Go containers? Go serverless?

A cloud native journey

Michael Hausenblas, Developer Advocate, Red Hat

@mhausenblas

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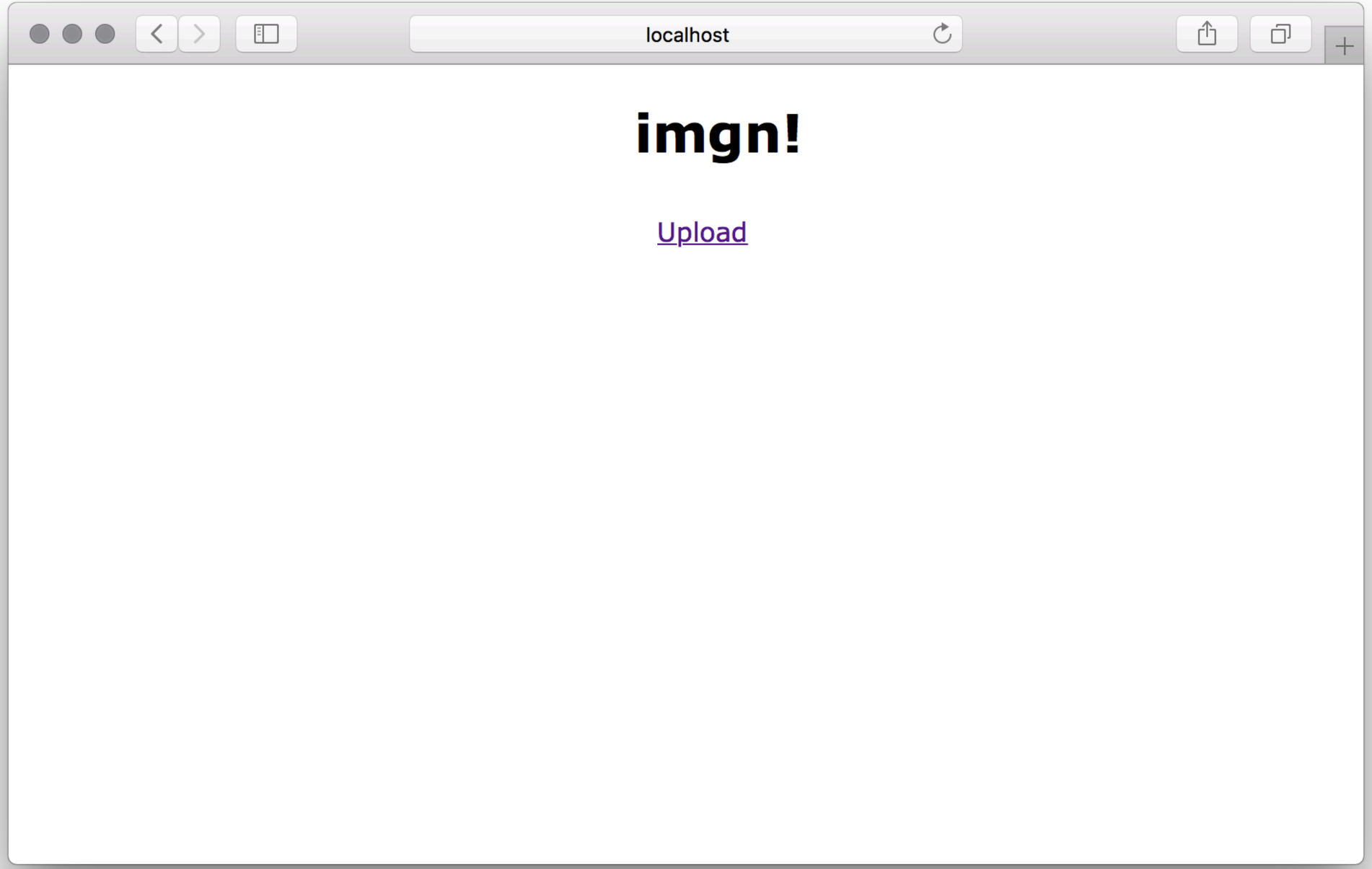
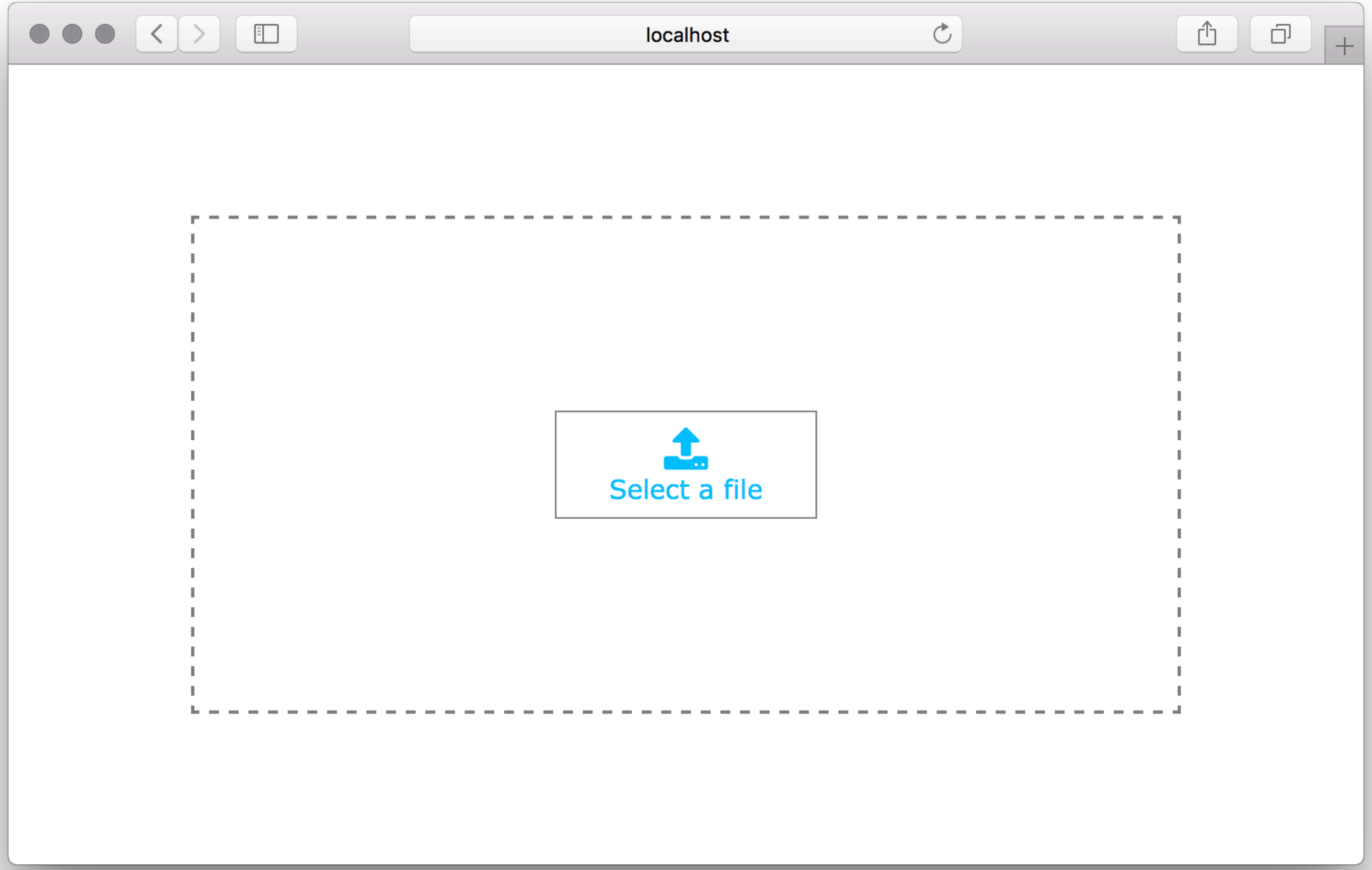
$ whois mhausenblas

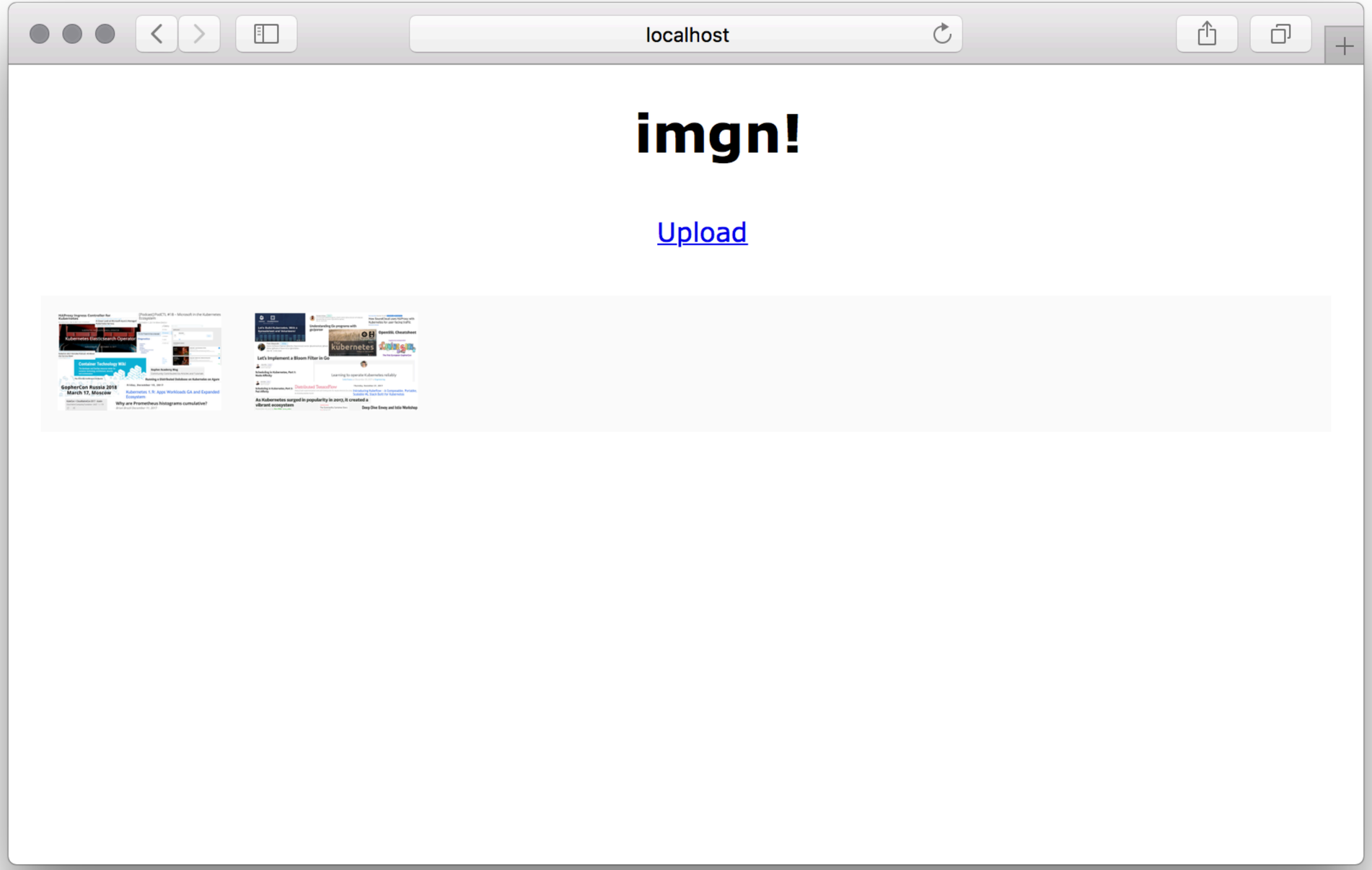
- Developer Advocate @ Red Hat (Go, Kubernetes), Cloud Native Ambassador @ CNCF
- Developer Advocate @ Mesosphere (Mesos, DC/OS, Kubernetes)
- Chief Data Engineer @ MapR (HDFS, HBase, Drill, etc.)
- Applied research—4y in Ireland, 7y in Austria (Linked Data, media semantics)
- Nowadays mainly developing tools in Go (before: Python, Node.js, Java, C++)
- Developer by trade, ops by passion

The Monolith


localhost
imgn!
Upload



Hit me up on Twitter: @mhausenblas



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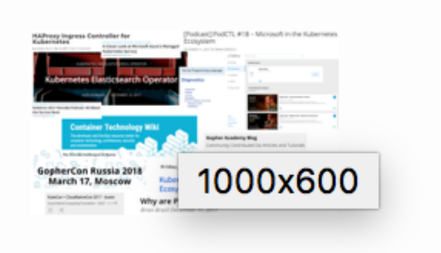

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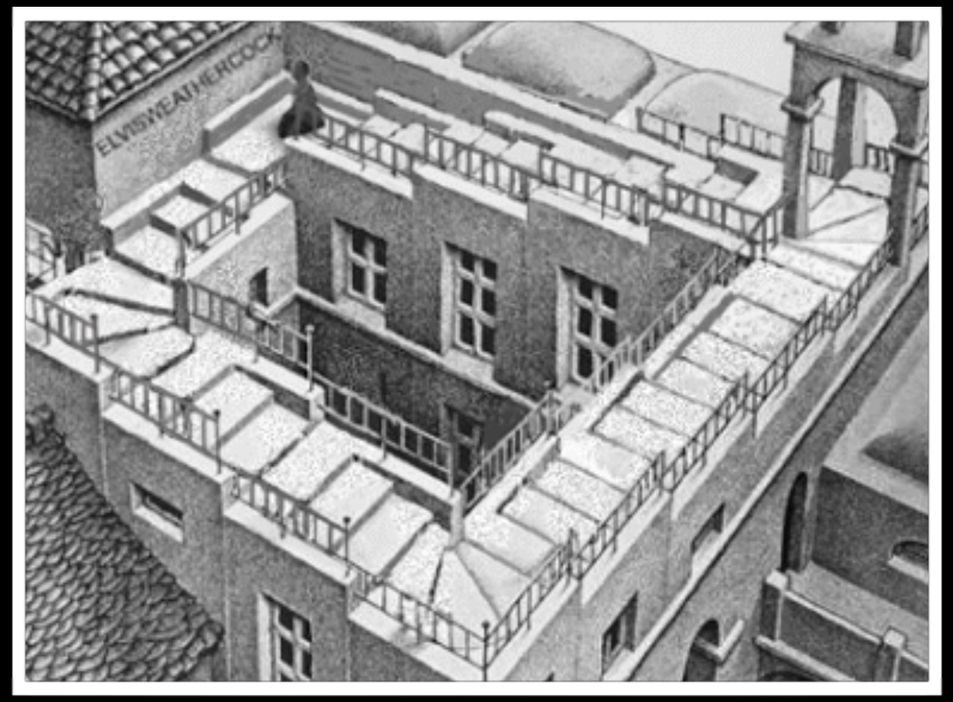
Act 1

Containerized Microservices

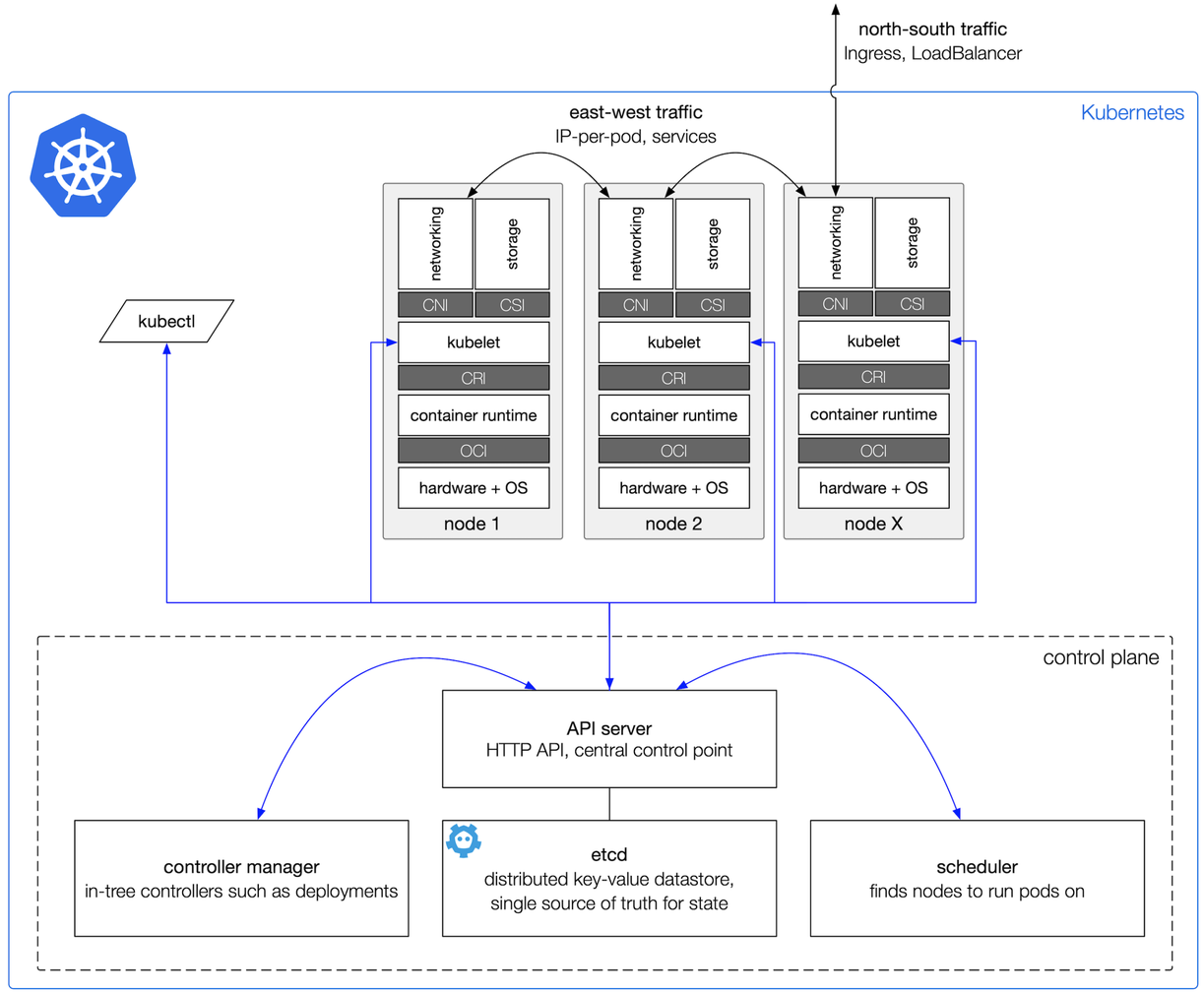
demo time!



github.com/mhausenblas/imgn/containers

Kubernetes

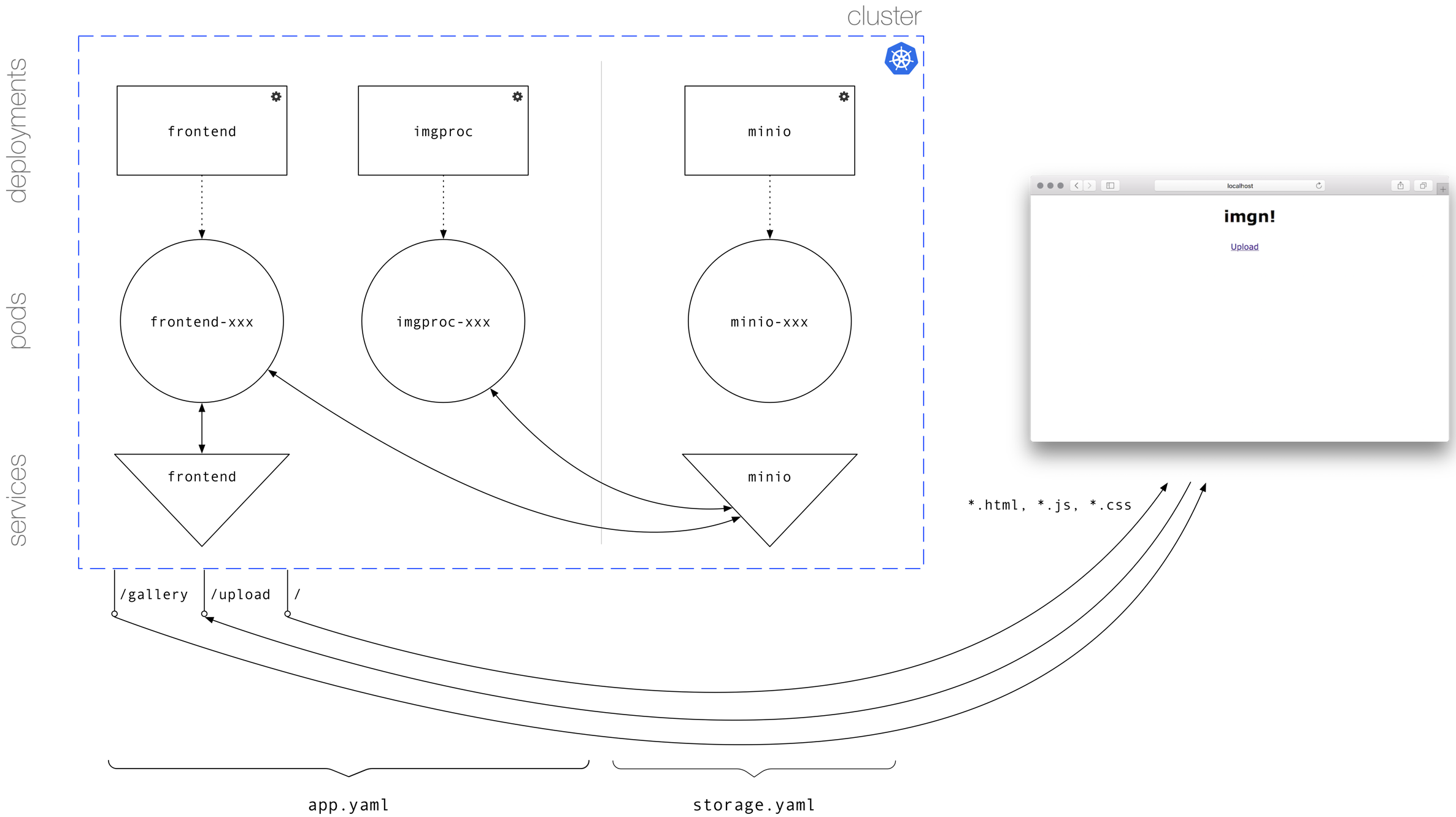
- Container lifecycle management
- Declarative API + control loops
- Extensible through plug-ins and custom resources/controllers



kubernetes.io

imgn as containerized microservices app

- Microservices:
  - serving static assets for UI, exposing HTTP API:
    - upload image
    - list images + metadata
  - batch metadata extraction
- Using Minio (S3 clone) as shared storage for images and metadata
- Leverages vanilla Kubernetes abstractions (deployments, services)


cluster
deployments
pods
services
frontend
imgproc
minio
frontend-xxx
imgproc-xxx
minio-xxx
frontend
minio
/gallery
/upload
/
*.html, *.js, *.css
app.yaml
storage.yaml

localhost
imgn!
Upload

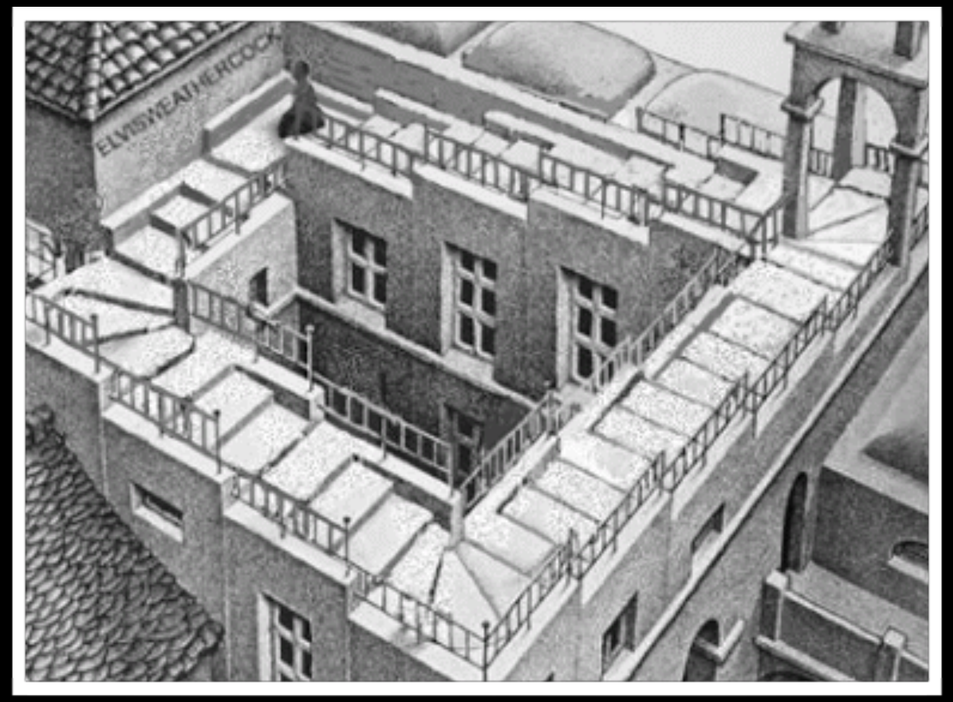
Alternative container-based architectures

- lift and shift (aka: put existing monolith into a pod)
- both microservices as containers in one pod, share data via local volume
- app containers in different pods, share data via persistent volume

Act 2

Serverless

demo time!



github.com/mhausenblas/imgn/functions

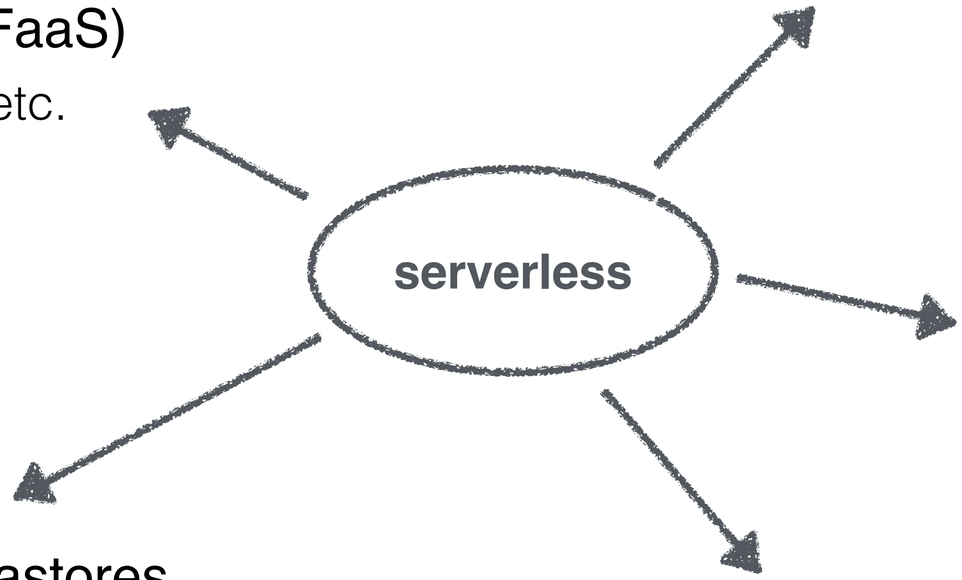
Serverless

query

BigQuery, Amazon Athena, etc.

Function-as-a-Service (FaaS)

AWS Lambda, knative, etc.



message queues

SQS, Azure Service Bus, etc

databases & datastores

Redshift, Azure Data Lake, etc.

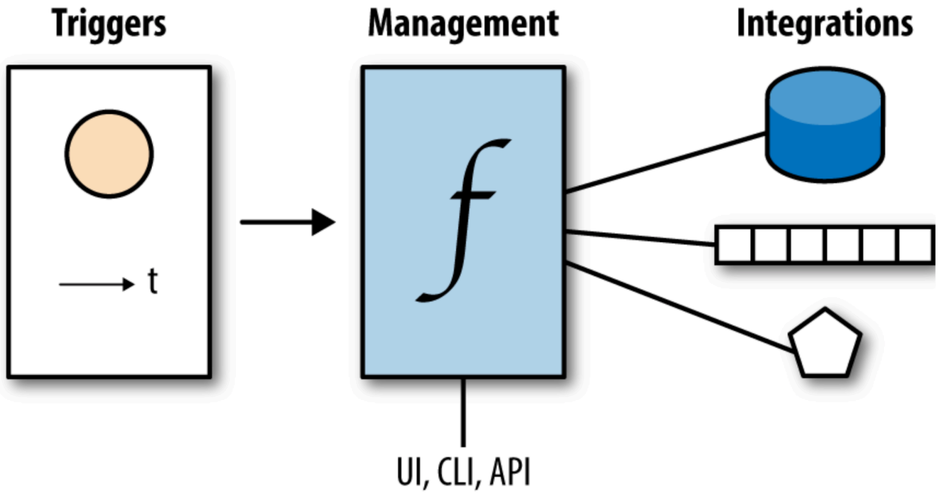
object storage

S3, Google Cloud Storage, etc.

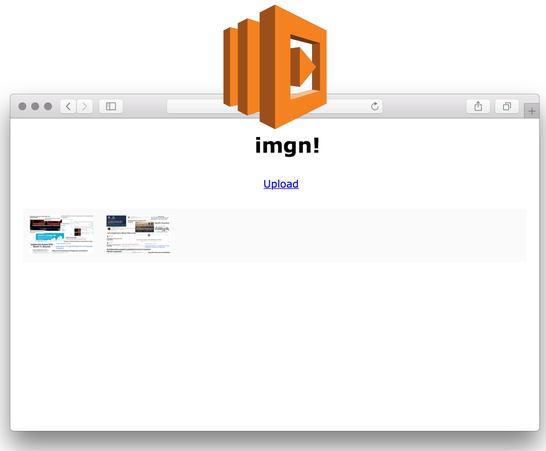
boringis.cool/#lets-talk-about-serverless

Function-as-a-Service concept

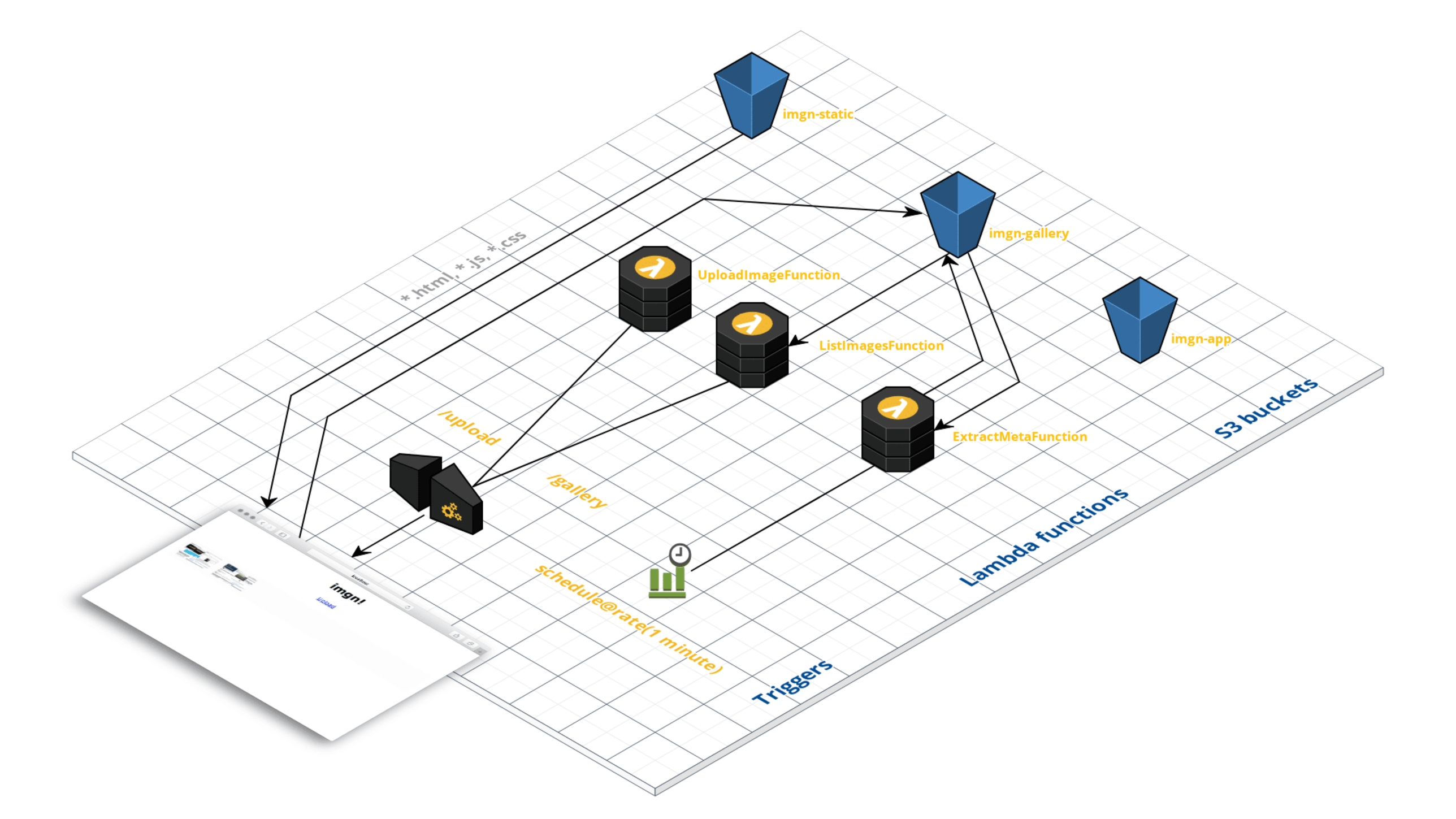
- event-driven (i.e. needs trigger)
- short-running (practically minutes)
- stateless (externalize state/integrations)



imgn serverless



- Three Lambda functions:
  - upload image
  - list images + metadata
  - metadata extraction
- Using S3 as shared storage for images and metadata and static assets for UI
- Leverages SAM to deploy Lambda functions, API Gateway, CloudWatch


imgn-static
imgn-gallery
imgn-app
UploadImageFunction
ListImagesFunction
ExtractMetaFunction
*.html, *.js, *.css
/upload
/gallery
schedule(rate(1 minute))
imgn!
Upload
S3 buckets
Lambda functions
Triggers

Alternative serverless architectures

- trigger metadata extraction on `s3:ObjectCreated` event rather than periodically via CloudWatch event
- replace two-phased pre-signed URL/S3 bucket put flow with a Amazon Cognito-based flow using AWS SDK for JavaScript

Comparison

Containers and serverless: similar, yet different

	containerized microservices (Kubernetes)	serverless (AWS Lambda)
unit of deployment	pod	function
build artifact	container image	ZIP, JAR file
artifact distribution	container registry	S3 buckets
event triggers	no built-ins, requires framework	built-in (API Gateway, S3 buckets, etc.)
state	can be stateful, requires some effort	stateless, but lots of integrations

Containers and serverless: similar, yet different

	containerized microservices (Kubernetes)	serverless (AWS Lambda)
latency	generally good	can be challenging
observability	not opinionated, integration points	AWS specific
billing	pay for resources, no matter if used or not	pay what you consume
lift and shift	possible	no
local development	doable	limited

The good

- Containerized microservices: Kubernetes provides portability
- Serverless: developers can focus on business logic
- Both containers and serverless:
  - ratio of “code to config” (YAML manifests) comparable
  - increase dev/deploy velocity

The bad

- containerized microservices:
  - handling container images
  - DX is poor
- serverless:
  - language dependent latencies
  - state hydration

Resources

Articles and blog posts

- Understanding Cloud Native Infrastructure

  infoq.com/articles/cloud-native-infrastructure

- 5 reasons you should be doing container native development

  open.microsoft.com/2018/04/23/5-reasons-you-should-be-doing-container-native-development/

- Developing on Kubernetes

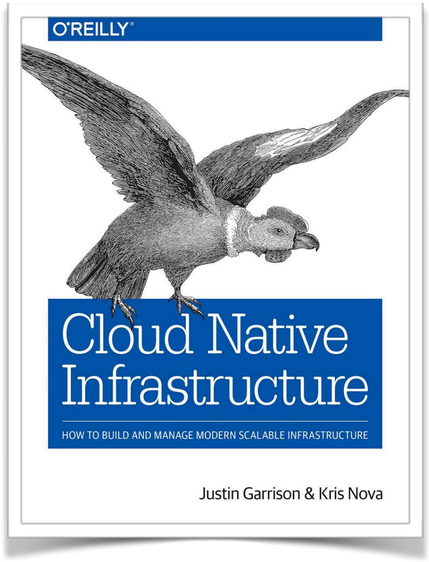
  kubernetes.io/blog/2018/05/01/developing-on-kubernetes/

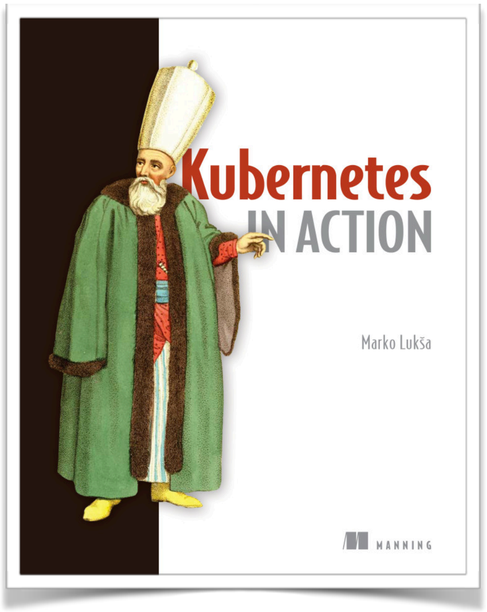
- What is a Service Mesh, and Do I Need One When Developing Cloud Native Systems?

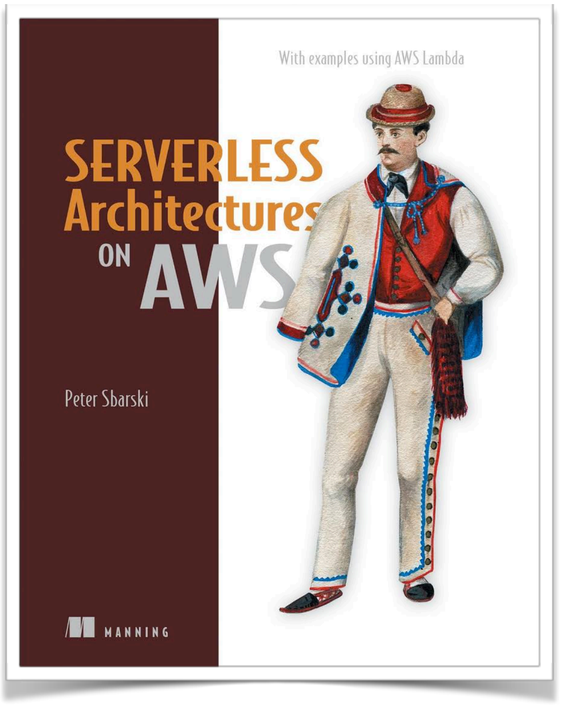
  skillsmatter.com/skillscasts/10668-looking-forward-to-daniel-bryant-talk

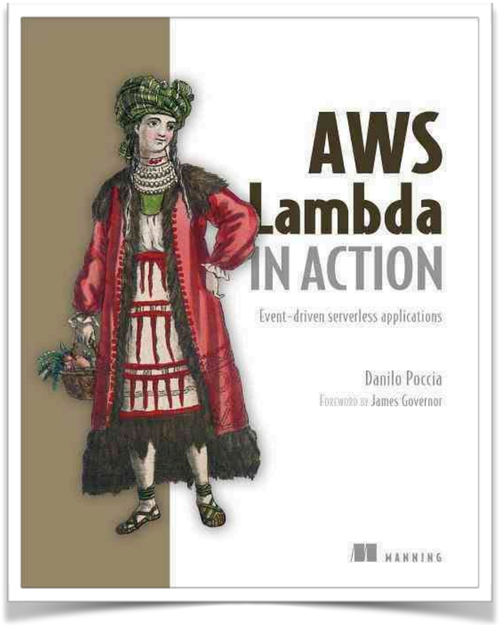
Articles and blog posts

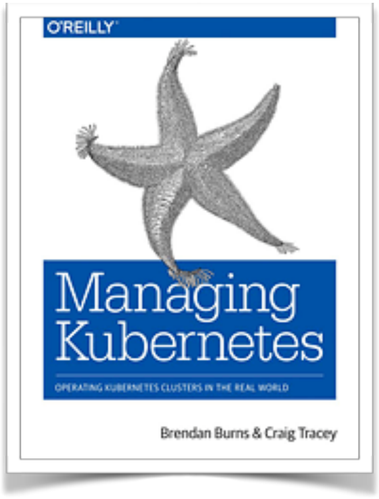
- Best AWS Lambda Use Cases From Video Processing To Predictive Page Rendering
  dashbird.io/blog/best-aws-lambda-serverless-use-cases/
- Learn about serverless with these books, videos, and tutorials
  oreilly.com/ideas/learn-about-serverless-with-these-books-videos-and-tutorials
- AWS Lambda and the Monolith
  medium.com/@ryannedolan/aws-lambda-and-the-monolith-a0eb2d1516ef
- From Monolith to Microservices — Part 1: AWS Lambda and API Gateway
  articles.microservices.com/from-monolith-to-microservices-part-1-aws-lambda-and-api-gateway-8ce5cf3f0d99

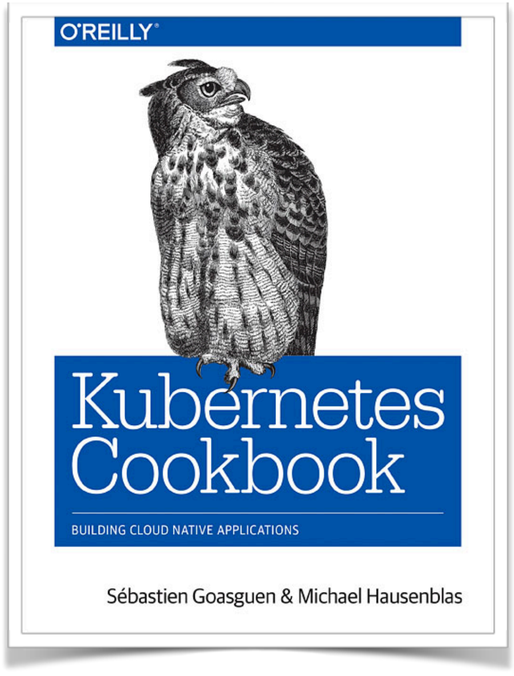


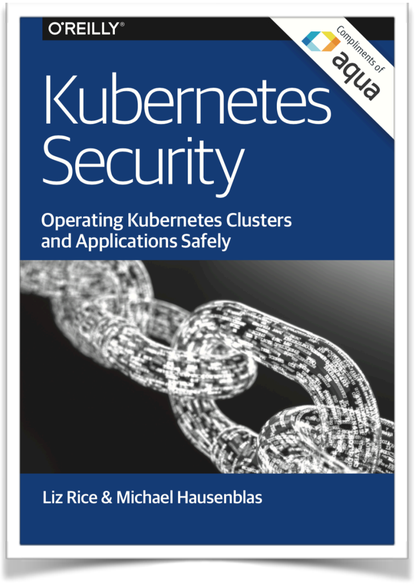


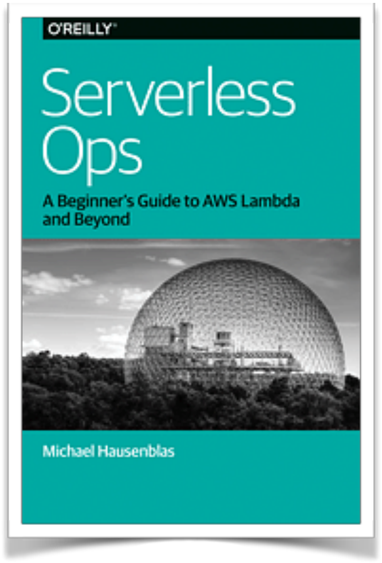












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