



BRENT OZAR
UNLIMITED®

3 Numbers Every Architect Needs to Know

Agenda: 3 numbers every architect should know

- How busy is your server?
- How hard is it working?
- How much data do you have?

How busy is your server?

- **Perfmon - SQLServer: SQL Statistics – Batch Requests/sec**
- **Not Transactions/sec**
- **Trend on an hourly basis and break it out by:**
 - Weekday vs weekend
 - Business hours vs after hours
 - Maintenance windows (backups, DB maintenance)



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When Batch Requests / Sec changes

- **Going up? More users, more API calls, new functionality in the application**
- **Going down? Less users or API calls, or code has been streamlined so that more work is done in less queries**
- **More data could mean an increase – but only if you have things like functions that are called row-by-row**



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Batch Requests / Sec seen in the field

- 0 – 1,000 – easy to handle with commodity hardware.
- 1,000-5,000 – be careful, because one bad change to a query can knock a commodity server over.
- 5,000-25,000 – if you're growing, you should be making a scale-out or caching plan.
- Over 25,000 – doable, but requires a lot of attention.
Our record at the moment: ~150k sustained.



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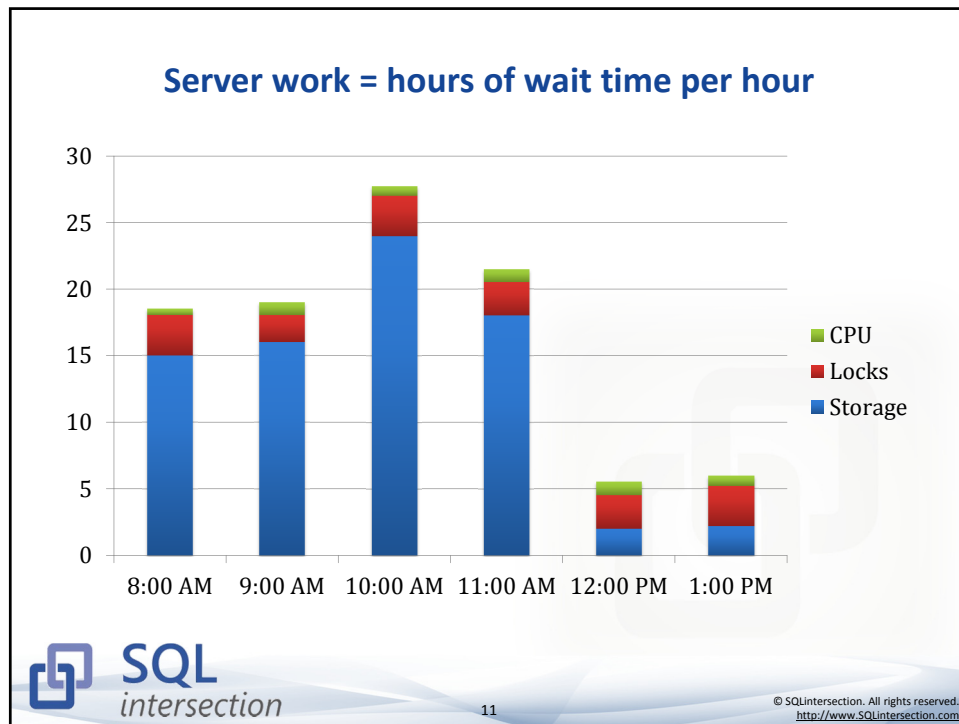
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How hard is your server working?

- **Dynamic Management View (DMV) sys.dm_os_wait_stats**
- **Tracked cumulatively over time, so snapshots are all you**
- **Start with: <http://BrentOzar.com/go/getwaits>**
- **Trend on an hourly basis and break it out by:**
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When Wait Time per Hour changes

- **This metric is linked to Batch Requests:**
the more work the server is asked to do, the more it waits.
- **Going up? Batch Requests could be going up, or the server is responding slower to the existing workload.**
 - Storage got slower, indexes were dropped, queries were tuned poorly, other processes are running on the server
- **Going down? Batch Requests could be too, or the server is responding faster to the workload.**
 - Indexes or queries were tuned, more memory was added



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Wait Time per Hour seen in the field

- **0 – Your server isn't doing anything.**
- **1 hour of waits – You're still not doing much.**
(each CPU core could have a query waiting,
and your server has multiple CPU cores, right?)
- **1 hour of waits X your number of cores – now we're working! And we should probably be tuning.**



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Total data size in GB/TB

- Rough guess: size of MDF/NDF data files on the server
- More accurate: used space in files. For each user database:
`SELECT SUM(size)FROM sys.database_files WHERE type = 0;`
- Over time for the past: backup sizes in msdb.dbo.backupfile
- In SaaS environments, chart the number of databases too



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When Database Size changes

- **Going up? Make sure it's related to user counts. If not, we started adding new features and storing new data, or storing backups inside the database.**
- **Going down? Hopefully people are dropping scratch tables. (Note: we're not distinguishing active vs logged data here)**



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Database size seen in the field

- **1-150GB – easy to handle with SQL Server Standard Edition on commodity hardware.**
- **150-500GB – easy to handle with Enterprise Edition**
- **Over 500GB – it starts to matter if this is active data, and how it's accessed (OLTP vs analytical)**
- **Over 1TB OLTP data – starts to get very challenging**
- **Our record at the moment: ~100TB per SQL Server, and ~10k-~12k databases per server.**



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Recap: 3 numbers every architect should know

- **How busy is your server? Batch Requests / Time**
- **How hard is it working? Wait Time Per Hour**
- **How much data do you have? Data Size in GB/TB**

