Using Apache Derby
The Open Source Database Embedded in ColdFusion 8/9

(Preview for CF Meetup)
Why are we here?

- ColdFusion 8 (and 9) includes the open source Apache Derby database
- Easy to misconstrue what it does, doesn’t do; why/why not use it
- Will try to show here why you should consider it, even for production, transactional, multi-user applications
- Will also discuss several topics of typical interest when considering/using it
Topics

- Audience For This Talk
- Quick Demonstration
- Some Natural Questions: What is it? Why use it? And more
- Dashing a Common Myth
- How to Use/Enable it in ColdFusion
- Connecting to Derby Databases Using Tools
- Derby SQL Topics/Issues
- Some Common Challenges
- Resources for Learning More
About Your Speaker

- 12 yrs CF experience (26 in Enterprise IT)
  - Independent consultant since April 2006
  - Member, Adobe Community Experts
  - Certified Adv CF Developer (4 - 8), Certified Adobe Instructor
  - Writer in FAQU, Adobe DevCenter, CommunityMX, CFDJ, more
  - Contributor to all three Ben Forta CF8 WACK books
  - Run the Online ColdFusion Meetup (coldfusionmeetup.com)
  - Living in Alpharetta, Georgia (north of Atlanta)

- Web home at www.carehart.org
  - Hosts ~300 blog entries, 70+ articles, 80+ presentations, more
  - UGTV: recordings of 300+ presentations by ~200 CFUG speakers
  - CF411.com - 1000+ tools/resources in 100+ categories
  - Consulting: available for troubleshooting, tuning, training
    - For as few as days, hours; remote or on-site
Audience For This Talk

- Those just curious about it
- Those already using it
- Those skeptical about it
QUICK DEMONSTRATION
Let’s answer several natural questions …

Is Derby a “real” DBMS? Absolutely

- Open source relational database implemented entirely in Java (http://db.apache.org/derby/)
  - Implements JDBC and SQL standards, all in a tiny footprint (~2 MB)
Some Natural Questions: What is Derby?

- Yet has advanced features you'd expect in a quality DBMS:
  - Stored procedures, triggers, views, referential integrity constraints (including cascading deletes), localization/unicode
  - Cost-based query optimization, transactions, savepoints, checkpoint/recovery, transaction logs, backup, schemas, authentication (including LDAP), encryption, and much more
  - Row-level locking with available escalation to table level when needed, deadlock detection, and more
Some Natural Questions: What is Derby? (cont.)

- Is Derby something new? Not really
  - Actually started life as Cloudscape (from Cloudscape) in 1997
    - Cloudscape Inc was acquired by Informix in 1999
    - IBM acquired Informix DB assets in 2001, continued development as IBM Cloudscape
    - IBM contributed it to Apache in 2004 (continues contributing, with Sun)
  - Now known also as Sun Java DB and included in Sun Java 1.6 SDK
Why has Adobe included it in CF8/9?

- Provides a built-in DBMS for use by customers, that is portable
- One can create a scalable database without any add’l software installation
  - And one can rely on it being there if bundling/distributing a CF8/9 application
- Is used for example databases (portability really helped there)
Some Natural Questions: Why Use It?

- Why use Derby versus using something like MySQL?
  - Significant: you can know that the DB server is installed in CF8/9
    - With MySQL and most other DBMS’s, you must install them in addition to CF
    - Benefit both for users and those deploying apps onto CF (whether as standalone or J2EE deployment)
- Is it a pure development only DB?
  - No, it is fully intended for production. Recall the long list of features mentioned
Some Natural Questions: Why Use It?

- How does it perform and scale?
  - Demonstrated to scale very well for large volumes and loads, in various scenarios
  - Clustering support available via open source Sequoia project
    - http://community.continuient.com/community/sequoia
  - See Additional Notes (downloadable at Max Presentation Library) for links to several other resources discussing Derby performance
Some Natural Questions: Other questions

- Is this the same database engine that's embedded in Adobe Air?
  - No, that’s SQLLite: http://www.sqlite.org
  - Then again, Derby can compete with it, running on small devices

- Is it in both CF8/9 Standard and Enterprise?
  - Yes, there’s no difference in use of the DB in the two editions
Some Natural Questions: Other questions

- Can you use it with CF7 or 6?
  - Yes, but you would need to install Derby yourself, and you need to use the “Other” database driver type to create a DSN
  - See resources listed later under “Resources on using Derby with CF, prior to CF8”
Embedded vs Network Mode

- Comes in two flavors: “Embedded” and “Network” modes
  - Both support multi-user, transactional applications built with CF/other servers

- Embedded
  - Runs in-process (within CF/JRun),
  - Low overhead
  - Conservative defaults (minimal memory use)
  - Accepts connections only from threads within the embedding process (CF/JRun)
Embedded vs Network Mode

- Networked (or client/server)
  - Separately started, TCP-based network server
  - Accepts connections from other processes or hosts (outside of CF)
  - Lightweight client driver
- Distinction should become more clear in remainder of presentation
I've heard that Derby is a single-user DBMS

Again, no. The misconception is due to misunderstanding that the Embedded edition accepts connections only from within the *embedding application*. Derby, as embedded within CF, is certainly multi-threaded supporting multiple users and databases at one time.
How to Use/Enable it in ColdFusion

- Configured in CF 8/9 Admin, like other DBMS’s
- Observing the Example Derby Databases preconfigured in CF8/9
  - What they are: artgallery, bookclub, cfcodeexplorer, cfdocexamples
  - Each stored as a directory per database, within:
    - `[coldfusion]\db`
    - `[jrun4]\servers[instance]\cfusion-ear\cfusion-war\WEB-INF\cfusion\db`
How to Use/Enable it in ColdFusion (cont.)

- Configuring a New Derby Datasource in CF
  - Choose Embedded or “Client” (Network) mode
    - Embedded mode runs Derby as embedded within CF
    - Client/Network mode requires running a separate Server instance of Derby
    - Choice is driven by whether multiple applications need to access DB
      - Again, not whether multiple users need to access it
    - Setting up the optional Network Server
      - See various resources offered at end of talk
How to Use/Enable it in ColdFusion (cont.)

- Configuring a New Derby Datasource in CF (cont.)
  - Choose whether you’re creating new database (or pointing to an existing one)
    - Check box option in CF Admin, if creating “Embedded” DSN
      - or can indicate via connectionstring: Create=true
    - Can also create programmatically with CF Admin API or DerbyCFC (http://derbycfc.riaforge.org/)
    - Or with command line “ij” tool, discussed later
  - Use CFQUERY to execute SQL DDL to define tables, columns, indexes, as per usual
    - Or consider any of many tools available…
Connecting to Derby Databases Using Tools

- What actions are you looking for?
  - Access from a favored IDE? Or any IDE that helps? Or the command line?
  - Ability to view data? Create SQL? View/change database schema/relationships?
  - Run test SQL statements?
  - Generate CFC/CRUD code? Build complete CRUD applications?
Connecting to Derby Databases Using Tools

- Each of these is available in different forms
  - Tools that leverage CF’s RDS feature and any CF DSN database type
  - Generic command line tools that support Derby (and don’t know about CF)
  - IDEs that support Derby (and don’t know about CF)
Connecting to Derby Databases Using Tools (cont.)

- Tools based on CF’s RDS feature
  - Can access **Embedded** databases as defined within CF, using CF’s RDS feature
    - For more on using RDS, see docs or my presentation ([http://carehart.org/presentations/#rds2](http://carehart.org/presentations/#rds2))
  - DreamWeaver, HomeSite+, CF Studio
    - Can look at a Derby database, see its tables and columns, view its data, and build SQL query/update statements
Connecting to Derby Databases Using Tools (cont.)

- Eclipse (using Adobe CF8 extensions for Eclipse, CFBuilder)
  - Adds ability to generate CFCs from tables to perform CRUD (create, read, update, delete) operations
  - http://www.adobe.com/support/coldfusion/downloads.html#cfdevtools
  - See “Introducing the Adobe ColdFusion Extensions for Eclipse”
    - http://www.carehart.org/presentations/#adcfeclipse

- None of these offer visual tools to *create/modify* schema: tables/columns, etc (DDL)

- Other CF/Derby Tools
  - DataMGR (CRUD creator): http://datamgr.riaforge.org/
  - DerbyCFC: http://derbycfc.riaforge.org/
Other Derby Developer tools:
- command line tools
  - sysinfo – Derby system information
  - dblook – schema dump/extraction tool
  - ij - SQL scripting tool
- Examples on next page
- More on using these
  - http://db.apache.org/derby/docs/dev/tools/
Connecting to Derby Databases Using Tools (cont.)

- **sysinfo** – Display Derby system information
  - `[cfroot]\lib\java -jar derbyrun.jar sysinfo`

- **dblook** – Display DB schema
  - `java -jar derbyrun.jar dblook -d jdbc:derby:C:\ColdFusion8\db\bookclub`
  - `java -jar derbyrun.jar dblook -d jdbc:derby:C:\ColdFusion8\db\bookclub -o myddl.txt`

- **ij** – View table in existing database
  - `java -jar derbyrun.jar ij`
  - Opens command line prompt >, then enter cmds, ending with ;
    - `connect 'jdbc:derby:C:\ColdFusion8\db\bookclub';`
    - Show tables;
    - Select title from books;
    - Show indexes;
    - Show connections;
    - Exit;
Connecting to Derby Databases Using Tools (cont.)

- Creating new DB from scratch with ij
  - java -jar derbyrun.jar ij
  - Opens command line prompt >, then enter cmds, ending with ;
    - connect 'jdbc:derby:C:\ColdFusion8\db\demodb;create=true';
    - create table demo (id integer, name varchar(25));
    - insert into demo values (1, ‘Charlie’);
    - Select * from demo;
    - Exit;
  - Note: if doing copy/paste of above, check pasted single quotes
  - Can also put cmds in file to run as script using ij
    - Again, see http://db.apache.org/derby/docs/dev/tools/
Connecting to Derby Databases Using Tools
(cont.)

- Other Derby Developer tools: IDEs
  - Naturally, entering commands via command line may not appeal
  - Many tools (free and commercial) to work with Derby from Eclipse and standalone GUI DB tools
  - See Additional Notes for more and additional resources
  - Note: Using these tools you cannot access a Embedded DSN within CF, while CF is started
Derby SQL Topics/Issues

- Supports JDBC 4, entry-level SQL-92, as well as some higher-level features of SQL-99 and newer
  - “SQL-99 and SQL-2003 features mapped to Derby”
  - http://wiki.apache.org/db-derby/SQLvsDerbyFeatures
Derby SQL Topics/Issues

Some challenges encountered by CFers

- Various challenges with identity columns, nulls, columns with spaces, more

- Lack of TOP keyword
  - See comments at http://www.alagad.com/go/blog-entry/derby--sqlite-and-other-derby-myths

- Pagination (see comments at http://www.alagad.com/go/blog-entry/derby--sqlite-and-other-derby-myths)
Derby Versions

- 10.2 – **This is the version included in CF 8**
- 10.3
  - New features included Drop/Rename column, Blob/Clob support, more
- 10.4
  - New features included asynchronous replication, JMX, more
- More details and additional older (and possibly newer) releases:
- While you could download and implement updated versions, they would not be supported by CF8
  - CF9 will include later update (10.4.2 as of beta 1)
Some Common Challenges with Derby on CF

- A couple of known problems, some fixed in 8.01, some remain
  - Also:
    - Creating a new datasource sometimes goes to “Other” driver screen
    - Problem with Unicode, easily solved
    - Renaming a column (via Alter Table)
  - See Additional Notes for more
Some Tips

- If updating data in Derby databases, this calls for using orderly shutdown of CF (not just cancelling the jrun.exe task)
  - Otherwise Derby may spend extra time doing recovery at next startup
- To back up a database, you can use the online backup utility.
  - For information on this utility, see the *Derby Server and Administration Guide*
- Various Derby environment settings can be tweaked
  - See *Additional Notes* document for details, ideas, additional resources
Other Derby Observations

Other Derby Features

- Zero Administration
  - available options, generally need not be tweaked
- Hibernate support (http://wiki.apache.org/db-derby/HibernateHelp)
- Spring support: (http://www-128.ibm.com/developerworks/web/library/wa-spring2/)
- DB can be stored on CD
  - See “Creating Derby databases for read-only use” in *Derby Developer's Guide*
Other Derby Observations (cont.)

- Other possible Derby uses:
  - As a pre-configured demo database for your existing application
  - As a testing database and a way of verifying database independence
  - To replace existing file based storage
Resources for Learning More

Resources describing Derby in a CF Context
- My “Getting Started with the Apache Derby Open Source Database in CF8”
- Derby subsite at CFCommunity.org
- “Working with the Apache Derby Database and ColdFusion”, by Chip Temm
- “Using Apache Derby - The built-in CF8 Database”, by Scott Stroz
- “Derby != SQLite and Other Derby Myths”, by Scott Stroz
- “Using the Derby Database”, by Steve Bryant
- “Creating Derby embedded databases in ColdFusion 8”, Kay Smoljak
- Exploring Your DB With Eclipse 101 (Including Derby DBs!), Todd Sharp
- See Additional Notes for links to all these
Resources for Learning More

- Resources on using Derby with CF, prior to CF8
  - “Installing Apache Derby Database on ColdFusionMX 7.0.2”
  - “ColdFusion Everywhere PART 2”
  - See Additional Notes for links to all these

- Resource for Adobe CF extensions for Eclipse
  - “Introducing the Adobe ColdFusion Extensions for Eclipse”
    - http://www.carehart.org/presentations/#adcfeclipse
  - Leveraging RDS in Eclipse, DW, and HS+: Secure, Useful
    - http://www.carehart.org/presentations/#rds2
Resources for Learning More

- General Interest Derby Resources
  - Derby manuals (http://db.apache.org/derby/manuals/index.html)
    - 10.2 manuals: http://db.apache.org/derby/manuals/index.html#docs_10.2
    - Getting Started with Derby (42pp)
    - Derby Reference Manual (291pp)
    - Derby Developer's Guide (135pp)
    - Tuning Derby (98pp)
    - Derby Server and Administration Guide (74pp)
    - Derby Tools and Utilities Guide (74pp)
  - Other Derby sites and resources
    - See Additional Notes
Conclusion

- Derby is a very robust, substantially complete DBMS
  - Not at all just a development database, nor for single-user use
- We’ve answered many common questions, misunderstandings
- Saw it can be used in either embedded or client/network mode
- Saw how to enable Derby DBs within CF
- Learned of many options for tools to access Derby DBs
  - Some built into normal CF editors (DW, HS, CFS, Eclipse)
  - Some through various other Derby-specific tools
- Discussed various SQL issues, challenges in using Derby with CF
- Pointed out many, many available resources to learn more
Feedback and Follow-up

- Please fill out the evaluation
- Available for ColdFusion troubleshooting, setup, implementation consulting
  - Also other developer productivity coaching, system admin and tuning support, and more
  - Remote or on-site
  - Again, for as little as days, hours, even 15 minutes
  - http://carehart.org/consulting/