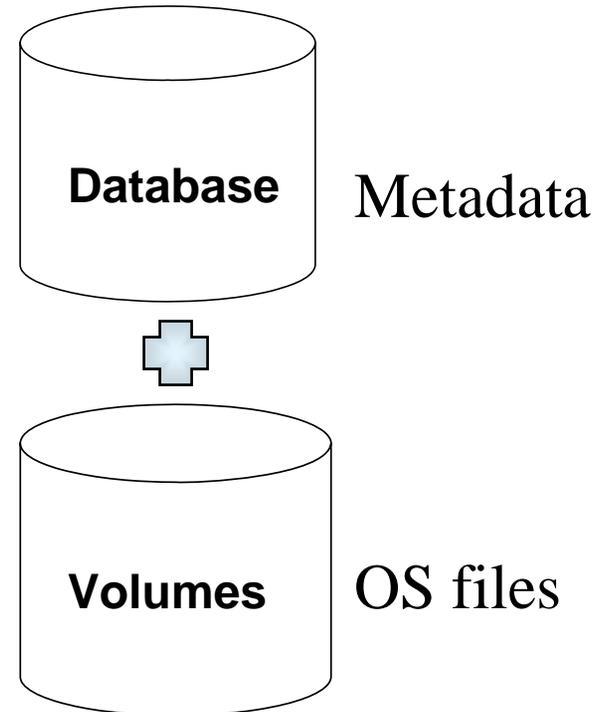


# Trouble Shooting Performance in Teamcenter Engineering

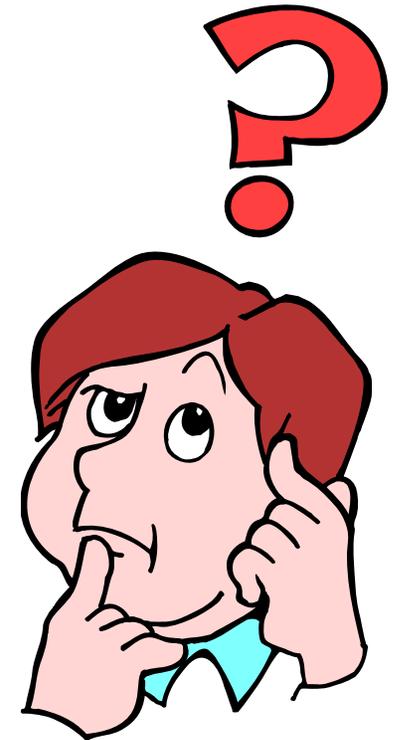
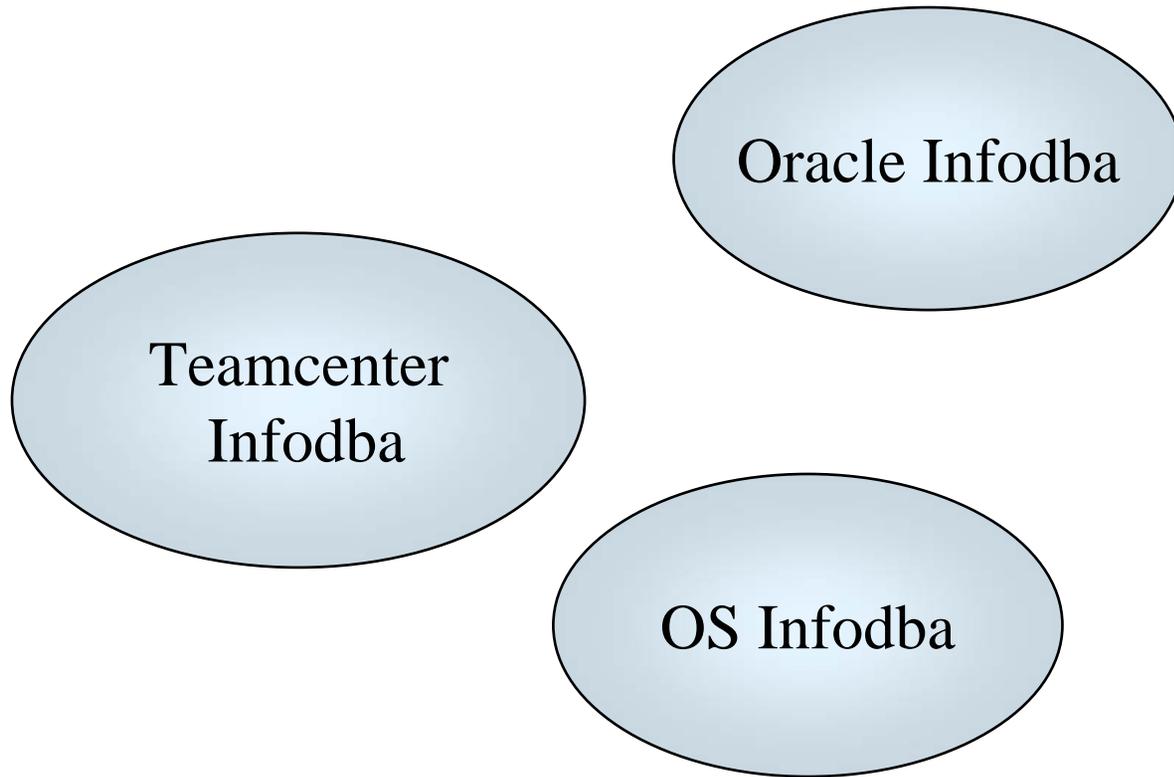
Author            Mahadevan Thiagarajan  
Company        Tata Consultancy Services Ltd  
Email            [mahadevan.t@tcs.com](mailto:mahadevan.t@tcs.com)  
Phone            91-80-55025425

# What is Teamcenter ?

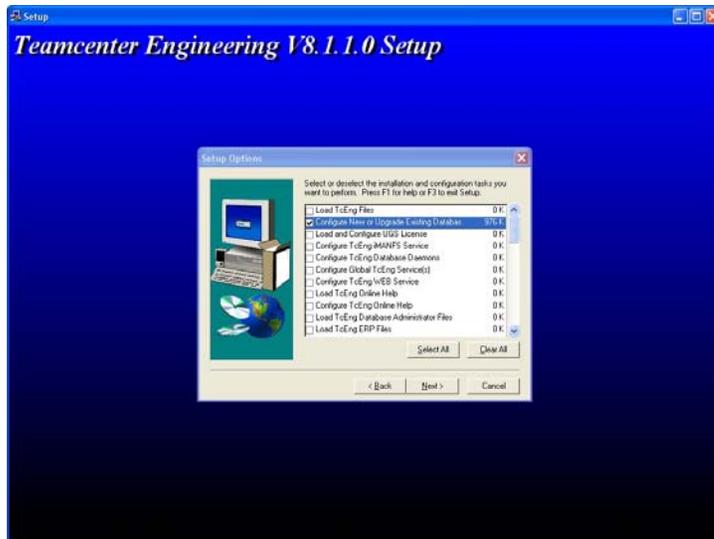
Teamcenter is an Object Oriented (PLM) application which uses a Relational Data Base Management System (RDBMS) and the operating system to store data.



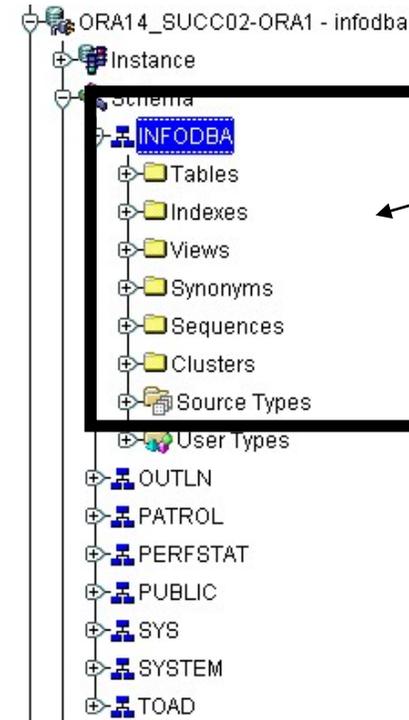
# What is this "infodba"?



# Oracle Infodba



Install



Owned  
by  
oracle  
infodba

- The Oracle "infodba" account/passwd is created after the Oracle database is built. ( Part of post DB Creation Steps )
- TC installation creates necessary tables, views, etc for iMAN

# TCE 2005 – Oracle infodba ???

- In TCE 2005, the traditional Oracle infodba concept is changed.
- The new TCE 2005 Installer gives us the option of creating an Oracle User ( need not be infodba ), and creates the tablespace and creates the schema under that user.
- A single DB can thus have many TCE schema under different Oracle user.

# Teamcenter Infodba

- The TC "infodba" account is mainly internal to IMAN and not directly involved with database operations.
- The "infodba" account is the "super user" account for TC and is made part of the group "DBA".
- The group "DBA" is also created when TC is installed.
- The TC "infodba" and Oracle "infodba" accounts have the same name, but are totally independent of one another and perform different functions.

# OS Infodba

- This is an optional account created by the system administrator. The account is used by TC (if user is logged into TC as "infodba") to access the operating system files and directories.
- Some TC installations use this account to manage the entire IMAN file system installation, the \$IMAN\_ROOT, and the IMAN VOLUME(s).
- This account is not used in TC database activities and it is independent from the Oracle "infodba" account. However, if the auto login preference variable is set for TC, the user can conveniently login to the operating system as "infodba", start TC, and be automatically logged into IMAN as the "infodba" user.

# Persistent Object Manager - POM

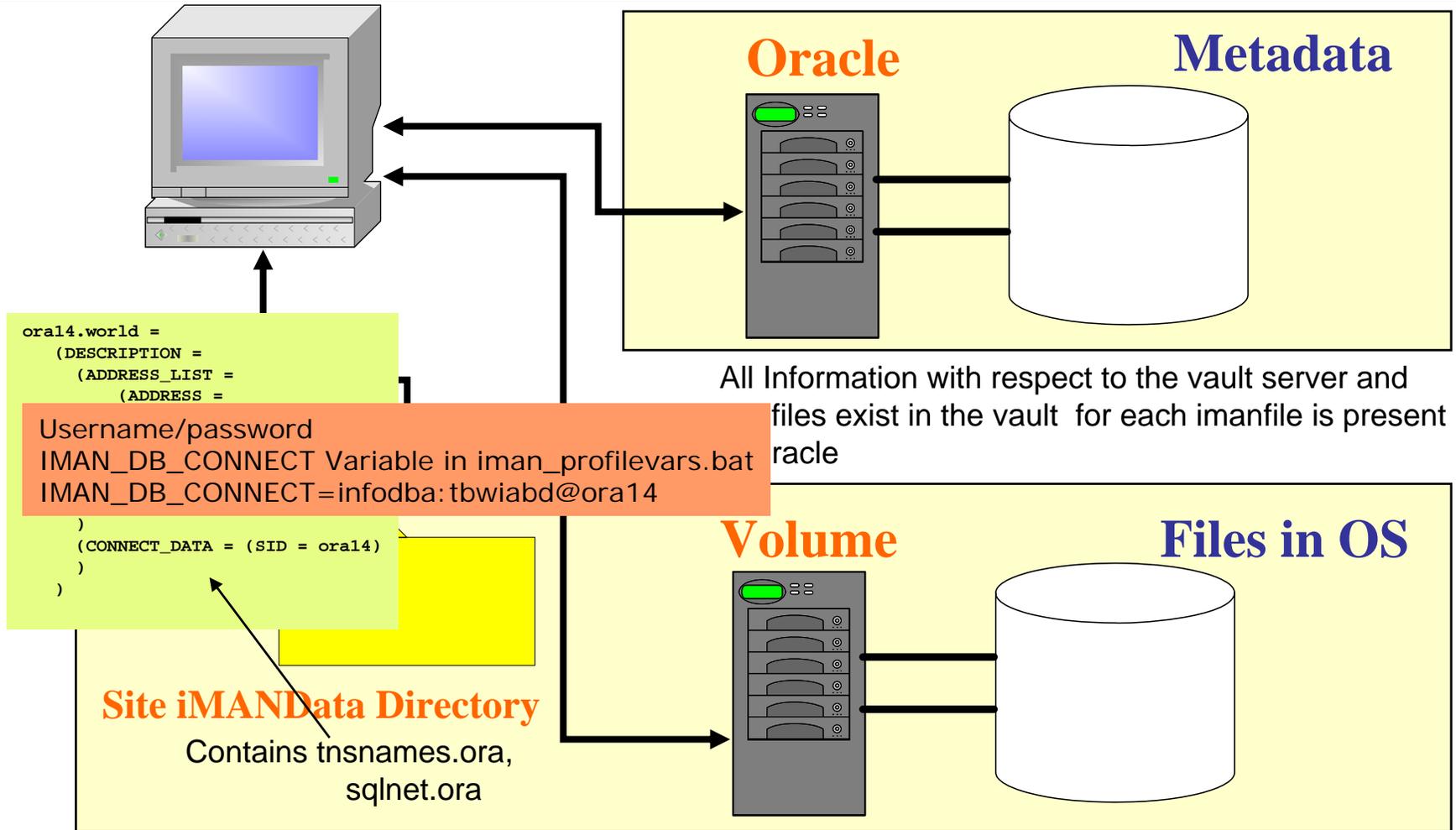
The tabulated data (Meta-Data) in the RDBMS is translated into the object data model using an IMAN Persistent Object Manager (POM) layer. This is presented to the IMAN user in the form of an object.



The POM module is responsible for

- Maintaining the definition of the system data model,
- Provides a vendor independent interface to the RDBMS &
- Maintains the integrity of the data.

# ITK Program Communication



# Managing Large Teamcenter Sites

- Oracle DBA, TC Admin , OS Admin – Role they Play
- TCE Deployment Guide & GTAC
- Deployment Considerations
- Managing Customization – Right Versions
- TC Databases – Production, Testing, Development
- Infrastructure Test Environments
- Integrations with Other Systems - Challenges
- Backups
- Legacy Data Load
  - DB Settings
  - DB Tuning for Data Load

# Teamcenter Deployment Considerations

- Clustering of the DB
  - Better Availability
  - Load Sharing
- Clustering of %IMAN\_DATA% directory
  - Better Availability
- Usage of Monitoring Software for
  - iMANfs
  - DB Daemons
  - Monitoring Database ( Size, Deadlocks ,etc )

# Teamcenter Upgrade

- Test Environments with full data
- Requirements of the New Version
- GTAC PR's on the New Version
- Recommendation from Other Sources
- Customization – Replacement Calls, Removal of Custom Functions, etc
- Testing Integrations
- Performing Test Upgrades and Redoing it to fine tune the steps
- New Version Deployment Strategy
- Testing Deployments
- Doing the actual upgrade & Deployment

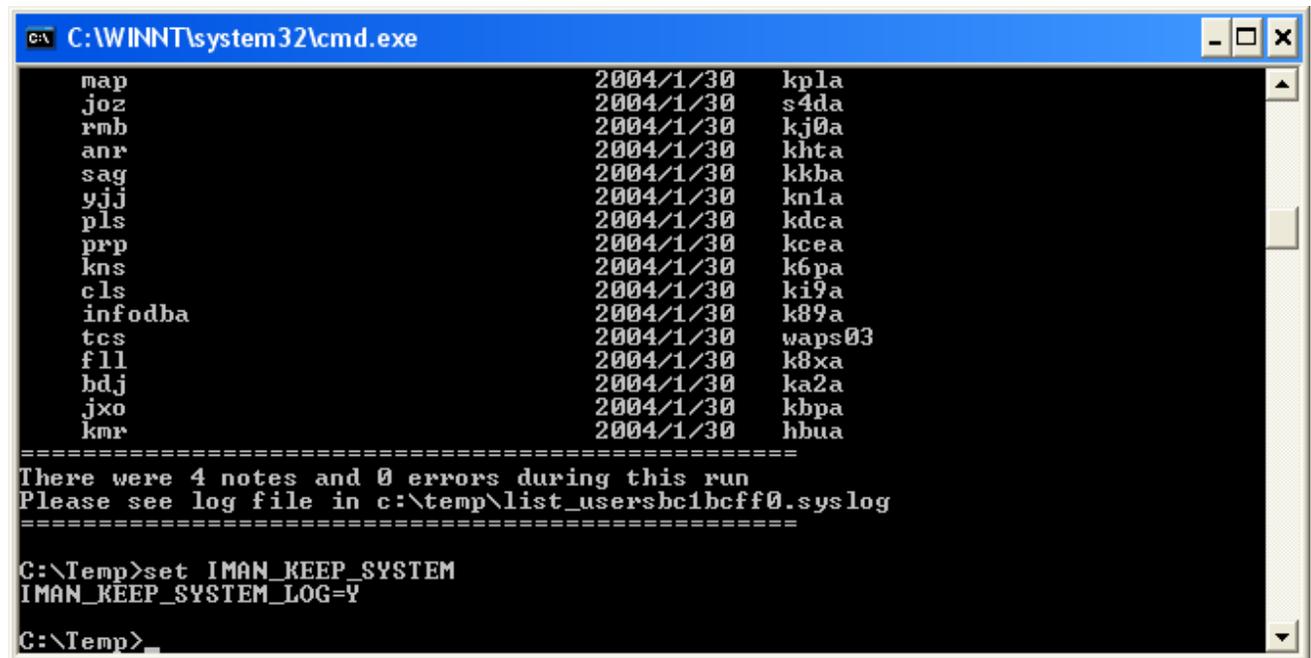
# Trouble Shooting Performance

## Areas of Concern

- Server Sizing
- Customization ?? Check for e.g. poor algorithms, loops etc. Including optimized API calls
- Database performance
- Network Issues / Bottlenecks
- Other areas

# IMAN\_KEEP\_SYSTEM\_LOG=Y

This setting keeps the iMAN syslog even if there are no errors



```
C:\WINNT\system32\cmd.exe
map                2004/1/30    kpla
joz                2004/1/30    s4da
rmb                2004/1/30    kj0a
anr                2004/1/30    khta
sag                2004/1/30    kkba
yjj                2004/1/30    kn1a
pls                2004/1/30    kdca
prp                2004/1/30    kcea
kns                2004/1/30    k6pa
cls                2004/1/30    ki9a
infodba           2004/1/30    k89a
tcs                2004/1/30    waps03
fll                2004/1/30    k8xa
bdj                2004/1/30    ka2a
jxo                2004/1/30    kbpa
kmr                2004/1/30    hbua
=====
There were 4 notes and 0 errors during this run
Please see log file in c:\temp\list_usersbc1bcff0.syslog
=====
C:\Temp>set IMAN_KEEP_SYSTEM
IMAN_KEEP_SYSTEM_LOG=Y
C:\Temp>
```

# IMAN\_SQL\_DEBUG=BJPT

- B = expand bind variable
- J = write into journal file
- P = write a profile of all SQL at the end of the syslog
- T = write query times

# Output of iMAN syslog for list\_uesrs with BJPT option

```
TextPad - [C:\Temp\list_users152adc50.syslog]
File Edit Search View Tools Macros Configure Window Help
SELECT vuid FROM pow_f_lock MINUS SELECT vuid FROM pow_r_lock WHERE type=
2 ORDER BY vuid :
err=0 rows=0 0.110 secs
DDS_exit (897 insts, 56 ghosts)
DMS_exit (962 cpids cached)
DELETE FROM pm_process_list WHERE pm_process_id = 'AAx800hblvgucD';
err=0 rows=1 0.015 secs
Total number of calls to EIM_check_error: 1666
-----
Line Freq Cum.t Max.t Avg.t Rows Err. Statement
1 87 0.122 0.031 0.001 87 0 SELECT ppid, puid FROM PPOM_OBJECT WHERE puid IN (:1)
2 82 0.187 0.016 0.002 80 0 SELECT DISTINCT t_01.rsecondary_objectu FROM PIMANRELATION t_01 WHERE ( ( t_0
3 80 0.173 0.016 0.002 80 0 SELECT PFORMTYPEDEF.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_
4 60 0.078 0.016 0.001 60 0 SELECT PAUDITDEFINITION.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc,
5 59 0.126 0.016 0.002 0 0 SELECT DISTINCT t_0.puid FROM PIMANTYPE t_0 WHERE (UPPER(t_0.ptype_name) = UPF
6 46 0.176 0.016 0.004 46 0 SELECT PPOM_CLASS.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_fr
7 41 0.078 0.016 0.002 0 0 SELECT DISTINCT t_0.puid FROM PIMANCOMPOUNDPRODEF t_0 WHERE (UPPER(t_0.pdispl
8 37 0.063 0.016 0.002 37 0 SELECT ptimestamp, puid FROM PPOM_OBJECT WHERE puid IN (:1)
9 31 0.015 0.015 0.000 31 0 SELECT puid, ptimestamp FROM PPOM_OBJECT WHERE puid = :1
10 19 0.046 0.016 0.002 36 0 SELECT puid, pseq, pvalu_0 FROM PPROPERTIES WHERE puid IN (:1)
11 19 0.032 0.016 0.002 19 0 SELECT PGROUP.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_frozer
12 18 0.015 0.015 0.001 51 0 SELECT puid, pseq, pvalu_0, pvalc_0 FROM PLIST_OF_ROLE WHERE puid IN (:1)
13 11 0.094 0.016 0.009 11 0 select count(*) "number" from v$session where upper(decode(ascii(substr(machi
14 9 0.000 0.000 0.000 9 0 SELECT t_01.PUID FROM PAM_NAMED_TAG t_01 WHERE ( UPPER(t_01.pName) = UPPER(
15 8 0.016 0.016 0.002 8 0 SELECT puid FROM PPOM_OBJECT WHERE puid = :1
16 6 0.000 0.000 0.000 6 0 SELECT PAM_NAMED_TAG.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis
17 6 0.016 0.016 0.003 14 0 COMMIT
18 5 0.000 0.000 0.000 0 0 SELECT pcpid FROM PPOM_CLASS WHERE upper(PPOM_CLASS.pname)= upper('')
19 4 0.016 0.016 0.004 4 0 SELECT t_01.PUID FROM PPOM_APPLICATION t_01 WHERE ( ( t_01.pname = :1 ) AND (
20 4 0.015 0.015 0.004 4 0 SELECT ptimestamp, puid FROM PPOM_OBJECT WHERE puid IN (:1) FOR UPDATE
21 3 0.016 0.016 0.005 3 0 SELECT PUSER.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_frozen,
22 3 0.000 0.000 0.000 3 0 SELECT PROLE.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_frozen,
23 3 0.000 0.000 0.000 3 0 SELECT DISTINCT t_0.puid FROM PPOM_MEMBER t_0 WHERE ((t_0.ruseru = :1) AND (t_
24 3 0.000 0.000 0.000 3 0 INSERT INTO pow_r_lock (ref_uid, ref_class, vuid, process, type) VALUES (:1,:2
25 3 0.015 0.015 0.005 3 0 DELETE FROM pow_r_lock WHERE process = :1 AND ref_uid = :2
26 2 0.016 0.016 0.008 0 0 SELECT t_01.PUID FROM PPOM_APPLICATION t_01 WHERE t_01.pname LIKE :1
27 2 0.000 0.000 0.000 0 0 SELECT t_01.PUID FROM PAM_ACE t_01 WHERE ( t_01.racl_idu = :1 )
28 2 0.000 0.000 0.000 166 0 SELECT puid, pseq, pvalu_0, pvalc_0 FROM PLIST_OF_TOOLS
29 2 0.000 0.000 0.000 0 0 SELECT puid, pseq, pval_0 FROM PNAME_REF_LIST
30 2 0.000 0.000 0.000 30 0 SELECT puid FROM PAM_PRIVILEGES
31 2 0.000 0.000 0.000 19 0 SELECT pm_process_id, pm_key FROM pm_process_list
32 2 0.000 0.000 0.000 66 0 SELECT PPOM_OBJECT.puid, ptimestamp FROM PPOM_OBJECT, PDATASETTYPE WHERE PPOM_OE
33 2 0.000 0.000 0.000 66 0 SELECT PDATASETTYPE.puid, ptimestamp, ppid, rowning_siteu, rowning_sitetc, pis_
34 2 0.016 0.016 0.008 2 0 SELECT DISTINCT t_01.rroleu FROM PGROUPMEMBER t_01 , PPOM_MEMBER t_02 , PGROU
35 2 0.000 0.000 0.000 2 0 INSERT INTO pow_m_lock (ref_uid, ref_class, vuid, process, type) VALUES (:1,:2
```

# IMAN\_SLOW\_SQL=2

IMAN\_SLOW\_SQL is an environment variable that will enable the customer to find slow queries in iMAN.

The default value is 2.

This means that any query that took more than 2 seconds will be automatically analyzed and then plan of execution will be written into the syslog.

```
SELECT PIMANTYPE.puid, ptimestamp, ppid, rowning_siteu, rowning_sitec, pis_frozen,
ptype_class, ptype_name FROM PPOM_OBJECT, PIMANTYPE WHERE PPOM_OBJECT.puid
= (PIMANTYPE.puid);
===>Took 5.989 seconds to execute that SQL
SELECT STATEMENT
  NESTED LOOPS
    TABLE ACCESS FULL      PIMANTYPE
    TABLE ACCESS BY INDEX ROWID PPOM_OBJECT
      INDEX      UNIQUE SCAN  PIPPOM_OBJECT

table PIMANTYPE has 355 rows, last analyzed never with 0 rows
  index PIPIMANTYPE on PIMANTYPE (PUID) last analyzed never over 0 rows
  index PIPIMANTYPE_0 on PIMANTYPE (PTYPE_NAME, PTYPE_CLASS) last analyzed never over 0 rows
table PPOM_OBJECT has 2167046 rows, last analyzed never with 0 rows
  index PIPPOM_OBJECT on PPOM_OBJECT (PUID) last analyzed never over 0 rows
*** NOTE:: in line 2385 of eim_enquire.c
+++ That SQL took a long time to execute -- set IMAN_SLOW_SQL to -1.0 to suppress this analysis
70 seconds to POM DB x-act
```

# IMAN\_ORACLE\_TRACE=yes

- Enables trace at Oracle for that session

```
C:\WINDOWS\system32\cmd.exe - sqlplus infodba@ora14
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.5.0 - Production
SQL> select value from v$parameter where name= 'user_dump_dest';
VALUE
-----
/opt/oracle9i/admin/ora14/udump
SQL> _

C:\Temp\imanserver.exe876ec0
File Edit Search View Tools Macros Configure
Memory      :- 2047Mb
Total Swap  :- 4095Mb
Free Swap   :- 4095Mb
Running customer environment

Portal Server Working Directory :- c:\TEK
Portal Server Server ID (Marker) :- ora14

Using the following path to locate pdb file
C:\NCENG001\bin;C:\NCENG001\bin;C:\N
will free markpoints - limit 10
POM V9.1.0.0 compiled on Oct 13 2004
Compiled: -D_DB_ORACLE -D_DB_MSSQL
TextServer::WARNING - IMAN_MSG_ROOT is no
**** Connected to 'ora14.manbw.dk' as 'ir

Setting Oracle tracing on
DBMS VERSION:: Oracle9i Enterprise Editi
DBMS VERSION:: PL/SQL Release 9.2.0.5.0 -
DBMS VERSION:: CORE 9.2.0.6.0
DBMS VERSION:: TNS for Solaris: Version 9
DBMS VERSION:: NLSRTL Version 9.2.0.5.0 - Production

ORACLE:: Setting TIMED_STATISTICS to TRUE
ORACLE:: Setting TRACEFILE_IDENTIFIER to 'imanserver.exe876ec0'
ORACLE:: Setting SQL_trace to level 12 -- show bind variables and wait events.
ORACLE:: Setting SQL_TRACE to TRUE.

9 lines selected 33 66 Read|Ovr|Block|Sync|Rec|Caps
```

```
C:\Telnet succ02-ora1
bash-2.05$ pwd
/opt/oracle9i/admin/ora14/udump
bash-2.05$ ls -l ora14_ora_2819_imanserver.exe876ec0.trc
-rw-r----- 1 ora9i dba 611813 Jul 12 23:11 ora14_ora_2819_imanserver.
exe876ec0.trc
bash-2.05$ _
```

# IMAN\_JOURNALLING

Globally enables or suppresses creation of all journal files.

- Journal files contain a listing of programmatic interaction between the application and other basic software modules (e.g., POM, ITK, etc.). and are stored in the \$IMAN\_TMP\_DIR directory
- The specific Teamcenter Engineering modules that participate in journalling is controlled by IMAN\_Journal\_Modules.
- This preference accepts a logical ON or OFF as a value.
- Default setting is OFF (suppress journalling).

# IMAN\_Journalling=ON

# IMAN\_journaling=ON (Note the small j and single l)

```
list_userscd5a05c0.jnl - WordPad
File Edit View Insert Format Help
Courier New 10 Western B U
0* Journal file created by c9535g4 on Sat Jan 31 11:12:59 2004

0* (0.235000s gap)
POM_init_module ()
0* --> 0.703000s
0* AM_init_module ()
0* returns 0 [in 0.015000 secs]
0* --> 0.750000s
0* EIM_PM_id_of_process ( process_id)
0* process_id = 'AABExi9ulwguCD' returns 0 [in 0.000000 secs]
0* --> 1.125000s
0* POM_class_id_of_class ( 'POM_application', class_id)
0* class_id = 000000d3 <<0M0003400ec7d653c0abcd0000007100000000>> returns 0 [in 0.000000 secs]
0* --> 1.125000s
0* POM_attr_id_of_attr ( 'name', 'POM_application', attr_id)
0* attr_id = 0000055c <<0M0003400ec7d653c0abcd0000078400000000>> returns 0 [in 0.000000 secs]
0* --> 1.125000s
0* POM_attr_id_of_attr ( 'password', 'POM_application', attr_id)
0* attr_id = 0000055b <<0M0003400ec7d653c0abcd00000783000000000>> returns 0 [in 0.000000 secs]
0* --> 1.125000s
0* POM_create_enquiry_on_string ( 000000d3, 0000055c, 8, ( '' ), enqid)
0* returns 0 [in 0.000000 secs] enqid = 000002c0 <<0CRxi9ulwguCD>>

For Help, press F1
```

```
list_userscd5a05c0.jnl - WordPad
File Edit View Insert Format Help
Courier New 10 Western B U
lin_rm_remove_processes ( 1, ( 'AABExi9ulwguCD' ))
0* returns 0 (in 0.000000 secs)

0* (0.000000s gap)
AM_exit_module ()
0* returns 0 (in 0.000000 secs)
0*
0* Time spent in this function, or those it calls
0* % total total call average
0* elapsed elapsed cpu counts time
0* -----
0* 18 1.14 0.313 2 0.57 POM_init_module
0* 8.3 0.515 0.343 94 0.00548 FORMTYPE_ask_def_class_name
0* 4.7 0.296 0.157 2 0.148 POM_load_class_extent
0* 3.5 0.217 0.141 149 0.00146 POM_old_execute_enquiry
0* 3 0.187 0.094 68 0.00275 POM_refresh_instances
0* 3 0.187 0.015 1 0.187 POM_start
0* 1 0.063 0.047 1 0.063 SA_init_module
0* 0.75 0.047 0.031 1 0.047 BOM_init_module
0* 0.75 0.047 0.032 542 8.67e-005 POM_class_of_instance
0* 0.51 0.032 0.015 583 5.49e-005 POM_class_id_of_class
0* 0.51 0.032 0.032 44 0.000727 POM_attr_id_of_attr

For Help, press F1
```

# IMAN\_Journal\_Modules

- Sets which Teamcenter Engineering modules will create application journal files when IMAN\_Journalling is set to ON.

This preference accepts one or more of the following strings as value(s):



AM  
DATASET  
EPM  
FOLDER  
FORM  
GRM  
IMANTYPE  
IMF  
ITEM  
LOV  
MAIL  
METHOD  
POM  
PROP  
PREF  
QRY  
VM  
VRULE  
NONE

- Default setting is ALL

# IMAN\_POM\_JOURNALLING=ON

- Enables or suppresses extended application journal file logging.
- This preference accepts a logical ON or OFF as a value.
- Default setting is OFF (suppress extended journalling).
- Setting to N means Nested

```
TextPad - [C:\Temp\list_users28242e60.jnl]
File Edit Search View Tools Macros Configure Window Help
Time spent in this function, or those it calls
% total total call average
elapsed elapsed cpu counts time
-----
15 0.687 0.296 248 0.00277 POM_refresh_instances
13 0.61 0.359 94 0.00649 FORNTYPE_ask_def_class_name
10 0.453 0.343 2 0.227 POM_init_module
6.9 0.312 0.219 186 0.00168 POM_old_execute_enquiry
6.5 0.297 0.219 3 0.099 POM_load_class_extent
2.1 0.096 0.094 98 0.00098 POM_enquiry_execute
1.4 0.064 0.032 73 0.000877 POM_does_class_exist
1.4 0.063 0.048 1 0.063 BOM_init_module
1.4 0.062 0.047 1 0.062 SA_init_module
1 0.047 0 1 0.047 POM_start
0.99 0.045 0.032 876 5.14e-005 POM_class_id_of_class
0.68 0.031 0.031 1 0.031 POM_stop
0.68 0.031 0.016 2 0.0155 AE_init_module
0.68 0.031 0.03 7 0.00443 POM_combine_enquiries
0.68 0.031 0.032 406 7.64e-005 POM_name_of_class
0.35 0.016 0.016 9 0.00178 POM_create_enquiry_on_string
0.35 0.016 0.015 33 0.000485 POM_describe_attrs
0.35 0.016 0.016 81 0.000198 POM_old_delete_enquiries
0.35 0.016 0.015 545 2.94e-005 POM_class_of_instance
0.35 0.016 0.015 286 5.59e-005 POM_subclasses_of_class
(+ another 129 routines)
25 1.16 0.422 3518 0.000329 Time outside journalling (total gap time)
```

# AM\_DEBUG=ON

```
TextPad - [C:\Temp\list_users6f501740.syslog]
File Edit Search View Tools Macros Configure Window Help

AM_check_priv (READ) on 00000cf8
00000cf8 Has Bypass(true) [Bypass] (000009a4@1) index=0 does not apply
00000cf8 Has Class(RevisionRule) [Public Rev Rule] (000009aa@3) index=0 does not apply
00000cf8 Has Type(Mail Folder) [Mailbox] (000009ac@3) index=0 does not apply
00000cf8 Has Class(ImanAliasList) [Personal Address List] (000009ae@3) index=0 does not apply
00000cf8 Has Class(Folder) [No ACL] (000009af@3) Optimised away
00000cf8 Owning User(Infodba) [System] (000009a8@2) index=0 result: granted from acl 000009a7 acc 000
00000cf8 Has Class(POM_object) [System Objects] (000009a6@1) index=0 sub node result granted used
00000cf8 Has Class(POM_object) [No ACL] (000009a2@0) index=0 sub node result granted used
00000cf8 => AM_check_priv (READ) result granted

AM_check_priv (READ) on 00000cfa
00000cfa Has Bypass(true) [Bypass] (000009a4@1) index=0 does not apply
00000cfa Has Class(RevisionRule) [Public Rev Rule] (000009aa@3) index=0 does not apply
00000cfa Has Type(Mail Folder) [Mailbox] (000009ac@3) index=0 does not apply
00000cfa Has Class(ImanAliasList) [Personal Address List] (000009ae@3) index=0 does not apply
00000cfa Has Class(Folder) [No ACL] (000009af@3) Optimised away
00000cfa Owning User(Infodba) [System] (000009a8@2) index=0 result: granted from acl 000009a7 acc 000
00000cfa Has Class(POM_object) [System Objects] (000009a6@1) index=0 sub node result granted used
00000cfa Has Class(POM_object) [No ACL] (000009a2@0) index=0 sub node result granted used
00000cfa => AM_check_priv (READ) result granted

AM_check_priv (READ) on 00000cfb
00000cfb Has Bypass(true) [Bypass] (000009a4@1) index=0 does not apply
```

# Other Variables – Not sure still worth a try

- `API_JOURNAL=FULL`
- `IMAN_DEBUG=ON`
- `IMAN_ALTERNATE_IN_USE=YES` (See SFB-iMAN-989 for more details)
- `IMAN_SQL_DEBUG=BJ`
- `AM_BYPASS=ON`
- `ICS_DEBUG=1`
- `SML_DEBUG=1`
- `IMAN_DEBUG=ON`
- `IMAN_SDL_MAGIC=49`

# Resourceful GTAC - Interesting Useful PR's

- PR-04554672 – How to set Journalling for UGS for TCE Session
- PR-04663546 – How to set Journalling for UGS for UG-Manager session
- PR-4932017 – How to delete attributes in a saved class
- SFB-iMAN-989 – Notes on IMAN\_ALTERNATE\_IN\_USE ( Not required in TCE 2005)

# Reference Documents for this PPT

## From UGS

- TCE Deployment Guide

- GTAC Documents

## From ORACLE

- Use of Oracle Enterprise Manager

- Use of Statspack

- Documents from Metalink

- Experience from Customer Sites