AWS re:Invent

SEC339

Actionable threat hunting in AWS

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AWS re:Invent

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aws

Agenda

Incident handling 101

Preparation

Identification

Containment, eradication, recovery

AWS Support enterprise support plan for incident response

AWS technical account manager

Who	Designated point of contact for AWS Support
What	Provides guidance and advocacy
Where	Operational excellence
When	Application launch, incident management, operational maturity

tbs TNT truTV CNN HLN GREAT BIG STORY TCM TURNER CLASSIC MOVIES TURNER SPORTS B/R CINEMAX

HBO cartoonito tooncast CN CARTOON NETWORK BOOMERANG [adult swim] WB DC Oh!K THE CW pogo

WarnerMedia™

TCM NEW LINE CINEMA CASTLE ROCK ENTERTAINMENT Hanna-Barbera glitz* TOONAMI SPACE I.SAT TABI CHANNEL Boing TNT SERIE

ChileVisión MONDO TV WB TV h Rooster Teeth hello sunshine FULLSCREEN GUNPOWDER & SKY TCM cinéma crunchyroll

Incident handling 101

AWS re:Invent

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SANS incident handling 101

- Preparation
- Identification
- Containment
- Eradication
- Recovery
- Lessons learned

Ten places your security group should spend time

1. **Accurate account info**
2. Use MFA
3. No hard-coding secrets
4. Limit security groups
5. Intentional data policies
6. **Centralize AWS CloudTrail logs**
7. Validate IAM roles
8. **Take action on GuardDuty findings**
9. Rotate your keys
10. Being involved in dev cycle

Preparation

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Preparation

- AWS CloudTrail
- Amazon GuardDuty
- Inventory
- Vulnerability detection
- AWS Support

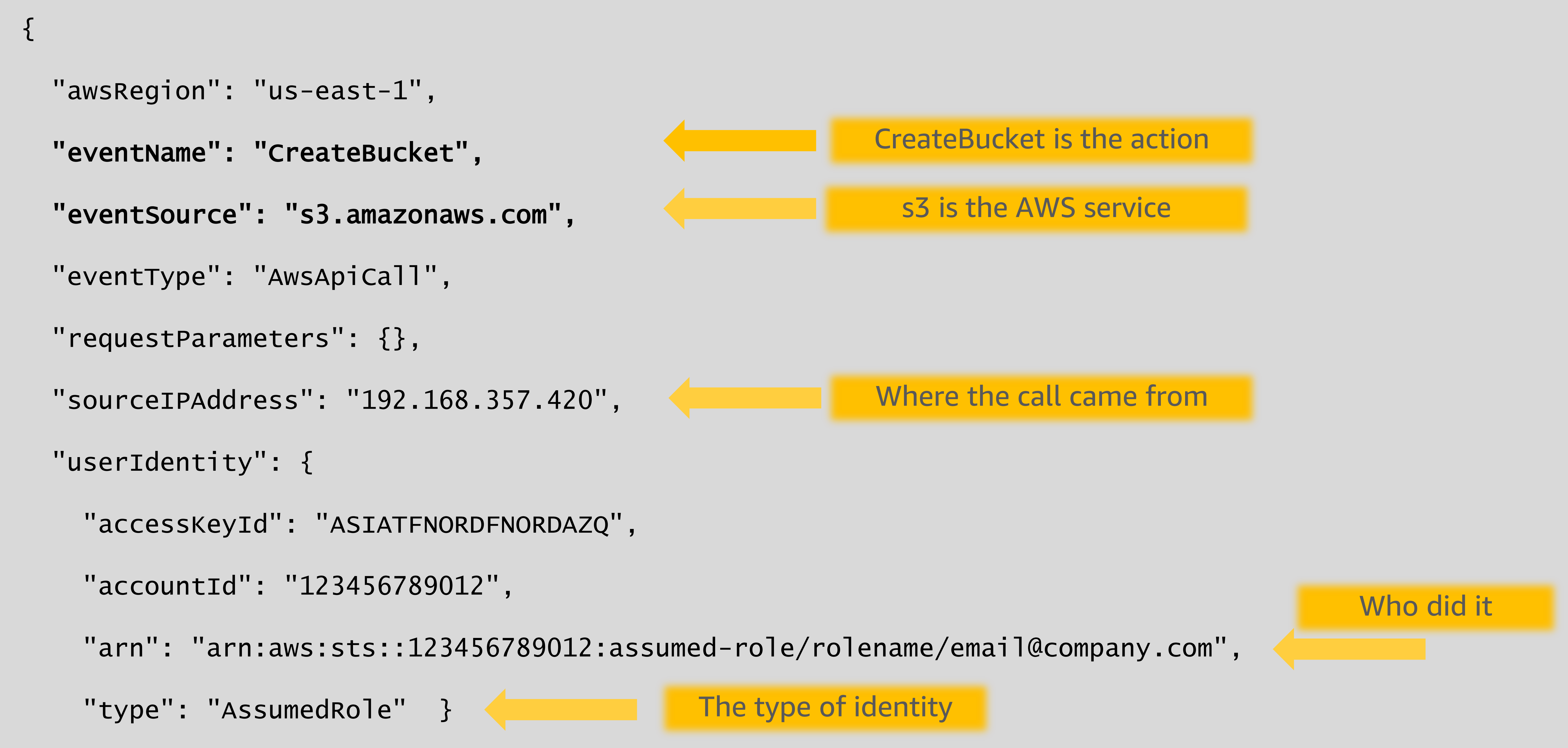
Centralized AWS CloudTrail

- CloudTrail deployed via CFT in all accounts
- Events written to one bucket per payer
- Dedicated logging account
- Splunk ingests the CloudTrail events

Scale

- 800 AWS accounts
  - 12 organizational payers
- 8.1m CloudTrail events per hour
- 37% are management events
- 18% AssumeRole
- 10% Decrypt

CloudTrail primer



```
{
  "awsRegion": "us-east-1",
  "eventName": "CreateBucket",
  "eventSource": "s3.amazonaws.com",
  "eventType": "AwsApiCall",
  "requestParameters": {},
  "sourceIPAddress": "192.168.357.420",
  "userIdentity": {
    "accessKeyId": "ASIATFNORDFNORDAZQ",
    "accountId": "123456789012",
    "arn": "arn:aws:sts::123456789012:assumed-role/rolename/email@company.com",
    "type": "AssumedRole"  }
```

CreateBucket is the action

s3 is the AWS service

Where the call came from

Who did it

The type of identity

Centralized Amazon GuardDuty

- All GuardDuty findings fed to centralized account
- Amazon CloudWatch Events triggers a push to Splunk via HTTP event collector (HEC)
- Caveat: Must be done in all regions

Sample Code:
https://github.com/turnerlabs/aws-guardduty-enterprise

How does GuardDuty work ?

- Baselines accounts
- 30-day learning period
- Leverages AWS internal "threat lists," Proofpoint & CrowdStrike
- You can add your own set of trusted and bad actor IPs

GuardDuty: Event summary

```
index=guardduty

| dedup id

| stats count by detail.type
```

- 79% are PortProbeUnprotectedPort
- 4% are unusual IAM recon activity
- 2.5% are logins from unusual IP addresses

Inventory (Antiope)

- Lots of accounts and lots of regions makes for a big haystack
- Enterprise tools are expensive
- Requirement to track cross-account trust relationships
- Search engine to help find gaping security holes
- Opensource
- Pronounced An-Tie-Oh-Pee

https://github.com/turnerlabs/antiope

What Antiope collects

- Amazon EC2 instances
- Security groups
- Elastic network interfaces
- Amazon Route 53 domains
- Route 53 zones
- Amazon Elasticsearch Service (Amazon ES)
- Amazon Elastic Container Service (Amazon ECS) tasks & clusters
- Amazon Elastic Container Registry (Amazon ECR) repos
- Amazon CloudFront
- AWS CloudFormation
- AMIs
- VPCs, VPN & direct connect
- AWS Identity and Access Management (IAM) roles & users
- AWS Lambda & Lambda layers
- Trusted advisor
- Support cases

CloudSploit

- Open Source Cloud Vulnerability Scanner
- WarnerMedia executes across all accounts hourly
- Integrated to Antiope
- Security issues presented to account owners via Scorecards (Excel)
- Paid versions available

PSA: Set your security contact

- My new goal is to find account compromise before AWS does
- But if I don’t, AWS Abuse team or technical account manager (TAM) will be reaching out
- Set the account security contact to your SOC or IR

Identification

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Alternate session title: So now I have three billion compressed json blobs in S3. What's next?

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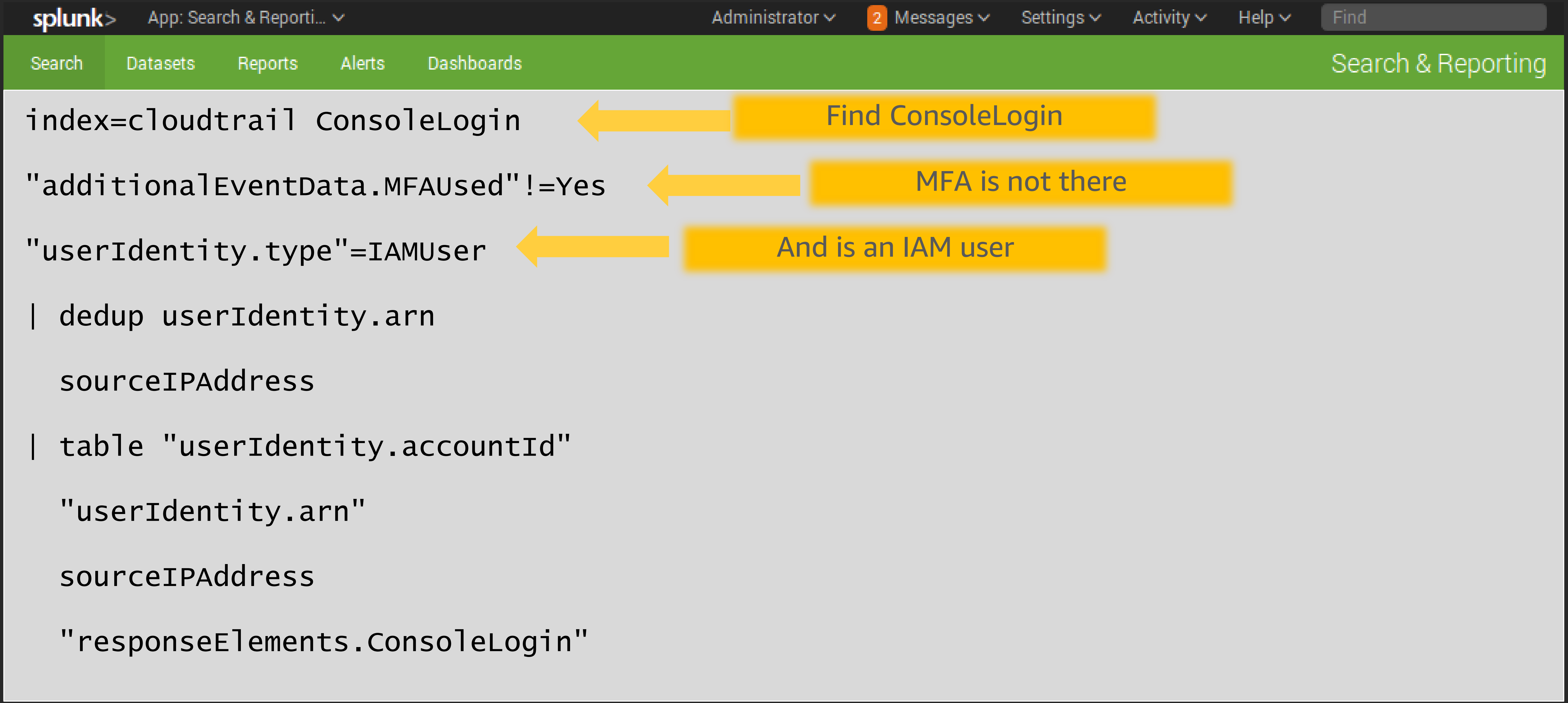
Identification strategy

- CloudTrail to detect events we know are bad
- GuardDuty to correlate events in CloudTrail
- GuardDuty to find events in VPCFlow logs & DNS logs we can't see
- CloudSploit for misconfigured resources
- Antiope to manage, AWS accounts find where a resource is

CloudTrail - IAM Login with no MFA



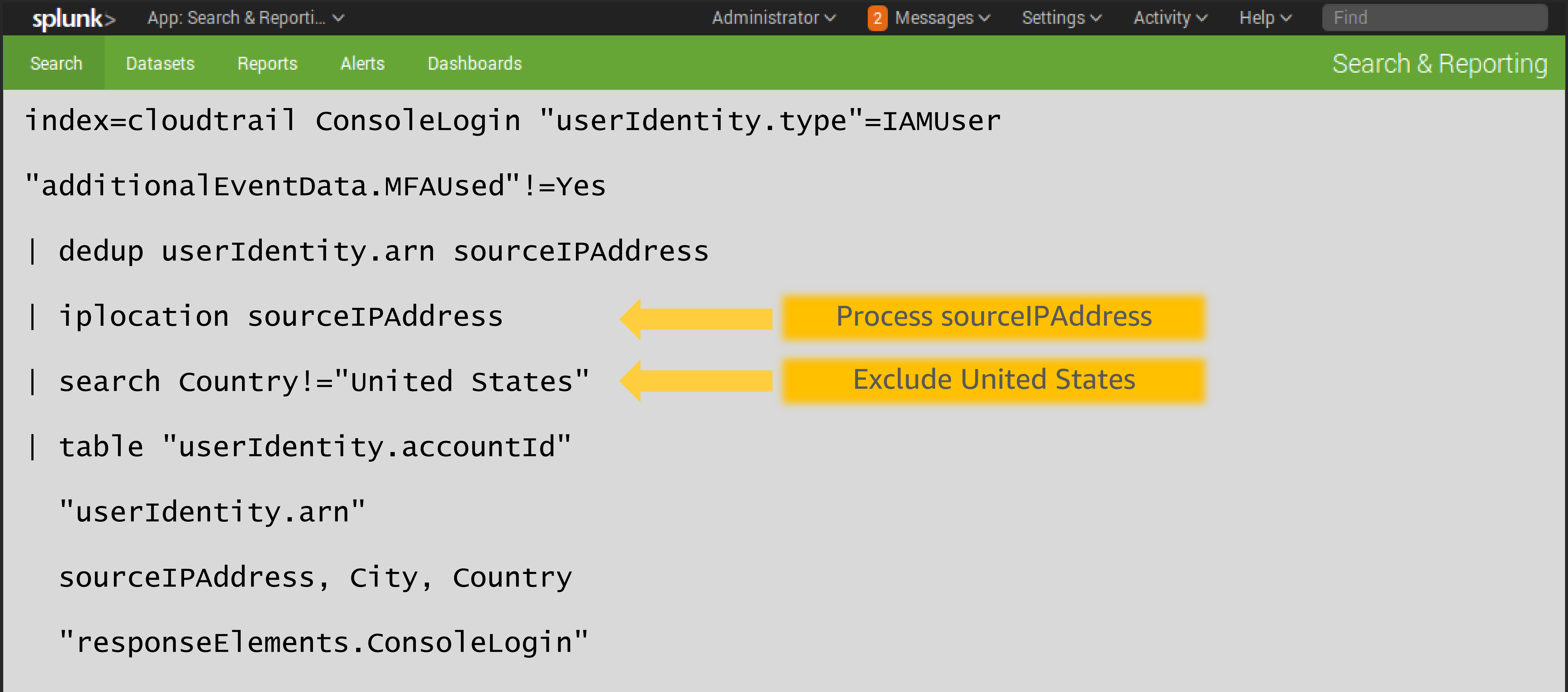
```
index=cloudtrail ConsoleLogin
"additionalEventData.MFAUsed"!=Yes
"userIdentity.type"=IAMUser
| dedup userIdentity.arn
  sourceIPAddress
| table "userIdentity.accountId"
  "userIdentity.arn"
  sourceIPAddress
  "responseElements.ConsoleLogin"
```

Find ConsoleLogin

MFA is not there

And is an IAM user

CloudTrail: Add IAM login locations

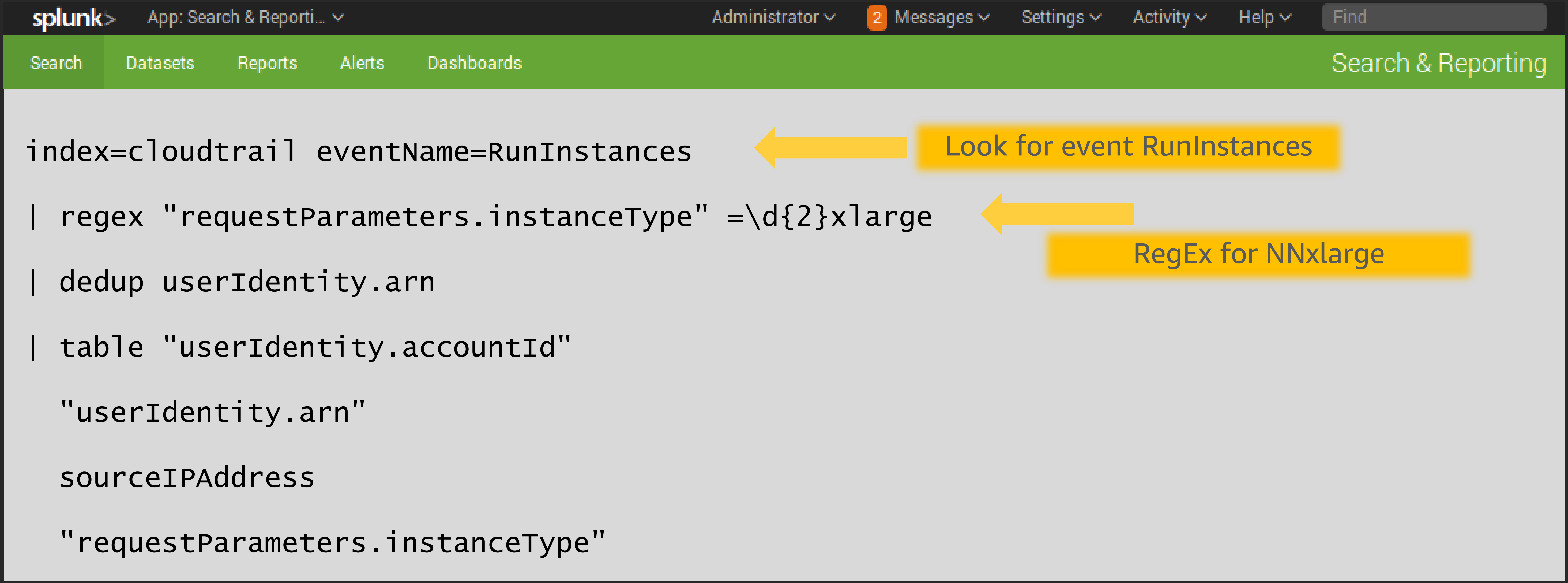


```
index=cloudtrail ConsoleLogin "userIdentity.type"=IAMUser

"additionalEventData.MFAUsed"!=Yes

| dedup userIdentity.arn sourceIPAddress

| iplocation sourceIPAddress

| search Country!="United States"

| table "userIdentity.accountId"

  "userIdentity.arn"

  sourceIPAddress, City, Country

  "responseElements.ConsoleLogin"
```

Process sourceIPAddress

Exclude United States

CloudTrail: Expensive Amazon EC2 detection

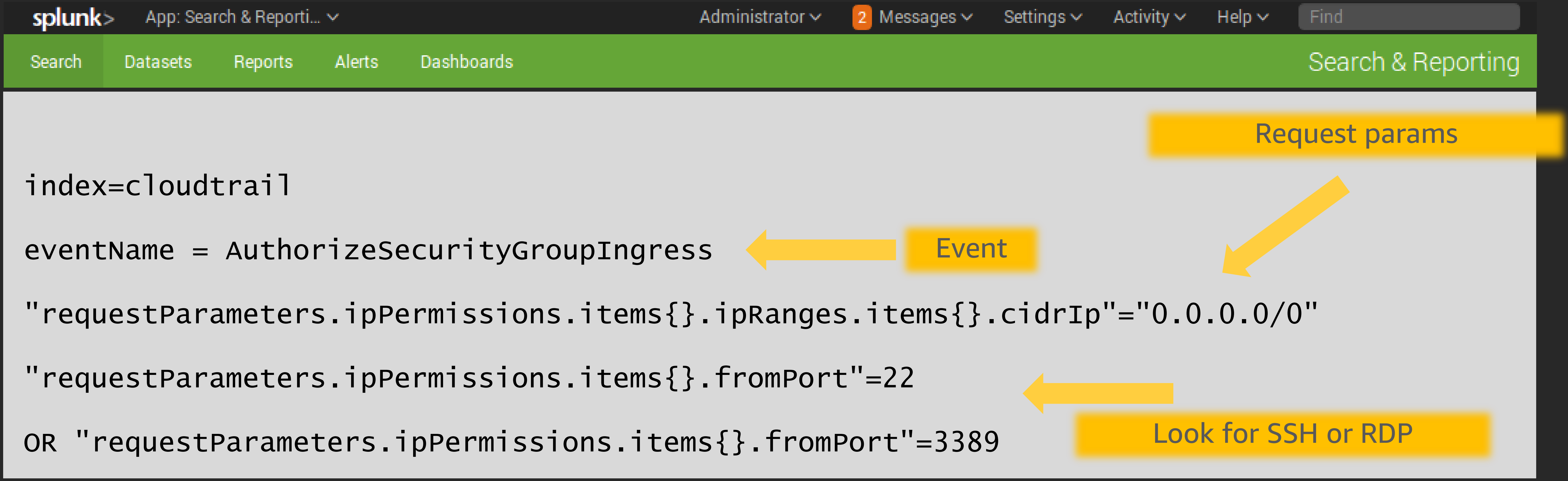


```
index=cloudtrail eventName=RunInstances
| regex "requestParameters.instanceType" =\d{2}xlarge
| dedup userIdentity.arn
| table "userIdentity.accountId"
  "userIdentity.arn"
  sourceIPAddress
  "requestParameters.instanceType"
```

Look for event RunInstances

RegEx for NNxlarge

CloudTrail: Open security groups



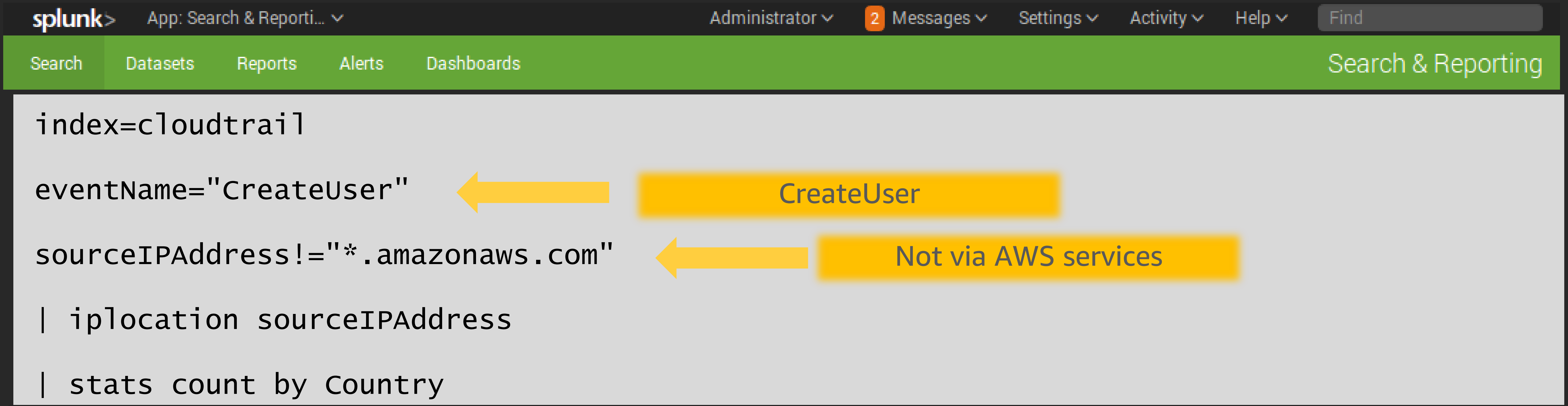
```
index=cloudtrail

eventName = AuthorizeSecurityGroupIngress

"requestParameters.ipPermissions.items{}.ipRanges.items{}.cidrIp"="0.0.0.0/0"

"requestParameters.ipPermissions.items{}.fromPort"=22

OR "requestParameters.ipPermissions.items{}.fromPort"=3389
```

Request params

Event

Look for SSH or RDP

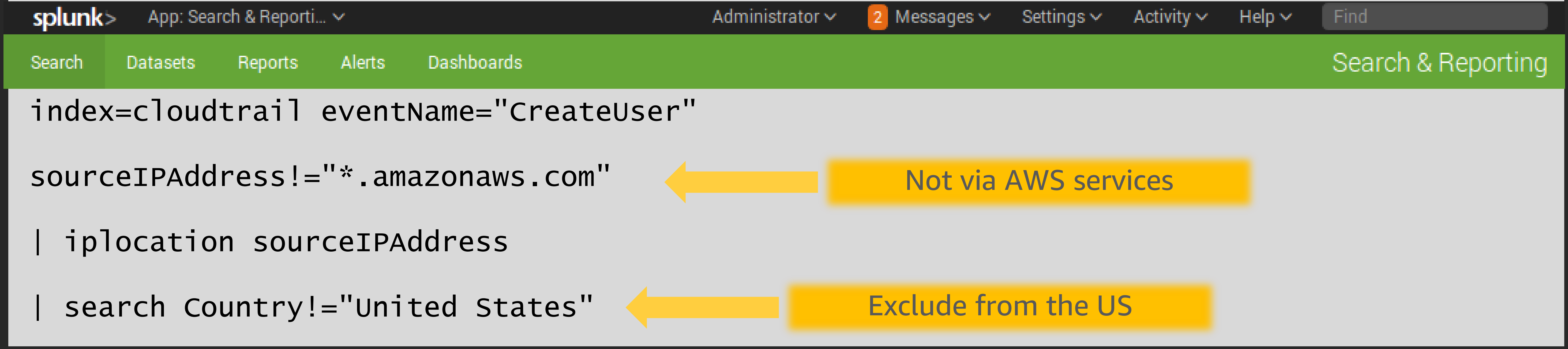
CloudTrail: User creation detection



```
index=cloudtrail

eventName="CreateUser"

sourceIPAddress!="*.amazonaws.com"

| iplocation sourceIPAddress

| stats count by Country
```

CreateUser

Not via AWS services



```
index=cloudtrail eventName="CreateUser"

sourceIPAddress!="*.amazonaws.com"

| iplocation sourceIPAddress

| search Country!="United States"
```

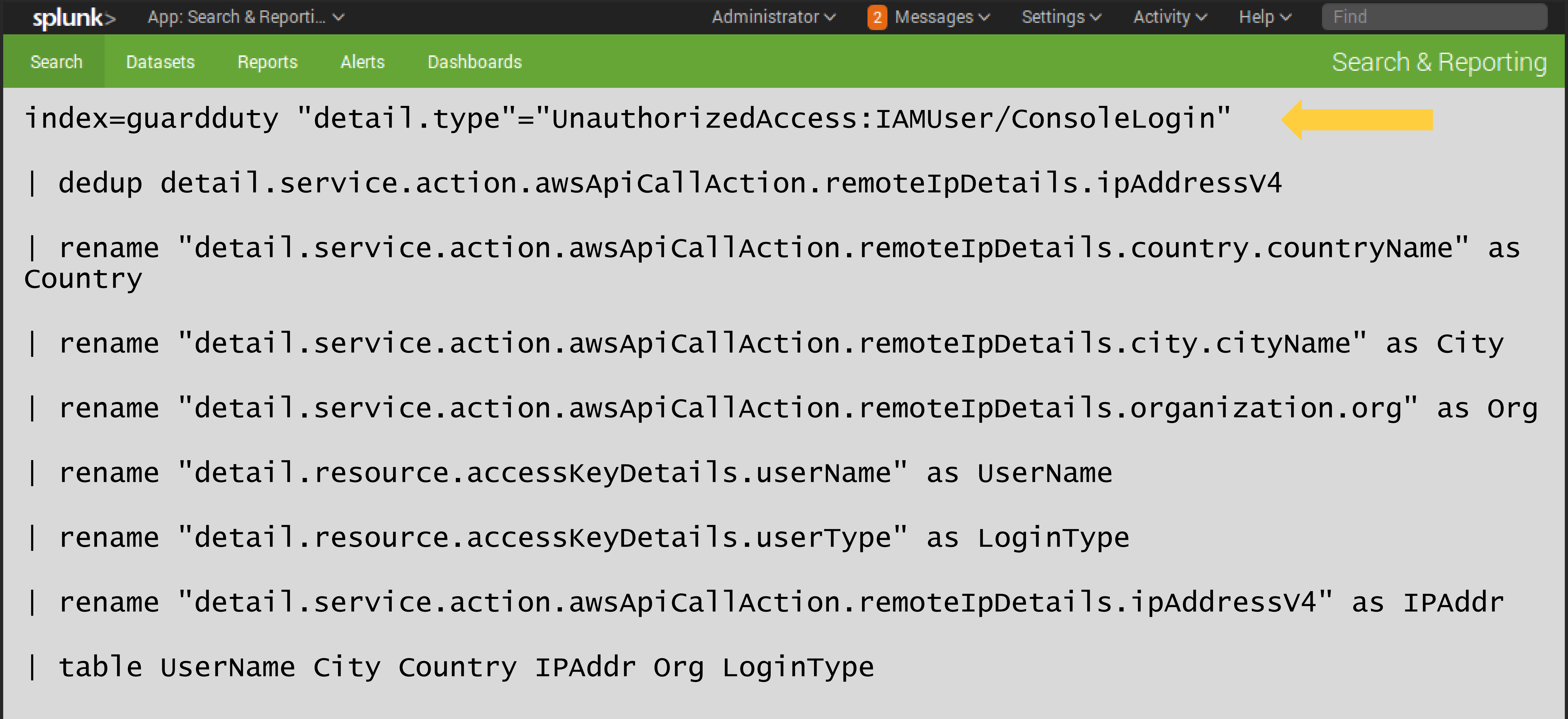
Not via AWS services

Exclude from the US

Detection Catalog: CloudTrail Events

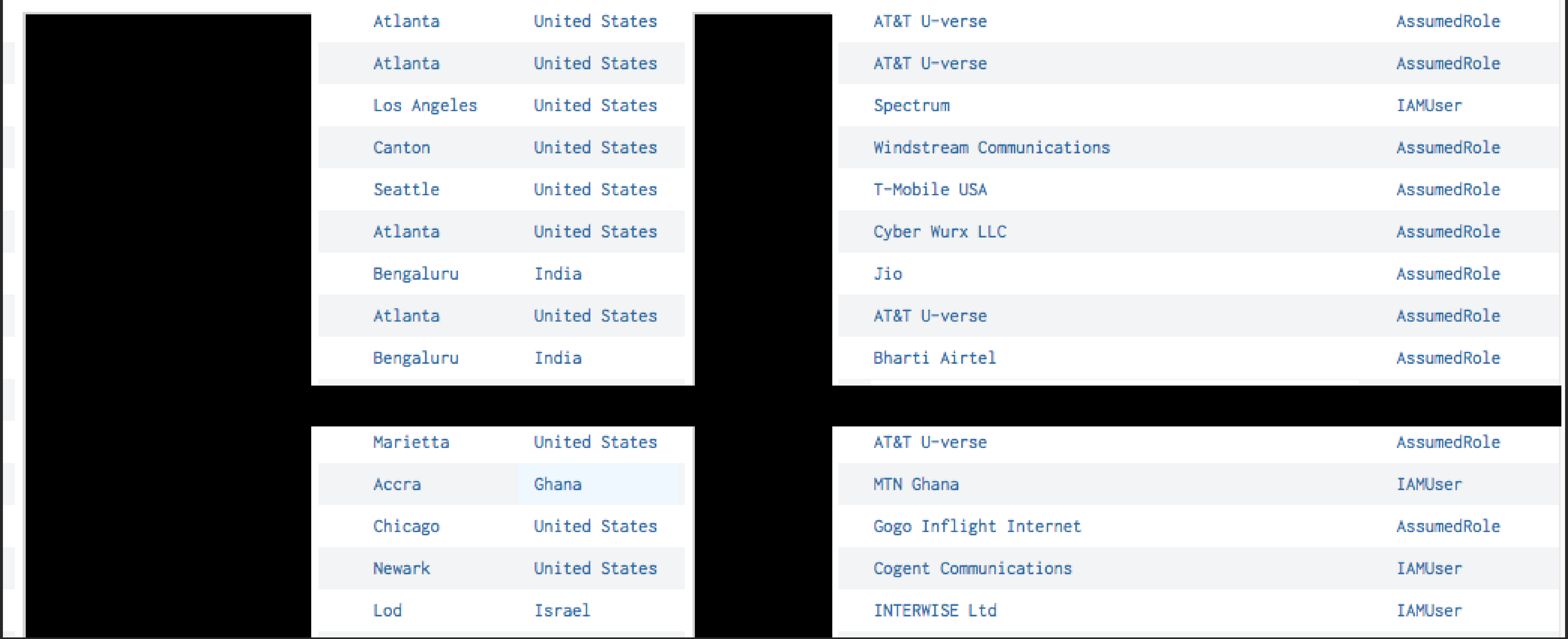
- CreateClientVpnEndpoint
- DeleteDetector
- DeleteMembers
- DisassociateFromMasterAccount
- DisassociateMembers
- StopMonitoringMembers
- DeleteTrail
- StopLogging
- UpdateTrail
- AuthorizeSecurityGroupEgress
- AttachInternetGateway
- AttachNetworkInterface*

GuardDuty: Logins from new IP addresses



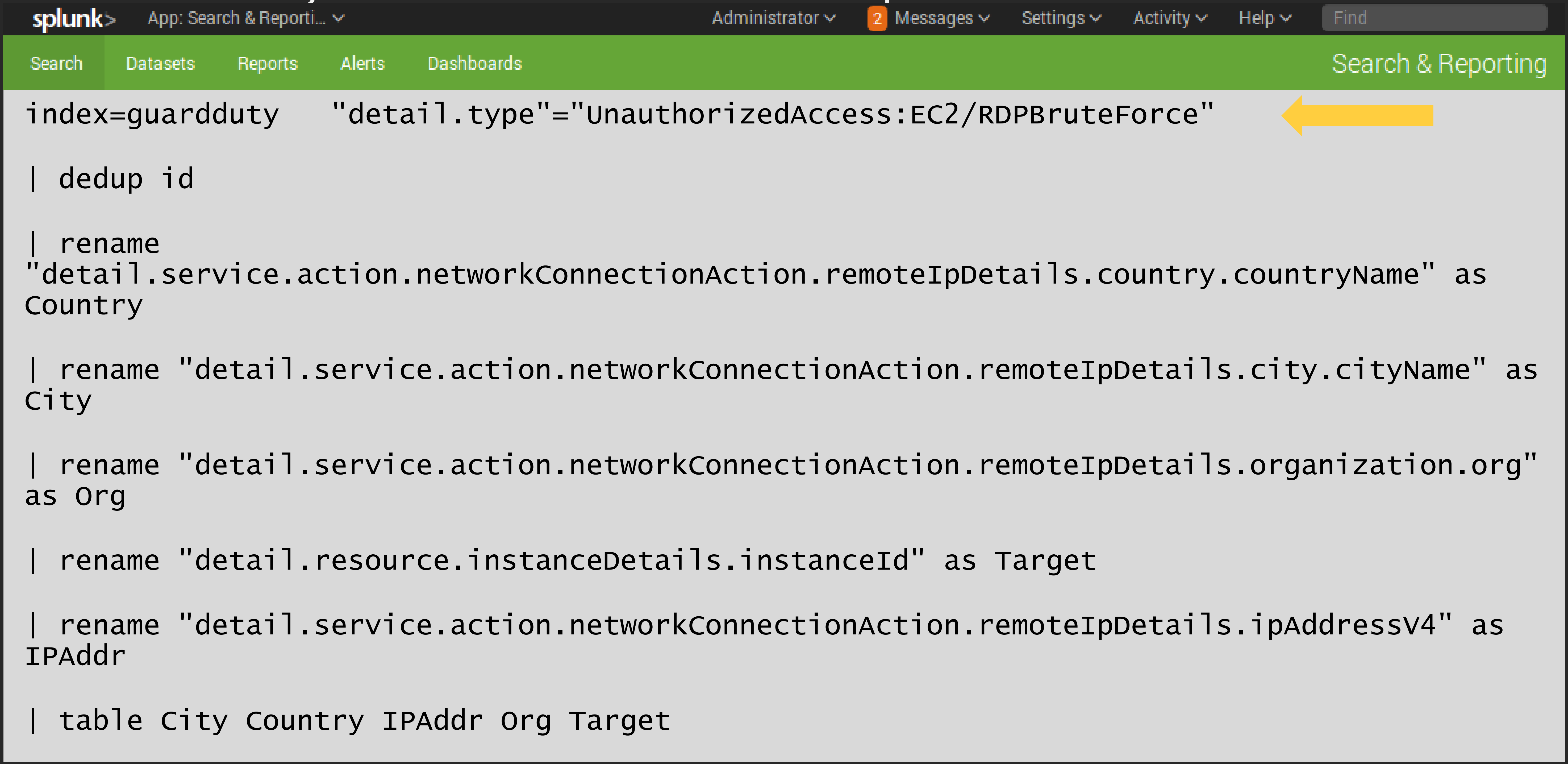
```
index=guardduty "detail.type"="UnauthorizedAccess:IAMUser/ConsoleLogin"

| dedup detail.service.action.awsApiCallAction.remoteIpDetails.ipAddressV4

| rename "detail.service.action.awsApiCallAction.remoteIpDetails.country.countryName" as Country

| rename "detail.service.action.awsApiCallAction.remoteIpDetails.city.cityName" as City

| rename "detail.service.action.awsApiCallAction.remoteIpDetails.organization.org" as Org

| rename "detail.resource.accessKeyDetails.userName" as UserName

| rename "detail.resource.accessKeyDetails.userType" as LoginType

| rename "detail.service.action.awsApiCallAction.remoteIpDetails.ipAddressV4" as IPAddr

| table UserName City Country IPAddr Org LoginType
```

GuardDuty: Login from new IP addresses results



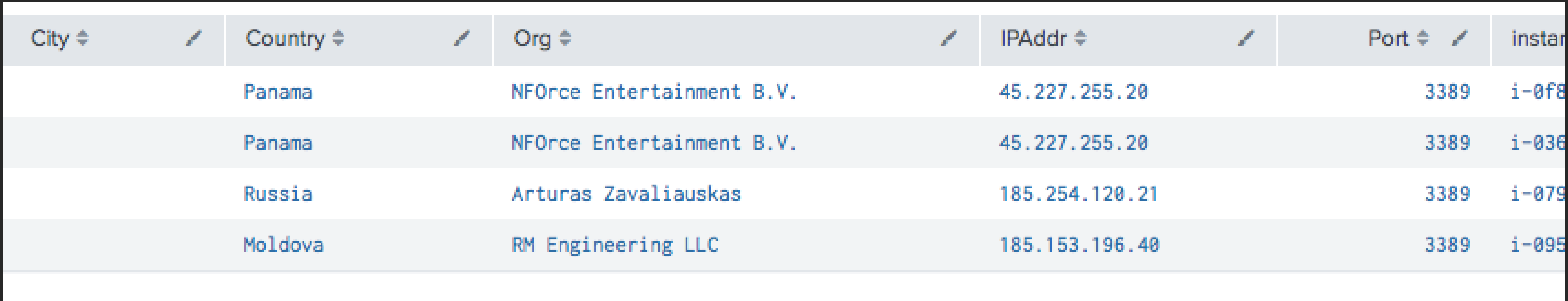
[redacted]	Atlanta	United States	[redacted]	AT&T U-verse	AssumedRole
[redacted]	Atlanta	United States	[redacted]	AT&T U-verse	AssumedRole
[redacted]	Los Angeles	United States	[redacted]	Spectrum	IAMUser
[redacted]	Canton	United States	[redacted]	Windstream Communications	AssumedRole
[redacted]	Seattle	United States	[redacted]	T-Mobile USA	AssumedRole
[redacted]	Atlanta	United States	[redacted]	Cyber Wurx LLC	AssumedRole
[redacted]	Bengaluru	India	[redacted]	Jio	AssumedRole
[redacted]	Atlanta	United States	[redacted]	AT&T U-verse	AssumedRole
[redacted]	Bengaluru	India	[redacted]	Bharti Airtel	AssumedRole
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	Marietta	United States	[redacted]	AT&T U-verse	AssumedRole
[redacted]	Accra	Ghana	[redacted]	MTN Ghana	IAMUser
[redacted]	Chicago	United States	[redacted]	Gogo Inflight Internet	AssumedRole
[redacted]	Newark	United States	[redacted]	Cogent Communications	IAMUser
[redacted]	Lod	Israel	[redacted]	INTERWISE Ltd	IAMUser

GuardDuty: RDP brute force report



```
index=guardduty   "detail.type"="UnauthorizedAccess:EC2/RDPBruteForce"

| dedup id

| rename
"detail.service.action.networkConnectionAction.remoteIpDetails.country.countryName" as
Country

| rename "detail.service.action.networkConnectionAction.remoteIpDetails.city.cityName" as
City

| rename "detail.service.action.networkConnectionAction.remoteIpDetails.organization.org"
as Org

| rename "detail.resource.instanceDetails.instanceId" as Target

| rename "detail.service.action.networkConnectionAction.remoteIpDetails.ipAddressV4" as
IPAddr

| table City Country IPAddr Org Target
```

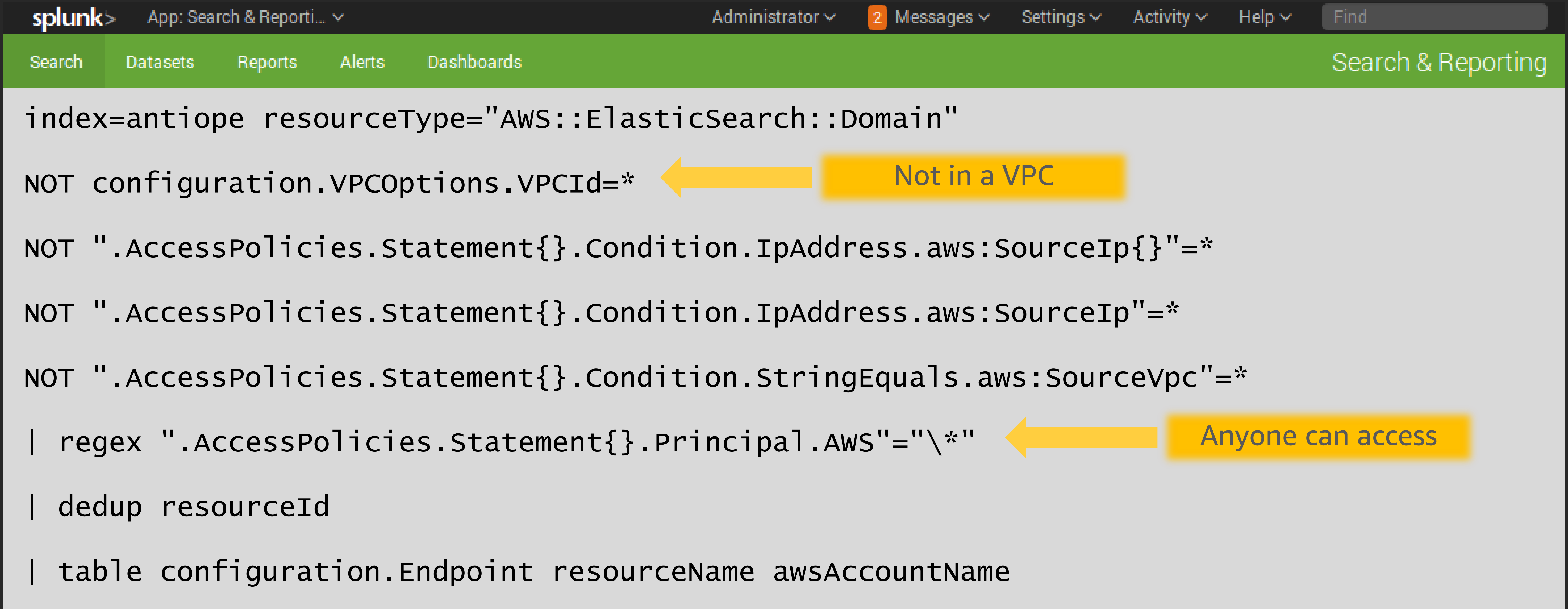
GuardDuty: RDP brute force results



City	Country	Org	IPAddr	Port	insta
	Panama	NFOrce Entertainment B.V.	45.227.255.20	3389	i-0f8
	Panama	NFOrce Entertainment B.V.	45.227.255.20	3389	i-036
	Russia	Arturas Zavaliauskas	185.254.120.21	3389	i-079
	Moldova	RM Engineering LLC	185.153.196.40	3389	i-095

This is the difference between:
"Hey you have misconfigured your security group"
and
"Hey, you're under attack"

Antiope: Public ElasticSearch cluster

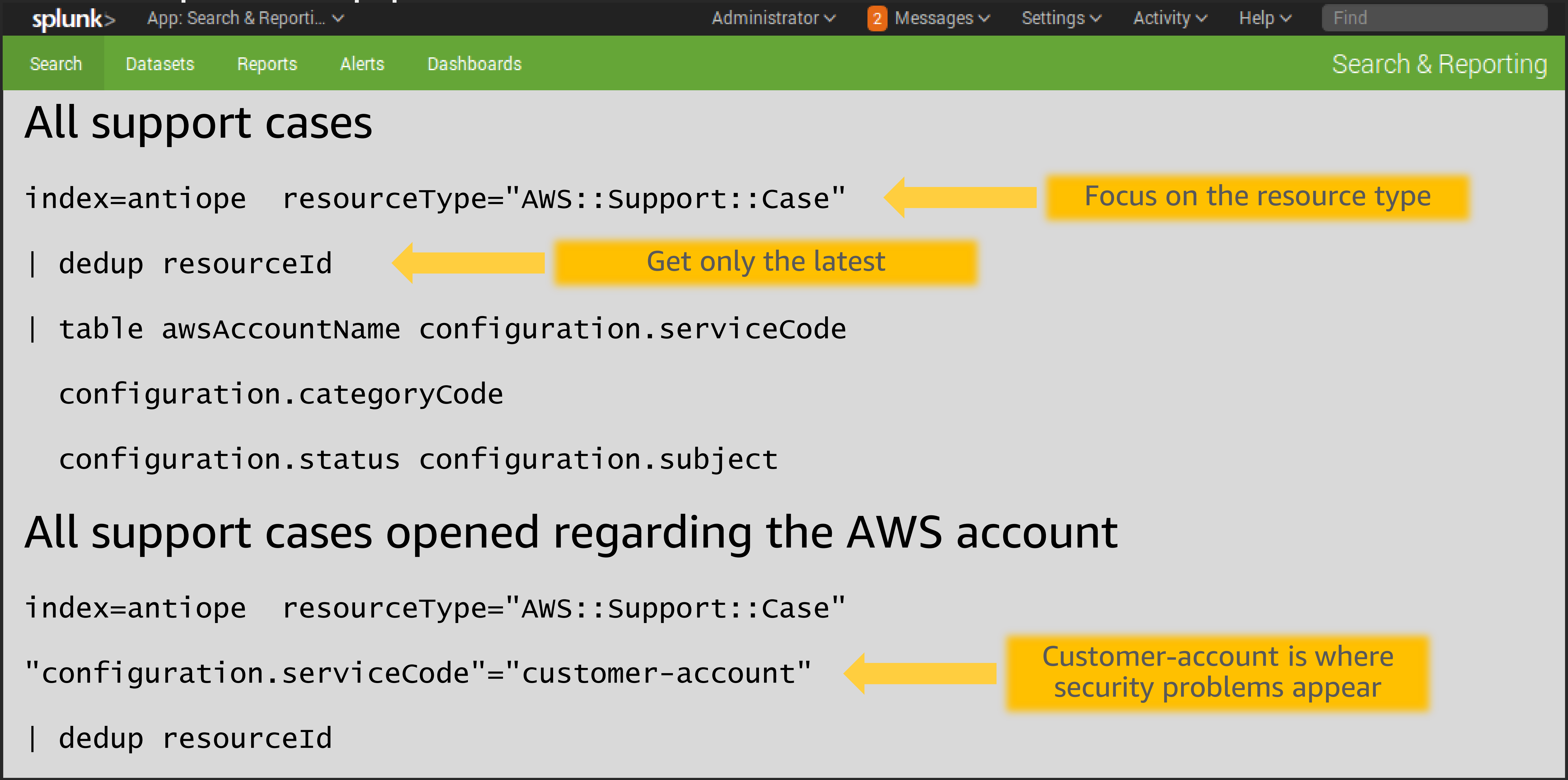


```
index=antiope resourceType="AWS::ElasticSearch::Domain"

NOT configuration.VPCOptions.VPCId=*

NOT ".AccessPolicies.Statement{}.Condition.IpAddress.aws:SourceIp{}"=*

NOT ".AccessPolicies.Statement{}.Condition.IpAddress.aws:SourceIp"=*

NOT ".AccessPolicies.Statement{}.Condition.StringEquals.aws:SourceVpc"=*

| regex ".AccessPolicies.Statement{}.Principal.AWS"="\*"

| dedup resourceId

| table configuration.Endpoint resourceName awsAccountName
```

Not in a VPC

Anyone can access

Antiope: Support cases



All support cases

```
index=antiope  resourceType="AWS::Support::Case"
| dedup resourceId
| table awsAccountName configuration.serviceCode
  configuration.categoryCode
  configuration.status configuration.subject
```

Focus on the resource type

Get only the latest

All support cases opened regarding the AWS account

```
index=antiope  resourceType="AWS::Support::Case"
"configuration.serviceCode"="customer-account"
| dedup resourceId
```

Customer-account is where security problems appear

NEW!

Amazon Detective

Quickly analyze, investigate, and identify the root cause of security issues

Built-in data collection

Automated analysis

Visual insights

Containment, eradication, & recovery

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Containment, eradication & recovery

- Review CloudTrail
- What user did it?
- Rotate password & access key
- What else did they do?

CloudTrail is an effective tool for account compromise analysis

Containment, eradication & recovery

- Isolate instances with pre-built IR security groups
- Leverage tools for instance forensics
  - ssm-acquire can be fully automated
  - Threat Response and Margarita Shotgun are good too
- https://forensicate.cloud/ for more resources

Enterprise support value

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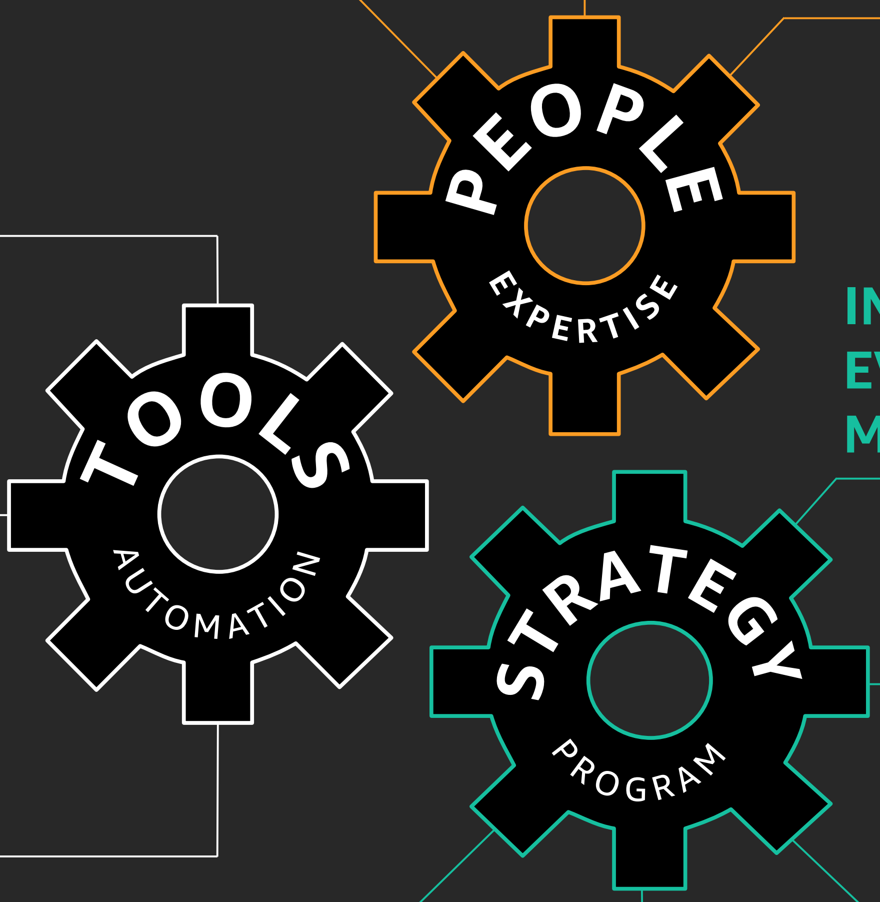
AWS enterprise support



TECHNICAL ACCOUNT MANAGER (TAM)

SMEs

SUPPORT CONCIERGE

TRUSTED ADVISOR (TA)

PERSONAL HEALTH DASHBOARD (PHD)

SUPPORT API

INFRASTRUCTURE EVENT MANAGEMENT (IEM)

WELL-ARCHITECTED REVIEW

ARCHITECTURE SUPPORT

TRAINING

OPERATION EXCELLENCE

Enterprise support value to security teams

Proactive	Alert on security issues & remediate them
Design	Deliver customized training & help architectural decision
Incident management	Provide timely support by working with AWS service teams
Operational excellence	Help optimize & recommend ways to use services more efficiently
Redesign	Enhance the architecture using upcoming features

Links

GuardDuty deployment

https://github.com/turnerlabs/aws-guardduty-enterprise

Antiope

https://github.com/turnerlabs/antiope

ssm-acquire

https://github.com/mozilla/ssm-acquire

CloudSploit

https://github.com/cloudsploit/scans

Splunk queries

https://www.chrisfarris.com/post/reinvent2019-sec339/

EC2 DFIR

https://forensicate.cloud/

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Thank you!

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