SERVERLESS AND CONTAINERS: A MATCH MADE IN THE CLOUD

Donna Malayeri

Product Manager, Pulumi

@PulumiCorp

@lindydonna

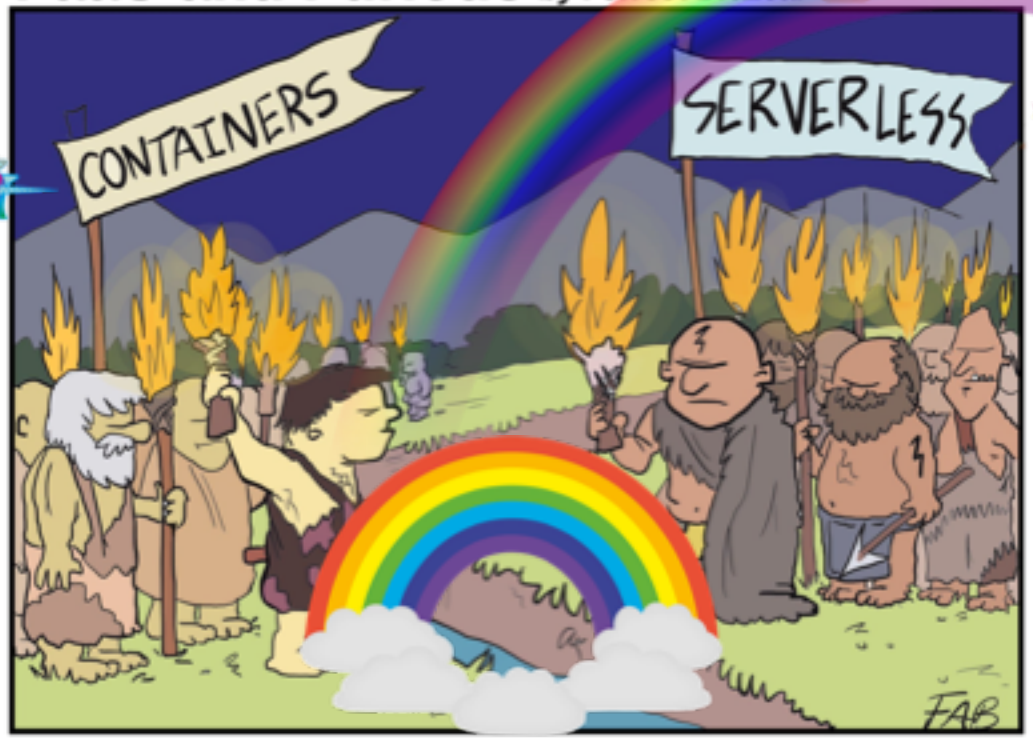
pulumi

SERVERLESS AND CONTAINERS

- Containers give you full control over your compute workloads
- Serverless scales instantly and is cheaper to own and operate
- Modern applications need both compute models
- Consider tools that make it easy to combine them

FaaS and Furious by Forrest Brazeal

A CLOUD GURU

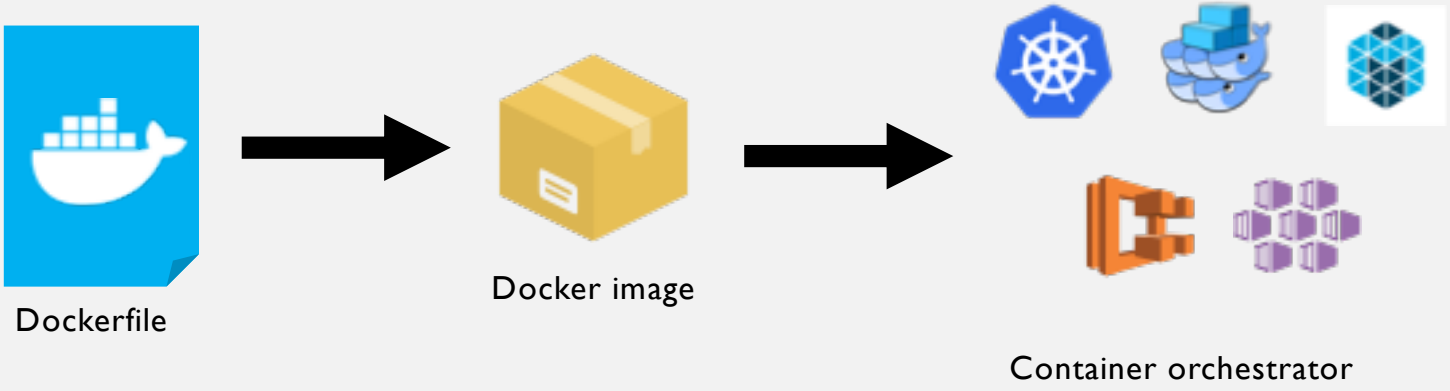


The two tribes regarded each other suspiciously
in the glow of their brightly blazing production environments.

IN THE EARLY DAYS OF CLOUD, THERE WERE ONLY VIRTUAL MACHINES

- How often should I *patch* my server?
  - How *do* I patch?
- How do I deploy *code*?
- How *many* servers do I need?
- How can I *scale* my app?

CONTAINERS REDUCE COMPLEXITY



CONTAINERS

Dockerfile

docker build

Docker image

Container registry

```
FROM jrottenberg/ffmpeg

RUN apt-get update && \
    apt-get install python-dev python-pip -y && \
    apt-get clean

RUN pip install awscli

WORKDIR /tmp/workdir

ENTRYPOINT
```

Task definition

Service description

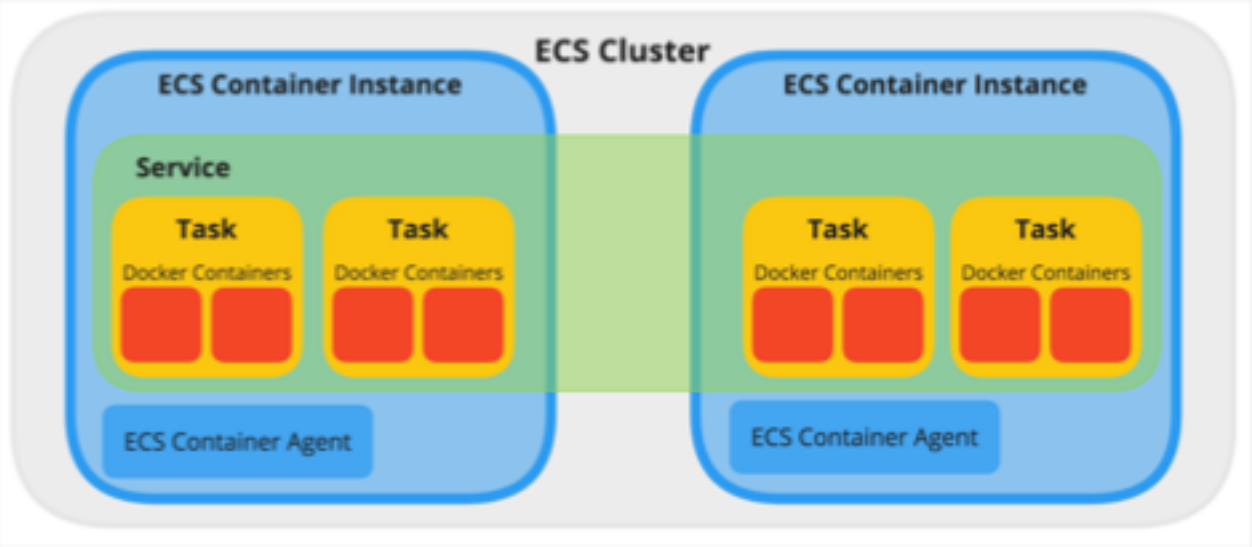
AWS Elastic Container Service

CONTAINER BENEFITS

- Abstraction for compute: containers instead of VMs
- Useful package format
- Full control over application environment
- Full control over task placement
- Control over compute resources

CONTAINERS AT RUNTIME

ECS Service Description



Graphic: https://medium.freecodecamp.org/amazon-ecs-terms-and-architecture-807d8c4960fd

CONTAINERS: THINGS TO MANAGE

- How often should I *update* my Dockerfile dependencies?
- How do I *build* my container images?
- How do I get my containers in *production*?
- How *many* servers do I need?
- How can I *scale* my app?

SERVERLESS

- Event-driven compute with near-instant scale
- Managed, ephemeral compute
- Never pay for idle

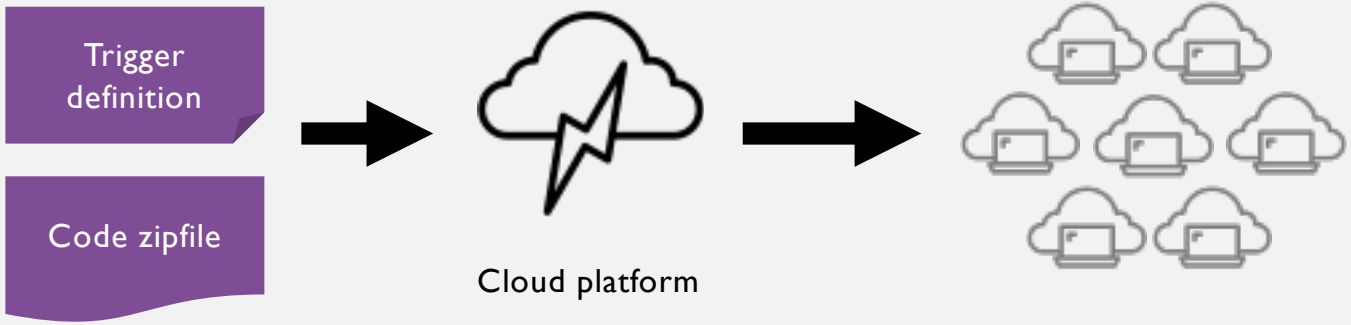
(Btw, there are actually servers)

AWS Lambda

Azure Functions

Google Cloud Functions

SERVERLESS: JUST PROVIDE YOUR CODE



Cloud icons: https://www.flaticon.com/authors/payungkead

WHY SERVERLESS?

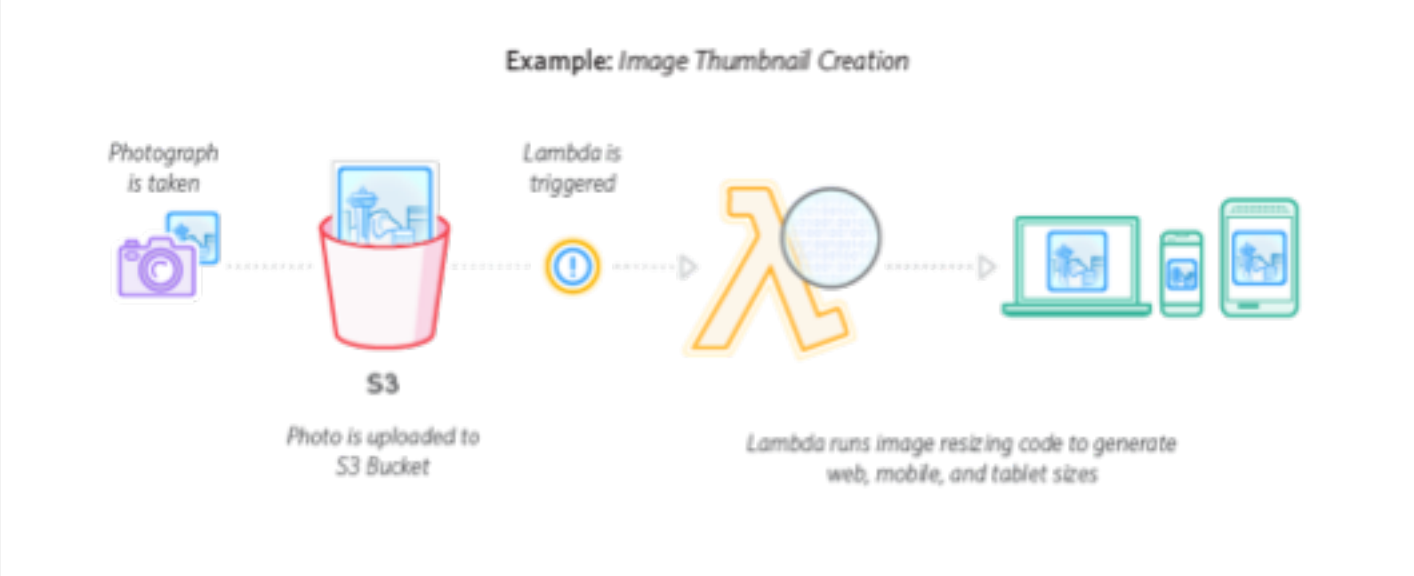
- Reduce operational overhead
- Faster time to market
- Focus on business value

The Serverless Spectrum https://read.acloud.guru/the-serverless-spectrum-147b02cb2292

SCHEDULED TASKS

https://functions.azure.com

CREATE IMAGE THUMBNAIL



https://aws.amazon.com/lambda/

SERVERLESS CAVEATS

- Works best for event-based workloads
- Cloud vendor supports specific languages and runtimes
- Can’t customize execution environment
- Not well-suited for long-running tasks

ANALOGY: RENTING VS OWNING A BIKE

NEW CONTAINER EXECUTION MODELS

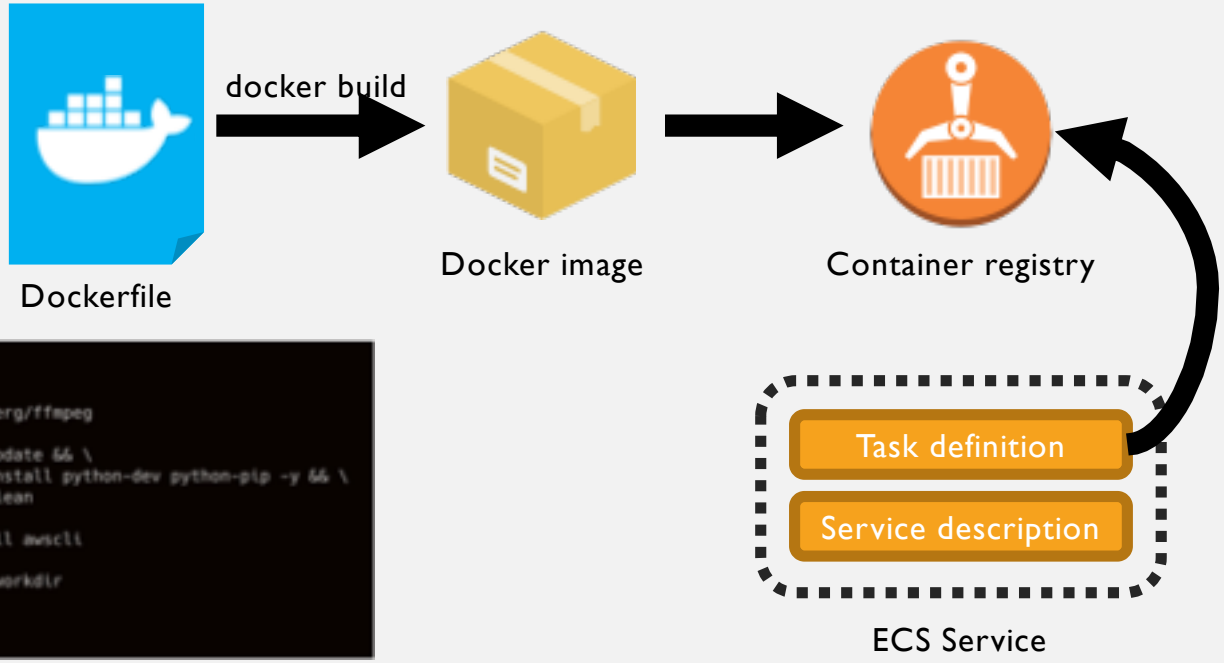
- Azure Container Instances
- AWS Fargate

- On-demand containers
- Don’t have to manage underlying cluster

TOOLING CAN BRIDGE THE GAP

- Serverless is still new
- Most tools handle only serverless scenarios
- Emerging trend: tools for *both* serverless and containers

CONTAINERS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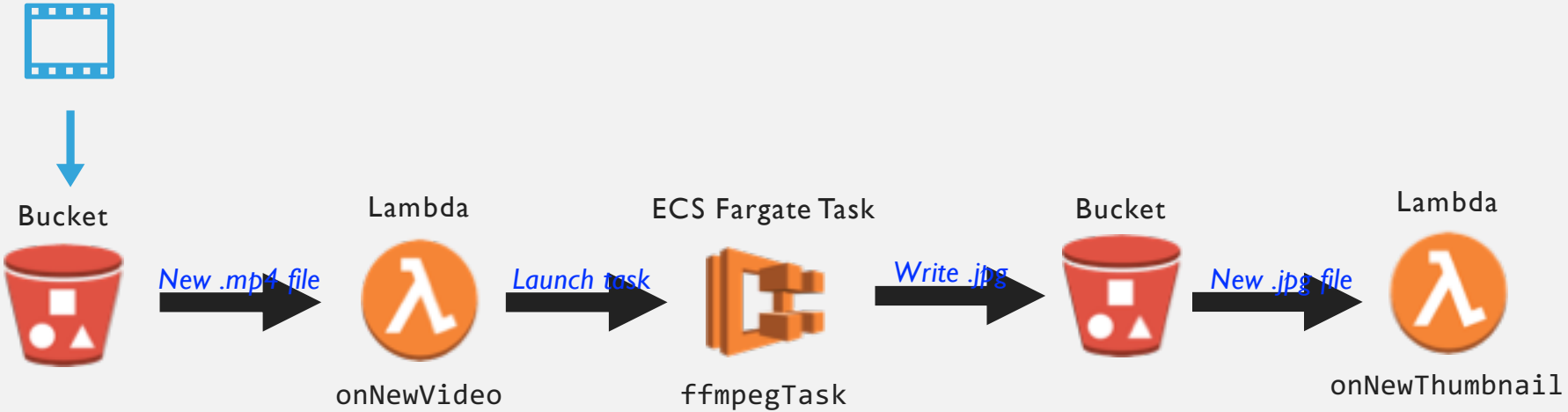
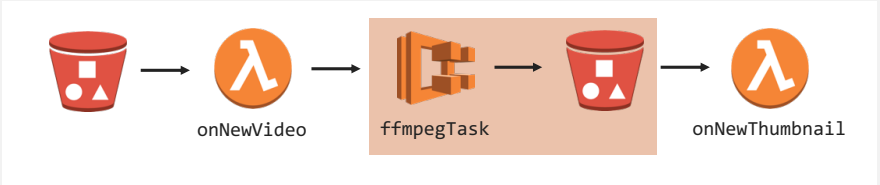
EXAMPLE: VIDEO THUMBNAILER



DEFINING THE APP IN PULUMI



Dockerfile

```
FROM jrottenberg/ffmpeg

RUN apt-get update && \
    apt-get install python-dev python-pip -y && \
    apt-get clean

RUN pip install awscli

WORKDIR /tmp/workdir

ENTRYPOINT \
  aws s3 cp s3://${S3_BUCKET}/${INPUT_VIDEO} ./${INPUT_VIDEO} && \
  ffmpeg -i ./${INPUT_VIDEO} -ss ${TIME_OFFSET} -vframes 1 -f image2 -an -y ${OUTPUT_FILE} && \
  aws s3 cp ./${OUTPUT_FILE} s3://${S3_BUCKET}/${OUTPUT_FILE}
```

```
let bucket = new cloud.Bucket("bucket");

let ffmpegTask = new cloud.Task("ffmpegTask", {
  build: "./docker-folder",
  memoryReservation: 512,
});

bucket.onPut("onNewVideo", async (bucketArgs) => {
  const file = bucketArgs.key;
  const framePos = ... // extract timestamp from filename

  await ffmpegTask.run({
    environment: {
      "S3_BUCKET": bucket.id.get(),
      "INPUT_VIDEO": file,
      "TIME_OFFSET": framePos,
      "OUTPUT_FILE": file + '.jpg',
    },
  });
}, { keySuffix: ".mp4" });

bucket.onPut("onNewThumbnail", async (bucketArgs) => {
  console.log(`*** New thumbnail: file ${bucketArgs.key}.`);
}, { keySuffix: ".jpg" });
```

CONTAINERS WITH PULUMI

- How often should I *update* my Dockerfile dependencies?
- ~~How do I *build* my container images?~~
- ~~How do I get my containers in *production*?~~
- How *many* servers do I need?
- How can I *scale* my app?

SERVERLESS WITH PULUMI

- Easily reference other cloud resources
- Define serverless functions inline

ONE TOOL TO RULE THEM ALL

- Define infrastructure using code
- Pulumi turns this into a declarative plan
- Serverless functions and containers are easy to define
- Just one toolchain to learn

SUMMARY

- Serverless and containers each have their place
- Use serverless for event-based code that needs to scale on demand
- Use containers for durable workloads, or to customize environment
- Use tools that make it easy to manage both

Learn more at **`pulumi.io`**

`github.com/pulumi`

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