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Leveraging Cloud Storage Technologies for Next Generation File Services

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EXECUTIVE SUMMARY

The world is quickly changing and so is the way of doing business. Terms like “distributed enterprise” are no longer enough to describe the new enterprise after cloud and mobile revolutions have changed the rules. Now, the mobile work force counts for the majority of the users and this has direct consequences on how data are created, accessed and have to be managed. It’s probably better talking about the “dispersed enterprise”.
Users work on many different devices at the same time, continuously switching from one device to another, and hence document workflows have dramatically changed. Data are accessed from everywhere at anytime by single users and teams: collaboration platforms, starting from file sharing solutions, are fundamental layers of any modern organization.

At the same time, traditional file servers are present everywhere, in primary sites as well as in small remote and branch offices. These servers represent an invaluable resource for sharing documents between PCs, but traditional LAN protocols are not designed to cope with modern devices on the internet. Furthermore, file servers do not tolerate the on/off behavior of mobile devices with the risk of losing data when a device comes up with modified data to synchronize. Moving data across networks and maintain its security and integrity is quite complex.
Nowadays, TCO of traditional storage infrastructures is an issue (especially when we talk about ROBOs) and enterprises are looking at new ways to provide storage services to their users. Cloud storage addresses all the new challenges and can be a viable solution to:

- cut costs,
- have unmatched control on data access and security,
- improve user experience,
- provide best data protection and disaster recovery options,
- centralized management.

CTERA, with its hybrid architecture, helps enterprises and ISPs of any size to design and implement next generation cloud storage infrastructures capable of providing modern data services integrated with the rest of the enterprise infrastructure and at a competitive cost.

UNDERSTANDING THE CHALLENGES

The limits of traditional storage

NAS (Network Attached Storage), and file servers in general, are designed to work with PCs and LAN protocols like SMB or NFS. communication with tablets, phones, as well as remote access (via WAN or Internet), is not possible, and this is only the tip of the iceberg.

Consolidation of NAS/File environments, in most of the cases, is not a viable option due to protocol limitations, lack of bandwidth and/or latency. At the same time, ROBO infrastructures are costly to maintain. In fact, File Servers, even more so remote ones, are relatively expensive to manage. For example, they need external backup and/or Disaster Recovery systems aimed at preventing data loss in case of logical or physical failures. Most of these data protection mechanisms have to be maintained and, especially in remote offices, just changing a tape could be an issue leading to additional costs.

For modern enterprises, targeting at cloud computing as reference architecture, traditional storage is hard to manage, provision, monitor and control. It lacks most of the requisites to obtain multi-tenancy, automation, abstraction, agility and provisioning characteristics.

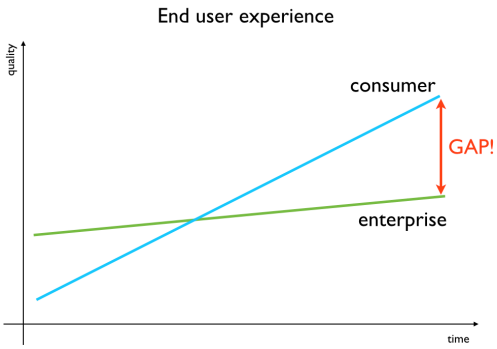
The list of limits, and costs, of traditional NAS systems doesn't end here. Data growth, for example, is another issue. Usually, the quantity of active data grow with the increase of active users, but the quantity of stored data grows over time. This means that the enterprise has two options:

- over-provisioning at the beginning and paying in advance for unused space;
- provisioning the right amount of resources and incurring in costs for infrastructure upgrades and reconfigurations later.

It's hard to chose the worse scenario!

The Value of User Experience

End-users are now used to technology and they consume cloud services on a daily basis as private consumers. These users want to relive the same experience at work that they live at home with their consumer-grade cloud services such as Dropbox or Google Drive.



On average, they usually work with three different devices which they want synchronized and updated with latest data available.

Sometimes, just because the enterprise is not able to keep up with the change, phenomenons like BYOD (Bring Your Own Device) are joined by others like BYOC (Bring Your Own Cloud) and concerns about security or data leaks are raising more than ever.

Closing the gap between home and work user experiences makes employees more productive while the enterprise regains control of data, costs and risks.

New Ways to Produce and Collaborate

Users have new behaviors when it is time to produce and work on documents. Rich files creation and editing is a process that now goes through different devices. People take notes and pictures on phones, they put contents all together on PCs or tablets, sometimes they use platform specific apps to further enrich documents. Eventually, they need a trusted repository where it is possible to share content and work together with the rest of the team. Especially when it's a teamwork, documents are viewed, opened and modified on different devices and users take for granted that they won't lose the updates they make, even if it happens when they are off line.

Why The User Experience Is So Important

Ordinary tools, like email or traditional file services, are not able to grant all of the freedom and agility requested by the modern business processes. Users find themselves stuck on

rigid legacy systems that undermine their productivity and, consequently, they try to use other non-enterprise-grade tools. The risks for the enterprise become huge and, on top of that, IT department is often blamed for the poor service.

Sometimes, departments or teams directly buy external services to achieve the level of functionality they want but, also in this case, synchronization between internal and external sources, as well as loss of control and integration with the rest of the company, introduce hidden costs and risks. Most of the times, the reasons why shadow IT is becoming so relevant, is because IT mangers are not able to provide a comparable solution to external services.

The Cloud Backend

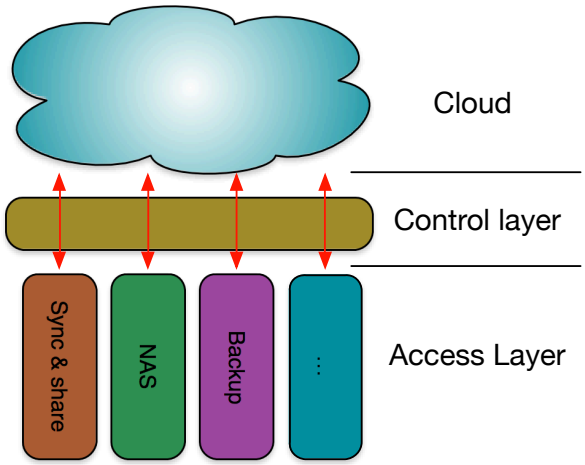
Many organizations are looking with interest at cloud computing because it promises more agility at lower costs, this is even more true for cloud storage. Cloud storage can have different meanings and forms, but when implemented transparently to the users and business processes it shows dramatic advantages when compared to legacy approaches.

The most important thing that is necessary to understand when we talk about cloud storage is that delivering next generation integrated file services is not possible without introducing an abstraction and control layer between access methods and the data repositories.

Avoiding the separation between data, access and control functions leads to rigid solutions that can be great to solve a single vertical problem but are not suitable for a 360° approach. For example, sync & share services are great for mobile users but when these users sit in front of their PC they want to access the same files on the local file server. In the case of a sync & share service tightly coupled to data it's simply not possible. There are many reasons to implement this separation and they range from ease of use to efficiency and performance of the whole storage system.

Consolidation, Automation, Device and access method independency, as well as multi tenancy, are only a few of the possible benefits of cloud storage which all lead to fast ROI and better overall TCO.

Furthermore, the freedom of choice between public, private and hybrid cloud allows enterprises of any sizes to take full advantage of this technology.



Cloud, integration and security

Two of the most important aspects of cloud storage are security and integration.

In particular, when we talk about security, the discussion is at two different levels. One is the psychological aspect of cloud security and the other is its real technical implementation.

Leaving technical details for the following chapters, the psychological aspect is the first and most important issue IT managers have to face when they propose the cloud to their organization. The company management has to be assured about the security of the cloud they want to adopt.

Data encryption, access control and auditing are all basic features that have to be implemented at the root of any cloud storage project. Even more so, when the choice applies to relatively insecure public cloud infrastructures, having complete control over data and users is a fundamental key to success.

Looking at what the market offers, it's not difficult to discover that the main difference between consumer and enterprise grade cloud solutions is mostly related to the level of implemented security features and control given to the data owner rather than the cloud operator (who may or may not be the data owner).

If security is the most important aspect, integration with the rest of the infrastructure follows immediately after it. For example, most of enterprises have already implemented traditional file services as well as directory services (e.g. Microsoft Active Directory). Integration with existing infrastructure and services has two main obvious advantages:

- Transparency and ease of use for the end user.
- Ease of management and infrastructure simplification for the system administrator.

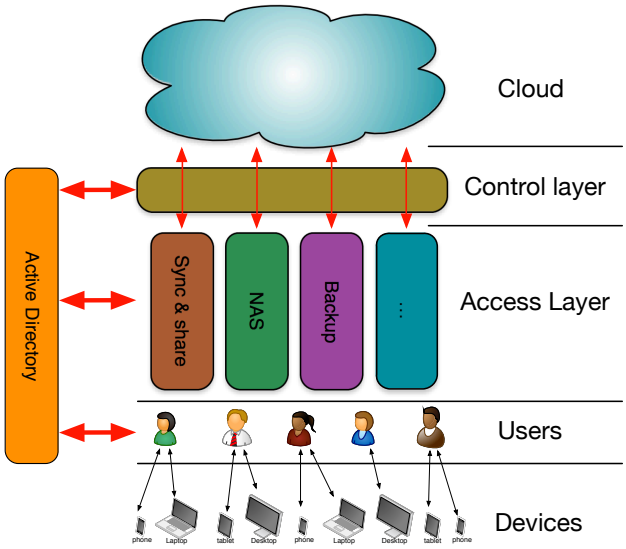
In both examples integration leads to an overall simplification that saves time and cost.

THINKING ABOUT A SOLUTION

Components of The Solution

As already mentioned above, there are a few distinctive elements of a cloud storage solution capable of covering most enterprise needs regarding modern file services:

- Object storage;
- Management and Control layer;
- Service gateways (appliances, endpoint clients and mobile apps)



In the next pages I will cover these, giving a short description about their characteristics, what you should look for and, eventually, talking about the implementation made by CTERA.

What Is Object Storage?

An Object-based Storage, contrary to file systems which manage data based on a file hierarchy design, manages data as objects. Objects are the sum of data and metadata, they are unique in the system and can be stored or retrieved independently by their position.

Usually, an Object storage system is highly automated, distributed, resilient and available. Its particular design makes it a perfect choice for large distributed applications where scalability, reliability, availability and durability are more important than speed of the single transaction. Modern commodity scale-out architectures and advanced protection schemes (like erasure coding, for example) strongly contribute to make the $/GB ratio of Object storage very competitive, when compared to other type of storage systems.

At the same time, object storage is usually accessed through APIs which is quite uncommon for traditional file services.

An Object storage system can be private or public (the best known public implementation is Amazon S3). Enterprises can chose between public and private in function of their needs, but most important factors that leads to way or the other are:

- Upfront investment in the private infrastructure against the pay-as-you-go model of the public cloud;
- Laws, regulations, data locality and other security restrictions or concerns;

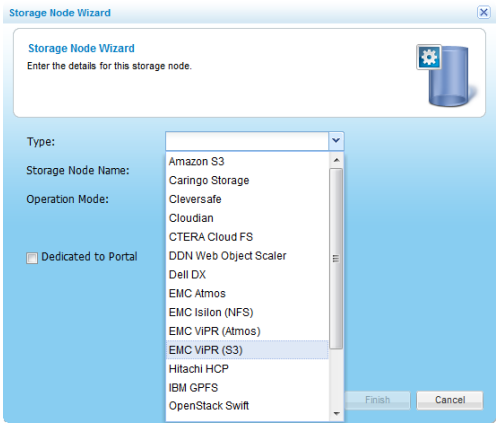
In any case, even though it is not always true, most of the vendors offer standard APIs alongside their proprietary access methods. This can be of help to avoid the lock-in to a specific platform or finding a larger number of solutions to build your own ecosystem.

An Introduction to The CTERA Platform

CTERA platform is a complete hybrid cloud architecture, including a comprehensive set of tools and edge appliances, capable of enabling the deployment and management of next generation file and collaboration services for and mobile users in organization of any size.

CTERA's platform supports both private and public object storage systems and services including almost all primary object storage vendors and service providers.

CTERA Portal is the core of CTERA's platform and it is a scalable service, implemented as a set of Virtual Machines, which is capable of delivering storage services (and management functionalities) for installations that support millions of users. CTERA Portal is also capable of simultaneous access to different storage backends allowing better performance while avoiding vendor lock-in.

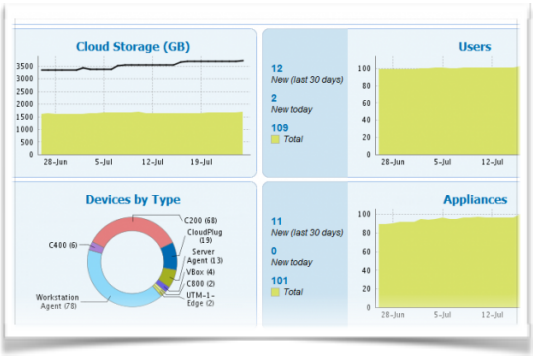


CTERA Portal introduces a layer of abstraction between the storage backend and the front end storage services. This allows the end user to choose between different storage vendors and/or service providers while giving complete freedom in terms of configuration of a cloud storage infrastructure of any size.

Management and Control Layer

To be considered *Cloud*, a storage service should have a series of basic characteristics: most important are Multi-tenancy, self-provisioning, automation, scalability, security, centralized management and monitoring.

Especially in highly distributed organizations, where mobile workers and remote offices are an important part of the organization, it's essential to have a single point of management and, at the same time, automation and self-provisioning mechanisms to minimize system administration efforts. All these functionalities lead to a lower TCO.



A comprehensive set of security related features is also fundamental to have complete control of what is happening to the system at the user level. Centralized log management as well as auditing tools are essential to have a complete view of all the important aspects of the infrastructure.

CTERA Portal provides a centralized management console with a web UI. It's the center of all operations and it provides control for the storage backend as well as for the front end storage services, devices and users. The Portal also supersedes all the storage traffic and can collect any kind of information and log.
The system administrator has a complete view of the managed resources and can configure user/team accessible self-provisioning portals, remote NAS gateways, sync & share services and so on.

Security by Design

Data security and integrity should be considered as two fundamental aspects of any storage infrastructure, and it becomes of dramatic importance when we talk about cloud and hybrid implementations.

How it is implemented by CTERA

CTERA offers an end-to-end comprehensive set of security feature which includes:

- Source-based encryption (AES-256): All data is locally encrypted with the end user's private key before leaving the endpoint or appliance, which ensures it travels and arrives encrypted to the cloud. This feature enables an end-to-end secure communication with data that is never exposed unencrypted at any stage of the communication and storing process.
- Volume encryption (also 256-bit AES, optional): provides protection against thefts of local appliance or hard hard drives.
- Highly secure connection through Transport Level Security (TLS) between the edge and the cloud which avoids the risk of data interception and manipulation.
- Private key management: the end user is the only one who have access and can manage the encryption keys of the data;
- Data fingerprinting (SHA-1): a mechanism which is capable of assuring that data arrived at the destination is identical to what was sent;
- Full integration with Microsoft Active Directory and LDAP: simplification of the infrastructure leveraging an existing and widely used authentication and identity management solution which already provides a single sign-on mechanism, password expiration policies, organization and group ACLs, and so on;
- 2-factor authentication: a process which ensures that only the intended recipient of the file can access it (user receive e second password via email or SMS).
- Remote wipe of the shared data managed by CTERA on mobile device, allowing to remove enterprise copies of files from mobile devices in the case of theft, loss or simply an employee leaving.

Why it is important for you

In order to provide a complete and secure enterprise solution, it's important to have a reliable and comprehensive set of management and monitoring tools.

CTERA, through Portal and its integration with other tools like Active Directory, provides a well designed tool that can manage environments of any size with a relatively small effort.

Whether the system is implemented on premises or delivered through a service provider, having full control of its own users and data stored in it is fundamental.

Its modern architecture, designed to adhere to large cloud provider needs, shows all its potential and ease of use in any circumstance when it is adopted from the enterprises of any size.

File Service Gateways (edge devices, endpoint and mobile apps)

If it is true that cloud backend and management/control layers are the platform on top of which you can build storage services, even more so will users want to access those services in the most transparent possible way.

The great advantage of this type of design is that the NAS Gateway appliance is expendable and, in case of a disaster, data and can be easily recovered from the cloud.

Especially NAS cloud storage gateways, which are designed to emulate actual NAS boxes, have to maintain identical behavior and performance. This is why NAS gateways should be substantially designed around a cache and optimized to use data reduction techniques, in order to eliminate bandwidth constraints imposed by slow internet connections.

At the same time, communication encryption is a key feature to ensure security in data transfers between the appliance and the cloud.

Other key factors are management and monitoring: They should be centralized and configuration parameters of the appliance should reside on the central management console.

For sync & share it's the same thing: it should resemble popular tools but it also needs to add enterprise features (like, for example, strong encryption and Active Directory integration). Team collaboration is another important part of these solutions and specific features, like shared folders for example, should always be implemented. In function of access policies, users should also be able to transparently access all files, the ones directly uploaded with the sync & share from their mobile devices as well as files stored on the appliance at the office.

How it is implemented by CTERA

The appliance has two main functions: NAS and Backup. Volumes with quotas, Microsoft AD authentication and snapshot for fast file recovery can easily be shared with end-user. Alongside NAS, the appliances provide backup functionalities for both PCs (Windows, Linux), Macs and servers in the network. Backups can be automated and scheduled while agents for most common Microsoft servers and Hyper-V are available. Role-based administration capabilities help to delegate basic administration functions to remote offices, while maintaining central supervision and control for the whole infrastructure.

CTERA Cloud storage gateways are appliances that can replace traditional file servers (or NAS) in terms of functionalities, combining legacy file services (NFS, SMB and AFS) with innovative features like remote backup capabilities and a cloud backend.

Deduplication, granular incremental backups and throttling enable great bandwidth savings allowing the deployment of these appliances even when the internet connection has severe bandwidth constraints.

CTERA's enterprise sync & share (EFSS) service is totally integrated with the rest of the ecosystem and has the same security features. It is available through easy to use apps and agents for major operating systems. Version control and other collaboration mechanisms are in place allowing groups of users to work together on the same files also when they have slow or intermittent internet access.

Auditing functionalities are available to monitor file access and users' behaviors for regulatory compliance and enterprise security purposes.

Why it is important for you

CTERA provides a wide range of appliances, features and functionalities specifically designed for enterprises and Cloud Service Providers

CTERA NAS gateways have the right characteristics to be deployed in remote offices of any size and sync & share apps/agents is the right companion to close the circle around team collaboration. Optimization, security and central management features make this solution really deployable in many use cases with minimal effort while promising a dramatically low TCO.

The cloud backup functionality, delivered through the appliance, brilliantly solves ROBO backup, disaster recovery and data protection issues freeing the enterprise from the high costs of traditional solutions and improving the overall efficiency of remote infrastructure at a lower cost.

BOTTOM LINE

The way users produce and consume contents has drastically changed over the last few years, both at home and work. Mobility and cloud are driving the change and the IT department is in charge of finding tools to give the right answers to user and business needs. On the other hand, the debate around cloud is open and most enterprises are currently struggling to find the right model (private, hybrid or public) for their infrastructure. Security concerns, data locality and other regulations, especially outside US, make these considerations even more difficult.
Last but not least, the costs of managing storage are continuously growing. Data are created and never deleted, all files are important and have to be protected, each potential stop or data loss has an immediate impact on productivity and costs.

Cloud storage seems to be the only way to solve all of these problems but implementation also counts. CTERA, with its hybrid platform, has all the characteristics to take full advantage of the cloud and delivery enterprise-grade innovative services to end users.

Strong security features, scalability, multi tenancy, self-provisioning capabilities, central management, ease of use and integration with the infrastructure already in place make this solution suitable for all kinds of organizations and Cloud Service Providers.
In fact, even smaller enterprises can have access to CTERA products through a series of service providers who are able to offer SaaS storage solutions based on the CTERA platform.

CTERA can help enterprises to implement innovative and integrated private cloud storage services that can dramatically drive down infrastructure TCO, especially for remote offices, while improving the overall end user experience and quality of service. When compared to traditional approaches, it also shows huge benefits in terms of security and control over data and users. CTERA has to be considered a brilliant solution to enterprises that ask for innovative file and collaboration services for stable and mobile workforce.

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Why Juku

Jukus are Japanese specialized cram schools and our philosophy is the same. Not to replace the traditional information channels, but to help those who make decisions for their IT environments, to inform and discuss the technological side that we know better: IT infrastructure virtualization, cloud computing and storage.

Unlike the past, today those who live in IT should look around themselves: things are changing rapidly and there is the need to stay informed, learn quickly and to support important decisions, but how? Through our support, our ideas, the result of our daily interaction that we have globally on the web and social networking with vendors, analysts, bloggers, journalists and consultants. But our work doesn't stop there, the comparison and the search is global, but the sharing and application of our ideas must be local and that is where our daily experience, with companies rooted in local areas, becomes essential to provide a sincere and helpful vision. That's why we have chosen: "think global, act local" as a payoff for Juku.

Author

Enrico Signoretti, consultant, trusted advisor and passionate blogger (not necessarily in that order). Having immersed into IT environments for over 20 years, his career began with Assembler in the second half of the 80′s before moving on to UNIX platforms (but always with the Mac at heart) until now when he joined the "Cloudland". During these years his job has changed from deep technical roles to management and customer relationship management. In 2012 he founded Juku consulting SRL, a new consultancy and advisory firm highly focused on supporting end users, vendors and third parties in the development of their IT infrastructure strategies. He is constantly keeping an eye on how market evolves and continuously looking for new ideas and innovative solutions. You can find Enrico's social profiles here: http://about.me/esignoretti