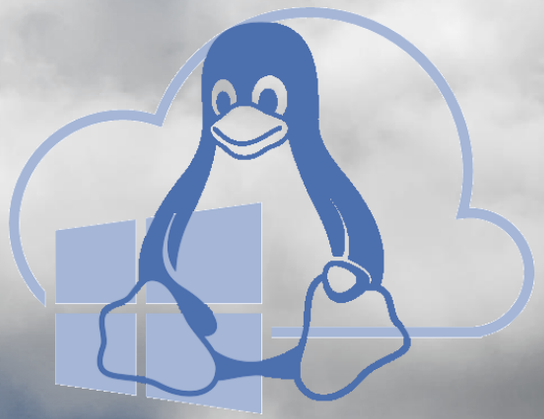
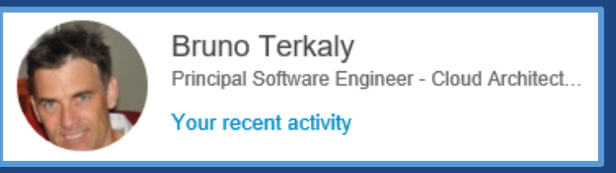
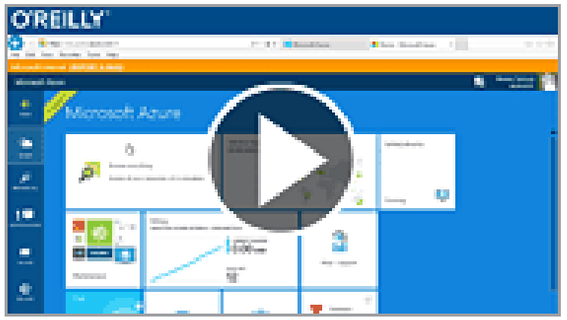
Linux – A first-class citizen in Windows Azure



Bruno Terkaly
bterkaly@Microsoft.com
Principal Software Engineer
Mobile/Cloud/Startup/Enterprise



- First, I am software developer (C/C++, ASM, C#, Java, Node.js, etc)
- O'Reilly Author (Just about to release my second 8 hour course)
- I help companies migrate off monolithic architectures
- Support Executive Escalations, Evaluate potential acquisitions/partnerships for leadership team
- Onboard strategically important ISVs onto Azure - focusing on Linux-based workloads.
- Currently, focusing on distributed architectures, the democratization of container-based workloads
- Excited about platform-as-a-service abstractions to manage large distributed workloads.



Larger Cover

Microsoft Azure Data Storage for Developers

Cloud-Based Provisioning, Storage, and Data Retrieval with Java and Linux

By Bruno Terkaly

Publisher: O'Reilly Media
Final Release Date: November 2015
Run time: 8 hours 9 minutes

★★★★★ 5.0

Read 2 Reviews | Write a Review

In this Microsoft Azure Data Storage for Developers training course, expert author Bruno Terkaly covers everything you need to know about data storage with Microsoft Azure. This course is designed for users that have some basic working knowledge of Java.

Microsoft Azure – A Cloud offering choice

Goals for today

- Introduction To Azure
- Tour Through The Azure Portal
- Tour In Azure Data Center
- Provisioning Infrastructure From The Portal
- Provisioning Open Source Software
- Linux Marketplace Offerings
- Containers, Distributed Computing And Microservices

Platform Services

Security & Management

- Portal
- Active Directory
- Multi-Factor Authentication
- Automation
- Key Vault
- Store / Marketplace
- VM Image Gallery & VM Depot

Compute

- Cloud Services
- Service Fabric
- Batch
- Remote App

Web and Mobile

- Web Apps
- API Apps
- API Management
- Mobile Apps
- Logic Apps
- Notification Hubs

Developer Services

- Visual Studio
- Azure SDK
- Team Project
- Application Insights

Hybrid Operations

- Azure AD Connect Health
- AD Privileged Identity Management
- Backup
- Operational Insights
- Import/Export
- Site Recovery
- StorSimple

Integration

- Storage Queues
- Biztalk Services
- Hybrid Connections
- Service Bus

Media & CDN

- Media Services
- Content Delivery Network (CDN)

Analytics & IoT

- HDInsight
- Machine Learning
- Data Factory
- Event Hubs
- Stream Analytics
- Mobile Engagement

Data

- SQL Database
- SQL Data Warehouse
- Redis Cache
- Search
- DocumentDB
- Tables

Infrastructure Services

Compute

- Virtual Machines
- Containers

Storage

- BLOB Storage
- Azure Files
- Premium Storage

Networking

- Virtual Network
- Load Balancer
- DNS
- Express Route
- Traffic Manager
- VPN Gateway
- Application Gateway

Datacenter Infrastructure (24 Regions, 19 Online)

Microsoft

Demo

A quick tour with the portal

144, 143

Microsoft

Demo

Quick Data Center Tour
Where to run Linux workloads

Azure Security

- 24 hour monitored physical security
- Monitoring and logging
- Patching
- Antivirus/Antimalware protection
- Intrusion detection and DDoS
- Zero standing privileges
- Isolation
- Azure Virtual Networks
- Encrypted communications
- Private connection
- Data encryption
- Identity and access

Customers can also run antimalware solutions from partners on their VMs

Centralized monitoring/analysis systems provide 24x7 alerts

Microsoft conducts regular penetration testing to improve Azure security controls and processes

Deployment
Code or JSON?

Code

```
New-AzureVM –VM $myVM
New-AzureStorageAccount –StorageAccountName $acct
Set-AzureVNetConfig –ConfigurationPath -Path
```

JSON

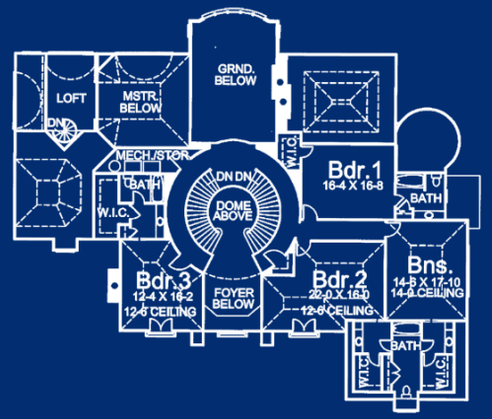
```
{
 "$schema": "https://../deploymentTemplate.json#",
 "contentVersion": "1.0.0.0",
 "parameters": {},
 "variables": {},
 "resources": [],
 "outputs": {}
}
```

Code or JSON

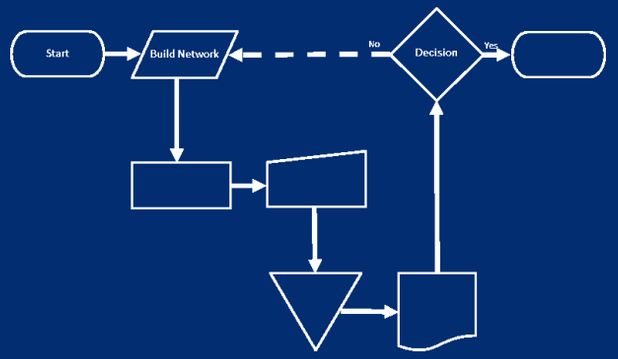
- The declarative JSON approach is the new way of provisioning infrastructure
- Using code limits the ability to parallelize time consuming tasks

Provisioning Resources with the Azure Resource Manager-ARM

- Allows you to manage your Azure resources in a declarative way
- You describe the structure and relationships of a deployable group of resources in JSON templates



Define the end result



Not all the steps

Application Gateway Public I...
Backup Protect Iaasvm
Create Backup Vault
Create Internal Loadbalancer
Create Storage Account Premium
Dtl Create Vm Builtin User
Loadbalancer With Multivip
Networkinterface With Public...
Rbac Builtinrole Virtualmach...
Tags Vm
Vm Multiple Data Disk
Vnet Two Subnets
2 Vms Internal Load Balancer
Alert To Slack With Logic App
Application Gateway Url Path...
Customscript Extension Azure...
Documentdb Webapp
Dtl Create Vmtemplate
Encrypt Running Linux Vm
List Storage Keys Windows Vm
Ospatching Extension On Ubuntu
Redis Premium Persistence
Site To Site Vpn
Userdefined Routes Appliance
Vm Monitoring Diagnostics Ex...
Vmss Linux Nat
Vmss Windows Nat
Web App With Redis Cache
2fe Linux Lb80 Ssh 1be Win N...
Multi Vmss Linux
Active Directory New Domain ...
Apache2 On Ubuntu Vm
Arm Asm S2s
Checkpoint Multi Nic
Cloudera On Centos
Couchbase On Ubuntu
Datastax Enterprise Marketpl...
Diskraid Ubuntu Vm
Docker Neo4j
Docker Wordpress Mysql
Dsc Extension Iis Server Win...
Eset Vm Extension
Go Ethereum On Ubuntu
Hdinsight Linux Run Script A...
Hdinsight Linux With Edge Node
Intel Lustre Clients On Centos
Lamp App
Mesos Swarm Marathon

Application Gateway Public Ip
Cdn With Custom Origin
Create Documentdb Account Co...
Create Key Vault
Create Storage Account Stand...
Dtl Create Vm Username Pwd
Loadbalancer With Nat Rule
Point To Site
Redis Cache
Traffic Manager External End...
Vm Sshkey
Webapp With Golang
2 Vms Loadbalancer Lbrules
Alert To Text Message With L...
Cdn Customize
Customscript Extension Publi...
Dsc Linux Azure Storage On U...
Dynamic Web Tests
Encrypt Ru
Logic App
Premium S
Redis Prem
Specialized
Vm Differe
Vmaccess On Ubuntu
Vmss Ubuntu Autoscale
Vnet To Vnet
Windows Vm Diagnostics Exten...
Custom Images At Scale
Multi Vmss Windows
Active Directory New Domain
App Service Environment Serv...
Blockapps Strato
Chef Extension Windows Vm
Concourse Ci
Create Hpc Cluster Custom Im...
Datastax Enterprise
Django App
Docker Simple On Ubuntu
Dokku Vm
Dsc Pullserver To Win Server
Ethereum Cpp On Ubuntu
Haproxy Redundant Floatingip...
Hdinsight Linux Ssh Password
Hdinsight Linux With Hue On ...
Jenkins On Ubuntu
Marketplace Samples
Minecraft On Ubuntu

Automation Runbook Getvms
Create Application Gateway
Create Documentdb Account
Create Security Group
Data Factory Blob To Sql
Dtl Create Vm Username Ssh
Logic App Create
Public Ip Dns Name
Simple Linux Vm
Vm Customdata
Vm User Image Data Disks
1 Vm Loadbalancer 2 Nics
2 Vms Loadbalancer Natrules
Api App Gateway Existing
Cdn With Storage Account
Dependency Between Scripts U...
Dsc Linux Public Storage On ...
New Vm Galler...
Windows Vm
om Api
Multiplevms
Vm
Vmss Lapstack Autoscale
Vmss Windows Customimage
Web App Github Deploy
Winrm Windows Vm
Expressroute Circuit Vnet Co...
Centos 2nics Lb Cluster
Ansible Advancedlinux
Apprenda60 Express
Bootstorm Vm Boot Time
Chef Json Parameters Ubuntu Vm
Coreos With Fleet Multivm
Create Hpc Cluster Linux Cn
Datastax On Ubuntu
Docker Ckan
Docker Swarm Cluster Simple
Drone Ubuntu Vm
Elasticsearch Centos 3node
Github Enterprise
Hdinsight Apache Spark
Hdinsight Linux Ssh Publicke...
Hortonworks On Centos
Kafka On Ubuntu
Mcafee Extension Windows Vm
Mongodb High Availability

Azure Dns New Zone
Create Availability Set 3fds...
Create Expressroute Circuit
Create Site To Site Vpn
Dtl Create Lab
Linux Vm Serial Output
Logic App Sendgrid
Rbac Builtinrole Resourcegroup
Simple Windows Vm
Vm From User Image
Vm With Rdp Port
2 Vms 2 Fds No Resource Loops
Alert To Queue With Logic App
Api App Gateway New
Cdn With Web App
Discover Private Ip Dynamica...
Dtl Create Lab With Policies
Encrypt Create Pre Encrypted...
Expressroute Circuit Public ...
Nsg Dmz In Vnet
Redis Premium Cluster Diagno...
Scale Existing Vmss
Traffic Manager Webapp
Vm From Specialized Vhd
Vmss Linux Jumpbox
Vmss Windows Jumpbox
Web App Sql Database
2fe Lb80 Rdp 1be Nsg Rdp
Multi Tier Service Networking
Iaas Story
Anti Malware Extension Windo...
Apprenda60 Small
Bosh Setup
Cisco Csr 1000v
Couchbase Ansible
Create Hpc Cluster
Deis Cluster Coreos
Docker Kibana Elasticsearch
Docker Swarm Cluster
Dsc Extension Azure Automati...
Elasticsearch
Gluster File System
Hdinsight Genomics Adam
Hdinsight Linux Ssh Publickey
Iis 2vm Sql 1vm
Kafka Ubuntu Multidisks
Memcached Multi Vm Ubuntu
Mongodb On Centos

DEMO: Let's go view all the templates

Microsoft

Demo

Quick Start Templates

[jump start the creation of cloud infrastructure]

Microsoft

Demo

Provisioning Resources With The Azure Resource Manager (The ARM)

Microsoft

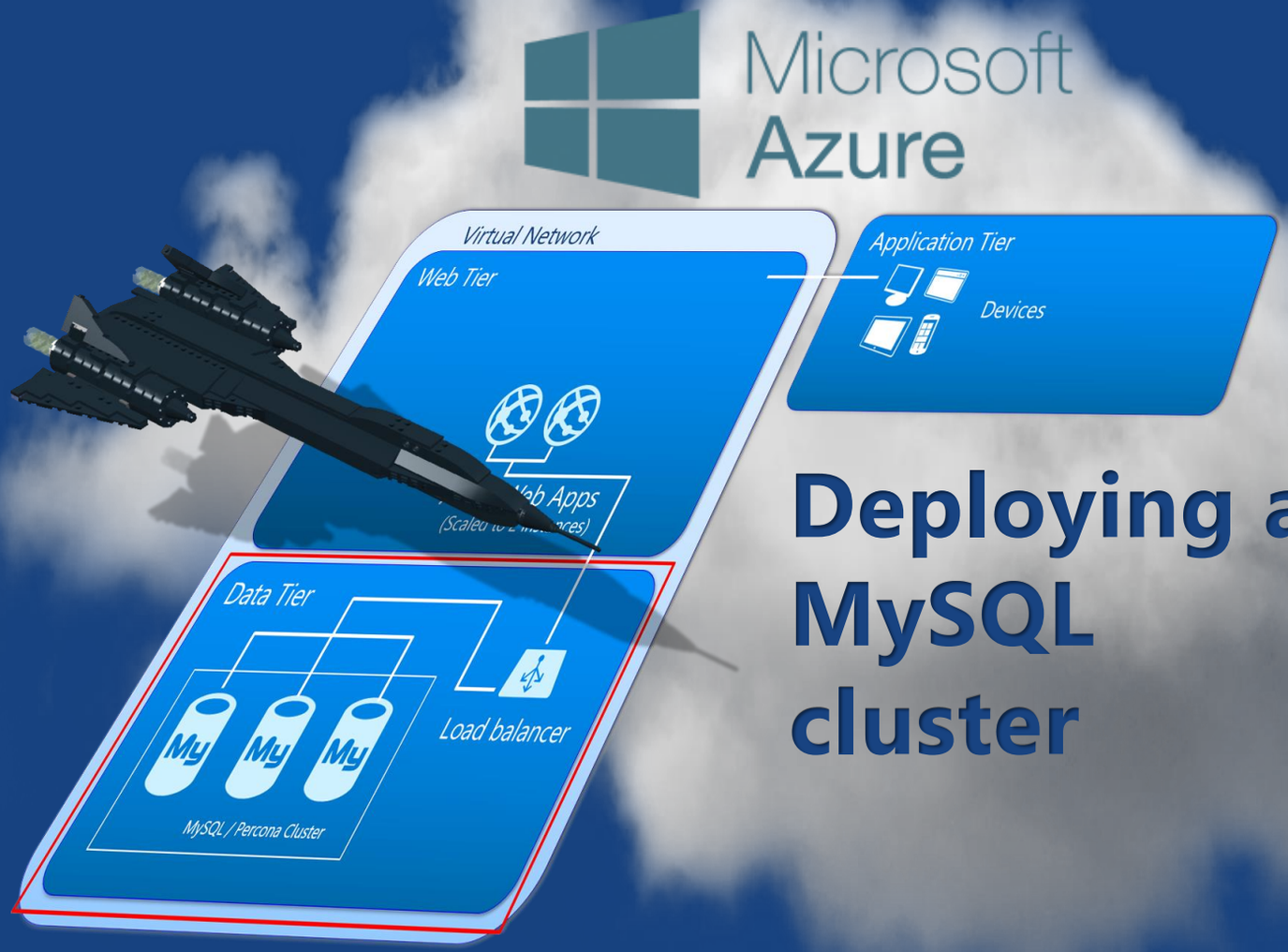
Demo

Deploying Github

Show Live demo 147

High Availability Clustering

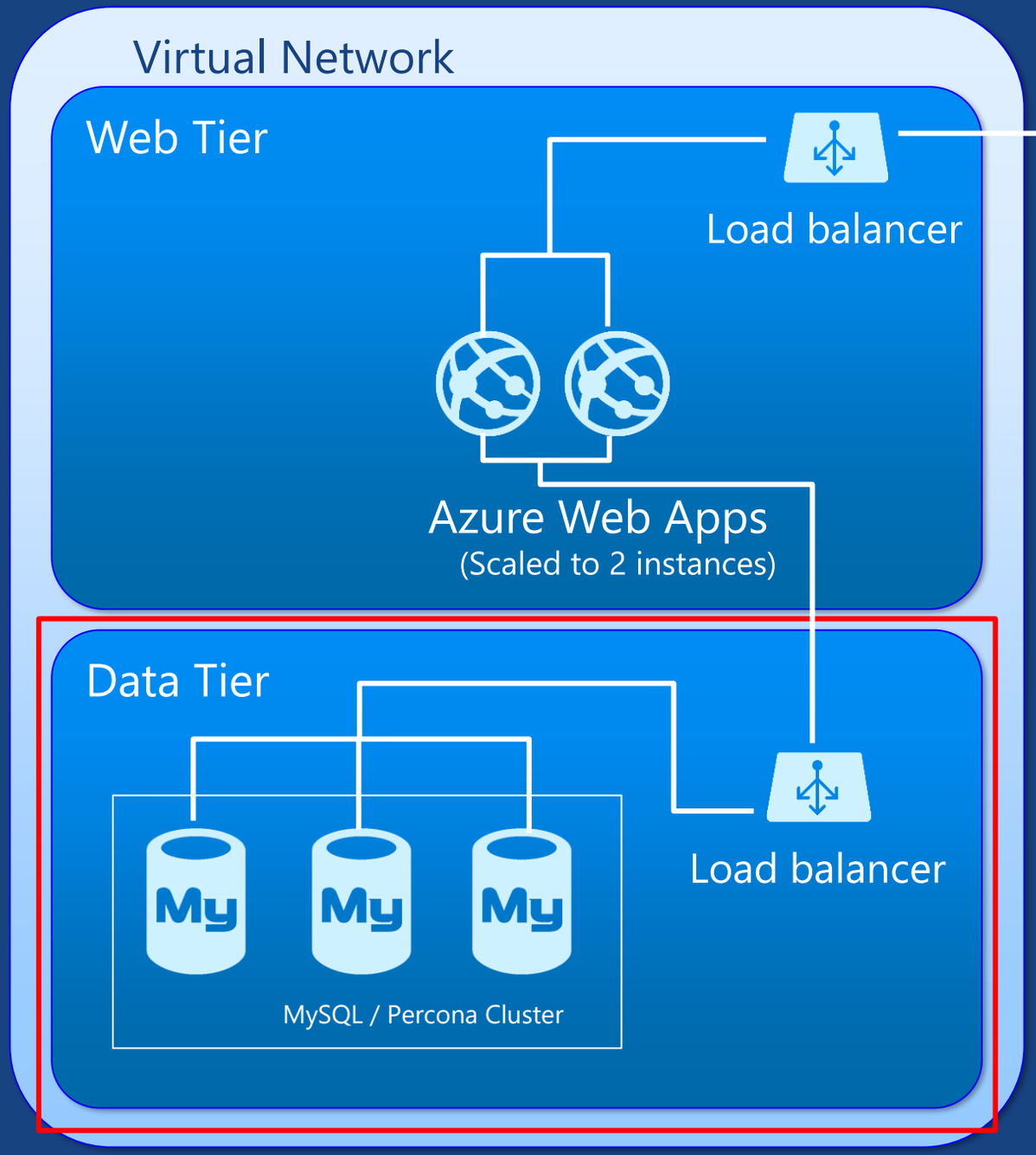
Demo

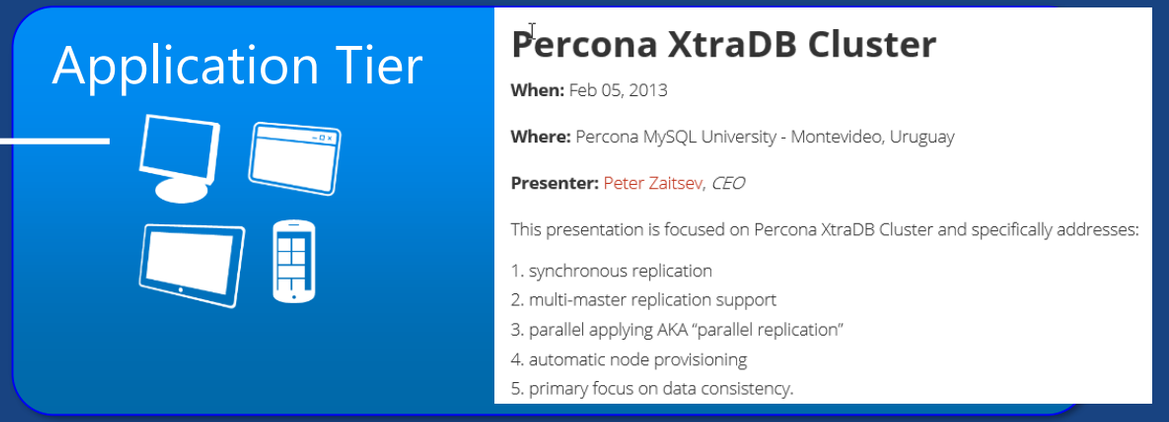


Deploying a MySQL cluster

- Imagine that you want to build out a Linux-based cloud infrastructure
- Percona XtraDB Cluster
- Is an active/active high availability and high scalability open source solution for MySQL® clustering.

See next slide and come back 149 , 150, 151





- Let's build out the data tier with ARM templates
- The Data Tier can be built out with 1 command
- Needed Infrastructure
  - 3 VMs
  - 3 Network Cards
  - 1 SQL Load Balancer
  - 3 Availability Sets/Zones
  - 1 Virtual Network
  - 1 Public IP

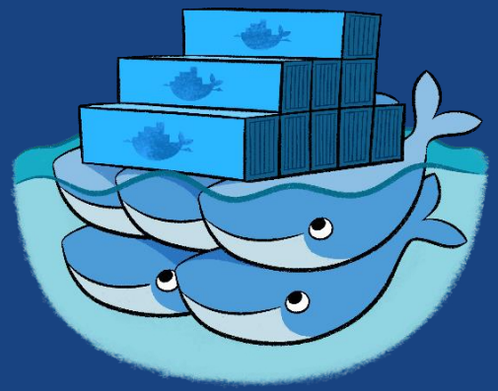
Revolutionary Technology

The birth of the container

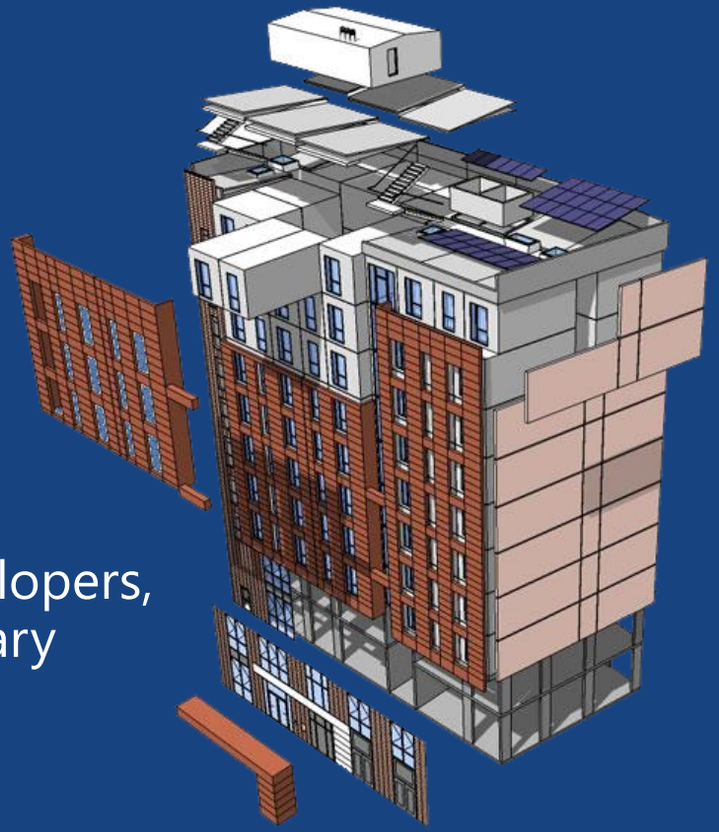
- April 26, 1956, the SS Ideal-X, an ageing tanker, departed from the Port of Newark, and docked in the Port of Houston five days later

Docker Containers and Azure

- Containers get a lot of headlines and it's clear why



- For the daily lives of developers, containers are revolutionary

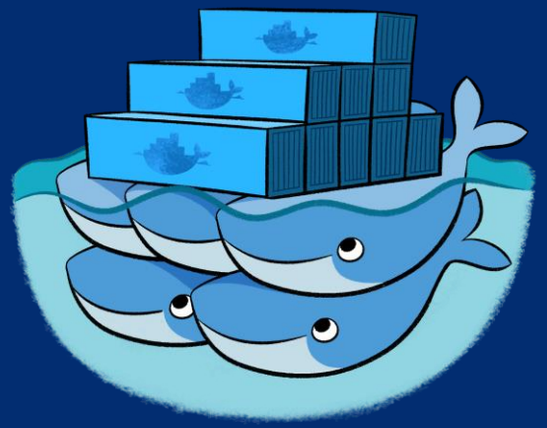


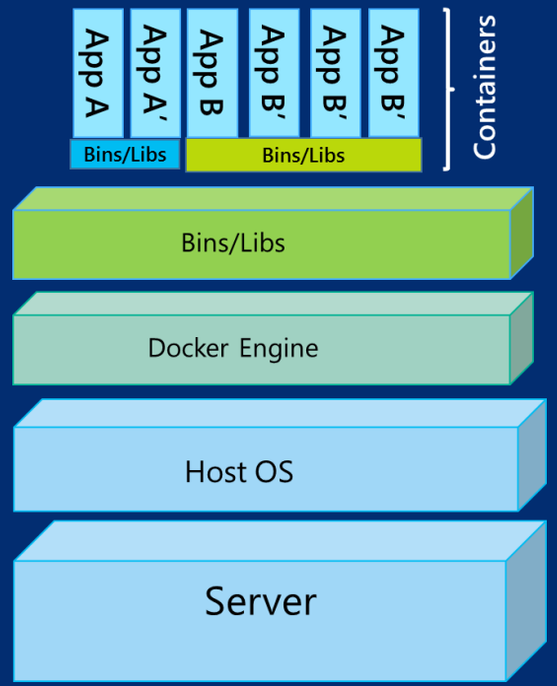
- We've seen breakthroughs before:
  - Containers are breakthrough because they enable functional environment in seconds instead of tens of minutes with virtual machines
  - Spend more time coding and less time waiting for something to happen

The ability to break a problem into smaller pieces is always beneficial in unexpected ways, and containers offer a way of doing that on a scale not possible before.

Container Essential Value Propositions

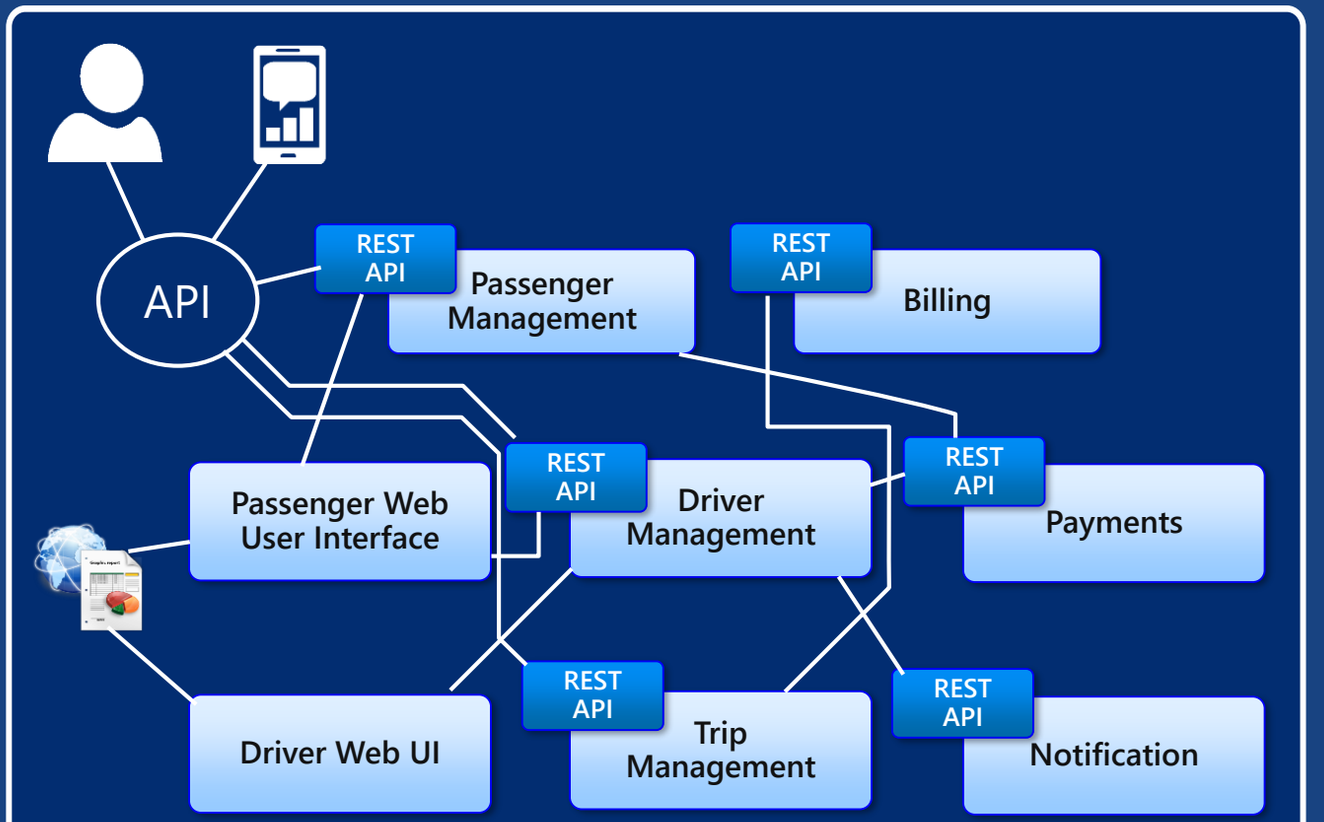
- Running apps in isolation
- Abstracting the plumbing
- Democratizing distributed applications
- Running anywhere
- Getting to production
- Higher Application Density
- Predictable Dev ⇨ Test ⇨ Prod





Driving Docker Value

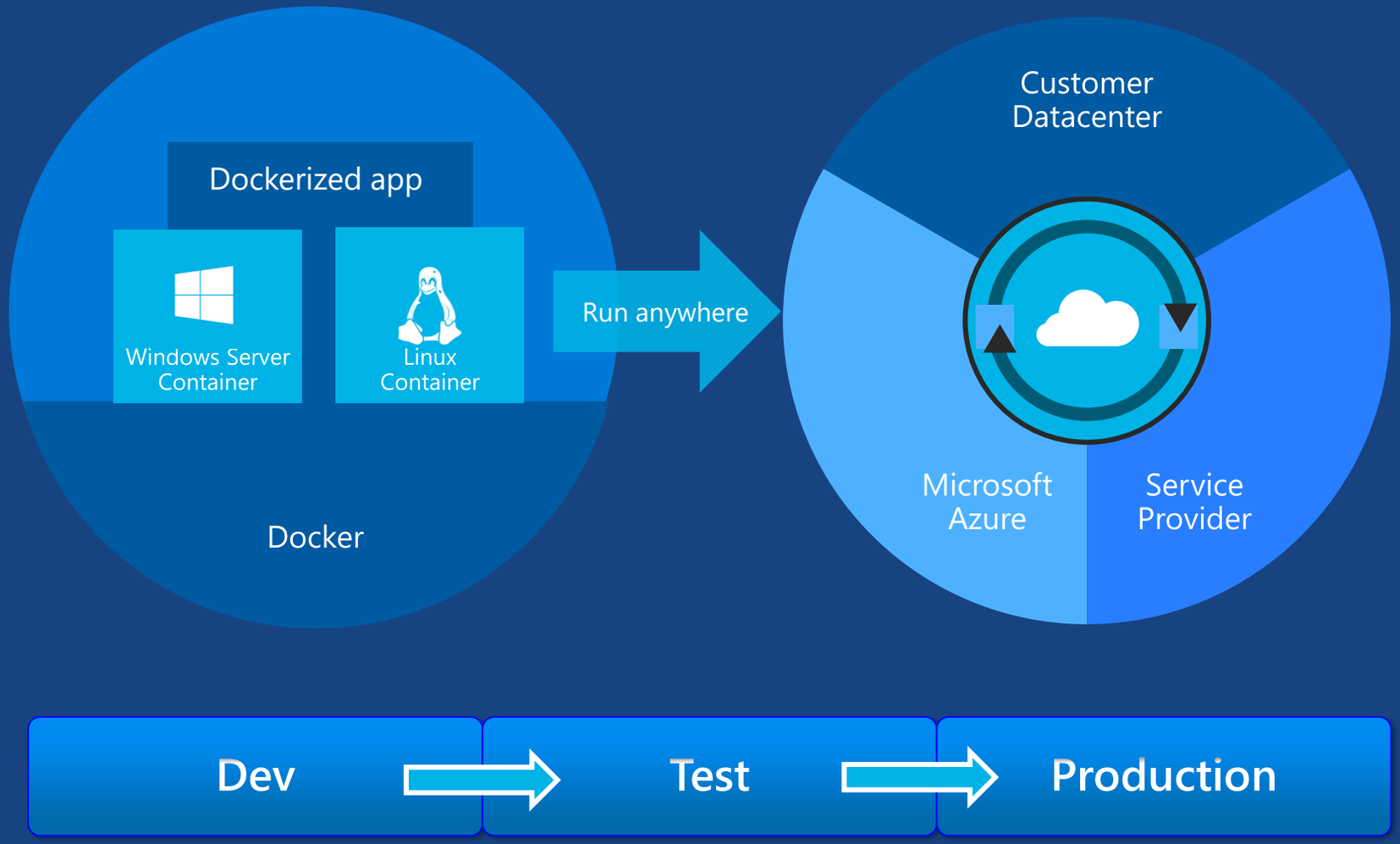
- Not just about optimizing application performance
- Focus now is optimizing the speed of service delivery
- More than just about cost
- It is about creating new revenue streams
- Mobile-first and user-friendly big data applications



Containerization and Microservices

- Simple to develop
- Simple to deploy
- Simple to scale

Docker Containers and Azure



A NEW ARCHITECTURAL STYLE

Most Widely Used Images

NGINX	Docker is being used to contain a lot of HTTP servers, it seems. It is interesting that Apache (httpd) didn't make the top 10.
Redis	This popular in-memory key/value data store is often used as an in-memory database, message queue, or cache.
Ubuntu	Still the default to build images.
Logspout	For collecting logs from all containers on a host, and routing them to wherever they need to go.
MongoDB	The widely-used NoSQL datastore.
Elasticsearch	Full text search.
CAdvisor	Used by Kubernetes to collect metrics from containers.
MySQL	The most widely used open source database in the world.
Postgres	The second-most widely used open source database in the world. Adding the Postgres and MySQL numbers, it appears that using Docker to run relational databases is surprisingly common.

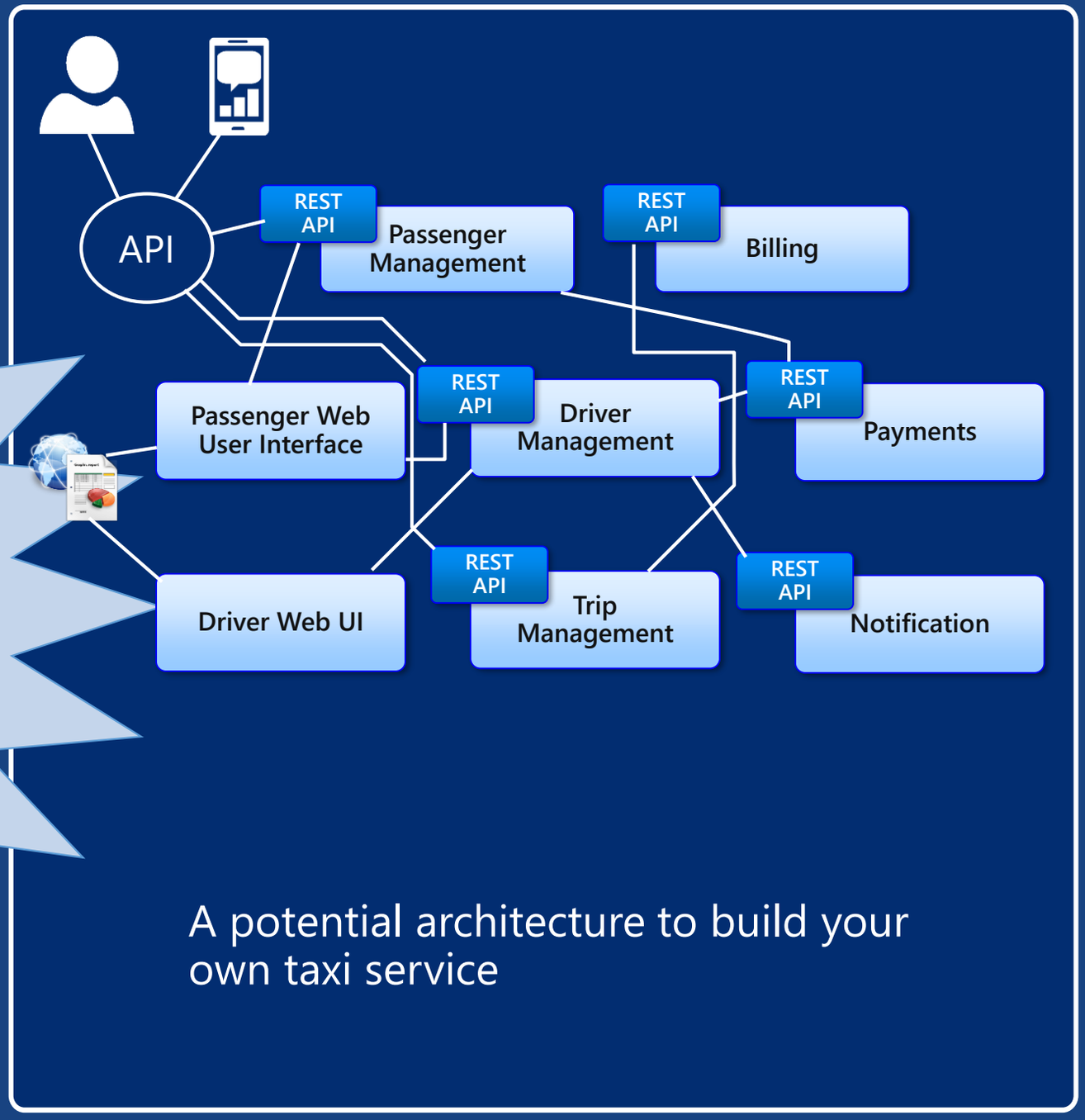
Microservices

Microserv es a u th etti
a lot of att

- Ar
- se
- pro
- Service c ht mechani ms
- Often with an HTTP protocol

Microservices unlock the real payoff for containers

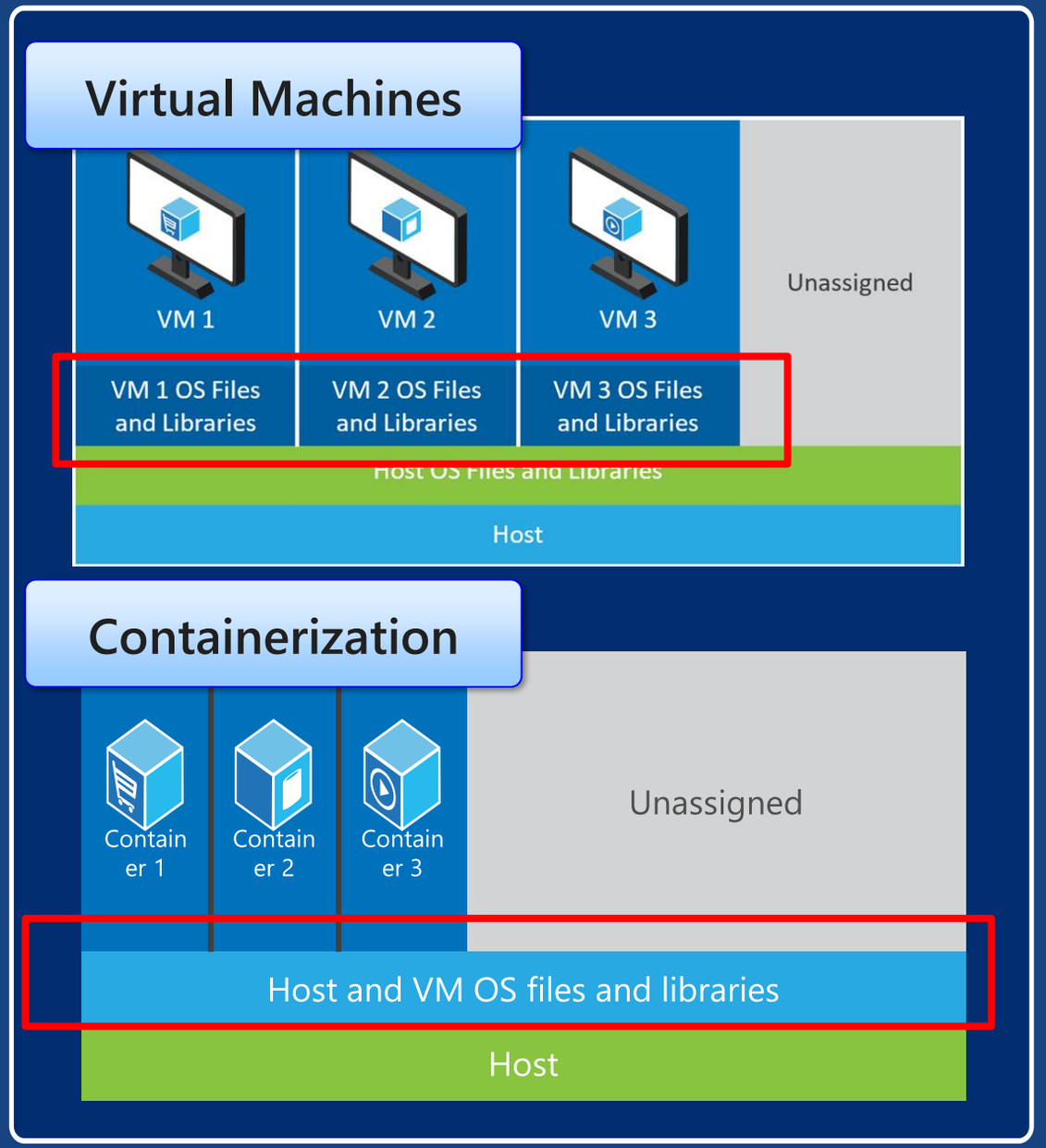
They are vehicle for those independently deployable pieces



A potential architecture to build your own taxi service

Virtualization – 2 perspectives

- What makes virtual machines slower than containers to startup, deploy, and run?



Where can you run these containers?

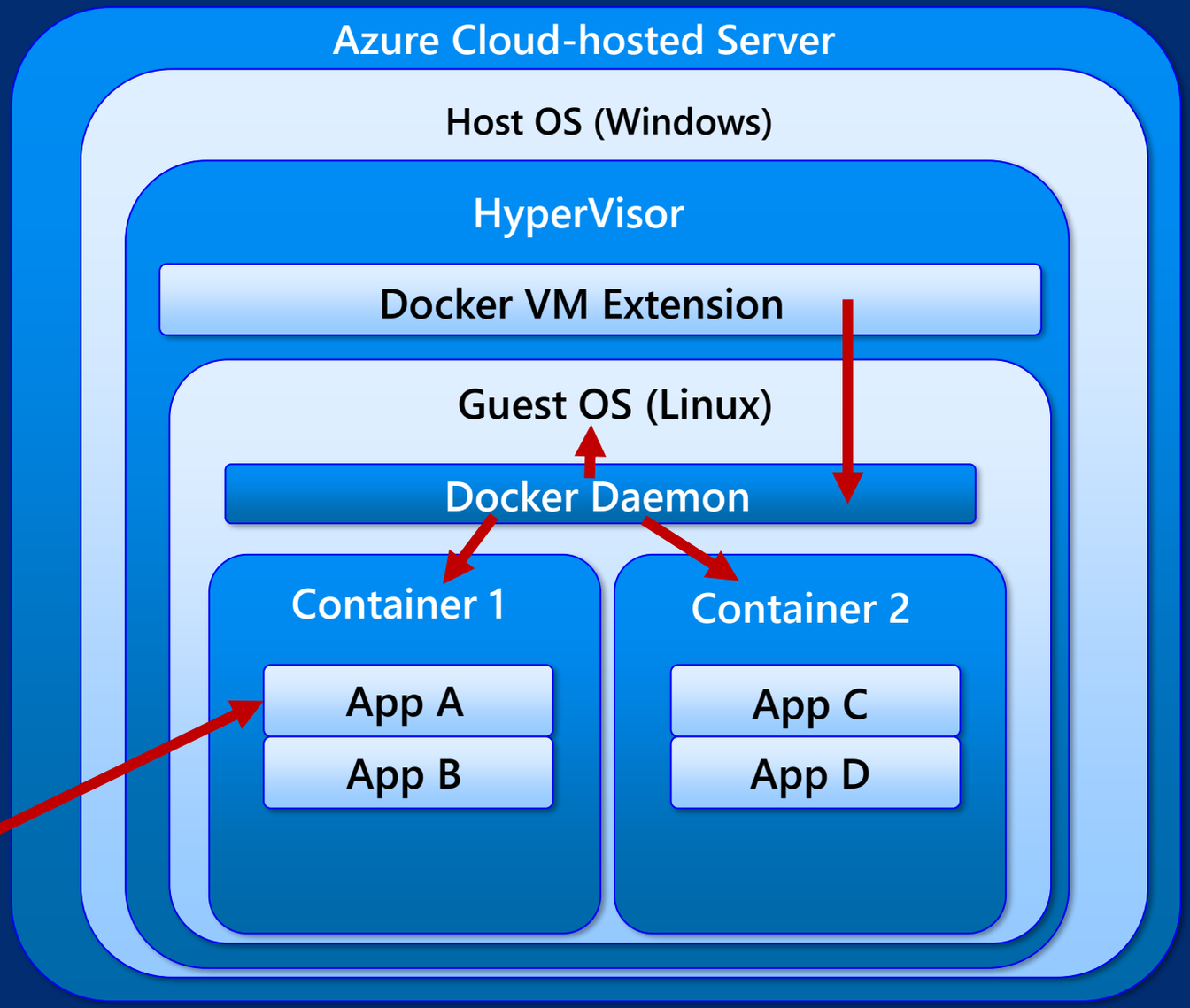
Bare Metal

Virtual

Cloud

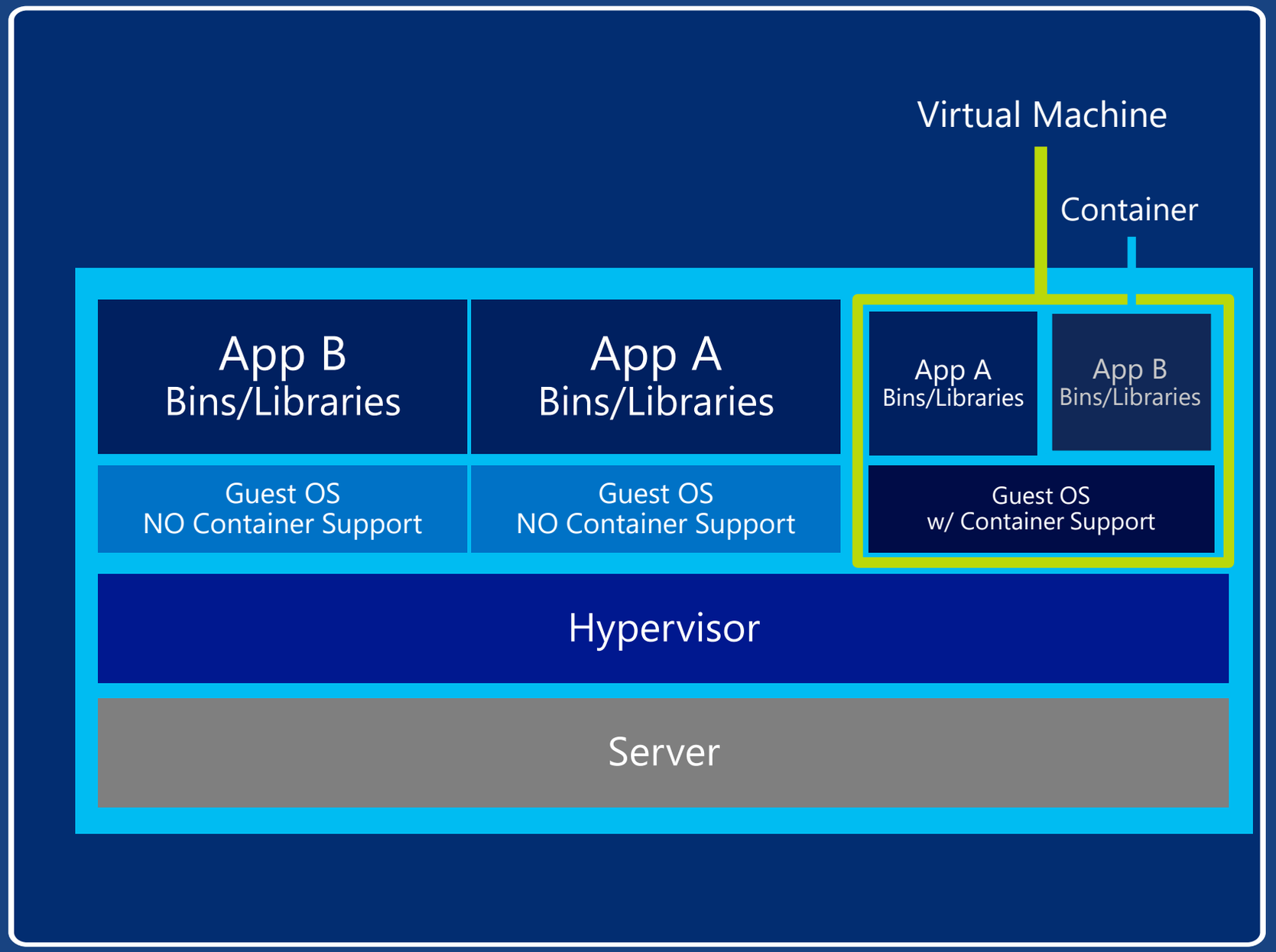
Generally you run one app per container, although more is possible.

Hosted in a cloud on VMs



Containers in the Cloud - Azure

- But in public clouds they run under a hypervisor
- Container support gives you greater density



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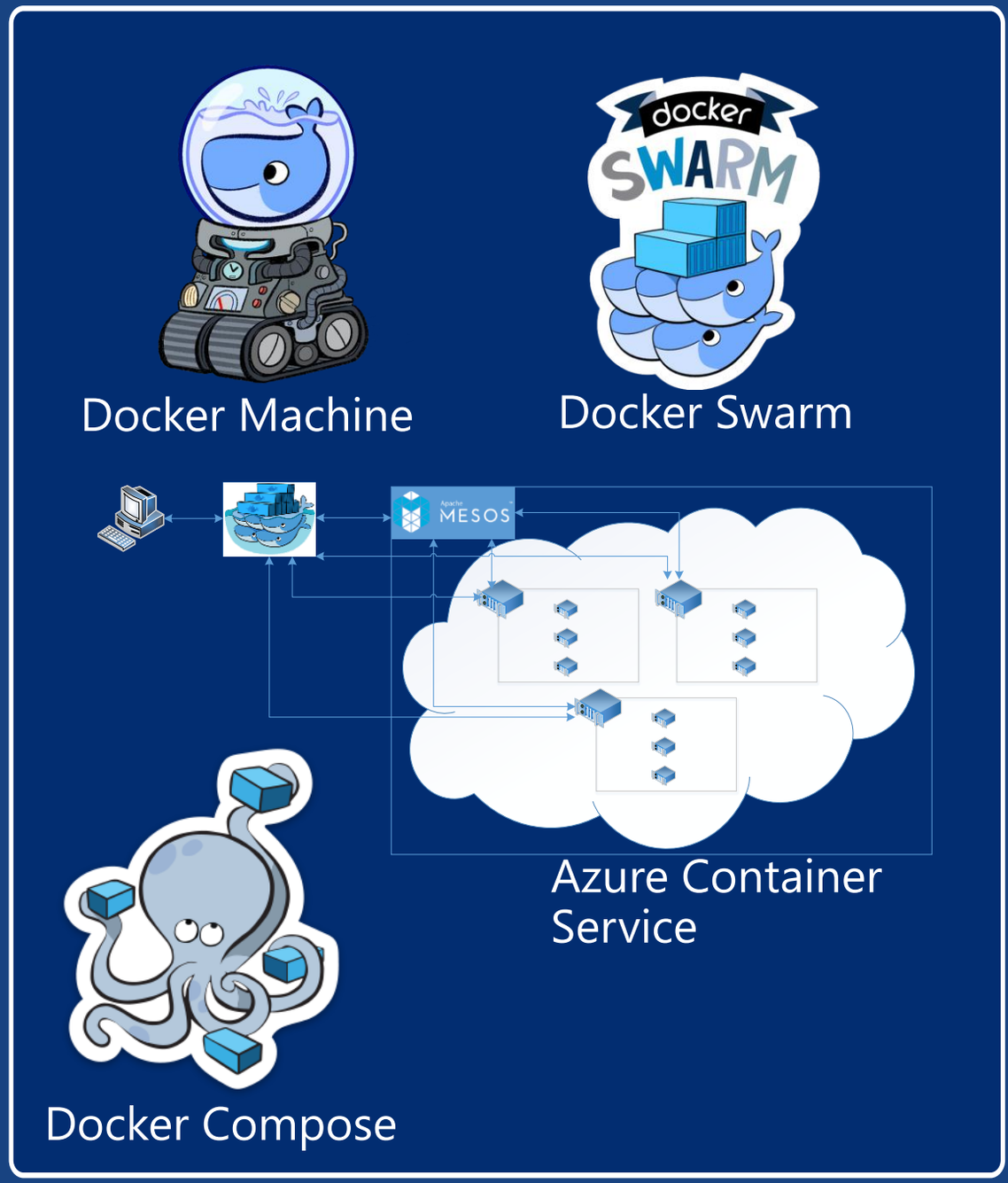
Orchestration Solutions

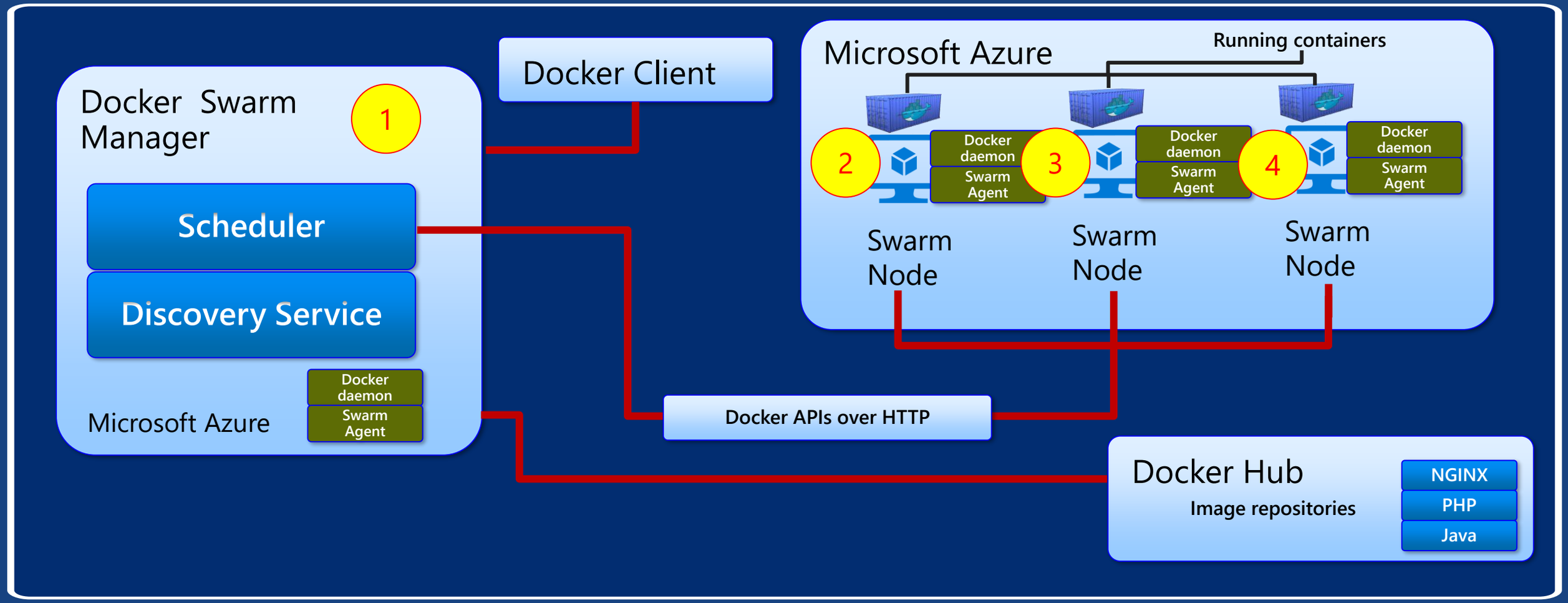
Orchestration Management

Docker – Advanced Topics

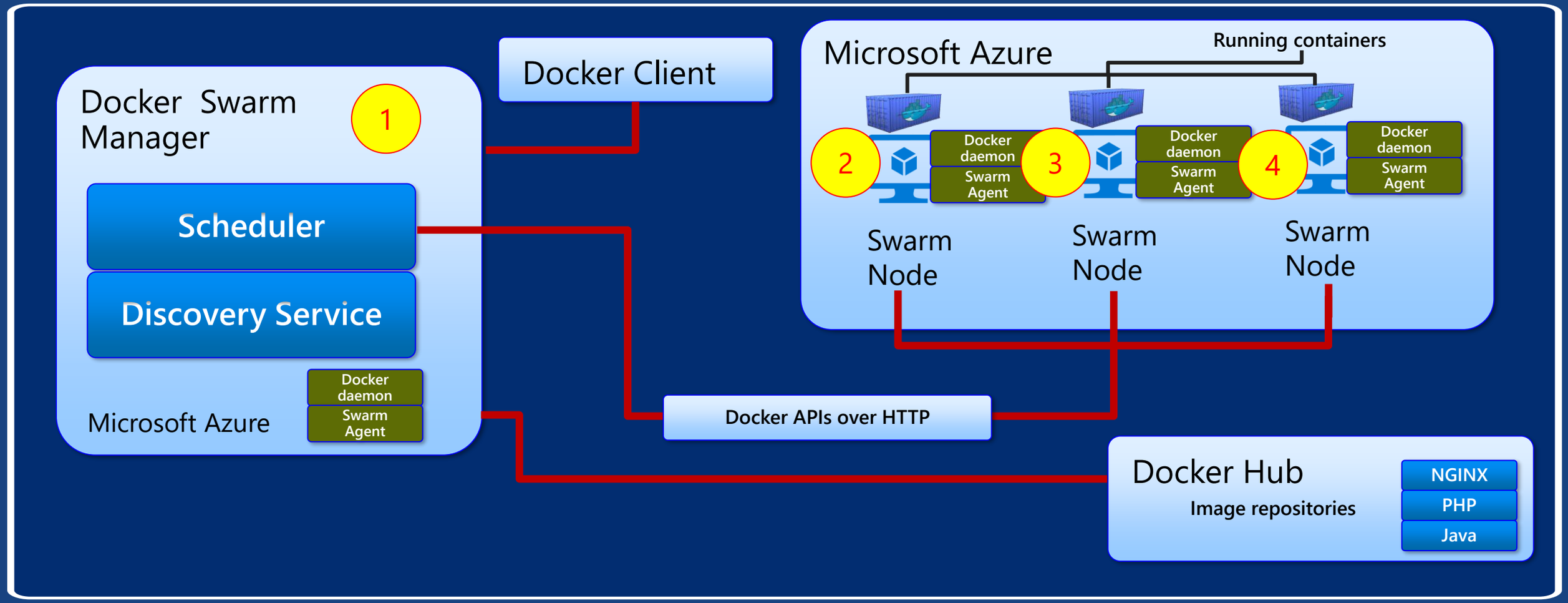
- Docker Machine
- Docker Swarm
- Docker Compose
- Azure Container Service



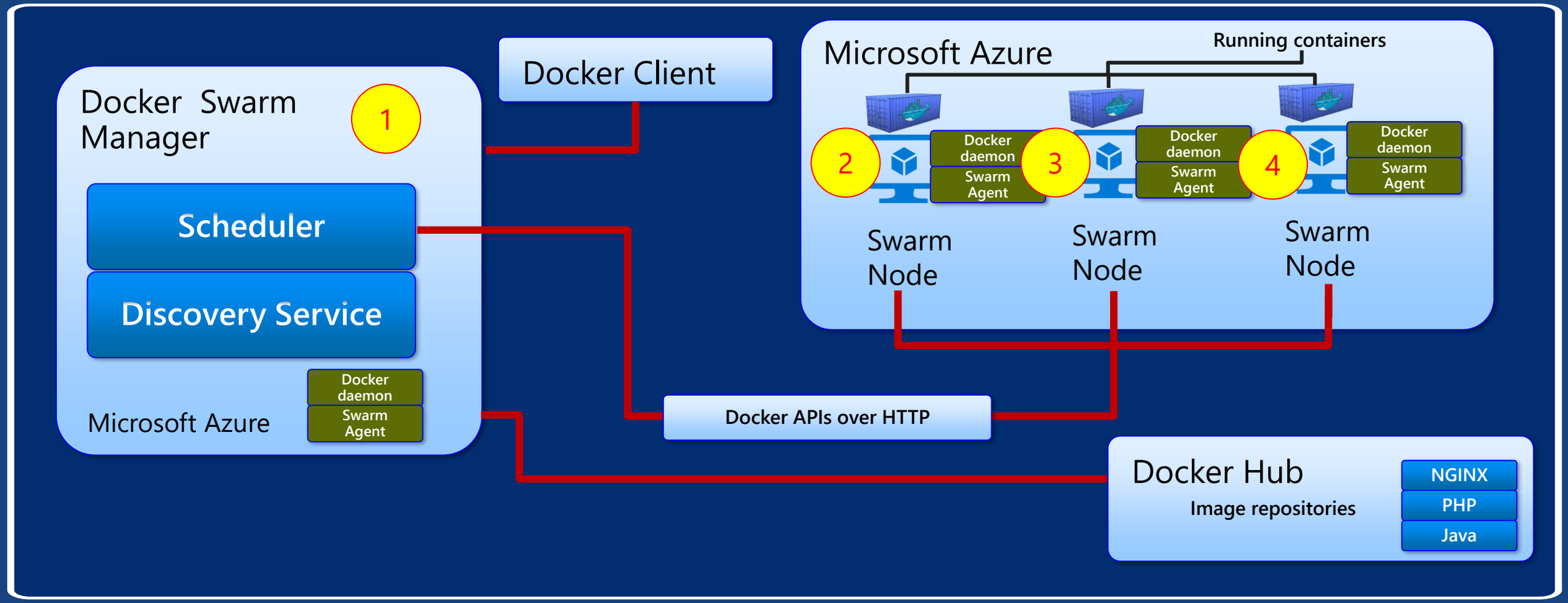
Part 1 – Provisioning the VMs



Part 2 – Defining Swarm Master



Part 3 – Defining Swarm Nodes



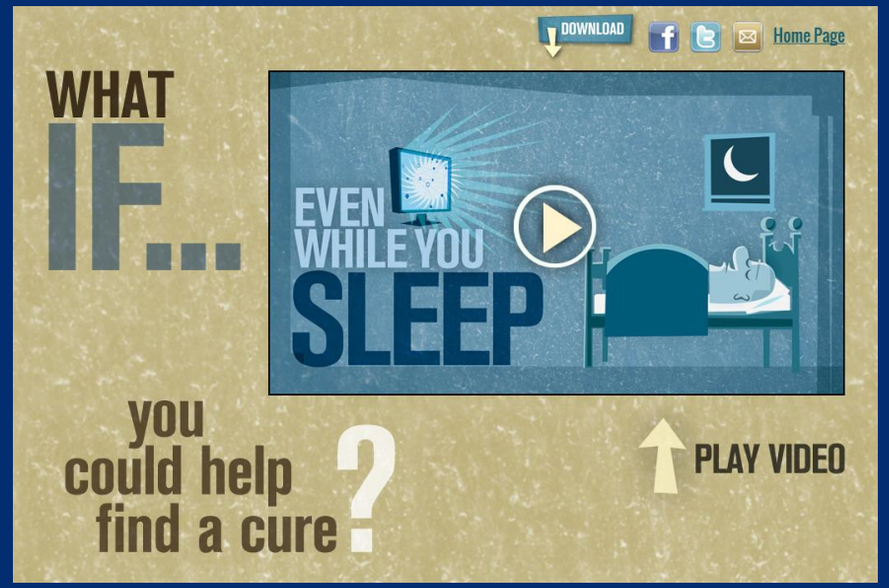
Part 4 – Running Containers

- docker-compose.yml
  - Compose is a tool for defining and running multi-container Docker applications.
  - With Compose, you use a Compose file to configure your application's services.
  - Then, using a single command, you create and start all the services from your configuration

docker-compose.yml

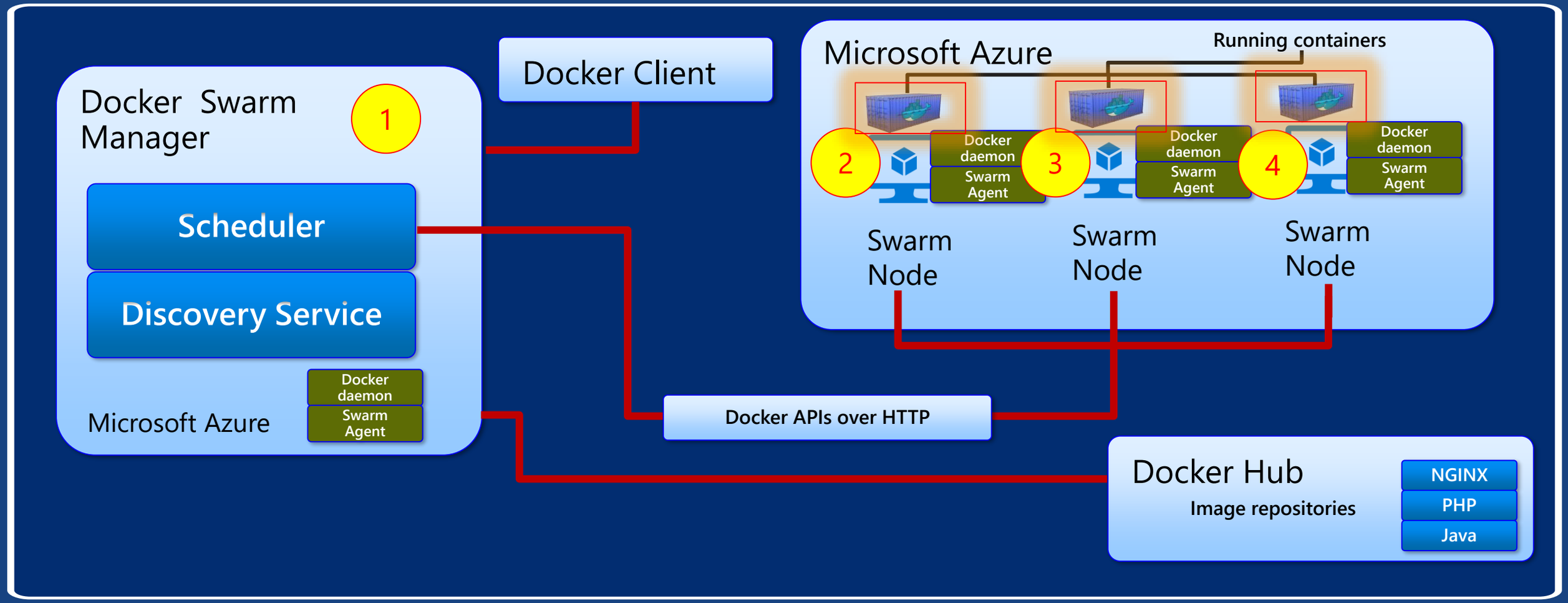
```
root@btdocker
worker:
  image: jordan0day/folding-at-home
~
~
~
~
```

- You can also add other images to the docker-compose.yml file



- Add your computer to over 113,000 others around the world outputting 20,000 teraflops of computing power to form the world's largest distributed supercomputer.

Part 4 – Running Containers



Last content slide

Linux – A first-class citizen in Windows Azure

- Conclusion
- Wrap up
- Questions?

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