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# Deep-Dive into ODP.NET, Managed Driver and Entity Framework

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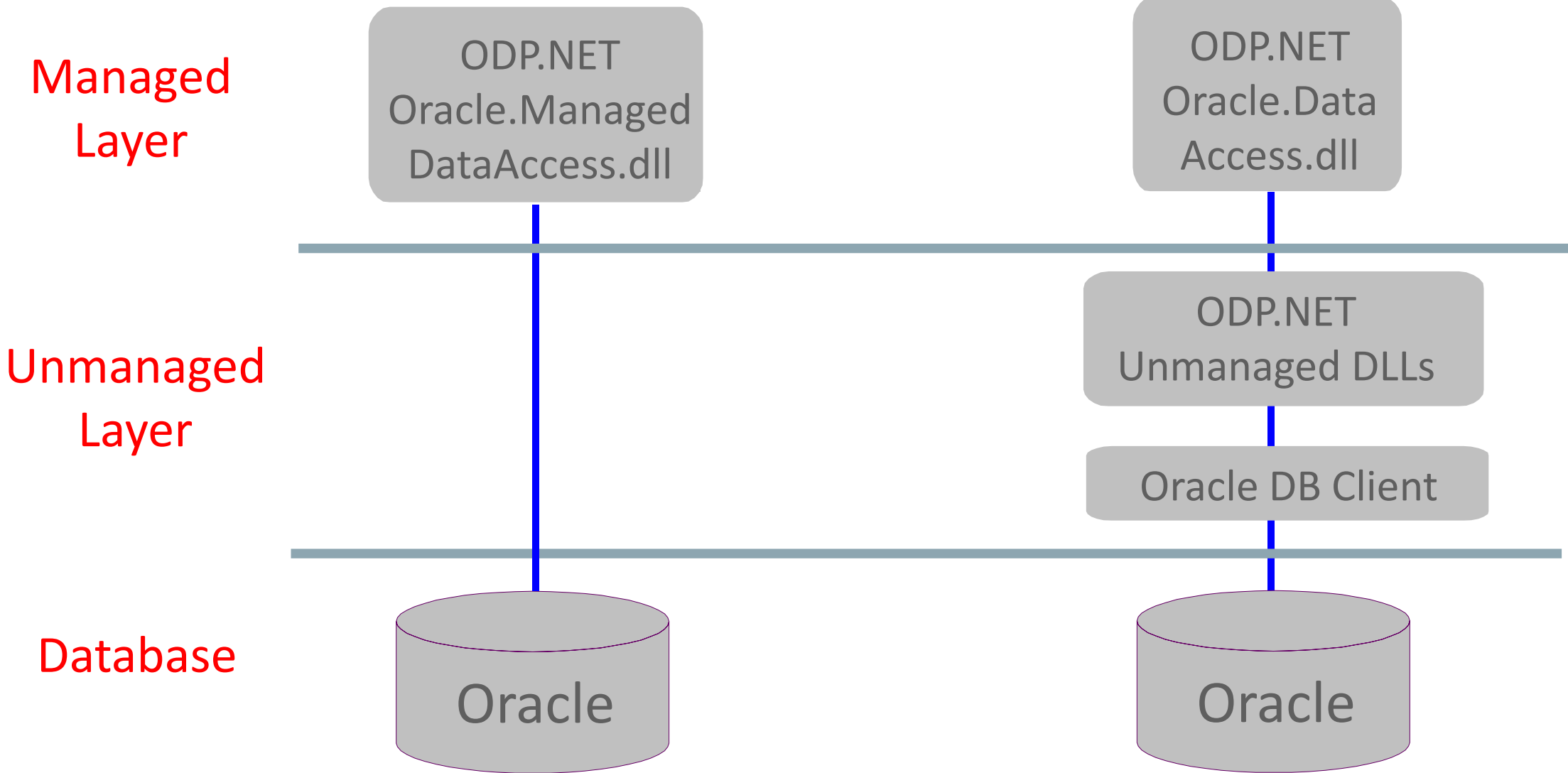
# Program Agenda

- 1 ODP.NET, Managed Driver
- 2 ODP.NET, Managed Driver – New Features
- 3 Oracle and Entity Framework
- 4 Oracle and Entity Framework – New Features

A woman with long brown hair and glasses is sitting at a wooden table in a cafe. She is wearing a brown leather jacket over a blue patterned scarf. She is holding a black mobile phone to her ear with her left hand and looking down at a newspaper or magazine on the table with her right hand. The background is a blurred cafe interior with other tables and chairs.

# ODP.NET, Managed Driver

# ODP.NET Architecture





# Managed ODP.NET

- 100% managed provider
- Supports .NET Framework 4 and higher
- Assembly – Oracle.ManagedDataAccess.dll
- No other Oracle Client files required
  - Unless using distributed transactions with .NET 4.5.1 or lower (Oracle.ManagedDataAccessDTC.dll)
  - Unless using Kerberos (Oracle.ManagedDataAccessIOP.dll)
- Namespaces
  - Oracle.ManagedDataAccess.Client
  - Oracle.ManagedDataAccess.Types

# Managed ODP.NET vs. Unmanaged ODP.NET

## Benefits of Managed

- One assembly for both 32-bit and x64
- Easier side by side deployment
- Deploy smaller and fewer binaries
  - Before: 150 MB
  - After: Less than 10 MB
- Easier patching process
- Available NuGet and MSI packages
- Fully integrated with Code Access Security

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# ODP.NET, Managed Driver



# Deployment Configuration Options

- Option 1: single configuration file deployment
  - .NET config file contains TNS, SQL\*Net, and LDAP settings
    - i.e. Machine.config, web.config, app.config
- Option 2: multi-file configuration
  - .NET config file
  - Tnsnames.ora, sqlnet.ora, and ldap.ora
- Option 3: no configuration files
  - Store connect info in Data Source attribute

# Configuration

- No Windows Registry settings
- Cannot use Bequeath protocol
  - Bequeath = DB and client on same machine with connections bypassing listener
  - Use TNS, Easy Connect, or LDAP

# Configuring Deployment

- .NET config file
  - Similar settings as unmanaged plus TNS, SQL\*Net, and LDAP settings
  - Managed - <oracle.manageddataaccess.client>
  - Unmanaged - <oracle.dataaccess.client> or <oracle.unmanageddataaccess.client>
- Tnsnames.ora, Sqlnet.ora, and Ldap.ora
  - Same attribute settings
  - Most, but not all attributes are available

# .NET Config File Settings

<oracle.manageddataaccess.client>

<version number> - specific version or \*

<dataSources> - alias and descriptors

<settings>

<LDAPsettings>

<implicitRefCursor>

<distributedTransaction>

<edmMappings>

<onsConfig> - Oracle Notification Service for FAN messages

# Configuration Settings Order of Precedence

- 1. .NET config
- 2. Directory specified by TNS\_ADMIN in .NET config
- 3. .ORA files located in .EXE directory

# Unmanaged to Managed ODP.NET Migration

- 1. Add Oracle.ManagedDataAccess.dll assembly to project
- 2. Modify namespace(s) to use managed ODP.NET
- 3. Change .NET config settings for managed ODP.NET
  - Easier portability in the future with new `<oracle.unmanageddataaccess.client>`
    - Same format as `<oracle.manageddataaccess.client>`

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# Migrating to Managed ODP.NET



# Managed ODP.NET vs. Unmanaged ODP.NET

## Benefits of Unmanaged

- More functionality
  - Will remain so for foreseeable future, but will reach parity over time
    - UDTs, BulkCopy, AQ, TAF, Client Result Cache, etc.
  - New features introduced here
  - Supports versions earlier than .NET Framework 4
- More mature
  - Advantage will decline over time



# ODP.NET, Managed Driver

New Features

# Distributed Transactions

## ODP.NET, Managed Driver

- Oracle and Microsoft collaborated on new fully managed Microsoft Distributed Transaction Coordinator APIs
  - Added in .NET Framework 4.5.2
- Enhancement: Oracle.ManagedDataAccessDTC.dll is no longer necessary for distributed transactions
  - Functionality incorporated into Oracle.ManagedDataAccess.dll
  - Must use .NET 4.5.2 or higher
- Easier setup
  - Still must configure distributed transaction recovery service

# Security

## ODP.NET, Managed Driver

- Kerberos
  - Single sign-on and centralized authentication
  - During setup, acquire Kerberos5 credentials with MIT Kerberos 4.0.1 or higher
    - Not needed at runtime
  - File based credential cache or Windows logon credentials as Kerberos credentials (Microsoft Local Security Authority (MSLSA))
- Client-Side Wallet
  - Secure External Password Store (SEPS) for storing password credentials

# Security

## ODP.NET, Managed Driver

- Network Data Encryption
  - Advanced Encryption Standard (AES)
  - RSA RC4
  - Triple-DES (3DES)

# Additional New Features

## ODP.NET, Managed Driver

- XML DB
  - ODP.NET XML DB classes
- Implicit Ref Cursor
- 32 KB limit for character data types
- Entity Framework 6 and Code First



# Oracle and Entity Framework



# Entity Framework

- Object-relational mapper
  - Developers work with relational data using domain-specific objects specific to the application
- Entity Framework Data Modeling
  - Database First
  - Model First
  - Code First
- Querying
  - Language Integrated Query (LINQ)
  - Entity SQL

# EF Database First and Model First

- Entity Data Model wizard and designers
- Function Imports
  - Define .NET methods that map to stored procedures
  - Add Function Import dialog integration
- Use REF CURSORS (RC) from stored procedures to return result sets
  - Only one result set per stored procedure in EF
  - Return types
    - Complex – read-only
    - Entity – read and updatable
- Define result set bind and metadata info in .NET config

# Entity Framework - Implicit REF Cursor

- RC metadata can be automatically generated for EF implicit result sets
- Steps
  - 1. While in EF project, run stored procedure in Server Explorer
  - 2. Check off “Select for Config” box(es)
  - 3. Click “Add to Config” button
- Benefit
  - Eliminates hand-coding metadata

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# EF: RC Metadata Auto Generation



# Oracle and Entity Framework

New Features

# Entity Framework

## New Features for Managed and Unmanaged

- Entity Framework 6 certification
  - Integrated with Visual Studio tools (e.g. EDM wizard) and ODP.NET
- Code First
  - Convention
  - Configuration to override convention
    - DataAnnotations
    - Fluent API
- Code First Migrations

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# Entity Framework Code First



# Entity Framework 6 Changes

## Oracle-specific changes

- New assemblies
  - Oracle.ManagedDataAccess.EntityFramework and Oracle.DataAccess.EntityFramework
  - Version: 6.121.2.0
  - Follows recommended EF provider model and clean separation with EF 5
- Boolean and Byte default data type mapping has changed
  - 1. .NET Boolean maps to Oracle Number(1,0) and vice-versa
  - 2. .NET Byte maps to Oracle Number(2,0) and Number(3,0) and vice-versa
  - For EF 5 and earlier, these Oracle Numbers map to Int16
    - Can retain old behavior via customized data mapping

# Entity Framework 6 Changes

## Oracle-specific changes

- .NET config custom type mapping has changed
  - New version for EF 6 – Changes in red

```
<oracle.manageddataaccess.client>  
  <version number="*">  
    <edmMappings>  
      <edmNumberMapping>  
        <add NETType="bool" MinPrecision="1" MaxPrecision="1" DBType="Number" />  
        <add NETType="byte" MinPrecision="2" MaxPrecision="3" DBType="Number" />  
        <add NETType="int16" MinPrecision="4" MaxPrecision="5" DBType="Number" />  
      </edmNumberMapping>  
    </edmMappings>  
  </version>  
</oracle.manageddataaccess.client>
```

# Entity Framework 6 Changes

## Oracle-specific changes

- Custom mapping changes
  - DbType: Oracle Database data type
  - NETType: .NET data type that the Oracle data type maps to
  - MinPrecision: minimum range Oracle data type will map to .NET type
  - MaxPrecision: maximum range Oracle data type will map to .NET type

# Additional Oracle .NET Resources



OTN

[otn.oracle.com/dotnet](http://otn.oracle.com/dotnet)



Twitter

[twitter.com/OracleDOTNET](https://twitter.com/OracleDOTNET)



YouTube

[youtube.com/OracleDOTNETTeam](https://youtube.com/OracleDOTNETTeam)



Email

[alex.keh@oracle.com](mailto:alex.keh@oracle.com)

Q+A

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