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    "Maryam R.Aliabadi, August 7th, 2023"
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    "## Learning objectives\n",
    "\n",
    "- Set up your AWS account\n",
    "- Understanding of the organization of cloud services\n",
    "- AWS user interfaces\n"
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    "## Set up your AWS account\n",
    "\n",
    "We have created AWS accounts for every team. Please ask TA about your
assigned account. You will have access to your account through this link:
https://ubc-cicsso.awsapps.com/start\n",
    "\n",
    "Please carefully read the account policy
[here](https://docs.google.com/document/d/1KzEkrp2GKaAcMHJNLvfjiM-EZOcwMNII
VJWtMRbQcXs/edit?usp=sharing)."
   ]
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    "## Organization of cloud services\n",
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    "\n",
    "### Region\n",
    "Before setting up a cloud service or setting up the server in the Cloud, we first want to know in ***which part of the world we will set up our instance***. There are many regions around the globe where we can set up the instance. So we want to specify the `region`, the physical geographical location where you want to build your services. AWS currently supports around 26 regions around the globe, including the US (many regions within the US), Canada, China, India, Africa, the Middle East, etc...\n",
    "\n",
    "Please check out this [map](https://aws.amazon.com/about-aws/global-infrastructure/), and it shows all the available regions and all regions that will be launching soon.\n",
    "\n",
    "```{tip}\n",
    "Setting up instances and data storage in a region closest to you is one of the reasons it can be accessed at lightning speed.\n",
    "```\n",
    "\n",
    "```{important}\n",
    "Since we are in Canada, we must have set up our instance in Canada, but we are using a student version of AWS, and only 2 regions are supported, `us-east-1` and `us-west-2`. Therefore, we will be setting up our instance in the `us-west-2 (Oregon)` region. So make sure you select the `us-west-2 (Oregon)` region within AWS.\n",
    "```\n",
    "\n",
    "### Availability Zones\n",
    "\n",
    "A region consists of one or more availability zones. These are ***isolated locations within a region***, and each availability zone ***consists of multiple data centers***, typically 3. All these data centers will consist of multiple servers. Within these isolated locations, they have their own power infrastructure and are physically separated from other availability zones by kilometers, ensuring fault isolation. ***AWS recommends replicating data and resources across availability zones for resiliency***, and these availability zones are ***interconnected using high-speed private networking (low-latency links)***.\n",
    "\n",
    "For example, us-west-2 (Oregon) region has 3 availability zones represented by a region code followed by a letter identifier `ca-central-1` `us-west-2` `us-east-1`\n",
    "\n",
    "\n",
    "### Security Group \n",
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    "\n",
    "A security group acts as a firewall that controls the traffic allowed
to and from the resources in your virtual private cloud (VPC). You can
choose the ports and protocols to allow for inbound traffic and for
outbound traffic.\n",
    "\n",
    "\n",
    "### Virtual Private Cloud (VPC) and Subnets\n",
    "\n",
    "With Amazon Virtual Private Cloud (Amazon VPC), you can launch AWS
resources in a logically isolated virtual network that you've defined. This
virtual network closely resembles a traditional network that you'd operate
in your own data center, with the benefits of using the scalable
infrastructure of AWS.\n",
    "\n",
    "### Policy\n",
    "\n",
    "A policy is an object in AWS that, when associated with an identity or
resource, defines its permissions. AWS evaluates these policies when an IAM
principal (user or role) makes a request. Permissions in the policies
determine whether the request is allowed or denied. \n",
    "\n",
    "### Identity Access Management (IAM)\n",
    "\n",
    "With AWS Identity and Access Management (IAM), you can specify who or
what can access services and resources in AWS, centrally manage
fine-grained permissions, and analyze access to refine permissions across
AWS.\n",
    "\n",
    "- Create an account in AWS (root user)\n",
    "    - Root user \n",
    "    - IAM user\n",
    "\n",
    "- Setup IAM (Identity and access management) users\n",
    "    - Create ***groups*** based on the responsibilities (eg:
Administrators/ Students)\n",
    "    - Attach a ***policy*** to the group \n",
    "    - Managed policies (eg: AdministratorAccess, AmazonS3FullAccess
)\n",
    "    - Custom/User defined policies\n",
    "    - Add the ***users*** to the respective groups\n",
    "    \n",
    "\n",
    "### Useful links to AWS global infrastructure & security\n",
    "\n",
    "Here are some articles related to AWS global infrastructure and
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security. \n",
    "\n",
    "[Regions and availability
zones](https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-regions-av
ailability-zones.html)\n",
    "\n",
    "[List of regions and availability
zones](https://aws.amazon.com/about-aws/global-infrastructure/regions_az/)\
n",
    "\n",
    "[VPC and
subnets](https://docs.aws.amazon.com/vpc/latest/userguide/how-it-works.html
#vpc-subnet-basics)\n",
    "\n",

"[NACL](https://docs.aws.amazon.com/vpc/latest/userguide/vpc-network-acls.h
tml#nacl-basics)\n",
    "\n",
    "[Route
tables](https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Route_Tables.h
tml#RouteTables)\n",
    "\n",
    "[Security
groups](https://docs.aws.amazon.com/vpc/latest/userguide/vpc-security-group
s.html)"
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    "## Ways to interact with AWS\n",
    "\n",
    "### [Web interface](https://www.awsacademy.com/LMS_Login)\n",
    "To interact with AWS, A web-based GUI provides the capability to
interact with the services within AWS. \n",
    "\n",
    "- Login to your learners lab and click on the green AWS button. This
will take you to the AWS console. Here you can see all the services that
AWS provides, and you can interact with them."
   ]
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```

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    "### [AWS CLI](https://aws.amazon.com/cli/)"
   ]
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    "This is a command line way to interact with AWS. Click the below
toggle for details on installing AWS cli!\n",
    "\n",
    "To install AWS CLI check
[here](https://docs.aws.amazon.com/cli/latest/userguide/install-cliv2-linux
.html).\n",
    "\n",
    "Here are minimal instructions;\n",
    "\n",
    "1) Download the AWS cli."
   ]
  },
  {
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    "curl \"https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip\" -o
\"awscliv2.zip\""
   ]
  },
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    "\n",
    "2) Unzip and install it\n"
   ]
  },
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```

```
    "sudo apt install unzip\n",
    "unzip awscliv2.zip\n",
    "sudo ./aws/install"
   ]
  },
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    "3) With step 2 you have installed AWS cli. Now we need to set it up (configure) to interact with services in your account. We usually need ***access key*** and ***secret***, and usually, you set up this in your account as mentioned in [this article](https://docs.aws.amazon.com/IAM/latest/UserGuide/id_credentials_access-keys.html). "
   ]
  },
  {
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    "aws configure"
   ]
  },
  {
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    "and it will ask you to enter the ***access key, secret, region and output format***; "
   ]
  },
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    "ubuntu@ip-172-31-29-179:~$ aws configure\n",
    "AWS Access Key ID [None]: x\n",
    "AWS Secret Access Key [None]: x\n",
    "Default region name [None]: us-west-2\n",
    "Default output format [None]: json"
   ]
```

```
  },
  {
   "cell_type": "markdown",
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   "source": [
    "You can find this information from your management console. "
   ]
  },
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    "4) ALL DONE !!! AWS CLI can be used to interact with many services. Check this [out](https://docs.aws.amazon.com/cli/latest/reference/). We will use CLI to interact with AWS services such as S3 and EMR.\n",
    "\n",
    "Just to make sure that you configured it correctly, you can run `aws sts get-caller-identity` and you should see the following. If you see an error, then you need to check your credentials."
   ]
  },
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    "    \"UserId\": \"AROAXEBJAAI5IQJSEEQIX:user1875239=gittu.george@gmail.com\",\n",
    "    \"Account\": \"489712255546\",\n",
    "    \"Arn\": \"arn:aws:sts::489712255546:assumed-role/voclabs/user1875239=gittu.george@gmail.com\"\n"
   ]
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    "### [SDK](https://aws.amazon.com/sdk-for-python/)\n",
    "\n",
    "A software development kit (SDK) is a set of platform-specific building tools for developers. You require components like debuggers,
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```
compilers, and libraries to create code that runs on a specific platform, operating system, or programming language. SDKs put everything you need to develop and run software in one place.\n",
    "We won't be using it much. A good blog [here](https://adamraffe.com/2019/02/20/aws-fundamentals-part-3-interacting-with-aws/) explains various ways of interaction."
   ]
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    "\n",
    "### [Cloud Formation](https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/Welcome.html)\n",
    "\n",
    "AWS CloudFormation is a service that helps you model and set up your AWS resources so that you can spend less time managing those resources and more time focusing on your applications that run in AWS. You create a template that describes all the AWS resources that you want (like Amazon EC2 instances or Amazon RDS DB instances), and CloudFormation takes care of provisioning and configuring those resources for you. You don't need to individually create and configure AWS resources and figure out what's dependent on what; CloudFormation handles that."
   ]
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