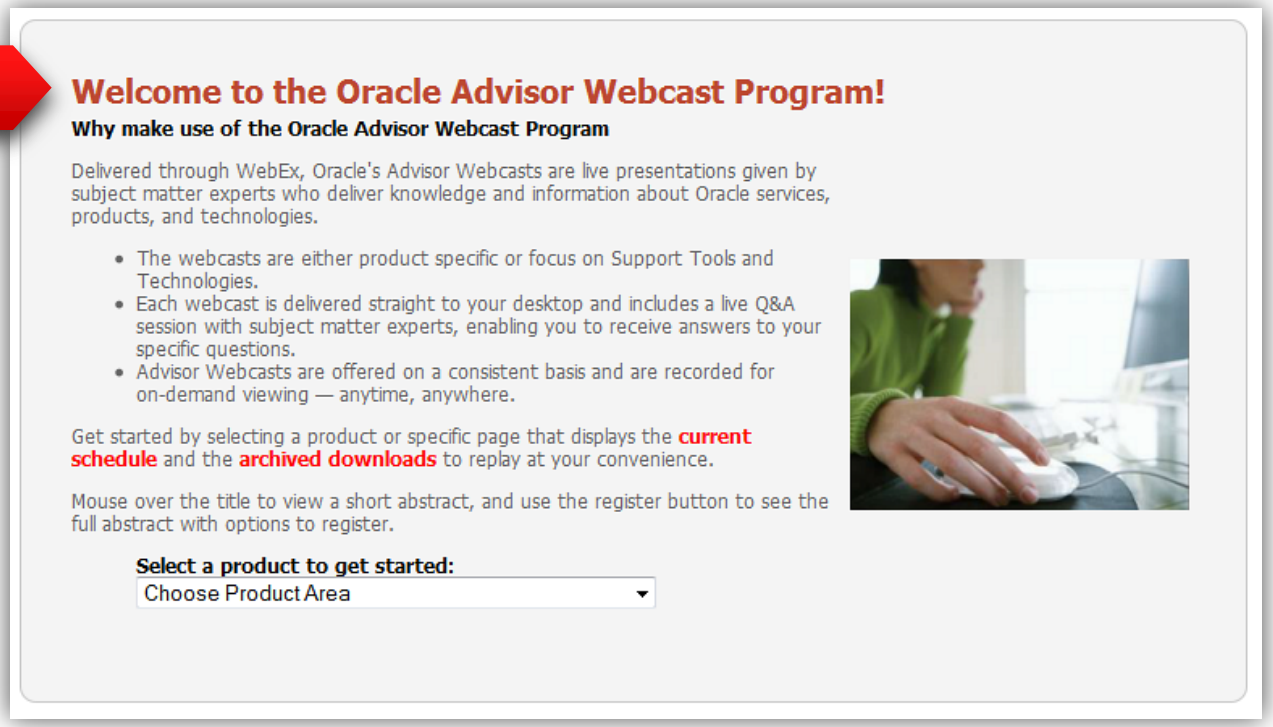
Upcoming: Best Practices: Proactive Data Collection to Troubleshoot Performance Issues

Oracle Advisor Webcast Program

- Current schedule
- Archived recordings
- Doc ID 740966.1



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AGENDA

- Presentation – approximately 45 minutes
- Q&A Session – approximately 15 minutes
  - Web attendees can ask questions via Q&A panel
  - Phone attendees can ask questions via Q&A panel or phone (operator assisted)

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ATTENTION – AUDIO Options

You can

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- **or join teleconference (dial in)**

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- Listen only mode
- Advantage: no need to dial in
- What about Questions?
  Type your questions into WebEx Q&A panel
- If you prefer full audio access in order to ask questions directly, please connect to our teleconference
- Connect details you will find at next slide

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Teleconference Connect details:

1. Conference ID: 73401569
2. International dial in: +44 (0) 1452 562 665
3. US Free call: 1866 230 1938
4. List with national toll free numbers is available in note 1148600.1

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ORACLE

Oracle Advisor Webcast

Best Practices: Proactive Data Collection to Troubleshoot DB Performance Issues

Nayan Ranjan Sahu
Principal Software Engineer

ORACLE SUPPORT

AGENDA

- Presentation – approximately 45 minutes
- Q&A Session – approximately 15 minutes

  - Web attendees can ask questions via Q&A panel only
  - Phone attendees can ask questions via Q&A panel or phone (operator assisted)

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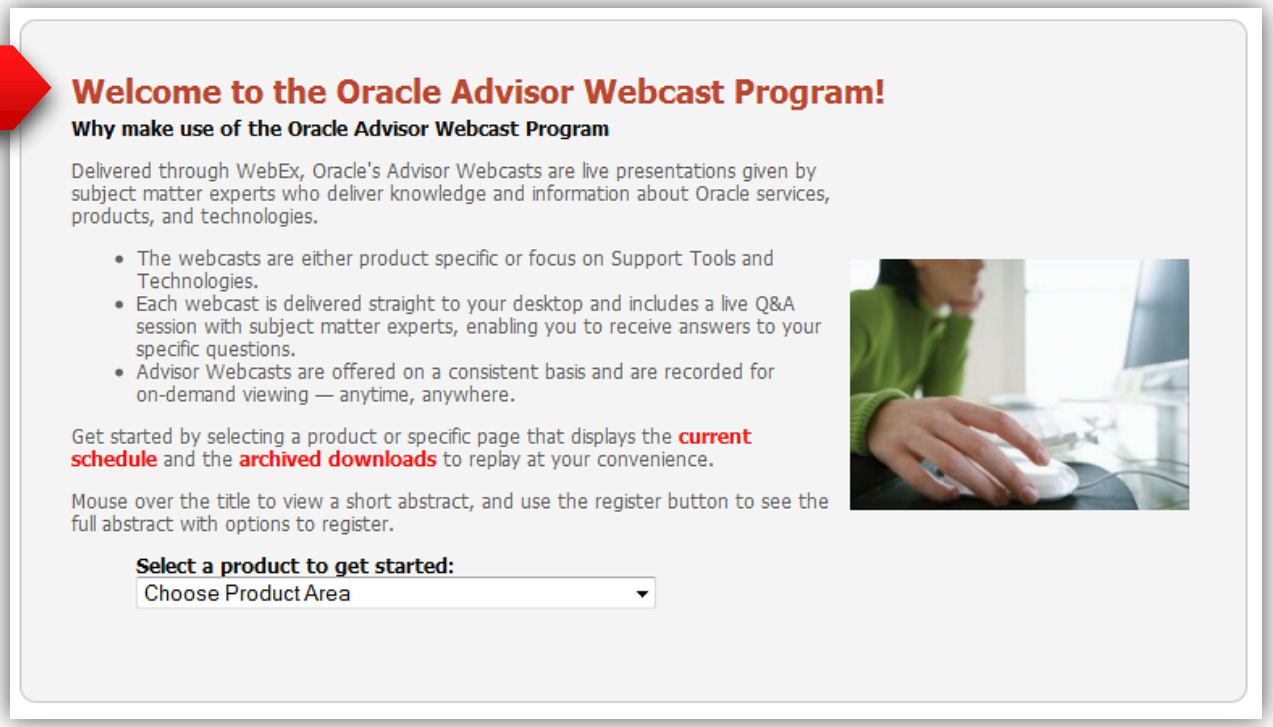

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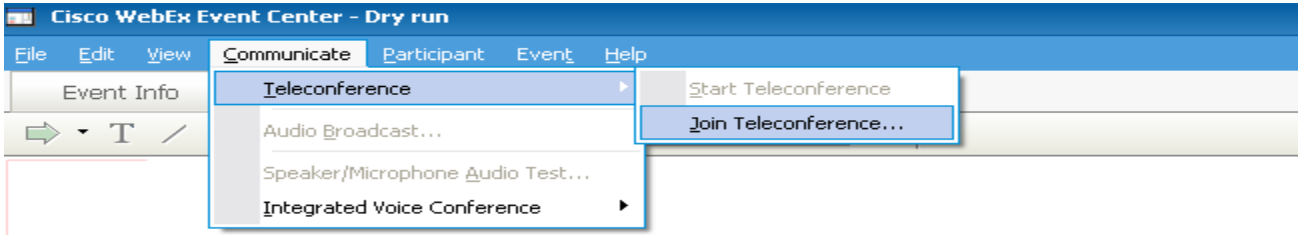

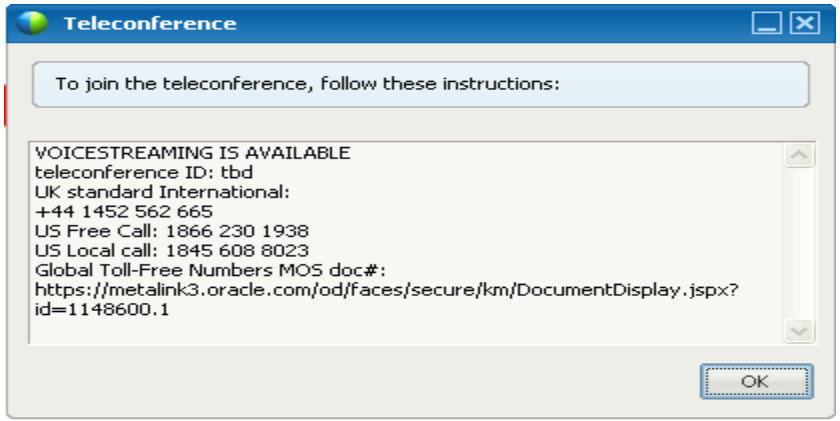

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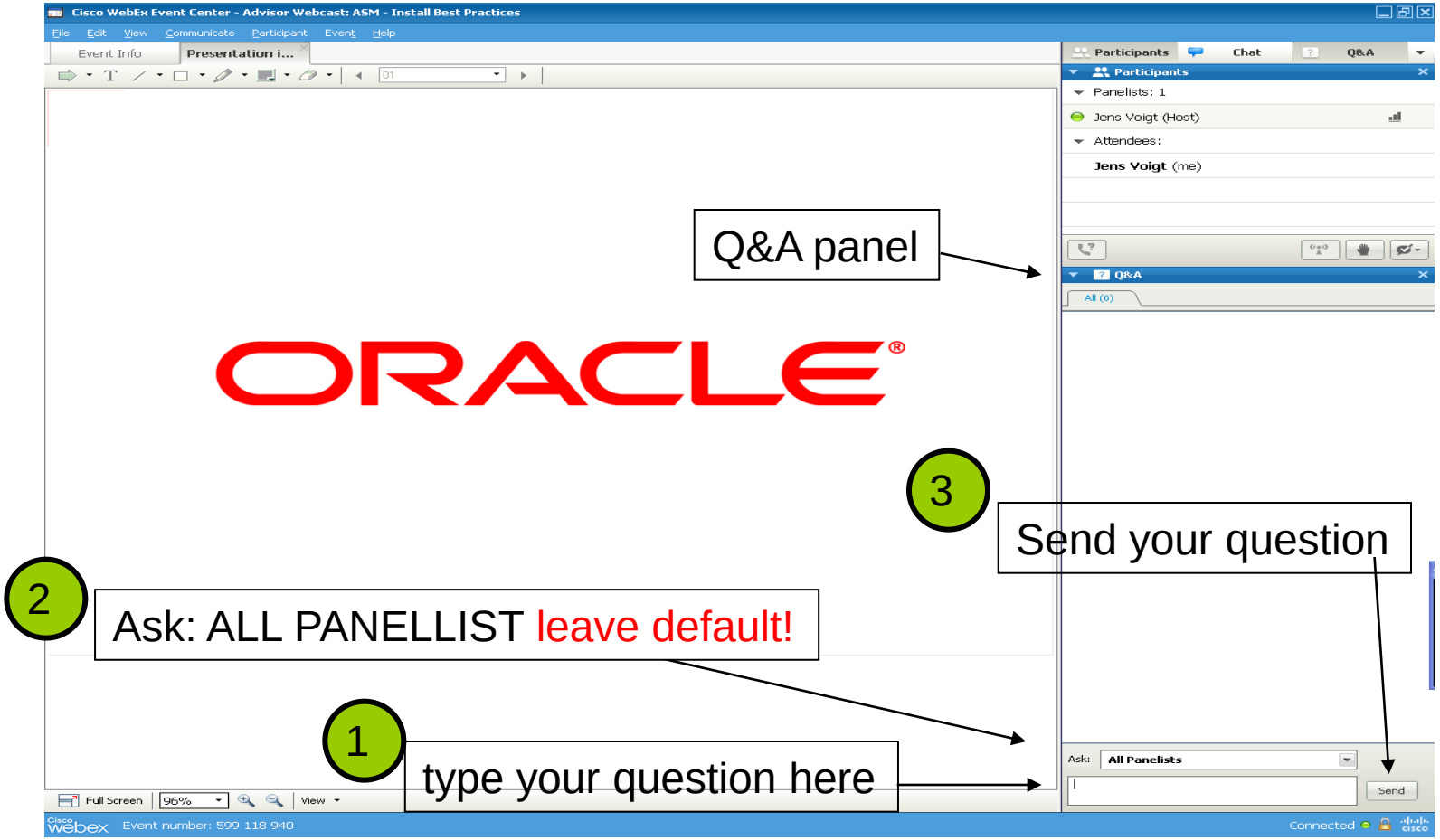

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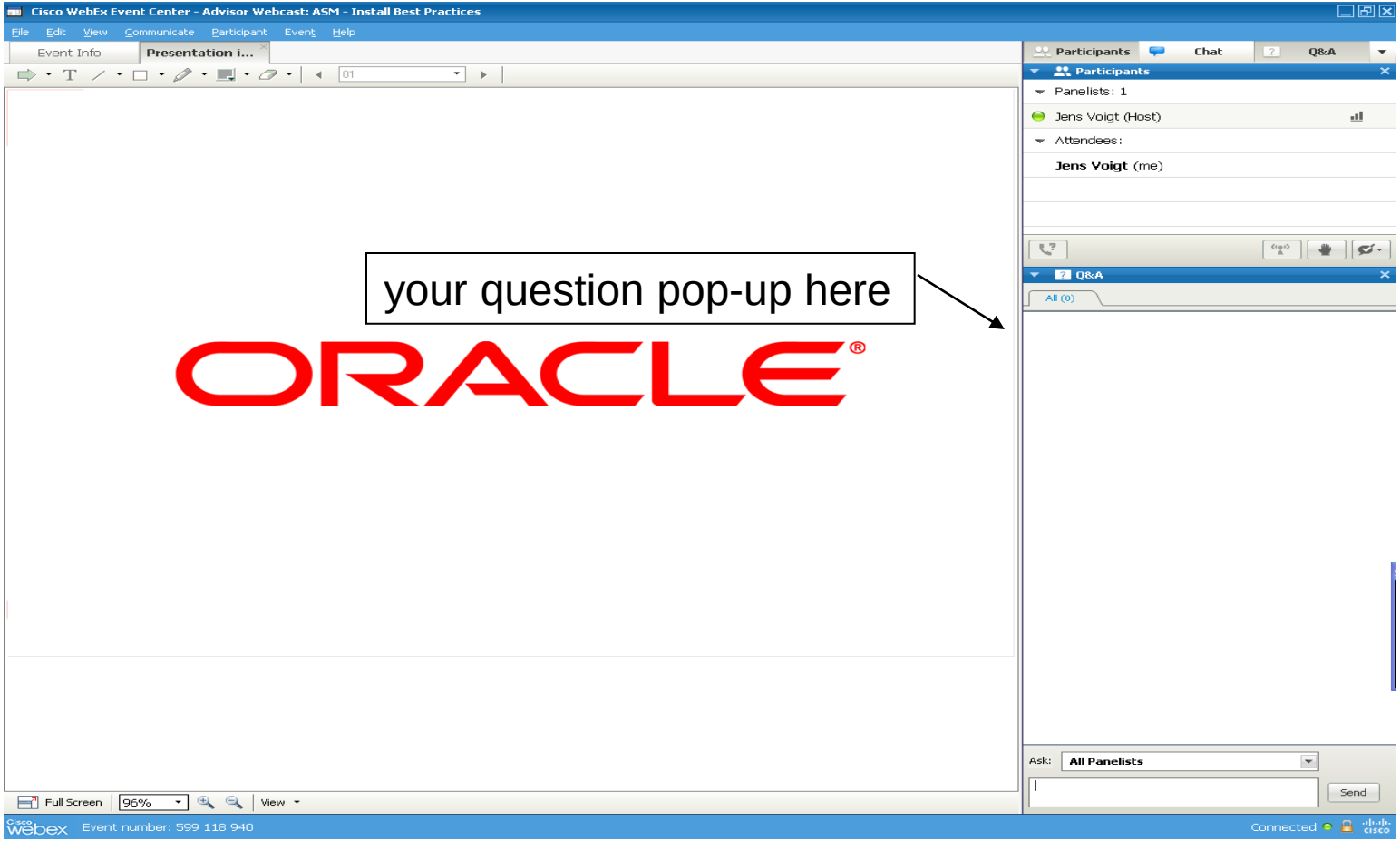

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Oracle Advisor Webcast

Best Practices: Proactive Data Collection to Troubleshoot DB Performance Issues

Nayan Ranjan Sahu
Principal Software Engineer

ORACLE SUPPORT

Objectives

- Identifying Right Diagnostics for different core db performance problems and its approaches
- Overview of basic performance diagnostic tools

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Agenda

- DB Performance problem categories
- Different Approaches
- When to collect What and Why?
- Demonstration
- Best practices
- Q & A

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Problem Categories

SLOW	HANG	TRANSIENT
Database-wide	Database-wide	
Jobs	Jobs	
Statements	Statements	

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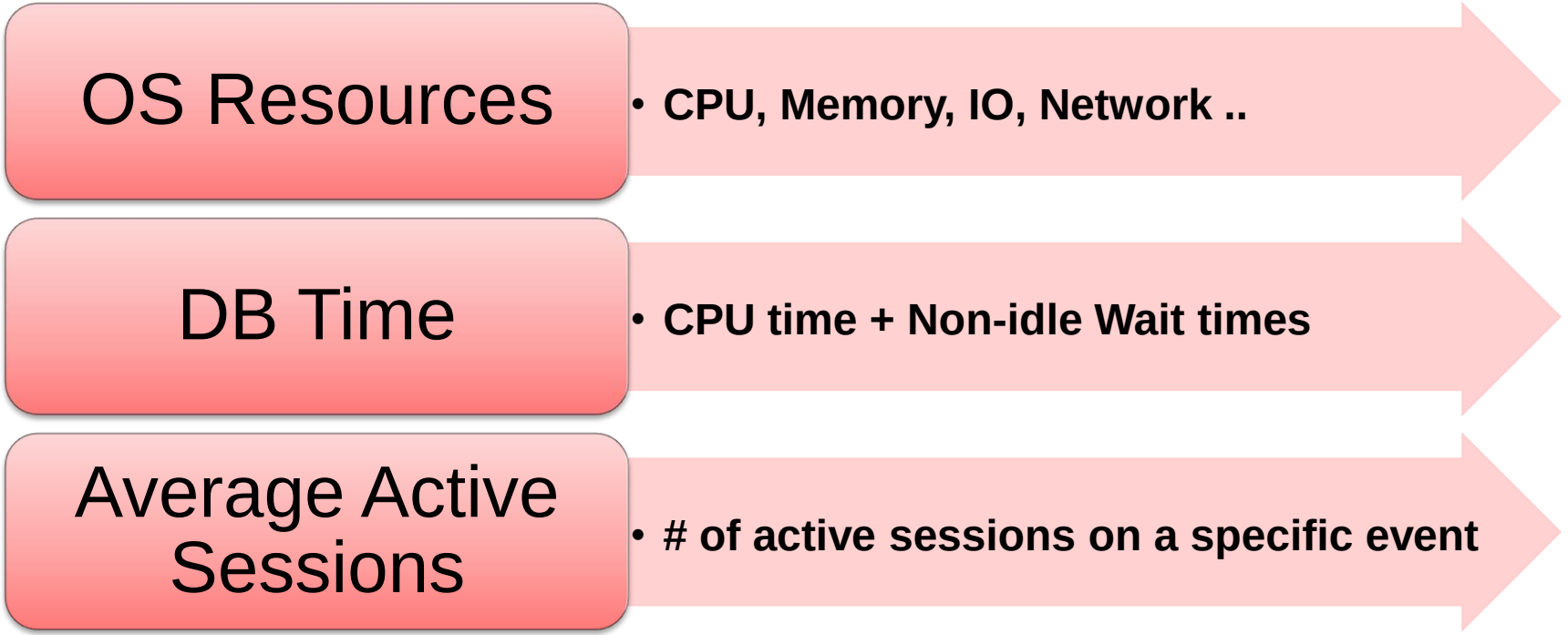
Basic Approach



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Slow - Overall Database

- Basic Approach
  - OS Watcher Black Box **[Operating system resource utilization]**
  - AWR / Statspack Report **[Database time (DB Time) analysis]**
  - ASH Report **[Average active sessions reviews]**
  - Alertlog
  - RDA

	Snap Id	Snap Time	Sessions	Cursors/Session
Begin Snap:	1787	01-Oct-13 23:00:23	44	1.8
End Snap:	1788	02-Oct-13 00:00:26	48	1.7
Elapsed:		60.05 (mins)		
DB Time:		296.05 (mins)		

Top 5 Timed Foreground Events

Event	Waits	Time(s)	Avg wait (ms)	% DB time	Wait Class
direct path read	123,323	11,288	92	63.55	User I/O
DB CPU		6,652		37.45	
log file sync	39,401	78	2	0.44	Commit
SQL*Net more data to client	694,946	18	0	0.10	Network
asynch descriptor resize	42,596	7	0	0.04	Other

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Slow - Overall Database

- Special cases

  - Lfsdiag script output for high Log file sync waits **[Doc ID 1064487.1]**
  - Version count report for high version count issues **[Doc ID 438755.1]**
  - Cursortrace in case of high version count issues **[Doc ID 296377.1]**
  - System state dump may be required for library cache locks, latches, mutex, enqueues scenarios

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Slow or Hang – Batch Jobs

- Basic Approach
  - SQL tracing (10046 event, dbms_monitor) **[DB Time analysis]**
  - AWR Report / Statspack Report **[-- do --]**
  - ASH analysis **[Active session review]**
  - OS Watcher BB **[OS resource utilization]**
- Deep Dive
  - PL/SQL profiler (dbms_profiler) **[Doc ID 243755.1]**
  - Multiple Errorstack, Shortstack **[Spinning on CPU]**
  - Hang Analyze / System state **[True Hang]**
  - Strace/truss/tusc
  - Gdb, dbx etc..

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Slow – Query/Statement

- Basic Approach
  - SQL tracing (10046 event, event++,etc) **[DB Time Analysis]**
  - AWRSQRPT.SQL **[Exec. stats, plans – history]**
  - Recent changes in environment (Structure/parameters/object statistics/system statistics etc.
  - SQLT(SQLTXPLAIN)

- Deep Dive
  - SQLT(SQLTXPLAIN)
  - Execution Plan analysis
  - CBO Trace(10053 trace)

call	count	cpu	elapsed	disk	query	current	rows
Parse	1	0.00	0.00	0	0	0	0
Execute	1	0.00	0.00	0	0	0	0
Fetch	1	23.65	104.25	164360	200997	1	1
total	3	23.65	104.26	164360	200997	1	1

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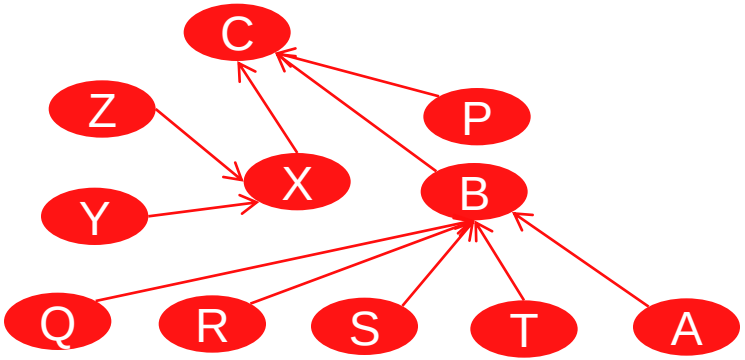
Hang – Complete Database

- Basic Approach
  - Multiple Hang Analyze **[Process dependency maps]**
  - Multiple System State dump **[Process states ,dependencies etc.]**
  - AWR report (provided snaps gathered) **[DB Time analysis]**
  - ASH report (provided samples collected) **[Active session review]**
  - OS watcher Output **[OS resource utilization]**
  - Alertlog
- Deep Dive
  - Multiple shortstacks , errorstacks
  - Strace/truss/tusc



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Hang – Query/Statement

- Basic Approach
  - SQL tracing (10046 event, dbms_monitor) **[DB Time Analysis]**
  - Errorstack, Shortstacks **[Spinning on CPU]**
  - AWRSQRPT.SQL **[Stats, plans from history]**
  - ASH analysis **[ASH info from history]**

- Deep Dive
  - Review if the hang is at the parse phase ("*explain plan for"* hangs?)
  - Waiting indefinitely (enqueue, locks)? ("check gv$lock for finding blocker")
  - Progressing in dead slow ("Execution Plan" review)

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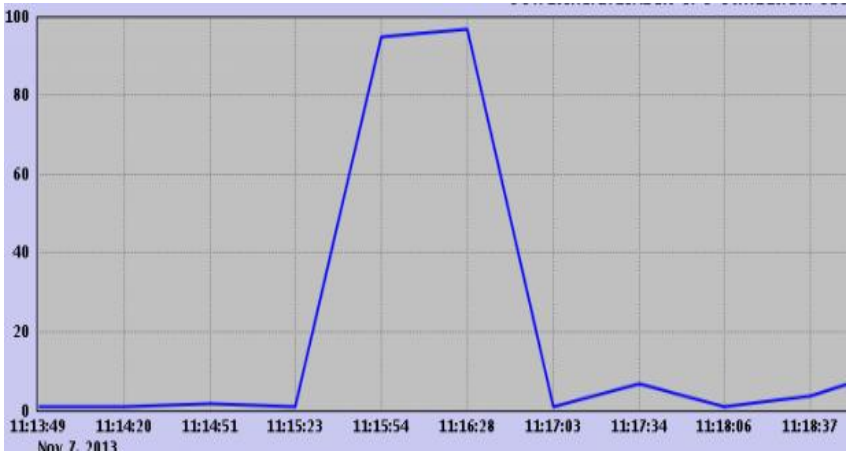
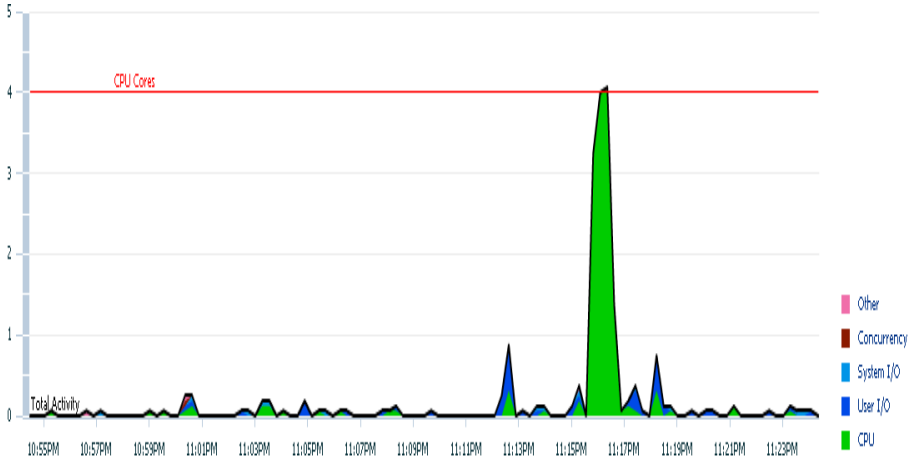
Transient Problems

- Approach
  - OS Watcher BB **[OS resource utilization]**
  - ASH analysis **[Active session review]**
  - OEM Top activity, ASH analytics **[Active session review]**





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OS Watcher Black Box

(Doc ID 301137.1)

```
./startOSWbb.sh
-or-
./startOSWbb.sh 60 10 gzip /u02/tools/oswbb/archive
```

- Collects and archives important operating system performance metrics
- Simple Installation
- Simple method of report collection
- Default polling interval is 30 sec and default schedule window is 48 hrs
- Very minimal overhead
- A graphical utility `oswbba` draws graphs on the raw data
- It has options to extend the functionality to add custom scripts

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RDA

(Doc ID 314422.1)

```
unzip rda.zip
chmod +x rda


./rda.sh [-v]
```

- Provides comprehensive picture of system environments
- Simple Installation
- Simple method of reports collection
- Can be configured with -S option to chose different collections
- Review data collection using : `RDA__start.htm`
- Information e.g. Installed OS packages/patches, kernel parameter settings etc.

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AWR report

(Doc ID 1363422.1)

To take snap:

```
Execute dbms_workload_repository.create_snapshot();
```

To view report:

```
@?/rdbms/admin/awrrpt.sql
```

- Very useful diagnostic for DB time and metrics analysis
- Requires diagnostic pack licenses
- Records workload related statistics at every snaps by `mmon` slaves.
- Information is stored under sysaux tablespace
- Top SQLs are ordered under various metrics categories
- By default snaps are taken hourly

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Statspack report

(Doc ID 94224.1)

To take snaps:

```
Execute Statspack.snap();
```

To view report:

```
@?/rdbms/admin/spreport.sql
```

- Similar to AWR report
- Does not require any diagnostic pack license
- Install statspack proactively in case no diag. pack license
- Manually schedule snaps interval using either dbms_job(sample script :`spauto.sql`) or using cron os utility
- Level>=6 capture execution plans of top sqls and can be viewed using `sprepsql.sql` (equivalent to `awrsqrpt.sql`)

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ASH Report

(Doc ID 276103.1)

To view report:

```
@?/rdbms/admin/ashrpt.sql
```

- Performance statistics of ***active sessions*** are sampled and captured every second.
- 1 out of 10 samples are kept in history(AWR)
- Very useful diagnostic for transient performance problems
- Filters can be applied when executed using `ashrpti.sql`

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Hang Analyze dump

(Doc ID 130874.1)

Single instance:

```
oradebug hanganalyze <level>
```

Rac:

```
oradebug setinst all
oradebug -g all hanganalyze <level>
```

- Very useful incase of database hang scenarios
- Prints out dependencies among processes
- Light weight trace than system state dump
- Levels decide whether to capture process states of blockers / waiters
- Preferred collection method over system state dump when number of processes are very high

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System State dump

(Doc ID 423153.1)

Single instance:

```
oradebug dump systemstate <level>
```

Rac:

```
oradebug setinst all
oradebug -g all dump systemstate <level>
```

- Very useful incase of database hang scenarios
- Heavier dump file.
- Dumps state objects of all the database processes
- Be cautious when number of processes are very high
- Use `sqlplus –prelim` option when sysdba connection is not allowed

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SQL Tracing

(Doc ID 376442.1)

```
oradebug setospid <ospid>
oradebug Event 10046 trace name context forever, level n
-or-
alter session set events '10046 trace name context forever, level n';
-or-
alter session set events 'sql_trace [sql: <sql_id>| <sql_id>] level n'
```

- Traces a session's activity
- Very useful for analyzing SQL performance
- Captures individual sql execution statistics on *parse, execute* and *fetch*
- Captures *waits* and *binds* information based on levels set
- Captures *actual row sources*
- Use dbms_monitor for tracing client id,services,modules,actions

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Errorstack / Shortstack

```
For Errorstack:                          For Shortstack:
oradebug seospid <ospid>                 oradebug seospid <ospid>
oradebug dump errorstack <n>             oradebug short_stack
oradebug dump errorstack <n>             oradebug short_stack
```

- Useful when session is spinning on CPU
- Captures error stacks and function call stacks
- Capture multiple errorstack/shortstack in short duration
- Errorstack captures process state dumps and context areas (level 3)

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SQLT (SQLTXPLAIN) *(Doc ID 215187.1)*

```
XTRACT example:
#cd sqlt/run
# sqlplus apps
SQL> START sqltxtract.sql [SQL_ID]|[HASH_VALUE] [sqltxplain_password]
e.g.
SQL> START sqltxtract.sql 0w6uydn50g8cx sqltxplain_password
```

- Captures most of relevant performance diagnostics surrounding a single SQL statement
- Gathers info. from current state as well as from history(AWR) .
- Different methods of report collection e.g. XPLAIN, XTRACT, XECUTE etc.
- Diagnostics are captured consistently at a single point of time.

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SQLHC

(Doc ID 1366133.1)

```
# sqlplus / as sysdba
SQL> START sqlhc.sql <T|D|N> <sql_id>
e.g.
SQL> START sqlhc.sql T djkbyr8vkc64h
```

- Quick health check tool for a SQL statement
- Lighter information than SQLTXPLAIN
- Reports non-compliant observation
- Readable SQL code (sqlhc.sql)
- No database footprint.

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LTOM

(Doc ID 352363.1)

```
To Install:
  uncompress ltom.tar.Z
  tar xvfp ltom.tar

To Start:
     ./startltom.sh
```

- A java program designed as a real-time diagnostic platform.
- Proactive in nature : Automatic problem detection and collects the necessary diagnostics based on rules defined.
- i) Automatic Hang Detection - use cautiously :Check Rules. at `$TOM_HOME/init/hangDetect.properties`

  ii) System Profiler

  iii) Automatic Session Tracing - use cautiously : Check Rules at `$TOM_HOME/init/sessionRecorder.properties`
- LTOMg provides graphical output of the data collected

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Misc. OS debugging tools

	Linux	Solaris	AIX	HPUX	Windows
Application Call Stacks	Pstack,etc	Pstack,etc	pstack/proc stack/dbx, etc	pstack /gdb,etc	ADPlus, WinDbg,etc
System Calls	Strace,etc	Truss,etc	Truss,etc	Tusc,etc	ADPlus, WinDbg,etc
Debugger	gdb,dbx etc.	gdb, dbx etc.	gdb, dbx etc.	gdb, dbx etc.	ADPlus, WinDbg, etc
Profiler	qprof, Dtrace, etc	Dtrace, etc	Gprof,etc	Caliper,etc	ADPlus, WinDbg,etc

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Demonstration

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Best practices

- Know your system's environment
- Keep the tools up-to-date
- Install and verify relevant tools on your environments and keep them ready and running for contingencies
- AWR/ Statspack framework should be taking snaps and define the retention periods appropriately
- Take advantages of plan stability features for query performances (e.g. SPM baselines) esp. upgrade situations.
- Sql tuning advisor(tuning pack license) can be useful for new query tuning exercises

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References

- Best Practices: Proactive Data Collection ..… [Doc 1477599.1]
- Master Note: Database Performance Overview [Doc ID 402983.1]
- Master Note: SQL Query Performance Overview [Doc ID 199083.1]
- OSWatcher Black Box (Includes: [Video]) [Doc ID 301137.1]
- SQLT Diagnostic Tool [Doc ID 215187.1]
- SQL Tuning Health-Check Script (SQLHC) [Doc ID 1366133.1]
- Automatic Workload Repository (AWR) Reports … [Doc ID 1363422.1]
- How to Collect Diagnostics for Database Hanging .. [Doc ID 452358.1]
- FAQ: How to Use AWR reports to Diagnose …. [Doc ID 1359094.1]

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Summary

What we covered today

- Different Problem categories
- Various approaches
- Various important Diagnostics
- When to collect what and why
- Best practices

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Questions & Answers

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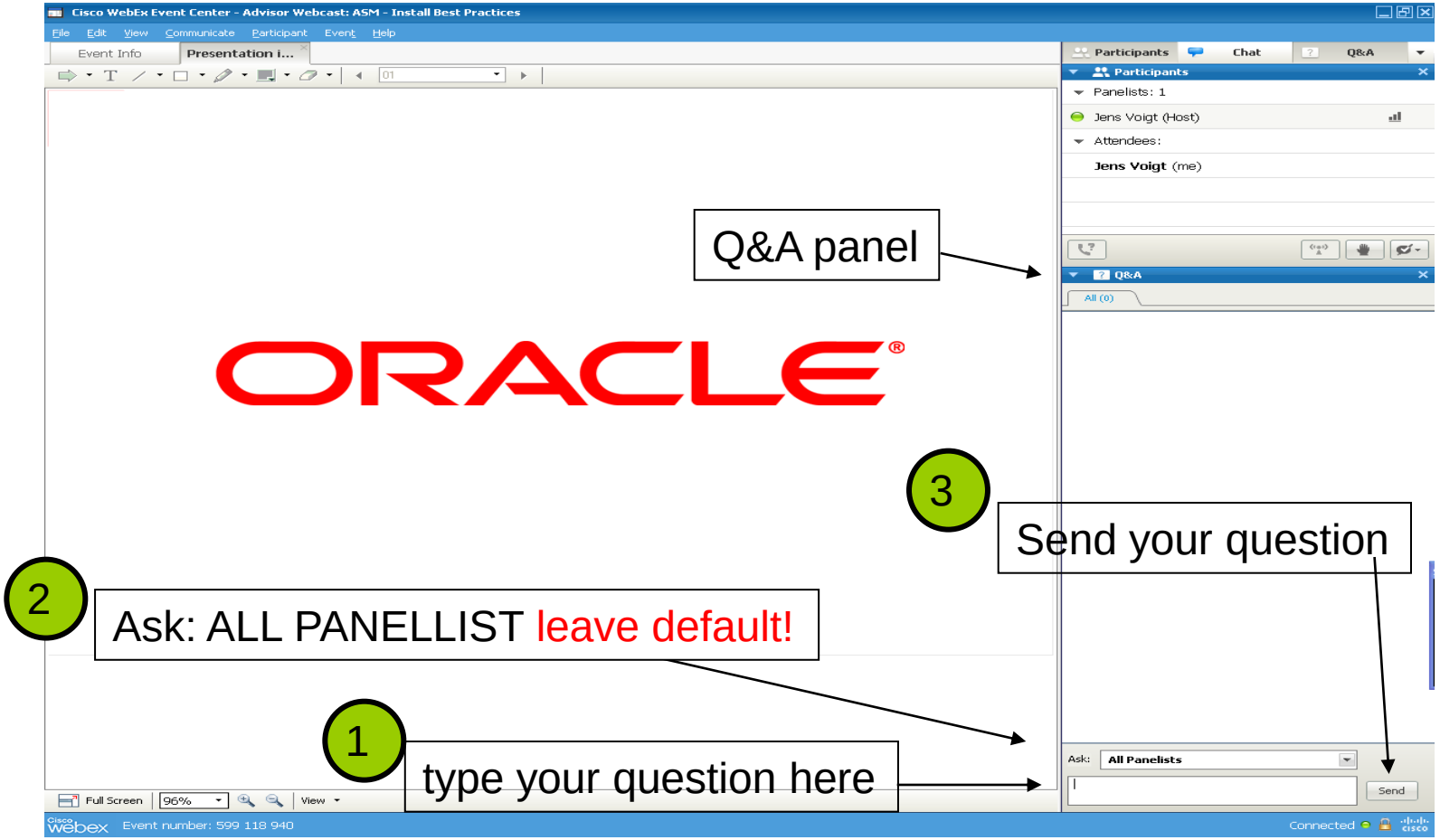

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Further Info & Help

- Generic Advisor Webcast Note (Doc ID 740966.1)
- Database Advisor Webcast (Doc ID 1456176.1)
- DB Newsletter (Doc ID 1284265.1)
- MOS Community Database Tuning

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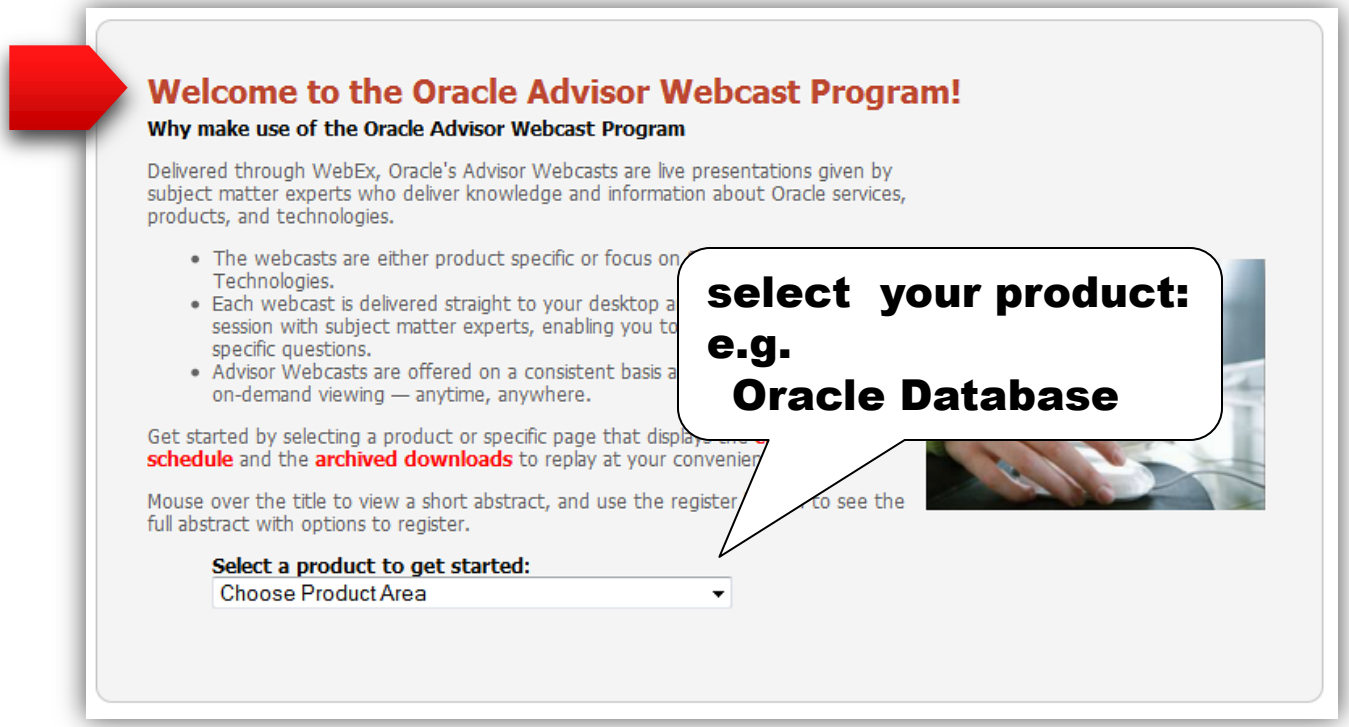

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Oracle Database Technology	PL/SQL Performance Tuning	Jan 24, 08:00 PT	REGISTER
High Availability Data Guard	Data Guard: Overview and Usage of the Data Guard Broker	Feb 19, 08:00 PT	REGISTER

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Instance Performance - 11g	Mutexes in Oracle Database	April 30, 2013	Recording | .pdf
Patching - EM 12c	Automation of patch conflict resolution and deployment through EM 12c	April 25, 2013	Recording | .pdf
Error: ORA-4030	How to use the ORA-4030 Troubleshooting Tool on My Oracle Support	April 17, 2013	Recording | .pdf

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Available References and Resources to Get Proactive

- About Oracle Support Best Practices
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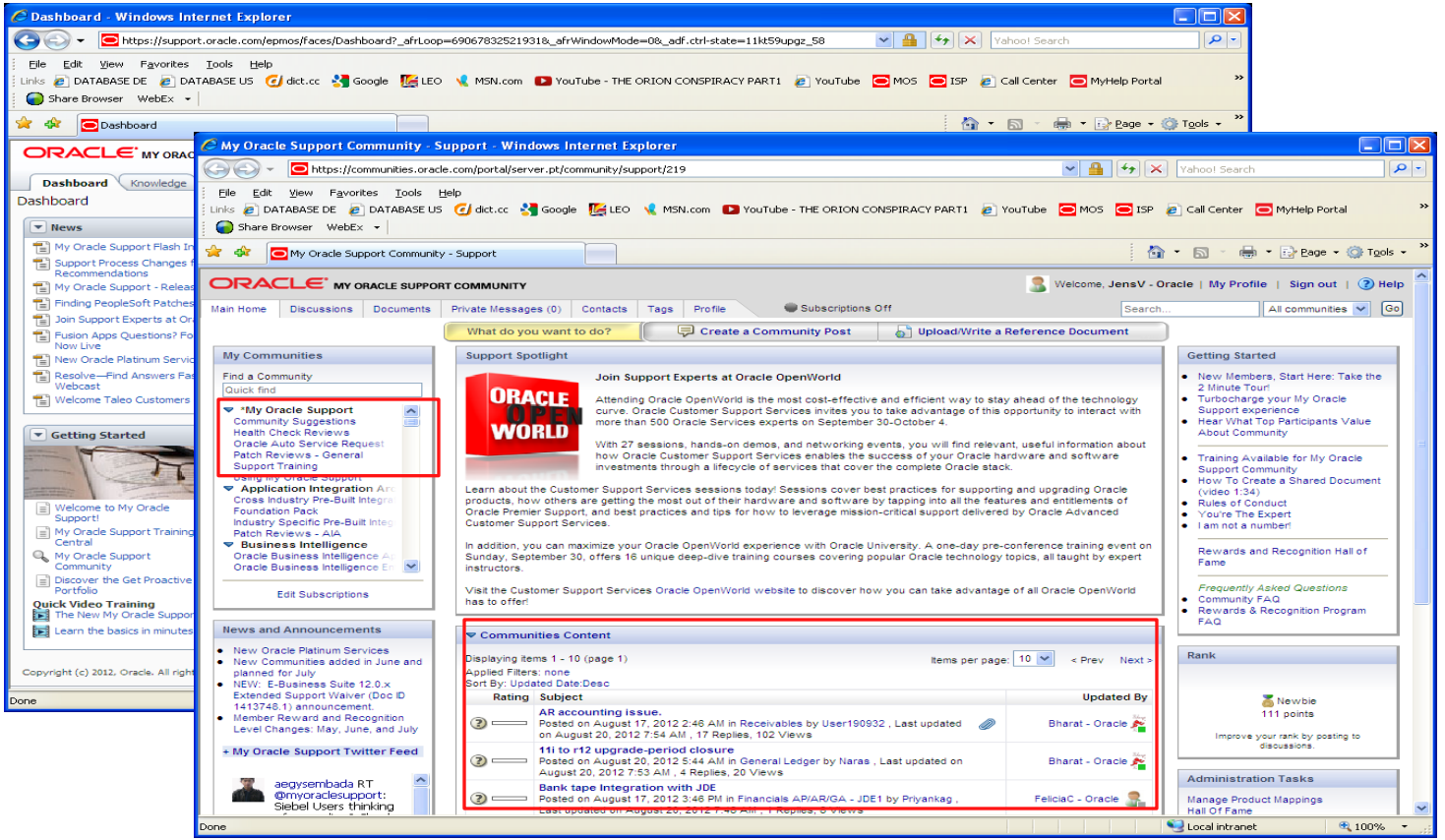

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