

Database DevOps: Better database change management

Chicago PUG

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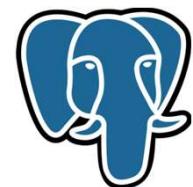
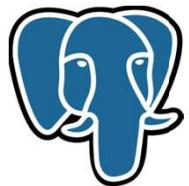
$$\begin{matrix} \text{two people} \\ + [\end{matrix} \begin{matrix} \text{woman} \\ , \end{matrix} \begin{matrix} \text{woman} \\ , \end{matrix} \begin{matrix} \text{boy} \\ , \end{matrix} \begin{matrix} \text{girl} \\ , \end{matrix} \begin{matrix} \text{boy} \\ , \end{matrix} \begin{matrix} \text{girl} \\] = \end{matrix} \begin{matrix} \text{heart} \end{matrix}$$

$$\begin{matrix} \text{family} \\ , \end{matrix} \begin{matrix} \text{music note} \\ , \end{matrix} \begin{matrix} \text{bee} \\ , \end{matrix} \begin{matrix} \text{coffee cup} \\ = \end{matrix} \begin{matrix} \text{100} \end{matrix}$$

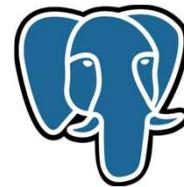


My Journey

Work



Hobby



1999

2004

2018

2020

2022

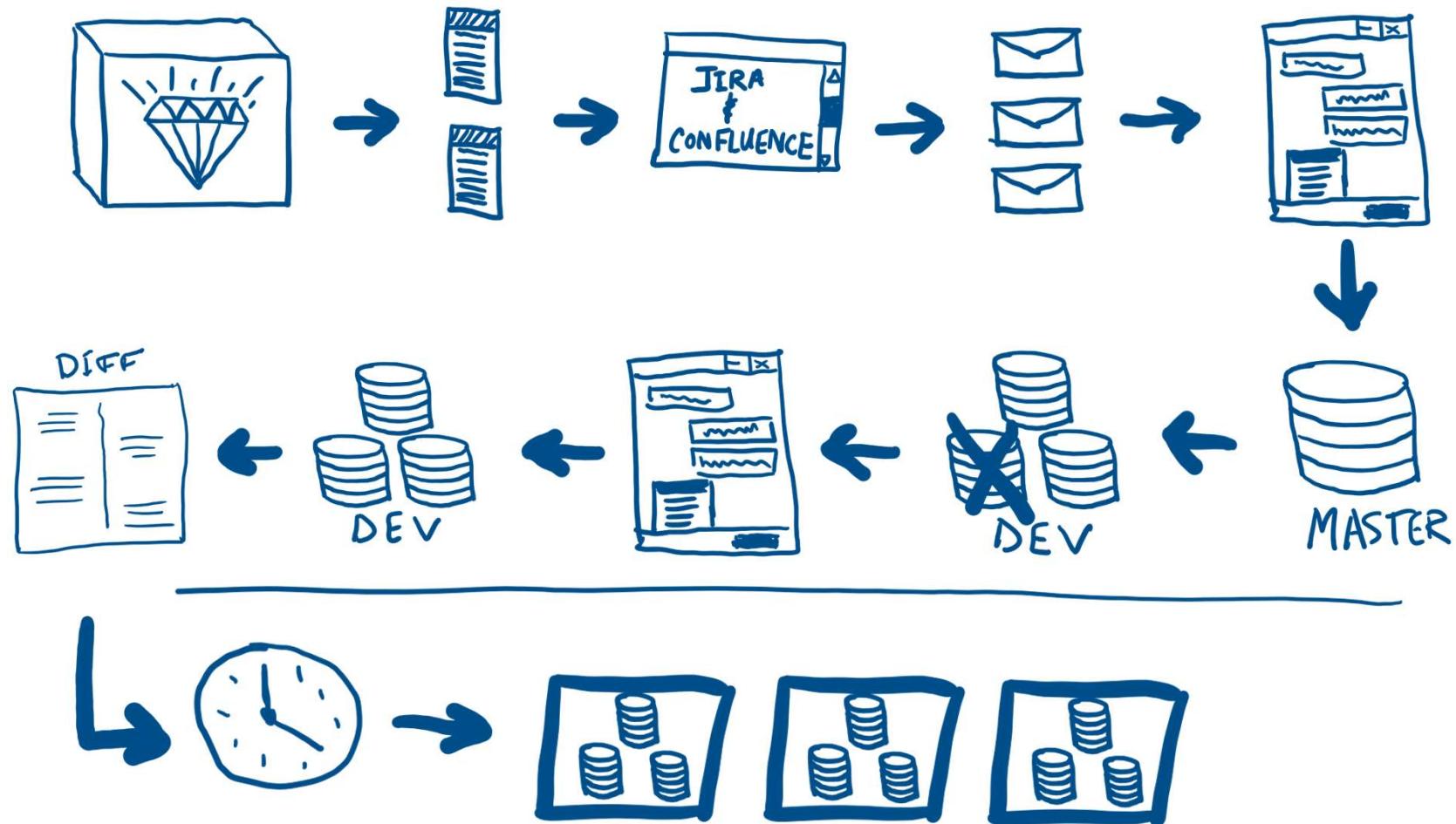


Agenda

- 01** What problem are we solving?
- 02** Database change management architectures
- 03** Elevator pitch demo
- 04** Database DevOps Goal

01/04

What problem are we solving?



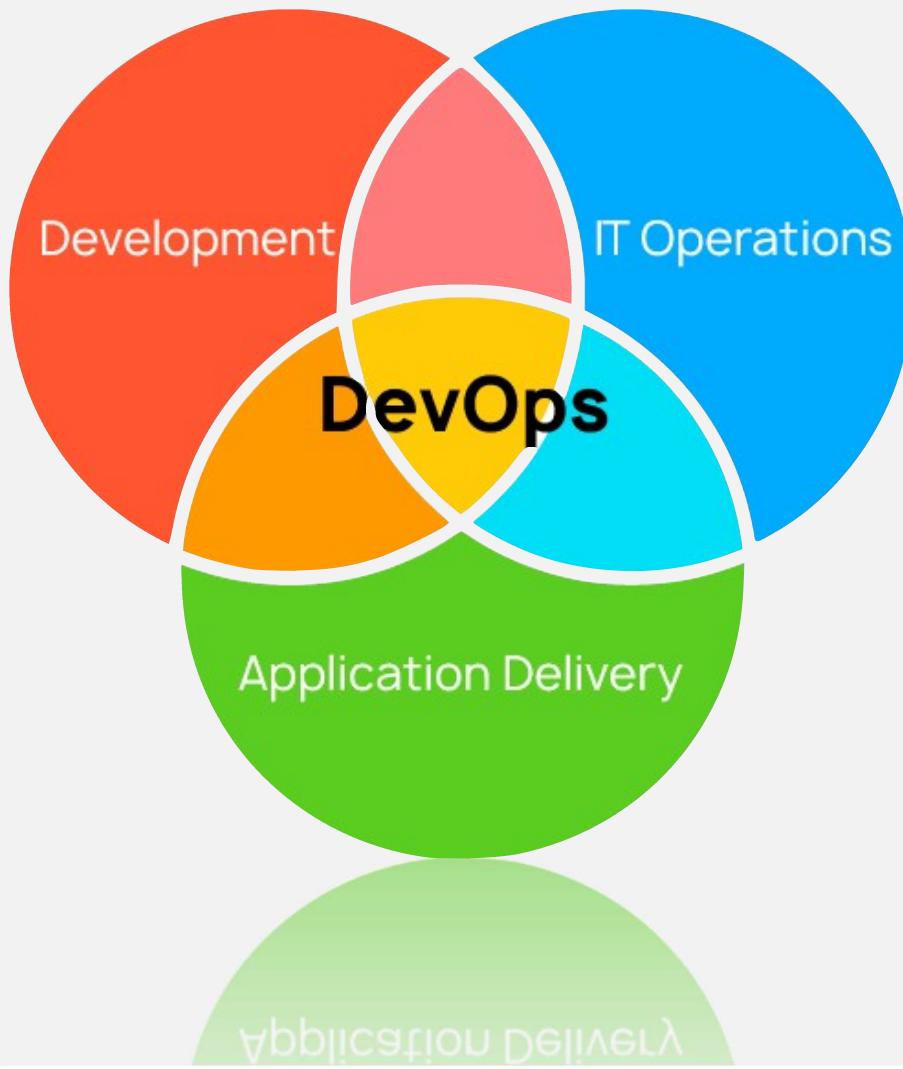


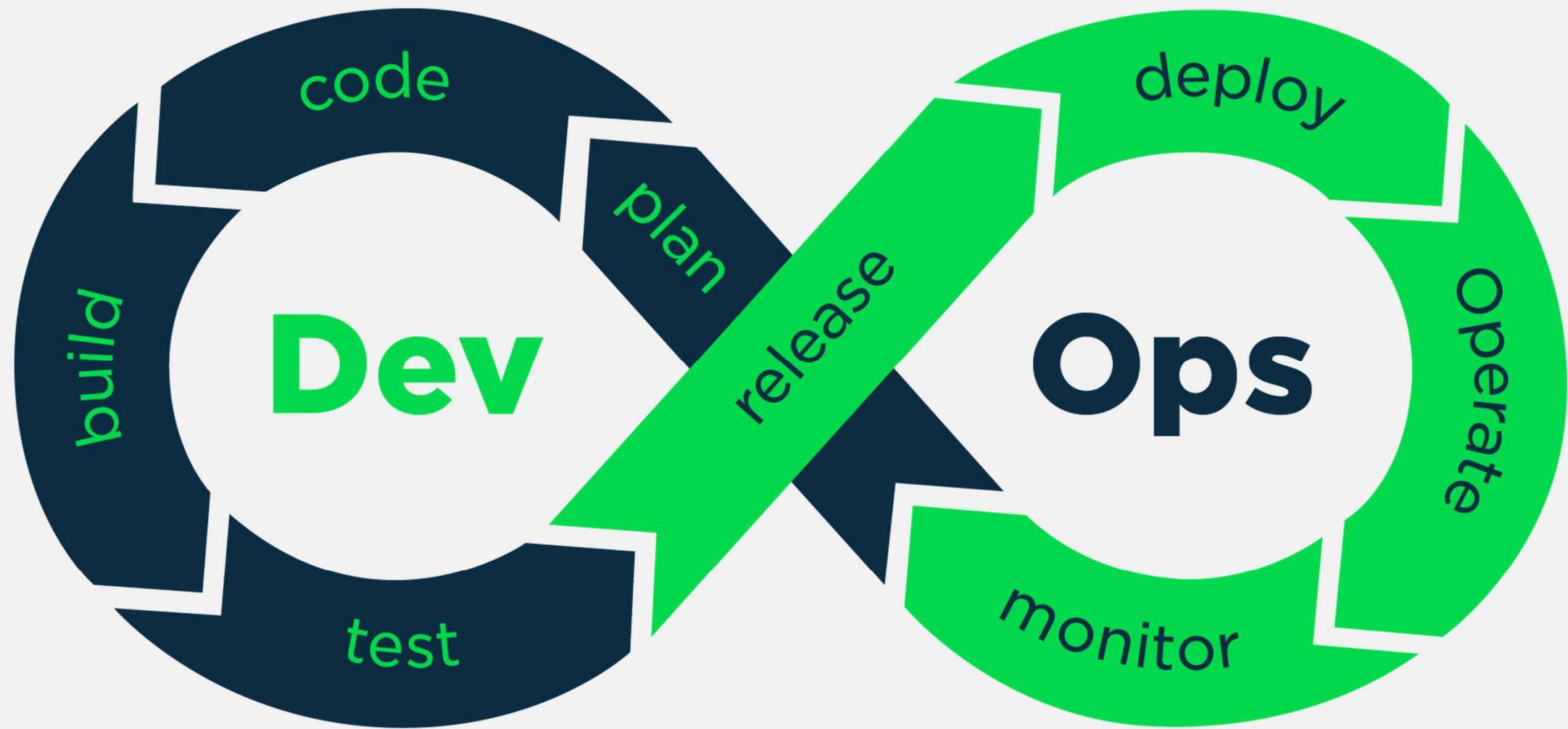
**There had to be a
better way...**

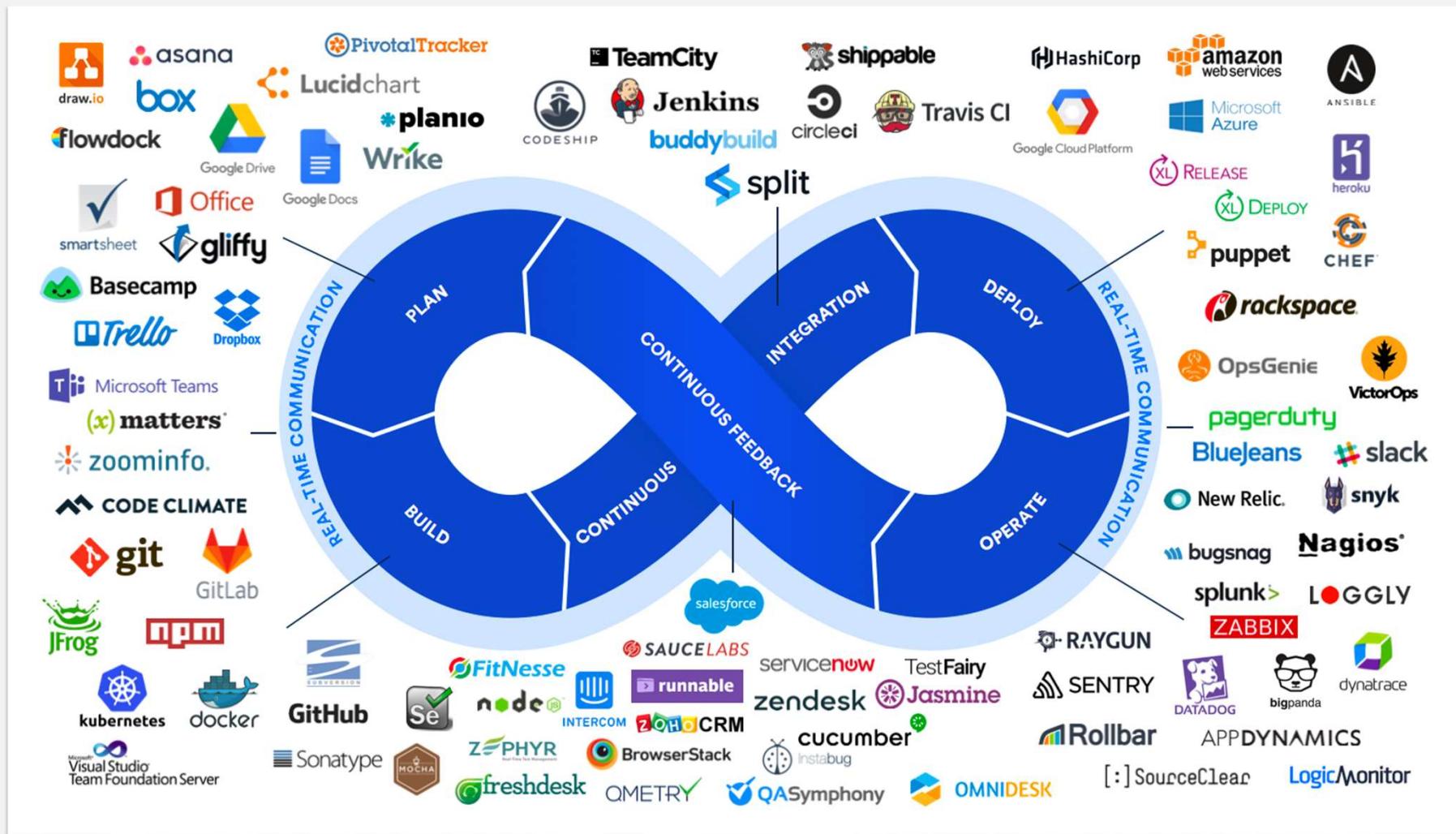
...right?

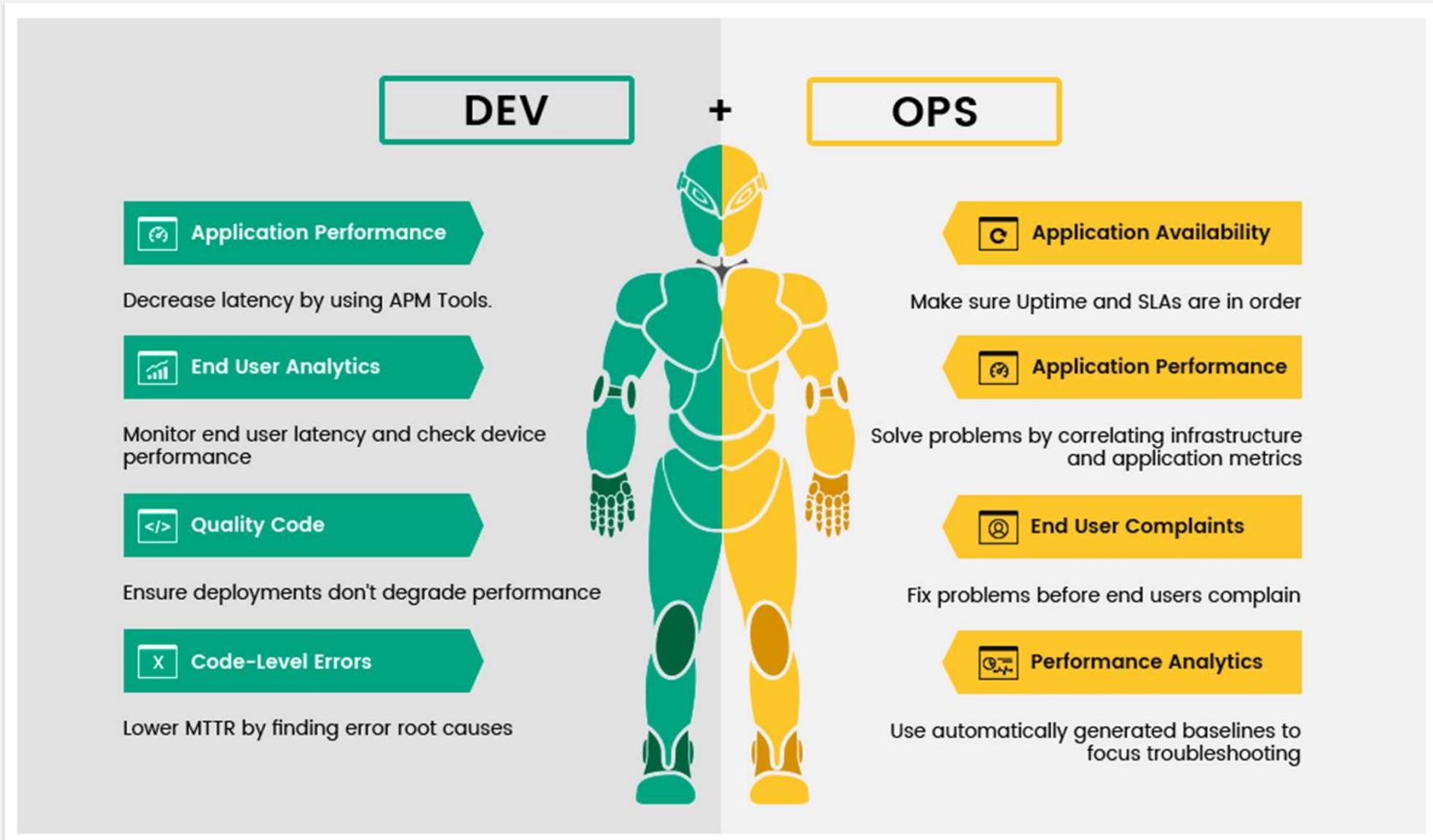


**"We're putting the
DevOps back together."**

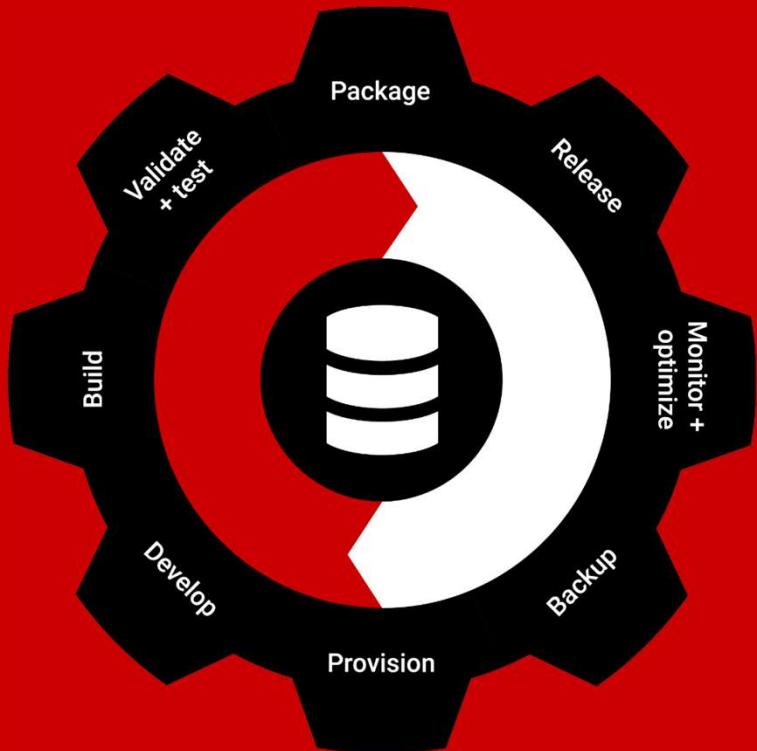












“DevOps is the union of people, process, and products to enable continuous delivery of value to our end users.”

**Donovan Brown,
Partner Program Manager, Azure Incubations,
Microsoft**



What is Database DevOps

Standardize
team-based development

Automate
database deployments

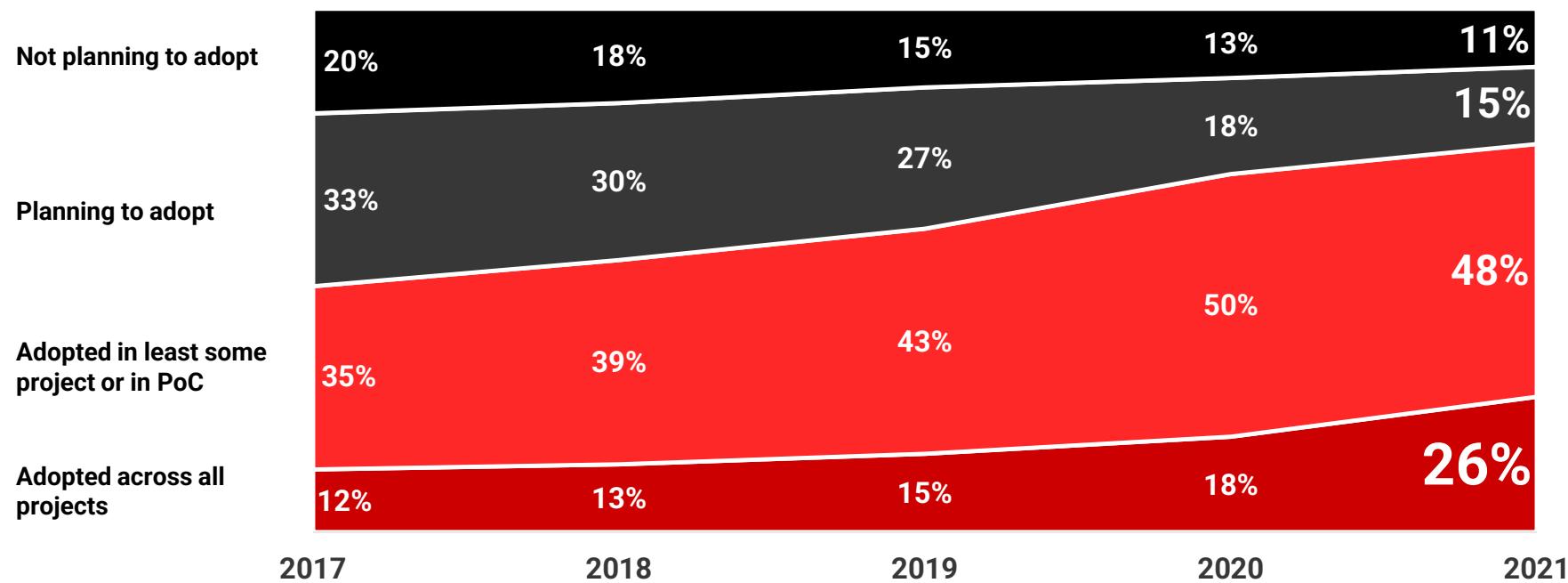
Protect
and preserve data

Monitor
performance & availability



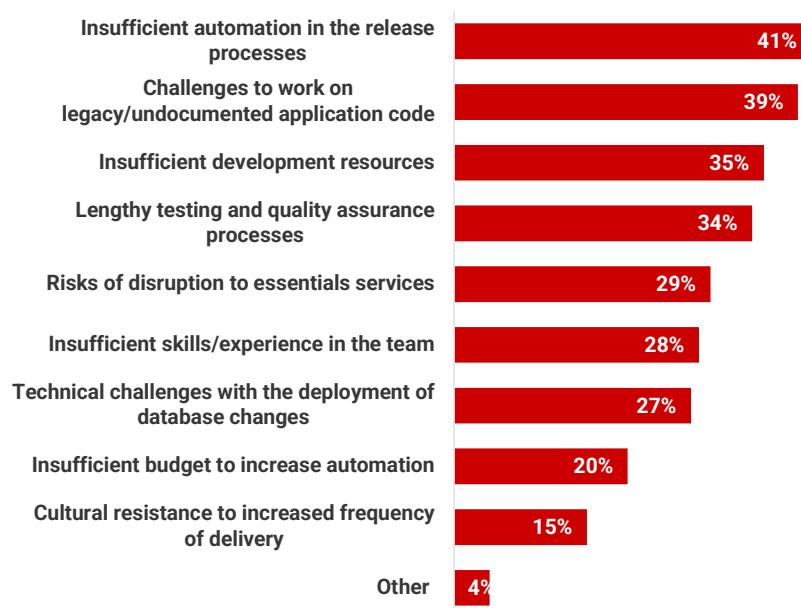
Adoption of DevOps has been increasing steadily over the past 5 years

DevOps adoption trends (2017-2020)

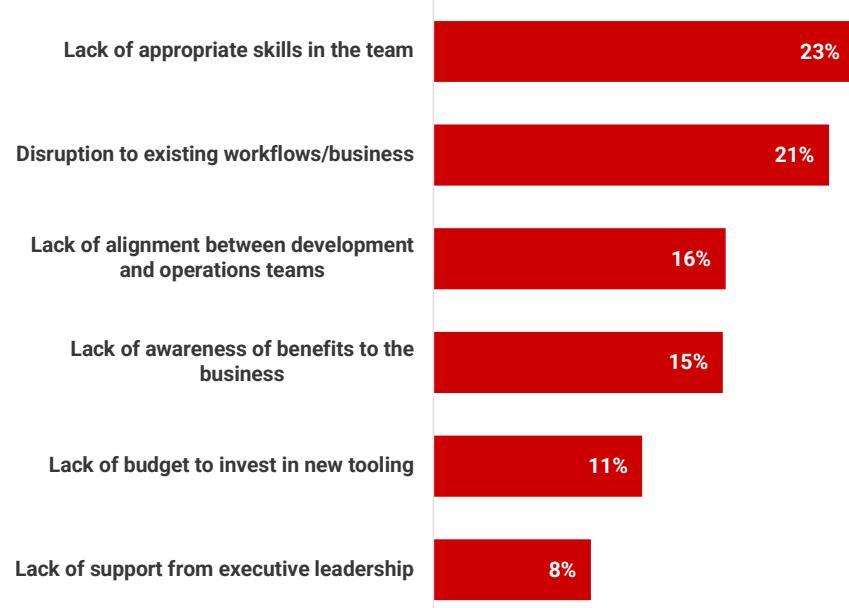


Challenges to adopt DevOps and improve performance

What are the top challenges to improve software delivery performance

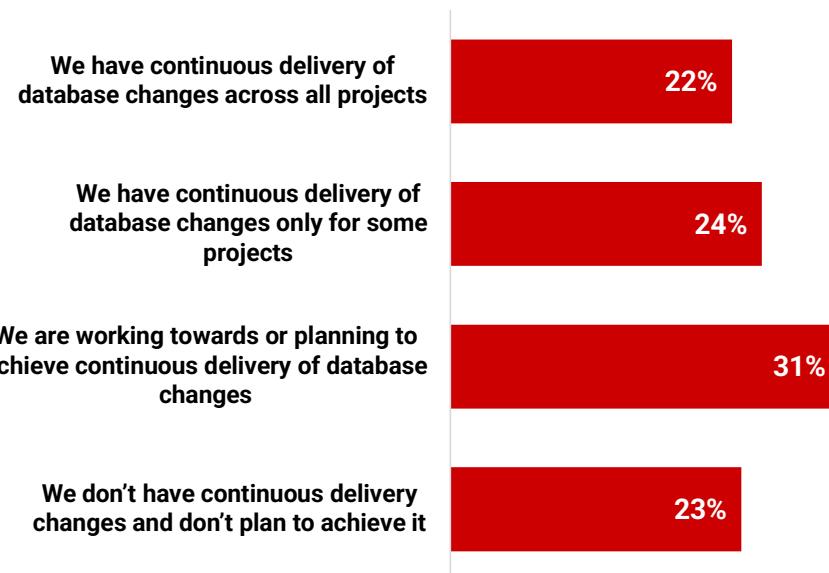


What was, or what would be, the main obstacle to implementing a DevOps approach in your organization?

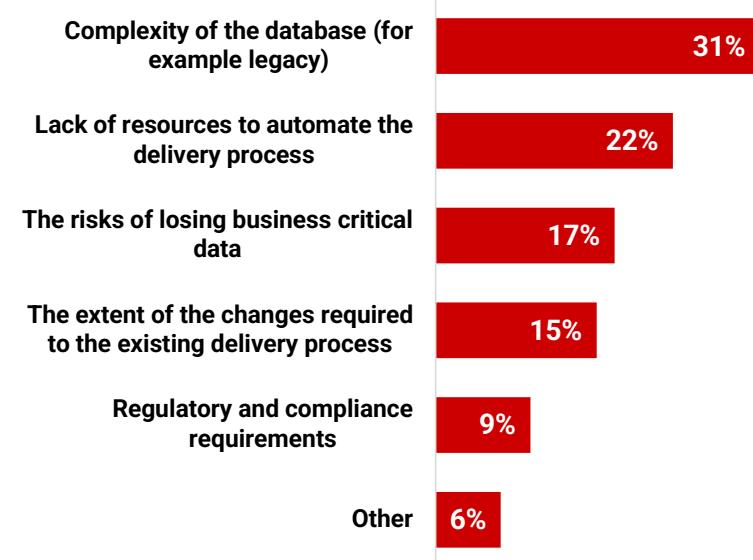


Continuous delivery of database changes is still challenging to implement

Which of the following statements best describe your organization's delivery process for database changes?

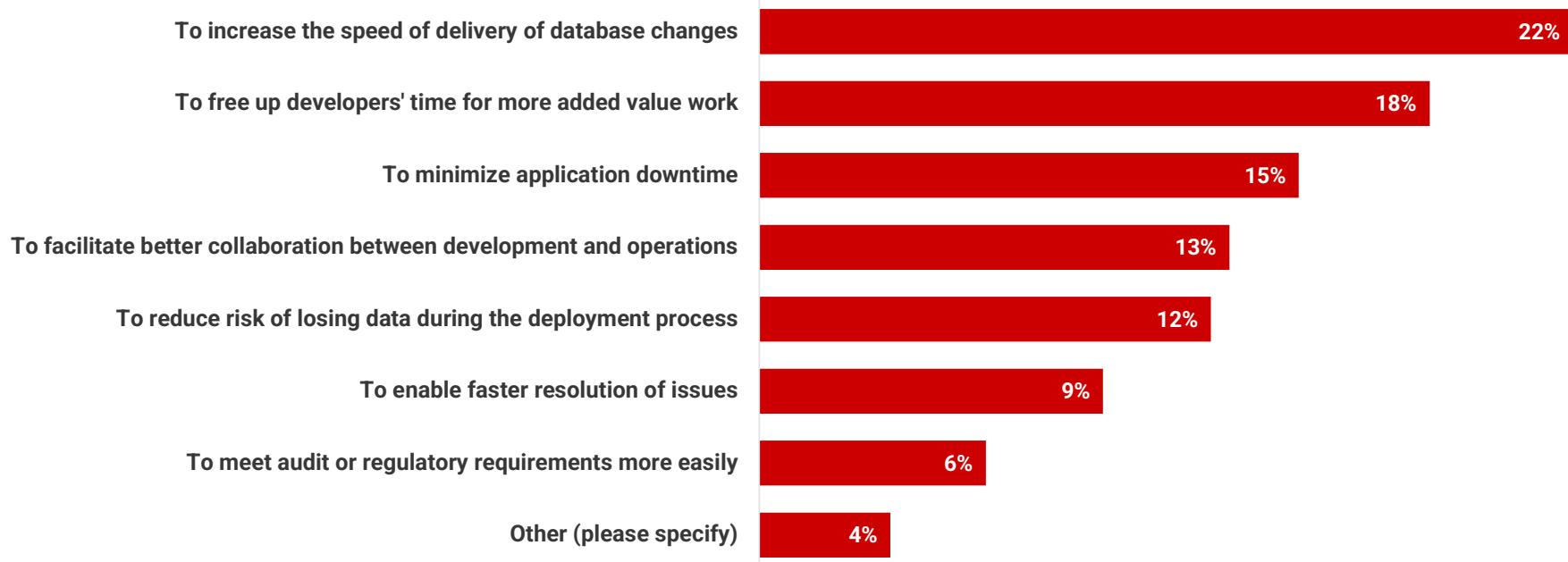


What would be or was the greatest challenge to achieve continuous delivery of database changes?



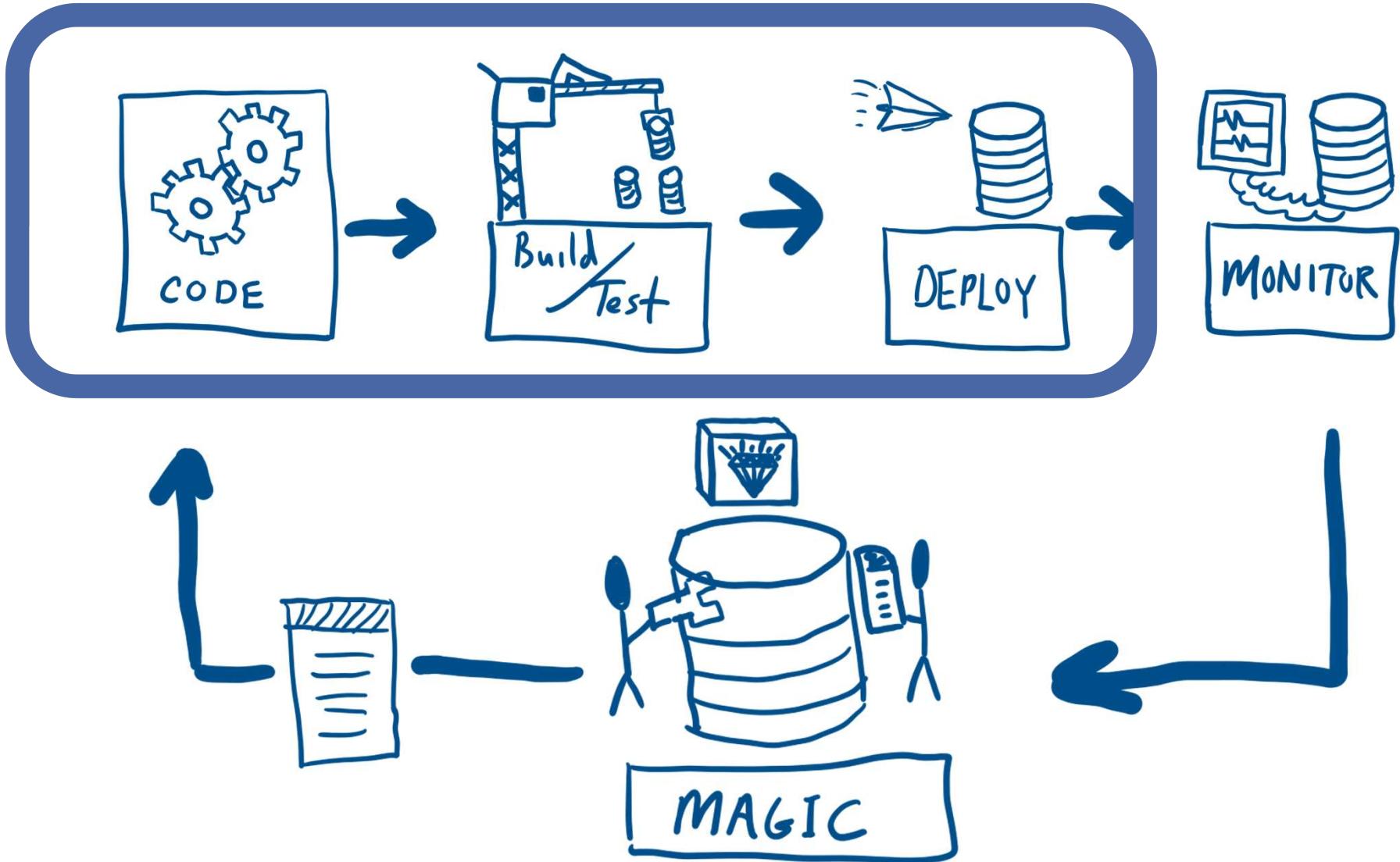
Speed and efficiency are the main drivers to implement database DevOps

Which of these would be the main driver for automating the delivery of database changes as part of a wider DevOps process?



Shift Left!

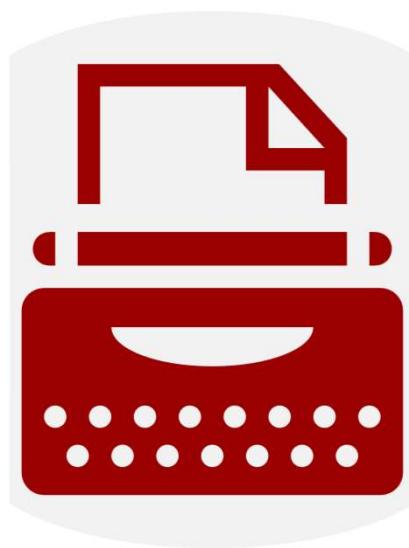




02/04

Database change management architectures

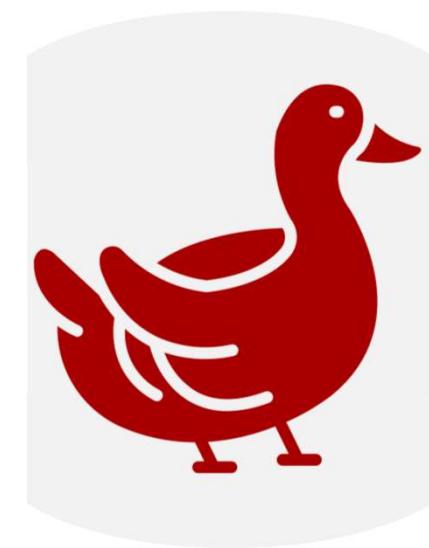
Change Management Architectures



Manual



State-based



Migration-based

Manual Change Management

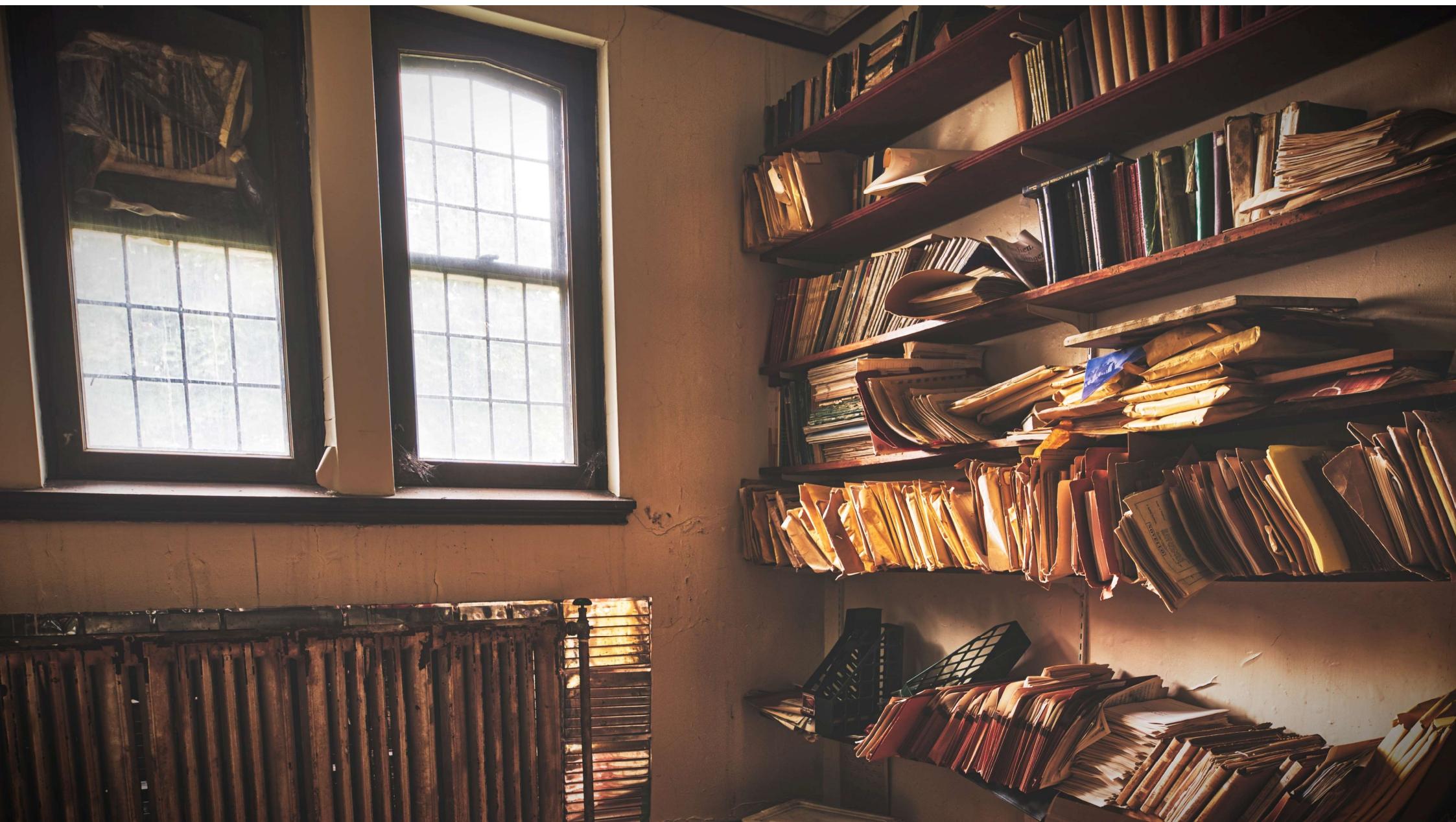


Manual Change Management

- Easy to start
- Easy to customize
- Error prone
- Not scalable
- "Wild West" management



Bad movie & Bad idea







E,₁ M₃, A,₁ I,₁ L,₁

H⁴

R¹

A¹

S⁵

É

B³

C³

E

E





State-based



State-based

- Easily identify the **source of truth**
- **One migration** from state-to-state
- Good for re-aligning databases that **drift**

State-based tools

Entity Relationship (ER)

- ER/win, ERStudio
- pgModeler

Database-first tools

- SQL Server Database Projects
- Flyway & Liquibase (partial)

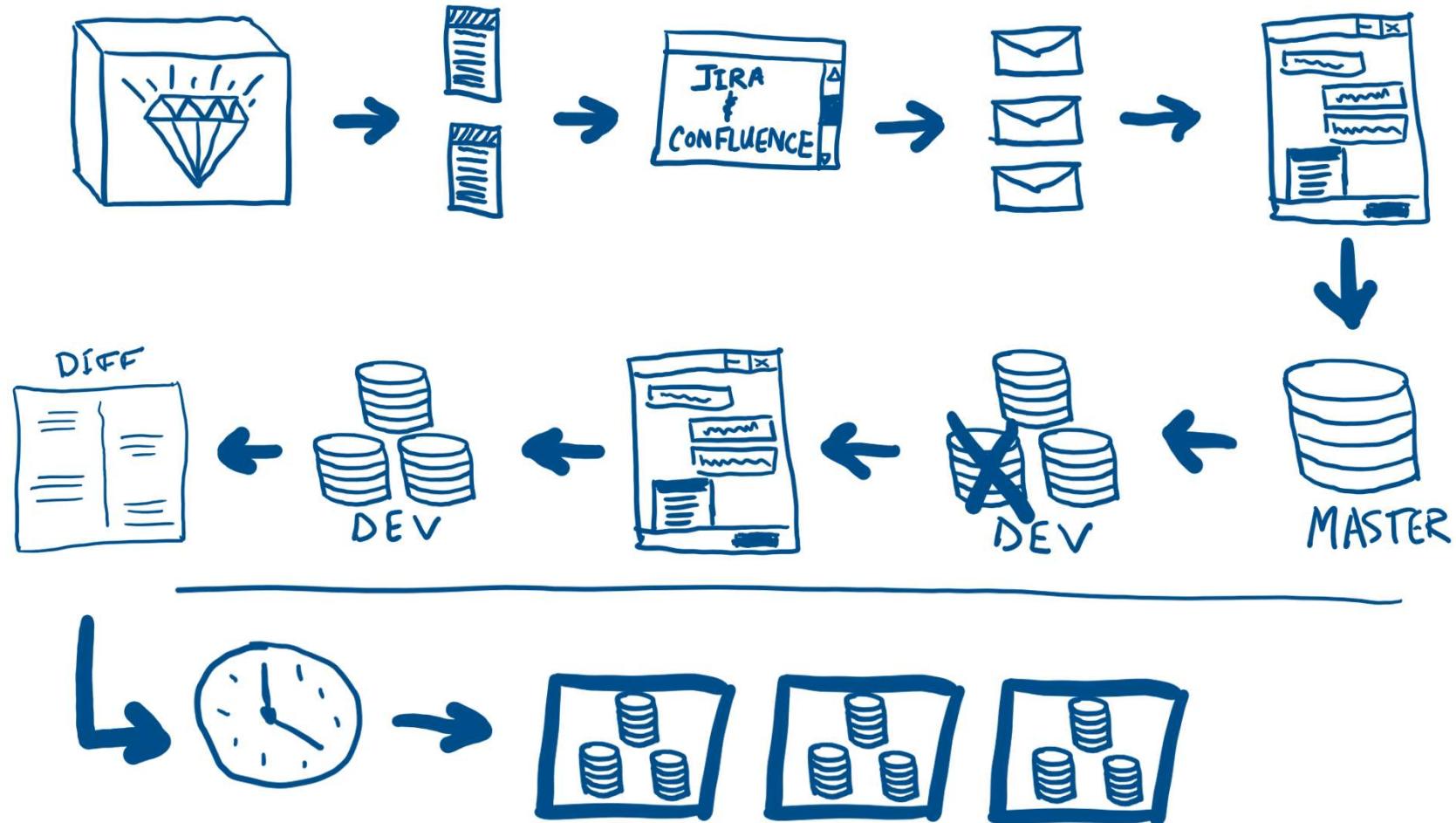
Manual Diff Tools

- **IDEs**
 - DBeaver, SSMS, Data Grip, Azure Data Studio, PGAdmin, etc.
- **DB Specific Tools**
 - Postgres Compare (paid), SQL Compare (paid)
- **OSS Scripts**
 - Migra, Pyseas (both Postgres)

Manual State Management

- Maintain (at least) two copies of PROD: DEV & STAGING
- Apply changes to DEV
- Compare (DIFF) DEV -> STAGING
- Verify migration script
- Apply script to STAGING
- Verify STAGING
 - Backup PROD -> restore STAGING -> backup PROD -> restore STAGING -> repeat...
- Apply to PROD when appropriate





Migrations



Migrations (ORM)

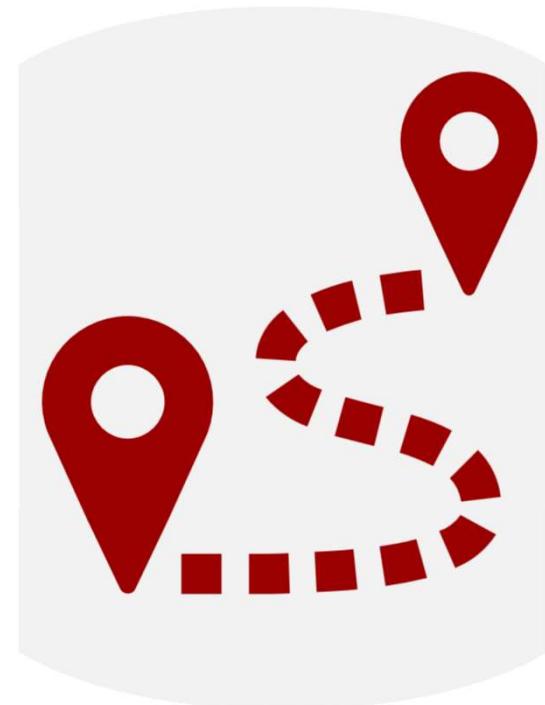
- Schema management for developers
- All major languages support migrations
- Data objects = Schema objects
- Functions/Triggers/Stored Procedures can be cumbersome
- Repeatable scripts usually not supported easily



* You are (probably) here

Migrations (SQL)

- Step-based migrations, similar to ORM
- Typically, pure SQL... although some support language frameworks
- SQL-specific features vary by tool
 - Verify/testing integration
 - Repeatable (idempotent) migrations
- Can "baseline" an existing database



* You want to get here!

Flyway

- Originally OSS, Java-based tool
- Now owned by Redgate
- Free and Paid tier
- Active support and community
- Repeatable migrations
- Placeholder values in scripts



03/04
Demo

04/04

Database DevOps Goal

What is Database DevOps

Standardize
team-based development

Automate
database deployments

Protect
and preserve data

Monitor
performance & availability



What are the results of adoption?

- Repeatable, reliable deployments
- Data protection by default
- Empowerment of individuals
- Faster speed to value
- Employee retention
- Improved reputation
- Improved communication

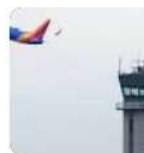


CNN

FAA system outage causes thousands of flight delays and cancellations across the...
1 day ago

FOX BUSINESS

FAA outage caused by personnel who 'failed to follow procedures'
1 hour ago



NBC NEWS

FAA outage: Damaged database file took down safety system, grounding...
1 day ago



ABC NEWS

Software maintenance mistake at center of major FAA computer meltdown:...
2 days ago



NPR

What is NOTAM? The latest on the outage that led to a nationwide ground stop
1 day ago



What behaviors are required?

- Standardise early
- Shift left
- Strive for small frequent changes
- Drive automation - everywhere

What Questions do you have?





THANK YOU!

github.com/ryanbooz/presentations

