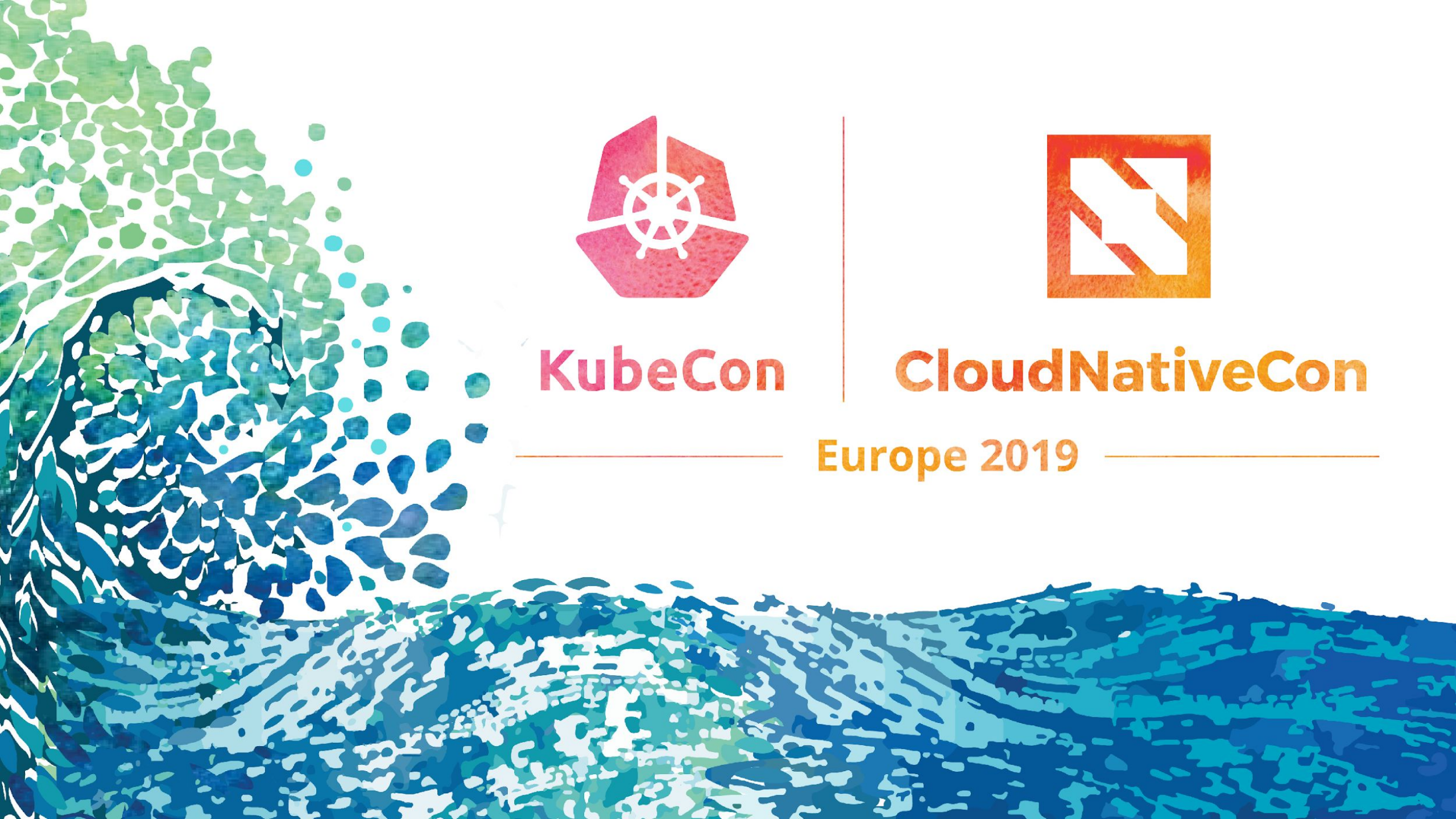
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BRIGADE

Event-driven scripting for Kubernetes

@matei_radu

Who am I?

Radu M (@matei_radu, https://radu.sh)

- piano enthusiast
- open source maintainer for Brigade, CNAB
- software engineer @Microsoft (Deis Labs 💛)

Agenda

- advanced scripting guide
- how does Brigade work?
- building custom gateways
- securing Brigade
- dependencies in brigade.js
- testing Brigade scripts

Kubernetes as a “cloud OS”

An operating system manages **processes on a machine**.

Kubernetes manages **containers on a cluster**.

Operating System Shell Scripting

Flow control that wraps the execution of **processes**, but is not opinionated about what the **process** do, or how they run.

Operating System Shell Scripting


```
#!/bin/bash

for i in $( ls -1 ); do
   if [[ -d $i ]]; then
      echo "$i is a directory"
   fi
done
```

Cluster Shell Scripting?

Flow control that wraps the execution of **containers**, but is not opinionated about what the **containers** do, or how they run.

Cluster Shell Scripting


```
for i in $( run_some_container ); do
  if $( run_some_other_container ); then
    $( run_yet_another_container )
  fi
done
```

BRIGADE

What is Brigade?

- CNCF Sandbox Project

What is Brigade?

- framework for event-driven scripting on Kubernetes
- extremely lightweight, Kubernetes native
- chain together containers to create workflows

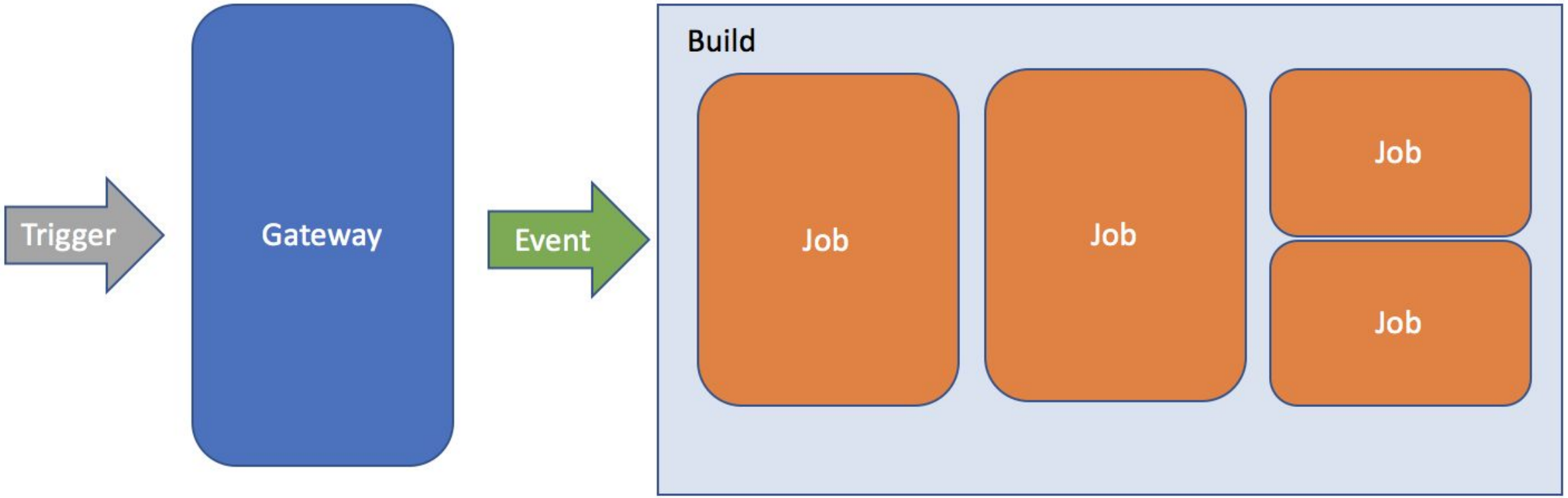
It's just JavaScript

```
const { events, Job } = require("brigadier")

events.on("someEvent", ( eventData ) => {
  var program = Job("one", "alpine:3.5")
  program.tasks = [ "echo hello", "echo goodbye"]

  program.run()
})
```

Demo

Advanced scripting guide

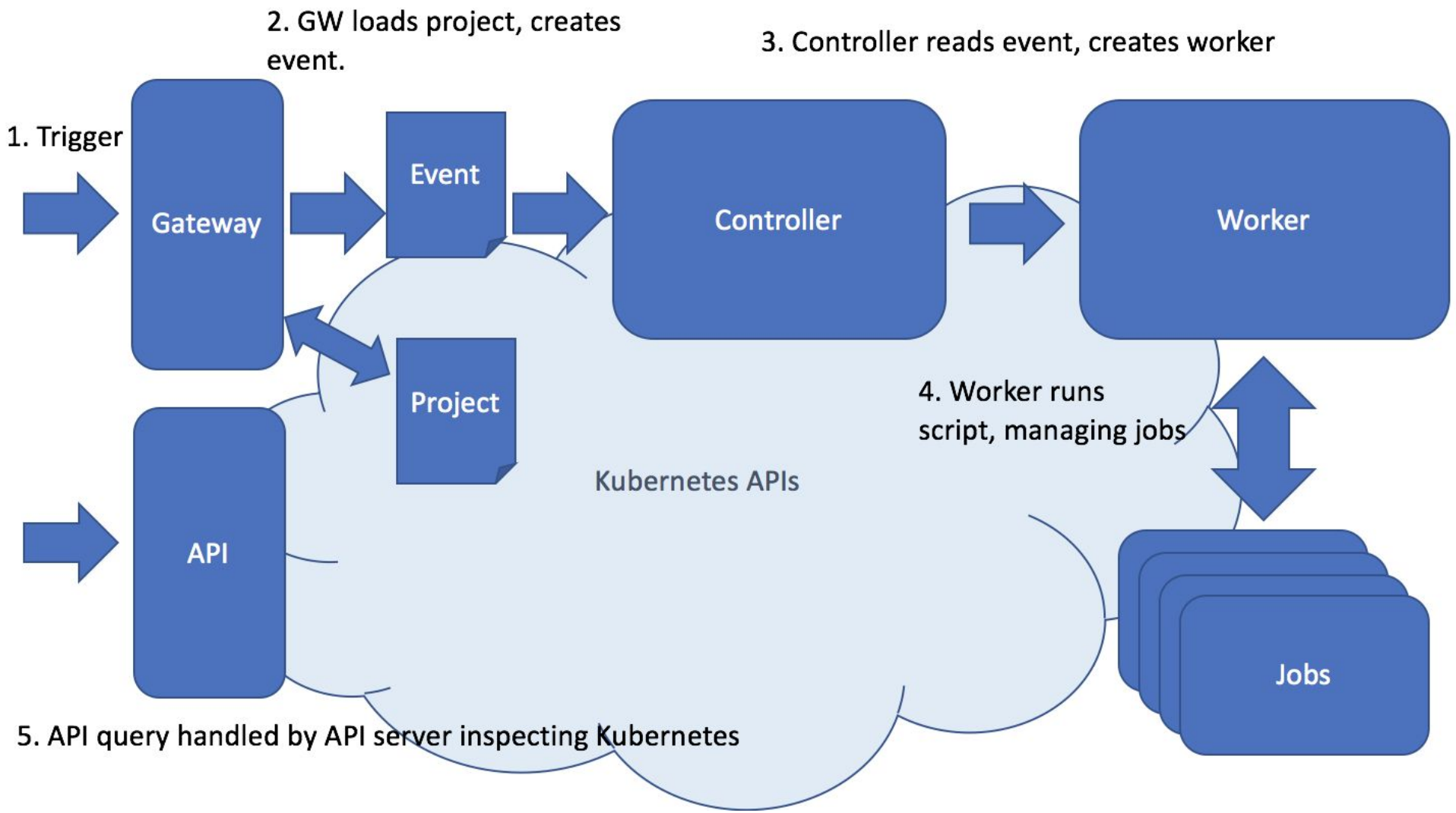
How does Brigade work?



Components

- gateways -- translate events from inside or outside the cluster into Brigade "builds"
- controller -- listens for events and creates worker pods
- worker pods -- execute the JavaScript pipeline and schedules jobs
- API (optional) -- used to interact with Brigade from web or CLI components

How does Brigade work?



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Gateways
(docs.brigade.sh/topics/gateways)

- translate events from outside the cluster
- out-of-the-box: generic gateway (arbitrary JSON and CloudEvents), container registry, GitHub
- they can be webhooks, but any application that can create a Kubernetes secret can be a gateway (brig exec acts like a gateway)
- examples for Go, NodeJS, Bash, Python

Demo

Building custom gateways

Security (docs.brigade.sh/topics/security)

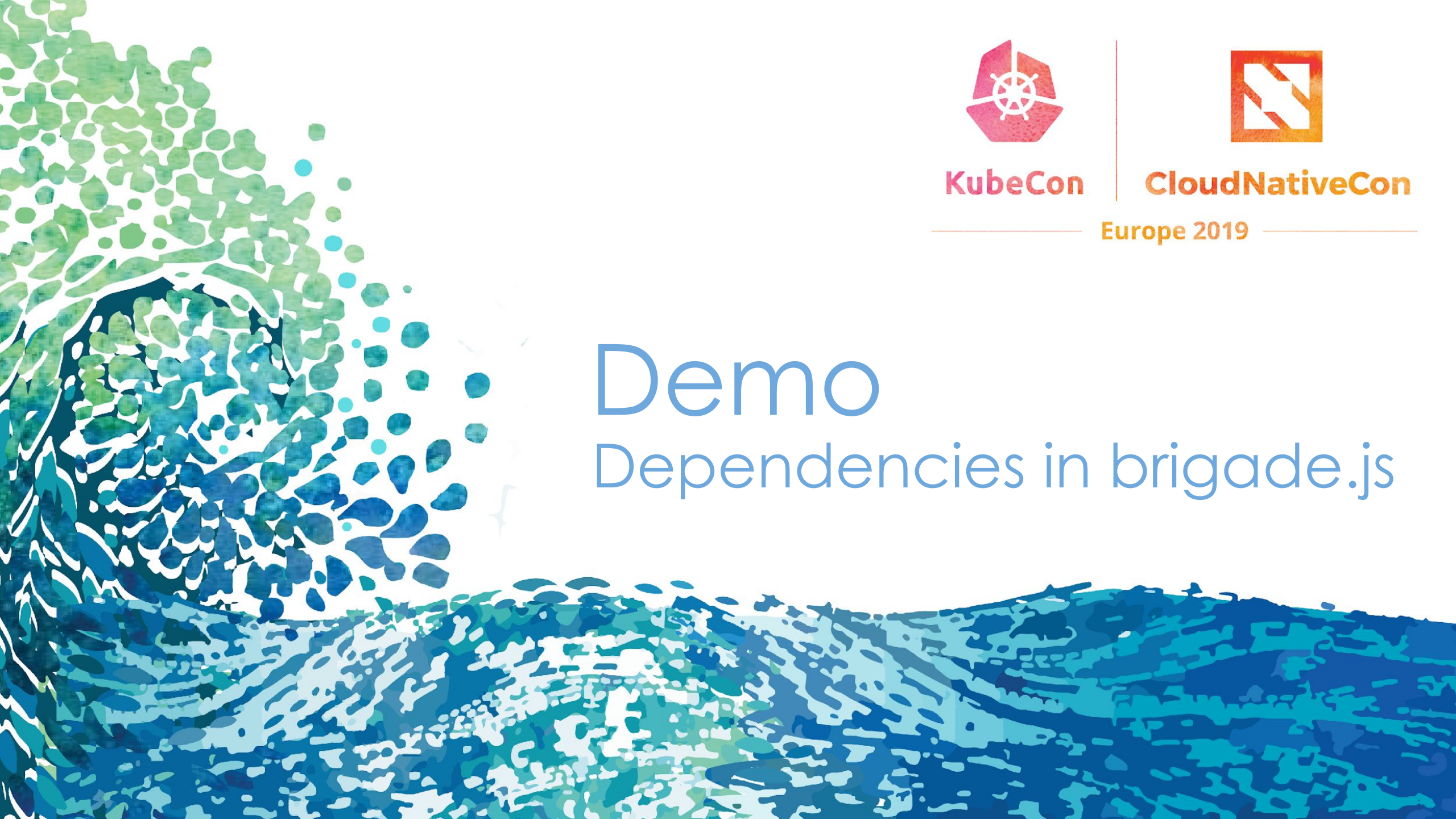
- isolate Brigade in a namespace
- use RBAC (enabled by default)
- always use HTTPS for exposed services (docs.brigade.sh/topics/ingress)
- always use trusted container images in jobs
- always validate and authenticate events

Dependencies in brigade.js (docs.brigade.sh/topics/dependencies)

- import local JavaScript modules from the same repo
- import packages from NPM (pulled on event)
- build a custom worker image with the added dependencies

(docs.brigade.sh/topics/workers)

- BUT - avoid putting *too much* logic in brigade.js, and when possible, start jobs with that logic



Demo

Dependencies in brigade.js

Testing Brigade scripts
(docs.brigade.sh/topics/testing)

- brigtest (github.com/technosophos/brigtest)
  - checks is brigade.js is properly formatted and execute unit tests
  - does not run jobs, does not need Kubernetes

- Brigade Integration Test (github.com/blimmer/brigade-project-integration-test)
  - integration testing, using Minikube
  - automatically configures Brigade, creates a project, invokes events, and tests the output

Community + Integrations

- built-in support for CloudEvents (CNCF)
- integration with GitHub Checks API
- integrations with Prometheus and Virtual Kubelet (CNCF)
- support for arbitrary event data with a generic gateway

Ecosystem

Related Projects

- Kashti - a dashboard for your Brigade pipelines.
- Brigadeterm - a simple terminal ui for brigade pipelining system.
- Brigade exporter - a Prometheus exporter to gather metrics from Brigade.
- Gateways
  - BitBucket events: Gateway Support for BitBucket repositories
  - GitLab events: Gateway Support for GitLab repositories
  - Kubernetes events: Gateway that listens to Kubernetes event stream
  - Event Grid gateway: Gateway for Azure Event Grid events
  - Cron Gateway: Schedule events to run at a particular time
  - Trello and Generic Webhooks: Experimental gateway for Trello and for generic webhooks
  - Draft Pack for Building Custom Gateways: Build your own gateway in 5 minutes
  - Azure DevOps / VSTS gateway: Gateway for Azure DevOps / VSTS events

Brigade ❤️ Developers

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Getting Started - docs.brigade.sh

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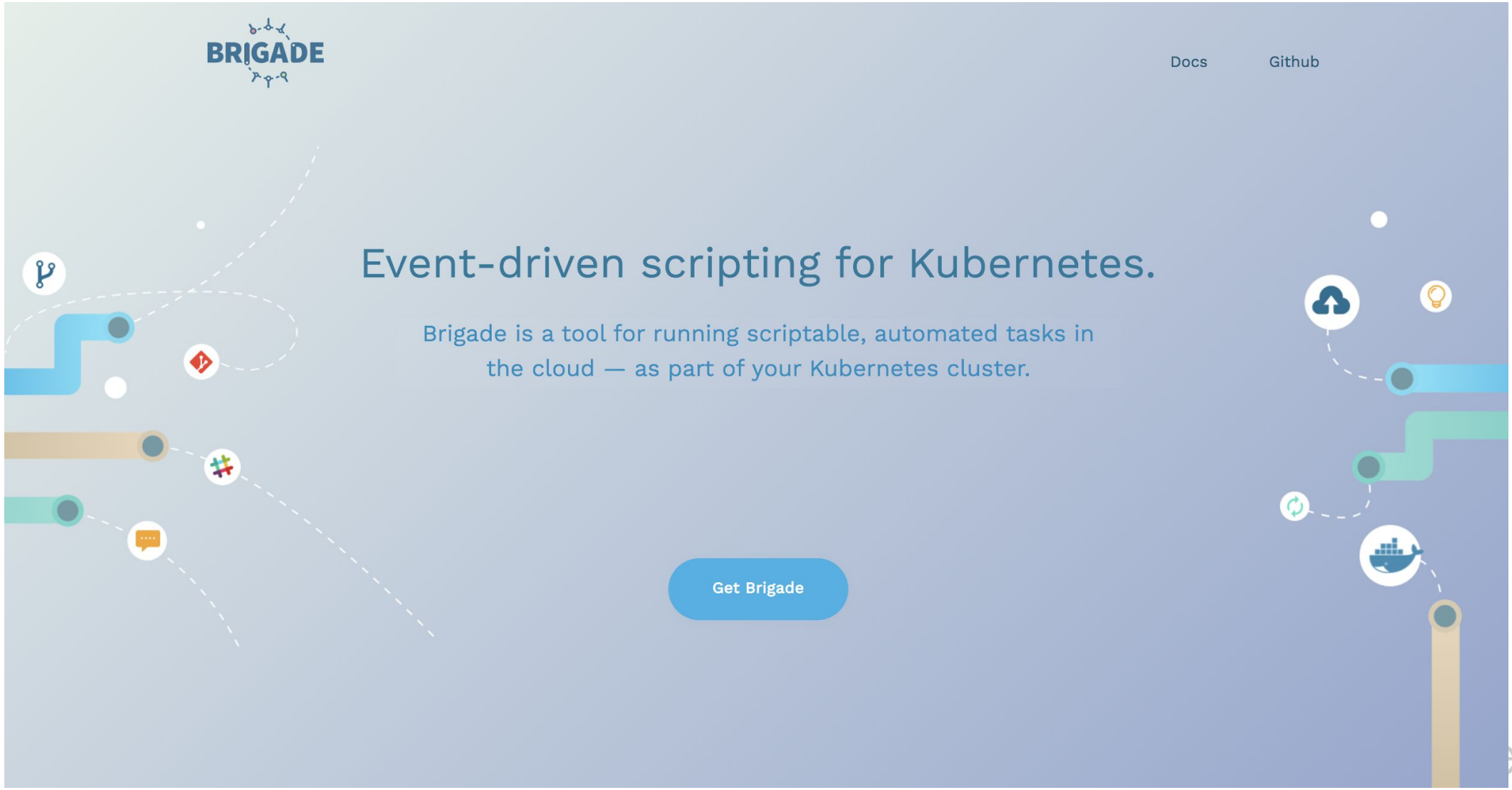

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Contribute - #good-first-issue

brigadecore / brigade ✓

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Event-based Scripting for Kubernetes. brigade.sh

Edit

cncf | kubernetes | Manage topics

1,322 commits | 3 branches | 24 releases | 1 environment | 69 contributors | MIT

Branch: master ▾ | Create new file | Upload files | Find File | Clone or download ▾

vdice Merge pull request #915 from vdice/fix/log-level ... Latest commit c9bb882 6 hours ago

.github	chore(*): updates per org change to brigadecore	2 months ago
brig	make worker command configurable globally with a controller flag (#906)	12 days ago
brigade-api	chore(*): updates per org change to brigadecore	2 months ago
brigade-controller	allow default worker command to also be set via env var (#910)	5 days ago
brigade-cr-gateway	chore(*): update image org to brigadecore	2 months ago
brigade-generic-gateway	chore(*): update image org to brigadecore	2 months ago
brigade-vacuum	chore(*): updates per org change to brigadecore	2 months ago
brigade-worker	fix(brigade-worker): uppercase BRIGADE_LOG_LEVEL val for deriving cor...	a day ago
docs	Merge branch 'master' into docs-analytics	12 days ago
git-sidecar	chore(*): update image org to brigadecore	2 months ago
pkg	make worker command configurable globally with a controller flag (#906)	12 days ago
scripts	chore(*): update image org to brigadecore	2 months ago

Get involved!

- #brigade in the Kubernetes Slack
- bi-weekly community meeting, Tuesdays, 6pm CET
- github.com/brigadecore/brigade

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Questions & Answers
@matei_radu

TL;DR

- Brigade is a cluster scripting environment that allows you to chain multiple containers and create workflows and pipelines
- lightweight, and works on **any Kubernetes cluster**
- write scripts in basic JavaScript
- Brigade is a Kubernetes application - you can manage and monitor it the same way as any other application
- Brigade is a CNCF Sandbox Project, stable at v1.0.0

FAQ - Declarative?

- Brigade is a cluster scripting environment - so a real programming language is required
- But… it is easy to create pipelines with Brigade
- we are actively investigating adding support for declarative pipelines (YAML, **HCL**), and there are already multiple declarative implementations for Brigade (community-driven)

FAQ - Windows and Kubernetes?

[WIP] Experimental Windows containers support #838

Draft **radu-matei** wants to merge 1 commit into `brigadecore:master` from `radu-matei:windows-entrypoint`

Conversation 0 | Commits 1 | Checks 2 | Files changed 1

radu-matei on 8 Mar — Member

What this PR does / why we need it:
This PR adds very early experimental Windows Server containers support.
It has been tested with a Virtual Kubelet node backed by Azure Container Instances, so the following are current known limitations:

- job and build caches are not supported (limitation of volumes in ACI)
- the Git sidecar is not supported (limitation of volumes in ACI)
- the entrypoint is passed directly to the command arguments, not constructed as a script (limitation of volumes in ACI)

FAQ - Brigade on ARM clusters

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[WIP] Add ARM64 support #803

Open **Alxandr** wants to merge 11 commits into `brigadecore:master` from `Alxandr:master`

Conversation 45 Commits 11 Checks 0 Files changed 10

Alxandr on 8 Feb — First-time contributor

What this PR does / why we need it: It adds ARM64 support to brigade, allowing it to run on ARM (and hybrid ARM64/AMD64) clusters.

If applicable:

- [ ] this PR contains documentation
- [ ] this PR contains unit tests
- [ ] this PR has been tested for backwards compatibility

No code changes have been performed, so it should not need unit tests, nor break backwards compatibility. It might warrant an update to docs just to say it supports ARM though?

Resolves #773

@matei_radu