

PydanticAI

BUILDING PRODUCTION-GRADE AI AGENTS

From Fundamentals to Advanced
Agent Workflows with
Python's Type-Safe Framework

TYPE-SAFE BY DESIGN

Leverage Pydantic
for robust validation
and confidence.



TOOLS & INTEGRATIONS

Power agents with
tools, APIs, and
external systems.



AI AGENTS

Intelligent.
Structured.
Reliable.

MULTI-AGENT SYSTEMS

Collaborate.
Orchestrate.
Scale.



PRODUCTION READY

Test, evaluate,
and deploy with
confidence.



MODERN
PYTHON



RELIABLE
BY DESIGN



OBSERVABLE
& EVALUABLE



DURABLE
EXECUTION



BUILT FOR
DEVELOPERS

STEVE T.

PydanticAI: Building Production-Grade AI Agents

From Fundamentals to Advanced Agent Workflows with Python's Type-Safe Framework

Steve T. Team Publications

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<https://leanpub.com/pydanticaibuildingproduction-gradeaiagents>

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From Fundamentals to Advanced Agent Workflows with Python's Type-Safe Framework

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Introduction: Why PydanticAI?

It is 2 a.m. Your AI agent has been running for forty-seven minutes, making tool calls in an apparent infinite loop. The cost of the API calls is climbing. You have no idea which step of the agent's reasoning went wrong, and the log files are a wall of unstructured text. This is not a hypothetical scenario. It is what happens when you build LLM applications without proper structure, type safety, or observability.

For most of the early days of generative AI, building applications with large language models felt like herding cats. You would write a script that sends a prompt to an API, parses some JSON response, calls a tool, and prays everything works. Every framework promised to solve this problem. Some added DSLs that obscured what was actually happening. Others introduced layers of abstraction so deep that debugging became an exercise in reverse engineering someone else's internals.

PydanticAI takes a different approach. It was built by the same team behind Pydantic Validation, the library that powers data validation across the entire Python ecosystem, including the OpenAI SDK, Anthropic SDK, LangChain, LlamaIndex, AutoGPT, CrewAI, and Transformers. The design philosophy is simple: bring the type safety, validation, and developer experience that made Pydantic famous to the world of AI agent development.

The result is a framework that feels like FastAPI. If you have ever written a FastAPI application, you already understand much of PydanticAI's mental model. Agents are defined with familiar Python types. Tools are plain Python functions with type hints and docstrings. Responses are validated against Pydantic models. Dependency injection works the way you expect it to work from your experience with web frameworks.

This book will walk you through everything you need to know to build production-grade AI agents with PydanticAI. We start with the fundamentals: installing the framework, creating your first agent, and understanding how agents interact with language models. We then move into the core features that make PydanticAI distinctive: structured outputs validated by Pydantic models, tool calling with automatic parameter extraction, dependency injection for clean architecture, and multi-agent orchestration patterns.

By the end of this book, you will be able to build agents that call external tools with typed parameters, chain multiple agents together in complex workflows, deploy them to production with full observability through Pydantic Logfire, and evaluate their performance systematically using Pydantic Evals. You will understand not just how to use every feature of the framework, but why each design choice was made and when to reach for a particular pattern.

The framework is model-agnostic by design. You can swap between OpenAI, Anthropic, Gemini, Groq, Mistral, Cohere, Bedrock, Ollama, or any provider compatible with the OpenAI API without changing your agent code. This book covers multiple providers and shows you how to choose the right model for each use case.

The code in this book is written for PydanticAI's current stable API. The framework has evolved quickly since its initial release, but the patterns and principles discussed here will remain relevant as new features are added. Throughout, we emphasize production readiness: testing strategies, observability, security guardrails, performance optimization, and deployment patterns.

Let us begin.

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Chapter 12: Real-World Case Studies and Future Directions

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Case Study: Customer Support Automation

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Case Study: Data Analysis and Reporting Agent

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Case Study: Multi-Agent Research System

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Conclusion: Building the Future

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Conclusion

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