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COLDFUSION 5
The Fastest Way to Build and Deploy Powerful Web Applications

Database 3: Improving Database Processing

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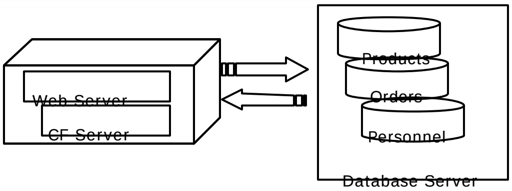
Agenda

- **Eight Measures of Architectural Quality**
- **DB Performance and Scalability:**
  - Query Caching
  - BlockFactor
  - Indexes
- **DB Reliability:**
  - Constraints
  - Triggers
  - Transaction Management
  - Bind Parameters
- **DB Extensibility and Maintainability:**
  - Stored Procedures
- **The Other Measures of Quality**
- **Where to Learn More and Q&A**

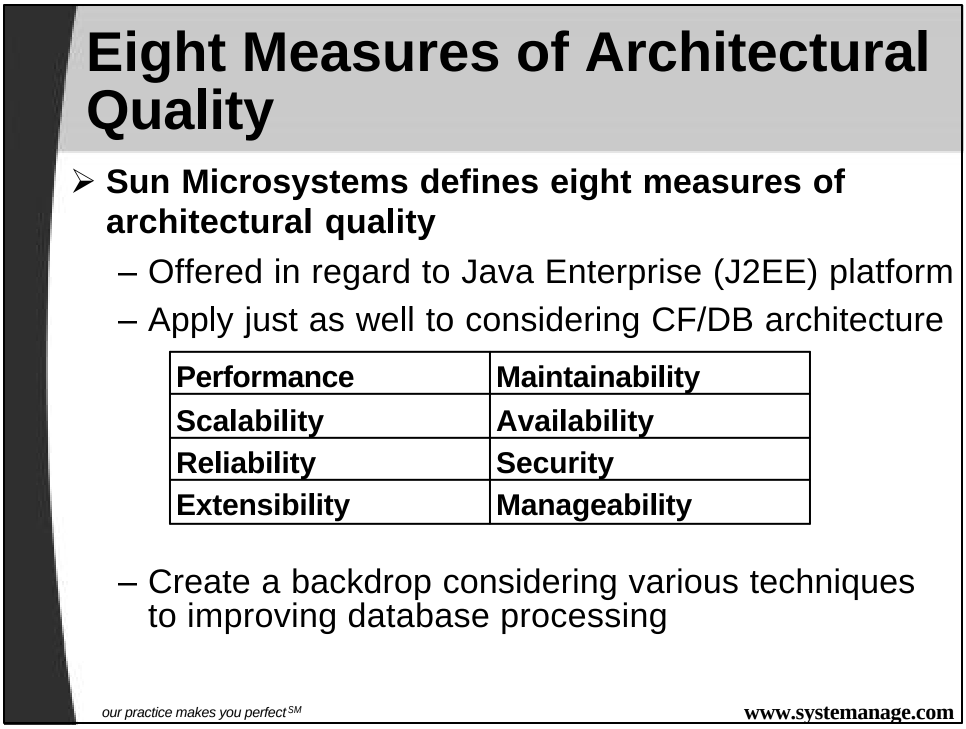
Part 3 of 3

- ➢ **This seminar is part 3 of 3 presented today**
  - – Previous two were in conference “beginner” track
- ➢ **Part 3 is in “Advanced” track**
  - – Won’t lose those who’ve made it this far
  - – May discuss things that advanced developers have already heard (more than once)
    - May hear it in a different way today
    - Or leave thinking about it differently than before
    - May simply trigger your putting them into effect
- ➢ **More than just “how to”**
  - – Focus as much on why, architectural perspective
  - – 50% is CF-specific, rest meaningful to other developers

Databases & Overall Architecture



- ➢ **Database processing is just part of your overall system and information architecture including:**
  - – Web server, CF server, DB server
  - – As well as DB design, SQL code, CF code
- ➢ **Should evaluate entire system in terms of quality**

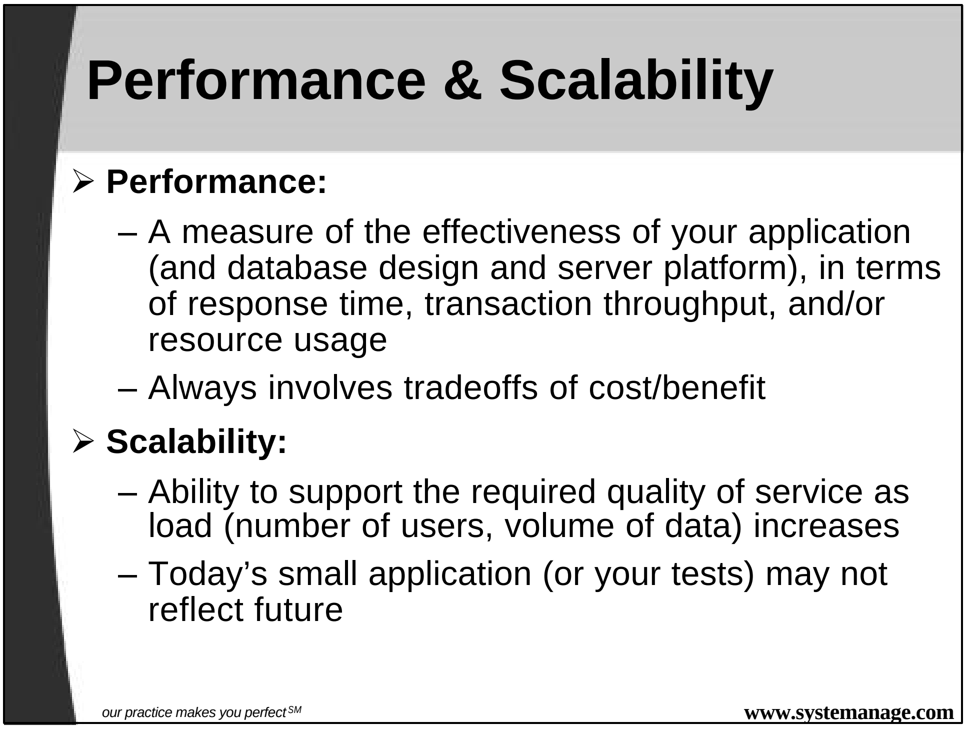


Eight Measures of Architectural Quality

- **Sun Microsystems defines eight measures of architectural quality**
  - – Offered in regard to Java Enterprise (J2EE) platform
  - – Apply just as well to considering CF/DB architecture

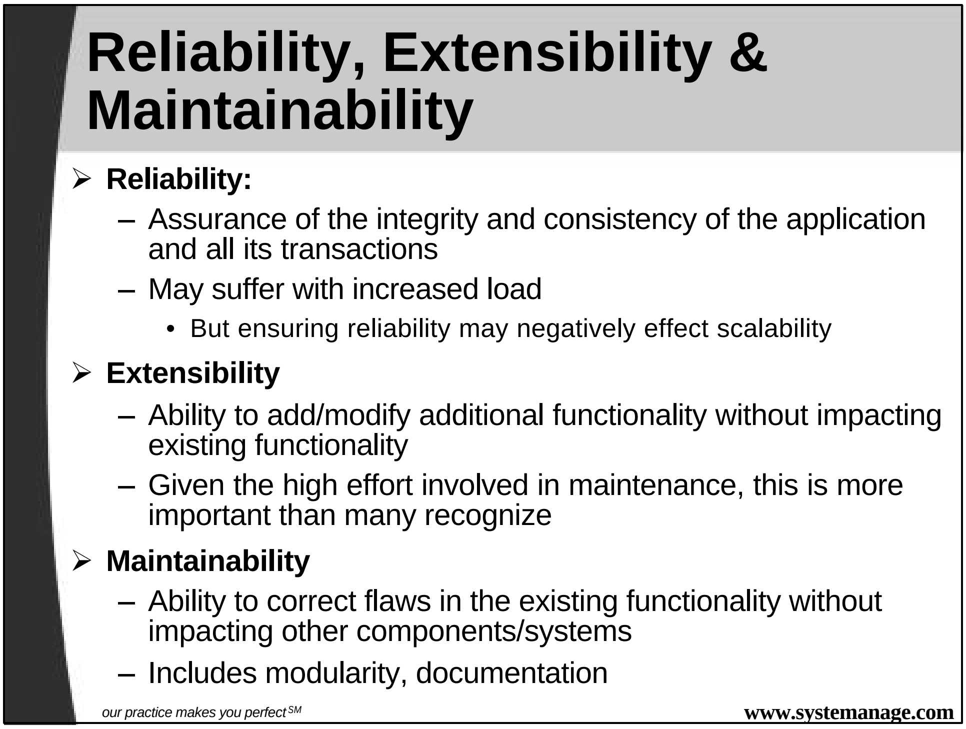
Performance	**Maintainability**
Scalability	**Availability**
Reliability	**Security**
Extensibility	**Manageability**

  - – Create a backdrop considering various techniques to improving database processing



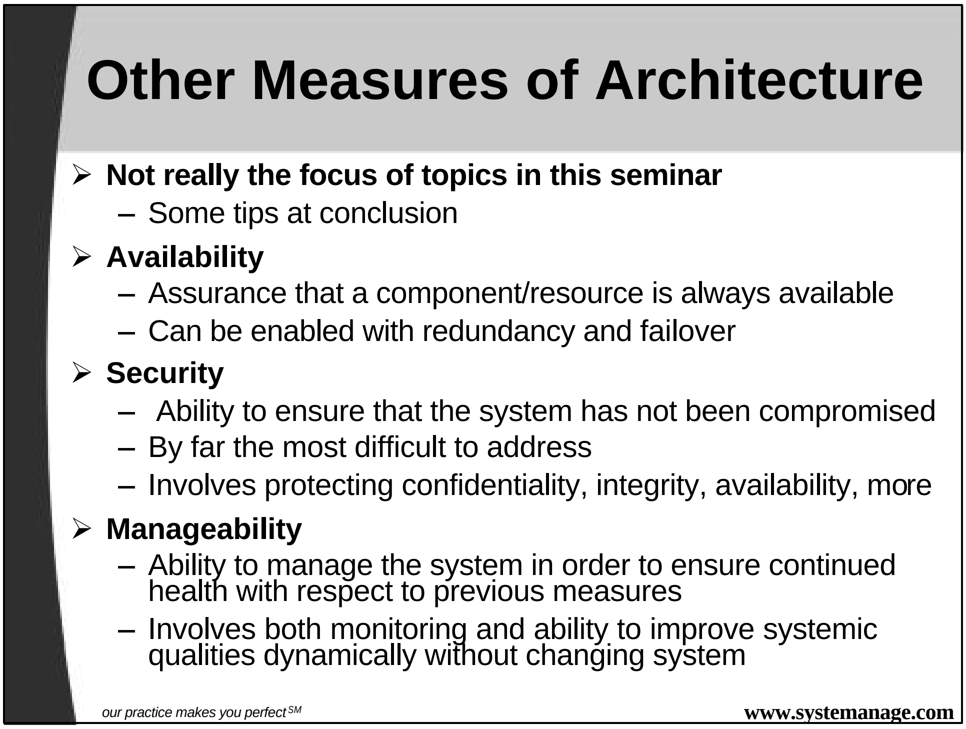
Performance & Scalability

- **Performance:**
  - – A measure of the effectiveness of your application (and database design and server platform), in terms of response time, transaction throughput, and/or resource usage
  - – Always involves tradeoffs of cost/benefit
- **Scalability:**
  - – Ability to support the required quality of service as load (number of users, volume of data) increases
  - – Today’s small application (or your tests) may not reflect future



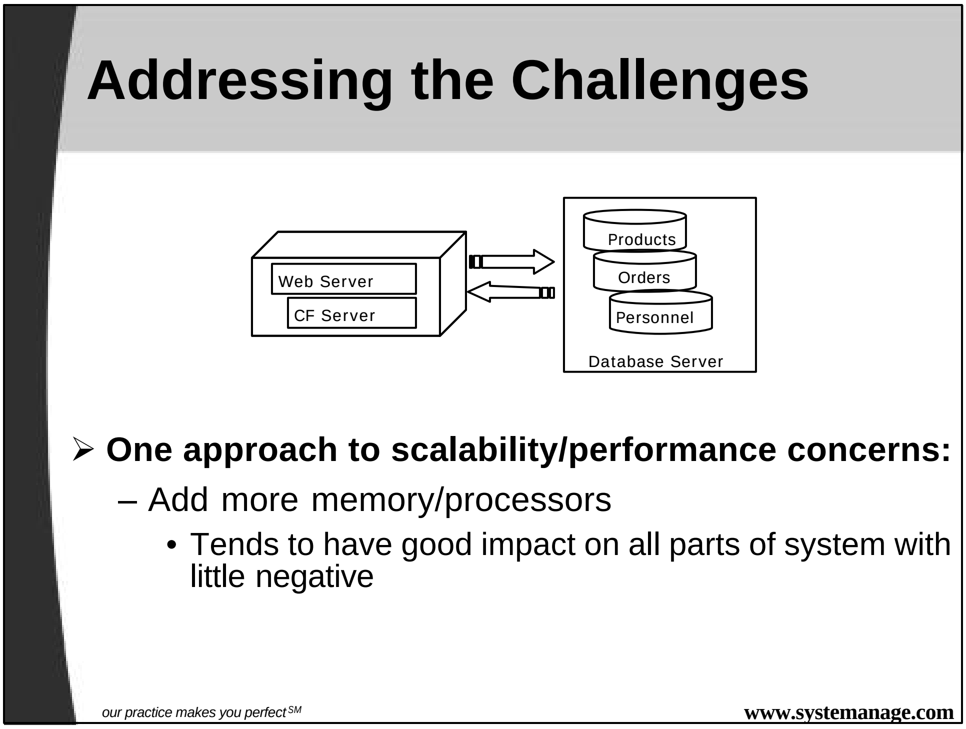
Reliability, Extensibility & Maintainability

- **Reliability:**
  - Assurance of the integrity and consistency of the application and all its transactions
  - May suffer with increased load
    - But ensuring reliability may negatively effect scalability
- **Extensibility**
  - Ability to add/modify additional functionality without impacting existing functionality
  - Given the high effort involved in maintenance, this is more important than many recognize
- **Maintainability**
  - Ability to correct flaws in the existing functionality without impacting other components/systems
  - Includes modularity, documentation



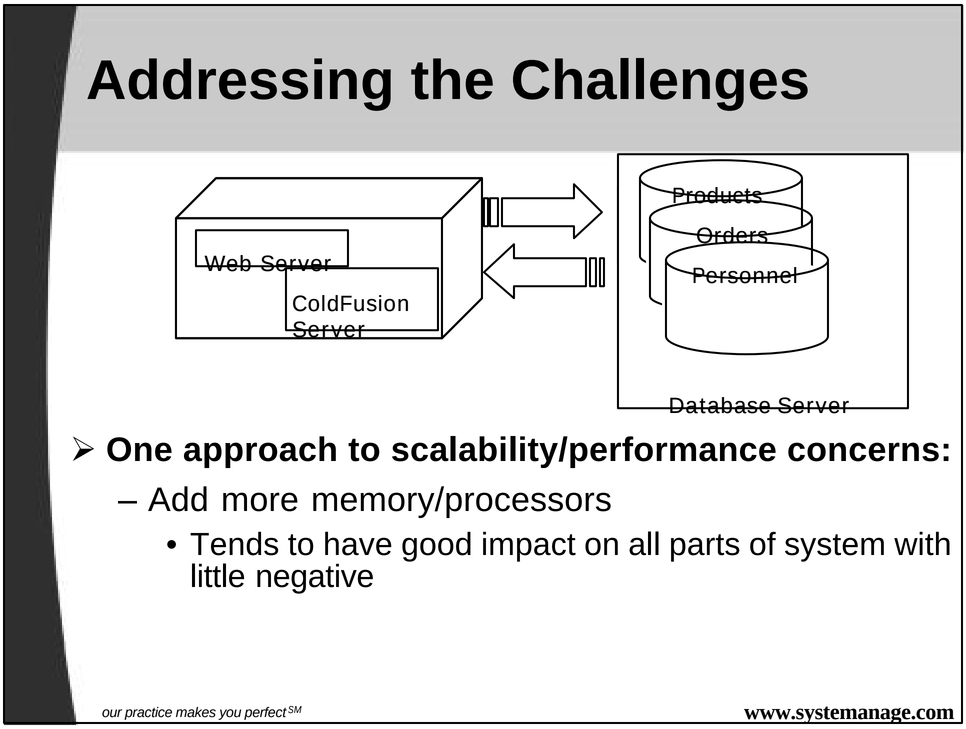
Other Measures of Architecture

- **Not really the focus of topics in this seminar**
  - Some tips at conclusion
- **Availability**
  - Assurance that a component/resource is always available
  - Can be enabled with redundancy and failover
- **Security**
  - Ability to ensure that the system has not been compromised
  - By far the most difficult to address
  - Involves protecting confidentiality, integrity, availability, more
- **Manageability**
  - Ability to manage the system in order to ensure continued health with respect to previous measures
  - Involves both monitoring and ability to improve systemic qualities dynamically without changing system



Addressing the Challenges

- **One approach to scalability/performance concerns:**
  - Add more memory/processors
    - Tends to have good impact on all parts of system with little negative



Addressing the Challenges

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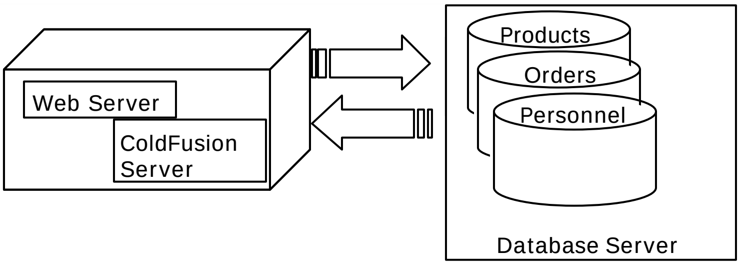
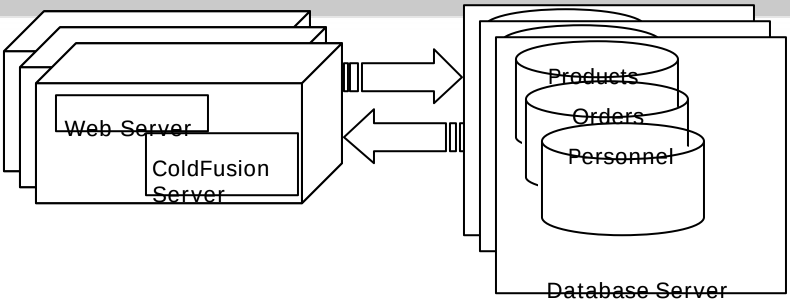
Clusters and Distributed Servers



- **Another solution:**
  - Distribute processing across multiple servers
    - May be simply segregating CF Server and DB server
      - Again, generally a very good idea
    - May involve creating cluster for web server
      - Tends to add complexity to design and implementation

Clusters and Distributed Servers



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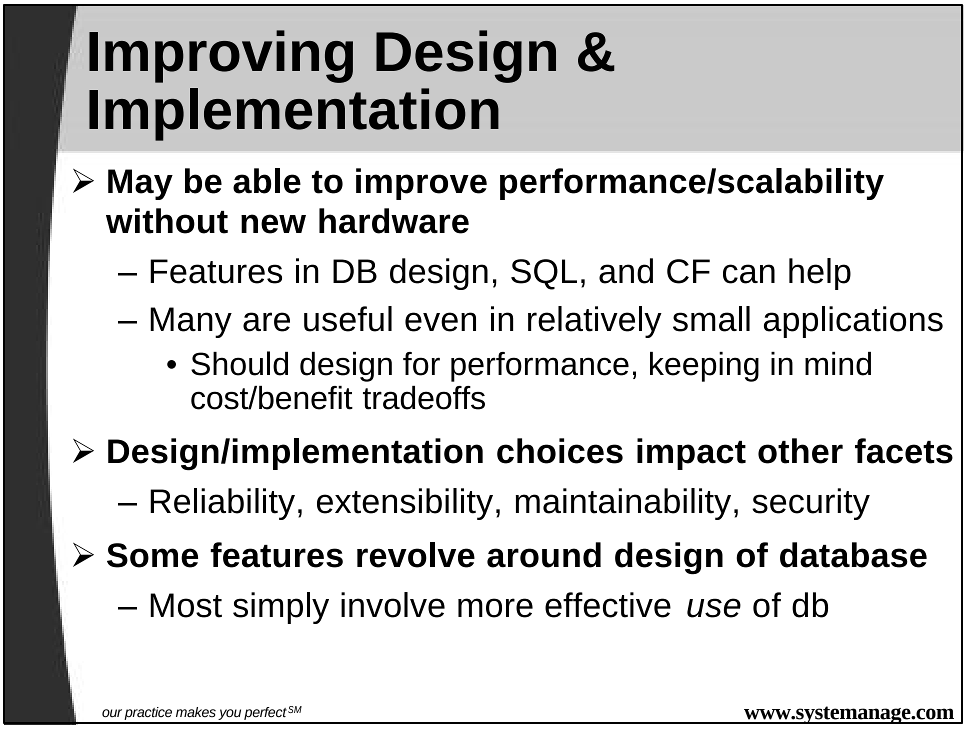
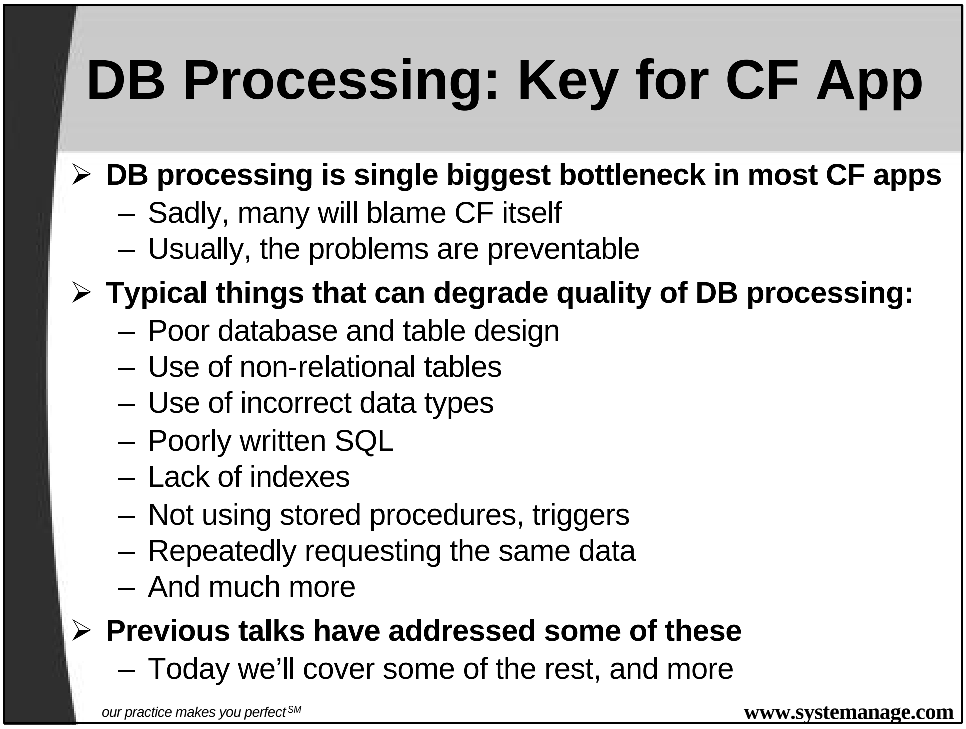


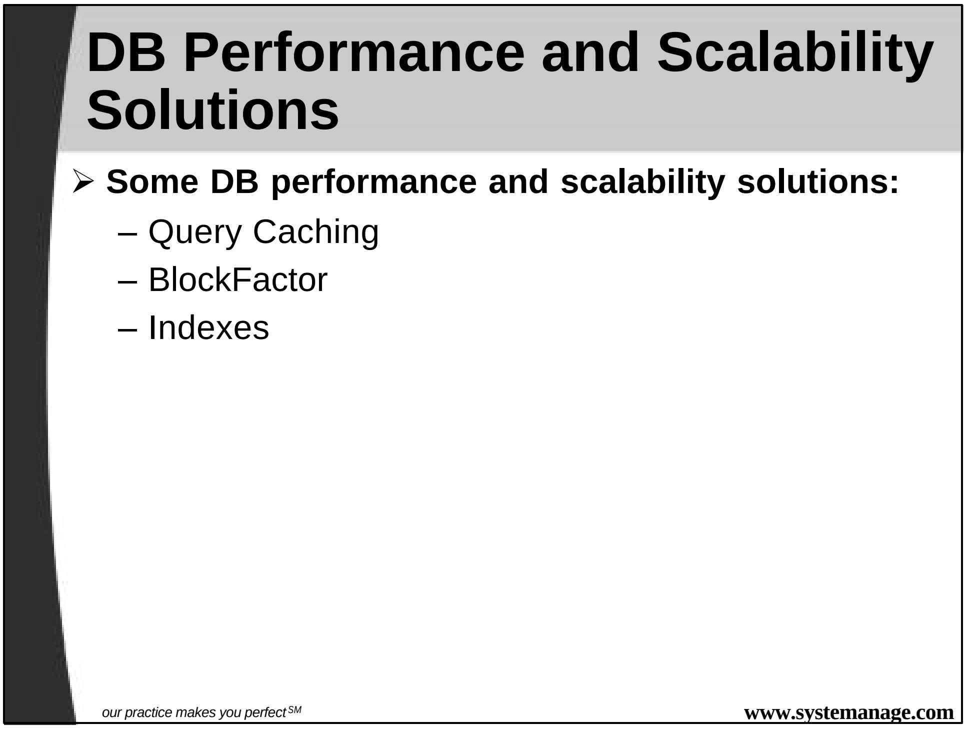
Improving Design & Implementation

- **May be able to improve performance/scalability without new hardware**
  - Features in DB design, SQL, and CF can help
  - Many are useful even in relatively small applications
    - Should design for performance, keeping in mind cost/benefit tradeoffs
- **Design/implementation choices impact other facets**
  - Reliability, extensibility, maintainability, security
- **Some features revolve around design of database**
  - Most simply involve more effective *use* of db



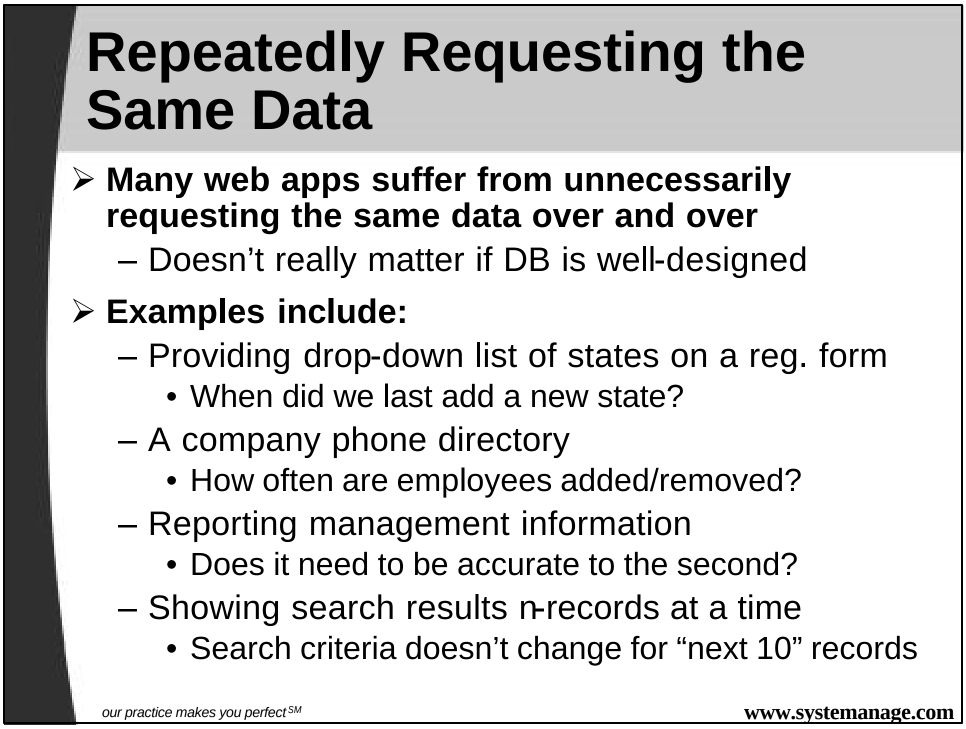
DB Processing: Key for CF App

- **DB processing is single biggest bottleneck in most CF apps**
  - Sadly, many will blame CF itself
  - Usually, the problems are preventable
- **Typical things that can degrade quality of DB processing:**
  - Poor database and table design
  - Use of non-relational tables
  - Use of incorrect data types
  - Poorly written SQL
  - Lack of indexes
  - Not using stored procedures, triggers
  - Repeatedly requesting the same data
  - And much more
- **Previous talks have addressed some of these**
  - Today we'll cover some of the rest, and more



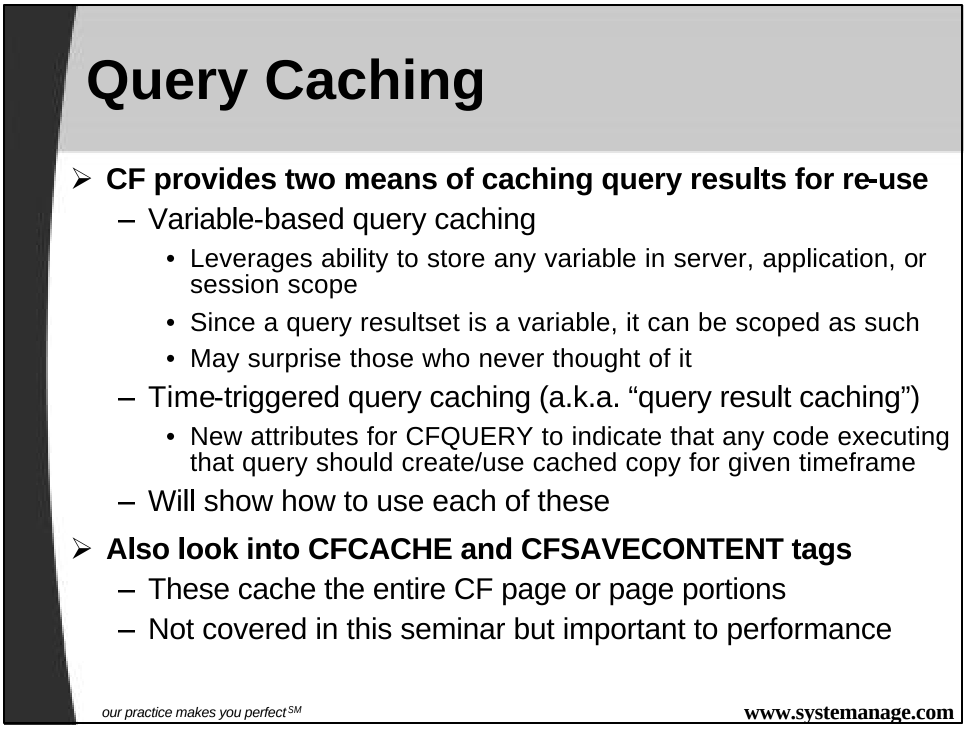
DB Performance and Scalability Solutions

- **Some DB performance and scalability solutions:**
  - – Query Caching
  - – BlockFactor
  - – Indexes



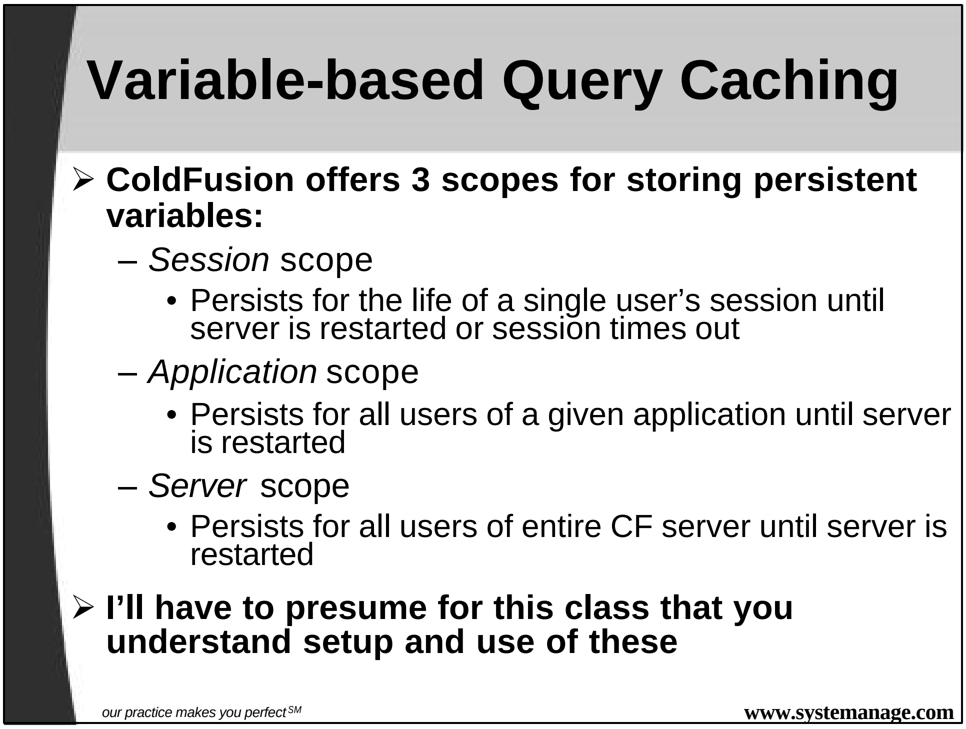
Repeatedly Requesting the Same Data

- **Many web apps suffer from unnecessarily requesting the same data over and over**
  - – Doesn’t really matter if DB is well-designed
- **Examples include:**
  - – Providing drop-down list of states on a reg. form
    - • When did we last add a new state?
  - – A company phone directory
    - • How often are employees added/removed?
  - – Reporting management information
    - • Does it need to be accurate to the second?
  - – Showing search results n-records at a time
    - • Search criteria doesn’t change for “next 10” records



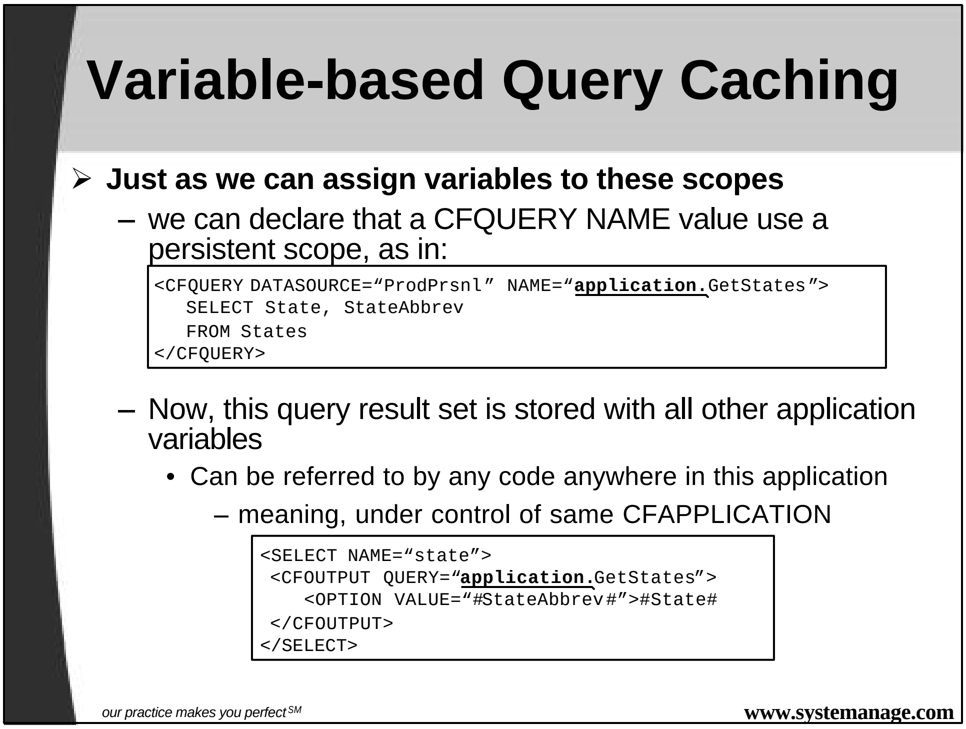
Query Caching

- CF provides two means of caching query results for re-use
  - Variable-based query caching
    - Leverages ability to store any variable in server, application, or session scope
    - Since a query resultset is a variable, it can be scoped as such
    - May surprise those who never thought of it
  - Time-triggered query caching (a.k.a. “query result caching”)
    - New attributes for CFQUERY to indicate that any code executing that query should create/use cached copy for given timeframe
  - Will show how to use each of these
- Also look into CFCACHE and CFSAVECONTENT tags
  - These cache the entire CF page or page portions
  - Not covered in this seminar but important to performance



Variable-based Query Caching

- ColdFusion offers 3 scopes for storing persistent variables:
  - *Session* scope
    - Persists for the life of a single user’s session until server is restarted or session times out
  - *Application* scope
    - Persists for all users of a given application until server is restarted
  - *Server* scope
    - Persists for all users of entire CF server until server is restarted
- I’ll have to presume for this class that you understand setup and use of these



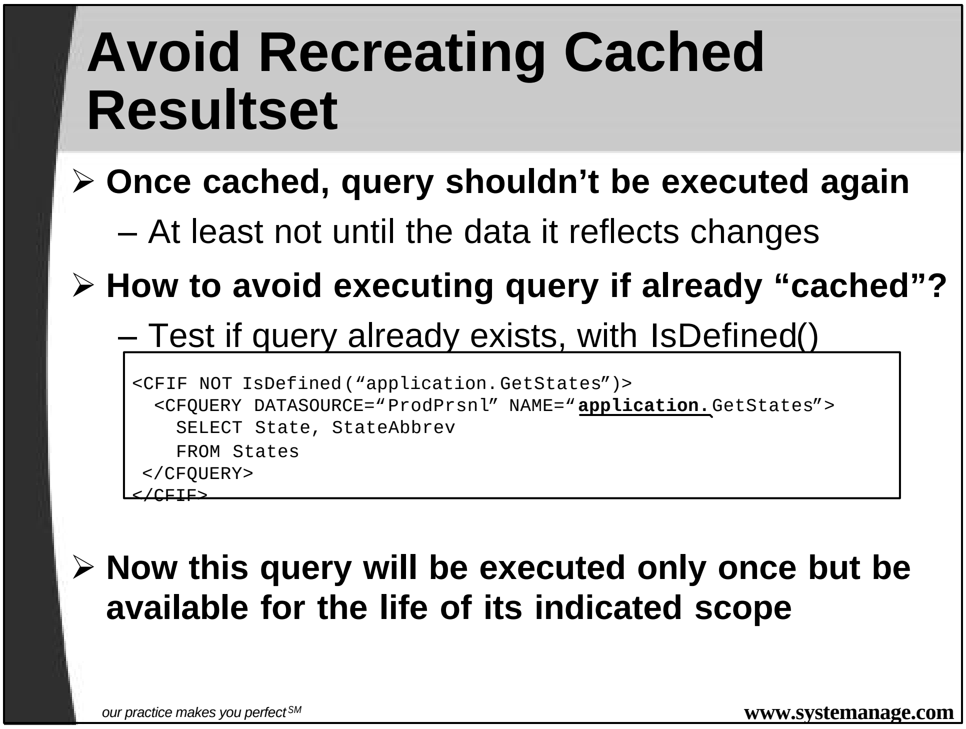
Variable-based Query Caching

- **Just as we can assign variables to these scopes**
  - we can declare that a CFQUERY NAME value use a persistent scope, as in:

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="application.GetStates">
   SELECT State, StateAbbrev
   FROM States
</CFQUERY>
```

  - Now, this query result set is stored with all other application variables
    - Can be referred to by any code anywhere in this application
      - meaning, under control of same CFAPPLICATION

```
<SELECT NAME="state">
 <CFOUTPUT QUERY="application.GetStates">
    <OPTION VALUE="#StateAbbrev#">#State#
 </CFOUTPUT>
</SELECT>
```



Avoid Recreating Cached Resultset

- **Once cached, query shouldn't be executed again**
  - At least not until the data it reflects changes
- **How to avoid executing query if already "cached"?**
  - Test if query already exists, with IsDefined()

```
<CFIF NOT IsDefined("application.GetStates")>
  <CFQUERY DATASOURCE="ProdPrsnl" NAME="application.GetStates">
    SELECT State, StateAbbrev
    FROM States
 </CFQUERY>
</CFIF>
```

- **Now this query will be executed only once but be available for the life of its indicated scope**

Where to Create/Update Variable-based Cached Query?

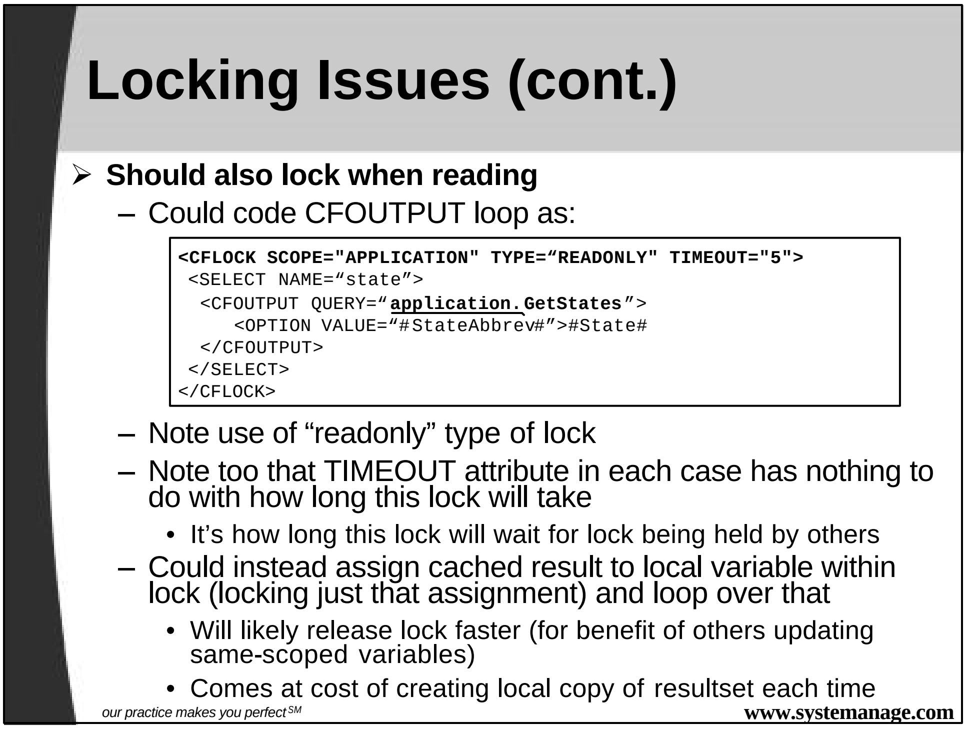
- **Where might it be sensible to put query creation code to be cached for all app users?**
  - Application.cfm
- **When should the query be re-executed?**
  - Whenever its underlying database table changes
    - In whatever template performs changes to data
    - Only dilemma: if code outside your control updates DB
- **Consider use of session scope to hold a user's search results over many "next n" pages?**
  - Create/cache it on the search action page

Another Challenge: Locking Issues

- **Shared scope variables should be locked when written to**
  - Should probably instead code query as:

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetStates">
   SELECT State, StateAbbrev
   FROM States
</CFQUERY>
<CFLOCK SCOPE="APPLICATION" TYPE="EXCLUSIVE" TIMEOUT="5">
   <CFSET application.GetStates= GetStates>
</CFLOCK>
```

  - Note use of "exclusive" type of lock
    - Not wrapping query in lock because you should avoid holding locks any longer than needed
      - Why make lock wait for query to run?
      - It should just be locked for however long it takes to assign the result set to the persistent variable

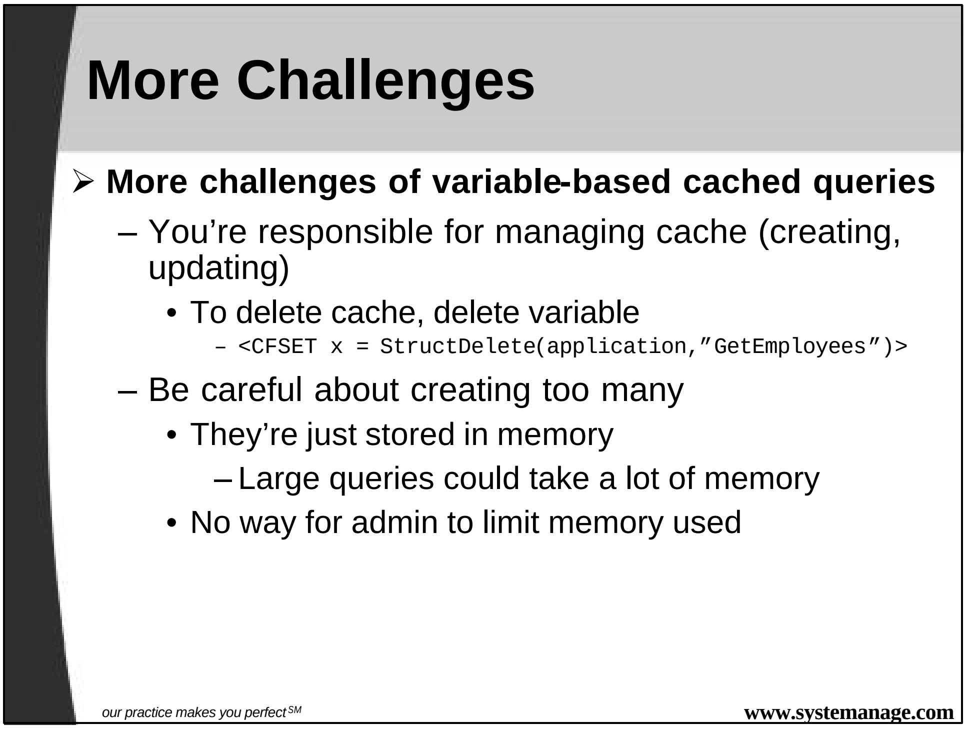


Locking Issues (cont.)

- **Should also lock when reading**
  - Could code CFOUTPUT loop as:

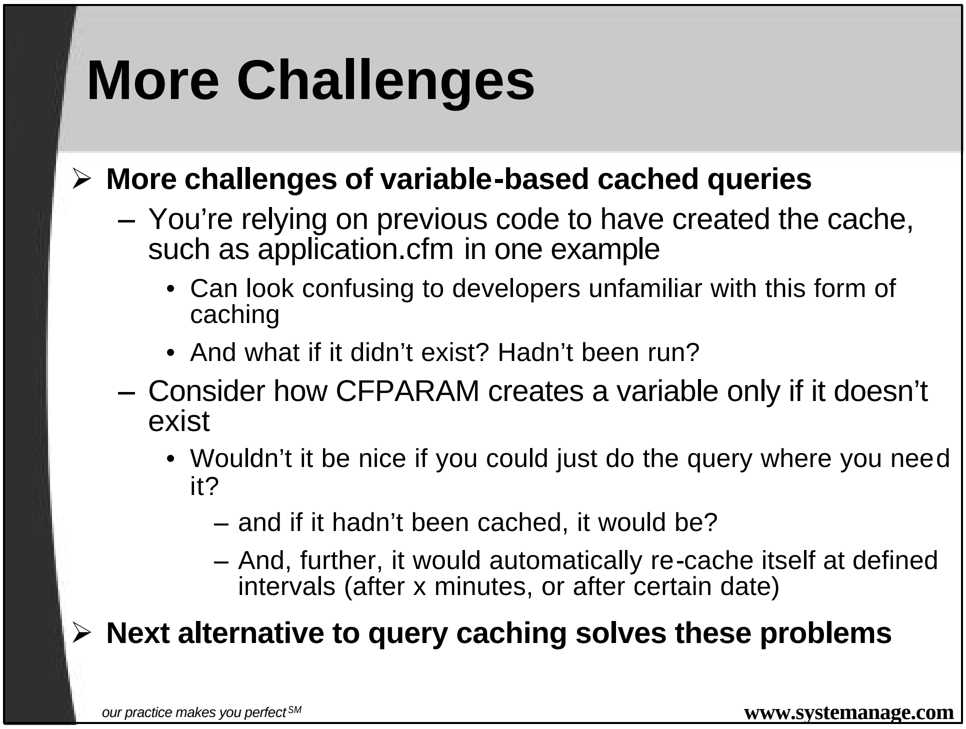
```
<CFLOCK SCOPE="APPLICATION" TYPE="READONLY" TIMEOUT="5">
 <SELECT NAME="state">
  <CFOUTPUT QUERY="application.GetStates">
     <OPTION VALUE="#StateAbbrev#">#State#
  </CFOUTPUT>
 </SELECT>
</CFLOCK>
```

  - Note use of "readonly" type of lock
  - Note too that TIMEOUT attribute in each case has nothing to do with how long this lock will take
    - It's how long this lock will wait for lock being held by others
  - Could instead assign cached result to local variable within lock (locking just that assignment) and loop over that
    - Will likely release lock faster (for benefit of others updating same-scoped variables)
    - Comes at cost of creating local copy of resultset each time



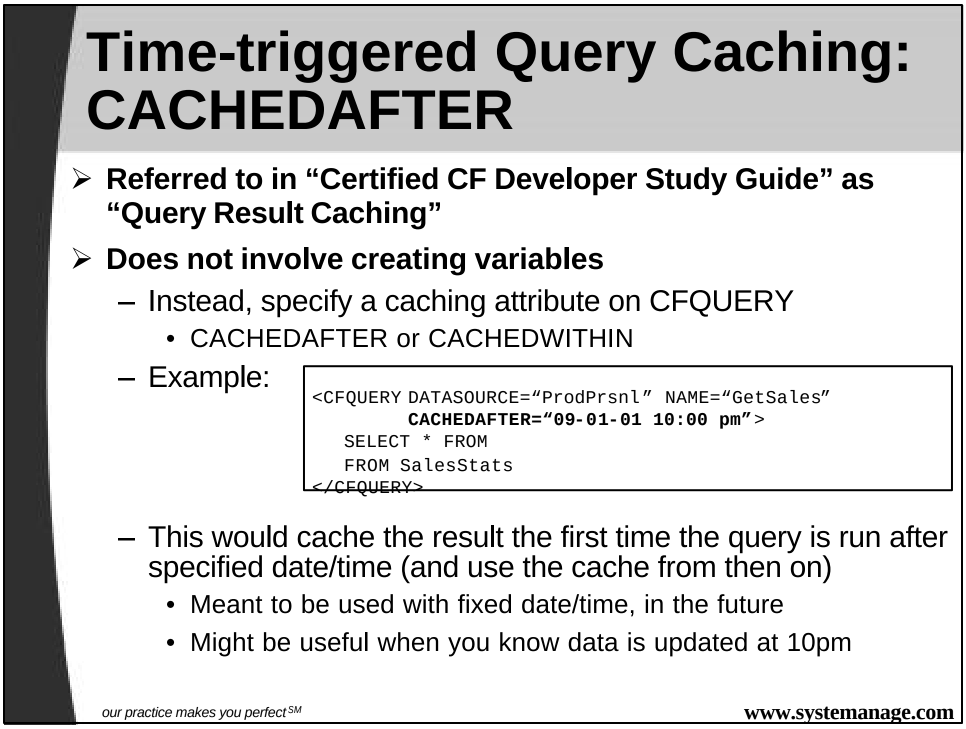
More Challenges

- **More challenges of variable-based cached queries**
  - You're responsible for managing cache (creating, updating)
    - To delete cache, delete variable
      - `<CFSET x = StructDelete(application,"GetEmployees")>`
  - Be careful about creating too many
    - They're just stored in memory
      - Large queries could take a lot of memory
    - No way for admin to limit memory used



More Challenges

- **More challenges of variable-based cached queries**
  - You’re relying on previous code to have created the cache, such as application.cfm in one example
    - Can look confusing to developers unfamiliar with this form of caching
    - And what if it didn’t exist? Hadn’t been run?
  - Consider how CFPARAM creates a variable only if it doesn’t exist
    - Wouldn’t it be nice if you could just do the query where you need it?
      - and if it hadn’t been cached, it would be?
      - And, further, it would automatically re-cache itself at defined intervals (after x minutes, or after certain date)
- **Next alternative to query caching solves these problems**

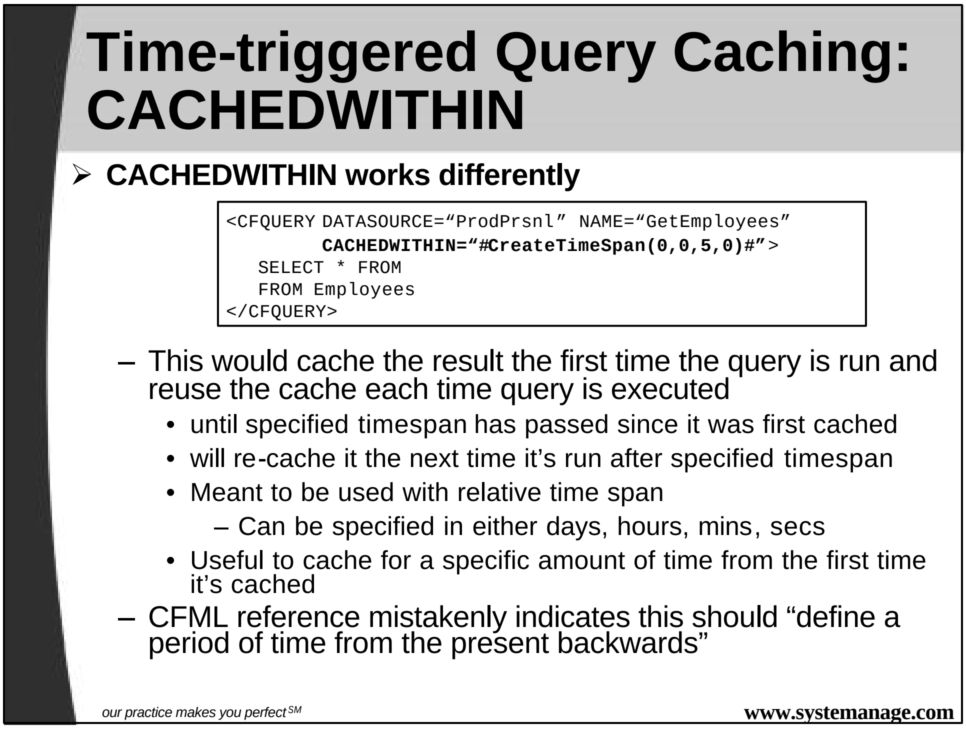


Time-triggered Query Caching: CACHEDAFTER

- **Referred to in “Certified CF Developer Study Guide” as “Query Result Caching”**
- **Does not involve creating variables**
  - Instead, specify a caching attribute on CFQUERY
    - CACHEDAFTER or CACHEDWITHIN
  - Example:

```
<CFQUERY DATASOURCE=“ProdPrsnl” NAME=“GetSales”
         CACHEDAFTER=“09-01-01 10:00 pm”>
   SELECT * FROM
   FROM SalesStats
</CFQUERY>
```

  - This would cache the result the first time the query is run after specified date/time (and use the cache from then on)
    - Meant to be used with fixed date/time, in the future
    - Might be useful when you know data is updated at 10pm

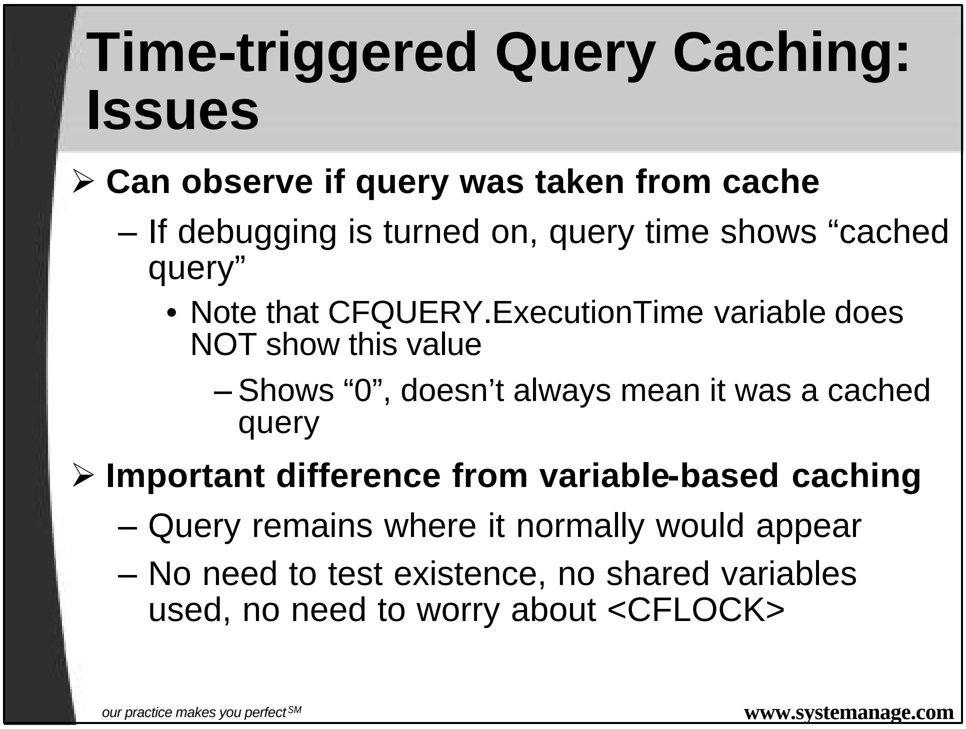


Time-triggered Query Caching: CACHEDWITHIN

- **CACHEDWITHIN works differently**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees"
        CACHEDWITHIN="#CreateTimeSpan(0,0,5,0)#">
   SELECT * FROM
   FROM Employees
</CFQUERY>
```

  - This would cache the result the first time the query is run and reuse the cache each time query is executed
    - until specified timespan has passed since it was first cached
    - will re-cache it the next time it's run after specified timespan
    - Meant to be used with relative time span
      - Can be specified in either days, hours, mins, secs
    - Useful to cache for a specific amount of time from the first time it's cached
  - CFML reference mistakenly indicates this should "define a period of time from the present backwards"



Time-triggered Query Caching: Issues

- **Can observe if query was taken from cache**
  - If debugging is turned on, query time shows "cached query"
    - Note that CFQUERY.ExecutionTime variable does NOT show this value
      - Shows "0", doesn't always mean it was a cached query
- **Important difference from variable-based caching**
  - Query remains where it normally would appear
  - No need to test existence, no shared variables used, no need to worry about <CFLOCK>

Time-triggered Query Caching: Dynamic Queries

- **A single CFQUERY may generate multiple cached results**
  - – If SQL is built dynamically, each unique SQL statement is cached separately
    - Consider search action page driven by form fields
      - – Same CFQUERY with different resulting SQL will create separate cached result
  - – Pro
    - Means more potential to benefit from cache
  - – Con
    - Means lots of cached results could be created

Time-triggered Query Caching: Admin Settings

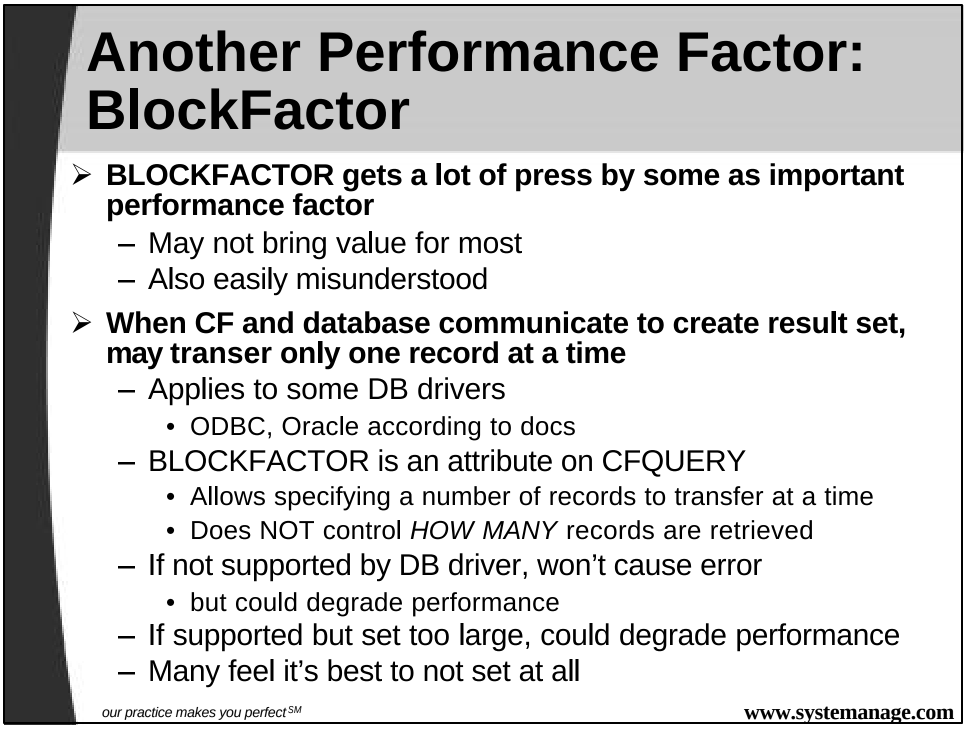
- **Time-triggered caching is governable by admin settings**
  - – Can restrict total number of cached queries allowed
  - – Limit the maximum number of cached queries on the server to xxx queries
    - When the limit is exceeded, oldest query is dropped and replaced
    - Defaults to 100 on installation of CF
  - – Can disable this sort of caching by setting to 0

Time-triggered Query Caching: Sharing Cached Results

- **Mentioned previously that unique SQL in same query will result in different cached results**
  - Conversely, and perhaps unexpectedly to many, cached result for given SQL can be reused by *another* CFQUERY
    - To reuse another query’s cached result, query must have identical SQL and DATASOURCE
      - And, if specified, identical DBTYPE and Login info
    - *Doesn’t* need to have same query NAME
    - Of course, doesn’t need to be in *same* template
      - Nor even in same *application*

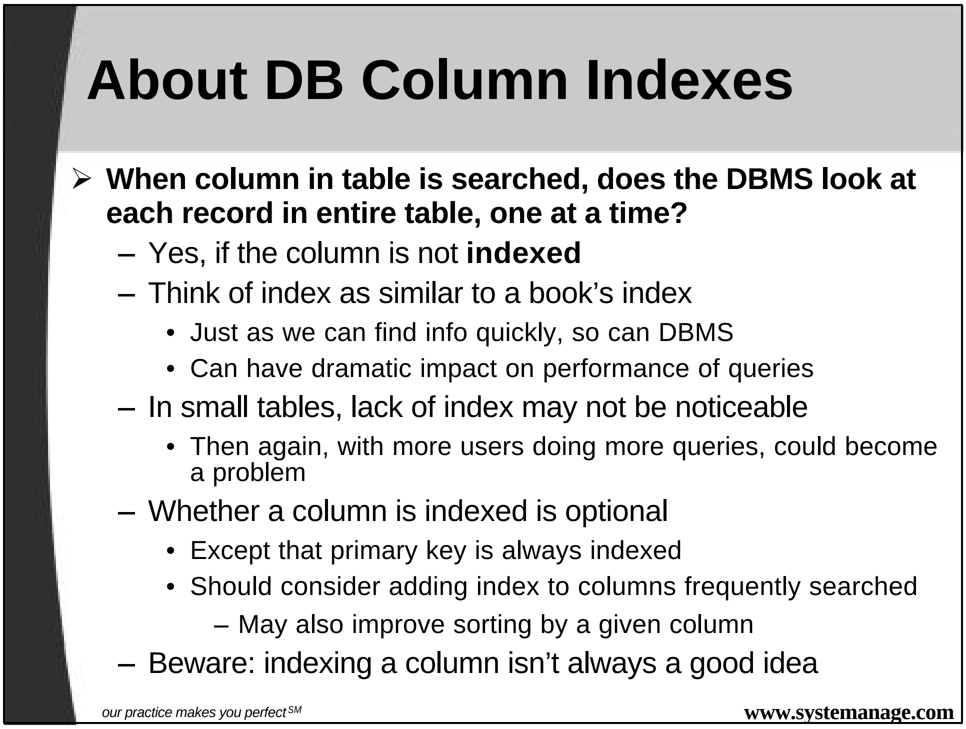
More About CachedAfter

- **CF docs are very sparse about CACHEDAFTER**
  - Both the docs and the Certification Study Guide say it supports only a date
    - Will support a date and time
      - Can specify date as any valid CF date, then add time
        - » such as “09/01/01 10:00pm” or “09-01-2001 22:00”
    - To cache each day as of 10pm, use
      - `CACHEDAFTER="#dateformat(now())# 22:00"`
    - Can’t, however, just specify a time



Another Performance Factor: BlockFactor

- ➢ **BLOCKFACTOR gets a lot of press by some as important performance factor**
  - – May not bring value for most
  - – Also easily misunderstood
- ➢ **When CF and database communicate to create result set, may transer only one record at a time**
  - – Applies to some DB drivers
    - ODBC, Oracle according to docs
  - – BLOCKFACTOR is an attribute on CFQUERY
    - Allows specifying a number of records to transfer at a time
    - Does NOT control *HOW MANY* records are retrieved
  - – If not supported by DB driver, won't cause error
    - but could degrade performance
  - – If supported but set too large, could degrade performance
  - – Many feel it's best to not set at all



About DB Column Indexes

- ➢ **When column in table is searched, does the DBMS look at each record in entire table, one at a time?**
  - – Yes, if the column is not **indexed**
  - – Think of index as similar to a book's index
    - Just as we can find info quickly, so can DBMS
    - Can have dramatic impact on performance of queries
  - – In small tables, lack of index may not be noticeable
    - Then again, with more users doing more queries, could become a problem
  - – Whether a column is indexed is optional
    - Except that primary key is always indexed
    - Should consider adding index to columns frequently searched
      - – May also improve sorting by a given column
  - – Beware: indexing a column isn't always a good idea

Indexing Cautions

- **Before rushing off to create indexes on too many columns, consider a few cautions:**
  - Each index requires time to be maintained during record insert/udpate operations
  - Not all data is suitable for indexing
    - Depending on indexing technique used by DBMS, data without many unique values may not benefit
      - State may not be good index while lastname is
  - Indexed data does add to storage requirement for DB

Creating/Adding Indexes

- **To add an index to a table for a given column**

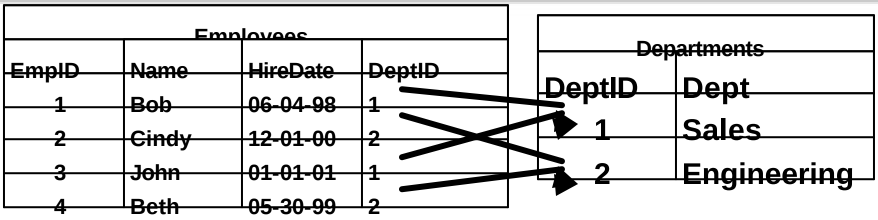
```
CREATE INDEX indexname
ON tablename (columnname)
```

  - *Indexname* must be unique within given table
  - Can create index before or after populating table with data
- **CF and even SQL coding isn't typically changed by adding indexes**
  - Just see improved query performance (at tradeoff of aforementioned cautions)

DB Reliability Solutions

- **Some DB reliability solutions:**
  - – Constraints
  - – Triggers
  - – Transaction Management
  - – Bind Parameters

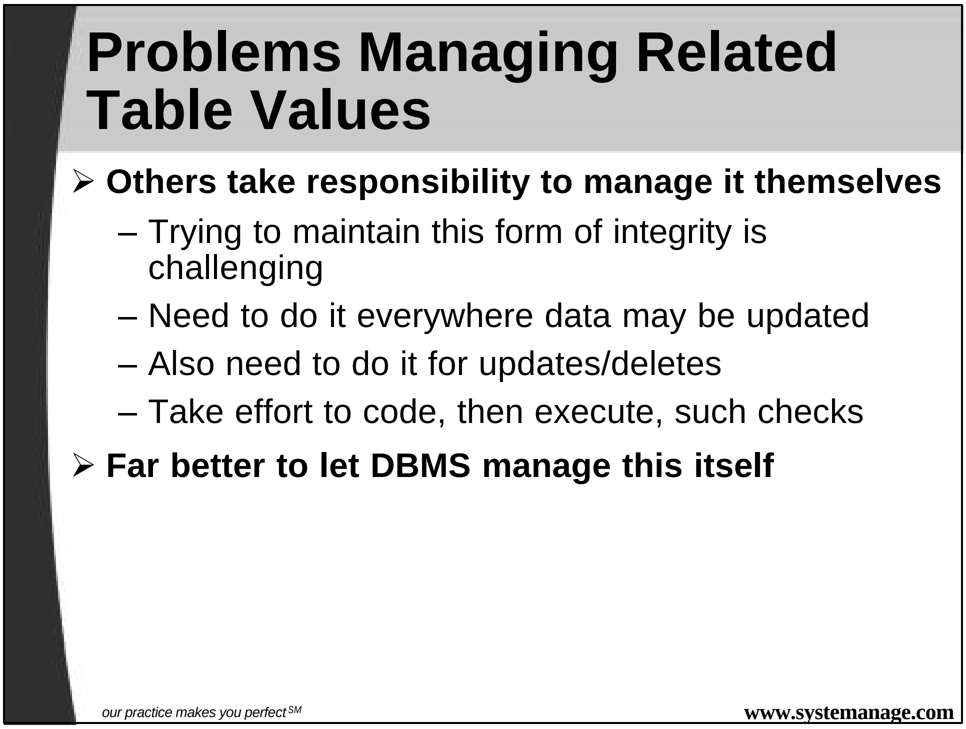
About DB Column Constraints



Employees			
EmpID	Name	HireDate	DeptID
1	Bob	06-04-98	1
2	Cindy	12-01-00	2
3	John	01-01-01	1
4	Beth	05-30-99	2

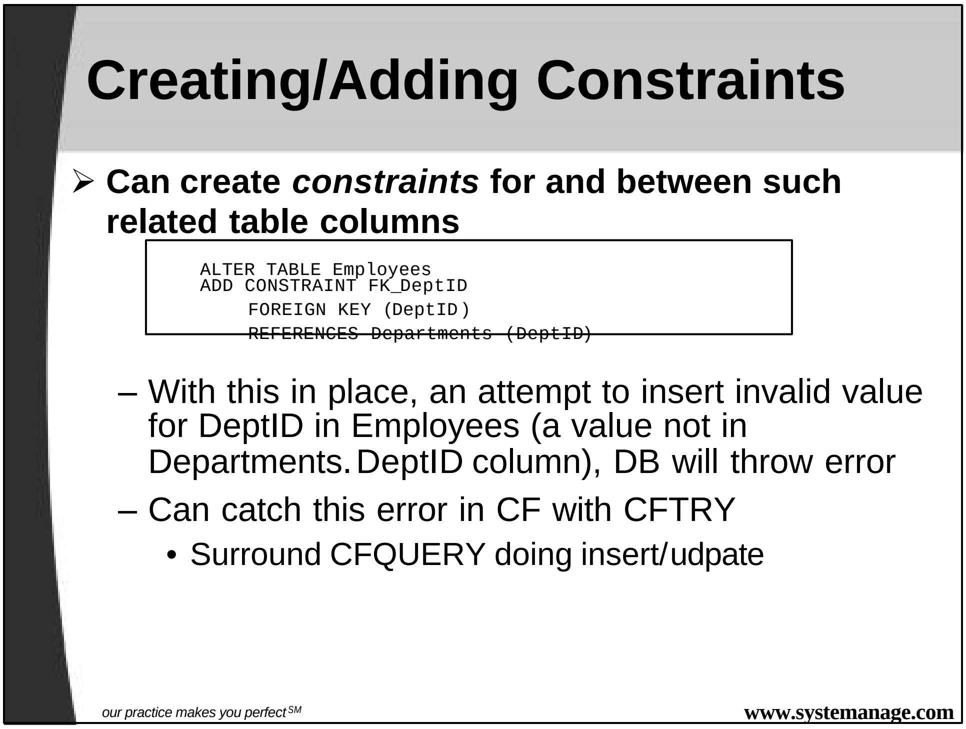
Departments	
DeptID	Dept
1	Sales
2	Engineering

- **In Database 2 seminar, we learned about inter-related tables and how to create JOINs between them**
  - – Learned that, in this example, values of Employees.DeptID reflect those in Departments.DeptID
    - Can be used to lookup Dept name by way of joining them
  - – What ensures that the only values stored in Employees.DeptID come from Departments.DeptID?
    - Many developers don't take steps to ensure this



Problems Managing Related Table Values

- **Others take responsibility to manage it themselves**
  - – Trying to maintain this form of integrity is challenging
  - – Need to do it everywhere data may be updated
  - – Also need to do it for updates/deletes
  - – Take effort to code, then execute, such checks
- **Far better to let DBMS manage this itself**

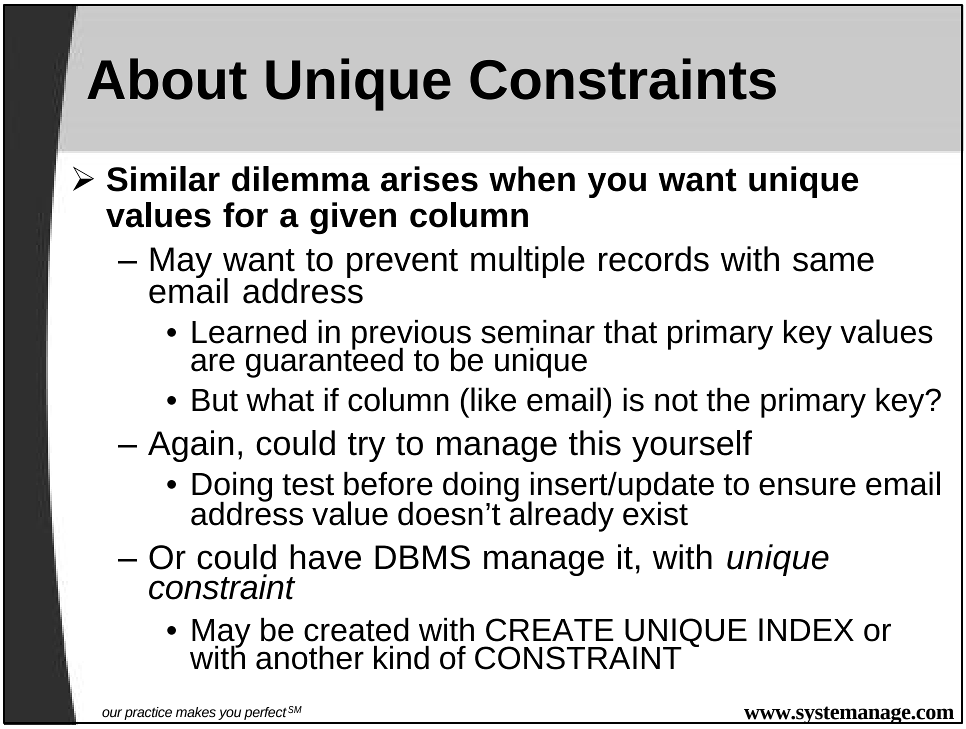


Creating/Adding Constraints

- **Can create *constraints* for and between such related table columns**

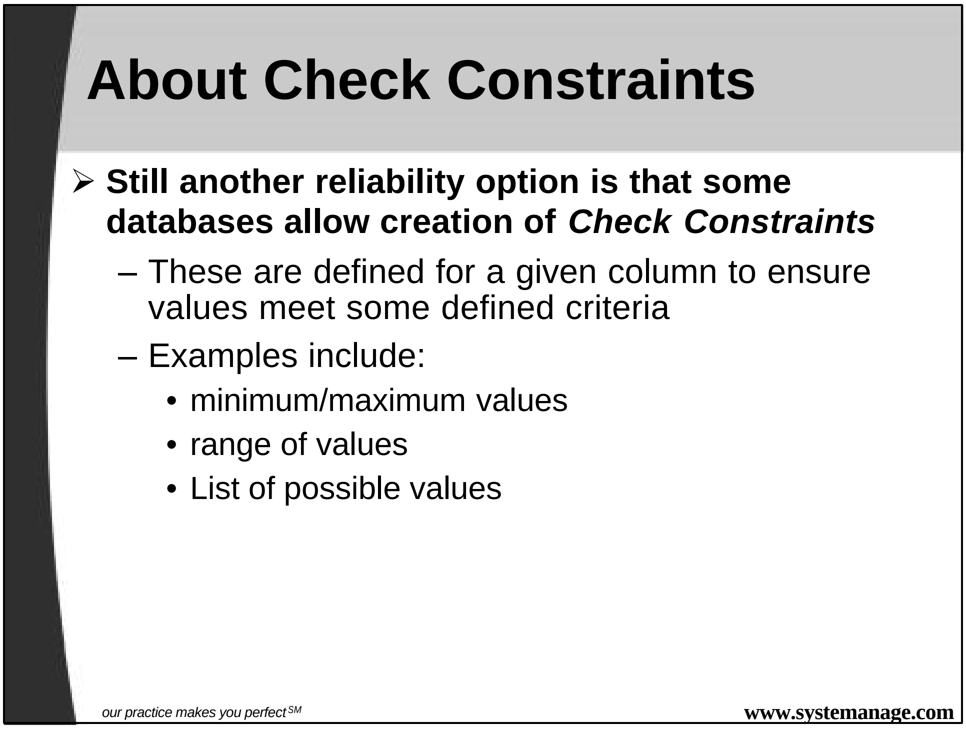
```
ALTER TABLE Employees
ADD CONSTRAINT FK_DeptID
    FOREIGN KEY (DeptID)
    REFERENCES Departments (DeptID)
```

  - – With this in place, an attempt to insert invalid value for DeptID in Employees (a value not in Departments.DeptID column), DB will throw error
  - – Can catch this error in CF with CFTRY
    - • Surround CFQUERY doing insert/udpate



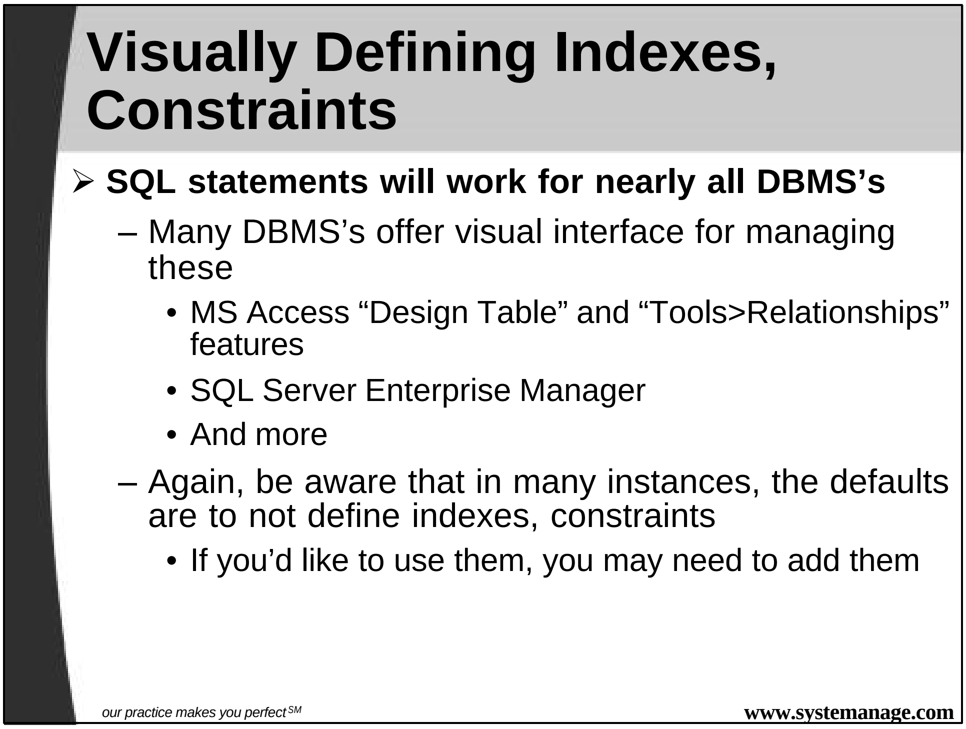
About Unique Constraints

- **Similar dilemma arises when you want unique values for a given column**
  - May want to prevent multiple records with same email address
    - Learned in previous seminar that primary key values are guaranteed to be unique
    - But what if column (like email) is not the primary key?
  - Again, could try to manage this yourself
    - Doing test before doing insert/update to ensure email address value doesn't already exist
  - Or could have DBMS manage it, with *unique constraint*
    - May be created with CREATE UNIQUE INDEX or with another kind of CONSTRAINT



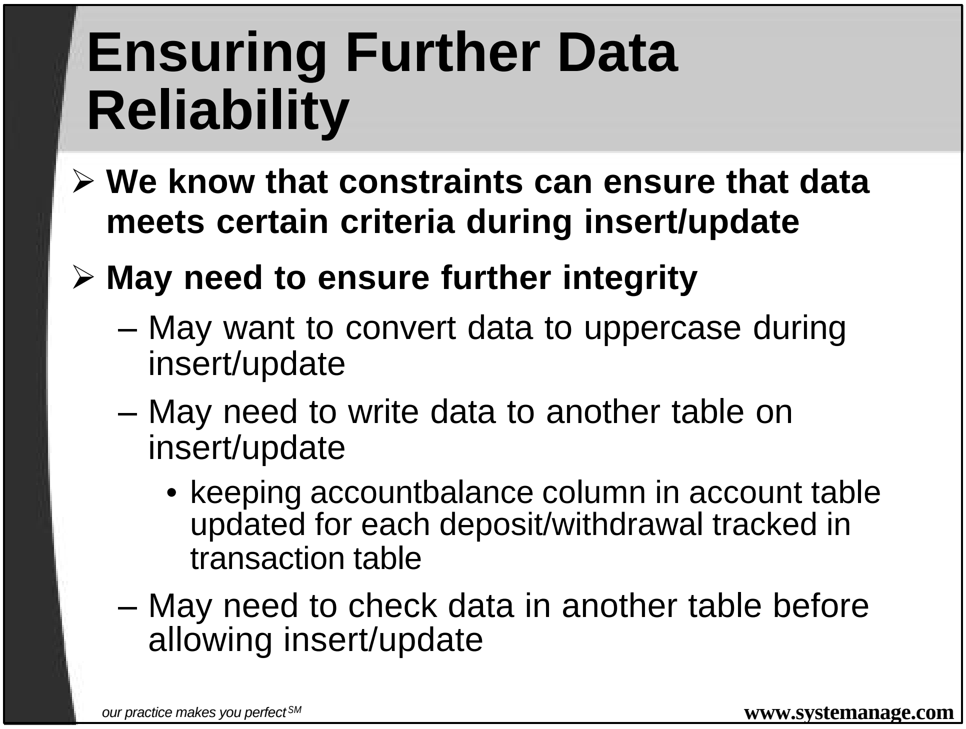
About Check Constraints

- **Still another reliability option is that some databases allow creation of *Check Constraints***
  - These are defined for a given column to ensure values meet some defined criteria
  - Examples include:
    - minimum/maximum values
    - range of values
    - List of possible values



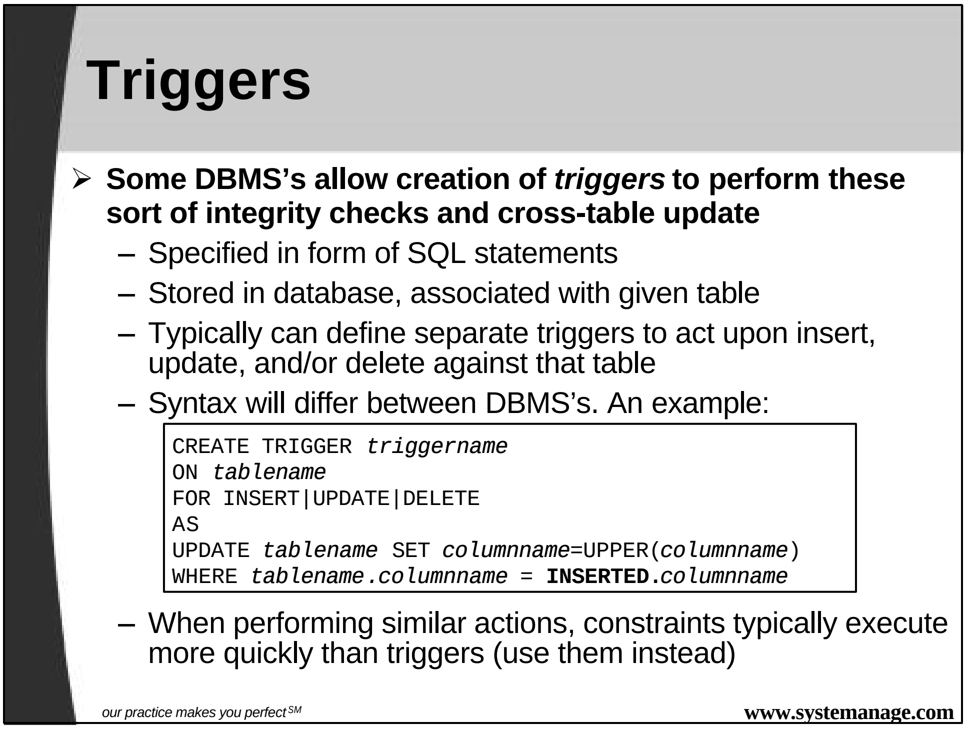
Visually Defining Indexes, Constraints

- **SQL statements will work for nearly all DBMS's**
  - Many DBMS's offer visual interface for managing these
    - MS Access "Design Table" and "Tools>Relationships" features
    - SQL Server Enterprise Manager
    - And more
  - Again, be aware that in many instances, the defaults are to not define indexes, constraints
    - If you'd like to use them, you may need to add them



Ensuring Further Data Reliability

- **We know that constraints can ensure that data meets certain criteria during insert/update**
- **May need to ensure further integrity**
  - May want to convert data to uppercase during insert/update
  - May need to write data to another table on insert/update
    - keeping accountbalance column in account table updated for each deposit/withdrawal tracked in transaction table
  - May need to check data in another table before allowing insert/update

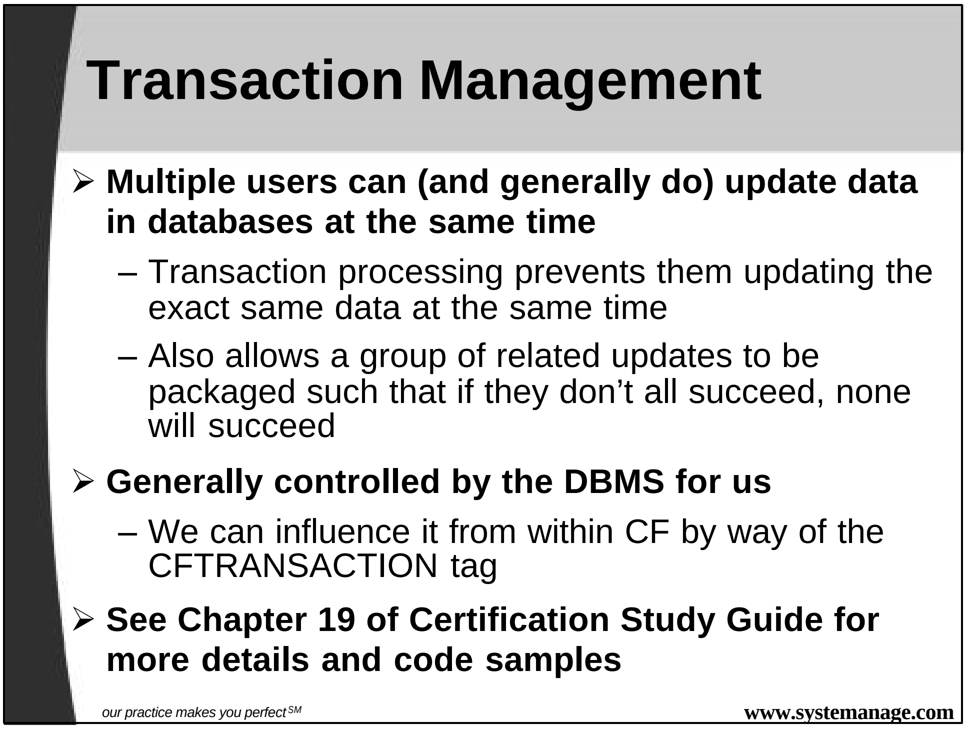


Triggers

- **Some DBMS's allow creation of *triggers* to perform these sort of integrity checks and cross-table update**
  - Specified in form of SQL statements
  - Stored in database, associated with given table
  - Typically can define separate triggers to act upon insert, update, and/or delete against that table
  - Syntax will differ between DBMS's. An example:

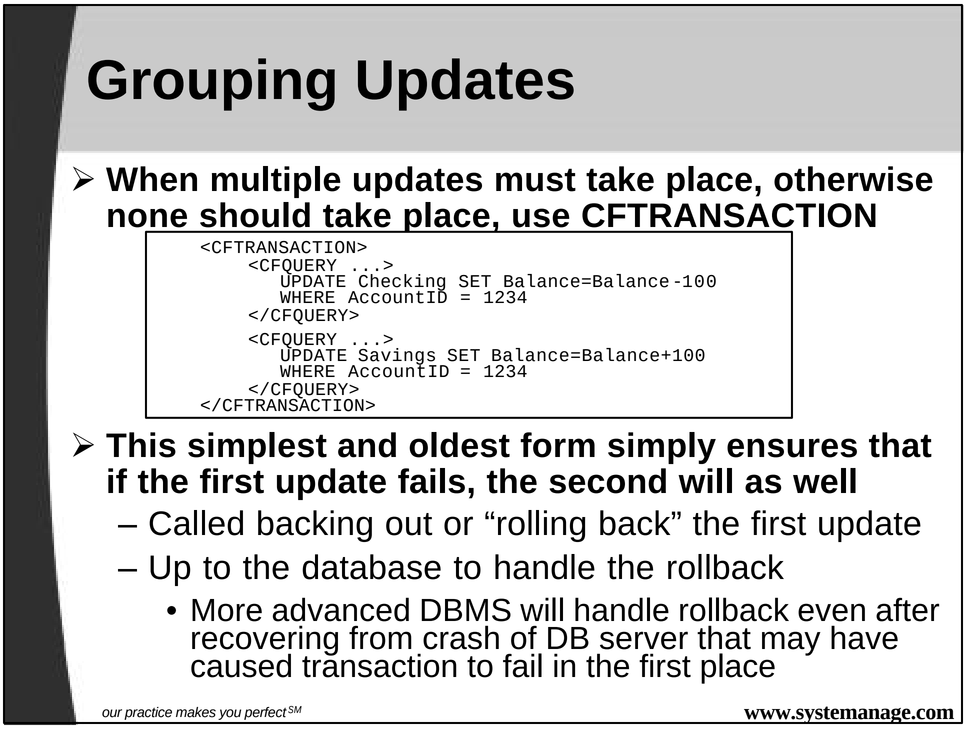
```
CREATE TRIGGER triggername
ON tablename
FOR INSERT|UPDATE|DELETE
AS
UPDATE tablename SET columnname=UPPER(columnname)
WHERE tablename.columnname = INSERTED.columnname
```

  - When performing similar actions, constraints typically execute more quickly than triggers (use them instead)



Transaction Management

- **Multiple users can (and generally do) update data in databases at the same time**
  - Transaction processing prevents them updating the exact same data at the same time
  - Also allows a group of related updates to be packaged such that if they don't all succeed, none will succeed
- **Generally controlled by the DBMS for us**
  - We can influence it from within CF by way of the CFTRANSACTION tag
- **See Chapter 19 of Certification Study Guide for more details and code samples**

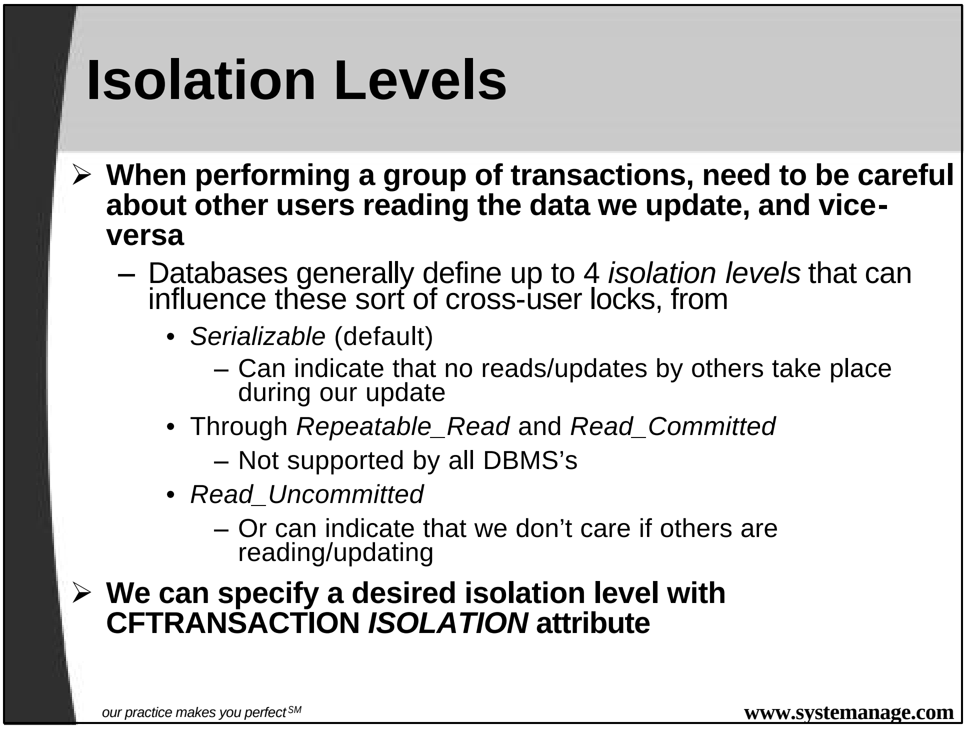


Grouping Updates

- **When multiple updates must take place, otherwise none should take place, use CFTRANSACTION**

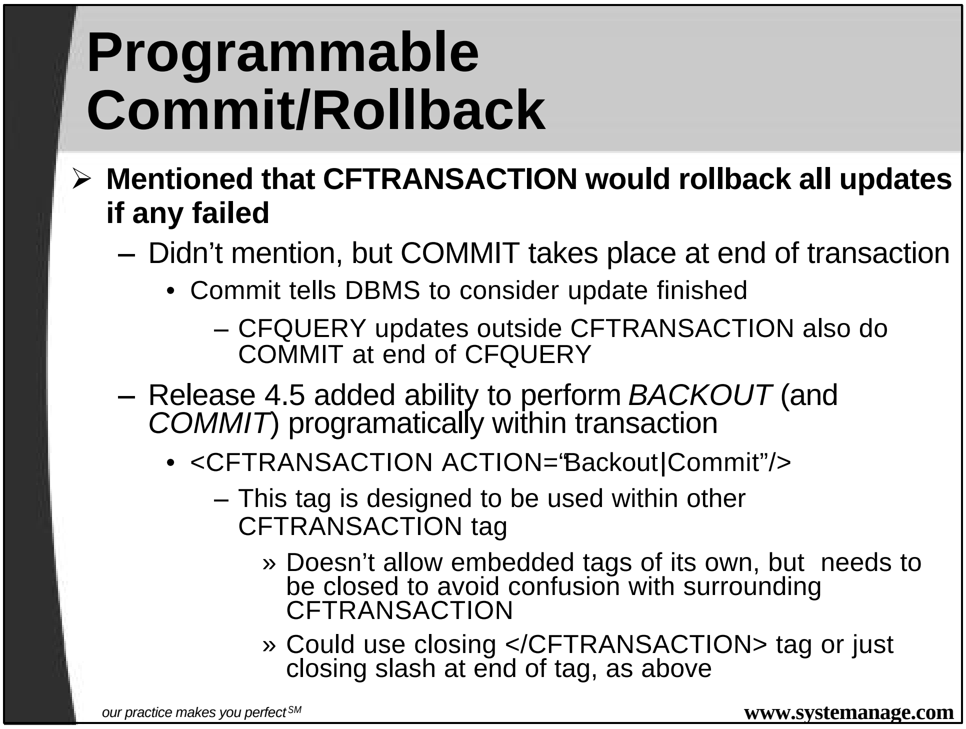
```
<CFTRANSACTION>
    <CFQUERY ...>
       UPDATE Checking SET Balance=Balance-100
       WHERE AccountID = 1234
    </CFQUERY>
    <CFQUERY ...>
       UPDATE Savings SET Balance=Balance+100
       WHERE AccountID = 1234
    </CFQUERY>
</CFTRANSACTION>
```

- **This simplest and oldest form simply ensures that if the first update fails, the second will as well**
  - Called backing out or “rolling back” the first update
  - Up to the database to handle the rollback
    - More advanced DBMS will handle rollback even after recovering from crash of DB server that may have caused transaction to fail in the first place



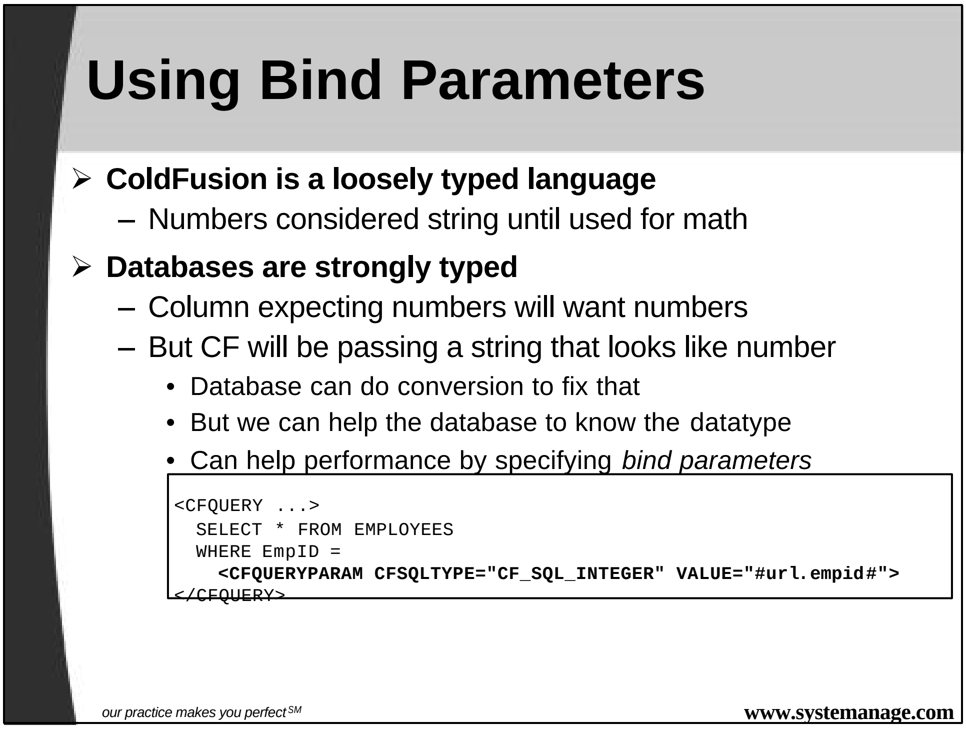
Isolation Levels

- **When performing a group of transactions, need to be careful about other users reading the data we update, and vice-versa**
  - Databases generally define up to 4 *isolation levels* that can influence these sort of cross-user locks, from
    - *Serializable* (default)
      - Can indicate that no reads/updates by others take place during our update
    - Through *Repeatable_Read* and *Read_Committed*
      - Not supported by all DBMS’s
    - *Read_Uncommitted*
      - Or can indicate that we don’t care if others are reading/updating
- **We can specify a desired isolation level with CFTRANSACTION *ISOLATION* attribute**



Programmable Commit/Rollback

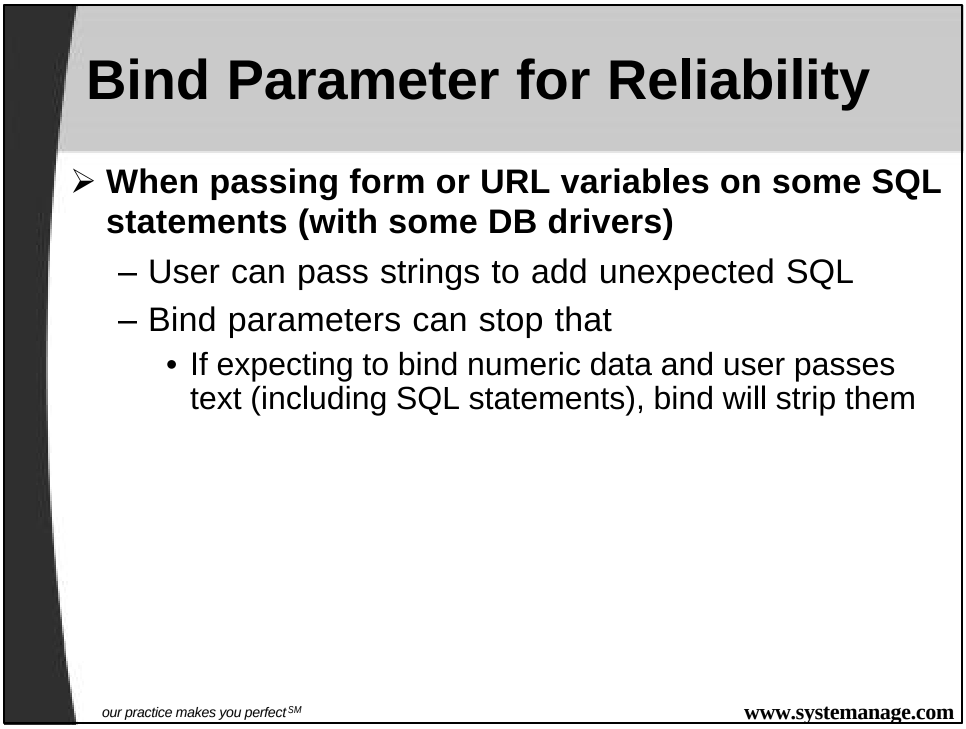
- **Mentioned that CFTRANSACTION would rollback all updates if any failed**
  - Didn’t mention, but COMMIT takes place at end of transaction
    - Commit tells DBMS to consider update finished
      - CFQUERY updates outside CFTRANSACTION also do COMMIT at end of CFQUERY
  - Release 4.5 added ability to perform *BACKOUT* (and *COMMIT*) programatically within transaction
    - <CFTRANSACTION ACTION=“Backout|Commit”/>
      - This tag is designed to be used within other CFTRANSACTION tag
        - » Doesn’t allow embedded tags of its own, but needs to be closed to avoid confusion with surrounding CFTRANSACTION
        - » Could use closing </CFTRANSACTION> tag or just closing slash at end of tag, as above



Using Bind Parameters

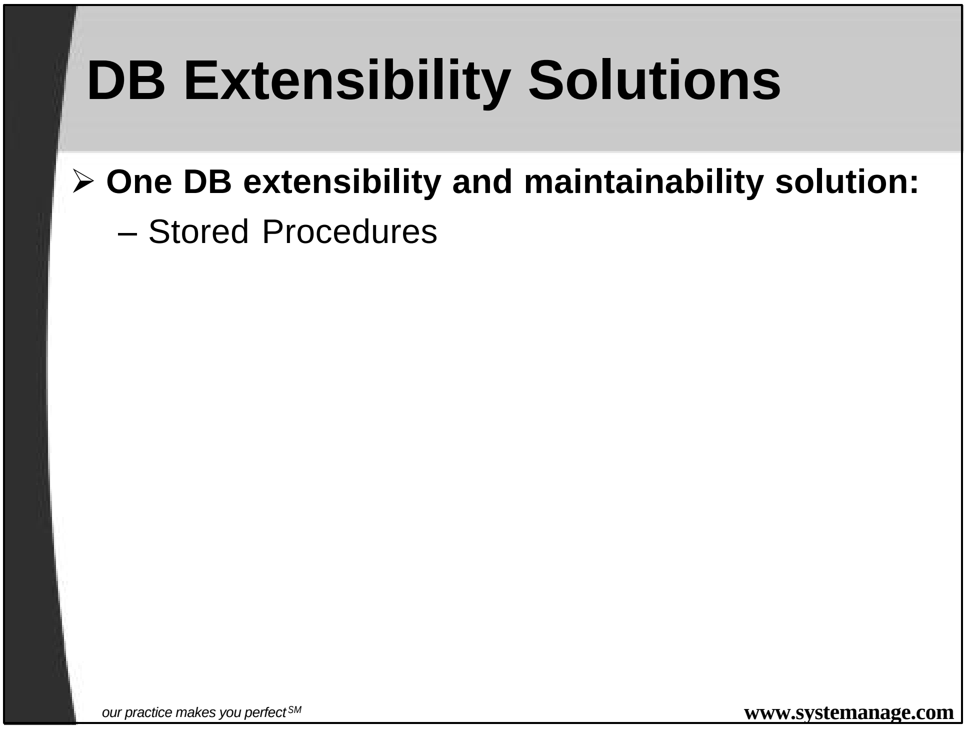
- **ColdFusion is a loosely typed language**
  - Numbers considered string until used for math
- **Databases are strongly typed**
  - Column expecting numbers will want numbers
  - But CF will be passing a string that looks like number
    - Database can do conversion to fix that
    - But we can help the database to know the datatype
    - Can help performance by specifying *bind parameters*

```
<CFQUERY ...>
  SELECT * FROM EMPLOYEES
  WHERE EmpID =
    <CFQUERYPARAM CFSQLTYPE="CF_SQL_INTEGER" VALUE="#url.empid#">
</CFQUERY>
```



Bind Parameter for Reliability

- **When passing form or URL variables on some SQL statements (with some DB drivers)**
  - User can pass strings to add unexpected SQL
  - Bind parameters can stop that
    - If expecting to bind numeric data and user passes text (including SQL statements), bind will strip them



DB Extensibility Solutions

- **One DB extensibility and maintainability solution:**
  - Stored Procedures

About Stored Procedures

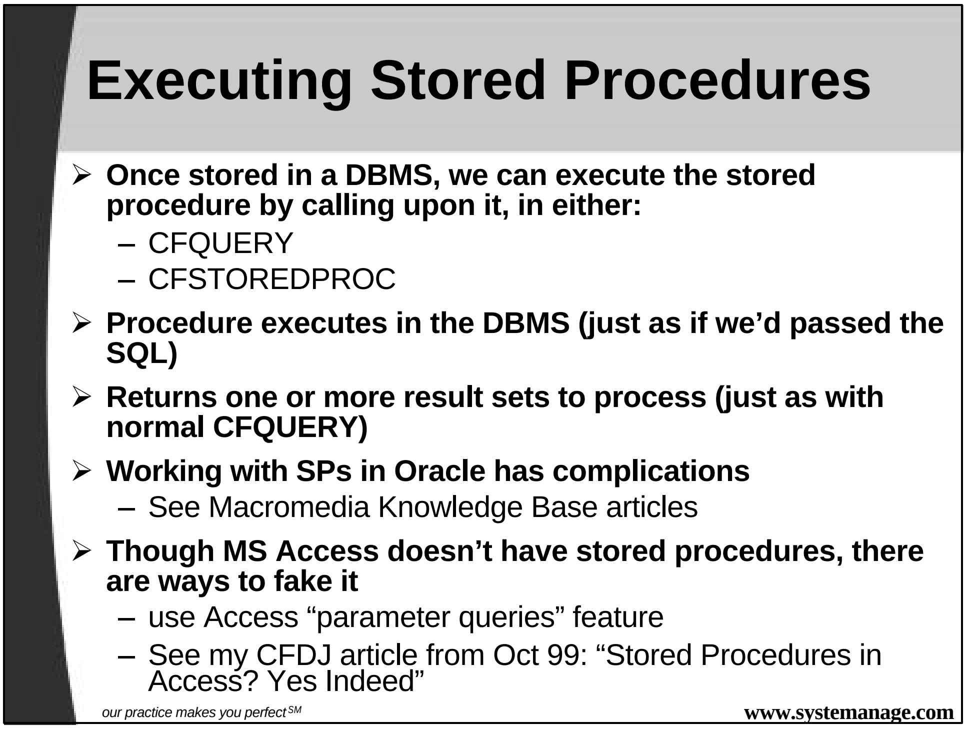
- **We typically specify SQL statements within CFQUERY tags within our CF templates**
  - What if multiple templates would execute same SQL?
  - While we could use CFINCLUDE to re-use this code, there are options in most DBMS's to store that code in the DBMS
  - Then would call upon it much like we call a custom tag
    - But instead of executing CF code, it just executes SQL
  - Each DBMS has its own language for the SQL to be used for such stored procedures, for instance:
    - Oracle: PL/SQL
    - SQL Server: T/SQL

Creating Stored Procedures

- **Other benefits:**
  - Stored procedure typically compiled and stored in DBMS
  - Parameters can be passed to procedure to be used in SQL execution
  - Can create and use variables, pass data among statements, and perform conditional processing within the SQL
  - Can execute multiple statements in one procedure
  - Stored procedure may be able to return multiple record sets
  - Example might be:

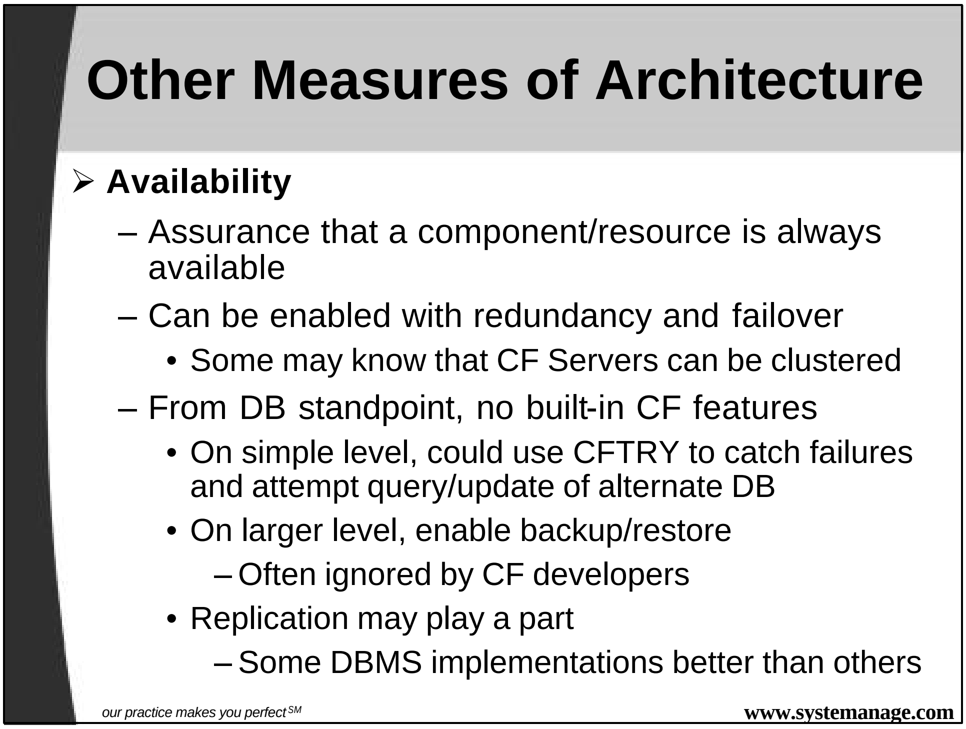
```
CREATE PROCEDURE procedurename in/outparms
ON tablename
AS
SQL statements
```

  - Can create Stored Procedures using CFQUERY
    - More typically created in DBMS, managed by DB Admin



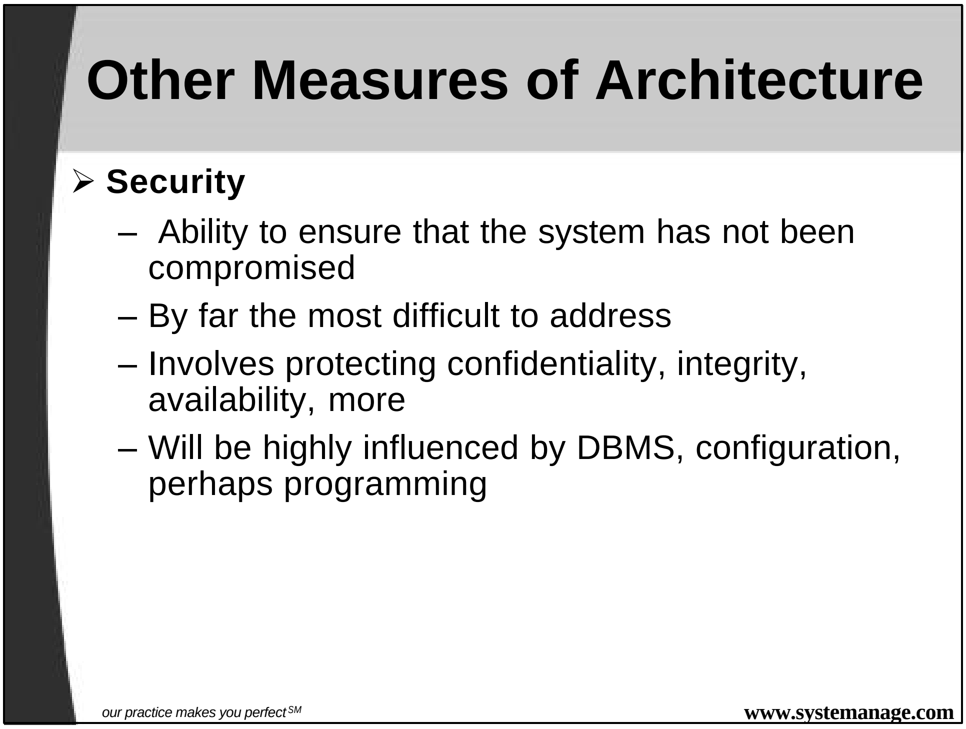
Executing Stored Procedures

- Once stored in a DBMS, we can execute the stored procedure by calling upon it, in either:
  - – CFQUERY
  - – CFSTOREDPROC
- **Procedure executes in the DBMS (just as if we'd passed the SQL)**
- **Returns one or more result sets to process (just as with normal CFQUERY)**
- **Working with SPs in Oracle has complications**
  - – See Macromedia Knowledge Base articles
- **Though MS Access doesn't have stored procedures, there are ways to fake it**
  - – use Access "parameter queries" feature
  - – See my CFDJ article from Oct 99: "Stored Procedures in Access? Yes Indeed"



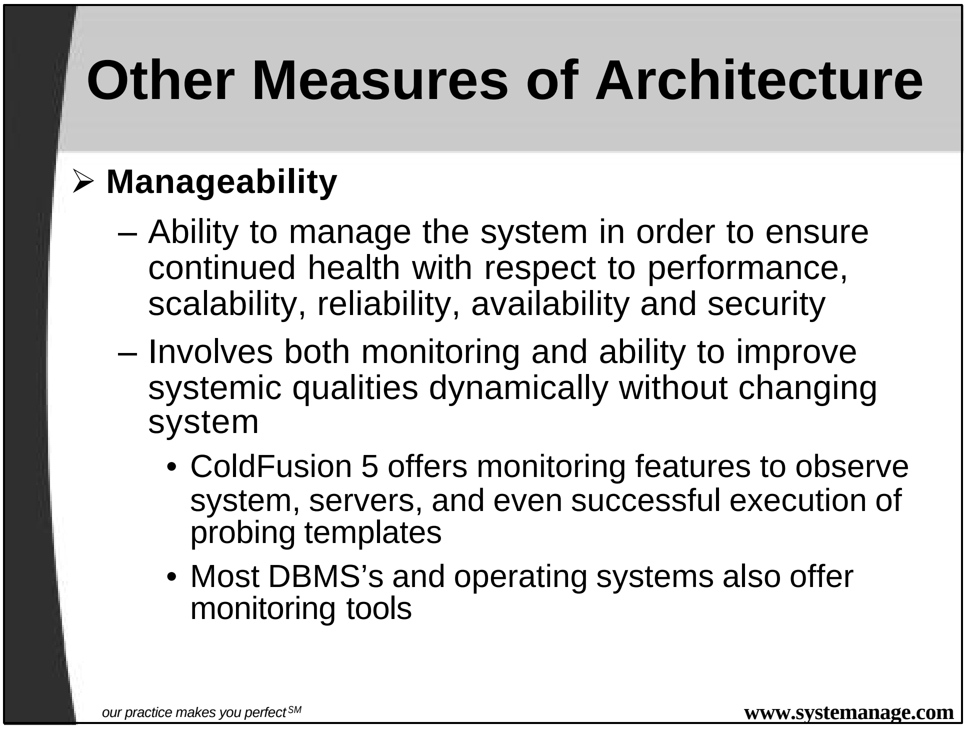
Other Measures of Architecture

- **Availability**
  - – Assurance that a component/resource is always available
  - – Can be enabled with redundancy and failover
    - • Some may know that CF Servers can be clustered
  - – From DB standpoint, no built-in CF features
    - • On simple level, could use CFTRY to catch failures and attempt query/update of alternate DB
    - • On larger level, enable backup/restore
      - – Often ignored by CF developers
    - • Replication may play a part
      - – Some DBMS implementations better than others



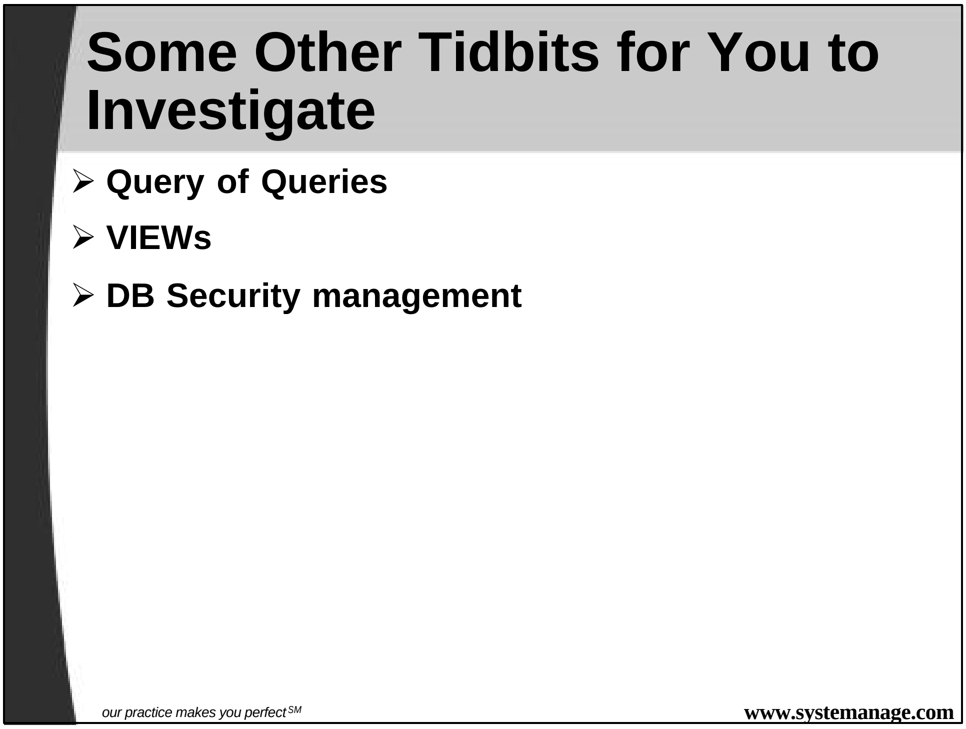
Other Measures of Architecture

- **Security**
  - – Ability to ensure that the system has not been compromised
  - – By far the most difficult to address
  - – Involves protecting confidentiality, integrity, availability, more
  - – Will be highly influenced by DBMS, configuration, perhaps programming



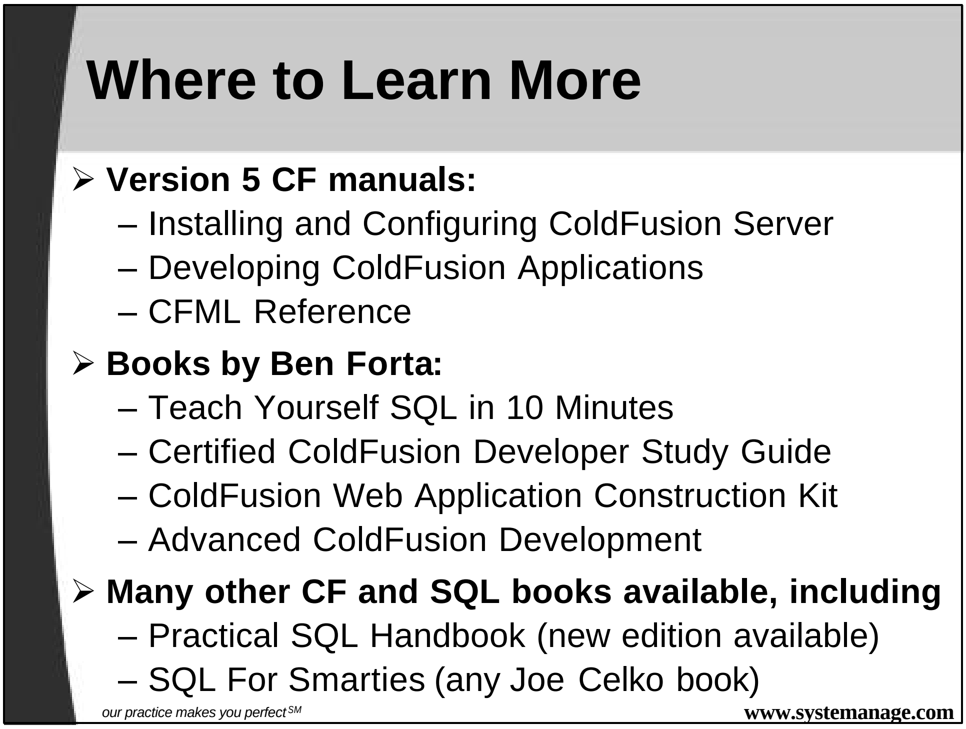
Other Measures of Architecture

- **Manageability**
  - – Ability to manage the system in order to ensure continued health with respect to performance, scalability, reliability, availability and security
  - – Involves both monitoring and ability to improve systemic qualities dynamically without changing system
    - • ColdFusion 5 offers monitoring features to observe system, servers, and even successful execution of probing templates
    - • Most DBMS's and operating systems also offer monitoring tools



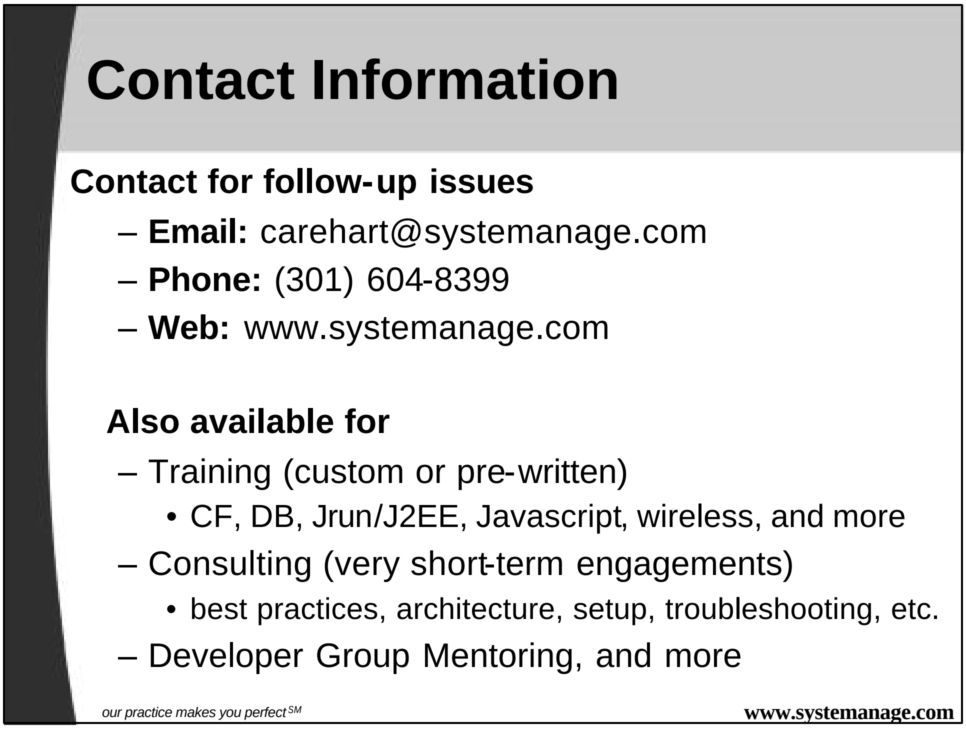
Some Other Tidbits for You to Investigate

- **Query of Queries**
- **VIEWs**
- **DB Security management**



Where to Learn More

- **Version 5 CF manuals:**
  – Installing and Configuring ColdFusion Server
  – Developing ColdFusion Applications
  – CFML Reference
- **Books by Ben Forta:**
  – Teach Yourself SQL in 10 Minutes
  – Certified ColdFusion Developer Study Guide
  – ColdFusion Web Application Construction Kit
  – Advanced ColdFusion Development
- **Many other CF and SQL books available, including**
  – Practical SQL Handbook (new edition available)
  – SQL For Smarties (any Joe Celko book)



Contact Information

Contact for follow-up issues

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- **Web:** www.systemanage.com

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- Training (custom or pre-written)
  - CF, DB, Jrun/J2EE, Javascript, wireless, and more
- Consulting (very short-term engagements)
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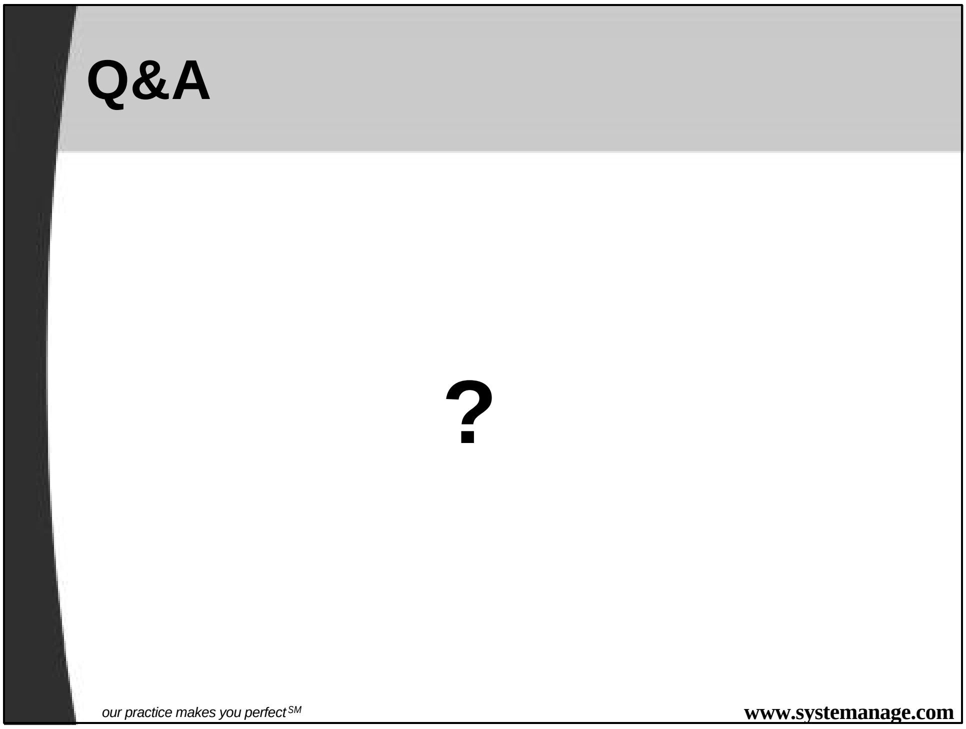

Q&A

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