20 MUST KNOW things about Amazon EC2

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EC2 Service lets you create virtual machines on AWS

1. Each machine is called an **EC2 Instance**
2. **EC2 = E C C (Elastic Compute Cloud)**
3. EC2 instances are elastic, meaning they can instantly grow or shrink to match the requirements of a specific application.
4. You can pay-as-you-go for ec2 instances and per second.

Features of Amazon EC2

- Persistent storage volumes for your data using Amazon **Elastic Block Store (Amazon EBS) volumes** which are elastic in nature and multiple volumes can be added to an instance.
- Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as ***regions*** and ***Availability Zones***
- A **firewall** that enables you to specify the protocols, ports, and source IP ranges that can reach your instances . Also called ***security groups***
- Option of having **Static IPv4 addresses** for dynamic cloud computing, known as ***Elastic IP addresses***
- **Metadata**, known as ***tags***, that you can create and assign to your Amazon EC2 resources
- Various sizes and capacity of servers.

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In order to create an ec2 instance , we have to have an AMI

AMI Stands for **Amazon Machine Image**

AMI is basically an OS image

An Amazon Machine Image (AMI) provides the information required to launch an instance

An AMI includes the following:

- A template for the root volume for the instance (for example, an operating system, an application server, and applications)
- Launch permissions that control which AWS accounts can use the AMI to launch instances
- A block device mapping that specifies the volumes to attach to the instance when it's launched

Types of AMI:

1. AWS Provided AMI’s (free)
2. Community AMI’s (free)
3. AWS Marketplace AMI (free and paid)
4. Your custom AMI’s

Amazon Linux AMI (great for beginners!)

Amazon Linux AMI are supported and maintained Linux images provided by AWS. Some of the features of Amazon AMI's are

- A stable, secure, and high-performance execution environment for applications running on Amazon EC2.
- Provided at no additional charge to Amazon EC2 users.
- Repository access to multiple versions of MySQL, PostgreSQL, Python, Ruby, Tomcat, and many more common packages.
- Regular updates of components and packages like yum
- Includes packages that enable easy integration with AWS services, such as the **AWS CLI, the Boto library** for Python etc.

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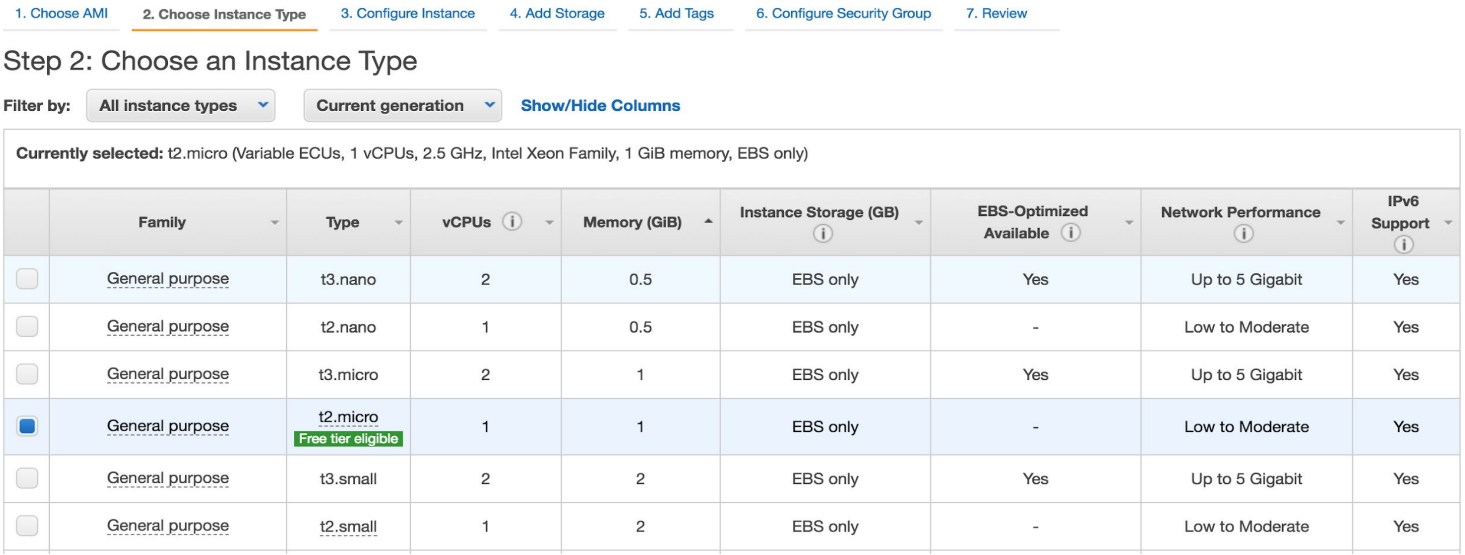
You choose the size of EC2 by selecting a type

There are different types of EC2 instances



1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 2: Choose an Instance Type

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
☐	General purpose	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
☐	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
☐	General purpose	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes
☑	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
☐	General purpose	t3.small	2	2	EBS only	Yes	Up to 5 Gigabit	Yes
☐	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes

1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

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
☐	Memory optimized	x1e.32xlarge	128	3904	2 x 1920 (SSD)	Yes	25 Gigabit	Yes
☐	Memory optimized	x1.32xlarge	128	1952	2 x 1920 (SSD)	Yes	25 Gigabit	Yes
☐	Memory optimized	x1e.16xlarge	64	1952	1 x 1920 (SSD)	Yes	10 Gigabit	Yes
☐	Memory optimized	x1e.8xlarge	32	976	1 x 960 (SSD)	Yes	Up to 10 Gigabit	Yes
☐	Memory optimized	x1.16xlarge	64	976	1 x 1920 (SSD)	Yes	10 Gigabit	Yes

https://aws.amazon.com/ec2/instance-types/

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You need certain things/components to successfully launch an EC2 and log into it

- VPC , Subnet (there are default subnets)
- Security Group
- Key Pair
- Storage (usually EBS)
- AMI
- Instance Type

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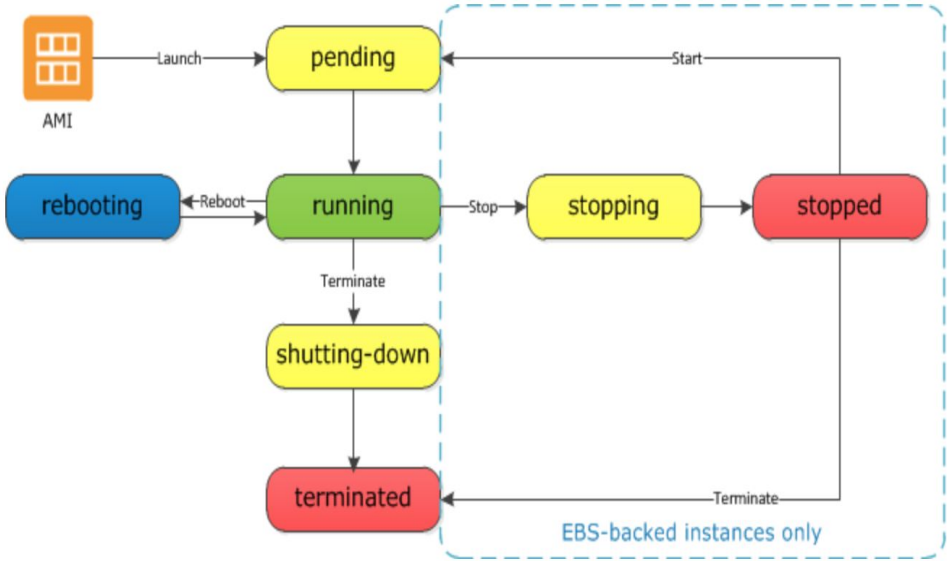
EC2 Lifecycle

You can:

1) Launch EC2
2) Reboot/restart
3) Stop EC2(like shutdown)
4) Hibernate EC2 instance
5) Terminate EC2(release forever)
6) Start EC2(If Stopped)



Differences Between Reboot, Stop, Hibernate, and Terminate

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-instance-lifecycle.html

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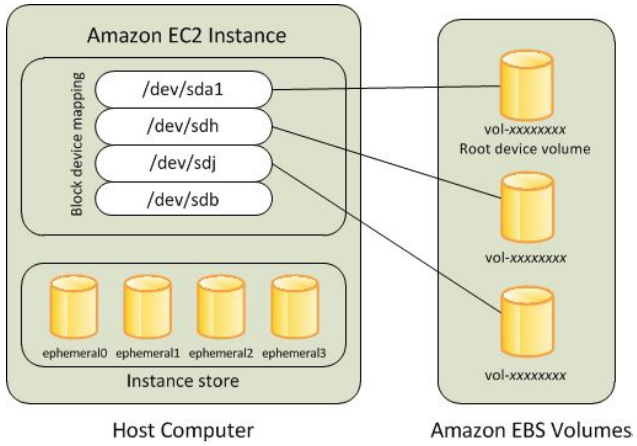
There are 2 kinds of EC2 Storage

1) **Instance Store:** Hard disk is in the host machine. You lose data if EC2 instance is shut down.
2) **EBS Storage:** EBS stands for Elastic Block Storage. EBS one of the two types of storage on AWS. EBS is basically independent of EC2 and is like a networked drive. You can terminate(release forever) an EC2 and still save EBS volumes and use it later.



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EC2 Pricing Model

- **1) On Demand Instances :** Rent it for few seconds/hours/days etc . Pay as you go $$$

- **2) Reserved Instances :** Pay upfront for 1-3 years and save a lot (up to 75%) $$

- **3) Spot Instance:** You bid on them IF available. May terminate with 2 minute notice . uptp 90% cheaper than On Demand Instances $

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EC2 Tenancy : Are virtual machines on a shared host or not?

- **Dedicated (** Needed for compliance and security sensitive needs)
  - **Dedicated Instance** (Your EC2 stays on a host that only is used by you. Host hardware may change)
  - **Dedicated Host**(you literally get a physical machine reserved)
- **Multi-tenant Type** (Cheap and usually secure)

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When an EC2 instance Is stopped

Private IP remains with the EC2 instance

Public IP may change when you restart a stopped instance

The underlying host (physical machine) may change

Differences Between Reboot, Stop, Hibernate, and Terminate

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-instance-lifecycle.html

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EC2 Public IP address and Elastic IP

Elastic IP (EIP) are Static(persistent) IP's that you can create on demand. They are different than the Public IP you get when you launch an EC2 instance (if public IP is enabled) . You can attach EIP to an EC2 instance.

Elastic IP's stay with the instance even when the instance is stopped. This is in contrast to the default Public IP given to instance, which is released after an instance is stopped.

You always pay for EIP if it's not attached to a **running** EC2. So if EC2 is stopped and has Elastic IP , you pay for the EIP.

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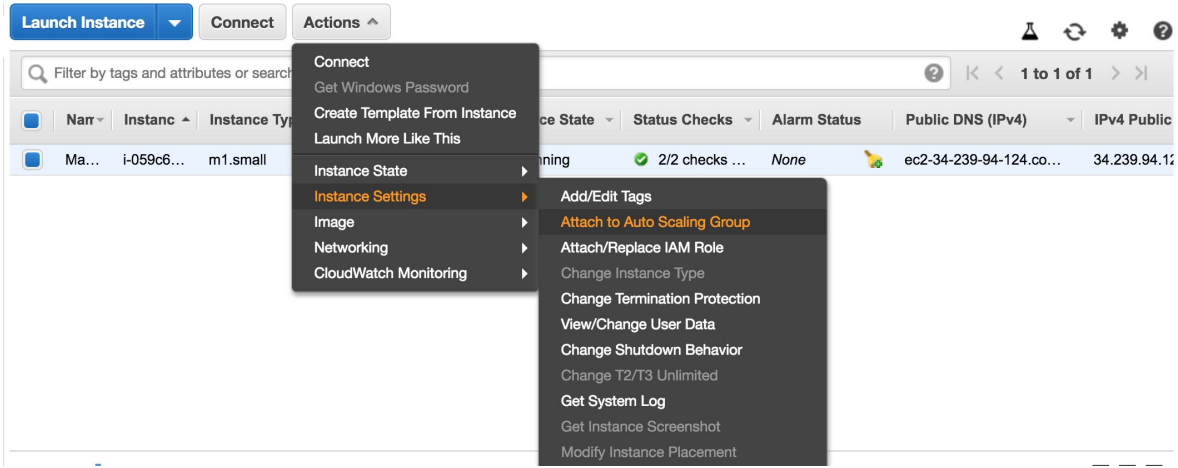
Termination Protection: Easy to launch , easy to destroy

- In order to protect accidental deletion, we can set termination protection on an EC2 Instance. This is an added layer of protection for critical EC2 instance.



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View Instance Metadata

You can access your EC2 instance metadata by accessing the following URL:

```
[ec2-user ~]$ curl http://169.254.169.254/latest/meta-data/
ami-id
ami-launch-index
ami-manifest-path
block-device-mapping/
hostname
iam/
instance-action
instance-id
instance-type
local-hostname
local-ipv4
mac
metrics/
network/
placement/
profile
public-hostname
public-ipv4
public-keys/
reservation-id
security-groups
services/
```

These examples get the value of some of the metadata items from the preceding example.

```
[ec2-user ~]$ curl http://169.254.169.254/latest/meta-data/ami-id
ami-12345678
```

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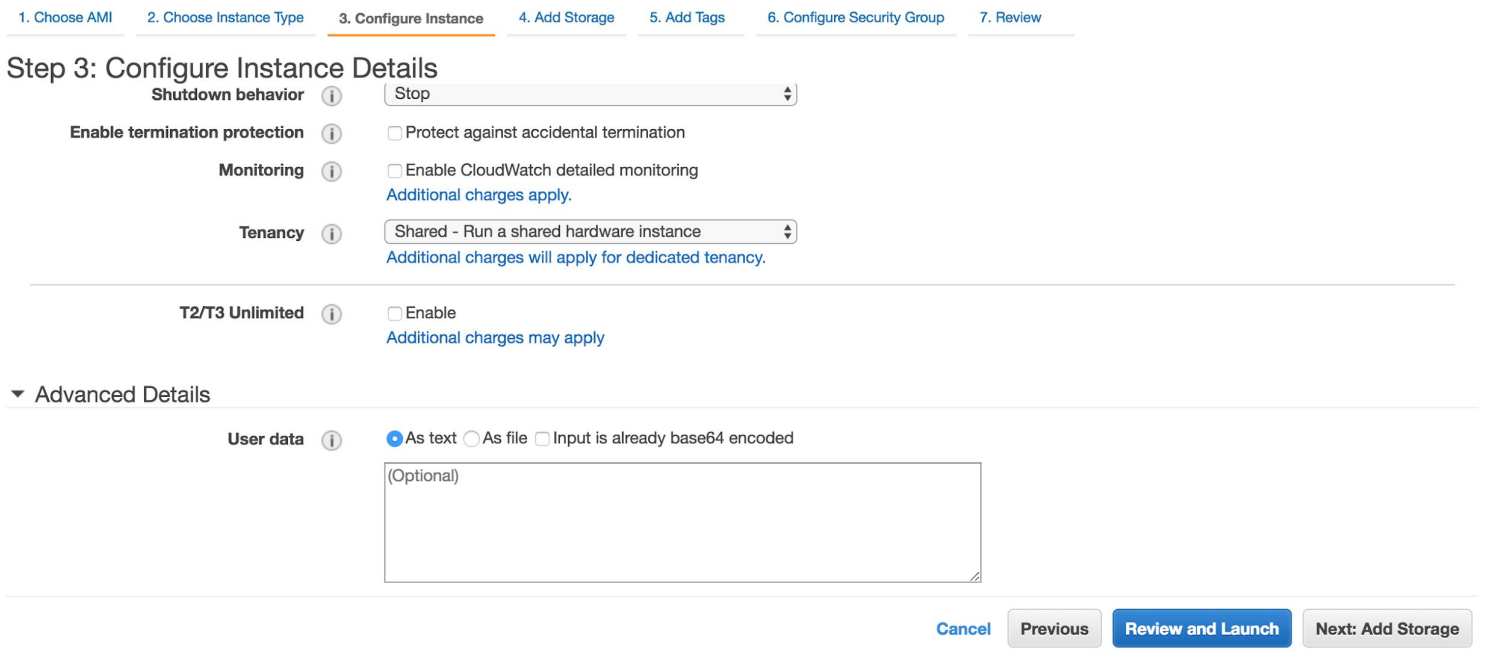
Run Commands on Your EC2 Instance at Launch

You can do this using **Userdata** section. Just pass a script in the userdata box **Tab 3** during the launch process.



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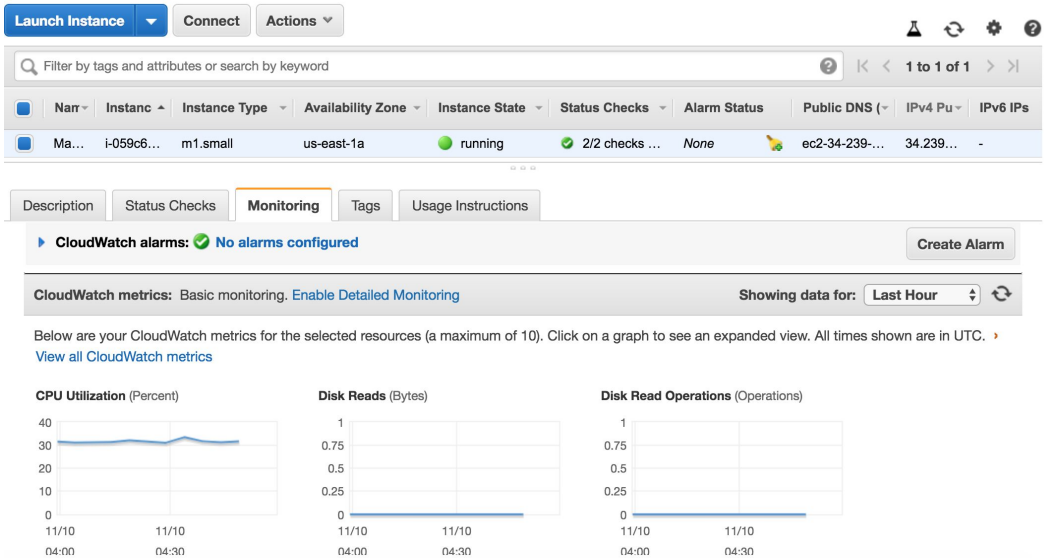
EC2 Monitoring

Cloudwatch Services provides basic **monitoring** for various EC2 instance metrics like

CPU Utilization, Network In/ Out Packets In/Out Disk Read/Writes.

But does **does not provide** metrics like **Memory(RAM) Utilization**. You can create **custom metrics** for things like Memory Utilization and disk usage monitoring.

Click 3rd Tab (default is description) to view cloudwatch metrics



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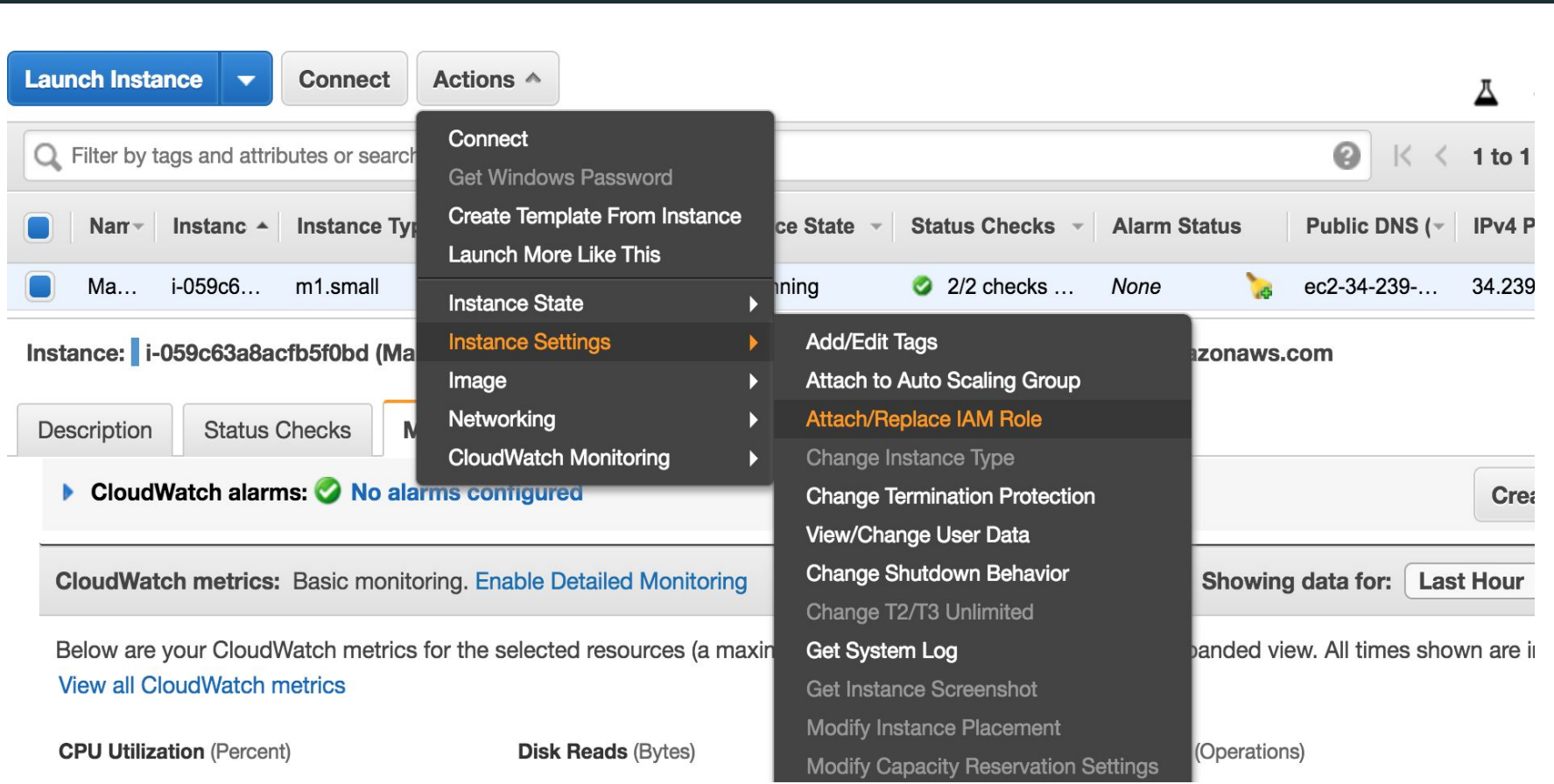
Roles: Add permissions to EC2

You can’t access other AWS resources from your EC2 instance by default. You need to either

1) **hard code credentials**(access key id and secret access key) somewhere in the code or in a file which is **not recommended**.
2) Attach Roles with proper permissions to EC2 . This way you can access services like S3 , dynamoDB etc from EC2 . This is safer because **Roles use temporary credentials**.


Launch Instance
Connect
Actions
Connect
Get Windows Password
Create Template From Instance
Launch More Like This
Instance State
Instance Settings
Image
Networking
CloudWatch Monitoring
Add/Edit Tags
Attach to Auto Scaling Group
Attach/Replace IAM Role
Change Instance Type
Change Termination Protection
View/Change User Data
Change Shutdown Behavior
Change T2/T3 Unlimited
Get System Log
Get Instance Screenshot
Modify Instance Placement
Modify Capacity Reservation Settings
Filter by tags and attributes or search
1 to 1
Name
Instance
Instance Type
Status Checks
Alarm Status
Public DNS
IPv4 P
Ma…
i-059c6…
m1.small
2/2 checks …
None
ec2-34-239-…
34.239
Instance: i-059c63a8acfb5f0bd (Ma
azonaws.com
Description
Status Checks
CloudWatch alarms: No alarms configured
CloudWatch metrics: Basic monitoring. Enable Detailed Monitoring
Showing data for: Last Hour
Below are your CloudWatch metrics for the selected resources (a maxi
anded view. All times shown are i
View all CloudWatch metrics
CPU Utilization (Percent)
Disk Reads (Bytes)
(Operations)

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Snapshots: Backup Data that lives on EBS Volumes

- You can then create EBS volumes with snapshot

Snapshots of encrypted volumes are encrypted , while volumes created from encrypted snapshots are also encrypted.

Read more about EBS encryption

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EBSEncryption.html

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Custom AMI: You can create a custom AMI(pre-baked)

- Install the apps you want and launch it anytime you want.
- Makes the configuration Process Quicker
- A snapshot is created when you create an AMI
- An AMI can be created using a snapshot.

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Interfaces to ec2

You can interface with EC2 resources using the following mediums:

- AWS Management console
- AWS CLI
- AWS Cloudformation
- AWS SDK(boto,node.js, java etc)
- AWS REST API

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EC2 Autoscaling: Increased Performance and Availability

You can also use Amazon EC2 Auto Scaling for dynamic scaling of EC2 instances in order to automatically increase the number of Amazon EC2 instances during demand spikes to maintain performance and decrease capacity during lulls to reduce costs.

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EC2 Free Tier. Go Practice!

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☐	General purpose	t2.nano	1	0.5	EBS only	-
☑	General purpose	t2.micro Free tier eligible	1	1	EBS only	-
☐	General purpose					-
☐	General purpose	t2				-
☐	General purpose					-

Micro instances are eligible for the AWS free usage tier. For the first 12 months following your AWS sign-up date, you get up to 750 hours of micro instances each month. When your free usage tier expires or if your usage exceeds the free tier restrictions, you pay standard, pay-as-you-go service rates.
Learn more about free usage tier eligibility and restrictions

References

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/

LABS

https://github.com/ravsau/15-AWS/tree/master/services/ec2/labs

LAB 1: Creating a Basic Linux EC2

(on demand- with option size hard disk sg)

LAB 2: Creating a Windows EC2 instance

LAB 3: Install and configure Web server and Create an Golden Image(ami), launch instance from golden image

LAB 4: Demonstration of command line interface to work with ec2

*Use Amazon linux AMI

LAB 4: EC2 Permissions with Access keys and with Roles

LAB 5: AWS EC2 Command Line Interface commands

LAB 6: Creating an ec2 with instance store as root volume

LAB 7: EC2 Userdata and SSH

Auth with username and password

LAB 8: Install Cloudwatch Unified Agent

LAB 9: Collect Apache logs in Cloudwatch using cloudwatch agent

LAB 10: Install Wordpress using AWS Marketplace

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Put them in the discussion section.

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