
AWS
re:Invent
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SVS315

Building multi-tenant applications with AWS Lambda and AWS Fargate

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Picking a compute model



Does it fit your scaling profile?



How will it influence your cost profile?



How does it align with the profile of your team?



What kind of workloads will you need to support?

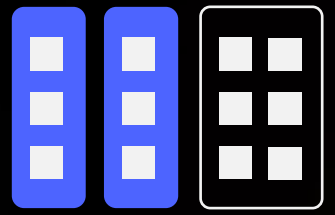


What is your starting point?

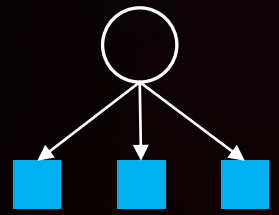
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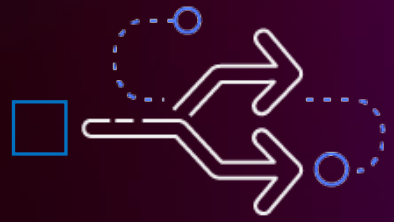
Key architecture considerations



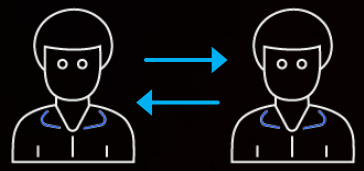
Which deployment models will you support?



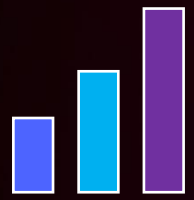
How will you route tenant loads?



How do you automate application configuration/deployment?



How will you isolate tenant resources?

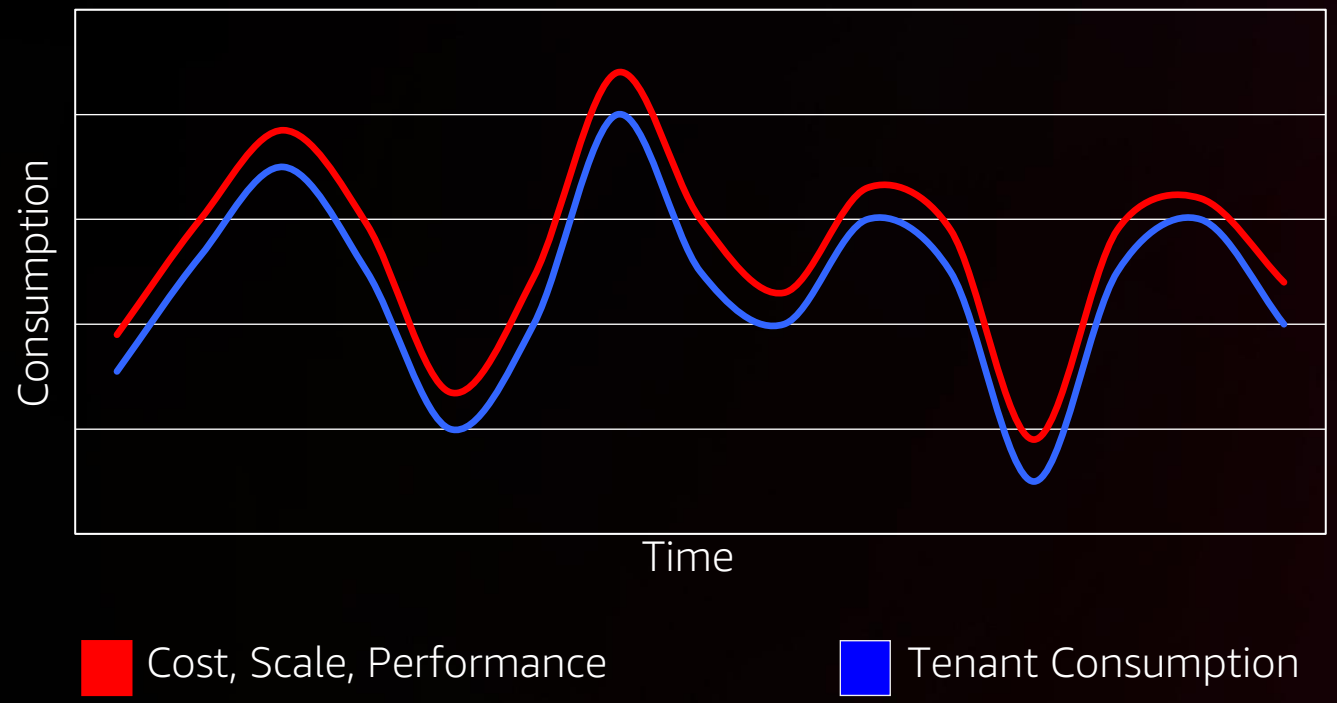


How will you support tiered tenant experiences?

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The SaaS and serverless fit



- Agility
- Cost optimization
- Operational efficiency
- Blast radius
- Focus on IP

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Compute trade-offs

AWS Fargate

Pros

- Community tooling
- Selection (Amazon EKS, Amazon ECS, Fargate)
- Developer learning curve
- Deployment/management tooling
- Built-in multi-tenant constructs

Cons

- Isolation considerations
- Scaling tuning
- Idle compute resources

Serverless

Pros

- Fine-grained deployment
- No idle resources/scaling
- Third-party extensibility
- Amazon API Gateway integration
- Layers for shared concepts

Cons

- Developer learning curve
- Concurrency management
- Silo proliferation of functions

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Two models, one mindset



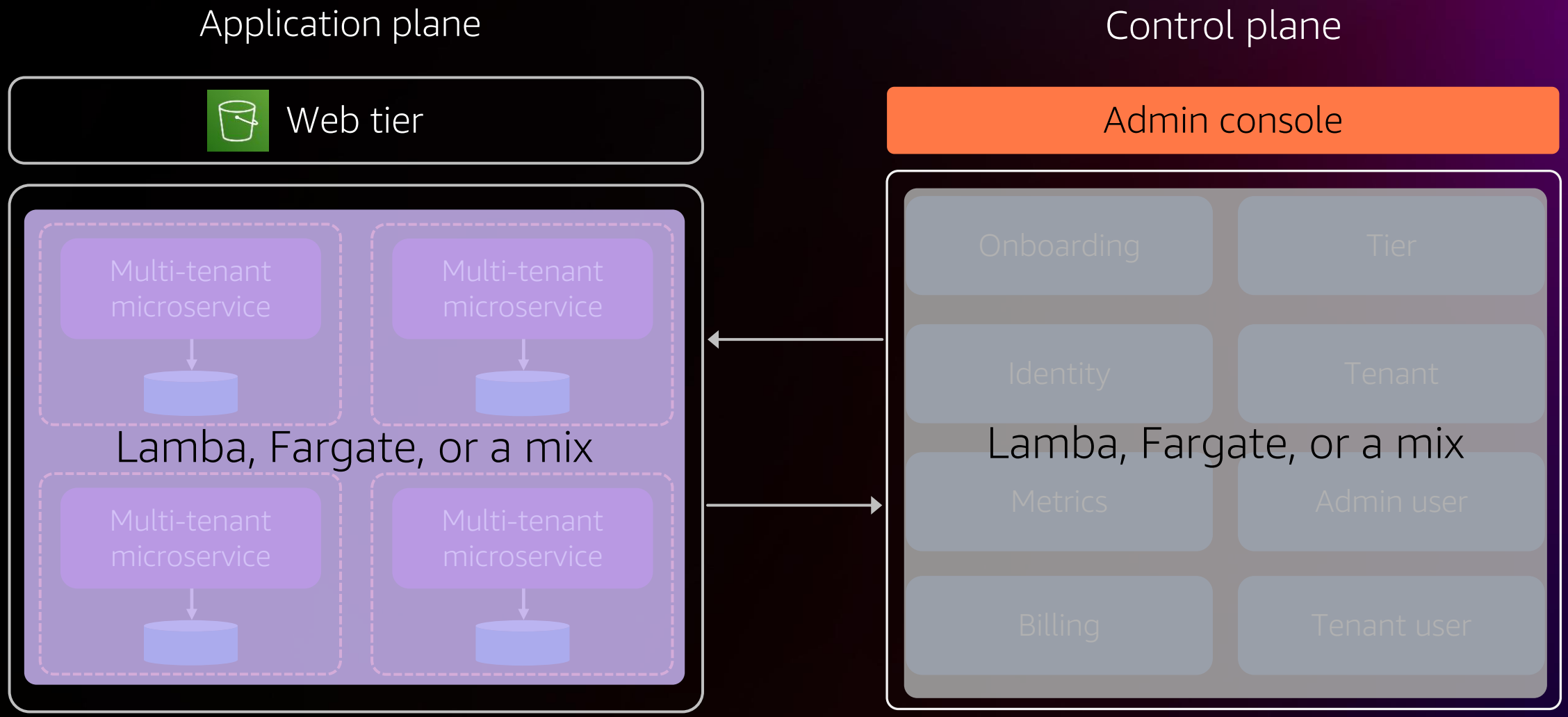
- Deployment
- Isolation
- Noisy neighbor
- Tiering
- Routing

Fully managed execution and scale



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Common to all serverless models

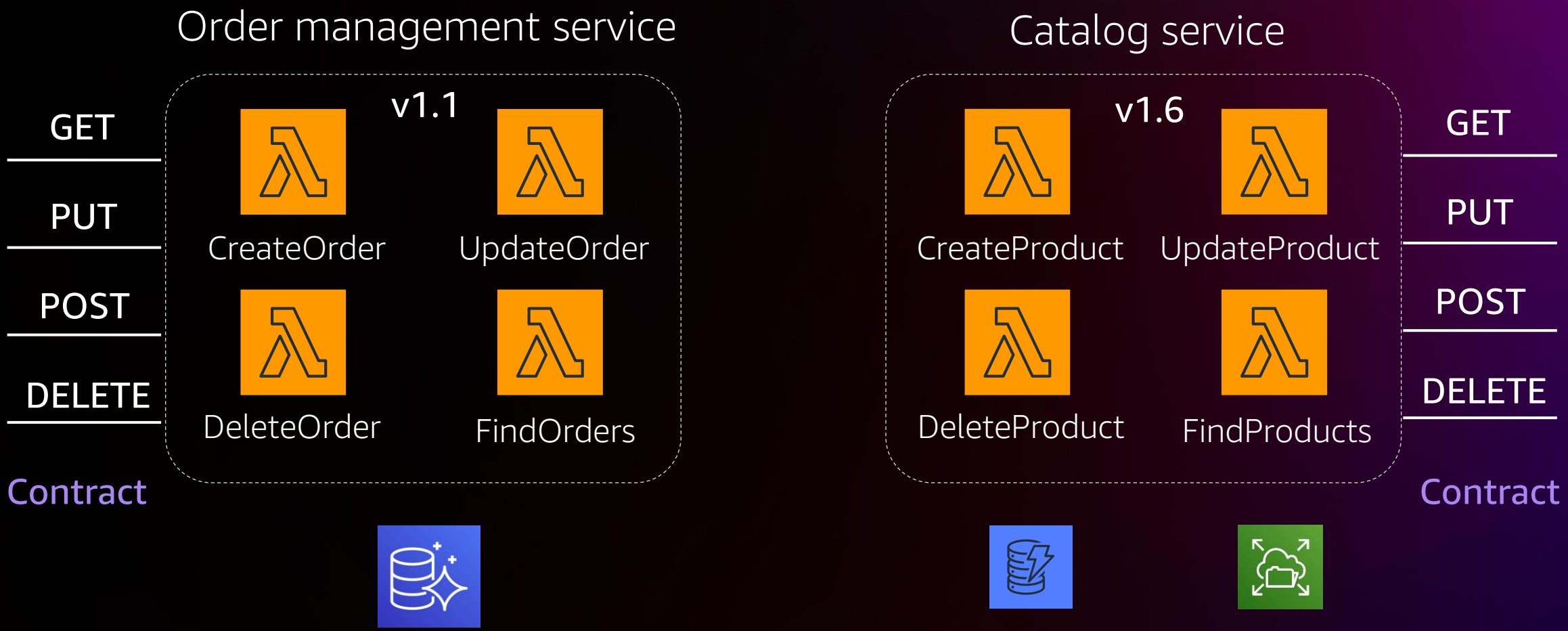


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The multi-tenant Lambda model

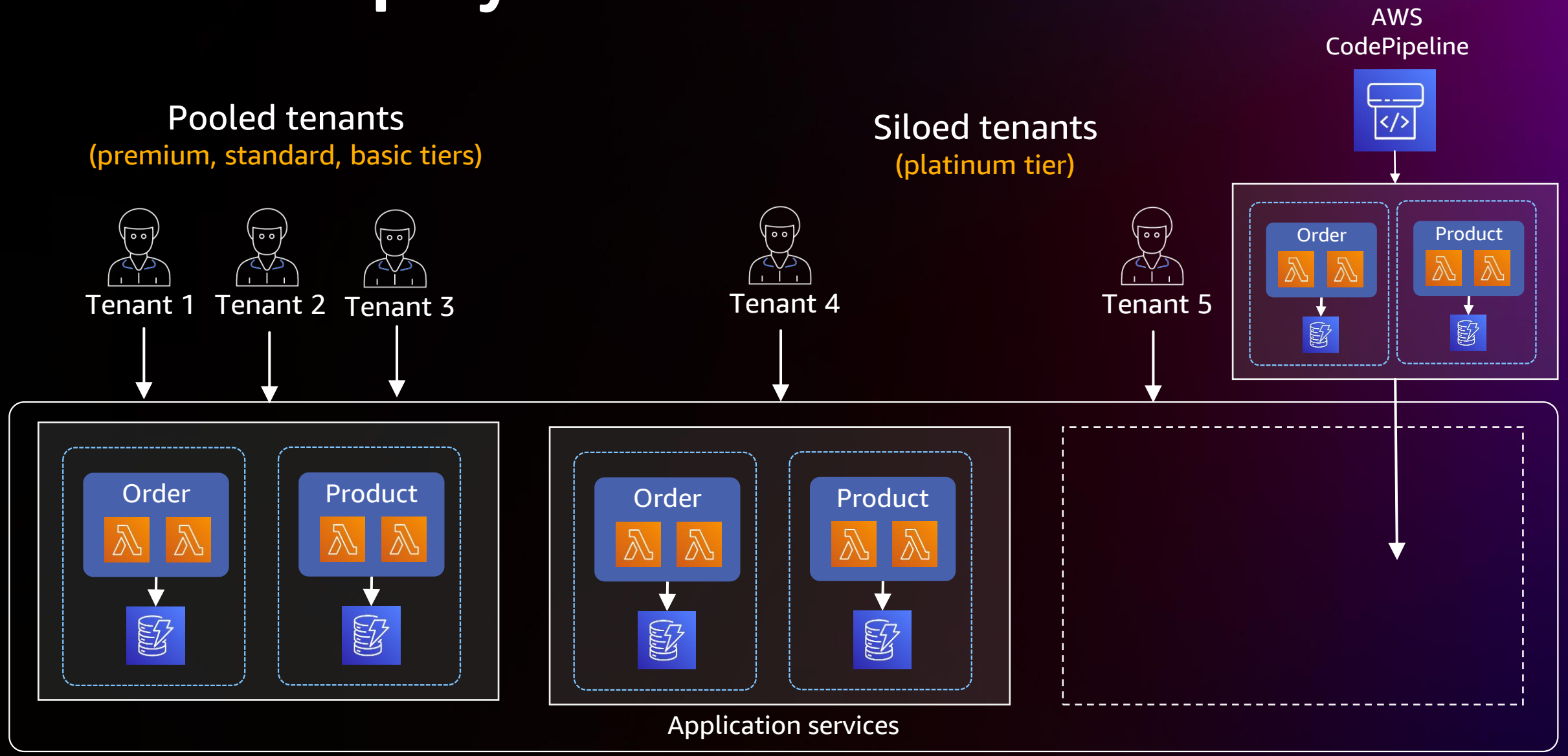
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Composing microservices from functions



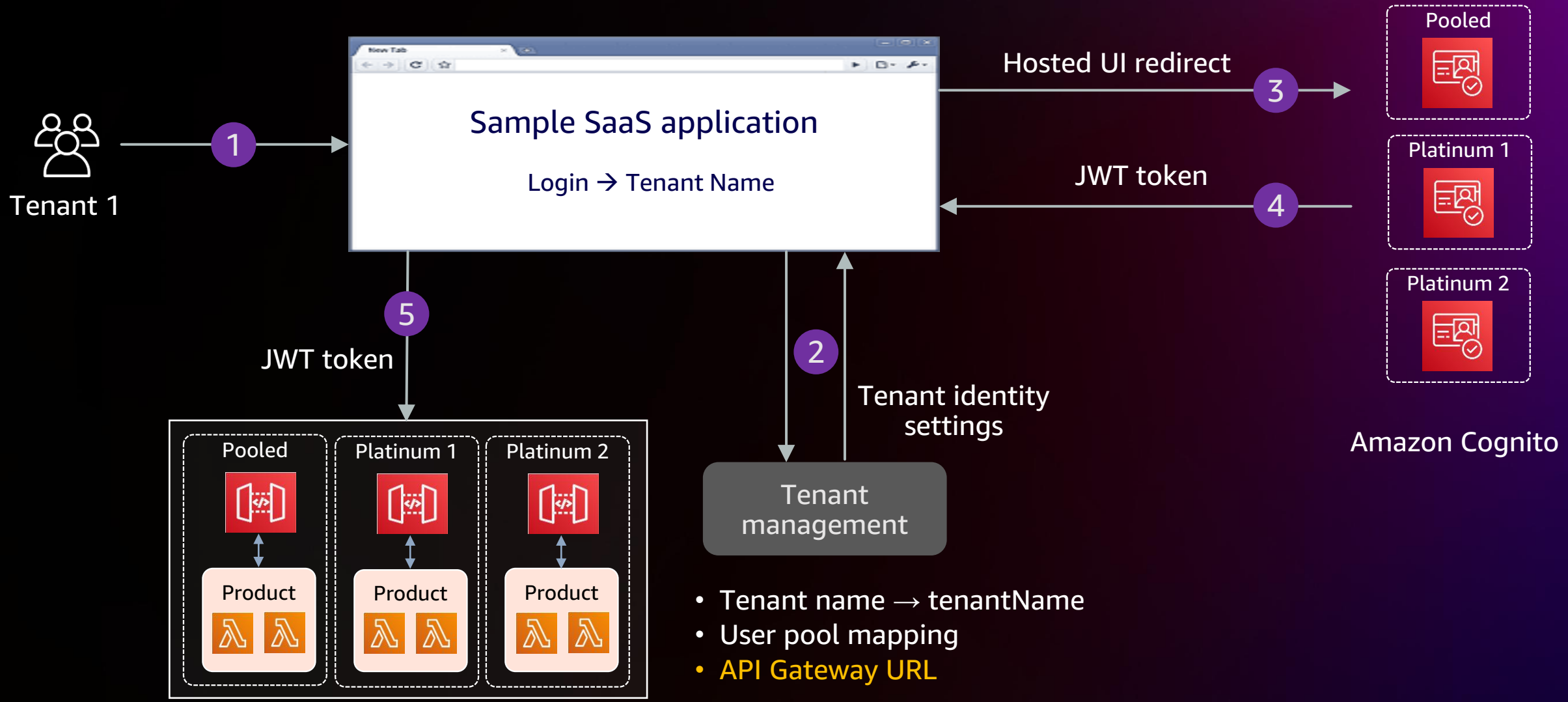
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Lambda deployment models



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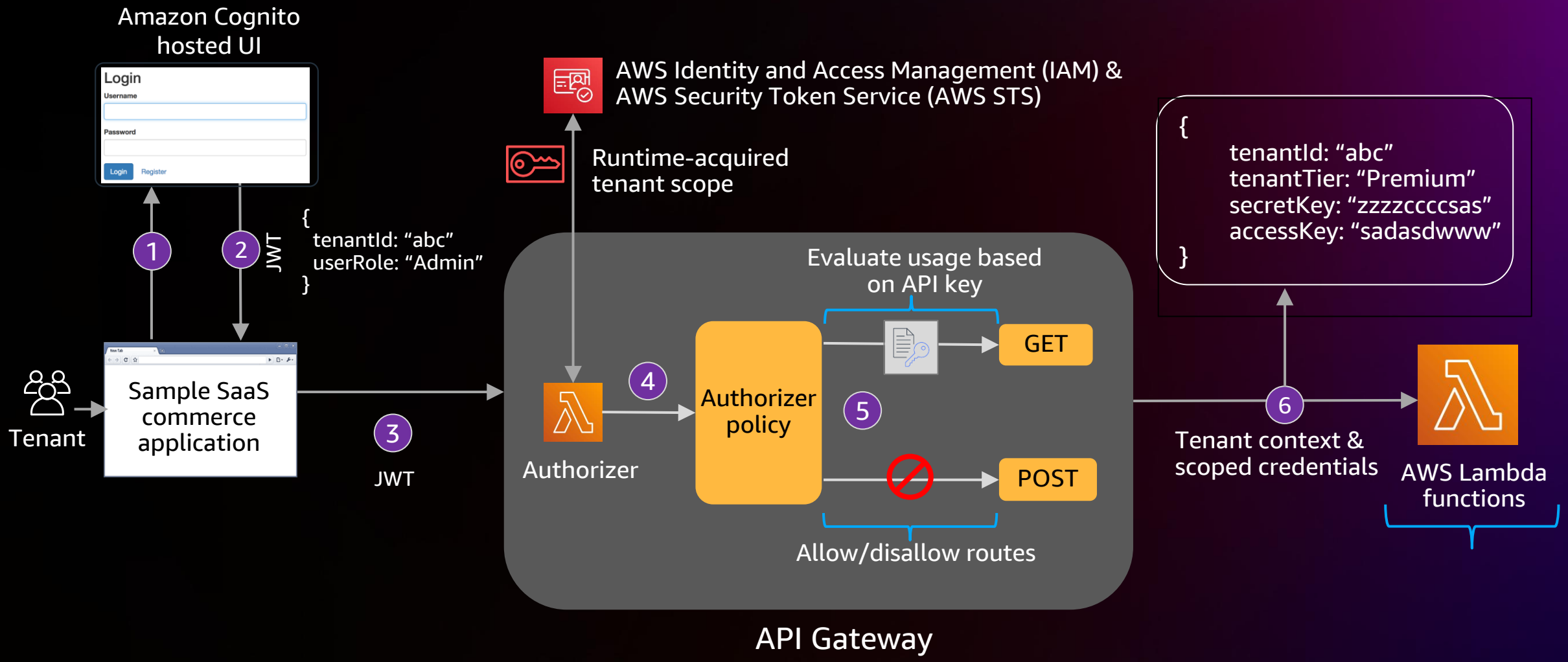
Lambda routing models



- Tenant name → tenantName
- User pool mapping
- API Gateway URL

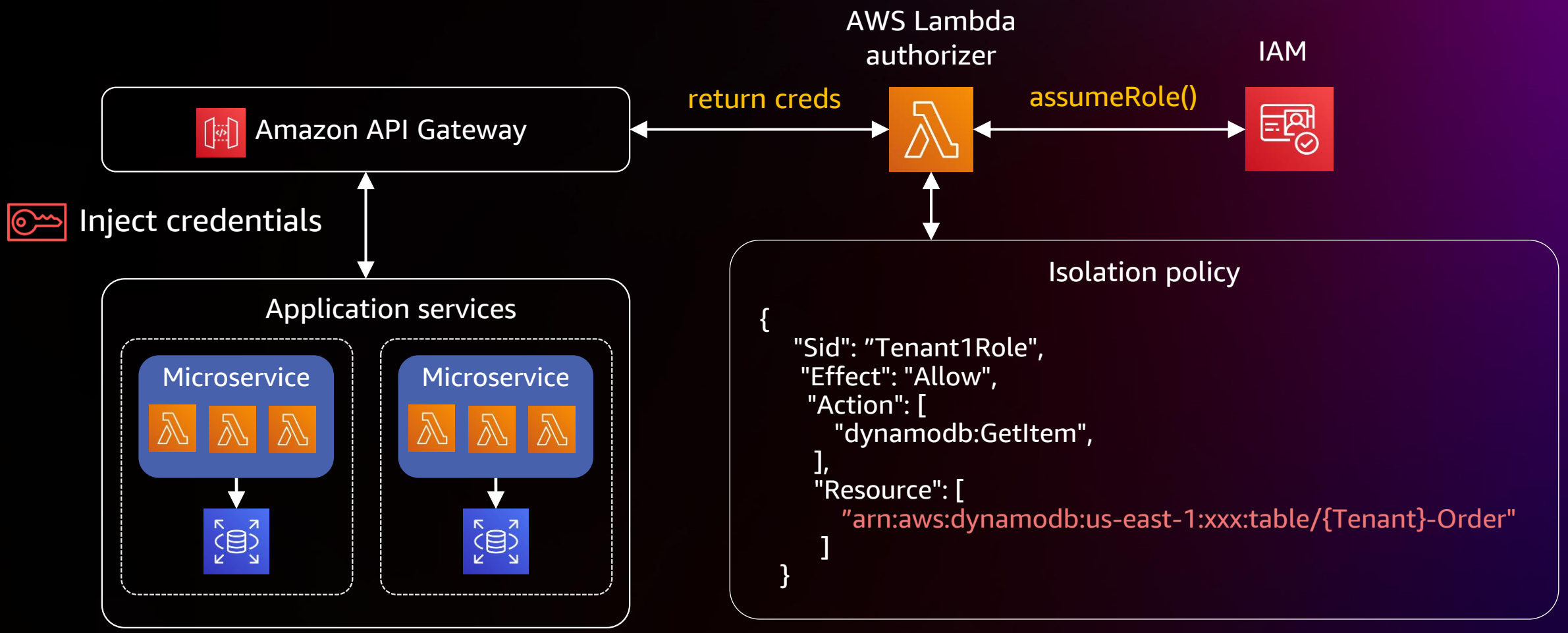
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Lambda authentication/authorization



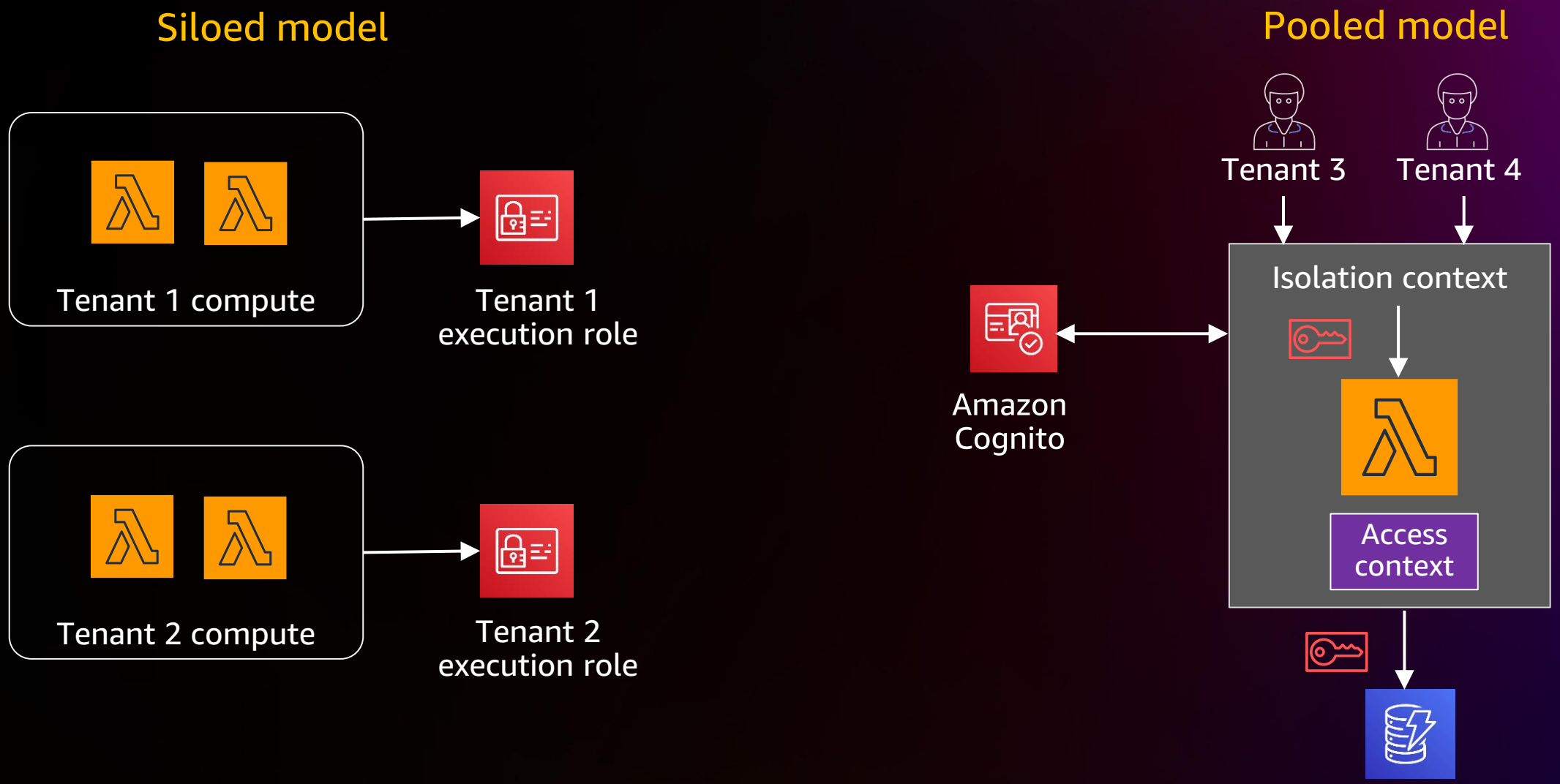
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Authorizer injected credentials



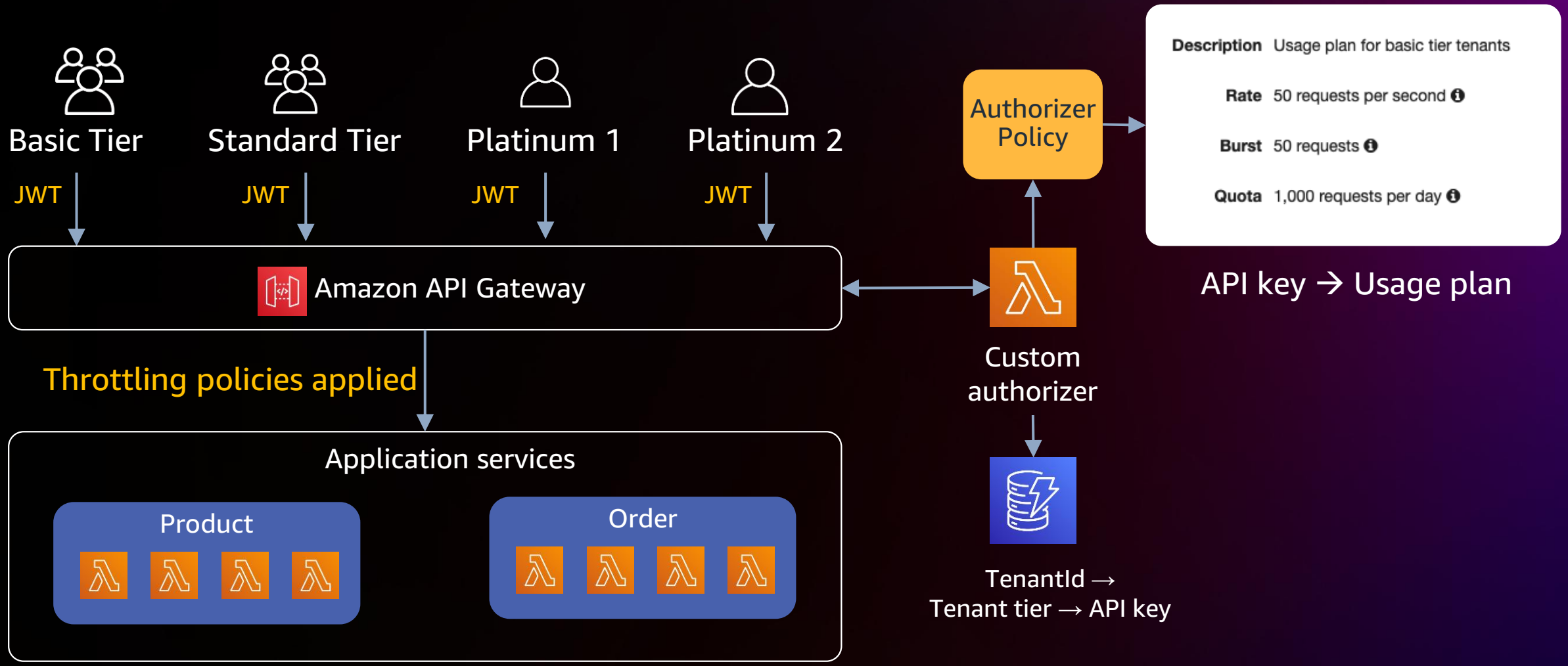
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Lambda isolation models



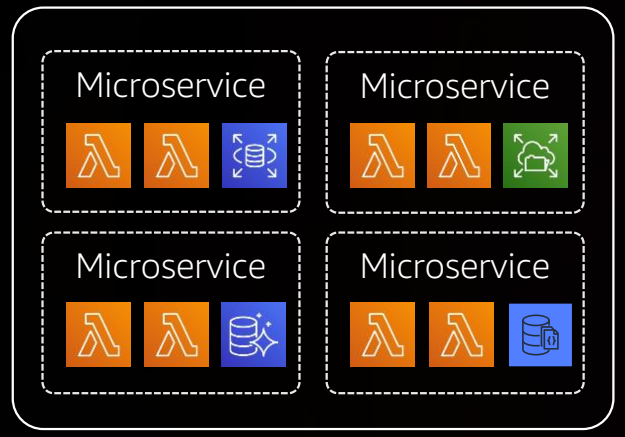
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Tier-based throttling with Lambda



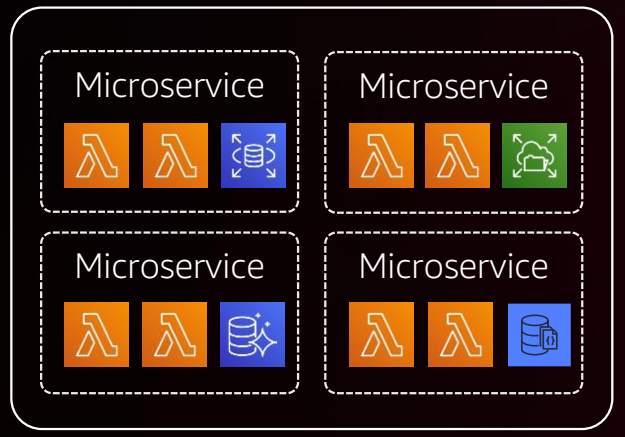
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Noisy neighbor and Lambda concurrency



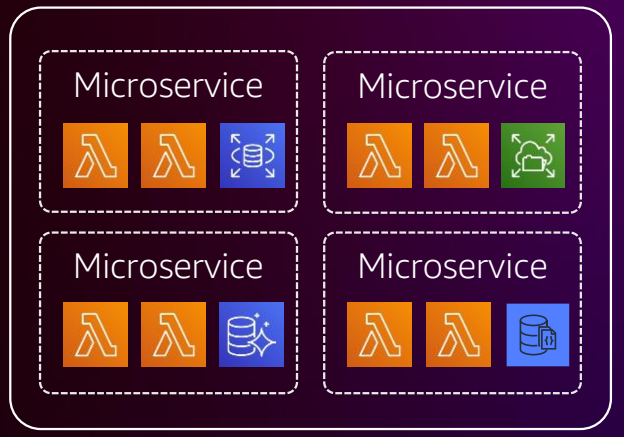
Basic tier

Reserve concurrency = 100



Advanced tier

Reserve concurrency = 300



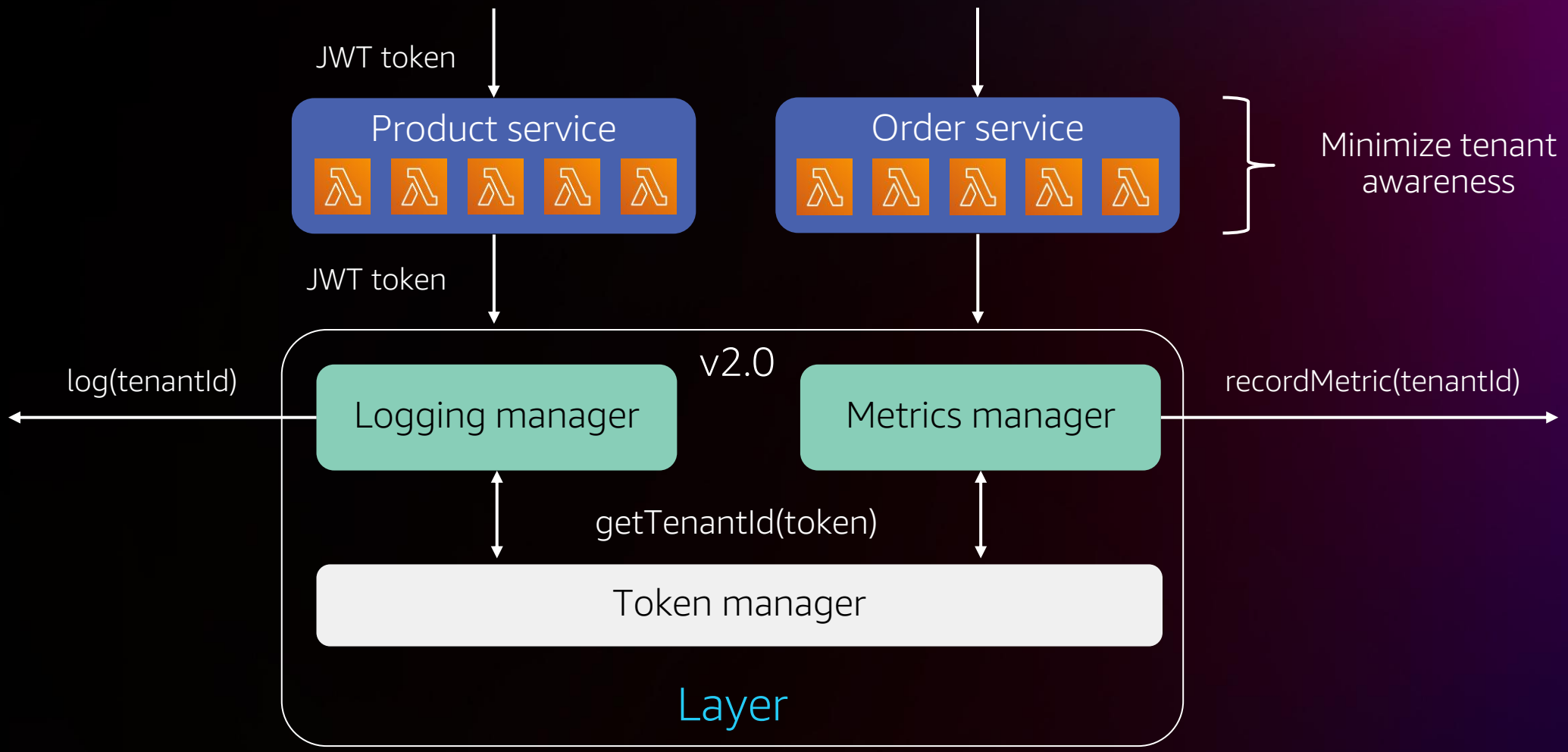
Premium tier

Reserve concurrency = All unreserved

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Lambda layers for shared constructs



Layers are deployed and versioned separately

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The multi-tenant Fargate model

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EKS and ECS on Fargate



Amazon EKS



Amazon ECS



Amazon EKS



Amazon ECS



EC2

Cluster of EC2 instances



Fargate

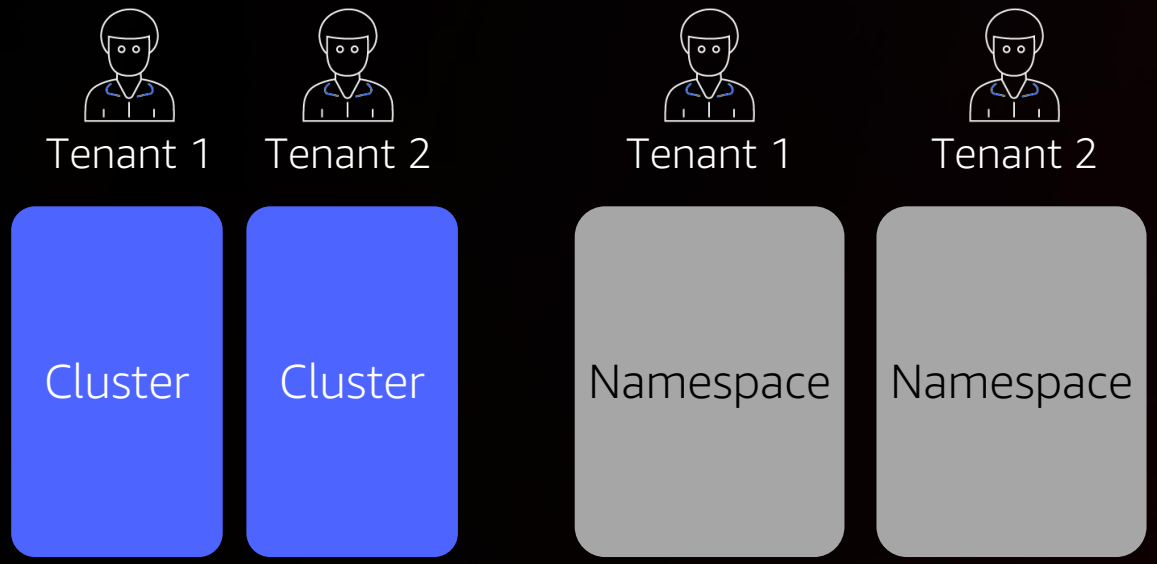
Serverless compute for containers

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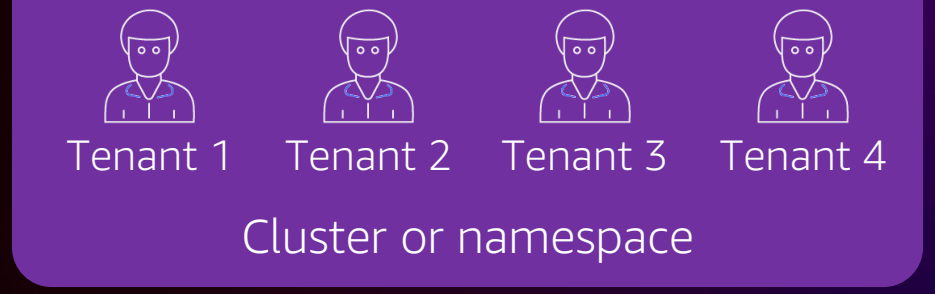
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Container deployment models

Siloed deployments

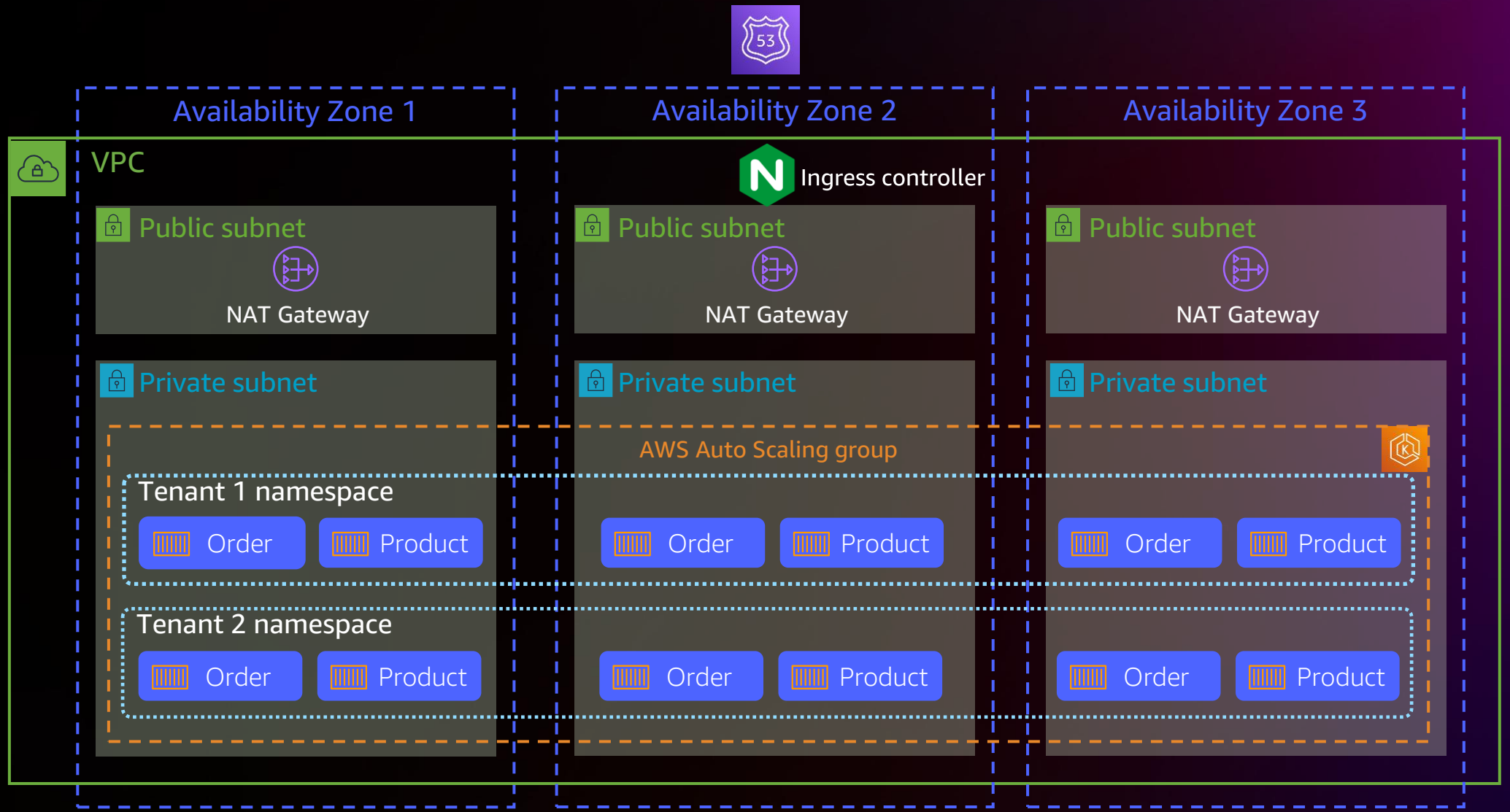


Pooled deployments



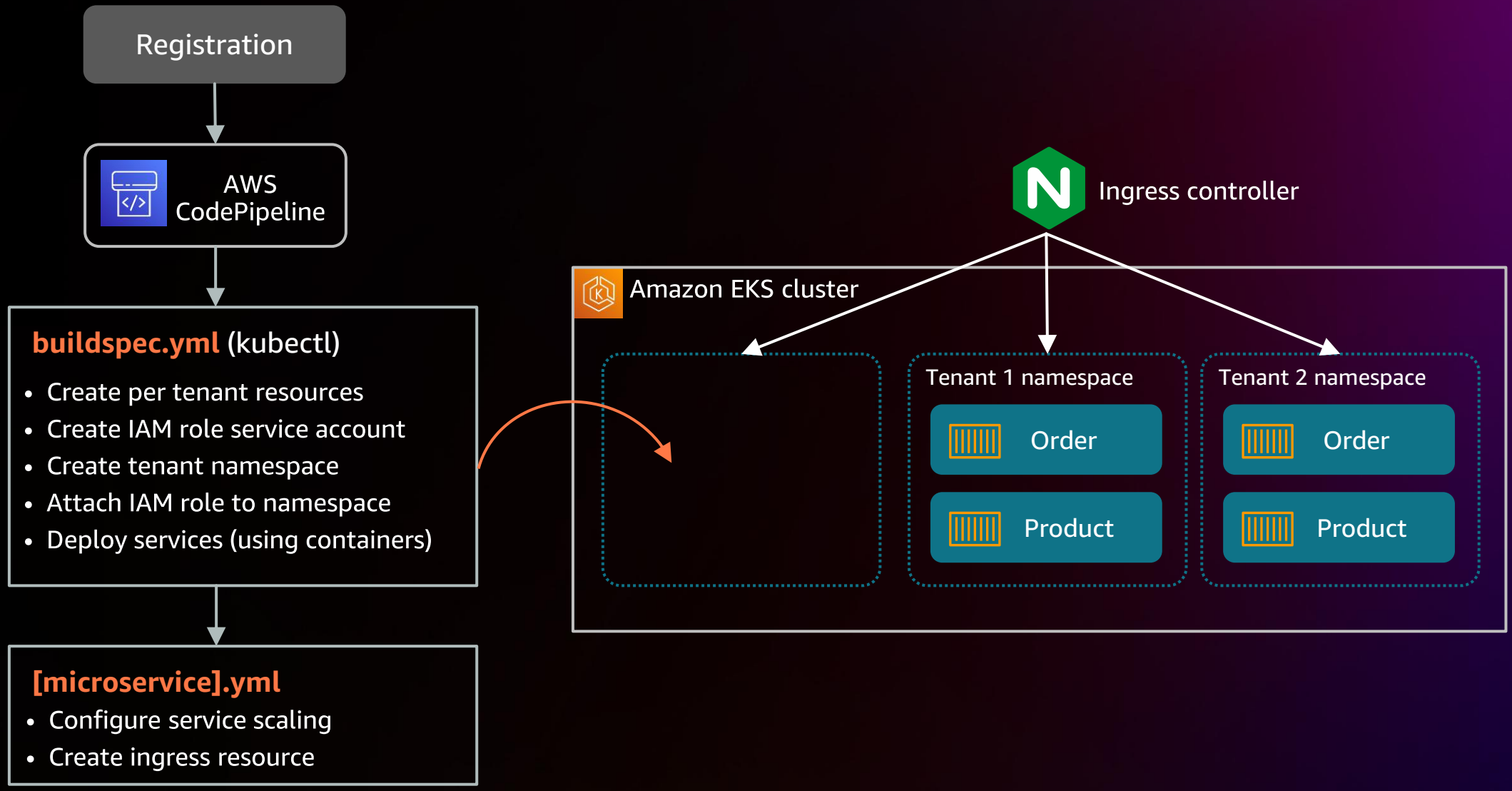
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Sample EKS deployment: Namespace per tenant



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Namespace provisioning



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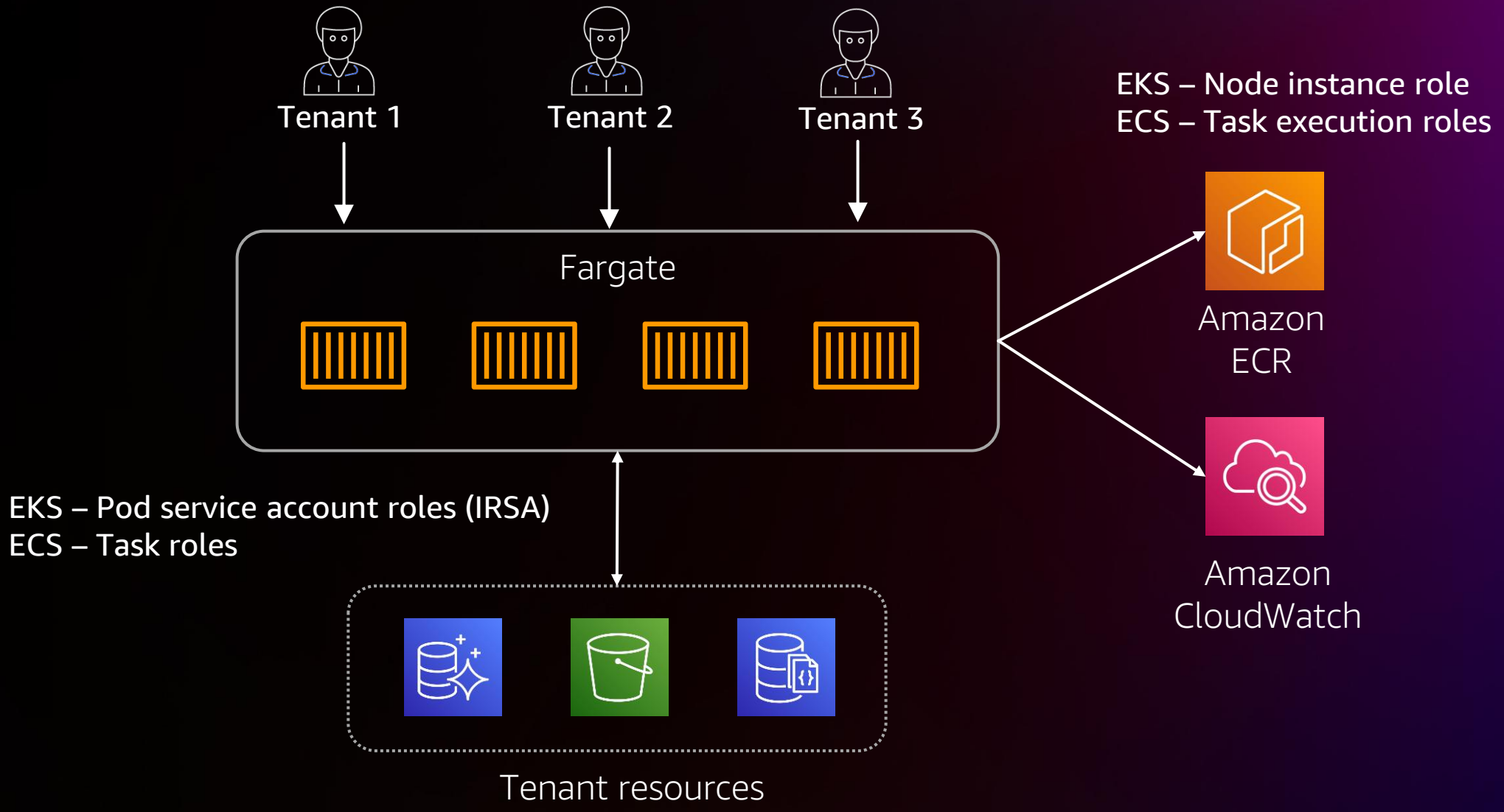
Tenant isolation: A layered model

EKS and ECS constructs
(Cluster and namespace based)

Fargate constructs

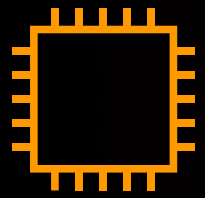
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Tenant isolation terminology/constructs



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Fargate and tenant isolation



Hardware virtualization

Tasks/pods get isolated compute



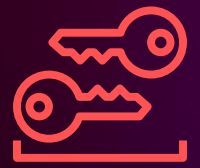
Network isolation

Tasks get dedicated ENIs



Storage isolation

Tasks get dedicated storage



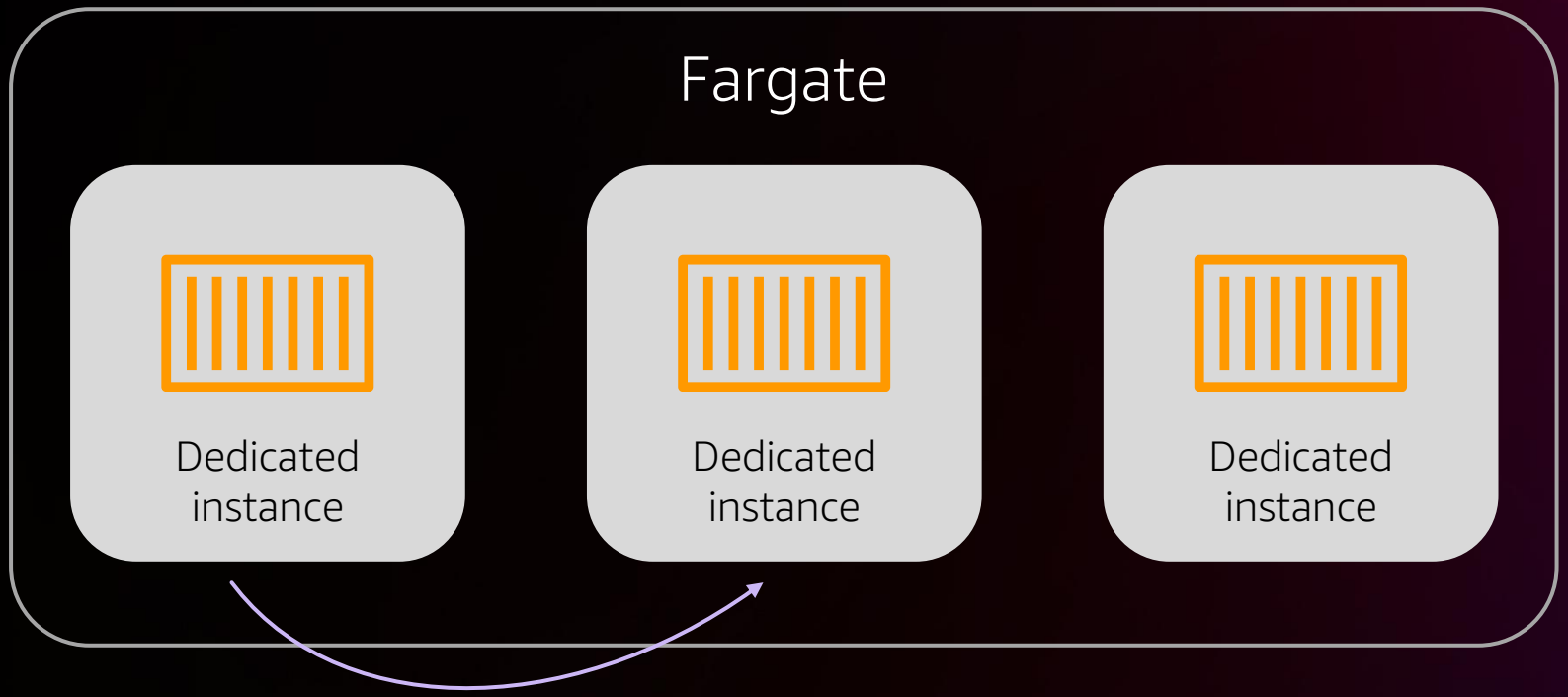
Credential isolation

Tasks get credentials scoped to applications

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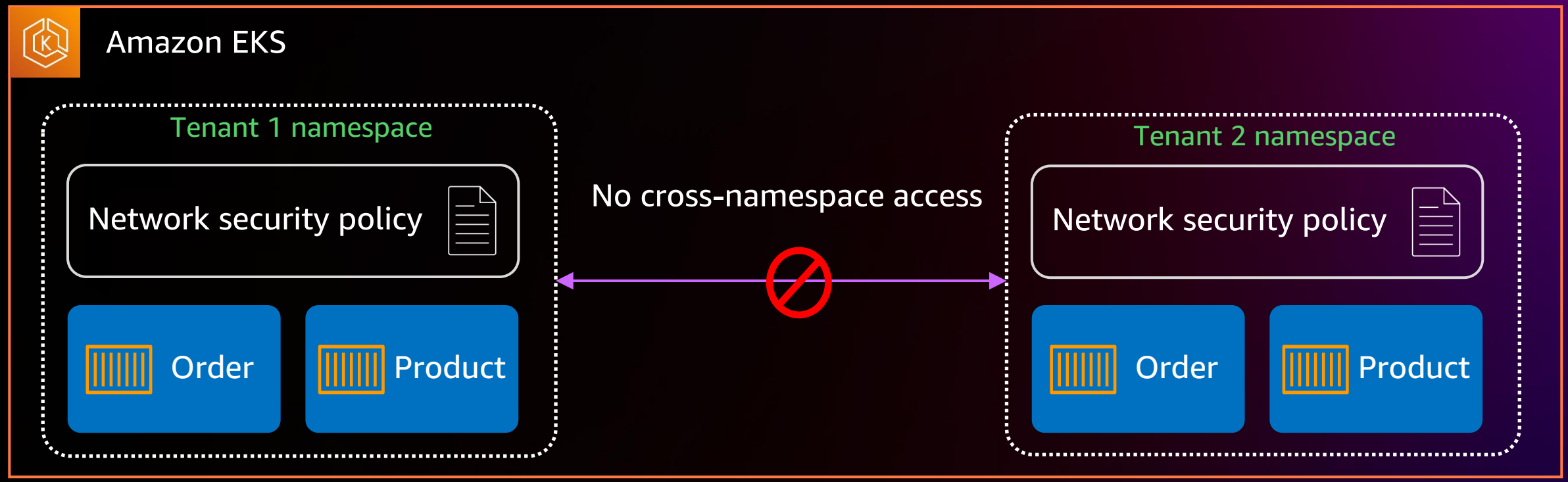
Fargate enhances the isolation model



Limits concerns about escapability

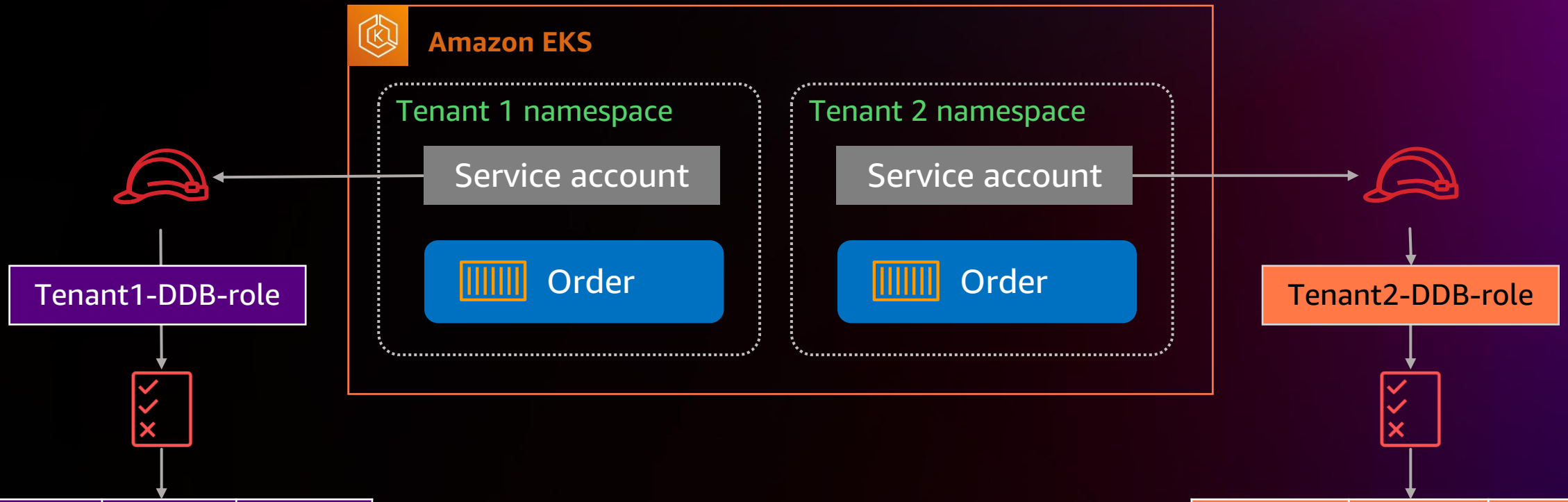
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EKS isolation with namespaces



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Applying IAM roles for service accounts (IRSA)



OrderId	Price	Quantity
20001	$500.00	20
20002	$299.99	24
20003	$204.12	30

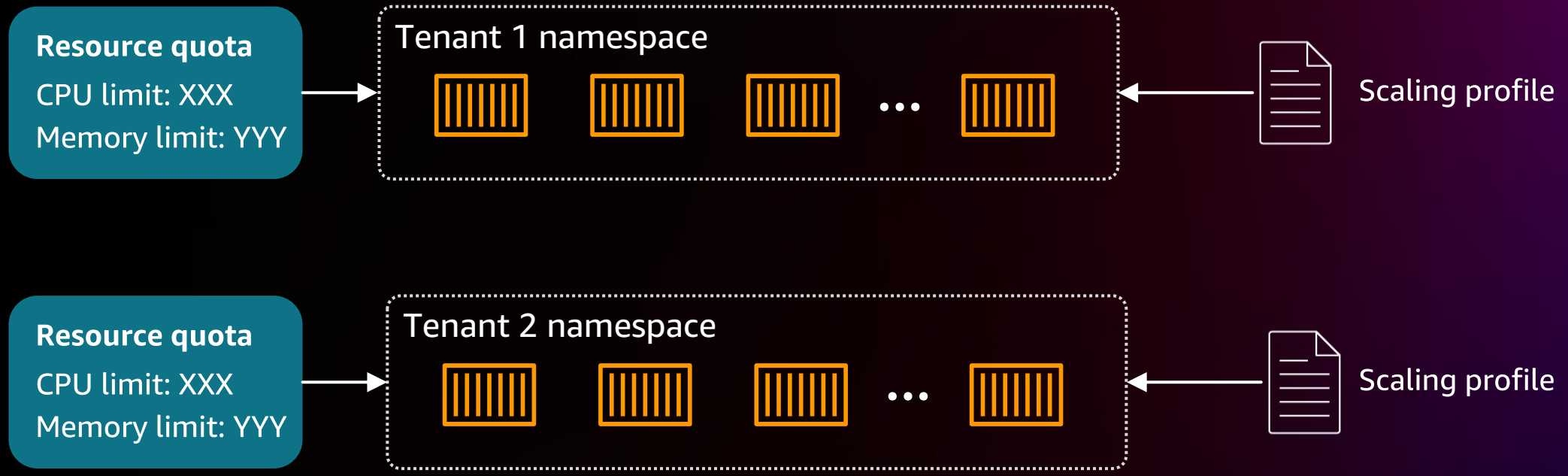
Order-Tenant1 table

OrderId	Price	Quantity
33919	$13.55	1
98194	$11.66	34
73919	$532.33	2

Order-Tenant2 table

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Tiering and throttling



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Takeaways

- Serverless aligns naturally to the SaaS value proposition
- Developer experience may drive your preferences
- Cost and operational complexity can vary based on your domain
- Factor onboarding and DevOps into your thought process
- Consider using Lambda and Fargate together

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More SaaS sessions

Breakout sessions

- SAS305 – SaaS architecture patterns: From concept to implementation
- SAS405 – SaaS microservices deep dive: Simplifying multi-tenant development
- SAS306 – SaaS migration: Inside a real-world multi-tenant transformation
- SAS302 – Supporting extensibility in SaaS environments
- PEX310 – Optimizing your multi-tenant SaaS architecture

Workshops

- SAS403 – SaaS microservices deep dive: Multi-tenancy meets microservices
- SAS402 – Serverless meets SaaS: Inside a real-world serverless SaaS solution
- SAS401 – Amazon EKS SaaS: Building a working multi-tenant environment

Business session

- PEX209 – Building your SaaS journey on AWS

More SaaS sessions

Chalk talks

- SAS307 – DevOps and SaaS: Applying automation in multi-tenant environments
- SAS303 – SaaS anywhere: Building SaaS solutions that run in hybrid models
- SAS301 – Multi-tenant meets ML: Building ML-based SaaS environments
- SAS304 – Solving the SaaS compliance puzzle
- PEX313 – The SaaS control plane: The heart of SaaS growth
- ARC403 – Amazon EKS SaaS deep dive: Inside a multi-tenant EKS solution
- ARC323 – Designing a multi-tenant SaaS tiering and throttling strategy
- SVS315 – Building multi-tenant applications with AWS Lambda and AWS Fargate

Builders' session

- ARC327 – How to optimize cost in your multi-tenant architecture

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Additional resources

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