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# Mastering Server Tuning with Wait Stats

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1.1 p1

## Introduce yourself in Slack:

	Developer	Development DBA	Production DBA
Write C#, Java code	Daily		
Build queries, tables	Daily	Sometimes	
Tune queries	Sometimes	Daily	
Design indexes		Daily	
Monitor performance		Daily	Sometimes
Troubleshoot outages			Daily
Manage backups, jobs			Daily
Install, config SQL			Sometimes
Install, config OS			Sometimes

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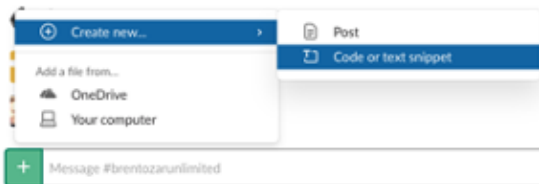
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## Slack pro tips

Accidentally close your browser? Want to share screenshots? Lots of pro tips: [BrentOzar.com/slack](https://BrentOzar.com/slack)

No direct messages please – use the public room.

To share code or T-SQL, click the + sign next to where you type text in, and choose “code or text snippet.”



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## Slack is a great cheat code.

Get stumped on a lab?

Wondering how other students solved it?

Wondering how *quickly* other students work?

Take a peek in the Slack room.

Otherwise, don't look (spoilers.)

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99-05: dev, architect, DBA  
05-08: DBA, VM, SAN admin  
08-10: MCM, Quest Software  
Since: consulting DBA

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## My job: 2-day SQL Critical Care®

Day 1, morning: rapidly assess a single SQL Server, database indexes, queries running against it, team

Day 1 afternoon & day 2 morning: write findings

Day 2 afternoon: deliver findings & training to get the team out of the emergency, quickly

This class: sharing my techniques, experiences

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# I'll show you with lectures + labs.

This isn't about theory: it's about practice.

We'll step through this cycle repeatedly:

1. **Lecture:** you watch me for 1-2 hours
2. **Hands-on lab:** you spend 1 hour working on a lab about the concepts you just saw
3. **I do the lab:** you watch me spend 30-45 minutes on that same lab so you can check your work

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## This morning's cycle

1. Lectures & demos:
  1. How to measure your server
  2. Observing a server with slow storage and understanding how it shows up in measurements
2. Noon-2PM: lab & lunch:  
you make a storage-bottlenecked server go faster
3. 2PM-2:45PM: I do the same lab you just did

Then the cycle starts again.

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## Continuing on this week

How to fix common wait types like CXPACKET, PAGEIOLATCH, LCK%, SOS\_SCHEDULER\_YIELD

How to identify and mitigate poison wait types like RESOURCE\_SEMAPHORE and THREADPOOL

How to prove that your changes made things better

How to decide whether config changes, query/index tuning, or hardware/VM changes are best

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## Instant Replay & lab scripts

For a year from your date of purchase, you can:

- Watch the videos (I'm recording this class)
- Download the scripts and database
- Re-run the labs on your own home machines

<https://BrentOzar.com/go/masterservers>

Problems? Email [Help@BrentOzar.com](mailto:Help@BrentOzar.com).

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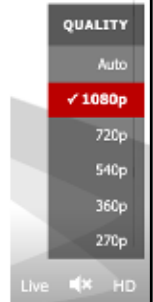
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## Live streaming tips & tricks

You can adjust video quality at the bottom right

You can pause if you need to walk away, but once you pause, you'll be behind the other students, and the live Q&A, polls, etc won't make sense

If your video stream seems 20-30 seconds behind, or you lose connection, try refreshing your browser



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# Students with my AWS lab VMs

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# About your VM

AWS i3.xlarge:

- 4 cores so queries can go parallel
- ~30GB RAM so queries get workspace memory
- All solid state storage to create & test indexes fast

Installed & updated: SQL Server 2019,  
SSMS 18, First Responder Kit scripts

Your lab VM will stay up during the class.  
Do not shut it down until you're completely done:  
shutting it down erases it permanently.

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# About your storage

C: OS, SQL Server binaries, backups

Z: Ephemeral storage (local SSD)

- It's a PCI Express SSD installed in the VM's host, so if the VM moved from host to host, the data would die.
- Ephemeral storage disappears when the instance is shut down and then started back up.
- In most cases, you don't store user databases on ephemeral storage: it's too risky.
- Here, for a training class, it's fine.

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## **Z: also hosts TempDB.**

Sometimes, you don't want to host both user databases and TempDB on the same storage.

However, storage isn't the bottleneck here.

When creating indexes, you don't have to bother with the SortInTempDB option.



## Rules we're breaking

“Never remote desktop into the SQL Server.”

“Never run SSMS on the SQL Server itself.”

“Don't run applications on the SQL Server.”

None of those are the root cause for the performance issues you'll be seeing.





## What you're not allowed to do

### **Don't change networking or security settings.**

You and I both have to be able to log in remotely so I can fix stuff if you break something.

### **Don't shut down the VM until you're done.**

When you shut it down, it'll disappear.

### **Ask why something was built this way.**

Just like real life, you inherited this mess.



# Everyone's labs

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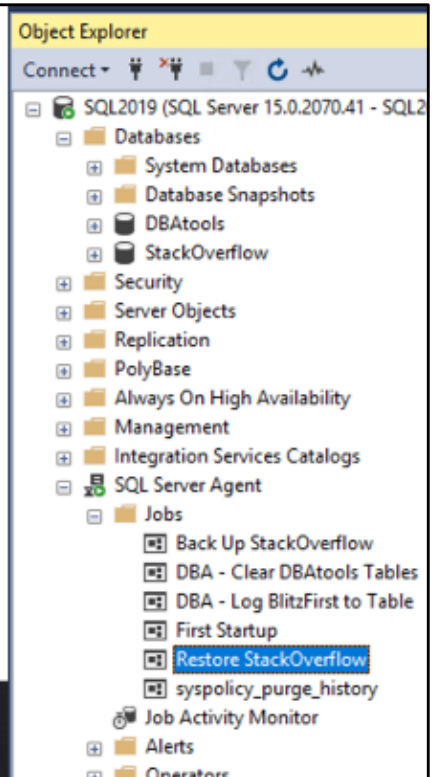


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## When you hit a problem

1. Close SQLQueryStress  
(end-task it if you have to)
2. Use the Agent jobs to restore your database if you have to (15min.)
3. Rerun the setup process for lab we're on (may require running a script, SQLQueryStress, etc)

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## Been in other Mastering classes?

In Mastering Index Tuning & Query Tuning, I said:

“I didn’t leave any land mines in the server setup.”

That’s not true for this class:  
sometimes we’ll cap cores, or RAM, or storage.

But I’ll tell you about those gotchas each time.

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## Download the latest stress tests

I changed the SQLQueryStress json files in January:

<https://BrentOzar.com/go/getstressed>

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## Lab 1: Dedupe & Eliminate Indexes

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## We need a running workload.

In your midday lab, you'll be analyzing DMVs.

To do that, we need real workloads doing selects, inserts, updates, and deletes.

(This is also why tools like `sp_BlitzIndex` don't work very well in development & offline environments: none of the indexes are really getting used.)

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## Setting up the workload

1. If you've been playing around changing tables or indexes, restore your StackOverflow database
2. Copy & run the setup script for this lab module:  
[BrentOzar.com/go/serverlab1](https://BrentOzar.com/go/serverlab1)
3. Start SQLQueryStress:
  1. File Explorer, \Labs, double-click SQLQueryStress.exe
  2. Click File, Open, \Labs\ServerLab1.json
  3. Click Go

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## Set yours up and let it run.

I'll give you a couple of minutes to set it up,  
and then we'll start into our first lecture.

If you need to revisit the instructions,  
look at the slide numbers that we're on.

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