

OpenEdge Database Monitoring

The Coders Are Out To Get You

Tom Bascom, White Star Software

Abstract: It's true. They are. And this talk is all about how to prove it.



OpenEdge Database Monitoring

The Coders Are Out To Get You!

It's True, They Are!

Tom Bascom, White Star Software
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A Few Words about the Speaker

- Tom Bascom: Progress user & roaming DBA since 1987
- Partner: White Star Software, LLC
 - Expert consulting services related to all aspects of Progress and OpenEdge.
 - Remote database management service for OpenEdge.
 - Author of:  **protop**
 - Simplifying the job of managing and monitoring the world's best business applications.
 - tom@wss.com

The Deadly Sins Of Coders

- Bad transaction scope
- Bad WHERE clauses
- Keywords that they just can't seem to forget
- It works great in Development!

Bad Transactions

Poor Transaction Scope

- If you have transactions that last more than 1 second you probably have a problem.
- There are three main categories:
 - Transactions that span UI (long time)
 - “Business Transactions” inappropriately implemented as database transactions (very large –L)
 - Ad-hoc “data fix” routines with poor transaction scope

Transaction Spanning UI

- Drives out of control BI growth
- Consumes resources
- Could crash your system, possibly in a difficult to recover manner
- Caused by poor coding practices with regards to buffer and transaction scope

Business Transaction as a DB Transaction

- Often associated with interruptible and easily restartable or reversible business processes
- For example:
 - Purging old data
 - Bulk updates

Ad-Hoc “Data Fix”

It's just quick and dirty code...
No need to follow best practices!

```
find controlTable where activity = 1234.  
controlTable.inuse = yes.
```

```
run myUpdate.p.  /* myUpdate.p updates a few million rows... */
```

Preventing Ad-Hoc Accidents

It's just ~~some~~ code...
No need ~~for~~ best practices!

```
do for controlTable transaction:  
  find controlTable exclusive-lock where activity = 1234.  
  controlTable.inuse = yes.  
end.  
  
run myUpdate.p.  /* myUpdate.p updates a few million rows... */
```

Monitoring Bad Transaction Scope

ProTop Command Key: d

demo Auto Interval Rate DS 2202 175604 1.160
2020/10/26 19:42:15
demo 1134 209 0
protop.wss.com

ProTop Version 3.14159x as of September 22, 2020 11:14

demo

Hit%	99.72	Commits:	417	Examined:	10991	APW Writes:	516	DB UpTime:	110d 03:15
Connections:	1046	Undos:	20381	New RM:	10366	APW Write%	100	Backup Age:	08:45 -n
Log Reads:	693637			From RM:	10366	Bufs Scanned:	3677		
%	35			RM Locked:	10319	APW Scan Wrs:	1	Oldest TRX:	00:18:41 SQL
Log Writes:	0	Lock Tbl HWM:	1000014	From Free:	0	APW Q Wrts:	0	Curr BIClstr:	420810 SQL
Brokers:	5	Curr # Locks:	1804	Front2Bk:	624	Chkpt Q Wrts:	515	Old BIClstr:	420793 4gl
OS Reads:	1944	Rec Lk/s:	51781	Mod Bufs:	2509	Flushed Bufs:	0	Num BIClstrs:	17 4gl
Servers:	2	Lk Dura (ms):	3.49	Evicted:	0	Chkpt Len:	00:01:50	BI MB Used:	1088 App
OS Writes:	516								Web
Clients:	2					BI	AI	Curr AI Ext:	2 of 12
LogRd/LogWr:	0.00	Lock Tbl%	0.18%			Notes:	108076 108076	Curr Seq#:	90710
Servers:	34					Wrts to Log:	526 526	Empty AI:	11 BIW/AIW/
LogRd/RecRd:	3.03					BIW/AIW Wrts:	373 525	Full AI:	0 AI
RemCnx:	2					BIW/AIW Wrt%:	71 100		
Rec Reads:	229207					Partial Wr:	0 0	Locked AI:	0
Server:	64								
Idx Reads:	199973								
Speed:	0								
Rec Creates:	10366	BogoMIPS:	5.03						
Local:	885	Random IO (ms):	0.12						
Idx Creates:	800	Sync IO (sec):	1.81						
Batch:	47	(MB/sec):	53.04						
Rec Updates:	151	User Exp SHM:	90000						
WDOG:	1 1 1								
Rec Deletes:	132								
Mgmt:	1								
Idx Deletes:	612								
APWs:	2								
Idx Blk Spl:	0								
RPLS:	0 1								



Monitoring Bad Transaction Scope

ProTop Command Key: x

demo Auto Interval Rate DS 2202 175604 1.160
 2020/10/26 19:42:15
 demo 1134 209 0
 protop.wss.com

ProTop Version 3.14159x as of September 22, 2020 11:14

demo

Hit%	99.72	Commits:	417	Examined:	10991	APW Writes:	516	DB UpTime:	110d 03:15
Connections:	1046	Undos:	20381	New RM:	10366	APW Write%	100	Backup Age:	08:45 -n
Log Reads:	693637			From RM:	10366	Bufts Scanned:	3677		
%	35			RM Locked:	10319	APW Scan Wrs:	1	Oldest TRX:	00:18:41 SQL
Log Writes:	0	Lock Tbl HWM:	1000014	From Free:	0	APW Q Wrts:	0	Curr BIClstr:	420810 SQL
Brokers:	5	Curr # Locks:	1804	Front2Bk:	624	Chkpt Q Wrts:	515	Old BIClstr:	420793 4gl
OS Reads:	1944	Lock Tbl%	0.18%	Flushed Bufts:	0	Num BIClstrs:	17	4gl	
Servers:	2	Rec Lk/s:	51781	Mod Bufts:	2509	Chkpt Len:	00:01:50	BI MB Used:	1088 App
OS Writes:	516	Lk Dura (ms):	3.49	Evicted:	0				Web
Clients:	2								
LogRd/LogWr:	0.00								
Servers:	34								
LogRd/RecRd:	3.03								
RemCnx:	2								
Rec Reads:	229207								
Server:	64								
Idx Reads:	199973								
Speed:	0								
Rec Creates:	10366								
Local:	885								
Idx Creates:	800	BogoMIPS:	5.03						
Batch:	47								
Rec Updates:	151	Random IO (ms):	0.12						
WDOG:	1 1 1								
Rec Deletes:	132	Sync IO (sec):	1.81						
Mgmt:	1								
Idx Deletes:	612	(MB/sec):	53.04						
APWs:	2								
Idx Blk Spl:	0	User Exp SHM:	90000						
RPLS:	0 1								

	BI	AI	Curr AI Ext:	2 of 12
Notes:	108076	108076	Curr Seq#:	90710
Wrts to Log:	526	526	Empty AI:	11 BIW/AIW/
BIW/AIW Wrts:	373	525	Full AI:	0 AI
BIW/AIW Wrt%	71	100		
Partial Wr:	0	0	Locked AI:	0



Bad WHERE Clauses

WHERE clause – Golden Rule

- Equality matches on **all** leading components of an index!

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- The company is always the same, why should I include it?

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- Equality matches on **all** leading components of an index!
- The company is always the same, why should I include it?

```
etime( yes ).  
find order where orderNum = 36.  
display etime.
```

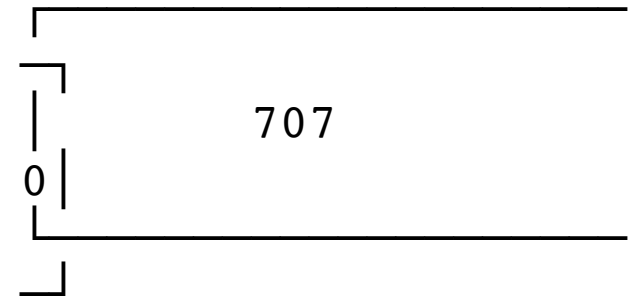
```
etime( yes ).  
find order where company = 0 and orderNum = 36.  
display etime.
```


WHERE clause – Golden Rule

- Equality matches on **all** leading components of an index!
- The company is always the same, why should I include it?

```
etime( yes ).  
find order where orderNum = 36.  
display etime.
```

```
etime( yes ).  
find order where company = 0 and orderNum = 36.  
display etime.
```



Recognizing Bad WHERE Clauses at run time

ProTop Command Key: d

```
demo Auto Interval Rate DS 81 6001 0.381          ProTop Version 3.14159x as of October 06, 2020 10:27
2020/10/28 11:54:38
demo 1 25465 105                                  /db/demo
protop.wss.com
p
Hit%      98.33      Commits:      0      Examined:      0      APW Writes:      0      DB UpTime:      00:11
Connections:      3      Undos:      0      New RM:      0      APW Write%      0      Backup Age:      Never!      -n
Log Reads:      2231033      From RM:      0      Bufs Scanned:      0
%      14
Log Writes:      0
Brokers:      1
OS Reads:      37194      Lock Tbl HWM:      27      RM Locked:      0      APW Scan Wrs:      0      Oldest TRX:      00:00:00      SQL
Servers:      0
OS Writes:      0      Curr # Locks:      1      From Free:      0      APW Q Wrts:      0      Curr BIClstr:      0      SQL
Clients:      0
LogRd/LogWr:      0.00      Lock Tbl%      0.01%      Front2Bk:      0      Chkpt Q Wrts:      0      Old BIClstr:      0      4gl
Servers:      0
LogRd/RecRd:      2.01      Rec Lk/s:      57      Flushed Bufs:      0      Num BIClstrs:      0      4gl
RemCnx:      0
Rec Reads:      1110408      Lk Dura (ms):      1.90      Mod Bufs:      0      Chkpt Len:      BI MB Used:      0      App
Server:      0
Idx Reads:      1110440      Evicted:      0
Speed:      0
Rec Creates:      0      BI      AI      Curr AI Ext:      Disabled
Local:      2
Idx Creates:      0      Bogomips:      3.72      Notes:      0      0      Curr Seq#:      0
Batch:      0
Rec Updates:      0      Random IO (ms):      0.01      Wrts to Log:      0      0      Empty AI:      0      BIW/AIW/
WDOG:      0 0 0
Rec Deletes:      0      Sync IO (sec):      0.00      BIW/AIW Wrts:      0      0      Full AI:      0      AI
Mgmt:      0
Idx Deletes:      0      (MB/sec):      0.00      BIW/AIW Wrt%      0      0
APWs:      0
Idx Blk Spl:      0      User Exp SHM:      233373      Partial Wr:      0      0      Locked AI:      0
```



Recognizing Bad WHERE Clauses at run time

ProTop Command Keys: t i u

demo Auto Interval Rate DS 81 6001 0.381
 2020/10/28 11:54:38
 demo 1 25465 105
 protop.wss.com
 . . .

ProTop Version 3.14159x as of October 06, 2020 10:27

/db/demo

Table Activity

Tbl#	Area#	BX	Table Name	RM Chain	#Records	Frag%	Scat	Churn	AvgRow	Create	Read v	Update	Delete
OS Read													

>	14	7	B1 Order	5	727285	0.00%	1	1.53	93	0	1110439	0	0
34702	1	7	B1 Benefits	4	21	0.00%	1	0.00	40	0	0	0	0
0	2	7	B1 BillTo	4	2	0.00%	1	0.00	111	0	0	0	0
0													

Index Activity

Idx#	Area#	BX	Index Name	Blocks	Util	Lvls	Idx Root	Note	Create	Read v	Split	Delete
BlkD1												

>	41	8	B1 Order.OrderNum		1655	98.30%	3	69760	PU	0	1109656	0	0
0	8	8	B1 Benefits.EmpNo		1	4.80%	1	2176	PU	0	0	0	0
0	9	8	B1 BillTo.custnumbillto		1	0.70%	1	4224	PU	0	0	0	0
0													

User IO Activity

Usr#	Name	PID	Flags	Blk Ac v	OS Rd	OS Wr	Hit%	Rec Lck	Lk HWM	CSC Age	Line#	Program Name



Keywords to forget!

- CAN-DO()
 - CAN-DO() in a WHERE clause forces client side selection and sorting
- USE-INDEX
 - Overrides the compiler's index selection
 - Prevents the use of multiple indexes to resolve a query
- MATCHES
 - When used in a WHERE, forces a table scan

It Works Great in
Development!

ProTop Features

ProTop Command Key: ?

d = Performance Dashboard

t = Table Activity
i = Index Activity
l = LOB Activity
u = User IO Activity
x = Active Transactions
L = Login Brokers
a = Storage Areas
^b = Buffer Pools

U = User Information Viewer
H = Health Check
^l = Progress "showcfg" info

0 = Color Picker
! = Generate DBAnalys Output
R = DB Parameters Report

2 = Pro2 Activity

^p = programmer mode
^d = dump & load scripts
^f = FAQ about oddball stuff

; = Set Refresh Interval

% = Switch between Raw and Rate Sampling
\$ = Switch between Auto and On-Demand Sampling
<space> = Refresh Sample (or un-pause)
h, ? = Help
q = Quit

c = Configuration Viewer

w = Latches and Resources
k = Checkpoints
b = Blocked Sessions
r = OE Replication Agents
f = File IO
s = Server Activity
A = "Classic" App Servers
B = BigB Guesstimator

= Set Usr#
***** = Client Statement Cache

6 = Set Table Name
7 = Set Index Name
S = Client/Server Parameters

j = PASOE Health Scanner

^u = SQL update stats script
^r = dbanalys review & reports
v = view reports

^ = Modify Sort Columns

o = OS Info (if avail)

Q = SQL activity
D = Disk Free Space
/ = Sequences
N = Network Traffic
W = Who is Connected?
m = Multi-Tenant Info
e = Application Specific
^a = After-Imaging Info

P = Set Process Id
_ = Clear Client Statement Cache

8 = Monitor Users of a Table
9 = Monitor Users of an Index
T = Show Table and Index Ranges

C = CDC Processing Queue

^t = show session temp-tables
Y = show session user*stat
y = run profiler on this session

& = Show ProTop Properties

User Drill Down

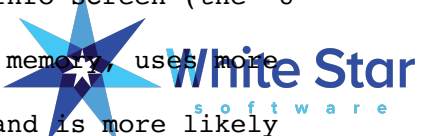
ProTop Command Key: #

demo Auto Interval Rate DS 81 6001 0.381
 2020/10/28 11:54:38
 demo 1 25465 105
 protop.wss.com

ProTop Version 3.14159x as of October 06, 2020 10:27

/db/demo

#	Hit%	Commits:	Examined:	DB Connection Number
3	100.00	0		
Log Reads:	2836	Undos: 0	New RM:	Enter the DB Connection Number for the session of interest. This is the "Usr#" found on many ProTop screens, in the DB .lg file, and in many Progress error
Log Writes:	0		From RM:	
OS Reads:	0	Lock Tbl HWM: 27	RM Locked:	
OS Writes:	0	Curr # Locks: 0	From Free:	Usr# 2
LogRd/LogWr:	0.00	Lock Tbl% 0.00%	Front2Bk:	
LogRd/RecRd:	2.14	Rec Lk/s: 0		Client statement cache type: 1 0 = Off
Rec Reads:	1325	Lk Dura (ms): 0.00	Mod Bufs:	1 = Single (Top of Stack)
Idx Reads:	1325		Evicted:	2 = Full Call Stack
Rec Creates:	0			
Idx Creates:	0	BogoMIPS: 6.33		Most of the time you want "1". You typically do not need the full stack unless you are planning to look at the detailed User Info screen (the "U" command). The full stack option obviously takes more memory, uses more space in the client/server networking communications and is more likely
Rec Updates:	0	Random IO (ms): 0.01		
Rec Deletes:	0	Sync IO (sec): 0.00		
Idx Deletes:	0	(MB/sec): 0.00		



User Drill Down and programmerMode

ProTop Command Key: ^p

demo OnDemand Interval Summary DS 81 5296 0.017 ProTop Version 3.14159x as of October 06, 2020 10:27 2020/10/28

12:59:27
 demo 1 1 1 programmerMode /db/demo
 protop.wss.com

```

T#?U^p
  Login Name: tom      Login Time:Wed Oct 28 11:46:44 2020      -Bp Bufs:      0      BI Reads:      0      Logical Rd:
7305877
  Usr#:      2      Device/IP: /dev/pts/2      -Bp Used:      0      BI Writes:      0      Logical Wr:
0
  Connect Id:      3      Full Name:      AI Reads:      0      Disk Reads:
121910
  PID:      23288      Phone:      Server:      0      AI Writes:      0      Hit%
98
  TID:      23288      E-Mail:      Serv PID:      0      Num TRX:
0
0
  Serv TID:      0      Curr Locks:
0
  Session Info: ABL SELF S4      Lock HWM:
2
  TRX Info: --None--
  
```

Session Table Activity

Tbl#	Area#	Table Name	RM Chain	#Records	Frag% Scat	Churn	AvgRow	Create	Read v	Update	Delete
> 14	7	Order	5	727285	0.00% 1	5.00	93	0	3636425	0	0
? 1	7	Benefits	4	21	0.00% 1	0.00	40	0	0	0	0
? 2	7	BillTo	4	2	0.00% 1	0.00	111	0	0	0	0

Session Index Activity



User-specific Table & Index Information

ProTop Command Key: Y

```

Y ^tyyyyY
      Hit%      99.96
Connections: 1321
  Log Reads: 2311950
%      44
  Log Writes: 0
6
  OS Reads: 894 Lo
1
  OS Writes: 171 Cu
3
  LogRd/LogWr: 0.00
Servers: 18
  LogRd/RecRd: 2.09
3
  Rec Reads: 1103601 Lk
Server: 80
  Idx Reads: 1124285
0
  Rec Creates: 1003
Local: 1162
  Idx Creates: 4029
Batch: 44
  Rec Updates: 346 Rand
1 1 1
  Rec Deletes: 449 Syn
1
  Idx Deletes: 2030
2
  Idx Blk Spl: 6 Us
0 1
  Rec Waits: 0
0
  Resrc Waits: 40
  
```

User-specific Table, Index, and LOB statistics for the current session

05:06

The point of this is to demonstrate the gathering of user table and index stats from 10:01 -n

within a running session. It isn't really all that insightful with regards to your Brokers:

specific application. 21:30 SQL Servers:

Unless you have modified protop.p to generate some test traffic you probably won't 32660 SQL Clients:

see much happening. If your table and index ranges are set to look at meta-schema 32627 4gl

activity you will mostly see the "user experience" queries running. 33 4gl RemCnx:

2112 App

The ProTop session should not be doing any IO against your application tables unless of 12

you have implemented an "application specific monitoring" plugin. 91822

11 BIW/AIW/WDOG:

0 AI Mgmt:

APWs:

0 RPLA/RPLS:

0 Utilities:

0.00

Top 10 Tables Used by My Session

tblName	tblRd	tblCr	tblUp	tblDl
__Field	36,961	0	0	0
__StorageObject	15,453	0	0	0



Temp Table Usage

ProTop Command Key: ^t

Temp Table Statistics

Temp table statistics require OpenEdge 11 or higher
and must be enabled by setting:

```
export TTDEBUG=yes
```

```
in $PROTOP/bin/localenv
```

You must also uncomment the -tt* parameters in
etc/protop.pf:

Temp Table Usage

ProTop Command Key: ^t

Idx Deletes:	627	(MB/sec):	Temp-Table Info				APWs:	
2								
Idx Blk Spl:	0	User Exp SHM:			ked AI:	0	RPLA/RPLS:	
0 1					a Used:	0	Utilities:	
Rec Waits:	0				a Used%	0.00	TRX:	
0								
Resrc Waits:	15		/home/wssdba/pt3/tmp/DBI453740352qIesrr <unlinked>					
Latch Waits:	5							
418								
Latch Reqs:	4071605		4096 DBI Block Size	42 current temp-tables			Blocked Rec:	
1			? DBI File Size	6 archived			Other Blkd:	
0								
			1032 DBI Total Blocks	100 peak				
			225 DBI Empty Blocks	67 tt indexes	e	Read v	Update	Delete
			5 DBI Free Blocks	18874 total current records				
			0 DBI RM Free Blocks	1426755 total current bytes	1	312100	5	0
				100.00% tt hit ratio	0	65074	0	0
				19614 tt rec create	0	2237	0	0
				2247734 tt rec read	0	2131	0	0
				13306 tt rec update	0	2067	0	0

Tbl#	Area#	BX	Table Name	OS Read
> 23	16	B1	ap-trans	
0				
214	174	B1	customer	
0				
105	20	B1	bank-rec-doc	
0				
539	20	B1	prod-exp-loc-q	
0				
871	20	B1	wb_help-all	
0				
450	174	B1	loc-group	
0				
849	22	B1	wb_dept-user	
0				



Temp Table Usage

ProTop Command Key: ^t

```
demo 1314 1122 _____ Temp-Table Details
_____ protop.wss.com
Hit% | TT Name | Procedure Name | Bytes | Records | Create | Read | Update | Delete | OSRead | Was Deleted |
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
ions: 1339
Log Reads: | tt_tbl | protop.p | 45239 | 1245 | 1245 | 787069 | | | | | -n
% 45
Log Writes: | tt_tbl.xid-idx | protop.p | | | 1247 | 789776 | | | | | kers:
6
OS Reads: | | | | | | | | | | | vers:
1
OS Writes: | tt_idx | protop.p | 135133 | 2327 | 2327 | 16189 | | | | | ents:
3
LogRd/LogWr: | tt_idx.xid-idx | protop.p | | | 2334 | 18631 | | | | | mCnx:
| vers: 18
LogRd/RecRd: | | | | | | | | | | |
3
Rec Reads: | tt_lob | protop.p | 487 | 9 | 9 | | | | | |
| rver: 80
Idx Reads: | tt_lob.xid-idx | protop.p | | | 9 | 20 | | | | | peed:
0
Rec Creates: | | | | | | | | | | |
| ocal: 1180
Idx Creates: | tt_areaExtent | protop.p | 11547 | 242 | 242 | 58578 | | | | |
| atch: 44
Rec Updates: | tt_areaExtent.ae-idx | protop.p | | | 242 | 59318 | | | | | WDOG:
1 1 1
Rec Deletes: | | | | | | | | | | | Mgmt:
1
Idx Deletes: | tt_area | protop.p | 7698 | 117 | 117 | 234 | 116 | | | | APWS:
2
Idx Blk Spl: | tt_area.pctAlloc-idx | protop.p | | | 117 | 237 | | | | | RPLIS:
0 1
```



Profiler Sample Code

ProTop Command Key: y

Idx Blk Spl:	0	User Exp SHM:	Are You Sure?	ed AI:	0	RPLA/RPLS:																																																																																																																																					
0 1				Used:	0	Utilities:																																																																																																																																					
Rec Waits:	0			Used%	0.00	TRX:																																																																																																																																					
0																																																																																																																																											
Resrc Waits:	35																																																																																																																																										
Latch Waits:	6																																																																																																																																										
418																																																																																																																																											
Latch Reqs:	6413397					Blocked Rec:																																																																																																																																					
0																																																																																																																																											
Latch/logRd:	3.32					Other Blkd:																																																																																																																																					
0																																																																																																																																											
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The Profiler capability is used to track down performance issues within the ProTop client. It is very unusual for an end-user to need to run this for that purpose.

Aside from debugging ProTop this code is also a useful example of embedding the profiler within an application. The source can be found in lib/zprof*.p

It is fine to run this code in order to get a feel for how useful embedded profiling can be (IMHO it is *VERY* useful).

But be aware that profiling can very quickly create very large



Profiler Output

ProTop Command Key: y

```
Profiler: Top 20 Results
-----
|Description: ProTop3 Execution Profile [00:00:15]
|
|Session Total Execution Time   00:00:02
|
|Line 0 = initialization, line -1 = cleanup
|
|-----
```

Top 20 Lines: Total Execution Time

Program/Class	Line	Time	Avg Time	Calls	Internal Procedure/Method
dc/dashboard.p	3812	0.902008	0.000000	2000002	mon-update
dc/dashboard.p	0	0.554537	0.277269	2	mon-update
ssg/sausage00.p	1937	0.164200	0.000004	46774	scanDataSet
ssg/sausage00.p	0	0.154750	0.077375	2	scanDataSet
ssg/sausage00.p	1974	0.132913	0.000003	43213	scanDataSet
dc/idxact.p	877	0.132201	0.000029	4546	upd-tt_index
dc/uio.p	0	0.126270	0.063135	2	mon-update
dc/dashboard.p	3813	0.120680	0.000000	2000000	mon-update
ssg/sausage00.p	1973	0.095414	0.000002	43517	scanDataSet



Conclusion

Summary

- How to recognize bad transactions
- How to recognize bad where clauses
- Some keywords to banish
- Tools to show your coders the way to righteous coding and happy users!

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Thank You!

Questions?

See you in the chat window or e-mail tom@wss.com!