The background of the slide features a blue gradient with a network of white lines and dots, resembling a globe or a complex system. Overlaid on this are several interlocking gears of different sizes, some of which are glowing with a bright blue light. Two human hands are visible: one at the top left, with the index finger pointing towards the gears, and another at the bottom center, with the palm facing upwards as if supporting or presenting the system.

# CS 470 Project Two Conference Presentation: Cloud Development

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# Overview

- About me!
- Purpose of the presentation:
  - Migration of full stack to cloud-native app
  - AWS microservices
  - Containerization and Orchestration
  - Serverless Architecture
  - Cloud-based development principles

# Containerization

- **Models used**
  - Containers
- **What tools are necessary for containerization?**
  - Docker
  - Docker Compose

The image displays four screenshots related to Docker containerization:

- Top Left:** Docker Desktop interface showing a table of containers. The table has columns: Name, Image, Status, Port(s), CPU (%), and Actions. The containers listed are `ferret` (node-lafs-a, Exited (137)), `mongod` (mongo, Exited), and `mongos` (mongo, Exited).
- Top Right:** A terminal window showing a JSON object: `{ "started": "2024-07-11T07:45:02.877Z", "uptime": 1.736 }`.
- Bottom Left:** A Windows PowerShell terminal showing the output of a Docker build command. The output includes steps like `COPY package*.json .`, `RUN npm install`, `COPY .`, `exporting to image`, `exporting layers`, `writing image sha256:f3418774d0b0185ffefafb28c0de93e999e4dbc99e9f69961cb34f60fb561d53`, and `naming to docker.io/library/node-lafs-api`.
- Bottom Right:** A web browser showing the LoopBack API Explorer for the API `learn-angular-from-scratch-step-by-step-api`. The interface includes fields for `answer`, `question`, and `User`, and a `Token Not Set` message.

# Orchestration

- Values of using Docker Compose
  - Simplified Configuration
  - Multi-Container management
  - Efficient workflow
  - Scalability

The image displays two screenshots related to Docker Compose and API management.

The left screenshot shows a Windows PowerShell terminal window with the following output:

```
PS C:\Users\tonem\lfafe-api> docker-compose up
time="2024-07-11T21:57:17-06:00" level=warning msg="C:\\Users\\tonem\\lfafe-api\\docker-compose.yml: 'v
ersion' is obsolete"
time="2024-07-11T21:57:17-06:00" level=warning msg="networks.default: external_name is deprecated. Ple
ase set name and external: true"
[*] Running 2/0
[+] Container lfafe-db Created
[+] Container lfafe-api Created
Attaching to lfafe-api, lfafe-db
lfafe-db | {"t":{"id":"2024-07-12T03:57:17.594+00:00"},"s":"I", "c":"CONTROL", "id":23285, "ct
x":"main","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtoco
ls=tlsv1"}
lfafe-db | {"t":{"id":"2024-07-12T03:57:17.597+00:00"},"s":"I", "c":"NETWORK", "id":6448683, "ct
x":"main","msg":"Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set tcpFastOpenServer
, tcpFastOpenClient, and tcpFastOpenQueueSize."}
```

The right screenshot shows the Docker Desktop interface. The 'Containers' tab is active, displaying a table of running containers:

Name	Image	Status	Port(s)	CPU (%)	Actions
lfafe-api	node:lfafe	Exited (137)	4200-4200	0%	1   1   1
lfafe-db	mongo:4	Running (2/2)	27017-27017	0.45%	1   1   1
lfafe-api	node:lfafe	Running	3000-3000	0%	1   1   1

Below the table, it shows 'Showing 4 items' and 'RAM 1.21 GB CPU 0.00%'. The rightmost screenshot shows the 'LoopBack API Explorer' interface, which is a web-based tool for managing API instances. It includes a 'learn-angular-from-scratch-step-by-step-api' section and a 'question' section with various actions like 'Patch an existing model instance or insert a new one into the data source'.



# The Serverless Cloud

## Serverless

- **Serverless and its advantages**
  - Using someone else's servers
  - Managing servers
  - Cost of compute time and other resources
  - Operational and developmental complexity
  - Security
- **S3 storage compared to local storage**
  - S3 Cloud storage
  - Local storage
  - Both store data and files
  - Differ in security, durability, scalability, and cost



# The Serverless Cloud

## API & Lambda

- **Advantages of using a serverless API**
  - Code development and deployment
  - Cost and compute time
- **Lambda API Logic**
  - Event driven
  - Functions handle requests
  - API gateway or other sources
  - Scaling
  - Execution
  - Efficient routing and data handling
- **Scripts**
  - Supports different coding languages
  - IAM roles and policies
- **Integrating the frontend with the backend**
  - Lambda functions
  - API Endpoints
  - Frontend integration
  - Testing
  - Monitoring and debugging

### Event JSON

[Format JSON](#)

```
1 {  
2   "queryStringParameters": {  
3     "name": "David"  
4   }  
5 }  
6 |
```



us-east-1.console.aws.amazon.com/lambda/home/region/us-east-1#/functions/DeleteRecord/newFunction>true&tab=testing

Services Search [Alt+S] N. Virginia vmlab/now336032-Tom\_Sean@

The area below shows the last 4 KB of the execution log.

```
{
  "statusCode": 200,
  "body": "({\"DeleteData\": {
    \"httpStatusCode\": 200, \"requestId\": \"f9f028d4e137782542139f33744616c546b7f660843AA30\", \"attempt\": 1, \"totalRetryDelay\": 0 } })",
  "headers": {
    "Content-Type": \"application/json\",
    \"X-Requested-With\": \"XMLHttpRequest\",
    \"Access-Control-Allow-Headers\": \"Content-Type,X-Amz-Data-Authorization,X-Api-Key,X-Requested-With\",
    \"Access-Control-Allow-Origin\": \"*\",
    \"Access-Control-Allow-Methods\": \"POST,GET,PUT\"
  }
}
```

### Summary

Code SHA-256	Execution time
JHX9P2Fofl0GUYmjaVlYRR1gg90SgnVHWRAyypg/QY:	11 seconds ago (August 2, 2024 at 02:48 AM MDT)
Request ID	Function version
bb343c32-1449-4981-b4e5-e93ba20b97a	SLATEST
Duration	Billed duration
305.23 ms	306 ms
Resources configured	Max memory used
128 MB	91 MB

### Log output

The section below shows the logging calls in your code. [Click here](#) to view the corresponding CloudWatch log group.

```
START RequestId: bb343c32-1449-4981-b4e5-e93ba20b97a Version: SLATEST
END RequestId: bb343c32-1449-4981-b4e5-e93ba20b97a
REPORT RequestId: bb343c32-1449-4981-b4e5-e93ba20b97a Duration: 305.23 ms Billed Duration: 306 ms Memory Size: 128 MB Max Memory Used: 91 MB
```

Test event TestDeleteAnswer was successfully saved.

Save Test

us-east-1.console.aws.amazon.com/lambda/home/region/us-east-1#/functions/EchoFunction/newFunction>true&tab=code

Services Search [Alt+S] N. Virginia vmlab/now336032-Tom\_Sean@ 1670-0009-4841

Successfully updated the function EchoFunction.

Function URL: info

Code Test Monitor Configuration Aliases Versions

### Code source info

Upload from

Go to Anything (Ctrl-F) index.mjs Execution results

Execution results

Execution results

Test Event Name

Response

```
{
  "statusCode": 200,
  "body": "Hello World!"
}
```

Function Logs

```
START RequestId: a3d4f2a-32d2-4776-bcf3-2bca0b04e7 Version: SLATEST
2024-07-25T07:29:35.740Z a3d4f2a-32d2-4776-bcf3-2bca0b04e7 DFD Received name: David
2024-07-25T07:29:35.740Z a3d4f2a-32d2-4776-bcf3-2bca0b04e7 DFD
{"name":"David"}
2024-07-25T07:29:35.740Z a3d4f2a-32d2-4776-bcf3-2bca0b04e7 DFD Response:
{"statusCode":200,"body":"Hello World!"}
END RequestId: a3d4f2a-32d2-4776-bcf3-2bca0b04e7
REPORT RequestId: a3d4f2a-32d2-4776-bcf3-2bca0b04e7 Duration: 30.07 ms Billed Duration: 31 ms Memory Size: 128 MB
```

Request ID

us-east-1.console.aws.amazon.com/lambda/home/region/us-east-1#/functions/GetSingleRecord/newFunction>true&tab=testing

Services Search [Alt+S] N. Virginia vmlab/now336032-Tom\_Sean@ 1670-0009-4841

The test event TestGetAnswer was successfully saved.

### Executing function: succeeded [logs]

Details

The area below shows the last 4 KB of the execution log.

```
{
  "statusCode": 200,
  "body": "({\"GetData\": {
    \"httpStatusCode\": 200, \"requestId\": \"f9f028d4e137782542139f33744616c546b7f660843AA30\", \"attempt\": 1, \"totalRetryDelay\": 0 } })",
  "headers": {
    "Content-Type": \"application/json\",
    \"X-Requested-With\": \"XMLHttpRequest\",
    \"Access-Control-Allow-Headers\": \"Content-Type,X-Amz-Data-Authorization,X-Api-Key,X-Requested-With\",
    \"Access-Control-Allow-Origin\": \"*\",
    \"Access-Control-Allow-Methods\": \"POST,GET,PUT\"
  }
}
```

### Summary

Code SHA-256	Execution time
nF6GchY71DlUf4bnd5KSV6/GKASdyW03c	now (August 2, 2024 at 02:01 AM MDT)
Request ID	Function version
ae4562c9-7063-4121-ab3b-26179ae9b997	SLATEST
Duration	Billed duration
33.63 ms	34 ms
Resources configured	Max memory used
128 MB	91 MB

### Log output

The section below shows the logging calls in your code. [Click here](#) to view the corresponding CloudWatch log group.

```
START RequestId: ae4562c9-7063-4121-ab3b-26179ae9b997 Version: SLATEST
END RequestId: ae4562c9-7063-4121-ab3b-26179ae9b997
REPORT RequestId: ae4562c9-7063-4121-ab3b-26179ae9b997 Duration: 33.63 ms Billed Duration: 34 ms Memory Size: 128 MB Max Memory Used: 91 MB
```



# The Serverless Cloud

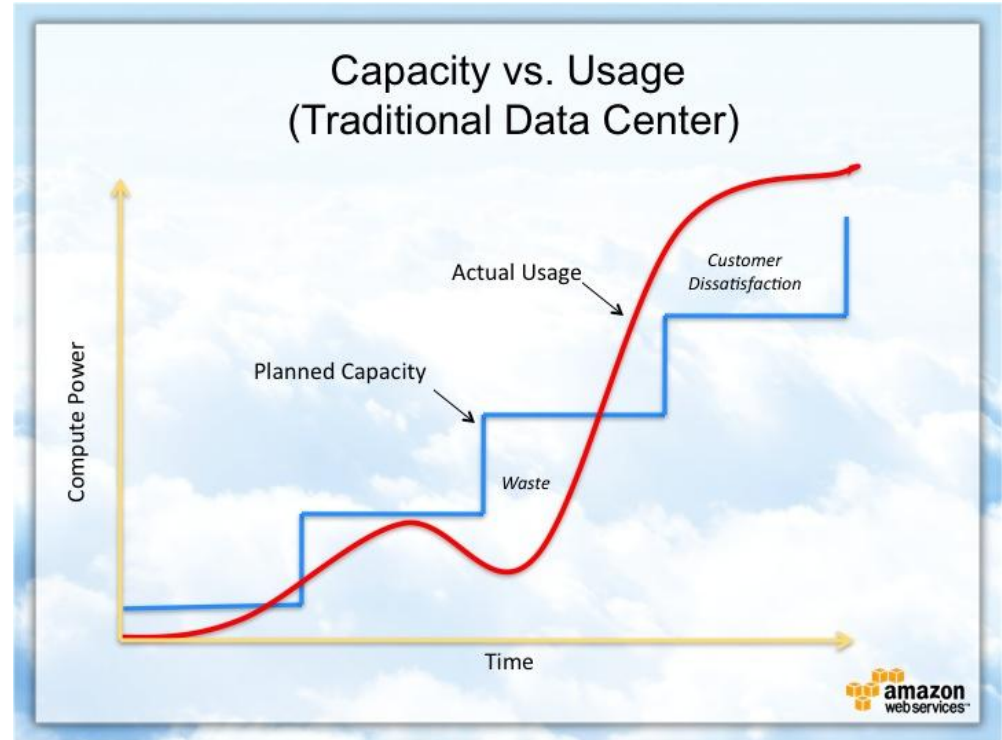
## Database

- **Differences between MongoDB and DynamoDB**
  - Hosting location
  - Configuration complexity
  - Security
  - Availability
  - Compatibility
  - Capacity
  - Query methods
  - Data types
- **Queries performed**
  - Questions and Answers tables
  - Scripts produced for queries



# Cloud-Based Development Principles

- **Elasticity**
  - Scaling
  - Storage
  - Resources
- **Pay-for-use model**
  - Computing
  - Storage
  - Data transfer





# Securing Your Cloud App

## Access

- IAM roles and policies

## Policies

- Roles/ Permissions
- Policies / LabRole

## API Security


- IAM Roles/Policies
- Encryption
- Bucket policies
- Lambda and the database
- S3 Bucket

# CONCLUSION

- Scalability
- Cost Efficiency
- Management

**Categories**


Learn all about Angular



Angular

Angular is a platform that makes it easy to build applications with the web.


Angular JS   Angular 2   Angular 4   Angular 5   Angular 6   Angular 7



Angular CLI

Angular cli is a command line interface to scaffold and build angular apps using nodejs style modules.

Angular CLI   Testing



TypeScript

TypeScript is a typed superset of JavaScript that compiles to plain JavaScript.

Javascript   Webpack   Typescript 2.x