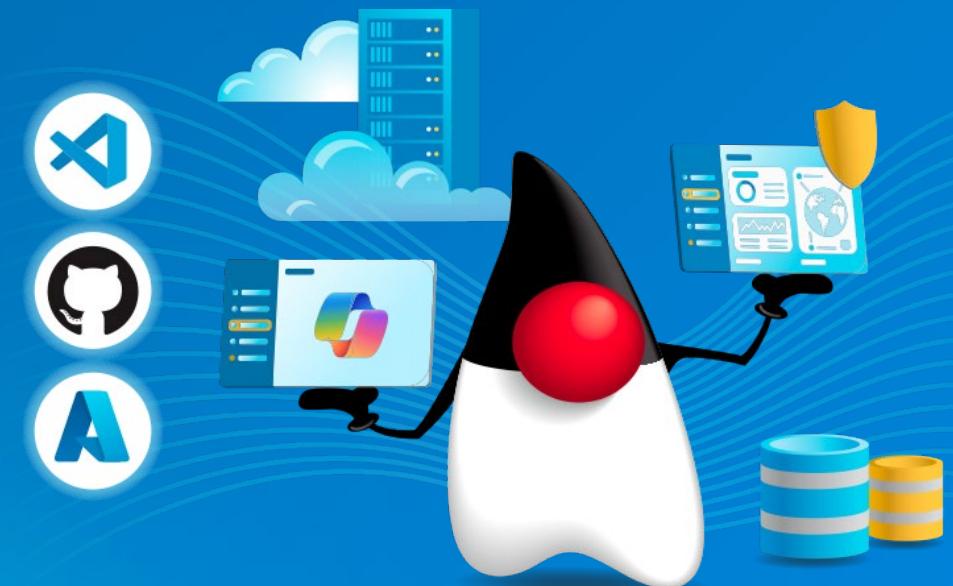




Microsoft Java Developer Conference 2024

Code. Cloud. Community.



Semantic Kernel for Java



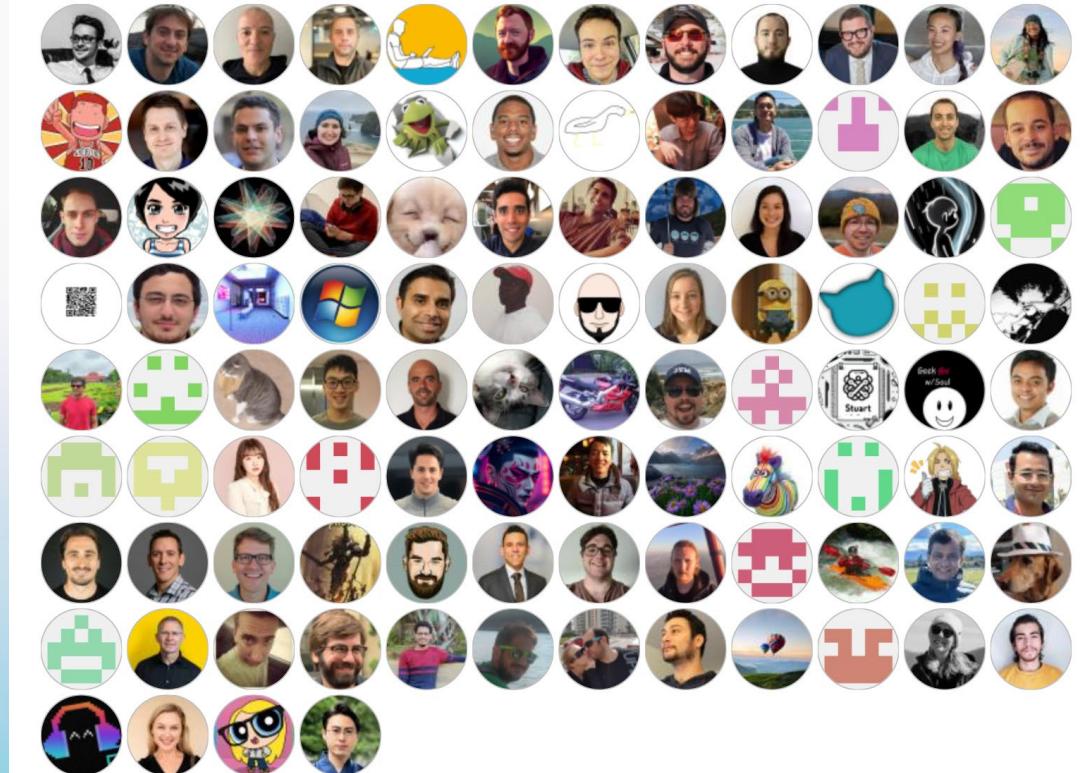
Who We Are!



Rory Preddy
Developer Advocate

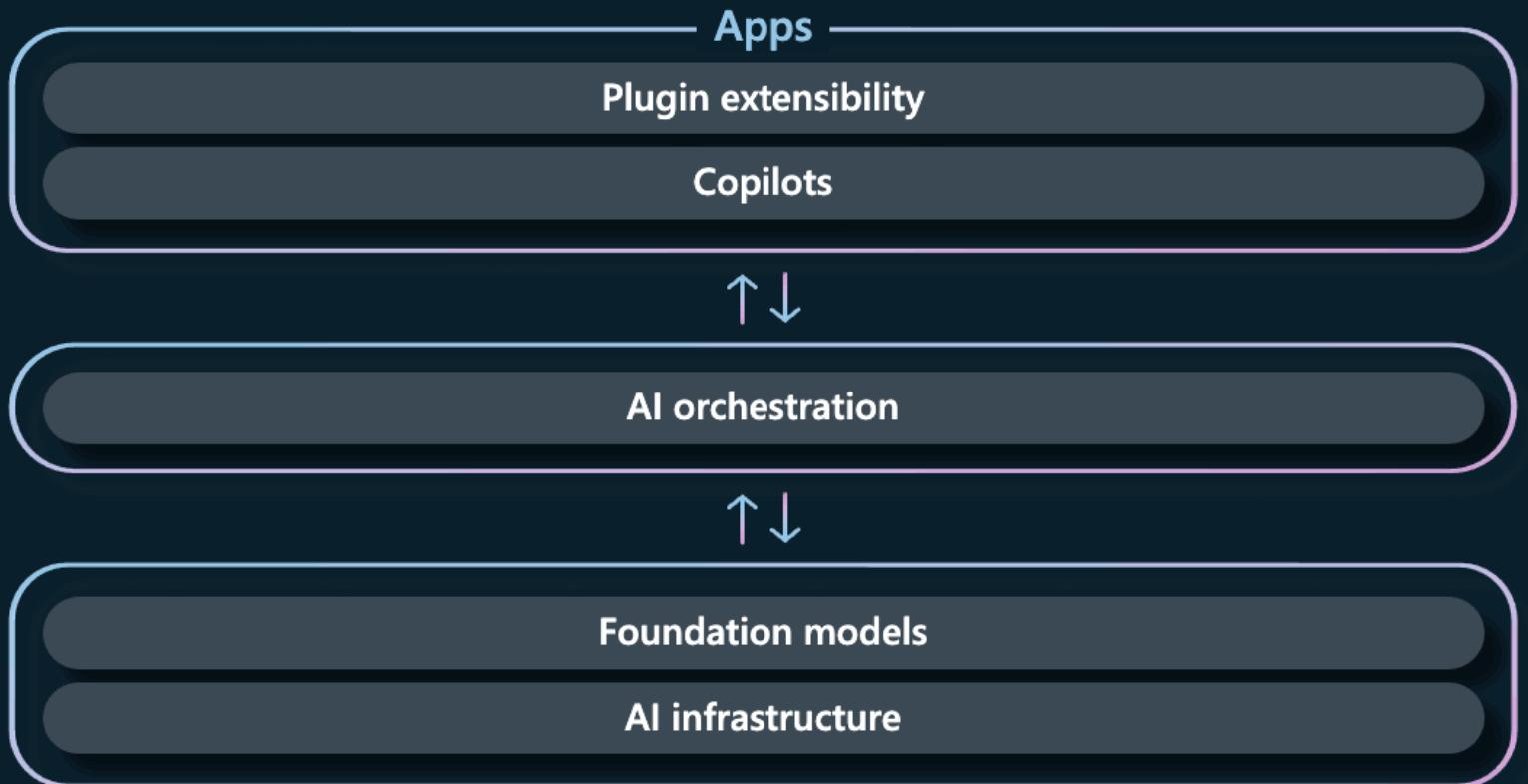
X rorypreddy

Contributor Wall of Fame



<https://aka.ms/SKDiscord>

Copilot stack



How did we get here?

Chatbot

Simple back-and-forth chats with a user.

Copilot

Agents that work side-by-side with a user to complete a task.

RAG

Retrieval augmentation generation for conversations grounded in real data.

Fully autonomous

Agents that can respond to stimuli with minimal human intervention.

What is Semantic Kernel (SK)?

Semantic Kernel is a lightweight open-source SDK
that lets you **orchestrate** native code with LLMs.



SK for Java

Java 8+ library

Available on Maven Central

Works on Android 8.0 API Level 26+

Popular Models

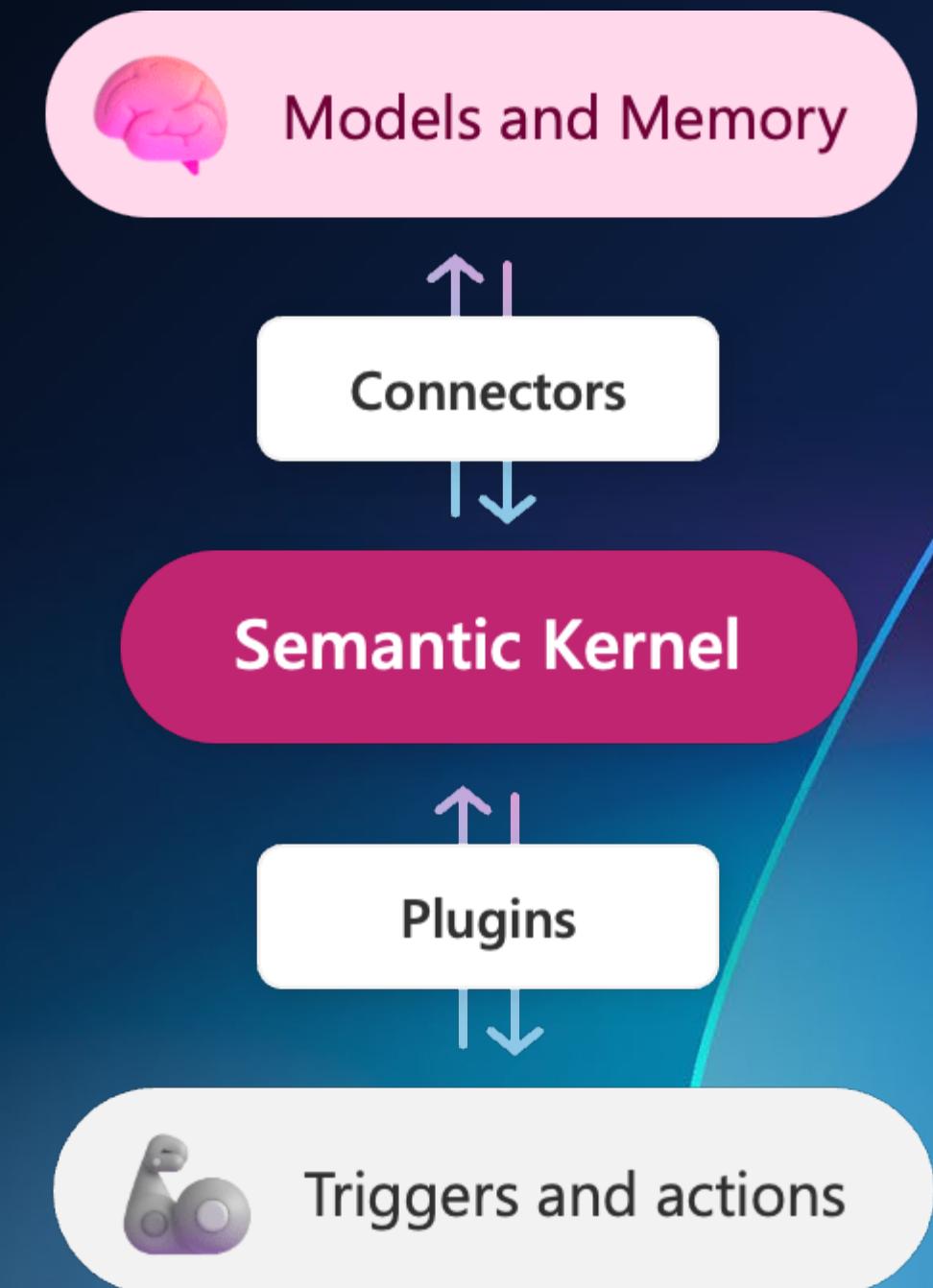
Open sourced on GitHub

MIT License

Samples available (based on Java 17+)

GraalVM Native Image (WIP)

Concepts



Create the Kernel

```
public Kernel kernel() throws ConfigurationException {
    // Create a memory for the kernel to store information
    var memory = SKBuilders.semanticTextMemory().build();

    // Load Open ai settings from the configuration file/properties/environment
    AzureOpenAISettings settings = new AzureOpenAISettings(SettingsMap.getDefault());

    // Create an OpenAI client
    OpenAIAsyncClient openAiClient = new OpenAIApplicationBuilder()
        .endpoint(settings.getEndpoint())
        .credential(new AzureKeyCredential(settings.getKey()))
        .buildAsyncClient();

    // Create a text completion service
    TextCompletion completion = SKBuilders.textCompletion()
        .withOpenAIClient(openAiClient)
        .withModelId(modelId:"text-davinci-003")
        .build();

    // Create a kernel
    return SKBuilders
        .kernel()
        .withMemory(memory)
        .withDefaultAIService(completion)
        .build();
}
```

Writer plugin

Function	Description for model
Brainstorm	Given a goal or topic description generate a list of ideas.
EmailGen	Write an email from the given bullet points.
ShortPoem	Turn a scenario into a short and entertaining poem.
StoryGen	Generate a list of synopsis for a novel or novella with sub-chapters.
Translate	Translate the input into a language of your choice.

Can you write me a short poem about living in Dublin, Ireland and then create a story based on the poem?

Planner

Copilot
Sure! Here's a story based on living along the Grand Canal in Dublin, Ireland...

Skills (Plugins)

```
Kernel kernel = getKernel();

// Add a native function to the kernel that can call a search engine
SKFunctionsearch =kernel.importSkill(newSearchEngineSkill(), null).getFunction("search", null);

// Add a semantic skill that can summarize a block of text
SKFunctionsummarize =kernel.importSkillFromDirectory("SummarizeSkill", "./").getFunction("Summarize", null);

// Answer a question with a short summary as a result
kernel.runAsync("What's the tallest building in South America?", search, summarize);
```

Memory Example

```
var facts = Arrays.asList(  
    "My name is Andrea",  
    "I work as a tourist operator",  
    "I've been living in Seattle since 2005",  
    "I visited France and Italy five times since 2015",  
    "My family is from New York"  
)  
  
// Save facts to memory  
for (int i = 0; i < facts.size(); i++) {  
    var memory = kernel.getMemory();  
    memory  
        .saveInformationAsync(MEMORY_COLLECTION_NAME, facts.get(i), "info" + i, null, null)  
        .block();  
}
```

Memory Example

```
// System prompt
String prompt = """
    Consider only the facts below when answering questions.
    About me: {{memory.recall 'where did I grow up?'}}
    About me: {{memory.recall 'where do I live?'}}
    Question: {{$input}}
    Answer:
    """;

...
// User prompt
SKContext result = kernel
    .invokeAsync("Do I live in the same town where I grew up?", context, null)
    .block();
```

Query Results

RENDERED PROMPT:

Consider only the facts below when answering questions.

About me: My family is from New York

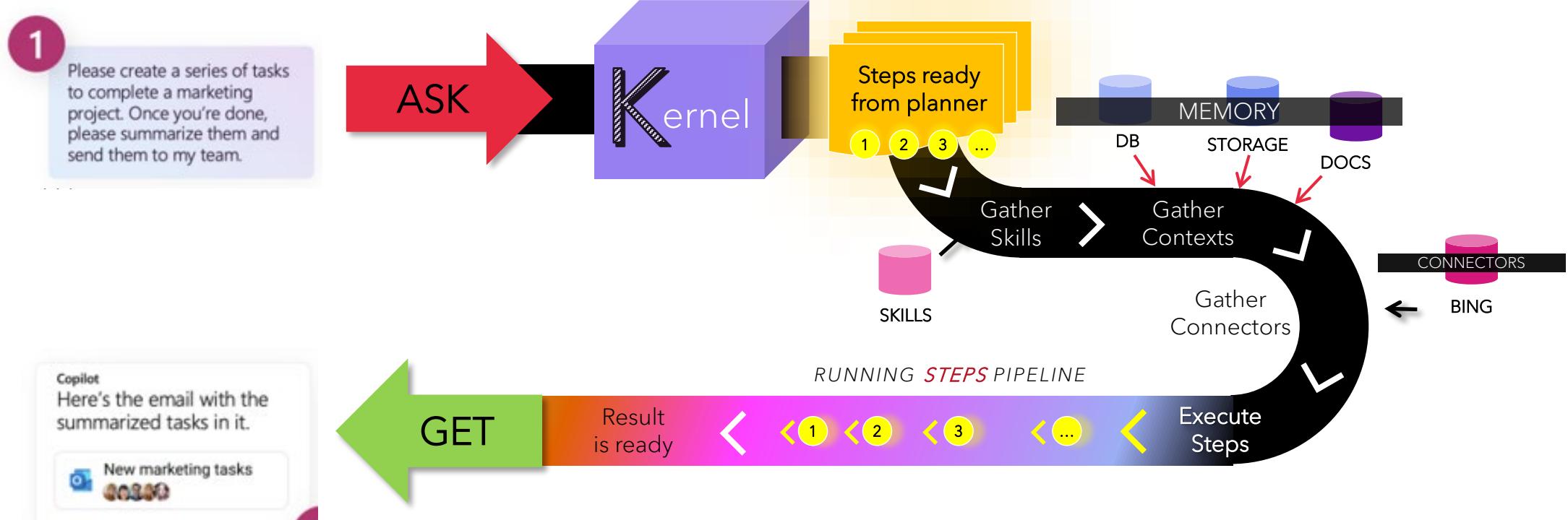
About me: I've been living in Seattle since 2005

Question: Do I live in the same town where I grew up?

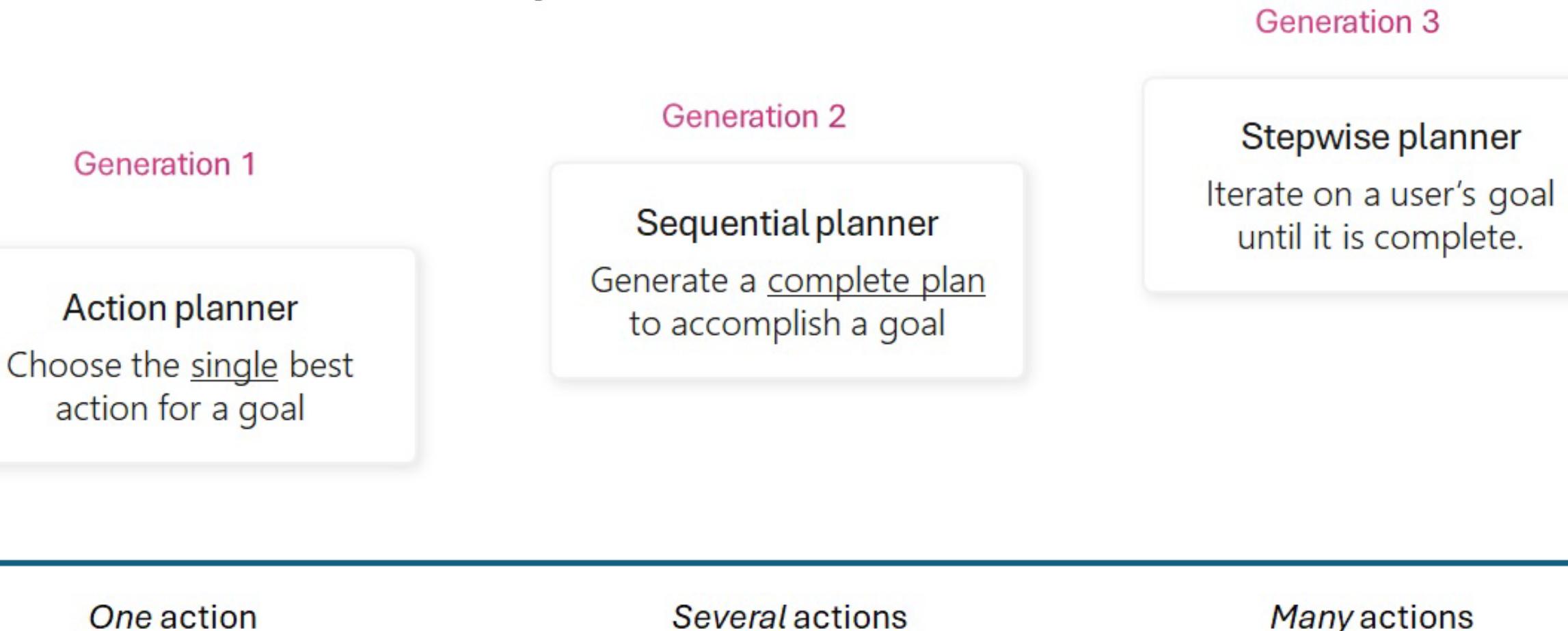
Answer:

No, I do not live in the same town where I grew up since my family is from New York and I have been living in Seattle since 2005.

SK Example



The evolution of planners



Planner

```
// Add text skills into the planner
kernel.importSkill(new TextSkill(), "TextSkill");

// Create a plan to achieve the goal
var planner = new SequentialPlanner(kernel, null, null);
var plan = planner.createPlanAsync(
    "Write a poem about John Doe, then translate it into Italian, then convert it to uppercase."
).block();

// Execute the plan
SKContext result = plan.invokeAsync().block();
```

Code to Cloud Journey

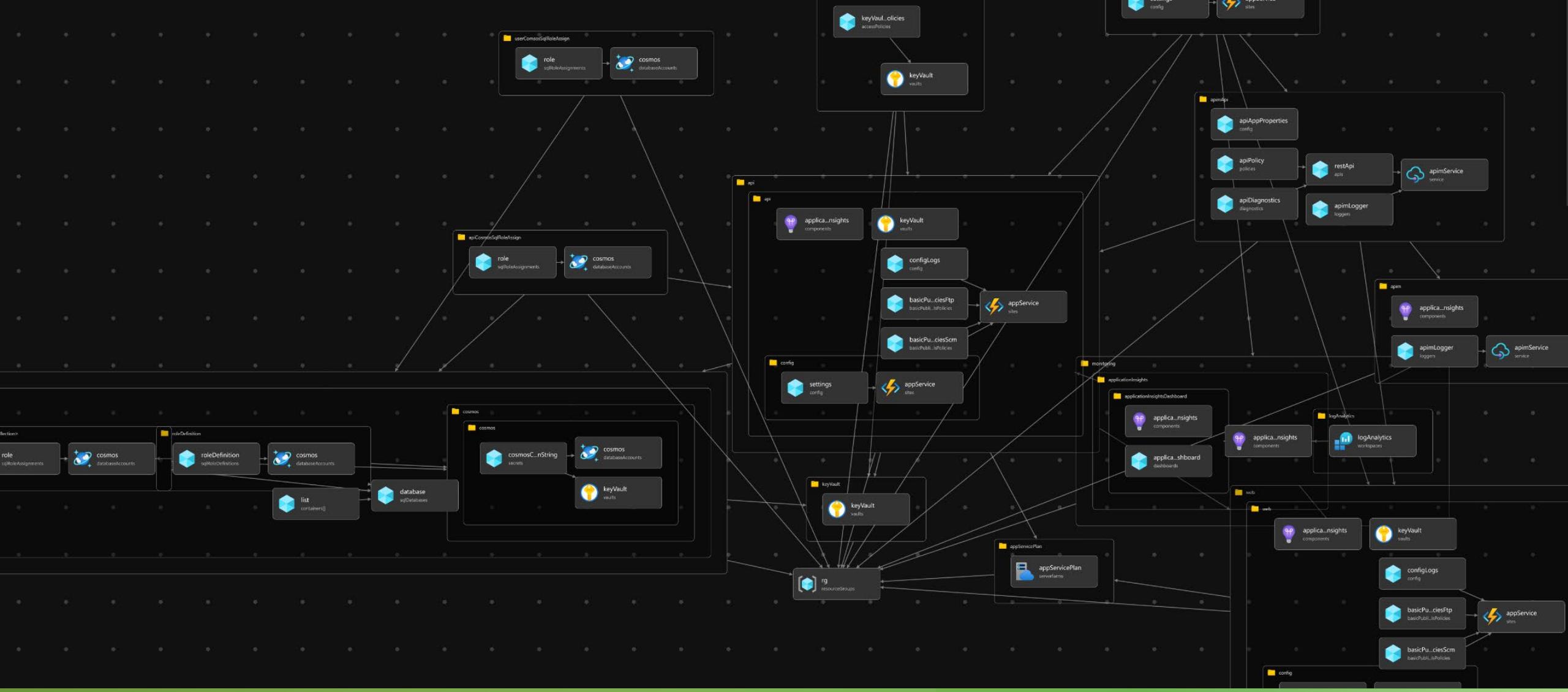


Application Code

Which cloud services should I use with this code?
What libraries do I need to reference?
How should I set up my local dev environment?
Provision infrastructure & services
Configure infrastructure & services
Roles & Permissions
Infrastructure as Code
Run locally (F5)
Deploy to cloud
Monitoring & Observability
CI/CD pipeline

Developer's Goal

App Running in the Cloud with CI/CD & monitoring



THAT'S A LOT TO THINK ABOUT AND
MANAGE...

Azure Developer CLI

azd init
azd up
azd monitor
azd pipeline config

azd commands



Your app

azd up



The cloud

Template Library

A community-contributed template gallery built to work with the Azure Developer CLI.



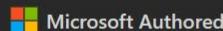
openai



Not familiar with the Azure Developer CLI (azd)? [Learn more](#)

Viewing 2 templates for '**openai**'

Sort by: [Alphabetical \(A - Z\) ▾](#)



Java - ChatGPT + Enterprise data with Azure OpenAI and Cognitive Search

by Davide Antelmo

This repo is the java conversion of the well known chatGPT + Enterprise data code sample originally developed in python

Artificial Intelligence

Azure App Service

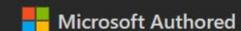
Bicep

Azure Cognitive Search

Java

Azure OpenAI Service

React.js



Spring ChatGPT Application using Azure OpenAI on Azure Spring Apps

by Yi Liu

A sample that uses Java Spring framework to build ChatGPT-style application running in Azure Spring Apps.

Artificial Intelligence

Azure Spring Apps

Bicep

<https://aka.ms/awesome-azd>



During a performance review, your supervisor will discuss your performance over the past year and provide feedback on areas for improvement ¹. They will also provide you with an opportunity to discuss your goals and objectives for the upcoming year ¹. Performance reviews are a two-way dialogue between managers and employees ¹.

Citations: [1. employee_handbook.pdf#page=4](#)

Follow-up questions: *What is the process for scheduling a performance review?*

How often are performance reviews conducted? What are some common performance review ratings?

Type a new question (e.g. does my plan cover annual eye exams?)

Configure answer generation

- Java Azure Open AI SDK
- Java Semantic Kernel - Memory
- Java Semantic Kernel - Orchestration

Semantic Kernel mode *

Function Chaining

Retrieve this many search results:

3

Exclude category

Use semantic ranker for retrieval

Use query-contextual summaries instead of whole documents

Suggest follow-up questions

Retrieval mode *

Vectors + Text (Hybrid)

Close

Demo

aka.ms/sk-code

1.0.0 Release Candidates

- OpenAI plugin spec
- Kernel hooks
- HandleBars Planner

<https://github.com/microsoft/semantic-kernel/tree/java-v1>

Just released!



! findPotentialThingsWrong.prompt.yaml U X

! function2.prompt.yaml U

i R ⌂ □ ...

prompts > ! findPotentialThingsWrong.prompt.yaml > [] input_variables > {} 0 > ↵ required

```
1   name: ShippingExpertAgent
2   description: Helps a user get information about a shipment
3   template: |
4       <message role="system">
5           ## Instructions
6           Help the user by providing information about their shipment.
7
8           ## Information about the shipment
9           {{ShippingPlugin-GetShipmentInformation shippingCode}}
10          </message>
11          template_format: handlebars
12          plugins:
13              include:
14                  - ShippingPlugin
15          input_variables:
16              - name:             shippingCode
17                  description: The ID of the shipment
18                  required: true
```



...



Thank you



- Code**
aka.ms/sk-code
- Docs**
aka.ms/sk-jdconf
- Tools**
aka.ms/awesome-azd
- Discord**
aka.ms/SKDiscord