AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

CMP213

Lessons learned from customers who have adopted AWS Graviton

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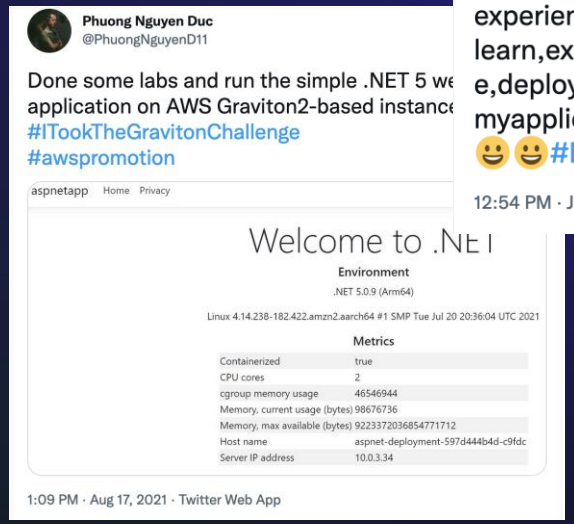
Graviton Challenge

FOUR DAYS TO ACHIEVE UP TO 40% BETTER PRICE PERFORMANCE











Contest Best Adoption Winners:

Best Adoption – Enterprise
VMWare vRealize IT team
48% latency reduction;
22% cost savings ($60K/month)

Best Adoption – Startup
Kasm Technologies
48% better performance;
25% cost savings

Hackathon Winners:

Best New App
PickYourPlace
Geospatial analytics platform for real estate

Best Migrated App
eGenie
Deep learning–based image credibility checker

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aws.amazon.com/ec2/graviton/challenge

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Graviton Challenge contest winners

- **Best Adoption Enterprise:** VMware vRealize SRE team
- **Best Adoption Startup:** Kasm Technologies
- **Most Impactful Adoption:** VMware vRealize SRE team
- **Best New Workload:** Dustin Wilson
- **Most Innovative Adoption:** Loroa

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Kasm Workspaces

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Kasm Workspaces

THE CONTAINER STREAMING PLATFORM

Container orchestration

Auto scaling compute

Cloud and/or on premises

Stream UI containers to an HTML5 canvas, embedded in your apps

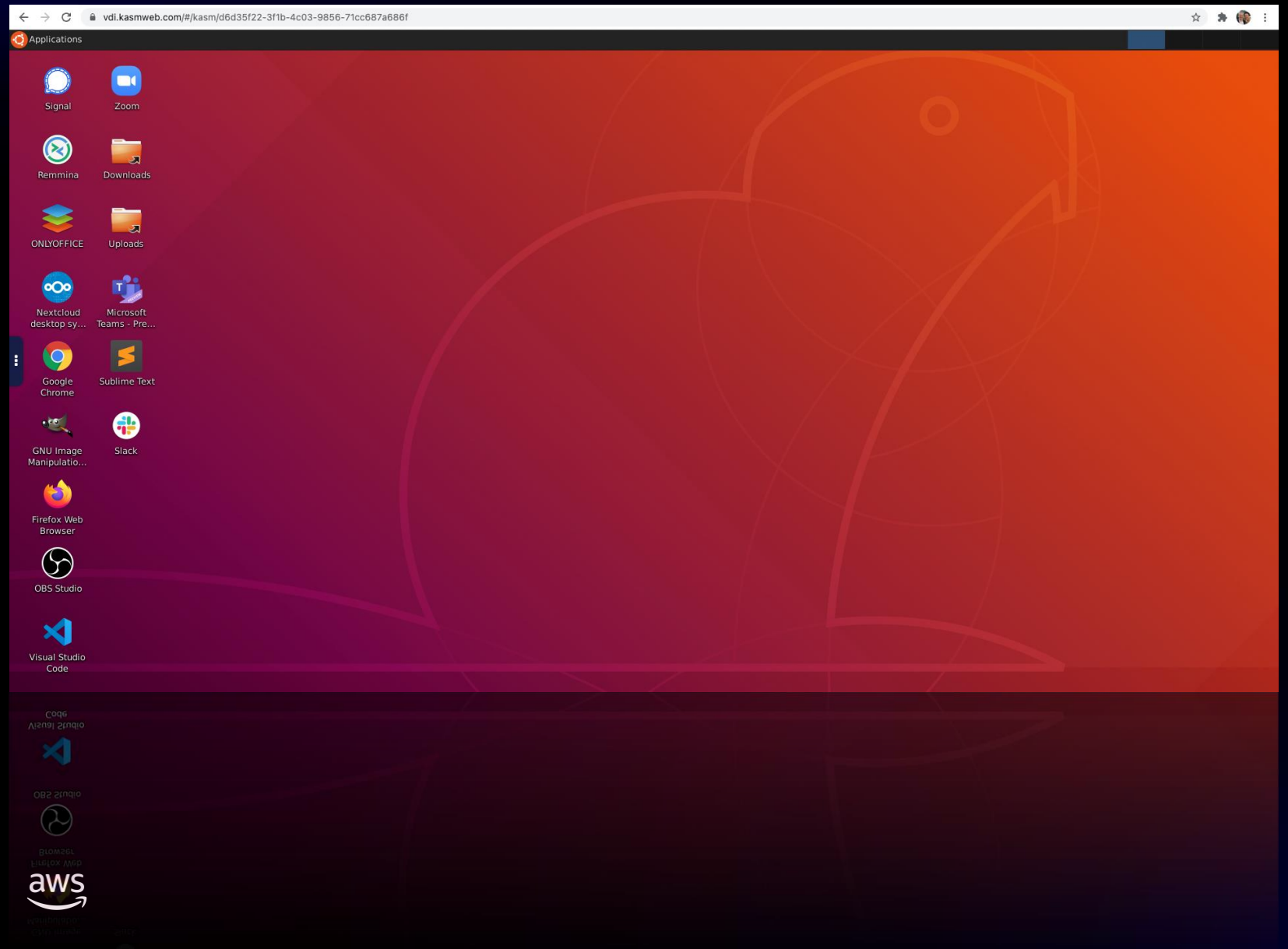
Use Kasm Workspaces directly for

- Desktop as a service
- Browser isolation
- App streaming

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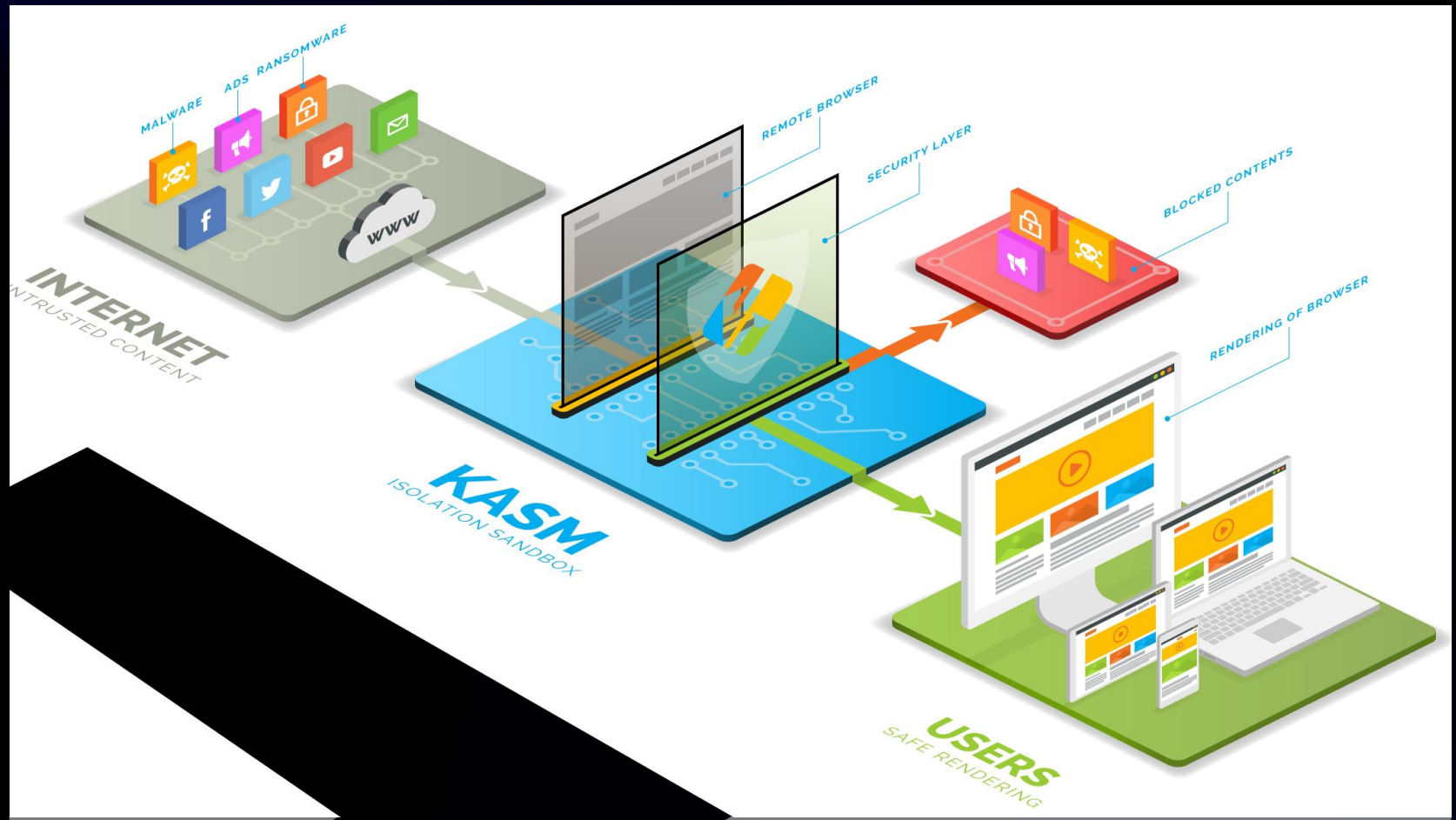
Desktop as a service



- Secure containerized desktops
- Persistent or ephemeral
- Desktops provision instantly
- Embedded data loss prevention
- DevOps approach provides updates without downtime

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Browser isolation



- Containerized Chrome, Edge, Firefox
- Users interact with rendering of internet within their local browser
- Embedded data loss prevention
- Ultimate protection from internet threats and data loss

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Why AWS Graviton?

Running a full desktop in the cloud requires more compute than typical use cases, such as APIs or load balancers

- Runs full desktop or UI applications
- Must render content in real time

All API microservices written in Python

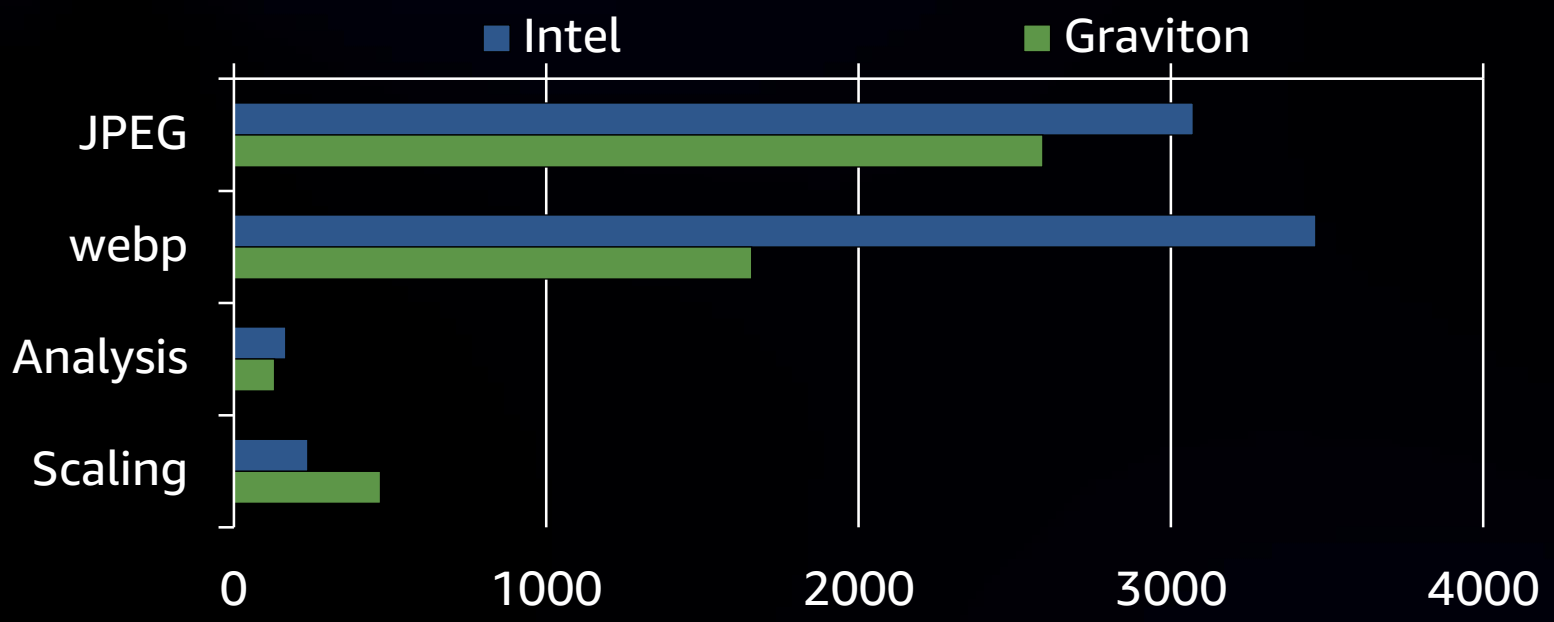
Postgres and Redis already available for Arm

Ubuntu desktop and dependencies available for Arm

KasmVNC likely a low level of effort to adapt

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KasmVNC – Rendering service



KasmVNC - Core rendering service

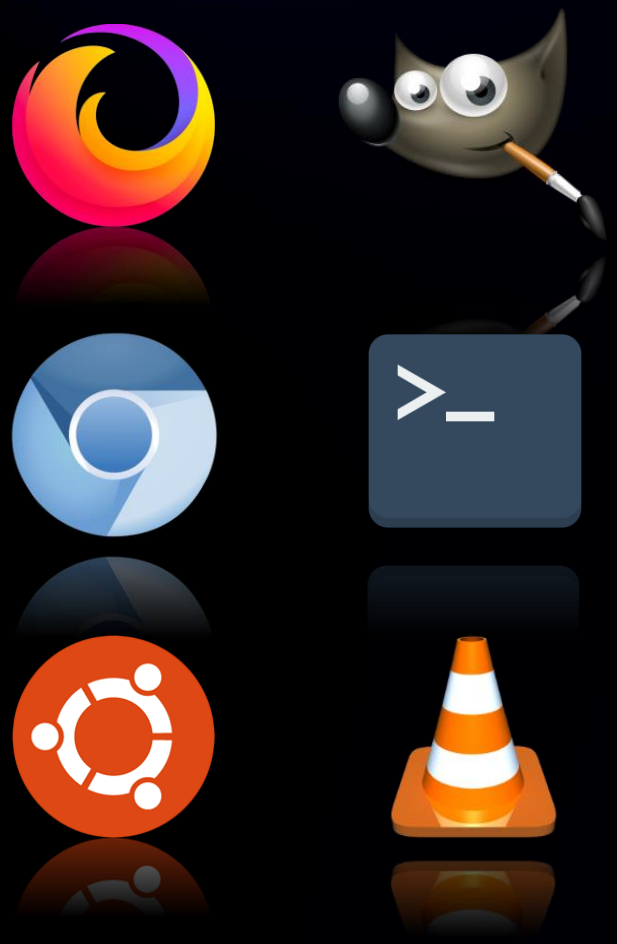
- Updating our builds and CI pipelines for arm64 for all supported OS
- Porting SSE to Neon
- Overall, low level of effort required
- JPEG encoding 15% faster**
- Webp encoding 52% faster**

* Measurement in milliseconds, lower is better
** Random pixel images at lossy compression

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Open source Workspaces images



Kasm Workspaces open-source images had to be updated to support multiple architectures

9 of the 23 Workspaces images were made multi-platform for release of 1.10.0

Firefox
Chromium
Ubuntu Bionic Desktop
Gimp
Terminal
VLC
Visual Studio Code
Remmina
rdesktop

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Other work to support Graviton

KASM WORKSPACES PLATFORM

Client API, manager API, and agent containers –
CI pipeline updates to build multi-architecture builds

Update installation scripts to be architecture aware

Testing and validation for multiple platforms

Documentation

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Environmental impact

KASM WORKSPACES PLATFORM

Our clients are looking to scale into the hundreds of thousands of concurrent users

For each 100,000 concurrent sessions running 24/7, that equates to roughly 402 American households

With AWS Graviton, the Kasm Workspaces Platform will be an environmentally friendly and extremely scalable solution for remote work

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Conclusions

KASM WORKSPACES PLATFORM

Arm vCPUs are physical cores, resulting in clear better performance that does not fluctuate with noisy neighbors

Provides an immediate 20% reduction in costs

Increased performance provides potential to use Kasm platform over subscribing, further increasing cost savings

Clear environmental impact

Low level of effort to add support for Graviton

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VMware on AWS Graviton2

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Background

- VMware vRealize Production Engineering team – Infra, CI/CD, SRE
- Production workload on Amazon EKS mixed node clusters (Arm and x86)
- ~60 microservices written in Java, Rust, Golang
- Cost and performance optimization initiative
- Project team: Tilottama Gaat, Chris Todd, Abhishek Attri, Akasit Sriprathum, Junyi Shi

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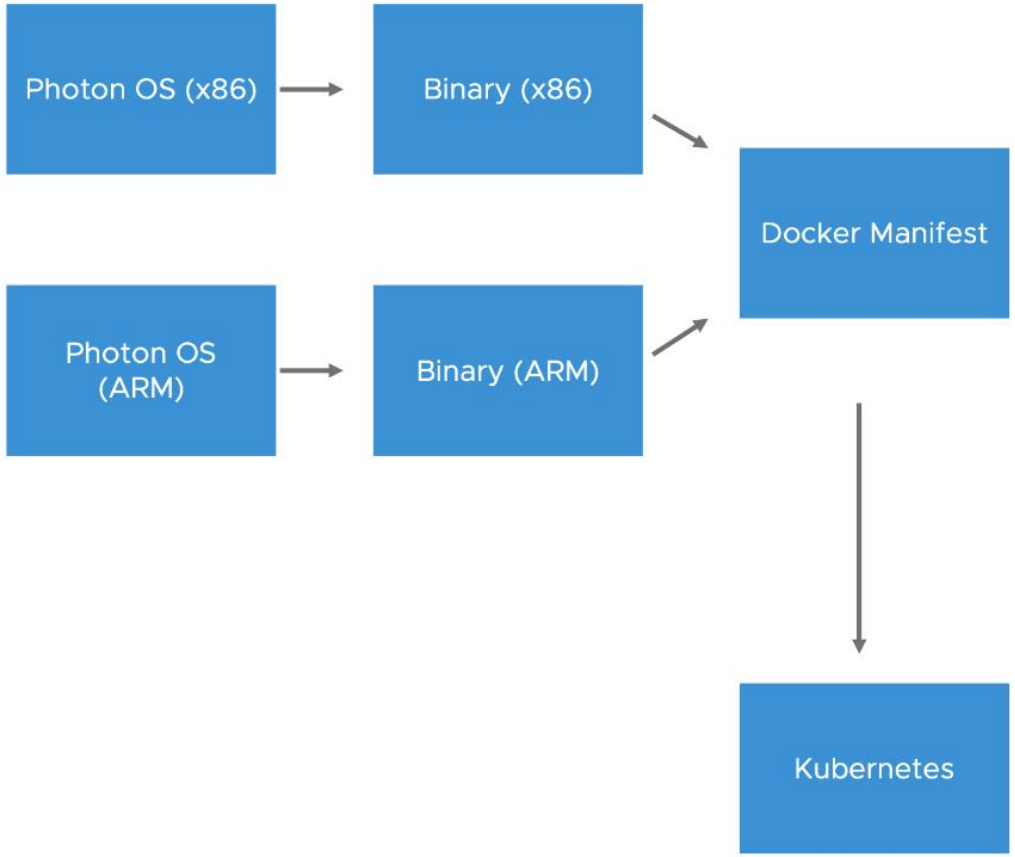
Multi-architecture container images

```
ARG ARCH=amd64

FROM photon:4.0@sha256:e46f431d
    AS base-amd64

FROM photon:4.0@sha256:31160726
    AS base-arm64v8

# cross platform
FROM base-${ARCH}
```



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Current Kubernetes workload on Graviton

- Data ingress gateway
  - High data volume
  - Written in Java
  - Produces and consumes data through Kafka

- VMware Ddlog (https://research.vmware.com/projects/differential-datalog-ddlog)
  - Open-source tool for deductive databases
  - Written in Rust

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Current Kubernetes workload on Graviton

- Kubernetes Daemonsets
  - Kube2iam
- Monitoring
  - Telegraf daemonset
  - Fluentd daemonset (Ruby)
  - Kubecost (https://www.kubecost.com)
  - Wavefront proxy
    - Open source (https://github.com/wavefrontHQ/wavefront-proxy)

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Data ingress gateway performance

Scale Performance Test

vRLIC processing 232 MB/s

	X86	ARM
Batch Latency (99%)	117.08	59.792
Total CPU Cores Used	10.867	8.813



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Challenges

- Docker Buildx and Manifest both experimental
  - Buildx has a bug with artifactory
  - Manifest used for docker image build

- Production outage caused due to c6gn nodes
  - C6gn are network-optimized nodes; we saw suddenly bandwidth drop
  - AWS suggested c6g nodes
  - AWS proactively collaborated with VMware to prioritize fix
  - Fix has been rolled out in VMware account by AWS

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Challenges

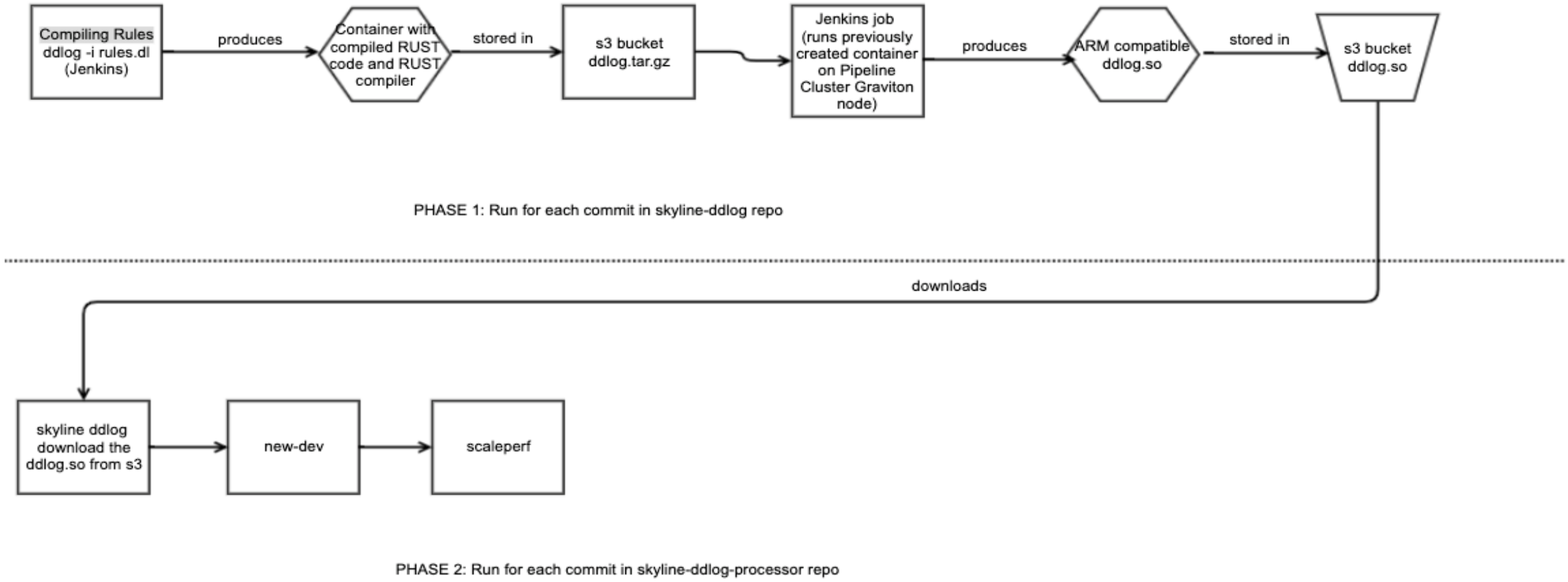
- Rust-based compilation is platform-dependent
  - ARM QEMU – very slow
  - Kubernetes on Graviton node – effective

- Several issues blocking Kafka/ZooKeeper
  - Native library without Arm binaries
  - Not well-documented for Arm support version
  - Issue with liveness probe API

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Rust compiling diagram on AWS



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Summary

- Kubernetes pods on Graviton: **>100**
- Kubernetes Graviton nodes: **>50**
- Languages
  - **Java**
  - **Golang**
  - **Rust**
  - **Ruby**
- Time taken to migrate one microservice to Graviton: **~4 weeks average**
- Total cost savings per month: **~20%–22%**

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Thank you!

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