

## Belatrix Software Factory

### Sample Automated Load/Stress Testing Success Cases

**Introduction.** In this white paper we will discuss different cases where the Belatrix Quality Assurance team has implemented successful automated testing strategies to provide our Clients with Load and Stress Testing services, but first we'd like to introduce our company: Belatrix Software Factory is a leading Software Services Outsourcing company with its main offices and delivery centers based in Mendoza, Argentina. We provide Software Development, Quality Assurance, Localization and Graphics Design Services using the Staff Augmentation Model: we specialize in assembling the right team for our clients' needs and then helping them manage it. We don't just give our clients a person and a computer, we pride in adding value to our services by supporting and helping them make the best use of their resources.

**Quality Assurance Services.** BSF's Quality Assurance department provides testing and quality assurance services for projects developed within the company (internal projects) or by other companies (external projects). It also supplies mechanisms to improve existing practices by developing standardized processes for the entire company and by applying ISO™ standards, international standards, and lessons learned from CMMI™-SEI.

Belatrix's QA team specializes in high value-added QA services such as Load Testing, Scripted Testing, etc. Because of this we are extremely selective in our recruitment process and only hire top software engineers that have a passion for Quality Assurance.

Some of the Testing Strategies we follow are:

- Functional Testing
- Risk-Based Testing

- Graphic User Interface
- Acceptance, Usability and Accessibility
- Performance (Stress and Load)
- Regression
- Installation and Configuration
- Security
- API Testing (N.Unit and MS-VSTester Edition)
- Automation (Python, VBscript, Apodora, Mercury QTP)
- Smoke Test

### *Belatrix's Services*

- *Software development*
- *Software quality assurance*
- *Graphic design*
- *Remote system support and administration*
- *Language localization*

## Case Study A: Load Testing a System

**Migration.** Our client contacted us to help them validate that their re-architected system would perform as well or better than the older solution under different usage scenarios. This was a Desktop Client-Server system.

**The Company.** This Client is a leading supplier of discovery, collaboration, and knowledge enterprise solutions, desktop software, scientific databases and consulting services to the pharmaceutical, biotechnology, and chemical industries. The Company provides: Enterprise solutions, desktop software, scientific databases, and professional services for biotechnology, drug discovery and chemical research, including software, databases, and web sites which enable customers to create, analyze and communicate chemical, biological, and scientific information more effectively.

**The Products.** This Client's products are used primarily in the pharmaceutical, biotechnology and chemical industries, as well as in higher education and in academic and government research. The company's principal software is the de facto standard and primary communication tool on the chemist's desktop. The enterprise version of this solution enables research information organizations to deploy application and information solutions using Internet, intranet, and extranet technologies. These solutions are now in use by companies such as Abbot Laboratories, Johnson & Johnson, Merck, etc.

**The Challenge.** Our client was creating a new version of this product in a more modern platform and they wanted to convince old customer to migrate to the new version. Therefore, we had to demonstrate that the new version had a better performance and that it was more reliable. Based on its experience, the Belatrix

Quality Assurance team proposed to automate the process to load-test the system.

**The Solution.** Along with the client Belatrix decided that the best option was to create a custom framework that allows us to:

- Load a data base with a large amount of data
- Simulate a WAN in a LAN
- Network latency
- Bandwidth
- Delay
- Simulate Inactive and active users in the system
- Perform tests over the system
- Control every parameter from a controller script
- Tests
- WAN parameters (Latency, Bandwidth, etc)
- Sequence
- Results
- Repetitions
- etc

Some of the tools and technologies that were chosen included:

- Python
- .NET
- DummyNet
- XML
- TOAD

**The Results.** Belatrix helped the Client define and implement the performance test strategy.

Also Belatrix contributed to identify and fix performance problems and demonstrate that the newest version of the product had several advantages over the older version.

## Case Study B: Load Testing a Web-based CRM application using automation tools.

This particular client had designed a very light-weight CRM online application and was in need of system sizing metrics to design their deployment strategy.

**The Products: We tested an application called Phonesheet.** It is a simple Web-based service that lets you take a call and record who called, when, and why. Then you, or anyone else in the office you give the access to, can see the board, and can mark the call as completed when it is handled. Very simple, and a good use of shared connectivity (the Web). It's a nice app for an individuals and organizations trying to keep up with their phone log.

**The Challenge.** The client's product was stress-tested in order to determine how many concurrent users could work with the application online and also to determine which was the hardware needed to host the application.

**The solution.** Using the open source application OpenSta we recorded several test scripts to simulate the different workflows that a normal user would take while using the application. This tool allowed us to have full coverage of the client's request.

**The results.** We were able to determine exactly how many concurrent users could support the application using the existing hardware, by doing this we set the maximum capacity of the hardware and what could be the costs to expand the hardware in order to support more concurrent users.

## Case Study C: Stress testing of a Web-based application.

The Client was not fully confident on the ability of their application to perform well under heavy load, they also wanted to make sure the system in question would resist hacker attacks,

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**The Products in Question.** We tested an application that transforms the numbers in your database into graphics on your screen to visualize complex organic chemical formulas online on a Web page. Retrieve or search for a set of compounds, choose the data you want to see, whether it is biological test results in Oracle tables, physical property values calculated automatically or prices in a catalog, and also another module that will generate an interactive window showing a scatterplot, histogram, or other useful data graphic.

**The Challenge.** Make the migration of an existing website intended to perform chemical searches for the pharmaceutical industry and chemical industry. Determine

if the new site could match or even exceed the existing site's performance while making queries to the Database. By performance we mean:

- Measure the response time for a web chemical search for each individual user.
- Measure the response time for all the queries made to the Oracle Data base.
- Compare the results of the new site and match then with the production site
- Present new alternatives to improve the response time of the application

**The solution.** Using OpenSta (an open source application) we recorded several test scripts to simulate the different kind of searches that a normal user would take while using the application. This allowed us to:

- Know exactly how many concurrent users the application would support.
- We were able to simulate from 10,000 to 100,000 queries per hour.
- Predict the scalability of the application in terms of hardware.

**The results.** Our process and testing strategy allowed us to first determine the existing gap between the new site and the production site, the first cases showed that the new application was under the estimated performance, the results were extremely useful for the developers to detect in the code the areas that needed to be polished. After a few testing cycles the new application was able to work in a better way than the production site.

A quicker site than the existing one

Be able to refine the results of the queries by comparing the results in both sites

Warn the client that the existing hardware wasn't enough for the new application, thus predicting scalability issues in a live environment.

Be able to test in a unattended way each build in a defined period of time, this allowed us to apply other kinds of testing to the application like security testing.

### Case Study D: Load Testing a very popular Web site.

The Client had been hired to develop a Web site that would need to support thousands of concurrent user and they engaged Belatrix to provide the assurance and guidance that their system would perform at the levels it was supposed to

**The Client.** RDVO provides web sites services to important clients like Red Sox, MBTA, etc.

**Product.** MBTA. (Massachusetts Bay Transportation Authority). This particular product consisted on a website which is accessed by lots of users looking for information regarding transportation, automatic intelligent trip planning, trip schedules, etc. Due to the constant and massive access to this site, its performance was quite poor.

**The solution.** Belatrix carried out a Load Testing procedure in order to identify the bottle necks in this product (considering network, hardware, software platform, the application itself, the database, etc).

After recreating an exact copy of the production environment, analyzing the requirement, and designing the whole testing procedure, Belatrix was able to obtain:

- Determination of the approximate number of users the application can realistically support, both now and in the future.
- Measured end user response time for key transactions and various user load levels.
- Identification of performance bottlenecks.
- Analyzed Infrastructure Components (CPU, bandwidth, memory, I/O etc).
- Modeled scalability of applications.
- Measured performance boundaries and failure behavior of each component.

- Detailed statistical reports of their systems' performance.
- Performance-under-load observations to allow Subject Matter Experts to make recommendations on how to upscale and improve performance.

Some of the tools and technologies used on this project were:

- OpenSTA
- NetEm
- Dummynet
- IP Spoofers
- Database access counters

**The Results.** After analyzing the obtained results, Belatrix was able to determine the improvements that needed to be carried out, involving hardware, Database tuning, and network configuration. Achieving an outstanding increase in the site performance and the user experience

**We invite you to learn how a relationship with Belatrix will give your company a distinctive advantage through low cost, disciplined, and high quality software development and quality assurance services.**