Introduction to S3

AMAZON SIMPLE STORAGE SERVICE (S3)

1 WHAT IS AMAZON S3?

Amazon S3 is a cloud-based scalable, high-speed, low-cost web service designed for online backup and archiving of data and application programs. S3 allows the users to upload, store and download any file or object up to five Terra bytes (5 TB) in size. Amazon does not impose any limitation on the number of items that a subscriber can store. Amazon S3 provides durability by redundantly storing data on multiple devices in multiple data centers. The data is transferred using Secure Socket Layer and is also automatically encrypted when uploaded. This makes the data highly secure. Amazon S3 Service Level Agreement, ensures the user that they can rely on it when they need it. The user is also allowed to choose the AWS region to minimize latency and cost. Users data is tracked only for billing purposes. Users can create and name a bucket that stores data. Once a bucket is created, infinite amount of data can be stored in a bucket. User can upload as many objects as required into an Amazon S3 bucket. Each object can contain up to 5 TB of data. Each object is stored and retrieved using a unique developer-assigned key. The users can download the data or enable others to do so. The users can also grant or deny access to others who want to upload or download data into their Amazon S3 bucket. Authentication mechanisms can help keep data secure from unauthorized access.[5]

2 WHY IS IT USED?

- Backup and Archiving

  Amazon S3 offers a secure solution for backing up and archiving critical data. Businesses looking to achieve efficiency and scalability within their backup and recovery environments, without the need for an on-premises infrastructure can use s3. Amazon S3s versioning capability can be used to provide even further protection for stored data.

- Content Storage and Distribution

  Amazon S3 provides highly durable and available storage for a variety of content. The entire storage infrastructure can be offloaded to the cloud. Amazon S3s high scalability and pay-as-you-go pricing model is an advantage in handling growing storage needs. The contents can be distributed directly from Amazon S3 or it can be used as an origin store for delivering content to Amazon CloudFront edge locations.

- Big Data Analytics

  Irrespective of the type of data that is stored, Amazon S3 can be used as a big data object store. Amazon Web Services offers a wide range of services to help manage big data by reduction in costs and increasing the speed of innovation.

- Static Website Hosting

  Entire static website can be hosted on Amazon S3 for a lower cost. It is a hosting solution that has high availablity and can scale automatically to meet traffic demands. Amazon S3 reliably serves traffic and handles unexpected peaks without worrying about scaling the infrastructure.

- Cloud-native Application Data

  Amazon S3 provides high performance and high availability of storage that makes it easy to scale and maintain cost-effective mobile and Internet-based apps that run fast. With Amazon S3, any amount of content can be added and accessed from anywhere, so applications can be deployed faster and can reach more customers.

- Disaster Recovery

  Amazon S3s features such as durability, security and global infrastructure offers a robust disaster recovery solution designed to provide superior data protection.[1]

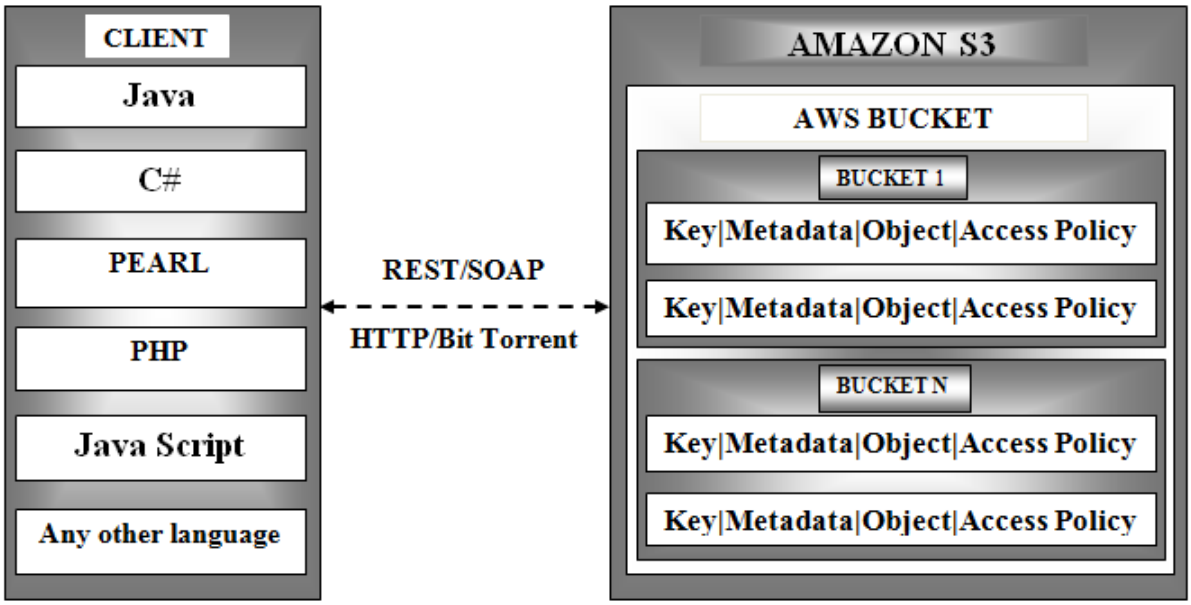


Figure 1: Architecture of Amazon S3

3 ARCHITECTURE

As depicted in the above diagram, Amazon S3 uses web services interfaces such as REST, SOAP, and BitTorrent to provide storage services. It stores data with an object storage architecture. Buckets and objects can be created, listed and retrieved using a REST-style HTTP interface or a SOAP interface. the In addition, HTTP GET interface and the BitTorrent protocol can be used to download the objects.

3.1 Buckets

A bucket is a container for objects. A bucket has a name, owner, Access Control Policy and a location. Buckets cannot contain other buckets. AWS limits each user to create up to 100 buckets but, there is no limitations on number of objects that can be stored within a bucket.

3.2 Bucket Names

When creating a bucket , specify the name of the bucket which should be unique. If trying to create a bucket with a name that already exists, then BucketAlreadyExists error message will be displayed. A buckets name cannot be changed after it is created. Making a new bucket and copying the contents of the old bucket in to it is also allowed. Rules to be followed while naming a bucket

- Bucket names can only contain lowercase letters, numbers, periods, underscores , and dashes.
- Bucket names must start with a number or letter.
- Bucket names must be 3 to 255 characters long.
- Bucket names cannot be in an IP address style (e.g., 192.168.5.4)

3.3 S3 Objects

An S3 Bucket is a container for S3 Objects. An S3 Object is just a container for data. Amazon S3 has no knowledge of the contents of the objects. It just stores it as a bunch of bits. Each object must belong to a bucket and should also have a key, owner, value, meta-data and an Access Control Policy.

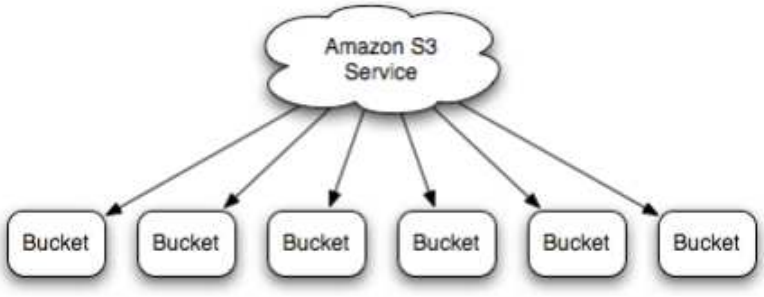


Figure 2: Buckets in Amazon S3

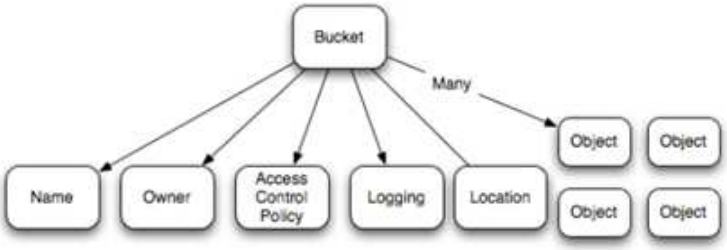


Figure 3: Bucket description

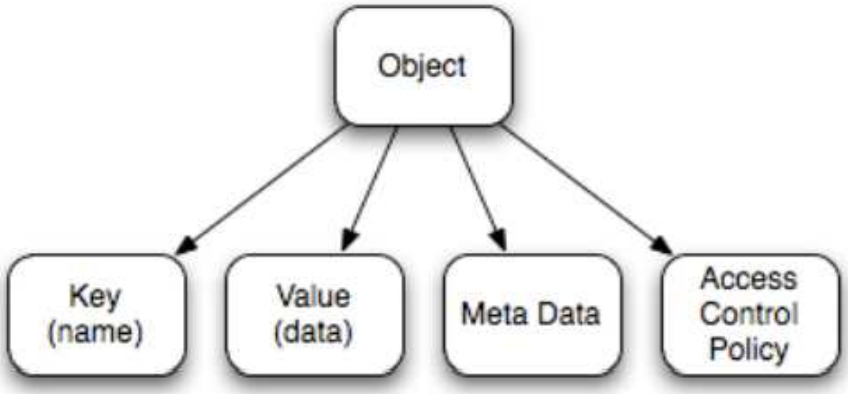
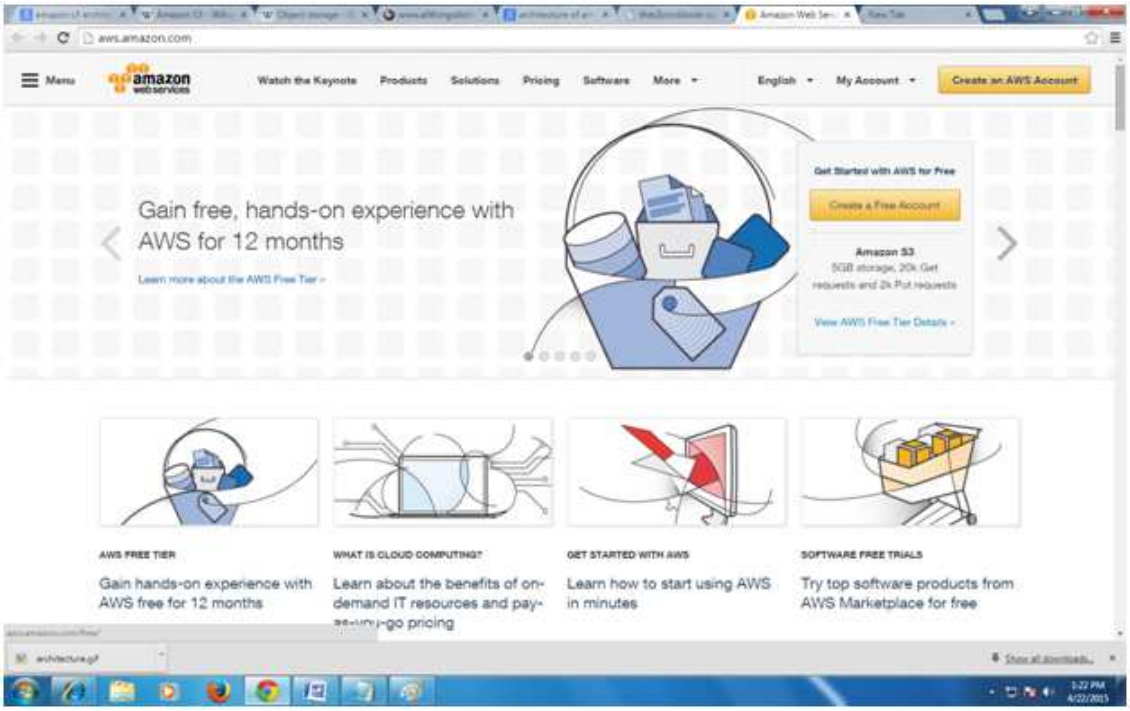


Figure 4: Object description



3.4 Object Keys

An objects key is its name. The name cannot be changed after it has been created and must be unique within a bucket. An Objects key can be any sequence ranging from 0 to 1024 Unicode UTF-8 characters. This means that you can have a key with a name of length zero, that is an empty string.

3.5 Object Values

The value, which is a sequence of bytes, is the data that an object contains.

3.6 Access Control Policies

Both buckets and objects have Access Control Policies (ACP). An Access Control Policy defines who can do what to a given Bucket or Object. The list of grants on that object or bucket forms the ACP. Each grant gives a specific user or group of users (the grantee) a permission on that bucket or object. Grants can only give access. An object or bucket without any grants on it is un-readable or writeable.[3]

4 Accessing Amazon S3

4.1 Singing up for AWS

Signing up for any of the Amazon Web Services is a two step process.

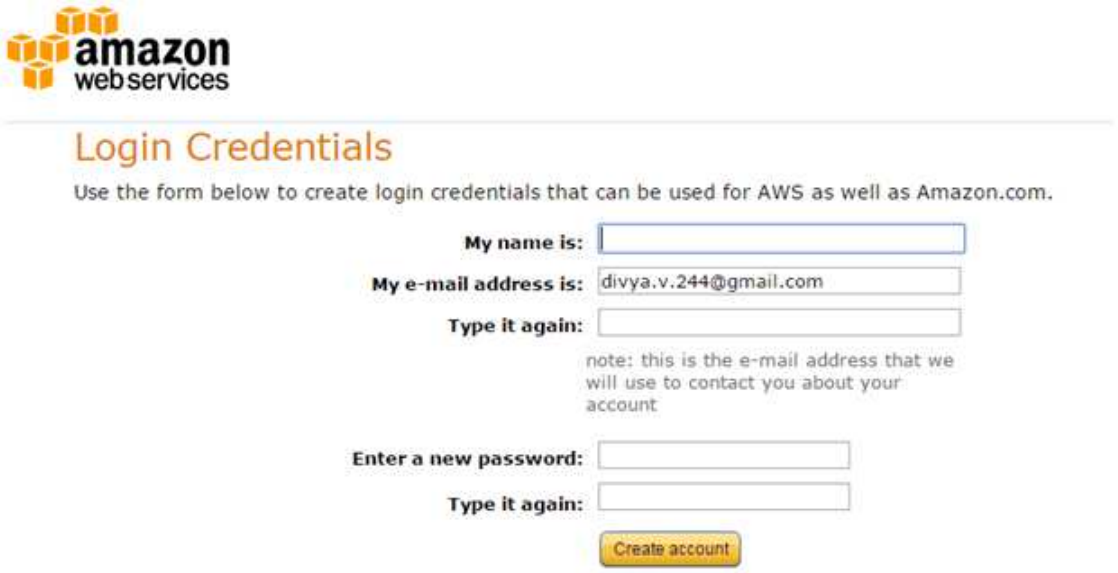
1. Sign up for an Amazon Web Service Account.
2. Sign up for that specific service.

Signing up for Amazon Web Services

- Go to http://aws.amazon.com.
- Select “create an aws account” on right side of the screen.
- click on “create free account”.

Fill in the details and select "I am a new user" and sign in.

Then you will be directed to the screen to enter the login credentials as shown below.

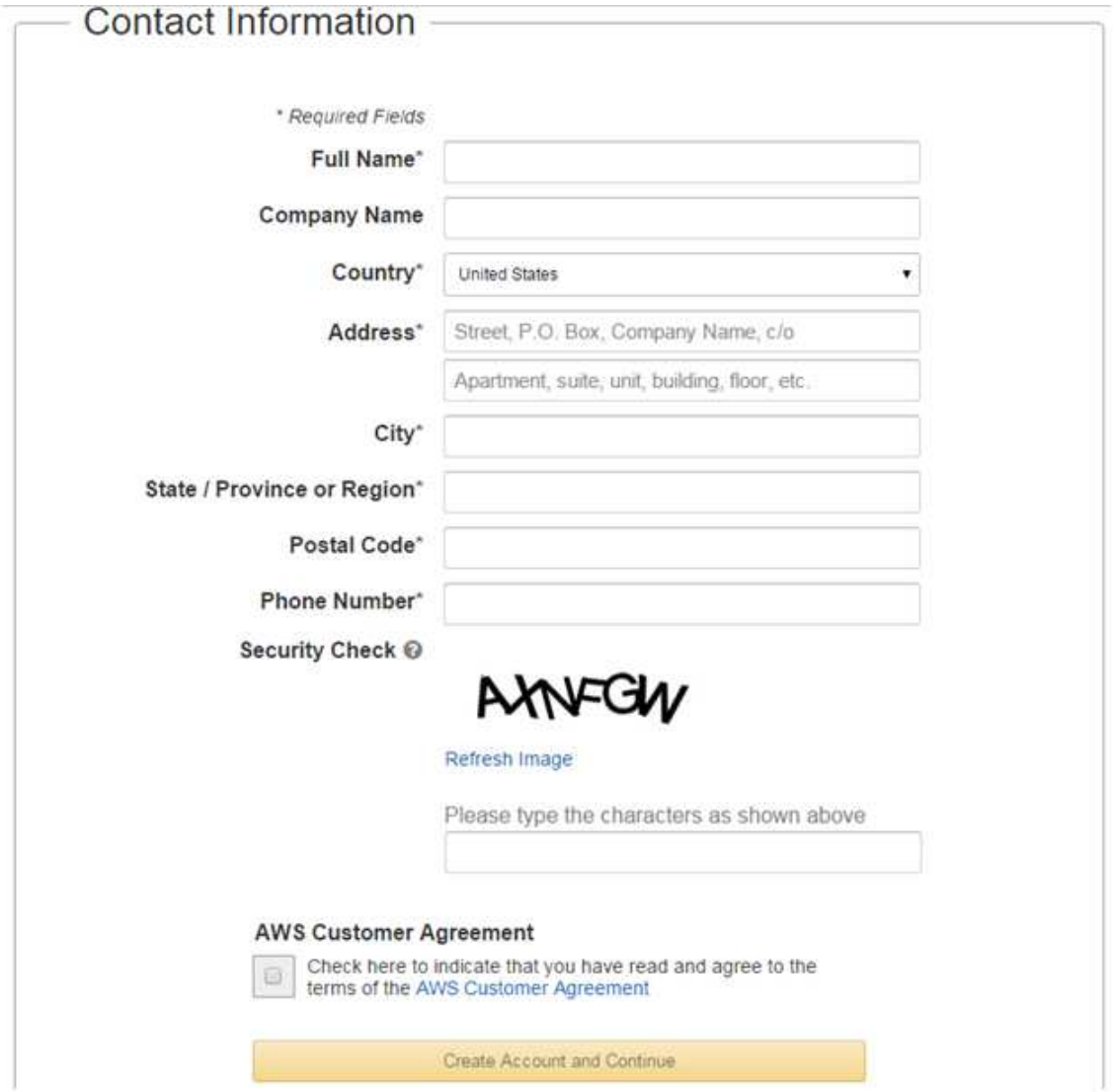


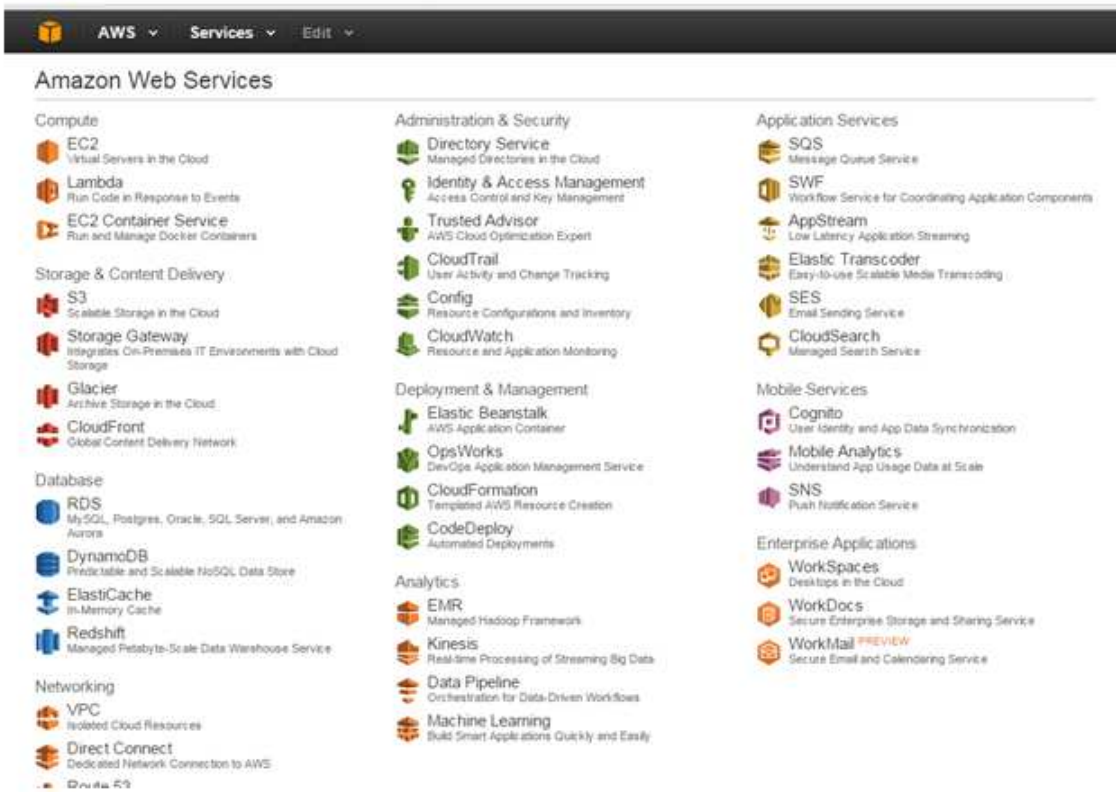
- Fill in the details and select "I am a new user" and sign in.
- You will be directed to the screen to enter the login credentials as shown in the screenshot below.
- Enter all the information and click create account.
- Fill in all the credit card details correctly and then you will be getting a confirmation mail.
- You can now activate your account through the mail and your AWS account will be created successfully.
- Once the account has been created successfully you can enter the email address and password to sign in
- You will be taken to a page with a set of links to all of the different Amazon Web Services.
- Click on the 'Amazon Simple Storage Service' link.
- Then Select S3.

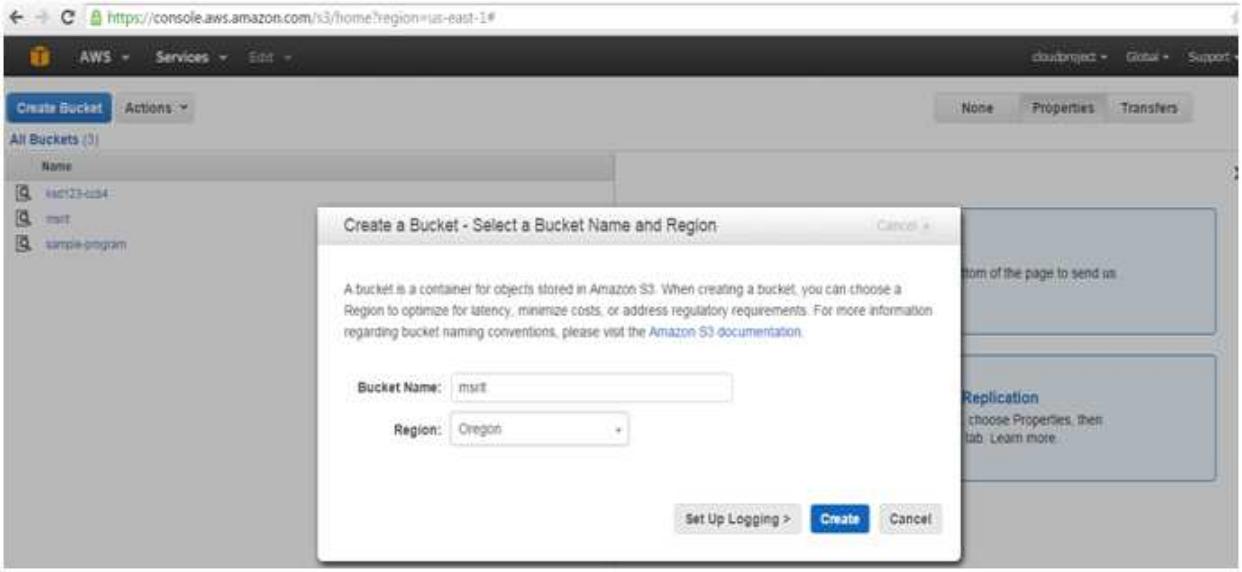
4.2 Creating and deleting a bucket

To create bucket

- Click Create Bucket.
- In the Bucket Name field, specify a name for the bucket
- In the Region field, select a region
- Click Create
- To add objects select the bucket and click on upload option and then you can add the files or images as required.
- To move objects from one bucket to another, click on bucket and select the object that you need to move and then right click a menu appears and select copy option. Select the bucket where you want to move the object and click on paste.
- To delete an object Select the object or the bucket and right click and select delete option from the menu.

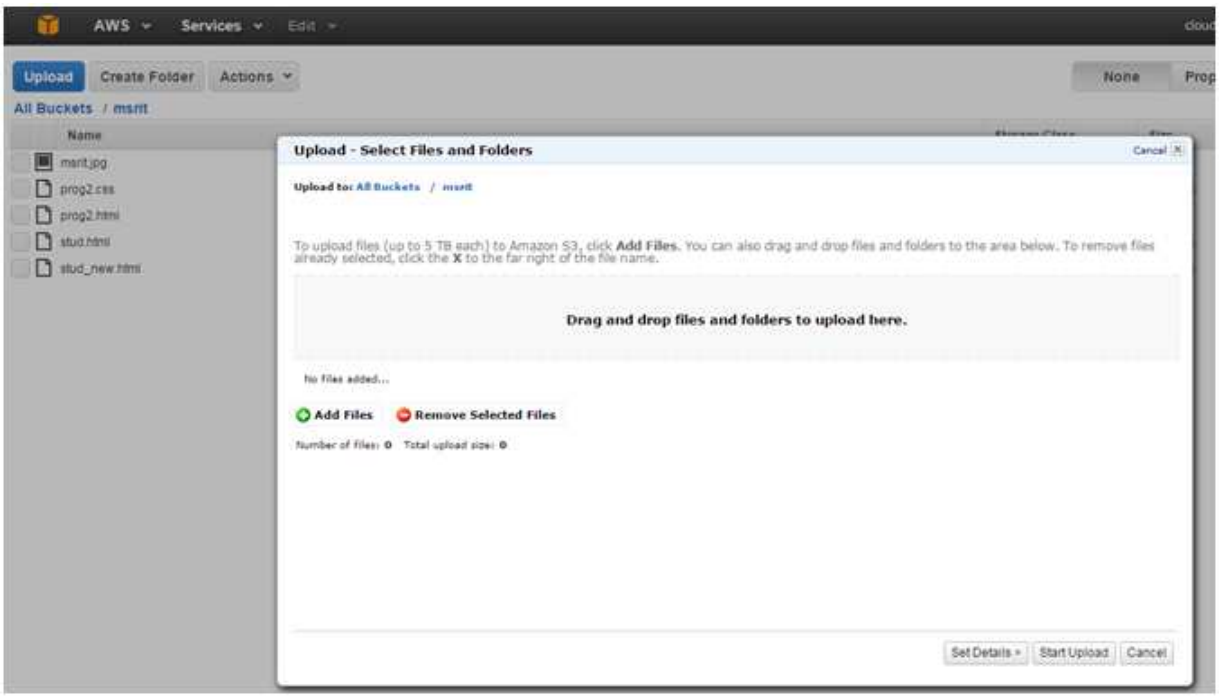

Contact Information
* Required Fields
Full Name*
Company Name
Country*
United States
Address*
Street, P.O. Box, Company Name, c/o
Apartment, suite, unit, building, floor, etc.
City*
State / Province or Region*
Postal Code*
Phone Number*
Security Check
AXNFGW
Refresh Image
Please type the characters as shown above
AWS Customer Agreement
Check here to indicate that you have read and agree to the terms of the AWS Customer Agreement
Create Account and Continue


AWS
Services
Edit
Amazon Web Services
Compute
EC2
Virtual Servers in the Cloud
Lambda
Run Code in Response to Events
EC2 Container Service
Run and Manage Docker Containers
Storage & Content Delivery
S3
Scalable Storage in the Cloud
Storage Gateway
Integrates On-Premises IT Environments with Cloud Storage
Glacier
Archive Storage in the Cloud
CloudFront
Global Content Delivery Network
Database
RDS
MySQL, Postgres, Oracle, SQL Server, and Amazon Aurora
DynamoDB
Predictable and Scalable NoSQL Data Store
ElastiCache
In-Memory Cache
Redshift
Managed Petabyte-Scale Data Warehouse Service
Networking
VPC
Isolated Cloud Resources
Direct Connect
Dedicated Network Connection to AWS
Administration & Security
Directory Service
Managed Directories in the Cloud
Identity & Access Management
Access Control and Key Management
Trusted Advisor
AWS Cloud Optimization Expert
CloudTrail
User Activity and Change Tracking
Config
Resource Configurations and Inventory
CloudWatch
Resource and Application Monitoring
Deployment & Management
Elastic Beanstalk
AWS Application Container
OpsWorks
DevOps Application Management Service
CloudFormation
Templated AWS Resource Creation
CodeDeploy
Automated Deployments
Analytics
EMR
Managed Hadoop Framework
Kinesis
Real-time Processing of Streaming Big Data
Data Pipeline
Orchestration for Data-Driven Workflows
Machine Learning
Build Smart Applications Quickly and Easily
Application Services
SQS
Message Queue Service
SWF
Workflow Service for Coordinating Application Components
AppStream
Low Latency Application Streaming
Elastic Transcoder
Easy-to-use Scalable Media Transcoding
SES
Email Sending Service
CloudSearch
Managed Search Service
Mobile Services
Cognito
User Identity and App Data Synchronization
Mobile Analytics
Understand App Usage Data at Scale
SNS
Push Notification Service
Enterprise Applications
WorkSpaces
Desktops in the Cloud
WorkDocs
Secure Enterprise Storage and Sharing Service
WorkMail PREVIEW
Secure Email and Calendaring Service


https://console.aws.amazon.com/s3/home?region=us-east-1#
AWS
Services
Edit
cloudproject
Global
Support
Create Bucket
Actions
None
Properties
Transfers
All Buckets (3)
Name
Create a Bucket - Select a Bucket Name and Region
Cancel
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:
msrit
Region:
Oregon
Set Up Logging >
Create
Cancel
Replication
choose Properties, then
tab. Learn more.


AWS
Services
Edit
Create Bucket
Actions
None
Properties
Transfers
All Buckets (3)
Name
ksd123-ccb4
msrit
sample-program


AWS
Services
Edit
Upload
Create Folder
Actions
None
Properties
Transfers
All Buckets / ksd123-ccb4
Name
Storage Class
Size
Last Modified
The bucket 'ksd123-ccb4' is empty


AWS
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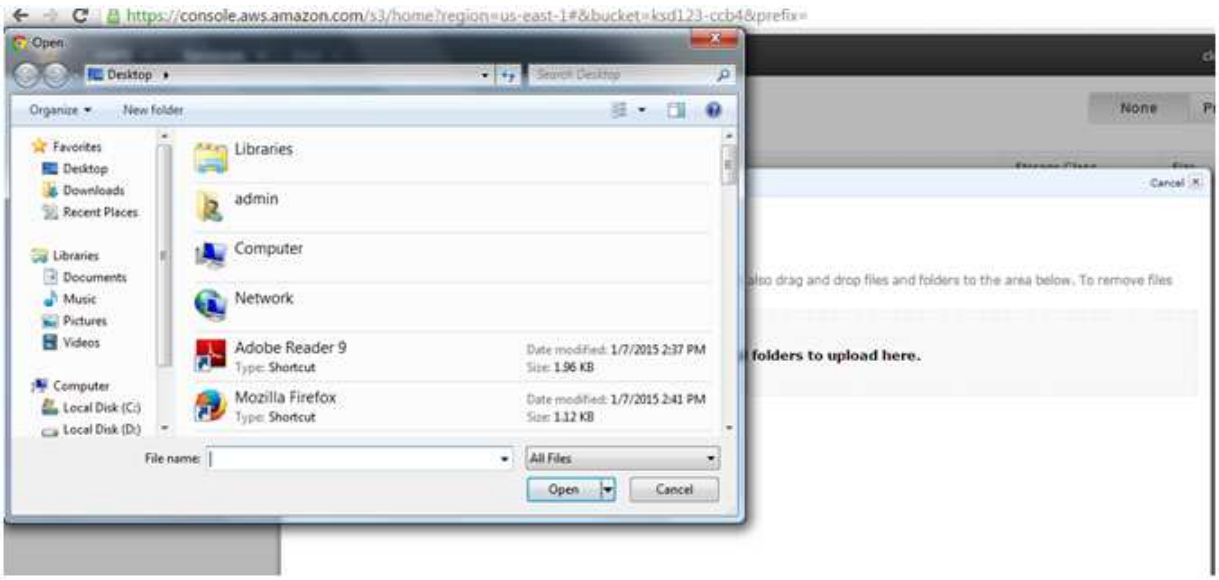
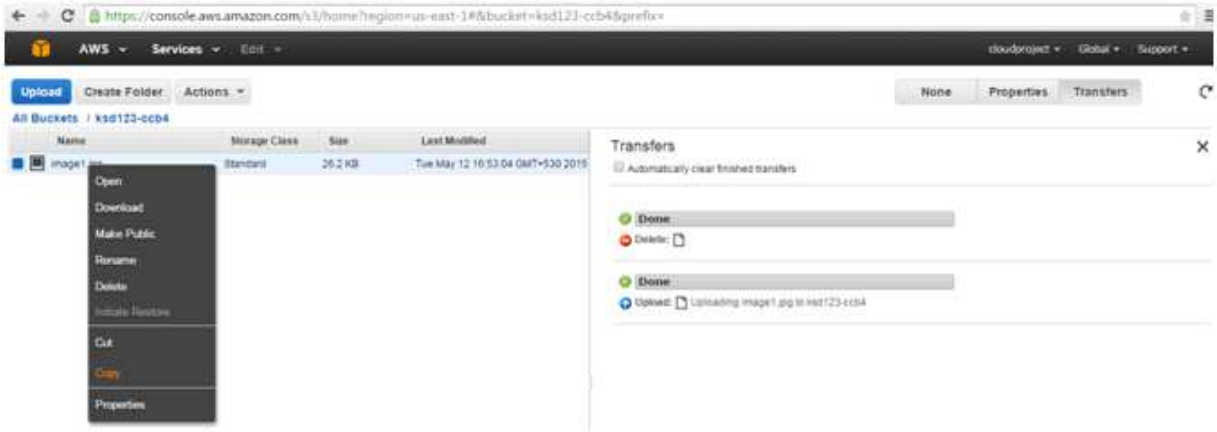
Actions
None
All Buckets / msrit
Name
msrit.jpg
prog2.css
prog2.html
stud.html
stud_new.html
Upload - Select Files and Folders
Cancel
Upload to: All Buckets / msrit
To upload files (up to 5 TB each) to Amazon S3, click Add Files. You can also drag and drop files and folders to the area below. To remove files already selected, click the X to the far right of the file name.
Drag and drop files and folders to upload here.
No files added...
Add Files
Remove Selected Files
Number of files: 0 Total upload size: 0
Set Details
Start Upload
Cancel


https://console.aws.amazon.com/s3/home?region=us-east-1#&bucket=ksd123-ccb4&prefix=
Open
Desktop
Search Desktop
Organize
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Local Disk (C:)
Local Disk (D:)
Libraries
admin
Computer
Network
Adobe Reader 9
Type: Shortcut
Date modified: 1/7/2015 2:37 PM
Size: 1.96 KB
Mozilla Firefox
Type: Shortcut
Date modified: 1/7/2015 2:41 PM
Size: 1.12 KB
File name:
All Files
Open
Cancel
None
Cancel
folders to upload here.


AWS
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All Buckets / ksd123-ccb4
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Storage Class
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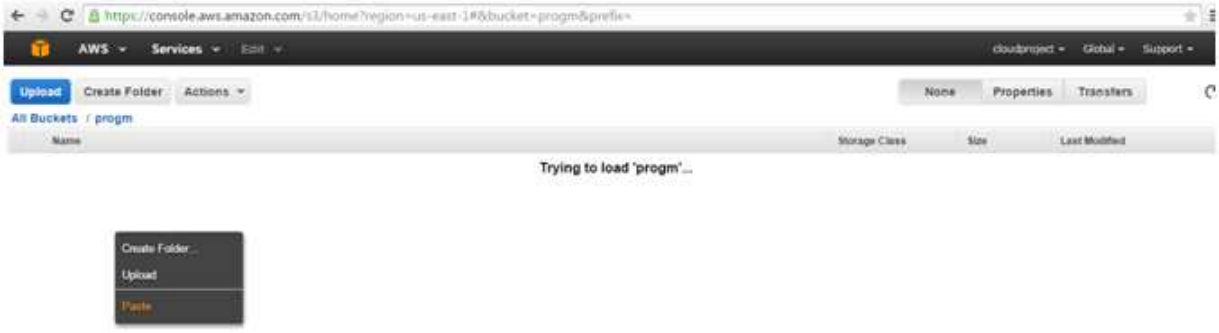
AWS
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Actions
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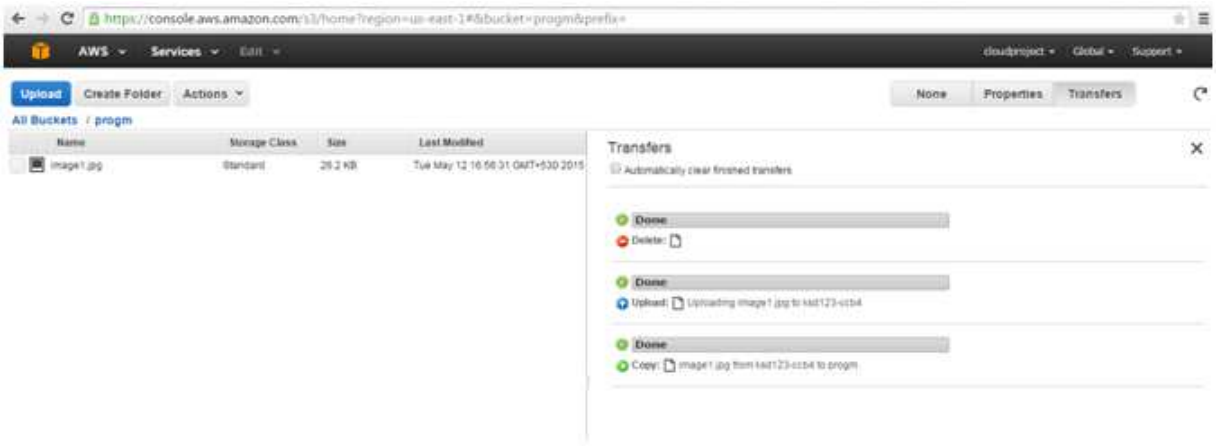
All Buckets / progm
Name
Storage Class
Size
Last Modified
Trying to load 'progm'...
Create Folder...
Upload
Paste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Create Folder
Actions
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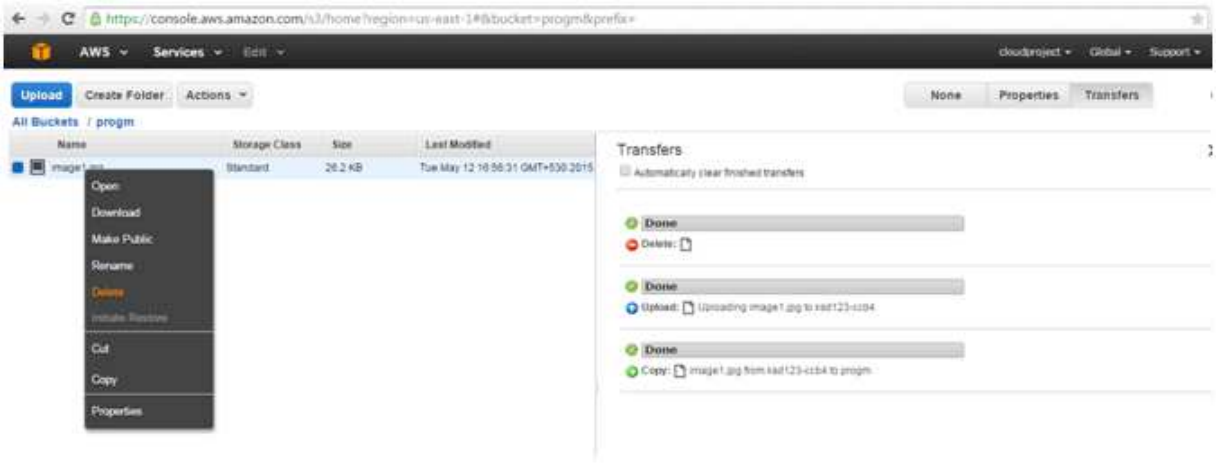
Transfers
All Buckets / progm
Name
Storage Class
Size
Last Modified
image1.jpg
Standard
26.2 KB
Tue May 12 16:56:31 GMT+530 2015
Transfers
Automatically clear finished transfers
Done
Delete:
Done
Upload:
Done
Copy: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All Buckets / progm
Name
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Size
Last Modified
Standard
26.2 KB
Tue May 12 16:56:31 GMT+530 2015
Open
Download
Make Public
Rename
Delete
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Copy
Properties
Transfers
Automatically clear finished transfers
Done
Delete:
Done
Upload:
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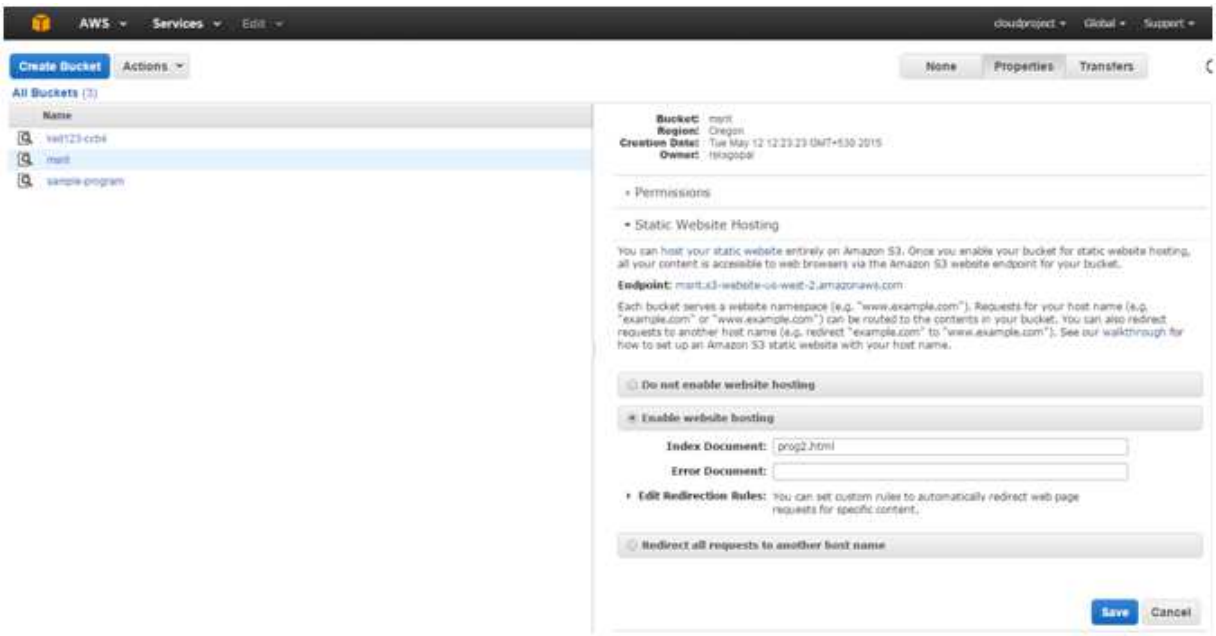
Copy:


AWS
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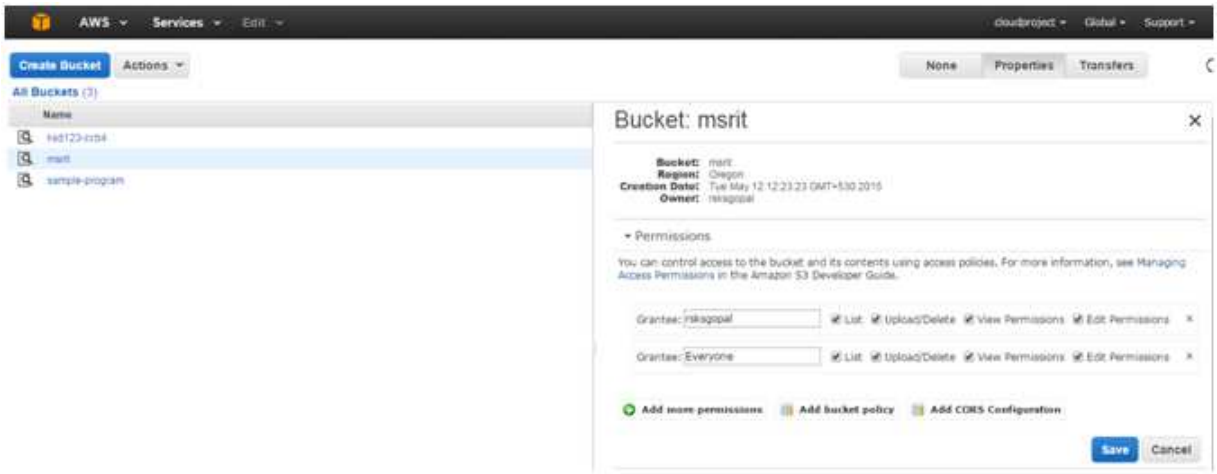
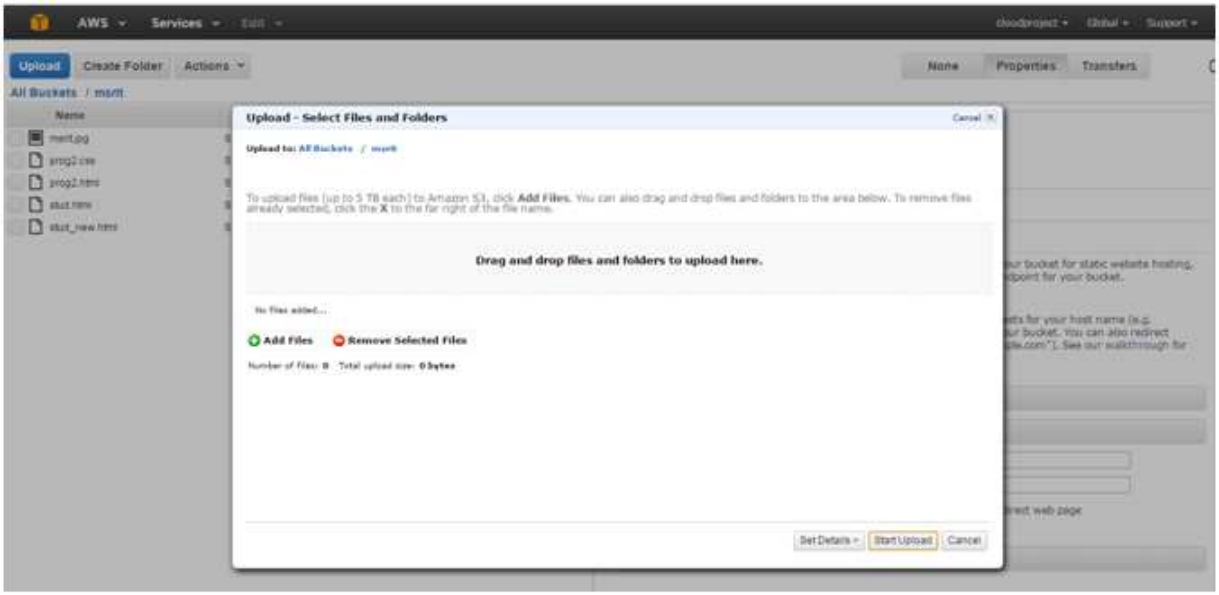
cloudproject
Global
Support
Create Bucket
Actions
None
Properties
Transfers
All Buckets (3)
Name
Bucket:
Region:
Creation Date:
Owner:
Permissions
Static Website Hosting
Endpoint:
Do not enable website hosting
Enable website hosting
Index Document:
prog2.html
Error Document:
Edit Redirection Rules:
Redirect all requests to another host name
Save
Cancel


AWS
Services
Edit
cloudproject
Global
Support
Create Bucket
Actions
None
Properties
Transfers
All Buckets (3)
Name
Bucket: msrit
Bucket: msrit
Region: Oregon
Creation Date: Tue May 12 12:23:23 GMT+530 2015
Owner: rekagopal
Permissions
You can control access to the bucket and its contents using access policies. For more information, see Managing Access Permissions in the Amazon S3 Developer Guide.
Grantee: rekagopal
List
Upload/Delete
View Permissions
Edit Permissions
Grantee: Everyone
Add more permissions
Add bucket policy
Add CORS Configuration
Save
Cancel


AWS
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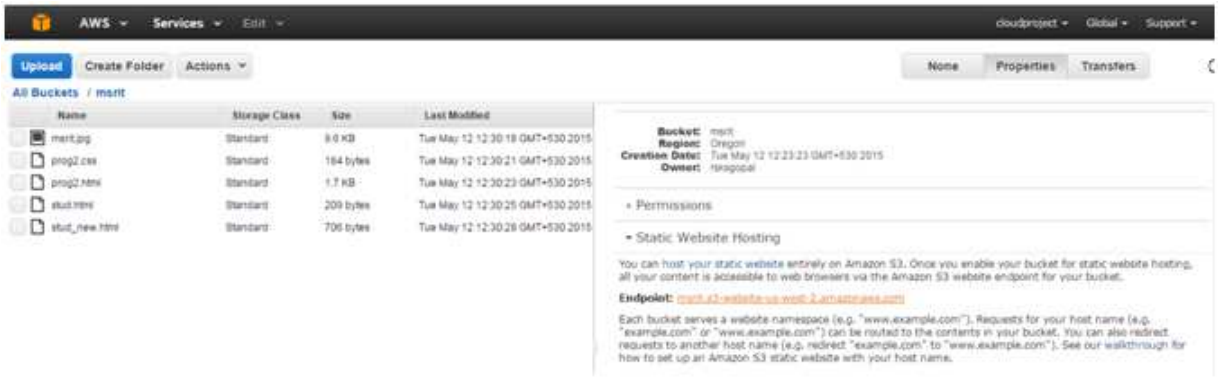
Support
Upload
Create Folder
Actions
None
Properties
Transfers
All Buckets / msrit
Name
Upload - Select Files and Folders
Cancel
Upload to: All Buckets / msrit
To upload files (up to 5 TB each) to Amazon S3, click Add Files. You can also drag and drop files and folders to the area below. To remove files already selected, click the X to the far right of the file name.
Drag and drop files and folders to upload here.
No files added...
Add Files
Remove Selected Files
Number of Files: 0 Total upload size: 0 bytes
Set Details
Start Upload
Cancel



4.3 Hosting a static website

- Create the bucket.
- Go to properties on the right side of the screen and select static web hosting
- Add the source html document in the field named index document.
- Then click save.
- Set permissions for the bucket.Make sure permissions are set to everyone.
- Then click save.
- Add the corresponding files by selecting upload button on the top left corner of the screen.
- Select the files by clicking on add files then click on start upload.
- Once the upload is completes the added files will appear as objects of the bucket.
- Finally go to properties option of the bucket and click on link shown on endpoint.

The website will be hosted.[4][2]

5 CASE STUDY

PINTEREST

Pinterest is a free website that requires registration to use. Users can upload, save, sort, and manage images, known as pins, and other media contents, like videos and images, through collections known as pin boards. Pinterest acts as a personalized media platform. Users can browse the content of others on the main page. Pinterest has rapid growth and currently has 48 million users. Pinterest was able to scale its business because it was built on Amazon Web Services (AWS). With a company of fewer than 12 employees, Pinterest didnt want to dedicate staff time to managing a data center. Instead, Pinterest uses AWS to manage a high-performance social application that stores more than 8 billion objects and 400 terabytes of data in the AWS Cloud using Amazon Simple Storage Service (Amazon S3). The company now has about 80 million objects stored in S3, which holds about 410 terabytes of user data.

msrit.s3-website-us-west-2.amazonaws.com

Welcome to MSRIT

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M. S. Ramaiah Institute of Technology (MSRIT) is an autonomous private engineering college located in Bengaluru, Karnataka and is affiliated to the Visvesvaraya Technological University headquartered at Belgaum, Karnataka, India.[1] The college was established in 1962. From Aug 2007, MSRIT has been academically autonomous for both Under Graduate and Post Graduate Programs.[2] While VTU will still award the degrees, the college has academic freedom in framing its own schemes of study, curricula and student evaluation. MSRIT offers undergraduate and graduate courses of study and research including Bachelor of Engineering, Bachelor of Architecture, Master of Technology, Master of Business Administration and offers programs leading to award of PhD in various disciplines. In 2013, MSRIT was ranked 16th best engineering College in India by India Today and Neilson.[3] The same survey also rated the college as the best in Karnataka. MSRIT is also a research centre in 12 areas including engineering and management disciplines. MSRIT is the only engineering college in Bangalore that is autonomous for both undergraduate and postgraduate courses.

msrit.s3-website-us-west-2.amazonaws.com/stud_new.html

Enter your details:

Name: soumya
Age: 24
Email: soumya@gmail.com
Branch: ISE
Password: •••
Re-enter: •••
Submit Clear

The page at msrit.s3-website-us-west-2.amazonaws.com says:

Submitted

OK

NASDAQ OMX

NASDAQ OMX is the largest exchange company in the world and currently owns and operates 24 markets, three clearing houses and five central securities spanning six continents. The Global Data Products division focuses on creating innovative products for institutional retail and individual investor customers.

Customers use Market Replay on the trade support desk to validate client questions; compliance officers use it to validate execution requirements and rate National Market System (NMS) compliance; and traders and brokers use it to look at certain points in time to view missed opportunities or, potentially, unforeseen events. Rather than using a database, the exchange is storing text files at Amazon. Amazon S3 enables them to deliver hundreds of thousands of small files per day to AWS, and then back to the customer, in seconds which is an ideal solution at a low cost.

References

[1] *http://aws.amazon.com/s3/.*

[2] *http://davidwalsh.name/hosting-website-amazon-s3.*

[3] *http://docs.aws.amazon.com/AmazonS3/latest/dev/WebsiteHosting.html.*

[4] *http://www.smalldatajournalism.com/projects/one-offs/using-amazon-s3/.*

[5] Donald Robinson. *Amazon Web Services Made Simple: Learn how Amazon EC2, S3, SimpleDB and SQS Web Services enables you to reach business goals faster.* Emereo Pty Ltd, 2008.