tSQLt Tests: Unit Test Your SQL Server Code and Sleep Better

Andy Jones
@SQLBits
#tSQLt

Coeo
Making SQL Sense

Why?

- Robust Code
- Automate
- Save Money
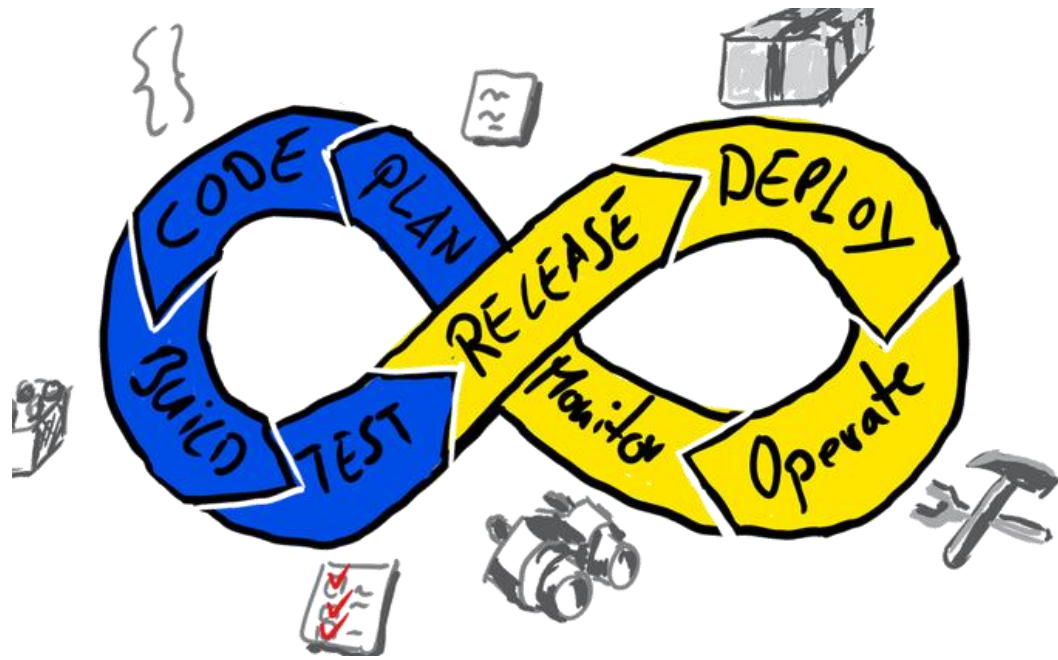- Improve Reputation
- Senior Position
- Enjoyable
- DevOps

Agenda

Unit Testing

Test Driven Development

tSQLt

Faking and Isolation

Third Party Tools

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DevOps

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

Sam Guckenheimer

DevOps

a — 11.7 seconds

Etsy — 50 per day

N — Thousands per day

https://techbeacon.com/10-companies-killing-it-devops

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Testing?

Senior developer: "How do you test your code?"

Junior developer: "I compile it"

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Database Release Spectrum

Typical Process

Sprint → Build → Test → Rework → Test → Live
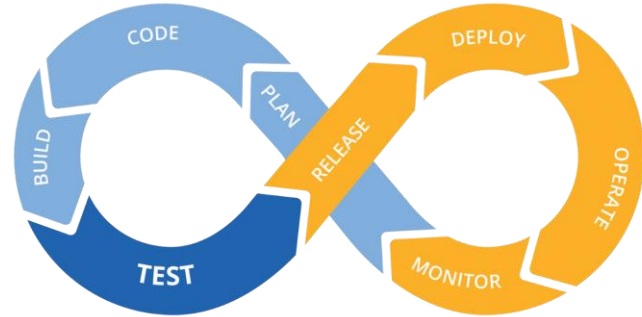
Could not find stored procedure 'dbo.InsertOrder'
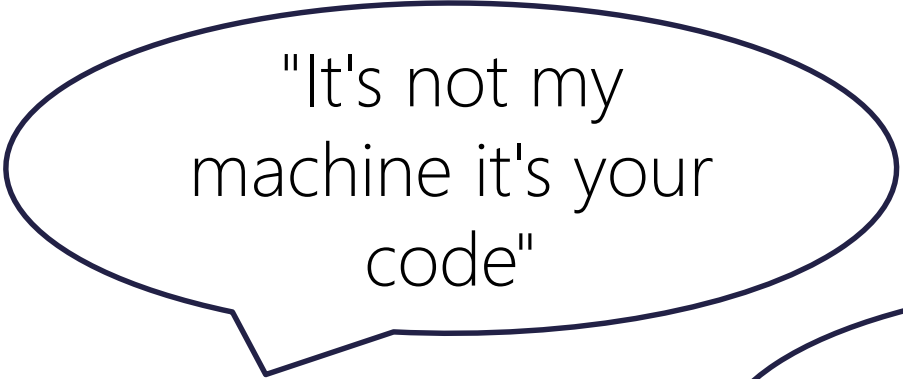
Invalid column name 'TeamMember'

Procedure or function 'CustomerSelect' expects parameter '@Active', which was not supplied

Operand type clash: datetime2 is incompatible with int
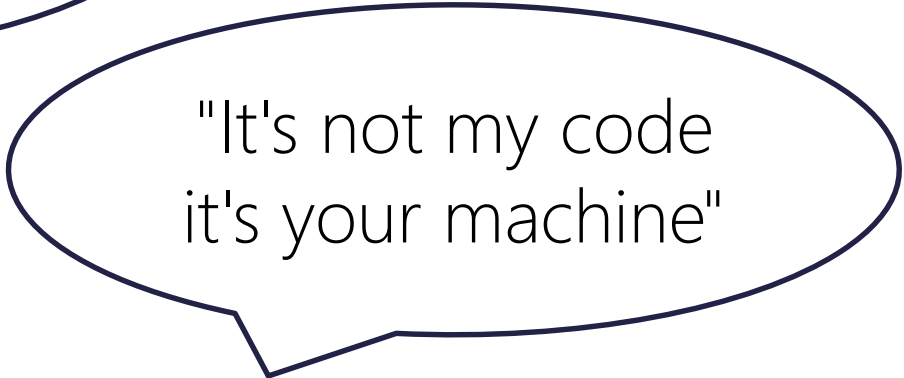
The INSERT statement conflicted with the FOREIGN KEY constraint

Blame
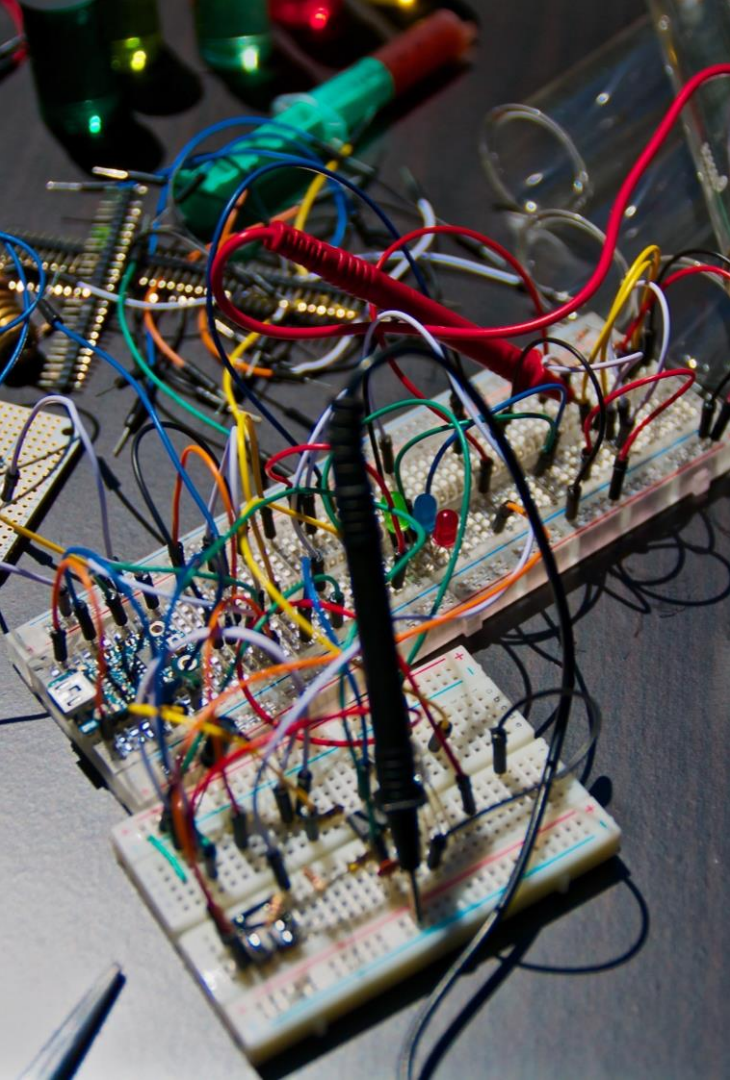
Unit Testing

- Same Language
- Smallest Unit
- Isolated
- Any Order
- Repeatable
- Each Test Every Time
- Automated
- Remove Human Error
- Familiar to Devs JUnit | xUnit | Pester

Test Driven Development

Write Test → Test Fails → Code → All Tests Pass → Refactor → All Tests Pass

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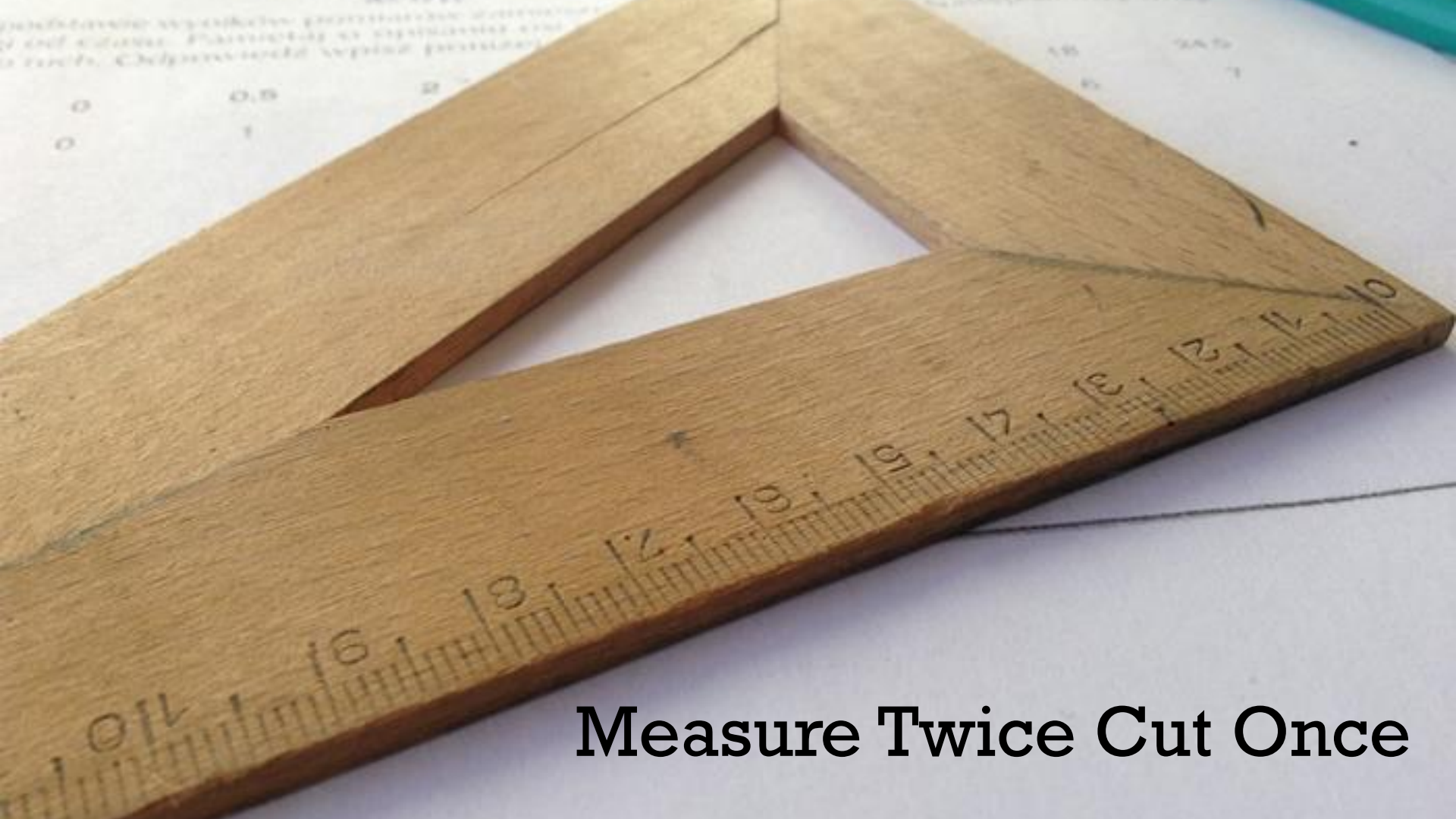
Measure Twice Cut Once

tSQLt

- Open source on GitHub
- Free
- 2005 and up
- Framework and tests are TSQL
- Independent via transactions
- Methods to fake objects and isolate

Install

DOWNLOADS

TSQLT

Download the latest tSQLt version here:

Download "tSQLt"

tSQLt_V1.0.5873.27393.zip –

Downloaded 15319 times – 86 KB

http://tsqlt.org/downloads

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Files

Demo - Install

WELCOME TO TSQLT – THE DATABASE UNIT TESTING FRAMEWORK FOR SQL SERVER
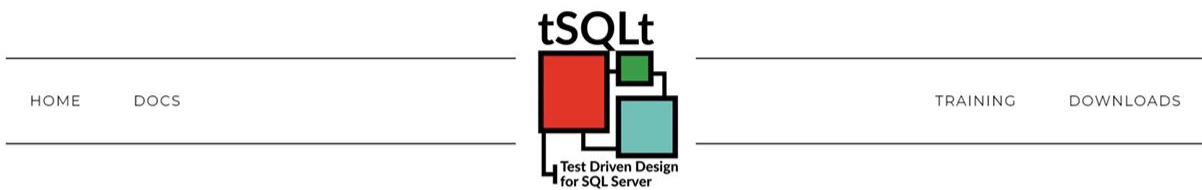
On this website you will find the information necessary for installing and using tSQLt. Also, you can click on the Articles link on the menu above for more information on database quality.

WHAT IS TSQLT?

tSQLt is a database unit testing framework for Microsoft SQL Server. tSQLt is compatible with SQL Server 2005 (service pack 2 required) and above on all editions.

MAIN FEATURES

tSQLt allows you to implement unit tests in T-SQL. This is important as you do not have to switch between various tools to create your code and your unit tests. tSQLt also provides the following features to make it easier to create and manage unit tests:

- Tests are automatically run within transactions – this keeps tests independent and reduces any cleanup work you need

3 Ways to Improve Your Testing Skills

sqlity.net

tSQLt

Download Your **FREE** Infographic

DOWNLOADS

Download "tSQLt"
tSQLt_V1.0.5873.27393.zip
– Downloaded 15175 times

Enable CLR

SetClrEnabled.sql

```sql
EXECUTE sp_configure 'clr enabled', 1;
RECONFIGURE;
GO
```

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Star Schema
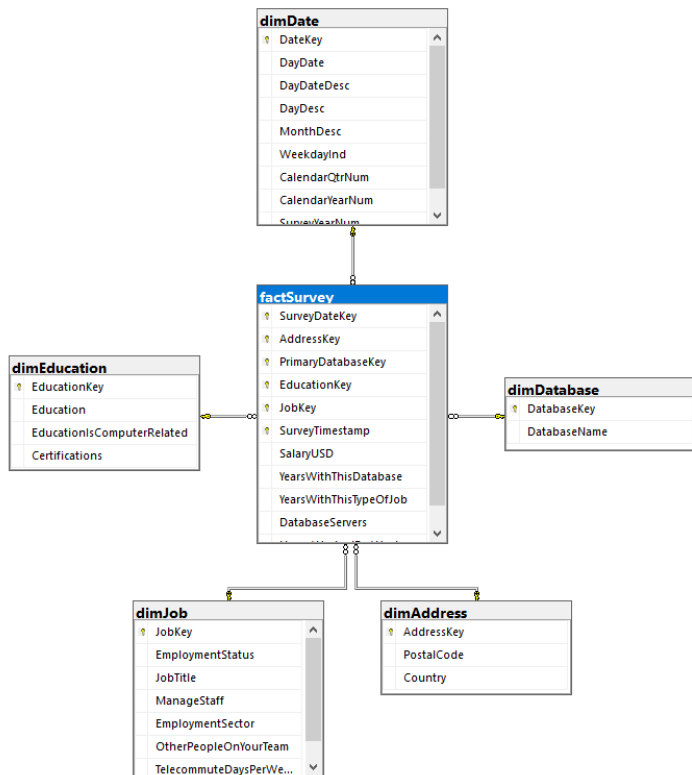
Demo – Create Our First Test

Test Structure

Assemble → Act → Assert

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Assemble

Fake Table

Fake Function

Fake View

Spy Procedure

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Act

```sql
--Act: Call the Get_Unknown_Key function
SELECT @Actual = dbo.Get_Unknown_Key();
```

Assert

- AssertEmptyTable
- AssertEquals
- AssertEqualsString
- AssertEqualsTable
- AssertEqualsTableSchema
- AssertLike
- AssertNotEquals
- AssertObjectDoesNotExist
- AssertObjectExists
- AssertResultSetsHaveSameMetaData
- Fail
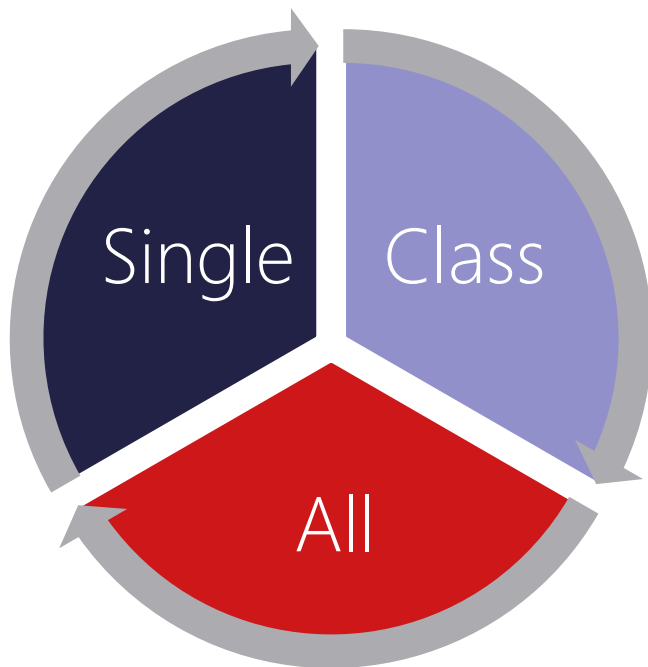
Prod Bugs Cost You 100x
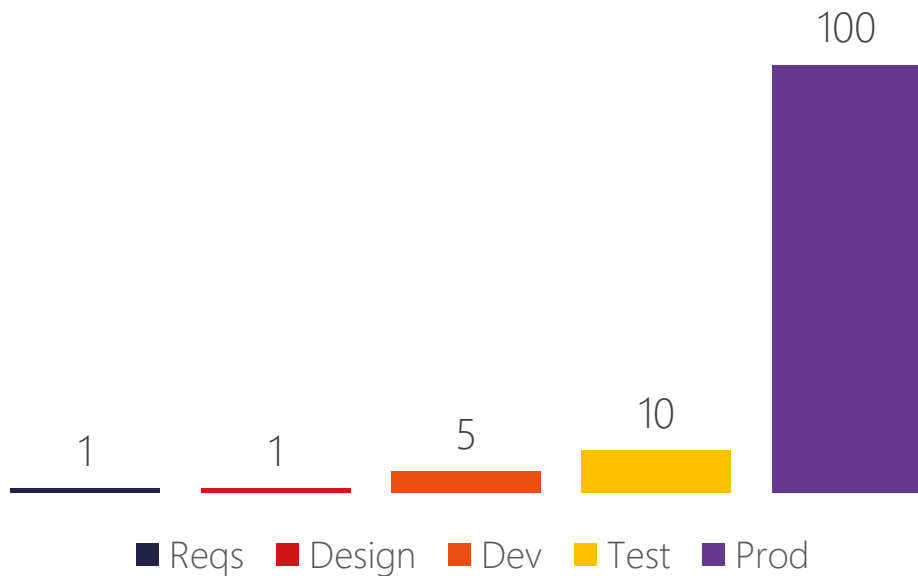
Source: http://www.riceconsulting.com/public_pdf/STBC-WM.pdf

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Demo – Isolation

Zero

One

Some

Infographic

3 WAYS TO IMPROVE YOUR TESTING SKILLS

Did I write enough tests? Too many?
Did I cover the most common causes for defects?
If you ever have asked yourself any of those questions,
take a look at test case heuristics.

A heuristic (proper: "heuristic technique") is an approach to problem solving based on experience that will get you close to the ideal solution.

Using heuristics in unit testing helps you to cover the most common causes for defects. But they also help to keep the number of tests low, reducing maintenance costs.

http://sqlity.net/lp-heuristics

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Demo – Static Data

Clean Up

Not for production ✖

EXECUTE tSQLt.Uninstall;

Demo – Spy Procedure

Performance Testing? | Functional Only

Modular

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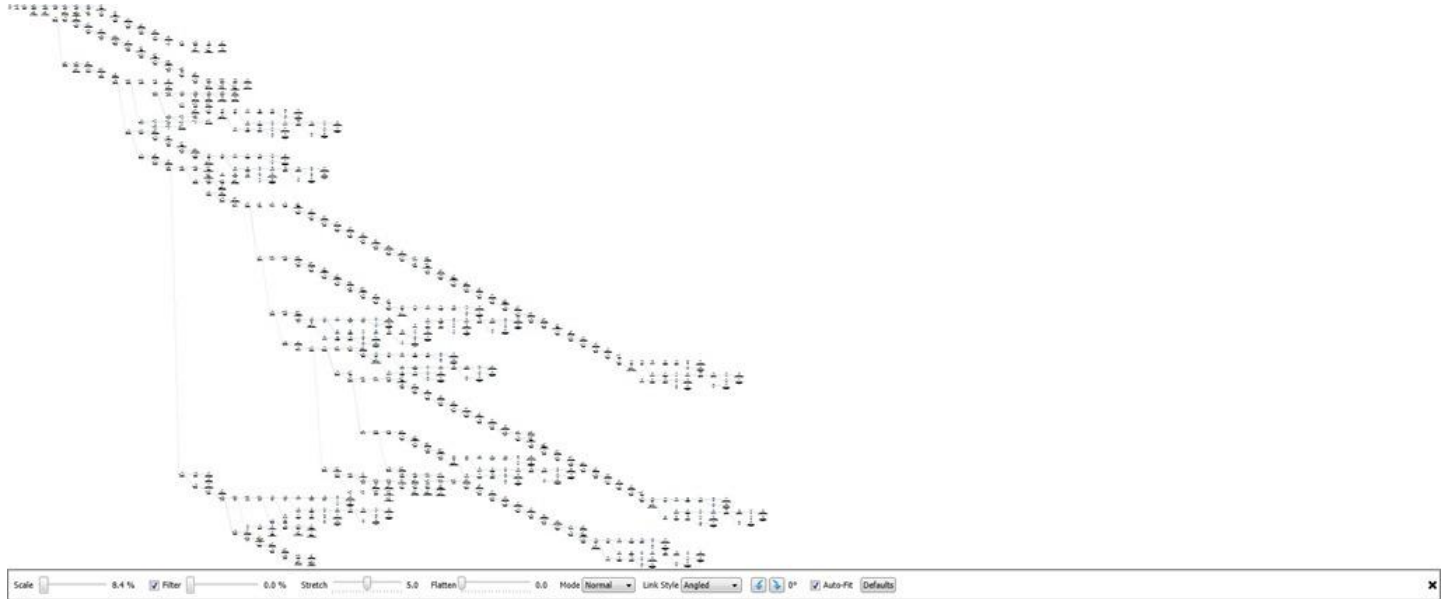
Optimiser Help

Properties — SELECT

Misc	
Cached plan size	24 KB
CompileCPU	1
CompileMemory	224
CompileTime	1
Degree of Parallelism	1
Estimated Number of Rows	215.763
Estimated Operator Cost	0 (0%)
Estimated Subtree Cost	0.709365
Logical Operation	
Memory Grant	1024
MemoryGrantInfo	
Optimization Level	FULL
OptimizerHardwareDependentProperties	
Parameter List	@UserID
Physical Operation	
Reason For Early Termination Of Statement Optimization	Good Enough Plan Found
RetrievedFromCache	true

Which SP Are Tests

Starts Test **+** Extended Property **=** ✔

Naming Convention

```sql
EXECUTE tSQLt.NewTestClass
    @ClassName = 'Orders';


CREATE PROCEDURE Orders.[test Failed Order]
    AS

    --assemble
    --act
    --assert
    RETURN;
```

Extended Property
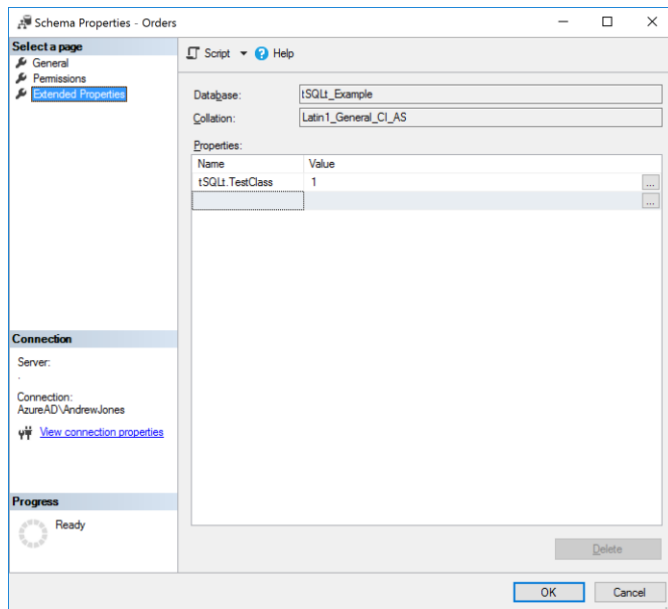
tSQLt.TestClasses

```sql
CREATE VIEW tSQLt.TestClasses
AS
  SELECT s.name AS Name, s.schema_id AS SchemaId
    FROM sys.extended_properties ep
    JOIN sys.schemas s
      ON ep.major_id = s.schema_id
   WHERE ep.name = N'tSQLt.TestClass';
```

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tSQLt.Tests

```sql
CREATE VIEW tSQLt.Tests
AS
  SELECT classes.SchemaId, classes.Name AS TestClassName,
         procs.object_id AS ObjectId, procs.name AS Name
    FROM tSQLt.TestClasses classes
    JOIN sys.procedures procs ON classes.SchemaId = procs.schema_id
   WHERE LOWER(procs.name) LIKE 'test%';
```

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Demo – Setup Procedure

Third Party Tools

Redgate

Devart

ApexSQL

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SQL Cop

http://sqlcop.lessthandot.com
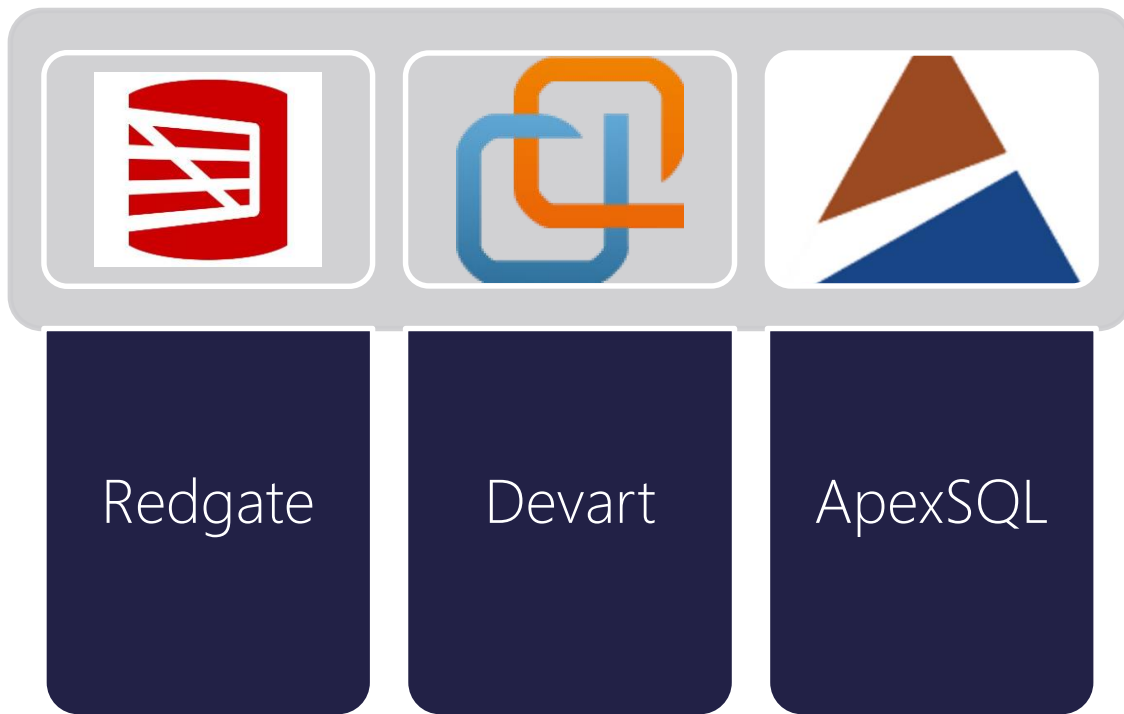
Standards

Code Coverage

"Testing can be used to show the presence of bugs, but never to show their absence"

Edsger W. Dijkstra

Summary

- Robust
- Find bugs early
- Automated
- Shared
- Repeatable
- Better you

Example Database

```
tSQLt_Example
    Database Diagrams
    Tables
    Views
    External Resources
    Synonyms
    Programmability
        Stored Procedures
            System Stored Procedures
            Accelerator.AlertParticleDiscovered
            Accelerator.SendHiggsBosonDiscoveryEmail
            AcceleratorTests.test a particle is included only if it fits inside the boundaries of the rectangle
            AcceleratorTests.test a particle within the rectangle is returned
            AcceleratorTests.test a particle within the rectangle is returned with an Id, Point Location and Value
            AcceleratorTests.test email is not sent if we detected something other than higgs-boson
            AcceleratorTests.test email is sent if we detected a higgs-boson
            AcceleratorTests.test foreign key is not violated if Particle color is in Color table
            AcceleratorTests.test foreign key violated if Particle color is not in Color table
            AcceleratorTests.test no particles are in a rectangle when there are no particles in the table
            AcceleratorTests.test ready for experimentation if 2 particles
            AcceleratorTests.test status message includes the number of particles
            AcceleratorTests.test we are not ready for experimentation if there is only 1 particle
            tSQLt.ApplyConstraint
            tSQLt.ApplyTrigger
            tSQLt.AssertEmptyTable
            tSQLt.AssertEquals
```
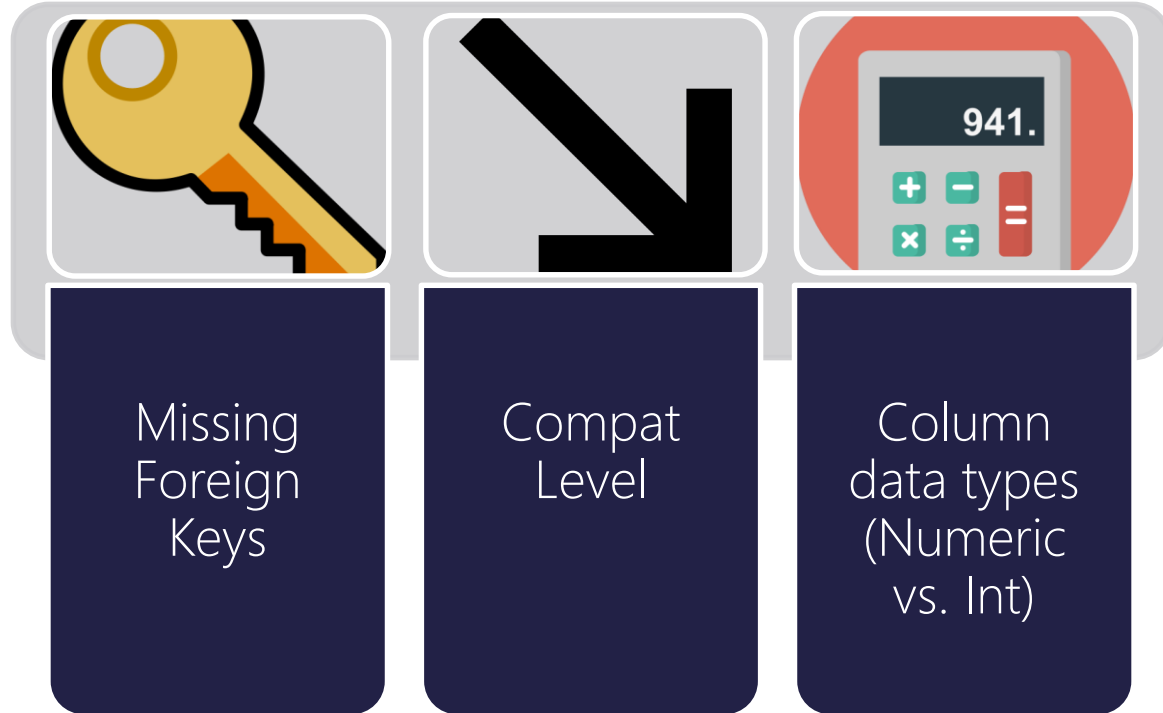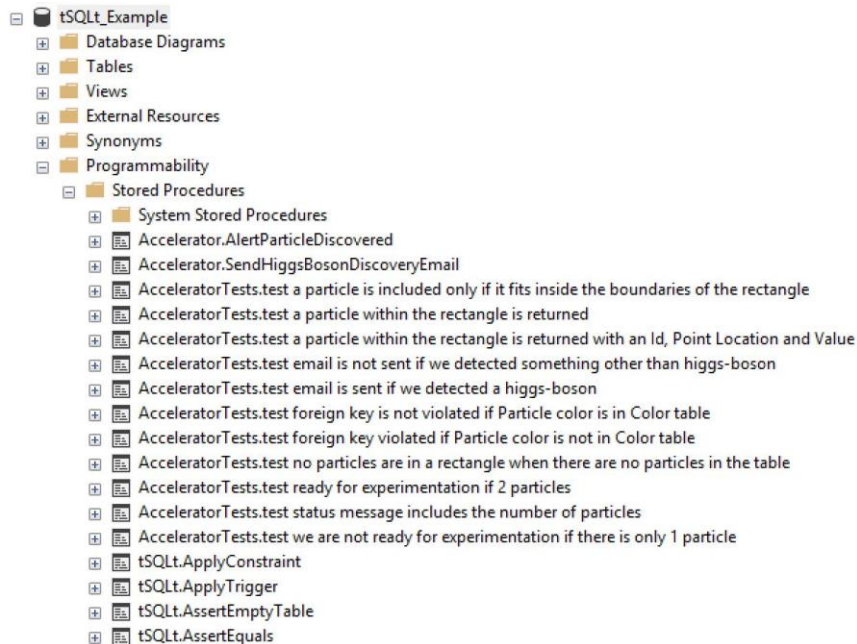
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Call To Action

"The best time to plant a tree is twenty years ago. The second best time is now"

Chinese Proverb

Just like Jimi Hendrix …

We love to get feedback

Please complete the session feedback forms

SQLBits - It's all about the community...

Please visit Community Corner, we are trying this year to get more people to learn about the SQL Community, equally if you would be happy to visit the community corner we'd really appreciate it.

Thanks

Andy Jones

andrew@coeo.com

@SQLSprint

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