The importance of e-commerce and the advantages of moving to the cloud.

Abstract

E-commerce can improve revenues for all businesses irrespective of their size or market. There are a number of significant IT challenges for businesses to maintain and develop their e-commerce activity: How do I keep my customer data secure? Can my e-commerce site work for all my global customers, in new countries and new markets? How easily can I scale IT capacity to meet demand? What about seasonal variations in demand? In this white paper we will look at how cloud hosting provides a number of benefits for e-commerce solutions and how the Interoute Virtual Data Centre IaaS cloud can provide an e-commerce platform that responds to these challenges.
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Introduction

E-commerce has become an increasingly important part of an organisation’s sales strategy offering consumers and businesses the flexibility to shop and buy over the Internet. Having an online presence improves revenues for all businesses irrespective of their size or market. There are a number of significant IT challenges for businesses to maintain and develop their e-commerce activity:
• How do I keep my customer data secure?
• Can my e-commerce site work for all my global customers, in new countries and new markets?
• How easily can I scale IT capacity to meet demand?
• What about seasonal variations in demand?

Today, there are numerous options available for owning and operating your e-commerce IT solution. In this white paper we will look at how cloud hosting provides a number of benefits for ecommerce solutions and how the Interoute Virtual Data Centre IaaS cloud can provide the perfect e-commerce platform. VDC can be used to deploy an e-commerce solution that responds to the challenges mentioned above: it is scalable and flexible, inherently secure, and has globally-distributed compute zones that are closer to your customers. In the final section, we look at some of the issues that can arise with network latency in hybrid cloud solutions, and how the distributed compute zones of VDC can allow you to beat latency problems and thus develop more cost-effective and responsive hybrid solutions. Interoute VDC has a simple pricing model which is easy to understand and to budget for. There are no charges for within-network data transfers, or data transfers to/from the Internet, which means that VDC is a very competitive offering for the network-intensive demands of e-commerce.

What is electronic commerce?

E-commerce is the trading of products or services using computer networks, primarily the Internet. There was a time when e-commerce was a specialised type of business practice restricted to a few marketplaces (think financial services, or wired information feeds for news media) while almost all companies primarily sold directly person to person or via the telephone. Then along came the Internet in the 1990s, which provided all companies with a digital, global marketplace, and the ability to reach customers that had been previously out of reach.

Amazon is a perfect example of a company that has benefited from the e-commerce explosion. Founded in 1994, the original Amazon.com was simply an online bookstore and the multitude of products it does today was unimaginable. The original investment made was mainly in developing more efficient warehousing and delivery processes, and it actually took Amazon almost 10 years to make a profit. They are now though one of the largest e-commerce brands in the world and they have diversified to provide a wide range of products directly and through partners, all of which has been based purely on their ability to sell through their e-commerce website and to meet the demands of their customers.
Do I really need e-commerce?

This question really is down to each individual organisation and its particular combination of products and services. Almost any business can nowadays benefit from some level of e-commerce activity, especially since its competitors are likely to be doing this already. E-commerce is essentially all about convenience for customers; if you aren’t offering your products or services through the Internet, but your competitors are, it is highly likely your customers will prefer to buy from them. Consider the music industry as an example, twenty years ago being a music consumer involved going into a shop and buying a CD, and during this time there were a large number of specialised retailers for different types of music. However fast forward 20 years and you are not likely to remember the last time you purchased a CD, let alone the last time you purchased one by actually going into a shop. The convenience of e-commerce sites like Amazon to purchase CDs, and online services like iTunes, Apple Music and Spotify mean that we can have instant access to all of the music that we want.

E-commerce in the cloud?

Having established what e-commerce is, and its place in an organisation’s sales strategy, what benefits are offered by hosting your e-commerce solution in the cloud?

Scalability

One of the main benefits of moving to a cloud hosting platform is the ability to scale your platform in line with demand as your business grows or in line with seasonal peaks. Often referred to as ‘elastic scaling’, cloud hosting offers businesses the ability to have IT environments that are always appropriately-sized. With e-commerce in mind the importance of being able to quickly or automatically size your environment to ensure your customers are serviced as they would expect to be is vitally important. Consumers expect their online shopping experience to be fast and a slow or unresponsive site leads to loss of sales and loss of customers.

Resilience

Most cloud providers are based in multiple geographical locations which allows a solution to be designed across different physical locations providing resilience and protection against failures. Consumers expect your e-commerce site to be available at all times, and therefore protection against a disaster is vital. If your site is down your customers may take the decision to purchase from your competitors.

Cloud platforms not only offer multiple locations, they usually include virtual load-balancing functions which provide automatic failover between locations.

Performance

In most cases and especially for smaller businesses, Cloud hosting offers the ability to purchase a platform vastly superior to that which could be afforded when purchasing hardware directly. This ensures greater performance for a more cost effective price; why invest in a platform with capacity your business does not need for most of the time, when you can have the same performance on a more cost effective opex basis?
Management

Many businesses also struggle to have the in-house skills to operate an underlying platform, skills that are expensive and add cost that could be spent elsewhere. Hosting in the cloud removes the need for in-house teams to manage and operate the underlying hardware, hypervisor and orchestration layer, thus freeing them up to focus on the application and the customer experience.

Cost savings

When designing a cloud solution, as opposed to an on-premises solution, it can be initially sized to meet your typical day-to-day demand and not to meet your expected peak demand. Which in terms of cost means you are able to provide just the right level of service for the current level of demand.

Add to this the fact that your in-house IT teams are free to focus their time on the application, that you can deploy across multiple locations and get greater performance for less money—a move to hosting your e-commerce platform in the cloud is hard to argue against.

So why use Interoute Virtual Data Centre?

Virtual machines with hot and cold vertical scaling

Interoute VDC allows you to deploy virtual machines (VMs) with a choice of operating systems that can be independently sized for any amounts of CPU, memory and storage, according to your requirements. So rather than having to deploy fixed-size small, medium or large virtual instances, you can deploy exactly the compute resource that you require. If requirements change, Interoute VDC allows you to vertically scale your virtual machine resources up and down at any time. This can be done both ‘cold’ (VM is turned off) and ‘hot’ (VM is running).

Virtual machines can be deployed from a wide range of pre-built operating system templates, and you can upload your own operating system templates into VDC.

All of this gives you a lot of flexibility for dealing with the variable demands on your e-commerce services.

Location, location, location

Interoute VDC is built into the fabric of a global optic fibre network, owned and operated by Interoute. What this means is that you get fast, reliable and resilient connectivity between your VDC zones all free of charge. What’s more it’s easy to get closer to your customers with 14 live VDC zones across the globe and two more coming online in 2015. So whether you have customers in a single country or across the globe you have the option of deploying your services within a region, improving the performance to your end users and therefore reducing the number of lost sales due to poor solution performance.
High performance network

The underlying network is the piece that a lot of businesses forget when designing a solution. Whilst most cloud providers offer connectivity between their cloud nodes and customers using the Internet, Interoute VDC is integrated at the core of the Interoute fibre network, allowing you to transfer data between VDC zones—and optionally, to your own premises—across a high speed private network with an end-to-end SLA guaranteeing performance. This performance has been verified by the independent analyst, Cloud Spectator, who conducted research on Interoute VDC against three other leading cloud providers testing network latency and throughput. In all comparisons, Interoute VDC demonstrated the highest throughputs and lowest latencies.

Resilience

Interoute VDC is provided in 14 VDC zones globally with free private data transfer between zones. This means that with Interoute you can build a highly resilient, highly available and highly scalable solution in multiple geographical locations.

Scalability

Interoute VDC enables you to use resources on an elastic basis scaling up and down as required with utility-based billing. You can scale horizontally with additional VMs, and scale vertically with additional CPU, memory and storage for an existing VM. In any case you only pay for your additional consumption whilst you are consuming it; returning to your normal costs at the end of any busy period. But how is this achieved?

Manual Scaling: Interoute VDC offers you the ability to deploy additional services into your environment for any period of time (with a minimum of one hour). This means that you can add additional resources or VMs before a known busy period and once this has passed delete them and only pay for those resources whilst you use them.

Auto Scaling: The VDC API provides complete programmatic access, giving you the ability to add additional servers automatically via simple scripting techniques. This ensures that your environment can scale up and down reacting to changes in site traffic automatically, reducing the number of lost sales and allowing your business to focus on other areas.

How do I achieve this? A step-by-step example

We have now outlined the benefits of running your ecommerce platform on Interoute VDC. This leads to the question, how can this be achieved? What are the practical steps that would be involved to deploy an e-commerce site?

Consider an example of a fictitious customer called Byte Size Gifts, which sells customisable food gifts. Due to the nature of their business they are affected by seasonal peaks around Christmas, Valentine’s Day and Easter when their products are in higher demand. They have an existing ecommerce site which is hosted on-premises and they are now looking to move to a cloud-hosted solution deployed on Interoute VDC with a view to resolving the following issues:

- They lose revenue each time their current on-premises solution fails as there is no resilience built-in.
- They are unable to scale to meet seasonal demand, which is growing each year.
- They want to expand globally and ensure customers in each new region get the same level of performance from the e-commerce site.
Their new e-commerce site on VDC has a web front end with application and database servers; they want to have the application and database servers on a private network with only the web server being Internet-facing. They also require deployment in two VDC zones with failover in the event of a failure at the primary site. The final design is illustrated below:

(Please note that the sub-networks in the above diagram are illustrative.)

**Step 1: Networks**

Before Byte Size Gifts can start deploying their virtual machines and migrating their applications, first we need to design and configure their networks.

Interoute VDC has a number of different network types that can be deployed quickly and easily through the VDC GUI or API. The Byte Size Gifts final design uses three of the European VDC zones. For each zone the network deployments are detailed below.

- **Amsterdam**
  - Public facing network with clustered virtual firewalls and virtual load balancers. This zone’s function is to distribute traffic between the active and passive environments in London and Slough in the event of a failure.
London
- Active site with two networks.
- Public network which hosts the web servers which is only reachable through the firewalls and load balancers in Amsterdam.
- Private network which hosts the remaining application and database servers. This would also be a routed network to allow replication of data from the London private network to the Slough private network.

Slough
- Backup site which acts as a replica of London and also has two networks.
- Public network which hosts the web servers which is only reachable through the firewalls and load balancers in Amsterdam.
- Private network which hosts the remaining application and database servers. This would also be a routed network to allow replication of data from the London private network to the Slough private network.

London-Slough private networks in VDC have a latency of under 2 ms so the data replication performance for this solution will be extremely good. The London-Amsterdam VDC network latency is less than 6 ms.

**Step 2: Virtual appliances**

Now that the networking is in place, Byte Size Gifts can begin to deploy their virtual appliances, namely the firewalls and load balancers.

As previously mentioned the virtual firewalls will be deployed in Amsterdam, Interoute customers are able to deploy these services either via the Interoute CloudStore or they can be added to their VDC environment pre-built and ready to be configured. Once deployed, Byte Size Gifts would configure the required policies and rules to enable traffic into and out of their e-commerce site and to load balance across the different servers and sites.
Step 3: Virtual machines

The customer now has their networks deployed and the perimeter security appliances in place. So now the VMs can be deployed into the relevant zones ready for application deployment. Byte Size Gifts are able to test connectivity between the servers and from the Internet as they go, ensuring that everything is in place and working.

Step 4: Application software

With the networking and VMs in place, Byte Size Gifts can now deploy and configure their applications. They are a number of architecture options; for the example given the customer has a web front end with an application server and database servers. The database servers would be clustered across two zones to ensure minimal data loss in the event of a failover. The application servers and web servers would then be configured independently with changes replicated between the VDC zones.

Step 5: Migration

The customer has now deployed their networks, virtual appliances and virtual machines and they have configured their applications. Before they move into testing, the data from their existing environment needs to be migrated. This can be done in a number of ways however in this scenario the customer has added private network connectivity from their premises directly into the Interoute fibre network, which means they have direct private, high performance connectivity into their VDC environment to transfer the data.

Step 6: Testing

The customer now has the site and data ready to go however before they go live they want to configure and test auto-scaling scripts using the VDC API. The customer configures and deploys a new VM to be used to run the scripts, they connect to this and deploy scripting services. Once deployed they use API calls to check the load on the VMs and if this reaches a certain threshold a new VM is deployed via the API ensuring that the demand never exceeds the capacity of their environment.
Step 7: Going live

The e-commerce site is now fully provisioned and ready to go live, and it has been fully tested by the customer. The final phase for deployment is for the customer to amend their public DNS records to point to the new VDC public IP addresses.

The site is now live and making money for Byte Size Gifts however looking to the future they have the option to deploy services across the globe, increase capacity and add additional applications and services to their environment, all through one global control interface.

Hybrid cloud e-commerce: If you ‘own the base and rent the spikes’ watch out for latency

The seasonal variations in demand experienced in retail e-commerce are quite extreme, and the pay-as-you-go elasticity of public cloud is well-suited to this business situation, as the above example explained. Nevertheless, for a mature e-commerce business with an established customer base, it can be more economic to run for the ‘baseline’ parts of the demand cycle using privately-owned infrastructure, and then use public cloud to handle the ‘spikes’ of demand. (See Joe Weinman’s book Cloudonomics, page 167, for a discussion of the ‘own the base and rent the spikes’ approach.)

In principle, this ‘hybrid cloud’ solution is not much more complex than the solution illustrated above. It adds another, private site to the solution architecture, which is not difficult to achieve with additional private network inter-connections to join the private site with the public cloud zones, to form an integrated ‘virtual WAN’.

The problem is that in a hybrid system you will have an inevitable separation of compute and data storage over multiple sites. The further apart those sites are geographically, the worse will be the network latency. This is a time cost which is largely a fact of geography and cannot be avoided. In Europe, the majority of public cloud services are concentrated in the North-west region (Ireland, UK, Netherlands). If your business operates in Southern or Eastern Europe you will be faced with considerable latency issues: the network latency from Ireland/UK to Spain and Italy, or Eastern European countries, via the fastest private networks, is of the order of 20 to 25 milliseconds. Unlike its cloud competitors, Interoute has designed VDC with compute zones distributed all over Europe. The goal is to provide zones in the locations where companies are operating, reducing the network latency in order to boost overall system performance. Here is a brief explanation of why that matters.

For an e-commerce solution, system performance requirements are determined by the expectations of the customer. The target response time for every customer interaction—the time taken between a ‘send’ action by the user, and the appearance of a response in the web browser—is 200 milliseconds (0.2 seconds). More than this and the user will start to experience a frustrating sense of delay. In a hybrid cloud solution, each single request by the user can involve multiple pull/push movements of data across the network: retrieving customer details from a remote database, adding new content to a database, processing text or image in one location and using the result in another location. Consider the case of an e-commerce business operating private infrastructure in Spain, using public cloud located in Amsterdam, via a private network inter-connection. Every data transaction will cost about 25 milliseconds. It is easy to see that given four or five transactions of 25 ms, and a customer response time of 200 ms, network latency can consume the major part of the total response time the system has to meet.
To meet your response time requirements, you will be squeezed to do more processing in less time within your data centres, or to provision a more complex replicated data storage system to reduce the number of data transfers, either of which will have recurring per-minute costs in larger numbers of CPU cycles, more memory and more storage (or faster and more expensive storage).

In retail e-commerce, profit margins are usually set very tight, thus the cost difference between a profitable and an unrealistic operation can be very narrow. There is an alternative to the response time squeeze. Interoute VDC has been designed differently to other major cloud providers, with distributed compute zones located in North-west, East, Central and Southern Europe. This gives you the double advantage of being closer to your customers, and minimising network latency for the back end processing tasks. This can reduce your operational costs, and give you more options to offer an enhanced level of service to your customers, which puts you in an advantaged position against your competitors.

**Find out more**

Interoute is one of Europe's largest network providers. Our cloud computing platform, Interoute VDC, can be combined with numerous network and unified communications services, as a competitively-priced package with industry-leading SLAs. Contact us at vdcsales@interoute.com to discuss your cloud computing and network requirements.

You can learn more about Interoute VDC at [cloudstore.interoute.com](http://cloudstore.interoute.com).