

# Understanding Cloud Disaster Recovery Costs

Natalie Serebryakova  
Staff Cloud Engineer



# About me

- My name is Natalie
- I'm a Staff Cloud Engineer

- Worked at  Symantec   reddit 

- Consulting <https://www.in-n-out.cloud> 
- AWS Community Builder
- LinkedIn: <https://www.linkedin.com/in/login-id/>



# Agenda

- **What is Disaster Recovery**
- **What is Cost Estimation and Optimization**
- **Business Continuity Planning**
- **Estimating DR Costs for Cloud resources**
- **Example of Cost Optimization for Services hosted on AWS Cloud (EKS, RDS)**

\* examples and financial numbers used in this presentation are not the real data

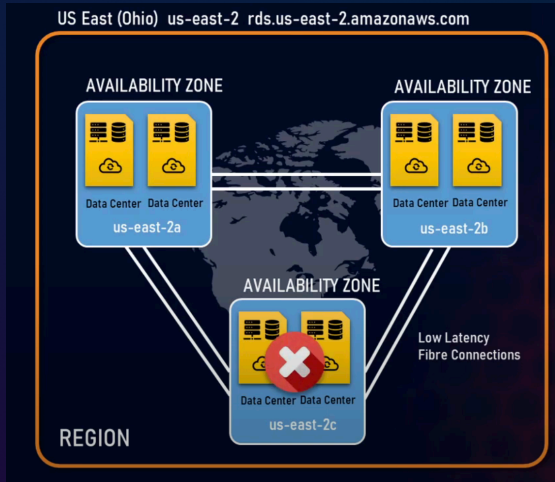


# What is a Disaster?

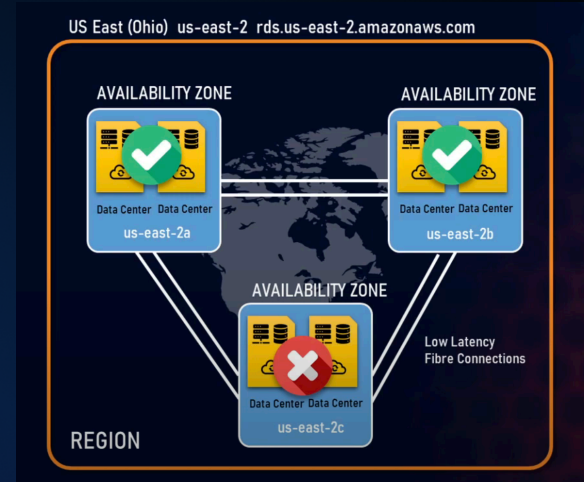
Natural Disaster	Technical Failures	Human Action
Earthquake	Power failure	Unintentional misconfiguraiton
Floods	Network connectivity	Unauthorized access or modifications



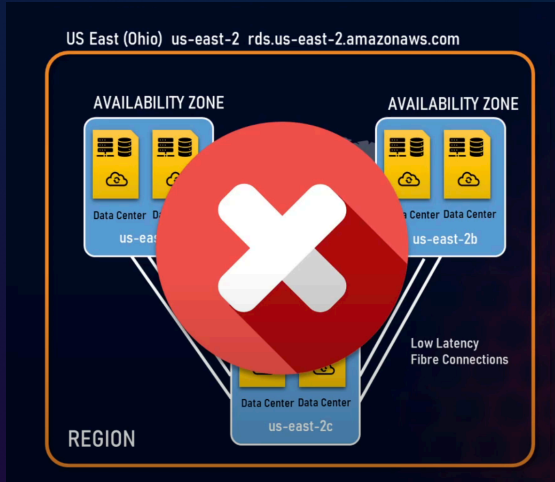
# High Availability



High Availability



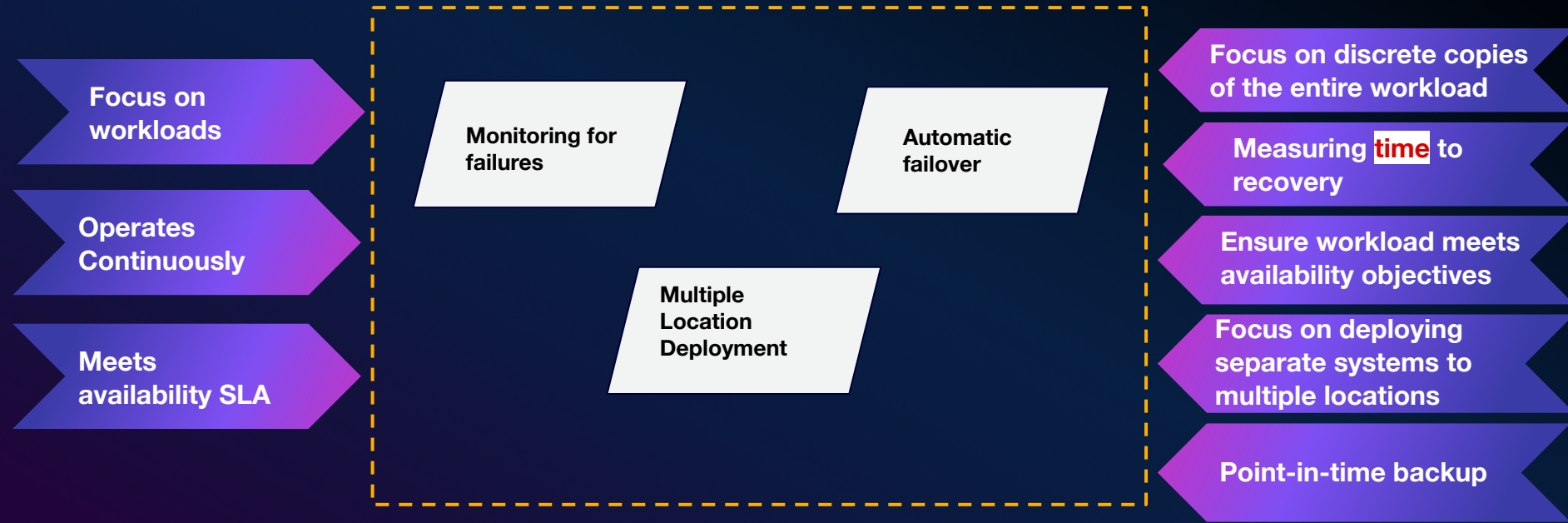
# Disaster Recovery



Disaster Recovery



# High Availability is not a Disaster Recovery



# Resiliency: workload ability to recover quickly

DR and Availability

DR measures objectives for one-time events

Recovery  
Objectives

Disaster Recovery

RTO (Recovery Time)

RPO (Recovery Point)

Resiliency

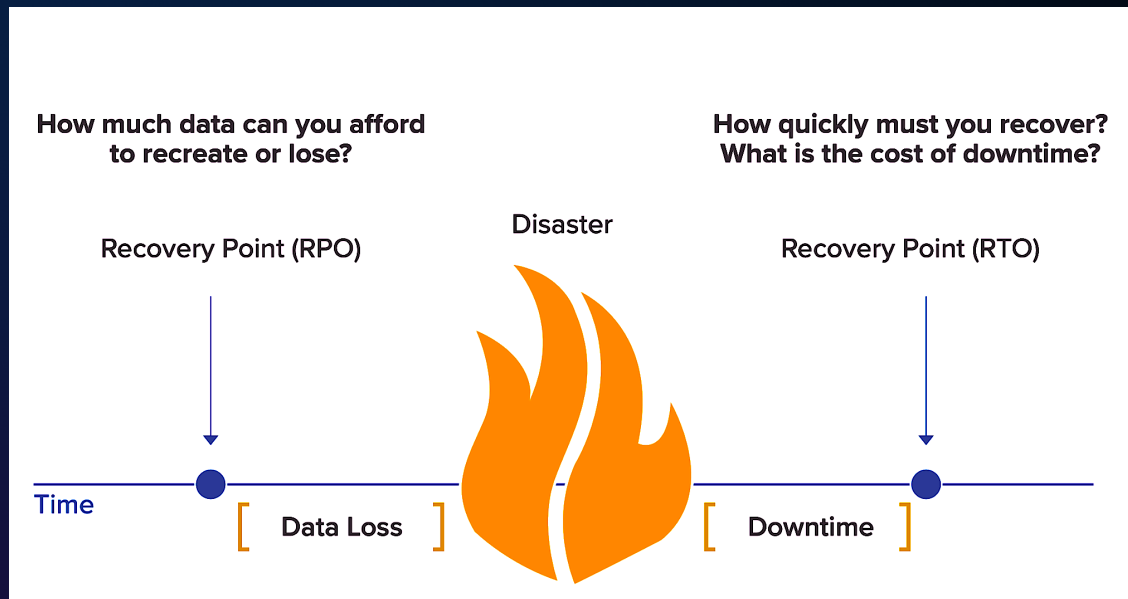
Availability

MTBF (Mean time between Failures)

MTTR (Mean time to Recover)



# RPO and RTO



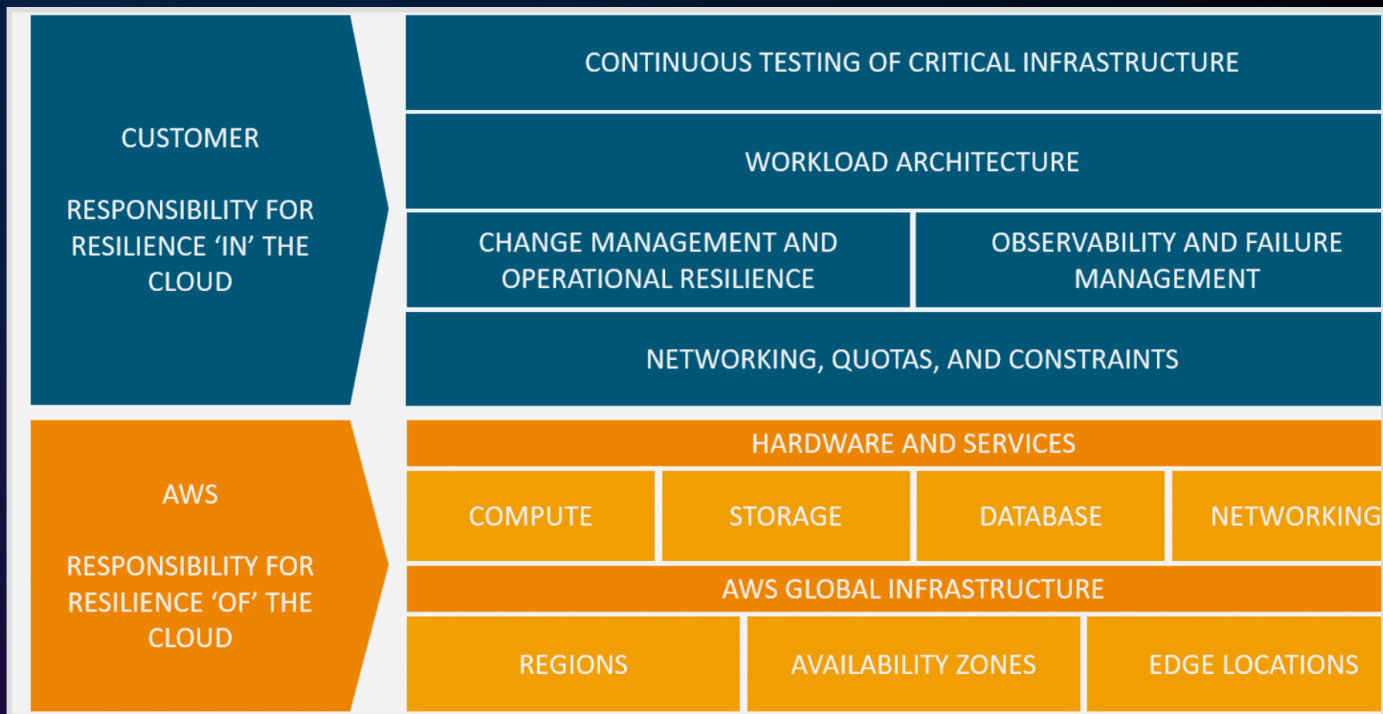
**Resiliency** is workload ability to recover quickly

+

and **dynamically acquire computing resources** to meet demand



# Cloud Resiliency



\* Image: from official AWS documentation AWS [original doc](#)



# Cloud Disaster Recovery (DR)

A combination of **strategies** and **services** intended to minimize downtime and data loss with fast, reliable recovery.



# Cost Estimation and Cost Optimization

**Cost Estimation** is a process of forecasting the expenses associated with using Cloud services over a given period.

**Cost Optimization** is the approach to reduce expenses and maximize value while maintaining product quality and business efficiency.



# Business Continuity Planning

**BCP** is the process involved in creating a system of prevention and recovery from potential threats to a company.

**Cloud Disaster recovery** is an essential part of any organization's BCP focused on safeguarding data and infrastructure



# Components involved in optimizing DR costs

- Compute Costs
- Storage Costs
- Data Retrieval/Backup Costs
- Network Costs
- License Costs
- Support



# Tools and Approaches for Cost Optimization

- Define Budgets and Set Alerts
- Utilize Pricing Calculators, Amazon QuickSight service
- Configure Cost Management Tools
- Continuously Review and Optimize
- 3rd party tooling, e.g.:
  - K8s -> Cast.ai
  - IaC -> Infracost



# Cloud Provider: Pricing Calculators (free)

aws

pricing calculator

Feedback

Language: English

Contact Sales

Create an AWS Account

AWS Pricing Calculator

My Estimate

Create estimate: Configure AWS Application Migration Service

Step 1

Add service

Step 2

Configure service

Create estimate: Configure AWS Application Migration Service

Info

Description

Enter a description for your estimate

Choose a location type

Info

Choose a Region

US East (Ohio)

Configure AWS Application Migration Service (MGN)

Info

While your source servers are actively replicating, including during the free period, you will incur charges for any AWS infrastructure that is provisioned by AWS Application Migration Service to facilitate data replication. You will also incur charges for resources that are provisioned when you launch test or cutover instances, such as compute (Amazon EC2) and storage (Amazon EBS) resources, according to your AWS pricing plan. [Learn more about service pricing, here.](#)

This calculator only provides the fees accrued to the MGN service. Charges for EC2 and EBS resources, are not included in the cost estimates of this calculator.

Number of server/s

Number

Number of hour/s per server

Number

Show calculations

Pricing Calculator | Microsoft A...

azure.microsoft.com/en-us/pricing/calculator/

Azure

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Pricing calculator

Calculate your estimated hourly or monthly costs for using Azure.

Try Azure for free

Create a pay-as-you-go account

Log in to save cost estimates and use your Azure agreement pricing.

Products

Example scenarios

Saved estimates

FAQs

Select a product to include it in your estimate.

Search products

Popular

Compute

Networking

Storage

Web

Mobile

Containers

Databases

Virtual Machines

Provision Windows and Linux VM in seconds

Storage Accounts

Durable, highly available, and massively scalable cloud storage

Azure SQL Database

Build apps that scale with managed and intelligent SQL database in the cloud

App Service

Quickly create powerful cloud apps for web and mobile

Azure Cosmos DB

Build or modernize scalable, high-performance apps

Azure Kubernetes Service (AKS)

Deploy and scale containers on managed Kubernetes

Azure Functions

Azure AI services

Microsoft Cost Management

Out with Sales

Compute Engine

\$138.70 / month

Service type

Instances

Instances configuration

Advanced settings

Number of Instances\*

Instance-time\*

730 hours per m...

Changing Instance-time will automatically calculate number of instances, assuming 100% run time.

Operating System / Software\*

Free: Debian, CentOS, CoreOS, Ubuntu or BYOL (Bring Your Own License)

Provisioning Model

Regular

Spot (Preemptible VM)


Machine type\*

Machine Family\* General Purpose

Series\* N1

Machine type\* n1-standard-4

Machine Type Based on your selections n1-standard-4 vCPU: 4, RAM: 15 GB

In-n-out.cloud

# Tools and Approaches for Cost Estimation

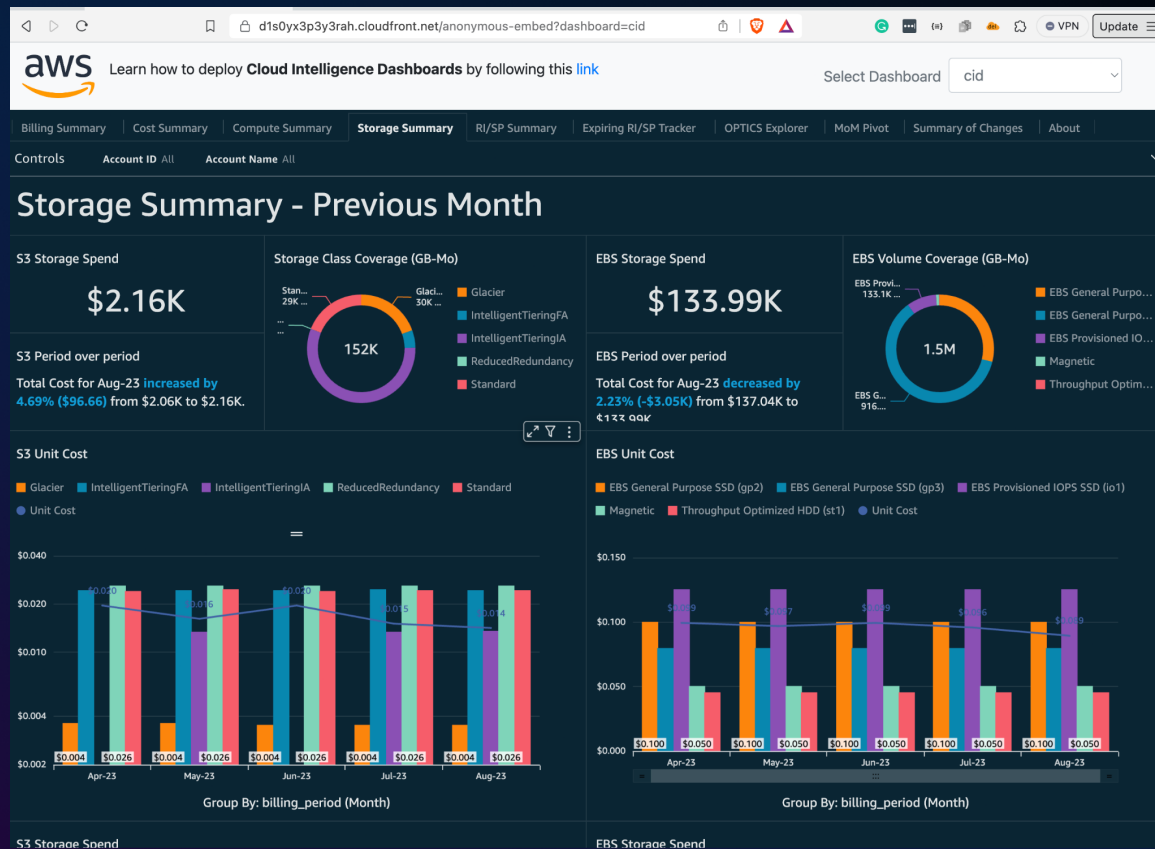
Disaster Recovery Option	Monthly RDS Cost	Backup Storage Cost (if applicable)	Total Monthly Cost
Backup and Restore	\$1,000	\$100 (Backup storage)	\$1,100
Pilot Light	\$1,100	—	\$1,100
Warm Standby	\$1,500	—	\$1,500
Multi-Region Failover	\$2,100	—	\$2,100
→ ~ C			

DR Option	Monthly EC2 Cost	Monthly EBS Cost	Total Estimated Monthly Cost
-----	-----	-----	-----
Backup and Restore	\$800	\$200	\$1,000
Pilot Light	\$900	\$200	\$1,100
Warm Standby	\$1,200	\$200	\$1,400
Multi-Region Failover	\$2,000	\$200	\$2,200
→ ~			

DR Option	Monthly VPC Cost	Monthly <a href="#">AZs</a> Cost	Monthly SGs Cost	Total Estimated Monthly Cost
-----	-----	-----	-----	-----
Backup and Restore	\$100	\$200	\$50	\$350
Pilot Light	\$120	\$220	\$60	\$400
Warm Standby	\$150	\$250	\$70	\$470
Multi-Region Failover	\$200	\$300	\$100	\$600
→ ~				



# Viewing Service Utilization in Amazon QuickSight



# Example: Assumptions

This **Example** demonstrates how to optimize costs for a company operating during **US market hours**.

**Goal:** The disaster recovery (DR) strategy and resource utilization must ensure high availability specifically during these market hours.

**Approach:** Utilize "*cost factors*" to allocate monthly Cloud costs according to the resource utilization of each DR strategy.

**Current DR strategy :** Pilot Light (Multi Regional Failover)



# Step 1: Identify and Select DR Strategies

The goal is to create a DR plan that balances cost, recovery time objectives (RTOs), and recovery point objectives (RPOs) to meet the organization's unique needs and risk profile.



\* Image: from official AWS documentation AWS [original doc](#)

## Example:

Current DR strategy :

Pilot Light (Multi Regional Failover)

*Is this the optimal DR strategy?*



## Step 2: Define DR services

- **Find Critical Workloads** - applications that are critical to business operations
- **Classify Resources by importance** - e.g., critical, important, non-essential  
Including supporting infrastructure.
- Calculate Recovery Point Objectives (**RPO**) and Recovery Time Objectives (RTO)
- Review **Compliance** and **Legal** Requirements
- Create a Recovery Hierarchy



# Step 3: Calculate Utilization Percentages

- **Collect Data:**

Collect metrics: CPU utilization for EC2 instances, read/write operations for RDS databases, etc

- **Analyze Peak and Average Utilization**(*resource's potential is used*) :

Calculate the peak and average utilization of these resources over a defined period.

- **Set Baselines:**

Establish what is considered 100% utilization for each type of resource.

(e.g: for EC2, it might be when the CPU is above 90% usage)

- **Calculate Percentages:**

**Utilization percentage** is calculated by comparing the **actual usage data** to the **baseline maximum capacity**.



## Step 4: Define “Cost Factor” for utilized resources

**"Cost factors"** percentage of total Cloud spending that each Disaster Recovery (DR) strategy accounts for.

$$\text{Cost Factor} = (\text{Total Resource Cost} / \text{Cost of DR Strategy}) \times 100\%$$



## Example: DR infrastructure resources used

Resource	Type	Quantity	Utilization in Multi-Region Failover
EC2 Instances	c5.xlarge	2	Low (16%) during the day with high memory spikes
	m5.24xlarge	3	High during market(trading) hours (70%), very low off-hours (5%)
EKS Clusters	m5.24xlarge	3	High during trading hours (70%), very low off-hours (5%)
RDS Databases	db.m5.large	1	Constantly high (100%)
AWS Backup	For RDS Aurora	0	0% (snapshots taken every hour)



# Example#1: Cost factor for EKS resources

Objective:

- Underutilization during non-peak hours:  
Indicate over-provisioning, as usage significantly drops outside of market hours.
- High utilization during trading hours:  
Justify the choice of **m5.24xlarge** instances during those peak periods.



# Example#1: Cost Factor Calculation for EKS Cluster

Total Costs:

- **Monthly cost for running:** 3 x m5.24xlarge instances, each instance costs \$4.608/ per hr 24/7 30 days

Total monthly cost =  $3 \times \$4.608 \times 24 \times 30 \text{ days} = \$9950.4$

- **Failover-Specific Costs:** Costs associated with the Multi-Region Failover setup during peak operational hours (assuming 10 hours/day).

Failover cost per day =  $3 \text{ instances} \times \$4.608 \text{ per hour} \times 10 \text{ hours} = \$138.23$

Failover cost per month =  $\$138.23 \times 30 \text{ days} = \$4146.9$

- **Cost Factor:**

Cost Factor =  $(\text{Monthly Failover Cost} / \text{Total Monthly Cost}) \times 100\%$

Cost Factor =  $(\$4146.9 / \$9950.4) \times 100\% \approx 41.7\%$

Approximately **41.7%** of the total EKS EC2 costs are dedicated to supporting Multi-Region Failover operations.

*Is it the best DR strategy?*



# Example#1: Ways to Optimize EKS cost

- **Right-Sizing:** Transition to using fewer instances in standby mode during off-peak hours for EKS instances
- **Cost Efficiency:** fewer instances running continuously
- **Transition to Warm Standby:**
  - Assumption: Reduce standby instances to 3 x m5.xlarge running 24/7 in the standby region.
  - New Monthly Cost for Standby:  $3 \times \$0.1920 \times 24 \times 30 = \$414.72$
  - Savings: Original Monthly Cost - New Monthly Cost =  $\$4146.9 - \$414.72 = \$3732.17$
  - Percentage Savings:  $(\$3732.17 / \$4146.9) \times 100\% \approx 89\%$

Transition to a Warm Standby setup results in a reduction **89%** in monthly EC2 costs while still maintaining the necessary readiness for a quick failover during emergencies.



# Example#2: Cost factor for snapshots to AWS Backup

Objective:

RDS instance with 500GB of storage, generate 30 GB of transaction logs monthly.

## Backup Storage Costs:

- Storage: 500 GB x \$0.095 per GB-month = **\$47.50** per month.

## Transaction Log Costs:

- **Assumption:** 30 GB of transaction logs generated per month.
- Storage for Logs: 30 GB x \$0.095 per GB-month = **\$2.85** per month.

## Total Monthly Cost for Continuous Backup:

- Total Cost: \$47.50 (backups) + \$2.85 (logs) = **\$50.35** per month



## Example#2: Cost Factor Calculation for AWS Backup

Cost Factor for Continuous Backup:

- Cost Factor =  $(\$50.35 / \$10,000) \times 100 \% = 0.5035\%$

Operational Flexibility:

- Simplified Operations: Managing continuous backups can be simpler operationally, because it removes the need to schedule snapshot timings and manage snapshot storage growth directly.



## Example#2: Ways to Optimize AWS Backup cost

- **Review and Adjust:**

Regularly review backup storage requirements.

Delete outdated backups and adjust retention policies.

- **Lifecycle Policies:**

Implement lifecycle policies to transition older backups to more cost-effective storage classes, such as moving backups to Amazon S3 Glacier for long-term storage at lower costs.

- **Cross-Region Backup Optimization:** for cross-region backups, strategically select regions where storage costs are lower, if regulatory compliance permits.



# Viewing Service Utilization in Amazon QuickSight

## CUDOS Dashboard: EC2 Instance Usage %

aws Learn how to deploy **Cloud Intelligence Dashboards** by following this [link](#)

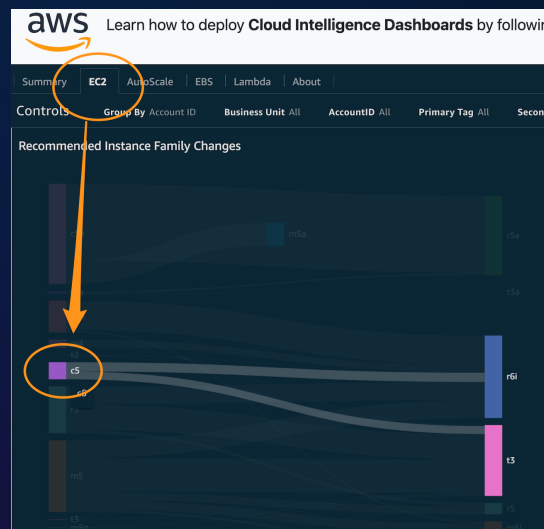
Executive: Billing Summary | Executive: RI/SP Summary | Executive: MoM Trends | **Compute** | Storage & Backup | Amazon S3 | Databases

Controls Payer Accounts All Account Names All Linked Account IDs All Usage Unit Normalized

EC2 Instances Usage time % and Cost  
For EC2 Elasticity reporting period. Select Instance to filter


Instance	Account	Region	Instance Type	Cost	Usage %	Usage Hours
i-Ac/mFcIENy8H	Account w5TF	us-east-1	m5.large	\$32.98	100%	672
i-BP57RdozIgoT	Account KeUS	eu-central-1	t3.small	\$12.14	100%	672
i-DczbXPX7cRcz	Account Sncl	eu-west-1	c5.xlarge	\$47.59	59%	397

## Cloud Intelligence Dashboard: Recommended Instance Family Changes



## Example#3: Optimize instance type using QuickSigh

Resource	vCPUs	Memory (GiB)	Bandwidth	Pricing (on Demand)
c5.xlarge	4	8	10 Gbps	<b>0,1700 US\$</b>
r6g.large	2	16	10 Gbps	0,1008 US\$
t3.large	2	8	5 Gbps	<div>\$0.0832 x2 <b>\$0.1664</b></div>



# Step 1: Identify and Select DR Strategies

The goal is to create a DR plan that balances cost, recovery time objectives (RTOs), and recovery point objectives (RPOs) to meet the organization's unique needs and risk profile.



Image: from official AWS documentation AWS [original doc](#)

**Current DR strategy :**

Pilot Light (Multi Regional Failover)

Or

Warm Standby (Multi Regional Failover)

***Choices to improve DR more***



# Results: DR infrastructure resources used

Resource	Type	Quantity	Utilization in Multi-Region Failover
EC2 Instances	t3.large	1-2	High during the day (70%)
	m5.xlarge	1-3	High during trading hours (70%), very low off-hours (5%)
EKS Clusters	m5.xlarge	1-3	High during trading hours (70%), very low off-hours (5%)
RDS Databases	db.m5.large	1	Constantly high (100%)
AWS Backup	For RDS Aurora	1	0% (snapshots taken every hour)



# More tasks for Cost Optimization improvements

- **Scheduled Scaling**

Implement scheduled scaling for services to automatically adjust instance counts based on predictable workload patterns. Scale down during low-demand periods to save costs.

- **Tagging and Cost Allocation**

Tagging strategies to categorize resources by DR strategy, application, or department. Cost Allocation tags help in accurate cost attribution and allocation.

- **Reserved Instances (RIs)**

Purchase Reserved Instances for predictable workloads with stable usage patterns. RIs offer significant cost savings compared to On-Demand instances.



# Summary

- **Cost Analysis:** Continuously monitor and analyze disaster recovery costs to identify any unexpected or unnecessary expenses.
- **Resource Optimization:** Rightsize resources in the secondary region to ensure over-provisioning not happening
- **Automation:** Implement automation for resource provisioning and deprovisioning to minimize costs when resources are not actively in use.



# THANK YOU!

Find me if any questions:



<https://in-n-out.cloud>



[linkedin.com/in/login-id](https://www.linkedin.com/in/login-id)



SPEAKER SPOTLIGHT

NATALIE SEREBRYAKOVA

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Understanding Cloud  
Disaster Recovery Cost



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