## Microsoft

# OPENedX

# ON MICROSOFT AZURE

Seamlessly Deploying A Scalable, High Availability Open edX
Solution on Microsoft Azure
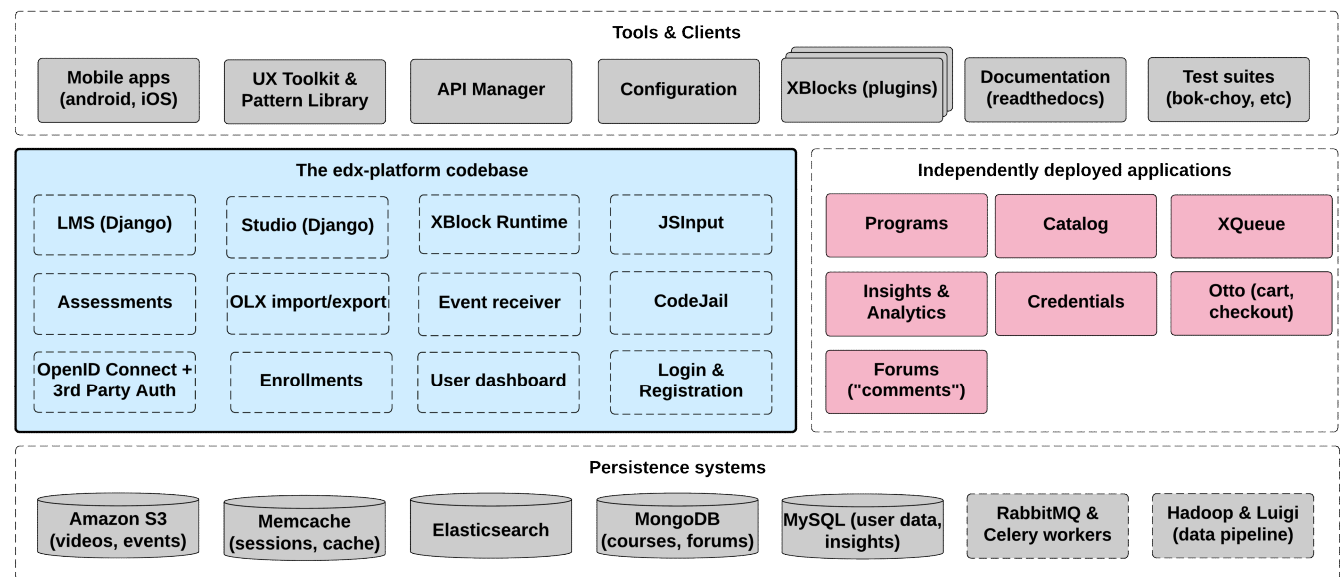
**05.24.17**

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# Observations

- 263+ references to AWS within the source code of the edx-platform

- Exclusive use of open source components
  - Nginx
  - Mysql & Mongo
  - Memcache
  - Elastic Search
  - Celery & Rabbit MQ, etc.

**Tools & Clients**

| Mobile apps (android, iOS) | UX Toolkit & Pattern Library | API Manager | Configuration | XBlocks (plugins) | Documentation (readthedocs) | Test suites (bok-choy, etc) |

**The edx-platform codebase**

| LMS (Django) | Studio (Django) | XBlock Runtime | JSInput |
| Assessments | OLX import/export | Event receiver | CodeJail |
| OpenID Connect + 3rd Party Auth | Enrollments | User dashboard | Login & Registration |

**Independently deployed applications**

| Programs | Catalog | XQueue |
| Insights & Analytics | Credentials | Otto (cart, checkout) |
| Forums ("comments") | | |

**Persistence systems**

| Amazon S3 (videos, events) | Memcache (sessions, cache) | Elasticsearch | MongoDB (courses, forums) | MySQL (user data, insights) | RabbitMQ & Celery workers | Hadoop & Luigi (data pipeline) |

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# Can this platform be installed on Microsoft Azure?

# Azure is an open cloud

**DevOps** — Nagios, VAGRANT, Jenkins, GRUNT, Gradle, Clients, Android, iOS, Xamarin, APACHE CORDOVA

**Management** — CHEF, puppet labs, ANSIBLE, SALTSTACK, mist.io, libcloud, SCALR CLOUD MANAGEMENT

**Applications** — WordPress, Joomla!, Drupal, PaaS & DevOps, apprenda, Jelastic, GitHub

**App Frameworks & Tools** — php, nodeJS, Python, Java, Ruby, IntelliJ IDEA, eclipse

**Databases & Middleware** — hadoop, redis, cleardb, cloudera, MySQL, mongoDB, Couchbase

**Infrastructure** — Linux, Ubuntu, redhat, SUSE, Debian, bitnami, ORACLE LINUX, freeBSD, docker

# What did we do?

- **December 2016,** launched a production Dogwood-based Open edX site completely hosted on Microsoft Azure

- **March 2017**, upgraded from Dogwood to Ficus with comprehensive theming

- **Now**: delivery mechanism for bootstrapping this infrastructure has been made available to the community



https://openedx.microsoft.com

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# Design Considerations

- **High Availability** - will the system remain online if one or more components fail?

- **High Scalability** - can the capacity of the system be expanded as needed?

- **Disaster Recovery** - can data loss be circumvented? Can the system be recovered?

- **Upgradability** - can the system be upgraded after the initial setup?

- **Monitoring & Alerting** – can the system provide notification to a support team?
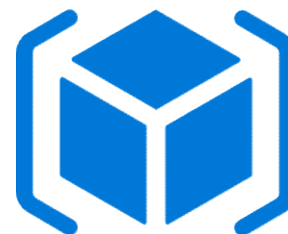
# How did we do it?

 **Fork** 6

We opted for comprehensive configuration and customizations via repository forks.

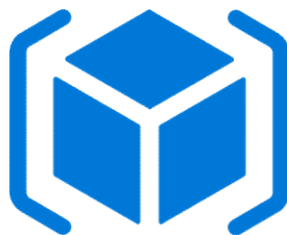We created an Azure-based deployment system from scratch to support service delivery.



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# The Tools
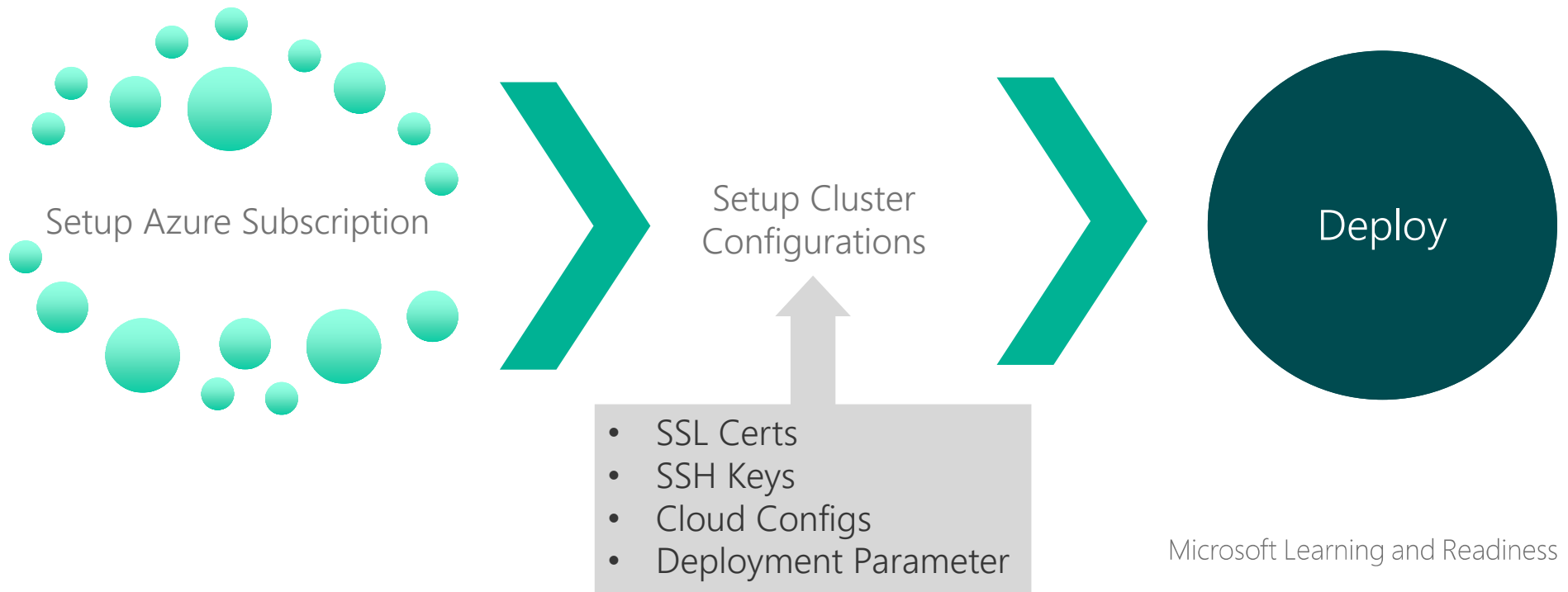
**Azure Resource Manager Templates driven by PowerShell**
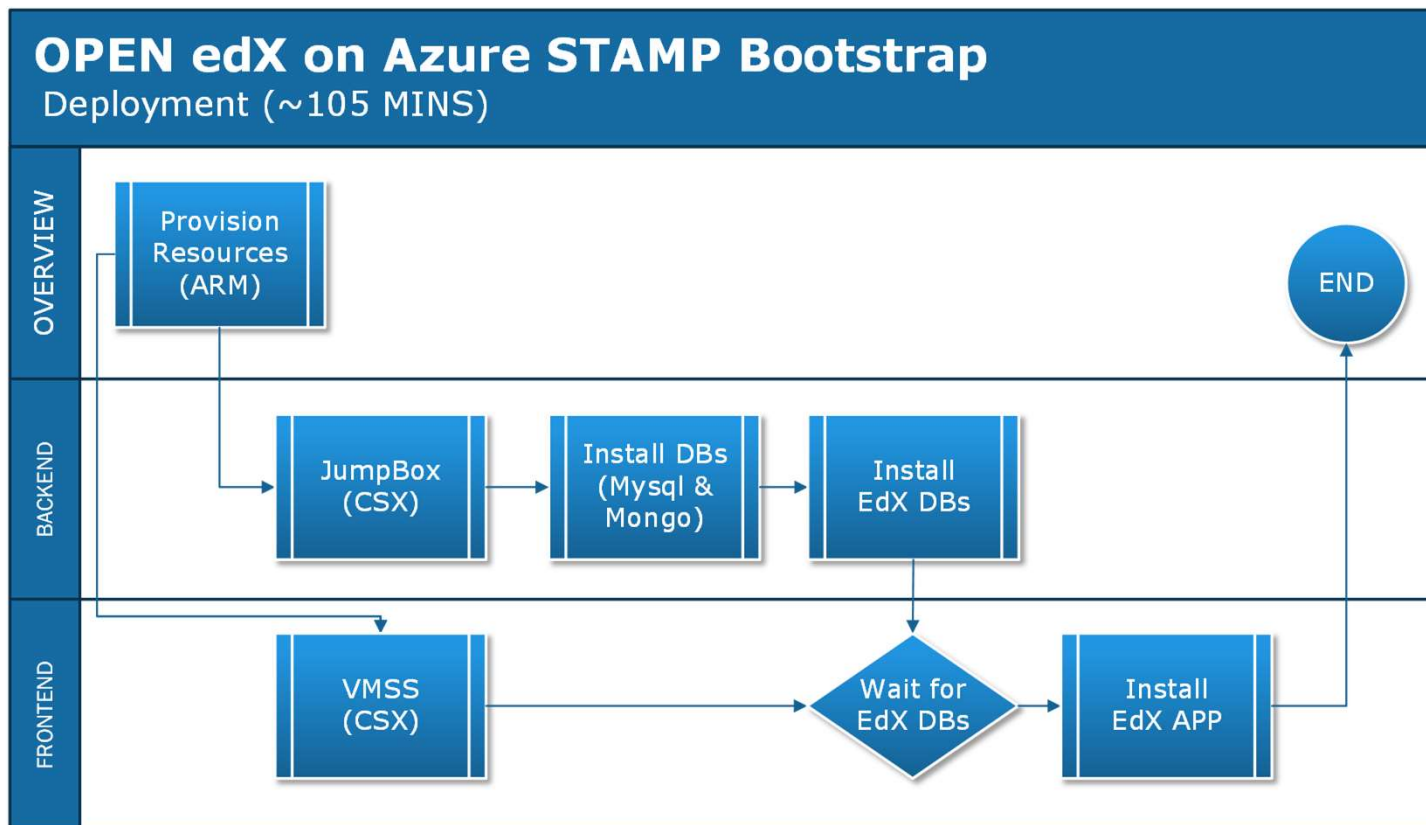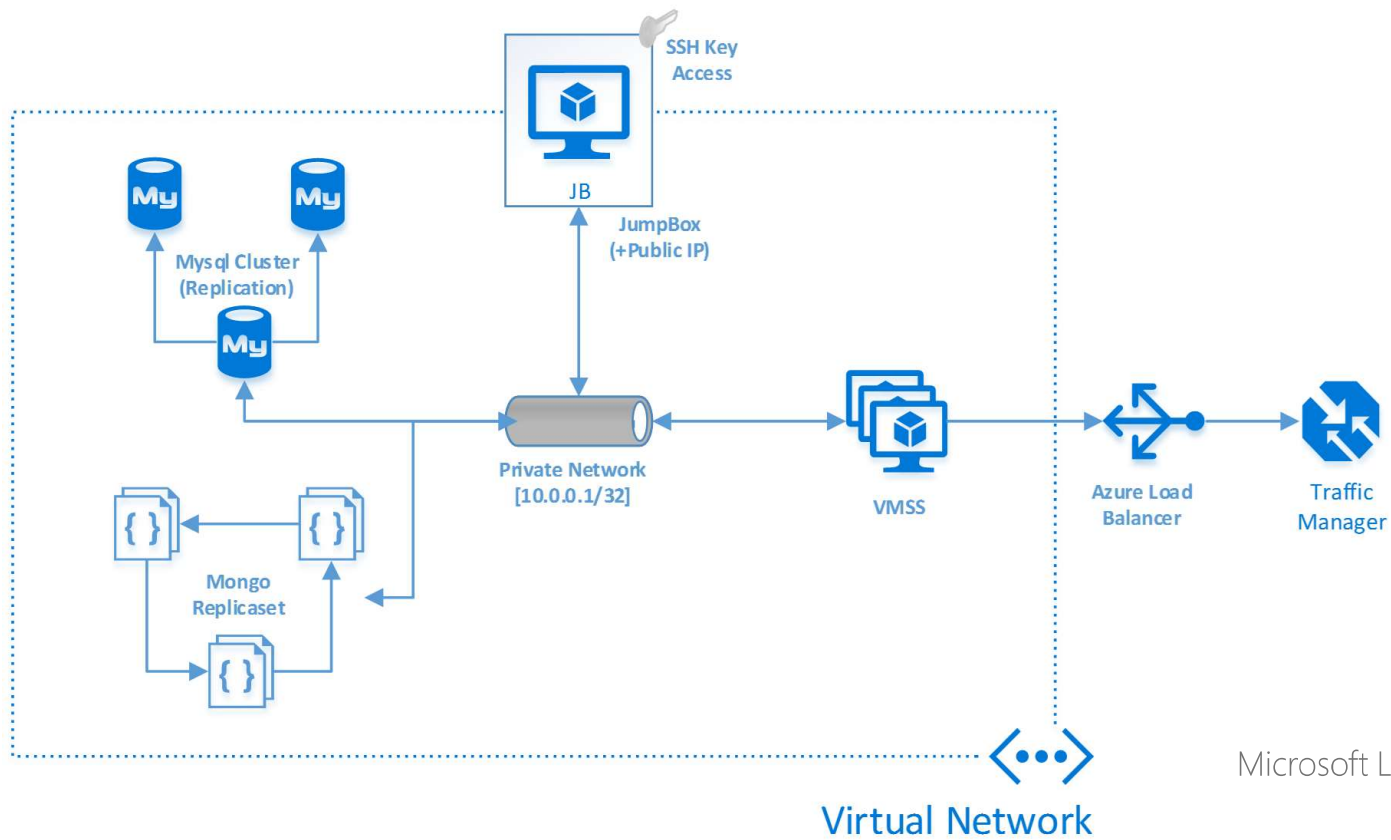
Azure

Resource
Manager

\+

PowerShell

# The Process

**Setup Azure Subscription**

**Setup Cluster Configurations**

- SSL Certs
- SSH Keys
- Cloud Configs
- Deployment Parameter

**Deploy**

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# Deployment Process



**OPEN edX on Azure STAMP Bootstrap**
Deployment (~105 MINS)

OVERVIEW

BACKEND

FRONTEND

Provision Resources (ARM)

END

JumpBox (CSX) → Install DBs (Mysql & Mongo) → Install EdX DBs

VMSS (CSX) → Wait for EdX DBs → Install EdX APP

# Architecture



SSH Key Access

JB

JumpBox (+Public IP)

Mysql Cluster (Replication)

Private Network [10.0.0.1/32]

VMSS

Azure Load Balancer

Traffic Manager

Mongo Replicaset

Virtual Network

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# Want to get started?

**Detailed documentation is now available on Github**

https://aka.ms/openedxonazure

Thank you

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