



Friends of Oracle and Java



Instrumenting, Analyzing, & Tuning the Performance of Oracle ADF Applications

Frank Houweling
UKOUG 2014

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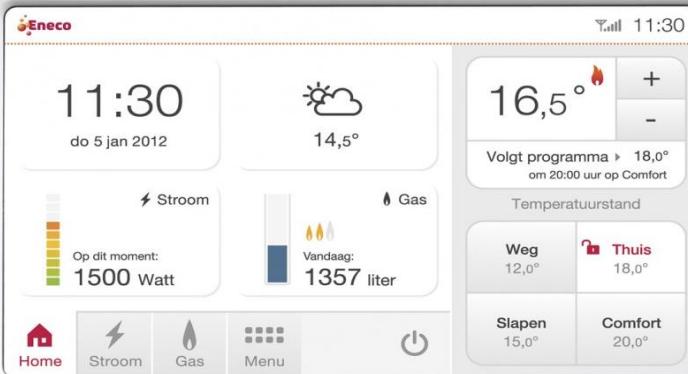
- Frank Houweling
- Senior Java / ADF specialist
- Focus on performance diagnosis and performance management
- Lead developer of the ADF Performance Monitor
- AMIS (Netherlands)
- Oracle Partner 

Agenda

- What is instrumentation
- Why instrumentation is important
- Cost of tracking
- Analyzing and tuning
- Oracle ODL Analyzer
- Build your own performance monitor
 - What you can instrument
 - Not ADF specific
 - ADF specific
 - Five examples how you can instrumentation key spots in ADF applications
 - HTTP Request
 - Errors / Exceptions
 - ADF Business Components
 - JVM memory consumption
 - ApplicationModule pooling (activation and passivation)

Instrumentation

- Instrumentation; we can not live without it



Instrumentation of Code

- Instrumentation refers to an ability to monitor or measure the level of a product's performance, to diagnose errors and to write trace information
- Instrumenting gives visibility and insight of what is happening inside the application
 - What methods and queries are executed, when and how often
- Programmers implement instrumentation in the form of code instructions that monitor specific components in a system

Why instrumentation is important (1)

- Many applications are like a smoke screen
- It is very unclear what is happening in the background
- Where should we look for bottlenecks ?



Why instrumentation is important (2)

- End-users do not accept slow applications anymore
- Is your application running as it should?
- Response Times within SLA agreements?
- Are there errors? What type/severity of errors?



Cost of Tracking

- Tracking everything is impossible – it is like a fire hose; there is far too much data and there will be a significant performance overhead
- We should find the balance; to track important/relevant events but also not tracking too much
- Tracking should be able to be turned on and off at runtime

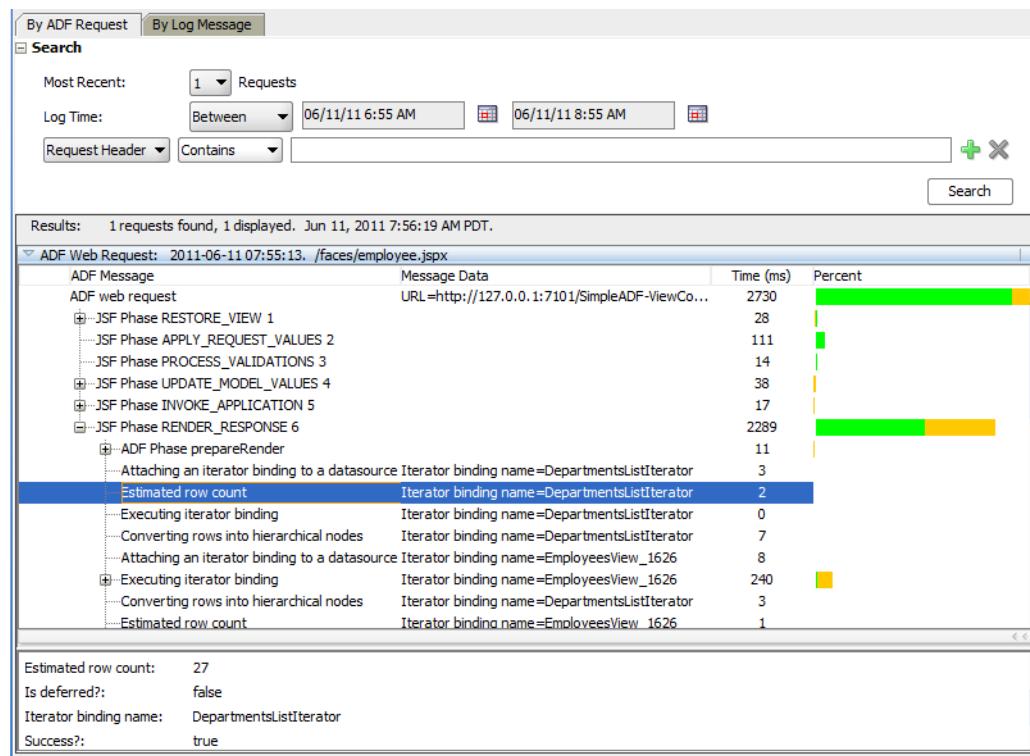


Analyzing and Tuning

- What is the SLA?
- If users are complaining and if they are right, you have to know where time is spent
- Instrumentation should give clear performance information (metrics) when methods/operations begin and when they end, and calculate how long it took to execute
 - What methods and queries are executed, when and how often
- When we have insight into performance problems specific problems may be addressed

Instrumentation Provided by Oracle: ODL Analyzer

- In JDeveloper support for performance analysis of ADF apps is provided through the [ODL Analyzer](#) (By ADF Request).
- **Problem:** can't be used in test en product environments because of the amount of logging generated and the significant performance overhead



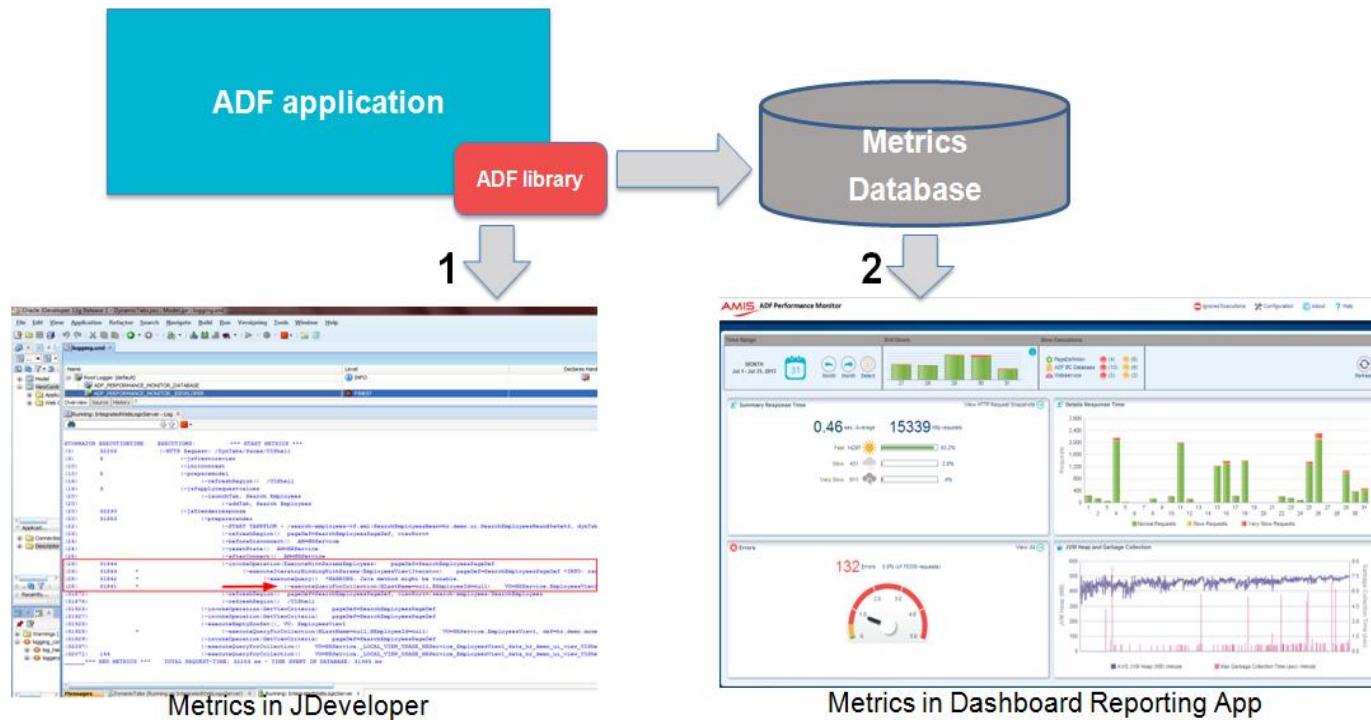
Built Your Own Monitor; Instrument your ADF code

- You can instrument your own ADF code and create your own performance monitor tracking tool
 - Create several ‘stopwatch’ metrics classes that can be plugged in into the ADF framework
 - ADF BC framework extension classes
 - Fusion lifecycle phaseListener
 - ServletFilter
 - HTTP eventListener
 - Error eventListener
 - Create a “metrics” library that contains your metrics code

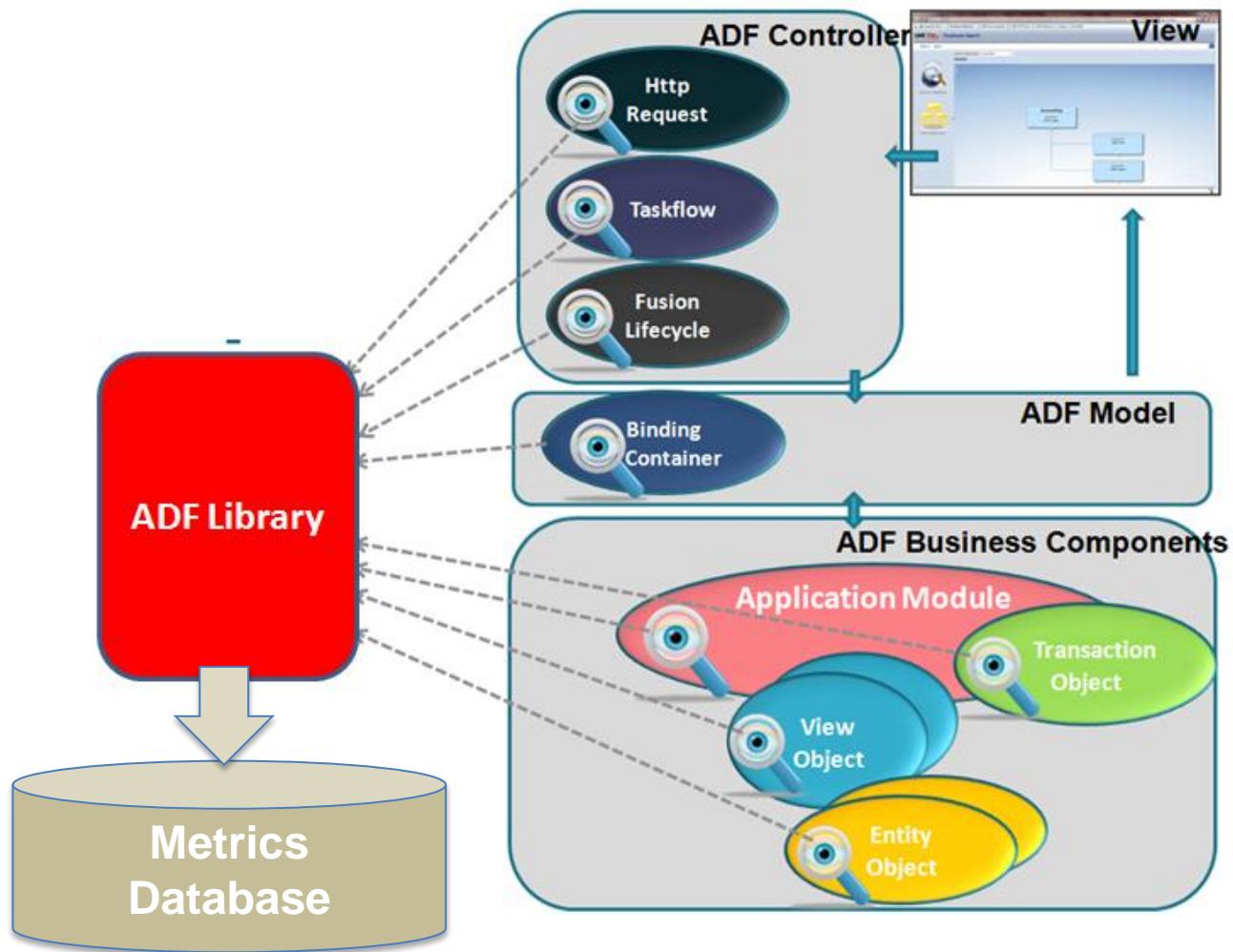


Save Metrics in Database

- Add this library to your ADF app
- The metrics library saves the metrics to the database
 - That uses its own JDBC Datasource
- You can create a Dashboard Reporting App based on the metrics



Instrument Multiple Layers



Instrumentation in Enterprise Manager

- SQL Execution Details shows metrics that give visibility and insight
 - After analysis SQL experts can take action to solve slow SQL executions

ORACLE® Enterprise Manager

Active Reports English

Monitored SQL Execution Details

Overview

SQL ID: 42xpu26gv8bp2	Execution Started: Sun Mar 17, 2013 11:13:18 PM	Last Refresh Time: Sun Mar 17, 2013 11:13:18 PM	Execution ID: 16777216	User: HARI	Fetch Calls: 0
with tp as (select * from tbl_parallel), tl as (select length(id_val) id from tbl_parallel where id_val > tl.id) select min(length(id_val)) from tp t1, tp t2, tl where t1.id > t2.id > tl.id					
Session ID: 73 Session Serial #: 54 User ID: 91 Module: SQL Developer Service: SYS\$USERS Program: SQL Developer			Time & Wait Statistics		
			Duration	Database Time	OS / SQL & Java
			39.0s	37.5s	0.0s
			100	100	0
			IO Statistics		
			Buffer Gets	631	
			IO Requests	2,759	
			IO Bytes	167MB	

Details

Plan Statistics **Activity**

Plan Hash Value: 1113008812

TIP: Right mouse click on the table allows to toggle between IO Requests and IO Bytes

Operation	Name	Estimate...	Cost	Timeline(39s)	Exec...	Actual ...	Memory	Temp	IO Requests	CPU Activity %	Wait Activity %
SELECT STATEMENT					1	0					
MERGE JOIN			125M	4,917							
SORT JOIN			250K	4,170							
MERGE JOIN			250K	144							
SORT JOIN			500	13							
TABLE ACCESS FULL	TBL_PARALLEL		500	12							
SORT AGGREGATE			1								
TABLE ACCESS FULL	TBL_PARALLEL		9,999	12							
SORT JOIN			9,999	129							
TABLE ACCESS FULL	TBL_PARALLEL		9,999	12							
SORT JOIN			9,999	129							
TABLE ACCESS FULL	TBL_PARALLEL		9,999	12							

ADF Call Stack

- Like the database EM we can also create call stacks in ADF
 - Gives visibility into which ADF method caused other methods to execute
 - Organized by the sequence of their execution
 - Elapsed times and a view of what happened when.

REQUEST CALL STACK

ADF Web Request Message

ADF Executions	tip: click on warnings and ADF executions to see details	Time (ms)	Percent of Request	Time in Request (ms)
ADF Phase initcontext		0		11
ADF Phase preparemodel				
refreshRegion() region=/UIShell				
ADF Phase jsfapplyrequestvalues				
launchTab				
addTab				
ADF Phase jsfrenderresponse				
ADF Phase preparerender				
START TASKFLOW /search-employees-tf				
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=				
createApplicationModule()				
connect()				
create()				
afterConnect()				
invokeOperation(ExecuteWithParamsEmployees)				
executeIteratorBindingWithParams(EmployeesView1Iterator)				
executeQuery()				
executeQueryForCollection() VO=HRService.EmployeesView1				
Fetching, creating rows for HRService.EmployeesView1, fetched: 35	7209	17	9073	
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=/search-empcl		0	9110	
refreshRegion() region=/UIShell		0	9112	
invokeOperation(GetViewCriteria)		3	9233	
executeEmptyRowSet()		1	9284	
executeQueryForCollection() VO=HRService.EmployeesView1, times executed=2		0	9284	
executeQueryForCollection() VO=HRService._LOCAL_VIEW_USAGE_HRService_Employ		SQL 1	11893	
Fetching, creating rows for HRService._LOCAL_VIEW_USAGE_HRService_EmployeesVi		2	11894	
executeQueryForCollection() VO=HRService._LOCAL_VIEW_USAGE_HRService_Emplo		SQL 3424	11981	
Fetching, creating rows for HRService._LOCAL_VIEW_USAGE_HRService_Employee		3215	12189	

SQL Query

```
SELECT Employees.EMPLOYEE_ID, Employees.FIRST_NAME, Employees.LAST_NAME,
Employees.EMAIL, Employees.PHONE_NUMBER, Employees.HIRE_DATE, Employees.JOB_ID,
Employees.SALARY, Employees.COMMISSION_PCT, Employees.MANAGER_ID,
Employees.DEPARTMENT_ID ,hr_main.sleep(0.2) as ind_slow ,Employees.FIRST_NAME||

'||Employees.LAST_NAME full_name_calculated FROM EMPLOYEES Employees where (
(UPPER(Employees.LAST_NAME) LIKE UPPER('%|| nvl(BLastName)|| %')) and (
(Employees.EMPLOYEE_ID = nvl(BEmployeeId,Employees.EMPLOYEE_ID) ))
```

Summary request User

Garbage Collection Time Change 0

Managed Server DefaultServer

36

What you could Instrument (1)

(Not ADF specific)

- HTTP Request
 - Response Time
 - User ID,
 - User Organization
 - Button/Link clicked on (ADF component ID)
 - View ID
 - Session ID
 - Date and Time
 - Browser
 - Client IP
 - WLS Managed Server Name
 - Server URI
 - ECID
- Errors / Exceptions
 - Error Code, Error Message, Error Class
 - Stack Trace
- JVM
 - Heap Space
 - Garbage Collection Time
-

What you could Instrument (2) (ADF specific)

- ViewObject SQL queries
 - BindVariable values
 - Rows fetched (loaded) from database into ADF app
 - Applied ViewCriteria
 - SQL query statement
 - ViewAccessors
- EntityObject
 - DML methods
 - Locks
- ApplicationModule
 - AM Pooling; passivations and activations
 - Database transactions
 - Creation Time
 - Connection time to database
- Fusion Lifecycle phases
 - Start & end of phases
- Taskflow parameters
 - Initializers and start parameters
 - finalizers
- BindingContainer (PageDef)
 - Iterator executions
 - Operations and Custom Methods
-

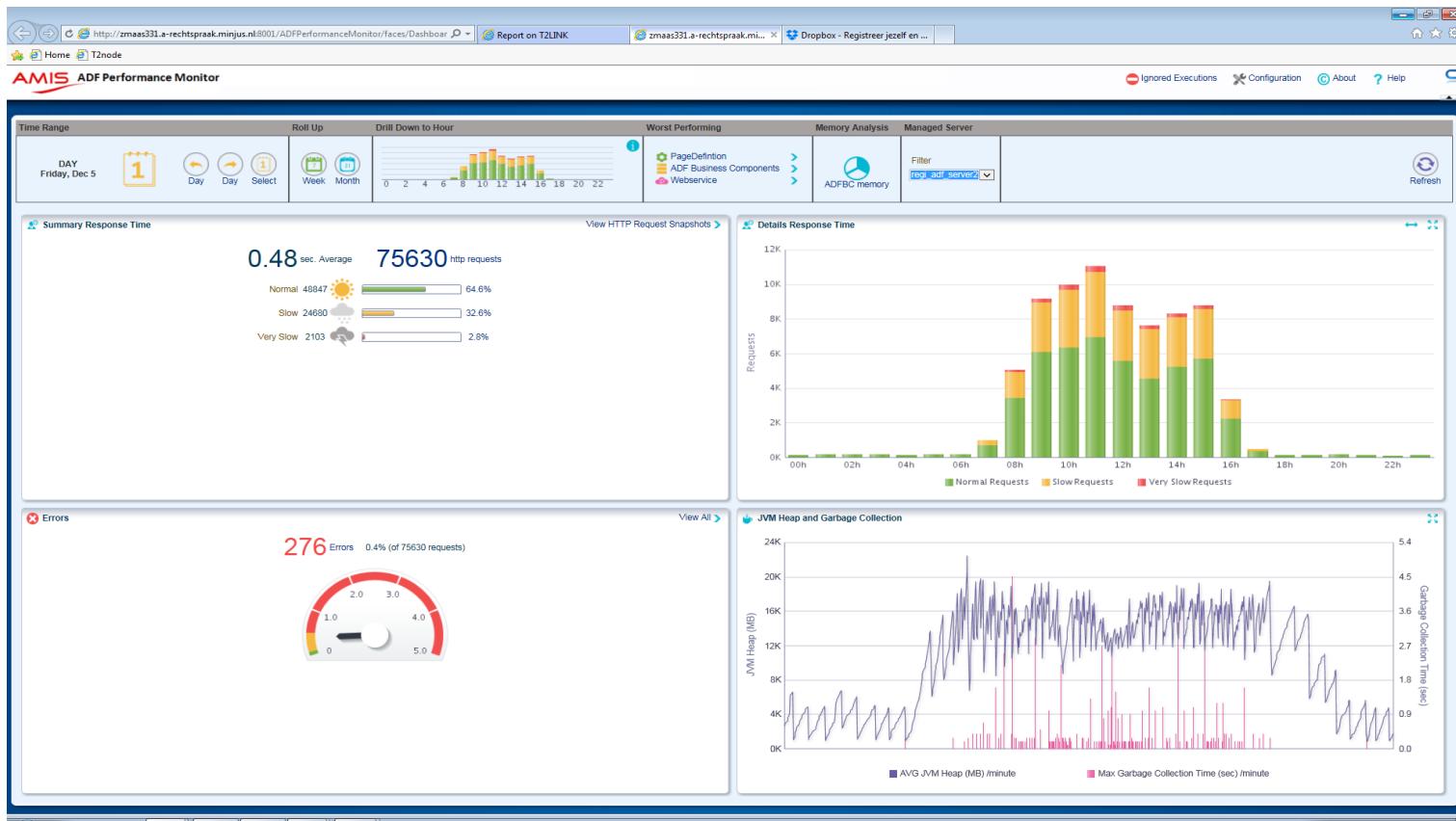
Case 1

HTTP Request Instrumentation

- Use a ServletFilter to instrument HTTP Request response time
 - Instrument *doFilter()*
 - Alternatively *HttpServletRequestListener*
- User ID
 - *ADFContext adfCtx = ADFContext.getCurrent();
SecurityContext secCntx = adfCtx.getSecurityContext();
String userId = secCntx.getUserName();*
- Managed Server
 - *System.getProperties().getProperty("weblogic.Name");*
- Session ID
 - *httpServletRequest.getSession().getId()*
- Server URI
 - *httpServletRequest.getRequestURI();*

Monitor Service Level Agreement (SLA)

- Real-time performance information
- Are response times within or outside SLA boundaries?
- Is immediate action required?



Monitor SLA - HTTP Request Response Time

- Example: from 15:00 to 16:00 the response times have increased significantly (more red and yellow colored parts in the 15u bar)
 - This should be a trigger to investigate the root cause



Monitor a specific End-users

- Problems of specific end-users can be analyzed

The screenshot shows a web-based performance monitoring tool. At the top, there's a navigation bar with links like 'Home' and 'T2node'. Below it, a search bar has 'HTTP REQUESTS' typed in. The main area displays a table titled 'HTTP Requests (305)' with columns: Snapshot, Response Time (Sec), Time in Database (Sec), Request Time, Button/Link clicked on, and User ID. Most rows show 'snapshot' in the 'Snapshot' column and 'KORSELS' in the 'User ID' column. A specific row for 'snapshot' at 12:05 14:41:32 has 'Item1' in the 'Button/Link clicked on' column. A modal dialog box titled 'Select User' is open over the table, showing a list with 'KORSELS*' at the top and 'KORSELS' selected. There are 'OK' and 'Cancel' buttons at the bottom of the dialog.

Snapshots	Response Time (Sec)	Time in Database (Sec)	Request Time	Button/Link clicked on	User ID
snapshot	19.65	19.57	12-05 13:33:31	qsFormZakIt	KORSELS
snapshot	7.83	7.57	12-05 13:33:09	qsFormZakIt	KORSELS
snapshot	6.28	5.84	12-05 15:14:32	qsFormZakIt	KORSELS
snapshot	2.30	1.85	12-05 14:41:29	qsFormZakIt	KORSELS
snapshot	1.43	1.25	12-05 13:30:42	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.32	1.12	12-05 13:44:46	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.27	0.82	12-05 15:14:54	qsFormZakIt	KORSELS
snapshot	1.14	0.59	12-05 14:10:00	Item1	KORSELS
snapshot	1.13	0.04	12-05 14:12:15	ZvpRegionRgLcSdI	KORSELS
snapshot	1.10	0.57	12-05 16:27:31	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.08	0.70	12-05 14:41:32	qsFormZakIt	KORSELS
snapshot	1.08	0.63	12-05 16:27:26	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.03	0.81	12-05 13:36:21	ZvpArl	KORSELS
snapshot	1.02	0.59	12-05 13:38:12	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.01	0.56	12-05 13:38:15	ZvpZittingPresentatiennaam	KORSELS
snapshot	1.00	0.91	12-05 13:33:20	qsFormZakIt	KORSELS
snapshot	0.99	0.54	12-05 13:23:41	ZvpZittingPresentatiennaam	KORSELS
snapshot	0.96	0.52	12-05 13:44:15	ZvpZittingPresentatiennaam	KORSELS
snapshot	0.95	0.18	12-05 16:08:05	qsFormZakOb	KORSELS
snapshot	0.94	0.47	12-05 16:36:16	ZvpZittingPresentatiennaam	KORSELS
snapshot	0.92	0.84	12-05 13:33:18	qsFormZakIt	KORSELS
snapshot	0.92	0.49	12-05 13:30:39	ZvpZittingPresentatiennaam	KORSELS
snapshot	0.91	0.15	12-05 15:39:53	qsFormZakOb	KORSELS
snapshot	0.91	0.50	12-05 17:13:22	ZvpArl	KORSELS
snapshot	0.89	0.45	12-05 13:44:44	ZvpZittingPresentatiennaam	KORSELS

Case 2

Instrumenting Errors / Exceptions

- Configure a custom *MetricsDCErrorHandler* that extends from *DCErrorHandlerImpl*:
 - <http://technology.amis.nl/2014/04/27/adf-performance-monitor-troubleshooting-test-and-production-errors/>

The screenshot shows a Java code editor with the file `MetricsDCErrorHandlerImpl.java` open. The code implements a class `MetricsDCErrorHandlerImpl` that extends `DCErrorHandlerImpl`. It overrides the `reportException` method to log exceptions if they are active, and then calls the superclass's `reportException` method.

```
1 package nl.amis.metrics.adf;
2
3 import ...
4
5
6
7 public class MetricsDCErrorHandlerImpl extends DCErrorHandlerImpl {
8
9     public MetricsDCErrorHandlerImpl(boolean b) {
10         super(b);
11     }
12
13     public MetricsDCErrorHandlerImpl() {
14         super(true);
15     }
16
17     @Override
18     public void reportException(DCBindingContainer dCBindingContainer, Exception exception) {
19         boolean active = MetricsUtils.isActive();
20         if (active) {
21             String message = exception.getMessage();
22             if (message != null && !(message.contains("ORA-20"))) {
23                 MetricsUtils.logException(exception, false);
24             }
25         }
26         super.reportException(dCBindingContainer, exception);
27     }
28 }
```

Errors (1) - Overview

AMIS ADF Performance Monitor

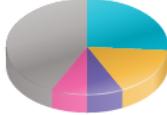
ERRORS

Date/Time Range Start 2013-12-30 00:00:00 End 2014-01-05 23:59:59

Ignore Executions Configuration About Help

Show search region

Errors (42)



- class.java.lang.NullPointerException (11)
- ORA-04068: existing state of packages has been discarded (7)
- ORA-04068: existing state of packages has been discarded ORA-04061: existing st... (7)
- ORA-02292: integrity constraint (PGI.PGL_KPN_ND_FK) violated - child record fo... (3)
- ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated (2)
- ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PAG..... (2)
- other (18)

HTTP Requests (42)

Snapshots	Exception Message	Request Time	Database process time	Button/Link clicked on	User ID	Show User ID	Session details	Server
snapshot	ORA-04068: existing state of packages has been discarded ORA-04061: existing st...	0.35	0.24	01-03 15:40:49	-	admin@oga		
snapshot	Er is geen bedrijfsnummer bekend bij dit plan.	0.55	0.00	01-03 10:27:29	tk	admin@st_geb		
snapshot	ORA-04068: existing state of packages has been discarded ORA-04061: existing st...	0.46	0.00	01-03 15:41:01	PagMainMenuPagg001Start	admin@oga		
snapshot	ORA-02290: check constraint (PGI.PAG_BGG_02) violated ORA-06512: at PGI.PAG_...	0.40	0.33	01-03 09:43:45	pagadfil_train_finish	admin@oga		
snapshot	ORA-04068: existin ORA-02290: check constraint (PGI.PAG_BGG_02) violated ORA-06512: at PGI.PAG_BGG_CREATE, line 90	0.38	0.13	01-03 16:06:24	-	admin@oga		
snapshot	Er is geen bedrijfsn ORA-06512: at PGL.PAGA001_PJT_CREATE_ACTIE, line 70 ORA-06512: at PGL.PAGA001_PJT_CREATE_ISI, line 2	0.18	0.03	01-03 10:26:21	tk	admin@st_geb		
snapshot	ORA-02292: integrity constraint (PGI.S_KPN_ND_FK) violated - child record fo...	0.16	0.06	01-03 17:28:50	deleteKmkDialog	admin@oga		
snapshot	Write failed: Broken pipe	0.15	0.00	01-02 14:52:04	-	admin@oga		
snapshot	ORA-04068: existing state of packages has been discarded ORA-04061: existing st...	0.15	0.00	01-03 16:09:02	ADF_Dialog	admin@st_kvs		
snapshot	popView(): No view has been pushed.	0.11	0.00	01-03 10:31:36	pagadfil_lov_annuleer	admin@OGA		
snapshot	ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PAG...	0.10	0.04	12-31 10:50:19	crtSBC	admin@oga		
snapshot	ORA-00001: unique constraint (PGI.PAG_PJT_UK_01) violated ORA-06512: at PGI.PAG...	0.10	0.03	01-03 16:44:51	pagadfil_train_finish	admin@oga		
snapshot	ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PAG...	0.10	0.00	12-31 11:22:40	crtSBC	admin@oga		

Errors (2) - Stacktrace

ERRORS

Date/Time Range Start 2013-12-30 00:00:00 End 2014-01-05 23:59:59

Errors (42)

class java.lang.NullPointerException (11)
ORA-04068: existing state of packages has been discarded
ORA-04068: existing state of packages has been discarded ORA-04061: existing st... (7)
ORA-02292: integrity constraint (PGI.PGI_KPN_KND_FK) violated - child record fo... (3)
ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated
ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PAG.....
other (18)

HTTP Requests (42)

Snapshots	Exception Message	Request Time	Database process time	Button/Link clicked on	User ID	Session details	Server
snapshot	ORA-04068: existing state of packages has been discarded ORA-04061: existing st...	0.46	0.00	01-03 15:41:01	PagMainMenuPagg001Start	admin@oga	
snapshot	ORA-02290: check constraint (PGI.PAG_BGG_CK_02) violated ORA-06512: at PGI.PAG...	401.00	332.00	01-03 09:43:45	pagedfib_train_finish	admin@oga	
snapshot	ORA-04068: existing state of packages						
snapshot	Er is geen bedrijfsnummer bekend bij dit						
snapshot	ORA-02292: integrity constraint (PGI.PGI						
snapshot	Write failed: Broken pipe						
snapshot	ORA-04068: existing state of packages						
snapshot	popView(): No view has been pushed.						
snapshot	ORA-00001: unique constraint (PGI.PAG						
snapshot	ORA-00001: unique constraint (PGI.PAG						
snapshot	ORA-00001: unique constraint (PGI.PAG						
snapshot	ORA-00001: unique constraint (PGI.PAG						
snapshot	class java.lang.NullPointerException						

REQUEST CALL STACK

ADF Web Request Message Exception Stack Trace

java.sql.SQLIntegrityConstraintViolationException: ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated
ORA-06512: at "PGI.PAGF001_CTT_BUWERKEN_IFG", line 171
ORA-06512: at "PGI.PAGF001_CTT_BUWERKEN_IFG", line 249
ORA-06512: at "PGI.PAGF001_API", line 85
ORA-06512: at line 1

```

at oracle.jdbc.driver.T4CTTloer.processError(T4CTTloer.java:462)
at oracle.jdbc.driver.T4CTTloer.processError(T4CTTloer.java:405)
at oracle.jdbc.driver.T4C8Oall.processError(T4C8Oall.java:931)
at oracle.jdbc.driver.T4CTTfun.receive(T4CTTfun.java:481)
at oracle.jdbc.driver.T4CTTfun.doRPC(T4CTTfun.java:205)
at oracle.jdbc.driver.T4C8Oall.doOALL(T4C8Oall.java:548)
at oracle.jdbc.driver.T4CPreparedStatement.doOAll(T4CPreparedStatement.java:217)
at oracle.jdbc.driver.T4CPreparedStatement.executeForRows(T4CPreparedStatement.java:1115)
at oracle.jdbc.driver.OracleStatement.executeUpdateWithTimeout(OracleStatement.java:1498)
at oracle.jdbc.driver.OraclePreparedStatement.executeInternal(OraclePreparedStatement.java:3769)
at oracle.jdbc.driver.OraclePreparedStatement.executeUpdate(OraclePreparedStatement.java:3904)
at oracle.jdbc.driver.OraclePreparedStatementWrapper.executeUpdate(OraclePreparedStatementWrapper.java:1512)
at weblogic.jdbc.wrapper.PreparedStatement.executeUpdate(PreparedStatement.java:172)
at nl.pagoni.paglib.model.PayBaseApplicationModuleImpl.callStoredProcedure(PayBaseApplicationModuleImpl.java:154)
at nl.pagoni.pagf001.model.IfpPagf001AMImp.wzgigCtsSpecifex(IfpPagf001AMImpl.java:93)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:39)
at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:25)
at java.lang.reflect.Method.invoke(Method.java:597)
at oracle.adf.model.binding.DCInvokeMethod.invokeMethod(DCInvokeMethod.java:657)
at oracle.adf.model.binding.DCDDataControl.invokeMethod(DCDDataControl.java:2143)
at oracle.adf.model.bc4j.DCJboDataControl.invokeMethod(DCJboDataControl.java:3114)
at oracle.adf.model.binding.DCInvokeMethod.callMethod(DCInvokeMethod.java:261)
at oracle.jbo.uicl.binding.JUCtrlActionBinding.bind(JUCtrlActionBinding.java:1635)
at oracle.adf.model.binding.DCDDataControl.invokeOperation(DCDDataControl.java:2150)
at nl.amis.metrics.adf.MetricsDataControl.invokeOperation(MetricsDataControl.java:211)
at oracle.jbo.uicl.binding.JUCtrlActionBinding.invoke(JUCtrlActionBinding.java:740)
at oracle.adf.controller.v2.lifecycle.PageLifecycleImpl.executeEvent(PageLifecycleImpl.java:402)

```

Summary request

User
Time of request
31-12-2013 10:50:19
Response Time (ms)
101
Response Time in database (ms)
41
Server URI
ovamixu104:7023
User clicked on
cttSBC
JVM memory (MB)
370
Jvm Heap Change
1
Garbage Collection Time Change
0

Errors (3) - ADF Callstack

ERRORS

Date/Time Range Start 2013-12-30 00:00:00 End 2014-01-05 23:59:59

Errors (42)

class.java.lang.NullPointerException (11)
ORA-04068: existing state of packages has been discarded
ORA-04068: existing state of packages has been discarded ORA-04061: existing st... (7)
ORA-02292: integrity constraint (PGI.PGI_KPN_KND_FK) violated - child record fo... (3)
ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated
ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PAG.....
other (18)

HTTP Requests (42)

Snapshots	Exception Message	REQUEST CALL STACK	Request Time	Database process time	Button/Link clicked on	User ID	Session details	Server
snapshot	ORA-04068: existing state of pa	ADF Web Request Message	tip: move with mouse over warnings⚠ and ADF executions to see details					
snapshot	ORA-02290: check constraint (P	ADF Executions						
snapshot	ORA-04068: existing state of pa							
snapshot	Er is geen bedrijfsnummer beke							
snapshot	ORA-02292: integrity constraint							
snapshot	Write failed: Broken pipe							
snapshot	ORA-04068: existing state of pa							
snapshot	popView(): No view has been p							
snapshot	ORA-00001: unique constraint (
snapshot	ORA-00001: unique constraint (
snapshot	ORA-00001: unique constraint (
snapshot	class.java.lang.NullPointerExcep							

REQUEST CALL STACK

ADF Web Request Message Exception Stack Trace

ADF Executions tip: move with mouse over warnings⚠ and ADF executions to see details

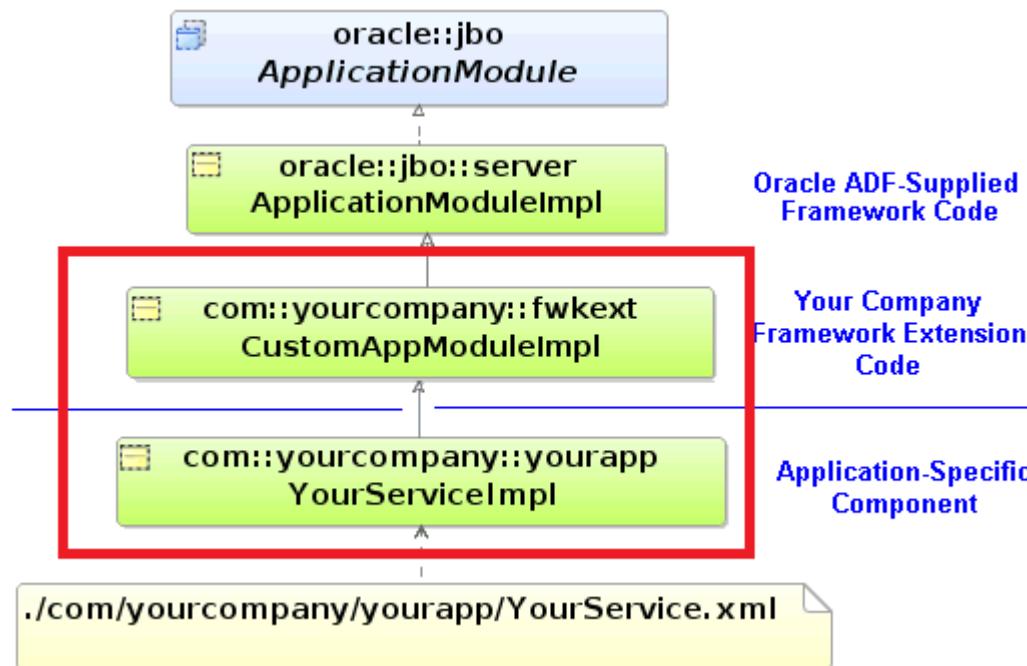
	Time (ms)	Percent of Request	Time in Request (ms)
HTTP Request view id=, users=	101	0	0
ADF Phase jsfrestoreview	2	46	46
ADF Phase initcontext	0	48	48
ADF Phase preparemodel	2	48	48
refreshRegion() region=pageDef=BgtTeFlatterenPageDef, viewPort=BgtTeFlatterenPagu002TF/BgtTeFlatteren	0	49	49
refreshRegion() region=pageDef=MijnPagoniPageDef, viewPort=mijnPagoni/MijnPagoni	0	49	49
refreshRegion() region=pageDef=IfgPageDef, viewPort=IfgPagf001TF/Ifg	0	49	49
refreshRegion() region=pageDef=IfgPageDef, viewPort=IfgPagf001TF/Ifg	0	49	49
refreshRegion() region=UShell	0	50	50
refreshRegion() region=pageDef=PjtShowPageDef, viewPort=PjtShowPaga001TF/PjtShow	0	50	50
ADF Phase jsfapplyrequestvalues	2	51	51
ADF Phase jsfprocessvalidations	43	54	54
invokeOperation(wijzigCttSpecieki)	41	55	55
plsql call pagf001_a_maak_ctt_specieki	41	55	55
EXCEPTION : ORA-00001: unique constraint (PGI.PAG_IPT_UK_01) violated ORA-06512: at PGI.PA...	0	85	85
invokeOperation(queryIf)	0	96	96
executeliteratorBindingWithParams(IfvVOIterator)	0	96	96
executeQuery()	0	96	96
executeQueryForCollection() VO=IfgPagf001AM.IfVO	0	96	96

Summary request

User
Time of request
31-12-2013 10:50:19
Response Time (ms)
101
Response Time in database (ms)
41
Server URL
ovamisux104:7023
User clicked on
cttSCB
JVM memory (MB)
370
Jvm Heap Change
1
Garbage Collection Time Change
0

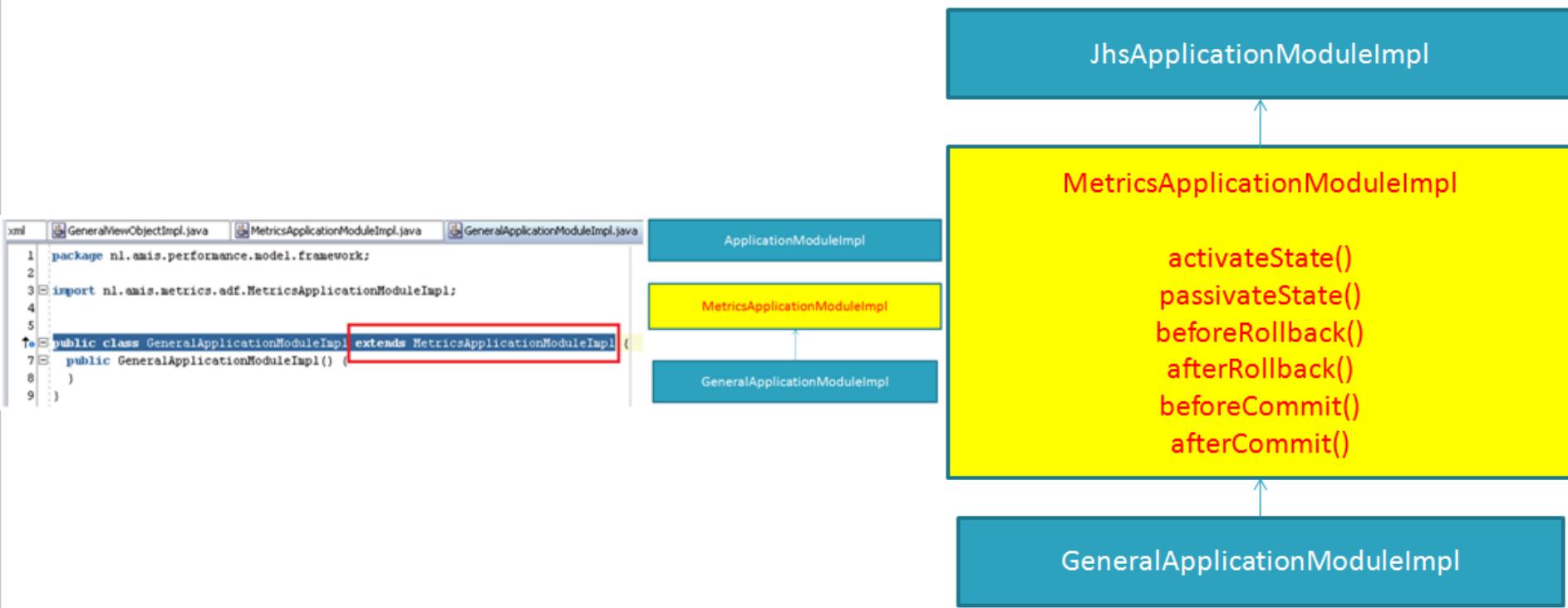
Instrument ADF BC

- Instrument with the use of ADF BC framework extension classes
 - Use your project or company base classes (or create a dedicated metrics package with extension classes)
 - Override specific methods to measure key actions inside the ADF framework



Creating a Metrics ApplicationModule

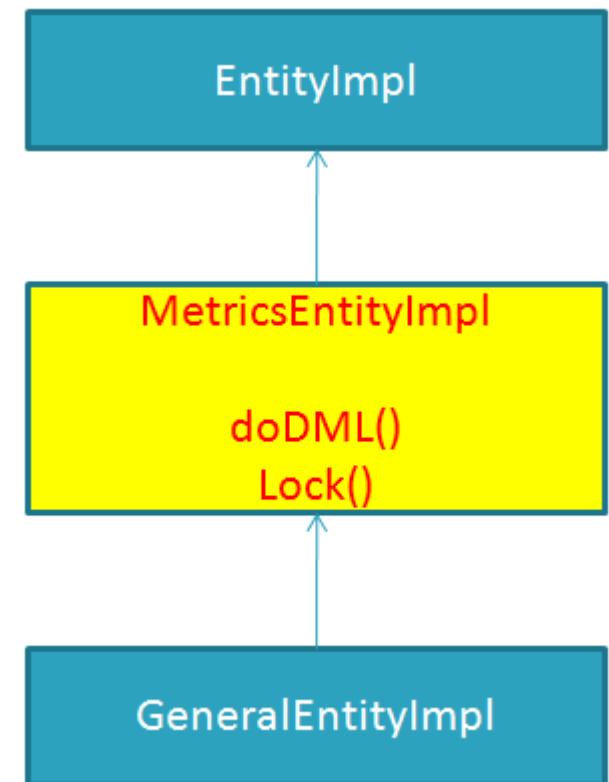
- Create a dedicated “metrics ApplicationModuleImpl” that extends from *oracle.jbo.server.ApplicationModuleImpl*
- Your project base class extends from this *MetricsApplicationModuleImpl*:



Creating a Metrics EntityObject

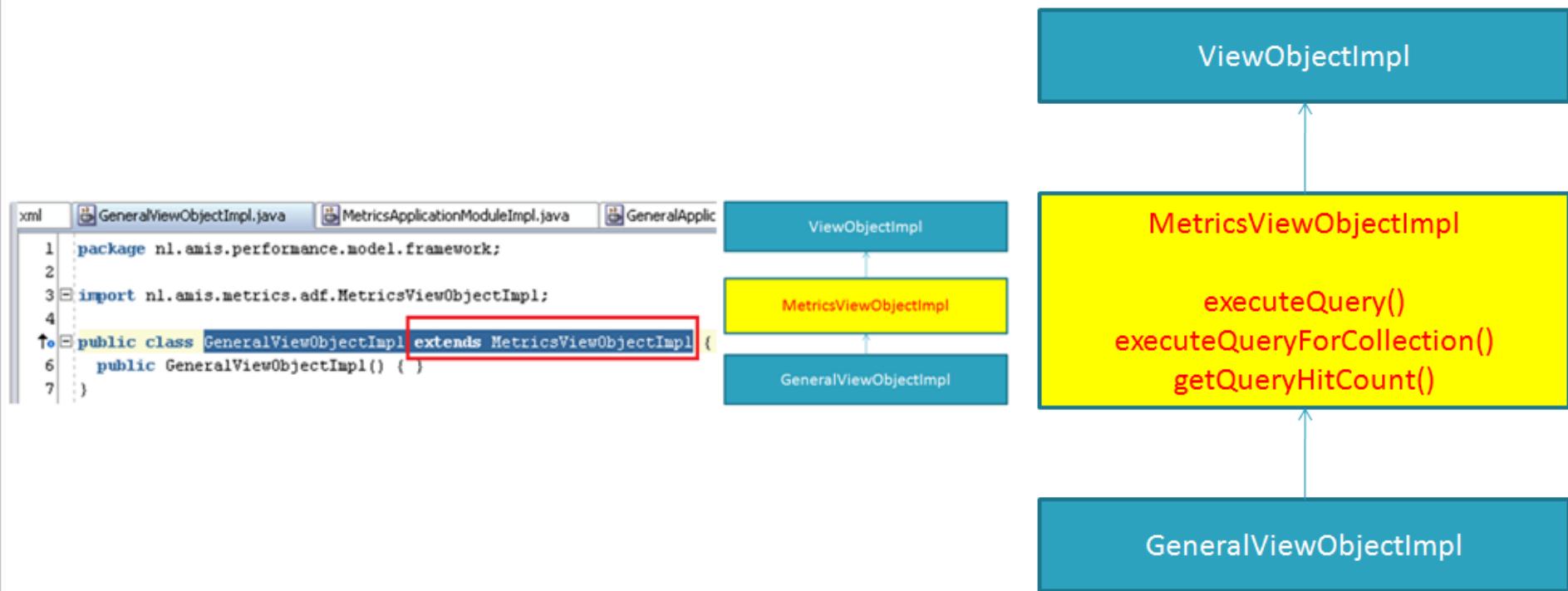
- Create a dedicated “metrics EntityObject” that extends from `oracle.jbo.server.ViewObjectImpl`
- Your project base class extends from this `MetricsViewObject`:

```
xml GeneralViewObjectImpl.java GeneralEntityImpl.java MetricsAplica
1 package nl.amis.performance.model.framework;
2
3 import nl.amis.metrics.adf.MetricsEntityImpl;
4
5 public class GeneralEntityImpl extends MetricsEntityImpl {
6     public GeneralEntityImpl() {
7     }
8 }
```



Creating a Metrics ViewObject

- Create a dedicated “metrics ViewObject” that extends from `oracle.jbo.server.ViewObjectImpl`
- Your project base class extends from this `MetricsViewObject`:



Look for Key Methods to instrument

- You can look at the [ViewObjectImpl](#) API doc for important and interesting methods to instrument & monitor

[Overview](#) [Package](#) **Class** [Tree](#) [Deprecated](#) [Index](#) [Help](#)

Oracle I

[PREV CLASS](#) [NEXT CLASS](#)

SUMMARY: NESTED | [FIELD](#) | [CONSTR](#) | [METHOD](#)

[FRAMES](#) [NO FRAMES](#) [All Classes](#)

DETAIL: [FIELD](#) | [CONSTR](#) | [METHOD](#)

oracle.jbo.server

Class ViewObjectImpl

java.lang.Object
 └ oracle.jbo.common.NamedObjectImpl
 └ oracle.jbo.server.NamedObjectImpl
 └ oracle.jbo.server.ComponentObjectImpl
 └ oracle.jbo.server.ViewObjectImpl

All Implemented Interfaces:

java.util.EventListener, [ViewCriteriaClauseBuilder](#), [ViewCriteriaManagerOwner](#), [ViewObject](#), [NavigatableRowIterator](#), [OperationContainer](#), [Properties](#), [RowIterator](#), [RowMatchBindValueSupplier](#), [EntityListener](#), [TransactionListener](#), [TransactionPostListener](#), [StructureDef](#), [VariableManager](#)

Direct Known Subclasses:

[DCDataVO](#), [DSViewObjectImpl](#), [FinderViewImpl](#), [PlaceholderVOImpl](#), [ViewObjectOnRowSet](#)

```
public class ViewObjectImpl
extends ComponentObjectImpl
implements ViewObject, EntityListener, RowSetListener, TransactionListener, TransactionPost
```

The implementation of the `ViewObject` interface, the middle-tier class that manages database queries and provides the interface for the application to interact with the database.

A View Object manages a view row set (`ViewRowSetImpl`). When the application calls a `RowSet` method

<code>RowSet</code>	deepCopy (java.util.HashMap voAttrMap, long options) This method delegates to the default <code>RowSet</code> .
<code>void</code>	defineNamedWhereClauseParam (java.lang.String name, java.lang.Object defau Defines a named bind variable to use with the view object's where-clause.
<code>boolean</code>	doesRowFilterMatch (Row[] masterRows, java.lang.Object[] rowFilterValues)
<code>void</code>	dumpQCs() Internal: Applications should not use this method.
<code>Enumeration<Object></code>	enumerateRowsInRange() Creates and returns an enumerator of the rows in the range.
<code>void</code>	executeDetailQuery (Row[] masterRows)
<code>void</code>	executeEmptyRowSet()
<code>void</code>	executeQuery() Executes the query.
<code>executed void</code>	executeQueryForCollection (java.lang.Object qc, java.lang.Object[] params, This method is invoked right before the row set executes the query.
<code>KeyDef</code>	findAltKeyDef (java.lang.String keyName)
<code>void</code>	findAndDeleteRowSetRowByRowKey (RowKey key, int maxTries)

Case 3 Monitor SQL queries

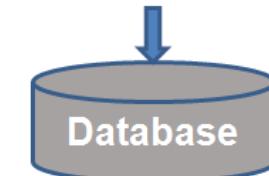
- Override the ViewObject method `executeQueryForCollection()`
 - Which SQL queries are executed, their execution time, when and how often ?
 - Including (detail) queries from ViewAccessors, ViewLinks, programmatic ViewObjects, e.g.



```
public class SummitViewObjectImpl extends ViewObjectImpl {  
  
    private static final ADFLogger logger = ADFLogger.createADFLogger(SummitViewObjectImpl.class);  
  
    protected void executeQueryForCollection(Object object, Object[] objectl, int i) {  
        long startTime = System.nanoTime();  
        super.executeQueryForCollection(object, objectl, i);  
        long totalTime = (System.nanoTime() - startTime) / 1000000;  
        logger.fine("VO DATABASE EXECUTION VO usagename: " + getUsageName() + " millis: " + totalTime);  
    }  
}
```

start
stop

select *
from customers



See

<http://technology.amis.nl/2014/03/11/adf-performance-tuning-instrumenting-your-adf-application-part-1/>

```
VIEWOBJECT DATABASE EXECUTION VO usagename: Customers millis: 9  
VIEWOBJECT DATABASE EXECUTION VO usagename: _LOCAL_VIEW_USAGE_oracle_summit_model_views_CustomerVO_CreditRatingVO1 millis: 0  
VIEWOBJECT DATABASE EXECUTION VO usagename: _LOCAL_VIEW_USAGE_oracle_summit_model_views_CustomerVO_CountryVO1 millis: 0  
VIEWOBJECT DATABASE EXECUTION VO usagename: OrdersForCustomer millis: 4
```

Instrumenting Tips

- To ensure that your start and stop code is executed in case an error occurs, use a **try-finally** block
- Be sure that your logging can be turned on and off at runtime
- Create a class that is responsible for starting/stopping logging methods
 - Retrieving the current nanotime just before and immediately after the method execution by calling [System.nanoTime\(\)](#)
 - [System.currentTimeMillis\(\)](#) can be a few milliseconds inaccurate (!)

```
protected void executeQueryForCollection(Object object, Object[] objectl, int i) {

    boolean active = MetricsUtils.isActive();
    MetricsVOExecution metricsExecution = null;
    if (active) {
        metricsExecution = new MetricsVOExecution();
        cached = 0;
    }
    try {
        super.executeQueryForCollection(object, objectl, i);
    } finally {
        if (active)
            metricsExecution.stop(METHOD_EXECUTEQUERYFORCOLLECTION, this, objectl);
    }
}
```

Additional ViewObject Runtime Metrics (1)

- Possible additional ViewObject runtime metrics
 - Bind variable names / values
 - Fetched rows loaded into ADF app
 - Applied ViewCriterias
 - SQL statement

```
/**  
 * Queries from ViewObjectImpl  
 * stop method for ViewObject.executeQueryForCollection()  
 */  
  
public void stop(int method, MetricsViewObjectImpl viewObjectImpl, Object[] params) {  
    super.stop();  
    this.method = method;  
    bindVars = getParams(params);  
    viewCriterias = getAppliedViewCriterias(viewObjectImpl);  
    definitionName = viewObjectImpl.getDefFullName();  
    usageName = viewObjectImpl.getApplicationModule().getName() + "." + viewObjectImpl.getName();  
    fetched = viewObjectImpl.getCached();  
}
```

ADF Callstack

Slow ViewObject Query

HTTP REQUESTS

Date/Time Range Start 2014-12-08 00:00:00 End 2014-12-08 23:59:59 User ID

REQUEST CALL STACK

ADF Web Request Message

ADF Executions	tip: click on warnings and ADF executions to see details	Time (ms)	Percent of Request	Time in Request (ms)
▽ HTTP Request		15665	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	0
ADF Phase jsfrestorereview		7	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	2
ADF Phase initcontext		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	11
▽ ADF Phase preparemodel		6	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	11
refreshRegion() region=/UIShell		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	17
▽ ADF Phase jsfapplyrequestvalues		19	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	18
▽ launchTab		1	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	35
addTab		1	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	36
▽ ADF Phase jsfrenderresponse		15612	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	38
▽ ADF Phase preparerender		9074	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	38
START TASKFLOW /search-employees-tf		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	52
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	202
createApplicationModule()	⚠	1090	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	367
connect()		111	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1461
create()		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1571
afterConnect()		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1572
✔ invokeOperation(ExecuteWithParamsEmployees)		7516	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1584
✔ executeIteratorBindingWithParams(EmployeesView1Iterator)		7514	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1586
✔ executeQuery()		7254	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	1847
⚠ executeQueryForCollection() VO=HRService.EmployeesView1	⚠ SQL	7209	<div style="width: 100%; background-color: #ff8c00; height: 10px;"></div>	1861
Fetching, creating rows for HRService.EmployeesView1, fetched: 35		17	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9073
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=/search-emplic		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9110
refreshRegion() region=/UIShell		0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9112
✔ invokeOperation(GetViewCriteria)		3	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9233
✔ executeEmptyRowSet()		1	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9284
✔ executeQueryForCollection() VO=HRService.EmployeesView1, times executed=2	⚠	0	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	9284
✔ executeQueryForCollection() VO=HRService._LOCAL_VIEW_USAGE_HRService_Emplo	SQL	1	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	11893
Fetchino, creating rows for HRService._LOCAL_VIEW_USAGE_HRService_EmployeVi		2	<div style="width: 100%; background-color: #0072bc; height: 10px;"></div>	11894

Execution Details

```
method=executeQueryForCollection
usage=HRService.EmployeesView1
definition=hr.demo.model.queries.EmployeesView
fetched=35
fetchsize=36
bindvariables:
-BLastName=null,
-BEmployeeId=null
execution time=7209
```

SQL Statement

REQUEST CALL STACK

ADF Web Request Message

ADF Executions	tip: click on warnings and ADF executions to see details
ADF Phase initcontext	
ADF Phase preparemodel	
refreshRegion() region=UIShell	
ADF Phase jsapplyrequestvalues	
launchTab	
addTab	
ADF Phase jsfrenderresponse	
ADF Phase preparerender	
START TASKFLOW /search-employees-tf	
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=	
createApplicationModule()	
connect()	
create()	
afterConnect()	
invokeOperation(ExecuteWithParamsEmployees)	
executelIteratorBindingWithParams(EmployeesView1Iterator)	
executeQuery()	
executeQueryForCollection() VO=HRService.EmployeesView1	
Fetching, creating rows for HRService.EmployeesView1, fetched: 35	
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=/search-emplic	
refreshRegion() region=UIShell	
invokeOperation(GetViewCriteria)	
executeEmptyRowSet()	
executeQueryForCollection() VO=HRService.EmployeesView1, times executed=2	
executeQueryForCollection() VO=HRService._LOCAL_VIEW_USAGE_HRService_Emplo	
Fetching, creating rows for HRService._LOCAL_VIEW_USAGE_HRService_EmployeesVi	
executeQueryForCollection() VO=HRService._LOCAL_VIEW_USAGE_HRService_Emplo	
Fetching, creating rows for HRService._LOCAL_VIEW_USAGE_HRService_Employee	

SQL Query

```

SELECT Employees.EMPLOYEE_ID, Employees.FIRST_NAME, Employees.LAST_NAME,
Employees.EMAIL, Employees.PHONE_NUMBER, Employees.HIRE_DATE, Employees.JOB_ID,
Employees.SALARY, Employees.COMMISSION_PCT, Employees.MANAGER_ID,
Employees.DEPARTMENT_ID ,hr_main.sleep(0.2) as ind_slow ,Employees.FIRST_NAME||'|
'||Employees.LAST_NAME full_name_calculated FROM EMPLOYEES Employees where (
(UPPER(Employees.LAST_NAME) LIKE UPPER('%'|| nvl(:BLastName,"") || '%')) ) and (
Employees.EMPLOYEE_ID = nvl(:BEmployeeId,Employees.EMPLOYEE_ID)) )

```

SQL	Time (ms)	Percent of Request	Time in Request (ms)
7209	7209		1861
17	17		9073
0	0		9110
0	0		9112
3	3		9233
1	1		9284
0	0		9284
SQL	1		11893
2	2		11894
SQL	3424		11981
3215	3215		12189



User

36

Garbage Collection Time Change
0Managed Server
DefaultServer

ViewObject Query Performance Aggregated

- AVG, Occurrences, Total execution time, Min, Max

Top ADFBC Database Executions Date/Time Range Start 2014-12-08 00:00:00 End 2014-12-08 23:59:59

By Average Execution Time Filter ViewObject Query Managed Server All

TOP ADFBC Database Executions by Execution Time

z

Type

- Less than 1 sec
- Between 1 and 2 sec
- More than 2 sec

		Avg Execution Time	Occurrences	Total Exec Time
ViewObject query	HRService.EmployeesView1.executeQueryForCollection	7.31	1412	10321.72
ViewObject query	HRService.DepartmentsView1.executeQueryForCollection	3.35	2	6.7
ViewObject query	HRService._LOCAL_VIEW_USAGE_HRService_EmployeesView1_data_hr_demo_ui_view_UIShellPageDef_d	3.19	709	2261.71
ViewObject query	HRService.JobsView1.executeQueryForCollection			
ViewObject query	HRService.LocationsViewRO.getQueryHitCount			
ViewObject query	HRService.LocationsViewRO.executeQueryForCollection			
ViewObject query	HRService._LOCAL_VIEW_USAGE_HRService_EmployeesView1_data_hr_demo_u			
ViewObject query	HRService.JobsView1.getQueryHitCount			
ViewObject query	HRService.EmployeesView1.getQueryHitCount			

ViewObject Analysis

HRService.Er... Date/Time Range Start 2014-12-08 00:00:00 End 2014-12-08 23:59:59

Execution Time (Sec)	Request Call Stack	RequestTime	Fetched	Bind Variables
9.64	callstack	2014-12-08 12:16:27	35	BLastName=null,BEmployeeId=null
9.41	callstack	2014-12-08 12:16:26	35	BLastName=null,BEmployeeId=null
9.32	callstack	2014-12-08 12:16:28	35	BLastName=null,BEmployeeId=null
8.97	callstack	2014-12-08 12:16:29	35	BLastName=null,BEmployeeId=null
8.75	callstack	2014-12-08 12:16:37	35	BLastName=null,BEmployeeId=null
8.71	callstack	2014-12-08 12:16:28	35	BLastName=null,BEmployeeId=null
8.70	callstack	2014-12-08 12:16:38	35	BLastName=null,BEmployeeId=null
8.68	callstack	2014-12-08 12:16:28	35	BLastName=null,BEmployeeId=null
8.47	callstack	2014-12-08 12:16:29	35	BLastName=null,BEmployeeId=null
8.35	callstack	2014-12-08 12:16:23	35	BLastName=null,BEmployeeId=null
8.30	callstack	2014-12-08 12:16:39	35	BLastName=null,BEmployeeId=null
8.25	callstack	2014-12-08 12:16:42	35	BLastName=null,BEmployeeId=null
8.19	callstack	2014-12-08 11:49:05	35	BLastName=null,BEmployeeId=null
8.16	callstack	2014-12-08 12:16:23	35	BLastName=null,BEmployeeId=null

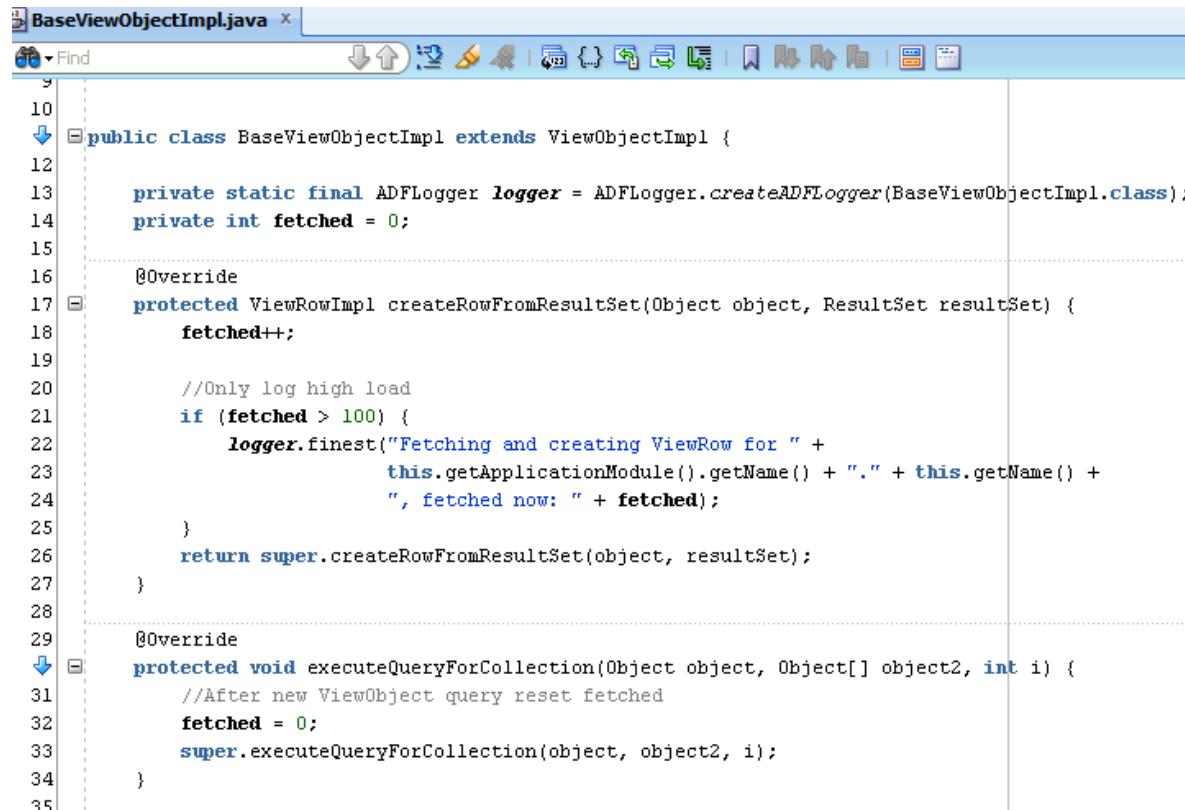
Case 4: Instrumenting how many rows are fetched/loaded

- Detecting an overload of ViewObject rows
 - Prevent JVM memory overconsumption (!)
 - <http://technology.amis.nl/2014/02/03/adf-performance-monitor-detecting-and-analyzing-a-high-adf-bc-memory-consumption/>



Instrumenting how many rows are fetched/loaded

- Overriding the method `createRowFromResultSet()` and counting them in your `MetricsViewObjectImpl`.
 - Reset the counter before a query is executed (again):

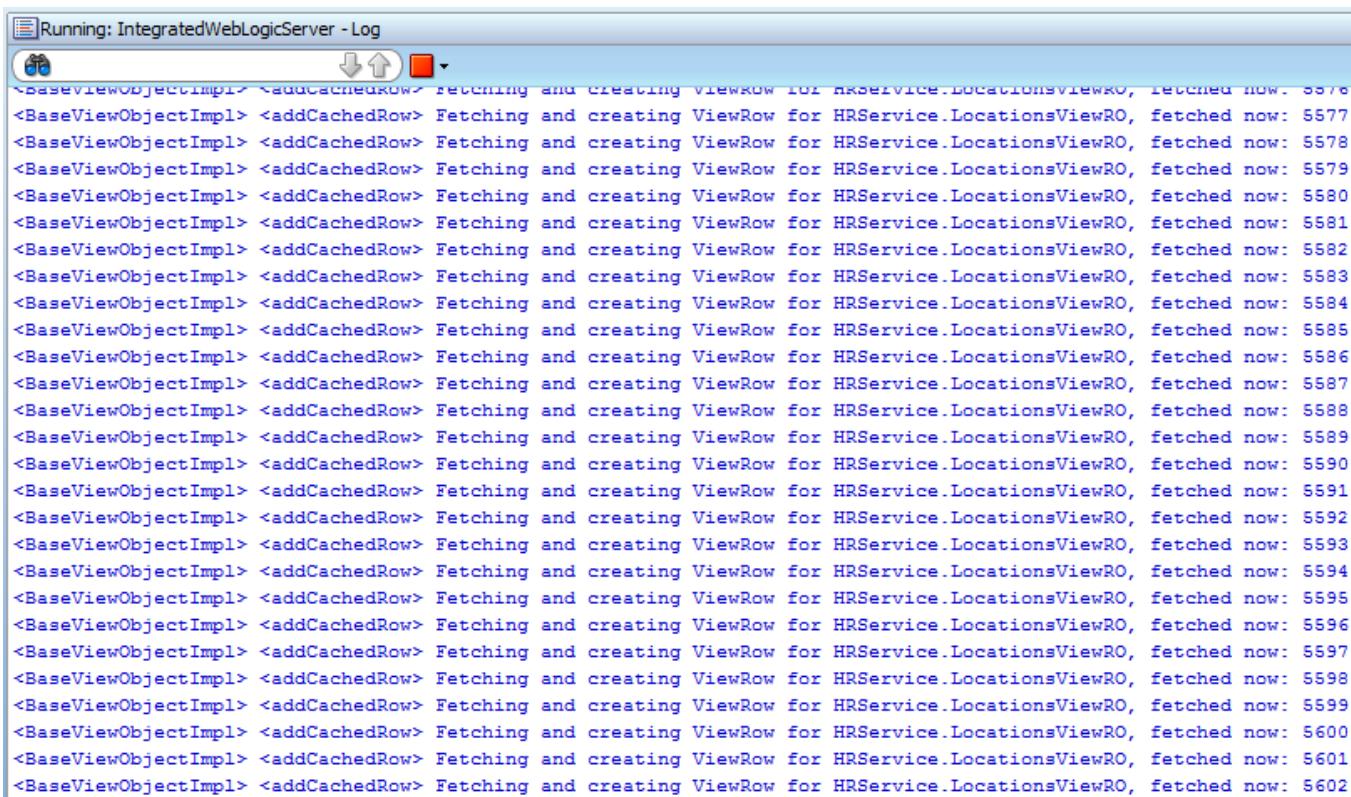


The screenshot shows a Java code editor window with the title bar "BaseViewObjectImpl.java". The code is annotated with line numbers from 10 to 35. It defines a class `BaseViewObjectImpl` that extends `ViewObjectImpl`. The class contains two overridden methods: `createRowFromResultSet` and `executeQueryForCollection`. In `createRowFromResultSet`, a private static final logger is created, and a variable `fetched` is initialized to 0. The method increments `fetched` and logs a message if it exceeds 100. In `executeQueryForCollection`, the variable `fetched` is reset to 0 before calling the super method.

```
10
11
12
13     private static final ADFLogger logger = ADFLogger.createADFLogger(BaseViewObjectImpl.class);
14     private int fetched = 0;
15
16     @Override
17     protected ViewRowImpl createRowFromResultSet(Object object, ResultSet resultSet) {
18         fetched++;
19
20         //Only log high load
21         if (fetched > 100) {
22             logger.finest("Fetching and creating ViewRow for " +
23                           this.getApplicationModule().getName() + "." + this.getName() +
24                           ", fetched now: " + fetched);
25         }
26         return super.createRowFromResultSet(object, resultSet);
27     }
28
29     @Override
30     protected void executeQueryForCollection(Object object, Object[] object2, int i) {
31         //After new ViewObject query reset fetched
32         fetched = 0;
33         super.executeQueryForCollection(object, object2, i);
34     }
35 }
```

Instrumenting how many rows are fetched/loaded

- A high load can now be detected in JDevelopers console log
 - You might want to not log every single row that is fetched like here but only above a certain threshold (for example for every hundred)



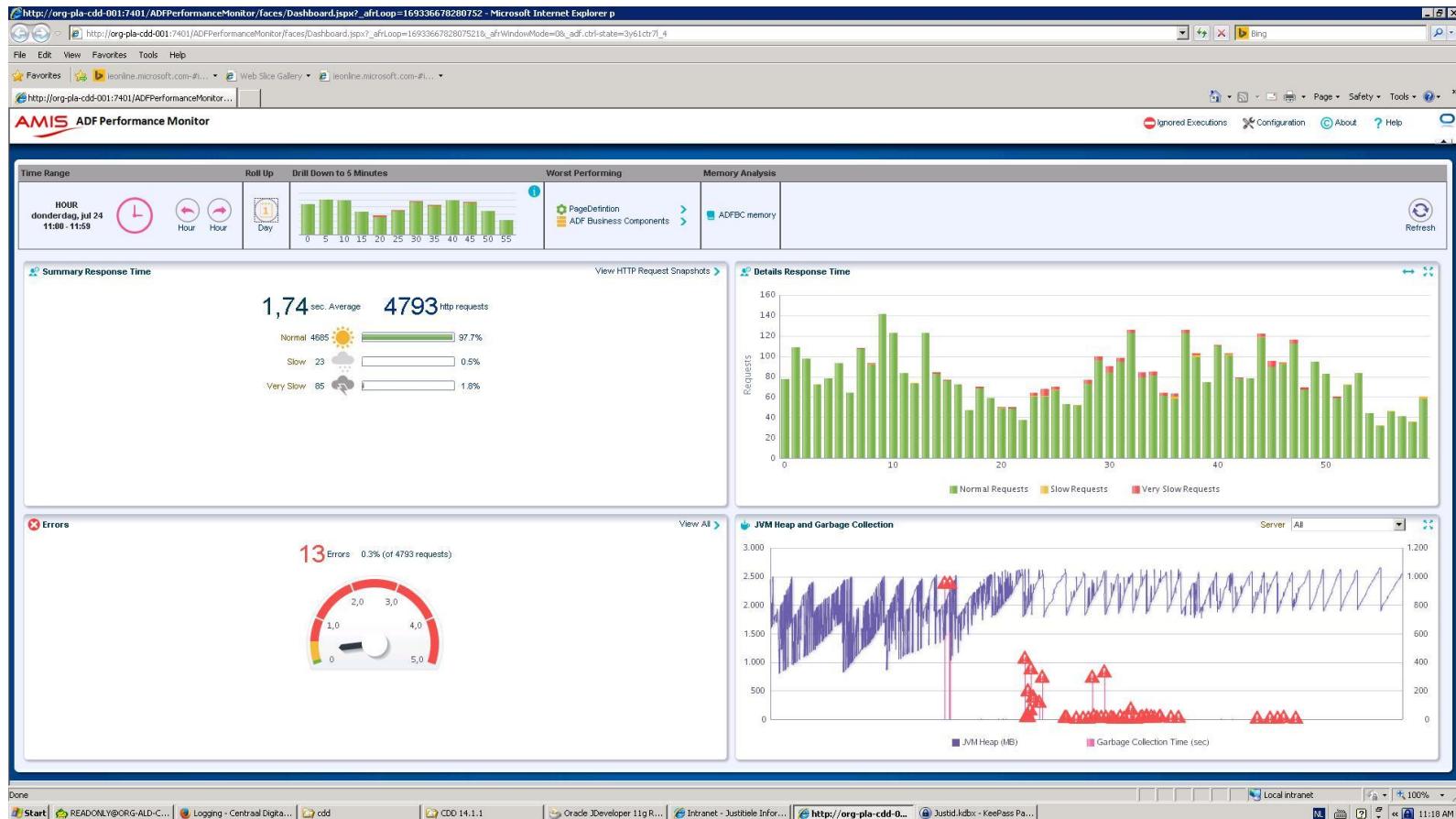
The screenshot shows a JDeveloper Log window titled "Running: IntegratedWebLogicServer - Log". The window contains a scrollable list of log entries. Each entry consists of a timestamp and a message indicating a row fetch operation. The messages are repeated numerous times, showing a high volume of activity. The timestamp in each message is identical, suggesting a continuous log entry or a bug in the logging code.

```
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5576
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5577
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5578
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5579
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5580
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5581
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5582
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5583
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5584
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5585
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5586
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5587
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5588
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5589
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5590
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5591
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5592
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5593
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5594
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5595
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5596
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5597
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5598
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5599
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5600
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5601
<BaseViewObjectImpl> <addCachedRow> Fetching and creating ViewRow for HRService.LocationsViewRO, fetched now: 5602
```

Loaded Rows in Memory (1) JVM memory overconsumption

- Example: ADF application with JVM memory overconsumption

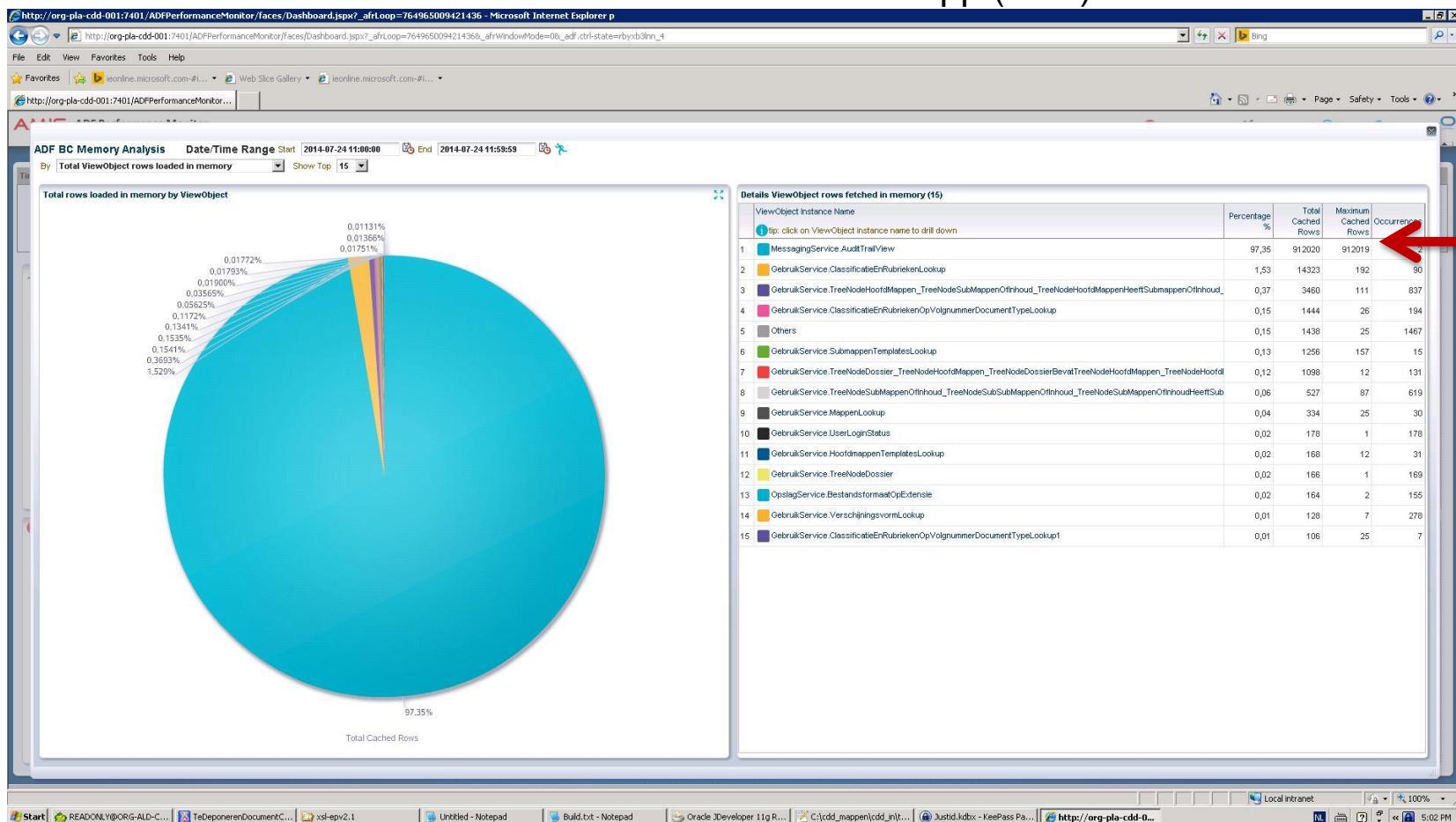
We see many JVM warnings of long garbage collections; this should be a trigger to investigate



Loaded Rows in Memory (2)

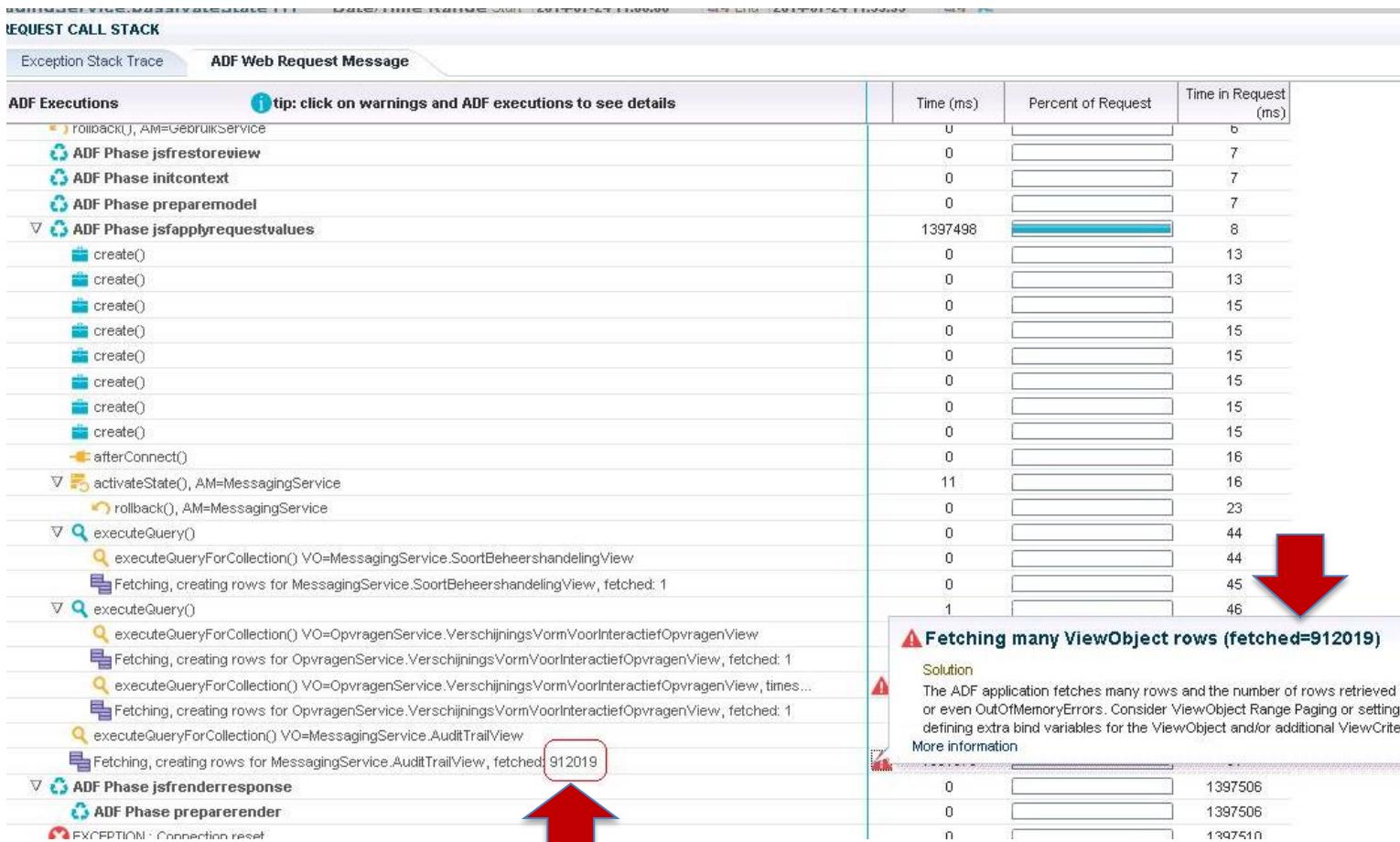
ADF BC Memory Analyzer

- In this production ADF app, for a single ViewObject instance, more than **900.000** rows were loaded in the ADF app (Blue) !



Loaded Rows in Memory (3) ADF CallStack

- In this production ADF app, for a single ViewObject instance, more than **900.000** rows were loaded in the ADF app (!)
- Loading 900.000 rows takes more than 10 minutes

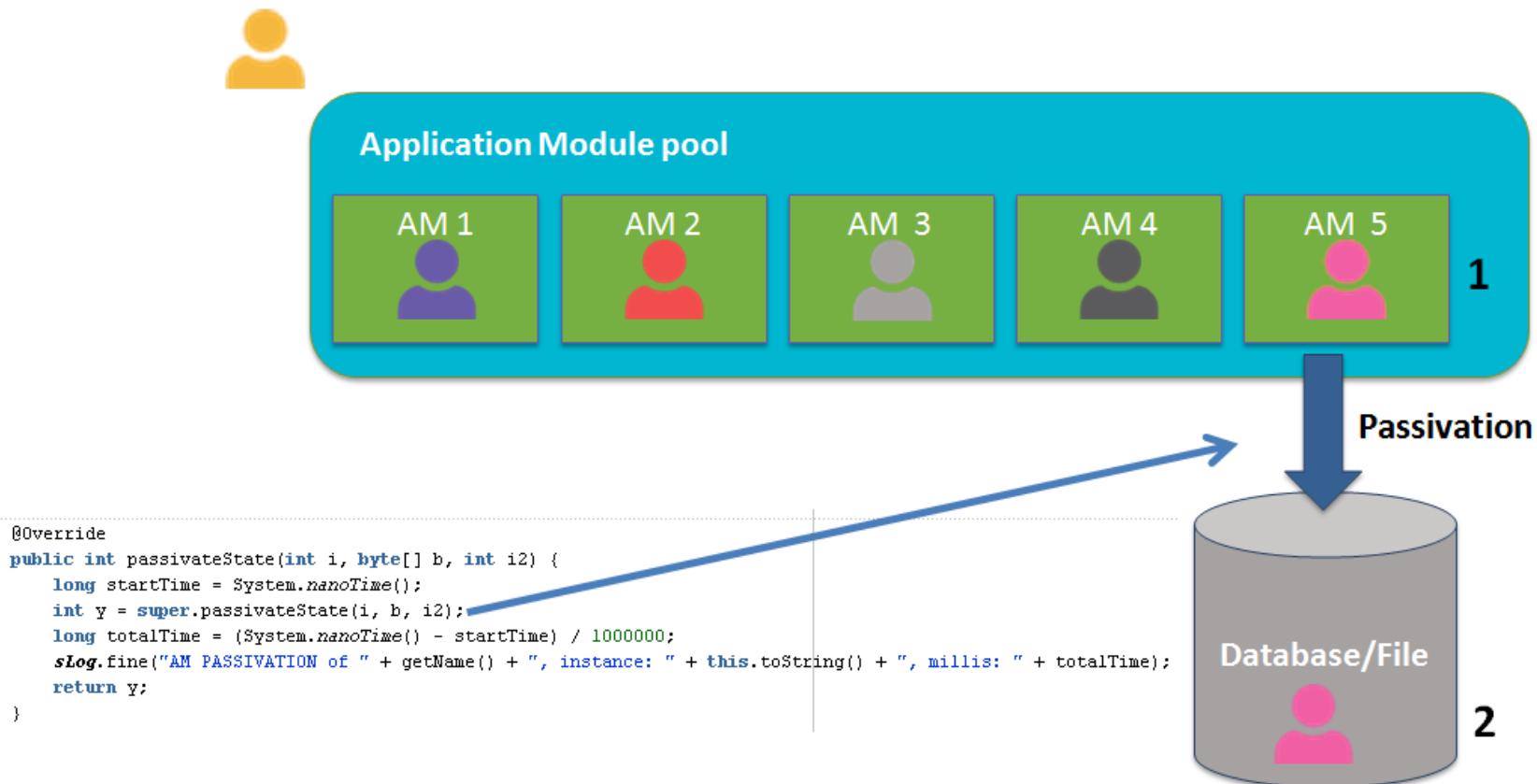


Case 5: Instrumenting AM activation and passivation

- **ApplicationModule** pooling enables multiple users to share several application module instances. It involves saving and retrieving session state data from the database, file, or Java memory.
- This mechanism is provided to make the application scalable and becomes very important under high load with many concurrent users.

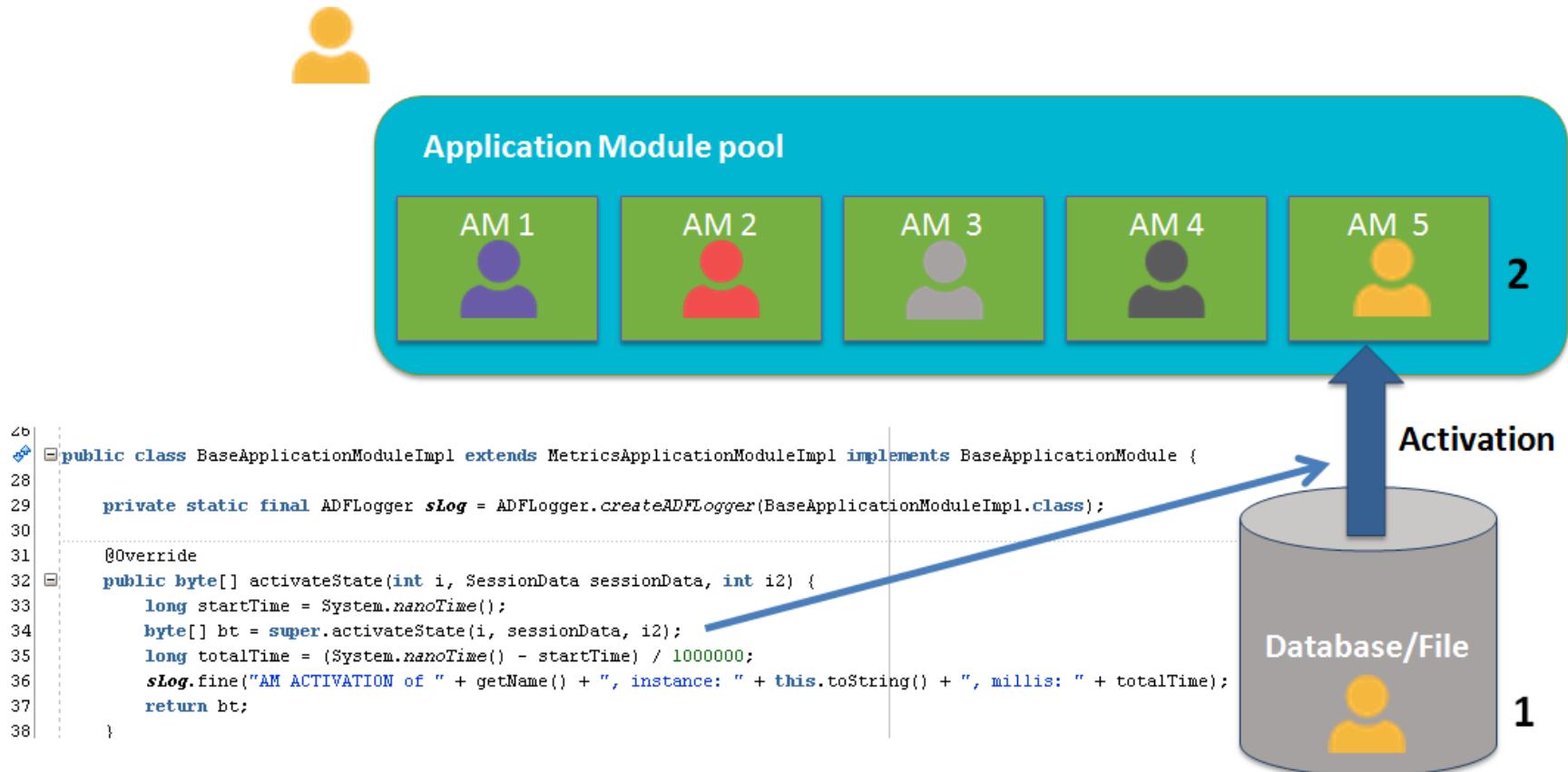
Instrument ApplicationModule passivation

- Override the *ApplicationModule* method *passivateState()* in your metrics base class:
- See <http://technology.amis.nl/2014/04/01/adf-runtime-diagnostics-instrumenting-your-adf-application-part-2/>



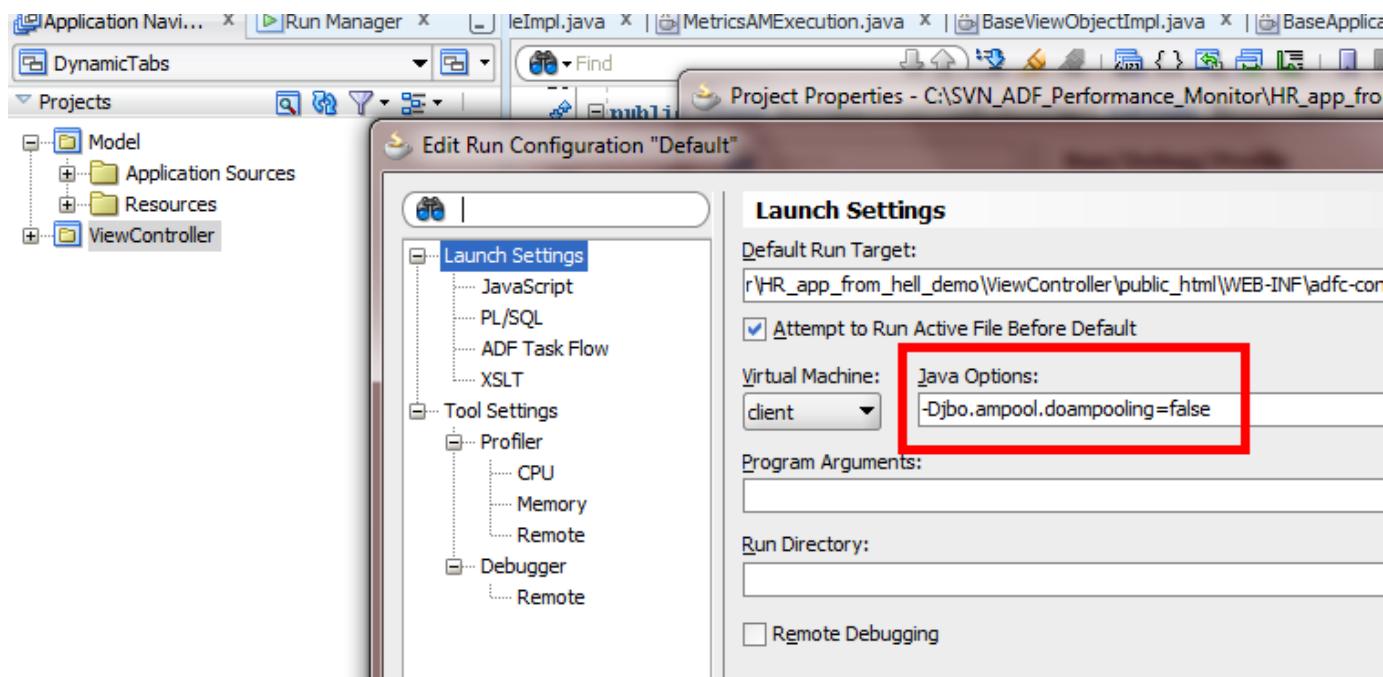
Instrument ApplicationModule activation

- Override the *ApplicationModule* method *activateState()* in your metrics base class:



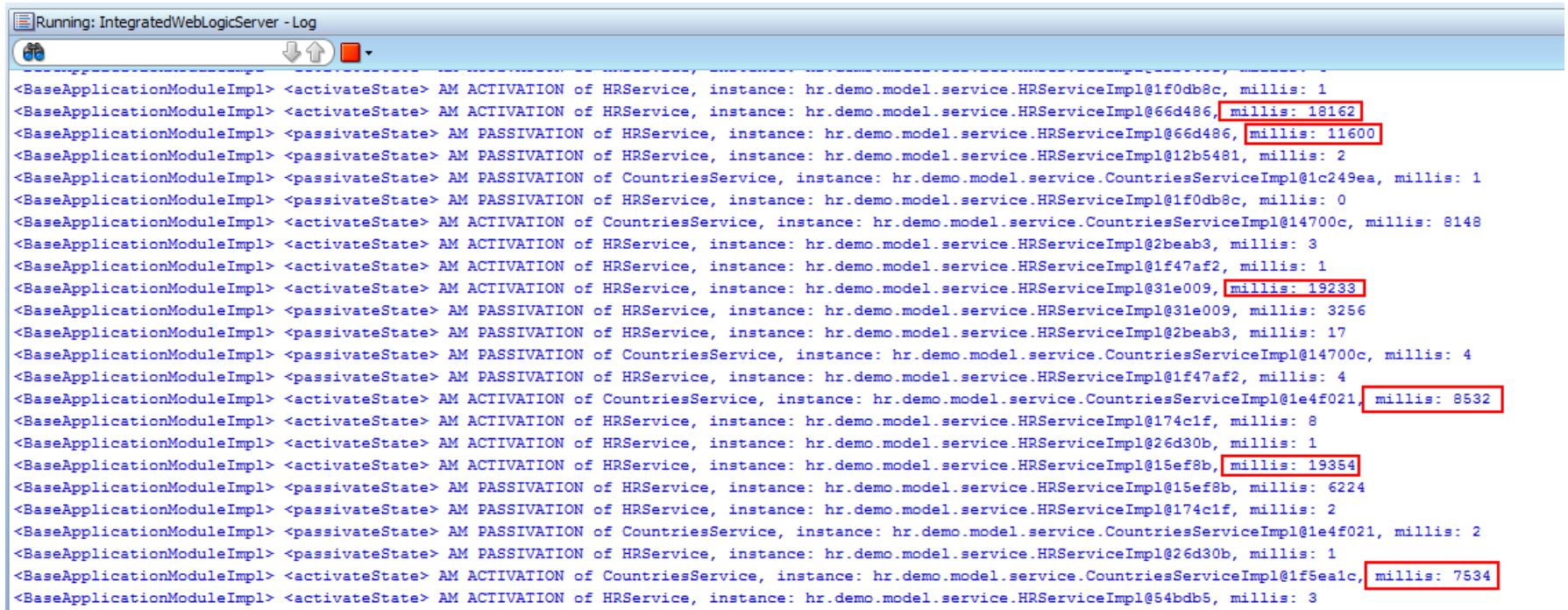
Test Instrumentation Activation and Passivation

- In this way you can monitor which ApplicationModules are activated/passivated, their activation/passivation time, when and how often it is executed.
- Run your ADF application with **Djbo.ampool.doampooling=false** to test this



Test ApplicationModule Activation and Passivation

- Logging JDevelopers console log:



The screenshot shows a JDeveloper Log window titled "Running: IntegratedWebLogicServer - Log". The log output displays a series of messages related to the activation and passivation of application modules. The messages are color-coded in blue, and specific millisecond values are highlighted with red boxes.

```
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@1f0db8c, millis: 1
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@66d486, millis: 18162
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@66d486, millis: 11600
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@12b5481, millis: 2
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@1c249ea, millis: 1
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@1f0db8c, millis: 0
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@14700c, millis: 8148
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@2beab3, millis: 3
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@1f47af2, millis: 1
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@31e009, millis: 19233
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@31e009, millis: 3256
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@2beab3, millis: 17
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@14700c, millis: 4
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@1f47af2, millis: 4
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@1e4f021, millis: 8532
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@174c1f, millis: 8
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@26d30b, millis: 1
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@16ef8b, millis: 19354
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@16ef8b, millis: 6224
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@174c1f, millis: 2
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@1e4f021, millis: 2
<BaseApplicationModuleImpl> <passivateState> AM PASSIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@26d30b, millis: 1
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of CountriesService, instance: hr.demo.model.service.CountriesServiceImpl@1f5ealc, millis: 7534
<BaseApplicationModuleImpl> <activateState> AM ACTIVATION of HRService, instance: hr.demo.model.service.HRServiceImpl@54bdb5, millis: 3
```

Example: Slow Activation of ApplicationModule

AMIS ADF Performance Monitor

HTTP REQUESTS

REQUEST CALL STACK

ADF Web Request Message

ADF Executions i tip: click on warnings and ADF executions to see details

	Time (ms)	Percent of Request	Time in Request (ms)
HTTP Request	40353	<div style="width: 100%;"></div>	0
ADF Phase jsfrestoreview	7	<div style="width: 1%;"></div>	2
ADF Phase initcontext	0	<div style="width: 0%;"></div>	10
ADF Phase preparemodel	30344	<div style="width: 75%;"></div>	10
create()	0	<div style="width: 0%;"></div>	17
afterConnect()	0	<div style="width: 0%;"></div>	17
activateState(), AM=CountryService	8256	<div style="width: 2%;"></div>	19
refreshRegion() region=pageDef=SearchEmployeesPageDef, viewPort=/search-employees/S	0	<div style="width: 0%;"></div>	8276
create()	0	<div style="width: 0%;"></div>	8279
afterConnect()	0	<div style="width: 0%;"></div>	8279
activateState(), AM=HRSERVICE	7	<div style="width: 1%;"></div>	8280
refreshRegion() region=pageDef=SearchJobsPageDef, viewPort=/jobs/SearchJobs	0	<div style="width: 0%;"></div>	8290
refreshRegion() region=pageDef=	0	<div style="width: 0%;"></div>	8291
create()	0	<div style="width: 0%;"></div>	8295
afterConnect()	0	<div style="width: 0%;"></div>	8295
activateState(), AM=HRSERVICE	2	<div style="width: 1%;"></div>	8296
create()	0	<div style="width: 0%;"></div>	8302
afterConnect()	0	<div style="width: 0%;"></div>	8302
activateState(), AM=HRSERVICE	22048	<div style="width: 100%;"></div>	8303
rollback(), AM=HRSERVICE	0	<div style="width: 0%;"></div>	8902
activateIteratorState()	21442	<div style="width: 100%;"></div>	8909
executeQueryForCollection() VO=HRSERVICE.LocationsViewRO	111	<div style="width: 1%;"></div>	8917
Fetching, creating rows for HRSERVICE.LocationsViewRO, fetched: 4999	1708	<div style="width: 1%;"></div>	9029
activateTransients()	19605	<div style="width: 100%;"></div>	10745
executeIteratorBinding(LC)	0	<div style="width: 0%;"></div>	30352
refreshRegion() region=UISh	0	<div style="width: 0%;"></div>	30353
ADF Phase isfrenderresponse	11	<div style="width: 1%;"></div>	30354

Execution Details
method=activateState
AM=HRSERVICE
definition=hr.demo.model.service.HRSERVICE
instance=@1249911
execution time=22048

Execution Details
method=activateTransients()
details=HRSERVICE.LocationsViewRO
execution time=19605

Example: Slow Passivation of ApplicationModule

AMIS ADF Performance Monitor

HTTP REQUESTS

Date/Time Range Start 2014-03-31 00:00:00 End 2014-04-06 23:59:59

REQUEST CALL STACK

ADF Web Request Message

ADF Executions	tip: click on warnings and ADF executions to see details	Time (ms)	Percent of Request	Time in Request (ms)
HTTP Request		53067		0
ADF Phase jsfrestorereview		5		3
ADF Phase initcontext		0		9
ADF Phase preparemodel		30963		9
ADF Phase jsfapplyrequestvalues		53		30974
invokeOperation(GetViewCriteria)		0		30978
invokeOperation(GetViewCriteria)		0		30980
ADF Phase jsfprocessvalidations		11		31028
ADF Phase jsfupdatemodelvalues		12		31039
ADF Phase validatemodeleupdates		2		31051
ADF Phase jsfinvokeapplication		18043		31054
executelteratorBinding(EmployeesView1Iterator)		18032		31060
executeQuery()		18032		31060
executeQueryForCollection() VO=HRSERVICE.EmployeesView1, times executed=2		18011		31072
Fetching, creating rows for HRSERVICE.EmployeesView1, fetched: 35		6		49085
ADF Phase metadatacommit		0		49102
ADF Phase jsfrenderresponse		133		49103
getQueryHitCount() VO=HRSERVICE		16		49103
passivateState(), AM=HRSERVICE		1		49174
rollback(), AM=HRSERVICE		5		49240
passivateState(), AM=CountriesSERVICE		0		49248
rollback(), AM=CountriesSERVICE		1		49248
passivateState(), AM=HRSERVICE		0		49252
passivateState()		3796		49253
passivateTransients()		2058		49253
passivateTransients()		2058		49253
rollback(), AM=HRSERVICE		0		53063
passivateState(), AM=HRSERVICE		1		53063

Execution Details
method=passivateState
AM=HRSERVICE
definition=hr.demo.model.service.HRSERVICE
instance=@1444129
execution time=3796

Execution Details
method=passivateTransients()
details=HRSERVICE.LocationsViewRO
execution time=2058

Example: Worst ApplicationModule activations & passivations overview

- Monitor aggregates of ApplicationModule activations and passivations
 - AVG, Occurrences, Total Exec Time, Min, Max
 - Zoom in into single executions

AMIS ADF Performance Monitor

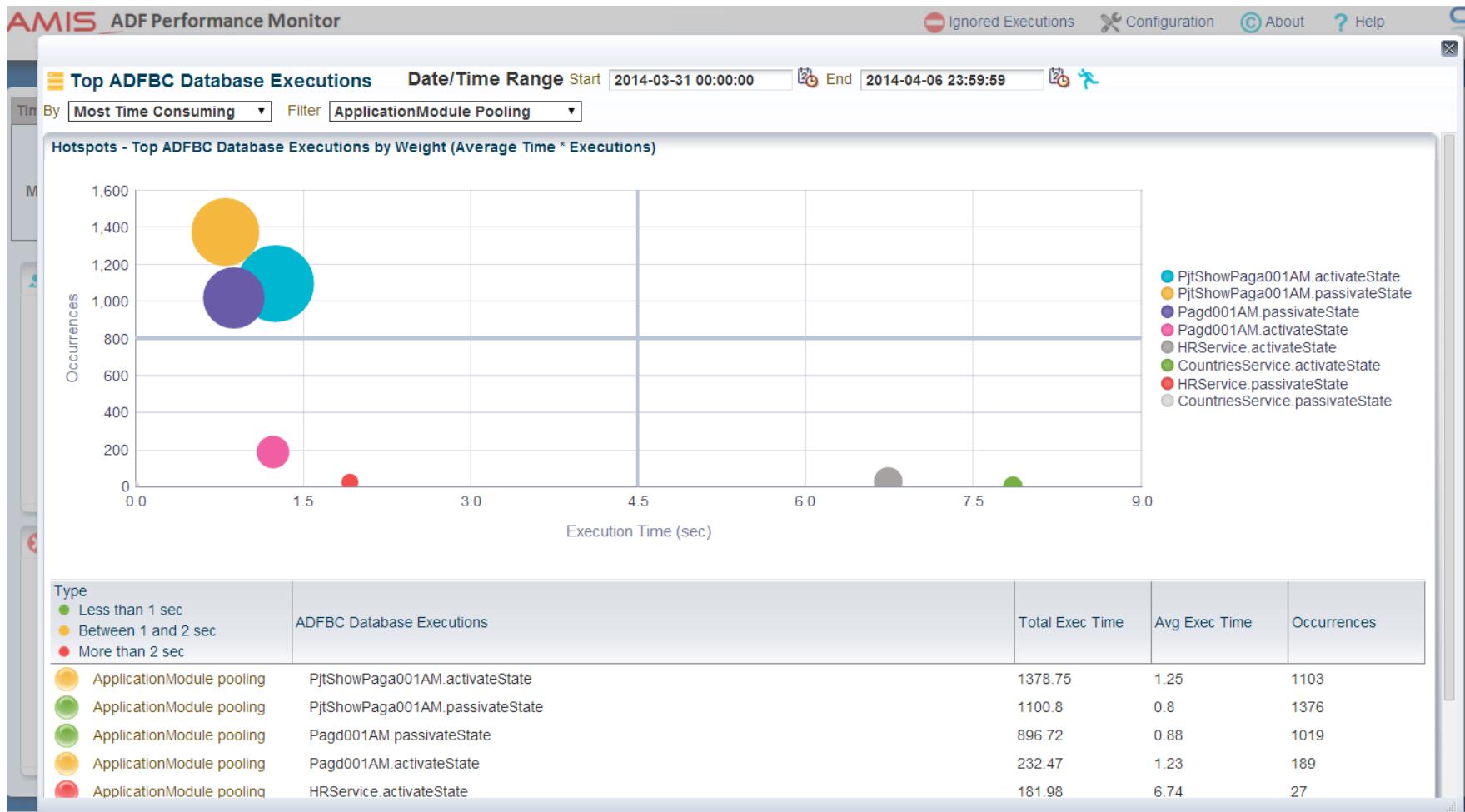
Ignored Executions Configuration About Help

Top ADFBC Database Executions Date/Time Range Start 2014-03-31 00:00:00 End 2014-04-06 23:59:59 Filter ApplicationModule Pooling

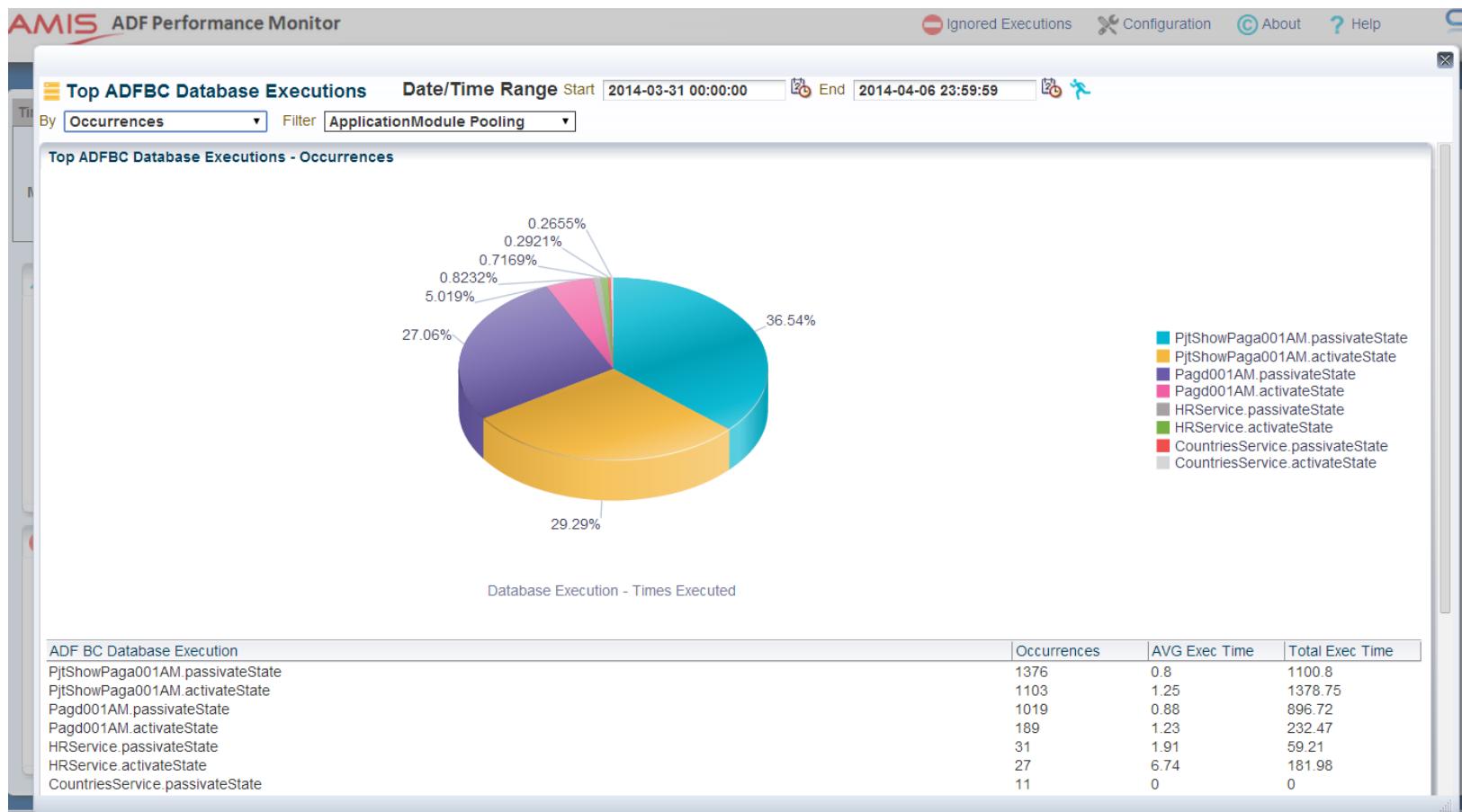
By Average Execution Time ▾

TOP ADFBC Database Executions by Execution Time		Show Min <input type="checkbox"/>	Show Max <input type="checkbox"/>	tip: click on Database Execution link to zoom in		
Type	Execution Time	Avg Execution Time	Occurrences	Total Exec Time		
Less than 1 sec	ADF BC Database Execution					
Between 1 and 2 sec						
More than 2 sec						
ApplicationModule pooling	CountriesService.activateState	7.84	10	78.4		
ApplicationModule pooling	HRService.activateState	6.74	27	181.98		
ApplicationModule pooling	HRService.passivateState	1.91	31	59.21		
ApplicationModule pooling	PjtShowPaga001AM.activateState	1.25	1103	1378.75		
ApplicationModule pooling	Pagd001AM.activateState	1.23	189	232.47		
ApplicationModule pooling	Pagd001AM.passivateState	0.88	1019	896.72		
ApplicationModule pooling	PjtShowPaga001AM.passivateState	0.80	1376	1100.8		
ApplicationModule pooling	CountriesService.passivateState	0.00	11	0		

Example: Worst ApplicationModule activations & passivations overview (2)



Example: Occurrences overview



Learn More

- [Instrumenting your ADF Application – part 1](#)
- [Instrumenting your ADF Application – part 2](#)
- [Tips on How to Limit ADF BC Memory Consumption](#)
- ADF Performance Monitor
 - [Whitepaper](#)
 - [Information](#)

