Getting Started: DBA Basics (90 minutes)

Congratulations! You’re Our New Progress DBA! Now What?
Tom Bascom, White Star Software

Abstract: People often ask what tasks a newly minted OpenEdge DBA should be performing? What should my daily, weekly, monthly etc checklist have on it? What's good? What's BAD? Where do I even look to find out? What do I need to pay attention to? What can I ignore? What should I lose sleep over? When should I update my resume? Who can help me? In this session we will show you the way through the challenges that lie in front of you and help bring peace to your weekends and evenings!
Getting Started: DBA Basics

Congratulations! You're Our New Progress DBA! Now What?

Tom Bascom, White Star Software
tom@wss.com
A Few Words about the Speaker

• Tom Bascom: Progress user & roaming DBA since 1987

• Partner: White Star Software & DBAppraise, 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
Audience Survey

• How many do at least some Progress DBA work?
Audience Survey

- How many do at least some Progress DBA work?
- How many have been doing that work for less than a year?
• How many do at least some Progress DBA work?
• How many have been doing that work for less than a year?
• Is anyone on a version of Progress that is a single digit number... i.e. V9, V8, etc.
Audience Survey

• How many do at least some Progress DBA work?
• How many have been doing that work for less than a year?
• Is anyone on a version of Progress that is a single digit number... i.e. V9, V8, etc.
• Who is on OpenEdge 10?
Audience Survey

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• How many have been doing that work for less than a year?
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• Who is on OpenEdge 10?
• How about 11.x?
Audience Survey

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- Who is on OpenEdge 10?
- How about 11.x?
- 12?
Audience Survey

• How many do at least some Progress DBA work?
• How many have been doing that work for less than a year?
• Is anyone on a version of Progress that is a single digit number... i.e. V9, V8, etc.
• Who is on OpenEdge 10?
• How about 11.x?
• 12?
• Are there any coders in the room?
Now What?!?!
Resources To Get Started With
Online Documentation

https://community.progress.com/community_groups/openedge_general/w/opendedgegeneral/1329.openedge-product-documentation-overview

OpenEdge Product Documentation Overview

Community hosts the most recent product documentation for Progress and OpenEdge products. Product documentation is available in both PDF and HTML formats. Click a link below to access the product documentation for your Progress or OpenEdge product. Within each category, use the links to access individual books or use the PSDN search mechanism to search for particular information within the documentation. Recent documentation categories also provide ZIP files that let you download an entire documentation set at one time.

- OpenEdge 11.7 Product Documentation
- OpenEdge 11.6 Product Documentation
- OpenEdge 11.5 Product Documentation
- OpenEdge 11.4 Product Documentation
- OpenEdge 11.3 Product Documentation
- OpenEdge 11.2 Product Documentation
- OpenEdge 11.1 Product Documentation
- OpenEdge 11.0 Product Documentation
- OpenEdge 10.2B Product Documentation
- OpenEdge Architect Task Map
- OpenEdge GUI for .NET Task Map
- Download 11.0 Documentation Example Procedure files
• Windows “CHM” Docs
  Start -> OpenEdge -> Help ->

There are good Mac apps for reading CHM files:
Article: Getting error 1124 when trying to read a record from the database.
https://knowledgebase.progress.com/articles/Article/P190094
Sep 13, 2015 - Getting error 1124 when trying to read a record from the database. The error 1124 results in the database shutting down. Scanning the...

Article: Fixing errors (4229) and (1124) on a database.
https://knowledgebase.progress.com/articles/Article/P18310
May 25, 2017 - The first recommendation would be to go to a good backup of the database and if running (AI) After Imaging, then roll forward to before the...

Article: Determining the causes of S/E 1124 (wrong dbkey in block)
https://knowledgebase.progress.com/articles/Article/P5286
Mar 15, 2017 - The cause of "SYSTEM ERROR: wrong dbkey in block. Found <dbkey>, should be <dbkey2> (1124)" is very often due to hardware or operating...
Step 1: Exercise your knowledgebase search skills:

How to subscribe to Product Announcement and Notification Service (PANS)

Environment
- Product: All Progress Products
- Version: All supported versions
- OS: All supported platforms
- Database: All supported databases
- Applications: SupportLink

Question/Problem Description
How to subscribe to Product Announcement and Notification Service (PANS)

Steps to Reproduce
- Clarifying Information
- Error Message
- Defect/Enhancement Number
- Cause
- Resolution
  1. Log into SupportLink [https://progresslink.progress.com/]
  2. Select SupportLink
  3. Select “Email Notifications and Alerts” at the top of the page.
  4. Select the items you wish to receive.
  5. Select “Update” at the top of the page.

Progress Alert and Notification Service

Dear OpenEdge PANS,

Below are your new OpenEdge notifications.

<table>
<thead>
<tr>
<th>Product Alert - ALL</th>
<th>Article#</th>
<th>Solution Title</th>
<th>Defect/Enhancement#</th>
</tr>
</thead>
<tbody>
<tr>
<td>09–Nov–2017 16:11 EST</td>
<td>000085298</td>
<td>Progress OpenEdge 11.7.2 Service Pack Readme</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Article – ALL</th>
<th>Article#</th>
<th>Solution Title</th>
<th>Defect/Enhancement#</th>
</tr>
</thead>
<tbody>
<tr>
<td>09–Nov–2017 18:45 EST</td>
<td>000085301</td>
<td>Enabling database for replication fails with error (11727)</td>
<td></td>
</tr>
</tbody>
</table>
Progress Community

http://community.progress.com
<table>
<thead>
<tr>
<th>Title</th>
<th>Start Date</th>
<th>Replies</th>
<th>Views</th>
<th>Last Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Please send me any pdf regarding…”</td>
<td>TomBascom, Dec 26, 2014</td>
<td>0</td>
<td>1,567</td>
<td>TomBascom Dec 26, 2014</td>
</tr>
<tr>
<td>Loads of Progress info and documentation links...</td>
<td>Cringer, Jan 25, 2012</td>
<td>4</td>
<td>3,863</td>
<td>JustMe Sep 7, 2012</td>
</tr>
<tr>
<td>What Is Your Average Day A Openedge Developer/administrator</td>
<td>Cecil, Tuesday at 3:03 PM</td>
<td>11</td>
<td>89</td>
<td>TomBascom A moment ago</td>
</tr>
</tbody>
</table>
https://stackoverflow.com/questions/tagged/progress-4gl%20or%20progress-db%20or%20openedge
Slack

https://join.slack.com/t/openedge/shared_invite/enQtMTgwODYyODI4MDM2LTg3MDFlMGVkODY2NTdiYjQ0ZDE4MzAwZTvxMDCxMWI0NzMyYTU5M2JjY2ZmMWRjZGlzNzZINWViNzN3MDJiNDY

Or:

https://goo.gl/oTwneQ

Or:

https://tinyurl.com/slackOpenEdge
PUG Challenge
Don’t forget!

• Your Application Vendor
  – Documentation & recommendations
  – May have their own forums
  – Knowledgebase
  – User conferences
  – And so forth!
Setting Up Your Command Line Environment
PROENV

• Provides a command line environment that is properly configured to run all administrative commands.
  – DLC & WRKDIR environment variables will be set.
  – PATH will include $DLC/bin and other useful bits.

• If you do not use PROENV then you need to ensure that the DLC variable is exported and that $DLC/bin is in your PATH!
Pro Tip! If you are running on Windows make sure to adjust the width and height of the proenv window!

The pre-oe11 default is 300 lines by 24 columns – and that does not work well for anyone.

Modern monitors can easily support 160 columns by 64 lines with a comfortable font size. And there are much better color options than white on black.

White Star Software
Starting a Database
Starting a Database

- PROSERVE
- DBMAN
- Exploder
PROSERVE

Pro

- Command Line
- Easy to Script
- Lots of Control
- Repeatable
- Sequence of actions is guaranteed

Con

- Must Provide Details like “dbname”
- Dinosaur stigma?

$ proserve dbname –n 500 –spin 3149 –B 1000000 –L 50000
$ probiw dbname
$ proaiw dbname
$ prowdog dbname
$ proapw dbname
DBMAN

Pro

• Command Line
• Works with conmgr.properties
• Easy to Script
• Starts Page Writers & Watchdog
• Runs as a “Service” on Windows (avoids Windows “user logout closes background windows” issue).

Con

• Uses conmgr.properties
• Admin Server must be running
• Order of operations is not controllable.
• Admin Server uses Java

proenv> dbman dbName -start
Exploder

Pro

• Exercises Health Care Benefits

Con

• Graphical Interface
• Requires Admin Server
• Requires conmgr.properties
• Ugly
• Confusing
• Incomplete
• Unreliable (Java)
• But if you like that sort of thing...
Exploder Pro Tip

- Always make sure that the admin server is running before deciding that Exploder (or dbman) isn’t working properly!

```bash
proenv> proadsv -query
OpenEdge Release 10.2B as of Mon Dec 14 17:02:01 EST 2009
AdminServer is alive. (8545)
proenv>
```
Stopping a Database
Stopping a Database

- PROSHUT
- DBMAN
- Exploder

$ proshut -by sports2000
Shutdown is executing. (1613)
Shutdown complete. (1614)
Stopping a Database

- PROSHUT
- DBMAN
- Exploder

- Delete the .lk file...
- Kill -9
- Reboot server...
- Trip over plug...
Stopping a Database

- PROSHUT
- DBMAN
- Exploder

- Delete the .lk file...
- Kill -9
- Reboot server...
- Trip over plug...

On the bright side Progress crash recovery works very, very well – none of the above will corrupt an OpenEdge database. (Do NOT, however, try these techniques with certain other big name databases...)
PROSHUT

Pro

• Command Line
• Easy to Script
• Lots of Control
• Fast

Con

• What’s a Command Line?

$ proshut –by dbname
DBMAN

Pro

• Command Line
• Works with conmgr.properties
• Easy to Script

Con

• Command Line
• Uses conmgr.properties
• Admin Server must be running

$ dbman dbName -stop
Exploder

Pro

- Graphical Interface
- Requires Admin Server
- Requires conmgr.properties
- Ugly, Confusing, Incomplete
- Unreliable
- Cannot control sequence
- Easy to shutdown the wrong db
How Do I Make a Backup?
How Do I Make a Backup?

• PROBKUP – the preferred method endorsed by experienced Progress DBAs everywhere.
How Do I Make a Backup?

• PROBKUP – the preferred method endorsed by experienced Progress DBAs everywhere.

• Methods used by Future Job-Seekers:
  – Disk Mirroring
  – OS Backup
  – 3rd Party Tools
  – VM or SAN “snapshots”
PROBKUP

- Knows where **all** of the parts of the database are (even the parts in memory or in unusual disk locations).
- Can be executed with the database online.
- Can skip empty space in the db.
- Can be used to change “physical” DB Structure (extent size & location)
- Can turn on after-imaging online if you forget!

$ probkup online dbname dbname.pbk -com
"All The Parts of the DB"

```bash
# sports.st
#
# b /bi/sports.b1
#
# d "Schema Area":632;1 /db/sports.d1
# d "Info Area":732;1 /db/sports_7.d1
# d "Customer/Order Area":832;8 /db/sports_8.d1
# d "Primary Index Area":91;8 /db/sports_9.d1
# d "Customer Index Area":101;64 /db2/sports_10.d1
# d "Order Index Area":1132;64 /db/sports_11.d1
#
# a /ai/sports.a1
# a /ai/sports.a2
# a /ai/sports.a3
# a /ai/sports.a4
```
OS Backup & 3rd Party Tools

• The database must be offline or in a “quiescent state”.
• You are responsible for making certain of the above.
• You must also ensure that all parts of the database are included in the backup.
VM or SAN “Snapshots”

• The snapshot must be a consistent, point in time image of the entire database.
• The database will be in a crashed state when recovered.
• Not all snapshot products are created equally!
• Progress has tested and certified EMC’s SRDF.
• Some users report success with VMWare’s VMotion (but beware of possible performance issues).
• Other users report VMotion horror stories – Caveat Emptor!
Other Stuff to Backup

- $DLC/properties
- DB Log Files
- Structure (.st) Files
- Parameter (.pf) Files
- $DLC/startup.pf
- repl.properties etc.
- $DLC/certs
None of My SQL Knowledge Works
None of My SQL Works!?! 

• Progress is NOT SQL.
• Period. Full Stop. End of Story.
• Thinking about Progress like SQL will only lead to pain and agony.
None of My SQL Works!?!  

- Progress is NOT SQL.  
- Period. Full Stop. End of Story.  
- Thinking about Progress like SQL will only lead to pain and agony.  

- Some of us like it this way 😊
4gl vs SQL

• There are 2 “languages” – 4gl and SQL-92 that share a common “storage engine”.
• The storage engine is what DBAs manage.
• Virtually all Progress applications are written with the 4gl.
• SQL is used almost exclusively for external reporting or data extracts.
• The languages are not aware of each other.
  – Triggers and stored procedures in one language are not known to triggers in the other!
Embedded SQL-89 – Is NOT SQL-92!!!

• The 4GL language has some very old and very limited SQL-89 syntax embedded in it.
• This permits trivial ad-hoc queries within a 4gl session such as:

  select count(*) from customer.

• This makes a good demo.
Attempting to use the embedded SQL-89 in application code will only lead to pain, suffering and agony.

Do not go there.

You have been warned.
Progress is **NOT** SQL! Progress is much better than that.

- The 4GL language does not respect “field width” – **all** data is variable width.
- A field format is just a default suggestion used when the programmer provides no other input or display format – it is not a constraint.
- For instance a character field defined as “x(30)” might be “overstuffed” with a string of length 2,000.
- This is normal and very common practice within 4gl applications. **It is not an error.**
New SQL Width Options!

ADT and ASU can be enabled for specific Login Brokers, For example:

```
proserve <dbname> -S <port> -SQLTruncateTooLarge ON -SQLWidthUpdate ON  ServerType both
proserve <dbname> -m3 -S <port> -SQLTruncateTooLarge ON -SQLWidthUpdate ON  ServerType SQL
```

When data is truncated there is a message in the database log similar to:

```
SQLSRV2 2: (-----) 13 authorized data truncation action(s) performed.
```

If ADT or ASU is not needed may also be enabled for individual client sessions via ODBC or JDBC. Example:

```
sqlexp -url "jdbc:datadirect:openedge://localhost:<port>;databasename=<databasename>;truncateTooLarge=output;"
```

Refer to Article 000068442, How to enable Authorized Data Truncation in a JDBC or ODBC connection.

For interaction between ADT and ASU Refer to the Whitepaper: Autonomous Schema Update Functionality:
```
https://community.progress.com/community_groups/openedge_rdbms/f/18/t/19534
```

White Star Software
SQL-92 Interface

- SQLEXP
- ODBC/JDBC
- DBTOOL
- UPDATE STATISTICS
- SQLDUMP
SQLEXP

$DLC/bin/sqlexp -user userName -password passWord \  
-db dbName -S servicePort \  
–infile script.sql –outfile sqlexp.log

• Run SQL scripts
• GRANT and REVOKE perms (save the scripts because the SQL permissions are not included in a dump & load!)
ODBC/JDBC
$ dbtool sports

DATABASE TOOLS MENU
-------------------------------------------
1. SQL Width & Date Scan w/Report Option
2. SQL Width Scan w/Fix Option
3. Record Validation
4. Record Version Validation
5. Read or Validate Database Block(s)
6. Record Fixup
7. Schema Validation
9. Enable/Disable File Logging

Q. Quit

Choice:
UPDATE STATISTICS

/* genUpdateSQL.p */

mpro dbName -p genUpdateSQL.p -param "updstats.sql"

sqlexp -user user -password passWord -db dbName -S port -infile updstats.sql -outfile updstats.log

output to value( session:parameter ).

for each _file no-lock where _hidden = no:
  put unformatted
    "UPDATE TABLE STATISTICS AND INDEX STATISTICS AND "
    "ALL COLUMN STATISTICS FOR PUB."
    "'"' _file._file-name '"' "
  skip
  "commit work;"
  skip.
end.
output close.
Dumping Your SQL Configuration

Thursday: 10:30 – 11:30 Brussels
Paul Koufalis

Dump & Load: More than just a few Proutil Commands
The DBA’s Best Friend

After-Imaging
After-Imaging

• Roll-forward recovery.
• A journal of transaction “notes” that can be replayed against a baseline backup to restore a database to the last completed transaction or a point in time or a specific transaction number.
• This is the same concept that some other databases refer to as the “redo log”.

White Star Software
Why do I need after-imaging?

- Protection from media loss -- such as bad tapes, a crashed disk, a destroyed data center or stolen servers...
Why else do I need after-imaging?

• Protection from human errors:

  $ cd /db
  $ rm *

  for each customer:
    delete customer.
  end.

  for each order:
    delivered = yes.
  end.

  $ vi dbname.db
  ...
  :x

• Human error is at least as big a risk as hardware problems.
After-Imaging Best Practices

- Enable after-imaging on all updateable databases.
- Place after-image extents on separate disks from data extents.
- Use 8 to 16 variable extents with “large files” enabled (more for OER).
- Run an AIW.
- Switch extents as often as the business needs you to.
- Use the sequence number when naming archived logs.
- Copy archived logs to an external location ASAP.
- Verify your process by continuously rolling forward.
- Monitor both your “empty” and “full” extents.
- Keep at least 30+ days of archived after-image logs.
- Establish dedicated backup and recovery filesystems.
Startup Parameters
Where to Find Them?

- On the command line.
- In a script.
- In “.pf” files.
- In $DLC/properties/conmgr.properties 😞
- Verify by examining the “dbname.lg” file.
  - Search for “(333)” and examine the next 50-75 lines...
Important Configuration Options
Important Configuration Options

- Connections
- BI Cluster Size
- Block Sizes
- Storage Areas
- Rows Per Block
Connections

- -n is connections **NOT** licenses, -n should always be larger than your license count!
- -Mi/Ma/Mn/Mpb: network broker connection parameters
- -m3/ServerType: SQL vs 4GL server
- -minport, -maxport: port range used by servers
Connections

- **-n**: is NOT licence count so give yourself a good buffer
- **-Mi 1 – Ma 5** is a good start for most people
- **-Mpb** = max concurrent users (4GL or SQL) / -Ma plus a few
- **-Mn** = Sum of –Mpb plus a generous few extra
- **-ServerType**: segregate 4GL and SQL connections on separate –m3 brokers
- Use non-overlapping –minport and –maxport ranges for each broker
BI Cluster Size

• The Default varies with release, 512KB is current.
• For “Workgroup” Licenses smaller is better.
  – More, but smaller, delays.
• For “Enterprise” Licenses bigger is better.
  – May increase crash recovery time a bit.
  – But reduces the risk of painful delays during heavy processing.
  – 32768 KB is “a good start”.
• proutil dbname –C truncate bi –bi 32768
Block Sizes

- **DB Block (Must Dump & Load to Change)**
  - 4KB or 8KB
  - **NOT** 1KB or 2KB
- **BI Block**
  - 16KB
  - `proutil dbname -C truncate bi -biblocksize 16`
- **AI Block**
  - 16KB
  - `rfutil dbname -C aimage truncate -ai 16`
  - AI must be disabled so do it ‘early’
Storage Areas

- Type 2 storage areas are the foundation for all advanced features of the OpenEdge database.
- Type 2 areas have cluster sizes of 8, 64 or 512.
- Data blocks in Type 2 areas contain data from just one table.
- Use **Many** (Type 2) Storage Areas (and never use Type 1 Areas).
- Do **NOT** assign tables to areas based on “function”.
- Instead group objects by common “technical attributes” (Rows Per Block, size, activity level).
- Put Large Objects (LOBs) in separate Areas.
- Do **NOT** store data, indexes or LOBs in the “Schema Area”.

White Star Software
**Storage**

- RAID 5 is EVIL!
- So are the variants spawned from it:
  - RAID 6
  - RAID DP (Double Parity or Definitely Putrid)
  - Et al – Parity based RAID provides a Parody of Performance (all RAID other than RAID 10 is parity based).
- NAS <> SAN
- If at all possible avoid NetApp
- SANs exist to make life easy for storage admins – they are not there to make your database run faster.
Just 20 50 slides to go!
Where Are the Log Files?
Where are the log files?

• dbname.lg
• Admin Server:
  $WRKDIR/admserv.log
• App Servers:
  $WRKDIR/appsrv.broker.log
  $WRKDIR/appsrv.server.log
  Location of $WRKDIR can be found in $DLC/bin/proenv
• OS Logs
  – /var/log, /usr/adm
Monitoring
But first...

- Always set --tablerangesize and --indexrangesize on db startup!
- To what values?
But first…

- Always set –tablerangesize and –indexrangesize on db startup!
- To what values?

```plaintext
/* range.p -- mpro dbName -p ./range.p */

define variable t as integer no-undo label "tables".
define variable i as integer no-undo label "indexes".

for each _file no-lock where _hidden = no:
    t = t + 1.
end.

for each _index no-lock:
    i = i + 1.
end.

display t i with side-labels.
```
dbname.lg: What to Ignore

(452) Login by root on /dev/pts/6.
(453) Logout by root on /dev/pts/6.
(708) Userid is now tom.
(8873) Login usernum 2547, remote SQL client.
(14658) Previous message sent on behalf of user 2542, server pid 22516, broker pid 5778.
(12699) Database xyz Options:

And a few squillion more “noise” messages...

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Process-Id</th>
<th>P-336</th>
<th>T-1240798976</th>
<th>I ABL</th>
<th>5: (452) Login by tom on /dev/pts/1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[2014/08/23@09:34:36.572-0400]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[2014/10/24@13:07:54.129-0400]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(334) Single-user session end.</td>
</tr>
</tbody>
</table>
### dbname.lg: What to Pay Attention To

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2248</td>
<td>Begin normal shutdown</td>
</tr>
<tr>
<td>2249</td>
<td>Begin ABNORMAL shutdown</td>
</tr>
<tr>
<td>542</td>
<td>Server shutdown started by root on /dev/pts/6.</td>
</tr>
<tr>
<td>5292</td>
<td>SYSTEM ERROR: The broker is exiting unexpectedly, beginning Abnormal Shutdown.</td>
</tr>
<tr>
<td>1384</td>
<td>The database is being shutdown.</td>
</tr>
<tr>
<td>915</td>
<td>Lock table overflow, increase -L on server</td>
</tr>
<tr>
<td>1081</td>
<td>Too many users requested semaphore undo, increase SEMMNU.</td>
</tr>
<tr>
<td>358</td>
<td>SYSTEM ERROR: Too many subprocesses, cannot fork. Errno=12.</td>
</tr>
</tbody>
</table>

Note: not a comprehensive list or errors but you get the idea
dbname.lg: What to Panic Over!

(37) Your database was damaged. Dump its data and reload it.

(43) Cannot find or open file <filename>, errno = <number>.

(1124) SYSTEM ERROR: Wrong dbkey in block. Found 5512, should be 1458 in area 15.

(886) The database was last used <date/time>.
(887) The before-image file expected <date/time>.
(888) Those dates don't match, so you have the wrong copy of one of them.

SYSTEM ERROR: ...

Note2: not all SYSTEM ERRORs are worth getting out of bed for
dbname.lg: What Not To Miss

(1362) Full backup started.
(1364) Full backup successfully completed.

(7129) Usr 61 set name to Aimage full.
(3778) This is after-image file number 270 since the last AIMAGE BEGIN
(3777) Switched to ai extent /ai/sports.a4.

• The lack of these messages means that backups are not executing.
• Or that after-imaging is not functioning.
Monitoring Tools & Services

- PROMON (free, included)
- ProTop (free or paid)
  - 16:30 – 17:30 Copenhagen; [WSS]
  - **ProTop: The Best OE Monitoring Dashboard in the Galaxy**
- Roll your own with Virtual System Tables
- OE Management ("Fathom Management")
- Progress Managed DBA Service
- DBAppraise (support services add-on for ProTop)
What to Monitor

- Is the DB up?
- Backup Age
- Number of connections
- Oldest active transaction
- Commits/sec
- Logical Reads/sec
- After-image # of full extents
- Busy users, tables and indexes

- Latch timeouts
- Locks in use
- Blocked users
- IO response
- CPU performance
- Disk Space
Database Performance Tuning Talks

Wednesday
10:00 – 11:00 Amsterdam; [Adam Backman] **Top n performance tips**
15:45 – 16:45 Amsterdam; [Dan Foreman] **Captain, Where should I go? What should I do?**

Thursday
11:45 – 12:45 Brussels; [Adam Backman] **Build your own luck**
13:45 – 14:45 Brussels; [Tom Bascom] **OpenEdge Database Performance Tuning**
16:30 – 17:30 Copenhagen; [WSS] **ProTop: The Best OE Monitoring Dashboard in the Galaxy**

Friday
9:00 – 10:00 Brussels; [Dan Foreman] **promon for Dummies & Geniuses**
It’s Not “Just” a Database
It’s Not “Just” a Database

• Any Amount of Tuning can always be defeated by lousy code.
It’s Not “Just” a Database

• Any Amount of Tuning can always be defeated by lousy code.

• … and there is a LOT of lousy code out there 😞
The performance enhancement possible with a given improvement is limited by the fraction of the execution time that the improved feature is used.

\[ S = \frac{T_s}{T} = \frac{1}{f_p/n + f_s} \]

-- Amdahl’s Law
In other words:

- Trying to improve small things that nobody notices probably isn’t the road to fame and fortune.

- Big queries that return lots of data and which are frequently used by lots of users will be much more noticeable.
Users!

• Sometimes you need to know what they are doing:
  – UNIX: kill –USR1 <pid>
  – Windows: %DLC%\bin\proGetStack <pid>

• Must own the process or be root/administrator
• Creates a protrace.<PID> in working directory
• The protrace contains a 4gl stack trace!
PROGRESS stack trace as of Tue Dec 4 11:28:00 2012
Command line arguments are
/progress/dlc/bin/_progres -p mls.p -pf /los_prod/develop.pf -T /dbtmp
Startup parameters:
-pf /progress/dlc/startup.pf,-T /dbtmp,-clientlog /los_logs/debug/
client_f474458_20121204_112720_45302816.log
... (snip)
+++PARALLEL TOOLS CONSORTIUM LIGHTWEIGHT COREFILE FORMAT version 1.0
... (snip)
** 4GL Stack Trace **
---> obj/mnu/menu (/los_prod/obj/mnu/menu.r) at line 416
    obj/src/startup (/los_prod/obj/src/startup.r) at line 2042
    mls.p (/los_prod/mls.r) at line 26
** Persistent procedures/Classes **
Handle File Name
001010 /los_prod/obj/tools/proclib.r
000000 /los_prod/config.r (STATIC)
001000 /los_prod/obj/prt/genBarcode.r
Application Code Performance Tuning Talks

**Wednesday**

14:00 – 17:30 Prague; [Paul Koufalis, Peter Judge] **Workshop: 4GL Code Performance - Profiling and Indexing**
15:45 – 16:45 Cologne; [Panel] **Debugging and Trouble-Shooting Panel**

**Thursday**

10:30 – 11:30 Noordwijk; [Dan Foreman] **TEMP-TABLE Monitoring & Perf Tuning**
13:45 – 14:45 Manchester; [Dan Foreman] **Needle in a Stack Trace**
16:30 – 17:30 Copenhagen; [WSS] **ProTop: The Best OE Monitoring Dashboard in the Galaxy**

**Friday**

9:00 – 10:00 Brussels; [Dan Foreman] **promon for Dummies & Geniuses**
11:45 – 12:45 Cologne; [Paul Koufalis, Peter Judge] **Mastering 4GL Code Performance - Profiling & Indexing**
10:15 – 11:14 Brussels; [Tom Bascom] **Embedded Application Performance Instrumentation**
16:30 – 17:30 Manchester; [Tom Bascom] **4GL Coding Worst Practices**
A Few Words About “killing” Users
About “killing” Users...

• If you are on UNIX:
  – “kill -9” is **dangerous**! You will crash the database!
  – “kill -9” does not “always work”
  – “kill -1” (“hangup”) is safe and effective
  – proshut dbname –C disconnect usr#
About “killing” Users...

• If you are on Windows:
  – We’re sorry 😞
  – Task Manager “end task” is equivalent to kill -9.
  – Logging out can terminate all of your background windows – including “scheduled tasks”. Which will act like a kill -9.
Checklists
Mornings
Mornings

• Verify successful backup
• Verify that after-imaging is enabled and properly switching extents
• Verify that warm spare is available and up to date
• Verify that monitors are running and that alerts are flowing
• Verify sufficient file system free space
Mornings

- Check bi file size
- Check fixed extent free space
- Check free space in ai archive filesystem
- Check free space in backup filesystem
- Check for “runaway” processes
- Check for overnight processes that may still be running (but should not be)
- Check for left over long open transactions
Mornings

• Review db log file for overnight messages
• If you are using the alternate buffer pool -- review B2, ensure that there are free blocks and that lru2 is disabled
• Check monitored metrics for trends that are approaching actionable thresholds
• Read Progress PANS alerts
Mornings

• Review OS logs
• Review OS free memory
• Review summary of previous day’s CPU and disk utilization
• Check OS configuration for unwelcome changes
During the Day
During the Day

- AI switching & warm spare apply
- Number of users/connections
- High disk IO rates, low buffer hit ratio
- Unusually active tables or indexes
- Unusual log file messages and alerts
- Lock Table HWM, active locks
- Time between checkpoints
- OS bottlenecks and constraints
During the Day

- Long open TRX & BI file growth
  - Find the oldest transaction (usually a code problem)
- Blocked users/connections
  - REC = record locking, coding issue
  - BK*, TX* etc indicate system resource constraints
- Excessively active connections or “rapid readers”
  - What are they doing?
  - Is it legitimate?
  - Is there a better way?
- Use the “client statement cache” or “proGetStack” to identify specific code causing a problem.
  - Work with development to get it fixed.
Weekly
Weekly

- Rotate/Truncate the .lg file
- Cleanup trash in db directories
  - protrace, leftover scratch files, core files, etc
  - Don’t forget –T!
- Refresh dbanalys
- Refresh “prostrct list”
- Refresh DEV/TEST/QA/Training etc.
  - This may involve restoring a PROD backup which will verify that backups are good.
Weekly

• After refreshing dbanalys review:
  – Index utilization, identify idxcompact targets
  – Check rows per block settings
  – Check RM chains
  – Fragmentation
  – Scatter
• Schedule appropriate remediation activities
Monthly

• Outage summary: planned and unplanned
• Capacity Planning Reports:
  – Basic CRUD & TRX trends
  – Overall DB growth
  – User/Connection trends
  – IO response
  – Project disk space needs
  – Project disk throughput needs
  – Project memory & CPU utilization
Quarterly

\[ A \div 4 \]
Quarterly

• Review all startup parameters and config options
• Review storage area configuration
• If allowing SQL-92 connections:
  – Run dbtool to adjust SQL-width
  – Run “update statistics” for the optimizer
• If using SSL etc – review certificate validity & expiration
• Review OS configuration, kernel params etc.
  – Test IO throughput: random reads & synchronous writes
• Review Progress release level
• Review monitored metrics and alerts
• Review any new business growth plans
Annually

- DR Test
- License review & “true-up”
- Review HW landscape and potential upgrades
- Review business growth plans & projections
- PUG Challenge/Exchange
Special Events
Upgrades & Service Packs

- Shutdown
- Truncate the bi
- Backup
- Install the upgrade or SP (or change $DLC)
- proutil –C updatevst
- proutil –C updateschema
- Restart
Pre-Release or Upgrade

- Review any online changes that should be made permanent: -spin, -L, etc.
- Run “proutil –C describe” and confirm that you have the config options that you need (large files etc).
- Review all startup parameters & config options:
  - General: -n, -L, -B, -B2, -lru2skips, -lru2skips, -spin, -M* (if used)
  - Schema related: -omsizes, -*rangesize
  - Other Config: bi cluster & block size
- Review storage areas – are any new areas needed? (Perhaps a table should be split out?)
- Review .df for problems – i.e. RECID fields, no storage area etc
- Review Progress service packs – should a SP be applied?
Post-Release

- Check schema area for stray objects
- Check that no RECID fields have snuck in
- Verify that tables, indexes and LOBs are all in proper storage areas
- Verify –omsize, -*rangesize etc.
- Verify B2 assignments
Post-Outage (unplanned)

- Root cause analysis
- Remediation plan
- Lessons learned
  - New or improved alerts
  - Additional instrumentation
  - Improved procedures
  - Additional training
Free Time
Planning, Testing & Optimizing

• Benchmarking and stress testing
• Alternative configurations
• New OpenEdge releases and features
• Reducing required downtime
Questions?
Thank You!