CS 470 Project Two Conference Presentation: Cloud Development

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Overview

Hello, my name is Zachary Meisner!

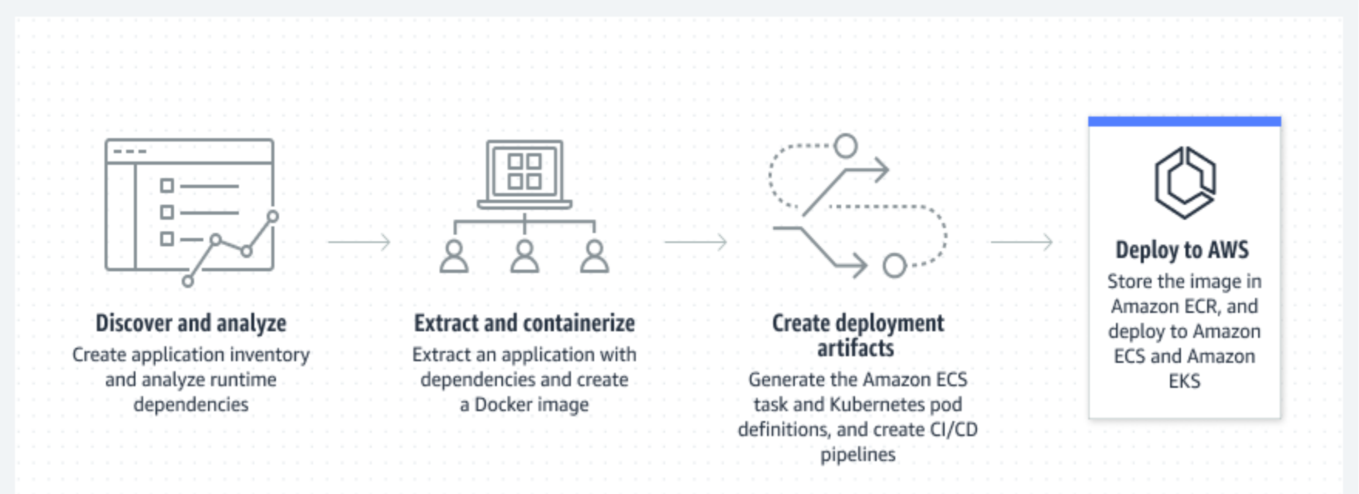
I am overjoyed that I can present for you today. I will relay to you the secrets of success when it comes to AWS serverless solutions that are revolutionizing the industry and the applications we build and deploy.

Containerization

(*Introduction to AWS Lambda - Serverless Compute on Amazon Web Services* 2015)

The Lambda Compute Model is primarily used to allow customers the ability to interact with our application with the use of integrated containerized functions. This compute infrastructure performs administration of compute resources. This serverless compute service runs code virtually for any application or backend service.

Containerization 2



Discover and analyze
Create application inventory and analyze runtime dependencies

Extract and containerize
Extract an application with dependencies and create a Docker image

Create deployment artifacts
Generate the Amazon ECS task and Kubernetes pod definitions, and create CI/CD pipelines

Deploy to AWS
Store the image in Amazon ECR, and deploy to Amazon ECS and Amazon EKS

(AWS App2Container(AC2) – Amazon Web Services 2022)

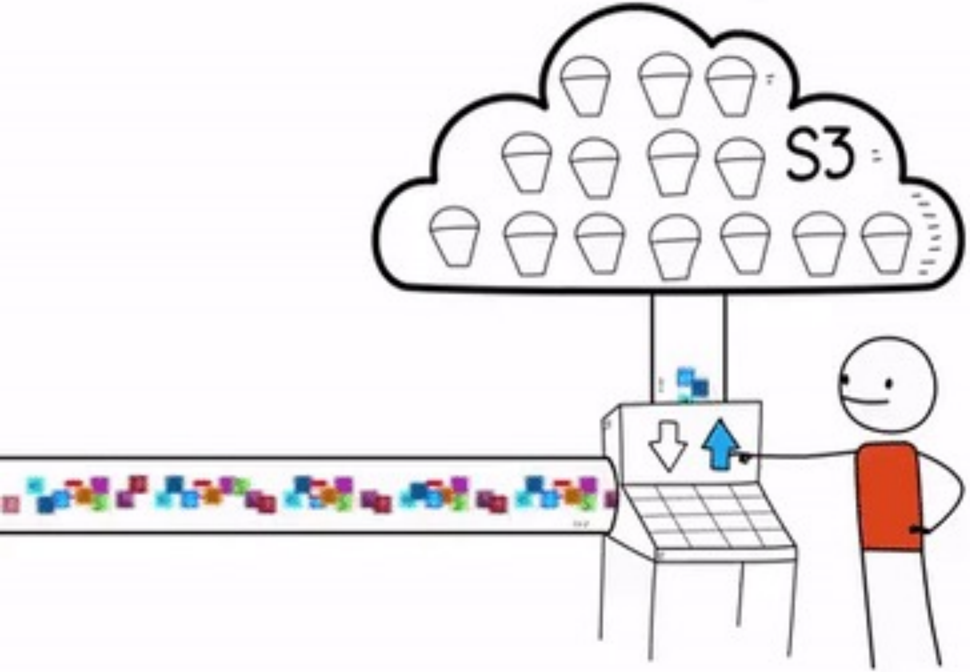
AC2 is used to modernize legacy applications. Mainly those that use Java, and .NET. This standard toolset for migrating applications offers scalability, security, and easy identification of needed dependencies and configurations for containerization.

Orchestration

(*Play with docker* 2022)

Docker Compose is a tool used to define and operate applications that require multiple containers. When using Docker Compose, a YAML file is written to configure the applications services. Portability and reproducibility of containerized processes provides the ability for easy moving, and scaling, of these applications in real time.

The Serverless Cloud



(*Introduction to Amazon S3 GIF* 2017)

“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.” (Musgrave, 2022)

The Serverless Cloud 2

Serverless

Serverless drives management, provisioning, scaling, and maintenance of your database and storage systems. The integration with security makes serverless especially powerful as its API implementation

S3 Storage

S3 storage is your data in the hands of specialists and professionals. In other words, you have top of the line security, encryption, and assurance for your data.

Local Storage

With local storage you have more of a choice on what happens with your data, but at your own risk of keeping up with not only server maintenance, but security assurance in the great cat and mouse game between threat actors and defenders.

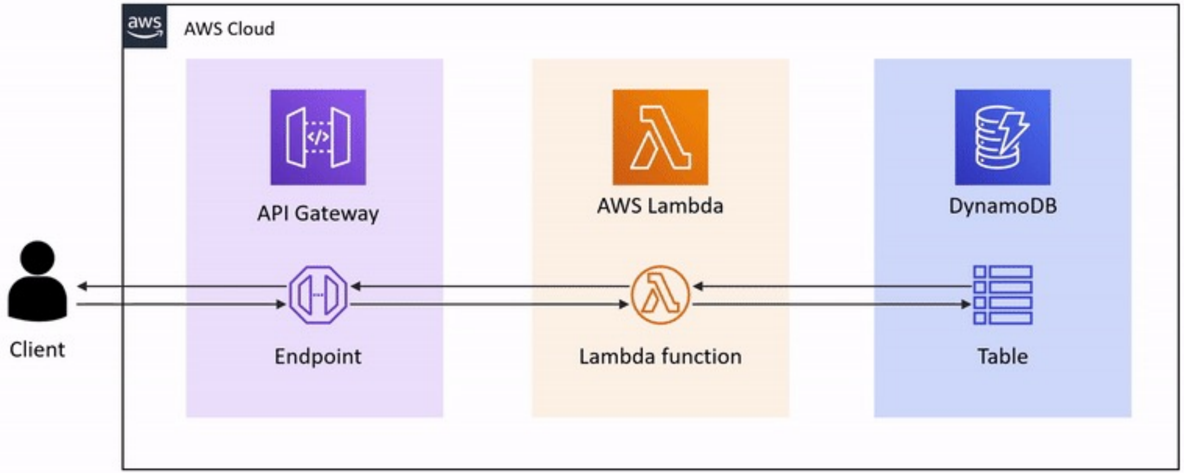
The Serverless Cloud 3

API & Lambda

Lambda API logic lets you send different requests to communicate with different containers. A single request is given to a container to execute code provided by the user to satisfy the request.

Some of the different scripts include GET, POST, PATCH, DELETE, and LIST. These scripts are written to talk to the database and assure communication with proper channels and manipulate the overall goal of the project.

The Serverless Cloud 4



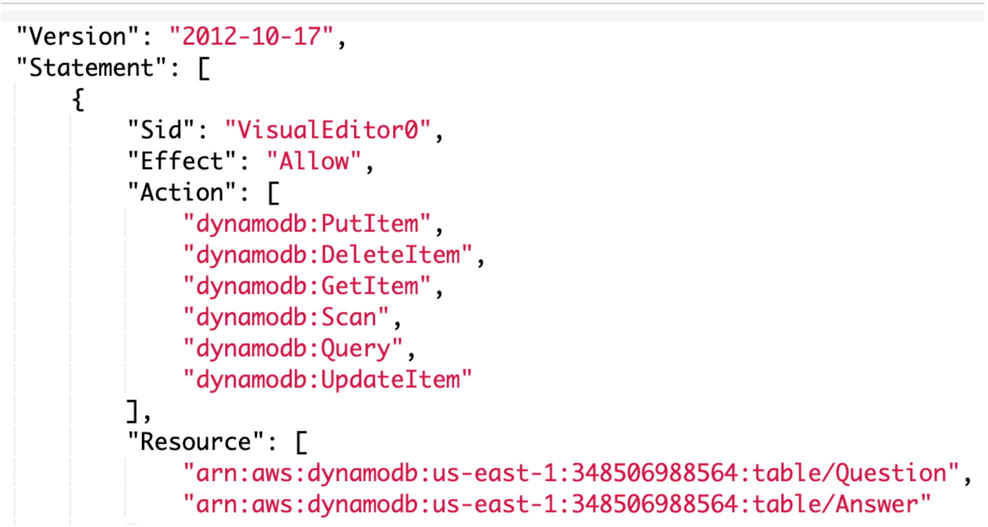
(Rehemägi, 2020)

Integrating the frontend with the backend can be done in three simple steps. 1. The creation of the table, 2. Adding needed items and attributes, and 3. Creating your query and policy. After this, you will be able to access your database from the frontend using queries!

The Serverless Cloud 5

Database

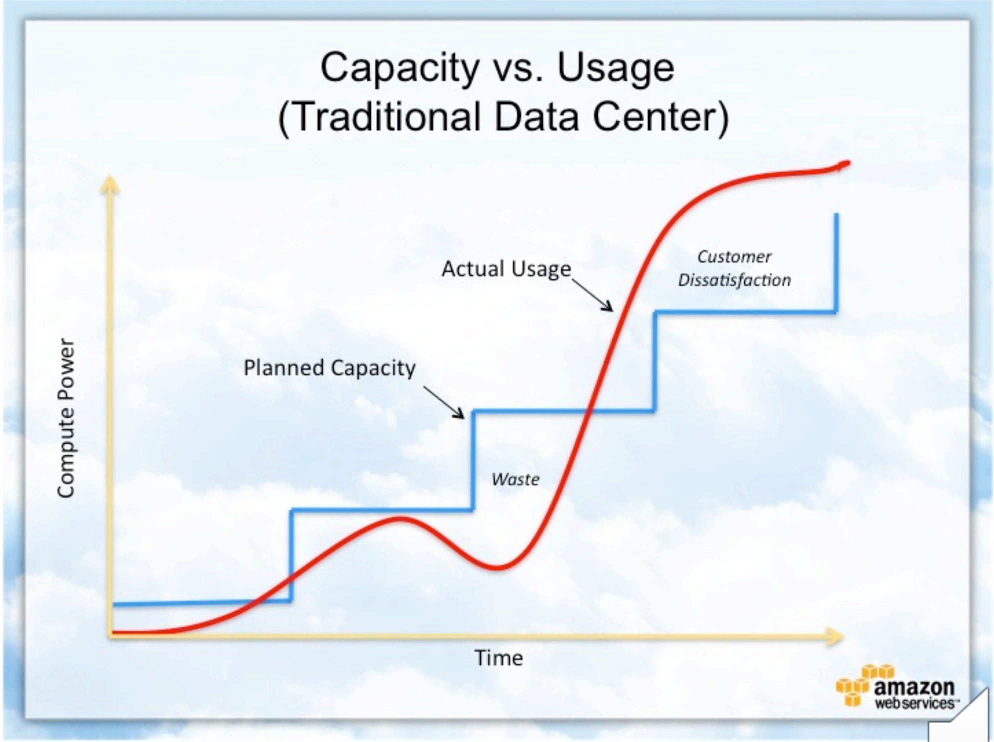
- The ability to query our database comes with functionality such as GET and POST methods, among others such as Single-Record Fetching and Upserting Records.
- The scripts needed to allow this to happen involve test events to assure functionality in addition to the implementation of policies written in JSON which are needed for each query.



```
"Version": "2012-10-17",
"Statement": [
    {
        "Sid": "VisualEditor0",
        "Effect": "Allow",
        "Action": [
            "dynamodb:PutItem",
            "dynamodb:DeleteItem",
            "dynamodb:GetItem",
            "dynamodb:Scan",
            "dynamodb:Query",
            "dynamodb:UpdateItem"
        ],
        "Resource": [
            "arn:aws:dynamodb:us-east-1:348506988564:table/Question",
            "arn:aws:dynamodb:us-east-1:348506988564:table/Answer"
```

Cloud-Based Development Principles

Elasticity is the definition of your applications usage in an amorphous way. This is downscaling the resources your application is using relative to who is using it and when, in addition to upscaling these resources on demand when needed. This allows for appropriate pricing models that reflect the actual state of need that a customer has when hosting their website or application.



Securing Your Cloud App

Access

Lambda allows the setting of execution policies for security credentials. This would disallow unauthorized parties from executing certain functionality within your application. Lambda recommends each function have a unique role to assure security to keep your application secure.

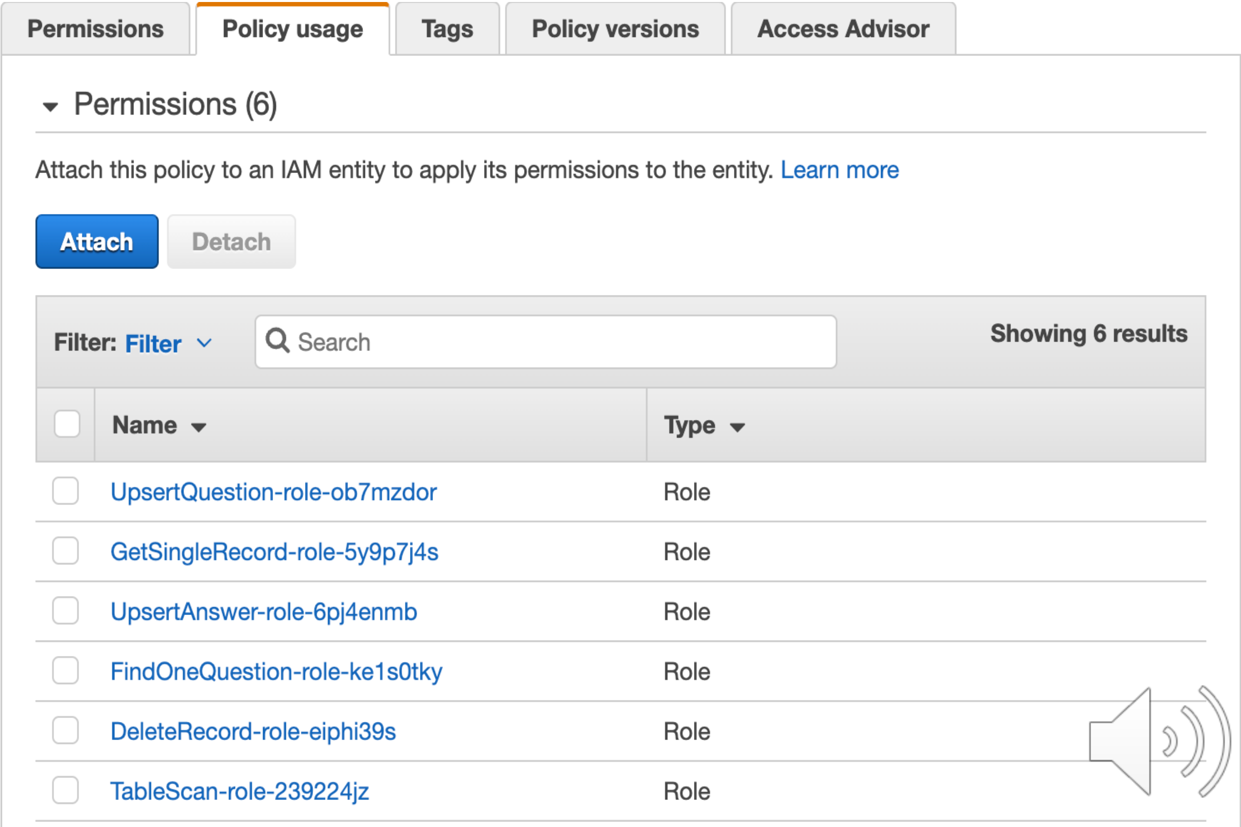
(*Vulnerable AWS Lambda function – Initial access in cloud attacks - Blog Article* 2022)

Securing Your Cloud App 2

Policies

One custom policy I created was named LambdaAccessToQuestionAndAnswerTable.

Each Lambda function has an IAM role which policies can be attached to. These roles define permissions that the function needs to access other AWS Services and Resources.



▾ Permissions (6)

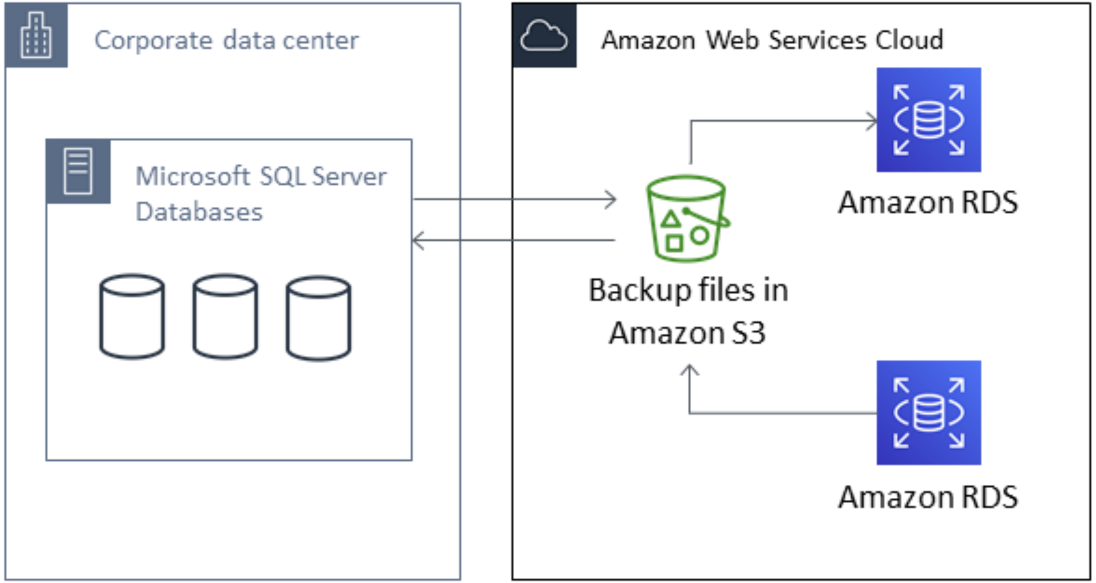
Attach this policy to an IAM entity to apply its permissions to the entity. Learn more

□	Name ▾	Type ▾
□	UpsertQuestion-role-ob7mzdor	Role
□	GetSingleRecord-role-5y9p7j4s	Role
□	UpsertAnswer-role-6pj4enmb	Role
□	FindOneQuestion-role-ke1s0tky	Role
□	DeleteRecord-role-eiphi39s	Role
□	TableScan-role-239224jz	Role

Securing Your Cloud App 3

API Security

- Defining different levels of access, monitoring, logging, authorization, and authentication are all different ways to secure Lambda/Gateway connectivity.
- Using an RDS proxy filters your functions by managing database connections that relay queries.


Corporate data center
Microsoft SQL Server Databases
Amazon Web Services Cloud
Backup files in Amazon S3
Amazon RDS
Amazon RDS

(Amazon, 2022)

CONCLUSION

Cloud development is pertinent as the ever-evolving front of technology offers new and improved ways to solve problems, in addition to defending against new threats that lurk around the corner. Streamlining the ease of application and web management in addition to the affordable cost factor, make it easy to handle these issues on a case-by-case basis. Full Stack integration overtime will prove that migration to architectures like AWS, will further the safety of our community's infrastructure, and ability to assure profitability at cost, and ease.

Thank you for your time.

Citations

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