

OpenDemand Systems, Inc.



# *OpenLoad - Rapid Performance Optimization Tools & Techniques for CF Developers*

Speed Application Development & Improve Performance

**WebSphere.** software



# True or False?

## *Exposing common misconceptions about software quality...*

- During design you will know how many simultaneous users your software and hardware platform supports
- Waiting until the end of the project to begin testing saves time and money
- The more changes you make, the less often you need to test
- If you don't test, your users will happily do it for you
- Establishing performance goals based on the needs and wants of your users sets false expectations
- Testing tools are too complex, expensive and time consuming to implement

# What We'll Cover Today

- Why is Load Testing Important?
- Special Considerations when Testing CF Apps
- Difficulty of Load Testing Web Apps in General
- OpenLoad™ Testing Solution
- Optimizing Web Application Performance

# Why is Load Testing Important?

*Head off problems before they impact your users.*

- Website performance has a direct impact on customer satisfaction.  
Therefore discovery and analysis of performance bottlenecks is a crucial factor to the success of your business.
- Load testing implies simulating multiple users to determine:
  - The capacity a website can handle.
  - If there are bottlenecks and where they are located.
- Your peers are already doing it:  
Bank of Ireland, University of Colorado, ISiteDesign, JaggedPeak, Prevision, B-there.com, Smart Advice, and many more

# Special Considerations when Testing CF Apps

*If it were only that easy...*

- CF simplifies development, but testing is still a challenge
  - Detecting session management variables (CFID or CFTOKEN)
  - Handling dynamic redirects via CFLOCATION (Fusebox)
  - Let's not forget about JavaScript (CFFORM) and Flash!
- Legacy test tools don't fit CF development model
  - Requires complex scripting and data analysis
  - Can add weeks (sometimes months) to project schedule
  - Let's face it, they're way too expensive to implement and maintain

# Difficulty of Load Testing Web Apps in General

## *Legacy test tools had it easy...*

- Load testing a web application is more difficult than testing other types of applications.
- Load testing a web application requires:

Simulating diverse users (sometimes in large numbers).

Traversing pages! (Ouch!)

Over sockets! (Arrgh!)

And collecting performance data from both ends!

(\*faint\*)

- The next slides outline the difficulties in more detail.

# Simulating Users

## *Welcome to the Wild Wild Web...*

- In 'real life' a request thread is spawned by a real human user.
- Users are diverse.

Browser settings are different.

Connection speeds differ.

Different 'think time' durations between requests.

Data varies by user (login ID, password, session ID, menu selections, cookies, etc.)

# Simulating Requests

*Just when you thought you had it all under control...*

- A user scenario consists of HTTP requests.
- Generating requests to simulate a load is not easy.
  - Each web application will have different request-specific-- and often cryptic-looking –URLs.
- Requests also need to be sent in order.
- Requests may contain FORM data and COOKIES.
- Requests might be over HTTP or HTTPS.
- Requests may be dynamically generated via JavaScript, Java Applets, Flash, etc.
- Requested content needs to be verified for correctness

# Data Analysis

*Now the real fun begins...*

- Supposing that all of the data from a series of scenarios could be captured and accurately played back...

There is still a difference between:

A bunch of recorded bytes.

Data presented so that optimization possibilities can emerge.

Making the results useful is itself time-consuming

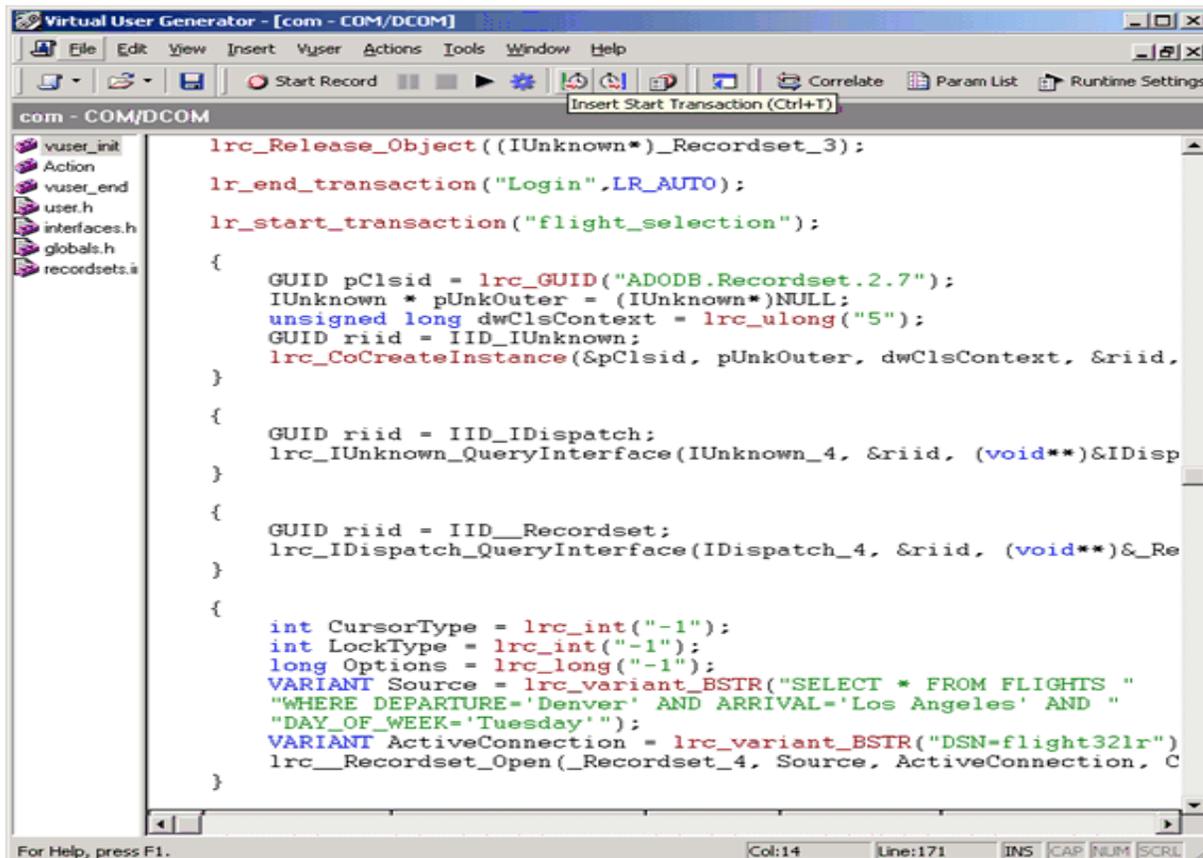
Trying to pinpoint a bottleneck in a log file can be like searching for a needle in a haystack

You don't have time to play detective, you've got code to develop

# Legacy Test Tools

*Load testing is challenging enough as it is...*

- Do you really need to learn another proprietary scripting language?



```
Virtual User Generator - [com - COM/DCOM]
File Edit View Insert Vuser Actions Tools Window Help
Start Record Correlate Param List Runtime Settings
com - COM/DCOM
Insert Start Transaction (Ctrl+T)
vuser_init
Action
vuser_end
user.h
interfaces.h
globals.h
recordsets.i

lrc_Release_Object((IUnknown*)_Recordset_3);

lr_end_transaction("Login",LR_AUTO);

lr_start_transaction("flight_selection");

{
    GUID pClsid = lrc_GUID("ADODB.Recordset.2.7");
    IUnknown * pUnkOuter = (IUnknown*)NULL;
    unsigned long dwClsContext = lrc_ulong("5");
    GUID riid = IID_IUnknown;
    lrc_CoCreateInstance(&pClsid, pUnkOuter, dwClsContext, &riid,
}

{
    GUID riid = IID_IDispatch;
    lrc_IUnknown_QueryInterface(IUnknown_4, &riid, (void**)&IDisp
}

{
    GUID riid = IID_Recordset;
    lrc_IDispatch_QueryInterface(IDispatch_4, &riid, (void**)&Re
}

{
    int CursorType = lrc_int("-1");
    int LockType = lrc_int("-1");
    long Options = lrc_long("-1");
    VARIANT Source = lrc_variant_BSTR("SELECT * FROM FLIGHTS "
    "WHERE DEPARTURE='Denver' AND ARRIVAL='Los Angeles' AND "
    "DAY_OF_WEEK='Tuesday'");
    VARIANT ActiveConnection = lrc_variant_BSTR("DSN=flight321r");
    lrc__Recordset_Open(_Recordset_4, Source, ActiveConnection, C
}

For Help, press F1. Col:14 Line:171 INS CAP NUM SCRL
```

# OpenLoad™ - Next Generation Testing Solution

*Makes testing as easy as using a browser...*

- Overcomes the difficulties of testing Web Applications.
- With easy-to-use browser based tools for:
  - Creating user scenarios (no scripting)
  - Configuring test runs (model real-world users)
  - Scheduling test runs (number of users)
  - Analyzing test results (real-time graphical and text reports)
- Makes iterative testing practical and affordable.
- Powered by WebSphere Application Server (WAS) and fully integrated with WebSphere Studio Application Developer (WSAD).

# OpenLoad™ Testing Process

*Look Ma, no scripting...*



# Trade3 Ltd.

## *Let's test the waters...*

- Mock brokerage trade application.
- Trivial example demonstrates the insidiousness of bottlenecks in applications.
- It is not a large application but -

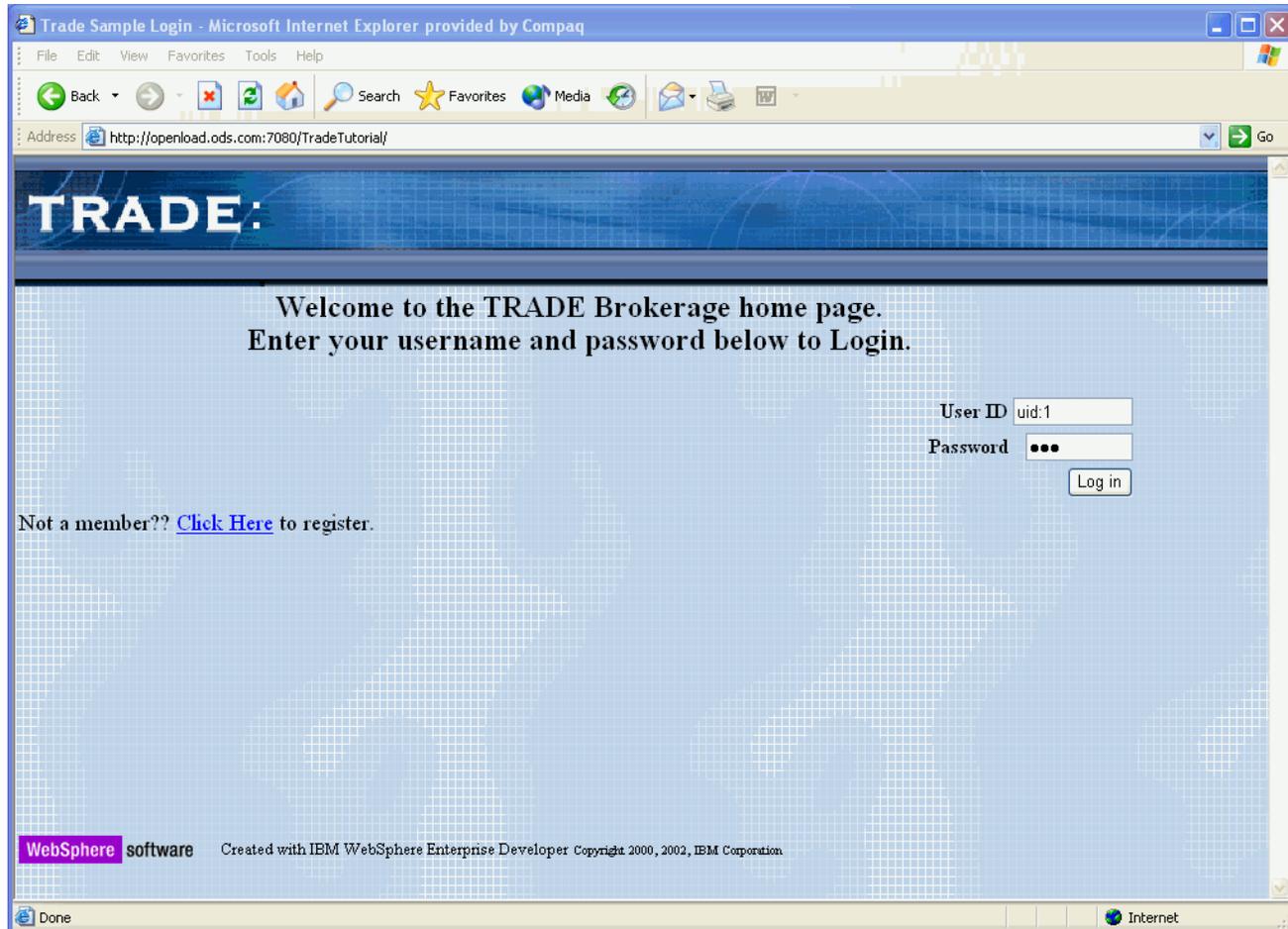
It uses session dependent variables and JavaScript.

It communicates with a database.

It has potential for high user volume.

# Trade3 Ltd.

*All the characteristics of your typical Web App...*



# Problems?

*There's only one way to know for sure...*

- Does the Trade3 web application suffer from any performance hindrances?

Who knows?

- Without analyzing all of the code it is difficult to tell.

Code profiling helps, but doesn't tell the whole story

- Some bottlenecks might not even be in the code!

Server configuration and tuning

Hardware resource limitations

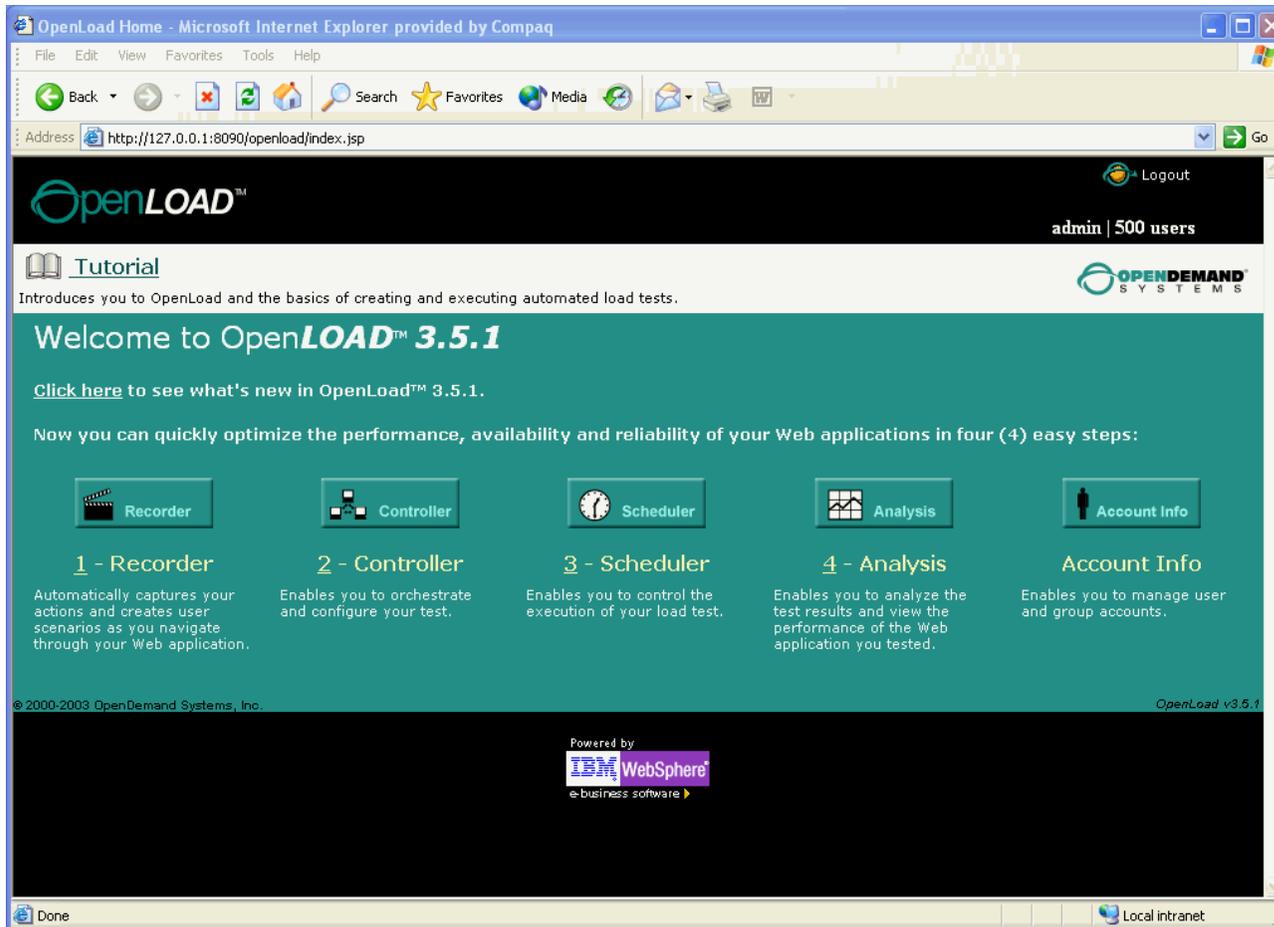
# OpenLoad™ Testing Process

*If only programming a VCR were this easy...*

- There are only four steps to produce a test result with OpenLoad:
  - 1) Recorder - Record user scenario
  - 2) Controller - Configure test specifics
  - 3) Scheduler - Schedule tests to be executed
  - 4) Analysis - Analyze results
- The next slides will walk us through these steps using the Trade3 application.

# OpenLoad™ Testing Modules

*Achieve peak performance in four easy steps...*



The screenshot shows the OpenLoad 3.5.1 web interface. The browser window title is "OpenLoad Home - Microsoft Internet Explorer provided by Compaq". The address bar shows "http://127.0.0.1:8090/openload/index.jsp". The page features the OpenLOAD logo, a "Logout" link, and "admin | 500 users". A "Tutorial" section introduces the user to OpenLoad and the basics of creating and executing automated load tests. The main content area is titled "Welcome to OpenLOAD™ 3.5.1" and includes a link to see what's new. Below this, it states: "Now you can quickly optimize the performance, availability and reliability of your Web applications in four (4) easy steps:". The four steps are: 1 - Recorder (Automatically captures your actions and creates user scenarios as you navigate through your Web application.), 2 - Controller (Enables you to orchestrate and configure your test.), 3 - Scheduler (Enables you to control the execution of your load test.), and 4 - Analysis (Enables you to analyze the test results and view the performance of the Web application you tested.). A fifth section, "Account Info", enables user and group account management. The footer includes "© 2000-2003 OpenDemand Systems, Inc.", "OpenLoad v3.5.1", and "Powered by IBM WebSphere e-business software".

# OpenLoad™ Recording Process

*Just point and click...*

- Create use scenarios

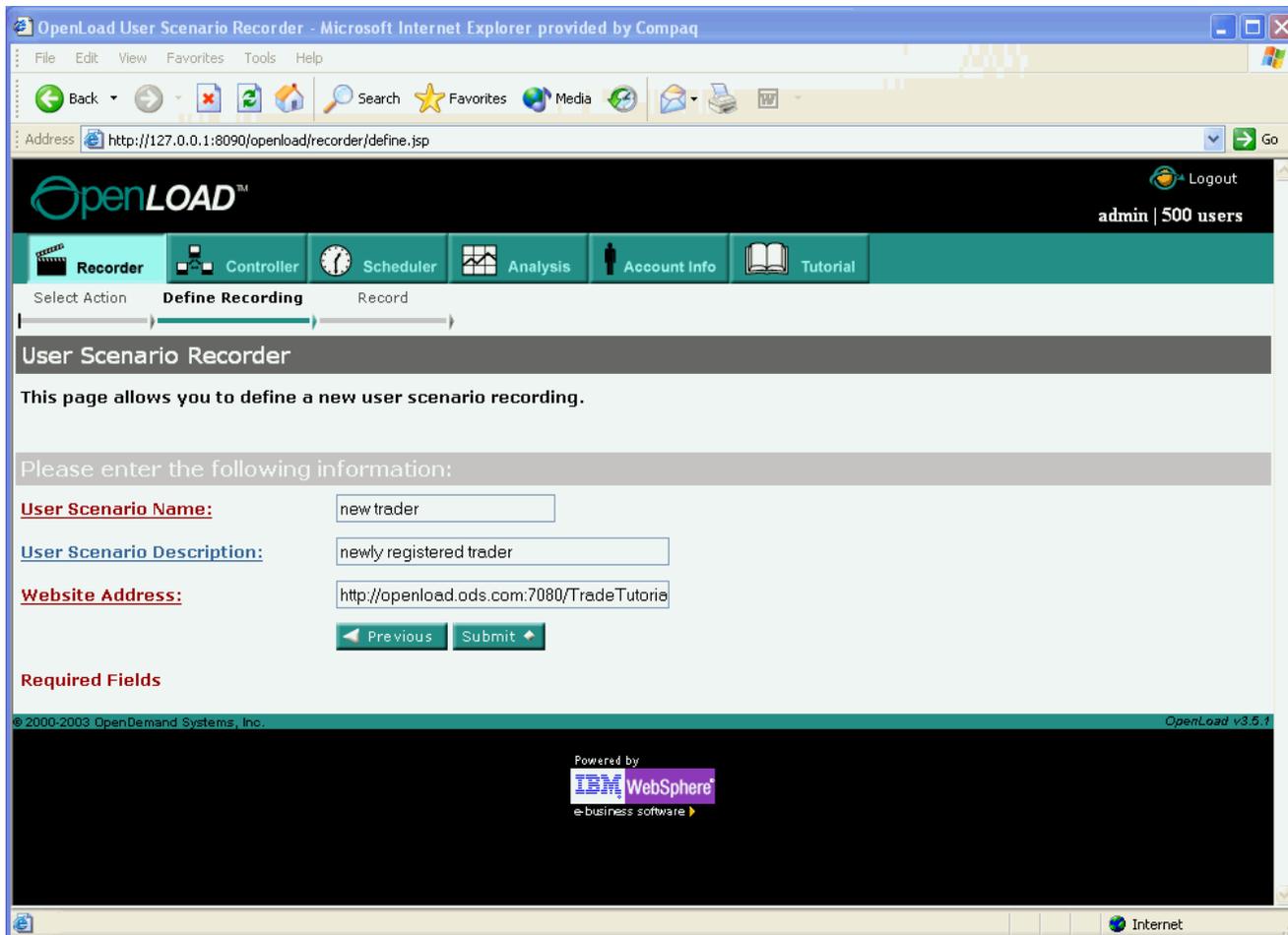
All you do is navigate through your web application as a user would.

OpenLoad records a set of HTTP/S requests in the background and stores them as XML based scripts.

OpenLoad will use the request set to simulate a user interacting with the Trade3 web application.

# Recorder

*Define your user scenario types...*



The screenshot shows a web browser window titled "OpenLoad User Scenario Recorder - Microsoft Internet Explorer provided by Compaq". The address bar shows the URL "http://127.0.0.1:8090/openload/recorder/define.jsp". The page features the OpenLOAD logo and a navigation menu with tabs for Recorder, Controller, Scheduler, Analysis, Account Info, and Tutorial. The Recorder tab is active, and the "Define Recording" sub-tab is selected. The main content area is titled "User Scenario Recorder" and contains the following text: "This page allows you to define a new user scenario recording." Below this, it says "Please enter the following information:" and lists three required fields: "User Scenario Name" (value: new trader), "User Scenario Description" (value: newly registered trader), and "Website Address" (value: http://openload.ods.com:7080/TradeTutoria). There are "Previous" and "Submit" buttons at the bottom of the form. The footer includes the copyright notice "© 2000-2003 OpenDemand Systems, Inc." and the version "OpenLoad v3.5.1". The page is powered by IBM WebSphere e-business software.

# Recorder (cont.)

*Browse your application like a real user...*

The image shows two side-by-side browser windows. The left window is the 'OpenLoad User Scenario Recorder' in 'Edit Mode'. It contains a form for editing a user scenario with the following fields:

- User Scenario Name:** new trader
- User Scenario Description:** newly registered
- Website Address:** http://openload
- Duration:** .58 minute(s)
- Page Request:** page\_1
- URL:** http://openload
- Method:** GET
- Query String:** (empty)
- Delete:**

The right window is the 'Trade Sample User Portfolio' application. It displays a 'TRADE:' header and the following information:

- Welcome: uid:1 / [My Account](#) / [Logout](#)
- Current Account Balance: \$272561.0
- Current Market Conditions: Dow Jones Industrials, Nasdaq Composite
- Portfolio Details Table:**

Symbol	Index	Price	Shares	Value	Buy	Sell
s:415	1	52.0	177.0	9204.0	Buy 100	Sell
s:136	2	175.0	11.0	1925.0	Buy 100	Sell
s:23	3000	38.0	256.0	9728.0	Buy 100	Sell
s:15	5000	28.0	100.0	2800.0	Buy 100	Sell

Below the table is a 'Quotes' section with a note: 'Note: Quotes delayed up to 5 minutes. You may buy or choose from the available services listed below.' A 'Quote' field contains 's:1'.

## Recorder (cont.)

*Build complex data driven scenarios in minutes...*

- Many possible scenarios:

Logon (with success/failure)

Buy/sell shares

Get stock quotes

Update account info

- Customize your scenarios

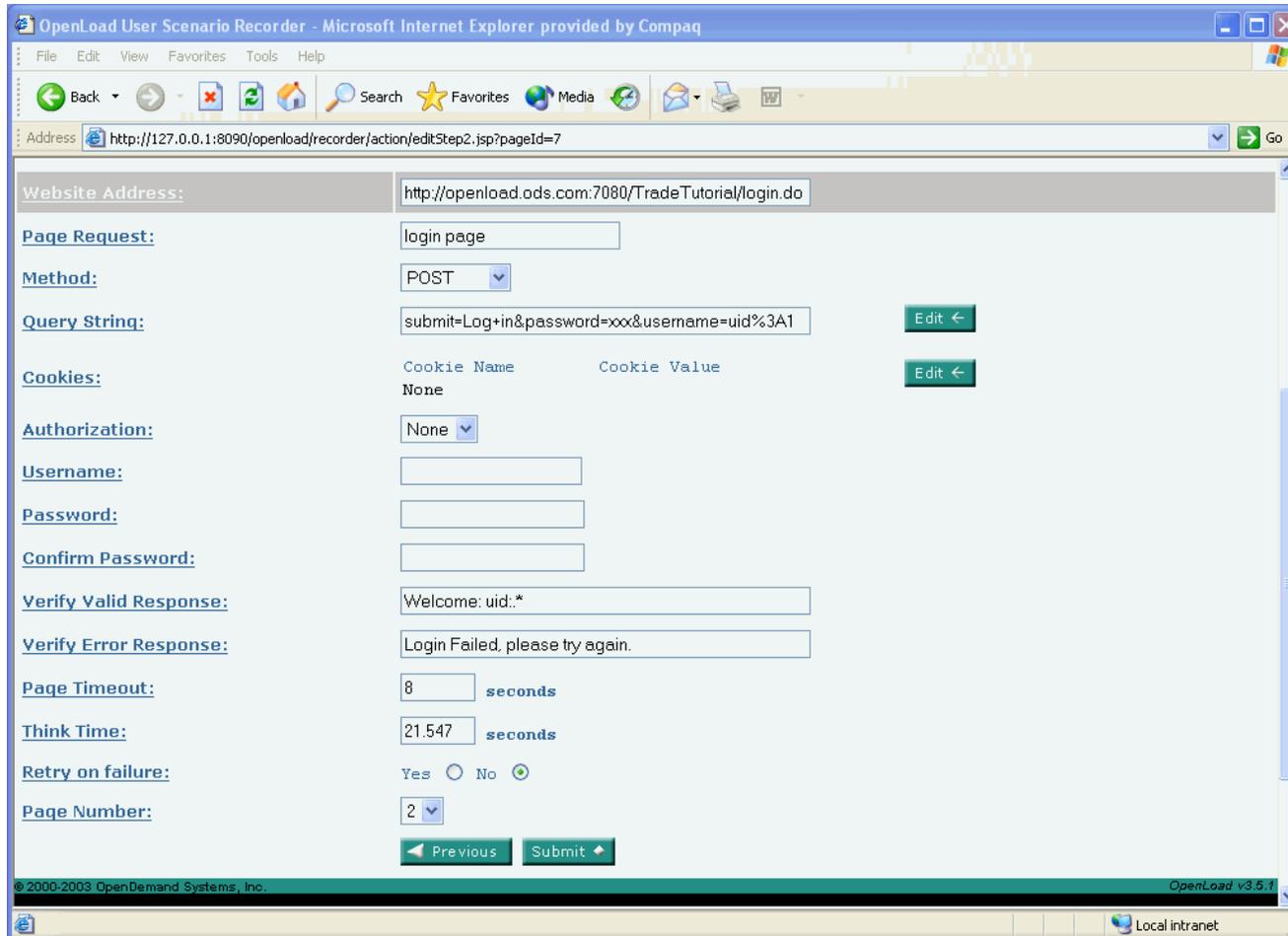
Parameterize requests (usernames, passwords, etc.)

Verify response content (success/failure)

Add new requests to existing scenarios

# Recorder (cont.)

*Customize scripts for regression testing...*



OpenLoad User Scenario Recorder - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address <http://127.0.0.1:8090/openload/recorder/action/editStep2.jsp?pageId=7> Go

**Website Address:**

**Page Request:**

**Method:** POST

**Query String:**  [Edit](#)

**Cookies:**

Cookie Name	Cookie Value
None	

[Edit](#)

**Authorization:** None

**Username:**

**Password:**

**Confirm Password:**

**Verify Valid Response:**

**Verify Error Response:**

**Page Timeout:**  seconds

**Think Time:**  seconds

**Retry on failure:** Yes  No

**Page Number:**

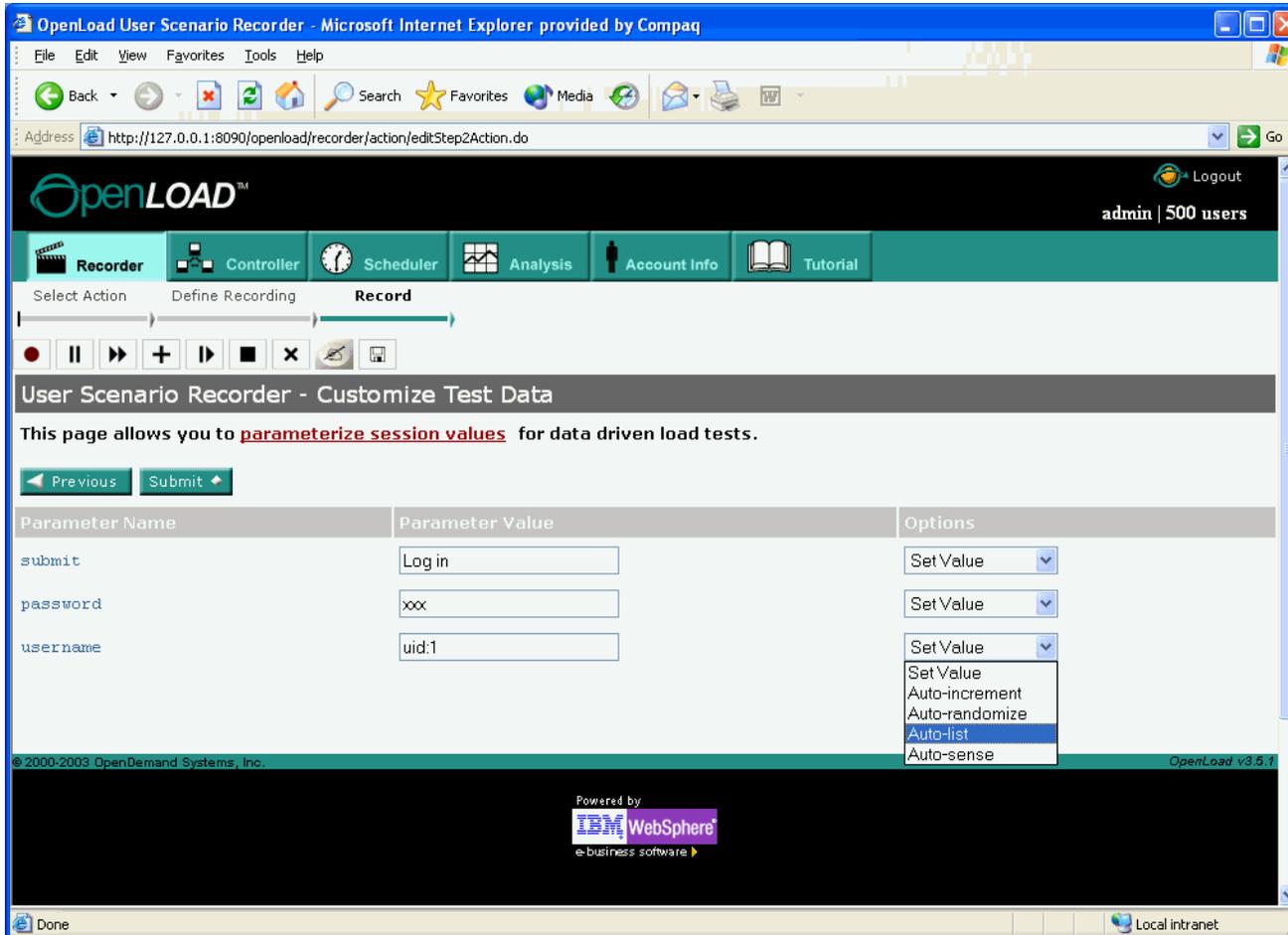
[Previous](#) [Submit](#)

© 2000-2003 OpenDemand Systems, Inc. OpenLoad v3.5.1

Local Intranet

# Recorder (cont.)

*Parameterize your tests without scripting...*



OpenLOAD User Scenario Recorder - Microsoft Internet Explorer provided by Compaq

Address: http://127.0.0.1:8090/openload/recorder/action/editStep2Action.do

OpenLOAD™ admin | 500 users Logout

Recorder Controller Scheduler Analysis Account Info Tutorial

Select Action Define Recording Record

User Scenario Recorder - Customize Test Data

This page allows you to parameterize session values for data driven load tests.

Previous Submit

Parameter Name	Parameter Value	Options
submit	Log in	Set Value
password	xxx	Set Value
username	uid:1	Set Value Auto-increment Auto-randomize Auto-list Auto-sense

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Done Local intranet

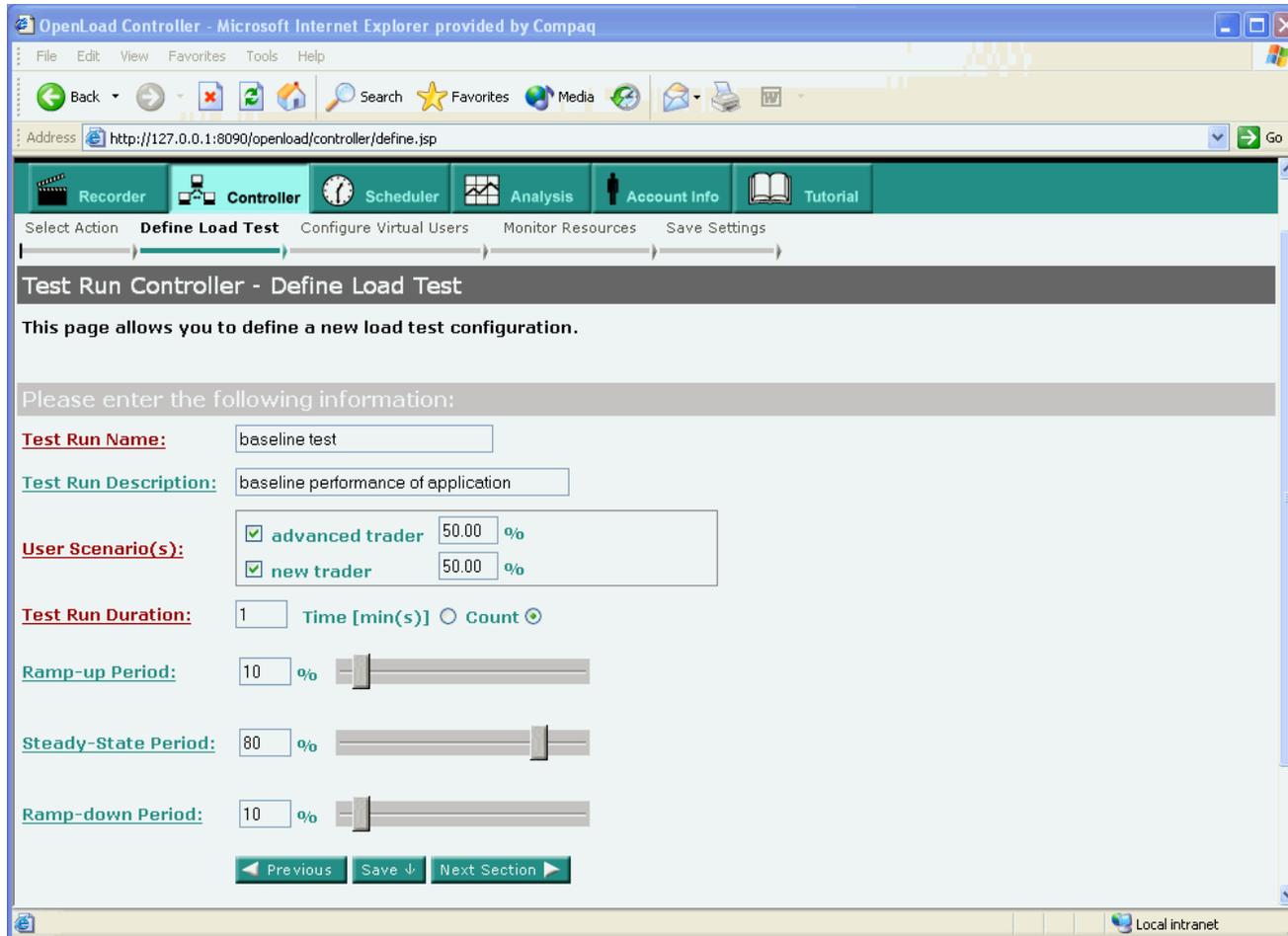
# Controller

## *Define your test configuration...*

- Weight % of users by type (population modelling).  
50% new visitors, 25% registered users, etc.
- Limit test duration based on number of  
Times to iterate through your recorded scenarios  
Minutes to run scenarios before stopping.
- Increase the number of virtual users in a controlled fashion  
Configurable ramp-up, ramp-down, and peak durations

# Controller (cont.)

*Model user population and load conditions...*



OpenLoad Controller - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help

Address <http://127.0.0.1:8090/openload/controller/define.jsp>

Recorder Controller Scheduler Analysis Account Info Tutorial

Select Action **Define Load Test** Configure Virtual Users Monitor Resources Save Settings

### Test Run Controller - Define Load Test

This page allows you to define a new load test configuration.

Please enter the following information:

**Test Run Name:**

**Test Run Description:**

**User Scenario(s):**

- advanced trader 50.00 %
- new trader 50.00 %

**Test Run Duration:**  Time [min(s)]  Count

**Ramp-up Period:**  %

**Steady-State Period:**  %

**Ramp-down Period:**  %

Local intranet

## Controller (cont.)

### *Accurately model real world user load...*

- Lets you configure your test.

Who your users are.

Their connection speed.

DSL, T1, 56 kbps, etc.

The browser they will use.

The features that they support.

Cookies, SSL, cache settings, version of HTTP.

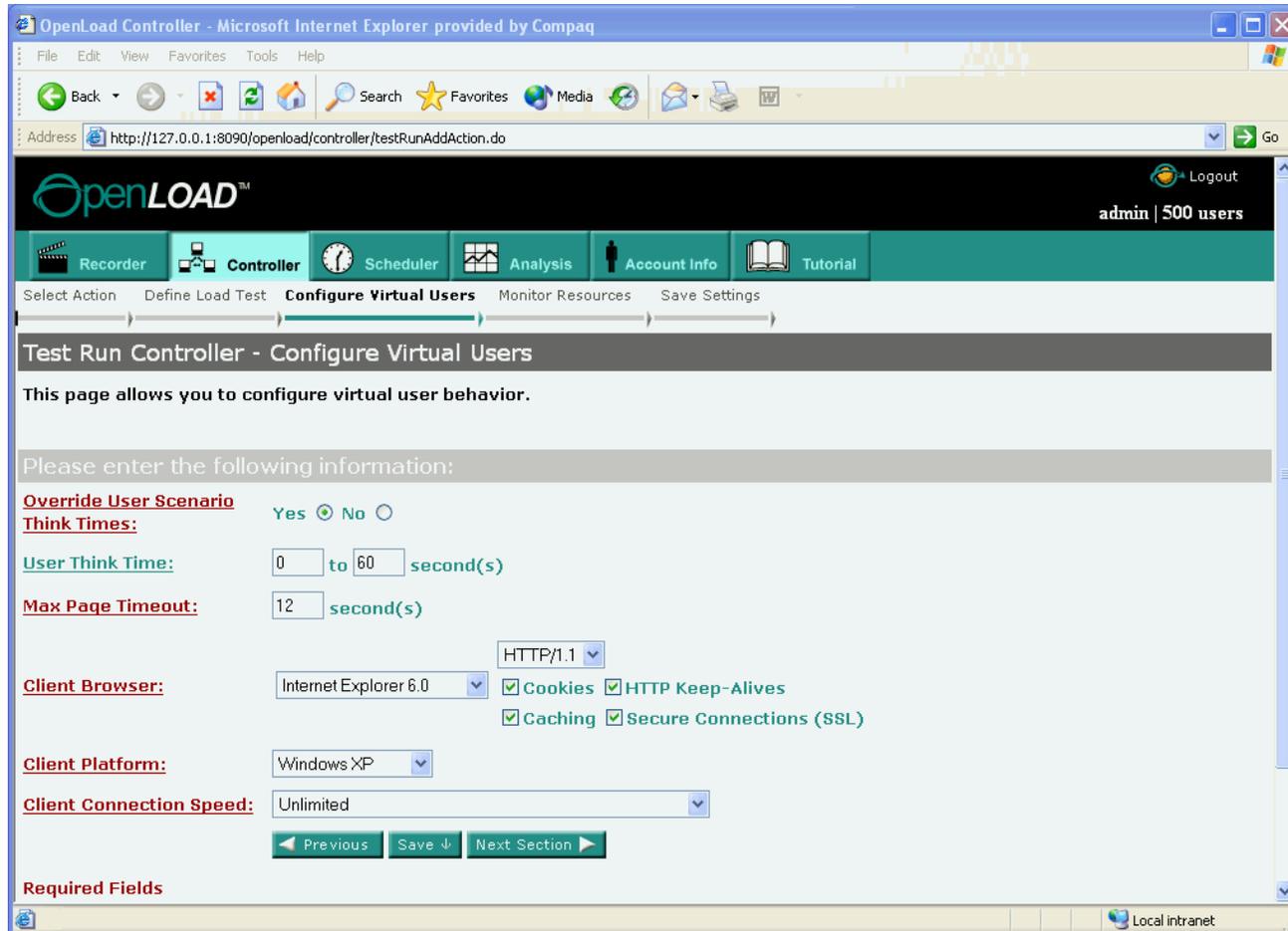
Their operating system.

Their 'thinking' time between requests.

Their threshold for page performance.

# Controller (cont.)

*Define global settings for test run...*



OpenLoad Controller - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help

Address: http://127.0.0.1:8090/openload/controller/testRunAddAction.do

OpenLOAD™ Logout admin | 500 users

Recorder Controller Scheduler Analysis Account Info Tutorial

Select Action Define Load Test **Configure Virtual Users** Monitor Resources Save Settings

**Test Run Controller - Configure Virtual Users**

This page allows you to configure virtual user behavior.

Please enter the following information:

**Override User Scenario** Yes  No

**Think Times:**

**User Think Time:** 0 to 60 second(s)

**Max Page Timeout:** 12 second(s)

**Client Browser:** Internet Explorer 6.0 HTTP/1.1

Cookies  HTTP Keep-Alives

Caching  Secure Connections (SSL)

**Client Platform:** Windows XP

**Client Connection Speed:** Unlimited

Previous Save Next Section

Required Fields

Local intranet

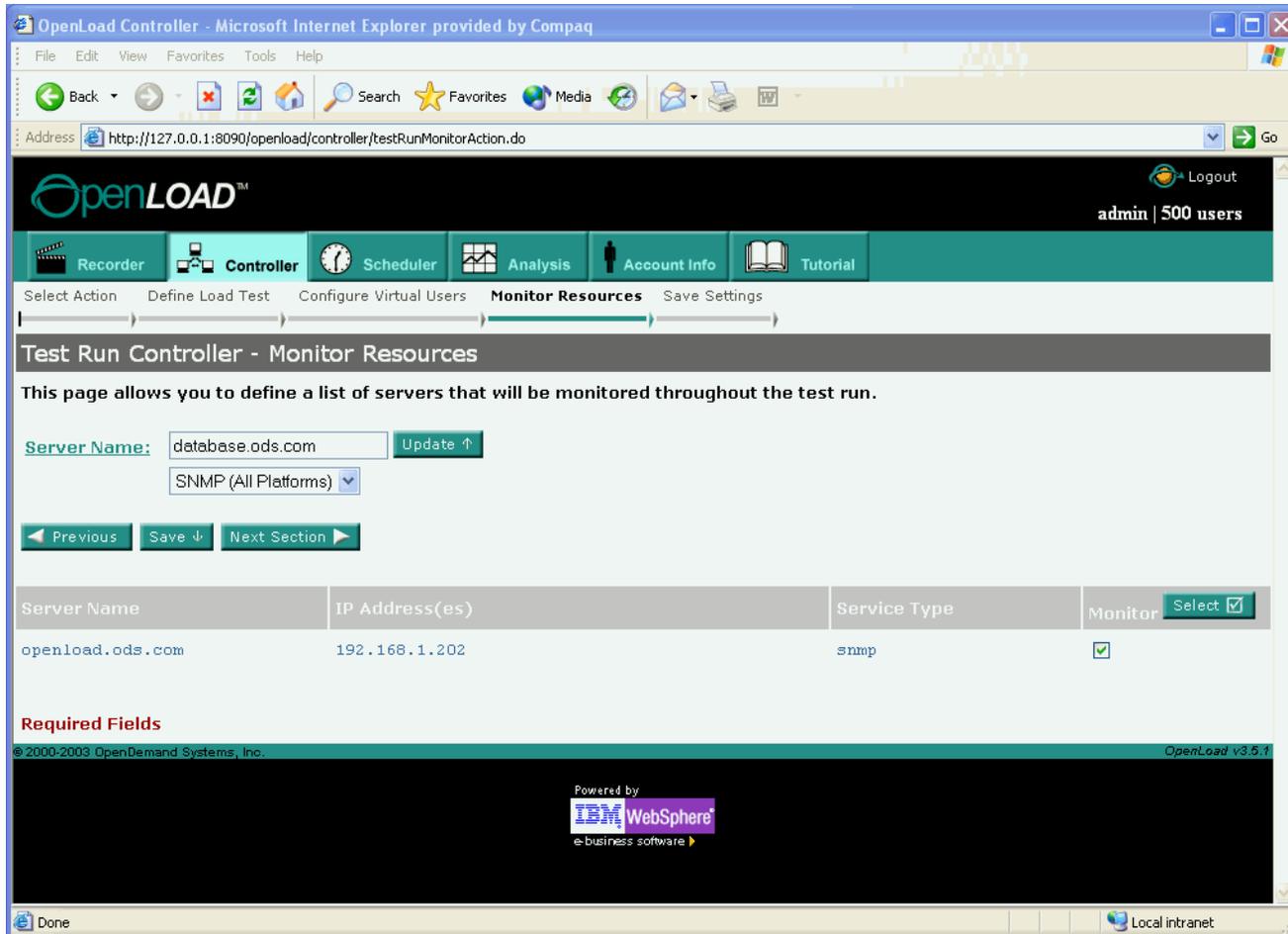
## Controller (cont.)

*Monitor your servers load throughout the test...*

- Monitor different tiers with minimal intrusion
  - SNMP for all platform including Windows 2000 and XP
  - RSTAT for Linux and Unix only
- Monitor System resources
  - CPU, memory, disk and network activity

# Controller (cont.)

*Monitor multiple web, application and database servers...*



OpenLOAD™

Logout  
admin | 500 users

Recorder Controller Scheduler Analysis Account Info Tutorial

Select Action Define Load Test Configure Virtual Users **Monitor Resources** Save Settings

### Test Run Controller - Monitor Resources

This page allows you to define a list of servers that will be monitored throughout the test run.

Server Name:  Update ↑  
SNMP (All Platforms) ▾

Previous Save Next Section

Server Name	IP Address(es)	Service Type	Monitor
openload.ods.com	192.168.1.202	snmp	<input checked="" type="checkbox"/>

Required Fields

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Done Local intranet

# Scheduler

*Effortlessly test your app under what if scenarios...*

- Allows you to configure:

Time a test is executed.

Can schedule a long test to run overnight

The duration of a test.

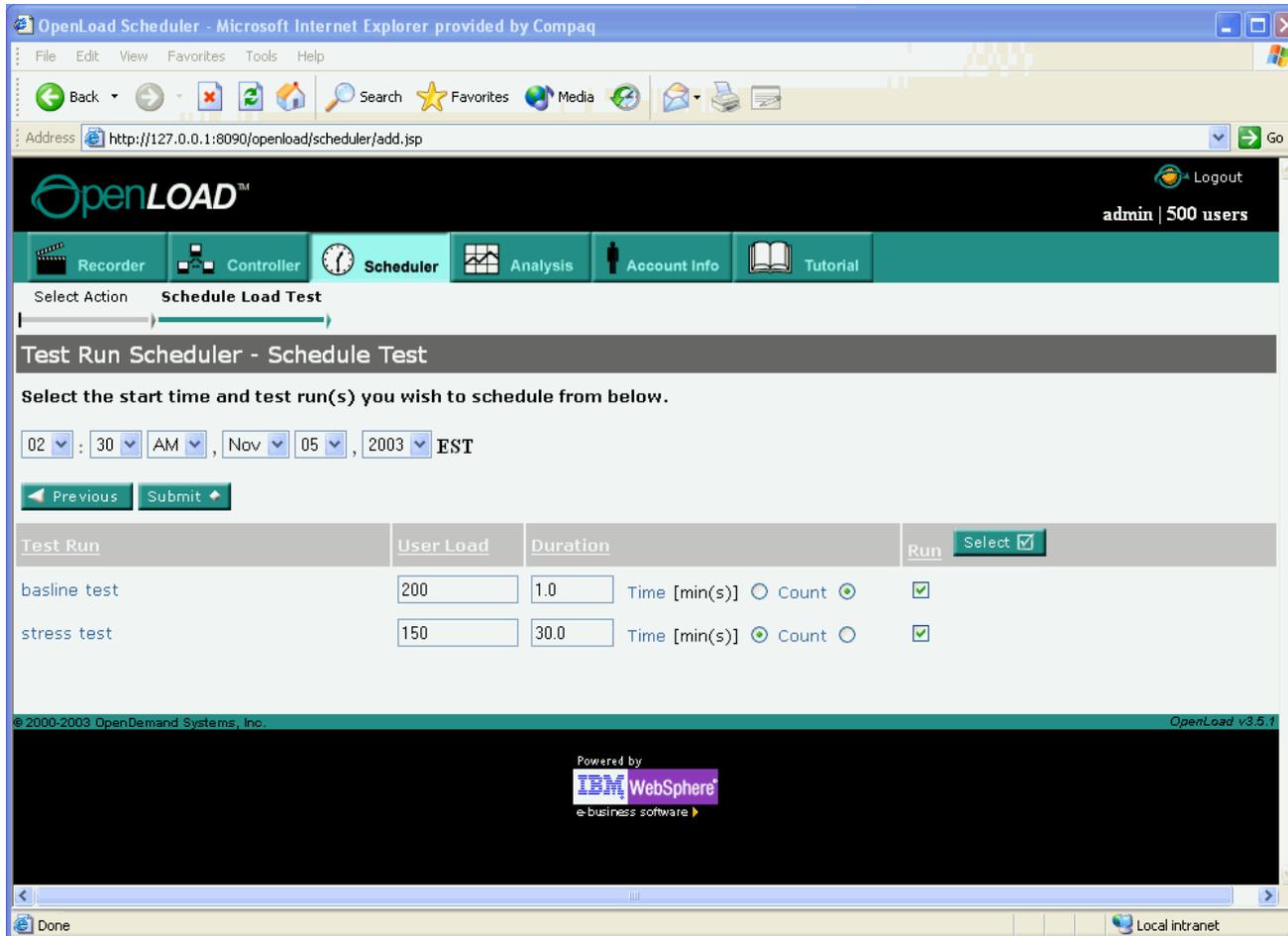
The length of time or number of times OpenLoad will send requests to a web application.

The number of simulated users during a test.

The number of tests to execute simultaneously.

# Scheduler (cont.)

*Run tests unattended for automated regressions...*



OpenLoad Scheduler - Microsoft Internet Explorer provided by Compaq

Address: http://127.0.0.1:8090/openload/scheduler/add.jsp

Logout admin | 500 users

Recorder Controller Scheduler Analysis Account Info Tutorial

Select Action Schedule Load Test

Test Run Scheduler - Schedule Test

Select the start time and test run(s) you wish to schedule from below.

02 : 30 AM, Nov 05, 2003 EST

Previous Submit

Test Run	User Load	Duration	Run	Select <input checked="" type="checkbox"/>
baseline test	200	1.0 Time [min(s)] <input type="radio"/> Count <input checked="" type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
stress test	150	30.0 Time [min(s)] <input checked="" type="radio"/> Count <input type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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Done Local intranet

# Analysis

## *Easily pinpoint bottlenecks within your application...*

- Displays the test results so that performance obstacles can be identified.

- Produces a report of all virtual user activity.

Total sessions, current page view, max page time and last error

- Produces a brief summary of all of the metrics.

Page distribution times

Total sessions, page views, requests, responses

- Produces a detailed report of all of the metrics.

Average response time, timeouts and error by test run, user scenario and page view

# Analysis (cont.)

*Monitor progress of each virtual user...*

OpenLoad Analysis - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address <http://127.0.0.1:8090/openload/analysis/index.jsp> Go

## Test Run Analysis

This page allows you to pinpoint performance bottlenecks within your application and infrastructure.

Report View Tools Help

Report Types

- Test Results
  - Test Runs
    - baseline test [Wed Nov 05 23:...
    - baseline test [Wed Nov 05 23:...
    - baseline test [Wed Nov 05 23:...
  - User Scenarios
    - new trader
    - advanced trader
  - Servers
    - 192.168.1.202

Virtual User Report	Summary Report	Detailed Report	Graph Report	
VU ID	Sessions	Page Name	Max Time	Last Error
0	1	page_11	1.33s	VERIFY ERROR
1	1	page_11	1.45s	VERIFY ERROR
2	1	page_11	1.38s	VERIFY ERROR
3	1	page_11	1.38s	VERIFY ERROR
4	1	page_11	1.39s	VERIFY ERROR
5	1	page_11	1.61s	VERIFY ERROR
6	1	page_11	3.00s	VERIFY ERROR
7	1	page_11	3.00s	VERIFY ERROR
8	1	<a href="http://openload.ods.com:7080/TradeTutorial/login.do">http://openload.ods.com:7080/TradeTutorial/login.do</a>		
9	1	page_11	3.00s	VERIFY ERROR
10	1	page_11	3.00s	VERIFY ERROR
11	1	page_11	1.62s	VERIFY ERROR
12	1	page_11	1.30s	VERIFY ERROR
13	1	page_11	2.50s	VERIFY ERROR
14	1	page_11	3.00s	VERIFY ERROR
15	1	page_11	2.66s	VERIFY ERROR
16	1	page_11	1.77s	VERIFY ERROR
17	1	page_11	3.00s	VERIFY ERROR
18	1	page_11	1.30s	VERIFY ERROR
19	1	page_11	1.31s	VERIFY ERROR
20	1	page_11	3.00s	VERIFY ERROR
21	1	page_11	2.67s	None
22	1	page_11	3.00s	VERIFY ERROR
23	1	page_11	1.52s	VERIFY ERROR
24	1	page_11	1.38s	VERIFY ERROR

Applet com/opendemand/applets/JAppletAnalysis started Local intranet

# Analysis (cont.)

*Perform before and after comparisons...*

OpenLoad Analysis - Microsoft Internet Explorer provided by Compaq

Address: <http://127.0.0.1:8090/openload/analysis/index.jsp>

## Test Run Analysis

This page allows you to pinpoint performance bottlenecks within your application and infrastructure.

Report View Tools Help

Report Types

Test Results

Test Runs

- baseline test [Wed Nov 05 23:09:09 EST 20...
- baseline test [Wed Nov 05 23:19:07 EST 20...
- User Scenarios
- Servers
- baseline test [Wed Nov 05 23:19:07 EST 20...
- User Scenarios
  - new trader
  - advanced trader
- Servers
  - 192.168.1.202

Virtual User Report	Summary Report	Detailed Report	Graph Report
Test Run	baseline test	baseline test	
Test Run Start Date:	Wed Nov 05 23:09:09 EST 20...	Wed Nov 05 23:19:07 EST 20...	
Test Run Status:	completed	completed	
<b>Business Requirements:</b>			
% Performance	100.0000%	100.0000%	
% Availability	100.0000%	98.0000%	
% Reliability	100.0000%	93.6225%	
<b>Page Time Distribution:</b>			
% Page Time <= 4s	100.00%	100.00%	
4s < % Page Time <= 8s	0.00%	0.00%	
8s < % Page Time <= 12s	0.00%	0.00%	
% Page Time > 12s	0.00%	0.00%	
<b>Test Run Statistics:</b>			
Total Virtual Users	25	25	
Total Sessions	25	25	
Total Page Views	275	275	
Total Requests	400	400	
Total Responses	400	392	

Applet: com/opendemand/applets/JAppletAnalysis started

Local intranet

# Analysis (cont.)

*Identify slow or error prone pages...*

OpenLoad Analysis - Microsoft Internet Explorer provided by Compaq

Address: http://127.0.0.1:8090/openload/analysis/index.jsp

## Test Run Analysis

This page allows you to pinpoint performance bottlenecks within your application and infrastructure.

Report View Tools Help

Report Types

Test Results

Test Runs

- baseline test [Wed Nov 05 23: ...]
- baseline test [Wed Nov 05 23: ...]
- baseline test [Wed Nov 05 23: ...]

User Scenarios

- new trader
- advanced trader

Servers

- 192.168.1.202

Virtual User Report	Summary Report	Detailed Report	Graph Report		
User Scenar...	Page Name	Avg Time	Max Time	% Timeouts	% Errors
new trader	page_1	1.54s	1.78s	0.00%	0.00%
new trader	login page	0.27s	0.45s	0.00%	100.00%
new trader	page_3	0.34s	0.47s	0.00%	0.00%
new trader	page_4	0.07s	0.14s	0.00%	0.00%
new trader	page_5	0.07s	0.12s	0.00%	0.00%
new trader	page_6	0.12s	0.23s	0.00%	0.00%
new trader	page_7	0.01s	0.05s	0.00%	0.00%
new trader	page_8	0.01s	0.02s	0.00%	0.00%
new trader	page_9	1.53s	3.00s	0.00%	0.00%
new trader	page_10	0.01s	0.03s	0.00%	0.00%
new trader	page_11	0.01s	0.03s	0.00%	0.00%
advanced tra...	page_1	1.59s	1.78s	0.00%	0.00%
advanced tra...	login page	0.30s	0.50s	0.00%	92.31%
advanced tra...	page_3	0.26s	0.41s	0.00%	0.00%
advanced tra...	page_4	0.08s	0.12s	0.00%	0.00%
advanced tra...	page_5	0.07s	0.09s	0.00%	0.00%
advanced tra...	page_6	0.14s	0.27s	0.00%	0.00%
advanced tra...	page_7	0.03s	0.08s	0.00%	0.00%
advanced tra...	page_8	0.01s	0.02s	0.00%	0.00%
advanced tra...	page_9	1.78s	3.00s	0.00%	0.00%
advanced tra...	page_10	0.01s	0.03s	0.00%	0.00%
advanced tra...	page_11	0.05s	0.33s	0.00%	0.00%

Applet com/opendemand/applets/JAppletAnalysis started

Local intranet

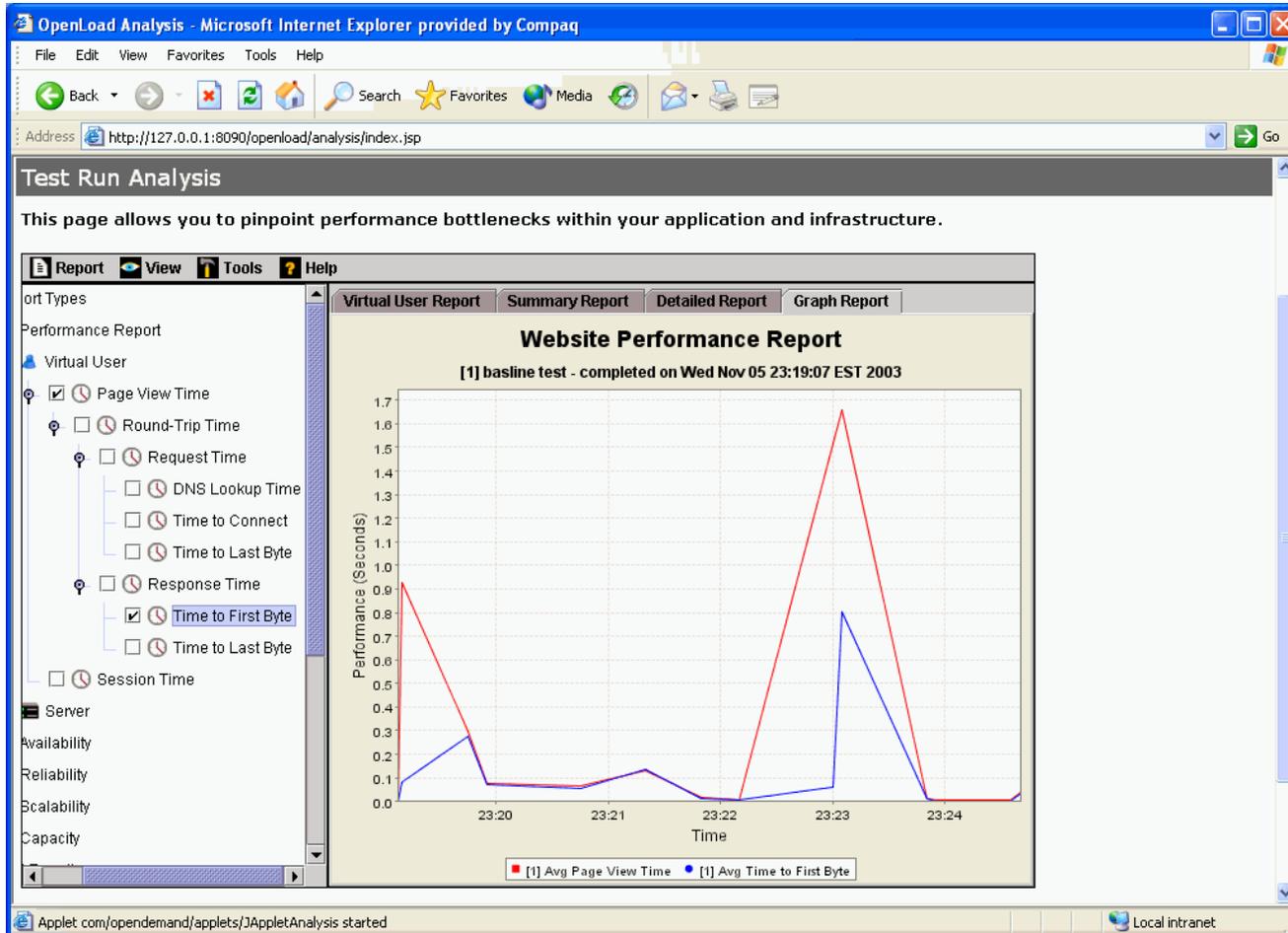
## Analysis (cont.)

### *Graph performance trends over time and user load...*

- Allows you to graph all of the data for easy viewing
  - Server and client metrics
  - Request, response times and sizes
  - Many others!
- Can compare tests to find performance improvements, degradations.

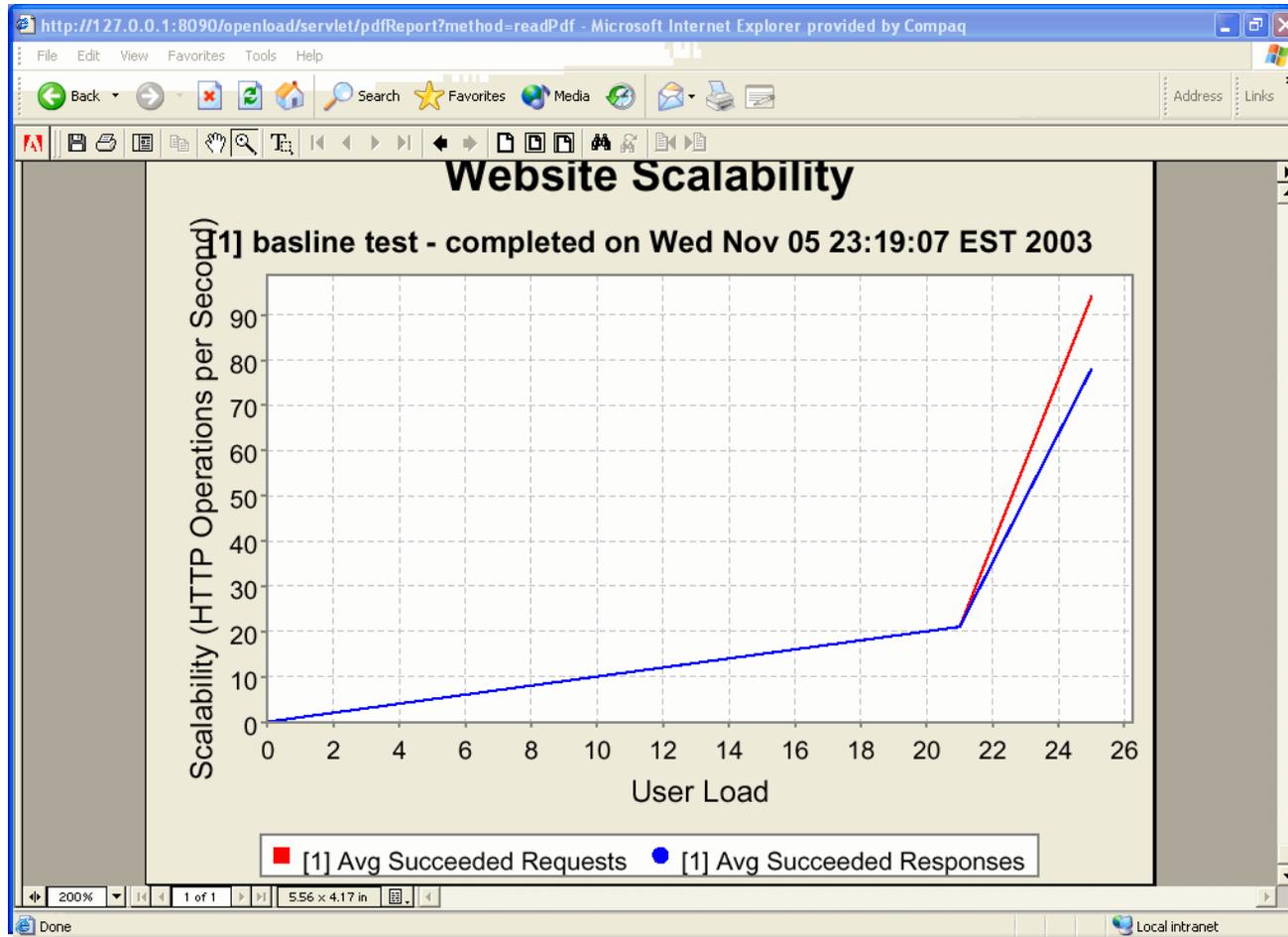
# Analysis (cont.)

*Drill down metrics for even greater detail...*



# Analysis (cont.)

*Export your test results...*



# Fixing the Problem

*Iterative testing makes it easier to identify the problem...*

- Is it the code?
- Is it the database?
- Is it the server configuration?
- Is it the connection pool?
- Or something else?

# Why OpenLoad™?

*Because it makes your life easier...*

- It not only provides a convenient browser-based interface for managing the complexity of testing web applications for us...
- It makes it *easy!*

To create scenarios

To configure users

To run tests

And to analyse their results

OpenDemand Systems, Inc.



## Questions and Answers

To obtain a free trial of OpenLoad™ contact OpenDemand at **(973) 735-0547x2** or **info@opendemand.com**, or register at

<http://www.opendemand.com/openload/trial.shtml>

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