Day 4: Tools Integration in Google ADK

ENHANCING DEVELOPMENT WITH POWERFUL SOFTWARE TOOLS

INTRODUCTION & AGENDA

Session Overview

Introduction to ADK Tools

Overview of the tools available within Google ADK to enhance agent capabilities.

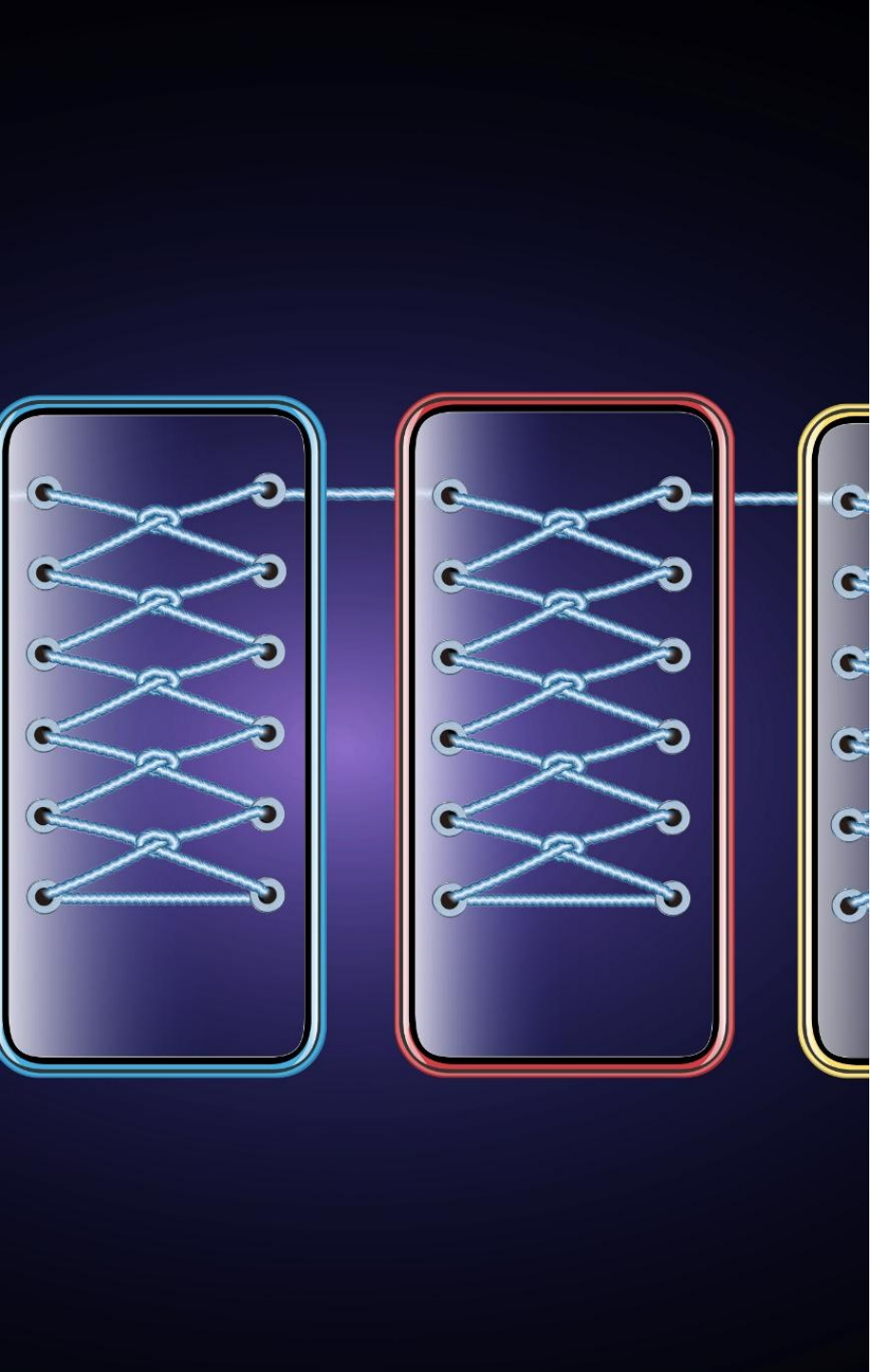
Adding and Customizing Tools

Learn how to add built-in and custom tools to agents for dynamic workflows.

Practical Demonstrations

Demo steps and hands-on exercises for extending agent functionality beyond text generation.

UNDERSTANDING TOOLS IN ADK



What are Tools in ADK?

Modular Components

Tools in ADK act as modular bridges linking agents to external systems for extended functionality.

Functionality Expansion

Tools enable agents to fetch data, run code, and interact with databases for intelligent workflows.

Integration and Definition

Each tool has a name, description, and input schema to ensure precise integration and operation.

Enterprise Use Cases

Leveraging tools makes agents practical and versatile for complex enterprise operations.

BUILT-IN TOOLS OVERVIEW

Common Built-in Tools

Search Tool Functionality

The Search Tool helps agents fetch updated information from the web to answer queries accurately.

Code Execution Tool

Code Execution Tool enables running Python snippets for calculations and data transformations efficiently.

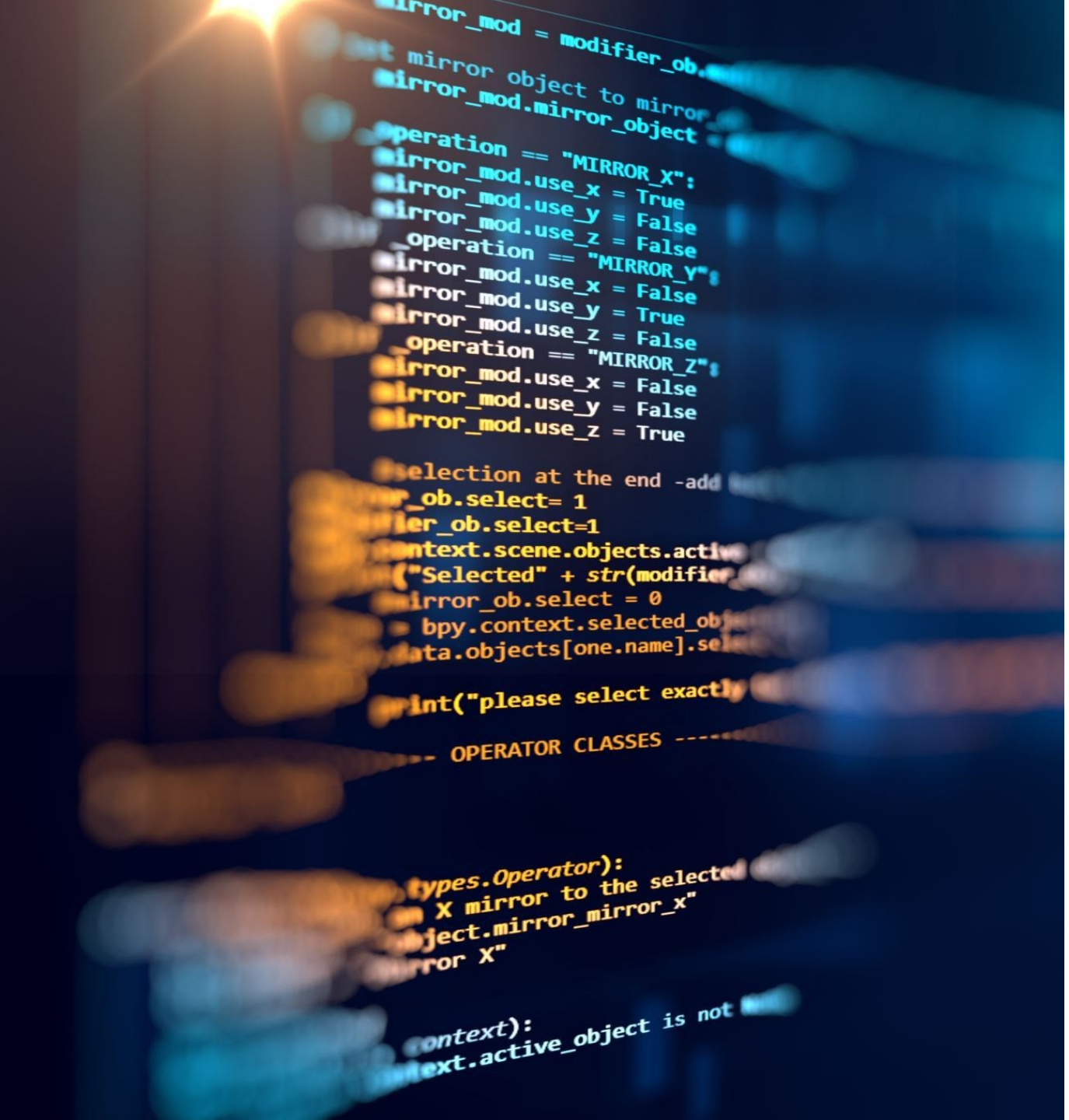
Ease of Integration

Built-in tools are pre-configured and easy to integrate, speeding up development without custom coding.

Use Case Suitability

Built-in tools are great for rapid prototyping, while custom tools fit specialized development needs.

ADDING BUILT-IN TOOLS TO AN AGENT



Integration Steps

Using ADK API for Integration

Developers use the ADK API to attach built-in tools to agents during initialization seamlessly.

BuiltInTools Class Example

The BuiltInTools class allows easy inclusion of tools like search in agent setup with simple code.

Simplified Development

Built-in tools provide ready functionalities, letting developers focus on workflows instead of common features.

CREATING A CUSTOM TOOL

Custom Tool Development

Extending Agent Functionality

Custom tools allow developers to enhance agents with specific business operations.

Defining Python Functions

Create functions that perform tasks like fetching company details from APIs.

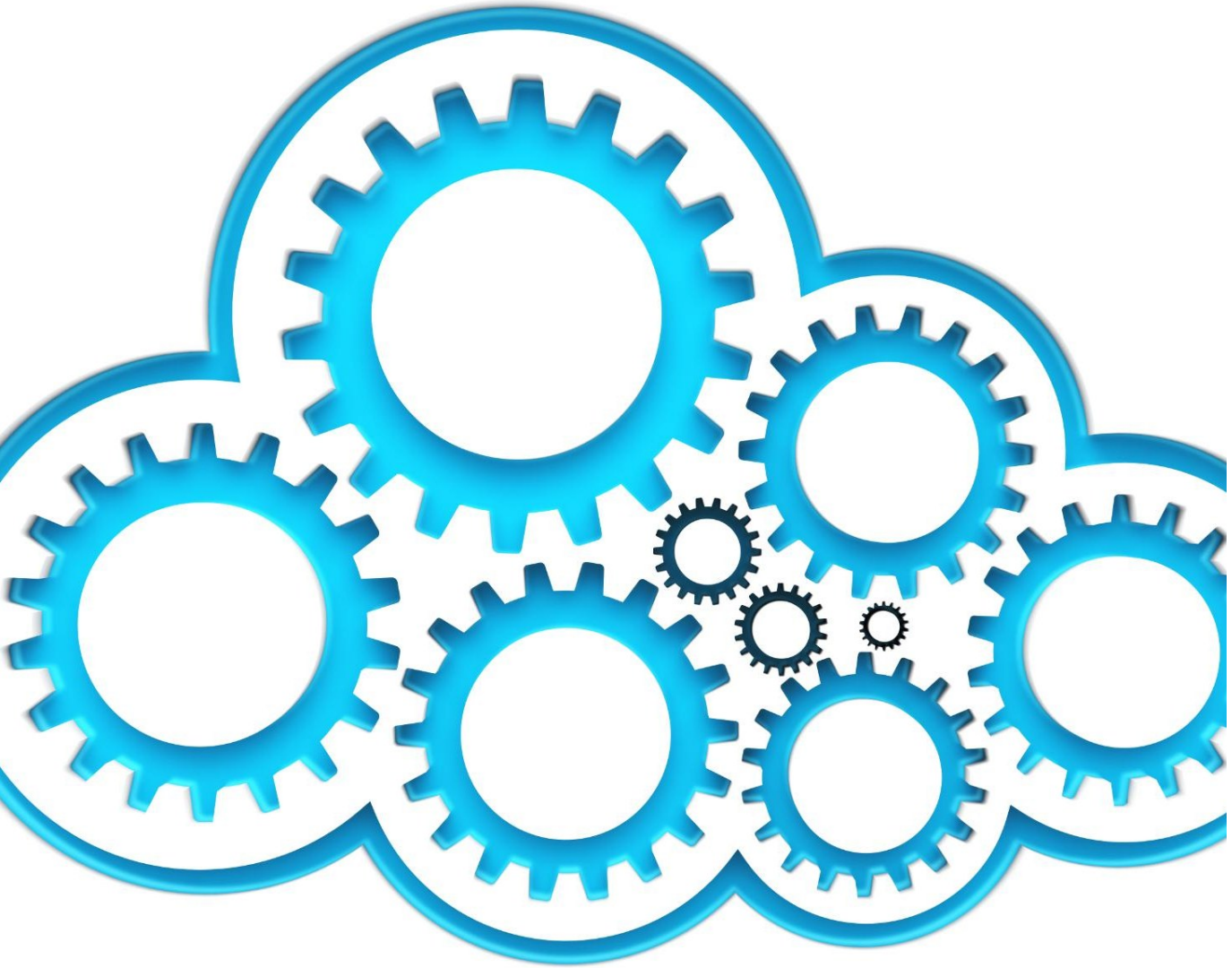
Tool Integration

Wrap functions in tool classes and attach them to agents for seamless execution.

Business Workflow Automation

Custom tools enable unique workflows and integration with proprietary systems.

ATTACHING TOOLS TO AGENT



Dynamic Tool Integration

Flexible Tool Attachment

Agents can have tools attached during initialization or dynamically at runtime for improved flexibility.

Input Schema Compatibility

Ensuring input schema matches expected parameters is critical to prevent runtime errors during integration.

Adaptability to Changing Tasks

Dynamic integration enables agents to adapt to changing tasks or environments for enhanced responsiveness.

DEMO STEPS

Practical Demonstration

Agent Initialization

Start by initializing the agent with clear instructions to define its behavior and purpose.

Attach Built-in Tools

Integrate built-in tools like search to extend agent capabilities easily.

Add Custom Tools

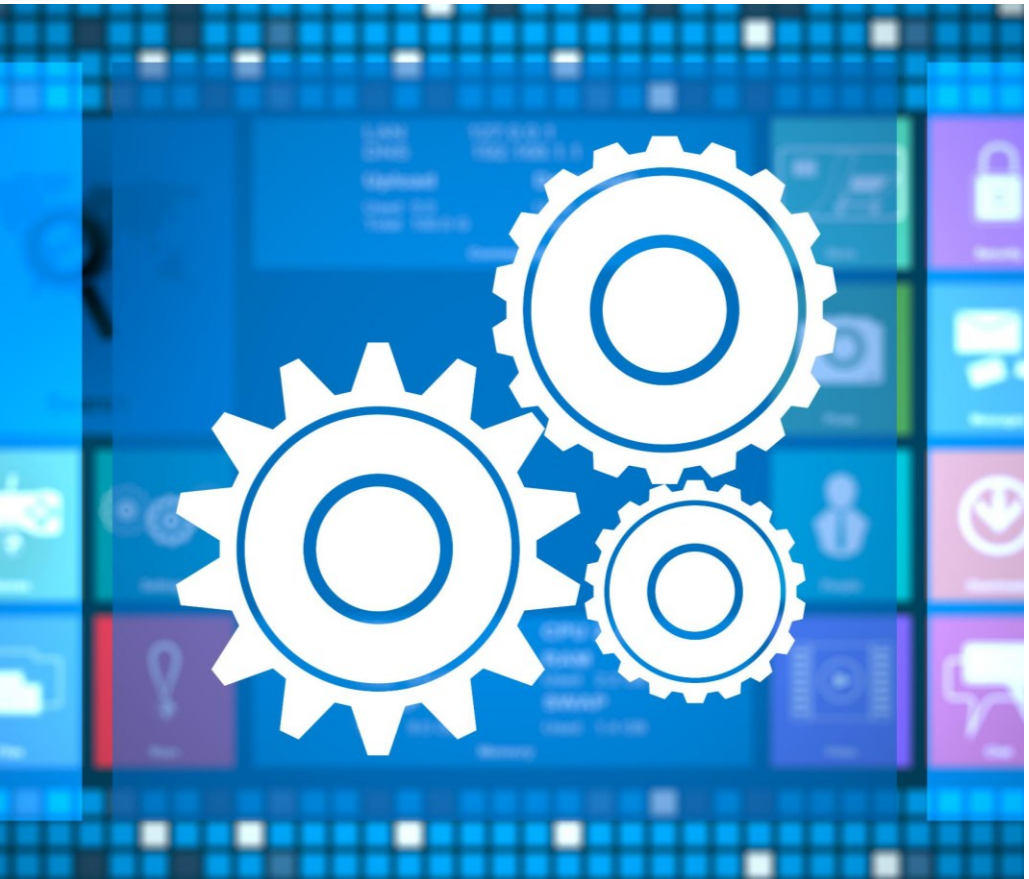
Enhance agent functionality by adding custom tools such as fetching company details.

Run and Validate

Run the agent in CLI mode, interact with it, validate responses, and debug as needed.

KEY TAKEAWAYS

Summary of Learnings



Importance of Tools

Tools empower agents to be versatile and enhance their problem-solving capabilities.

Built-in vs Custom Tools

Built-in tools provide quick solutions, while custom tools offer flexibility for specialized tasks.

Integration and Validation

Proper integration and validation ensure agents perform accurately and reliably in real-world scenarios.

Advanced Agent Capabilities

Mastering tool integration enables agents to handle complex workflows and interact with real systems.

HANDS-ON EXERCISE

Practical Task

Custom Tool Creation

Define a function to fetch company details and wrap it using the ADK Tool class for integration.

Agent Integration

Attach the custom tool to an agent and validate its output using a command line interface.

Bonus Tool Enhancement

Optionally add a second tool for data formatting or enrichment to extend agent capabilities.

Q&A

Discussion and Clarifications

Clarifying Doubts

The session allows participants to address questions and clear any uncertainties about tool usage and integration.

Sharing Use Cases

Participants share real-world examples and ideas for effectively integrating tools in their projects.

Best Practices and Scaling

Discussion includes strategies for error handling and scaling workflows in enterprise tool-based environments.