Smart Client Offline Data Caching and Synchronization

Brian Noyes
Principal Software Architect
IDesign, Inc.
www.idesign.net

Agenda

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

Agenda

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

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

The Big Picture
Agenda

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

Communications Strategies

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

---

Agenda

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

Connection Detection

Brian Noyes
IDesign, Inc.
www.idesign.net
Agenda

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

Client Data Caching

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

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

Data Synchronization

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

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

Client Data Caching and Synchronization Options

Brian Noyes
IDesign, Inc.
www.idesign.net
Agenda

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

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
Offline Application Block

Offline Application Block Client

Brian Noyes
IDesign, Inc.
www.idesign.net
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
Blog: http://www.softinsight.com/bnoyes

Resources

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

Smart Client Architecture and Design Guide:

Smart Client Offline Application Block:

SQL Express: http://msdn.microsoft.com/express/sql/