



A ColdFusion, Flex & AIR Conference

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

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# 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
- How to Use/Enable it in ColdFusion
- Connecting to Derby Databases Using Tools
- Derby SQL Topics/Issues
- Resources for Learning More

# About Charlie Arehart

Independent Consultant since Apr 2006

- 12 yrs CF experience (26 in Enterprise IT)
- Member, Adobe Community Experts
- Certified Adv CF Developer (4-8), Cert. Adobe Instructor
- Frequent speaker to user groups, conferences worldwide
- Run the Online ColdFusion Meetup (coldfusionmeetup.com)
- Living in Alpharetta, Georgia (Atlanta)

Web home at [www.carehart.org](http://www.carehart.org)

- Host ~300 blog entries, 70+ articles, 90+ presentations
- UGTV: recordings of 300+ presentations by ~200 speakers
- CF411.com - 1000+ tools/resources in 100+ categories
- Consulting: available for CF troubleshooting, tuning; training
  - Remote or on-site

# Audience For This Talk

- Those just curious about it
  - Those already using it
  - Those skeptical about it
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- Note: In many cases, I offer additional details for some points in an “Additional Notes” document, at <http://www.carehart.org/presentations/#derby>



# 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)
- Is it a single-user DB meant for development?
  - Not at all, is a threaded multiuser DBMS
  - Fully intended for production
    - With the enterprise DBMS features you'd expect...

# Advanced features you'd expect



- 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

# 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**
  - More at <http://developers.sun.com/javadb/>



# QUICK DEMONSTRATION

# 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)
- Is this the same database engine embedded in Adobe Air?
  - No, that's SQLite: <http://www.sqlite.org>
  - Why different? Just different Adobe teams
  - Derby could have been used: it runs on small devices too
    - But adds a lot more functionality they didn't see a need for

# Why use versus MySQL, etc.?



- No need to use it if you already use them
- For those developing deployable CF apps
  - you can know that the DB server is installed in CF8/9
    - With MySQL and most other DBMS's, they must be installed in addition to CF

# How does it perform and scale?



- Demonstrated to scale very well for large volumes and loads, in various scenarios
  - IBM whitepaper addresses this
  - Clustering support available via open source Sequoia project
    - <http://community.continuent.com/community/sequoia>
  - See Additional Notes for links to several other resources discussing Derby performance

# Is it in both CF8/9 Standard and Enterprise?

- Yes, there's no difference in use of the DB between Standard and Enterprise
- 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 in Additional Notes



# Embedded vs Network Mode

- Comes in two flavors: “Embedded” and “Network” modes
  - Both support multi-user, transactional applications built with CF/other servers
  - Let’s explain....
- Embedded
  - Runs in-process (within CF/JRun), low overhead
  - Accepts connections only from threads within the embedding process (CF/JRun)
  - Conservative defaults (minimal memory use)

# Embedded vs Network Mode (cont.)

- Networked (or client/server)
  - Requires you to start separate network server
    - Included in CF, of course
  - Accepts connections from other processes or hosts (outside of CF)
  - Connect from CF via lightweight client driver

# Dashing a Common Myth

- People often assert that Derby is a single-user DBMS
  - Again, no. Common misunderstanding
  - Embedded edition accepts connections only within the *embedding application*
  - CF is certainly multi-threaded, supporting multiple users and databases at one time
  - So Derby can certainly handle multiple requests, multiple users at once

# How to Use/Enable it in ColdFusion

- Configured in CF 8/9 Admin, like other DBMS's
- Let's look first at existing ones, then creating new
- 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
    - Choice is driven by whether multiple applications need to access DB
      - Again, not whether multiple users need to access it
- For Embedded mode
  - Check “Create Database”
  - Provide foldername (where in [cf]/db/ to create)
- For Client (Server or Network mode)
  - Need to set up and run optional Network Server
  - Point to that during DSN creation, like any DBMS
    - See various resources offered at end of talk



# 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/tools 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 **Derby** databases as defined within CF, accessing them by way of 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

# 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/#adcfecclipse>
- 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/>

# Connecting to Derby Databases Using Tools (cont.)

- 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 in Additional Notes



# 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/>
    - <http://www.ibm.com/developerworks/opensource/library/os-ad-ij/index.html>

# 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
    - Eclipse Derby plugin
    - Squirrel, RazorSQL, Aqua Data Studio, etc.
  - Note: Using these tools, you cannot access an Embedded DSN within CF, while CF is started
  - See *Additional Notes* for more and additional resources

# 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
    - [http://www.bryantwebconsulting.com/blog/index.cfm/2007/6/8/using\\_the\\_derby\\_database](http://www.bryantwebconsulting.com/blog/index.cfm/2007/6/8/using_the_derby_database)
  - 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
  - <http://wiki.apache.org/db-derby/DerbyTenThreeRelease>
- 10.4
  - New features included asynchronous replication, JMX, more
  - <http://wiki.apache.org/db-derby/DerbyTenFourRelease>
- CF9 will include later update (10.4.2 as of beta 1)
- More details and additional older (and possibly newer) releases:
  - [http://db.apache.org/derby/derby\\_downloads.html](http://db.apache.org/derby/derby_downloads.html)
- While you could download and implement updated versions, they would not be supported by CF8

# 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
  - Client variable datasource
  - Database to use with CF9 ORM
- I'm sure many more will be identified over time as people consider it more



# 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 (cont.)

- 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/#adcfecclipse>
  - Leveraging RDS in Eclipse, DW, and HS+: Secure, Useful
    - <http://www.carehart.org/presentations/#rds2>

# Resources for Learning More (cont.)

## ➤ 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](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



# Questions On Presentation

- Charlie Arehart
  - [charlie@carehart.org](mailto:charlie@carehart.org)
- I'd really appreciate your feedback
  - <http://carehart.org/feedback/>
- Available for ColdFusion troubleshooting, setup, implementation consulting
  - Also system admin and tuning support, developer productivity coaching, and more
  - Remote or on-site
  - For as little as days, hours, even 15 minutes
  - <http://carehart.org/consulting/>