Using Apache Derby
The Open Source Database Embedded in ColdFusion 8

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Why are we here?

- ColdFusion 8 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
- Fundamentals
  - Embedded vs Client/Server Mode
  - Dashing a Common Myth
  - Some Natural Questions: What is it? Why use it? And more
- Using Derby, And Tools
  - How to Use/Enable it in ColdFusion
  - Connecting to Derby Databases Using Tools
- Miscellany
  - Derby SQL Topics/Issues
  - Some Common Challenges
  - Resources for Learning More
About Your Speaker

- 11 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 books
  - Frequent speaker to user groups, conferences worldwide including
    - Adobe Max, cf.Objective, CFUnited, Scotch on the Rocks, webDU, webManiacs
  - 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 - 700+ 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
FUNDAMENTALS
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*
  - This does NOT mean only **one user of that application**!
- Derby, as embedded within CF, is certainly multi-threaded, supporting multiple users and databases at one time
Some Natural Questions: What is Derby?

- 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)
  - 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?
  - 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 application
  - Is used for example databases (portability really helped there)
Some Natural Questions: Why Use It?

- Why use Derby versus using something like MySQL? *Apache Derby*
  - Significant: you can know that the DB server is installed in CF8.
    - 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

- 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.continuent.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 SQLite: http://www.sqlite.org
  - Then again, Derby can compete with it, running on small devices

- Is it in both CF8 Standard and Enterprise?
  - Yes, there’s no difference in use of the DB in the two editions

- 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”
USING DERBY, AND TOOLS
How to Use/Enable it in ColdFusion

- Configured in CF 8 Admin, like other DBMS’s
- Observing the Example Derby Databases preconfigured in CF8
  - What they are: artgallery, bookclub; cfcodeexplorer; cfdocexamples
  - Each stored as a directory per database, within:
    - \([\text{coldfusion8}]\db\)
    - \([\text{jr}un4]\servers\[\text{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
  - 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/)
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?

- 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)
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)
- DreamWeaver, HomeSite+, CF Studio
  - Can look at a Derby database, see its tables and columns, view its data, and build SQL query/update statements
- Eclipse (using Adobe CF8 extensions for Eclipse)
  - Adds ability to generate CFCs from tables to perform CRUD (create, read, update, delete) operations
    - http://www.adobe.com/support/coldfusion/downloads.html#cfdevtools
- None of these offer visual tools to **create/modify** schema: tables/columns, etc (DDL).
- **CF Tools NOT based on CF’s RDS feature**
  - CF-based DB tools specifically supporting CF/Derby Tools
    - DerbyCFC: [http://derbycfc.riaforge.org/](http://derbycfc.riaforge.org/)
    - CF-based DB tools that support Derby just as all other CF DSNs
Other Derby Developer tools: command line

- **ij** - SQL scripting tool ("eye-jay")
  - `java -jar c:\coldfusion8\lib\derbyrun.jar ij`
- dblook – schema dump/extraction tool
- sysinfo – Derby system information
- More on using these

Other Derby Developer tools: IDEs

- Available features to work with Derby from Eclipse and other GUI DB tools
  - Eclipse Derby and DTP plugins
  - Non-Eclipse tools like Squirrel, RazorSQL, Aqua Data Studio
  - Some support DDL as well as DML SQL
- These do not rely on RDS connection
  - Cannot access an embedded database while CF is running. Use Network mode.
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](http://wiki.apache.org/db-derby/SQLvsDerbyFeatures)
- Some challenges encountered by CFers
  - Various challenges with identity columns, nulls, columns with spaces, more
  - Lack of TOP keyword
  - Pagination (see comments at [http://www.alagad.com/go/blog-entry/derby--sqlite-and-other-derby-myths](http://www.alagad.com/go/blog-entry/derby--sqlite-and-other-derby-myths))
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
- Perhaps CF9 will include later updates
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 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

- **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
Resources for Learning More

- General Interest Derby Resources
    - 10.2 manuals: [http://db.apache.org/derby/manuals/index.html#docs_10.2](http://db.apache.org/derby/manuals/index.html#docs_10.2)
    - *Getting Started with Derby* (42pp)
    - *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
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