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Video Streaming

# Scaling up the Prime Video audio/video monitoring service and reducing costs by 90%

The move from a distributed microservices architecture to a monolith application helped achieve higher scale, resilience, and reduce costs.

https://www.primevideotech.com/video-streaming/scaling-up-the-prime-video-audio-video-monitoring-service-and-reducing-costs-by-90

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Convert video streams to frames/decrypt audio

Monitoring the quality of every video stream

Analyse frames or audio buffers for defects

Send real-time notifications

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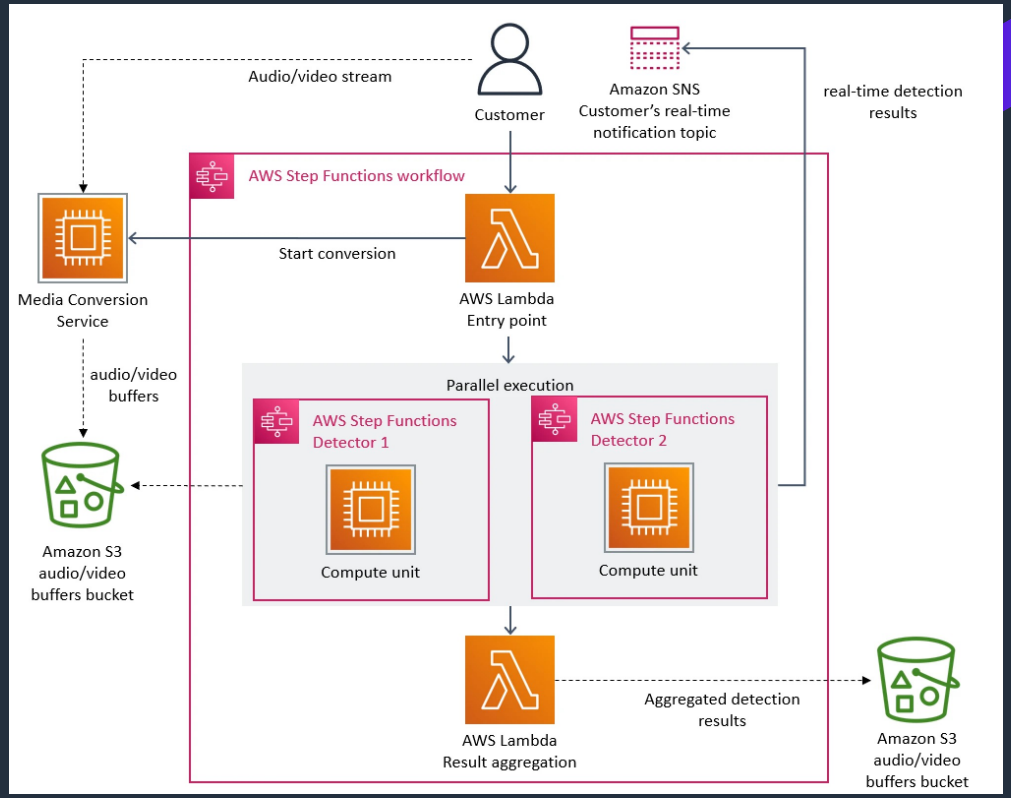


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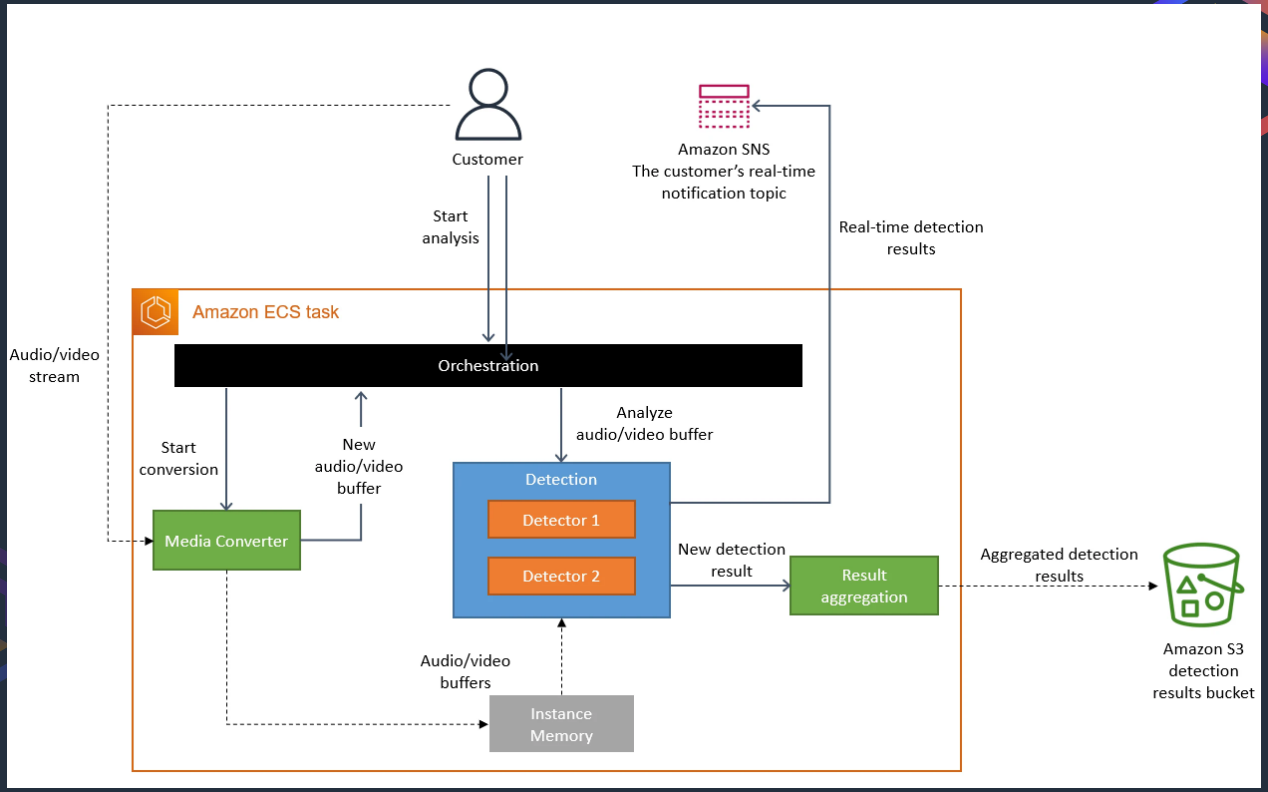


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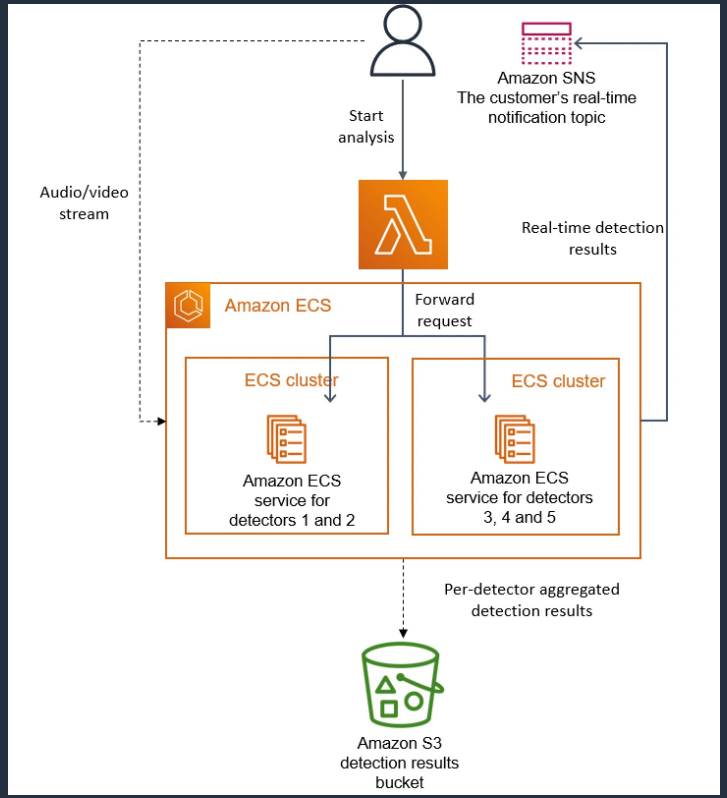


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# So many bad takes - what is there to learn from the Prime Video microservices to monolith story

| Containers | Serverless |
| --- | --- |
| Custom code and services | Serverless events and functions |
| Lots of choices of frameworks and API mechanisms | Standardized choices |
| Where needed, optimize serverless applications by also building services using containers to solve for<br>• Lower startup latency<br>• Long running compute jobs<br>• Predictable high traffic | Combine these building blocks<br>λ AWS Lambda<br>API Gateway<br>Amazon SNS, SQS<br>Amazon DynamoDB<br>AWS Step Functions |

https://adrianco.medium.com/so-many-bad-takes-what-is-there-to-learn-from-the-prime-video-microservices-to-monolith-story-4bd0970423d4

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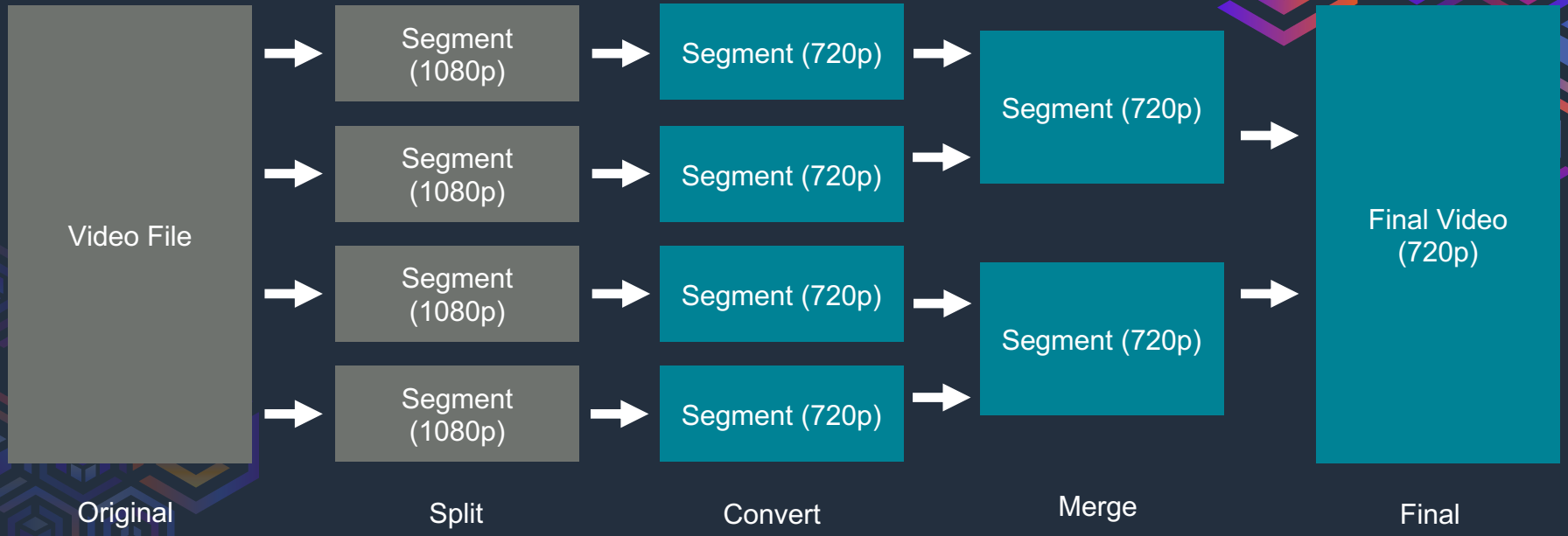
# Divide and conquer




Read more: https://bit.ly/3wJOdvQ

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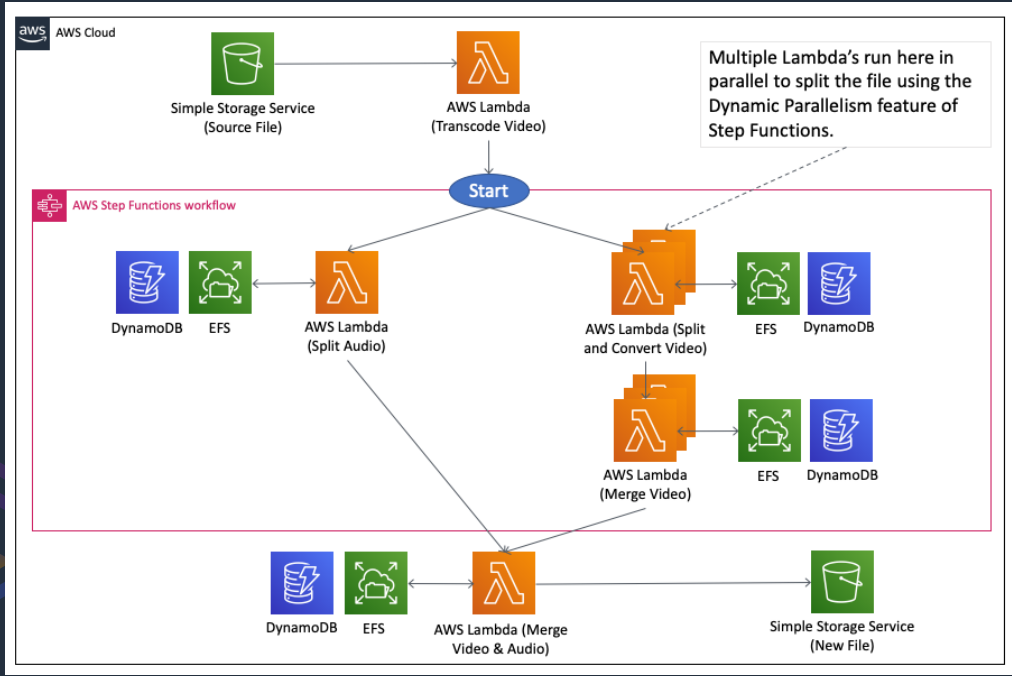
# Parallel Computing with Lambda & Step Functions

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## Serverless Video Transcoder

| | Serverless Lambda | Traditional EC2 (t2.large) | MacBook Pro 16GB 3.5GHz i7 |
|---|---|---|---|
| 34MB MP4 (00:43, 1920×1080) | 11 seconds | 32 seconds | 18 seconds |
| 77MB MP4 (6:49, 2048×1152) | 26 seconds | 144 seconds | 78 seconds |
| 100MB MP4 (59:56, 1280×720) | 86 seconds | 1073 seconds | 592 seconds |
| 350MB MP4 (07:45, 2560×1440) | 35 seconds | 432 seconds | 224 seconds |
| 420MB MKV (01:02, 3840 x 1606) | 112 seconds | 157 seconds | 101 seconds |
| 1GB MKV (57:57, 1280 x 718) | 185 seconds | 4320 seconds | 2367 seconds |

Read more: https://bit.ly/3wJOdvO

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# Encoding, Fast and Slow:
## Low-Latency Video Processing Using Thousands of Tiny Threads

Sadjad Fouladi[1], Riad S. Wahby[1], Brennan Shacklett[1],
Karthikeyan Vasuki Balasubramaniam[2], William Zeng[1],
Rahul Bhalerao[2], Anirudh Sivaraman[3], George Porter[2], Keith Winstein[1]

[1]*Stanford University,* [2]*UC San Diego,* [3]*MIT*

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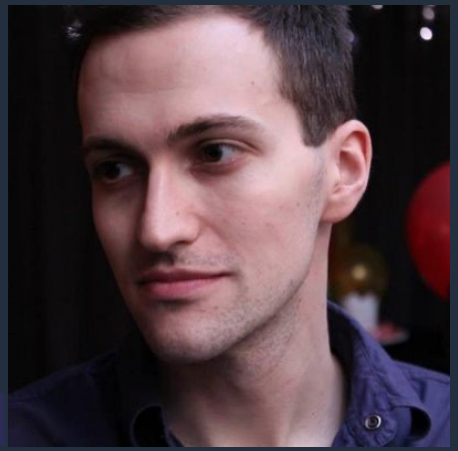
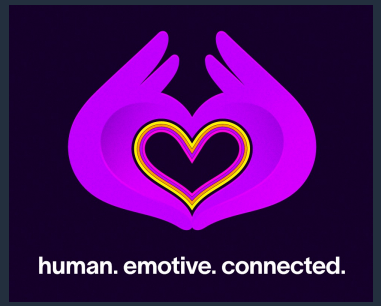



- AWS Serverless Hero
- Author of Serverless Architectures on AWS
- Co-organiser of the Melbourne Serverless Meetup
- Co-organiser ServerlessDays ANZ
- Former VP Education & Research at A Cloud Guru
- Former head of Serverlessconf
- Co-founder of heart hands



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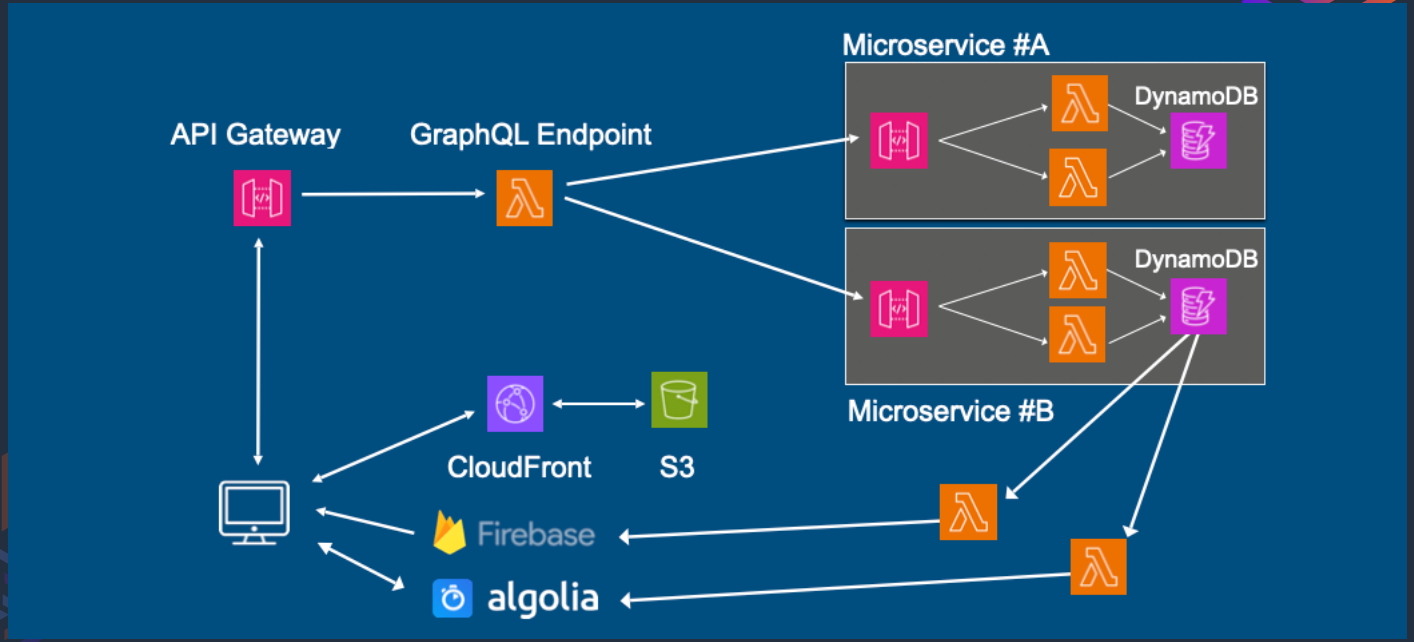
Teams of developers working in parallel



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And the costs weren't too bad either (2018)

289 Lambda Functions
19 Microservices
3.68TB of data in S3

107m Lambda Invocations / month
45m API Requests / month
3.8+ TB of data via CloudFront per day

650K+ users

| Service | Cost |
|---|---|
| Key Management Service | $25.26 |
| Simple Storage Service (S3) | $108.23 |
| Config | $109.84 |
| Elastic Transcoder | $154.17 |
| **API Gateway** | **$192.14** |
| Developer Support | $314.59 |
| Redshift | $371.50 |
| DynamoDB | $373.54 |
| **Lambda** | **$706.49** |
| CloudWatch | $3,142.73 |
| CloudFront | $5,099.85 |

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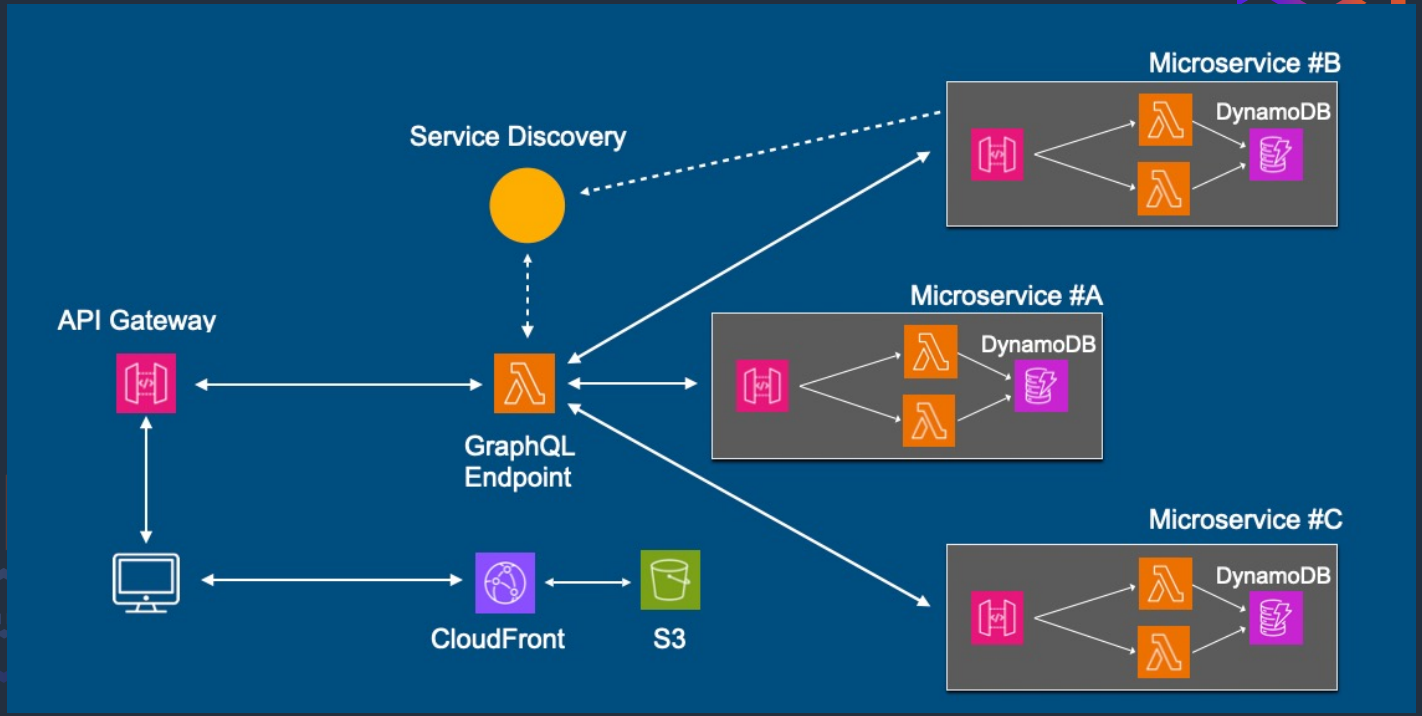
## Gaining team efficiency and speed



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# How we build today: from a scaleup back to a startup

- Serverless first approach makes technical decisions easier
- Leverage as many AWS and third-party services as possible
- Differentiate with a magical user experience
- Make the development experience easy

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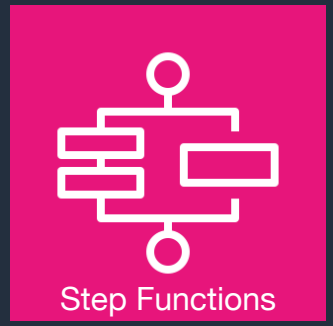
# Core Services





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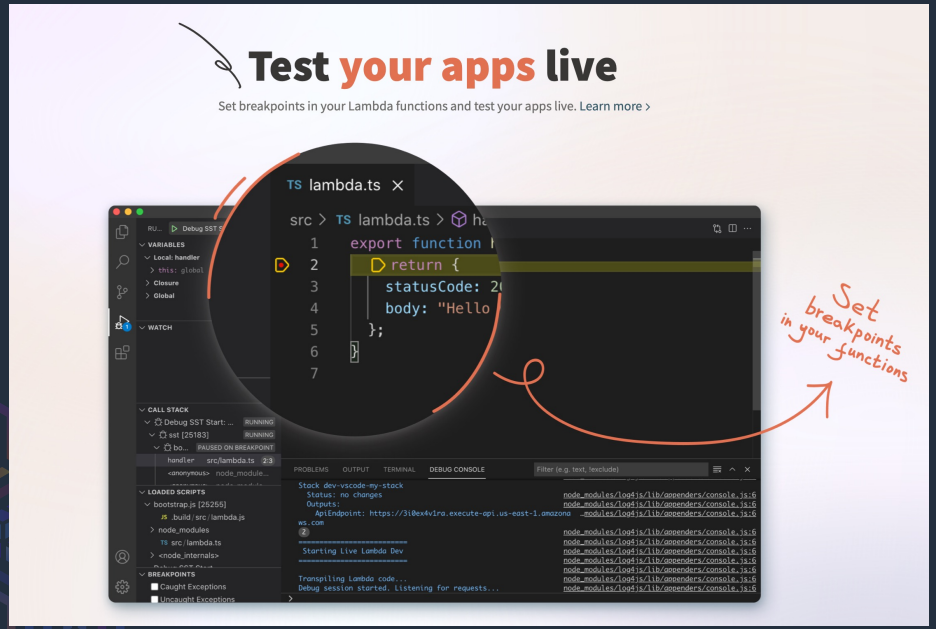
## Serverless Stack (SST)

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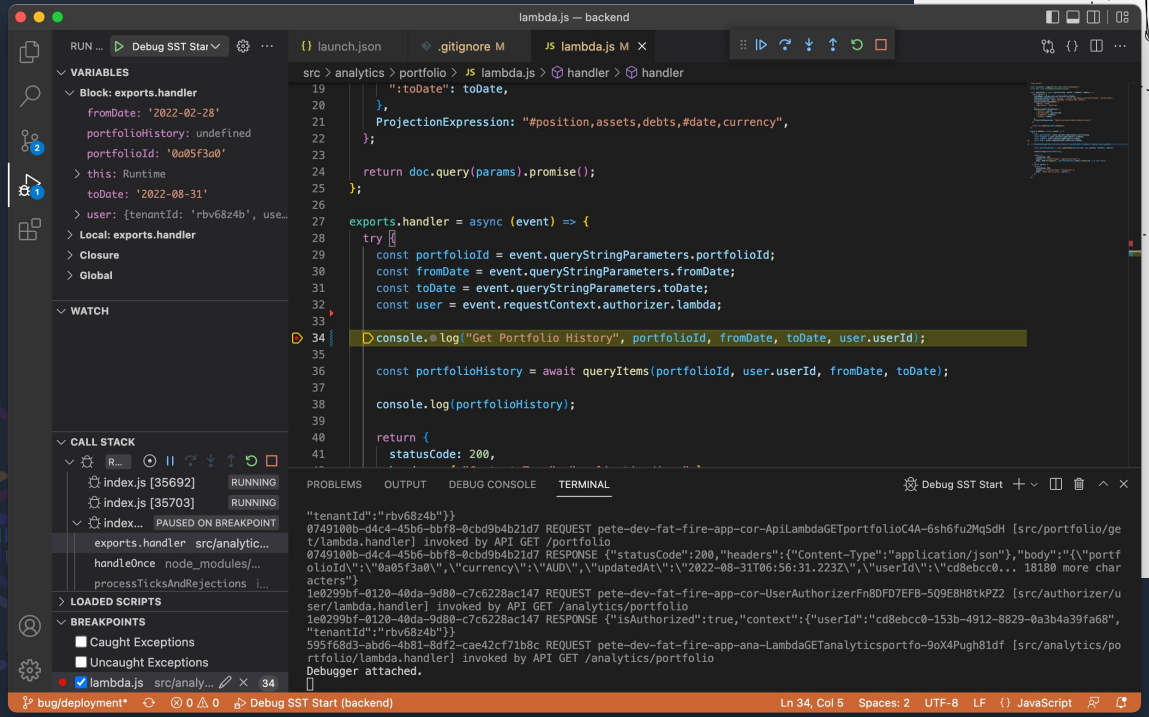
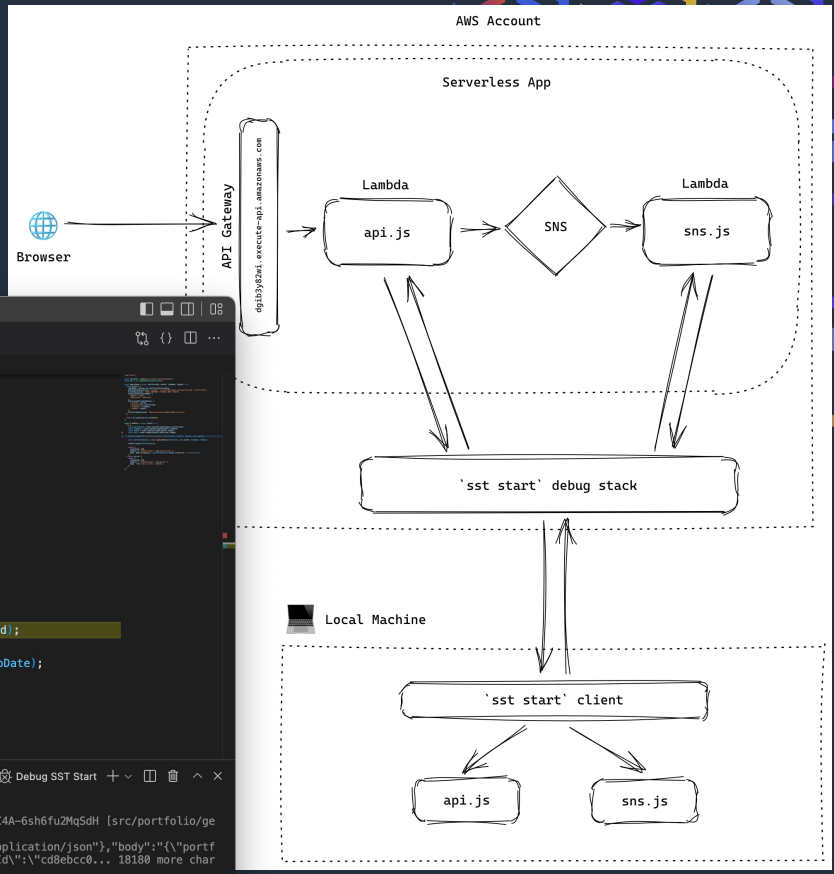
## Serverless Stack (SST)



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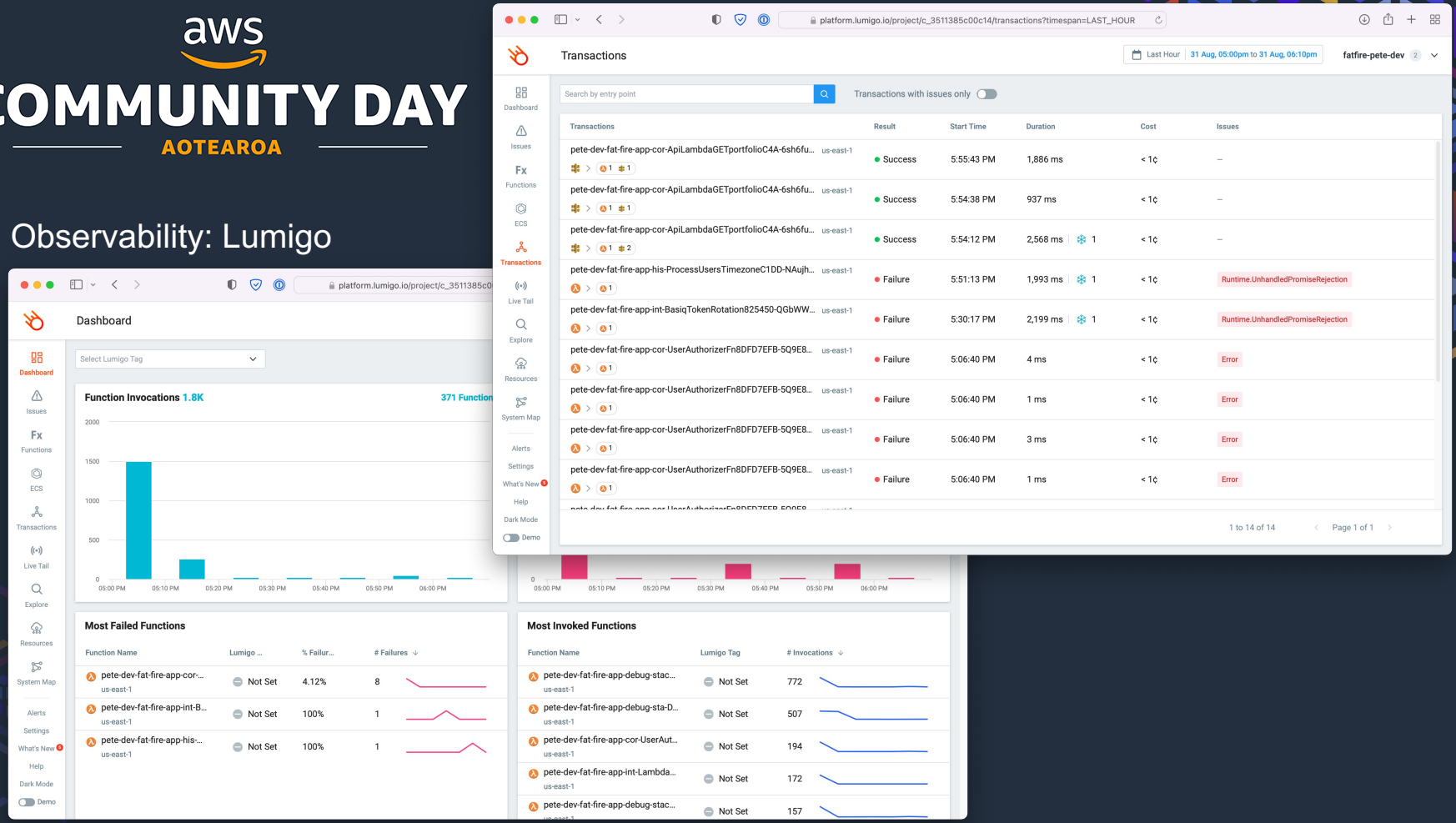
## Observability: Lumigo



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## Microsoft Guidance vs LangChain

```
# we use LLaMA here, but any GPT-style model will do
llama = guidance.llms.Transformers("your_path/llama-7b", device=0)

# we can pre-define valid option sets
valid_weapons = ["sword", "axe", "mace", "spear", "bow", "crossbow"]

# define the prompt
character_maker = guidance("""The following is a character profile for an RPG gam
```json
{
    "id": "{{id}}",
    "description": "{{description}}",
    "name": "{{gen 'name'}}",
    "age": {{gen 'age' pattern='[0-9]+' stop=','}},
    "armor": "{{#select 'armor'}}leather{{or}}chainmail{{or}}plate{{/select}}",
    "weapon": "{{select 'weapon' options=valid_weapons}}",
    "class": "{{gen 'class'}}",
    "mantra": "{{gen 'mantra' temperature=0.7}}",
    "strength": {{gen 'strength' pattern='[0-9]+' stop=','}},
    "items": [{{#geneach 'items' num_iterations=5 join=', '}}"{{gen 'this' temperature=0.7}}"{{/g
}```""")

# generate a character
character_maker(
    id="e1f491f7-7ab8-4dac-8c20-c92b5e7d883d",
    description="A quick and nimble fighter.",
    valid_weapons=valid_weapons, llm=llama
)
```

```
from langchain.prompts import ChatPromptTemplate
from langchain.prompts.chat import SystemMessage, HumanMessagePromptTemplate

template = ChatPromptTemplate.from_messages(
    [
        SystemMessage(
            content=(
                "You are a helpful assistant that re-writes the user's text to "
                "sound more upbeat."
            )
        ),
        HumanMessagePromptTemplate.from_template("{text}"),
    ]
)

from langchain.chat_models import ChatOpenAI

llm = ChatOpenAI()
llm(template.format_messages(text='i dont like eating tasty things.'))
```
```

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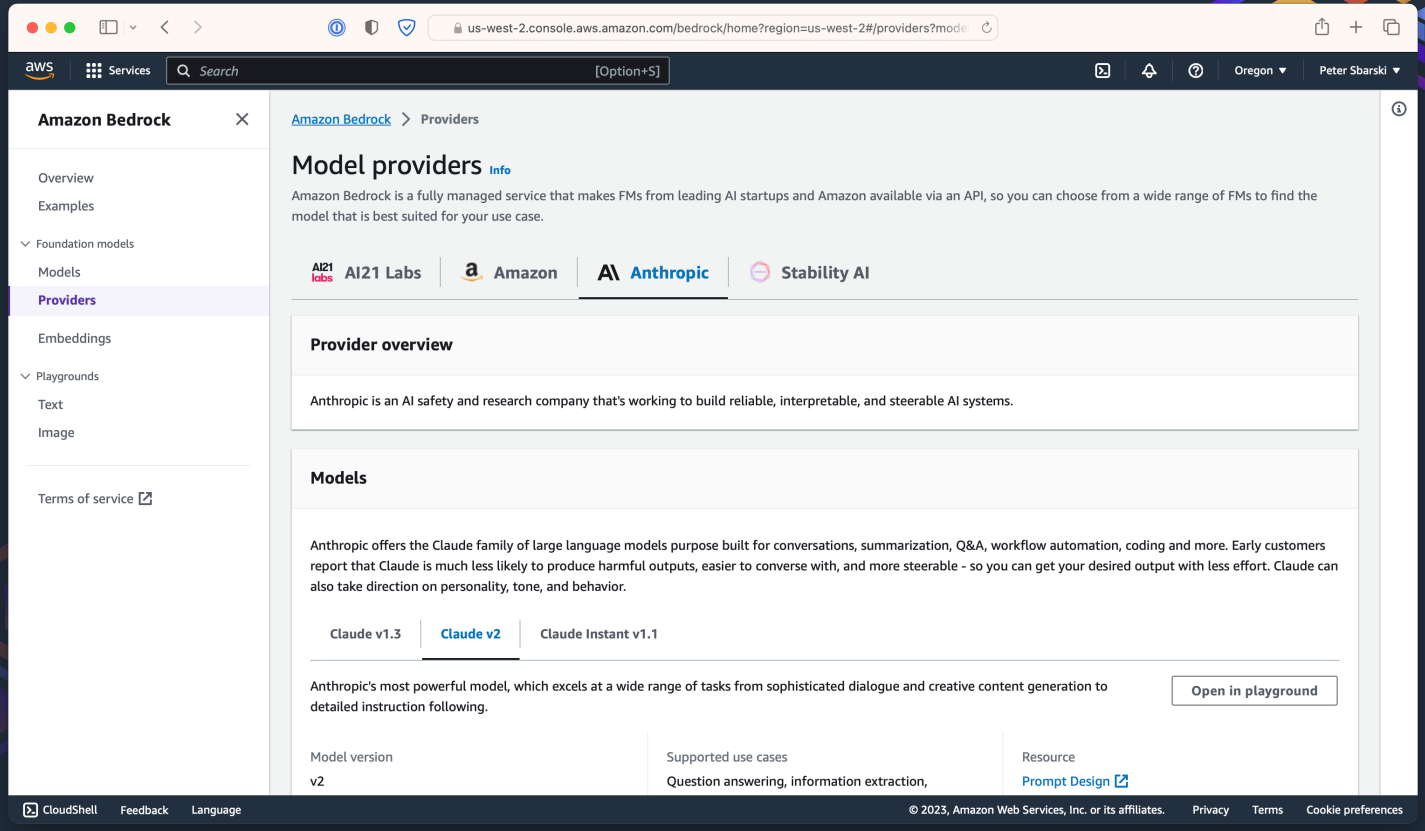

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- Security/compliance first
- Use microservices
- Serverless where possible
- CI/CD
- Monitor, monitor, monitor!
- https://youtu.be/IPOvrK3S3gQ
- Serverless monoliths can be OK!
- Automation is a must
- Think through your testing strategy
- Go Serverless to enable experimentation and evolution
- Have a technical strategy

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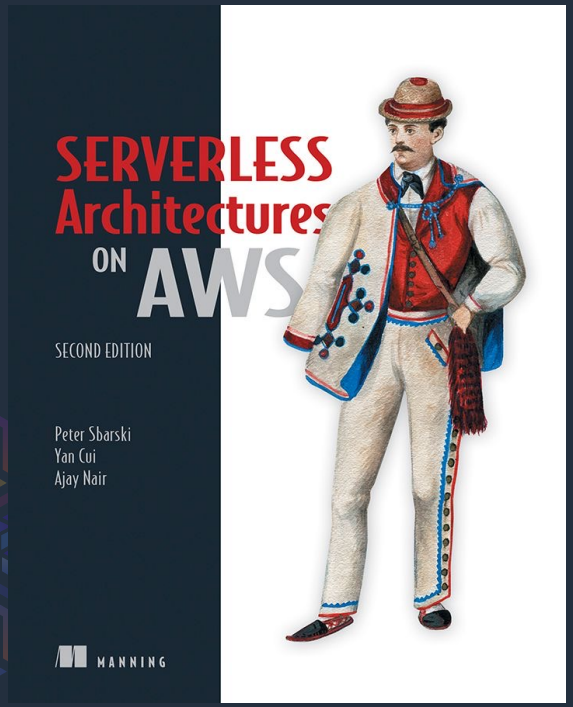
## Thank you!




**Serverless Architectures on AWS:**
https://www.manning.com/books/serverless-architectures-on-aws-second-edition

**The Value Flywheel Effect:**
https://itrevolution.com/product/the-value-flywheel-effect/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