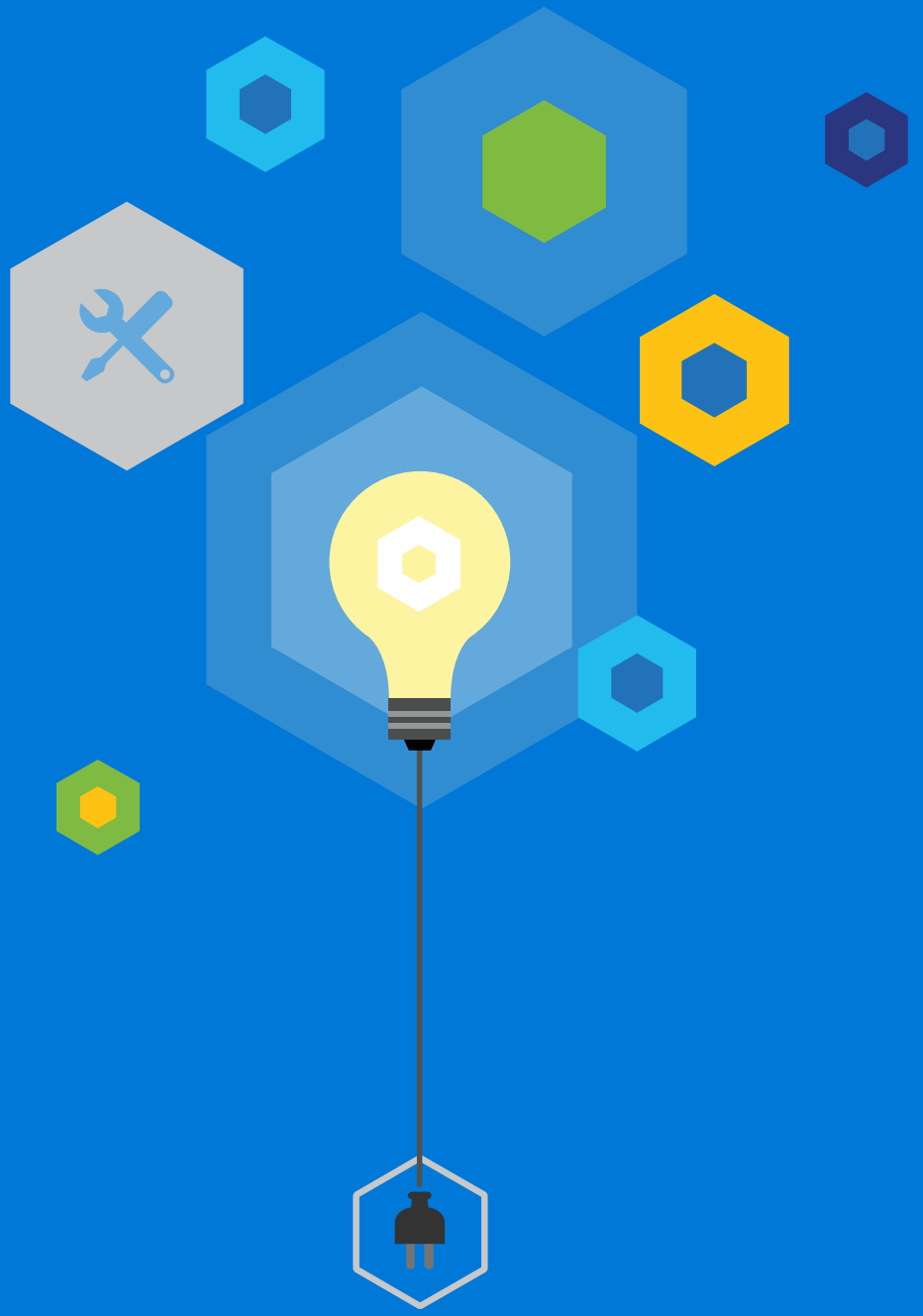
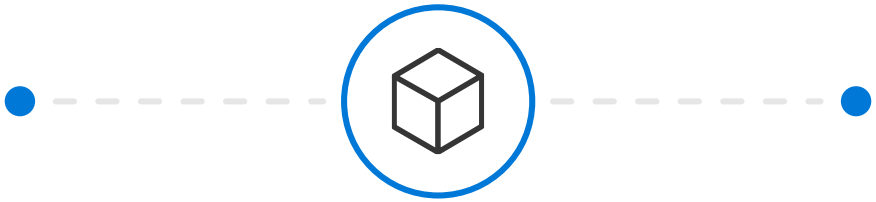
The container ecosystem @ Microsoft

A story of developer productivity

Nills Franssens
Cloud Solution Architect
@nillsf



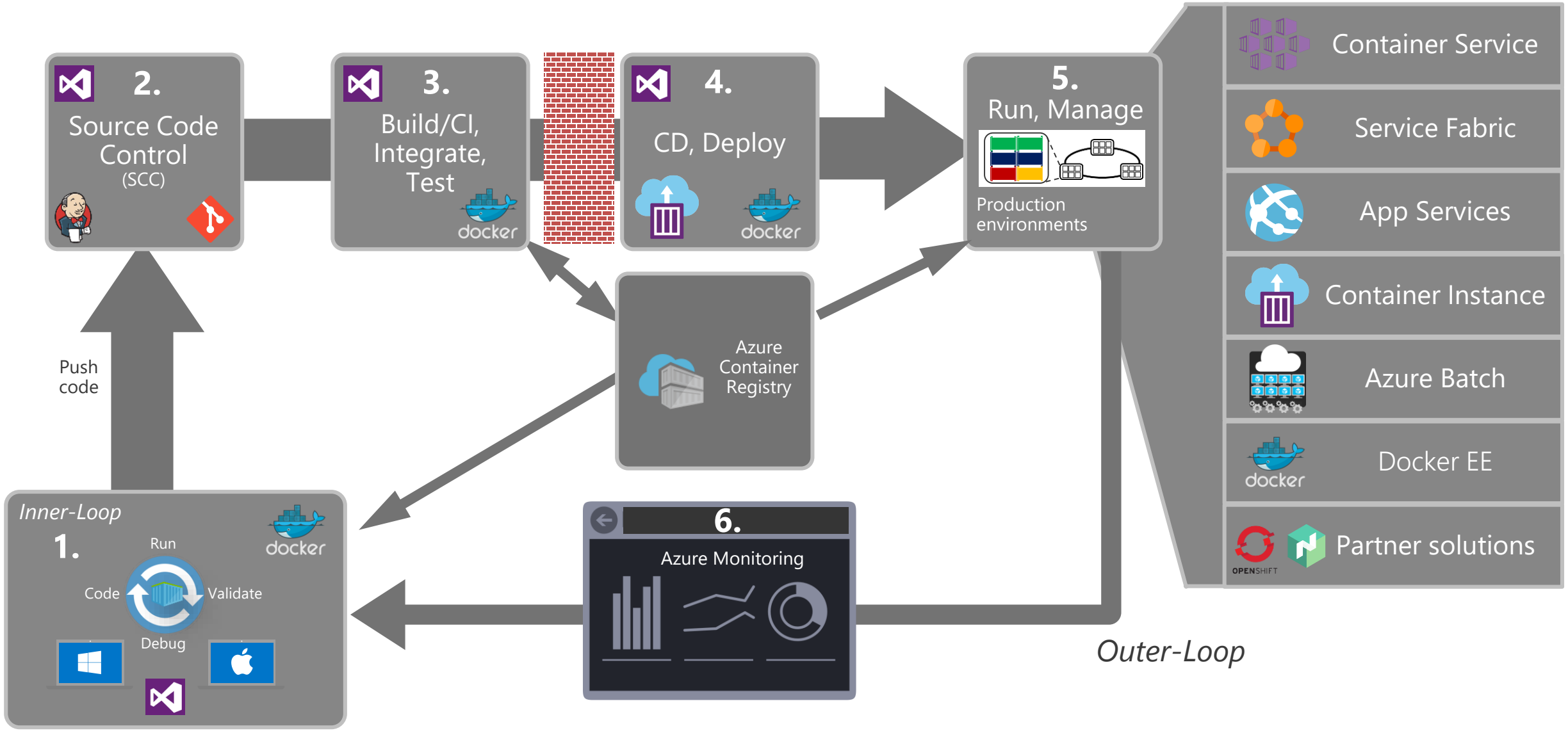
Industry analysts **agree**



"By 2020, more than 50% of enterprises will run mission-critical, containerized cloud-native applications in production, up from less than 5% today."

Gartner®

Containerized workflow – Our agenda for today



An Inspiration: Cargo Transport Pre-1960

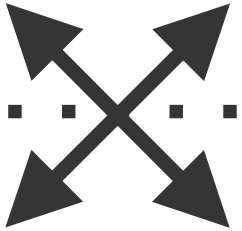
Multiplicity of Goods





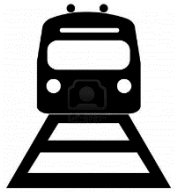


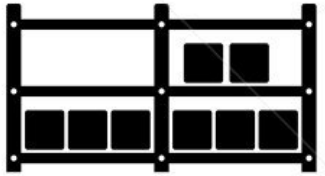
Do I worry about how goods interact (e.g. coffee beans next to spices)



Multipilicity of methods for transporting/storing






Can I transport quickly and smoothly (e.g. from boat to train to truck)

Solution: Intermodal Shipping Container Ecosystem

Multiplicity of Goods





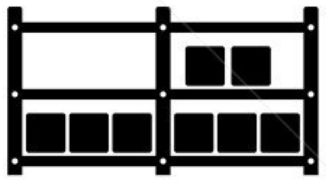


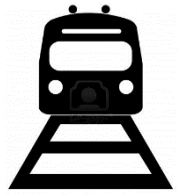
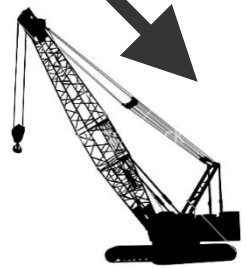
Do I worry about how goods interact (e.g. coffee beans next to spices)

A standard container that is loaded with virtually any goods, and stays sealed until it reaches final delivery.

…in between, can be loaded and unloaded, stacked, transported efficiently over long distances, and transferred from one mode of transport to another

Multiplicity of methods for transporting/storing

Can I transport quickly and smoothly (e.g. from boat to train to truck)

The Intermodal Shipping Container Ecosystem

- 90% of all cargo now shipped in a standard container
- Order of magnitude reduction in cost and time to load and unload ships
- Massive reduction in losses due to theft or damage
- Huge reduction in freight cost as percent of final goods (from >25% to <3%)
- massive globalization
- 5000 ships deliver 200M containers per year

The Problem in 2017: Distributed Applications

Multiplicity of Stacks

Static website

nginx 1.5 + modsecurity + openssl + bootstrap 2

User DB

postgresql + pgv8 + v8

Queue

Redis + redis-sentinel

Analytics DB

hadoop + hive + thrift + OpenJDK

Background workers

Python 3.0 + celery + pyredis + libcurl + ffmpeg + libopencv + nodejs + phantomjs

Web frontend

Ruby + Rails + sass + Unicorn

API endpoint

Python 2.7 + Flask + pyredis + celery + psycopg + postgresql-client

Do services and apps interact appropriately?

Multiplicity of hardware environments

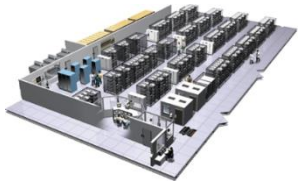
Development VM

QA server

Customer Data Center

Production Servers

Public Cloud



Disaster recovery

Production Cluster

Contributor's laptop

Can I migrate smoothly and quickly?

Let's create an **ecosystem** for **distributed** applications

Multiplicity of Stacks

Static website

User DB

Web frontend

Queue

Analytics DB

Do services and apps interact appropriately?

An engine that enables any payload to be encapsulated as a lightweight, portable, self-sufficient container…

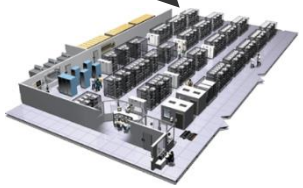
…that can be manipulated using standard operations and run consistently on virtually any hardware platform

Multiplicity of hardware environments

Development VM

QA server

Customer Data Center



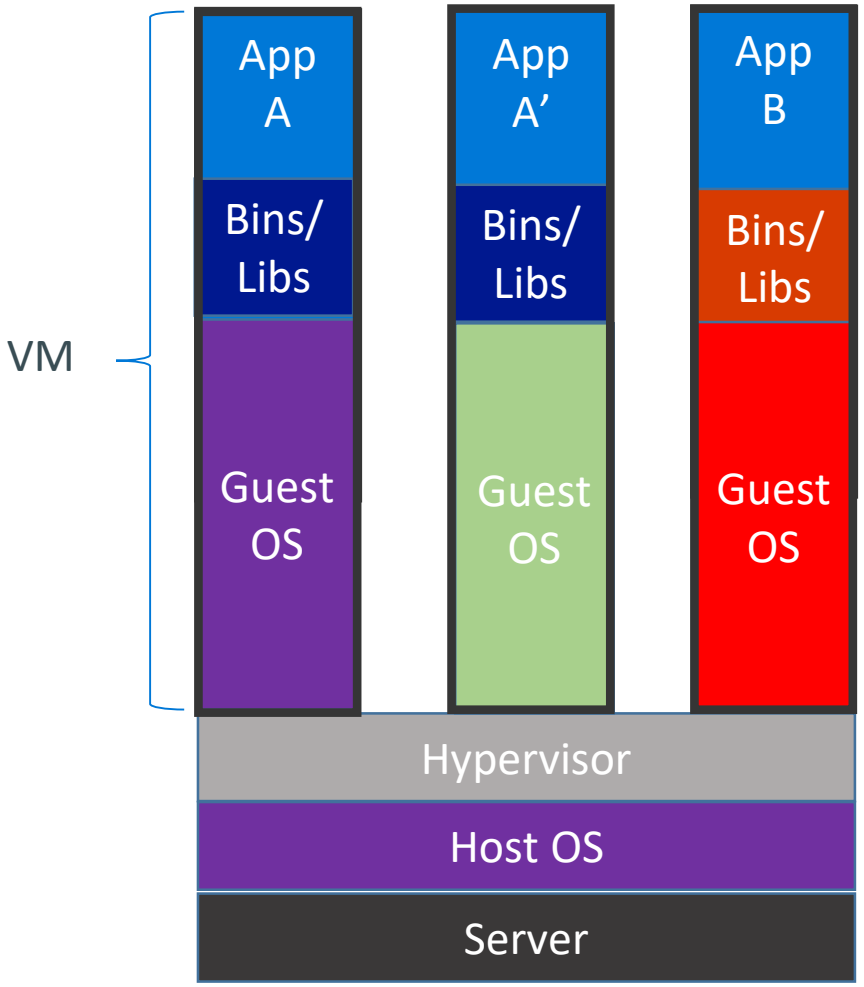
Public Cloud

Production Cluster

Contributor's laptop

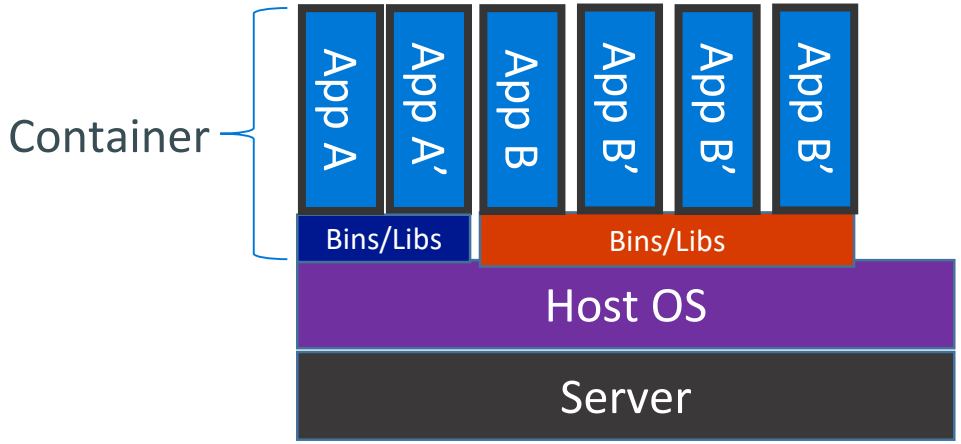
Can I migrate smoothly and quickly

Comparison: Containers vs. VMs

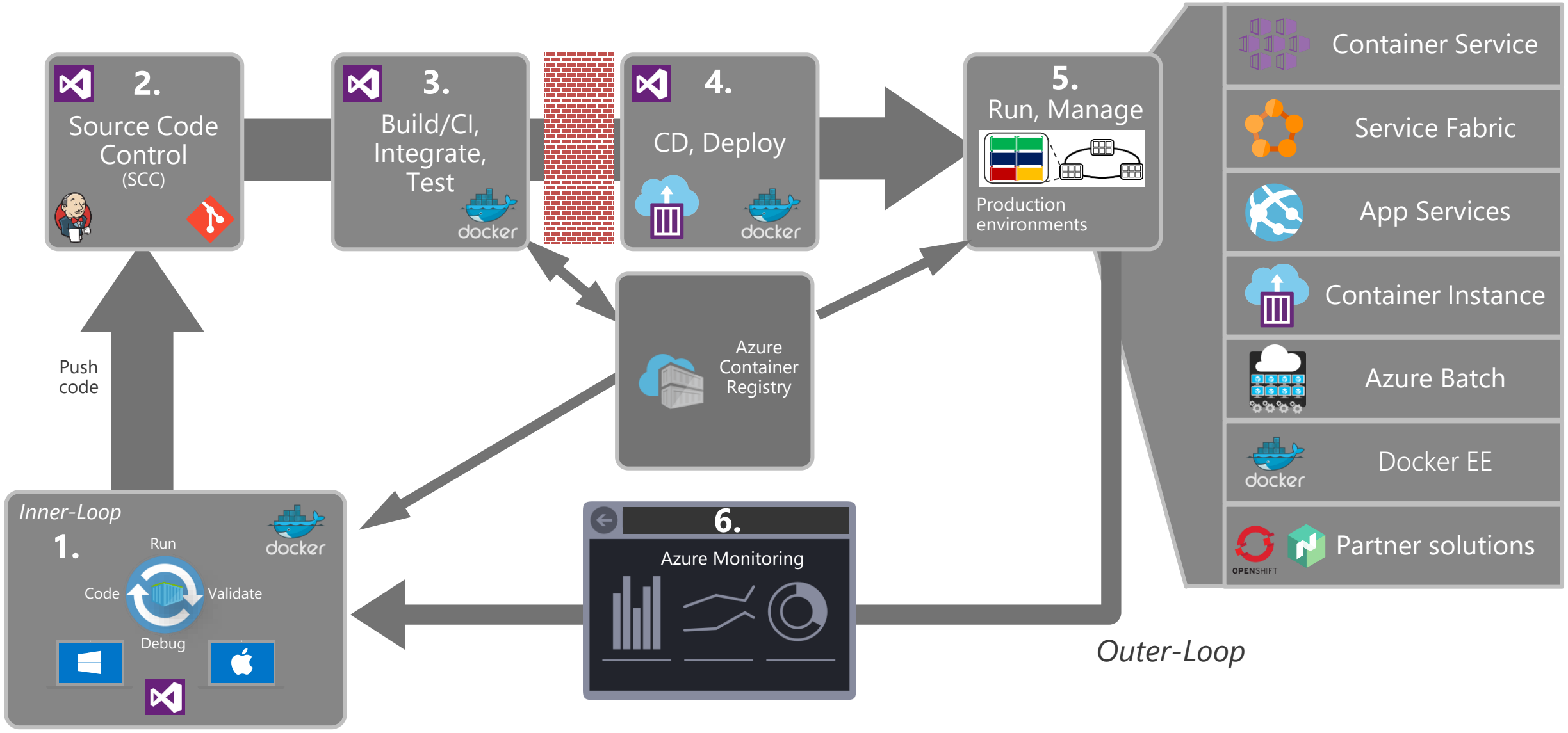


Containers are isolated,
but share OS kernel and, where appropriate, bins/libraries

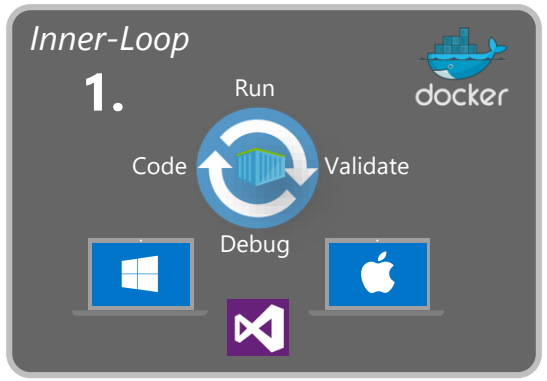
…result is significantly faster deployment, much less overhead, easier migration, faster restart



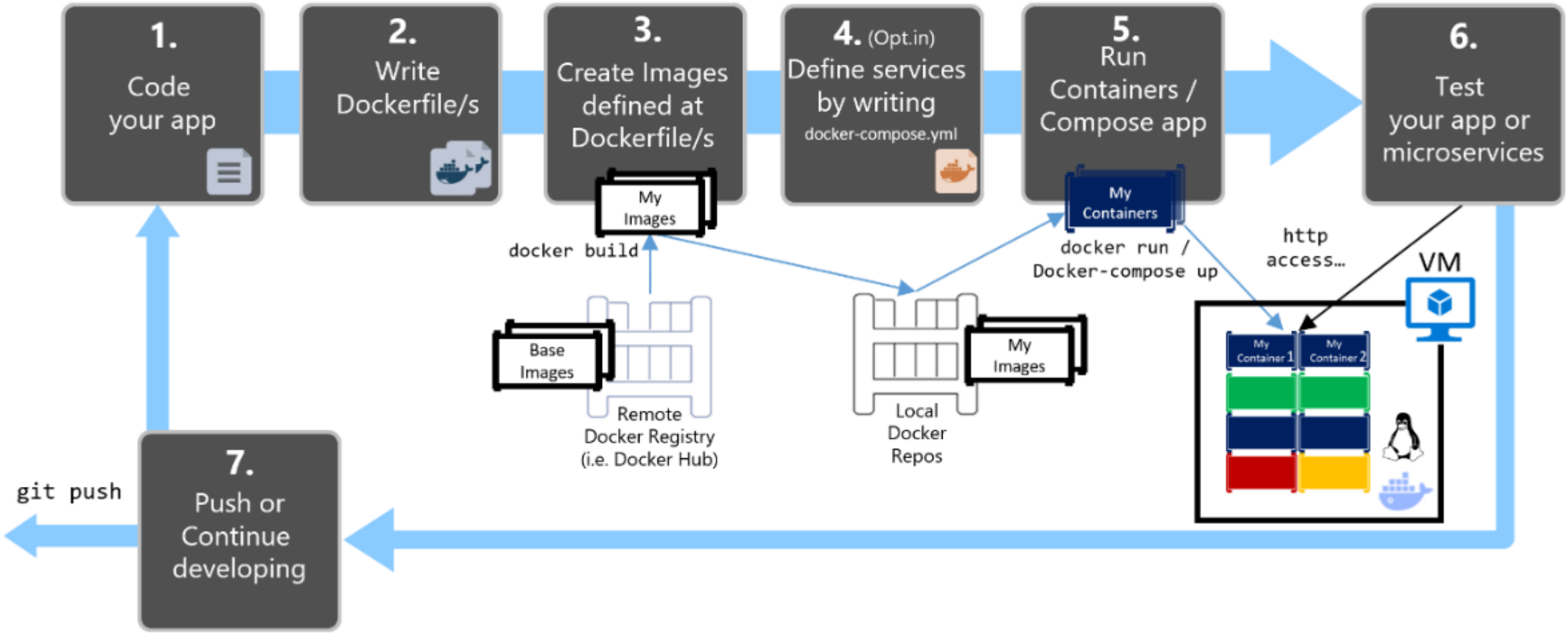
Containerized workflow



The Inner-Loop

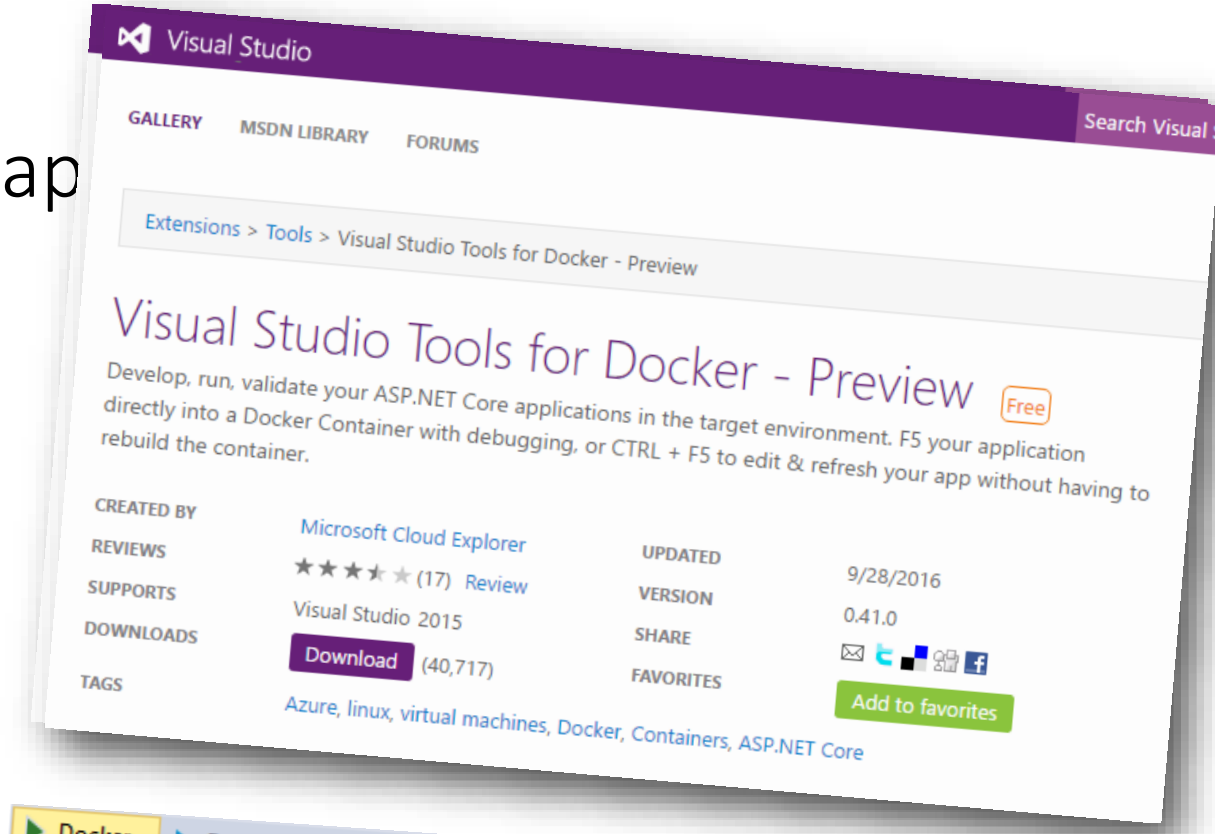


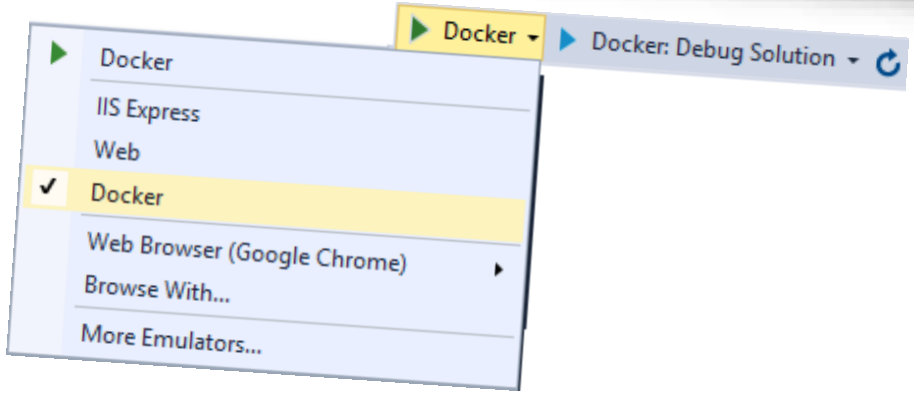
Inner-Loop development workflow for Docker apps



Visual Studio Docker Tools

- Run, Debug, Test Web & Console ap in docker containers
  - *Linux today, Windows Server & Nano Server coming soon*
- Multi Container Debugging
- Edit & Refresh of code
- Scaffolds docker assets
  - Dockerfile, docker-compose.yml

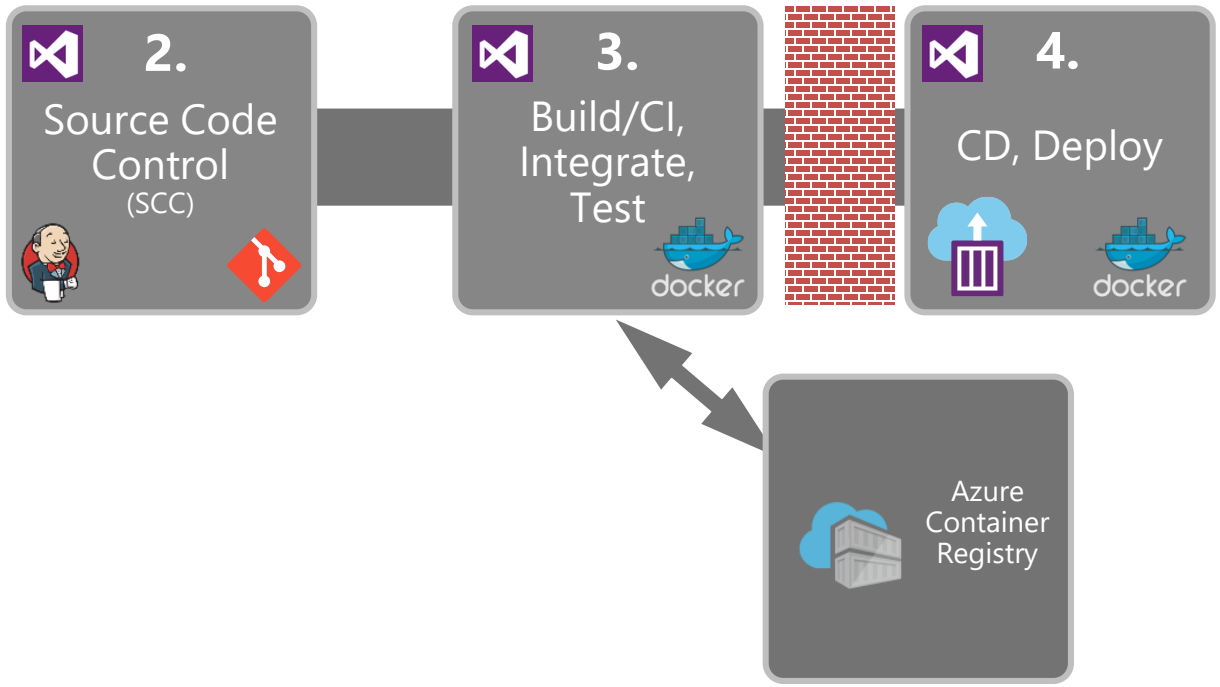




aka.ms/DockerToolsForVS

Demo 1: .net core application in Docker Container in VScode

The Outer-Loop: CICD



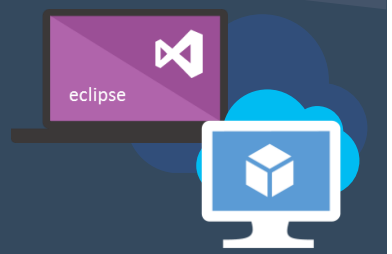
Microsoft Ecosystem

People | Process | Products

01

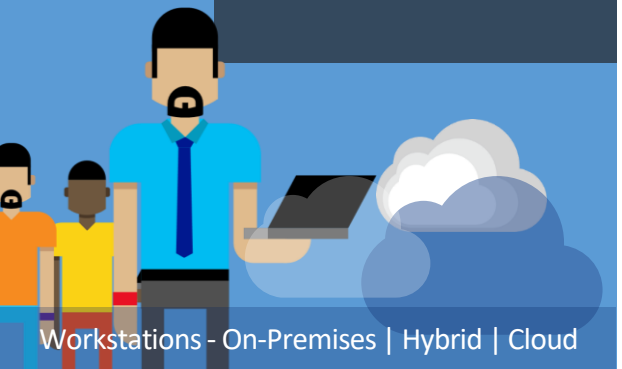
Develop

Developer Workstation



Team Collaboration

TFS / VSTS



Workstations - On-Premises | Hybrid | Cloud

02

Build & Test

Build/CI

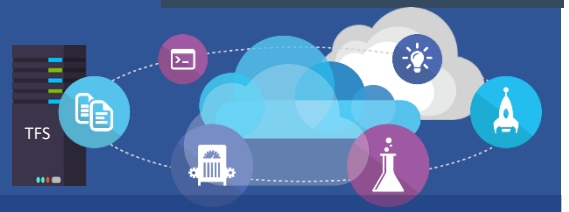
TFS / VSTS

Release Management for Visual Studio

Test

TFS / VSTS

Microsoft Test Manager



ALM Services - On-Premises | Hybrid | Cloud

03

Deploy

Release

Microsoft System Center

Release Management for Visual Studio

Automation Service

PowerShell | WAML

Azure Resource Management

xPlat Command Line

Environments - On-Premises | Hybrid | Cloud

04

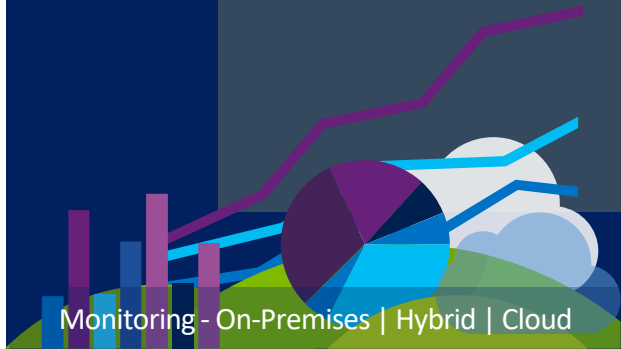
Monitor & Learn

Monitor

Microsoft System Center

VSTS

Application Insights



Monitoring - On-Premises | Hybrid | Cloud

Mixed Ecosystem

People | Process | Products

01 Develop

Developer Workstation

Team Collaboration

GitHub

CodePlex

02 Build & Test

Build/CI

gradle

GRUNT

Jenkins

Hudson

Test

gradle

GRUNT

03 Deploy

Configuration

puppet labs

CHEF

Release

gradle

GRUNT

Jenkins

Hudson

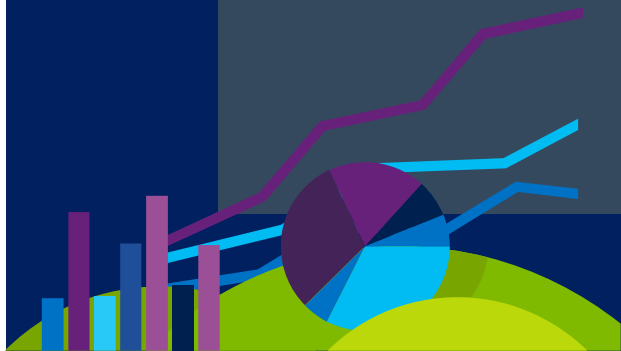
VAGRANT

04 Monitor & Learn

Monitor

Nagios

ZABBIX



This graphic shows OSS and partner products that are integrated with the Microsoft DevOps solution

Azure Container Registry

Manage images for all types of containers

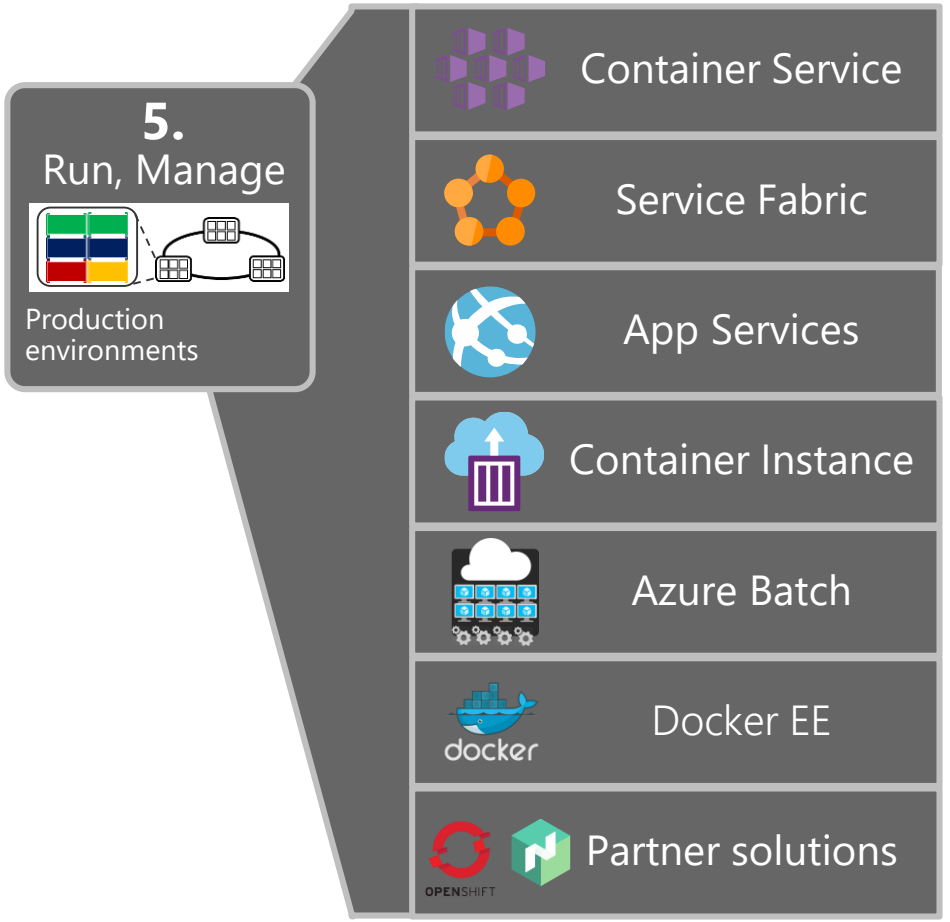
One registry across multiple regions

Keep container images close

Use Native Docker CLI tools

Demo 2: A quick look at Docker in VSTS and ACR

The Outer-Loop: Running containers



Azure Container offerings

Container Service – Container hosting environment optimized for Azure that lets you deploy, scale, and orchestrate container-based applications using containers using Kubernetes, DC/OS or Docker Swarm.

Container Instance – Easily run containers with a single command. No container orchestration tools to learn—just an application, in a container, running in the cloud.

Container Registry – Store and manage container images across all types of Azure deployments

Web App for Containers – Deploy web applications on App Service using Linux containers.

Service Fabric – Develop microservices and orchestrate containers on Windows or Linux.

Docker EE – Build, ship and run business critical applications in production at scale.

Microsoft driving the container revolution

Azure Container Instances

- Serverless containers, billed per second
- Deploy in seconds
- No VM management
- Made open-source as virtual kubelet

Azure Container Service (AKS)

- Managed Kubernetes
- Control plane managed by Microsoft
- Only pay for Agent nodes

Microsoft deeply committed to Open Source

Open Service Broker API

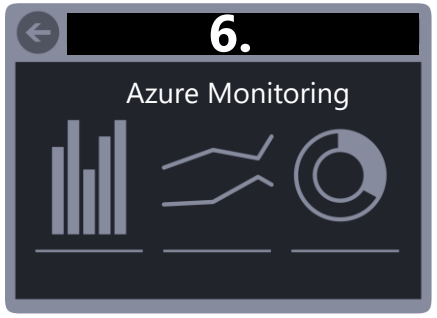
- Community-driven API to provision managed services
- 11 Azure services currently supported
- Best of both worlds

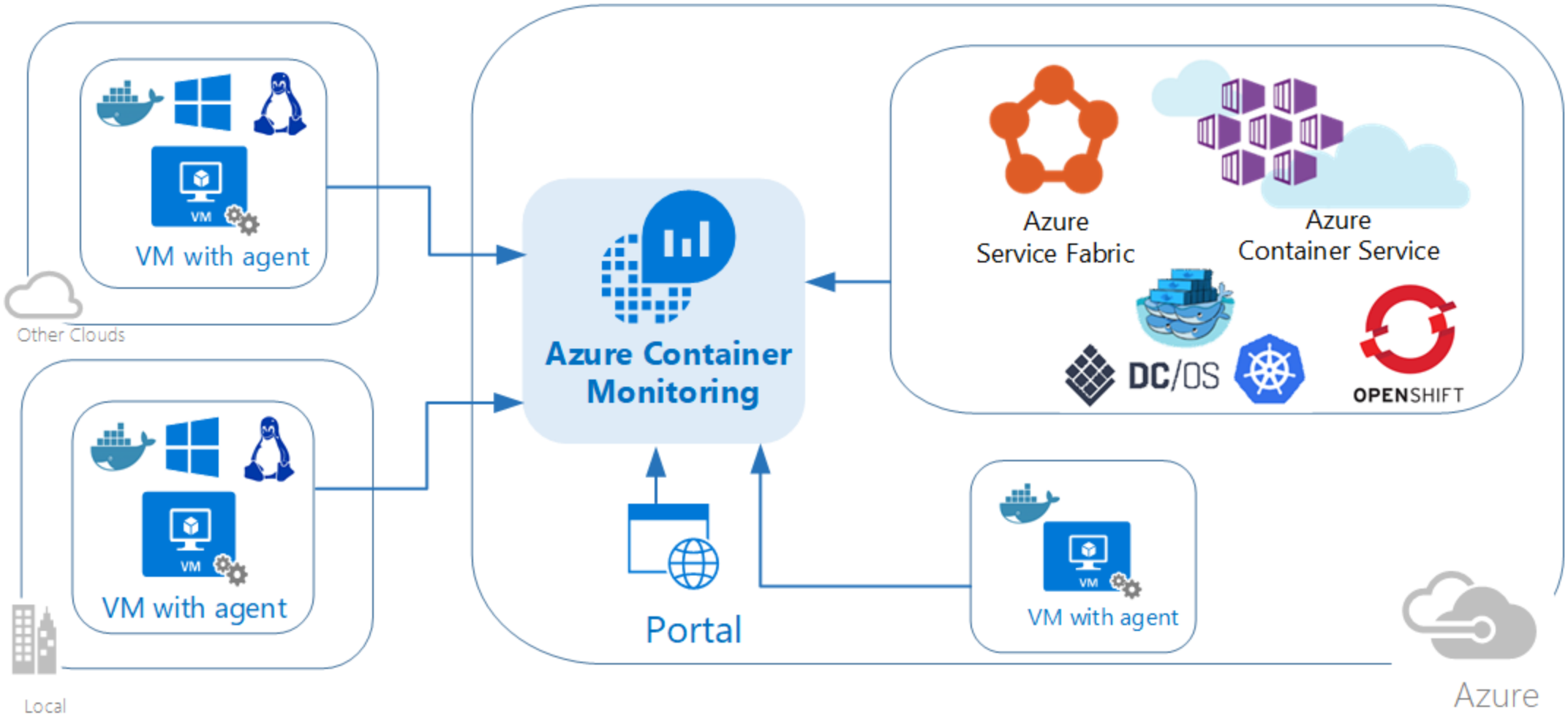
Support – Contribute – Service

- Be the best platform to run your application
- Large contributor to open projects
- Integrate open source projects into 1th party services

Demo 3: ACI

Closing Outer-Loop: Monitoring




VM with agent
Other Clouds
VM with agent
Local
Azure Container Monitoring
Portal
Azure Service Fabric
Azure Container Service
DC/OS
OPENSHIFT
VM with agent
Azure

How to get started?

Options for migration

Rewrite

- Re-implement using container- and cloud-optimized framework (e.g. ASP.NET Core)
- Lots of work
- Option to change architecture

Lift and shift

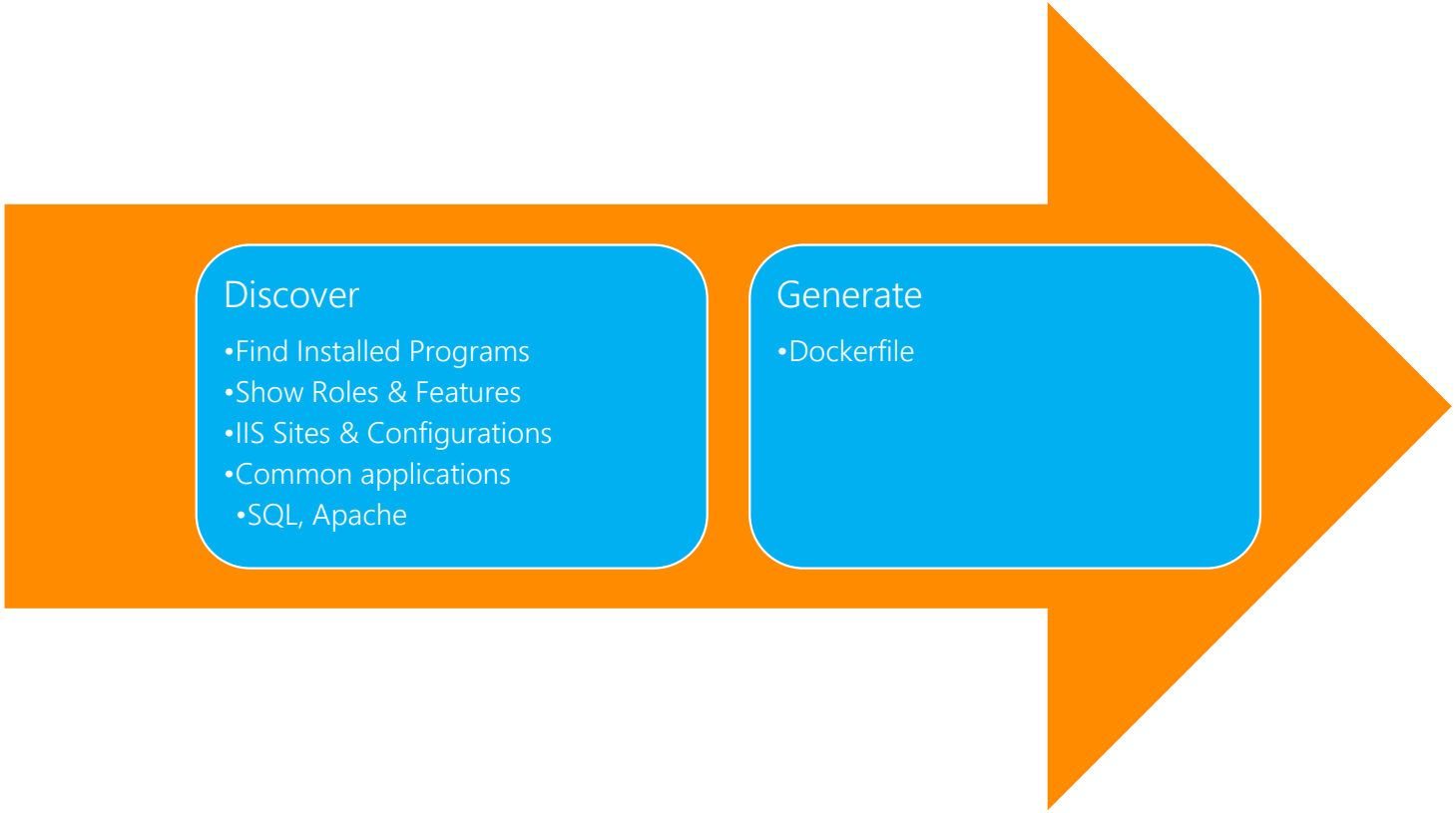
- Migrate existing VMs to container
- Extract essentials from VM image
- Benefit from sharing resources at kernel

Containerize

- Host existing app in Docker image
- Deploy app in image
- Applies mostly to ASP.NET and WCF services
- Some rework required

Image2Docker

- Convert WIM/VHD to Dockerfile
- Written in PowerShell
- Open Source

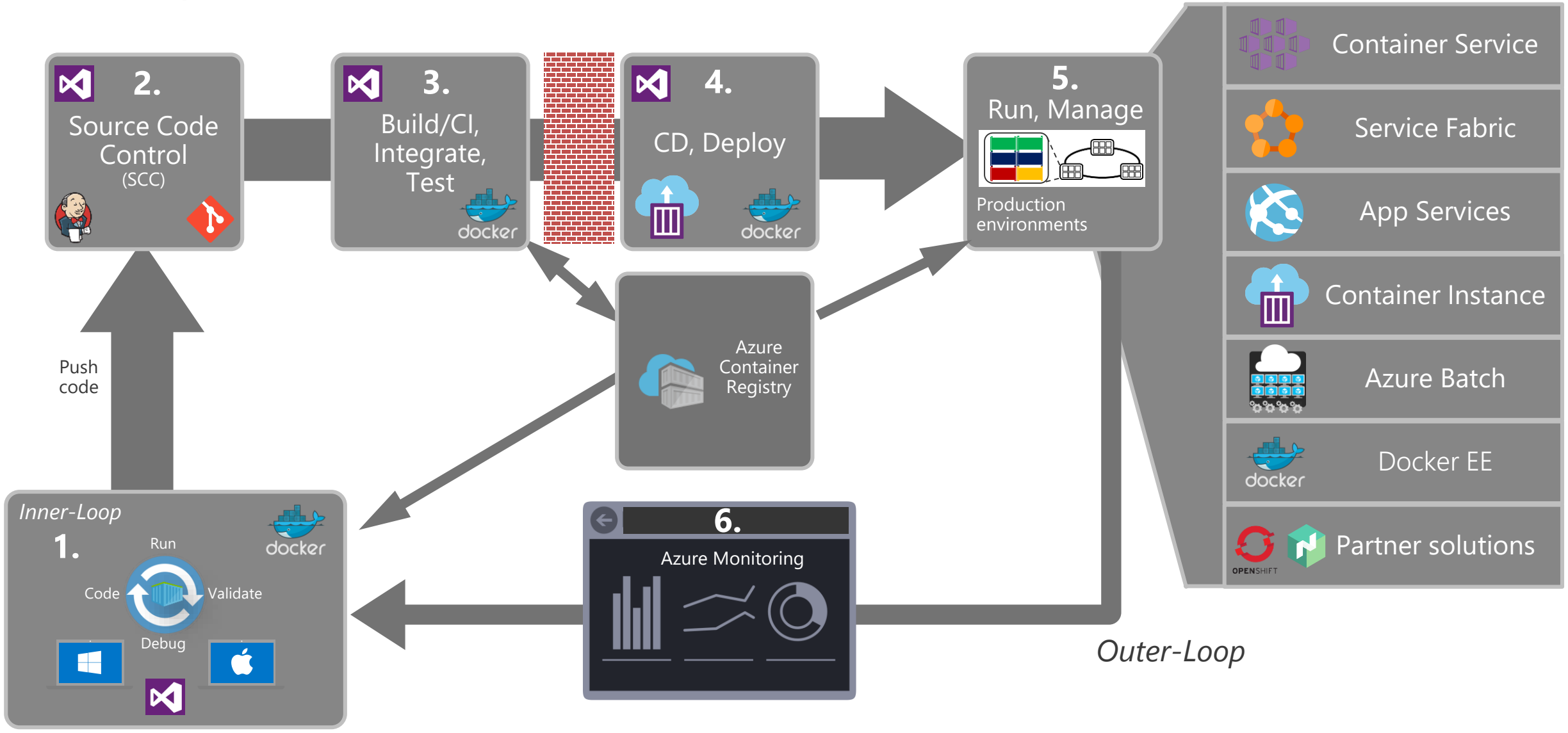


https://github.com/docker/communitytools-image2docker-win

More resources

- Some great e-books:
  - Windows Containers: https://aka.ms/containersebook
  - Docker application lifecycle: https://aka.ms/dockerlifecycleebook
  - .NET Microservices: https://aka.ms/MicroservicesEbook
  - Modernize existing .NET applications: https://aka.ms/liftandshiftwithcontainersebook

Recap


2.
Source Code Control
(SCC)
3.
Build/CI, Integrate, Test
docker
4.
CD, Deploy
docker
5.
Run, Manage
Production environments
Container Service
Service Fabric
App Services
Container Instance
Azure Batch
Docker EE
Partner solutions
OPENSHIFT
Azure Container Registry
Push code
Inner-Loop
1.
Run
Code
Validate
Debug
docker
6.
Azure Monitoring
Outer-Loop

Thank you