

DiCloud user guide

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1. What is DiCloud?

DiCloud is a testbed that allows users to **experiment** with [Amazon Web Service](#) cloud resources in the context of the National Science Foundation's [Global Environment for Network Innovations](#) (GENI) project. DiCloud interfaces with a prototype GENI [control framework](#). More information about the DiCloud project is available [here](#).

1.1 How does DiCloud work?

DiCloud gives the user access to the following resources:

- [Elastic Compute Cloud](#) (EC2) instances: servers with local storage that are accessible through the Internet via a public IP address and from other EC2 instances via a local private IP address.
- [Simple Storage Service](#) (S3) buckets: a bucket is a storage space varying from 1 byte to 5 GB that can store objects. The objects can only be accessed through a put/get interface.
- [Elastic Block Storage](#) (EBS) volumes: EBS is a Network Attach Storage (NAS) that can be mounted and accessed by only one EC2 instance at a time. Any filesystem can be created on an EBS volume.

A limited budget is allocated for the resources that are monitored in real time using [Amazon CloudWatch](#). Once the allocated budget has expired, resources are automatically revoked and experiments are stopped until further funding is available.

1.2 How do I get an account?

Send an email to dicloud@cs.umass.edu to request an account.

2. First login

The DiCloud home page is located at <http://geni.cs.umass.edu/vise/dicloud.php>

Use the login and password that has been provided by the administrator.

Username
Password

Login

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How do I get an account?

Send an email to dycloud@cs.umass.edu to request an account.

If your login is successful, you will reach your home page that looks like:

Hi **geni**, you are logged into the DiCloud testbed's web portal! Follow the simple steps below to request access to VISE's nodes. We also recommend reading our **FAQ** for more information on the interfaces for accessing each sensor

Current resources

EC2 leases:

No current EC2 lease

EBS leases:

No current EBS lease

S3 leases:

No current S3 lease

Request new resources

[Request new EC2 servers](#)

[Request new S3 buckets](#)

[Request new EBS volumes](#)

Administration functions

[Edit User Information](#)

Email dicloud@cs.umass.edu if you experience any problem..

2.1 Update your password

Click on the 'Edit User Information' button from your home page. Then click on the 'Change password' link next to your user name to update your password. If you don't have administrator rights, you will have to logout and log in again with your new password.

Edit user information

User id	Name	Password	Certificates
13	geni	Change password	3 certificates Download your keypair

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem..

2.2 Download your keypair

The keypair is a key that is need to SSH into EC2 instances. Each instance that will be launched on your behalf will only be accessible using your keypair.

Click on the 'Edit User Information' button from your home page.

Then click on the Download your keypair' link next to your user name. A page similar to the following one will appear:

Here is your EC2 keypair

Copy this keypair in `~/.ec2/geni` and make sure the file is only accessible by you (`chmod 600`)

You will be able to use that keypair to connect to EC2 instances you have started by using: `ssh -i geniroot@ec2-xx-xxx-xx-1.amazonaws.com`

```

KEYPAIR geni f6:e8:de:8f:13:60:67:b1:e1:fb:b2:1d:f9:a6:8e:e8:37:03:69:c2 -----BEGIN RSA PRIVATE KEY-----
MIIEowIBAAKCAQEA1omwPNMsO9AEriHsvCohU1hP/0uGmAZP/gGA4SdgEZihBL4PINM261oXdHBL
RD3IDIO14OnfhjXd8Dtv+2NjA45ITIN9kZESH+M1S9lqz2sUpsGBOchJMtupYyvGxTCd+oZ0re15
jez7kwJ5z1xUzhgb4TogdUa8+daOjt3XE6tJtFHVcSXc/lG8cZQW/y3xsEX3p8o94F3u2HMYYYHhy
eN4xwEpXKAKG/hNrLJJBEPZi9RXuhwXkmWnmyMv/+nwWrPKJRFQ9bCYF4IK6YnYFKaWYRtmkeMe
l+d+HgINQUApzoM8CWbUcrzq7jkyr/TH+k97HQwVuQkV93b0pU7W/wlDAQABAoIBAQCVLUSLif7z
Y/q+WRM3eTSUjUYB4qCTf05Me8TafxmwdMQtUSxx/l7GVg3io3azfuxvyau3SjYRNnRFCdvBitP
1xDfcQsCNouvH+5f3cr6TLxTIYQsM1+ZuIVKZe9rCjSk4O8bKeJsQgp10rq11/WjR0pUkQr51+Xs
twY2n+vDsUQ4hVIsaEVtFvH4Hs0C5NQh56nGFET88JW+MNVG4oCkloyuGB4Qlyq3492APPLtUafn
u0dWxOgjtLfs4HxdISPZV2vbZDcU9XTUfId7F6Rr4Nv6Vy2NiAeUt5aKjHlxuSemSVIW+PB87XO
Yu9CUZSgil7n0D1tbNTCXseQYmKRAoGBAP3zA4en/p/wGZpcxJSxNjk0fwkMm6bwAFDh0Vzg1Dty
1nQii6sDFLILJQL2L4EezmZa4jPZQ1VCHgt5A7EE7Og1D6jicUBGTdrPrKzb0caNCN4dNvKsEMb HRTK0t6F/8yKCDyXrMty
/mEyG6CWqFBLkZAoGBANhFMytZDh+4EveDk+az
W6pZMMleoc1NRydH9bdPLBWUOIBkzGWK31U8WnNFqbp1WEg82il9apqBHmxGYEV7qnNdcqE+s8NE
aDelTGqPCx3m1mi8YAFqa7jJrWTY2SPM587VpgeJQf9UO3XEzfkV3NLsQWeqRTvryEzyUX3w19vX
AoGAAWsQA/vuMhp3KiOGfYXX1W3zn6tQWzhP6CO6tZgT11km1XMz8HqN7RL8VZdTWlxR29p9fUAb
QI3NNE6dTW/O5Fvrk4X6SP1eIK6mpPzXJEAbNm9/x5J0NYu7N9iCIPgCm7PRo/T85A35g1qzgzCO
VUUwHVm3n6E7Th7p2oxvoFECgYAnG6Rcl1d9fuDXJ1D4d9iMnmJHF7i0kIPak5WoV0XGhS4OcaVQ
dONb23UTwTYnBI85SN++fvJnDBA/Th6ckfdJs01GQTqhrU/csG1xzYgaxy8hcvqlZ7zJG0ZfmkN
o0EL0vCaDkUD8exqqHMCpuRus9BD+bNZLAERgQQhfQrbswKBgDuQZiPc/wYDkXN9TsFBDq5H+Wk
lqZCbZRmtMEEVFqKNL6ulDn2l/x5wRHSsyrLh1EIQdFrZgk69lwWS/LWPRF1ZXJflw7gtpdiXDN
Q+eN6vi51ww8TVsqleiT7HkQH+G86jAjc0Qgx6ox/jXDZAUAXcodnmKqepwOOaTqaGO5 -----END RSA PRIVATE KEY-----

```

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

Copy/paste this entire key, including the `-----BEGIN RSA PRIVATE KEY-----` and `-----END RSA PRIVATE KEY-----` lines into `~/.ec2/yourlogin`. Next, it is important to change the permissions of your keypair file, or else EC2 will not let you connect to it via SSH. To do this, just type the following in your `~/.ec2` directory:

```
$ chmod 600 ~/.ec2/yourlogin
```

You will be able to log into your EC2 instances using a command line like:
`ssh -i yourlogin root@ec2-xx-xxx-xx-xx.compute-1.amazonaws.com`

Note that the `-i` parameter is the name of the keypair (which is your login) and not the name of the file. If you try to give the path to the certificate file, ssh will fail.

3. Using EC2 resources

To use EC2 servers, simply click on the 'Request new EC2 servers' on your home page. Select the kind and number of instances you need as follows:

• You are logged as user geni

[Logout](#)

Amazon EC2 resources

Provide the information about the EC2 resources you would like to use.

EC2 Instance type

EC2 region

Number of instances (note that each instance will result in a separate lease)

Number of hours

AMI ID

Leases are granted immediately if the budget allows it. Resources are automatically reclaimed at the end of the lease or when the budget has been used, whichever comes first. This means that servers are automatically shutdown when the lease is over or the budget is used.

Requesting leases for 2 m1.small instances with AMI id ami-78f21911 in region us-east-1 for 8 hours

Lease 20 inserted in database.

Lease 21 inserted in database.

[Click here to start your instances](#)

[Back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problems.

DiCloud is funded as part of the National Science Foundation's [Global Environment for Network Innovations \(GENI\)](#)

To start your server instances, you need to click on the link **'Click here to start your instances'**. The leases will then be processed and the instances will be started as needed. The EC2 server will be started and an instance id will be assigned to the server:

The DiCloud Testbed

Checking EC2 leases

Instance id	Instance type	AMI id	Region	Lease start time	Duration (hours)	Status
	m1.small	ami-78f21911	us-east-1	Wed Oct 27 0:14:50 EDT 2010	2	Starting new EC2 Instance for lease 22 Instance Id: i-a6e345cb

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Email dicloud@cs.umass.edu if you experience any problem.

DiCloud is funded as part of the National Science Foundation's [Global Environment for Network Innovations \(GENI\)](#)

It usually takes a while for EC2 servers to start. You can check the status on the instance from your home page by clicking on the 'Check' link of the EC2 instance.

Hi **geni**, you are logged into the DiCloud testbed's web portal! Follow the simple steps below to request access to each sensor

Current resources

EC2 leases:

Instance id	Instance type	AMI id	Region	Lease start time	Duration (hours)	Status
i-a6e345cb	m1.small	ami-78f21911	us-east-1.	Wed Oct 27 0:14:50 EDT 2010	2	Check

EBS leases:

When an instance has been successfully started, you will obtain its IP address in the page generated by following the 'Check' link. Here is an example of the resulting page:

The DiCloud Testbed

Checking EC2 leases

Checking instance id:i-a6e345cb

Instance Id	i-a6e345cb
AMI Id	ami-78f21911
Public name	ec2-50-16-32-140.compute-1.amazonaws.com
Private name	domU-12-31-39-0B-08-F3.compute-1.internal
Public IP	50.16.32.140
Private IP	10.214.15.1
Instance State	running
Instance Type	m1.small
Key pair	geni
Start time	2010-10-27T04:23:21+0000
Availability zone	us-east-1a

Terminate this instance

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

You can connect to the instance above using your keypair (see section 2.2) with a command line like:

```
ssh -i yourlogin root@ec2-50-16-32-140.compute-1.amazonaws.com
```

or

```
ssh -i yourlogin root@50.16.32.140
```

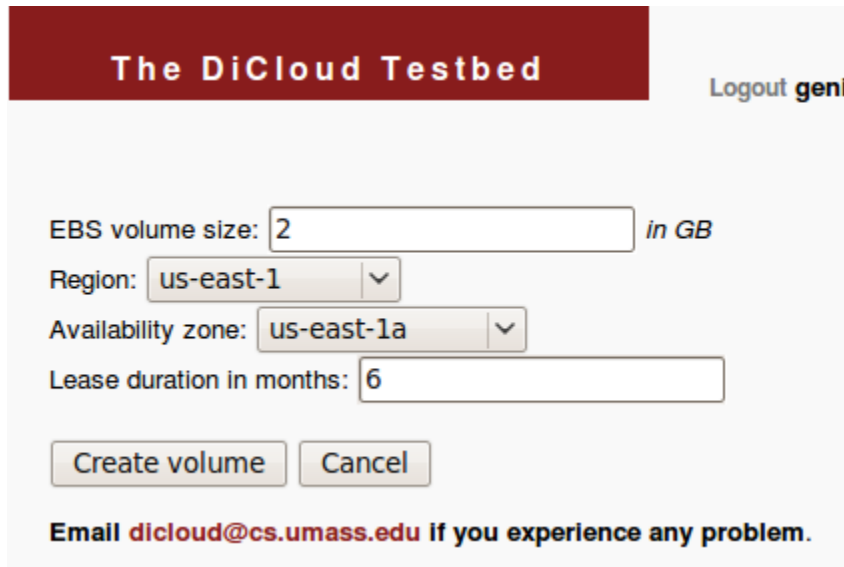
The private IP can be used to communicate with other EC2 instances.

You can also force to terminate this instance (kill the virtual machine) by clicking the 'Terminate this instance' button. You will be able to restart the instance as long as the lease has not expired by clicking the '**Process your leases**' button from your home page.

4. EBS resources

EBS is a network attached storage. It provides a block device that can be attached to a running

instance. To create a new EBS volume, click on the **'Request new EBS volumes'** from your home page.



The DiCloud Testbed Logout **geni**

EBS volume size: in GB

Region: ▼

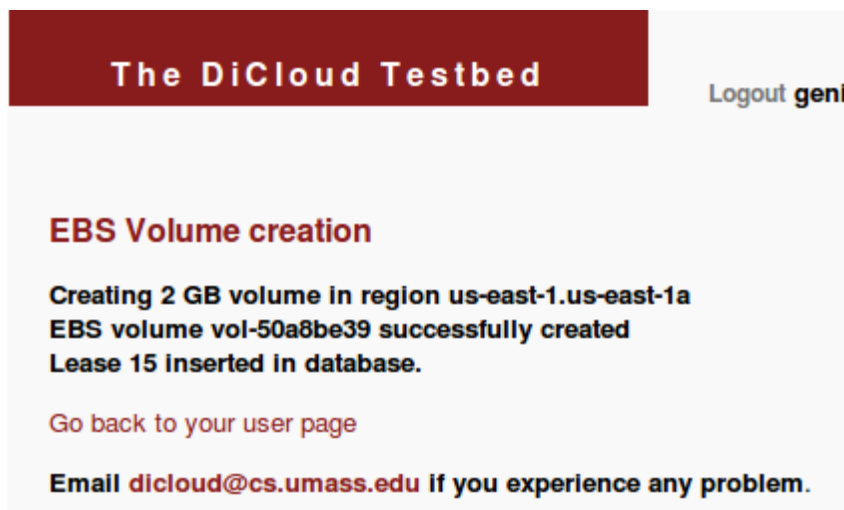
Availability zone: ▼

Lease duration in months:

Email dicloud@cs.umass.edu if you experience any problem.

Note that EBS volumes can only be attached to EC2 instances running in the same availability zone of the same region.

Volumes are created as soon as you click the 'Create volume' button.



The DiCloud Testbed Logout **geni**

EBS Volume creation

Creating 2 GB volume in region us-east-1.us-east-1a
EBS volume vol-50a8be39 successfully created
Lease 15 inserted in database.

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

As soon as the volume is created you can attach it to a running instance. You can check the status of an EBS volume from your home page by clicking on the 'Check' link next to the instance.

Current resources

EC2 leases:

Instance id	Instance type	AMI id	Region	Lease start time	Duration (hours)	Status
i-a6e345cb	m1.small	ami-78f21911	us-east-1.	Wed Oct 27 0:14:50 EDT 2010	2	Check

EBS leases:

Volume ID	Size (In GB)	Region	Date Created	Duration (months)	Operations
vol-50a8be39	2	us-east-1.us-east-1a	Wed Oct 27 0:38:46 EDT 2010	6	Check / Attach / Detach / Delete

Click 'Attach' to attach the volume to a running instance as follows:

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EBS Attach Volume

EC2 instance id to attach to:

Name to give to the device:

Current list of EC2 leases:

Instance id	Instance type	AMI id	Region	Lease start time	Duration (hours)	Status
i-a6e345cb	m1.small	ami-78f21911	us-east-1.	Wed Oct 27 0:14:50 EDT 2010	2	Check

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

You can check the status of the EBS volume to make sure it has been attached properly:

EBS Volume check

Checking volume vol-50a8be39 in region us-east-1

EBS Volume id: vol-50a8be39

Region: us-east-1a

Creation time: 2010-10-27T04:38:42+0000,

Status: in-use/attached

Attached to EC2 instance id: i-a6e345cb

Registered as device : /dev/hdd

Attach time: 2010-10-27T04:44:39+0000]

Done

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

The volume can be detached before the instance it is attached to terminates by clicking the 'Detach' link.

The '**Delete**' link permanently destroys the EBS volume and the associated lease is immediately terminated.

5. S3 usage

S3 buckets can contain a large number of objects (files). The S3 bucket name has to be unique world-wide since it is registered in the Amazon DNS under bucket-name.s3.amazonaws.com.

New buckets can be allocated using the '**Request new S3 buckets**' from the user home page. We recommend to only use 1 bucket per user.

S3 bucket name: *Authorized characters are lowercase us-ascii letters (a-z), digits (0-9), dot (.) and hyphen (-)*

Region: US EU

Lease duration in months:

Email dicloud@cs.umass.edu if you experience any problem.

It is then possible to put or get files in the bucket using the appropriate links from the user home page:

S3 leases:

Bucket	Region	Date Created	Duration (months)	Operations
dicloud-experiment1	US	Wed Oct 27 1:16:10 EDT 2010	2	Check / Put / Get / Delete

The put operation uploads a file to S3 as follows:

S3 upload

Choose file to upload to the bucket:

Name to give to the object:

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

Note that the file is first uploaded to the DiCloud portal and then uploaded to S3. This is why you will see the name of a temporary file during the upload process:

The DiCloud Testbed

Logout [geni](#)

S3 upload

Uploading file /tmp/php2u2q4y as object image1 in bucket dicloud-experiment1

[Go back to your user page](#)

Email dicloud@cs.umass.edu if you experience any problem.

To retrieve a file from an S3 bucket, use the object name (that was given when you did put the file):

The DiCloud Testbed

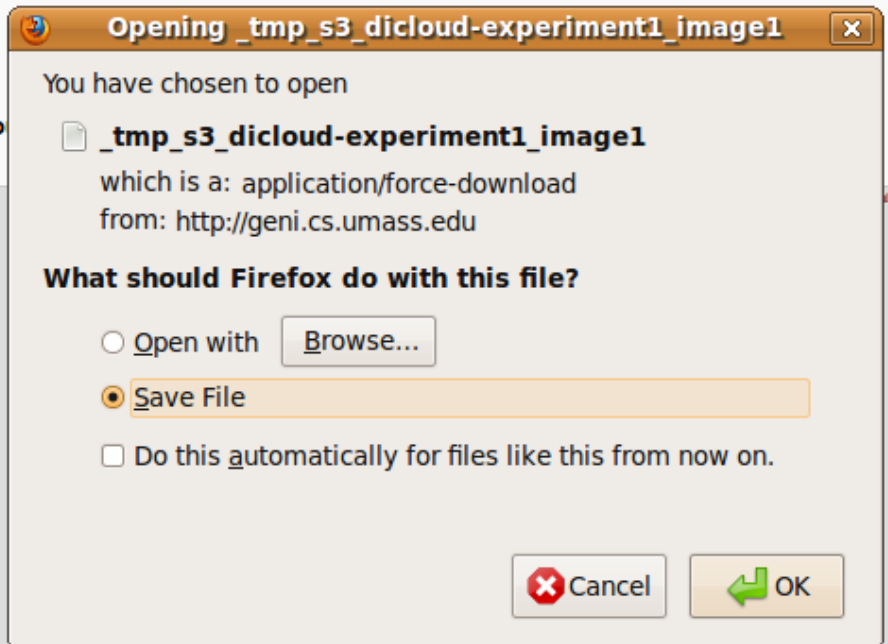
Logout [geni](#)

S3 download

Object name:

[Go back to your user page](#)

Email dicloud@cs.umass.edu if yo



6. Pricing

Currently, only the administrator can see the budget expenses. Here are some indications of the cost of the different operations.

6.1. EC2 instance prices

Each instance is started with CloudWatch for monitoring. The current prices per hour (in USD) are as follows:

CLOUDWATCH = -0.015 per instance per hour.

m1.small,us-west-1=-.095
m1.large,us-west-1=-.38
m1.xlarge,us-west-1=-.76
m2.2xlarge,us-west-1=-.57
m2.xlarge,us-west-1=-1.34
m2.4xlarge,us-west-1=-2.68
c1.medium,us-west-1=-.19
c1.xlarge,us-west-1=-.76

m1.small,us-east-1=-.085
m1.large,us-east-1=-.34
m1.xlarge,us-east-1=-.68
m2.2xlarge,us-east-1=-.5
m2.xlarge,us-east-1=-1.2
m2.4xlarge,us-east-1=-2.4
c1.medium,us-east-1=-.17
c1.xlarge,us-east-1=-.68

m1.small,eu-west-1=-.095
m1.large,eu-west-1=-.38
m1.xlarge,eu-west-1=-.76
m2.2xlarge,eu-west-1=-.57
m2.xlarge,eu-west-1=-1.34
m2.4xlarge,eu-west-1=-2.68
c1.medium,eu-west-1=-.19
c1.xlarge,eu-west-1=-.76

m1.small,ap-southeast-1=-.095
m1.large,ap-southeast-1=-.38
m1.xlarge,ap-southeast-1=-.76
m2.2xlarge,ap-southeast-1=-.57
m2.xlarge,ap-southeast-1=-1.34
m2.4xlarge,ap-southeast-1=-2.68

c1.medium,ap-southeast-1=-.19
c1.xlarge,ap-southeast-1=-.76

The network traffic is charged per GB (to and from the Internet traffic have different costs):

EC2_NETWORK_IN_PER_GB = 0; (-0.10 after Nov 1, 2010)
EC2_NETWORK_OUT_PER_GB = -.15;

6.2. Other prices

S3 storage is billed per GB per month plus the network bandwidth at EC2 pricing. Note that downloading data from S3 has to go through the DiCloud proxy which requires in+out network traffic. Each put and get operation also has a nominal cost.

S3_STORAGE_PER_GB_PER_MONTH = -.15;
S3_PUT_OPERATION = -.01 / 1000;
S3_GET_OPERATION = -.01 / 10000;

EBS is charged per million IOs (read or write) on the volume plus the cost of storage per GB per month (same cost as S3)

EBS_IO_PER_MILLION = -.1;