Recovering With Minimal Impact:
Advanced Database Restore Methods

Bob Pusateri

He/Him

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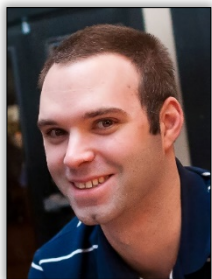
About Bob Pusateri

Microsoft
C E R T I F I E D
Master
SQL Server 2008

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MVP
Microsoft®
Most Valuable
Professional

Specialties:
- Performance Tuning
- Very Large Databases
- SQL Server Storage Engine
- Cloud Architecture
- Teaching & Helping

ChiSQL

FRIEND OF
redgate
2021

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Agenda

- Point-in-time restores

- Page restores

- Piecemeal restores

https://flic.kr/p/9Tjo7V

Have you ever lost data?

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How can we help prevent data loss?

- Have backups

- Have backups scheduled at the right intervals

- Have backups that have been **validated via restore**

- Have a big toolbox of restore techniques
  - Know when to use them!
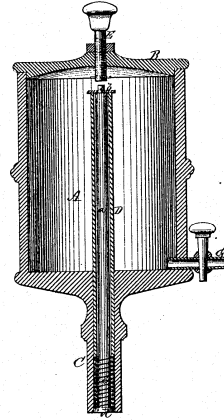 - Have runbooks!

- Practice them regularly

Restores: The Real McCoy!

E. McCOY.

Improvement in Lubricators for Steam-Engines.

No. 129,843.   Patented July 23, 1872.

Witnesses
John A. Ellis
E. K. Watson

Inventor
Elijah McCoy
T. H. Alexander K.
Atty.

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Disasters: Not all the same

- Datacenter blows away

- Server melts

- Network dies

- Storage dies

- There's others...

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Disaster Scenarios

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Disaster #1

OOPS!

I ran a <u>DELETE</u> without a <u>WHERE</u>

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Data loss occurred _____ ago

- All data entered since that time can be lost

- The entire database needs to be reset to that point in time

- Database is in simple recovery

- If it's not in simple recovery, you have more options

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Point-in-time Restores

- Backup combinations that can be restored:

  - Full

  - Full + Differential

  - Full + Log(s)

  - Full + Differential + Log(s)

- Point-in-time doesn't work for all of these!

- Can we do a point-in-time restore with a full backup?

Point-in-time Restore Options

- STOPAT
  - Stop at an exact date/time

- STOPATMARK
  - Create a marked transaction or specify an LSN
  - Rollback to after that transaction happened

- STOPBEFOREMARK
  - Create a marked transaction or specify an LSN
  - Rollback to before that transaction happened

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You Want Point-in-time Restore When....

- "OH SNAP!" queries

- Deployments gone bad

Demo: Point-In-Time Restore

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Point-in-time Restores ARE NOT

- A substitute for planning

- A substitute for testing

- Object-Level Recovery

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Disaster #2

Editor | **Messages**

Msg 8939, Level 16, State 98, Line 1
Table error: Object ID 1205579333, index ID 1, partition ID 72057594042515456, alloc unit ID 72057594048217088 (type In-row data), page (3:153).
Test (IS_OFF (BUF_IOERR, pBUF->bstat)) failed. Values are 133129 and -4.
Msg 8928, Level 16, State 1, Line 1
Object ID 1205579333, index ID 1, partition ID 72057594042515456, alloc unit ID 72057594048217088 (type In-row data): Page (3:153) could not be processed. See other errors for details.
Msg 8976, Level 16, State 1, Line 1
Table error: Object ID 1205579333, index ID 1, partition ID 72057594042515456, alloc unit ID 72057594048217088 (type In-row data).
Page (3:153) was not seen in the scan although its parent (3:48) and previous (3:152) refer to it. Check any previous errors.
Msg 8978, Level 16, State 1, Line 1
Table error: Object ID 1205579333, index ID 1, partition ID 72057594042515456, alloc unit ID 72057594048217088 (type In-row data).
Page (3:154) is missing a reference from previous page (3:153). Possible chain linkage problem.
CHECKDB found 0 allocation errors and 4 consistency errors in table 'ZipCodes' (object ID 1205579333).
CHECKDB found 0 allocation errors and 4 consistency errors in database 'DemoData'.
repair_allow_data_loss is the minimum repair level for the errors found by DBCC CHECKDB (DemoData).
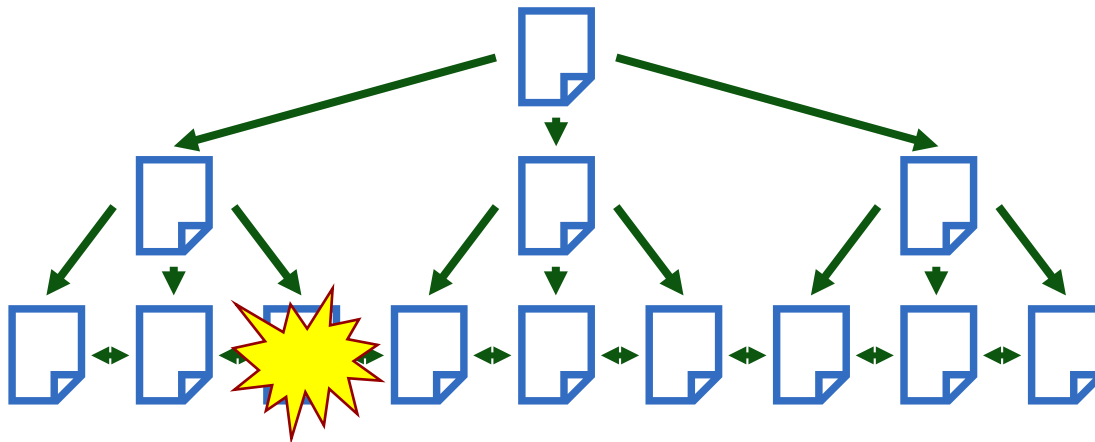
CORRUPTION!!

Database Pages

- SQL Server database files are divided up into "pages"

- 8K in size
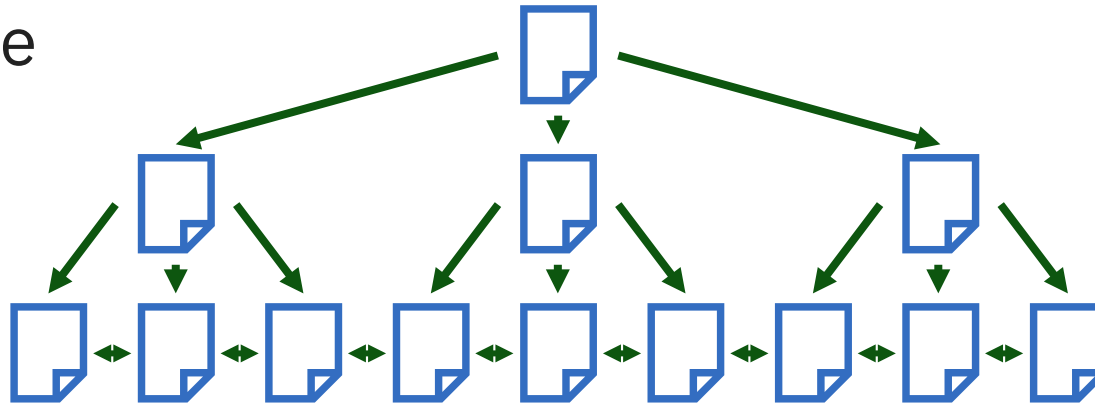
Database Pages

- DBCC CHECKDB has found one corrupt page

- You have a 20TB database

- It takes 5 hours to restore

What do we do?

- Restore the entire database?

- Restore just the corrupt pages?

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Reasons to use page restore

- Save time – Faster than a full restore

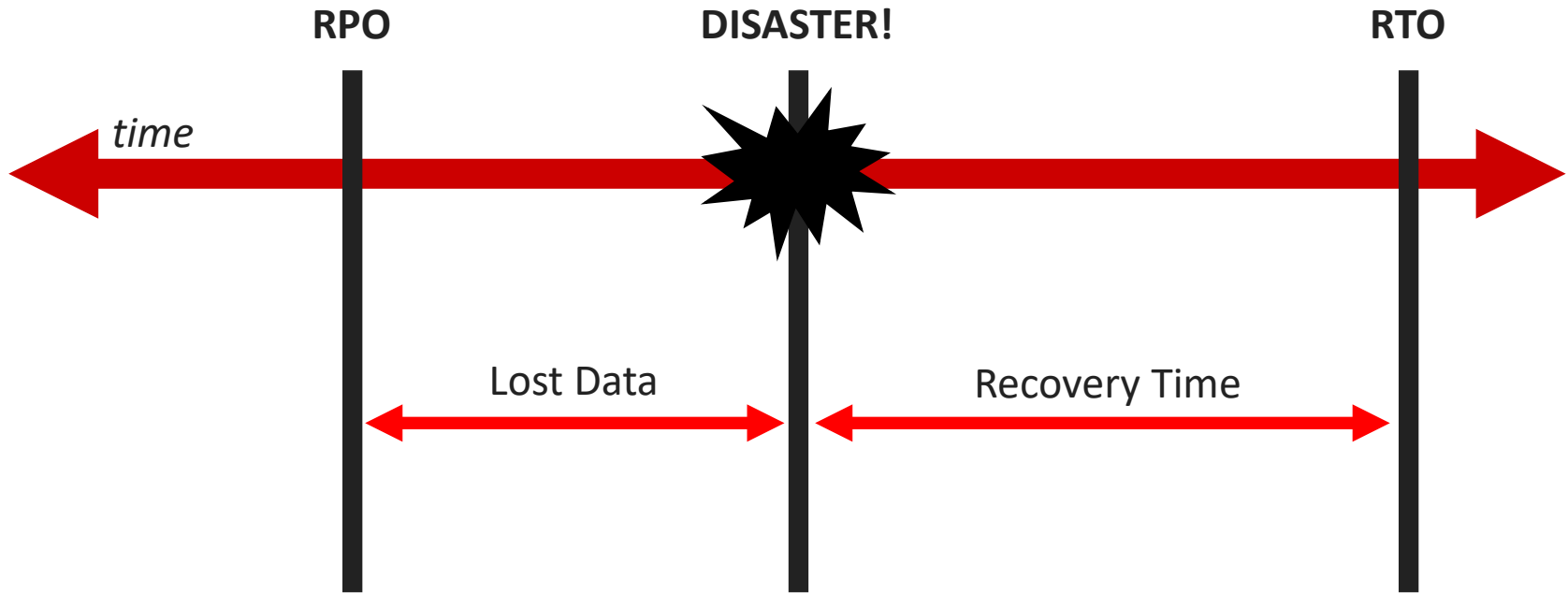- Keep the rest of the database online!

- Impress your friends?

Demo:
Page Restore

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Disaster #3

RTO doesn't allow enough time to restore the entire database

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Show of Hands:

Who here has an RPO/RTO established?

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RPO   DISASTER!   RTO

time

Lost Data   Recovery Time

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Piecemeal Restore

- Also known as "Partial Restore"

- Lets you bring part of the database online

- Requirements

  - Multiple filegroups

  - Enterprise Edition

  - Planning

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Use piecemeal restore when....

- Database is already offline

- You have RTO requirements to meet

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Demo:
Piecemeal Restore

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Third-Party Backup Tools

- May not offer these capabilities

- Test and see!

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In Conclusion...

- Have backups

- Have backups scheduled at the right intervals

- Have backups that have been validated via restore

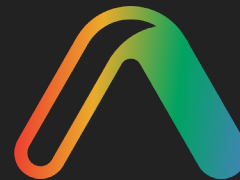- Have a big toolbox of restore techniques

- Practice restores regularly

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Session evaluation
Your feedback is important to us

Evaluate this session at:

www.PASSDataCommunitySummit.com/evaluation

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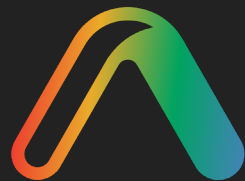# Thank you

https://www.bobpusateri.com/r/pass2021

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