



# How to Scale DNN from 4,000 to 200,000 Users

**A Budget Challenge Case Study**

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## Introduction

**BUDGET CHALLENGE IS A BUSINESS FOCUSED** on preparing young people to effectively manage their personal finances. Developed in 2005 and based in Cincinnati, Ohio, Budget Challenge was built as an application on top of the DNN platform. This patented educational simulation incorporates a “learning-by-doing” approach to teach high school students how to manage money.



Students are provided with simulated paychecks and bills to pay, and they compete with one another to see how effectively they can save in a 401k, pay their bills and avoid fees.



This “road test for personal finance” allows students to gain experience managing money without the high cost of financial mistakes and credit damage.



**BUDGET CHALLENGE JOINED FORCES WITH H&R BLOCK'S PHILANTHROPIC DOLLARS AND SENSE PROGRAM IN THE SUMMER OF 2014.**

H&R Block was interested in giving away scholarships to students, and Budget Challenge was the perfect match for the powerhouse tax preparation company. Unlike some other industries, the tax preparation business benefits when their customers are more educated about their own finances.



Partnering with Budget Challenge presented multiple benefits for H&R Block – they were given the opportunity to award scholarships to young people and to educate them about personal finances at the same time.







This partnership with H&R Block brought explosive growth to Budget Challenge.



**200,000** +



**4,900%** +

**HAVING REACHED** just an estimated 4,000 youths across the U.S. in 2013, company management at Budget Challenge anticipated interaction with as many as **200,000 students** during the course of the 2014-2015 school year, **a spike in traffic of over 4,900%!**



## HOSTING PROVIDER OVERVIEW:

# PointClick Technologies

**POINTCLICK TECHNOLOGIES IS A FULL-SERVICE** managed hosting provider, providing cloud and dedicated hosting and a variety of managed services to clients across different industries. Established in 2007, PointClick differentiates itself from other providers by focusing on the business requirements and business outcomes of its customers, rather than simply addressing infrastructure issues.

Its customer-first approach encompasses the entire life cycle of an enterprise's transition to the Cloud.

The services range from application and database optimization, compliance readiness, disaster recovery and business continuity, capacity planning through to successful on-ramping and ongoing audits.



Headquartered in Raleigh, North Carolina, the company hosts its servers at two data centers, both of which are SSAE 16 certified – one located in Raleigh, North Carolina, and the other in Ashburn, Virginia. Both state-of-the-art facilities provide clients with the highest possible level of technology, reliability, safety, security and scalability.





## APPLICATION DEVELOPER OVERVIEW:

# IowaComputerGurus

**IOWACOMPUTERGURUS, INC. IS A WEST DES MOINES, IOWA-BASED COMPUTER CONSULTING FIRM.**

Initially founded in March of 2006, it has become a leading provider of custom software solutions using Microsoft-based technologies. IowaComputerGurus specializes in the delivery of custom software solutions across the world with a strong emphasis on top-notch customer support.



IowaComputerGurus is a Microsoft Silver Certified Partner and assists customers with Web technology needs for

everything from simple sites for smaller organizations to PCI Level 1-compliant e-commerce solutions designed to handle millions of transactions annually, and everything in between.

With over 220 customers from more than 10 countries, IowaComputerGurus has developed countless DotNetNuke extensions and skins, as well as created countless other non-DNN-based solutions.



## **THE CHALLENGE:** Optimizing DNN to Scale Up to 50,000 Concurrent Users

**EVEN BEFORE THE PARTNERSHIP** with H&R Block was finalized, the fast approaching back-to-school deadline was looming. While Budget Challenge was initially satisfied with the performance of their DNN platform for the first several years, an unclear path to scale up the platform frustrated them.

The company now needed to accommodate 50,000 concurrent users, but when they attempted to scale up to that capacity, DNN seemed unable to handle the load. Budget Challenge was in desperate need of improved performance from their CMS, so company managers approached their DNN hosting provider to ask for help, but they were unable to scale up the application adequately to handle the increased load.

**After being unable to resolve their DNN issues, Budget Challenge management was finally referred to PointClick Technologies for assistance.**



Once we understood that our partnership with H&R Block would become a reality, we knew we needed to use the services of a company like PointClick – one that could meet the challenges ahead within a very short timeframe,”

SAID DAVE BUTEN, PRESIDENT AND CO-FOUNDER – ALONG WITH HIS WIFE PALMIRA -- OF BUDGET CHALLENGE.





## **THE PLAY-BY-PLAY: How Budget Challenge Met Its Challenge**

**RIGHT FROM THE ONSET**, it was clear that the Budget Challenge platform had challenges. An initial performance test with the current hosting provider was conducted for 100 concurrent users on a five-server set up. In normal situations, one server would be enough to handle the workload from 100 concurrent users.



**UNFORTUNATELY, THE SITE PERFORMED MISERABLY** – it became unstable with low throughput and the response times were sluggish. Further testing in the existing environment would not have resulted in measureable improvements, and a change was necessary.



## STEP 1: Migrate Environment to PointClick Technologies

**THE FIRST STEP WAS TO MIGRATE** the entire environment over to PointClick Technologies in order to better size up the current state of the platform.



Conducting the same performance test now on PointClick's environment – with absolutely no changes to the configurations, code or application – yielded a **100% INCREASE IN PERFORMANCE.**

Simply changing hosting providers proved to be a huge benefit. However, the team still was far away from reaching its target.



**POINTCLICK AND IOWACOMPUTERGURUS** at this point implemented New Relic's Server Monitoring and Application Performance Monitoring tools in order to get a good picture of what was going on with the servers and applications. This helped to allow identification of stress points within the system as the scale and traffic load increased.

ALL LOAD TESTING UP TO THIS POINT, AND THROUGHOUT THIS PROJECT, WAS COMPLETED USING LOADSTORM'S CLOUD-BASED WEB SITE USER SIMULATION TESTING. THIS TOOLSET WAS INVALUABLE AS BY TESTING FULL REQUEST SIMULATIONS LARGE TRAFFIC LOADS WERE EASY TO SIMULATE.

## STEP 2:

# Configure DNN for Web Farm Usage

**NOW IT WAS IOWACOMPUTERGURUS'** turn to take a stab. One of their first actions was to upgrade the platform.



Budget Challenge was built on the open-source DNN platform. IowaComputerGurus obtained licensing to upgrade to Evoq Content, a supported version through DNN software, which provided valuable additional enterprise load-handling capability. Of specific interest were the Web Farm Cache Synchronization and Page Output Caching functionalities.

IowaComputerGurus then proceeded to take advantage of these load-handling features within Evoq Content to optimize the platform.



**THE RESULTS WERE SUCCESSFUL:** the Budget Challenge application now easily handled 1000 to 1200 concurrent users with ease simply by enabling and supporting proper cache synchronization and usage.



## STEP 3: Content Delivery Network (CDN) Speeds Up Performance

**POINTCLICK WAS ABLE TO FURTHER REDUCE** the overhead on the servers by offloading 70% to 80% of the load to Incapsula's Content Delivery Network and Web Application Security services to protect the Web site.



**This allowed the application to scale up to between 20,000 and 25,000 users.**



**LOOKING AT THE REPORTS GENERATED SOME CURIOUS RESULTS:** the site was indeed failing – bottlenecked at around 25,000 concurrent users. However, none of the servers were experiencing any issues.

The CPU and memory usage were not overworked. This was an example of examining where the delineation of application and network responsibilities was going to be crucial.





## STEP 4: Success Achieved

**IOWACOMPUTERGURUS DUG DEEPER** into the server configuration and database code, specifically looking at core configurations of ASP.NET, IIS and the Windows servers. After a few modifications, the application soon achieved stunning performance and became capable of handling 50,000 concurrent users, if not more.



**THE KEY WAS A TRUE PARTNERSHIP OF TWO ORGANIZATIONS** – one a managed hosting provider and the other an application development guru – both of which worked closely together around the clock over the July 4th weekend.

By working lockstep in making application changes, tuning the database, modifying and implementing server changes (a “Change an Item and Retest” approach) the partners were able to identify, change and predict the next action.



**And, ultimately, they were able achieve what the client thought was unattainable – supporting 50,000 concurrent users.**

**50,000**



## Reflections

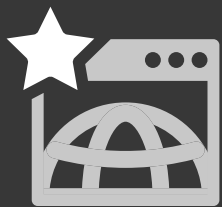
### HAVING GAINED A REPUTATION AS EXPERTS

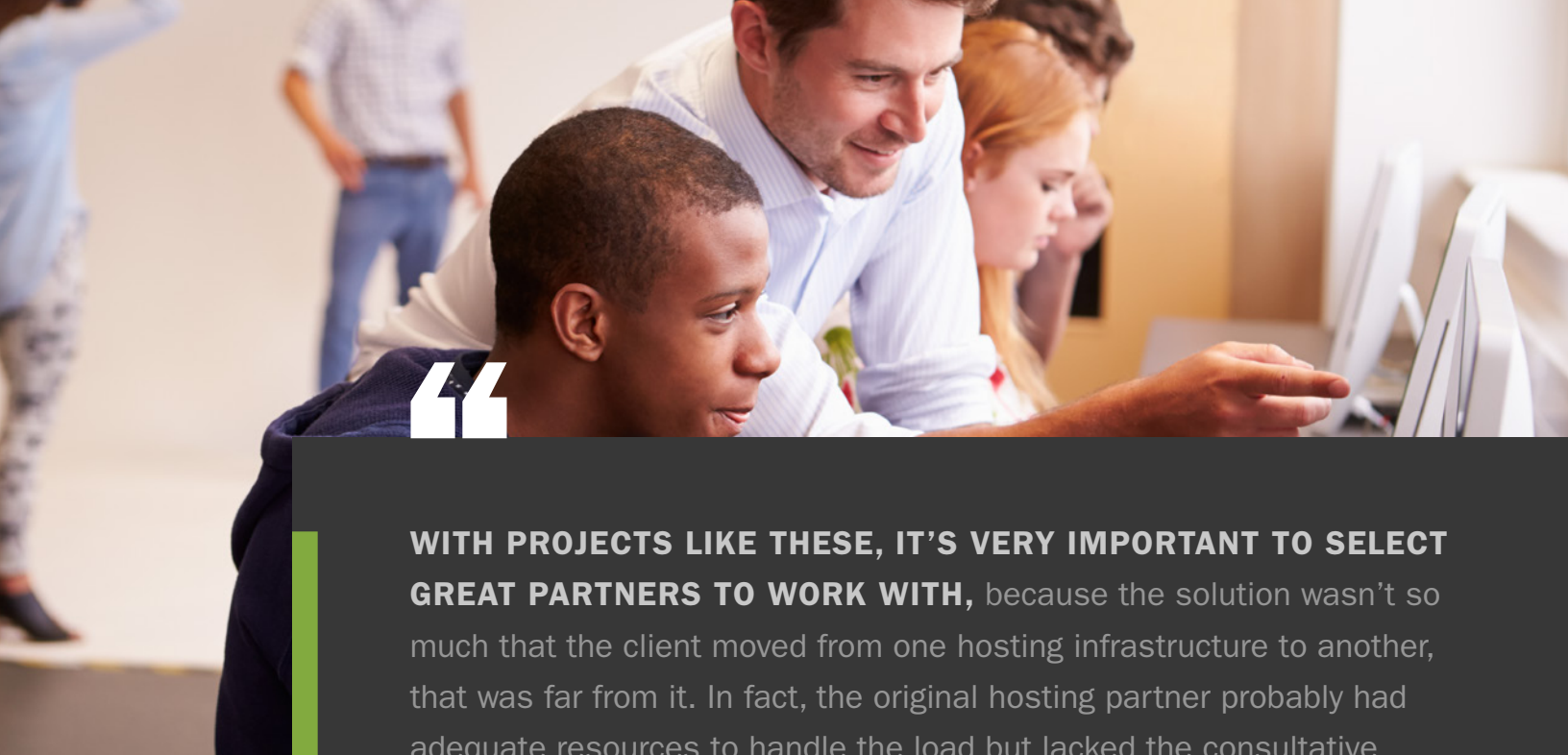
in the DNN CMS, the two experienced teams understood exactly where to look for the answer to Budget Challenge's problems – and it wasn't just in DNN.

“

We know the strength of DNN, but we also know the limitations of the platform and related hosting environment. This is especially true in high load situations, if it isn't coded or configured correctly, performance can be abysmal,”

said Mitchel Sellers, CEO of IowaComputerGurus. As it turned out, they were right – Budget Challenge's DNN application was incorrectly configured, had several third-party module issues and the servers were not properly optimized for the load.





**WITH PROJECTS LIKE THESE, IT'S VERY IMPORTANT TO SELECT GREAT PARTNERS TO WORK WITH,** because the solution wasn't so much that the client moved from one hosting infrastructure to another, that was far from it. In fact, the original hosting partner probably had adequate resources to handle the load but lacked the consultative approach PointClick takes with every engagement.



Our approach allows us to find answers to application and performance issues where many other hosting providers may not look,”

**SAYS MALIK KHAN, PRESIDENT AND CEO OF POINTCLICK.**



Ultimately, working collaboratively the teams successfully set up a 100% cloud-based infrastructure that is load balanced across five Web nodes, with a Microsoft SQL Server backend and plenty of computer and network horsepower.





## Today

Budget Challenge, in partnership with H&R Block, continues to grow.

The company is currently registering upwards of 2,000 students per day. Its DNN platform, after receiving much-needed improvements, now effectively handles 55,000 page views an hour or more. Their load time averages around 0.95 seconds, and the system is typically running about 20,000 sessions per day.



**“I’M NOT SURE HOW WE WOULD HAVE RESOLVED THE SITUATION WITHOUT THEM,”**

said Dave Buten. “PointClick and IowaComputerGurus were knowledgeable, flexible and extremely responsive on an around-the-clock basis. I hate to think where we’d be right now if it weren’t for the expertise that they both brought in helping us scale our application.”



There's no doubt that DNN is a powerful CMS platform. But, like any other tool, it must be used correctly in order to maximize its efficiency. That's where the experience and expertise of a hosting provider teaming up with an application development guru come into play.



**"MOST PROVIDERS FOCUS ON INFRA-  
STRUCTURE AND PUSH EVERYTHING  
ELSE BACK ON THE CLIENT,"  
SAID MALIK KHAN.**

**"WE FOCUS OUR EFFORTS ON THE BUSINESS REQUIRE-  
MENTS AND BUSINESS OUTCOMES OF OUR CUSTOMERS.  
WE PUT THEM FIRST, ABOVE EVERYTHING ELSE."**

**"It is this customer-oriented attitude, in combination with years of practical application development experience and technical expertise, that sets us apart from our competitors," said Mitchel Sellers.**