Published: 8/24/2011

Windows® Phone

# Application Data Storage

Rob S. Miles | Microsoft MVP | University of Hull, UK
Andy Wigley | Microsoft MVP | Appa Mundi

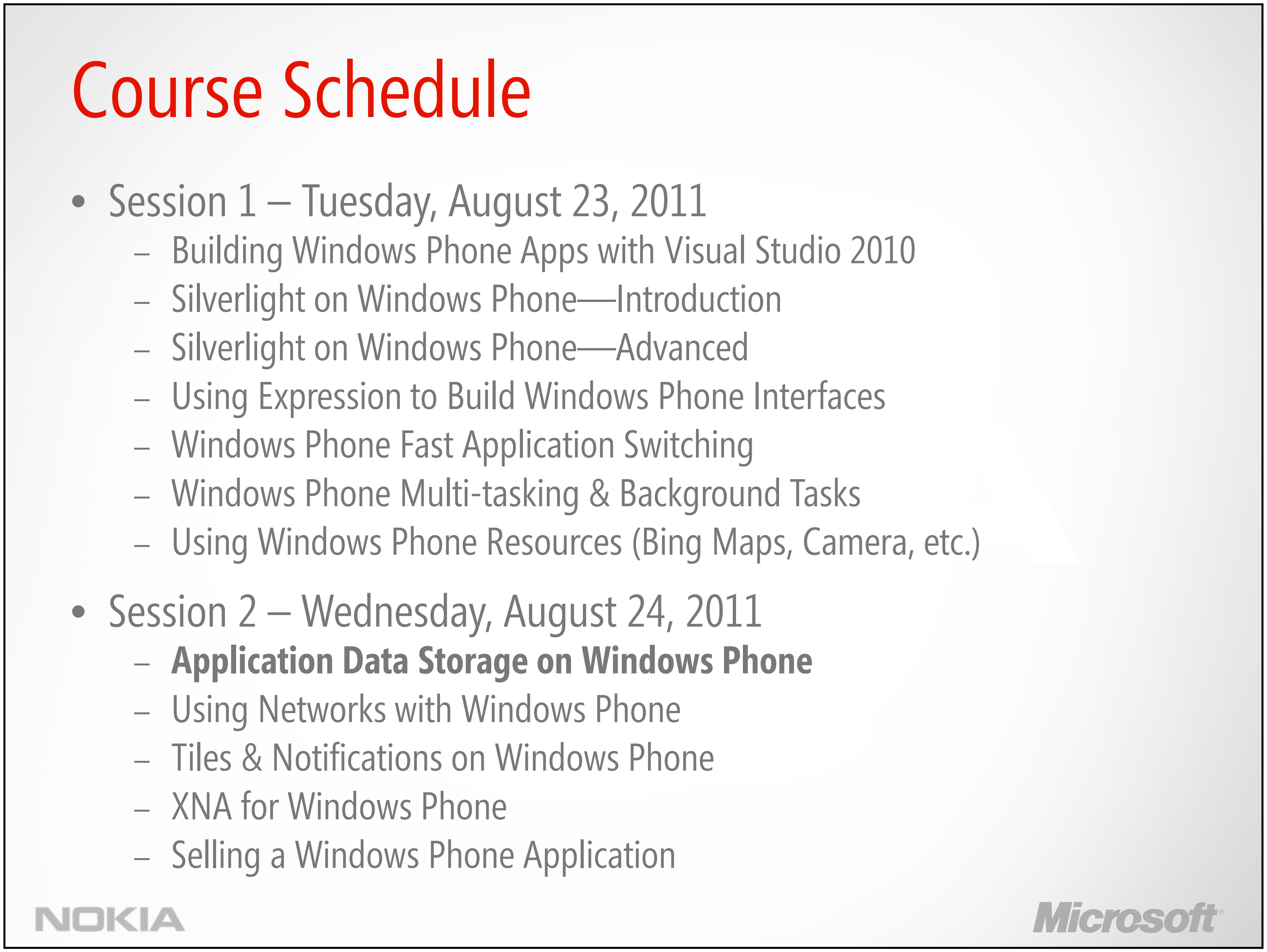
Session 8.0

NOKIA

2
Phone
People
3
Messaging
9
Linked Inbox

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

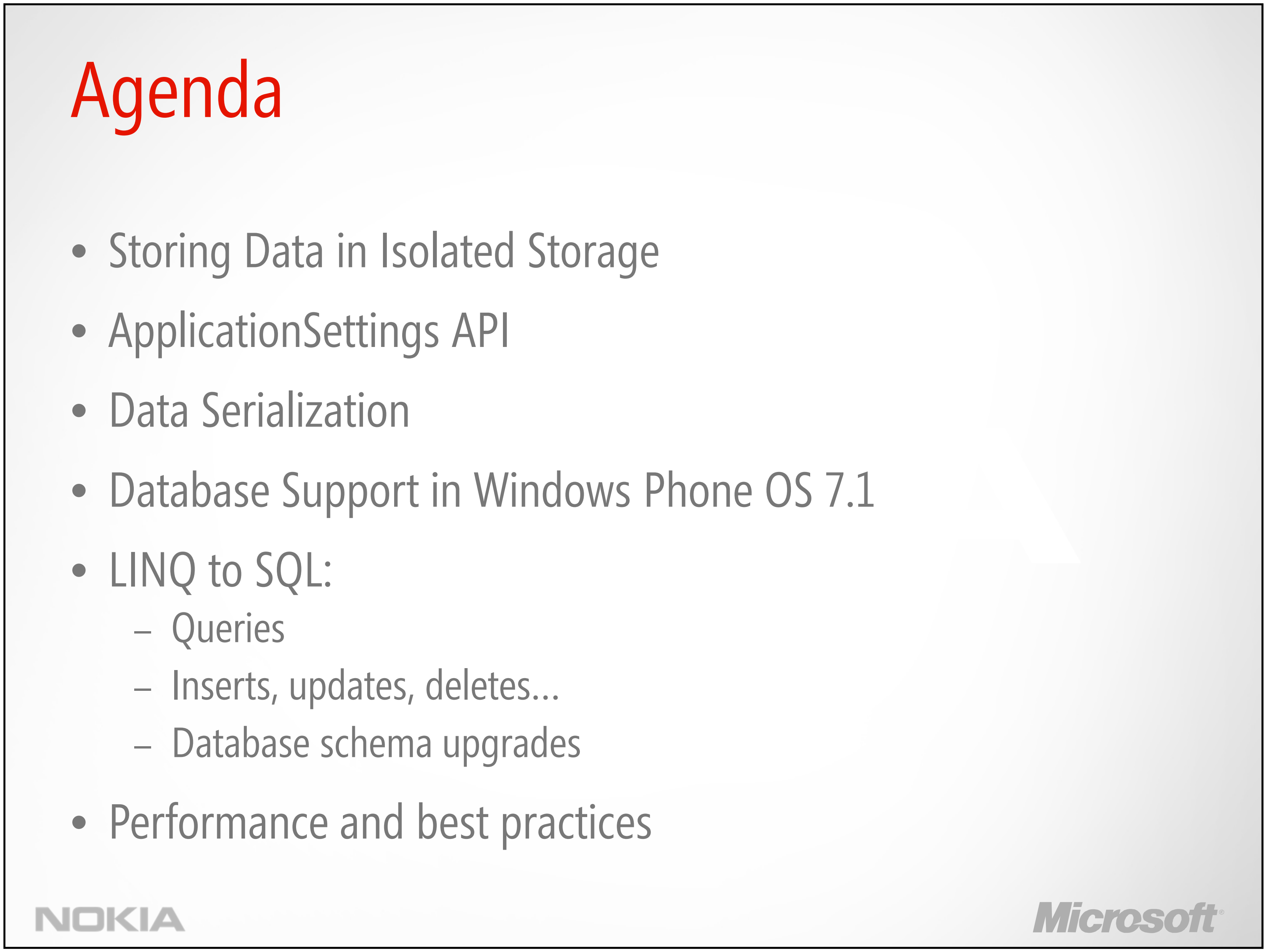
Published: 8/24/2011



## Course Schedule

- Session 1 – Tuesday, August 23, 2011
  - Building Windows Phone Apps with Visual Studio 2010
  - Silverlight on Windows Phone—Introduction
  - Silverlight on Windows Phone—Advanced
  - Using Expression to Build Windows Phone Interfaces
  - Windows Phone Fast Application Switching
  - Windows Phone Multi-tasking & Background Tasks
  - Using Windows Phone Resources (Bing Maps, Camera, etc.)
- Session 2 – Wednesday, August 24, 2011
  - **Application Data Storage on Windows Phone**
  - Using Networks with Windows Phone
  - Tiles & Notifications on Windows Phone
  - XNA for Windows Phone
  - Selling a Windows Phone Application

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Agenda

- Storing Data in Isolated Storage
- ApplicationSettings API
- Data Serialization
- Database Support in Windows Phone OS 7.1
- LINQ to SQL:
  - Queries
  - Inserts, updates, deletes…
  - Database schema upgrades
- Performance and best practices

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

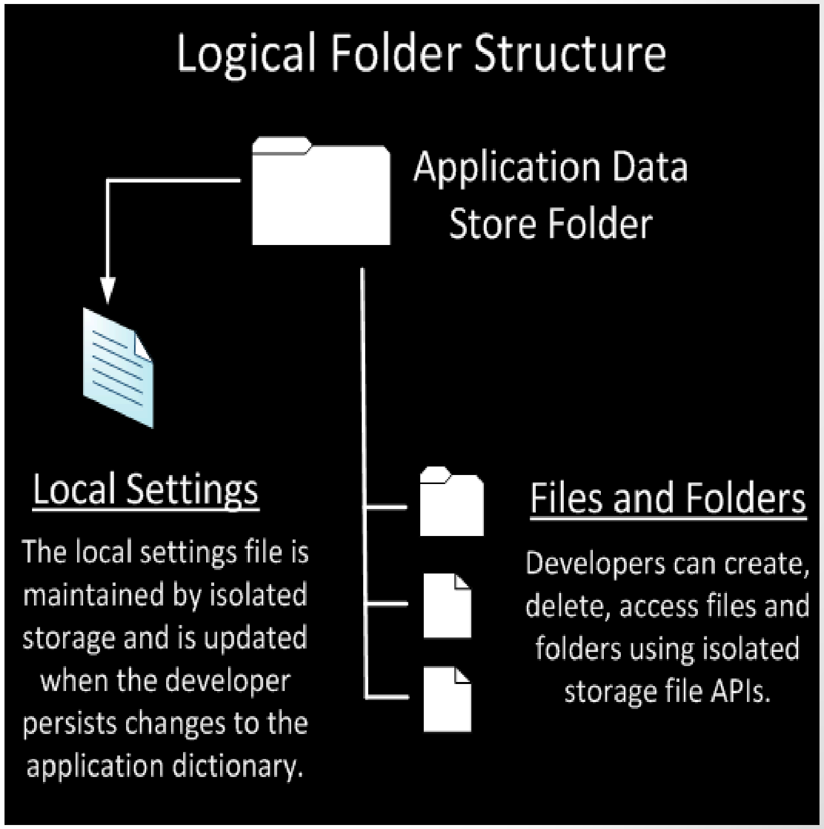
Published: 8/24/2011

## Storing Data in Isolated Storage

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Isolated Storage

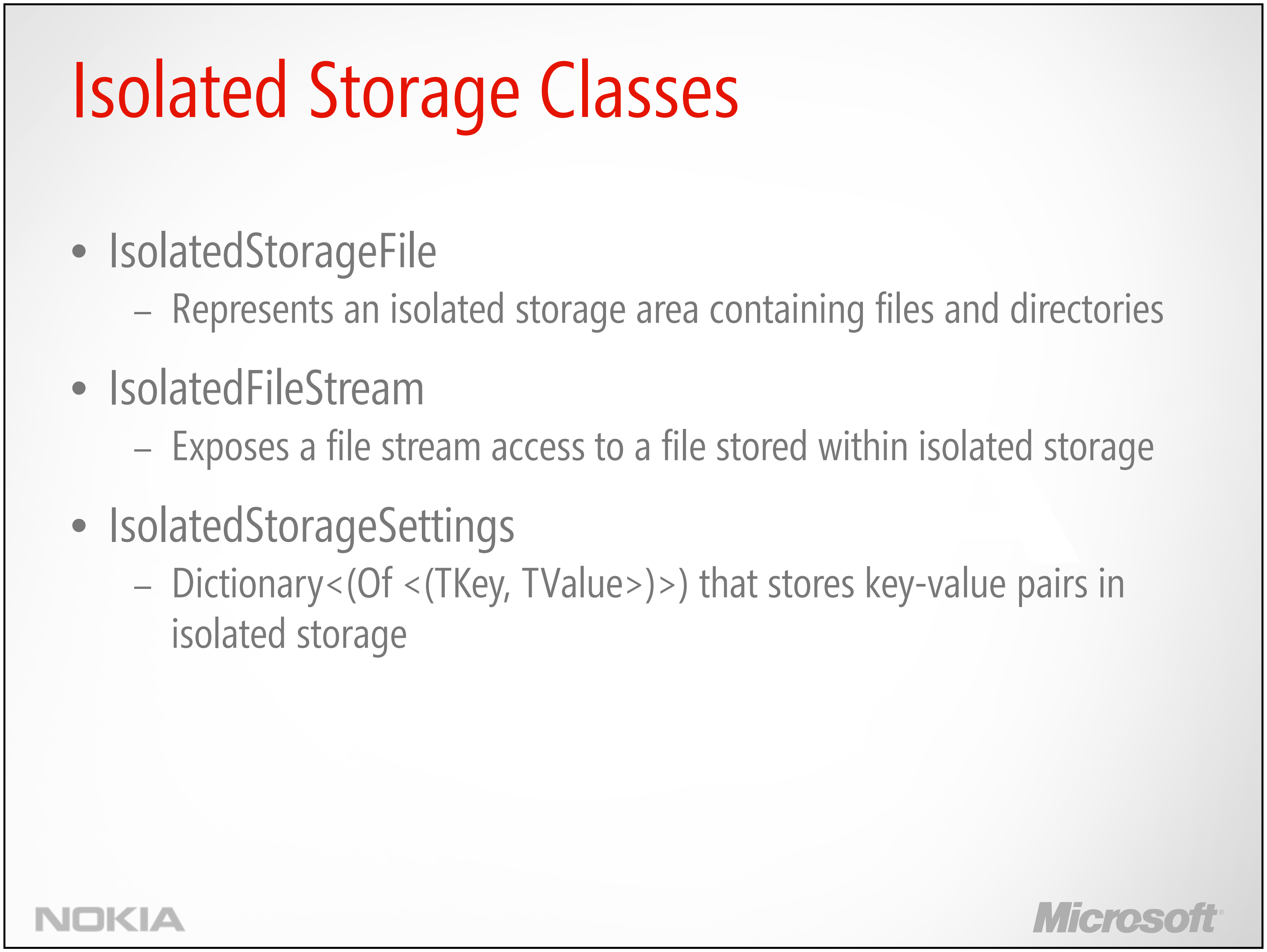
- All I/O operations restricted to isolated storage
  - Use Isolated File storage to create a files and folder structure hierarchy
  - Use Isolated Settings storage to store application settings



The local settings file is maintained by isolated storage and is updated when the developer persists changes to the application dictionary.

Developers can create, delete, access files and folders using isolated storage file APIs.

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

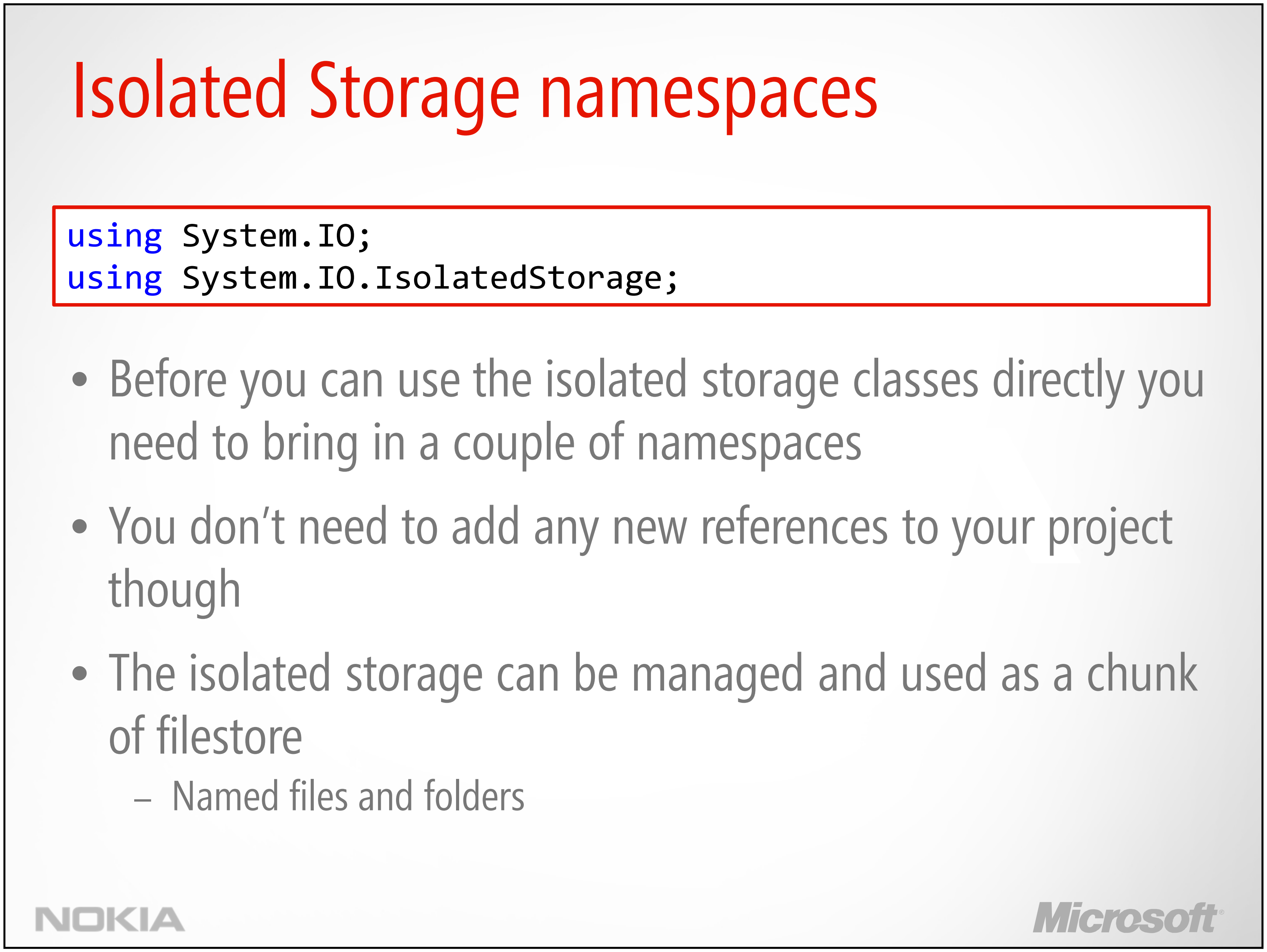


## Isolated Storage Classes

- IsolatedStorageFile
  - Represents an isolated storage area containing files and directories
- IsolatedFileStream
  - Exposes a file stream access to a file stored within isolated storage
- IsolatedStorageSettings
  - Dictionary<(Of <(TKey, TValue>)>) that stores key-value pairs in isolated storage

NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Isolated Storage namespaces

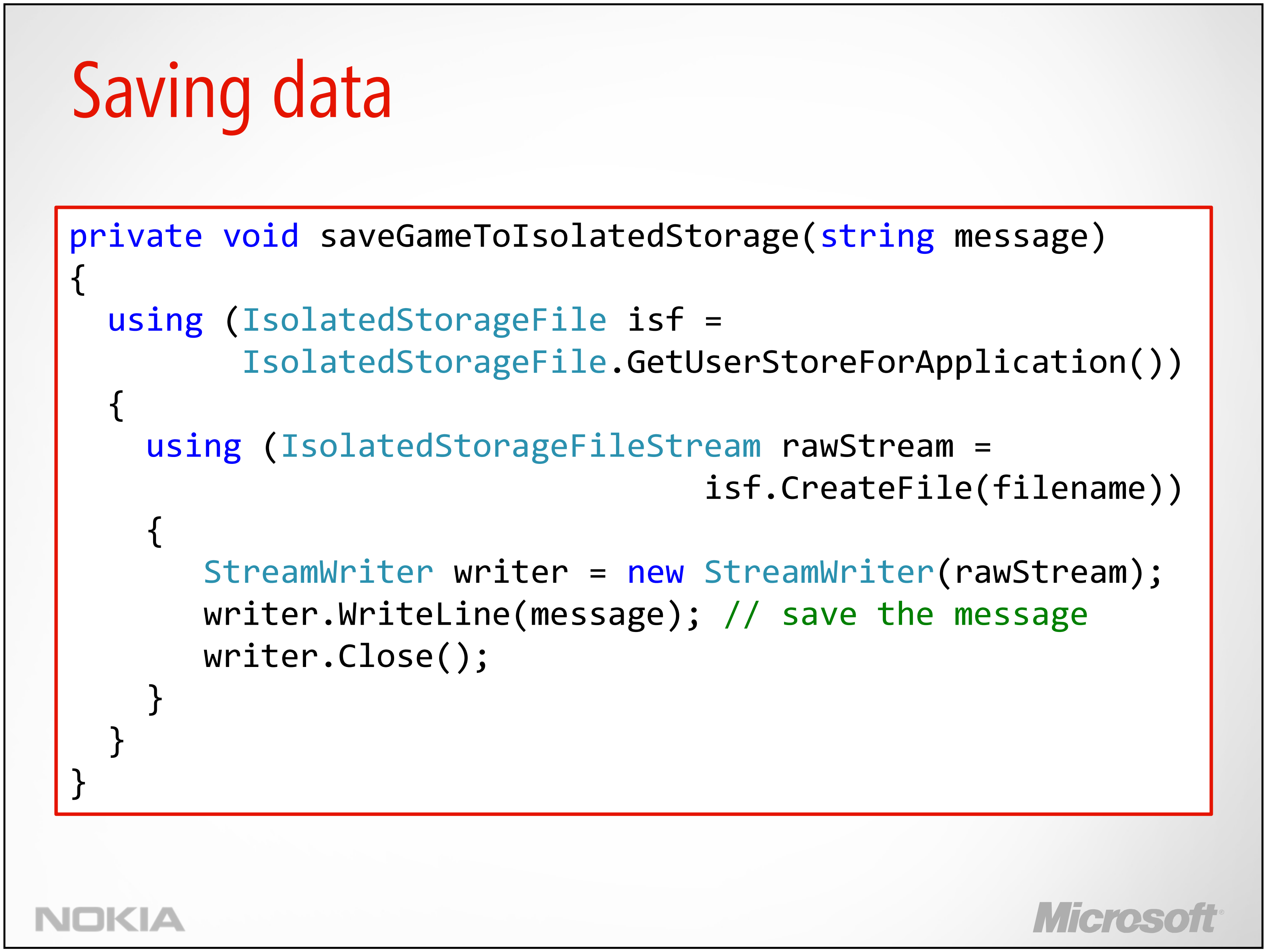
```
using System.IO;
using System.IO.IsolatedStorage;
```

- Before you can use the isolated storage classes directly you need to bring in a couple of namespaces
- You don't need to add any new references to your project though
- The isolated storage can be managed and used as a chunk of filestore
  - Named files and folders

NOKIA

Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

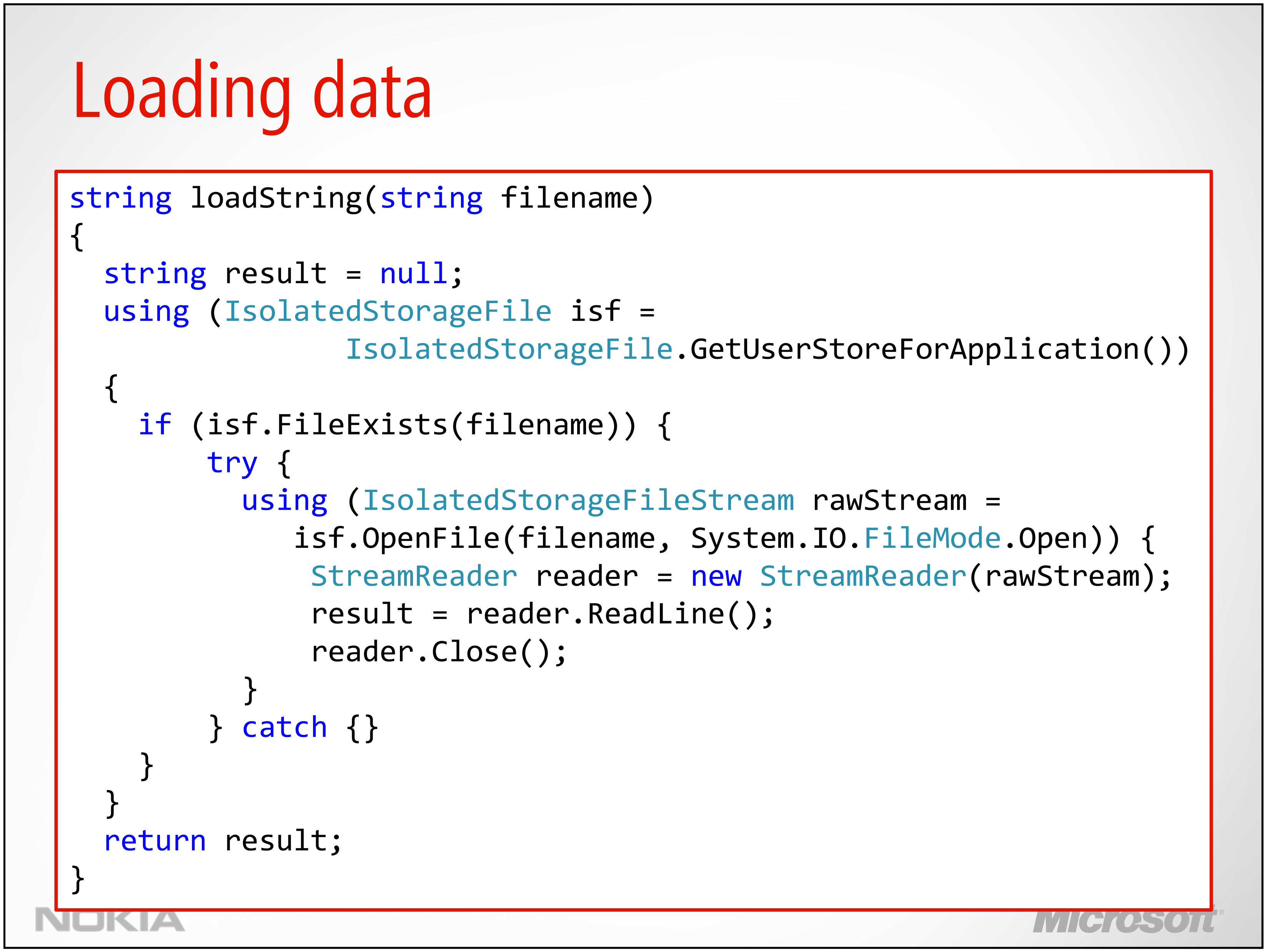


## Saving data

```
private void saveGameToIsolatedStorage(string message)
{
  using (IsolatedStorageFile isf =
         IsolatedStorageFile.GetUserStoreForApplication())
  {
    using (IsolatedStorageFileStream rawStream =
                                    isf.CreateFile(filename))
    {
       StreamWriter writer = new StreamWriter(rawStream);
       writer.WriteLine(message); // save the message
       writer.Close();
    }
  }
}
```

NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



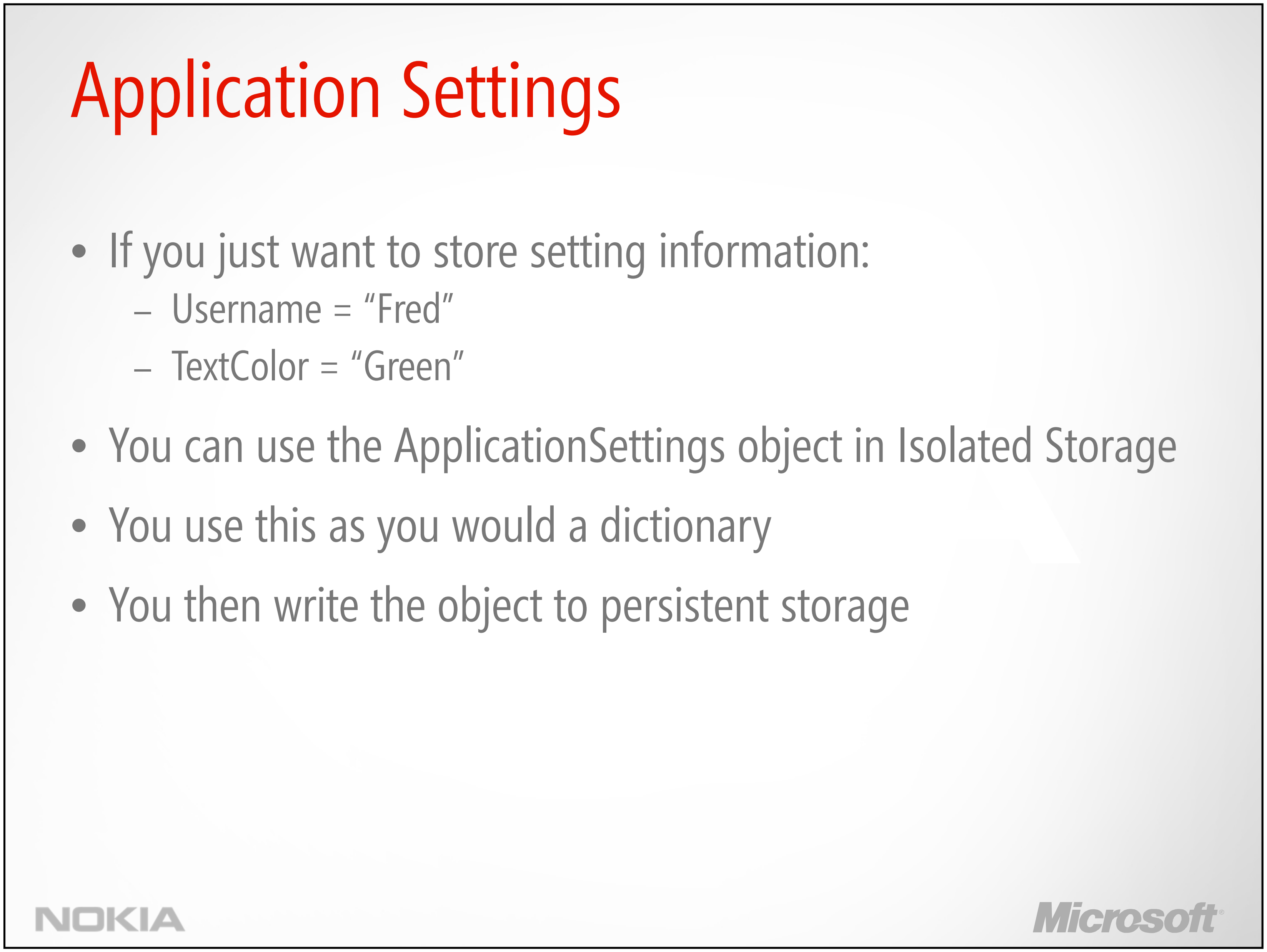
## Loading data

```
string loadString(string filename)
{
  string result = null;
  using (IsolatedStorageFile isf =
                IsolatedStorageFile.GetUserStoreForApplication())
  {
    if (isf.FileExists(filename)) {
        try {
          using (IsolatedStorageFileStream rawStream =
             isf.OpenFile(filename, System.IO.FileMode.Open)) {
              StreamReader reader = new StreamReader(rawStream);
              result = reader.ReadLine();
              reader.Close();
          }
        } catch {}
    }
  }
  return result;
}
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Demo
## Using Isolated Storage

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



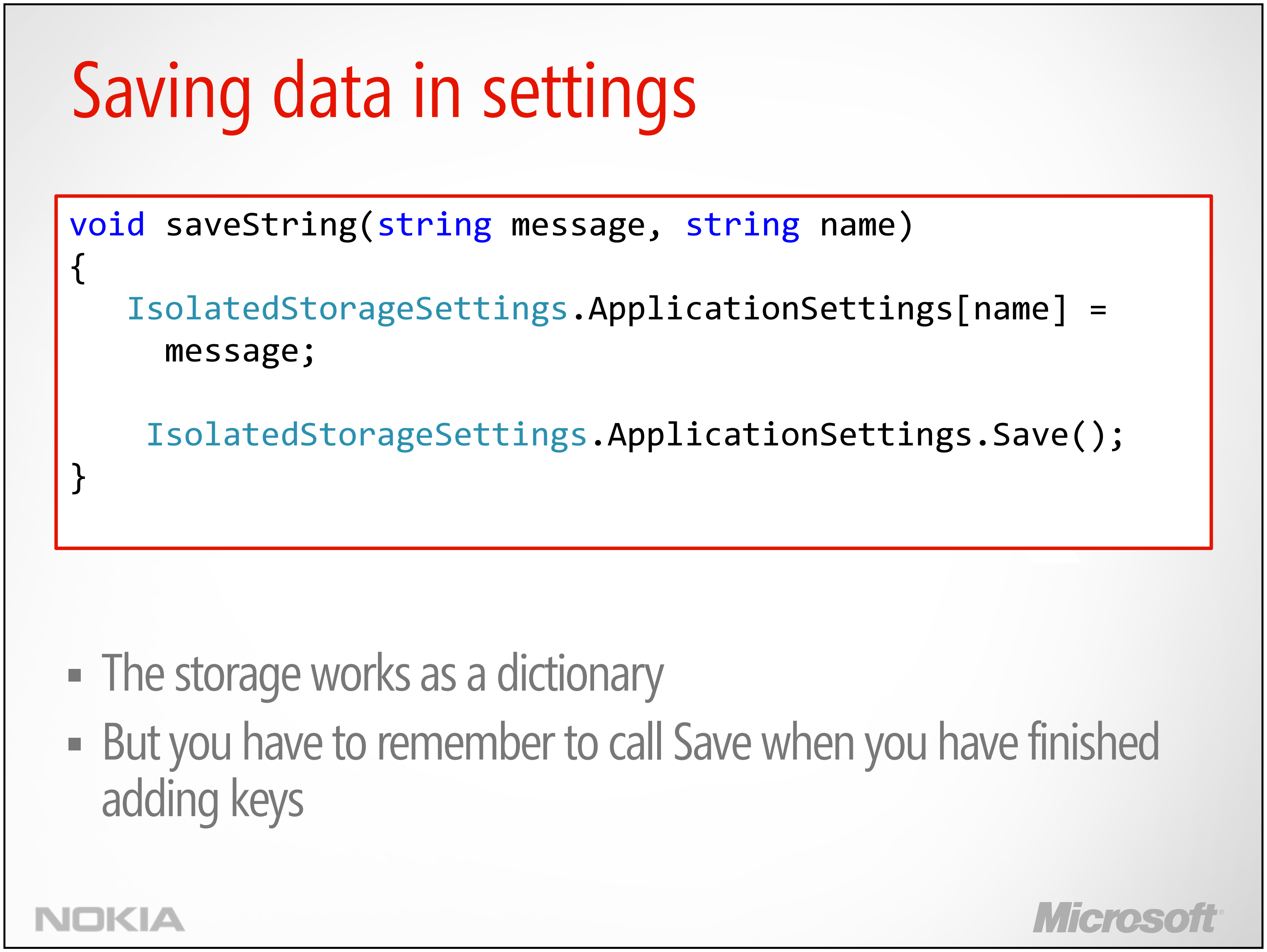
## Application Settings

- If you just want to store setting information:
  - Username = “Fred”
  - TextColor = “Green”
- You can use the ApplicationSettings object in Isolated Storage
- You use this as you would a dictionary
- You then write the object to persistent storage

NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011



## Saving data in settings

```
void saveString(string message, string name)
{
   IsolatedStorageSettings.ApplicationSettings[name] =
     message;

    IsolatedStorageSettings.ApplicationSettings.Save();
}
```

- The storage works as a dictionary
- But you have to remember to call Save when you have finished adding keys

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Loading from settings

```
string loadString(string name)
{
  if (IsolatedStorageSettings.ApplicationSettings.
                                          Contains(name))
  {
      return (string)
           IsolatedStorageSettings.ApplicationSettings
                                                [filename];
    }
    else
        return null;
}
```

- Test for the key before you try to find it or you will get an exception thrown

NOKIA Microsoft

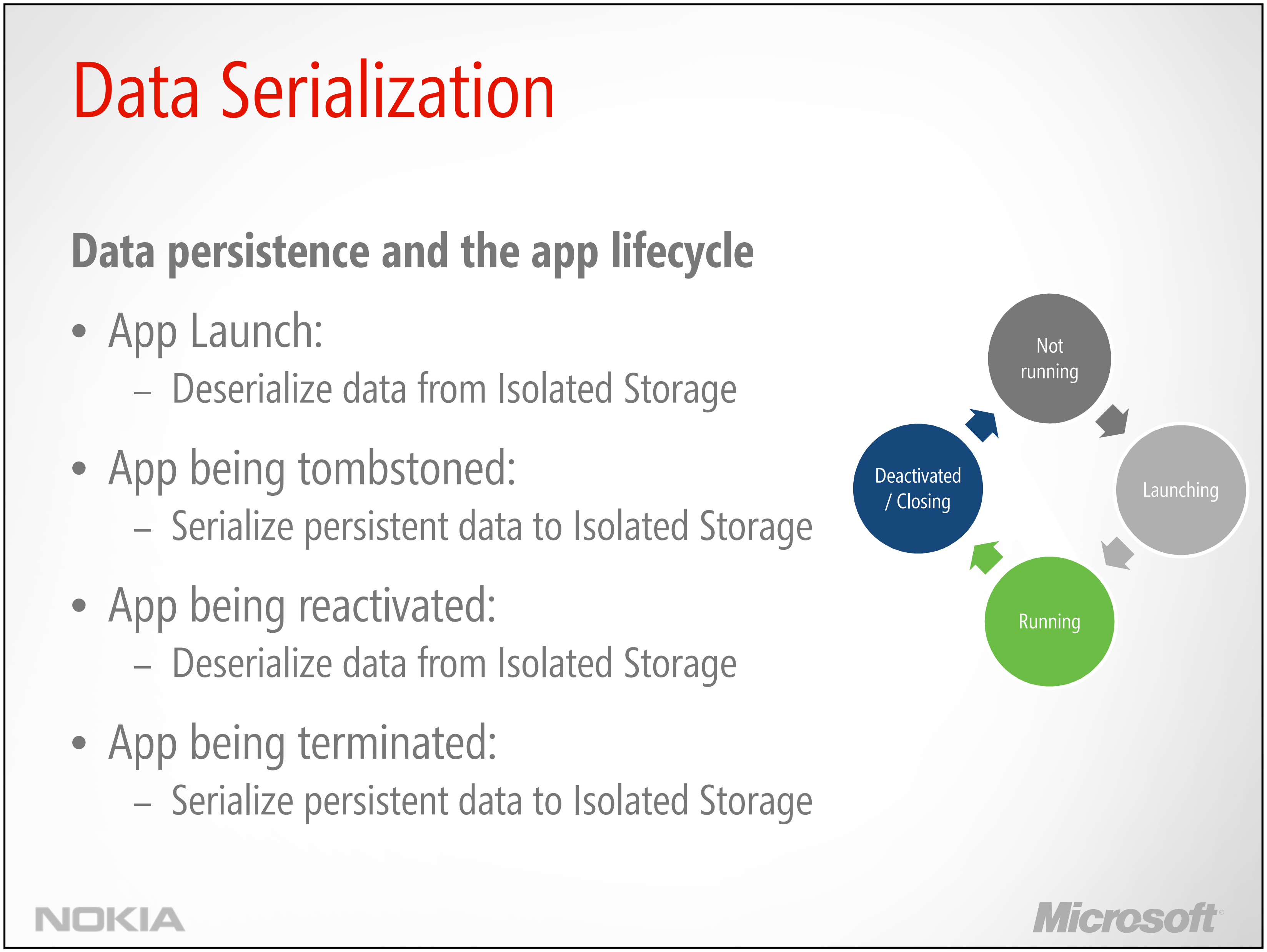
©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Windows Phone

## Demo

## Using Settings Storage

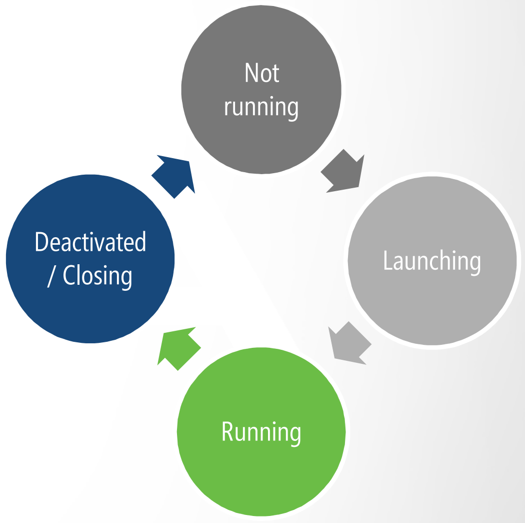
©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Data Serialization

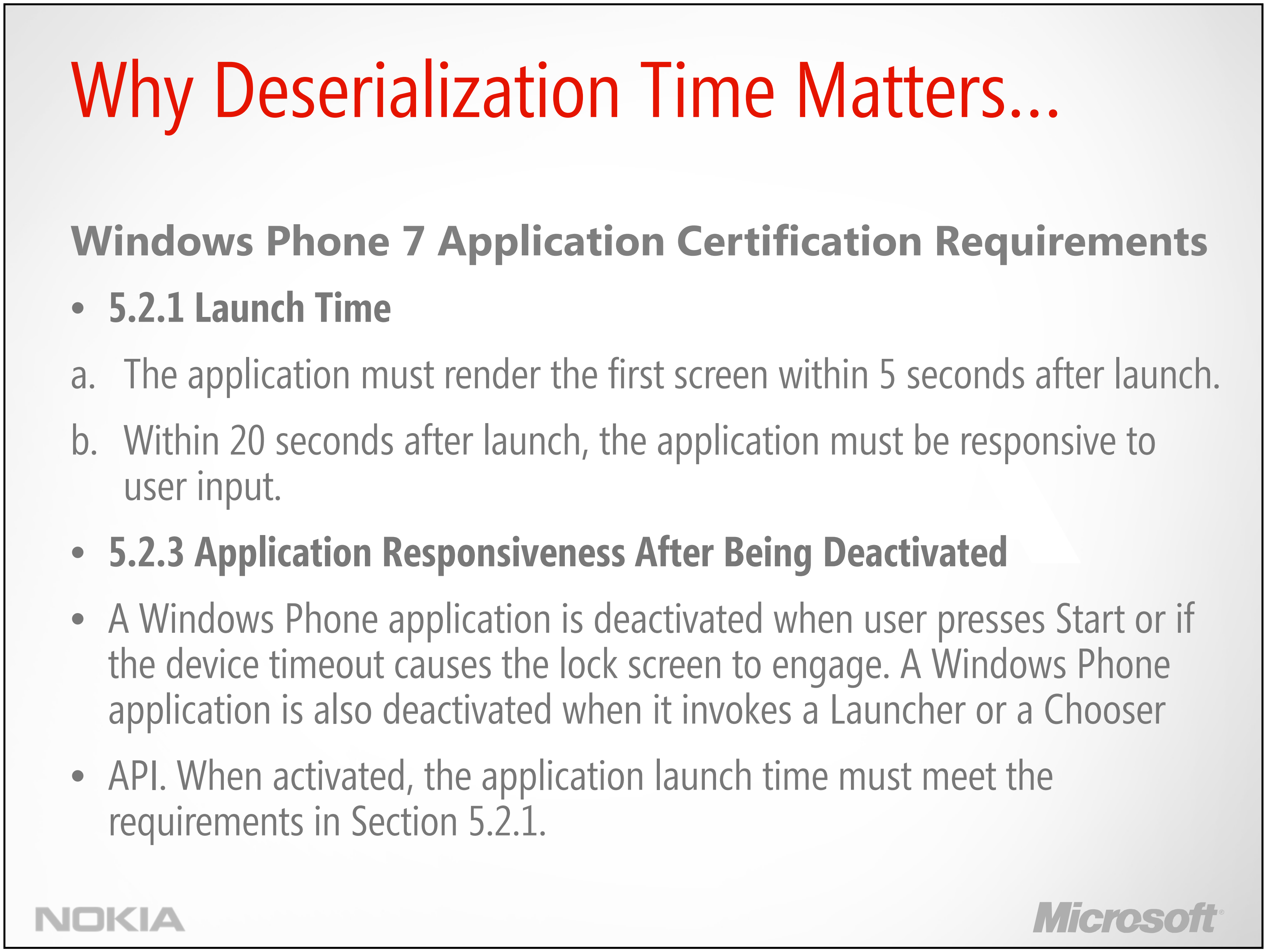
**Data persistence and the app lifecycle**

- App Launch:
  - Deserialize data from Isolated Storage
- App being tombstoned:
  - Serialize persistent data to Isolated Storage
- App being reactivated:
  - Deserialize data from Isolated Storage
- App being terminated:
  - Serialize persistent data to Isolated Storage



NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Why Deserialization Time Matters…

**Windows Phone 7 Application Certification Requirements**

- **5.2.1 Launch Time**

a. The application must render the first screen within 5 seconds after launch.

b. Within 20 seconds after launch, the application must be responsive to user input.

- **5.2.3 Application Responsiveness After Being Deactivated**
- A Windows Phone application is deactivated when user presses Start or if the device timeout causes the lock screen to engage. A Windows Phone application is also deactivated when it invokes a Launcher or a Chooser
- API. When activated, the application launch time must meet the requirements in Section 5.2.1.

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Windows Phone

## Demo

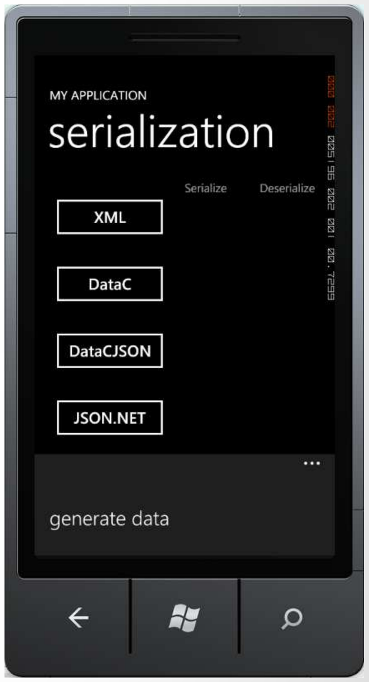
Serialization to Isolated Storage

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Data Serialization Performance

- Test of serialization and deserialization of 18000 objects to/from Isolated Storage (real phone)

| Serialization | Serialize (ms) | Deserialize (ms) |
|---|---|---|
| XMLSerializer | 9624 | 24471 |
| DataContract | 19342 | 25361 |
| DataContractJSON | 21729 | 60404 |
| JSON.NET | 8879 | 18777 |
| SharpSerializer | 19154 | 20458 |



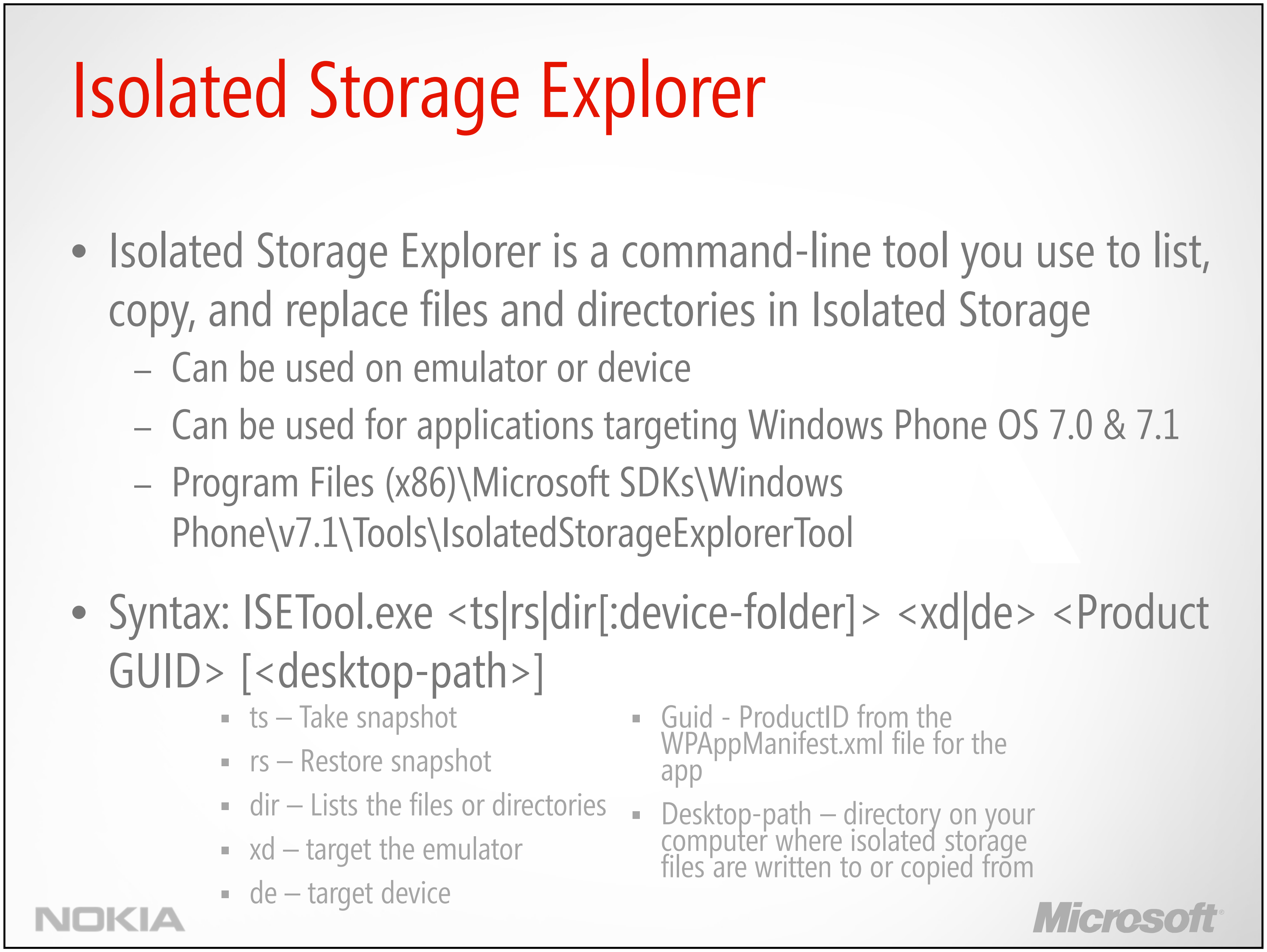
Credit: Test software adapted from sample on blog by MVP **Jevgeni Tšaikin**
http://www.eugenedotnet.com/2010/12/windows-phone-7-serialization-comparison/

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011

## Tools:
## Isolated Storage Explorer

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

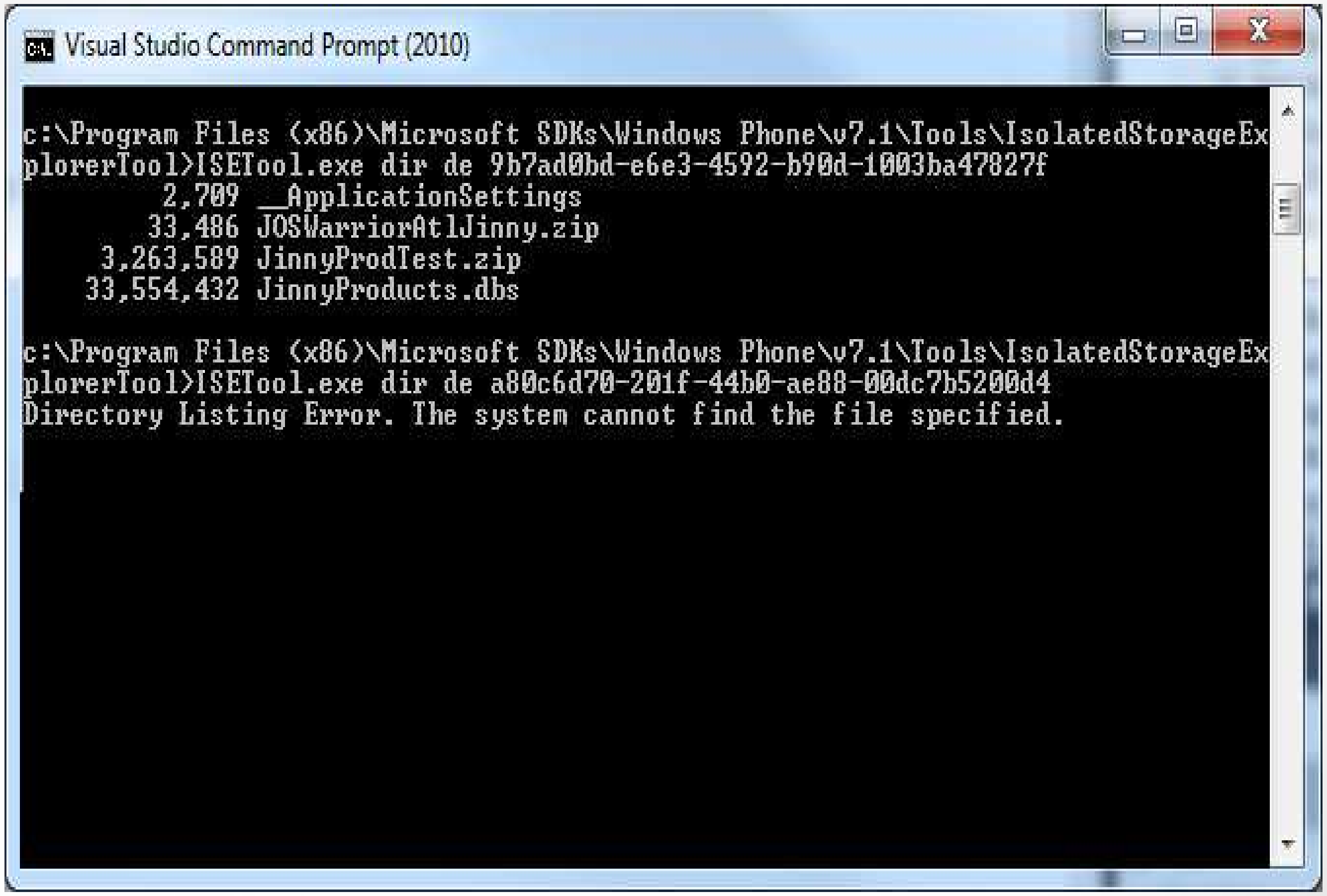


## Isolated Storage Explorer

- Isolated Storage Explorer is a command-line tool you use to list, copy, and replace files and directories in Isolated Storage
  - Can be used on emulator or device
  - Can be used for applications targeting Windows Phone OS 7.0 & 7.1
  - Program Files (x86)\Microsoft SDKs\Windows Phone\v7.1\Tools\IsolatedStorageExplorerTool
- Syntax: ISETool.exe <ts|rs|dir[:device-folder]> <xd|de> <Product GUID> [<desktop-path>]
  - ts – Take snapshot
  - rs – Restore snapshot
  - dir – Lists the files or directories
  - xd – target the emulator
  - de – target device
  - Guid - ProductID from the WPAppManifest.xml file for the app
  - Desktop-path – directory on your computer where isolated storage files are written to or copied from

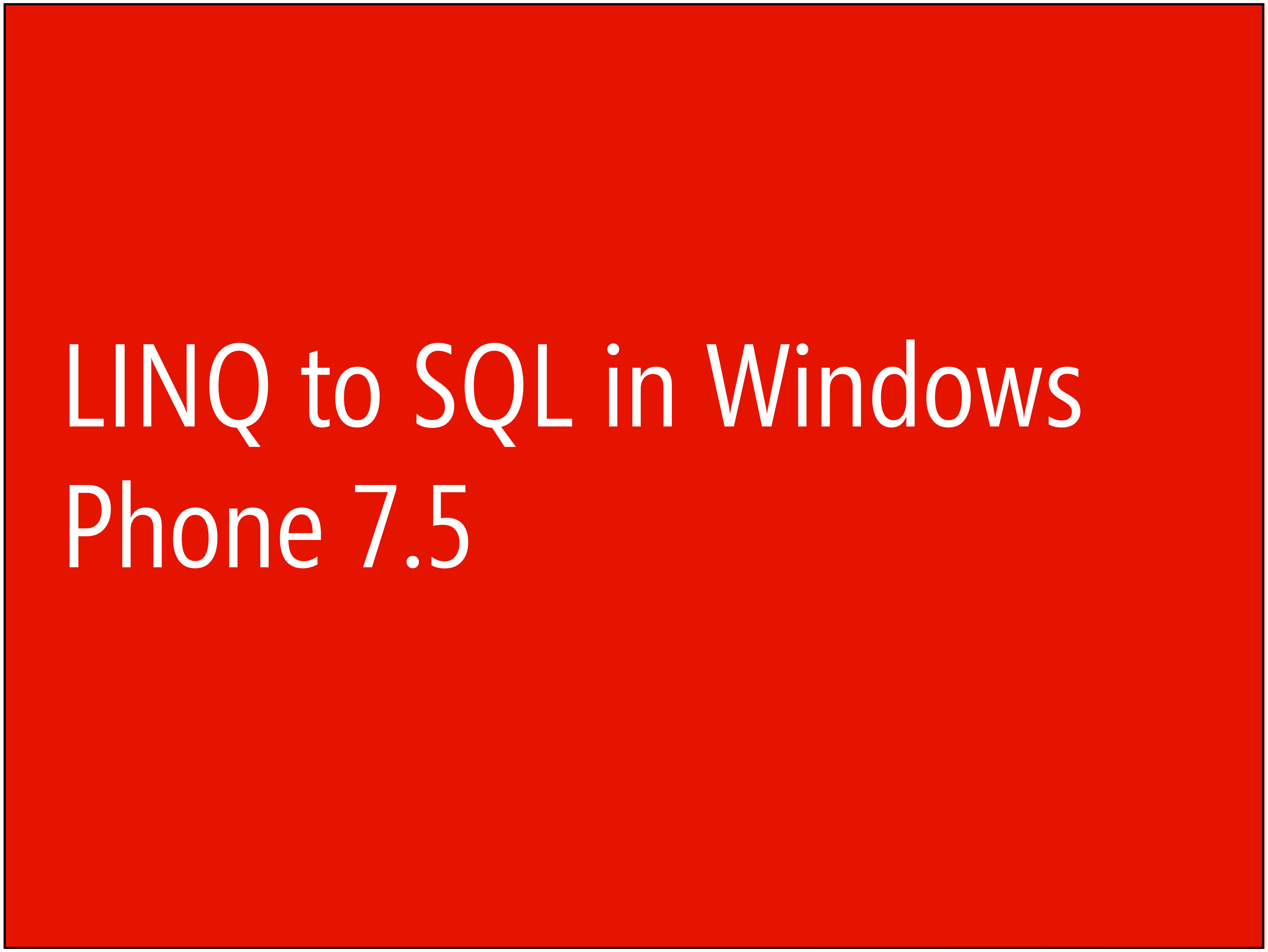
©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Isolated Storage Explorer Example



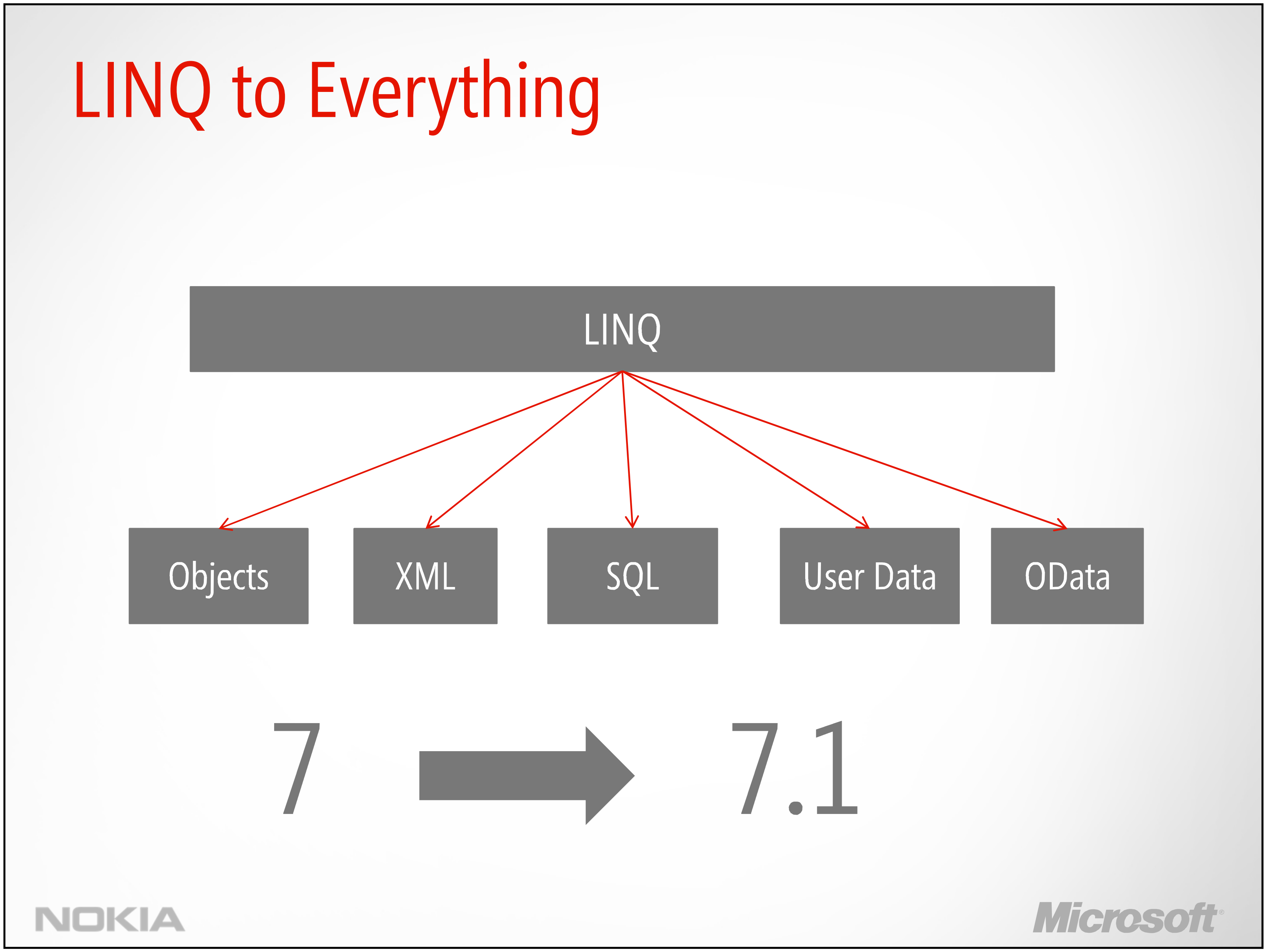
```
c:\Program Files (x86)\Microsoft SDKs\Windows Phone\v7.1\Tools\IsolatedStorageEx
plorerTool>ISETool.exe dir de 9b7ad0bd-e6e3-4592-b90d-1003ba47827f
         2,709 __ApplicationSettings
        33,486 JOSWarriorAtlJinny.zip
     3,263,589 JinnyProdTest.zip
    33,554,432 JinnyProducts.dbs

c:\Program Files (x86)\Microsoft SDKs\Windows Phone\v7.1\Tools\IsolatedStorageEx
plorerTool>ISETool.exe dir de a80c6d70-201f-44b0-ae88-00dc7b5200d4
Directory Listing Error. The system cannot find the file specified.
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## LINQ to SQL in Windows Phone 7.5

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

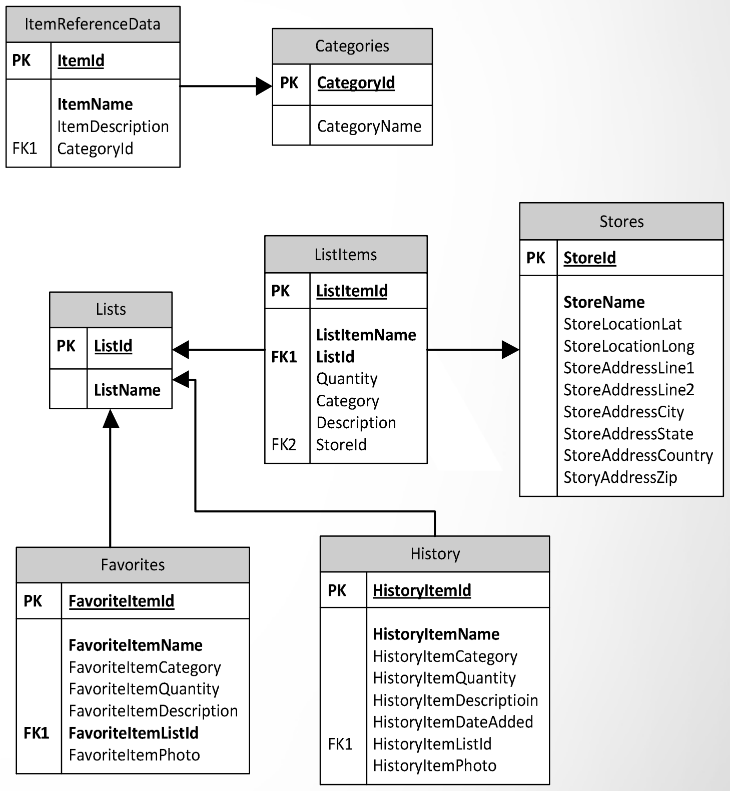


## LINQ to Everything

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Complex Schema

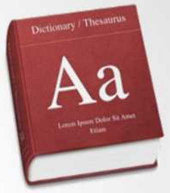
- Numerous relationships and constraints
- Example: Shopping List
  - 7 tables
  - 100s of records
  - 5 foreign keys



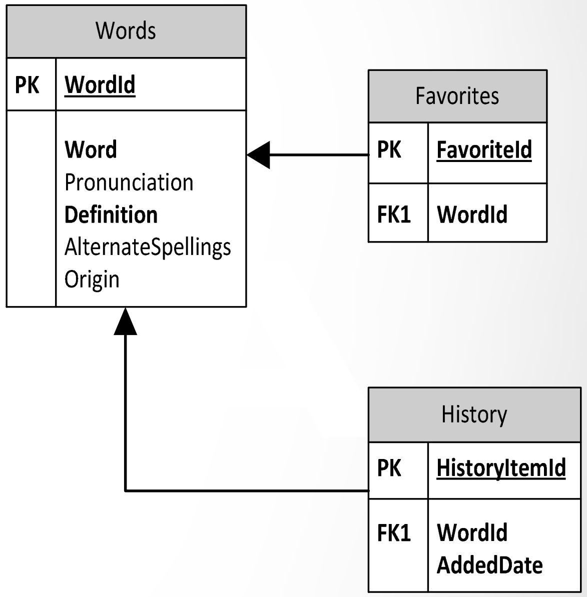
NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Reference Data



- Huge amounts of static reference data
- Example: dictionary app
  - 3 tables
  - 1 table with 500k rows

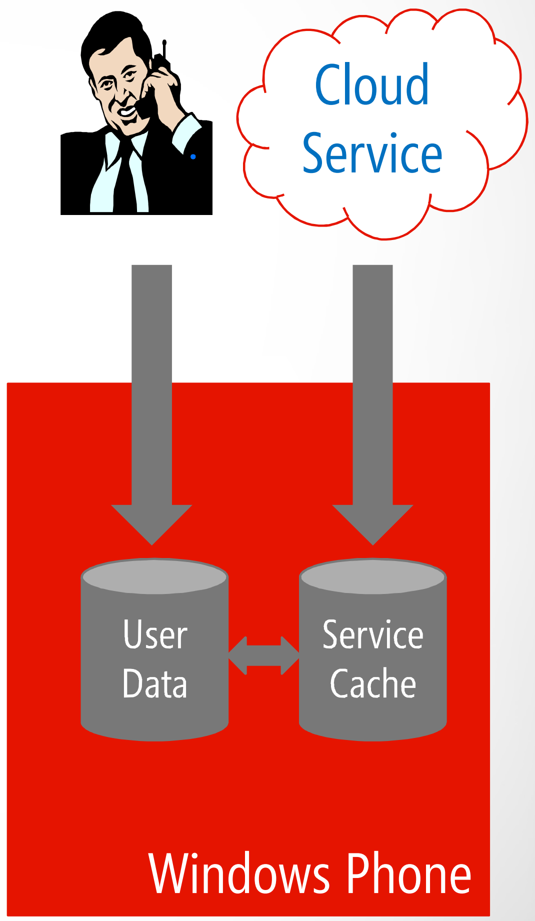


NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Web Service Cache

- Fetch reference data from cloud
- Cache locally
- Combine with user-specific data



©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Windows Phone

## Demo

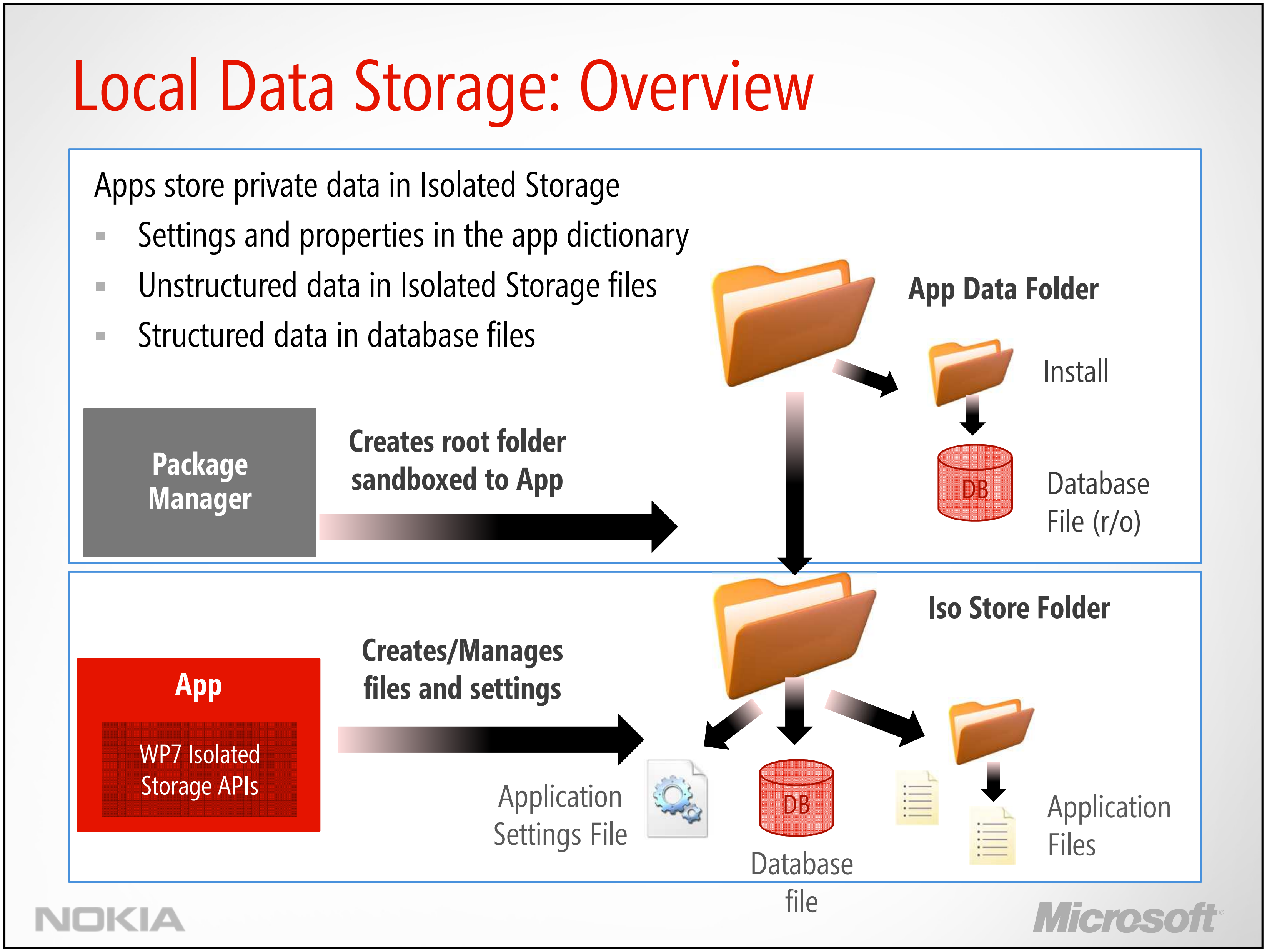
Local Database Storage

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Database Support in Windows Phone 7.5

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011

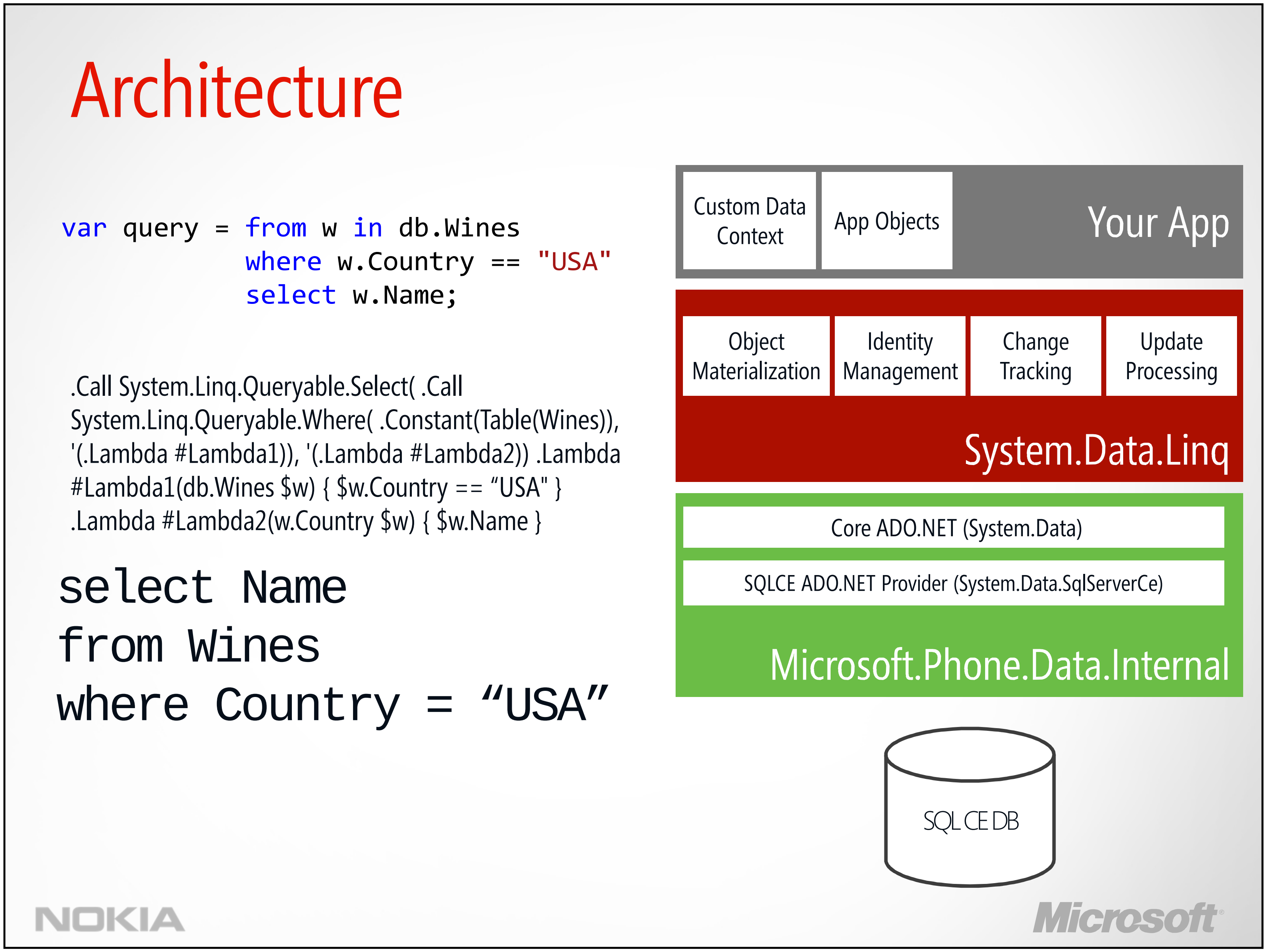


## Local Data Storage: Overview

Apps store private data in Isolated Storage

- Settings and properties in the app dictionary
- Unstructured data in Isolated Storage files
- Structured data in database files

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

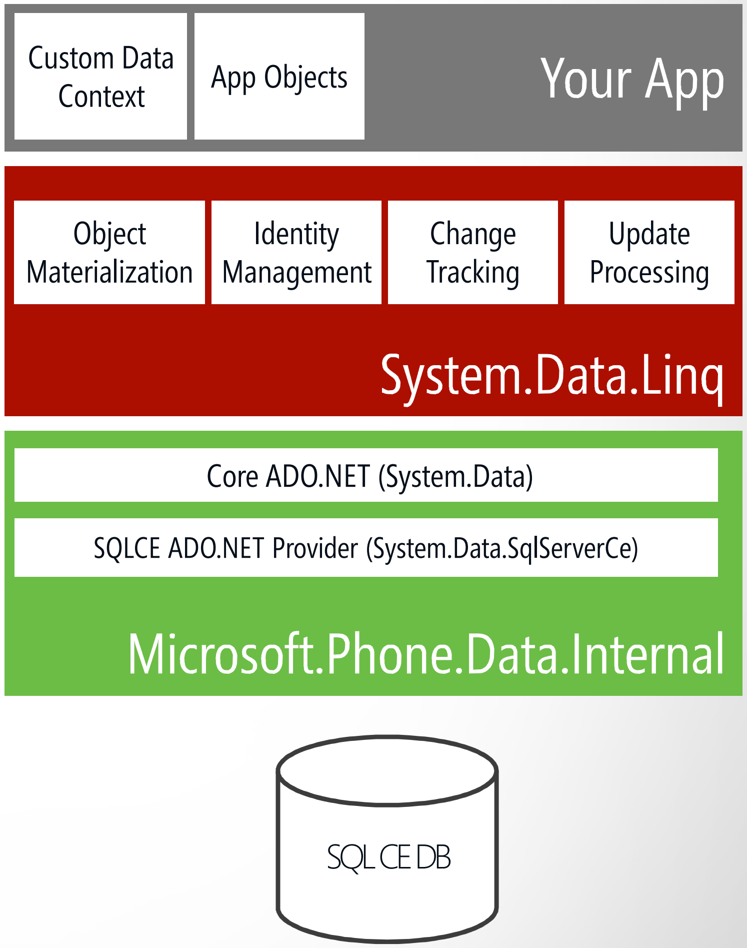


## Architecture

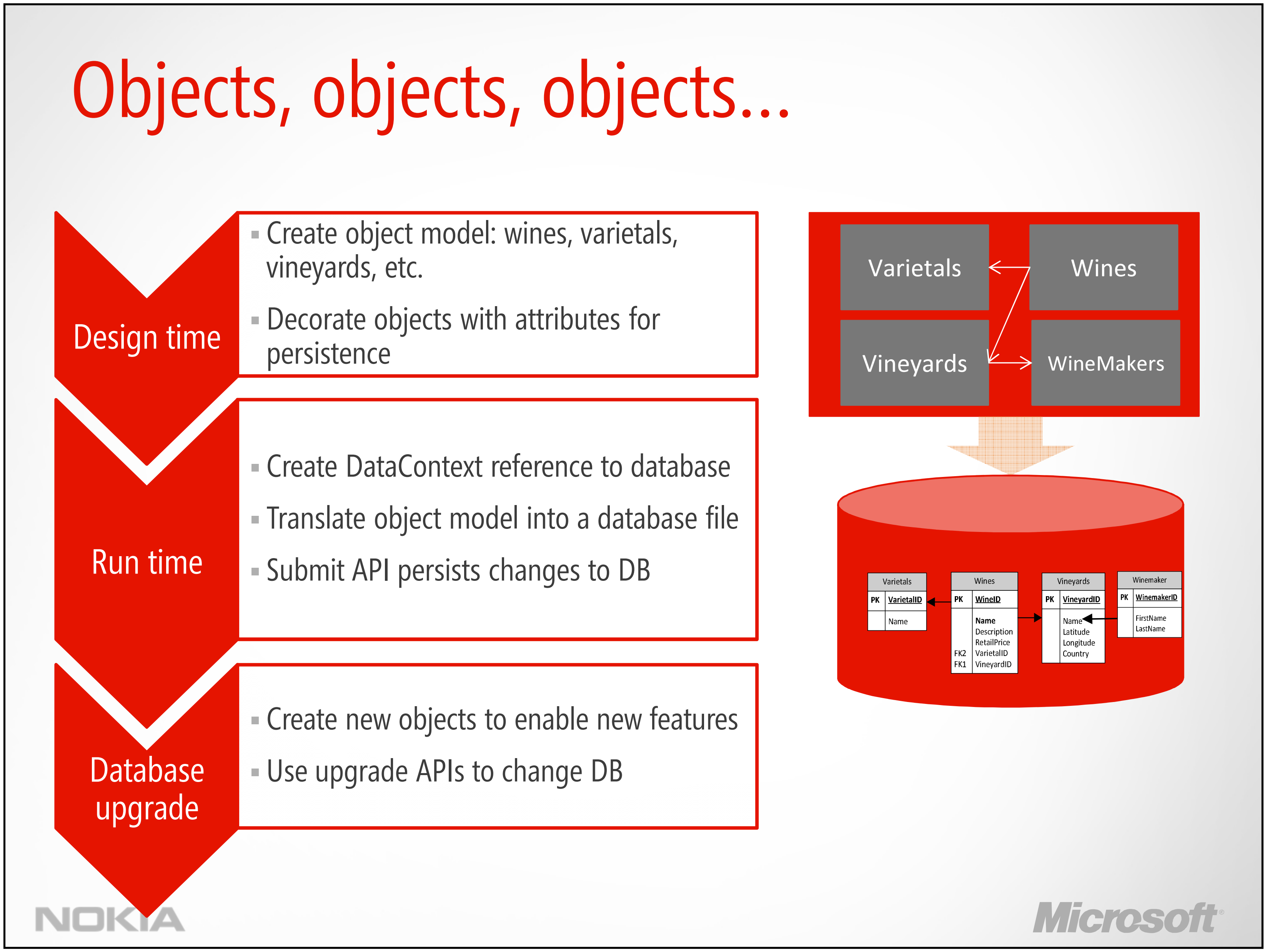
```
var query = from w in db.Wines
            where w.Country == "USA"
            select w.Name;
```

.Call System.Linq.Queryable.Select( .Call System.Linq.Queryable.Where( .Constant(Table(Wines)), '(.Lambda #Lambda1)), '(.Lambda #Lambda2)) .Lambda #Lambda1(db.Wines $w) { $w.Country == “USA" } .Lambda #Lambda2(w.Country $w) { $w.Name }

```
select Name
from Wines
where Country = “USA”
```



©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Objects, objects, objects…

**Design time**

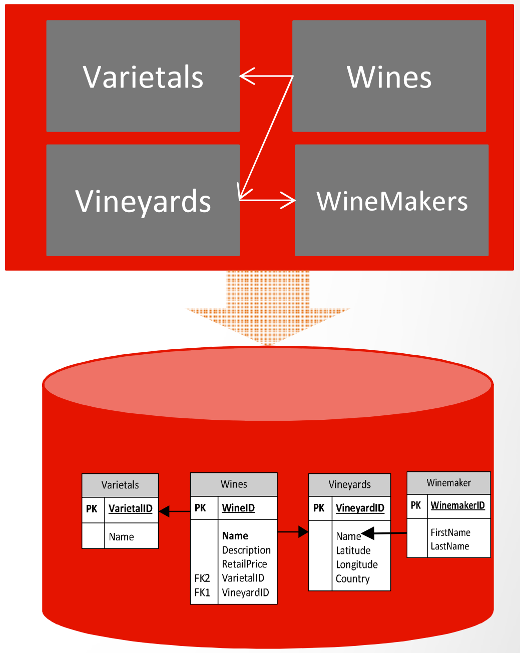
- Create object model: wines, varietals, vineyards, etc.
- Decorate objects with attributes for persistence

**Run time**

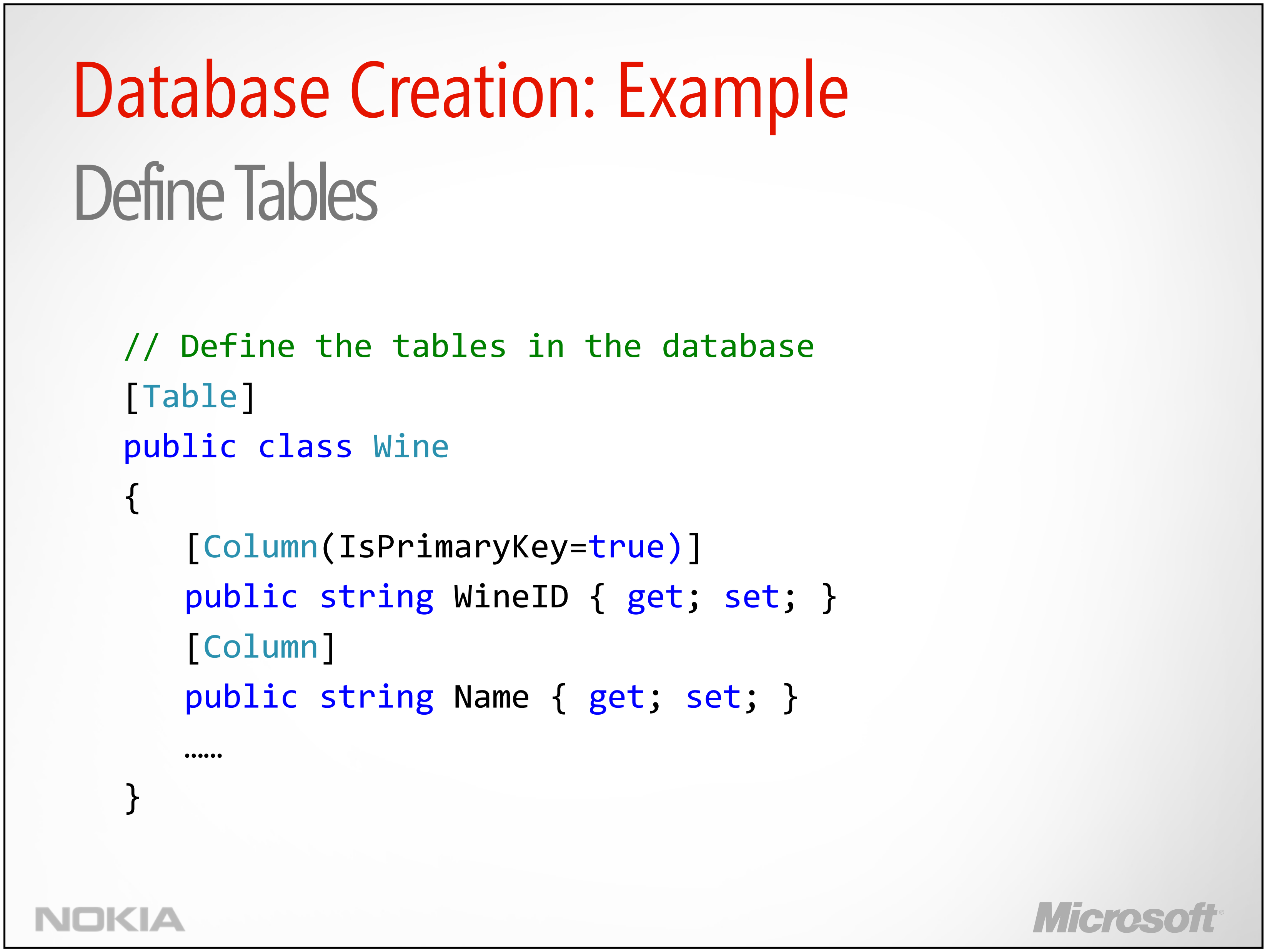
- Create DataContext reference to database
- Translate object model into a database file
- Submit API persists changes to DB

**Database upgrade**

- Create new objects to enable new features
- Use upgrade APIs to change DB



©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

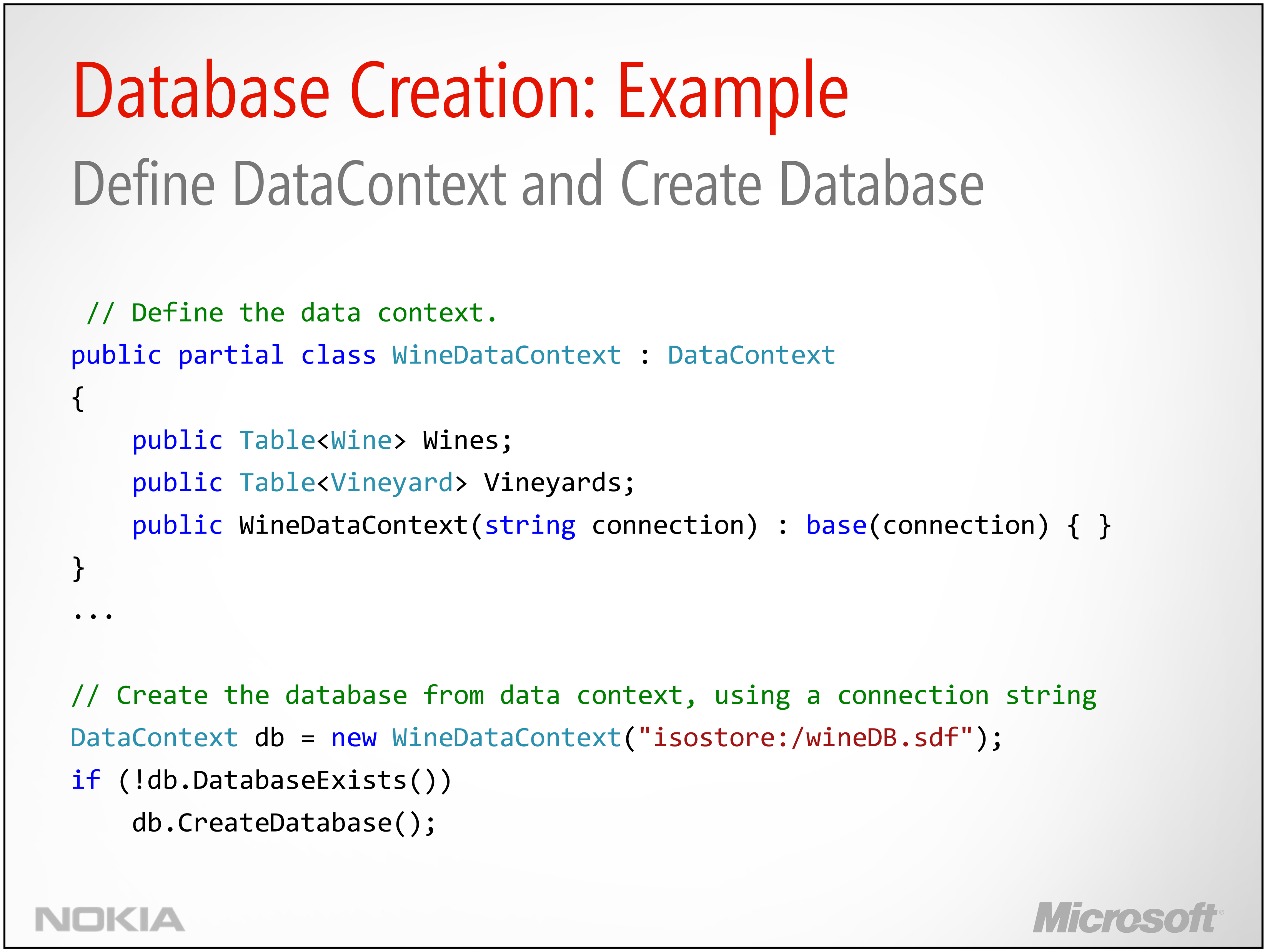


## Database Creation: Example

### Define Tables

```
// Define the tables in the database
[Table]
public class Wine
{
    [Column(IsPrimaryKey=true)]
    public string WineID { get; set; }
    [Column]
    public string Name { get; set; }
    ……
}
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

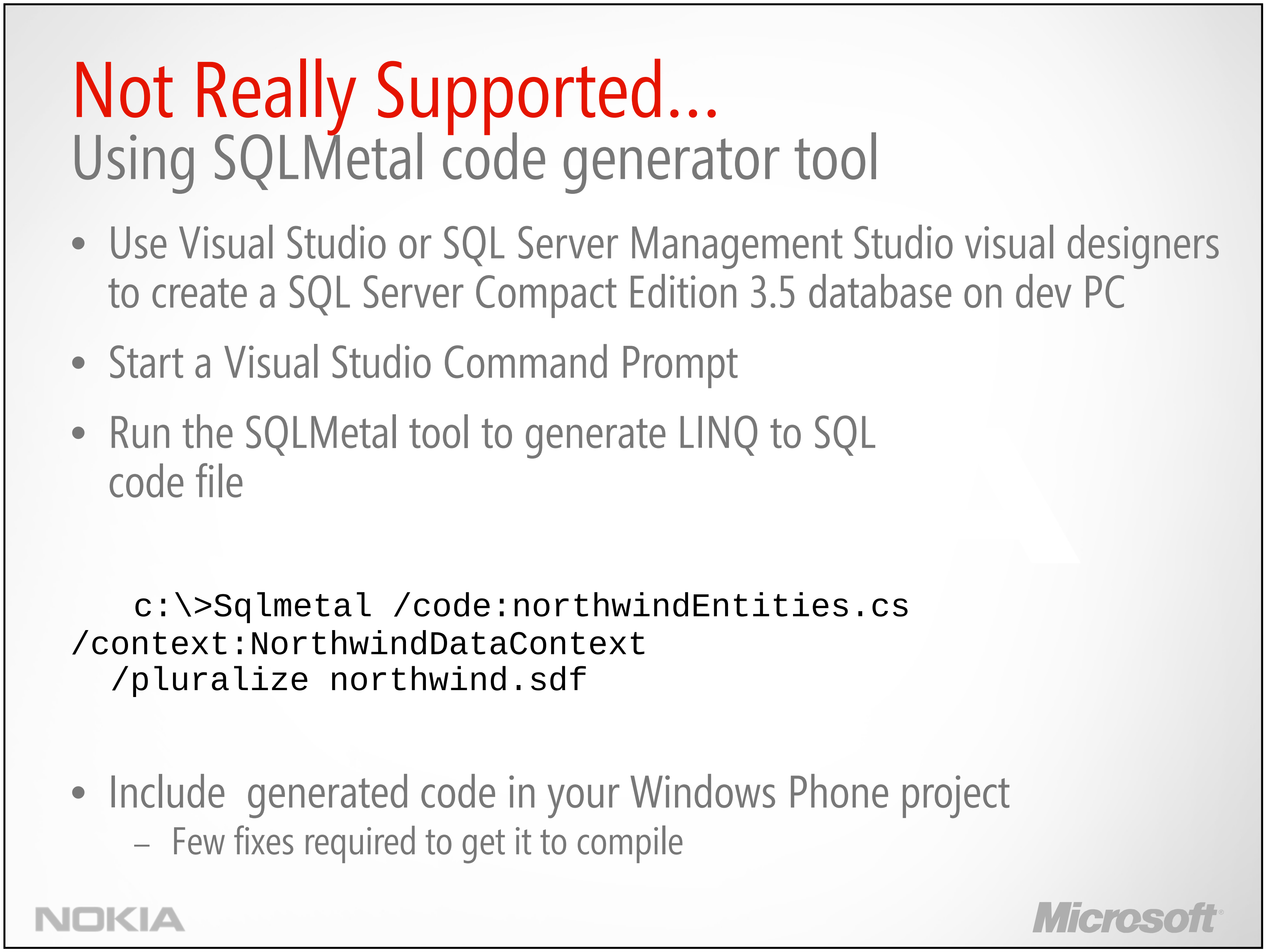


## Database Creation: Example

### Define DataContext and Create Database

```
 // Define the data context.
public partial class WineDataContext : DataContext
{
    public Table<Wine> Wines;
    public Table<Vineyard> Vineyards;
    public WineDataContext(string connection) : base(connection) { }
}
...

// Create the database from data context, using a connection string
DataContext db = new WineDataContext("isostore:/wineDB.sdf");
if (!db.DatabaseExists())
    db.CreateDatabase();
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Not Really Supported…
### Using SQLMetal code generator tool

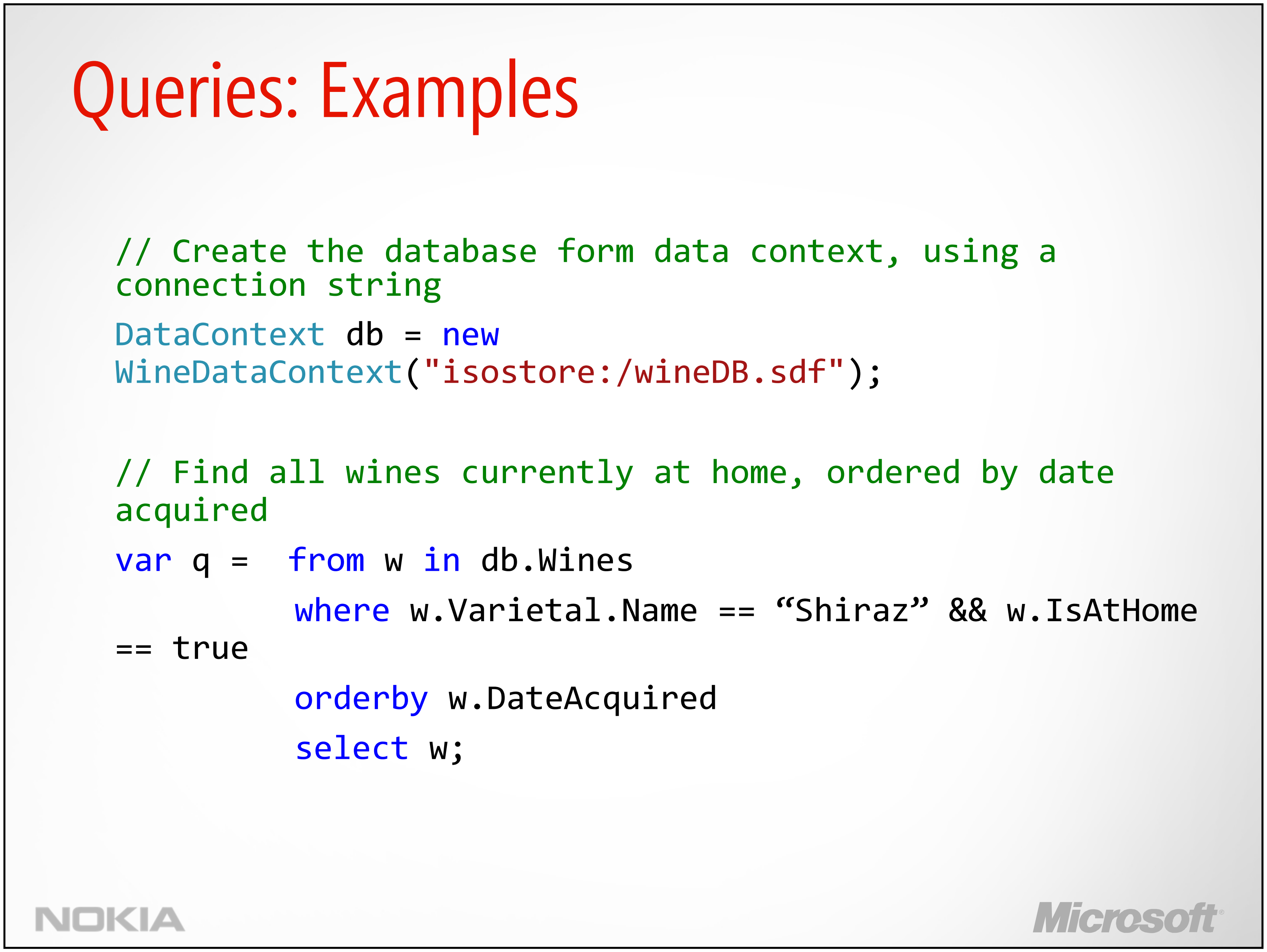
- Use Visual Studio or SQL Server Management Studio visual designers to create a SQL Server Compact Edition 3.5 database on dev PC
- Start a Visual Studio Command Prompt
- Run the SQLMetal tool to generate LINQ to SQL code file

```
   c:\>Sqlmetal /code:northwindEntities.cs
/context:NorthwindDataContext
  /pluralize northwind.sdf
```

- Include  generated code in your Windows Phone project
  - Few fixes required to get it to compile

NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



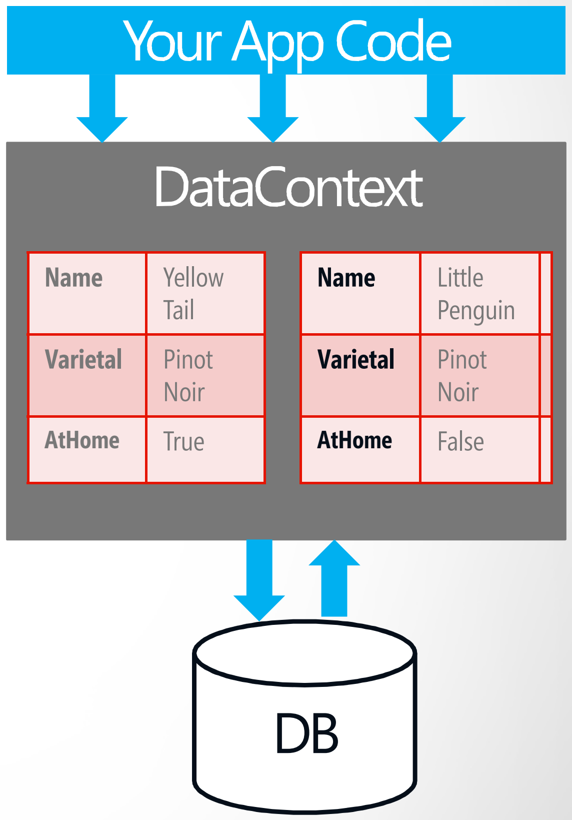
## Queries: Examples

```
// Create the database form data context, using a
connection string
DataContext db = new
WineDataContext("isostore:/wineDB.sdf");

// Find all wines currently at home, ordered by date
acquired
var q =  from w in db.Wines
         where w.Varietal.Name == “Shiraz” && w.IsAtHome
== true
         orderby w.DateAcquired
         select w;
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

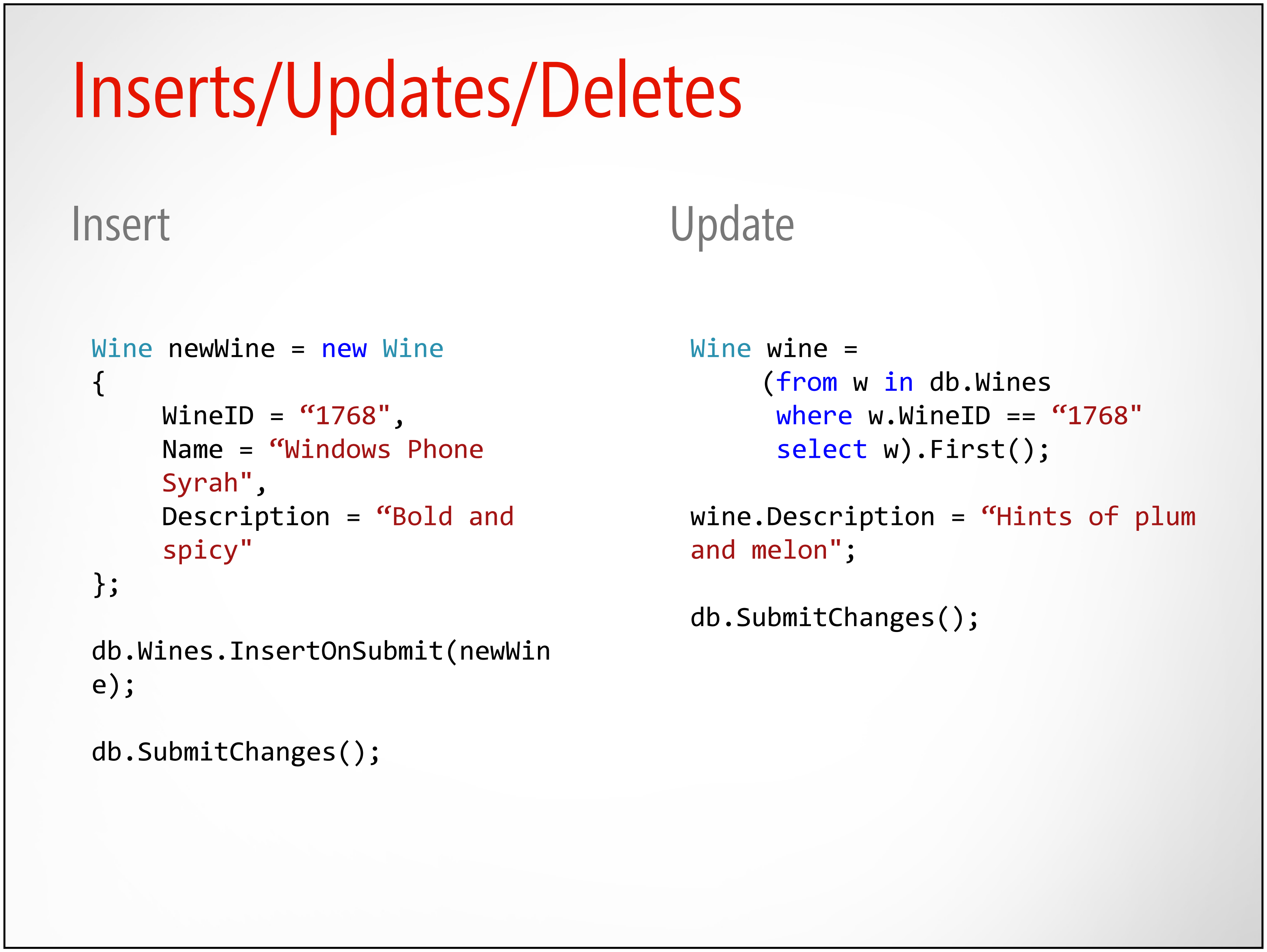
## Inserts/Updates/Deletes

- It's all about the DataContext
  - Changes made against the DataContext first
  - Changes persisted by calling SubmitChanges()
- SubmitChanges
  - LINQ to SQL determines change set and submits to DB



NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Inserts/Updates/Deletes

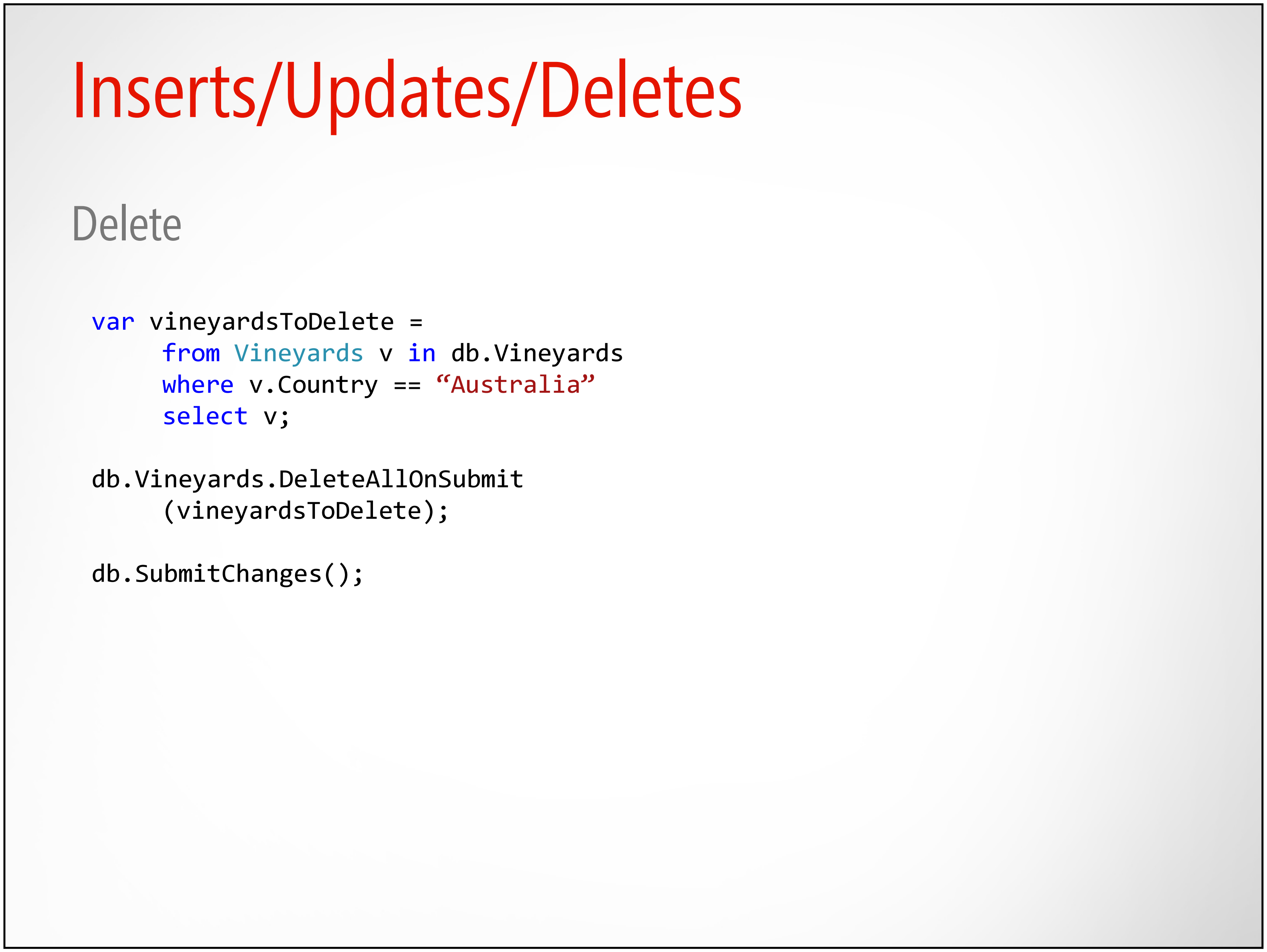
### Insert

```
Wine newWine = new Wine
{
     WineID = “1768",
     Name = “Windows Phone
     Syrah",
     Description = “Bold and
     spicy"
};

db.Wines.InsertOnSubmit(newWin
e);

db.SubmitChanges();
```

### Update

```
Wine wine =
     (from w in db.Wines
      where w.WineID == “1768"
      select w).First();

wine.Description = “Hints of plum
and melon";

db.SubmitChanges();
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Inserts/Updates/Deletes

### Delete

```
var vineyardsToDelete =
     from Vineyards v in db.Vineyards
     where v.Country == “Australia”
     select v;

db.Vineyards.DeleteAllOnSubmit
     (vineyardsToDelete);

db.SubmitChanges();
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

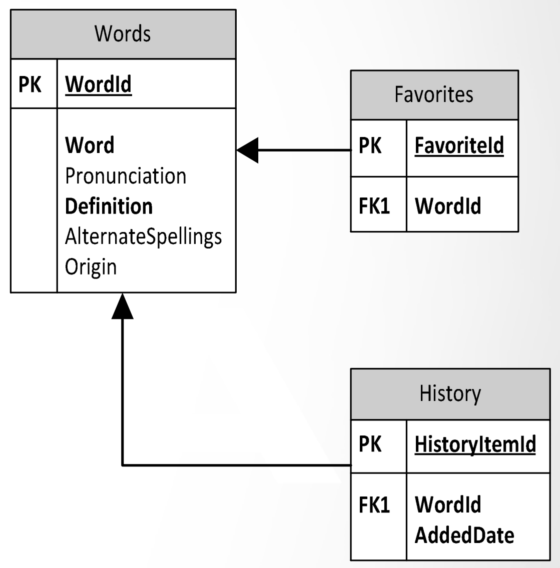
## Demo
## Programming LINQ to SQL

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

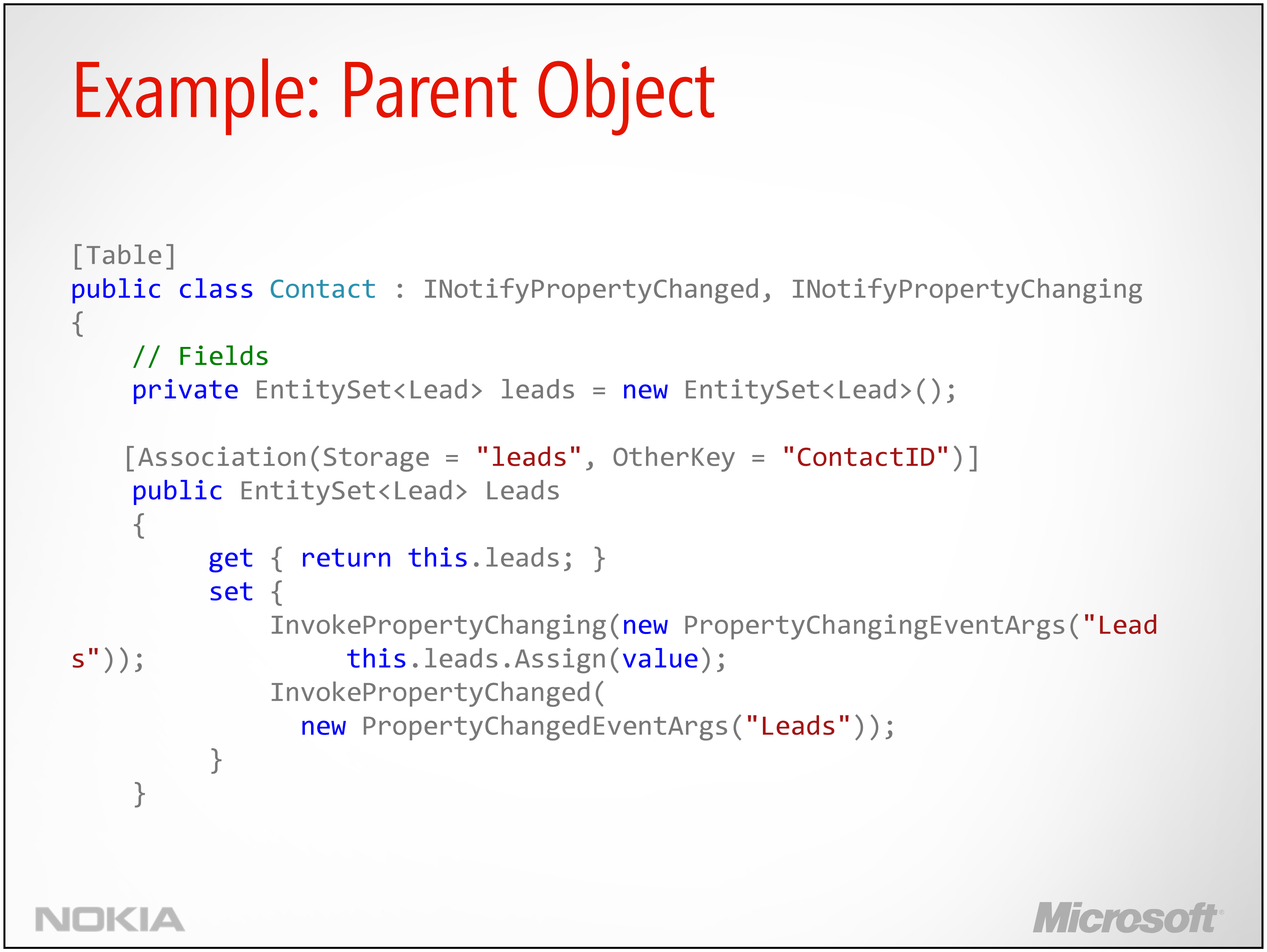
Published: 8/24/2011

## Relationships

- Express one-many, one-one and many-many relationships using EntitySet<T> and EntityRef<T> columns
- In the relational database, a child table has a column – the Foreign Key - that stores the unique ID of a record in the parent table



©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

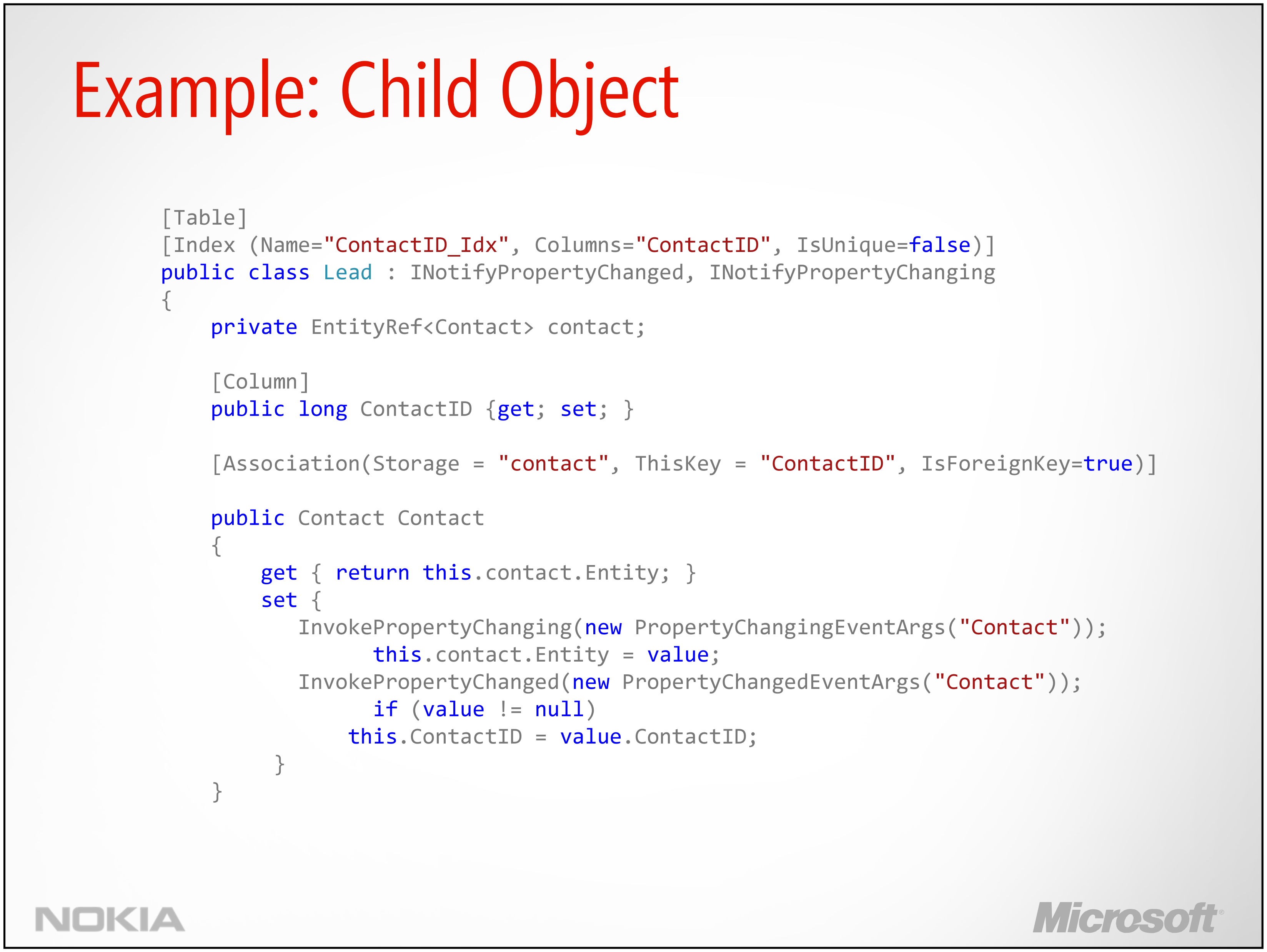


## Example: Parent Object

```
[Table]
public class Contact : INotifyPropertyChanged, INotifyPropertyChanging
{
    // Fields
    private EntitySet<Lead> leads = new EntitySet<Lead>();

   [Association(Storage = "leads", OtherKey = "ContactID")]
    public EntitySet<Lead> Leads
    {
         get { return this.leads; }
         set {
             InvokePropertyChanging(new PropertyChangingEventArgs("Lead
s"));             this.leads.Assign(value);
             InvokePropertyChanged(
               new PropertyChangedEventArgs("Leads"));
         }
    }
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011

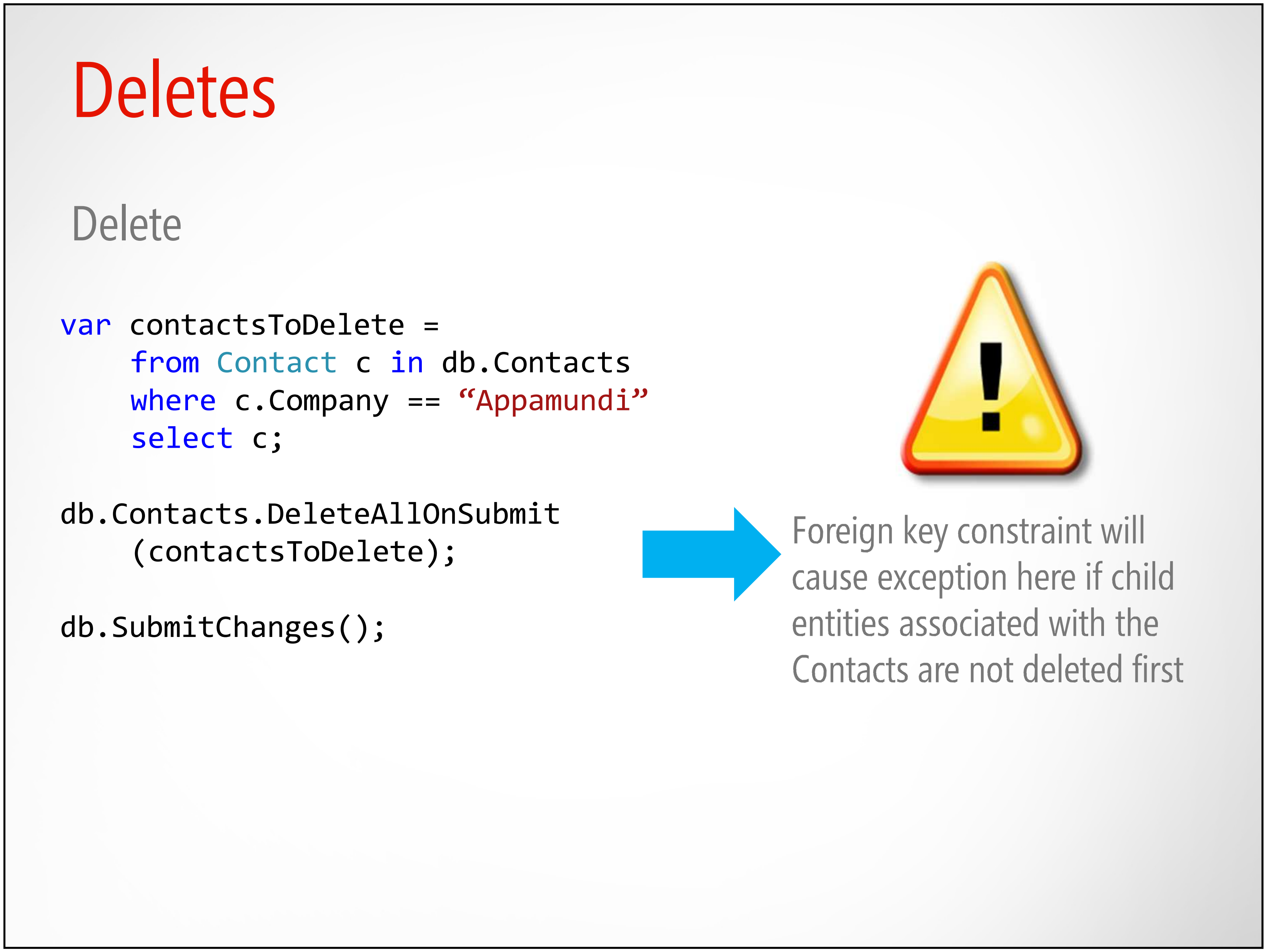


## Example: Child Object

```
[Table]
[Index (Name="ContactID_Idx", Columns="ContactID", IsUnique=false)]
public class Lead : INotifyPropertyChanged, INotifyPropertyChanging
{
    private EntityRef<Contact> contact;

    [Column]
    public long ContactID {get; set; }

    [Association(Storage = "contact", ThisKey = "ContactID", IsForeignKey=true)]

    public Contact Contact
    {
        get { return this.contact.Entity; }
        set {
           InvokePropertyChanging(new PropertyChangingEventArgs("Contact"));
                 this.contact.Entity = value;
           InvokePropertyChanged(new PropertyChangedEventArgs("Contact"));
                 if (value != null)
               this.ContactID = value.ContactID;
         }
    }
```

NOKIA Microsoft

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Deletes

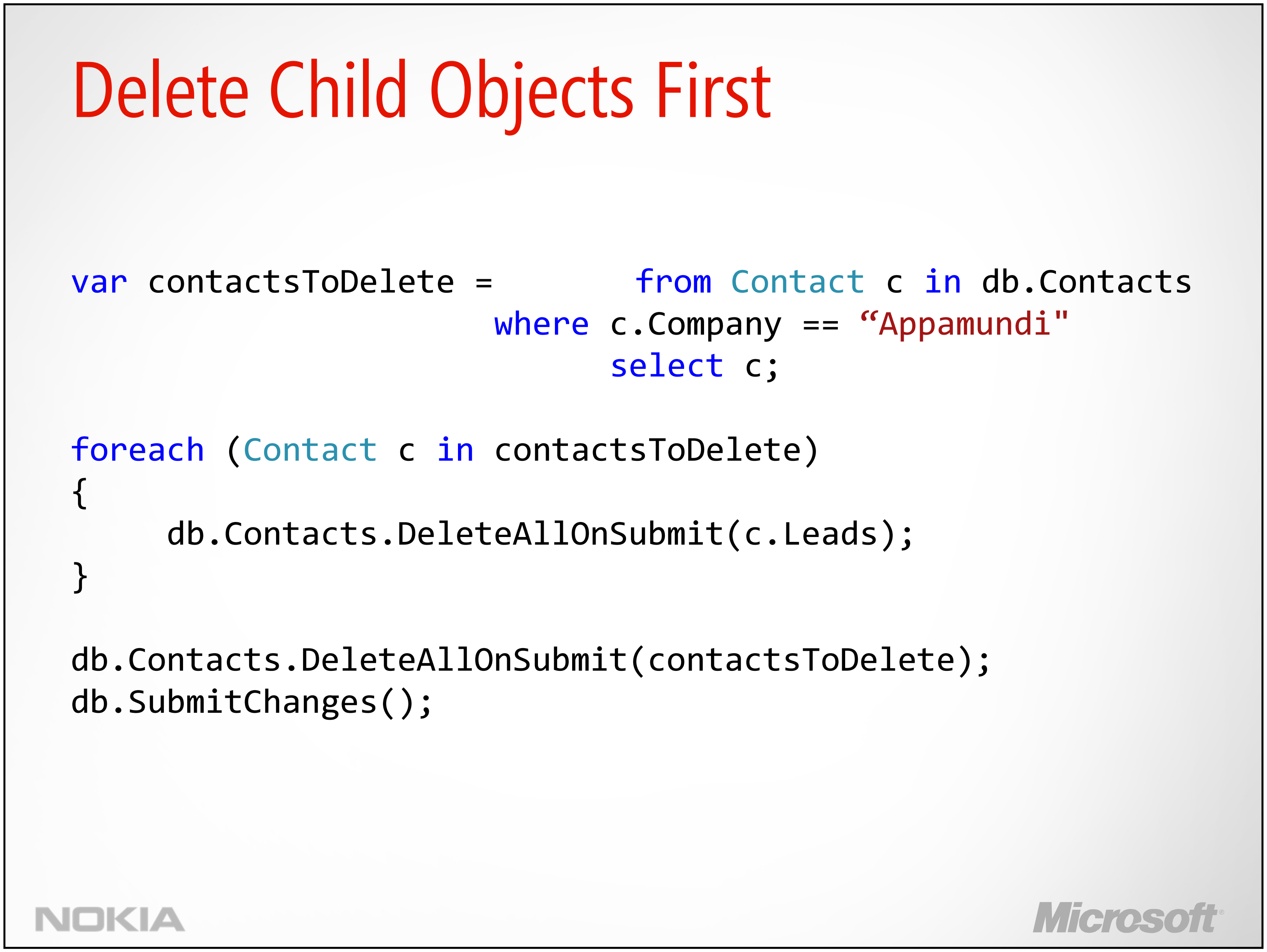
### Delete

```
var contactsToDelete =
    from Contact c in db.Contacts
    where c.Company == "Appamundi"
    select c;

db.Contacts.DeleteAllOnSubmit
    (contactsToDelete);

db.SubmitChanges();
```

Foreign key constraint will cause exception here if child entities associated with the Contacts are not deleted first

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011



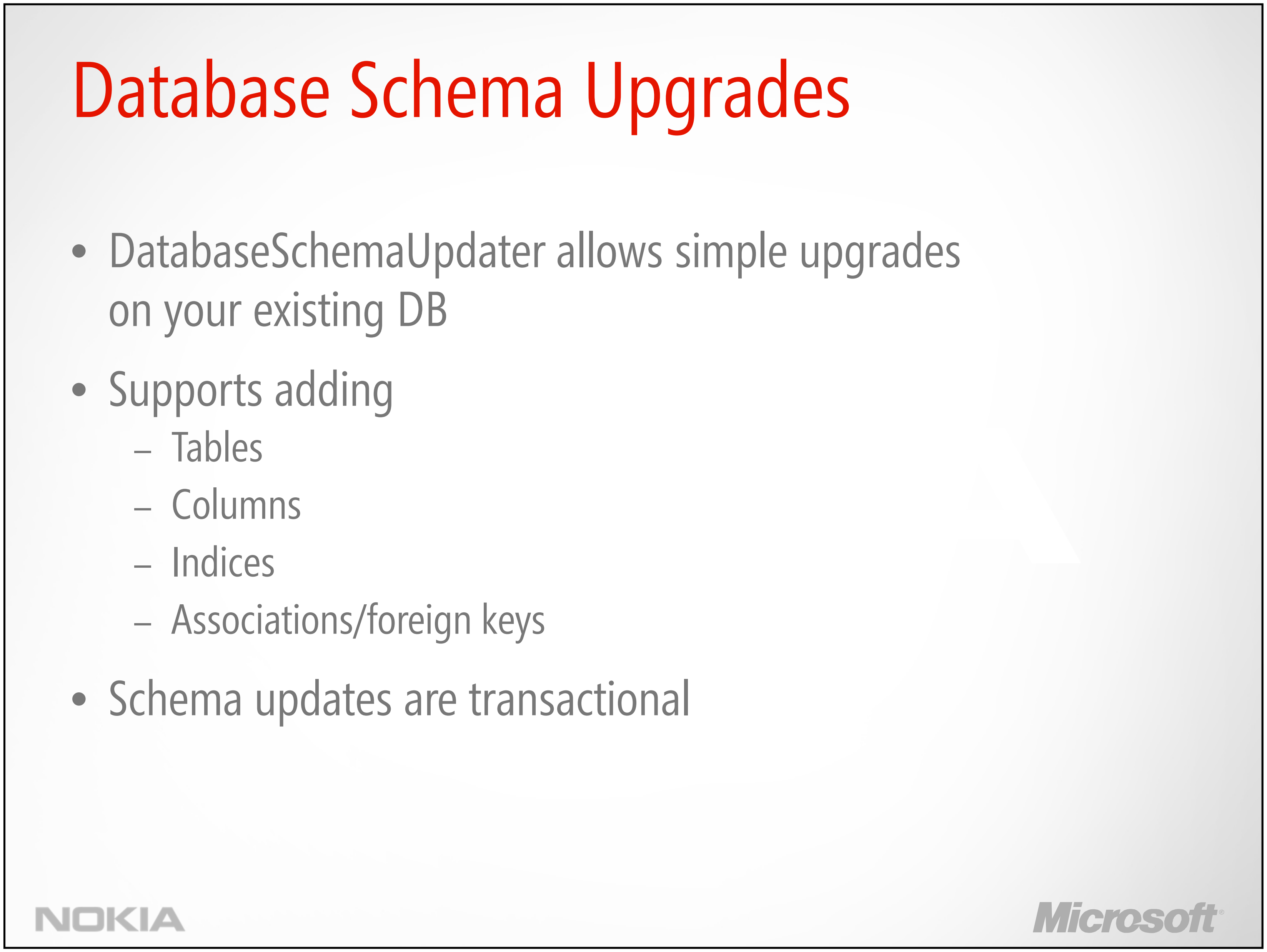
## Delete Child Objects First

```
var contactsToDelete =       from Contact c in db.Contacts
                      where c.Company == “Appamundi"
                            select c;

foreach (Contact c in contactsToDelete)
{
     db.Contacts.DeleteAllOnSubmit(c.Leads);
}

db.Contacts.DeleteAllOnSubmit(contactsToDelete);
db.SubmitChanges();
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Demo
## Entity Relationships
## Foreign Keys

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

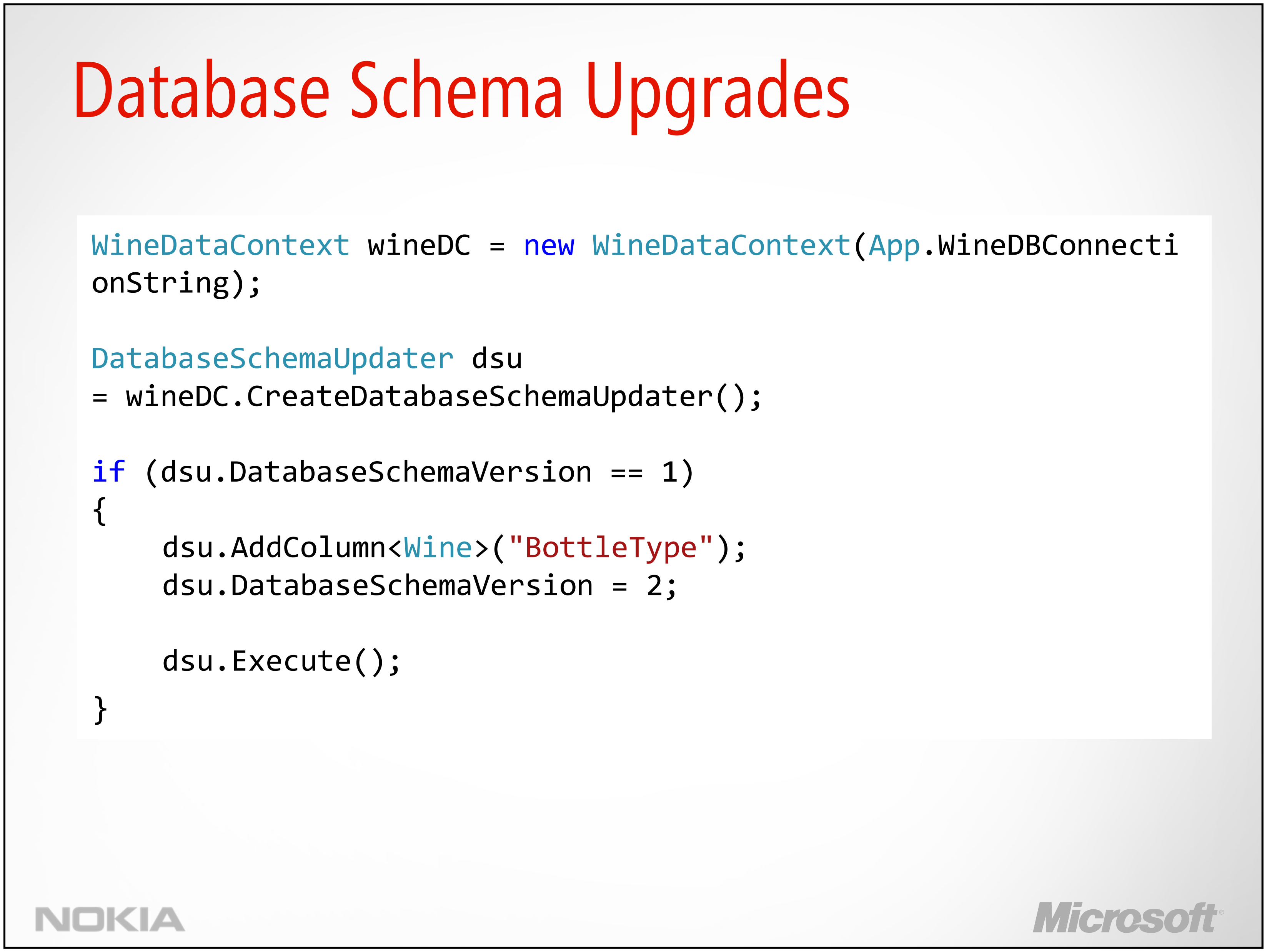


## Database Schema Upgrades

- DatabaseSchemaUpdater allows simple upgrades on your existing DB
- Supports adding
  - Tables
  - Columns
  - Indices
  - Associations/foreign keys
- Schema updates are transactional

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Published: 8/24/2011



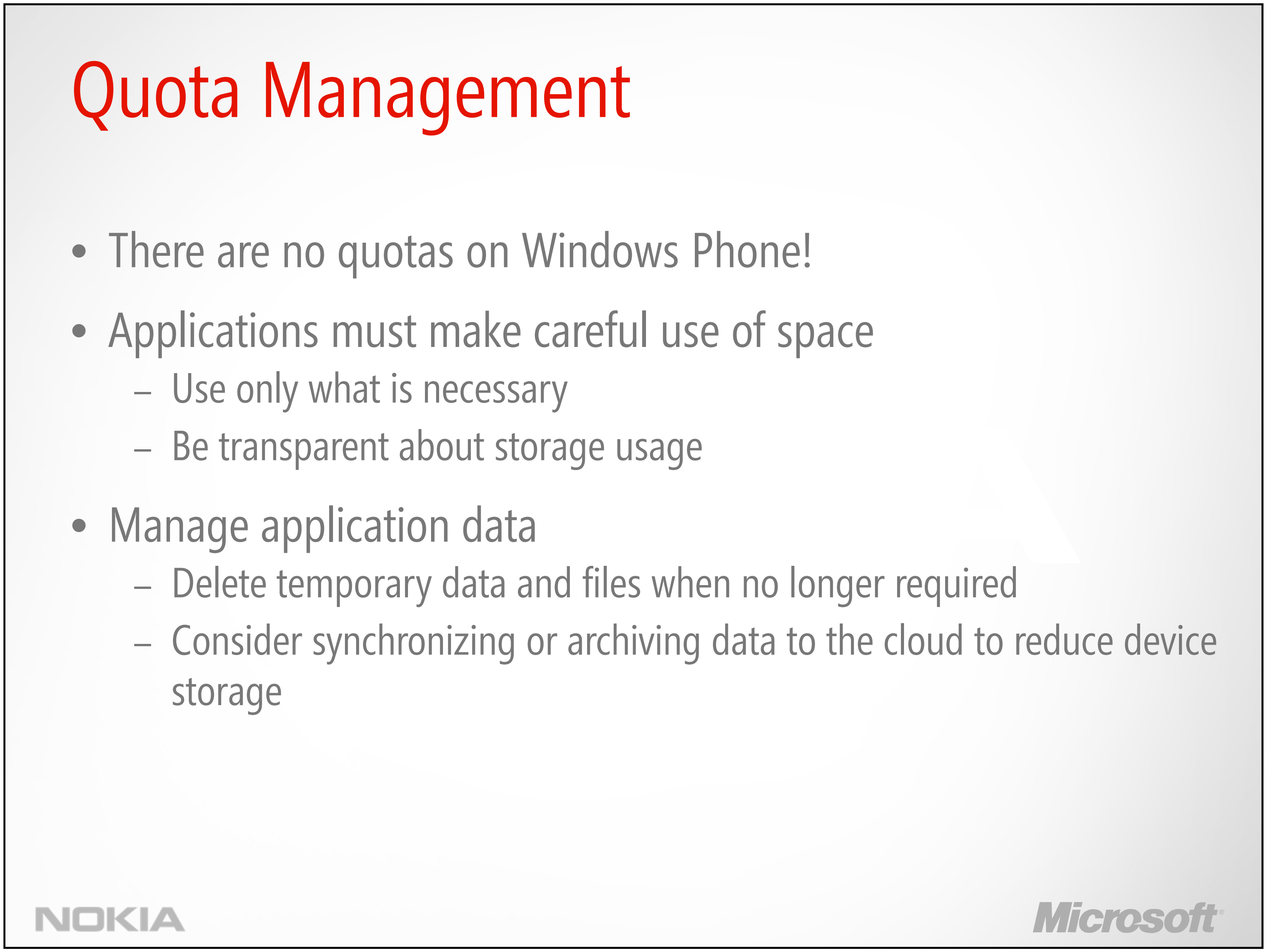
## Database Schema Upgrades

```
WineDataContext wineDC = new WineDataContext(App.WineDBConnecti
onString);

DatabaseSchemaUpdater dsu
= wineDC.CreateDatabaseSchemaUpdater();

if (dsu.DatabaseSchemaVersion == 1)
{
    dsu.AddColumn<Wine>("BottleType");
    dsu.DatabaseSchemaVersion = 2;

    dsu.Execute();
}
```

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

## Best Practices

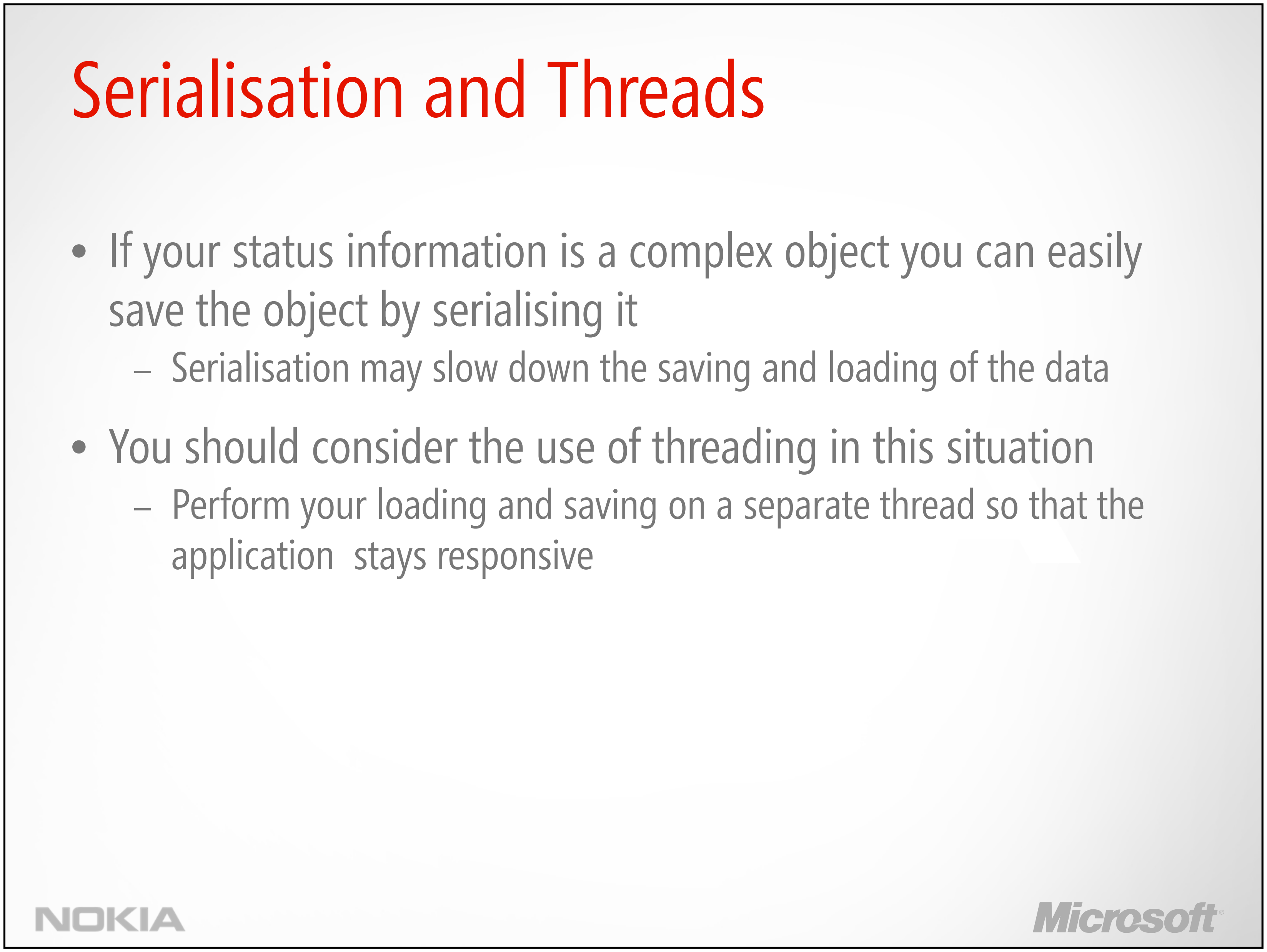
©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## Quota Management

- There are no quotas on Windows Phone!
- Applications must make careful use of space
  - Use only what is necessary
  - Be transparent about storage usage
- Manage application data
  - Delete temporary data and files when no longer required
  - Consider synchronizing or archiving data to the cloud to reduce device storage

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

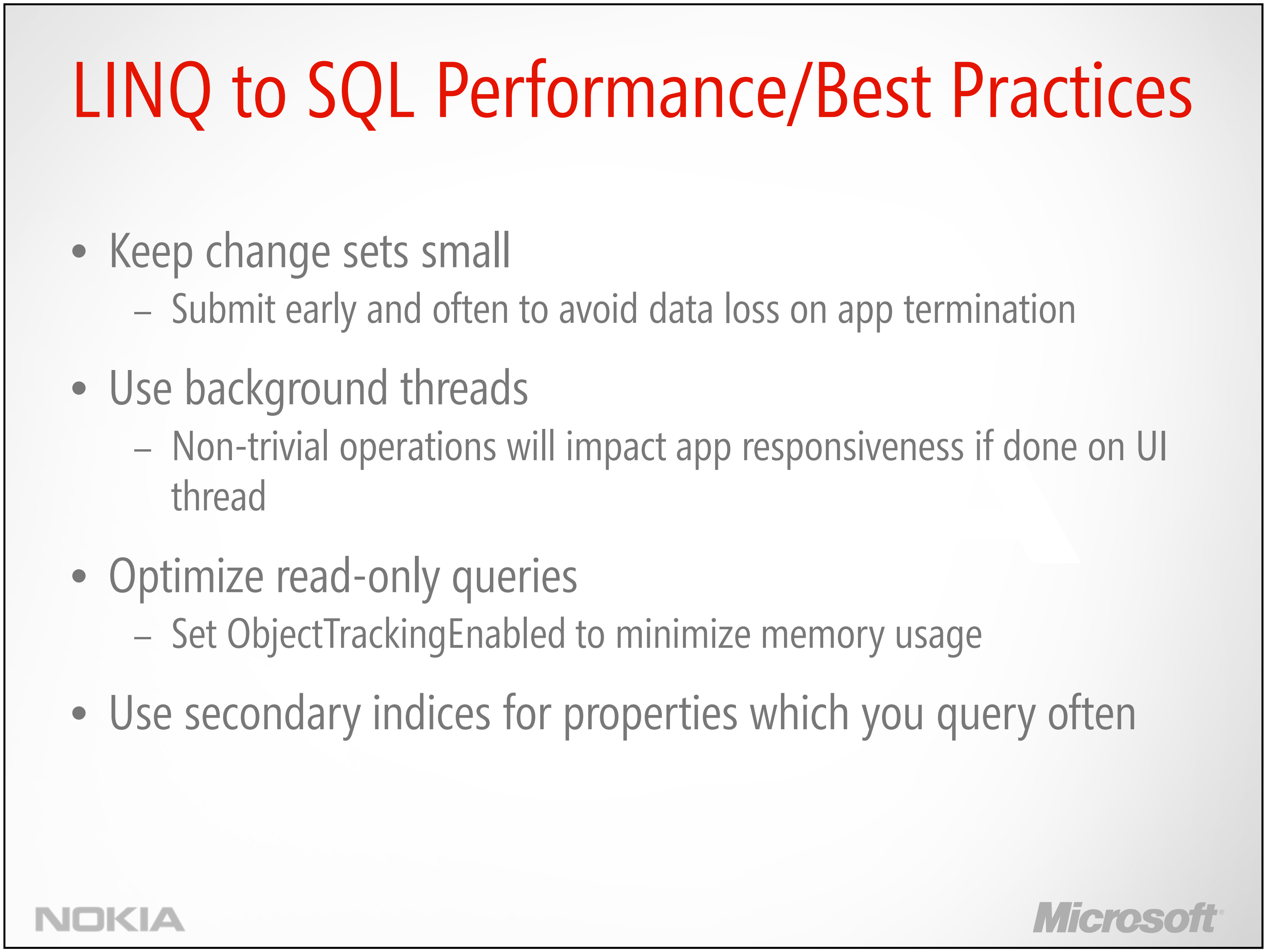


## Serialisation and Threads

- If your status information is a complex object you can easily save the object by serialising it
  - Serialisation may slow down the saving and loading of the data
- You should consider the use of threading in this situation
  - Perform your loading and saving on a separate thread so that the application stays responsive

NOKIA Microsoft

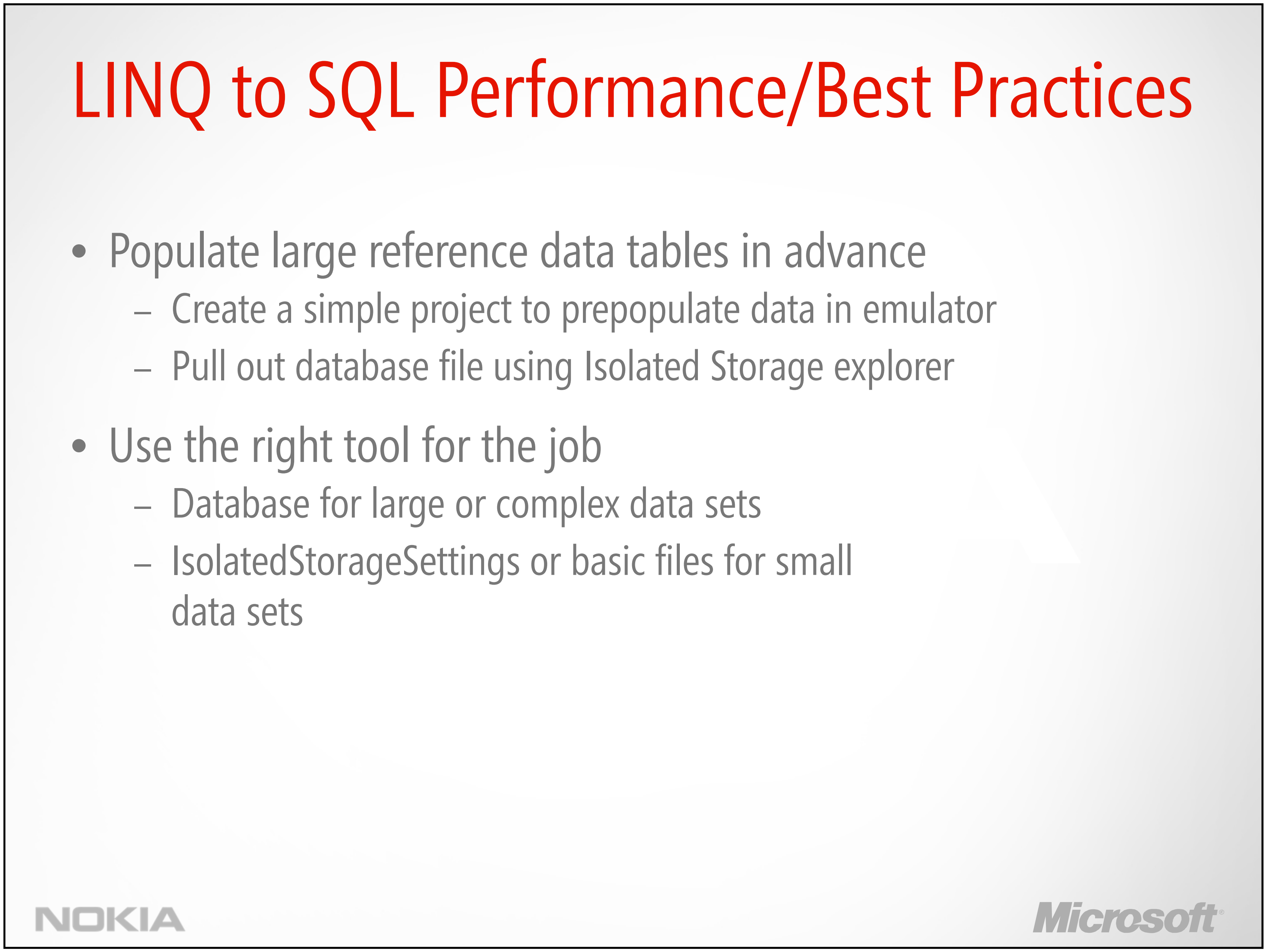
©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## LINQ to SQL Performance/Best Practices

- Keep change sets small
  - Submit early and often to avoid data loss on app termination
- Use background threads
  - Non-trivial operations will impact app responsiveness if done on UI thread
- Optimize read-only queries
  - Set ObjectTrackingEnabled to minimize memory usage
- Use secondary indices for properties which you query often

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.



## LINQ to SQL Performance/Best Practices

- Populate large reference data tables in advance
  - Create a simple project to prepopulate data in emulator
  - Pull out database file using Isolated Storage explorer
- Use the right tool for the job
  - Database for large or complex data sets
  - IsolatedStorageSettings or basic files for small data sets

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Windows® Phone

The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.

MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

© 2011 Microsoft Corporation. All rights reserved.
Microsoft, Windows, Windows Vista and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.

Microsoft®

©2011 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista, Windows Azure, Hyper-V and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries.
The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.