

# MONITORING SERVERLESS ARCHITECTURES

**CAN YOU HELP WITH SOME PRODUCTION PROBLEMS?**

Your Manager



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# WHAT IS SERVERLESS?

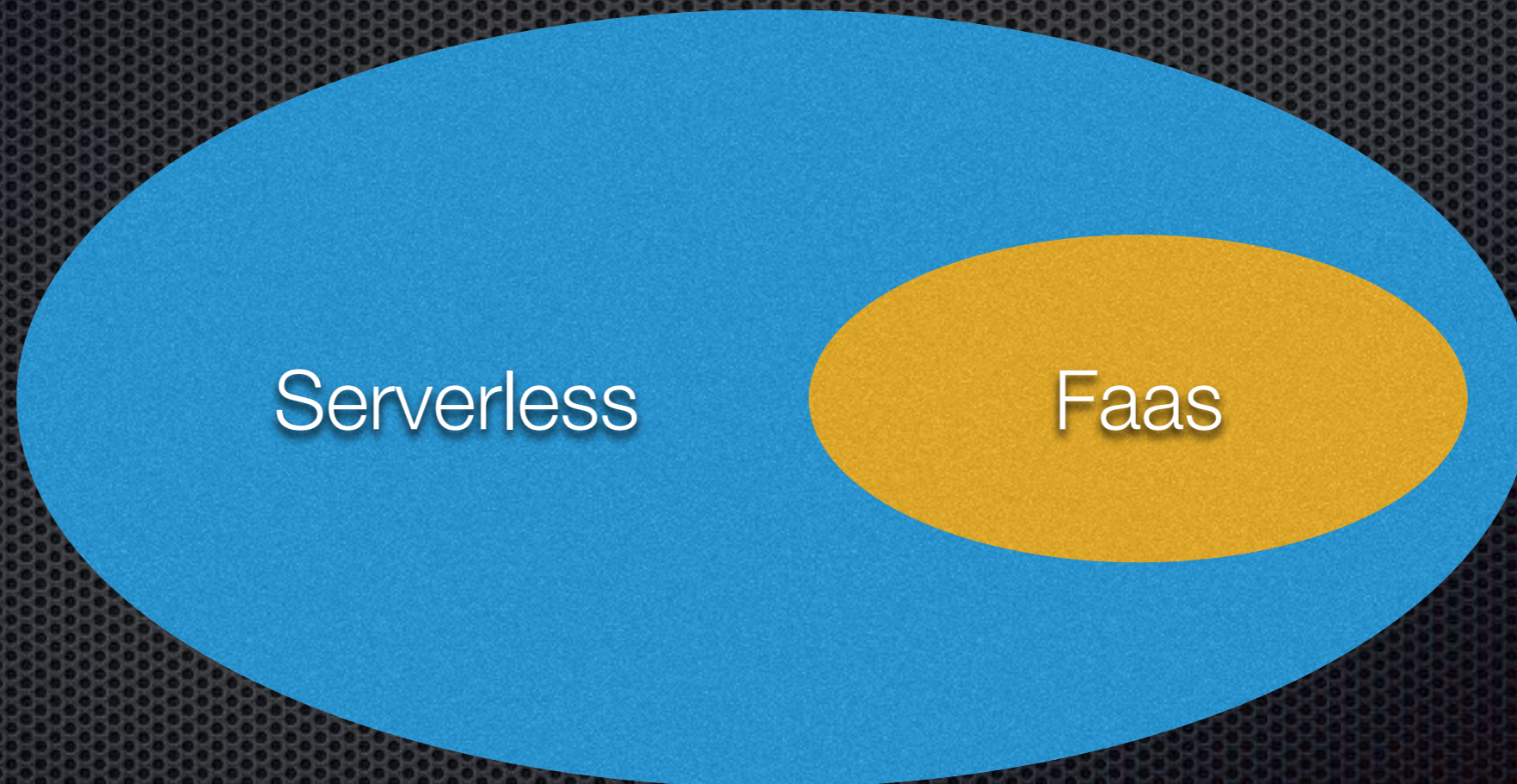


# Cloud-native

# PaaS?



# Serverless $\neq$ FaaS



# Managed runtime

# WHY SERVERLESS?



# Availability

# Scalability

# Economy

# Time to market



# Security

# Operability

# SERVERLESS BUILDING BLOCKS

# AWS Lambda

- ✦ Java, C#, NodeJS, Python
- ✦ sync & async invocation
- ✦ 1 million invocations and 400k GB-s free per month
- ✦ \$0.20 per 1 million requests and ~\$6.65 for 400k GB-s thereafter



# AWS API Gateway

- ✦ security, caching, throttling
- ✦ functions as API implementations
- ✦ 1 million requests free per month
- ✦ \$3.50 per 1 million requests and \$0.09/GB (for the first 10 TB, then cheaper)



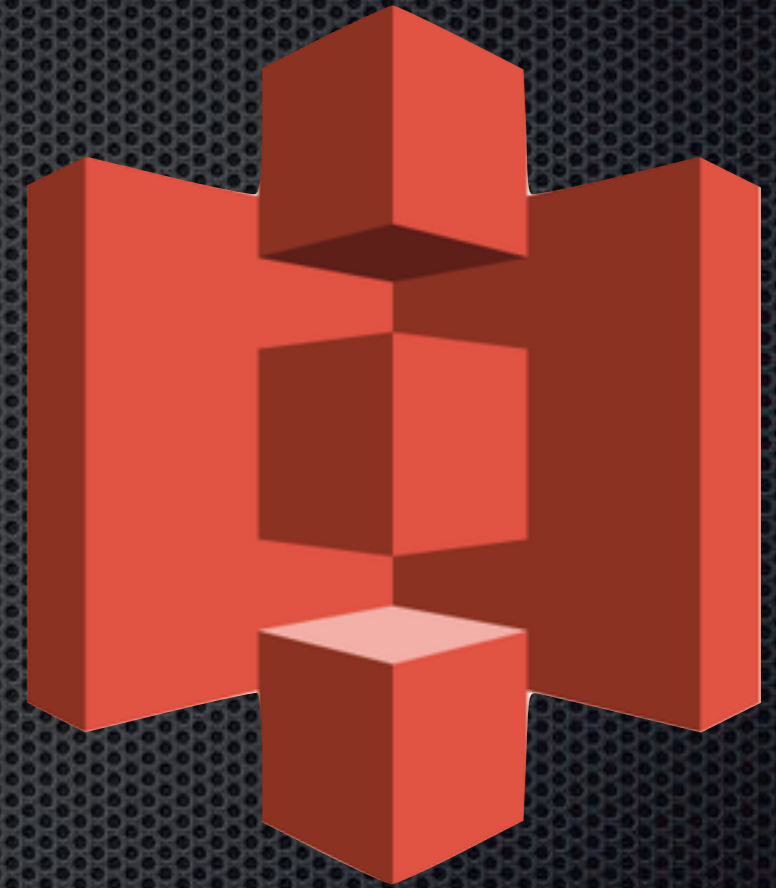
# AWS DynamoDB

- document and key-value
- function as triggered procedures
- 25 GB of storage and 25 units of read capacity each month for free (~200k requests per month)
- \$0.25 per GB/month and \$0.0065 per hour for 10 units of write capacity (36k writes/hour) or 50 units of read capacity (180k reads/hour)



# AWS S3

- ✦ durable, available and scalable
- ✦ functions as content processors
- ✦ 5 GB of storage and 15 GB of data transfer out to Internet each month for free
- ✦ \$0.03 per TB/month and \$0.09 per GB data transfer out to Internet



# AWS SNS

- ✦ pub-sub, push notifications
- ✦ functions as destinations
- ✦ 1m publishes, 1m mobile push notifications, 1k emails, 100k HTTP notifications and 1 GB of data transfer out each month for free
- ✦ \$0.50 per 1m publishes, \$0.60 per 1m HTTP notifications and \$0.09 per GB data transfer out to the Internet





# AWS Kinesis Streams

- ✦ pub-sub, persistent
- ✦ functions as consumers
- ✦ no free tier
- ✦ \$0.015 per shard/hour, \$0.014 per 1m PUT payload units (25KB) + extended retention charges
- ✦ data transfer is free



# Other AWS services

SQS

SES

Cognito

IoT

Greengrass

Button

Step Functions

CloudFront

Route53

Batch

ElasticSearch

ElastiCache

RDS

EMR

Redshift



# MONITORING



# AWS CloudWatch

- ✦ scalable, managed
- ✦ real-time monitoring
- ✦ metrics, logs, alarms, events



# METRICS



# CloudWatch Metrics

- ✦ retention: 1m (15 days), 5m (63 days), 1h (15 months)
- ✦ basic monitoring (1m/5m) is free
- ✦ 10 metrics and 1 million API requests for free each month
- ✦ \$0.30 per metric/month for the first 10k metrics (\$0.02 for metrics over 1M)
- ✦ \$0.01 for 1000 API requests



# AWS Lambda

- ✦ Invocations
- ✦ Errors
- ✦ Dead Letter Errors
- ✦ Duration
- ✦ Throttles



# AWS API Gateway

- 4XX Error
- 5XX Error
- Cache Hit Count
- Cache Miss Count
- Count
- Integration Latency
- Latency





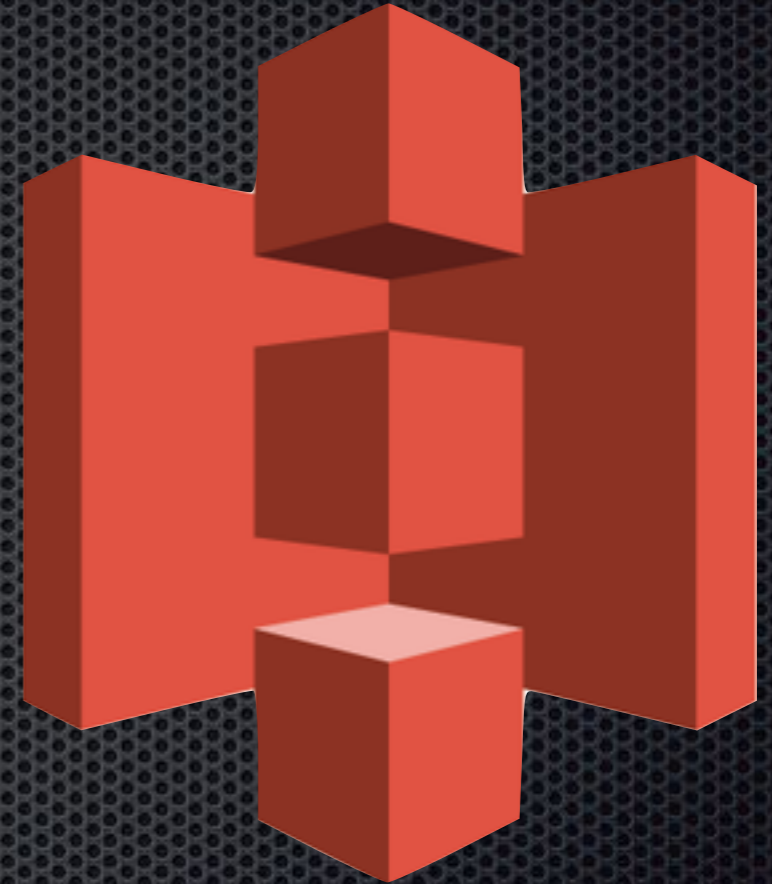
# AWS DynamoDB

- Provisioned Capacity Units Read/Write
- Consumed Capacity Units Read/Write
- Online Index Consumed Capacity/Progress/Throttling
- Returned Bytes
- Returned Item Count
- Returned Records Count (Streams)
- Successful Request Latency
- Errors System/User
- Conditional Check Failed Requests
- Throttled Events Read/Write/Requests



# AWS S3

- ✦ Bucket Size Bytes (daily)
- ✦ Number Of Objects (daily)
- ✦ All Requests
- ✦ Get/Put/Delete/Head/Post/List Requests
- ✦ Bytes Downloaded/Uploaded
- ✦ Errors 4XX/5XX
- ✦ First Byte Latency
- ✦ Total Request Latency

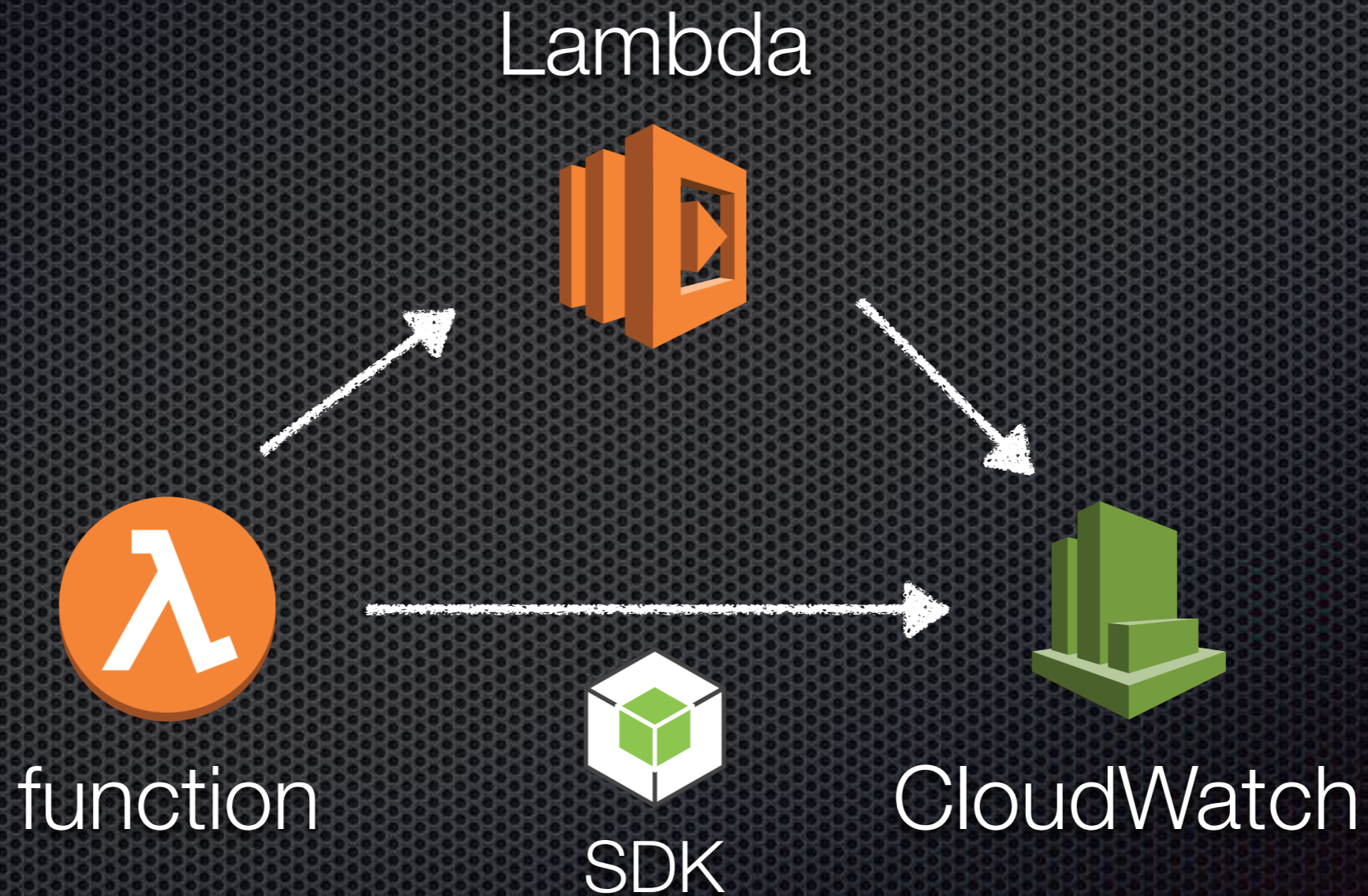


# AWS SNS

- ✦ Number Of Messages Published
- ✦ Publish Size
- ✦ Number Of Notifications Delivered
- ✦ Number Of Notifications Failed
- ✦ SMS Success Rate



# Custom Metrics



# Estimated Billing

- ✦ Total Estimated Charges
- ✦ Estimated Charges (per service)



# DASHBOARDS



# CloudWatch Dashboards

- ✦ metrics, alarms, static text
- ✦ 3 dashboards (up to 50 metrics) per month for free
- ✦ \$3 per dashboard per month





ALERTING

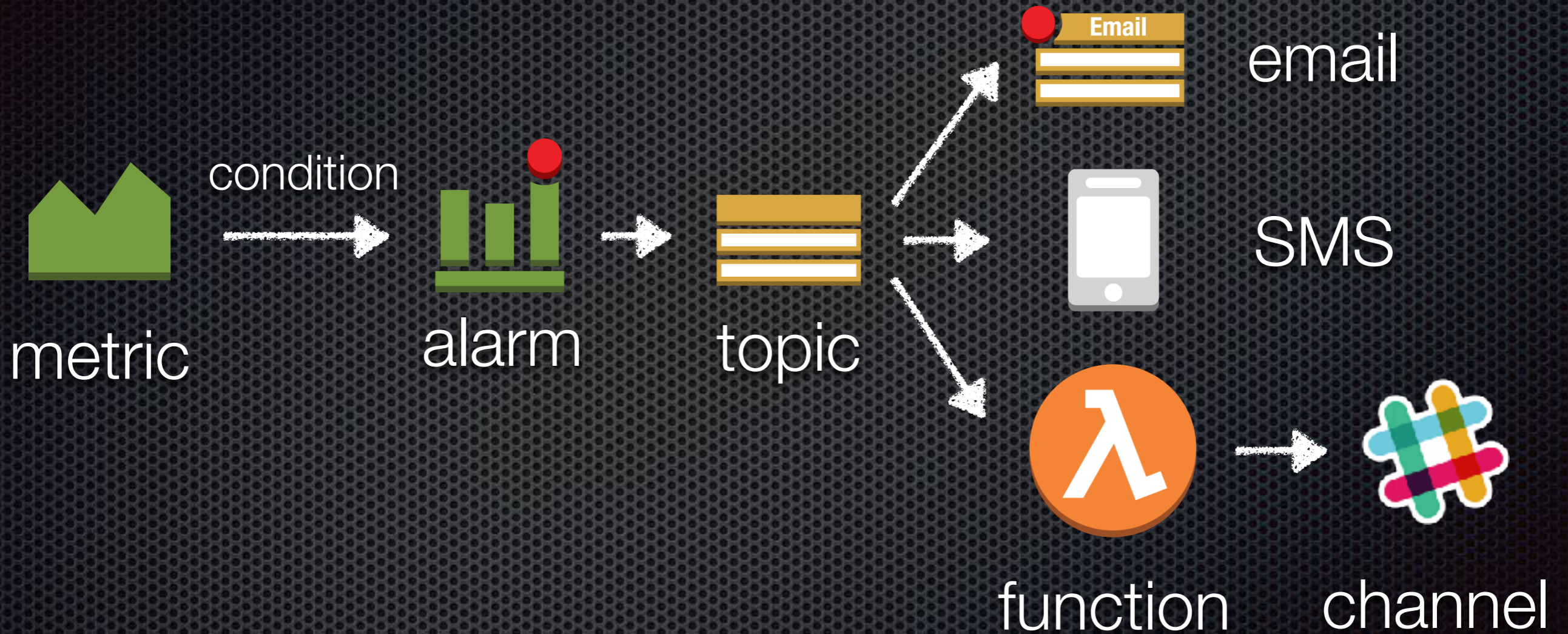


# CloudWatch Alarms

- ✦ watches metrics over time
- ✦ can trigger a function via SNS
- ✦ 10 alarms per month for free
- ✦ \$0.10 per alarm per month



# Serverless Alerting



# LOGGING



# CloudWatch Logs

- ✦ ingests and stores application logs
- ✦ configurable retention period
- ✦ 5 GB data ingestion and 5 GB archived storage per month for free
- ✦ \$0.5985 per GB ingested per month
- ✦ \$0.0315 per GB archived per month



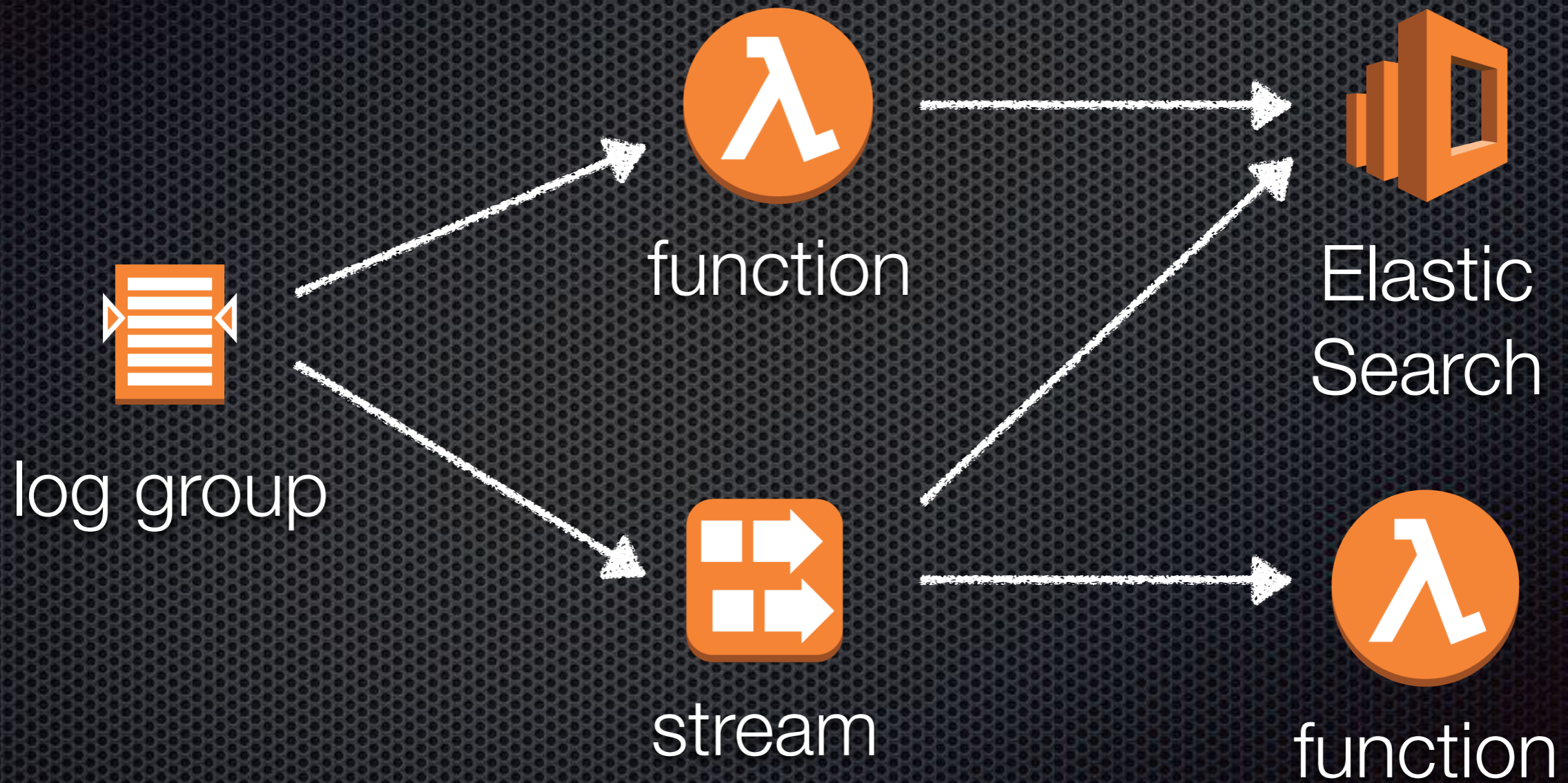
# Log Collection



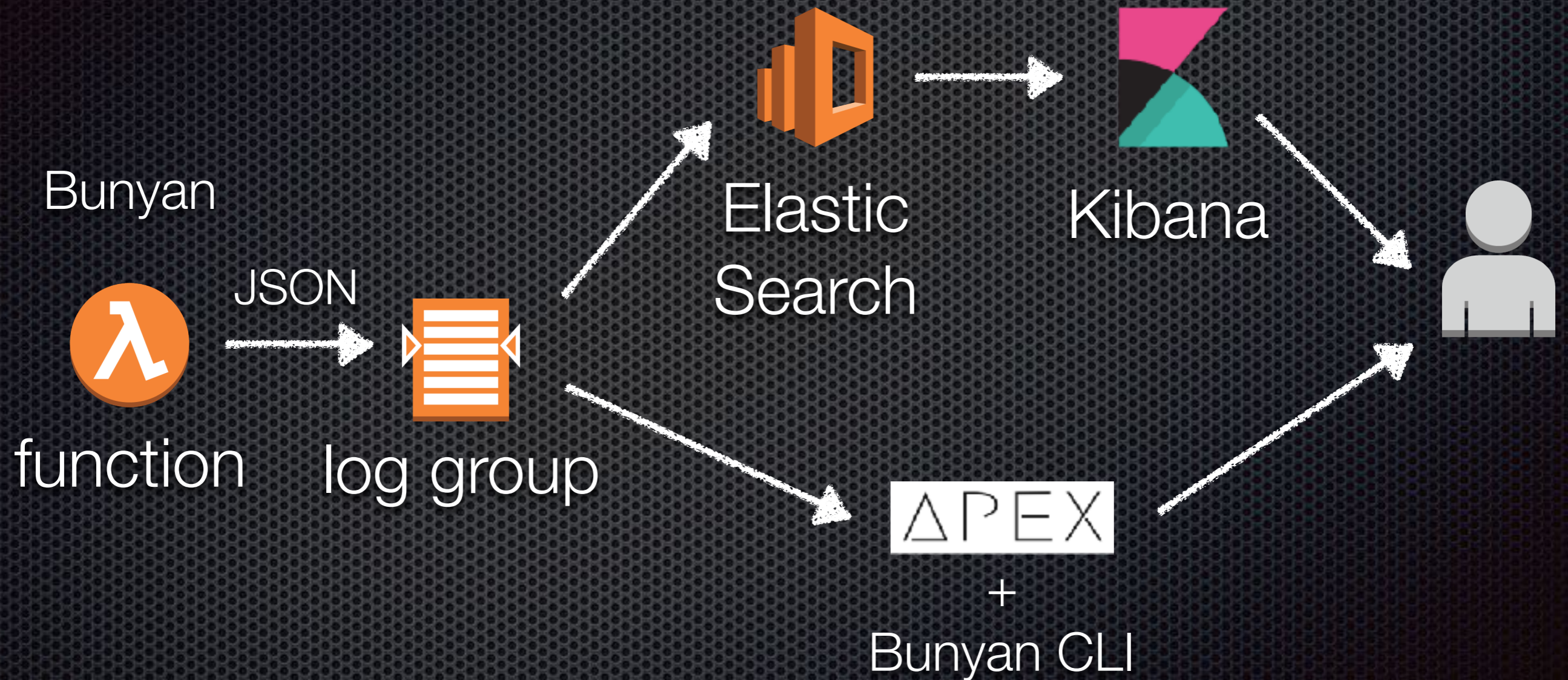
# Log Filtering



# Log Streaming



# Log Browsing





# EVENTS



# CloudWatch Events

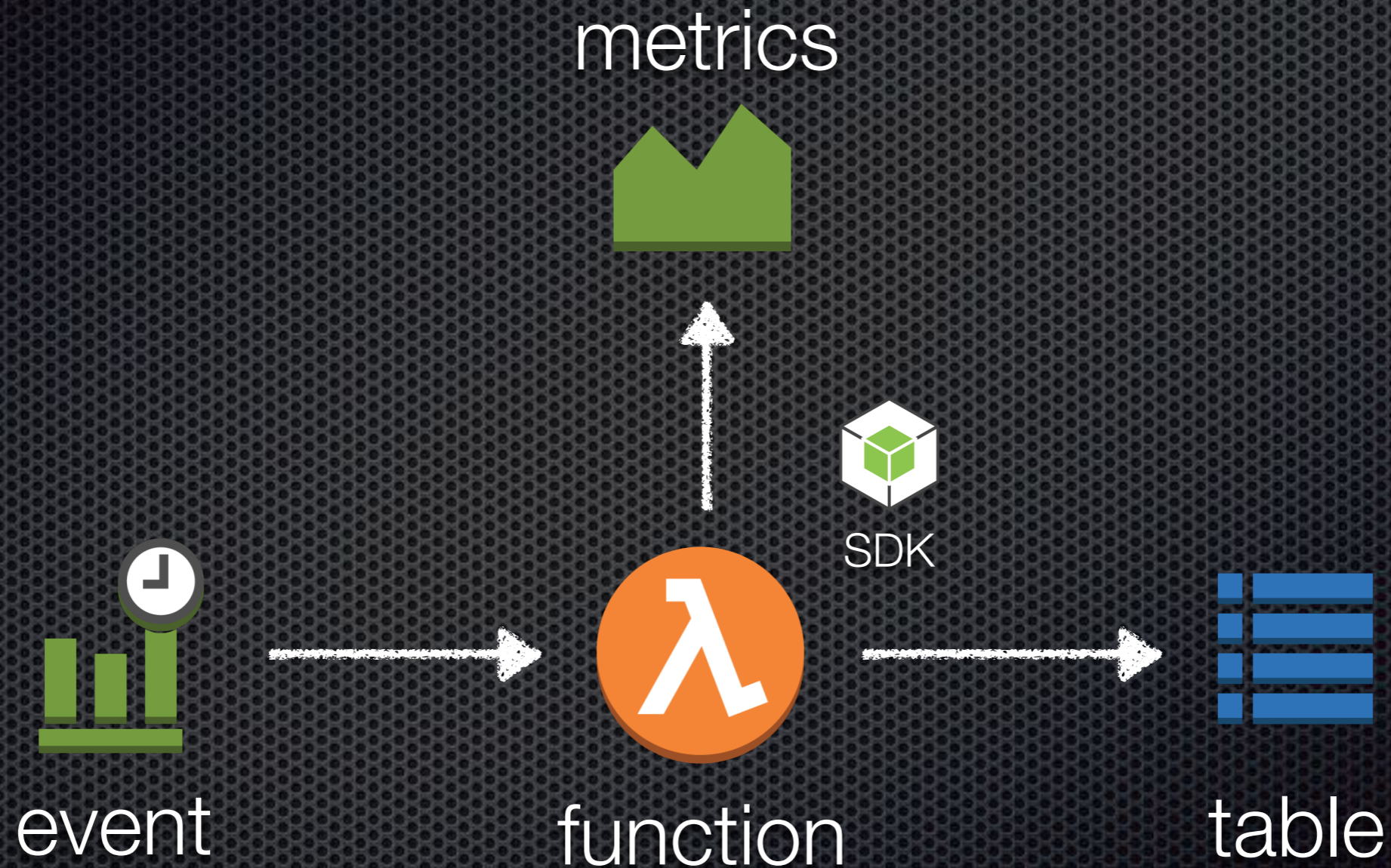
- ✦ stores & streams application events
- ✦ \$1 per 1 million custom events



# Custom Events



# DynamoDB dynamic capacity



# HEALTH CHECKS

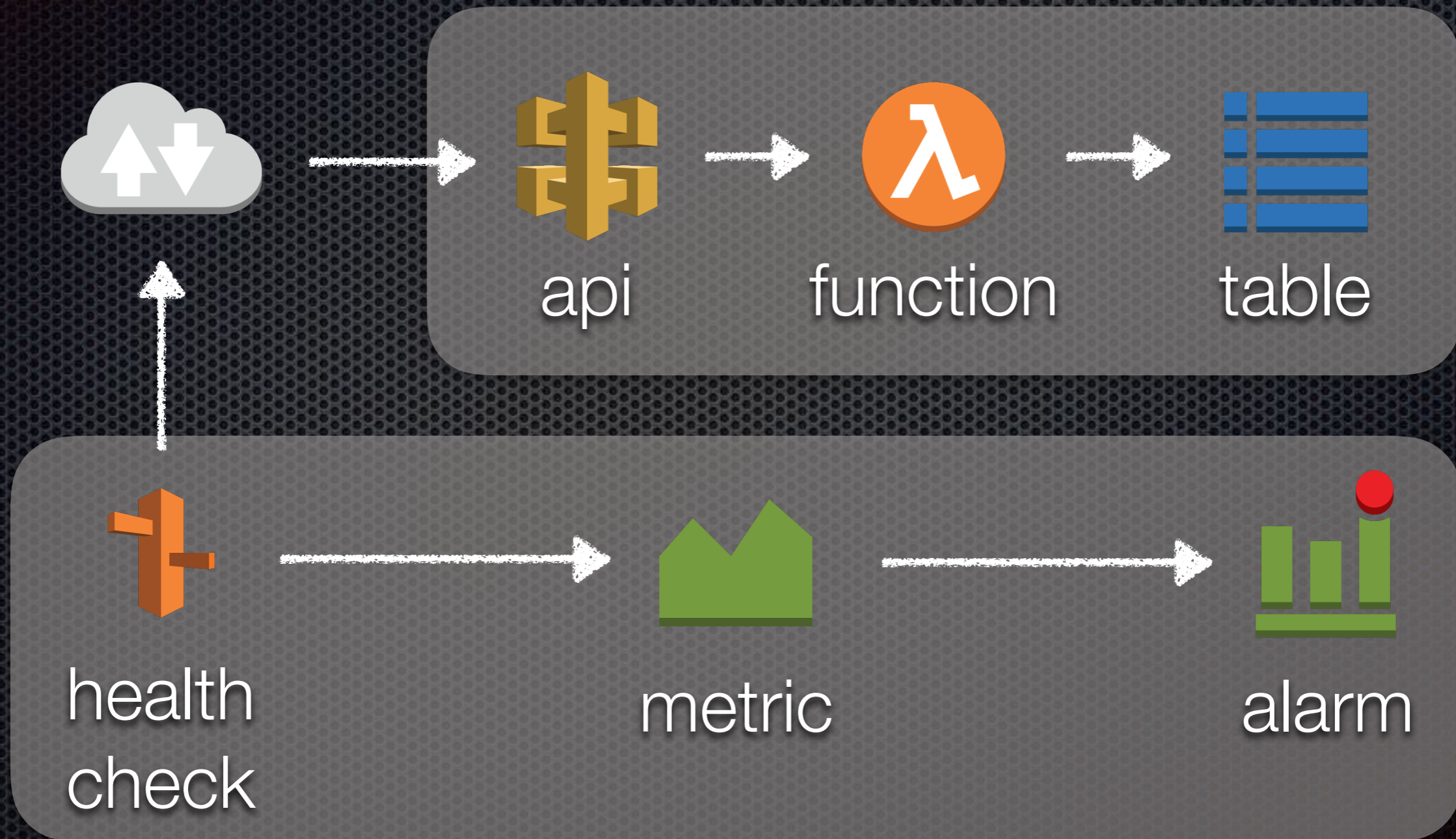


# Route53 Health Checks

- ✦ monitors HTTP(S) endpoints
- ✦ 50 AWS endpoint checks per month for free
- ✦ \$0.50 per health check per month
- ✦ \$1 per feature (HTTPS, string matching, fast interval, latency) per month



# Health Checks



# TRACING

A long-exposure photograph of a road at night, showing light trails from cars in red, orange, and yellow. The word 'TRACING' is overlaid in white text on the right side.



# AWS X-Ray

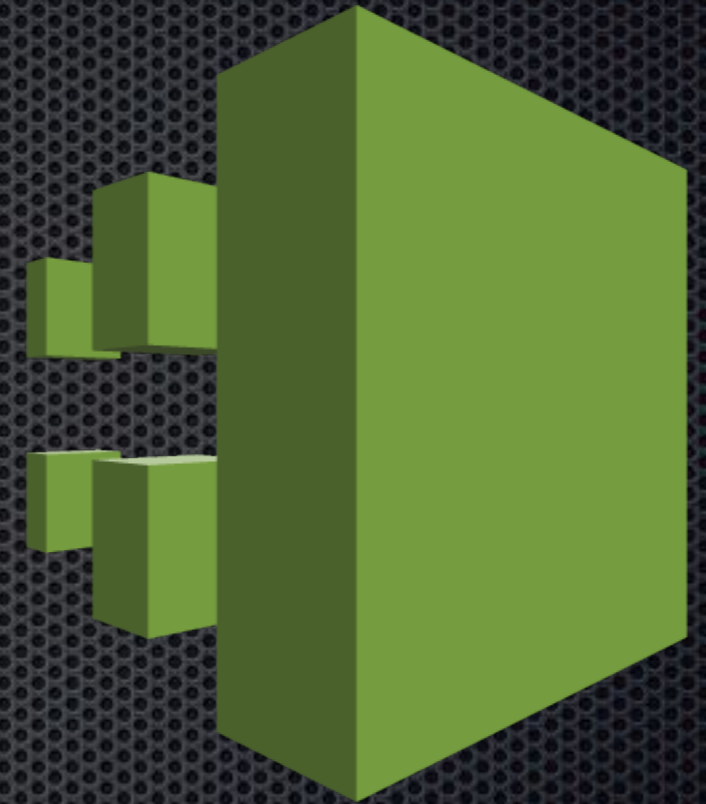
- ✦ collects transaction traces
- ✦ support for Lambda coming soon
- ✦ 100k traces recorded and 1 million traces retrieved/scanned free per month
- ✦ \$5 per 1 million traces recorded and \$0.50 per 1 million traces retrieved/scanned per month



# AUDITING

# AWS CloudTrail

- ✦ audits all console, API, SDK activity
- ✦ first copy of management event free
- ✦ additional copies \$2 per 100k events
- ✦ \$0.10 per 100k data events



# THE FUTURE

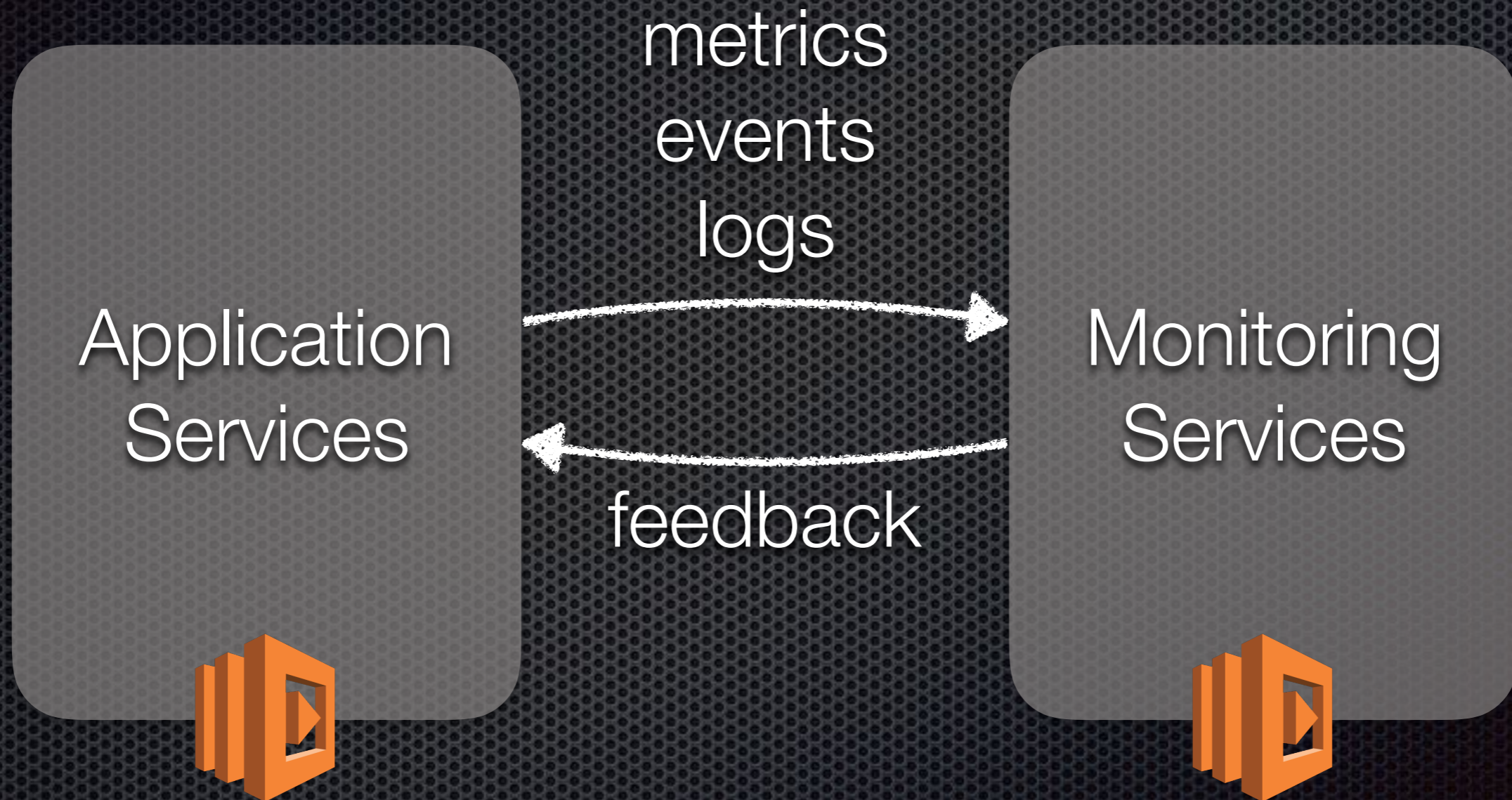


# Total Visibility

# Monitoring as a Service

# Monitoring not only for Operations

# Application <-> Monitoring





# Monitoring as the enabler for the new functionality

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QUESTIONS?