

# AWS re:Invent

NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

COM 305

# Automate & manage AWS Outposts capacity across a multi-account AWS setup

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# Challenges

- Enable cloud-native migrations
- Support self-service deployments
- Manage Outposts usage
- Track team migrations
- Spend as little as possible on maintenance



# Margaret Valtierra

AWS Community Hero

Chicago AWS user group

Program Manager, Morningstar

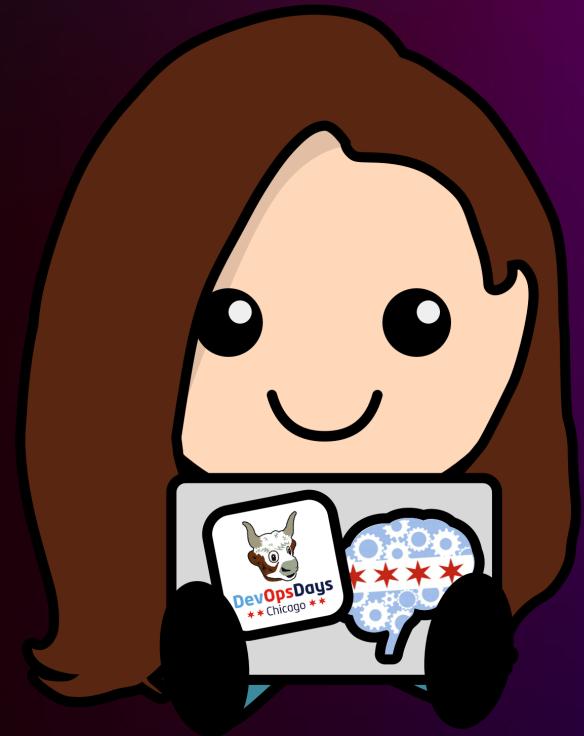


Image by @sosplush

# Agenda

Outposts and our migration goals

Quota iterations: excel and chaos

Moving the quota to AWS

Automating, tracking, and managing

Lessons learned



# Outposts and our migration goals

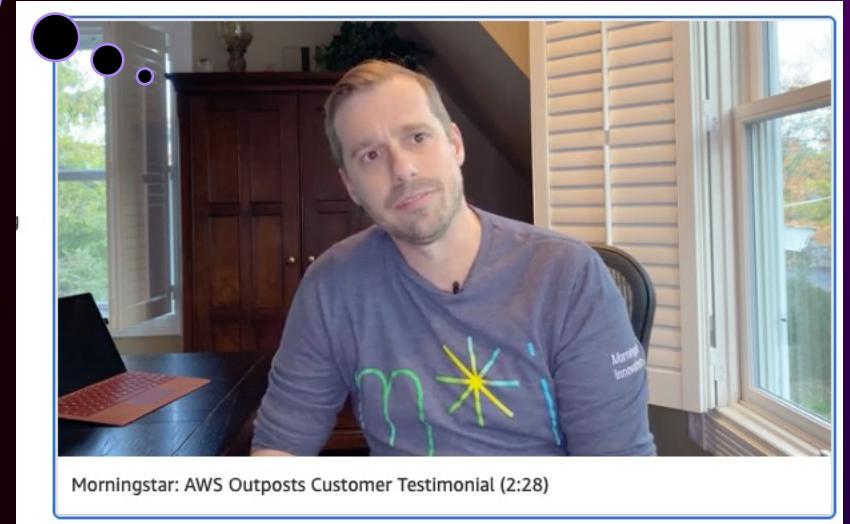


# Back in 2019

## Key technology goals

- Go all in on AWS
- Move out of data centers by 2025
- Target EOL and unused servers
- Hands-on training to use cloud

Let's buy Outposts!



Morningstar: AWS Outposts Customer Testimonial (2:28)

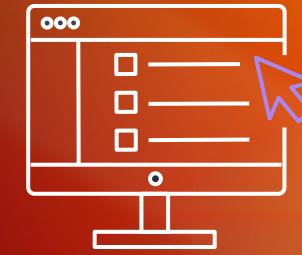
# Outposts in 2019



Same AWS designed infrastructure as AWS data centers  
(built on AWS Nitro System)

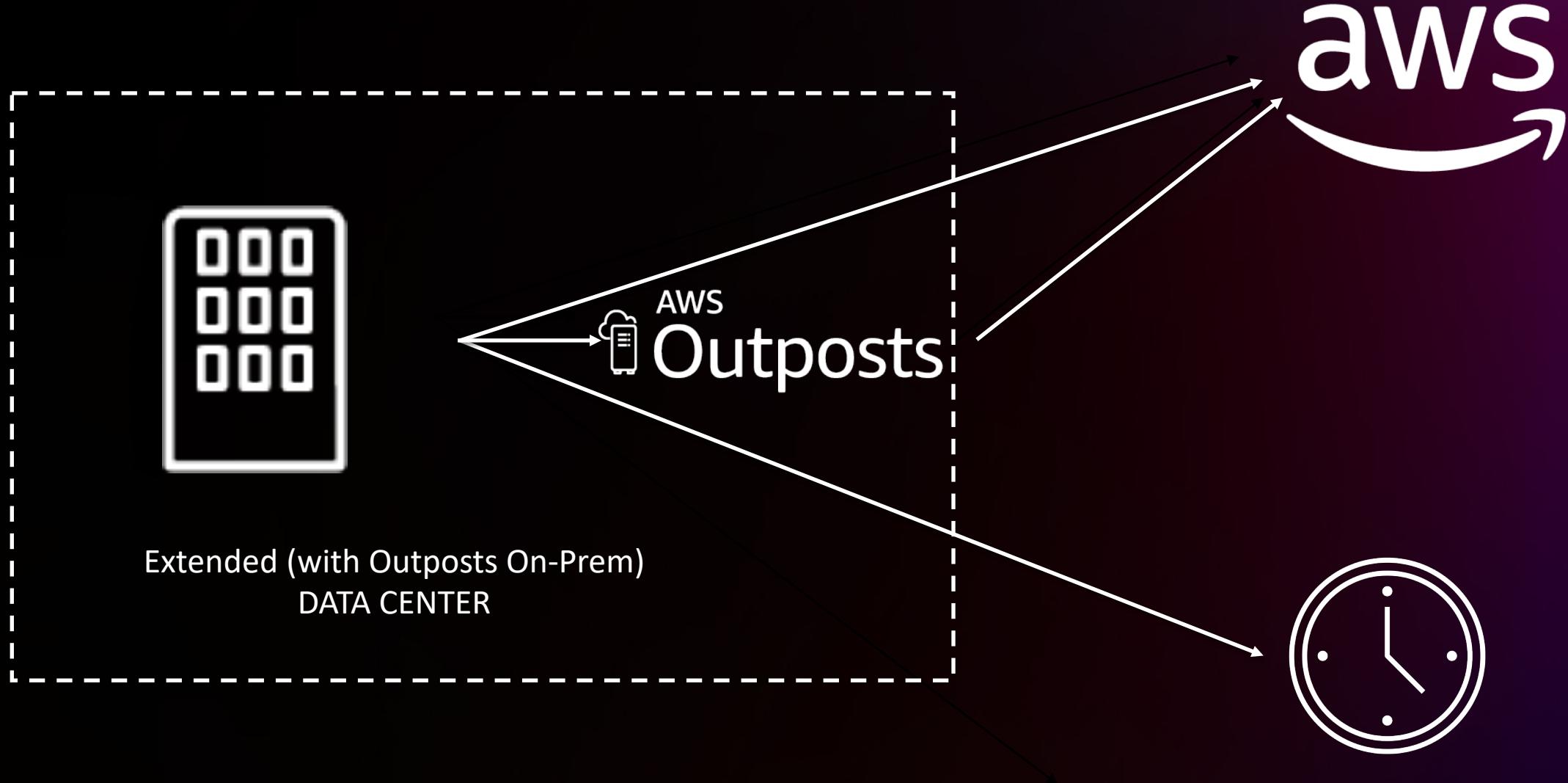


Fully managed, monitored, and operated by AWS as if in AWS Regions

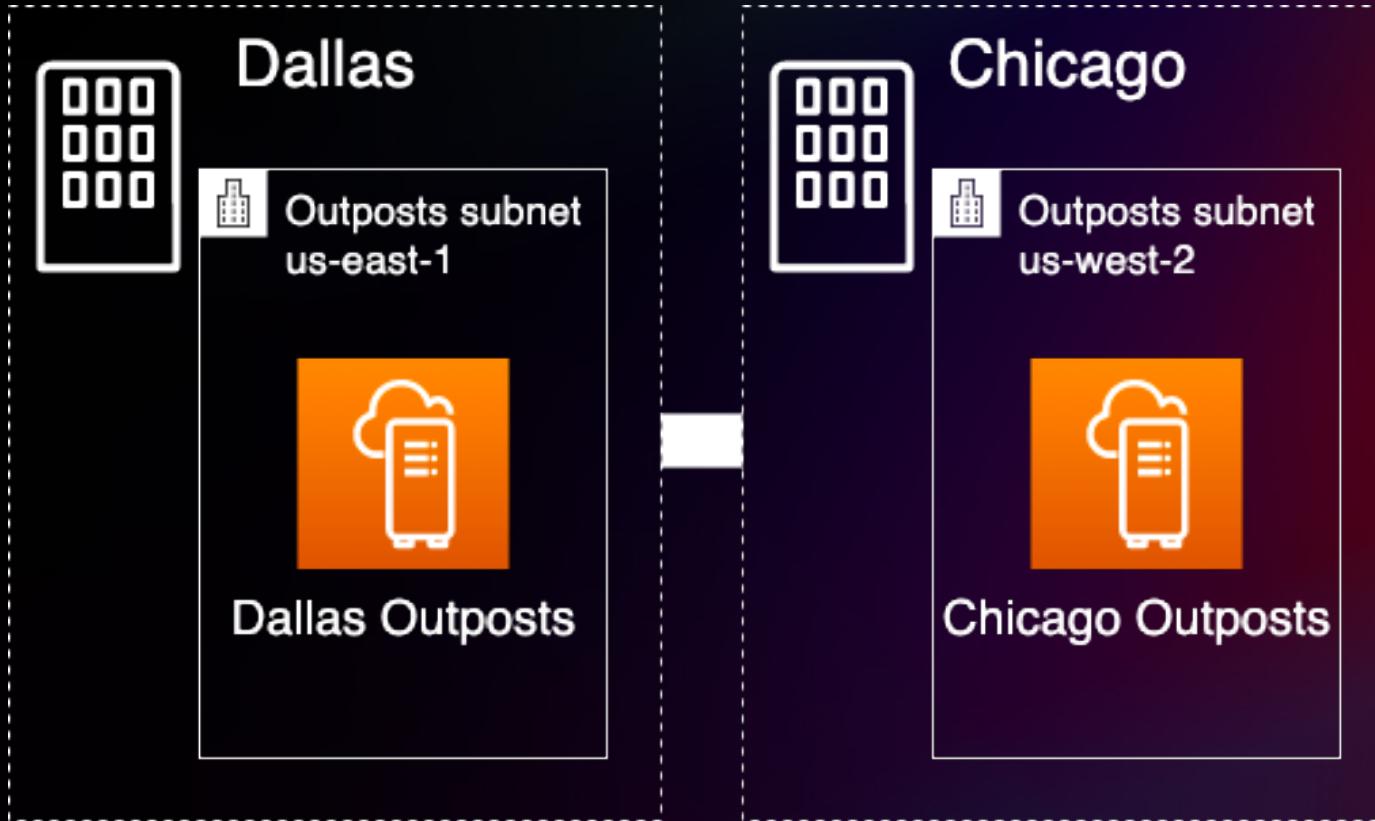


Single pane of management in the cloud providing the same APIs and tools as in AWS Regions

# Outposts goals



# Outposts at Morningstar



# Outposts in AWS

Screenshot of the AWS EC2 Instances page showing a list of running instances. The instance **i-0d71\*\*\*\* (stg-outposts-kafka-producers)** is selected.

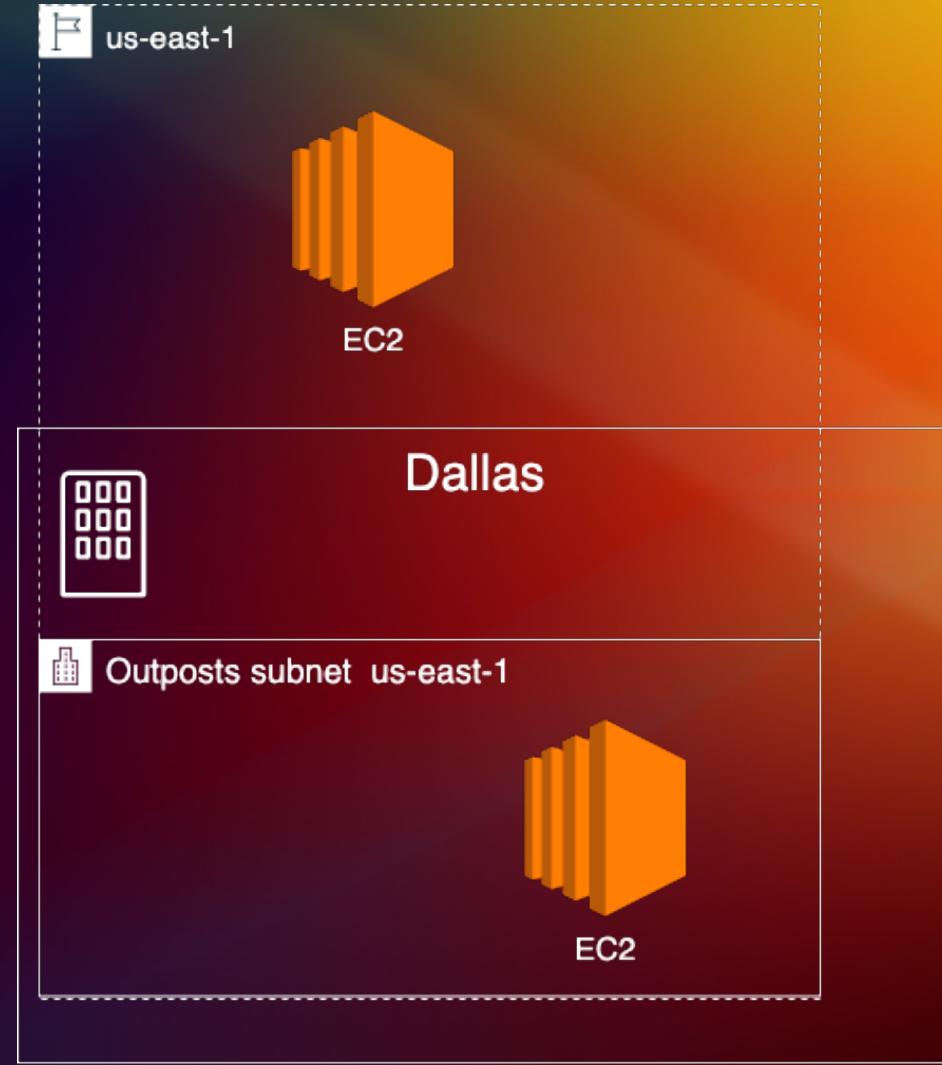
Name	Instance ID	Instance state	Instance type	Status check
stg-fund-dataop-q... (stg-outposts-kafka-producers)	i-0f50c...	Running	m5.large	2/2 checks passed
stg-fund-dataop-notification-outpos...	i-0d640...	Running	m5.large	Insufficient data
stg-fixedincome-solr	i-03bf8...	Running	c5d.2xlarge	2/2 checks passed
-	i-046b1...	Running	m5.xlarge	2/2 checks passed

**Instance: i-0d71\*\*\*\* (stg-outposts-kafka-producers)**

Auto-assigned IP address	m5.large	AWS Compute Optimizer finding
IAM Role	VPC ID	No recommendations available
ecsInstanceV	Subnet ID	Auto Scaling Group name
AMI ID	(us-east-1-outposts1-dallas)	stg-outposts-kafka-producers20220224144458228

**Instance details**

Platform	AMI ID	Monitoring
Linux/UNIX (Inferred)	(us-east-1-outposts1-dallas)	disabled

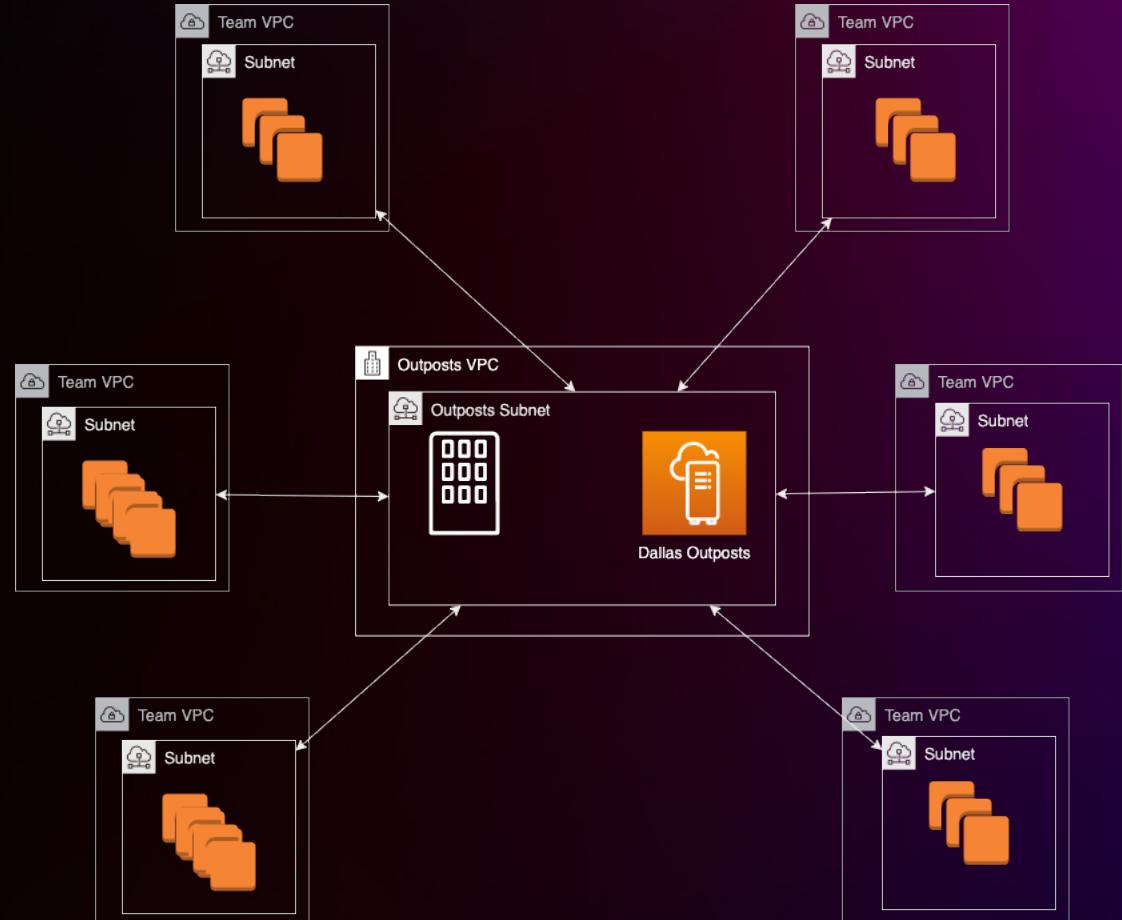


# Account boundaries at Morningstar



# Sharing Outposts with teams

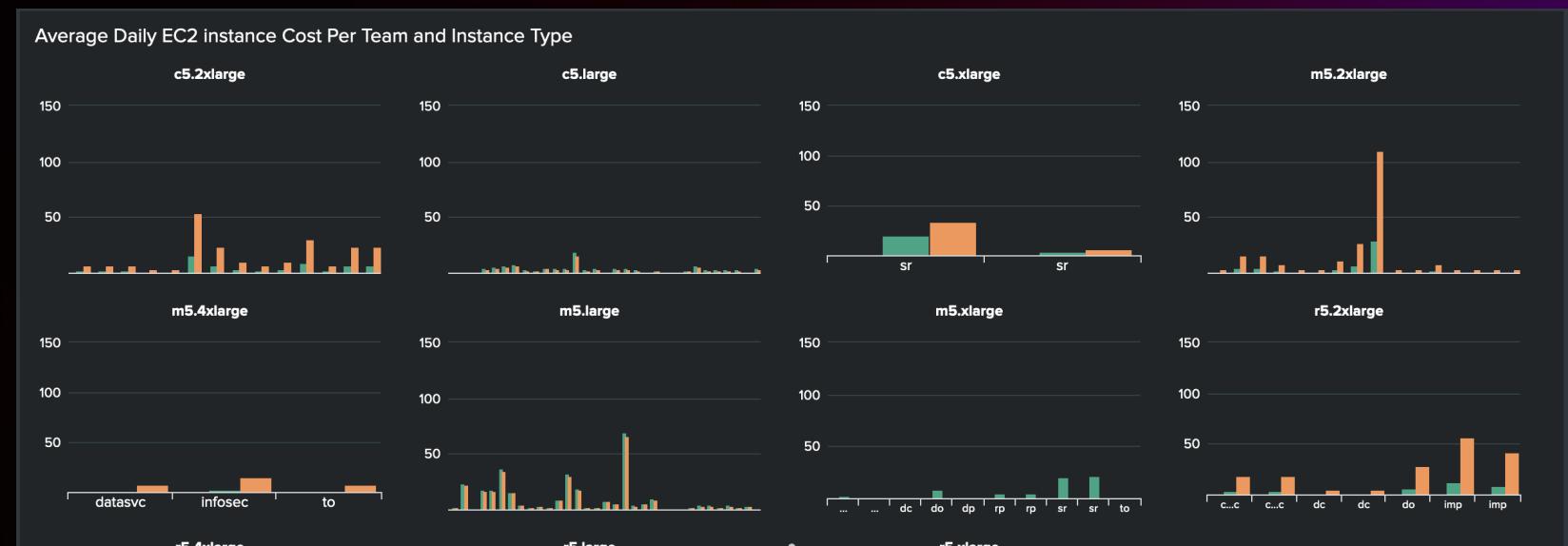
- AWS Resource Access Manager (AWS RAM)
- Segment resources between Outposts and in-region
- Easy for teams already using AWS



# Solution iterations: Excel and chaos

# Tracking usage and capacity

- Predicting capacity at onboarding
- Estimating EC2 needs
- Tracking usage across teams and accounts



# The quota system: Version 1

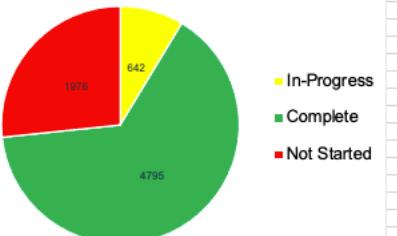
The AWS logo, consisting of the lowercase letters "aws" in a white sans-serif font, with a curved arrow underneath pointing from the bottom left towards the right.

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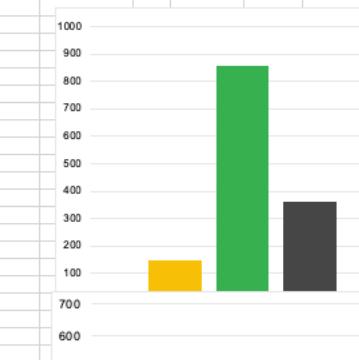
@margaretvaltie

# The quota system: Version 2

Oct - Feb 2022										May-22									
Dallas Outposts		Total	Available	Used	% in use	DALLAS	available	used	total	% in use	DALLAS	available	used	total	% in use	change from feb			
c5.large		245	172	73	0.298	c5.large	22	100	122	82%	c5.large	31	83	114	73%	-8			
c5.xlarge		23	20	3	0.13	c5.xlarge	2	21	23	91%	c5.xlarge	12	23	35	66%	12			
c5.2xlarge		33	10	23	0.697	c5.2xlarge	53	13	66	20%	c5.2xlarge	58	28	86	33%	20			
m5.large		220	90	130	0.59091	m5.large	63	165	228	72%	m5.large	7	125	232	54%	4			
m5.xlarge		22	22	0	0	m5.xlarge	1	21	22	95%	m5.xlarge	8	28	36	78%	14			
m5.2xlarge		36	6	30	0.83333	m5.2xlarge	12	24	36	67%	m5.2xlarge	32	20	52	38%	16			
m5.4xlarge		3	3	0	0	m5.4xlarge	0	2	2	100%	m5.4xlarge	0	2	2	100%	0			
r5.large		120	120	0	0	r5.large	13	27	40	68%	r5.large	21	27	48	56%	8			
r5.xlarge		20	19	1	0.05	r5.xlarge	0	20	20	100%	r5.xlarge	5	19	24	79%	4			
r5.2xlarge		26	22	4	0.154	r5.2xlarge	31	15	46	33%	r5.2xlarge	39	15	54	28%	8			
r5.4xlarge		3	3	0	0	r5.4xlarge	1	2	3	67%	r5.4xlarge	1	2	3	67%	0			
Chicago Outposts		Total	Available	Used	% in use	CHICAGO	available	used	total	% in use	CHICAGO	available	used	total	% in use	change from feb			
c5.large		115	76	39	0.339	c5.large	1	55	56	98%	CHICAGO	101	47	148	32%	92			
c5.2xlarge		43	4	39	0.907	c5.2xlarge	28	30	58	52%	c5.large	2	0	2	0%	-56			
m5.large		272	118	154	0.56618	m5.large	38	216	254	85%	c5.xlarge	21	37	58	64%	-196			
m5.xlarge		32	27	5	0.15625	m5.xlarge	0	35	35	100%	c5.2xlarge	74	196	270	73%	235			
m5.2xlarge		48	0	48	1	m5.2xlarge	6	45	51	88%	m5.large	12	39	51	76%	0			
m5.4xlarge		6	1	5	0.83333	m5.4xlarge	3	3	6	50%	m5.xlarge	7	44	51	86%	45			
r5.large		132	132	0	0	r5.large	26	46	72	64%	m5.2xlarge	4	2	6	33%	-66			
r5.xlarge		30	30	0	0	r5.xlarge	5	25	30	83%	m5.4xlarge	1	0	1	0%	1			
r5.2xlarge		20	16	4	0.2	r5.2xlarge	13	22	35	63%	r5.2xlarge	66	30	96	31%	66			
r5.4xlarge		2	1	1	0.5	r5.4xlarge	1	1	2	50%	r5.large	35	27	62	44%	27			
											r5.2xlarge	13	22	35	63%	33			
											r5.4xlarge	0	3	3	100%	3			
SERVER STATUS	Active																		
Count of Server	Column Labels																		
Row Labels	Planned AWS Migr.	Planned	Planned	Retirement		Grand Total													
2022 Q1		146	858			363	1367												
2022 Q2		347	504			333	1184												
Grand Total		493	1362			696	2551												
MIGRATION PLAN	(All)																		
MIGRATION TIMELINE	(All)																		
SERVER STATUS	(Multiple Items)																		
Row Labels	Count of Server																		
In-Progress		642																	
Complete		4795																	
Not Started		1976																	
Grand Total		7413																	
SERVER STATUS	Active																		
MIGRATION TIMELINE	(All)																		
MIGRATION PLAN	(All)																		
Count of Server	Column Labels																		
Row Labels	AWS	Outpost Retire				Grand Total													
2022		201	242			443	580												



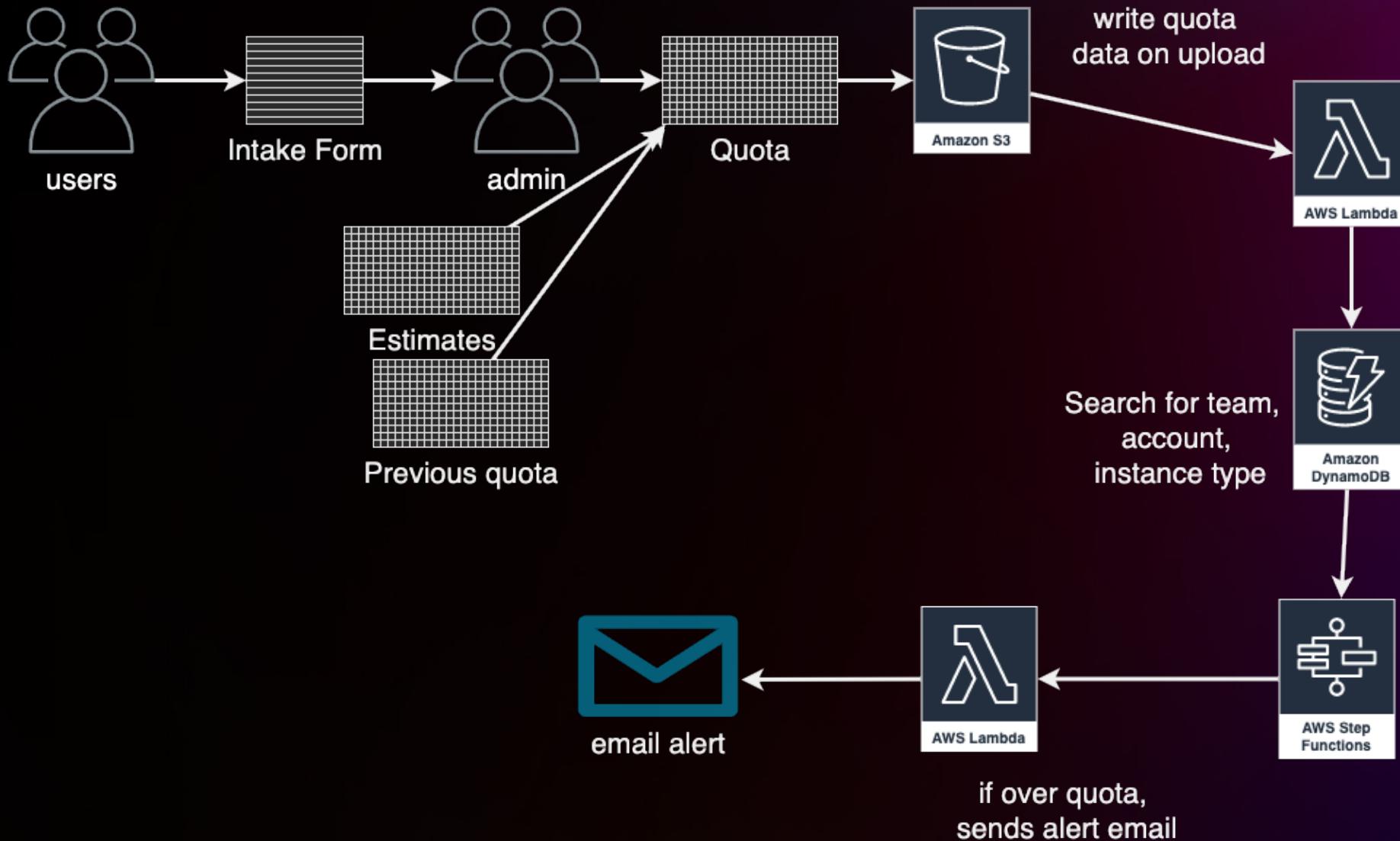
■ In-Progress  
■ Complete  
■ Not Started



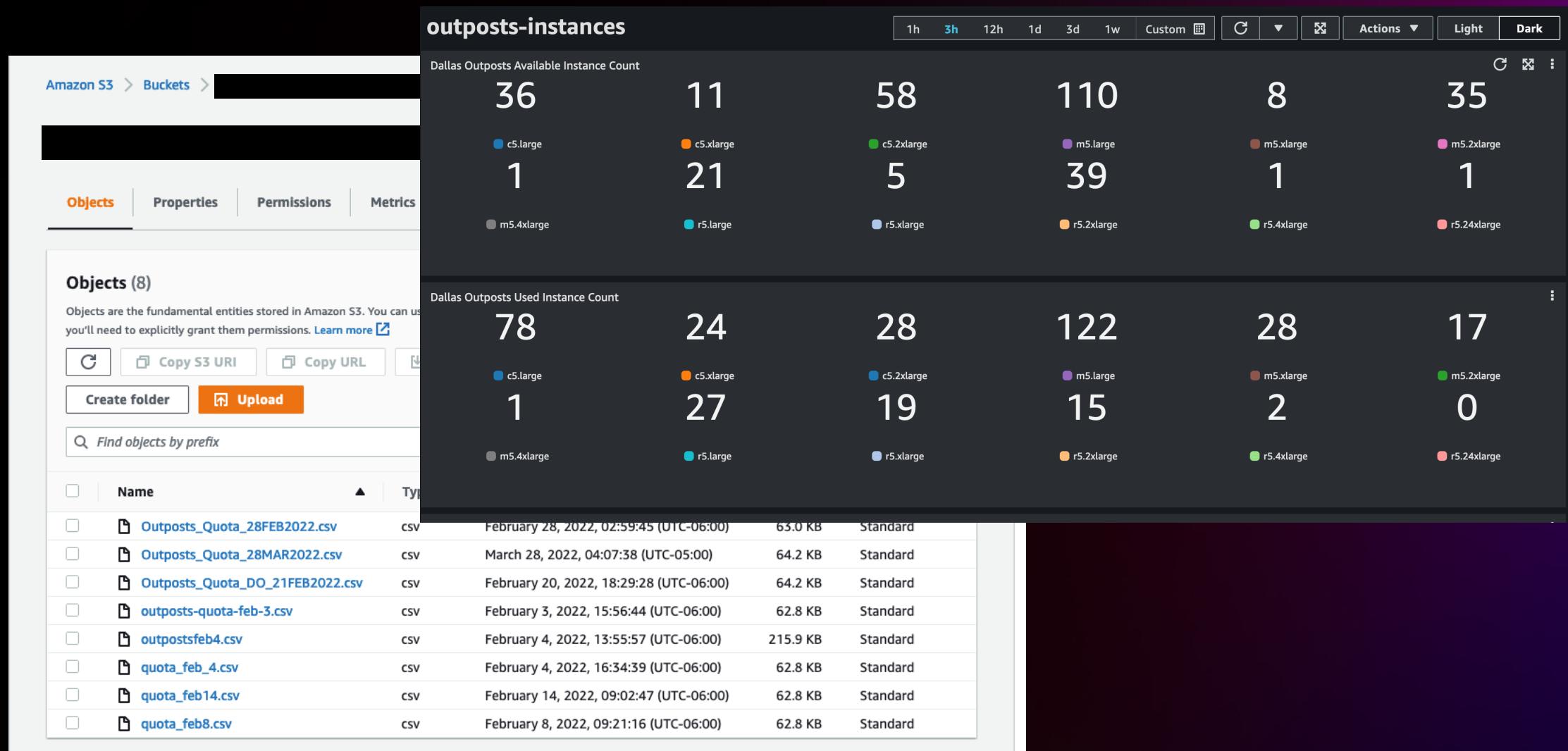
row_num	account_id	tid	env	region	instance_type	threshold
2	1001	913	ade	non-prod	us-east-1	c5.large
3	1002	913	ade	non-prod	us-east-1	c5.xlarge
4	1003	913	ade	non-prod	us-east-1	c5.2xlarge
5	1004	913	ade	non-prod	us-east-1	m5.large
6	1005	913	ade	non-prod	us-east-1	m5.xlarge
7	1006	913	ade	non-prod	us-east-1	m5.2xlarge
8	1007	913	ade	non-prod	us-east-1	m5.4xlarge
9	1008	913	ade	non-prod	us-east-1	r5.large
10	1009	913	ade	non-prod	us-east-1	r5.xlarge
11	1010	913	ade	non-prod	us-east-1	r5.2xlarge
12	1011	913	ade	non-prod	us-east-1	r5.4xlarge
13	1012	913	ade	non-prod	us-west-2	c5.large
14	1013	913	ade	non-prod	us-west-2	c5.2xlarge
15	1014	913	ade	non-prod	us-west-2	m5.large
16	1015	913	ade	non-prod	us-west-2	m5.xlarge
17	1016	913	ade	non-prod	us-west-2	m5.2xlarge
18	1017	913	ade	non-prod	us-west-2	m5.4xlarge
19	1018	913	ade	non-prod	us-west-2	r5.large
20	1019	913	ade	non-prod	us-west-2	r5.xlarge
21	1020	913	ade	non-prod	us-west-2	r5.2xlarge
22	1021	913	ade	non-prod	us-west-2	r5.4xlarge
23	1022	470	ade	prod	us-east-1	c5.large
24	1023	470	ade	prod	us-east-1	c5.xlarge
25	1024	470	ade	prod	us-east-1	c5.2xlarge
26	1025	470	ade	prod	us-east-1	m5.large
27	1026	470	ade	prod	us-east-1	m5.xlarge
28	1027	470	ade	prod	us-east-1	m5.2xlarge
29	1028	470	ade	prod	us-east-1	m5.4xlarge
30	1029	470	ade	prod	us-east-1	r5.large
31	1030	470	ade	prod	us-east-1	r5.xlarge
32	1031	470	ade	prod	us-east-1	r5.2xlarge
33	1032	470	ade	prod	us-west-2	c5.large
34	1033	470	ade	prod	us-west-2	c5.2xlarge
35	1034	470	ade	prod	us-west-2	m5.large
36	1035	470	ade	prod	us-west-2	m5.xlarge
37	1036	470	ade	prod	us-west-2	m5.2xlarge
38	1037	470	ade	prod	us-west-2	m5.4xlarge
39	1038	470	ade	prod	us-west-2	r5.large
40	1039	470	ade	prod	us-west-2	r5.xlarge
41	1040	470	ade	prod	us-west-2	r5.2xlarge
42	1041	470	ade	prod	us-west-2	r5.4xlarge
43	1042	470	ade	prod	us-east-1	c5.large
44	1043	968	as	non-prod	us-east-1	c5.xlarge
45	1044	968	as	non-prod	us-east-1	c5.2xlarge
46	1045	968	as	non-prod	us-east-1	m5.large
47	1046	968	as	non-prod	us-east-1	m5.xlarge
48	1047	968	as	non-prod	us-east-1	m5.2xlarge
49	1048	968	as	non-prod	us-east-1	m5.4xlarge
50	1049	968	as	non-prod	us-east-1	r5.large
51	1050	968	as	non-prod	us-east-1	r5.xlarge
52	1051	968	as	non-prod	us-east-1	r5.2xlarge
53	1052	968	as	non-prod	us-east-1	r5.4xlarge
54	1053	968	as	non-prod	us-west-2	c5.large
55	1054	968	as	non-prod	us-west-2	c5.2xlarge
56	1055	968	as	non-prod	us-west-2	m5.xlarge



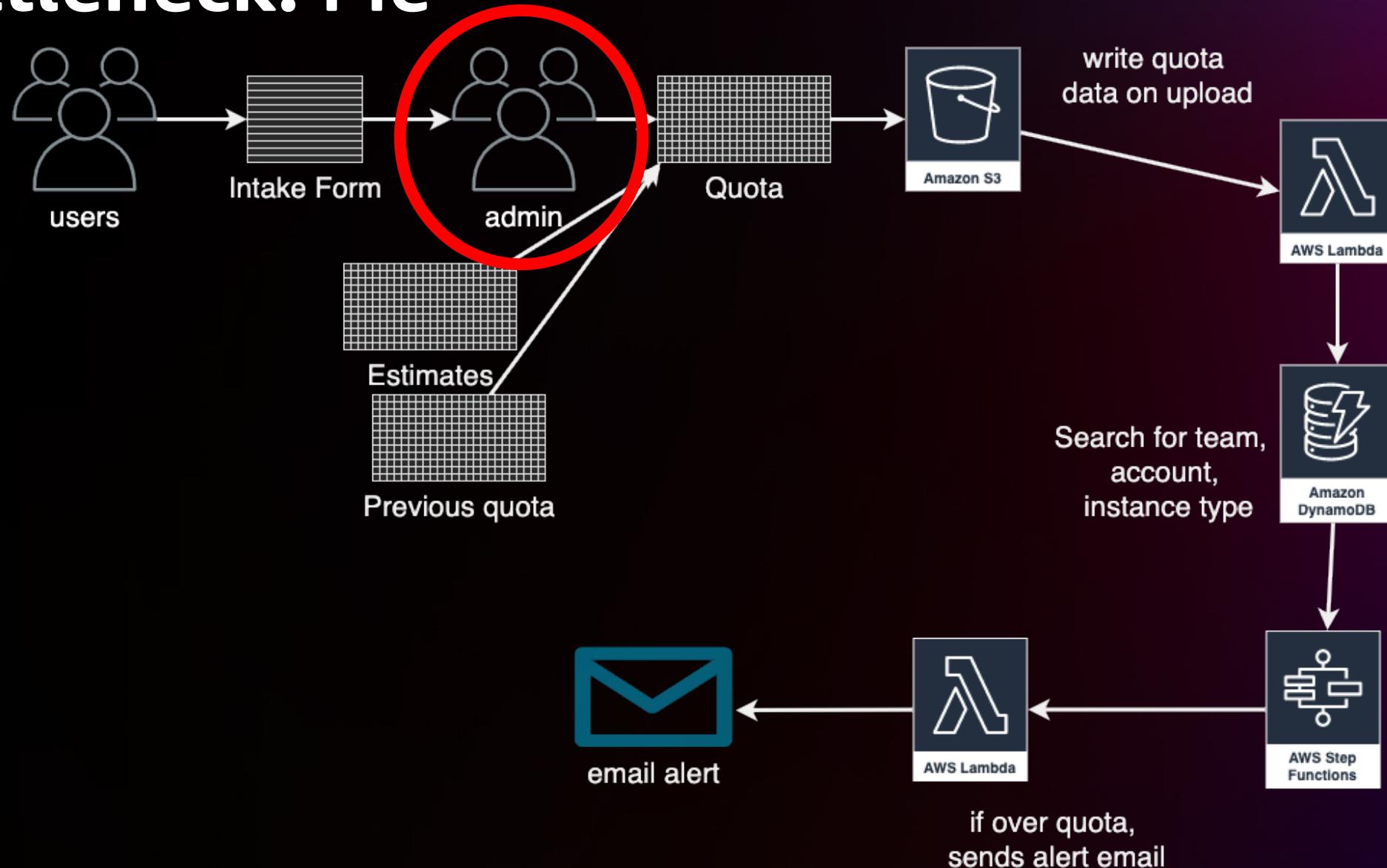
# The quota system: Version 2



# The quota system: Version 2



# Bottleneck: Me

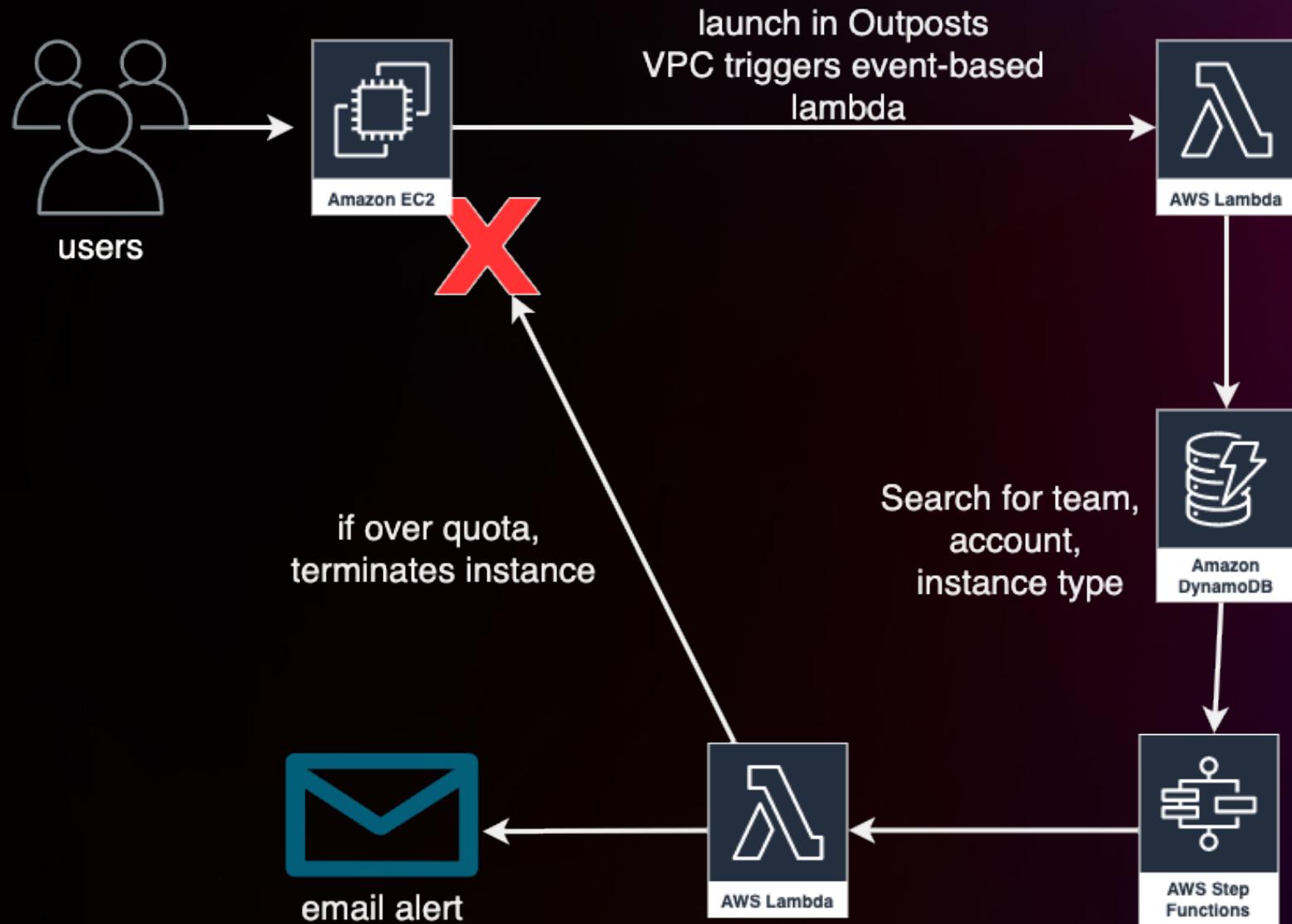


# The quota system: Version 3

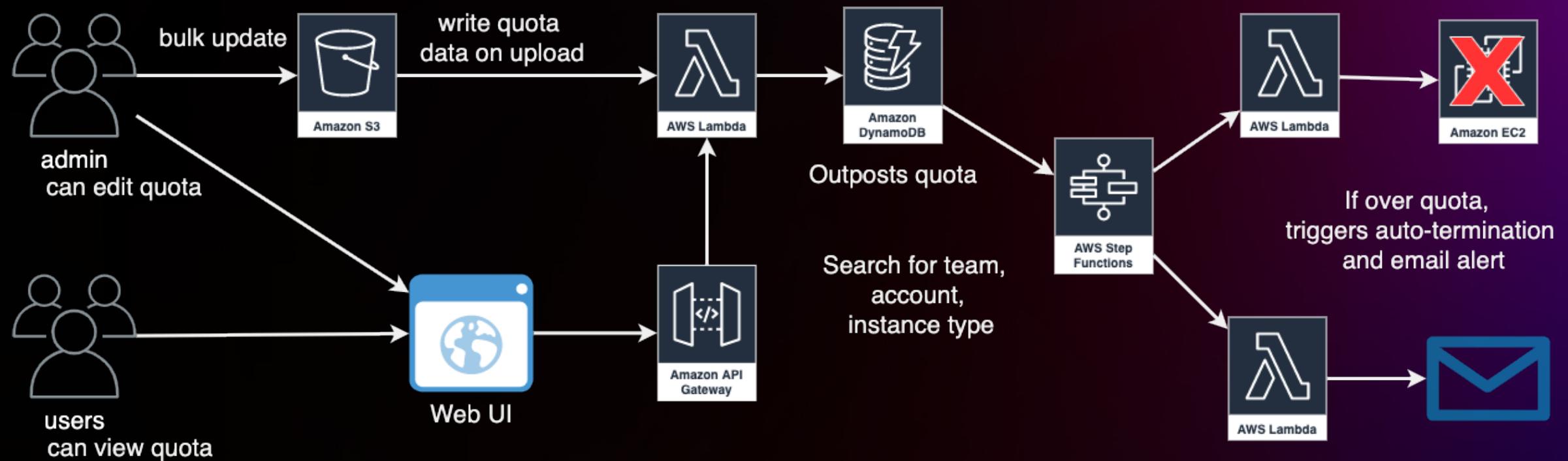
A screenshot of a web-based application interface titled "CloudServices". The top navigation bar includes links for "Tools", "Contact", and "Logout". Below the navigation is a "Create" button. The main content area features a table with 10 entries per page, with a search bar at the top right. The table columns are: #, id, Account ID, TID, Region, Environment, Instance, Quota, and Edit. Each row contains a redacted "id" field and a blue "Edit" button.

#	id	Account ID	TID	Region	Environment	Instance	Quota	Edit
460	214		mp	us-east-1	prod	c5.2xlarge	0	<button>Edit</button>
898	234		mp	us-west-2	prod	c5.2xlarge	0	<button>Edit</button>
215	778		mp	us-east-1	prod	c5.large	10	<button>Edit</button>
681	173		mp	us-west-2	prod	c5.large	0	<button>Edit</button>
556	329		mp	us-east-1	prod	c5.xlarge	0	<button>Edit</button>
546	788		mp	us-west-2	prod	m5.2xlarge	0	<button>Edit</button>
616	299		mp	us-east-1	prod	m5.2xlarge	0	<button>Edit</button>
138	118		mp	us-west-2	prod	m5.4xlarge	0	<button>Edit</button>
509	775		mp	us-east-1	prod	m5.4xlarge	0	<button>Edit</button>
197	240		mp	us-east-1	prod	m5.large	0	<button>Edit</button>

# Trust, but auto-terminate



# The quota system: Version 3



# Demo



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# User view

CloudServices Tools Contact Login

Show 100 entries Search:

#	id	Account ID	TID	Region	Environment	Instance	Quota
1	1921475	[REDACTED]	mob	us-east-1	prod	m5.xlarge	0
2	31731164	[REDACTED]	indiv	us-west-2	non-prod	r5.2xlarge	0
3	3363272	[REDACTED]	imp	us-west-2	prod	r5.2xlarge	0
4	3293235	[REDACTED]	rp	us-east-1	non-prod	r5.4xlarge	0
5	2806709	[REDACTED]	sr	us-west-2	non-prod	r5.large	0
6	7040461	[REDACTED]	mi	us-west-2	non-prod	m5.2xlarge	1
7	1682937	[REDACTED]	cloudsvc	us-east-1	non-prod	r5.2xlarge	0
8	1212766	[REDACTED]	corpsys	us-west-2	prod	r5.2xlarge	0
9	2953843	[REDACTED]	ept	us-east-1	non-prod	r5.2xlarge	0
10	1355893	[REDACTED]	baa	us-east-1	prod	r5.xlarge	0
11	1357189	[REDACTED]	to	us-west-2	non-prod	r5.2xlarge	1
12	2568989	[REDACTED]	datasvc	us-west-2	non-prod	r5.4xlarge	2
13	6123475	[REDACTED]	mob	us-west-2	prod	c5.2xlarge	8
14	2788736	[REDACTED]	imp	us-east-1	non-prod	m5.4xlarge	0



# Log in



Login to continue

Username

cloudsvcui-user

Password

.....

LOGIN



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# Filter by account, region, or instance

The screenshot shows a web-based management interface for CloudServices. At the top, there's a navigation bar with links for CloudServices, Tools, Contact, and Logout. Below the navigation is a "Create" button. The main area features a table with the following columns: #, id, Account ID, TID, Region, Environment, Instance, Quota, and Edit. The table contains ten rows of data, each with a unique ID and TID, and specific details for Region, Environment, Instance, and Quota. Each row includes an "Edit" button. The "Account ID" column is heavily redacted with black bars.

#	id	Account ID	TID	Region	Environment	Instance	Quota	Edit
460	21	[REDACTED]	mp	us-east-1	prod	c5.2xlarge	0	<button>Edit</button>
898	23	[REDACTED]	mp	us-west-2	prod	c5.2xlarge	0	<button>Edit</button>
215	77	[REDACTED]	mp	us-east-1	prod	c5.large	2	<button>Edit</button>
681	17	[REDACTED]	mp	us-west-2	prod	c5.large	0	<button>Edit</button>
556	32	[REDACTED]	mp	us-east-1	prod	c5.xlarge	0	<button>Edit</button>
546	78	[REDACTED]	mp	us-west-2	prod	m5.2xlarge	0	<button>Edit</button>
616	29	[REDACTED]	mp	us-east-1	prod	m5.2xlarge	0	<button>Edit</button>
138	11	[REDACTED]	mp	us-west-2	prod	m5.4xlarge	0	<button>Edit</button>
509	77	[REDACTED]	mp	us-east-1	prod	m5.4xlarge	0	<button>Edit</button>
197	24	[REDACTED]	mp	us-east-1	prod	m5.large	0	<button>Edit</button>



# Update quota

CloudServices Tools Contact

## Update Quota Entry

Account ID  
[REDACTED]

TID  
mp

Region  
us-east-1

Environment  
prod

Instance Type  
c5.large

Quota  
10

[Cancel](#) [Save](#)



# View updated total

CloudServices Tools Contact Logout

Create

Show 10 entries Search: [REDACTED]

# ↴	id ↴	Account ID ↴	TID ↴	Region ↴	Environment ↴	Instance ↴	Quota ↴	Edit ↴
460	[REDACTED]	mp	us-east-1	prod	c5.2xlarge	0		<button>Edit</button>
898	[REDACTED]	mp	us-west-2	prod	c5.2xlarge	0		<button>Edit</button>
215	[REDACTED]	mp	us-east-1	prod	c5.large	10		<button>Edit</button>
681	[REDACTED]	mp	us-west-2	prod	c5.large	0		<button>Edit</button>
556	[REDACTED]	mp	us-east-1	prod	c5.xlarge	0		<button>Edit</button>
546	[REDACTED]	mp	us-west-2	prod	m5.2xlarge	0		<button>Edit</button>
616	[REDACTED]	mp	us-east-1	prod	m5.2xlarge	0		<button>Edit</button>
138	[REDACTED]	mp	us-west-2	prod	m5.4xlarge	0		<button>Edit</button>
509	[REDACTED]	mp	us-east-1	prod	m5.4xlarge	0		<button>Edit</button>
197	[REDACTED]	mp	us-east-1	prod	m5.large	0		<button>Edit</button>

# Lessons learned

## Key technology goals

- Plan your capacity
- Track utilization
- Set quota by account



# Thank you!



Please complete the session  
survey in the **mobile app**