

Debugging in APEX and SQL Developer

OOW - 2010

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About Dimitri Gielis

- Director & Co-Founder of APEX Evangelists / Sumneva
- 12+ years of Oracle Experience
- OBUG APEX SIG Leader
- 'Dimitri.Gielis@AE' in the APEX forums
- Presenter at ODTUG, OOW, UKOUG, OBUG, ...
- OCP 8i/9i/10g + APEX Certified
- Oracle ACE Director
- “APEX Developer of the Year 2009”

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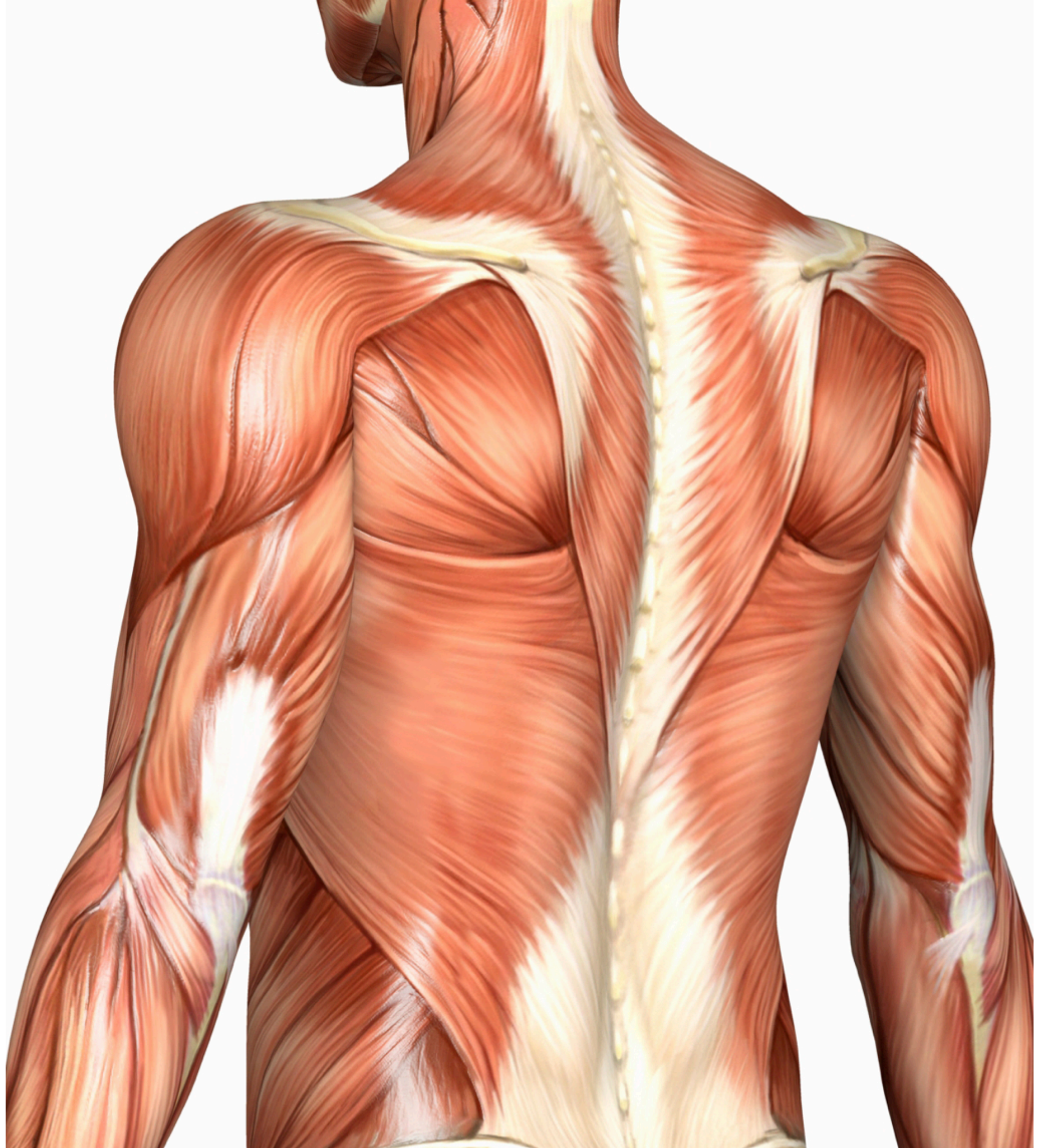
Specific Debugging Methods

- Developer Toolbar
- Debug Mode
- Trace files
- Code Instrumentation
- Client-side Tools
- Interactive Debugging
- Database Monitor
- Others (Application Reports, ...)

This Presentation focusses on

- Code Instrumentation
- Normal Debugging with SQL Developer
- Logging and Debugging in APEX 4.0
- Remote Debugging of APEX with SQL Developer

Code Instrumentation



Code Instrumentation

- Allows us to see what our code is doing at runtime
- Add instrumentation as you code
- Make it configurable
- Many ways to do that (dbms_application_info, ...)
- Is it necessary, does it make the system slower?

If you don't believe me, see what Tom Kyte says about that :-)

<http://tkyte.blogspot.com/2005/06/instrumentation.html>

Code Instrumentation

- <https://logger.samplecode.oracle.com/>

Welcome Dimitri ([Account](#) | [Account Help](#) | [Sign Out](#))



Samplecode Username: **dimitrigielis_ext**

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Summary	A PL/SQL logging and debugging utility.
Categories	plsql , application-express
Owner(s)	tmuth

Author: Tyler D. Muth

Contributing Author: Christopher Beck

Last Updated: 4/16/2009

Project Version: 1.3.0

Related Products: APEX, PL/SQL

Supported DB Versions: XE, 10.2, 11.1, 11.2.

Discussions: [General Questions](#) | [Announcements](#) | [Enhancement Requests](#) | [Bug Reports](#)

Important! Before you can post to discussions you must [Request Project Role](#) and select the role of "Observer". I've set you for that role.

Download Now: https://logger.samplecode.oracle.com/source/browse/*checkout*/logger/tags/1.3.0/logger_1.3.0.zip

- [What is Logger?](#)

About Logger

- Written by Tyler D. Muth (and Christopher Beck)
- Simple to use PL/SQL logging and debugging framework
 - Debugging
 - Error Logging
 - Timing
 - Instrumentation

Installation of Logger

- grant connect,create view, create job, create table, create sequence, create trigger, create procedure, create any context to <user>
- @logger_install.sql

Using Logger

- in your PL/SQL code:
 - `logger.log('Some Text','schema.package.procedure');`
 - `logger.log_error('Error Text','schema.package.procedure');`
 - `logger.log_apex_items('APEX','schema.package.procedure');`
 - ... (many other possibilities)
- `select * from logger_logs_5_min;`

Logger

D E M O N S T R A T I O N

PL/SQL Debugging with SQL Developer

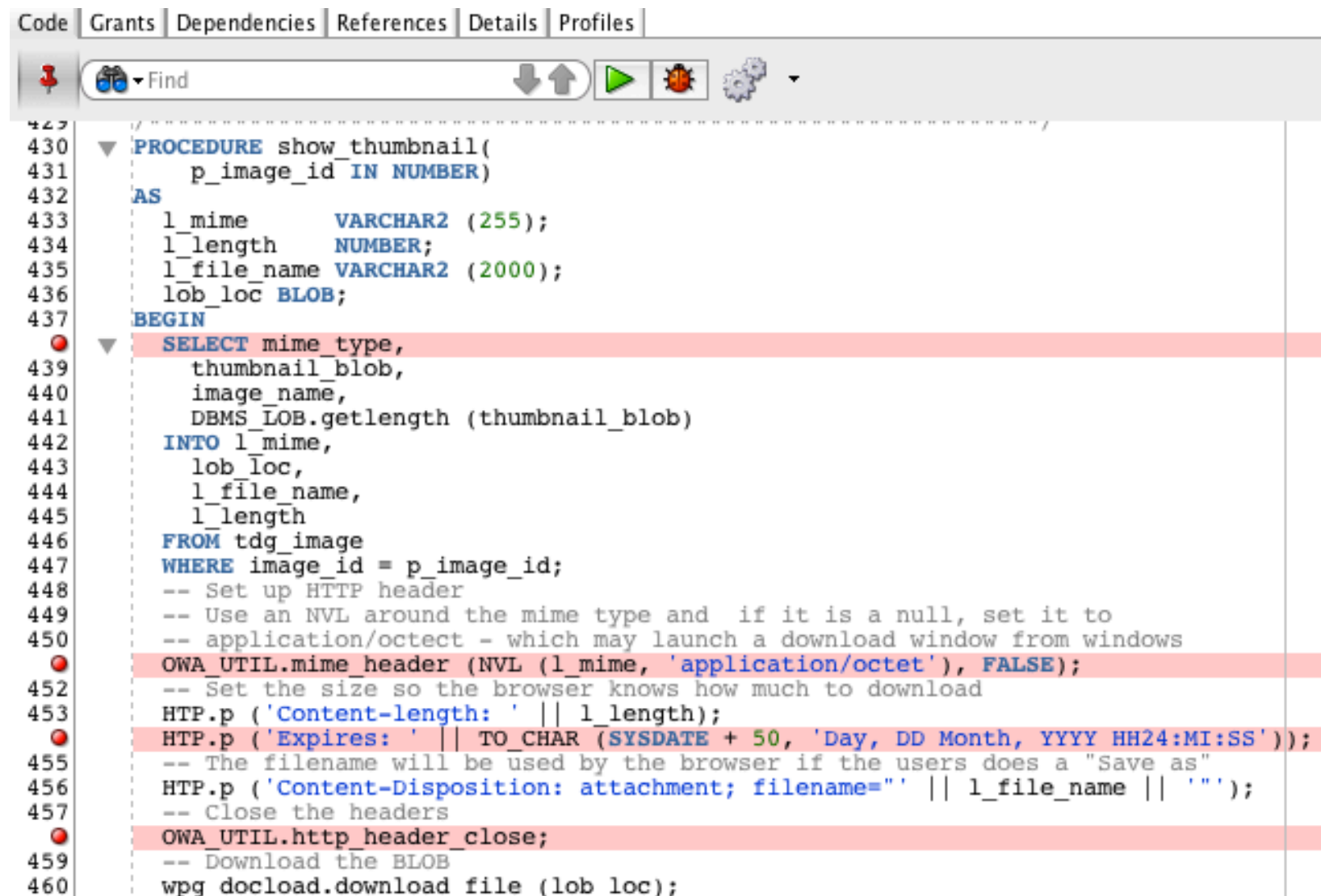


What is Debugging?

- Ability to step through code
- Watch and Change Variables/Parameters
- Set Breakpoints
- View Call and Exception Stack
- Run/don't run specific code

Normal PL/SQL Debugging

- Set Breakpoints
- Compile your package for Debug



```
Code Grants Dependencies References Details Profiles
Find
429
430 PROCEDURE show_thumbnail(
431     p_image_id IN NUMBER)
432 AS
433     l_mime      VARCHAR2 (255);
434     l_length    NUMBER;
435     l_file_name VARCHAR2 (2000);
436     lob_loc     BLOB;
437 BEGIN
438     SELECT mime_type,
439            thumbnail_blob,
440            image_name,
441            DBMS_LOB.getlength (thumbnail_blob)
442     INTO l_mime,
443            lob_loc,
444            l_file_name,
445            l_length
446     FROM tdg_image
447     WHERE image_id = p_image_id;
448     -- Set up HTTP header
449     -- Use an NVL around the mime type and if it is a null, set it to
450     -- application/octet - which may launch a download window from windows
451     OWA_UTIL.mime_header (NVL (l_mime, 'application/octet'), FALSE);
452     -- Set the size so the browser knows how much to download
453     HTP.p ('Content-length: ' || l_length);
454     HTP.p ('Expires: ' || TO_CHAR (SYSDATE + 50, 'Day, DD Month, YYYY HH24:MI:SS'));
455     -- The filename will be used by the browser if the users does a "Save as"
456     HTP.p ('Content-Disposition: attachment; filename="' || l_file_name || '"');
457     -- Close the headers
458     OWA_UTIL.http_header_close;
459     -- Download the BLOB
460     wpg_docload.download_file (lob_loc);
```

Normal PL/SQL Debugging

- Execute in Debug mode
(enables Debugging Log tab)
- Need specific grants!



```
ORA-01031: insufficient privileges  
ORA-06512: at "SYS.DBMS_DEBUG_JDWP", line 68  
ORA-06512: at line 1
```

```
grant DEBUG CONNECT SESSION to <user>;  
grant DEBUG ANY PROCEDURE to <user>;
```

Normal PL/SQL Debugging

- Debugging Toolbar



- Find Execution Point
 - Step Over
 - Step Into
 - Step Out
 - Step to End of Method
 - Resume / Pause / Terminate
- Other tabs: Breakpoints, Smart Data, Data, Watches

Debugging in SQL Dev

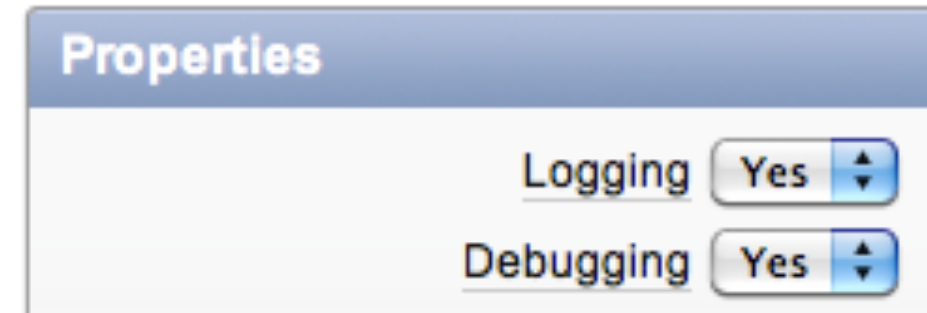
D E M O N S T R A T I O N

Logging and Debugging in APEX 4.0



Logging

- APEX itself is heavily instrument
- Logging can be enabled / disabled
- Results in APEX_WORKSPACE_ACTIVITY_LOG (also in Application Reports)
- dbms_application_info is used a lot behind the scenes
 - look at v\$session, v\$session_longops



Debugging

- DEBUG Mode lets us:
 - View page rendering and processing actions
 - View session state information
 - View timing information (CPU, not wall-clock)
- !! Changed in APEX 4.0 !!
- Results in APEX_DEBUG_MESSAGES

New Debug View in APEX 4.0

Items Pages Queries Tables PL/SQL Images **Debug** Session Errors

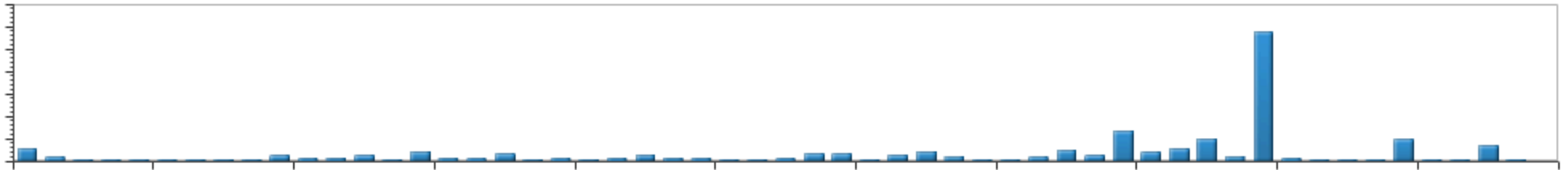
Page View Identifier

Application: **367**

Page: **1**

Elapsed Time: **0.12587**

Maximum Execution Time **0.02875**



Elapsed	Execution	Message	Level	Graph
0.03688	0.00276	S H O W: application="367" page="1" workspace="" request="" session="1681521389910867"	3	
0.03956	0.00079	Language derived from: FLOW_PRIMARY_LANGUAGE, current browser language: en	3	
0.04033	0.00036	alter session set nls_language="AMERICAN"	3	
0.04069	0.00021	alter session set nls_territory="AMERICA"	3	
0.04090	0.00032	NLS: CSV charset=WE8MSWIN1252	3	
0.04122	0.00021	...NLS: Set Decimal separator="."	3	
0.04143	0.00034	...NLS: Set NLS Group separator=","	3	
0.04177	0.00032	...NLS: Set g_nls_date_format="DD-MON-RR"	3	
0.04209	0.00038	...NLS: Set g_nls_timestamp_format="DD-MON-RR HH.MI.SSXFF AM"	3	
0.04247	0.00120	...NLS: Set g_nls_timestamp_tz_format="DD-MON-RR HH.MI.SSXFF AM TZR"	3	
0.04368	0.00048	...Setting session time_zone to -04:00	3	
0.04415	0.00074	NLS: Language=en	3	
0.04489	0.00114	Application 367. Authentication: CUSTOM2. Page Template: 10156214620740501	3	

Ways to turn on/off Debug Mode

- Application can run in DEBUG Mode
 - Using the Developer Toolbar (toggle)
 - Using the URL (YES/NO)

f?p=App:Page:Session:Request:Debug:ClearCache:

- Disabled in production
(Run Application Only or Debugging: No)

Debugging behind the scenes

- Information is stored in
 - `wwv_flow_debug`
 - `wwv_flow_debug_messages`
 - `wwv_flow_debug_messages2`
- Level = importance, but everything seems to be 3...

Debug Mode

- We can reference the value of DEBUG Mode
 - :DEBUG
 - APEX_APPLICATION.G_DEBUG
 - v('DEBUG')
 - &DEBUG.

Write to APEX debugger (code instr.)

```
if APEX_APPLICATION.G_DEBUG = 'YES'  
then
```

```
    . . .
```

```
end if;
```

```
wwv_flow.debug('enter debug info');
```

```
begin
```

```
    apex_040000.wwv_flow_debug_message.enable_debug_messages(p_level=>3);
```

```
    apex_040000.wwv_flow_debug_message.log_message('I am here',true,1);
```

```
end;
```

Logging and Debugging in APEX 4.0

D E M O N S T R A T I O N

Remote Debugging of APEX with SQL developer

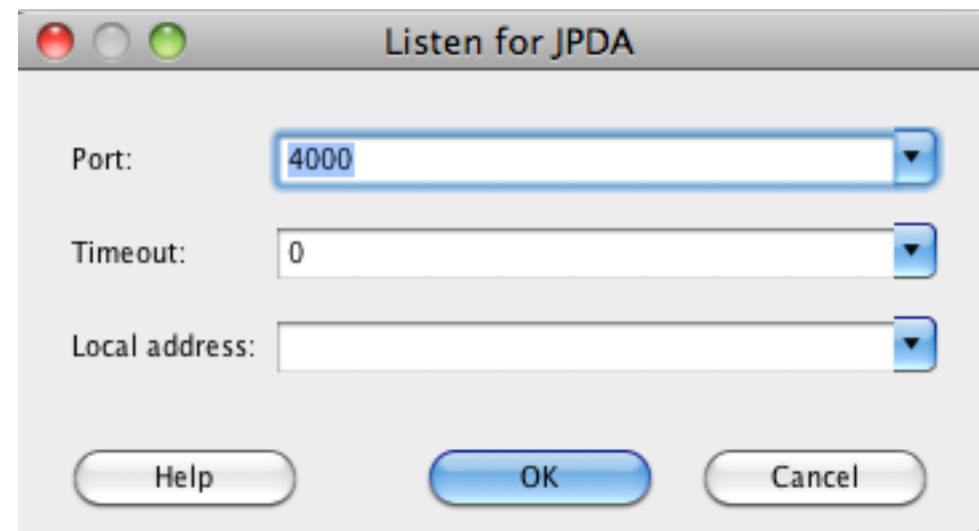
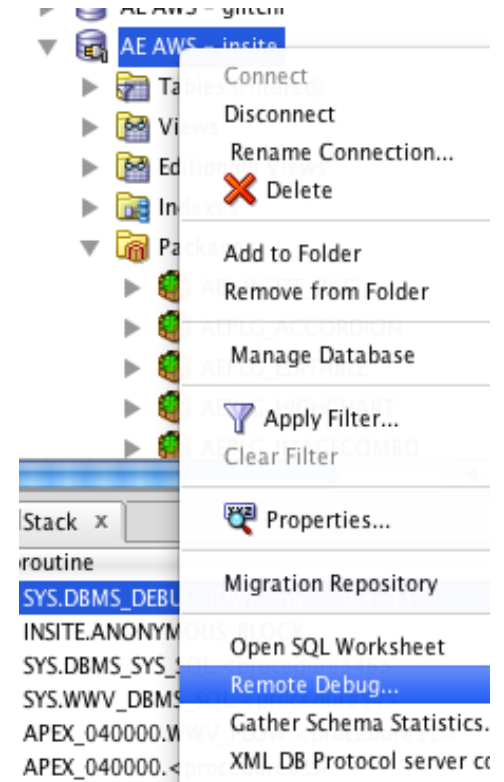


Local Debugging

- Set Breakpoint(s)
- Compile code in Debug Mode
- Execute Code
- ... Debug ...

Setup Debugging

- Start the Remote Debug in SQL Developer (Right click on connection)
- Set the port and your (developer) IP address



Remote Debugging

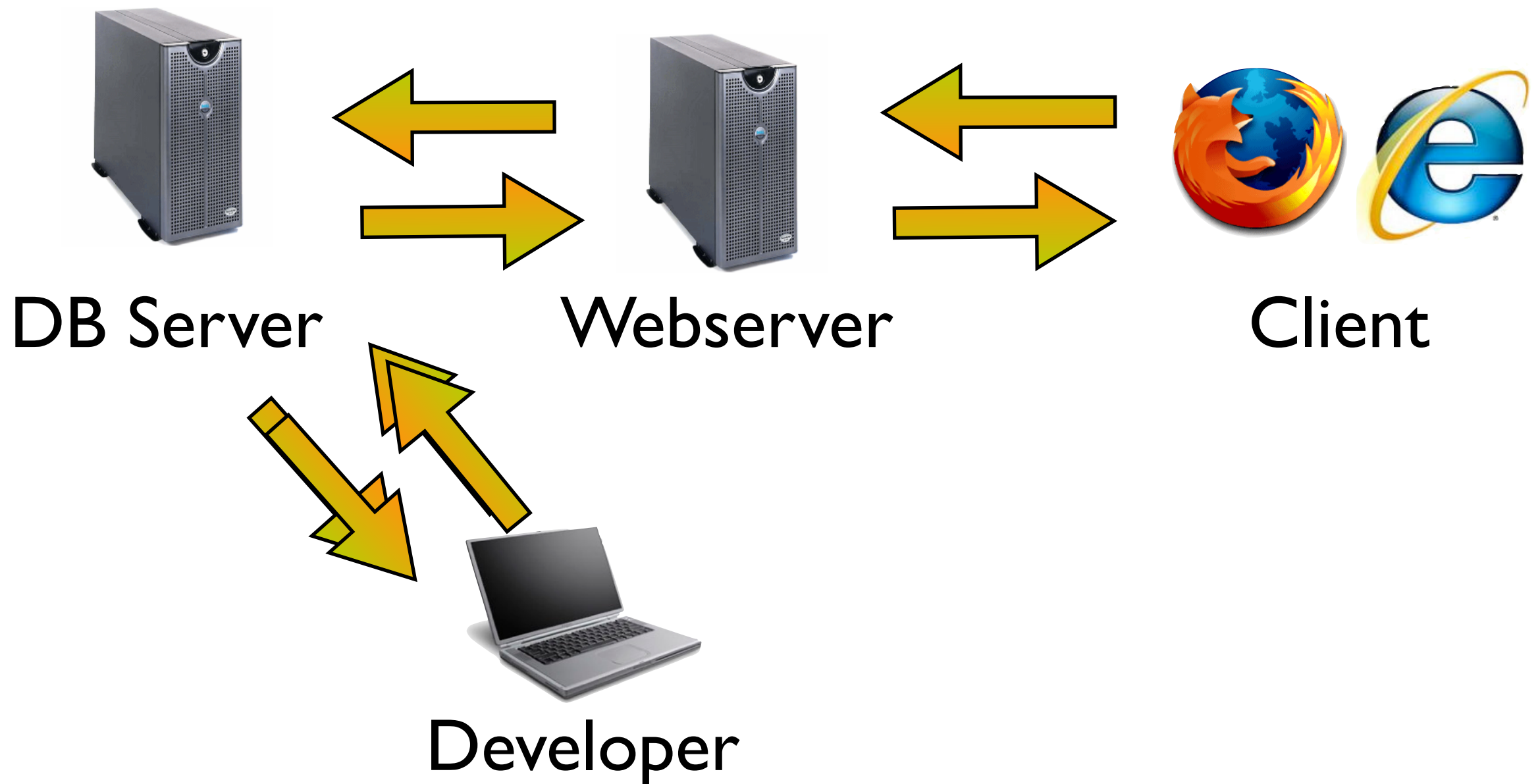
- Connect to Remote Debugger
- Set Breakpoint(s)
- Compile code in Debug Mode
- Execute Code
- ... Debug ...
- Disconnect from Remote Debugger

Remote Debugging Requirements

- Remote Debugging Relies on DBMS_DEBUG_JDWP package (introduced in 9iR2)
- Necessary grants **EPG**:
 - grant debug any procedure to ANONYMOUS;
 - grant debug connect session to ANONYMOUS;
- Necessary grants **Other**:
 - grant debug any procedure to APEX_PUBLIC_USER;
 - grant debug connect session to APEX_PUBLIC_USER;

Remote Debugging Requirements

- Machine with SQL Developer running needs access to the server and the other way round!



Remote Debugging

- Example:

```
dbms_debug_jdwp.connect_tcp(host, port);  
... call code ...  
dbms_debug_jdwp.disconnect;
```

- Through the URL (APEX >= 3.1)

```
f?p=APP_ID:PAGE_ID:SESSION_ID::REMOTE
```

Remote Debugging APEX with SQL Dev

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Summary

- Code Instrumentation is important
- Normal Debugging with SQL Developer
- Logging and Debugging in APEX 4.0
- Remote Debugging of APEX with SQL Developer

Q & A

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