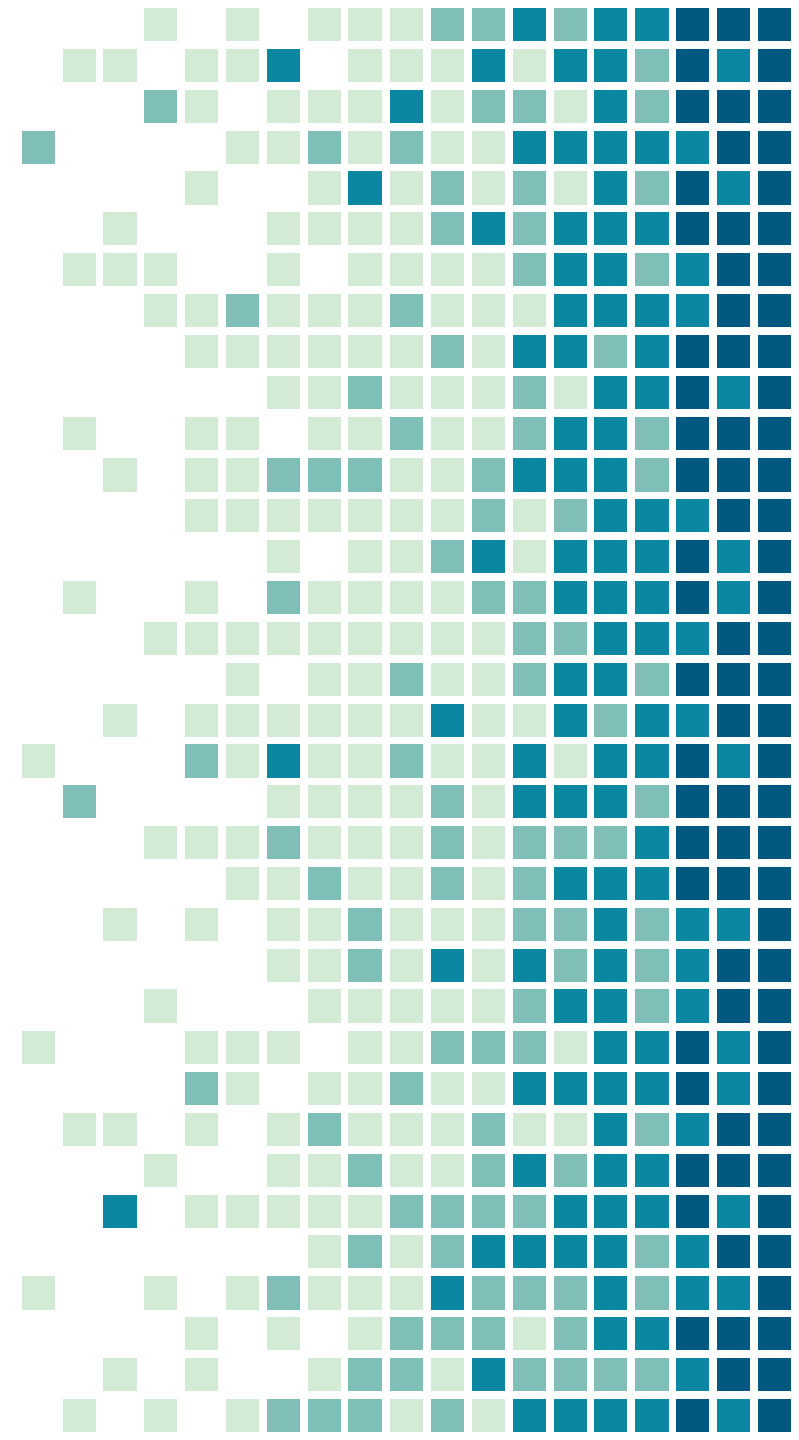# Database Deployment Methods Demystified

Deborah Melkin
Redmond SQL Server UG, 2023-08-09

About Me

- 20+ years as a DBA
- Mainly work with SQL Server
- Mainly work with OLTP
- NESQL Board Member
- Azure Data Community Advisory Council
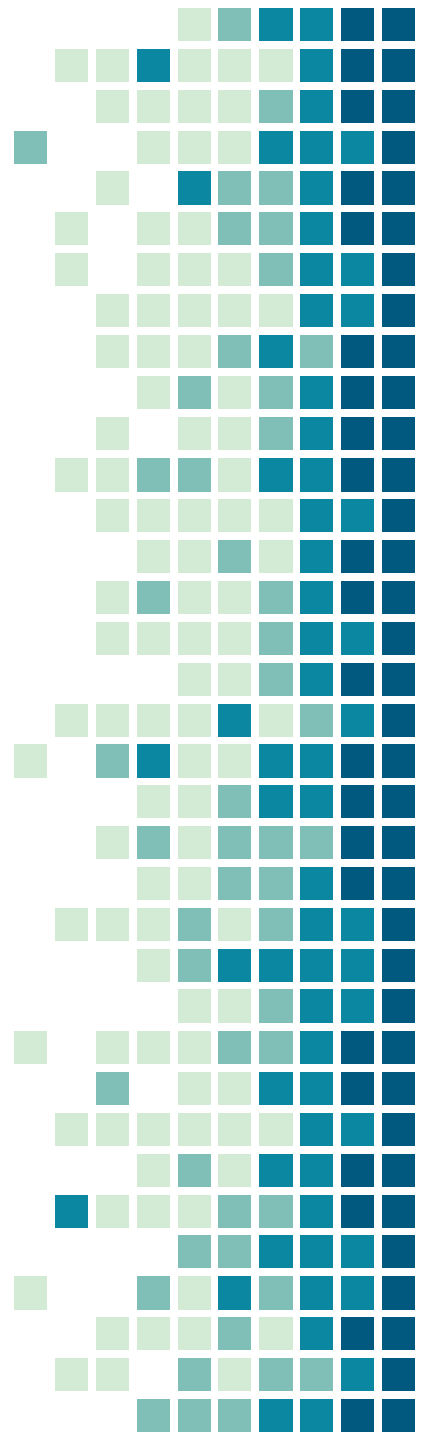- #Redgate100
- Microsoft MVP – Data Platform

About Me – The Important Stuff

- I'm a long time member of the alto section.
- I go to bluegrass jams regularly.
- I've been learning guitar and now mandolin.
- I am a bit of a musical theater geek.
- My husband and I do geeky things with our dog.

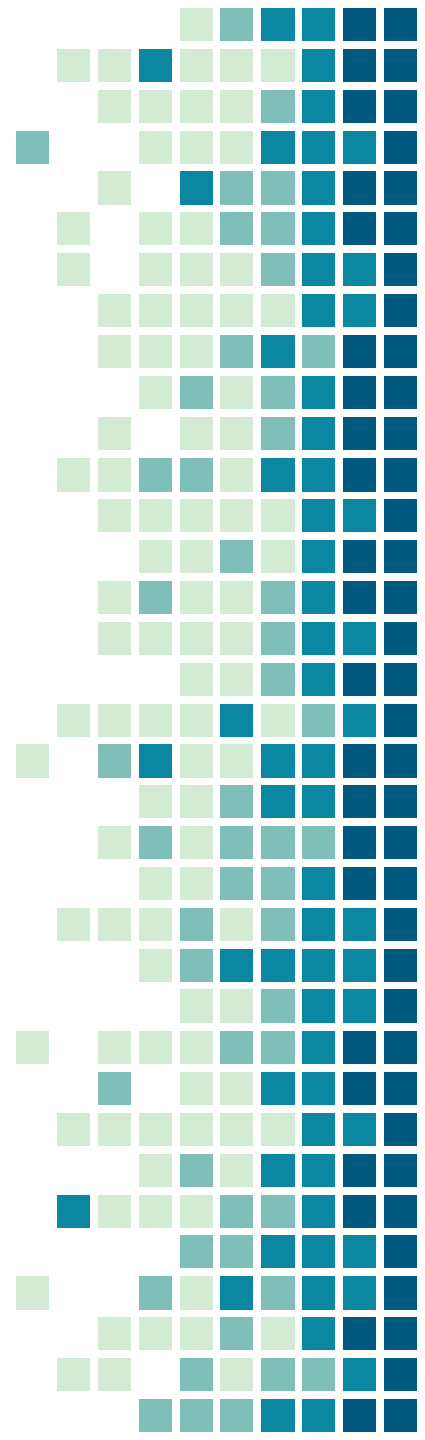# Why Talk about Database Deployment Methods?

Not just "DevOps"...

- We all have code to deploy
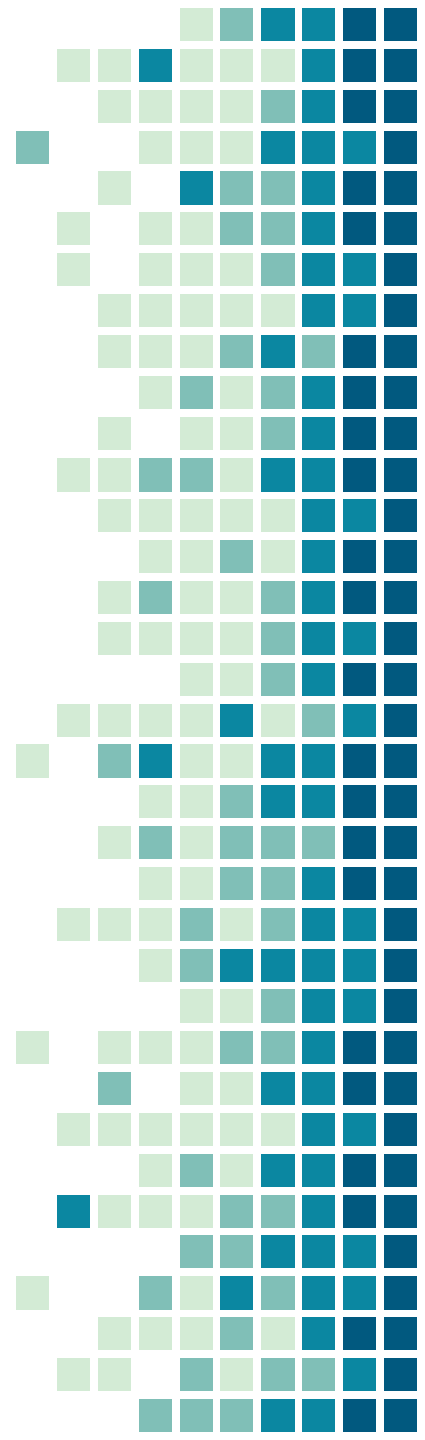- This affects everyday workflow
- "DataOps"

It doesn't matter whether you are Agile or Waterfall or Waterfall pretending to be Agile…
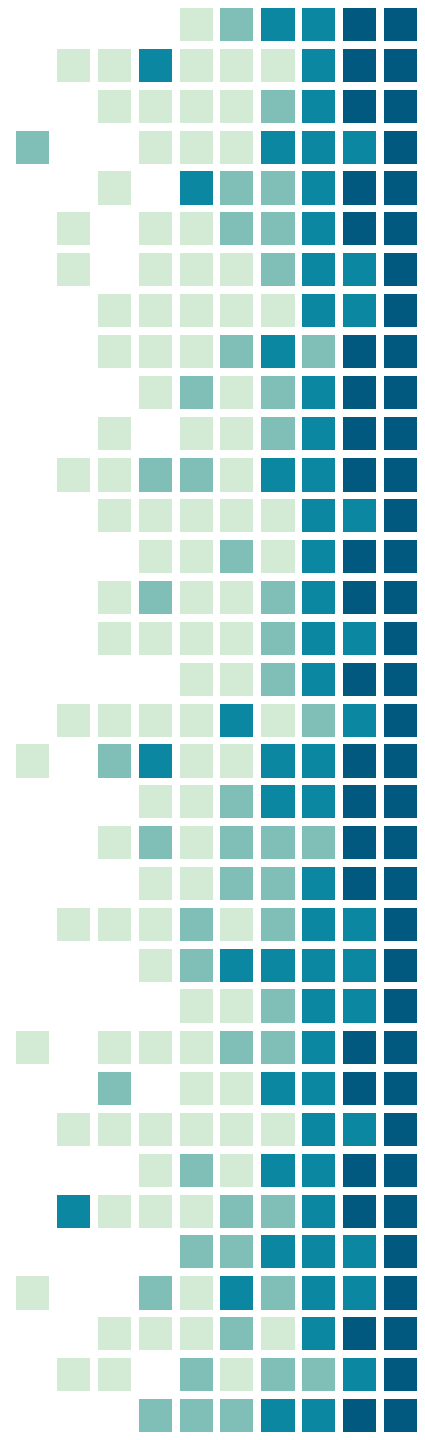if you have database changes, this matters to you!

Related Terms

- "Source of Truth"
  - The artifact used to determine what the database should contain like depending on version or features that have been released.

- "Database as Code"
  - The idea that the database is an integral part of the application and should be subject to the same treatment, while still acknowledging the differences that need to be accounted for.
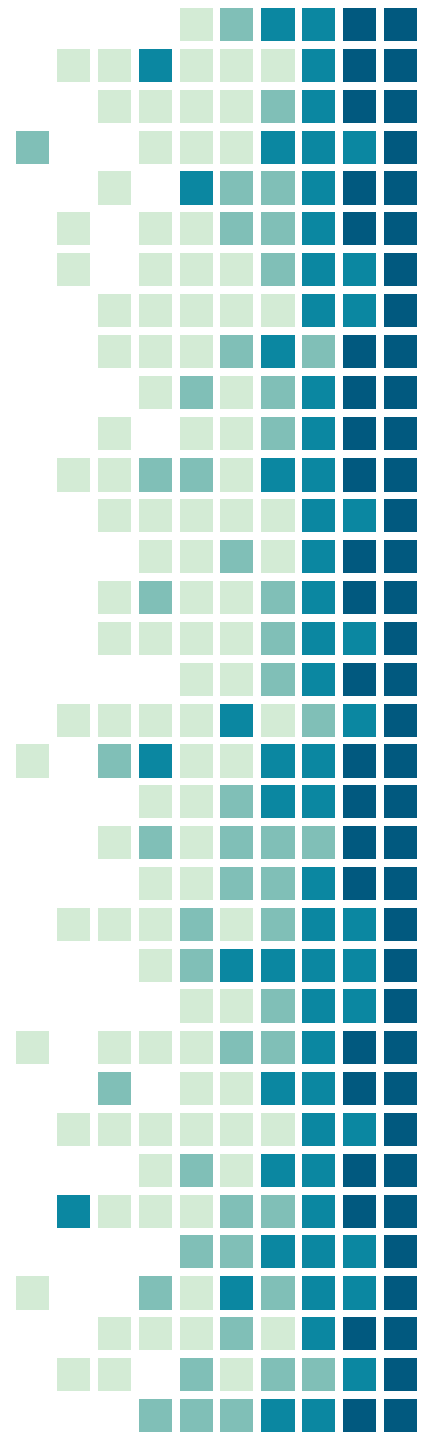
Requirements

- Should be able to create a new database or upgrade an existing one

- A newly created or upgraded existing database must be the same
    - Exception: the upgraded database may have deprecated objects that have not been dropped. But strategy must exist for deprecation.

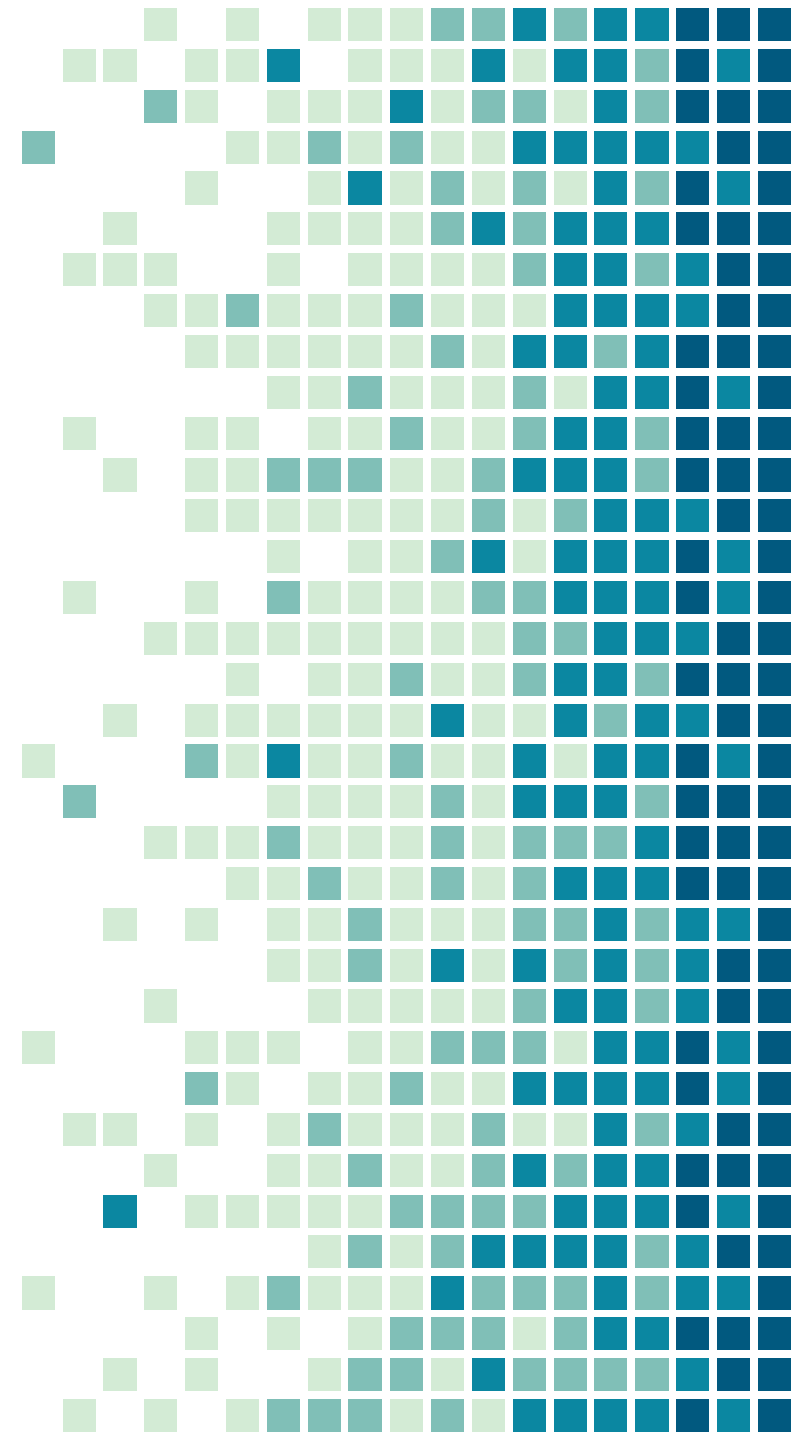- Deployments* must be re-runnable

Types of deployments

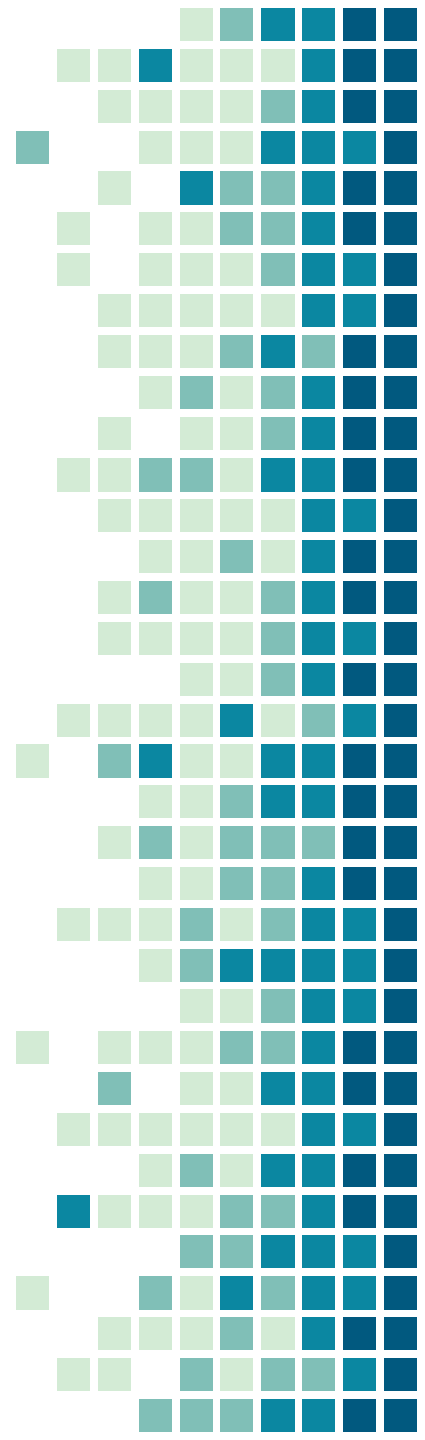- Migration based deployment
- State based deployment

Migration Based Deployment

What is a Migration Based Deployment

- Series of scripts executed to deploy database changes
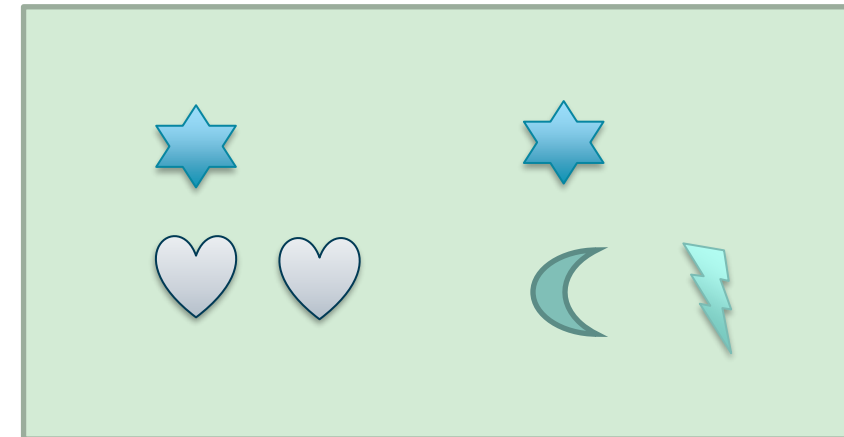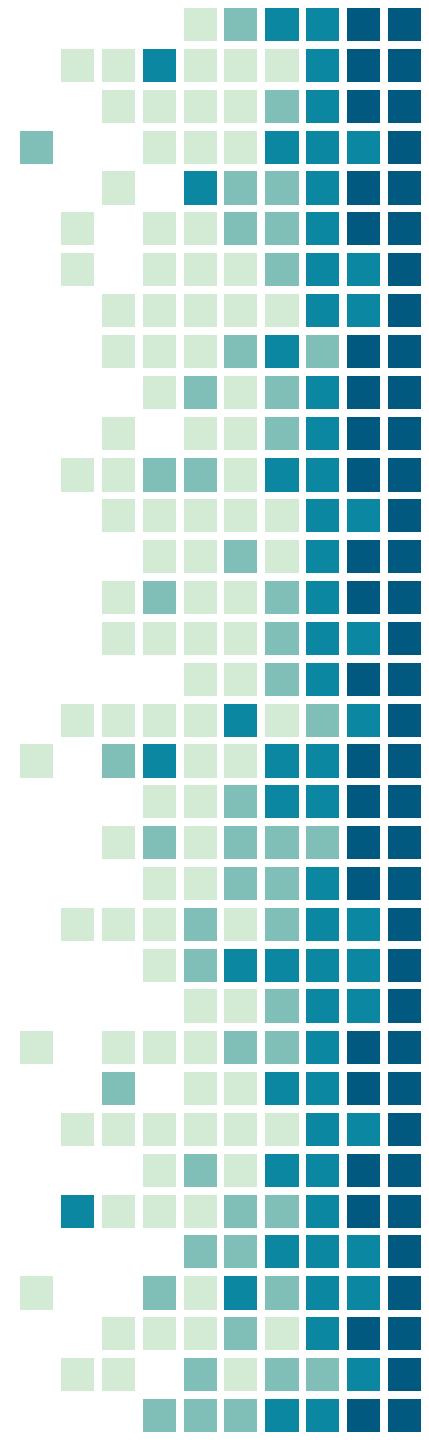
Source

Target

Target 2

- ~~Add 1 Blue Star~~

  Make sure there are 4 blue stars

- ~~Add 1 Pink Heart~~

  Make sure there are 3 Pink Hearts

- ~~Add 1 Green Moon~~
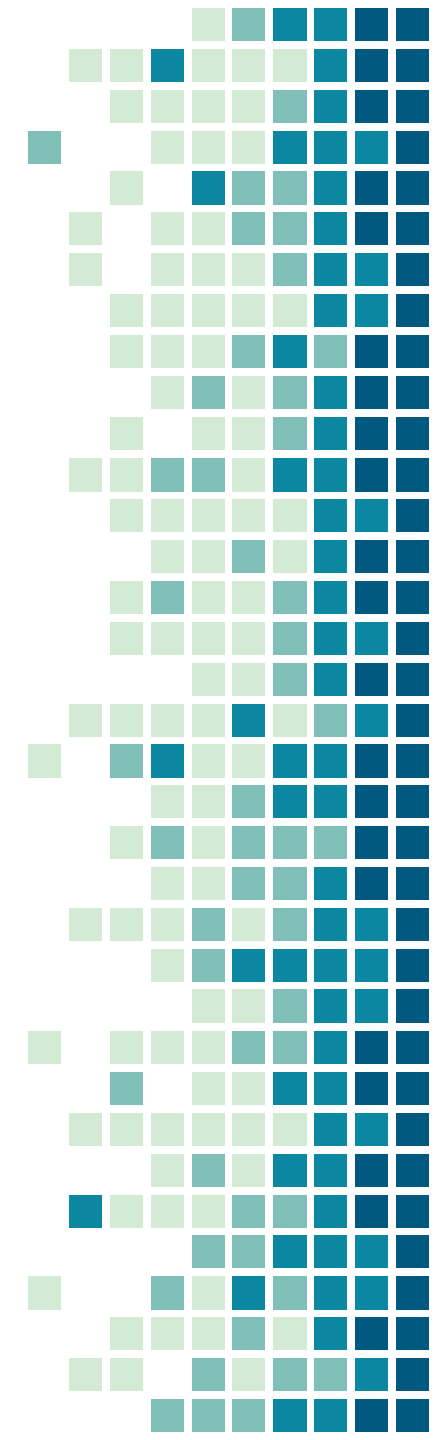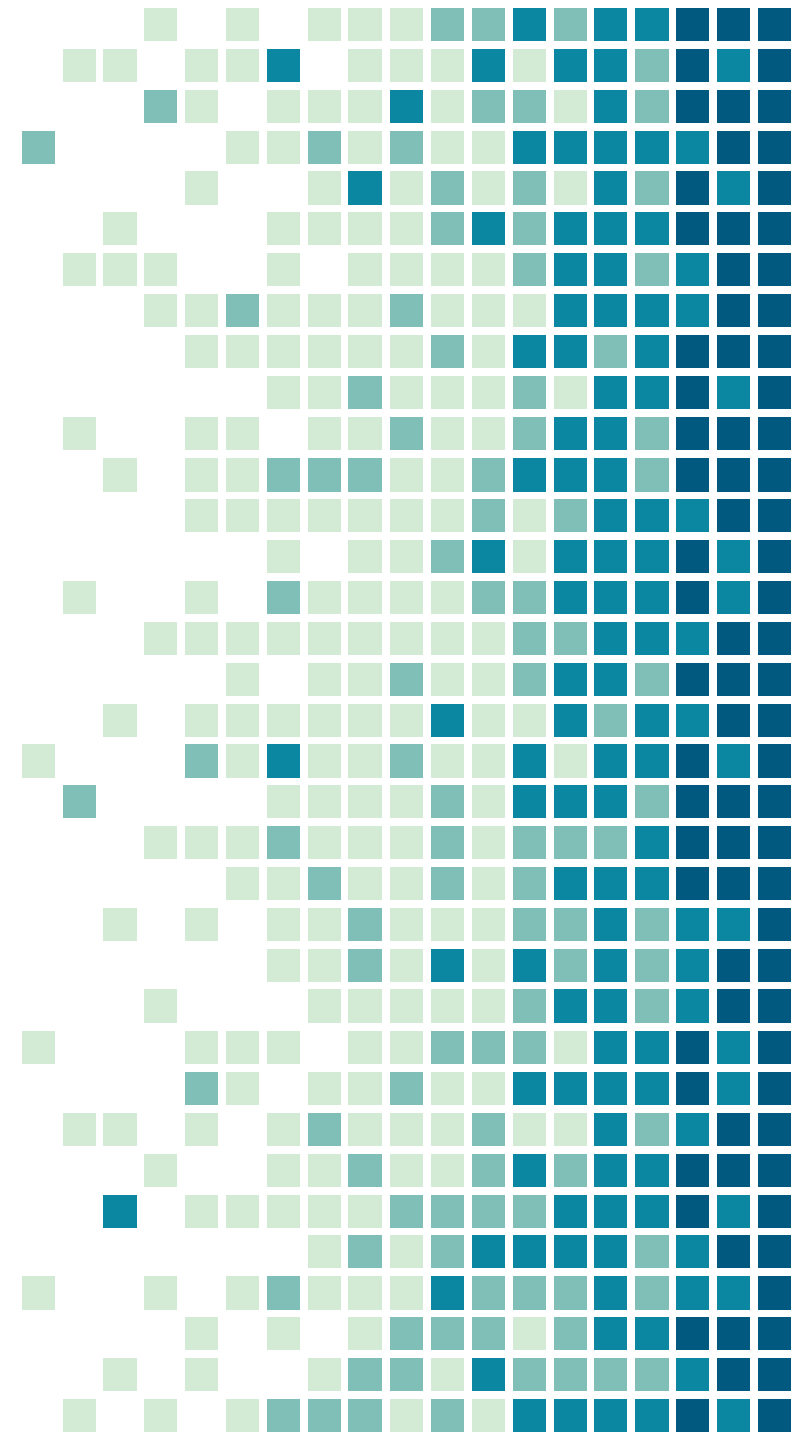
  Make sure there is 1 Green Moon

Tools that can be used:

- 3rd Party Tools:
  - Liquibase
  - Flyway

- Home Grown Tools:
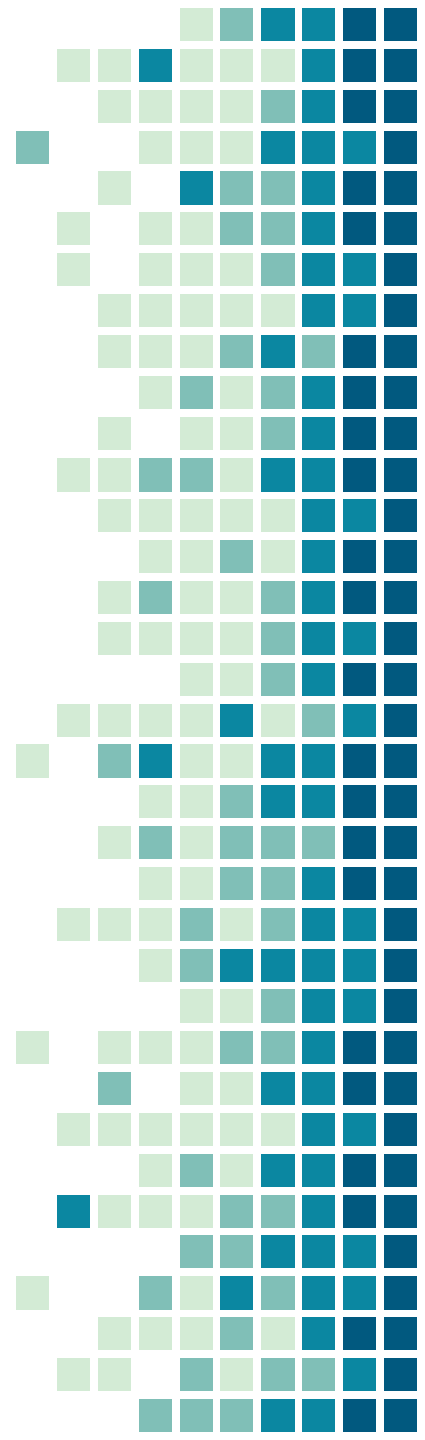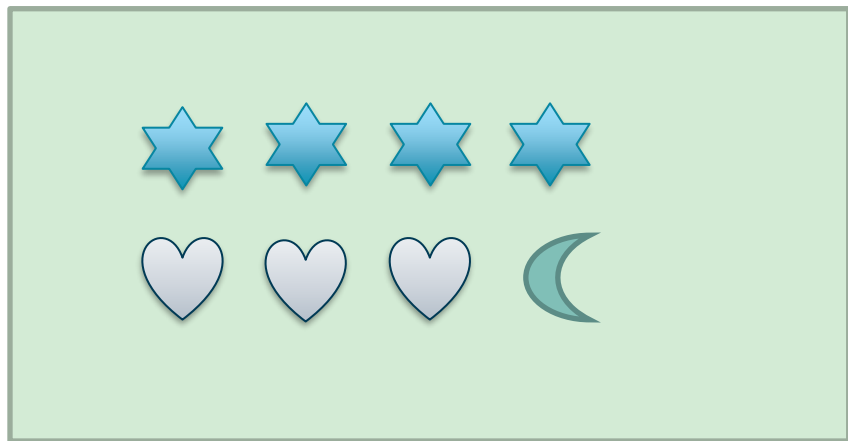 - PowerShell\dbatools
  - sqlcmd

State Based Deployment

What is a State Based Deployment

- Comparison between target database and source that determines what the differences are, creates the SQL needed for the updates, then executes the changes
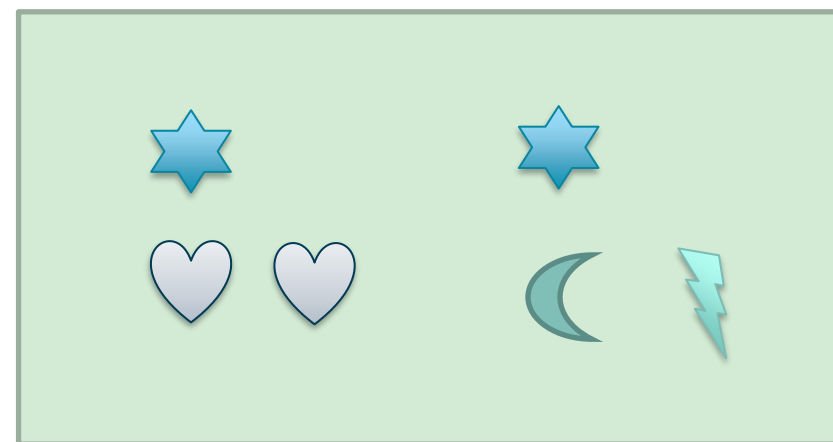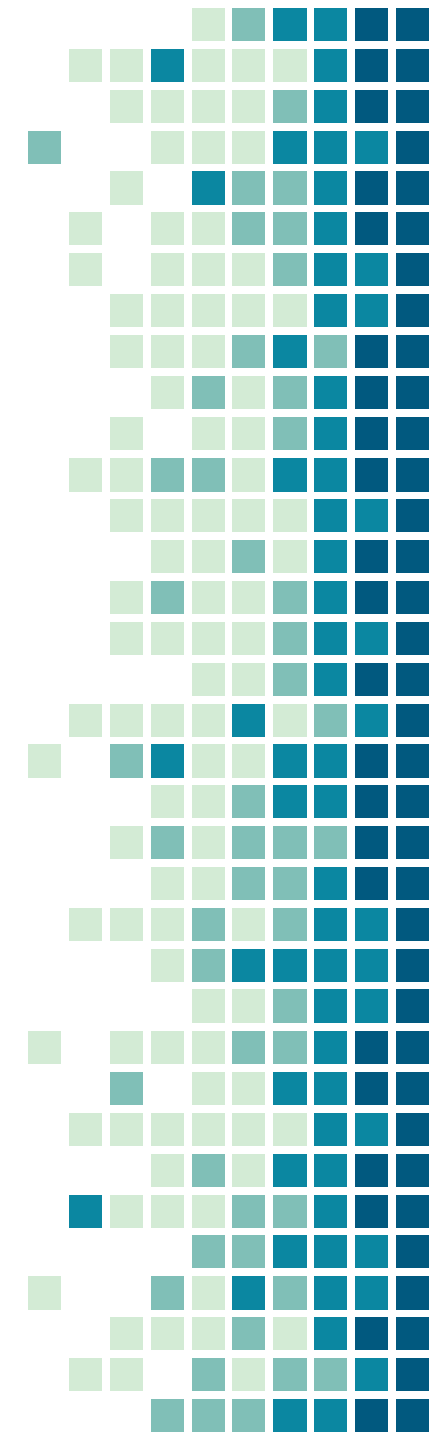 - Examples: dacpac\bacpac

Source

Target

Target 2

- Run Compare against Source and Target
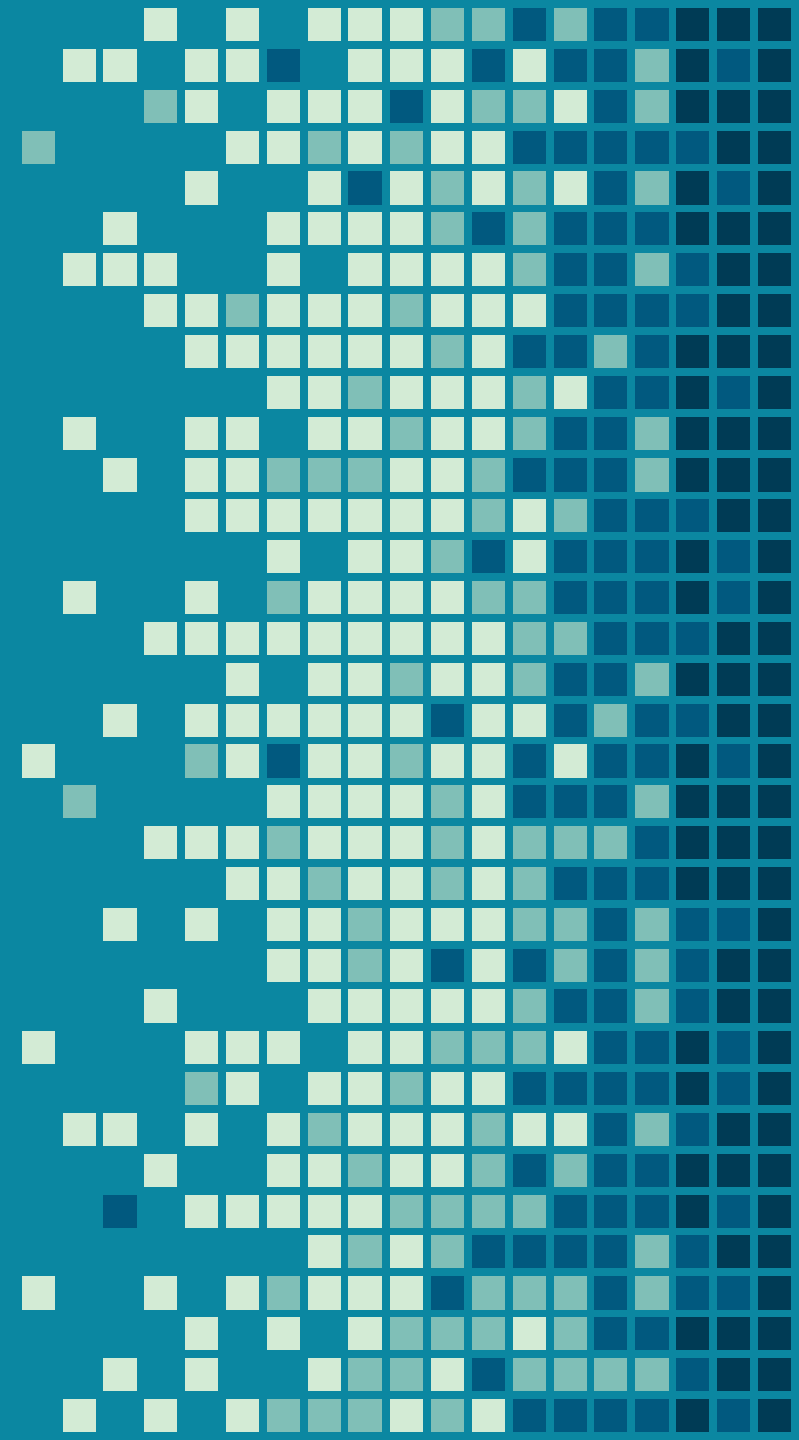
- Apply changes

Tools that can be used:

- 3rd Party Tools
  - sqlpackage.exe
  - Database Projects – Deploy
  - Redgate SQL Change Automation

- Home Grown Tools:
  - dbatools.io (Publish-DbaDacPackage)
  - Internal company comparison tools
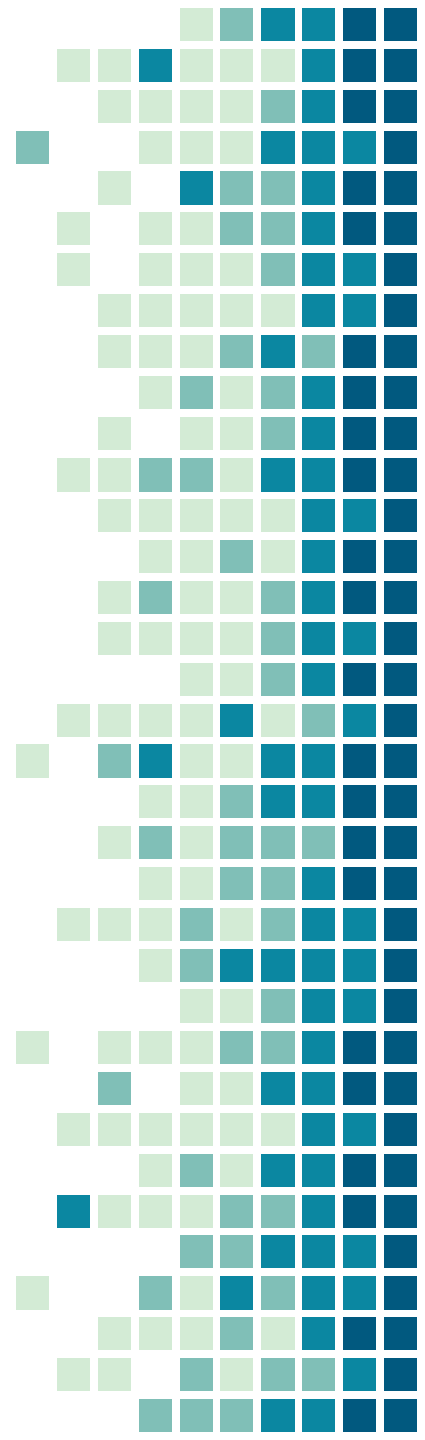
"Demos!

Considerations

Things to Consider

- Source Control
  - Folder structure
  - Naming Conventions

- Database Instances\Environments
  - Individual developer instances
  - Shared environments

- Release Processes
  - CI\CD vs Installers?
  - Feature Releases vs. Versioned Releases
  - "Chain of Command", i.e. who's responsible for the process?
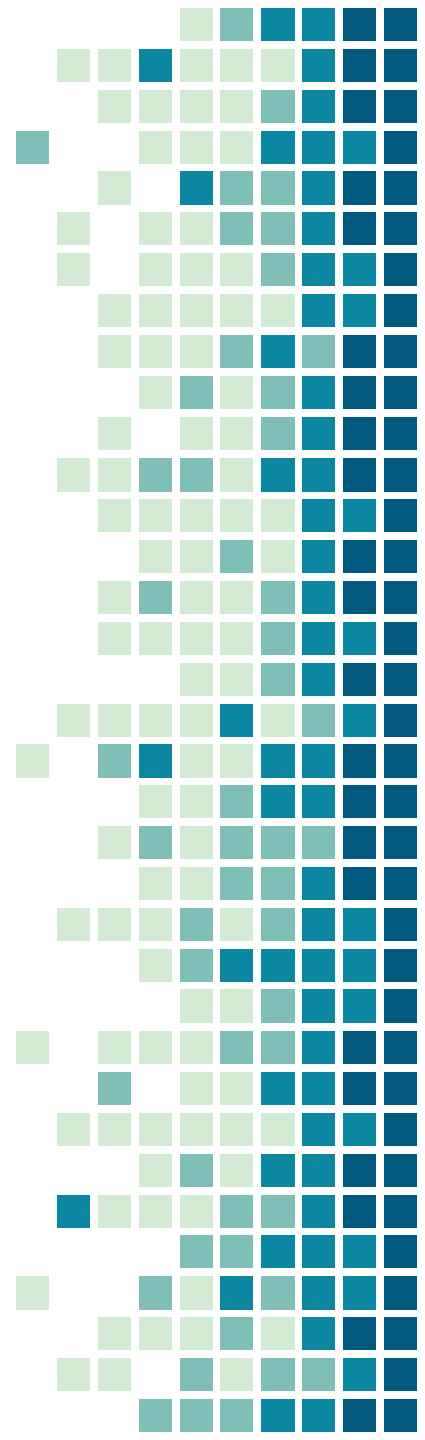
Things to Consider (cont'd)

- Deployment Window
- Data Changes
- Cross Database Dependencies
- Installs vs Upgrades
- Testing
- Client Customization\Schema Drift
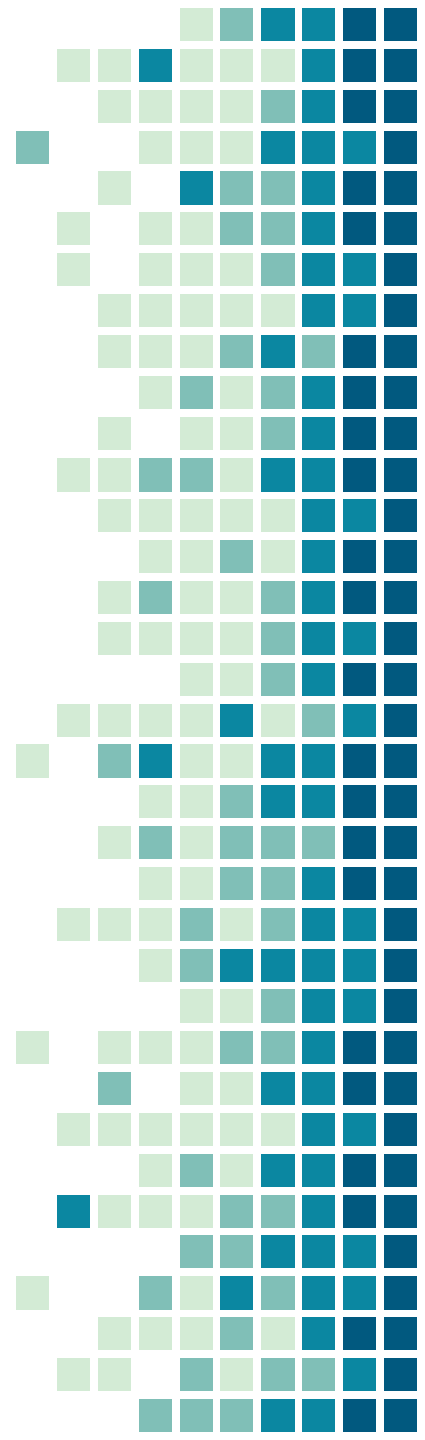- Error handling during deploys\Upgrade "Rollback"
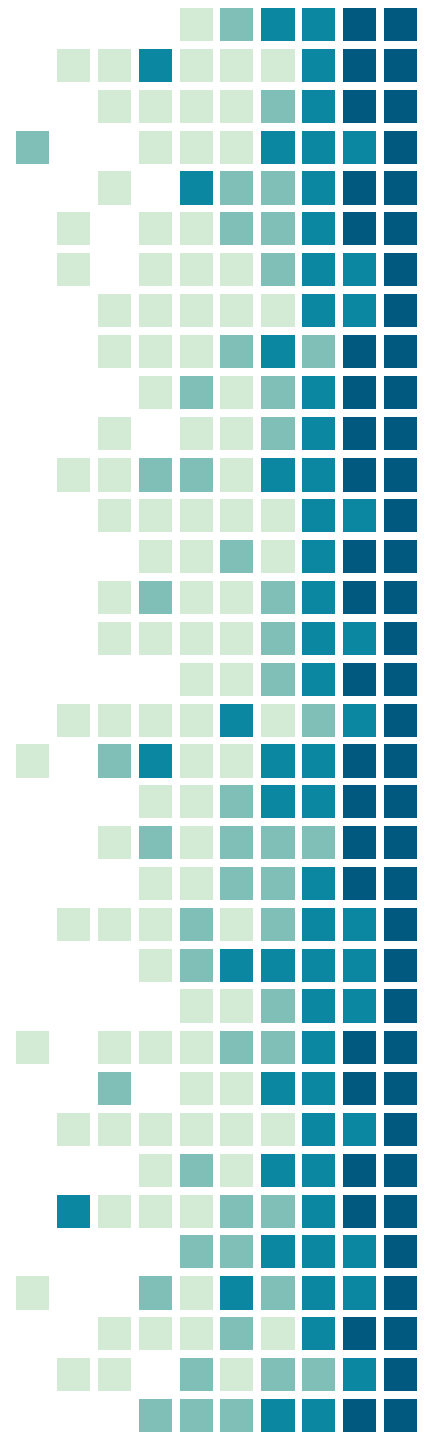
Leaving with more Questions than Answers?

- Understanding how migration based deployments and state based deployments work is the easy part

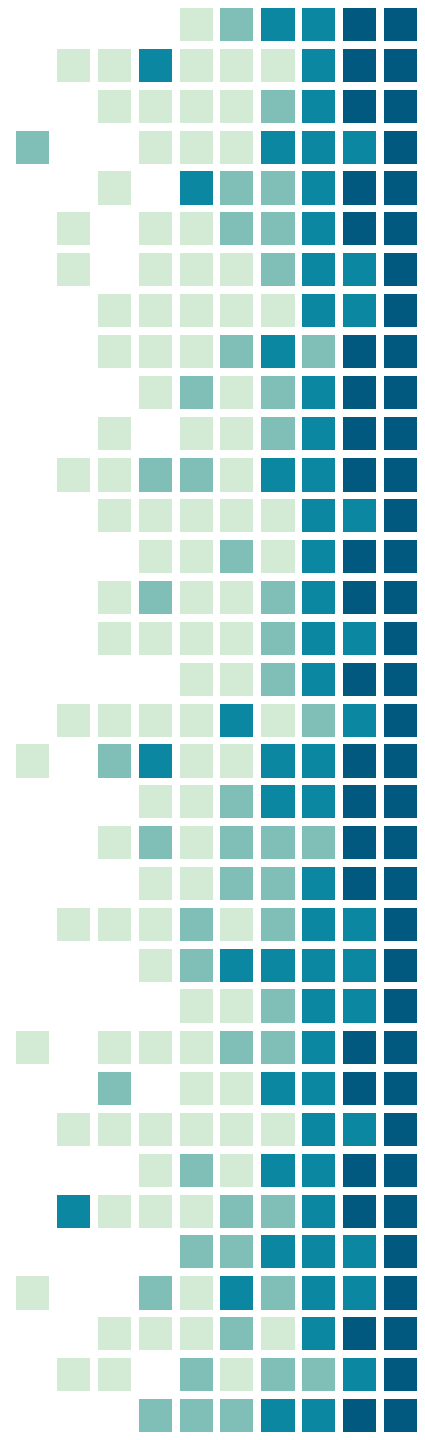- Setting up the deployment strategy is hard.

Resources – Tools

- Flyway: https://flywaydb.org/
- Liquibase: https://www.liquibase.org/
- sqlpackage.exe: https://learn.microsoft.com/en-us/sql/tools/sqlpackage/sqlpackage?view=sql-server-ver16
- Database Projects: https://learn.microsoft.com/en-us/visualstudio/data-tools/creating-and-managing-databases-and-data-tier-applications-in-visual-studio?view=vs-2022
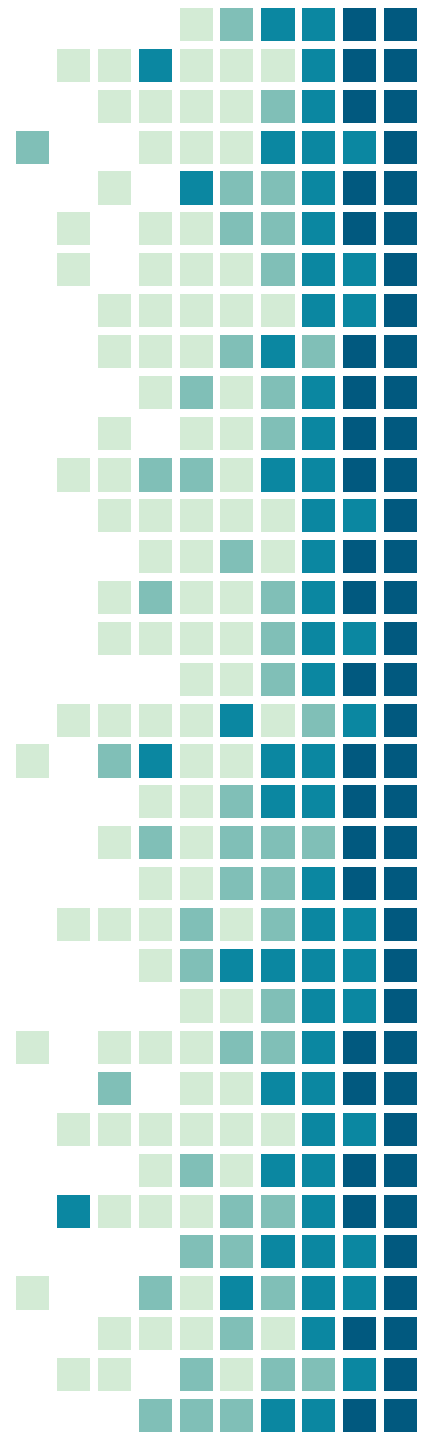
Resources – General Blog Posts

- https://www.dbmaestro.com/blog/database-devops/state-driven-vs-migration-driven

- https://littlekendra.com/2019/01/23/state-vs-migration-for-database-source-control-the-core-question/

- https://catalyzesql.com/blog/2023/08/09/database-devops-core-concepts-migration-scripts/

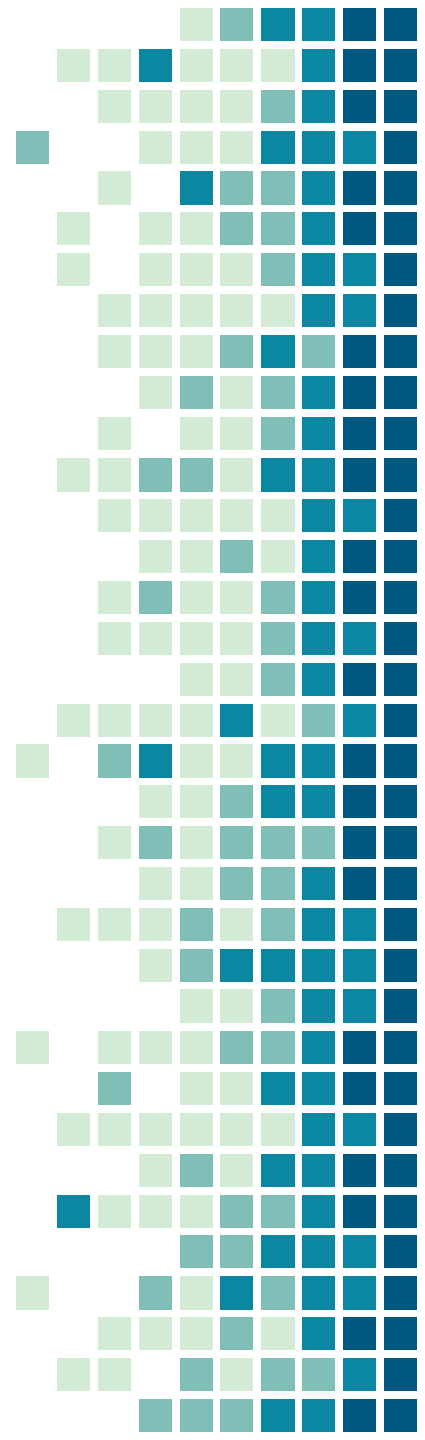- https://blog.greglow.com/2018/02/02/devops-should-databases-use-state-based-migration-based-deployment/

Resources (cont'd)

- https://www.gatevnotes.com/continuous-deployment-sql-server-data-tools-project-template/

- https://eitanblumin.com/2022/07/12/ssdt-which-version-of-my-database-was-deployed/

- https://eitanblumin.com/2022/07/05/should-the-database-and-application-projects-be-in-the-same-repository/

- https://www.oliviervs.be/database-projects/database-projects-deploying-changes/

Any other Questions?

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- Blog:
  - DebtheDBA.wordpress.com
- Github:
  - https://github.com/DebtheDBA/DBDeployments

Thanks for coming!