APM, a pillar of your digital strategy in China

Contents

APM in China: what for and why now?

Application performance management (APM) no longer needs a lengthy introduction. Its value is well known to all businesses which use digital services internally and externally – in other words, any international enterprise, including those seeking to develop in the People's Republic of China (PRC). They rely on APM tools and services to resolve issues proactively, analyze application downtime and dysfunctions, improve customer service, plan application rollouts, and manage Service Level Agreements (SLA) effectively.

Meanwhile, digital transformation has become a cornerstone of the Chinese government's 13th Five-Year Plan. China is devoting significant resources to information and communications technologies (ICT), its "highest priority" sector, strengthening and developing its infrastructure and refining its regulatory approach.

In such a context, where government is pushing for advances in the digital economy, businesses coming to the PRC may see this as the perfect opportunity to ensure their own growth. Investment in ICT – by banks, consumer retailers, luxury brands, telecommunications operators, digital service providers, freight/logistics and industry – is not an "option" in China, where fintech, online shopping, and speedy production and delivery circuits are very highly developed, in many cases to a greater extent than anywhere else so far.

This is why it is imperative to ensure the performance of digital tools: business applications, consumer websites, industry-specific software, public administration, financial services, smart logistics, and many more. The stakes of APM in China are high, just as they are elsewhere. Nevertheless, managing application performance in mainland China involves some specific challenges.

This white paper takes a look at what makes the Chinese market so special when it comes to ensuring end-user quality of experience on internet and intranet applications.

China: a digital world apart

China: a digital world apart

It may be tempting for global enterprises to treat China as just one country in a broader Asia-Pacific approach to digital performance. That would be a mistake. In fact, China must be considered apart because of the nature of its internet networks and regulations. For instance, where certain technical choices work well for Singapore or Japan, those same choices will not necessarily deliver good performance to users in mainland China. Even application services that perform smoothly in Hong Kong may be unfeasibly slow for users on the mainland.

Here are some of the reasons why:

- Network operators and connectivity (international and domestic interconnections, audience size)

- A filtered, regulated internet (the 'Great Firewall', regulations, etc.)

- Different mainstream internet services (social media & e-commerce, business outlook)

Network operators and connectivity

Some important decisions that enterprises setting up business in China must make involve the networks which deliver these services. The communications infrastructure can be a significant hurdle for enterprises which are seeking to expand to the People's Republic of China.

1 International connections: China & rest of world

In terms of international internet traffic, the resources for global internet connections with China are limited. There used to be only three international gateways to the internet in China, and these are still the big three: Beijing, Shanghai, and Guangzhou. In recent years the addition of seven new hubs for national connection to the global internet – in Chengdu, Wuhan, Xi'an, Shenyang, Nanjing, Chongqing, and Zhengzhou – has improved capacity and speeds significantly, particularly in those hub cities, of course.

Therefore location matters greatly, and is a factor to consider in application performance management and strategies for making applications available to users (hosting, CDN, etc.), whether those users are members of your workforce in Chinese subsidiaries or consumers doing their online shopping.

2 Domestic interconnections: China-to-China

Now for the picture within the country: in general terms, telecommunications network coverage in China is divided between two main historical operators, both of which also provide internet services. Each covers a significant part of mainland China:

- China Unicom, with a market share of about 29%, serves the northern part.

- China Telecom, the largest (about 46%), covers mainly the southern part of the country.

- In addition to the two big historical operators, a third major player, China Mobile (about 25%), provides significant coverage throughout China.

It would be an understatement to say that these networks *do not mesh seamlessly*. In other words, what Eurobiz noted in 2014 still holds true today: "a site hosted in Beijing may be practically unavailable from Shanghai because of peering issues".

Furthermore, a wide range of small, regional ISPs are on the major networks, and connecting across the different Chinese ISPs is neither smooth nor fast. Therefore not only is performance slow across the north/south divide, but it can also be slow on either side of the divide (north-north or south-south connections).

This is why so much depends on location; it is an essential factor in planning for optimum application delivery and performance.

3 Audience size

In terms of digital performance, the fact that interconnections within the country are cumbersome is complicated by congestion. Consider the sheer weight of numbers: China Telecom reported in 2017 that the Chinese infrastructure (all operators combined) is able to provide 6,640 Gbps of bandwidth to China's 731 million internet users (of a total population of some 1.4 billion), and calculates that only about 9.3 kbps on average is available to each person if everyone connects simultaneously.

Any plans to boost performance for users by focusing resources on specific geographical areas, therefore, must also involve load testing. Audience levels often prove overwhelming for international companies, which are unaccustomed to such a high number of people using their online services. The performance problems that could arise can be forestalled by proper load testing and capacity planning.

A filtered, regulated internet

The Chinese administration believes that state control of the internet in China is necessary for security, the idea being to keep harmful information out and prevent the internet from being used for unlawful purposes. With respect to this rationale, perhaps the best-known requirement is the "Bei'An", the ICP license required for any website that is hosted in China.

## 1 The "Great Firewall" (Golden Shield)

What people now call The "Great Firewall" is identified with internet censorship and information filtering – it isn't an actual firewall in the true sense of the term. The official name of the apparatus is Golden Shield. In line with the government's efforts to enforce its cyberspace sovereignty, it resorts to blocking page components (cf. mainstream internet services, described below), DNS tampering, filtering on the basis of keywords, IP blacklisting, protocol-level disruptions of VPN services, and so on.

In terms of APM, all of these technical "chokes" obviously can slow traffic and cause performance problems above and beyond the question of telecommunications infrastructures.

Thus, at the technical level, exchanges of information between China and the rest of the world are restricted by a combination of deliberate interference and the physical limitations of connection to the global internet. Not for nothing has the Chinese internet been viewed as a huge *intra*net.

The state of the Chinese communications infrastructure in addition to Golden Shield means that effective APM solutions must be able to conduct measurements both from within China and from the rest of the world.

In other words, have points of presence ("PoPs") for testing response times and availability throughout the purview of the Great Firewall as well as in Chinese market areas outside mainland China.
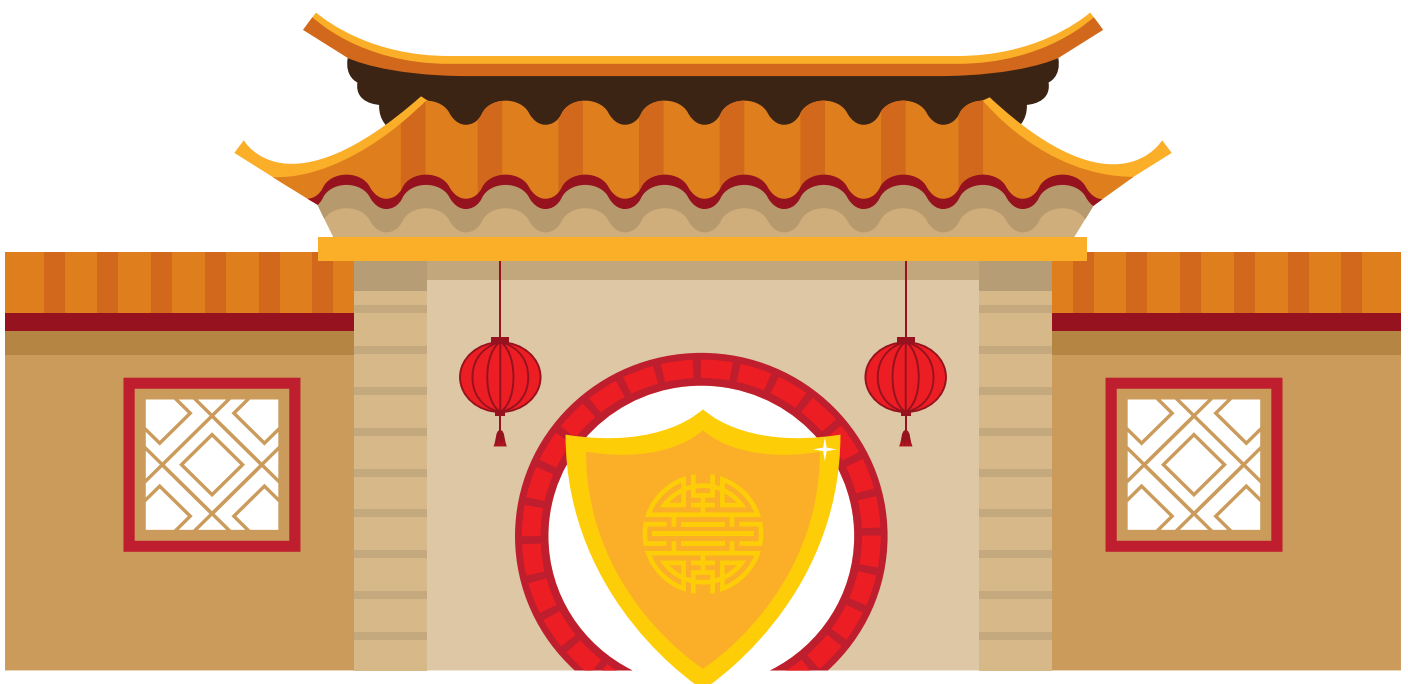
2 Regulatory requirements

The internet is regulated in China, as it is to some extent in most other countries. For enterprises seeking to implement a successful digital strategy, it is important to be aware of the regulations and how to comply with them.

There are license requirements, unsurprisingly, for commercial websites, CDNs, cloud providers, and other service providers which wish to operate in China. The main authorities which regulate and license internet-related undertakings are the Cyberspace Administration of China (CAC), the Ministry of Industry and Information Technology (MIIT; license requirements are set forth in its *Classification Catalogue of Telecommunications Services*), and the Ministry of Public Security (MPS; owner of Golden Shield).

Furthermore, with respect to data security, the new Chinese law on cybersecurity, effective on 1 June 2017, sets the legal framework for control and monitoring of the country's cyberspace by Chinese authorities. Any personal data that is collected in China is protected, and must be stored on servers in China.

3 Third-party advice & services

It goes without saying that international companies should seek local assistance from specialists (integrators and hosting providers, IT consulting firms, chamber of commerce, legal counsel, etc.) when setting up business in China. For ICT needs (CDNs, data centers, enterprise application integration, payment platforms and so on), reputable companies established in China are familiar with license requirements and know how to navigate the landscape of providers in the country.

This bears mentioning because it is the first important step for successful application performance management.

Mainstream internet services

As enterprises seeking to expand to China already know, many of the services that form the substance of the global/social marketplace in their home countries are not available on the internet in China. The blocking of such mainstream internet services and platforms may be considered within the wider scope of the Great Firewall, discussed above, as being part of the same intranet rationale.

1 Social media & e-commerce

Chinese consumers shop on the world-class marketplace, Alibaba, or on JD.com, for example. To search the Chinese web, about 75% of netizens use Baidu, the Chinese search engine giant (all SEO strategies therefore should be geared to Baidu). Alternatively, they might be searching with Shenma, 360 Search, Sogou, and lastly, Google.

They watch videos on Youku and iQiyi, for instance, and do their social networking on platforms like Weibo (Sina), aka "China's Twitter" and Kaixin. WeChat/Weixin (Tencent) is now well known across the globe.

Furthermore, most of these platforms are built seamlessly around payment solutions and services (Alipay, WeChat Pay, TenPay, etc.). In China, QR code payment is very widely used for mobile transactions. Fintech (financial technology) in general is highly developed and integrated in China, not only for e-commerce transactions, but also for bill payment, lending, insurance and other financial and banking needs.

2 Business outlook

Referring to the foremost internet giants collectively as "BAT" (Baidu, Alibaba, Tencent) – or BATS, along with Sina – business media report on their intense competition, rapid development, overlap and the constant state of flux in market shares between them. These mega-companies are having a huge impact on the internet, including cultural media, medical services, banking, finance and insurance, as well as on the logistics industry.

Analysts feel BAT may significantly transform the structure of the market. This is why BAT is a presence to be reckoned with by international groups entering the digital economy in China, for all of the same reasons those enterprises keep close watch in their home countries over social media, e-commerce platforms, and search engine developments.

Negotiating application performance in China's digital ecosystem

Negotiating application performance in China's digital ecosystem

This second part of the white paper draws on real-life experience in application performance management in mainland China to illustrate the value of APM in enhancing the efficiency and performance of internet and intranet applications.

It investigates important aspects for achieving the best possible application performance and end-user satisfaction. These are discussed in two sections:

- **Delivering good business application performance**

  The first section looks at the challenges of providing your internet or intranet applications to users in China, and how much location matters to multitier architectures. It discusses how to get the information you need from end-user monitoring to make the best delivery choices for your type of application.

- **Good practices for making websites 'China-ready'**

  The second section focuses on B2B and B2C websites. It covers how to ensure good performance for web visitors in mainland China, and investigates how APM tools and expert analysis can help optimize their experience. Optimizing websites and web apps for use in China is an effective performance enhancer, regardless of the state of the domestic communications infrastructure.

Both sections offer concrete examples of how APM is an essential partner in decision-making and implementing application services in China's digital economy. The various players in the delivery infrastructure can be optimized with insights from load testing, in addition to synthetic transaction monitoring and real-user monitoring to ensure quality levels.

Furthermore, many application performance issues can be addressed through the design of the application itself (with APM troubleshooting tools), adapting its underlying architecture, and checking any network-related issues (NAPM).

Delivering good business application performance

From the point of view of application performance management, location should be a top priority. The state of the Chinese communications infrastructure means there is a virtual divide not only between the Golden Shield area and the rest of the world, but also between northern and southern China. This is why, in a nutshell, location is so important to application performance.

But what is meant by location, and what does that mean for the multitier architectures that underlie complex business applications (CRM, ERP, etc.)? What are the options for ensuring smooth, fast delivery of intranet/internet applications to end users? How can APM tools help with these decisions?

1 Location matters: hosting & access vs architecture

Whether your budget and technical constraints drive your hosting decisions toward the Chinese cloud or physical data centers, or toward remote access to databases or applications in other countries, decision-makers should be aware of legal obligations which affect the choices they make. There are not only administrative requirements (an ICP license is required for any website hosted in China, VPNs operating in China must have permits, and so forth), but also regulations which may have an impact on multitier architectures as well.

For instance, the new Chinese cybersecurity law means that all personal information collected in China or having to do with national security must be housed on servers in China. It follows that databases storing payment data collected in China must be located in China. Therefore, the architecture of digital services, in particular the data tier, must be planned with this in mind.

Moreover, since the Great Firewall can seriously hamper access to/from any part of the architecture that lies outside of mainland China, it can be extremely inefficient to connect to business-critical applications on servers outside the country. This calls for informed decisions regarding the application tier (VPN, local hosting, or other solution?)

One example of relocating the application tier to China comes from the experience of an international automotive group. Their system was not running smoothly at their offices in China. After testing with APM tools, the enterprise found that slow response times were due to its internal software for ordering parts. For sales in China, their colleagues on the mainland had to process orders on an application located in Europe.

The cause of poor performance in China was determined on the basis of the results of active monitoring with a synthetic transaction tool. The enterprise then decided to have the application installed in China to serve the Chinese market. In this case, it was advantageous to host the application locally; hosting within China was the key to solving this major performance issue.

These are facts that should be considered carefully – with help from local APM specialists, hosting providers, integrators, and digital agencies – to ensure that application performance is not penalized by bad hosting choices, poorly targeted CDNs, or unoptimized distribution of architecture tiers.

APM helps enterprises determine which options are best suited to their particular circumstances and objectives. End-user monitoring and APM expertise locate performance issues and give insights into how to make IT investments most effective.

2 Hosting in China

It is widely recognized by integrators and digital solutions providers specializing in the Chinese market that local hosting is the key to success in mainland China. Hosting websites, applications, and databases locally is one of the most important – and sometimes obligatory – steps to setting up digital services in China.

To keep track of quality of experience on applications and websites that are hosted in China, APM monitoring tools are a necessary component of any digital services system. One local hosting provider explains why:

> *Monitoring tools which use scenarios to run user transactions have proved very useful for making sure our customers are delivering good service. This kind of monitoring gave us the diagnostics we needed to pinpoint a significant performance problem for an international fashion brand – we were able to trace the anomaly to a specific data center. We then contacted the operator to resolve the problem quickly.*
>
> *It was especially important that the monitoring system had PoPs for testing performance over the entire country; otherwise we would not have been able to see exactly where the problem was.*
>
> **Hugo Aguado, APAC CEO at Ecritel, Shanghai**

The end-user perspective, combined with extensive coverage, is the key to detecting problem spots and ensuring QoE on applications hosted in China, whether in the cloud, on dedicated servers or on shared servers.

Cloud

Everything points to Chinese cloud services developing in the near future to achieve competitiveness with the big global cloud providers.

In April 2017 the MIIT published its Three-Year Plan for Cloud Computing Development. The Ministry foresees a nearly threefold growth in the Chinese cloud computing industry by 2019, compared to 2015. All the while, Alibaba has been expanding its services, clearly with an eye on Amazon's offering.

Whether international companies doing business in China turn to cloud offerings for their corporate infrastructure (IaaS), to host their websites, store their data in virtual data centers, provide private cloud services, or for their needs as PaaS or SaaS providers themselves, it is obviously very important to choose the right cloud provider.

Integrators established in China are a precious resource in the selection process. They have knowledge of the local market offering (the foremost Chinese cloud provider is Alibaba, with China Telecom, Huawei and others far behind; AWS and Microsoft are also top global contenders in China).

As importantly, they can advise in line with budget and service requirements, and put APM tools to work to optimize performance and target investments.
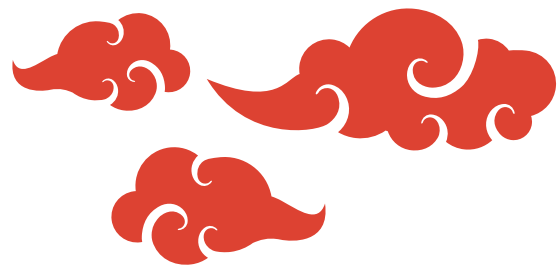
Data centers

Whether for cloud deployment or for physical server space, selecting data centers in/near China requires careful thinking about location. For proximity to Chinese customers or coworkers, there are two choices: data center within mainland China, or nearby data center outside China (for instance, Hong Kong, Singapore, or Japan).

Hosting in the PRC is costly in terms of administrative red tape as well as in technology fees (power, storage space, bandwidth, etc.). Data centers just outside China allow easier, faster deployment. The disadvantage is – once again – the congestion which slows international traffic coming into China.

The choice also depends on how much speed or interactivity is required. Chinese users of applications or streaming content would be better served from a data center on the mainland. On the other hand, web pages that are somewhat static could be served from other locations.

On the mainland, again, the location of the target audience of the hosted application is of utmost importance. The three big telecom operators, China Telecom (CT), China Unicom (CU), and China Mobile (CM) operate the lion's share of data centers, most of which connect only to the carrier which owns the data center. The lower number of carrier-neutral data centers are operated by independent Chinese firms or a very few global providers.

Furthermore, as is true elsewhere, the services offered by the data center are very important selection criteria (availability & response time SLAs, change management, etc.). For enterprise-class service and reliability, it is still advisable to resort to global providers operating data centers in China. Once again, to ensure quality, rely on a trusted local specialist to assess data centers and provide local technical support.

CDNs: accelerating China-to-China access

The Shanghai-based consultants at Ecritel consider that local hosting, the foremost way to improve application response times, must work in tandem with CDNs. For these specialists, CDNs are not just a good extra option – they go hand in hand with hosting in China. This is why this section on CDNs is included in the chapter dedicated to local hosting.

At first glance, CDN services might look like a way to avoid setting up systems in mainland China. This is not necessarily the right way to look at it, even if that is sometimes how it works. While it is true that CDNs may be useful for international exchanges (as is discussed below), one of their primary purposes in China is to communicate content to different parts of the country even when the origin server is already located in China.

If a server is located in the southern part of China, for instance, domestic users in the north have to tolerate long delays. In such cases, it is highly beneficial to resort to CDNs to accelerate content distribution from an origin server in mainland China. This is one approach that can vastly improve the experience for web application users in various parts of the country by reducing response times.

In fact, Ecritel recommends using more than one CDN to ensure coverage of the entire territory. This is because a single CDN provider may not be able to accelerate content locally in every area. Therefore, to optimize performance throughout China, it is advisable to adopt a "multi-CDN" approach.

Among the major Chinese CDN providers, ChinaCache and ChinaNetCenter (in a partnership with AWS), have the largest market shares and decent QoS. Hosting specialists in China can advise which of the several Chinese providers or rare global providers licensed to operate in the country is best for accelerating content to the domestic market in line with your budget and SLA requirements.

2 Accessing resources hosted outside of China

CDNs: bringing the outside in

CDN providers must be licensed to operate in the PRC; a few global providers have entered into partnerships with Chinese firms to operate CDNs in China. CDNs which deploy cache servers in China can solve many location-related problems and boost response times to improve user experience.

To be worthwhile, cache servers delivering content to mainland China must be located behind the Great Firewall (whence the advantage of working with local providers). At the same time, supposing Hong Kong or even Taiwan is included in an enterprise's "Chinese market" area, the CDN must also have edge servers to deliver content efficiently to those places, which are located outside the purview of the Golden Shield (whence the advantage of working with global providers).

Application performance monitoring should be planned to test the application(s) or website(s) to detect and help fix any performance problems – whether they are due to the CDN or other components in the delivery infrastructure.

By way of illustration, an international luxury jewelry group called on a global CDN provider to bring the content of its website closer to users in Asia. This proved to be an excellent solution everywhere in the Asian market area… except for mainland China!

To determine where the difficulty lay, the luxury brand sought the services of an APM specialist. The brand website was subjected to intensive testing with synthetic monitoring tools. On the basis of detailed waterfall diagnostics, the APM team analyzed the results and worked with the luxury corporation's CDN provider to pinpoint the problem. It was found that one of the edge servers which was providing content to mainland China was located outside the Great Firewall, in Japan.

In collaboration with the APM specialists, the CDN provider was then able to resolve the problem and ensure satisfactory performance for the Chinese visitors of its client's website. Such CDN issues are difficult to detect unless a monitoring system is in place to track end-user experience and APM specialists are on hand to analyze the results.

> " Some software technology companies that offer cloud-based e-commerce platforms may not have servers in China. This can lead to site instability in this country. Through APM, our clients would find out that having a CDN service in China could be quite beneficial. With ip-label additionally measuring the differences in telecom performance in China based on geography, our clients can make informed decisions on which CDN provider to use. "
>
> **Timothy Sy, Business Development Director at Isobar Commerce, Shanghai**

VPNs

In some cases, relocating applications and databases to the Chinese cloud or physical data centers may not be feasible. A business application on an intranet may be required to run back office software (ERP, CRM, etc.) that is housed outside the Great Firewall. This may be the case, for instance, when the enterprise is not yet a legal business entity in China, the proper licenses are still pending, or when particular technical or security constraints apply.

Under such circumstances, businesses may find resorting to a VPN more in phase with their specific needs. Some companies have decided to replicate remote tools or databases to a local server this way to make connecting to back office applications easier for coworkers in mainland China.

VPNs are not officially illegal in China, even if they are often targeted by the Golden Shield apparatus for reasons of censorship and non-compliance with authorization requirements. While individual expats may find VPNs satisfactory for their personal use (www.comparitech.com offers expertise for such audiences), using VPNs in a corporate context is obviously very different. The VPNs proposed by local providers are licensed, and therefore are allowed to operate in China.

Things are currently in transition because of the cybersecurity law which entered into force in mid-2017. Ecritel cautions that while one-to-one VPN tunnels are technically still a viable corporate solution, care must be taken to ensure that personal data collected in China is stored in China.

For these and other business needs (i.e. to access corporate resources located outside of China), local integrators can offer the advice and services that enterprises require, and application performance monitoring can be set up to check how well business applications are running on the VPN.

3 Local expertise and SLAs for hosting and access choices

When resorting to local hosting, CDN, or VPN to support business activities in China, as anywhere else, it is essential to make sure the provider lives up to its promises (service level agreements or SLAs). Continuous performance monitoring is good practice, and the only way for either side – provider and customer – to define, check and enforce SLA compliance.

First of all, any reputable hosting provider or supplier of connectivity services uses a variety of monitoring tools to ensure the quality of the infrastructure it provides to its customers.

> *As a fundamentally technical company, we have monitoring tools to check up on the technical components that we provide. But we also use tools for an external view, for example, of our cloud services to see availability from the outside, not just whether everything is running fine on our own equipment. We need to cover middleware – this is important for enforcing our SLAs.*
>
> *To complete the performance picture, we rely on end-user transaction monitoring to make sure users are getting acceptable service when they interact with applications. These three types of monitoring help us to ensure the quality and performance of the infrastructures that we provide to our customers in China.*
>
> **Hugo Aguado, APAC CEO at Ecritel, Shanghai**

Secondly, businesses which rely on hosting and facilities management specialists need to be able to define realistic SLAs – and 'realistic' may be different in China compared to other parts of the world. As is well known, furthermore, global enterprises establish service level agreements not just with external hosting providers, but also with their own business units (internal users). In both cases, SLAs should be based on QoE metrics because they are user-centric and oriented toward efficiency and productivity.

Synthetic transaction monitoring is one APM approach that is specifically dedicated to these business needs. It performs round-the-clock testing of cloud-deployed applications, applications served from a data center in China, or applications accessed over a VPN. Additionally, load testing the delivery platform is a basic requirement for ensuring good application performance and help with capacity planning.

More ways to enhance the performance of digital services are discussed in the following section, which deals more specifically with website performance in China.

Good practices for making websites 'China-ready'

In addition to questions of platform location and distribution, websites and web apps themselves must be optimized for the Chinese market with the help of APM tools that can conduct measurements from points of presence (PoPs) both inside and outside China.

The expectations, constraints, and characteristics of the Chinese internet ecosystem can degrade performance considerably if they are not taken into account.

- Sometimes it's cultural rather than purely technical:
Chinese web surfers prefer richly visual, animated, interactive pages. Pages for Chinese consumers must be designed to offer sophistication without affecting end-user performance.

  Sometimes it's regulatory as much as technical:
- The Great Firewall is a force to be reckoned with when preparing web content and deciding on URLs.

  Sometimes it gets very technical:
- The impact of audience size is greater than in other countries, a fact that aggravates delays due to unoptimized application code, problems with the network, and all the usual suspects.

Effective localization of the design and content of websites and applications should be planned from the start. The twofold challenge of regulations and the technical limitations of the communications infrastructure mean that these two aspects should be addressed in tandem.

1   Browsers & Design

Because Chinese consumers expect lots of interactivity on websites, web page display issues require special attention. This is one aspect, in addition to censorship, which slows down web pages designed for the Chinese market. Another aspect is that the most popular browsers and browser versions may not be the ones you think.

Web designers should be sensitive to the audience they are building their sites for, and that includes knowing the kinds of browsers they are designing for. The landscape keeps changing, but as of Q4 2017, the five most popular web browsers in China were Chrome (by far, with over 43%), IE8, IE9 (each with about 9%), and the Chinese browsers QQ (Tencent, over 6.5%), and 2345 (over 5%). Updated statistics about which browsers people in China are using is provided on Baidu's site at http://tongji.baidu.com/data/browser.

To obtain more targeted information about the context of users of a specific website, real-user monitoring is a straightforward APM solution. A good RUM tool ideally returns information about browsers and browser versions, OS, screen resolution, device, URL, ISP and location. It traces the activity of users of specific web pages and applications with last-mile coverage.

Such information can help designers to accelerate the page display process and help them target specific optimizations on the basis of actual usage of the website or app in production.

Once the problem spots are identified, they can be resolved the same way as in any other country, by streamlining images and limiting the number of requests, for example (cf. our white paper on How to make your website a top performer), and using techniques to optimize page display.

> *As with other markets, optimization of render start would be quite beneficial for the China market as well, and through APM, along with guidance from ip-label in particular, we were able to find out a few best practices to hasten the rendering process such as flushing HTMLs early, splitting the payload, etc.*
>
> **Timothy Sy, Business Development Director at Isobar Commerce, Shanghai**

According to Isobar Commerce, the data gathered by APM tools is one part of the process of improving user experience. But data alone is only the first step. Another important part of the impovement process – which leverages investments in optimization – is analysis and guidance from APM specialists based on the results generated by monitoring tools. Such expertise is a valuable asset for efficiently targeting improvement points and making optimization investments pay off.

2 Content (third-party & internal domains)

Sophisticated web pages draw content from lots of sources. It is a major challenge to figure out which content is slowing down the display or even completely blocking the site. Even when webmasters are aware of Chinese restrictions on mainstream third-party domains, it can be hard to locate where problems lie.

APM tools and an expert eye are needed here because the root causes of problems often are not easy to spot. In fact, as the locally based specialists at Isobar Commerce explain, sometimes items in an internal domain can run into interference from Golden Shield.

> *While it's commonly known that the infamous Great Firewall has a tight grip on content here, some of our clients are still coming into China with their new sites that still display restricted 3rd party domains, usually from Facebook, Google, Twitter, or YouTube.*
>
> *But sometimes even their own internal domains would also face issues with the Great Firewall. These domains would have a negative impact on their site's performance and it takes clear APM results for these companies to see and review domains that have to be removed or modified.*
>
> **Timothy Sy, Business Development Director
> at Isobar Commerce, Shanghai**

Application performance can be seriously degraded by Golden Shield in other ways, too. In particular, if the URL contains any forbidden keywords, the site will be blocked. It is easy to check whether a site is blocked at a given time for users in mainland China. Free online tools, such as the not-for-profit website www.greatfirewallofchina.org, among others, can test accessibility in China.

Furthermore, ambiguities or improprieties in simplified Chinese content can cause sites to be blocked (simplified Chinese accounts for 98.6% of all web pages in China; 0.6% are in traditional Chinese and 0.4% in English, according to Baidu and the CNNIC). The list of blacklisted words is constantly changing; one source of information about banned Chinese terms can be read (in English) at http://supchina.com/2017/08/01/words-chinese-state-media-banned/).

In addition, for B2B or B2C e-commerce sites, it is good practice to keep in mind the specificities of the Chinese internet – for instance, local payment platforms and technologies. Unsurprisingly, Chinese payment platforms provide the smoothest end-user experience for transactions in mainland China. Such third-party domains can be integrated seamlessly, without causing undue latencies as they operate well under Chinese data protection storage requirements and Golden Shield constraints.

Such considerations are all part of application performance management in China because they have a direct effect on website availability and response times.

3 Testing upstream & in production: monitoring, troubleshooting, load testing

Whether in production or for pre-production testing of new website and web app versions, performance monitoring, troubleshooting and load testing are industry-recognized good practices in application performance management. The beauty of APM is that it can be implemented upstream, to fix problems proactively before going live.

Experience shows that international luxury corporations (fashion, jewelry, fine spirits, timepieces, perfumes) are typically very conscientious about applying APM good practices from the early stages of their China market development. Such enterprises generally have very rich brand websites.

It is therefore easy to see why they are among the leading customers of load testing and APM audits prior to rolling out their websites to Chinese audiences, as well as for monitoring their website's performance in production.

Ideally, an APM provider should offer business sector benchmarks to help its customers see how well their website is doing with respect to the websites of their competitors in China. The measurements conducted to establish the benchmarks can also identify the web host, the technology underlying the web pages and, where applicable, the CDN used by competitor websites.
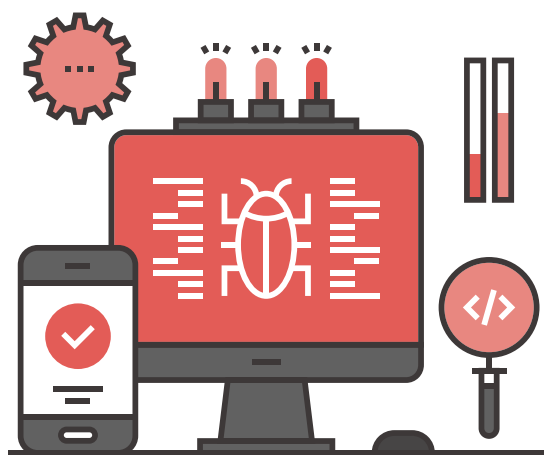
Because APM tools are "modular", they can be used all together, in different combinations, or singly, depending on the scope and results required of monitoring campaigns. They can be deployed for continuous operation or as the need arises.

- To check how the website is performing at all times, **synthetic monitoring**, also called active monitoring, is often recommended along with **network application performance monitoring** (NAPM). Together these two tools proactively detect any problem in the entire delivery infrastructure which affect website response times and availability.

- **Real-user monitoring** zooms in on trouble spots as they relate to the actual context of each website visitor, detecting the device, OS, browser, etc. on which the website or app is running, all the way through the last mile. RUM tools and analysis are ideally used in addition to proactive **synthetic monitoring** to ensure that no performance problem goes undetected.

- **Troubleshooting** tools dive deep into the web application's code to pinpoint issues within the app itself that cause slow response times or impede availability. Root causes are identified down to the line of code, to enable agile optimization of app performance.

- **Load testing** is a must in China for all customer-facing websites. Global brands may find their websites or web apps unable to cope with unexpectedly huge numbers of visitors. The size of an average audience in China is enormous compared to average audiences elsewhere. Analysis of the results of load testing sheds light on congestion points, detects infrastructure weak points under load, and also shows where workarounds are needed to adapt to the Chinese market.

  Load testing is often among the first approaches to ensuring quality of experience for Chinese audiences, whether by Asian television stations seeking to cater for mainland Chinese viewers, or by global consumer goods giants entering the Chinese market.

A US-based sports apparel and footwear e-retailer provides an instructive case of how different APM tools can work together. For its e-commerce website in China, this company decided to implement a comprehensive package that combines synthetic monitoring (transactions), real-user monitoring, reporting with customized dashboards, and assistance with interpreting results and improving end-user experience. The same customer was also a candidate for load testing in advance of peak sales seasons.

For this group's strategy, there was another determinant factor: the presence of measurement points (PoPs) to monitor performance across mainland China in addition to PoPs in Hong Kong and Taiwan for its all-inclusive "China market" sector. This way the e-retailer could be sure to catch performance problems on either side of the Great Firewall, and measure how well its site was working for users throughout its designated China market area.

Because the monitoring needs of any digital services project (website, intranet application, web app, etc.) depend on the project's scope and lifecycle, APM specialists carefully consider all aspects in order to determine which tools are best suited to the project at hand.

The ultimate purpose of monitoring is to check and improve performance, not just generate data. The measurements conducted on a website or web application should be seen as one step in a larger analytical process. APM specialists add value to the data that comes from monitoring by helping customers to make sense of the results and identify ways to fix any trouble spots.

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APM in China:
the ultimate challenge

APM in China: the ultimate challenge

In a nutshell, to ensure optimal application performance in China, global enterprises should seek to:

- be sensitive to the limitations of the communications infrastructure when designing and deploying applications and digital services

- relocate (or replicate) technical platforms to China whenever possible

- adapt to local culture and conform to regulations

APM specialists, integrators, hosting companies, and digital agencies with experience in the Chinese market are invaluable assets for clarifying these important aspects of your digital transition to mainland China.

The future is mobile... the future is now!

These strategies should be put into practice for all digital services regardless of whether those services are accessed on PCs or on mobile devices (tablet, smartphone). Mobility is one ICT area which is even more developed in China than anywhere else. It is a massive, mature and sophisticated market (fintech, health services, transport, e-commerce, gaming, logistics, and more).

While mobile usages are increasingly prevalent the world over, in China mobile transactions are already almost entirely ubiquitous. The most striking example is mobile payment (QR code, red packets, etc.), which is easy and speedy almost anywhere, even in outdoor markets. People in China don't even need to take their wallet with them when they go out – they can get tickets, pay for groceries, hail a cab, and buy their friends drinks all with their smartphone.

Baidu, the top Chinese search engine by far, includes very significant mobile-related criteria in its algorithm to favor efficient mobile apps and websites. Baidu's "mobile first" indexing is a clear sign of the popularity in China of all things mobile.

Apart from everyday mobile searches and transactions, mobile is a main source of infotainment and culture. Well aware of this fact, a European couturier recently sought the help of APM specialists in its plans to broadcast a Parisian fashion show simultaneously in China on mobile WeChat. The question was how to give users a smooth, simultaneous, high-quality mobile video experience, without the lag, freezes, and other glitches that can plague live broadcasts, especially on mobile devices.

In this and other ways, forward-looking global B2B and B2C e-commerce enterprises are pursuing their digital transformation by integrating mobility into their business model. Likewise, it is in the best interests of corporate IT, service providers, and operators to apply APM good practices to mobile digital services.

Global benefits: better digital business

While the Chinese market does pose some specific regulatory and technical issues, these constraints can be envisioned as an opportunity to further investigate ways of streamlining and optimizing applications and architectures. Not only will efforts pay off in the PRC with faster response times and greater availability, but globally as well.

Any new approach or improvement that works in China will be beneficial in markets with similar or lesser demands, too. The discipline of adapting to the Chinese infrastructure, regulations, and audience size is good "training" for implementing good practices elsewhere.

APM in China may be viewed as the ultimate challenge: when international businesses invest in APM in a market as challenging as China, the outcomes can be trickled down to other markets. The good practices these enterprises set up to optimize application performance in China can be adapted to improve the performance of their applications across the globe.

Acronym glossary

APM	application performance management
BAT / BATS	Baidu, Alibaba, Tencent / +Sina
B2B	business-to-business
B2C	business-to-consumer
CAC	Cyberspace Administration of China
CDN	content delivery network
CM	China Mobile (major operator across the country)
CNNIC	China Internet Network Information Center
CT	China Telecom (market leader and principal operator in southern areas)
CU	China Unicom (principal operator in northern areas)
IaaS	infrastructure as a service
ICP	internet content provider (license required for web presence in China)
ICT	information and communications technologies
ISP	internet service provider
MIIT	Ministry of Industry and Information Technology
MPS	Ministry of Public Security
NAPM	network application performance monitoring
PaaS	platform as a service
PoP	'point of presence' (locations from which synthetic tools measure performance)
PRC	People's Republic of China
QoE	quality of experience
QoS	quality of service
RUM	real-user monitoring
SaaS	software as a service
SEO	search engine optimization
SLA	service level agreement
URL	uniform resource locator
VPN	virtual private network

About the
ip-label group

ip-label has been assisting enterprises in their digital transformation for over fifteen years. A leading specialist of user quality of experience, the ip-label group offers an extensive range of APM (application performance management) solutions for analyzing and measuring the performance of all digital services including web, business apps, mobile, telephony, video and voice.

Want to know more about application performance management?

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