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Sentiment analysis at work

How Mindshare and Marriott are mining social-media data to analyse customer sentiment

Fixing data quality problems

Database strategies drive business growth

Andrew Corroll, Mindshare's head of data integration.

A Weather Eye on the World of 'Big Data'

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DATA MANAGEMENT and business analytics have assumed a new level of importance in recent times. "Big data" is the term many are using to capture the essence of a world drowning in exabytes—from customer databases through social media to data collected by sensors in a plethora of environments. Data management and business intelligence (BI) professionals likely will be in ever-greater demand across the private and public sectors as CIOs drive strategies to draw down useful information and gain maximum value from the data flood.

Welcome, then, to this quarterly eZine from TechTarget that offers articles and strategy advice for European data management and BI pros, including regular features on BI and data warehousing, database strategies, and data integration, quality and governance.

This edition ranges over three hot topics in those areas: how two Internet startups in the UK are keeping their database and business strategies closely aligned, and what other small and medium-sized enterprises can learn from them; how companies are using social-media sentiment analysis to get up close and personal with customers; and how data quality can be assured from end to end.

These are exciting times for data management and BI. I hope you find this new eZine stimulating and useful. ■



Brian McKenna

UK Bureau Chief, SearchDataManagement.co.UK

Sentiment Analysis at Work

Marketing services company Mindshare and hotel chain Marriott International are mining social media to analyse customer sentiment.

BY JESSICA TWENTYMAN

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HE CANNES LIONS advertising festival is one of the most prestigious international events in the advertising industry's calendar. Last year, one lucky winner of the coveted Gold Lion award, partly for its use of sentiment analysis tools and techniques, was Mindshare, a marketing and media services firm that is part of the global advertising giant WPP.

Mindshare UK scooped the award for a customer-recruitment campaign it devised on behalf of retail bank First Direct. Online forums, blogs, comment threads and social networks such as Twitter were mined to hear what existing First Direct customers were saying about the bank—both good and bad. These comments were then broadcast as live digital advertising on the London Underground, in train stations and in shopping centres.

It was a daring campaign at a time when consumer trust and confidence in the banking sector were in the doldrums—not to mention a sophisticated use of business intelligence (BI) tools and techniques. But Mindshare has a wealth of experience in this area, according to Mark Bulling, business director at the company. "Clients have long needed to understand why one campaign is better received than another, why it reaps better results in a particular geography or via a particular channel or when targeted at a particular customer segment, so we've always had to stay up to date with new ways of collecting and slicing data," he said. "And in the current economy, there's more pressure than ever to be able to provide that data so that clients can be confident about justifying their advertising spend."

Much of the social data analytics effort at Mindshare is in the

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“It’s not the quantitative analysis of social media sources that’s the problem.”

—ANDREW CORROLL
Head of data integration, Mindshare

hands of **ANDREW CORROLL**, the company’s head of data integration. Like many other BI professionals, he’s finding that social media provides a potential treasure trove of new data, but at the same time presents some interesting challenges. “It’s not the quantitative analysis of social media sources that’s the problem,” he said. “Thanks to Twitter APIs [application programming interfaces] and the like, it’s not so difficult to measure the number of online mentions of a product that a campaign generates or to identify exactly which bloggers are the most influential in terms of generating comments about a product or brand.”

What’s more difficult, he continued, is identifying the mood expressed in an online comment—whether it is positive, negative or neutral. “That’s a much harder thing to do,” Corroll said. “With data collected from social media sites, we’re increasingly exploring the

structure of grammar—how words are connected to convey meaning, for example—which is a totally different kind of analysis. It's less quantitative and more qualitative." This is where sentiment analysis comes in. The technology, in itself, is not new. Large consumer brands have been using sentiment analytics technologies for some time. These apply natural language processing (NLP), computational linguistics

and text analysis to unstructured data in order to gauge the tone of conversations. What is new is the application of these technologies to information collected from social media sources, not to mention the sheer volume of such data that now exists online. For general BI, Mindshare works with a variety of different tools from different vendors—but, for now, its strategy for sentiment analysis is firmly based on open source scripting languages, including Python and R. "Both of these scripting languages lend themselves well to the drawing down of text from social media sites and the application of textual analysis processes to it," said Corroll. Python, for example, includes the Natural Language

Toolkit, a suite of libraries and programmes for symbolic and statistical NLP. The handcrafted approach that Mindshare uses may demand more technical skills, but it offers the company the most cost-efficient way to analyse text for sentiment, said Corroll.

"We're increasingly exploring the structure of grammar—how words are connected to convey meaning—which is a totally different kind of analysis. It's less quantitative and more qualitative."

—ANDREW CORROLL

*Head of data integration,
Mindshare*

GETTING SENTIMENT ANALYSIS CAPABILITIES OFF THE SHELF

Other companies are starting to invest in commercial tools for sentiment analysis. In many cases, these are still standalone. But increasingly, BI software suppliers are developing social media analytics suites that combine quantitative analysis tools—such as volume of conversation and share of voice—with tools for qualitative analysis, including sentiment analysis.

Hotel chain Marriott International, for example, has been working

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with one of the biggest BI companies on the first version of its social media analysis platform, which was launched last year. One of the most important goals of this collaboration was to get insight into how Marriott's brand is perceived online, what kind of sentiment surrounds the brand and who the brand's most influential advocates are, according to Mike Keppler, senior vice president at Marriott International.

Speaking at a software user conference last year, Keppler outlined

the findings of this experiment. He was impressed, for example, by the fact that Marriott was able to pick as many blogs, Twitter streams, public relations newswires and Web crawlers to analyse as it wanted.

"In general, working with a limited data set, we found very positive sentiment, and more important, we found very little negative sentiment," he said. The software also maintains a continuous archive of conversations for ongoing analysis, enabling companies to analyse how sentiment changes over time, and it provides

multi-language support—important for multinational companies for whom a negative customer comment in French is as valid as one in English.

Marriott was also able to identify which high-profile bloggers regularly posted positively about its brand. "We have a voice as a company, but we also found that there were other players that were talking about Marriott," Keppler said.

Many industry watchers, however, point out that sentiment analysis is still a complex and uncertain activity. While the technology is designed to pinpoint significant words in unstructured data as a means of evaluating, for instance, customer reaction to a new product or service, the complexity of human conversation makes accuracy difficult. Comments that are sarcastic or unpredictable, or that make specific cultural references, can be difficult for humans to interpret, let alone machines. Sentiment can also be swayed by temporary factors, such as the poster's mood at the time of writing. As a result, most sentiment analysis applied to social media data still requires human inter-

"We have a voice as a company, but we also found that there were other players that were talking about Marriott."

—MIKE KEPPLER

*Senior vice president,
Marriott International*

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vention for findings to be interpreted and validated before any action is taken, users and analysts said.

MANY SOCIAL MEDIA ANALYTICS TOOLS STILL STUCK IN SILOS

And there are wider issues with the first generation of social media analytics software, said James Kobielus, an analyst with IT market research company Forrester Research. In many cases, he said, these suites remain silos, “separate from existing BI, data warehousing, predictive analytics, complex event processing and data integration

tools. Few vendors provide best-of-breed integrated tools in all of these areas, and the high price tag and scarcity of skilled development and modeling personnel who can work with these technologies spell high total cost of ownership for the unwary.”

So, before any consumer brand pitches headlong into attempting to analyse what customers are saying about it online, there are important decisions to be made. Can the company afford to monitor all social media traffic, given the persistent need for some kind of human interpretational effort? Can it

afford to respond to all the issues that are identified, or should it postpone dealing with some issues and tackle a prioritized subset of issues first? And, above all, should it consider putting social media “listening” in the hands of a skilled outsourcer, given the need for human intervention and the potential costs involved? Until these issues are resolved, companies might struggle to “hear” true sentiment above the general babble of online conversations. ■

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When Data Goes Bad: Finding and Fixing Faulty Info

Data quality isn't as cut-and-dried as you might think. But it has to be faced.

BY MARK WHITEHORN

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IT'S EASY TO think of data quality, and data quality analysis, in terms of absolutes—a date of birth is, after all, either right or wrong. But in many other cases, data quality is not clear-cut and can vary depending on what use you are making of the data.

This difference is highlighted when we compare the use of data in transactional and analytical systems. In a transactional human resources (HR) system, for example, we tend to examine one record at a time. In the gender field we might see an entry that reads “Male,” in the next record “F” and in a third “Femail.” While we may question the spelling ability of the person who entered the data, we would not be in any doubt about the gender of the people whose records we were inspecting. We could argue that the data quality here is acceptable because it is fit for use. However, suppose we pull that data into an analytical system in order to report on the number of males and females employed (see **Figure 1**, page 9). The same data is clearly not fit for this analytical purpose.

NOT ALL MEN ARE HUNKS: A DATA QUALITY ANALYSIS ISSUE

I recently looked at the data collected by a very respectable company and performed just this analysis. We found all the usual suspects plus one I'd never seen before: “Hunk.” Querying revealed that all hunks were males under 30 and that all the records using the unusual terminology were entered during the period when a young female temporary secretary was in post. Draw your own conclusions here; we

certainly did. Happily, an update query quickly calmed the horrified head of HR.

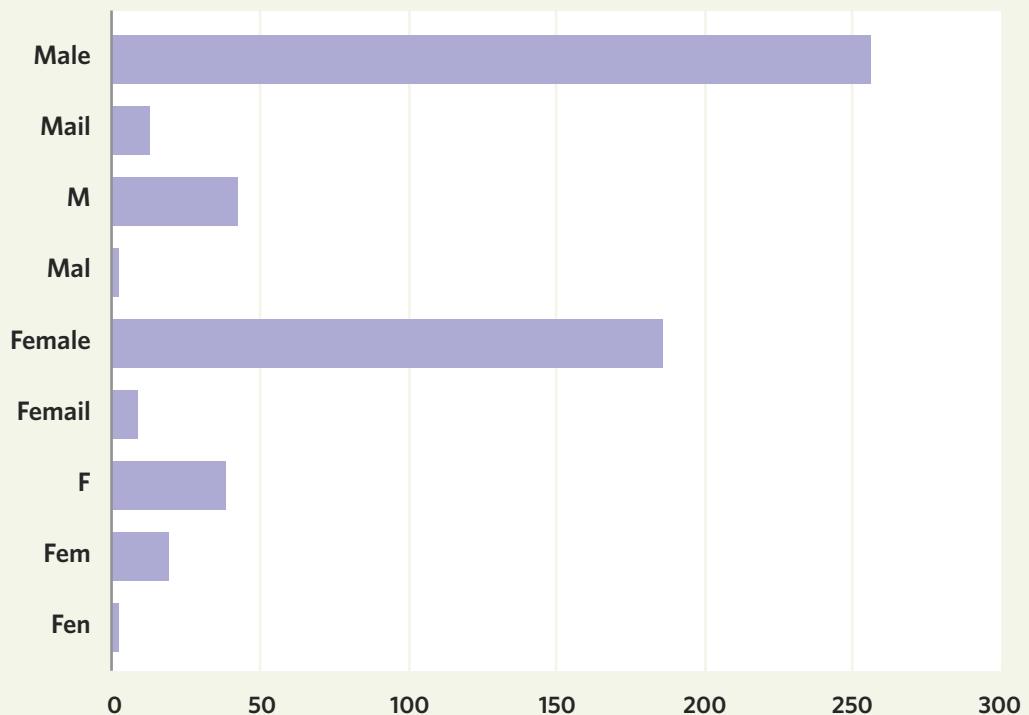
Data is typically collected in the transactional database systems that underpin the applications (stock control, sales and so on) that run the business. This is the data collected day by day as the business moves forward. For analytical purposes, copies of this data are often extracted from these transactional systems (also described as source systems), transformed and loaded into a data warehouse.

So, given that background, we can try to answer some common questions about bad data.

➔ **Where does bad data come from?** Typically from applications that feed data into the source systems. The usual culprits are open text fields into which anything can be typed. One excellent way to fix bad data is to modify the user interface (UI) so that only valid data can be entered.

➔ **It is time-consuming and expensive to fix bad data. Why?** It isn't

FIGURE 1: *There are nine different entries in this gender field—two should suffice.*



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expensive to run update queries to fix bad data: The time and expense lie in defining exactly what is good and what is bad. In order to create that definition we need to work closely with users of the data to find, for example, the acceptable domains of values for every field. For instance, the users might tell us that the gender field should contain either "Male" or "Female." (The UI might allow "M" or "F" to be entered but would use a look-up table to substitute the acceptable value in the field.) Is "Not Known" an acceptable entry? The users will know. A domain doesn't have to be a list of valid entries; it can be a range of values, from zero to 100, for instance. In addition, we need to find the business rules that define the difference between good and bad data. For example:

- All orders marked "Priority" must be for more than £10,000.
- All members of staff must be over 18 years of age.

➔ **Do we always have to fix it?** Bearing in mind that it is expensive to fix bad data and that, as discussed above, some "bad" data can still be fit for purpose, we may decide to leave it alone. This can sound like heresy, but data quality is only an issue when it affects the bottom line of the business. If it costs more to fix it than to leave it alone, a simple return on investment calculation tells us to leave it. Having said all of that, if the balance of cost vs. benefit is about even, I would always lean towards fixing it. Bad data has a tendency to bite you later, so if the opportunity arises, and it isn't too expensive, I sleep better if it is fixed.

➔ **Where is the best place to fix it?** Broadly speaking, there are three approaches to consider (see **FIGURE 2**, page 11):

1. Fix the existing data in the transactional systems.
2. Improve the applications so no more bad data can be entered.
3. Tolerate bad data in the source systems and fix it when we perform the extract, transform and load (ETL) process to move it into the data warehouse.

Armed with an understanding of what constitutes good and bad data, the first approach is to fix existing data. We can run a series of data quality analysis queries to identify bad data and run update queries to make it good. That'll sort out the data already in the system but

won't stop more bad data arriving in future.

This leads us to consider the second approach: We can rewrite the applications to keep out bad data. Realistically, this is often impossi-

ble. With older applications the source code may be lost, and with third-party software, the manufacturer may be slow to apply the necessary changes (or at worst uninterested in doing so). In some cases the best option may be to run nightly batch jobs that identify bad data and update it to good. You can also train the staff who input the data to enter data more carefully.

If you decide to fix just for analytical accuracy, you can either use the methods above or write data cleansing into

the ETL process. ETL is typically undertaken using a tool, and many have good built-in mechanisms for cleansing data.

It isn't expensive to run update queries to fix bad data: The time and expense lie in defining exactly what is good and what is bad.

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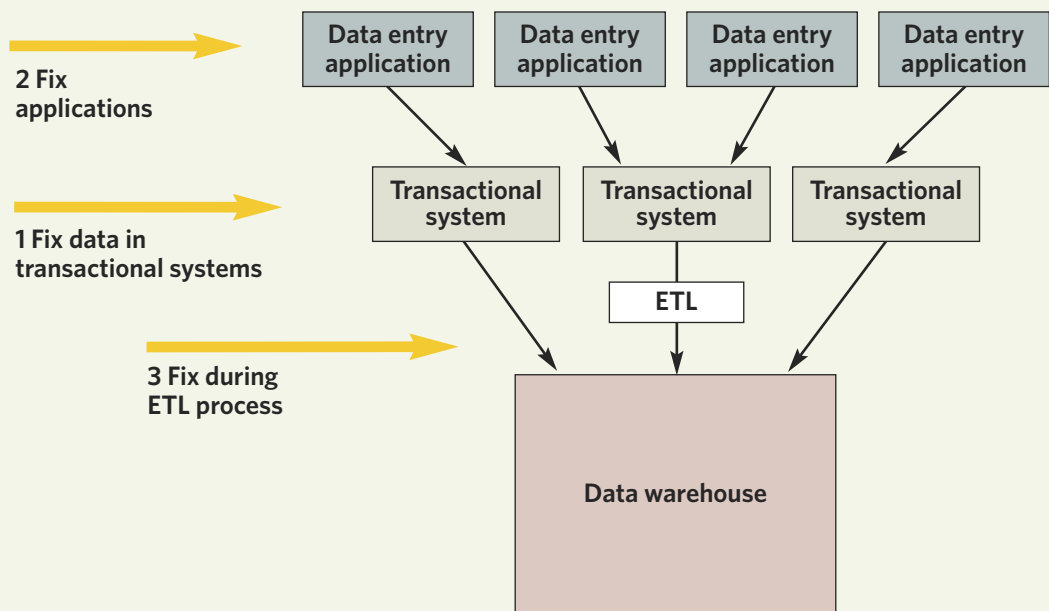
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FIGURE 2: The different options for fixing bad data



➔ **Is there anything else we can do?** It can also be worth considering data mining techniques for spotting bad data. A system can be trained to recognise the “shape” of correct data and flag any significant deviations. This is relatively new technology, but such systems are already in use, either as part of the ETL process to inspect data coming in from source systems, or as part of a nightly batch job running against data in transactional systems.

The whole area of data quality analysis and management is a complex one, and in recent years it has been brought into sharp relief by the growing requirement for business intelligence and analytics. The ETL layer in any data warehouse system is itself complex, and there exists a school of thought (to which I

subscribe) that says it’s impossible to write a set of rules for cleansing data that is 100% effective. Whatever rules you write, if the input isn’t controlled—and often it can’t be—eventually new (and imaginative) forms of bad data will be typed in.

This is where the use of data mining in cleansing data is so helpful. It is pattern-based, not rule-based, so it has a much better chance of finding those new variants that we will never write a rule for because we’ve never seen them before. Who would have predicted “Hunk”? ■

Bearing in mind that some “bad” data can still be fit for purpose, we may decide to leave it alone.

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Databases in Driver's Seat at Web Startups

UK-based Vungle and WinkBall are putting their database strategies at the heart of their online growth plans. Here's what other SMEs can learn from them.

BY ARIF MOHAMED

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ACK SMITH has been called one of the 20 UK entrepreneurs to watch in 2011 by the Institute of Directors' magazine, *Director*. He founded Mediaroots while still at university in 2008 and built it into a successful video software tutorials business. Smith is now establishing his next Internet company, called Vungle, and, like Mediaroots, its success will depend on its having the right database strategy and technology behind it.

JAMES PIPE, who is Vungle's head of product and is responsible for the firm's database strategy, explains its service as one that enables its customers to create concise, high-definition video tutorials for any website or Web, desktop, Android or iPhone application.

Pipe said the firm's broad database strategy is to "record and measure everything. We keep track of every project, video, stakeholder and stage of processing within the database. That way, we know overall project progress, but also exactly who is the creator or editor of every part, and who is currently processing the video."

He said that the extensive monitoring means Vungle can discover production process bottlenecks more easily and apply quality assurance procedures where necessary.

The business opted for a bespoke database system, creating it from "a list of non-solution-specific criteria," Pipe said. As a result, he added, the database technology "is continuously adapted to suit our business as it develops."

The database is designed to handle the production of thousands of

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“We keep track of every project, video, stakeholder and stage of processing within the database.”

—JAMES PIPE
Head of product, Vungle

videos per week, with a focus on ease of use so it can be picked up by any suitably trained individual at each stage. It uses a flexible storage architecture, enabling database capacity to be scaled up quickly and massively in response to increased demand, Pipe said. He added that because high levels of concurrent access were expected, “the ability to work from any network or VPN-connected device has been designed in.”

DATABASE STRATEGY INCLUDES CLOUD TO TAKE OUT ADMINISTRATION

However, in the future, Vungle aims to move the system to a cloud database, which offers a more effective way of scaling up the service rapidly, according to Pipe. “We are looking to host the system online,” he said. “Updates to the database made by those directly involved in the production process would remove much of the administrative burden currently required to keep the database up to date.”

Pipe said the main issues the firm currently faces include “adapting to changing requirements, documentation of the continually evolving structure [and] ensuring that the database provides a net administrative advantage during the production process, rather than a burden.” Data entry is proving to be the most costly exercise at present.

Another organisation that has placed extensible database technology at the heart of its business is WinkBall, a rapidly growing video social networking website.

Since its launch in August 2009, WinkBall has had over 30 million hits, with more than a million regular visitors to its website. More than 600,000 people, including celebrities, politicians and sports personalities, have given interviews to WinkBall since its launch.

“Databases are at the core of the WinkBall product, powering the

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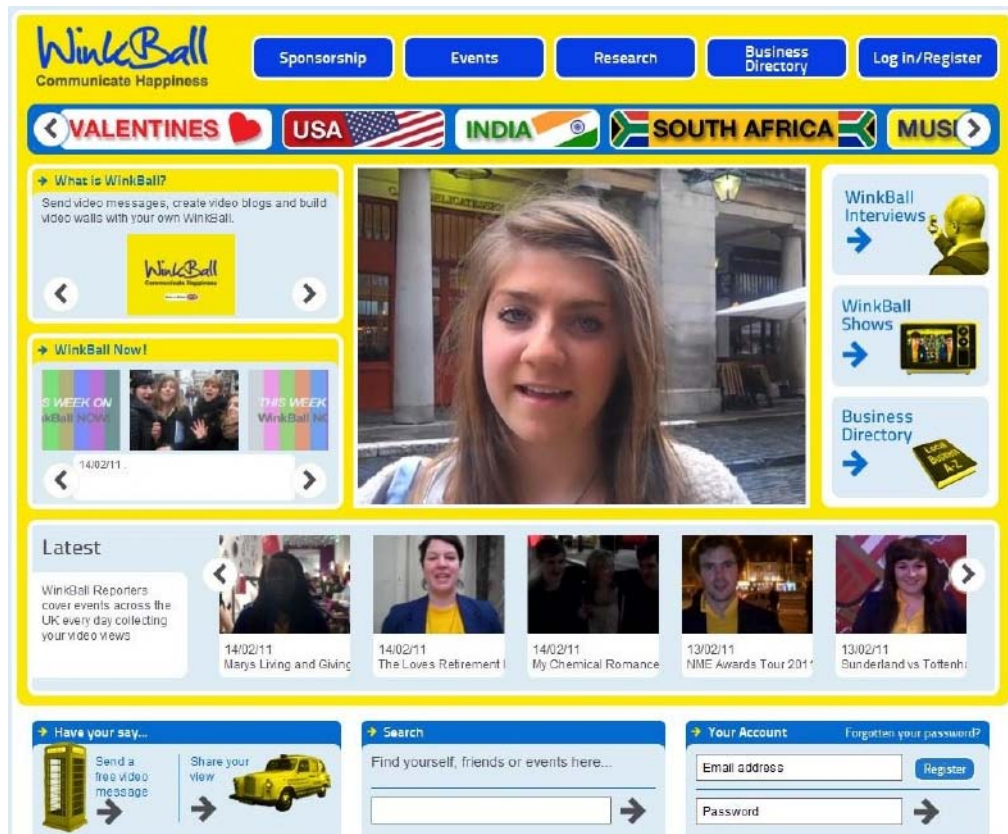
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WINKBALL: Video messaging site WinkBall designed its database infrastructure to be able to grow dynamically as business expands.



website which represents everything that we do,” said **ALEX POTSIDES**, technical development manager at WinkBall.

WinkBall operates several core production database systems and has several layers of test beds to ensure smooth updates when data moves from one stage to another—for example, from individual developers’ workstations to staging servers. It employs full data replication and caching, which mirrors production as closely as possible.

“Resource use is closely monitored to ensure we catch problems early, and tuning is effected at every level to maximise throughput and availability,” Potsides added.

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*Technical development
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WINKBALL'S DATABASE STRATEGY PUTS PRIORITY ON SCALABILITY

At the heart of WinkBall's database strategy is the ability to grow dynamically as the business expands, he said. "Our infrastructure is highly scalable, scaling out as well as up so that as demand increases, capacity is added to service that demand in a way that is cost-effective and as simple as possible to maintain."

In terms of being able to negotiate the business cycle, Potsides said that the firm's systems have to scale with demand, which is affect-

ed by market conditions. "This, in turn, influences our purchasing decisions, and the strategy has to be flexible enough to accommodate that," he said.

The company is considering nonrelational data stores or cloud-based database services because of the elasticity they offer. "Because we are a Web-focused company, it's a lot simpler for us to migrate to new technologies as there's no installed base in the same way you'd have with a traditional application," Potsides said.

These technologies could help to eliminate some of WinkBall's current

database issues that centre on performance. Potsides said the firm has directed the majority of its tuning efforts on optimising complex queries, reducing database latency and ensuring that sufficient hardware and network resources are available. "Our relational mapping layer dictates the actual interactions to a large degree, but how we interact with it can lead to significant gains in performance," he said.

Apart from performance issues, some of the most costly parts of WinkBall's database operations currently involve physical factors, with hardware, data storage and co-location being key examples. "The time it takes to diagnose problems is another expense," Potsides said, "although the benefits we gain far outweigh the cost, as poor performance is completely unacceptable."

Cloud computing, with its potential for reducing the cost of deploying large-scale applications, may provide the answer.

"Eventually, we'd like to involve more cloud-based services in our offering, whether that's using existing products or introducing our own internally developed tools," he said. "However, we are very sensitive

"Because we are a Web-focused company, it's a lot simpler for us to migrate to new technologies."

—ALEX POTSIDES

Technical development manager, WinkBall

to things like data security and latency, so whatever route we finally take, we'd have to be sure that our concerns are addressed."

MANY SMEs LACKING IN DATABASE TECHNOLOGY SKILLS

Robert Rutherford, managing director at consultancy Quostar, said that, in reality, these two Internet companies are unusual for small and medium-sized enterprises (SMEs) in their level of database literacy.

"Most SMEs simply don't have any strategy for their database systems," he said. "You'll typically find that the internal IT team, or person, within SMEs just won't have the required skills to effectively manage a database. Therefore databases often become unstable, insecure and huge, and they perform badly."

Rutherford added that, when it comes down to it, most SMEs don't actually need a full-time database administrator. All they require is a few hours a month spent on management and tuning, which an external service provider can do relatively cheaply.

However, said Rutherford, SMEs that want to operate their own database infrastructure should develop the four traditional database strategy areas of

availability, performance, recoverability and security.

"These core areas are often never thought of until issues occur and are quickly followed by a knee-jerk reaction which will make a situation worse or incur unnecessary costs," he said. "Business management should understand these four areas and must determine what is acceptable. This then makes the IT team's job much easier when putting forward solutions with associated costs."

Cloud-based database services can be a way for SMEs to gain access to enterprise-class technology "without the associated costs and management pains," Rutherford noted. And while security is often raised as a potential issue on cloud computing, he said that credible cloud services providers "have security systems and internal processes that are superior to the majority of SME environments." ■

"Most SMEs simply don't have any strategy for their database systems."

—ROBERT RUTHERFORD
Managing director, Quostar

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