Beyond Lambda

Advanced serverless solution designs,
and the problems they solve.

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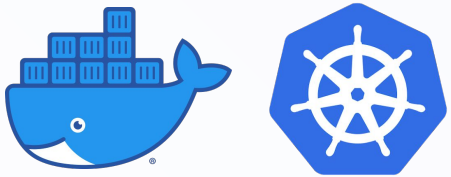
About me

Your friendly neighborhood jack of all trades.

This talk is not for …

serverless 101

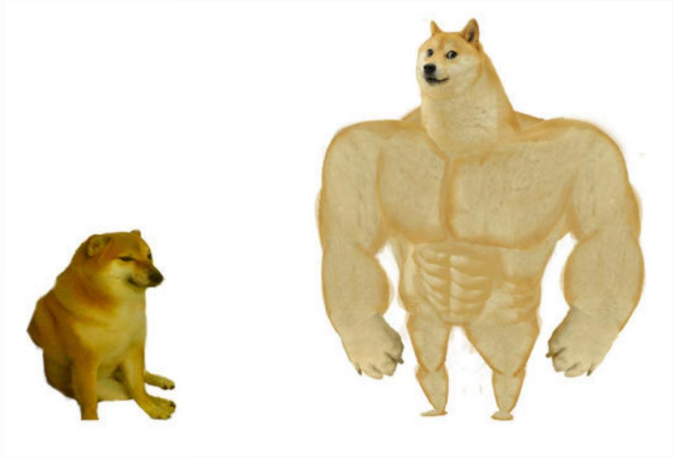


serverless vs. container

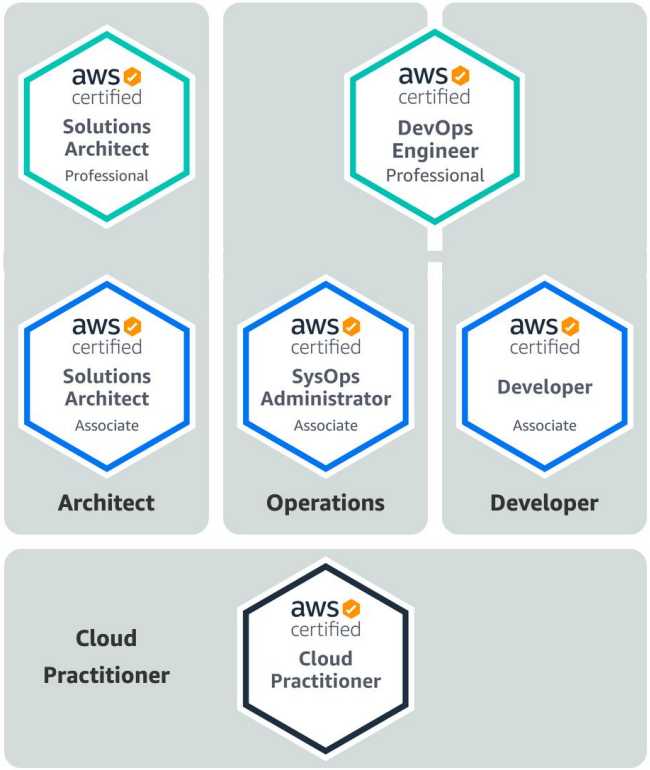
GCP and Azure

Takeaway from this talk

use more free services, write less code, and design clean architectures

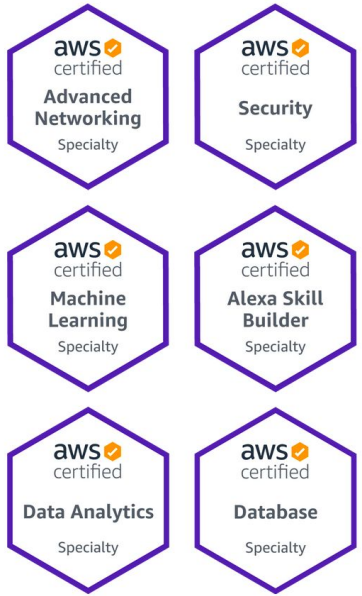


An unlikely way to get started

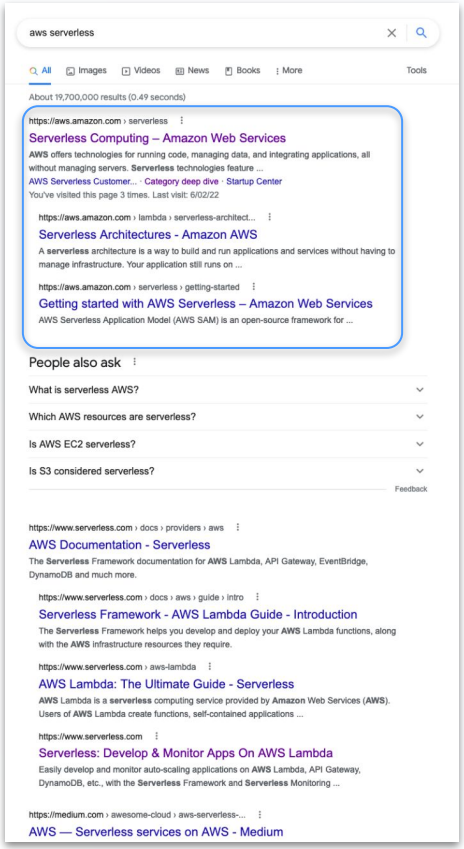


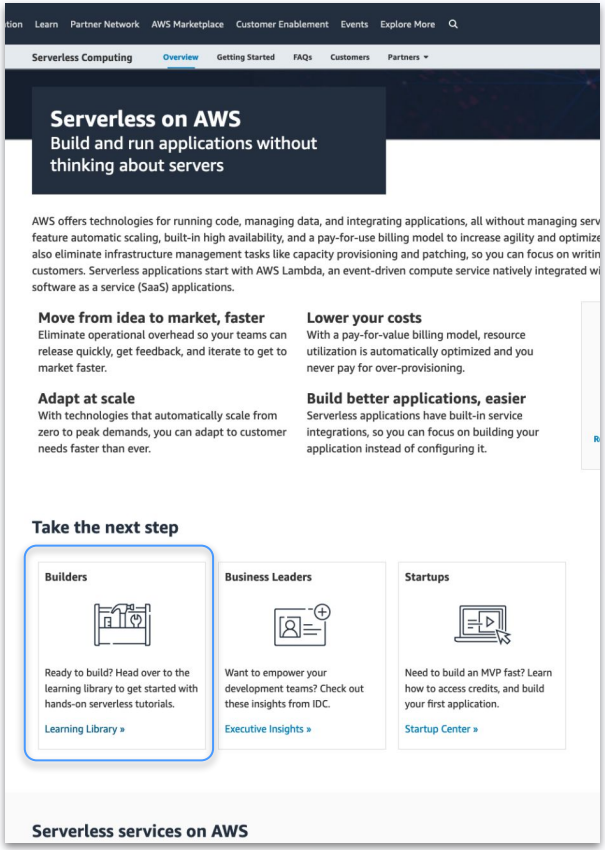
Specialty

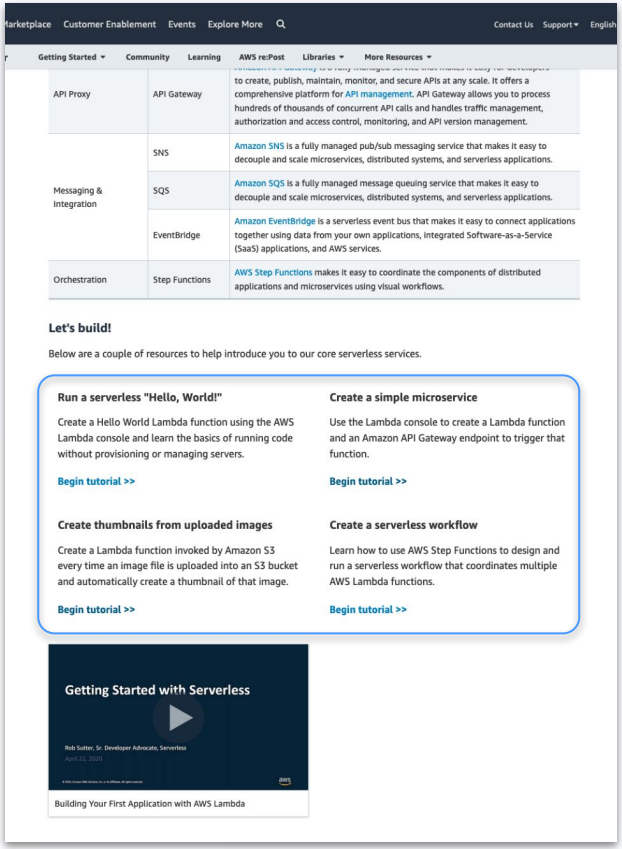
Technical AWS Cloud experience in the Specialty domain as specified in the **exam guide**



More likely you have done this







Classic serverless patterns

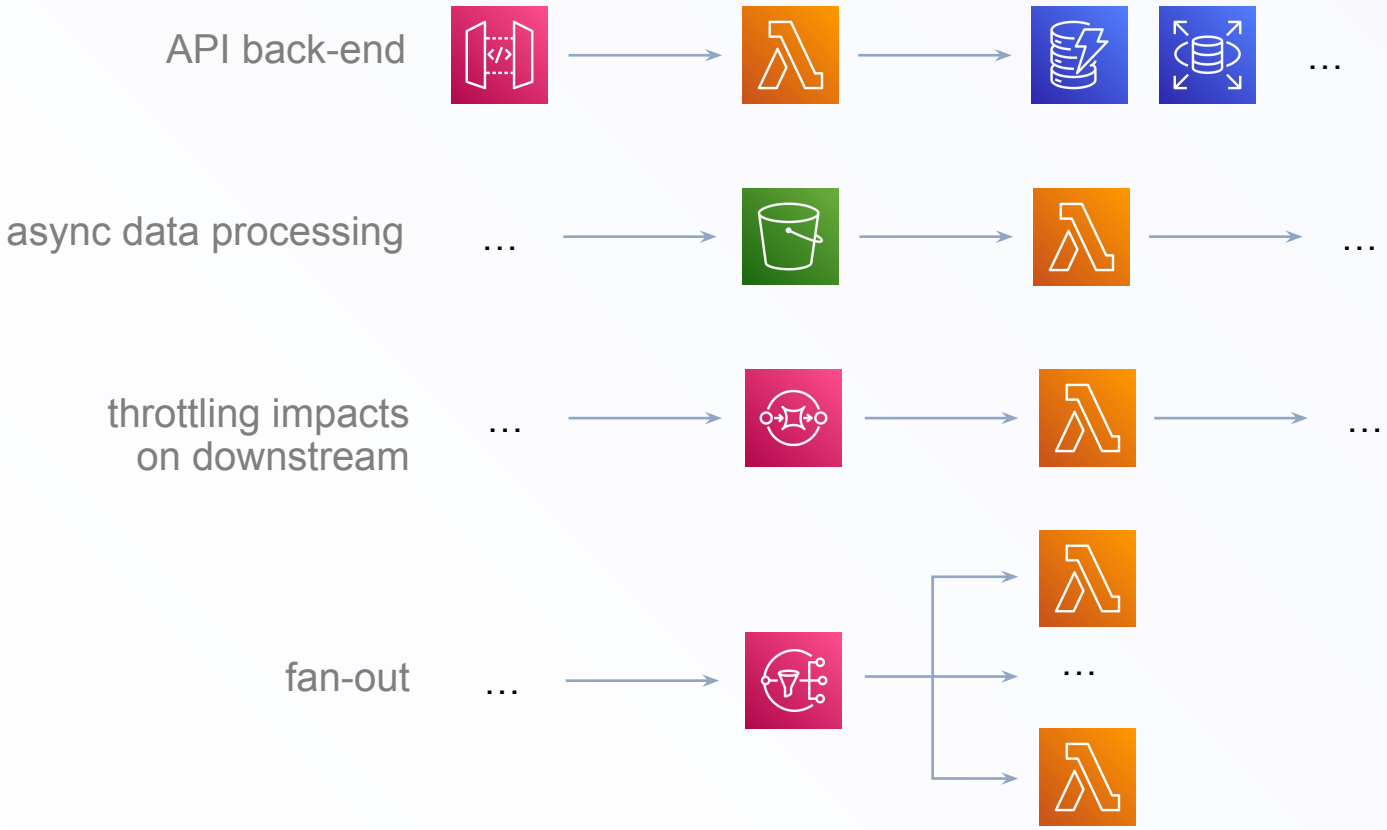
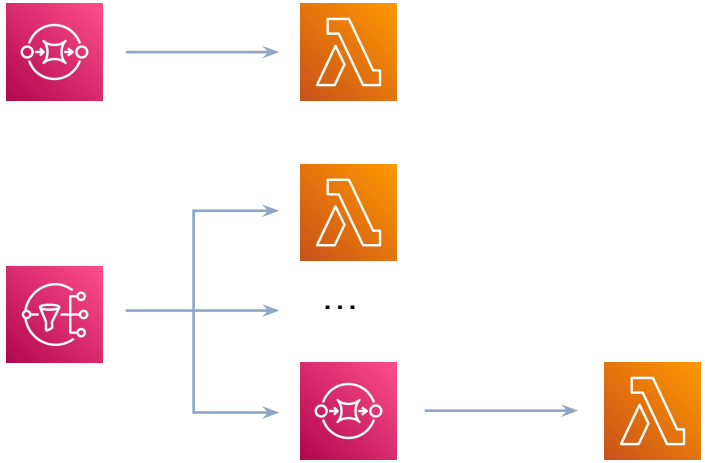


Photo by Mohamed Nohassi on Unsplash

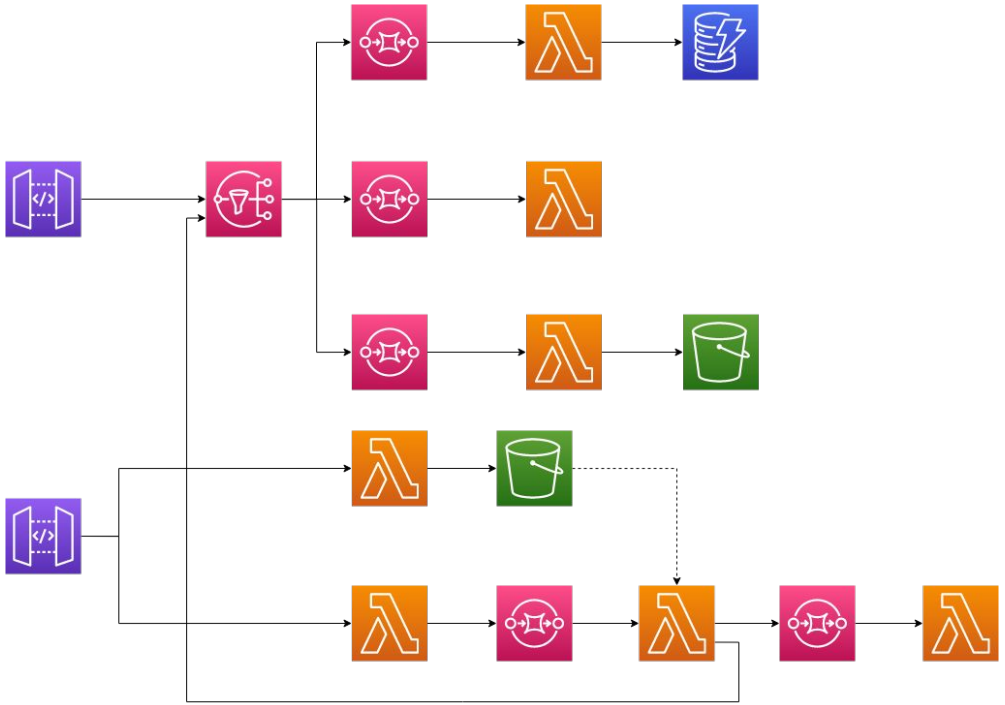
Problem:

SQS/SNS fatigue



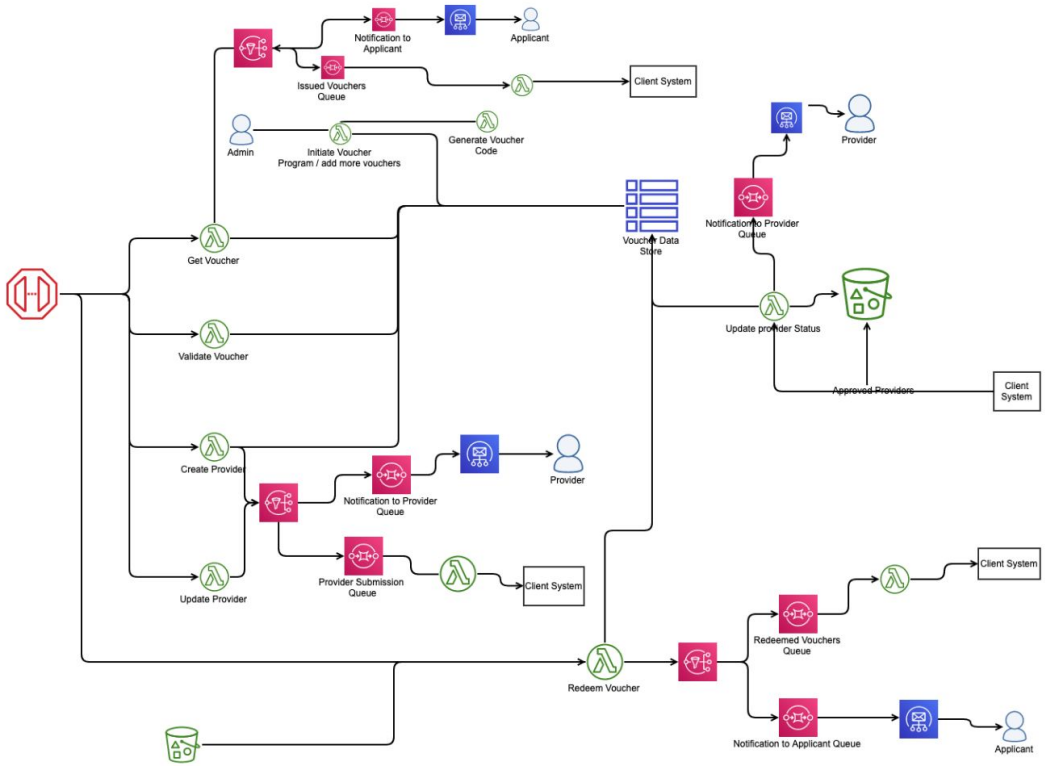
Problem:

SQS/SNS fatigue



Problem:

SQS/SNS fatigue

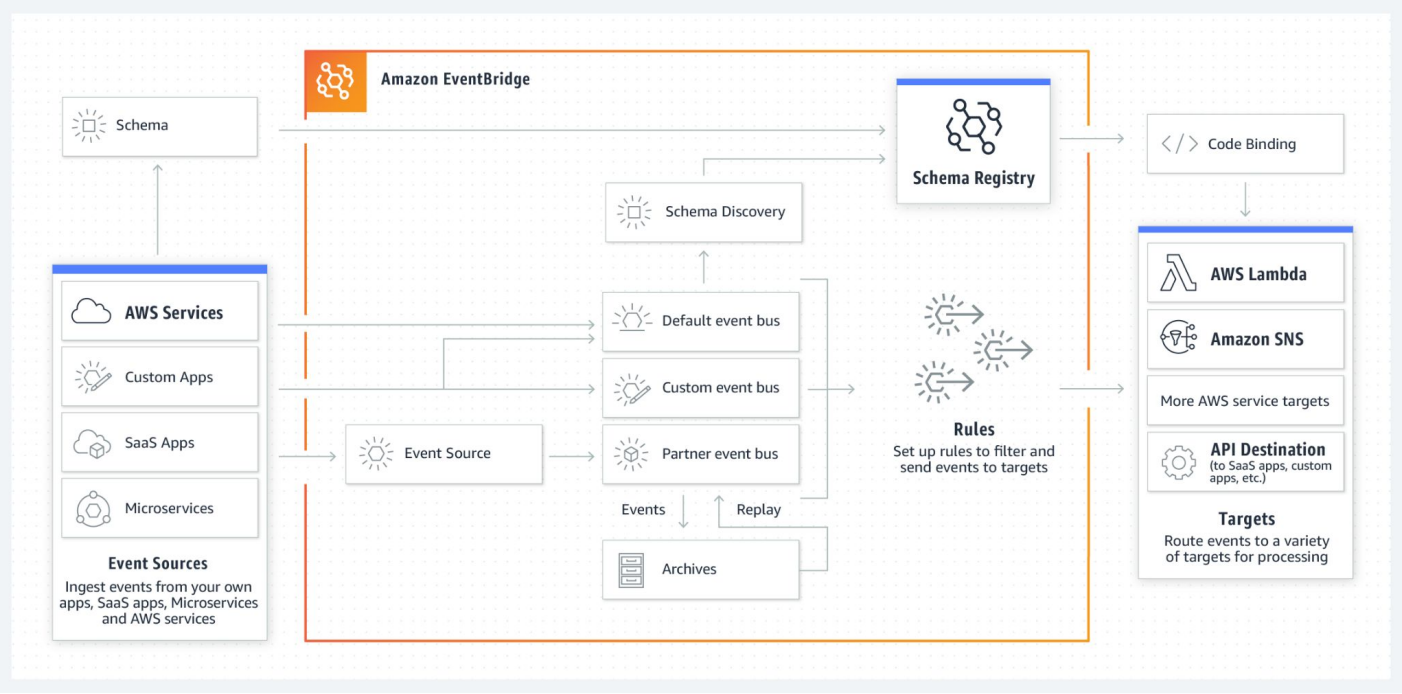


Problem:

SQS/SNS fatigue

- too much Infra-as-Code
- inconsistent queue/retry behaviours
- low maintainability and extensibility

AWS EventBridge



https://aws.amazon.com/eventbridge/

AWS EventBridge – event bus

default

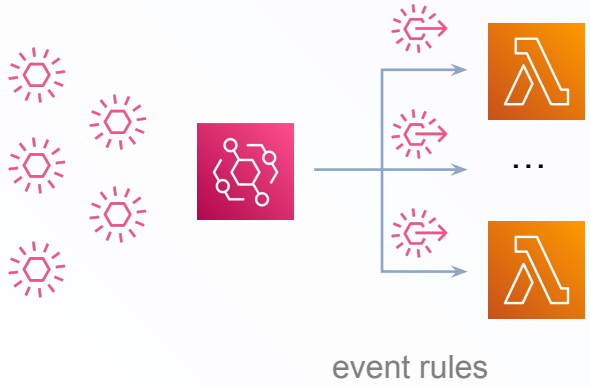
custom event bus

AWS EventBridge – sending events

AWS SDK
EventBridge client

```
{
  "Entries": [
    {
      "Source": "au.com.cevo.eventbridge-demo",
      "DetailType": "OrderCreated",
      "Detail": "{ \"key1\": \"value1\", \"key2\": \"value2\" }",
      "Resources": [
        "resource1",
        "resource2"
      ]
    }
  ]
}
```

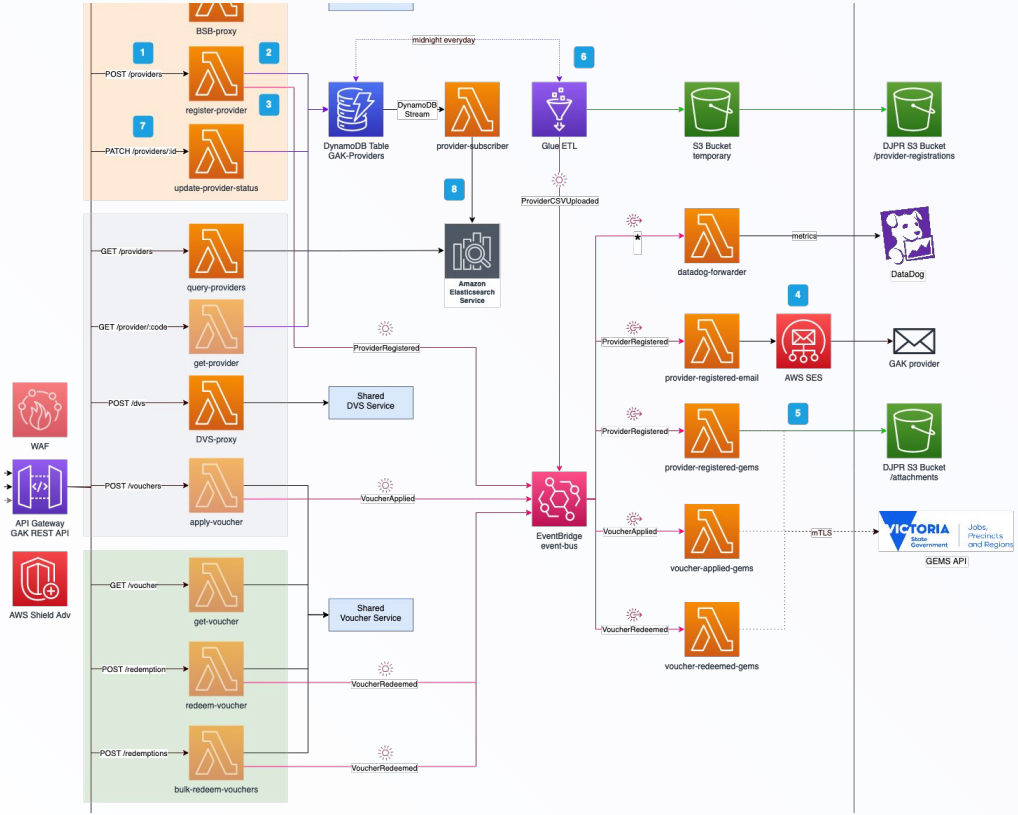
AWS EventBridge – handling events



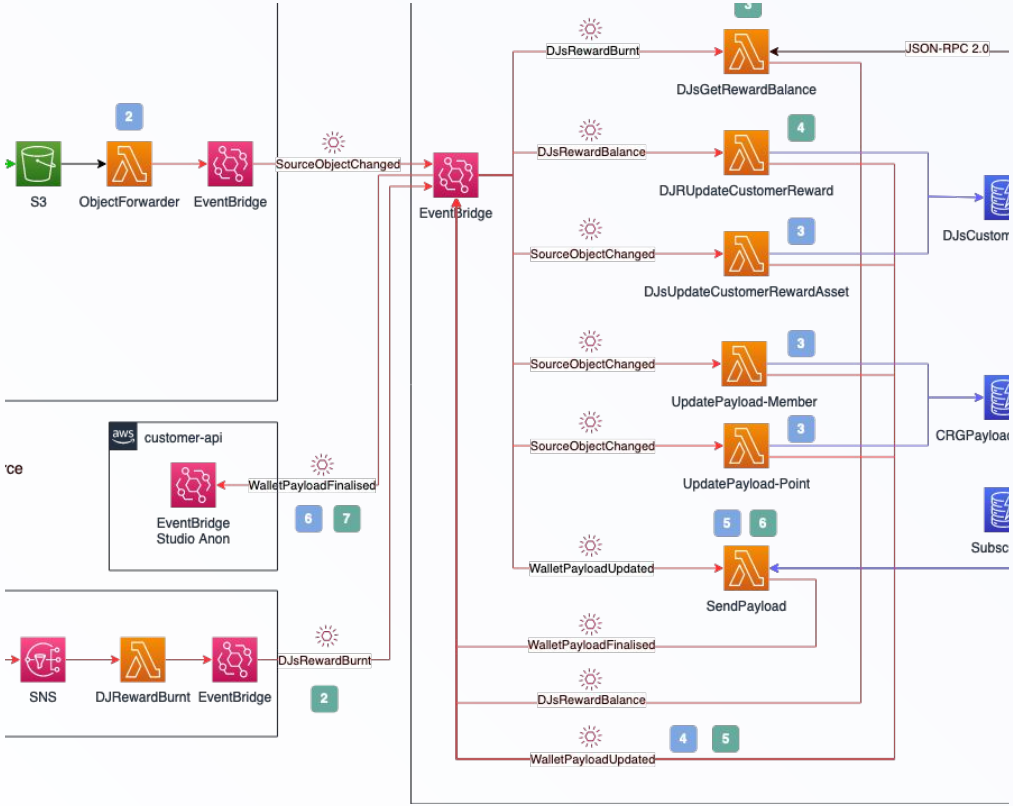

```
{
  "source": ["au.com.cevo.eventbridge-demo"],
  "detail-type": ["OrderCreated"]
}
```

```
{
  "source": ["au.com.cevo.eventbridge-demo"],
  "detail-type": ["OrderCreated"],
  "detail": {
    "key1": "foo"
  }
}
```

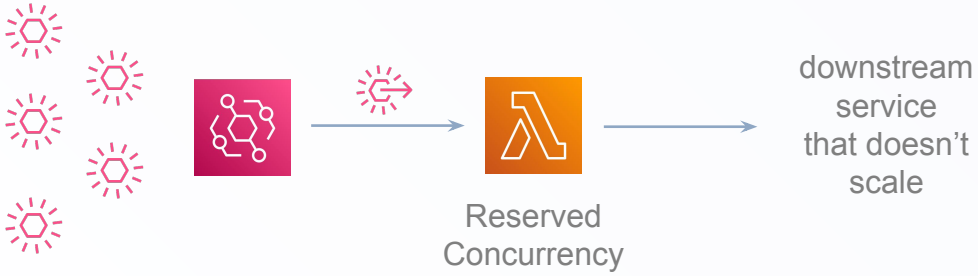
AWS EventBridge

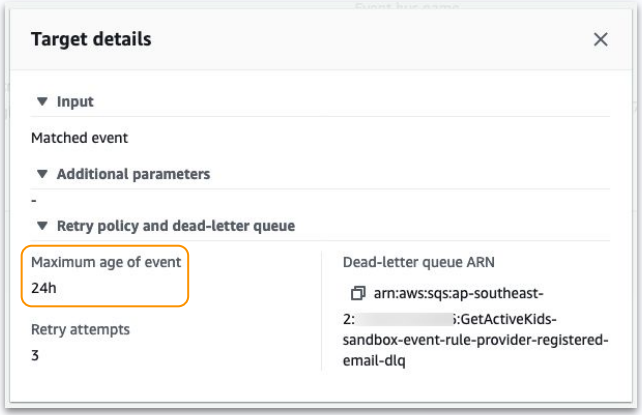


AWS EventBridge



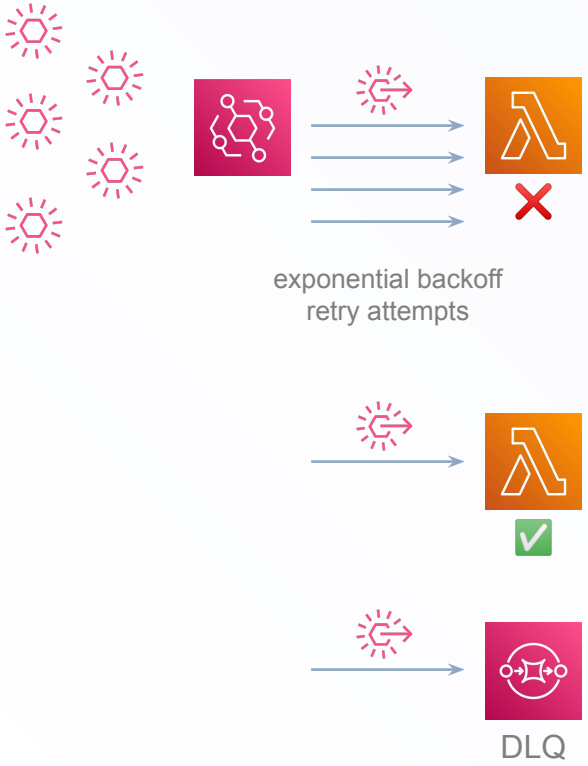
AWS EventBridge – throttling

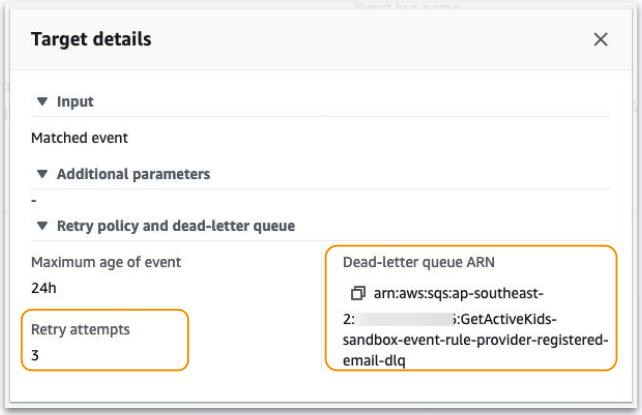




- maximum age of event: 24 days
- minimum age of event: 1 minute

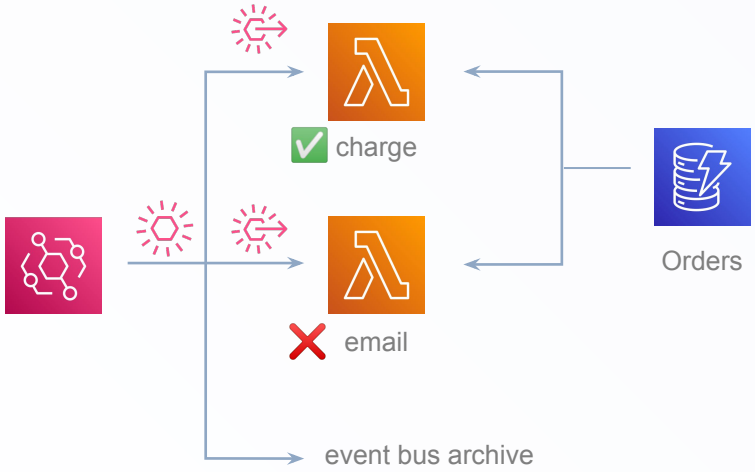
AWS EventBridge – retry & DLQ





- maximum retry attempts: 185

AWS EventBridge – archive & replay

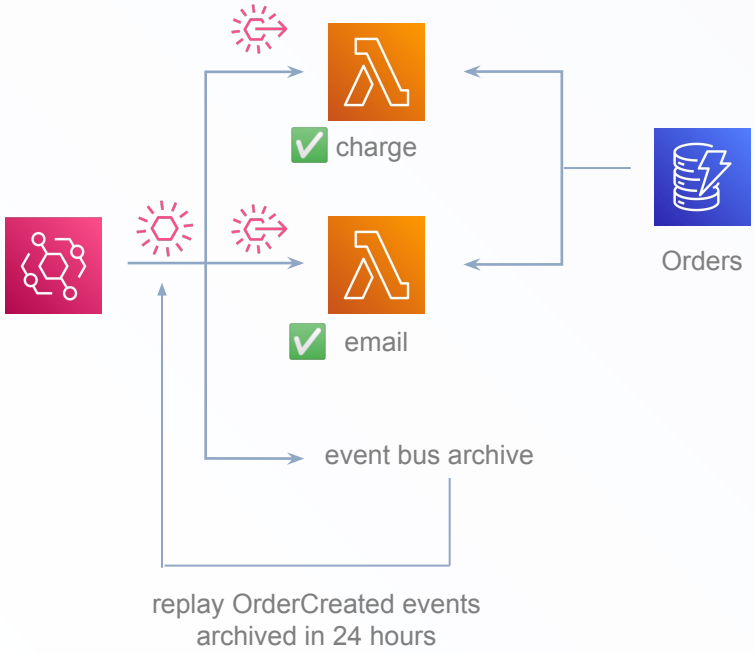


ID	…	statusEvents

1	…	[
		{
		"status": "order_charged",
		"timestamp": "2022-02-01T14:48:00.000Z"
		}
		]

…	…	…

AWS EventBridge – replay & idempotency



ID	…	statusEvents

1	…	[
		{
		"status": "order_charged",
		"timestamp": "2022-02-01T14:48:00.000Z"
		},
		{
		"status": "email_sent",
		"timestamp": "2022-02-01T14:50:00.000Z"
		}
		]

…	…	…

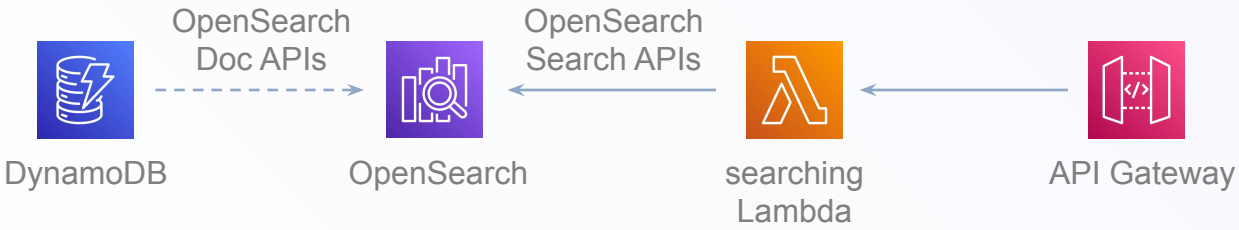
Problem:

DynamoDB and text-based search

ID	name	description	…
1	Tennis Victoria	Tennis Victoria is the State Sporting Organisation for Tennis in Victoria …	…
2	ANZ Hot Shots	ANZ Tennis Hot Shots is designed for all kids of age and ability …	…
3	Australian Rugby Union	Rugby Australia is the sport's national governing body in Australia …	…
4	RAFA Academy	Play tennis on clay court …	…
…	…	…	…

```
SELECT *
FROM company
WHERE
        name LIKE ‘%tennis%’
OR
        description LIKE ‘%tennis%’
```

DynamoDB + OpenSearch



DynamoDB + OpenSearch

```
PUT company/_doc/1
{
  "name": "Tennis Victoria",
  "description": "Tennis Victoria is the …"
}

PUT company/_doc/2
{
  "name": "ANZ Hot Shots",
  "description": "ANZ Tennis Hot Shots …"
}

PUT company/_doc/3
{
  "name": "Australian Rugby Union",
  "description": "Rugby Australia is …"
}

…
```

ID	name	description	…
1	Tennis Victoria	Tennis Victoria is the State Sporting Organisation for Tennis in Victoria …	…
2	ANZ Hot Shots	ANZ Tennis Hot Shots is designed for all kids of age and ability …	…
3	Australian Rugby Union	Rugby Australia is the sport's national governing body in Australia …	…
4	RAFA Academy	Play tennis on clay court …	…
…	…	…	…

https://opensearch.org/docs/latest/opensearch/rest-api/document-apis/index/

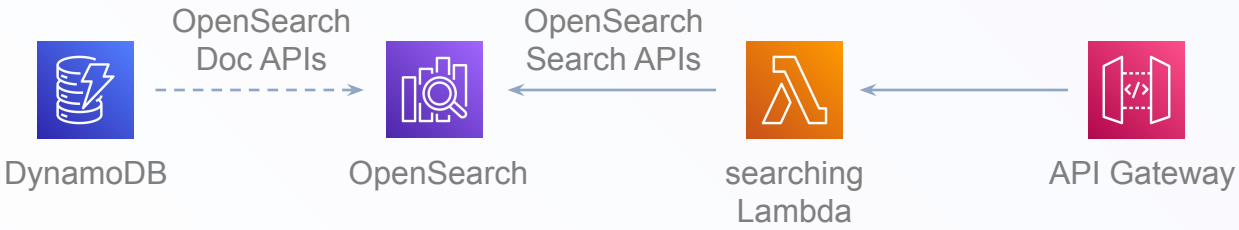
DynamoDB + OpenSearch

```
POST company/_search
{
  "size": 10,
  "query": {
    “query_string”: “*tennis*”,
    “fields”: [“name”, “description”]
}
```

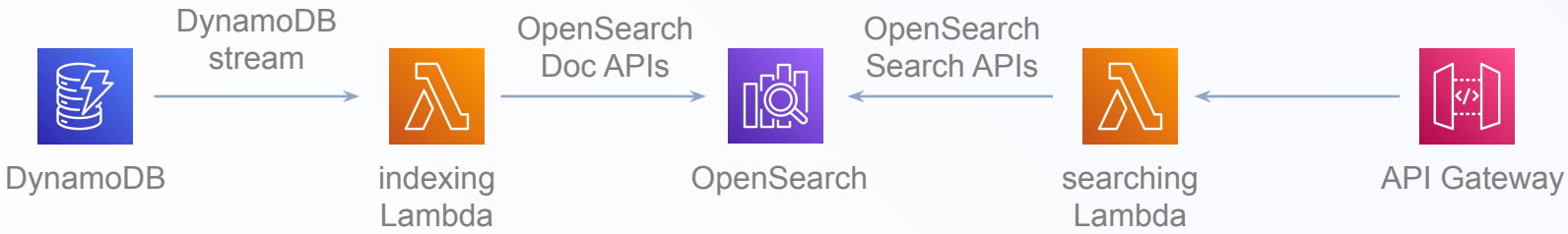
ID	name	description	…
1	Tennis Victoria	Tennis Victoria is the State Sporting Organisation for Tennis in Victoria …	…
2	ANZ Hot Shots	ANZ Tennis Hot Shots is designed for all kids of age and ability …	…
3	Australian Rugby Union	Rugby Australia is the sport's national governing body in Australia …	…
4	RAFA Academy	Play tennis on clay court …	…
…	…	…	…

https://opensearch.org/docs/latest/opensearch/rest-api/search/

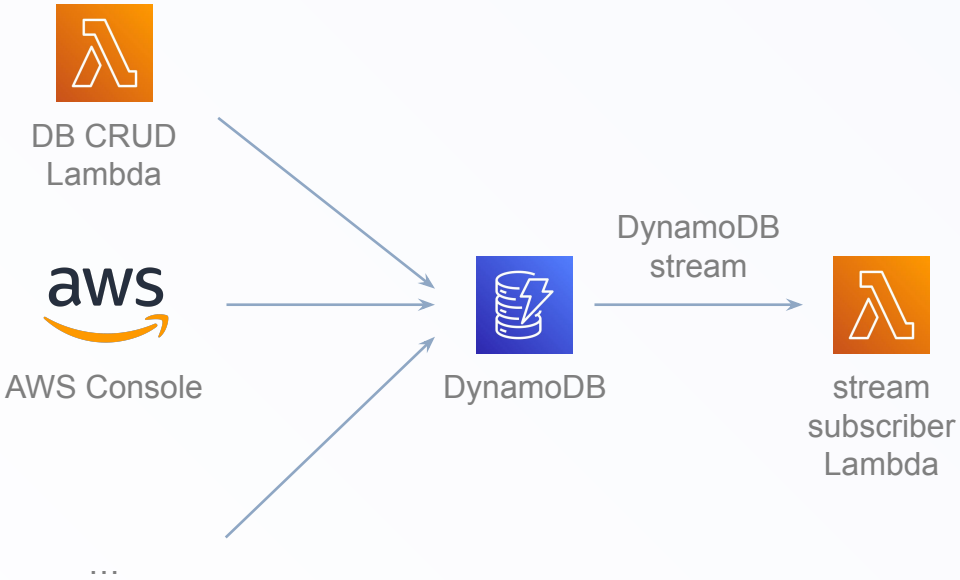
DynamoDB + OpenSearch



DynamoDB + OpenSearch

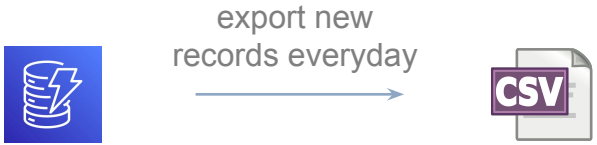


DynamoDB Stream

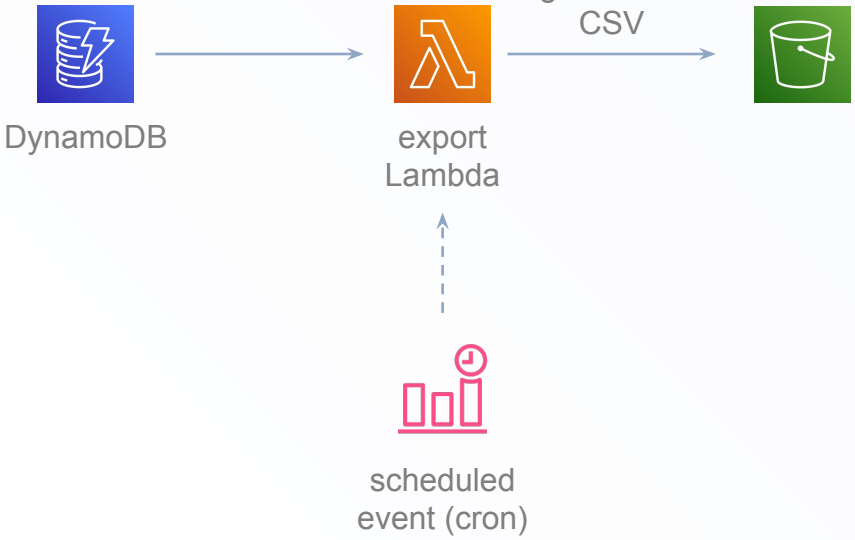


Problem:

DynamoDB data export



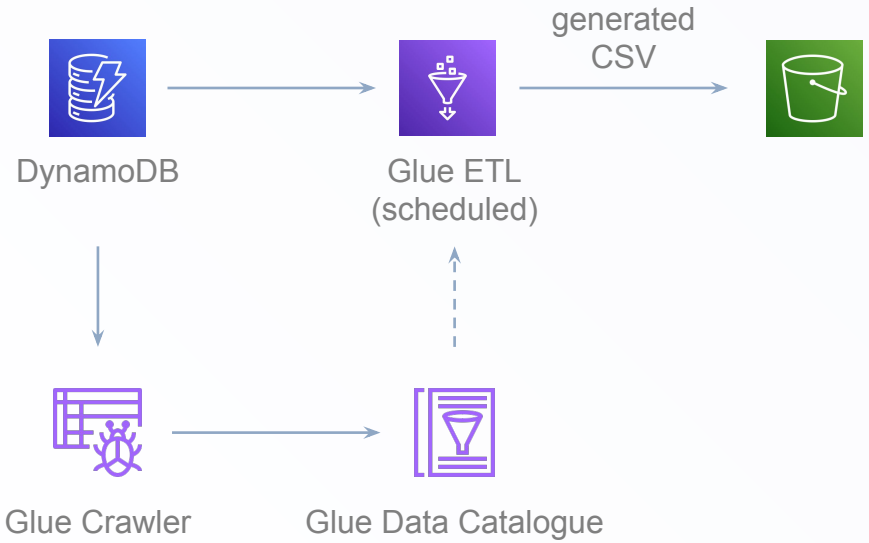
DynamoDB data export – Lambda attempt



Constraints

- Lambda timeout limit (15mins)
- DynamoDB query limit (100 records/page)

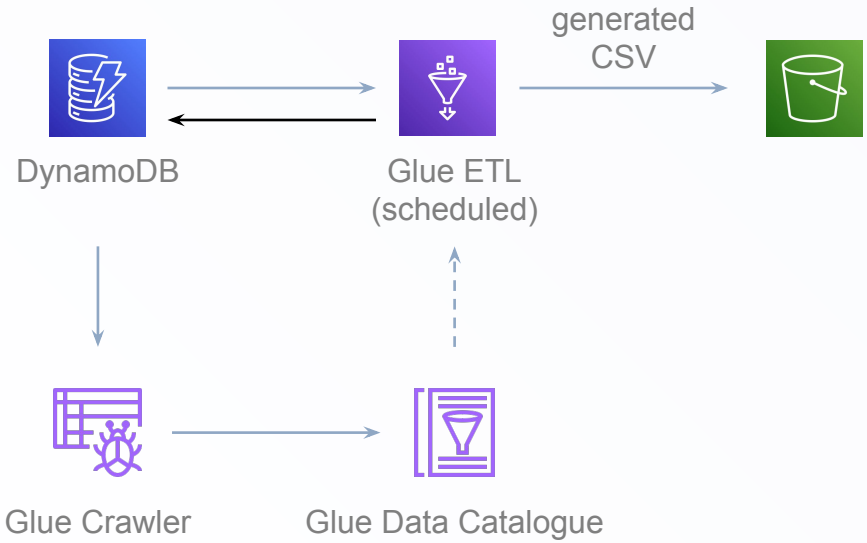
DynamoDB data export – AWS Glue ETL



Benefits

- Longer timeout limit (default 48 hrs)
- Operates on the whole data set
- Python + AWS SDK (Boto3)

DynamoDB data export – AWS Glue ETL



ID	…	statusEvents

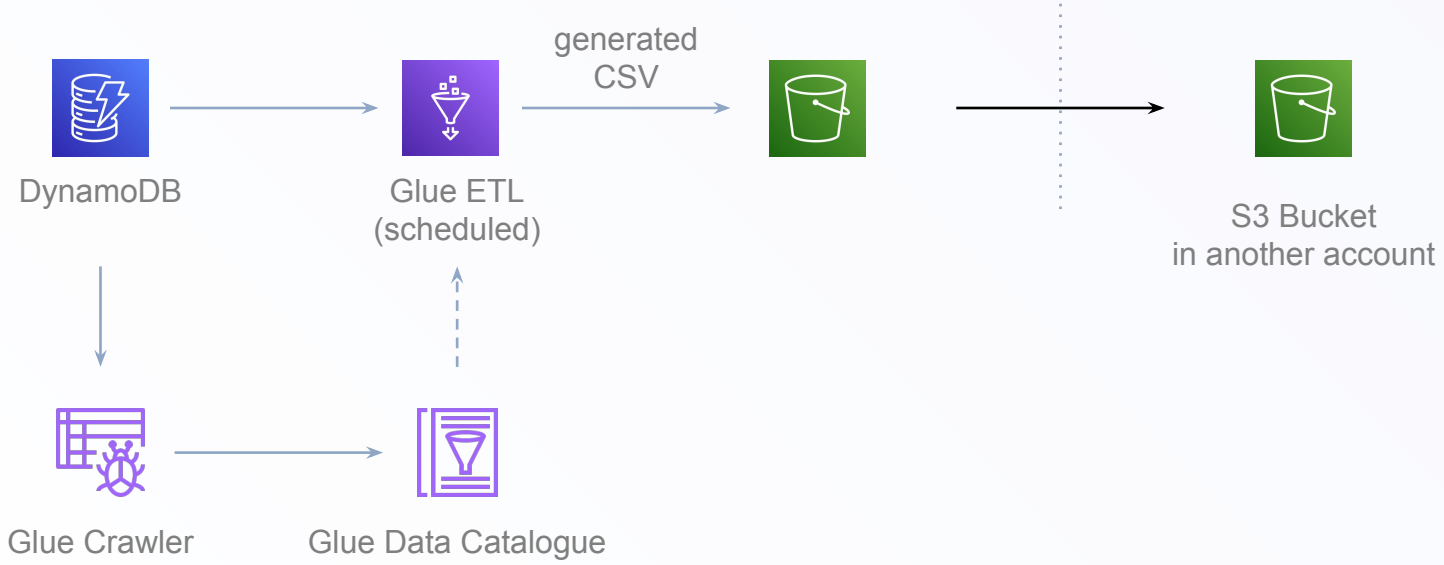
1	…	[
		{
		"status": "csv_exported",
		"timestamp": "2022-02-01T14:48:00.000Z"
		}
		]

2	…	[ ]

3	…	[
		{
		"status": "csv_exported",
		"timestamp": "2022-02-01T14:48:00.000Z"
		}
		]

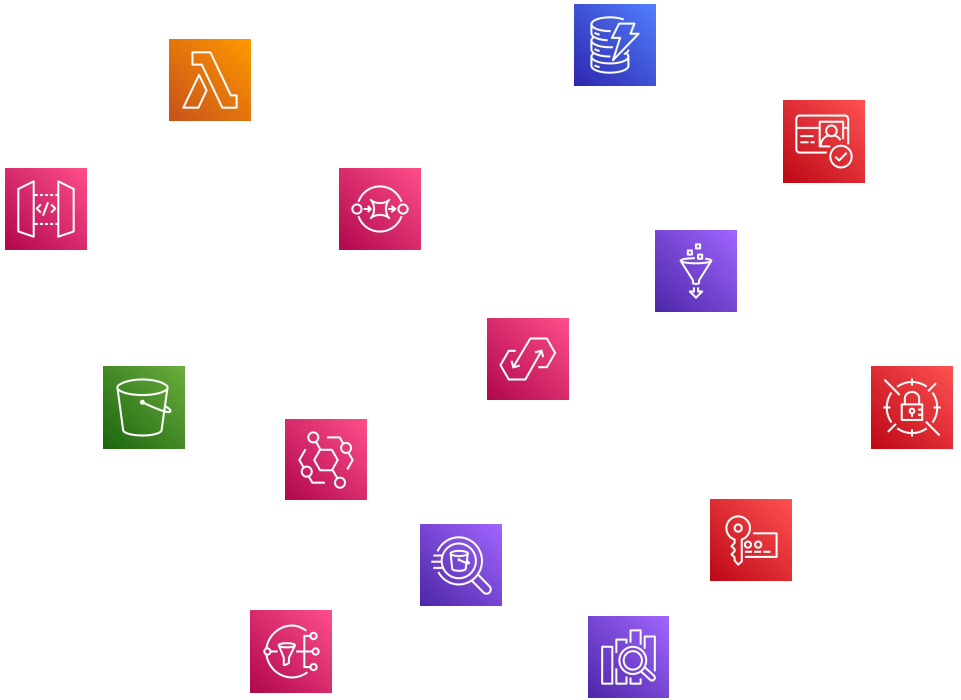
…	…	…

DynamoDB data export – AWS Glue ETL



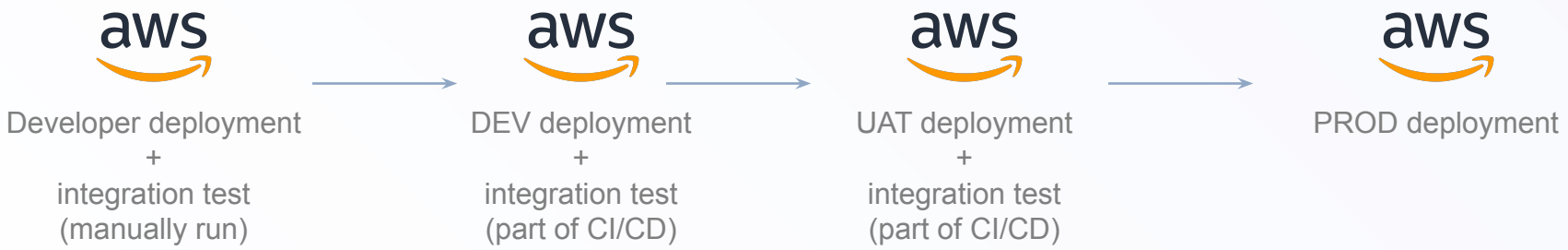
Problem:

Testing many moving parts



Testing Serverless Solution - integration test

Deploy and test with real cloud services



Jest Cucumber ...

Testing Serverless Solution - test downstream

send a request POST /orders

assert response: status code, payload

assert data changes in DynamoDB through AWS SDK

assert objects in S3 bucket through AWS SDK

assert impacts on downstream services though _____ API/SDK

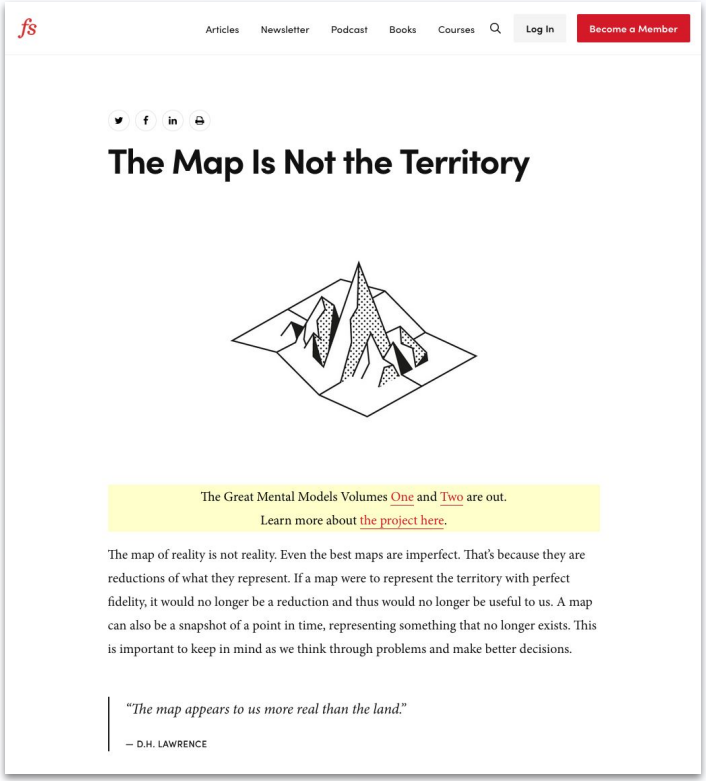
There are more …

- Authorise API Gateway with AWS Cognito User Pool and triggers
- Query and update large amount of DynamoDB records with AWS Athena
- Break through 15-min Lambda timeout limit with “hand-off” pattern
- Use AWS AppFlow to transfer data from SaaS production such as Salesforce
- …

Takeaway from this talk

- Serverless ≠ Lambda
- Constraints & solutions in serverless ecosystem
- Design event-driven serverless solutions
- Testing serverless solutions

Takeaway from this talk



https://fs.blog/map-and-territory/


cevo