SQL Server: Detecting and Correcting Database Corruption

Module 1: Introduction

Paul S. Randal
http://www.SQLskills.com/blogs/paul/
Paul@SQLskills.com

pluralsight
hardcore developer training

Why Is This Course Important?

- **Corruption does happen, many times per day, all around the world**
  - Check out the SQL Server Central data corruption forums
- **Many people don't realize they have corruption until too late**
  - Either they don't know how to check for corruption or they miss the warning signs that corruption has occurred
  - The faster you realize you have corruption, the more likely you will be able to recover with minimal downtime and data loss
- **Many people don't know what to do when they do have corruption, leading to:**
  - More data loss and downtime than necessary
  - Monetary and even job losses
  - Overall lowered perception of SQL Server
    - Makes it harder to convince management that SQL Server is Enterprise-capable
- **Check out the upcoming follow-on course *SQL Server: Advanced Corruption Recovery Techniques***

What Can Happen to an Unprepared DBA Confronted by Corruption?

- Image from http://commons.wikimedia.org/wiki/File:Panic_button.jpg

Things That Many People Try First

- **Restart SQL Server**
  - Just wastes time and delays getting back online
    - Especially if the physical server is power-cycled too
    - Although I've seen it work rarely when the I/O subsystem is doing stale reads
- **Immediately jump to a "last resort" and cause data loss without working through options**
  - E.g. running repair instead of using backups
  - E.g. removing the transaction log
- **Forcibly detach/drop a damaged or SUSPECT database**
  - It will fail to attach again so now the situation is even worse!

Real-World Example

- **Story**
  - The database is corrupt and it takes literally days to bring online
  - Customer is a small bank in the US
- **Cause**
  - Customer only had a full backup from January plus log backups every ½ hour until April when corruption hit
  - All backups are stored on tape
- **Resolution**
  - Restored ALL the backups (approximately 5000!) and luckily none were corrupt
- **Cost**
  - Aggravation to bank customers while bank was down for several days
  - The bank went out of business
- **Lessons learned**
  - Plan a backup strategy that allows an efficient and quick restore
  - Test the disaster recovery strategy

Practice Makes Perfect

- **If you're recovering from corruption, or helping a client recover from some corruption:**
  - You must know what you're doing
  - You must have practiced
  - You must NOT make things worse
- **Even if you've never run consistency checks before:**
  - A little bit of knowledge means you'll have a good idea what to do and when to ask for help from someone more experienced
  - Your colleagues/clients will be very impressed if you recover from a disaster

Root Cause Analysis

- **No matter what method you use to recover from corruption, you should always determine why it happened to avoid future problems**
- **It may be obvious what happened**
  - E.g. a known SAN problem or power failure
- **You may have no idea what happened, so what to do?**
  - Google/Bing for the corruption message you saw
  - Run I/O subsystem and server memory diagnostics
  - Examine the SQL Server error log and Windows event logs for clues
  - Check that firmware is up-to-date
  - Investigate NTFS filter drivers
  - Possibly contact Microsoft Customer Support for assistance

Why Can I Teach This Course?

- **I spent 9 years on the SQL Server team in Microsoft, from 1999 through 2007, as a developer, and in various management roles**
- **From 2000 to 2003 I was the developer responsible for DBCC CHECKDB (and the rest of the 130+ DBCC commands)**
  - Rewrote much of the consistency checking and repair code
  - Added consistency checking capabilities for new SQL Server 2005 features and data structures
  - Fixed hundreds of repair bugs
- **I've been involved in more than a thousand cases of corruption over the years, and have advised countless people over email, Internet forums, and our consulting clients**

Course Structure

- **This course applies to all versions of SQL Server from SQL Server 2005 onward, except where noted**
- **This course assumes basic knowledge of SQL Server terminology**
  - E.g. database, transaction log, backup
- **Module 2: Causes of database corruptions**
- **Module 3: Detecting page corruption**
- **Module 4: Consistency checking**
- **Module 5: DBCC CHECKDB and related commands**
- **Module 6: Interpreting DBCC CHECKDB output**
- **Module 7: Simple restore techniques**
- **Module 8: Simple repair techniques**

- **For more advanced topics, see *SQL Server: Advanced Corruption Recovery Techniques,* coming later in 2013**