GEM System – Advanced AI solutions for efficient, secure, and scalable integrations

We are GEM System – *a leading Czech IT company with a clear focus on the use of artificial intelligence in business.*

We have been operating on the market for more than 15 years, and it is the combination of our long-term experience in system integration with state-of-the-art AI technologies that sets us apart from the rest.

We believe that the future of companies lies in their ability to effectively use data, automate processes, and develop new services based on artificial intelligence. That is why we build solutions that combine:

✓ **robust development of enterprise applications and data platforms,**	✓ **multi-agent architectures,**	✓ **advanced implementation of AI and process automation.**

Thanks to this approach, we are able to provide our clients with **technologically advanced, secure, and scalable solution**s that have a clear impact on their business results.

Our AI projects help companies grow, increase efficiency, and give them a competitive advantage in an environment where digitization and innovation set the pace of the market.

For us, AI is not just a technology, but a strategic tool that helps us transform our clients' businesses.

OUR TECHNOLOGICAL EXPERTISE AND BUSINESS-ORIENTED APPLICATION

✓ **Google ADK (Agent Development Kit)** – a framework for agent orchestration, connection to LLM, and workflow management.
Business use: rapid integration of AI solutions directly into the client's internal infrastructure with the possibility of modular expansion.

✓ **OPEN AI SDK** – development kit for integration into OpenAI LLM, unified API for chat/completions, functions, tools, and streaming.
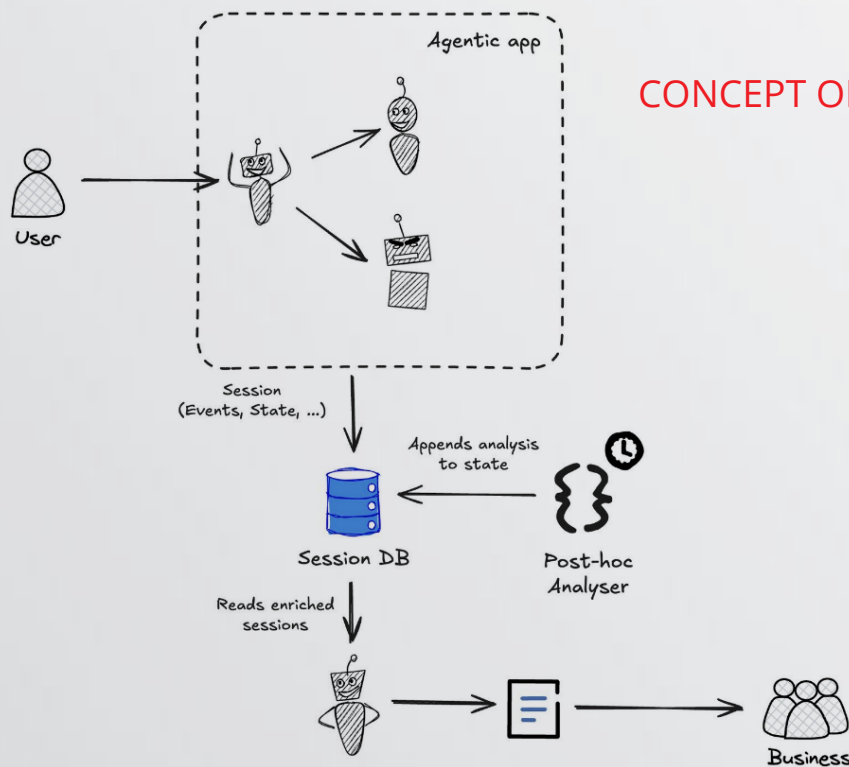*Business use:* acceleration of PoC and production chatbot development, assistants, and internal tools; cost reduction thanks to unified integration.

✓ **Reinforcement learning** – learning based on rewards/punishments, optimization of model behavior according to target metrics (e.g., RLHF/RLAIF).
Business use: improving the quality of responses to domain queries, personalizing recommendations, optimizing prices or bidding strategies in real time.

CONCEPT OF ADK BASED AGENTS
(H. HOTZ, GOOGLE)

Self-teaching – autonomous improvement of the model/agent through self-reflection, self-critique, and generation of its own training data.
Business use: reducing annotation costs, gradually increasing the accuracy of internal assistants (FAQ, troubleshooting, knowledge mining).

A2A (Agent-to-Agent) – communication and cooperation between multiple agents with clearly defined roles (specialist, coordinator, controller).
Business use: automation of complex processes across departments (e.g., request processing: query receipt » analysis » solution proposal » quality control » report).

MCP – Multi-Component Platform – platform approach to AI solutions: modular components (LLM, tools, connectors, memory, task queues) with unified orchestration.
Business use: scalable enterprise architecture for AI projects, quick replacement/upgrade of components (models, vector databases) without impact on business.

Agent orchestration – managing the execution of multiple agents, planning steps, transferring context and results, auditing, and observability.
Business use: robust operation of AI processes (complaint management, client onboarding, KYC), SLA monitoring, and explainability of steps for compliance.

Multi-agent architecture – allows you to combine different agents that communicate with each other and pass on tasks.
Business use: for example, a conversational agent communicates with the customer, an RL evaluator assesses the quality of responses, and a reporting agent prepares management recommendations.

LANGUAGE MODELS USED AND BUSINESS BENEFITS

- **Google Gemini (Flash, 2.5 pro, 1.5)**
  - **Flash:** quick responses for common dialogues (e.g., customer chat).
  - **2.5 Pro / 1.5**: deeper analysis, recommendation and report generation
    (e.g., production configuration optimization, big data analysis).

- **OpenAI GPT (o1, 4.1, 5.0)** – used for reasoning, output validation, and result comparison.

Business use: accurate and auditable recommendations for management decision-making.

- **Open-source models (Llama 2, Mistral, Falcon)** – testing and PoC for domain-specific tasks.
  Business use: rapid AI prototyping for internal processes, HR, or reporting.

GEM'S PROCESS APPROACH – FROM IDEA TO OPERATION

1 | **Analysis and PoC** – rapid concept verification, model and workflow selection.

2 | **Prototyping** – development of a basic version, testing with real data.

3 | **Iteration and validation** – modification and validation of outputs based on real data.

4 | **Deployment and scaling** – production operation, monitoring, and continuous development.

REFERENCES AND PROJECT EXAMPLES

- **In-car office, Make My Day** – AI assistants for workflow management, personalization, and email and calendar management via GraphAPI.

- **POC automotive configurator** – multi-agent system for vehicle configuration and ordering, RL evaluation, PDF reporting, agent orchestration.

- **VZP** – automated test case generation, LLM output validation, reporting, and auditing.

- **CV project** – AI for CV processing, information extraction, classification, and candidate recommendation.

- **AI for internal reporting** – generation of regular management reports from complex data sources.

- **RAG (Retrieval-augmented generation) projects** – combination of LLM with a corporate knowledge base, e.g., for quick information retrieval in documentation and manuals.

- **A major gas station chain operator, active not only on the Czech market** – development and implementation of an AI application for legal administration, enabling efficient work with legal documents, case law, and contract templates. The project included SPA frontend (React, CZ/EN, optimization for Edge), back-end (.NET/JAVA) with LLM Adapter Layer, connection to SharePoint, Active Directory, and MS SQL Server. Key features included legal research, document analysis, sensitive data anonymization, approval workflow, audit logs, and reporting. The project was implemented using Prince 2 methodology, CI/CD pipelines, and with a high level of security, GDPR, and NIS2 compliance.

SECURITY, AUDIT, AND GOVERNANCE – TECHNOLOGIES AND EXAMPLES

- **Data anonymization** – removal of personal identifiers before data processing.

- **Encryption and access control** – encrypted communication and role-based access.

- **Logging and audit** – all agent interactions are recorded for audit purposes.

- **On-premise or hybrid operation** – option to operate models directly in the client's infrastructure.

- **Security training and internal documentation** – we regularly train our team and share best practices.

- **Technology:** SQLAlchemy + audit logs, encrypted REST API via FastAPI/Uvicorn, RBAC, monitoring via our own dashboard.

GEM SYSTEM – OUR UNIQUE VALUE

GEM System is synonymous with the combination of strong integration capabilities, cutting-edge development processes, and advanced AI architectures. Thanks to our unique combination of multi-agent orchestration, modular architecture, and sophisticated process framework, we are able to provide our clients with solutions that truly transform their businesses. Our AI systems are not only technologically advanced – they are practical, secure, auditable, and scalable across different departments and processes.

With an emphasis on security, compliance, and best practices, we provide our partners with full control over their data and AI results, while our flexible architecture enables rapid deployment and future expansion. GEM System can deliver real value in day-to-day operations, from accelerating internal processes and optimizing customer interactions to generating accurate analytical recommendations for management. Our solutions combine innovation with proven stability, ensuring clients a competitive advantage, efficiency, and long-term sustainability of AI deployment.

WHY GEM SYSTEM?

By combining our many years of experience with complex system integrations, our ability to deliver and manage large-scale enterprise applications, and our development of cutting-edge AI technologies, we are a unique partner for the digital transformation of companies and institutions.

Our clients particularly appreciate:

- **Stability and reliability** – more than 20 years on the market, 150+ specialists, turnover exceeding CZK 290 million, professional 24/7 support for critical systems.

- **Extensive technological partnerships** – Google, Microsoft, Red Hat, Oracle, Adobe – which enable us to always choose the best solution.

- **Quality confirmed by certifications** – ISO, TISAX, and others, which guarantee security and reliability.

- **Practical innovations** – from AI agents and intelligent automation to extensive integration platforms and the operation of key systems in the automotive, finance, retail, healthcare, and government sectors.

We are proud to be able to connect modern architectures (AI, multi-agent systems, cloud-native solutions) with the real needs of our clients. Our projects for ŠKODA Auto, Raiffeisenbank, Generali, VZP ČR, Ahold, Dr. Max, Volkswagen Financial Services, and others prove that GEM System can successfully handle projects with high complexity and demanding security and availability requirements.

Our vision is to continue pushing the boundaries of IT and artificial intelligence, bringing new business models and efficiency, and being a long-term, reliable, and innovative partner for our clients in the era of digital transformation.