

Marek Polcar

Product Engineer | Full-Stack Developer | AI-Native Builder

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Open to: onsite in Brno, hybrid in Prague or Vienna, remote in Czech Republic, Austria, or Germany

Languages: Czech (native), English (full professional), Spanish (elementary), German (elementary)

Professional Summary

Product Engineer with 15+ years of full-stack experience and a track record of shipping products end-to-end as a solo developer. Eight years at Xpand2 owning everything from architecture and implementation to deployment and operations, functioning as a self-directed builder who scoped requirements, made architectural decisions, and shipped production systems without external management overhead. Core backend expertise in Java, Spring, TypeScript, and Elasticsearch (co-architected a 200+ node cluster processing 200K docs/sec). Ships React frontends just as comfortably.

Recently accelerated into AI-native development: built generative AI products from zero to production (Kyna.cz, Simple-Kids-Routine.com), deployed LLM-powered infrastructure tooling with strict guardrails, and created custom MCP integrations that turn AI into a control plane for production systems. Uses Cursor, Codex, Claude, and Gemini daily; built custom skills, rules, and MCP servers to maximize shipping velocity through AI-assisted coding, testing, and deployment.

Thrives in small, high-trust teams with direct ownership and fast iteration cycles. Experienced mentoring junior engineers and conducting code reviews.

Technical Skills

- **Languages & Frameworks:** TypeScript (React 19, Node.js, NestJS, Express, Fastify), Java (21/17, Spring Boot, Hibernate, Spring Data, Java EE, JSF), Python (FastAPI), JavaScript, C#, PHP (Zend Framework, Nette Framework), HTML, CSS
- **AI & LLM:** Cursor (1+ year daily, custom skills/rules/MCP integrations), Codex, Claude, Gemini (image generation API, Flash identity analysis), Copilot, Open WebUI, custom MCP server development, prompt engineering, agentic workflow design, LLM output evaluation & guardrails, structured output validation
- **Databases:** Elasticsearch (200+ node cluster ops, query optimization, index lifecycle management), MongoDB, MySQL, SQLite, ArangoDB, Redis, PostgreSQL
- **Infrastructure & DevOps:** Docker, Docker Swarm, Kubernetes (K8s), Nginx / Lua, Ansible, Jenkins CI/CD, GitHub Actions, TeamCity, Cloud (AWS, GCP, Hetzner Cloud), Linux administration
- **Frontend:** React (hooks, state management), React Native (Expo), Tailwind CSS, Astro, responsive design, UX/UI fundamentals, container queries
- **Tools & Practices:** Git, SVN, JetBrains IDEs, Azure DevOps (familiar), Maven, Keycloak, Puppeteer, debugging & root-cause analysis, code review, technical writing, test generation, API design (REST, OpenAPI), Agile/Scrum

Professional Experience

Xpand2 | Graz, Austria (Remote) **Senior Full-Stack Developer** | December 2017 - Current

Solo developer with full ownership of end-to-end product delivery, from system design and implementation to deployment, monitoring, and maintenance of all company applications and infrastructure. Operated as a de facto Epic Owner across all projects, leading technical direction without external management oversight.

Key Achievements & Infrastructure:

- **High-Scale Elasticsearch Infrastructure:** Co-architected and operated an Elasticsearch cluster on Hetzner Cloud with 200+ nodes, 120 TB of storage, peaking at 200,000 documents per second. Managed index lifecycle policies, rolling

upgrades, and capacity planning for continuous availability. Debugged cluster splits, index corruption, and query performance degradation at enterprise scale

- **LLM-Powered DevOps Automation:** Deployed Open WebUI with a custom system-prompted Qwen3 model to interact with the Ansible package system, enabling natural language infrastructure commands (e.g., "Create ES cluster with xyz nodes", "Upscale/Downscale the cluster"). Implemented strict validation layers to ensure zero erroneous commands reach production, requiring the same evaluation rigor that LLM observability platforms demand
- **Custom MCP Integration:** Created a Model Context Protocol (MCP) server to connect all internal services to the LLM, turning AI into a unified, auditable control plane for the entire platform with trace-level visibility into command execution and failure modes
- **AI-Assisted Development with Cursor & Codex:** Using AI-assisted IDEs as the primary development environment for 1+ year. Built custom skills, rules, and MCP integrations to enforce code quality, automate test generation, and streamline the full development lifecycle from prototyping to production

Featured Project: Balance Scorecard / Business Service Catalog (IT SLA Monitoring Platform) | Lead Developer (2022 - 2024)

- **Business-Critical Platform Delivery:** Designed and built a full-stack enterprise SLA monitoring platform tracking performance and availability across a 4-level hierarchy (Solution -> Service -> System -> Resource) with 15+ REST API modules. Delivered on schedule with zero critical bugs in production
- **Configurable Measurement Pipeline:** Created a pipeline that processes raw metrics through metric streams, applies decision factors (exclusions, incidents, maintenance windows), and calculates SLA compliance across a hierarchical rollup from System through Service and Solution levels
- **Real-Time Dashboards & Reporting:** Built interactive React dashboards with hierarchical tree visualizations, URL-persisted filter state, and automated weekly/monthly/yearly PDF report generation
- **Resilient Queue Processing:** Designed a Redis-backed priority queue with crash recovery, stale entry reaping, exponential backoff, and dead-letter queuing for reliable asynchronous metric processing
- **Tech Stack:** TypeScript, React, NestJS, Elasticsearch, ArangoDB, Redis, Docker, Jenkins CI/CD, Nginx

Featured Project: Bosun.one (Fleet Management SaaS) | Lead Developer (2020 - 2021)

- **End-to-End Product Delivery:** Single-handedly built and shipped a cross-platform fleet management platform to App Store and Google Play, now used by commercial operators including Auckland Coastguard and Belaire Ferries NZ
- **Offline-First Architecture:** Engineered real-time data sync via WebSockets with offline-first storage, enabling voyage logging, crew management, and maintenance scheduling in coastal/offshore environments with zero cellular signal. Zero data loss by design
- **Regulatory Compliance:** Built a compliance engine supporting MNZ-approved MTOP/MOSS frameworks: automated crew certification tracking, seetime logging, and operational checks so fleet operators pass audits with minimal manual effort
- **Security & Audit:** Introduced an immutable audit mechanism in Elasticsearch for tamper-proof regulatory data integrity
- **Tech Stack:** React Native (Hooks), MobX, SQLite, Node.js (Express), MongoDB, Elasticsearch, Expo

Featured Project: Datascout (Elasticsearch Wrapper) | Developer (June 2019 - January 2020)

- **Rapid Prototyping:** Built a full-featured Elasticsearch wrapper with WYSIWYG PDF reporting, Kibana visualizations, and client-editable JavaScript data transformations
- **API & Integration:** Designed automatic data validation against OpenAPI specs and integrated Jupyter Notebooks for remote execution via REST API & WebSockets

- **Tech Stack:** React, Java, MySQL, Nginx, Docker, Keycloak, ELK, Redis, Puppeteer

Bosun Technologies | Auckland, New Zealand **Senior Full-Stack Developer** | *June 2017 - November 2017 (during Working Holiday stay in NZ)*

- **DevOps Modernization:** Dockerized existing ASP.NET projects for both development and production environments
- **Automation:** Automated backups and created a single-command recovery system
- **Mentorship:** Mentored and code-reviewed two junior engineers
- **Tech Stack:** JavaScript, C#, MySQL, SQLite, Docker, Nginx, Git

TopMonks | Prague, Czech Republic **Java Developer** | *October 2013 - September 2016*

- **Client:** Česká Spořitelna (Czech banking institution): implemented RESTful endpoints to expose internal banking data for 3rd party developers and Single Page Applications
- **Microservices Migration:** Redesigning projects to adopt microservices architecture
- **Developer Tooling:** Created Maven Archetype to ease setting up new modules
- **CI/CD Optimization:** Improved TeamCity CI module workflow, cutting deployment time to 1/10 of the original
- **Containerization:** Introduced Docker to the integration environment for running CI helper tools
- **Observability:** Used Elasticsearch & Kibana to audit and visualize data flowing through the API gateway
- **API Documentation:** Automated Apiary documentation verification using Dredd testing tool, ensuring docs always match actual implementation. Synced local documentation files stored in on-premise Bitbucket Server to public Apiary page
- **Release Management:** Took on responsibility for modules release management
- **Process:** Active participant in Scrum retrospectives, provided feedback to Scrum Master
- **Tech Stack:** Java, Spring, Elasticsearch, TeamCity, Docker, REST, Apiary, Maven, Git

3sixty.eu | Prague, Czech Republic **PHP & JavaScript Developer** | *November 2008 - August 2012*

- **CI/CD:** Installed Jenkins CI server for building PHP CMS core into RPM packages with MySQL up/down migration
- **Architecture:** Implemented a PHP Job Queue environment to replace CRON scheduler
- **Performance:** Extended the PHP CMS core with a MySQL replication adapter, reducing read time by 50% at peak
- **Quality Advocacy:** Convinced CEO to adopt unit testing for new PHP code by presenting prior research
- **Frontend:** Built a car repair shop order form using JavaScript and jQuery FullCalendar plugin
- **Tech Stack:** PHP, Zend Framework, Nette Framework, JavaScript, jQuery, MySQL, SVN, Git

University of Texas at El Paso | El Paso, USA **Research Assistant** | *October 2012 - May 2013*

- Maintained the department's website
- Designed and implemented a system for tracking students' certificates

AI-Native Product Development | Solo Development (2025 - Current)

Kyna.cz: Generative AI for Pet Breeders

Generative AI application for dog breeders. Upload photos of your dogs, pick an atmosphere, and get a professional promotional flyer in minutes. Disrupting the manual graphic design market: compressing a 2-day, 500-2000 CZK manual design process into a 5-minute automated pipeline.

- Four generation pipelines, each with its own prompt strategy:
 - **Strict:** pixel-perfect extraction and composition
 - **Creative:** phenotype synthesis for stylized output
 - **Collage:** multi-view reference collages with Gemini Flash identity analysis and anti-leak prompt rules
 - **Inpaint:** multi-pass (canvas layout with slot labels, per-dog identity inpainting, then a global polish pass)
- Python/FastAPI image preprocessing service (rembg for background removal, auto-crop, normalization, watermarking) with SHA-256 caching
- Full audit trail for every generation written to disk
- Video generation, batch editing, and breed-specific show-stand pose generation
- Structured output validation, context management, and automated quality scoring
- Evaluation layers to detect and reject hallucinated visual artifacts before delivery to end users
- Currently in private alpha
- Built every piece with agentic workflows, custom Cursor skills, and MCP integrations; AI is both the product and the development method
- **Stack:** React 19, Vite, TypeScript, Fastify, Google Gemini API, Python/FastAPI, rembg, Astro (landing site), Cloudflare Pages

Simple-Kids-Routine.com: Visual Routine Planner for Kids

Morning routine app for kids aged 4-10, replacing the parent-as-parrot morning routine with an image-based visual guide. Currently live with real families using it daily.

- Multiple children with color-coded profiles
- Three activity types: normal, timer, and time-locked checkpoints
- Different display modes depending on the kid's age
- Visual progress tracking built for pre-readers: large emojis, no scrolling, responsive layout using container queries
- Two parts: React web app + separate Astro marketing site with newsletter signup, Turnstile spam protection, and EmailOctopus integration
- Built from zero to public beta using agentic AI workflows: product definition, design, implementation, landing page, newsletter integration, user feedback iteration
- **Stack:** React 19, Vite, TypeScript, Tailwind, Astro (marketing site), Cloudflare Pages, Hetzner VPS, GitHub Actions CI/CD

LLM-Powered Infrastructure Control Plane (at Xpand2, also listed under Key Achievements)

Deployed Open WebUI with a custom system-prompted Qwen3 model + custom MCP server connecting all internal services. Natural language infrastructure commands with validation layers to prevent erroneous commands in production. Demonstrates complex prompt engineering with structured output validation and MCP server integration for maintaining application state across AI agents.

Side Projects

Tapka.cz | Solo Development (2014 - Current)

Multi-tenant SaaS platform for dog breeders. Each breeder gets their own website with dog profiles, 4-generation pedigree trees, litter management, and a puppy marketplace. Can run on a tapka.cz subdomain or plug in their own domain.

- Multi-tenant routing with bilingual URLs (Czech and English)
- On-demand image resizing with disk caching
- Geo-based puppy search
- Four subscription tiers
- Ownership transfer workflows with email verification
- Theme system so breeders can customize the look of their site
- Built years before AI tooling existed; the project that taught end-to-end product ownership from data model through deployment, SEO, payments, and keeping it running
- **Stack:** Java EE, JSF, MongoDB, Spring Data, Bootstrap, Maven, WildFly

Education

Czech Technical University (CTU) | Prague, CZ **BSc in Computer Science** | *Fall 2007 - May 2011*

University of Texas at El Paso (UTEP) | El Paso, USA **Graduate Exchange Student** | *Fall 2012 - May 2013*