Tracing and Debugging RDC/TMS/OC: The Secrets of the Oracle RDBMS and OPA Debugging Tools in the OPA 4.0 Environment

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Introduction

- Sunil G. Singh of DBMS Consulting, Inc.
- Specialize in Oracle Pharmaceutical and E-Business implementations and long-term support.
- Thanks to the OCUG for this demo/discussion opportunity.

Acknowledgements

- Thanks to OCUG for this opportunity to speak.
- Special thanks to my many friends and colleagues at Oracle, OCS, OPA Support, Industry and other Vendors for their comments and insights into this topic.
- Special thanks to S. Clover, K. Howells, A. Alasso and K. Rejndrup for some of the OPA specific techniques discussed here.

Goals

- Explanation of the needs for special debugging techniques for RDC, TMS and OC from a customer perspective and some possible issues.
- Examine some general debugging techniques from the Oracle RDBMS, pertaining to OPA in a production environment.
- Examine some general debugging techniques techniques from the UNIX OS level.
- Examine some general debugging techniques techniques that are OPA specific related to Oracle Forms and Server Code.

Scope

- Technical discussion.
- Debugging techniques considered as related to the Oracle Pharmaceutical Applications only.
- Debugging from a developer's perspective is not covered. No source code access is assumed.
- **Absolutely no intention or attempt** to reverse engineer any Oracle product or violate any Oracle license agreement. The content of this presentation is only for production support purposes.

Assumptions

- OC 4.0.2 or OC 4.0.3 configuration with a UNIX back-end.
- Privileged access to NT Middle Tier and RDBMS back-end.

What environments should be used

- Where possible, all debugging should occur in a testing or development environment.
- An instance which is a copy of the production environment is also an invaluable asset for issues which are data or volume related.
- If some debugging or analysis of a problem must be done in a production environment, great care must be taken to insure that it does not greatly impact production work or affect production data.

Reasons for Debugging in a production OPA environment

- Occasionally, an error may be encountered in an Oracle Pharmaceutical Application which is not possible to reproduce in a test or development environment. It is useful in these cases to have analytical techniques available in production.
- To expedite the resolution and analysis process, it is always necessary to:
  - Determine if the problem is unique to a specific environment, server, instance, Middle Tier, study, user, PC, OS.
  - Determine if the problem is the result of something unique to a specific organisation's configuration.
  - Determine if the problem is related to a customisation.

Who should Debug ? Access and privileges to these techniques.

- Roles for administrative support for OC within an organisation need to be clearly defined.
- It is very difficult to segregate the role of application support completely from DBA or System Administration support. In an ideal situation, the resources responsible for OPA support would have complete access to the OS and RDBMS as required by these techniques.
- However, this may contradict already defined roles for User, Application and System support.

RDBMS Level: dbms_system

- Assume a production system where RDBMS can not be shutdown
- Created a test scenario where the error “32200: Unable to set printer specification” appears when selecting Admin -> Admin Reports -> Reference Codelists
- Goal is to trap the exact SQL statement that causes the error so that the root cause can be determined
- The key is to start the trace right before the error actually occurs. Don’t trace at the login time of the user because the trace file will be too large and contain superfluous SQL statements.

RDBMS Level: dbms_system (2)

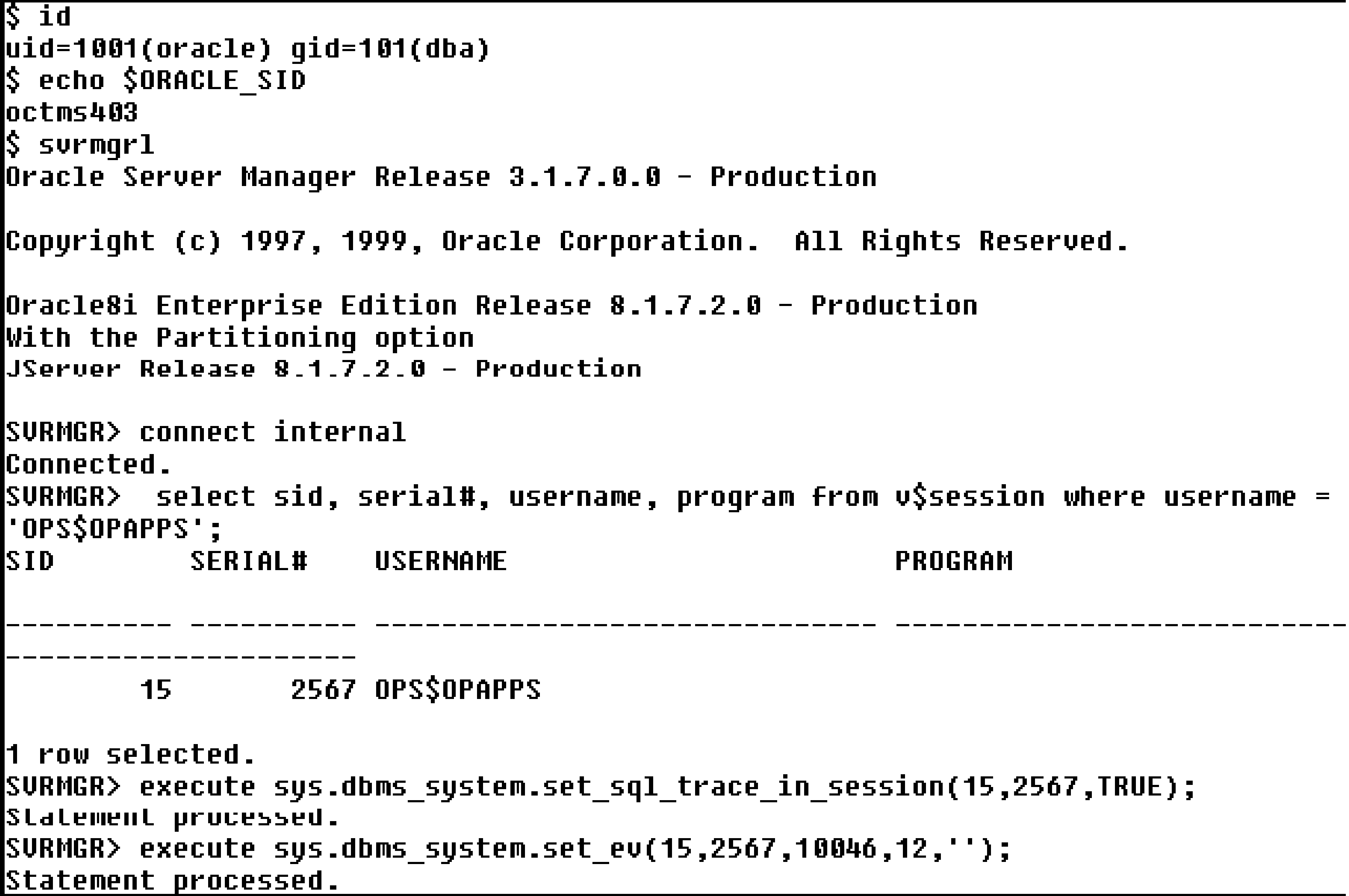
- Bring application right to the brink of the error/failure.
- Identify the sid, serial#, username from v$session
  - Select sid, serial#, username, program from v$session where username = ‘OPS$<user>’;
- Start the tracing:
  - Execute sys.dbms_system.set_sql_trace_in_session(<SID>,<SERIAL#>,TRUE);
- Turn on bind variables
  - Execute sys.dbms_system.set_ev(<SID>,<SERIAL#>,10046,12,’’);

RDBMS Level: dbms_system (3)

- Actually cause the error to occur. Perform the action that causes the failure
- Do **NOT** close the dialogue box
- Stop the tracing:
  - Execute sys.dbms_system.set_sql_trace_in_session(<SID>,<SERIAL#>,FALSE);
- Turn off bind variables
  - Execute sys.dbms_system.set_ev(<SID>,<SERIAL#>,10046,0,’’);
- Copy the trace file into a temporary directory. Check the USER_DUMP_DEST area for a current trace file.

RDBMS Level: dbms_system (4)

- Execute tkprof and generate a record file
  - Tkprof <trace_file>.trc <trace_file>.out record=<trace_file>.rec
- Examine the record file and find the SQL Statement before the MESSAGE_TOPICS select
- Find this statement in the .trc file. Examine the value= line in this file to determine the value of the bind variable, e.g., :b1
- Execute this SQL statement interactively to determine the root cause of the failure.



```
$ id
uid=1001(oracle) gid=101(dba)
$ echo $ORACLE_SID
octms403
$ svrmgrl
Oracle Server Manager Release 3.1.7.0.0 - Production

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Oracle8i Enterprise Edition Release 8.1.7.2.0 - Production
With the Partitioning option
JServer Release 8.1.7.2.0 - Production

SVRMGR> connect internal
Connected.
SVRMGR>  select sid, serial#, username, program from v$session where username =
'OPS$OPAPPS';
SID        SERIAL#    USERNAME                       PROGRAM

---------- ---------- ------------------------------ ---------------------------
---------------------
        15       2567 OPS$OPAPPS

1 row selected.
SVRMGR> execute sys.dbms_system.set_sql_trace_in_session(15,2567,TRUE);
Statement processed.
SVRMGR> execute sys.dbms_system.set_ev(15,2567,10046,12,'');
Statement processed.
```

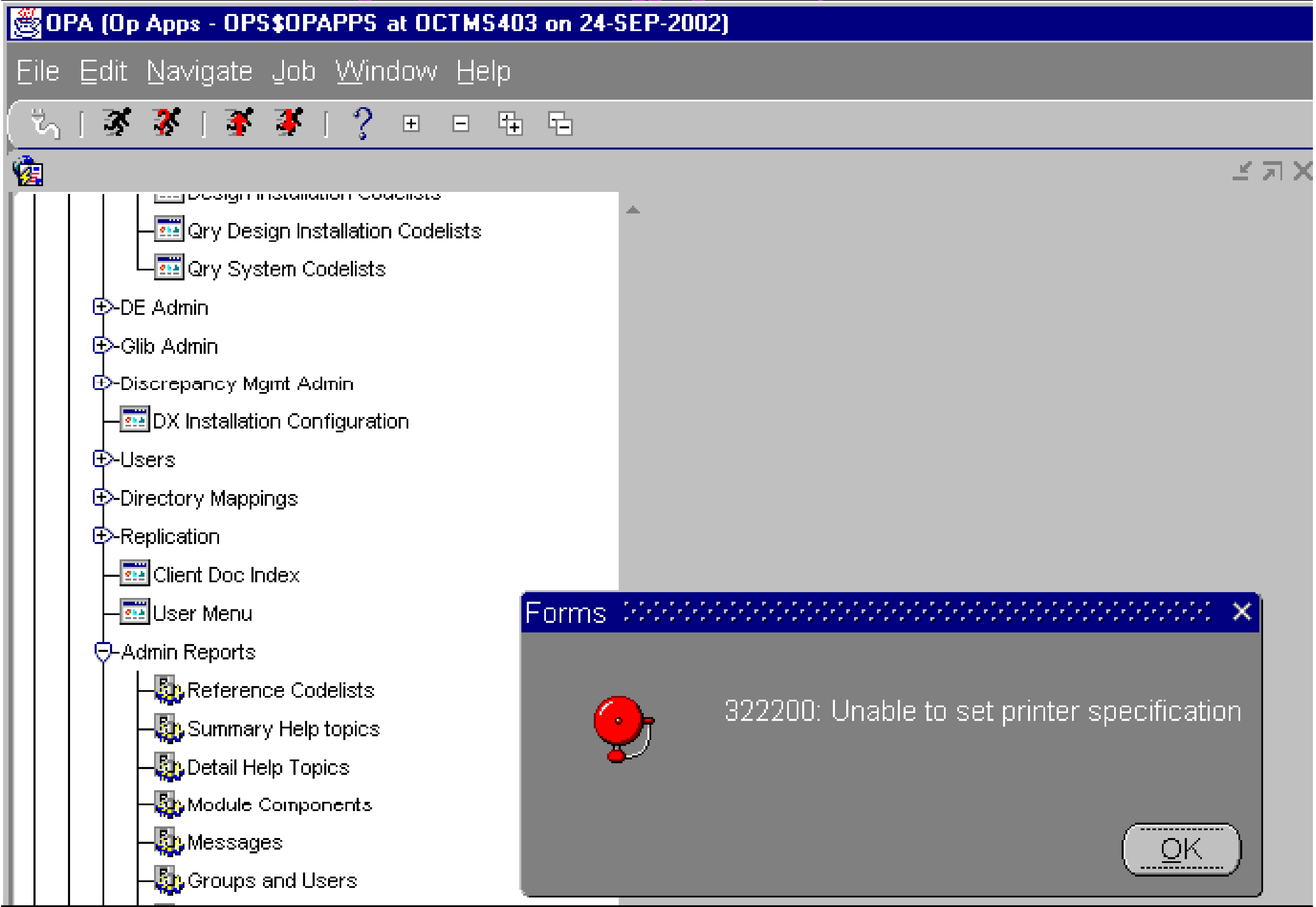
OPA (Op Apps - OPS$OPAPPS at OCTMS403 on 24-SEP-2002)

322200: Unable to set printer specification

```
SVRMGR> execute sys.dbms_system.set_sql_trace_in_session(15,2567,FALSE);
Statement processed.
SVRMGR> execute sys.dbms_system.set_sql_trace_in_session(15,2567,FALSE);
Statement processed.
SVRMGR> execute sys.dbms_system.set_ev(15,2567,10046,0,'');
Statement processed.
SVRMGR> show parameter dump
NAME                                TYPE    VALUE
----------------------------------- ------- ------------------------------
background_core_dump                string  partial
background_dump_dest                string  /export/home/oracle/admin/octm
core_dump_dest                      string  /export/home/oracle/admin/octm
max_dump_file_size                  string  UNLIMITED
shadow_core_dump                    string  partial
user_dump_dest                      string  /export/home/oracle/admin/octm
SVRMGR> exit
Server Manager complete.
dbmssunserver3% cd /export/home/oracle/admin/octms403/udump
dbmssunserver3% ls -alt | more
total 194
drwxr-xr-x   2 oracle   dba          1536 Sep 24 06:36 .
-rw-r-----   1 oracle   dba         51687 Sep 24 06:36 octms403_ora_893.trc
dbmssunserver3% cp octms403_ora_893.trc /tmp/ref_codelist_error.trc
dbmssunserver3% cd /tmp
dbmssunserver3% tkprof ref_codelist_error.trc ref_codelist_error.out record=ref_
codelist_error.rec

TKPROF: Release 8.1.7.2.0 - Production on Tue Sep 24 06:55:15 2002

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```

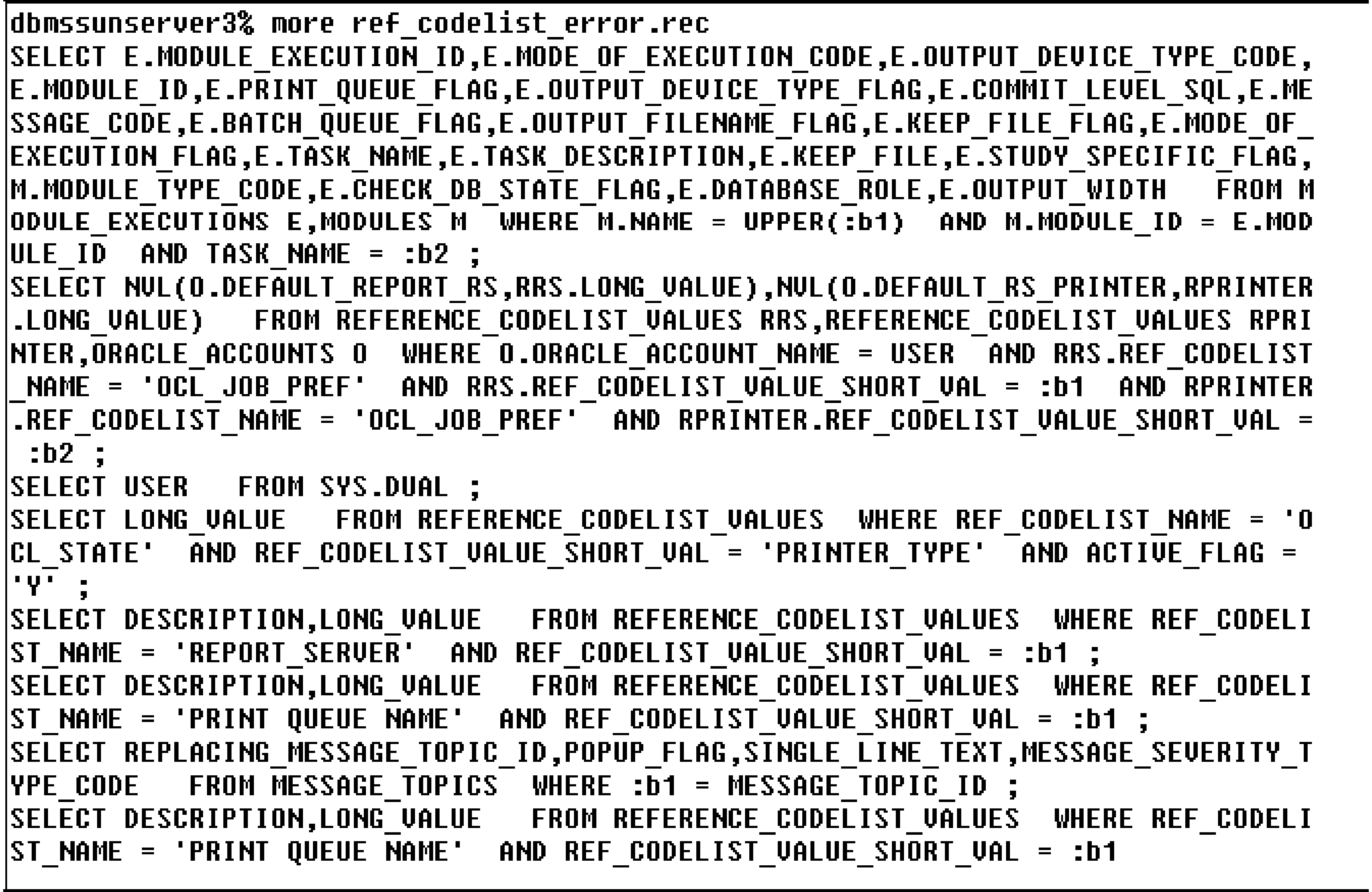

```
dbmssunserver3% more ref_codelist_error.rec
SELECT E.MODULE_EXECUTION_ID,E.MODE_OF_EXECUTION_CODE,E.OUTPUT_DEVICE_TYPE_CODE,
E.MODULE_ID,E.PRINT_QUEUE_FLAG,E.OUTPUT_DEVICE_TYPE_FLAG,E.COMMIT_LEVEL_SQL,E.ME
SSAGE_CODE,E.BATCH_QUEUE_FLAG,E.OUTPUT_FILENAME_FLAG,E.KEEP_FILE_FLAG,E.MODE_OF_
EXECUTION_FLAG,E.TASK_NAME,E.TASK_DESCRIPTION,E.KEEP_FILE,E.STUDY_SPECIFIC_FLAG,
M.MODULE_TYPE_CODE,E.CHECK_DB_STATE_FLAG,E.DATABASE_ROLE,E.OUTPUT_WIDTH   FROM M
ODULE_EXECUTIONS E,MODULES M  WHERE M.NAME = UPPER(:b1)  AND M.MODULE_ID = E.MOD
ULE_ID  AND TASK_NAME = :b2 ;
SELECT NVL(O.DEFAULT_REPORT_RS,RRS.LONG_VALUE),NVL(O.DEFAULT_RS_PRINTER,RPRINTER
.LONG_VALUE)   FROM REFERENCE_CODELIST_VALUES RRS,REFERENCE_CODELIST_VALUES RPRI
NTER,ORACLE_ACCOUNTS O  WHERE O.ORACLE_ACCOUNT_NAME = USER  AND RRS.REF_CODELIST
_NAME = 'OCL_JOB_PREF'  AND RRS.REF_CODELIST_VALUE_SHORT_VAL = :b1  AND RPRINTER
.REF_CODELIST_NAME = 'OCL_JOB_PREF'  AND RPRINTER.REF_CODELIST_VALUE_SHORT_VAL =
 :b2 ;
SELECT USER   FROM SYS.DUAL ;
SELECT LONG_VALUE   FROM REFERENCE_CODELIST_VALUES  WHERE REF_CODELIST_NAME = 'O
CL_STATE'  AND REF_CODELIST_VALUE_SHORT_VAL = 'PRINTER_TYPE'  AND ACTIVE_FLAG =
'Y' ;
SELECT DESCRIPTION,LONG_VALUE   FROM REFERENCE_CODELIST_VALUES  WHERE REF_CODELI
ST_NAME = 'REPORT_SERVER'  AND REF_CODELIST_VALUE_SHORT_VAL = :b1 ;
SELECT DESCRIPTION,LONG_VALUE   FROM REFERENCE_CODELIST_VALUES  WHERE REF_CODELI
ST_NAME = 'PRINT QUEUE NAME'  AND REF_CODELIST_VALUE_SHORT_VAL = :b1 ;
SELECT REPLACING_MESSAGE_TOPIC_ID,POPUP_FLAG,SINGLE_LINE_TEXT,MESSAGE_SEVERITY_T
YPE_CODE   FROM MESSAGE_TOPICS  WHERE :b1 = MESSAGE_TOPIC_ID ;
SELECT DESCRIPTION,LONG_VALUE   FROM REFERENCE_CODELIST_VALUES  WHERE REF_CODELI
ST_NAME = 'PRINT QUEUE NAME'  AND REF_CODELIST_VALUE_SHORT_VAL = :b1
```

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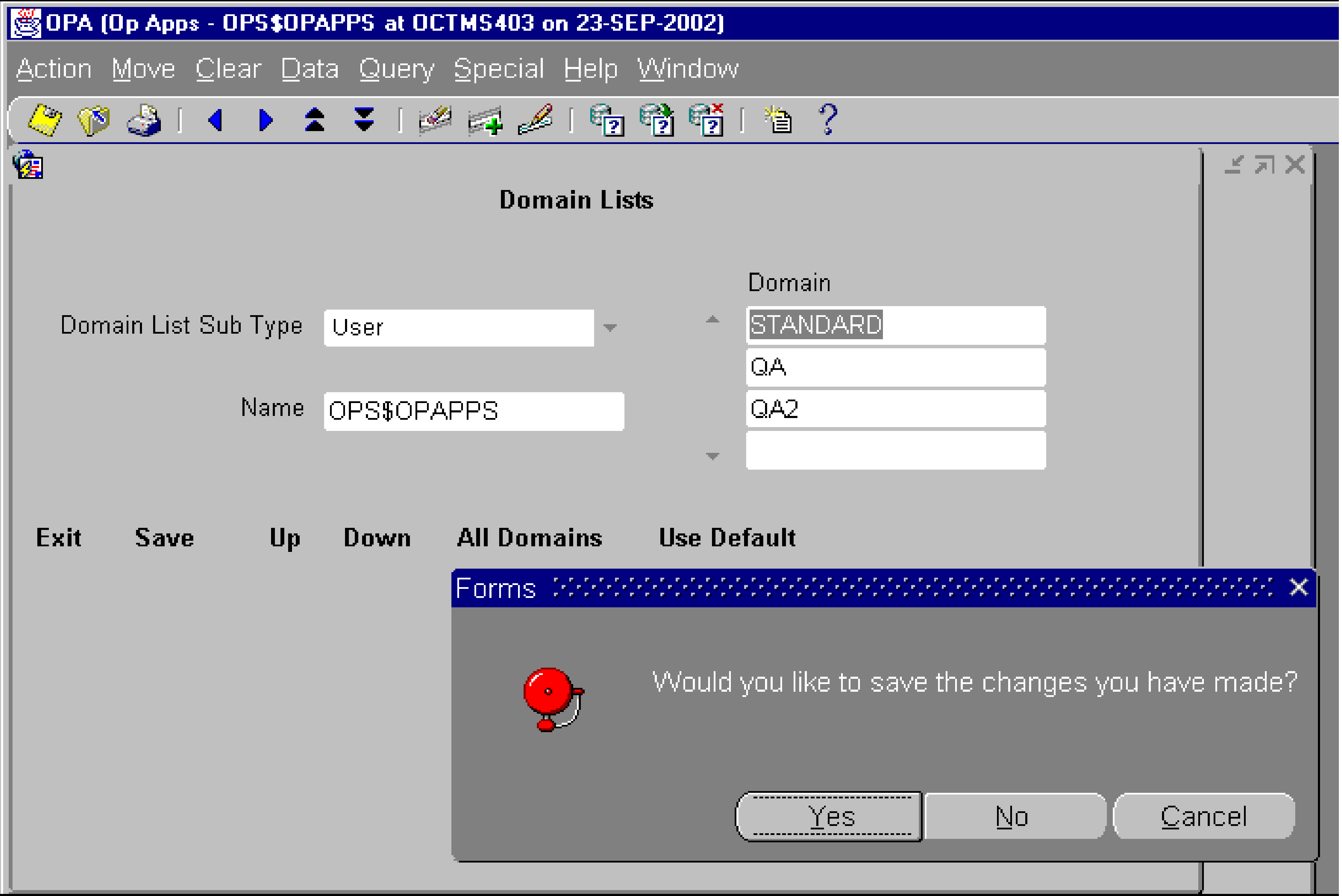
```
dbmssunserver3% more ref_codelist_error.trc
=====================
PARSING IN CURSOR #19 len=148 dep=0 uid=136 oct=3 lid=136 tim=0 hv=3554033569 ad
='82e1c4b8'
SELECT DESCRIPTION,LONG_VALUE   FROM REFERENCE_CODELIST_VALUES  WHERE REF_CODELI
ST_NAME = 'PRINT QUEUE NAME'  AND REF_CODELIST_VALUE_SHORT_VAL = :b1
END OF STMT
PARSE #19:c=0,e=0,p=0,cr=0,cu=0,mis=1,r=0,dep=0,og=0,tim=0
WAIT #19: nam='SQL*Net message to client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #19: nam='SQL*Net message from client' ela= 0 p1=675562835 p2=1 p3=0
BINDS #19:
 bind 0: dty=1 mxl=128(50) mal=00 scl=00 pre=00 oacflg=03 oacfl2=10 size=128 off
set=0
   bfp=01a40310 bln=128 avl=13 flg=05
   value="%RXC_PRINTER%"
EXEC #19:c=0,e=0,p=0,cr=0,cu=0,mis=0,r=0,dep=0,og=4,tim=0
FETCH #19:c=0,e=0,p=0,cr=2,cu=0,mis=0,r=0,dep=0,og=4,tim=0
WAIT #19: nam='SQL*Net message to client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #19: nam='SQL*Net message from client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #19: nam='SQL*Net message to client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #19: nam='SQL*Net message from client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #21: nam='SQL*Net message to client' ela= 0 p1=675562835 p2=1 p3=0
WAIT #21: nam='SQL*Net message from client' ela= 0 p1=675562835 p2=1 p3=0
=====================
```

OPA Forms Level: debug_toggle=Y

- Real-life example: Admin -> Glib Admin -> User Domain. Click [All Domains] button, click exit, answer Yes to question "Would you like to save the changes you have made?"
- Returns error FRM-40105 – Unable to resolve reference to item CONTROL.SAVE.
- It happens that this error occurs without much contact/execution on the RDBMS level


OPA (Op Apps - OPS$OPAPPS at OCTMS403 on 23-SEP-2002)
Action Move Clear Data Query Special Help Window

Domain Lists

Domain List Sub Type	User
Name	OPS$OPAPPS

Domain
STANDARD
QA
QA2

Exit
Save
Up
Down
All Domains
Use Default

Forms

Would you like to save the changes you have made?

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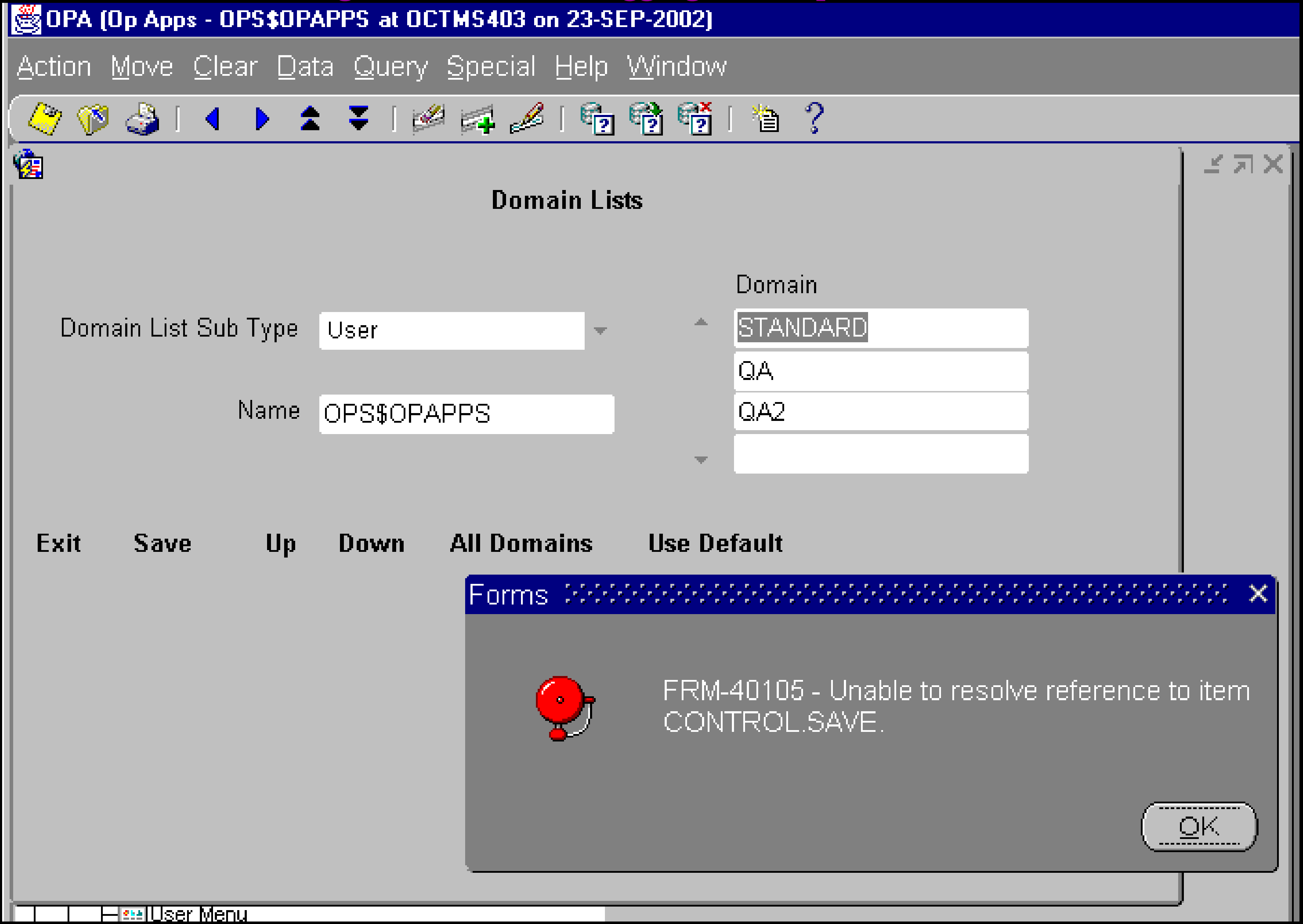
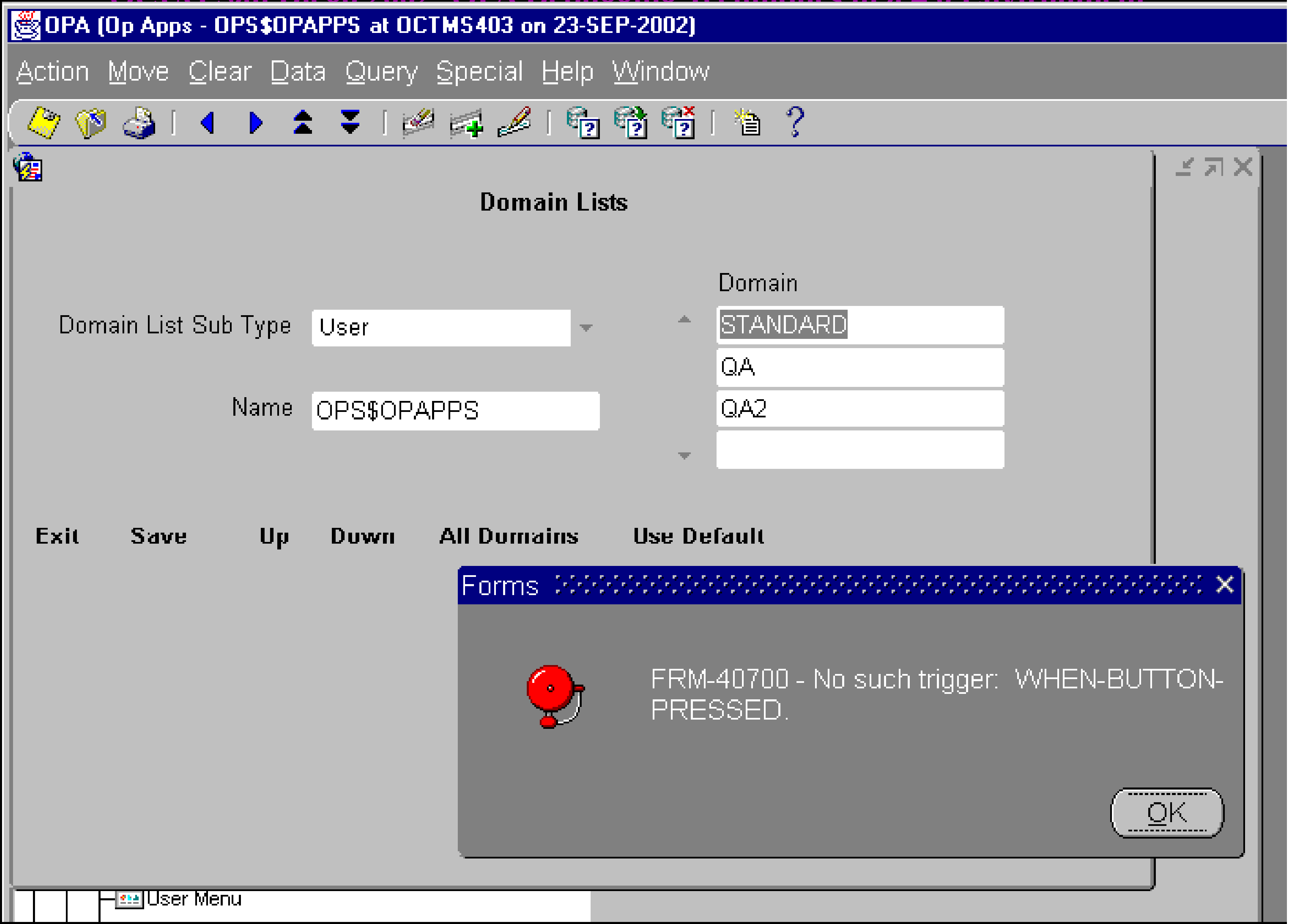

OPA (Op Apps - OPS$OPAPPS at OCTMS403 on 23-SEP-2002)
Action Move Clear Data Query Special Help Window
Domain Lists
Exit
Save
Up
Down
All Domains
Use Default
Forms
OK
User Menu

Domain List Sub Type: User

Name: OPS$OPAPPS

Domain:
STANDARD
QA
QA2

FRM-40105 - Unable to resolve reference to item CONTROL.SAVE.



OPA (Op Apps - OPS$OPAPPS at OCTMS403 on 23-SEP-2002)

Domain Lists

Domain List Sub Type: User

Name: OPS$OPAPPS

Domain: STANDARD, QA, QA2

Forms

FRM-40700 - No such trigger: WHEN-BUTTON-PRESSED.

OPA Forms Level: debug_toggle=Y (2)

- The debug_toggle is an old parameter from the earlier versions of OC. It is also used for debugging ftp file transfer failures.
- In the %ORACLE_HOME%\806\forms60\server\formsweb.cfg file, add debug_toggle=**Y** to the end of the line which starts with form= in the [opa40] section
- Stop and restart the OracleiSuitesHTTPServer and the Oracle Forms Server [Forms60Server] service
  - In a production environment, users may have to log off for a short period of time for this step.

OPA Forms Level: debug_toggle=Y (2)

- In a query mode form, hit SHIFT+F8. There will be a message on the lower left screen status bar that says “Debug Level is now 1”.
- Hit SHIFT+F8 again, the Debug Level will increment by 1. The maximum value is 5
- In some Forms, SHIFT+F8 will bring up a dialogue box for printing first. Try a query in Admin -> Reference Codelists -> Local Codelists and then SHIFT_F8. Then set the debug level and go to the menu path in question.

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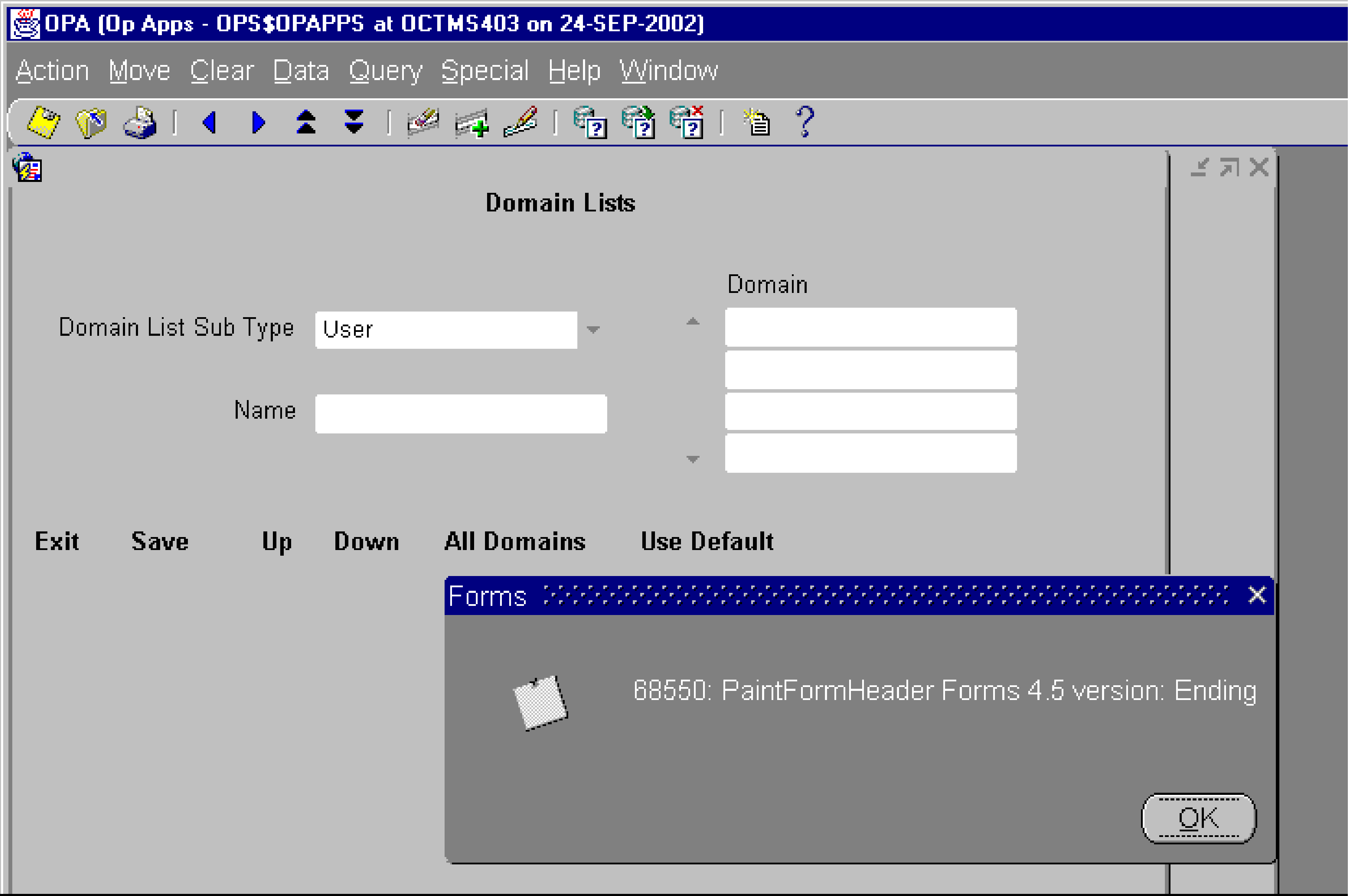


OPA (Op Apps - OPS$OPAPPS at OCTMS403 on 24-SEP-2002)

Domain Lists

Domain List Sub Type: User

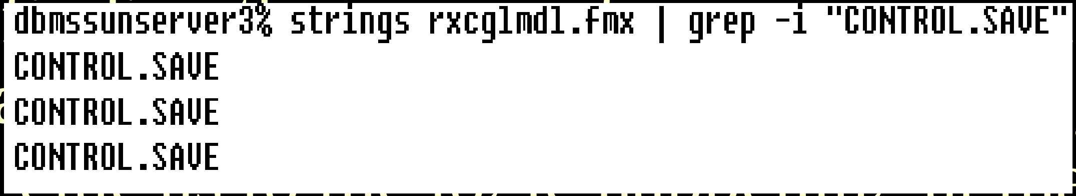
Name:

Domain

68550: PaintFormHeader Forms 4.5 version: Ending

OS Level: Strings the Forms .fmx and .rep files

- Sometimes, even the debug messages are not enough to definitively determine where a problem is.
- Action -> Environment in most parts of OC will say what module is running, and this is sometimes the name of the actual form.
- ftp %OPA_HOME%\oc\<module>.fmx to a UNIX machine and perform
  - strings <module.fmx> | grep –i "<Error Message String>
- Sometimes, fi ge or a particula , and a partial clue as to the logic happening at that particular time of failure is crucial for an analysis.



```
dbmssunserver3% strings rxcglmdl.fmx | grep -i "CONTROL.SAVE"
CONTROL.SAVE
CONTROL.SAVE
CONTROL.SAVE
```

OS Level: Strings the $RXC_BIN Server Code

- Sometimes, finding the source of an error message or a particular select statement can be a problem, and a partial clue as to the logic happening at that particular time of failure is crucial for an analysis.
- Performing a strings on the binary file running the module and "grep"ing the error or SQL statement can be very useful, especially for
  - rxcbeblt (Batch Loading)
  - rxcbvbvs (Batch Validation)
  - Rxcdxbvb (Data Extract Views)

OPA Level: Set .oclrc parameters

- Most batch jobs will give more verbose output if $RXC_DEBUG is set in .oclrc. Some will also provide traces in USER_DUMP_DEST if $SQL_TRACE is set in .oclrc
  - RXC_DEBUG=3; export RXC_DEBUG
  - SQL_TRACE=TRUE; export SQL_TRACE
- Recall that .oclrc is no longer necessary in OC 4.0.x, so this file has to be manually created in the user's $HOME directory. Additionally, this file should obey Bourne shell syntax since rxcpsdps runs in /bin/sh.

OS Level: Run the command from Batch_Jobs

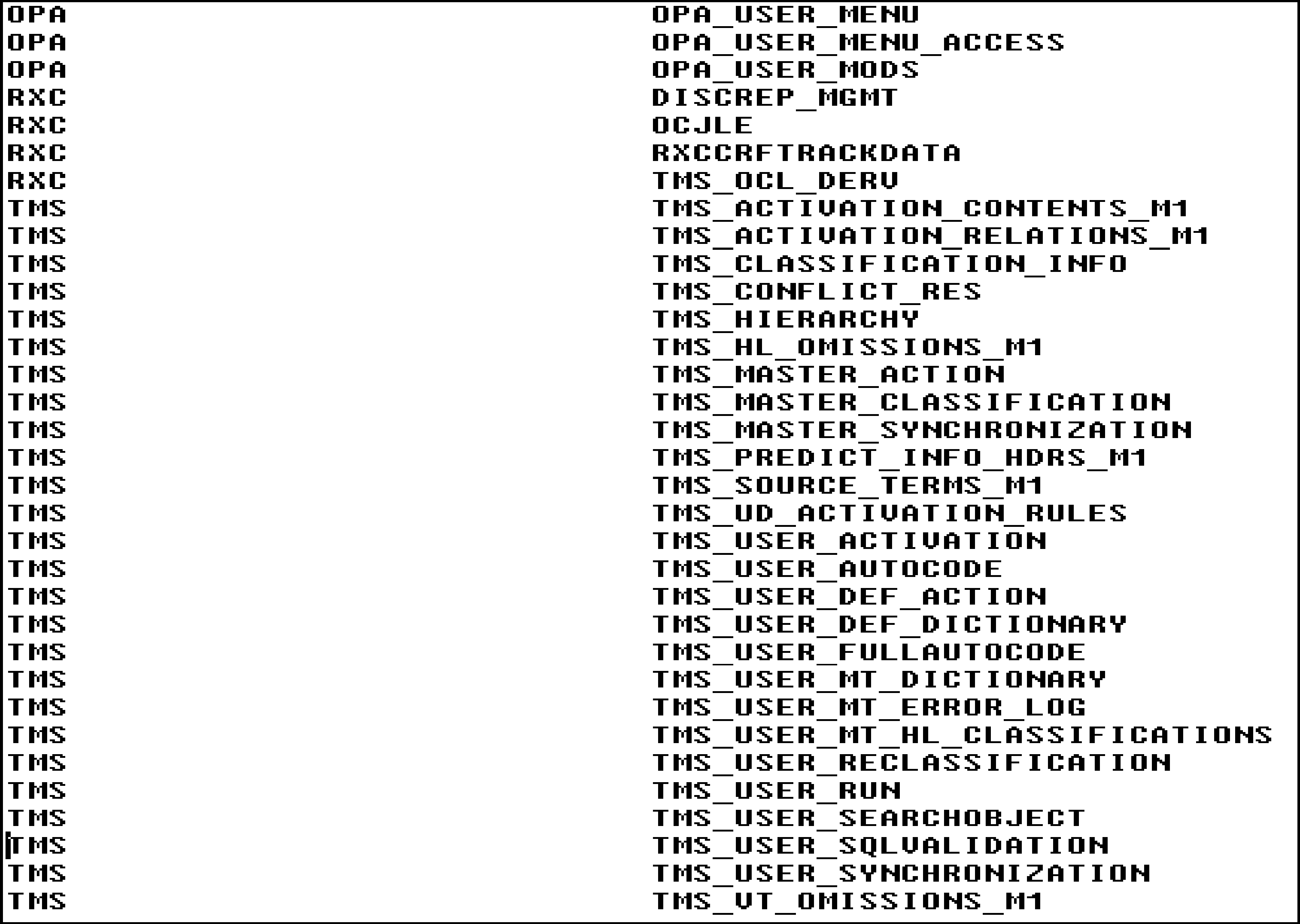
- Sometimes, some batch jobs might core and not leave a complete log file. In this case, it is very useful to query the cmd_buffer from the RXC.BATCH_JOBS table and manually execute this command from the UNIX command line logged in as the user in question.
- The parameters for the logfile and outfile will have to be adjusted, usually something in /tmp, to prevent a file conflict with the files already existing from the previous failed run.
- This cmd_buffer was previously in OC 3.x log files, but somehow is no longer present in 4.0.x

OS Level: Trap the at file

- If a particular batch job does not execute correctly and always results in a mail message with some strange failure to the rxcprod account, the at job which runs this job can be trapped.
- Schedule the job in question for sometime in the future
- Examine /var/spool/cron/atjobs directory and search for a file ending in .a
- Examine this file to determine if there is a possible shell script syntax error, or possibly an environment variable that is not being set correctly.

OPA Level: OPA_TRACE.DebugOn

- The function OPA.OPA_TRACE.DebugOn can be called for some packages (mostly TMS) which are wrapped but sometimes return errors.
- The output is generally very verbose so it is best to have a small set of test data to reproduce the issue.
- Set serveroutput on size 1000000 is a prerequisite, as well as a manual call to the procedure/function in question, where the arguments have to first be determined.
- The TableOn procedure can also be called to populate the table OPA.OPA_DEBUG for tests that are very large/
- This is particularly useful for derivation issues from OC to TMS. A list of packages where OPA_TRACE can be used appears on the next slide.



```
OPA                           OPA_USER_MENU
OPA                           OPA_USER_MENU_ACCESS
OPA                           OPA_USER_MODS
RXC                           DISCREP_MGMT
RXC                           OCJLE
RXC                           RXCCRFTRACKDATA
RXC                           TMS_OCL_DERV
TMS                           TMS_ACTIVATION_CONTENTS_M1
TMS                           TMS_ACTIVATION_RELATIONS_M1
TMS                           TMS_CLASSIFICATION_INFO
TMS                           TMS_CONFLICT_RES
TMS                           TMS_HIERARCHY
TMS                           TMS_HL_OMISSIONS_M1
TMS                           TMS_MASTER_ACTION
TMS                           TMS_MASTER_CLASSIFICATION
TMS                           TMS_MASTER_SYNCHRONIZATION
TMS                           TMS_PREDICT_INFO_HDRS_M1
TMS                           TMS_SOURCE_TERMS_M1
TMS                           TMS_UD_ACTIVATION_RULES
TMS                           TMS_USER_ACTIVATION
TMS                           TMS_USER_AUTOCODE
TMS                           TMS_USER_DEF_ACTION
TMS                           TMS_USER_DEF_DICTIONARY
TMS                           TMS_USER_FULLAUTOCODE
TMS                           TMS_USER_MT_DICTIONARY
TMS                           TMS_USER_MT_ERROR_LOG
TMS                           TMS_USER_MT_HL_CLASSIFICATIONS
TMS                           TMS_USER_RECLASSIFICATION
TMS                           TMS_USER_RUN
TMS                           TMS_USER_SEARCHOBJECT
TMS                           TMS_USER_SQLVALIDATION
TMS                           TMS_USER_SYNCHRONIZATION
TMS                           TMS_VT_OMISSIONS_M1
```

Q&A.

- Please come to Booth 19 and 20 with any additional questions, and also for:
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