LILLEBÆLT ACADEMY
UNIVERSITY OF APPLIED SCIENCES

ITT3 SS special subjects

SS2 AWS

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Contents

1 Project outline

This Special Subject has as a main interest the Amazon Web Services (AWS). The purpose of this course is to give the student the foundation of cloud computing as an infrastructure (IaaS) by the use of Amazon.

Outline of the 5 weeks

- Week 39: SS2 startup, AWS Infrastructure and IAM
- Week 40: AWS Amazon Elastic Cloud Compute (EC2)
- Week 41: AWS Amazon Elastic Block Storage (EBS)
- Week 43: AWS Amazon S3 and Amazon Glacier
- Week 44: Amazon Virtual Private Cloud (VPC)

2 Week 39 SS2 startup, AWS Infrastructure and IAM

2.1 Goals of the week(s)

Pratical and learning goals for the period is as follows

2.1.1 Practical goals

- Groups are introduced to AWS and have a good idea about the content of SS2

2.1.2 Learning goals

- Cloud computing
- Level 1: Explain what cloud computing is
- Level 2: Give at least 3 advantages with a short description of why cloud computing is better than the traditional one
- Level 3: Describe the AWS infrastructure, give with a brief overview of their services and create a new account, group, user, policy, and role within IAM.

2.2 Deliverable

- Weekly presentations Friday at 12:15
- Document describing how to fulfill the general learning goals of SS2

2.3 Hands-on time

- Exercise 1:

Create your free tier AWS account and secure it with MFA for the root user. Select the most suitable region for your needs.

- Exercise 2: Create an IAM group called `Administrators' and attach a policy that gives the group permission to access all of your resources.

Note that you are now logged in as root which is not a best practice.

Create a non-root user, add it to your new group and try to log in using the new credentials. Set the MFA for this user as well. From now on, you will use the non-root user when doing exercises.

2.4 Comments

- Create a document where you outline how you will fullfill the 5 SS learning goals. Remember to consider how you document the different parts.
- Check this[1] before you choose your location for the AWS account.
- You may find this[2] very useful for the exercises.

3 Week 40 Amazon Elastic Compute Cloud (EC2)

3.1 Goals of the week(s)

Pratical and learning goals for the period is as follows

3.1.1 Practical goals

- None at this time

3.1.2 Learning goals

- Virtual machines
- Level 1: Explain what EC2 is
- Level 2: Launch a new instance within suitable security groups depending on use cases
- Level 3: Make HLD and LLD, including the use cases for each exercise (diagram + short description)

3.2 Deliverable

- Weekly presentations Friday at 12:15
- Probably some personal document update

3.3 Hands-on time

- Exercise 1 (LG lvl 1)

[1] https://docs.aws.amazon.com/IAM/latest/UserGuide/introduction.html
[2] https://www.youtube.com/watch?v=9CKsX6MOPDQ

Using the Feynman technique[3], write half-a-page about AWS and EC2. Self-evaluate afterwards by highlighting formulations and concept where you feel weak.

- Exercise 2 (LG lvl 2)

Launch a new linux instance and connect to it using SSH. Set the security groups accordingly.

- Exercise 3 (LG lvl 2)

Launch a new windows instance and connect to it with RDP (maybe try bootstrapping).

- Exercise 4

Your company wants to host a new website to sell their products on, by taking the advantage of EC2 instances and WordPress. Your job is to deploy the WordPress website on a linux instance. In case you are using the instance launched for exercise 1, make sure you change the existing security group with one that matches your needs.

3.4 Comments

- Department head will be joining us on Thursday morning
- Exercises 2 and 4 are very similar, you can choose between hosting WordPress on a linux or windows instance, or you can try both.
- Check this[4] before launching an instance, so you do not get billed. Always terminate your instance if you don't use it anymore. It is very important to clean after yourself while practicing on AWS.
- You may find this[5] very useful for the exercise 2 or this[6] for the exercise 4.

4 Week 41 Amazon Elastic Block Store (EBS)

4.1 Goals of the week(s)

Pratical and learning goals for the period is as follows

4.1.1 Practical goals

- None at this time

4.1.2 Learning goals

- EBS Storage
- Level 1: Know what EBS is, what it is used for, volume types and other related concepts.
- Level 2: Able to create/attach/detach/reattach/encrypt/delete a volume and use snapshots.
- Level 3: Match system requirements and implement virtual machines using EC2 and EBS

[3] https://www.youtube.com/watch?v=tkm0TNFzIeg
[4] https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-instance-lifecycle.html
[5] https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/hosting-wordpress.html
[6] https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/EC2Win_CreateWordPressBlog.html

4.2 Deliverable

- Weekly presentations Friday at 12:15
- Probably some personal document update

4.3 Hands-on time

- Exercise 1 (LG lvl 1)

Using the Feynman technique[7], write 250 words about EBS. Self-evaluate afterwards by highlighting formulations and concept where you feel weak.

- Exercise 2 (LG lvl 2)

Create an EBS volume for an EC2 instance, terminate (delete) the instance and notice what happened with the volume.

- Exercise 3 (LG lvl 2)

Take a snapshot of an EBS volume, delete the volume and use the snapshot to restore the volume.

- Exercise 4 (LG lvl 2)

Launch an EC2 instance with an encrypted Amazon EBS volume (in two different ways) and test the encryption transparency to the instance itself.

- Exercise 4

Your company encountered some problems after the last update of their website, and now, it is not displaying all the information needed for the customers. What you want to do, is to detach a boot drive and attach another one. The company has an instance with a volume attached to it and two snapshots (called `snapshot1' and `snapshot2'). `Snapshot2' contains the update version of the website, so you want to rollback to `snapshot1'.

4.4 Comments

- After you are done with the exercises, do not forget to delete all the instances, volumes and snapshots.
- See this[8] for exercise 3.
- We will be discussing SS3. So please consider which technologies you will be using in your internship, and we'll see if it fits with the network idea of SS3.
- The results of the SS! hand-in is now available on wiseflow[9]. We discuss it Friday.

5 Week 43 Amazon S3 and Amazon Glacier

5.1 Goals of the week(s)

Pratical and learning goals for the period is as follows

[7] https://www.youtube.com/watch?v=tkm0TNFzIeg
[8] https://www.youtube.com/watch?v=HPXnXkBzIHw
[9] https://wiseflow.dk

5.1.1 Practical goals

- None at this time

5.1.2 Learning goals

- Storage
- Level 1: Know what Amazon S3 and Glacier are
- Level 2: Able to create and use glacier storage and S3
- Level 3: Know how to work with buckets, objects and how to host static websites with S3.

5.2 Deliverable

- Weekly presentations Friday at 12:15
- Probably some personal document update
- Thursday at 12:15 selected volunteers will present about special subject to the visitors.

5.3 Hands-on time

- Exercise 1 (LG lvl 1)

Using the Feynman technique[10], write 250 words about S3 and glacier. Self-evaluate afterwards by highlighting formulations and concept where you feel weak.

- Exercise 2 (LG lvl 2)

You have a system in place where you do daily incremental backups, and weekly complete backups. The weekly backup is 5TB of data. Rentention time is 3 months. What does it cost per month to put it on amazon glacier?

- Exercise 3 (LG lvl 2)

Create an S3 bucket called ``mynewbucket''. Notice what happens. A bucket name (web folder name) must be unique globally, while a key object (filename) must be unique within a bucket.

- Exercise 4 (LG lvl 2)

Use the bucket you created earlier to upload an object (any file from your PC that you are okay with making public to the Internet). Open the Amazon S3 URL (you will get an XML error code with AccessDenied). Make the object public and try again (make a notice of the URL). Rename the object and check the URL. Is it the same? Try and access it. Delete the object and reload the page.

- Exercise 5

Enable Version Control and create multiple versions of an object.

- Exercise 6

Use S3 to restore a deleted object.

- Exercise 7

Host a static website on a bucket.

[10] https://www.youtube.com/watch?v=tkm0TNFzIeg

5.4 Comments

- After you are done with the exercises, do not forget to delete all the objects and buckets. Here is how to work with buckets[11] and objects[12].
- See this[13] for exercise 5.
- Friday is scheduled something about LEARN. It is a survey. MON gives an introduction.
- We will be getting high school visitors in the afternoon.

6 Week 44 Amazon Virtual Private Cloud (VPC)

6.1 Goals of the week(s)

Pratical and learning goals for the period is as follows

6.1.1 Practical goals

- None at this time

6.1.2 Learning goals

- Virtual private clouds
- Level 1: Know what Amazon VPC is
- Level 2: Able to set up and use VPC
- Level 3: Able to set up and use multi-subnet VPCs and other advanced features

6.2 Deliverable

- Weekly presentations Friday at 12:15
- Probably some personal document update
- Final report handin is next week.

6.3 Hands-on time

- Exercise 1 (LG lvl 1)

Using the Feynman technique[14], write 250 words about VPCs in AWS. Self-evaluate afterwards by highlighting formulations and concept where you feel weak.

- Exercise 2 (LG lvl 2)

In AWS console, use the VPC wizard to set up a VPC with a single public subnet. Create a security group to match the needs of a web server.

[11] https://docs.aws.amazon.com/AmazonS3/latest/user-guide/create-configure-bucket.html
[12] https://docs.aws.amazon.com/AmazonS3/latest/user-guide/upload-download-objects.html
[13] https://docs.aws.amazon.com/AmazonS3/latest/dev/HostingWebsiteOnS3Setup.html
[14] https://www.youtube.com/watch?v=tkm0TNFzIeg

- Exercise 3

In AWS console, use the VPC wizard to create a VPC with one public and one private subnet. Create security group and ACLs (if needed). Launch an EC2 instance on the public subnet and configure it as a web server. Try to access the web server as a user.

- Exercise 4

Try using the AWS CLI for exercise 1 or 2.

6.4 Comments

- Useful links for ex.1[15], ex.2[16], ex.3[17].
- After you are done with the exercises, do not forget to delete what you have created (do NOT delete the default VPC and its components).
- wiseflow handins link will appear later.

7 Mandatory elements

To help keep you on track, and to maintain an apropriate level of teacher contact, there are some mandatory elements.

- All weeks will include presentations on class.

  This is a presentation with the class as *audience* and you must have decided in advance the *purpose* of the presentation

- Project management

  You will create a gitlab project for project management and for configurations.

  Remember to invite the teachers.

- All weeks will include a meeting with the teacher(s)

  This is a 10-15 minute meeting, where you present status on tasks and milestones, and if you have specific questions

8 End-of-SS report

Each SS ends with a report hand-in. The report must document, that the student is able to:

- Document a project or process
- Learn new skills and/or gain new knowledge
- Explain technical or other relevant material within a given context
- Present technical or other relevant material within a given context
- Do structured project management

[15] https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_Scenario1.html
[16] https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_Scenario2.html
[17] https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/vpc-subnets-commands-example.html

The report will includes links and references to relevant material, either online links or appendices. The former is prefered.

Since Gitlab is used for SS, links to gitlab resources like design documents, tests and more may be relevant.