client info
at a glance

Company: Enterprise

Industry: Car rental

Team Accomplishes More

• Since TeamQuest Surveyor, the team has saved 30-40+ hours of data purification and report generation per report.

• Automating data collection from other teams saved 3-4 hours per individual.

• Allows team to parse through data and look for problems they would have never been able to proactively search before.

Enterprise Drives Success with Business Metrics, Data, and Automated Forecasting

IT recoups hundreds of hours annually

Enterprise Holdings (EHI) is the corporate parent of Enterprise Rent-A-Car, Alamo Rent A Car, National Car Rental and Enterprise CarShare. With annual revenues of $16.4 billion and more than 78,000 employees, EHI and its affiliates own and operate almost 1.4 million cars and trucks. This makes it the largest car rental service provider in the world measured by revenue, employees and fleet.

In the past, performance and capacity forecasting and modeling at EHI was done by employing a resource-intensive and error-prone strategy for forecasting inclined to inaccuracies. It involved large volumes of data being manually fed into Microsoft Excel or Access. Dozens of resources and countless hours were consumed to collect data, guesstimate growth and present a forecast (with crossed fingers). This was repeated quarterly and annually.

"One common error committed at that time was to create a forecast by taking CPU usage and then using a linear trend for the forecast," said Performance Engineer Clyde Sconce. "If you do it that way, in our experience, you will be mostly wrong. As too much time was being spent on forecasting with largely poor results, we decided to implement TeamQuest Surveyor."

Surveyor Forecasting

The basic methodology EHI uses with Surveyor is to clearly define and standardize information and associated processes, automate input data where possible, implement sophisticated analysis and capacity planning strategies that are consistently applied, and automatically generate analytic forecasting reports.

"These analysis reports are now available daily and weekly instead of only quarterly before," said Sconce. "This enables us to understand changes immediately and take action."

The forecasting data flow makes that possible. Inputs come from a wide range of sources. This includes basic technical data from TeamQuest server performance

> "... clearly define and standardize information and associated processes, automate input data where possible, implement sophisticated analysis and capacity planning strategies…"

metrics, UNIX systems, hardware systems, business metrics and Java tools. It leads to outputs such as cyclical forecast projections of organic CPU and business growth, dollar cost per server, specific forecasts for different lines of business and executives, and even the ability to check the accuracy of actual versus planned forecasts to see where we might have gone wrong and why.

"We also use Surveyor for historical analysis, business management and application efficiency tracking," Sconce said. "In our AIX environment, application tracking is useful for efficient Logical Partition (LPAR) and frame management, particularly when you are often moving things around using vMotion."

Forecast Inputs

EHI uses PostgreSQL database information such as server configuration (current and historical), resources consumed (CPU, memory, storage) and business transactions (via user agents).

"Our AIX systems also provide plenty of useful metrics such as RPERF which is a rating for horsepower consumption that helps you to see whether you need to add or remove CPUs," Sconce said. "These measures normalize capacity across different models and/or platforms, as well as provide continuity when servers are upgraded or migrated so that historical data is not lost."

Future hardware configurations (planned for implementation) also need to be incorporated into forecasts so that projections include these future assets.

Additionally, EHI uses overrides for several purposes. In some cases growth rates may be inaccurate if historical data is incomplete. For example, a brand new server may show up as having 300% growth. Sconce can override numbers like that in their forecasts, correcting them to something more realistic such as 10%.

Bad data, too, needs to be removed from the plan. EHI has to watch for baseline jumps such as shifts in resource consumption without changes in growth rates. An example might be where two servers are merged into one. In that case, the workload has doubled but the growth rate has not changed.

The Key is Business Alignment...

Forecasting, of course, can't be done in isolation as an IT-only activity. Sconce advises it's essential to take into account current as well as historical business transactions that represent how much work is actually pushing the resources consumed. A big metric in the world of EHI, for instance, is cars rented per hour.

"The business lives and breathes on that number, so whatever IT metrics we use internally, we always translate them into cars per hour when communicating with management. This makes it necessary to correlate business transactions to resources consumed in order to estimate the cost to the organization."

"Taking the metric of dollar cost per server... we are able to estimate the actual dollar cost per business application and per transaction"

To ensure accuracy, EHI communicates with the various lines of business to get an estimate of anticipated growth. Sconce emphasizes that this has to be done using metrics that are familiar with the business.

"Taking the metric of dollar cost per server which originates from our Accounting Department database, we are able to estimate the actual dollar cost per business application and per transaction," explained Lead Performance Engineer Gary Savage. "This is invaluable when it comes to translating IT metrics into the language of the business and in seeing how well we are doing in terms of cost."

IT can group and associate forecasts based on specific groups of servers such as those used in various regions or for different functions. The team also harnesses third party vendor tools that allow them to collect Java environment statistics as well as transactional data (such as URL hit counts, which have been a good measure of head count).

Savage says they use event tags on their data, allowing them to label historical or even future events that may have significantly altered the forecasting pattern.

"For example, if management asks us about something that happened two years back, we can find it easily by referring to its event tag," Savage said.

Predictive Analytic Accuracy

Savage says one key to predictive analytic accuracy is how the information is processed.

"An accurate forecast must employ a sophisticated analytical tool that can do things like cyclical trending, anomaly removal, baseline shifts, hardware changes, cost correlations and flexible report groupings (by theme, solution, location, etc.). Just throwing all of the data and inputs into a blender won't work very well. TeamQuest Surveyor provides and automates all of these functions."

Savage and Sconce say there are many important lessons they have learned from their Surveyor-based forecasting.

"The values we rely on the most, for example, are peak hourly averages at the server level."

"... we found it best to focus on organic consumption (raw CPU, memory, storage) and conduct overrides for editing of anomalous data, annual growth rate and baseline jumps."

"The values we rely on the most, for example, are peak hourly averages at the server level," Savage and Sconce said. "We have also found it useful to have exception reports generated to flag servers with missing data or anomalies that need to be investigated. Further, we found it best to focus on organic consumption (raw CPU, memory, storage) and conduct overrides for editing of anomalous data, annual growth rate and baseline jumps."

Note that for organic, cyclical growth, EHI calculates annual growth (monthly compounded) and then applies a cyclical pattern based on monthly usage. "Monthly cyclical growth lets us be more accurate and make more timely capital expenditures when compared to linear (annual) projections. For example, a linear projection may let us know to make a purchase in June. But by using organic cyclic growth, we were able to delay the purchase until December when it would be needed for a seasonal peak," they said.

Reality Check

There is no "easy button" when it comes to this type of sophisticated predictive analytics, according to Savage. He believes it takes the implementation of a robust forecast reporting process, which requires commitment and many hours of hard work. However, once completed, the benefits are significant.

"We dramatically reduced our staff resource time commitments," Savage said. "We were able to automate the forecasting process and implement daily/weekly reporting, we developed a standardized forecasting strategy and were able to conduct historical forecast tracking to identify areas of improvement. We were, therefore, able to provide superior forecasting accuracy. We believe that each targeted objective was successful and TeamQuest Surveyor clearly demonstrated the ability to achieve or surpass our requirements."

"Monthly cyclical growth lets us be more accurate and make more timely capital expenditures when compared to linear (annual) projections."