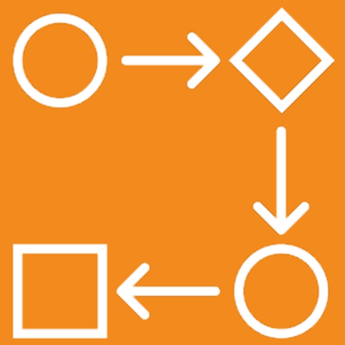
CF SUMMIT 2021

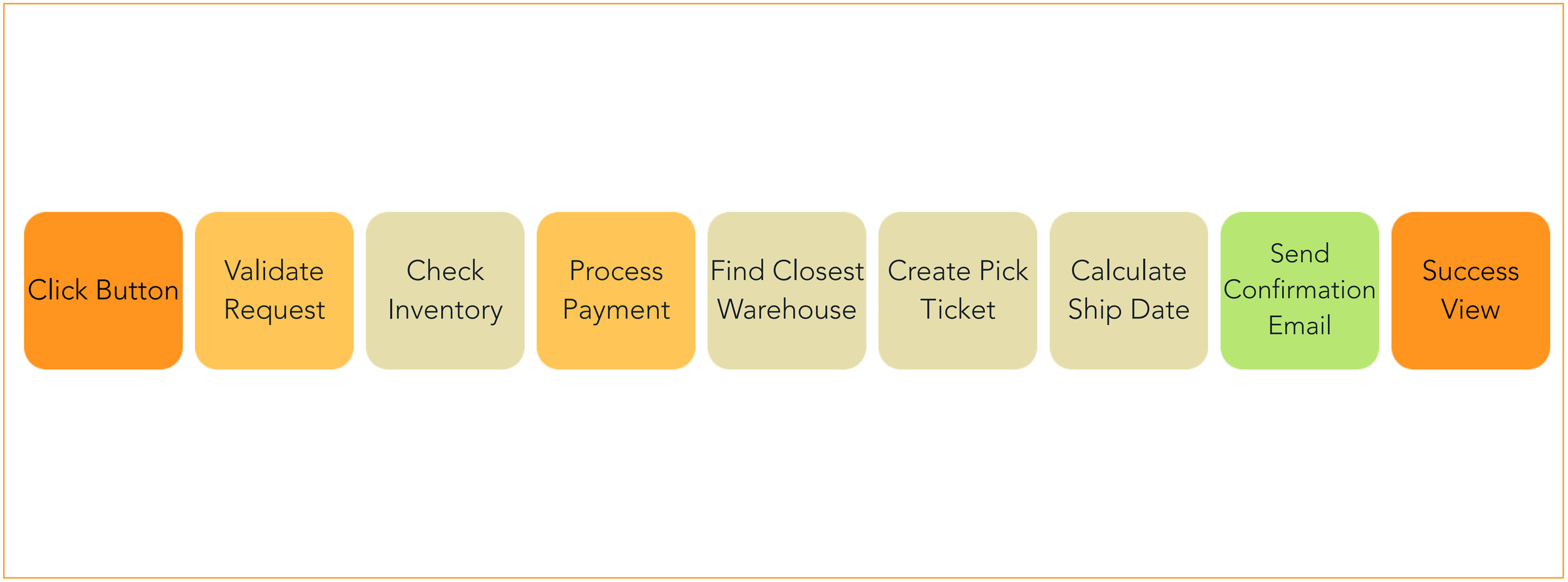
Scalable, Responsive Apps and Services with Queues and Pub/Sub Mechanisms

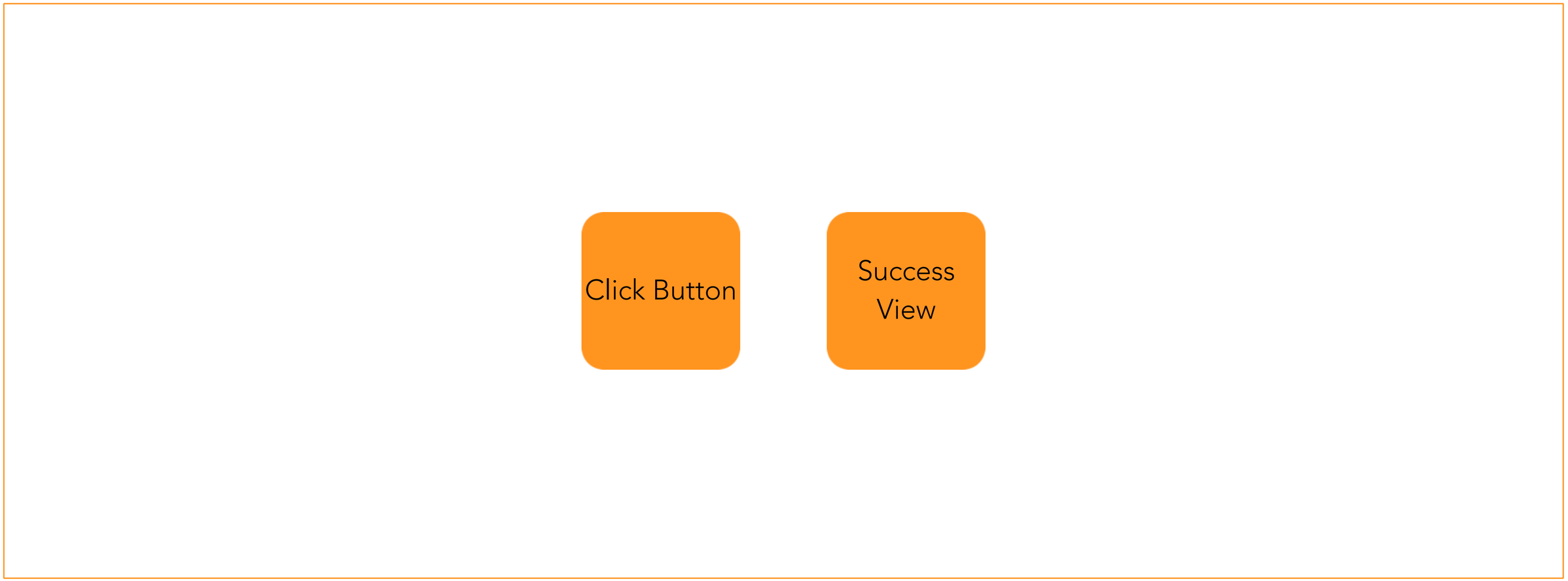
BRIAN KLAAS

Workflows



Buy Now with 1-Click


Click Button
Validate Request
Check Inventory
Process Payment
Find Closest Warehouse
Create Pick Ticket
Calculate Ship Date
Send Confirmation Email
Success View


Click Button
Success View

Nothing's faster
than work you don't have to wait for.

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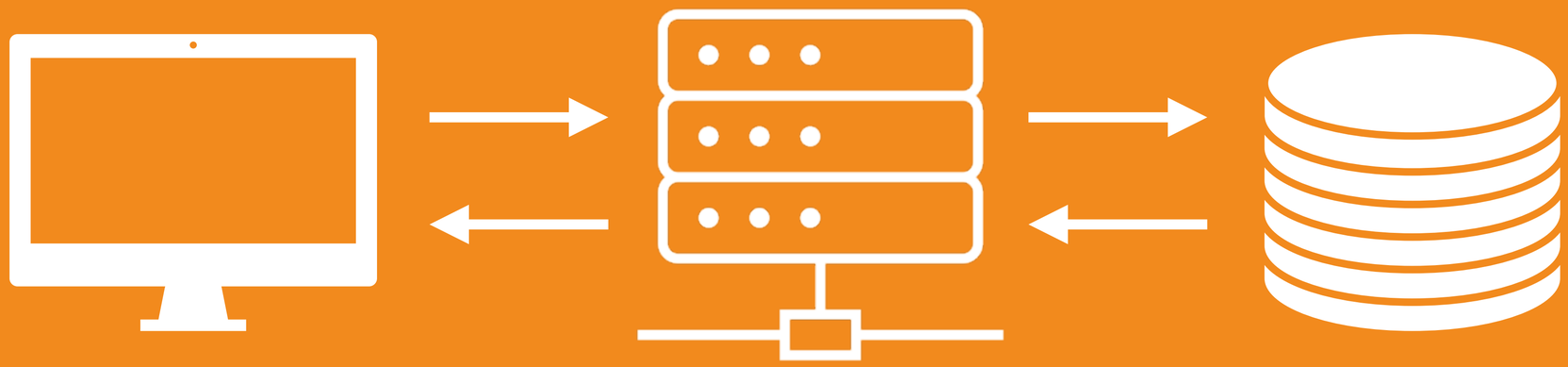
Request/Response



Request/Response

We've got to wait around for some ill-defined future point.

runAsync( ) in ColdFusion 2018+

```
runAsync(validateRequest)
        .then(checkInventory)
        .then(processPayment)
        .then(findClosestWarehouse)
        .then(createPickTicket)
        .then(calculateShipDate);
        .then(sendEmailConfirmation);
```

Request/Response 

```
var clientView = runAsync(validateRequest)
        .then(processPayment)
        .then(sendEmailConfirmation);

var warehouseProcess = runAsync(findClosestWarehouse)
        .then(checkInventory)
        .then(createPickTicket)
        .then(calculateShipDate);
        .then(sendShipmentDateEmail);
```

Request/Response 

Error handling
Retries
Throttling
New business requirements

Linear, linked flow encourages brittle architectures

Request/Response 

Linear, linked flow blocks your ability to scale

Request/Response 

How can we do better?

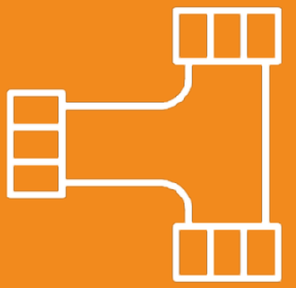
Event-driven

Something happens.
Code responds.

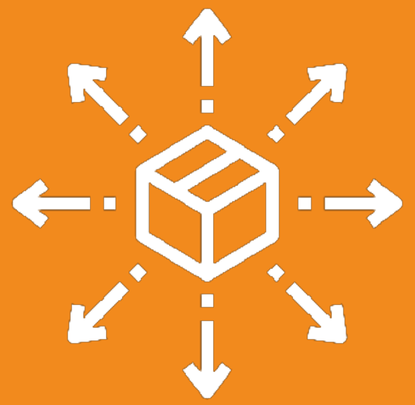
Database triggers

SQL

Event–driven = automatic plumbing

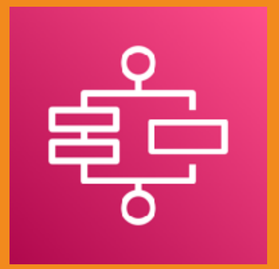


Event-driven = easy fan-out



How do you know it’s done?

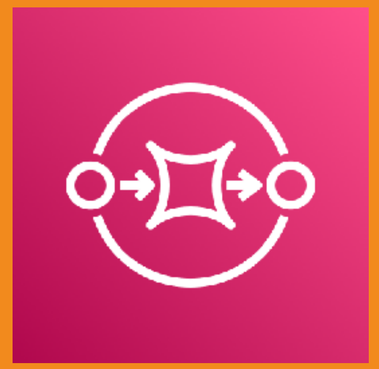
Orchestration tools



Orchestration = additional complexity

Something simpler?

Pub/Sub + Queues



SNS = Simple Notification Service

SNS = Pub/Sub

SNS = One Publisher, Many Subscribers

SNS Subscribers:

https endpoints (including CFML)

Email

Phone number (SMS)

SQS queue

Lambda

Kinesis Firehose

Pinpoint application

SNS subscribers can:

Filter on specific criteria

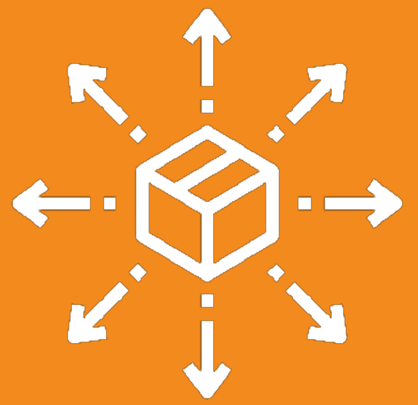
Retry on delivery to https endpoints

Specify DLQ on completely failed delivery

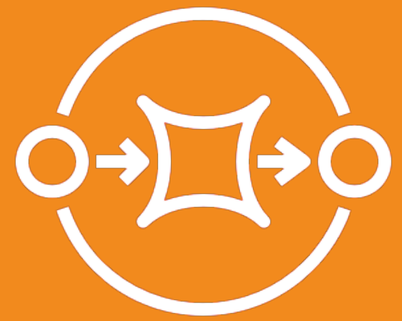
```
snsService= getCloudService(awsCredentials, {"serviceName" : “SNS"});

topic = snsService.createTopic(topicName);

msgBody = {“customer”: 123, “orderID”: 456, “amount”: “78.90”};

topic.publish(msgBody);
```

github.com/brianklaas/awsplaybox

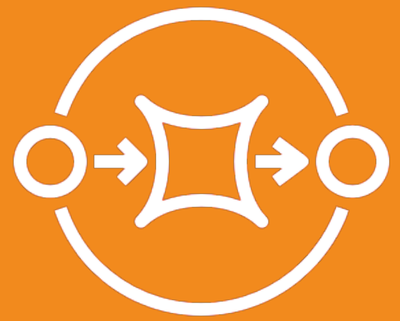
SNS = Fan-out



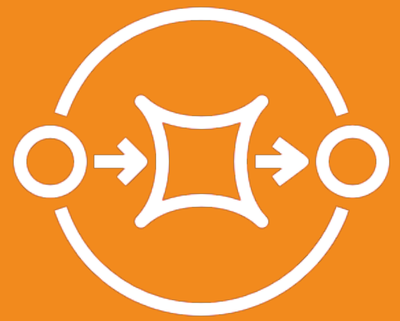
SQS = Simple Queue Service

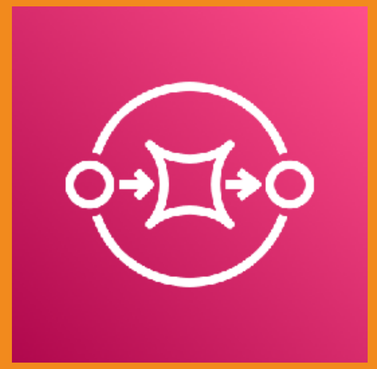


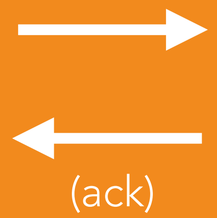
SQS = Stack of messages

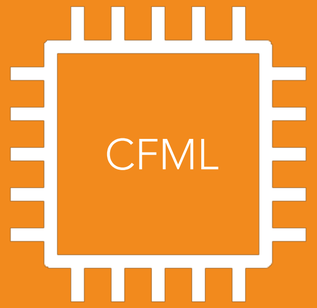


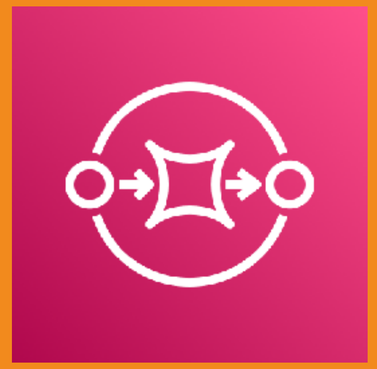
SQS = One publisher, one worker

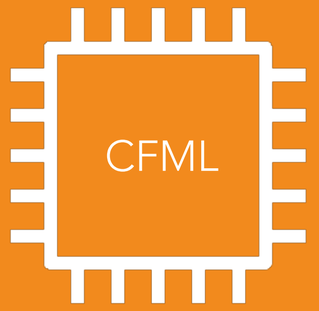


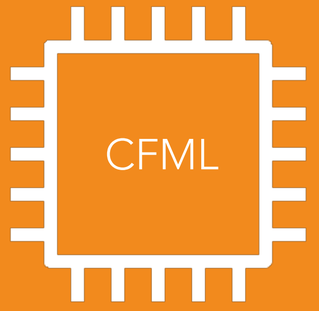


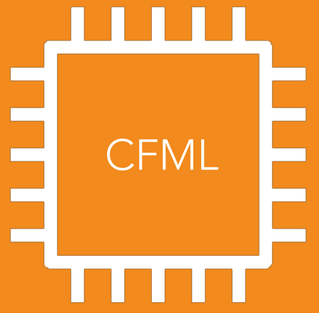

(ack)


CFML




CFML


CFML

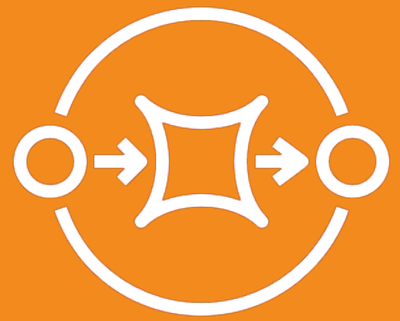

CFML

SQS queues can:

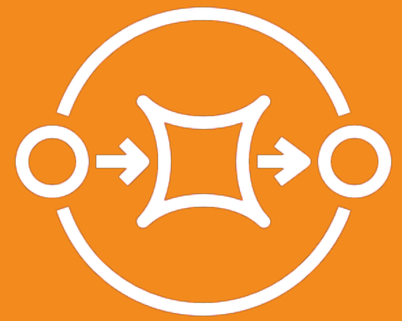
Perform content-based deduplication

Retry messages on failed processing

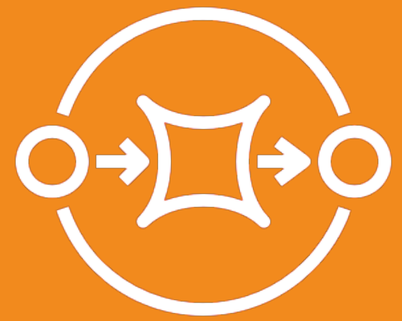
Specify DLQ on completely failed processing



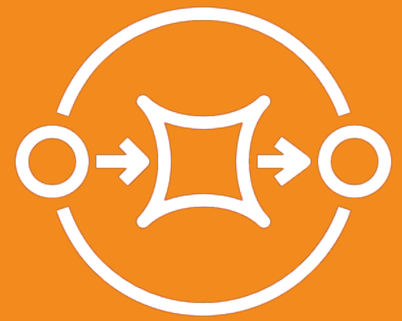
SQS != ordered processing



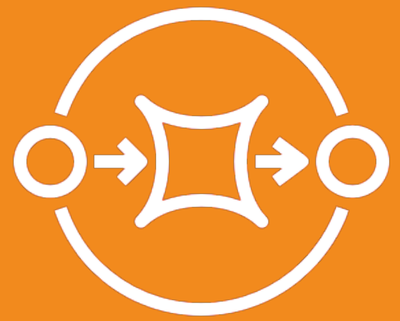
SQS != only-once delivery



SQS reqiures idempotency



FIFO queues for order

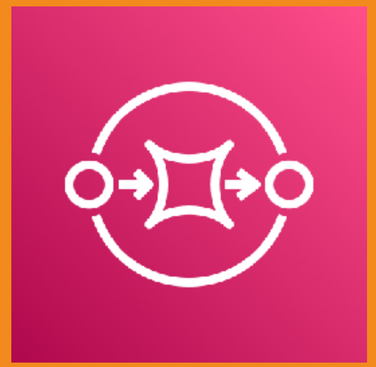


```
sqsService= getCloudService(awsCredentials, {"serviceName" : “SQS”});

msgBody = {“customer” : 123, “orderID” : 456, “amount” : “78.90”};

message = {“messageBody” : msgBody};

myQueue.sendMessage(message);
```

github.com/brianklaas/awsplaybox

```
sqsService= getCloudService(awsCredentials, {"serviceName" : “SQS”});

urlOfQueue = sqsService.GetQueueUrl(nameOfQueue);

messageInfo = sqsService.receiveMessage(urlOfQueue);

receiptHandle = messageInfo.messages[1].receiptHandle;

// do work

sqsService.deleteMessage(urlOfQueue,receiptHandle);
```


vs



Message Size Limit:

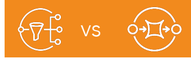
SNS = 256 KiB

SQS = 256 KiB

Message Persistence:

SNS = No

SQS = Yes



Message Ordering:

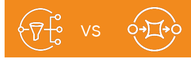
SNS = Yes

SQS = Yes, when using FIFO queues

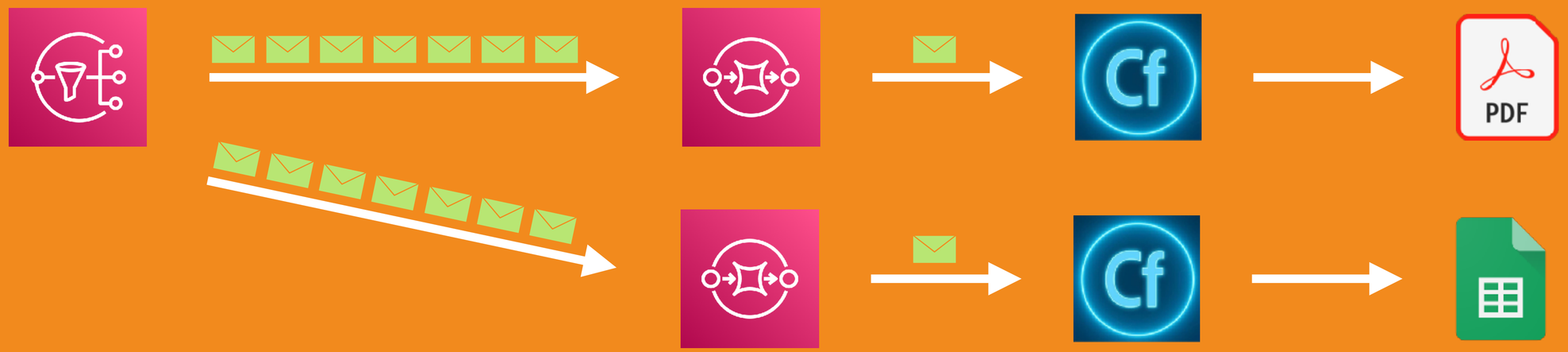
Message Filtering:

SNS = Yes

SQS = Just added!



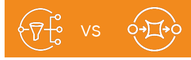
Common Pattern: SNS in front of SQS



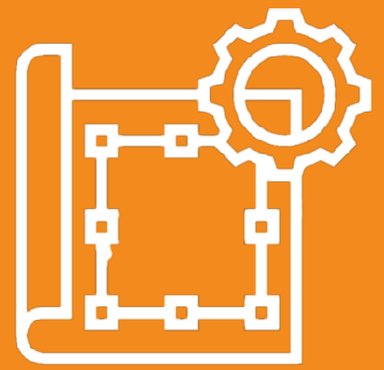
Use cases:

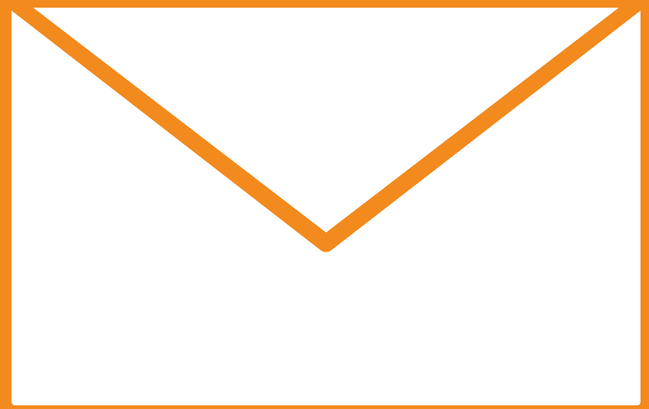
SNS = Fan-out to multiple recipients
SQS = Queuing up work by processors

SNS + SQS allows you to scale and parallelize work safely and durably.



Real-World Example 1

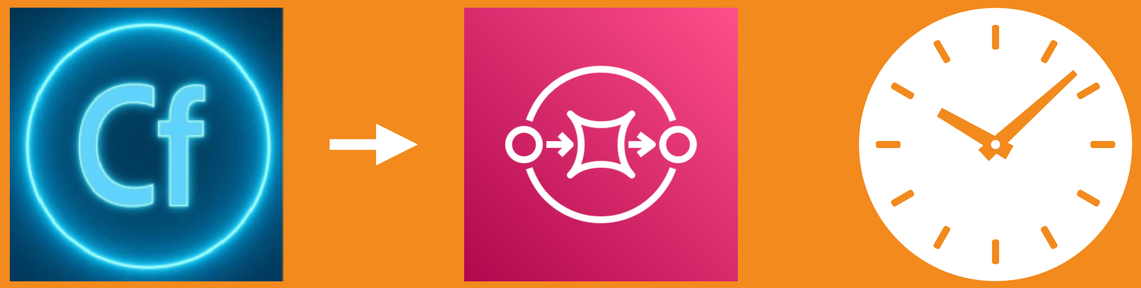




Example

Example

Example



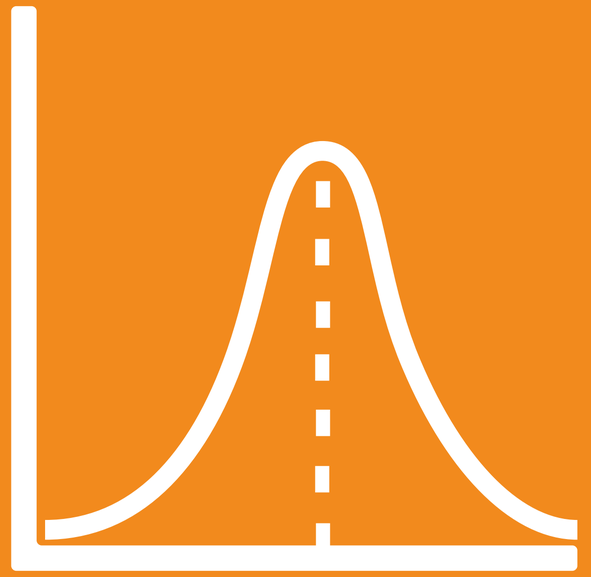
Example

Example

```
sqsService= getCloudService(awsCredentials, {"serviceName" : “SQS”});

urlOfQueue = sqsService.GetQueueUrl(nameOfQueue);

messageInfo = sqsService.receiveMessage(urlOfQueue);

receiptHandle = messageInfo.messages[1].receiptHandle;

// Build and send the custom email

sqsService.deleteMessage(urlOfQueue,receiptHandle);
```

Example 

$$\frac{(\text{numRequests} * \text{avg execution time})}{\text{seconds for scheduled task}}$$



Example

```
var remainingTime = 55000;
do {
    var messageProcessStartTime = getTickCount();
    // get SQS message, generate and send email, delete message
    var messageProcessEndTime = getTickCount();
    remainingTime -= (messageProcessEndTime - messageProcessStartTime);
} while (remainingTime gt 0);
```

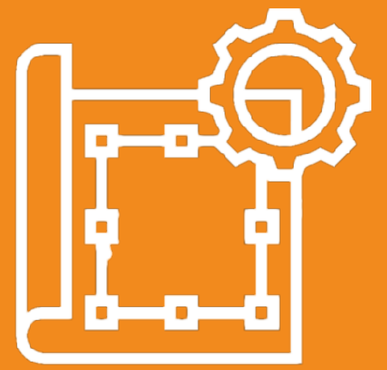
Example 

Processing–intensive tasks

Throttle processing of a batch of items

Example

Real-World Example 2

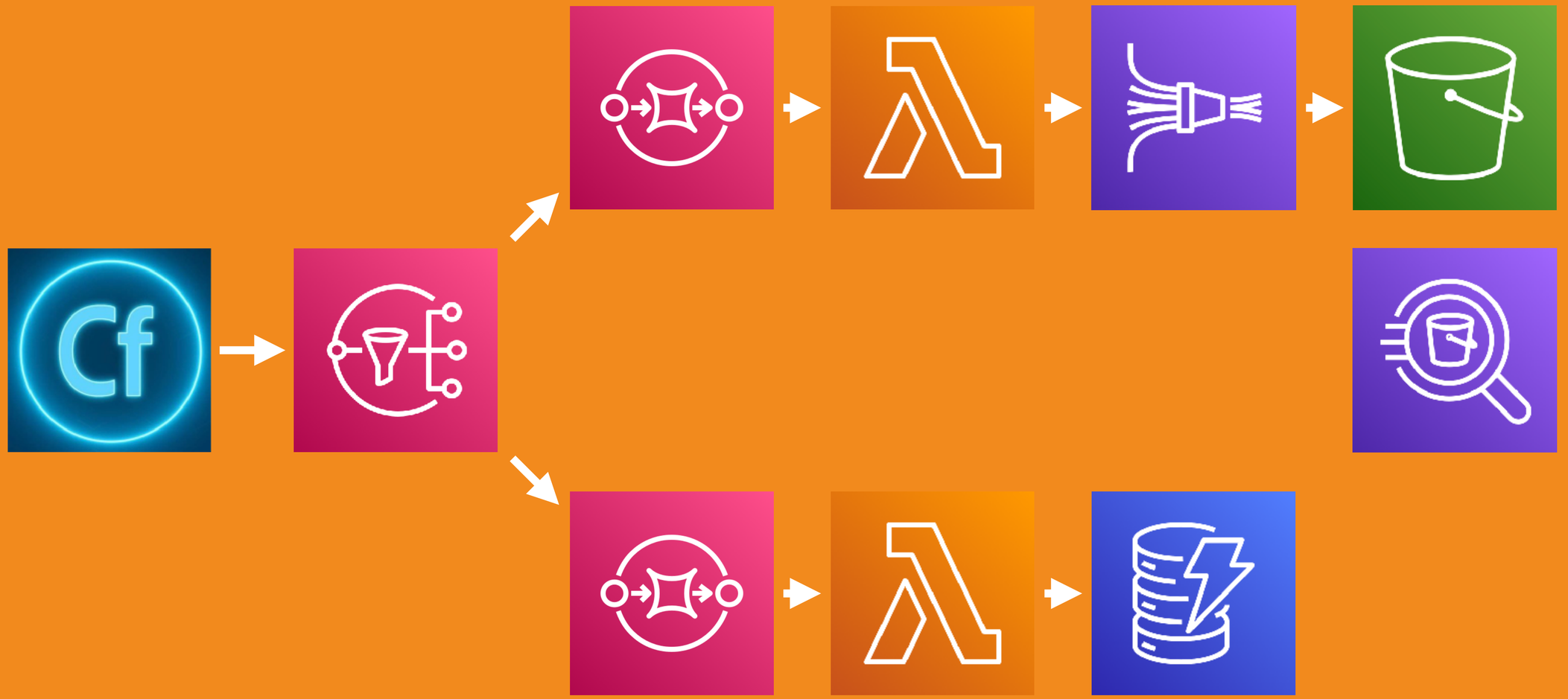




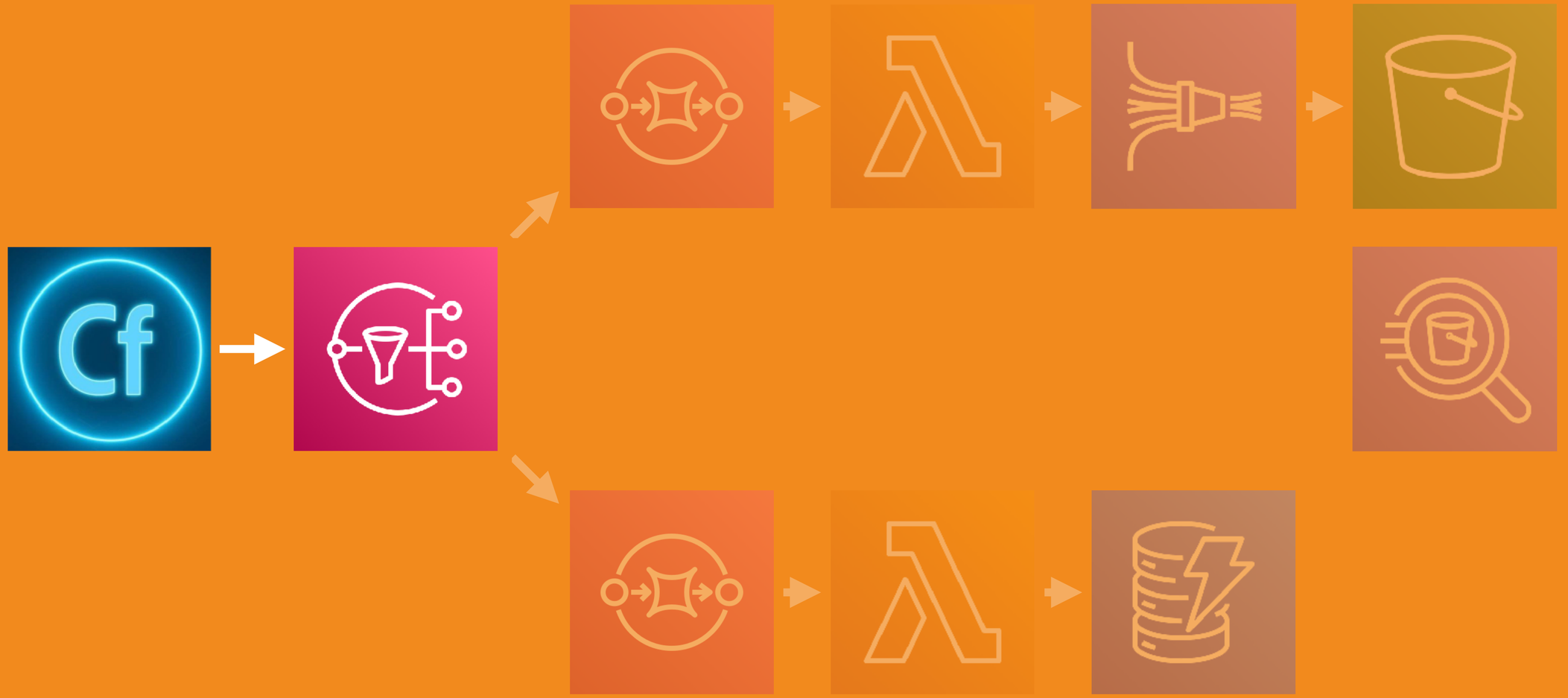




Example



Example

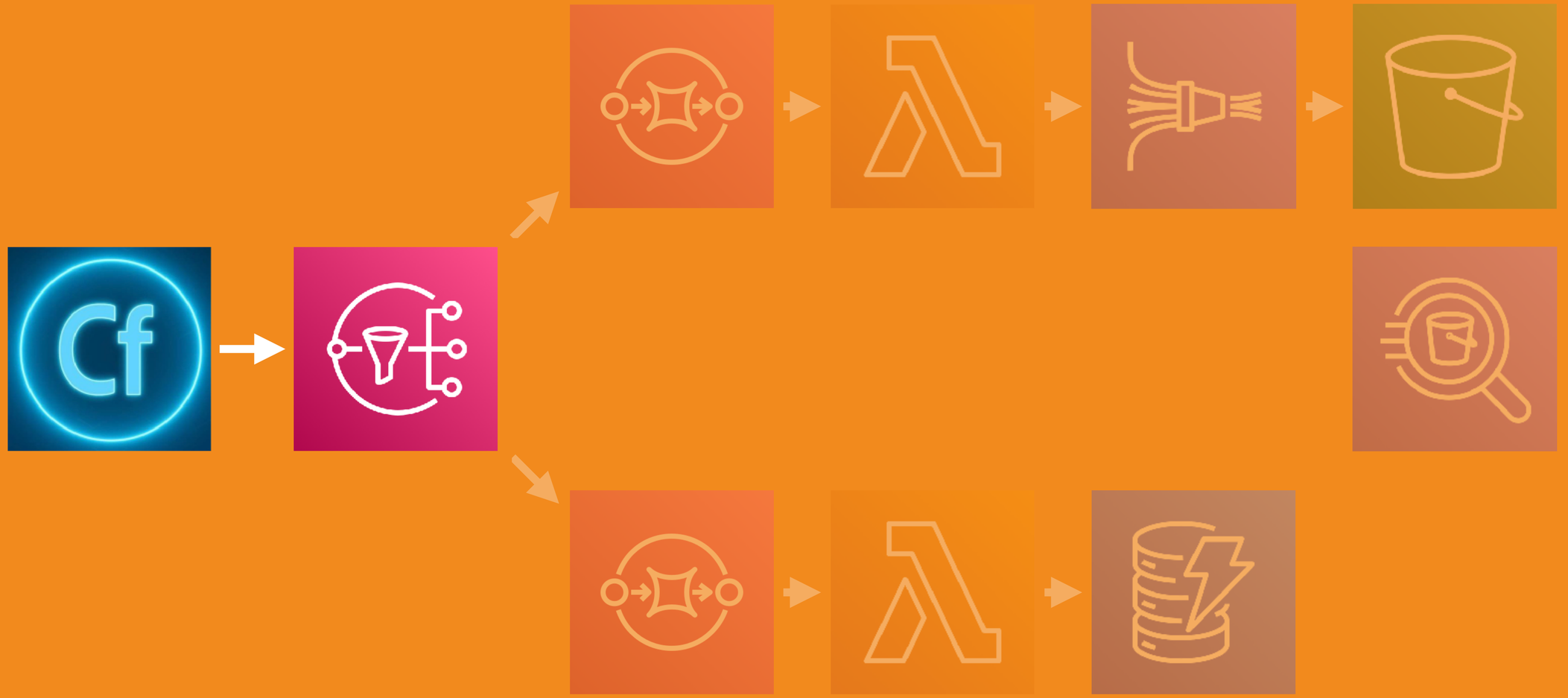


Example

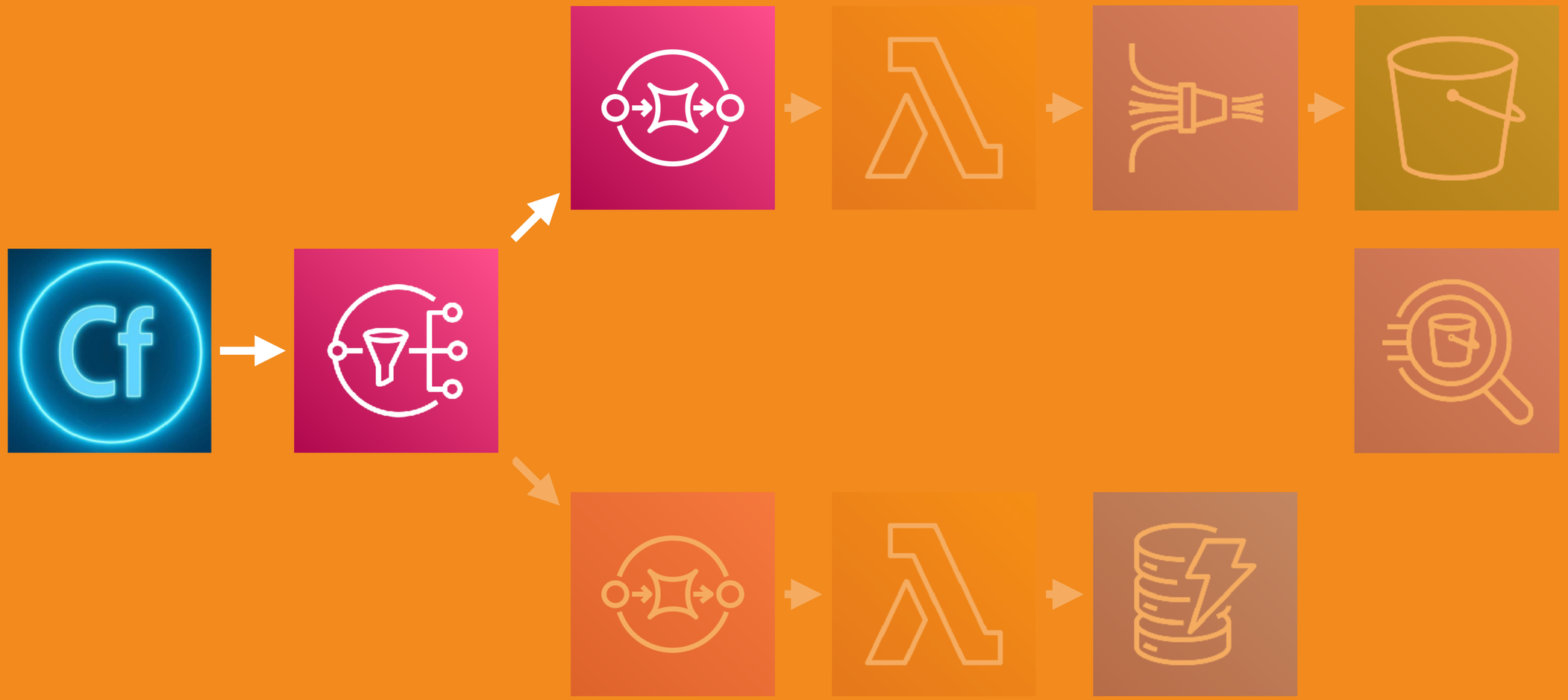
```
snsService= getCloudService(awsCredentials, {"serviceName" : “SNS"});

topic = snsService.createTopic(topicName);

msgBody = {“customer”: 123, “orderID”: 456, “amount”: “78.90”};

topic.publish(msgBody);
```

github.com/brianklaas/awsplaybox

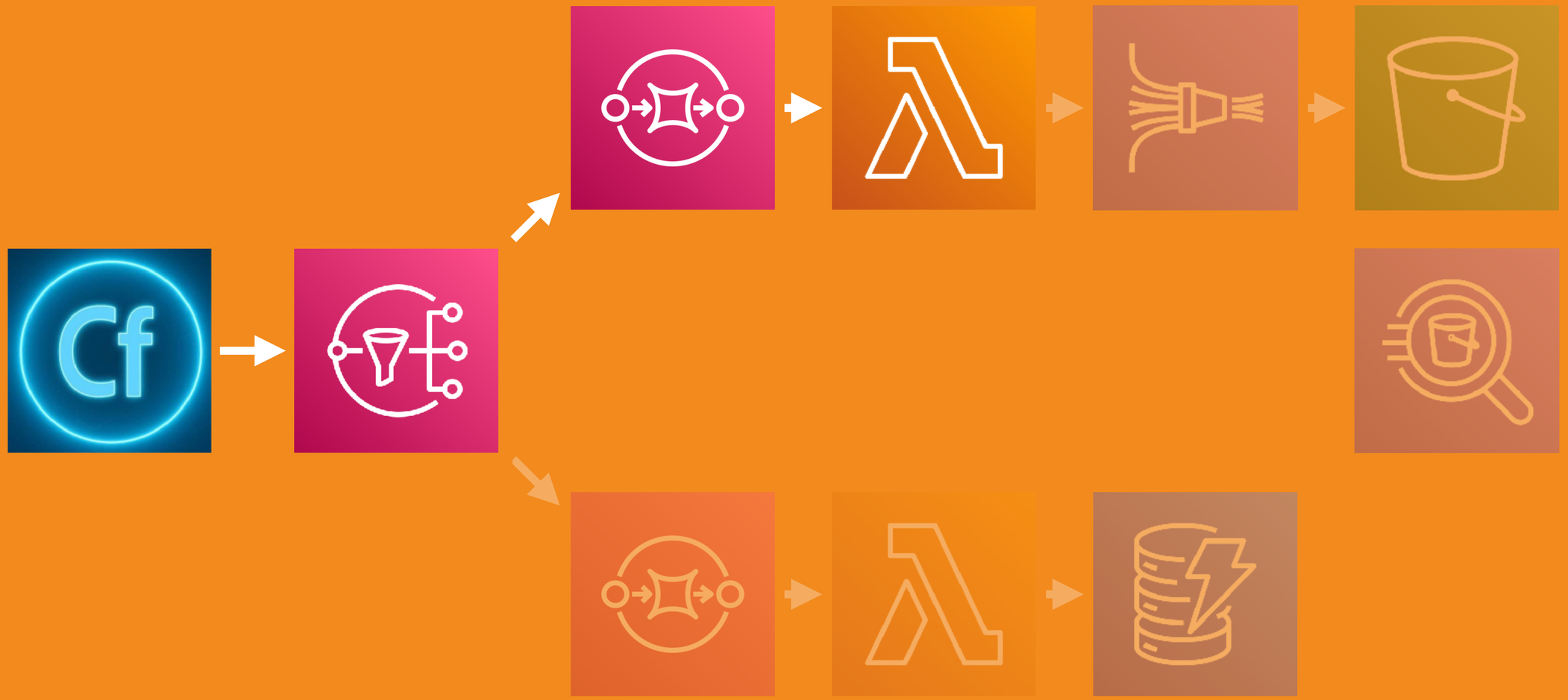
Example 



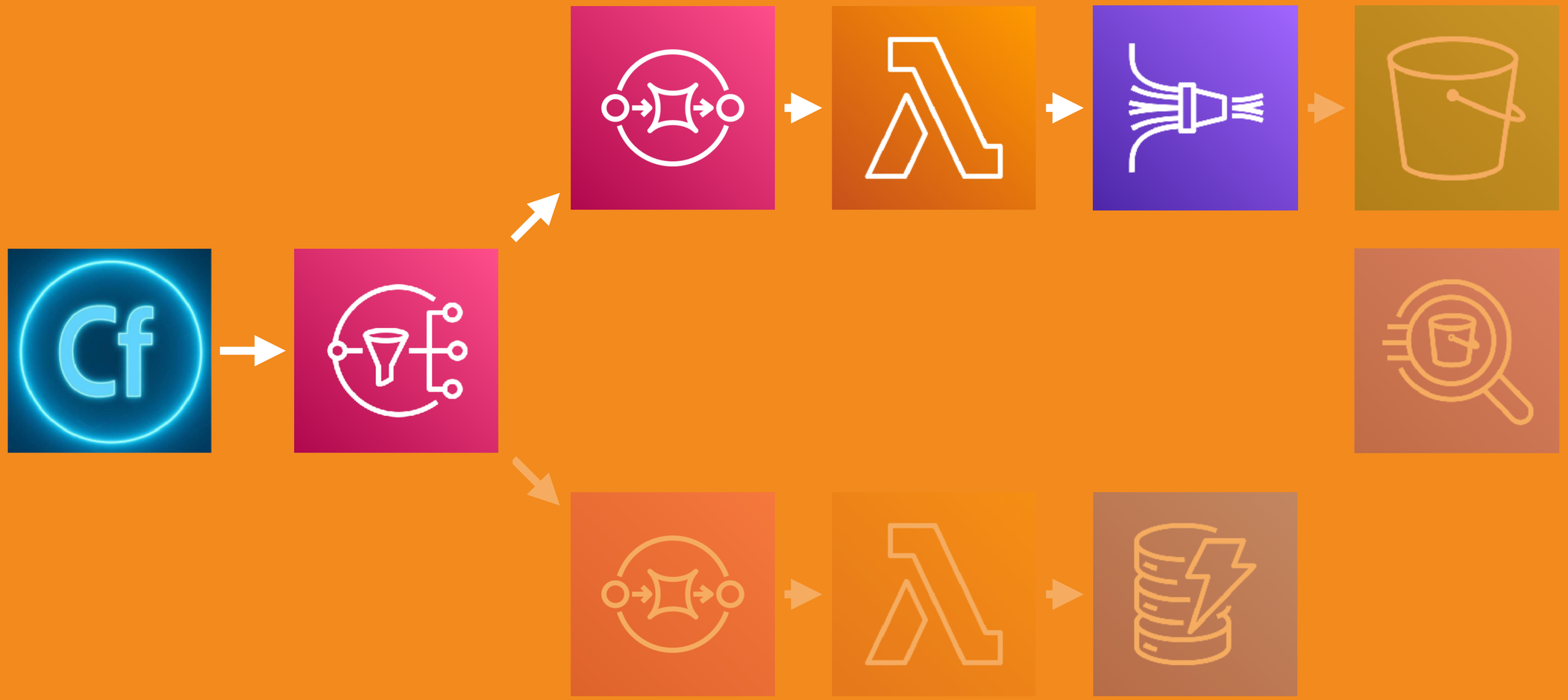
Example



Example



Example



Example

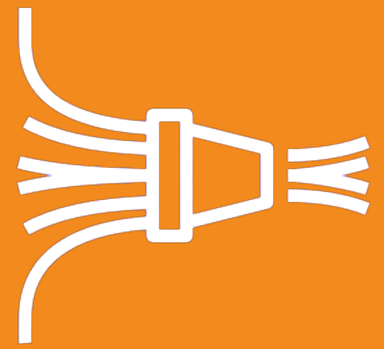
Kinesis Data Firehose:

Can ingest up to 500,000 records/second

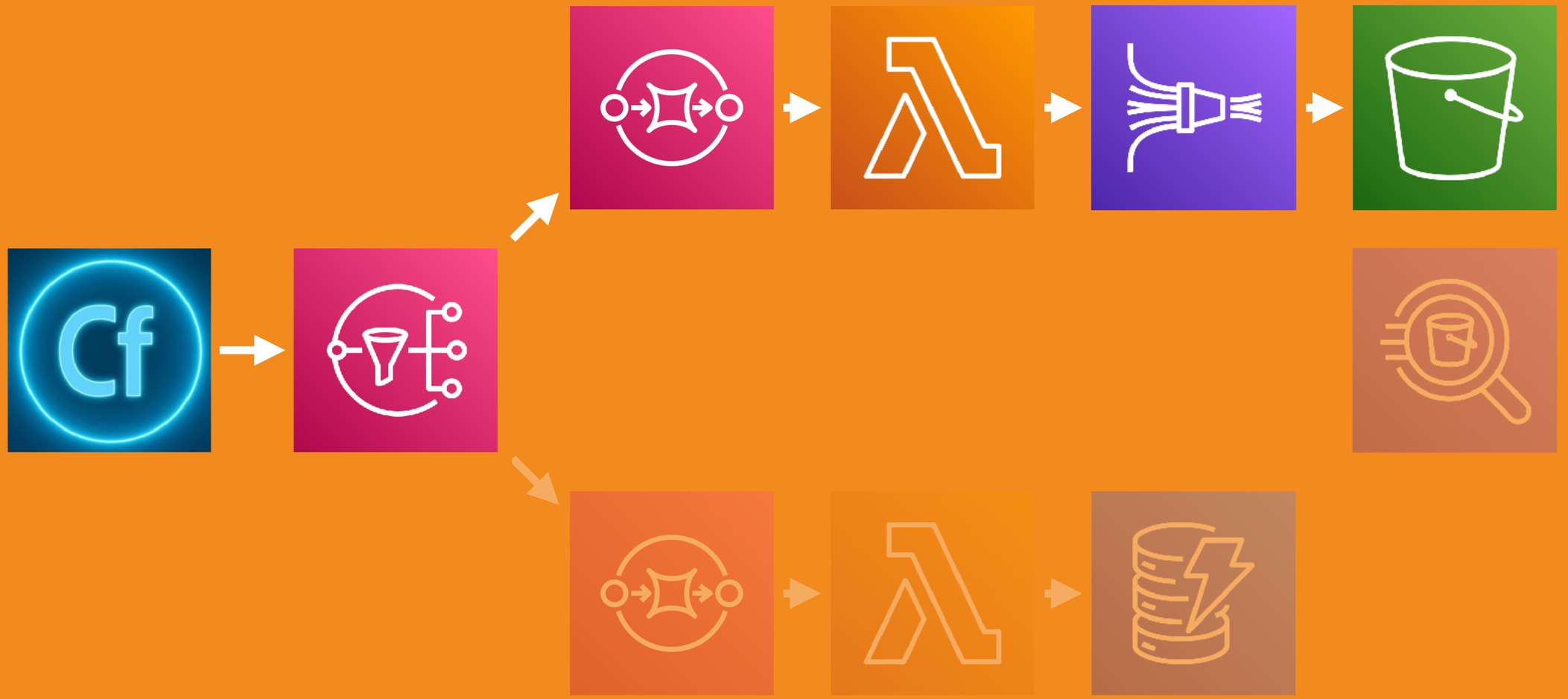
Stores records for up to 7 days

Manages writing to the destination

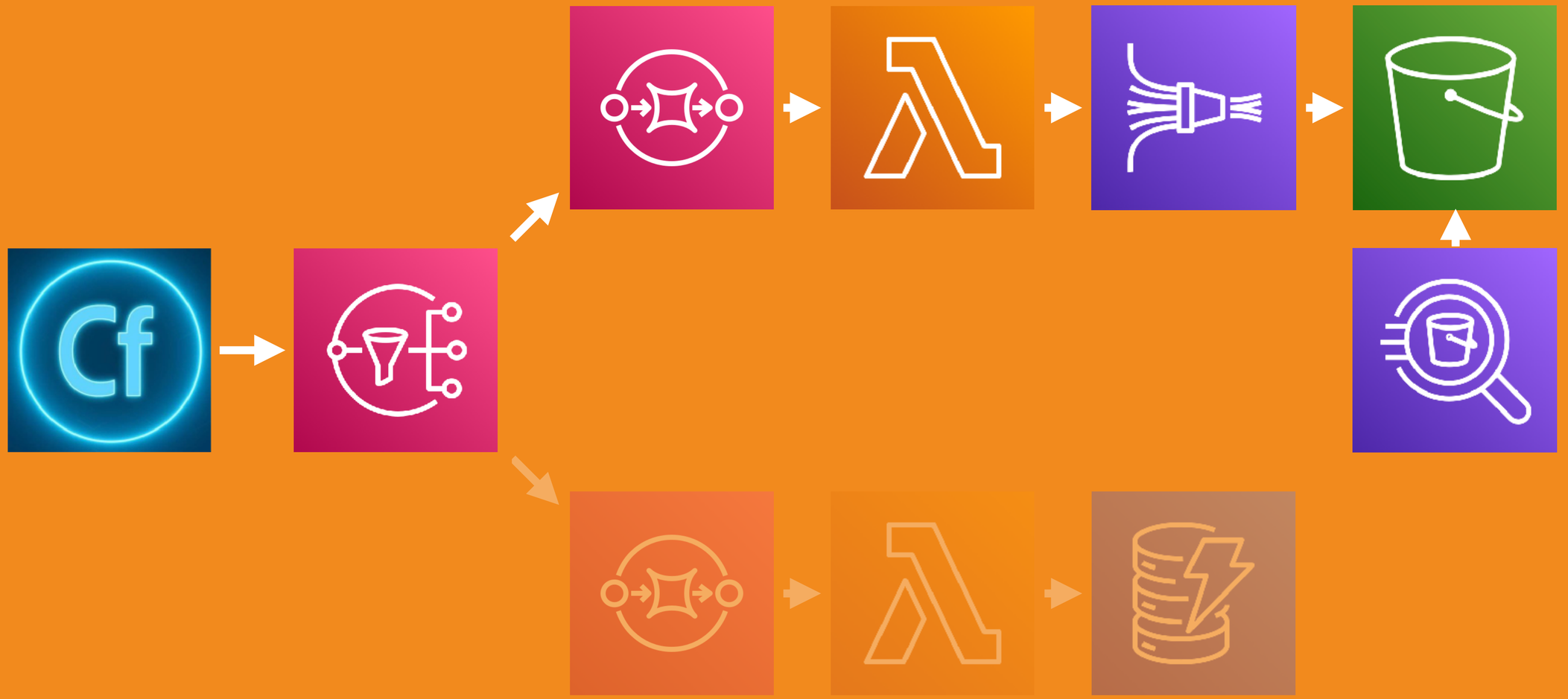
Can be queried in real-time with Kinesis Data Analytics



Example



Example



Example

Amazon Athena:

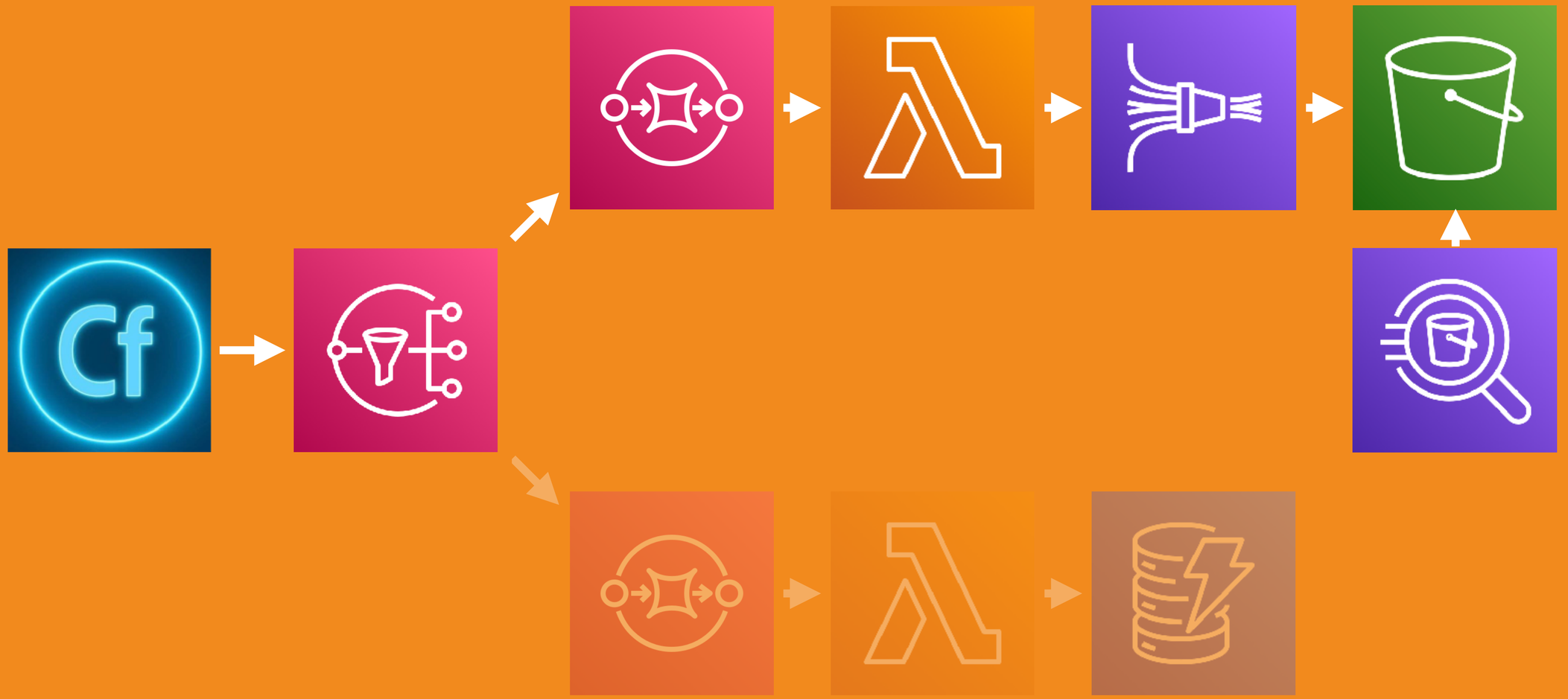
Query files in S3 with SQL

Store in JSON, CSV, or **Parquet** formats

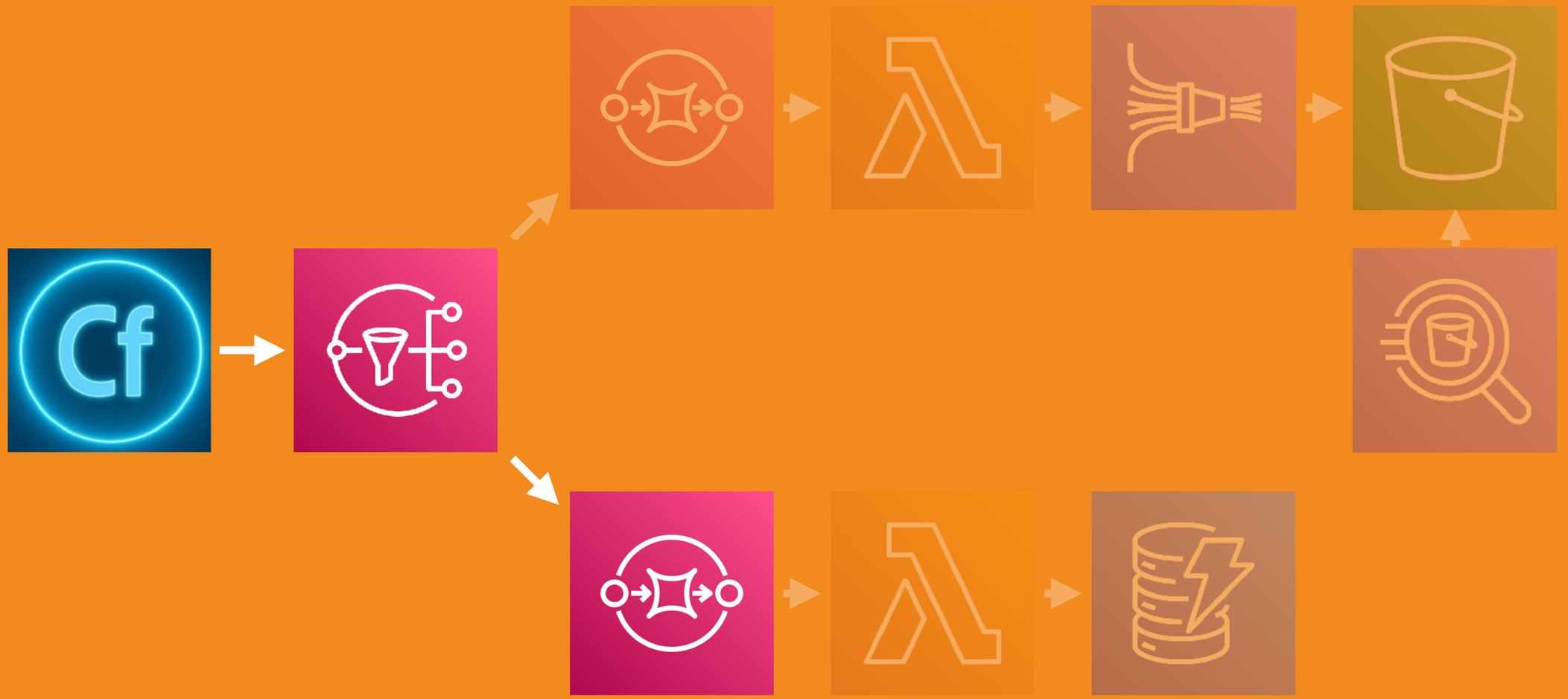
Ad-hoc or repeated queries

Pay based on amount of data scanned

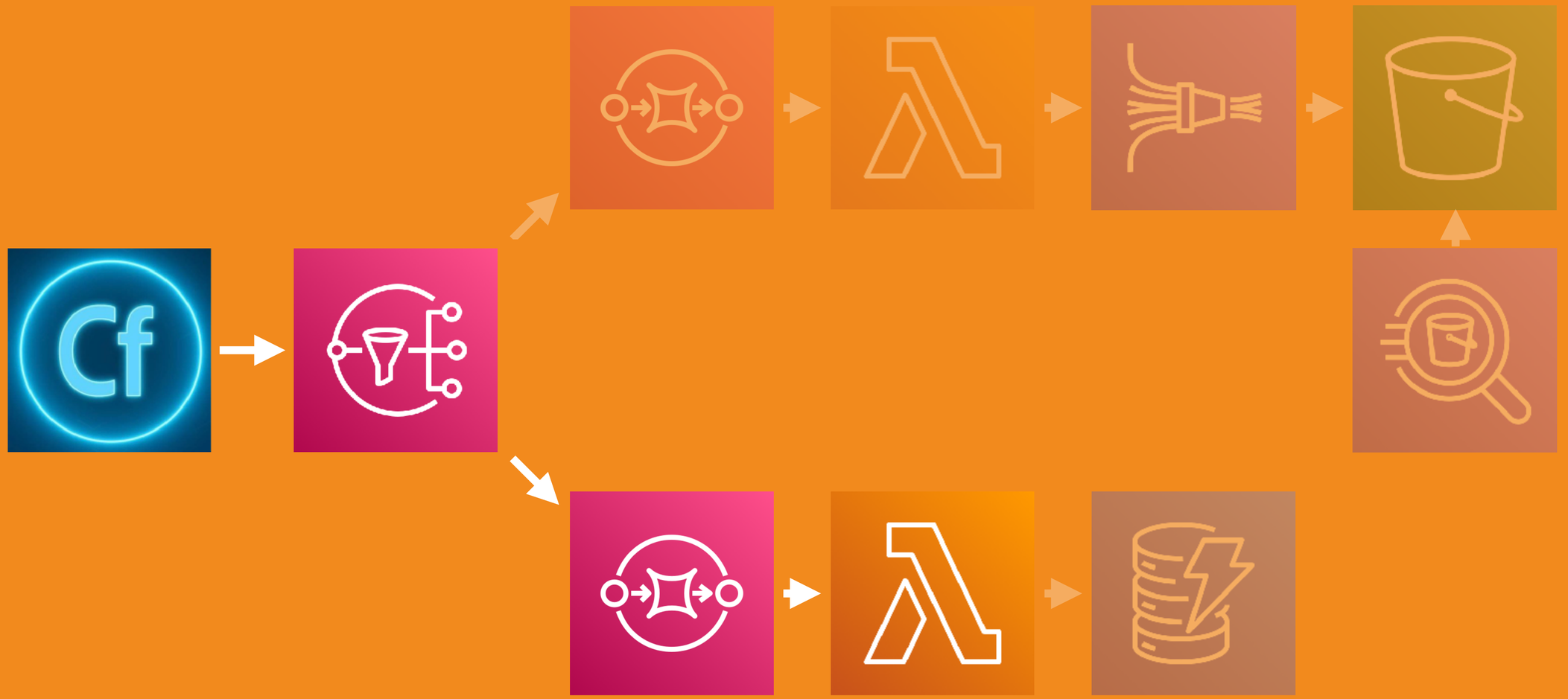
Example



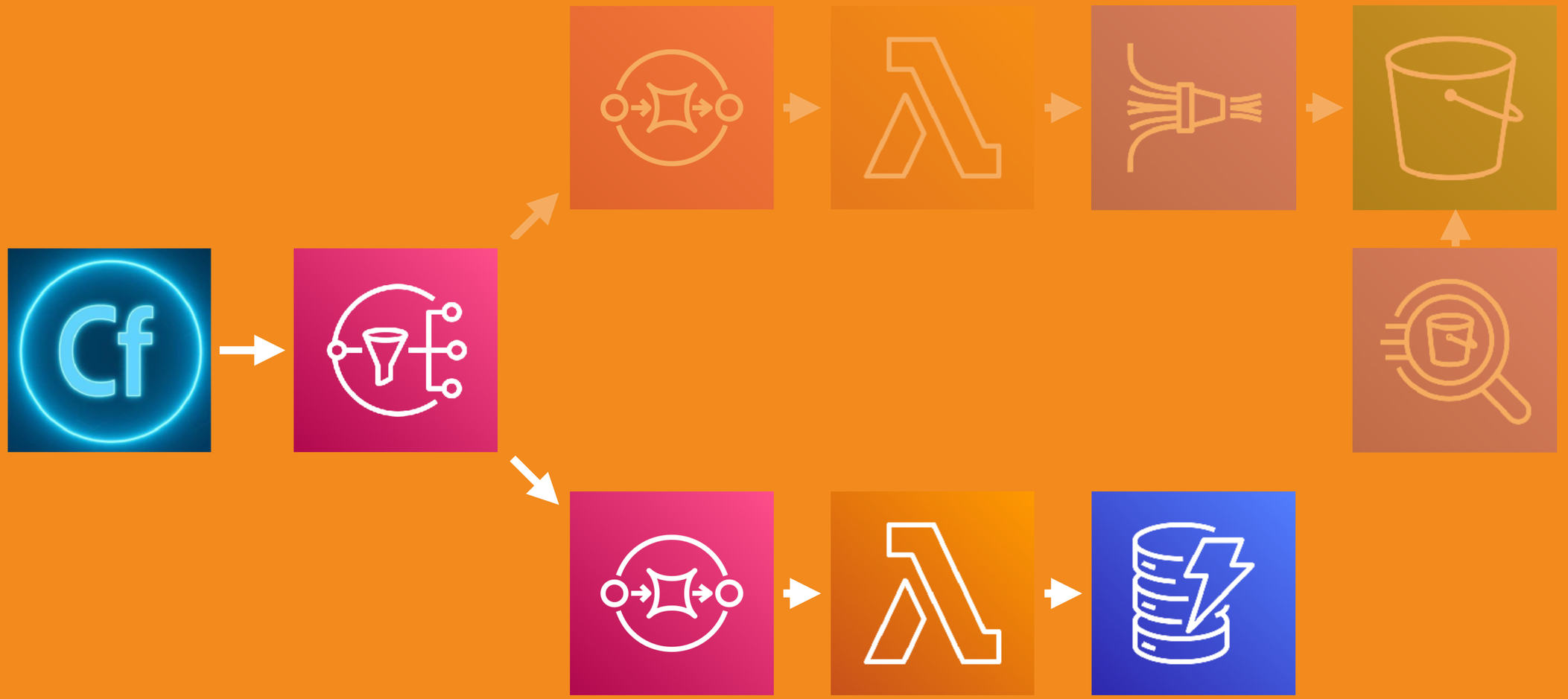
Example



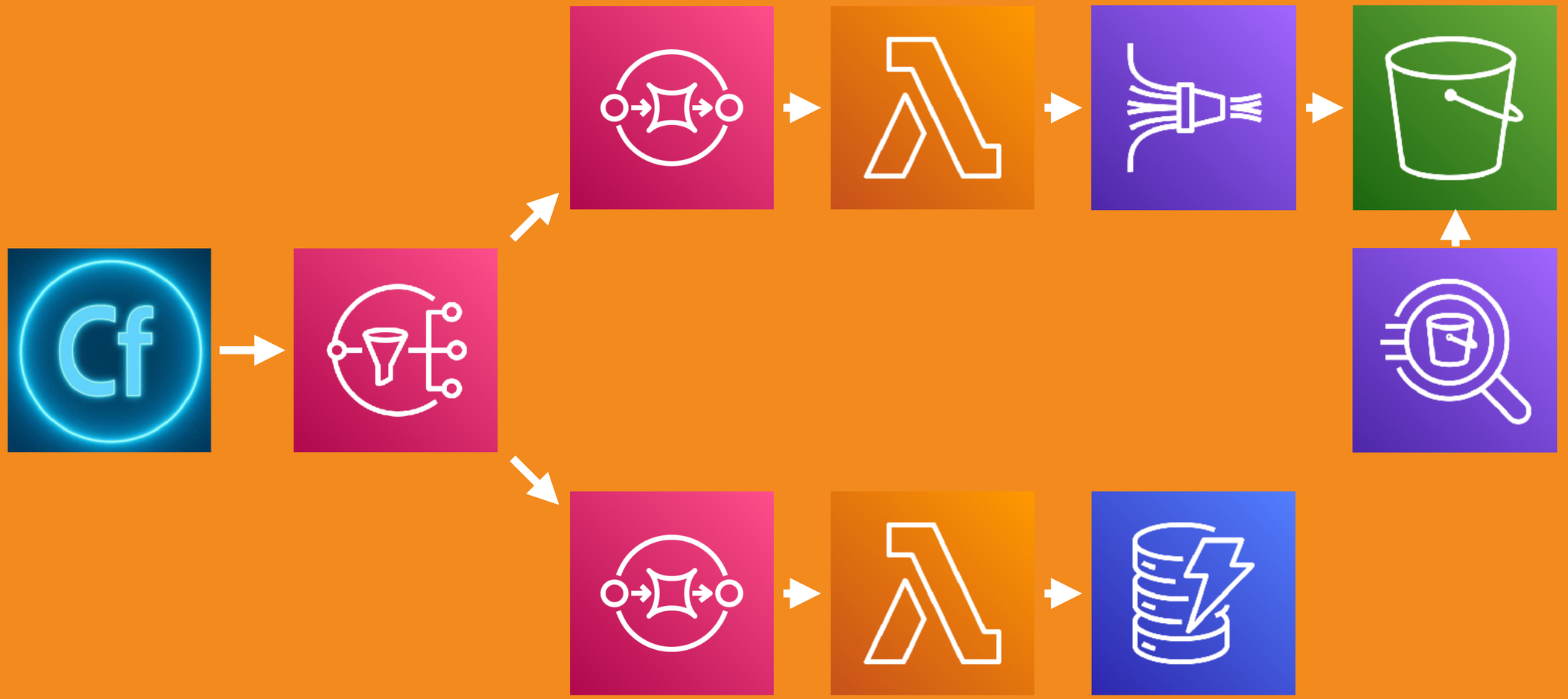
Example



Example



Example

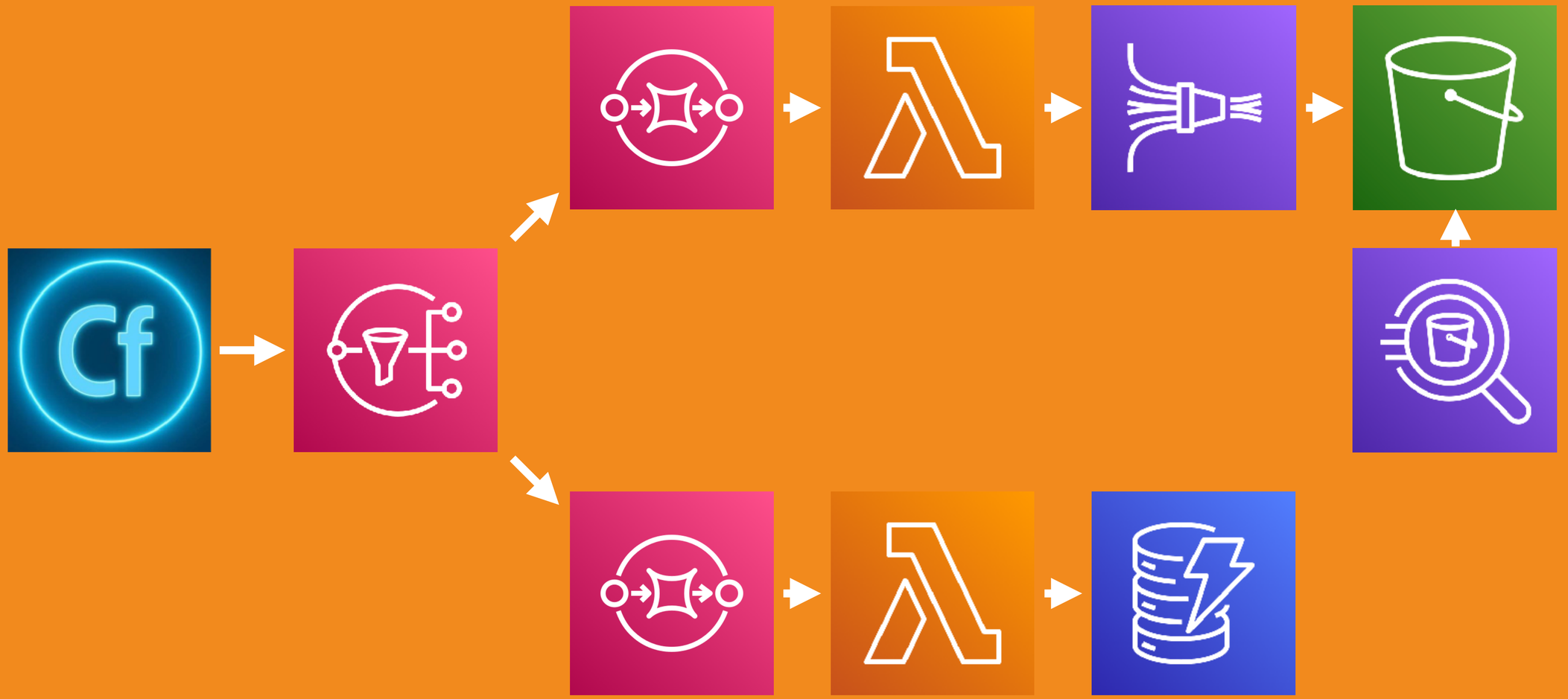


Example

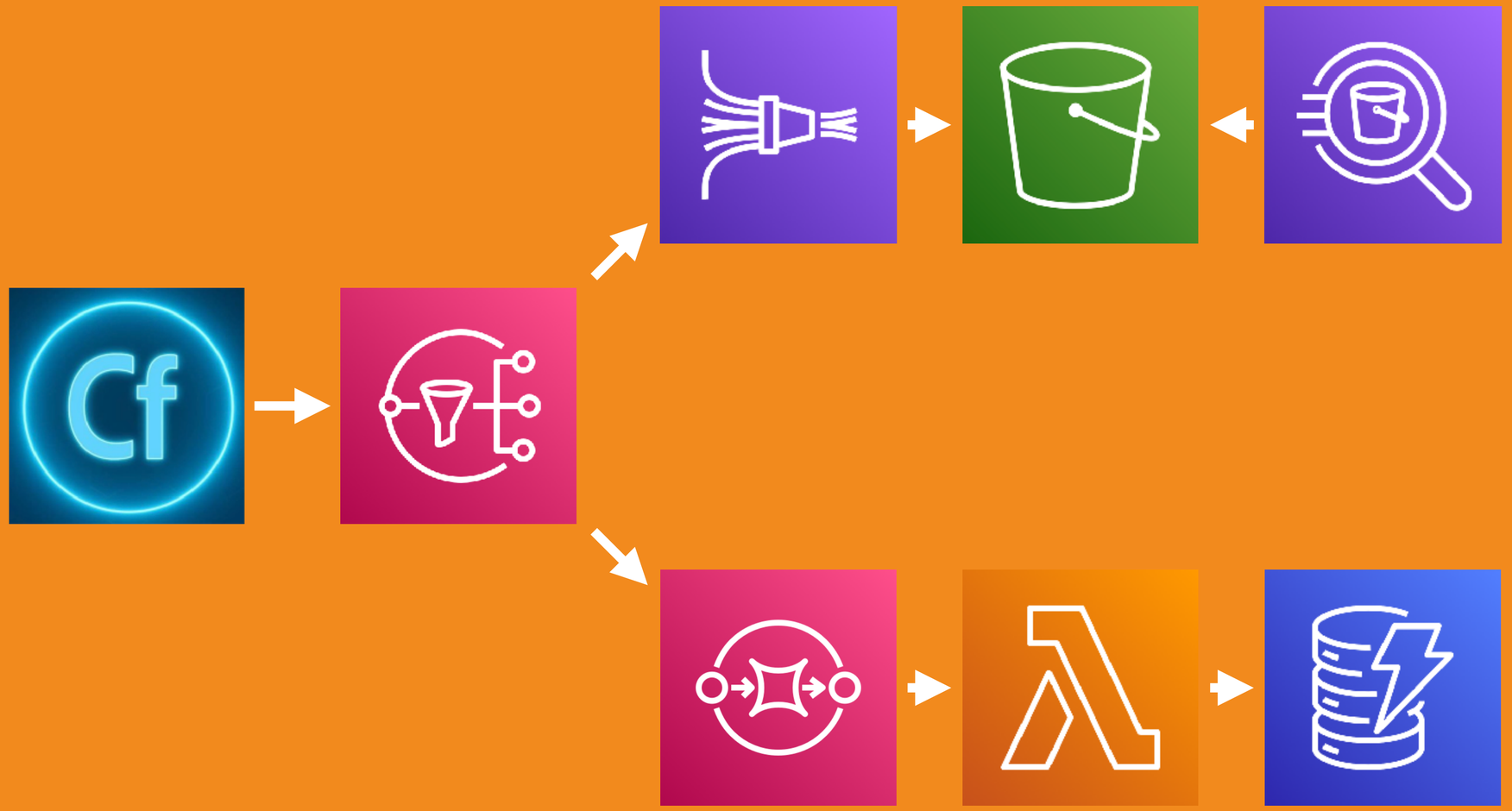
So how much does this cost?

40 million requests = $30/month

Example 



Example



Example

Safe experimentation!

Example 

Go Do!

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