Moving Banner to the Cloud, Start to Finish in 3 Weeks

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About William & Mary

- Founded in 1693
- Public Research University
- Enrollment of just under 10k
- Located in Williamsburg, Virginia
- Very Centralized IT Department

WILLIAM & MARY

INFORMATION TECHNOLOGY

About The Systems Design & Architecture Team

- Team of 13
- Banner is a small part of what we do
- Includes Linux and Windows Admins, DBAs, Application Administrators

Disclaimers

- This is about moving to self-managed cloud
- We’re going to get a little technical
- We go (way) outside the documentation
- We have our own words that don’t match this conference
- 3 weeks was only possible because of a lot of posturing

Why Consider IaaS Cloud?

- More than “Not my Data center”
- Hundreds of services with no upfront investment
- Provides the base layer or an everything platform (not just the ERP)
- Scale with demand
- *Everything* is manageable as code

Cloud Goals for William & Mary

- No application is special
- Define everything as code
- Automate Everything
- Follow Lean Software Development Principles

Lean Software Development

1. Eliminate waste
2. Amplify learning
3. Decide as late as possible
4. Deliver as fast as possible
5. Empower the team
6. Build integrity in
7. Optimize the whole

Banner and Friends at William & Mary

- 7 Instances (production + 6 non-production)
  - Half are automatically refreshed on regular intervals
- 2 Instances of ODS
- 2 Instances of Degreeworks
- 3 Instances of Banner Document Management
- Argos and Qlik* for Reporting

We Name Stuff Differently

DBA is a Database Administrator, regardless of the application

Application Administrator runs upgrades and manages configuration of the application (e.g. Banner, Degreeworks, etc.)

2004
W&M Launches Banner

2018
Banner 9 Launches 100% in Containers

What's a Container?

An application packaged with its runtime dependencies into a standard package.

Java

Tomcat

WAR File

Instance Agnostic Configuration

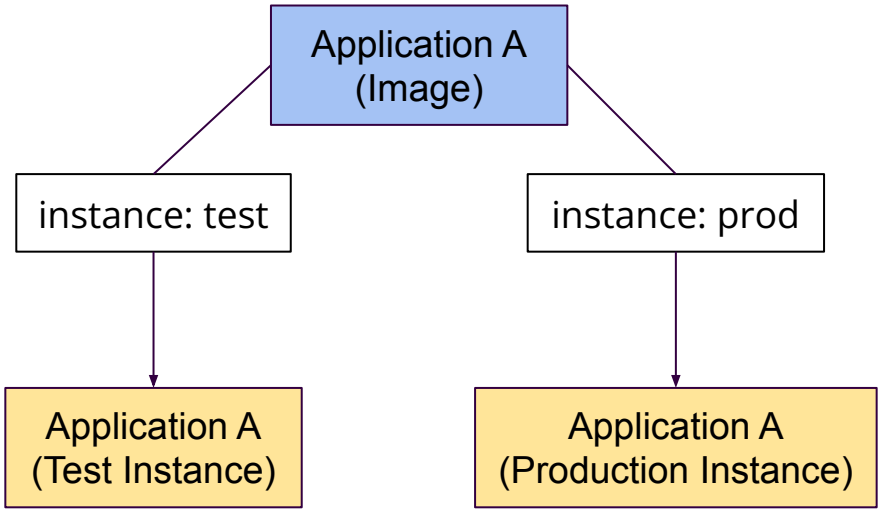
Container Orchestrators

- Run containers across a fleet of servers.
- Orchestrator dynamically configures load balancer
- Large ecosystem for other out of the box integrations

kubernetes

Multiple Instances

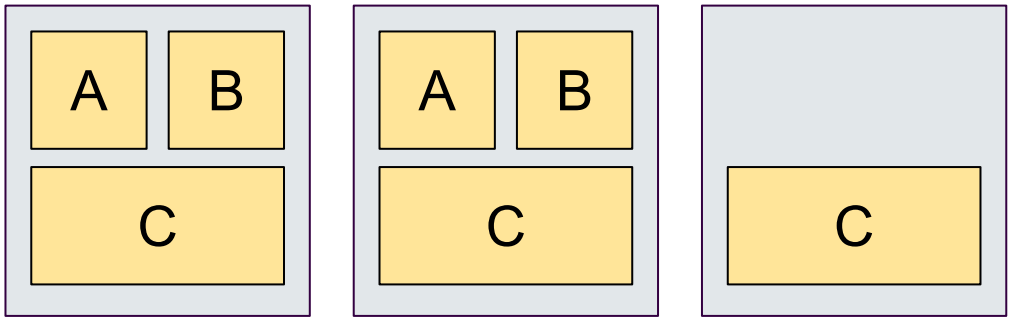
Build once and promote as validated



Managing Containers

Scaling Up

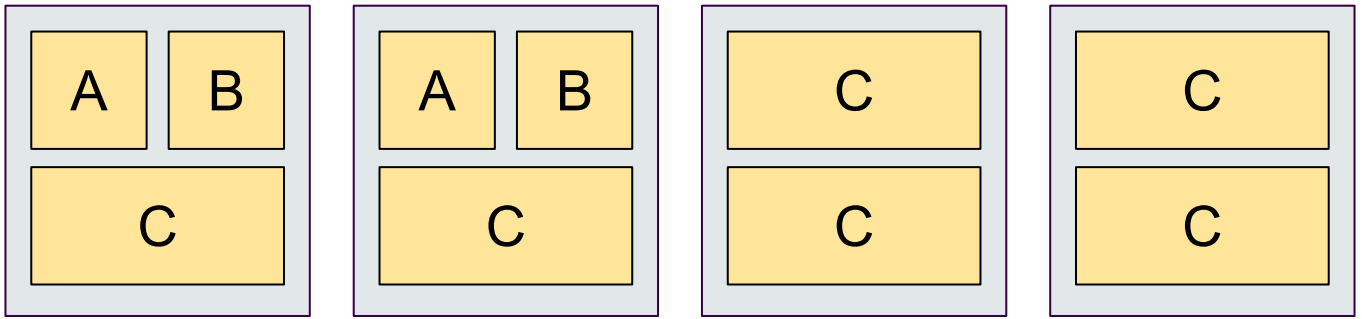
A: 2
B: 2
C: 3



Managing Containers

Scaling Up

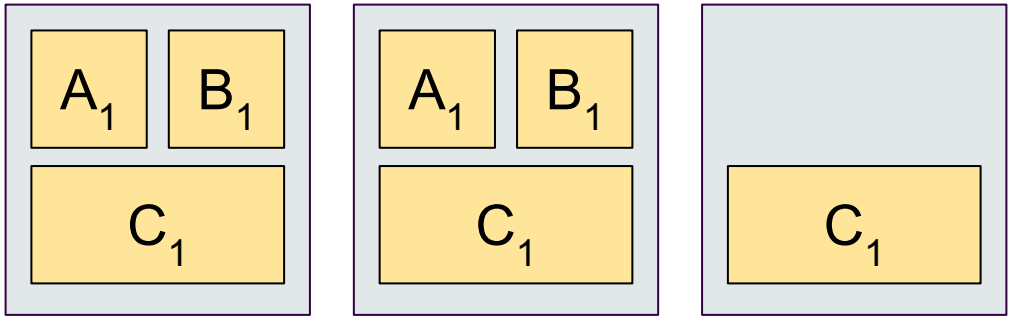
A: 2
B: 2
C: 3 → 6



Managing Containers

Updating Versions

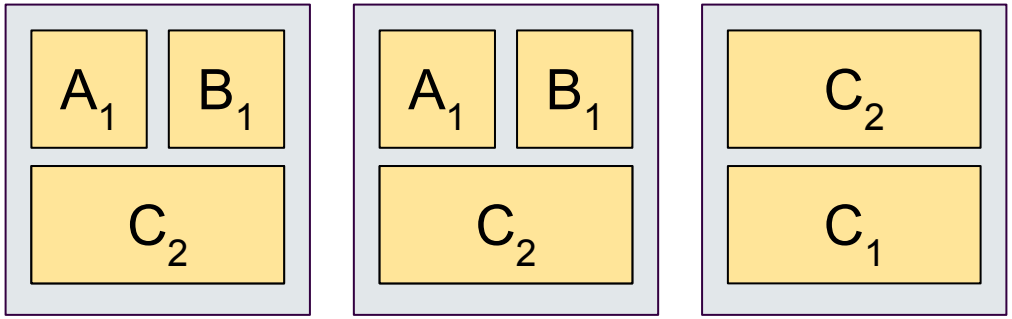
A: v1
B: v1
C: v1



Managing Containers

Updating Versions

A: v1
B: v1
C: v1 → v2



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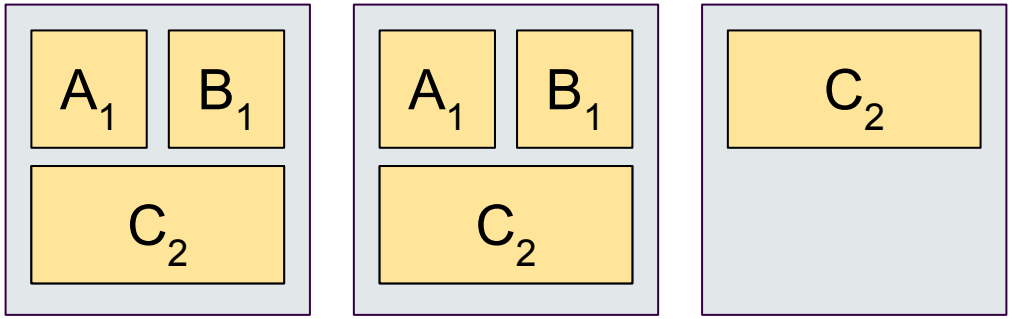

Configurations are Versioned

Configuration pushed to git repository and automatically implemented

Components of Banner

	Servers Required
Services for 1 Instance of Banner	19
Production should be redundant	19
6 Non-Production Instances	114
Databases	7
Jobsub Servers	7
ESM/Upgrades	1
	167 Total Servers

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Databases	7
Jobsub Servers*	7
ESM/Upgrades	1
	8 Traditional Servers + 159 Containers

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Spring 2019
Shift from Solaris to Linux
Separate Jobs from Database Server

Jobsub Also Uses Containers

But Different

Java

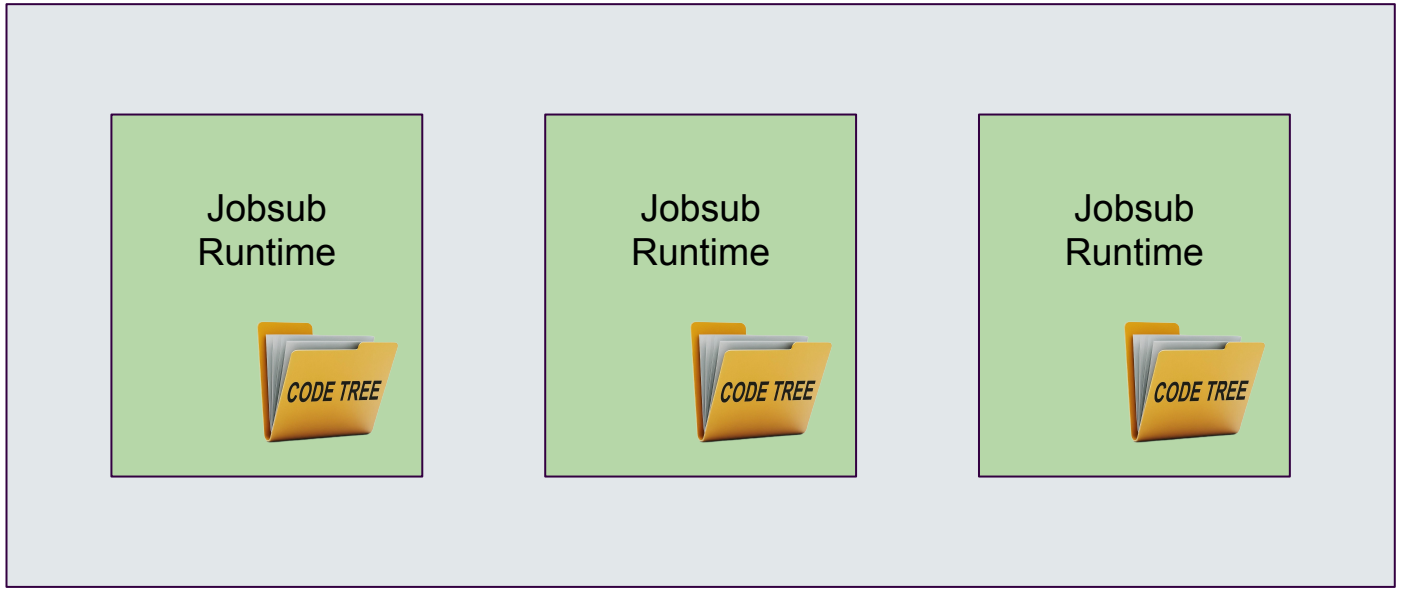
Oracle Client

Vault

Other Runtime Libraries

Jobsub Also Uses Containers

But Different



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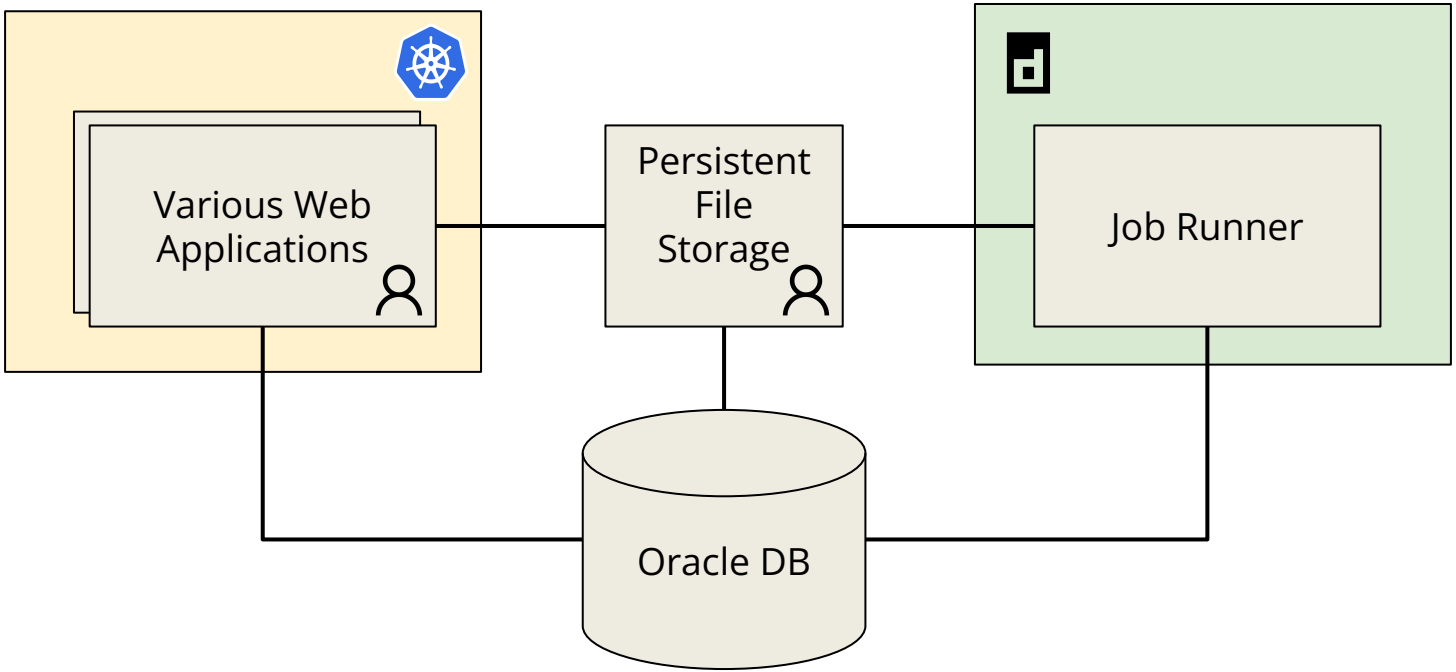
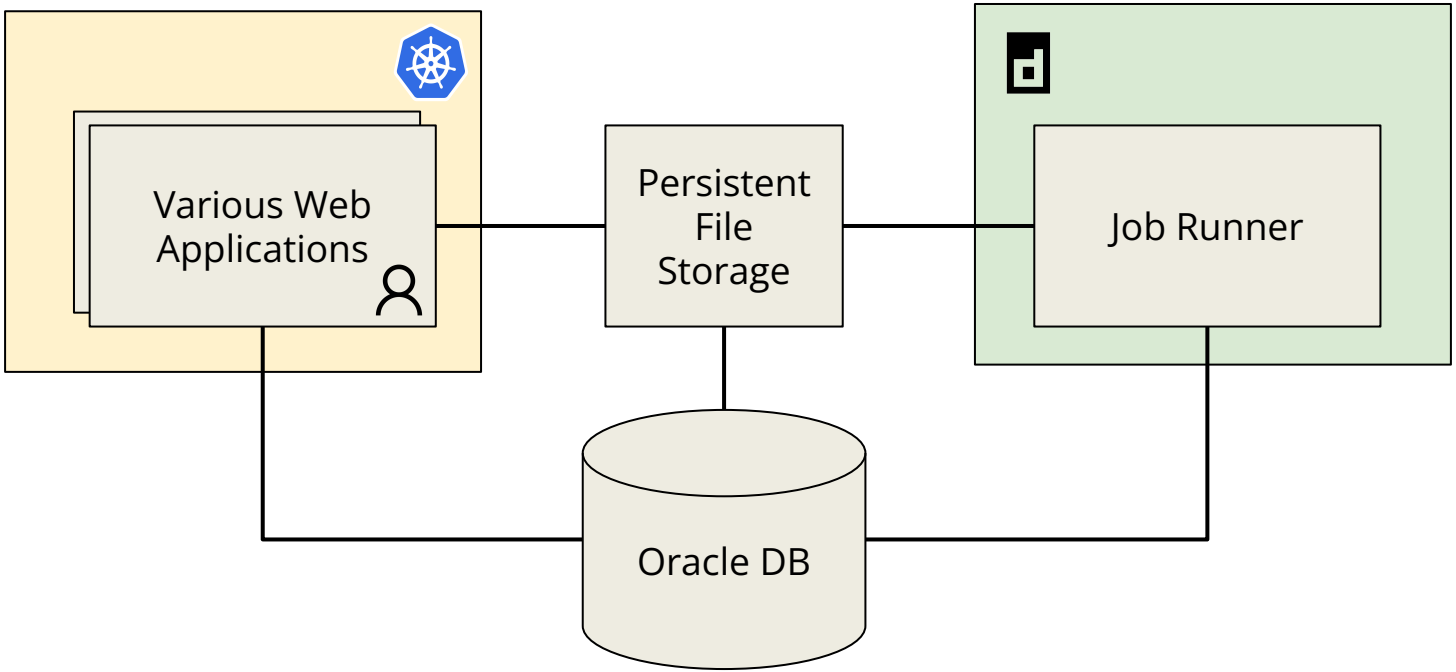
On-Premise Architecture



Cloud Architecture



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Momentum Going Strong

- COVID required shifting priorities
- COVID response is managed using the same tools, mostly in the cloud
- Everyone gained comfort around Cloud

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November 2022

All remaining instances move to Cloud

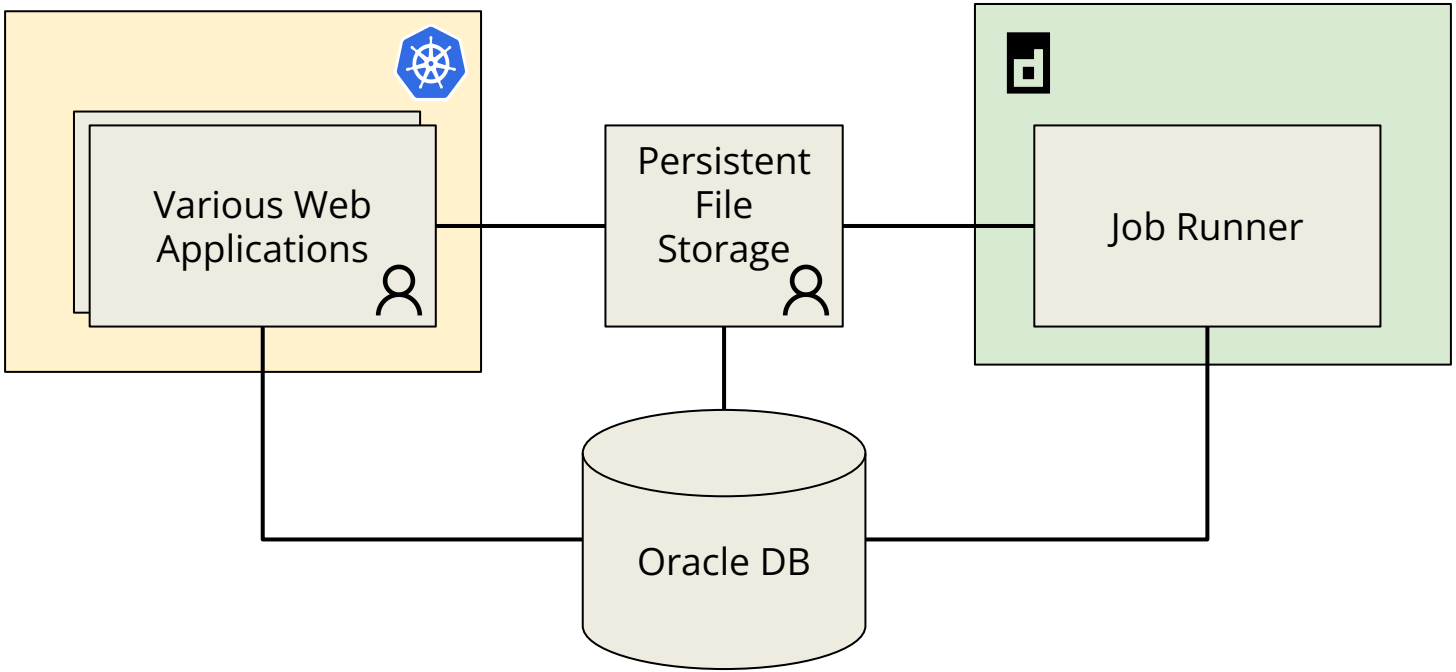
Moving Production

- July 2022 - decision + mandate to move everything in the ecosystem to cloud by January 2023
- Spent a few months exploring AWS
- Found lots of options
  - Neatest thing was AWS application migration service

Where Does 3 Weeks Come From?

- We wanted to enjoy our break
- Too many options
- 3 weeks before Thanksgiving, we decided to go live the Sunday before
  - Registration was the first business day after go-live
- Announced to Campus that there would be a maintenance outage
- Started syncing data

On-Premise Architecture



Day of the Move

1	Stop all on-premise servers	9am
2	Start syncing the code tree	9:02am
3	Relaunch the Database in AWS	9:10am
4	Update DNS for the database	10:30am
5	Launch all services in AWS	12pm

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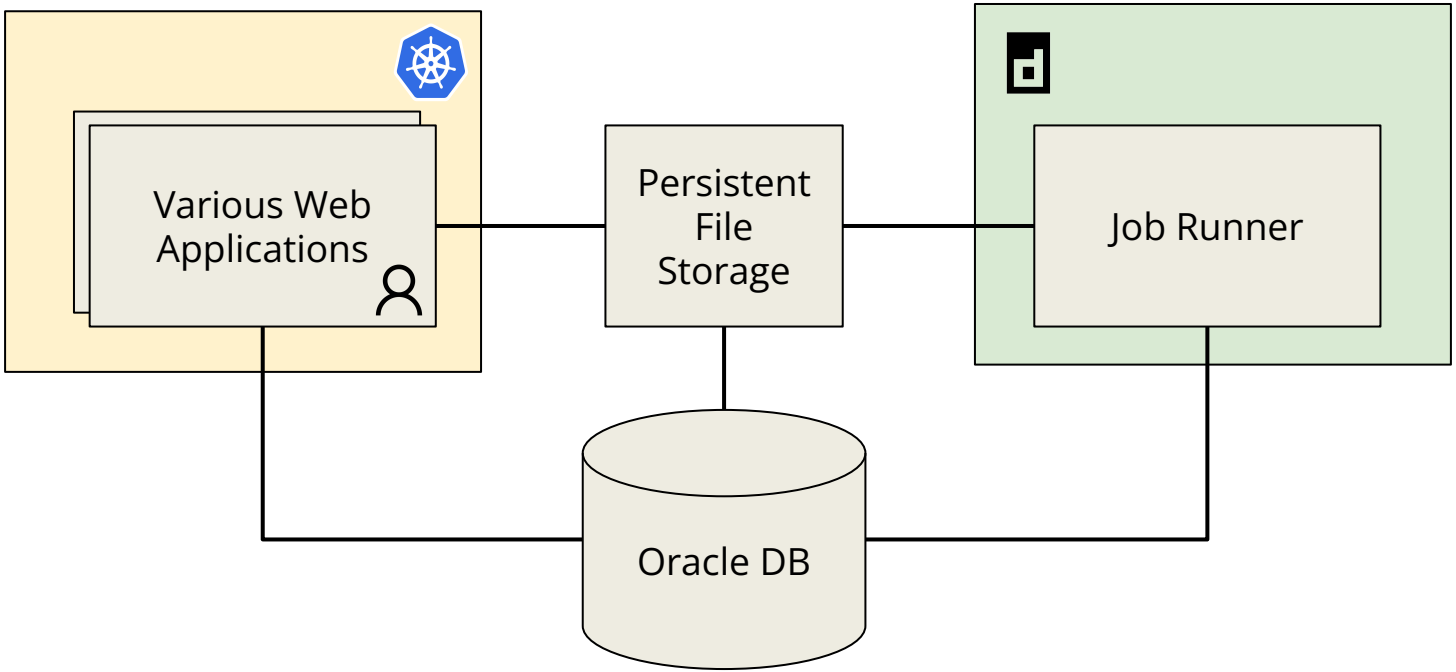
	Sit around and think about what we missed….	
5	Launch all services in AWS	12pm (one month before original deadline)

Cloud Architecture



What about the rest?

- All other apps followed after hours, but before Christmas
  - Degreeworks was after hours and one person
  - Banner Document Manager was the only slow thing
    - License file requirement
- ODS Stayed Behind
  - Performance is the same
  - Qlik loads all data, and 10ms round trip times up from 2ms was too slow

What’d we Get Back?

- Shutdown Non-Production Instances after business hours (~40% savings)
- Scale up for registration (20 replicas of Registration in minutes)
- Working towards on-demand startup of applications
  - Leave non-production off until it’s needed

Why It All Worked

- Deferred Decisions Until As Late as Possible
- Optimized for The Whole
  - Didn’t focus on the single application we were asked to move
- Take Chances
- Project was managed by team doing the work
- Automate everything possible

Questions?

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