



Cloud Computing

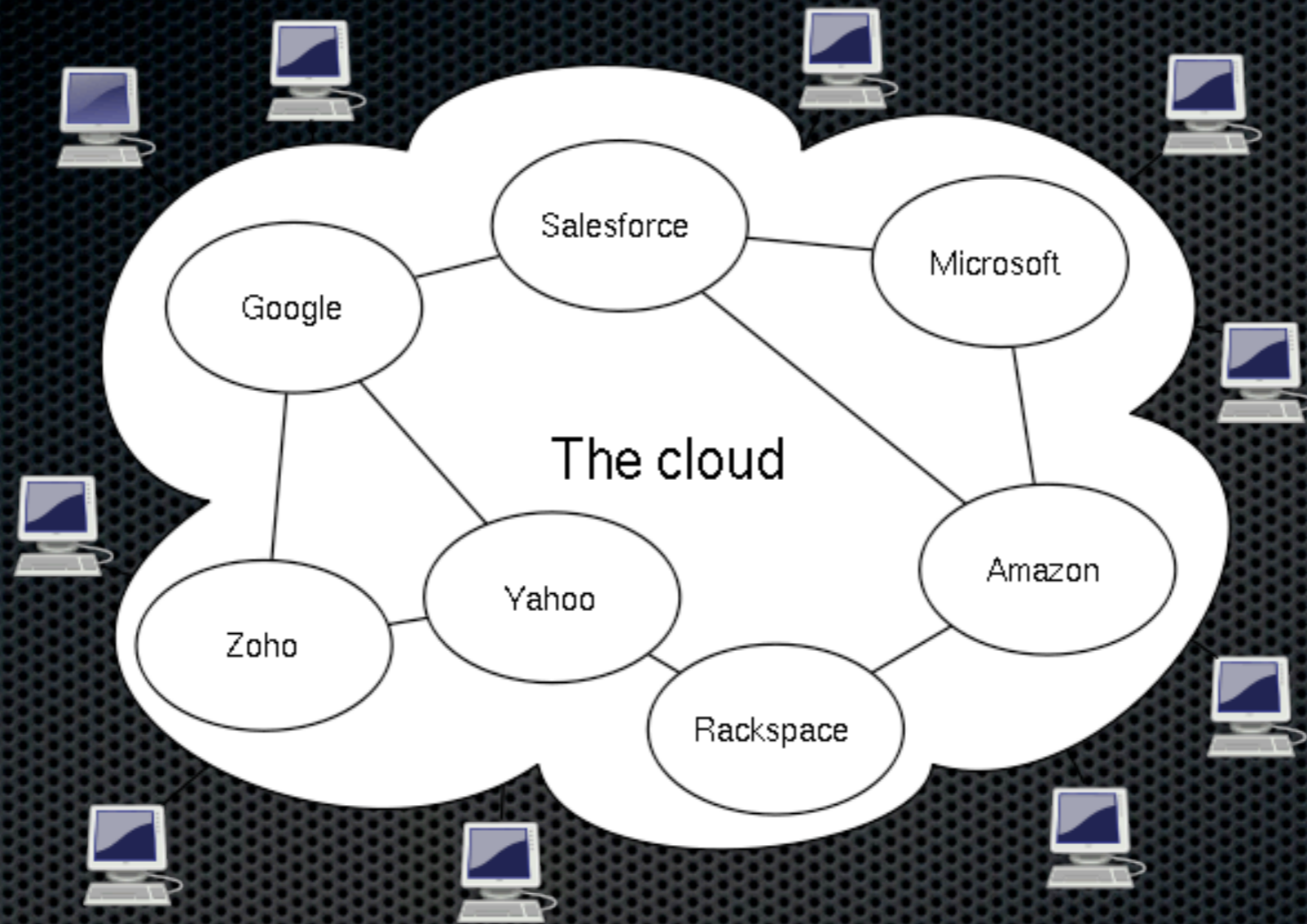
Use Cases and Considerations

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Thursday, March 4th, 2010
Max Technical Training, Room E

Cloud Computing Basics

No complete consensus definition yet. A few common features are:

- ▶ Rented infrastructure
 - Resources as a service
 - Lowered admin costs
 - Pay as you go
 - Less wasted capacity
- ▶ Simpler functions per cloud service
- ▶ Uses Web protocols to interact via API calls



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There are many clouds,

or just one Cloud, depending on how orthodox you want to be.
Some clouds are more interconnected than others.
Some are hybrid private / 3rd party clouds.

Typical Cloud Components

▶ Storage

- many providers, unlimited capacity, no brains

▶ Servers

- fewer providers, quickly scalable, no meat

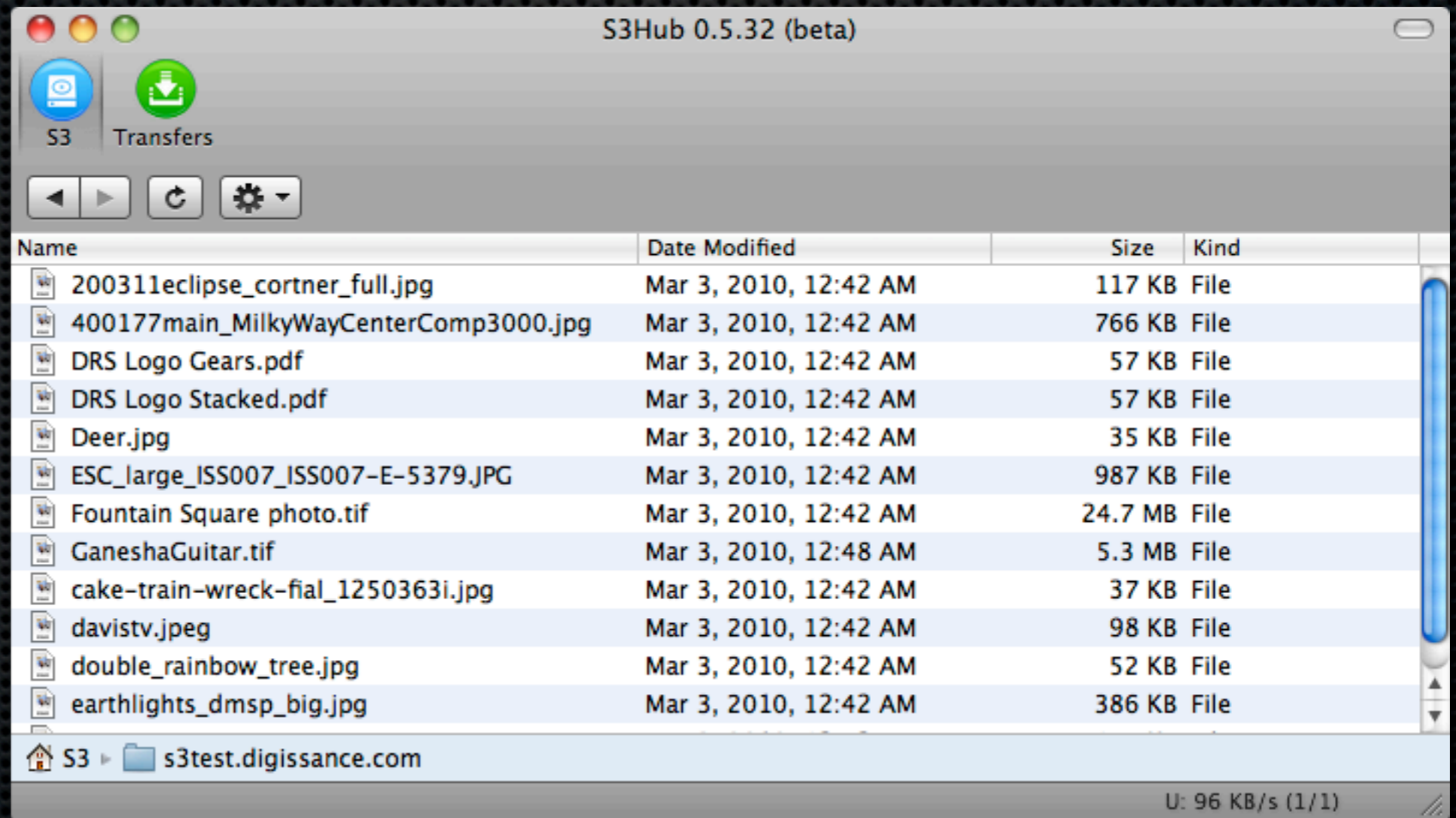
▶ Databases

- a few providers, omnipresent, no rhythm

Storage Clouds

Distributed storage networks, very scalable systems with APIs, gui and web interfaces.

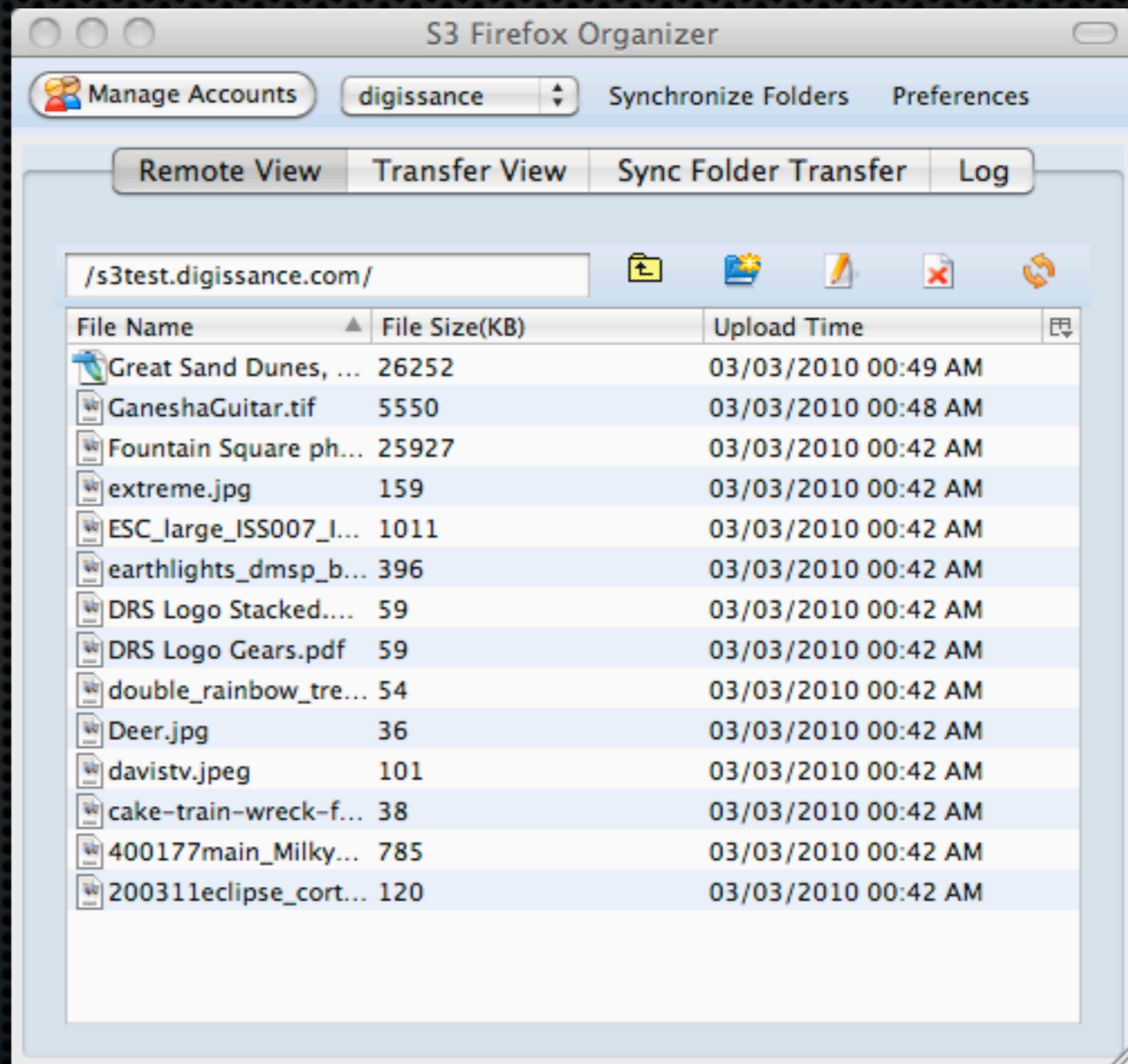
Amazon S3
(S3Hub)



Storage Clouds

Most provide geographic redundancy for an extra fee.

Amazon S3
(S3Fox)



Storage Clouds

Requires API interaction for most uses.

Ruby script for counting items in a bucket:

```
require 'rubygems'
require 'right_aws'

AWS_ID='id'
AWS_KEY='mykey'

s3=RightAws::S3Interface.new(AWS_ID, AWS_KEY)
count=0

buckets=s3.list_all_my_buckets.collect{|b| b[:name]}
buckets.each do |bucket_name|
  s3.incrementally_list_bucket(bucket_name) { |k|
    count += k[:contents].size
  }
end
puts count
```

Storage Clouds

JungleDisk (permissions)

The screenshot shows the 'MY ACCOUNT' interface for workgroup.myjungledisk.com. It features a sidebar with navigation menus and a main content area with an 'Access Overview' table and a 'Grant Access' form.

Account Management

- Account/Billing Summary
- Subscriptions/Purchases
- Invoices

Desktop Edition

- Purchase Jungle Disk
- Jungle Disk Plus Signup
- Web Access
- Jungle Disk Plus Usage

Workgroup Edition

- Workgroup Edition Signup
- Master Account Setup
- Sub-Account Management
- Bucket Management
- Bucket Access Overview
- Usage Reporting

Current User

- scottbeta@jungledisk.com
- Logout

Access Overview for workgroup.myjungledisk.com

Bucket	Account	Access	Remove
documents			
	johndoe	Read/Write ▼	Remove
	janesmith	Read ▼	Remove
 johndoe 			
	johndoe	Read/Write ▼	Remove
new (No access configured)			

Grant Access

bucket: User: Access:

eWEEK

Storage Clouds

box.net
(users)

The screenshot displays the 'Users in your Enterprise' page in the Box Admin interface. The page header includes the Box logo, the tagline 'store here, access anywhere', and the user 'Box Admin (entadmin@box.net)' with links for 'Settings', 'Help', and 'Logout'. A search bar for users is located in the top right. Below the header, there are tabs for 'Home' and 'Users', and buttons for 'Add New User' and 'Bulk Add Users'. A notification indicates 'you are using 10 of 20 user licenses'. The main content area lists three users with their details:

User	Total storage	Last login	Last action	Sub Users
chriswofford@bellsouth.net Chris Wofford	36.95 MB of 50 GB	no login	downloaded - "Photo 21 Bedroom #2.JPG"	no users
cstevens@abetterchance.org Chantal Stevens	0 bytes of 1 GB	no login	no actions	no users
entuser1@box.net Enterprise User 1	17.01 MB of 5 GB	Friday, February 15, 2008	uploaded - "clermoRes08-edit.doc"	Enterprise Sub User 1 - Full, Enterprise Sub User 2 - Read Only, Enterprise Sub User 3 - Write Only view more

At the bottom of the list, 'entuser2@box.net Enterprise User 2' is partially visible. The eWEEK logo is in the bottom right corner.

Storage Clouds

MozyPro (history)

The screenshot shows the 'History' tab of the MozyPro Remote Backup software. It displays a table of backup operations and a list of files. The backup history table shows several successful manual backups from October 2, 2007. The file list below shows various documents and settings files, all of which are noted as 'File already on MozyPro servers'. The interface includes navigation tabs, a 'Clear History' button, and a status bar at the bottom showing quota usage.

MozyPro Remote Backup (1.8.6.2) - Configuration

Backup Sets | File System | Schedule | Options | **History** | Restore

Last backup ran 23 minutes ago

Start Time	Type	Duration	Result	F...	Size	Files Enco...	Size Enco...	Files Transfer...	Size Transfer...
10/02/2007 03:02 PM	Manual	00:01:20	Success	48	43.9 MB	1	511.6 KB	0	0 bytes
10/02/2007 02:37 PM	Manual	00:13:14	Success	48	43.9 MB	3	41.4 MB	3	41.4 MB
10/02/2007 01:59 PM	Manual	00:01:24	Success	46	3.0 MB	0	0 bytes	0	0 bytes
10/02/2007 01:57 PM	Manual	00:01:31	Success	46	3.0 MB	1	511.6 KB	0	0 bytes
10/02/2007 01:54 PM	Manual	00:01:31	Success	46	3.0 MB	0	0 bytes	0	0 bytes
10/02/2007 01:35 PM	Manual	00:02:50	Success	46	3.0 MB	46	3.0 MB	6	3.0 MB

File	Path	Patch Size	Encoding T...	Transfer Ti...	Transfer R...	Other Details
Division of Taxation, Indivi...	C:\Documents and Setting...	266 bytes	00:00:00			File already on MozyPro servers
Desktop.ini	C:\Documents and Setting...	122 bytes	00:00:00			File already on MozyPro servers
Google AdSense - Referral ...	C:\Documents and Setting...	232 bytes	00:00:00			File already on MozyPro servers
Netflix Television for Insta...	C:\Documents and Setting...	398 bytes	00:00:00			File already on MozyPro servers
Ramius Timesheets.url	C:\Documents and Setting...	134 bytes	00:00:00			File already on MozyPro servers
Simply Ming Recipes Chile, ...	C:\Documents and Setting...	192 bytes	00:00:00			File already on MozyPro servers
Use case - Wikipedia, the f...	C:\Documents and Setting...	209 bytes	00:00:00			File already on MozyPro servers

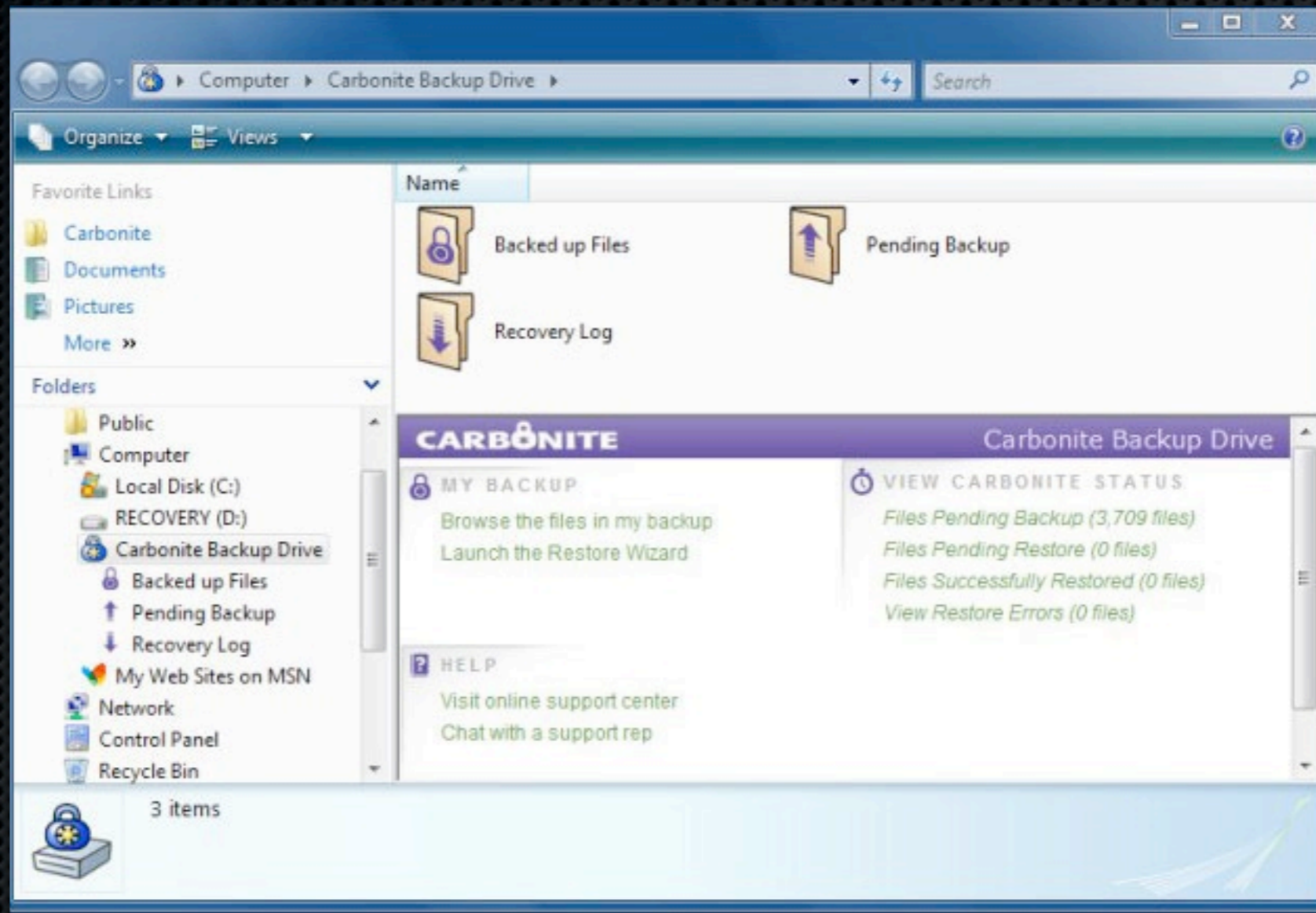
Clear History

Save Cancel

1.7% of quota used

Quota: 2.5 GB Used: 43.9 MB Remaining: 2.5 GB Files: 48

Storage Clouds



Carbonite (Explorer interface)

Storage Clouds

The screenshot shows the Egnyte web interface. At the top left is the 'MY COMPANY' logo. A search bar contains the text 'cost' and a 'Search' button. The top right shows a user profile for 'John Smith' with links for 'Home', 'My Profile', and 'Sign Out'. Below the search bar, there are tabs for 'Detailed View' and 'Summary View'. The main content area displays search results for the keyword 'cost', showing 'Results 1 - 5 of 3'. Two results are visible: 'Waterfall Analysis Results.pdf' and 'FGI Analysis.xls'. Each result includes a document icon, a checkbox, the filename, and links for 'Similar', 'Context', and 'History'. The 'Waterfall Analysis Results.pdf' result shows a date of 'Tuesday, December 04, 2007 12:40:32 PM', author 'Vijay Kak', and a folder path. The 'FGI Analysis.xls' result shows a date of 'Tuesday, December 04, 2007 12:32:18 PM', author 'John Smith', and a folder path. On the left side, there are navigation options: 'Folders', 'Address Book', and 'Narrow results by'. Under 'Narrow results by', there is a 'My Home' section, a 'By Date' section with 'Start' and 'End' date pickers, and a 'By Individuals' section with checkboxes for 'John Smith (4)' and 'Vijay Kak (1)'. On the right side, there is an 'Actions' menu with icons for 'Share', 'Export', 'Send', 'Tag', and 'Delete'.

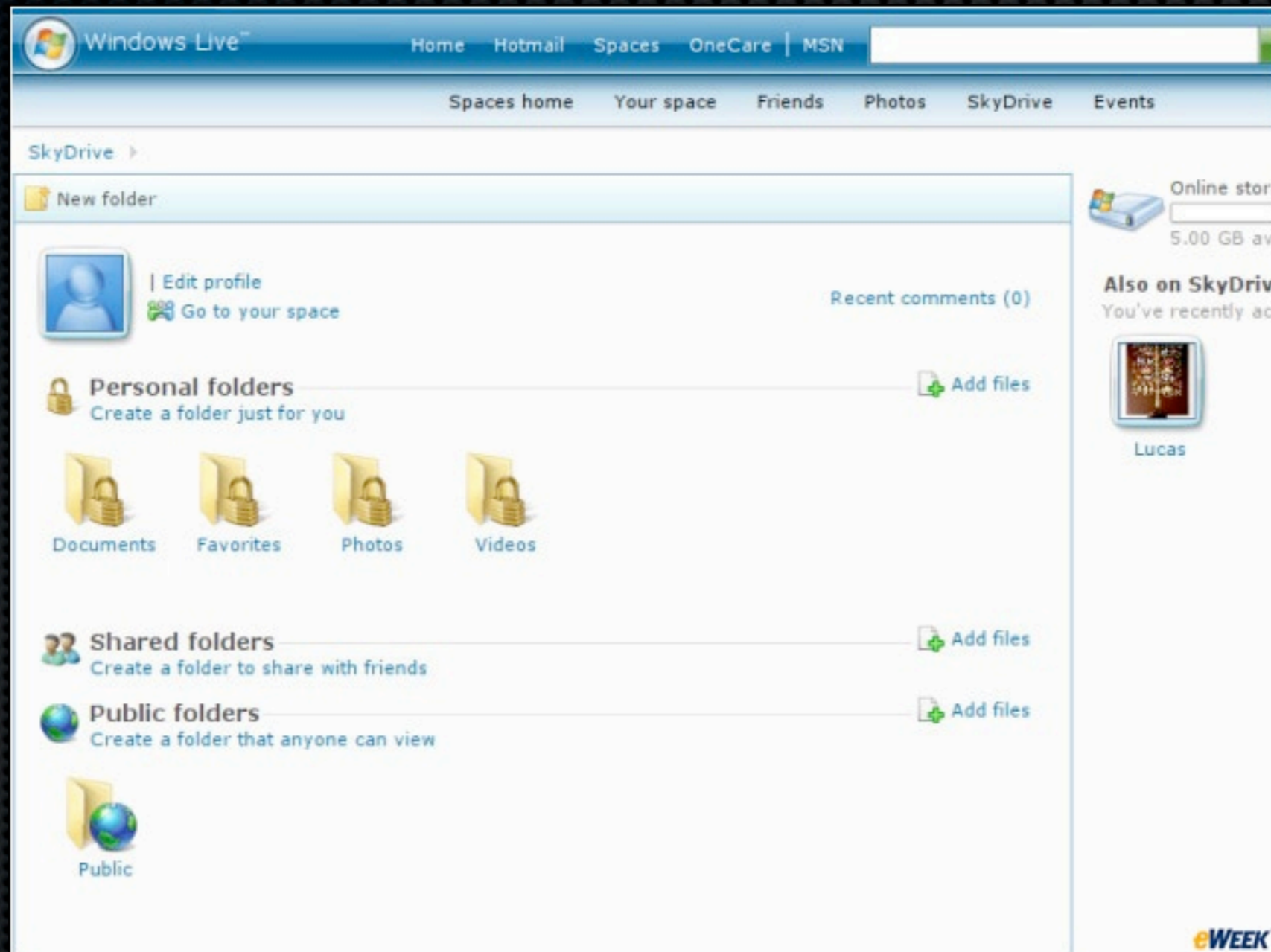
Egnyte (search)

Storage Clouds

The screenshot displays the Swapdrive web interface for a corporate account. The left sidebar contains the Swapdrive logo and a navigation menu with links for Home Directory, Address Book, Help, Personal Settings, and Logoff. Below the menu is a 'DOWNLOAD SWAPDRIVE BACKUP' button and a 'POWERED BY SWAPDRIVE' logo. The main content area shows the user's name (Eric Martin) and account ID (emartin), along with a storage usage bar indicating 42.49MB used. A dropdown menu is set to 'click here to see shared drives' with a 'Go!' button. Below this is a instruction: 'Click on a folder name to open or click on a file name to download. Select a file or folder by checking the box next to the folder name.' The 'Current Directory' is shown as the root directory. A toolbar on the left includes buttons for UPLOAD, DOWNLOAD, DELETE, NEW FOLDER, and MOVE. The main area lists two folders: 'Backup' and 'EMartin', each with an unchecked checkbox to its left. A mouse cursor is positioned over the 'Backup' folder.

Swapdrive (drive list)

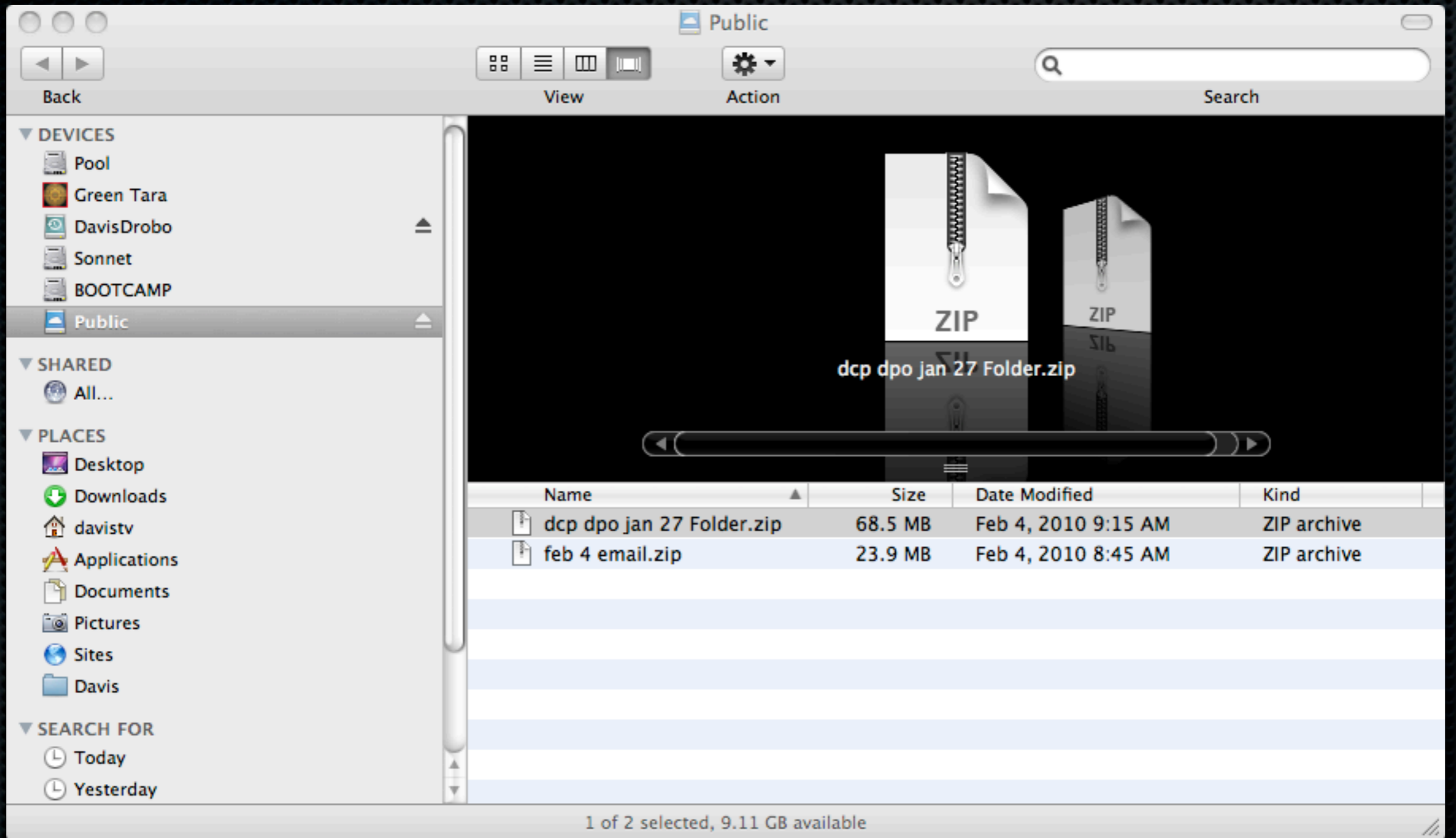
Storage Clouds



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Windows Live SkyDrive looks a lot like...

Storage Clouds



Apple's iDisk (mobile me service)

Storage Clouds

Symantec Protection Network My Profile | Support | Help | Logout
Demous SPNlight

Home My Services **Users** Alerts Reports

Online Backup Online Storage for Backup Exec™

Online Backup

Usage Plan: Unknown
Storage Capacity: 50.0 GB
Used: 26.9 GB
Available: 23.1 GB
Computers Subscribed: 10

Computers Users

Type computer name

Add a Computer

Name	Hostname	Capacity Used	Status	Last Completed Backup (GMT)	Actions
BillsDT	enterprise.veritas.com-D-071945-B	0 GB	Unavailable		Backup Restore Cleanup Remove
billsLT	enterprise.veritas.com-L-071945-A	0 GB	Backup Agent Online	9/1/2008 4:12:06 PM	Backup Restore Cleanup Remove
Boris_DT	enterprise.veritas.com-D-072036-A	470.0 MB	Backup Agent Online	8/22/2008 1:21:13 PM	Backup Restore Cleanup Remove
Boris_LT	enterprise.veritas.com-L-072036-A	4.1 MB	Unavailable	8/19/2008 3:15:44 PM	Backup Restore Cleanup Remove
dee laptop	enterprise.veritas.com-L-072120-A	15.6 MB	Unavailable	8/30/2008 8:31:54 PM	Backup Restore Cleanup Remove
Dee's Office	enterprise.veritas.com-D-072120-A1	273.2 MB	Backup Agent Online	9/8/2008 12:22:22 PM	Backup Restore Cleanup Remove
Ike_LT	enterprise.veritas.com-L-072124-A	1.4 GB	Backup Agent Online	9/7/2008 1:19:09 PM	Backup Restore Cleanup Remove
Ike_PC_Work	enterprise.veritas.com-D-072124-A	24.4 GB	Backup Agent Online	9/6/2008 8:07:47 AM	Backup Restore Cleanup Remove
YREEP_D	enterprise.veritas.com-D-030673-A	243.0 MB	Unavailable	9/7/2008 4:17:54 PM	Backup Restore Cleanup Remove
YREEP_L	enterprise.veritas.com-L-030673-A	53.3 MB	Unavailable	8/22/2008 8:19:27 AM	Backup Restore Cleanup Remove

IMPORTANT: If you have not yet done so, please use the following link to sign up for (or update) your free HCC Group Escrow account. HCC Group can securely store your encryption passphrase so that you can recover it. ([Signup or Login to HCC Group](#) | [Learn More](#))

Symantec online backup

Servers / Hosting

More like fast-scaling automated virtualization than the cloud storage model.

Not as compelling in terms of cost savings unless you need:

- ▶ Fast scalability for large surges in traffic
- ▶ Lots of computing power over a short timeline
- ▶ Less expensive transfer costs with a cloud storage service
- ▶ Lots and lots of hardware if you do it yourself

Servers / Hosting

A few of the Community Linux AMIs
(Amazon Machine Images) available for EC2

Launch Instances Cancel X

CHOOSE AN AMI CREATE KEY PAIR CONFIGURE FIREWALL LAUNCH

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its Select button.

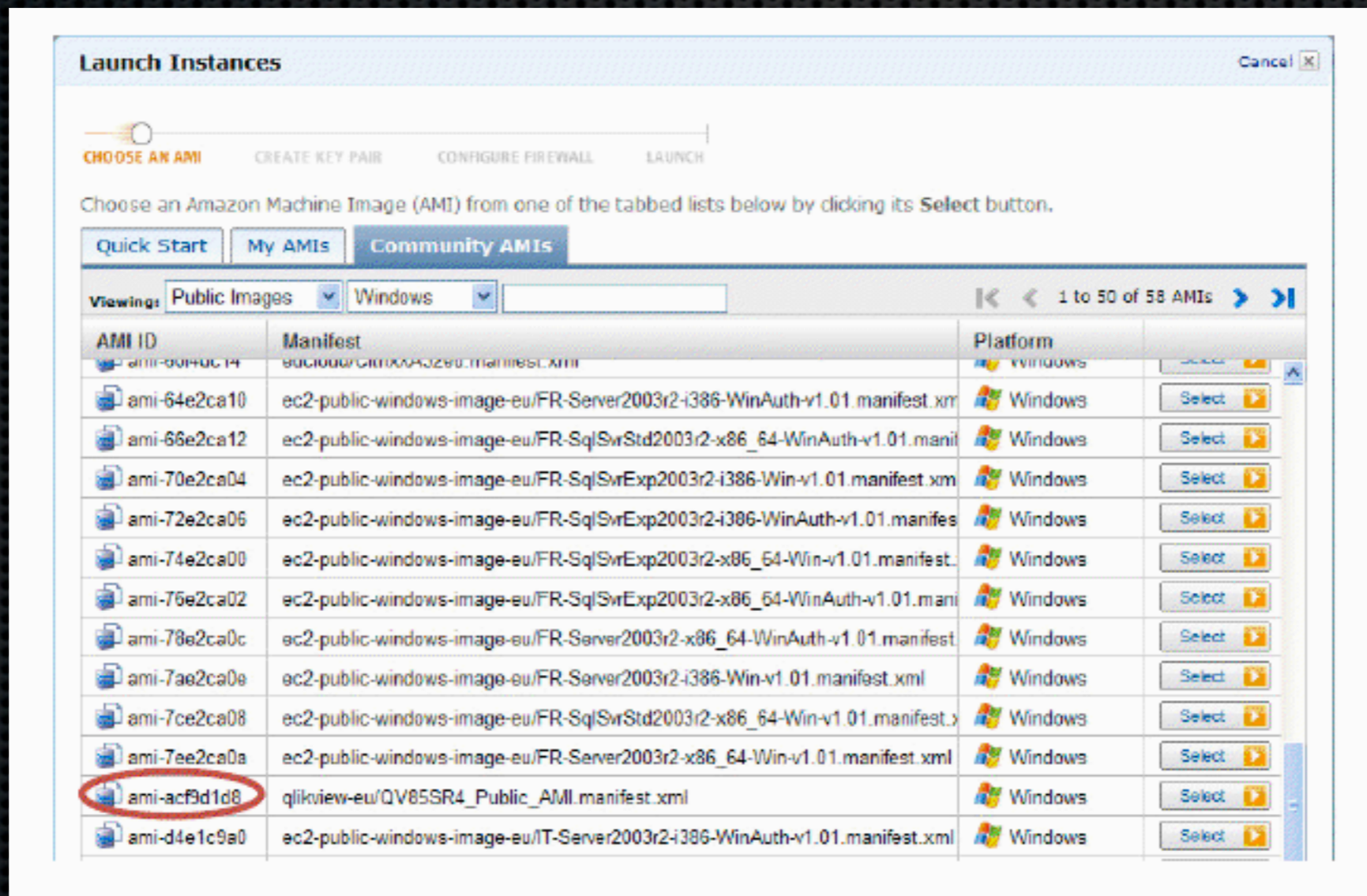
Quick Start My AMIs **Community AMIs**

Viewing: All Images All Platforms 1 to 50 of 1672 AMIs

AMI ID	Manifest	Platform	
ami-0022c769	level22-ec2-images/ubuntu-7.04-feisty-base-20071225a.manifest.xml	Ubuntu	Select
ami-005db969	alestic-64/ubuntu-8.04-hardy-base-64-20081222.manifest.xml	Ubuntu	Select
ami-005eba69	kaavo-ntier-db/imod-ntier-32bit-FC-DB.manifest.xml	Other Linux	Select
ami-0129cc68	cer-64-centos5_10-1/image.manifest.xml	Cent OS	Select
ami-014da868	ami.alurium.com/image_bundles/Fedora6_Jetty_OpenBD/image.manifest.xml	Fedora	Select
ami-015db968	alestic-64/ubuntu-8.04-hardy-rightscale-64-20081222.manifest.xml	Ubuntu	Select
ami-01789d68	thamtech-ami-images/gimapsync/image.manifest.xml	Other Linux	Select
ami-018e6b68	rbuilder-online/phonehome-1.5.6-x86_10132.img.manifest.xml	Other Linux	Select
ami-01c92d68	rbuilder-online/blt-0.01-x86_17328.img.manifest.xml	Other Linux	Select
ami-01ca2e68	scalr-images/www_x64-2008-09-19-0931/image.manifest.xml	Other Linux	Select
ami-01e10468	RunBlast/runblast.manifest.xml	Other Linux	Select
ami-01f71368	jumpbox-amis/drupal-1.1.4.manifest.xml	Other Linux	Select
ami-0244a16b	awsworld/image.manifest.xml	Other Linux	Select

Servers / Hosting

A few of the Community Windows AMIs available for EC2



The screenshot shows the 'Launch Instances' wizard in the AWS Management Console. The 'Community AMIs' tab is selected, and the 'Viewing' dropdown is set to 'Public Images' and 'Windows'. A list of 58 AMIs is displayed, with the first 10 visible. The AMI ID 'ami-acf9d1d8' is circled in red.

AMI ID	Manifest	Platform	Actions
ami-60f40c14	ec2-public-windows-image-eu/FR-Server2003r2-i386-WinAuth-v1.01.manifest.xml	Windows	Select
ami-64e2ca10	ec2-public-windows-image-eu/FR-Server2003r2-i386-WinAuth-v1.01.manifest.xml	Windows	Select
ami-66e2ca12	ec2-public-windows-image-eu/FR-SqlSvrStd2003r2-x86_64-WinAuth-v1.01.manifest.xml	Windows	Select
ami-70e2ca04	ec2-public-windows-image-eu/FR-SqlSvrExp2003r2-i386-Win-v1.01.manifest.xml	Windows	Select
ami-72e2ca06	ec2-public-windows-image-eu/FR-SqlSvrExp2003r2-i386-WinAuth-v1.01.manifest.xml	Windows	Select
ami-74e2ca00	ec2-public-windows-image-eu/FR-SqlSvrExp2003r2-x86_64-Win-v1.01.manifest.xml	Windows	Select
ami-76e2ca02	ec2-public-windows-image-eu/FR-SqlSvrExp2003r2-x86_64-WinAuth-v1.01.manifest.xml	Windows	Select
ami-78e2ca0c	ec2-public-windows-image-eu/FR-Server2003r2-x86_64-WinAuth-v1.01.manifest.xml	Windows	Select
ami-7ae2ca0e	ec2-public-windows-image-eu/FR-Server2003r2-i386-Win-v1.01.manifest.xml	Windows	Select
ami-7ce2ca08	ec2-public-windows-image-eu/FR-SqlSvrStd2003r2-x86_64-Win-v1.01.manifest.xml	Windows	Select
ami-7ee2ca0a	ec2-public-windows-image-eu/FR-Server2003r2-x86_64-Win-v1.01.manifest.xml	Windows	Select
ami-acf9d1d8	qlikview-eu/QV85SR4_Public_AMI.manifest.xml	Windows	Select
ami-d4e1c9e0	ec2-public-windows-image-eu/IT-Server2003r2-i386-WinAuth-v1.01.manifest.xml	Windows	Select

Servers / Hosting

eApps servers use Parallels virtualization, cheaper than EC2, a few limitations.

The screenshot displays the Parallels Business Automation Control Panel interface. The browser address bar shows the URL <https://cp.eapps.com/cp/>. The page title is "Parallels Business Automation - Control Panel". The navigation bar includes links for "Site", "System", "My Account", "Upgrade Center", "Help", and "Sign Out". The main content area is titled "Select Another Site" and contains a table of 11 virtualized websites. The table has columns for "Site", "System", and "IP Address".

Site	System	IP Address
bugaboo.virtual.vps-host.net	bugaboohomedesign.com	69.89.10.250
caa.virtual.vps-host.net	caa.virtual.vps-host.net	69.89.8.188
cincinnatiport.virtual.vps-host.net	cincinnatiport.virtual.vps-host.net	216.154.209.113
editspot-ns1.virtual.vps-host.net	editspot-ns1.virtual.vps-host.net	69.89.5.196
editspotsrc.virtual.vps-host.net	source.editspot.com	69.89.8.72
hdc.virtual.vps-host.net	hdc.virtual.vps-host.net	69.89.10.107
infidelitytalk.virtual.vps-host.net	infidelitytalk.virtual.vps-host.net	69.89.9.224
mycityliving.virtual.vps-host.net	mycityliving.virtual.vps-host.net	216.154.223.44
petsuites.virtual.vps-host.net	petsuites.virtual.vps-host.net	216.154.212.10
spotlets.com	my.spotlets.com	69.89.9.87
thephx.virtual.vps-host.net	thephx.virtual.vps-host.net	216.154.208.145

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Databases

Be aware of Eventual Consistency.
Great for large datasets without client sync.

Amazon
SimpleDB
(SDB Tool
in Firefox)

The screenshot shows the Amazon SimpleDB Tool (SDB Tool) interface in a browser window. The browser address bar shows the URL `chrome://sdbizo/content/sdbizo_window.xul`. The interface is titled "Simple DB Tool" and includes links for "About", "Config", and "Report an Issue".

Select

Select Expression

```
select * from panda_videos where status = 'error'
or status = 'processing'
```

[Documentation](#)

Run Select

Domains

Domains

- panda_profiles
- panda_users
- panda_videos

Reload Domains Show Metadata Delete Domain...

e.g. mydomain Create Domain

Results

Items	Attribute Names	Attribute Values
▶ 28e4d970-a9fe-012c-9e75-123139016cf3		
▶ 292a0ee0-a9fe-012c-9e75-123139016cf3		
▶ 29639ce0-a9fe-012c-9e75-123139016cf3		
▼ cd8dcf40-e210-012c-9ea1-123139016cf3	player	flash
	last_notification_at	2010-02-19T17:47:46+00:00
	status	processing
	audio_bitrate	
	fps	
	width	
	parent	
	original_filename	
	audio_codec	

Next Results

Add/Replace Attributes

Domain: panda_videos

Item: cd8dcf40-e210-012c-9ea1-123139016cf3

Name: [input field]

Values: [one value per line]

replace existing values

Log

<Executing action[runSelect]>

Databases

SimpleDB serves results in pages, requires repeated requests to gather all data.

Simple DB
Tool
(Java app,
cross-
platform)

The screenshot shows the SimpleDB Query Tool interface. At the top, there are controls for 'run', 'Sponsored...', 'Region: US', 'Domain: panda_profiles', 'Get Metadata', and 'New Domain'. The main query input field contains: `select count(*) from panda_videos where status = 'queued'`. Below this, three query results are displayed in separate windows:

- Query 1:** `select count(*) from panda_videos where status = 'original'`
Box Usage: 5.98508E-5 Items: 2 Time To Run: 0.213 secs
Results table:

itemName()	Count
Domain	4719
Total	4719
- Query 2:** `select count(*) from panda_videos where status = 'success'`
Box Usage: 1.327784E- Items: 2 Time To Run: 0.353 secs
Results table:

itemName()	Count
Domain	14021
Total	14021
- Query 3:** `select count(*) from panda_videos where status = 'queued'`
Box Usage: 2.28538E-5 Items: 2 Time To Run: 15.085 secs
Results table:

itemName()	Count
Domain	0
Total	0

Databases

Other providers:

Google App's Bigtable

- ▶ cheaper than SDB, mostly Python-oriented right now

EnterpriseDB's Postgres+ Advanced Server

- ▶ Oracle compatibility, newer and not as developed yet.

Microsoft SQL Server Data Services (SDDS)

- ▶ It's there if you'll lose your job for choosing anything else.

MySQL and Oracle

- ▶ Really just database clusters setup on virtualized servers in the cloud, not cloud databases in a strict sense.

A few use cases

- ▶ Community Video Site
- ▶ Offsite Incremental MySQL Backup
- ▶ Homebrew iTunes
- ▶ Static Database

Go Big Recruiting » Recruiting Made Easy




http://gobigrecruiting.com/ Google

GOBIG RECRUITING
Recruiting Made Easy

troy_student Password Login
[Forgot Your Password?](#) Remember Me

Home Students Coaches Recruiting 101 Buzz About Blog

Submit your game film to college coaches online. **No more sending TAPES and DVDs through the mail!**
Go Big Recruiting will save you time and money!

- 1 CREATE**

Enter your information into your online profile.
- 2 UPLOAD**

Add your game film, highlight film, or both.
- 3 CHOOSE**

Choose the schools that can review your film and profile.
Get notified once they do!

[Get Started Now](#)
[Learn More »](#)

Community Video Site

Old system: Upload videos to web server, tied up CPU, always running out of storage.

Go Big » Video

http://gobigrecruiting.com/student/video/video.php?svid=9857

Go Big » Video


GoBIG RECRUITING
Recruiting Made Easy

You are logged in as troy_student FAQ My Account Logout

HOME PROFILE VIDEO SCHOOLS

« Back to Videos

test 6



00:23 / 03:34

Add marker at 00:00:23 called Add

Tips

To add chapters to your video:

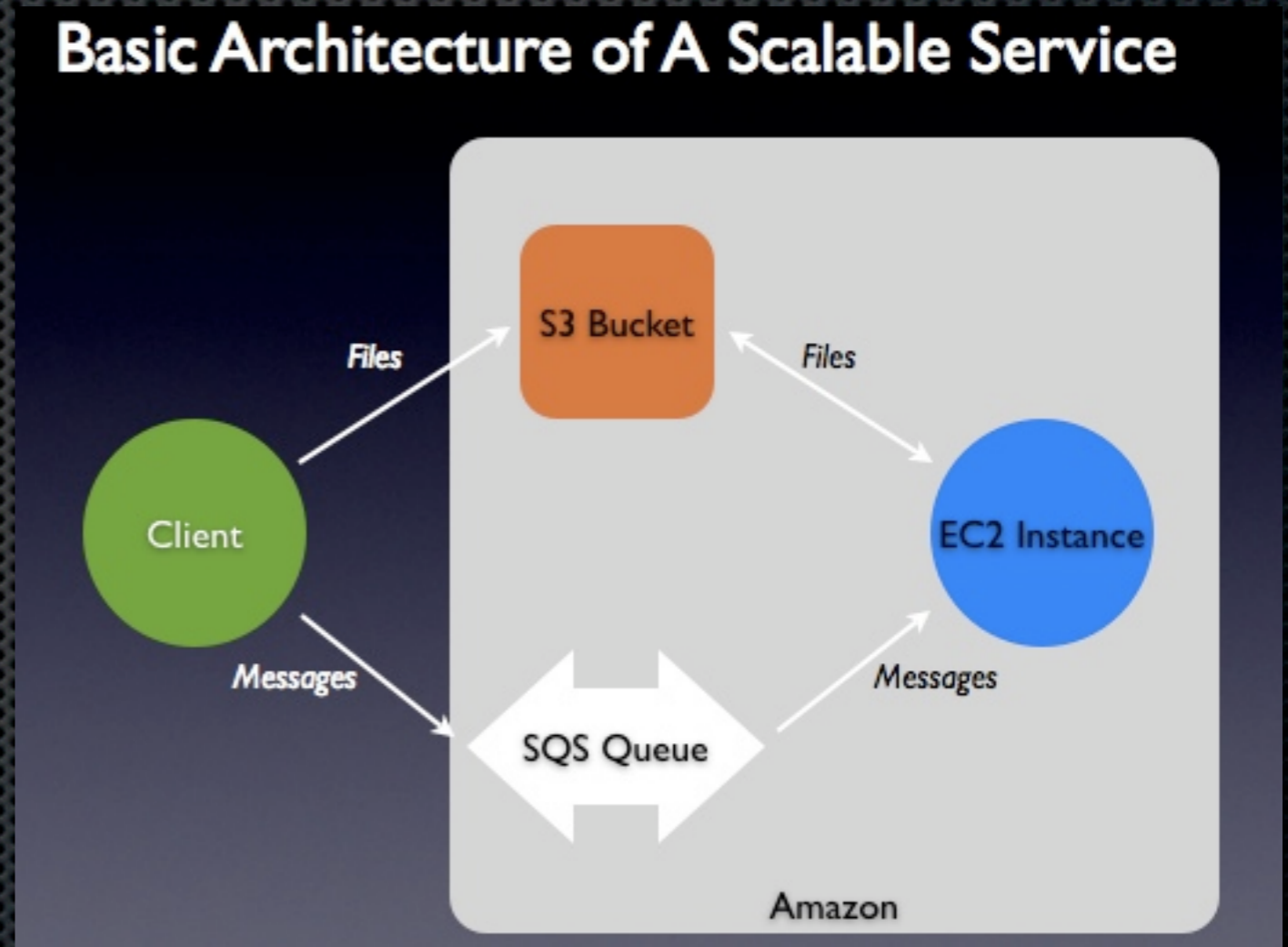
1. Pause the video at the position you would like to mark.
2. Enter a title for your chapter in the text field below the video player.
3. Click "Add" and your chapter will appear in this box.

Community Video Site

New system: Upload videos to EC2
transcoding server, web server freed.

Community Video Site

- ▶ S3 for large video file storage and server
- ▶ Doesn't support resume yet
- ▶ SimpleDB for encoding queue
- ▶ Would rather use SQS now instead
- ▶ EC2 for web hosting
- ▶ Had to use paid SMTP delivery service



From Amazon's SQS documentation

Offsite Incremental MySQL Backup

- ▶ MMORPG server: Frequent, small updates and inserts.
- ▶ Uses scripts based on:
<http://pauldowman.com/2009/02/08/mysql-s3-backup/>
- ▶ Ruby scripts using AWS::S3 gem
- ▶ Full export, compress, upload, then binary log files are uploaded and rotated for incremental restores.

Homebrew iTunes

- ▶ Small area symphony orchestra with its own recordings, doesn't like iTunes' cut of sales
- ▶ S3 storage and delivery of audio files
- ▶ Expiring URLs to limit link sharing
- ▶ Low cost to implement, scales up with sales well

Homebrew iTunes

Expiring Links in PHP

```
<?php
require_once('Crypt/HMAC.php');
echo getS3Redirect("/test.jpg") . "\n";

function getS3Redirect($objectName) {
    $S3_URL = "http://s3.amazonaws.com";
    $keyId = "your key";
    $secretKey = "your secret";
    $expires = time() + 60;
    $bucketName = "/your bucket";
    $stringToSign = "GET\n\n\n$expires\n$bucketName$objectName";
    $hasher =& new Crypt_HMAC($secretKey, "sha1");
    $sig = urlencode(hex2b64($hasher-&gt;hash($stringToSign)));
    return "$S3_URL$bucketName$objectName?AWSAccessKeyId=$keyId&Expires=$expires&Signature=$sig";
}

function hex2b64($str) {
    $raw = "";
    for ($i=0; $i < strlen($str); $i+=2) {
        $raw .= chr(hexdec(substr($str, $i, 2)));
    }
    return base64_encode($raw);
}
?>
```

Static Database

- ▶ Large, static data set, lots of simultaneous clients
- ▶ Bad case for database, used S3 instead
- ▶ Generated static files from database records, scrambled naming convention
- ▶ Increased application response time dramatically
- ▶ Took a week to process and upload data to S3
- ▶ Another team involved in the project pushed back hard, made client sign a waiver even though they were never liable.

Cloud Gotchas

- ▶ Storage services aren't programmable other than permissions
- ▶ Databases exhibit strange time effects, don't use for applications where sync is important
- ▶ You still need backups, these services can and do fail
- ▶ Management applications are growing up, but still immature compared to pre-cloud infrastructure tools
- ▶ API libraries for different languages are spotty, do your research before you bid



Thank You