



# Break New Ground

**San Francisco**  
September 16–19, 2019

# Developing Secure .NET Applications with Oracle Database

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# Agenda

- Authentication
- Using Wallets
- Secure Communications and Data Integrity
- Proxy Authentication
- Application Context
- Tracing

# Authentication

# Passwords and OracleCredential

- OracleCredential class

- Uses .NET SecureString to store passwords

- Enables using passwords outside the connection string

- Mitigates exposing credentials in a memory dump

- Available with pooled and non-pooled scenarios

- Each OracleCredential object generates a new pool even if credentials of both objects are the same

- Available in ODP.NET 18+ with Core, Managed, and Unmanaged

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**ODP.NET**

**OracleCredential**



# Using Wallets

# Secure External Password Store (SEPS)

- Client-side wallet for storing password credentials
  - No longer embed user names and passwords
  - Reduces security risk
- Works for ODP.NET Core, Managed and Unmanaged on Windows
- Simplifies large-scale deployments that use passwords



# SEPS Setup

## 1 Create wallet file

Example

```
mkstore -wrl <dir> -create  
Enter password: <password>
```

## 2 Set wallet location directory

C# Example

```
OracleConfiguration.WalletLocation = @"<dir>";
```

## 3 Turn on SEPS

C# Example

```
OracleConfiguration.SqlNetWalletOverride = true;
```

# Secure Communications and Data Integrity

# Transport Layer Security (TLS)

- Successor to Secure Sockets Layer (SSL)
- Provides encrypted communications and data integrity
- Widespread use in computing industry
- Works for ODP.NET Core, Managed and Unmanaged

Works for ODP.NET Core on Windows, Linux, and macOS

# TLS Setup

1 Create wallet with certificate

2 Enable TCP/IP with SSL

```
Example  
PROTOCOL=tcps
```

3 Set wallet location directory

```
C# Example  
OracleConfiguration.WalletLocation = @"<dir>";
```

# TLS Setup

4 Set TLS/SSL  
version (optional)

C# Example

```
OracleConfiguration.SSLVersion = "1.2 or 1.1";
```

5 Enable TLS/SSL  
authentication

C# Example

```
OracleConfiguration.SqlNetAuthenticationServices = "(tcps)";
```

# Configuring Encryption Usage

- Algorithms

  - Advanced Encryption Standard (AES)

    - AES 128-bit

    - AES 192-bit

    - AES 256-bit

  - Triple-DES (3DES)

    - 112-bit

    - 168-bit

- OracleConfiguration properties

  - SqlNetEncryptionClient - Negotiates whether to turn on encryption

  - SqlNetEncryptionTypesClient – Algorithm(s) that are enabled

# Configuring Data Integrity Usage

- Algorithms

  - SHA-1

  - SHA-2

    - SHA-256

    - SHA-384

    - SHA-512

- OracleConfiguration properties

  - SqlNetCryptoChecksumClient - Negotiates whether to turn on data integrity

  - SqlNetCryptoChecksumTypesClient – Algorithm(s) that are enabled



# TLS/SSL Recommendation

- Use latest Oracle tools, client, and DB versions when possible
- e.g. Windows now restricts MD5 algorithm

MD5 is orapki.exe 12.1 wallet generation default

# Proxy Authentication

# Proxy Authentication

- Allows real user to login as a middle-tier user
- Ideal for connection pooling scenarios
- Retain pooling performance and scalability benefits
- Gain ability to distinguish user identities, privileges, and preserve auditing
- Available in ODP.NET Core, Managed, and Unmanaged

# Proxy Authentication Example

- Real user = HR → ODP.NET user
- Middle-tier user = APPSERVER → ODP.NET proxy user
- One connection created with two sessions
  - One session per user
- Connection and proxy session cached in pooling
- Real user's session created upon connection open and destroyed upon return to pool

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# ODP.NET Proxy Authentication

# Application Context

# Oracle Application Context

- Name-value pairs to track any arbitrary app context
- App logic determines how to use context
  - User identity, resource access, logs for auditing, track resource usage, etc.
  - E.g. use client id with Virtual Private Database or Label Security for access control
- Retains pooling benefits
- Benefits over proxy authentication
  - Second session not required
  - Does much more than just track identity
- However, requires supplying app logic to use context



# OracleConnection App Context Properties

- ClientId

String identifying user, such as user id

- ClientInfo

String specifying user session info

- ModuleName

String identifying functional block, such as Human Resources or Accounts Payable

- ActionName

String identifying module action, such as READ, INSERT, UPDATE

# OracleConnection App Context Properties

- Properties can be set after opening connection
  - No additional round trip
  - App context set on DB by piggybacking on next round trip
- When connection returns to pool, app context properties reset to NULL
- Available in ODP.NET Core, Managed, and Unmanaged

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**ODP.NET**

**Application Context**

# Tracing

# Traces Can Exclude Customer Data



- Directs ODP.NET to not trace SQL, app data, connection strings, and other potentially sensitive info
- Benefit: Share traces with Oracle Support and third-parties without revealing data and configuration
- ODP.NET 20c adds the following trace levels:

Managed and Core trace level = 8

Unmanaged trace level = 64



Questions?

# Hands on Labs

## HOL4642: Building .NET Applications with Oracle Database

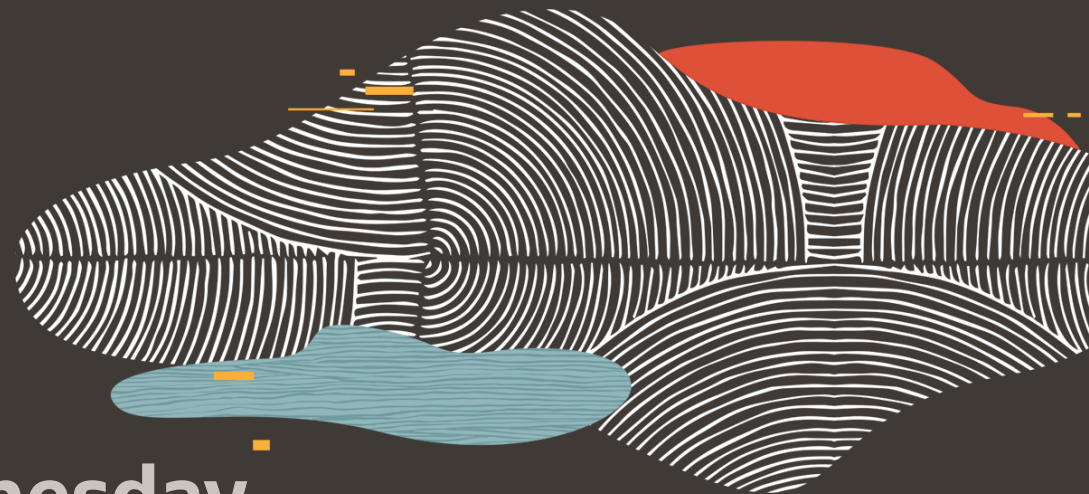
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### Tuesday

2:15-3:15 Moscone West 3019

### Wednesday

9:00am-10:00 Moscone West 3019





What's Ahead

Today

Tuesday

11:30-12:15 Getting Started with Oracle and .NET

Moscone South 308

12:30-1:15 Eliminate Application Downtime with  
Oracle Database and .NET

Moscone South 313

## What's Ahead

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# Wednesday

5:00-5:45 Developing and Deploying Oracle  
Database Applications in Kubernetes  
Moscone South 313

# Thursday

9:00AM-9:45 Accelerate Oracle Database .NET  
Application Performance - Moscone  
South 313

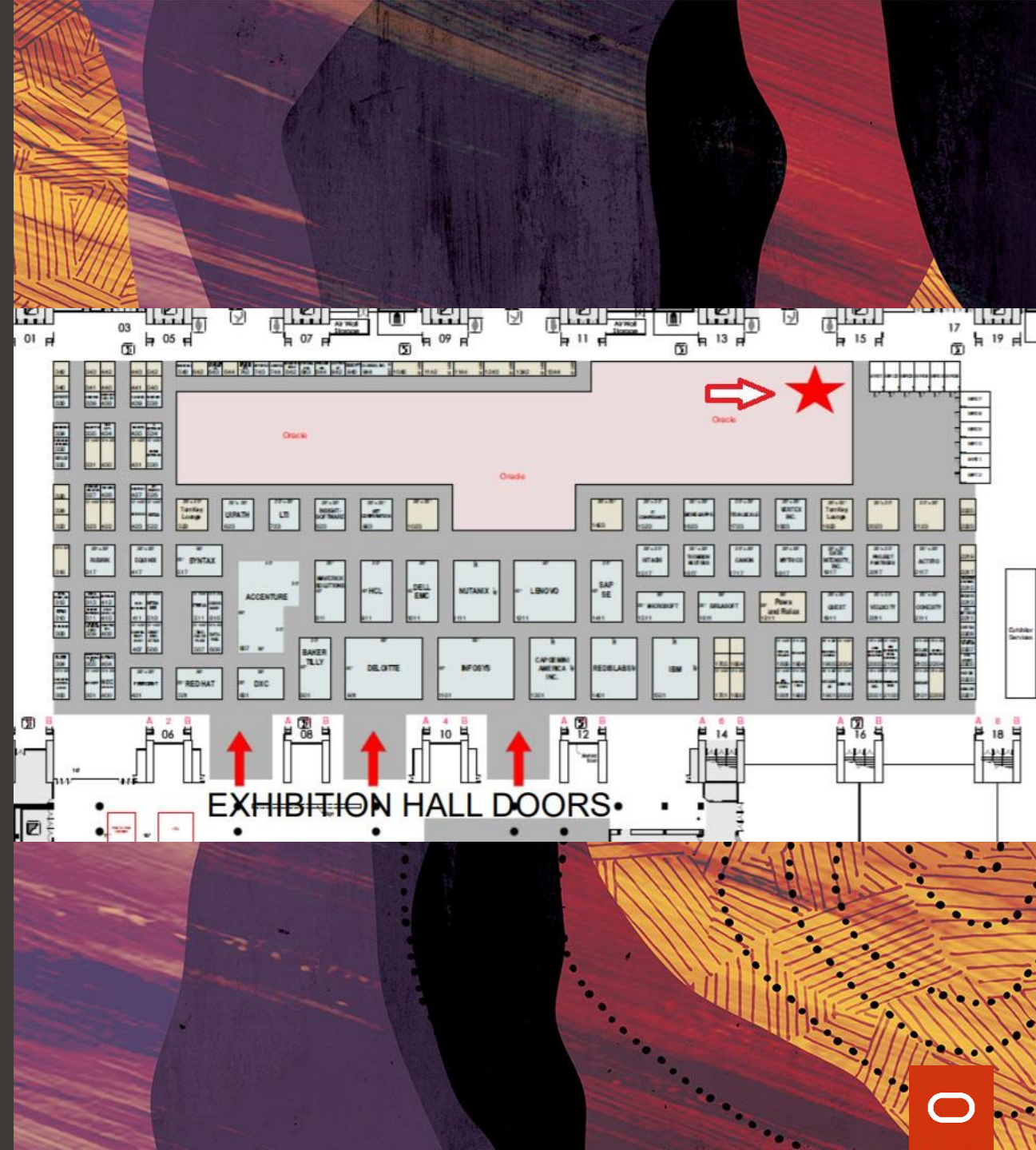
1:15 – 2:00 Exploring the Multicloud: Working with  
Azure and Oracle Autonomous Database  
- Moscone South 209

2:15-3:00 Running Oracle Database and  
Applications in Docker Containers on  
Windows - Moscone South 313

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DEV-013: .NET Development and  
Windows Integration for Oracle  
Database



# Thank You

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