

Increasing Website Bandwidth Using Cloud Services

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This talk shows how you can use cloud storage for these files to greatly increase your website's bandwidth and responsiveness.

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<http://momjian.us/presentations>

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Network Bandwidth

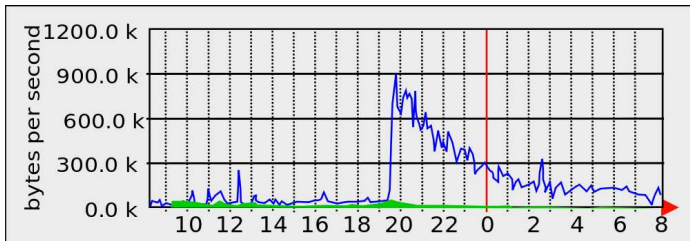
- ▶ Symetric or different up/down speeds
- ▶ Consistent or uneven
- ▶ Always available or sometimes offline

My Setup

- ▶ 50 megabits per second (Mbps) down and up
- ▶ Sometimes offline due to upgrades, power failure
- ▶ Occasional heavy demand

Managing Heavy Demand

The “Slashdot” Effect,
https://en.wikipedia.org/wiki/Slashdot_effect



<https://commons.wikimedia.org/wiki/File:SlashdotEffectGraph.svg>

You Need a Spillway



https://commons.wikimedia.org/wiki/File:Hoover_Dam_and_Arizona_Spillway,_1983.jpg

Increasing Bandwidth

- ▶ Dynamically increasing bandwidth is usually difficult
- ▶ You need to repoint your content to another location that always has more bandwidth
- ▶ Cloud providers usually have high bandwidth

Some Terms

- ▶ Subdomains
 - ▶ `www.momjian.us` is a subdomain of `momjian.us`
 - ▶ `pickle.momjian.us` is a subdomain of `momjian.us`
- ▶ DNS (domain name service) maps domain names to IP addresses
 - ▶ `momjian.us` maps to IP address `72.94.173.45`
 - ▶ a CNAME record maps one hostname to another
- ▶ Apache is a daemon that serves web pages

Let's Use Amazon Web Services (AWS)

- ▶ Lots of acronyms
- ▶ Simple Storage Service (S3)
- ▶ CloudFront
- ▶ ~~EC2~~
- ▶ ~~EBS~~

How Do We Reroute Our Content?

- ▶ Create an Amazon S3 bucket
- ▶ Create a subdomain for the content
- ▶ Copy our content to the S3 bucket
- ▶ Setup disabled webserver rules to reroute subdomain requests to S3
- ▶ Setup disabled DNS rules to reroute subdomain content to S3

Hostnames

- ▶ external.momjian.us
- ▶ external.momjian.us.s3.amazonaws.com
- ▶ download.momjian.us
- ▶ d2mt7v560udp.cloudfront.net

AWS Services

Amazon Web Services





Compute & Networking

-  **Direct Connect**
Dedicated Network Connection to AWS
-  **EC2**
Virtual Servers in the Cloud
-  **Elastic MapReduce**
Managed Hadoop Framework
-  **Route 53**
Scalable Domain Name System
-  **VPC**
Isolated Cloud Resources

Storage & Content Delivery

-  **CloudFront**
Global Content Delivery Network
-  **Glacier**
Archive Storage in the Cloud
-  **S3**
Scalable Storage in the Cloud
-  **Storage Gateway**
Integrates On-Premises IT Environments with Cloud Storage





Database

-  **DynamoDB**
Predictable and Scalable NoSQL Data Store
-  **ElastiCache**
In-Memory Cache
-  **RDS**
Managed Relational Database Service
-  **Redshift** NEW
Managed Petabyte-Scale Data Warehouse Service

Deployment & Management

-  **CloudFormation**
Templated AWS Resource Creation
-  **CloudWatch**
Resource and Application Monitoring
-  **Data Pipeline**
Orchestration for Data-Driven Workflows
-  **Elastic Beanstalk**
AWS Application Container
-  **IAM**
Secure AWS Access Control
-  **OpsWorks** NEW
Dev/Ops Application Management Service

App Services

-  **CloudSearch**
Managed Search Service
-  **Elastic Transcoder** NEW
Easy-to-use Scalable Media Transcoding
-  **SES**
Email Sending Service
-  **SNS**
Push Notification Service
-  **SQS**
Message Queue Service
-  **SWF**
Workflow Service for Coordinating Application Components

Additional Resources


Getting Started

See our documentation to get started and learn more about how to use our services.

Trusted Advisor

Best practice recommendations to save money, improve fault tolerance, increase performance, and close security gaps.

Service Health

 All services operating normally.

Updated: Jun 25 2013 11:21:00 GMT-0400

[Service Health Dashboard](#)

Set Start Page

Console Home

 **AWS Marketplace**
Find & buy software, launch with 1-Click and pay by the hour.

Example

```
  

```

Local Flowers Only



Local



S3

Create Bucket



Services ▾

Edit ▾

Christine Momjian ▾

Global ▾

Help ▾

Welcome to Amazon Simple Storage Service

Amazon S3 is storage for the Internet. It is designed to make web-scale computing easier for developers.

Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, secure, fast, inexpensive infrastructure that Amazon uses to run its own global network of web sites. The service aims to maximize benefits of scale and to pass those benefits on to developers.

You can read, write, and delete objects ranging in size from 1 byte to 5 terabytes each. The number of objects you can store is unlimited. Each object is stored in a bucket with a unique key that you assign.

Get started by simply creating a bucket and uploading a test object, for example a photo or .txt file.

[Create Bucket](#)

S3 at a glance

Create



Add



Manage



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[Privacy Policy](#)

[Terms of Use](#)

[Feedback](#)

Additional Information

[Getting Started Guide](#)

[Documentation](#)

[All S3 Resources](#)

[Forums](#)



Bucket Name

The screenshot shows the Amazon S3 console interface. At the top, there is a navigation bar with the Amazon logo, 'Services', 'Edit', and user information 'Christine Momjian', 'Global', and 'Help'. The main heading is 'Welcome to Amazon Simple Storage Service'. Below this, there is introductory text about Amazon S3 and a 'Create Bucket' button. A modal dialog box is open in the center, titled 'Create a Bucket - Select a Bucket Name and Region'. The dialog contains a text input field for 'Bucket Name' with the value 'external.momjian.us' and a dropdown menu for 'Region' set to 'US Standard'. At the bottom of the dialog are buttons for 'Set Up Logging >', 'Create', and 'Cancel'. The background of the console is dimmed.

Services Edit Christine Momjian Global Help

Welcome to Amazon Simple Storage Service

Additional Information

Getting Started Guide

Documentation

Create a Bucket - Select a Bucket Name and Region

Cancel X

A bucket is a container for objects stored in Amazon S3. When creating a bucket, you can choose a Region to optimize for latency, minimize costs, or address regulatory requirements. For more information regarding bucket naming conventions, please visit the [Amazon S3 documentation](#).

Bucket Name:

Region:

Set Up Logging > Create Cancel

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Feedback

Bucket Properties

The screenshot shows the Amazon S3 console interface. At the top, there is a navigation bar with the Amazon logo, 'Services' and 'Edit' dropdown menus, and user information for 'Christine Momjian', 'Global', and 'Help'. Below this, a secondary bar contains a 'Create Bucket' button, an 'Actions' dropdown, and tabs for 'None', 'Properties', and 'Transfers'. The main content area is titled 'All Buckets' and features a table with a 'Name' column. A single bucket named 'external.momjian.us' is listed and highlighted in light blue. A context menu is open over this bucket, offering options: 'Create Bucket...', 'Delete', 'Paste Into', and 'Properties'. At the bottom of the page, there is a footer with copyright information, links for 'Privacy Policy' and 'Terms of Use', and a 'Feedback' button.

Bucket Created

The screenshot displays the Amazon S3 console interface. At the top, there is a navigation bar with the Amazon logo, 'Services' and 'Edit' dropdown menus, and user information for 'Christine Momjian' with 'Global' and 'Help' dropdowns. Below the navigation bar, there are buttons for 'Create Bucket' and 'Actions'. On the right side, there are tabs for 'None', 'Properties', and 'Transfers', along with refresh and help icons. The main content area is divided into two panes. The left pane, titled 'All Buckets', contains a table with one entry: 'external.momjian.us'. The right pane, titled 'Bucket: external.momjian.us', shows the bucket's details: 'Bucket: external.momjian.us', 'Region: US Standard', 'Creation Date: Tue Jun 25 12:04:51 GMT-400 2013', and 'Owner: Me'. Below these details are several expandable sections: 'Permissions', 'Static Website Hosting', 'Logging', 'Notifications', 'Lifecycle', 'Tags', and 'Requester Pays'.

Services ▾ Edit ▾ Christine Momjian ▾ Global ▾ Help ▾

Create Bucket Actions ▾ None Properties Transfers ↻ ?

All Buckets

Name
external.momjian.us

Bucket: external.momjian.us ✕

Bucket: external.momjian.us
Region: US Standard
Creation Date: Tue Jun 25 12:04:51 GMT-400 2013
Owner: Me

- Permissions
- Static Website Hosting
- Logging
- Notifications
- Lifecycle
- Tags
- Requester Pays

DNS for S3

```
external      IN      CNAME   external.momjian.us.s3.amazonaws.com.
```

S3 Permission Failure

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <Error>
  <Code>AccessDenied</Code>
  <Message>Access Denied</Message>
  <RequestId>41F9EEB772A6A0F4</RequestId>
- <HostId>
  3MLjMX9ojZL9PrasHy2aKS8iLKDJ3xc64CvGVaSKiATvTJmjiZVQPUOmr5Xo6FL
  </HostId>
</Error>
```

Bucket List Permission

The screenshot shows the AWS IAM console interface for managing bucket permissions. At the top, there is a navigation bar with the AWS logo, 'Services' and 'Edit' dropdowns, and user information for 'Christine Momjian'. Below the navigation bar, there are buttons for 'Create Bucket' and 'Actions'. The main content area is titled 'All Buckets' and shows a table with one bucket named 'external.momjian.us'. To the right of the bucket list, the 'Permissions' tab is selected, displaying a list of permissions. The first permission is for the grantee 'cnmomjian' with checked options for 'List', 'Upload/Delete', 'View Permissions', and 'Edit Permissions'. The second permission is for the grantee 'Everyone' with checked 'List' and unchecked 'Upload/Delete', 'View Permissions', and 'Edit Permissions'. Below the permissions list are buttons for 'Add more permissions', 'Add bucket policy', and 'Add CORS Configuration'. At the bottom right of the permissions panel are 'Save' and 'Cancel' buttons. Below the permissions panel, there is a section for 'Static Website Hosting'. At the bottom of the page, there is a copyright notice, links for 'Privacy Policy' and 'Terms of Use', and a 'Feedback' button.

Services Edit Christine Momjian Global Help

Create Bucket Actions None Properties Transfers

All Buckets

Name
external.momjian.us

Permissions

- Grantee: cnmomjian List Upload/Delete View Permissions Edit Permissions
- Grantee: Everyone List Upload/Delete View Permissions Edit Permissions

Add more permissions Add bucket policy Add CORS Configuration

Save Cancel

Static Website Hosting

S3 Permission Success

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <ListBucketResult>  
  <Name>external.momjian.us</Name>  
  <Prefix/>  
  <Marker/>  
  <MaxKeys>1000</MaxKeys>  
  <IsTruncated>>false</IsTruncated>  
</ListBucketResult>
```

Copy Image File to S3

```
$ s3cmd --acl-public put flower.jpg s3://external.momjian.us  
flower.jpg -> s3://external.momjian.us/flower.jpg [1 of 1]  
3342844 of 3342844 100% in 3s 903.64 kB/s done  
Public URL of the object is: http://external.momjian.us.s3.amazonaws.com/flower.jpg
```

Bucket Contents

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <ListBucketResult>
  <Name>external.momjian.us</Name>
  <Prefix/>
  <Marker/>
  <MaxKeys>1000</MaxKeys>
  <IsTruncated>>false</IsTruncated>
- <Contents>
  <Key>flower.jpg</Key>
  <LastModified>2013-06-25T16:55:35.000Z</LastModified>
  <ETag>"5543cdef6dbb1e5b0895a8481ce89f56"</ETag>
  <Size>3342844</Size>
  <StorageClass>STANDARD</StorageClass>
</Contents>
</ListBucketResult>
```

Local and S3 Flowers



Local



S3

Webpage URLs


General Media Permissions Security

Address	Type
http://momjian.us/flower/flower.jpg	Image
http://external.momjian.us/flower.jpg	Image

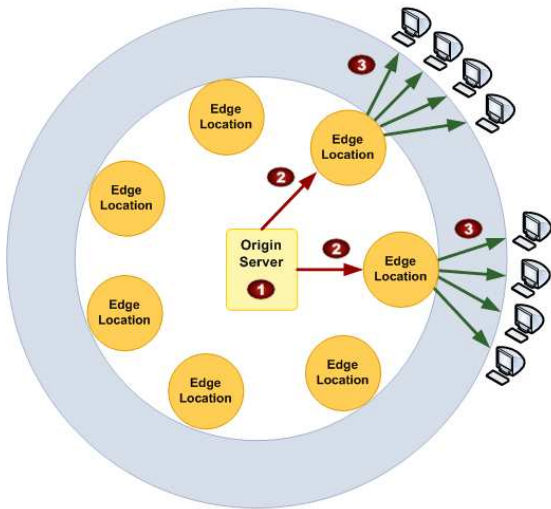
Location: http://momjian.us/flower/flower.jpg
Type: JPEG Image
Size: 3,264.5 KB (3,342,044 bytes)
Dimensions: 2,800px × 2,052px (scaled to 252px × 185px)

Block Images from momjian.us

Media Preview: Save As...



Content Delivery Network (CDN)



<http://docs.aws.amazon.com/AmazonCloudFront/latest/DeveloperGuide/Paying.html>

Create CloudFront Distribution

The screenshot shows the Amazon CloudFront console interface. At the top, there is a navigation bar with the Amazon logo, 'Services' and 'Edit' dropdown menus, and user information for 'Christine Momjian' with 'Global' and 'Help' dropdowns. On the left, a 'Navigation' sidebar lists 'Distribution' (selected), 'Private Content', 'How-To Guide', and 'Origin Access Identity'. The main content area is titled 'CloudFront: Distributions' and features a toolbar with buttons for 'Create Distribution', 'Distribution Settings', 'Delete', 'Enable', 'Disable', 'Show/Hide', 'Refresh', and 'Help'. Below the toolbar, a yellow box titled 'Amazon CloudFront Getting Started' contains the text: 'Either your search returned no results, or you do not have any distributions. Click the button below to create a new CloudFront distribution. A distribution allows you to distribute content using a worldwide network of edge locations that provide low latency and high data transfer speeds (learn more)'. A 'Create Distribution' button is centered at the bottom of this yellow box.

Distribution Settings



Services ▾

Edit ▾

Christine Momjian ▾

Global ▾

Help ▾

CloudFront > Create Distribution

Step 1: Select delivery method

[Step 2: Create distribution](#)

Origin ID

S3-external.momjian.us

Restrict Bucket Access

Yes

No

Default Cache Behavior Settings

Path Pattern

Default (*)

Viewer Protocol Policy

HTTP and HTTPS

HTTPS Only

Object Caching

Use Origin Cache Headers

Customize

Minimum TTL

0

Forward Cookies

None (Improves Caching)

Distribution CNAME



Services ▾

Edit ▾

Christine Momjian ▾

Global ▾

Help ▾

CloudFront > Create Distribution

Step 1: Select delivery method

Step 2: Create distribution

Distribution Settings

Price Class

Alternate Domain Names(CNAMEs)

SSL Certificate

Default Root Object

Logging On Off

Bucket for Logs

Log Prefix

Distribution Created

Services ▾ Edit ▾ Christine Momjian ▾ Global ▾ Help ▾

Navigation

- > **Distribution**
- Private Content
 - How-To Guide
 - Origin Access Identity

CloudFront: Distributions

Create Distribution ⓘ Distribution Settings Delete Enable Disable Show/Hide Refresh Help

Viewing: Any Delivery Method ▾ Any Status ▾ 1 to 1 of 1 Distributions < >

	Domain Name	Origin	Status
<input checked="" type="checkbox"/> ⓘ	d2mt7vdv560udp.cloudfront.net	external.momjian.us.s3.amazonaws.com	Deployed

DNS for Cloudfront

```
download      IN      CNAME    d2mt7vdv560udp.cloudfront.net.
```

Individual DNS lines can be adjusted to disable the caching of results, and DNS can be hosted on remote servers.

Hostname download.momjian.us

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <ListBucketResult>
  <Name>external.momjian.us</Name>
  <Prefix/>
  <Marker/>
  <MaxKeys>1000</MaxKeys>
  <IsTruncated>>false</IsTruncated>
- <Contents>
  <Key>flower.jpg</Key>
  <LastModified>2013-06-25T16:55:35.000Z</LastModified>
  <ETag>"5543cdef6dbb1e5b0895a8481ce89f56"</ETag>
  <Size>3342844</Size>
  <StorageClass>STANDARD</StorageClass>
</Contents>
</ListBucketResult>
```


Cloudfront Example

```
  
  

```

Local, S3, Cloudfront



Local



S3



Cloudfront

Apache Redirect to Local Storage

```
<VirtualHost *:80>  
    ServerName download.momjian.us  
    DocumentRoot /var/www/s3-download  
</VirtualHost>
```

Apache Redirect to Cloudfront

```
RewriteCond %{HTTP_HOST} ^download\.momjian\.us  
RewriteRule ^(.*)$ http://d2mt7vdv560udp\.cloudfront\.net/$1 [redirect=302,last]
```

Conclusion



<http://momjian.us/presentations>

<https://www.flickr.com/photos/usfivspacific/>