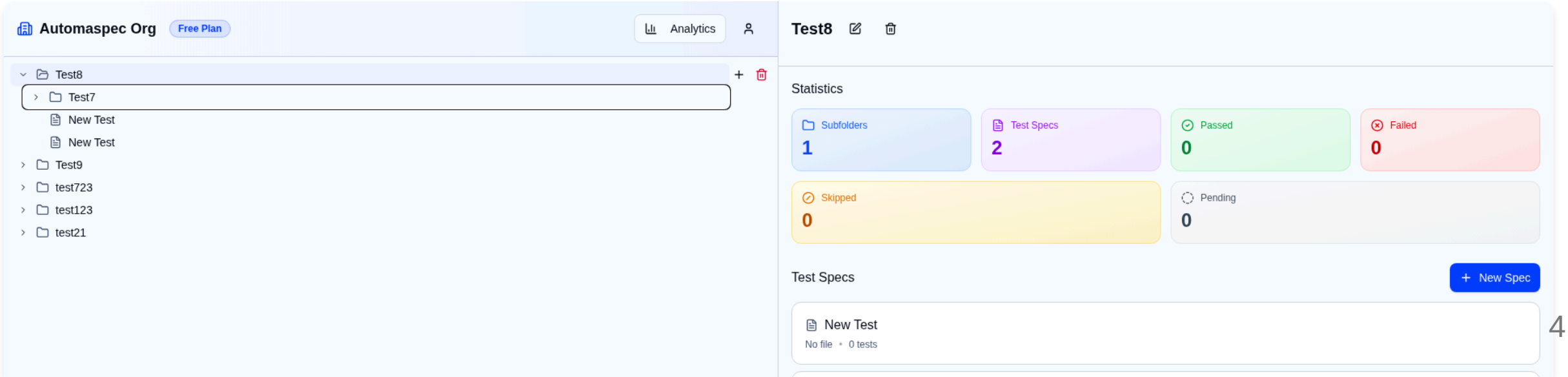
- 🔗 **Deep Integration:** Automatically syncs Vitest execution results to requirements.
- 📋 **Live Traceability:** Requirement ↔ Test Spec ↔ Execution Result. All linked.
- 🤖 **AI Assistant:** Chat with your test suite to generate cases or explain failures.

Why it's different:

Unlike erratic spreadsheets or siloed Jira plugins, AutomaSpec represents the **state of truth directly from CI/CD**.

Demo: Core Workflow

1. **Define Requirements:**
   Users create requirements linked to specs.
2. **Sync Execution:**
   CI pipeline pushes results; coverage updates instantly.
3. **Trace & Audit:**
   Drill down from a business goal to the specific test.

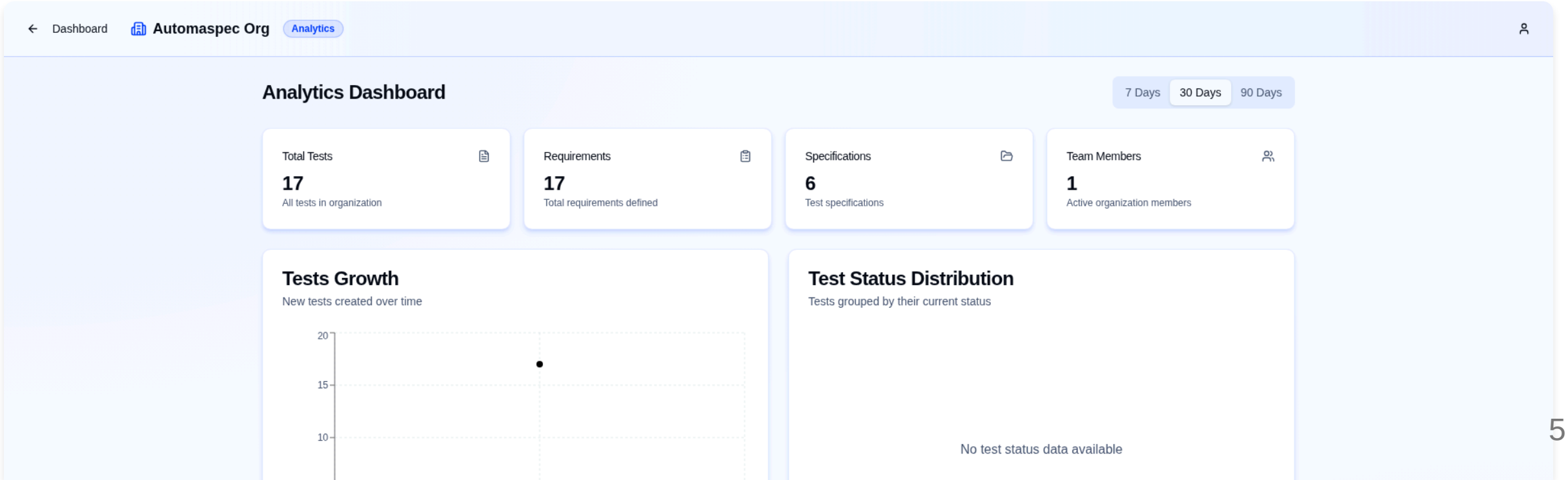


Demo: Analytics Dashboard

Real-Time Insights:

Comprehensive metrics and visualizations for test coverage and execution trends.

- **Coverage Metrics:** Track requirement coverage over time.
- **Execution Trends:** Visualize test pass/fail rates.
- **Period Selection:** Analyze performance across different timeframes.

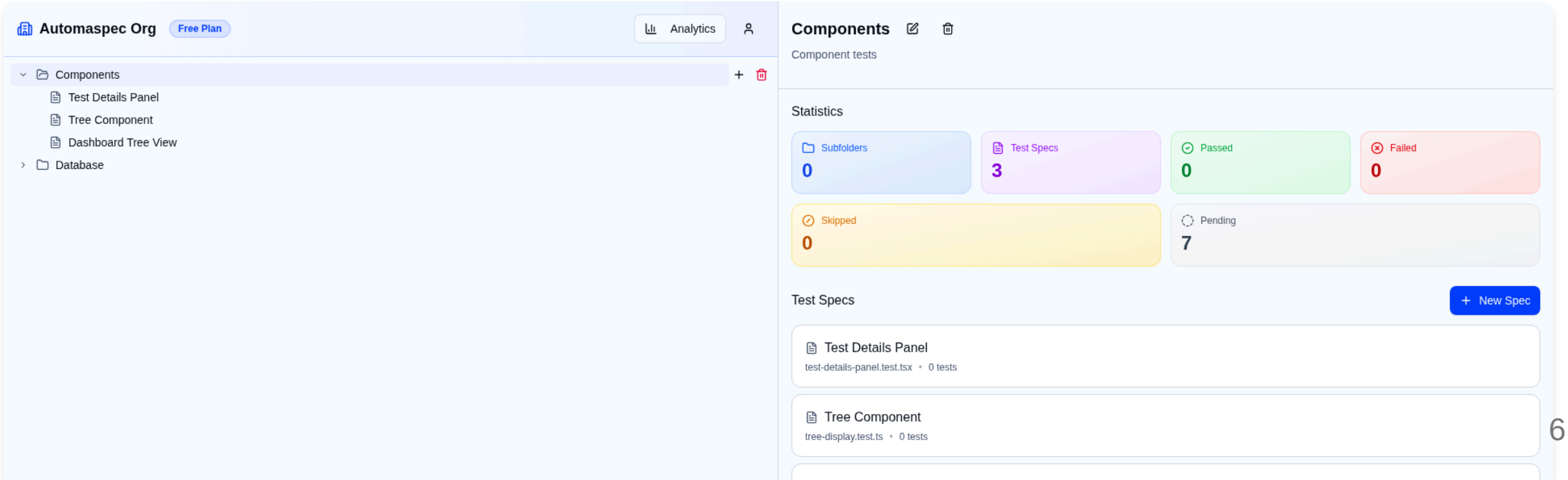


Demo: Main Dashboard

Centralized Test Management:

Organized view of projects, folders, and test specifications.

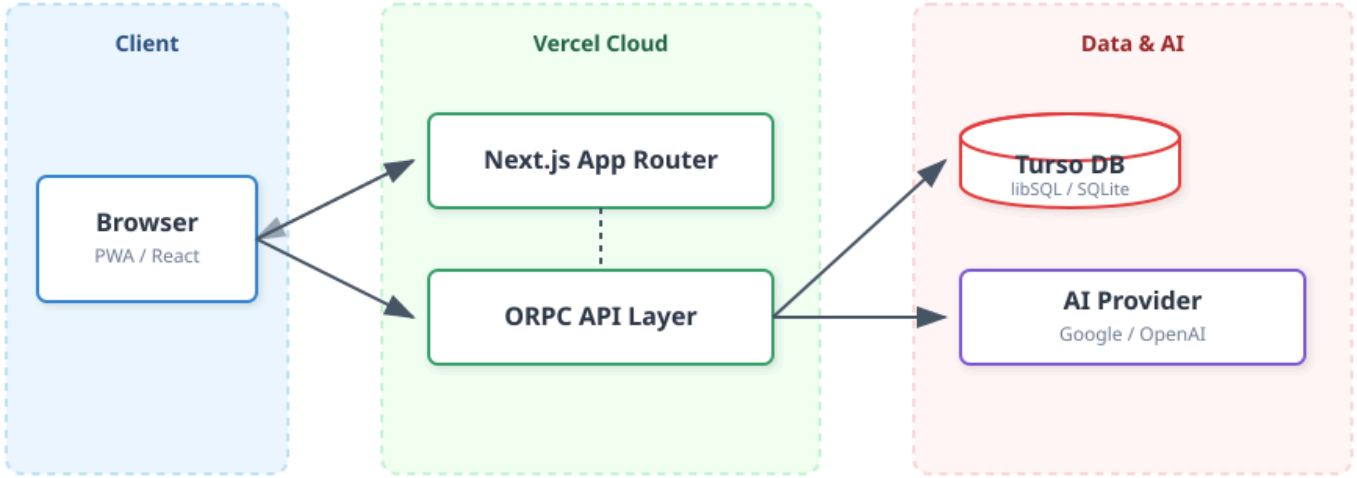
- **Hierarchical Structure:** Navigate through organizations and projects.
- **Quick Access:** Tree view of folders and test specs.
- **Status Overview:** Visual indicators for test execution status.



High-Level Architecture

Key Components:

- **Frontend:** Next.js 16 (React 19), Tailwind CSS, Framer Motion.
- **Backend:** Serverless Functions via Vercel, ORPC for type-safe contracts.
- **Database:** Distributed SQLite (Turso) managed via Drizzle ORM.
- **AI Integration:** Vercel AI SDK into Google/OpenAI.



Technology Stack

Category	Technology	Purpose
Framework	**Next.js 16**	Full-stack React framework with App Router
Language	**TypeScript**	Strict type safety across full stack
Database	**Turso (LibSQL)**	Edge-compatible distributed SQLite
ORM	**Drizzle ORM**	Type-safe SQL builder and schema management
API	**oRPC**	End-to-end type-safe API contracts with OpenAPI generation
Testing	**Vitest**	Unit testing framework
AI	**Vercel AI SDK**	Integration with LLM providers (Google Gemini/OpenRouter)

Front-End Architecture

WHY:

Needed a scalable, SEO-friendly SPA with robust server integration for a complex dashboard.

WHAT:

- **App Router:** Hierarchical routing for Organizations/Projects.
- **Server State:** TanStack Query for caching & optimistic updates.
- **Type Safety:** End-to-end typed API calls via oRPC.
- **Components:** Modular UI using Radix Primitives.

TECH: Next.js 16, React 19, TanStack Query, Radix UI, Tailwind CSS v4

```
// Type-safe reactive data fetching with TanStack Query
const [period] = useState<AnalyticsPeriod>('30d')
const { data } = useQuery(orpc.analytics.getMetrics.queryOptions({
    input: { period }
}))
```

Adaptive User Interface

WHY:

To provide a seamless experience for QA engineers across Desktop (4K), Tablet, and Mobile devices.

WHAT:

- **Mobile-First:** Styles defined for small screens, scaling up via breakpoints (`sm`, `md`, `lg`).
- **Responsive Navigation:** Sidebar on desktop -> Drawer on mobile.
- **Theme Support:** System-aware Dark/Light mode integration.
- **Accessibility:** WCAG 2.1 AA compliance via Radix UI.

TECH: Tailwind CSS v4, Lucide Icons, next-themes, Radix UI Primitives

> *Verified support for 16:9, 21:9, and mobile portrait aspect ratios.*

API Documentation

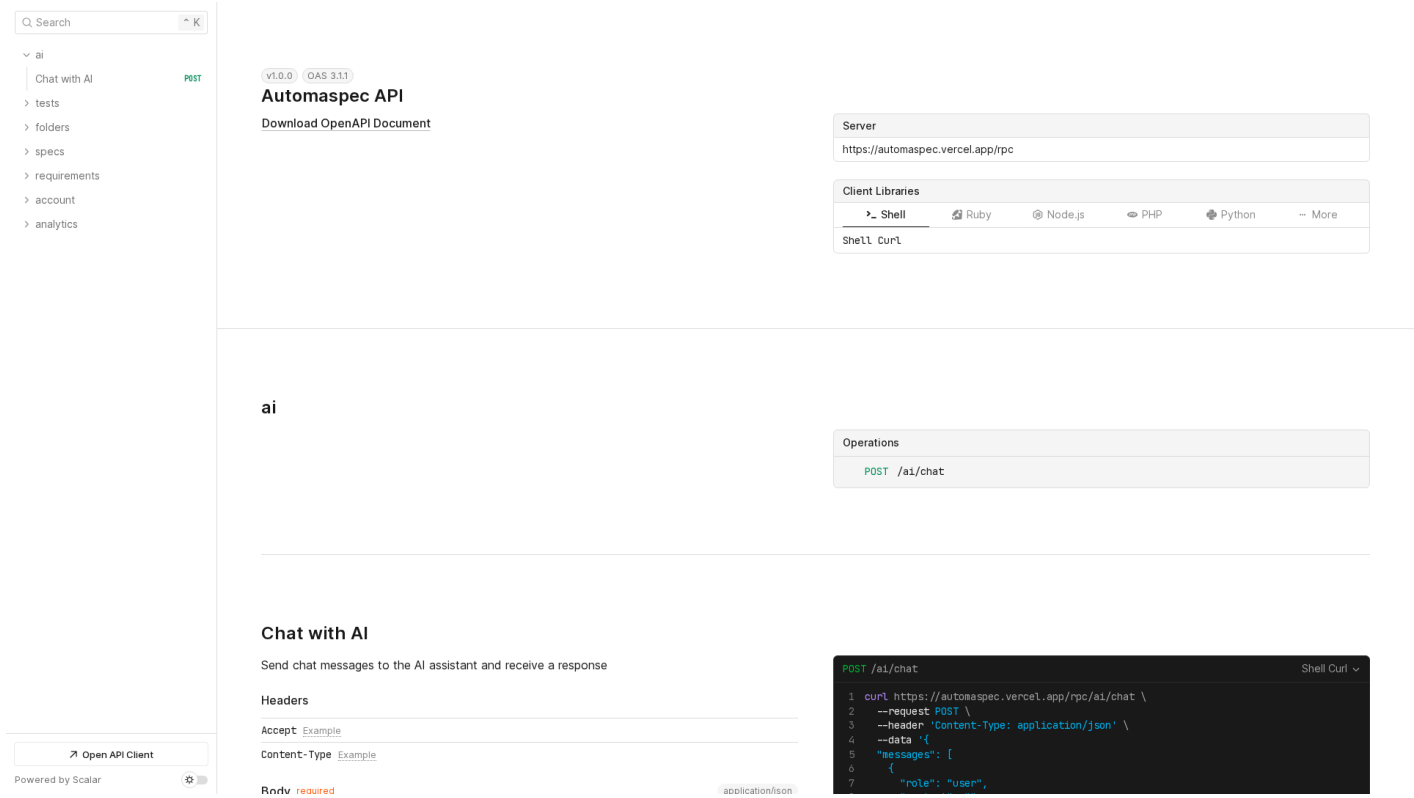
WHY:

Ensure external integrations and developers have an accurate source of truth.

WHAT:

- **Auto-Generated:** Docs derived from Zod schemas.
- **Interactive:** Scalar UI for in-browser testing.
- **OpenAPI:** Exports valid 3.1 spec.
- **Zero Drift:** Docs update with code.

TECH: oRPC, Scalar UI, Zod, OpenAPI



CI/CD Pipeline

WHY:

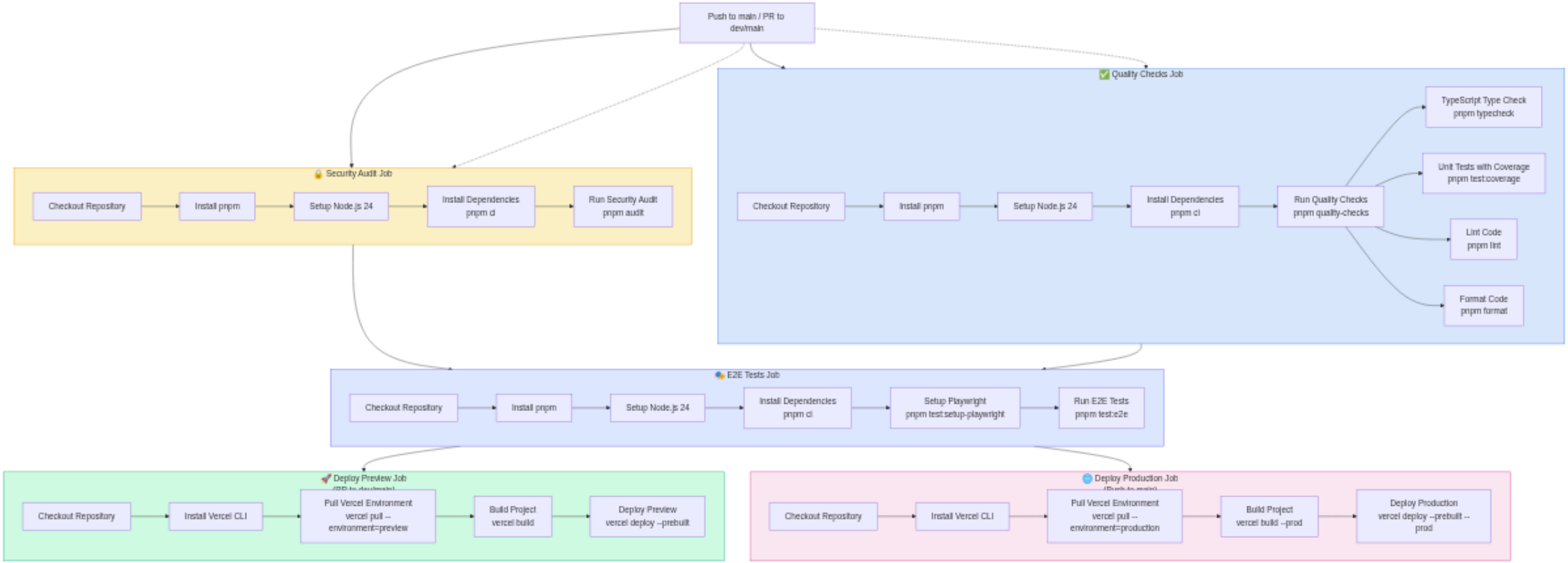
To automate quality control and ensure safe, frequent deployments to production.

WHAT:

1. **Quality Gate:** Lint (`oxlint`), Format, Typecheck before merge.
2. **Security:** Automated `pnpm audit` for dependencies.
3. **Test Automation:** Unit testing execution with coverage.
4. **Delivery:** Auto-deploy to Vercel (Preview/Prod).

TECH: GitHub Actions, Vercel CLI, Docker, Lefthook

CI/CD Pipeline: Diagram



Containerization

WHY:

To guarantee environment consistency ("works on my machine") and enable portability.

WHAT:

- **Multi-Stage Build:** `deps` → `builder` → `runner` (Optimized layers).
- **Standalone Mode:** Trims `node_modules` for ~100MB final image.
- **Security:** Runs as non-root user (`nextjs`).
- **Orchestration:** Docker Compose profiles for Dev vs. Prod.

TECH: Docker, Docker Compose, node:24-alpine, Next.js Standalone

```
# Final Stage
FROM base AS runner
USER nextjs
COPY --from=builder /app/.next/standalone ./
CMD ["node", "server.js"]
```

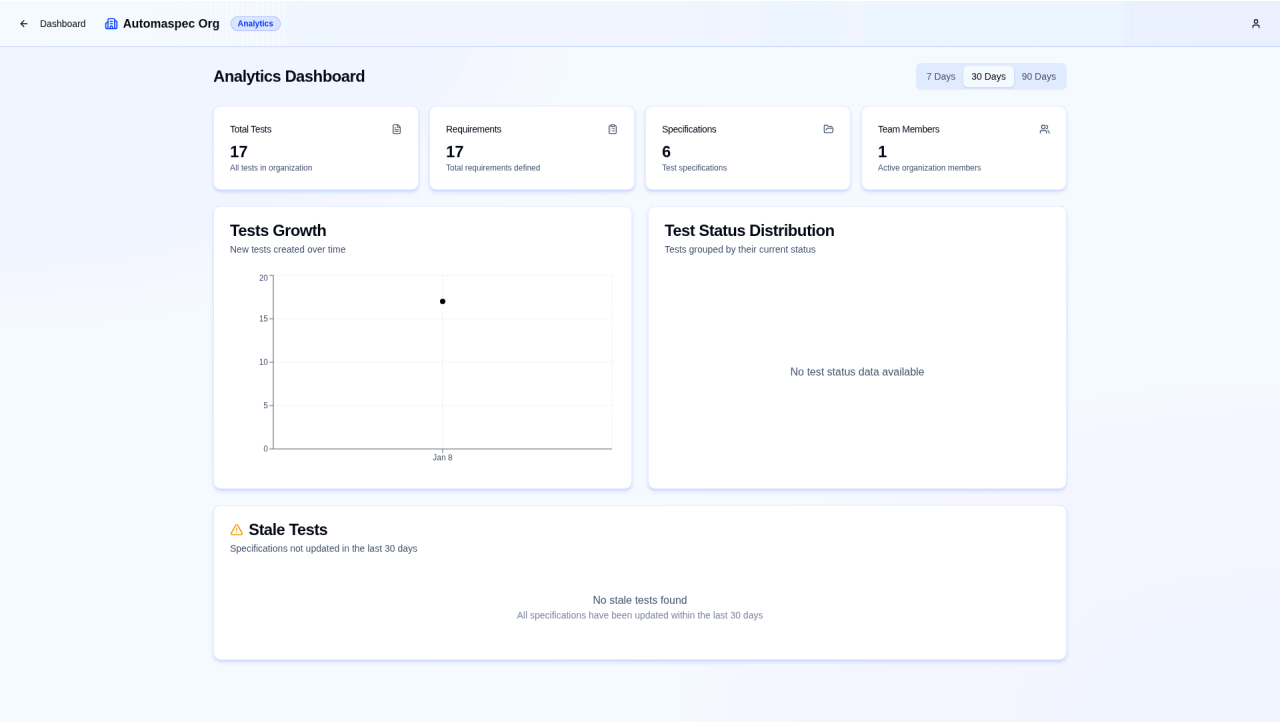
Challenges & Solutions

Challenge	Solution
Vercel vs Docker	*Problem:* Vercel doesn't run Docker. *Fix:* Used Hybrid strategy—Docker for local dev/testing reliability, Vercel for scalable Serverless production.
Type Synchronization	*Problem:* Keeping API and Frontend types in sync. *Fix:* Implemented **oRPC** to infer frontend types directly from backend Zod schemas.
Complex State	*Problem:* Managing real-time spec updates. *Fix:* Utilized **TanStack Query** for efficient server-state caching and optimistic UI updates.

Results

✅ Project Checklist

- [x] **Core MVP:** Requirement management & Test syncing.
- [x] **Architecture:** Scalable Next.js 16 + Serverless setup.
- [x] **Quality:** CI/CD pipeline with 100% E2E critical flow coverage.
- [x] **Documentation:** Auto-generated API Reference.



Q&A

Production: automaspec.vercel.app
Repository: github.com/qweered/automaspec
Documentation: `/rpc/docs` (Scalar)

Thank You!

Student: Aliaksandr Samatyia
Contact: aliaksandr.samatyia@stud.ehu.lt