
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

GAM203

How AWS and Riot Games built a governance reporting engine

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Riot Games

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Principal Technical Account Manager
AWS Enterprise Support

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Sr. Customer Delivery Architect
AWS ProServe

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Agenda

About Riot Games

Where we were

Design Decisions

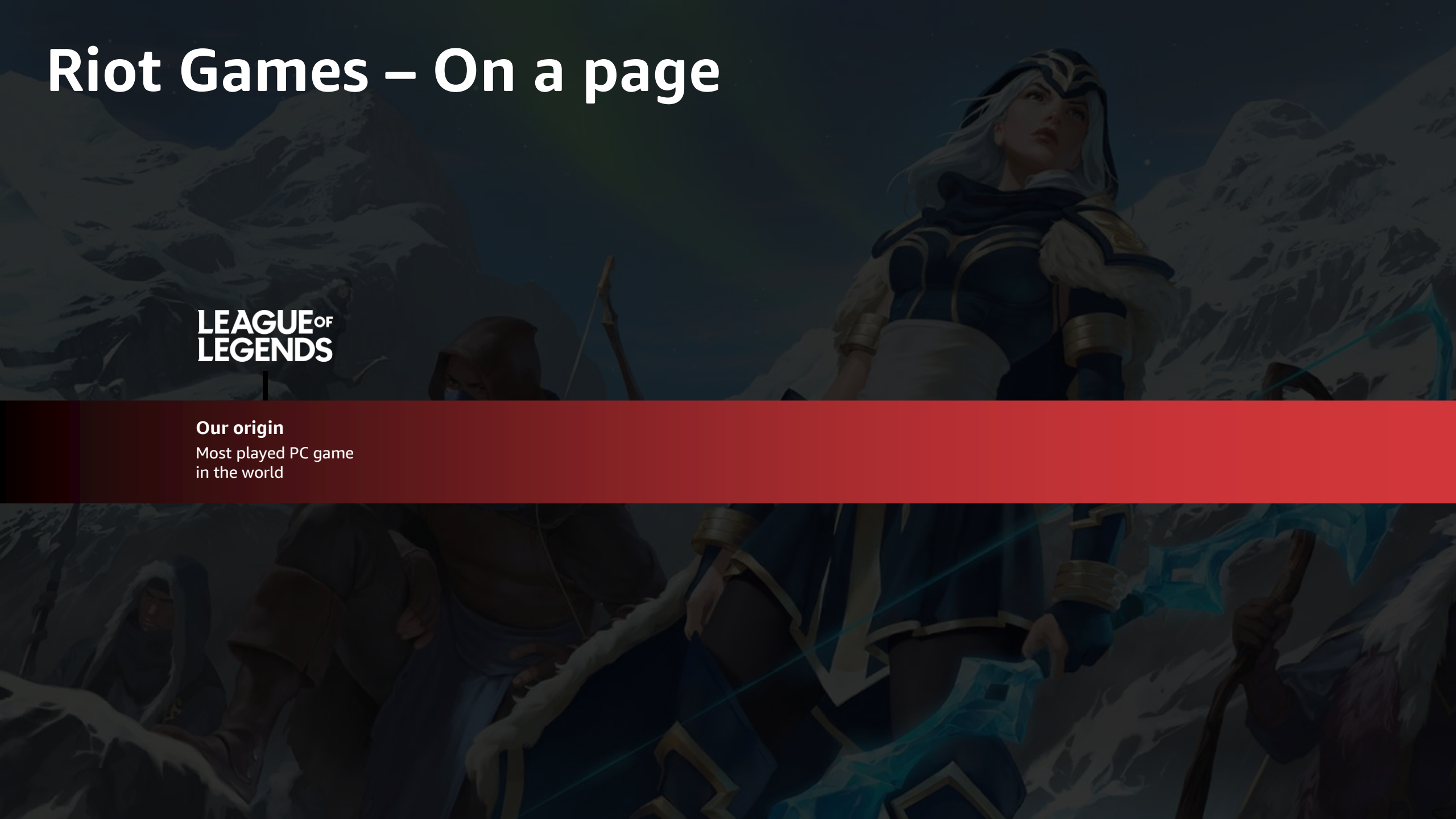
Building the Solution

Visualizing the Data

Where we are going

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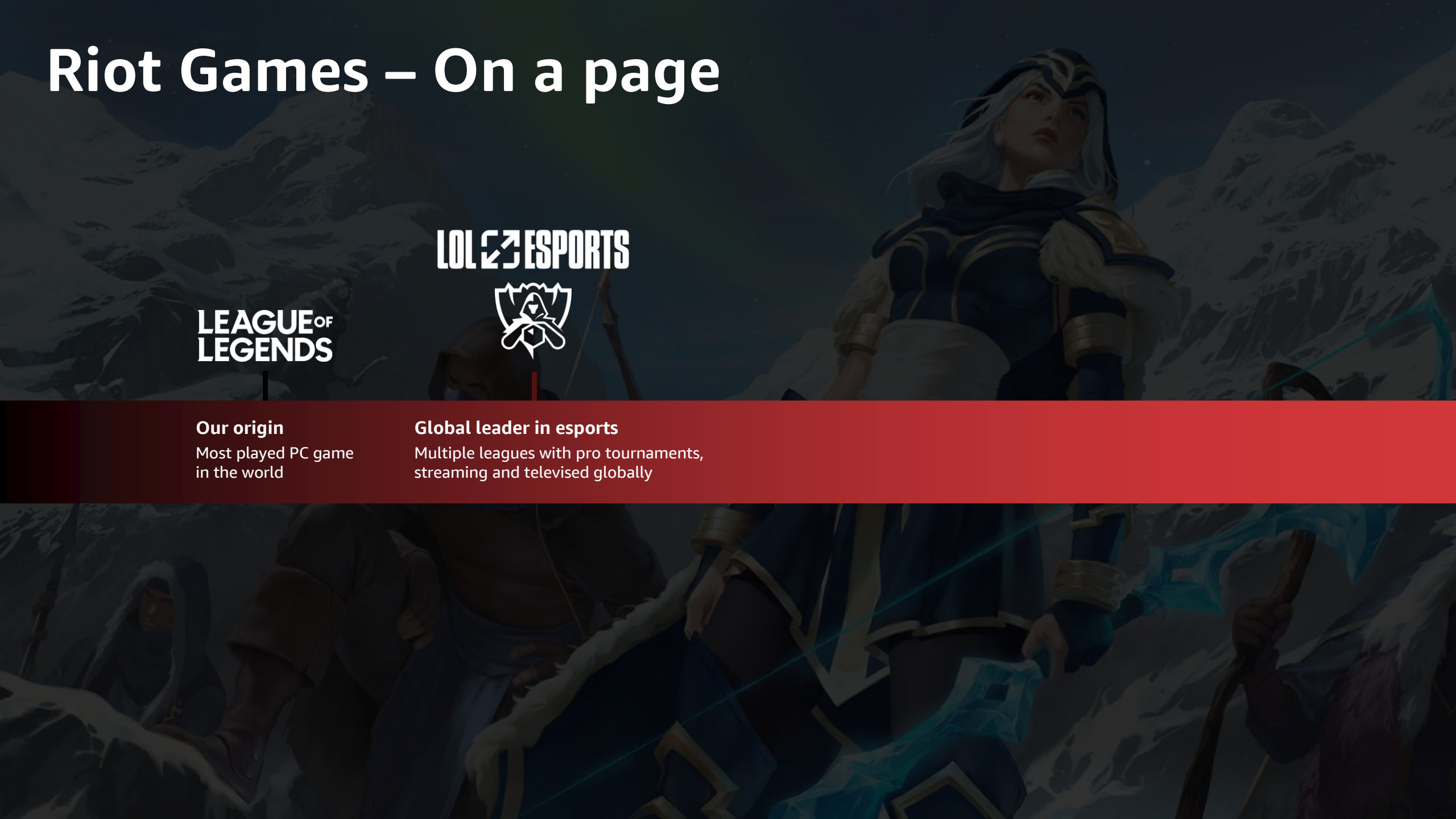
Riot Games – On a page



Our origin

Most played PC game
in the world

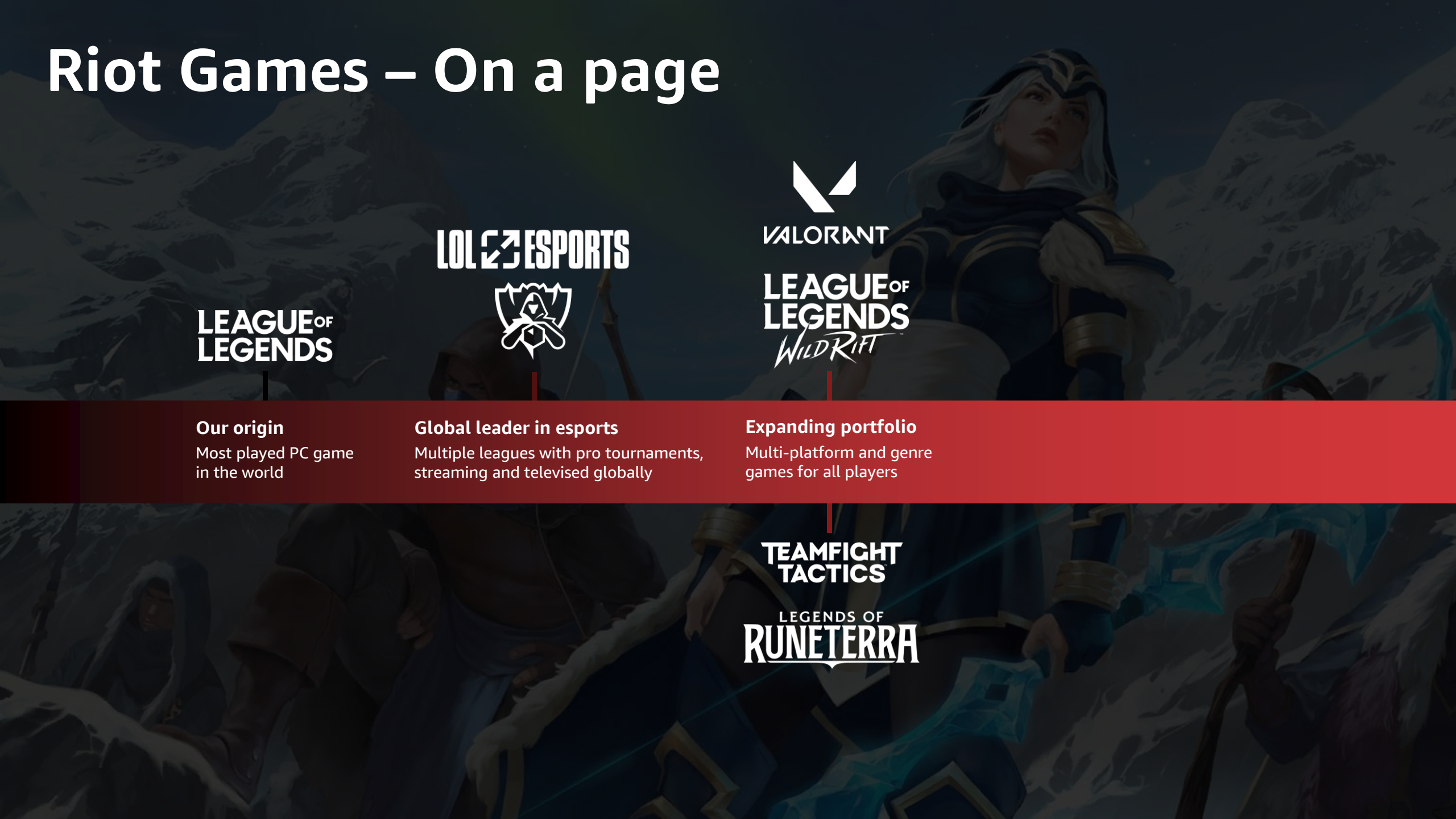
Riot Games – On a page



Our origin
Most played PC game in the world

Global leader in esports
Multiple leagues with pro tournaments, streaming and televised globally

Riot Games – On a page

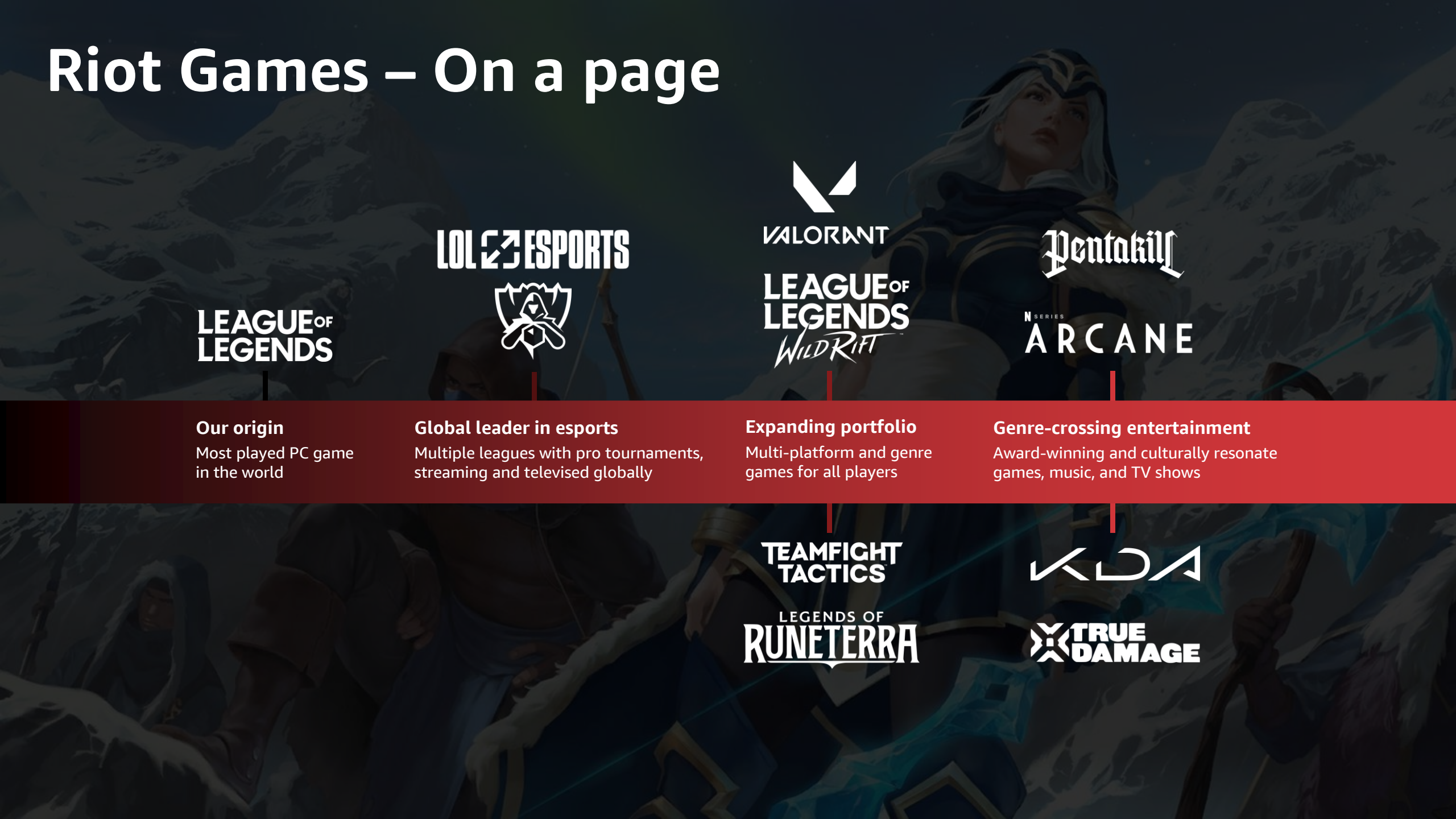


Our origin
Most played PC game in the world

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Expanding portfolio
Multi-platform and genre games for all players

Riot Games – On a page



Our origin
Most played PC game in the world

Global leader in esports
Multiple leagues with pro tournaments, streaming and televised globally

Expanding portfolio
Multi-platform and genre games for all players

Genre-crossing entertainment
Award-winning and culturally resonate games, music, and TV shows

Where we were

1

Limited solutions
We faced limitations with the current services trying to add business context and cost categories, and provide financial chargebacks

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Where we were

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Limited solutions
We faced limitations with the current services trying to add business context and cost categories, and provide financial chargebacks

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Manual reporting
There were no real-time reports and no self-service for the different teams

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We faced limitations with the current services trying to add business context and cost categories, and provide financial chargebacks

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There were no real-time reports and no self-service for the different teams

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Complex datasets
We identified limited documentation around the CUR files and difficulties in aggregating unblended and amortized costs

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We faced limitations with the current services trying to add business context and cost categories, and provide financial chargebacks

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4

Inspiration from AWS Cloud Economics workshop
We observed multiple cost-savings opportunities, our coverage levels and actual utilization of purchases

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Design Decisions

Provide a unified dashboard for all governance decisions in AWS

- Cost visualization
- Attribution
- Optimization
- Security

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Report based on Riot's business requirements

- Rollups that cater for dynamic reallocation of tags
- Report at Game/Service/Environment level even for containers

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Amortize all expenses that happen once a year/month

- Credits and discounts
- Reserved Instances Purchases
- Unused Reserved Instances

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- Provide guidance at a resource level
- Reason for cost fluctuation and model coverage changes
- Assist with long term purchasing / commitments decisions

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Detect and alert on deviations in spend and coverage

- Take action before billing cycle is completed and understand day to day variation

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Centralize Data Access Control

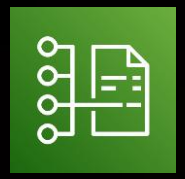
- Visuals display data based on user permission level

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Building the Solution

We used data available from different AWS services



AWS Cost & Usage Reports



AWS Trusted Advisor



AWS Compute Optimizer



AWS Budgets



Amazon CloudWatch



AWS Cost Explorer



AWS Support API



Amazon EC2 API



Amazon S3 Storage Lens

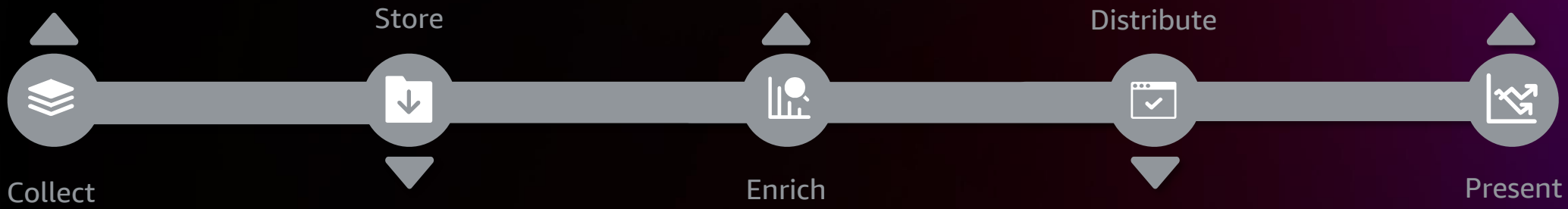


AWS CloudTrail

. . . and other non-AWS sources like business units, security findings

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Processing Pipeline

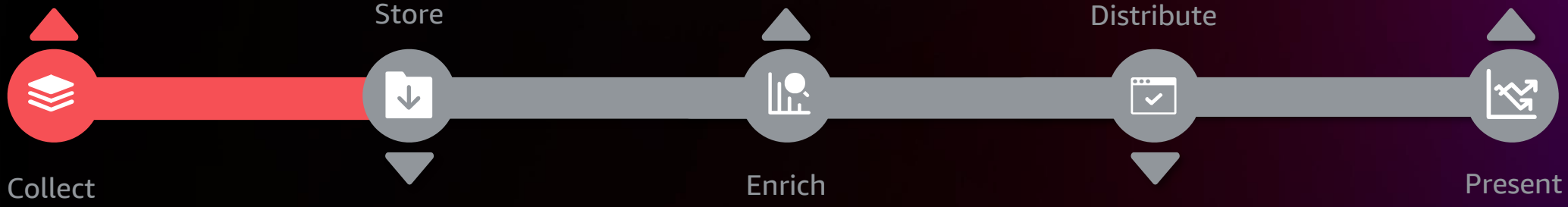


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Processing Pipeline

Inputs

AWS, Riot, and 3rd party services



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Processing Pipeline

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AWS, Riot, and 3rd party services

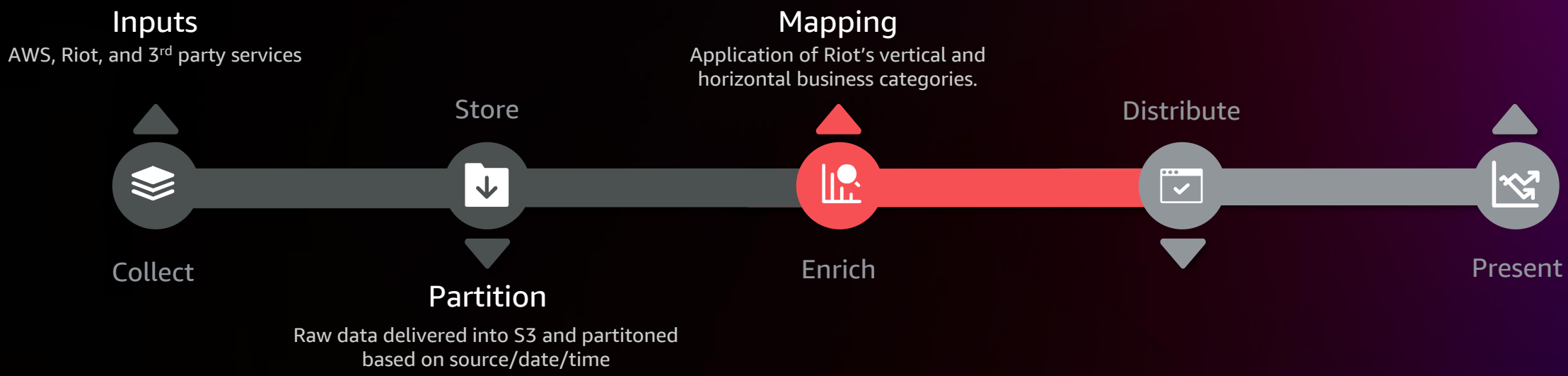


Partition

Raw data delivered into S3 and partitoned based on source/date/time

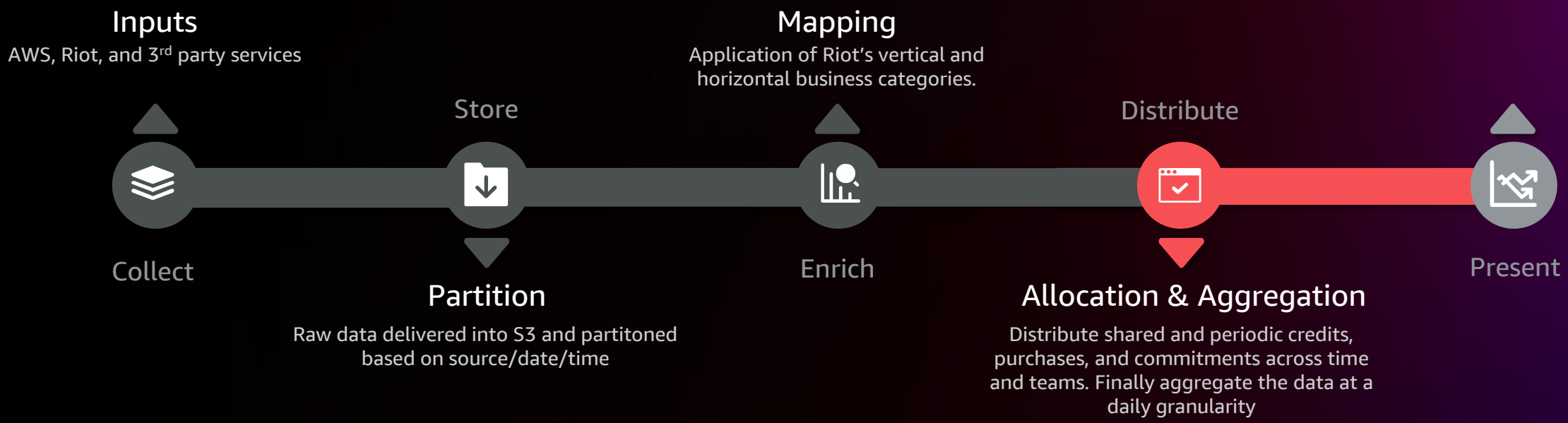
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Processing Pipeline



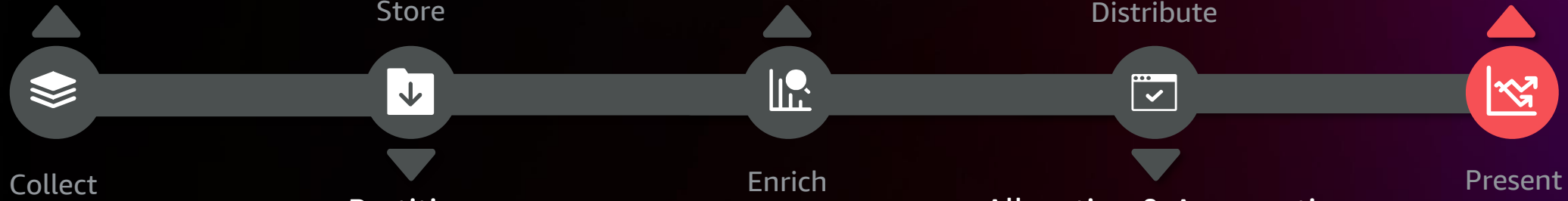
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Processing Pipeline



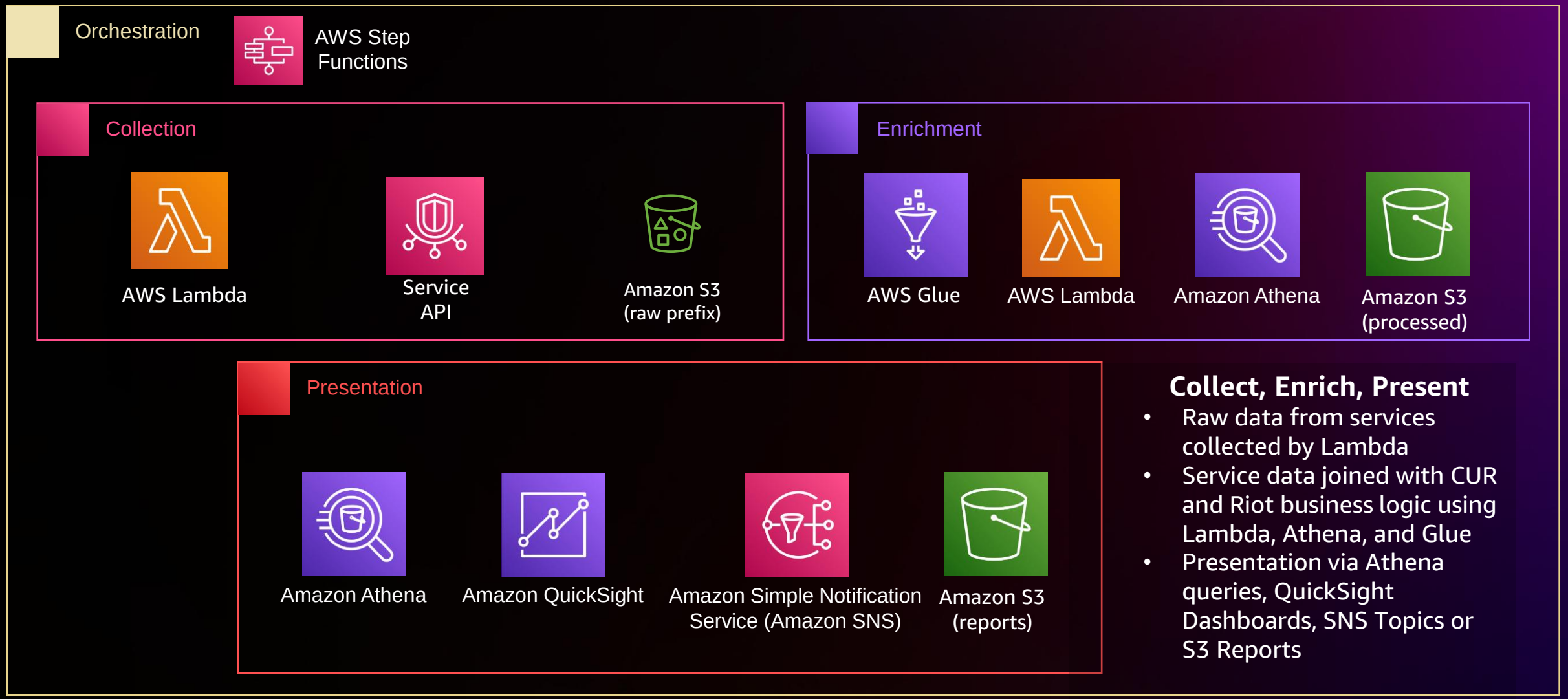
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Processing Pipeline



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Architecture



Collect, Enrich, Present

- Raw data from services collected by Lambda
- Service data joined with CUR and Riot business logic using Lambda, Athena, and Glue
- Presentation via Athena queries, QuickSight Dashboards, SNS Topics or S3 Reports

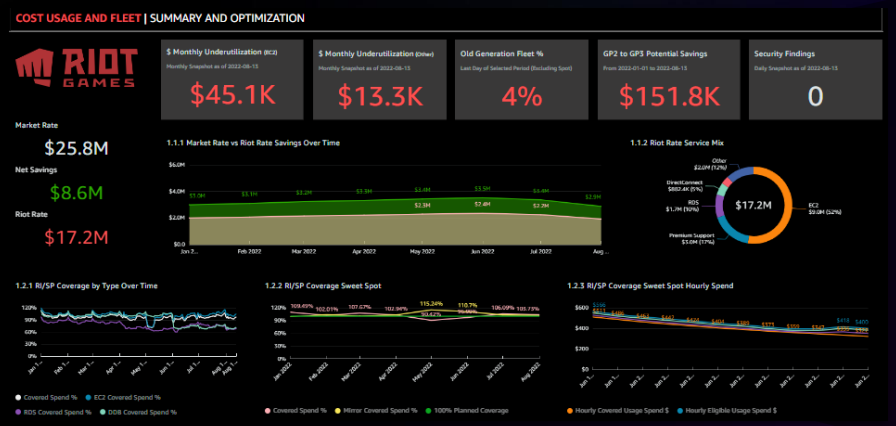
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Visuals show mock-up data

Analysis Dashboards

We created dashboards tailored to different personas

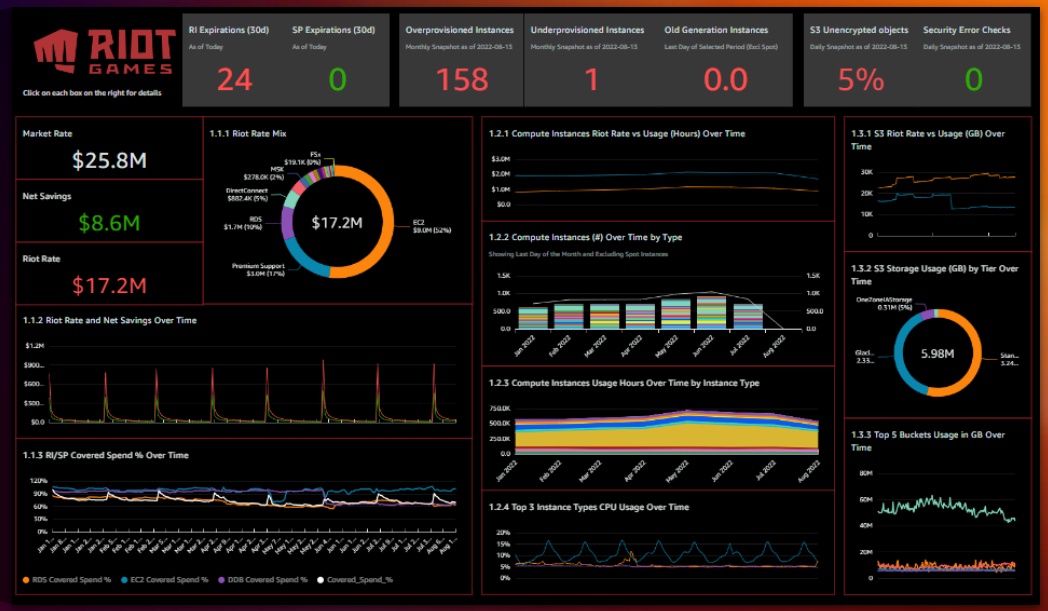
Executive Dashboard



Org Level Reporting for finance and governance

QuickSight URL navigation to more detail

TechOps Dashboard



In depth detail for operations and engineering teams

using Amazon QuickSight row-level security to focus teams on their dataset

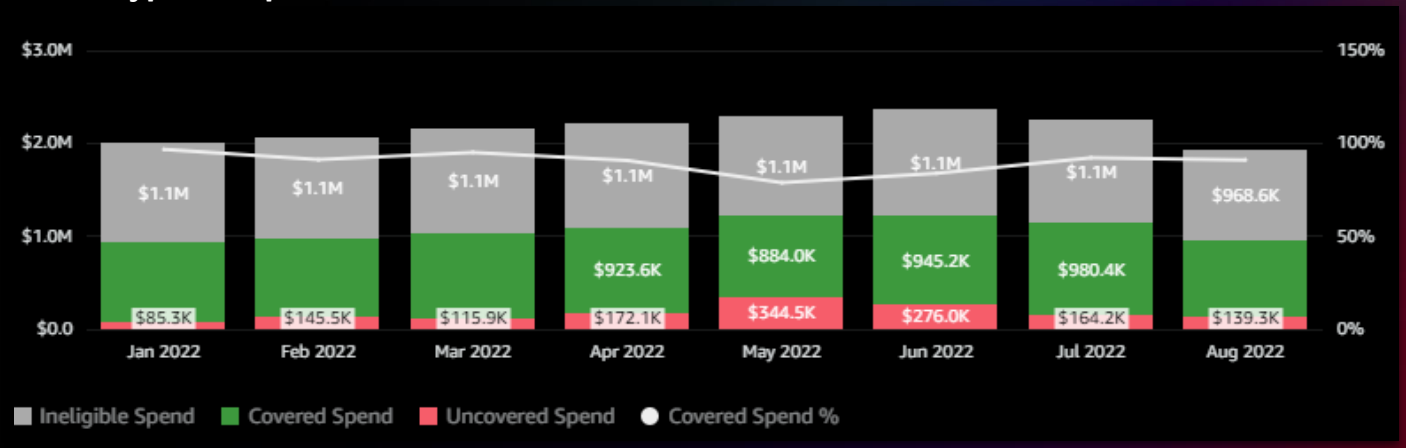
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Visuals show mock-up data

Storytelling with Visuals

The dashboards use a “green is good, reduce the red” philosophy

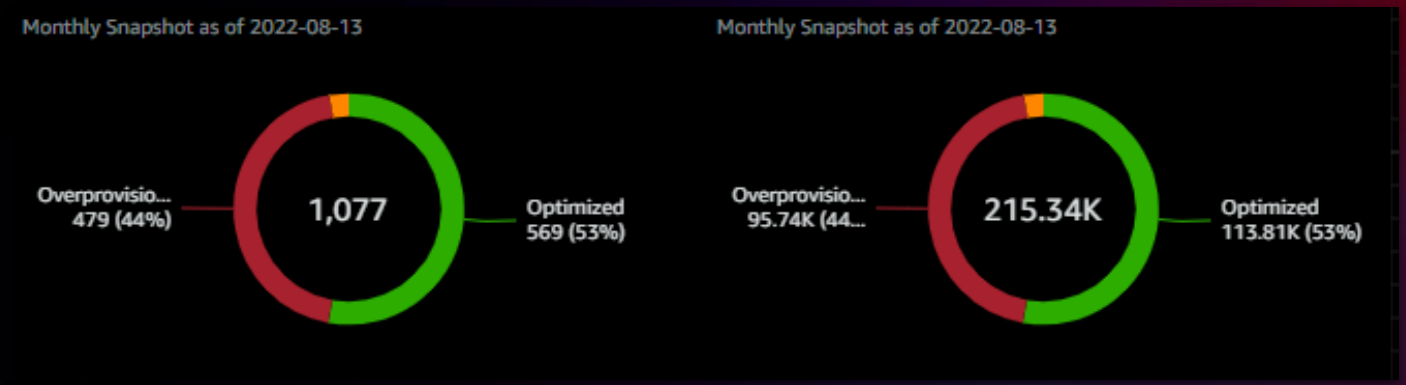
Three types of Spend



Your team had $276K of uncovered spend for June 2022

Reduce **Uncovered Spend to** capture potential savings

Compute Optimizer Recommendations



44% of your EC2 instances are overprovisioned

Drill down into **Overprovisioned** resources for **rightsizing** recommendations

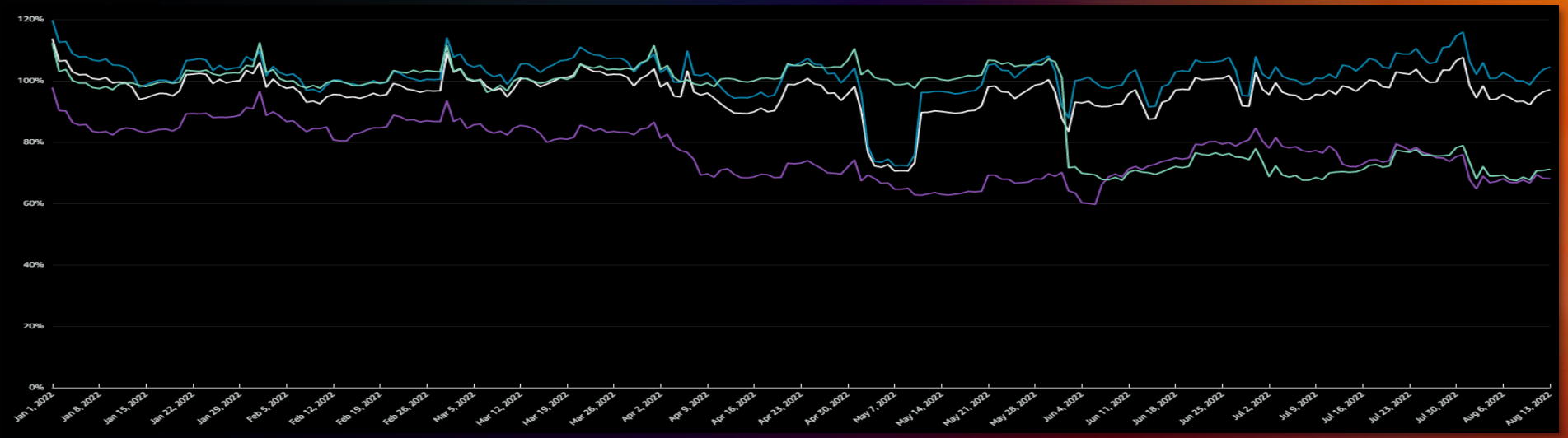
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Visuals show mock-up data

Defining coverage KPIs

We defined coverage as percentage of spend that is using an RI or SP vs On-demand

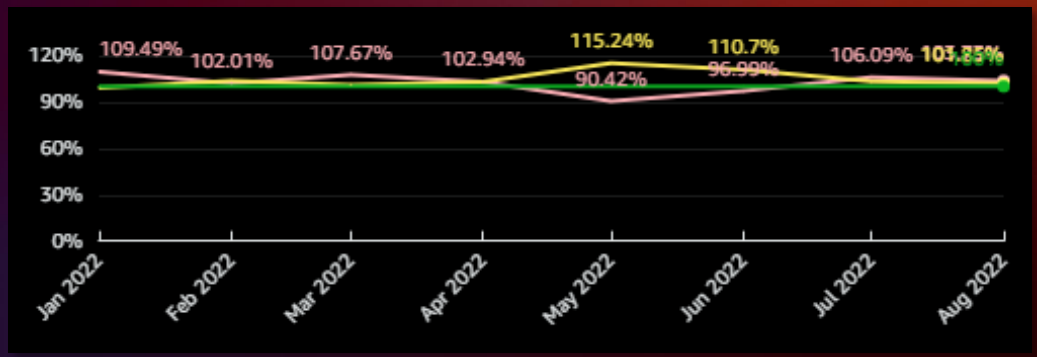
RI/SP Covered Spend % Over Time



. . . and that helped us perform what/if analysis;

for instance, we are able to find the “sweet spot” between being over- and under-covered with Reserved Instances and Savings Plans

RI/SP Coverage Sweet Spot



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Visuals show mock-up data

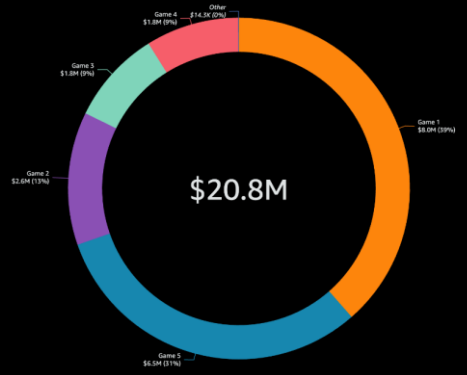
Setting Governance Goals

Defined the coverage targets for each team and each service and mapped it to realized savings based on exceeding targets.

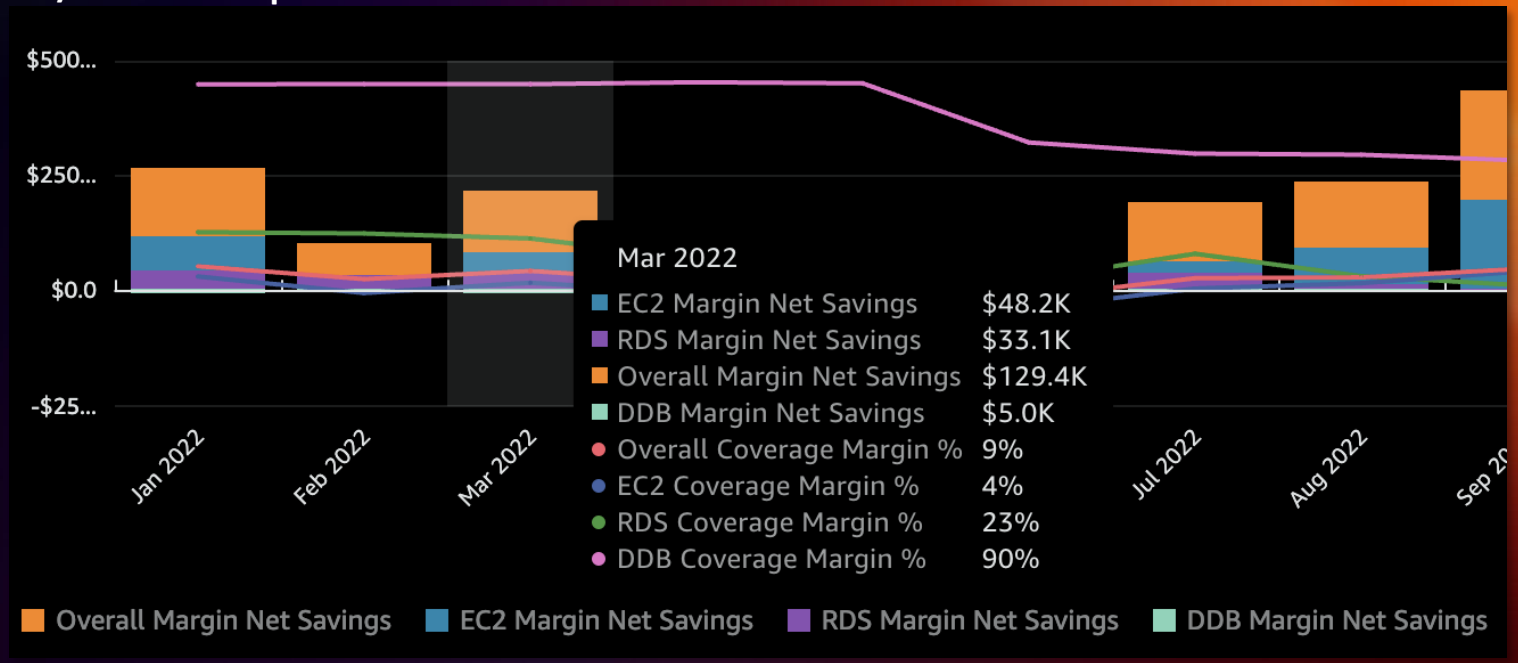
RI/SP Coverage Targets

- **OVERALL : 89% (+ 9%)**
- **EC2: 94% (+4%)**
- **RDS: 83% (+23%)**
- **DDB: 95% (+90%)**

Savings from RI/SP Purchases



RI/SP Covered Spend % Over Time



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Visuals show mock-up data

Influencing Purchasing Decisions

With our unified dataset, we were able to accurately predict the realized savings for purchasing recommendations

Expiring Commitments

2.2.3 Expiring RI in the Next 30/60/90 Days

As of today

Service	30 days (#)	30 days (Hourly $)
DynamoDB	0	$0.00
EC2	1	$0.00
RDS	2	$5.73

Display commitments about to expire in the next 30, 60, and 90 days; the hourly commit.

Covered Resources by Recommended Commitment

Instance Type / ...	Instance ID	30d Spend	30d Usage	60d Spend	60d Usage
t4g.nano		$0.00	0	$28.99	6.04K
m5.large		$0.00	0	$92.12	490
r4.2xlarge		$0.00	0	$21.60	24
m5.xlarge		$0.00	0	$10.53	28
m5a.xlarge		$0.00	0	$18.16	51
m5.4xlarge		$0.00	0	$93.25	62
m5.large		$0.00	0	$15.90	75
m5.large		$0.00	0	$37.52	177
m5.large		$0.00	0	$58.71	295
m5.large		$0.00	0	$164.50	875

Add details of covered Resources and Instances for the Recommended Commitment

Cross Team Consumption



Compare what teams purchase the Reserved Instances and Savings Plans against the teams that are using them

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Visuals show mock-up data

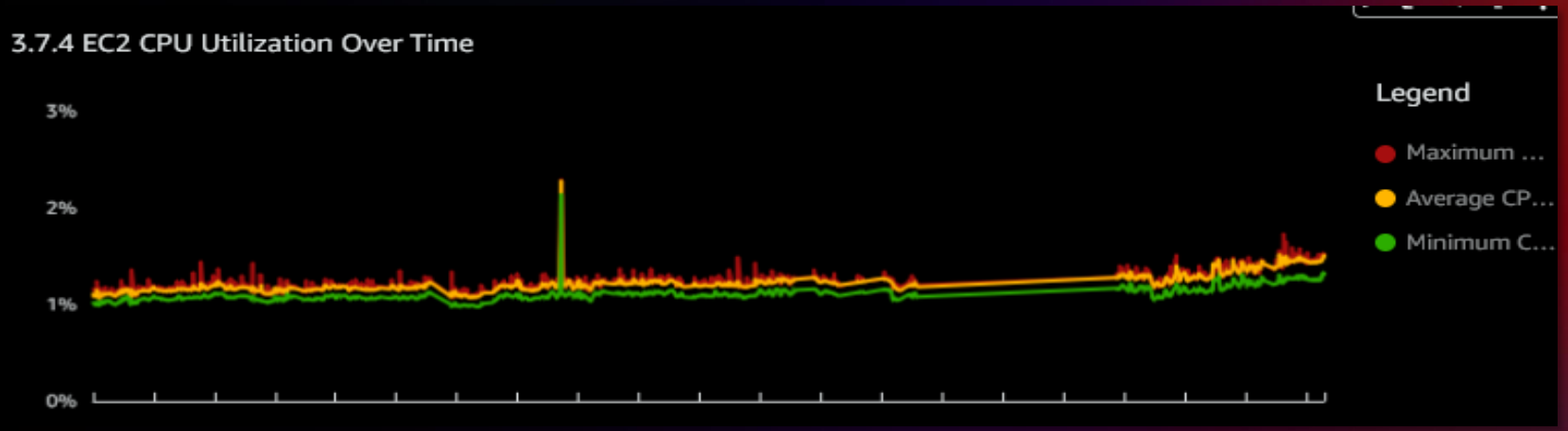
Optimization Recommendations

Optimization Recommendations

Monthly Snapshot as of 2022-11-22

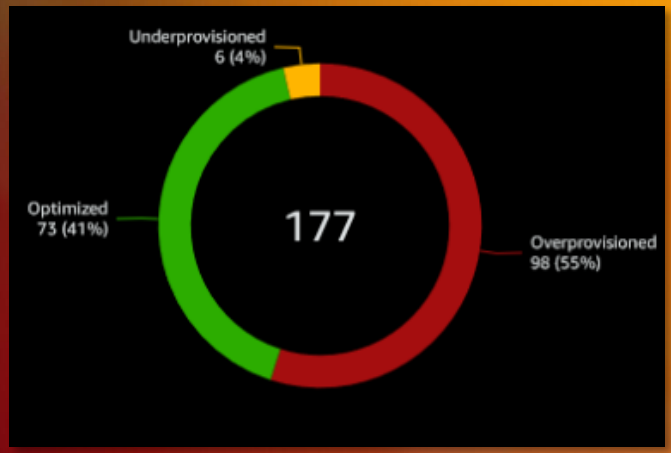
Instance ID	Resource Status	CPU Over	Memory Over	EBS IO...	EBS Throughput Under	Network Bandwidth Over
i-0f8...	Overprovisioned	✓	✓	✓	✓	✓

Utilization Metrics

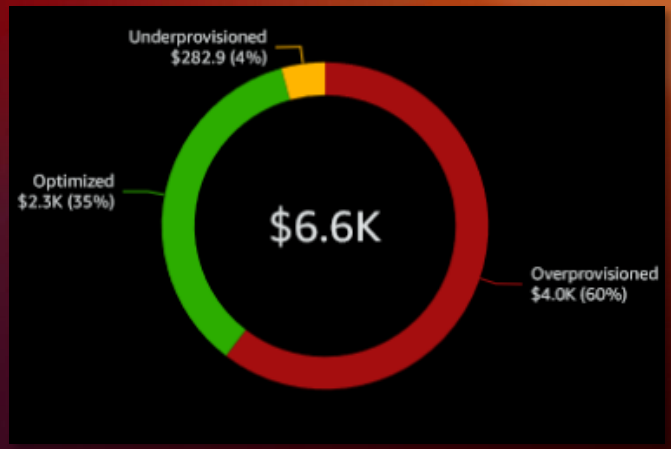


We augmented the recommendations with actual CPU utilization for an instance

Reduce the Red - Overprovisioned

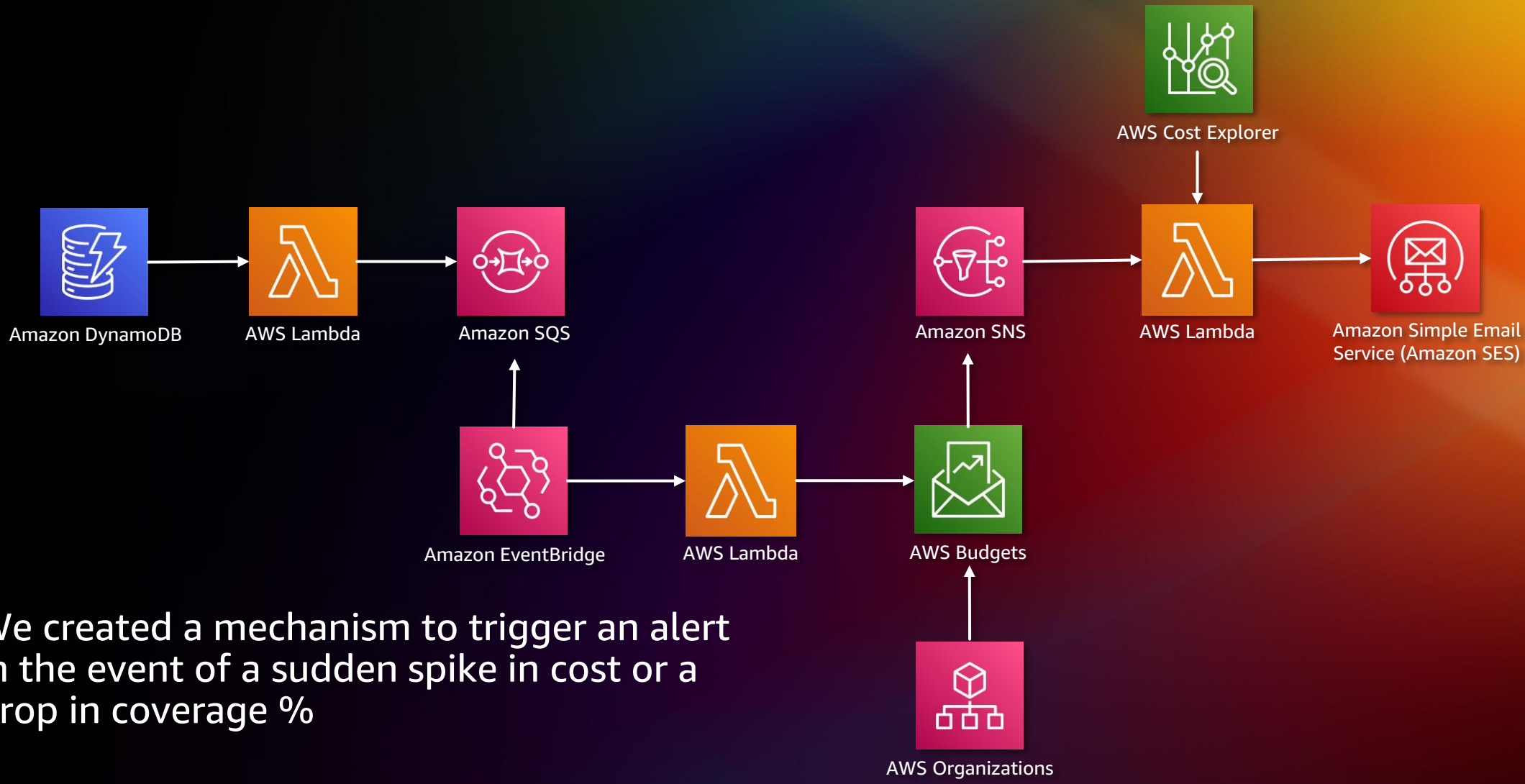


Projected Savings



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Budget and Coverage Alerts



We created a mechanism to trigger an alert in the event of a sudden spike in cost or a drop in coverage %

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Visuals show mock-up data

Budget and Coverage Alerts

Hello,

The spend associated with the team **Accounting1** has **increased by $24.31!**

The average spend during the last 45 days is $118.32 and the spend as of 2022-08-18 is $142.63 ($142.63 Usage / $0.0 Marketplace), an **increase of 17.05%**.

The account with the highest spend is [redacted] and the service with the highest spend is AWS Glue.

Details

Spend by Account (last 15 days)

Account ID	Name	2022-08-04	2022-08-05	2022-08-06	2022-08-07	2022-08-08	2022-08-09	2022-08-10	2022-08-11	2022-08-12
[redacted]	[redacted]	$75.52	$78.48	$77.40	$77.09	$78.46	$77.70	$78.35	$78.35	$78.46
[redacted]	[redacted]	$58.96	$58.33	$58.17	$58.01	$58.71	$58.89	$58.82	$58.83	$58.77

Spend by Service (last 15 days / Top 10 Services)

Service	2022-08-04	2022-08-05	2022-08-06	2022-08-07	2022-08-08	2022-08-09	2022-08-10	2022-08-11	2022-08-12
AWS Glue	$32.54	$30.58	$30.47	$30.27	$30.92	$30.89	$30.94	$30.97	$30.94
Amazon Relational Database Service	$14.69	$13.90	$13.90	$13.90	$13.90	$13.90	$13.90	$13.90	$13.90
AWS CloudTrail	$21.88	$21.76	$21.64	$21.64	$21.78	$21.84	$21.87	$21.84	$21.74
EC2 - Other	$19.40	$24.73	$24.73	$24.73	$24.73	$24.73	$24.97	$24.73	$24.73
Amazon DynamoDB	$6.26	$6.26	$6.26	$6.26	$6.36	$6.57	$6.57	$6.57	$6.57
Amazon Elastic Compute Cloud - Compute	$7.00	$7.00	$7.00	$7.00	$7.00	$7.00	$7.00	$7.00	$7.00
Amazon QuickSight	$6.19	$6.19	$6.19	$6.19	$6.19	$6.19	$6.19	$6.19	$6.19
AmazonCloudWatch	$4.80	$4.77	$4.76	$4.81	$4.85	$4.86	$4.85	$4.84	$4.84
AWS Cost Explorer	$4.19	$3.98	$4.15	$3.90	$3.91	$3.93	$3.82	$3.94	$4.05
AWS Lambda	$3.28	$3.28	$3.20	$3.18	$3.26	$3.32	$3.30	$3.28	$3.27

Spend by Type (last 15 days)

Service	2022-08-04	2022-08-05	2022-08-06	2022-08-07	2022-08-08	2022-08-09	2022-08-10	2022-08-11	2022-08-12	2022-08-13
Usage	$134.49	$136.82	$135.57	$135.10	$137.17	$136.59	$137.17	$137.18	$137.24	$135.78

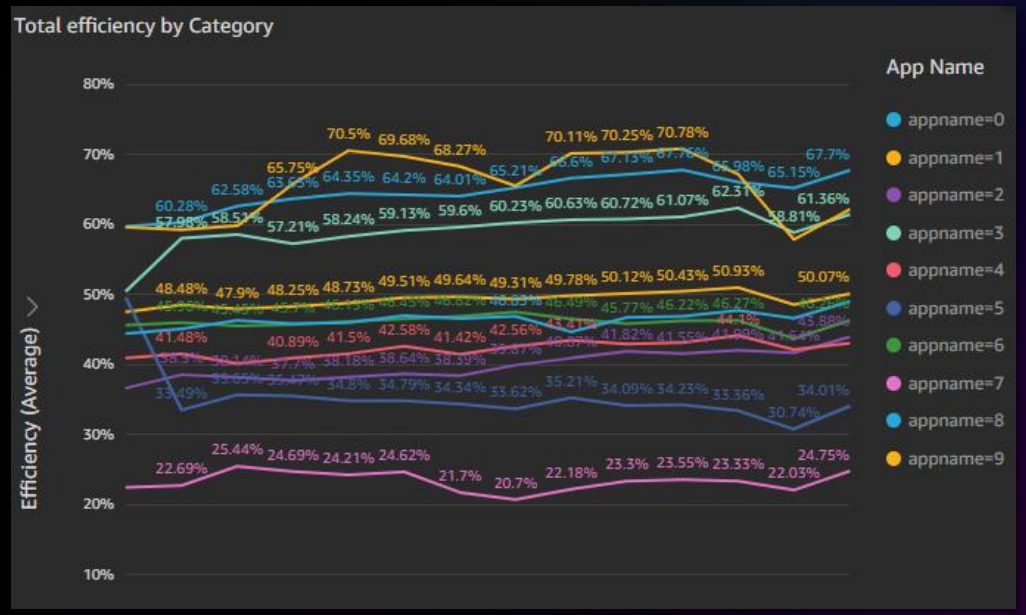
An email alert gets generated when a team breaches their threshold for coverage, spend, or utilization.

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Visuals show mock-up data

New Input Sources

We incorporated open-source tools and Riot datasets to create a holistic governance view





The inclusion of open-source tools like KubeCost gives us the ability to track spend, usage, and performance at an application level. Security findings from Security operation enabled us to create a scorecard with actionable items for each team.

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Where we are going



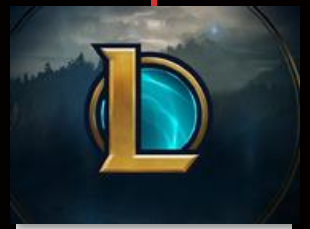
RI/SP approvals
Visualize the purchase approval process



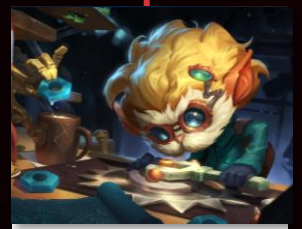
Service health
Track AWS operational health



On demand insights
Amazon QuickSight Q provides ability to perform data exploration



Unit Economics
Visualize cost per player per service



Data Ops
Establishing DevOps practices



Improvements
Add new features, visuals, and insights

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Key Takeaways

- Understand the drivers for Cost and Usage
- Good tagging practice
- Attribute the Cost to Teams, Applications, Environments and Lines of Businesses
- Define Coverage targets and help teams achieve those targets
- Validate which teams/resources are benefiting from RI/SP commitments and consider that while renewing commitments
- Lookout for Right sizing opportunities and show the true savings opportunity by teams, environments and lines of businesses
- Alert teams in near real time if the spend spikes and provide reasons for the spike
- Make the insights actionable by creating self explaining KPIs like “Green is Good, Reduce the Red”

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Thank you!

Special Thanks to:

Arthur Basbaum
Derek DeFields
Brent Rich
Daniel Martinez
Tracy Kuaea
Jennifer Kwoon
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