



SAGE Computing Services

Customised Oracle Training Workshops and Consulting

‘n’ methods to improve Apex performance

Why stop at 10?

Scott Wesley

Systems Consultant & Trainer

Agenda

- Introduction
- Prevention
- Fluff
- Diagnosis
- Fluff
- Time Management
- Fluff
- Conclusion
- Drinks



Connor McDona1d

Larry Lessig?



the law is strangling creativity

http://presentationzen.blogs.com/presentationzen/2005/10/the_lessig_meth.html
http://www.ted.com/talks/larry_lessig_says_the_law_is_strangling_creativity.html



Identity 2.0 – Dick Hardt

<http://identity20.com/media/OSCON2005/>



who's the Dick on your site



so today's going to be more like this





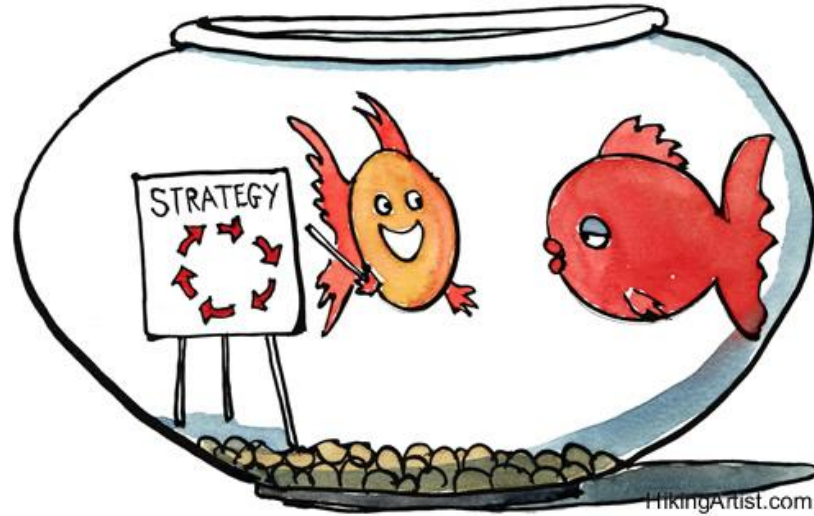


← This presentation

← what you can explore

```
who_am_i;
```





Computing Serv
SAFE







AUSOUG



NATIONAL CONFERENCE SERIES
2010 - PERTH CONFERENCE

ORACLE WITH 20:20 FORESIGHT

*"Innovate, Interact, Educate and
Maximise the Use of Your Oracle Software"*

Perth 22-23 November 2010, Burswood Entertainment Complex
www.ausoug.org.au/2020

REGISTER NOW for what will be the largest Oracle conference in
Western Australia this year.

The "Oracle with 20:20 Foresight" Conference in Perth Western Australia will bring together the AUSOUG, OAUG and ODTUG communities and the news out of Oracle OpenWorld. The theme "Innovate, Interact, Educate and Maximise the use of your Oracle Software" defines the changing shape of the Oracle community in the world and how best to gain the most benefit from it.

Attend the conference and gain skills, networking and product information of value to both yourself and your employer. Covering - Core Technology, Oracle Middleware, Oracle BI and Oracle Applications. And all presented by world class speakers.

Presenter	Topic
Steven Feuerstein	Golden Rules
Penny Cookson	Meet the CBO
Howard Ong	Make your legacy application live...
Scott Wesley	Apex performance
Jeff Kemp	Oracle Apex Themes and Templates
Damien Bootsma	Database performance made easy
Tom Kyte	The Best Way
Connor McDonald	Managing optimiser statistics
Frank Bommarito	Outlines, Profiles, SQL Plan Baselines

prevention - innovate
time management - educate
diagnosis - interact
not just Apex - maximise



prevention - innovate
time management - educate
diagnosis - interact
not just Apex - maximise



example



checkboxes



Source

* Process [\[Download Source\]](#)

```
begin
  << chk >>
  for i in 1..apex_application.g_f20.count loop
    update resources
    set deleted = 'Y'
    where code = apex_application.g_f20(i);
  end loop chk;
end;
```

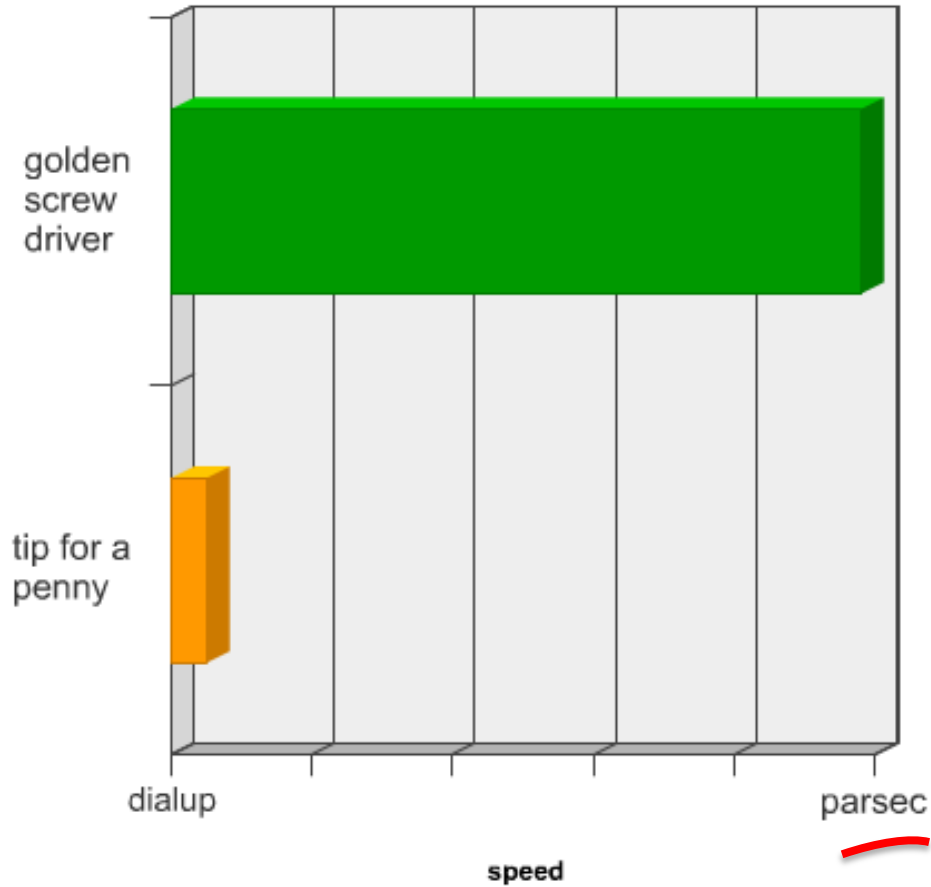
Source

* Process [Download Source]

begin

forall i in indices of apex_application.g_f20
 update resources
 set deleted = 'Y'
 where code = apex_application.g_f20(i);
end;

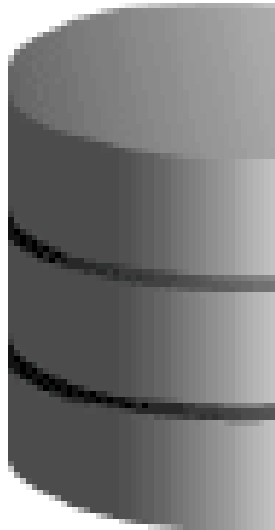
Performance Benefit





move away from Oracle Forms (to Apex)



A screenshot of an Oracle Application Express form. The form has a table with columns: Quantity, Cost, Status, and Chargeable. The table contains two rows of data. Below the table is a dropdown menu with a list of codes: LNCH, CHRS, CONF, DATS, PC1, and FILE. The LNCH code is selected. At the bottom of the form are buttons for OK, Cancel, Close, and Save.

Quantity	Cost	Status	Chargeable
20	420	Complete	<input type="checkbox"/>
1	0	Complete	<input type="checkbox"/>

Code

LNCH

CHRS

CONF

DATS

PC1

FILE

OK

Cancel

Close

Save

authentication



LDAP



```
FUNCTION return_ldap_groups  
RETURN t_ldap_group PIPELINED;
```



```
CREATE OR REPLACE TYPE r_ldap_group
AS OBJECT
  (username      VARCHAR2(100)
  ,group_name    VARCHAR2(100))
/
```

```
CREATE OR REPLACE TYPE t_ldap_group
AS TABLE OF r_ldap_group;
/
```



```
CREATE MATERIALIZED VIEW mv_ldap_groups  
REFRESH COMPLETE  
START WITH SYSDATE  
NEXT TRUNC(SYSDATE) + 1  
AS  
SELECT username, group_name  
FROM TABLE(return_ldap_groups);
```



authorisation



Authorization Scheme

Cancel

Delete

Apply Changes

Show All

Name

Subscription

Authorization Scheme

Evaluation Point

Comments

Evaluation Point

Validate authorization scheme

- ☒ Once per page view
☐ Once per session



Help - Mozilla Firefox



http://localhost:8080/apex/www_flow_item_help.show_help?p_item_id=1869709



Validate authorization scheme

Close

Help

Determines if the authorization scheme should be evaluated once per session or once per page view.

Evaluating once per session is much more efficient. However if the authorization check depends on changing session state or other factors that are not consistent over an entire session then you can choose to have the authorization scheme evaluated once per page view.

javascript:popupURL('www_flow_help.show_help?p_lang=en-g...



Login Processing

Pre-Authentication Process

Authentication Function

-BUILTIN-

[Built In] [Database Account] [LDAP]

LDAP Host [LDAP Test Tool]

LDAP Port

Use SSL

☐ SSL ☐ SSL with Authentication ☒ No SSL

Use Exact Distinguished Name (DN)

☒ Yes ☐ No

LDAP DN String

LDAP Username Edit Function

Post-Authentication Process

```
-- To populate application item F_ADMIN_SCHEME  
-- (preferably via perhaps app_auth_pkg.post_authentication_process  
  
app_auth_pkg.fn_admin_scheme (:APP_USER);
```

Help Text

Conditions

Condition Type

PL/SQL Expression

[PL/SQL] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1

```
:F_ADMIN_SCHEME = 'Y'
```

☐ Do not validate code (parse code at runtime only).

conditions



Conditional Display

Condition Type

- No Condition -

- No Condition -

Exists (SQL query returns at least one row)

NOT Exists (SQL query returns no rows)

SQL Expression

PL/SQL Expression

PL/SQL Function Body Returning a Boolean

Request = Expression 1

Request != Expression 1

Request Is Contained within Expression 1

Request Is NOT Contained within Expression 1

Value of Item in Expression 1 = Expression 2

Value of Item in Expression 1 != Expression 2

Value of Item in Expression 1 Is NULL

Value of Item in Expression 1 Is NOT NULL

Value of Item in Expression 1 = Zero

Value of Item in Expression 1 != Zero

Value of Item in Expression 1 Is NULL or Zero


Value of Item in Expression 1 Is NOT null and the Item Is NOT Zero

Value of Item in Expression 1 Contains No Spaces

Value of Item in Expression 1 Is Numeric

pagination style





 Rows 15 Go 


<u>Id</u>	<u>First Name</u>	<u>Last Name</u>	<u>Address1</u>	<u>Address2</u>	<u>City</u>	<u>State</u>	<u>Postal Code</u>	<u>Number1</u>	<u>Number2</u>	<u>Credit Limit</u>	<u>Email</u>
6	Albert	Lambert	10701 Lambert International Blvd.	-	St. Louis	MO	63145	314-555-4022	-	1000	-
3	Edward	Logan	1 Harborside Drive	-	East Boston	MA	02128	617-555-3295	-	1000	-
4	Edward "Butch"	OHare	10000 West OHare	-	Chicago	IL	60666	773-555-7693	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
5	Fiorello	LaGuardia	Hangar Center	Third Floor	Flushing	NY	11371	212-555-3923	-	1000	-
1	John	Dulles	45020 Aviation Drive	-	Sterling	VA	20166	703-555-2143	-	1000	-
2	William	Hartsfield	6000 North Terminal Parkway	-	Atlanta	GA	30320	404-555-3285	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-


1 - 15 

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CE



 Rows 15 Go 

<u>Id</u>	<u>First Name</u>	<u>Last Name</u>	<u>Address1</u>	<u>Address2</u>	<u>City</u>	<u>State</u>	<u>Postal Code</u>	<u>Number1</u>	<u>Number2</u>	<u>Credit Limit</u>	<u>Email</u>
6	Albert	Lambert	10701 Lambert International Blvd.	-	St. Louis	MO	63145	314-555-4022	-	1000	-
3	Edward	Logan	1 Harborside Drive	-	East Boston	MA	02128	617-555-3295	-	1000	-
4	Edward "Butch"	OHare	10000 West OHare	-	Chicago	IL	60666	773-555-7693	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
5	Fiorello	LaGuardia	Hangar Center	Third Floor	Flushing	NY	11371	212-555-3923	-	1000	-
1	John	Dulles	45020 Aviation Drive	-	Sterling	VA	20166	703-555-2143	-	1000	-
2	William	Hartsfield	6000 North Terminal Parkway	-	Atlanta	GA	30320	404-555-3285	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-

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2.03

SCOTTWE



Region Definition

Report Attributes

Print Attributes

Region Name: **Customers**

Show All

Column Attributes

Layout and Pagination

Sorting

Messages

Report Export

Break Formatting

External Processing

Layout and Pagination

Report Template

[HTML] [Look 1] [Look 2] [Look 3] [Look 4] [CSV] [XML]

Report Attributes Substitution

Show Null Values as

Pagination Scheme

Enable Partial Page Refresh

Display Position

Number of Rows

Maximum Row Count

Strip HTML

- Row Ranges X to Y of Z (no pagination)
- No Pagination Selected -
- Row Ranges 1-15 16-30 (with set pagination)
- Row Ranges 1-15 16-30 in select list (with pagination)
- Row Ranges X to Y (no pagination)
- Row Ranges X to Y of Z (no pagination)
- Row Ranges X to Y of Z (with pagination)
- Search Engine 1,2,3,4 (set based pagination)
- Use Externally Created Pagination Buttons
- Row Ranges X to Y (with next and previous links)

engine]

Serv

Com

SA

ajax methods



List of Values

Named LOV

Display Extra Values

Display Null Value

Null Display Value

Null Return Value

Cascading LOV Parent Item(s)

Page Items to Submit

Optimize Refresh

List of values definition

```
select name d, org_id r
from   organisations
start with parent_org_id = :P12_PARENT_ORG_ID
connect by prior org_id = parent_org_id
order by 1
```

Create or edit static List of Values

Create Dynamic List of Values

> List of Values Examples

Cascading LOV

Organisation Sage Computing Services ▼

Sub-Organisation

Classroom Training
Self Study Program
Training Division

```
function getEmail(pUser) {  
    var get = new htmldb_Get(null,$v('pFlowId'),  
        'APPLICATION_PROCESS=GET_EMAIL',0);  
    get.addParam('x01',pUser);  
    gReturn = get.get();  
    json_SetItems(gReturn);  
}
```



post calculation computation



Edit Organisation

Action Edit Query Block Record Field Help

Name Sage Professional Services

Parent

Address PO Box 220 Hillarys
PERTH WA 6025

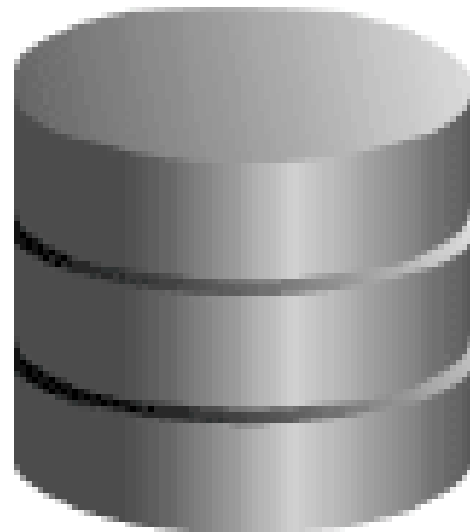
Telephone 041-990-4458

Internal ☐

Close Save

Record: 2/? ... List of Valu... <OSC>

post query



Source

Source Used Always, replacing any existing value in session state ▾

Source Type Database Column ▾

[\[static text\]](#) [\[DB Column\]](#) [\[SQL Query\]](#) [\[PL/SQL expression\]](#) [\[PL/SQL function body\]](#)

Maintain session state Per session ▾

Source value or expression

EMAIL_LIST

Post Calculation Computation

REPLACE (:P1_EMAIL_LIST, ':', '
')

Format Mask



Source

Source Used Always, replacing any existing value in session state ▾

Source Type Database Column ▾

[static text] [DB Column] [SQL Query] [PL/SQL expression] [PL/SQL function body]

Maintain session state Per session ▾

Source value or expression

CODE

Post Calculation Computation

my_pkg.get_description(:P1_CODE)

Format Mask



bulk collects





```
<< email_loop >>
FOR r_rec IN
  (SELECT email
   FROM employees) LOOP
  lc_emails := lc_emails
               ||r_rec.email
               ||',';
END LOOP email_loop;

lc_emails := RTRIM(lc_emails,',');
```



```
SELECT DISTINCT email  
BULK COLLECT  
INTO   lt_emails  
FROM   employees;
```

```
lc_emails := apex_util.table_to_string  
              (p_table  => lt_emails  
               ,p_string => ', ');
```

validation sequence



Conditions

When Button Pressed

- Select Button - ▼

Condition Type

PL/SQL Expression ▼

[PL/SQL] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1

```
apex_application.g_inline_validation_error_cnt = 0
```

CSS in SQL



Source

Region Source

```
SELECT emp_id  
       , '<b>' || ename || '</b>'  
       , salary  
FROM emp
```


Column Formatting

Number / Date Format

CSS Class CSS Style

Highlight Words

HTML Expression

[Insert column value]

network traffic



HTML Header

HTML Header

Include Standard CSS and JavaScript

Yes ▼

Yes

No

HTML Body Attribute

Page HTML Body Attribute

Definition

* Header

```
<head>
  <title>#TITLE#</title>
  #HEAD#

<!--
  JQuery related content added by Scott Wesley - Sage Computing Services
  Used for datepicker widget (as per Apex 4.0) and dialog box
-->
<script src="#WORKSPACE_IMAGES#jquery-1.4.2.min.js" type="text/javascript"></script>
<script src="#WORKSPACE_IMAGES#jquery-ui-1.8.4.custom.min.js" type="text/javascript"></script>
<link type="text/css" rel="stylesheet" href="#WORKSPACE_IMAGES#jquery-ui-1.8.4.custom.css" />

<link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_2/css/theme_4_0.css" type="text/css" />
<!--[if IE]><link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_2/css/theme_4_0_ie.css"
```

Page Rendering



Page

Page Name: [0](#) Template: [Application default](#)
Title: [0](#) Header Text:
HTML Header: Footer Text:
HTML Body: Build Option:
Help Text: Authorization: [No](#)
Page Group: [Welcome](#) Cached: No

Regions

Display Point: After Header ▾▴

10 ☐ [ApexLib - Javascript/CSS](#) HTML

50 ☒ [Main Menu](#) [List](#)

Display Point: Before Footer ▾▴

20 ☒ [ApexLib - Before footer](#) PL/SQL

21 ☐ [ApexLib - Handle Error Page](#) HTML

Display Point: Region Position 01 ▾▴

1 >>> [Breadcrumb](#) [Breadcrumb Entry](#)

40 ☐ [School](#) HTML

Display Point: Region Position 08

70 ☐ [AppList](#) HTML

Buttons

Items

Region: [School](#) ☐ ☐ ☐

10 [P0_SCHOOLS](#) Select List with Submit

```
-- Is the current page a help/contact popup/login
-- these pages don't need jquery, cancel page calculations.
FUNCTION is_popup_page
  RETURN BOOLEAN IS
BEGIN
  RETURN wwv_flow.get_page_alias IN
    ('ITEMHELP' -- help popup
    , 'LOGIN'    -- not a popup, but doesn't need dates
    , 'CONTACTS' -- contact manager popup
    , 'FINDSPP'  -- SPP lookup
    , 'EMAIL'    -- not worth cancelling to and doesn't need jquery
    , 'EMAILSENT' -- closes in a few seconds
    );
END is_popup_page;
```



javascript validation



Quick Lookup

[Master Book List](#)

This Book

[Oracle® Application Express API Reference Release 3.2](#)

This Page

[9 JavaScript APIs](#)

[\\$x\(pNd\)](#)
[\\$v\(pNd\)](#)
[\\$\\$pNd, pValue\)](#)
[\\$u_Carray\(pNd\)](#)
[\\$u_Narray\(pNd\)](#)
[\\$nvl\(pTest, pDefault\)](#)
[doSubmit\(pRequest\)](#)
[confirmDelete\(pMessage, pRequest\)](#)
[\\$x_Style\(pNd, pStyle, pString\)](#)
[\\$x_Hide\(pNd\)](#)
[\\$x_Show\(pNd\)](#)
[\\$x_Toggle\(pNd\)](#)
[\\$x_Remove\(pNd\)](#)
[\\$x_Value\(pNd, pValue\)](#)
[\\$x_UpTill\(pNd, pToTag\)](#)
[\\$x_ItemRow\(pNd, pFunc\)](#)
[\\$x_HideItemRow\(pNd\)](#)
[\\$x_ShowItemRow\(pNd\)](#)
[\\$x_ToggleItemRow\(pNd\)](#)
[\\$x_HideAllExcept\(pNd, pNdArray\)](#)
[\\$x_HideSiblings\(pNd\)](#)
[\\$x_ShowSiblings\(pNd\)](#)
[\\$x_Class\(pNd, pClass\)](#)
[\\$x_SetSiblingsClass\(pNd, pClass, pNdClass\)](#)

Oracle® Application Express API Reference Release 3.2

Part Number E13369-01



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9 JavaScript APIs

This section describes JavaScript functions and objects included with Oracle Application Express and available on every page. You can use these functions and objects to provide client-side functionality, such as showing and hiding page elements, or making XML HTTP Asynchronous JavaScript and XML (AJAX) requests.

Topics in this section include:


- [\\$x\(pNd\)](#)
- [\\$v\(pNd\)](#)
- [\\$\\$pNd, pValue\)](#)
- [\\$u_Carray\(pNd\)](#)
- [\\$u_Narray\(pNd\)](#)
- [\\$nvl\(pTest, pDefault\)](#)
- [doSubmit\(pRequest\)](#)
- [confirmDelete\(pMessage, pRequest\)](#)
- [\\$x_Style\(pNd, pStyle, pString\)](#)
- [\\$x_Hide\(pNd\)](#)
- [\\$x_Show\(pNd\)](#)

#TIMING#



Header and Footer


Region Header


A large, empty rectangular box with a thin black border, intended for the Region Header content.

Region Footer


#TIMING#

A large rectangular box with a thin black border, containing the text "#TIMING#" at the top left. The rest of the box is empty.



 Rows 15 Go 

<u>Id</u>	<u>First Name</u>	<u>Last Name</u>	<u>Address1</u>	<u>Address2</u>	<u>City</u>	<u>State</u>	<u>Postal Code</u>	<u>Number1</u>	<u>Number2</u>	<u>Credit Limit</u>	<u>Email</u>
6	Albert	Lambert	10701 Lambert International Blvd.	-	St. Louis	MO	63145	314-555-4022	-	1000	-
3	Edward	Logan	1 Harborside Drive	-	East Boston	MA	02128	617-555-3295	-	1000	-
4	Edward "Butch"	OHare	10000 West OHare	-	Chicago	IL	60666	773-555-7693	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
5	Fiorello	LaGuardia	Hangar Center	Third Floor	Flushing	NY	11371	212-555-3923	-	1000	-
1	John	Dulles	45020 Aviation Drive	-	Sterling	VA	20166	703-555-2143	-	1000	-
2	William	Hartsfield	6000 North Terminal Parkway	-	Atlanta	GA	30320	404-555-3285	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-

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2.03

SCOTT WE



cache

Show All

Name

Display Attributes

Header and Footer

HTML Header

HTML Body Attribute

Security

Duplicate

Cache

Configuration

Error

Help

Comments

Cache

Cache Page No

Cache Timeout 6 hours

Cache By User No

Cache Page Condition - Select Condition Type -

[\[PL/SQL\]](#) [\[item=value\]](#) [\[item not null\]](#) [\[request=e1\]](#) [\[page in\]](#) [\[page not in\]](#) [\[exists\]](#) [\[none\]](#) [\[never\]](#)

Expression 1

Expression 2

deterministic functions



Source

Region Source

```
SELECT *  
FROM my_table  
WHERE my_column = v('MY_ITEM')
```

Source

Region Source

```
SELECT *  
FROM my_table  
WHERE my_column = :MY_ITEM
```


Source

Region Source

```
SELECT *  
FROM my_table  
WHERE my_column = my_own_function(another_column)
```

Source

Region Source

```
SELECT *  
FROM my_table  
WHERE my_column = v('MY_ITEM')
```

```
BEGIN
  SELECT *
  INTO my_variable
  FROM my_table
  WHERE my_column = v('MY_ITEM');
END;
```

From 10gR2



Pre Apex3.x



ie - Oracle XE

pre-patch



```
CREATE OR REPLACE FUNCTION V
( p_item    IN VARCHAR2
, p_flow    IN NUMBER    := NULL
, p_scope   IN VARCHAR2 := 'SESSION_AND_USER'
, p_escape  IN VARCHAR2 := 'N'
)
RETURN VARCHAR2 DETERMINISTIC
=====
-- Wraps the existing APEX V function and adds the DETERMINISTIC optimizer hint
-- so that the function isn't called for each row the query engine is verifying.
-- See /2006/11/caution-when-using-plsql-functions-in.html
-- for details.
=====
IS
BEGIN
    RETURN FLOWS_020200.V
        ( p_item => p_item
        , p_flow  => p_flow
        , p_scope => p_scope
        , p_escape => p_escape
        );
END V;
/
```

Source

Region Source

```
SELECT *  
FROM my_table  
-- scalar subquery caching  
WHERE my_column = (SELECT v('MY_ITEM') FROM DUAL)
```


implicit vs explicit conversion



Converting PL/SQL Datatypes

Sometimes it is necessary to convert a value from one datatype to another. For example, to use a `DATE` value in a report, you must convert it to a character string. PL/SQL supports both explicit and implicit (automatic) datatype conversion.

To ensure your program does exactly what you expect, use explicit conversions wherever possible.

```
create or replace function nv (  
    p_item in varchar2)  
    return number  
-- Copyright (c) Oracle Corporation 1999. All Rights Reserved.  
--  
--     DESCRIPTION  
--     Function to return a numeric flow value.  V stands for value.  
--  
--     SECURITY  
--  
--     NOTES  
--  
is  
begin  
    return to_number(v(p_item));  
end nv;  
/
```



Start Page | sage_xe | train_xe

| 0.056 seconds

Worksheet | Query Builder

```
1  
2 select * from organisations where name = 123;  
3
```

Query Result | Explain Plan

SQL | 0.056 seconds

OPERATION

- [-] SELECT STATEMENT
 - [-] TABLE ACCESS
 - [-] Filter Predicates
 - TO_NUMBER(NAME)=123

sequences



Table / View Owner
▼

Table / View Name
▼

Page and Region
Attributes
▼

Tab (optional)
▼

Primary Key
▼

Columns
▼

Process Options
▼

Branching
▼

Confirm

Create Form

Cancel

< Previous

Next >

Define the source for the primary key columns.

Owner: SAGE

Table / View Name: PARTIES

Primary Key Column: ID

* Source Type

☒ Existing trigger☐ Custom PL/SQL function☐ Existing sequence

▼ Custom PL/SQL Function Example

```
DECLARE
  L_PRIMARY_KEY NUMBER;
BEGIN
  SELECT MAX(EMPNO) + 1
  INTO   L_PRIMARY_KEY
  FROM   EMP;
```

```
RETURN L_PRIMARY_KEY;
END;
```



```
BEGIN
  INSERT INTO my_table
    (my_pk, ...
VALUES
  (my_seq.NEXTVAL, ...);
END;
/
```

prevention – innovate
time management – educate
diagnosis – interact
not just Apex – maximise



PL/SQL APIs



Tables



PARTIES

PLCH_PARTS

SW_DUMMY

SYS_PARAMETERS

TIMESHEETS

TIMESHEET_ENTRIES

USER_LINKS

EMP

EMPLOYEE_FILES

ERROR_MESSAGES

ITEM_COMMON_VALUES

NOT_AVAILABLE

PARTIES

PLCH_PARTS

SW_DUMMY

SYS_PARAMETERS

TIMESHEETS

TIMESHEET_ENTRIES

USER_LINKS

Table Data Indexes Model Constraints Grants Statistics UI Defaults Triggers

Add Column Modify Column Rename Column Drop Column Rename Copy Drop T

Column Name	Data Type	Nullable	Default	Primary Key
-------------	-----------	----------	---------	-------------

ID	NUMBER	No	-	1
FIRST_NAMES	VARCHAR2(30)	Yes	-	-
NAME	VARCHAR2(30)	No	-	-
DOB	DATE	Yes	-	-
JOB_TITLE	VARCHAR2(30)	Yes	-	-
PAR_TYPE	VARCHAR2(1)	No	-	-
PAR_ID	NUMBER	Yes	-	-
EFF_FROM	DATE	Yes	-	-
EFF_TO	DATE	Yes	-	-

1 - 9

[Download](#)

Create

Table

View

Index

Sequence

Type

Package

Procedure

Function

Trigger

Database Link

Materialized View

Synonym

Package



```
-- table API for application "PARTIES_API", generated 17-NOV-2010
-- package specification
--
```

```
create or replace package "PARTIES_API" is
```

```
-----
-- create procedure for table "PARTIES"
```

```
procedure "INS_PARTIES" (
    "P_ID"           in number,
    "P_FIRST_NAMES"  in varchar2  default null,
    "P_NAME"         in varchar2,
    "P_DOB"          in date       default null,
    "P_JOB_TITLE"    in varchar2  default null,
    "P_PAR_TYPE"     in varchar2,
    "P_PAR_ID"       in number     default null,
    "P_EFF_FROM"     in date       default null,
    "P_EFF_TO"       in date       default null
);
```

```
-----
-- update procedure for table "PARTIES"
```

```
procedure "UPD_PARTIES" (
```



create or replace package "PARTIES_API" is

-- create procedure for table "PARTIES"
 procedure "INS_PARTIES" (...

-- update procedure for table "PARTIES"
 procedure "UPD_PARTIES" (...

-- delete procedure for table "PARTIES"
 procedure "DEL_PARTIES" (...

-- get procedure for table "PARTIES"
 procedure "GET_PARTIES" (...

-- get procedure for table "PARTIES" including MD5
 procedure "GET_PARTIES" (...

-- build MD5 function for table "PARTIES"
 function "BUILD_PARTIES_MD5" (...
) return varchar2;

end "PARTIES_API";



merge vs insert/update



multi-table insert





```
BEGIN
  INSERT INTO my_table
    (my_pk, ...
VALUES
  (fn_get_my_seq, ...);
END;
/
```

```
CREATE OR REPLACE TRIGGER my_table_br_trg
BEFORE INSERT OR UPDATE ON sage.my_table
FOR EACH ROW
BEGIN
    IF :NEW.my_id IS NULL THEN
        SELECT my_seq.NEXTVAL
        INTO :NEW.my_id
        FROM dual;
        -- :NEW.my_id := my_seq.NEXTVAL -> 11g
    END IF;
END;
/
```


shared components

copy object

subscriptions

pl/sql packages

re-use

page zero

ui defaults



Conditions

When Button Pressed

- Select Button - ▼

Condition Type

PL/SQL Function Body Returning a Boolean ▼

[PL/SQL] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1

```
-- apex_application.g_inline_validation_error_cnt = 0  
  
return my_pkg.run_validation
```

prevention - innovate
time management - educate
diagnosis - interact
not just Apex - maximise



apex_dml_lock_wait_time



Application Computation

Show All

Item

Frequency

Computation

Authorization

Conditions

Configuration

Comments

Item

Application: **101 Scott Sandpit**

Sequence

* Computation Item



Frequency

Computation Point

Computation

Computation Type

* Computation

2

debug mode




) r where rownum <= to_number(:APXWS_MAX_ROW_CNT)

0.05: IR binding: ":APXWS_MAX_ROW_CNT"="APXWS_MAX_ROW_CNT" value="10000"

2.06: Printing rows. Row window: 1-15. Rows found: 16

	<u>First Name</u>	<u>Last Name</u>	<u>Address1</u>	<u>Address2</u>	<u>City</u>	<u>State</u>	<u>Postal Code</u>	<u>Number1</u>	<u>Number2</u>	<u>Credit Limit</u>	<u>Email</u>	
		Lambert	10701 Lambert International Blvd.	-	St. Louis	MO	63145	314-555-4022	-	1000	-	
		Logan	1 Harborside Drive	-	East Boston	MA	02128	617-555-3295	-	1000	-	
		O'Hare	10000 West O'Hare	-	Chicago	IL	60666	773-555-7693	-	1000	-	
		Eugene Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
		Morello	LaGuardia	Hangar Center	Third Floor	Flushing	NY	11371	212-555-3923	-	1000	-
		John	Dulles	45020 Aviation Drive	-	Sterling	VA	20166	703-555-2143	-	1000	-
	2	William	Hartsfield	6000 North Terminal Parkway	-	Atlanta	GA	30320	404-555-3285	-	1000	-
	7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
	7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
	7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	
7	Eugene	Bradley	Schoephoester Road	-	Windsor Locks	CT	06096	860-555-1835	-	1000	-	

1 - 15 of 2401 

2.04

2.07: Region: timer

2.07: Computation point: AFTER_BOX_BODY

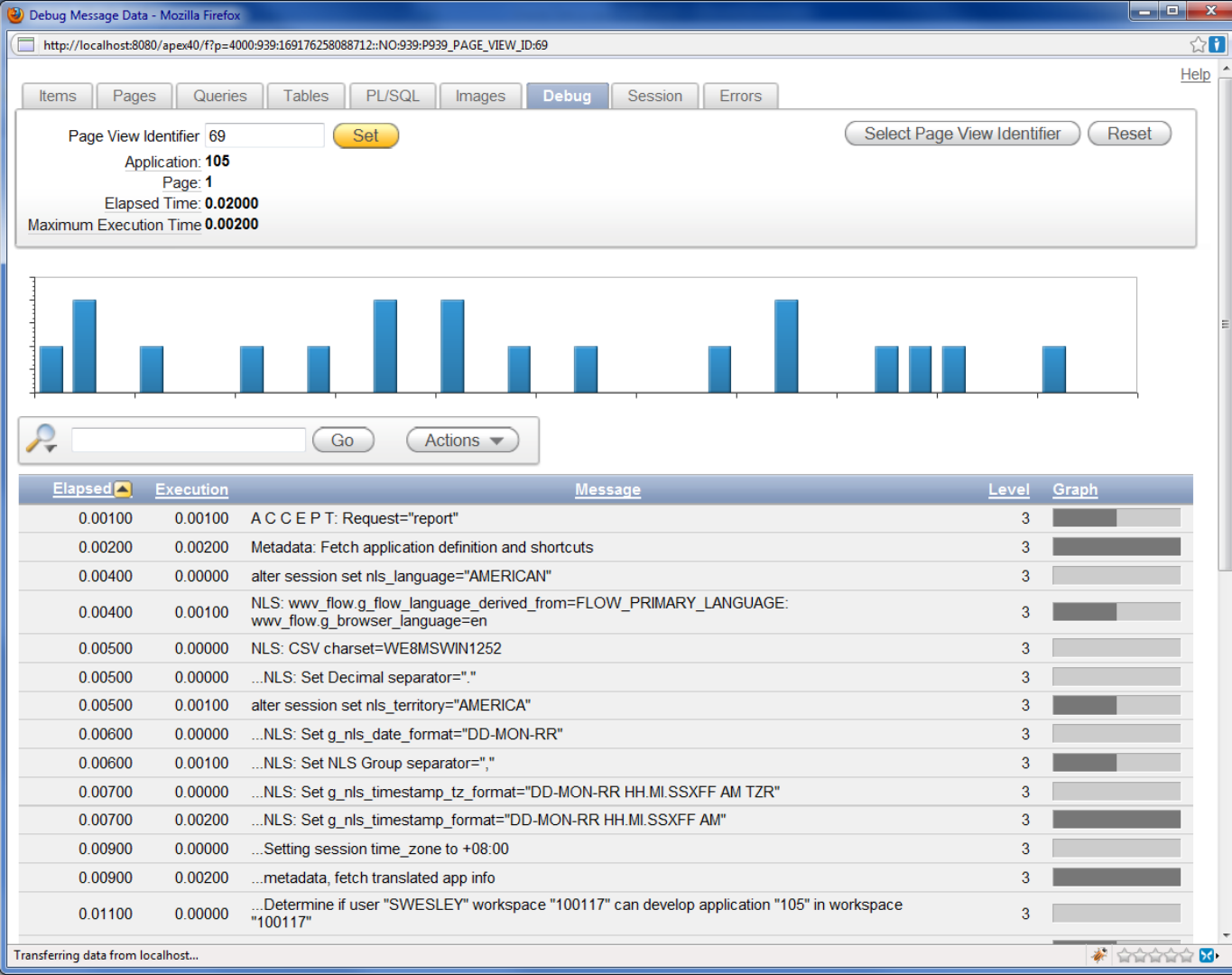
2.07: Processing point: AFTER_BOX_BODY

2.07: Computation point: BEFORE_FOOTER

2.07: Processing point: BEFORE_FOOTER

2.07: Show page template footer

SCOTTWE




```
wwv_flow.debug('my debug information');
```



firebug



customers classic - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Google Page

Firebug - customers classic

File View Help

Console HTML CSS Script DOM Net

Clear Persist All HTML CSS JS XHR Images Flash

URL	Status	Domain	Size	Timeline
GET f?p=101:6:3632168	302 Found	localhost:8080	16.7 KB	19ms
GET f?p=101:6:2077906	200 OK	localhost:8080	16.7 KB	2.04s
GET theme_3_1.css	304 Not Modified	localhost:8080	17.2 KB	1ms
GET wwv_flow_file_mgr	304 Not Modified	localhost:8080	70.5 KB	4ms
GET wwv_flow_file_mgr	304 Not Modified	localhost:8080	57.6 KB	5ms
GET wwv_flow_file_mgr	304 Not Modified	localhost:8080	25.9 KB	1.02s
GET apex_ns_3_1.js	304 Not Modified	localhost:8080	33.7 KB	1.02s
GET apex_3_1.js	304 Not Modified	localhost:8080	39.1 KB	1.01s
GET apex_get_3_1.js	304 Not Modified	localhost:8080	7.4 KB	1ms
GET apex_builder.js	304 Not Modified	localhost:8080	4.9 KB	1ms
GET apex_3_1.css	304 Not Modified	localhost:8080	17.4 KB	1ms
GET headerBg.jpg	304 Not Modified	localhost:8080	13.6 KB	
GET e.gif	304 Not Modified	localhost:8080	870 B	
GET hdingBar-BG.gif	304 Not Modified	localhost:8080	147 B	
GET footerBg.gif	304 Not Modified	localhost:8080	262 B	
GET wwv_flow_file_mgr	304 Not Modified	localhost:8080	110 B	3ms
16 requests			322.2 KB (288.7 KB from cache)	3.26s (onload: 3.3s)

+27ms Started

0 0 DNS Lookup

0 0 Connecting

0 0 Sending

0 2.04s Waiting

+2.04s 0 Receiving

+3.22s 'DOMContentLoaded' (event)

+3.27s 'load' (event)

Id

7 E

1 J

2 V

4 E

6 A

3 E

5 F

Output

2.01

SCOTTW

Done

tracing



`http://.../f?p=100:1&p_trace=YES`

```
show parameter USER_DUMP_DEST
```

jmeter



<http://one-size-doesnt-fit-all.blogspot.com/2010/05/configuring-apache-jmeter-for-apex.html>



Tues 23rd Nov 2010

11am Studio 2




http://sagecomputing.com.au/presentations_sage_computing_services.html




page performance



 Since Display

Weighted Performance

Application	Page	Page Views	Average Elapsed	Weighted Performance	Percentage	Graph
101	6	<u>44</u>	1.1645	51.2400	50.4132	<div><div></div></div>
101	3	<u>31</u>	0.4887	15.1500	14.9055	<div><div></div></div>
103	31	<u>32</u>	0.1372	4.3900	4.3192	<div><div></div></div>
103	32	<u>35</u>	0.1166	4.0800	4.0142	<div><div></div></div>
103	42	<u>23</u>	0.1726	3.9700	3.9059	<div><div></div></div>
103	21	<u>24</u>	0.1446	3.4700	3.4140	<div><div></div></div>
103	1	<u>16</u>	0.1850	2.9600	2.9122	<div><div></div></div>
103	20	<u>17</u>	0.1229	2.0900	2.0563	<div><div></div></div>
103	8	<u>8</u>	0.2250	1.8000	1.7710	<div><div></div></div>
103	2	<u>16</u>	0.1069	1.7100	1.6824	<div><div></div></div>
103	30	<u>8</u>	0.1863	1.4900	1.4660	<div><div></div></div>
103	23	<u>11</u>	0.1282	1.4100	1.3872	<div><div></div></div>
103	5	<u>8</u>	0.1488	1.1900	1.1708	<div><div></div></div>
103	3	<u>13</u>	0.0723	0.9400	0.9248	<div><div></div></div>
103	33	<u>2</u>	0.4500	0.9000	0.8855	<div><div></div></div>
						row(s) 1 - 15 of 28 

[Download](#)

Elapsed time columns are reported in seconds.

Serv

A

Find Since Display

Page Performance

Application	Page	Page Name	Page Views	Average Elapsed	Weight	Percent of Total		Dynamic Views	Cached Views	Partial Page Views	Page Processing
103	31	Help Center	32	0.1372	4.3900	12.7839	<div><div></div></div>	26	0	6	0
103	32	Help Center	35	0.1166	4.0800	11.8812	<div><div></div></div>	35	0	0	0
103	42	Project Overview	23	0.1726	3.9700	11.5609	<div><div></div></div>	23	0	0	0
103	21	Help Center	24	0.1446	3.4700	10.1048	<div><div></div></div>	21	0	3	0
103	1	Home	16	0.1850	2.9600	8.6197	<div><div></div></div>	16	0	0	0
103	20	Help Center	17	0.1229	2.0900	6.0862	<div><div></div></div>	14	0	0	3
103	8	Item Help	8	0.2250	1.8000	5.2417	<div><div></div></div>	7	0	0	1
103	2	System Settings	16	0.1069	1.7100	4.9796	<div><div></div></div>	10	0	0	6
103	30	Manage Users	8	0.1863	1.4900	4.3390	<div><div></div></div>	8	0	0	0
103	23	Help Center	11	0.1282	1.4100	4.1060	<div><div></div></div>	10	0	0	1
103	5	Help Center	8	0.1488	1.1900	3.4653	<div><div></div></div>	7	0	0	1
103	3	Help Center	13	0.0723	0.9400	2.7373	<div><div></div></div>	13	0	0	0
103	33	Notification E-mail	2	0.4500	0.9000	2.6209	<div><div></div></div>	1	0	0	1
103	103	Manage Users	11	0.0736	0.8100	2.3588	<div><div></div></div>	8	0	0	3
103	101	Login	7	0.1014	0.7100	2.0676	<div><div></div></div>	7	0	0	0



1 - 15

[Download](#)

Elapsed time columns are reported in seconds. Page Processing entries are included.

monitor activity




 User Page  Session Page Mode - All - Since 4 weeks Display 15

Page Views

Application	Page	User	Time Stamp	Elapsed Time	Report Rows	Session	Think Time	Error Message	Page Mode	Cached Regions
103	42	nobody	5 days ago	0.25	35	655367906291951	17.00		Dynamic	0
103	31	nobody	5 days ago	0.17	8	655367906291951	246,315.00		Dynamic	0
103	105	SCOTTWE	8 days ago	0.03	0	409768910568606	46.00		Dynamic	0
103	105	SCOTTWE	8 days ago	0.04	0	409768910568606	61.00		Dynamic	0
103	105	SCOTTWE	8 days ago	0.03	0	409768910568606	2.00		Dynamic	0
103	32	SCOTTWE	8 days ago	0.09	2	409768910568606	2.00		Dynamic	0
103	31	SCOTTWE	8 days ago	0.10	8	409768910568606	4.00		Dynamic	0
103	23	SCOTTWE	8 days ago	0.30	114	409768910568606	3.00		Dynamic	0
103	1	SCOTTWE	8 days ago	0.05	1	409768910568606	11.00		Dynamic	0
103	105	SCOTTWE	8 days ago	0.06	0	409768910568606	83.00	ORA-01403: no data found	Dynamic	0
103	32	SCOTTWE	8 days ago	0.15	2	409768910568606	5.00		Dynamic	0
103	31	SCOTTWE	8 days ago	0.11	8	409768910568606	5.00		Dynamic	0
103	1	SCOTTWE	8 days ago	0.03	1	409768910568606	25.00		Dynamic	0
103	101		8 days ago	0.02	0	409768910568606	981,824.00		Dynamic	0
103	32	nobody	8 days ago	0.33	2	409768910568606	4.00		Dynamic	0
										1 - 15 

[Download](#)

Elapsed time columns are reported in seconds.



prevention - innovate
time management - educate
diagnosis - interact
not just Apex - maximise



short circuit evaluation





```
SELECT NVL(a_column  
           ,expensive_fn(b_column)) my_column  
FROM a_table;
```



```
SELECT COALESCE(a_column  
                ,expensive_fn(b_column)) my_column  
FROM a_table;
```



```
IF a != b  
OR (a IS NULL AND b IS NOT NULL )  
OR ( a IS NOT NULL AND b IS NULL )
```



```
IF (COALESCE(a,-1) != COALESCE(b,-2) )
```



```
IF NVL(a,-1) != NVL(b,-1)
```

queries



Source

Region Source

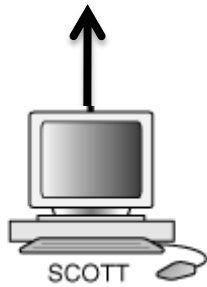
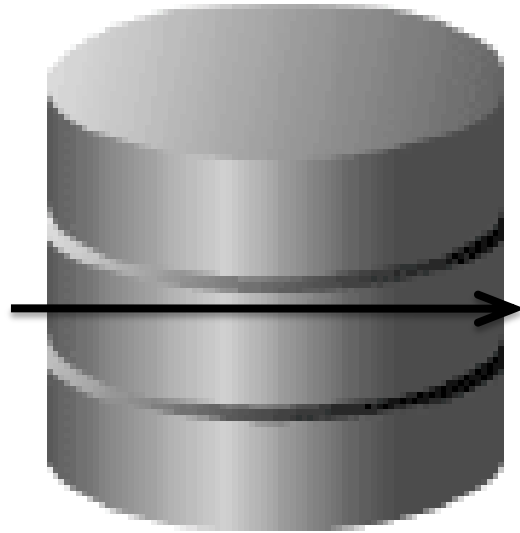
```
SELECT name, TO_CHAR(dt, 'DD-MM-YYYY') dt, amt, cum_amt -- Model results
FROM (
    SELECT name, TRUNC(dt, 'MM') dt, SUM(amt) amt
    FROM customer
    GROUP BY name, TRUNC(dt, 'MM')
)
MODEL
PARTITION BY (name)
DIMENSION BY (dt)
MEASURES (amt, cast(NULL AS NUMBER) cum_amt) -- Define calculated col
IGNORE NAV
RULES SEQUENTIAL ORDER(
    amt[FOR dt FROM TO_DATE('01-01-2007', 'DD-MM-YYYY')
        TO TO_DATE('01-12-2007', 'DD-MM-YYYY')
        INCREMENT NUMTOYMINTERVAL(1, 'MONTH')
    ] = amt[CV(dt)] -- Apply amt for given date, if found
    , cum_amt[ANY] = SUM(amt)[dt <= CV(dt)] -- Calculate cumulative
)
ORDER BY name, dt
/
|
```

remote database queries



small_table

big_table



SCOTT

Source

Region Source

```
SELECT st.info, sum(bt.measure) total  
FROM small_table st  
JOIN big_table@remote_db bt  
ON st.id = bt.id
```

Source

Region Source

```
SELECT /*+ DRIVING_SITE(bt) */  
       st.info, sum(bt.measure) total  
FROM small_table st  
JOIN big_table@remote_db bt  
ON st.id = bt.id
```


database version

hardware

experiment

load

table size

data distribution

phase of the moon

statistics



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Question time

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