AWS re:Invent

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

BOA303-R2

Build end-to-end CI/CD pipelines for your iOS apps

Sébastien Stormacq (him)
Principal Developer Advocate
AWS

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Continuous integration

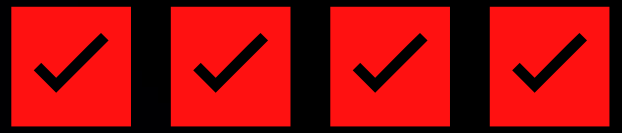


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iOS

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Continuous integration



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CI/CD challenges for iOS

Provision the hardware

Automate the build process

Have a macOS machine part of the workflow

Integrate with AWS services

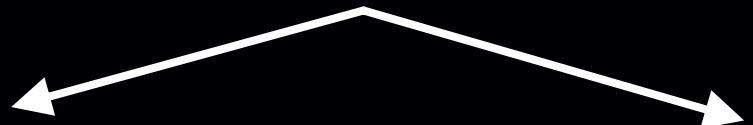
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Typical solution #1: Xcode Server

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Install and configure







Build

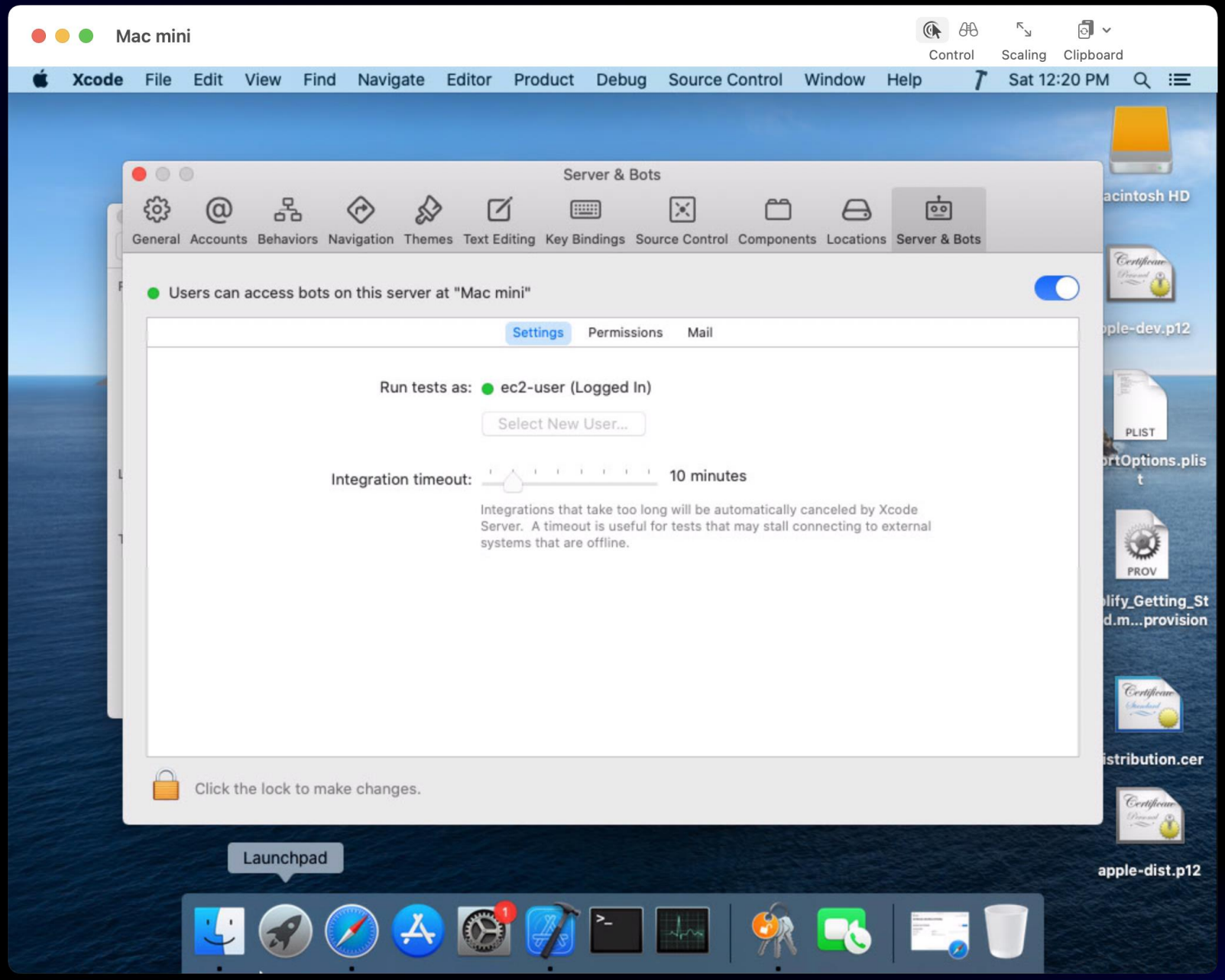


Xcode build bot

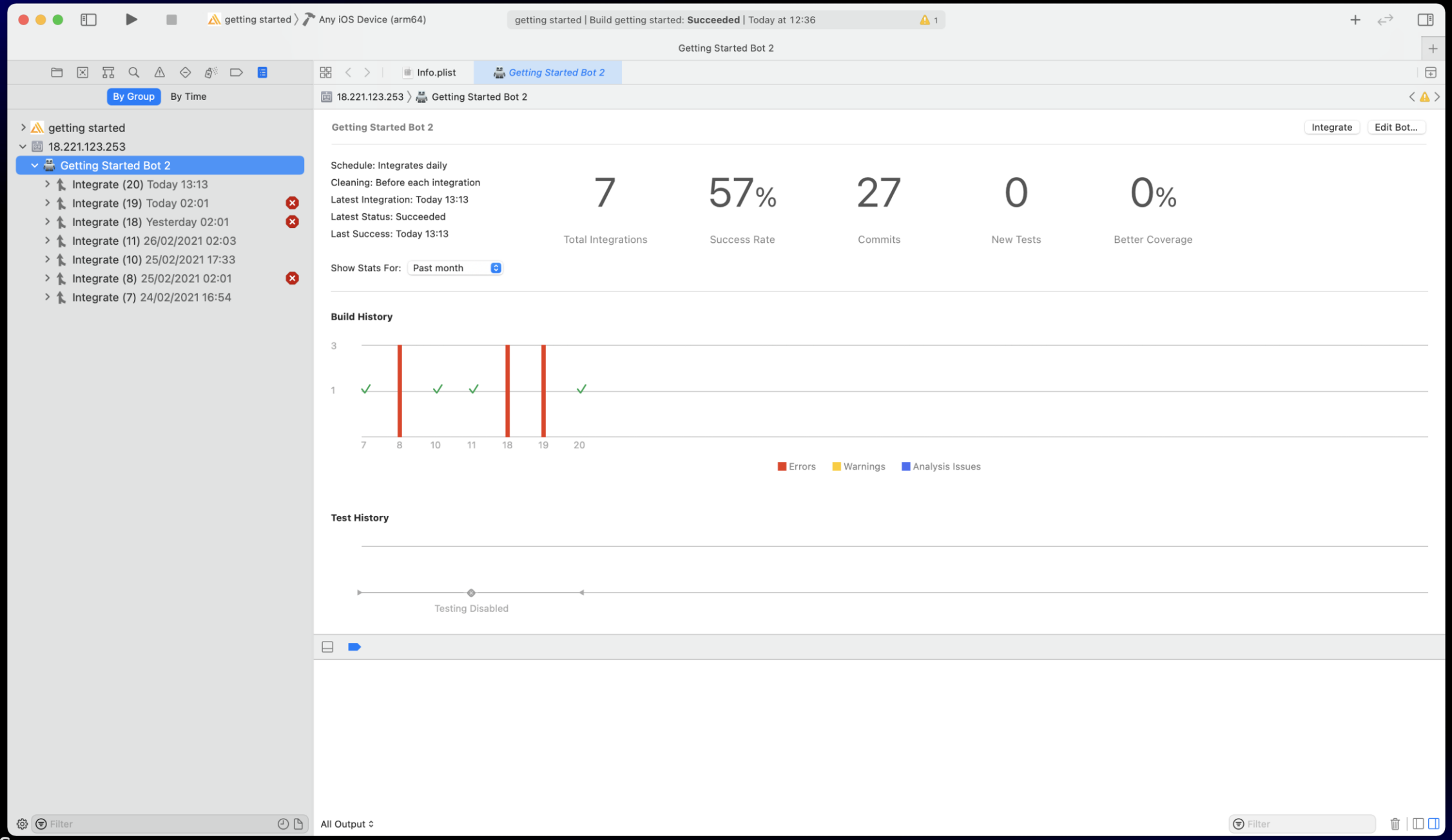
Xcode Server

aws

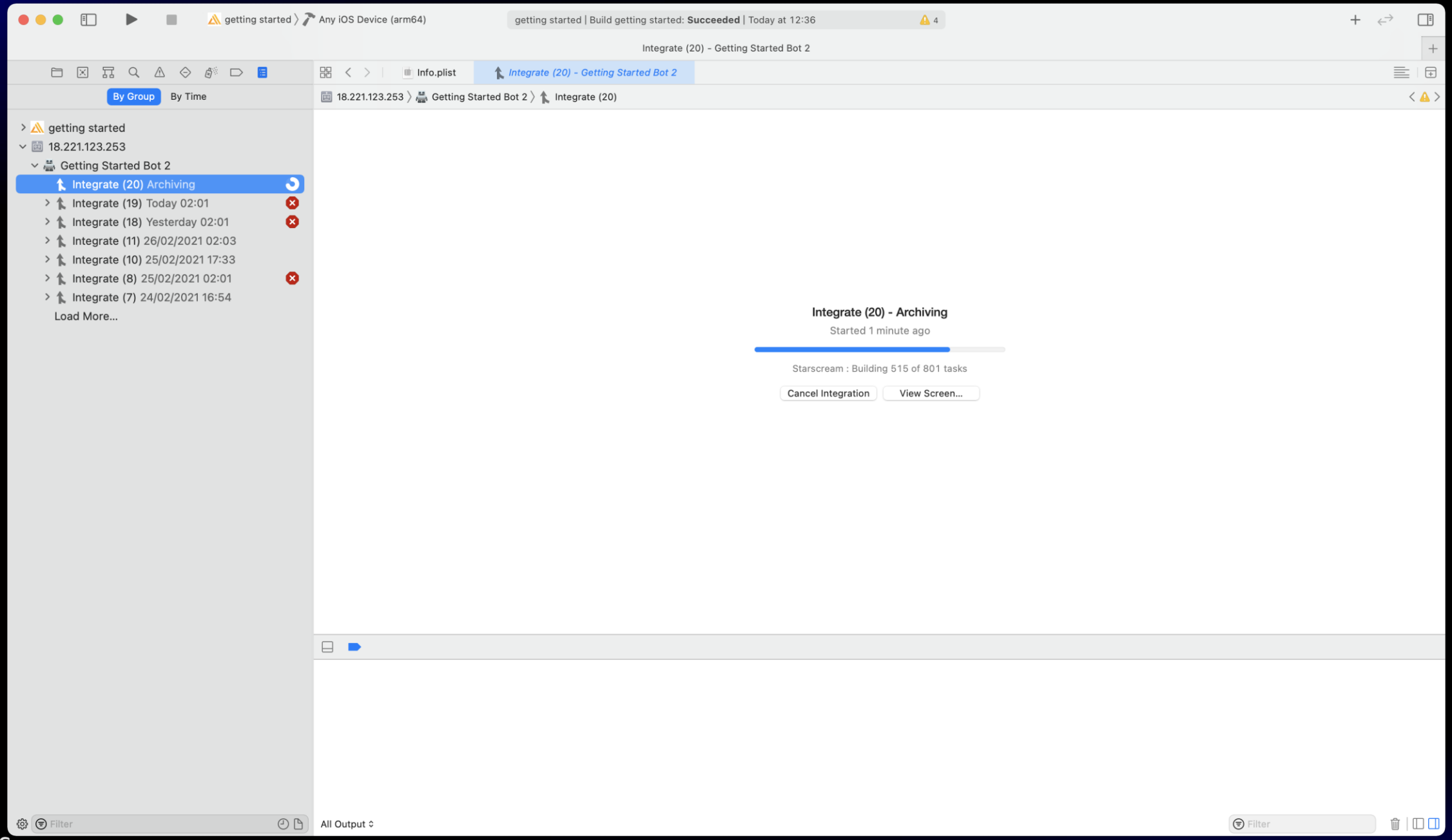
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Typical solution #2: Orchestration plus macOS worker nodes

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CI/CD challenges for iOS

Provision the hardware

Automate the build process

Have a macOS machine part of the workflow

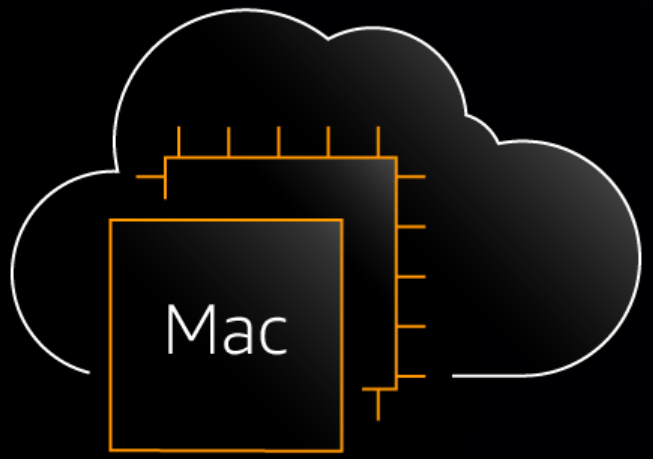
+ install and maintain software

+ integrate with AWS services

+ Integrate with AWS orchestrator

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Provisioning the hardware



Amazon EC2 instances

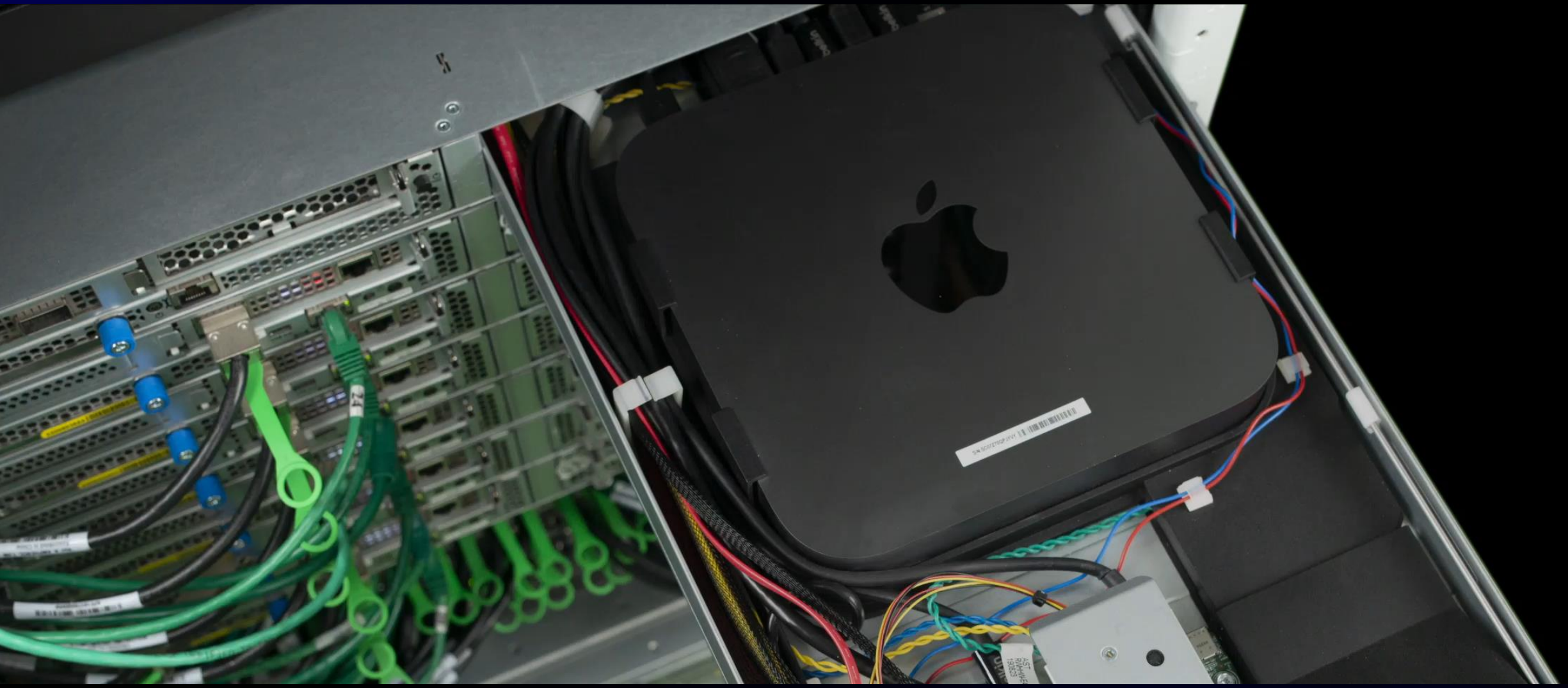
VPC, security groups

Amazon EBS, snapshots, AMI

AWS Identity and Access Management (IAM) role, user data

AWS Systems Manager Agent (SSM Agent)

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Start a Mac EC2 instance

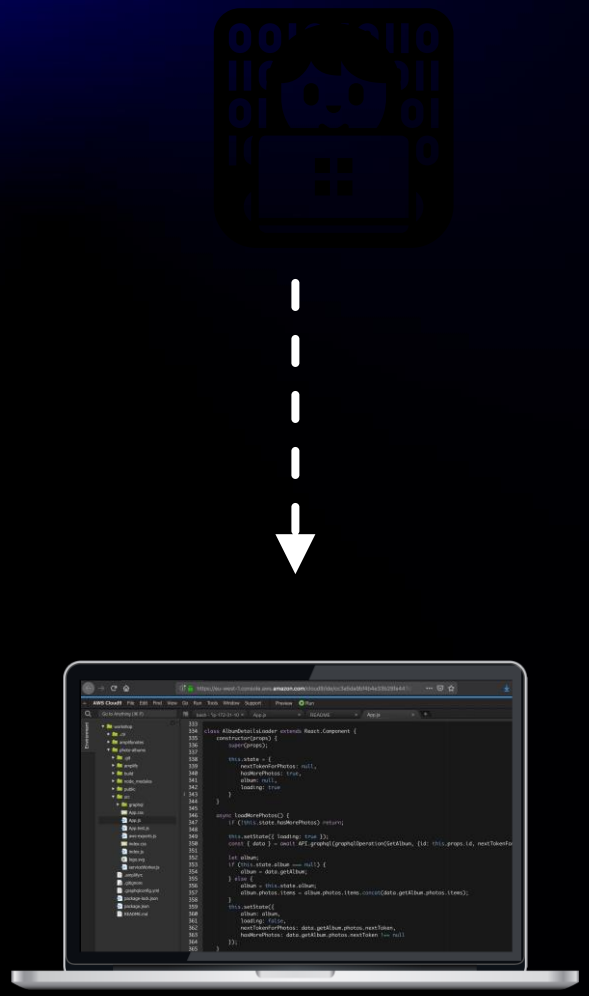
```
➜  ~ aws --region $REGION ec2 allocate-hosts \
        --instance-type mac1.metal          \
        --availability-zone us-east-2b      \
        --quantity 1
{
    "HostIds": [
        "h-0bab92ca090bfec3f"
    ]
}
```

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Start a Mac EC2 instance

```
➜ ~ aws --region $REGION ec2 run-instances \
        --instance-type mac1.metal                          \
        --key-name your_key                                 \
        --placement HostId=h-0bab92ca090bfec3f              \
        --security-group-ids sg-01000000000000032           \
        --image-id AWS_Or_Your_AMI_Id
{
    "Groups": [],
    "Instances": [
        {
            "AmiLaunchIndex": 0,
            "ImageId": "ami-019fd52485934f8bd",
            "InstanceId": "i-0883f109e7f9b025c",
            "InstanceType": "mac1.metal",
            "KeyName": "sst-aws",
            "LaunchTime": "2021-03-08T16:47:39+00:00",
            "Monitoring": {
                "State": "disabled"
            },
```

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AWS Cloud

ssh.public.key

Amazon EC2

Big Sur

Security group
TCP 22

Mac1 instance

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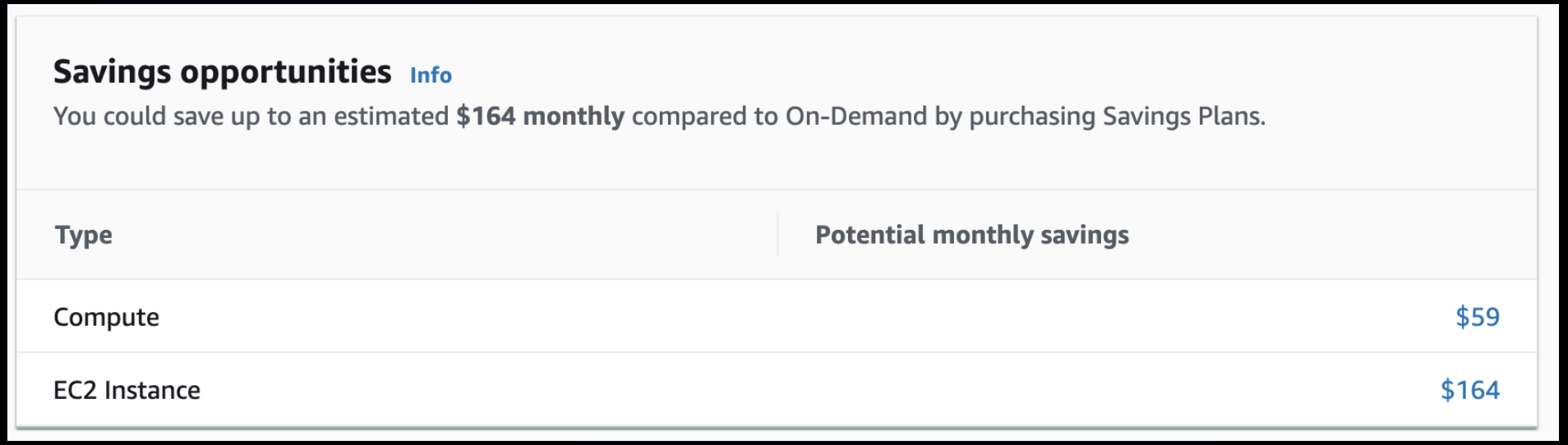
Mac1 pricing

$1.083/hour (minimum of 24 hours)



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Mac1 Savings Plans



Savings opportunities Info

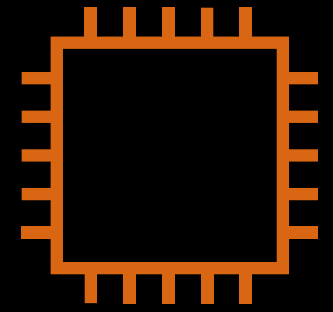
You could save up to an estimated **$164 monthly** compared to On-Demand by purchasing Savings Plans.

Type	Potential monthly savings
Compute	$59
EC2 Instance	$164

Up to 66% savings compared to On-Demand

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Mac1 EC2 tips: VNC (optional)



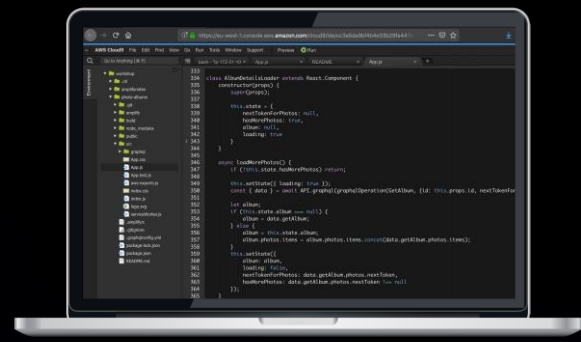
Mac1 instance

```
sudo passwd ec2-user

sudo defaults write                                                 \
/var/db/launchd.db/com.apple.launchd/overrides.plist    \
com.apple.screensharing                                             \
-dict Disabled -bool false

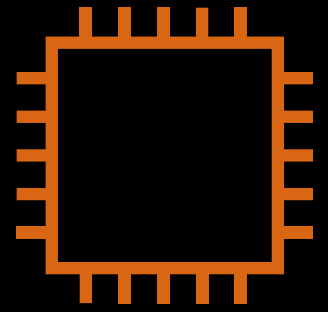
sudo launchctl load -w                                              \
/System/Library/LaunchDaemons/com.apple.screensharing.plist

ssh -L 5900:localhost:5900 -C -N -i /path/key.pem     \
    ec2-user@my-instance-public-dns-name
open vnc://localhost:5900
```



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Mac1 EC2 tips: Amazon EBS




```
PDISK=$(diskutil list physical external | \
        head -n1 | cut -d" " -f1)

APFSCONT=$(diskutil list physical external |  \
           grep "Apple_APFS" | tr -s " "   |  \
           cut -d" " -f8)

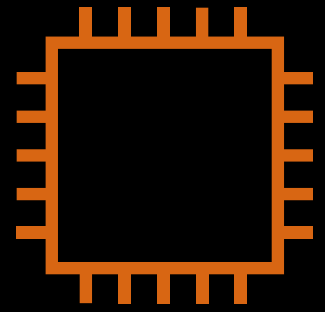
yes | sudo diskutil repairDisk $PDISK

sudo diskutil apfs resizeContainer $APFSCONT 0
```

aws

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Mac1 EC2 tips: CLI install Xcode



Mac1 instance

```
# Download and install Xcode from your private website (or S3 bucket)
aws s3 cp s3://your_private_bucket/apple/Xcode_13.xip xcode.xip
xip --expand xcode.xip
sudo mv Xcode.app /Applications

# Download and install Xcode CLI (use your own S3 bucket / Amazon CloudFront distribution, the below will stop working at some point)
aws s3 cp s3://your_private_bucket/apple/Command_Line_Tools_for_Xcode_13.dmg
hdiutil mount ./xcode-cli.dmg
sudo installer -pkg /Volumes/Command\ Line\ Developer\ Tools/Command\ Line\ Tools.pkg -target /
hdiutil unmount /Volumes/Command\ Line\ Developer\ Tools/

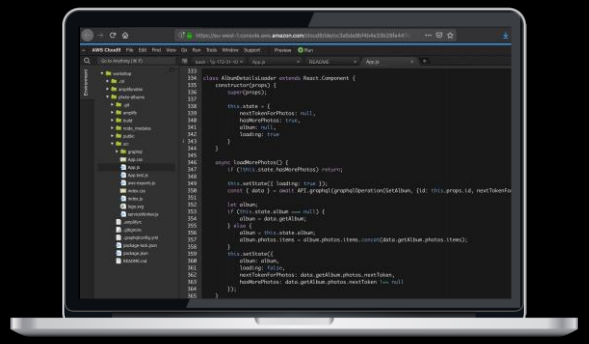
sudo installer -pkg /Applications/Xcode.app/Contents/Resources/Packages/XcodeSystemResources.pkg -target /
sudo installer -pkg /Applications/Xcode.app/Contents/Resources/Packages/CoreTypes.pkg -target /
sudo installer -pkg /Applications/Xcode.app/Contents/Resources/Packages/MobileDevice.pkg -target /
sudo installer -pkg /Applications/Xcode.app/Contents/Resources/Packages/MobileDeviceDevelopment.pkg -target /

# accept the license
sudo xcodebuild -license accept
xcode-select -p
```

aws

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Mac1 EC2 tips: Create golden AMI



```
REGION=us-east-2
# REPLACE THE IP ADDRESS IN THE COMMAND BELOW
# Use the EC2 mac1 Instance Public IP
EBS_VOLUME_ID=$(aws ec2 --region $REGION describe-instances --query
'Reservations[].Instances[?PublicIpAddress==`<YOUR MAC EC2 PUBLIC
IP>`].BlockDeviceMappings[][].Ebs.VolumeId' --output text)
aws ec2 create-snapshot --region $REGION --volume-id $EBS_VOLUME_ID --description "macOS Big Sur
Xcode"

# AT THIS STAGE COPY THE SNAPSHOT_ID RETURNED BY THE PREVIOUS COMMAND
# WAIT FOR THE SNAPSHOT TO COMPLETE, THIS CAN TAKES SEVERAL MINUTES
SNAPSHOT_ID=<YOUR SNAPSHOT ID>
aws ec2 register-image --region=$REGION --name "GOLD_macOS_BigSur_Xcode" --description "macOS Big
Sur Xcode Gold Image" --architecture x86_64_mac --virtualization-type hvm --block-device-mappings
DeviceName="/dev/sda1",Ebs=\{SnapshotId=$SNAPSHOT_ID,VolumeType=gp3\} --root-device-name
"/dev/sda1"
```

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Automated builds



Build

Sign

Archive

Upload to iTunes Connect

Use AWS Amplify backend

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Build and archive

```
xcodebuild clean build archive                \
        -workspace "$WORKSPACE"               \
        -scheme "$SCHEME"                     \
        -archivePath "$ARCHIVE_PATH"          \
        -configuration "$CONFIGURATION"
```

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Code signing

Create a dedicated keychain

Import your Apple Distribution key and cert

Import root certificates

Configure access permissions



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Code signing

CREATE A DEDICATED KEYCHAIN



```
security create-keychain -p "${PASSWORD}" "${NAME}"
security unlock-keychain -p "${PASSWORD}" "${NAME}"
security list-keychains -s "${NAME}" "${OLD_KEYCHAIN_NAMES[@]}"
```

aws

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Code signing

IMPORT YOUR KEY



```
echo $S3_APPLE_DISTRIBUTION_CERT | base64 -d > $DIST_CERT

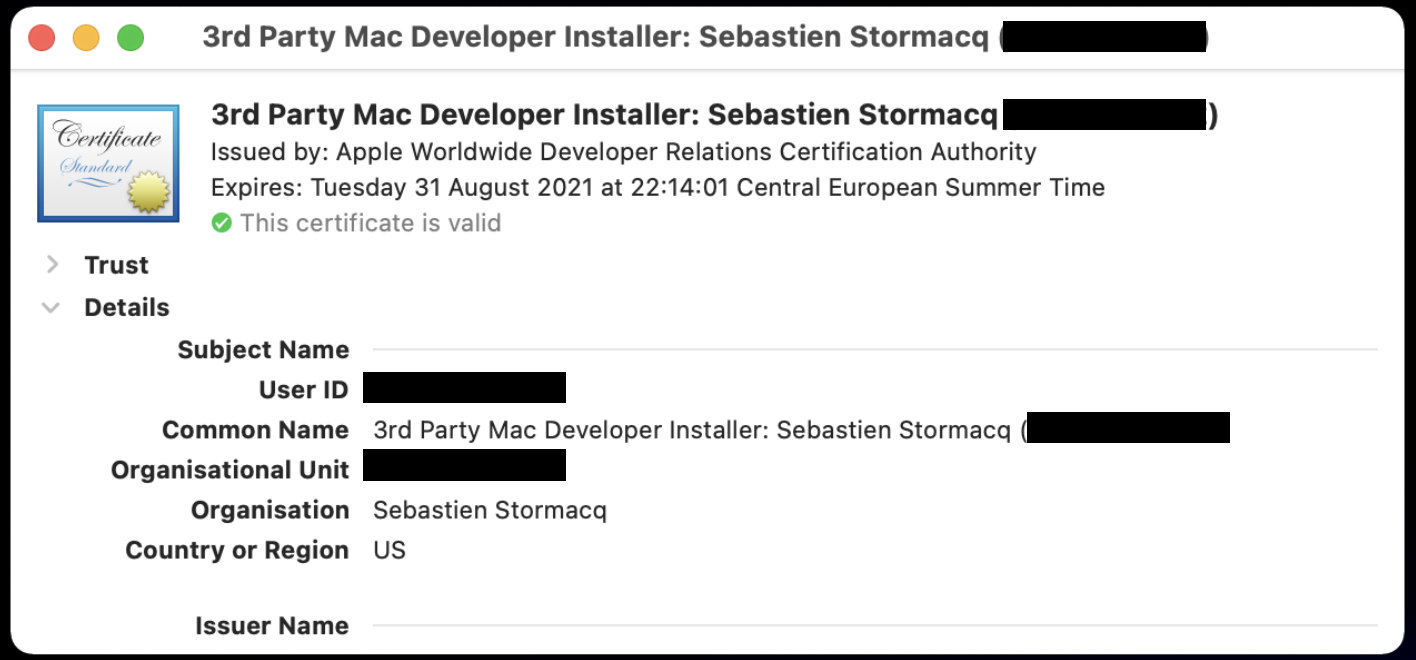
security import "${DIST_CERT}"                          \
       -P "${APPLE_DISTRIBUTION_KEY_PASSWORD}" \
       -k "${KEYCHAIN_NAME}"                            \
       -T /usr/bin/codesign                             \
       -T /usr/bin/xcodebuild
```

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Code signing

IMPORT YOUR KEY





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Code signing

IMPORT APPLE ROOT CERTIFICATE IN SYSTEM KEYCHAIN



```
SYSTEM_KEYCHAIN_NAME=/Library/Keychains/System.keychain

curl -o ~/AppleWWDRCAG3.cer \
     https://www.apple.com/certificateauthority/AppleWWDRCAG3.cer

sudo security import ~/AppleWWDRCAG3.cer          \
             -t cert -k "${SYSTEM_KEYCHAIN_NAME}" \
             -T /usr/bin/codesign -T /usr/bin/xcodebuild
```

aws

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Code signing

AUTHORIZE DEV TOOLS TO ACCESS THE KEYCHAIN



```
security set-key-partition-list              \
          -S apple-tool:,apple:,codesign:    \
          -s                                 \
          -k "${PASSWORD}" "${NAME}"
```

aws

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Code signing

INSTALL THE MOBILE PROVISIONING PROFILE



```
echo $S3_MOBILE_PROFILE | base64 -d > mobile.profile

UUID=$(security cms -D -i mobile.profile \
        -k "${KEYCHAIN_NAME}" |
        plutil -extract UUID xml1 -o - - |
        xmllint --xpath "//string/text()" -)

mkdir -p "$HOME/Library/MobileDevice/Provisioning Profiles"

cp mobile.profile "$HOME/Library/MobileDevice/Provisioning
Profiles/${UUID}.mobileprovision"
```

aws

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Other build steps

Amplify

Increase build number

Upload to iTunes Connect



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Amplify

RE-CREATE AMPLIFYCONFIGURATION.JSON



```
/usr/local/bin/amplify pull \
    --amplify $AMPLIFY \
    --frontend $FRONTEND \
    --providers $PROVIDERS \
    --yes --region us-east-2
```

aws

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Other build steps

Amplify

Increase build number

Upload to iTunes Connect



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Increase build number




```
BUILD_NUMBER=`date +%Y%m%d%H%M%S`

plutil -replace CFBundleVersion    \
       -string $BUILD_NUMBER       \
       "./getting started/Info.plist"
```

aws

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Other build steps

Amplify

Increase build number

Upload to iTunes Connect



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Upload to iTunes Connect



```
xcrun altool                                    \
      --upload-app                              \
      -f "$(pwd)/build/$SCHEME.ipa"             \
      -t ios                                    \
      -u $APPLE_ID                              \
      -p @env:APPLE_SECRET
```

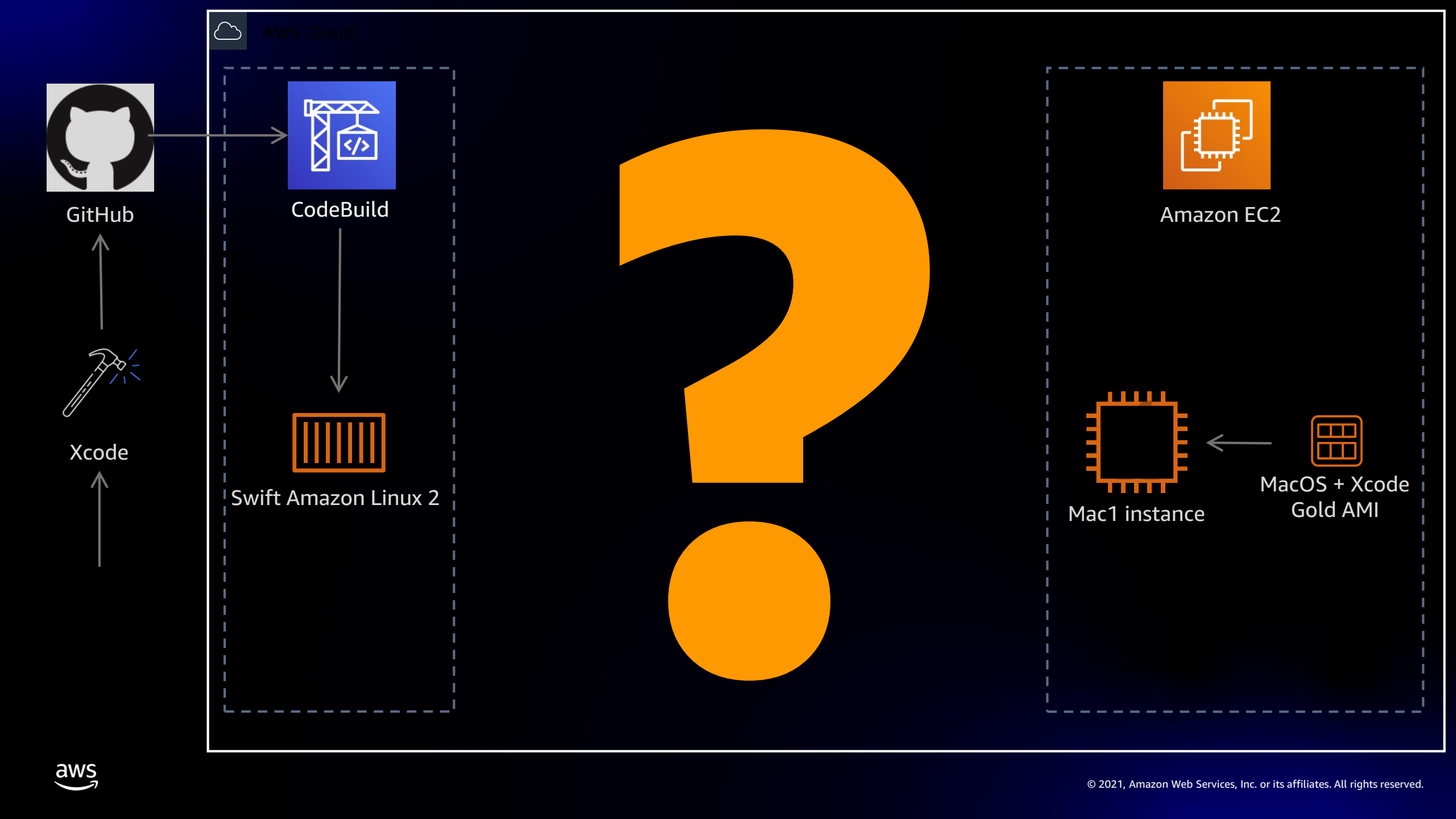
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Integrate in the pipeline

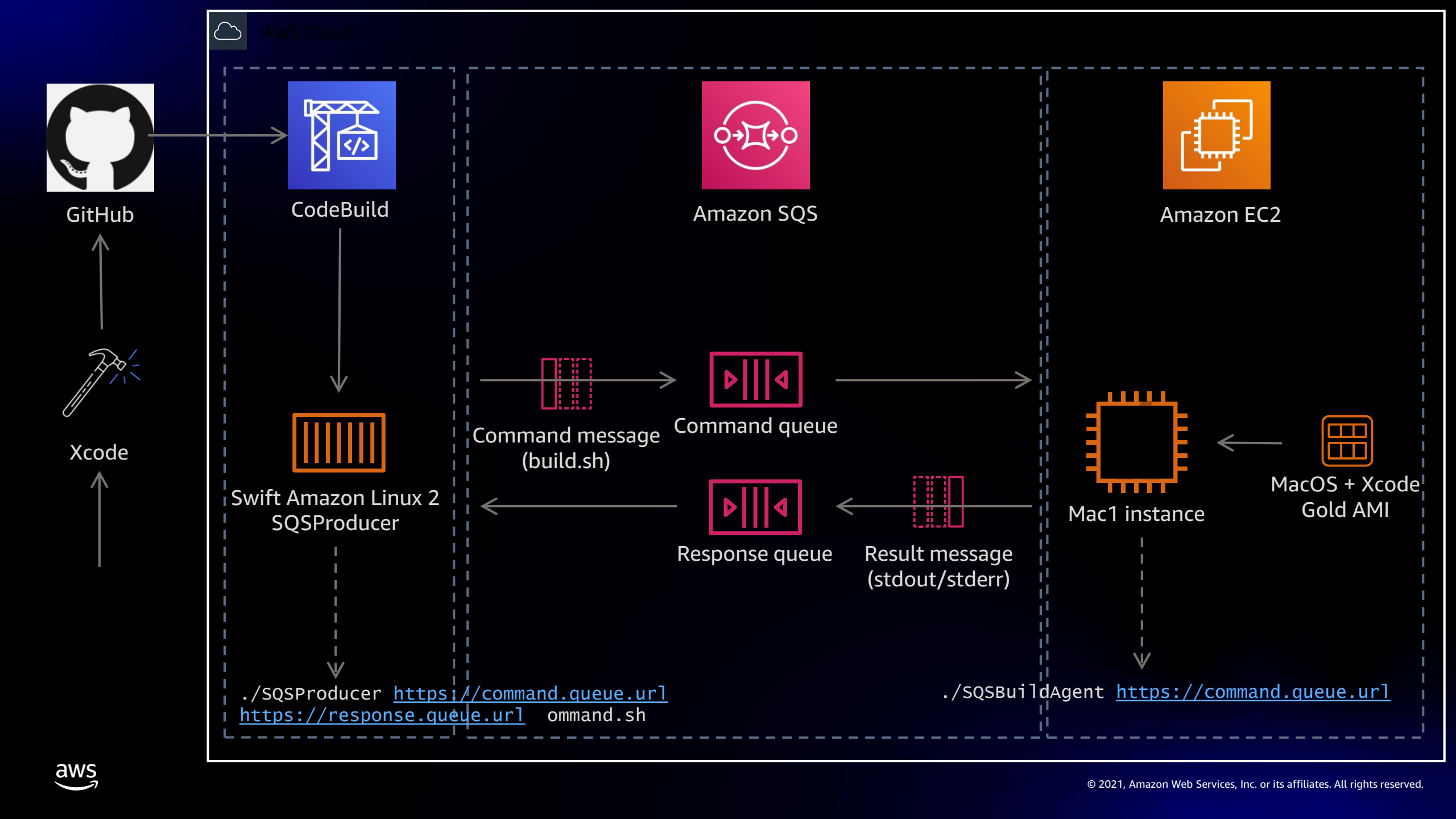


- AWS CodePipeline + AWS CodeBuild
- MacOS worker node
- Agent-based
  - Amazon SQS
  - AWS Systems Manager
- Unit and GUI tests

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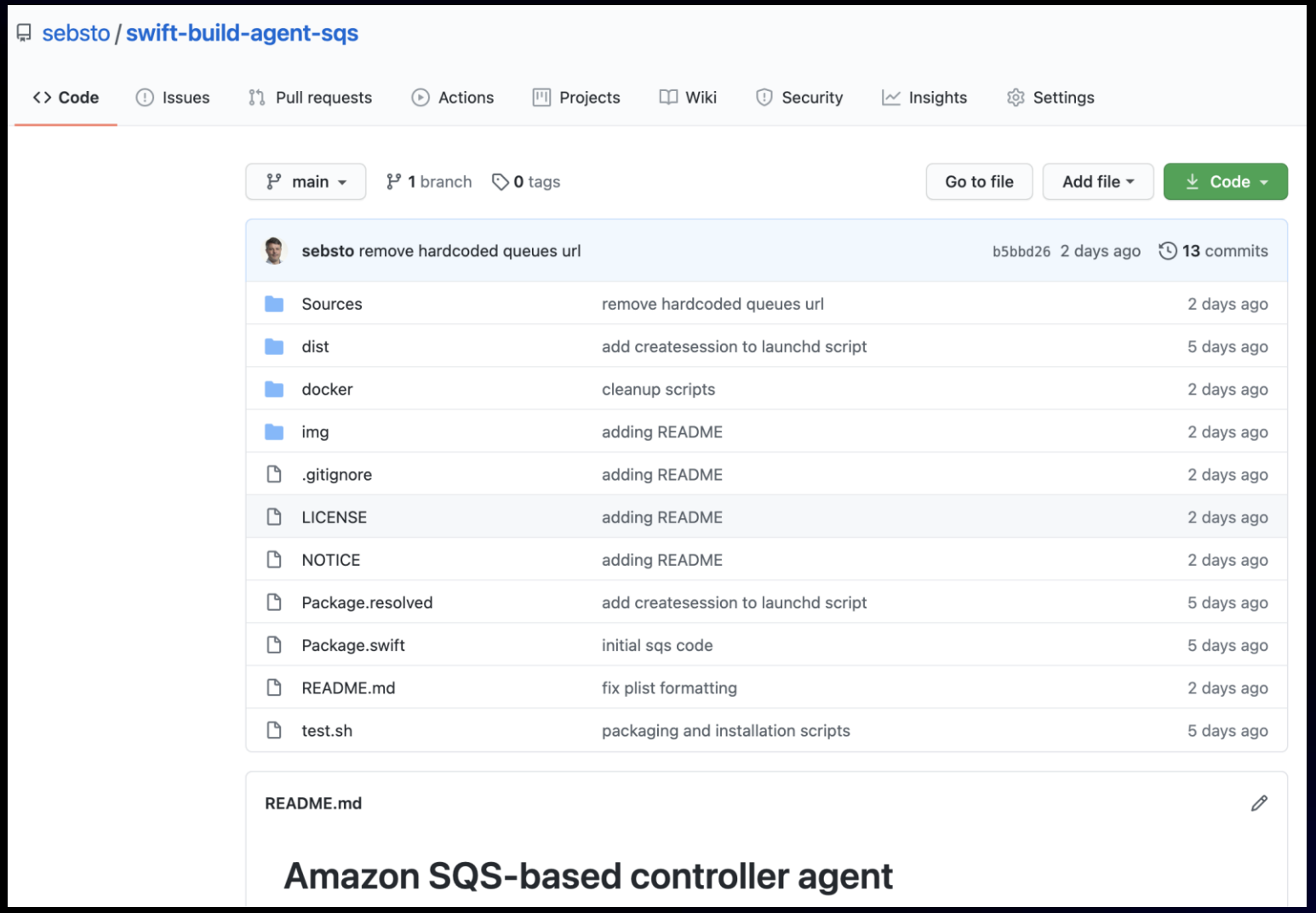
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Amazon SQS build agent

SOURCE CODE



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Code build

BUILDSPEC.YML

```
version: 0.2

phases:

   install:
    commands:
    # install the keychain and required private keys and certificates
    - SQSProducer $SQS_COMMAND_QUEUE_URL $SQS_RESPONSE_QUEUE_URL code/cli-
      build/01_keychain-cli.sh

    pre_build:
    commands:
    # pull out the project and its dependencies
    - SQSProducer $SQS_COMMAND_QUEUE_URL $SQS_RESPONSE_QUEUE_URL code/cli-
    build/02_prepare_project.sh
```

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Code deploy

BUILDSPEC.YML

```
version: 0.2

phases:

    build:
    commands:
    # build and prepare the archive
    - SQSProducer $SQS_COMMAND_QUEUE_URL $SQS_RESPONSE_QUEUE_URL code/cli-
    build/03_build-cli.sh

    post_build:
    commands:
    # export and verify teh archive
    - SQSProducer $SQS_COMMAND_QUEUE_URL $SQS_RESPONSE_QUEUE_URL code/cli-
    build/04_archive-cli.sh
```

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Integrate AWS services



- IAM
- Amazon S3
- AWS Secrets Manager
- AWS CLI

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IAM permissions attached

```
{
"Sid": "VisualEditor0",
"Effect": "Allow",
"Action": [
    "cloudformation:List*",
    "cloudformation:Describe*",
    "cloudformation:Get*",
    "cloudformation:Validate*",
    "cloudformation:Detect*",
    "amplify:List*",
    "amplify:Get*",
    "sqs:Receive*",
    "sqs:Send*",
    "sqs:DeleteMessage"
],
"Resource": "*"
},
```

```
{
"Sid": "VisualEditor1",
"Effect": "Allow",

"Action":
"secretsmanager:GetSecretValue",

"Resource": [
"arn:aws:secretsmanager:REGION:ACC
OUNT_ID:secret:amplify*",
"arn:aws:secretsmanager:REGION:ACC
OUNT_ID:secret:apple*"
]
}
```

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Store your build secrets

SECRETS MANAGER

```
aws secretsmanager create-secret                    \
                   --name apple-dist-certificatee \
                   --secret-binary fileb://./apple-dist.p12

aws secretsmanager create-secret   \
                   --name apple-id \
                   --secret-string myemail@me.com
```

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Retrieve your build secrets

SECRETS MANAGER

```
export APPLE_SECRET=$($AWS_CLI secretsmanager get-secret-value \
        --secret-id $APPLE_SECRET_SECRET                       \
        --query SecretString --output text)

# These are base64 values, we will need to decode to a file when
needed
APPLE_CERT=$($AWS_CLI secretsmanager get-secret-value \
        --secret-id $APPLE_DISTRIBUTION_CERT_SECRET   \
        --query SecretBinary --output text)
```

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Retrieve your build secrets

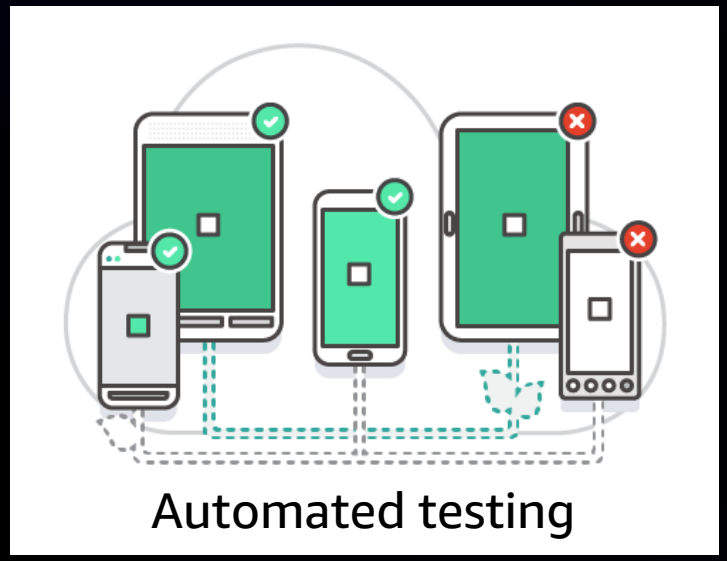
SECRETS MANAGER

```
echo $APPLE_CERT | base64 -d > $DIST_CERT

security import "${DIST_CERT}"  \
         -P "${KEY_PASSWORD}"   \
         -k "${KEYCHAIN_NAME}"  \
         -T /usr/bin/codesign   \
         -T /usr/bin/xcodebuild
```

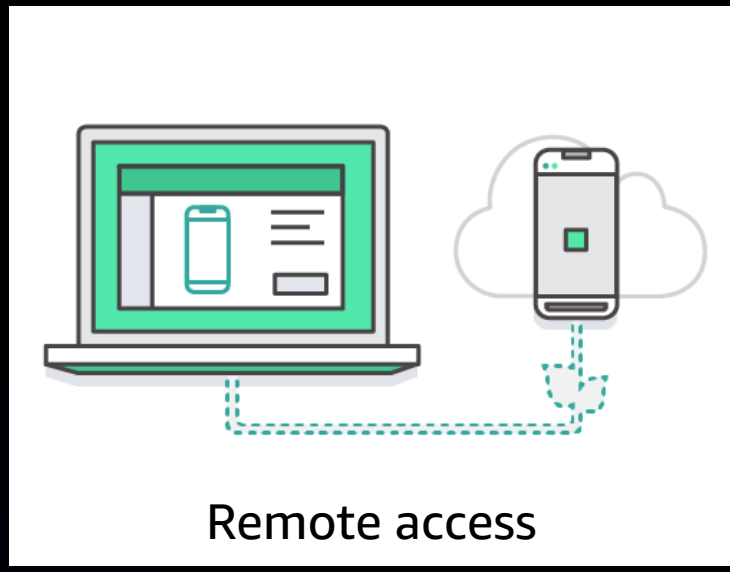
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Testing on actual devices



Automated testing

Test your app in parallel against a large collection of physical devices in the AWS Cloud

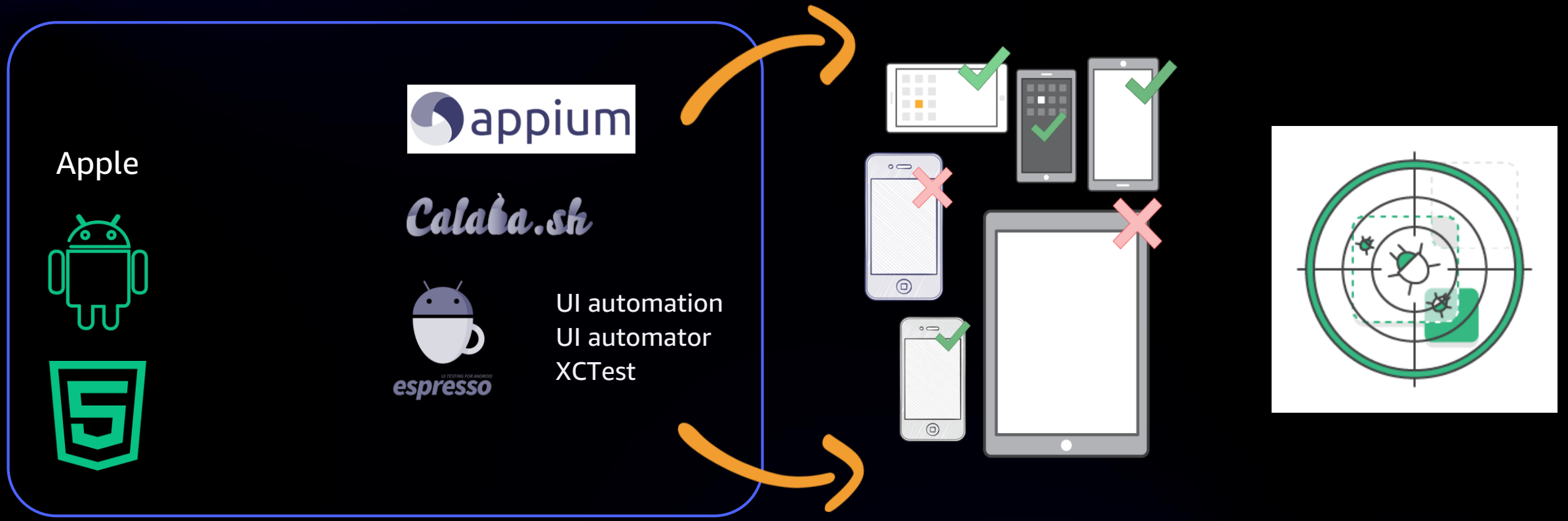


Remote access

Gesture, swipe, and interact with devices in real time, directly from your web browser or local host

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Automation testing on AWS Device Farm



Your app + Popular test frameworks → AWS Device Farm → Detailed test reports

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End-to-end demo

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Getting Started with AWS

Build an iOS Application

Create a simple iOS application using AWS Amplify

INTRODUCTION | 1 CREATE IOS APP | 2 INITIALIZE AMPLIFY | 3 ADD AUTHENTICATION | 4 ADD API AND DATABASE | 5 ADD STORAGE

Introduction: Build an iOS Application

Follow step-by-step instructions to build your first iOS application.

Overview

In this tutorial, you will create a simple iOS application using AWS Amplify, a set of tools and serverless services in the cloud. In the first module, you'll build a simple iOS application. Through the remaining modules, you will initialize a local app using the Amplify Command Line Interface (Amplify CLI), add user authentication, add a

✔ AWS Experience	Beginner
Time to Complete	60 minutes
$ Cost to	Free Tier eligible

Continuous integration on iOS?



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Automate your build on macOS

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README.md

AWS CodeBuild passing

Instructions to build on Amazon EC2

The below are step by step instructions to build this project on macOS. It describe how to start an Amazon EC2 mac1 instance and how to use the command line to install your development environment and to build the project. If you are using your own Mac, you can skip the Amazon EC2 section.

Prepare a mac1 EC2 instance with Xcode (one time setup)

1. Get an mac1 instance (doc).

(userdata to install SQS based build agent : `curl -s https://download.stormacq.com/aws/mac/build/installer.sh | sh)

Tips

- Remember, you need to allocate a dedicated host. Minimum billing period is 24h.
- Choose an EBS volume large enough, Xcode and development tools need space. I use a 500Gb gp3 volume.
- Create a Security Group with at least SSH (TCP 22). If you plan to use Xcode Server, add the following:
    - TCP 443 (HTTPS)
    - TCP 20300 (Xcode Server)
    - TCP 20343 - 20346 (Xcode Server)

https://github.com/sebsto/amplify-ios-getting-started/tree/main/code

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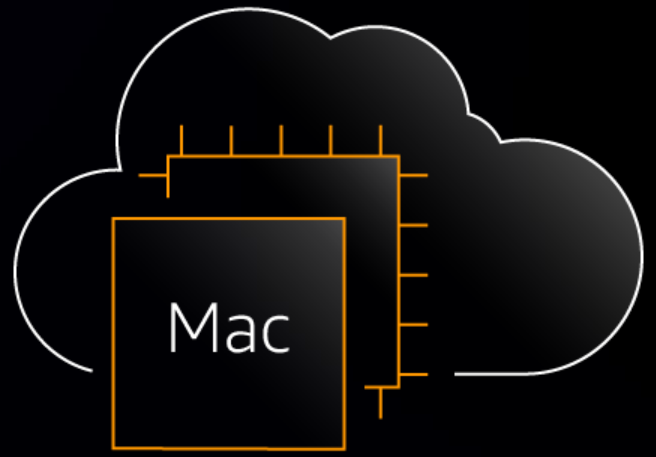
2



Integrate your builds in a pipeline

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3



Get a Mac in the cloud

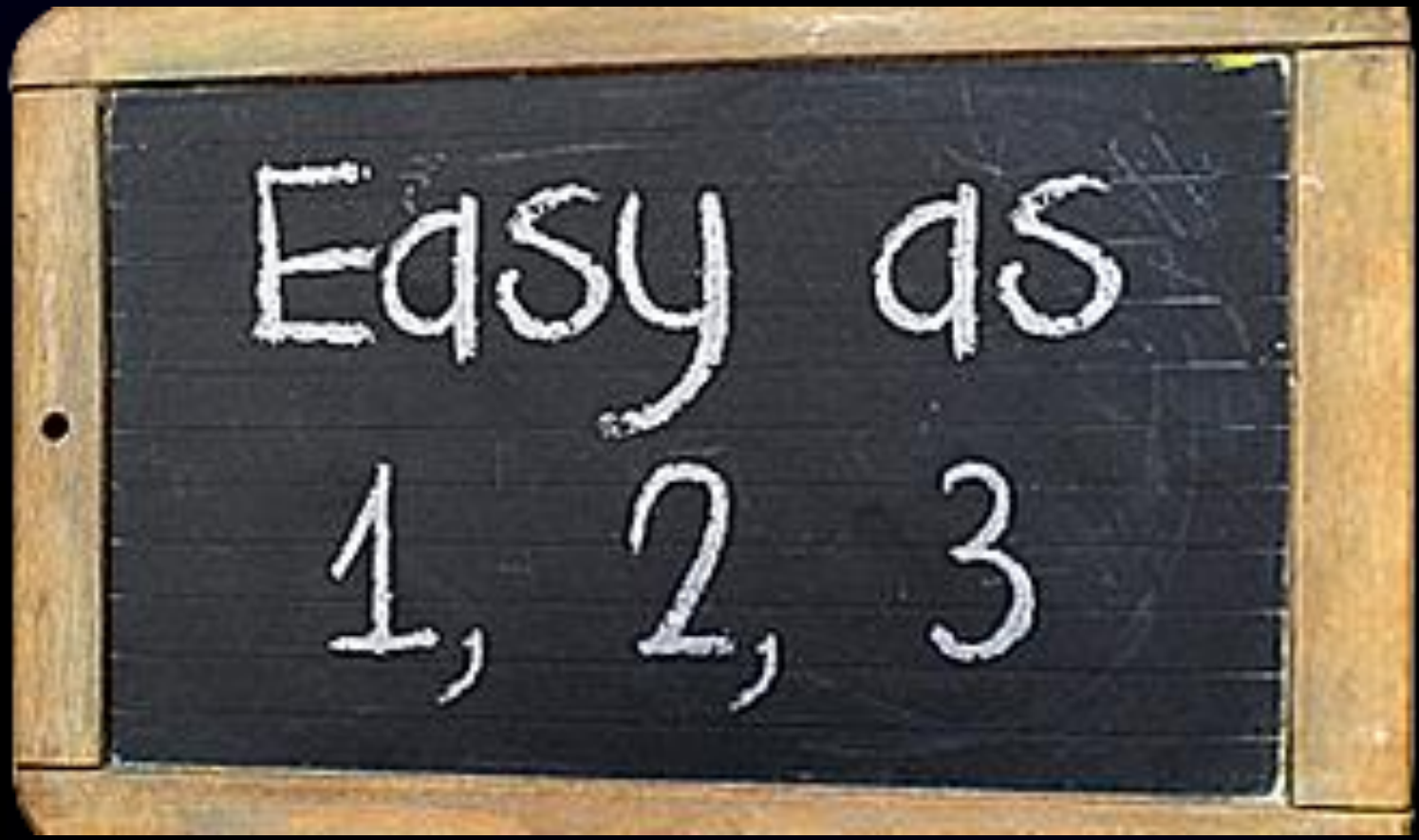
aws

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4



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Your imagination  is the limit

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Thank you!

Sébastien Stormacq

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