

## Software Developer Conference 2005

# Smart Client Offline Data Caching and Synchronization

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## About Brian

- Principal Software Architect, IDesign Inc. ([www.idesign.net](http://www.idesign.net))
- Microsoft MVP in ASP.NET
- Writing
  - MSDN Magazine, MSDN Online, The Server Side.NET, CoDe Magazine, asp.netPRO, Visual Studio Magazine
  - Data Binding in Windows Forms 2.0, Addison-Wesley, expected release fall 2005
- Speaking
  - Microsoft TechEd US, Europe, Malaysia, SDC, Visual Studio Connections, DevTeach, VSLive!, INETA Speakers Bureau
- Participate in Microsoft design reviews
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- Blog: <http://www.softinsight.com/bnoyes>



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## Agenda

- What is a Smart Client?
- Offline Operations Challenges
- Data Communications Strategies
- Connection Management
- Client Side Data Caching and Synchronization
- Offline Application Block



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## What is a Smart Client

- Rich user interface (Windows Forms)
- Connects to back-end services
- Runs securely on the client
- Supports auto-deployment and update over the network
- Supports disconnected operations



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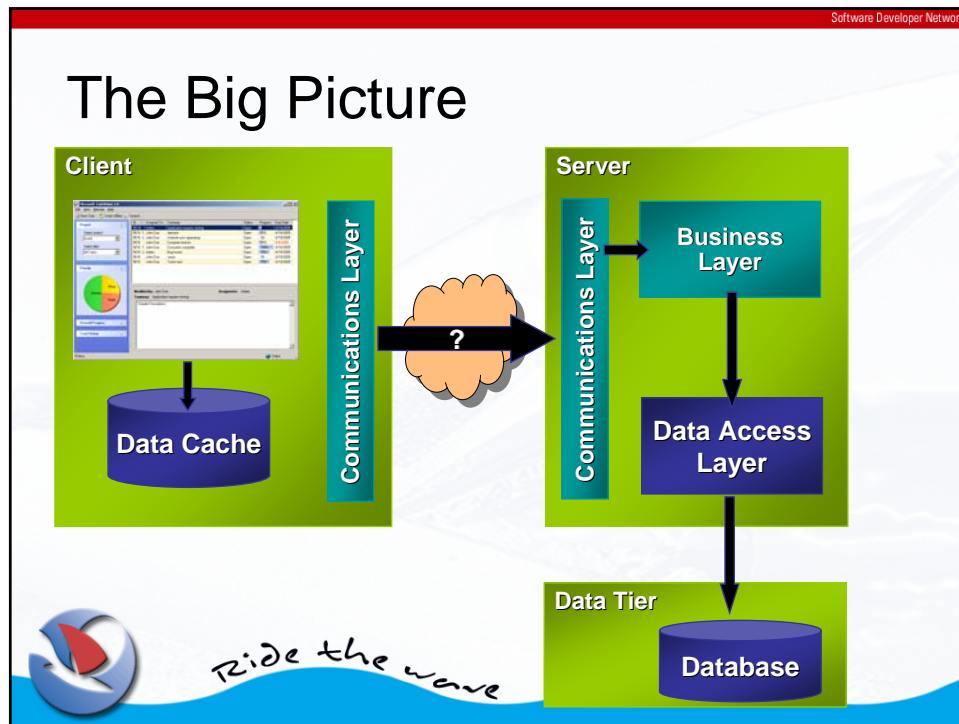
## Offline Operations

### Challenges

- Offline use case identification
- Online communications transport
- Connection management
- Client-side caching approach
- Offline data synchronization
- Security



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## Communications Strategies

- Database
- .NET Remoting
- Enterprise Services (COM+)
- MSMQ
- Web Services
- Indigo



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## Data Transfer Strategies

- Object-Oriented
  - Pass a Data Transfer Object via a method call or property
    - DataSet or custom business entity
- Service-Oriented
  - Invoke operation, passing or receiving parameters
  - Deliver message containing data
- Data-Oriented
  - Query execution / Replication / Queues



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## Connection Management

- Detect and control online vs. offline operations
  - Modify UI / Functionality
- Detection techniques
  - Try connected operation – handle failure
  - WinInet API
  - Offline Block Connection Management
  - NetworkChange/NetworkInterface classes (.NET 2.0)




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# Demo: Connection Detection

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## Client Data Caching

- Memory
- Saved Data Transfer Object
- Database
  - MSDE, SQL Express, SQL Mobile
- Message Queues
  - MSMQ
  - Database
    - Custom, SQL Service Broker
  - Enterprise Services




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## Data Synchronization

- Reference data vs. operational data
- Data oriented
  - Merge replication
- Service oriented
  - Remote method invocation
  - Message delivery
    - Confirmation return message
    - Poll for completion



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# Data Synchronization

- Concurrency resolution
  - ADO.NET detection / exception propagation
  - Distributed transactions
    - Enterprise Services
    - Indigo



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demo

## Demo: Client Data Caching and Synchronization Options

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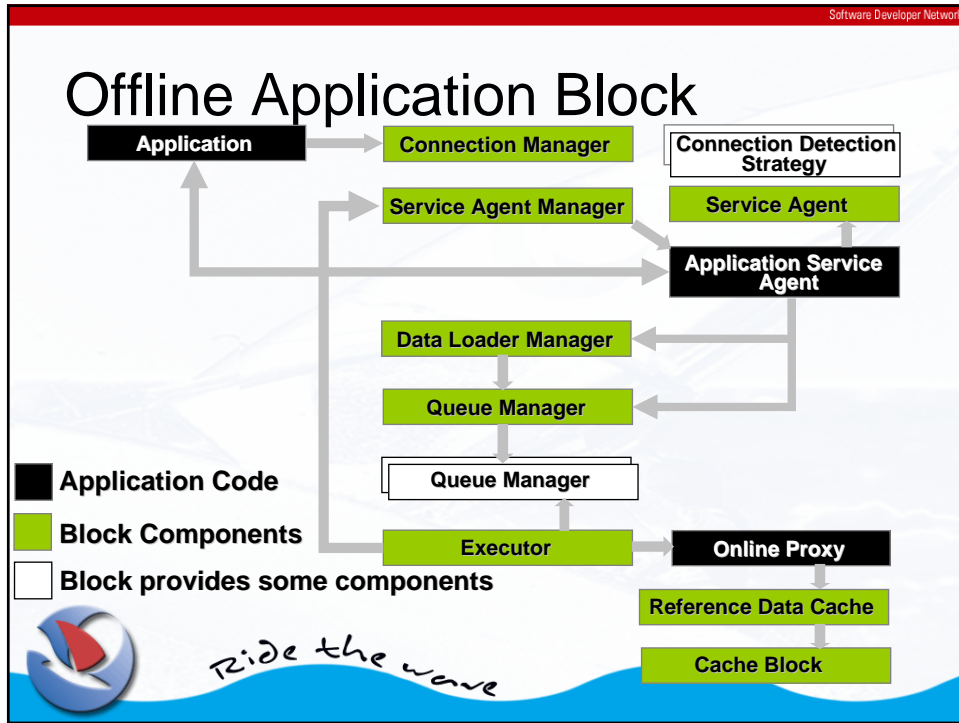
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## Offline Application Block

- Connection State Detection / Control
- Download / Upload Data
- Queued data requests
- Reference Data Caching
- Asynchronous request processing
- Encryption / signing of stored data
- Provider model for connection detection, data request queuing, data caching, service agents



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## Demo: Offline Application Block Client


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## Summary

- Design for disconnected operations early
  - Identify offline use cases
  - Pick data communications technology
  - Select caching and synchronization mechanism
- Prefer decoupled, service oriented approaches for enterprise applications
- Simplest option: Isolated Storage caching of DataSets passed through Web Services
- Explore the Offline Application Block for maximum flexibility
- Email: [brian.noyes@idesign.net](mailto:brian.noyes@idesign.net)
- Blog: <http://www.softinsight.com/bnoyes>



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## Resources

**COM and .NET Component Services, Juval Lowy, O'Reilly & Assoc:**  
<http://www.oreilly.com/catalog/comdotnetsvs/>

**Smart Client Architecture and Design Guide:**  
<http://www.msdn.microsoft.com/smartclient/default.aspx?pull=/library/en-us/dnpag/html/scag.asp>

**Smart Client Offline Application Block:**  
<http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnpag/html/offline.asp>

**SQL Express:** <http://msdn.microsoft.com/express/sql/>

