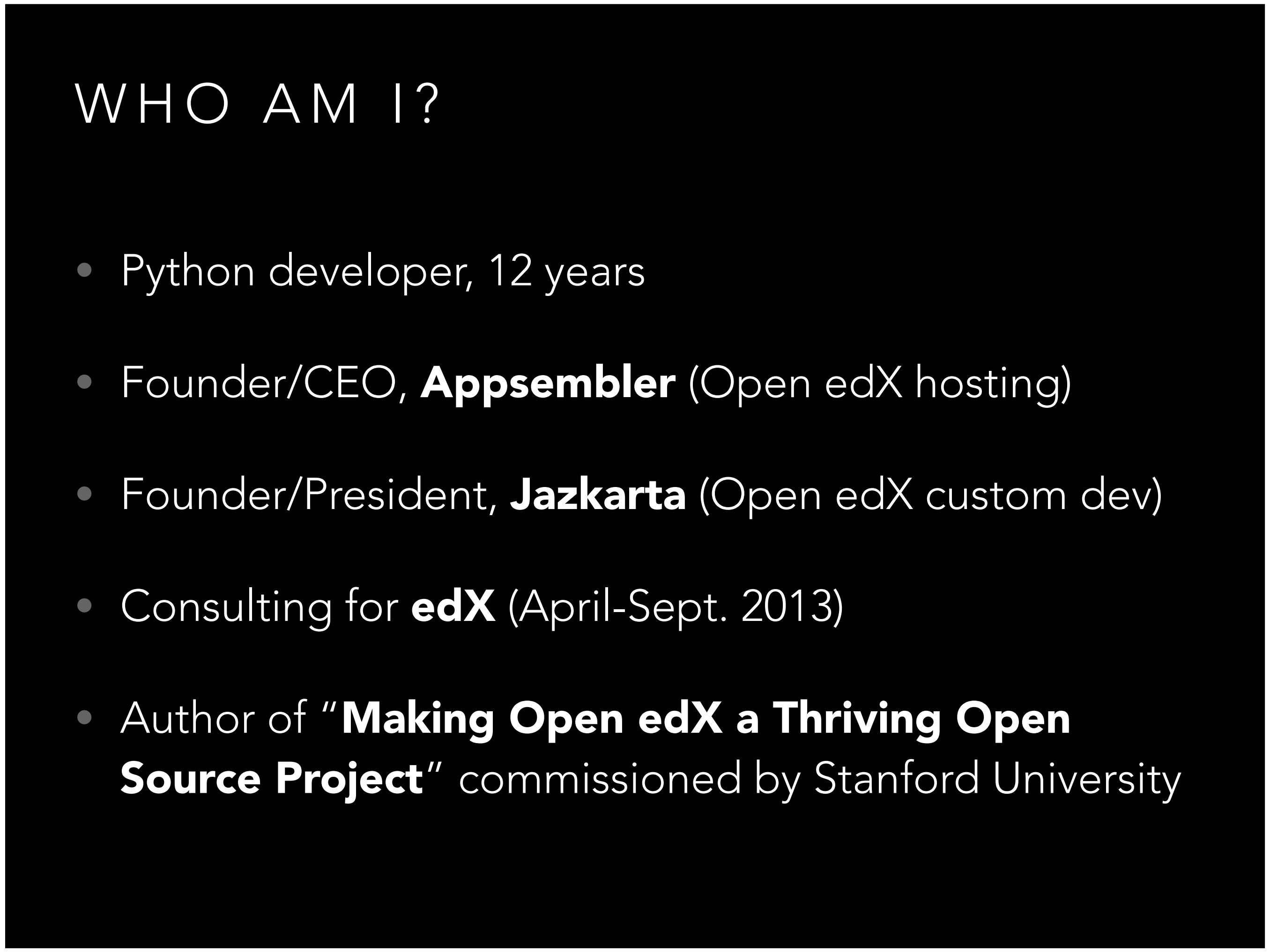
OPEN EDX CONFERENCE | 2014-11-19 | CAMBRIDGE, MA

OPEN EDX & DOCKER

LOW-COST HOSTING, SHAREABLE EDX DISTROS, EASIER DEV ENVS

by Nate Aune
@natea

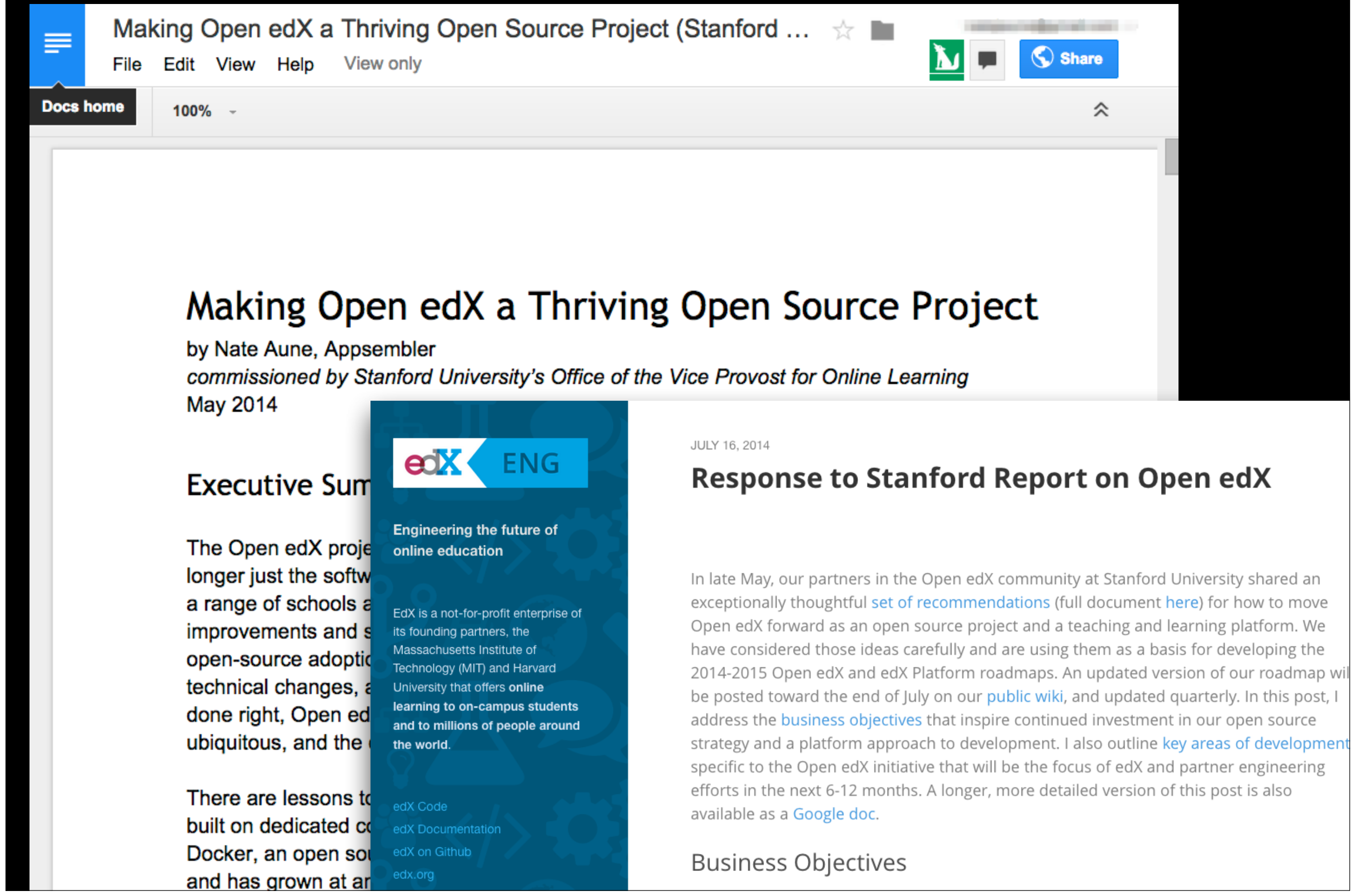


WHO AM I?

- Python developer, 12 years
- Founder/CEO, **Appsembler** (Open edX hosting)
- Founder/President, **Jazkarta** (Open edX custom dev)
- Consulting for **edX** (April-Sept. 2013)
- Author of "**Making Open edX a Thriving Open Source Project**" commissioned by Stanford University

For a long-time I worked with organizations to help them with their *content* management challenges, and was heavily involved in the Plone community, a popular open source Python-based CMS. Nowadays I'm working with organizations and their online learning initiatives, and doing a lot more with Open edX.

bitly.com/openedxreport



Making Open edX a Thriving Open Source Project (Stanford ...
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Docs home
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Making Open edX a Thriving Open Source Project

by Nate Aune, Appsembler
commissioned by Stanford University's Office of the Vice Provost for Online Learning
May 2014

Executive Sum

The Open edX proje
longer just the softw
a range of schools a
improvements and s
open-source adoptio
technical changes, a
done right, Open ed
ubiquitous, and the

There are lessons to
built on dedicated co
Docker, an open sou
and has grown at an

EdX is a not-for-profit enterprise of its founding partners, the Massachusetts Institute of Technology (MIT) and Harvard University that offers **online learning to on-campus students and to millions of people around the world.**

JULY 16, 2014

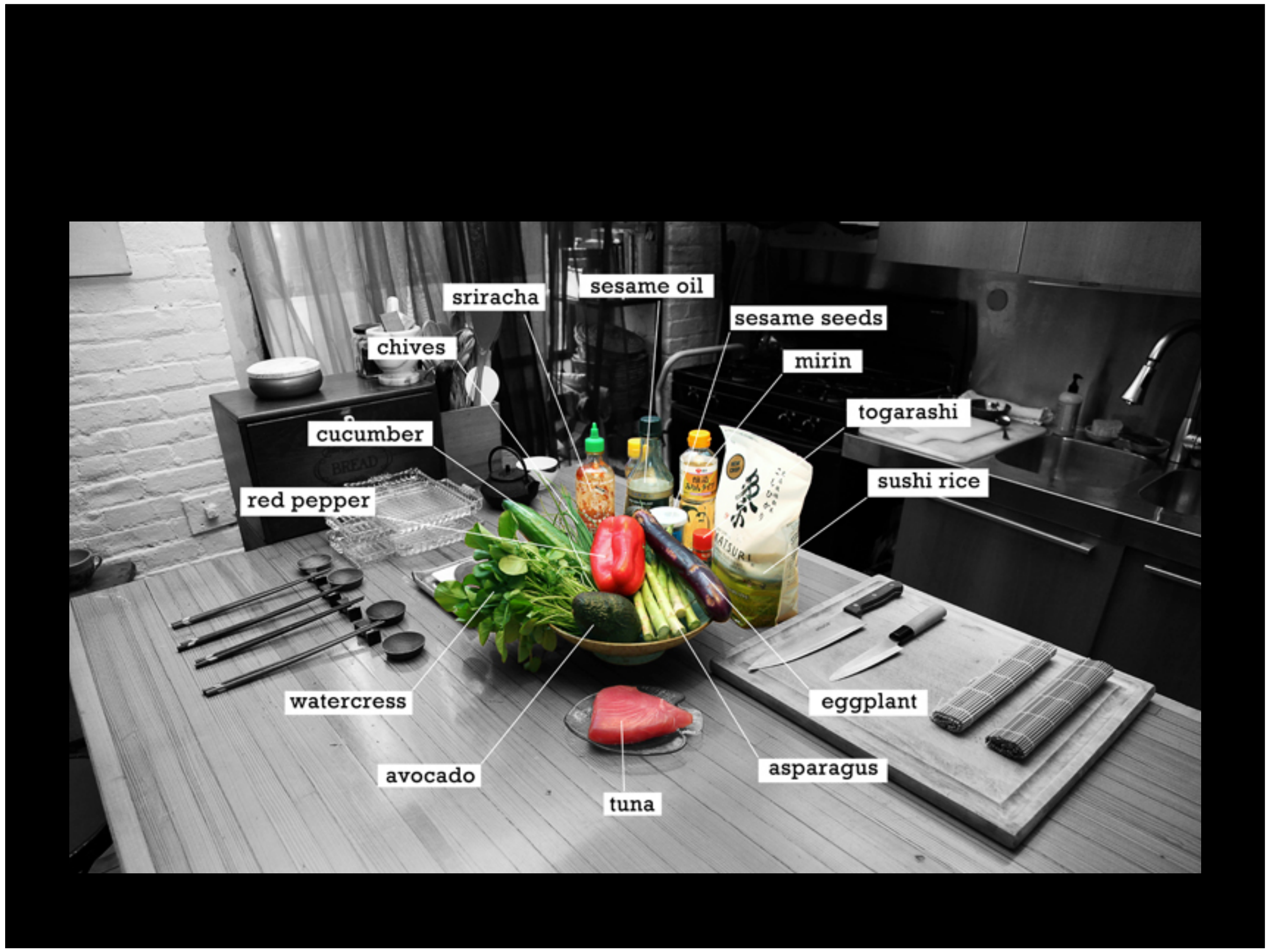
Response to Stanford Report on Open edX

In late May, our partners in the Open edX community at Stanford University shared an exceptionally thoughtful set of recommendations (full document here) for how to move Open edX forward as an open source project and a teaching and learning platform. We have considered those ideas carefully and are using them as a basis for developing the 2014-2015 Open edX and edX Platform roadmaps. An updated version of our roadmap wil be posted toward the end of July on our public wiki, and updated quarterly. In this post, I address the business objectives that inspire continued investment in our open source strategy and a platform approach to development. I also outline key areas of development specific to the Open edX initiative that will be the focus of edX and partner engineering efforts in the next 6-12 months. A longer, more detailed version of this post is also available as a Google doc.

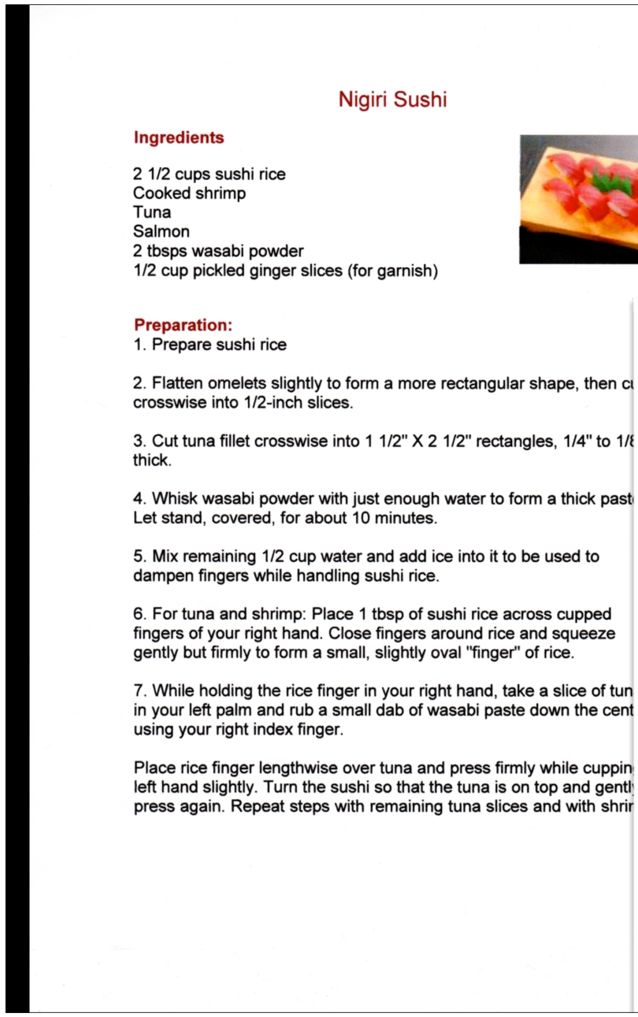
Business Objectives

When I was doing the research for the report "Making Open edX a Thriving Open Source Project", I interviewed a lot of people about Open edX. And I started to see some patterns emerge, and it really got me thinking about the spirit of open source. Beth touched on this yesterday when she said that open source is a gift. Let me share an example in another thing we all like to do. Eat!

Let’s say that your friend… oh, let’s say his name is Ned.. has invited you over to a sushi dinner. When you arrive at his house, the table is set, a candle is lit, and when you sit down at the table, there’s an amazing sushi meal all prepared for you to enjoy.



What you probably didn’t realize is that for the last 3 hours before you got there, Ned was slaving away in the kitchen preparing that meal for you. And he had to pull together a lot of ingredients in just the right quantities to make the sushi just right.



Nigiri Sushi

Ingredients

2 1/2 cups sushi rice
Cooked shrimp
Tuna
Salmon
2 tbsps wasabi powder
1/2 cup pickled ginger slices (for garnish)

Preparation:

1. Prepare sushi rice

2. Flatten omelets slightly to form a more rectangular shape, then cu crosswise into 1/2-inch slices.

3. Cut tuna fillet crosswise into 1 1/2" X 2 1/2" rectangles, 1/4" to 1/ thick.

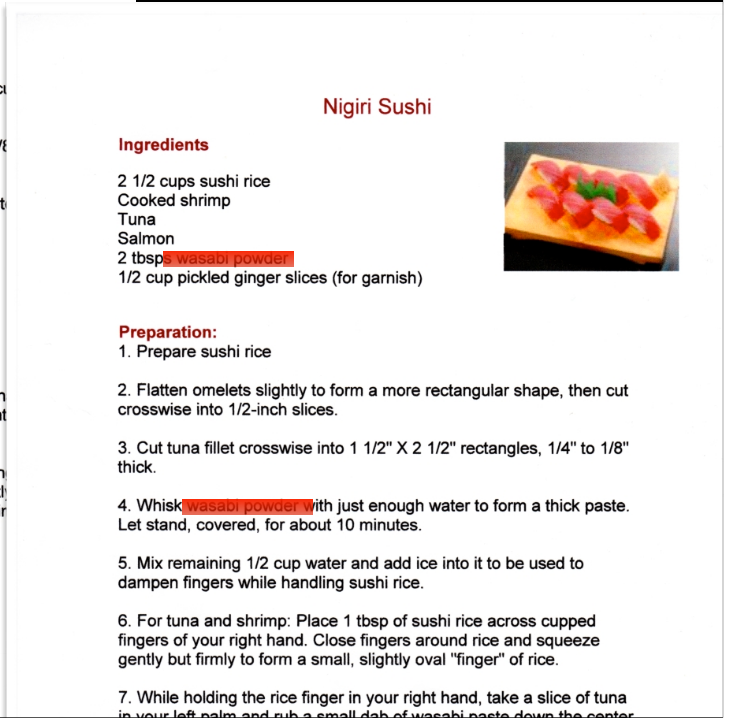
4. Whisk wasabi powder with just enough water to form a thick past Let stand, covered, for about 10 minutes.

5. Mix remaining 1/2 cup water and add ice into it to be used to dampen fingers while handling sushi rice.

6. For tuna and shrimp: Place 1 tbsp of sushi rice across cupped fingers of your right hand. Close fingers around rice and squeeze gently but firmly to form a small, slightly oval "finger" of rice.

7. While holding the rice finger in your right hand, take a slice of tun in your left palm and rub a small dab of wasabi paste down the cent using your right index finger.

Place rice finger lengthwise over tuna and press firmly while cuppin left hand slightly. Turn the sushi so that the tuna is on top and gentl press again. Repeat steps with remaining tuna slices and with shrir



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3. Cut tuna fillet crosswise into 1 1/2" X 2 1/2" rectangles, 1/4" to 1/8" thick.

4. Whisk wasabi powder with just enough water to form a thick paste. Let stand, covered, for about 10 minutes.

5. Mix remaining 1/2 cup water and add ice into it to be used to dampen fingers while handling sushi rice.

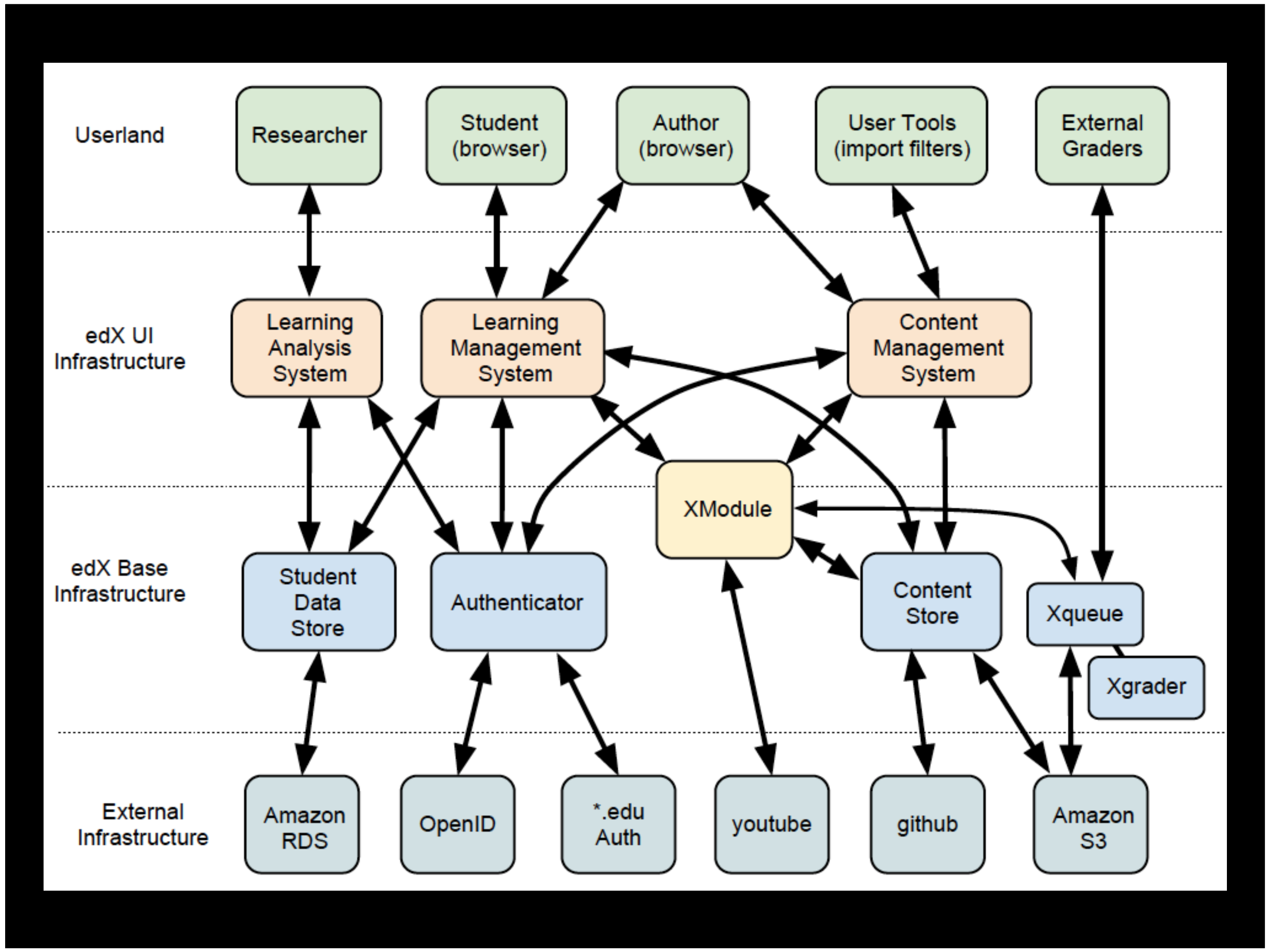
6. For tuna and shrimp: Place 1 tbsp of sushi rice across cupped fingers of your right hand. Close fingers around rice and squeeze gently but firmly to form a small, slightly oval "finger" of rice.

7. While holding the rice finger in your right hand, take a slice of tuna in your left palm and rub a small dab of wasabi paste down the center

After dinner, you say to Ned, that sushi meal was so amazing, could I get the recipe so I can make it at home? Sure! (next) But he adds with a wink and a nod, if you make any improvements to the recipe, I want to hear about it.

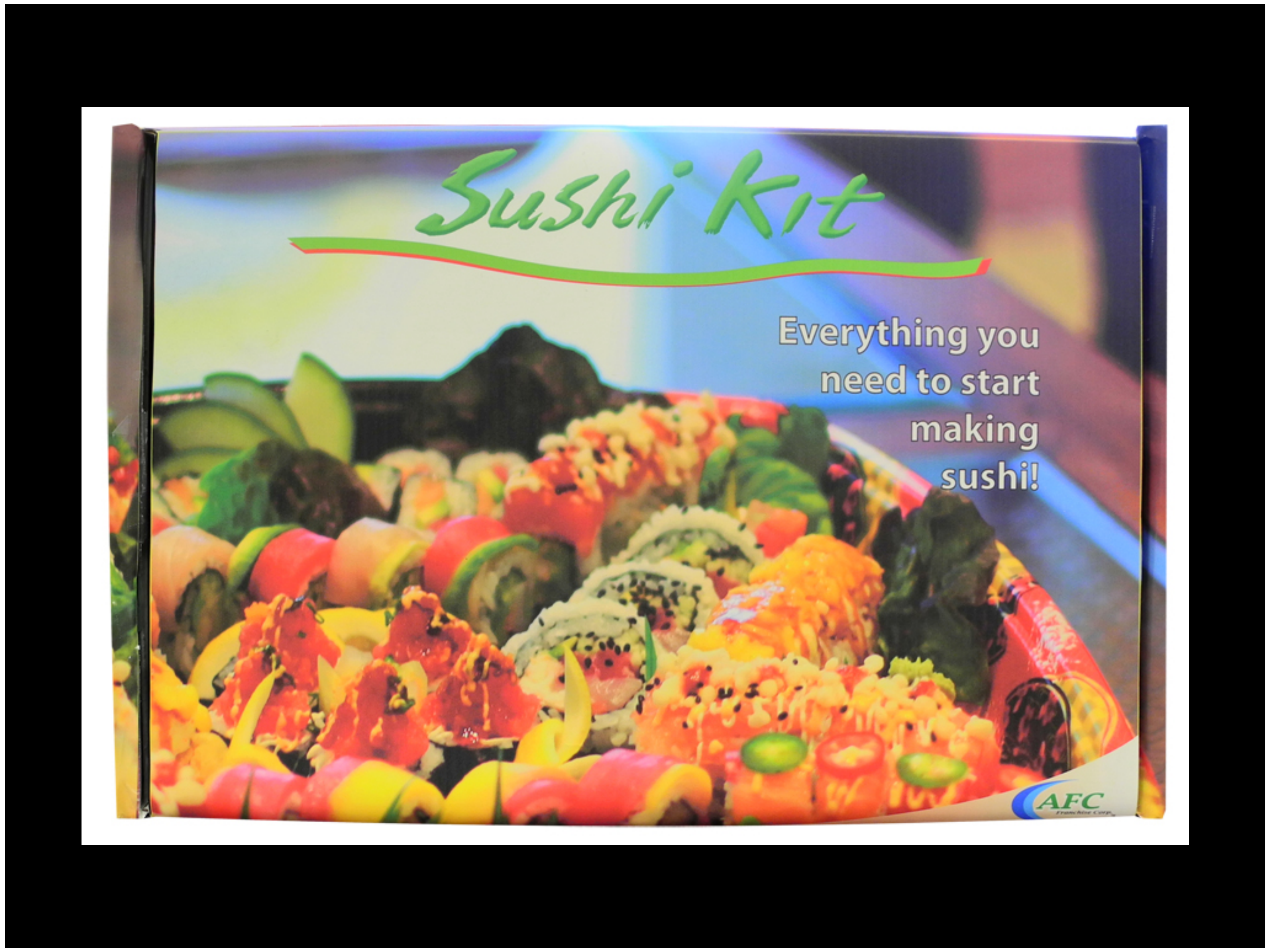
Well, Open edX is kind of like that fine sushi dinner isn't it? It's a gift, but it's one that has some strings attached. It comes with a contract with explicit instructions to share. But it's not always easy to share your improvements. While we'd all like to think Open edX comes to us like this:

OPEN edX



When we open it up, it looks something more like this.

Look familiar? … So the fundamental question that I couldn’t get out of my head last night is, “If Open Source is all about sharing, how come it’s so hard to share my improvements to Open edX?” If I take Ned’s sushi recipe and make a supersushi…

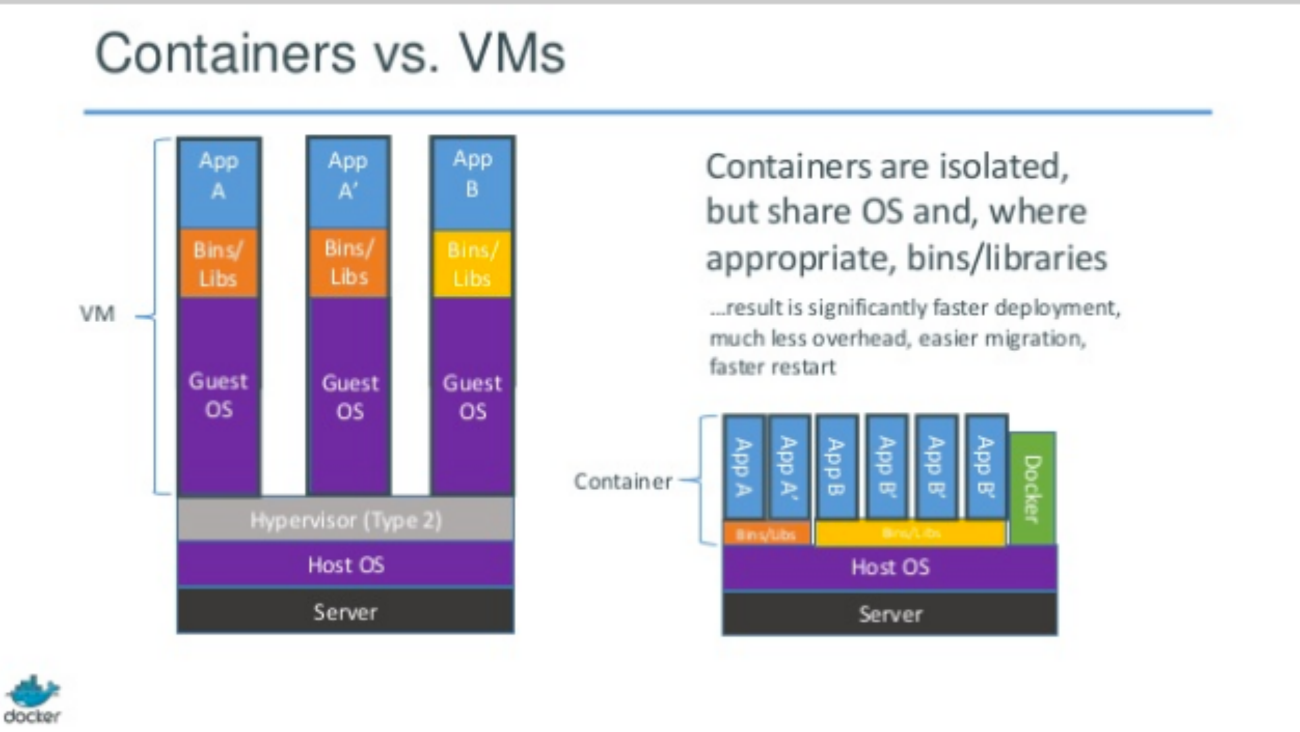


Can’t I package up my supersushi and deliver that to you as sushi kit, instead of as raw sushi ingredients? Wouldn’t that mean that more people could enjoy my delicious sushi? (okay, I apologize if this is making some of you hungry. I promise - no more sushi slides!)

Open edX is a complicated system with a lot of moving parts. What if you could package up all those moving parts, essentially snapshot your working edX site with all of your improvements, and then share that package with someone.. let's say.. in Japan just as easily as sharing it with your co-worker?

This is where Docker comes in. Docker is essentially a way to snapshot your software and redistribute it, but here’s what makes it different. It’s not just the code you’re snapshotting but the entire … application … including all libraries and components that edX depends on to run.

WHY NOT VIRTUAL MACHINES?



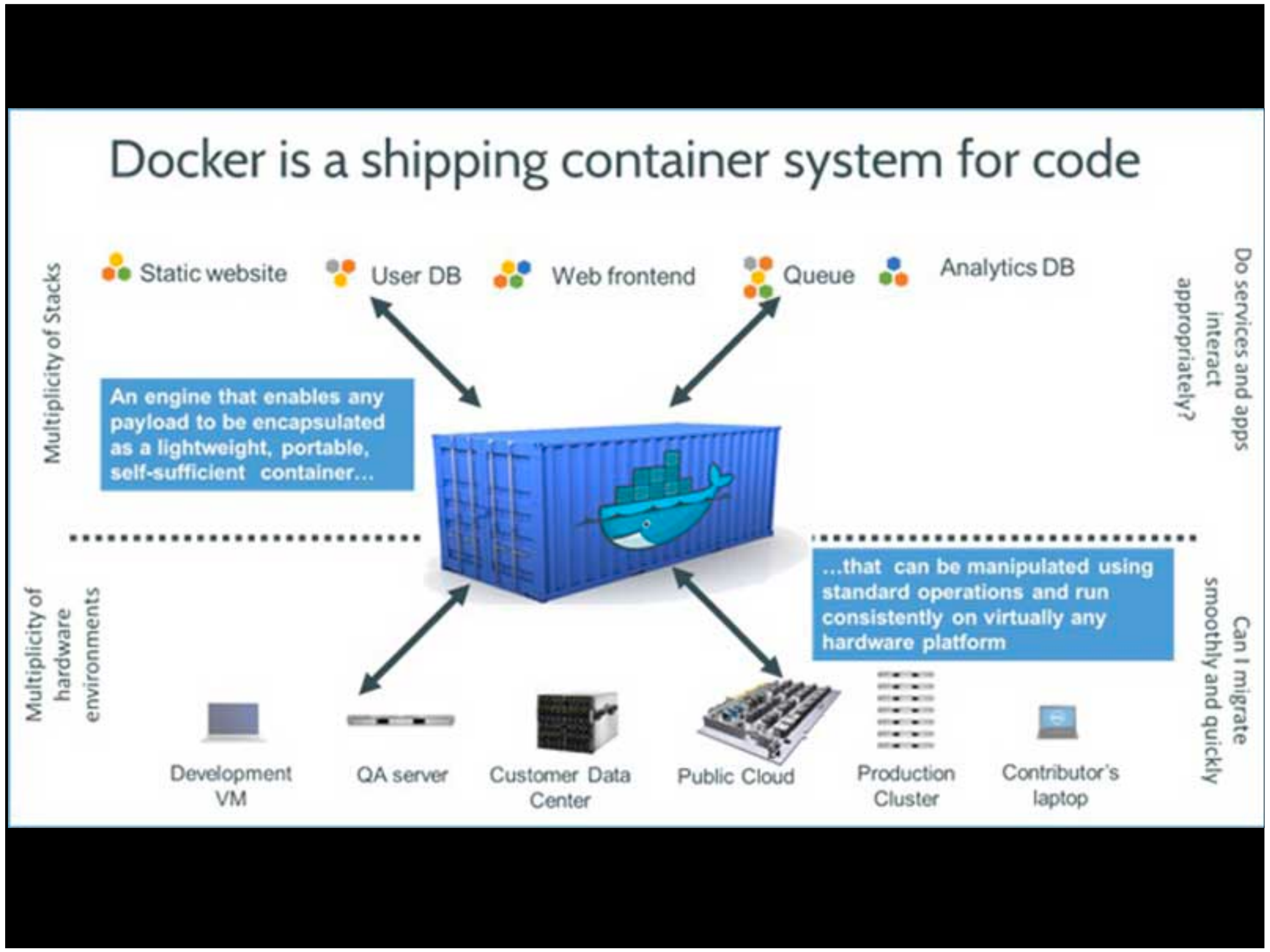
Containers vs. VMs

Containers are isolated, but share OS and, where appropriate, bins/libraries

...result is significantly faster deployment, much less overhead, easier migration, faster restart

You might say, “well, we already have virtual machines that can be spun up using Vagrant. Why do we need Docker?” Docker containers consume less resources and they’re faster. While VMs consume a lot of memory on your machine and take awhile to start up, Docker containers are very lightweight and spin up in seconds.

You’re all familiar with shipping containers that go on those big ships? You can think of Docker as a shipping container system for code.

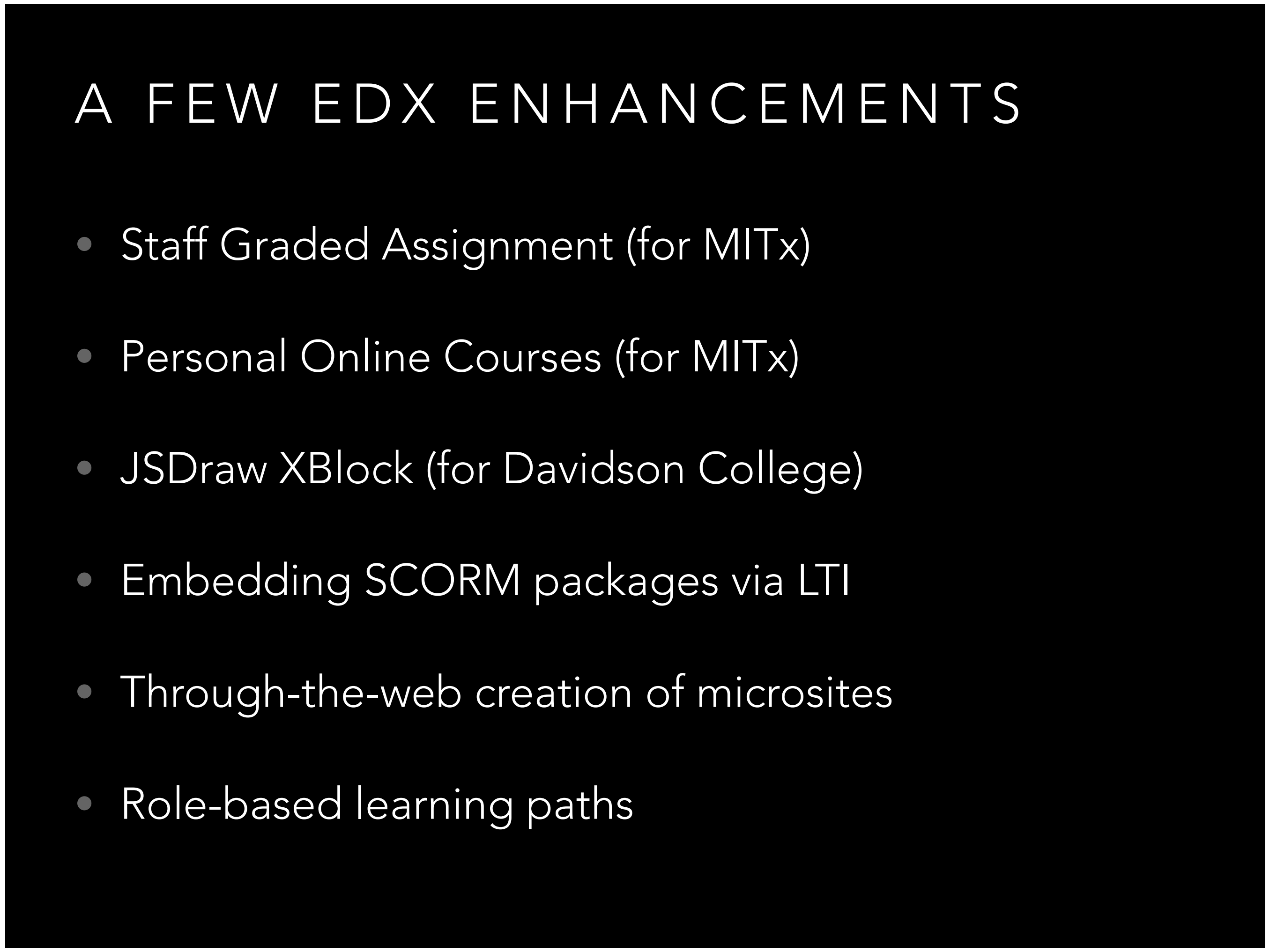


Docker is a shipping container system for code

An engine that enables any payload to be encapsulated as a lightweight, portable, self-sufficient container...

...that can be manipulated using standard operations and run consistently on virtually any hardware platform

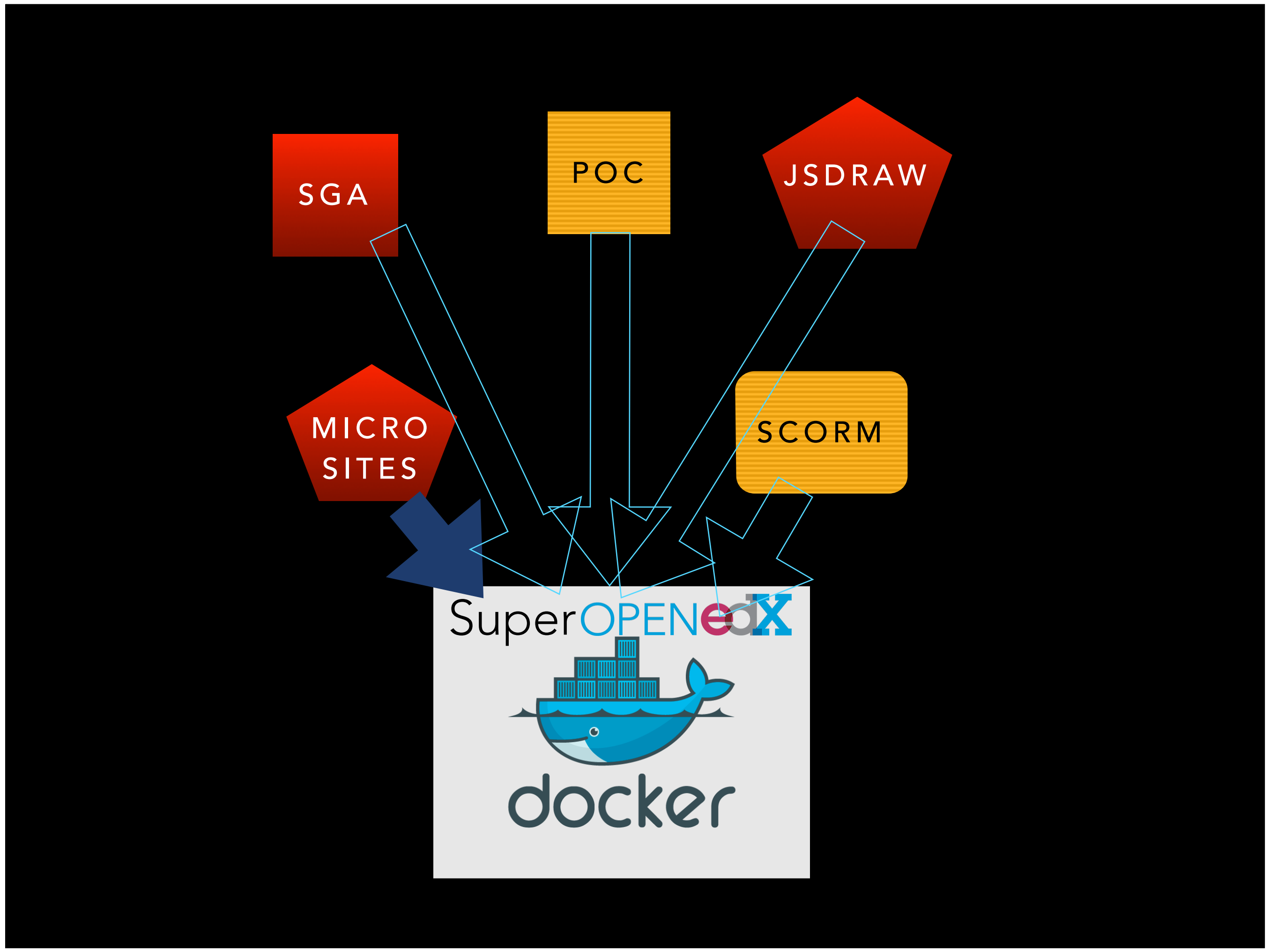
The container is a standard format and you can put anything in it. Same is true of Docker containers. And they can run consistently on virtually any hardware platform. Let’s walk through an example to make it more concrete how this works.



A FEW EDX ENHANCEMENTS

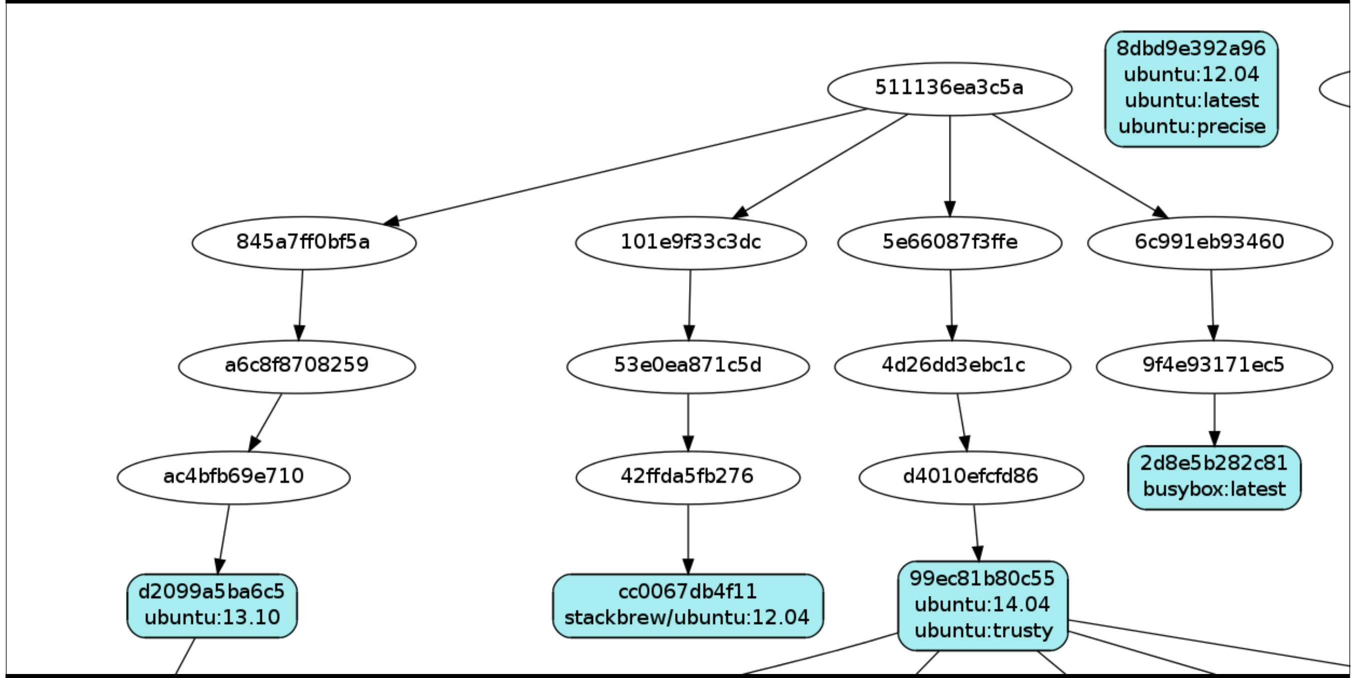
- Staff Graded Assignment (for MITx)
- Personal Online Courses (for MITx)
- JSDraw XBlock (for Davidson College)
- Embedding SCORM packages via LTI
- Through-the-web creation of microsites
- Role-based learning paths

In the last year, we've built all these different enhancements to Open edX for different customers. Let's say I wanted to share all of these enhancements with you. Of course, I could send you the Github URLs and provide a long list of documentation to read, or … I could just package it up as a Docker image… (similar to an AMI)



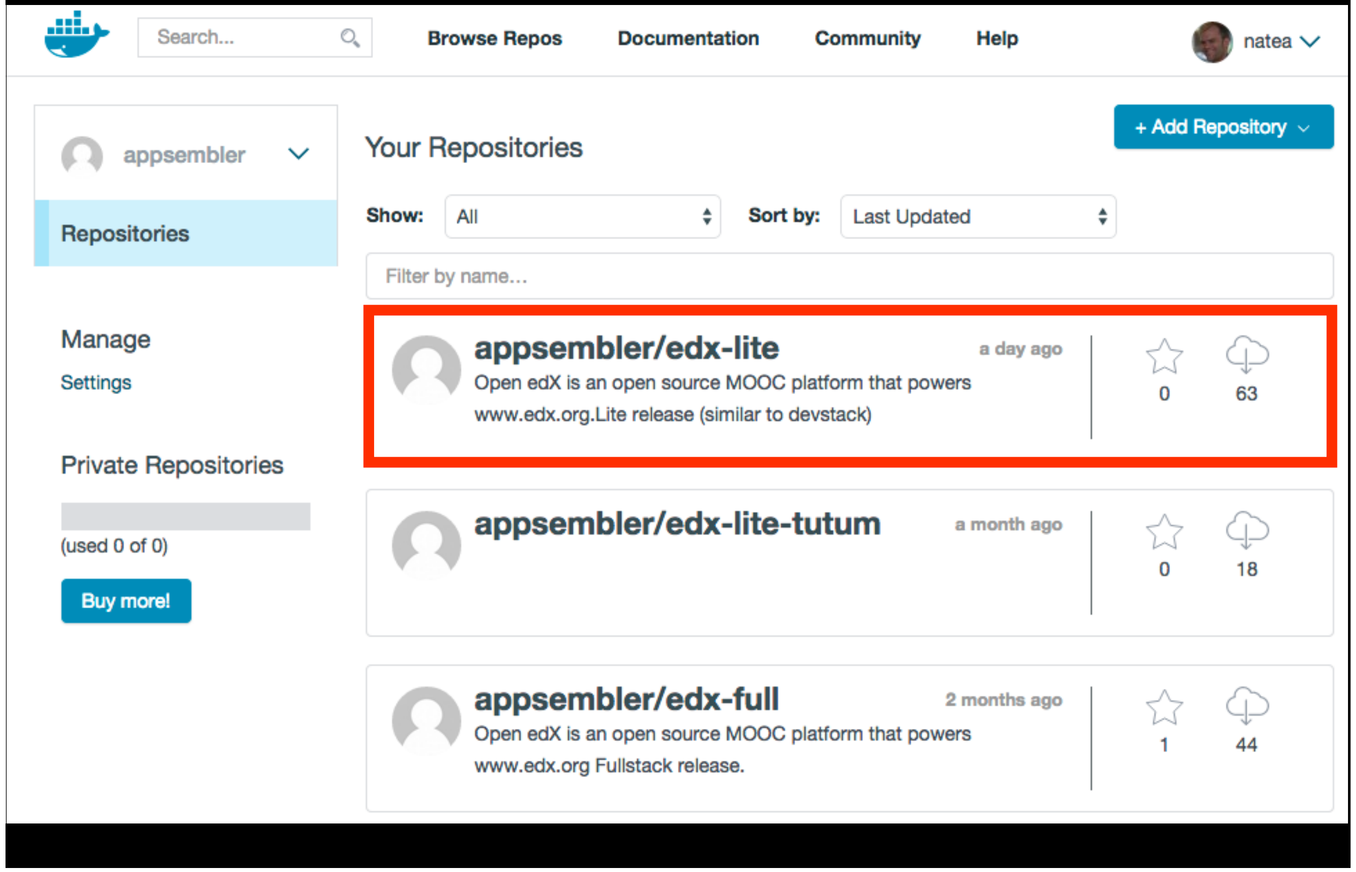
.. and give you my SuperOpenedX. If you’re a developer, you can hit the ground running with a fully-operational distribution of my Open edX site. If you’re a company, you can distribute this image to your customers, and they can run it anywhere (Amazon AWS, Google Cloud, Microsoft Azure, OpenStack which all now support Docker)

IMAGES ARE LIKE GITHUB REPOS



The other great thing about Docker images, is that I can pull down your Docker image, and make a few changes to it, and push back my changes, and it only has to save the diff between those changes, not an entirely new image. What Github is to Git, so Docker Registry Hub is to Docker.

https://registry.hub.docker.com/repos/appsembler/



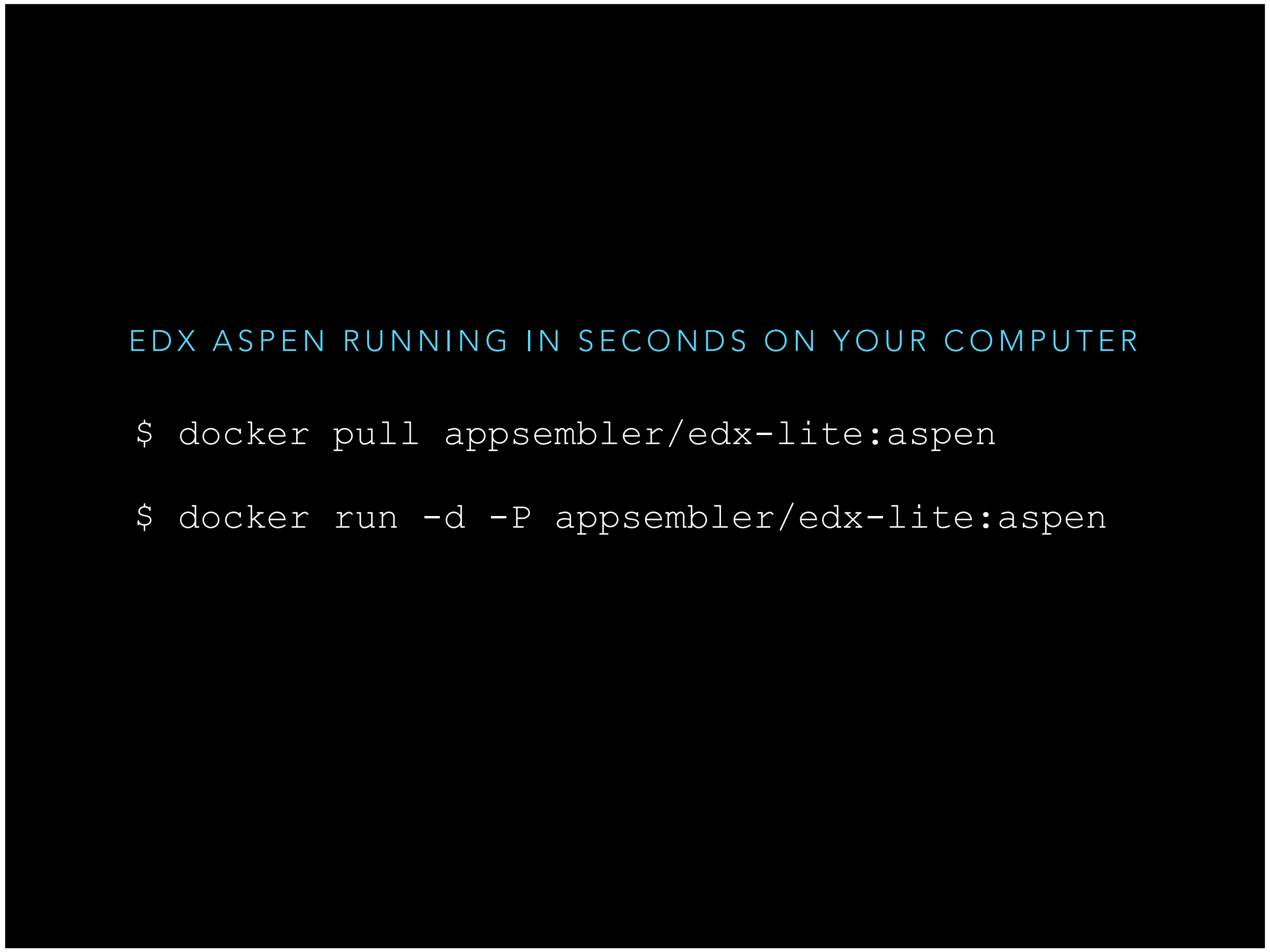
Your Repositories

Show: All
Sort by: Last Updated

(used 0 of 0)

Repository	Description	Updated	Stars	Downloads
appsembler/edx-lite	Open edX is an open source MOOC platform that powers www.edx.org.Lite release (similar to devstack)	a day ago	0	63
appsembler/edx-lite-tutum		a month ago	0	18
appsembler/edx-full	Open edX is an open source MOOC platform that powers www.edx.org Fullstack release.	2 months ago	1	44

So here's an example of a Docker Registry Hub listing for my company Appsembler, and you can see that we've pushed a Docker image called "edx-lite". This is the latest Aspen release and was updated yesterday.

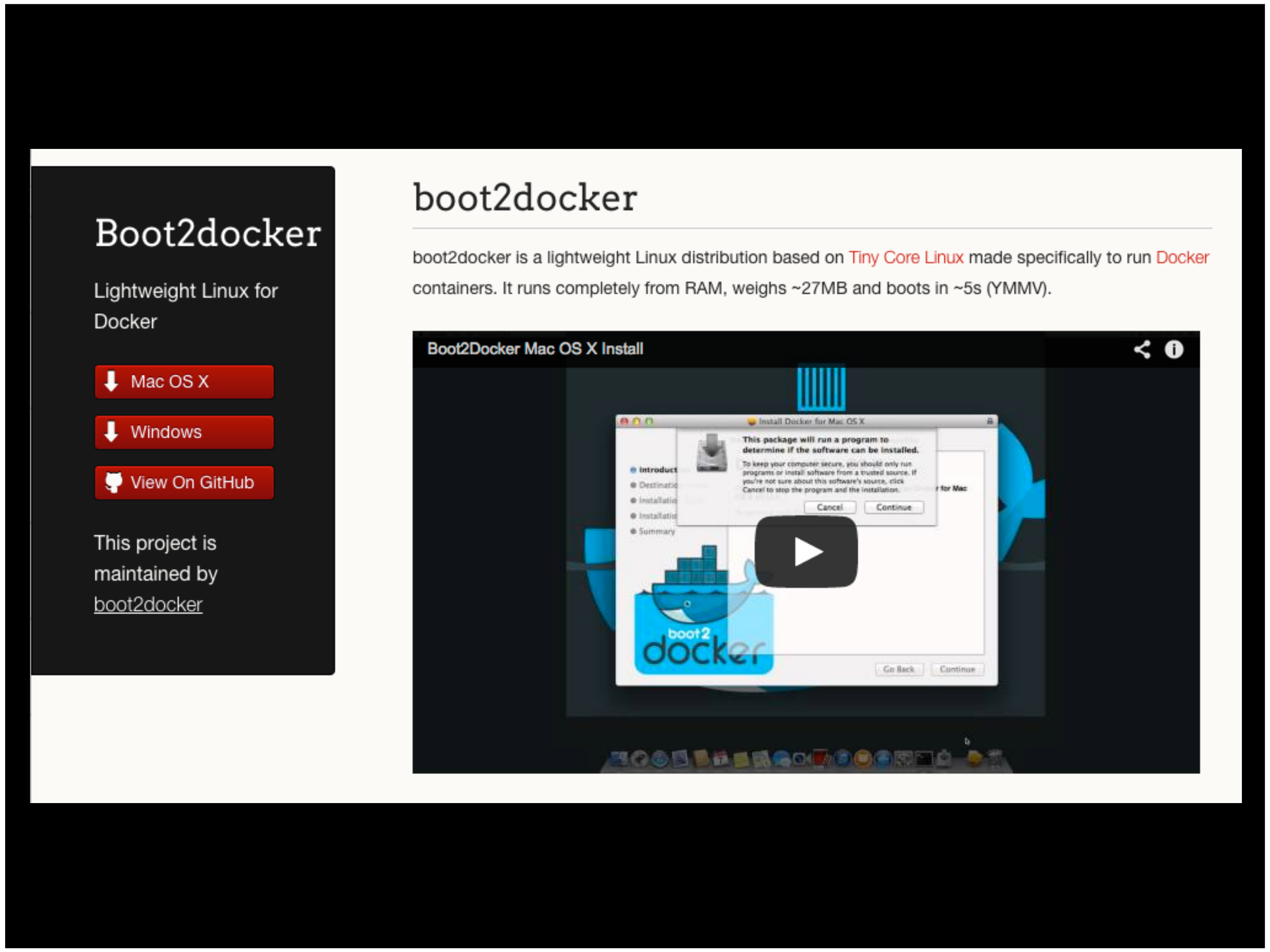


EDX ASPEN RUNNING IN SECONDS ON YOUR COMPUTER

```
$ docker pull appsembler/edx-lite:aspen

$ docker run -d -P appsembler/edx-lite:aspen
```

So if you had Docker running on your computer right now, you could run these two commands, and have edX running on your machine in a couple minutes. edx-lite is a pre-built image which means that it’s already been provisioned and ready-to-use. Think of it like an appliance - no assembly required.



Boot2docker

Lightweight Linux for Docker

This project is maintained by boot2docker

boot2docker

boot2docker is a lightweight Linux distribution based on Tiny Core Linux made specifically to run Docker containers. It runs completely from RAM, weighs ~27MB and boots in ~5s (YMMV).

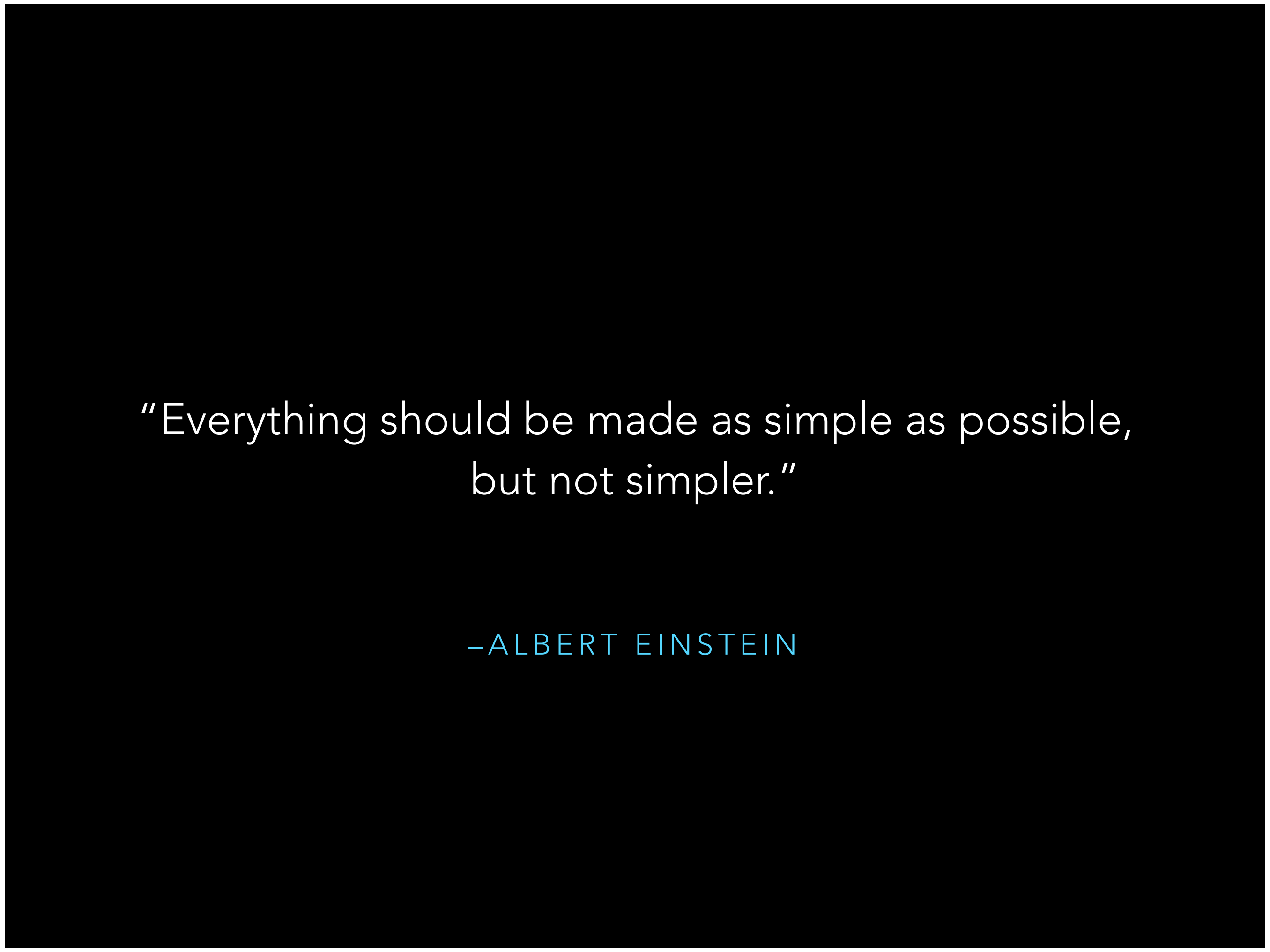
Boot2Docker Mac OS X Install

Install Docker for Mac OS X

This package will run a program to determine if the software can be installed.

To keep your computer secure, you should only run programs or install software from a trusted source. If you're not sure about this software's source, click Cancel to stop the program and the installation.

boot2docker is a point-n-click installer for Mac and Windows that makes it drop dead simple to get Docker running on your computer.

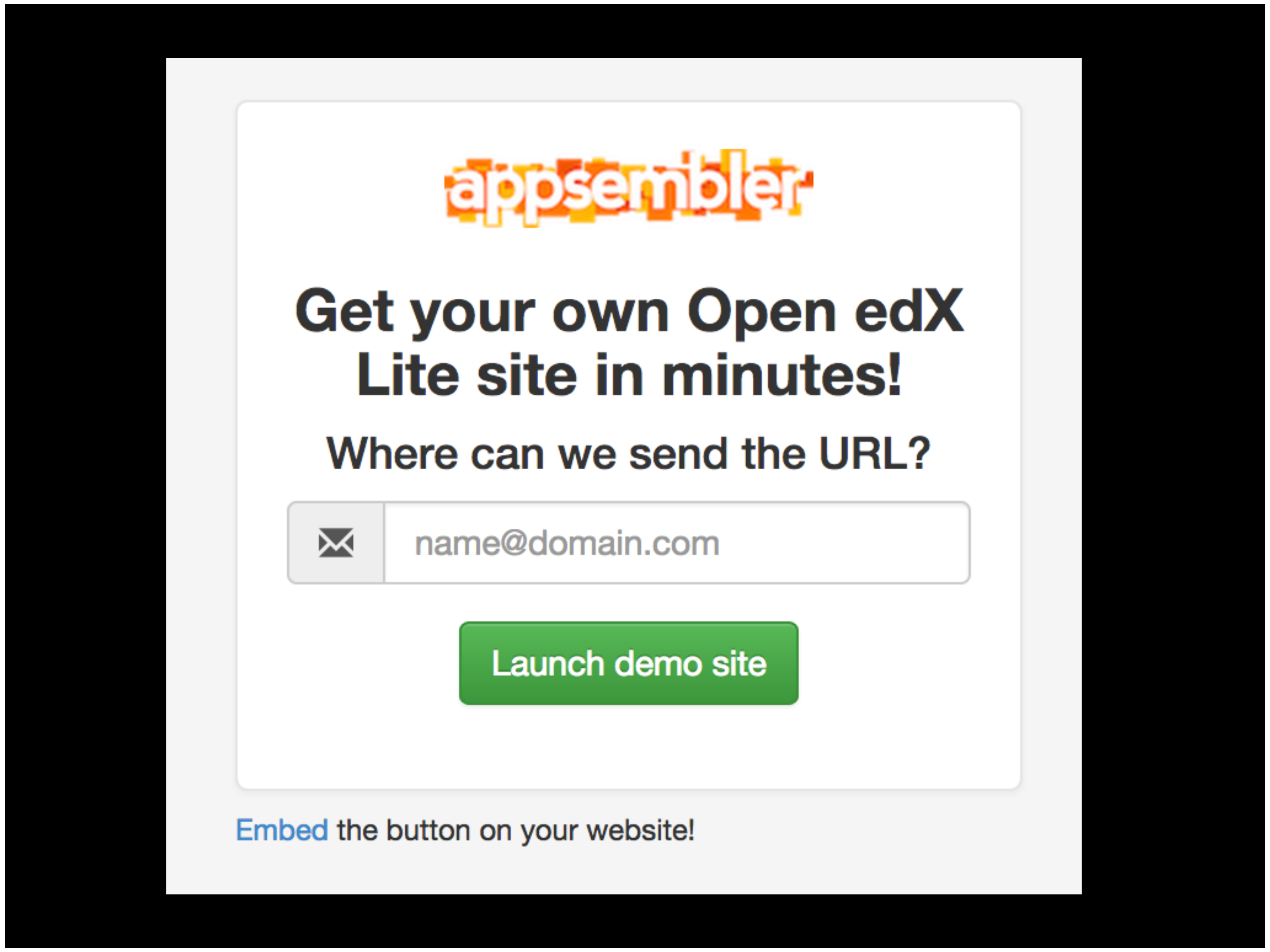


> “Everything should be made as simple as possible,
> but not simpler.”
>
> –ALBERT EINSTEIN

But we wanted to make it so easy to try Open edX that you don’t even need to install anything on your computer. We wanted to make the Steve Jobs equivalent user experience for someone totally new to Open edX, who doesn’t want to mess with AMIs or Vagrant or Ansible. Docker makes this a lot easier.

bitly.com/tryopenedx

Ok, so I want to try a little experiment. I want you all to take out your mobile phones and go to this URL. There's also a QR code for those of you with fat fingers. (We haven't tested 50 people all at once but let's try it)

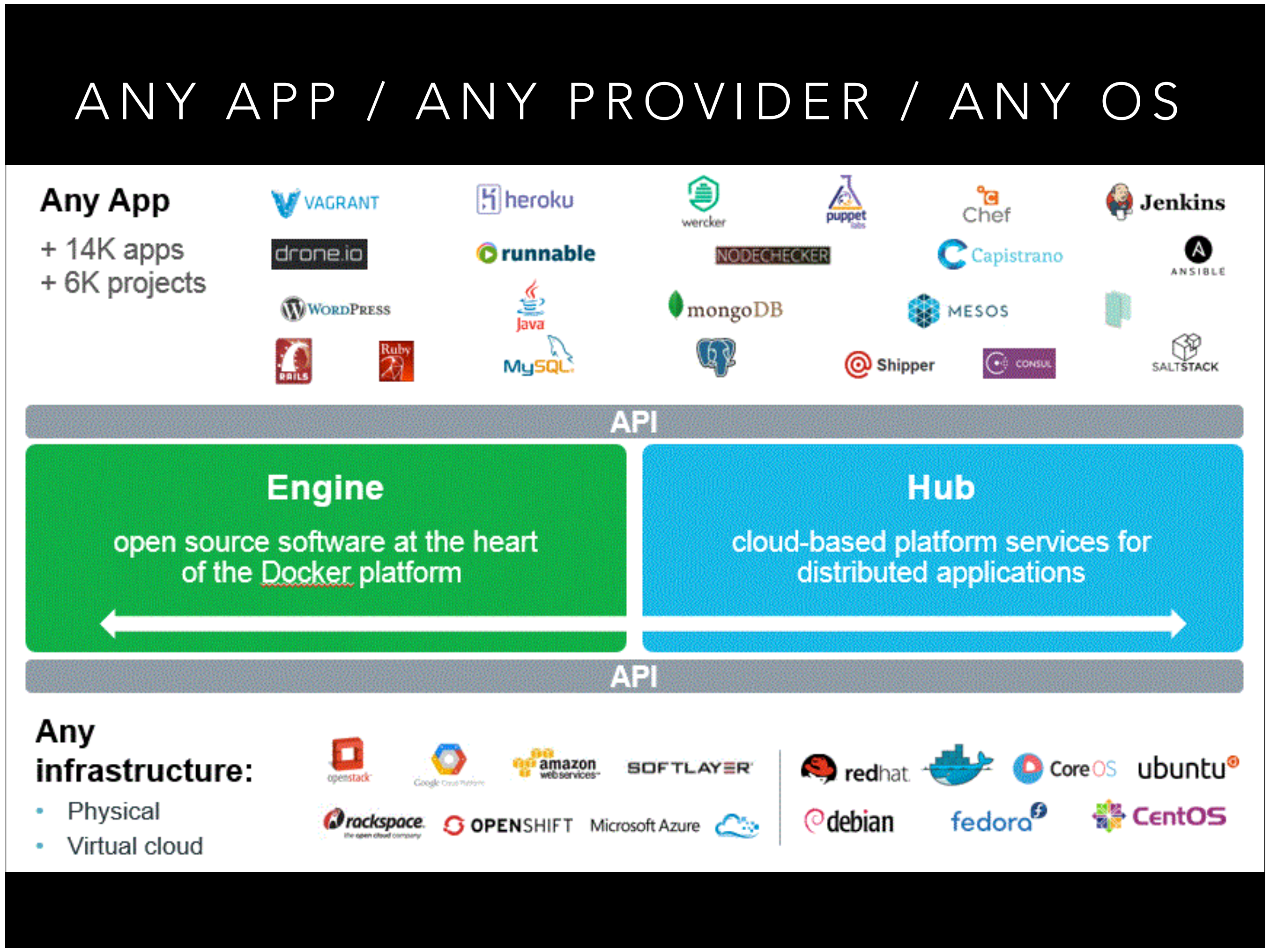


Get your own Open edX Lite site in minutes!

Where can we send the URL?

Embed the button on your website!

So if you were able to bring up that page on your phone, you should see something like this. A simple form in which we ask for your email, so we can send you the URL of your Open edX site. Don’t worry, we won’t spam you. And if the demo gods are smiling on us, you should see a “Deploy complete” message and a URL to view your own Open edX site. This whole process takes 30 seconds - it probably takes longer to type in your email address than it does to deploy Open edX.



ANY APP / ANY PROVIDER / ANY OS

Any App

+ 14K apps
+ 6K projects

API

Engine

open source software at the heart of the Docker platform

Hub

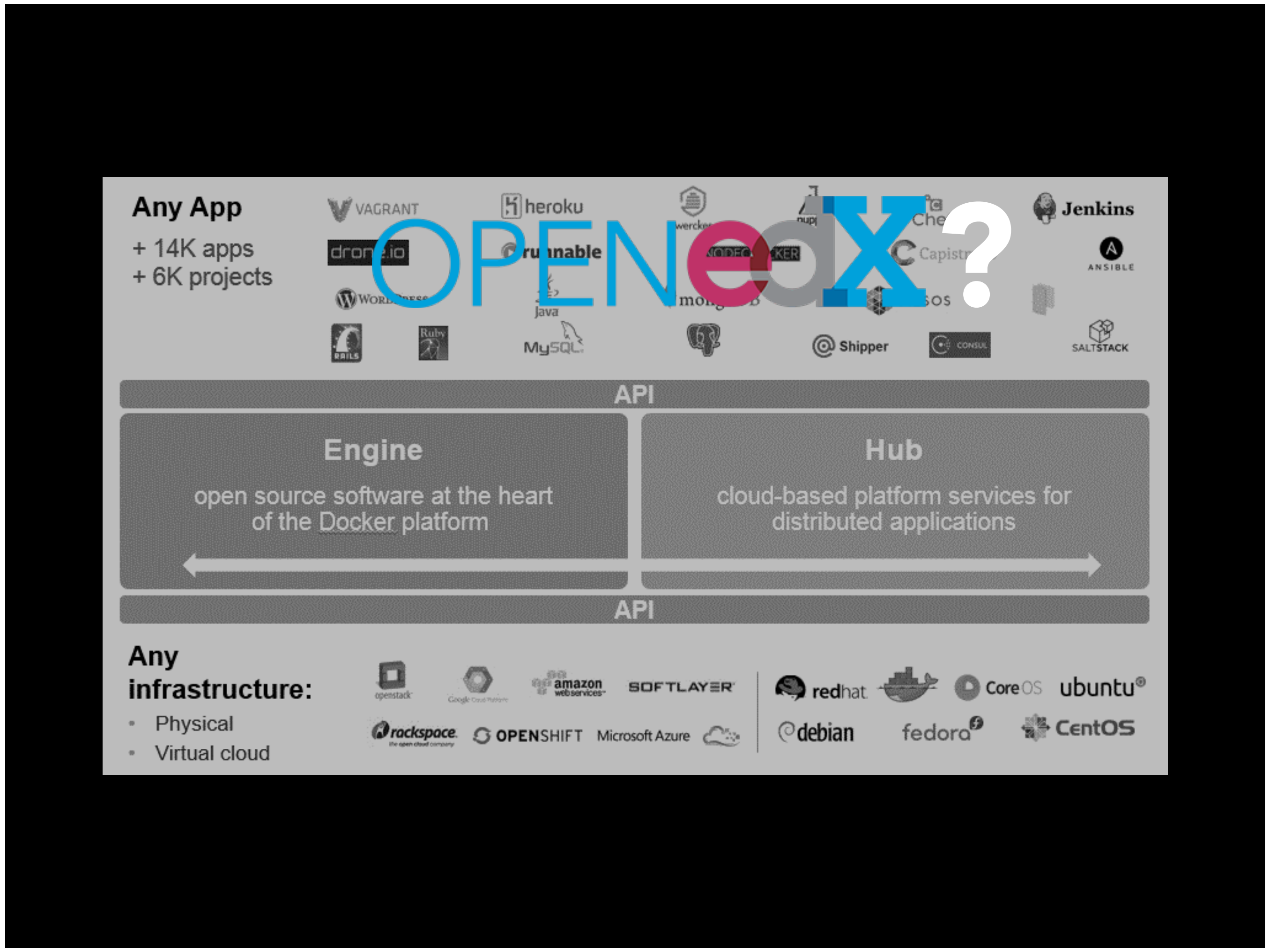
cloud-based platform services for distributed applications

API

Any infrastructure:

- Physical
- Virtual cloud

The promise of Docker is that you can take any app and deploy it to any hosting provider, on any operating system.



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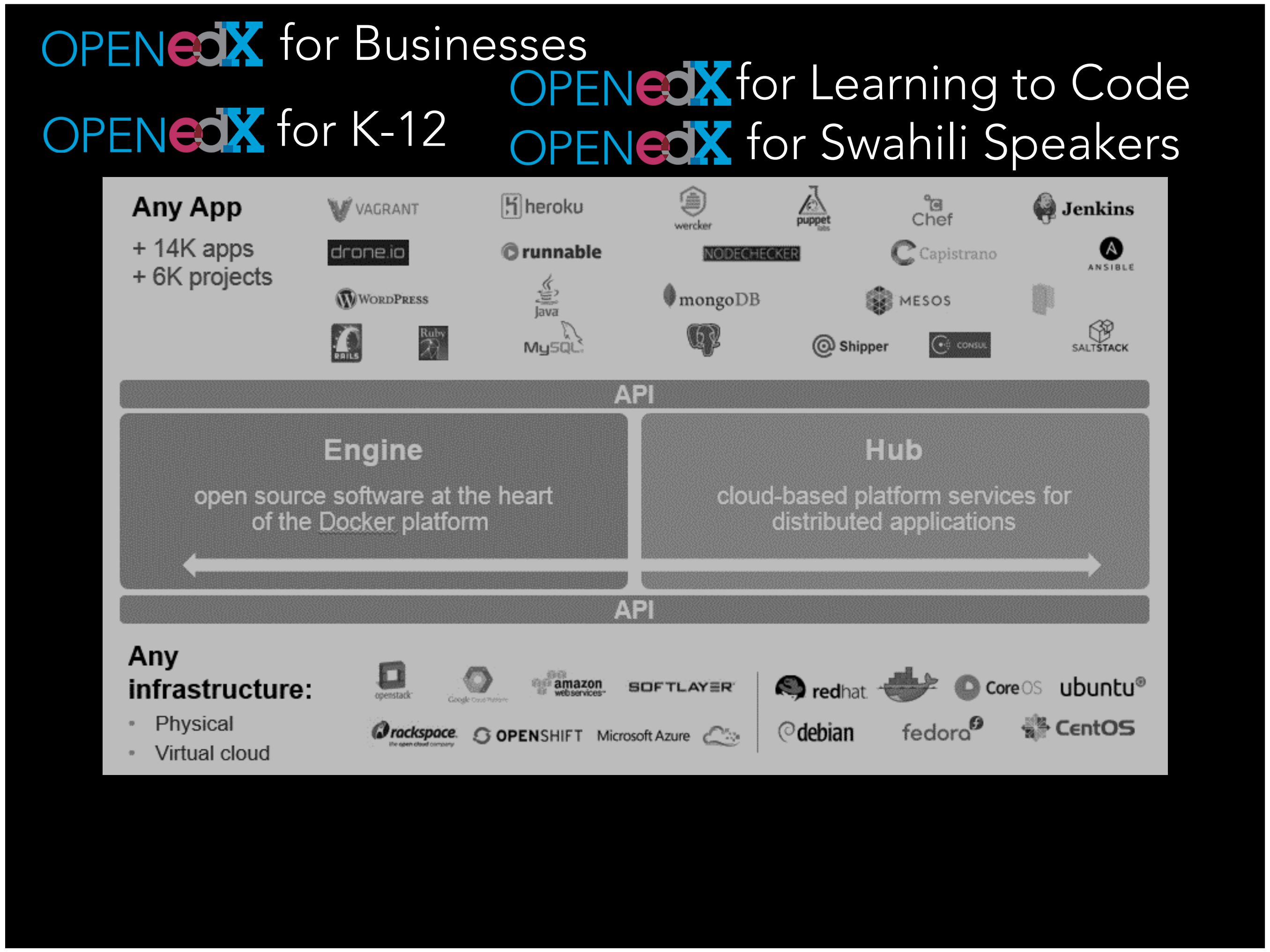
Imagine a world in which this is true not just for Open edX itself…



OPENedX for Businesses

OPENedX for Learning to Code

OPENedX for K-12

OPENedX for Swahili Speakers

Any App

+ 14K apps

+ 6K projects

API

Engine

open source software at the heart of the Docker platform

Hub

cloud-based platform services for distributed applications

API

Any infrastructure:

- Physical
- Virtual cloud

But a variety of Open edX distributions that are for different audiences (Open edX for Businesses, Open edX for K-12, Open edX for those who speak Swahili!). Together we can make this a reality for Open edX!

There’s been a lot of talk about letting a thousand flowers blossom, but seeds need to be planted, nurtured and watered before they blossom into beautiful flowers. Docker provides a fertile ground.

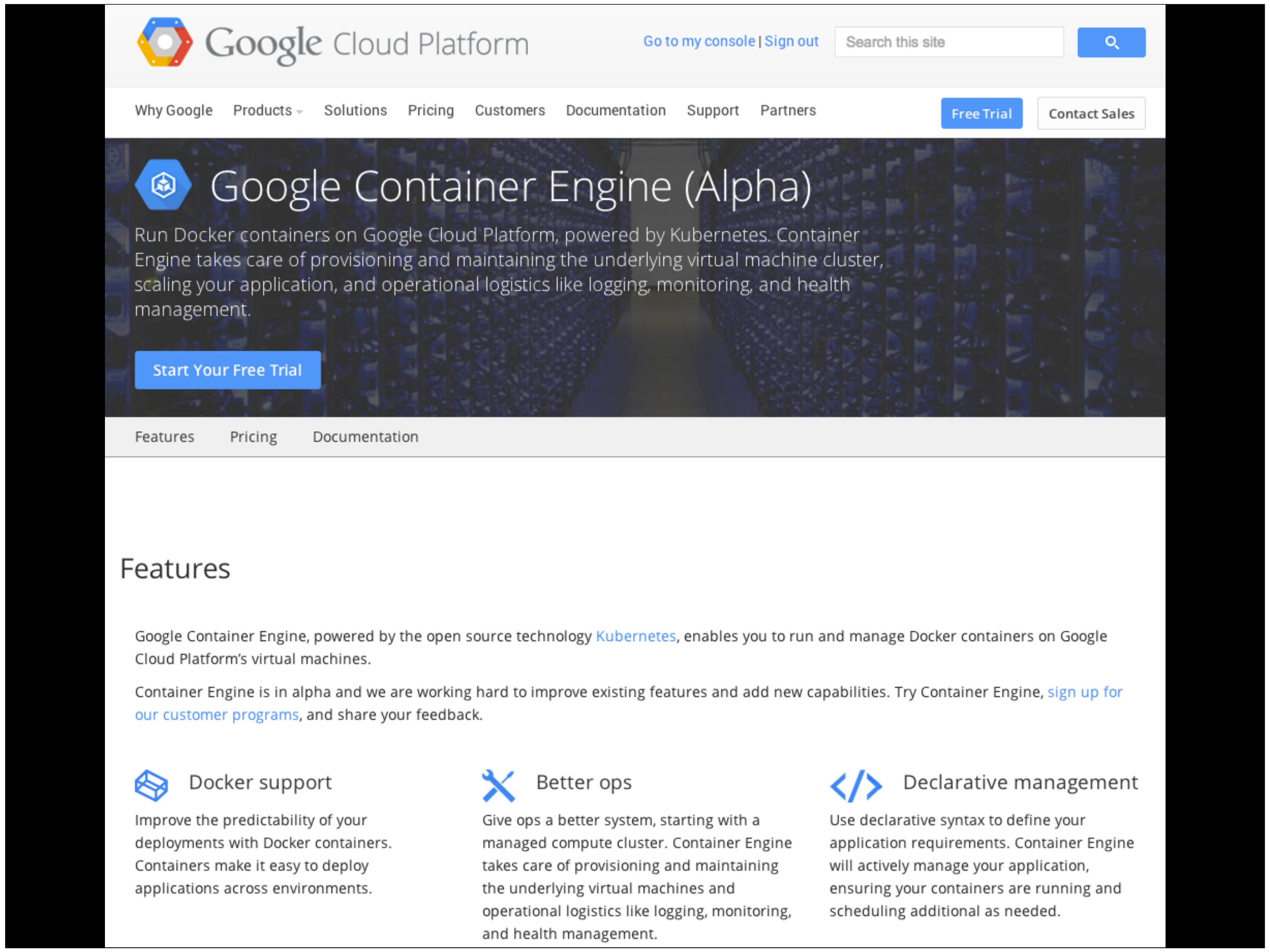
It’s great that we’re sharing our code on Github, but let’s not only share the seeds but share the flowers too.

THANK YOU!

Contact me
nate@appsembler.com
@natea

Help "Dockerize"
Open edX
at the Hackathon!

Visit
openedx.appsembler.com
to get an Open edX site



Google Container Engine (Alpha)

Run Docker containers on Google Cloud Platform, powered by Kubernetes. Container Engine takes care of provisioning and maintaining the underlying virtual machine cluster, scaling your application, and operational logistics like logging, monitoring, and health management.

Features

Google Container Engine, powered by the open source technology Kubernetes, enables you to run and manage Docker containers on Google Cloud Platform's virtual machines.

Container Engine is in alpha and we are working hard to improve existing features and add new capabilities. Try Container Engine, sign up for our customer programs, and share your feedback.

Docker support

Improve the predictability of your deployments with Docker containers. Containers make it easy to deploy applications across environments.

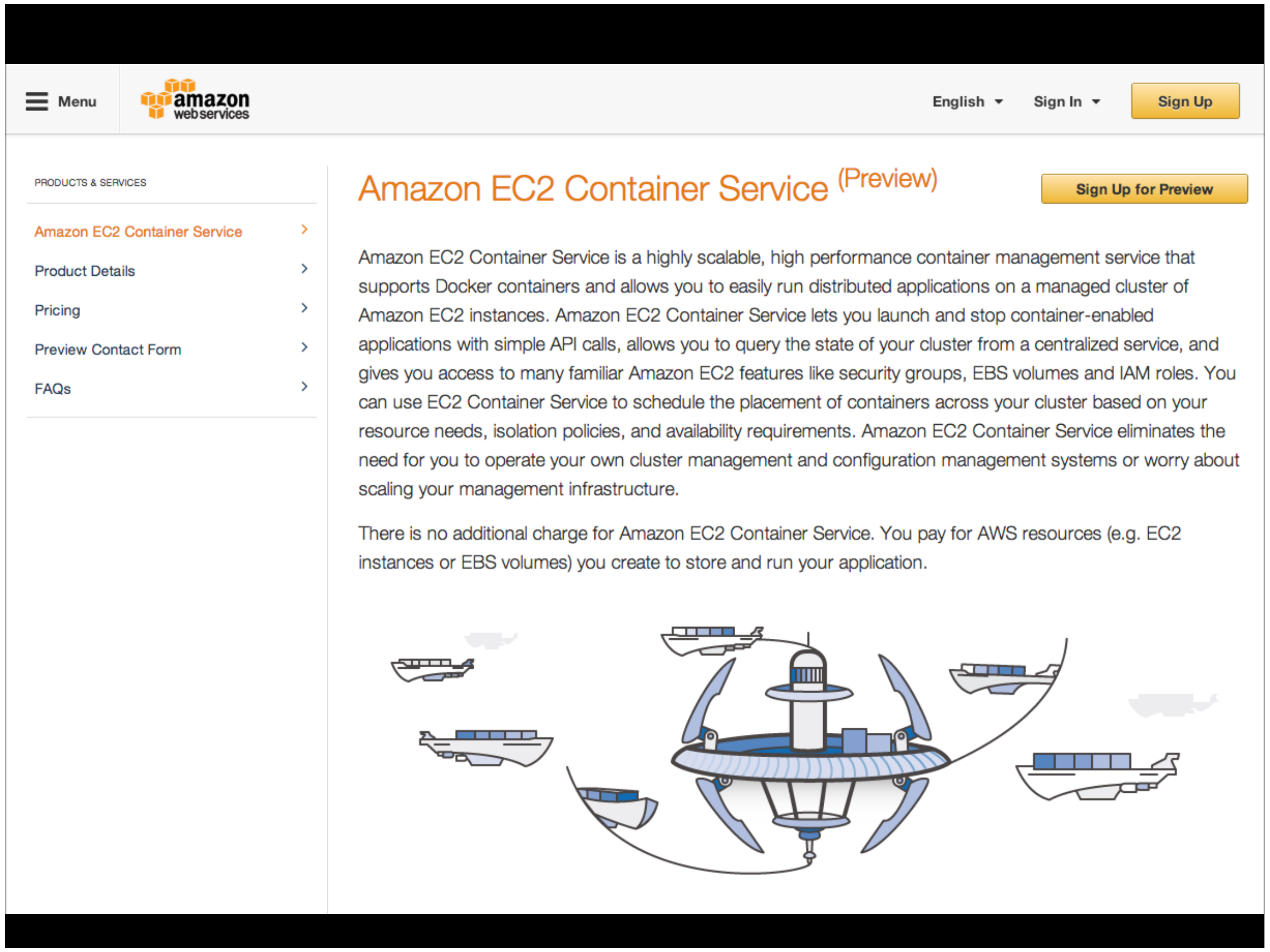
Better ops

Give ops a better system, starting with a managed compute cluster. Container Engine takes care of provisioning and maintaining the underlying virtual machines and operational logistics like logging, monitoring, and health management.

Declarative management

Use declarative syntax to define your application requirements. Container Engine will actively manage your application, ensuring your containers are running and scheduling additional as needed.

On Nov. 4. at Google Cloud Platform Live, they announced support for Docker containers with their Google Container Engine service.

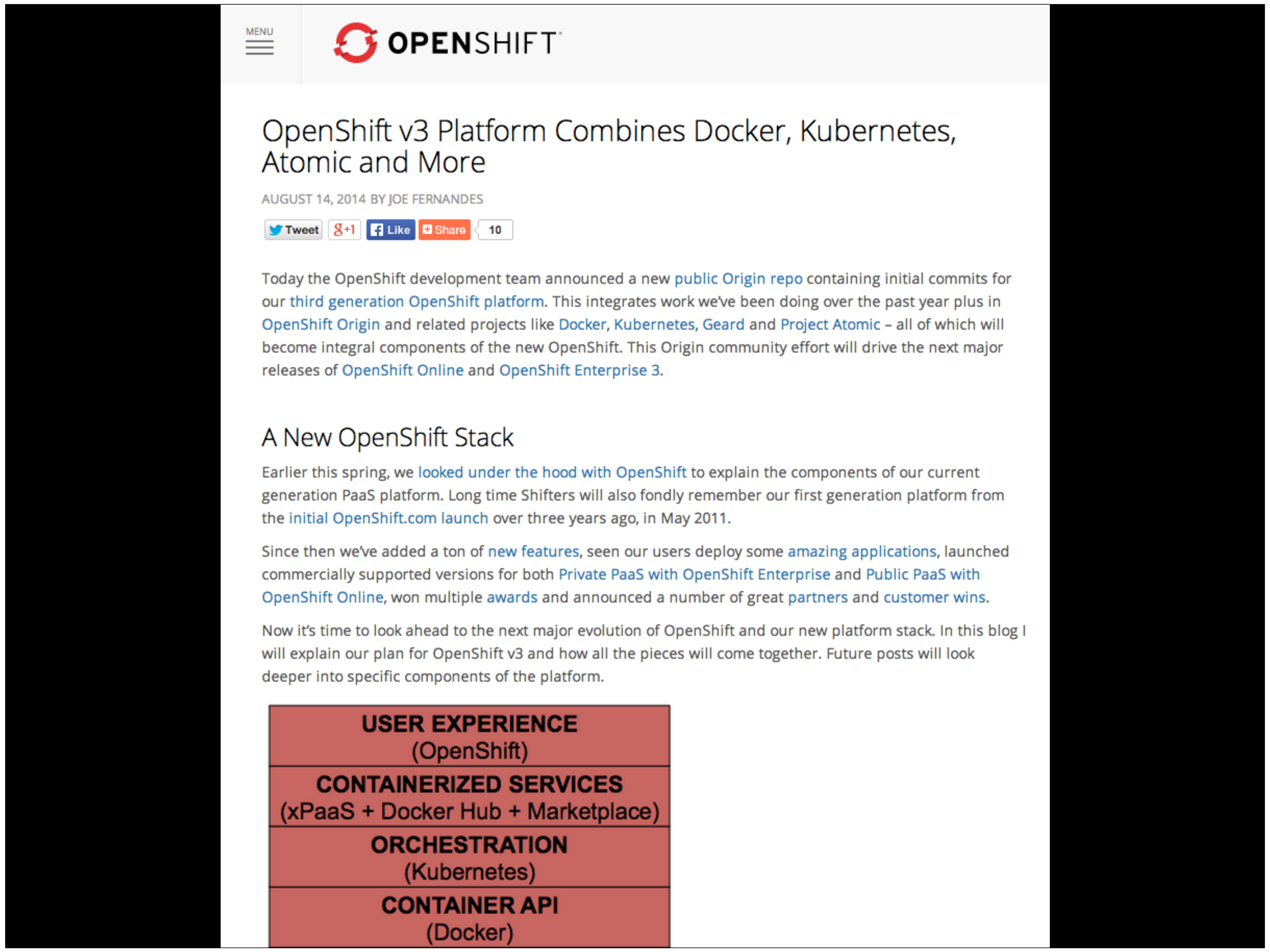


Amazon EC2 Container Service (Preview)

Amazon EC2 Container Service is a highly scalable, high performance container management service that supports Docker containers and allows you to easily run distributed applications on a managed cluster of Amazon EC2 instances. Amazon EC2 Container Service lets you launch and stop container-enabled applications with simple API calls, allows you to query the state of your cluster from a centralized service, and gives you access to many familiar Amazon EC2 features like security groups, EBS volumes and IAM roles. You can use EC2 Container Service to schedule the placement of containers across your cluster based on your resource needs, isolation policies, and availability requirements. Amazon EC2 Container Service eliminates the need for you to operate your own cluster management and configuration management systems or worry about scaling your management infrastructure.

There is no additional charge for Amazon EC2 Container Service. You pay for AWS resources (e.g. EC2 instances or EBS volumes) you create to store and run your application.

Just a few days later (Nov. 13) at AWS re:invent developer conference, not to be out-done by Google, Amazon announced their Amazon EC2 container service.



OpenShift v3 Platform Combines Docker, Kubernetes, Atomic and More

AUGUST 14, 2014 BY JOE FERNANDES

Today the OpenShift development team announced a new public Origin repo containing initial commits for our third generation OpenShift platform. This integrates work we've been doing over the past year plus in OpenShift Origin and related projects like Docker, Kubernetes, Geard and Project Atomic – all of which will become integral components of the new OpenShift. This Origin community effort will drive the next major releases of OpenShift Online and OpenShift Enterprise 3.

A New OpenShift Stack

Earlier this spring, we looked under the hood with OpenShift to explain the components of our current generation PaaS platform. Long time Shifters will also fondly remember our first generation platform from the initial OpenShift.com launch over three years ago, in May 2011.

Since then we've added a ton of new features, seen our users deploy some amazing applications, launched commercially supported versions for both Private PaaS with OpenShift Enterprise and Public PaaS with OpenShift Online, won multiple awards and announced a number of great partners and customer wins.

Now it's time to look ahead to the next major evolution of OpenShift and our new platform stack. In this blog I will explain our plan for OpenShift v3 and how all the pieces will come together. Future posts will look deeper into specific components of the platform.

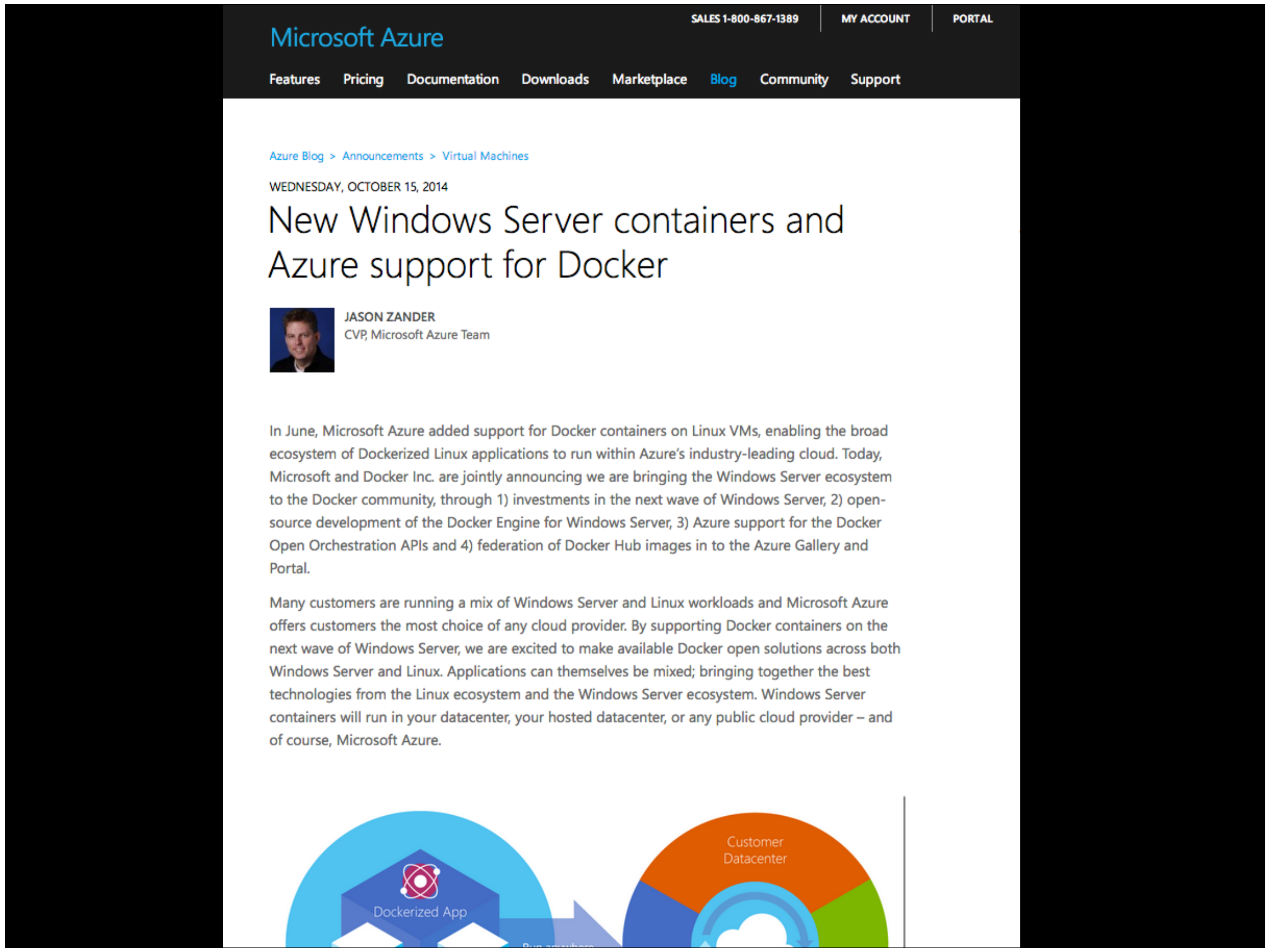
USER EXPERIENCE
(OpenShift)

CONTAINERIZED SERVICES
(xPaaS + Docker Hub + Marketplace)

ORCHESTRATION
(Kubernetes)

CONTAINER API
(Docker)

Redhat announced back in August that they are integrating Docker into v3 of their OpenShift PaaS service.



WEDNESDAY, OCTOBER 15, 2014

New Windows Server containers and Azure support for Docker

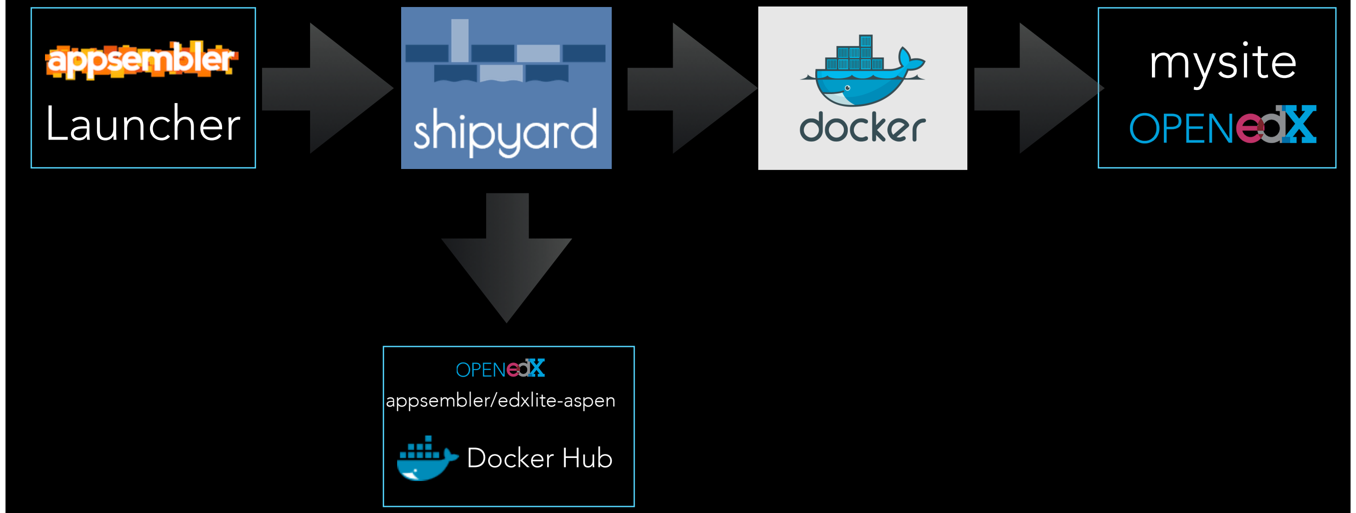
JASON ZANDER
CVP, Microsoft Azure Team

In June, Microsoft Azure added support for Docker containers on Linux VMs, enabling the broad ecosystem of Dockerized Linux applications to run within Azure's industry-leading cloud. Today, Microsoft and Docker Inc. are jointly announcing we are bringing the Windows Server ecosystem to the Docker community, through 1) investments in the next wave of Windows Server, 2) open-source development of the Docker Engine for Windows Server, 3) Azure support for the Docker Open Orchestration APIs and 4) federation of Docker Hub images in to the Azure Gallery and Portal.

Many customers are running a mix of Windows Server and Linux workloads and Microsoft Azure offers customers the most choice of any cloud provider. By supporting Docker containers on the next wave of Windows Server, we are excited to make available Docker open solutions across both Windows Server and Linux. Applications can themselves be mixed; bringing together the best technologies from the Linux ecosystem and the Windows Server ecosystem. Windows Server containers will run in your datacenter, your hosted datacenter, or any public cloud provider – and of course, Microsoft Azure.

And even Microsoft announced in October support for Docker in their Azure cloud hosting service.

THE ARCHITECTURE



appsembler Launcher

shipyard

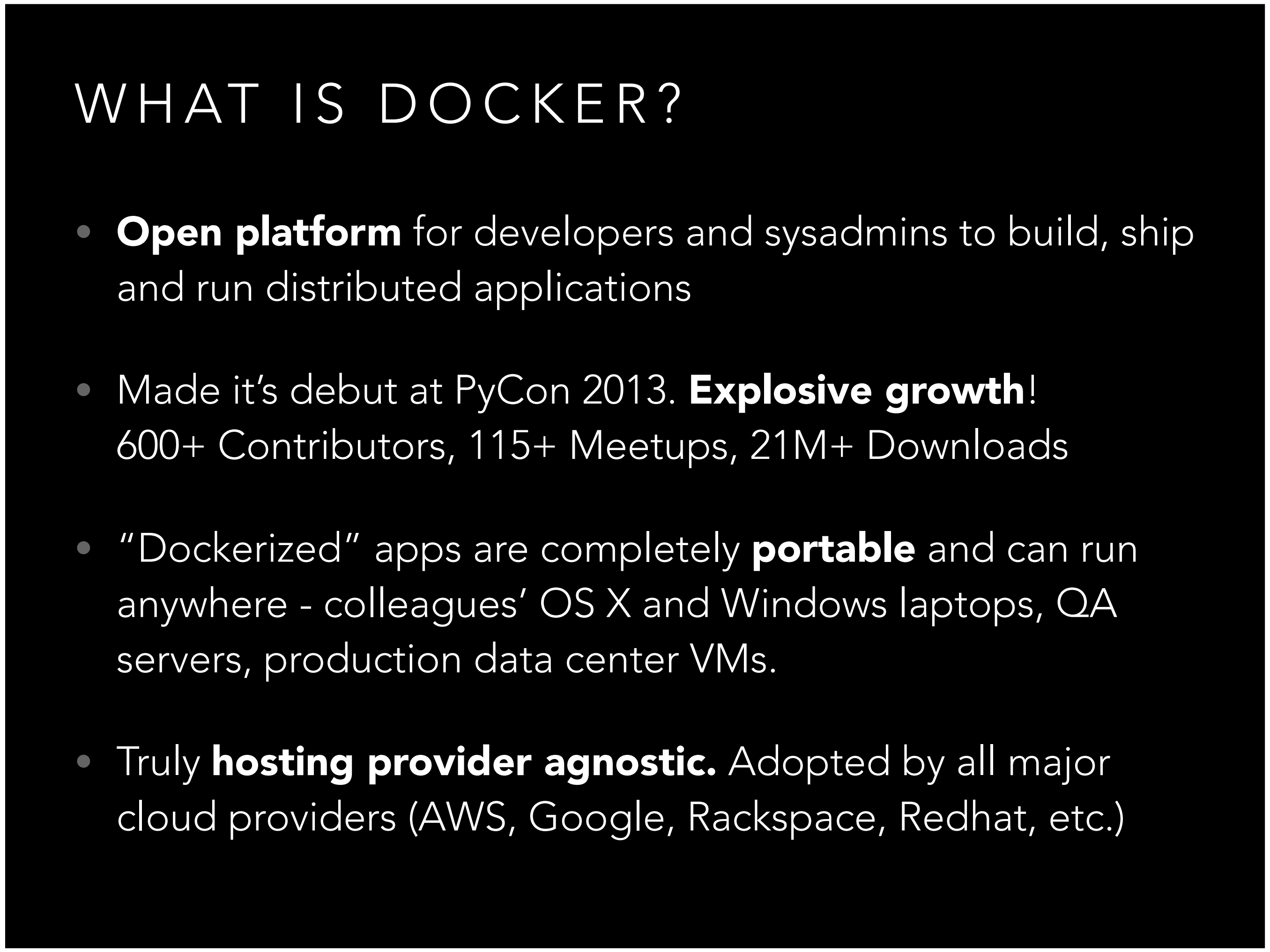
docker

mysite OPENedX

OPENedX

appsembler/edxlite-aspen

Docker Hub



WHAT IS DOCKER?

- **Open platform** for developers and sysadmins to build, ship and run distributed applications
- Made it’s debut at PyCon 2013. **Explosive growth**!
  600+ Contributors, 115+ Meetups, 21M+ Downloads
- “Dockerized” apps are completely **portable** and can run anywhere - colleagues’ OS X and Windows laptops, QA servers, production data center VMs.
- Truly **hosting provider agnostic.** Adopted by all major cloud providers (AWS, Google, Rackspace, Redhat, etc.)

SUMMARY OF DOCKER BENEFITS

- **Isolation**: Lightweight containers provide isolation but don’t use as many resources as virtual machines.

- **Portability**: Easier to share Docker images by pushing them to Docker Hub.

- **Scalability**: Add more containers to an application to increase capacity.

- **Cost effective**: Lower-cost hosting due to efficiencies of Docker containers.