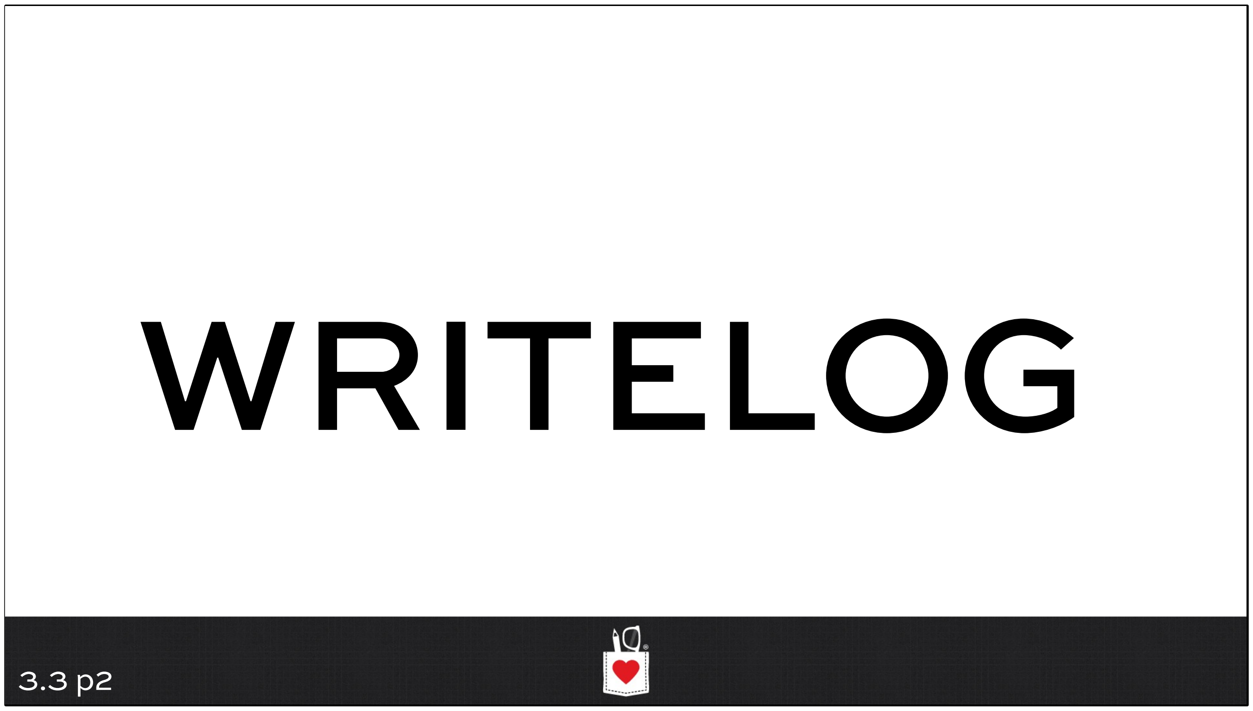
BRENT OZAR UNLIMITED®

Listening & Logging Waits

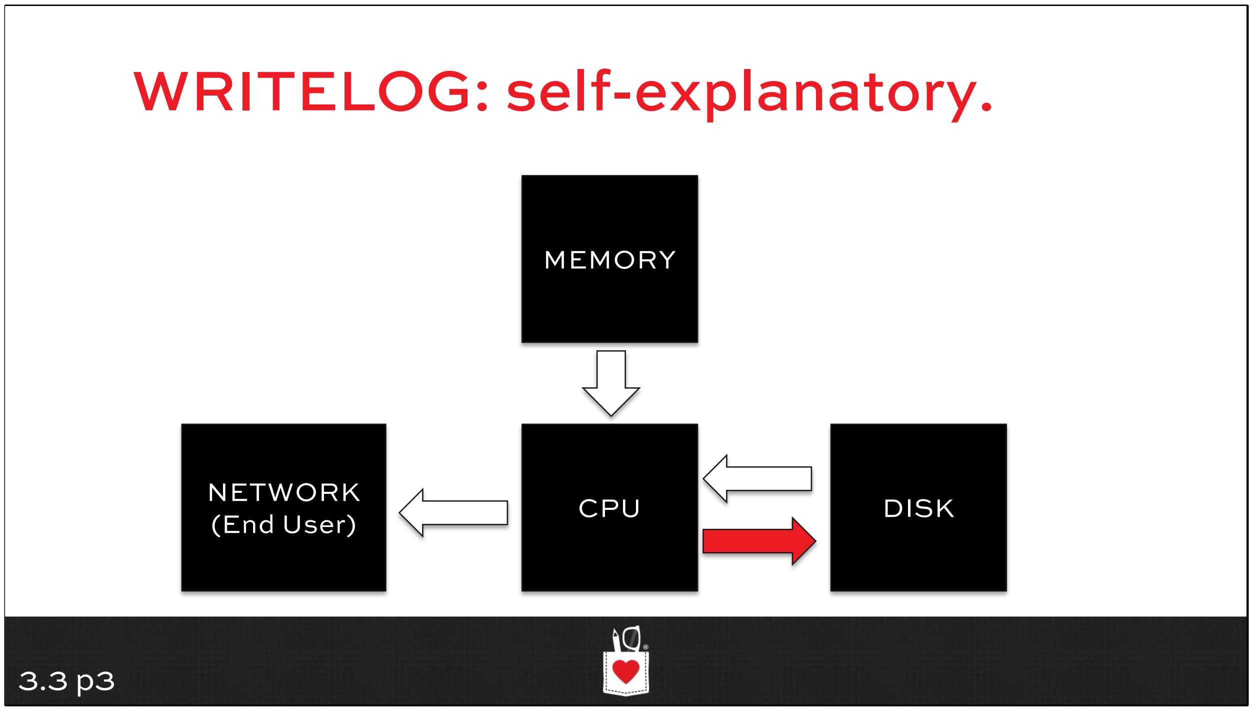
WRITELOG, HADR_SYNC_COMMIT, ASYNC_NETWORK_IO

3.3 p1



WRITELOG

3.3 p2



WRITELOG: self-explanatory.

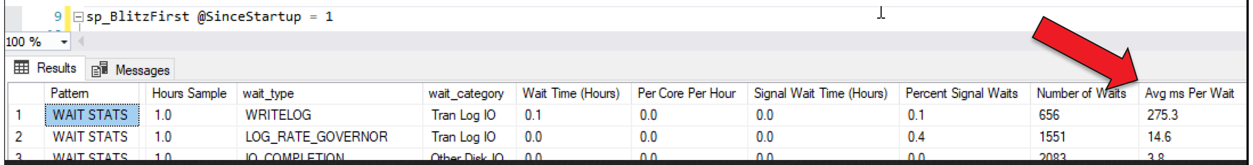
3.3 p3

Two wait stat numbers matter.

Wait Time: total amount of time you've waited

Avg ms Per Wait: when we do wait on something, how long do we have to wait?

Shown off to the right in sp_BlitzFirst:



```
sp_BlitzFirst @SinceStartup = 1
```

	Pattern	Hours Sample	wait_type	wait_category	Wait Time (Hours)	Per Core Per Hour	Signal Wait Time (Hours)	Percent Signal Waits	Number of Waits	Avg ms Per Wait
1	WAIT STATS	1.0	WRITELOG	Tran Log IO	0.1	0.0	0.0	0.1	656	275.3
2	WAIT STATS	1.0	LOG_RATE_GOVERNOR	Tran Log IO	0.0	0.0	0.0	0.4	1551	14.6
3	WAIT STATS	1.0	IO_COMPLETION	Other Disk IO	0.0	0.0	0.0	0.0	2083	3.8

3.3 p4

These two won’t match.

WRITELOG average wait time, milliseconds:
when your query is waiting on the log file,
this is how long it’s waiting.

Drive & file response time:
can be higher or lower, because you’re not always waiting for these files.

Your storage team only cares about the latter.

3.3 p5

Perfmon counters for more info

Performance Monitor counter:
Physical Disk: Avg Sec/Write (aka write latency)

Reported in whole seconds – use 3 decimal places for MS.

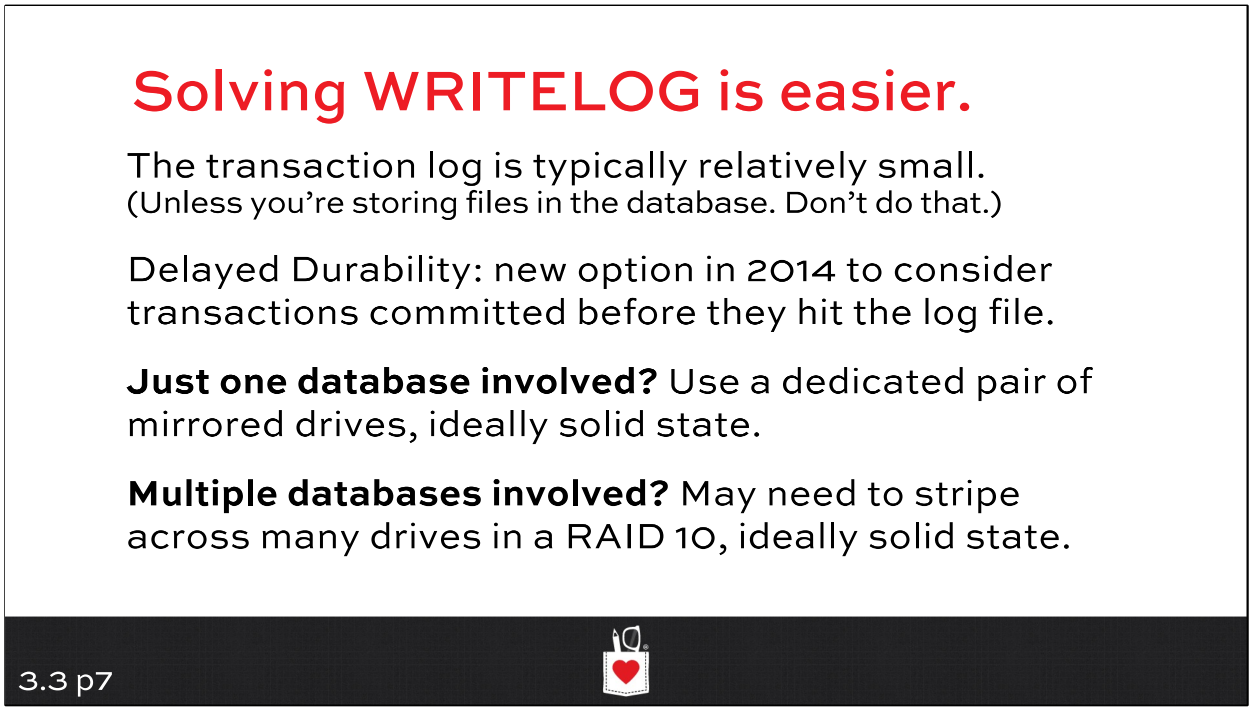
Microsoft says >3 milliseconds log writes are slow. Me: 20.

Good for both physical and virtual servers

Related counters: Physical Disk: Reads/sec, Writes/sec
(shows how much we're asking storage to work)

The more we ask storage to work, the slower it'll get.

3.3 p6



Solving WRITELOG is easier.

The transaction log is typically relatively small.
(Unless you're storing files in the database. Don't do that.)

Delayed Durability: new option in 2014 to consider transactions committed before they hit the log file.

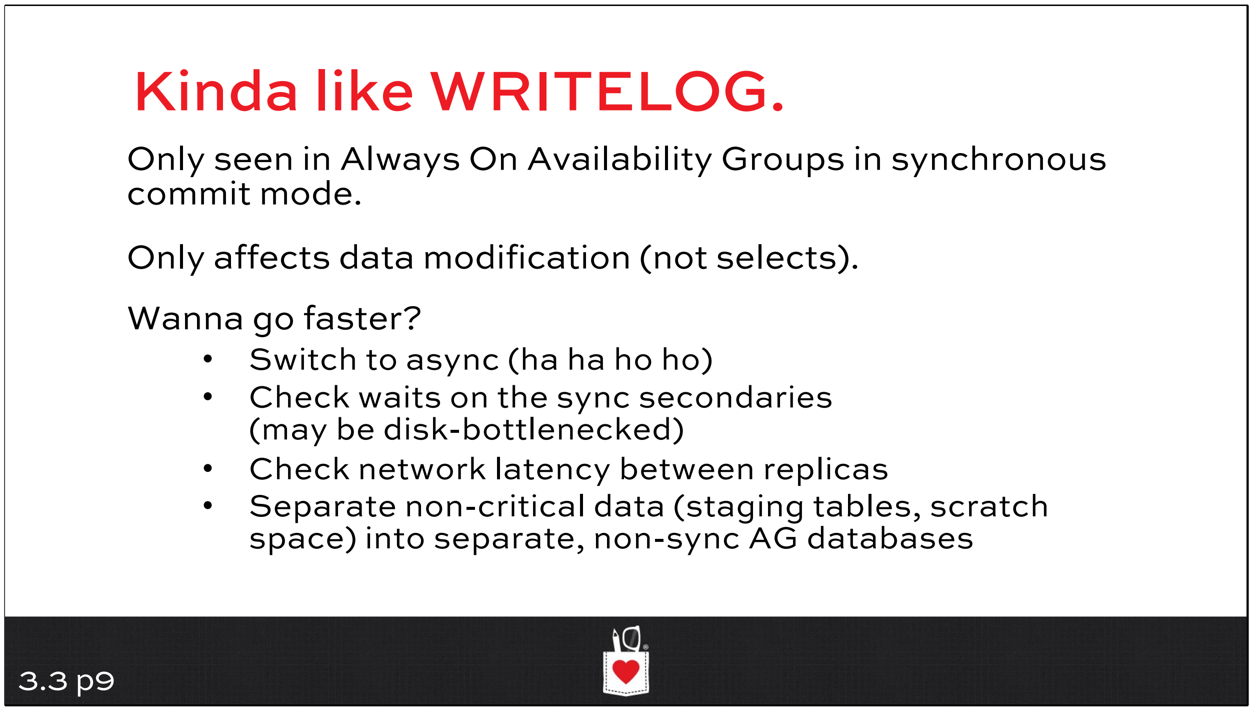
Just one database involved? Use a dedicated pair of mirrored drives, ideally solid state.

Multiple databases involved? May need to stripe across many drives in a RAID 10, ideally solid state.

3.3 p7

HADR_SYNC _COMMIT

3.3 p8



Kinda like WRITELOG.

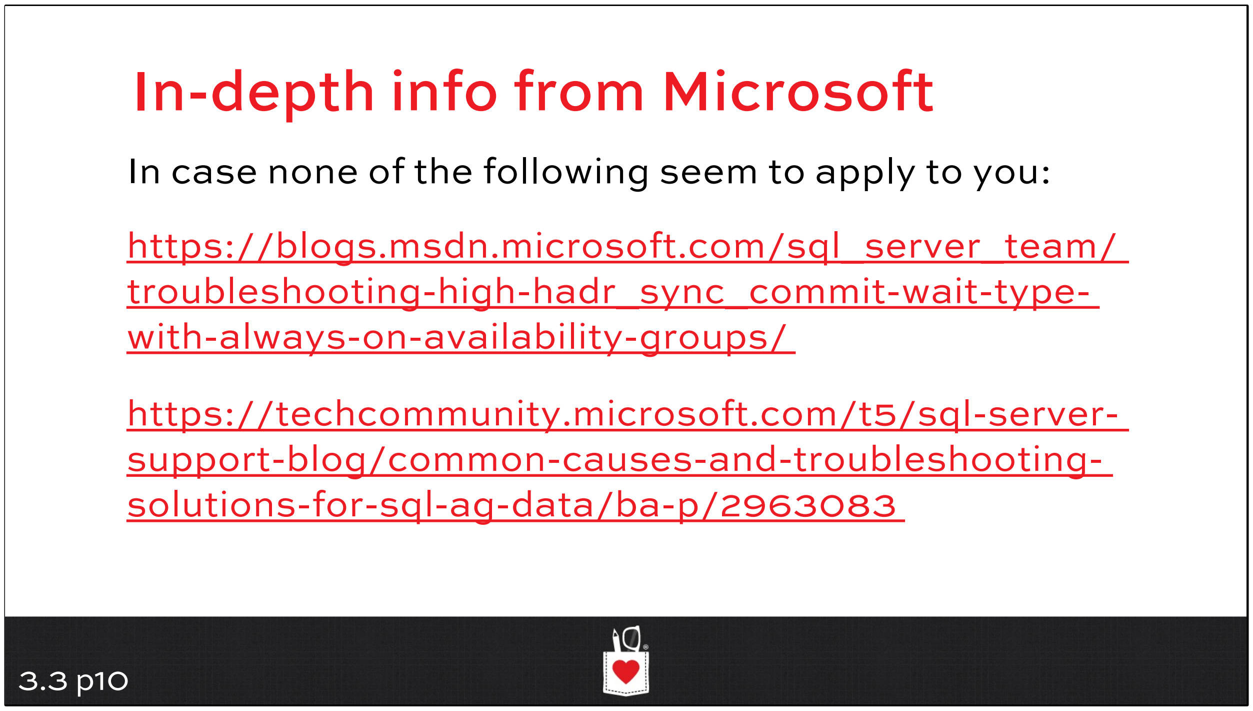
Only seen in Always On Availability Groups in synchronous commit mode.

Only affects data modification (not selects).

Wanna go faster?

- Switch to async (ha ha ho ho)
- Check waits on the sync secondaries (may be disk-bottlenecked)
- Check network latency between replicas
- Separate non-critical data (staging tables, scratch space) into separate, non-sync AG databases

3.3 p9



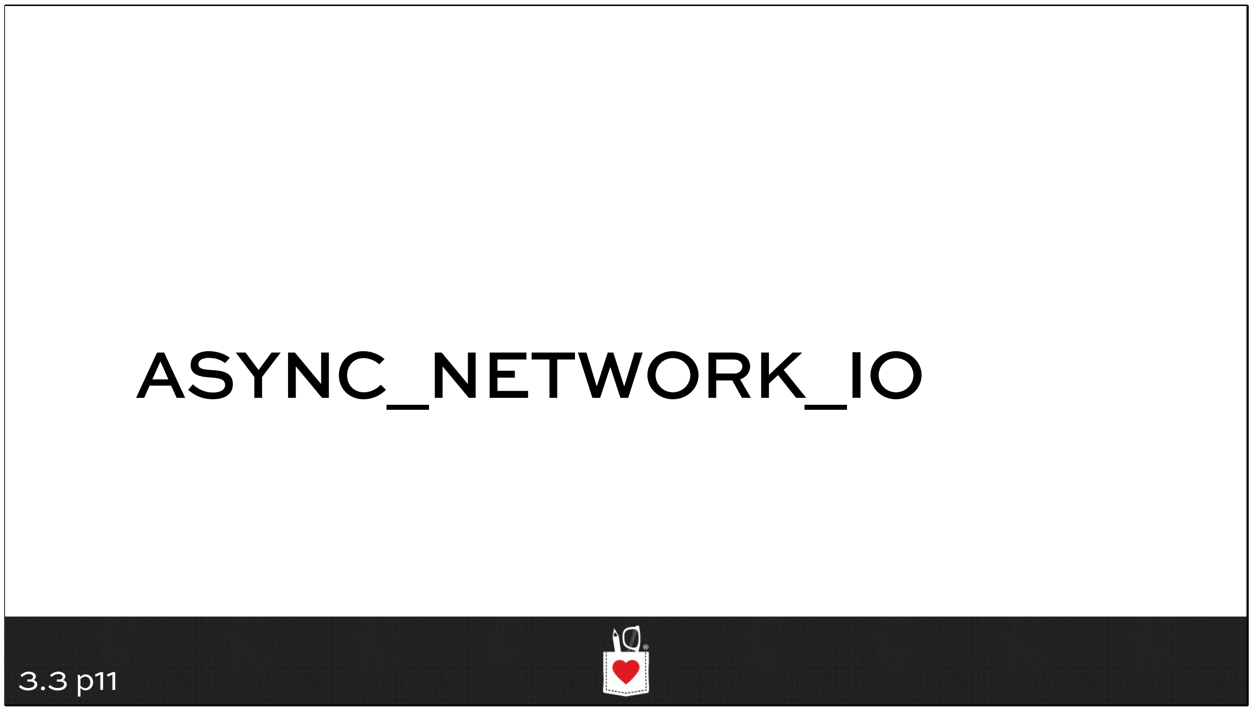
In-depth info from Microsoft

In case none of the following seem to apply to you:

https://blogs.msdn.microsoft.com/sql_server_team/troubleshooting-high-hadr_sync_commit-wait-type-with-always-on-availability-groups/

https://techcommunity.microsoft.com/t5/sql-server-support-blog/common-causes-and-troubleshooting-solutions-for-sql-ag-data/ba-p/2963083

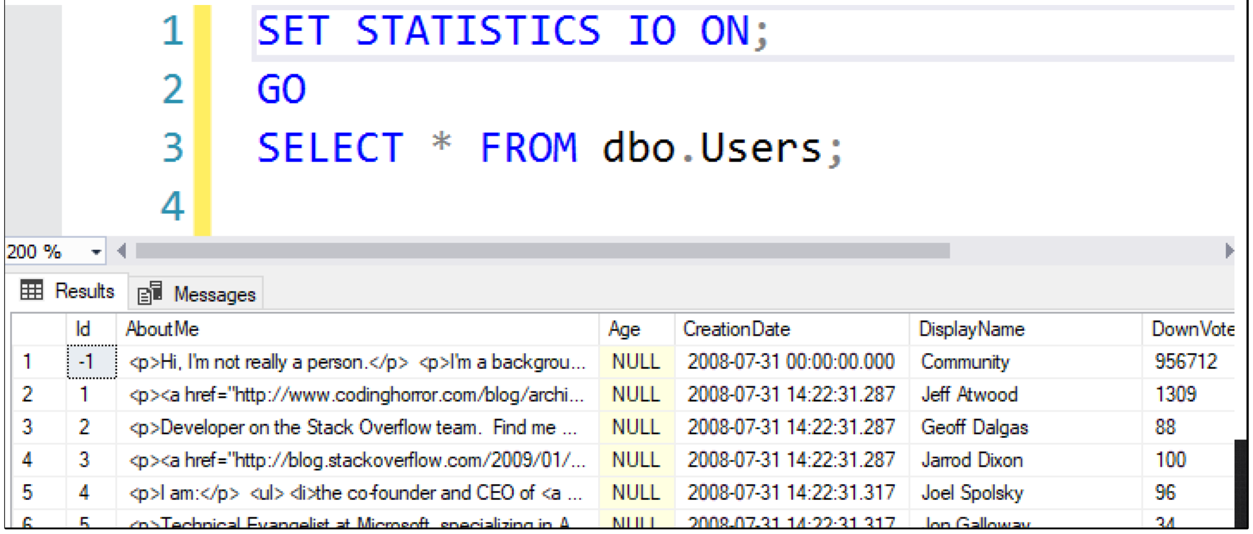
3.3 p10



ASYNC_NETWORK_IO

3.3 p11

Run this (ridiculous) query



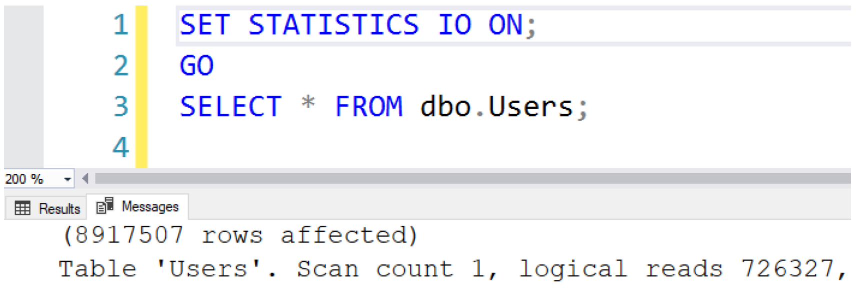
```
SET STATISTICS IO ON;
GO
SELECT * FROM dbo.Users;
```

200 %

Results | Messages

	Id	AboutMe	Age	CreationDate	DisplayName	DownVote
1	-1	<p>Hi, I'm not really a person.</p> <p>I'm a backgrou...	NULL	2008-07-31 00:00:00.000	Community	956712
2	1	<p><a href="http://www.codinghorror.com/blog/archi...	NULL	2008-07-31 14:22:31.287	Jeff Atwood	1309
3	2	<p>Developer on the Stack Overflow team. Find me ...	NULL	2008-07-31 14:22:31.287	Geoff Dalgas	88
4	3	<p><a href="http://blog.stackoverflow.com/2009/01/...	NULL	2008-07-31 14:22:31.287	Jarrod Dixon	100
5	4	<p>I am:</p> <ul> <li>the co-founder and CEO of <a ...	NULL	2008-07-31 14:22:31.317	Joel Spolsky	96
6	5	<p>Technical Evangelist at Microsoft, specializing in A...	NULL	2008-07-31 14:22:31.317	Jon Galloway	34

The query reads a lot of data



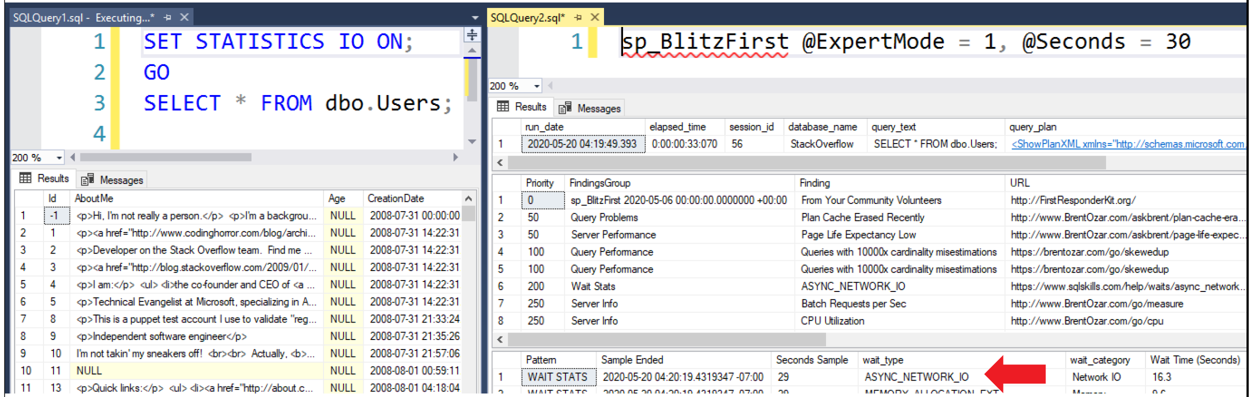
```
SET STATISTICS IO ON;
GO
SELECT * FROM dbo.Users;
```

```
(8917507 rows affected)
Table 'Users'. Scan count 1, logical reads 726327,
```

But reading data isn't the bottleneck:
this table fits in RAM, and is completely cached.

3.3 p13

Top wait: ASYNC_NETWORK_IO.



SQLQuery1.sql - Executing...*

```
SET STATISTICS IO ON;
GO
SELECT * FROM dbo.Users;
```

	Id	AboutMe	Age	CreationDate
1	-1	<p>Hi, I'm not really a person.</p> <p>I'm a backgrou...	NULL	2008-07-31 00:00:00
2	1	<p><a href="http://www.codinghorror.com/blog/archi...	NULL	2008-07-31 14:22:31
3	2	<p>Developer on the Stack Overflow team. Find me ...	NULL	2008-07-31 14:22:31
4	3	<p><a href="http://blog.stackoverflow.com/2009/01/...	NULL	2008-07-31 14:22:31
5	4	<p>I am:</p> <ul> <li>the co-founder and CEO of <a ...	NULL	2008-07-31 14:22:31
6	5	<p>Technical Evangelist at Microsoft, specializing in A...	NULL	2008-07-31 14:22:31
7	8	<p>This is a puppet test account I use to validate "reg...	NULL	2008-07-31 21:33:24
8	9	<p>Independent software engineer</p>	NULL	2008-07-31 21:35:26
9	10	I'm not takin' my sneakers off! Actually, <b>...	NULL	2008-07-31 21:57:06
10	11	NULL	NULL	2008-08-01 00:59:11
11	13	<p>Quick links:</p> <ul> <li><a href="http://about.c...	NULL	2008-08-01 04:18:04

SQLQuery2.sql*

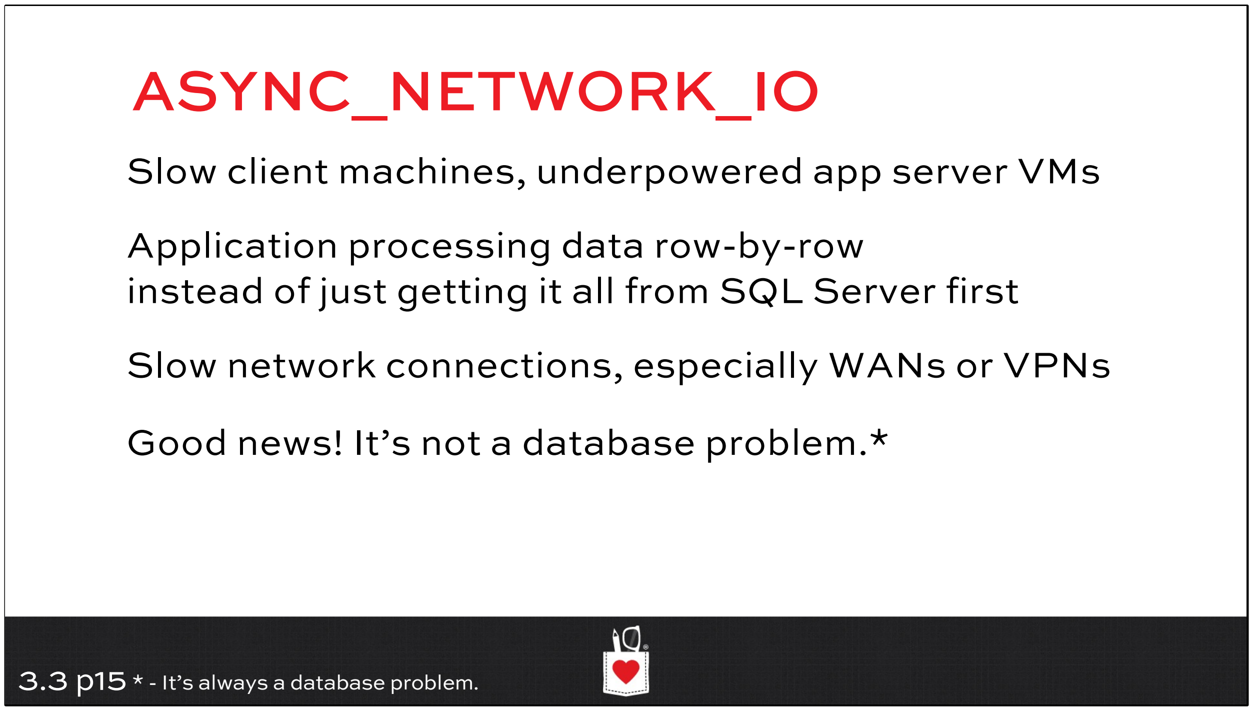
```
sp_BlitzFirst @ExpertMode = 1, @Seconds = 30
```

	run_date	elapsed_time	session_id	database_name	query_text	query_plan
1	2020-05-20 04:19:49.393	0:00:00:33:070	56	StackOverflow	SELECT * FROM dbo.Users;	<ShowPlanXML xmlns="http://schemas.microsoft.com

	Priority	FindingsGroup	Finding	URL
1	0	sp_BlitzFirst 2020-05-06 00:00:00.0000000 +00:00	From Your Community Volunteers	http://FirstResponderKit.org/
2	50	Query Problems	Plan Cache Erased Recently	http://www.BrentOzar.com/askbrent/plan-cache-era...
3	50	Server Performance	Page Life Expectancy Low	http://www.BrentOzar.com/askbrent/page-life-expec...
4	100	Query Performance	Queries with 10000x cardinality misestimations	https://brentozar.com/go/skewedup
5	100	Query Performance	Queries with 10000x cardinality misestimations	https://brentozar.com/go/skewedup
6	200	Wait Stats	ASYNC_NETWORK_IO	https://www.sqlskills.com/help/waits/async_network...
7	250	Server Info	Batch Requests per Sec	http://www.BrentOzar.com/go/measure
8	250	Server Info	CPU Utilization	http://www.BrentOzar.com/go/cpu

	Pattern	Sample Ended	Seconds Sample	wait_type	wait_category	Wait Time (Seconds)
1	WAIT STATS	2020-05-20 04:20:19.4319347 -07:00	29	ASYNC_NETWORK_IO	Network IO	16.3

3.3 p14



ASYNC_NETWORK_IO

Slow client machines, underpowered app server VMs

Application processing data row-by-row
instead of just getting it all from SQL Server first

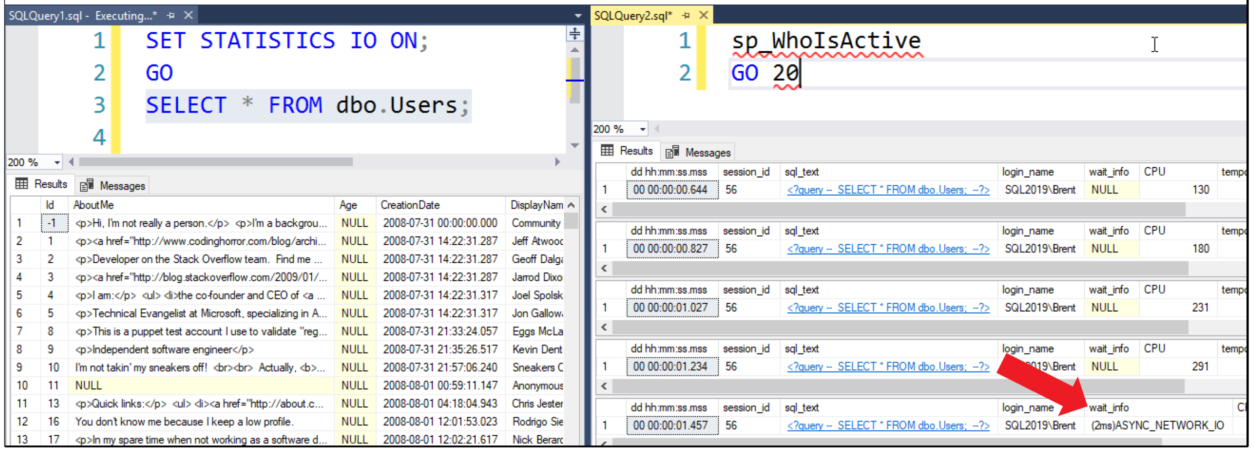
Slow network connections, especially WANs or VPNs

Good news! It’s not a database problem.*

3.3 p15 * - It’s always a database problem.

Tracking down the apps involved

Run sp_WhoIsActive repeatedly and look for ASYNC_NETWORK_IO in the wait_info:



```sql
SET STATISTICS IO ON;
GO
SELECT * FROM dbo.Users;
```

	Id	AboutMe	Age	CreationDate	DisplayNam
1	-1	`<p>Hi, I'm not really a person.</p> <p>I'm a backgrou...`	NULL	2008-07-31 00:00:00.000	Community
2	1	`<p><a href="http://www.codinghorror.com/blog/archi...`	NULL	2008-07-31 14:22:31.287	Jeff Atwooc
3	2	`<p>Developer on the Stack Overflow team. Find me ...`	NULL	2008-07-31 14:22:31.287	Geoff Dalga
4	3	`<p><a href="http://blog.stackoverflow.com/2009/01/...`	NULL	2008-07-31 14:22:31.287	Jarrod Dixo
5	4	`<p>I am:</p> <ul> <li>the co-founder and CEO of <a ...`	NULL	2008-07-31 14:22:31.317	Joel Spolsk
6	5	`<p>Technical Evangelist at Microsoft, specializing in A...`	NULL	2008-07-31 14:22:31.317	Jon Gallow
7	8	`<p>This is a puppet test account I use to validate "reg...`	NULL	2008-07-31 21:33:24.057	Eggs McLa
8	9	`<p>Independent software engineer</p>`	NULL	2008-07-31 21:35:26.517	Kevin Dent

9	10	
		```
		I'm not takin' my sneakers off! 

		 Actually, <b>...
		```
			NULL	2008-07-31 21:57:06.240	Sneakers C

10	11	NULL	NULL	2008-08-01 00:59:11.147	Anonymous
11	13	`<p>Quick links:</p> <ul> <li><a href="http://about.c...`	NULL	2008-08-01 04:18:04.943	Chris Jester
12	16	You don't know me because I keep a low profile.	NULL	2008-08-01 12:01:53.023	Rodrigo Sie
13	17	`<p>In my spare time when not working as a software d...`	NULL	2008-08-01 12:02:21.617	Nick Berarc

```sql
sp_WhoIsActive
GO 20
```

	dd hh:mm:ss.mss	session_id	sql_text	login_name	wait_info	CPU	tempd
1	00 00:00:00.644	56	`<?query -- SELECT * FROM dbo.Users; --?>`	SQL2019\Brent	NULL	130	

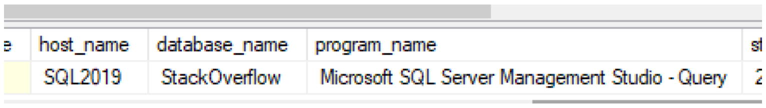
	dd hh:mm:ss.mss	session_id	sql_text	login_name	wait_info	CPU	tempd
1	00 00:00:00.827	56	`<?query -- SELECT * FROM dbo.Users; --?>`	SQL2019\Brent	NULL	180	

	dd hh:mm:ss.mss	session_id	sql_text	login_name	wait_info	CPU	tempd
1	00 00:00:01.027	56	`<?query -- SELECT * FROM dbo.Users; --?>`	SQL2019\Brent	NULL	231	

	dd hh:mm:ss.mss	session_id	sql_text	login_name	wait_info	CPU	tempd
1	00 00:00:01.234	56	`<?query -- SELECT * FROM dbo.Users; --?>`	SQL2019\Brent	NULL	291	

	dd hh:mm:ss.mss	session_id	sql_text	login_name	wait_info	CI
1	00 00:00:01.457	56	`<?query -- SELECT * FROM dbo.Users; --?>`	SQL2019\Brent	(2ms)ASYNC_NETWORK_IO	

Scroll across to the app, host



e	host_name	database_name	program_name	st
	SQL2019	StackOverflow	Microsoft SQL Server Management Studio - Query	2

Go to the application owner with the query & host

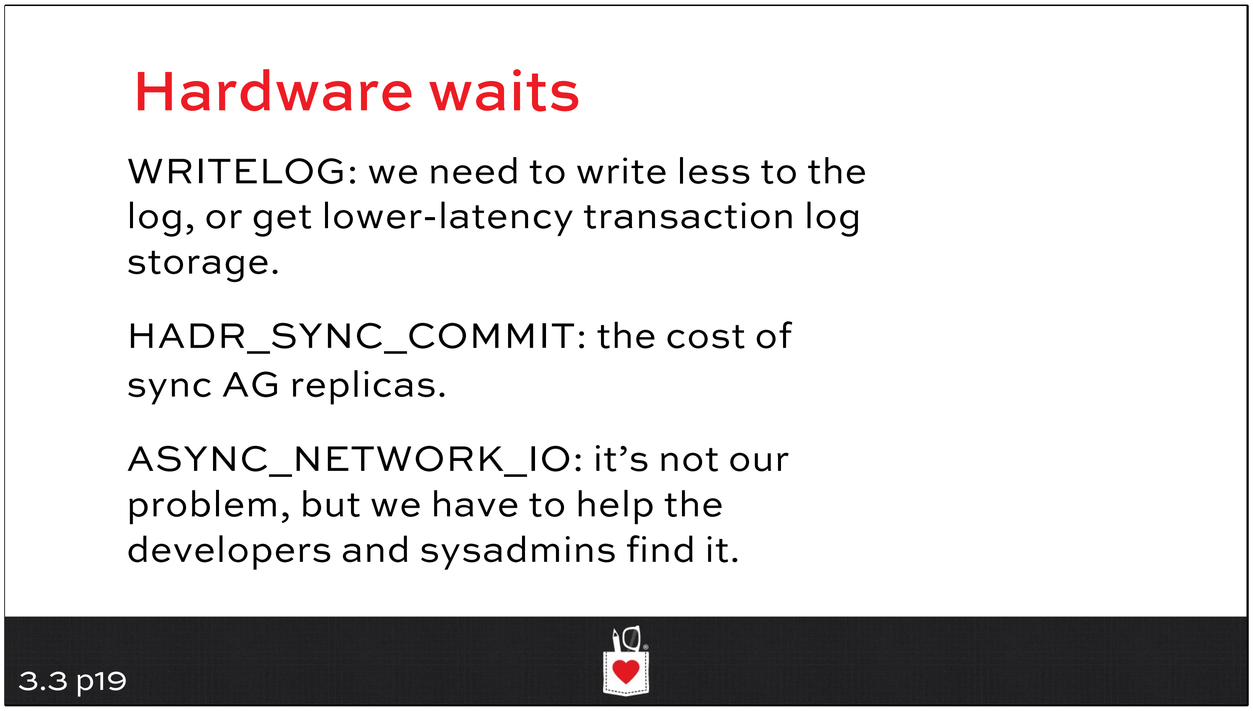
Ask to see the source code for what's running that query to find out if it's doing row-by-row processing

Check the app server to see if it's maxed out on CPU or RAM

3.3 p17

Recap

3.3 p18



Hardware waits

WRITELOG: we need to write less to the log, or get lower-latency transaction log storage.

HADR_SYNC_COMMIT: the cost of sync AG replicas.

ASYNC_NETWORK_IO: it's not our problem, but we have to help the developers and sysadmins find it.

3.3 p19