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Cloud Storage Platform for Service Providers

The term “cloud storage” seems to have acquired many definitions. At Cloud Leverage™, we define cloud storage as an enterprise-class file server located in multiple geographically diverse data centers for performance, redundancy and security. Connectivity is achieved over a secure, private network, or the public Internet using SSL, with various access clients including a Web Services API, a Windows® native directory folder, a Windows® sync client, WebDAV for Mac® and Linux as well as mobile clients for iPhone, Blackberry® and Windows® Mobile. As the need for storage capacity continues to grow each year, many organizations are evaluating and adopting cloud storage as a cost-effective, highly scalable option for their storage needs.

The cloud storage marketplace is evolving rapidly, and at Cloud Leverage, we believe that the future is here. Cloud storage is a disruptive, Service Oriented Architecture (SOA), not just cheaper storage sold on a pay-for-use basis. Despite being the early entrant into the cloud storage marketplace, a lack of advanced capabilities within their S3 offering caused Amazon to leave the door open for other Service Providers like Cloud Leverage to enter this rapidly growing market. Cloud Leverage wants to be a trusted IT service provider for our customers. We provide aggressive 100% uptime service level agreements to meet their demanding requirements every day.

The Cloud Leverage Storage Platform can also power offerings for other service providers wanting to enter the cloud storage market by allowing them to take advantage of a fully brandable, rapidly deployable cloud storage offering with impressive provisioning and billing APIs. Support and utilization of many different back-end technologies results in a variety of differentiated cloud storage offerings in terms of backup, cost, geo location and performance.

The purpose of this document is to provide an overview of the Cloud Leverage Storage Platform, the storage access clients and the benefits we create through our solutions.

The Cloud Storage Platform

Cloud Leverage’s flagship offering, the Cloud Storage Platform (CSP), is a deployable software platform that enables IT Service Providers to rapidly enter the fast growing cloud storage market with a multitude of high margin differentiated cloud storage solutions. The platform, CSP, is the core of all of Cloud Leverage’s solutions.

The capabilities offered by our cloud platform - secure sharing and collaboration, support for pay-for-use pricing and billing, and Web-scale deployment - far exceed the requirements expected of a cloud. In addition, the extensibility of our cloud platform and the accompanying access clients give service providers the ability to deploy a storage cloud with a focused or a broad market appeal. Together, these features help expand the use and applicability of cloud storage.

A well-architected storage cloud allows current applications to exploit the storage

Key Features

- A fully brandable Cloud Storage offering
- 9 Global Datacenters to choose from
- Numerous storage access clients and a REST API to simplify access
- Enterprise-grade security and features
- Enterprise private cloud storage options

infrastructure without undergoing major changes. In support of this view, the CSP offers multiple advanced capabilities including flexible file access and flexible storage organization. These include:

Enhanced User Experience

- Multiple Access Clients (desktop & mobile)
- Advanced sharing and collaboration
- Role-based permission management
- Hierarchical storage
- Tagged-based storage/search
- Programmatic access to storage
- End-to-end encryption – SSL in transit and 256-bit AES at rest

Suitability for Service Providers

- Web Services APIs
- Ease of deployment
- Multi-datacenter scalability
- Storage agnostic
- Leverages existing authentication and provisioning solutions
- Stateless architecture
- Fully managed IaaS platform
- Multi-tenancy support
- Extensible platform that allows service providers to create additional access clients and offer new services

Compared to the base definition of cloud storage services as represented by Amazon's current S3 offering or Rackspace's Cloud Files offering, a Cloud Leverage-powered cloud offers a "superset" of functionalities.

The primary function of the CSP is to allow the rapid and scalable provisioning of cloud storage solutions to customers of service providers.

Cloud Leverage can provide multiple levels of storage; providing for tiers of pricing, performance and availability. This value proposition is fundamentally different from simply deploying cloud storage capacity. The combination of Cloud Leverage's platform and the clients creates a unique opportunity for powerful and easily deployed cloud storage solutions that provides its customers with the ability to deliver customized, flexible, and fully integrated solutions.

CSP Architecture Overview

As a stateless architecture, the Cloud Leverage platform scales linearly to support a large customer base. The platform also maintains information about files and the file hierarchy as well as file locking, publishing and shared access in a file catalog. It also allows arbitrary metadata to be associated with any stored items. Both the file catalog and metadata are stored separately from the file contents in a high-performance, multi-datacenter database cluster providing quick access to content without having to access the physical storage where the file resides.

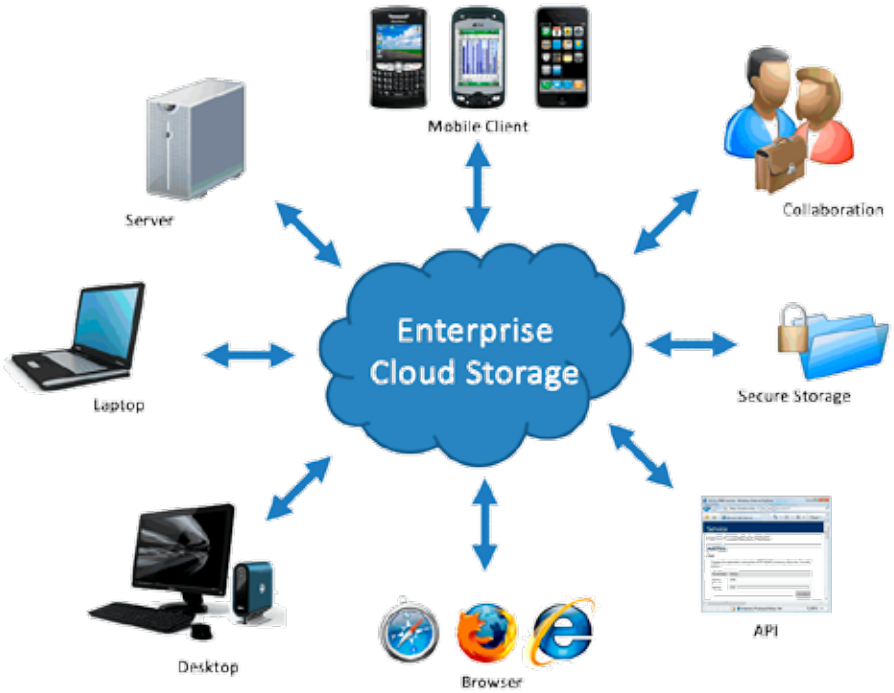
Platform Services

The CSP platform services include:

- **Web Services APIs:** The CSP is designed to be open and extensible, with REST

Web Services APIs. The full capabilities of the platform are exposed through these APIs. All access to the APIs is secured through SSL.

- **File Services:** The File Services API allows developers to manipulate folders, list directory contents, access file information and store and retrieve file contents.
- **Metadata Services:** The Metadata Services APIs allow developers to store and retrieve arbitrary information associated with a particular stored item. This feature of the platform allows information relative to the object to be stored along with the object. Tagged-based storage metadata and the File Catalog are stored separately from the file contents to provide quick access without having to access physical storage.
- **Sharing Services:** The Sharing Services API allows developers to manage a user's member directory, list objects shared to a user, create and manipulate existing shares and create and manipulate collaboration containers (Projects).
- **WebDAV:** Our platform supports access to files via WebDAV protocols in addition to the Web services interface to provide flexibility of access.



Provisioning and Authentication Support

Full support for adding/removing/editing users and accounts is provided through the Account API. This API allows developers to automate account management.

Access Extensibility

Files stored using the Cloud Leverage platform can be accessed using any Internet connected application, website or device. Out of the box, Cloud Leverage offers clients that enable access via the Windows® desktop, via Internet enabled smartphones – iPhone,

BlackBerry®, and Windows Mobile® devices as well as the REST API.

Rapid Scalability

The stateless architecture of the CSP server enables linear scaling. While each instance of the CSP is quite robust and has the ability to support a large number of accounts, Cloud Leverage automatically increases capacity to support additional service providers on the fly to ensure performance is always at its best.

End to End Security

The CSP ensures end-to-end security of the objects; this is accomplished using SSL encryption for connection between the clients and SCP and through the use of 256-bit AES for files that are stored.

Multiple Storage Options

Cloud Leverage can work with providers to offer different grades of storage to meet the needs of SMB or Enterprise client requirements for performance.

Advanced Services

The CSP offers a wide range of advanced services to end users, via Cloud Leverage Storage Access Clients, the service provider's clients and/or the RESTful Web Services APIs:

- **Choice of Datacenter Location:** Customers choose what parts of the world and which datacenters they wish to have their files stored in.
- **Uploading of multiple files of any type:** Files of any type (documents, presentations, PDFs, website images, videos, music and more) and size can be uploaded, stored and instantly shared. There are no limits.
- **Real-time access:** Unlike some online backup services, Cloud Leverage is true cloud storage, or an online filing cabinet, giving real-time access to stored files.
- **Collaboration and sharing of files with anyone, inside and outside an organization:** The Projects feature enables users to securely share files with colleagues, vendors, customers, family and friends; all without having to have an account or moving files from their stored location. Control of customers' data is where it belongs – with the customer.
- **Hierarchical and tag-based file organization:** Cloud Leverage features both hierarchical and tag-based file system organization and storing with Library File views for the easy search and retrieval of files.
- **Permission management:** Role-based permission management and share expiration lets customers manage their private and public shared data.
- **Notifications:** Account holders and non-account holders get notifications when files/folders are shared or when they have been assigned to a project. Notifications of shares to non-account holders can leverage a viral marketing element to encourage recipients to get their own accounts.
- **Contact import tool:** Users can easily share to any existing contacts by importing names from Plaxo, Outlook, Yahoo, Gmail or a CSV file.
- **Global CDN Publishable URL:** Cloud Leverage lets users generate public URL links to share and publish files on forums, blogs and websites using our 32-node

Global CDN.

- **Data security and control:** Cloud Leverage uses industry-leading 256-bit AES encryption for each stored file with SSL encryption for files in transit.

- **Patented Online Recycle Container:** Users can now delete and restore files right from the Web.

Storing Files

Whether using the native desktop client or Web browser, or uploading files on the go from a mobile device, customer data is secure and encrypted and always available anytime, anywhere it is needed.

- **Native Windows® Desktop:** Through the desktop integrated with Microsoft Windows®, Cloud Leverage Storage appears as a network drive, allowing users to simply drag and drop files onto the drive for safekeeping. When working in an application, customers can open files or modify them and save directly to the Cloud Storage network drive, just as they would if working from their local drive.

- **Uploading of Files from the Web:** Using the intuitive, rich Web 2.0 interface, users can upload multiple files of any size from their local PC or server. All of their business and personal files can be uploaded and securely available wherever they connect to the Internet.

- **Mobile Client:** Business documents, photos, videos, music etc. can be uploaded to a customer's personal cloud from their BlackBerry®, iPhone or Windows Mobile® smartphones and available for access from any of the other access points. Users simply access the local file directory from the easy-to-use carousal, select files and save online.

Organizing & Accessing Stored Files

Organizing, accessing and retrieving files can be done from both hierarchical and tagged-based views. Cloud Leverage provides users a practical bridge between the hierarchical file organization of yesterday and the tagging of content for easy search and retrieval of today and tomorrow.

- **File Manager:** For users who have grown accustomed to the way PCs have organized their files, our File Manager was designed to allow them to create or recreate a hierarchical file structure just like they would on their PC. These files are accessible through the desktop, Web and the mobile clients.

- **My Library File Views:** Users who have embraced tagging can store any file type, anywhere they want using Cloud Storage. All files stored are then displayed in an aggregate view within one click through the My Library navigation, found on the Web and mobile access clients. For example, the Documents view will display all of a business user's stored spreadsheets, presentations, and PDFs in one place, though they may be stored in various subfolders elsewhere.

- **Web Home:** The Web 2.0 and Mobile Home gives users an easy way to retrieve files that were recently accessed and worked on, as well as files that were recently shared and projects that were recently assigned, giving them a quick reference to the latest data they need.

- **Search Filters:** For Web and mobile access, Cloud Storage also provides search filters, letting users search by file name, folder name, and file type within any of the views to find the exact file for which they are searching.

Sharing Files

Users can easily share stored content. The sharing can take place internally within an organization and also securely with external users. Cloud Leverage also enables sharing via public URLs on our 32-node global CDN so users can share their files to a blog, website, etc. The user sharing the files has the ability to enforce access levels, access expiration and more. In addition to putting the control of a file with its owner, sharing a file also eliminates the issues relating to large files such as the inability to email them.

Collaborating

Users can collaborate on files without having to physically move them (for example, on a flash drive) or email them. This is accomplished via the Cloud Storage advanced collaboration capabilities named Projects. Multiple users can collaborate on a project by making changes or just reviewing the data. Files continue to reside within the owner's storage, but are accessible by all authorized users. Members of the project can view their projects through any access device and assign new files and folders to existing projects.

Ubiquitous Access

Through the growing number of Cloud Storage Access Clients, the CSP enables ubiquitous access.

Cloud Leverage Access Clients

The Cloud Storage Access Clients provide unparalleled access to stored files through a variety of access points including WebDAV, native Windows® desktop and native smartphone clients.

Cloud Leverage Native Windows® Desktop and WebDAV access

Cloud Leverage Native Windows® Desktop and WebDAV access provides seamless integration into the native environment, whether it is Windows, Linux or Mac letting customers work the way they do now.

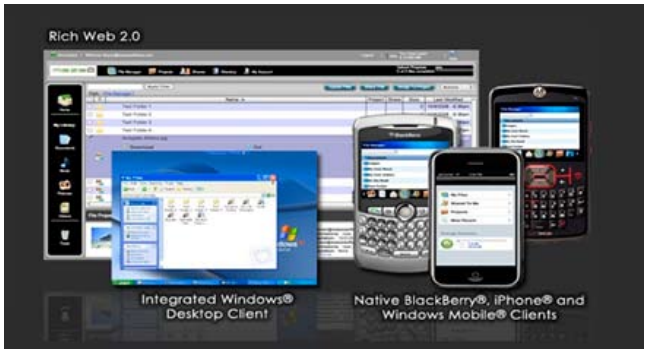


Figure 2: Cloud Leverage Storage Access Clients

Cloud Leverage Desktop Access Features:

- Appears and acts as a network drive letting users open and save files directly.
- Direct access to stored files through WebDAV for Mac, ® Linux® or any WebDAV enabled OS or software tool.
- Easily drag and drop of files on and off the cloud.
- Restore and/or save files directly from any Windows®-based application.

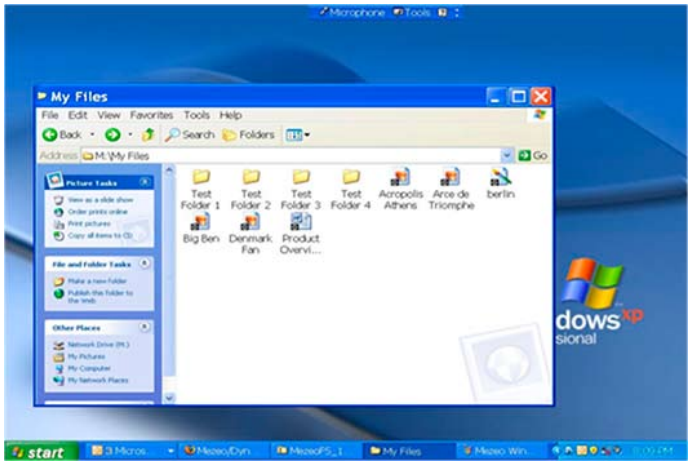


Figure 3: Native Windows® Desktop and WebDAV Access

Rich Web 2.0 Browser Access:

Cloud Leverage's rich Web 2.0 browser access lets users work across Windows®, Mac, and Linux OS platforms to store, share and access their digital files from anywhere they have an internet connection

Cloud Leverage Web 2.0 Browser Client Features:

- Easy-to-use intuitive interface for easy adoption.
- Centralized view of all stored content with tools for easy organizing, managing and sharing of files.
- Web Application Lock feature that lets users lock access to files when they are away from their PC or laptop without logging out or losing their place.
- Access anywhere from a wide variety of browsers including Internet Explorer, FireFox, Google Chrome and Safari.

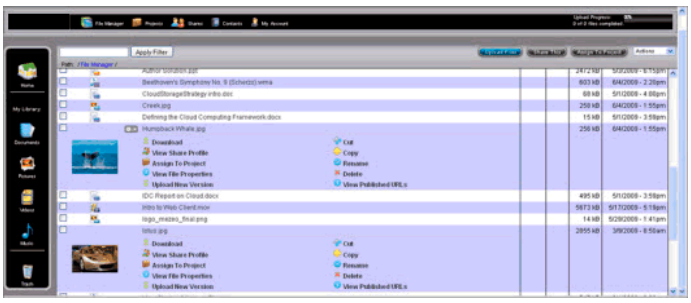


Figure 4: Rich Web 2.0 Browser Access

Smartphone access

BlackBerry®, Windows Mobile® and iPhone native clients provide access to cloud storage, letting customers truly go mobile while staying connected, extending access and sharing capabilities to your smartphone devices without storing a single file on the phone. Smartphones have become one of the most effective business tools utilized today. Cloud Leverage has leveraged the OS for each of these smartphone devices and exploits its native capabilities to bring customers yet another access point to get to their information from a familiar, intuitive and responsive interface.

Cloud Leverage Mobile Smartphone Clients Features:

- Upload and download files directly from the phone.
- Downloaded files work with native viewer applications for viewing files.
- Easy to use carousel for navigation with native menu functions.
- Access to entire library of files without worrying about device damage or loss.
- Brandable interface.

Figure 5: Cloud Leverage BlackBerry®, Windows Mobile® and iPhone Native clients

Why a REST Web Services API?

There is a lot of interest around REST Web Services Cloud Storage APIs, and for good reason. With the emergence of cloud storage, Service Providers recognize that a new service-oriented architecture (SOA) storage infrastructure has emerged – one that allows them to extend the capabilities and services far beyond what is offered by traditional storage. It is also clear that REST APIs provide this extensibility versus other access methods such as NFS, CIFS and WebDAV.

REST Cloud Storage APIs expose programmable access to storage and are uniquely language independent. REST APIs are the choice of Web developers who are creating Web 2.0 applications, contemplating future functionality and how it can be exploited for extending current Web applications, and creating new Web applications.

Cloud storage, as we have defined it in this document, is an enterprise-class file server located in multiple geographically diverse data centers. REST reflects the architecture of the Web, meaning it is very efficient and Web-like in its nature. First, it is stateless, which provides for storage access in the unpredictable and highly latent networks that comprise the Internet. The Cloud Leverage Cloud Storage Platform is a stateless Linux implementation; therefore, REST APIs are the obvious choice for the Cloud Leverage storage infrastructure. Second, it is highly efficient, enabling Web scale by allowing many clients to interact with many servers against a pool of objects. REST allows interactions via a network to occur with a minimum of overhead. REST also accommodates caching at both the client and the server, which can dramatically improve efficiency.

While there are other access methods that are often associated with cloud storage access (NFS, CIFS and WebDav), they are not optimal when the storage is accessed via the Web. NFS and CIFS are not particularly usable via an Internet connection, however we do support them for customers who can take advantage of the low-latency architec-

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ture of our global IP Anycast network. The behavior of these access methods does not accommodate the unique latency of Internet access, and a potentially complex configuration of firewalls is needed to allow this sort of traffic. Utilizing HTTP as the transport for REST means that the firewall requirements are the same as those to access the Web. While WebDAV is useful for an Internet connection, it (as do NFS and CIFS) only supports traditional file operations such as store and retrieve, versus the robust set of services that Web Services APIs can deliver.

Summary

In this document, we have provided insight into the Cloud Leverage storage as a service vision and strategy, and how it drives Cloud Storage technology. The Cloud Leverage value proposition is fundamentally different from simply deploying cloud storage capacity. Cloud Leverage's platform for cloud storage solutions enables service providers to deliver customized, flexible, and fully integrated solutions that will support future business needs.

What do we see in the future? The Cloud Storage market will continue to mature, players will drop out of the race, and there will be consolidation in the market. As solutions mature and Enterprises choose to own their own cloud, it will be imperative for Enterprise clouds and Service Provider clouds to interact. Service Providers and Enterprises must evaluate their options carefully today and look for a trusted advisor that can deliver on the future and not just the present.

Selecting a solution such as the Cloud Leverage Cloud Storage Platform will ensure that your investment leverages standard technology that will scale and give you the flexibility and customization that you need to be successful.

For a service provider seeking a platform for deployment of a branded cloud storage service offering, Cloud Leverage meets the test of cloud storage today, delivers the promise of cloud computing as envisioned, and offers differentiated features allowing for expanded use cases and options.

For additional information on the Cloud Leverage Cloud Storage Platform, visit http://www.cloudleverage.com.

About Cloud Leverage, Inc.

Cloud Leverage, Inc. is the global cloud performance platform that gives businesses the ability to stretch and accelerate traditional, centralized web content to meet the speed and reliability requirements of a demanding Internet audience. By utilizing Cloud Leverage's global 32 data center footprint and proprietary transport acceleration network, organizations can significantly secure, extend and enhance internal or third-party cloud applications all while improving their data center ROI. Cloud Leverage is a privately held company headquartered in Asheville, NC. To learn more, visit cloudleverage.com.

For more information about Cloud Leverage visit cloudleverage.com or call us at (888) 600-CLOUD

UNITED STATES
TEL +1 (828) 650-8555

UNITED KINGDOM
TEL +44 (0)207 078 4238

sales@cloudleverage.com