



# Academy Lab Projects – Showcase

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Building a Highly Available, Scalable  
Web Application

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# Acknowledgement

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We, the members of the project team, would like to express our sincere gratitude to all who have supported and guided us for achieving the completion of the BMIT3273 Cloud Computing course assignment. This project has offered a golden opportunity for us to obtain valuable knowledge and hands-on experience in designing and implementing cloud-based solutions using the Amazon Web Services (AWS).

Firstly, we would like to thank our lecturer, Mr. Low Choon Keat. He is also our practical class tutor as well. Under his continuous guidance and actively providing feedback, we are able to finish this project successfully within the stipulated time frame. He not only taught us theoretical knowledge in cloud concepts but also guided us to apply the knowledge in a practical environment. The clarity of instructions and the willingness to provide support when facing troublesome situations are very crucial for keeping our team on track and motivated.

We would also like to extend our gratitude to Tunku Abdul Rahman University of Management and Technology (TARUMT) for providing us with a supportive academic environment and the necessary resources. So, we are able to have a chance to learn theoretical concepts and technical skills about the cloud computing field. It also provides us with laboratory facilities and structured guidance of the BMIT3273 Cloud Computing course for fostering our foundation to explore the real-world cloud technologies. Without the academic support and opportunities provided by the university, this project would not have been possible.

We would also like to acknowledge AWS Academy for providing us an excellent learner lab environment and resources which enable us to deal with the hands-on tutorials. It provides us a platform for building, testing and deploying the required architecture. Without these resources, it will be hard for us to gain real-world exposure to tools such as EC2, RDS, Cloud9, Secrets Manager, Elastic Load Balancer and Auto Scaling Groups. These hands-on learning opportunities not only strengthened our technical skills but also gave us the insights for estimating cost, scalability and the best practices in cloud computing.

Moreover, we also wish to thank the collaborative effort within our team of 3 members who are Lim Jun Wei, Ong Yi Xin and Chia Ming Yi. Each member has contributed significant efforts in different phases of the project from planning and architectural design to the implementation, testing and documentation phases. All members collaboratively share their ideas, divide the tasks effectively and overcome the challenges together. Via the efficient collaboration, we are able to accomplish this assignment with a highly efficient and effective solution.





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# Introduction

# Introduction

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- Cloud-based **Student Records Web Application**
- Solves performance issues during **peak admissions** (e.g. slow or unavailable legacy system)
- Designed with **AWS Well-Architected Framework**
  - High availability & scalability
  - Load balancing
  - Security
  - Cost efficiency
- Supports core functions: **view, add, delete and modify student records**
- Built using **AWS services**: EC2, RDS, VPC, Cloud9, Secrets Manager, ELB and Auto Scaling



# Business Scenario Overview

# Business Scenario Overview

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- Problem & Opportunity
  - University's current web application is hosted on a single server → causes **downtime, slow response and scalability issues**
  - Users complain about **inconsistent availability** and **limited performance** during peak usage
  - Opportunity: Modernize the system using **cloud infrastructure** to achieve reliability, scalability and cost efficiency
- Users & Pain Points
  - **Students:** Difficulty accessing records when the system is overloaded
  - **Faculty:** Frustrated by data loss or slow updates
  - **IT Staff:** Struggle with manual server maintenance and lack of automation

# Business Scenario Overview

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- Solution Requirements
  - Deploy the application to **AWS Cloud**
  - Must be **highly available** (multi-AZ, load-balanced)
  - **Scalable:** Auto scaling for fluctuating traffic
  - **Secure:** VPC isolation, IAM roles, Secrets Manager
  - **Cost-efficient:** Optimized instance types and managed services (EC2 + RDS)



# Solution Overview

# Solution Overview

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## High-Level Description

- Cloud-based Student Management Web Application on AWS
- Web app hosted on EC2 with Load Balancer + Auto Scaling
- Database migrated to Amazon RDS (MySQL)
- Credentials secured with Secrets Manager
- Development via Cloud9 in dedicated VPC

# Design Considerations

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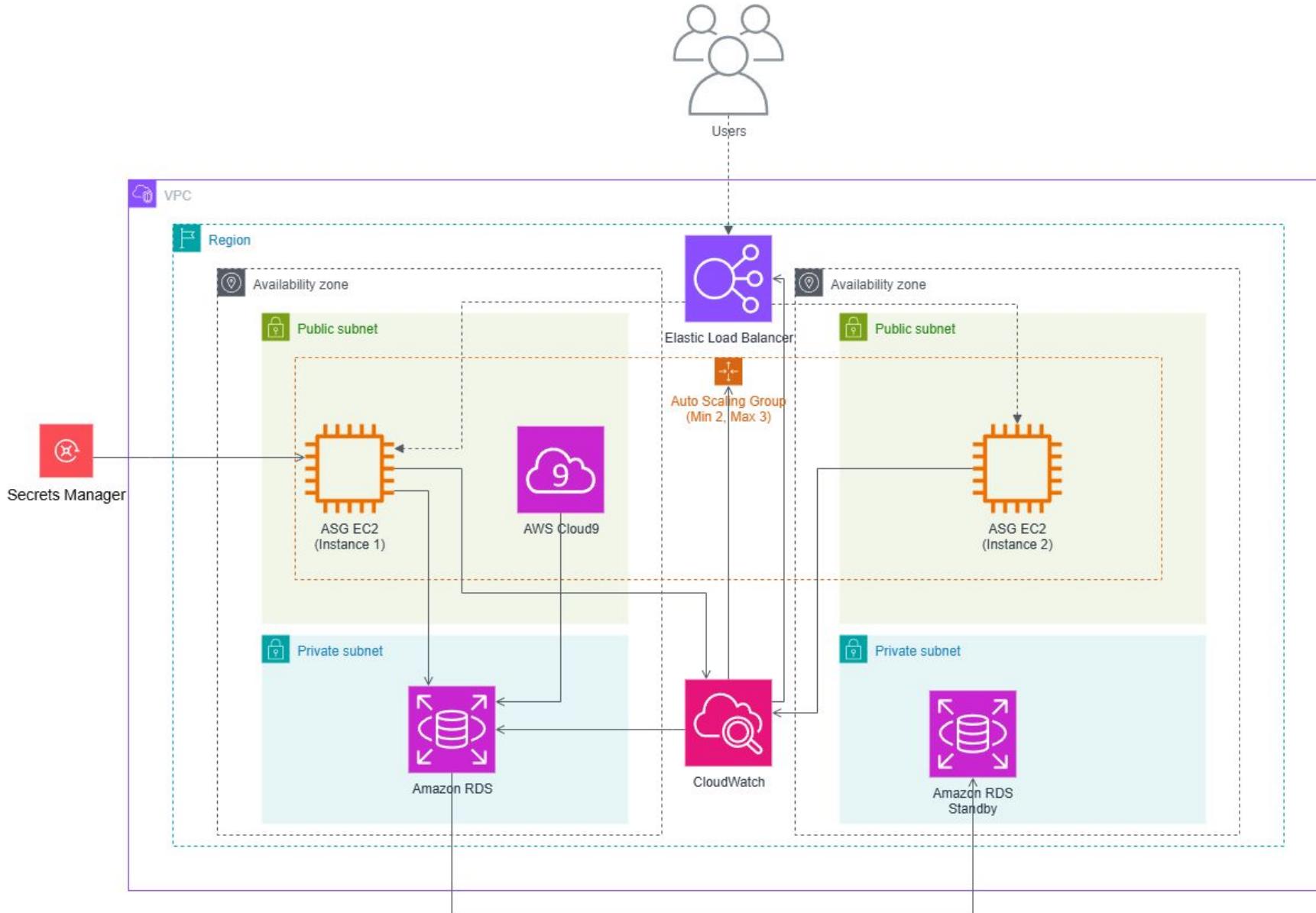
- Reliability & Availability
  - ALB + Multi-AZ Auto Scaling
- Security
  - Private RDS subnets + Secrets Manager
- Cost Efficiency
  - Free-tier eligible services, t3.micro instances
- Performance Efficiency
  - RDS for managed DB + Auto Scaling for demand
- Operational Excellence
  - Cloud9 & IAM roles for easy development
- Trade-offs
  - Simplified setup (no NAT, small instance types) for cost

# Use Cases

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- Students
  - View, add, delete and update records
- Administrators
  - Secure data management, system monitoring
- Developers
  - Deploy & test using Cloud9
- Scalability
  - Auto Scaling responds to load testing

# Architecture Diagram of the Solution





# AWS Pricing Calculator

# AWS Pricing Calculator



Contact your AWS representative: [Contact Sales](#)

Export Date: 09/11/2025

Language: English

[Estimate url](#)

## Estimate summary

### Upfront cost

0.00 USD

### Monthly cost

109.89 USD

### Total 12 months cost

1,318.68 USD

Includes upfront cost

## Detailed Estimate

### Name

Amazon EC2

### Group

-

### Region

US East (N. Virginia)

### Upfront cost

0.00 USD

### Monthly cost

7.59 USD

### Status

-

### Description:

ec2-university

### Config summary

Tenancy (Shared Instances), Operating system (Linux), Workload (Consistent, Number of instances: 1), Advance EC2 instance (t3.micro), Pricing strategy (On-Demand Utilization: 100 %Utilized/Month), Enable monitoring (disabled), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)

### Name

Amazon EC2

### Group

-

### Region

US East (N. Virginia)

### Upfront cost

0.00 USD

### Monthly cost

7.59 USD

### Status

-

### Description:

ec2-webapphosting

### Config summary

Tenancy (Shared Instances), Operating system (Linux), Workload (Consistent, Number of instances: 1), Advance EC2 instance (t3.micro), Pricing strategy (On-Demand Utilization: 100 %Utilized/Month), Enable monitoring (disabled), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)



# AWS Pricing Calculator

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Name	Group	Region	Upfront cost	Monthly cost
Amazon EC2	-	US East (N. Virginia)	0.00 USD	15.18 USD
<b>Status</b>	-			
<b>Description:</b>	university-asg-ec2 (Auto Scaling Group)			
<b>Config summary</b>	Tenancy (Shared Instances), Operating system (Linux), Workload (Consistent, Number of instances: 2), Advance EC2 instance (t3.micro), Pricing strategy (On-Demand Utilization: 100 %Utilized/Month), Enable monitoring (disabled), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)			
Name	Group	Region	Upfront cost	Monthly cost
Amazon EC2	-	US East (N. Virginia)	0.00 USD	7.59 USD
<b>Status</b>	-			
<b>Description:</b>	Cloud9			
<b>Config summary</b>	Tenancy (Shared Instances), Operating system (Linux), Workload (Consistent, Number of instances: 1), Advance EC2 instance (t3.micro), Pricing strategy (On-Demand Utilization: 100 %Utilized/Month), Enable monitoring (disabled), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)			
Name	Group	Region	Upfront cost	Monthly cost
Amazon RDS for MySQL	-	US East (N. Virginia)	0.00 USD	54.13 USD
<b>Status</b>	-			
<b>Description:</b>	db-university			
<b>Config summary</b>	Storage amount (20 GB), Storage for each RDS instance (General Purpose SSD (gp2)), Nodes (1), Instance type (db.t4g.micro), Utilization (On-Demand only) (100 %Utilized/Month), Deployment option (Single-AZ), Pricing strategy (OnDemand)			

# AWS Pricing Calculator

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Name	Group	Region	Upfront cost	Monthly cost
Elastic Load Balancing	-	US East (N. Virginia)	0.00 USD	17.41 USD
<b>Status</b>	-			
<b>Description:</b>	alb-university			
<b>Config summary</b>	Number of Application Load Balancers (1)			
Name	Group	Region	Upfront cost	Monthly cost
AWS Secrets Manager	-	US East (N. Virginia)	0.00 USD	0.40 USD
<b>Status</b>	-			
<b>Description:</b>	Mydbsecret			
<b>Config summary</b>	Number of secrets (1), Average duration of each secret (30 days), Number of API calls (100 per month)			
Name	Group	Region	Upfront cost	Monthly cost
Amazon CloudWatch	-	US East (N. Virginia)	0.00 USD	0.00 USD
<b>Status</b>	-			
<b>Description:</b>	CloudWatch			
<b>Config summary</b>	Number of Metrics (includes detailed and custom metrics) (0), GetMetricData: Number of metrics requested (100), GetMetricWidgetImage: Number of metrics requested (0), Number of other API requests (100), Number of vCPUs monitored by Database Insights (0 per hour), Number of Aurora Capacity Units (ACUs) monitored by Database Insights (0 per hour), Number of Aurora Capacity Units (ACUs) monitored by Database Insights (0 per hour)			

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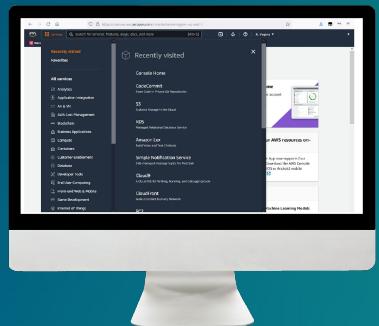
## Acknowledgement

AWS Pricing Calculator provides only an estimate of your AWS fees and doesn't include any taxes that might apply. Your actual fees depend on a variety of factors, including your actual usage of AWS services. [Learn more](#)



# Demo Link

# Demo



- [https://drive.google.com/file/d/1XGJqITI\\_NIIFOPVomMIE5URLo04x2Uf2/view?usp=sharing](https://drive.google.com/file/d/1XGJqITI_NIIFOPVomMIE5URLo04x2Uf2/view?usp=sharing)  
(Lim Jun Wei: Screenshots of Resources Deployed)
  - [https://drive.google.com/file/d/12PED-Fiv2mLImfQXZtqq47CVzLFb3YL/view?usp=drive\\_link](https://drive.google.com/file/d/12PED-Fiv2mLImfQXZtqq47CVzLFb3YL/view?usp=drive_link)  
(Ong Yi Xin: Snippet of Web Projects and Database Table, Fields and Records. Conclusion. Lesson Learned.)
  - [https://drive.google.com/file/d/1QEmC\\_yz9xMKaHzmVGdDxKUy6TG01wIOC/view?usp=drive\\_link](https://drive.google.com/file/d/1QEmC_yz9xMKaHzmVGdDxKUy6TG01wIOC/view?usp=drive_link)  
(Chia Ming Yi: Introduction, Business Scenario Overview, Solution Overview, Architecture Diagram, AWS Pricing Calculator.)



# Web Page URL

# Web Page URL

alb-university-29584847.us-east-1.elb.amazonaws.com





# Screenshot of Resources Deployed

# Amazon Virtual Private Cloud (VPC)

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- Provides secure network isolation for web + database layers
- CIDR Block: 10.0.0.0/24
- Subnets (2 public & 2 private):
  - `vpc-university-subnet-private1-us-east-1a` (10.0.0.64/27)
  - `vpc-university-subnet-private2-us-east-1b` (10.0.0.96/27)
  - `vpc-university-subnet-public1-us-east-1a` (10.0.0.0/27)
  - `vpc-university-subnet-public2-us-east-1b` (10.0.0.32/27)
- Availability Zones:
  - `us-east-1a`
  - `us-east-1b`

# Amazon Virtual Private Cloud (VPC)

## VPCs: Details & CIDRs

vpc-08eb1aa7ce448a728 / vpc-university-vpc

Actions ▾

### Details Info

VPC ID  
 vpc-08eb1aa7ce448a728

State  
 Available

Block Public Access  
 Off

DNS hostnames  
Enabled

DNS resolution  
Enabled

Tenancy  
default

DHCP option set  
[dopt-0e8cb79b6de160285](#)

Main route table  
[rtb-09c8e55c865ed45cf](#)

Main network ACL  
[acl-0f0b4e5f960d8968f](#)

Default VPC  
No

IPv4 CIDR  
10.0.0.0/24

IPv6 pool  
-

IPv6 CIDR (Network border group)  
-

Network Address Usage metrics  
Disabled

Route 53 Resolver DNS Firewall rule groups  
-

Owner ID  
 767397764113

Resource map

CIDRs

Flow logs

Tags

Integrations

### IPv4 CIDRs Info

Edit CIDRs

Address family

▲ | CIDR

| Status

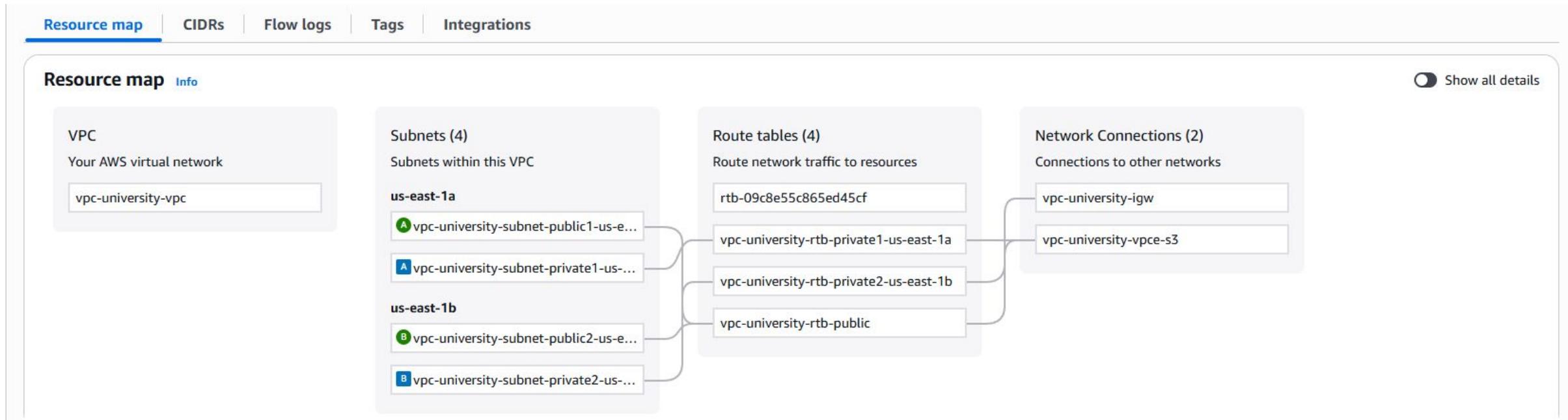
IPv4

10.0.0.0/24

Associated

# Amazon Virtual Private Cloud (VPC)

## VPCs: Resource Map



# Amazon Virtual Private Cloud (VPC)

## Subnets: vpc-university-subnet-private1-us-east-1a

subnet-055c7edb6967560b2 / vpc-university-subnet-private1-us-east-1a

Actions ▾

### Details

Subnet ID  
 subnet-055c7edb6967560b2

IPv4 CIDR  
 10.0.0.64/27

Availability Zone  
 use1-az2 (us-east-1a)

Network ACL  
acl-0f0b4e5f960d8968f

Auto-assign customer-owned IPv4 address  
No

IPv6 CIDR reservations  
-

Resource name DNS AAAA record  
Disabled

Subnet ARN  
 arn:aws:ec2:us-east-1:767397764113:subnet/subnet-055c7edb6967560b2

Available IPv4 addresses  
 27

Network border group  
 us-east-1

Default subnet  
No

Customer-owned IPv4 pool  
-

IPv6-only  
No

DNS64  
Disabled

State  
 Available

IPv6 CIDR  
-

VPC  
vpc-08eb1aa7ce448a728 | vpc-university-vpc

Auto-assign public IPv4 address  
No

Outpost ID  
-

Hostname type  
IP name

Owner  
 767397764113

Block Public Access  
 Off

IPv6 CIDR association ID  
-

Route table  
rtb-0a5a507f02385ecc | vpc-university-rtb-private1-us-east-1a

Auto-assign IPv6 address  
No

IPv4 CIDR reservations  
-

Resource name DNS A record  
Disabled

# Amazon Virtual Private Cloud (VPC)

## Subnets: vpc-university-subnet-private2-us-east-1b

subnet-0479dc2d85394be96 / vpc-university-subnet-private2-us-east-1b

Actions ▾

### Details

**Subnet ID**  
[subnet-0479dc2d85394be96](#)

**IPv4 CIDR**  
[10.0.0.96/27](#)

**Availability Zone**  
[use1-az4 \(us-east-1b\)](#)

**Network ACL**  
[acl-0f0b4e5f960d8968f](#)

**Auto-assign customer-owned IPv4 address**  
No

**IPv6 CIDR reservations**  
-

**Resource name DNS AAAA record**  
Disabled

**Subnet ARN**  
[arn:aws:ec2:us-east-1:767397764113:subnet/subnet-0479dc2d85394be96](#)

**Available IPv4 addresses**  
[27](#)

**Network border group**  
[us-east-1](#)

**Default subnet**  
No

**Customer-owned IPv4 pool**  
-

**IPv6-only**  
No

**DNS64**  
Disabled

**State**  
Available

**IPv6 CIDR**  
-

**VPC**  
[vpc-08eb1aa7ce448a728 | vpc-university-vpc](#)

**Auto-assign public IPv4 address**  
No

**Outpost ID**  
-

**Hostname type**  
IP name

**Owner**  
[767397764113](#)

**Block Public Access**  
Off

**IPv6 CIDR association ID**  
-

**Route table**  
[rtb-05bbb789dd4028394 | vpc-university-rtb-private2-us-east-1b](#)

**Auto-assign IPv6 address**  
No

**IPv4 CIDR reservations**  
-

**Resource name DNS A record**  
Disabled

# Amazon Virtual Private Cloud (VPC)

## Subnets: vpc-university-subnet-public1-us-east-1a

subnet-0aae5438cbbced8bd / vpc-university-subnet-public1-us-east-1a

Actions ▾

Details	
Subnet ID	<a href="#">subnet-0aae5438cbbced8bd</a>
IPv4 CIDR	<a href="#">10.0.0.0/27</a>
Availability Zone	<a href="#">use1-az2 (us-east-1a)</a>
Network ACL	<a href="#">acl-0f0b4e5f960d8968f</a>
Auto-assign customer-owned IPv4 address	No
IPv6 CIDR reservations	-
Resource name DNS AAAA record	Disabled
Subnet ARN	<a href="#">arn:aws:ec2:us-east-1:767397764113:subnet/subnet-0aae5438cbbced8bd</a>
Available IPv4 addresses	<a href="#">21</a>
Network border group	<a href="#">us-east-1</a>
Default subnet	No
Customer-owned IPv4 pool	-
IPv6-only	No
DNS64	Disabled
State	<span>Available</span>
IPv6 CIDR	-
VPC	<a href="#">vpc-08eb1aa7ce448a728   vpc-university-vpc</a>
Auto-assign public IPv4 address	No
Outpost ID	-
Hostname type	IP name
Owner	<a href="#">767397764113</a>
Block Public Access	<span>Off</span>
IPv6 CIDR association ID	-
Route table	<a href="#">rtb-0ce8ec163d6d41691   vpc-university-rtb-public</a>
Auto-assign IPv6 address	No
IPv4 CIDR reservations	-
Resource name DNS A record	Disabled

# Amazon Virtual Private Cloud (VPC)

## Subnets: vpc-university-subnet-public2-us-east-1b

subnet-08def64a345c5d50c / vpc-university-subnet-public2-us-east-1b

Actions ▾

Details	
Subnet ID	<a href="#">subnet-08def64a345c5d50c</a>
IPv4 CIDR	<a href="#">10.0.0.32/27</a>
Availability Zone	<a href="#">use1-az4 (us-east-1b)</a>
Network ACL	<a href="#">acl-0f0b4e5f960d8968f</a>
Auto-assign customer-owned IPv4 address	No
IPv6 CIDR reservations	—
Resource name DNS AAAA record	Disabled
Subnet ARN	<a href="#">arn:aws:ec2:us-east-1:767397764113:subnet/subnet-08def64a345c5d50c</a>
Available IPv4 addresses	<a href="#">25</a>
Network border group	<a href="#">us-east-1</a>
Default subnet	No
Customer-owned IPv4 pool	—
IPv6-only	No
DNS64	Disabled
State	<span>Available</span>
IPv6 CIDR	—
VPC	<a href="#">vpc-08eb1aa7ce448a728   vpc-university-vpc</a>
Auto-assign public IPv4 address	No
Outpost ID	—
Hostname type	IP name
Owner	<a href="#">767397764113</a>
Block Public Access	<span>Off</span>
IPv6 CIDR association ID	—
Route table	<a href="#">rtb-0ce8ec163d6d41691   vpc-university-rtb-public</a>
Auto-assign IPv6 address	No
IPv4 CIDR reservations	—
Resource name DNS A record	Disabled

# Amazon Virtual Private Cloud (VPC)

## Route Tables: vpc-university-rtb-private1-us-east-1a

rtb-0a5a507f02385ecc / vpc-university-rtb-private1-us-east-1a Actions ▾

<b>Details</b> <small>Info</small>	<b>Main</b> <input type="checkbox"/> No	<b>Explicit subnet associations</b> subnet-055c7edb6967560b2 / vpc-university-subnet-private1-us-east-1a	<b>Edge associations</b> -
<b>Route table ID</b> <input type="checkbox"/> rtb-0a5a507f02385ecc	<b>Owner ID</b> <input type="checkbox"/> 767397764113		
<b>VPC</b> vpc-08eb1aa7ce448a728   vpc-university-vpc			

**Routes** Subnet associations Edge associations Route propagation Tags

Routes (2)		Edit routes	
Filter routes		Both ▾	1
Destination	Target	Status	Propagated
pl-63a5400a	<a href="#">vpce-0dff605fdde011b59</a>	<input checked="" type="checkbox"/> Active	No
10.0.0.0/24	local	<input checked="" type="checkbox"/> Active	No

# Amazon Virtual Private Cloud (VPC)

## Route Tables: vpc-university-rtb-private2-us-east-1b

rtb-05bbb789dd4028394 / vpc-university-rtb-private2-us-east-1b Actions ▾

<strong>Details</strong> <small>Info</small>	<strong>Main</strong> <input type="checkbox"/> No	<strong>Explicit subnet associations</strong> <a href="#">subnet-0479dc2d85394be96</a> / <a href="#">vpc-university-subnet-private2-us-east-1b</a>	<strong>Edge associations</strong> –
<strong>Route table ID</strong> <a href="#">rtb-05bbb789dd4028394</a>	<strong>Owner ID</strong> <a href="#">767397764113</a>		
<strong>VPC</strong> <a href="#">vpc-08eb1aa7ce448a728</a>   <a href="#">vpc-university-vpc</a>			

**Routes** Subnet associations Edge associations Route propagation Tags

Routes (2)		Both		<a href="#">Edit routes</a>
<input type="text"/> Filter routes				<a href="#">Filter</a> <a href="#">1</a> <a href="#">2</a> <a href="#">3</a> <a href="#">4</a> <a href="#">5</a> <a href="#">6</a> <a href="#">7</a> <a href="#">8</a> <a href="#">9</a> <a href="#">10</a> <a href="#">11</a> <a href="#">12</a> <a href="#">13</a> <a href="#">14</a> <a href="#">15</a> <a href="#">16</a> <a href="#">17</a> <a href="#">18</a> <a href="#">19</a> <a href="#">20</a> <a href="#">21</a> <a href="#">22</a> <a href="#">23</a> <a href="#">24</a> <a href="#">25</a> <a href="#">26</a> <a href="#">27</a> <a href="#">28</a> <a href="#">29</a> <a href="#">30</a> <a href="#">31</a> <a href="#">32</a> <a href="#">33</a> <a href="#">34</a> <a href="#">35</a> <a href="#">36</a> <a href="#">37</a> <a href="#">38</a> <a href="#">39</a> <a href="#">40</a> <a href="#">41</a> <a href="#">42</a> <a href="#">43</a> <a href="#">44</a> <a href="#">45</a> <a href="#">46</a> <a href="#">47</a> <a href="#">48</a> <a href="#">49</a> <a 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# Amazon Virtual Private Cloud (VPC)

## Route Tables: vpc-university-rtb-public

rtb-0ce8ec163d6d41691 / vpc-university-rtb-public Actions ▾

**Details** Info

Route table ID	Main	Explicit subnet associations	Edge associations
<a href="#">rtb-0ce8ec163d6d41691</a>	<input type="checkbox"/> No	<a href="#">2 subnets</a>	-
VPC	Owner ID		
<a href="#">vpc-08eb1aa7ce448a728   vpc-university-vpc</a>	<a href="#">767397764113</a>		

**Routes** Subnet associations Edge associations Route propagation Tags

Routes (2)		Both		<a href="#">Edit routes</a>
Destination	Target	Status	Propagated	Route Origin
0.0.0.0/0	<a href="#">igw-07eb6b906a05208e9</a>	<span>Active</span>	No	Create Route
10.0.0.0/24	local	<span>Active</span>	No	Create Route Table

# Amazon Virtual Private Cloud (VPC)

## Internet Gateways

igw-07eb6b906a05208e9 / vpc-university-igw Actions ▾

Details <span>Info</span>			
Internet gateway ID	<input type="checkbox"/> igw-07eb6b906a05208e9	State	Attached
VPC ID	<a href="#">vpc-08eb1aa7ce448a728   vpc-university-vpc</a>		
Owner	<input type="checkbox"/> 767397764113		

**Tags** Manage tags < 1 >

Key	Value
Name	vpc-university-igw

# Amazon Virtual Private Cloud (VPC)

## Network ACLs: Inbound Rules

acl-0f0b4e5f960d8968f Actions ▾

Details <small>Info</small>		Associated with 4 Subnets	Default Yes	VPC ID <a href="#">vpc-08eb1aa7ce448a728 / vpc-university-vpc</a>
Network ACL ID <a href="#">acl-0f0b4e5f960d8968f</a>	Owner <a href="#">767397764113</a>			

[Inbound rules](#) | [Outbound rules](#) | [Subnet associations](#) | [Tags](#)

**Inbound rules (2)** [Edit inbound rules](#)

Rule number	Type	Protocol	Port range	Source	Allow/Deny
100	All traffic	All	All	0.0.0.0/0	<input checked="" type="checkbox"/> Allow
*	All traffic	All	All	0.0.0.0/0	<input type="checkbox"/> Deny

# Amazon Virtual Private Cloud (VPC)

## Network ACLs: Outbound Rules

acl-Of0b4e5f960d8968f Actions ▾

<b>Details</b> <small>Info</small>	<b>Associated with</b> 4 Subnets	<b>Default</b> Yes	<b>VPC ID</b> <a href="#">vpc-08eb1aa7ce448a728 / vpc-university-vpc</a>
<b>Network ACL ID</b> <a href="#">acl-Of0b4e5f960d8968f</a>			
<b>Owner</b> <a href="#">767397764113</a>			

Inbound rules Outbound rules Subnet associations Tags

**Outbound rules (2)** Edit outbound rules

Rule number	Type	Protocol	Port range	Destination	Allow/Deny
100	All traffic	All	All	0.0.0.0/0	<input checked="" type="checkbox"/> Allow
*	All traffic	All	All	0.0.0.0/0	<input type="checkbox"/> Deny

# Amazon Virtual Private Cloud (VPC)

## Network ACLs: Subnet Associations

acl-0f0b4e5f960d8968f Actions ▾

<b>Details</b> <small>Info</small>	<b>Associated with</b> 4 Subnets	<b>Default</b> Yes	<b>VPC ID</b> <a href="#">vpc-08eb1aa7ce448a728 / vpc-university-vpc</a>
<b>Network ACL ID</b> <a href="#">acl-0f0b4e5f960d8968f</a>			
<b>Owner</b> <a href="#">767397764113</a>			

Inbound rules | Outbound rules | **Subnet associations** | Tags

**Subnet associations (4)** [Edit subnet associations](#)

Name	Subnet ID	Associated with	Availability Zone	IPv4 CIDR	IPv6 CIDR
vpc-university-subnet-public1-us-ea...	<a href="#">subnet-0aae5438cbbced8bd</a>	acl-0f0b4e5f960d8968f	use1-az2 (us-east-1a)	10.0.0.0/27	-
vpc-university-subnet-private2-us-e...	<a href="#">subnet-0479dc2d85394be96</a>	acl-0f0b4e5f960d8968f	use1-az4 (us-east-1b)	10.0.0.96/27	-
vpc-university-subnet-private1-us-e...	<a href="#">subnet-055c7edb6967560b2</a>	acl-0f0b4e5f960d8968f	use1-az2 (us-east-1a)	10.0.0.64/27	-
vpc-university-subnet-public2-us-ea...	<a href="#">subnet-08def64a345c5d50c</a>	acl-0f0b4e5f960d8968f	use1-az4 (us-east-1b)	10.0.0.32/27	-

# Amazon Elastic Compute Cloud (EC2)

---

- **ec2-university**
  - Initial deployment for web app & database testing
  - AMI: Ubuntu
  - Type: t3.micro
- **ec2-webapphosting**
  - Production web server hosting the application
  - Connected to Application Load Balancer (ALB)
- **university-asg-ec2**
  - Auto scaled EC2 instances for high availability
  - Managed by Launch Template: lt-university
  - Min: 2, Desired: 2, Max: 3 instances

# Amazon Elastic Compute Cloud (EC2)

## ec2-university

Instance summary for i-000ba1936d94e9a77 (ec2-university) [Info](#)

Updated less than a minute ago

Category	Value
Instance ID	<a href="#">i-000ba1936d94e9a77</a>
IPv6 address	-
Hostname type	IP name: ip-10-0-0-21.ec2.internal
Answer private resource DNS name	-
Auto-assigned IP address	<a href="#">3.92.228.141 [Public IP]</a>
IAM Role	<a href="#">LabRole</a>
IMDSv2	Required
Operator	-
Public IPv4 address	<a href="#">3.92.228.141   open address</a>
Instance state	<span>Running</span>
Private IP DNS name (IPv4 only)	<a href="#">ip-10-0-0-21.ec2.internal</a>
Instance type	t3.micro
VPC ID	<a href="#">vpc-08eb1aa7ce448a728 (vpc-university-vpc)</a>
Subnet ID	<a href="#">subnet-0aae5438cbbced8bd (vpc-university-subnet-public1-us-east-1a)</a>
Instance ARN	<a href="#">arn:aws:ec2:us-east-1:767397764113:instance/i-000ba1936d94e9a77</a>
Private IPv4 addresses	<a href="#">10.0.0.21</a>
Public DNS	<a href="#">ec2-3-92-228-141.compute-1.amazonaws.com   open address</a>
Elastic IP addresses	-
AWS Compute Optimizer finding	<a href="#">Opt-in to AWS Compute Optimizer for recommendations.</a>   <a href="#">Learn more</a>
Auto Scaling Group name	-
Managed	false

# Amazon Elastic Compute Cloud (EC2)

## ec2-webapphosting

Instance summary for i-0b5b46c5a88cc6311 (ec2-webapphosting) [Info](#)

Updated less than a minute ago

<b>Instance ID</b> <a href="#">i-0b5b46c5a88cc6311</a>	<b>Public IPv4 address</b> <a href="#">44.208.29.119</a>   <a href="#">open address</a>	<b>Private IPv4 addresses</b> <a href="#">10.0.0.26</a>
<b>IPv6 address</b> -	<b>Instance state</b> <span style="color: green;">✓ Running</span>	<b>Public DNS</b> <a href="#">ec2-44-208-29-119.compute-1.amazonaws.com</a>   <a href="#">open address</a>
<b>Hostname type</b> IP name: ip-10-0-0-26.ec2.internal	<b>Private IP DNS name (IPv4 only)</b> <a href="#">ip-10-0-0-26.ec2.internal</a>	<b>Elastic IP addresses</b> -
<b>Answer private resource DNS name</b> -	<b>Instance type</b> t3.micro	<b>AWS Compute Optimizer finding</b> <span style="color: blue;">i</span> Opt-in to AWS Compute Optimizer for recommendations.   <a href="#">Learn more</a>
<b>Auto-assigned IP address</b> <a href="#">44.208.29.119 [Public IP]</a>	<b>VPC ID</b> <a href="#">vpc-08eb1aa7ce448a728 (vpc-university-vpc)</a>	<b>Auto Scaling Group name</b> -
<b>IAM Role</b> <a href="#">LabRole</a>	<b>Subnet ID</b> <a href="#">subnet-0aae5438cbbced8bd (vpc-university-subnet-public1-us-east-1a)</a>	<b>Managed</b> false
<b>IMDSv2</b> Required	<b>Instance ARN</b> <a href="#">arn:aws:ec2:us-east-1:767397764113:instance/i-0b5b46c5a88cc6311</a>	
<b>Operator</b> -		

# Amazon Elastic Compute Cloud (EC2)

## university-asg-ec2

Instance summary for i-0d782fef57536f083 (university-asg-ec2) [Info](#)

Updated less than a minute ago

<b>Instance ID</b> <a href="#">i-0d782fef57536f083</a>	<b>Public IPv4 address</b> <a href="#">18.207.221.254</a>   <a href="#">open address</a>	<b>Private IPv4 addresses</b> <a href="#">10.0.0.19</a>
<b>IPv6 address</b> -	<b>Instance state</b> <a href="#">Running</a>	<b>Public DNS</b> <a href="#">ec2-18-207-221-254.compute-1.amazonaws.com</a>   <a href="#">open address</a>
<b>Hostname type</b> IP name: ip-10-0-0-19.ec2.internal	<b>Private IP DNS name (IPv4 only)</b> <a href="#">ip-10-0-0-19.ec2.internal</a>	<b>Elastic IP addresses</b> -
<b>Answer private resource DNS name</b> -	<b>Instance type</b> t3.micro	<b>AWS Compute Optimizer finding</b> <a href="#">Opt-in to AWS Compute Optimizer for recommendations.</a>   <a href="#">Learn more</a>
<b>Auto-assigned IP address</b> <a href="#">18.207.221.254 [Public IP]</a>	<b>VPC ID</b> <a href="#">vpc-08eb1aa7ce448a728 (vpc-university-vpc)</a>	<b>Auto Scaling Group name</b> <a href="#">asg-university</a>
<b>IAM Role</b> <a href="#">LabRole</a>	<b>Subnet ID</b> <a href="#">subnet-0aae5438cbbced8bd (vpc-university-subnet-public1-us-east-1a)</a>	<b>Managed</b> false
<b>IMDSv2</b> Required	<b>Instance ARN</b> <a href="#">arn:aws:ec2:us-east-1:767397764113:instance/i-0d782fef57536f083</a>	
<b>Operator</b> -		

# Amazon Relational Database Service (RDS)

---

- DB Instance: db-university
- Engine: MySQL 9.0.39 (Free Tier)
- Subnet Group: dbsubnetgrp-university (private subnets across 2 AZs)
- Security: Secured with dbaccess SG (only web app & Cloud9 can connect)
- Database Name: STUDENTS
- Purpose: Stores and manages student records reliably
- Credentials: Stored in AWS Secrets Manager

# Amazon Relational Database Service (RDS)

db-university

db-university

Modify Actions ▾

Summary				
DB identifier db-university	Status <span style="color: green;">✓ Available</span>	Role Instance	Engine MySQL Community	Recommendations
CPU <div style="width: 2.97%;">2.97%</div>	Class db.t4g.micro	Current activity <div style="width: 2%;">2 Connections</div>	Region & AZ us-east-1a	

# Amazon Relational Database Service (RDS)

## db-university: Connectivity & Security

Connectivity & security    Monitoring    Logs & events    Configuration    Zero-ETL integrations    Maintenance & backups    Data migrations - new    Tags    Recommendations

### Connectivity & security

Endpoint & port	Networking	Security
<b>Endpoint</b> db-university.ct6swckma544.us-east-1.rds.amazonaws.com	<b>Availability Zone</b> us-east-1a  <b>VPC</b> vpc-university-vpc (vpc-08eb1aa7ce448a728)  <b>Subnet group</b> dbsubnetgrp-university  <b>Subnets</b> subnet-08def64a345c5d50c subnet-0aae5438cbbced8bd  <b>Network type</b> IPv4	<b>VPC security groups</b> dbaccess (sg-02652a9357633dc00) Active  <b>Publicly accessible</b> No  <b>Certificate authority</b> <a href="#">Info</a> rds-ca-rsa2048-g1  <b>Certificate authority date</b> May 26, 2061, 07:34 (UTC+08:00)  <b>DB instance certificate expiration date</b> September 10, 2026, 23:43 (UTC+08:00)

# AWS Cloud9

---

- Environment Name: cloud9-university
- Instance Type: t3.micro
- Networking: Connected via SSH in VPC public subnet
- Purpose:
  - Run CLI commands & deployment scripts
  - Created Secrets, migrated DB, performed load tests

# AWS Cloud9

## cloud9-university

cloud9-university

[Delete](#)[Open in Cloud9](#)

Details		
Name	Owner ARN	Status
cloud9-university	<a href="#">arn:aws:sts::767397764113:assumed-role/voclabs/user4171196=limjw-wm22@student.tarc.edu.my</a>	<a href="#">Stopped</a>
Description	Number of members	Lifecycle status
-	1	<a href="#">Created</a>
Environment type		
EC2 instance		

[EC2 instance](#)[Network settings](#)[Tags](#)

### EC2 instance

[Manage EC2 instance](#)

ARN	Instance type
<a href="#">arn:aws:cloud9:us-east-1:767397764113:environment:06073b3a409d4c4aa174bbddc71ce015</a>	t3.micro (1 GiB RAM + 2 vCPU)
Platform	Storage
Amazon Linux 2023	EBS only



# AWS Cloud9

## cloud9-university (terminal access database)

```
mysql -> ip-10-0-0-16.ec2.i x Immediate (Javascript (br x +)
voclabs:~/environment $ mysql -h db-university.ct6swckma544.us-east-1.rds.amazonaws.com -u nodeapp
voclabs:~/environment $ mysql -h db-university.ct6swckma544.us-east-1.rds.amazonaws.com -u nodeapp -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 350
Server version: 8.0.42 Source distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]> select * from students;
ERROR 1046 (3D000): No database selected
MySQL [(none)]> use STUDENTS;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+
| id | name      | address          | city       | state    | email           | phone   |
+----+-----+-----+-----+-----+-----+
| 1 | Alice Tan | Admin street 123 | Batu Caves | Selangor | alicetan123@gmail.com | 0163728467 |
| 2 | Ah Beng   | 123, Taman Bunga Raya | Kuala Lumpur | Kuala Lumpur | ahbeng352@gmail.com | 0173627847 |
| 3 | Ali Baba  | 35, Jalan Cemerlang | Kuala ABC   | Selangor | alibaba345@gmail.com | 0163728654 |
+----+-----+-----+-----+-----+-----+
3 rows in set (0.001 sec)

MySQL [STUDENTS]>
```

# AWS Secrets Manager

---

- Secret Name: Mydbsecret
- Stored Info: DB username, password, RDS endpoint
- Integration: Web application fetches DB credentials securely
- Advantage: Eliminated hardcoding sensitive info in web app

# AWS Secrets Manager

## Mydbsecret

### Mydbsecret

**Secret details**

Encryption key  
 aws/secretsmanager

Secret name  
 Mydbsecret

Secret ARN  
 arn:aws:secretsmanager:us-east-1:767397764113:secret:Mydbsecret-gu2l20

**Secret description**  
 Database secret for web app

C Actions ▾

# AWS Secrets Manager

## Mydbsecret: Secret Value

Overview    Rotation    Versions    Replication    Tags

**Secret value** Info

Retrieve and view the secret value.

**Key/value** **Plaintext**

Secret key	Secret value
user	<input type="text"/> nodeapp
password	<input type="text"/> nodeapp123
host	<input type="text"/> db-university.ct6swckma544.us-east-1.rds.amazonaws.com
db	<input type="text"/> STUDENTS

**Close** **Edit**

# Elastic Load Balancing (Application Load Balancer)

---

- Name: alb-university
- Type: Application Load Balancer (ALB)
- Target Group: tg-university
- Mappings: Public subnets in 2 AZs
- Security: Linked with Security Group "SGuniversity"
- DNS Endpoint: Used by users to access the web application
- Purposes:
  - Distributes traffic across multiple web servers
  - Ensures fault tolerance & better performance

# Elastic Load Balancing (Application Load Balancer)

alb-university

alb-university

C Actions ▾

▼ Details			
Load balancer type	Status	VPC	Load balancer IP address type
Application	Active	vpc-08eb1aa7ce448a728 [2]	IPv4
Scheme	Hosted zone	Availability Zones	Date created
Internet-facing	Z35SXDOTRQ7X7K	subnet-08def64a345c5d50c [2] us-east-1b (use1-az4) subnet-0aae5438cbced8bd [2] us-east-1a (use1-az2)	September 11, 2025, 00:09 (UTC+08:00)
Load balancer ARN	DNS name <a href="#">Info</a>		
<a href="#">arn:aws:elasticloadbalancing:us-east-1:767397764113:loadbalancer/app/alb-university/6fee5821fe70501d</a>	<a href="#">alb-university-29584847.us-east-1.elb.amazonaws.com (A Record)</a>		

Listeners and rules	Network mapping	Resource map	Security	Monitoring	Integrations	Attributes	Capacity	Tags
<h3>Listeners and rules (1) <a href="#">Info</a></h3>								
<p>A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.</p>								
Protocol:Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS	Trust store	
<input type="checkbox"/> HTTP:80	<ul style="list-style-type: none"><li>Forward to target group <a href="#">tg-university</a> [2]: 1 (100%) Target group stickiness: Off</li></ul>	<a href="#">1 rule</a>	<a href="#">ARN</a>	Not applicable	Not applicable	Not applicable	Not applicable	

# Elastic Load Balancing (Application Load Balancer)

## alb-university: Network Mapping

Listeners and rules    **Network mapping**    Resource map    Security    Monitoring    Integrations    Attributes    Capacity    Tags

**Network mapping** Info

Targets in the listed zones and subnets are available for traffic from the load balancer using the IP addresses shown.

VPC [Edit IP address type](#) [Edit IP pools](#)

vpc-08eb1aa7ce448a728 [Edit](#)  
IPv4 VPC CIDR: 10.0.0.0/24  
IPv6 VPC CIDR: -

Load balancer IP address type: IPv4

IP pools: -

**Availability Zones and subnets** Info

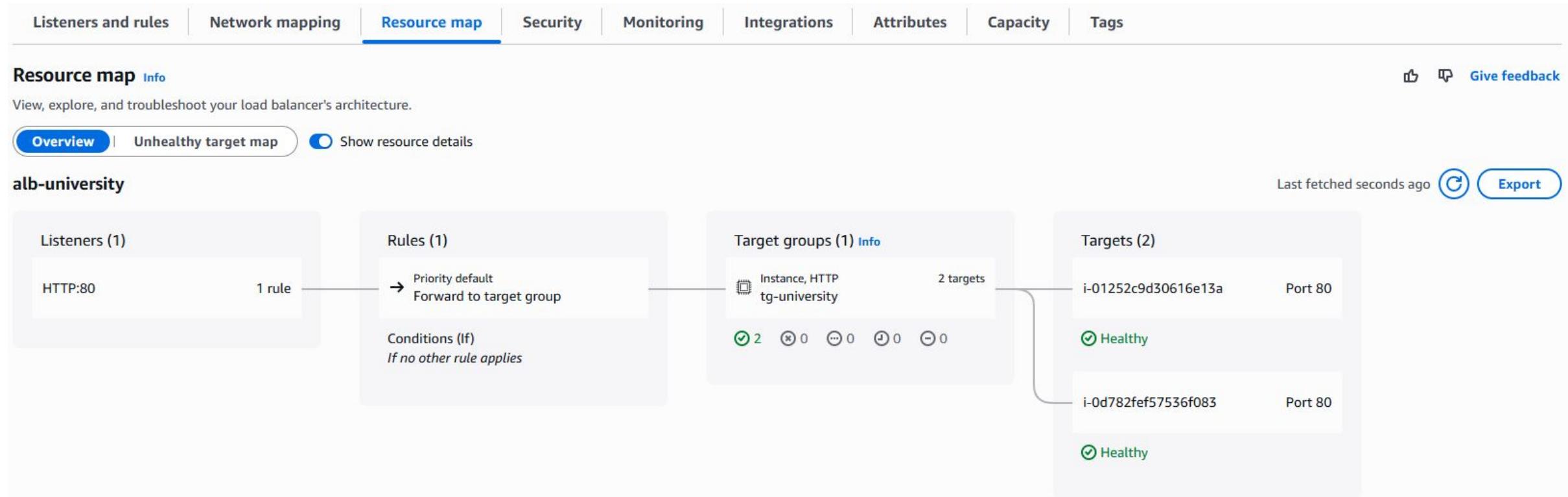
Including two or more Availability Zones, and corresponding subnets, increases the fault tolerance of your applications.

Zone	Subnet	Private IPv4 address	IPv6 address
us-east-1b (use1-az4)	<a href="#">subnet-08def64a345c5d50c</a> <a href="#">Edit</a>	Assigned from CIDR 10.0.0.32/27	Not applicable
us-east-1a (use1-az2)	<a href="#">subnet-0aae5438cbbced8bd</a> <a href="#">Edit</a>	Assigned from CIDR 10.0.0.0/27	Not applicable

[Edit subnets](#)

# Elastic Load Balancing (Application Load Balancer)

## alb-university: Resource Map



# Amazon EC2 Auto Scaling

---

- Usage: Added S3 Gateway Endpoint for compliance
- Storage: Minimal (1 GB, low request volume)
- Minimum Instances: 2
- Maximum Instances: 3
- Desired Capacity: 2
- Scaling Metric Type: Average CPU Utilization
- Target Value: 50%
- Purpose:
  - Automatically scales based on load and health checks
  - Reflects real-world architecture design (even if not actively storing files)

# Amazon EC2 Auto Scaling

## asg-university

### asg-university

**asg-university Capacity overview**

[arn:aws:autoscaling:us-east-1:767397764113:autoScalingGroup:2ee5855a-9203-47d8-b245-26e40a4e8c6a:autoScalingGroupName/asg-university](#) [Edit](#)

<b>Desired capacity</b> 2	<b>Scaling limits (Min - Max)</b> 2 - 3	<b>Desired capacity type</b> Units (number of instances)	<b>Status</b> -
------------------------------	--	---	--------------------

**Date created**  
Thu Sep 11 2025 00:13:15 GMT+0800 (Malaysia Time)

[Details](#) [Integrations - new](#) [Automatic scaling](#) [Instance management](#) [Instance refresh](#) [Activity](#) [Monitoring](#)

**Launch template** [Edit](#)

<b>Launch template</b> <a href="#">lt-04e33592ca4f61b0f</a> lt-university	<b>AMI ID</b> <a href="#">ami-0360c520857e3138f</a>	<b>Instance type</b> t3.micro	<b>Owner</b> arn:aws:sts::767397764113:assumed-role/voclabs/user4171196=limjw-wm22@student.tarc.edu.my
<b>Version</b> Default	<b>Security groups</b> -	<b>Security group IDs</b> <a href="#">sg-06be0a838c1a4b50c</a>	<b>Create time</b> Thu Sep 11 2025 00:11:43 GMT+0800 (Malaysia Time)
<b>Description</b> -	<b>Storage (volumes)</b> /dev/sda1	<b>Key pair name</b> vokey	<b>Request Spot Instances</b> No

[View details in the launch template console](#)

# Amazon EC2 Auto Scaling

## asg-university: Target Tracking Policy

**Target Tracking Policy**

**Policy type**  
Target tracking scaling

**Enabled or disabled**  
Enabled

**Execute policy when**  
As required to maintain Average CPU utilization at 50

**Take the action**  
Add or remove capacity units as required

**Instances need**  
300 seconds to warm up before including in metric

**Scale in**  
Enabled

# Amazon EC2 Auto Scaling

## asg-university: Network

Network			Edit
<b>Availability Zones</b> use1-az4 (us-east-1b) use1-az2 (us-east-1a)	<b>Subnet ID</b> <input type="checkbox"/> <a href="#">subnet-08def64a345c5d50c</a> <input type="checkbox"/> <a href="#">subnet-0aae5438cbbced8bd</a>	<b>Availability Zone distribution</b> Balanced best effort	

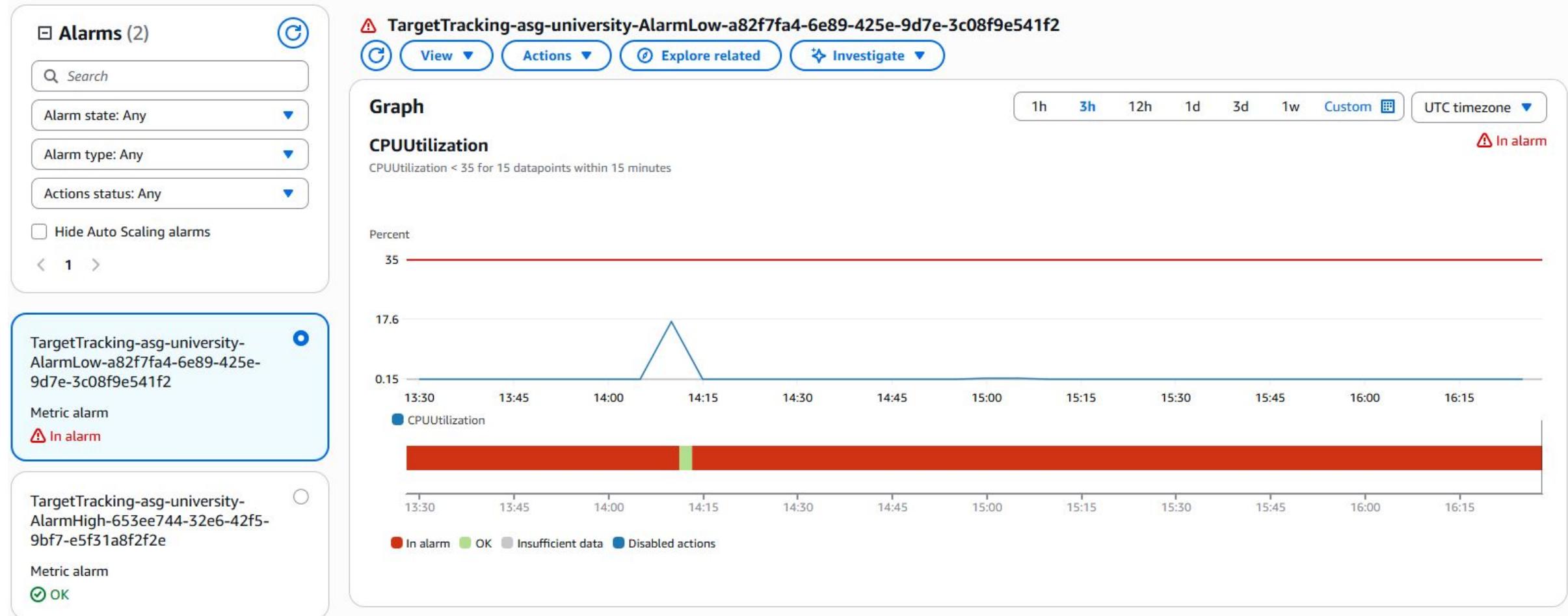
# CloudWatch

---

- Monitors average CPU utilization across Auto Scaling group
- Triggers scale out/in events based on Target Tracking Policy
- Ensures application can handle peak load while minimizing cost

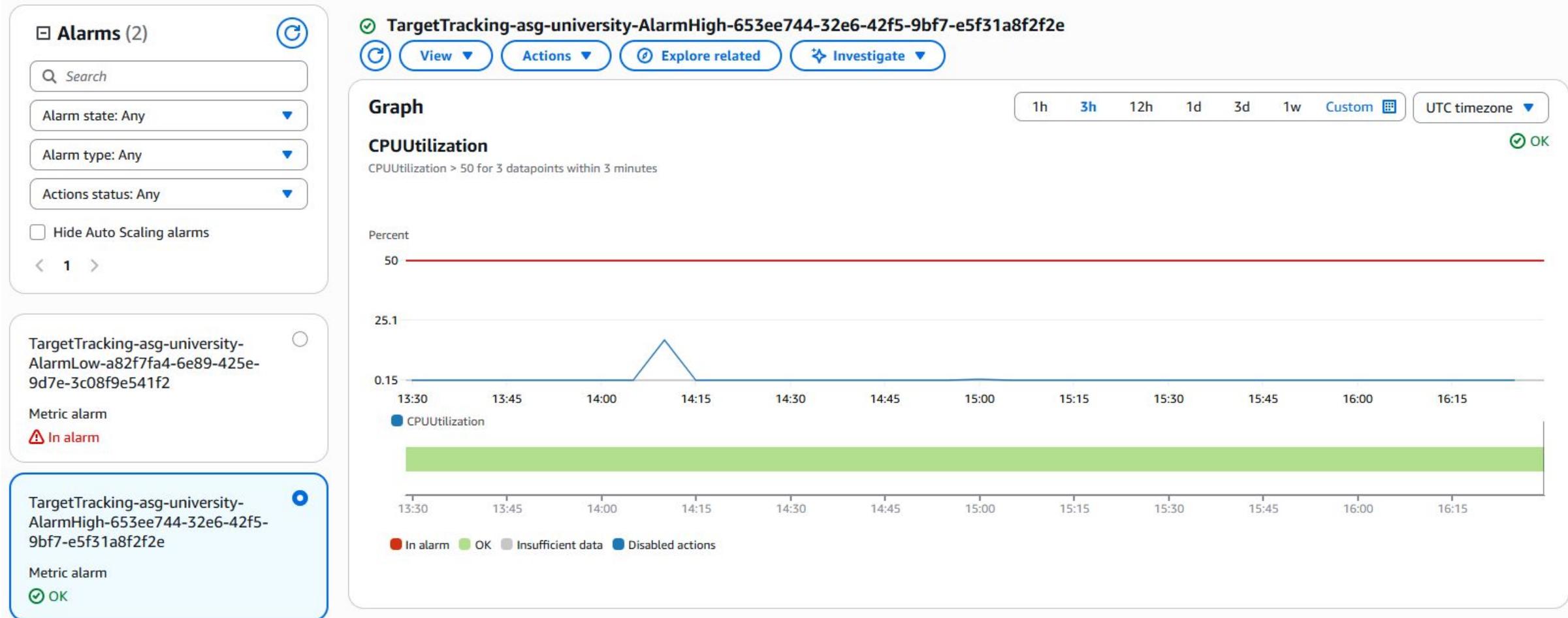
# CloudWatch

## TargetTracking-asg-university-AlarmLow



# CloudWatch

## TargetTracking-asg-university-AlarmHigh



# Identity and Access Management (IAM)

---

- Role: LabRole (attached via LabInstanceProfile)
- Permissions:
  - EC2 → access Secrets Manager
  - Cloud9 → deploy resources, run scripts
- Security Groups:
  - SGuniversity: Allowed HTTP (80) + MySQL (3306 from Cloud9 SG)
  - dbaccess: Allowed only EC2 + Cloud9 access to RDS

# Identity and Access Management (IAM)

## LabRole

**LabRole** [Info](#) [Delete](#) [Edit](#)

**Summary**

**Creation date**  
September 10, 2025, 23:17 (UTC+08:00)

**Last activity**  
 13 minutes ago

**ARN**  
 arn:aws:iam::767397764113:role/LabRole

**Instance profile ARN**  
 arn:aws:iam::767397764113:instance-profile/LabInstanceProfile

**Maximum session duration**  
1 hour

**Permissions** [Trust relationships](#) [Tags \(1\)](#) [Last Accessed](#) [Revoke sessions](#)

**Permissions policies (7) [Info](#)** You can attach up to 10 managed policies.

[Simulate](#) [Remove](#) [Add permissions ▾](#)

**Filter by Type** All types

<input type="checkbox"/>	Policy name	Type	Attached entities
<input type="checkbox"/>	<a href="#">AmazonEC2ContainerRegistryReadOnly</a>	AWS managed	1
<input type="checkbox"/>	<a href="#">AmazonEKSClusterPolicy</a>	AWS managed	1
<input type="checkbox"/>	<a href="#">AmazonEKSWorkerNodePolicy</a>	AWS managed	1
<input type="checkbox"/>	<a href="#">AmazonSSMManagedInstanceCore</a>	AWS managed	1
<input type="checkbox"/>	<a href="#">c168208a4328956l11535067t1w767397764113...</a>	Customer managed	1
<input type="checkbox"/>	<a href="#">c168208a4328956l11535067t1w767397764113...</a>	Customer managed	1
<input type="checkbox"/>	<a href="#">c168208a4328956l11535067t1w767397764113...</a>	Customer managed	1



# Snippet of Web Page(s) and Database Table, Field and Records

# Scenario 1: Add Student

## Initial Student List (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Alice Tan	Admin street 123	Batu Caves	Selangor	alicetan123@gmail.com	0163728467	<button>edit</button>
Ah Beng	123, Taman Bunga Raya	Kuala Lumpur	Kuala Lumpur	ahbeng352@gmail.com	0173627847	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>

[Add a new student](#)

# Scenario 1: Add Student

## Initial Student List (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+-----+
| id | name      | address           | city       | state    | email            | phone   |
+----+-----+-----+-----+-----+-----+-----+
| 1  | Alice Tan  | Admin street 123  | Batu Caves | Selangor | alicetan123@gmail.com | 0163728467 |
| 2  | Ah Beng    | 123, Taman Bunga Raya | Kuala Lumpur | Kuala Lumpur | ahbeng352@gmail.com | 0173627847 |
| 3  | Ali Baba   | 35, Jalan Cemerlang | Kuala ABC   | Selangor | alibaba345@gmail.com | 0163728654 |
+----+-----+-----+-----+-----+-----+-----+
3 rows in set (0.001 sec)

MySQL [STUDENTS]> █
```

# Scenario 1: Add Student

## Adding New Student (Mei Ling)



XYZ University

Home Students list

All fields are required

Name  
Mei Ling  
Name of this student

Address  
12, jalan abc, taman def, 68100 Batu Caves, Selangor  
Address for this student

City  
Batu Caves  
City for this student

State  
Selangor  
State for this student

Email  
meiling112@gmail.com  
Email for this student

Phone  
01627348625  
Phone number for this student

Submit

# Scenario 1: Add Student

## Result (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Alice Tan	Admin street 123	Batu Caves	Selangor	alicetan123@gmail.com	0163728467	<button>edit</button>
Ah Beng	123, Taman Bunga Raya	Kuala Lumpur	Kuala Lumpur	ahbeng352@gmail.com	0173627847	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>
Mei Ling	12, jalan abc, taman def, 68100 Batu Caves, Selangor	Batu Caves	Selangor	meiling112@gmail.com	01627348625	<button>edit</button>

Add a new student

# Scenario 1: Add Student

## Result (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+
| id | name      | address                               | city      | state     | email           | phone   |
+----+-----+-----+-----+-----+-----+
| 1  | Alice Tan  | Admin street 123                         | Batu Caves | Selangor  | alicetan123@gmail.com | 0163728467 |
| 2  | Ah Beng    | 123, Taman Bunga Raya                     | Kuala Lumpur | Kuala Lumpur | ahbeng352@gmail.com | 0173627847 |
| 3  | Ali Baba   | 35, Jalan Cemerlang                        | Kuala ABC  | Selangor  | alibaba345@gmail.com | 0163728654 |
| 5  | Mei Ling    | 12, jalan abc, taman def, 68100 Batu Caves, Selangor | Batu Caves | Selangor  | meiling112@gmail.com | 01627348625 |
+----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MySQL [STUDENTS]> |
```

# Scenario 2: Modify Student

## Initial Student List (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Alice Tan	Admin street 123	Batu Caves	Selangor	alicetan123@gmail.com	0163728467	<button>edit</button>
Ah Beng	123, Taman Bunga Raya	Kuala Lumpur	Kuala Lumpur	ahbeng352@gmail.com	0173627847	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>
Mei Ling	12, jalan abc, taman def, 68100 Batu Caves, Selangor	Batu Caves	Selangor	meiling112@gmail.com	01627348625	<button>edit</button>

Add a new student

# Scenario 2: Modify Student

## Initial Student List (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+
| id | name      | address                                | city      | state     | email           | phone   |
+----+-----+-----+-----+-----+-----+
| 1  | Alice Tan  | Admin street 123                         | Batu Caves | Selangor  | alicetan123@gmail.com | 0163728467 |
| 2  | Ah Beng    | 123, Taman Bunga Raya                      | Kuala Lumpur | Kuala Lumpur | ahbeng352@gmail.com | 0173627847 |
| 3  | Ali Baba   | 35, Jalan Cemerlang                         | Kuala ABC  | Selangor  | alibaba345@gmail.com | 0163728654 |
| 5  | Mei Ling    | 12, jalan abc, taman def, 68100 Batu Caves, Selangor | Batu Caves | Selangor  | meiling112@gmail.com | 01627348625 |
+----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MySQL [STUDENTS]>
```

# Scenario 2: Modify Student

## Modifying Student (Ah Beng) Information



XYZ University

Home Students list

All fields are required

Name  
Ah Beng  
Name of this student

Address  
123, Taman Bunga Raya ABC, City ABC  
Address for this student

City  
City ABC  
City for this student

State  
Terengganu  
State for this student

Email  
ahbeng\_modified@gmail.com  
Email for this student

Phone  
01218374957  
Phone number for this student

# Scenario 2: Modify Student

## Result (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Alice Tan	Admin street 123	Batu Caves	Selangor	alicetan123@gmail.com	0163728467	<button>edit</button>
Ah Beng	123, Taman Bunga Raya ABC, City ABC	City ABC	Terengganu	ahbeng_modified@gmail.com	01218374957	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>
Mei Ling	12, jalan abc, taman def, 68100 Batu Caves, Selangor	Batu Caves	Selangor	meiling112@gmail.com	01627348625	<button>edit</button>

[Add a new student](#)

# Scenario 2: Modify Student

## Result (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+-----+
| id | name      | address          | city      | state    | email           | phone   |
+----+-----+-----+-----+-----+-----+-----+
| 1  | Alice Tan  | Admin street 123 | Batu Caves | Selangor | alicetan123@gmail.com | 0163728467 |
| 2  | Ah Beng    | 123, Taman Bunga Raya ABC, City ABC | City ABC  | Terengganu | ahbeng_modified@gmail.com | 01218374957 |
| 3  | Ali Baba   | 35, Jalan Cemerlang | Kuala ABC | Selangor | alibaba345@gmail.com | 0163728654 |
| 5  | Mei Ling    | 12, jalan abc, taman def, 68100 Batu Caves, Selangor | Batu Caves | Selangor | meiling112@gmail.com | 01627348625 |
+----+-----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MySQL [STUDENTS]>
```

# Scenario 3: Delete Student

## Initial Student List (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Alice Tan	Admin street 123	Batu Caves	Selangor	alicetan123@gmail.com	0163728467	<button>edit</button>
Ah Beng	123, Taman Bunga Raya ABC, City ABC	City ABC	Terengganu	ahbeng_modified@gmail.com	01218374957	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>
Mei Ling	12, jalan abc, taman def, 68100 Batu Caves, Selangor	Batu Caves	Selangor	meiling112@gmail.com	01627348625	<button>edit</button>

Add a new student

# Scenario 3: Delete Student

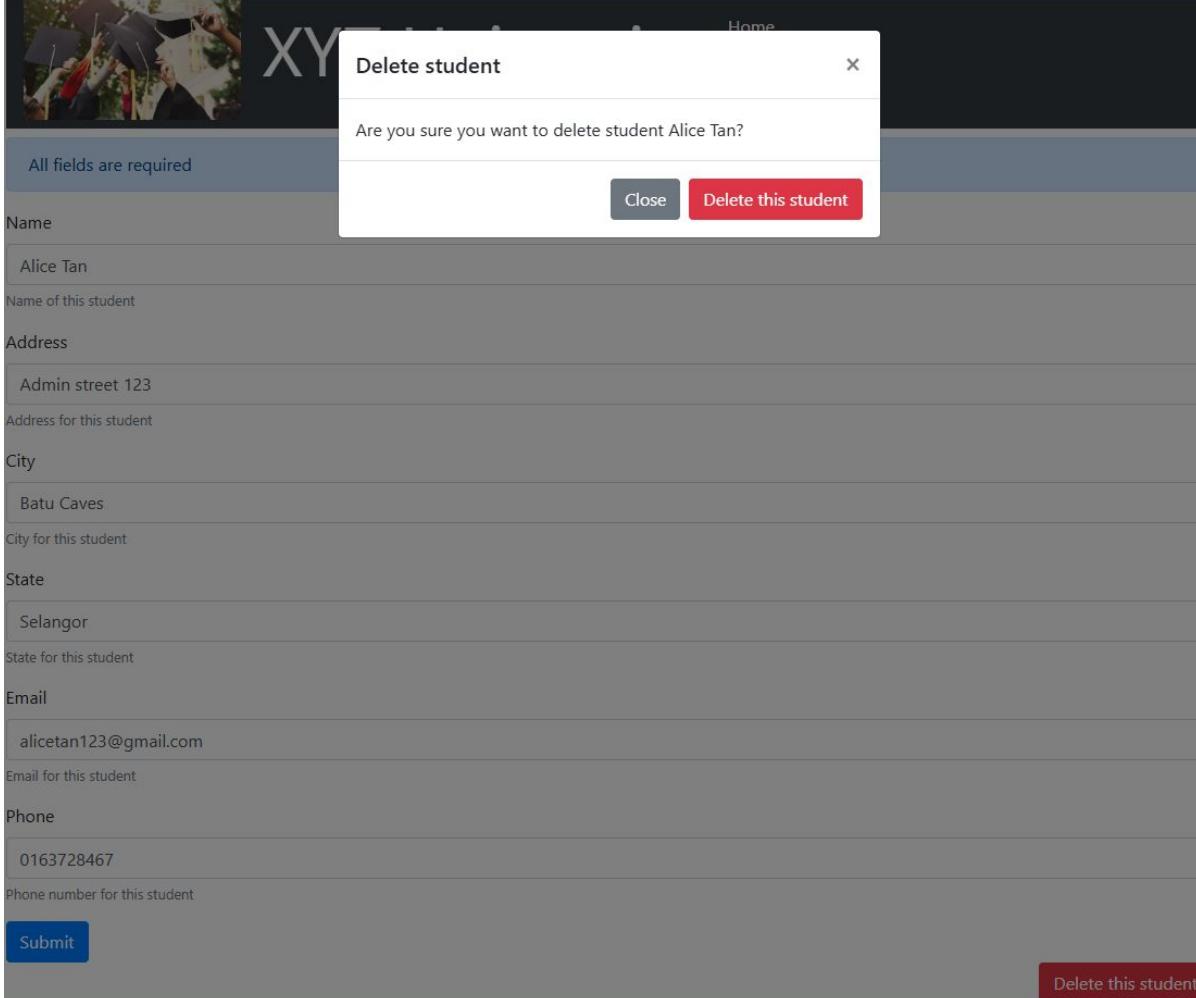
## Initial Student List (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+-----+
| id | name      | address          | city      | state    | email           | phone   |
+----+-----+-----+-----+-----+-----+-----+
| 1  | Alice Tan  | Admin street 123 | Batu Caves | Selangor | alicetan123@gmail.com | 0163728467 |
| 2  | Ah Beng    | 123, Taman Bunga Raya ABC, City ABC | City ABC  | Terengganu | ahbeng_modified@gmail.com | 01218374957 |
| 3  | Ali Baba   | 35, Jalan Cemerlang | Kuala ABC | Selangor | alibaba345@gmail.com | 0163728654 |
| 5  | Mei Ling    | 12, jalan abc, taman def, 68100 Batu Caves, Selangor | Batu Caves | Selangor | meiling112@gmail.com | 01627348625 |
+----+-----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MySQL [STUDENTS]>
```

# Scenario 3: Delete Student

## Delete Student (Alice Tan)



# Scenario 3: Delete Student

## Result (Web Page)



### All students

Name	Address	City	State	Email	Phone	
Ah Beng	123, Taman Bunga Raya ABC, City ABC	City ABC	Terengganu	ahbeng_modified@gmail.com	01218374957	<button>edit</button>
Ali Baba	35, Jalan Cemerlang	Kuala ABC	Selangor	alibaba345@gmail.com	0163728654	<button>edit</button>
Mei Ling	12, jalan abc, taman def, 68100 Batu Caves, Selangor	Batu Caves	Selangor	meiling112@gmail.com	01627348625	<button>edit</button>

[Add a new student](#)

# Scenario 3: Delete Student

## Result (Cloud9)

```
MySQL [STUDENTS]> select * from students;
+----+-----+-----+-----+-----+-----+-----+
| id | name      | address                                | city      | state     | email           | phone   |
+----+-----+-----+-----+-----+-----+-----+
| 2  | Ah Beng    | 123, Taman Bunga Raya ABC, City ABC | City ABC | Terengganu | ahbeng_modified@gmail.com | 01218374957 |
| 3  | Ali Baba   | 35, Jalan Cemerlang                         | Kuala ABC | Selangor   | alibaba345@gmail.com   | 0163728654  |
| 5  | Mei Ling    | 12, jalan abc, taman def, 68100 Batu Caves, Selangor | Batu Caves | Selangor   | meiling112@gmail.com   | 01627348625 |
+----+-----+-----+-----+-----+-----+-----+
3 rows in set (0.001 sec)

MySQL [STUDENTS]> █
```



# Conclusion

# Conclusion

---

- Modernized & Solved downtime and performance issues
- AWS Well-Architected Framework principles:
  - High Availability → Multi-AZ + Load Balancer + Auto Scaling
  - Security → VPC isolation, IAM, Secrets Manager
  - Cost Efficiency → Free-tier eligible instances & optimized services
- Key AWS Services
  - EC2, RDS, VPC, Cloud9, Secrets Manager, ELB, CloudWatch
- Outcome
  - Scalable, reliable and secure student management system
  - support peak admissions.



# Lesson Learned

# Lessons Learned

---

## Challenge & Solution

- **Challenge**
  - RDS in private subnet couldn't connect to EC2 in ASG due to misconfigured route tables & SGs.
- **Solution**
  - Fixed by adjusting SG rules (MySQL traffic only from EC2/Cloud9) + correct private route table setup.

## New Skill Acquired

- **How to integrate RDS with Auto Scaling EC2**
  - During load testing, new EC2 instances scaled automatically and still connected to RDS via Secrets Manager without manual setup.

# Lessons Learned

---

## Future Improvement

- **Extend scalability for university needs**
  - Example:
    - Support multiple faculties/departments in the university
    - Each handling thousands of concurrent student records
  - How?
    - Adding read replicas for RDS and scaling web tier across more regions.



# Guided and Challenge Lab Score

# Lim Jun Wei

## Grades for limjw-wm22@student.tarc.edu.my

 Print Grades (javascript:window.print())

Course Arrange By

AWS Academy Cloud Arch

Due Date

 Apply

Name	Due	Submitted	Status	Score
<a href="#">Challenge (Café) Lab: Creating a Dynamic Website for the Café Lab Assignments</a>	Jul 28 at 12:14am	30 / 30		
<a href="#">(Optional) Guided lab: Breaking a Monolithic Node.js Application into Microservices Lab Assignments</a>		- / 56		
<a href="#">Academy Cloud Architecting Course Assessment Assignments</a>		- / 100		
<a href="#">Capstone Project Lab Assignments</a>		- / 56		
<a href="#">Capstone Project Lab Assignments</a>		- / 35		
<a href="#">Challenge (Café) Lab: Automating Infrastructure Deployment Lab Assignments</a>	Sep 12 at 1:47pm	56 / 56		
<a href="#">Challenge (Café) Lab: Creating a Scalable and Highly Available Environment for the Café Lab Assignments</a>	Sep 12 at 12:09pm	56 / 56		
<a href="#">Challenge (Café) Lab: Creating a Static Website for the Café Lab Assignments</a>	Jul 14 at 4:26pm	29 / 29		

Name	Due	Submitted	Status	Score
<a href="#">Challenge (Café) Lab: Creating a VPC Networking Environment for the Café Lab Assignments</a>	Sep 11 at 11:30pm	56 / 56		
<a href="#">Challenge (Café) Lab: Implementing a Serverless Architecture for the Café Lab Assignments</a>		- / 56		
<a href="#">Challenge (Café) Lab: Migrating a Database to Amazon RDS Lab Assignments</a>	Sep 11 at 7:59pm	25 / 25		
<a href="#">Guided lab: Automating Infrastructure with AWS CloudFormation Lab Assignments</a>	Sep 12 at 12:31pm	56 / 56		
<a href="#">Guided lab: Building Decoupled Applications by Using Amazon SQS Lab Assignments</a>	Sep 12 at 2:28pm	56 / 56		
<a href="#">Guided Lab: Configuring Hybrid Storage and Migrating Data with AWS Storage Gateway S3 File Gateway Lab Assignments</a>		- / 40		
<a href="#">Guided lab: Creating a Highly Available Environment Lab Assignments</a>	Sep 12 at 11:15am	56 / 56		
<a href="#">Guided lab: Creating a Virtual Private Cloud Lab Assignments</a>	Sep 11 at 8:21pm	56 / 56		
<a href="#">Guided lab: Creating a VPC Peering Connection Lab Assignments</a>	Sep 11 at 11:50pm	56 / 56		
<a href="#">Guided lab: Creating an Amazon RDS Database Lab Assignments</a>	Sep 11 at 7:25pm	20 / 20		
<a href="#">Guided lab: Encrypting Data at Rest by Using AWS Encryption Options</a>	Sep 12 at 12:26am	56 / 56		



# Lim Jun Wei

Name	Due	Submitted	Status	Score
<b>Lab Assignments</b>				
<a href="#">Guided Lab: Exploring AWS Identity and Access Management (IAM)</a> Lab Assignments	Jul 7 at 1:23pm		56 / 56	
<a href="#">Guided lab: Implementing a Serverless Architecture on AWS</a> Lab Assignments			- / 56	
<a href="#">Guided lab: Introducing Amazon Elastic File System (Amazon EFS)</a> Lab Assignments	Jul 25 at 1:16pm		15 / 15	
<a href="#">Guided lab: Securing Applications by using Amazon Cognito</a> Lab Assignments			- / 56	
<a href="#">Module 2 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 3 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 4 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 5 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 6 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 7 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 8 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 9 Knowledge Check</a> Assignments			- / 100	
<b>Module 10 Knowledge Check</b> Assignments				
<b>Module 11 Knowledge Check</b> Assignments				
<b>Module 12 Knowledge Check</b> Assignments				
<b>Module 13 Knowledge Check</b> Assignments				
<b>Module 14 Knowledge Check</b> Assignments				
<b>Module 15 Knowledge Check</b> Assignments				
<b>Module 16 Knowledge Check</b> Assignments				
<b>Lab Assignments</b>			100%	679.00 / 679.00
<b>Assignments</b>			N/A	0.00 / 0.00
<b>Total</b>			100%	679.00 / 679.00



# Ong Yi Xin

## Grades for ongyx-wm22@student.tarc.edu.my

 Print Grades (javascript:window.print())

Course **Arrange By**  
AWS Academy Cloud Arch ▾ Module ▾ **Apply**

Name	Due	Submitted	Status	Score
<a href="#">Module 2 Knowledge Check Assignments</a>				- / 100
<a href="#">Guided Lab: Exploring AWS Identity and Access Management (IAM) Lab Assignments</a>	Jul 7 at 5:26am	56 / 56		
<a href="#">Module 3 Knowledge Check Assignments</a>				- / 100
<a href="#">Challenge (Cafe) lab: Creating a Static Website for the Café Lab Assignments</a>	Jul 14 at 10:04am	28 / 29		
<a href="#">Module 4 Knowledge Check Assignments</a>				- / 100
<a href="#">Guided lab: Introducing Amazon Elastic File System (Amazon EFS) Lab Assignments</a>	Jul 24 at 12:09pm	15 / 15		
<a href="#">Challenge (Cafe) lab: Creating a Dynamic Website for the Café Lab Assignments</a>	Jul 27 at 2pm	27 / 30		
<a href="#">Module 5 Knowledge Check Assignments</a>				- / 100

Name	Due	Submitted	Status	Score
<a href="#">Guided lab: Creating an Amazon RDS Database Lab Assignments</a>	Sep 12 at 1:19am			20 / 20 
<a href="#">Challenge (Cafe) lab: Migrating a Database to Amazon RDS Lab Assignments</a>	Sep 12 at 2:15am			25 / 25 
<a href="#">Module 6 Knowledge Check Assignments</a>				- / 100
<a href="#">Guided lab: Creating a Virtual Private Cloud Lab Assignments</a>	Sep 12 at 2:43am			56 / 56 
<a href="#">Challenge (Cafe) lab: Creating a VPC Networking Environment for the Café Lab Assignments</a>	Sep 12 at 3:27am			56 / 56 
<a href="#">Module 7 Knowledge Check Assignments</a>				- / 100
<a href="#">Guided lab: Creating a VPC Peering Connection Lab Assignments</a>	Sep 12 at 4am			56 / 56 
<a href="#">Module 8 Knowledge Check Assignments</a>				- / 100
<a href="#">Guided lab: Securing Applications by using Amazon Cognito Lab Assignments</a>				- / 56
<a href="#">Guided lab: Encrypting Data at Rest by Using AWS Encryption Options Lab Assignments</a>	Sep 12 at 5:03am			56 / 56 
<a href="#">Module 9 Knowledge Check Assignments</a>				- / 100



# Ong Yi Xin

Name	Due	Submitted	Status	Score		Name	Due	Submitted	Status	Score
<a href="#">Guided lab: Creating a Highly Available Environment</a> Lab Assignments	Sep 12 at 5:33am		52.27 / 56			<b>Lab Assignments</b>				
<a href="#">Challenge (Café) lab: Creating a Scalable and Highly Available Environment for the Café</a> Lab Assignments	Sep 12 at 6:57am		46.97 / 56			<a href="#">Challenge (Café) lab: Implementing a Serverless Architecture for the Café</a> Lab Assignments				- / 56
<a href="#">Module 10 Knowledge Check</a> Assignments			- / 100			<a href="#">Module 14 Knowledge Check</a> Assignments				- / 100
<a href="#">Guided lab: Automating Infrastructure with AWS CloudFormation</a> Lab Assignments	Sep 12 at 7:27am		42 / 56			<a href="#">Guided Lab: Configuring Hybrid Storage and Migrating Data with AWS Storage Gateway S3 File Gateway</a> Lab Assignments				- / 40
<a href="#">Challenge (Café) lab: Automating Infrastructure Deployment</a> Lab Assignments	Sep 12 at 2:28pm		50.4 / 56			<a href="#">Module 16 Knowledge Check</a> Assignments				- / 100
<a href="#">Module 11 Knowledge Check</a> Assignments			- / 100			<a href="#">Capstone Project</a> Lab Assignments				- / 35
<a href="#">Module 12 Knowledge Check</a> Assignments			- / 100			<a href="#">Academy Cloud Architecting Course Assessment</a> Assignments				- / 100
<a href="#">Guided lab: Building Decoupled Applications by Using Amazon SQS</a> Lab Assignments	Sep 13 at 1:35am		56 / 56			<a href="#">Capstone Project</a> Lab Assignments				- / 56
<a href="#">Module 13 Knowledge Check</a> Assignments			- / 100			<b>Lab Assignments</b>				94.64% / 679.00
<a href="#">Guided lab: Implementing a Serverless Architecture on AWS</a> Lab Assignments			- / 56			<b>Assignments</b>				N/A / 0.00
<a href="#">(Optional) Guided lab: Breaking a Monolithic Node.js Application into Microservices</a>			- / 56			<b>Total</b>				94.64% / 679.00



# Chia Ming Yi

Grades for chiamy-wm22@student.tarc.edu.my

 Print Grades (javascript:window.print())

Course

Arrange By

AWS Academy Cloud Arch

Module

Apply

Name

Due

Submitted

Status

Score

[Module 2 Knowledge Check](#)  
Assignments

- / 100

[Guided Lab: Exploring AWS Identity and Access Management \(IAM\)](#)  
Lab Assignments

Jul 7 at  
5:27am

56 / 56



[Module 3 Knowledge Check](#)  
Assignments

- / 100

[Challenge \(Cafe\) lab: Creating a Static Website for the Café](#)  
Lab Assignments

Jul 15 at  
1:41am

29 / 29



[Module 4 Knowledge Check](#)  
Assignments

- / 100

[Guided lab: Introducing Amazon Elastic File System \(Amazon EFS\)](#)  
Lab Assignments

Sep 11 at  
5:32am

15 / 15



[Challenge \(Cafe\) lab: Creating a Dynamic Website for the Café](#)  
Lab Assignments

Sep 11 at  
1:05pm

30 / 30



[Module 5 Knowledge Check](#)  
Assignments

- / 100

[Guided lab: Creating an Amazon RDS Database](#)  
Lab Assignments

Sep 11 at  
9:30am

20 / 20



Name	Due	Submitted	Status	Score
<a href="#">Challenge (Cafe) lab: Migrating a Database to Amazon RDS</a> Lab Assignments	Sep 12 at 4:33am		25 / 25	
<a href="#">Module 6 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Creating a Virtual Private Cloud</a> Lab Assignments	Sep 11 at 3:32pm		56 / 56	
<a href="#">Challenge (Cafe) lab: Creating a VPC Networking Environment for the Café</a> Lab Assignments	Sep 12 at 6am		56 / 56	
<a href="#">Module 7 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Creating a VPC Peering Connection</a> Lab Assignments	Sep 12 at 7:04am		56 / 56	
<a href="#">Module 8 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Securing Applications by using Amazon Cognito</a> Lab Assignments			- / 56	
<a href="#">Guided lab: Encrypting Data at Rest by Using AWS Encryption Options</a> Lab Assignments	Sep 12 at 9:13am		56 / 56	
<a href="#">Module 9 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Creating a Highly Available Environment</a> Lab Assignments	Sep 12 at 9:42am		52.27 / 56	
<a href="#">Challenge (Café) lab: Creating a Scalable and Highly Available Environment for the Café</a>	Sep 12 at 1:20pm		46.97 / 56	

Or

# Chia Ming Yi

Name	Due	Submitted	Status	Score
<a href="#">Module 15 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided Lab: Configuring Hybrid Storage and Migrating Data with AWS Storage Gateway S3 File Gateway</a> Lab Assignments			- / 40	
<a href="#">Module 16 Knowledge Check</a> Assignments			- / 100	
<a href="#">Capstone Project</a> Lab Assignments			- / 35	
<a href="#">Academy Cloud Architecting Course Assessment</a> Assignments			- / 100	
<a href="#">Capstone Project</a> Lab Assignments			- / 56	
Lab Assignments	89.32%		606.50 / 679.00	
Assignments	N/A		0.00 / 0.00	
Total	89.32%		606.50 / 679.00	



Name	Due	Submitted	Status	Score
Lab Assignments			- / 100	
<a href="#">Module 10 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Automating Infrastructure with AWS CloudFormation</a> Lab Assignments	Sep 12 at 2:17pm		28 / 56	<input checked="" type="checkbox"/>
<a href="#">Challenge (Café) lab: Automating Infrastructure Deployment</a> Lab Assignments	Sep 13 at 2:34pm		33.6 / 56	<input checked="" type="checkbox"/>
<a href="#">Module 11 Knowledge Check</a> Assignments			- / 100	
<a href="#">Module 12 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Building Decoupled Applications by Using Amazon SQS</a> Lab Assignments	Sep 13 at 3:52pm		46.67 / 56	<input checked="" type="checkbox"/>
<a href="#">Module 13 Knowledge Check</a> Assignments			- / 100	
<a href="#">Guided lab: Implementing a Serverless Architecture on AWS</a> Lab Assignments			- / 56	
<a href="#">(Optional) Guided lab: Breaking a Monolithic Node.js Application into Microservices</a> Lab Assignments			- / 56	
<a href="#">Challenge (Café) lab: Implementing a Serverless Architecture for the Café</a> Lab Assignments			- / 56	
<a href="#">Module 14 Knowledge Check</a> Assignments			- / 100	



# Formatted References (APA)

# Formatted References (APA)

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- “Connecting an EC2 Instance and an RDS Database Automatically - Amazon Relational Database Service.” Docs.aws.amazon.com, [docs.aws.amazon.com/AmazonRDS/latest/UserGuide/ec2-rds-connect.html](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/ec2-rds-connect.html). Accessed 8 Sept. 2025.
- “Automatically Connecting an EC2 Instance and a DB Instance - Amazon Relational Database Service.” Amazon.com, 2025, [docs.aws.amazon.com/AmazonRDS/latest/UserGuide/ec2-rds-connect.html](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/ec2-rds-connect.html)? Accessed 8 Sept. 2025.
- “Security Best Practices for Your VPC - Amazon Virtual Private Cloud.” Amazon.com, 2025, [docs.aws.amazon.com/vpc/latest/userguide/vpc-security-best-practices.html](https://docs.aws.amazon.com/vpc/latest/userguide/vpc-security-best-practices.html)? Accessed 8 Sept. 2025.
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# Thank you