The background of the slide features a blue gradient with a network of white lines and dots. Two hands are visible: one at the top left pointing towards a cluster of glowing blue gears, and another at the bottom center with the palm up. The text is overlaid on a semi-transparent blue rectangle in the upper right.

CS 470 Project Two Conference Presentation: Cloud Development

<https://youtu.be/gu1FK84rf9g>

Caleb Ryan Partain

April, 2024



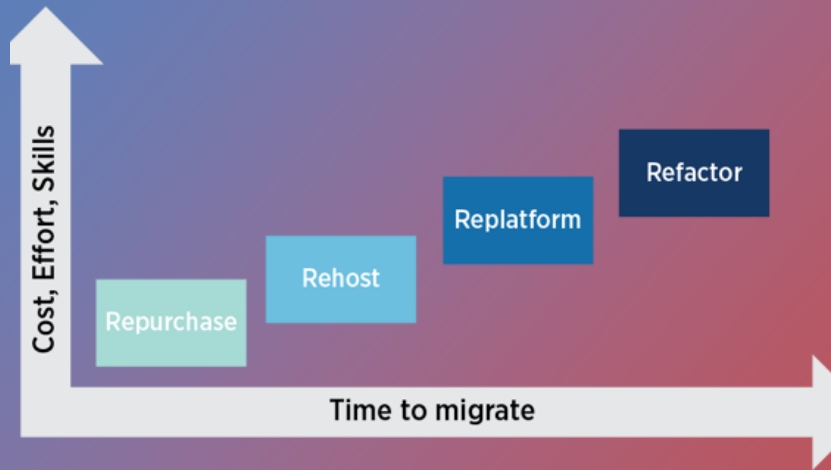
Overview

- Alabama
- 21 years old
- Graduation Computer Science Major

Goal:

Articulate the intricacies of cloud development to both technical and nontechnical audiences.



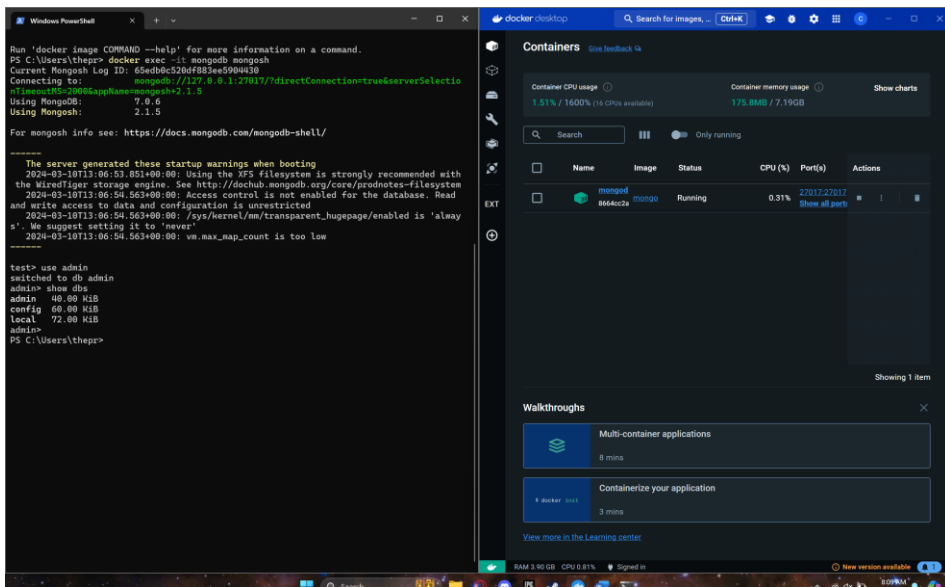


Containerization

- Rehost
- Replatform
- Refactor



Orchestration



The screenshot displays two windows side-by-side. The left window is a Windows PowerShell terminal with the following content:

```
Run 'docker image COMMAND --help' for more information on a command.
PS C:\Users\thepr> docker exec -it mongodb mongosh
Current Mongosh Log ID: 65ed8c52bd688ee5904a38
Connecting to: mongosh://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=30000
Using MongoDB: 7.0.6
Using Mongosh: 2.1.5

For mongosh info see: https://docs.mongodb.com/mongosh-shell/

-----
The server generated these startup warnings when booting
2024-03-10T13:06:59.563+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://docs.mongodb.org/core/production-file-system
2024-03-10T13:06:59.563+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2024-03-10T13:06:59.563+00:00: /sys/kernel/mm/transparent_hugepage/enabled is 'always'. We suggest setting it to 'never'
2024-03-10T13:06:59.563+00:00: vm.max_map_count is too low

-----

test> use admin
switched to db admin
admin> show dbs
admin 40.00 KiB
config 60.00 KiB
local 72.00 KiB
admin>
PS C:\Users\thepr>
```

The right window is the Docker Desktop interface. It shows a table of containers with the following data:

| Name | Image | Status | CPU (%) | Port(s) | Actions |
|--------|-------|---------|---------|-------------|----------------|
| mongod | mongo | Running | 0.31% | 27017:27017 | Show all ports |

Below the table, there are two walkthroughs:

- Multi-container applications (8 mins)
- Containerize your application (3 mins)

At the bottom, it says "View more in the Learning center".

Docker makes it easy

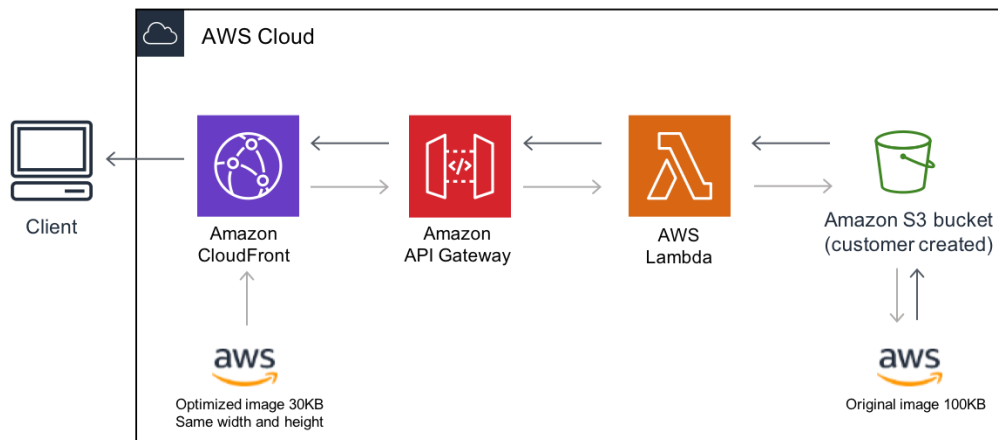
- Fast instantiation
- Dependency tracking
- Environmental variable standardization



The Serverless Cloud

Serverless

- What is “serverless” and what are its advantages?
- What is S3 storage and how does it compare to local storage?

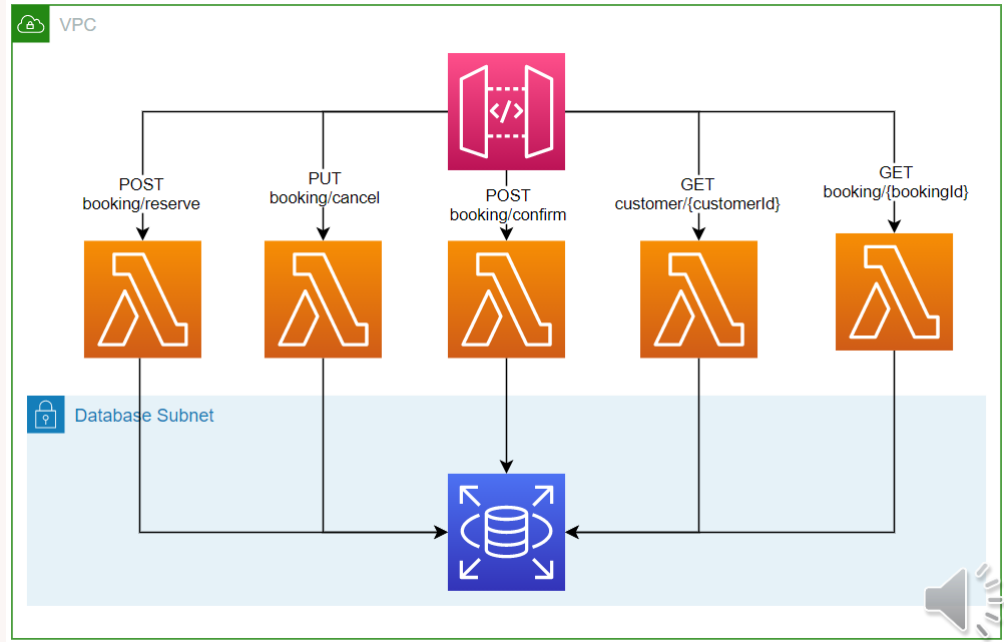


The Serverless Cloud

API & Lambda

Why use a serverless API?

- Horizontal Scalability
- Easy trouble shooting
- Simplified development
- Instant code deployment



The Serverless Cloud

Mongo

Document-Oriented

Dynamo

Key-Value Oriented

Table Scan Query for
Dynamo

```

/*****
 * Scan table for all results matching filter
 *****/

import { DynamoDBClient } from '@aws-sdk/client-dynamodb';
import { DynamoDBDocument, GetCommand, PutCommand, DeleteCommand, QueryCommand } from '@aws-sdk/lib-dynamodb';

const dynamoDbClient = new DynamoDBClient();
const docClient = DynamoDBDocument.from(dynamoDbClient);

const responseHeaders = {
  // HTTP headers to pass back to the client
  "Content-Type": "application/json",
  // the next headers support CORS
  "X-Requested-With": "*",
  "Access-Control-Allow-Headers":
    "'Content-Type,X-Amz-Date,Authorization,X-Api-Key,x-requested-with'",
  "Access-Control-Allow-Origin": "*",
  "Access-Control-Allow-Methods": "OPTIONS,*",
  // for proxies
  Vary: "Origin",
  // the "has-cors" library used by the Angular application wants this set
  "Access-Control-Allow-Credentials": "true",
};

async function queryDatabase(tableName, includeClause, whereClause) {
  // create the query params
  const paramQuery = async () => {
    // define our query
    let params = {
      TableName: tableName,
    };

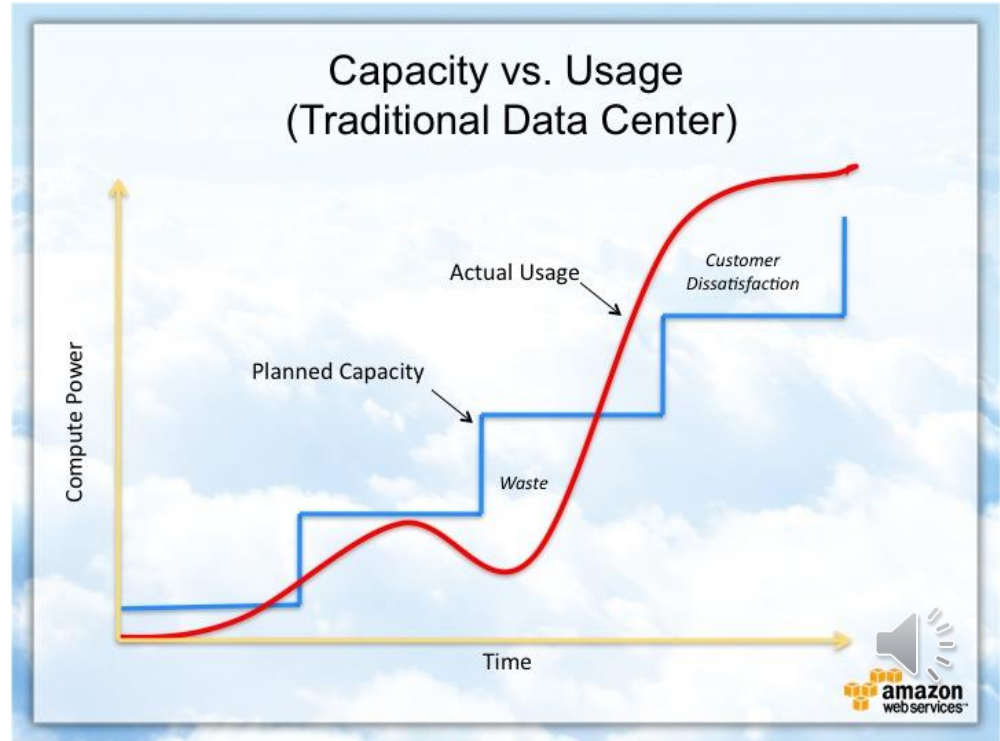
    if (whereClause) {
      // get the key and value
      let whereKey = Object.keys(whereClause)[0];
      let whereValue = whereClause[whereKey];

      // set our values
      params.ExpressionAttributeNames = { "#whereKey": whereKey };
      params.ExpressionAttributeValues = { ":whereValue": whereValue };
      params.FilterExpression = "#whereKey = :whereValue";
    }
  };
}
```



Cloud-Based Development Principles

- Elasticity
- Pay-for-use model



Securing Your Cloud App

Access

Amazon S3 > Buckets > snhuawsbucket

snhuawsbucket Info Publicly accessible

< Objects Properties **Permissions** >

Permissions overview

Access
[View analyzer for us-east-1](#)

Block public access (bucket settings)

Edit

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to all your S3 buckets and objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to your buckets or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

Block all public access

⚠ Off

► Individual Block Public Access settings for this bucket

Policies

Bucket policy Edit Delete

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#)

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "PublicReadGetObject",
      "Effect": "Allow",
      "Principal": "*",
      "Action": "s3:GetObject",
      "Resource": "arn:aws:s3:::snhuawsbucket/*"
    }
  ]
}
```

Copy

API Security

- How can you secure the connection between Lambda and Gateway?
- Lambda and the database
- S3 Bucket





CONCLUSION

- Cloud development introduces unparalleled scalability
- Cloud development allows for a plug and play environment for an application
- Cloud development can reduce hard coding time drastically.



Thank you for your time.