A manager's primer on Windows Azure and SQL Azure

What you need to know about limitations, security, pricing, uptime guarantees and the multi-tenant model

BY ALEXANDRA WEBER MORALES

It's been one year since Microsoft commercialized its cloud platform-as-a-service offerings, Windows Azure and SQL Azure. Celebrating the milestone, Redmond claims to now have 31,000 customers across 41 countries, including such biggies as T-Mobile USA and Xerox.

It's a critical juncture for the cloud PaaS market. Azure competes with Python-based Google App Engine, VMForce, Force.com and Ruby-based Heroku—not to mention an assortment of smaller ven-

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Azure and

How Des Moines, Iowa-based GCommerce became the anti-Amazon of auto parts

BY ALEXANDRA WEBER MORALES

It's been over a decade since supply-chain software solution provider GCommerce moved from the Big Apple to the Rust Belt, about nine years since it first tried to solve a pesky problem in the US$300 billion after-market auto parts industry, and one year since it finally found the key to the ignition: Windows Azure.

"I grew up in the auto parts business," said Steven Smith, president and CEO of GCommerce, who described it as "a long-tail industry with millions of parts," some of which have been manufactured for half a century. The drop shipment portion of the special orders market is costly and time-consuming. Not surprisingly, coordinating this vast network of more than 1,000 suppliers was no easy feat.

But aggregators such as Amazon have only exacerbated the problem, according to Smith, by siphoning off the high-margin sales, competing with suppliers, and leaving the slowest-moving parts to languish, undiscovered and unconnected, on dusty shelves.

"We tried to attack this problem about nine years ago. The problem is, you have an on-premise solution, you are trying to manage data warehouses remotely and you have an entire industry on your neck wondering, 'How do we know you're up to the task?'" he said.

"Windows Azure was a game-changer because we didn't have to worry about being the infrastructure anymore. We were able to take our domain experience and infuse it into the infrastructure."

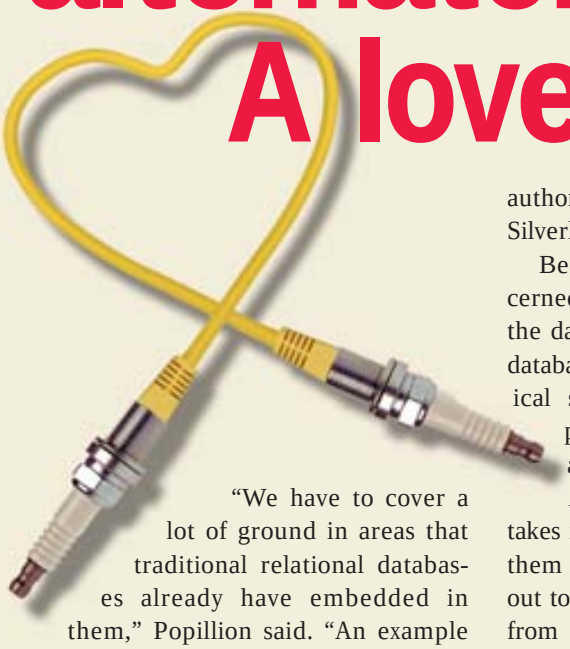
Sub-second response times

Thanks to their familiarity with Microsoft tools and additional Microsoft development support, the 40-person ISV launched its new service in just 90 days after beginning requirements gathering in early 2010. Its Virtual Inventory Cloud, or VIC for short, comprises Windows Azure, Silverlight, an on-premises BizTalk Server 2009 Enterprise application, and SQL Azure. On VIC, an end-to-end special order takes 15 seconds instead of 15 minutes.

VIC is highly scalable; via sharding, it's able to grow to more than 1 trillion rows of data and more than 1.5TB. It's also a speed demon, according to GCommerce's CTO Jason Popillion.

"Today, our solution on SQL Azure has a sub-second response time," he said. But getting there required some workarounds on the nascent SQL Azure platform.

alternators: A love story



"We have to cover a lot of ground in areas that traditional relational databases already have embedded in them," Popillion said. "An example is our implementation of a sharded, multi-partitioned database model. We had to create a model so we would have the ability to do indexing or recalculate access paths across partitions."

Statistical analysis of the data and how it would be read and executed upon gave GCommerce a "very detailed visual of how our data should be partitioned," he said. There are some SQL Server commands that don't work in SQL Azure, but the team found workarounds for those. "The worst case was it resulted in an extra call."

The advantage of SQL Azure, however, is the responsiveness depending on usage. "I want to make sure if I put it in the cloud it's scalable, it can grow or shrink," said Popillion. "Ideally, transactional throughput is extremely fast, and I only pay for the actual size of data set. I don't want to pay for licenses, I want to pay for usage."

What makes that sub-second response time even more interesting is that it's a round-robin transaction. When a user logs into the Web portal, it connects to a data center in Des Moines for authentication. Then, the user is connected to a Microsoft data center in San Antonio, Texas, for authorization. Finally, it goes to the Silverlight client in Redmond.

Because the application is concerned with part availability, some of the data are stored in the SQL Azure database and some are stored on physical suppliers' systems, which are pinged via Web services. There's also a drop shipment component. A freight estimator for the part takes its dimensions and weight, ships them from location to location, calls out to the carrier, and returns the rate from their Web service to the VIC user.

Domain smarts in the cloud

"What you're really seeing is a tectonic shift between the online world and the brick-and-mortar world," said Smith, noting that Amazon and other Internet retailers are deeply affecting physical retailers' margins. "VIC gives brick-and-mortar stores the kind of agility to harness the vast inventory of a market. You couldn't do this before."

Further, the success of VIC has spawned international usage. GCommerce has an office in Mexico, where the demand for VIC is huge. For optimal response times, a copy of VIC runs in a Microsoft data center in Mexico City.

Ultimately, the cloud PaaS approach has enabled an ideal scenario: Fast execution on domain expertise, minus infrastructure headaches.

"My advice would be to come to the cloud for very clear reasons: total cost of ownership, scaleability, maintenance," said Popillion. "Your solution is going to be defined around those reasons. Have faith that the infrastructure will be there. The security models and uptime models are in place. It's all about what you want to achieve." ▮

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dors. Despite an array of cloud services, IBM lags behind the pack with WebSphere for Amazon Web Services, an incomplete PaaS stack compared to Azure. Meanwhile, at the infrastructure-as-a-service level, Amazon Elastic Compute Cloud continues its early-to-market domination.

IBM and Microsoft clearly share concerns that their cloud strategies need improvement. Both have recently changed internal leadership, looking to laser in on what the people want from PaaS.

In February, Microsoft CEO Steve Ballmer displaced veterans Bob Muglia and Amitabh Srivastava, and promoted Satya Nadella to president of Microsoft's US$15 billion Server and Tools Business (STB).

Ballmer's stated hope? That Nadella, who spearheaded recent successes with the Bing search engine, can cultivate a "vision for the rapidly merging worlds of servers and services." It appears the company is ready for Azure to take flight at the forefront of STB.

Explaining PaaS

"We've believed for a fairly long time that PaaS is the sweet spot for the industry," said Jamin Spitzer, Microsoft's senior director of platform strategy.

"There are lots of companies that are going to be in the SaaS market, and that's still the primary spot Salesforce is in. Amazon came from a different perspective; they said they'll give you access to their hardware on billable consumption, but you're still managing that environment yourself."

Elucidating the PaaS difference is a consistent message across Microsoft as it reaches out to enterprise developers.

"Instead of saying, 'Let's take this concept of client-server and virtualize it a little bit,' we said, 'Treat the data center like it's one massive computer and build an OS that uses all the center resources it can call.' We've taken a very thoughtful approach to what will the market need in terms of PaaS. We're at a once-in-a-generation transition," said Spitzer.

That talking point resonates with its

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target audience. "I was part of a committee here that reviewed some competing cloud offerings. Amazon and IBM came on site to do presentations. They each had unique sets of strengths in the cloud space," said Jason Popillion, CTO of Des Moines, Iowa-based ISV GCommerce.

"What they don't have is a very specific path for software development."

Forrester analyst Tom Grant agreed: "If the app is already written in .NET, it's a no-brainer to make it run on Azure." While Java and PHP also run in Azure, appealing to the legions of Visual Studio developers makes sense. The Microsoft IDE lets you simulate locally before you deploy your application as a cloud services package and a configuration file.

Azure applications consist of Web roles (essentially .NET Web applications, such as MVC or Web Forms) and worker roles (which handle number-crunching and logic). Runtime, middleware, OS, virtualization, servers, storage and networking? No longer your responsibility.

"I think we have reached the point where the question isn't, 'Should we use an option like this?' It's justifying the reason not to use it," said Grant.

'You can do a price comparison with Azure vs. Amazon. One's a taxi ride, and the other is, "Here's a bunch of engine parts. Have at it."'

—Jamin Spitzer, Microsoft

What price for the platform?

Even better, 2011 is a buyer's market for cloud computing. Pundits have posited that the cost of a home server per kilowatt hour exceeds that of a datacenter compute instance.

Again, PaaS comes into play when comparing per-minute fees for compute infrastructure: Do you have the headcount to set up virtual machines on Amazon or manage your database? Add those costs in to your metered usage fees, Spitzer said. "You can do a price comparison with Azure vs. Amazon. One's a taxi ride, and the other is, 'Here's a bunch of engine parts. Have at it.'"

A major complaint in the past year, however, has been the price barrier to piloting a project on Azure. Responding to requests and competing free offers, Microsoft announced in February a free trial of Windows Azure until June 30. The offer comprises 750 hours of Extra Small Compute instance use, 25 hours of Small Compute instance, 500MB of storage, 10,000 storage transactions per month, 100,000 access control transactions, and two service bus connections. Also free (for 90 days) is a 1GB Web Edition of the SQL Azure Database, along with 500MB data transfers per month.

Once the free trials are exhausted, the extra small instance costs just 5 cents per computing hour. One Web role costs $90 a month to run a small instance continuously. During peak demand, you can easily add servers by simply typing in the number of instances you are using.

You are only charged, however, for the time they actually run. This means you neither over-invest nor under-deliver. Microsoft partner Thuzi, which creates Facebook applications that often go viral, has automated this process with APIs that allow a program to start or stop instances based on preset criteria so that it stays responsive but minimizes costs.

There are two tiers for SQL Azure pricing, depending on database size and the volume of transactions. The Web

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A glossary of Windows Azure and SQL Azure terms

SQL Azure: A cloud-based relational database service based on Microsoft SQL Server 2008.

SQL Azure Data Sync: A framework for synchronizing data in the cloud and offline, such as in a SQL Server database. To be released in late 2011.

Virtual Machine role: More of an infrastructure-as-a-service feature, this role runs an image of a Windows Server 2008 R2 virtual machine.

Web role: Supported by Internet Information Services 7, the Web role is essentially a .NET Web application such as MVC or Web Forms.

Windows Azure: The cloud operating system that provides the on-demand compute, storage, hosting, and management services for hosting customer-developed applications and services.

Windows Azure AppFabric: Middleware services for identity management and connectivity between applications that are on premises and in the cloud.

Windows Azure AppFabric Service Bus: A hosted infrastructure for secure connectivity for hard-to-reach service endpoints.

Windows Azure AppFabric Access Control: Provides federated authentication and authorization for REST Web services or enterprise integration.

Windows Azure Connect: Enables secure, IP-level network connectivity between a customer's on-premises IT resources and their Windows Azure hosted services.

Windows Azure Content Delivery Network: An add-on feature billed separately from Azure, the CDN has 24 locations globally where Azure blobs and static content output can be strategically cached for faster delivery to users.

Windows Azure platform: The infrastructure of hardware and software running in Microsoft data centers that allows customers to develop, manage, and host off-premises applications, data storage, and other services.

Windows Azure storage services: Blob, queue and table services, as well as Windows Azure drives.

Worker role: A role for general-purpose application workloads or background processing for Web roles. ■

—Alexa Weber Morales

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edition is $9.99 per database per month up to 1GB, and $49.95 per database per month up to 5GB. The business edition is $99.99 up to 10GB, $199.98 for 20GB and $499.95 up to 50GB.

Service-level agreements for different parts of the platform include a 99.9% uptime guarantee for external connectivity. For storage, Microsoft guarantees 99.9% correct data processing. SLAs are based on a 30-day cycle, with customer credits if they are not met.

SQL Azure gets there first

One novel aspect of Microsoft's PaaS proposition is SQL Azure. The surprise? Simply that the company has leapfrogged leading database vendors with the first multi-tenant, cloud-based relational database service that doesn't require installation or configuration.

The pros of SQL Azure include enterprise-class availability, scalability, security and self-healing. The cons are limits on size and features compared to SQL Server (for example, no Analysis Services, Replication, Reporting Services or Service Broker). However, just like an on-premise instance of SQL Server, SQL Azure's tabular data stream interface allows for Transact-SQL-based access.

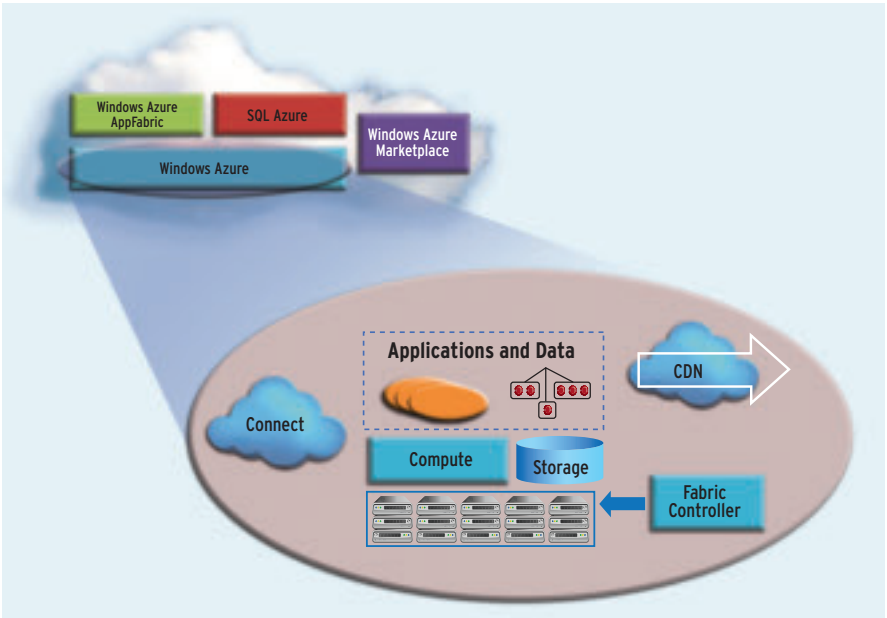
So far, the size limit (currently up to 50GB) seems to be the main complaint about SQL Azure. The workaround, which Microsoft has not yet automated, is federating (or sharding) large databases into multiple logical databases that can number in the hundreds or thousands. Because there is no referential integrity between the shards, however, developers must manually code for this. Companies such as TicketDirect have successfully launched large, sharded databases.

Another common scenario is using SQL Server in-house for sensitive data, and SQL Azure for cloud data, synchronized via the Microsoft Sync service. If sensitive data must live in the cloud, however, security protocols, encryption, masking, auditing and monitoring can help.

Azure's year of commercialization has taught many lessons. Among them is the realization that migrations are not the low-hanging fruit of a PaaS.

"If you have a very large IT department, lots of servers, lots of stateful apps that have to run on specific hardware, the one-time cost of moving an app to Azure might be very high. And the ongoing costs may not be the right thing either," said Spitzer. But pilot projects, or a workload that has spikes in demand or geodistribution, make perfect sense. Increasingly, a hybrid (partially on-premise, partially cloud) scenario marries both worlds; several new Azure features speak to its popularity.

There's Azure AppFabric, a form of middleware for .NET applications. Service Bus connects those applications with on-premise systems. AppFabric Caching improves performance via a distributed in-memory cache. The Azure Virtual Network includes Azure Connect, which enables IP-based net-



With its Azure platform and service strategy, Microsoft has its sights set on becoming a dominant hosting provider.

Seeding the app market

A platform play needs an app store: Hence the Windows Azure Marketplace beta, launched with the Microsoft Dynamics Marketplace, in 2010 and 2011 respectively. According to Microsoft, these are the first of several app stores powered by the company's Pinpoint search engine.

As of March 20, there were 24 applications available in the cloud-computing category of Windows Azure Marketplace. These included MapDotNet UX (for geospatial visualization, analysis and integration), DreamFactory Suite (for project and document management), AzureWatch Auto-Scaling Service (for deploying new instances when demand increases), and Visual WebGui Instant CloudMove (for migrating client or server code to the cloud). As of this writing, only three of the 24 applications had reviews or customer ratings.

In February, IBM also announced an online marketplace for partner applications: the Cloud Computing Specialty. It too has just a handful of offerings at this point.

Interestingly, it's been almost a year since PayPal offered a 60-day public beta of PayPal X on the IBM Smart Business Development and Test Cloud. Today, no sign exists online of the PayPal offering for IBM. Instead, the company points inquirers to the Google or Windows Azure opportunities for PayPal X.

Meanwhile, on March 14, Hewlett-Packard's CEO Leo Apotheker announced a platform-as-a-service strategy to take on Amazon Web Services, Apple and Windows Azure, along with plans for a cloud app store that would target consumers, small businesses and enterprises. No dates were specified, however. ▮

—Alexa Weber Morales

work connectivity between servers and Azure resources.

This evolution of Microsoft's offering speaks to a highly interactive process with its partners and developer community. Suggestions on improvements to Azure and SQL Azure have poured in from the forum at www.mygreatwindowsazureidea.com. And partner feedback prior to commercialization significantly changed the direction of SQL Azure.

"Between 2008 and 2009, that's where we saw what we wanted in SQL Azure. We made some course corrections before anyone was on the commercial product," said Spitzer.

Everyone's asking for something

Many niches are still lobbying for features. Take applications that run on delivery fleets via GPS devices: These developers not only want much larger databases enabled, they need UDP (User Datagram Protocol) endpoints for connectionless host-to-host communication paths in addition to the standard TCP.

Microsoft is also aware that concerns exist around housing data at Microsoft data centers. One solution would be to enable Transparent Data Encryption to help protect sensitive information such as health or financial records from prying eyes. Microsoft Access ADO 2.x Connections to SQL Azure could also provide additional security.

That said, security and compliance have been the target of significant internal Microsoft effort, so much so that security objections to the cloud among customers have diminished.

"There are questions about where the data is living, and things like European regulations, but Microsoft has been addressing them quickly," said Forrester's Grant. "Security was thought to be a huge show-stopper initially, but now we see that for a lot of people it hasn't been. They've realized the platform was more secure than they thought, so the conversation has shifted."

Though many of the security questions are no different than those facing networked on-premise applications, multi-tenancy can result in so-called "fate-sharing" incidents, such as during an April 2009 FBI raid on Texas data centers suspected in cybercrimes. When equipment was seized, co-located businesses were disrupted and, in some cases, shut down. A judge rejected a temporary restraining order preventing server seizure, saying criminal activity could have occurred without customer knowledge.

Microsoft has taken a robust approach to dealing with the cloud security questions proposed by the Gartner Group:

Where is my data hosted?

Does it live in a region or country that complies with my privacy requirements?

Is the cloud provider secure? Is it ISO27001-certified, along with parts of the Microsoft infrastructure?

Who can see my data?

How do you ensure employees or contractors don't bypass the law?

Can the compliance process be verified?

If the cloud provider goes out of business, can I get my data back?

For those who are not happy having Microsoft host their data, there's one more option, though not for the faint of wallet: They can buy a Windows Azure appliance, which can help meet government regulations for security or privacy. The appliance, the company noted, is still managed by Microsoft and is not completely isolated.

Philosophical musings

Describing cloud market machinations is akin to finding shapes in the shifting cloudscape—and has inspired some dramatic pronouncements. In a January 2011 report, Forrester predicted, "Tech-savvy business managers and staff will provision their own technology solutions… The IT status quo will collapse under these forces, and a new model—empowered [business technology]—will take its place."

"On the IT side, one of the propellants toward adopting the cloud has been an impatience with the ability of IT to deliver things and the inefficiencies of the on-premise model," said Grant. "Why do we have to have a dedicated system? Why is it not more multipurpose-friendly? Why can't we just treat the infrastructure as a utility that we just turn on or off?

"That's transforming IT into being more service-oriented, more a business enabler than focused on technology. It's a major shift."

The report forecasts a continued drop in computer science expertise as service continues its ascent.

Microsoft's Spitzer does not concur. "I don't believe that the IT department is dying out. I believe that there are some better positioned than others, some that are very aligned with needs of the business. Those guys are out doing back flips, because they look at PaaS delivered by Microsoft, and they get that they don't have to manage it themselves anymore."

'Security was thought to be a huge show-stopper... They've realized the platform was more secure than they thought.'

—Tom Grant, Forrester

The costs of management add up: There's monitoring the health of virtual machines. Maintaining and patching operating systems. Replicating data. Provisioning on-demand. And you pay a la carte—not by the box—for consumption. Meanwhile, PaaS performance results are impressive, and easily tuned via geolocation specifications and other improvements now being prototyped by Microsoft partners.

"I think developers, in particular, are in more demand than ever before," said Spitzer. "Every company is managing their back-end data. CRM data, Web data—how do I go and put all those things together? Those are very interesting challenges to solve." ▮