5-2009

Resource Optimization for Small Business Company Balance the Data Accuracy and Storage

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ABSTRACT

Small business plays a vital role in economy. There are lots of difficulties faced by the small business owners under today's financial crisis. Optimization could help small business owner to reduce the operation cost and earn more from the IT investment. In this paper, we provide a case study of IT resource optimization on a small trading company. Through the case study, the trading company could get an optimized balance on data accuracy and storage. A reduction in the number of data points can still allow a company to pull out meaningful statistics.

Keywords

Small business; resource optimization; Stock Market; RSI

INTRODUCTION

Small business is the business that is independently owned and operated with a small number of employees and a relatively low volume of annual receipt (Moutray, 2008). The small business plays an important role in today's economy. From the source of U.S. Small Business Administration (Moutray, 2008). there are 27 million small businesses in the United States. They provide half of the nation's nonfarm, private real gross domestic product (GDP) (Kobe, 2007) and half of all Americans work for a small firm. In the third quarter of 2007, 97 percent of the net new jobs were in small firms with fewer than 500 employees (Moutray, 2008).

Due to the financial crisis, more small business owners faced significant anxieties than before. The biggest problem faced to small business owners is undercapitalization. The small business owner must be mindful the cost of operation. A good cost control can give the owner more flexibility on funding usage.The owner must optimize the resource in the firm.

Optimization is a structured, systematic process to deliver full business value across an organization's IT infrastructure and application platform. "*Companies that manage their IT investments most successfully generate returns as much as 40% higher than those of their competitors* (Ross and Weill, 2002) ." Many researchers have studied this topic recently. Zirui et al. (2007(presented a framework of resource optimization allocation on e-business system. They used fuzzy clustering method to classify clients in a more efficient, optimized manner. Kaiqi and Perros (2006) presented an approach for resource optimization to minimize the total cost of computer resources used by a service provider for satisfying the QoS metric that the response time for executing differentiated service requests is statistically bounded. Kumar et al. (2007) provided an optimal human resource management model which can maximize profitability by taking into account factors peculiar to software service organizations. The High Performance On Demand Solutions (HiPODS, 2004) team from IBM presented a model on implement business more flexibility by automating the communication between the processes of making business decisions and maintaining the IT infrastructure.

Optimization usually can be viewed in three models (Doug, 2008):

- Core Infrastructure Optimization Model (Core IO model), focuses on the IT infrastructure use
- Business Productivity Infrastructure Optimization Model (BPIO Model), focuses on the business process
- Application Platform Optimization Model (APO Model), focus on end user

In this paper, we will provide a case of using data management to lower the operation cost in a small trading company.

The following is the structure of this paper: section 2 introduces the optimization goal of the case. Following that, section 3 provides the experiment and the result. Conclusion is in the last section.\

CASE STUDY

NPD (North Pole Dynamic) is a new start-up trading company which provides finance service on stock market. To beat other competitors, it must provide not only quote price but also many technical indicators to attract users. The amount of stored information is soaring, but the resources and budgets are not. There are lots of data generated in daily operation. Storing those data will take a lot of funding, including data center rental, UPS (Uninterruptible power supply), daily maintenance, etc. But some technical indicators will use the historical data to generate current result, such RSI (Relative Strength Index). If there is no much historical data, those indicators will lose the required accuracy. NPD must find a balance on accuracy and storage. There should be enough accuracy on technical indicators but without too much data redundancy. In this case, optimization is the process of modifying a system to achieve required business requirement by using fewer resources. The following we will show the optimization on calculating RSI indicator.

Relative Strength Index (RSI) is an extremely useful and popular momentum oscillator. The RSI compares the magnitude of a stock's recent gains to the magnitude of its recent losses and turns that information into a number that ranges from 0 to 100. It takes a single parameter (usually 14), the number of time periods to use in the calculation (Wilder, 1978).

RSI can indicate the buy or sell signal. Generally, if the RSI rises above 30 it is considered bullish for the underlying stock. Conversely, if the RSI falls below 70, it is a bearish signal.

The formula of RSI is the following (Pick the parameter as 14)

$$RSI = 100 - \frac{100}{1 + RS}$$

RS = Average Gain / Average Loss

Average Gain = [(previous Average Gain) x 13 + current Gain] / 14

First Average Gain = Total of Gains during past 14 periods / 14

Average Loss = [(previous Average Loss) x 13 + current Loss] / 14

First Average Loss = Total of Losses during past 14 periods / 14

From the above, we could know that calculating RSI is using a recursive method. If you start an RSI calculation in the middle of an existing data set, your values will only approximate the true RSI value.

The accuracy of RSI depends on the size of data set. The more data points, the more accuracy. Some financial service websites suggest 250 data points to calculate RSI value. In the following, RSI value is calculated in different size of data set.

We pick security symbol "AAPL" (Apple Inc.) to test. The historical data is retrieved from Yahoo Finance. The range of data is from Jan 3, 2007 to Jan 30, 2009. The size of data points we select 50, 100, 150, 250 and 500. We calculate the final 10 day to check the results. The detailed results are in the Table 1.

Table 1. RSI Value from Different Data Points

RSI	50 points	100 Points	150 Points	250 Points	500 Points
1-16-09	38.8251	37.5160	37.529	37.5282	37.5282
1-20-09	33.9591	32.8045	32.8119	32.8111	32.8111
1-21-09	42.6386	41.6513	41.6642	41.6637	41.6637
1-22-09	50.9333	50.1015	50.1178	50.1174	50.1174
1-23-09	50.9333	50.1015	50.1178	50.1174	50.1174
1-26-09	52.7668	51.9687	51.9856	51.9852	51.9852
1-27-09	54.3318	53.5624	53.5796	53.5793	53.5793
1-28-09	58.9902	58.3053	58.3232	58.3229	58.3229
1-29-09	56.8312	56.1688	56.185	56.1847	56.1847
1-30-09	51.9355	51.3247	51.3373	51.337	51.337

The following figure shows the change in line graph

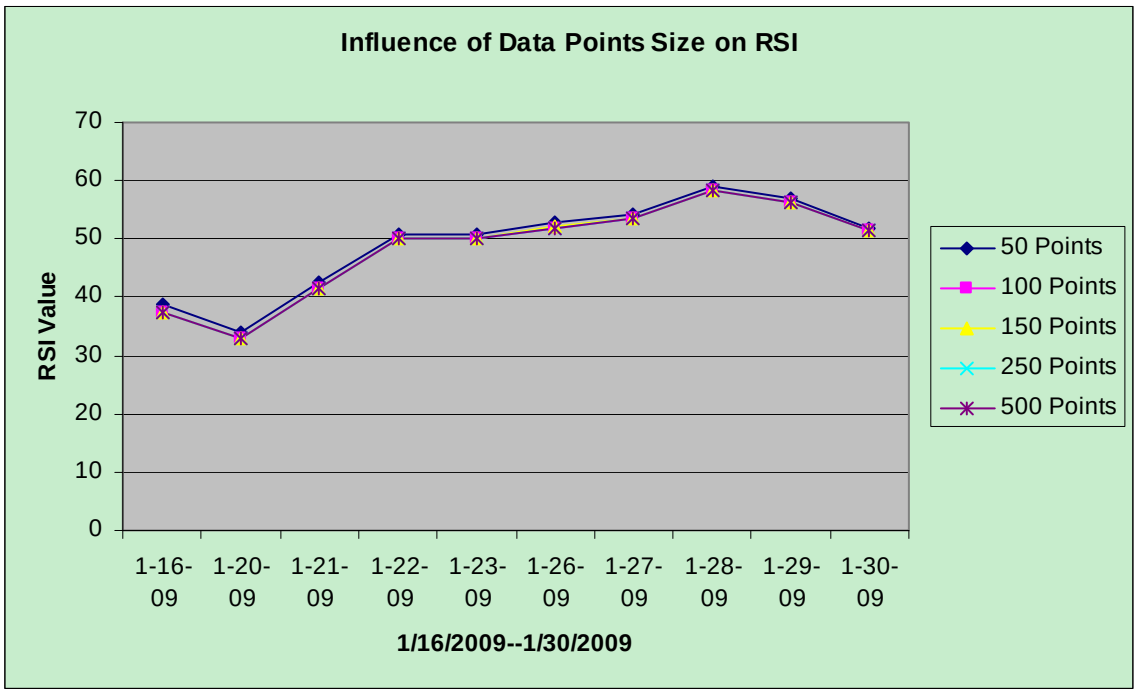

Figure 1. Influence of Data Points Size on RSI Value

From the table and graph, we could know, there is no big difference between 150 data points and 250 data points (even with 500 data points). 150 data points is accurate enough. Despite the theory required 250 data points, we can pick 150 data points as our data set. This will save a lot of storage space. The experiment results show a reduction in the number of data points (and thus in data storage hardware) can still allow a company to pull out meaningful statistics, and thus might be a good way for a small business to reduce their IT costs.

CONCLUSIONS

From the above case study, by reducing the size of data points, the storage for the historical data is also reduced, while the accuracy only lost a little. From the experiment result, the accuracy of data set of 150 points is enough, actually, yahoo finance also use 115 data points. By using this optimization strategy, the company saved a lot cost on data storage. This case study shows that optimization can help the organization get more from their IT investment while without increasing cost. This is especially important for small business under such a tough circumstance.

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