

PL/SQL Internet Programming

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Learning Objectives

- Describe the PL/SQL Web Toolkit
- Describe a Web Toolkit application
- Demonstrate Web Toolkit application development

Speaker's Qualifications

- John Jeunnette is a Principal Consultant at Prairie Systems Group, Limited.
- Twenty-plus years of Oracle-based application development. First Web Toolkit application for a major aerospace firm in 1998.
- Active in multiple user groups: President of the Oracle Development Tools User Group, member of the Rocky Mountain Oracle Users Group.
- Occasional speaker on PL/SQL programming and the Web Toolkit.

Agenda

- The Internet and how it works
- HTML Basics
- PL/SQL Web Toolkit
- How to use the PL/SQL Web Toolkit
- Questions

The Internet

- HyperText Transport Protocol (HTTP)
 - TCP/IP (Transmission Control Protocol/Internet Protocol)
 - Request/Response
 - Stateless

The Internet

- HyperText Markup Language (HTML)
 - Tagging schema based on Standard Generalized Markup Language (SGML)
 - Separate content from format
 - Minimal content identification

The Internet

- Browsers

- Netscape Navigator
- Microsoft Internet Explorer
- Mozilla Firefox (open source)
- Safari (Macs)
- Opera

- Variations

- Javascript implementations
- User Interface

The Internet (summary)

- HTML
- HTTP (TCP/IP)
- Web Browser

The Internet

- Uniform Resource Locators (URLs)

- Resolve to a specific IP address via a Domain Name Server lookup
- <http://www.odtug.com>
- http://www.prairiesystemsgroup.com/pls/caat/caat_abstracts_upd.main?conference_id=17

Browsers/HTML

- Document Object Model (DOM)
 - Web Page contents/organization
 - "Document" = <html>...</html> as organized by a browser

HTML Basics

```
<html>
<head>
...protocol header data (optional)
</head>
<body>
Page contents
</body>
</html>
```

HTML Basics: Tables

```
<table>
  <tr>
    <td>...cell contents</td>
    <td>...another cell</td>
  </tr>
  <tr>
    <td>a cell in another row</td>
    <td>another row</td>
  </tr>
</table>
```

HTML Basics: Links

```
<a
href=http://www.prairiesystemsgr
oup.com/pls/caat/caat_abstract
s_upd.add_abstract?conference_i
d=17>Add an Abstract</a>
```

HTML Basics: Forms

```
<FORM
action="/pls/caat/caat_abstracts_upd.validate_abstract" method="POST"
name="abstract">
Name: <INPUT TYPE="text"
NAME="abstract_name" SIZE="100"
MAXLENGTH="50">
<INPUT <INPUT TYPE="submit">
</FORM>
```

- POST verses GET parameters

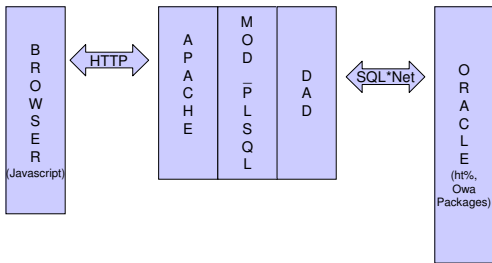
PL/SQL Web Toolkit

- Some History (from Tom Kyte)
 - Web Oracle Web (WOW Gateway) by Magnus Lonnroth of Sweden.
 - Oracle Web Agent (OWA) in version 1 of the Oracle Internet Server.
 - Cartridge in the Oracle Web Server (version 2)
 - OWAREPL by Tom Kyte in the Oracle Web Application Server (OWAS version 3).
 - Webdb listener
 - Oracle Application Server (version 4) includes PL/SQL cartridge
 - mod_plsql for Apache (Oracle HTTP Server).

PL/SQL Web Toolkit

- Components:
 - Oracle Database 8.1.6 and later
 - Oracle HTTP Server (OHS) (Apache)
 - Mod_plsql
 - Data Access Descriptor(s)
- Oracle Express Edition Embedded Gateway
- XML DB Embedded Gateway

Components Overview



PL/SQL Web Toolkit

- Context:
 - CGI Scripts
 - ASP – Active Server Pages
 - .NET – dot Net
 - JSP – Java Server Pages (and descendents)
 - PHP – PHP: Hypertext Preprocessor
 - PSP – PL/SQL Server Pages
 - Ruby on Rails

PL/SQL Web Toolkit

- Pros:

- Completely in the database
- Familiar syntax
- Stateless

- Cons:

- Stateless
- No separation of HTML from the code

PL/SQL Web Toolkit

- Data Access Descriptor (10g):

- PlsqlDatabaseUsername
- PlsqlDefaultPage
- PlsqlDocumentPath
- PlsqlDocumentProcedure
- PlsqlDocumentTablename
- PlsqlErrorStyle
- PlsqlMaxRequestsPerSession
- PlsqlSessionStateManagement

PL/SQL Web Toolkit

- Application Demonstration

PL/SQL Web Toolkit Documentation

- Oracle Application Server PL/SQL Web Toolkit Reference, 10g Release 3 (10.1.3). Part number B25598
- Oracle Application Server mod_plsql User's Guide, 10g Release 3 (10.1.3). Part number B25599
- HTML
- Javascript (optional)

PL/SQL Web Toolkit

- HelloWorld – simple procedure example

```
CREATE OR REPLACE PROCEDURE HelloWorld AS
BEGIN
  http.HTMLOpen;
  http.bodyOpen;
  http.print( 'Hello Seriously Practical Folks' );
  http.bodyClose;
  http.HTMLClose;
END;
/
```

PL/SQL Web Toolkit

- Application Module Logic
 - Block mode
 - Implicit database commits
 - Procedure independence (stateless)
 - Optimistic locking
 - No "returns"
 - The browser controls appearance
 - Lots of code
 - Procedure parameters (names and data types)
 - Exception blocks (error processing/debugging)

PL/SQL Web Toolkit

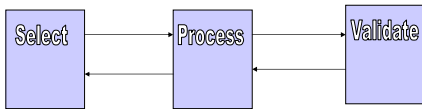
- Application Module Flow

- Parameter entry or record selection criteria
- Record collection screen with add, modify, and delete links
- One record data entry form
- Submit to a validation routine
- If validation errors, redisplay the data entry form for correction.
- If no errors, insert or update the record.

PL/SQL Web Toolkit

- Application Development

- Storyboarding:



PL/SQL Web Toolkit

- Data entry application example:

OPP_contacts_upd package
display_contacts procedure
process_contact procedure
validate_contact procedure

Table: opp_contacts

contact_id integer primary key,
contact_name varchar2(100),
contact_type varchar2(20),
contact_email varchar2(200),
contact_comments clob

PL/SQL Web Toolkit

- HTP package – procedures that generate HTML tags.
- HTP package – function versions of the procedures in the HTP package. (They return the tagged text so they can be embedded in other calls.)
- Owa_cookie – Subprograms that send and receive HTTP cookies to and from a client Web browser.
- Owa_image – Subprograms that obtain the coordinates where a user clicked an image. (Use with image maps.)
- Owa_opt_lock – Subprograms that impose database optimistic locking strategies, to prevent lost updates.
- Owa_pattern – Subprograms that perform string matching and string manipulation with regular expression functionality.
- Owa_sec – Subprograms used by the PL/SQL Gateway for authenticating requests.
- Owa_text – Subprograms used by package OWA_PATTERN for manipulating strings.
- Owa_util – Utility subprograms.
- Wpg_download – Subprograms that download documents from a document repository that you define using the DAD configuration.

PL/SQL Web Toolkit

- **Basic page structure:**
 - Htp.htmlOpen
 - Htp.bodyOpen
 - Htp.anchor
 - Htp.formOpen
 - Htp.formHidden
 - Htp.formText
 - Htp.formTextareaOpen
 - Htp.formTextareaClose
 - Htp.formCheckbox
 - Htp.formPassword
 - Htp.formRadio
 - Htp.formSelectOpen
 - Htp.formSelectOption
 - Htp.formSelectClose
 - Htp.formImage or Htp.formSubmit
 - Htp.formClose
 - Htp.bodyClose
 - Htp.htmlClose

PL/SQL Web Toolkit Tables

```
Htp.tableOpen  
Htp.tableRowOpen  
Htp.tableHeader  
Htp.tableHeader  
Htp.tableRowClose  
Htp.tableRowOpen  
Htp.tableData  
Htp.tableData  
Htp.tableRowClose  
Htp.tableClose
```

PL/SQL Web Toolkit

- Observations
 - Web PL/SQL Toolkit applications behave like block mode terminals.
 - “Stateless” operation can be confusing: the application (or the user) can navigate horizontally within the application to unexpected places.
 - Let the browser format the pages
 - Implicit commits are good and bad.

PL/SQL Web Toolkit

- Thank you
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