AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

ARC315-R2

Talking cost optimization

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Why are we here?



Agenda

Cost reporting

Strategies and mechanisms

Dashboards

Q & A

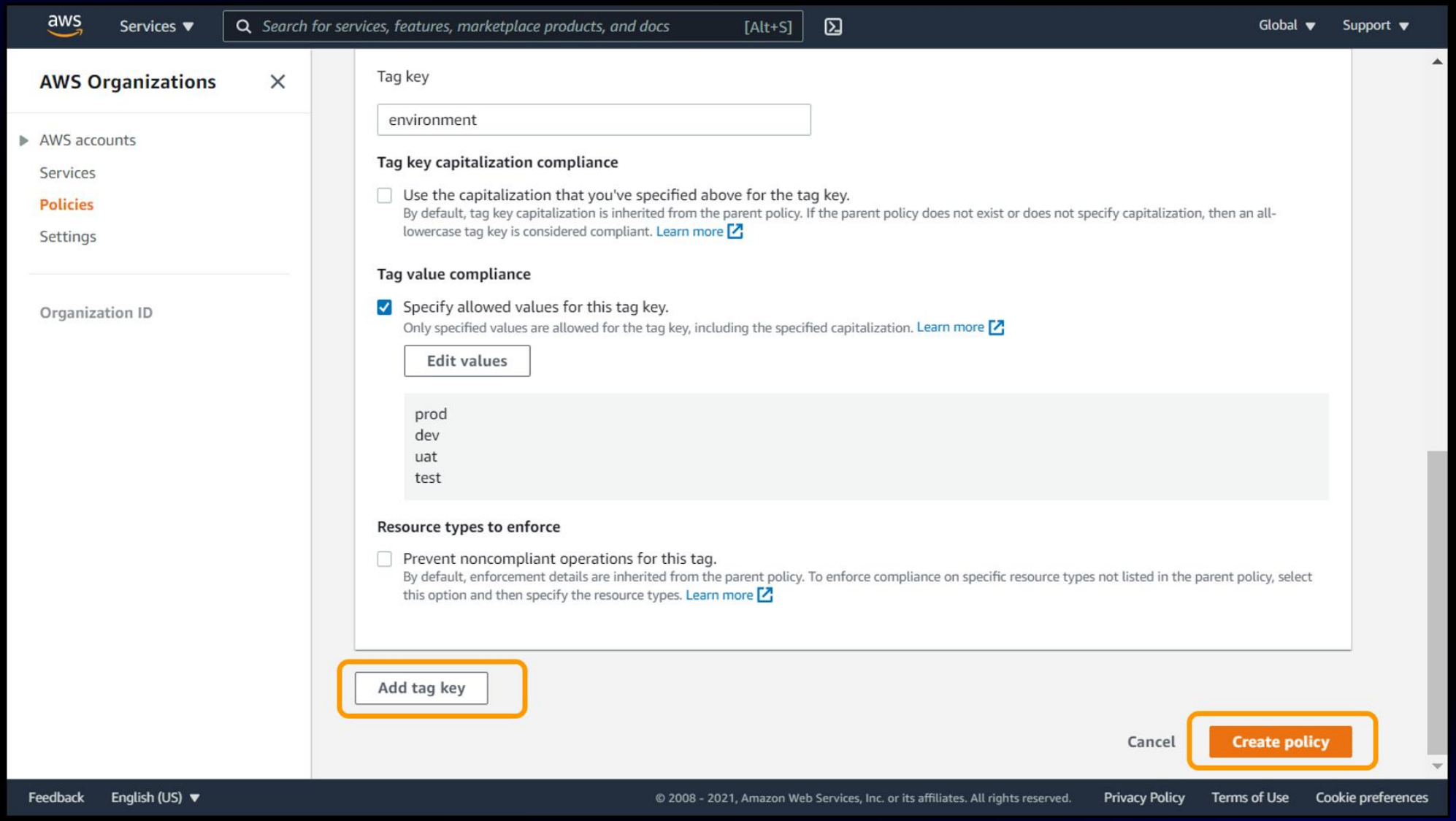
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Design principles

- Implement cloud financial management
- Adopt a consumption model
- **Measure overall efficiency**
- Stop spending money on undifferentiated heavy lifting
- **Analyze and attribute expenditure**

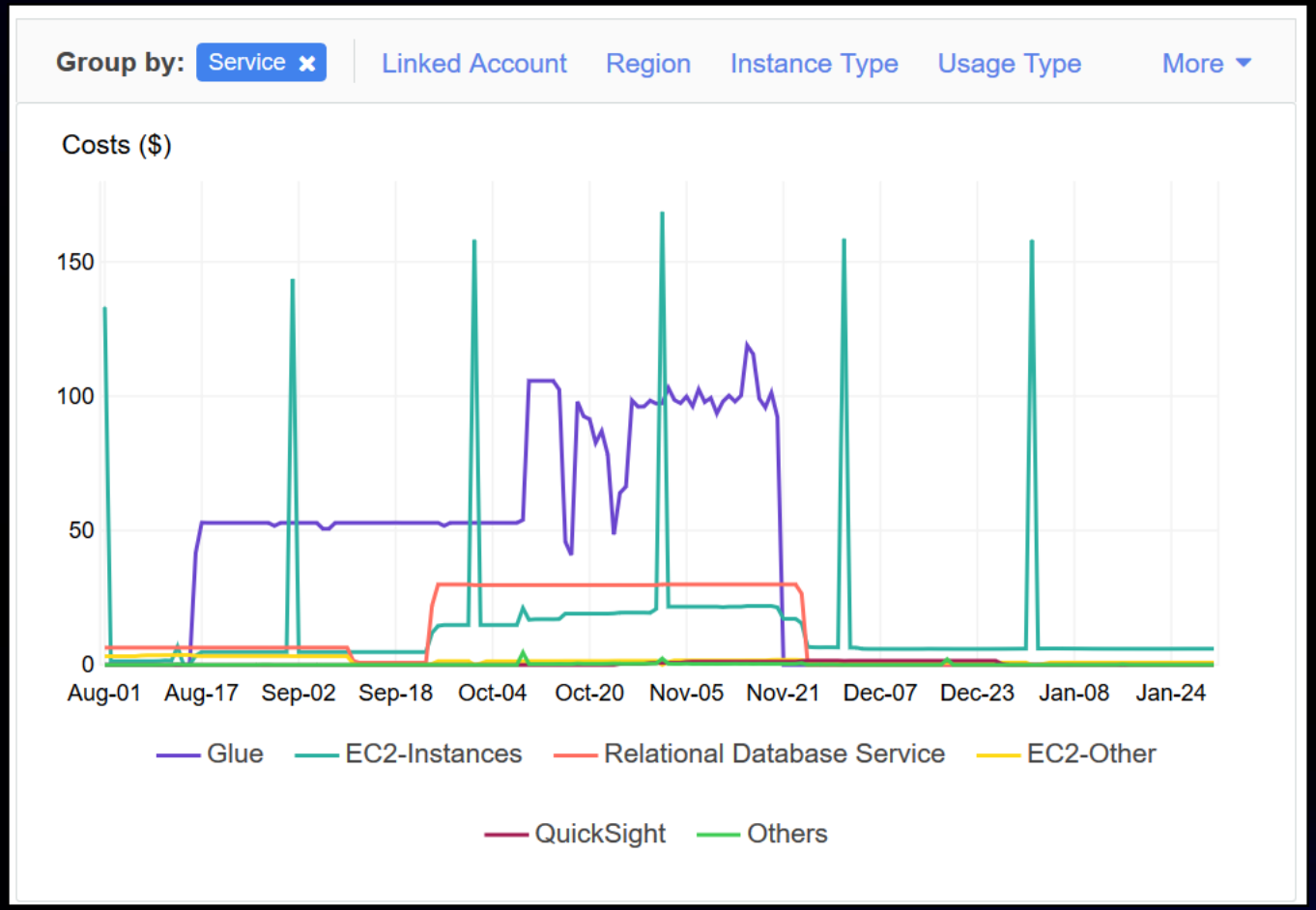
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Tagging



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Cost and usage visualization



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Usage trends

Current month costs

$139.34

19%
Over last month

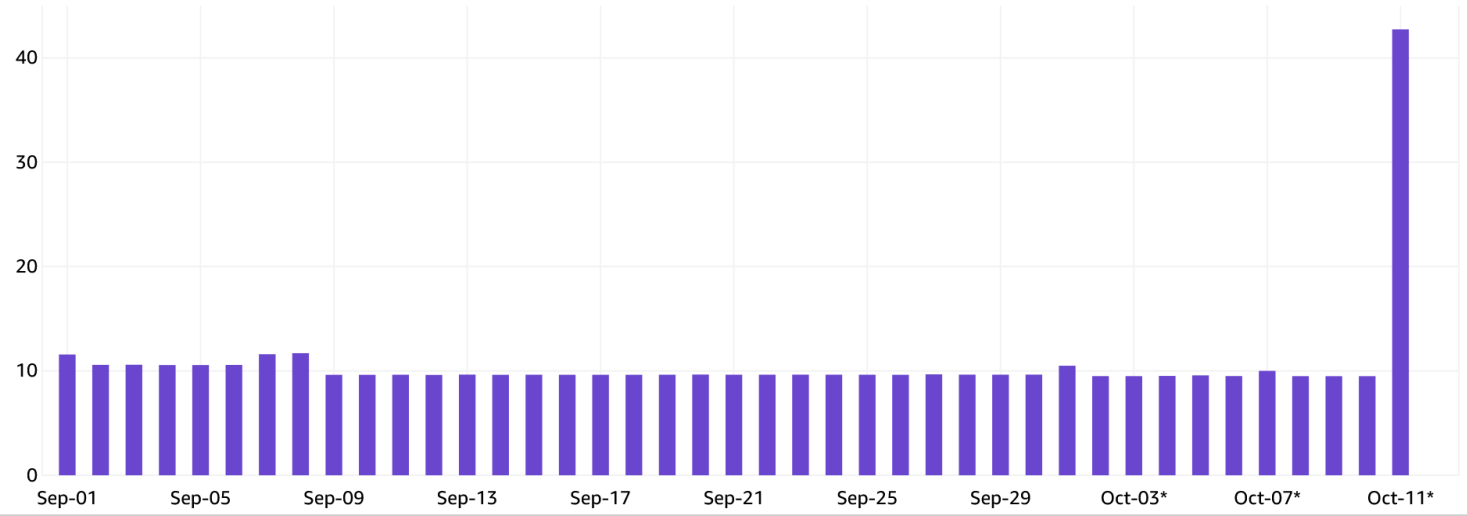
Forecasted month end costs

$329.94

10%
Over last month

Daily unblended costs ($)

Explore costs



October trends

Service usage

Amazon Elastic Compute Cloud - Compute costs are up $27.22 (325%)

Amazon Route 53 costs are up $0.50 (49%)

Account usage

(960166690193) costs are up $22.70 (19%)

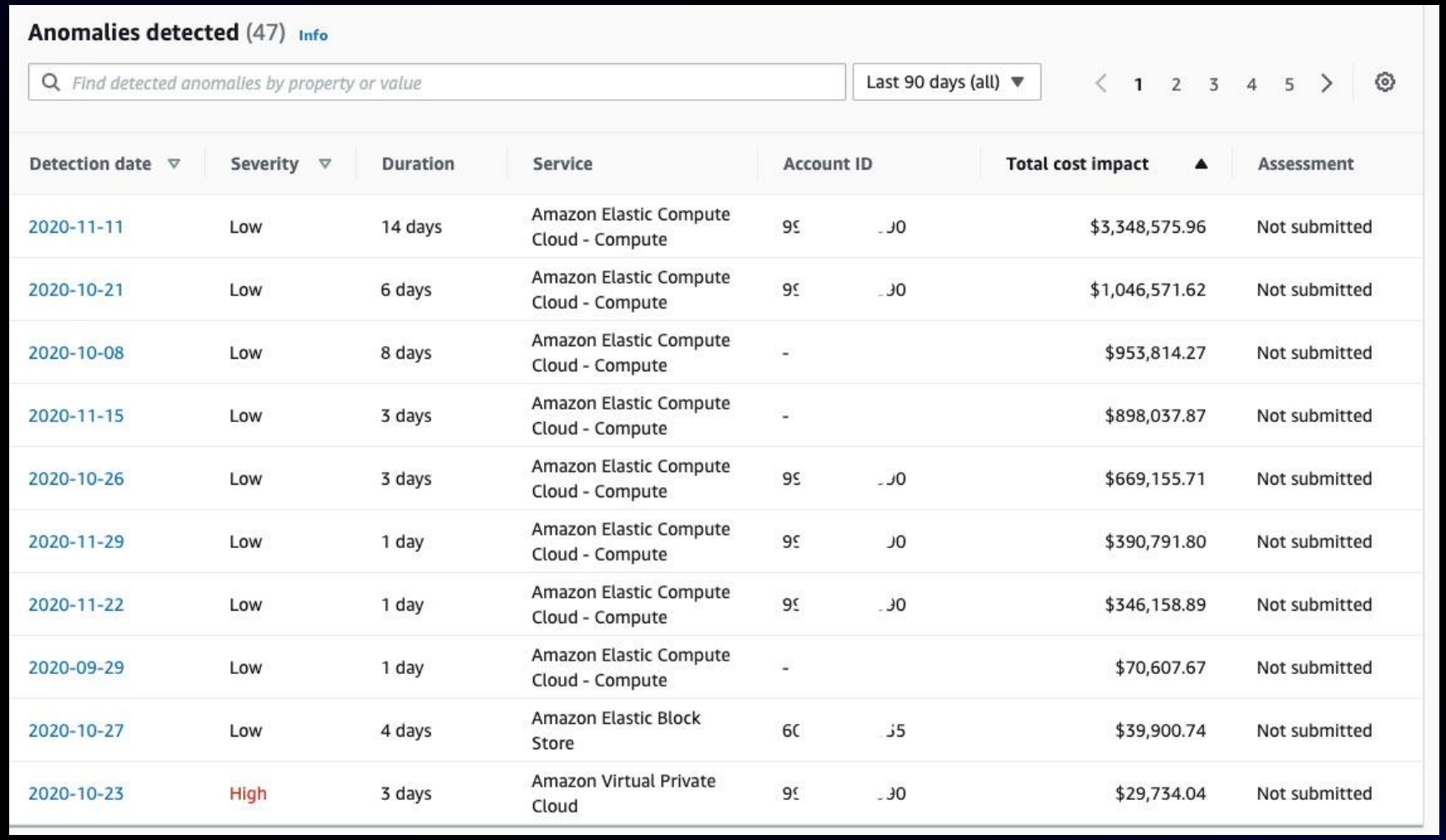
Region usage

eu-west-1 costs are up $26.08 (68%)

global costs are up $0.31 (5%)

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Anomaly detection



Anomalies detected (47) Info

Find detected anomalies by property or value

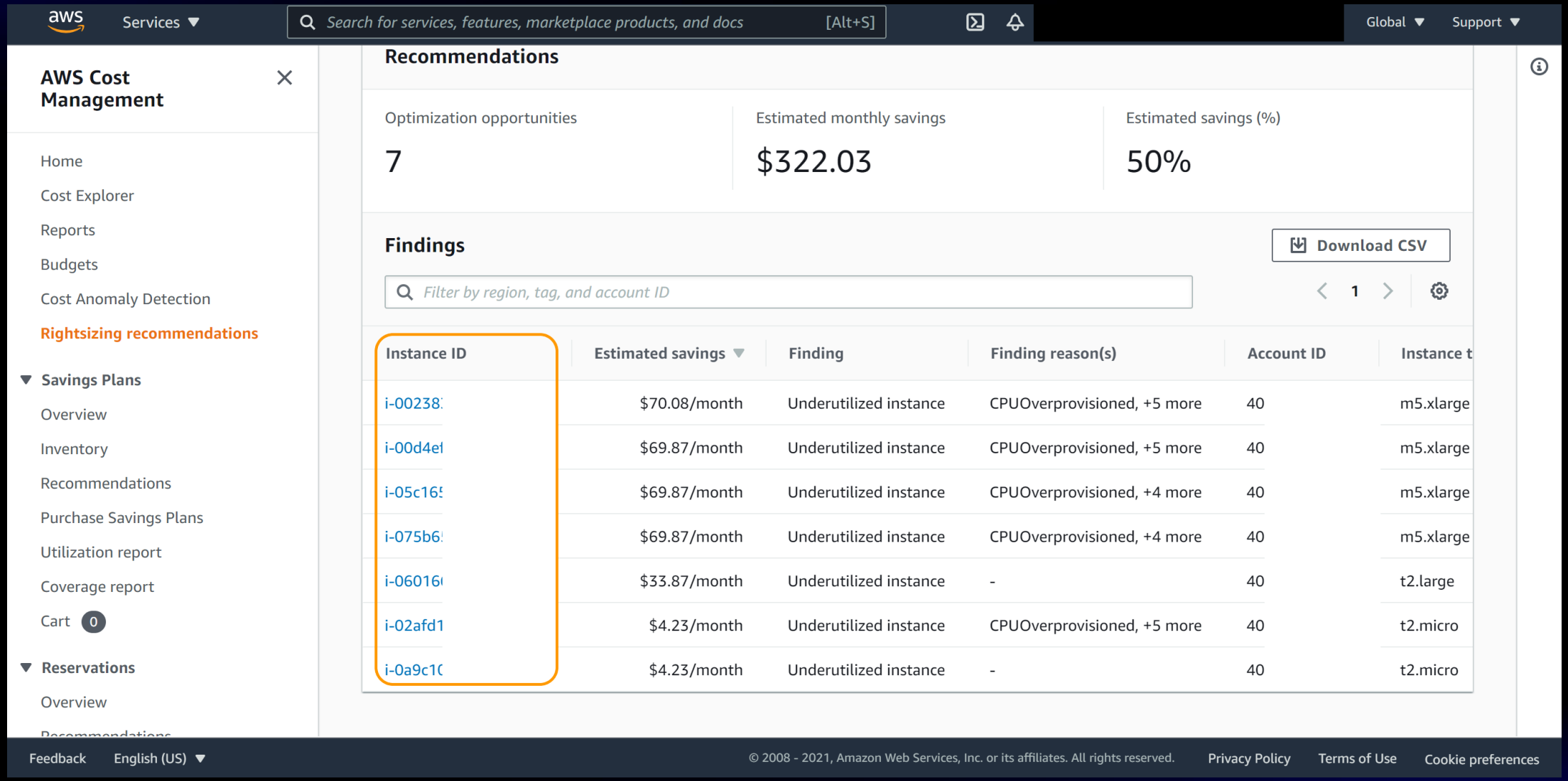
Last 90 days (all)

1 2 3 4 5

Detection date	Severity	Duration	Service	Account ID	Total cost impact	Assessment
2020-11-11	Low	14 days	Amazon Elastic Compute Cloud - Compute	9[illegible]0	$3,348,575.96	Not submitted
2020-10-21	Low	6 days	Amazon Elastic Compute Cloud - Compute	9[illegible]0	$1,046,571.62	Not submitted
2020-10-08	Low	8 days	Amazon Elastic Compute Cloud - Compute	-	$953,814.27	Not submitted
2020-11-15	Low	3 days	Amazon Elastic Compute Cloud - Compute	-	$898,037.87	Not submitted
2020-10-26	Low	3 days	Amazon Elastic Compute Cloud - Compute	9[illegible]0	$669,155.71	Not submitted
2020-11-29	Low	1 day	Amazon Elastic Compute Cloud - Compute	9[illegible]0	$390,791.80	Not submitted
2020-11-22	Low	1 day	Amazon Elastic Compute Cloud - Compute	9[illegible]0	$346,158.89	Not submitted
2020-09-29	Low	1 day	Amazon Elastic Compute Cloud - Compute	-	$70,607.67	Not submitted
2020-10-27	Low	4 days	Amazon Elastic Block Store	6[illegible]5	$39,900.74	Not submitted
2020-10-23	High	3 days	Amazon Virtual Private Cloud	9[illegible]0	$29,734.04	Not submitted

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EC2 rightsizing



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EC2 rightsizing

Recommendation Info

Finding reason(s): CPUOverprovisioned, MemoryOverprovisioned, EBSIOPSOverprovisioned, EBSThroughputOverprovisioned, NetworkBandwidthOverprovisioned, NetworkPPSOverprovisioned

We recommend that you **terminate** your idle **c5a.8xlarge** instance to save an estimated **$5,345.27 annually**. You can enhance these recommendations by installing the CloudWatch Agent.

Current instance utilization Info

General

Network capacity	CPU	Disk	Memory
10 Gigabit	0.7%	0.7%	0.6%

Disk utilization

Disk read (Ops/s)	Disk write (Ops/s)	Disk read throughput (KiB/s)	Disk write throughput (KiB/s)
-	-	-	-

Network utilization

Network in (KiB/s)	Network out (KiB/s)	Network packets in (Packets/s)	Network packets out (Packets/s)
30.234	0.239	4.375	0.881

Running hours

Savings Plans hours	RI hours	On-Demand hours	Total running hours
0	0	149	149

EBS utilization

EBS read (Ops/s)	EBS write (Ops/s)	EBS read throughput (KiB/s)	EBS write throughput (KiB/s)
28.157	5.777	155.945	1,008.436

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Cost and usage reports (CURs)

The 5 Ws:

1. **What** does it cost = line_item_unblended_cost
2. **Who** used it = line_item_usage_account_id
3. **When** was it used = line_item_usage_start_date
4. **Where** was it used = product_region
5. **Why** the cost occurred = line_item_resource_id

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Cloud Intelligence Dashboards

The Cloud Intelligence Dashboards framework

1. Start with your cost and usage reports

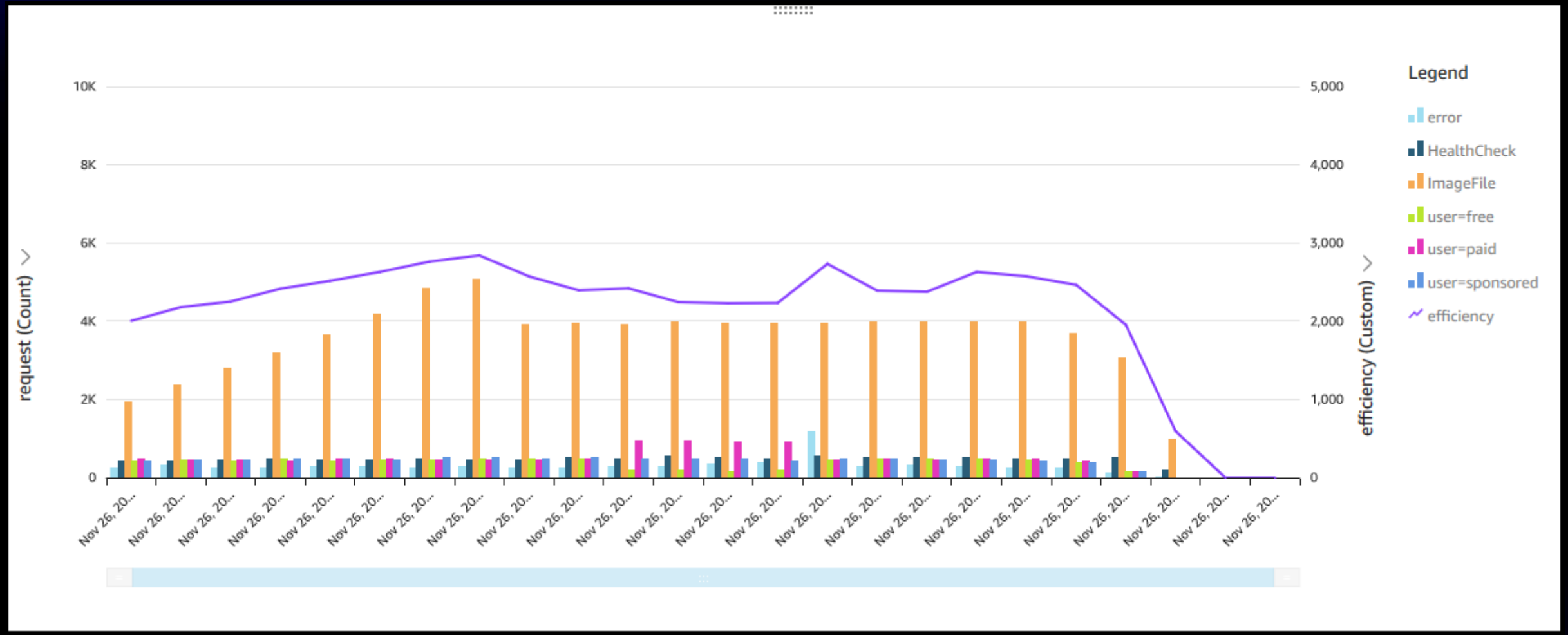
2. Set up the framework

3. Access your dashboards



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Workload efficiency



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Takeaways

- Understand your spend
- Visualize with dashboards
- Workload efficiency
- Automate
- Cost optimization is a journey over time

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Other sessions

- STG321-R1/R2 Amazon S3 cost optimization using S3 Storage Lens
- COP209-S Driving a cost-conscious culture with FinOps
- CMP210 Optimize compute for cost and capacity
- IOT302-R2 Build intelligent IoT devices faster with AWS IoT Greengrass
- NET306 AWS Well-Architected Framework for hybrid networks
- Check out youtube.com/amazonwebservices for breakout sessions after re:Invent

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Useful links

AWS Well-Architected cost labs: https://bit.ly/3afEyl4

AWS Architecture center for cost: https://go.aws/3oTSjhY

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Thank you!

Andrew Robinson

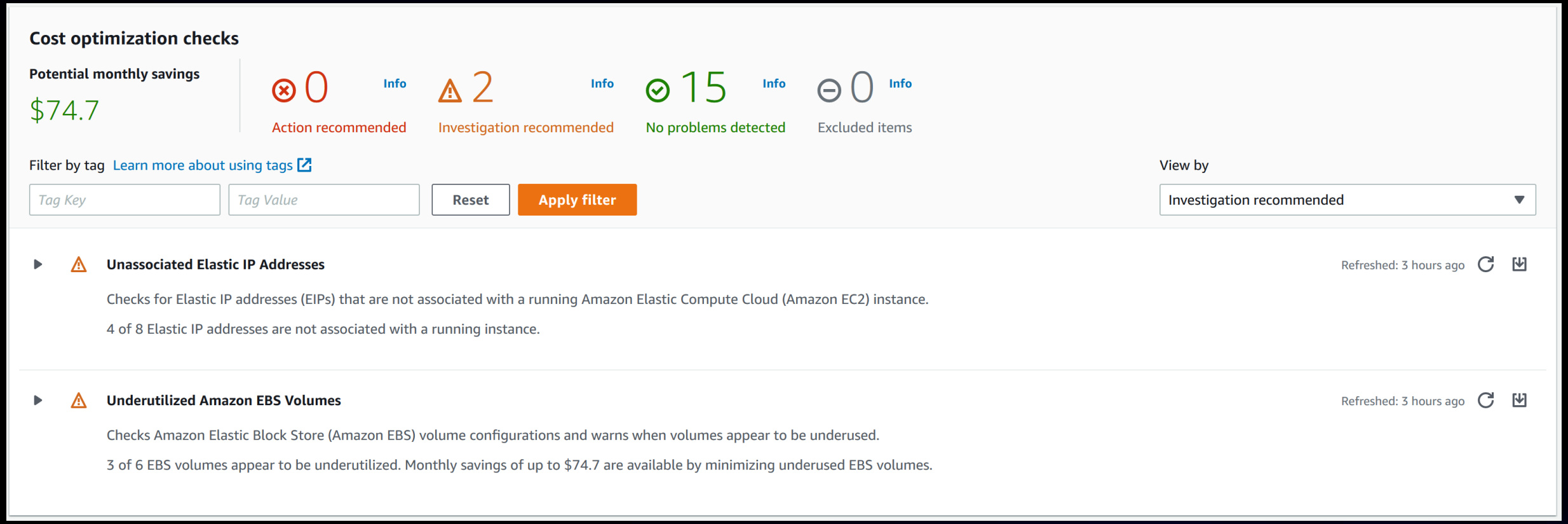
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Mahanth Jayadeva

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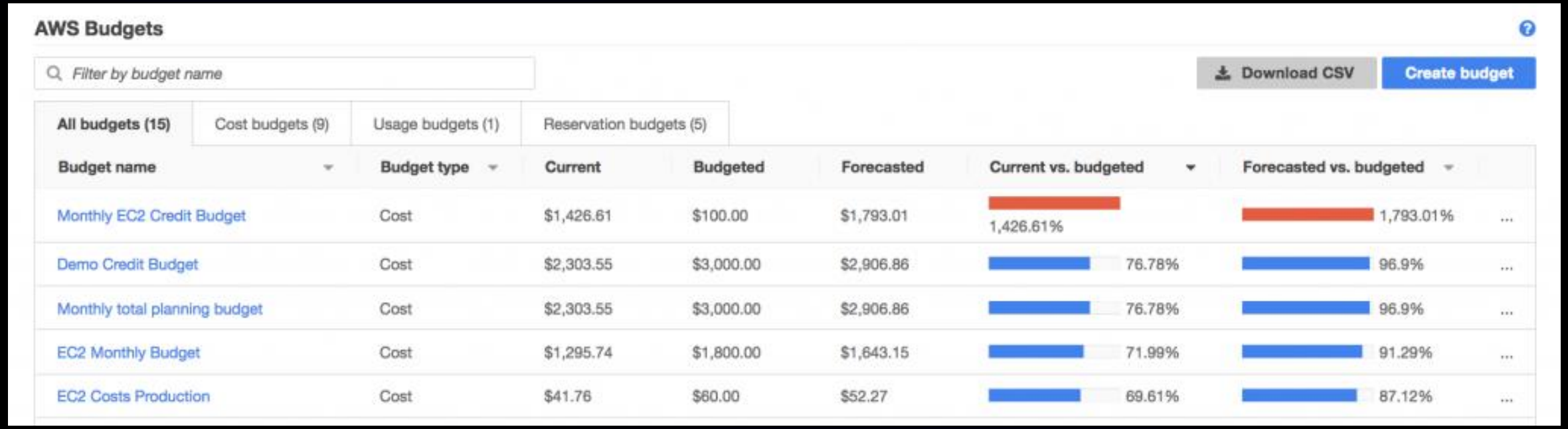
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Trusted advisor



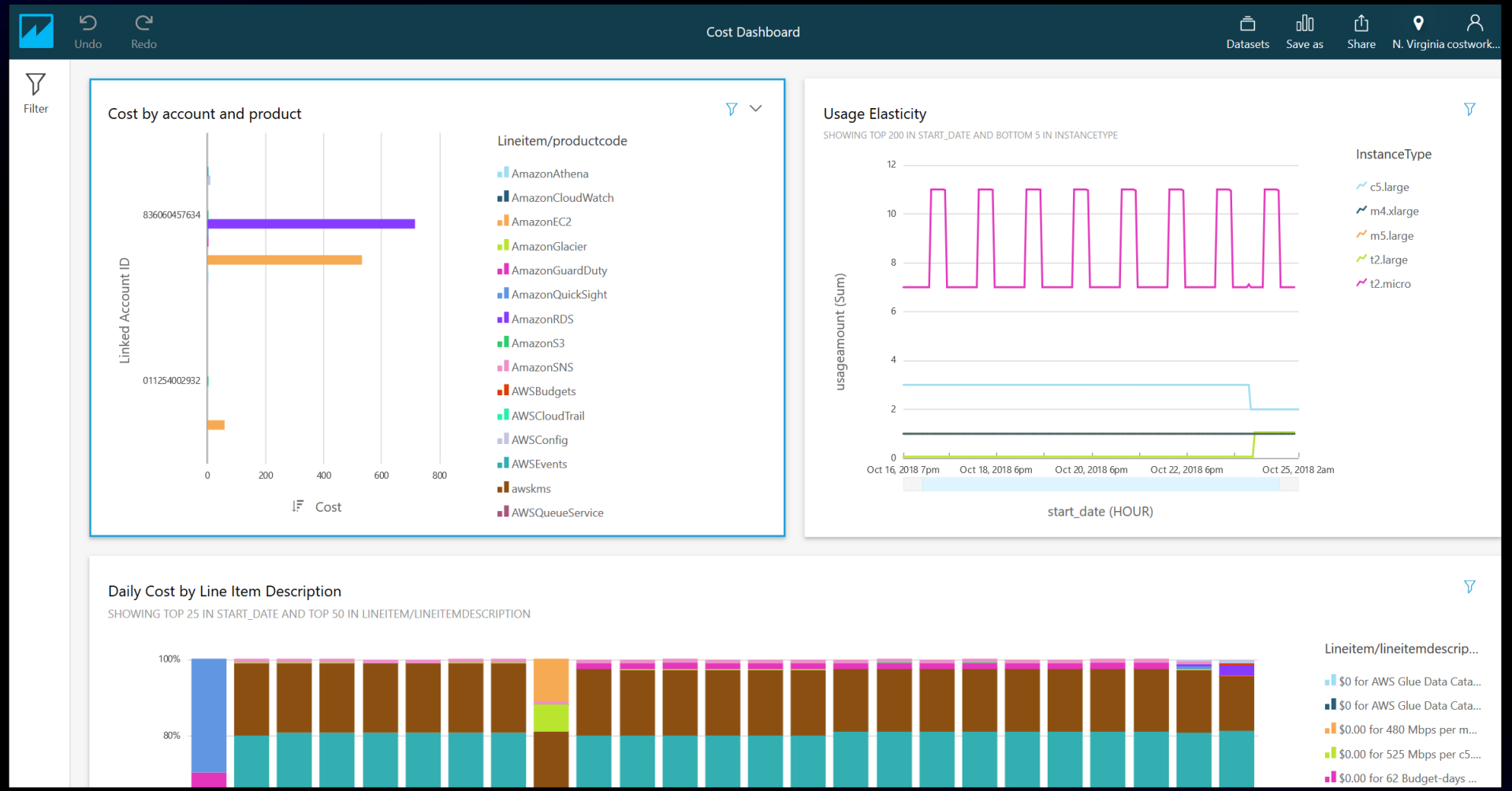
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AWS Budgets



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Visualizing cost



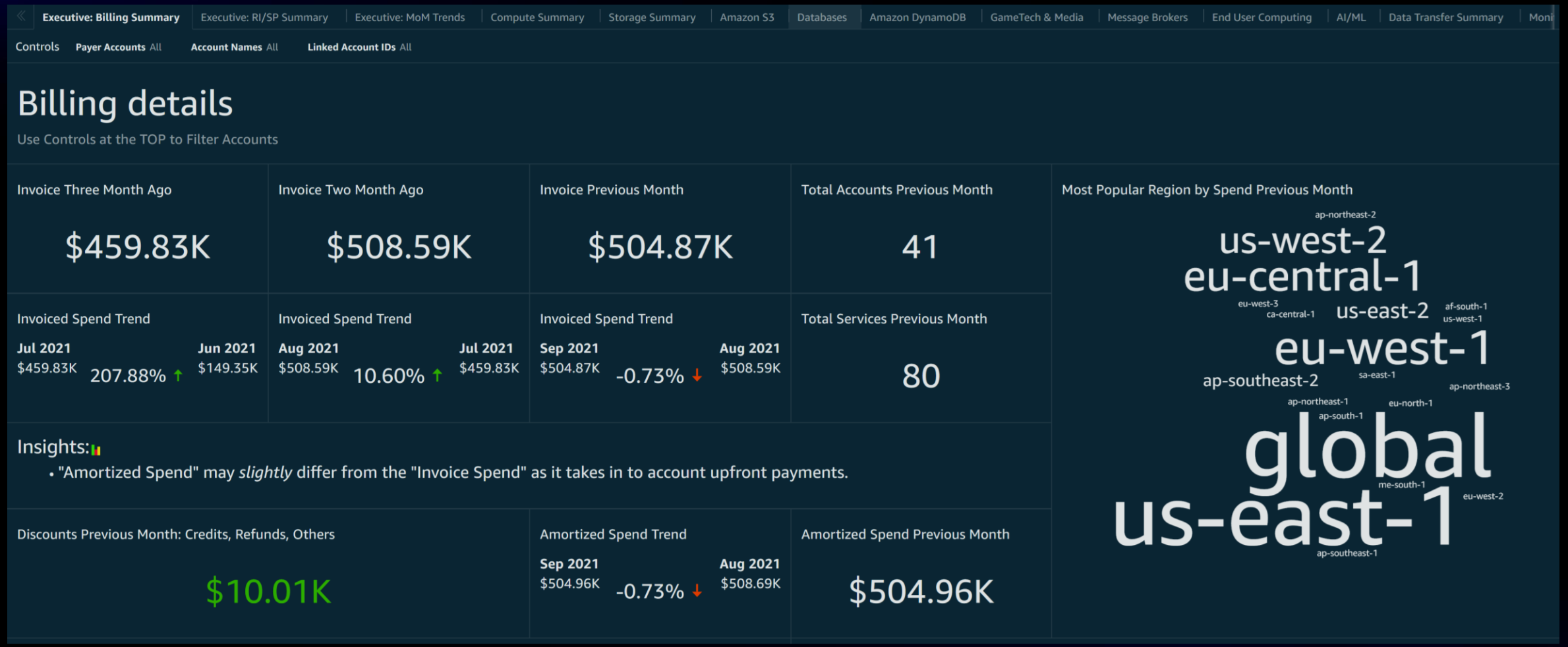
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Cost and usage analysis

AWS Service Charges		**$408.39**
▸ Athena		$0.00
▸ Budgets		$0.00
▸ CloudTrail		$0.00
▸ CloudWatch		$0.00
▸ CloudWatch Events		$0.00
▸ Config		$2.11
▸ Data Transfer		$0.00
▾ Elastic Compute Cloud		$364.71
▸ **EU (London)**		**$0.00**
▾ **US East (N. Virginia)**		**$364.71**
Amazon Elastic Compute Cloud running Linux/UNIX		$160.47
$0.00 per Linux t2.micro instance-hour (or partial hour) under monthly free tier	6 Hrs	$0.00
$0.0116 per On Demand Linux t2.micro Instance Hour	1,557.053 Hrs	$18.06
$0.0928 per On Demand Linux t2.large Instance Hour	1,534.517 Hrs	$142.40
$0.768 per On Demand Linux m5.4xlarge Instance Hour	0.017 Hrs	$0.01

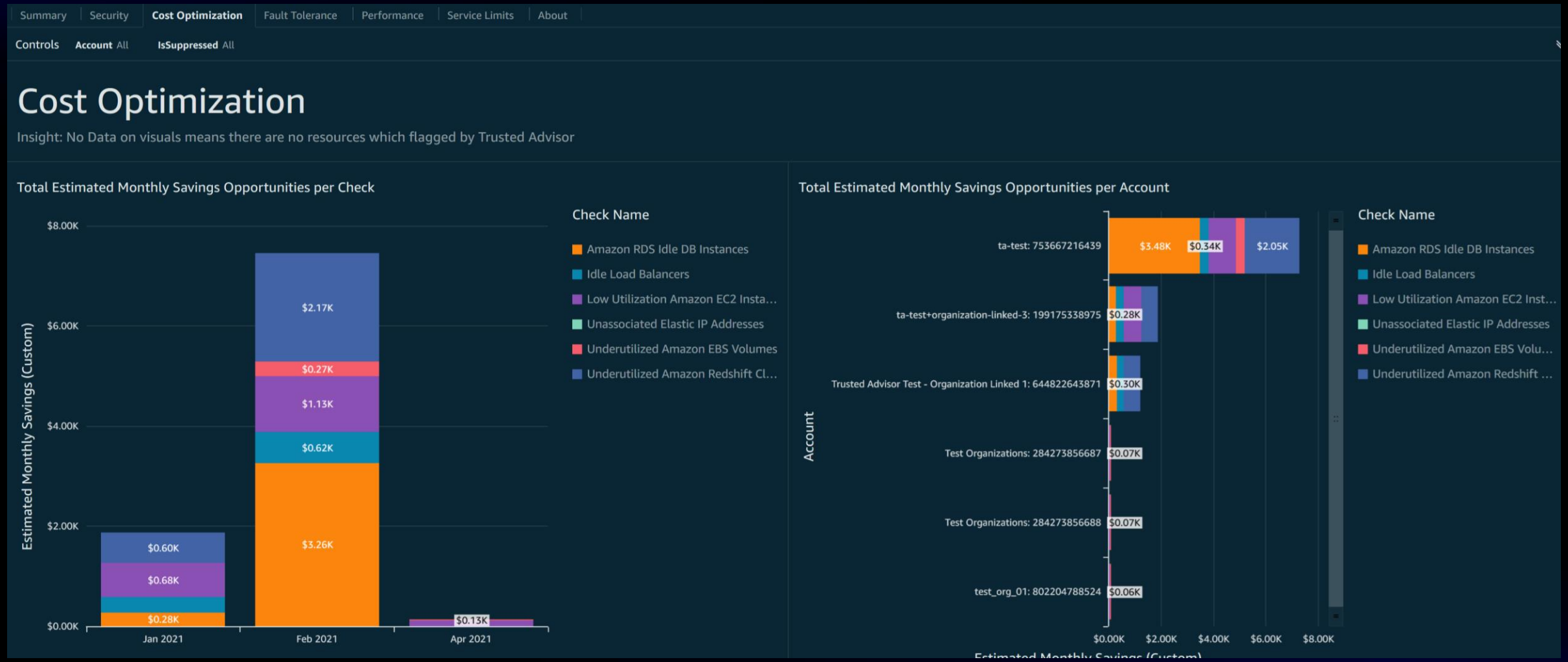
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CUDOS Dashboard



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TAO Dashboard



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CID Dashboard

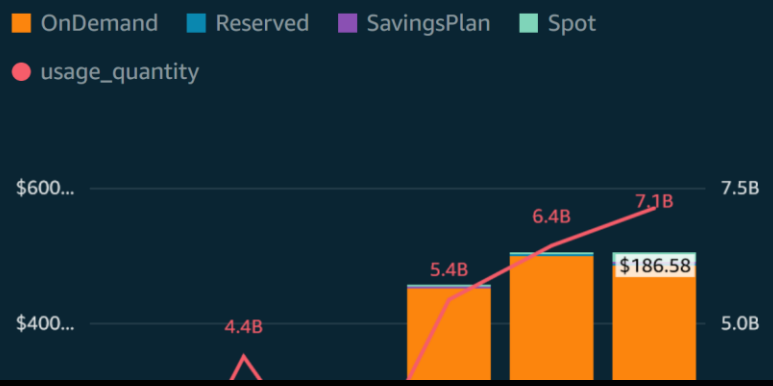
Billing Summary | **Cost Summary** | Compute Summary | Storage Summary | RI/SP Summary | Expiring RI/SP Tracker | OPTICS Explorer | MoM Pivot | About

Usage Cost Summary - Previous Month

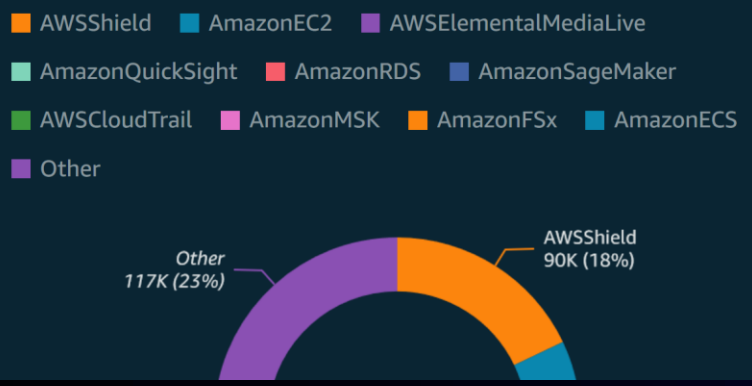
Usage Spend	Top Spending Account	Top Service by Spend	Most Popular Region …	Top Service Costs Movers - Top 3 spend if within top 20 movers for Sep-21 is:
$501.96K	5**35**********5****	AWSShield	global	• **AmazonEC2 increased by** 34.66% ($20.70K) from $59.71K to $80.41K.

Avg. Daily Run Rate	Number of Accounts	Number of Services	Number of Regions	Top Cost movers for Sep-21 are:
increased by 2.86% in Sep-21	41	81	20	• **AmazonEC2 increased by** 34.66% ($20.70K) from $59.71K to $80.41K. • **AWSCloudTrail increased by** 47.5% ($6.27K) from $13.21K to $19.48K. • **AWSConfig increased by** 191.45% ($3.92K) from $2.05K to $5.96K.

Usage Spend



Top 10 Drill Down

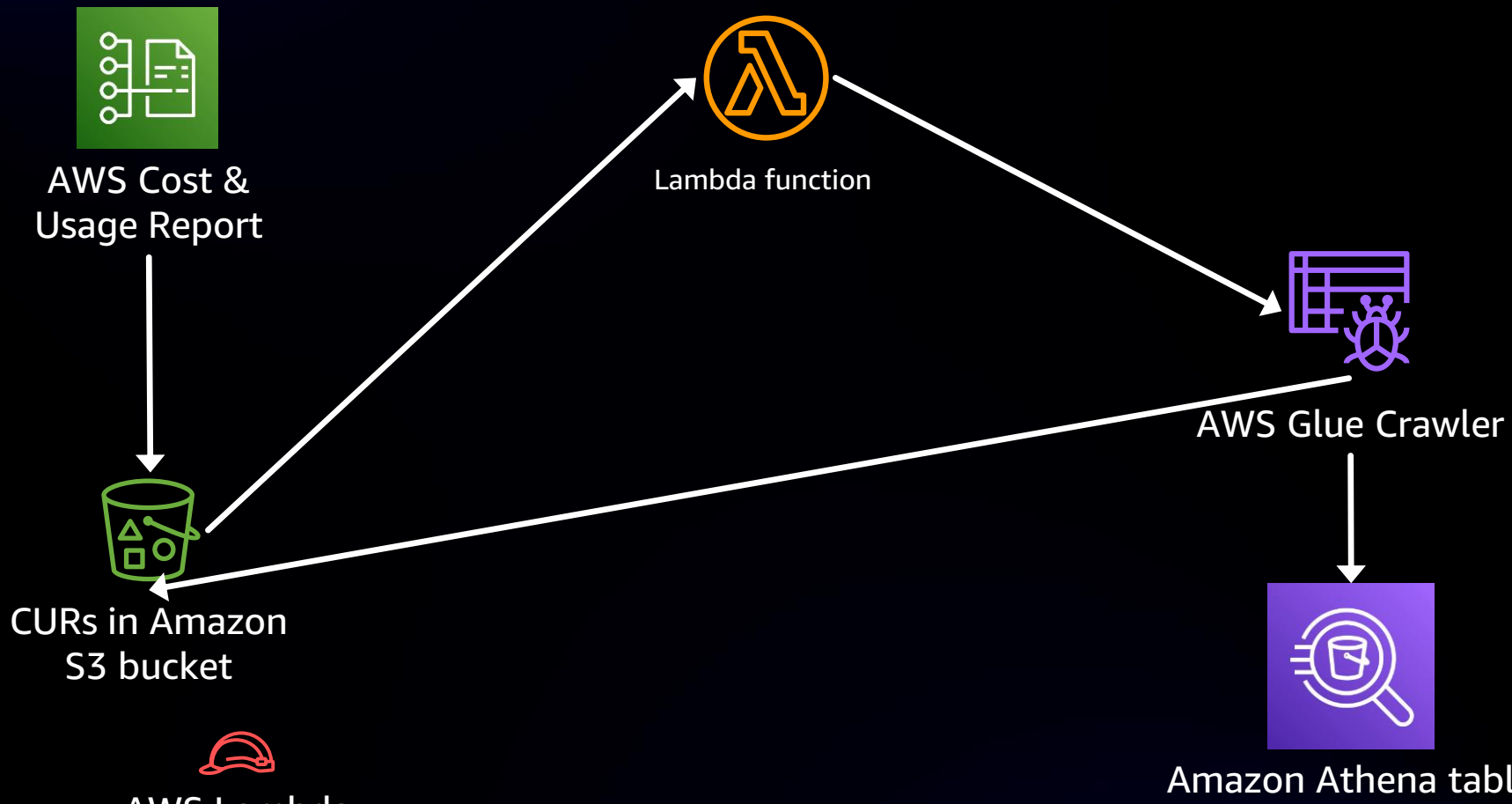


Top 5 Spending Accounts



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Automate cost and usage reports



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Example queries: Regional data transfer

```
...
WHERE
      year = '2021'
      AND month BETWEEN '7' AND '9'
      AND line_item_line_item_description LIKE '%regional data transfer%'
GROUP BY
      bill_payer_account_id,
      line_item_usage_account_id,
      DATE_FORMAT((line_item_usage_start_date),'%Y-%m'),
      line_item_product_code,
      product_product_family,
      product_region,
      line_item_line_item_description,
      line_item_resource_id
...
```

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Example queries: Regional data transfer

line_item_product_code	product_product_family	product_region	line_item_line_item_description	line_item_resource_id	sum_line_item_unblended_cost
AmazonEC2	Data Transfer	us-west-2	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	10939.588311471674
AmazonMSK	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	8886.500481222196
AmazonEC2	Data Transfer	us-west-2	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	7691.721372715785
AmazonMSK	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	3279.2249071491015
AmazonEC2	Data Transfer	us-west-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2981.6827442558983
AmazonMSK	Data Transfer	eu-west-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2648.231570748701
AmazonEC2	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2556.6854042714017
AmazonEC2	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2546.6990046925976
AmazonEC2	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2515.670930023398
AmazonEC2	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2492.7588846622994
AmazonEC2	Data Transfer	us-west-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2485.801855045
AmazonEC2	Data Transfer	us-west-2	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2425.634483028901
AmazonEC2	Data Transfer	us-west-2	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2349.7537544654974
AmazonEC2	Data Transfer	us-east-1	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2334.770691207802
AmazonEC2	Data Transfer	us-west-2	$0.010 per GB - regional data transfer - in/out/between EC2 AZs or using elastic IPs or ELB	<resource id>	2318.242548442899

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Example queries: Reserved instance coverage

```
CASE
  WHEN line_item_line_item_type IN ('Usage') THEN 'OnDemand'
  WHEN line_item_line_item_type IN ('Fee','RIFee','DiscountedUsage') THEN 'ReservedInstance'
...
WHERE
  year = '2021'
  AND month BETWEEN '1' AND '4'
  AND product_product_name = 'Amazon Elastic Compute Cloud'
  AND line_item_operation LIKE '%RunInstance%'
  AND line_item_line_item_type IN ('Usage','Fee','RIFee','DiscountedUsage')
  AND product_product_family NOT IN ('Data Transfer')
...
```

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Example queries: Reserved instance coverage

Results

	day_line_item_usage_start_date	ReservationType	LeaseID	InstanceType	InstanceFamily	UsageType	sum_line_item_usage_amount	sum_reservation_unused_ququantity
1	2020-07-01	OnDemand		c4.4xlarge	c4	Usage	2.0	0.0
2	2020-07-01	ReservedInstance	LeaseID	c4.large	c4	RIFee	1488.0	0.0
3	2020-07-01	ReservedInstance	LeaseID	c4.large	c4	DiscountedUsage	48.0	0.0
4	2020-07-01	OnDemand		c4.xlarge	c4	Usage	7.7369254655	0.0
5	2020-07-01	ReservedInstance	LeaseID	c5.2xlarge	c5	DiscountedUsage	880.6340259999998	0.0
6	2020-07-01	OnDemand		c5.2xlarge	c5	Usage	82.90021232459999	0.0
7	2020-07-01	ReservedInstance	LeaseID	c5.4xlarge	c5	DiscountedUsage	108.40902700000001	0.0
8	2020-07-01	OnDemand		c5.4xlarge	c5	Usage	188.43938533749997	0.0
9	2020-07-01	ReservedInstance	LeaseID	c5.9xlarge	c5	DiscountedUsage	8.36870379	0.0
10	2020-07-01	OnDemand		c5.large	c5	Usage	71.0	0.0
11	2020-07-01	ReservedInstance	LeaseID	c5.large	c5	RIFee	186000.0	3640.85495104
12	2020-07-01	ReservedInstance	LeaseID	c5.large	c5	DiscountedUsage	48.0	0.0
13	2020-07-01	ReservedInstance	LeaseID	c5.xlarge	c5	DiscountedUsage	671.1525049999999	0.0
14	2020-07-01	OnDemand		c5.xlarge	c5	Usage	364.8876020682	0.0
15	2020-07-01	OnDemand		c5d.2xlarge	c5d	Usage	1.0	0.0

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Example queries: Idle ELB

```
SUM(SUM(line_item_usage_amount)) OVER (PARTITION BY line_item_resource_id,
pricing_unit) AS usage_per_resource_and_pricing_unit,

COUNT(pricing_unit) OVER (PARTITION BY line_item_resource_id) AS
pricing_unit_per_resource
...
(
  WHERE
    line_item_product_code = 'AWSELB'
    AND month = CAST(month(current_timestamp + -1 * INTERVAL '1' MONTH) AS VARCHAR)
    AND year = CAST(year(current_timestamp + -1 * INTERVAL '1' MONTH) AS VARCHAR)
    AND line_item_line_item_type = 'Usage'
)
WHERE
  usage_per_resource_and_pricing_unit > 336
  AND pricing_unit_per_resource = 1
```

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Example queries: Idle ELB

Results

	bill_payer_account_id	line_item_usage_account_id	split_line_item_resource_id	product_region	pricing_unit	sum_line_item_usage_amount	sum_line_item_unblended_cost
1	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
2	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
3	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
4	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
5	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
6	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	20.16000000
7	111122223333	444455556666	<resource id>	eu-central-1	Hrs	720.0	19.44000000
8	111122223333	444455556666	<resource id>	eu-central-1	Hrs	720.0	19.44000000
9	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	18.14400000
10	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	18.14400000
11	111122223333	444455556666	<resource id>	eu-west-1	Hrs	720.0	18.14400000

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Microstrategy

- Saved $250,000 annually (30%)
- AWS CUR + analytics
- Rightsizing looking for idle resources, warning messages if instances idle for 1+ hour, instance stopped if idle for 2+ hours

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Wildlife Studios

- 45% saving on EC2 spend with Spot and CURs
- Tagging of resources with CUR and Cost Explorer to give project owners direct view of their spend, and identify idle and under utilized resources

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