E-Testing: Debugging Your CF Apps

How your HTML, CFML, and web application
looks, works, scales, and more

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The Challenge

- Finished coding app or fix to app
  - Ready to turn over to users
  - Have you tested the code?
    - "Running the code" isn't enough
- Need to evaluate software quality
  - End-user experience may differ from yours
  - Anticipate load, ongoing maintenance
- Cheaper to fix problems early
- Issues apply to lone developer or team
  - Tools exist, though many don't use them

Topics

- Seminar covers:
  - HTML-oriented Testing
  - CFML Code Testing
  - Web Application Testing
  - CFML Debugging

- Will look at 30 tests and point to resources to learn more
- How many are using any such tools?

Who Am I?

- A programmer by trade, trainer at heart
  - With nearly 20 years IT experience
    - 5 years ColdFusion, 1 year server-side Java
  - Monthly contributor to ColdFusion Developer Journal, bi-monthly columnist in Java Developer Journal
  - Speaker at user groups, conferences worldwide
  - Macromedia Certified Instructor & Developer
  - Course developer
- Practical Training and Hi-Gear Consulting

Part 1: HTML Testing

- ◆ 13 different tests (that I've identified)
  - From simple validation to effects of browser caching, cookie, and javascript support
- ◆ Many CF developers dismiss them
  - But they're free
  - Valuable, if used effectively
    - Challenge: Need to test *output* of CF template
- ◆ Failure to use costs you, company, client
  - in time and debugging effort
- ◆ Simplest test: Is your HTML valid?
  - Will code work in browser? All browsers?

Studio HTML Validation

- ◆ Studio offers HTML validation
  - Tools>Validate Document
    - Provides warnings and errors about HTML problems
  - Problem: need to test output, not source
    - Solution: Copy/paste output of your CF template into Studio blank page, then validate
  - Can even indicate which browser to support
    - Options>Settings>Validation
  - Can set which CF versions to support
    - When validating CF source, warns if tag/function not supported in chosen CF version
    - Useful when developing in R5, deploying in R4.5

HTML Validation Services

- ◆ Web-based services even easier
  - ▪ Such as http://validator.w3.org
  - ▪ Just point it to your site: it sees your HTML output
    - • If inside firewall, make copy of output available
  - ▪ Others:
    - • NetMechanic.com
    - • Netscape's "Web Site Garage"
      - ◆ http://websitegarage.netscape.com/O=wsg/tuneup_plus/index.html
    - • Search net for "html validation" for others

Other HTML Validations

- ◆ Other HTML-oriented tests available at this site (and others like it) include:
  - ▪ Link checking
    - • Also available within Studio
  - ▪ Spell checking
    - • Also available within Studio
  - ▪ Document weight (download time) testing
    - • Also available within Studio
  - ▪ Cascading StyleSheet validation
  - ▪ Color depth (browser safe palette) testing
  - ▪ Image compression testing

Additional Testing

- ◆ See article for further discussion
  - ■ Browser size testing
    - ● Studio feature supports testing; web services and shareware available
  - ■ JavaScript error testing
    - ● By default, modern browsers may hide JavaScript errors (from users and YOU!)
    - ● Turn errors back on during your testing

Accessibility Testing

- ◆ Providing access for disabled visitors
  - ■ Section 508 of US Federal Rehabilitation Act
  - ■ Useful for all developers and users
  - ■ Several sites provide info/support testing, including
    - ● http://www.cast.org/bobby
    - ● http://www.microsoft.com/enable/

Additional Accessibility Testing Tools *

- Have identified more accessibility testing tools since writing the article
  - Usable.Net (Macromedia Partner)
    - LIFT for DreamWeaver/UltraDev
      - Tools for accessibility and usability testing
      - Also available as web service:
        http://www.usablenet.com/lift_online_free_trial/index.htm
  - W3 tools for accessibility
    - http://www.w3.org/WAI/ER/existingtools.html

Additional Tests *

- Have identified still more useful tests since writing the article last year
  - These involve making changes to your browser to mimic settings users might make
  - Can't cover details in this given timeslot
    - Will identify tests, enough for you to research
  - Detailed steps provided in available daylong seminar (see last slide for info)
    - Also provides time to show use of tests and tools already discussed and more still to come today

Additional Tests *

- Testing disabled JavaScript
  - How does your app run if browser does not support JavaScript?
    - Can disable javascript and test
- Testing disabled cookies
  - How does your app run if browser does not support cookies? Big problem for sessions
    - Can disable cookies and test
      - Just be sure to clear any already set in browser

Topic Not Discussed in CFDJ Article

Additional Tests *

- Testing browser caching
  - How does your app run with different settings for browser page caching?
  - Can code to prevent caching (CFHEADER)
  - Should at least test with typical user cache settings

Topic Not Discussed in CFDJ Article

Part 2: CFML Code Testing

- ◆ Feeling cheated with focus on HTML testing?
- ◆ Wondering if CFML code testing is at all possible?
  - ▪ It is, but many developers don't know

4 Forms of CFML Testing

- ◆ Syntax checking
- ◆ Code quality testing
- ◆ Included file testing
- ◆ Code timing

CFML Syntax Checking

- CF includes a syntax checker
  - http://localhost/CFDOCS/cfmlsyntaxcheck/cfmlsyntaxcheck.cfm
- Available as of CF 4
  - Originally intended to ensure old code worked with changes in new release
  - Useful for testing code to at least ensure certain syntax errors have not been introduced before release
  - Doesn't really test all syntax
    - not updated for CF5
  - More details in article

CFML Code Quality Testing

- Previous tool doesn't test software quality
  - Whether it will perform well
  - Whether you've made any common CF coding mistakes
- Java and other languages have such tools
  - Why not CF?
  - Is it a pipe dream?

Steve Nelson's STOMP

- As in "stomp the bugs"
- Available from SecretAgents.com
  - Offered as fee-based web service
  - www.secretagents.com/products/index.cfm?fuseaction=product&product_id=1
- Some will find it worth every penny
  - Available for free trial

About Stomp

- Process of submitting code
  - Submit zip of source code to web service
- Report made available in minutes
  - What to fix, why, and how
- Identifies common (and some easily forgotten) CFML code problems

Sample Errors

- Suggested maxlength for form input field
- Suggested removing Select *
- Recommended <CFSETTING ENABLECFOUTPUTONLY="yes"> for templates with no text for display (or all the text was within CFOUTPUTs)
- Recommended changing a .cfm file to .htm (had no CF code)
- Recommended case-insensitive versions of find/replace/compare functions
- And more

Worthwhile?

- I knew not to do (or to do) many of these
  - Still, I had overlooked them, been lazy
- But I can look on the bright side
  - Only flagged a few out of hundreds of potential errors!
  - Complete list of the tests (which itself may be useful) currently offered at
    www.secretagents.com/content/index.cfm?fuseaction=testlist

Depth and Flexibility

- Depth of reporting can be drawback
  - Like grammar tools in word processors
    - Can be overwhelming number of errors found
- Also, you may not agree that an error should be flagged
  - Or perhaps it should be a suggestion instead
- Report is presented via Stomp web site
  - each error offers link to send feedback to Stomp administrator about an error

Another Code Testing Tool: ParseDog

- Focuses on identifying whether custom tag and CFINCLUDE files exist
  - has some extra features that may interest you
    http://aloha-webdesign.com/dloads/cf/parsedog/releasenotes.htm

Code Timing

- How long does it take code to run?
  - No automated "profiling" tools, yet
  - Can "roll your own" with CF's getTickCount() function
    - See CF docs for simple, useful example
- How long to compile? To run query?
  - CF Admin Debugger info can show several aspects
    - "show detailed processing time breakdown" option shows for all included templates, custom tags

Part 3: Web Application Testing

- How application as a whole (CF, HTML, JavaScript, etc.) works
  - In both reasonable and unexpected situations
- Covers several possible tests…

Web App Testing

- Data validation and "bounds" checking
  - Does your code handle unexpected input well?
- Functionality testing
  - Does the code work as expected?
- Security testing
  - Are only authenticated, authorized activities able to take place?
- 4 more, to be discussed later

How to Test These

- One approach is Acceptance Testing
  - Simply run the code (or have testers do it)
    - See if it does what's expected (with good/bad input)
- Another is Regression Testing
  - Run the code after making any changes, to make sure it produces same result as before
- Useful solution: session record/playback tools
  - Better tools test entire app, not just _a_ page

Like a VCR

- Most tools work like a VCR
  - Point to starting web page, click "record" and run through site as user would
    - tracks all button clicks, mouse clicks, links taken, even JavaScript or Flash events fired (in better tools)
  - Then playback
    - Can setup automated repeated playback
  - Most allow parameter-driven tests using data in a file or database
    - Allows testing of good, bad data, large volumes

Prominent Testing Tools

- Empirix (formerly RSW Software)
  - www.empirix.com
- Mercury-Interactive
  - www.mercuryinteractive.com
- Segue
  - www.segue.com
- Rational
  - www.rational.com
- All mature, relatively expensive

Prominent Testing Tools

- OpenDemand's OpenLoad
  - Hosted web load testing service
  - http://www.opendemand.com/cf/
- Newcomer, less expensive: Evalid
  - www.soft.com/eValid/
- Microsoft Web App Stress test tool
  - Freebie: well-equipped
  - http://webtool.rte.microsoft.com/

Still More Web App Testing

- Concurrency testing
- Performance/load testing
- Site monitoring

- Let's look at each…

Concurrency Testing

- Are there problems when multiple users access the code, or when a single user opens multiple browsers?
  - Not even really about "load" testing, just testing more than a single user!
  - Many sites brought to their knees with just a couple extra users
- Simple freeware stress testing tools may help with this
  - What happens running even a single page

Free Stress Testing Tools

- WebHammer
  - http://www.serverobjects.com/products.htm
  - Eval version limited to 2 request threads
- Paessler Webserver Stress Tool
  - http://www.paessler.com/tools/WebStress/webstress.htm
  - Free for 5 users, modest cost to add more
- Simply simulate http requests to a given page on server
  - Problem: often need to test more than just a given page, and with lots of different data

Performance/load testing

- Also, beyond simple concurrency testing
    - Can the code (and environment) sustain a large load of hundreds, thousands of users?
- Recorded, parameterized tests of previous reord/playback testing tools can be re-used
    - Is where these tools really shine

Load Testing Process

- Extensions to previous testing tools
    - Rerun the same recorded scripts
        - Some load tools use special scripting instead
    - Parameterize for varying data (using file or database)
    - Use tool's feature to create "virtual users"
        - Can mimic many, perhaps thousands, hitting the site and running through paths of pages
        - Not just banging away on a single page
    - Measure/report performance

Site monitoring

- Similar to previous tests, but monitoring automatically, over long run
  - Is the site up? Is anyone aware when it goes down? Did changes break the site?
- Can also leverage previous tools' recorded scripts
  - Each vendor offers monitoring tools to extend functional and load testing for ongoing monitoring

More Site Monitoring

- Smaller players exist as well
  - freshwater.com, tracert.com, others
    - Some just ping site to report if it's up or not
- CF5 offers probe mechanism to do this as well
  - See Admin>Tools>System Probes

Other Web App Testing

- Still other tests can be considered
  - COM/EJB/CORBA/Java component testing
  - Web service testing
  - WAP/WML testing
  - Search engine result optimization testing
- Will leave it to you to investigate

Other E-Testing

- May consider other testing as well
  - usability
  - documentation
  - installation
  - configuration
  - reliability/recovery
  - end-to-end
  - unit
  - white/gray/black-box

Don't Forget Acceptance Testing

- ◆ Is the code really what the user wants?
- ◆ More about prototyping than testing
    - ▪ During design, development, before rollout
- ◆ Wireframing
    - ▪ Create simple but adequate representations of the look and feel (and flow) of a site
    - ▪ Embraced by FuseBox community
        - • But all can benefit
    - ▪ Discussed in CFDJ article by Hal Helms
        - • "Exploring the Development Process," Vol 3, Issue 3

Integration Testing

- ◆ Your CF App and server interact with other servers and services
- ◆ Test also availability/performance of
    - ▪ Web Server, Cluster (if any)
    - ▪ Application Server (CF)
    - ▪ Database, DBMS, database server
    - ▪ Mail server, ftp server, so on

CFML Debugging *

- Though not really "testing", remember:
  - Administrator-enabled Debugging
    - what variables are being passed to this template, and how long is it taking to run?
  - CFDUMP
    - what are the current variables and their values?
  - Log analysis
    - what errors are occurring, to whom, and why?
  - Error Handling
    - Trapping and sending notification of errors`

Topic Not Discussed in CFDJ Article

Studio Debugger *

- Studio integrated debugger can be powerful
  - what lines of code are executing and why
    - Set breakpoints, monitor/change variables
    - Stop when given condition is reached
  - Problem: hard to setup, sometimes flaky
  - It can work. Daylong seminar will cover use
    - Also available in JRun Studio for debugging JSP

Topic Not Discussed in CFDJ Article

Conclusion

- ◆ Lots of testing possibilities
  - ■ May be thinking
    - How have I gotten by without it?
    - Or, how will I ever remember to do them all?
    - Or, we don't need no stinking testing!
  - ■ Just consider the possibilities, try them out
    - Remember that many tools are free, some even built into Studio or CF Server

Summary

- ◆ We covered:
  - ■ HTML-oriented testing
  - ■ CFML Code Testing
  - ■ Web Application Testing
  - ■ CFML Debugging
- ◆ Review these slides, accompanying article every few months as a checkup
  - ■ Consider my one-day seminar in future
  - ■ Several books, articles available

Resources

- Article for this seminar
  - E-Testing: Debugging Your Projects, CFDJ Vol 3 Issue 10 (Oct 2001)
    - http://www.sys-con.com/coldfusion/article.cfm?id=349
- Many books, articles, URLs listed in article. Key ones:
  - Testing Applications on the Web: Test Planning for Internet-Based Systems
    - by Hung Quoc Nguyen; Wiley, 2000
  - The Web Testing Handbook
    - By Steven Splaine, et al; Software Quality Engineering Pub, 2001

One Day Seminar

- Many more details and demonstrations
  - Additional forms of testing, and tools
    - Demonstrations of each tool
    - More detail on topics skipped here
      - Bowser setting tests, debugger, and more
  - Offered privately to organizations, perhaps publicly at scheduled locations on limited basis

One Day Seminar

- For questions on topics covered
  - Or information on the 1 day seminar, or other in-house consulting/training
  - Or presenting at another CF user group
- Contact: Charlie Arehart, Systemanage
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  - 301 604 8399