

Database Deployments without the Drama



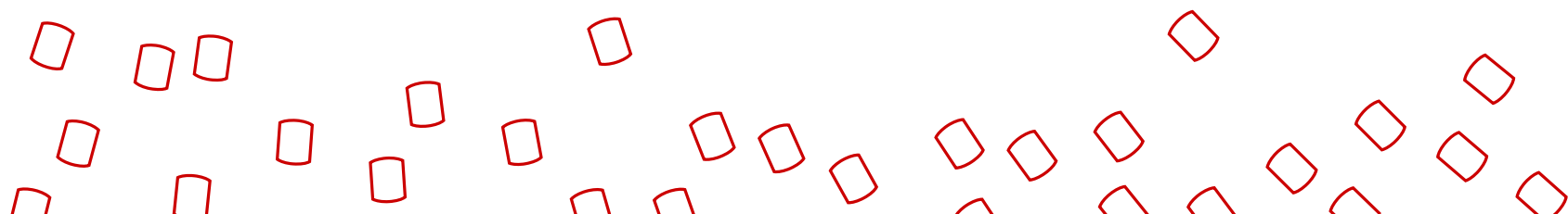
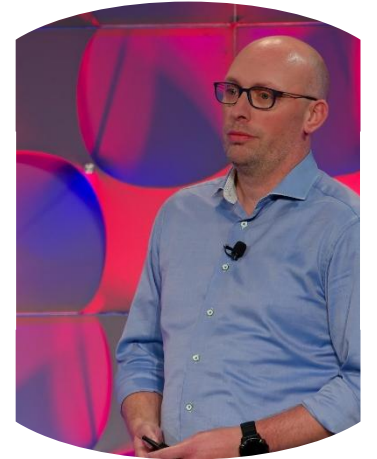
 redgate
Summit

Danny de Haan

Solutions Engineer

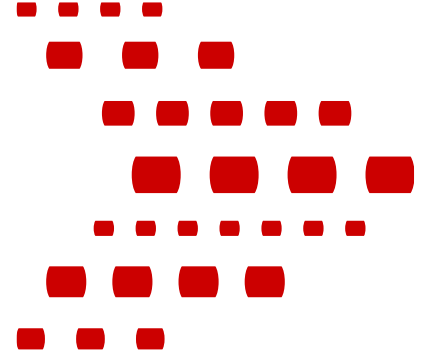
 [/in/dannydh](https://www.linkedin.com/in/dannydh)

thatinfradba@pm.me



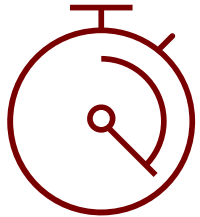
Agenda

- **Delivery Metrics**
- **Deployment Challenges**
 - Manual Code Review
 - Central Source of Truth
 - Drift in Downstream Environments
 - No Rollback Strategy
 - Monitoring & Feedback Loops
- **Q&A**



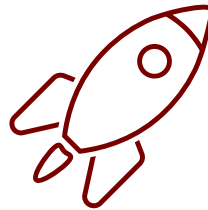
The (hopefully relatable) DBA Story

What metrics to track?



Change Lead Time

The time it takes from the point of committing code to code running in production



Deployment Frequency

This metrics measures how often new code is deployed to Production.



Change Fail Percentage

The % of deployments that result in a failure in Production, sometimes known as change failure rate (CFR)



Mean Time to Recovery

Average time it takes to Recover from failure in the Production environment. Also Known as MTTR

Challenge #1: Manual Code Review



Challenge #1: Manual Code Review



Change Lead Time

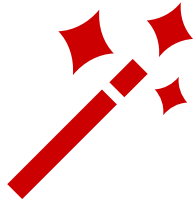


Deployment Frequency



Change Failure Rate

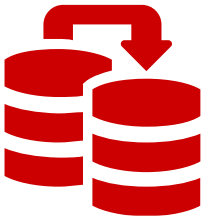




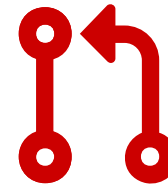
Auto-generate the
migration scripts
using Flyway



Automate the enforcement company/code
standards using the Flyway customizable
rules engine



Introduce an automated dry-run step in your
CI process against a production-like
database to test the execution and the
potential lead time using Flyway and TDM



Introduce Git pull
requests and automated
triggers to run tests

Migration script

Version ?

010_20250811101528

Description

Administrator

```
3 SET ANSI_PADDING, ANSI_WARNINGS, CONCAT_NULL_YIELDS_NULL, ARITHABORT, QUOTED_IDENTIFIER, ANSI_NULLS ON
4 GO
5 PRINT N'Creating [dbo].[alter]'
```

```
6 GO
7 CREATE TABLE [dbo].[alter]
8 (
9 [Id] [int] NOT NULL
10 )
11 GO
12 ALTER LOGIN sa WITH PASSWORD = 'WhateverIWantItToBe'
13 GO
```

Undo script

Version ?

010_20250811101528

Description

UNDO-Administrator

```
1 SET NUMERIC_ROUNDABORT OFF
2 GO
3 SET ANSI_PADDING, ANSI_WARNINGS, CONCAT_NULL_YIELDS_NULL, ARITHABORT, QUOTED_IDENTIFIER, ANSI_NULLS ON
4 GO
5 PRINT N'Dropping [dbo].[alter]'
```

```
6 GO
7 DROP TABLE [dbo].[alter]
8 GO
```



Report generated:

2025-08-11 10:21:31 ▼

[Dashboard](#)

[Code Analysis](#)

[Change Report](#)

[Drift Report](#)

[Migration Report](#)

[Dry Run Report](#)



2 violations

✓ C:\Repos\StackOverflow\migrations\V010_20250811101528__Administrator.sql

- Line 12, Column 1 - RX002 : Attempt to change password

✓ C:\Repos\StackOverflow\migrations\V009_20250808114407__Administrator.sql

- Line 7, Column 1 - RX001 : DROP TABLE statement

> migrations

▼ rules

- RX001__DropTables.toml
- RX002__PasswordChange_TSQL.toml
- RX003__Truncate.toml
- RX004__DropColumn.toml
- RX005__GrantToPublic.toml
- RX006__GrantWithGrantOption.toml
- RX007__GrantWithAdminOption.toml
- RX008__AlterUser.toml
- RX009__GrantAll.toml
- RX010__CreateServerRole.toml
- RX011__AlterServerRole.toml
- RX012__CreateTableWithoutPK.toml
- RX601_ExecSpConfigure.toml**
- RX602_ExecReconfigure.toml

RX601_ExecSpConfigure.toml

[Contents](#) [History](#) [Compare](#) [Blame](#)

```
1 dialects = ["TEXT"]
2 rules = ["(?i)(?<=^|\\s)sp_configure\\s+ALL(?:=|$|\\s|;)"]
3 passOnRegexMatch = false
4 description = "Execute sp_configure"
```

← Jobs in run #ADO-self-...
HROracle - Build

Deploy Build

▼

✓

Build48s

⌵

Initialize job<1s

✓

Checkout templates@...10s

✓

Checkout HROracle@d...2s

✓

Clean Build DB16s

⌵

Drift And Change Rep...<1s

⌵

Publish Drift And Cha...<1s

✓

Validate Migrate Scripts9s

✓

Validate Undo Scripts7s

✓

Post-job: Checkout H...<1s

✓

Post-job: Checkout te...<1s

⌵

Finalize Job<1s

⌵

Report build status<1s

✓ Validate Migrate Scripts

🔍 View raw log

86 Table dropped.
87 Table altered.
88 Table created.
89 Migrating schema "HR" to version "013.20240710195247 - redgate"
90 Table altered.
91 Migrating schema "HR" to version "014.20240822215417 - Feature123 Add column"
92 Table altered.
93 Successfully applied 14 migrations to schema "HR", now at version v014.20240822215417 (execution time 00:01.513s)
94 Executing SQL callback: afterMigrate - fix invalid objects
95 Schema version: 014.20240822215417
96
97 +-----+-----+-----+-----+-----+-----+-----+
98 | Category | Version | Description | Type | Installed On | State | Undoable |
99 +-----+-----+-----+-----+-----+-----+-----+
100 | Baseline | 001.20230215190287 | baseline | SQL_BASELINE | 2024-08-22 23:02:03 | Baseline | No |
101 | Versioned | 002.20230215195855 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
102 | Versioned | 003.20240129195859 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
103 | Versioned | 004.20240129200052 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
104 | Versioned | 005.20240129200317 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
105 | Versioned | 006.20240129200458 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
106 | Versioned | 007.20240205185541 | redgate | SQL | 2024-08-22 23:02:03 | Success | Yes |
107 | Versioned | 008.20240205190431 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
108 | Versioned | 009.20240424211804 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
109 | Versioned | 010.20240703184218 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
110 | Versioned | 011.20240703190131 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
111 | Versioned | 012.20240703194150 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
112 | Versioned | 013.20240710195247 | redgate | SQL | 2024-08-22 23:02:04 | Success | Yes |
113 | Versioned | 014.20240822215417 | Feature123 Add column | SQL | 2024-08-22 23:02:04 | Success | Yes |
114 +-----+-----+-----+-----+-----+-----+-----+

Challenge #2: Central Source of Truth



servicenow

Challenge #2: Central Source of Truth

```
-- Check if the database exists
IF NOT EXISTS (SELECT name FROM sys.databases WHERE name = 'SampleDB')
BEGIN
    PRINT 'Creating database SampleDB...'
    CREATE DATABASE SampleDB;
END
ELSE
BEGIN
    PRINT 'Database SampleDB already exists.'
END

-- Use the database
USE SampleDB;

-- Check if the table exists
IF NOT EXISTS (SELECT * FROM INFORMATION_SCHEMA.TABLES WHERE TABLE_NAME = 'Employees')
BEGIN
    PRINT 'Creating table Employees...'
    CREATE TABLE Employees (
        EmployeeID INT PRIMARY KEY,
        FirstName NVARCHAR(50),
        LastName NVARCHAR(50)
    );
END
ELSE
BEGIN
    PRINT 'Table Employees already exists.'
END

-- Check if the column "HireDate" exists
IF NOT EXISTS (
    SELECT * FROM INFORMATION_SCHEMA.COLUMNS
    WHERE TABLE_NAME = 'Employees' AND COLUMN_NAME = 'HireDate'
)
BEGIN
    PRINT 'Adding column HireDate...'
    ALTER TABLE Employees ADD HireDate DATE;
END
ELSE
BEGIN
    PRINT 'Column HireDate already exists.'
END
```

```
BEGIN TRY
    BEGIN TRANSACTION;

    -- Check if the column already exists
    IF NOT EXISTS (
        SELECT
            *
        FROM
            INFORMATION_SCHEMA.COLUMNS
        WHERE
            TABLE_NAME = 'Employees'
            AND COLUMN_NAME = 'NewColumn'
    )
    BEGIN
        -- Add the new column
        ALTER TABLE dbo.Employees
        ADD
            NewColumn NVARCHAR(50);

        PRINT 'Column NewColumn added successfully';
    END
    ELSE
    BEGIN
        PRINT 'Column NewColumn already exists';
    END

    COMMIT TRANSACTION;
END TRY
BEGIN CATCH
    PRINT 'An error occurred';
    ROLLBACK TRANSACTION;
END CATCH;
```

Challenge #2: Central Source of Truth



Change Lead Time



Change Failure Rate



Mean Time to Recovery





Flyway maintains an audit trail of deployments against each environment

Dry-Run

Flyway uses the deployment audit trail to generate a dry-run script of only pending scripts and changes against each environment.


```
SELECT
    [installed_rank]
    ,[version]
    ,[description]
    ,[type]
    ,[script]
    ,[checksum]
    ,[installed_by]
    ,[installed_on]
    ,[execution_time]
    ,[success]
FROM [flyway_schema_history]
ORDER BY installed_on desc
```

Results										
	installed_rank	version	description	type	script	checksum	installed_by	installed_on	execution_time	success
	43	043.20250716213211	YourNewMigrationDescription	SQL	V043_20250716213211__YourNewMigrationDescriptio...	-1574024041	1237	2025-07-16 21:36:45.980	22	1
	42	042.20250711163029	wat	SQL	V042_20250711163029__wat.sql	844382407	1237	2025-07-16 21:36:45.927	76	1
	41	041.20241030194331	redgate	SQL	V041_20241030194331__redgate.sql	2074455786	1182	2024-10-30 19:57:26.687	28	1
	40	040.20241017164444	redgate	SQL	V040_20241017164444__redgate.sql	41868308	1167	2024-10-17 17:48:50.753	28	1
	39	039.20240924205007	redgate	SQL	V039_20240924205007__redgate.sql	-895773060	1148	2024-09-24 21:55:42.980	32	1
	38	038.20240919141033	redgate	SQL	V038_20240919141033__redgate.sql	-1044457070	1140	2024-09-19 15:38:02.937	80	1
	37	037.20240917153157	redgate	SQL	V037_20240917153157__redgate.sql	-1538979606	1134	2024-09-17 16:53:16.590	70	1
	36	036.20240821183012	redgate	SQL	V036_20240821183012__redgate.sql	-532337433	1116	2024-09-03 21:27:53.263	34	1
	35	035.20240620152358	redgate	SQL	V035_20240620152358__redgate.sql	-1695694158	1062	2024-06-20 17:00:23.440	71	1
0	34	034.20240607145044	redgate	SQL	V034_20240607145044__redgate.sql	956460760	1010	2024-06-07 19:12:04.353	88	1
1	33	033.20240429200152	alter territories	SQL	V033_20240429200152__alter_territories.sql	-1120461888	971	2024-04-29 21:06:33.450	24	1
2	32	032.20240425152300	addUnitName	SQL	V032_20240425152300__addUnitName.sql	78826513	959	2024-04-25 16:58:10.900	125	1
3	31	031.20240416005644	redgate	SQL	V031_20240416005644__redgate.sql	949614388	945	2024-04-16 02:52:14.073	118	1
4	30	030.20240329142718	redgate	SQL	V030_20240329142718__redgate.sql	159580376	937	2024-04-02 21:04:28.037	108	1
5	29	029.20240325192502	redgate	SQL	V029_20240325192502__redgate.sql	-1944117065	933	2024-03-25 19:48:51.607	35	1
6	28	028.20240305215543	redgate	SQL	V028_20240305215543__redgate.sql	1945587673	931	2024-03-05 22:06:00.587	40	1
7	27	027.20240227193624	redgate	SQL	V027_20240227193624__redgate.sql	154847591	926	2024-02-27 19:47:06.990	268	1
--	--	-----	.	---	-----	-----	-----	-----	--	.



Deployment script preview



A [Flyway dry run](#) generates a single SQL file containing all statements the command will execute against the target.

! If any changes are made to the migrations, generate a new dry run script before proceeding.

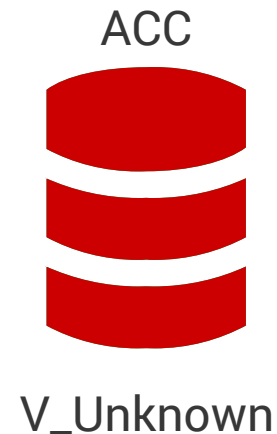
```
28 GO
29 SET ANSI_NULLS ON
30 GO
31 USE [StackOverflow_Tst]
32 GO
33 SET ANSI_NULLS ON
34 GO
35
36 -- Executing: migrate -> v005.20250807151619 (with callbacks)
37 -----
38
39 -- Source: C:\Repos\StackOverflow\migrations\V005_20250807151619__ActiveFlag.sql
40 -----
41 SET NUMERIC_ROUNDABORT OFF
42 GO
43 SET ANSI_PADDING, ANSI_WARNINGS, CONCAT_NULL_YIELDS_NULL, ARITHABORT, QUOTED_IDENTIFIER, ANSI_NULLS ON
44 GO
45 PRINT N'Altering [dbo].[Attachements]'
46 GO
47 ALTER TABLE [dbo].[Attachements] ADD
48 [Active] [bit] NULL
49 GO
50 PRINT N'Altering [dbo].[Badges]'
51 GO
52 ALTER TABLE [dbo].[Badges] ADD
53 [BadgeType] [varchar] (50) NULL
54 GO
55 PRINT N'Altering [dbo].[Users]'
56 GO
57 ALTER TABLE [dbo].[Users] ADD
58 [Active] [bit] NULL,
59 [ActivationDate] [datetime2] NULL
```

Close

Run migrate

Challenge #3: Drift in Downstream Environments

Database drift refers to the situation where a database environment gradually diverges from its expected or versioned state, often due to ad hoc or manual changes.



Challenge #3: Drift in Downstream Environments

What are common causes of database drift?

- Uncontrolled or direct changes against a database environment.
- Failed scripts that don't run inside a transaction requiring manual clean up.
- Inconsistent or manual undo processes that can leave the database in an inconsistent state.
- Use of idempotent scripts as a solution for “opting out” of versioning.

Challenge #3: Drift in Downstream Environments



Change Lead Time



Change Failure Rate



Mean Time to Recovery





Flyway has built-in capability to detect drift and generate an easy-to-understand report on what objects are in drift



Use of extended events in SQL Server and Custom Metrics in Redgate Monitor to alert on DDL changes against an environment



More frequent refreshing of non-production environments with the help of Test Data Manager

Report generated: 2025-08-07 14:32:36

[Dashboard](#)[Drift report](#)[Change Report](#)[Migration Report](#)[Dry Run Report](#)[Code Analysis Report](#)

+

0 object(s) added

0 object(s) removed

2 object(s) changed

i

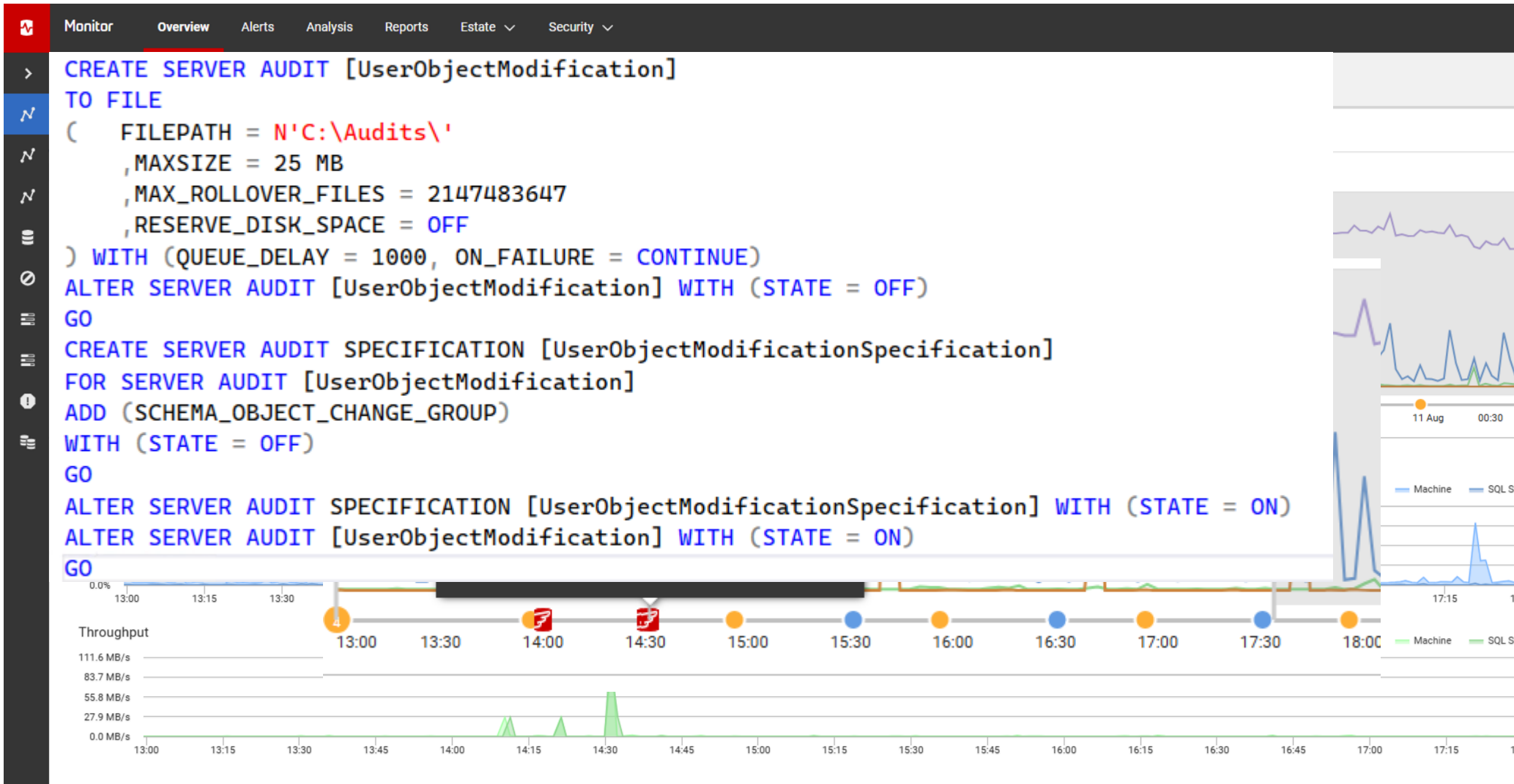
Environment: Prod

i

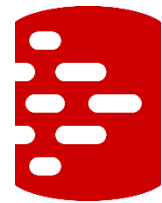
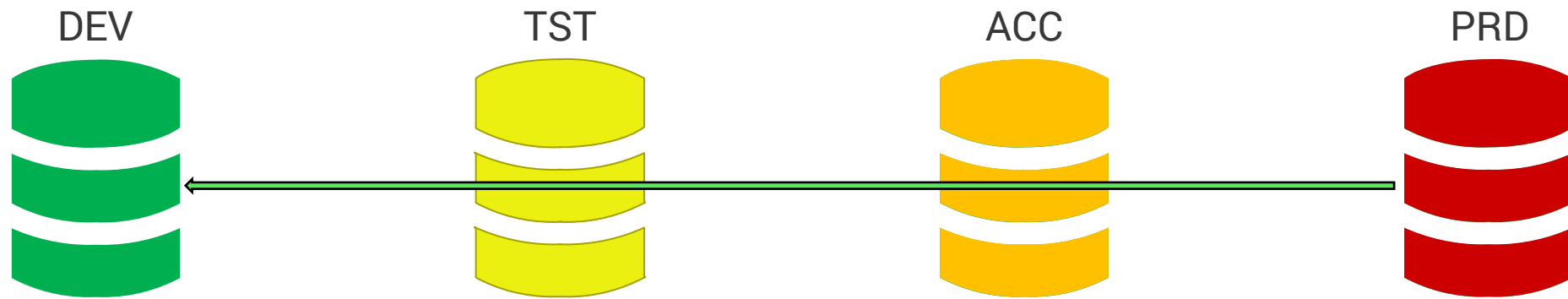
Build Environment: shadow

Objects that have been modified

Customers <div>Table</div>	
Expected	Actual
<pre>1 CREATE TABLE [dbo].[Customers] 2 (3 [CustomerID] [nchar] (5) NOT NULL, 4 [CompanyName] [nvarchar] (40) NOT NULL, 5 [ContactName] [nvarchar] (30) NULL, 6 [ContactTitle] [nvarchar] (30) NULL, 7 [Address] [nvarchar] (60) NULL, 8 [City] [nvarchar] (15) NULL, 9 [Region] [nvarchar] (15) NULL, 10 [PostalCode] [nvarchar] (10) NULL, 11 [Country] [nvarchar] (15) NULL, 12 [Phone] [nvarchar] (24) NULL, 13 [Fax] [nvarchar] (24) NULL, 14 [LinkedIn] [nvarchar] (50) NULL, 15 [RegionCode] [nvarchar] (20) NULL, 16 [CityCode] [nvarchar] (20) NULL 17) 18 GO 19 ALTER TABLE [dbo].[Customers] ADD CONSTRAINT [PK_Customers] PRIMARY KEY CLUSTERED ([CustomerID]) 20 GO 21 CREATE NONCLUSTERED INDEX [City] ON [dbo].[Customers] ([City]) 22 GO 23 CREATE NONCLUSTERED INDEX [CompanyName] ON [dbo]. [Customers] ([CompanyName]) 24 GO 25 CREATE NONCLUSTERED INDEX [PostalCode] ON [dbo]. [Customers] ([PostalCode])</pre>	<pre>1 CREATE TABLE [dbo].[Customers] 2 (3 [CustomerID] [nchar] (5) NOT NULL, 4 [CompanyName] [nvarchar] (40) NOT NULL, 5 [ContactName] [nvarchar] (30) NULL, 6 [ContactTitle] [nvarchar] (30) NULL, 7 [Address] [nvarchar] (60) NULL, 8 [City] [nvarchar] (15) NULL, 9 [Region] [nvarchar] (15) NULL, 10 [PostalCode] [nvarchar] (10) NULL, 11 [Country] [nvarchar] (15) NULL, 12 [Phone] [nvarchar] (24) NULL, 13 [Fax] [nvarchar] (24) NULL, 14 [LinkedIn] [nvarchar] (50) NULL, 15 [RegionCode] [nvarchar] (20) NULL, 16 [CityCode] [nvarchar] (20) NULL, 17 [Active] [nvarchar] (1) NULL 18) 19 GO 20 ALTER TABLE [dbo].[Customers] ADD CONSTRAINT [PK_Customers] PRIMARY KEY CLUSTERED ([CustomerID]) 21 GO 22 CREATE NONCLUSTERED INDEX [City] ON [dbo].[Customers] ([City]) 23 GO 24 CREATE NONCLUSTERED INDEX [CompanyName] ON [dbo]. [Customers] ([CompanyName]) 25 GO 26 CREATE NONCLUSTERED INDEX [PostalCode] ON [dbo].</pre>



Drift evolution



redgate

Test Data Manager



Challenge #4: No Clear Rollback Strategy



“91% of large organizations calculate the cost of unplanned downtime as at least \$300,000 per hour”

Kate Duggan, 'Why Database Discussions Have Moved from the Backroom to the Boardroom', Bloomberg

Challenge #4: No Rollback Strategy



Deployment Frequency

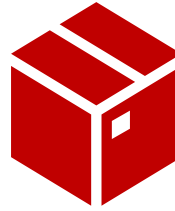


Mean Time to Recovery

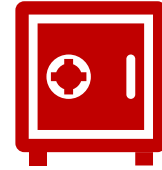




Auto generate rollback
scripts alongside
migrations scripts



Simulate rollbacks as part of
an automated CI/CD process



Include Automated
backups as a pre-
deployment step in your
release pipeline

Expand/Contract

Design the database with a
defensive approach to
avoid data loss



Consider feature flagging
where possible



Release often and in small
doses

```

Current version of schema [dbo]: 008.20250808110838
Undoing migration of schema [dbo] to version "008.20250808110838 - UNDO-Administrator"
Dropping [dbo].[Test2]
Undoing migration of schema [dbo] to version "007.20250808100357 - UNDO-sp configure"
Dropping [dbo].[Test1]
Undoing migration of schema [dbo] to version "006.20250807164606 - UNDO-Administrator"
Altering [dbo].[PostTypes]
Undoing migration of schema [dbo] to version "005.20250807151619 - UNDO-ActiveFlag"
Altering [dbo].[Attachements]
Altering [dbo].[Badges]
Altering [dbo].[Users]
Undoing migration of schema [dbo] to version "004.20250717125758 - UNDO-Administrator"
Altering [dbo].[Attachements]
Undoing migration of schema [dbo] to version "003.20250717115322 - UNDO-Administrator"
Dropping [dbo].[Attachements]
Undoing migration of schema [dbo] to version "002.20250716170320 - UNDO-Administrator"
Altering [dbo].[Users]
Successfully undid 7 migrations to schema [dbo], now at version v001.20250716170238 (execution time 00:00.440s)
Schema version: 001.20250716170238

```

Category	Version	Description	Type	Installed On	State	Undoable
Baseline	001.20250716170238	baseline	SQL_BASELINE	2025-08-08 11:18:32	Baseline	No
Versioned	002.20250716170320	Administrator	SQL	2025-08-08 11:18:32	Undone	
Versioned	003.20250717115322	Administrator	SQL	2025-08-08 11:18:32	Undone	
Versioned	004.20250717125758	Administrator	SQL	2025-08-08 11:18:32	Undone	
Versioned	005.20250807151619	ActiveFlag	SQL	2025-08-08 11:18:32	Undone	
Versioned	006.20250807164606	Administrator	SQL	2025-08-08 11:18:32	Undone	
Versioned	007.20250808100357	sp configure	SQL	2025-08-08 11:18:33	Undone	
Versioned	008.20250808110838	Administrator	SQL	2025-08-08 11:18:33	Undone	

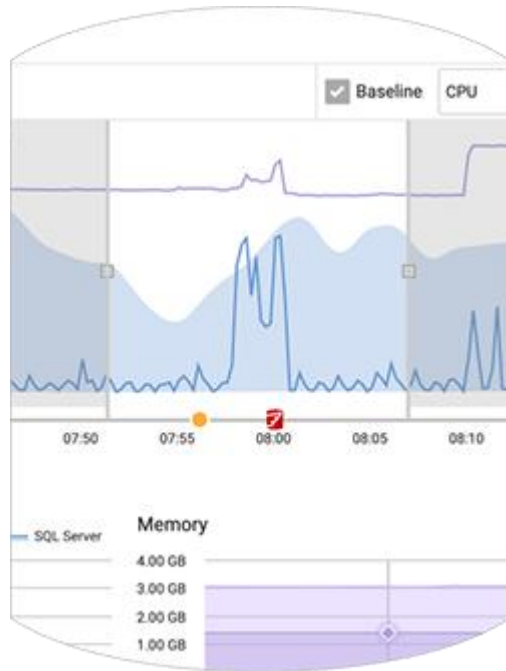
Challenge #5: Monitoring & Feedback Loops

- Difficulty pinpointing performance regressions
- Ensuring thorough testing within tight deadlines
- Maintaining a stable baseline for comparison
- Alert fatigue and noise
- Resource consumption of monitoring tools

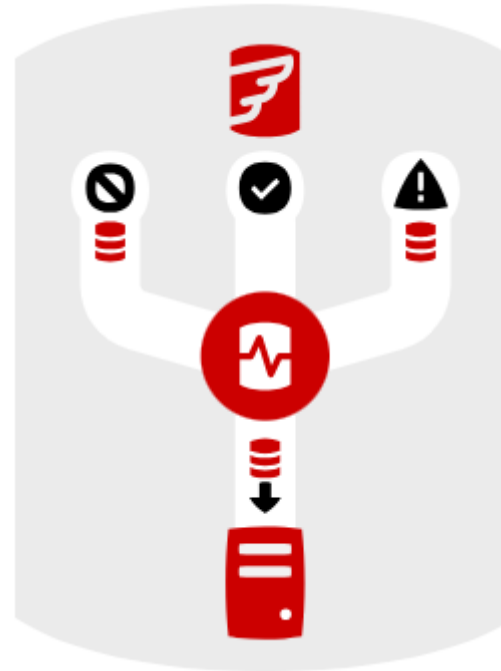


Mean Time to Recovery





Collaboration between
Development and Operations



Automated pre-deployment
DB Health check



Shift left – Extend monitor
to DEV and TST



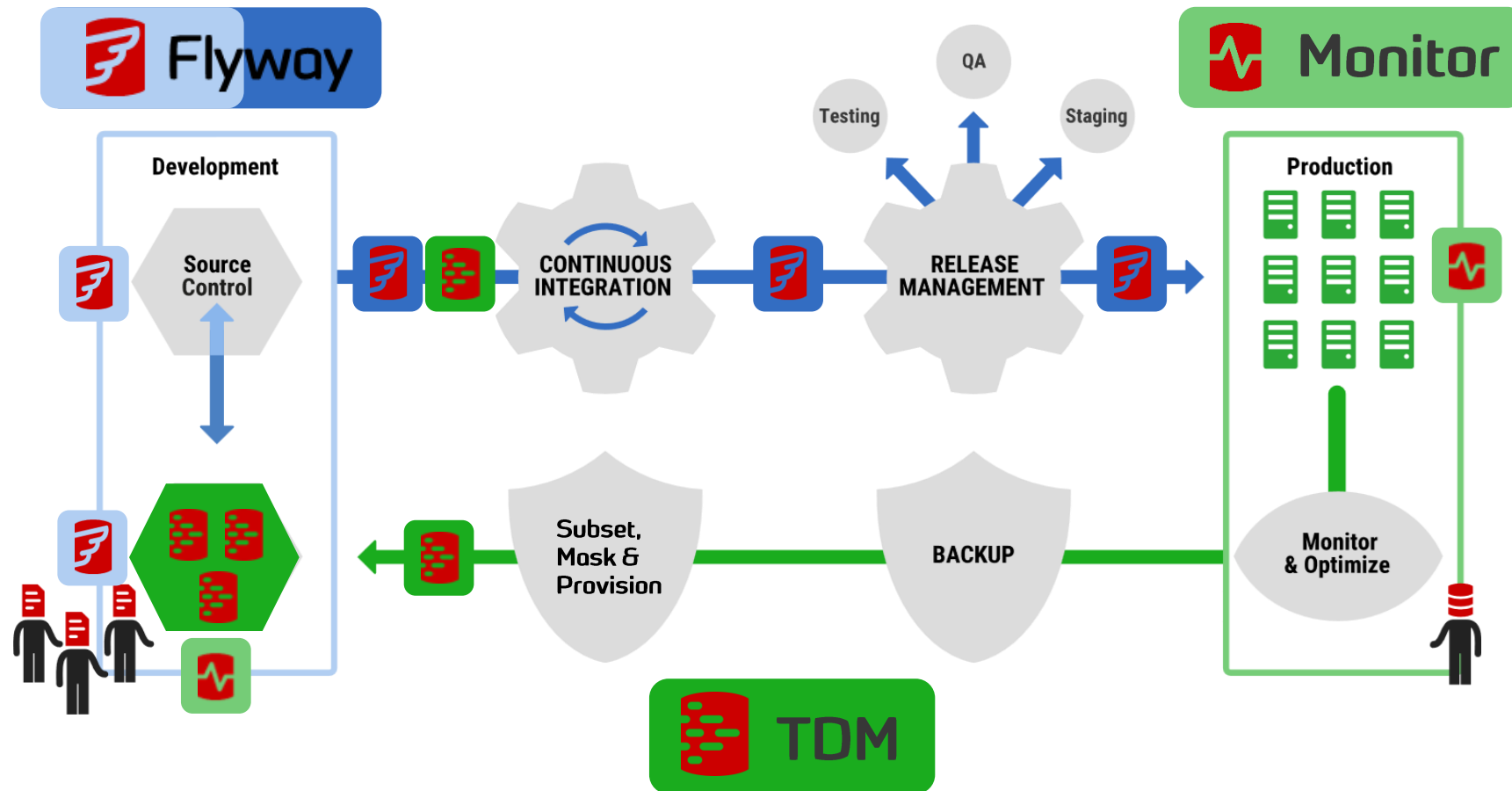
Keeping pace with a shifting tech landscape

The world's leading premium automobile and motorcycle manufacturer, financier, and dealership. Headquartered in Germany, with over 118,000 employees distributed globally, 2021 revenues amounted to €111.2 billion.

The Results

- Minimized performance downtime and freed up time for the ops team.
- Developers predict code changes before they hit production, avoiding negative customer impact.
- Less reactive fire-fighting. More time spent on ensuring the entire estate is optimized for future growth.
- As apps increase in volume, team can see which servers are coping with the demands and are fit to scale.

What does End-to-End Cross Database DevOps look like?



Questions



Redgate Clinic

Have you got a question you want to discuss further? Visit us at the Redgate Clinic on floor 2 today and a friendly Solutions Engineer will help you.



Experience a live demo

Join us for an opportunity to experience a live demo throughout the day on floor 2 with an experienced Redgate Solutions Engineer.



Scan the QR code to leave your feedback:

Please leave us your feedback to be in with a chance to win a complimentary 3-Day Ticket to PASS Summit 2025 and other giveaways !

Winner drawn during the drinks reception, you have to be present to win!

