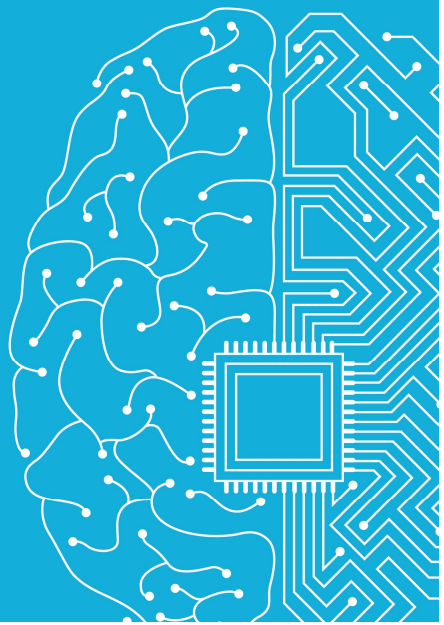
Overview of Azure IaaS & ARM



architech

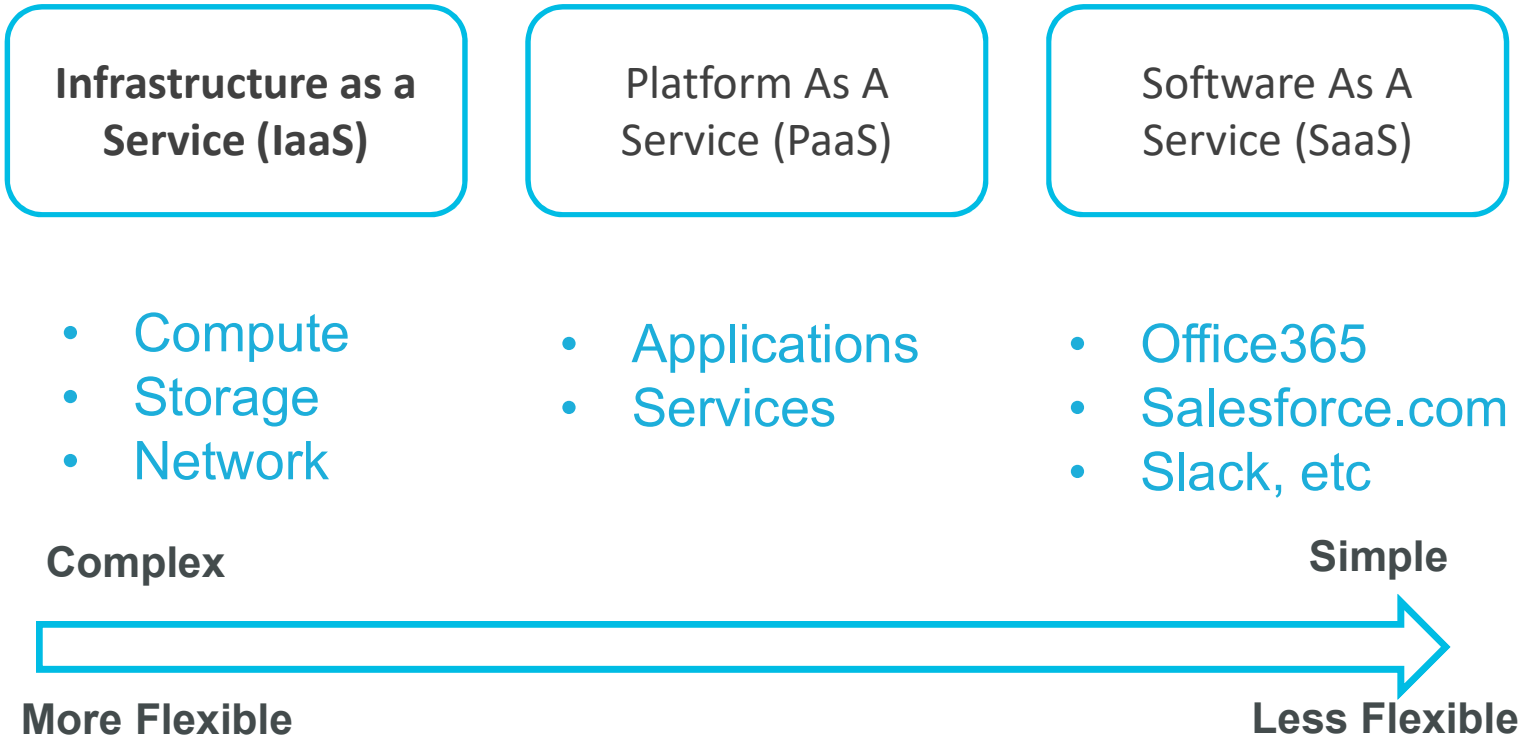
Cloud Computing Lunch & Learn Series

1. Cloud Computing for Non-Techies
2. **Overview of Azure IaaS and deploying an HA, secure Linux cluster**
3. Infrastructure As Code - Using Ansible to deploy docker to a Linux cluster
4. Docker + Docker Swarm to deploy and orchestrate your containerized apps
5. Infrastructure As Code – Terraform to define and deploy your infrastructure on Azure

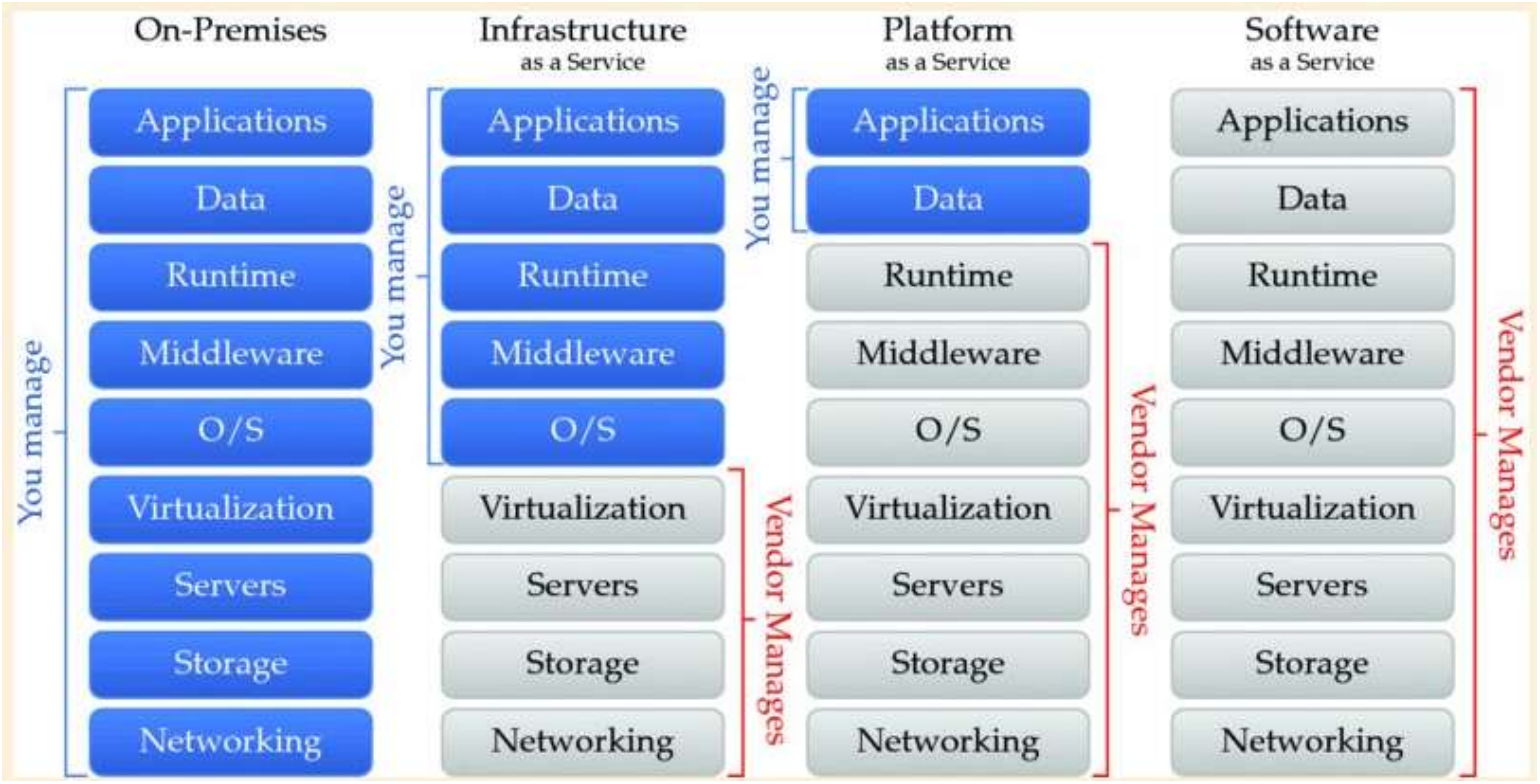
Agenda

1. Azure Resource Manager (ARM) and ARM Providers
2. ARM Architecture
3. Azure CLI and ARM templates
4. Infrastructure as code demo – deploying a multi-node, HA, secure Linux cluster
5. How does Azure IaaS fit in with Architech's strategy?

Different Categories of Cloud Computing



Complexity Spectrum



Azure Resource Manager and Providers

- 2 “versions” of Azure
  - ASM (Azure Service Manager) - **LEGACY**
  - ARM (Azure Resource Manager) – **ARM is the platform going forward**
- ARM portal at http://portal.azure.com

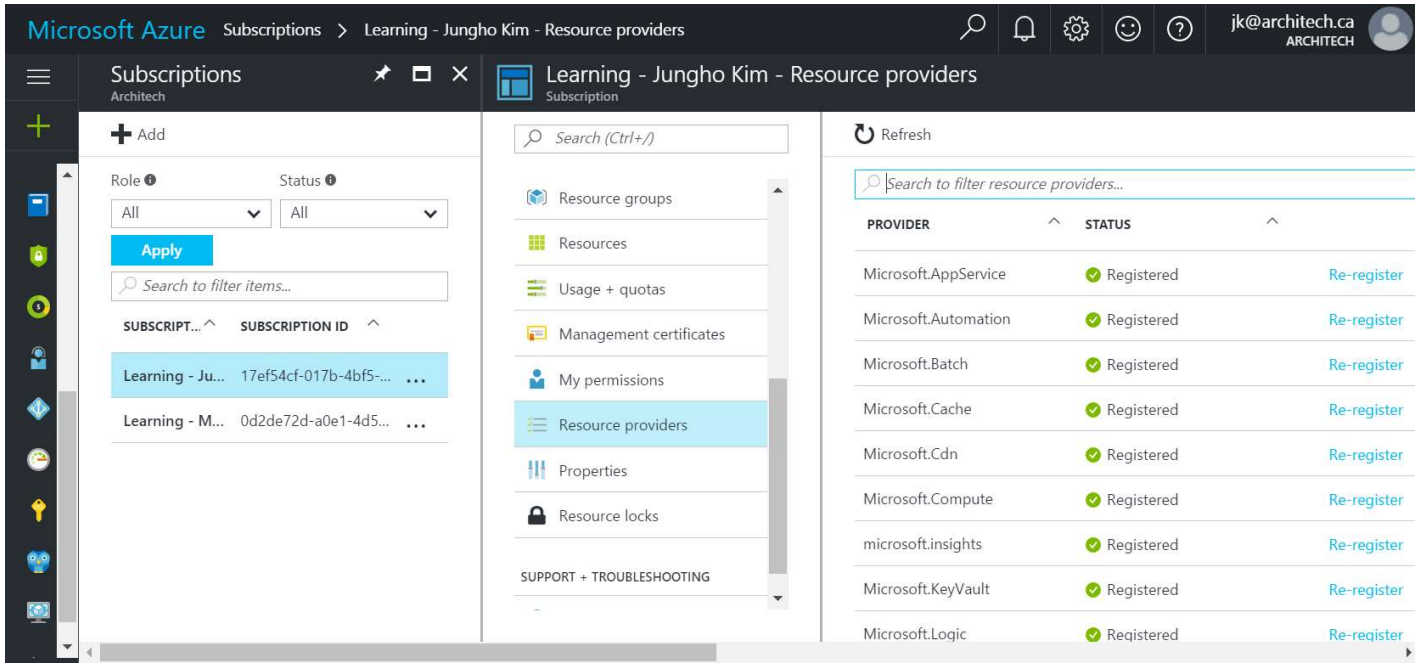
Azure Resource Manager and Providers

- All the capabilities of Azure (compute, network, storage, application services, etc) are called **Resources**
- Resources can be grouped into **“Resource Groups”**
- Resource Groups enable you to manage a group of resources as a single unit from a deployment, management, billing perspective
- **When you architect your solution on Azure, you compose resources into resource groups**

Azure Resource Manager and Providers

- Azure Resources are organized into Resource Providers
- Resource Providers supply the resources that you can deploy and manage
  - Microsoft.Compute – Virtual Machines and many more…
  - Microsoft.Storage – Blob, Table, Queue, File storage
  - Microsoft.Network – Virtual Network, Subnet, Load Balancer, and many more…
  - Many, many more…

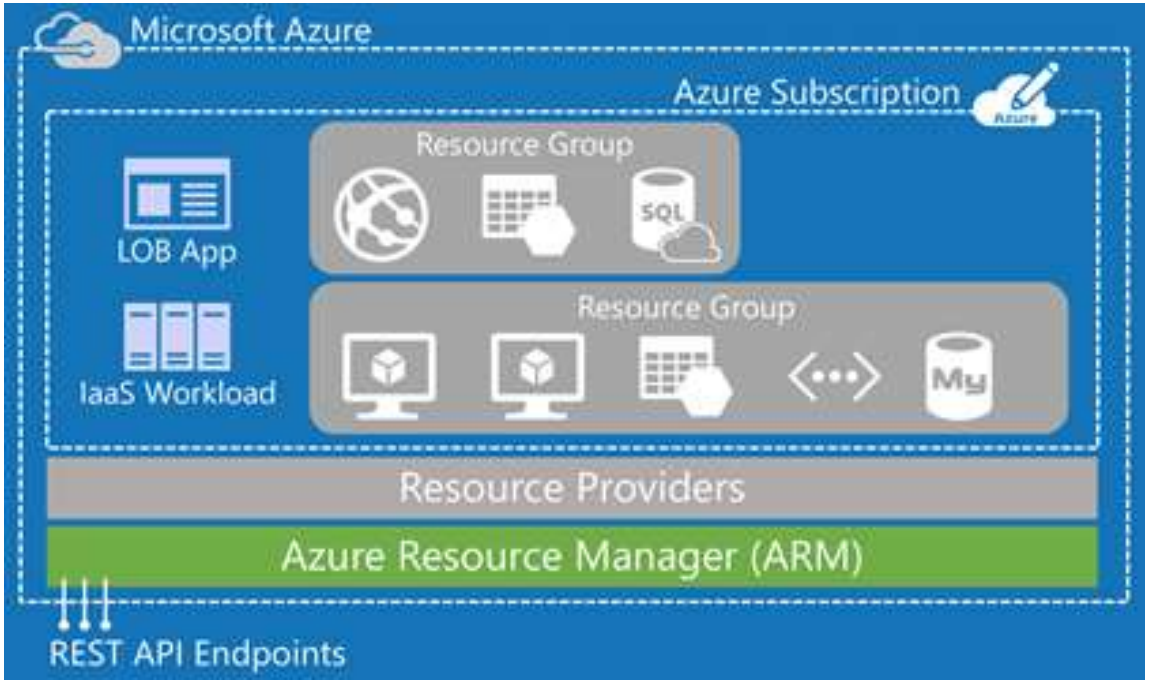
Azure Resource Manager and Resource Providers



azure provider list [options]
azure provider register [options]

Azure Resource Manager and Providers

- Azure Resource Providers supplies the resources you can access and manage
- Azure Resource Manager is the framework that allows you to manage the resources
- ARM is exposed via REST APIs
- You can access the APIs via
  - SDKs (Java, Node, .NET…)
  - Powershell
  - Azure CLI



Azure CLI

- Azure CLI is developed on top of Node.js. (See References Slide)
- Some important commands:

  `azure login`

  `azure help` (list all commands)

  `azure help [command]` (help for a given command)

  `azure config mode arm` (This puts you into ARM mode, remember ASM is legacy)

  `azure config list` (To list your config settings)

  `azure account list` (To list your subscriptions and see the current one)

- CLI is **cross platform** and is fine for provisioning and configuration via ARM templates
- For interactive interaction with ARM from the command line, Powershell is much better, which for now means Windows. (PS has been open sourced and will be available for macOS and Linux)

ARM Templates

- Enables you to declaratively define your Resource group and Resources
- JSON format that mirrors the schema of the REST API
- You deploy your templates using the following command:

1) Create your ARM resource group

```
azure group create –n groupName –l ‘Canada East”
```

2) Deploy your template

```
azure group deployment create –f “path to template” \
–e “path to param file” –g groupName –n nameOfDeployment
```

ARM Template

```
{
    "$schema": "https://schema.management.azure.com/schemas/2015-01-
01/deploymentTemplate.json#",
    "contentVersion": "1.0.0.0",
    "parameters": {},
    "variables": {},
    "resources": [],
    "outputs": {}
}
```

ARM Template

```
{
    "comments": "Availability set for the app VMs",
    "type": "Microsoft.Compute/availabilitySets",
    "name": "[variables('appAvailabilitySetName')]",
    "apiVersion": "2015-06-15",
    "location": "[resourceGroup().location]",
    "properties": {
        "platformUpdateDomainCount": "[variables('updateDomainCount')]",
        "platformFaultDomainCount": "[variables('faultDomainCount')]"
    }
}
```

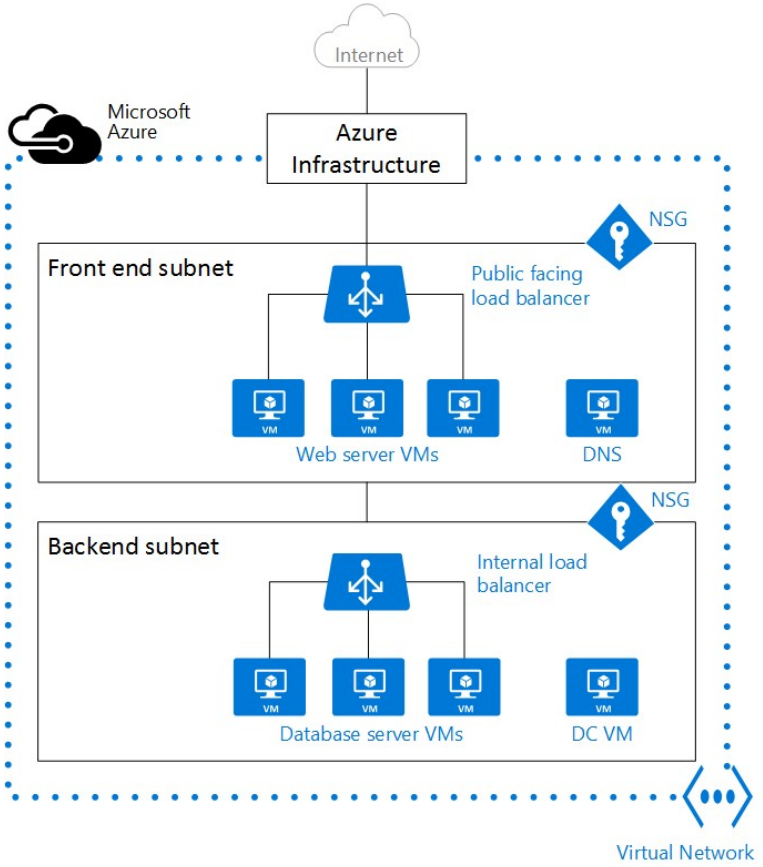
Common properties

Template Functions

- Are always invoked within `[]` e.g. `[variables('updateDomainCount')]`
- Grouped into:
  - Numeric functions e.g. copyIndex
  - String functions e.g. concat, split, substring etc…
  - Array functions
  - Deployment value functions e.g. accessing variables, parameters
  - Resource functions e.g. resourceId, resourceGroup etc…
- A well factored templates will use them heavily
- See https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-template-functions

A Typical Architecture

- Resources here are:
  - Virtual Network
  - Subnets
  - NSG (Network Security Group)
  - Load Balancers
  - Virtual Machines
  - Public IP Address
  - Private IP Address
  - NICs
- Resources have dependencies to other resources (e.g. subnet depends on vnet)



Grouping Resources

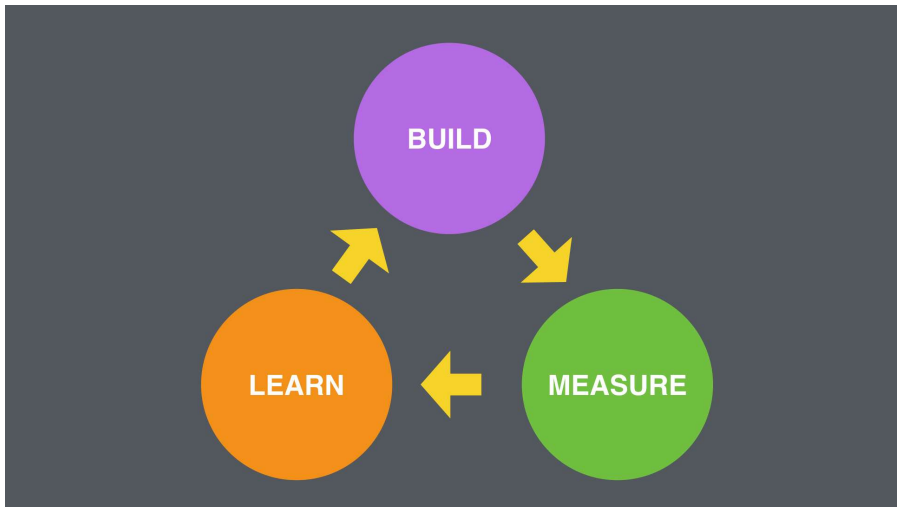
- Resources should be grouped based on balancing multiple criteria
  - Life-cycle of resource(s)
  - Rate of change for a given resource (what needs to get upgraded hence deployed more frequently?)
    - Virtual network and subnets won't change as frequently as VMs
    - Storage won't change as frequently as VMs
  - Recommend you group resources into the following groups:
    - Network resources (vnet, subnet, load-balancers, nsg, NICs, IP addresses etc)
    - Virtual Machines
    - Storage

Deploying an ARM template

https://bitbucket.org/architech/azure-linux-iaas-example

Why Do We Exist?

…To help our customers innovate…



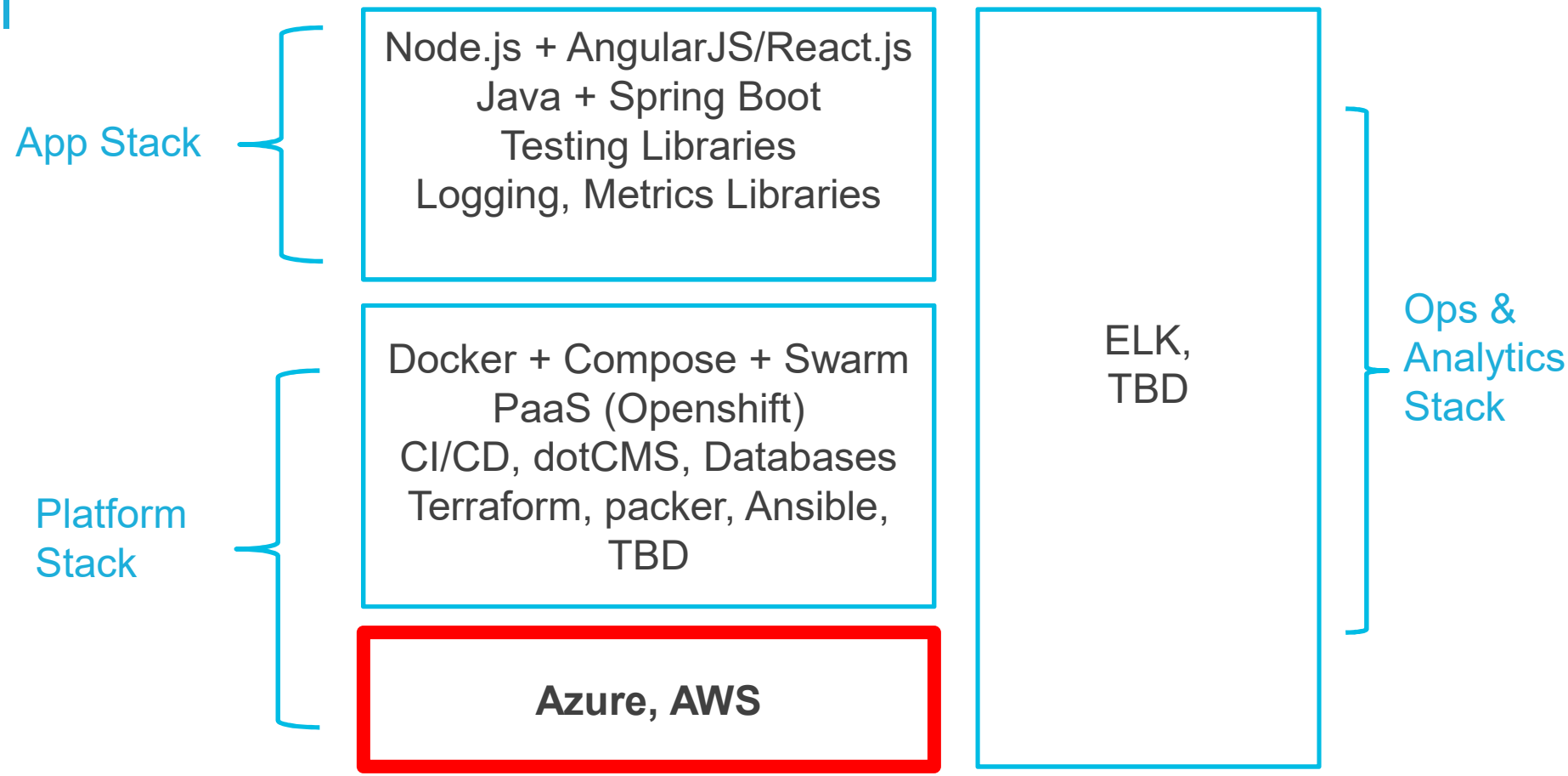
and move FAST!

Speed | Quality | Build the Right Solution

Capabilities	Strategy	Design	Engineering	CA
Methodology	Agile Engineering & Design Thinking			
Technology	**Cloud, Open Source, Automation, Fast to Develop, Fast to Test, Fast to Deploy, Fast to Change, Resilient, Scalable, Performant, Secure**.			
Partners	Microsoft	Red Hat	dotCMS	Cloudbees

and others…

Technology Stack



References

- Azure Resource Manager Overview - https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-overview
- ARM Supported Services - https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-manager-supported-services
- Using Azure Customer Script Extension with Linux VM - https://docs.microsoft.com/en-us/azure/virtual-machines/virtual-machines-linux-extensions-customscript?toc=%2fazure%2fvirtual-machines%2flinux%2ftoc.json
- Custom Script Extensions for Linux - https://github.com/Azure/custom-script-extension-linux
- Installing Azure CLI - https://docs.microsoft.com/en-us/azure/xplat-cli-install
- Azure CLI Commands in ARM mode - https://docs.microsoft.com/en-us/azure/virtual-machines/azure-cli-arm-commands

References

- Deploying ARM templates with Azure CLI - https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-template-deploy-cli
- View Deployment Operations in the Portal - https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-manager-deployment-operations
- ARM Schema Versions - https://github.com/Azure/azure-resource-manager-schemas/tree/master/schemas
- ARMVIZ, a very helpful tool to visualize your ARM resource dependencies - http://armviz.io/designer
- ARM course on Pluralsight - https://app.pluralsight.com/library/courses/azure-resource-manager-deep-dive/table-of-contents
- Architecting Azure Solutions course on Pluralsight - https://app.pluralsight.com/library/courses/architecting-azure-solutions-70-534-infrastructure-networking/table-of-contents