

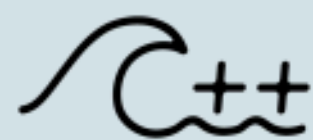
AWS SDK for C++

Developing software that uses the AWS cloud

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International C++ Conference 2024

<https://cppunderthesea.nl/>



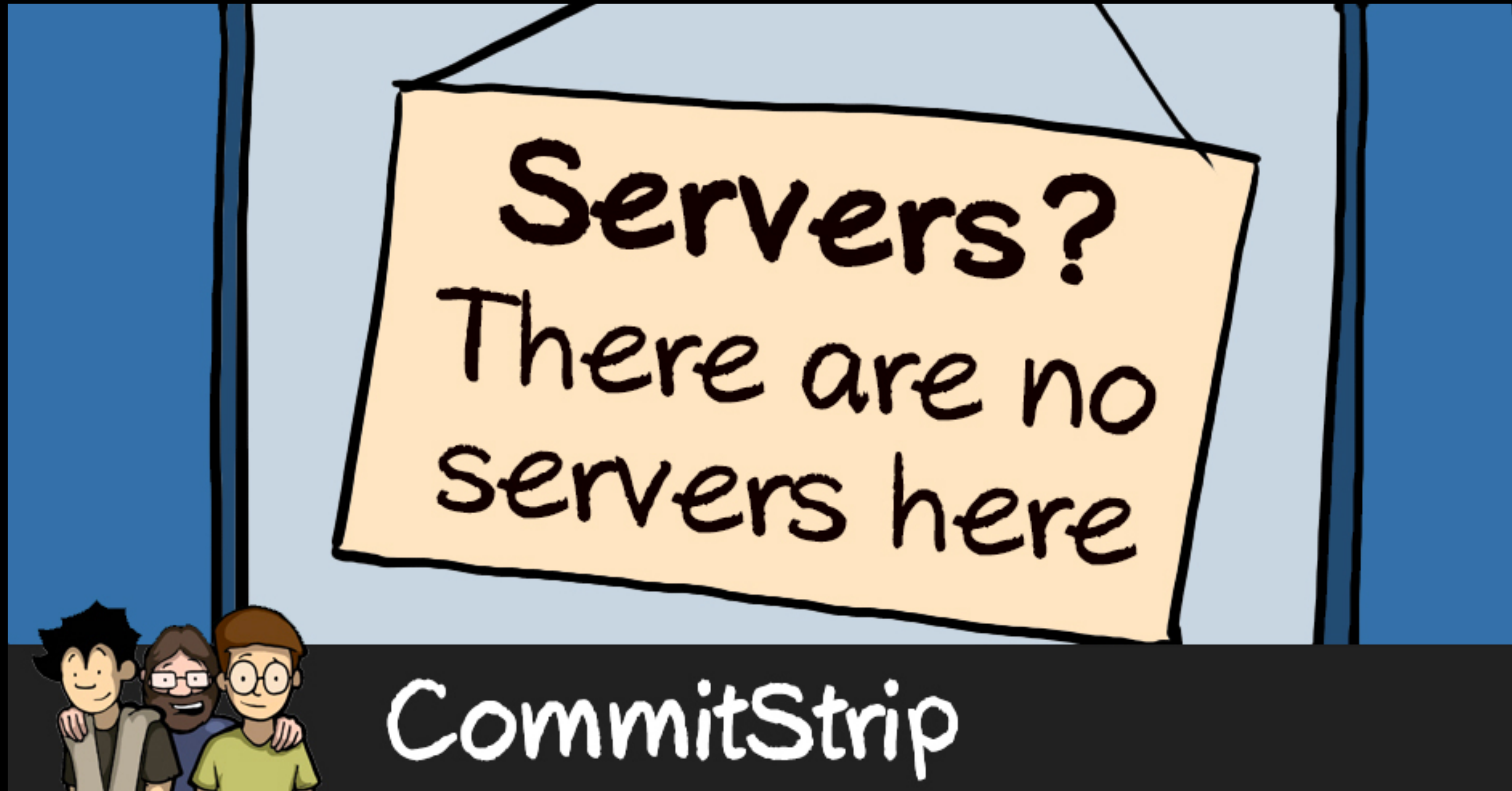
C++ Under the Sea

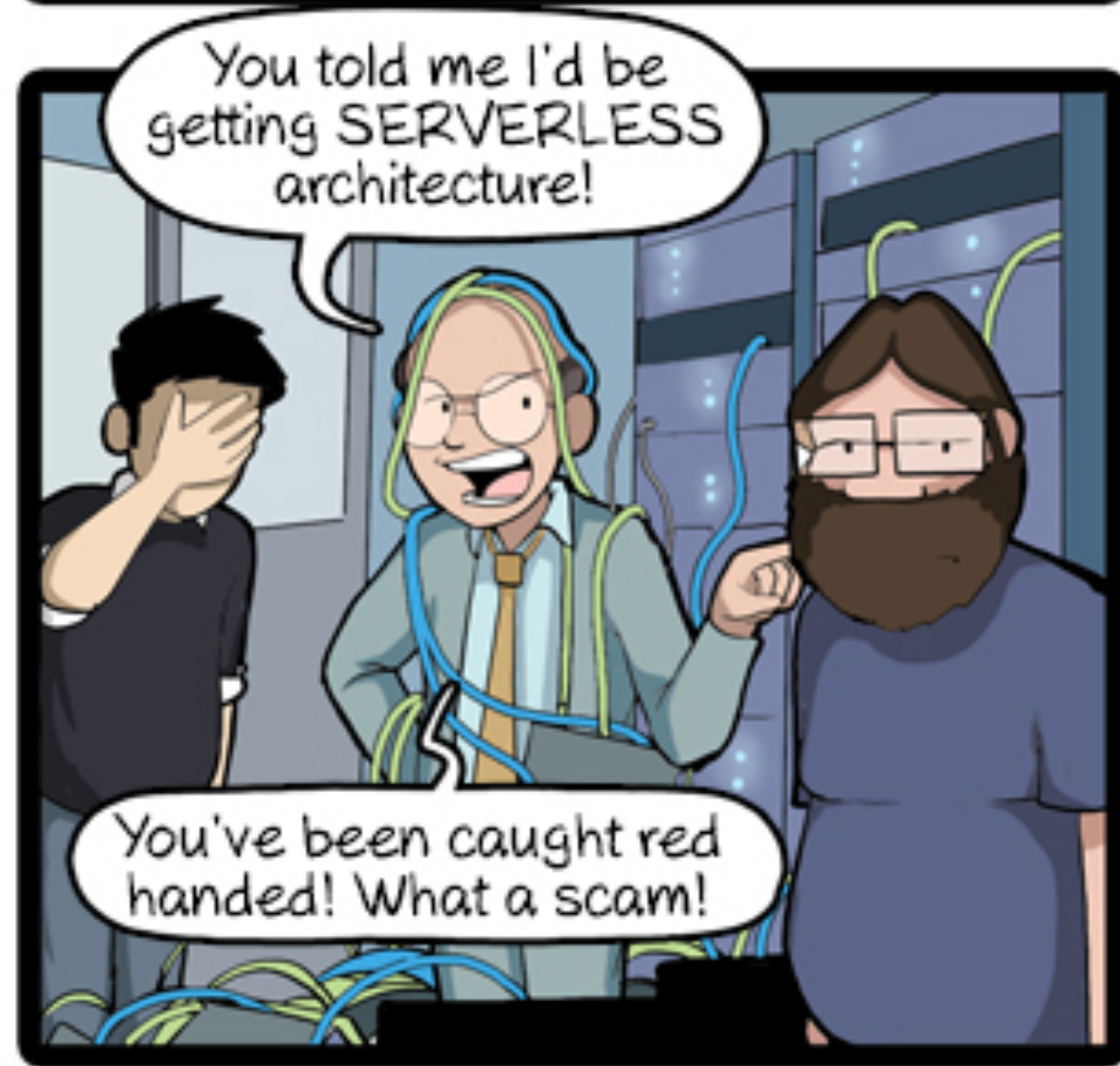
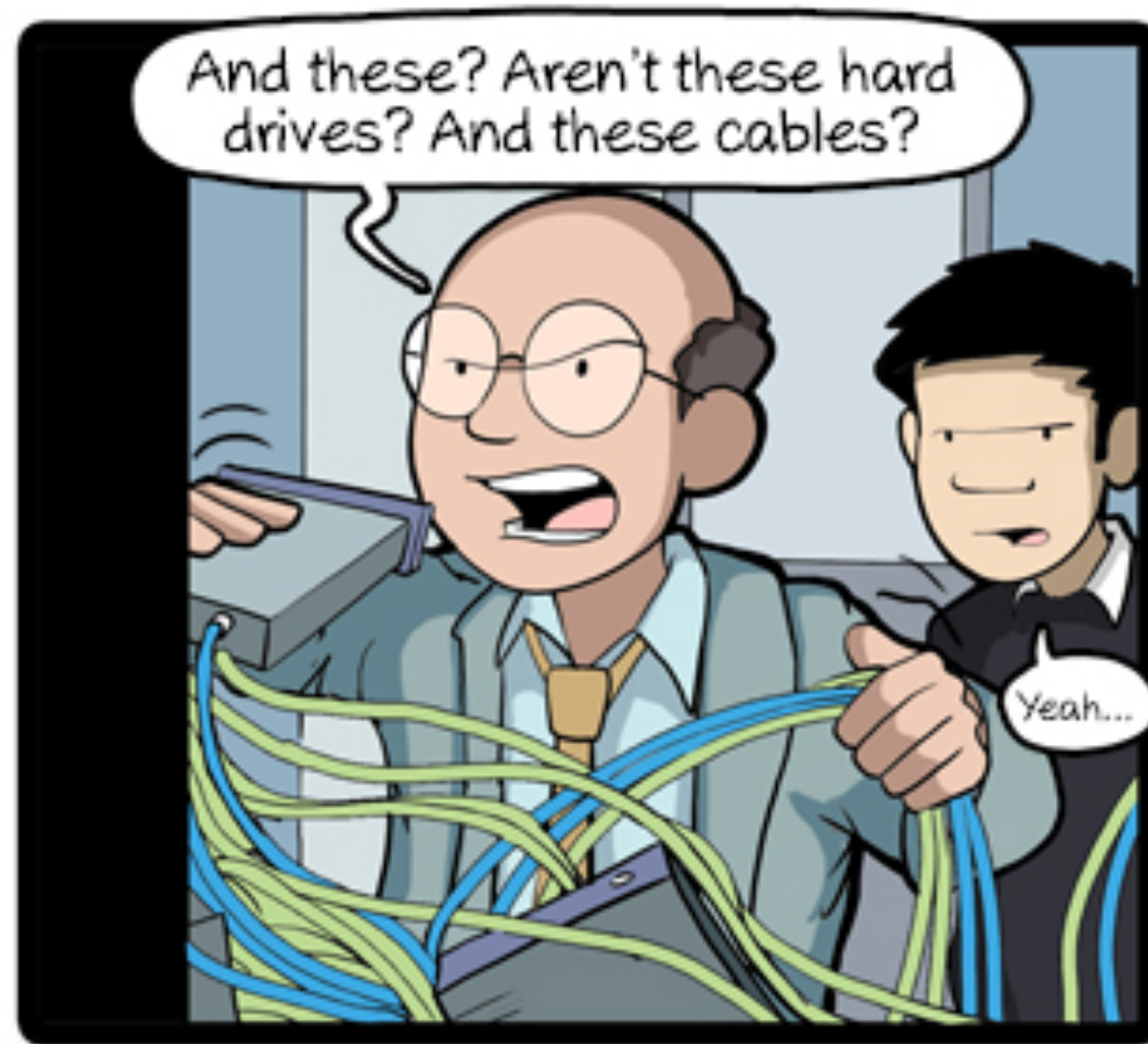
BREEPARK Breda, The Netherlands

11 October 2024



No Servers





Serverless Definition by AWS

A serverless architecture is a way to build and run applications and services without having to manage infrastructure. Your application still runs on servers, but all the server management is done by AWS. You no longer have to provision, scale, and maintain servers to run your applications, databases, and storage systems.

Introduction to AWS



Top categories of AWS services

EC2 versus Lambda

Setting up and running an EC2 instance (without autoscaling or other advanced options)

```
aws ec2 create-vpc
```

```
aws ec2 create-key-pair --key-name MyKeyPair --query \
  'KeyMaterial' --output text > MyKeyPair.pem
```

```
$ aws ec2 create-security-group --group-name my-sg \
  --description "My security group" --vpc-id vpc-1a2b3c4d
```

```
aws ec2 run-instances --image-id ami-0233214e13e500f77 --count \
  1 --instance-type t2.micro --key-name MyKeyPair \
  --security-group-ids sg-903004f8 --subnet-id subnet-6e7f829e --user-data
file:///user.dat
```


EC2 versus Lambda

User.dat for software installation on startup

```
#!/bin/bash
yum update -y
yum install -y httpd.x86_64
systemctl start httpd.service
systemctl enable httpd.service
echo "Hello World from $(hostname -f)" > /var/www/html/
index.html
```

EC2 versus Lambda

Command to deploy a Lambda via CLI including autoscaling

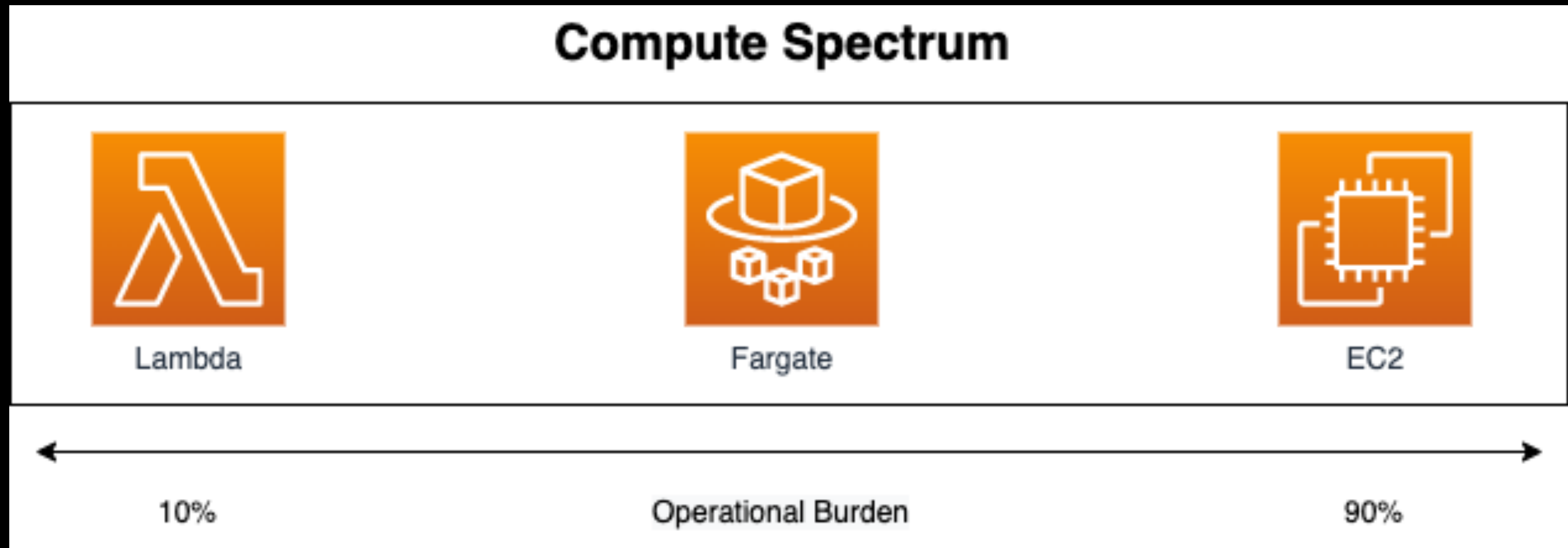
```
aws iam create-role --role-name basic-lambda-role \  
--assume-role-policy-document file:///trust-policy.json
```

```
aws lambda create-function \  
--function-name basic-lambda \  
--runtime nodejs14.x \  
--zip-file fileb:///basic-lambda-role.zip \  
--handler basic-lambda.handler \  
--role arn:aws:iam:***:role/basic-lambda-role \  
--memory-size 512
```

Lambda Memory & VCPU

Configured memory (MB)	Allocated cores
128 - 1769	1
1770 - 3538	2
3539 - 5307	3
5308 - 7076	4
7077 - 8845	5
8846 - 10240	6

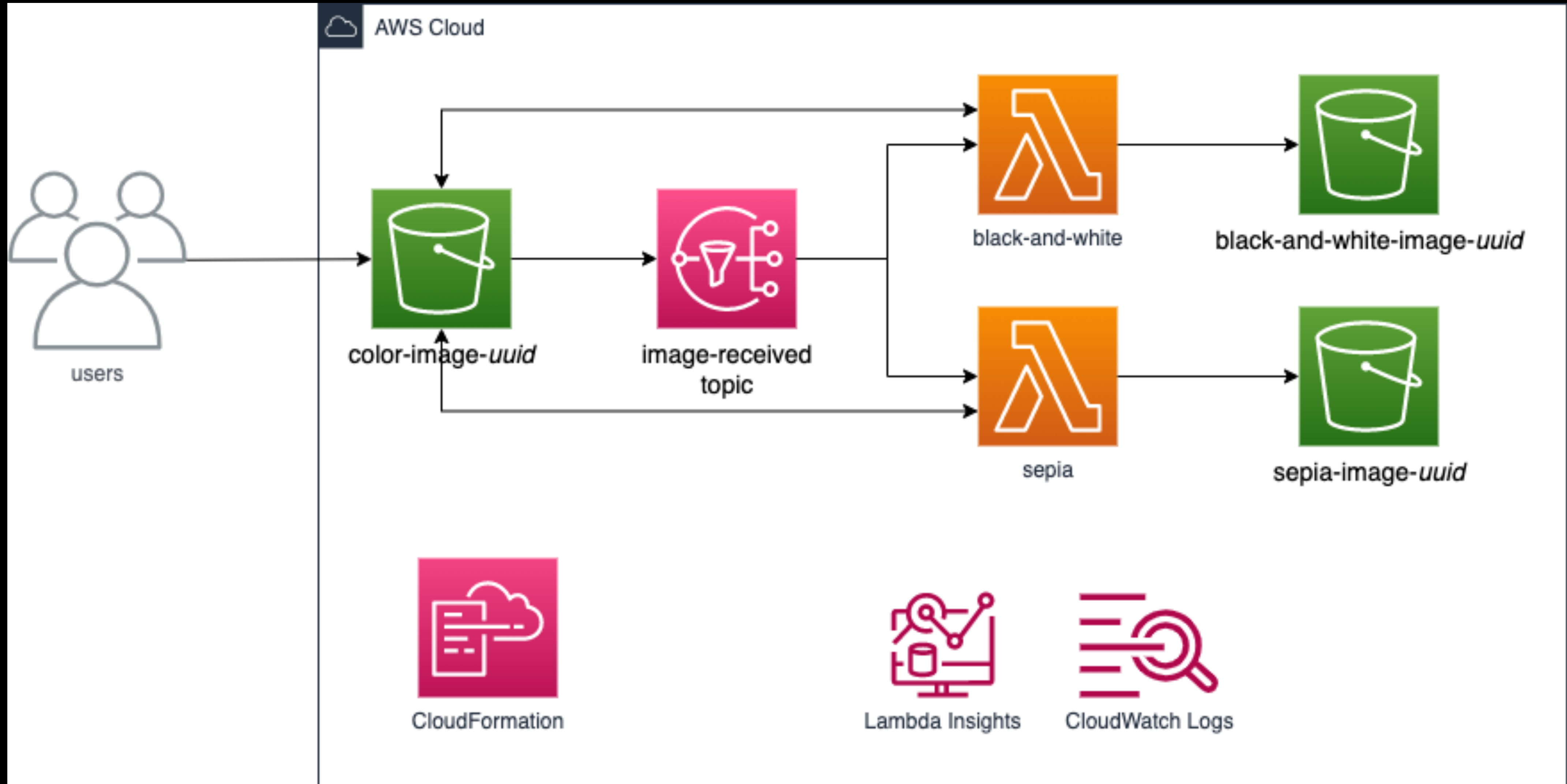
Compute spectrum



Demo Time



Demo solution



AWS SDK C++

```
Aws::S3::S3Client client(clientConfig);

auto outcome = client.ListBuckets();

bool result = true;
if (!outcome.IsSuccess()) {
    std::cerr << "Failed with error: " << outcome.GetError() << std::endl;
    result = false;
}
else {
    std::cout << "Found " << outcome.GetResult().GetBuckets().size() << " buckets\n";
    for (auto &&b: outcome.GetResult().GetBuckets()) {
        std::cout << b.GetName() << std::endl;
    }
}

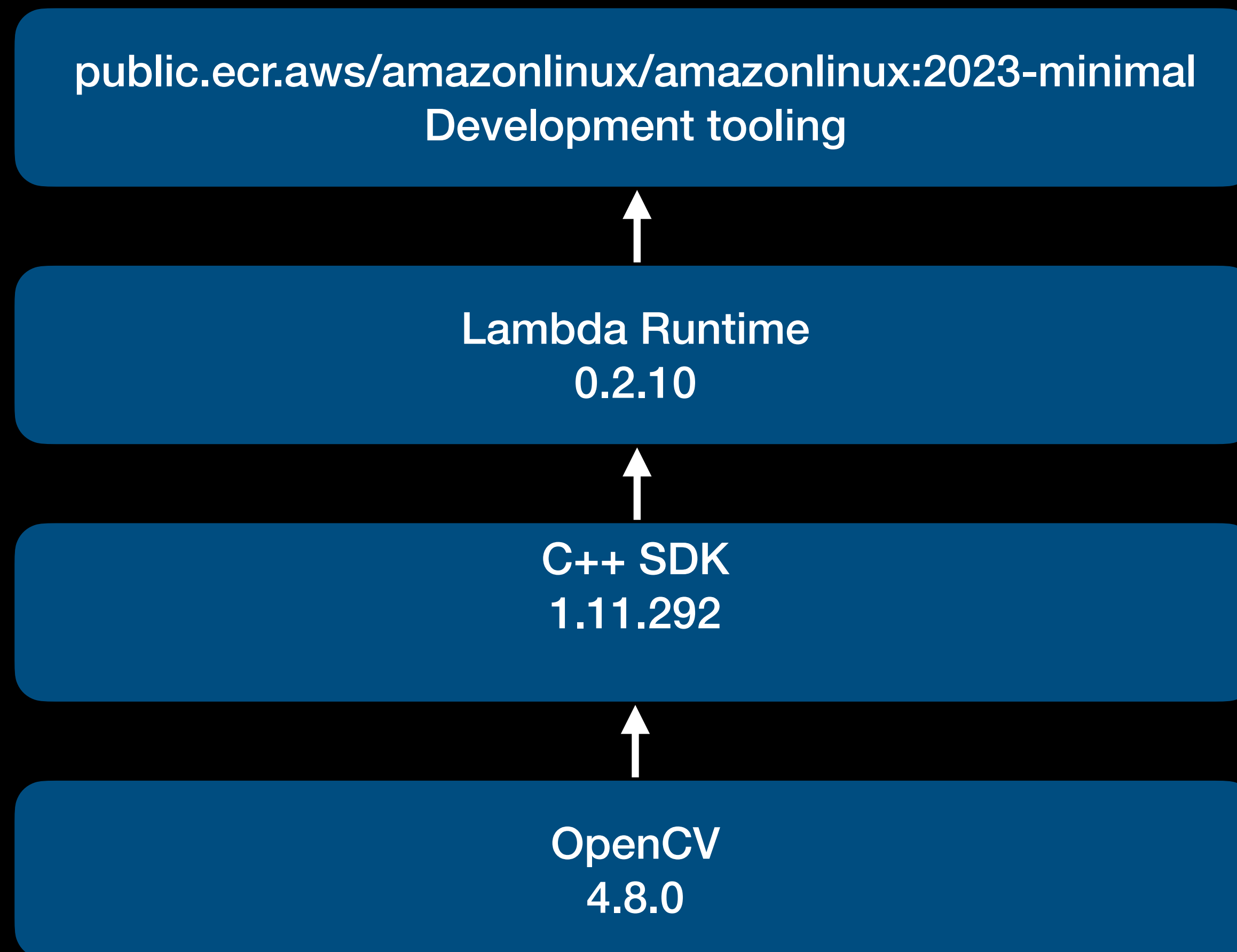
return result;
```

Image Lambda demo

- CLion IDE by JetBrains
- CMake 3.29.0
- Clang 18.1.2
- AWS SDK C++ 1.11.292
- AWS C++ Lambda runtime 0.2.10
- OpenCV 4.8.0
- Docker image with Amazon Linux 2023
- Using CLion remote development solution ([see Clion website](#))

Image Lambda demo

Docker image hierarchy with Amazon Linux 2023



Cmake

- Add the following lines to CMakeLists.txt

```
find_package(aws-lambda-runtime REQUIRED)
```

```
add_executable(black_and_white_lambda_demo black_and_white_lambda_demo.cpp)
```

```
target_link_libraries(black_and_white_lambda_demo PRIVATE AWS::aws-lambda-runtime)
```

```
aws_lambda_package_target(black_and_white_lambda_demo NO_LIBC)
```

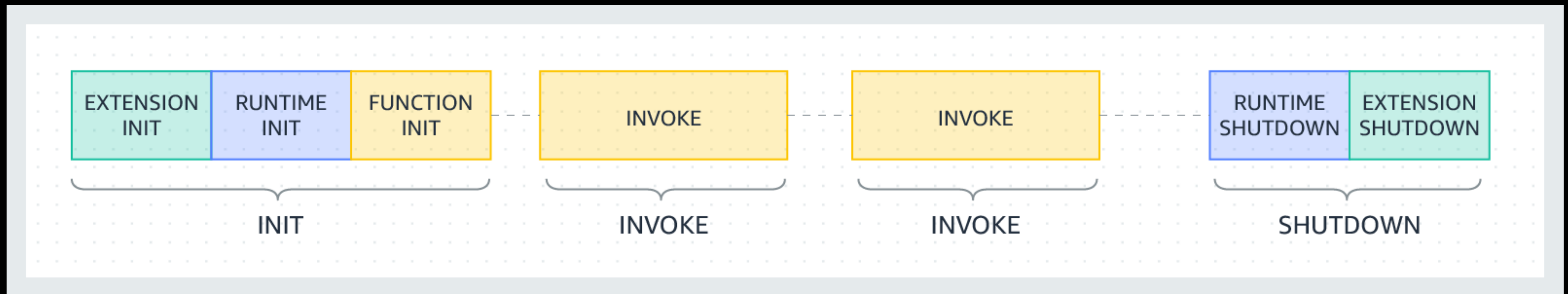
Lambda

Show the `black_and_white_lambda` in CLion

Use `EnvironmentCredentialsProvider`

When needed set the `ca-bundle`

Lambda



CloudFormation Development Kit

Show cdk code in CLion

Execute 'cdk bootstrap' when it is the first time you use cdk with your account

Upload Image



Wrap Up

- Code and presentation on GitHub - <https://github.com/TheDutchCppGrp>.
- You can create a free account on AWS for experimenting with their services. You can do a lot with the free tier (one year free).
- Be aware that when you start using payed services it can become costly based on what and how you use it. Use budgets and remove resources when not in use. Be careful.
- Need help when experimenting? You can contact me and when time permits I'm willing to help.
- When you need help for your business? I'm available for short term consultancy.

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