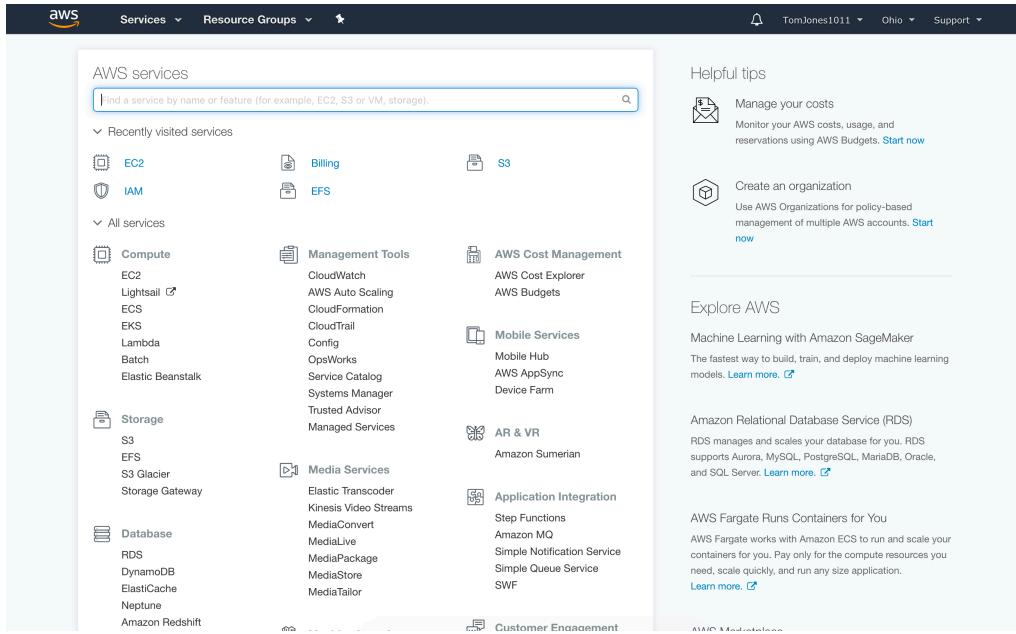


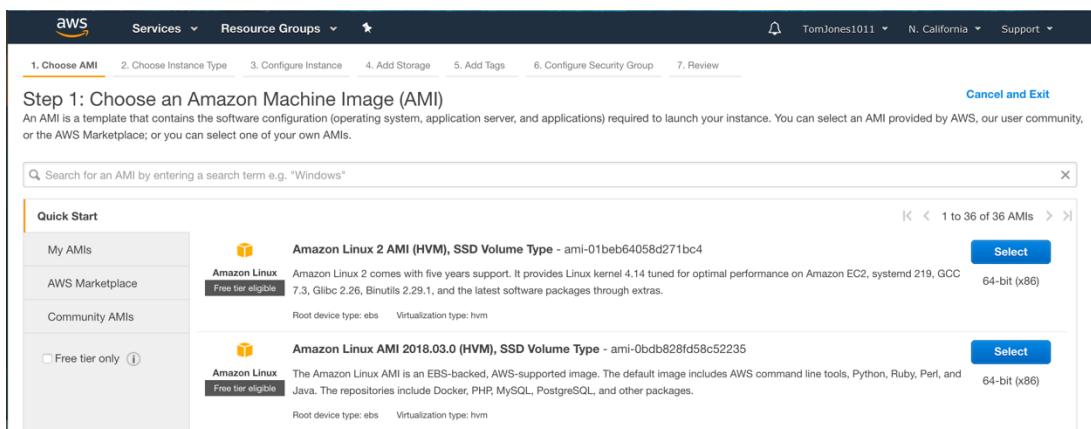
This lab is to introduce Cloud Computing, using the AWS Cloud environment from Amazon. As a participant in this lab, you will not be responsible for setting up your own AWS environment. Your instructor will provide you with information to access AWS.

When you first login to AWS, you will see the AWS dashboard. This is all of the services that are provided. However, you won't have access to all of these services as your instructor will have set up administrative policies to only enable access to certain areas.



The screenshot shows the AWS Management Console dashboard. At the top, there's a search bar with placeholder text "Find a service by name or feature (for example, EC2, S3 or VM, storage)." Below the search bar, there are sections for "Recently visited services" (EC2, IAM, Billing, S3, EFS) and "All services" categorized into Compute, Storage, Database, Management Tools, Mobile Services, Media Services, Application Integration, and Customer Engagement. On the right side, there are "Helpful tips" for managing costs and creating organizations, and "Explore AWS" sections for Machine Learning with Amazon SageMaker, Amazon Relational Database Service (RDS), and AWS Fargate. The overall interface is light-colored with blue links and icons.

On the dashboard, click on the EC2 link. This link will enable us to launch a virtual machine in the AWS environment.



The screenshot shows the "Choose AMI" step of the EC2 instance creation wizard. It displays a search bar with placeholder text "Search for an AMI by entering a search term e.g. "Windows"" and a list of AMIs. The first item listed is "Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-01beb64058d271bc4", which is highlighted with a yellow box. To its right, there are "Select" and "64-bit (x86)" buttons. Below this, another AMI entry for "Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type" is shown. The left sidebar includes sections for "Quick Start" (My AMIs, AWS Marketplace, Community AMIs, Free tier only), "Step 1: Choose an Amazon Machine Image (AMI)", and a note about AMIs being templates for launching instances. The top navigation bar shows "Services", "Resource Groups", and other account details.

Choose the first Amazon API. This is a distribution of Linux, specific to AWS.

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types Current generation Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
<input type="checkbox"/>	General purpose	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	General purpose	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes

Cancel Previous Review and Launch Next: Configure Instance Details

You have many options for the size of your virtual machine. Choose the t2.micro free tier and click Next.

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 Launch into Auto Scaling Group

Purchasing option: Request Spot instances

Network: vpc-9fc1edf8 (default) Create new VPC

Subnet: No preference (default subnet in any Availability Zone) Create new subnet

Auto-assign Public IP: Use subnet setting (Enable)

Placement group: Add instance to placement group

Capacity Reservation: Open Create new Capacity Reservation

IAM role: None Create new IAM role

Shutdown behavior: Stop

Enable termination protection: Protect against accidental termination

Monitoring: Enable CloudWatch detailed monitoring Additional charges apply.

Tenancy: Shared - Run a shared hardware instance Additional charges will apply for dedicated tenancy.

Cancel Previous Review and Launch Next: Add Storage

For the Configure Details page, leave the defaults and click Next.

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/xvda	snap-05316c96935fc40a	8	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel Previous Review and Launch Next: Add Tags

For the Add Storage, leave defaults and click Next.

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.

A copy of a tag can be applied to volumes, instances or both.

Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	(127 characters maximum)	Value	(255 characters maximum)	Instances	Volumes
This resource currently has no tags					

Choose the Add tag button or [click to add a Name tag](#).
Make sure your [IAM policy](#) includes permissions to create tags.

Add Tag (Up to 50 tags maximum)

Cancel Previous Review and Launch Next: Configure Security Group

For the Add Tags, leave defaults and click Next.

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: Create a new security group Select an existing security group

Security Group ID	Name	Description	Actions
sg-08b3efce843d3ea6e	3400	3400	Copy to new
sg-2b630850	default	default VPC security group	Copy to new

Inbound rules for sg-08b3efce843d3ea6e (Selected security groups: sg-08b3efce843d3ea6e)

Type	Protocol	Port Range	Source	Description
HTTP	TCP	80	0.0.0.0/0	
HTTP	TCP	80	::/0	
Custom TCP Rule	TCP	8080	0.0.0.0/0	
Custom TCP Rule	TCP	8080	::/0	
SSH	TCP	22	0.0.0.0/0	
SSH	TCP	22	::/0	
Custom ICMP Rule - IPv4	Echo Request	N/A	0.0.0.0/0	
Custom ICMP Rule - IPv4	Echo Request	N/A	::/0	

[Cancel](#) [Previous](#) [Review and Launch](#)

[Feedback](#) [English \(US\)](#)

For Configure Security Group, your instructor will have set up a 3400 Security Group. Make sure to select this group. You will see that this group will give you the ability to run HTTP (both port 80 and 8080), SSH, and Ping traffic. Click Review and Launch

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

AMI Details [Edit AMI](#)

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-01beb64058d271bc4

Free tier eligible Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras.
Root Device Type: ebs Virtualization type: hvm

Instance Type [Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups [Edit security groups](#)

Security Group ID	Name	Description
sg-08b3efce843d3ea6e	3400	3400

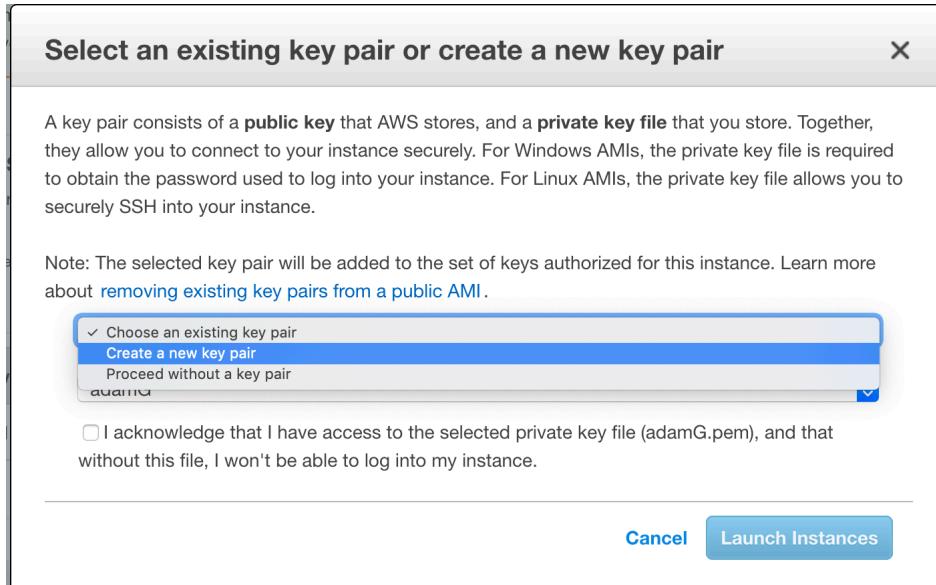
All selected security groups inbound rules

[Cancel](#) [Previous](#) [Launch](#)

[Feedback](#) [English \(US\)](#)

Click Launch

When you click Launch, you will be asked to Choose>Select a key pair.



Create a new key pair and enter your name for the key pair. Download the pem key to your local computer. Once you do this, return to your EC2 Dashboard and find your machine running (you can identify via the key that you just created in the Key Column). In the name column, click on the cell and name your machine.

The screenshot shows the AWS EC2 Dashboard. On the left, there's a sidebar with navigation links like Services, Resource Groups, Events, Tags, Reports, Limits, Instances, Launch Templates, Spot Requests, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, Bundle Tasks, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security, Security Groups, Elastic IPs, Placement Groups, Key Pairs, and Network Interfaces. The main content area is titled 'Launch Instance' and shows a table of instances. The table columns are: Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS (IPv4), and IPv4. There are 12 instances listed, including 'MattGermon...'. Below the table, a detailed view for 'Instance: i-0183f7d2a8a3b384b (MattGermonprez)' is shown. It includes tabs for Description, Status Checks, Monitoring, and Tags. Under 'Description', details like Instance ID, Instance state (running), Instance type (t2.micro), and Elastic IPs are listed. Under 'Status Checks', it shows Public DNS (IPv4) as ec2-52-53-220-156.us-west-1.compute.amazonaws.com, IPv4 Public IP as 52.53.220.156, IPv6 IPs as -, and Private DNS as ip-172-31-27-150.us-west-1.compute.internal.

On the dashboard note your public IP address below. You will need this to access your machine.
Note: this will change every time a server is restarted.

Now that you have your server running, you have your pem key, and you have your IP address, you can login to your machine.

ON MAC

Use your terminal/command tool to navigate to the folder where your pem key is
> chmod 400 YourName.pem

Login to the EC2 instance

> ssh -i "YourName.pem" ec2-user@your.ip.address.here

ON WINDOWS

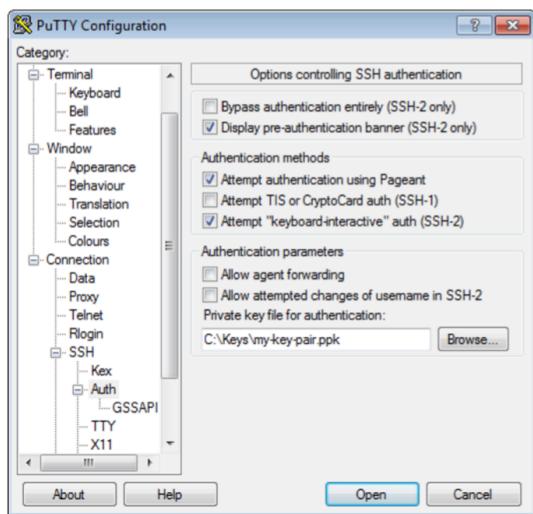
Download Putty and PuttyGen. Using PuttyGen you have to convert the pem key that you have to a ppk key that Putty will understand. There is a tutorial provided from Amazon here:

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/putty.html>

Once you have converted your key to a ppk key, open Putty and in the hostname/address type:

[ec2-user@your.ip.address](#)

Scroll down to connection-SSH-auth and browse to your newly created ppk key.



Before you click Open, you should scroll back up to Terminal and name and save your connection so you don't have to locate your ppk key every time. Click Open.

Whether on a Mac or Windows, you are now logged on:



The screenshot shows a terminal window titled 'KeyPairs — ec2-user@ip-172-30-0-160:~ — ssh -i BenBau.pem ec2-user@54.210.51.6 — 102x26'. The session has three tabs open: a red one, a yellow one, and a green one. The green tab is active and displays the following command-line session:

```
[ec2-user@ip-172-30-0-160 ~]$ exit
logout
Connection to 54.210.51.6 closed.
[Matts-MacBook-Pro-2:KeyPairs mattgermonprez$ ssh -i "BenBau.pem" ec2-user@54.210.51.6
Last login: Tue Nov  1 16:35:24 2016 from 137.48.255.12

[ec2-user@ip-172-30-0-160 ~]$
```

Below the terminal window, there is a small diagram of a terminal icon with the text 'Amazon Linux AMI' next to it.

Now that you are on your AWS cloud instance, you will revisit few of your prior labs. First, you should have noticed a few other servers in your EC2 dashboard. Can you ping the other servers? Are you on the same subnet? Work with a partner in class and see if you can ping each other (you will have to exchange your IP addresses).

Next, we are going revisit the Apache Web Server lab. Install the Apache Web Server and run the server on port 8080. Note that Amazon Linux uses the 'yum install' command and not 'apt install' as we have been doing with Ubuntu.

- 1) Install the Apache web server and run the server on port 8080
- 2) Show the home page on port 8080

In addition to EC2, you are going explore one more component of AWS – The Simple Storage Solution (S3). From your AWS console, you will be able to go to S3. Once logged in, you should see the following dashboard.

The screenshot shows the AWS S3 console interface. At the top, there's a banner about Amazon Glacier offering expedited retrievals. Below the banner, the navigation bar includes 'Services' (dropdown), 'Resource Groups' (dropdown), and user information ('TomJones1011', 'Global', 'Support'). A 'Discover the new console' link and a 'Quick tips' icon are also present.

The main area is titled 'Amazon S3'. It features a search bar labeled 'Search for buckets'. Below the search bar are three buttons: '+ Create bucket', 'Delete bucket', and 'Empty bucket'. The bucket list table has columns: 'Bucket name', 'Access', 'Region', and 'Date created'. There are 3 Buckets (0 Public) and 2 Regions.

Bucket name	Access	Region	Date created
elasticbeanstalk-us-east-1-574443048059	Not public *	US East (N. Virginia)	Aug 13, 2018 2:53:45 PM GMT-0500
elasticbeanstalk-us-west-1-574443048059	Not public *	US West (N. California)	Nov 5, 2018 11:08:50 AM GMT-0600
isqa2320	Not public *	US East (N. Virginia)	Oct 29, 2018 9:15:56 AM GMT-0500

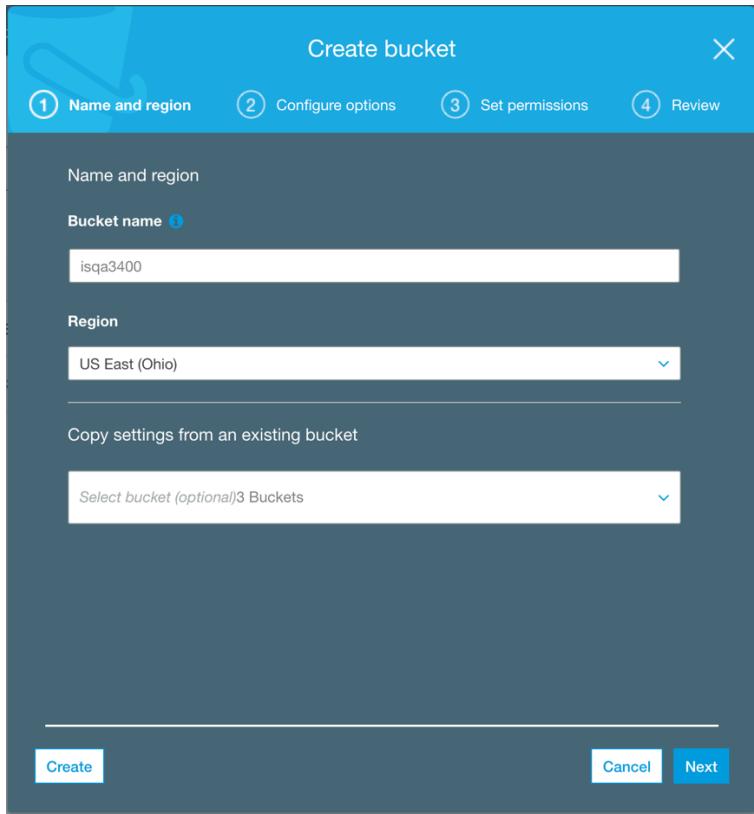
A small note at the bottom left states: '* Objects might still be publicly accessible due to object ACLs. [Learn more](#)'.

At the bottom of the page, there are links for 'Feedback', 'English (US)', and legal notices: '© 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 'Privacy Policy', and 'Terms of Use'.

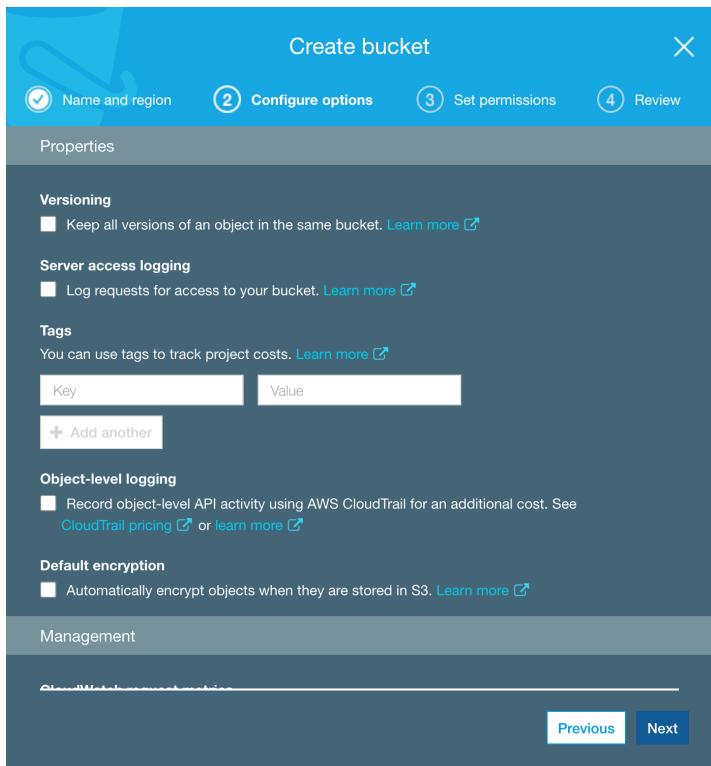
Once in S3, you will see a bucket named isqa3400. You can click on that bucket and you'll see an image of a panda in there. You could download it from the S3 interface but I'd actually like you to download it to your EC2 instance. You can do this very easily via the wget command. Return to your instance and type:

```
> wget https://s3-us-west-1.amazonaws.com/isqa3400/panda.jpg
```

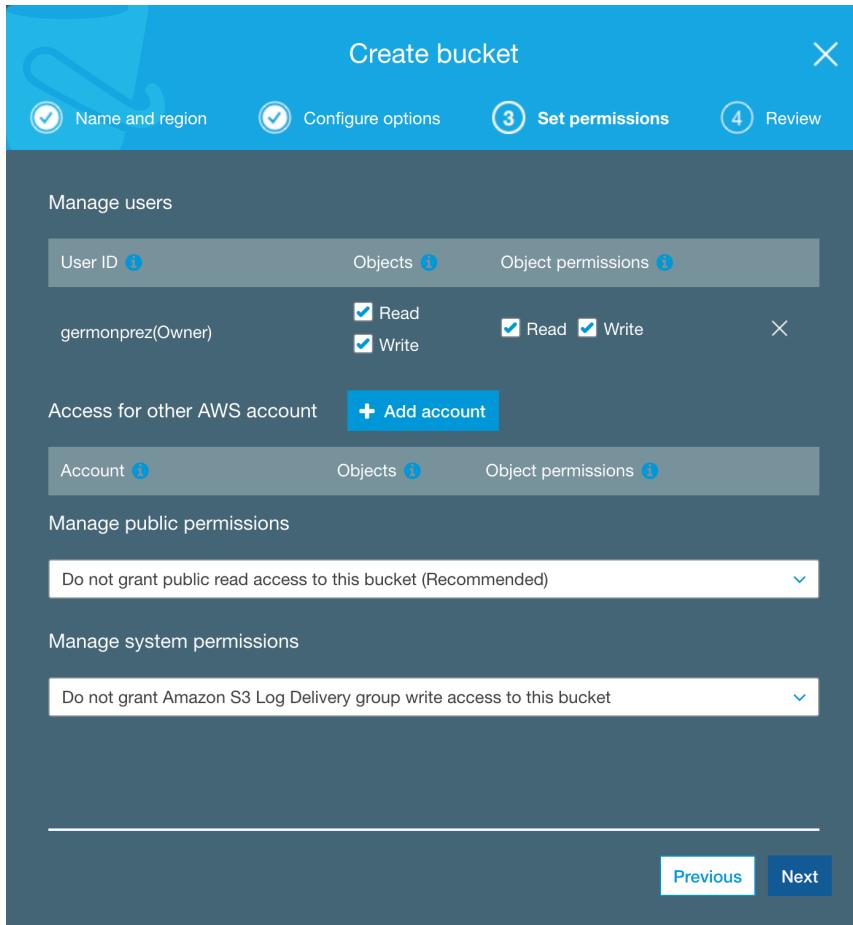
The point is to simply demonstrate the connection of resources in the AWS space. Now, create your own S3 bucket. You are given full S3 access so only modify your own bucket (policy).



Create an S3 bucket (use your name as the Bucket Name as this needs to be globally unique)



Keep defaults and click Next



Keep defaults and click Next and then Create Bucket

Upload a picture (keep all defaults in the upload process) into the S3 bucket (try and keep the image small). Return to your server and try and wget your own and someone else's picture.

Finally, turn your S3 into a static website.

The screenshot shows the AWS S3 console for a bucket named 'isqa3400'. The 'Overview' tab is active. Below it, there are six feature cards:

- Versioning**: Keep multiple versions of an object in the same bucket. Status: Disabled.
- Server access logging**: Set up access log records that provide details about access requests. Status: Disabled.
- Static website hosting**: Host a static website, which does not require server-side technologies. Status: Disabled.
- Object-level logging**: Record object-level API activity using the CloudTrail data events feature (additional cost). Status: Disabled.
- Default encryption**: Automatically encrypt objects when stored in Amazon S3. Status: Disabled.

At the bottom, there's an 'Advanced settings' section with a progress bar showing 0 In progress, 1 Success, and 0 Error operations.

Click the Properties tab of your bucket and then click Static website hosting. Include index.html as the name for the Index Document.

you will have to set the bucket permissions to be public. Add the following in the Permissions tab (change example-bucket with the name of your bucket):

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "PublicReadGetObject",  
            "Effect": "Allow",  
            "Principal": "*",  
            "Action": ["s3:GetObject"],  
            "Resource": ["arn:aws:s3:::example-bucket/*"]  
        }  
    ]  
}
```

The screenshot shows the AWS S3 console with the bucket 'isqa3400' selected. The 'Permissions' tab is active. Below it, the 'Bucket Policy' tab is selected, showing a JSON-based policy document:

```

1  {
2    "Version": "2012-10-17",
3    "Statement": [
4      {
5        "Sid": "PublicReadGetObject",
6        "Effect": "Allow",
7        "Principal": "*",
8        "Action": ["s3:GetObject"],
9        "Resource": ["arn:aws:s3:::isqa3400/*"]
10       }
11     ]
12   }

```

Below the policy editor, there are links for 'Documentation' and 'Policy generator'. At the bottom, a progress bar shows '0 In progress', '1 Success', and '0 Error'.

Accept the warning and save the changes.

Finally, create an index.html and upload it to the bucket – again keep all the defaults in the upload process. See if wget for the index.html page works. Visit the page as identified as the Endpoint in Properties.

The screenshot shows the AWS S3 console with the bucket 'isqa3400' selected. The 'Properties' tab is active. A 'Static website hosting' configuration dialog is open, showing the following settings:

- Endpoint:** http://isqa3400.s3-website.us-east-2.amazonaws.com
- Index document:** index.html
- Error document:** error.html
- Redirection rules (optional):** (empty)
- Options:**
 - Use this bucket to host a website (selected)
 - Redirect requests
 - Disable website hosting

Finally, provide a picture of how you believe resources/policies were administered for this lab.