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Making a Case for Using Relational Databases in Serverless Applications

Samuel Lock

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Moved to Costa Rica (& discovered surfing)

↳ 2019 : Bootstrapped Founder w/Serverless

↳ 2020 : Startup AWS DevOps Engineer

↳ 2023 : Serverless Developer @ Serverless Guru
AWS SME @ Toptal Freelancing

↳ 2024 : Solution Architect @ Serverless Guru
Amazon Authorized Instructor (AAI) @ AWS

Moved back to UK (& still can't surf)

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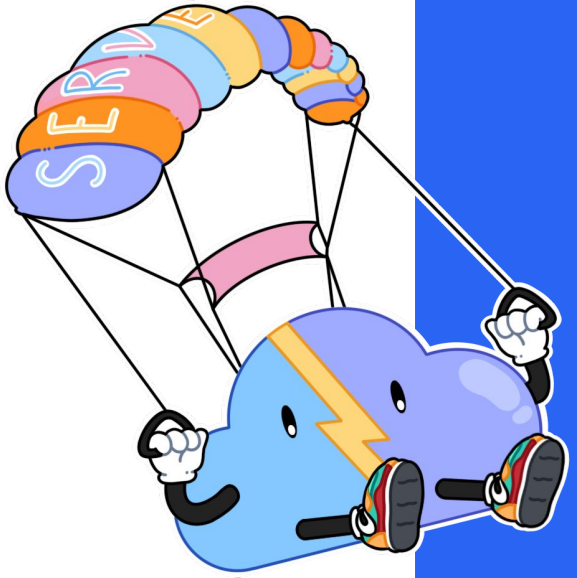
Our plans for today



(**R**)elational (**D**)ata(**B**)ase (**M**)anagement (**S**)ystems - e.g MySQL, Postgres

5 minutes	**Why RDBMS don't suit serverless**
10 minutes	**When RDBMS should be considered**
10 minutes	**How to improve the RDBMS DX**
	Q&A

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Why Relational Databases Don’t Suit Serverless

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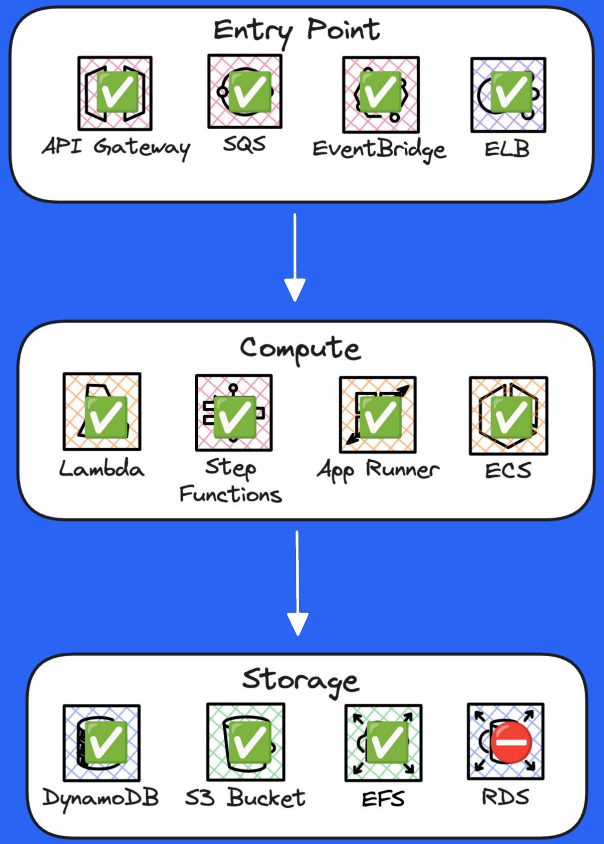

“Relational databases don’t scale”

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“Relational databases are slow”

↳ ACID Compliance

Relational Databases

DynamoDB

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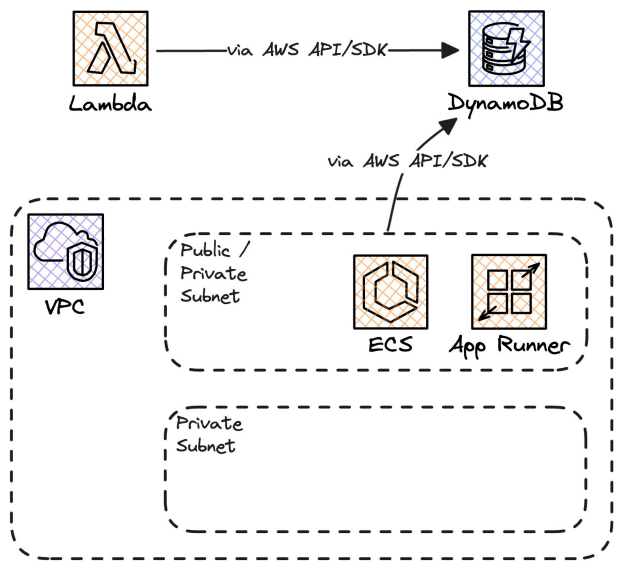
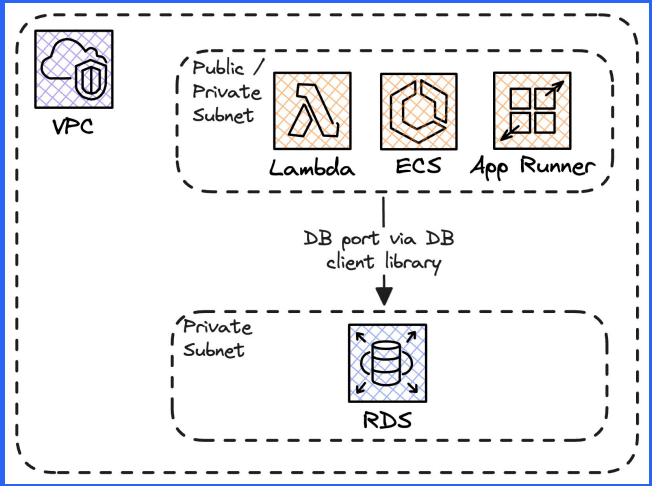
“Relational databases require a VPC”





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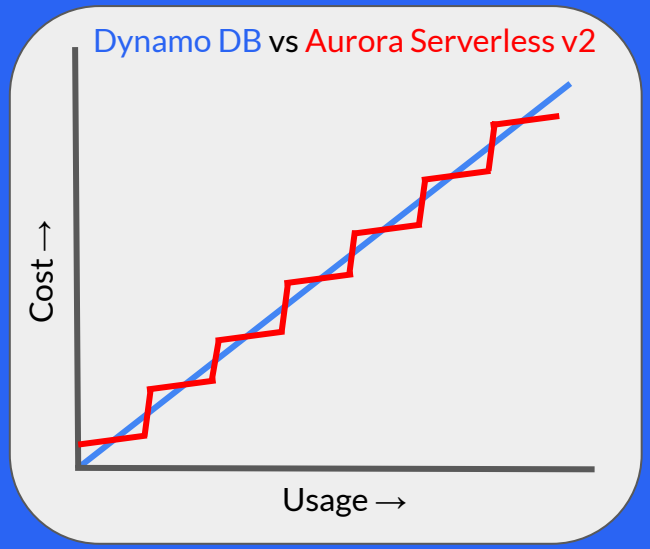
“Relational database pricing doesn’t scale to zero”



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Why are we here?

"Relational databases don't scale"

"Relational databases require a VPC"

"Relational databases are slow"

"Relational database pricing doesn't scale to zero"

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When Relational Databases should be considered

↳Highly-compliant industries

↳Migrating legacy applications using RDBMS already

↳When your data is naturally relational

↳When you don't know your access patterns

When Relational Databases should be considered

	DynamoDB	RDBMS Options (RDS, Aurora)
Request Body Size	16 Mb / **25 items** (via `BatchWriteItem`)	N/A (4 Mb w/ Data API)
Response Size Limit	1 Mb	N/A (1 Mb w/ Data API)
Item Size Limit	**400 Kb**	N/A (64 Kb returned w/Data API)
Request Concurrency	40K RRUs + 40K WRUs	Dictated by ACUs / DB instance size
Other Notes	↳ DynamoDB Streams ↳ TTL ↳ Point-in-time Recovery	↳ Backtrack (Point-in-time recovery)

Read-Heavy Scenario

All Items/Rows are 4 Kb | 500 TPS (All Reads) | 100,000 Items/Rows (400Gb)

	DynamoDB	Aurora Serverless v2	RDS
Price of Requests	**$0.25** per/m	**$0.02** per/m (estimated I/O cost)	N/A
First 10 TB of Data Out	**$0.09** per GB, **$0** within region.	**$0.09** per/GB (internet) **$0.02** per/GB to other AWS regions/AZ	**$0.09** per/GB (internet) **$0.02** per/GB to other AWS regions/AZ

Read-Heavy Scenario

All Items/Rows are 4 Kb | 500 TPS (All Reads) | 100,000 Items/Rows (400Gb)

	DynamoDB	Aurora Serverless v2	RDS
Requests (1.3 B)	$325 /month	$26 /month	N/A
Compute	N/A	$432 /month (assuming 5x ACU)	$485 (assuming 2x m7g.xlarge)
Storage (400 Gb)	$100 /month	$40 /month	$46 /month
Data Out (5.18 Tb)	$0 (Assuming same region)	$0 (Assuming same AZ)	$0 (Assuming same AZ)
Total	**$425 /month**	**$458 /month**	**$531 /month**

Write-Heavy Scenario

All Items/Rows are 4 Kb | 50 TPS (All Writes) | 100,000 Items/Rows (400Gb)

	DynamoDB	Aurora Serverless v2	RDS
Price of Requests (up to 1 B)	~~$0.25~~ **$5** per/m	~~$0.02~~ **$0.20** per/m (I/O cost)	N/A
First 10 TB of Data Out	**$0.09** per GB, **$0** within region.	**$0.09** per/GB (internet) **$0.02** per/GB to other AWS regions/AZ	**$0.09** per/GB (internet) **$0.02** per/GB to other AWS regions/AZ

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Write-Heavy Scenario

All Items/Rows are 4 Kb | 50 TPS (All Writes) | 100,000 Items/Rows (400Gb)

	DynamoDB	Aurora Serverless v2	RDS
Requests (130M)	~~$325~~ **$650** /month	$26 /month	N/A
Compute	N/A	~~$432~~ **$260** /month (assuming 3x ACU)	**$485** (assuming 2x m7g.xlarge)
Storage (400 Gb)	**$100** /month	**$40** /month	**$46** /month
Data Out (5.18 Tb)	**$0** (Assuming same region)	**$0** (Assuming same AZ)	**$0** (Assuming same AZ)
Total	**$750 /month**	**$326 /month**	**$531 /month**

WS experts

Combined Scenario

All Items/Rows are 4 Kb | 500 TPS (Reads) + 50 TPS (Writes) | 100,000 Items/Rows (400Gb)

	DynamoDB	Aurora Serverless v2	RDS
Reads	$325 /month	$458 /month	N/A
Writes	$650 /month	$286 /month	N/A
Both	$100 /month	$40 /month	$531 /month
Total	**$1075 /month**	**$784 /month**	**$531 /month**

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Improving The Developer Experience

ORMs

+ Keeps your code simple
+ Manages table schema

- JS is loosely typed
- DB migrations require centralization
- Bloat your Lambda package

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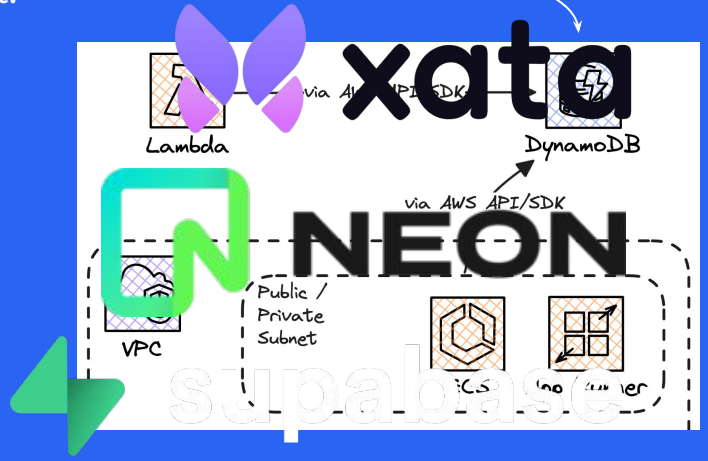
The Data API

Have your (cake) and eat it.

Replace with Aurora Serverless v2



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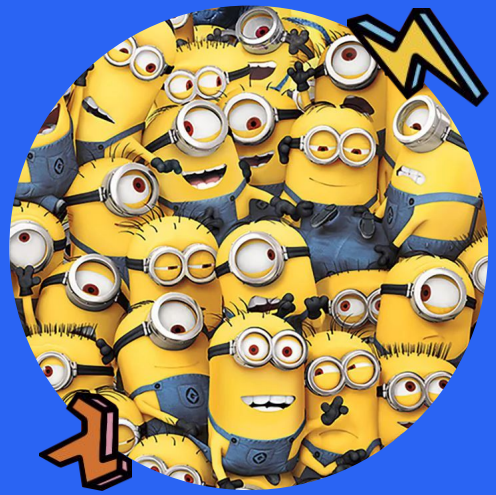
Ephemeral Environments

↳ Data API to create tables and seed

↳ 3rd parties offer branching: xata NEON



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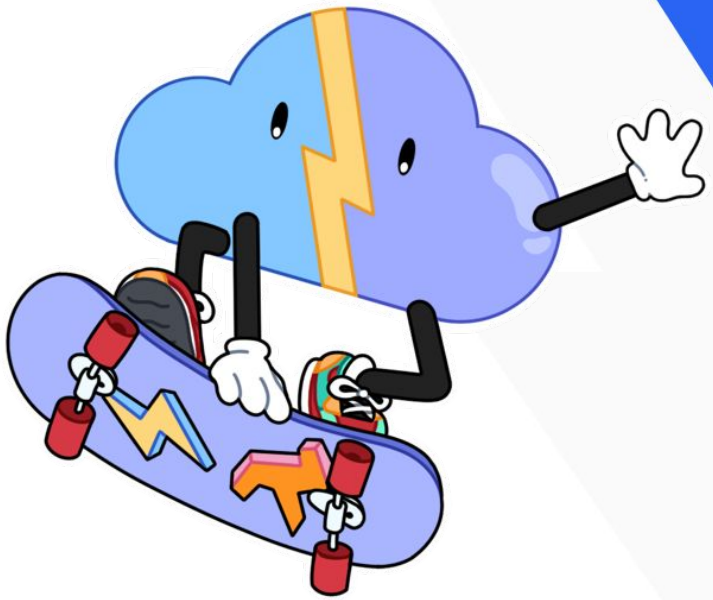

That’s it folks!

Thank you!

Time for Q&A.

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