

LAB 02: APP SCALING ON AMAZON WEB SERVICES

By Ali Miladi & Dany Tchente

TASK 1: SET UP

- 1- Copy the estimated costs that were shown in the launch wizard into the report. **Picture 1:**

The screenshot shows the AWS Free Usage Tier calculator. The main title is "Estimate of your Monthly Bill (\$ 17.38)". The "Choose region" dropdown is set to "Europe Central (Frankfurt)". A note states: "Inbound Data Transfer is Free and Outbound Data Transfer is 1 GB free per region per month". The "Amazon RDS On-Demand DB Instances" section contains a table with one row: Description (empty), DB Instances (1), Usage (100 % Utilized/M), DB Engine and License (MySQL), Class and Deployment (db.t2.micro), Storage (Standard (Single-A)), I/O (General F), Provisioned IOPS (0), and Storage (20 GB). Below this is an "Additional Backup Storage" section with a table for backup type and storage, and an "Add New Row" button. To the right, a sidebar titled "Common Customer Samples" lists various AWS application types with their respective configurations.

Picture 2:

The screenshot shows the AWS Free Usage Tier calculator with a detailed breakdown of the monthly bill. The title is "Estimate of Your Monthly Bill" with a value of "\$ 17.38". A note says: "Below you will see an estimate of your monthly bill. Expand each line item to see cost breakout of each service. To save this bill and input values, click on 'Save and Share' button. To remove the service from the estimate, jump back to the service and clear the specific service's form." The "Estimate of Your Monthly Bill" section includes an "Export to CSV" button and a "Save and Share" button. It lists services and their costs: Amazon RDS Service (Europe Central) - DB instances: \$ 14.64, Storage: \$ 2.74; AWS Support (Basic) - \$ 0.00. The total monthly payment is \$ 17.38. The sidebar on the right remains the same as in Picture 1.

2- Compare the costs of your RDS instance to a continuously running EC2 instance of the same size using the AWS calculator. (Don't forget to uncheck the Free Usage Tier checkbox at the top.)

Picture 3:

The screenshot shows the AWS Cost Explorer interface. At the top, it says "Estimate of your Monthly Bill (\$ 12.19)". On the left, there's a sidebar with various AWS services listed. The main area has sections for "Compute: Amazon EC2 Instances" and "Storage: Amazon EBS Volumes". The EC2 section shows one instance of type t2.micro with a monthly cost of \$ 9.81. The EBS section shows one volume of 20 GB with a monthly cost of \$ 2.38. A sidebar on the right titled "Common Customer Samples" lists several scenarios: "Free Website on AWS", "AWS Elastic Beanstalk Default", "Marketing Web Site", "Large Web Application (All On-Demand)", "Media Application", "European Web Application", and "Disaster Recovery and Backup".

Picture 4:

This screenshot shows a more detailed breakdown of the monthly bill. It includes sections for "Compute", "EBS Volumes", and "EBS IOPS", each with its own breakdown of costs. There's also a section for "AWS Support (Basic)" which is free. At the bottom, it shows the "Total Monthly Payment" as \$ 12.19. The sidebar on the right remains the same as in Picture 3.

The **RDS** instance is finally more expensive than the **EC2** instance continuously running. But this is worth it because the **RDS** instance is dedicated for the storage and has more space in our case.

3- In a two-tier architecture the web application and the database are kept separate and run on different hosts. Imagine that for the second tier instead of using RDS to store the data you would create a virtual machine in EC2 and install and run yourself a database on it. If you were the Head of IT of a medium-size business, how would you argue in favor of using a database as a service instead of running your own database on an EC2 instance? How would you argue against it? bla bla bla

Picture 5:

This screenshot shows the "Connect" configuration page for an RDS instance. It has three main fields: "Endpoint" (danycleve-drupal.cjubjwz1ab.eu-central-1.rds.amazonaws.com), "Port" (3306), and "Publicly accessible" (Yes). The "Endpoint" field is highlighted in red.

TASK 2: CONFIGURE THE DRUPAL MASTER INSTANCE TO USE THE RDS DATABASE

```
<?php
//
// database access settings in php format
// automatically generated from /etc/dbconfig-common/drupal7.conf
// by /usr/sbin/dbconfig-generate-include
//
// by default this file is managed via ucf, so you shouldn't have to
// worry about manual changes being silently discarded. *however*, 
// you'll probably also want to edit the configuration file mentioned
// above too.
//
// This file ends up being too verbose because the semantics for the
// options used in it differ per database type (and dbconfig's
// templating system does not handle conditionals); should you choose
// not to use debconf/dbconfig to handle Drupal's database
// configuration, you will probably prefer to discard $dbs, and store
// the declarations straight into $databases.

$dbs['mysql'] = array(
    'driver' => 'mysql',
    'database' => 'drupal7',
    'username' => 'drupal7',
    'password' => 'Nguemessu01',
    'host' => 'danycleve-drupal.cjubjwz1ab.eu-central-1.rds.amazonaws.com',
    'port' => '',
    'prefix' => ''
);

$dbs['pgsql'] = array(
    'driver' => 'mysql',
    'database' => 'drupal7',
    'username' => 'drupal7',
    'password' => 'Nguemessu01',
    'host' => 'danycleve-drupal.cjubjwz1ab.eu-central-1.rds.amazonaws.com',
    'port' => '',
    'prefix' => ''
);

$dbs['sqlite'] = array(
    'driver' => 'mysql',
    'database' => '/drupal7',
);

$databases['default']['default'] = $dbs['mysql'];
```

TASK 3: CREATE A CUSTOM VIRTUAL MACHINE IMAGE

ID d'AMI	Nom d'AMI	Source	Propriétaire	Visibilité	Statut	Date de création
ami-eef59b81	DanyCleve Dr...	944399408852/...	944399408852	Privé	available	8 mars 2018 13:03:17

Détails **Autorisations** **Balises**

Modifier

ID d'AMI	ami-eef59b81	Nom d'AMI	DanyCleve Drupal
Propriétaire	944399408852	Source	944399408852/DanyCleve Drupal
Statut	available	Raison du statut	-
Date de création	8 mars 2018 13:03:17 UTC+1	Plateforme	Other Linux
Architecture	x86_64	Type d'image	machine
Type de virtualisation	hvm	Description	Drupal connected to RDS database
Nom du périphérique racine	/dev/sda1	Type de périphérique racine	ebs
ID de disque RAM	-	ID du noyau	-
Codes produit	-	Périphériques de stockage en mode bloc	/dev/sda1=snap-0840d8f7b30b36f57:8:true:gp2

TASK 4: CREATE A LOAD BALANCER

1- On your local machine resolve the DNS name of the load balancer into an IP address using the nslookup command (Linux or Windows). Write the DNS name and the resolved IP Address(es) into the report

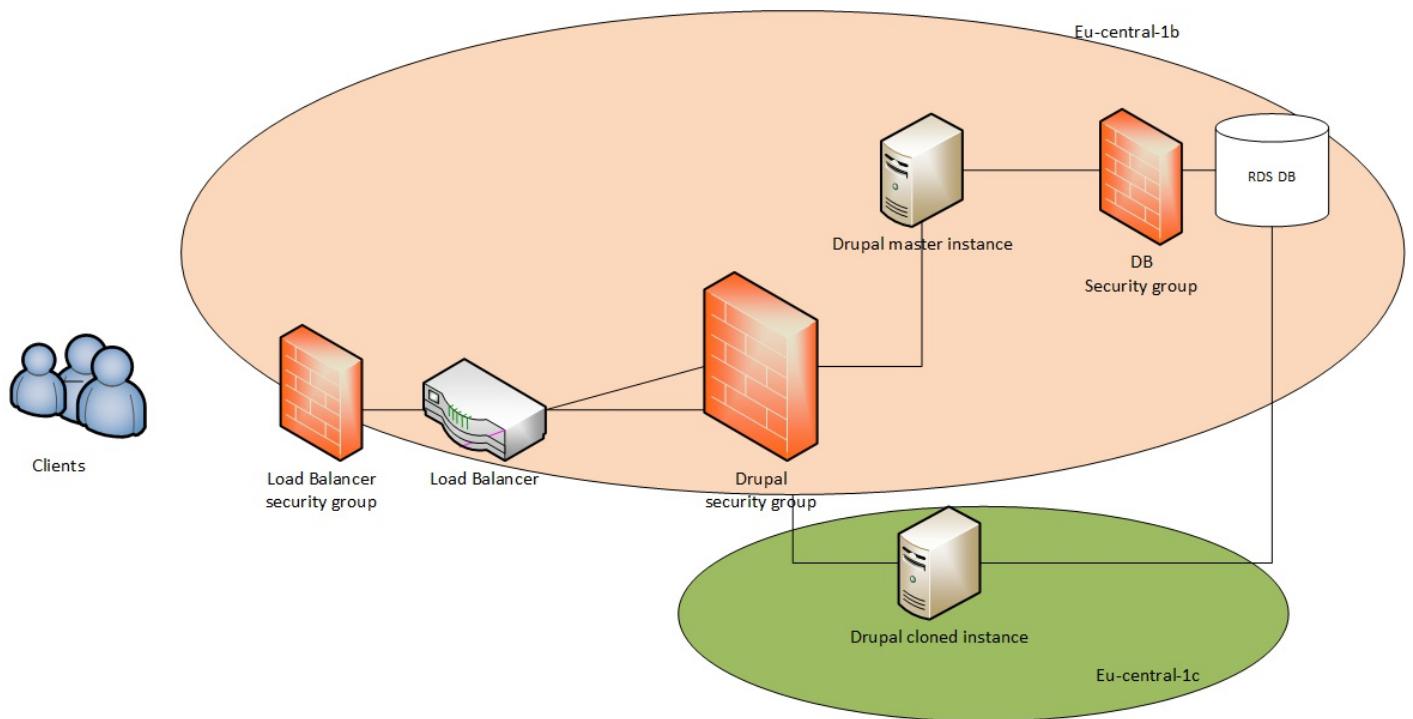
```
mbp-sims:Lab01 Sims$ nslookup
>
>
> DanyCleve-Drupal-467924870.eu-central-1.elb.amazonaws.com
Server:      10.192.22.5
Address:      10.192.22.5#53

Non-authoritative answer:
Name:  DanyCleve-Drupal-467924870.eu-central-1.elb.amazonaws.com
Address: 35.156.115.135
Name:  DanyCleve-Drupal-467924870.eu-central-1.elb.amazonaws.com
Address: 54.93.107.68
>
```

2- In the Apache access log identify the health check accesses from the load balancer and copy some samples into the report

TASK 5: LAUNCH A SECOND INSTANCE FROM THE CUSTOM IMAGE

1- Draw a diagram of the setup you have created showing the components (instances, database, load balancer, client) and how they are connected. Include the security groups as well.



2- Using the Simple Monthly Calculator calculate the monthly cost of this setup. You can ignore traffic costs. (Make sure you don't forget to include a component in the calculation. Also don't forget to uncheck the Free Usage Tier checkbox at the top.)

Services		Estimate of your Monthly Bill (\$ 81.98)																																	
<input type="button" value="Reset All"/> Choose region: Europe Central (Frankfurt) <input type="button" value="Clear Form"/>		Inbound Data Transfer is Free and Outbound Data Transfer is 1 GB free per region per month																																	
Amazon EC2		Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It is designed to make web-scale computing easier for developers. Amazon Elastic Block Store (EBS) provides persistent storage to Amazon EC2 instances.																																	
Amazon S3																																			
Amazon Route 53																																			
Amazon CloudFront																																			
Amazon RDS																																			
Amazon DynamoDB																																			
Amazon ElastiCache																																			
Amazon CloudWatch																																			
Amazon SES																																			
Amazon SNS																																			
Amazon WorkSpaces																																			
AWS Directory Service																																			
Amazon Redshift																																			
Amazon Glacier																																			
Amazon SQS																																			
Amazon SWF																																			
Amazon Elastic MapReduce																																			
Amazon Kinesis Streams																																			
Amazon CloudSearch																																			
AWS GovCloud (US)																																			
Compute: Amazon EC2 Instances: <table border="1"> <thead> <tr> <th>Description</th> <th>Instances</th> <th>Usage</th> <th>Type</th> <th>Billing Option</th> <th>Monthly Cost</th> </tr> </thead> <tbody> <tr> <td>Drupal master</td> <td>1</td> <td>100 % Utilized/Mo ✓</td> <td>Linux on t2.micro</td> <td>On-Demand (No Co</td> <td>\$ 9.81</td> </tr> <tr> <td>Drupal clone</td> <td>1</td> <td>100 % Utilized/Mo ✓</td> <td>Linux on t2.micro</td> <td>On-Demand (No Co</td> <td>\$ 9.81</td> </tr> <tr> <td colspan="6"> + Add New Row </td> </tr> </tbody> </table>								Description	Instances	Usage	Type	Billing Option	Monthly Cost	Drupal master	1	100 % Utilized/Mo ✓	Linux on t2.micro	On-Demand (No Co	\$ 9.81	Drupal clone	1	100 % Utilized/Mo ✓	Linux on t2.micro	On-Demand (No Co	\$ 9.81	+ Add New Row									
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Services Estimate of your Monthly Bill (\$ 81.97)

Choose region: Europe Central (Frankfurt)

Inbound Data Transfer is Free and Outbound Data Transfer is 1 GB free per region per month

Amazon EC2

Amazon S3

Amazon Route 53

Amazon CloudFront

Amazon RDS

Amazon DynamoDB

Amazon ElastiCache

Amazon CloudWatch

Amazon SES

Amazon SNS

Amazon WorkSpaces

AWS Directory Service

Amazon Redshift

Amazon Glacier

Amazon SQS

Amazon RDS On-Demand DB Instances:

Description	DB Instances	Usage	DB Engine and License	Class and Deployment	Storage	I/O
RDS drupal	1	100 % Utilized/Mon	<input type="button" value="MySQL"/>	<input type="button" value="db.t2.micro"/>	<input type="button" value="General Purp"/>	<input type="button" value="Provisioned IOPS: 0"/>
	<input type="button" value="Add New Row"/>					

Additional Backup Storage (Free backup storage up to 100% of provisioned Storage):

Backup Type	Backup Storage	
	<input type="button" value="Add New Row"/>	

Amazon RDS Reserved DB Instances:

Description	DB Instances	Usage	DB Engine and License	Class and Deployment	Offering and Term	Storage	I/O
	<input type="button" value="Add New Row"/>						

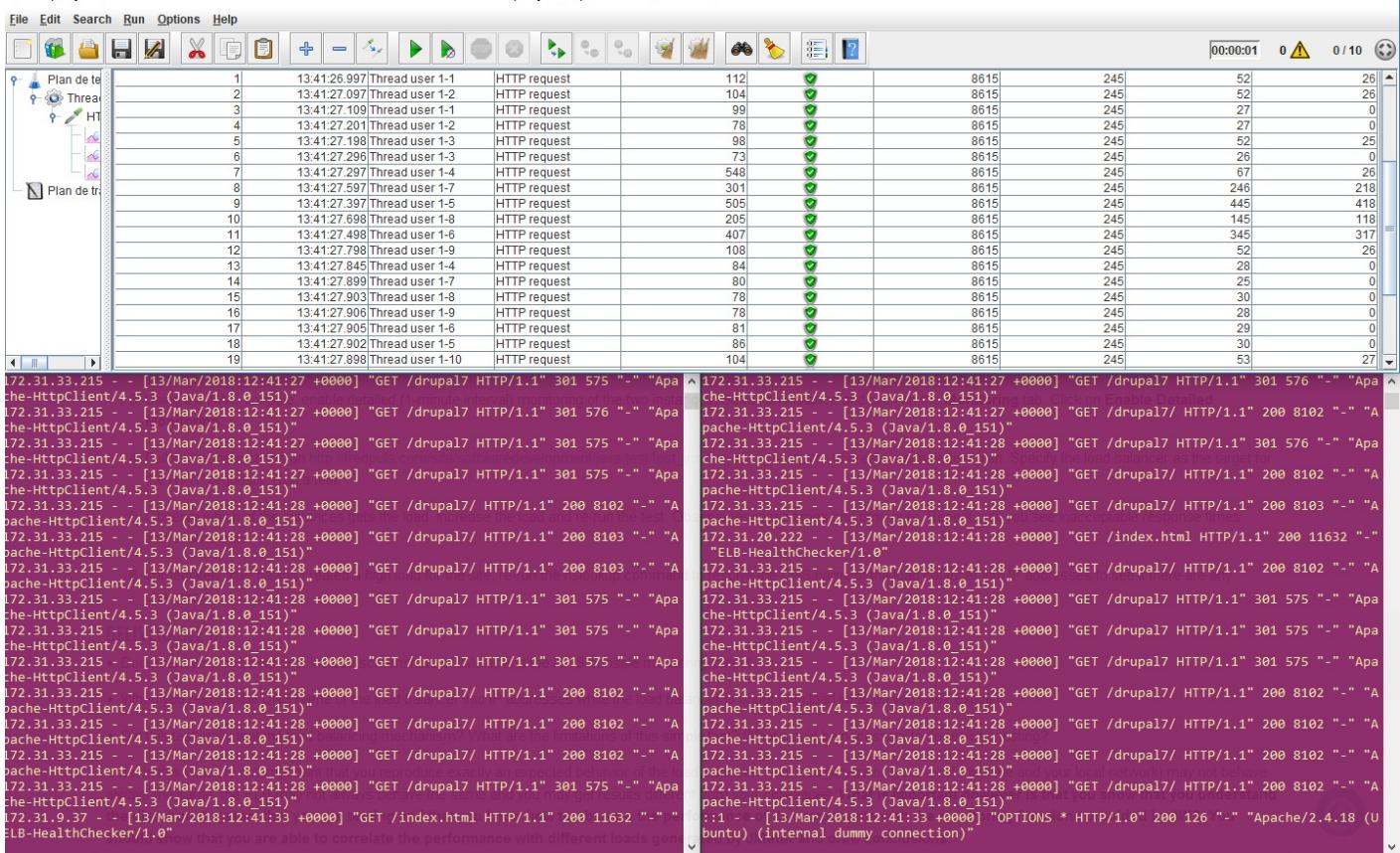
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Inter-Region Data Transfer Out:	<input type="text" value="0"/>	<input type="button" value="GB/Month"/>
Data Transfer Out:	<input type="text" value="0"/>	<input type="button" value="GB/Month"/>
Data Transfer In:	<input type="text" value="0"/>	<input type="button" value="GB/Month"/>
Intra-Region Data Transfer:	<input type="text" value="0"/>	<input type="button" value="GB/Month"/>

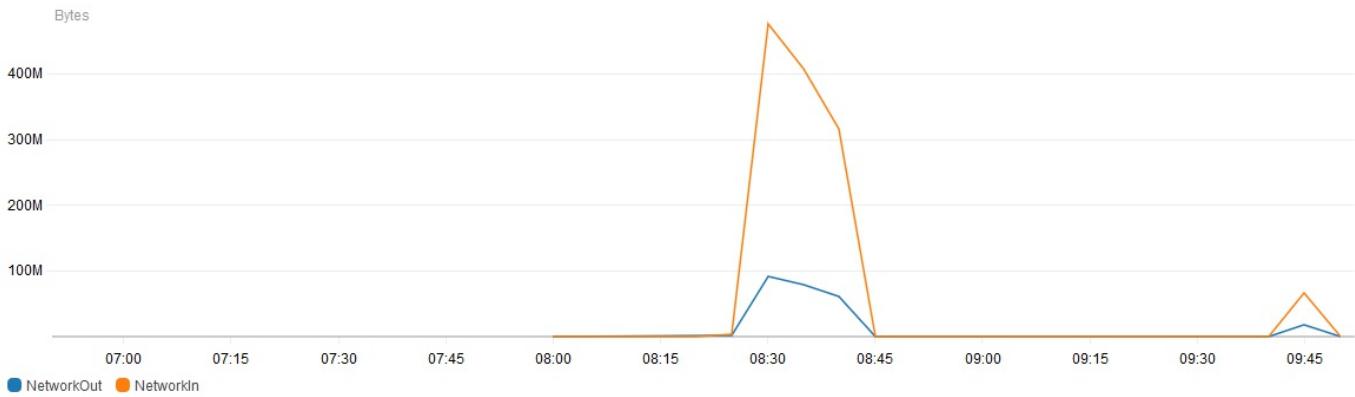
TASK 6: TEST THE DISTRIBUTED APPLICATION

- 1- Document your observations. Include screenshots of JMeter and the AWS console monitoring output

Picture 6:



Picture 7:



2- When you resolve the DNS name of the load balancer into IP addresses while the load balancer is under high load what do you see? Explain

The only difference between the output of the `nslookup` command before and during the generated high load is that the address of the first server changes. Actually, depending on the used `DNS` server, it can see one or more public IP addresses of the load balancer's public `DNS` name. In our case, we could see two or three public `IP`s and the first one changes depending on the `DNS` server. The only explanation that we found about the first address changing during the high load is that `AWS` assigns a set of public `IP` addresses and does a sort of load balancing over the load balancer itself.

3- Did this test really test the load balancing mechanism? What are the limitations of this simple test? What would be necessary to do realistic testing?

This test is not realistic because