CD for DBs
Database Deployment Strategies

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Evolution of Database Deployments

Manual Prod  Manual DB  Auto DB1  Auto DB++  DB Anywhere
Why is the Database Important

- Contains logic and critical business data
- The “brains” of an application
- Making changes to a database is much like doing brain surgery
Why is it complicated

• More than one application...
• Multiple databases per server...
• Most critical data...
  ▪ If you lose data from a database, you lose critical customer data
• Ouch. Schema Changes
Things to consider
Testing

• What applications does this deployment affect

• What testing should be done (before/during/after)

• What do you do if testing breaks
  o Automated Rollback?
  o Manual Intervention?
  o Who decides
Rollback

• At what point did it fail
  ▪ Did I corrupt tables
  ▪ Do I have partially updated data
  ▪ Is it partially deployed

• Was the system running when updating
  ▪ Do I have some records updated/changed since start
Automation

• Who owns the automation?
• How does the automation determine success/fail?
• What if I do fail?
• What tool to use?
• Supported features
  ▪ Automatic Rollback?
  ▪ Rolling Deployments?
Distributed Development / Infrastructure

- How do developers merge code
- How do you integrate developers work
- How do you handle distributed systems across the world
Methods
SQL Scripts / Rollback Scripts

```sql
SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0;
SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0;
SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='TRADITIONAL';

DROP SCHEMA IF EXISTS consult;
CREATE SCHEMA consult;
USE consult;

CREATE TABLE address (
    address_id INTEGER NOT NULL AUTO_INCREMENT,
    line1 VARCHAR(50) NOT NULL,
    line2 VARCHAR(50) NULL,
    city VARCHAR(50) NOT NULL,
    region VARCHAR(50) NOT NULL,
    country VARCHAR(50) NOT NULL,
    postal_code VARCHAR(50) NOT NULL,
    CONSTRAINT address_pk PRIMARY KEY (address_id)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE consultant_status (
    status_id CHAR NOT NULL,
    description VARCHAR(50) NOT NULL,
    CONSTRAINT consultant_status_pk PRIMARY KEY (status_id)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```
SQL Scripts / Rollback Scripts - Advantages

- Fast deployments
- Just run a SQL script!
- Minimal or no downtime
SQL Scripts / Rollback Scripts - Disadvantages

- Requires developer to never make mistakes
- Requires extensive testing
  - How to TRULY test rollback
- Error prone
- How do you merge multiple developers work
SQL Scripts / Rollback Scripts - Who should use

- Small Databases
- Small development teams
- Simple changes
- Legacy Databases
  - If no other choice
Backup at Deploy
Backup at Deploy - Advantages

• Guarantees you are 100% back to previous good state

• “Safest” technically speaking
Backup at Deploy - Disadvantages

- Every application that depends on the database is 100% down during deploy
- Slower deployments
Backup at Deploy - Who should use

• Applications that can withstand being down

• Smaller databases that backup quickly

• Applications that do not share databases
DACPAC

- Microsoft’s solution to help solve Database Deployment issues
- Profile
  - How do I run the DACPAC
- DACPAC
  - What changes did I make
- Looks at what is on the database currently and compares to changes in DACPAC then applies changes
DACPAC - Advantages

• Creates easier rollbacks

• Deploy the previous DACPAC
  o ElectricFlow™ lets you do this Automatically!
  o Works well with multiple developers

• Use VisualStudio

#DOES16
DACPAC - Disadvantages

• Requires well written profile
  ▪ Poorly written can cause data loss

• Microsoft only solution
  ▪ Not for Oracle or other DB’s

• Relatively new
DACPAC - Who should use

- Microsoft only shops that are on a newer version of SqlServer
- All who use a version of SqlServer that supports them
Other DB Deployment tools

• Datical
• DBMaestro
• Redgate
• Many Many more
Strategies
Just do it - Deploy all at once

• Deploy all at once to all machines

• Run individual tests after deployment

• Rollback all at once
Just do it - Deploy all at once

• Advantages
  ▪ Super fast deployments
  ▪ On Success, things are already out there

• Disadvantages
  ▪ Dangerous if you have failures
  ▪ Could bring down entire system
  ▪ Not a lot of time to test

NOT RECOMMENDED

#DOES16
Partial deploy (Canary)

Deploy Database Cluster

Deploy Application Cluster
Partial Deploy - Advantages

• Allows you to test on a subset of users
• On failure, you do not bring down everyone. Simply re-point the users on the new deploy cluster back to the original cluster
• Allows you to give a “sneak peek” to a subset of users
Partial Deploy - Disadvantages

• Can be complex to maintain

• Requires more infrastructure to maintain more clusters

• Often requires application changes

• Requires synchronizing databases
Rolling deployment

Database Cluster

Application Cluster

Test

#DOES16
Rolling deployment - Advantages

• No clone of infrastructure required
• Allows you to do some testing before rolling out to all machines
  o If something breaks you can simply remove the machines you deployed to from the cluster (little to no downtime)
• If you already have a cluster for your DB and Application, little or no changes are required
• Natively built into ElectricFlow™
Rolling Deployment - Disadvantages

- Version mismatch could cause issues depending on the application and architecture
- Requires you to have clustered environment for your DB and Application
  - (This is a best practice!!!)
- Could cause a complex overhead in scripts, unless using a tool like ElectricFlow™
Take Aways
Things to remember

• Don’t treat the database as the stepchild
  o Consider Databases from the start

• Different solutions fit different situations

• Consider failure when coming up with a deployment strategy

• Follow best practices
  o Backups, Clones, testing failure, etc

• Version the database metadata along with the process
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Thank you!