The Future of Serverless in 2025 and Beyond

11TH WORKSHOP ON SERVERLESS COMPUTING

Julian Wood

Principal Serverless Developer Advocate

AWS

About me

Julian Wood

Developer Advocate – AWS Serverless

Recovering server“more” infrastructure engineer

- Enterprises and startups

You can’t scare me, I have twin girls!

From Cape Town via London

@julian_wood

jrwood@amazon.com

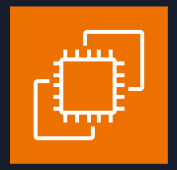
Serverless Land

Serverless has been …

Revolutionary

Amazon SQS

Amazon S3



Amazon EC2

Amazon SNS

Amazon DynamoDB

AWS Lambda

Azure Functions

AWS Fargate

Cloudflare workers

Google Cloud Functions

AWS Serverless spectrum

INCLUDES

AWS OFFERS A WIDE PORTFOLIO OF SERVERLESS SERVICES

Compute

AWS Lambda

AWS Fargate

Amazon ECS

AWS App Runner

Storage

Amazon S3

Amazon EFS

Workflows and Integrations

Amazon EventBridge

AWS Step Functions

Amazon API Gateway

AWS AppSync

Amazon SQS

Amazon SNS

Amazon Kinesis

Databases and Analytics

Amazon Aurora Serverless

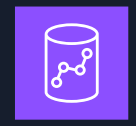
Amazon DynamoDB

Amazon OpenSearch Service

Amazon Bedrock

Amazon QuickSight

AWS Glue

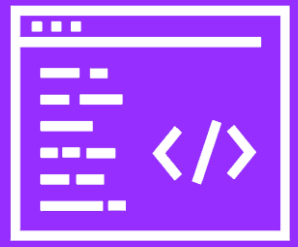


Amazon Redshift

Serverless is …

Why Serverless

Reduce Operational Overhead



Developer Experience

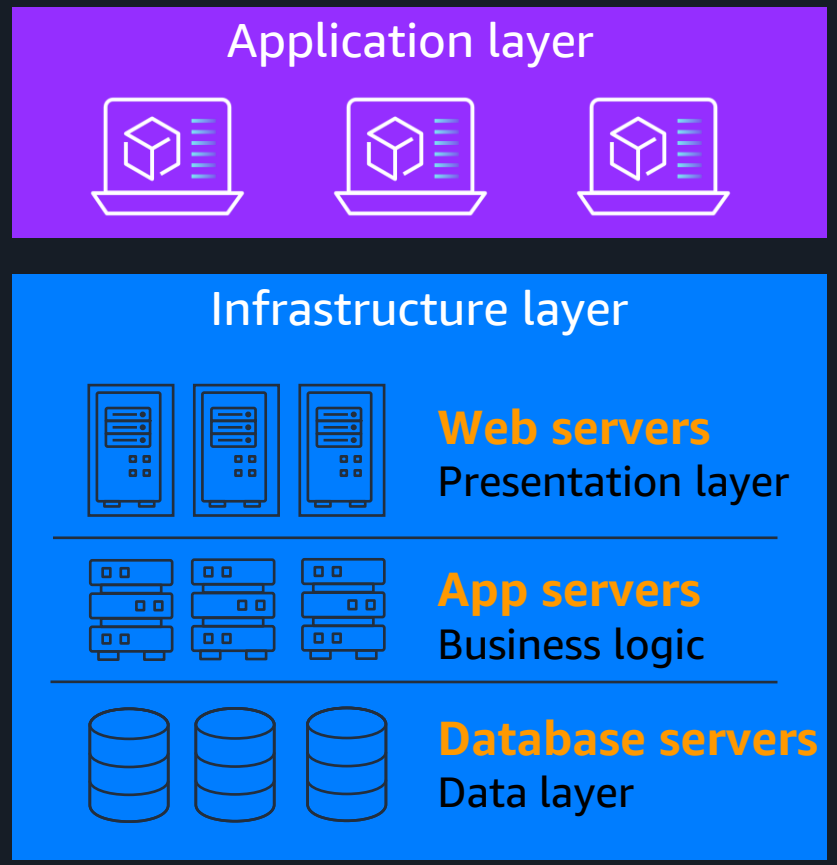
Seamless Integrations

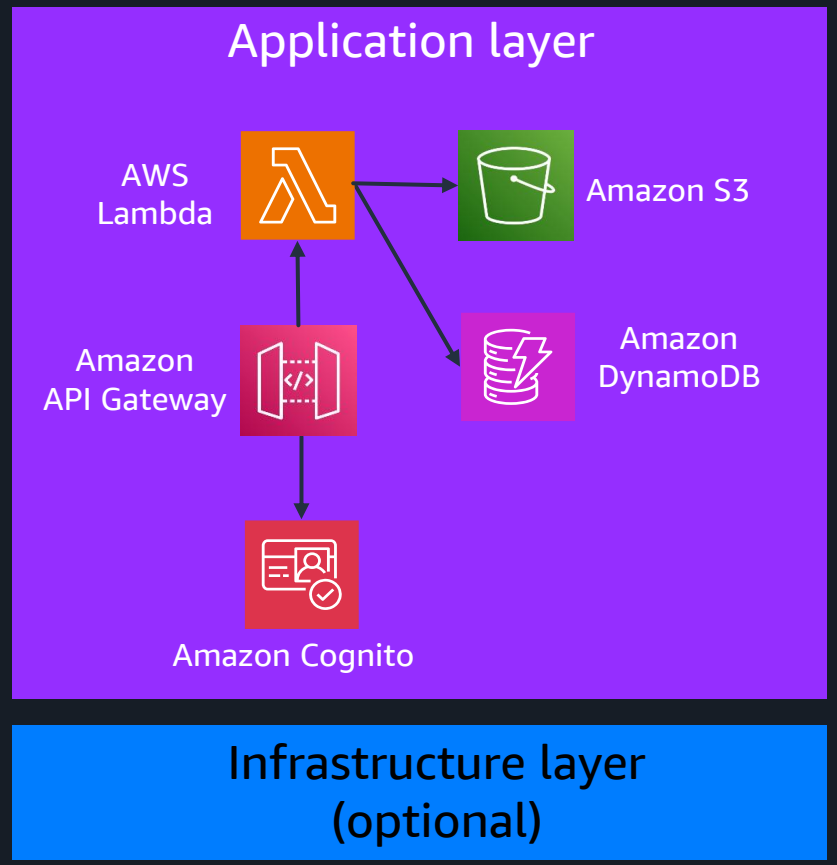
200+ AWS Services

Performance at any scale

Why Serverless

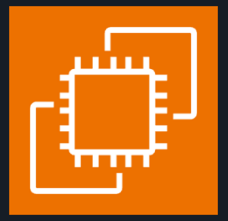
Focus on business logic, not infrastructure management



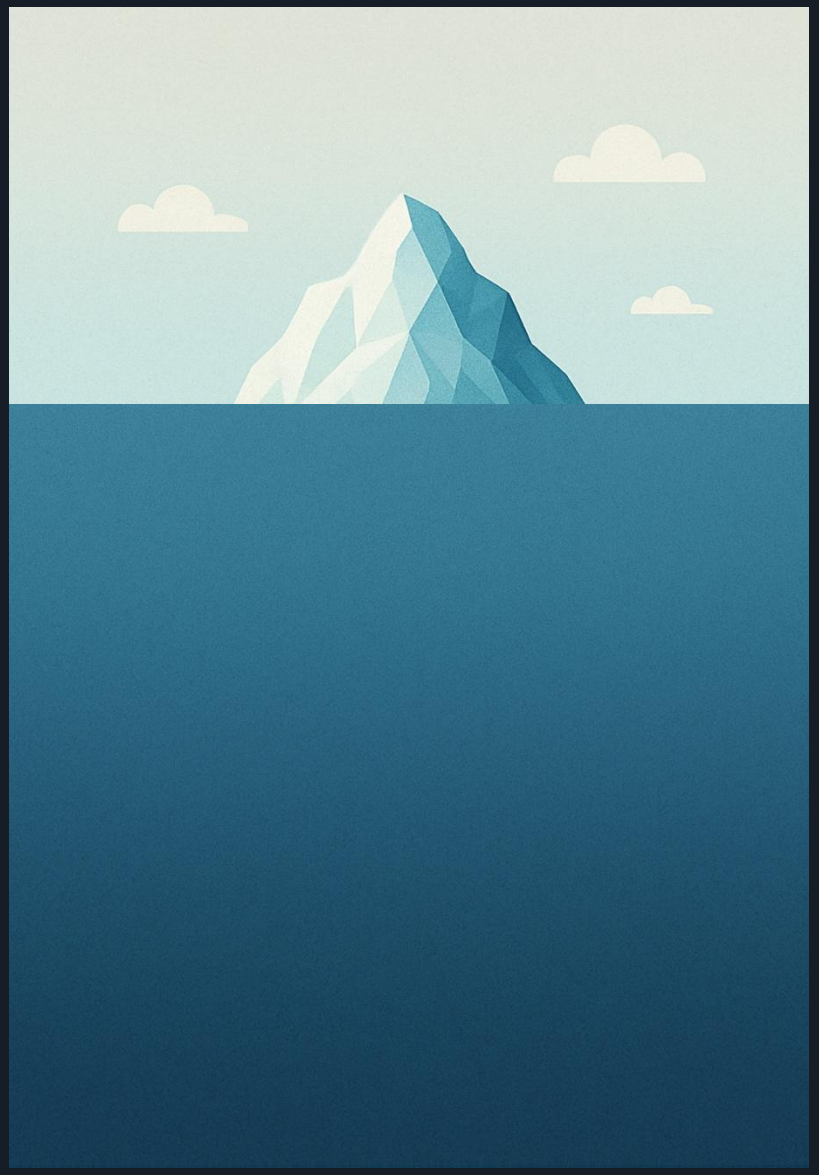


The biggest secret of “serverless”

(and many other serverless services)

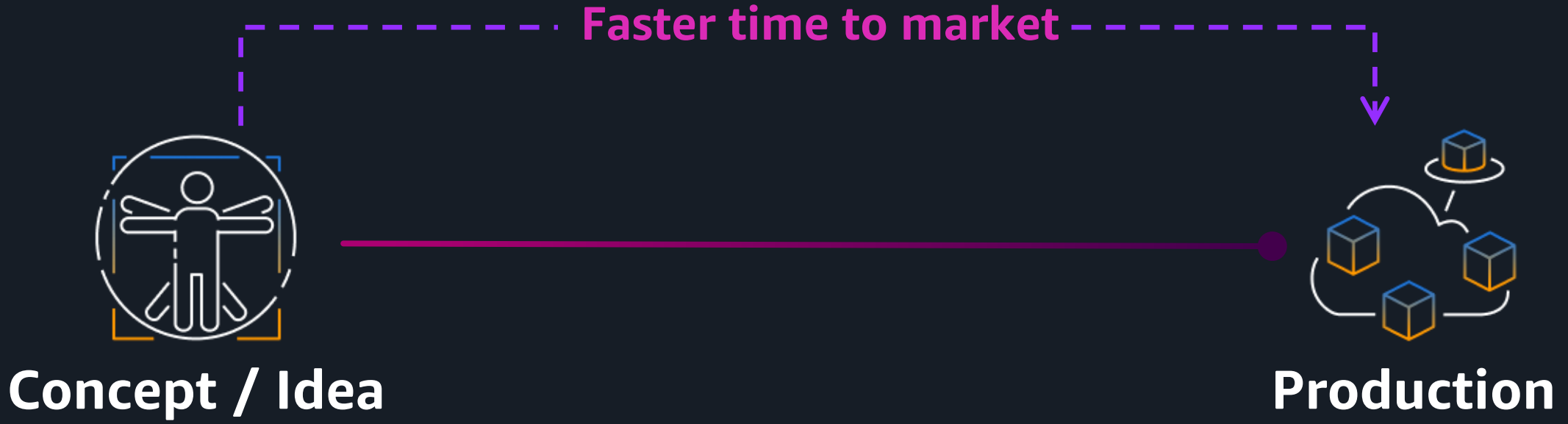


Hundreds of thousands of
EC2 instances under-the-hood



Why Serverless

A faster way to get to customer value



For you….

A faster way learn, explore, experiment, play, prove!

Serverless is everywhere!

Serverless and gen AI

1. Using AI to build (serverless) apps
2. Building AI (serverless) apps

1. Using AI to build (serverless) apps

MCP

Model Context Protocol

The API for GenAI

- AWS KB Retrieval - Re
- Brave Search - Web a
- EverArt - AI image ger
- Everything - Referenc
- Fetch - Web content f
- Filesystem - Secure fi
- Git - Tools to read, sea
- GitHub - Repository m
- GitLab - GitLab API, e
- Google Drive - File ac
- Google Maps - Locati
- Memory - Knowledge
- PostgreSQL - Read-o
- Puppeteer - Browser a
- Redis - Interact with R
- Sentry - Retrieving an
- Sequential Thinking -
- Slack - Channel mana
- Sqlite - Database inte
- Time - Time and timez

- 21st.dev Magic - Create
- Adfin - The only platform reconciliations with Adfin.
- AgentQL - Enable AI age
- AgentRPC - Connect to a
- Aiven - Navigate your Aiv OpenSearch® services
- Apache IoTDB - MCP Se
- Apify - Actors MCP Serve social media, search engine
- APIMatic MCP - APIMatic processes OpenAPI files an
- Astra DB - Comprehensiv database with a full range o
- Audiense Insights - Mark demographic, cultural, influ
- Axiom - Query and analy
- Bankless Onchain - Que
- BICScan - Risk score / as
- Box - Interact with the Inf
- Browserbase - Automate and more)
- Chargebee - MCP Server
- Chroma - Embeddings, v application database
- Chronulus AI - Predict ar

- CircleCI - Enable AI Ag
- ClickHouse - Query yo
- Cloudflare - Deploy, co Workers/KV/R2/D1)
- Codacy - Interact with your code.
- CodeLogic - Interact w architecture dependencie
- Comet Opik - Query ar LLMs in natural language
- Convex - Introspect an
- Dart - Interact with tas
- DevHub - Manage and
- E2B - Run code in secu
- EduBase - Interact wit management, and conten
- Elasticsearch - Query
- eSignatures - Contract
- Exa - Search Engine ma
- Fewsats - Enable AI Ag
- Fibery - Perform queri
- Financial Datasets - S
- Firecrawl - Extract web
- Fireproof - Immutable

- Gitee - Gitee API integr
- gotoHuman - Human-i to your gotoHuman inbox
- Grafana - Search dash
- Graphlit - Ingest anyth searchable Graphlit proje
- GreptimeDB - Provides GreptimeDB.
- Heroku - Interact with databases, and more.
- Hologres - Connect to
- Hyperbrowser - Hyper effortless, scalable brows
- IBM wxflows - Tool platfo
- ForeverVM - Run Pytho
- Inbox Zero - AI persona
- Inkeep - RAG Search o
- Integration App - Inter
- JetBrains – Work on yo
- Kagi Search - Search t
- Keboola - Build robust
- Lara Translate - MCP S for language detection an
- Logfire - Provides acce
- Langfuse Prompt Man releasing prompts.

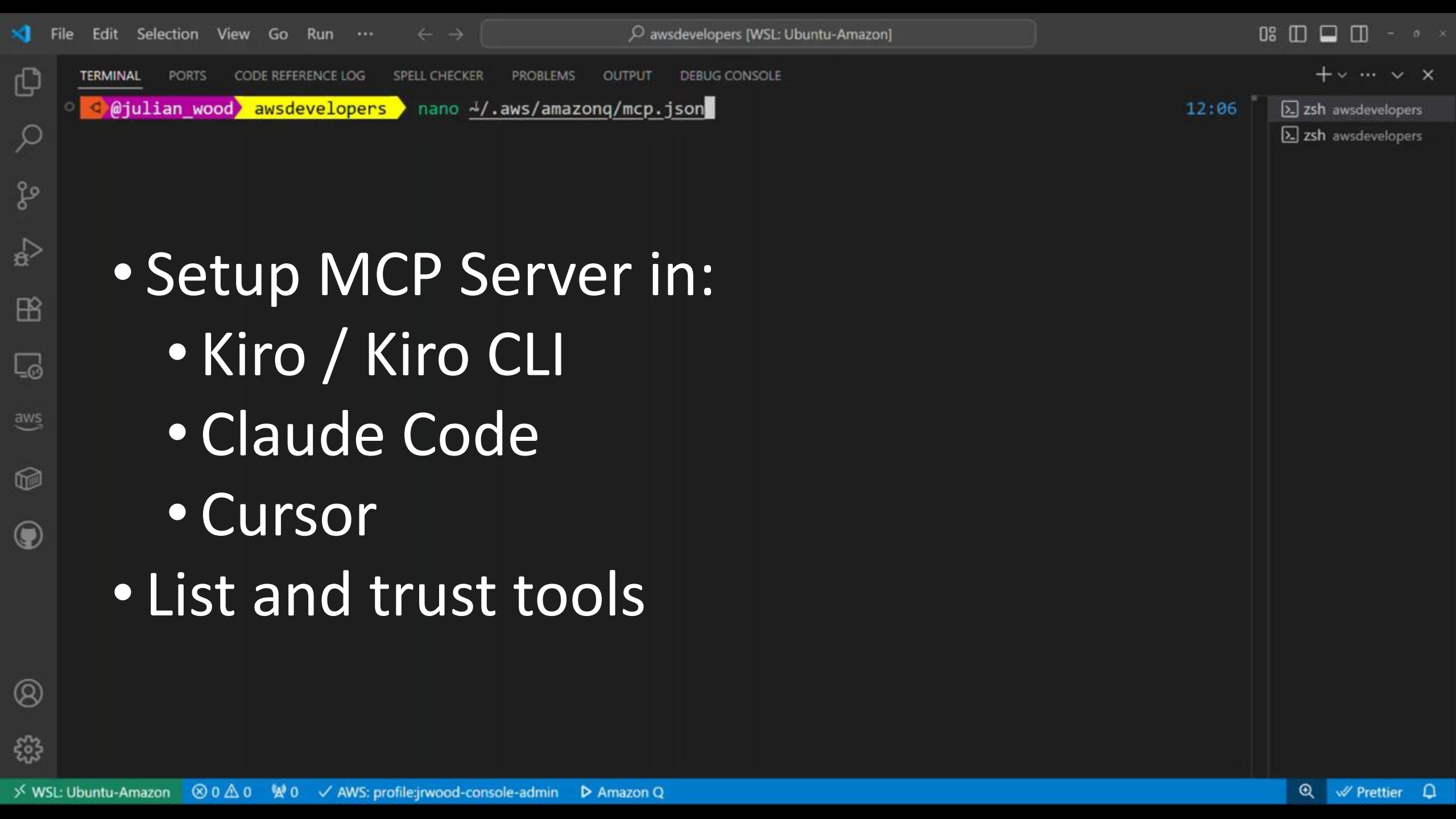
- Lingo.dev - Make your
- Mailgun - Interact with
- Make - Turn your Make
- Meilisearch - Interact &
- Metoro - Query and inte
- Milvus - Search, Query
- Momento - Momento C any scale.
- MotherDuck - Query ar
- Needle - Production-re
- Neo4j - Neo4j graph da memory
- Neon - Interact with the
- Notion - This project im
- OceanBase - MCP Serv
- Octagon - Deliver real-
- Oxylabs - Scrape webs data extraction.
- Paddle - Interact with th
- PayPal - PayPal's officia
- Perplexity - An MCP se in conversational AI.
- Qdrant - Implement ser
- Ramp - Interact with Ra
- Raygun - Interact with you

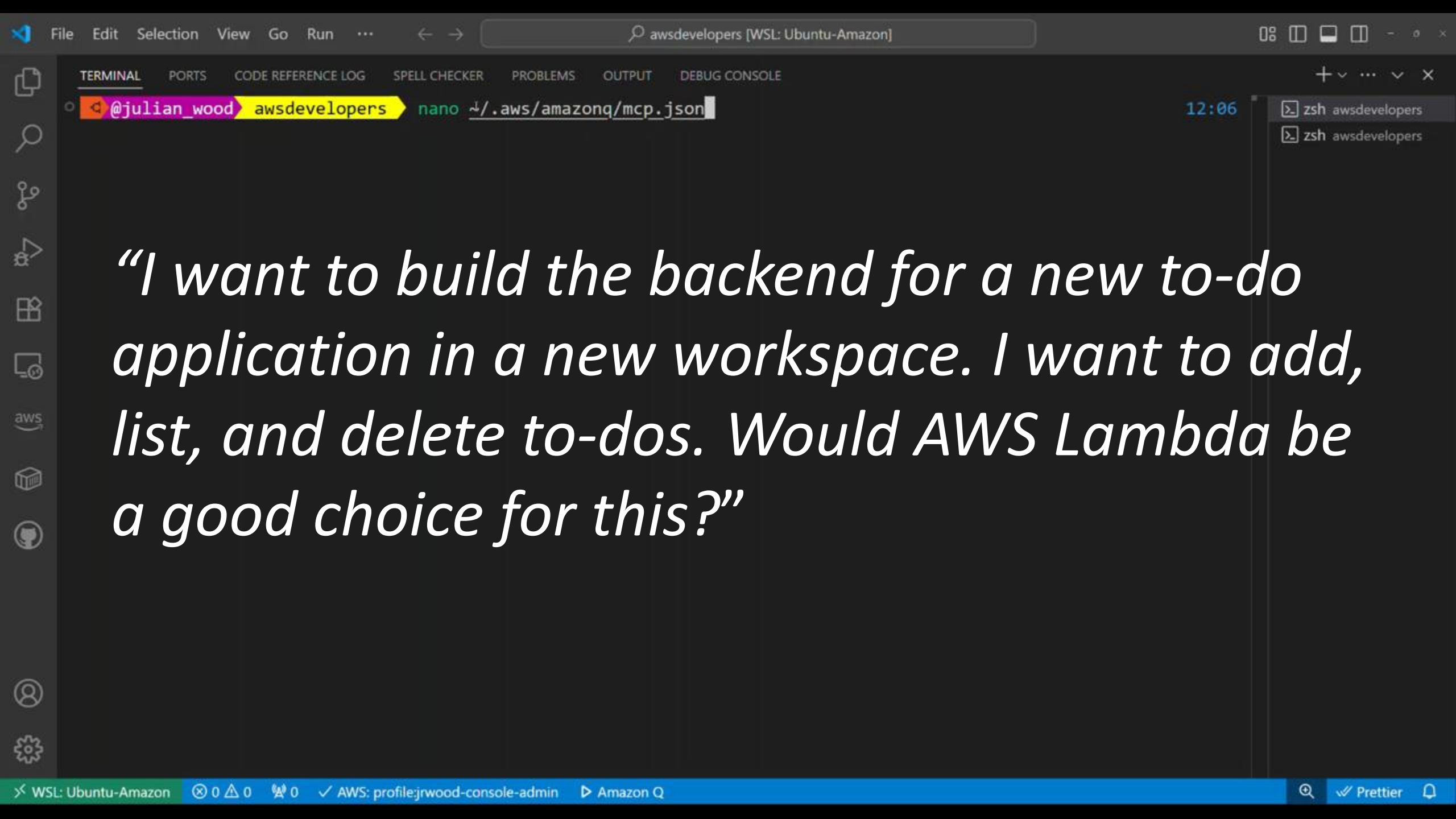
- Rember - Create spac
- Riza logo Riza - Arbitr
- Search1API - One API
- ScreenshotOne - Ren
- Semgrep - Enable AI
- SingleStore - Interact
- StarRocks - Interact
- Stripe - Interact with
- Tavily - Search engine
- Thirdweb - Read/writ transaction execution, p
- Tinybird - Interact wit
- UnifAI - Dynamically
- Unstructured - Set u Platform
- Vectorize - Vectorize M extraction and text chun
- Verodat - Interact wit
- VeyraX - Single tool t
- Xero - Interact with th
- Zapier - Connect you
- ZenML - Interact with y

https://github.com/modelcontextprotocol/servers

AWS Serverless MCP Server

- Serverless application lifecycle
- Web application deployment and management
- Observability
- Guidance, IaC templates, and deployment help


File Edit Selection View Go Run ···
awsdevelopers [WSL: Ubuntu-Amazon]
TERMINAL PORTS CODE REFERENCE LOG SPELL CHECKER PROBLEMS OUTPUT DEBUG CONSOLE
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
• Setup MCP Server in:
• Kiro / Kiro CLI
• Claude Code
• Cursor
• List and trust tools
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier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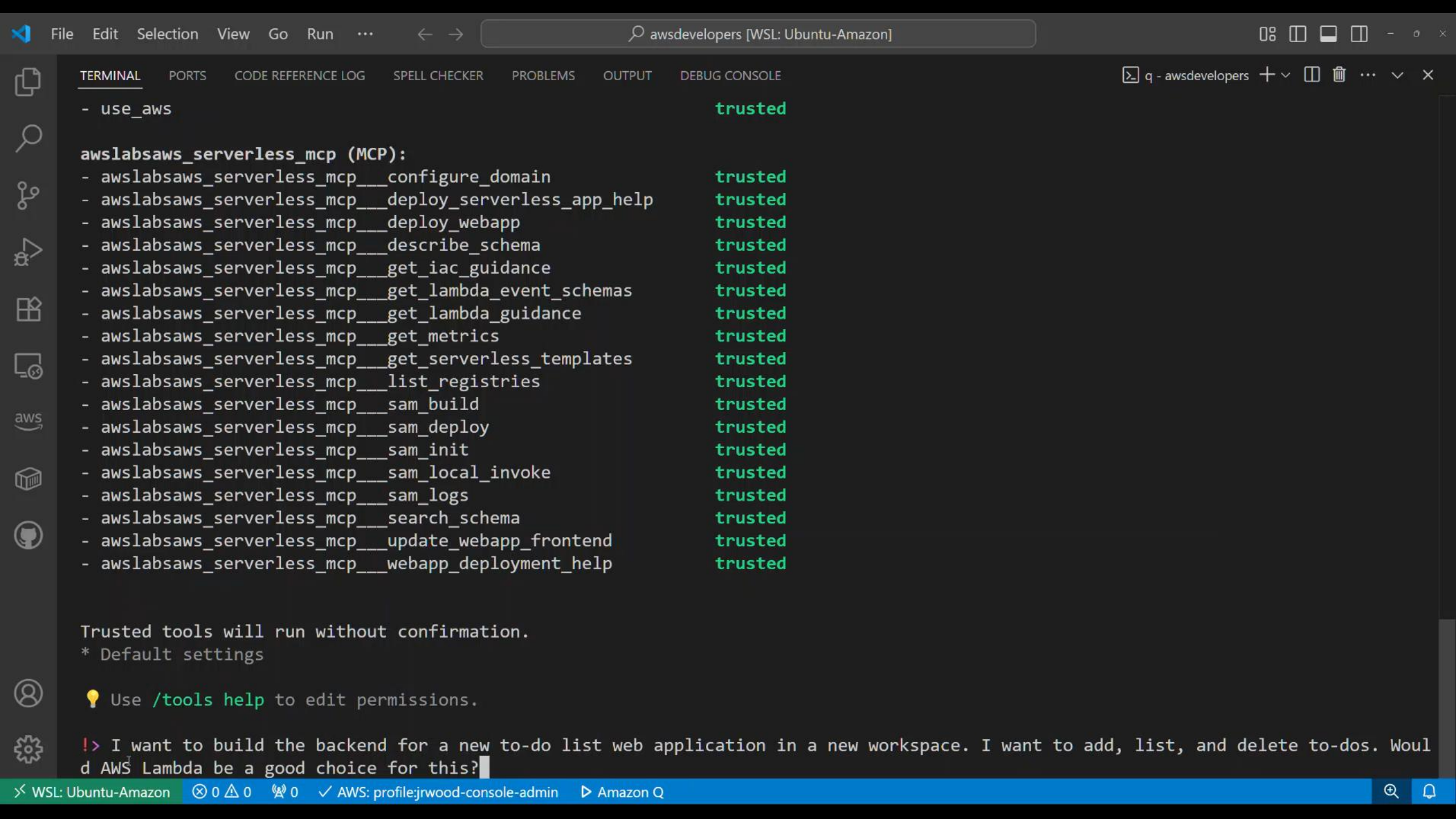
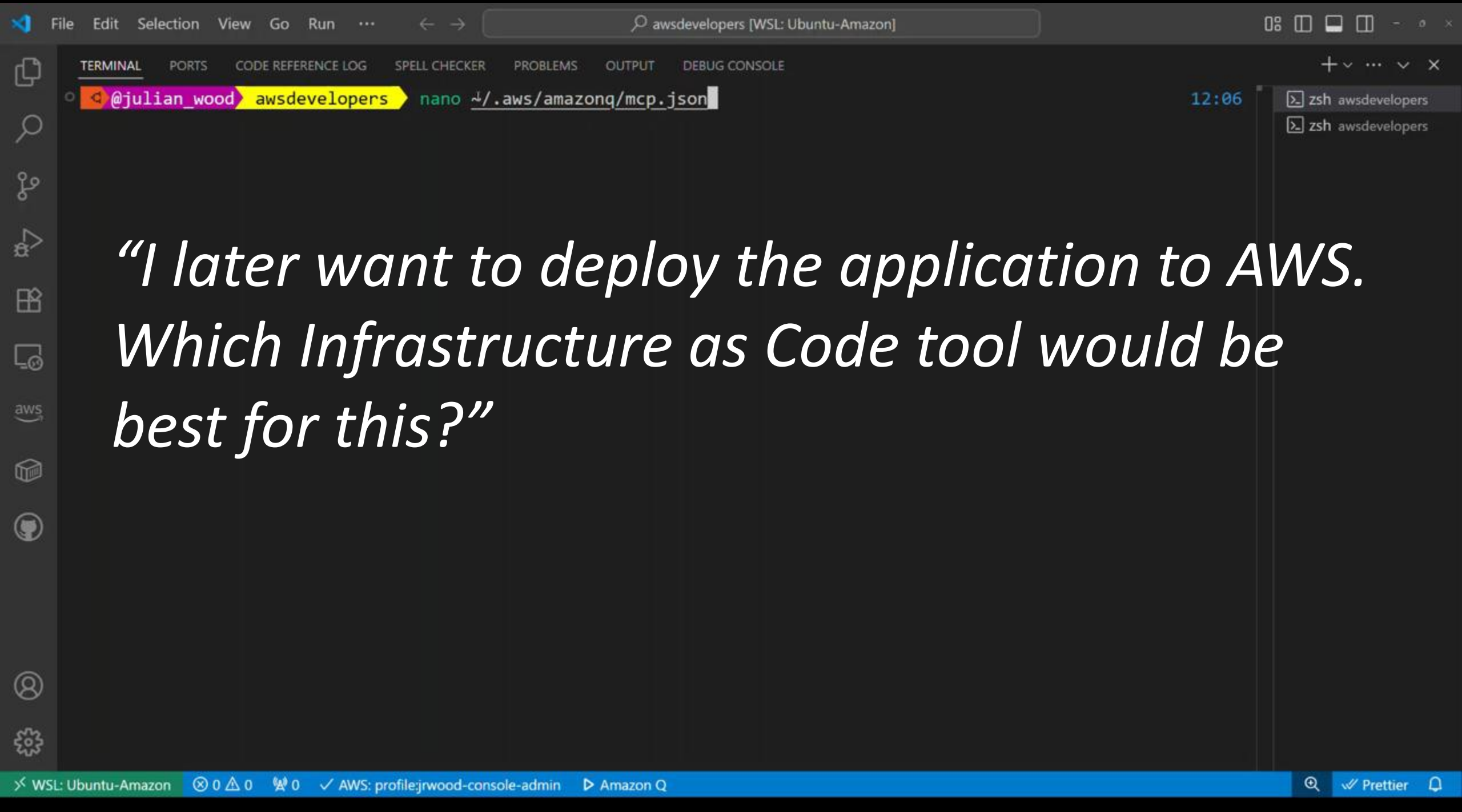
12:06
zsh awsdevelopers
zsh awsdevelopers
"I want to build the backend for a new to-do application in a new workspace. I want to add, list, and delete to-dos. Would AWS Lambda be a good choice for this?"
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier


File Edit Selection View Go Run ···
awsdevelopers [WSL: Ubuntu-Amazon]
TERMINAL PORTS CODE REFERENCE LOG SPELL CHECKER PROBLEMS OUTPUT DEBUG CONSOLE
q - awsdevelopers
- use_aws trusted
awslabsaws_serverless_mcp (MCP):
- awslabsaws_serverless_mcp___configure_domain trusted
- awslabsaws_serverless_mcp___deploy_serverless_app_help trusted
- awslabsaws_serverless_mcp___deploy_webapp trusted
- awslabsaws_serverless_mcp___describe_schema trusted
- awslabsaws_serverless_mcp___get_iac_guidance trusted
- awslabsaws_serverless_mcp___get_lambda_event_schemas trusted
- awslabsaws_serverless_mcp___get_lambda_guidance trusted
- awslabsaws_serverless_mcp___get_metrics trusted
- awslabsaws_serverless_mcp___get_serverless_templates trusted
- awslabsaws_serverless_mcp___list_registries trusted
- awslabsaws_serverless_mcp___sam_build trusted
- awslabsaws_serverless_mcp___sam_deploy trusted
- awslabsaws_serverless_mcp___sam_init trusted
- awslabsaws_serverless_mcp___sam_local_invoke trusted
- awslabsaws_serverless_mcp___sam_logs trusted
- awslabsaws_serverless_mcp___search_schema trusted
- awslabsaws_serverless_mcp___update_webapp_frontend trusted
- awslabsaws_serverless_mcp___webapp_deployment_help trusted
Trusted tools will run without confirmation.
* Default settings
Use /tools help to edit permissions.
!> I want to build the backend for a new to-do list web application in a new workspace. I want to add, list, and delete to-dos. Would AWS Lambda be a good choice for this?
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q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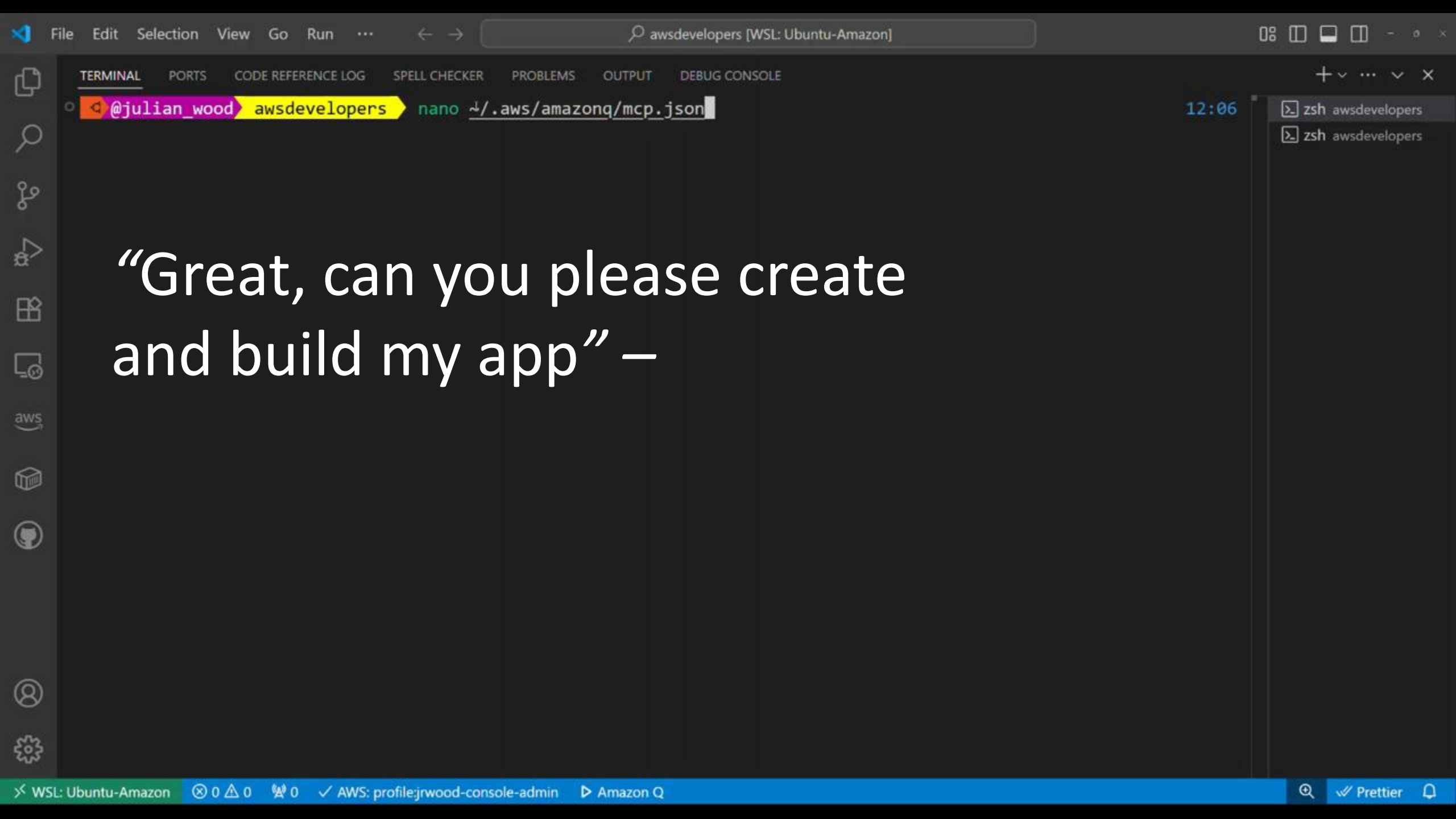
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
"I later want to deploy the application to AWS. Which Infrastructure as Code tool would be best for this?"
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier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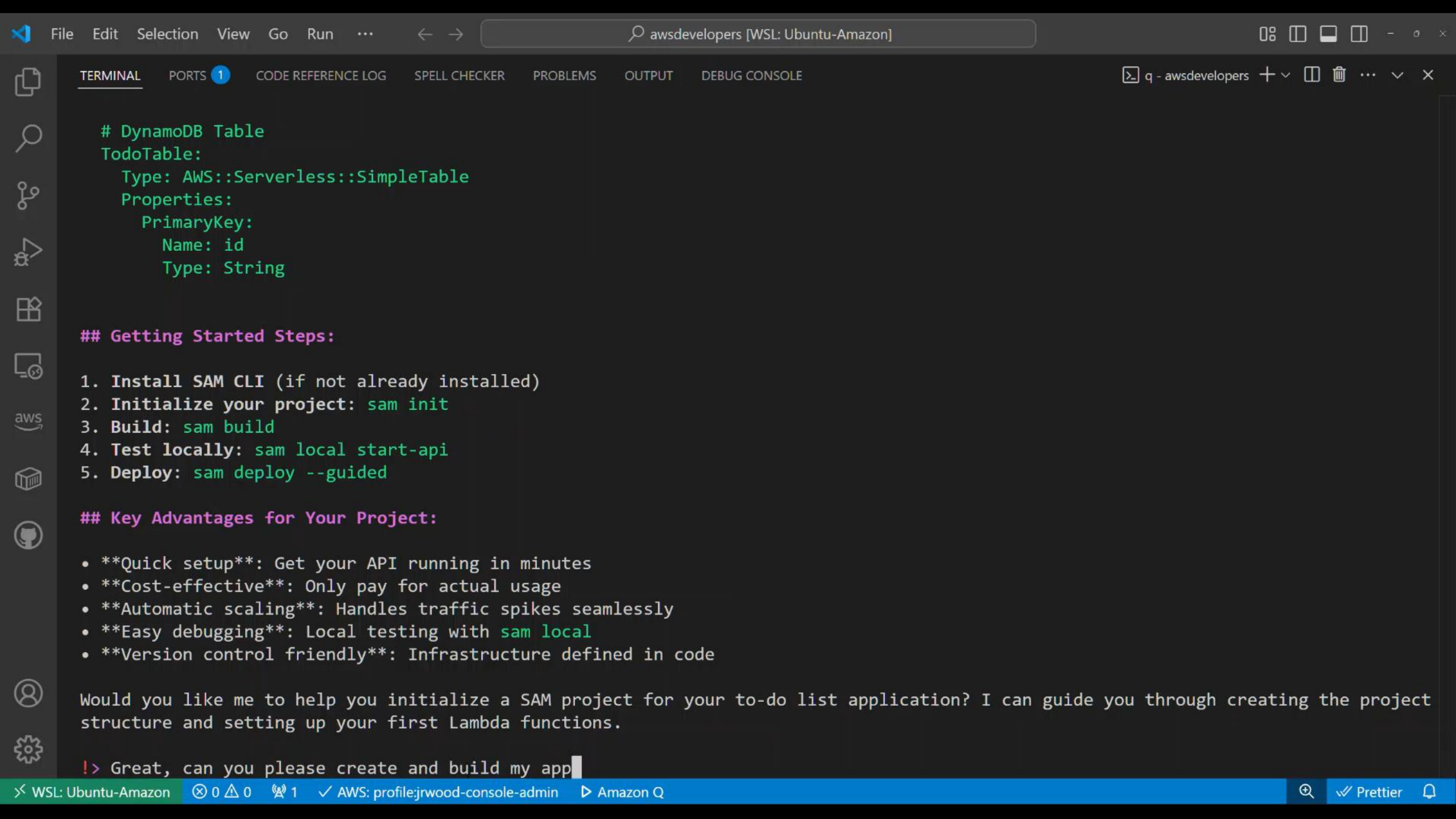
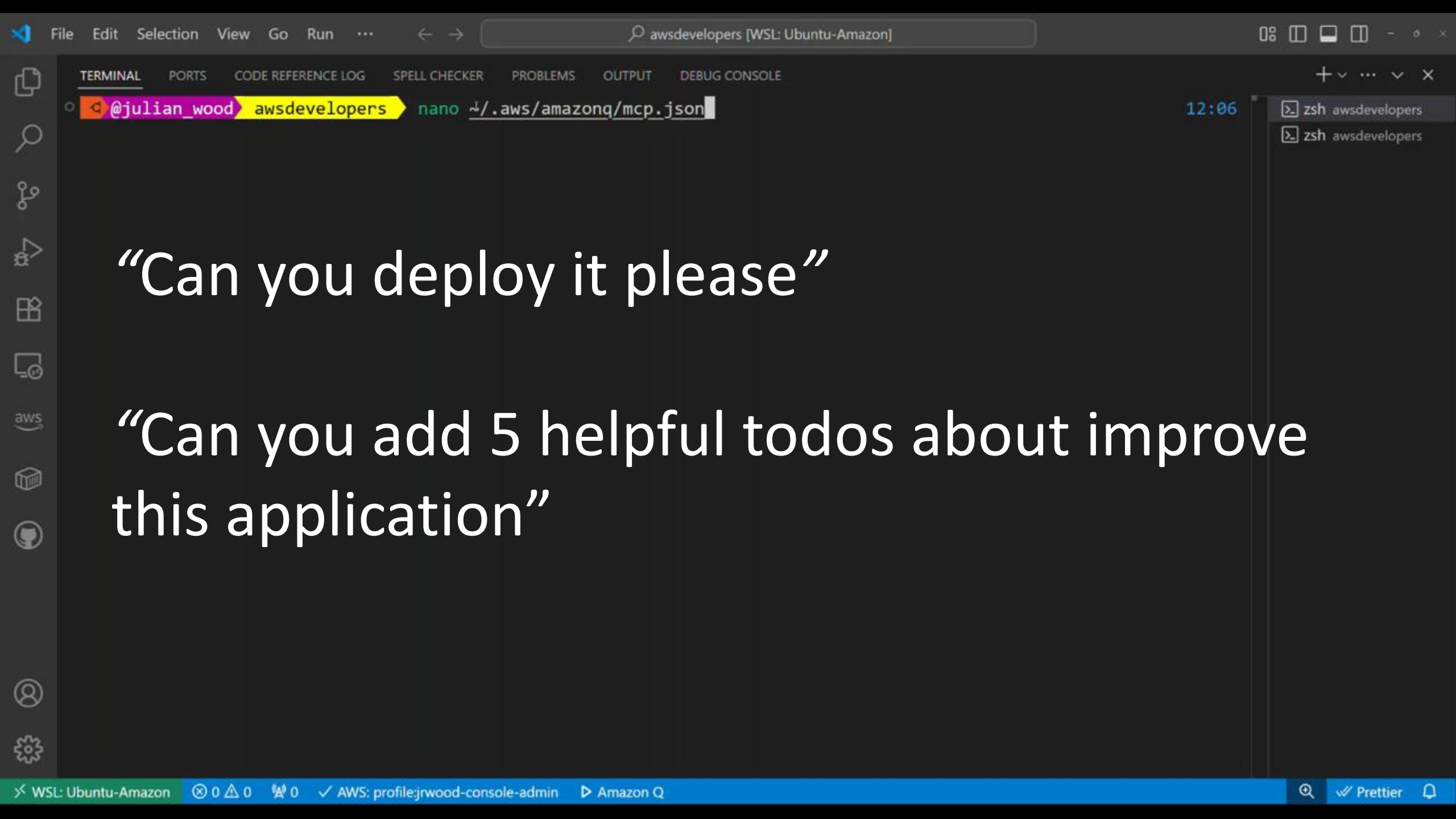
TERMINAL PORTS CODE REFERENCE LOG SPELL CHECKER PROBLEMS OUTPUT DEBUG CONSOLE
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
"Great, can you please create and build my app" –
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier


File Edit Selection View Go Run ···
awsdevelopers [WSL: Ubuntu-Amazon]
TERMINAL PORTS 1 CODE REFERENCE LOG SPELL CHECKER PROBLEMS OUTPUT DEBUG CONSOLE
q - awsdevelopers
DynamoDB Table
TodoTable:
Type: AWS::Serverless::SimpleTable
Properties:
PrimaryKey:
Name: id
Type: String
Getting Started Steps:
1. Install SAM CLI (if not already installed)
2. Initialize your project: sam init
3. Build: sam build
4. Test locally: sam local start-api
5. Deploy: sam deploy --guided
Key Advantages for Your Project:
• **Quick setup**: Get your API running in minutes
• **Cost-effective**: Only pay for actual usage
• **Automatic scaling**: Handles traffic spikes seamlessly
• **Easy debugging**: Local testing with sam local
• **Version control friendly**: Infrastructure defined in code
Would you like me to help you initialize a SAM project for your to-do list application? I can guide you through creating the project structure and setting up your first Lambda functions.
!> Great, can you please create and build my app
WSL: Ubuntu-Amazon
0 0
1
AWS: profile:jrwood-console-admin
Amazon Q
Prettier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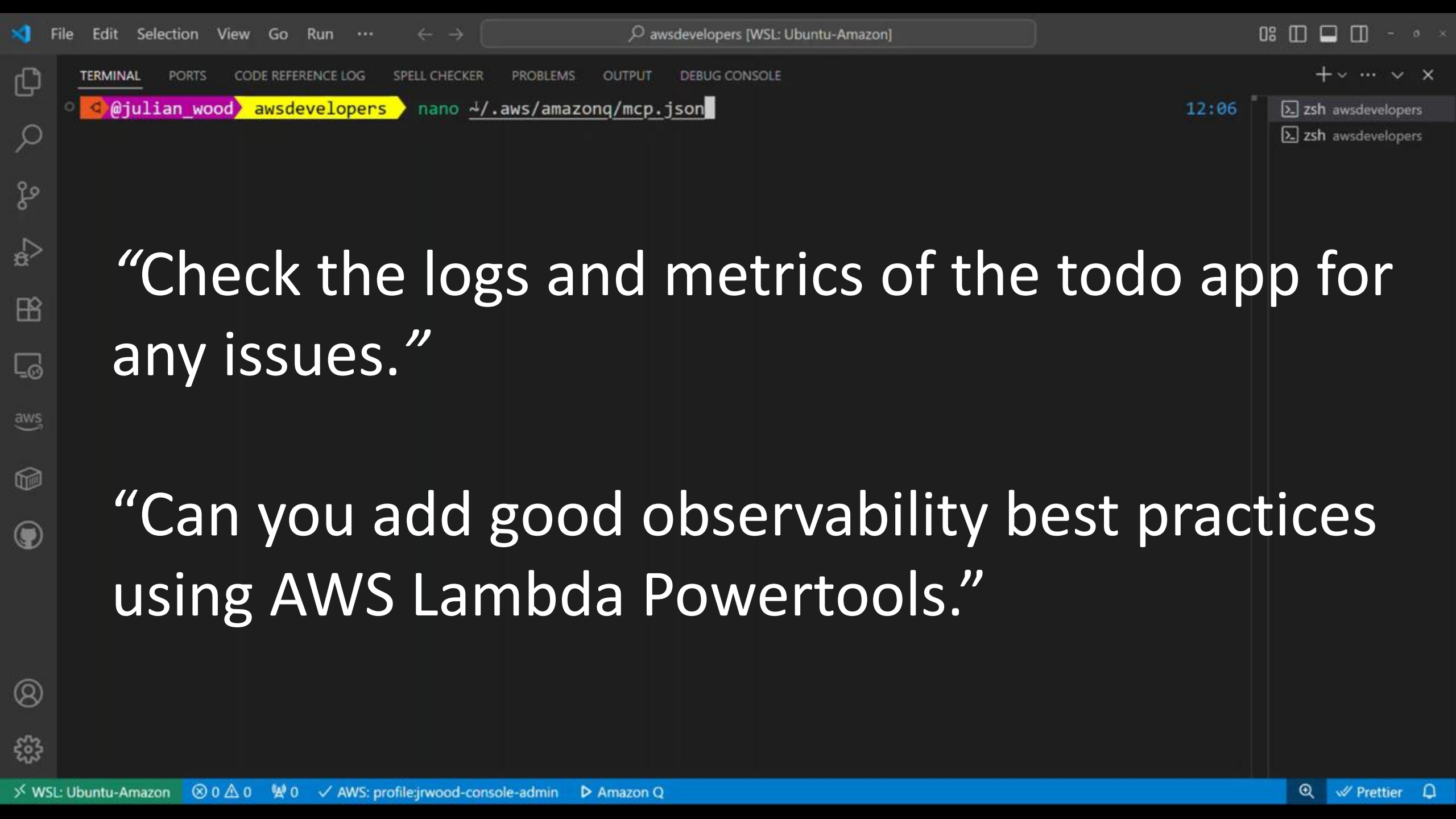
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
"Can you deploy it please"
"Can you add 5 helpful todos about improve this application"
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier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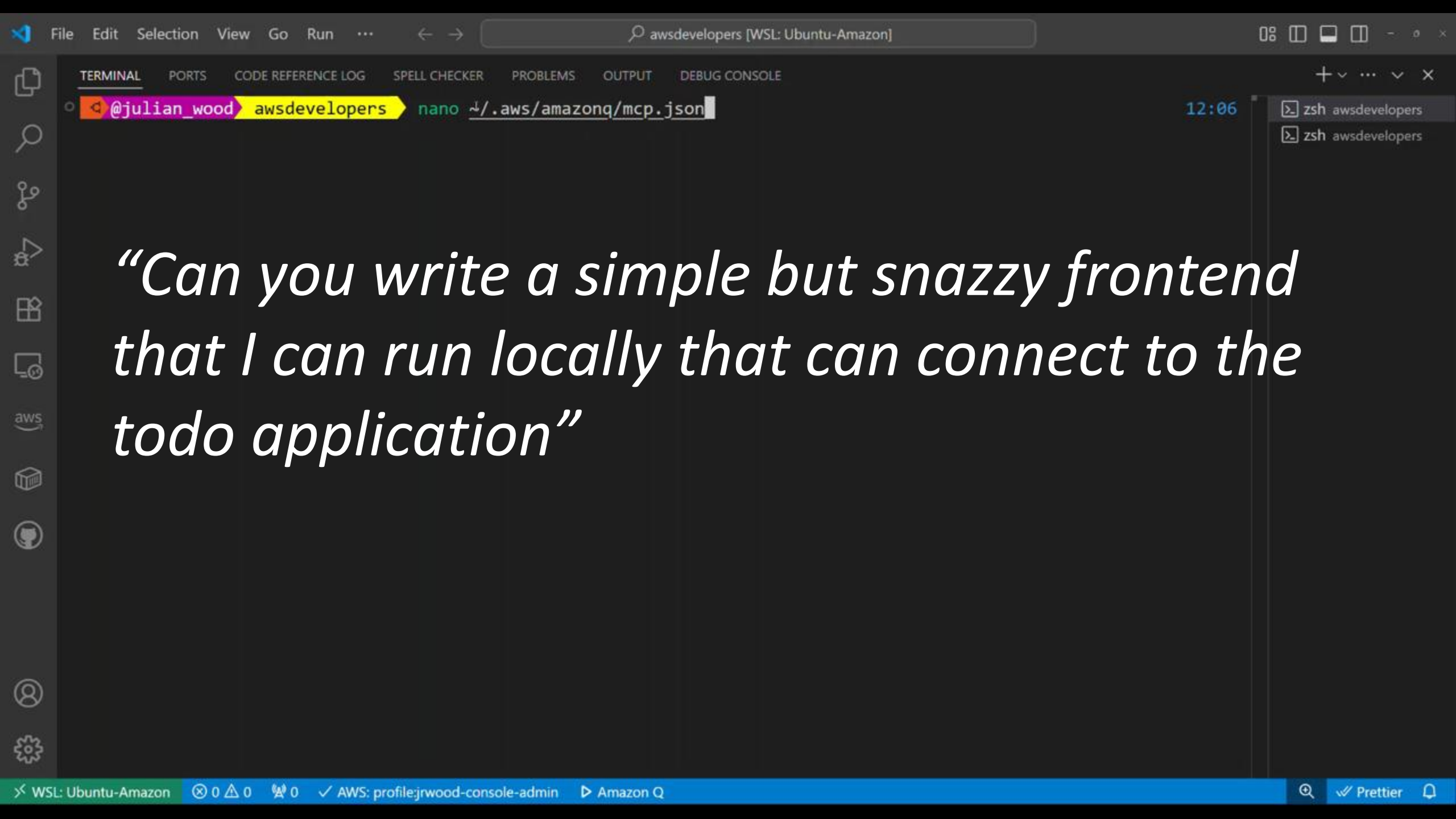
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
"Check the logs and metrics of the todo app for any issues."
"Can you add good observability best practices using AWS Lambda Powertools."
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier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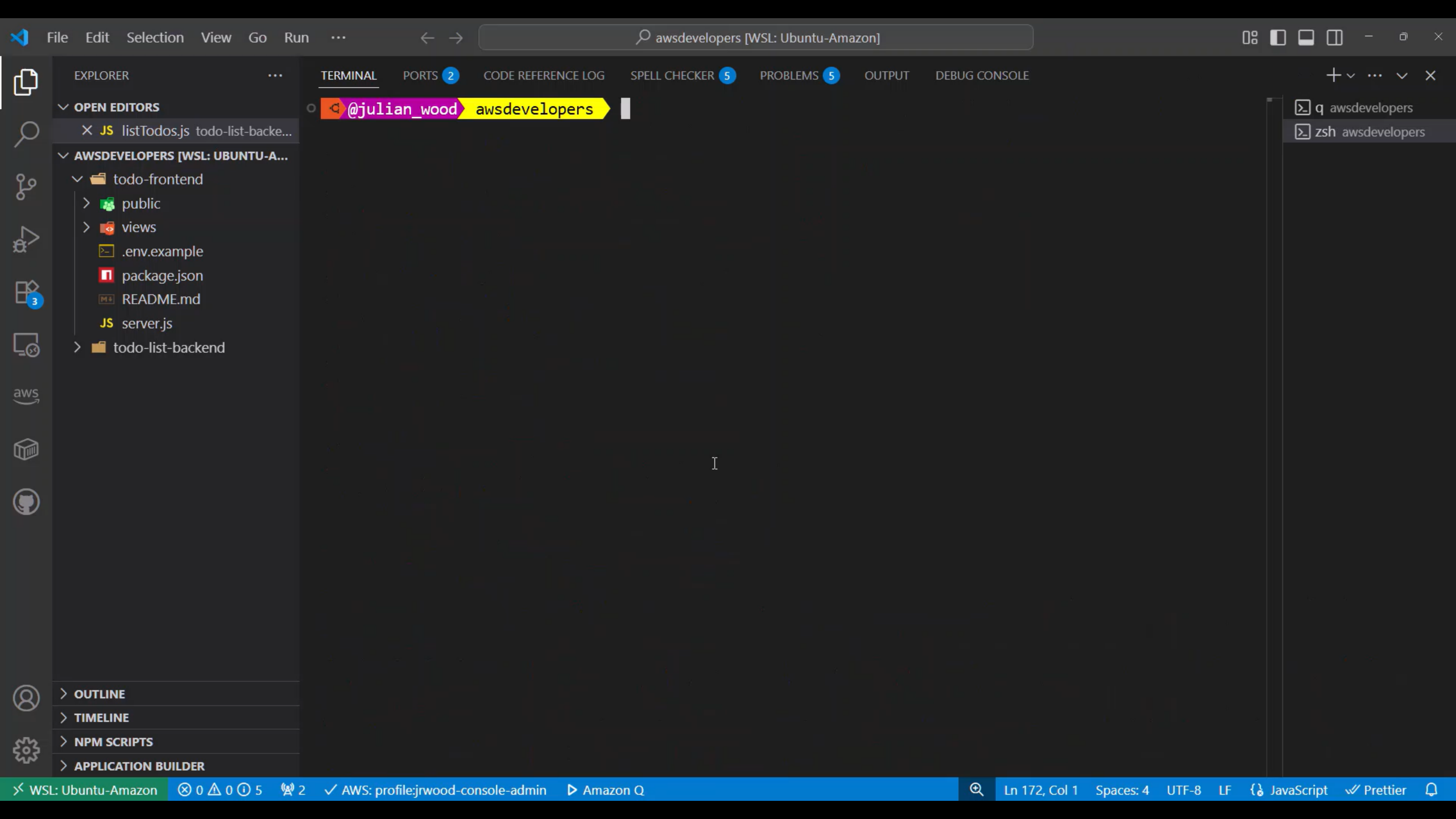
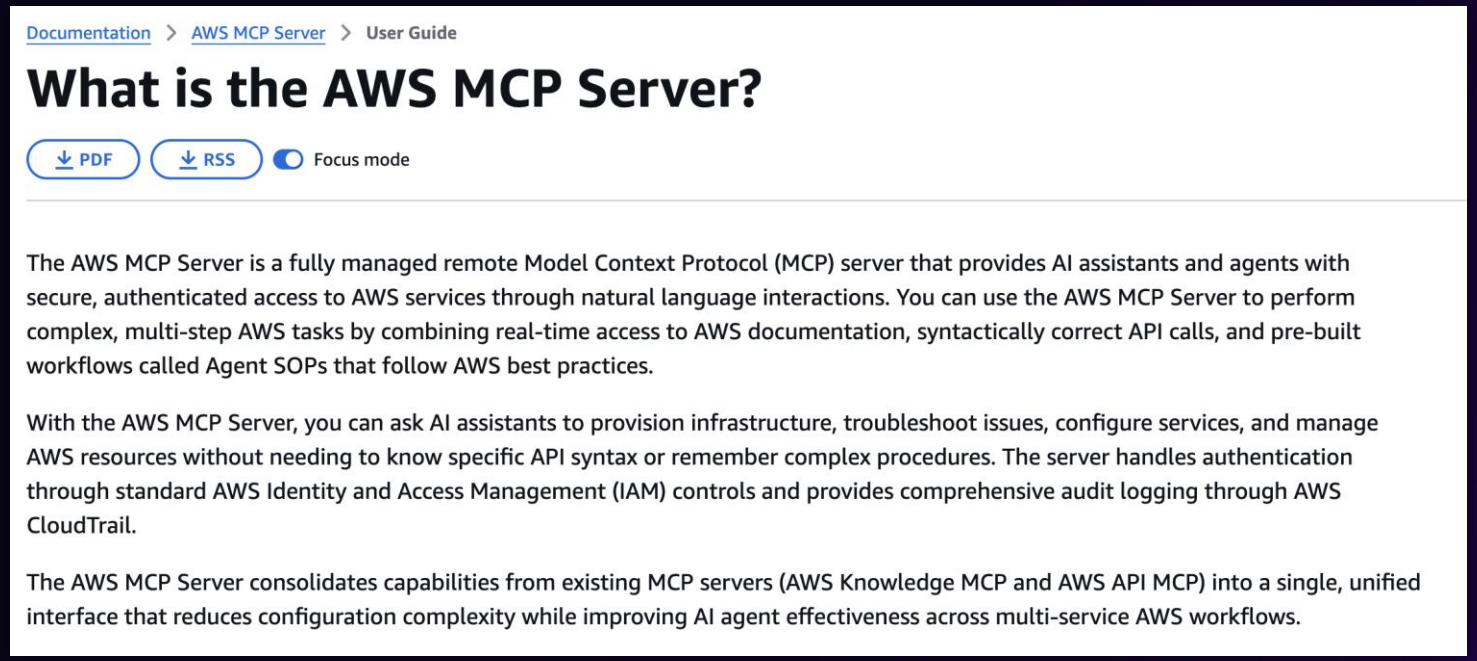
@julian_wood awsdevelopers nano ~/.aws/amazonq/mcp.json
12:06
zsh awsdevelopers
zsh awsdevelopers
"Can you write a simple but snazzy frontend that I can run locally that can connect to the todo application"
WSL: Ubuntu-Amazon
0 0
0
AWS: profile:jrwood-console-admin
Amazon Q
Prettier


File Edit Selection View Go Run
awsdevelopers [WSL: Ubuntu-Amazon]
EXPLORER
OPEN EDITORS
listTodos.js todo-list-backe...
AWSDEVELOPERS [WSL: UBUNTU-A...
todo-frontend
public
views
.env.example
package.json
README.md
server.js
todo-list-backend
OUTLINE
TIMELINE
NPM SCRIPTS
APPLICATION BUILDER
TERMINAL
PORTS 2
CODE REFERENCE LOG
SPELL CHECKER 5
PROBLEMS 5
OUTPUT
DEBUG CONSOLE
@julian_wood awsdevelopers
q awsdevelopers
zsh awsdevelopers
WSL: Ubuntu-Amazon
0 0 5
2
AWS: profile:jrwood-console-admin
Amazon Q
Ln 172, Col 1
Spaces: 4
UTF-8
LF
JavaScript
Prettier

Public preview of AWS MCP Server

FULLY MANAGED REMOTE MODEL CONTEXT PROTOCOL (MCP) SERVER FOR API AND DOCS



PP

Nov, 30th

re:Invent

US East (N. Virginia)

AWS MCP Server consolidates capabilities from the existing *AWS API MCP* and *AWS Knowledge* servers into remotely accessible and fully managed *Model Context Protocol (MCP)* server, and a unified interface, providing access to documentation, executing AWS API calls, and following pre-built workflows called *Agent Standard Operating Procedures (SOPs)*, that guide AI agents through common tasks on *AWS*.

AWS Announcement

Serverless and AI
2. Building AI (serverless) apps

GenAI is just another workload!

Everything you know (and love) about serverless still applies.

All your serverless knowledge applies!

- Less infrastructure to manage
- Variable compute demands
- Event-driven architecture
- Elastic scaling
- Pay-per-use economics
- Cost optimization
- Observability
- Failure handling

The Serverless GenAI Foundation

Amazon Bedrock is serverless:

- No infrastructure to manage
- Pay per API call (input/output tokens)
- Automatic scaling to demand
- Multiple model choices
- Enterprise security and compliance

Key integration points:

🔧 **Lambda/Fargate:**

Agent / tools compute

🔄 **Step Functions:**

Complex multi-step AI workflows

🚌 **EventBridge:**

AI event routing and response distribution

💾 **DynamoDB:**

Conversation state and context storage

📦 **S3:**

Knowledge base storage and model artifacts

Agents vs Tools

🤖 **Agents**
The orchestrators

🔧 **Tools**
The executors

🤖 Agents

The orchestrators

🤖 Agent characteristics:

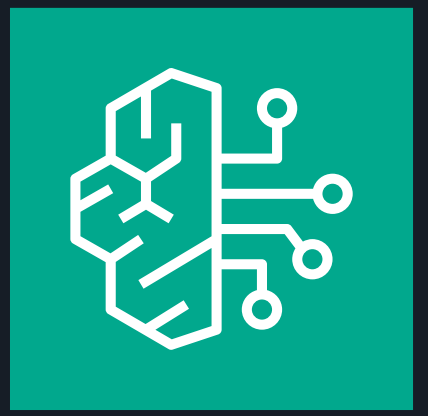
Call multiple tools to complete tasks

- Decision-making and planning
- Long-running conversations
- Stateful interactions

Agent compute considerations

Lambda
Short

Fargate
Long



Bedrock AgentCore Runtime
Abstracts all of this
Move up the stack

AgentCore Ecosystem

🚀 Runtime

Managed agent execution environment

🔗 Gateway

Transform existing APIs into agent tools

🌐 Browser

💻 Code Interpreter

📊 Observability

🧠 Memory

Persistent knowledge

🔐 Identity

Secure authentication and access management

Any framework:
CrewAI, LangGraph, LlamaIndex, OpenAI Agents SDK, Strands Agents

Any protocols: MCP, A2A

🔧 Tools

The executors

🔧 Tool characteristics:

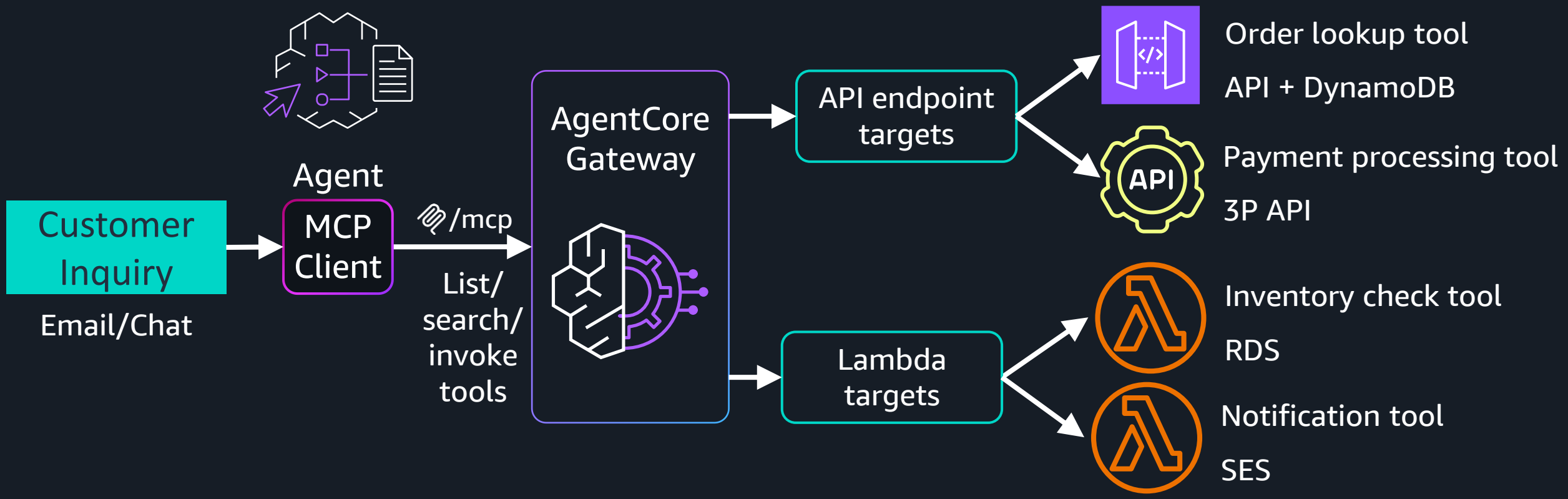
Called by agents to perform actions

- Existing functionality
- Self-describing
- Short-running operations
- Single-purpose functions
- Deterministic
- Stateless execution

✅ Lambda is ideal for tools:

- Fast startup
- Connect to anything
- Secure execution environment
- Pay only for execution time

Customer service AI agent



But I can’t/won’t do serverless, because….

Not for prod…

Can’t scale…

✅ AWS Lambda

15+ trillion requests each month

Prime Day: 1.7 trillion!

✅ Amazon ECS

3+ billion tasks launched each week

✅ AWS Step Functions

16000+ API actions

Billions of workflows daily

Performance

- Cold starts
- Code/language optimizations
- Native compilation
- Platform features:
    - Provisioned Concurrency/Mode
    - SnapStart

It’s different…

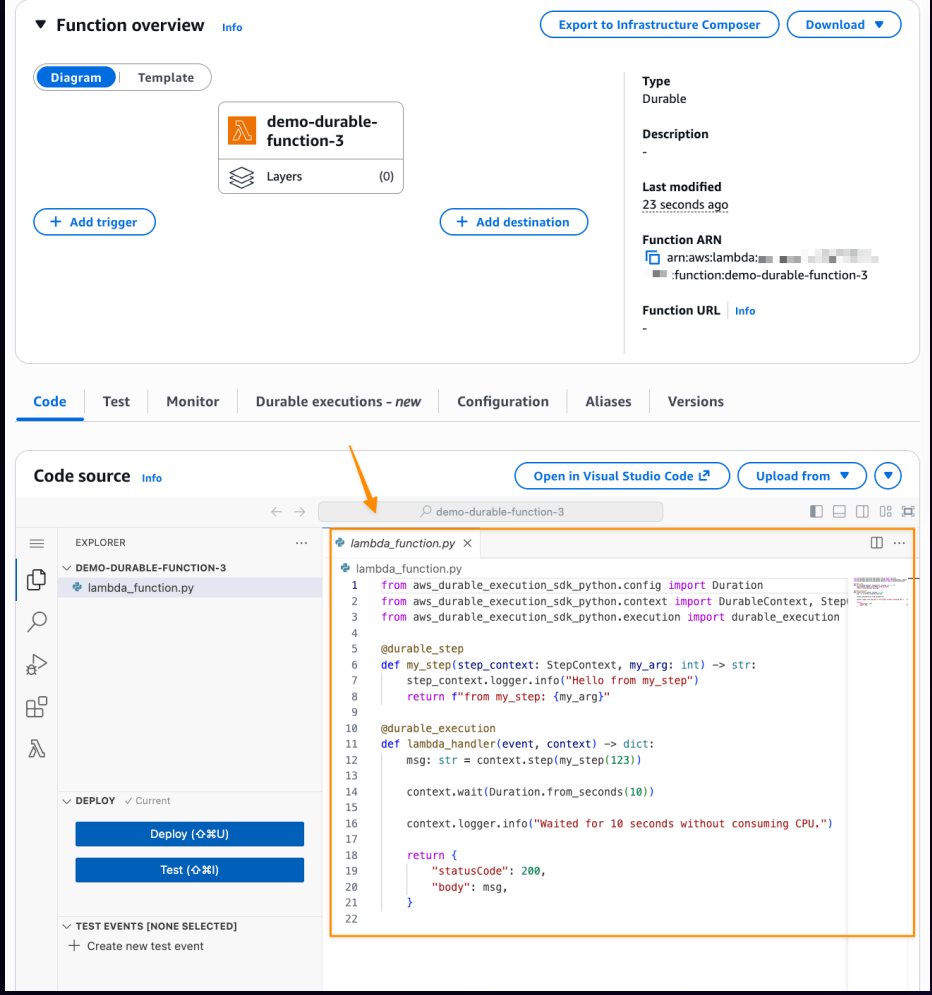
Is it?

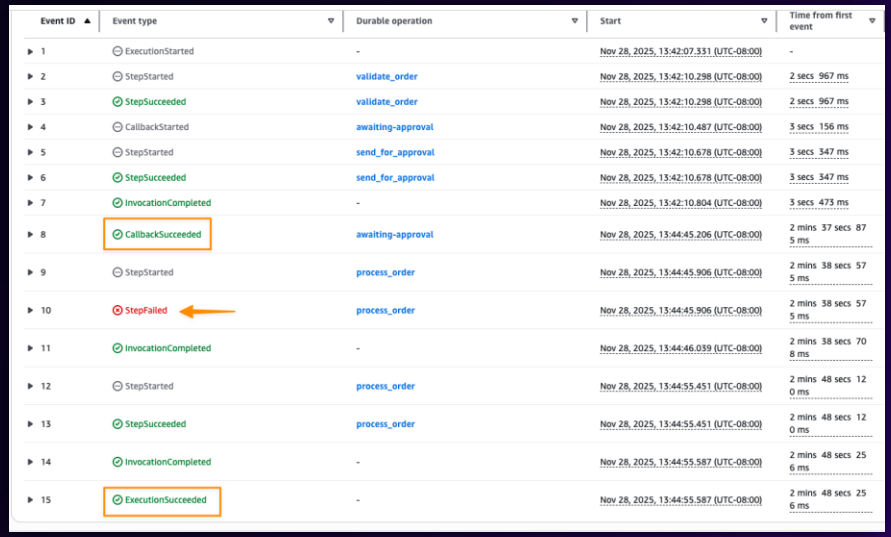
Standard languages
Standard SQL
Standard observability
Container images
Web adapter

AWS Lambda durable functions

MULTI-STEP RESUMABLE SERVERLESS FUNCTIONS POWERED BY LAMBDA AND STEP FUNCTIONS

GA





Event ID	Event type	Durable operation	Start	Time from first event
1	ExecutionStarted	-	Nov 28, 2025, 13:42:07.331 (UTC-08:00)	-
2	StepStarted	validate_order	Nov 28, 2025, 13:42:10.298 (UTC-08:00)	2 secs 967 ms
3	StepSucceeded	validate_order	Nov 28, 2025, 13:42:10.298 (UTC-08:00)	2 secs 967 ms
4	CallbackStarted	awaiting-approval	Nov 28, 2025, 13:42:10.487 (UTC-08:00)	3 secs 156 ms
5	StepStarted	send_for_approval	Nov 28, 2025, 13:42:10.678 (UTC-08:00)	3 secs 347 ms
6	StepSucceeded	send_for_approval	Nov 28, 2025, 13:42:10.678 (UTC-08:00)	3 secs 347 ms
7	InvocationCompleted	-	Nov 28, 2025, 13:42:10.804 (UTC-08:00)	3 secs 473 ms
8	CallbackSucceeded	awaiting-approval	Nov 28, 2025, 13:44:45.206 (UTC-08:00)	2 mins 37 secs 87 5 ms
9	StepStarted	process_order	Nov 28, 2025, 13:44:45.906 (UTC-08:00)	2 mins 38 secs 57 5 ms
10	StepFailed	process_order	Nov 28, 2025, 13:44:45.906 (UTC-08:00)	2 mins 38 secs 57 5 ms
11	InvocationCompleted	-	Nov 28, 2025, 13:44:46.039 (UTC-08:00)	2 mins 38 secs 70 8 ms
12	StepStarted	process_order	Nov 28, 2025, 13:44:55.451 (UTC-08:00)	2 mins 48 secs 12 0 ms
13	StepSucceeded	process_order	Nov 28, 2025, 13:44:55.451 (UTC-08:00)	2 mins 48 secs 12 0 ms
14	InvocationCompleted	-	Nov 28, 2025, 13:44:55.587 (UTC-08:00)	2 mins 48 secs 25 6 ms
15	ExecutionSucceeded	-	Nov 28, 2025, 13:44:55.587 (UTC-08:00)	2 mins 48 secs 25 6 ms

AWS News Blog Post

Cost…

Serverless pricing

- Pay per value/use
- Capacity caps
- Budget alerts
- Savings plans (compute/database)
- Lambda managed instances

Log cost reduction strategies

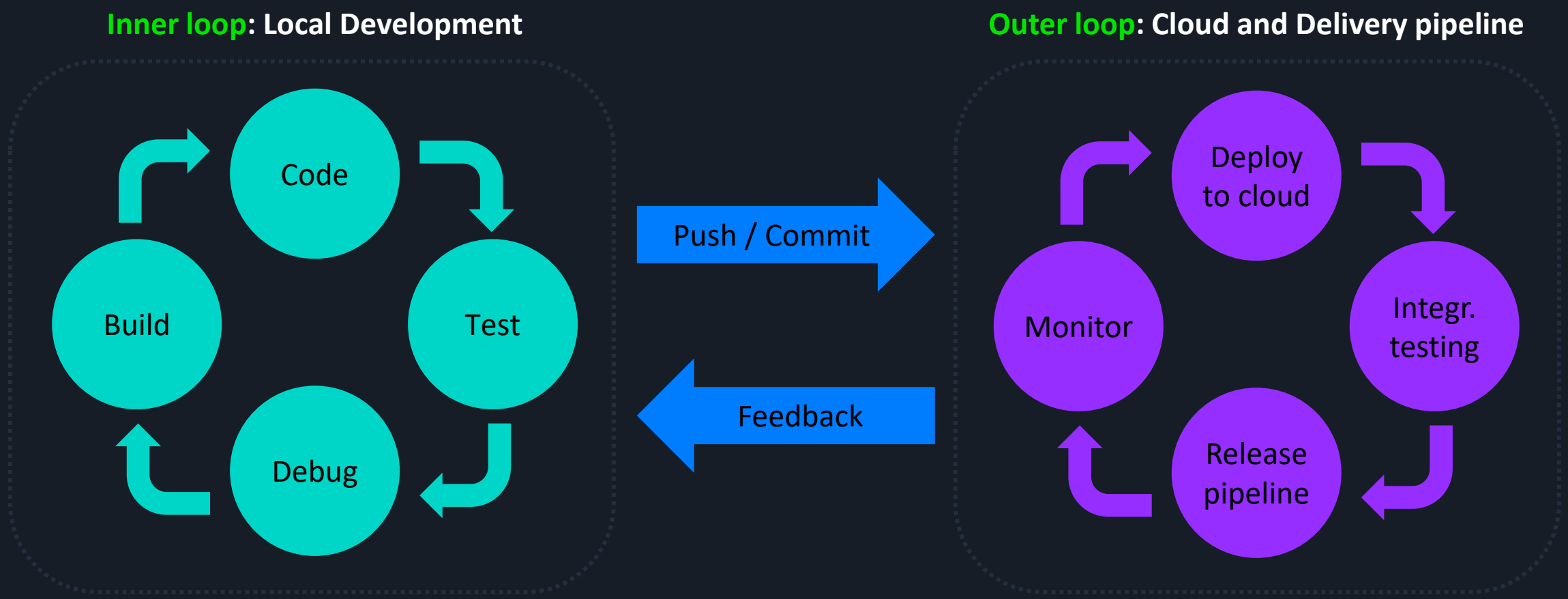
- Tiered pricing
- Structured logging and log levels
- Log retention
- Don't log what you don't need
- Archive to S3 or send to Firehose
- Monitor costs

Cost = architecture

Developer experience…

Development Loop

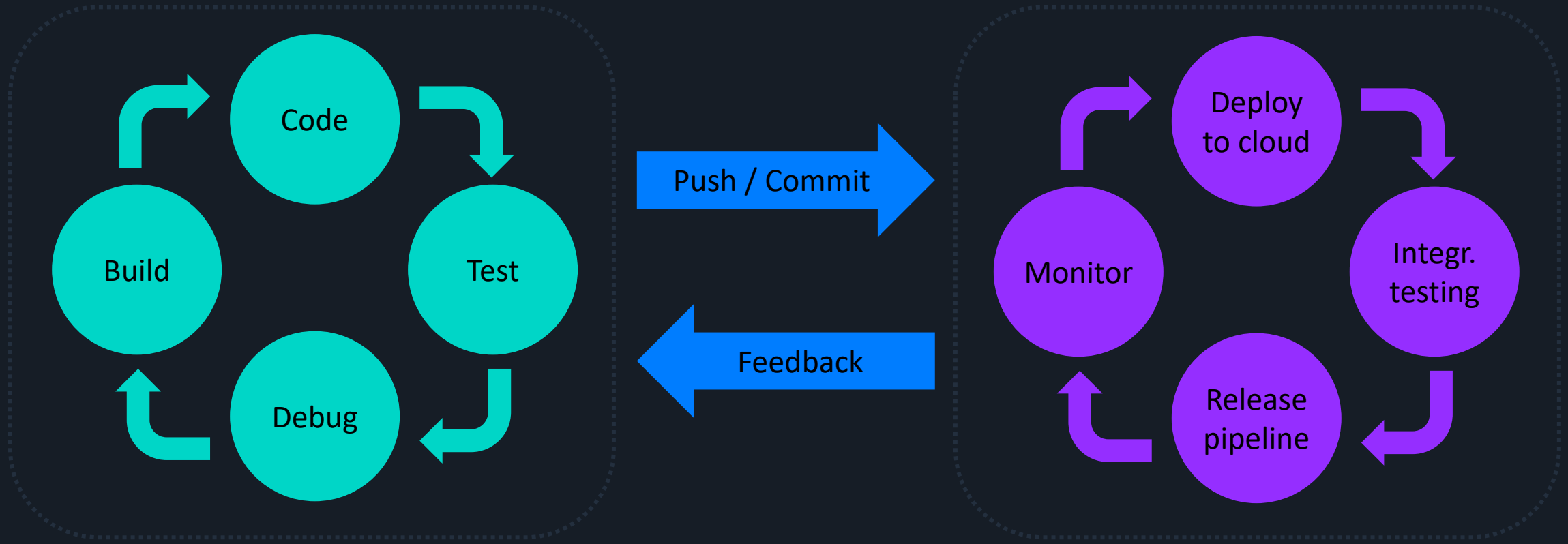
Development Loop



Serverless Development Loop

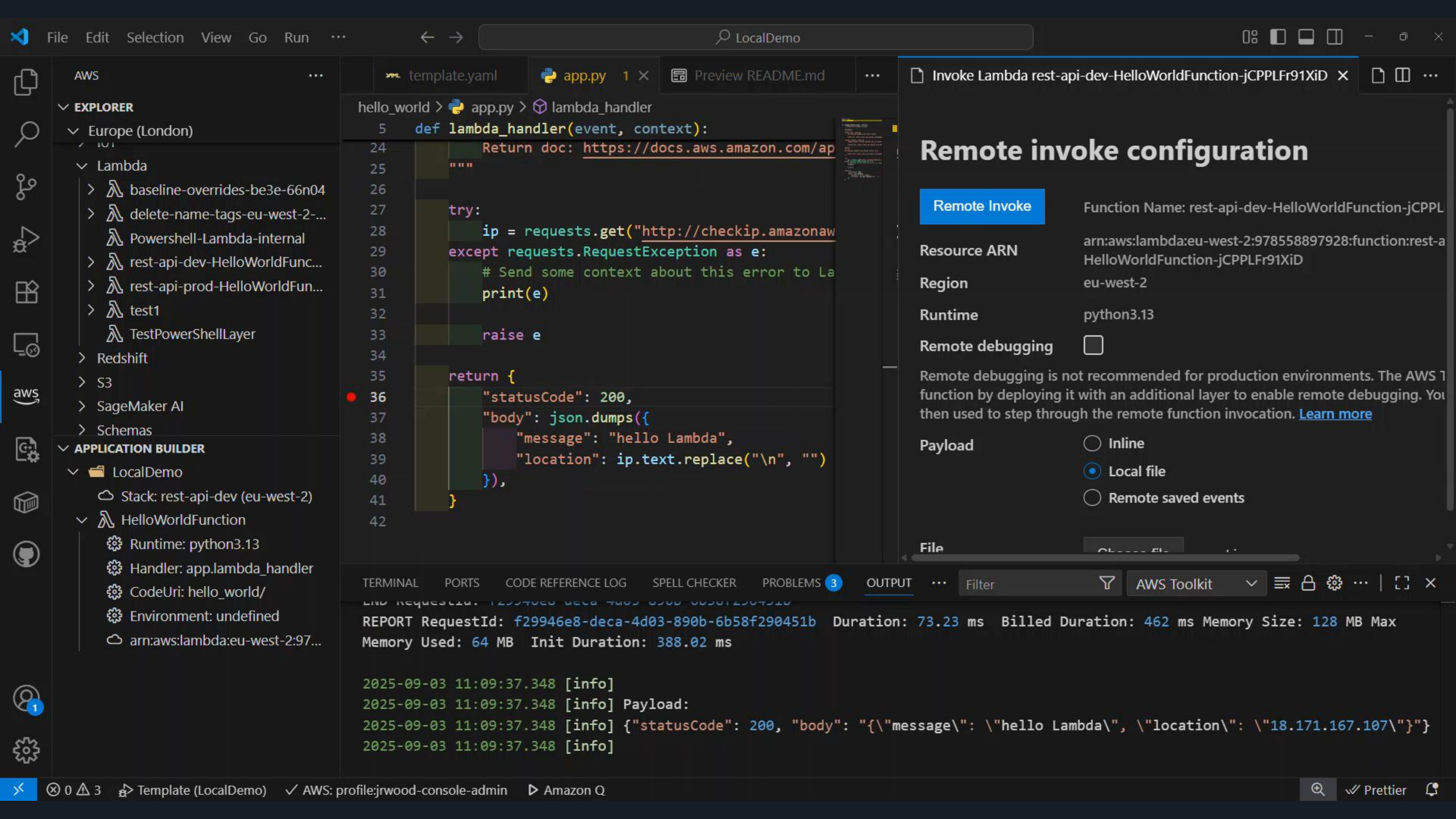
Inner loop: Local Development

Outer loop: Cloud and Delivery pipeline



Developer experience

- VSCode + clones integrations: Setup, init, patterns,
- Kiro
- MCP Servers
- Lambda console to IDE + debugging
- Step Functions: JSONata, variables, Workflow Studio IDE
- Serverless websockets
- Latency improvements


File Edit Selection View Go Run
LocalDemo
AWS
EXPLORER
Europe (London)
Lambda
baseline-overrides-be3e-66n04
delete-name-tags-eu-west-2-...
Powershell-Lambda-internal
rest-api-dev-HelloWorldFunc...
rest-api-prod-HelloWorldFun...
test1
TestPowerShellLayer
Redshift
S3
SageMaker AI
Schemas
APPLICATION BUILDER
LocalDemo
Stack: rest-api-dev (eu-west-2)
HelloWorldFunction
Runtime: python3.13
Handler: app.lambda_handler
CodeUri: hello_world/
Environment: undefined
arn:aws:lambda:eu-west-2:97...
template.yaml
app.py 1
Preview README.md
hello_world > app.py > lambda_handler
5 def lambda_handler(event, context):
24 Return doc: https://docs.aws.amazon.com/ap
25 """
26
27 try:
28 ip = requests.get("http://checkip.amazonaw
29 except requests.RequestException as e:
30 # Send some context about this error to La
31 print(e)
32
33 raise e
34
35 return {
36 "statusCode": 200,
37 "body": json.dumps({
38 "message": "hello Lambda",
39 "location": ip.text.replace("\n", "")
40 }),
41 }
42
Invoke Lambda rest-api-dev-HelloWorldFunction-jCPPLFr91XiD
Remote invoke configuration
Remote Invoke
Function Name: rest-api-dev-HelloWorldFunction-jCPPL
Resource ARN
arn:aws:lambda:eu-west-2:978558897928:function:rest-a
HelloWorldFunction-jCPPLFr91XiD
Region
eu-west-2
Runtime
python3.13
Remote debugging
Remote debugging is not recommended for production environments. The AWS T
function by deploying it with an additional layer to enable remote debugging. You
then used to step through the remote function invocation. Learn more
Payload
Inline
Local file
Remote saved events
File
TERMINAL PORTS CODE REFERENCE LOG SPELL CHECKER PROBLEMS 3 OUTPUT
Filter
AWS Toolkit
REPORT RequestId: f29946e8-deca-4d03-890b-6b58f290451b Duration: 73.23 ms Billed Duration: 462 ms Memory Size: 128 MB Max
Memory Used: 64 MB Init Duration: 388.02 ms
2025-09-03 11:09:37.348 [info]
2025-09-03 11:09:37.348 [info] Payload:
2025-09-03 11:09:37.348 [info] {"statusCode": 200, "body": "{\"message\": \"hello Lambda\", \"location\": \"18.171.167.107\"}"}
2025-09-03 11:09:37.348 [info]
0 3 Template (LocalDemo) AWS: profile:jrwood-console-admin Amazon Q
Prettier

Lock-in…

Lock-in

- Lock-in is really about switching costs
- Serverless reduces traditional lock-in
- What do you avoid building?
- Modern architectures help agility
- Serverless-specific portability

- Language/DB flexibility
- Your code/data/SQL

Open source

- Integrations: OTEL/Kafka/Kubernetes/etc.
- Tooling: Frameworks/OCI/Powertools
- Firecracker
- Lambda roadmap

The road ahead

CONTINUED INVESTMENTS ACROSS THE SPECTRUM TO HELP YOU BECOME MORE PRODUCTIVE

AWS Well-Architected fundamentals

Developer experience

Improved controls over services

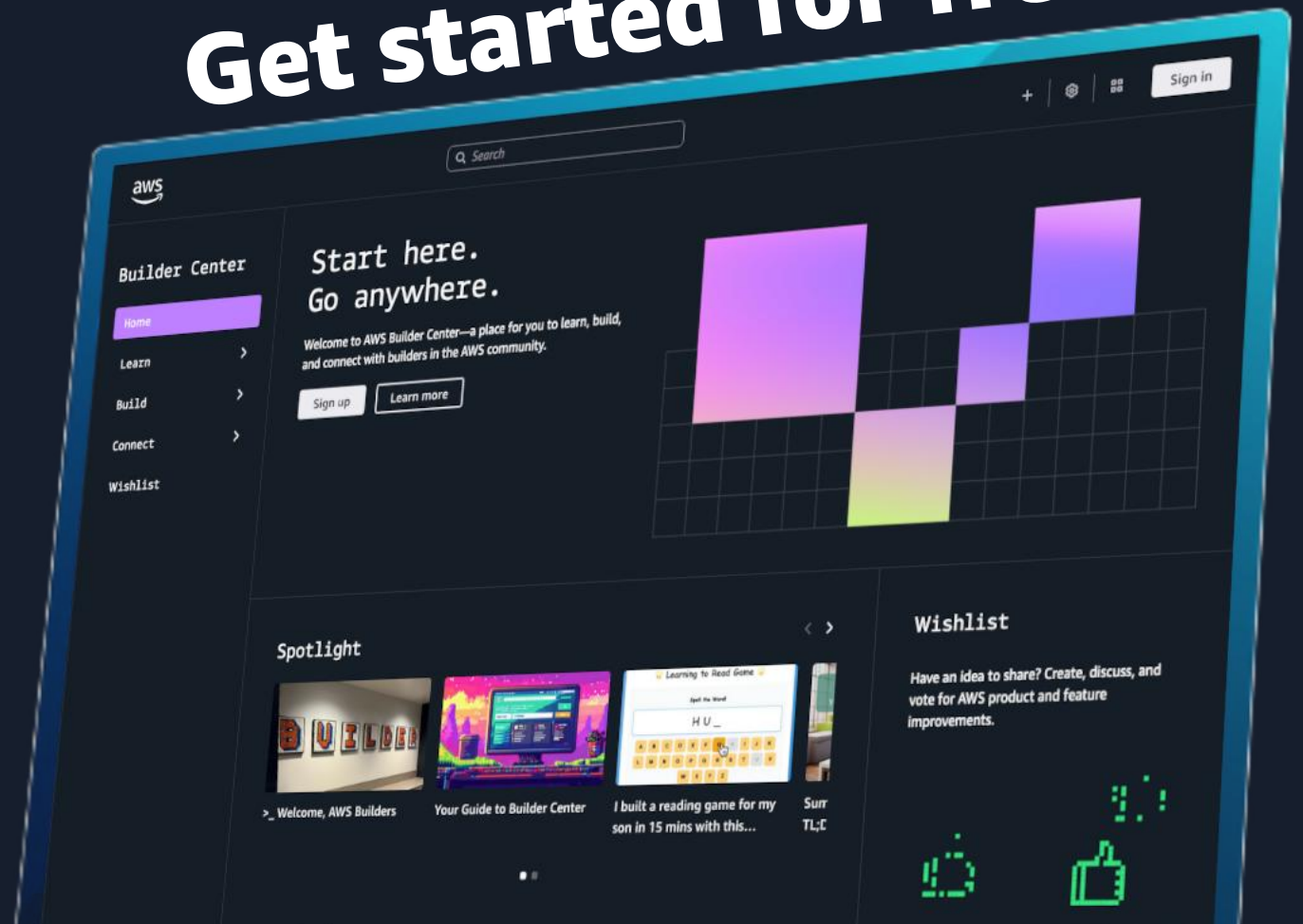
Simpler and broader integrations

Builders Center

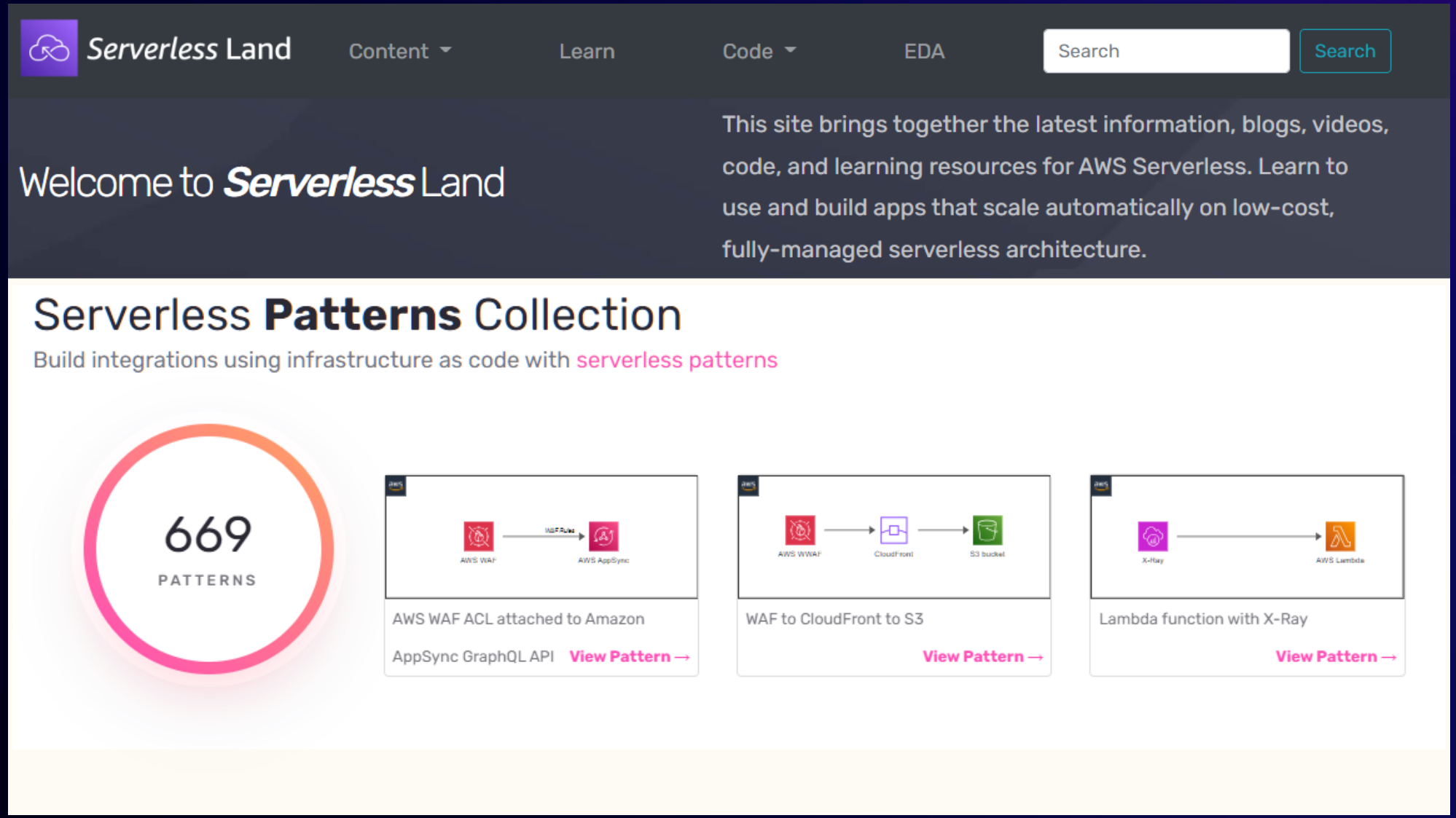
Claim your Builder ID

Go-to site for builders to connect with the AWS Community.

Get started for free



ServerlessLand.com



Thank you!

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