



## Top n performance tips

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**Abstract:** Performance is a vital component of user satisfaction. There are few issues more visible than poor system performance. This presentation will cover things that can be done in the setup, deployment and monitoring phases of your system to provide reliable performance to your users without changing application code. While you can never make bad code look perfect, you can make it better and in many cases this is enough to buy the time needed to find and correct code problems before they become critical. The goal of any database administrator is to make the database perform as well as possible and avoid being the bottleneck. This presentation will provide many helpful ways to ensure that your system will run as efficiently and effectively as possible.



# Top n Performance Tips

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# A Few Words about the Speaker

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- Adam Backman: Progress Database and system expert
- Partner: White Star Software
  - Expert consulting services for OpenEdge
- Partner: DBAppraise
  - System monitoring and alerting
  - Managed database services

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# Agenda

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- The goal of performance tuning
- System architecture overview
- Individual “safe” tips for performance improvement



# Goal of system performance tuning

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- Move the bottleneck to the fastest resource
  - Network (push from network to disk)
  - Disk (push from disk to memory)
  - Memory (push from memory to CPU)
  - CPU (try to achieve proper CPU utilization balance)



# Architecture

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- Network
  - Eliminate the network whenever possible
    - AppServers
    - -D
    - Program libraries
- Disks
  - Everything starts from the disk
  - Try to reduce or eliminate “shared” disk resources



# Architecture

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- Disks (continued)
  - SAN disks rely on a wire to move the data to the system vs. a BUS for local disks
  - NAS disks have all of the drawbacks of SAN disks along with a file-based focus vs. a block-based focus which greatly inhibits database performance
- Memory
  - Memory should be used to reduce/eliminate disk traffic
  - Buffers allow things to be moved once from disk and then used many times from memory to increase performance



# Architecture

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- CPU
  - Fewer faster CPU cores are nearly always better than many slower cores
  - Having the correct balance of CPU utilization after eliminating downstream bottlenecks should be the goal
  - Use a modest spin value between 2000 and 10000 in the vast majority of cases





# Setup - Disks

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- Disks are where you should invest your time, money and energy
- Do:
  - Buy local disks
  - Buy SSD if possible – price is no longer a barrier
  - Many smaller disks are better than few large disks
- Don't
  - Buy network storage – SANs increase complexity and reduce performance
  - Buy NAS storage – NAS systems are file-based not block based and this will kill performance



# Setup - Memory

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- Buy enough memory
- Memory is cheap
- Good rule is at least 10% of database size for database buffers
- Remember memory for all aspects of application
  - Users
  - AppServers
  - Additional software (add-on, bolt-on, ...)
  - Operating system



# Database setup

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- Type II storage areas
- Database block size
- Before image cluster size
- Database extent size
- -pica



# Type 1 Storage Area

Block 1				
1	Lift Tours			Burlington
3	66	9/23	9/28	Standard Mail
1	1	54	4.86	Shipped
1	2	55	23.85	Shipped

Block 2				
1	3	53	8.77	Shipped
2	1	19	2.75	Shipped
2	2	49	6.78	Shipped
2	3	13	10.99	Shipped

Block 3				
14	Cologne			Germany
2	Upton Frisbee			Oslo
1	Koberlein			Kelly
1	53	1/26	1/31	FlyByNight

Block 4		
BBB	Brawn, Bubba B.	1,600
DKP	Pitt, Dirk K.	1,800
4	Go Fishing Ltd	Harrow
16	Thundering Surf Inc.	Coffee City



# Type 2 Storage Area

Block 1		
1	Lift Tours	Burlington
2	Upton Frisbee	Oslo
3	Hoops	Atlanta
4	Go Fishing Ltd	Harrow

Block 2		
5	Match Point Tennis	Boston
6	Fanatical Athletes	Montgomery
7	Aerobics	Tikkurila
8	Game Set Match	Deatsville

Block 3		
9	Pihtiputaan Pyora	Pihtiputas
10	Just Joggers Limited	Ramsbottom
11	Keilailu ja Biljardi	Helsinki
12	Surf Lautaveikkoset	Salo

Block 4		
13	Biljardi ja tennis	Mantsala
14	Paris St Germain	Paris
15	Hoopla Basketball	Egg Harbor
16	Thundering Surf Inc.	Coffee City



# Type II Storage Areas

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- Like data is clustered together
- Increases the efficiency of DB requests
- Shown to universally improve performance



# Database block size

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- Generally, 8k database blocks work best for most systems
- 4k \*might\* be better for Windows environments



# BI cluster size

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- Determines the amount of work between checkpoints
- Larger cluster size equals less checkpoints
- Generally no downside as long as page writers are doing all of the work





# BI Cluster Size

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- Do not checkpoint more often than every 120 Seconds
- No writes at checkpoint
- Generally good to start at 8MB and move up from there



# Page Writers

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- BIW – Every database that does updates should have a BIW
- AIW – Every database that does updates should have an AIW
- APW - Every database that does updates should have at least 1 APW

# Tuning Page Writers (APWs)

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- Start with 1
- Watch the value of buffers flushed at checkpoint during “critical” processing hours
- If buffers flushed at checkpoint increases add 1 more APW and repeat until the number of buffers flushed at checkpoint is zero or near zero



# Database extent size

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- It really does not matter any more
- Variable length extents provide convenience without measurable performance impact in most (all?) cases

# After imaging and replication impact to performance

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- After imaging is one or more additional write operations for every transaction
- Writes are the most expensive type of I/O
- Replication can and in most cases does add a network layer to your application writes
- -pica is not a performance parameter until it is. If you have -pica set too low your update users will freeze until your transaction notes are applied to your target database



# Network Options

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- -T
  - Keep temp files off of network drives
- -pls
  - When using program libraries, allow programs to be cached locally
- -Mm
  - Use a larger network buffer size to minimize the number for packets
- -Mn
  - Increase the maximum number of servers to support you remote clients (Max. 5 clients per server)



# Disk stuff

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- Use modern journaled file systems
- Maintain OS buffers around 10%
- Understand all things that impact disk I/O



# What do you have to store?

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- Database files
- Before Image file(s)
- After Image file(s)
- Application files (if applicable)
- Temporary files (if applicable)
- Other applications





# Memory – How to use?

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- -B – The OpenEdge buffer pool has the greatest effect on overall system performance
- -B2 – The secondary buffer pool is best when used with fixed size, heavily utilized (read) tables



# User memory

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- -Bt – Many systems do as much as 50% of their I/O to temporary table access
- -mmax – keeping more programs in memory reduces I/O from the user



# The OpenEdge buffer pool -B

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- Looking for buffer hit percentages in the 99%+ range
- 10% of database size is a good starting point



# The secondary buffer pool –B2

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- Used for static heavily used tables
- Remember to store both table and index in –B2 space



# CPU stuff

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- -spin
- -lruskips



# -spin

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- Number of retries to get a DB latch before releasing the CPU
- Better to ask a number of times rather than relinquish the CPU and have to try again
- Values between 2000 and 10000 have been found to work best in a majority of situations
- Many older Progress-based systems have this set MUCH TOO HIGH



# -lruskips and -lru2skips

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- Allow for more efficient reuse of Progress buffer pool
- A setting of 100 will benefit most systems



# Other stuff

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- Please remember to set
  - `tablerangesize`
  - `indexrangesize`
- Install ProTop
  - It is free!
  - It can help you set your parameters properly
  - You can use it to find issues in your application or “trouble users”





White Star Software

# Questions?





# Thank You!