

Setting up for the lab

1. Restart the SQL Server service (clears stats)
2. Restore your StackOverflow database
3. Copy & run the setup script:
BrentOzar.com/go/serverlab6
4. If you saved your Lab 5 changes, apply those
5. Start SQLQueryStress:
 1. File Explorer, D:\Labs, run SQLQueryStress.exe
 2. Click File, Open, D:\Labs\ServerLab5.json
 3. Click Go



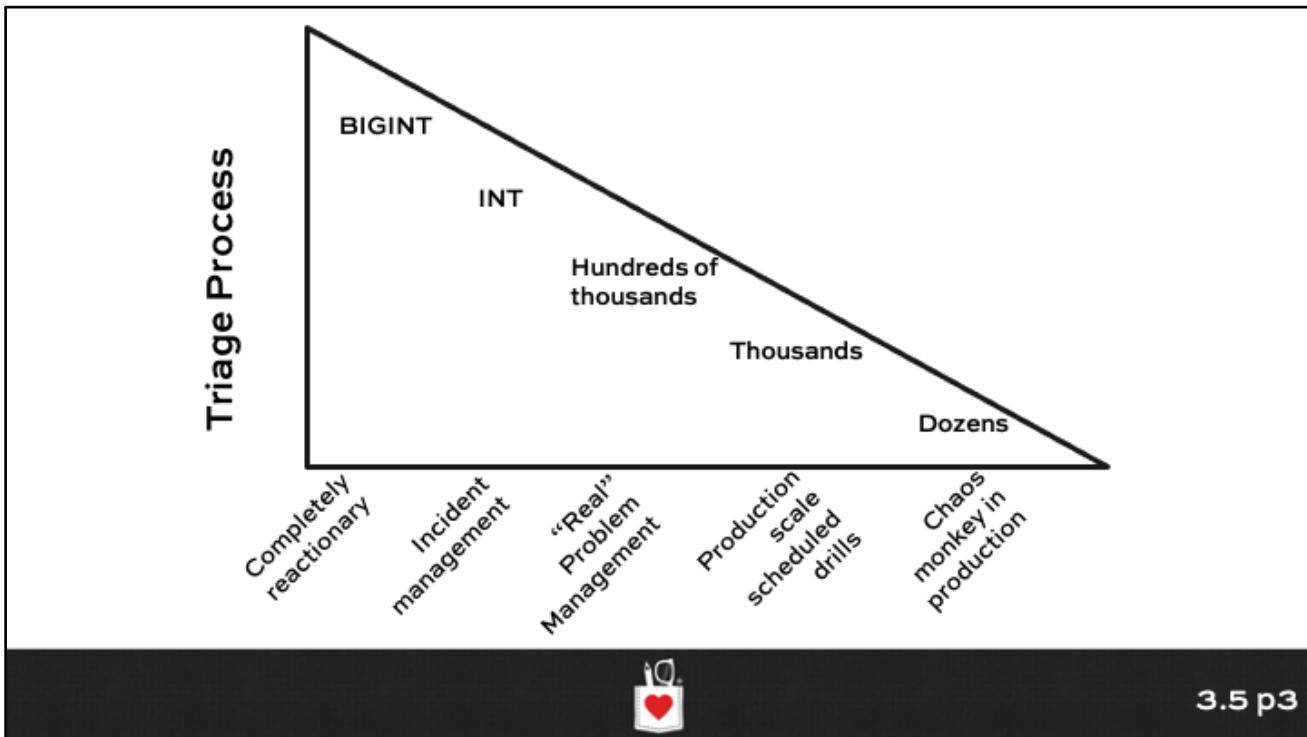
3.5 p1



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UNLIMITED®

How to Triage SQL Server Emergencies

3.5 p2



Serious example: ITIL

Information Technology Infrastructure Library

Related areas:

- Incident Management
 - Major incident specializations
- Problem management
- Change management

It's a library – it's pretty dry

Take the pieces that work best for you

BrentOzar.com/go/itil



3.5 p4

Your goal: get one step better.

Start to build and document processes that are:

- Proven
- Repeatable
- Teachable – to help turn our juniors into seniors



3.5 p5

Let's start with the
most common IT issue:
the Emergency Room.



Triage

is the process of
finding out where
the patient belongs.



Hospital triage levels

1. The patient is dead,
and we have to try to resuscitate them right now
2. The patient is likely to die regardless of whether
they receive medical help
3. The patient will live, but only if we help them now
4. The patient will live whether or not we help them



3.5 p8

SQL Server performance triage

1. The server is down, not responding to queries
2. The server is going to go down in minutes if we can't fix the problem quickly
3. The entire server is in bad shape, but will survive today whether we fix the problem or not
4. Some parts of some applications are unusually slow
5. Bob's report is running unusually slow
6. Bob's report is running just like it did yesterday: slow



3.5 p9

SQL Server performance triage

1. The server is down, not responding to queries
2. The server is going to go down in minutes if we can't fix the problem quickly

At these levels, you may have to take risks and perform drastic actions. You need to know which doctors to bring into the room.



3.5 p10

SQL Server performance triage

At these levels, taking risks or drastic actions can easily make things worse.

We need to prove it's not an emergency and respond appropriately.

4. Some parts of some applications are unusually slow
5. Bob's report is running unusually slow



3.5 p11

SQL Server performance triage

Sometimes Bob is just faking it.
That doesn't mean we ignore him, we just set priorities.

6. Bob's report is running just like it did yesterday: slow



3.5 p12

Your goal is to fill this out fast.

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p13

Your triage tools, in order:

1. Your monitoring software
2. sp_WhoIsActive
3. sp_BlitzFirst
4. sp_BlitzCache
5. sp_BlitzIndex
6. sp_Blitz



3.5 p14

The help desk can use these too.

The stored procedures require SA-level permissions.

You can grant permissions to procs rather than users.

It's crazy easy: <http://www.brentozar.com/askbrent/>



3.5 p15

```
USE master;
GO
CREATE CERTIFICATE sp_BlitzFirst_cert
ENCRYPTION BY PASSWORD = '50ClockSomewhere'
WITH SUBJECT = 'Certificate for sp_BlitzFirst',
START_DATE = '20130711', EXPIRY_DATE = '21000101';
GO
CREATE LOGIN sp_BlitzFirst_login FROM CERTIFICATE sp_BlitzFirst_cert;
GO
CREATE USER sp_BlitzFirst_login FROM CERTIFICATE sp_BlitzFirst_cert;
GO
GRANT EXECUTE ON dbo.sp_BlitzFirst TO sp_BlitzFirst_login;
GO
GRANT CONTROL SERVER TO sp_BlitzFirst_login;
GO
ADD SIGNATURE TO sp_BlitzFirst BY CERTIFICATE sp_BlitzFirst_cert
WITH PASSWORD = '50ClockSomewhere';
GO
GRANT EXECUTE ON dbo.sp_BlitzFirst TO [public];
GO
```



3.5 p16

Your monitoring software



3.5 p17

What part does monitoring do?

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

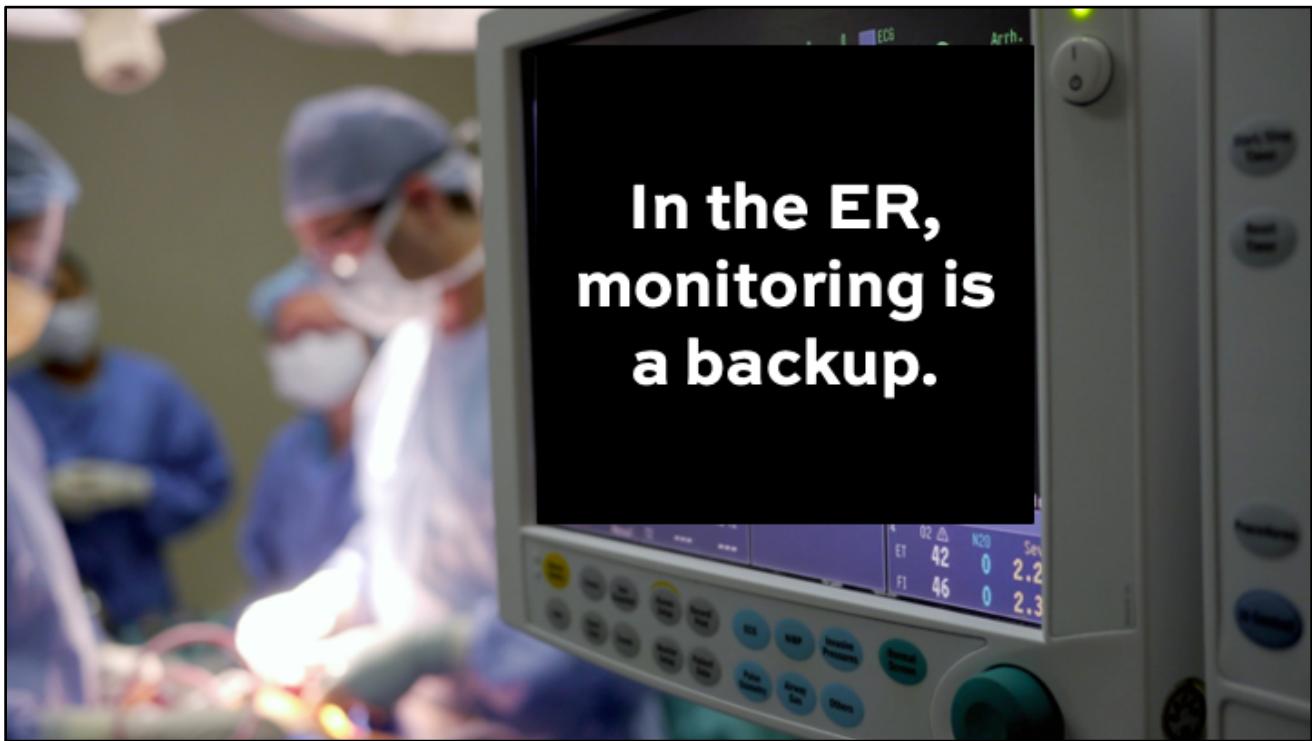
I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p18





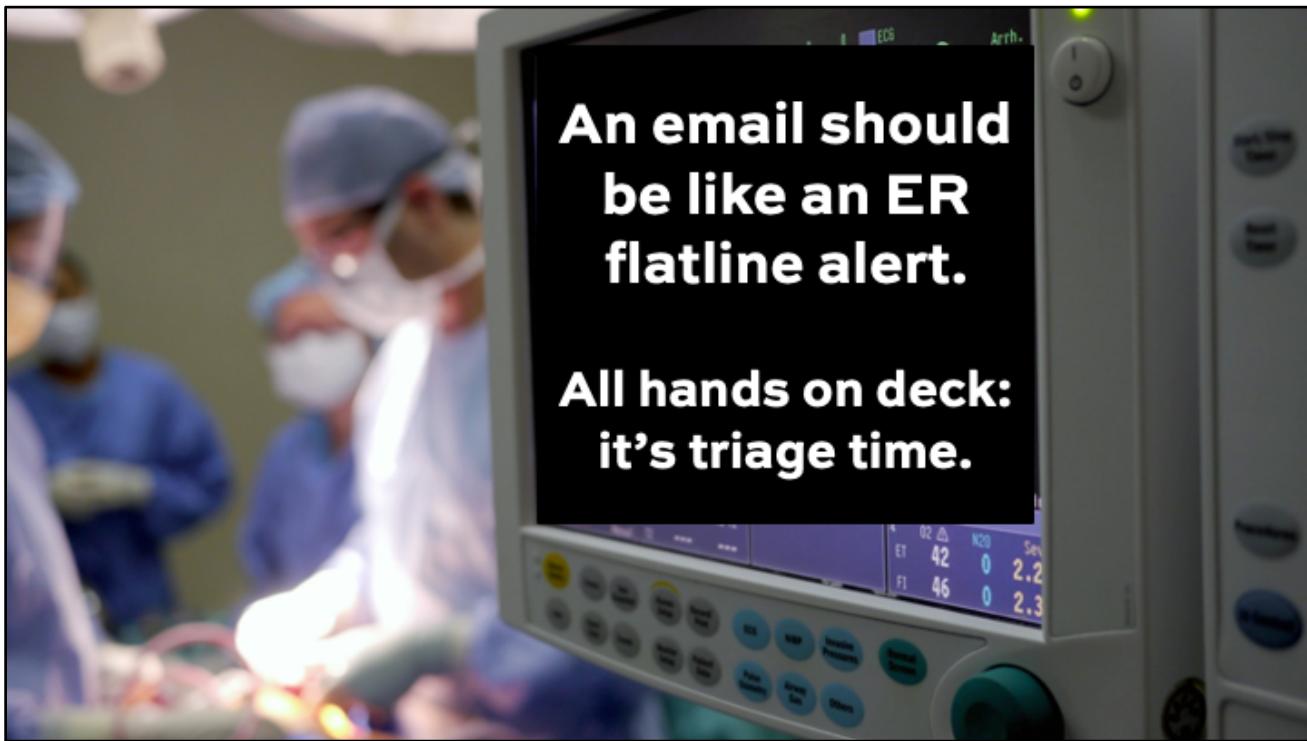


So monitoring software only:

- 1. Emails you when something is really on fire**
(and let's be honest, you have a rule that puts those emails in a folder anyway)
- 2. Helps when you need to look at the history of a specific metric, and compare it to today**
(and you know what that metric means, and what it should be)



3.5 p22



sp_WhoIsActive



3.5 p24

BrentOzar.com/go/active

Totally free diagnostic tool by Adam Machanic

Installs in the master database

Runs immediately, or in seconds

One-time point-in-time picture of running queries

Start with no parameters for the fastest picture:

```
EXEC dbo.sp_WhoIsActive
```



3.5 p25

SQL Server performance triage

1. The server is down, not responding to queries

If `sp_WhoIsActive` doesn't run,
you're not triaging performance.

It's an outage. Use our First Responder Kit:
BrentOzar.com/responder



3.5 p26

SQL Server First Responder Kit

This is a living document. Make it your own!

Instance Name: _____

Triaged By: _____

Date and Time: _____

1) Can you connect ?

Connect to SQL Server and run:

```
SELECT name, user_access_desc, state_desc, log_reuse_wait_desc  
FROM sys.databases;
```

Did you connect successfully? _____

Anything notable in returned columns? _____

Problems connecting?

Try the dedicated admin connection: <http://BrentOzar.com/go/DAC>

2) Who's running?

Gather key pieces of information using Adam Machanic's sp_whoisactive:

3.5 p27

Special cases

Corruption: BrentOzar.com/go/corruption

Failover: often only specific team members are authorized to perform a failover

Escalation paths: Microsoft support (\$500 per call, or a Premier Agreement)



3.5 p28

Triaging sp_WhoIsActive's output

No rows: nothing's going on.

Have any queries been running for hours?

Have any queries been running for minutes?

Is anyone being blocked?

Is someone using up all of TempDB?
(See the tempdb allocations column)



3.5 p29



Triage is part 1, and only part 1.

- 1. Identify the root cause of the problem.**
2. Propose a method for pain relief.
3. Make changes to relieve the pain.
4. Measure to prove that the pain is gone.
5. If it's not gone, back the change out, and go to 1.
6. If it's gone, document what happened.



3.5 p31

Round two: getting more info

```
EXEC sp_WhoIsActive  
@get_locks = 1, @get_plans = 1
```

Returns clickable XML fields with locks and plans



3.5 p32

Checkpoint: what level are we?

1. The server is down, not responding to queries
2. The server is going to go down in minutes if we can't fix the problem quickly
3. The entire server is in bad shape, but will survive today whether we fix the problem or not
4. Some parts of some applications are unusually slow
5. Bob's report is running unusually slow
6. Bob's report is running just like it did yesterday: slow



3.5 p33

SQL Server performance triage

2. The server is going to go down in minutes if we can't fix the problem quickly

If there's a huge blocking chain,
you might be done right now.



3.5 p34

Fill this out, get consensus, act.

The symptoms are a frozen web site and query timeouts.

I believe the root cause is a blocking chain led by Norm.

If we don't take action now, the effect will be continued blocking, log file growth, and the web site will be unusable.

I recommend that we:

- Take action to kill Norm Norm's query now to fix it, and
- Put this in the help desk queue to remove Norm's access



3.5 p35



**The ER staff can
actually compel you to
stay in a wheelchair.
(Today is not the day for that story.)**



3.5 p36

SQL Server performance triage

1. The server is down, not responding to queries
2. The server is going to go down in minutes if we can't fix the problem quickly

If `sp_WhoIsActive` runs, and doesn't show a huge blocking chain, you can probably rule out #1 and #2.



3.5 p37

SQL Server performance triage

Now let's move on to these.

- 3. The entire server is in bad shape, but will survive today whether we fix the problem or not
- 4. Some parts of some applications are unusually slow
- 5. Bob's report is running unusually slow
- 6. Bob's report is running just like it did yesterday: slow



3.5 p38

sp_BlitzFirst



3.5 p39

BrentOzar.com/askbrent

Totally free diagnostic tool by an amazingly hot guy

Installs in the master database

Runs in 5 seconds ideally, but can be more under load

Snapshot of the server's bottlenecks right now

Start with ExpertMode on because you're smart:

```
EXEC dbo.sp_BlitzFirst @ExpertMode = 1
```



3.5 p40

Most useful parameters

```
@Seconds = 60
```

```
@OutputDatabaseName = 'DBAtools',
@OutputSchemaName = 'dbo',
@OutputTableName = 'BlitzFirstResults_20150201'

@AsOf = '2015-07-09 15:00'
```



3.5 p41

Telling: what isn't there

Backups, restores	PLE low
DBCCs	Slow reads or writes
Data or log file growing or shrinking	Compilations/sec high
Long-running query blocking others	Plan cache erased recently



3.5 p42

Checkpoint: what level are we?

- 3. The entire server is in bad shape, but will survive today whether we fix the problem or not
- 4. Some parts of some applications are unusually slow
- 5. Bob's report is running unusually slow
- 6. Bob's report is running just like it did yesterday: slow



3.5 p43

Can we fill this out yet?

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p44

Fill this out, get consensus, act.

The symptoms are a frozen web site and query timeouts.

I believe the root cause is a surprise backup run by Norm the new guy.

If we don't take action now, the effect will be continued slow query response times for about 30 minutes.

I recommend that we:

- Put this in the help desk's queue to coordinate questions between the end user and the lead developer



3.5 p45

Getting out of the picture

The server is slow because Norm, the new guy, is running a database backup.

If he doesn't cancel it, it'll complete in about 30 minutes.

If he cancels it, there may be some aftereffects, but performance will likely improve much faster. (I don't have measurements on exactly how soon – this isn't the kind of thing we test for.)

If you want me to cancel his backup,
get permission from Carlos, the CIO.



3.5 p46

Checkpoint: what level are we?

sp_BlitzFirst might rule out #3,

but if #3 is happening, sp_BlitzFirst doesn't get you a root cause.

Either way, the next step is the same.

3. The entire server is in bad shape, but will survive today whether we fix the problem or not
4. Some parts of some applications are unusually slow
5. Bob's report is running unusually slow
6. Bob's report is running just like it did yesterday: slow



3.5 p47

sp_BlitzCache



3.5 p48

BrentOzar.com/blitzcache

Analyzes the top 10 most resource-intensive queries
in the server's plan cache

Includes all databases

Runs in 10-60 seconds (or more) depending on server
horsepower, memory size (doesn't block)



3.5 p49

Parameters

@Top = 10

(if you get more, it's gonna be slow)

@SortOrder = 'cpu'

or reads, duration, executions

@ExportToExcel = 1

(if you want to make copy/pasta)

@Reanalyze = 1

reuse the same plan data we gathered just now



3.5 p50

Is it the usual suspects?

Are they queries you recognize?

Are they using the same level of resources they usually use?

Is there 1 query suddenly using >50% of resources?

Did the query get compiled with unusual parameters?

We'll cover the mechanics of fixing it this week.



3.5 p51



Can we fill this out yet?

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p53

Fill this out, get consensus, act.

The symptoms are a frozen web site and query timeouts.

I believe the root cause is a bad query plan for GetCommentsDetails.

If we don't take action now, the effect will be a frozen web site and query timeouts for hours/days.

I recommend that we:

- Take action by freeing this plan from cache now, and
- Put this in the developers' queue to make GetCommentsDetails less vulnerable to parameter sniffing issues



3.5 p54

Checkpoint: what level are we?

sp_BlitzCache identifies #3-#5.

Now it's just down to the stuff that has been slow for weeks.

3. The entire server is in bad shape, but will survive today whether we fix the problem or not
4. Some parts of some applications are unusually slow
5. Bob's report is running unusually slow
6. Bob's report is running just like it did yesterday: slow



3.5 p55

sp_BlitzIndex



3.5 p56

BrentOzar.com/blitzindex

Diagnoses index design issues
(not fragmentation)

By default, analyzes the current database

Use @GetAllDatabases = 1 to check ‘em all

Max 50 databases – unless @BringThePain = 1



3.5 p57

Can we fill this out yet?

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p58

Fill this out, get consensus, act.

The symptoms are slow reports on the Sales table.

I believe the root cause is improper indexing on that table.

If we don't take action now, the effect will be continued slow queries, but no other parts of the app will be impacted.

I recommend that we:

- Take action by creating these 4 indexes on the development environment to investigate further, or
- Put this in my performance tuning queue



3.5 p59

Checkpoint: what level are we?

sp_BlitzIndex helps you fix #3-#6,
but only if there's indexing problems. There may be bigger ones.

- 3. The entire server is in bad shape, but will survive today whether we fix the problem or not
- 4. Some parts of some applications are unusually slow
- 5. Bob's report is running unusually slow
- 6. Bob's report is running just like it did yesterday: slow



3.5 p60

sp_Blitz



3.5 p61

BrentOzar.com/blitz

Totally free health check tool by a helpful idiot.

Installs in the master database by default
(but you can put it anywhere)

Runs in 10-60 seconds (or more) depending on server horsepower, user database count

Gives you a prioritized list of health problems

`EXEC dbo.sp_Blitz`



3.5 p62



This is not an emergency tool.

More parameters

```
@CheckUserDatabaseObjects = 0  
(ignores tables, indexes)  
  
@OutputDatabaseName = 'DBAtools',  
@OutputSchemaName = 'dbo',  
@OutputTableName = 'BlitzResults'
```



3.5 p64

Triage recap



3.5 p65

Your goal is to fill this out.

The symptoms are ____.

I believe the root cause is ____.

If we don't take action now, the effect will be ____.

I recommend that we:

- Take action ____ now to fix it, or
- Take action ____ to investigate further, or
- Put this in ____'s queue



3.5 p66

Your tools to triage performance

1. Your monitoring software
2. sp_WhoIsActive
3. sp_BlitzFirst
4. sp_BlitzCache
5. sp_BlitzIndex
6. sp_Blitz

Get 'em and learn more: BrentOzar.com/responder



3.5 p67