

# ANSWERING SOCIETY'S CALL:

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A Deep Dive into the  
Technologies behind the  
Alibaba Double 11 Global  
Shopping Festival

 Alibaba Cloud

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# INTRODUCTION

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**THE ALIBABA  
CLOUD PLATFORM  
AUTOMATICALLY  
DETECTED AND  
BLOCKED MORE THAN  
SIX BILLION ATTACKS  
FROM 184 COUNTRIES  
DURING THE DOUBLE  
11 EVENT**

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**For the last 10 years, the 11-11 Global Shopping Festival has continued to set new records. The Double 11 event is the biggest online shopping day in the global calendar, generating billions of dollars of sales and exceeding spending by consumers during any other shopping holiday.**

The 11-11 Global Shopping Festival 2019 was the biggest yet.<sup>1</sup> While online sales in the US reached USD \$6.2 billion on Black Friday 2018,<sup>2</sup> the number of Double 11 orders placed on Tmall passed the RMB 10 billion mark in just 96 seconds and sales hit a record RMB 268.4 billion (\$38.4 billion) in 24 hours.<sup>3</sup>

This was all made possible by Alibaba Cloud.

One notable change from previous years is that 100 percent of Alibaba's core systems were running on the cloud for the event, enabling the company to handle a world record-breaking 544,000 orders per second during peak traffic.<sup>4</sup>

That's not all. The Alibaba Cloud platform automatically detected and blocked more than six billion attacks from 184 countries during the Double 11 event, keeping platforms secure and available for shoppers.

Double 11 is arguably the biggest event in the online calendar and the record-breaking success of this year's 11-11 Global Shopping Festival is a clear demonstration of the capabilities of Alibaba Cloud's products and services.



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As consumer demand for online shopping continues to escalate, enterprises must react with the provision of a seamless and scalable e-retail solution."

The ground-breaking success of this year's Double 11 is also a clear call to action for enterprises from the world's consumers. As consumer demand for online shopping continues to escalate, enterprises must react with the provision of a seamless and scalable e-retail solution. To realize this ambition, enterprises need to leverage the leading technologies provided by Alibaba Cloud.

In this ebook, we will deep dive into our extensive suite of cloud-based products and services that not only enabled this mass-scale event but also protected the billions of consumers and businesses taking part.

We will explain how your business can use Alibaba Cloud's products and services to stand out, compete, and succeed not only on days like 11-11 – but on every day of the year.





# MEET OUR TECHNOLOGIES



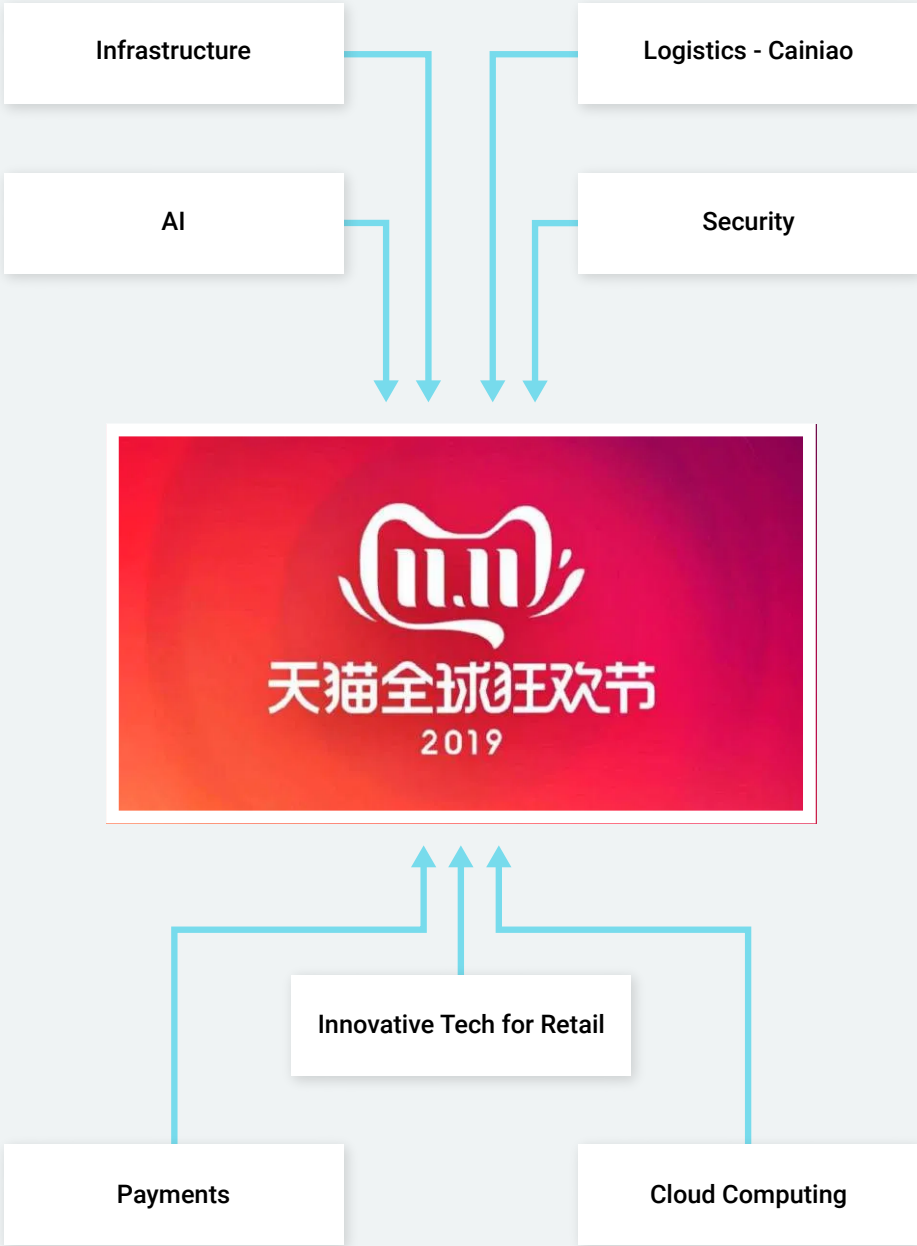
OUR CLOUD SECURITY SERVICES PROVIDE COMPLIANT, ADVANCED AND REGULARLY UPDATED DEFENSIVE SYSTEMS TO PROTECT YOUR BUSINESS AND ITS DATA AGAINST ATTACKS DURING CRITICAL TIMES

In this section, we will meet the core Alibaba Cloud products and services that enable the 11-11 Global Shopping Festival.

Each one brings something different to the table in terms of its capabilities and benefits. To summarize, for any business that wants to operate online, the core advantages of a cloud-based solution include:

- » **Reduced costs:** You avoid upfront costs and the provisioning of expensive equipment by only paying for the resources you use.
- » **Traffic predictions:** During major events like Double 11, production environment bottlenecks often result. However, the elasticity of the cloud (coupled with our auto-scaling functionality) allows your business to synchronize its resources with actual demand.
- » **Operations and maintenance:** You can schedule automated infrastructure updates and maintenance in off-peak periods, and ready your network for an anticipated peak in demand.
- » **Cyber security:** Our cloud security services provide compliant, advanced and regularly updated defensive systems to protect your business and its data against attacks during critical times.
- » **Data-enabled insights:** We provide a range of Data Analytics Solutions to help you harness the value of your data, which can be used to drive your corporate, business and functional strategies – and, ultimately, futureproof your enterprise.

Let's meet the core technologies that powered and enabled the 11-11 Global Shopping Festival now and discuss how each one could help your business thrive in the online arena.



# Core Technologies Provided by Alibaba Cloud during the 11.11 Global Shopping Festival 2019

How to support a USD 38.4 billion event in 24 hours

## Voice shopping



### Tmall Genie

- **1 million** orders placed and processed through voice command



## Machine translation



### Global

- Real-time translation of **21** languages supports more than **100** countries and regions



### Vast

- **200 billion** words translated

## Powerful infrastructure



### Scalability

- Peak order rate reached **544,000** per second
- Total GMV exceeded **USD 1 billion** in **68 seconds**



### Robustness

- Total GMV reached **USD 38.4 billion**
- **ZERO downtime** throughout the entire festival

## 100% on Cloud



### New Payment

- Accessible in over **220** countries and regions, supporting **27** currencies



### New Shopping Guide

- Edge AI generated **9.04 billion** personalized recommendations



### New Logistics

- Smart logistics engine powered **1.2 billion** packages
- Our Internet of Intelligence improved cross-border warehousing efficiency by **20%**



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**ECS PROVIDES A  
HIGH-PERFORMANCE,  
STABLE, RELIABLE AND  
SCALABLE SOLUTION**

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## ELASTIC COMPUTING

Elasticity is a vital quality for any business that wants to survive and thrive in today's competitive digital world. It allows you to quickly expand and decrease your computer processing, memory and storage resources to keep pace with changing demands.

As a result, you don't have to worry about engineering your systems for peak usage, making capacity plans or managing the extremes of service outages and idle resources during peaks and troughs in demand.

## INTRODUCING ECS

Our [Elastic Compute Service](#) (ECS) is the foundation on which many of our cloud-based products and services sit. This online computing service provides a high-performance, stable, reliable and scalable IaaS-level solution to your enterprise. It offers elastic and secure virtual cloud servers to cater for a vast range of cloud hosting needs.

ECS now runs on the latest Intel CPUs. For the Double 11 event, the fast memory and low latency capabilities of ECS helped power a vast range of cloud applications. What's more, ECS is easy to deploy – with just a few clicks you can scale your capacity to meet demand, without procuring any expensive IT infrastructure.

Alibaba Cloud recently introduced the 6th Generation of ECS, based on the X-Dragon Architecture. The 3rd Generation of the X-Dragon architecture fully supported the 2019 shopping event, where its servers seamlessly integrated our computing platforms into a single architecture, improving their cost efficiency by 20 percent.





During the 2019 Double 11 event, a range of AI-enabled features empowered international brands and SMBs. This included the 3D Taobao avatar, which helped 1,167 sellers increase their conversion rates per purchase by more than 20 percent, compared to the previous year.<sup>5</sup>



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**THE AI-ENABLED  
TAOBAO AVATAR HELPED  
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Further research also reveals that the integrated artificial intelligence features of X-Dragon can help our customers realize a 30 percent increase in the queries-per-second rate and a decrease in latency by 60 percent. These improved metrics enable dramatic improvements in an array of e-commerce scenarios, and also reduce the power wastage from physical servers because this is a cloud-based solution.<sup>6</sup>

Here are some of the standout ECS-based technologies, which also contributed to the success of the 11-11 Global Shopping Festival:

### **ECS Bare Metal Instance (EBM)**

Equipped with the proprietary Alibaba Cloud EBM chip and state-of-the-art virtualization, EBM Instances combine the elasticity of a virtual server with the performance and features of a physical server and played a critical role during Double 11.

However, the capabilities of our EBMs are not limited to the world of e-commerce. For example, an [ECS Bare Metal Instance](#) with eight vCPUs can provide a core frequency of 3.7 GHz to 4.1 GHz for better performance and faster response, which is a superior solution for gaming and finance businesses, compared to peer services.

### **Block Storage**

Alibaba Cloud ESSD disks provided a block storage service of low-latency and high performance to support core business applications as well as middleware, databases, and other systems used during Double 11.

Our ESSDs are extremely powerful. They are based on a 25 GE network and remote direct memory access (RDMA) technology, delivering a maximum random IOPS of one million per disk and low one-way latency. As a result, they can be utilized for any business case where short latency and high throughput is required.

### **GPU Instance and FPGA Instance**

Given the growing number of emerging codecs, video file formats and delivery methods, AI-enabled transcoding is a powerful and emerging capability, which can dramatically improve your workflows using automation and reduce file sizes without degrading the quality perceived by the viewer.

During the promotion period of Double 11, a massive amount of AI and video/image transcoding was performed on heterogeneous computing clusters provided by Alibaba Cloud, which are also ideal for parallel computing.

This allowed content to be seamlessly delivered to the end user, providing businesses with the opportunity to stand out in the digital space by providing rich, interactive content. A solid multimedia strategy is vital during such high-profile events, and a factor we will come back to later.

### **Server Load Balancer**

[Server Load Balancer](#) (SLB) is a traffic distribution and control service, which distributes inbound traffic among multiple ECS instances. In short, it responds to any sudden traffic spikes on your network and minimizes response times.

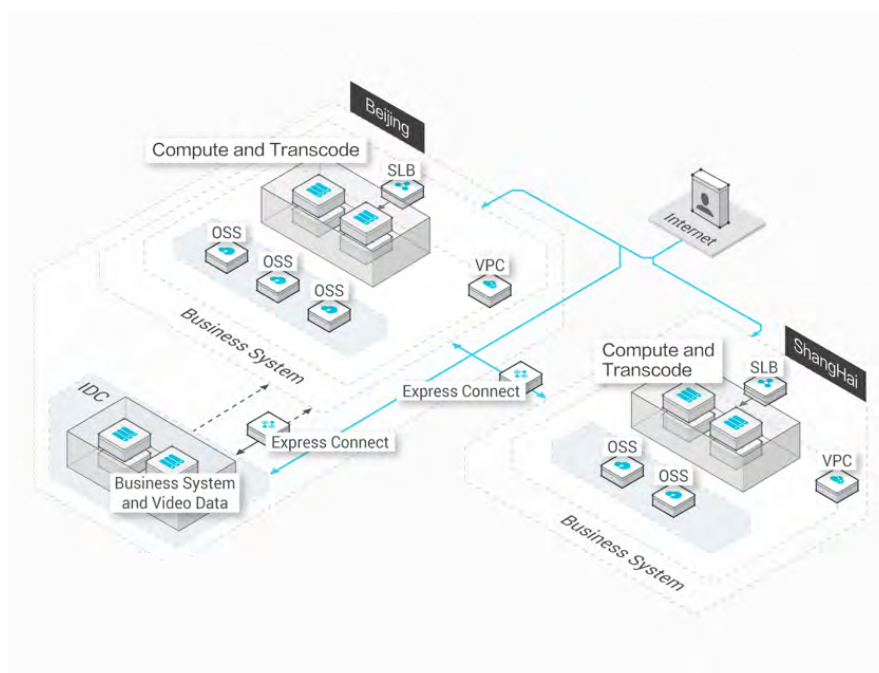
SLB balanced and distributed traffic during Double 11. By integrating SLB with [Auto Scaling](#), backend servers were able to scale up dynamically to guarantee the stability and availability of web servers. As such, SLB is suitable for any application with high access traffic to improve availability and reliability.



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AI-enabled transcoding can dramatically improve your workflows using automation and reduce file sizes without degrading the quality."

Let's look at an example of how SLB could help a video hosting service based in Beijing, China with the distribution of its mass traffic.



A typical infrastructure to help you distribute mass traffic across multiple regions

In the above diagram, SLB deploys instances across regions and uses these instances to load share mass user requests received on the video website. We have also integrated our [Express Connect](#) service, which provides this business with a bandwidth of 10GB so it can communicate between its VPCs ([Virtual Private Clouds](#)) both securely and seamlessly.

As a result, the video website can use a large amount of applications on its network and deal with a high volume of traffic. In period of peak demand, SLB also distributes this traffic among multiple instances, which improves the capability of its horizontal scaling.

As you can see, SLB does not exist in isolation to handle the mass distribution of traffic in this example. It also relies on our ECS, Express Connect, VPC and OSS (Object Storage Service) products and services to meet the operational requirements of this business.

This is an important point. A cloud-based environment cannot and should not exist in a silo. It needs to interconnect with a broad range of products and services to enable innovation and the digital prowess of your business.

Such interconnection is enabled by the Alibaba Cloud platform, which provides an intuitive and accessible space to modify your environment.

With this in mind, let's look at more of the key technologies that we used in the 11-11 Global Shopping Festival.

## MANAGING MEDIA



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ASPARAVIDEO LIVE  
PROVIDED 4K LIVE  
STREAMING TO AN  
ONLINE AUDIENCE OF  
OVER 25 MILLION

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Alibaba Cloud provides a range of powerful multimedia services. Thanks to our extensive cloud storage capabilities and efficient content delivery, we can provide a smooth and rich user experience across multiple formats.

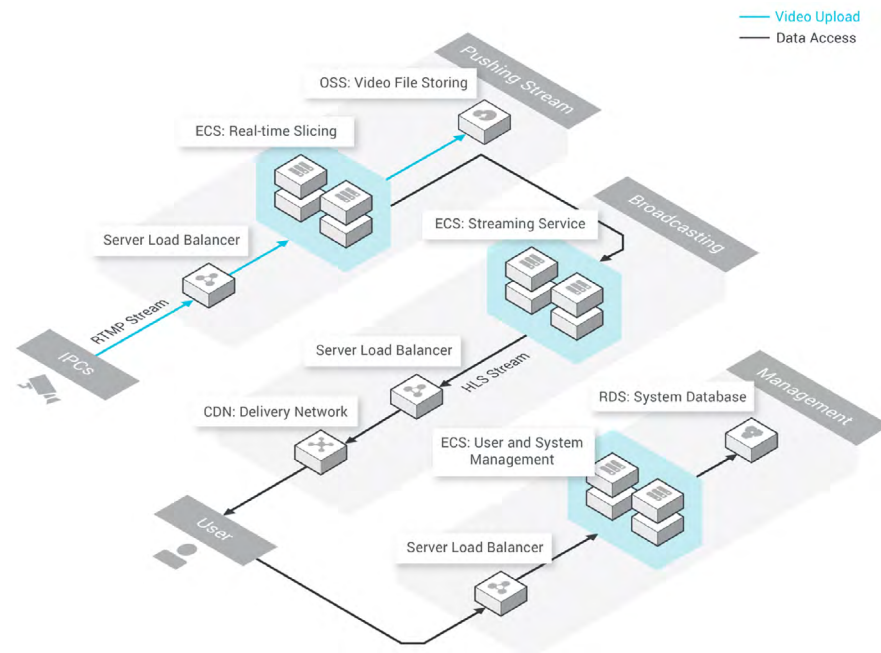
Our multimedia services were fundamental to drive user engagement and enable a smooth user experience during the 11-11 Global Shopping Festival, with highlights including:

- » **Object Storage Service (OSS):** [OSS](#) stored all the images and videos for Taobao and Tmall. Its low latency and high availability guaranteed a smooth user experience during the shopping festival.
- » **ApsaraVideo Live:** [ApsaraVideo Live](#) provided 4K live streaming to deliver the celebrity-laden Double 11 Festival Gala Show to an online audience of over 25 million.
- » **CDN and Dynamic Route for CDN:** With over 1,500 edge nodes around the world, Alibaba Cloud CDN ([Content Delivery Network](#)) provided and reserved over 100 Tbps of bandwidth for dozens of services during Double 11.

Let's look at another example of how our multimedia services can be used to enable a rapidly growing phenomenon: live streaming.



**Live streaming is the transmission of video or audio content simultaneously recorded and broadcast in real time to an audience. Live streaming is breaking down barriers between the social and corporate landscapes across multiple industries, helping businesses actively engage with their audiences and customers.**



**An example architecture for live streaming, which comprises of three core modules.**

A low-cost live video broadcasting platform generally comprises of three main modules: pushing stream, video broadcasting, and system management.

Our [Server Load Balancer](#) with ECS architecture could be used for the pushing stream module. This allows you to build a real-time video segmentation cluster where video streams are pushed by your clients and stored in OSS at a later date.

In the video broadcasting module, authenticated users request live-streaming videos. These real-time video segments are converted into the appropriate format and then pushed to our CDN.



The system management module manages the user information, devices, user verification, and other system management related services.

Live streaming is not the only media solution we provide. Alibaba Cloud can actively help businesses to seamlessly drive user engagement using a range of multimedia solutions.



**However, to ensure you provide the best user experience to meet the needs of your users, you also need to make sure your databases are in order...**

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**ALIBABA CLOUD  
DATABASE SERVICES  
ENABLED 42 MILLION  
DATABASE REQUESTS  
PER SECOND DURING  
THE 11-11 FESTIVAL**

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## STABLE AND RELIABLE DATABASES

Alibaba Cloud database services powered the Alibaba Cloud 11-11 shopping festival by providing the high scalable, stable, and reliable database services, especially during the unpredictable traffic spikes, without incident.

As a result, our database services enabled 42 million database requests per second, more than one million queries per request and 50,000 queries per second of real-time monitor and data storage. At the end of the event, 970PB of data had been processed and close to 1.3 billion orders were generated.

## INTRODUCING ASPARADB

**Our database services are provided under the [ApsaraDB](#) umbrella. Each offering delivers a service to automatically and continuously manage and monitor your database health and hardware securely.**

We monitor, backup, and recover your database automatically so that you can fully focus on your business development. If an issue is detected, we will locate it and fix it for you, giving you peace of mind for both large-scale events like Double 11 and your day-to-day operations.



We also support 90 percent of mainstream database engines, including MongoDB, PPAS, MySQL, SQL Server, and Redis. The following services were instrumental in the 11-11 Global Shopping Festival:

- » [ApsaraDB for RDS](#): Tens of thousands of people purchasing the same product results in high concurrency and challenges. To handle this, RDS provides parameter adjustment, elastic scaling, performance tuning, and more.
- » [ApsaraDB for MongoDB](#): Purchasing events involve massive unstructured data such as comments and monitoring data. With flexible storage and distributed scaling, MongoDB supports storage and high-concurrency query of unstructured data.
- » [ApsaraDB for Redis](#): A single Redis cluster provides over 10 million QPS, TB-level memory cache, and millisecond-level delay to ensure service stability.
- » [Data Transmission Service](#) (DTS): Our DTS speeds up incremental database log parsing by 150 percent to support cross-region active-active data and provides subscription index optimization and hash subscription to resolve media data delay.

For the Double 11 2019 event, our next-generation [ApsaraDB for PolarDB](#) also provided the performance and availability of traditional enterprise databases and the flexibility and cost-effectiveness of open source databases. Let's look at this solution in more detail now.



## ASPARADB FOR POLARDB

Our cloud native POLARDB powered the RT-Mart Carnival GO activity, Taoxianda app, and Fresh Hema retail experience at this year's Double 11 event, providing consumers with a seamless and omnichannel shopping experience. At peak time, it dealt with over 10 million database transactions per second and supported the analytics that were generated by such a massive amount of customer activity to generate business insights in real time.

POLARDB is compatible with MySQL, PostgreSQL and Oracle, supporting up to 100TB of data. It automatically adjusts the storage space based on your requirements, which is a key feature for the fast performance, high concurrency and automatic scaling required by events like Double 11.



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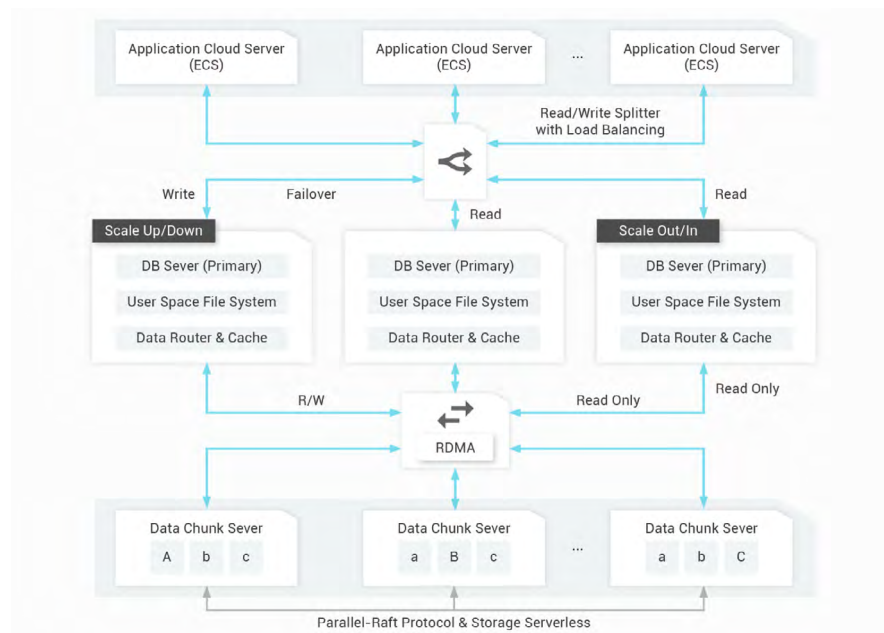
At peak time, POLARDB dealt with over 10 million transactions per second."

POLARDB also features high availability. Its systems are monitored and, if a failure is detected, the business applications are automatically switched to a healthy part of the system.

**But it doesn't matter whether your business operates in the retail, gaming, finance, live streaming or any other industry. POLARDB is a next-generation solution that provides:**

- » Elastic capability in minutes.
- » Physical replication latency in milliseconds.
- » Rapid up and down scaling up to match demand.
- » Smooth response to business load.
- » Minimal business cost.

Let's look at an example now where POLARDB reacts to a traffic spike thanks to a flash sale.



A typical POLARDB architecture to enable high concurrency.

In the above diagram, instances can be scaled out within seconds, meeting the read/write requirements for enterprise-level large-scale data analysis. Scale-out events can also be quickly implemented, and the availability of database clusters is enhanced, while keeping storage costs at a minimum.

As a result, these common, cross-industry issues are resolved:

- » **Size limitations:** A typical MySQL database is usually no more than 3TB, POLARDB is not constrained by the limitations of such traditional databases. You don't need to scale-out clusters, migrate data and shard databases as your data grows. As a result, your development costs are reduced, and your service is not interrupted.
- » **Scalability limitations:** The replication process is simplified using POLARDB. Instead of replicating all of the existing data to add a read-only node, POLARDB uses a 'one primary node, multiple replicas' architecture where all read/write and read-only nodes of the same instance access the same replica, greatly reducing storage costs.

- » **Data consistency and availability limitations:** POLARDB supports active/standby switchovers to prevent data loss and data inconsistency caused by asynchronous replication. Read-only replicas can be created within minutes to back up and restore data. This is a marked improvement compared to traditional databases, which often use incremental synchronization to sync data.

**While our database solutions automatically and continuously manage and monitor your database health and hardware securely, you also need to decide what to do with that data – and how to capitalize on this information...**



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**DURING DOUBLE 11,  
OUR IOT PLATFORM  
TRACED DELIVERIES  
FROM ORIGIN TO  
DESTINATION**

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## INTELLIGENT SOLUTIONS

Data is the new corporate currency and the amount gathered during an event like the 11-11 Global Shopping Festival is phenomenal. But you need to utilize that information both retrospectively and in real-time to help your business rise above the competition.

### IOT PLATFORM

Our [IoT Platform](#) is a device management platform that allows IoT application developers to implement two-way communication between end devices (such as sensors) and the cloud. As a result, you can gather information from a diverse network of assets and use that data to make better decisions to optimize your business.

For example, during Double 11, information about every package was uploaded directly to our IoT Platform, allowing deliveries to be traced from origin to destination and expedite speedy deliveries.

There are a huge range of alternative applications for such an IoT Platform, including smart cities, wearables, connected vehicles and smart retail solutions. Compared to other platforms, the Alibaba Cloud IoT Platform is also highly customizable, featuring a rules engine for rapid data collection, storage, and application development.

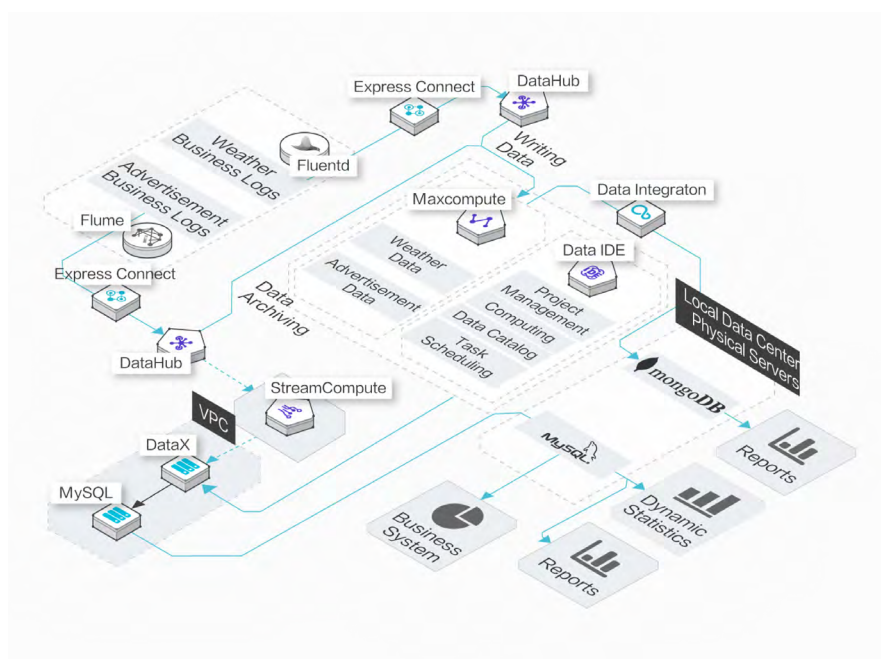


## MAXCOMPUTE AND ANALYTICDB

MaxCompute (formerly called ODPS) is a fast and fully hosted GB/TB/PB level data warehouse solution. On Double 11, MaxCompute supported all offline big data computing and acted as the one and only data warehouse.

Our AnalyticDB data analytics services was also run in conjunction with POLARDB during Double 11, enabling big data processing in order to gain actionable insights. Thanks to AnalyticDB, the difficulties of storing massive amounts of data are resolved and quick and precise real-time analysis could be carried out.

Let's look at a quick example. This architecture was implemented for Moji Weather, a log analysis business that migrated to MaxCompute. MaxCompute processes and analyzes 2TB of logs each day to benefit the company's personalized operating strategies.



The architecture implemented for Moji Weather.

As a result, the Moji Weather realized the following benefits:

- » **Enhanced business efficiency:** MaxCompute analyzes all logs using SQL, to enhance business efficiency by more than five times.
- » **Improved storage efficiency:** MaxCompute reduces the storage and computing costs by 70 percent and improves the performance and stability.
- » **Easy application of big data:** MaxCompute provides multiple open-source plugins for easy migration to the cloud.

**We have now looked at the instances, databases and intelligent solutions that have helped run the Double 11 event. However, all this hard work is meaningless if you cannot guarantee the security of your cloud-based network...**

### END-TO-END SECURITY

The Alibaba Cloud platform created 2,836 real-time analysis records for e-commerce platforms including Tmall and Taobao, blocking 4,730,000 attacks on these platforms.

We also successfully defended against 1,917 DDoS attacks, some of which were as high as 223 Gbps in volume.

This was only possible thanks to the combination of comprehensive security solutions Alibaba Cloud provides. These include:

- » [Web Application Firewall](#): WAF helped e-commerce customers to defend against massive web attacks, ensured the security of business transactions, and prevented malicious web crawling during Double 11. With WAF, several large airlines with special promotions reduced the ticket scalping rate.
- » [Anti-DDoS Premium](#): As the first cloud provider with next-generation IPV6 DDoS protection, Alibaba Cloud kept the Taobao and Youku platforms safe from DDoS attacks over Double 11.
- » [Threat Detection Service](#): Threat Detection Service provided automatic threat detection, analysis and SOC capabilities to provide cloud users with a clear picture of server security.

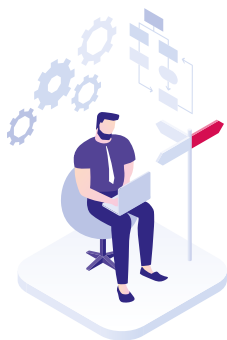
At Alibaba Cloud, we are committed to providing stable, reliable, secure and compliant cloud computing products and services.

For example, we recently implemented Alibaba Cloud's CDN and WAF services for airline operator Air Asia. Using these solutions and by working with Alibaba Cloud's security professionals, Air Asia identified 90 percent of its traffic as Bots. Now, we provide Air Asia with weekly security reports and regular updates.<sup>7</sup>

This is just one example. Over the last decade, we have protected more than two million companies worldwide, giving us a vast amount of experience to identify security threats and develop world-leading solutions.

# KEY TAKEAWAYS

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**APPSARADB ENSURED  
THAT NETWORKS AND  
SYSTEMS WERE SCALED  
TO PROCESS DURING  
DOUBLE 11**

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**The Double 11 Global Shopping Festival places huge demands on computing resources.**

Thanks to the fault-tolerant infrastructure and advanced technologies provided by Alibaba Cloud, this annual event has continued to go from strength to strength over the last decade.

All this experience and innovation can be summarised in following core capabilities:

## **EFFORTLESS ELASTICITY**

Phenomena such as Alibaba's Double 11 Global Shopping Festival involve millions of users and require large amounts of computing resources. In 2019, 100 percent of Alibaba's core systems were running on the cloud.

This is because Alibaba Cloud's platform of products and services provide the elasticity to cope with such demands and fluctuations in demand, to ensure the smooth and stable operation of the entire system.

## **EMPOWERED INTERACTIVITY**

During this year's 11-11 Global Shopping Festival, a world record-breaking 544,000 orders per second were taken, during peak traffic. On top of that, more than 22,000 international brands from 78 countries and regions also participated.

In today's hyper-digitized world, our online interactions are not a one-way experience. Whether you're researching, buying or watching a video streaming review of a product, you want to seamlessly interact with digital storefronts, unconstrained by geographical boundaries.

## ROBUST SECURITY

During the Double 11 event, the Alibaba Cloud platform automatically detected and blocked more than six billion attacks from 184 countries.

This is a clear testament to Alibaba Cloud's commitment to safeguarding the cloud security for every business. Thanks to our comprehensive stance on security, you can quickly establish robust, end-to-end protection to address your application security, data security, and platform security needs.



# IN CONCLUSION

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**DOUBLE 11 2019  
GENERATED USD \$38  
BILLION IN GROSS  
MERCHANDISE VALUE  
SALES**

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With sales hitting a record USD \$38.6 billion in 24 hours, 544,000 transactions per second at peak time and more than six billion cyber-attacks successfully averted, the cloud-based technologies being the Alibaba Double 11 Global Shopping Festival provided the required elasticity, interactivity and security for this year's event to surpass its predecessors.

Alibaba Cloud not only powers the technologies the Alibaba Group's own e-commerce ecosystem, it also provides the products and services to help businesses the world over get online and grow.

We recommend enterprises that are eager to try our extensive suite of products and services sign up for an Alibaba Cloud free trial service. Here, you can access up to \$300 (for individuals) or \$1,200 (for enterprises) of products and services across our platform.

If you would like to learn more about how you can use Alibaba Cloud to improve your business, please contact us at [www.alibabacloud.com/contact-sales](http://www.alibabacloud.com/contact-sales).





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## ABOUT

Established in September 2009, Alibaba Cloud is the cloud computing arm of Alibaba Group and develops highly scalable platforms for cloud computing and data management.

It provides a comprehensive suite of cloud computing services available from [www.alibabacloud.com](http://www.alibabacloud.com) to support participants of Alibaba Group's online and mobile commerce ecosystem, including sellers and other third-party customers and businesses.

Alibaba Cloud is a business within Alibaba Group which is listed on the New York Stock Exchange (NYSE) under the symbol BABA.

[www.alibabacloud.com/contact-sales](http://www.alibabacloud.com/contact-sales)