ArcGIS Mobile SDK

Best Practices

Jeff Shaner and Mike Shaw

Presentation outline

- Overview
  - Positioning ArcGIS Mobile
  - Mobile Architecture
  - ArcGIS Mobile Workflow
- Best Practices
  - General Coding Considerations
  - Working with Maps
  - Working with GPS
  - Editing Map Data
  - Fusing Data Using Web Services
- Future Direction for SDK

ArcGIS Mobile Positioning

ArcGIS Mobile SDK

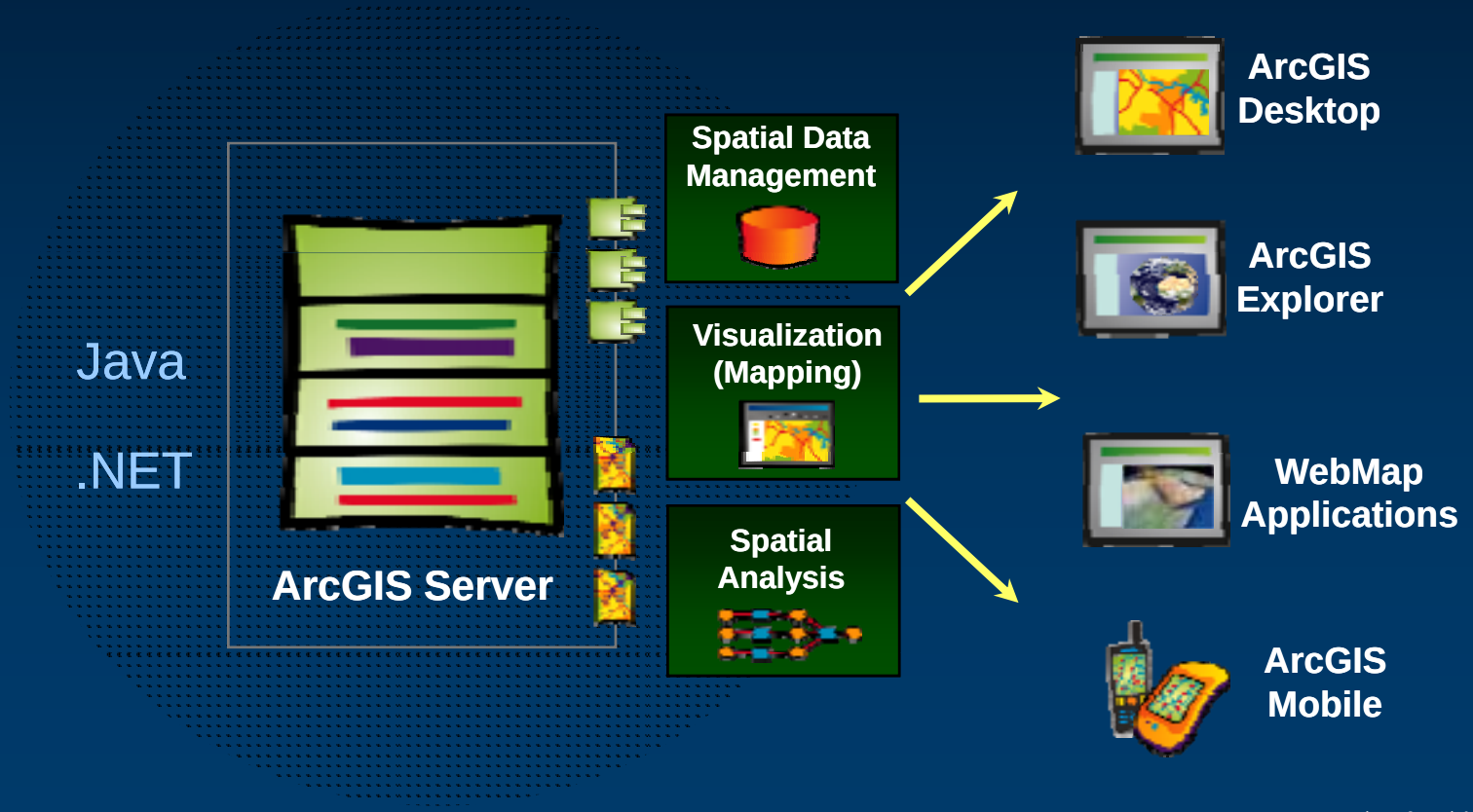
- An ArcGIS Server developer solution for mobile applications
- An SDK that ships with ArcGIS Server for building Mobile applications.
- A Suite of .NET Components for developing custom server-centric lightweight mobile applications

ArcGIS Mobile SDK

- Supports field workflows
  - Data viewing
  - Feature inspection
  - Basic data collection
- Direct synchronization with ArcGIS Server
- Connected and disconnected environments
- Windows Mobile and Desktop platforms

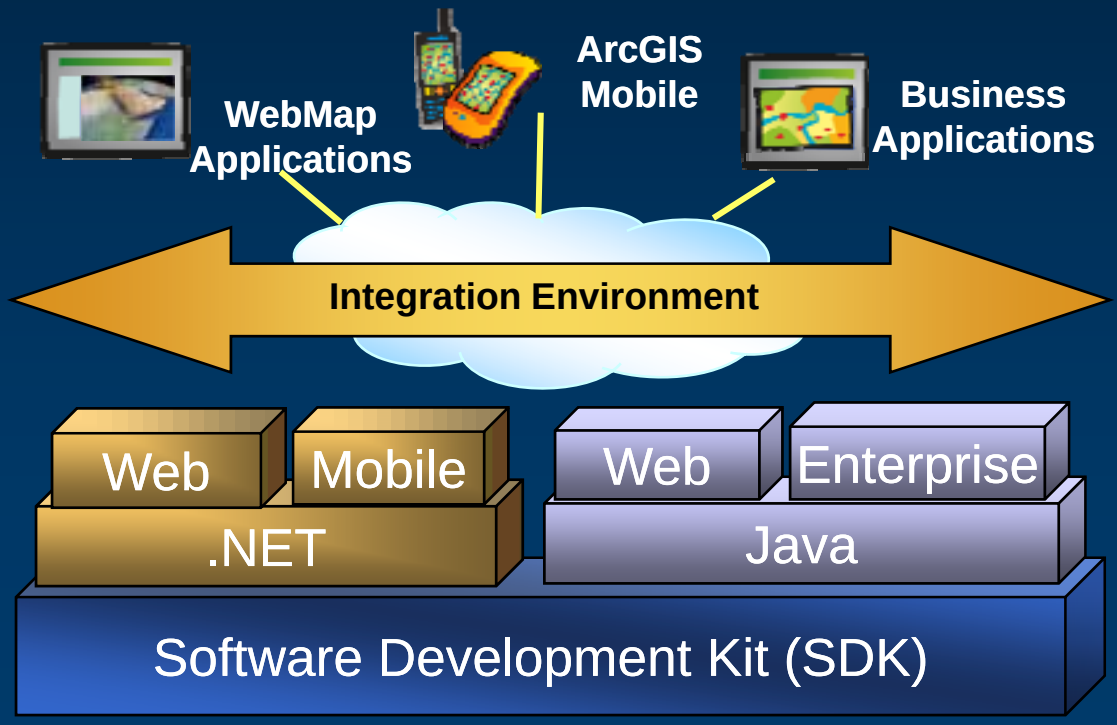
ArcGIS Server 9.2

- Complete & Integrated server-based GIS
- Out-of-the-box applications and services
- Rich developer opportunities



ArcGIS Server 9.2: Software Development Kit

- Build and deploy web & enterprise geospatial applications and services
- Productivity boost with out-of-the-box IDE integration
- Software Development Kit (SDK) includes :
  - .NET components
    - Web ADF
    - Mobile ADF
  - Java components
    - Web ADF
    - Enterprise ADF

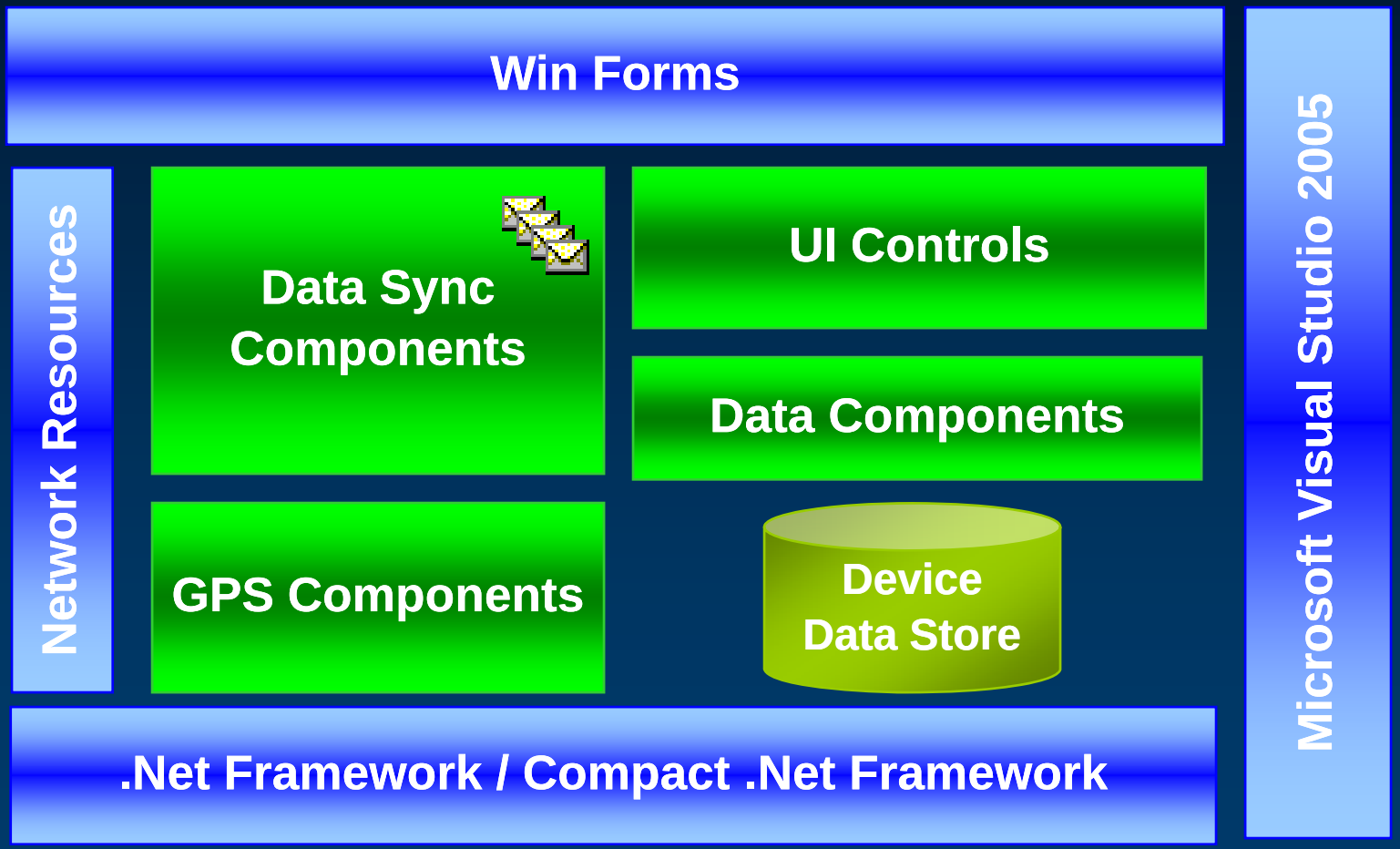


ArcGIS Mobile Architecture

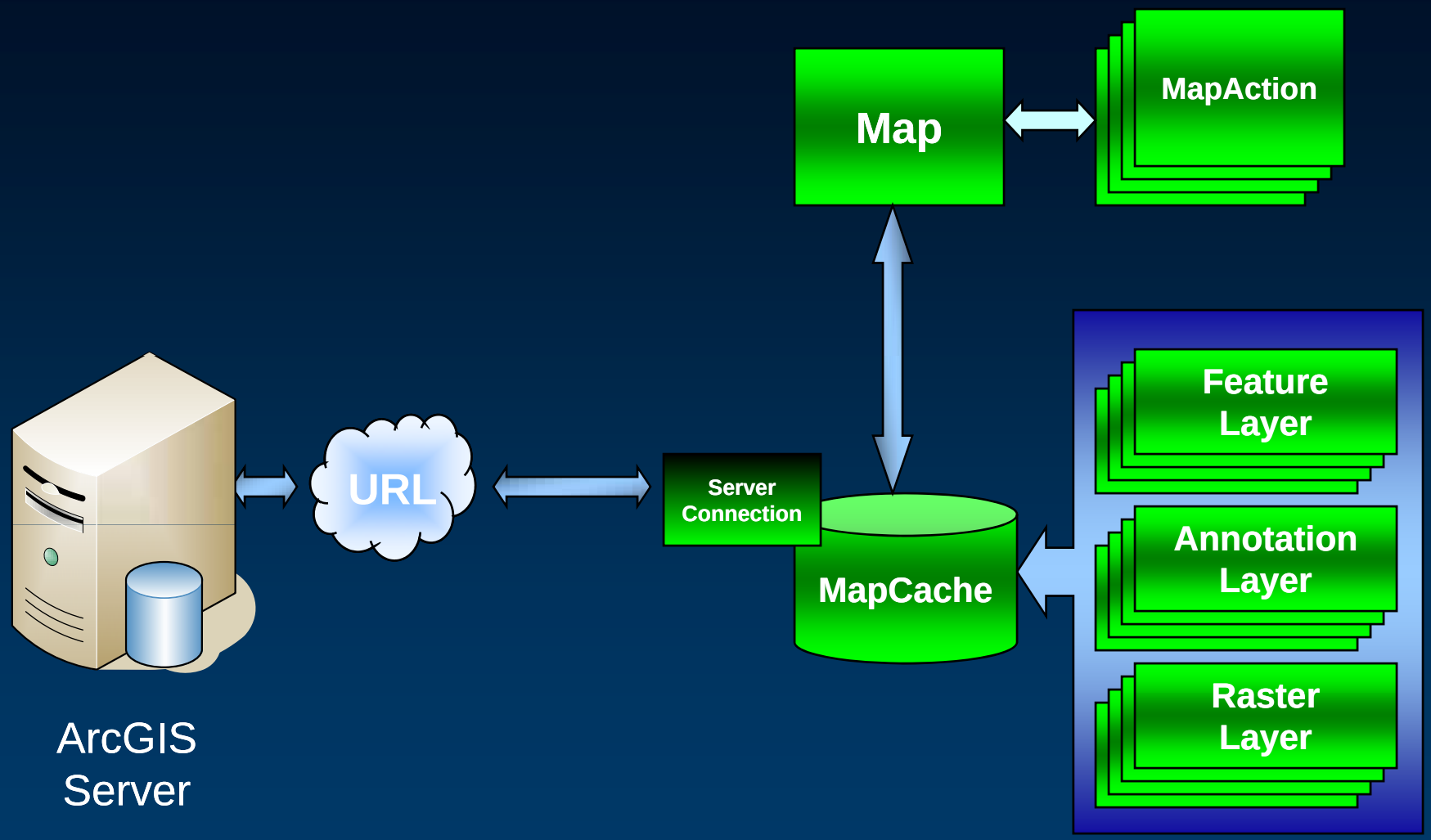
ArcGIS Mobile SDK : Features Overview

- Suite of .NET Mobile GIS components
- Support multiple connectivity scenarios
- Full Support of Geodatabase Transaction Model
- Leverage Visual Studio 2005 WinForms
- Small footprint and high performance
- Comprehensive developer help
  - Visual Studio integration
  - Walkthrough, Samples
  - Online documentation

ArcGIS Mobile SDK:
Seamless Microsoft Visual Studio Integration



ArcGIS Mobile SDK: Core components



ArcGIS Mobile SDK: Target Platforms

- Microsoft .NET/.NET Compact Framework 2.0
- Windows Mobile 5.0
  - PocketPC
  - SmartPhone
- Windows Mobile for Pocket PC 2003, 2003 SE
- Windows CE 5.0
- Windows XP

ArcGIS Mobile SDK: Prerequisites

- Visual Studio 2005
  - C# or VB.NET
- Familiarity with
  - .NET Framework 2.0/.NET Compact Framework 2.0
- Windows Mobile 5.0 SDKs (Pocket PC/Smartphone)
- Active Sync 4.1 or higher installed
- Thorough understanding of ADO.Net concepts
- Access to mobile devices to test deployment
- Access to GPS devices
- Device Security
- Familiarity with ArcGIS Server

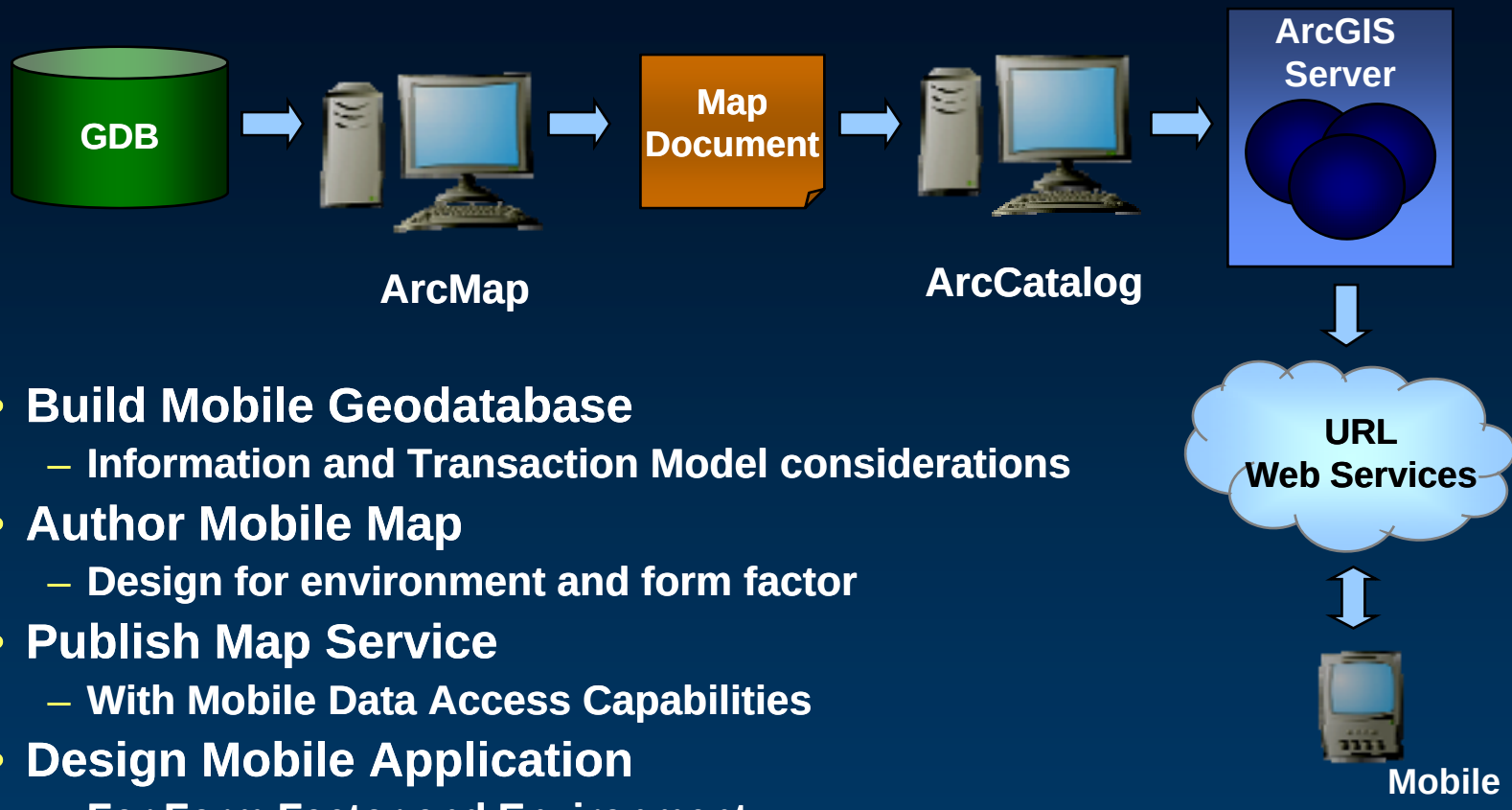
.NET Compact Framework considerations

- It’s a subset of .Net Framework
- Optimized for Smart Devices
- Not everything works the same
- Read the documentation

- You should use Visual Studio Emulators to develop, actual devices to test and deploy

ArcGIS Mobile Workflow

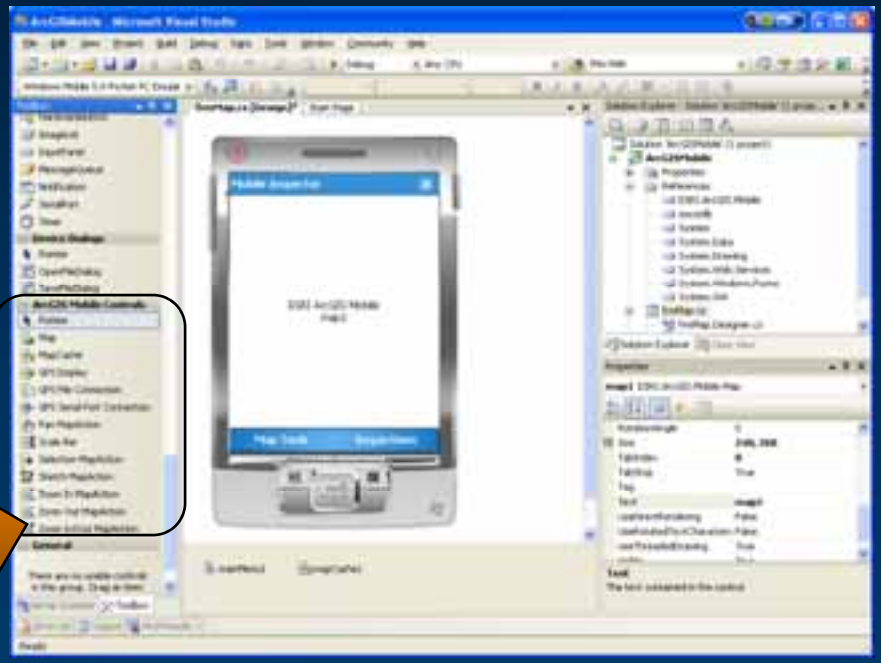
ArcGIS Mobile workflow



- Build Mobile Geodatabase
  - Information and Transaction Model considerations
- Author Mobile Map
  - Design for environment and form factor
- Publish Map Service
  - With Mobile Data Access Capabilities
- Design Mobile Application
  - For Form Factor and Environment
- Deploy Mobile Solution
  - Provision devices
- Synchronize Mobile GIS solution
  - Consider bandwidth and battery

Design Mobile Application

- Mobile SDK installed as part of ArcGIS Server
- Use Visual Studio 2005:
  - Windows Mobile 5.0 for Pocket PC
  - Pocket PC 2003
  - Windows Mobile 5.0 for Smartphone
  - Tablets and Notebooks (Windows XP)
- IDE Integration
- Build Simple and focused user interfaces
- Develop for function and form factor



ArcGIS Mobile Components

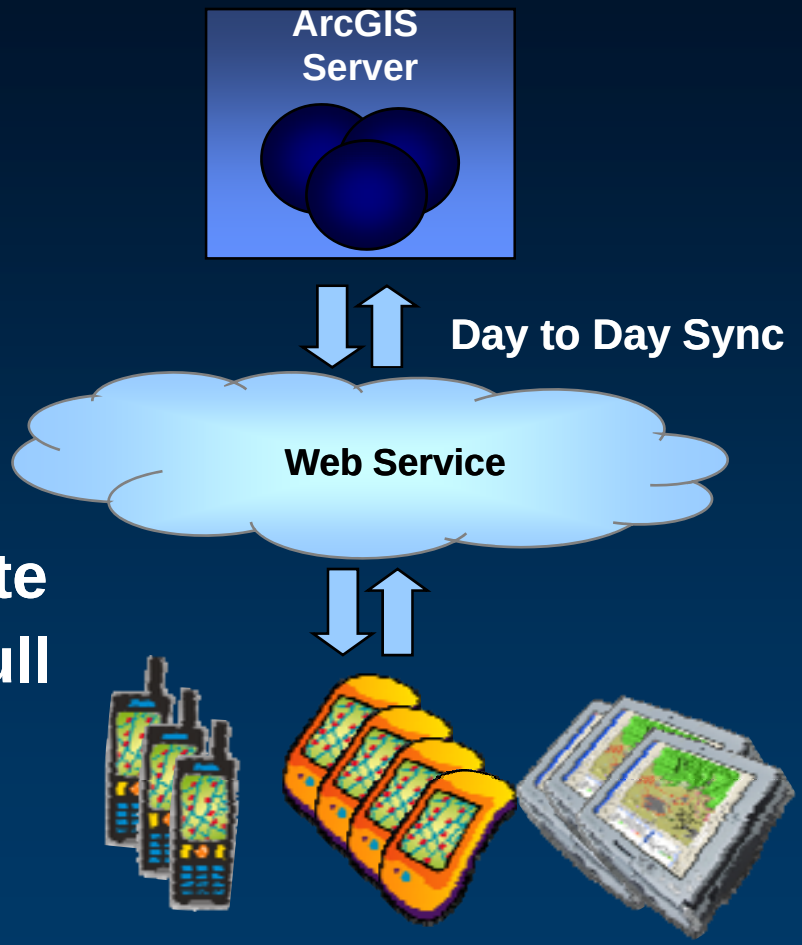
Deploy Mobile Solution

- Design your Mobile Application
- Integrate with existing solutions
- Generate initial client data
- Secure server and client data
- Deploy to devices

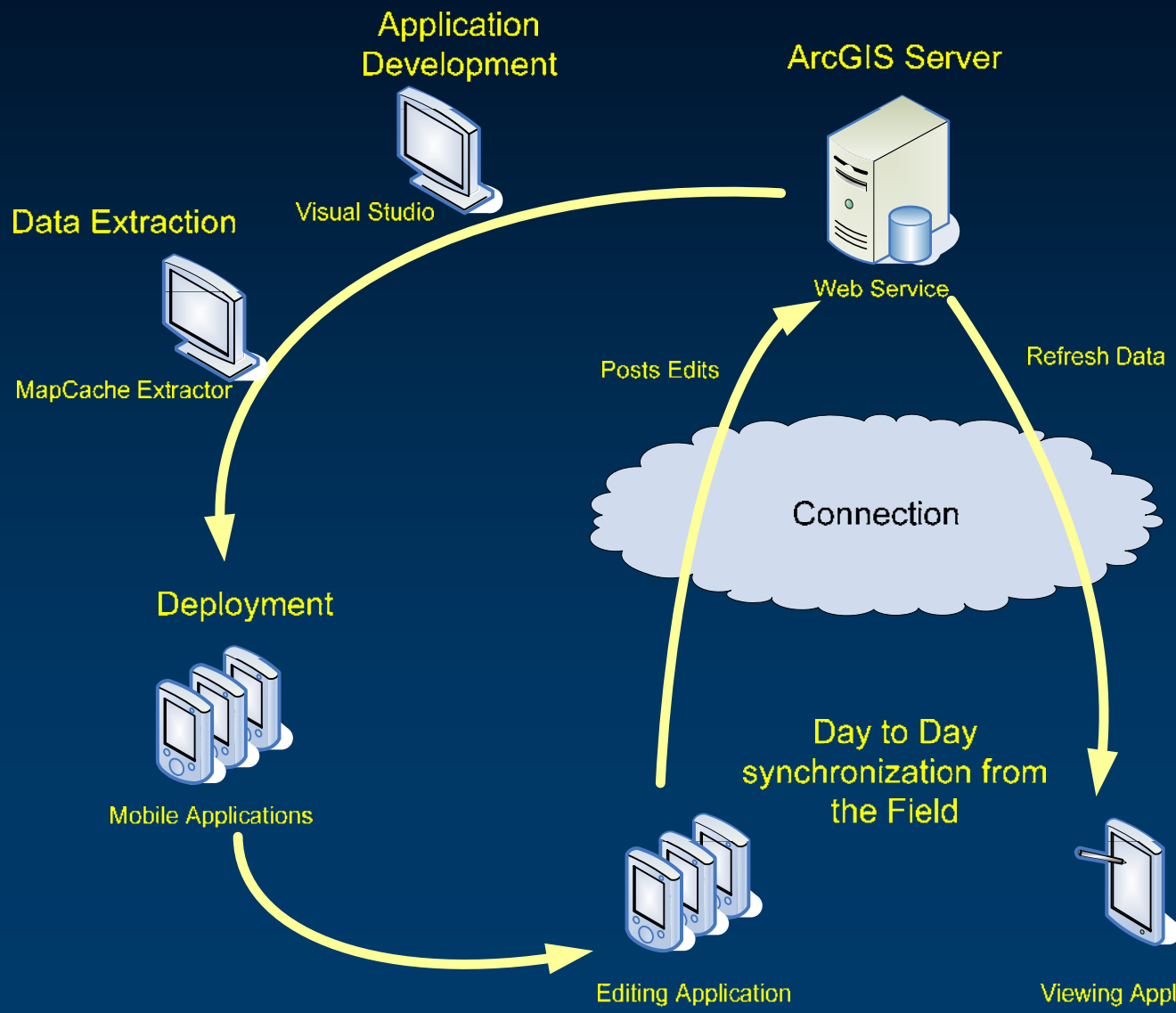
Synchronize Mobile GIS Solution

Application:

- **Takes responsibility for managing the sync process**
- **Pushes and pulls new and updated features**
- **Leverages spatial and attribute queries to optimize feature pull from the Server**



ArcGIS Mobile:
Application and Data Deployment



Best Practices

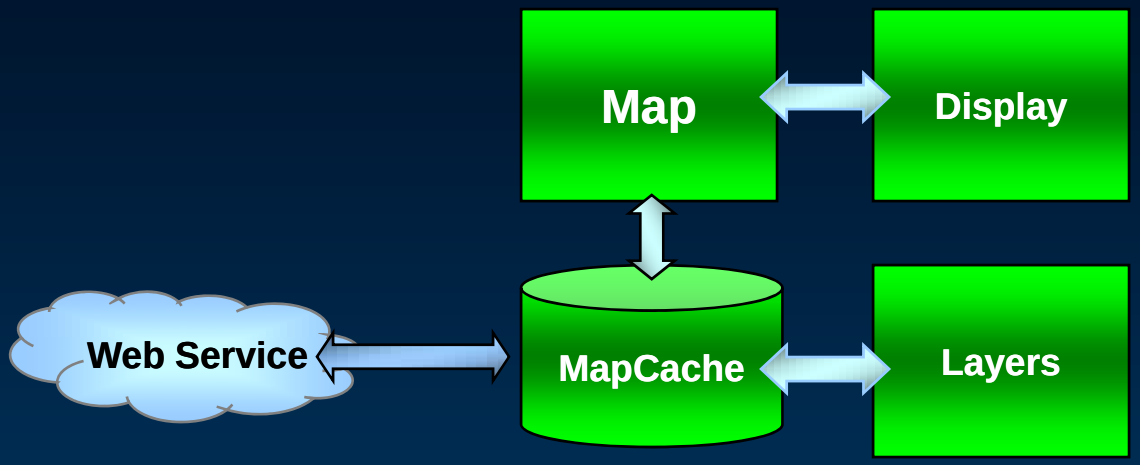
Mike

General Coding Guidelines

- Multiple threaded environment
  - Use BeginInvoke to push arguments to the UI
- Dispose of objects that implement IDisposable
  - Wrap inside using block
- Use try … catch blocks where appropriate
- Employ defensive coding practices
- Menu vs. Tool considerations

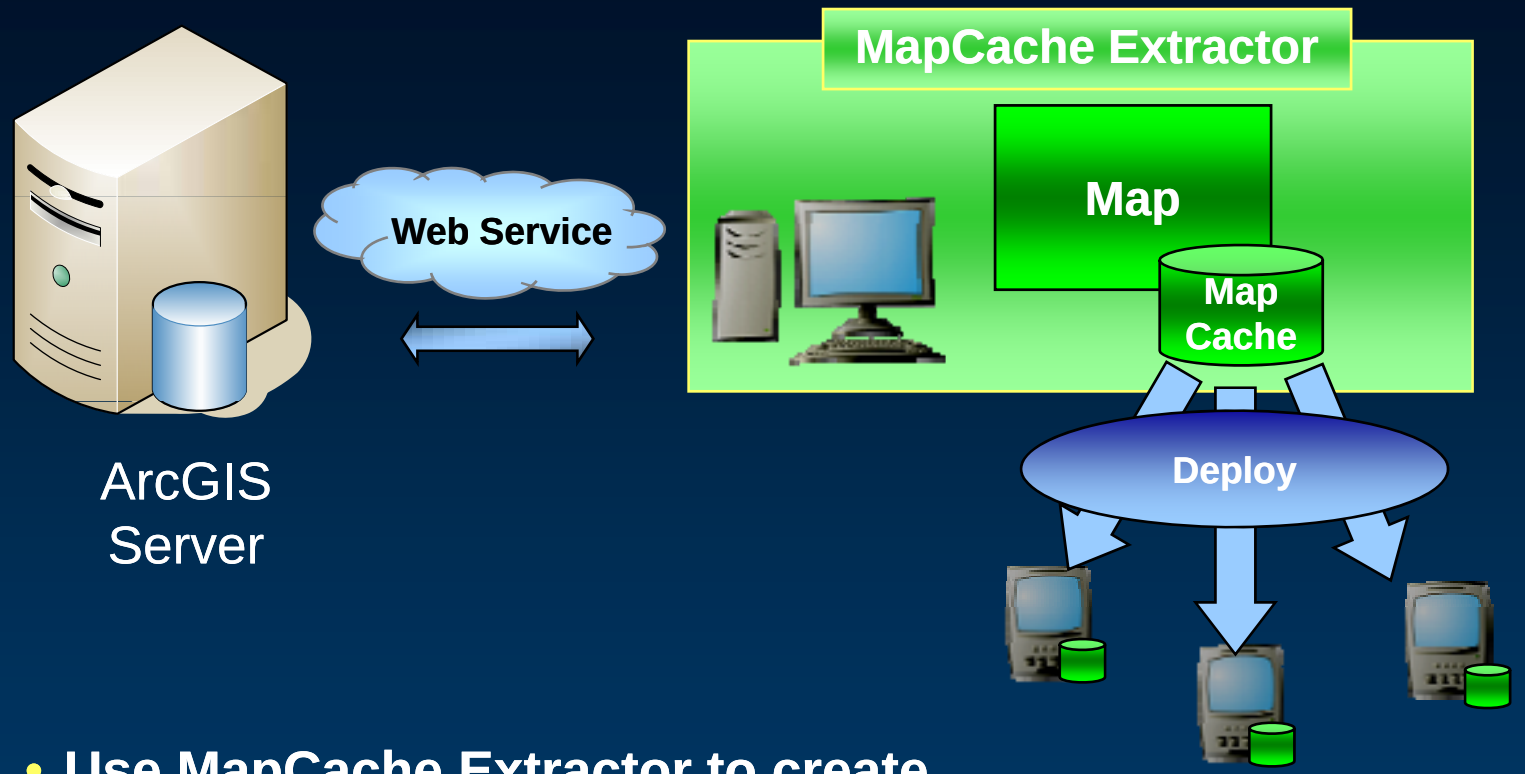
Best Practices – Working With Maps

Maps and the Map Cache



- Map component draws data from the map cache (threaded drawing)
- Map Cache stores map data on device.
- Map Cache component synchronizes updates with Server.
- Map supports markup/graphics on Display
- Map supports drawing of custom layers
- Map rotation supported

ArcGIS Mobile: Data Extraction



- **Use MapCache Extractor to create Map Caches on your Desktop**
- **Data synchronization is expensive! Provision mobile devices when they are in the office**

Synchronize Tips

- **Use Request_Completed event to monitor synchronization requests**
- ***Use the State and Notifications Broker API and be smart about how connected you are…***
  Microsoft.WindowsMobile.Status

Best Practices – Working With Maps

The Simple Demo (Jeff)

Demo Summary: Working With Maps

IDE Integration

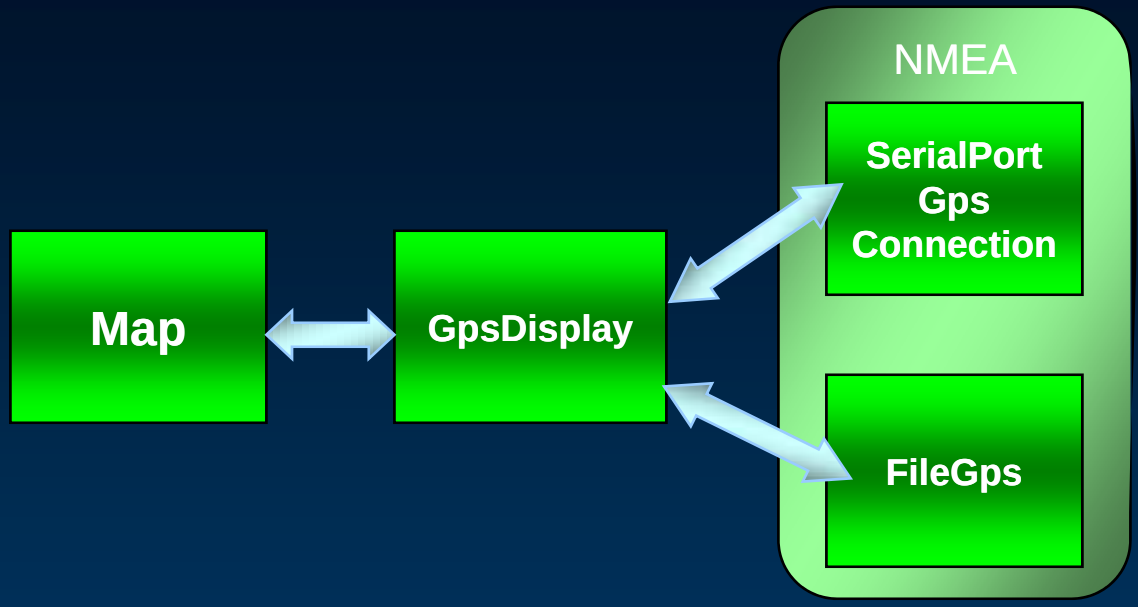
- Toolbox components with design time properties
- MapAction components encapsulate core tools – write less code!

Maps

- Map data drawn from local map cache
- MapCache component manages synchronization with the server
- Drawing is multi-threaded, UI is responsive!
- Use MapCache::Request_Completed event!

Best Practices – Working With GPS

GPS Components



- NMEA GPS implementation
- Smart GPS Map display
- Interface with Serial and File GPS
- Fires events with GPS positions for use in your custom tools

Best Practices – Working With GPS

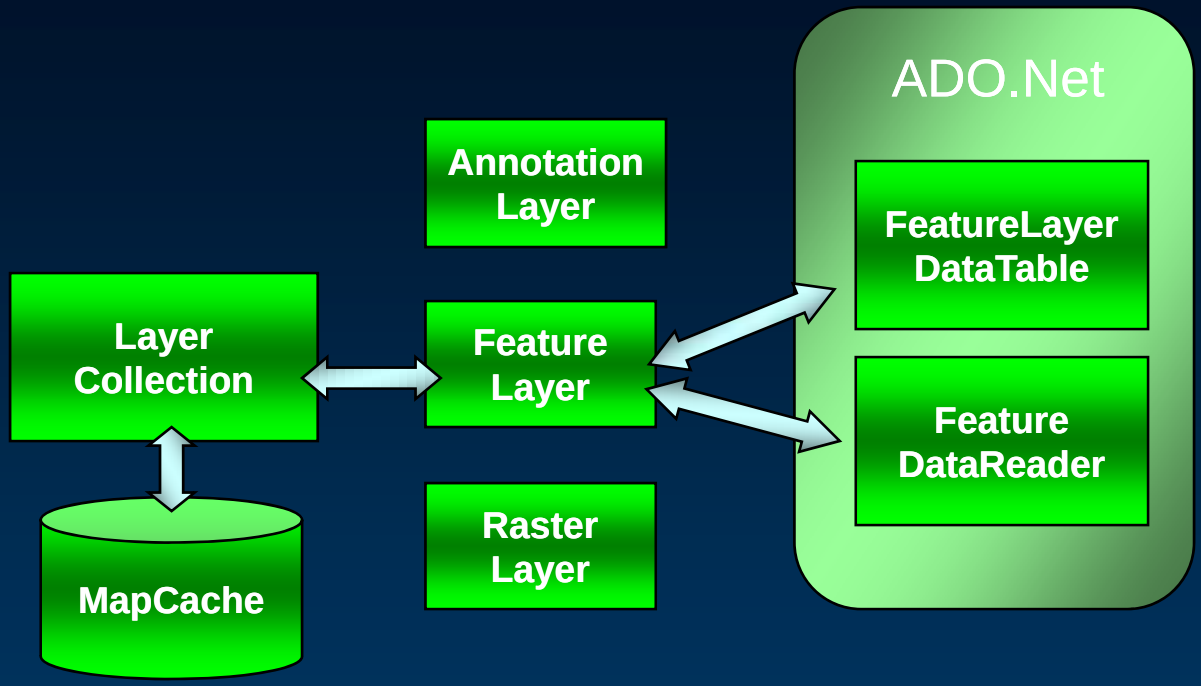
GPS Made Easy Demo (Jeff)

Demo Summary: GPS

- GPS Display component does all the work!
- GPS Serial Port or File connection used with GPS device or log file
- GPSEventArgs provides rich content parsed from NMEA sentences

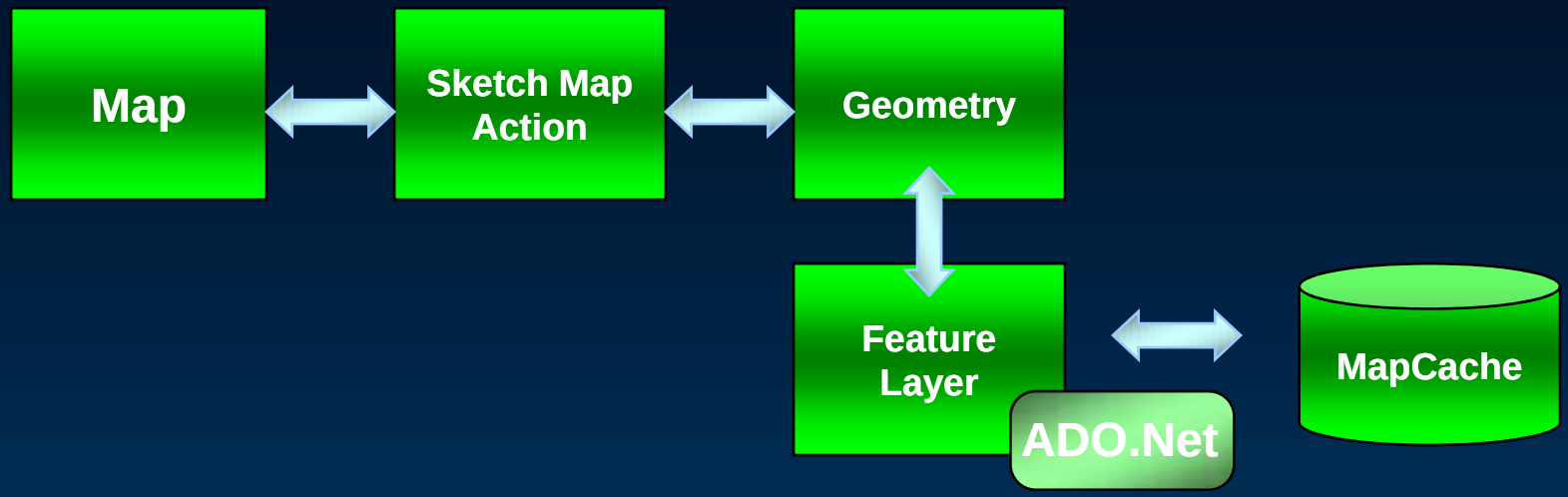
Best Practices – Editing Map Data

ADO.Net Integration



- Leverage ADO for:
  - Spatial and Attribute Queries
- Queries are executed against local data
- Data loaded into:
  - FeatureLayerDataTable (ADO DataTable) *Forward and Backward
  - FeatureDataReader (ADO IDataReader) *Forward only, faster
- Supports updates

Editing Features



- Edits can be performed regardless of connection status

- Geometry edits
  - Sketch Map Action and Components
  - Points, lines and polygon supported
- Attributes editing
  - ADO.Net components
- Snapping
  - Feature layers only

Best Practices – Editing Map Data

Data Collection Demo (Mike)

Demo Summary: ESRI Construction

- Create your own geometries and store them as features in the cache
  - SketchMapAction component
    - AddVertex(), DeleteVertex()
    - FinishSketch()
    - MapActionCompleted()
- Select features and update their attributes
  - Modify feature geometry
  - Update feature attributes
  - SelectionMapAction component
    - SelectionLayers()
    - SelctionType
    - GeometricRelationship
    - MapActionCompleted()
- Synchronize Edits with the Server

Best Practices – Fusing Data Using Web Services

Custom Layers

- Provide ability to fuse data into the map
  - Data sources other than ArcGIS Server
- Data does not reside inside the local cache.
- Provides framework to read and draw your data
- Examples:
  - Dynamic Data (Real time traffic, GeoRSS, etc)
  - Web Services Data (Virtual Earth basemap, ArcWebServices POI)
  - ArcGIS Server Web Services (Geoprocessing, Network, etc)

Best Practices – Fusing Data Using Web Services

Real-Time Feed Demo

Demo Summary: Real-Time Traffic

- Uses Webservice to request real-time traffic data
- Employs Custom Layer
  - Data Storage outside the cache
  - Over-ride Draw()
  - Add to Map.MapLayers()
- User defined symbology

Future Direction

- Improve how to work with large BaseMaps
  - Vector and Raster
- Improve Editing Components
  - Add Sketch Components for Smartphone
  - Add GPS as an input method for Sketch
- Add a MapGraphicsLayer
  - Always draws on top of the map
- Add Web Services security
  - Token-based security

Questions?

ArcGIS Mobile is easy…

Further questions?

- TECH-TALK AREAS
  - What: Further opportunity to discuss questions and concerns with presenters and subject matter experts
  - Where: Community Center
  - When: during the next 30 minutes
- ESRI Showcase
- Meet the Mobile team
  - Wednesday at 11:30 (Community Center – Oasis 3)
- ESRI Developers Network (EDN) website
  - http://edn.esri.com