
AWS
re:Invent
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STP307

Scaling a SaaS company for public company readiness

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AWS

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Braze powers interactions between consumers and brands they love

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Braze powers interactions between consumers and brands they love

Founded in 2011
Nasdaq: BRZE

NYC, LON, SF, SG, CHI, TYO, ATX, BER
Global Offices

1,400+
Employees

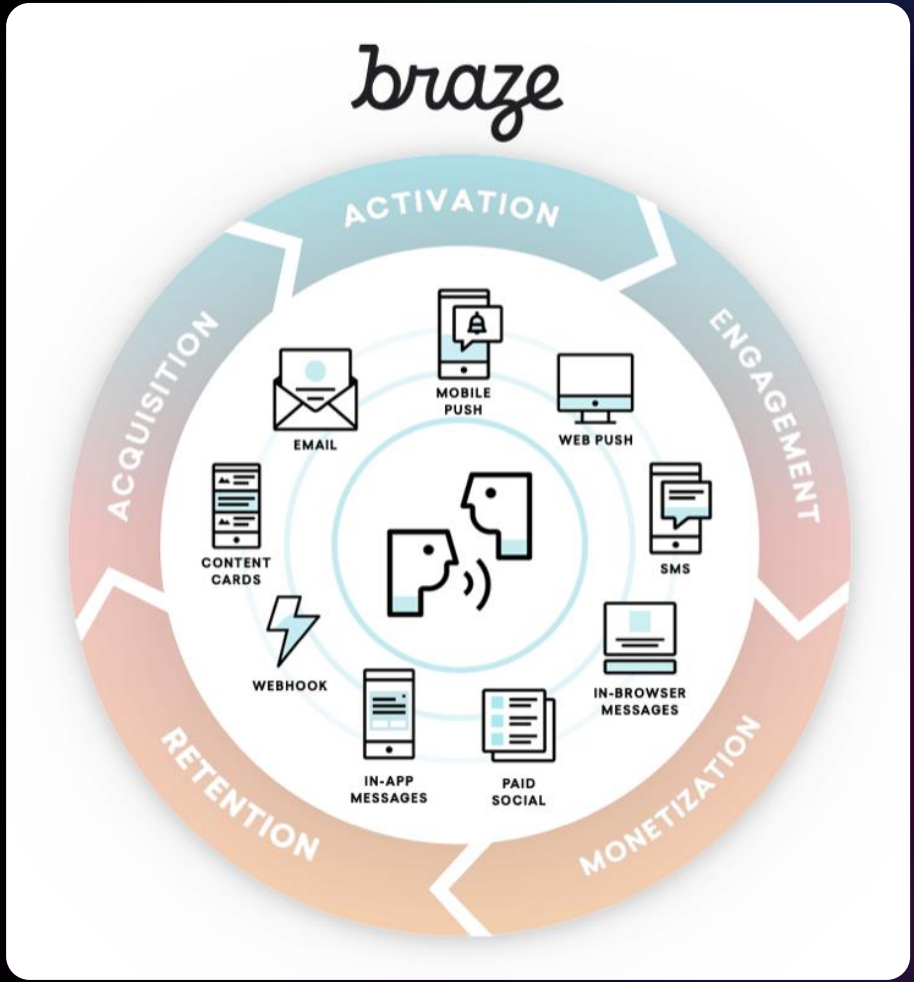
1,500+
Customers

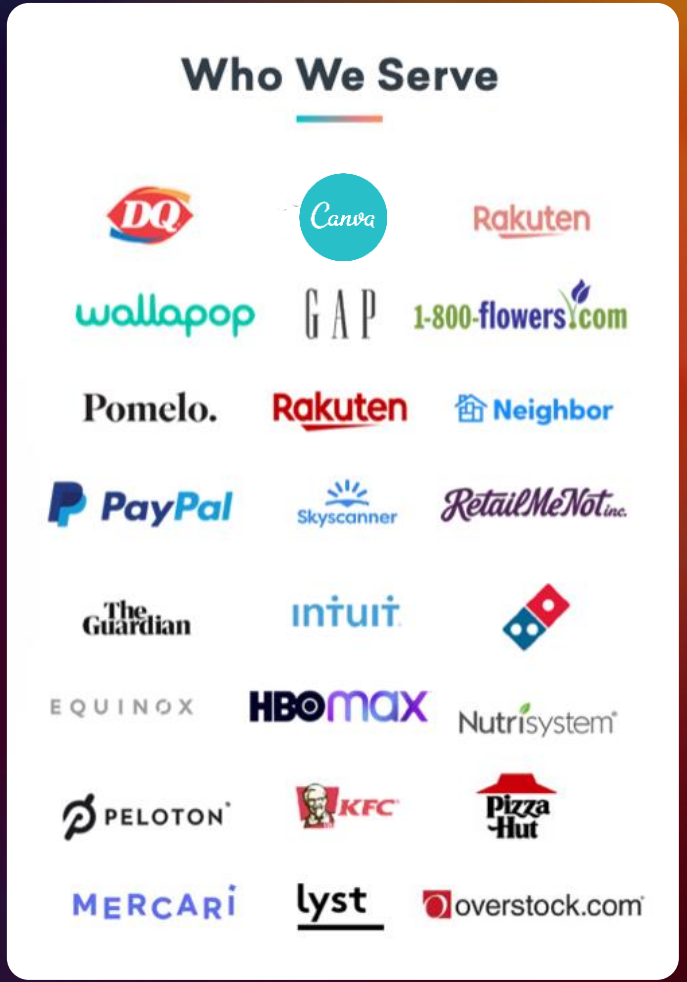
4.1B
Monthly Active Users

1.5T+
Messages sent in FY'2022

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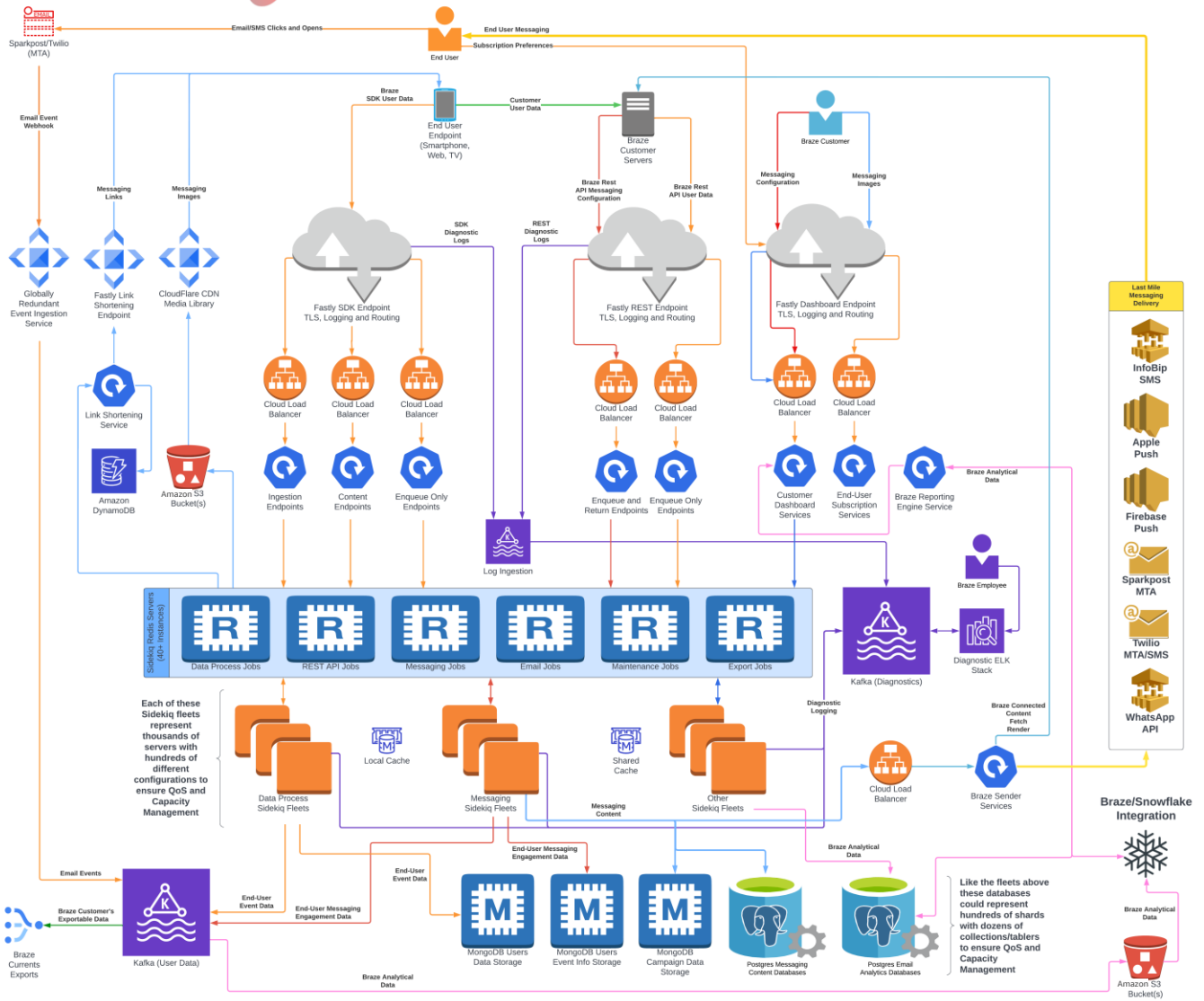
Braze powers interactions between consumers and brands they love





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High level Services Overview 2022



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What is public company readiness?

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Your company is prepared to withstand the scrutiny and processes required in the public market

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Engineering for public readiness



Reliability



Security



Cost management

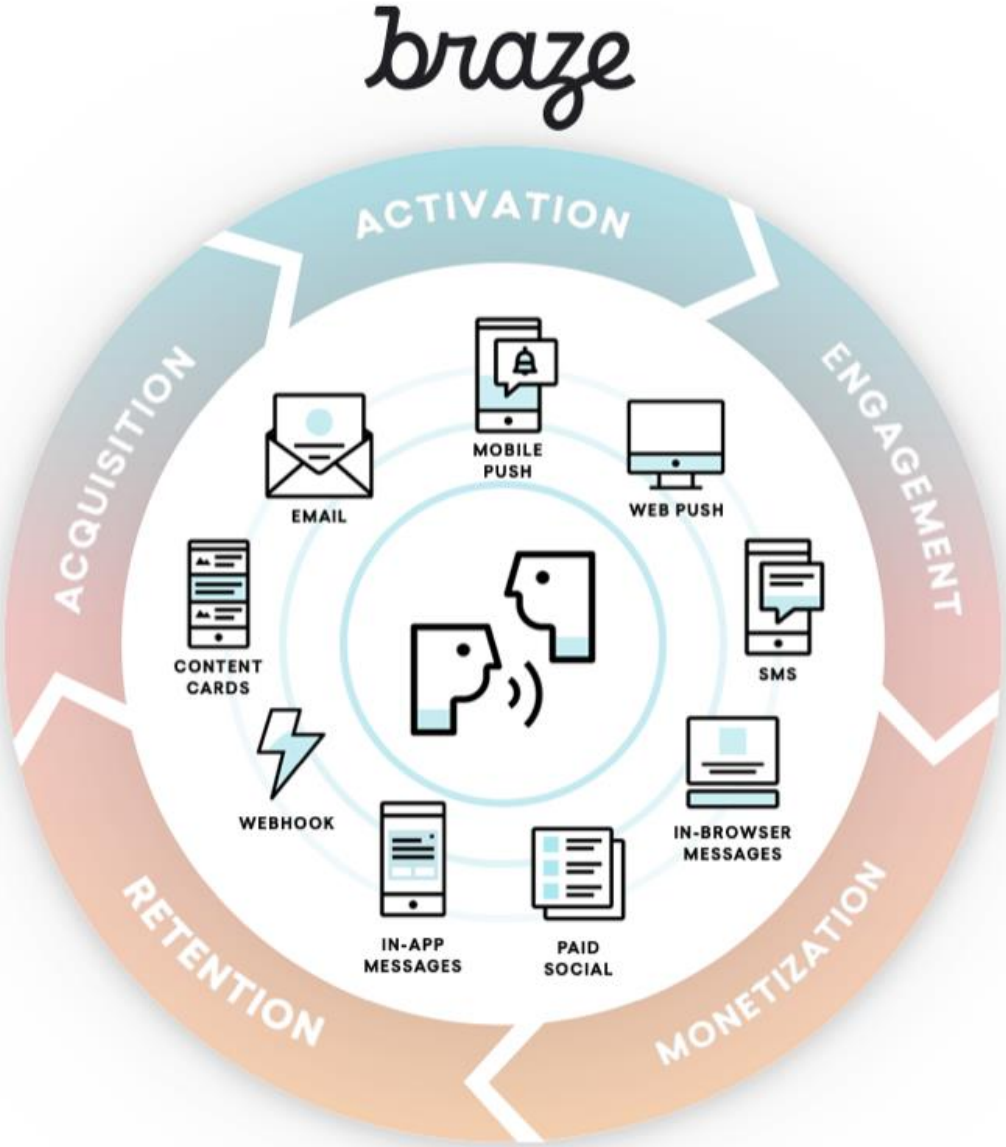


Team efficiency

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Braze engineering vision

- Modern, best in class tech
- Highly productive, fully autonomous
  - Deploy code independently
- Invest in systems and tooling for efficiency and safety
- Highly available system for business-critical experiences
- World-class culture with high job satisfaction



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Agenda

Reliability

Security

COR Forecasting

Entitlements and audits

Modularity

Q&A

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Reliability

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Being a public company raises your reputation – but unreliable technology risks your reputation

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Reliability for public readiness



24x7
on call



Datadog
monitoring SLO
and quality



Incident
response triage



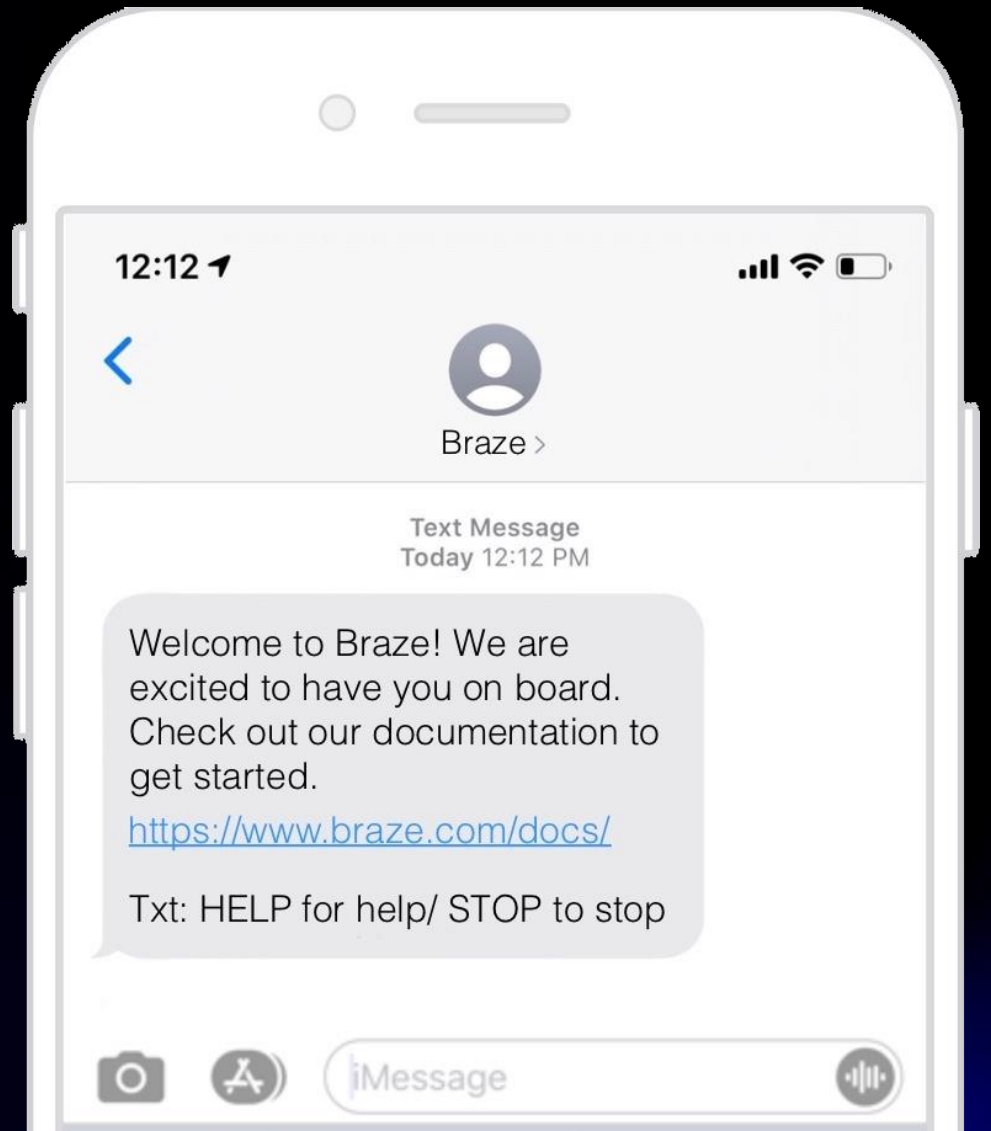
Systematic review
of incidents,
teams, and
follow-up

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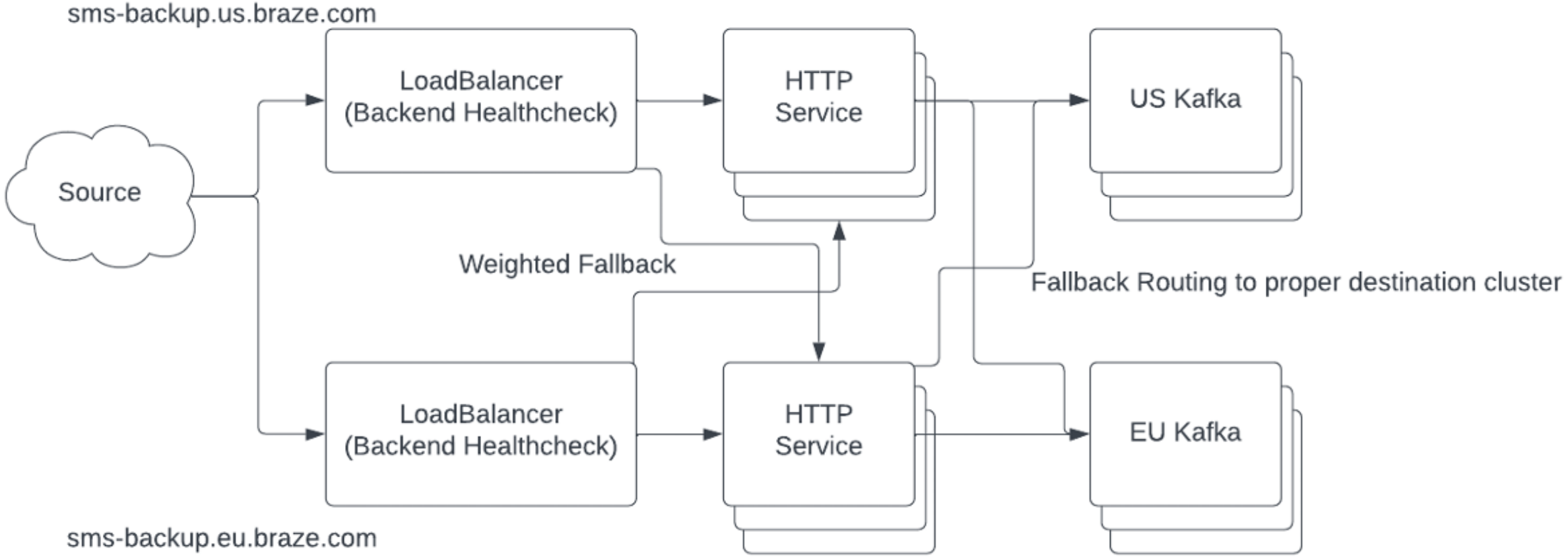
SMS backup endpoint

- Braze sends SMS on behalf of customers
- SMS subject to telecommunication network laws – must receive 100% customer opt-outs
- Reliance on providers to send opt-outs as webhooks
- Risk: Missing even one webhook



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Regional DNS Routing



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Security

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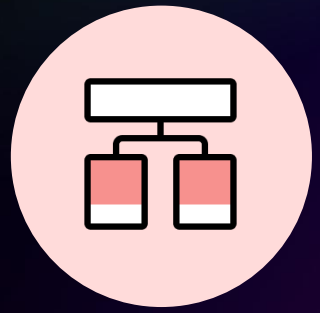
Our customers trust us with their most important asset – their customer relationships

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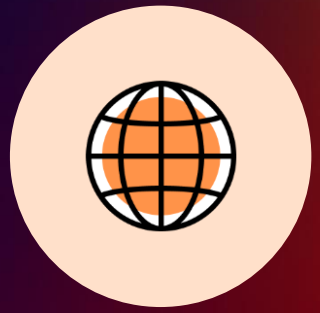
Security team at Braze



Application



Infrastructure



Network



Governance, risk, and compliance

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Case study: Public bug bounty

- Two-week public program with Bugcrowd, invitation only
- Testing infrastructure security and load
- Additional public and private programs for scope expansion testing
- Relied on platform custom environments

Validation within

2 days

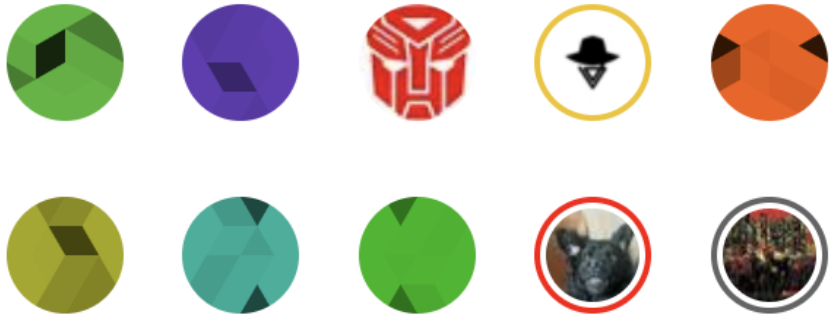
75% of submissions are accepted or rejected within 2 days

Average payout

$533.33

within the last 3 months

Latest hall of famers



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What is a platform custom environment (PCE)?

Fully functioning isolated instance of Braze's infrastructure, deployed onto Kubernetes

Infrastructure includes

- Data processing and message-sending workers
- MongoDB databases
- Memcached
- Redis
- Postgres
- REST API servers
- Dashboard web servers
- Internal tools services

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Platform custom environment at Braze

TWO PRIMARY WORKFLOWS

Mongo Seed Workflow

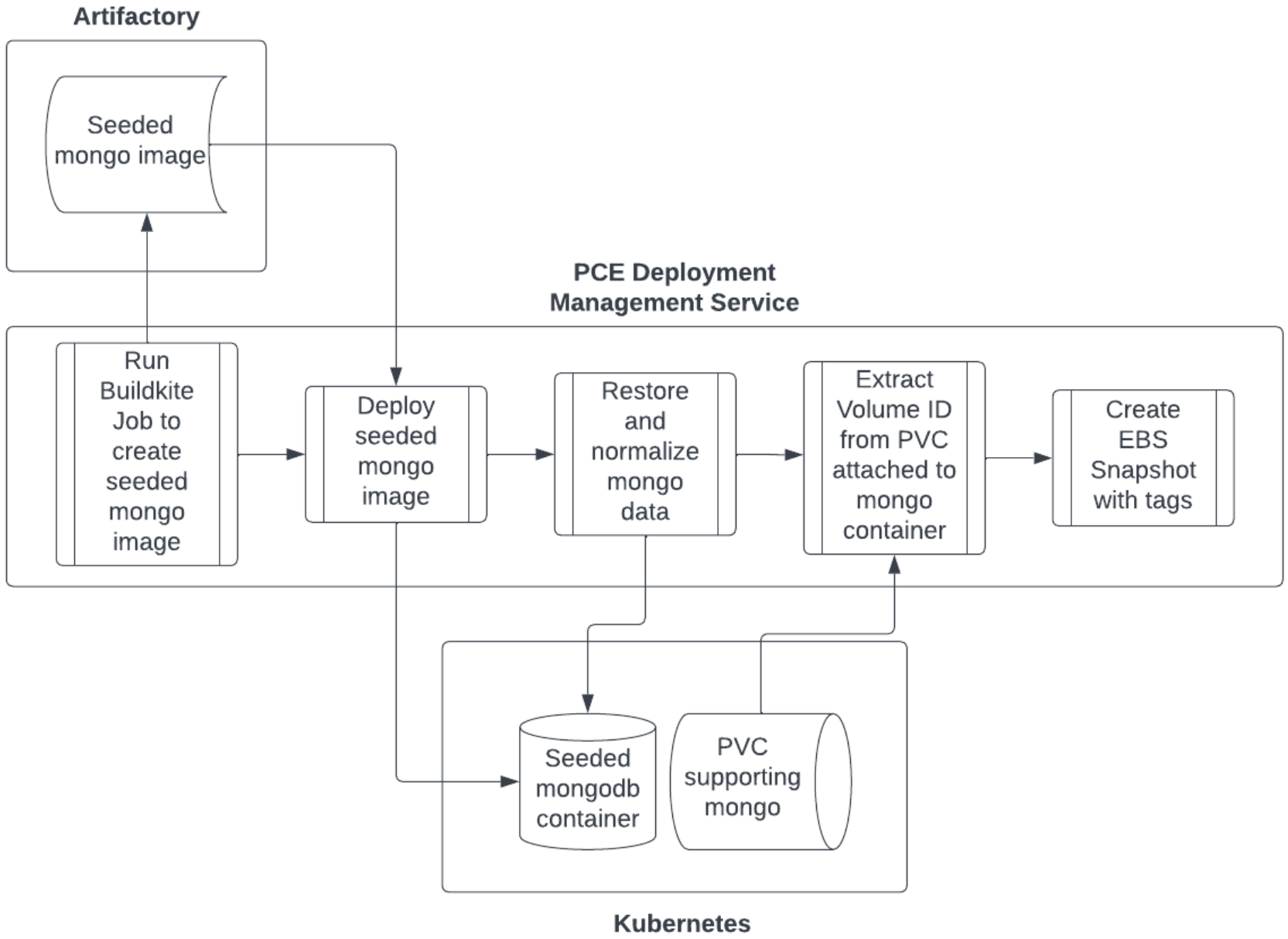
- Seeds MongoDB image with fake users
- Buildkite job runs to seed MongoDB image with dummy users and publishes to Artifactory
- Deployment management service (DMS) deploys the image
- DMS snapshots PVC associated with Mongo image and tags it

Deployment Workflow

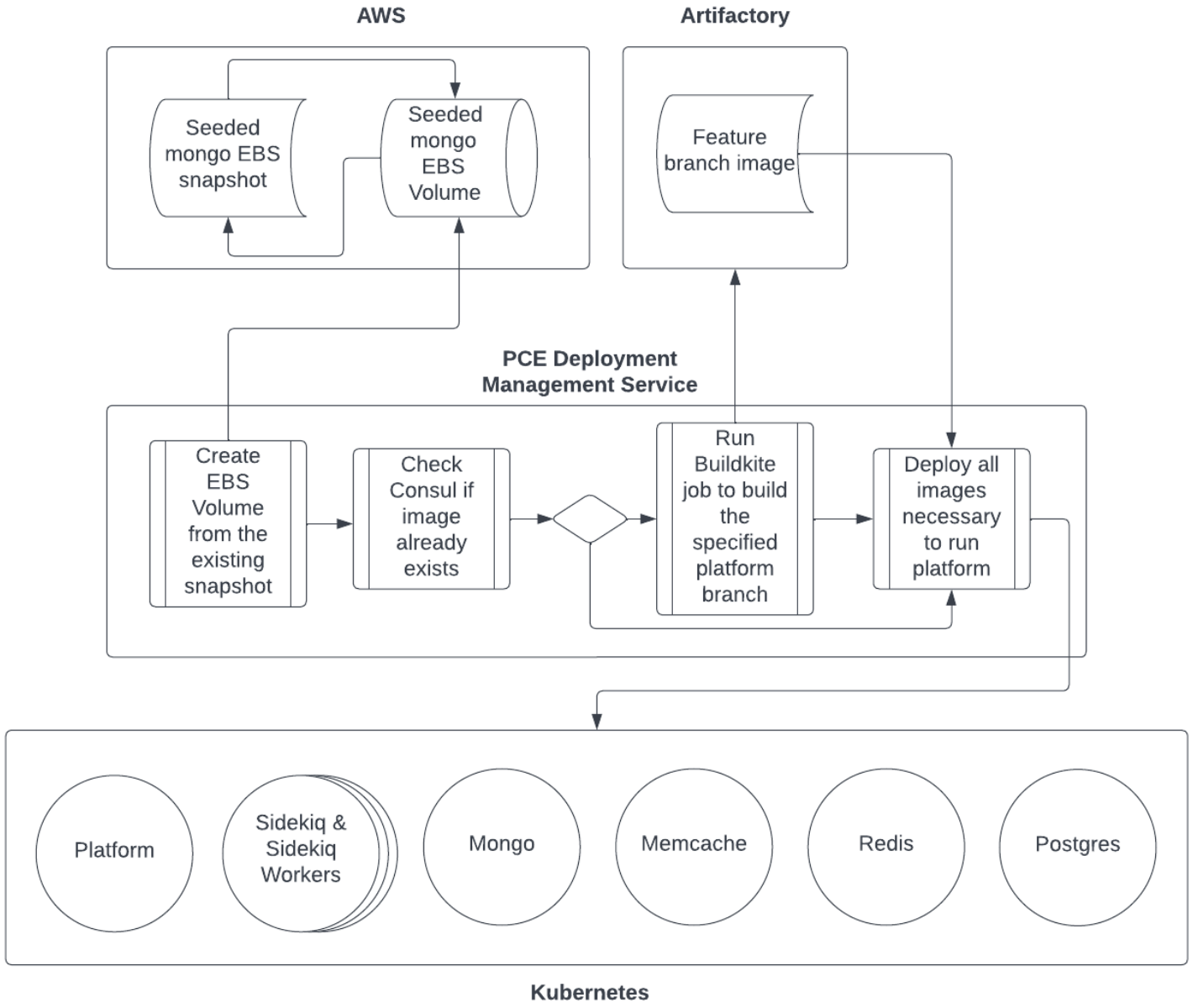
- Provision an EBS volume from latest MongoDB snapshot targeted by tags
- Run a Buildkite job and publish to Artifactory
- Deploy all images with fully functioning platform instance

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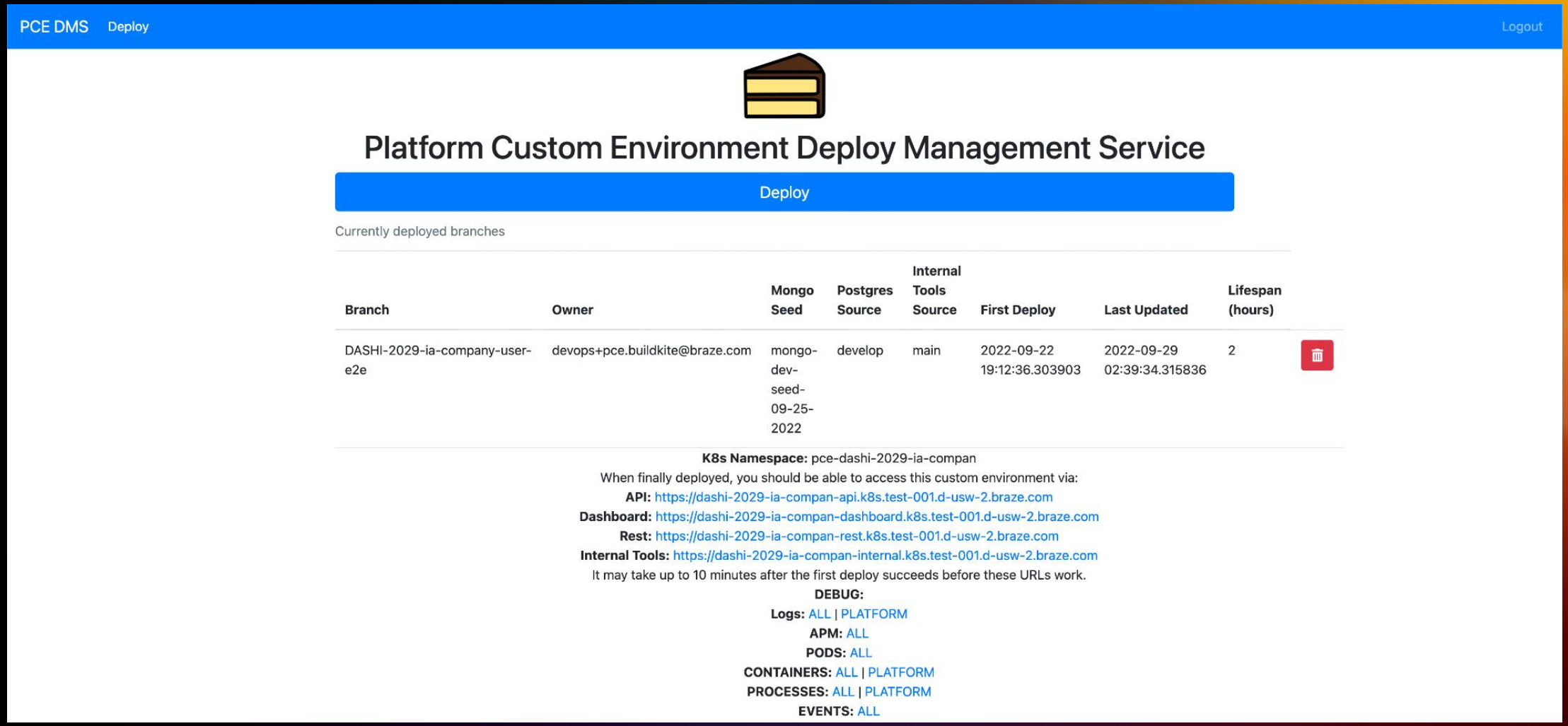


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Case study: Public bug bounty



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COR Forecasting

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Forecasting accuracy (within 5%) is vital for public companies

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COR Forecasting at Braze



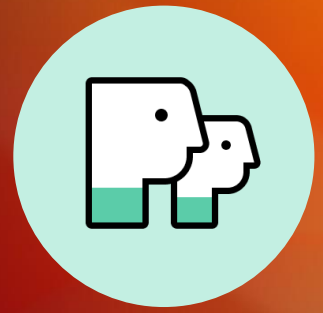
Cost tagging in AWS



Label deployments in Kubernetes



Savings plan monthly review



Implement COR committee

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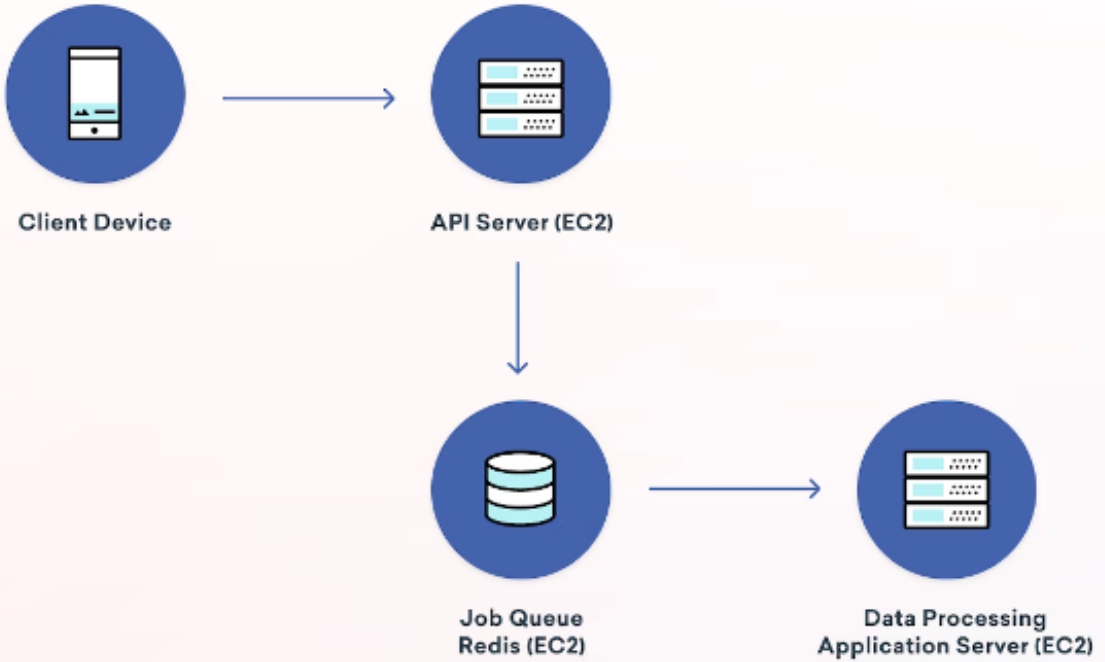
Case study: AWS Auto Scaling

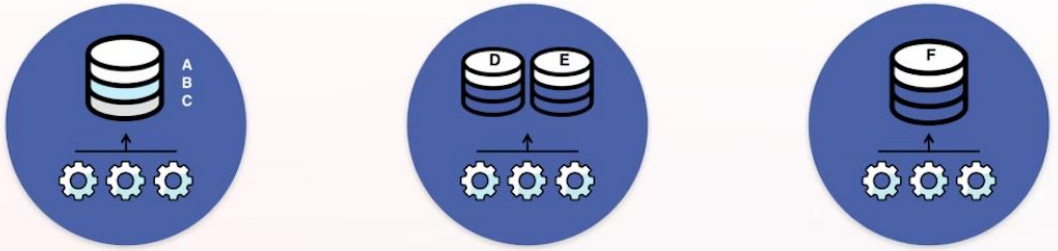
Two processing categories

- Data processing
- Message sending

Three deployment models

- Shared databases
- Dedicated databases, shared cluster
- Dedicated databases, dedicated cluster

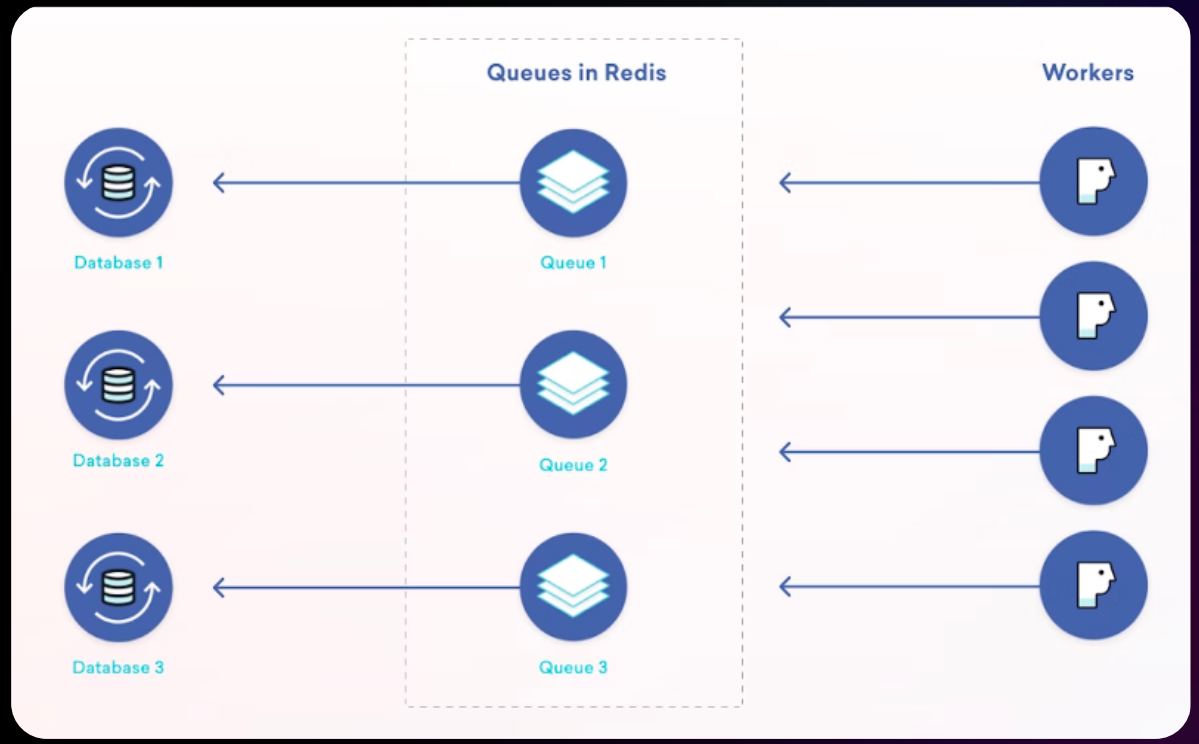




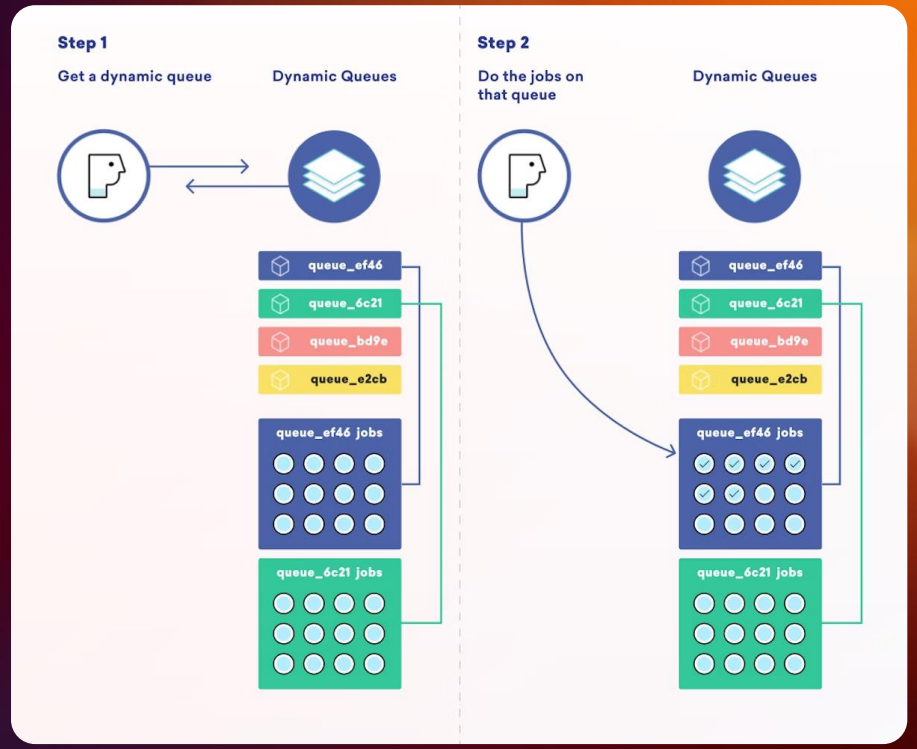
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Case study: AWS Auto Scaling

Tag per database cluster

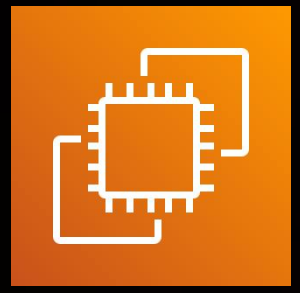


Dynamic queuing



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Case study: AWS Auto Scaling



Amazon Elastic Compute Cloud (Amazon EC2)



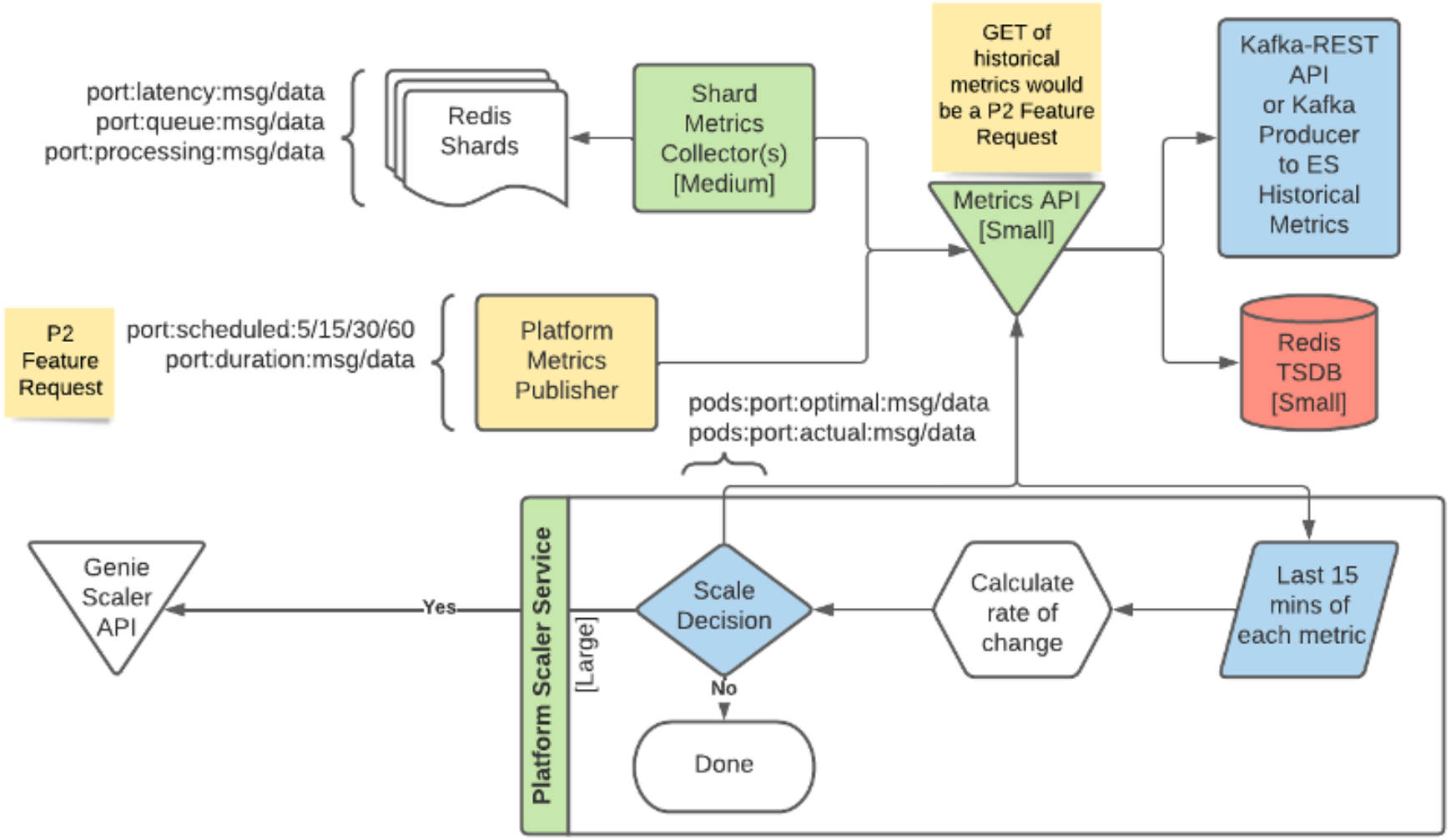
Amazon CloudWatch



AWS Lambda

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Case study: AWS Auto Scaling



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Entitlements and audits

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Entitlements and audits at Braze

Can you defend every cent of revenue?

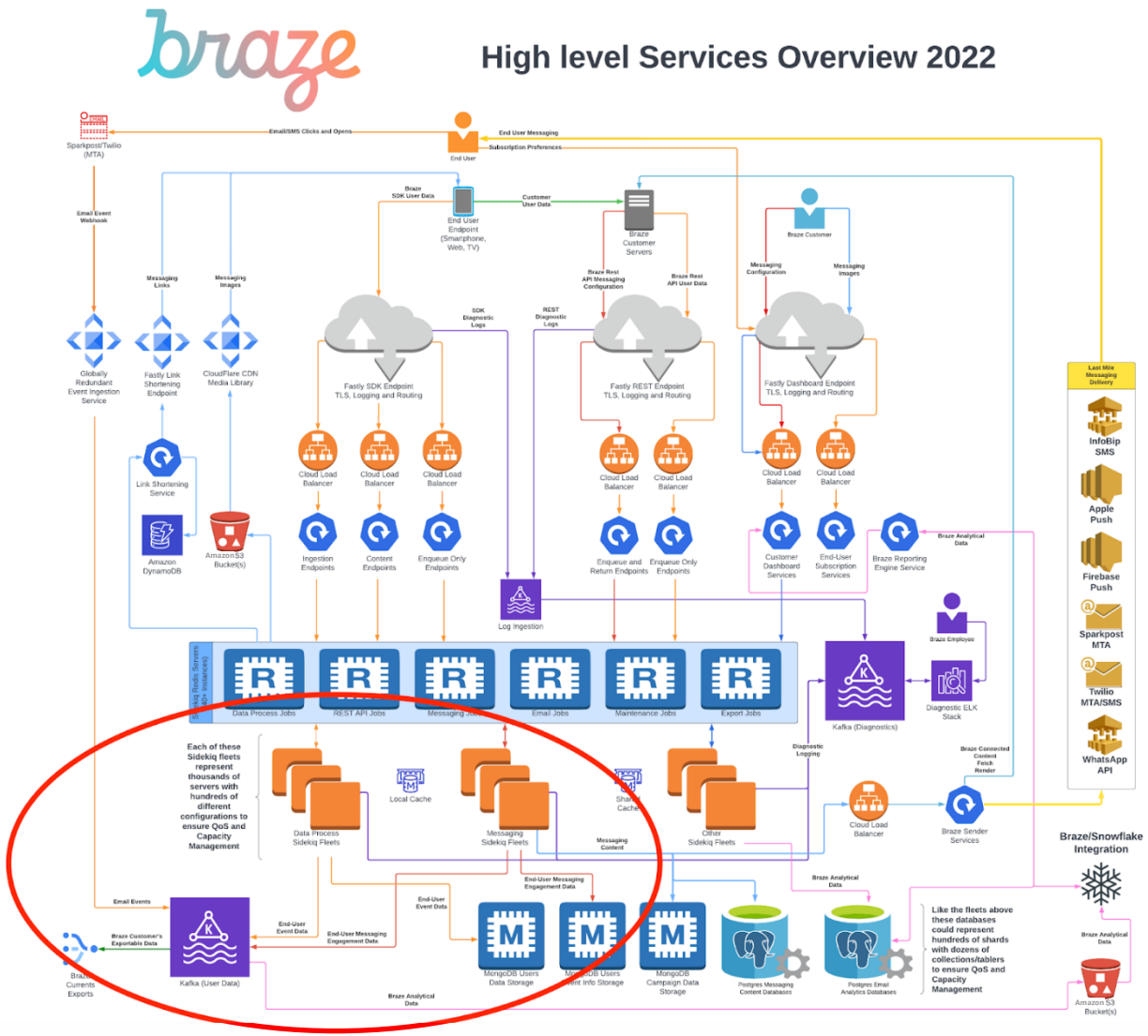
Build robust process

- Track billing data and associated overages
- Automate processes quickly – issue a 10-Q within 45 days of quarter end
- Audit access controls

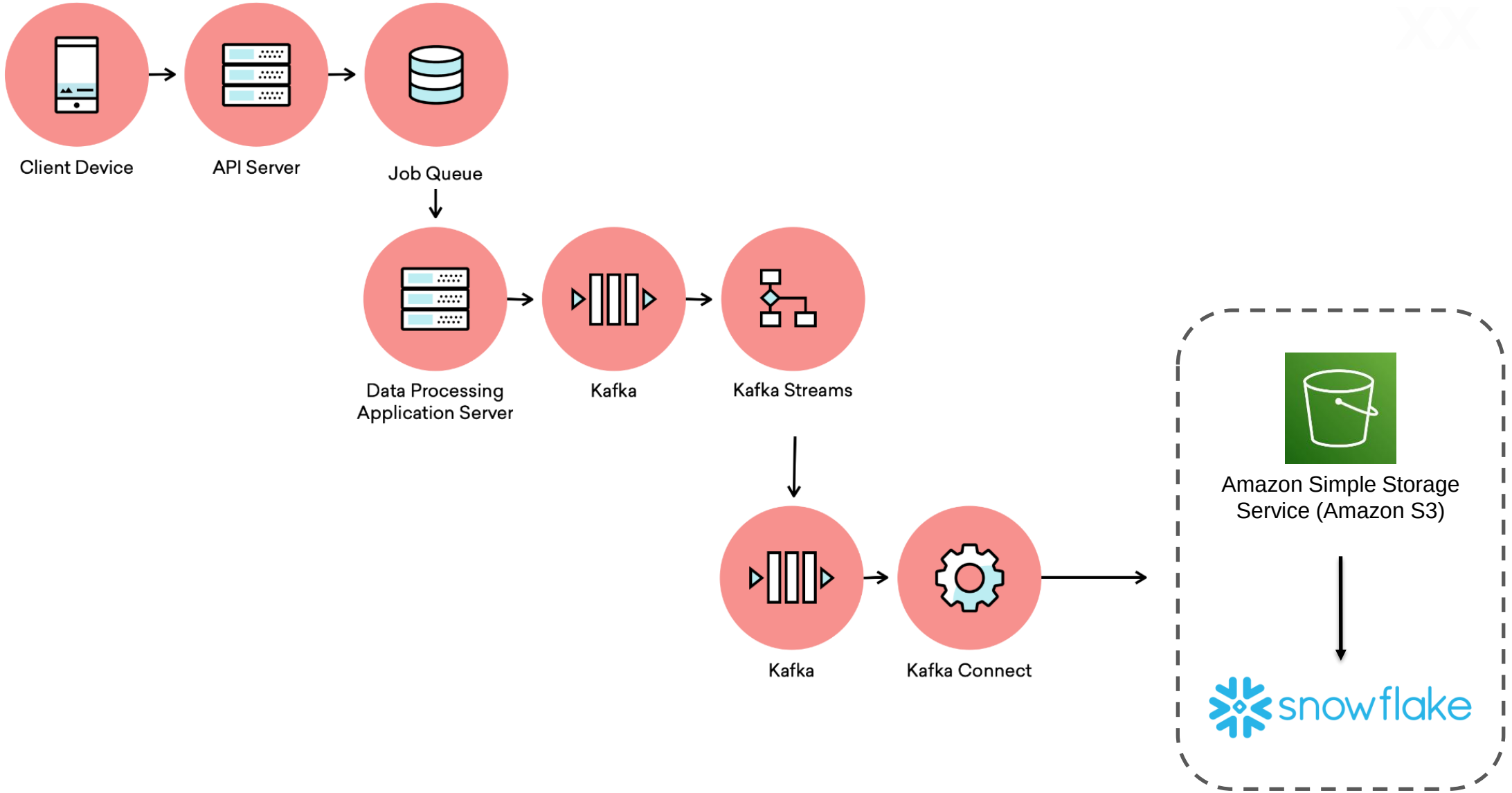
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Case study: Snowflake-powered billing

- Data aggregated in Snowflake nightly
- Share raw data and aggregations with BI team
- Internal billing dashboards
- Introduced source for incoming data (SDK, API, CSV)
- Pull Salesforce data into Snowflake



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Client Device
API Server
Job Queue
Data Processing Application Server
Kafka
Kafka Streams
Kafka
Kafka Connect
Amazon Simple Storage Service (Amazon S3)
snowflake

Modularity

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Modularity for product readiness

Enable teams to be independent owners

Focus on excellent tooling

- Teams should be able to easily own, test, deploy, build, and support
- Infrastructure enhancements
- Configuration and deployments
- Tech debt refactoring

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Case study: Deployments

- Built deployment tool for major applications
- Supports canary builds, rollbacks
- Shows currently deployed versions and percent of traffic flowing



Upgrade Version: US-01-k8s

A deploy will release a new version to the selected project(s) in the selected cluster(s). For clusters running on EC2, this will also pick up any configuration changes pushed out by Chef. For clusters running on Kubernetes, this will upgrade the helm release to also pick up any configuration changes added in braze-deployments.

Deploy Version Range

- (•) Minor Version Upgrade
- ( ) Major Version Upgrade

- Green rows mark versions that are eligible for deployment.
- Blue rows mark the currently deployed version(s) of the selected project(s).
- Gray rows mark older, ineligible versions.
- Yellow rows mark versions that are still building and will soon be eligible versions.

	Branch / Major Version	Commit / Minor Version	Commit Message Header	Commit Date
☐	release-99	4b055474b8d52172e28372814401d1e9ee47bfee e2e tests: ABORTED	[r99 hotfix] Fix PLATFORM-2TTM, fix PLATFORM-2TXM, fix PLATFORM-2TVS. (#47275)	2022-09-28 23:19:44.000Z
☐	release-99	d3cb73158be9fde65e7b9f01613655c37a61f0c6 e2e tests: ABORTED	[INN-401] Updates to measure REST API traffic bursts (#47221) (#47257)	2022-09-28 17:42:42.000Z
☐	release-99	fc1b1fad3240e0d5d14c23087a695dc59388bd81 e2e tests: ABORTED	[Hotfix] [MOPS-2784] account for DST boundaries when scheduling workflow summaries jobs (#47249) (#47251)	2022-09-28 15:41:47.000Z

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Modularity case study: Configuration

- Migration from EC2 to Kubernetes requires configuration to be in sync
- We were using encrypted Chef data bags for EC2 for secret storage
  - This has problems with lack of version control, human error, multiple manual processes
- A more modern model we use for Kubernetes is sops
  - sops is an editor of encrypted files ("Secrets OPerationS") made by Mozilla
- Migrated configuration to sops and in a GitHub repository
- Braze engineers create AWS IAM user and set it up for MFA
- Jenkins jobs poll the configuration repository every 5 minutes, build the configuration artifacts, and upload them to Artifactory

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Key takeaways

- Your reputation is hard earned and easily damaged
- Continuously earn trust with your customers, and your customers’ customers
- Be able to forecast budget within 5% accuracy
- Build a robust process to defend every cent of revenue
- Continue to enable teams to be independent owners
- Make steady updates to infrastructure and interfaces

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Thank you!

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