

CLOUD COMPUTING

Unit - V: STORING AND SHARING

This unit delves into the practical aspects of managing digital content in the cloud, from simple file storage to advanced photo editing and even controlling your entire computing environment from a web browser.

1. Understanding Cloud Storage

Cloud storage is a model of computer data storage in which digital data is stored in logical pools, the physical storage spans multiple servers, and the physical environment is typically owned and managed by a hosting company. It's essentially saving your files and data to remote servers rather than directly on your device.

Key Concepts:

- **Remote Servers (Data Centers):** Your data isn't on your local hard drive; it's on large, powerful servers located in data centers operated by cloud providers (e.g., Google, Amazon, Microsoft).
- **Accessibility:** Data can be accessed from any device (laptop, smartphone, tablet) with an internet connection, anywhere in the world, by logging into your cloud account.
- **Scalability:** Cloud storage can easily expand or shrink based on your needs. You pay for what you use, so you don't need to buy extra hardware you might not always need.
- **Redundancy and Durability:** Cloud providers store multiple copies of your data across different servers and often in different geographical locations to ensure data safety and availability, even if one server fails.
- **Cost-Effectiveness:** Reduces capital expenditure (no need to buy and maintain physical storage hardware) and shifts to an operational expense (pay-as-you-go).
- **Types of Cloud Storage:**
 - **Public Cloud Storage:** Storage offered by third-party providers over the public internet (e.g., Google Drive, Dropbox, Amazon S3).
 - **Private Cloud Storage:** Storage within an organization's own data center, replicating cloud principles internally.
 - **Hybrid Cloud Storage:** A mix of public and private cloud storage, allowing

organizations to choose where to store different types of data based on sensitivity or compliance.

- **Object Storage:** Stores data as objects in flat hierarchies, ideal for unstructured data like images, videos, backups (e.g., Amazon S3, Azure Blob Storage).
- **File Storage:** Organizes data in a hierarchical file system, like your computer's folders (e.g., Google Drive, OneDrive).
- **Block Storage:** Stores data in fixed-size blocks, providing high performance for applications that require direct access to raw storage (e.g., used for virtual machine disks).

Benefit: Liberates data from physical devices, enables seamless access, simplifies backups, and reduces the cost and complexity of managing storage infrastructure.

2. Evaluating Online File Storage

Online file storage services (often called cloud storage or file sync and share services) allow users to store, synchronize, and share files across devices and with others.

Evaluation Criteria:

1. **Storage Capacity & Pricing:**
 - How much free storage is offered?
 - What are the pricing tiers for more storage? Is it a good value?
2. **Syncing & Accessibility:**
 - Does it offer seamless syncing across all your devices (PC, Mac, iOS, Android)?
 - Is there a web interface for easy access?
 - Does it offer offline access to files?
3. **File Sharing & Collaboration:**
 - How easy is it to share files and folders with others?
 - Can you set permissions (view, edit, comment)?
 - Is there a robust version history to track changes and revert files?
 - Can multiple users co-edit documents (e.g., if integrated with office suites)?
4. **Security & Privacy:**
 - **Encryption:** Is data encrypted at rest (on servers) and in transit (during upload/download)?
 - **Two-Factor Authentication (2FA):** Is it supported for login security?
 - **Privacy Policy:** How does the provider handle your data? Do they scan content?
 - **Compliance:** For business users, relevant certifications (e.g., GDPR, HIPAA).
5. **Performance & Reliability:**
 - Upload/download speeds.
 - Uptime guarantees (SLA).

- Data durability (how well they protect against data loss).
- 6. **File Management Features:**
 - Drag-and-drop interface, search functionality, folder organization.
 - Support for various file types and large files.
 - Automatic photo/video backup from mobile devices.
- 7. **Integration:**
 - Does it integrate with operating systems, office suites, email, and other third-party apps?
- 8. **Customer Support:**
 - Availability and quality of support (knowledge base, chat, email, phone).

Examples to Evaluate:

- **Google Drive:** Integrates with Google Workspace (Docs, Sheets, Slides), excellent search, generous free tier, strong collaboration.
- **Microsoft OneDrive:** Deep integration with Microsoft 365 (Word, Excel, PowerPoint), good for Windows users, "Personal Vault" for sensitive files.
- **Dropbox:** Known for its simplicity and robust syncing across platforms, good for sharing with external collaborators.
- **Sync.com / pCloud:** Focus on privacy and strong encryption (often end-to-end encryption) for privacy-conscious users.
- **Apple iCloud Drive:** Best for Apple ecosystem users, seamless integration with macOS and iOS.

Benefit: Centralizes file storage, simplifies sharing, ensures data backup, and enables seamless access and collaboration from anywhere.

3. Exploring Online Bookmarking Services

Online bookmarking services allow users to save, organize, and share web links (bookmarks) in the cloud, accessible from any device. This moves your collection of useful websites beyond a single browser's local storage.

Key Features:

- **Cloud Syncing:** Bookmarks are stored online and synchronized across all your devices and browsers.
- **Tagging & Categorization:** Organize bookmarks with tags, folders, or categories for easy retrieval.
- **Search Functionality:** Quickly find saved links using keywords or tags.
- **Annotation & Notes:** Add personal notes, highlights, or comments to saved web pages.

- **Public/Private Sharing:** Choose to keep bookmarks private or share them publicly, within groups, or with specific individuals.
- **Browser Extensions:** Easy one-click saving of web pages from your browser.
- **Read-It-Later Functionality:** Save articles or web pages for offline reading later, often in a clean, distraction-free format.
- **Discovery:** Some services offer content discovery based on your saved links or popular links among users.

Examples to Explore:

- **Pocket (formerly Read It Later):** Primarily focused on saving articles and videos for later reading/viewing, often with offline access and a clean reading experience.
- **Diigo:** Offers robust annotation (highlighting, sticky notes) on web pages, powerful tagging, and group collaboration features.
- **Raindrop.io:** A modern, visually appealing bookmark manager with strong organizational features (collections, tags), support for various media types, and robust search.
- **Pinterest:** More visual, allows "pinning" images and videos to themed boards, useful for visual inspiration and discovery, though not a traditional text-based bookmarking tool.
- **Browser Sync (e.g., Chrome Sync, Firefox Sync):** While not dedicated services, modern browsers offer built-in cloud syncing of bookmarks, history, and passwords across devices.

Benefit: Centralizes your web resources, makes them accessible anywhere, and enhances organization and sharing of online content.

4. Exploring Online Photo Editing Applications

Online photo editing applications bring powerful image manipulation tools to the web browser, eliminating the need for expensive software downloads and enabling basic to advanced editing from any device. These are SaaS applications leveraging cloud processing power.

Key Features:

- **Basic Adjustments:** Cropping, resizing, rotating, exposure, contrast, brightness, saturation, white balance.
- **Filters & Effects:** One-click presets and artistic effects.
- **Retouching Tools:** Blemish removal, red-eye correction, teeth whitening, skin smoothing.
- **Layers (Advanced):** For complex compositions and non-destructive editing.
- **Text & Graphics Overlays:** Adding text, shapes, stickers, and frames.
- **Background Removal:** Often AI-powered, to quickly remove or replace image backgrounds.

- **AI Enhancements:** Automatic image enhancement, upscaling, object removal.
- **Cloud Integration:** Often directly linked to cloud storage services (e.g., Google Drive, Dropbox) for easy photo import and export.
- **Output Options:** Various file formats and compression settings for saving edited images.

Examples to Explore:

- **Pixlr (Pixlr X & Pixlr E):** Pixlr X is simpler and faster; Pixlr E (Editor) is more like Photoshop with layers and advanced tools, both browser-based and AI-enhanced.
- **Canva:** While primarily a graphic design tool, it has strong photo editing capabilities for quick adjustments, filters, and text overlays, great for social media graphics.
- **Fotor:** Offers a good balance of basic editing, collage making, and design templates.
- **Photopea:** A free online editor that strongly mimics Adobe Photoshop's interface and functionality, including layer support and PSD file compatibility.
- **Google Photos (Basic Editing):** Built-in editing tools for quick adjustments, filters, and cropping directly within the Google Photos cloud service.
- **Adobe Lightroom Web (Subscription based):** A web version of the popular professional photo editor, offering powerful organizational and editing tools for photographers.

Benefit: Provides accessibility to photo editing tools without software installation, enables quick edits on the go, and often integrates seamlessly with cloud photo storage.

5. Exploring Photo Sharing Communities

Photo sharing communities are cloud-based social platforms dedicated to sharing photographs, connecting with other photographers, and discovering visual content. They combine elements of cloud storage with social networking.

Key Features:

- **Photo Upload & Storage:** Cloud storage for uploading, organizing, and managing photo libraries.
- **Album & Gallery Creation:** Grouping photos into collections for easier Browse.
- **Social Interaction:** Liking, commenting, following other photographers, private messaging.
- **Discovery & Curation:** Explore photos by tags, categories, popularity, or user recommendations.
- **Tagging & Geotagging:** Adding keywords and location data to photos for discoverability.
- **Privacy Controls:** Managing who can view, comment on, or download your photos.
- **Community Features:** Forums, groups, contests, and challenges.

- **High-Resolution Uploads:** Support for large, high-quality images.
- **Licensing Options:** Some platforms allow photographers to license their work.

Examples to Explore:

- **Flickr:** One of the oldest and largest photo sharing sites, popular with professional and amateur photographers, known for groups and detailed EXIF data.
- **Instagram:** Primarily a mobile-first social network focused on visual sharing, widely popular for personal and brand content, though it emphasizes filters and short-form video.
- **500px:** Geared towards professional and serious amateur photographers, focusing on high-quality imagery, discovery, and portfolio building.
- **Unsplash / Pexels:** Primarily communities where photographers share high-quality, free-to-use stock photos, fostering a giving community.
- **Google Photos (for private sharing):** While not a public "community" in the traditional sense, its robust sharing features (shared albums, partner sharing) make it a powerful tool for private photo sharing with family and friends.

Benefit: Provides a platform for showcasing photography, connecting with a visual audience, discovering new content, and preserving memories in a cloud-backed environment.

6. Controlling It with Web-Based Desktops (Virtual Desktops/DaaS)

Web-based desktops, also known as Virtual Desktop Infrastructure (VDI) or Desktop as a Service (DaaS), provide a full desktop operating system and applications delivered from the cloud and accessible via a web browser or thin client. This allows users to access their personalized computing environment from anywhere, on any device.

Key Concepts:

- **Desktop Virtualization:** The desktop environment is separated from the physical device. The user's desktop, applications, and data reside on servers in a data center.
- **Centralized Management:** IT administrators can manage all desktops, applications, and user profiles from a central cloud console, simplifying deployment, updates, and security.
- **Any Device Access:** Users can access their full desktop experience from laptops, tablets, smartphones, or thin clients, regardless of the device's operating system or processing power.
- **Enhanced Security:** Data resides in the data center, not on the endpoint device. This reduces the risk of data loss from lost or stolen devices. Centralized security policies are easier to enforce.
- **Scalability & Flexibility:** Easily scale the number of desktops up or down based on user

demand.

- **Disaster Recovery:** Desktops and data are stored in the cloud, making disaster recovery simpler and faster.
- **Application Delivery:** Applications can be streamed or delivered as part of the virtual desktop, ensuring compatibility and reducing installation burdens.

How it works:

When a user logs into a web-based desktop, their input (mouse clicks, keyboard strokes) is sent to the remote server. The server processes these inputs and sends back a graphical image of the updated desktop, which is displayed on the user's local device. The actual computing power and data storage happen in the cloud.

Examples:

- **Amazon WorkSpaces:** A fully managed DaaS solution from AWS, allowing businesses to provision cloud-based desktops for their users.
- **Azure Virtual Desktop (AVD):** Microsoft's DaaS offering, providing a Windows 10/11 multi-session experience from the Azure cloud, integrating with Microsoft 365 and other Azure services.
- **Google Cloud Desktop (via partners):** Google Cloud offers the infrastructure to build VDI solutions with partners like Citrix and VMware.
- **Cloud-based Desktop Environments (less common for full OS):** While not full Windows/macOS, some online environments (e.g., rollApp) offer access to specific Linux-based applications or virtual desktops in a browser.

Benefit: Provides unprecedented flexibility for remote work, simplifies IT management, enhances data security, and extends the life of endpoint devices by shifting computing power to the cloud. It's the ultimate form of "controlling it with web-based desktops" as the entire computing environment becomes cloud-driven.
