THE ROAD TO KUBERNETES

Presented by Mike Berry
27 August 2018
WHO IS THIS GUY?

Mike Berry
Tech Area Lead

Pit Crew - 2016

Velocity Engineering - 2017

Omni Channel Platform - 2018
KEY DATES FOR THE ANZ KUBERNETES JOURNEY

- **October 2016**  
  “Docker in Production” discussed
- **November 2016**  
  Container Orchestration Requirements workshop
- **December 2016**  
  Container Orchestration Selection  
  IBM Blue Mix vs Openshift vs Docker Datacenter vs Rancher
- **February 2017**  
  Recommendation made for **Red Hat OpenShift**
- **March 2017**  
  Solution Design starts
- **May 2017**  
  Build work starts on new SOE with SELinux
- **August 2017**  
  Build for test and production clusters in progress
- **September 2017**  
  Gerard Florian (Group Executive - Technology) invite to discuss containers/DevOps w/ tech leaders
- **October 2017**  
  Live clusters in production with (3) real applications
- **February 2018**  
  Migration complete 21 platform services live.
- **June 2018**  
  Maile Carnegie (Group Executive - Digital Banking) invite to discuss containers w/ digital leaders
Lesson 1 – Understand why?
Lesson 2 - Find some allies
Lesson 3 - Containers are not little vms
Lesson 4 – Java inside containers can be hard
Lesson 5 - Plan and validate your logging strategy
Lesson 6 – Keep it simple
Lesson 7 – Add extra features over time
Lesson 8 – Teaching, Training and Education
LESSON 1 – UNDERSTAND WHY?

Faster Deployments with Zero Downtime

Increased stability for all environments

More production like environments (config as code)

Greater end to end control of the application lifecycle
WHY IS END TO END CONTROL IMPORTANT?

Cron entry

-> 0 2 * * Mon,Tue,Wed,Thu,Fri /usr/local/bin/startup.sh

This would run /usr/local/bin/startup.sh every Weekday @2am
TIMELINE EXAMPLE – SERVER SCHEDULED JOBS

12-Dec-16
- x1

24-Jan-17
- x3
- x2
- x1

20-Jan-17
- x2
- x2
Christmas Freeze

27-Jan-17
- x4

3-Feb-17
- x9

10-Feb-17
- x5

16-Feb-17
- x6

23-Feb-17
- x1

1-Feb-17
- x10

6-Feb-17
- x1

3-Feb-17
- x9
- x1

6-Feb-17
- x10

13-Feb-17
- x4

To be continued.

Teams Involved:
- Team 1
- Team 2
- Team 3
- Team 4
- Team 5
- Team 6

Scale 1cm = 1 day*

*only business days shown
CURRENT TOTALS – SERVER SCHEDULED JOBS

Cross team coordination work

- Phone: x2
- Emails: x4
- Meetings: x17
- Messages: x106

Time expended

62 days*

Servers complete

0

*Business days, excluding 3 week shutdown. As of (23-2-17)
SHARED SERVICE POOL WAIT TIME

Request

1. Start
2. Wait time
3. Wait time
4. Wait time

Success
Voice of Operations
- What is the right way to design this?
- Can it be easily maintained, upgraded or scaled up?
- Helped us work through issues with build teams & security teams.

Voice of Developers
- How are we going to change our application to suit containers?
- What will the continuous integration pipeline look like?
- Supported the first few applications into Kubernetes.
- Helped accelerate application changes to support migration to Spring Boot in a container.
Containers are immutable & ephemeral

Images don't change. Changes are applied to a new image

Containers can be stopped and destroyed, then rebuilt and replaced at any time

You will need a continuous integration pipeline to automatically create new container images and config maps

Think About

Bootstrap script that runs on launch
Liveness probe (service running)
Readiness probe (ready to accept traffic)
LESSON 4 – WARNING: JAVA INSIDE CONTAINERS CAN BE HARD

• The JVM will see all the node resources but not the container resource limits

• Kubernetes will terminate containers that use memory/cpu in excess of the set limit

• JAVA 10 has resolved the issue

See also https://developers.redhat.com/blog/2017/03/14/java-inside-docker/
LESSON 5 - PLAN AND VALIDATE YOUR LOGGING STRATEGY

REPORT CARD
NEEDS IMPROVEMENT
(see me after class)

ALWAYS LEARNING
LESSON 5 - PLAN AND VALIDATE YOUR LOGGING STRATEGY

- Plan for how you will aggregate your logs
- Test your approach with appropriate volume ahead of go live
ONE DOES NOT SIMPLY DEPLOY EVERYTHING TO KUBERNETES

AND HOPE FOR THE BEST
We started by running services in Namespaces that aligned with our **existing environments** including production.

We used labels to create duplicate environments to allow for **canary deployments**.

Next we moved our Continuous Integration service into Kubernetes to allow us to create a **no queue build service**.

**LESSON 7 – ADD EXTRA FEATURES OVER TIME**
PER-BUILD CONTAINERS (PODS)

Build Job
- Build artefact
- Run Unit Tests
- Docker build, tag and push image
- Create **system test environment**
- Run API/UI tests
- Code quality & security scans
- Complete destroy environment & agent

Per-build Container Bamboo Agents
The future is already here — it's just not very evenly distributed
– William Gibson

Sooo...
What is a container?
• Created “how to guides” and process documentation
• Video walkthroughs of performing deployments and using CI
• Hands on tutorial walking through troubleshooting a “pre-broken” build with in room and remote assistance.
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<tr>
<th>From...</th>
<th>...to this</th>
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<tbody>
<tr>
<td><strong>18 hours</strong> long deployments into Production on a Saturday night.</td>
<td><strong>1 hour</strong> deployment in business hours during the week.</td>
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<td>Planned and unplanned outages taking out dev &amp; test environments</td>
<td>Planned outages in dev/test rarely required (no more change boards).</td>
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<td><strong>2+ hours downtime daily</strong></td>
<td>Outages in the order of tens of minutes daily and <strong>limited to service/app.</strong></td>
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<td>New environments would take <strong>months</strong> to full create and validate</td>
<td>New environments created <strong>same day</strong> which duplicate production.</td>
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<td><strong>Average</strong> time from start of feature to production release was <strong>36 weeks</strong>.</td>
<td><strong>Average</strong> time from start of feature to production release is <strong>6 weeks</strong>. We’ve already done <strong>same day</strong> security fixes.</td>
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THANK YOU

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