

A ColdFusion, Flex & AIR Conference

## Dynamic Load Testing with Paessler Webserver Stress Tool

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## About Me

- Senior Web/Database Engineer, Instructor
- Certified ColdFusion Developer
- Microsoft Certified Solution Developer
- 10+ years with ColdFusion
- 8+ years with Fusebox
  - Also work with SQL, Oracle, JavaScript, VB, HTML, AJAX
- Server Tuning, Administration, Load Testing
- Teach one-on-one and custom classes
- On site and custom development
- Fusebox and Process Methodology

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## What we'll be covering

- Basic, parameterized, and scripted load testing with Paessler's Webserver Stress Tool.
- It's relatively inexpensive, simple and easy to use.
- Windows only
- Covering:
  - Test Types
  - setting up a set of URLs
  - Multiple users
  - URLs bound to a dataset (parameterize the tested URLs, merge with a dataset; one set for each user)
  - Scripting, instead of list of URLs
  - Simulate multiple simultaneous CF sessions
  - How to simulate AJAX calls
  - Test results and logs; where's the most useful information
- Monitor the process with FusionReactor

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## Terms To Know

- Click
  - User requests a page; this request will then get any redirects, frames, images etc. Click is only the first user action
- Click Time
  - Time until that click is finished loading (request fully loads in the browser), including redirections, frames, images etc. (Corresponds to the amount of time user would wait)
- Users
  - Each user runs through the list of URLs or the script
  - Each user will get a different CFID and CFTOKEN, just like browser sessions. Different sets of cookies.
    - If you enable cookies (Browser settings), those will be automatically passed along
- Click Delay
  - After request finishes loading in the browser, amount of time the simulated user will "read" before clicking the next link.

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## General Test Types

- Performance
  - Test one area of the site. Focus on some small areas, and put extra tracing there to see where/how to optimize
- Load
  - Increase the amount of traffic across a representative range of pages, to see how much the application can take, and how well it performs
    - Test within the network; eliminate network delays as the cause, to test the application
    - Test user experience while that load is going on
- Stress
  - Hit the server with a lot of load, as high as you can
  - See if server can handle a spike
    - From being announced on TV, or email blast, or Slashdot
  - Estimate maximum load server can support
  - More likely to hit limits between testing server and application server, if testing server / network is insufficient

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## Test Types in the Webserver Stress Tool

- Clicks
  - Constant load, until each user has run a certain number of clicks
  - Specify:
    - Max clicks per user
    - Number of users
    - Click delay
- Time
  - Constant load, for a certain number of minutes
  - Some problems may happen only after a while, and shorter tests will not bring those out. May appear fine until then
  - Specify:
    - Minutes to run the test
    - Number of users
    - Click delay
- Ramp
  - Increasing load (gradually increase number of users), for a certain number of minutes
  - Specify:
    - Minutes to run the test
    - Number of users
    - Click Delay
- We'll be focusing mainly on timed tests

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## URLs: URL Sequence

- A. WST runs the given URL, and all included objects. Does not run javascript
- B. Don't need to specify the images
- C. Do need to specify AJAX URLs
- D. Record automatically using the tool, and/or add manually
- E. URL variables and/or POST data
- F. Can have parameters in query string / form post
- G. Specify options for how these URLs are sequenced

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## URL Sequencing Options: pick one

- A. Users select randomly from the list
- B. Each user always clicks one URL
  - One URL from the list assigned to each user
- C. Users always go through the complete sequence of URLs, repeating
  - I use this one the most often, for load tests.
  - Example: login, searches and results, add/edit/delete, etc
- D. Users visit first X URLs, then randomly in the middle, then the last Y URLs
  - Useful for login, then random clicks, then post-process

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## Recording URLs

- A. Built-in URL Recorder
  - Launches a window containing IE, monitors where you're navigating
  - Won't capture AJAX requests!
  - Lists automatically
- B. Enter/edit list of URLs
  - Append/Edit/Delete
  - Cannot insert into the list, or reorder; appends to end

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## Demo

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## Data Merge: Parameterized URLs

- A. Unique numbers in URL
  - @@
  - Replaced with an increasing number
- B. Merge with data from CSV file
  - One line for each user
  - File stored in WST application root
  - @1@ for column 1 in the file, @2@ for column 2, etc up to 99
  - Data.dat Or, have one file per URL

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## Dynamic parameterized URLs: Token from result

- A. You can read a token from HTML output, to read a generated ID that the next pages need
  - Necessary if there's a session-specific ID or generated ID to pass along
- B. In HTML output of previous page, have a piece of query string within a comment
- C. Syntax
  - a) <!--TOKENquerystringTOKEN-->
- D. In next URL or form data, have @@@ which gets replaced with the given querystring piece
- E. Unique in the price range of this tool

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## Dynamic parameterized URLs: Example

**A. Example:**

- Contained in HTML of previous page (must be in one line, in an HTML comment, with no space between open/close comment and TOKEN)
- a) `<!--TOKENsearchid=112455&detailid=5TOKEN-->`
- URL in the list
- a) `http://demo/index.cfm?action=searchresults&@@@`
- Resulting URL:  
`http://demo/index.cfm?action=searchresults&searchid=11245&detailid=54`

**B. Note that if you don't enable cookies in the Browser Settings, you will need to pass CFID and CFTOKEN in the token for each page**

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## Demo

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## Configuration

**A. Configuration stored in an ini file**

**B. ini and scripts stored in same folder**

**C. Load an ini file from a folder, it finds other configuration there.**

**D. You may want to archive the configuration, or load from different folders. Keep track of configurations you use for those load tests**

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## AJAX

**A. Javascript on the browser calls a URL as a webservice, or a simple call**

**B. Use some HTTP proxy, like Fiddler, LiveHTTPHeaders, etc to capture the requested URL**

**C. Get URL, then parameterize like others**

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## Scripting

**A. Instead of URL list, can choose Custom URL Script instead of simple sequence**

**B. Similar to VBScript, but limited**

**C. Event subroutines, each get certain data**

**D. Start with default script**

**E. Code determines which URLs, and which order**

- Use arrays for URL lists.

**F. Token from result: Have to parse from HTML via script**

- In request's OnAfterRequest, set to variable data.token
- Next request OnBeforeClick, available in variable data.token
- Like @@@, but you will need to manually parse and replace

**G. Very limited editor**

**H. Change default log string, or add more lines. Can specify other custom info**

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## Scripting: OnBeforeClick

**A. Runs before each click**

**B. Input:**

- User number (0 before first user)
- Click count so far (0 before first)
- Token (retrieved on previous request)

**C. Set in this event:**

- URL
- Postdata (form)
- HTTP username, password
- Click delay
- Log string

**D. Instead of the simple URL list, need to determine in code. You may have arrays of URLs and form querystrings, and pick based on the click number**

**E. Also can specify SOAP action**

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## Scripting: other events

- A. OnAfterClick
- B. OnBeforeRequest
  - Before a single HTTP request; you can send custom HTTP headers
    - a) `request.additionalheader`
- C. OnAfterRequest
  - After receiving the full response

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## Demo

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## Results: logs, graphs

- A. Detailed log.txt
- B. Summary log
- C. One log file for each user
- D. Graphs
  - Spectrum of Click Times vs % of users
- E. CSV files
- F. Optional, can generate Word doc if Word is installed

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## Error codes

- A. Logs include headers, status codes
  - 500: server error
    - a) Some sites throw to another page; get status code 200 on that display page
  - status codes to look out for are 404, 503 (server unavailable)
- B. Sometimes tool logs status code 0; connectivity issue
  - Maybe server wasn't responding
- C. Check in log whether that error is from the requested page, or after redirect

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## Logging options

- A. Option to generate detailed/user logs or not
  - Recommended to use these while troubleshooting; however in major load/stress tests, may take too much room
- B. Options to display HTTP headers, and/or full HTML
  - Helpful for debugging, but HTML can be huge. HTTP headers less so
  - Headers: logs the cookies, redirects, etc. Exactly what the server is returning
  - Logged to the separate user logs
- C. Store in a ZIP file

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## Stats: Attempted Page views per hour

- A. Estimated load: pageviews/minute, pageviews/hour
  - Settings: Number of users, Click Delay in seconds
  - Each user, seconds per click == Click Delay
    - a) Assuming that each request takes no time to load. This is the attempted rate of requests
  - Each user, clicks per minute ==  $60 / \text{Click Delay}$
  - All users, clicks per hour ==  $(\text{Number of users}) * (3600 \text{ seconds/hour}) / \text{Click Delay}$
  - Example:
    - a) 55 users, click delay of 3 seconds, results in an estimate of 66,000 pageviews/hour
    - b) Actual result will be less than that, because of page loading times.

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## Stats: Total clicks

- A. Each user waits to click on the next link until the previous page loads, then the click delay for X seconds
- B. Total clicks for all users reflects the click delay, and how long each took to fully load.
- C. Compare this (with total time of test) to the attempted load and number of users.
  - $(\text{Total Clicks}) * (\text{Time in minutes of this test}) / 60$

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## FusionReactor

- A. Monitor memory, CPU graphs for the full test duration, and just before and after
  - See if memory is increasing steadily – would it run out just after the test duration?
  - Be aware of application/session timeout compared to the test duration
- B. Request duration, average
- C. Stack trace for certain long-running URLs
- D. Stack trace for all, see if there's a common delay point

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## JVM Tuning

- A. Total memory in the heap, minimum starting size
  - For load, set minimum=maximum to reduce resizing when app starting up
- B. Permanent generation/ Young generation / Tenured
- C. Survivor ratio
- D. GC times
- E. While tuning during 1 or a few load tests, turn on GC debug printing, to show how memory is behaving
- F. Other presentations at CFUnitd on tuning

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## Other tools to record URLs

- A. Firefox: LiveHTTP
- B. ServiceCapture
- C. Fiddler web debugging proxy  
<http://www.fiddler2.com/fiddler2/>

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## Suggestions

- A. Run the tool on another system (other than webserver)
- B. (note: Windows only)
- C. Make sure you are testing the application's performance, not network or client limits
  - Should be within the network, or you will be testing Internet performance
  - Use server-grade machine for load test
- D. Increase socket connections in registry
- E. Trial run before heavy load. Test scripts first, then up a little, before heavy load
  - Click test good for first run

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## Suggestions, page 2

- A. Settings
  - Browser settings: Enable cookies, show in log. Otherwise, you won't get the CFID, CFTOKEN!
- B. Keep track of test configuration, and any major settings you change between tests.
  - CF Admin settings summary
  - jvm.config
- C. Run a load test for longer, esp. if memory is trending upwards, to see if it will just run out later.

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**Suggestions, page 3**

A. Monitor server status with CF monitor, SeeFusion, or FusionReactor

- Memory, CPU, requests, DB
- Consider JDBC wrappers
- Slow-running threads
- Avg time

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**Suggestions, page 3 / Caveats**

A. Vista requires 7.2.2

B. Localhost requires 7.2.2: otherwise will use only non-localhost addresses

- Can now select Automatic, rather than individual local IPs to bind to
- In general usage, need to be accessing other sites on other server, but this is useful for development

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C. Any questions?

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