



To succeed in business it is necessary to make others see things as you see them.

## Performance Testing of .NET Web Application for Email Campaign Management

### Abstract

Its Netherlands based company specializing in personalized and interactive communication related applications which provides campaigns and solutions for interactive marketing over email, web and iTV, they wanted end to end performance testing and optimization which included testing the application under a load of 3000 concurrent users. After completion of project there was drastically improvement in the performance, they identified the break point of the application at 3500 users when all the server memory was 100% utilized. It helped overall performance and user experience was optimized as a result of this exercise.



## Client Profile

The client is a company based out of Netherlands specializing in personalized and interactive communication related applications. They have a range of products for sales management, campaign management and customer relationship management.

The client has created, developed and facilitated concepts, content, campaigns and solutions for interactive marketing over email, web and iTV. With these services and tools, they help their clients get qualified leads, sales, customer retention or profile building.

Gateway Testing Labs helped the client in doing end to end performance testing and optimization which included testing the application under a load of 3000 concurrent users. Gateway also did stress testing to identify the system breakpoint.

This was followed by a white box testing round involving complete source code review to pin point performance issues and then resolve it.

Gateway's services improved the overall performance of the application to substantially bring down the overall response time of the application, resulting in an enhanced customer experience while using the application.

## The Project

The product we tested for performance is a sales management system particularly dealing with generation of interactive mass email campaigns. This application is primarily to be used in call centers and BPO organizations in the Netherlands to plan and execute email campaigns.

The project is a simple web-based communication media created in ASP technology and SQL Server as database backend.

Some of the salient features of the application are:

- User can deliver message in relevant context with personal touch at right moment to their target group.
- Usage of ultra modern campaign management tools, data analysis and synchronization techniques.
- User has to login and fill up relevant description about the Title, First Name, Last Name and Email Addresses of their target person or group.
- User can see the preview of the email message and send it to its target person or group through specified email addresses.
- Since the target audience of the application was call center users, the application had to be designed and developed to perform optimally under load conditions.



## Business Need

The client had approached us to take care of the stability and performance of their web-based communication related application. They needed a stable environment with seamless performance for their business even at peak load of 3000 concurrent users.

**Client was looking for the following characteristics in their offshore partner:**

- Understand the flow of application and execute performance testing within their time and budget constraints.
- Execute the performance test at the end of their business day so that their business is not affected due to the test.
- Carry out a detailed performance analysis to convert the reports into meaningful information that can be acted upon.
- Carry out white box testing to review code for identifying opportunities of performance improvement and report them.
- Carry out a regression round of review to ascertain performance enhancement.

The overall scope of assignment was to perform load testing for 3000 concurrent users to confirm stability and performance of the application and to derive:

- Fastest and Slowest pages under different peak load conditions with minimum, average and maximum response time for each page.
- The maximum number of users that application can support
- Identify the problem area in terms of front-end, database and hardware platform.
- Opportunities for improvement in performance at in source code level.

## Challenges

One of the major challenges was to ensure that all load testing is done after client's working hours. Gateway deployed a team of performance testing experts who were flexible to support this unique business need of the client.

Some of the other challenges that we faced included:

- Proposing an effective load testing tool that not only satisfies client's requirements but also falls within their budgetary constraints.
- Work jointly with client to identify key scenarios which covers the sections of the application which are processing intensive.
- Parameterization of test scripts to send multiple emails.
- Constant collaboration with client's team to ensure seamless process during testing to avoid any error blocks affecting the process.
- Resolve issues related to SMTP and mass email sending that we encountered when 3000 concurrent users relayed emails because of which SMTP failed.
- Working at odd hours to support client's request on timing.
- Complete performance testing is a shorter time span to support client's business priorities.
- Having a near production environment to realistically assess performance of the application.



## Gateway's Solution

Gateway closely collaborated with client to understand the requirements and overall functional scope with its underlying business rationale'.

### Pre-requisites for taking up performance testing exercise:

- Stable system with no crash errors or bugs
- Realistic near-production test environment
- Performance Testing Tools and identification of scenarios
- Performance Requirements in terms of concurrency and number of users

### Approach

- We first identified, analyzed, confirmed and configured the test environment where testing was performed.
- Test Environment described the type of OS, CPU configuration, internal memory, and testing tool used for testing.
- We researched on multiple options for identifying the testing tool. We analyzed some open source tools against some commercial tools to do a comparative analysis. We finally suggested using WAPT 5.0 with WSOP 2.0 to execute load test.
- Identified the conditions under which the performance testing could be executed. The conditions are the dependencies and assumptions that needed to be fulfilled before starting test. E.g. live server application without functional errors, high bandwidth internet speed with instant connectivity to web server and properly configured SMTP server.
- This was followed by planning and

## Benefits

Gateway ensured ROI for the client's investment in performance testing by:

- Drastically improving the performance of the application in terms of
  - Response time
  - Memory usage
  - Database connections/optimizations
- Client identified the break point of the application and was aware that beyond a certain load condition, hardware and infrastructure will need to be scaled up. This decision can be taken by client based on structured information about application break point.
- We were able to identify that application breaks at 3500 users when all the server memory is 100% utilized resulting in a non-responsive application.
- Code review uncovered some of the major performance engineering problems in database and source code (design implementation).
- When server crashed, client was able to have the application running again since all testing was during client's non-business hours.
- Overall performance and user experience was optimized as a result of this exercise.



# Case Study

designing of test scripts followed by implementation of the test designs.

- Scripts were then recorded, enhanced, verified and load was configured which included delay time, ramp up pattern and configuration of concurrency.
- Scripts were tested and then executed in different scenario rounds with users ranging from 200 to 3000 in batches.
- Entire execution was divided into multiple rounds to do a progressive analysis of load and performance.
- We also accessed servers at client end to monitor and keep a log of CPU and memory usage on server side when the load was being executed.
- Test reports were generated by the tool. These reports were diligently analyzed to convert data into meaningful and actionable information. Result Analysis included reorganizing data and generating summary graphs wherever required.
- Prepared detailed performance test report which described all contents of results in details.
- Carried out detailed code review of the application against coding guidelines and code review checklist to identify performance issues at code level to come up with a detailed review report.
- Regression testing of application again on performance to ascertain performance improvement. Gateway team also provided recommendations on hardware and deployment platform to ensure that application does not break because of hardware bottlenecks and supports the intended business users

## Technology

The test automation tool used for performance testing was WAPT 5.0. The license version of this tool was purchased and installed at our local environment.

The following technologies were used along with WAPT 5.0 performance testing tool:

- Operating System: Windows XP, Win 2003
- Browsers: Internet Explorer 7, Mozilla Fire Fox 2.0.0.4.
- Internal memory: 2GB RAM
- CPU configuration: Intel Core 2 Duo processor

**Gateway TestLabs** defines test designs and delivers business enabled Testing solutions that help Global 2000 companies win in a flat world. These solutions focus on providing strategic differentiation and operational superiority to clients. Gateway creates these solutions for its clients by leveraging its domain and business expertise along with a complete range of testing services

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### Gateway TechnoLabs Pvt. Ltd.

Head Office: B/81, Corporate House, Judges Bungalow Road, Bodakdev, Ahmedabad - 380 054 INDIA.

Tel: +91 (79) 2685 2554 / 55 / 56 Fax: +91 (79) 2685 85910020

Web: [www.gatewaytechnolabs.com](http://www.gatewaytechnolabs.com) [www.offshoretestingservices.com](http://www.offshoretestingservices.com)

E-mail: [qa@gatewaytechnolabs.com](mailto:qa@gatewaytechnolabs.com)

