

# Guerrilla Warfare?

Guerrilla Tactics - Performance Testing  
MS SQL Server Applications

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# About Me

- Working with RDBMSs since the late 80s  
(MS SQLServer, Oracle, Ingres and MySQL)
- Started as software developer
- Spent time as DBA and Systems administrator
- Consultant working with developers to improve application performance

# Agenda

- Why Guerrilla Tactics?
- Getting to know the terrain – Testing & Monitoring
- Capturing & Analysing SQL Statements
- Indexing & Statistics
- Locking & Row versioning
- Questions (at any point)

# Why Guerrilla Tactics?

- Ideally
  - Performance is designed in from day one
  - You know the max and median load
  - You have full size hardware for testing
  - You have a full size database
  - You have good monitoring software

# Why Guerrilla Tactics?

- Who lives in the Ideal World?
  - No new software on servers
  - No money for monitoring software
  - Not much help/documentation
  - Not much time

# Why Guerrilla Tactics?

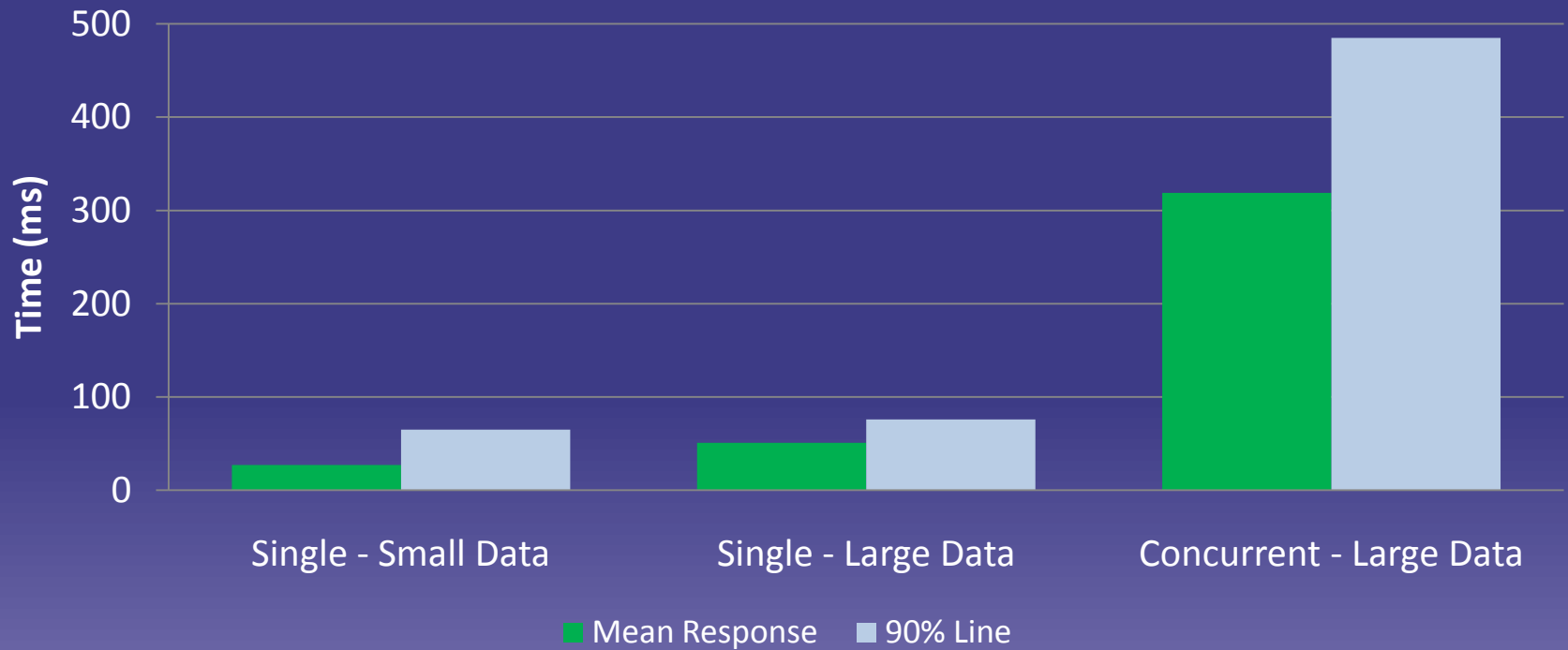
- Planning the Campaign
  - Aim – What is the system suppose to achieve?
  - Spies – Users, developers, DBAs & Sysadmins
  - Intelligence – Tracing & monitoring tools
  - Weapons – Development & testing tools

# Know the Terrain

- Data Volume
  - Get as close to real data as possible
- Hardware
  - Find out difference in behaviour between test and production
- Threads
  - Get as close to production load as is reasonable on the hardware

# Why It Matters

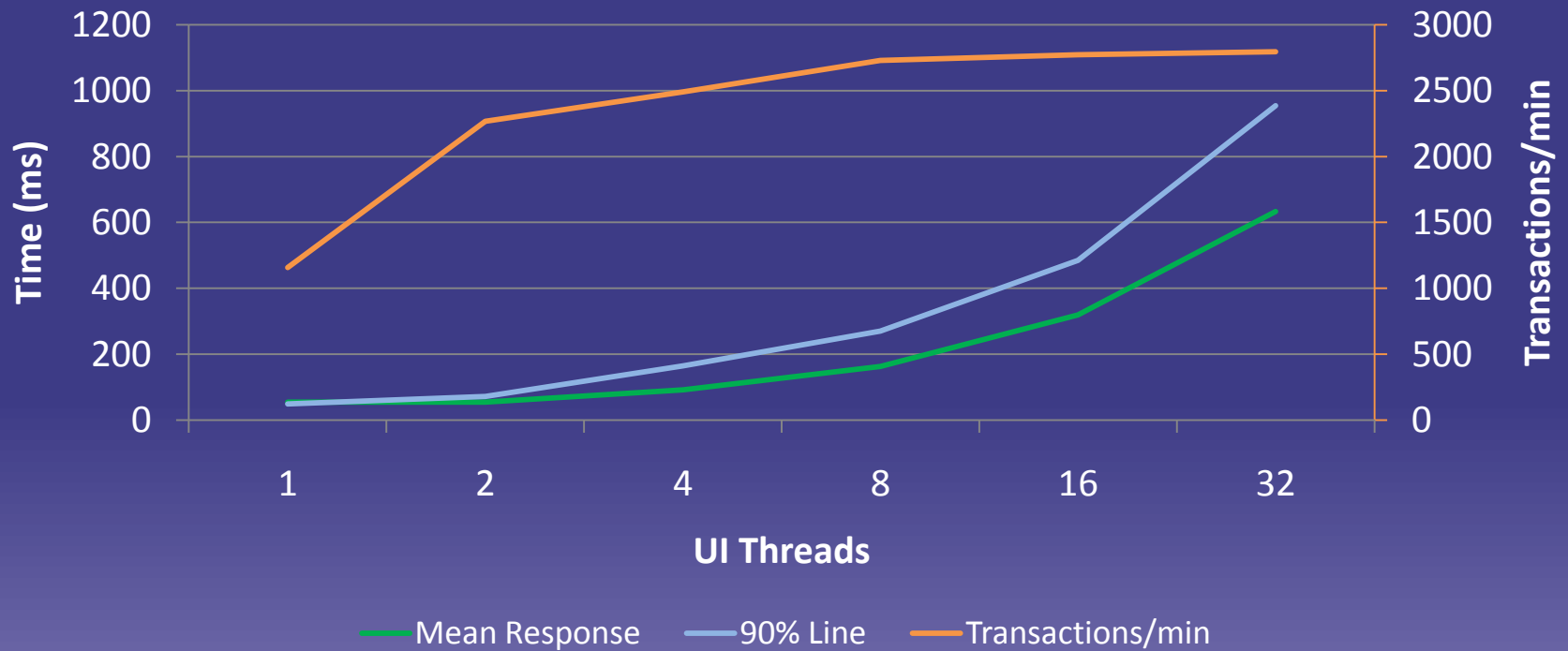
## Response Time (ms)





# Why It Matters

## Response Time VS Transaction Throughput



# Testing & Monitoring

- Demo
  - Perfmon
  - Activity Monitor
  - Dynamic Management Views & Dynamic Management Functions

# Testing & Monitoring

- OS - Perfmon:
  - Must be member of Performance Log Users group
  - And assign 'Log on as a batch job' to that group
- Database – Activity Monitor, DMVs & DMFs
  - Counters cleared on SQLServer restart (or CLEAR)
  - Requires VIEW SERVER STATE permission
  - Some DMVs/DMFs can be limited to VIEW DATABASE STATE permission

# Choosing your Battles

- Poor code
- Database set-up
- Application server set-up
- Hardware and Infrastructure
- All of the above?

# Capturing & Analysing SQL Statements

- Demo
  - SQLServer Profiler

# Capturing & Analysing SQL Statements

- SQL Server Profiler
  - Requires ALTER TRACE permission
  - Don't remote desktop onto the server
  - Pick events carefully
  - Filter as necessary
  - Run on a PC fast enough to take the load
  - Set Application Name in connection string
- DBCC DROPCLEANBUFFERS
  - Requires sysadmin fixed server role
- DBCC FREEPROCCACHE
  - Requires ALTER SERVER STATE permission

# Capturing & Analysing SQL Statements

- Analysing – SQL Server Profiler output
  - ClearTrace
    - <http://www.scalesql.com/cleartrace>
  - TraceAnalyzer
    - <http://www.dbsophic.com/traceanalyzer>
  - Roll your own SQL

# Indexing & Statistics

- Index
  - Fast way to find specific data
- Statistics
  - Information about data
  - Help database make decisions on finding data
- These have a cost



# Indexing & Statistics

- Demo
  - Database Engine Tuning Advisor

# Indexing & Statistics

- Check for similar indexes / statistics
- Database Engine Tuning Advisor
  - Requires sysadmin server role
- Retest!

# Locking & Row versioning

- Locking
  - Synchronize multi user access to data
- Main types of Locks
  - Shared – Allow other readers
  - Update – Reduce potential deadlocks
  - Exclusive – Prevent access to resource
  - Intent – Prevent higher level locks occurring

# Locking

- Database Engine Isolation Levels
  - Read uncommitted – read uncommitted data
  - Read committed – read lock select duration
  - Repeatable read – read lock transaction duration
  - Serializable – stops changes that bring data into and out of read scope

# Row versioning

- Row versioning
  - Reader gets previously committed values without blocking

# Row versioning

- Read Committed Snapshot
  - Database wide setting
  - Maintain committed data for read duration
- Snapshot isolation
  - Database wide setting but set by session
  - Maintain committed data for transaction duration
  - Errors occur if there are update conflicts

# Row versioning

- Demo

# Row versioning

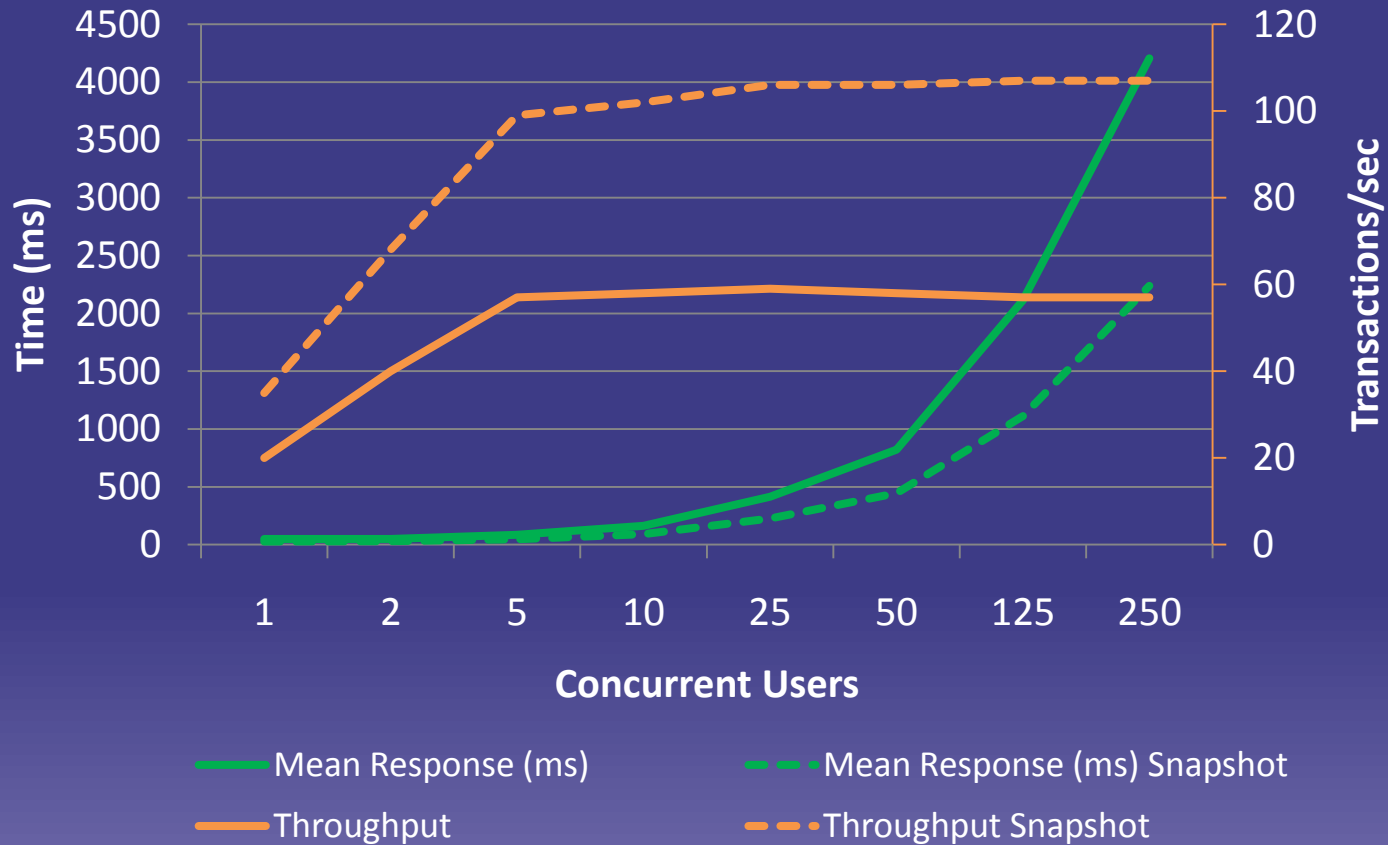
- Row versioning
  - Database setting
  - Behaviour change
  - Helps with lock waits
  - Overhead – hits tempdb



# Row versioning

- Read Committed Snapshot
  - No code change
- Snapshot isolation
  - Code change
  - More error handling

# Row Versioning Results



# Summary

- Preparation
  - Good tests - a lot of data + multiple threads
  - Perfmon, Activity Monitor, DMVs & DMFs
    - get high level picture
    - Locking, IO, CPU issues?
  - SQL Profiler
    - Find hot spots - Hardest hit not slowest

# Summary

- Action
  - Necessary / Appropriate
  - Indexes & Statistics
  - Recode
    - Denormalise maybe Normalise
    - Cache
    - Remove Scalar functions / Cursors
  - Row Versioning

# Questions?

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# Resources

- Slides and Demos
  - <http://blogs.catalystcomputing.co.uk/2010/10/guerrilla-warfare>
- ClearTrace - <http://www.scalesql.com/cleartrace>
- TraceAnalyzer - <http://www.dbsophic.com/traceanalyzer>
- Brent Ozar - <http://www.brentozar.com>
  - <http://www.brentozar.com/sql/sql-server-performance-tuning>
  - <http://www.brentozar.com/archive/2006/12/dba-101-using-perfmon-for-sql-performance-tuning>
  - [http://sqlbits.com/Agenda/event5/Using\\_Perfmon\\_and\\_Profiler/default.aspx](http://sqlbits.com/Agenda/event5/Using_Perfmon_and_Profiler/default.aspx)
- Quest Software – (Web search and sign up to get)
  - QuestSoftware-PerfmonPosterSQLServer.pdf
- The Art of Application Performance Testing – O'Reilly
- Performance Tuning with SQL Server Dynamic Management Views – Redgate
- Microsoft SQL Server 2005 The Storage Engine – MS Press
- Microsoft SQL Server 2008 Internals – MS Press

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[blogs.catalystcomputing.co.uk/2010/10/guerrilla-warfare](http://blogs.catalystcomputing.co.uk/2010/10/guerrilla-warfare)

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