AWS re:Invent

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CMP333

Build native Apple silicon apps with EC2 M1 Mac instances, featuring Goldman Sachs

Manish Rathaur (he/him/his)
Principal Product Manager, EC2
AWS

Rohan Deshpande (he/him/his)
Managing Director, Mobile and Open Source
Goldman Sachs

Anand Biligiri (he/him/his)
Architect, Mobile Platform
Goldman Sachs

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Agenda

- Why macOS on Amazon EC2 and AWS?
- Why our customers and partners are choosing Amazon EC2 Mac and macOS?
- Mobile CI/CD at Goldman Sachs with EC2 macOS
- **New! Apple silicon comes to AWS with Amazon EC2 M1 Mac instances**
  - Hardware specifications
  - Platform
  - macOS
  - Pricing
- Conclusion and Q&A

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Why macOS on Amazon EC2?

28+ million **developers**

Over 1 million **apps**

Over 1 billion active **devices**



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EC2 Mac customers and partners

Customers

The Pokémon Company INTERNATIONAL

intuit

RIOT GAMES

FLIPBOARD

Goldman Sachs

twitch

EastSide Games

MPL

DeNA

PAPAYA GAMING

INCOGNIA™

NBCUniversal

ring

Star Stable

circleci

JAMCITY

applitools

Partners

teradici

CIS Center for Internet Security®

Buildkite

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What our customers and partners are saying

- *"… builds are 18.4% faster and 80.5% more reliable"* – **Pinterest**
- *"...build times have reduced from 20 minutes to 5 minutes. UI automation tests that used to take 3 hours now take less than 1 hour…"* - **Flipboard**
- *"…we are able run up to 3x more parallel build jobs…"* - **MPL Gaming**
- *"…speed improvements enabled us to reduce our macOS fleet size by 50%"* – **Twitch**
- *"…we can more easily build out the top requested features including expanded storage, customized images, and more."* – **CircleCI**
- *"…doubled the number of concurrent players and increased our player base by 39 percent."* – **Star Stable**

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Mobile CI/CD at Goldman Sachs with EC2 macOS

Rohan Deshpande and Anand Biligiri

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Engineering at Goldman Sachs

Goldman Sachs

"At Goldman Sachs, our Engineers don't just make things – we make things possible. Build innovations that drive our business and financial markets worldwide. Solve the most challenging and pressing engineering problems for our clients. Join our engineering teams that build massively scalable software and systems, architect low latency infrastructure solutions, proactively guard against cyber threats, and leverage machine learning alongside financial engineering to continuously turn data into action. Create new businesses, transform finance, and explore a world of opportunity at the speed of markets."

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Goldman Sachs Engineering



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Mobile at Goldman Sachs



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Mobile platform

- One-stop central shop for mobile experiences at the firm
- Focus on the developer experience
  - Full mobile software lifecycle automation
  - Reusable software libraries and UI components
  - Mobile focused services and backends
  - Workforce training and community building

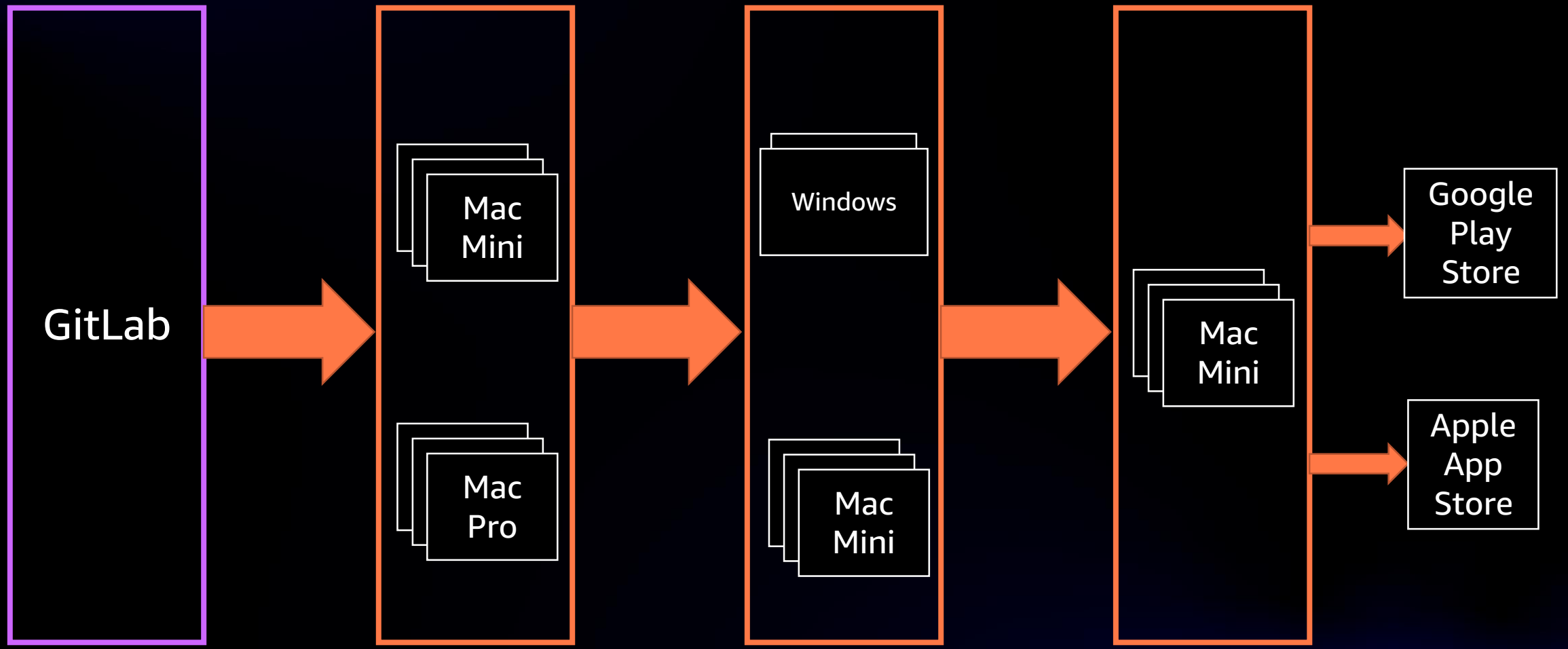
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Our journey

- How we built mobile apps
- Goals for a replacement
- Solution
- Impact
- Next steps

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How we built mobile apps...



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Goals



Reproducible

Build toolchain

Configuration

Connectivity



Contained

Builds in a “sandbox”

No state left behind



Scalable & Performant

On-demand

Faster hardware

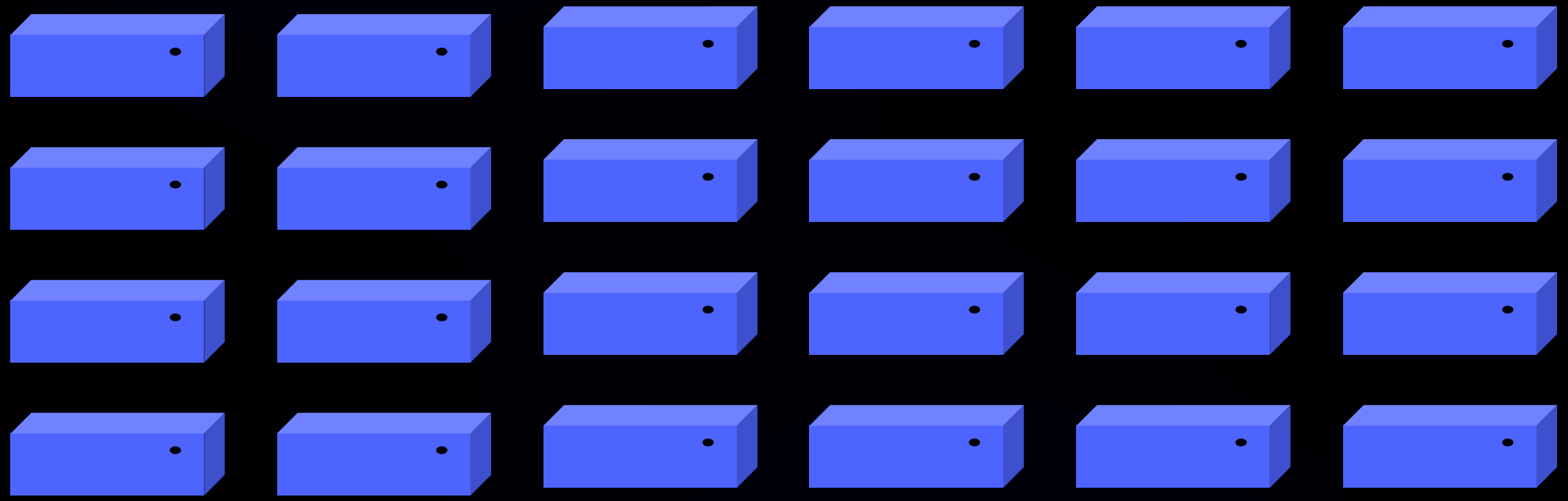
Capacity

Build, test, and deliver Android and iOS applications

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But we need macOS!



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EC2 macOS

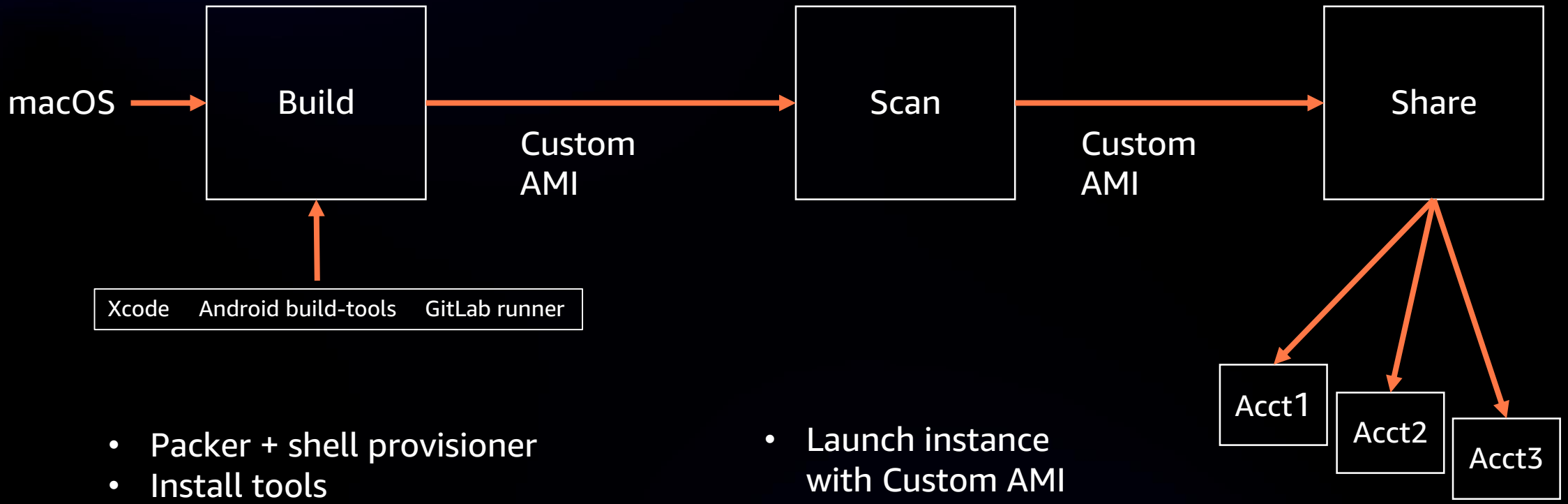
- macOS introduced late 2020
- On-demand provisioning: from weeks to minutes
- Fully remote operation
- Integrates with other AWS services

and more…

- Amazon Machine Images (AMI) for reproducibility
- Automated deployment via IaC
- Amazon Virtual Private Cloud (Amazon VPC), Security Groups for security and isolation
- Amazon VPC Endpoints to securely connect GitLab and other services
- AWS Secrets Manager for managing code signing keys

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macOS image pipeline

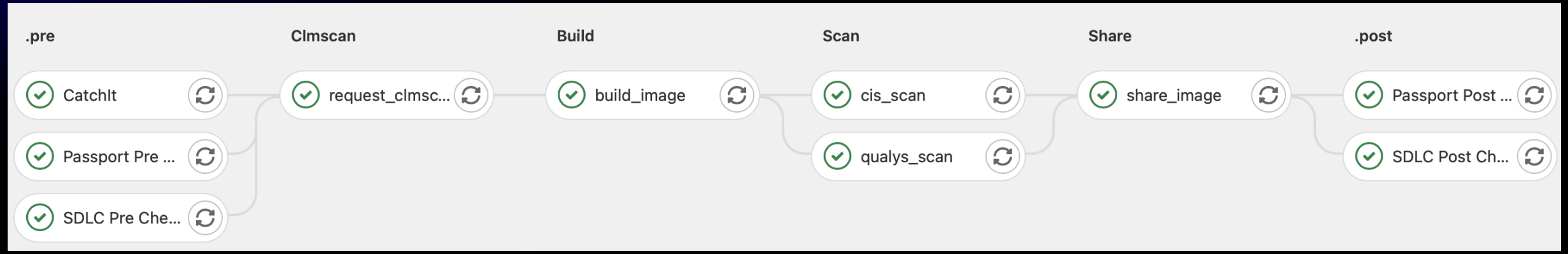


- Packer + shell provisioner
- Install tools
- Create user accounts
- Setup Autologin
- Skip first login setup

- Launch instance with Custom AMI
- CIS scan
- Other scans

Share image with accounts

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```
56 packer: output will be in this color.
57 ==> packer: Prevalidating any provided VPC information
58 ==> packer: Prevalidating AMI Name: dx-mobile-platform-mobile-platform-testbed-test-ami-2021_9_21-13_54_0
59     packer: Found Image ID: ami-098c730dfbe1aab81
60 ==> packer: Creating temporary keypair: packer_6149e3f9-f1bd-0c37-8472-0f9895516987
61 ==> packer: Launching a source AWS instance...
62 ==> packer: Adding tags to source instance
63     packer: Adding tag: "Name": "Image pipeline template -  dx-mobile-platform-mobile-platform-testbed-test-ami-2021_9_21-1
   3_54_0"
64     packer: Instance ID: i-001c199f6526e8ff3
65 ==> packer: Waiting for instance (i-001c199f6526e8ff3) to become ready...
66 ==> packer: Using ssh communicator to connect: 10.8.27.130
67 ==> packer: Waiting for SSH to become available...
68 ==> packer: Connected to SSH!
69 ==> packer: Uploading ../scripts/kcpassword => /tmp/
70 ==> packer: Uploading ../config/com.apple.SetupAssistant.plist => /tmp/
71 ==> packer: Uploading ../binaries/gitlab-runner-darwin-amd64-13.11.0 => /tmp/
72 ==> packer: Provisioning with shell script: ../scripts/resize_disk.sh
```

build_image

Retry

Duration: 73 minutes 53 seconds

Timeout: 1d (from project)

Tags: sky-image-build

Job artifacts

These artifacts are the latest. They will not be deleted (even if expired) until newer artifacts are available.

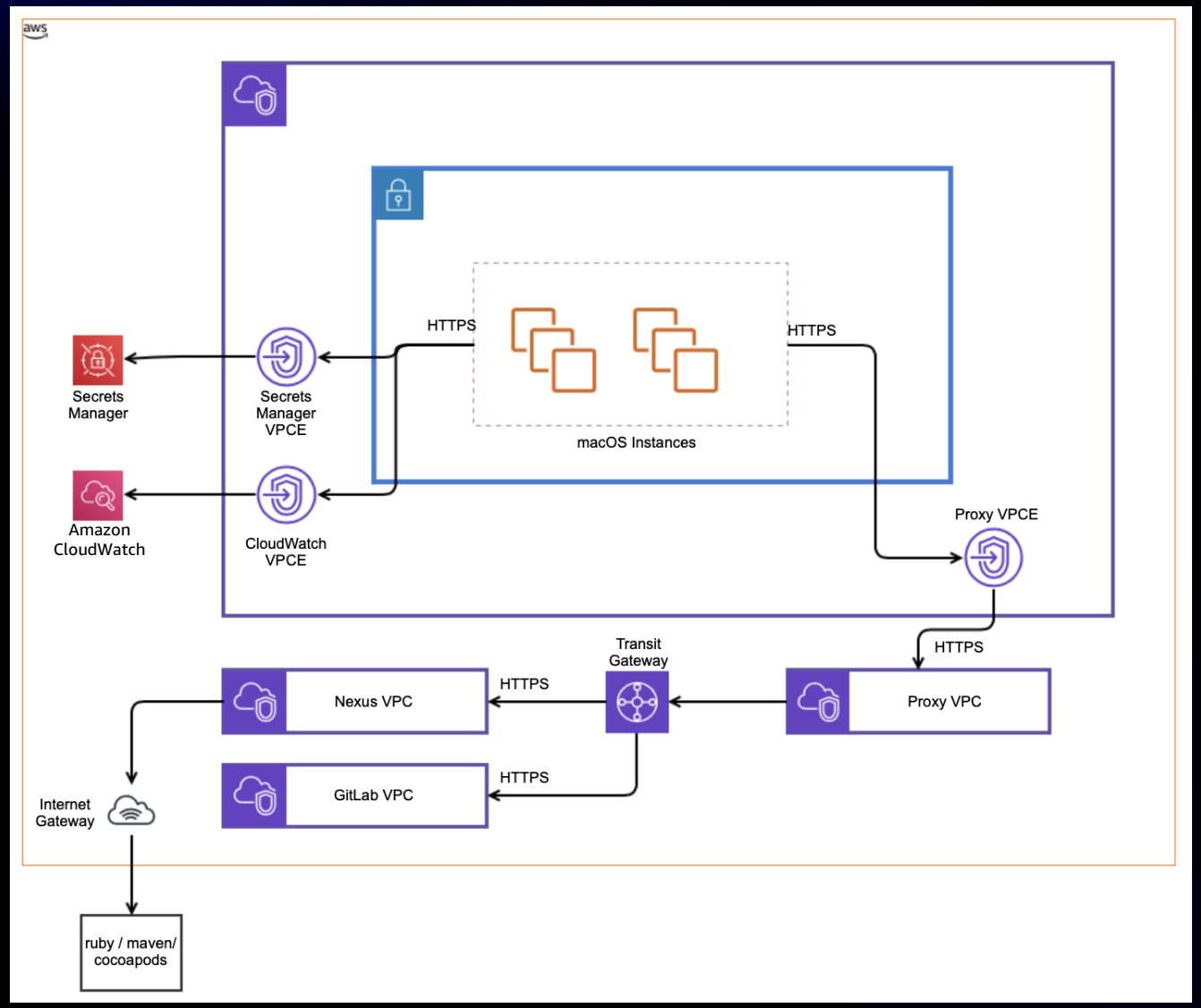
Keep | Download | Browse

Commit 7a9d94f2

added ec2-macos-init.log to cloudwatch

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macOS runners



Defined and deployed using Terraform

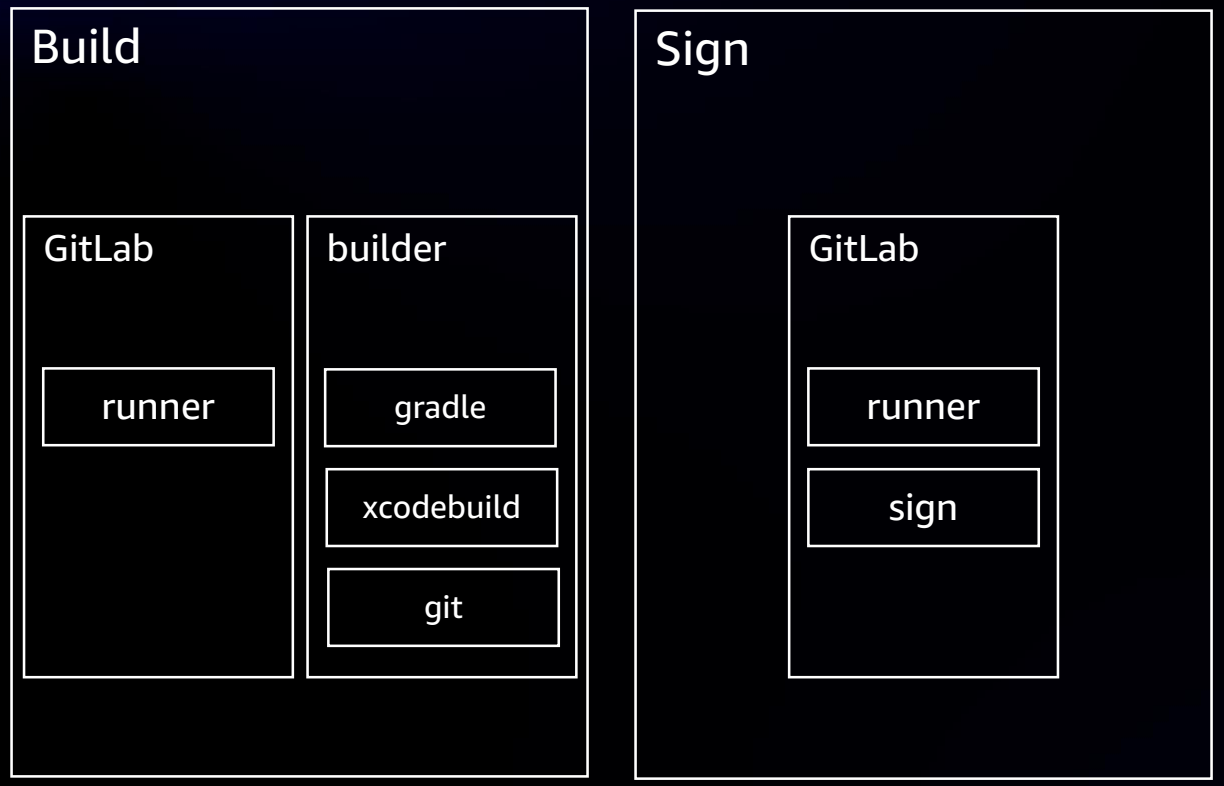
Integrates into the network infrastructure setup for other OS runners

Dependencies are proxied through Sonatype Nexus which enforces license and vulnerability scans

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Build sandboxing



gitlab-runner configured to run as ‘gitlab’ user

Custom executor

- Build
  - Execute build steps as builder (via sudo)
  - Sanitize home directory and processes
- Sign
  - Do not execute scripts
  - Custom script signs artifacts within the same pipeline
  - Distribution signing keys are available only to signer hosts

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Impact



Build duration reduction



Pre-commit builds and previews



Increased stability



Automation

On-demand provisioning: from weeks to minutes

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Next steps

- Adopt AWS Auto Scaling for EC2 Mac instances
- Support beta versions of Xcode and Android build-tools
- Adopt new macOS AMIs within 10 business days
- Adopt new versions of Xcode/Android build-tools within 5 business days
- Evaluate EC2 M1 Mac instances

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New! Amazon EC2 M1 Mac instances



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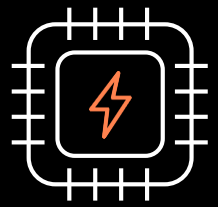
Instance specifications



Apple Silicon on AWS

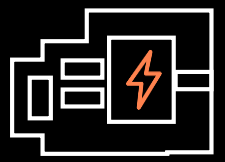
Apple M1 Mac mini

Built with AWS Nitro System



Nitro Security Chip

Hardware Root-of-Trust



Nitro Card

Network I/O and monitoring

8

4 performance cores
4 efficiency cores

16 GiB

memory

10 Gbps

network throughput

8 Gbps

Amazon EBS bandwidth

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Platform specifications

- Available as EC2 bare metal instances
- General Purpose Instance Family – Mac2
- Instance type – mac2.metal
- Up to 10 EBS volumes
  - General Purpose and Provisioned IOPS SSD recommended
- Up to 8 ENIs
- Support Dedicated Host tenancy with minimum allocation duration of 24 hours
- Internal SSD on M1 Mac mini not managed or supported

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Apple macOS support

- macOS Big Sur (11) and macOS Monterey (12) available as Amazon Machine Images (AMIs)
- Includes packages such as AWS CLI v2 and AWS Systems Manager
- SSH for command line access and VNC for GUI
- Install your own packages (https://github.com/aws/homebrew-aws)
- Customize macOS initialization with EC2 macOS Init (https://github.com/aws/ec2-macos-init)
- New macOS AMIs released at regular cadence

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Pricing

- No separate charge for macOS AMIs
- License included
- Per-second billing
- Mac2 Dedicated Hosts available on-demand with minimum of 24 hours
- Spot and Host Reservations not supported
- 1-year and 3-year Savings Plans available; up to 44% savings over on-demand

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Thank you!

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