Welcome to Week 1

AWS & Azure Academy 2024

PLURALSIGHT

Hello

About me...

HELLO
my name is

Allen Sanders
Senior Technology Instructor
Pluralsight ELS

- 27+ years in the industry

- 23+ years in teaching

- Certified Cloud architect

- Passionate about learning

- Also, passionate about Reese's Cups!

Agenda

- Speaking the language of Cloud

- Survey of AWS vs. Azure Services (Compute, Networking, Storage, Database)

- Secure networking on the Cloud (AWS PrivateLink and Azure Private Endpoints)

- Infrastructure-as-Code (IaC) – The What and the Why

How we're going to work together

- Slides and words to highlight key concepts

- Demos to bring those concepts "to life"

- Lab work (which will take place in sandboxes provided by "A Cloud Guru") for hands-on reinforcement

- NOTE: I welcome being interrupted – if you need more info, or clarification, or anything else, just break in and ask. I am here to help you.

Speaking the Language of Cloud

Application Hosting

By Application Hosting, we mean the target infrastructure and runtime platform used for deployment and execution of an application or system; can include compute (CPU and server resources), storage, network, data and operating system

Application Hosting – An "Interesting" Example?

Here's an example of someone thinking "outside-of-the-box" when it comes to application hosting!

https://mashable.com/article/pregnancy-test-doom/

What Are the Hosting Options with Cloud?

- ❑ IaaS

- ❑ PaaS

- ❑ Serverless / FaaS
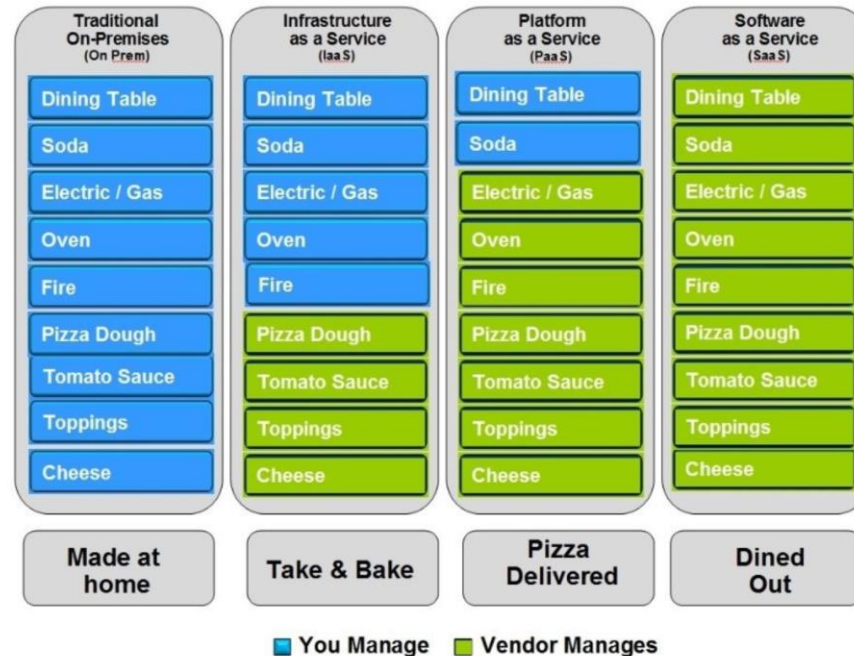
- ❑ SaaS

- ❑ Containers

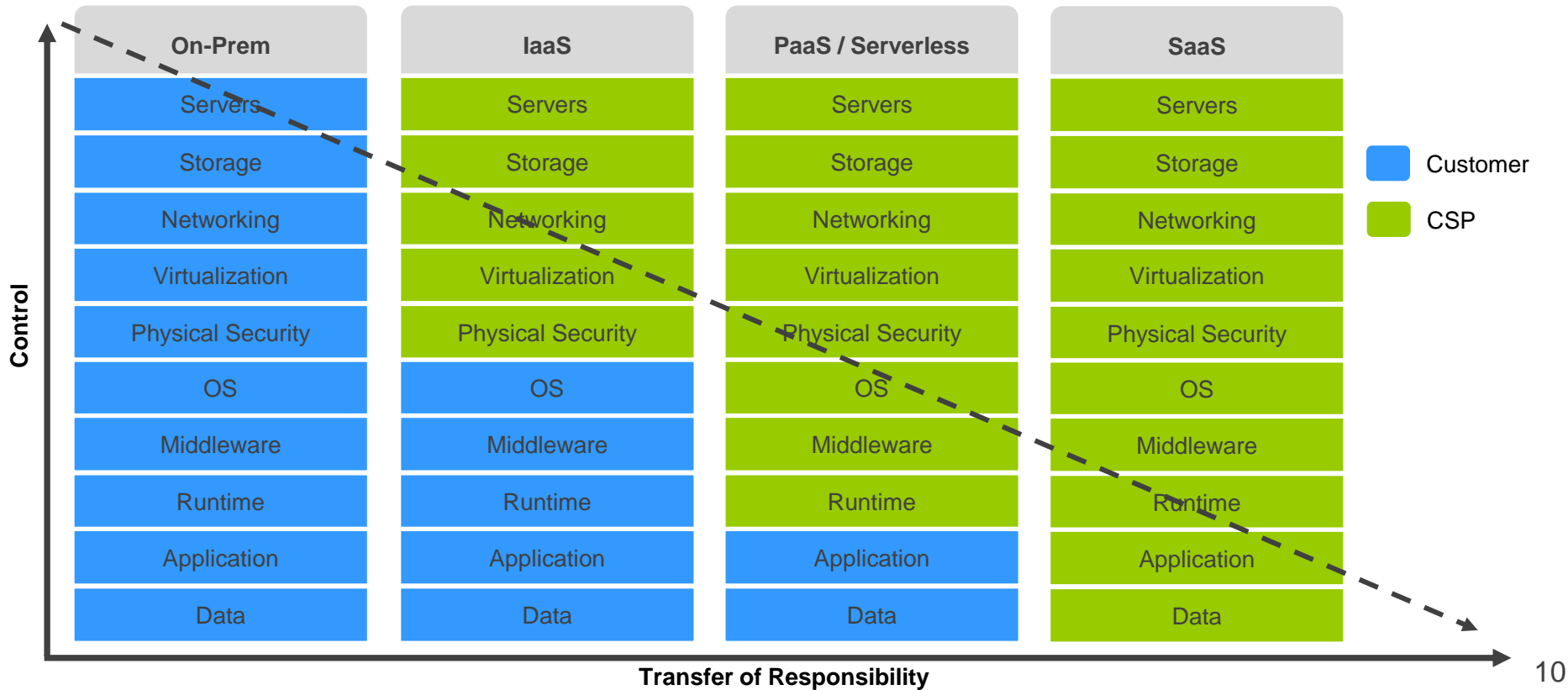# What do they all mean?

Pizza-as-a-Service

From a LinkedIn post by Albert Barron from IBM (https://www.linkedin.com/pulse/20140730172610-9679881-pizza-as-a-service/**)**

Pizza as a Service

Traditional On-Premises (On Prem)	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
Dining Table	Dining Table	Dining Table	Dining Table
Soda	Soda	Soda	Soda
Electric / Gas	Electric / Gas	Electric / Gas	Electric / Gas
Oven	Oven	Oven	Oven
Fire	Fire	Fire	Fire
Pizza Dough	Pizza Dough	Pizza Dough	Pizza Dough
Tomato Sauce	Tomato Sauce	Tomato Sauce	Tomato Sauce
Toppings	Toppings	Toppings	Toppings
Cheese	Cheese	Cheese	Cheese
Made at home	Take & Bake	Pizza Delivered	Dined Out

■ You Manage ■ Vendor Manages

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Side-by-Side Comparison

On-Prem	IaaS	PaaS / Serverless	SaaS
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking
Virtualization	Virtualization	Virtualization	Virtualization
Physical Security	Physical Security	Physical Security	Physical Security
OS	OS	OS	OS
Middleware	Middleware	Middleware	Middleware
Runtime	Runtime	Runtime	Runtime
Application	Application	Application	Application
Data	Data	Data	Data

Control

Transfer of Responsibility

Customer

CSP

Survey of AWS vs. Azure Services

Compute

AWS

Compute

AWS App Runner
Build and run production web applications at scale

Batch
Fully managed batch processing at any scale

EC2
Virtual Servers in the Cloud

EC2 Image Builder
A managed service to automate build, customize and deploy OS images

Elastic Beanstalk
Run and Manage Web Apps

Lambda
Run code without thinking about servers

Lightsail ↗
Launch and Manage Virtual Private Servers

AWS Outposts
Run AWS Services On Premises

Parallel Computing Service
Easily run HPC workloads at virtually any scale

Serverless Application Repository
Assemble, deploy, and share serverless applications within teams or publicly

AWS SimSpace Weaver
Build and run large-scale spatial simulations

Azure

Infrastructure as a Service (IaaS)

Availability sets	Community images	Compute Fleet
Azure compute galleries	Host groups	Image templates
Images	Lab accounts	Proximity placement groups
Restore Point Collections PREVIEW	SSH keys	Azure Virtual Desktop
Virtual machine scale sets	Virtual machines ★	VM application definitions
VM application versions	VM image definitions	VM image versions

Platform as a Service (PaaS)

App Services ★	Cloud services (extended support)	Azure Spring Apps
Virtual Instances for SAP solutions	Azure VMware Solution	

Serverless and microservices

Container Apps	Container Apps Environments	Function App
Kubernetes services	Kubernetes services - Automatic (Preview)	

High performance computing

BareMetal Instances	Batch accounts	Genomics accounts
Quantum Workspaces PREVIEW	SAP HANA on Azure PREVIEW	

Hybrid cloud

Azure Arc	Machines - Azure Arc

DEMO/LAB:

AWS - EC2 Instance Bootstrapping

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab01

DEMO/LAB:

AWS - Lambda Using
AWS Console

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab02

DEMO/LAB:

Azure - Function App in
Azure Portal

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab03

Networking

AWS

Networking & Content Delivery

API Gateway
Build, Deploy and Manage APIs

AWS App Mesh
Easily monitor and control microservices

Amazon Application Recovery Controller
Monitor application recovery readiness and manage failovers

AWS Cloud Map
Build a dynamic map of your cloud

CloudFront
Global Content Delivery Network

Direct Connect
Dedicated Network Connection to AWS

Global Accelerator
Improve your application's availability and performance using the AWS Global Network

AWS Private 5G
Deploy and scale private mobile networks on-premises

Route 53
Scalable DNS and Domain Name Registration

VPC
Isolated Cloud Resources

AWS PrivateLink

https://docs.aws.amazon.com/vpc/latest/privatelink/what-is-privatelink.html

https://docs.aws.amazon.com/vpc/latest/privatelink/concepts.html

https://docs.aws.amazon.com/whitepapers/latest/aws-privatelink/aws-privatelink.html

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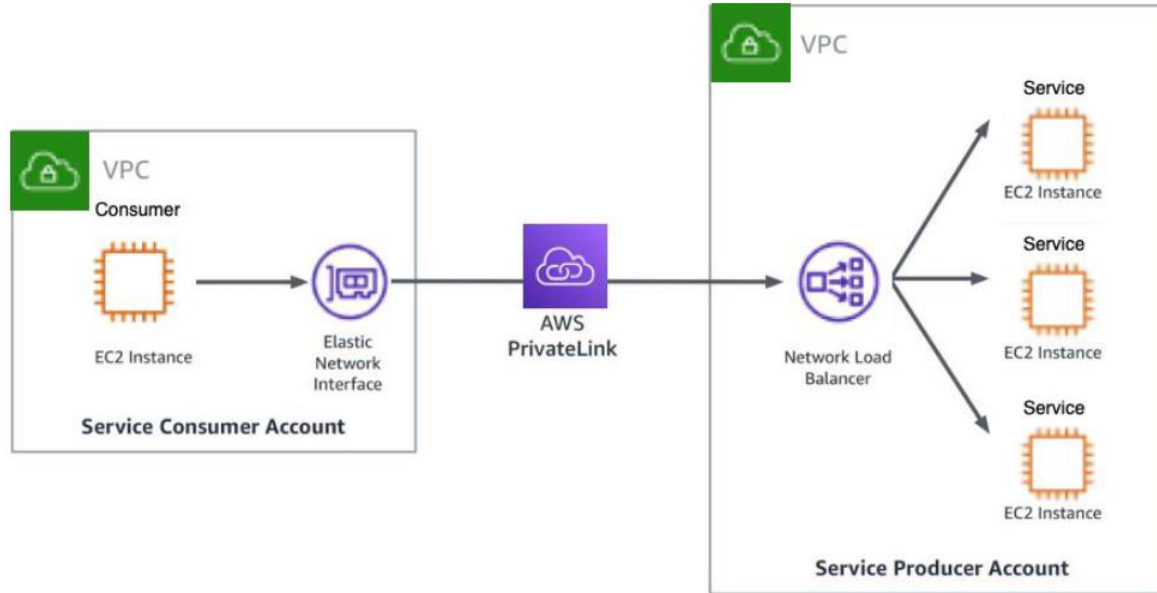
Azure

Network foundation

Bastions	Custom IP Prefixes	DNS private resolvers
DNS zones	NAT gateways	Network interfaces
Network managers	Private DNS zones	Private Link
Public IP addresses	Public IP Prefixes	Route tables
Virtual networks ★		

Hybrid connectivity

Communications Gateways	Connections	ExpressRoute circuits
ExpressRoute traffic collectors	Local network gateways	Mobile Networks
Peering Services	Peerings	Virtual network gateways
Virtual WANs		

Network security

DDoS protection plans	Firewall Manager	Firewalls
IP Groups	Network security groups	Network Security Perimeters PREVIEW
Web Application Firewall policies (WAF)		

Load balancing

Application gateways	Load balancers ★	Load balancing - help me choose

Content delivery

Front Door and CDN profiles	Microsoft Connected Cache for Internet Service Providers

Monitoring

Monitor ★	Network Watcher

Additional networking services

NGINXaaS PARTNER

Azure Private Link

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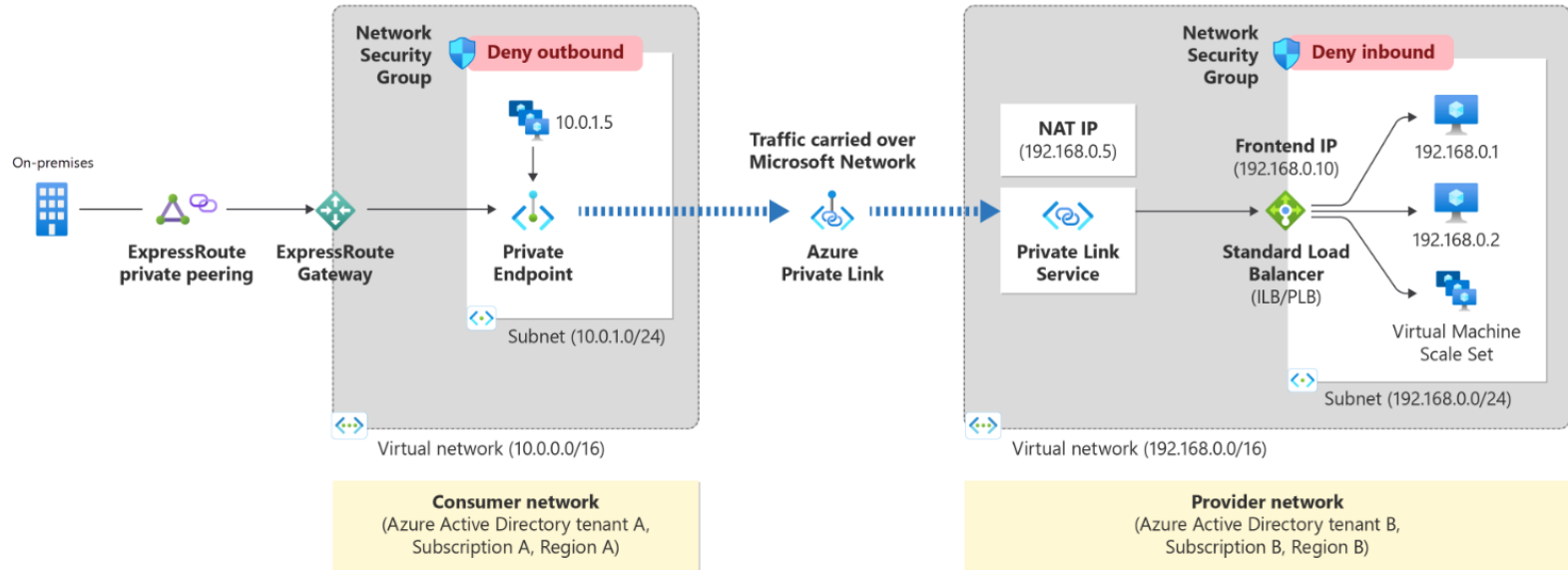
Storage

AWS

Storage

AWS Backup
AWS Backup centrally manages and automates backups across AWS services

EFS
Managed File Storage for EC2

AWS Elastic Disaster Recovery
Scalable, cost-effective application recovery to AWS

FSx
Fully managed third-party file systems optimized for a variety of workloads

S3
Scalable Storage in the Cloud

S3 Glacier
Archive Storage in the Cloud

Storage Gateway
Hybrid Storage Integration

Azure

Hybrid and edge storage

🗄️ Azure Edge Hardware Center   ☁️ Azure Stack Edge / Data Box Gateway

Object, file, and block storage

💾 Disk Accesses   🗄️ Disk Encryption Sets   💿 Disks

💾 Elastic SANs   Azure Native Qumulo Scalable File Service PARTNER   Azure NetApp Files

💾 Snapshots   Storage accounts   ★   Storage browser

Storage migration

☁️ Azure Data Box   Storage movers

Additional storage services

⚡ Data Lake Storage Gen1   HPC caches   Azure Managed Lustre

Storage Sync Services

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DEMO/LAB:

AWS - S3 and VPC

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab04

DEMO/LAB:

Azure - Private Link for Blob Storage

Execute the "Hands-On" lab available at https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab05

DEMO/LAB:

AWS - PrivateLink

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab06

Database

Relational Databases
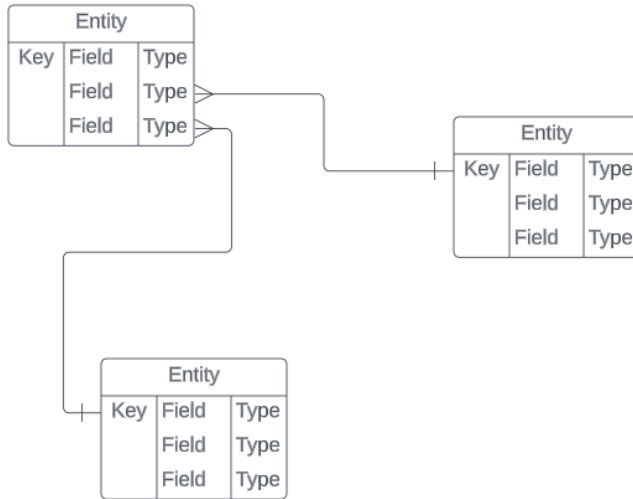
- Collection of related tables (representing entities) and fields (representing entity attributes)
- Supports identification of keys that can be used to quickly locate and uniquely identify entities
- Normalized relationships used to create hierarchies of connected entities and minimize data duplication
- Strict data design (schema)

Document Databases

```
{
    "id": "b01754e8-5108-401d-810d-ff0aa6b9337e",
    "name": {
        "first": "Melissa",
        "last": "Testing"
    },
    "address": {
        "street": "123 Main St",
        "city": "San Francisco",
        "state": "CA",
        "zip": "94105"
    }
}
```

- Data represented as a logical grouping of attributes and relationships
- Captures entire hierarchy (parent and children used to describe an entity (or "document")
- Data is repeated (rather than normalized), fully encapsulating all detail about an entity in the system
- Fluid data design

AWS

Database

☆ **Amazon DocumentDB**
Fully-managed MongoDB-compatible database service

DynamoDB
Managed NoSQL Database

ElastiCache
In-Memory Cache

Amazon Keyspaces
Serverless Cassandra-compatible database

Amazon MemoryDB
Fully managed, Redis OSS-compatible, in-memory database service

Neptune
Fast, reliable graph database built for the cloud

Amazon QLDB
Fully managed ledger database

RDS
Managed Relational Database Service

Amazon Timestream
Amazon Timestream is a fast, scalable, and serverless time series database for IoT and operational applications.

Azure

Build new applications

Azure Cosmos DB ★	Azure Database for PostgreSQL flexible servers	Azure SQL Database Hyperscale

Modernize existing applications

Azure Cosmos DB for MongoDB (vCore)	Azure Database for MySQL flexible servers	Azure Managed Instance for Apache Cassandra
Oracle Database@Azure	SQL databases ★	SQL managed instances
SQL virtual machines		

Hybrid data services

Azure Arc data controllers	PostgreSQL servers – Azure Arc PREVIEW	SQL managed instances - Azure Arc
SQL Server - Azure Arc		

Additional data services

Azure Cache for Redis	Azure Database Migration Services	Elastic Job agents
Managed databases	SQL Server stretch databases	

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DEMO/LAB:

AWS - Serverless with DB

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab07

DEMO/LAB:

Azure - MySQL Database

Execute the "Hands-On" lab available at
https://github.com/KernelGamut32/aws_azure_academy_2024_public/tree/main/week01/labs/lab08

Containerization

So, What Are Containers?

- Form of virtualization at the app packaging level (like virtual machines at the server level)
- Isolated from one another at the OS process layer (vs VM's which are isolated at the hardware abstraction layer)
- Images represent the packaging up of an application and its dependencies as a complete, deployable unit of execution (code, runtime and configuration)

So, What Are Containers?

- A platform (e.g., Docker) running on a system can be used to dynamically create containers (executable instances of the app) from the defined image
- Typically, much, much smaller than a VM which makes them lightweight, quickly deployable and quick to "boot up"
- An orchestration engine (e.g., Kubernetes) might be used to coordinate multiple instances of the same container (or a "pod" of containers) to enable the servicing of more concurrent requests (scalability)

So, What Are Containers?
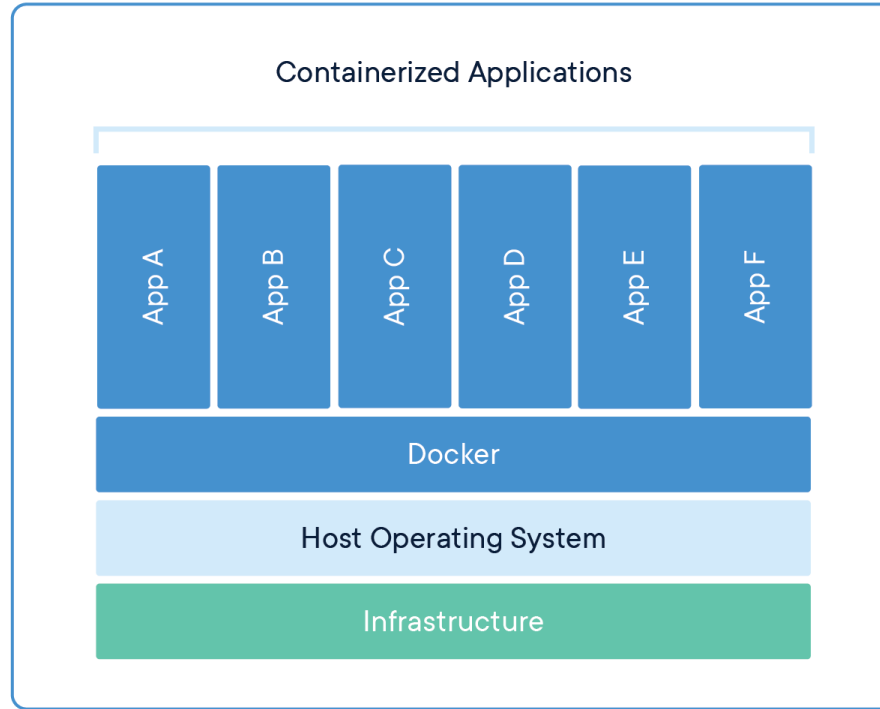
So, How Do Containers & Microservices Fit Together?

- Microservices – with their smaller size, independently-deployable and independently-scalable profile, and encapsulated business domain boundary – are a great fit for containers
- Using Kubernetes, sophisticated systems of integrated microservices can be built, tested and deployed
- Leveraging the scheduling and scalability benefits of Kubernetes can help an organization target scaling across a complex workflow in very granular ways
- This helps with cost management as you can toggle individual parts of the system for optimized performance

AWS

Containers

Elastic Container Registry

Fully-managed Docker container registry : Share and deploy container software, publicly or privately

Elastic Container Service

Highly secure, reliable, and scalable way to run containers

Elastic Kubernetes Service

The most trusted way to start, run, and scale Kubernetes

Red Hat OpenShift Service on AWS

Fully managed Red Hat OpenShift service on AWS

Azure

Container infrastructure

🔵 Container instances   ☁️ Container registries

Container management

🟣 Kubernetes fleet manager   🟣 Kubernetes services   🟣 Kubernetes services - Automatic (Preview)

🔴 Azure Red Hat OpenShift clusters   🟠 Service Fabric clusters   🟠 Service Fabric managed clusters
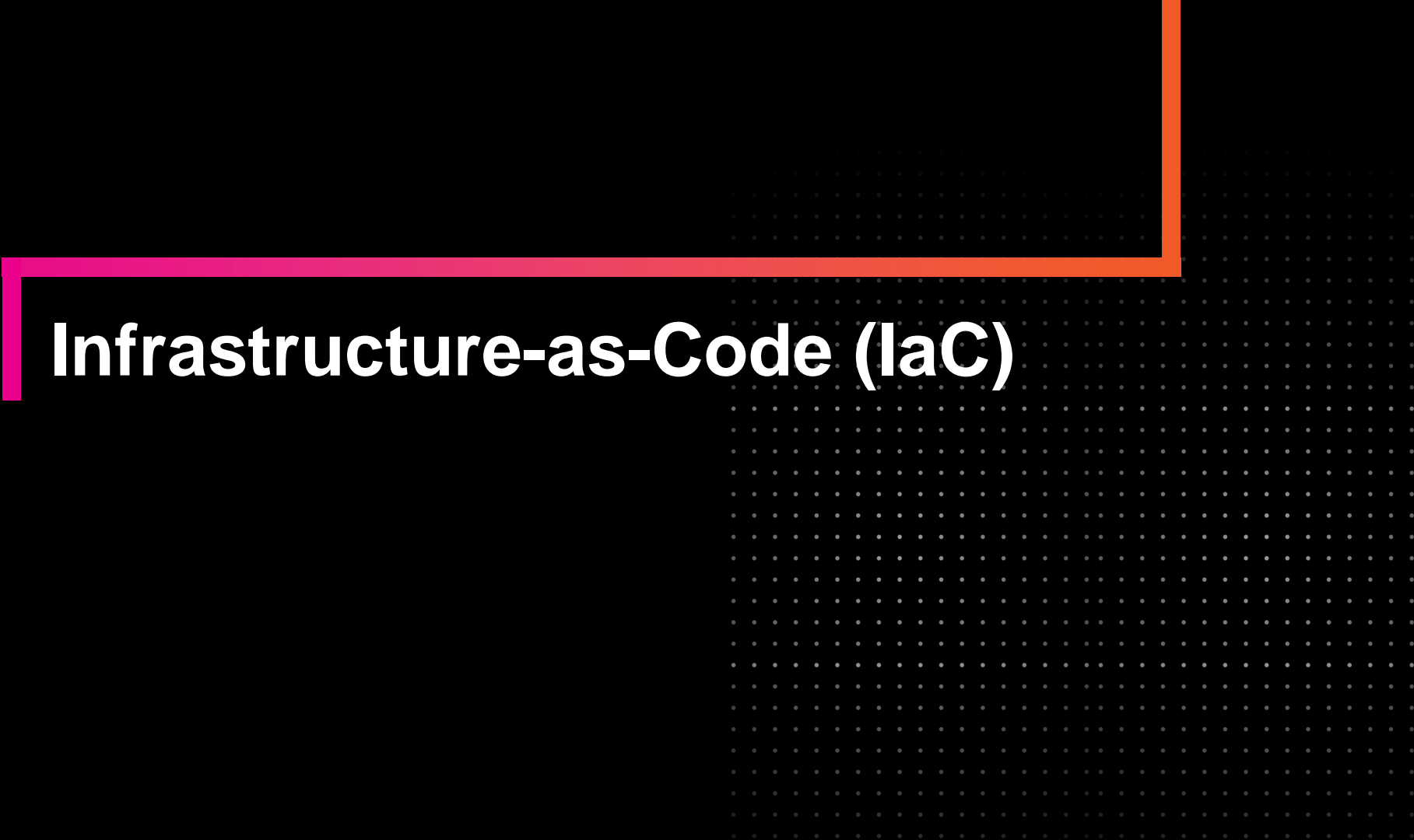
Containerized applications

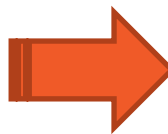🟢 App Configuration   🟣 Container App Jobs   🟣 Container Apps

Infrastructure-as-Code (IaC)

The What and the Why
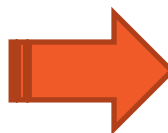
IaC – What is it?

- As the name implies, the definition & configuration of our infrastructure IN code

- Instead of manually creating (inefficient) → automated in scripts that run "at the push of a button"

IaC – Why is it valuable?

- If only creating a handful of resources, manual is (probably) fine

- Creating hundreds (or even thousands), not so much!

- Modern DevOps is built around automation – quickly tearing down and rebuilding entire sets of infrastructure as and when required
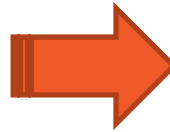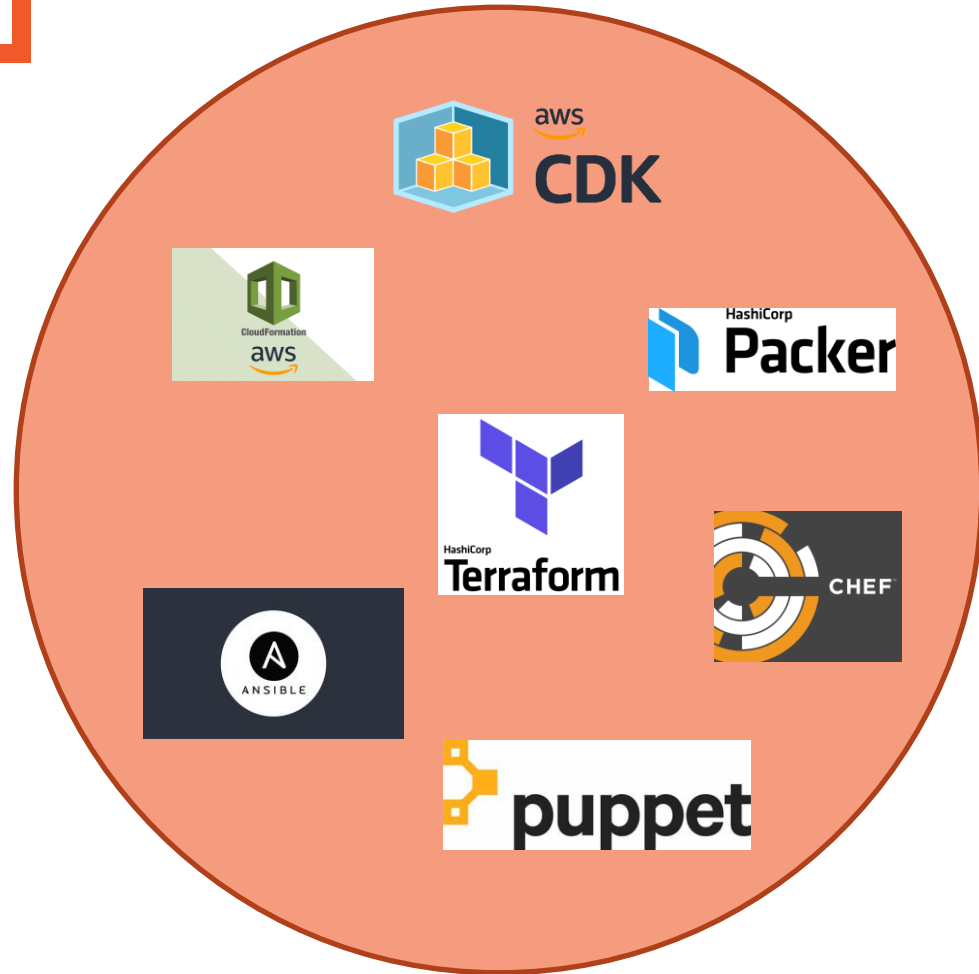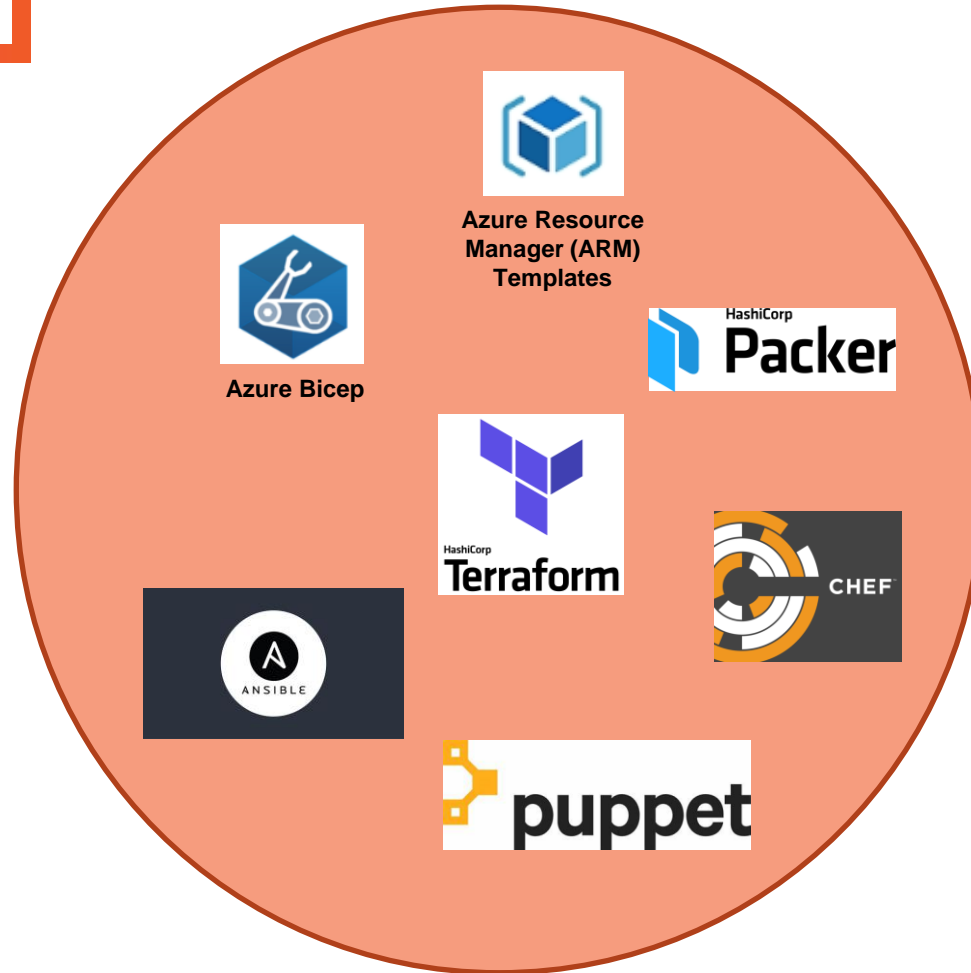
IaC – Advantages?

Testable

Repeatable

Auditable

IaC – AWS

IaC – Azure

Azure Resource Manager (ARM) Templates

Azure Bicep

HashiCorp Packer

HashiCorp Terraform

CHEF

ANSIBLE

puppet

Thank you!

If you have additional questions, please reach out to me at: asanders@gamuttechnologysvcs.com