

Oracle & .NET

Oracle & .NET: Git'r Dun Fast!

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About Me

J.T. Taylor Bio

- Exec. Vice President EaglePower Solutions & CEO of TaylorMade Software
 - 11 Years programmer; 9 years independent consultant & entrepreneur
 - Applied Mathematician; college adjunct Professor
 - Specialist in business database & financial applications
 - ASP.NET web applications (2 years)
 - .NET Smart/Rich Client (5 years)
 - Secretary of ONETUG <http://www.onetug.org>
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 - Currently developing .NET products for clients
 - Microsoft Partner & Member of ISV Empower program
 - Professional writer
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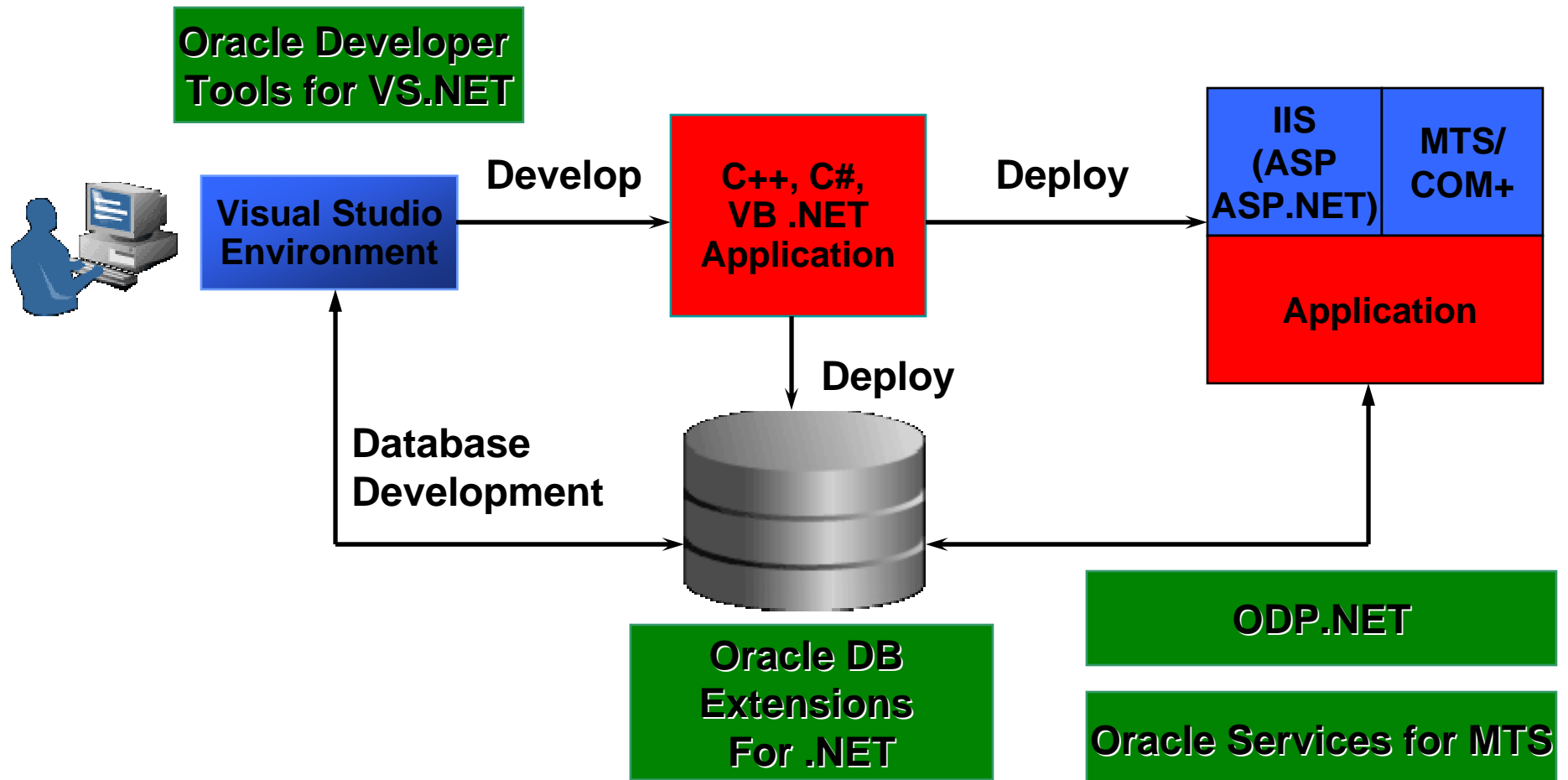


Agenda: ODT for VS.NET

- Oracle Developer Tools for Visual Studio .NET
 - Overview
 - Demo - drill down
- Oracle Database Extensions for .NET
 - Overview
 - Demo – My First SP
 - Tuning and Data Access
 - Demo – Data Access in a SP
 - Demo – Debugging a .NET SP



Windows Environment

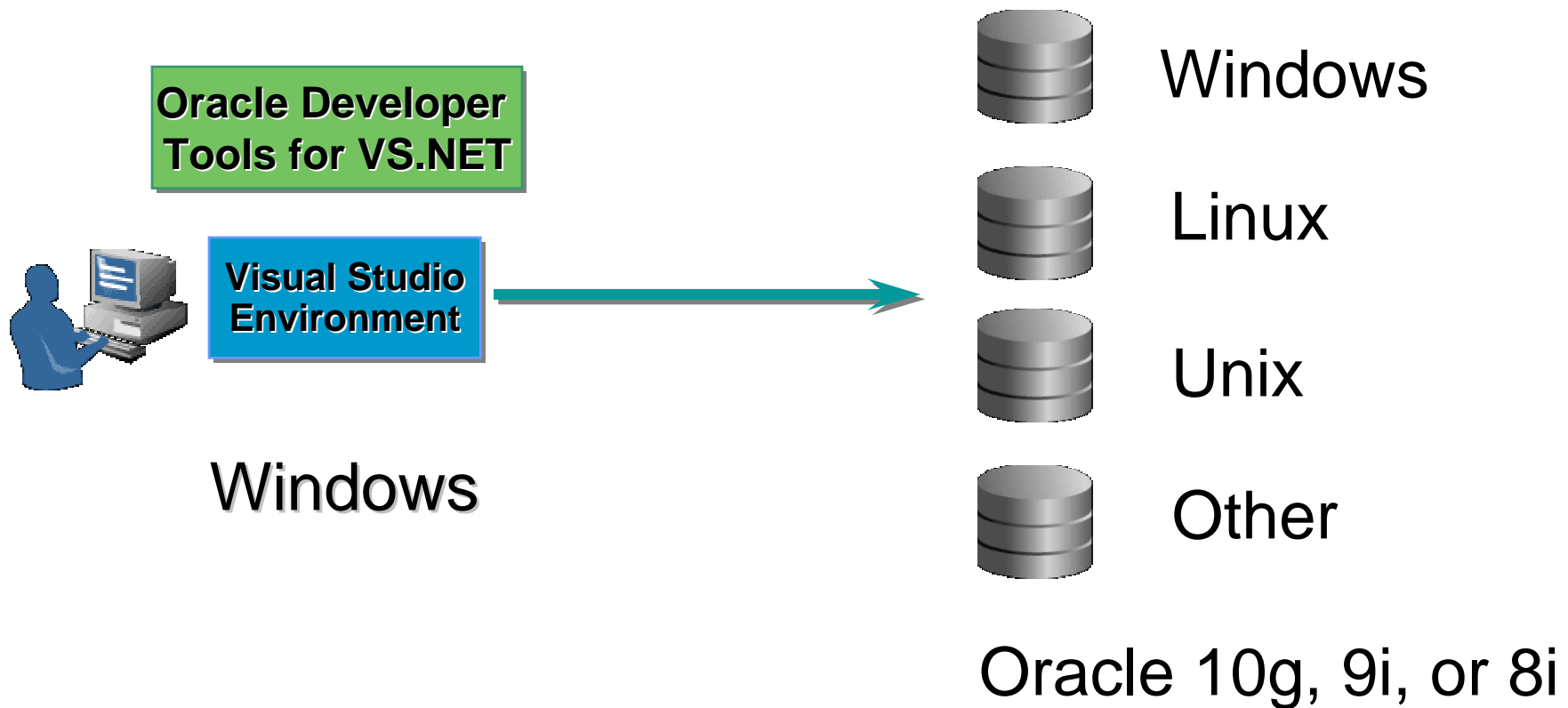


Oracle Developer Tools for VS.NET

- Tightly integrated “Add-in” for Visual Studio .NET
- Oracle is a premier-level partner in the Microsoft Visual Studio Industry Partner (VSIP) Program
- Available for free download now
 - <http://otn.oracle.com/dotnet>



Develop on Windows, DB Anywhere



Feature Overview

- Oracle Explorer – browse and alter schema
- Wizards and Designers
- Automatic code generation
- PL/SQL Editor with IntelliSense
- Oracle Data Window
- Oracle Query Window (ad hoc SQL)
- .NET Stored Procedure Deployment Wizard
- Integrated help system – SQL, PL/SQL keywords
- Debugging Capability



ODT - Demonstration

The Oracle logo, featuring the word "ORACLE" in a bold, red, sans-serif font with a registered trademark symbol (®) at the end. The logo is centered within a black rectangular background.

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

Oracle Developer Tools - Drill Down



Suncoast Oracle Users Group September 28th 2006

Oracle Explorer

- Tree control, similar to “Server Explorer”
- View Oracle schema objects
- Generate SQL for schema objects
- Filter hides unwanted schema objects
- A starting place for most tasks
 - View, alter, create schema objects
 - Auto generate code
 - View and edit Oracle data
 - Run stored procedures and functions



Designers and Wizards

- Table Designer
- View Designer
- Stored Procedure/Function Wizard
- Package Wizards
- Sequence Designer
- Synonym Designer
- Trigger Designer
- Data Adapter Wizard



Automatic Code Generation

- Drag and drop a schema object from Oracle Explorer
- Generated code uses OracleDataAdapter class (ODP.NET)
- Data Adapter Wizard can be run to customize
- Generate “typed datasets” as needed



PL/SQL Code Editor

- Syntax Coloring
- Collapsible regions
- IntelliSense
- Context sensitive help for SQL/PLSQL keywords
- Intelligent error display in task list
- Context-sensitive help for Oracle error numbers



Data Window

- View and update table data
- Run stored procedures and view data
- Supports Oracle data types
- View complex data types such as Ref Cursors



Oracle Query Window

- Execute "ad hoc" SQL
- Drag and drop objects from Oracle Explorer to generate SQL
- Result of select statements in grid or text format
- Execute multiple statements in a row
- Run scripts ("@myscript.sql")



Integrated Online Help

- Getting started
- Walkthroughs
- Oracle Developer Tools Reference Guide
- Context sensitive help for UI elements
- Context sensitive SQL and PLSQL keywords
- Oracle *Error Manual*
- Oracle *SQL Reference Guide*
- Oracle *PL/SQL Reference Guide*



New Features

- PL/SQL Debugging
- Visual Studio .NET 2005 support
- .NET 2.0 Stored Proc debugging



Visual Studio Debugging PL/SQL

Read Mark Williams article and download code samples:

<http://www.oracle.com/technology/oramag/oracle/06-sep/o56odp.html>

Then follow my notes on the steps carefully in the next several slides.

Also see: <http://cshay.blogspot.com/>



Debugging PL/SQL – Step 1

Connections in Oracle Explorer:

1. Create connection in Oracle Explorer for HR user with default role
2. Create connecton in Oracle Explorer for SYSTEM user with SYSDBA role (used for granting priviledges in Query Window)



Debugging PL/SQL – Step 2

Grant Privileges inside Query Window with SYSTEM Connection:

1. Right-click SYSTEM connection inside Oracle Explorer and open Query Window in Visual Studio.

2. Run

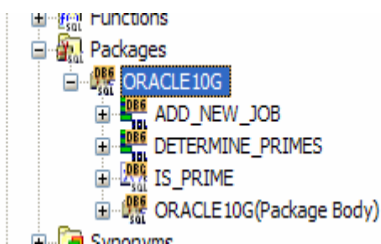
```
GRANT DEBUG CONNECT SESSION TO HR  
GRANT DEBUG ANY PROCEDURE TO HR  
GRANT EXECUTE ON HR.ORACLE10G TO HR;  
GRANT DEBUG ON HR.ORACLE10G TO HR;
```



Debugging PL/SQL – Step 3

Compile PL/SQL code with debug info:

1. Create the Mark Williams PL/SQL package example via Query Window.
2. Right-click on package and choose “Compile Debug” and watch the icon change on the package and its members.



Debugging PL/SQL – Step 4

Create C#.NET project to call PL/SQL
package proc & set breakpoints:

1. After the C# project has been created to call the PL/SQL stored procedure,
2. Set breakpoints in both C# code and PL/SQL



Debugging PL/SQL – Breakpoints

```
// add parameters to the collection
// they must be added in the proper
// order when using bind by position (the default)
cmd.Parameters.Add(p_in_values);
cmd.Parameters.Add(p_out_values);

// execute the pl/sql procedure to populate output array
cmd.ExecuteNonQuery();

// display results to console window
for (int i = 0; i < p_in_values.Size; i++)
{
    foreach (OracleParameter p in cmd.Parameters)
```

```
PACKAGE BODY "HR"."ORACLE10G" IS
-- procedure that processes the incoming associat
-- calls the method IS_PRIME to determine if elem
PROCEDURE "DETERMINE_PRIMES" ("P_IN_VALUES" IN T_
BEGIN
    -- loop through each element in the incoming ar
    -- and set the value for the corresponding elem
    -- in the out array
    for i in p_in_values.first..p_in_values.last
    loop
        p_out_values(i) := is_prime(p_in_values(i));
    end loop;
```



Debugging PL/SQL – Step 5

Set Visual Studio Debugging Options:

1. Disable Visual Studio Hosting Process debug option
2. Start and then terminate the debugger once



VS Project Debugging Options

SepOct2006 ORACLE://hr....ACLE10G[CODE] ORACLE://sys....ACLE10G[CODE] Program.cs

Application	Configuration: Active (Debug) Platform: Active (Any CPU)
Build	
Build Events	
Debug	Start Action <ul style="list-style-type: none"><input checked="" type="radio"/> Start project<input type="radio"/> Start external program: <input type="text"/><input type="radio"/> Start browser with URL: <input type="text"/>
Resources	
Settings	Start Options <ul style="list-style-type: none">Command line arguments: <input type="text"/>Working directory: <input type="text"/><input type="checkbox"/> Use remote machine <input type="text"/>
Reference Paths	
Signing	
Security	Enable Debuggers <ul style="list-style-type: none"><input type="checkbox"/> Enable unmanaged code debugging<input type="checkbox"/> Enable SQL Server debugging<input type="checkbox"/> Enable the Visual Studio hosting process
Publish	



Debugging PL/SQL – Step 6

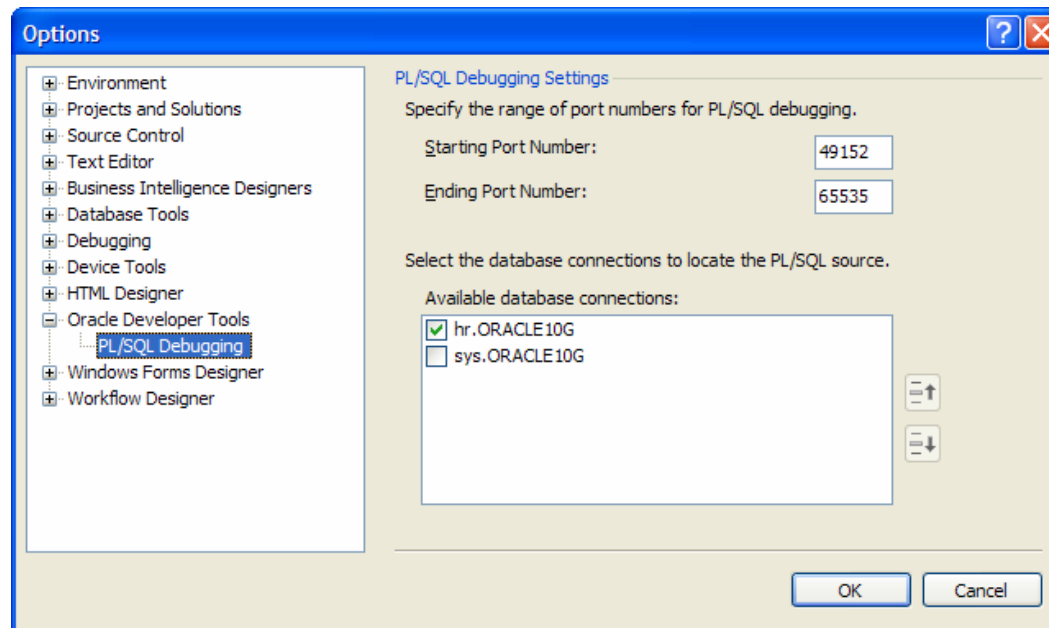
Configure ODT to locate the PL/SQL code to be debugged:

1. Select Tools -> Options from the Visual Studio main menu, select Oracle Developer Tools from the Options list, and then click the check box next to HR.Oracle in the Available Database Connections list. **Uncheck all other connections.**



Debugging PL/SQL – Step 7

Set TCP/IP on a random port within range and make sure range is not blocked by firewall.



Debugging PL/SQL – Step 8

Enable Application Debugging:

1. Tools -> Oracle Application Debugging from the Visual Studio main menu and ensure that there is a check mark next to Oracle Application Debugging in the menu, indicating that it is enabled.
2. Go for it! Call me if you it is not working and I will walk you through the steps.



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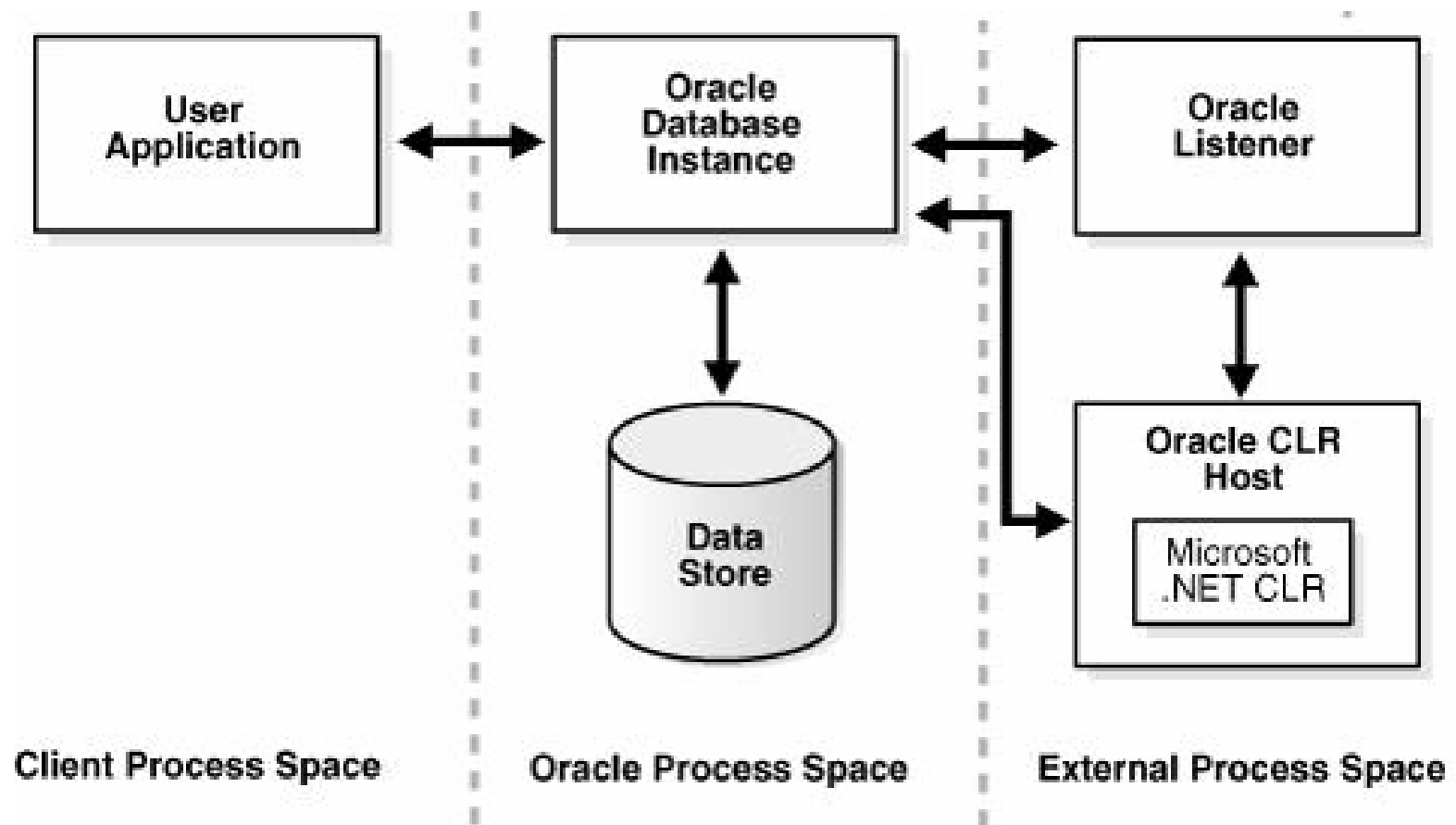


ODE for .NET

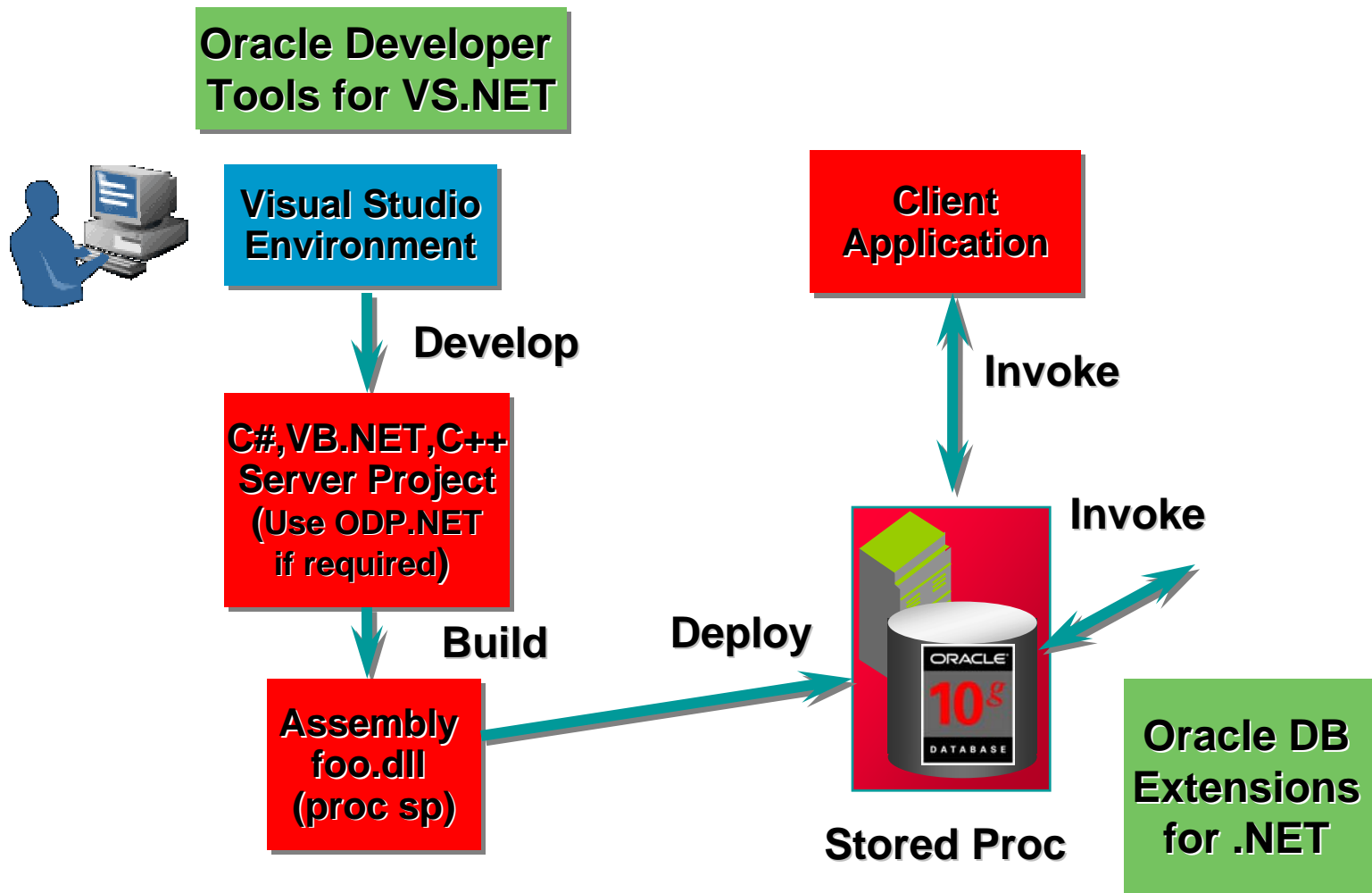
- Oracle 10g Release 2 on Windows
- Write Microsoft Visual C# or Visual Basic .NET stored procedures/functions
- Build assembly in Visual Studio .NET
- Deploy from Visual Studio .NET using .NET Deployment Wizard



Architecture



.NET Stored Procedures for Oracle



Supported Platforms

- Windows only
- .NET Framework 1.1
- .NET Framework 2.0
- Oracle 10.2 or later



When to use

- Ease of development
- Computationally intensive code
- Leverage .NET programming expertise
- Leverage existing .NET code libraries
- Windows platform only
- EXTEND ORACLE DATABASE!



Install

- “Custom” install of “Oracle Database Extensions for .NET” is required
- DBCA performs configuration
- CLR Service created and started
 - Service is named <OracleHomeName>ClrAgnt
- Follow hand-out installation & setup instructions Adobe Acrobat PDF file.



Creating a .NET Stored Procedure

1. Use Visual Studio .NET to build a .NET procedure or function in the usual way
2. If data access is required, use ODP.NET classes
3. Result is a .NET assembly
4. Run .NET Stored Procedure Deployment Wizard (included with Oracle Developer Tools)
5. Call .NET stored procedure as you would any other Oracle stored procedure



.NET Stored Procedure Project

Follow Mark Williams' or Christian Shay's example on creating Oracle stored procedures or functions:

http://www.oracle.com/technology/pub/articles/mastering_dotnet_oracle/williams_sps.html

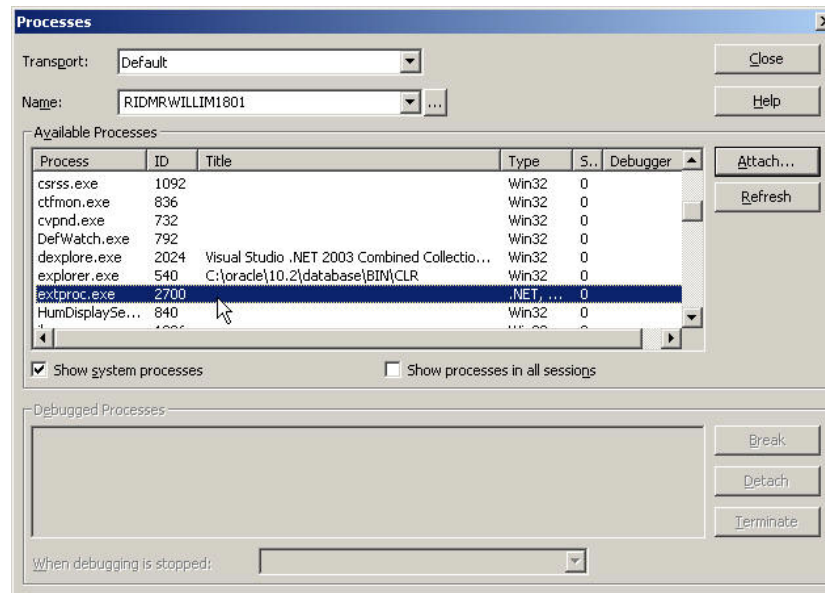
or

http://www.oracle.com/technology/obe/10gr2_db_single/develop/vs2/vs2.htm



.NET Stored Proc Debugging

The thing to remember is that you need to attach to the exact **extproc.exe** process that is actually been launched by the execution of the stored proc.
(see afore mentioned articles)



Stored Procedure Requirements

- Be declared a public static method.
- Not be a constructor or a destructor.
- Use parameter types that are compatible with the Oracle native database types.



Security Levels

- **Safe** - Access only to database resources.
- **External** - Read or write to local files, and access to network resources such as sockets and internet nodes
- **Unsafe**- Unrestricted execution including execution of unmanaged code. It is a superset of all other security levels.



OraCLRAgent Service

- Multithreaded Agent Architecture
 - Optimized for security and performance
 - A separate multithreaded process is started for each system identifier
 - Each TNS listener that is running on a system listens for incoming connection requests for a set of SIDs.
 - As system load thresholds are met, additional processes are spawned



Homework

The ORALCE Challenge!

Try creating a simliar PL/SQL CLR C#.NET stored procedure like the one from the MSSQL 2005 example below to work against a Web Service on an insert trigger:

<http://davidhayden.com/blog/dave/archive/2006/04/25/2924.aspx>



SQL 2005 CLR Compared

- <http://forums.oracle.com/forums/thread.jspa?messageID=1119271>
- <http://blogs.ittoolbox.com/visualbasic/dotnet/archives/clr-stored-procs-versus-tsql-stored-procs-round-2-10878>
- <http://blogs.ittoolbox.com/visualbasic/dotnet/archives/clr-stored-procs-versus-tsql-stored-procs-round-1-10415>
- <http://blogs.ittoolbox.com/visualbasic/dotnet/archives/the-clrud-design-pattern-for-clr-stored-procedures-c-vbnet-10672>
- <http://blogs.ittoolbox.com/visualbasic/dotnet/archives/clr-stored-procs-rock-10380>



Resources

NET Developer Center -

<http://otn.oracle.com/dotnet>

Special Thanks to:

- Christian Shay & Oracle
- Mark Williams
- Tom Roach & SOUG
- Joe Healy & Microsoft



Evaluations and Contact

Presentation downloads available from
<http://www.eaglepowersolutions.com/technologies/oracle.aspx>

Email: jt@eaglepowersolutions.com

Blog / Web Site: <http://www.eaglepowersolutions.com>

Thanks! SOUG & Tom Roach: <http://soug.acomp.usf.edu/>

