

# 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.

<https://momjian.us/presentations>

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# Network Bandwidth

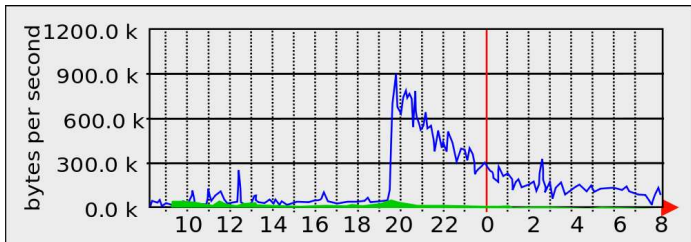
- Symetric or different up/down speeds
- Consistent or uneven
- Always available or sometimes offline

# 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://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](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
- d2mt7vdv560udp.cloudfront.net






# AWS Services

 **Services** ▾ **Edit** ▾ Christine Momjian ▾ Global ▾ Help ▾





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## 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
-  **ElasticCache**  
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  
DevOps 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.

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### Service Health


 All services operating normally.

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

[Service Health Dashboard](#)

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### Set Start Page

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

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# Example

```

```

```

```

# Local Flowers Only




Local



83

# Create Bucket

 **Services** ▾ **Edit** ▾ Christine Momjian ▾ Global ▾ Help ▾

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## 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](#)

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## S3 at a glance

<b>Create</b>	<b>Add</b>	<b>Manage</b>
		

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# Bucket Name

The screenshot shows the Amazon S3 console interface. At the top, there is a navigation bar with '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 S3 and a 'Create Bucket' button. A modal dialog box titled 'Create a Bucket - Select a Bucket Name and Region' is open in the center. The dialog contains the following text: '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.' Below the text, there are two input fields: 'Bucket Name:' with the value 'external.momjian.us' and 'Region:' with a dropdown menu showing 'US Standard'. At the bottom of the dialog, there are three buttons: '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:** external.momjian.us

**Region:** US Standard

Set Up Logging > Create Cancel

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# Bucket Properties

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 this, a blue 'Create Bucket' button and an 'Actions' dropdown are visible. The main content area is titled 'All Buckets' and shows a table with a 'Name' column. A bucket named 'external.momjian.us' is selected and highlighted in light blue. A context menu is open over this bucket, listing the following options: 'Create Bucket...', 'Delete', 'Paste Info', and 'Properties'. In the top right corner of the console, there is a status bar showing 'None Properties Transfers' and refresh/help icons. At the bottom of the page, there is a footer with copyright information: '© 2008 - 2013, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 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 AWS 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'. The main content area is split 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 metadata: 'Bucket: external.momjian.us', 'Region: US Standard', 'Creation Date: Tue Jun 25 12:04:51 GMT-00:00 2013', and 'Owner: Me'. Below the metadata are several expandable sections: 'Permissions', 'Static Website Hosting', 'Logging', 'Notifications', 'Lifecycle', 'Tags', and 'Requester Pays'. At the bottom of the console, there is a footer with the copyright notice '© 2008 - 2013, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 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

Bucket: external.momjian.us

Bucket: external.momjian.us  
Region: US Standard  
Creation Date: Tue Jun 25 12:04:51 GMT-00:00 2013  
Owner: Me

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

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# 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>
  3MLjMX9ojZL9PrasHy2aKS8iLKDJ3xc64CvGvaSKiATvTJmjiZVQPUOmfr5Xo6FL
  </HostId>
</Error>
```

# Bucket List Permission

The screenshot shows the AWS IAM console interface for configuring permissions on a bucket. The top navigation bar includes 'Services', 'Edit', and user information 'Christine Momjian'. The main area is titled 'All Buckets' and shows a table with one bucket named 'external.momjian.us'. A 'Permissions' panel is open on the right, displaying two permission entries:

- Grantee: `cnmomjian` with permissions:  List,  Upload/Delete,  View Permissions, and  Edit Permissions.
- Grantee: `Everyone` with permissions:  List and  Upload/Delete.

Below the permissions list are buttons for 'Add more permissions', 'Add bucket policy', and 'Add CORS Configuration'. At the bottom of the panel are 'Save' and 'Cancel' buttons. The footer contains copyright information: '© 2008 - 2013, Amazon Web Services, Inc. or its affiliates. All rights reserved.', links for 'Privacy Policy' and 'Terms of Use', and a 'Feedback' button.

# 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>'5543cdefdbb1e5b0895a8481cc89f56'</ETag>
  <Size>334284</Size>
  <StorageClass>STANDARD</StorageClass>
</Contents>
</ListBucketResult>
```

# Local and S3 Flowers



Local



S3



# Webpage URLs


General Media Permissions Security

Address	Type
<a href="http://momjian.us/flower/flower.jpg">http://momjian.us/flower/flower.jpg</a>	Image
<a href="http://external.momjian.us/flower.jpg">http://external.momjian.us/flower.jpg</a>	Image

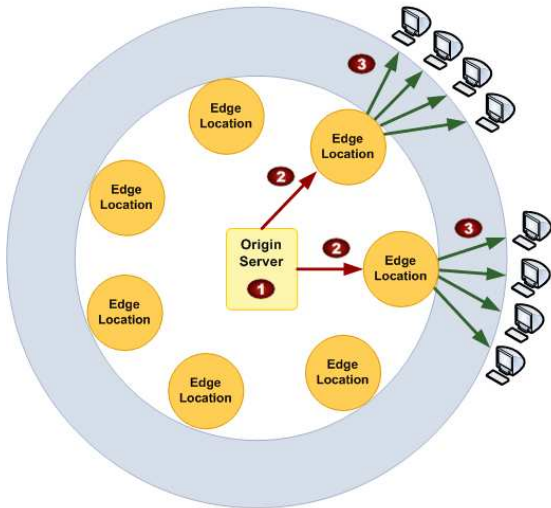
Location: <http://momjian.us/flower/flower.jpg>  
Type: JPEG Image  
Size: 3,264.5 KB (3,342,844 bytes)  
Dimensions: 2,800px × 2,052px (scaled to 252px × 185px)

Block Images from momjian.us

Media Preview: Save ⚙...



# 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 'Services' and 'Edit' dropdown menus, and a user profile for 'Christine Mornjian' with 'Global' and 'Help' options. On the left, a 'Navigation' sidebar is visible with 'Distribution' selected, and sub-links for '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 within this yellow box. At the bottom of the page, there is a copyright notice: '© 2008 - 2013, Amazon Web Services, Inc. or its affiliates. All rights reserved.' followed by links for 'Privacy Policy' and 'Terms of Use', and a 'Feedback' button on the right.

# Distribution Settings

Services ▾ Edit ▾ Christine Mornjian ▾ Global ▾ Help ▾

CloudFront > Create Distribution

Step 1: Select delivery method  
Step 2: Create distribution

Origin ID

Restrict Bucket Access  Yes  No

**Default Cache Behavior Settings**

Path Pattern

Viewer Protocol Policy  HTTP and HTTPS  HTTPS Only

Object Caching  Use Origin Cache Headers  Customize

Minimum TTL

Forward Cookies

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# Distribution CNAME

The screenshot shows the Amazon CloudFront console interface. At the top, there is a navigation bar with a logo, 'Services', 'Edit', and user information 'Christine Momjian', 'Global', and 'Help'. Below this is a breadcrumb trail 'CloudFront > Create Distribution'. The main content area is divided into two columns. The left column contains two steps: 'Step 1: Select delivery method' and 'Step 2: Create distribution', with the second step being the active one. The right column is titled 'Distribution Settings' and contains several configuration options: 'Price Class' (set to 'Use All Edge Locations (Best Performance)'), 'Alternate Domain Names (CNAMEs)' (with a text input field containing 'download.momjian.us'), 'SSL Certificate' (set to 'Default CloudFront Certificate (\*.cloudfront)'), 'Default Root Object' (empty text input), 'Logging' (radio buttons for 'On' and 'Off', with 'Off' selected), 'Bucket for Logs' (empty text input), and 'Log Prefix' (empty text input). Each input field has a help icon to its right. At the bottom of the page, there is a copyright notice '© 2008 - 2013, Amazon Web Services, Inc. or its affiliates. All rights reserved.', links for 'Privacy Policy' and 'Terms of Use', and a 'Feedback' button.

Services ▾ Edit ▾ Christine Momjian ▾ Global ▾ Help ▾

CloudFront > Create Distribution

Step 1: Select delivery method

Step 2: Create distribution

### Distribution Settings

Price Class Use All Edge Locations (Best Performance) ⓘ

Alternate Domain Names (CNAMEs) download.momjian.us ⓘ

SSL Certificate Default CloudFront Certificate (\*.cloudfront) ⓘ

Default Root Object ⓘ

Logging  On ⓘ  Off

Bucket for Logs ⓘ

Log Prefix ⓘ

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# Distribution Created

The screenshot displays the AWS Management Console interface for CloudFront Distributions. The top navigation bar includes 'Services', 'Edit', and user information 'Christine Mornjian'. The left sidebar shows the 'Distribution' menu with sub-items 'Private Content', 'How-To Guide', and 'Origin Access Identity'. The main content area is titled 'CloudFront: Distributions' and features a toolbar with 'Create Distribution', 'Distribution Settings', 'Create', 'Enable', 'Disable', 'Show/Hide', 'Refresh', and 'Help'. Below the toolbar, there are filters for 'Any Delivery Method' and 'Any Status', and a pagination indicator '1 to 1 of 1 Distributions'. A table lists the distribution details:

	Domain Name	Origin	Status
<input checked="" type="checkbox"/>	c2mt7vdy560udp.cloudfront.net	external.mornjian.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>'5543cdefdbb1e5b0895a8481cc8956'</ETag>
  <Size>334284</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



*<https://momjian.us/presentations>*

*<https://www.flickr.com/photos/usfwspacific/>*