AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

FSI309

Discover Financial Services: Payments mainframe to cloud platform

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Director, Payment Services
Discover Financial Services

Don Drake
Senior Analytics Specialist, Solutions Architect
Amazon Web Services

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Q: How to strangle a mainframe

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A: Very carefully

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Agenda

- The setup
- The strangler
- The solution
- The reveal
- The transformation (director’s cut)

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Discover Global Network

About Discover®

Value of Discover Global Network

Who we are

Discover Global Network

Comprising Discover Network, with millions of merchant and cash access locations; PULSE®, one of the leading ATM/debit networks in the US; and Diners Club International® and 20+ Network Alliance Partners around the world

By the numbers

Accepted at

50M+

DGN merchant locations[1]



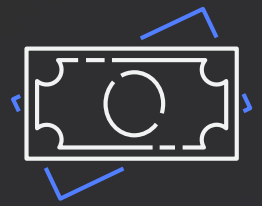
$95.9B

Direct banking loans[1]

Customers spent

$415B+

on Discover Global Network in 2020[1]



Discover Financial Services

A digital banking and payment services company that issues the Discover Card, and offers private student loans, personal loans, home loans, checking and savings accounts and certificates of deposit



[1] Internal reporting

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Discover Global Network

About Discover® Value of Discover Global Network

Who we are



2M+

ATMs in 140 countries and territories

There are

270M+

Discover Global Network cardholders worldwide[1]



Discover Global Network is accepted in



200+

countries and territories



By the numbers

Discover Global Network is the

FASTEST

growing global payments network[2]



[1] Discover Global Network participant reporting and RBR – Global Cards Data and Forecasts to 2025, Oct 2020

[2] Based on signed network alliance agreements over the past 12 years with major payment networks within respective countries –Panoramic Research study, conducted 2020

aws

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Payment services – What we do

M	A	N	I	C
Merchant	Acquirer	Network	Issuer	Cardmember



- Merchant bank
- Processor – Technical and operations infrastructure
  - Authorization, settlement, disputes, chargebacks, etc.
- Retained merchant portfolio

- Operating rules and regulations
- Two-sided marketplace
- Global Telecom Network (MPLS)
- Transaction switching
- Clearing and settlement
- Disputes – Case management, arbitration, chargebacks, etc.
- Interoperability and standards

- Card issuance
- Transaction authorization
- Cardholder billing
- Settlement

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The setup



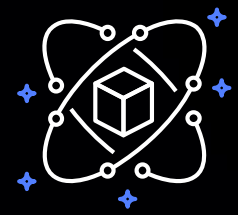
The network eco-system

A legacy landscape



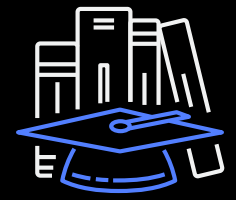
Network transformation

The need to compete



Settlement: The core of the network

Everyone gets paid



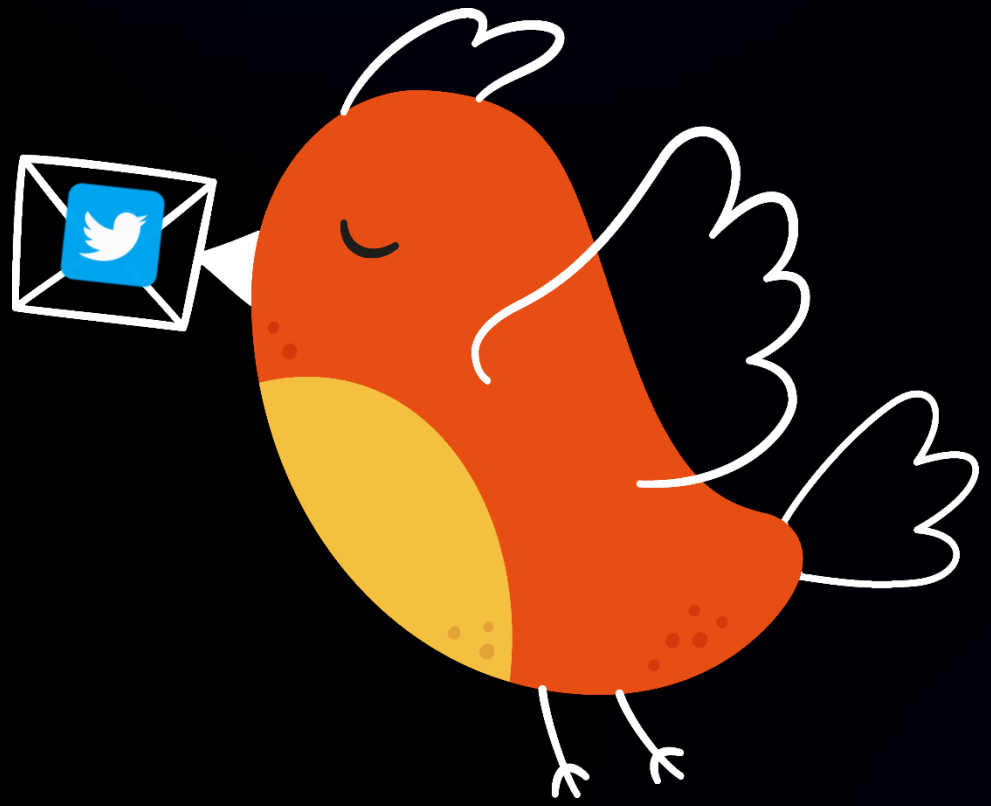
The knowledge gap

What’s under the hood

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Network transformation

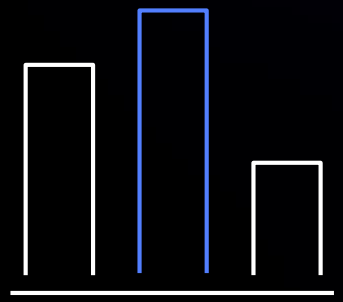
LEGACY IN A MODERN WORLD



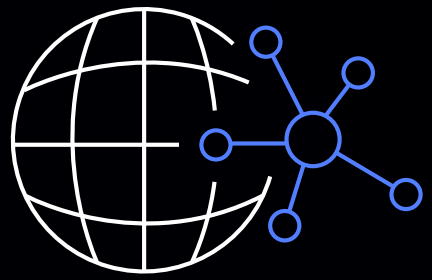
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Network transformation

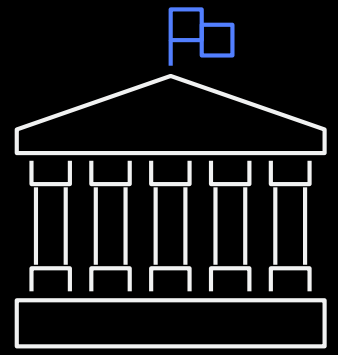
A MODERNIZED PLATFORM: WHY IS IT TIME?



The technology that got us here will not allow us to compete in the future



A global solution to compete on the world stage



Eliminate client irritants and speed to market capabilities

aws

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Network transformation

A MODERNIZED PLATFORM: BRING ON THE NEW

The platform provides standard interfaces

- REST APIs
- UI portal
- Event bus (internal)

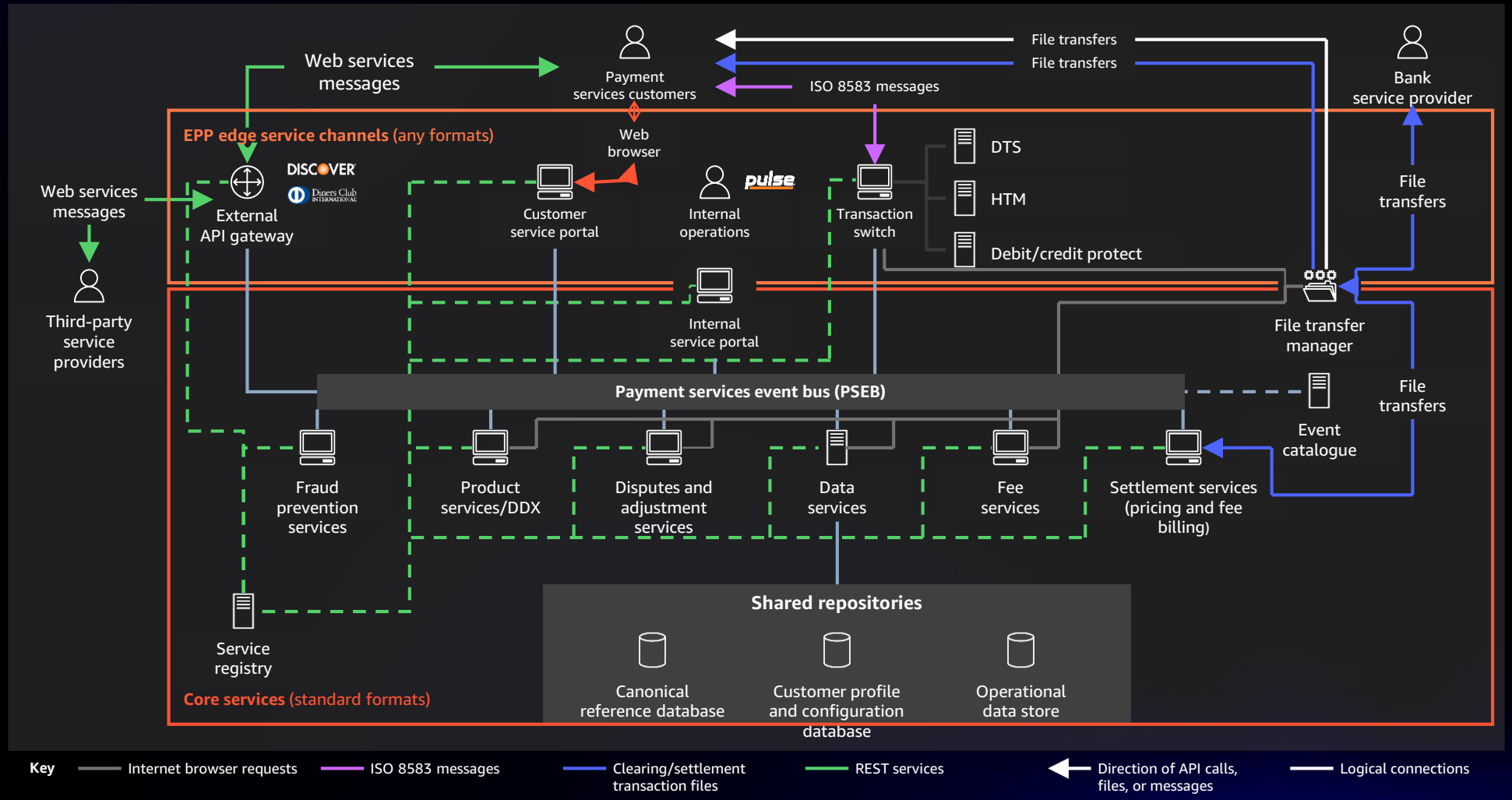
Edge services tokenize sensitive data

Core services only process tokenized, canonical data

Micro-services are loosely coupled

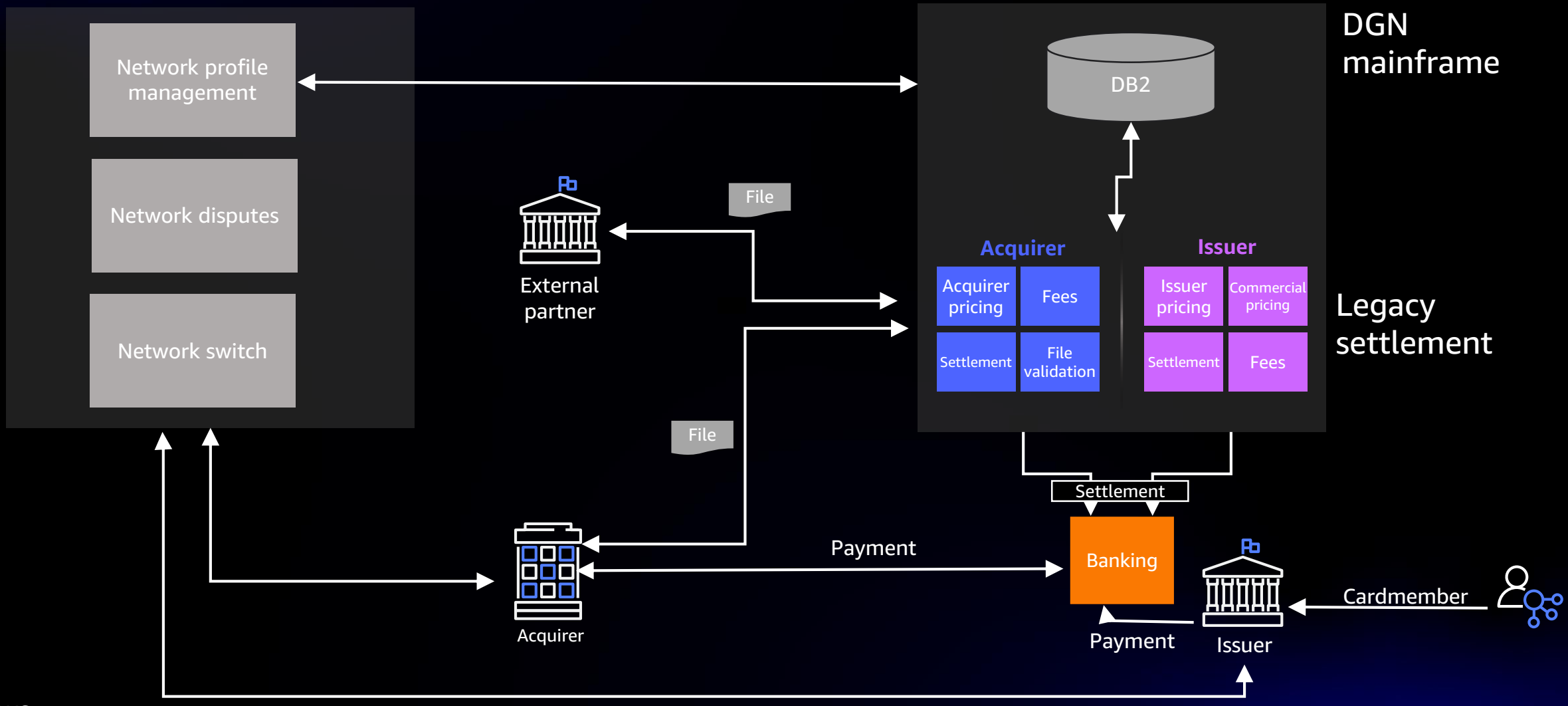
- Service registry for APIs
- Event bus for messaging

Customer and event data are all centralized and accessed through APIs



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Settlement: The core of the network



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The knowledge gap



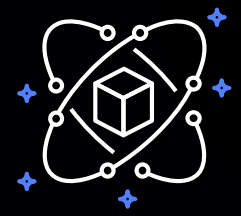
A 30-year-old problem

Anyone know where I put that document?



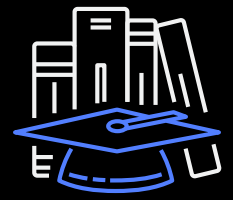
A dwindling team

Legacy skills: A costly commodity



What's going on in there?

The brain drain

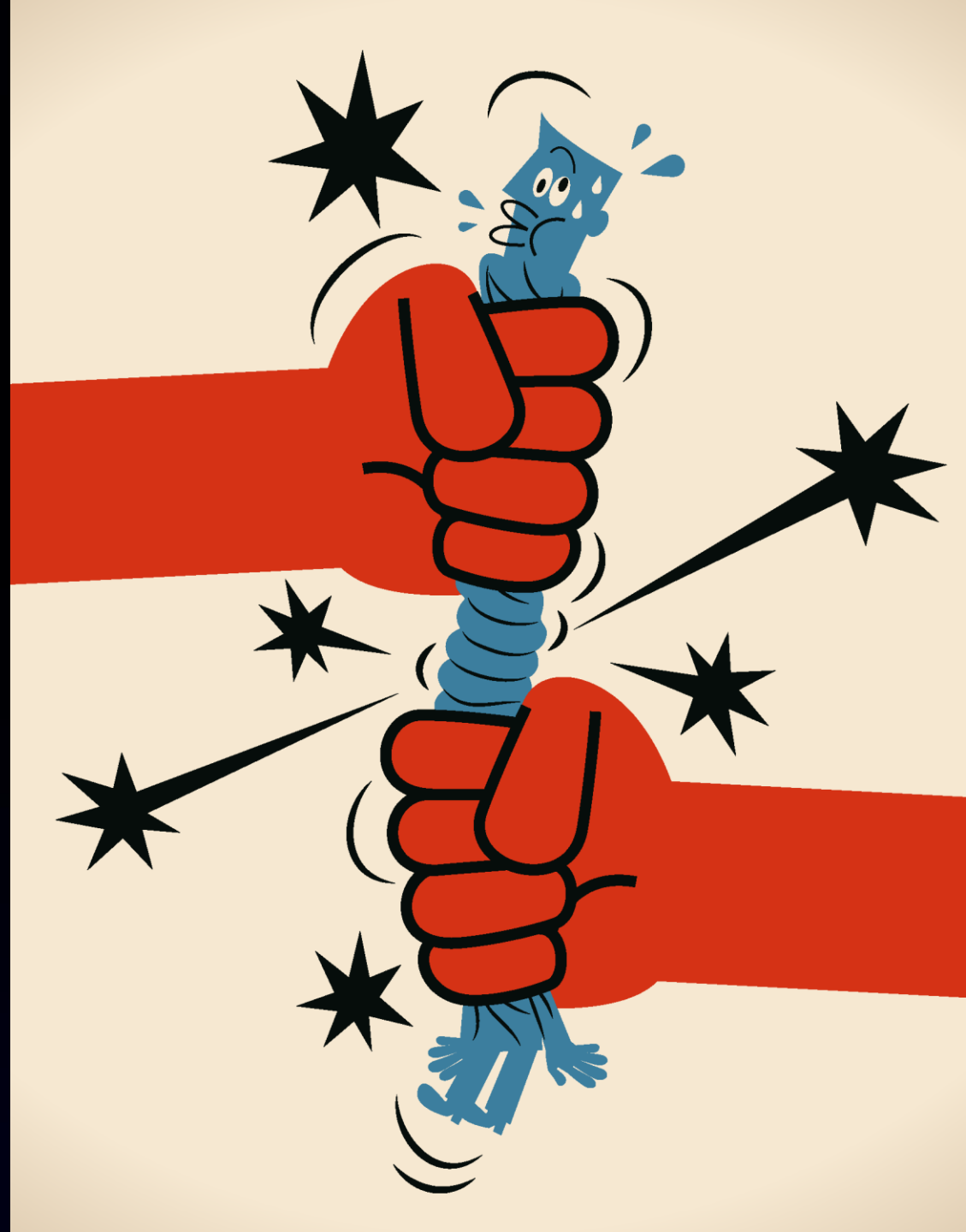


Better get started!

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The strangler

Incrementally migrate
a legacy system by
gradually replacing
the functionality with
applications and services . . .



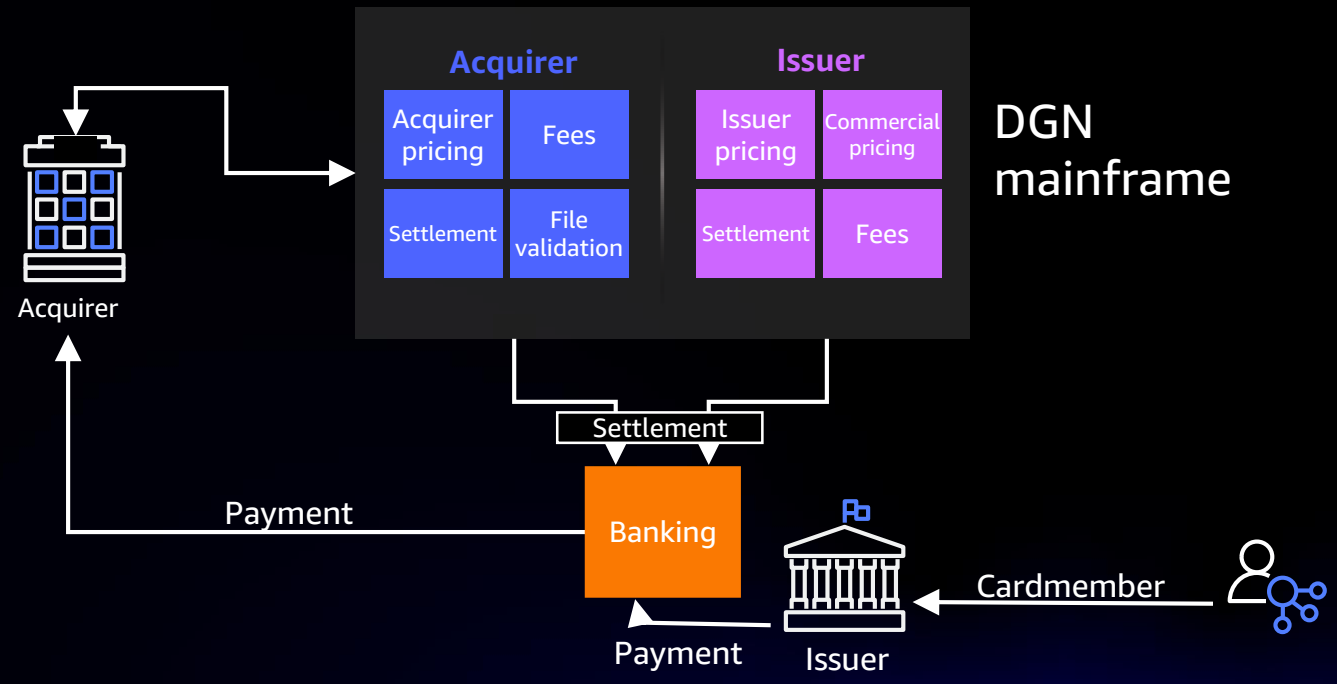
The strangler

Incrementally migrate a legacy system by gradually replacing the functionality with applications and services . . .



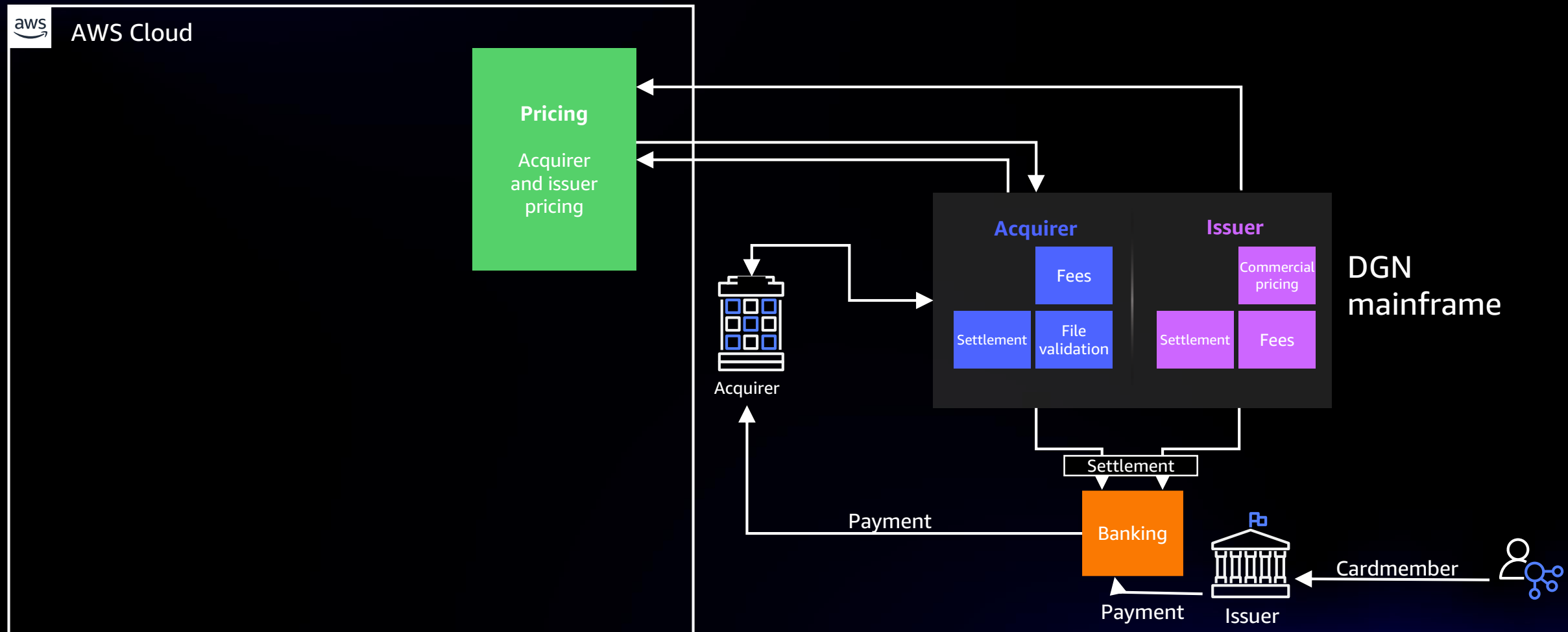
aws

DGN settlement – Legacy



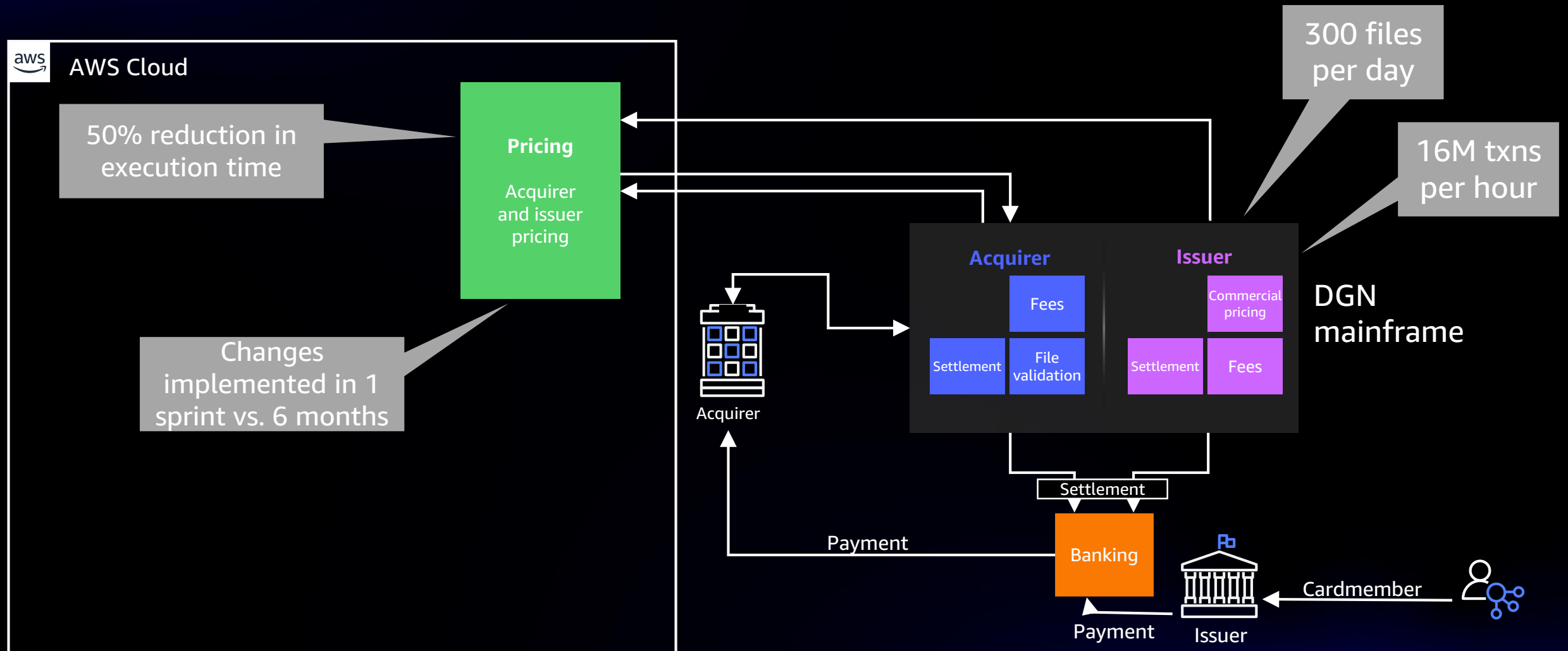
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DGN settlement – Strangulation phase 1



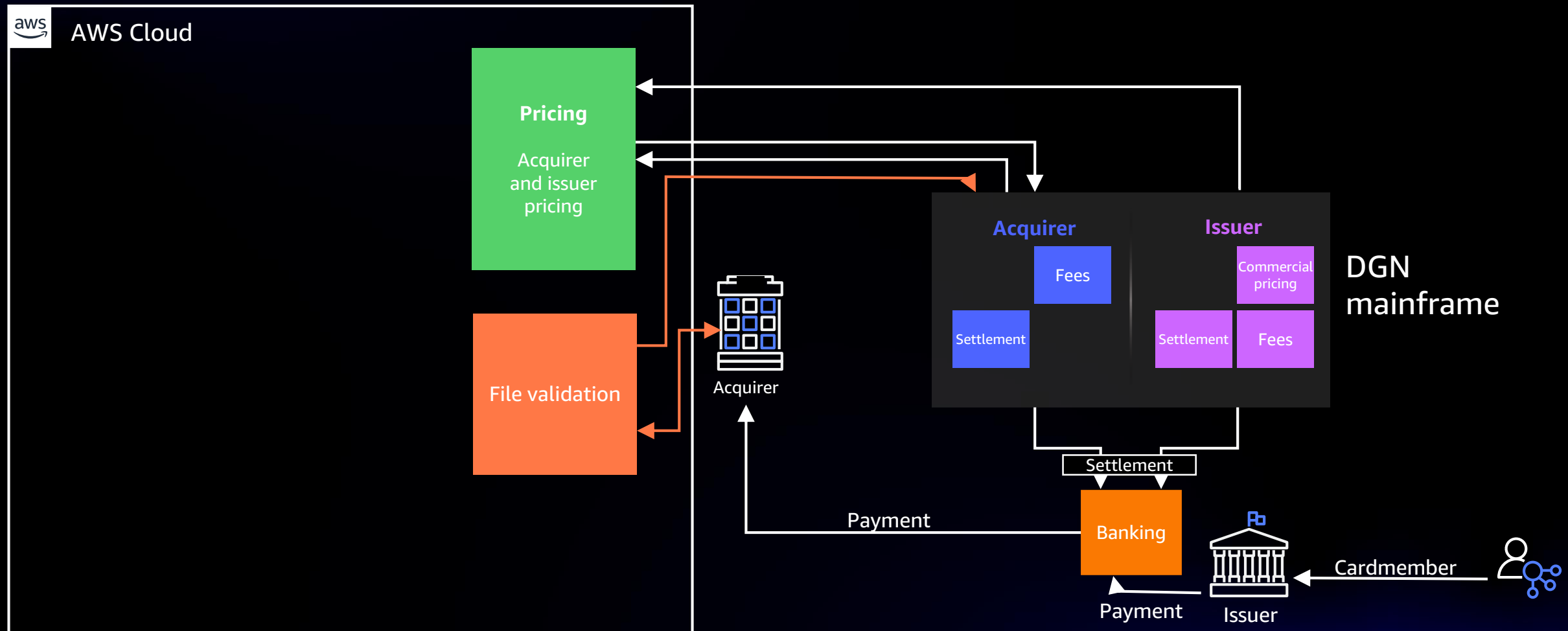
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DGN settlement – Strangulation phase 1



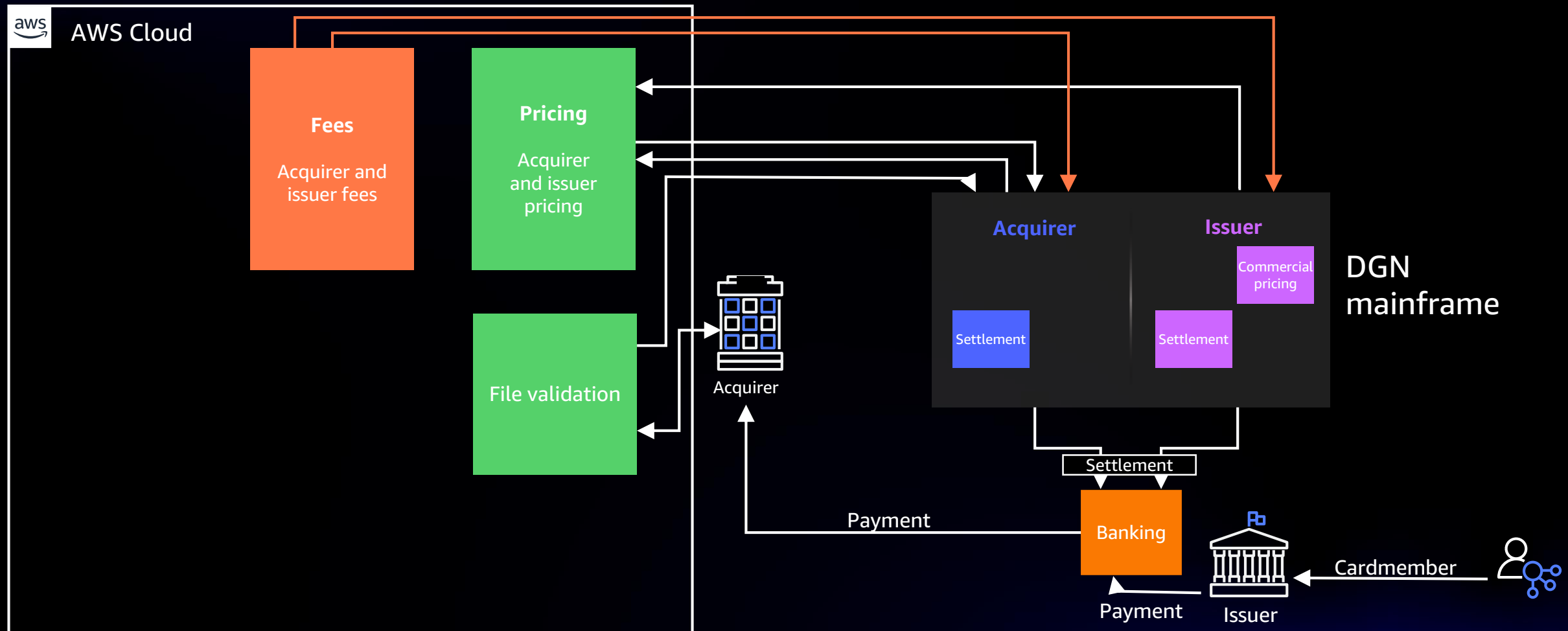
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DGN settlement



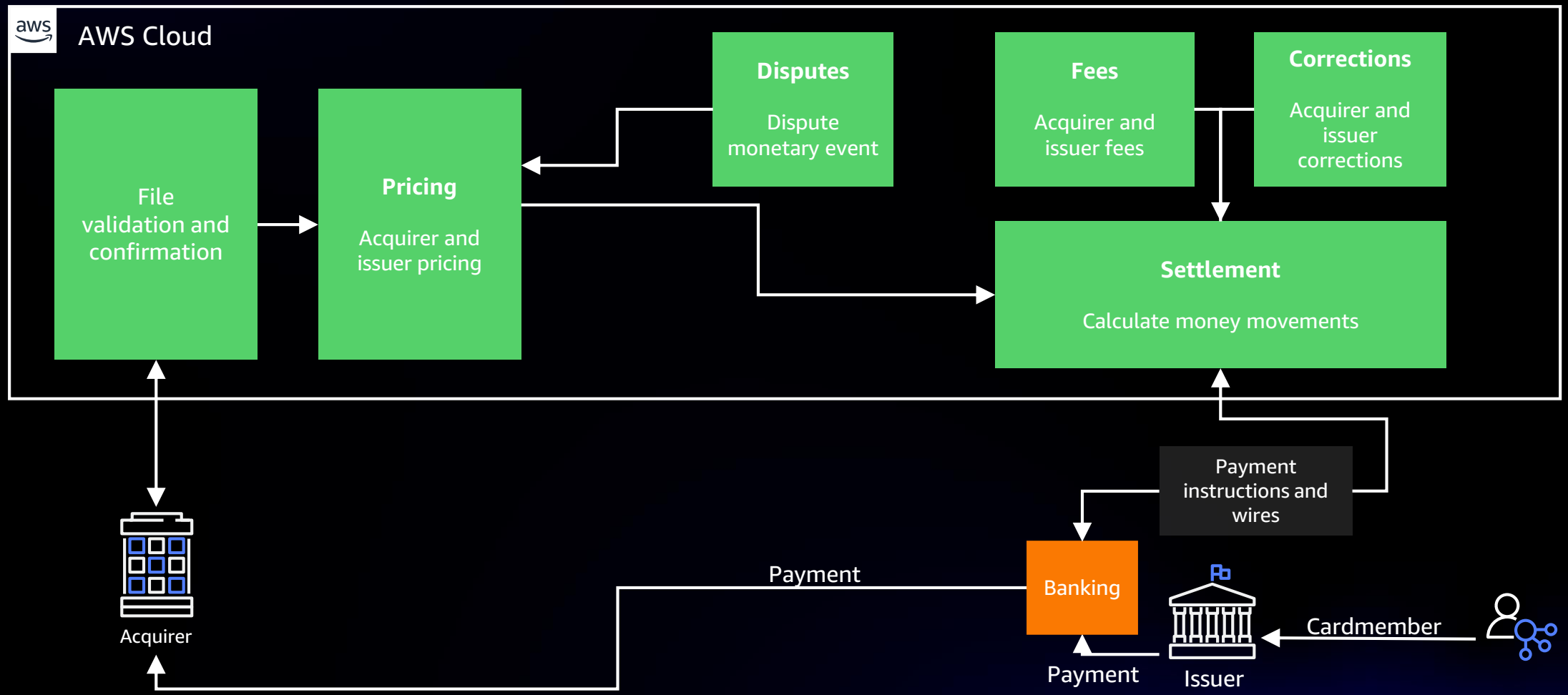
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DGN settlement



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DGN settlement



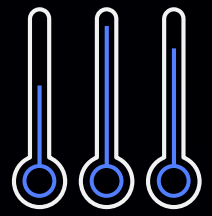
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The solution



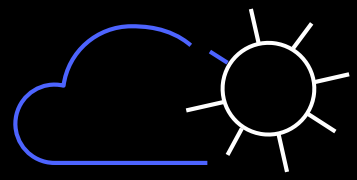
Take one

The internal cloud



Take two

Send in the clouds



Take three

The gory details

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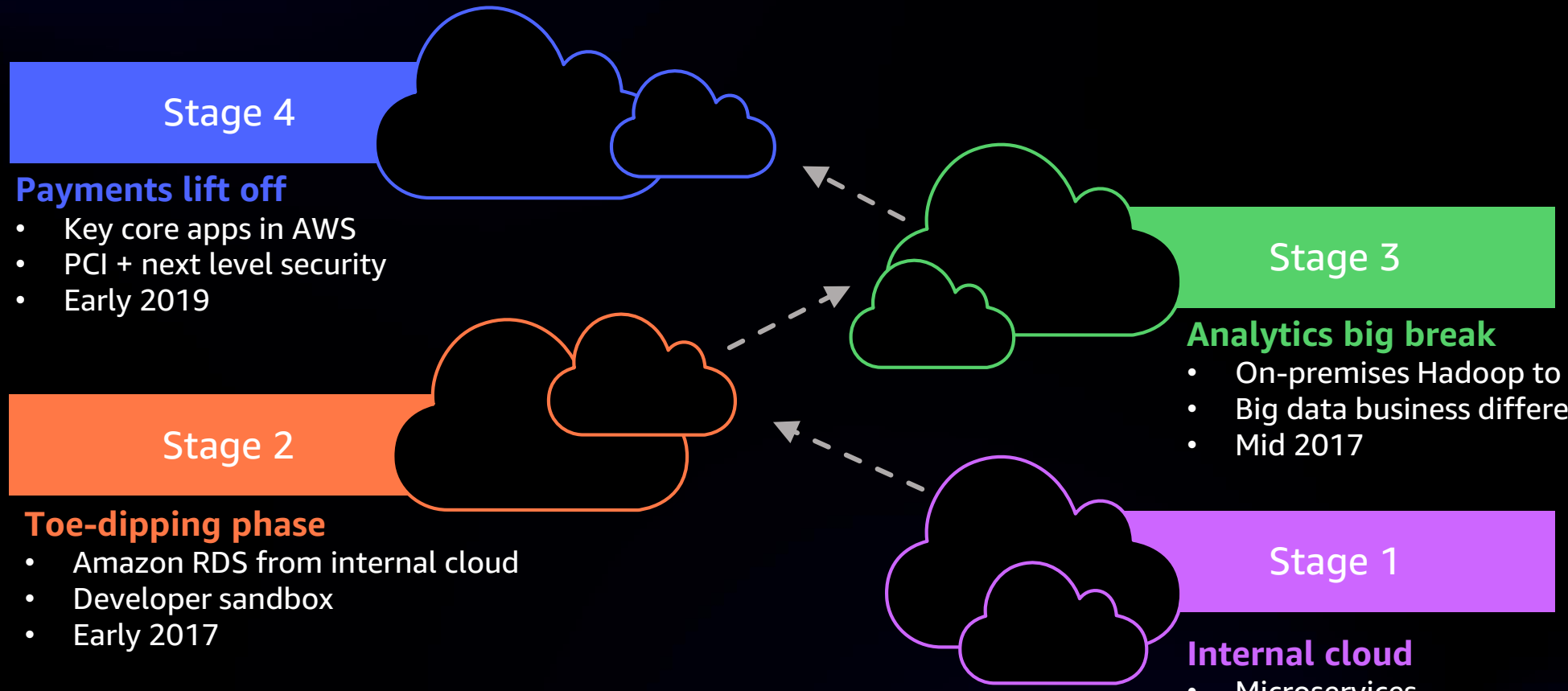
The intermission



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The intermission

DISCOVER'S JOURNEY TO THE CLOUD



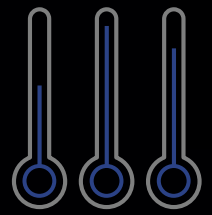
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The solution



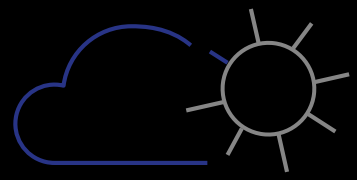
Take one

The internal cloud



Take two

Send in the clouds



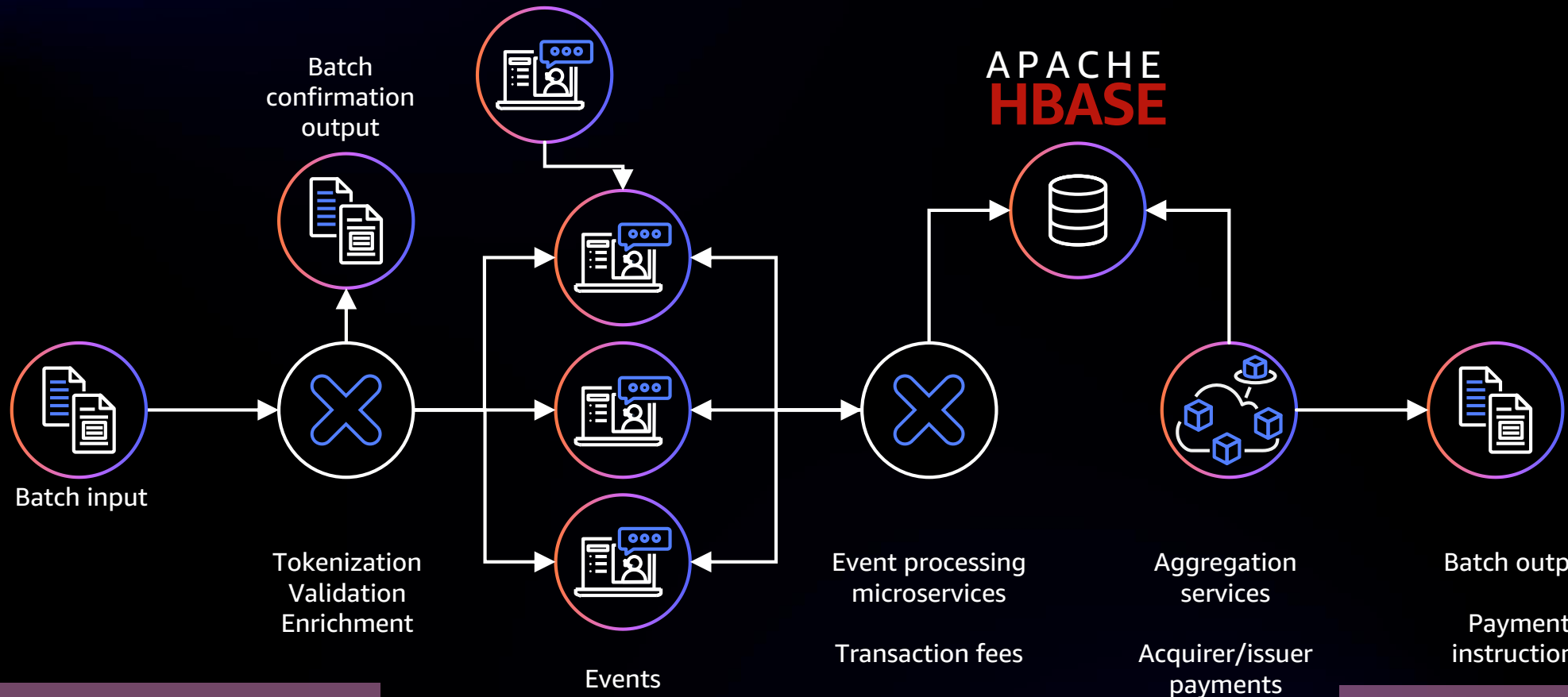
Take three

The gory details

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The solution – Take one

INTERNAL CLOUD



Bursty traffic –
50% of daily transactions
in one file (16m records)

Lacks scale
Costly for peak demand

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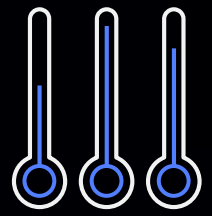
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The solution



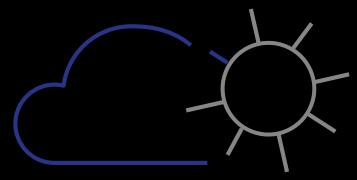
Take one

The internal cloud



Take two

Send in the clouds



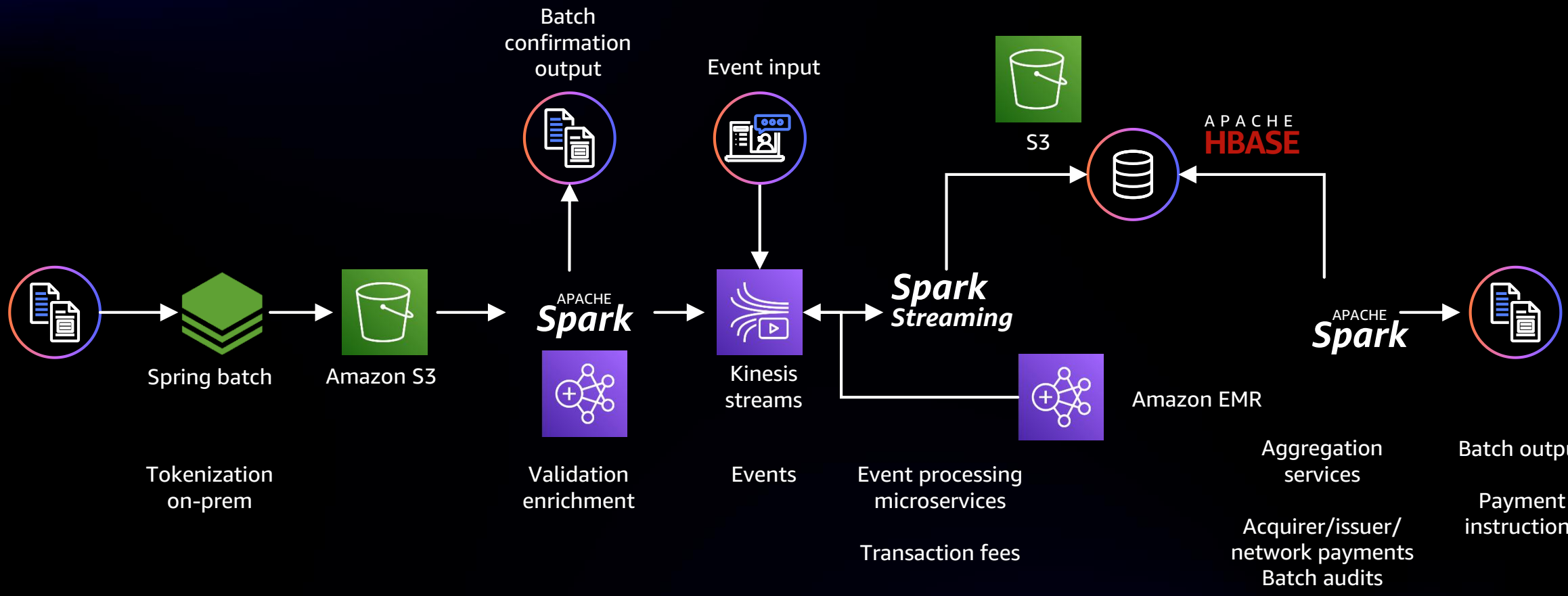
Take three

The gory details

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The solution – Take two

SEND IN THE CLOUDS



Scaled solution:
Auto scaled compute

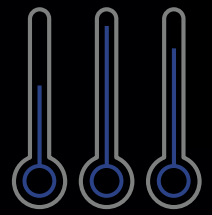
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The solution



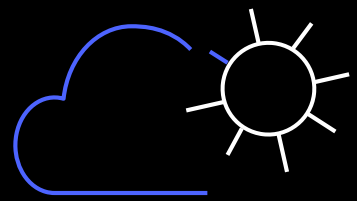
Take one

The internal cloud



Take two

Send in the clouds



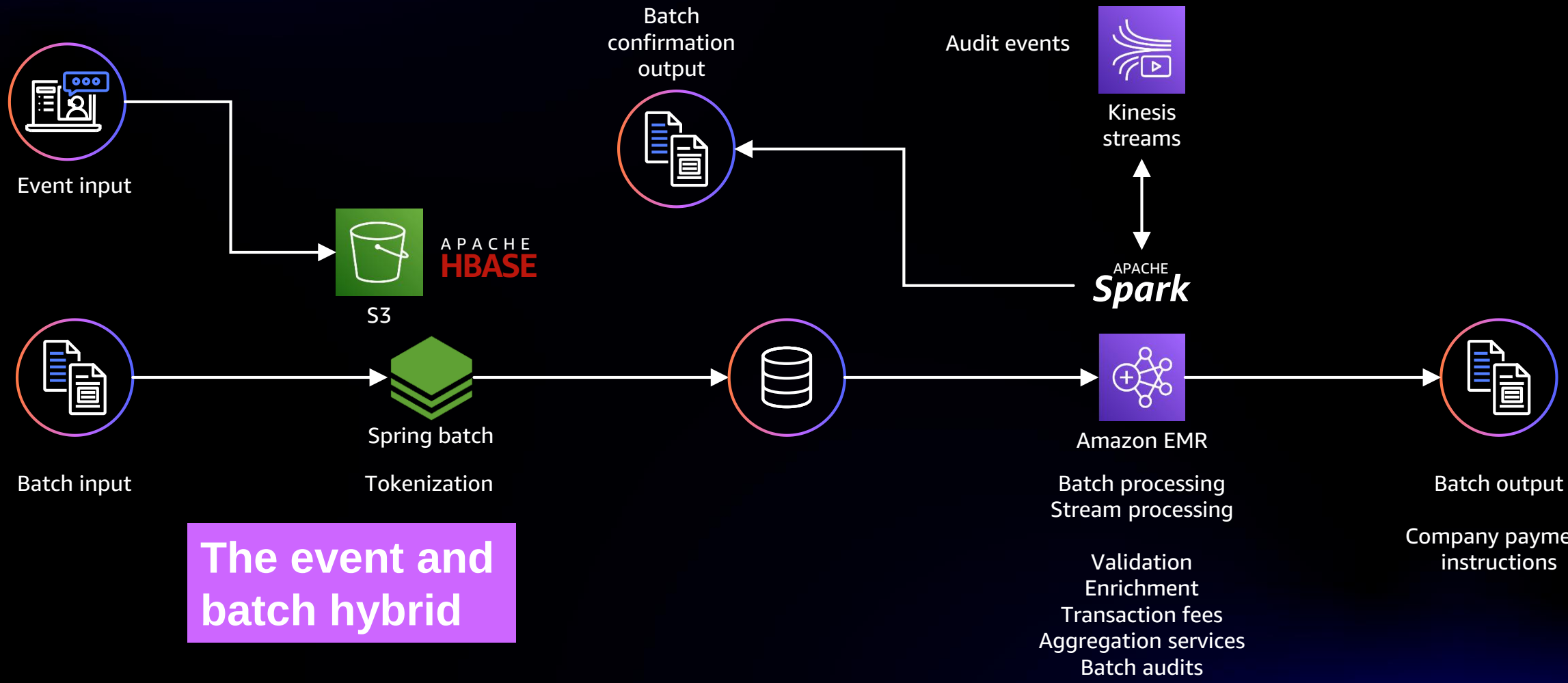
Take three

The gory details

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The solution – Take three

THE GORY DETAILS



The event and batch hybrid

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The solution

THE SECURITY QUESTION



Sorry but your password must contain an uppercase letter, a number, a haiku, a hieroglyph and the tears of a unicorn

- Direct connect over private links to AWS
- Private VPC connections to Amazon S3 buckets
- Identity and access management (IAM) roles
- Segregated accounts
- Warden monitoring
- Short-term credentials for secrets management
- Security tasks integrated through automation pipeline

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The solution

THE COMPLIANCE QUESTION

- Payment card industry (PCI) compliance
- ALL the security requirements and more . . .
- ALL critical risk data tokenized on prem
- Archiving and purging policies for S3 buckets

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The solution

THE COMPLIANCE QUESTION

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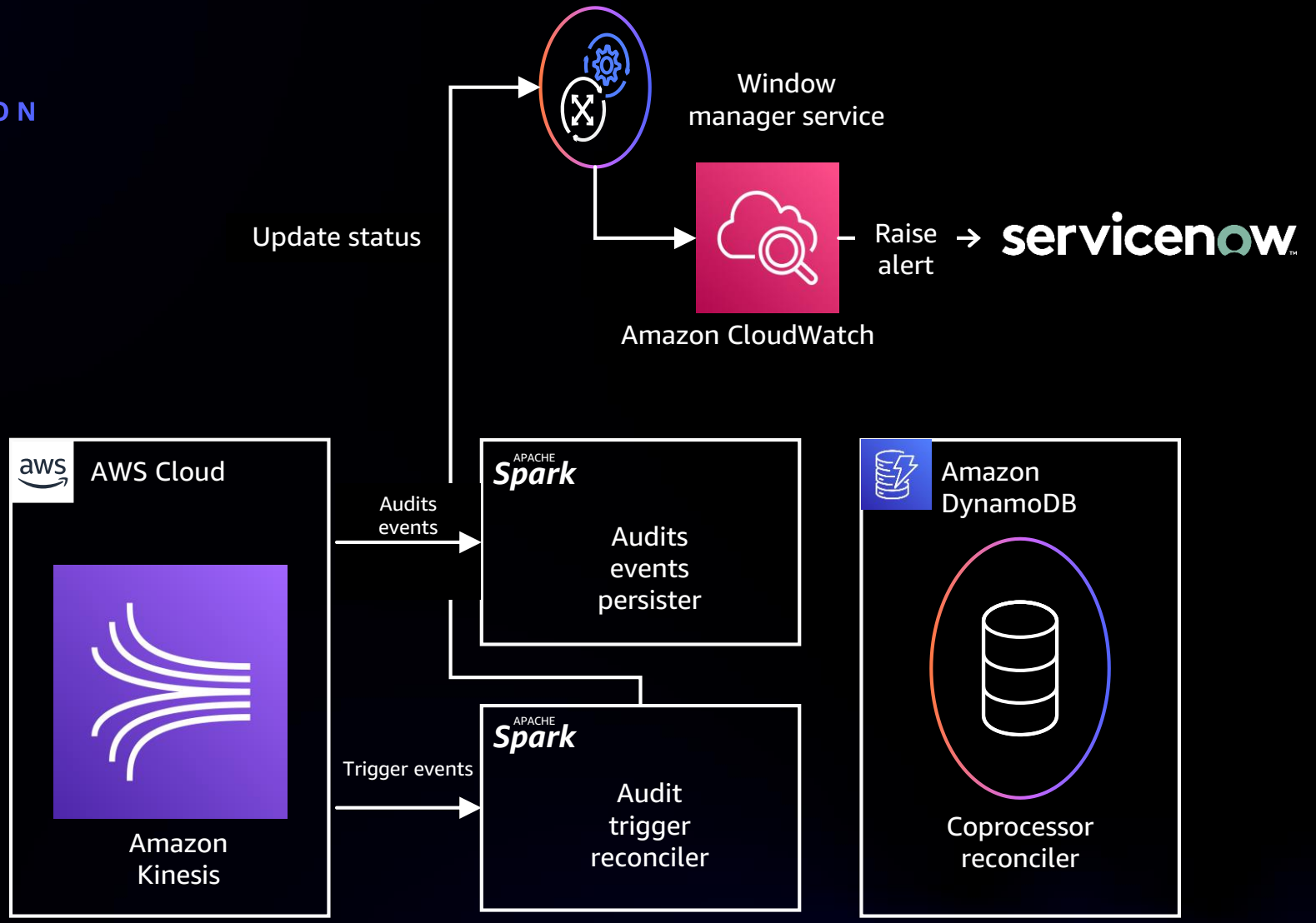
Guard rails on top of guard rails!

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The solution

THE AUDIT AND RELIABILITY QUESTION

- Streaming audit architecture
- Audit every transaction through the service
- Reconcile the data frequently
- Immediate reconciliation feedback
- Flexibility to cope with sudden bursts
- Separate audit and application infrastructure

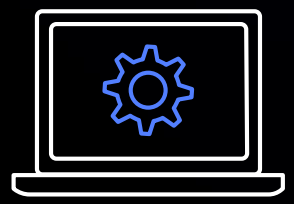


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The reveal

THE THINGS WE LEARNT BIT

The old

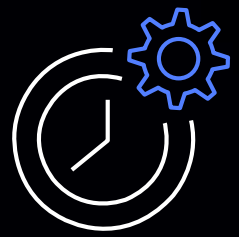


Choose wisely

Ask why

Ask if you need everything

And then do



Strangle slowly

Smaller pieces = stress-free releases . . .

But balance against complexity



Data-driven decisions

Compare old and new

But don't assume old = true

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The reveal

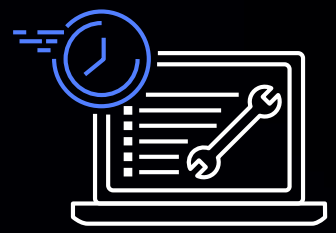
THE THINGS WE LEARNT BIT

The new



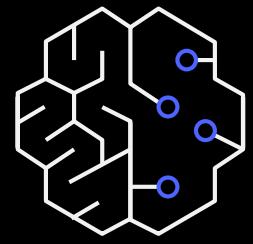
Build your architecture to suit the need

Adaptable,
extensible = sensible



Be prepared to pivot

Too much choice
is a good thing



Automate everything

Do we even have to
mention this anymore?

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The transformation (director's cut)

The process vs. the principle

- To Gant or not to Gant

The people vs. technology

- The innovation path to happiness

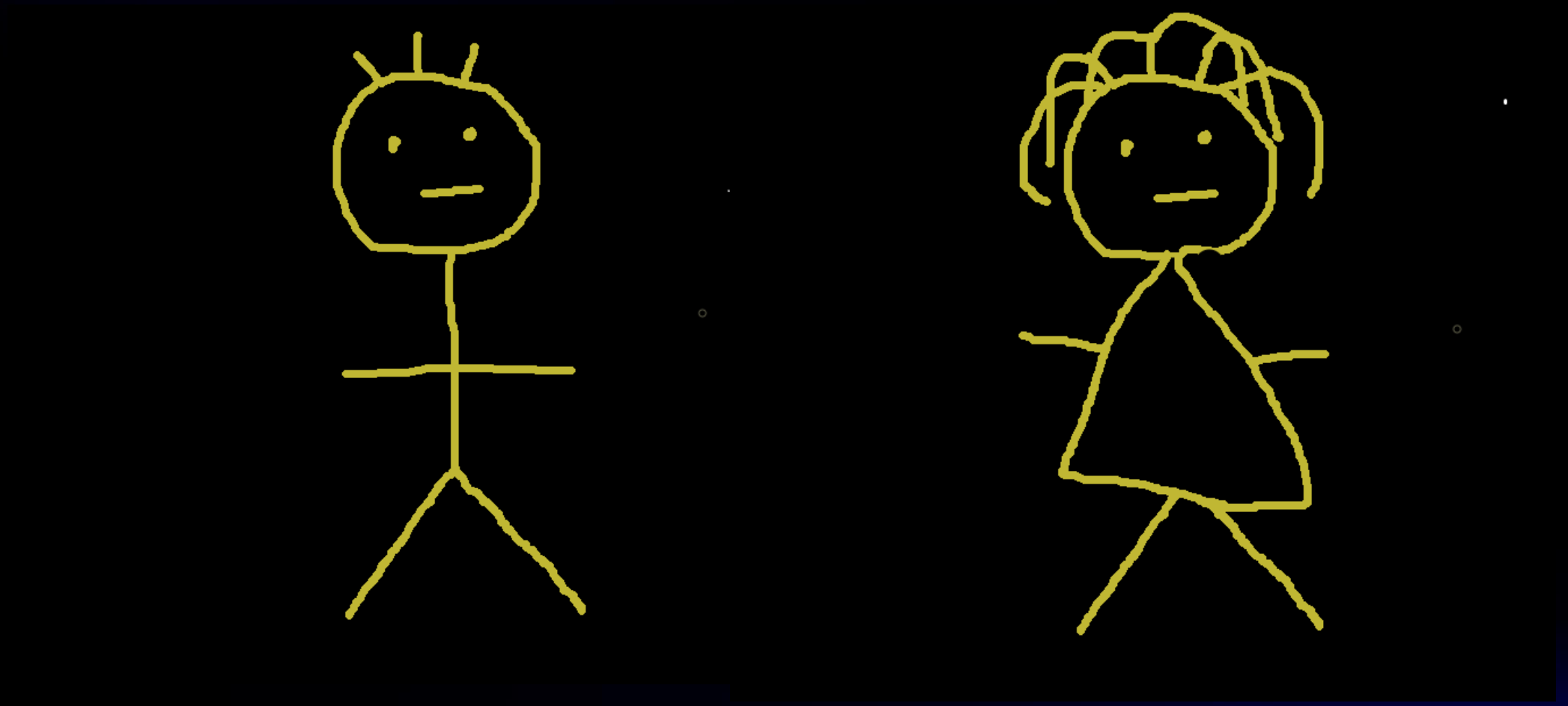
Cultural (r)evolution

- What even is "culture"?

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The people vs. technology

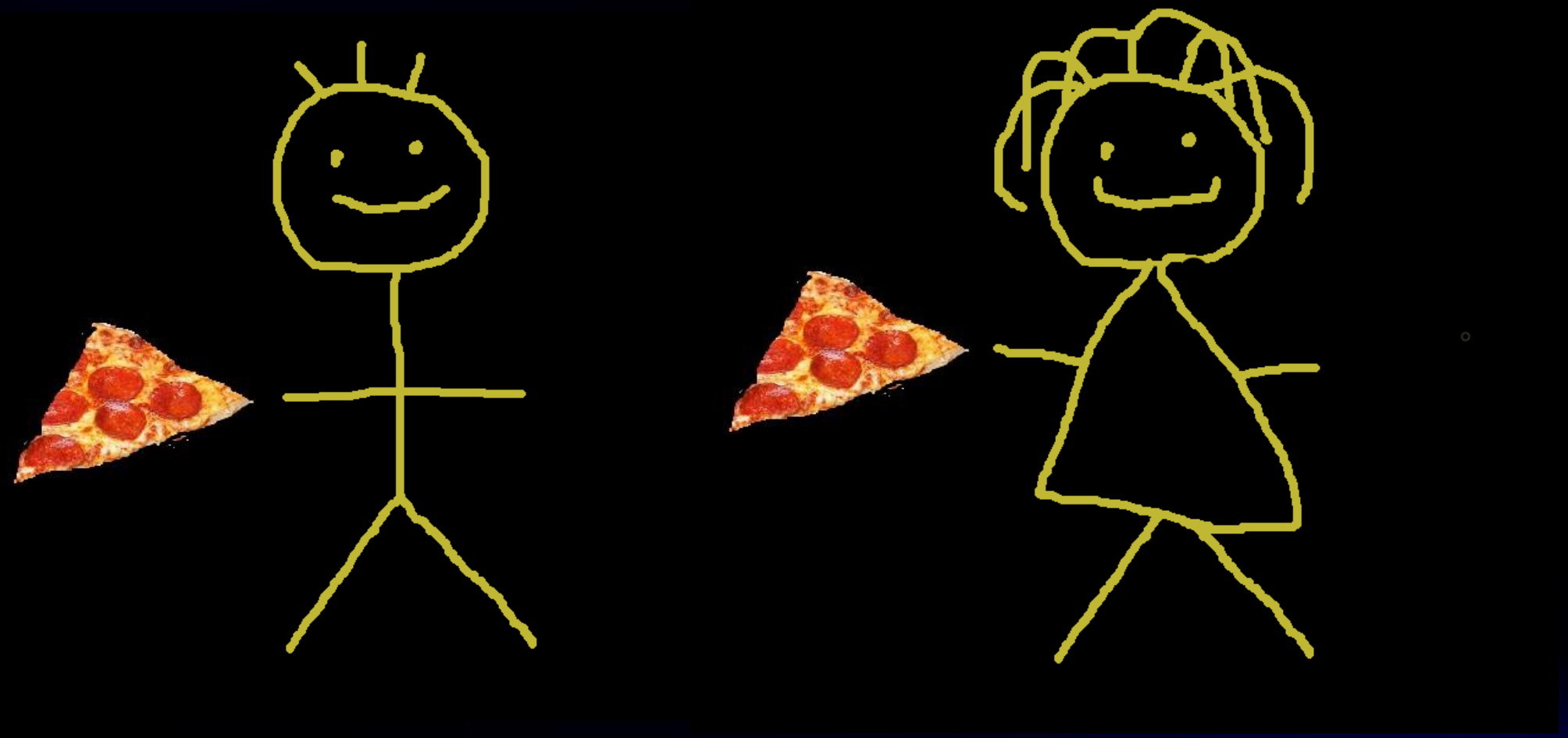
IN THE SOFTWARE LAND, ALL HAIL THE DEVELOPER . . .



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The people vs. technology

IN THE SOFTWARE LAND, ALL HAIL THE DEVELOPER . . .



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Cultural (r)evolution

The basics

- Communicate
- Collaborate
- Innovate
- Measure
- Be accountable

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Cultural (r)evolution

The basics

- Communicate
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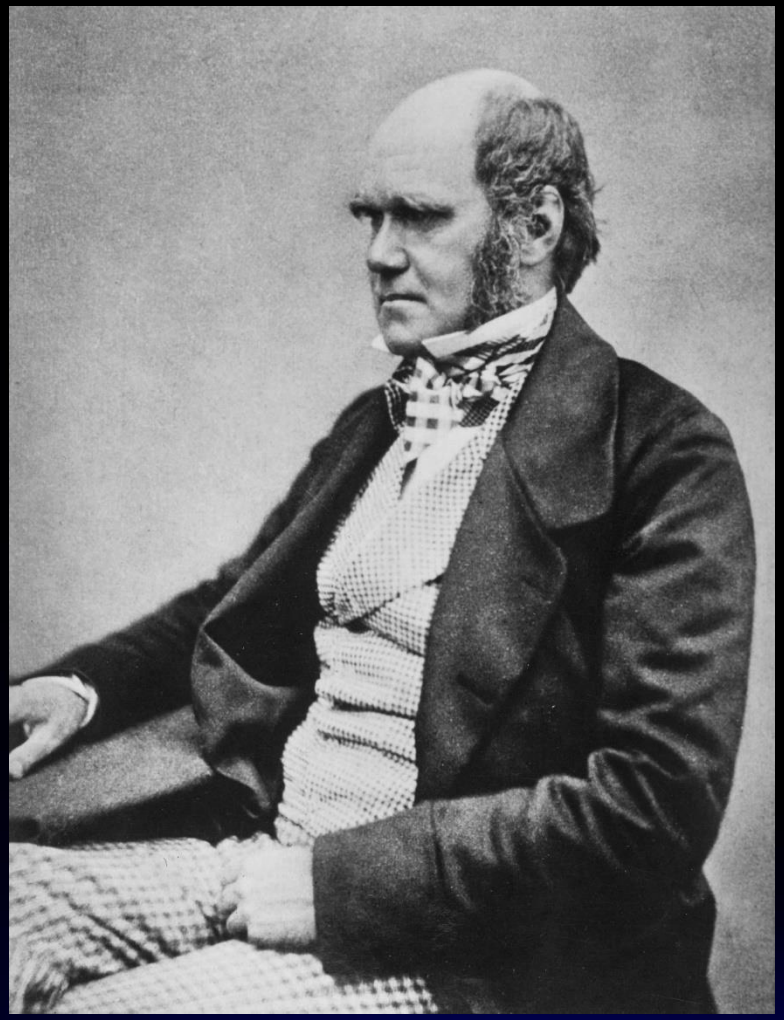
Don’t forget . . . to be nice to each other

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Cultural (r)evolution

Who

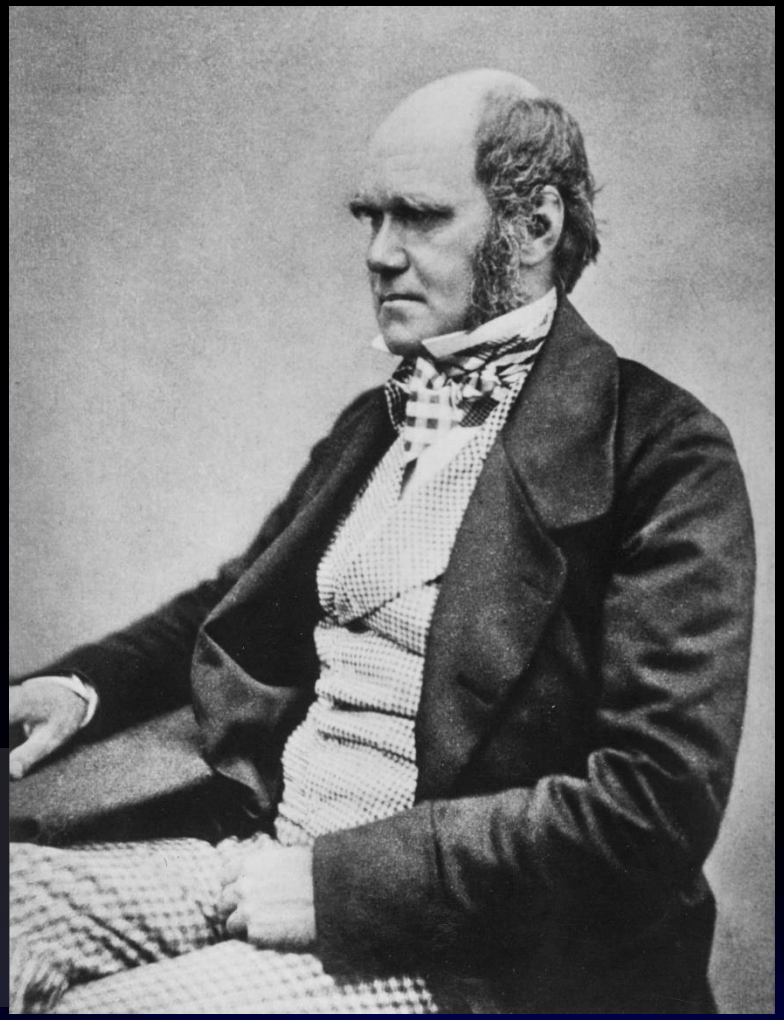
he?



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Cultural (r)evolution

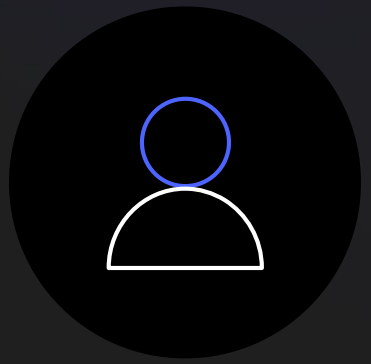
Who he?



> It's not the strongest or the most intelligent that survives . . .
>
> but the one **most responsive** to change.

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The credits



Protagonist

Lead Architect and
Head of Sarcasm

Pranjal Mathur



Agilist

Delivery Lead and
Head of Optimism

Kiran Nakka



Realist

Leadership Guru and
Head of Motivation

Susan Devlin

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Thank you!

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