

Erik Kitchen
SWE 645 HW 3

Class Home Page: <http://swe645-erik-kitchen.com.s3-website-us-east-1.amazonaws.com/>

HW3 Repository: https://github.com/erikkitchen/SWE_645_HW3

Spring Boot application link: 34.74.69.88/studentSurvey

Spring Boot health link: 34.74.69.88/health

Prerequisites:

Git downloaded on computer

Github account

Must have Docker installed on local computer. Set up account here: <https://hub.docker.com/>

create and download a maven and SpringBoot project:

- Create a Maven project (<https://start.spring.io/>)
- Do the following
 - o Under Project choose "Maven"
 - o Under Language choose "Java"
 - o Under Spring Boot choose 3.1.1
 - o Under Dependencies choose the following
 - "Spring Web"
 - "Spring Data JPA"
 - "MySQL Driver"
 - Name your Group, Artifact, Name, Description, and Package Name
 - o Under Packaging select "Jar"
 - o Under Java select "17"
 - o Click on Generate, unzip download, and move folder where you would like to store it.

Project

☐ Gradle - Groovy
☐ Gradle - Kotlin
☒ Maven

Language

☒ Java
☐ Kotlin
☐ Groovy

Spring Boot

☐ 3.2.0 (SNAPSHOT)
☐ 3.1.2 (SNAPSHOT)
☒ 3.1.1
☐ 3.0.9 (SNAPSHOT)
☐ 3.0.8
☐ 2.7.14 (SNAPSHOT)
☐ 2.7.13

Project Metadata

Group

Erik Kitchen

Artifact

student-survey

Name

student-survey

Description

HW3 project for Spring Boot

Package name

Erik Kitchen.student-survey

Packaging

☒ Jar
☐ War

Java

☐ 20
☒ 17
☐ 11
☐ 8

Dependencies

ADD DEPENDENCIES... ⌘ + B

Spring Web WEB

Build web, including RESTful, applications using Spring MVC. Uses Apache Tomcat as the default embedded container.

Spring Data JPA SQL

Persist data in SQL stores with Java Persistence API using Spring Data and Hibernate.

MySQL Driver SQL

MySQL JDBC driver.

Setup Database

- Go to Amazon RDS: <https://us-east-2.console.aws.amazon.com/rds/home?region=us-east-2#databases:>
- Click on Create Database
- Choose the following options:
 - Choose “Standard create”
 - Choose “MySQL”

Choose a database creation method Info

☒ **Standard create**
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

☐ **Easy create**
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type Info

☐ Aurora (MySQL Compatible)
☐ Aurora (PostgreSQL Compatible)
☒ **MySQL**
☐ MariaDB
☐ PostgreSQL
☐ Oracle

- Choose “Free tier”

Templates

Choose a sample template to meet your use case.

☐ **Production**
 Use defaults for high availability and fast, consistent performance.

☐ **Dev/Test**
 This instance is intended for development use outside of a production environment.

☒ **Free tier**
 Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. [Info](#)

Availability and durability

Deployment options [Info](#)
 The deployment options below are limited to those supported by the engine you selected above.

- ☒ **Multi-AZ DB Cluster – new**
 Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.
- ☐ **Multi-AZ DB instance (not supported for Multi-AZ DB cluster snapshot)**
 Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.
- ☐ **Single DB instance (not supported for Multi-AZ DB cluster snapshot)**
 Creates a single DB instance with no standby DB instances.

- Name DB instance identifier “gmustudentsurveydb”
- Set up username

Settings

DB instance identifier [Info](#)
 Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in “mydbinstance”). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ **Credentials Settings**

Master username [Info](#)
 Type a login ID for the master user of your DB instance.

1 to 16 alphanumeric characters. First character must be a letter.

☐ **Manage master credentials in AWS Secrets Manager**
 Manage master user credentials in Secrets Manager. RDS can generate a password for you and manage it throughout its lifecycle.

ⓘ If you manage the master user credentials in Secrets Manager, some RDS features aren't supported. [Learn more](#)

☐ **Auto generate a password**
 Amazon RDS can generate a password for you, or you can specify your own password.

Master password [Info](#)

- Setup password


Master password [Info](#)

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote), "(double quote) and @ (at sign).

Confirm master password [Info](#)

- Choose “Burstable classes”
- Then choose “db.t3.micro”

Instance configuration
The DB instance configuration options below are limited to those supported by the engine that you selected above.

 **Amazon RDS Optimized Writes** - new [Info](#)
☐ Show instance classes that support Amazon RDS Optimized Writes

DB instance class [Info](#)

- ☐ Standard classes (includes m classes)
- ☐ Memory optimized classes (includes r and x classes)
- ☒ Burstable classes (includes t classes)

db.t3.micro
 2 vCPUs 1 GiB RAM Network: 2,085 Mbps

☐ Include previous generation classes

- Choose the following for storage:
 - “General Purpose SSD(gp2)”
 - “20” GiB
 - Check “Enable storage autoscaling”
 - “1000” GiB

Storage

Storage type [Info](#)

General Purpose SSD (gp2)
 Baseline performance determined by volume size

Allocated storage [Info](#)

20 GiB
 The minimum value is 20 GiB and the maximum value is 6,144 GiB

Storage autoscaling [Info](#)
Provides dynamic scaling support for your database's storage based on your application's needs.

☒ **Enable storage autoscaling**
Enabling this feature will allow the storage to increase after the specified threshold is exceeded.

Maximum storage threshold [Info](#)
Charges will apply when your database autoscales to the specified threshold

1000 GiB
 The minimum value is 22 GiB and the maximum value is 6,144 GiB

- Under Connectivity Choose the following:
 - “Don’t connect to an EC2 compute resource”
 - “Default VPC”
 - “Default”
 - Check “Yes” for public access
 - “Create new”
 - Name VPC group name
 - “No Preference”
 - Choose “rds-ca-2019 (default)”

Connectivity
Info

☒
Don't connect to an EC2 compute resource

Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.

☐
Connect to an EC2 compute resource

Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC)
Info

Choose the VPC. The VPC defines the virtual networking environment for this DB instance.

Default VPC (vpc-0f630894c26772bf3)
3 Subnets, 3 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

After a database is created, you can't change its VPC.

DB subnet group
Info

Choose the DB subnet group. The DB subnet group defines which subnets and IP ranges the DB instance can use in the VPC that you selected.

default

Public access
Info

☒ **Yes**

RDS assigns a public IP address to the database. Amazon EC2 instances and other resources outside of the VPC can connect to your database. Resources inside the VPC can also connect to the database. Choose one or more VPC security groups that specify

VPC security group (firewall)
Info

Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate incoming traffic.

☐ **Choose existing**

Choose existing VPC security groups

☒ **Create new**

Create new VPC security group

New VPC security group name

GMU_DB_VPC

Availability Zone
Info

No preference

RDS Proxy

RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

☐ **Create an RDS Proxy**
Info

RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Proxy pricing](#).

Certificate authority - optional
Info

Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-2019 (default)

If you don't select a certificate authority, RDS chooses one for you.

- Under Additional configuration, select port “3306” and check “password authentication”

▼ Additional configuration

Database port [Info](#)
TCP/IP port that the database will use for application connections.

3306

Database authentication

Database authentication options [Info](#)

☒ Password authentication
Authenticates using database passwords.

☐ Password and IAM database authentication
Authenticates using the database password and user credentials through AWS IAM users and roles.

☐ Password and Kerberos authentication
Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.

- Under Additional configuration choose the following:
 - Insert Initial database name (Use the same name as the DB instance identifier)
 - Choose “default.mysql8.0”
 - Choose “default.mysql8.0”
 - Check “Enable automated backups”
 - Choose “1” day
 - Choose “no preference”
 - Check “copy tags to snapshots”
 - Check “Enable encryption”
 - Choose “(default)aws/rds”
 - Check “Enable auto minor version upgrade”
 - Choose “No preference”

▼ Additional configuration

Database options, encryption turned on, backup turned on, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Database options

Initial database name [Info](#)

If you do not specify a database name, Amazon RDS does not create a database.


DB parameter group [Info](#)

Option group [Info](#)

Backup

☒ Enable automated backups

Creates a point-in-time snapshot of your database

 Please note that automated backups are currently supported for InnoDB storage engine only. If you are using MyISAM, refer to details [here](#).

Backup retention period [Info](#)

The number of days (1-35) for which automatic backups are kept.

day

Backup window [Info](#)

The daily time range (in UTC) during which RDS takes automated backups.

☐ Choose a window

☒ No preference

☒ Copy tags to snapshots

Backup replication [Info](#)

☐ Enable replication in another AWS Region

Enabling replication automatically creates backups of your DB instance in the selected Region, for disaster recovery, in addition to the current Region.

Encryption

☒ Enable encryption

Choose to encrypt the given instance. Master key IDs and aliases appear in the list after they have been created using the AWS Key Management Service console. [Info](#)

AWS KMS key [Info](#)

Account

927832898956

Log exports

Select the log types to publish to Amazon CloudWatch Logs

- ☐ Audit log
- ☐ Error log
- ☐ General log
- ☐ Slow query log

IAM role

The following service-linked role is used for publishing logs to CloudWatch Logs.

RDS service-linked role

Maintenance

Auto minor version upgrade [Info](#)

☒ Enable auto minor version upgrade

Enabling auto minor version upgrade will automatically upgrade to new minor versions as they are released. The automatic upgrades occur during the maintenance window for the database.

Maintenance window [Info](#)

Select the period you want pending modifications or maintenance applied to the database by Amazon RDS.

- ☐ Choose a window
- ☒ No preference

Deletion protection

☐ Enable deletion protection

Protects the database from being deleted accidentally. While this option is enabled, you can't delete the database.

- Click on "Create Database"
- Your new database will now show up on the RDS dashboard
- Click on your new database DB identifier

Databases (1)										Group resources		Modify	Actions	Restore from S3	Create database
Filter by databases										< 1 >					
	DB identifier	Status	Role	Engine	Region & AZ	Size	Actions	CPU							
<input type="radio"/>	gmustudentsurveydb	Available	Instance	MySQL Community	us-east-2c	db.t3.micro	2 Actions		2.						

- Click on the VPC security groups link

Connectivity & security		
Endpoint & port	Networking	Security
Endpoint gmustudentsurveydb.cmjy1v5mkua 1.us-east-2.rds.amazonaws.com	Availability Zone us-east-2c VPC	VPC security groups GMU_DB_VPC (sg-0ebfcea4dd66bfb951) <input checked="" type="checkbox"/> Active

- Click on Inbound rules

sg-0ebfcea4dd66bfb951 - GMU_DB_VPC			
Details	Inbound rules	Outbound rules	Tags

- Click on Edit inbound rules

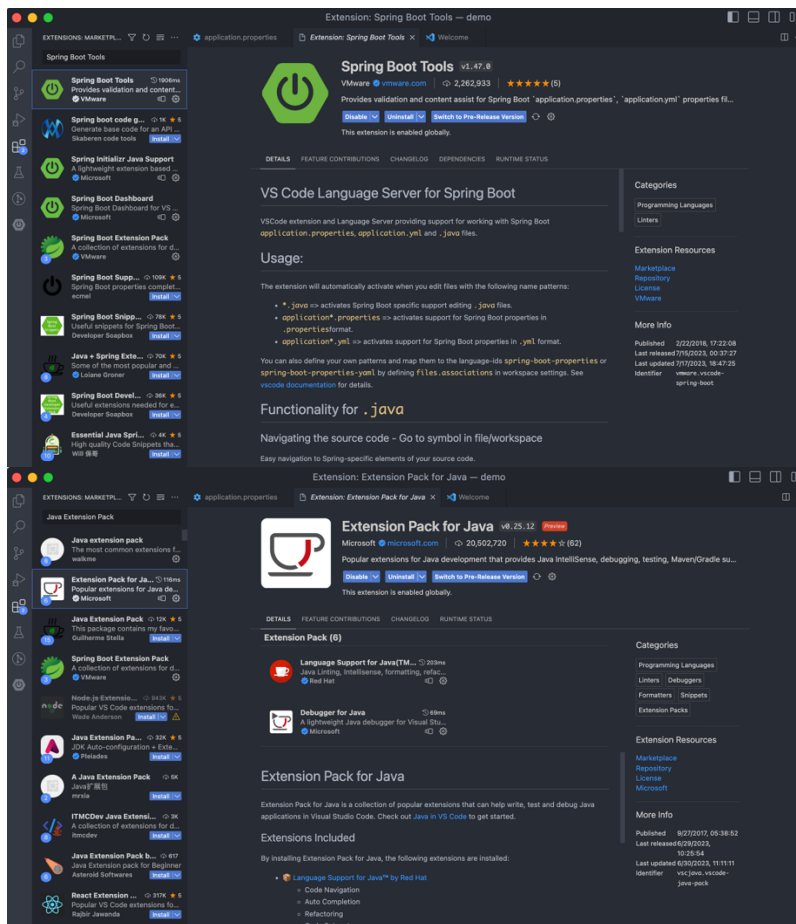
Inbound rules (1/1)								Manage tags	Edit inbound rules
Filter security group rules								< 1 >	
<input checked="" type="checkbox"/>	Name	Security group rule...	IP version	Type	Protocol	Port range			
<input checked="" type="checkbox"/>	-	sgr-0f455ff7981772020	IPv4	MYSQL/Aurora	TCP	3306			

- Update the following:

- Type to “All traffic”
 - Source to “Custom”
 - Insert “0.0.0.0/0”
- Click Save rules

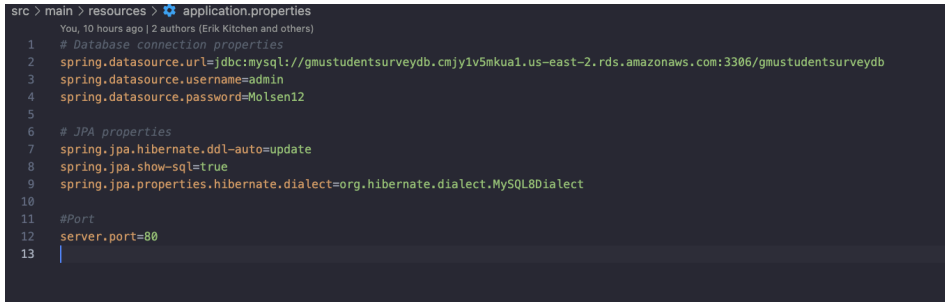
Download dependencies (For Visual Studios code IDE)

- Download the following
 - Spring Boot Tools
 - Extension Pack for Java



Set up/update files

- Update the following in applications.properties
 - o Update spring.datasource.url=jdbc:<database DNS>:3306/gmustudentsurveydb
 - o Update username and password (From above when creating database)
 - o Copy JPA properties in picture
 - o Server Port should be 80



```
src > main > resources > application.properties
You, 10 hours ago | 2 authors (Erik Kitchen and others)
1 # Database connection properties
2 spring.datasource.url=jdbc:mysql://gmustudentsurveydb.cmjy1v5mkua1.us-east-2.rds.amazonaws.com:3306/gmustudentsurveydb
3 spring.datasource.username=admin
4 spring.datasource.password=Molsen12
5
6 # JPA properties
7 spring.jpa.hibernate.ddl-auto=update
8 spring.jpa.show-sql=true
9 spring.jpa.properties.hibernate.dialect=org.hibernate.dialect.MySQL8Dialect
10
11 #Port
12 server.port=80
13
```

- Update pom.xml
 - o Update main path to yours
(<mainClass>Erik.Kitchen.studentsurvey.StudentSurveyApplication</mainClass>)
- Create the following folders at the same level as the main application class (StudentSurveyApplication.java) and create files inside (See github repository on what to put in)
 - o controller
 - StudentSurveyController.java
 - HealthController.java
 - o entity
 - StudentSurvey.java
 - o repository
 - StudentRepository.java
 - o Service
 - StudentSurveyService.java

Set up git repository (Follow instructions here with a few updates below:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf):

- Create GitHub repository named 'SWE_645_HW3' instead of 'SWE_645_HW2'
- Follow the rest of the steps in the link above

Set up Rancher (Follow instructions here:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf)

Create Docker Image (Follow instructions here with a few updates below:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf):

- Save file in Spring Boot repository instead of the HW2 repository
- Use updated dockerfile in HW3 github repository

Set up Kubernetes Cluster on GKE (Follow instructions here:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf)

Import GKE Cluster into Rancher (Follow instructions here:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf)

Install Jenkins (Follow instructions here with a few updates below:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf):

- Install Maven
 - o sudo apt update
 - o sudo apt install maven
- Install jdk 17
 - o sudo apt update
 - o sudo apt upgrade
 - o sudo apt install openjdk-17-jdk
- Go to Manage Jenkins
- Click on Plugins
- Search “Maven Integration plugin” and install
- Go back to Manage Jenkins
- Go to Tools
- Go down to Maven and click “Add Maven”
- Name “Maven”
- Unclick Install automatically and in MAVEN_HOME enter the location of your Maven installation (/usr/share/maven)

Maven installations ^ Edited

Maven installations
List of Maven installations on this system

Add Maven

Maven
Name
Maven

MAVEN_HOME
/usr/share/maven

☐ Install automatically ⓘ

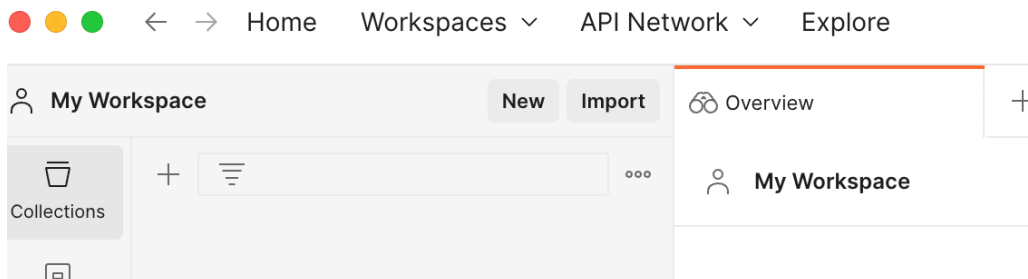
Add Pods and expose webapp (Follow instructions here with a few updates below:

https://github.com/erikkitchen/SWE_645_HW2/blob/main/README.pdf):

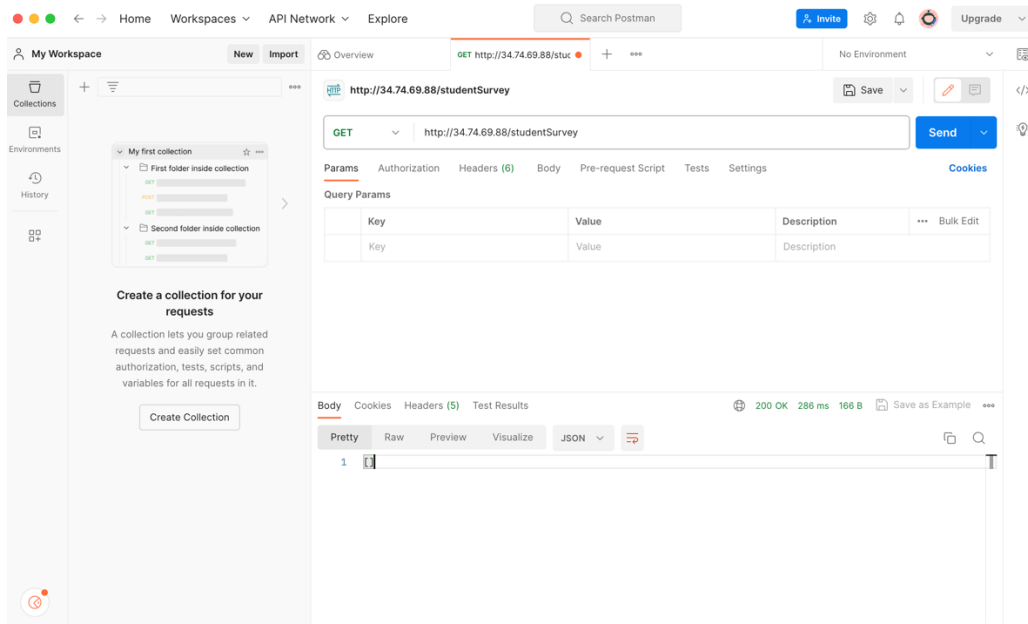
- Port should be 80 (Unless you chose different port for Spring Boot application)

Test Spring Boot application with Postman

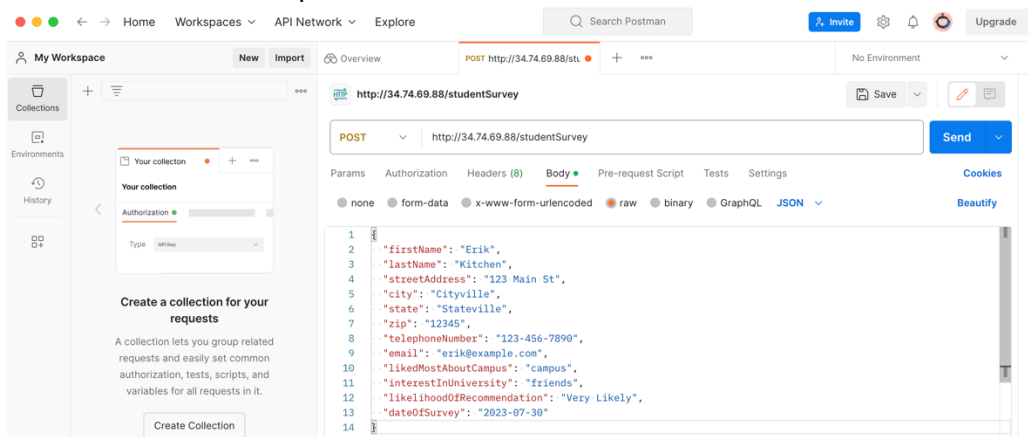
- Download Postman (<https://www.postman.com/downloads/>)
- Click on “New”



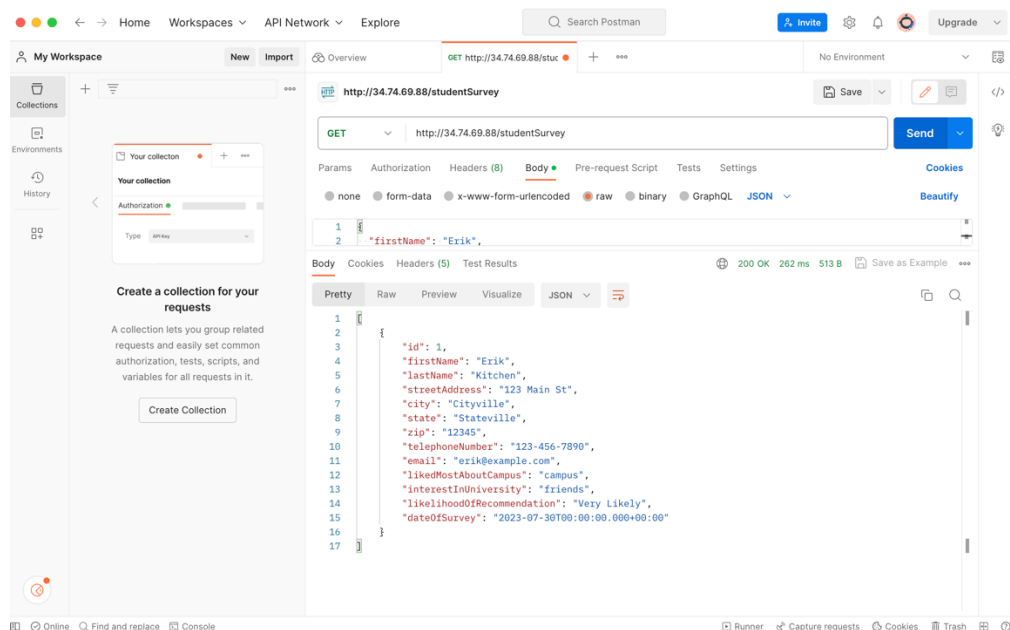
- Insert url with port and controller request mapping and click send (Should get an empty JSON file)



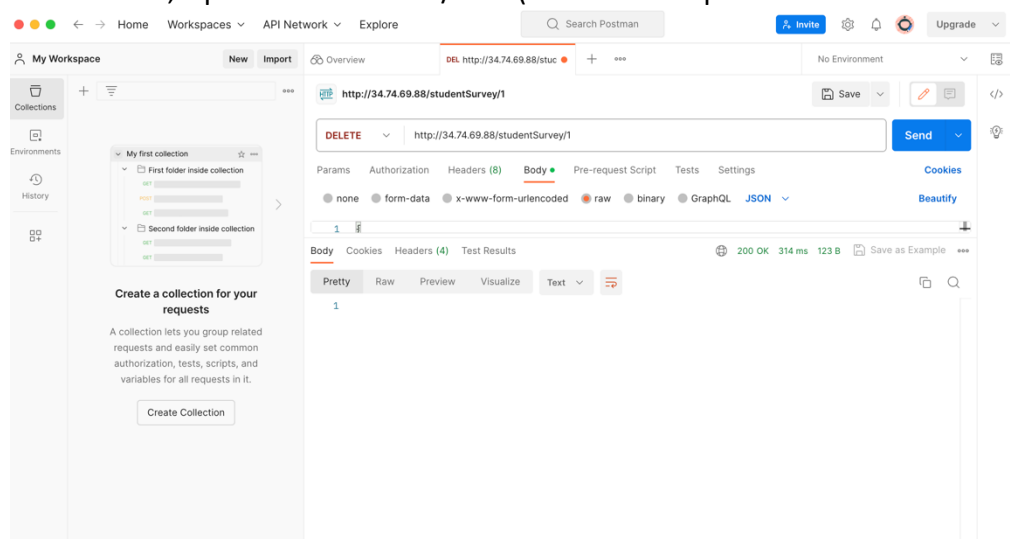
- Change to POST
- Click on "Body"
- Change to JSON
- Insert the below from picture



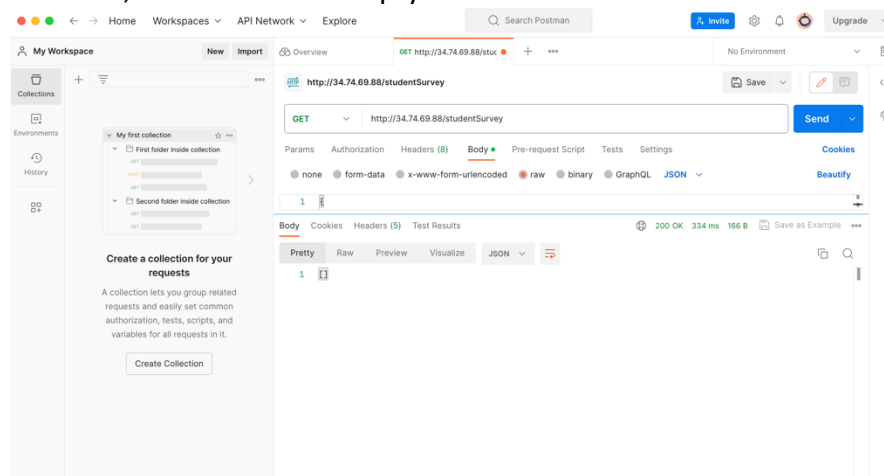
- Test GET again, The JSON you just posted will show up



- Test DELETE, Update url and add `/<id>` (id will show up in JSON from the GET above)



- Test GET, will come back empty



For videos to set up Rancher, Set up Kubernetes clusters, set up GKE, and set up Jenkins here:

https://github.com/erikkitchen/SWE_645_HW2/tree/main/Videos