SYBASE
TECHWAVE
SYMPOSIUM 2009

Getting Started with MobiLink in SQL Anywhere 11

Introduction to MobiLink Synchronization

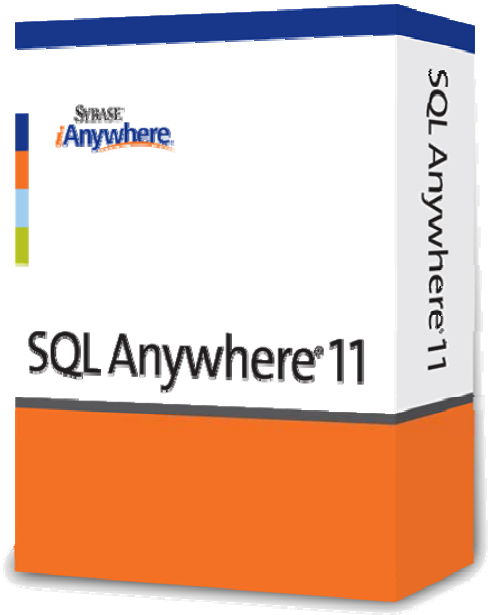
Joshua Savill

Product Manager

August 27th, 2009

AGENDA

- Introduction to SQL Anywhere 11 components
- Explanation of how MobiLink works
- Synchronization demo using a Synchronization Model



SYBASE TECHWAVE SYMPOSIUM 2009

PRESENTATION GOALS

- Provide an understanding of distributed data environments
- Outline some of the requirements and caveats for synchronization of data across distributed environments
- Demonstrate the development tools available with SQL Anywhere to mobilize a database using MobiLink

WHAT IS SQL ANYWHERE?

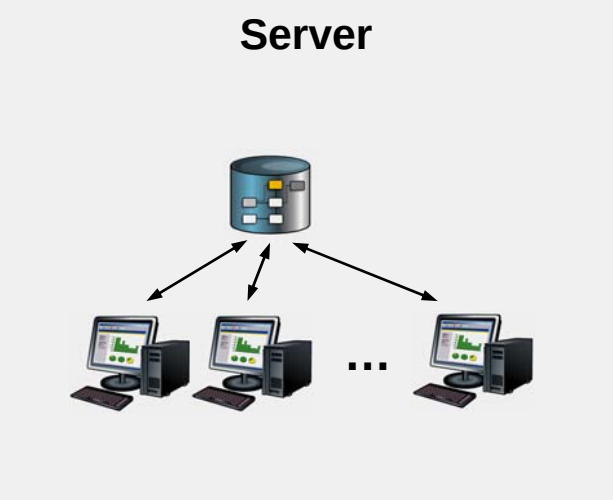
- Components
  - Data management
    - SQL Anywhere database server
    - UltraLite/UltraLiteJ
  - Data exchange
    - MobiLink
    - QAnywhere
    - SQL Remote
  - Design and management tools

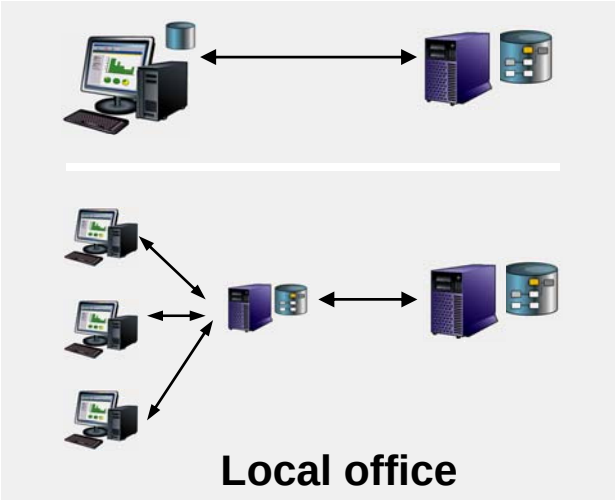
"Leading database server and enterprise synchronization solution, enabling rapid development and deployment of database-powered applications across desktop, server, mobile and remote office environments."

SYBASE TECHWAVE SYMPOSIUM 2009

OUTSIDE THE DATA CENTER

SQL Anywhere 11 – Usage Scenarios



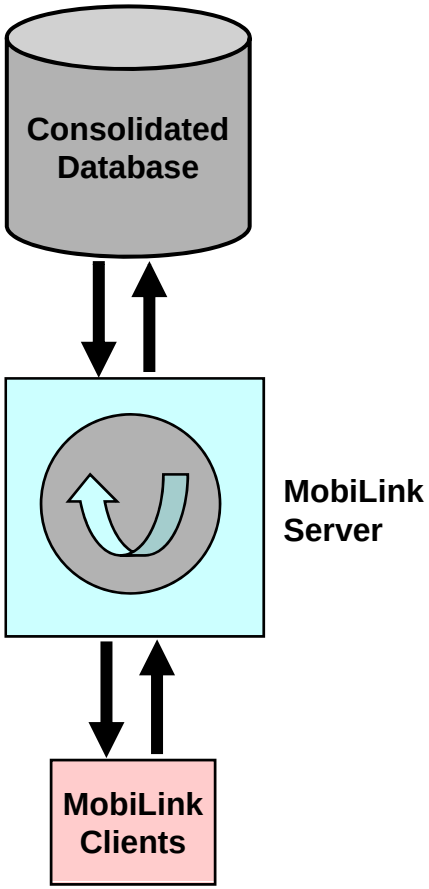


- Small and medium enterprise
  - Accounting
  - Administration
- Solution packages
  - Phone systems
  - Point of sale
- Local office
  - Store management
  - Inventory control
- Mobile
  - Traveling sales
  - Field service worker
  - Inspector

SYBASE TECHWAVE SYMPOSIUM 2009

MOBILINK SYNCHRONIZATION

- Data synchronization
  - Exchanging data
- Connecting
  - "Remote database"
    - UltraLite, UltraLiteJ, or SQL Anywhere
  - "Consolidated database"
    - SQL Anywhere
    - Sybase ASE
    - Oracle
    - Microsoft SQL Server
    - IBM DB2 UDB LUW (Linux, Unix, Windows)
    - IBM Mainframe
    - MySQL



SYBASE TECHWAVE SYMPOSIUM 2009

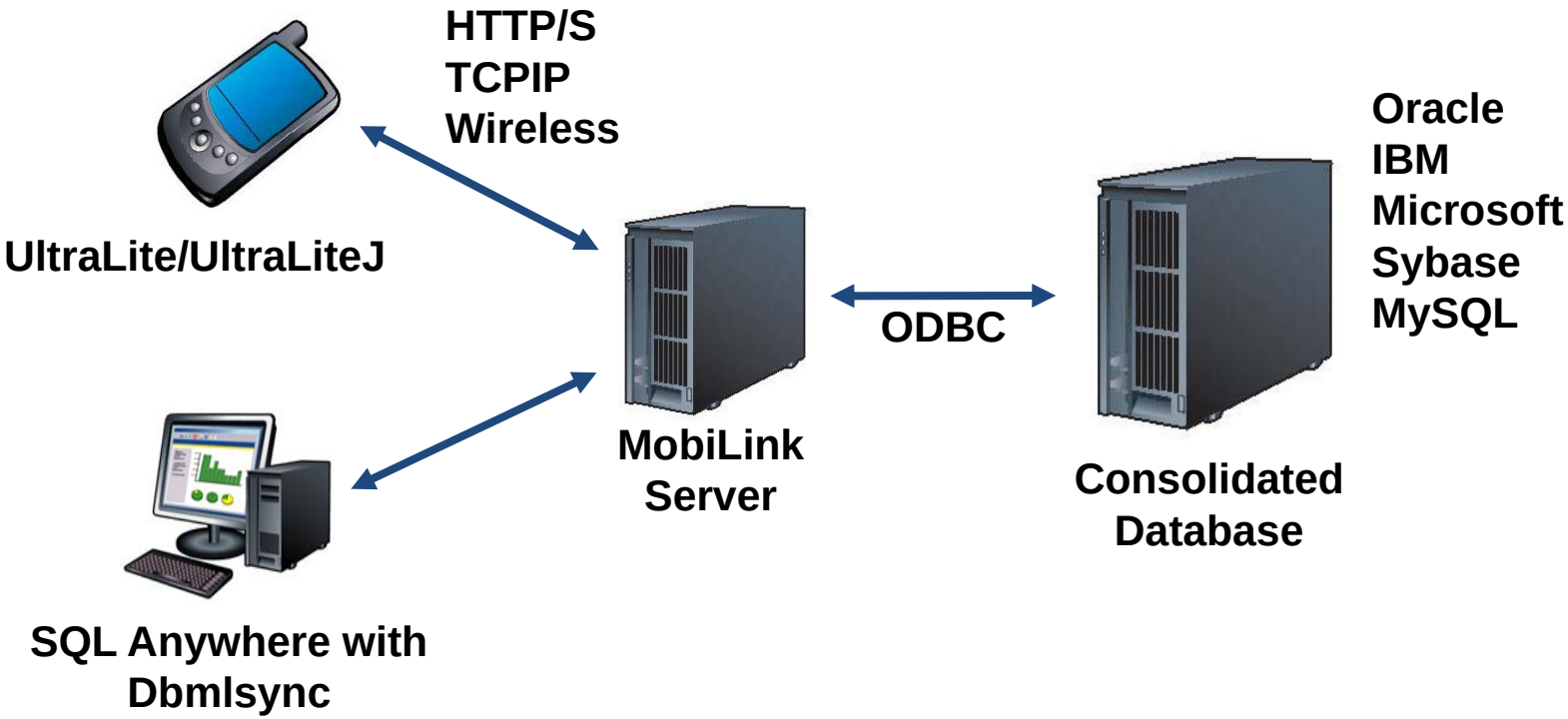
MOBILINK SYNCHRONIZATION

What is data synchronization?

- Sharing data between consolidated and remote
- Summary of changes instead of all changes
- Provides subsets of data defined by client or server
- Update anywhere
  - Bidirectional and unidirectional synchronization
- Guarantees data consistency in the synchronizing environment

SYBASE TECHWAVE SYMPOSIUM 2009

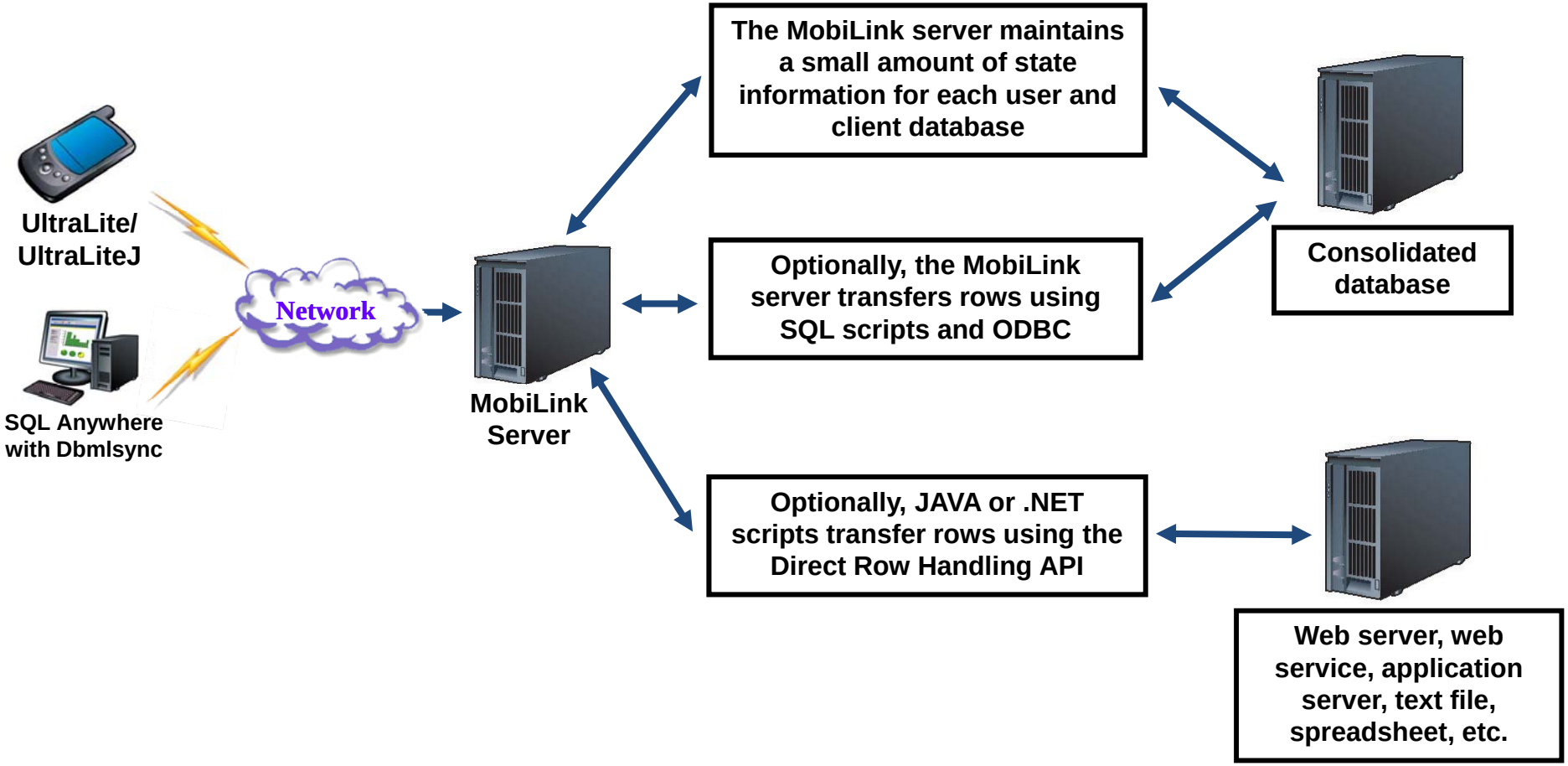
MOBILINK ARCHITECTURE



SYBASE TECHWAVE SYMPOSIUM 2009

PARTS OF MOBILINK SYNCHRONIZATION

MobiLink clients synchronize through the MobiLink server to a central data source



SYBASE TECHWAVE SYMPOSIUM 2009

PARTS OF MOBILINK SYNCHRONIZATION

- MobiLink client
  - SQL Anywhere, UltraLite, and UltraLiteJ
- Network
  - TCPIP, TLS, HTTP, HTTPS
- Consolidated database
  - MobiLink system tables
    - State information needed for synchronization
  - Central copy of data
- SQL row handling
  - Synchronizations scripts in SQL, JAVA, or .NET
    - JAVA and .NET scripts must return a valid SQL statement
- Direct row handling
  - Synchronize with other data sources using customized JAVA or .NET scripts

SYBASE TECHWAVE SYMPOSIUM 2009

MOBILINK PROCESS

High level processing of a MobiLink synchronization

1. Data is uploaded to the consolidated database

2. Data is downloaded to the remote database

SYBASE TECHWAVE SYMPOSIUM 2009

MOBILINK PROCESS

High level processing of a MobiLink synchronization

- Uploads
  - Change tracking in built into the remote database
  - Only changes since the last complete synchronization
  - Coalesce all transactions
    - E.g. if a row is updated 100 times, only the final revision is sent
- Downloads
  - Selects data from the consolidated database based on synchronization scripts

SYBASE TECHWAVE SYMPOSIUM 2009

HOW DOES SYNCHRONIZATION WORK?

Synchronization is made up of a set of events that get called in a predetermined order

- During synchronization, MobiLink progress through a serious of events
- Two types of events occur during synchronization
  - Connection level
    - High level event not associated with a particular table
    - These event perform tasks required during every synchronization
      - E.g. authenticate_user connection event
  - Table level
    - Associated with a particular table
    - These events perform tasks on a particular table
      - E.g. download_cursor table event

SYBASE TECHWAVE SYMPOSIUM 2009

TABLE LEVEL EVENTS

Two types of table level events

- Overall table event
  - Event related to specific table before processing data of the table
    - E.g. begin_upload and end_upload event
- Per-row event
  - Performs standard table operations: insert, update, delete
    - E.g. upload_insert and upload_delete

SYBASE TECHWAVE SYMPOSIUM 2009

TABLE LEVEL EVENTS

- For bidirectional synchronization, MobiLink requires at minimum the following synchronization events:
  - upload_insert
  - upload_update
  - upload_delete
  - download_cursor
  - download_delete_cursor (only if downloading deletes)
- Upload events are required for data to be synchronized from the client database to the consolidated

SYBASE TECHWAVE SYMPOSIUM 2009

HOW DO WE DETERMINE WHAT ACTIONS OCCUR DURING A SYNCHRONIZATION?

- Synchronization scripts are written when action must occur
- Each synchronization script corresponds to a particular event in the synchronization process
  - A script is executed when the event is invoked
- Individual statements (E.g. SQL) or stored procedure calls
  - Stored and referenced in the consolidated database
- Scripts are optional

WRITING SYNCHRONIZATION SCRIPTS

- Upload scripts
  - Tells MobiLink what to do with data uploaded from client database
- Download scripts
  - Determines which data MobiLink will download to the client database
- SQL, JAVA, and .NET support for scripts

SYBASE TECHWAVE SYMPOSIUM 2009

EXAMPLE SYNCHRONIZATION SCRIPTS

```
Child (dbo): upload_insert
/* Insert the row into the consolidated database. */
INSERT INTO "MobiLink"."dbo"."Child" ( "child_id", "parent_id",
"data" ) VALUES ( {ml r."child_id"}, {ml r."parent_id"}, {ml
r."data"} )

Child (dbo): upload_update
/* Update the row in the consolidated database. */
UPDATE "MobiLink"."dbo"."Child" SET "parent_id" = {ml
r."parent_id"},"data" = {ml r."data"} WHERE "child_id" = {ml
r."child_id"}

Child (dbo): download_cursor
SELECT "MobiLink"."dbo"."Child"."child_id",
"MobiLink"."dbo"."Child"."parent_id",
"MobiLink"."dbo"."Child"."data"
FROM "MobiLink"."dbo"."Child"
WHERE "MobiLink"."dbo"."Child"."last_modified" >= {ml
s.last_table_download}
```


SYBASE TECHWAVE SYMPOSIUM 2009

SCRIPT VERSIONS

- MobiLink scripts are organized by script version
  - Naming convention can follow project coding practices
  - Support for as many versions are required
    - Project_v100
    - Project_v101
    - Project_v102_dev
- Very useful for application upgrades allowing staged deployment
- When a client database synchronizes, it must specify which version of the scripts it requires

SYNCHRONIZATION TRANSACTIONS

MobiLink operates within a number of transactions

- Authentication
  - commit
- begin_connection
  - commit
- begin_synchronization
  - commit
- All upload events
  - commit
- prepare_for_download
  - commit
- All download_events
  - commit
- end_synchronization
  - commit

SYBASE TECHWAVE SYMPOSIUM 2009

SYNCHRONIZATION TRANSACTIONS

- Scripts **must never** result in a commit
  - MobiLink ensures changes made by the remote are applied atomically
    - All or nothing
    - If something happens all changes are rolled back, no partial changes are left on the consolidated database
      - Necessary for robustness
      - Guarantees no changes are lost from the remotes

SYBASE TECHWAVE SYMPOSIUM 2009

MOBILINK SERVER

- mlsrv11
- Establishes connections with the consolidated database via ODBC
- Accepts connections from remote databases and controls the synchronization process
  - Work engine in the synchronization process
- Can be run as a service or as a process

SYBASE TECHWAVE SYMPOSIUM 2009

MOBILINK CLIENTS

- Clients database support
  - SQL Anywhere, UltraLite, UltraLiteJ
- Requesting synchronization must include the following:
  - Remote database connection information
  - Remote ID for the client database synchronizing
  - Address of MobiLink server
  - Synchronization Protocol
    - TCIPIP, TLS, HTTP, HTTPS
  - Script Version

SYNCHRONIZATION UTILITIES

- SQL Anywhere Client utility

```
dbmlsync -c “DSN=MyDataSource” -x tcpip –
  e “sv=v1;adr=‘host=somehost;port=2439’”
```

- UltraLite Synchronization Utility

```
ulsync -c DBF=myuldb.udb
  “MobiLinkUid=remoteA;Stream=http;ScriptV
  ersion=2”
```


SYBASE TECHWAVE SYMPOSIUM 2009

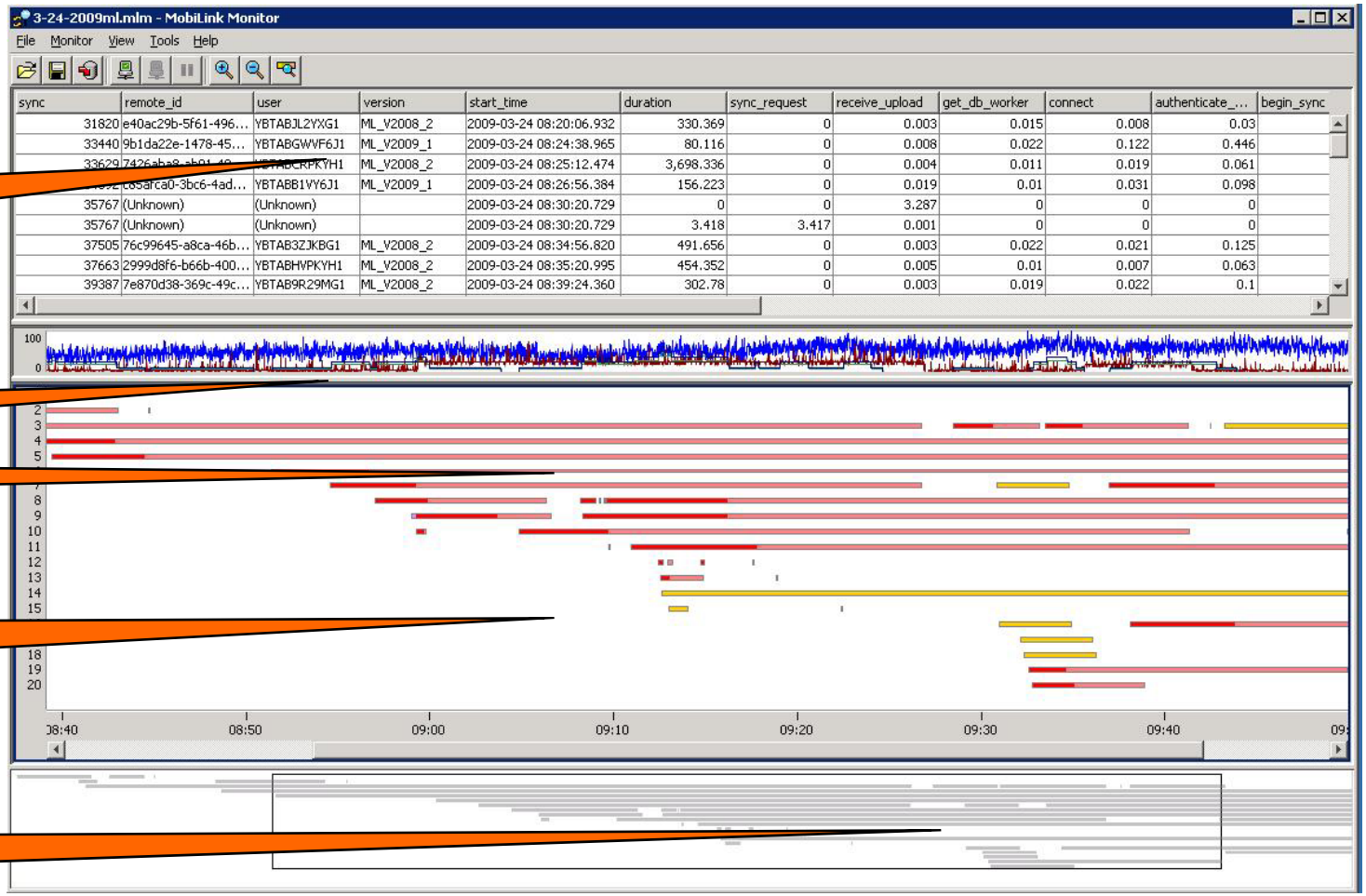
ULTRALITE PROGRAMMING INTERFACE

- C/C++ interface
- ODBC interface
- Embedded SQL
- UltraLite.NET
- UltraLiteJ
  - JAVA implementation of UltraLite that supports JAVA SE 1.5 (or later) and JAVA ME environments
  - BlackBerry support on OS 4.1 (or later)

MOBILINK MONITOR

- Provides detailed information about performance of synchronization
- Collects statistical information for synchronizations that occur in the monitoring sessions
- Provides data in a tabular or graphical form through the interface
- Does not degrade the performance of the MobiLink server
- Output of monitoring data can be saved in .CSV or exported to an ODBC data source

MOBILINK MONITOR



List of synchronizations

TCPIP work queue

Database access

Various stages of a synchronization

Time window used for zooming

SYBASE TECHWAVE SYMPOSIUM 2009

SYNCHRONIZATION MODEL WIZARD

- Eases the creation of MobiLink application
  - Configures MobiLink system tables and objects
  - Design data flow during synchronization
  - Auto generates the necessary synchronization scripts
- Deploys the synchronization model
  - Creates script files to run the MobiLink server and clients
- Models can be reconfigured and redeployed

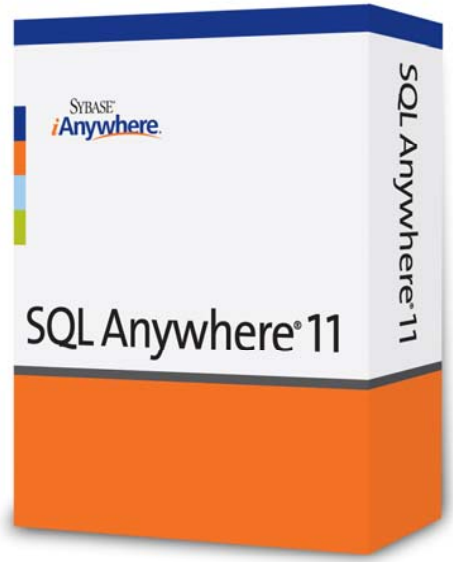
DEMO: SQL SERVER 2008 SYNCHRONIZATION

SQL Server 2008 with MobiLink

- Synchronization Model to design synchronization
- Deploy the Synchronization Model to a SQL Server 2008 consolidated database
- SQL Anywhere client database

RESOURCES

- Where to go from here…
  - SQL Anywhere website
    - http://www.sybase.com/sqlanywhere
  - Download the developer edition
    - http://www.sybase.com/detail?id=1055872
  - Try out the samples! (**%SQLANYSAMP11%**)
  - Look at the documentation
    - http://dcx.sybase.com
  - Newsgroups
    - http://www.sybase.com/detail_list?id=10891
  - White Papers
    - http://www.sybase.com/detail?id=1062460
  - SQL Anywhere Tech Corner
    - http://www.sybase.com/developer/library/sql-anywhere-techcorner



SYBASE TECHWAVE SYMPOSIUM 2009

Sybase Professional Services

www.sybase.com/professional-services/consulting/products

- Our Professional Services Organization can help you…
  - Upgrade from previous versions
  - Install and configure SQL Anywhere 11 with high availability options
  - Build a rapid proof of concept using tried-and-tested application templates, toolkits, and frameworks
    - Includes BlackBerry development (www.sybase.com/blackberry)
  - Learn more about SQL Anywhere through customized training and mentoring
  - Plan your architecture, distributed systems design, or application design
  - Tune and enhance performance
  - Test synchronization scalability

"The technology and the assistance we've received from iAnywhere's Professional Services team have enabled us to do things that would otherwise have been much more difficult and expensive given our business requirements."

Khaled El Emam
CTO
TrialStat

"Pearson benefited from the expert knowledge of iAnywhere Solutions Professional Services, helping their developers quickly gain knowledge in order to accelerate the development of SuccessMaker."

Kelli Anne Hodges
Curriculum Specialist
Pearson Digital Learning

GETTING STARTED WITH MOBILINK IN SQL ANYWHERE 11

Thank you FOR ATTENDING

SYBASE TECHWAVE SYMPOSIUM 2009