

CI for DB

Continuous Integration

About me

A guy who likes DB and ping pong

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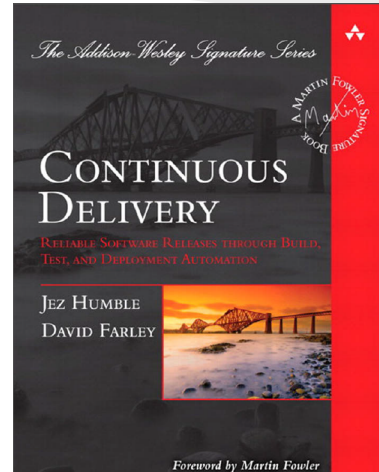
Challenges

- What is Continuous Integration?
- Environment best practice
- Every organization has different implementation
- Too many choices
- Hard to find working example
- Need to know various things - build/devops engineer

Continuous Integration

Continuous Delivery

- A must-read to understand CI
- Good summary
 - [Visualizations of Continuous Delivery](#) - Nhan Ngo



Continuous Integration

- An automated implementation of your application's build, deploy, test, and release process.
- Continuous integration is a practice, not a tool.
- Goal
 - The goal of continuous integration is that the software is in a working state all the time.
 - Involve everybody a part of the process of building, deploying, testing, and releasing software.
 - Improve feedback so that problems are identified, and resolved, ASAP.
 - Enables teams to deploy and release any version of software to any environment through a fully automated process

Before you start

- **Version control**
 - Everything in your project must be checked in to a single version control repository: code, tests, database scripts, build and deployment scripts, and anything else needed to create, install, run, and test your application
- **An automated build**
 - Whatever the mechanism, it must be possible for either a person or a computer to run your build, test, and deployment process in an automated fashion via the command line
- **Agreement of the team**
 - Continuous integration is a practice, not a tool. It requires a degree of commitment and discipline from your development team

Principles of software delivery

- Create a Repeatable, Reliable Process for Releasing Software
- Automate Almost Everything
- Keep Everything in Version Control
- If It Hurts, Do It More Frequently, and Bring the Pain Forward
- Build Quality In
- Done Means Released
- Everybody Is Responsible for the Delivery Process
- Continuous Improvement

References

- Continuous Delivery
- Continuous integration for databases using Red Gate tools
- Preparing for Continuous Delivery in the Enterprise
- Orchestrating Your Delivery Pipelines with Jenkins

DB Deployment

Environment

- How many environments do you have?
 - Local Dev -> Shared Dev -> QA -> Staging -> Production
- How to manage a known-good starting position of DB
 - A production-like environment
 - Create from the scratch
 - Using production backup
- Database contains state and this needs to be preserved after an upgrade

Database Development challenges

- Databases are inherently stateful
 - Focus is on ALTER instead of CREATE
 - Dependencies complicate scripts
 - Errors are often found only when scripts are executed
- Databases are often not integrated well with the application development life cycle
- DB Versions are frequently not persisted or managed well

from [Gert Drapers](#)'s presentation

Things to manage

- OS-level properties - power management, etc
- Server-level properties - memory setting, server option, etc
- Server-level objects - logins, jobs, etc
- Database-level properties - file and filegroup settings, database configuration options
- Database-level objects - table, sp, etc
- SSIS, SSRS, SSAS

Database Development

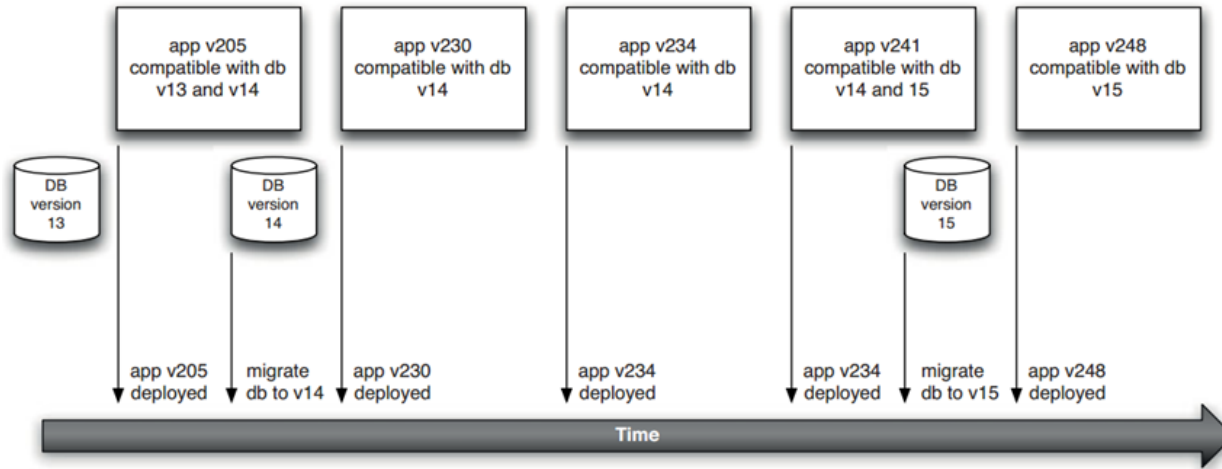
- Approach
 - Change-script driven(Imperative)
 - ReadyRoll, DbUp
 - Model-driven(Declarative)
 - You describe how you want your schema to look, instead of encoding inside a script how to implement it
 - SSDT, Redgate tools
- Imperative vs. Declarative
 - Manual vs. generated / programmatic
 - Point in time vs. always current
 - Sequential vs. differential

from [Gert Drapers](#)'s presentation

Database versioning

Decoupling database migration from application deployment

- Version table in each database



From Continuous Delivery

Components

Component - Version control

Main Component	Sub component	Object type	Tool
Version control	SCM	All	Subversion, Team Foundation Server, Vault, Git, Mercurial, etc
	SCM integration tool	VS(+SSDT)	<ul style="list-style-type: none">● SVN - AnkhSVN● GIT - Git Source Control Provider, Team Explorer● TFS - Team Explorer● SQL Connect - redgate● etc
		SSMS	<ul style="list-style-type: none">● SQL Source control - redgate● MSSCCI + Team explorer - not compatible with SSDT project● etc

Component - Build

Main Component	Sub component	Object type	Tool
Automate Build	Build	DB object (.sqlproj)	<ul style="list-style-type: none">● MSBuild● output : .dacpac (data-tier application package)
		SSIS (.dtproj)	<ul style="list-style-type: none">● Devenv● MSBuild using SSISMSBuild.dll● output : .ispac (integration service project package)
		SSRS (.rptproj)	<ul style="list-style-type: none">● Devenv● MSBuild using SSRSMSBuildTasks.dll

Component - Deploy

Main Component	Sub component	Object type	Tool
Automate Build	Deploy	DB object	<ul style="list-style-type: none">● MSBuild / sqlpackage.exe● sqlcmd - publish.sql● SQL Automation Pack - redgate● etc
		SSIS	<ul style="list-style-type: none">● PowerShell - Managed Object Model (MOM) for the SSIS Catalog● MSBuild with SSISMSBuild.dll● dtutil● etc
		SSRS	<ul style="list-style-type: none">● Powershell Report Server Web service SOAP API(http://server/reportserver/ReportService2010.asmx?wsdl)● MSBuild with SSRSMSBuildTasks.dll● rs.exe

Component - Test

Main Component	Sub component	Object type	Tool
Automate Build	Test	DB object	<ul style="list-style-type: none">• MSBuild• SQL Test - red gate
		SSIS	<ul style="list-style-type: none">• ORAYLIS BI.Quality - CodePlex no update since Nov, 2010
		SSRS	<ul style="list-style-type: none">• Unit Testing SSRS - CodePlex

Component - Automation tool

Main Component	Sub component	Object type	Tool
Automate Build	CI	All	<ul style="list-style-type: none">● Jenkins● TeamCity● Bamboo● etc
	Deployment	All	<ul style="list-style-type: none">● OctopusDeploy● Deployment manager - redgate● etc (Rundeck, ...)
	Packing	All	<ul style="list-style-type: none">● Nuget● etc
	Artifact repository	All	<ul style="list-style-type: none">● Nuget● Nexus● Artifactory● etc

References

Version Control

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<http://blogs.msdn.com/b/gertd/archive/2009/06/05/declarative-database-development.aspx>

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Build

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devenv - <http://blogs.objectsharp.com/post/2011/04/04/Build-a-Reporting-Services-Solution-with-MSBuild-40.aspx>

Deploy

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dtutil : <http://sev17.com/2012/11/06/scripting-ssis-package-deployments/>

powershell : <https://gist.github.com/kulmam92/5939944>

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Powershell - Report server web service SOAP API - <https://gist.github.com/kulmam92/6433572>

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SSRSMSBuild - <http://ssrsmsbuildtasks.codeplex.com/>

References

Test

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SSRS - <https://unittestssrs.codeplex.com/>

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SSIS - <http://ms-olap.blogspot.com/2010/09/biquality-20-released-on-codeplex.html>

CI

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<https://www.simple-talk.com/blogs/2014/02/11/automating-deployment-of-database-projects-with-red-gate-tools/>

<https://simonlearningsqlserver.wordpress.com/2014/06/27/using-octopus-deploy-to-publish-ssdt-projects-built-with-teamcity/>

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Packaging

Nuget- <http://www.hanselman.com/blog/NuGetForTheEnterpriseNuGetInAContinuousIntegrationAutomatedBuildSystem.aspx>

Demo - DB deployment

Demo Environment

- VS2012 - SSDT,SSDT-BI
- TFS 2013
- Jenkins

- **Jenkins plugin**

- Role-based Authorization Strategy
- CloudBees Folders Plugin
- Environment Injector Plugin
- build-name-setter
- Team Foundation Server Plug-in
- MSBuild Plugin
- Hudson PowerShell plugin
- Scriptler
- Jenkins Dynamic Parameter Plug-in
- Dynamic Parameter Plug-in
- Extensible Choice Parameter plugin



Dev machine

SQL Server 2012
VS 2012 with SSDT
SSDT-BI for VS2012
Team Explorer for VS2012



CI

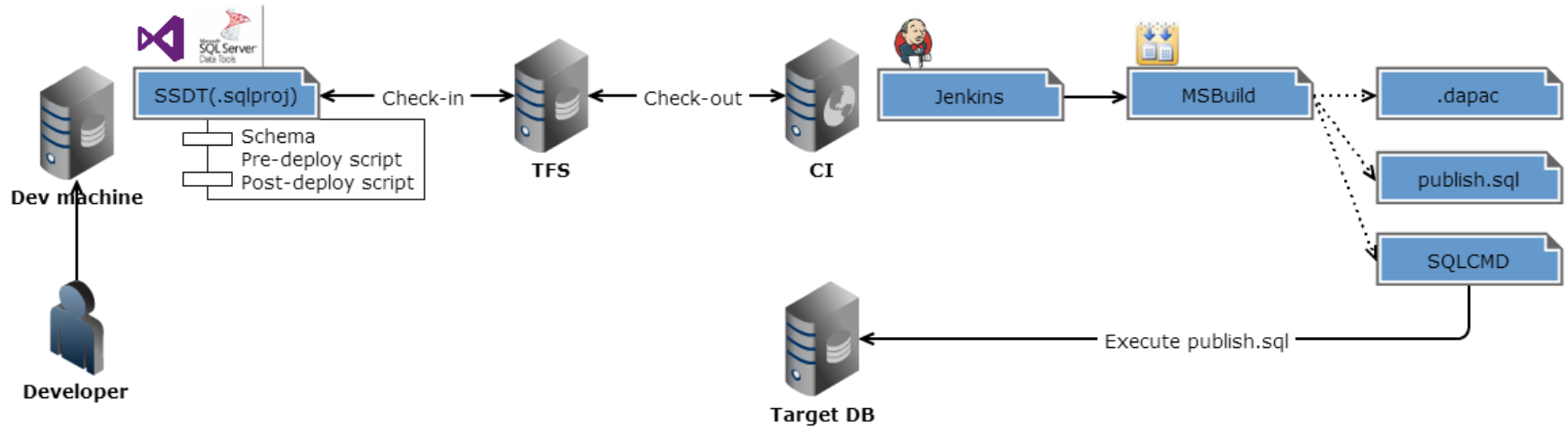
TFS 2013
SQL Server 2012
VS 2012 with SSDT
Jenkins
MSBuild Extension
SSISMSBuild.dll
SSRSMSBuildTasks.dll



DB

SQL Server 2012

Schema



Post and Pre deploy script

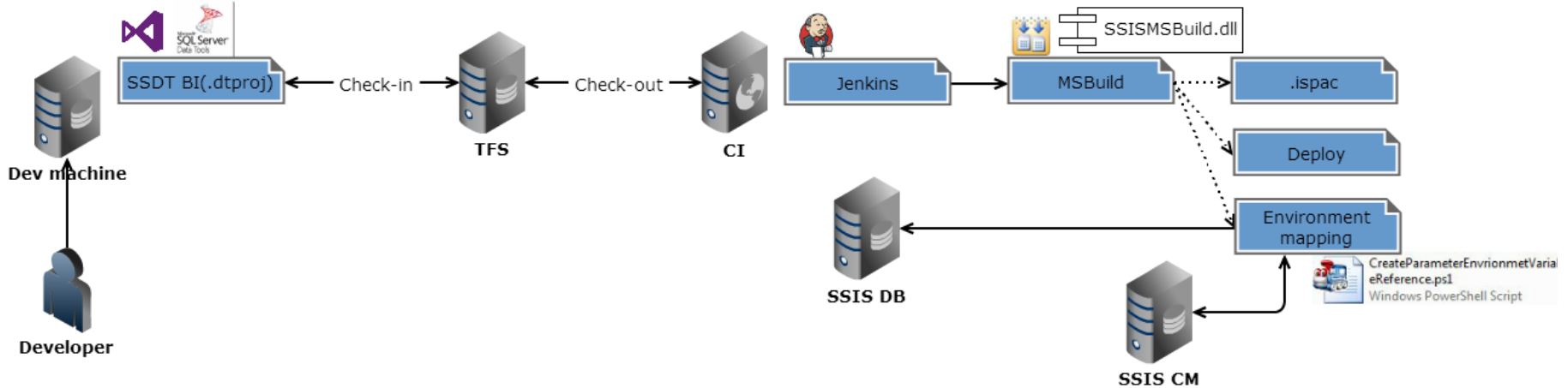
- SQL Server Database Project template doesn't create them by default
- SQLCMD script
- SSDT will create single publish.sql by merging pre-deploy script, migration script and post deploy script.

Demo - SSIS

SSIS Considerations

- **Deployment target**
 - OS folder, SSIS package store, MSDB, SSIS catalog
- **Deployment model**
 - Package based, project based
- **Configuration management**
 - Configuration file, configuration table, OS environment variable, SSIS catalog's environment
 - How to manage value for multiple test environments
 - configuration file on network share, SSIS catalog's environment, configuration table

SSIS



Delta deployment

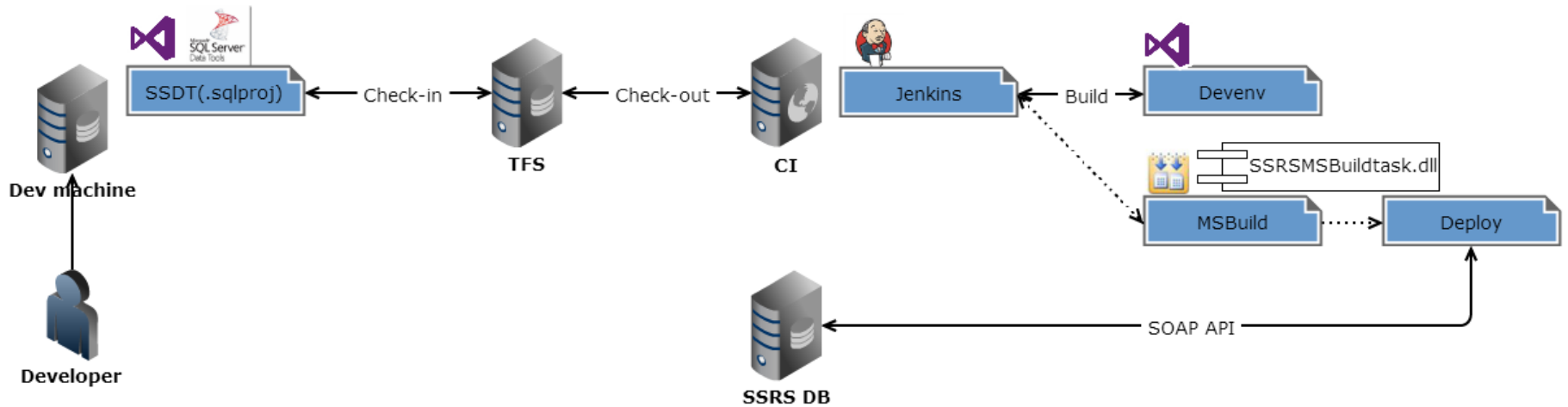
- Diff
- Changeset list from SCM
 - Jenkins
 - TFS
 - PowerShell using Microsoft Team Found
Snap-In
 - Groovy Script
 - TeamCity
 - Auto generate changelist : %system.teamcity.
build.changedFiles.file%

Demo - SSRS

SSRS Considerations

- The Lifecycle of a Reporting Services Report by Melissa Coates(sqlchick.com)
- Deployment target
 - Share point, report manager, etc
- Scope of deployment
 - report, data source, dataset, image, folder, link, subscription, security, etc
- Configuration management
 - configuration file, dll

SSRS



Further Consideration

- How to control changes in DB?
 - Prevention/Audit
 - Direct modification
 - Compare DB between environment?
 - A known-good starting position
- Continuous improvement
- Team efforts

References

Demo Environment

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Schema

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Delta deployment

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Q & A

Blog : <http://speakesql.wordpress.com/>