

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTE OF TECHNOLOGY
CENTER OF INFORMATION TECHNOLOGY AND SCIENTIFIC
COMPUTING
DEPARTMENT OF SOFTWARE ENGINEERING
Big Data Modeling and Management System

Assignment 1

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1. Introduction

This document contains the report on the first assignment on Big Data Management and Modeling System course.

The assignment requires the implementation of CRUD capabilities using R into a database.

In this report are included the database schema diagram and solutions to the assignment questions which are supported by screenshots.

2. Implementation

2.1 Database Schema

The database contains three tables of Student, Section and Assessment. Below is a diagram to explain the schema visually. (Q1a)

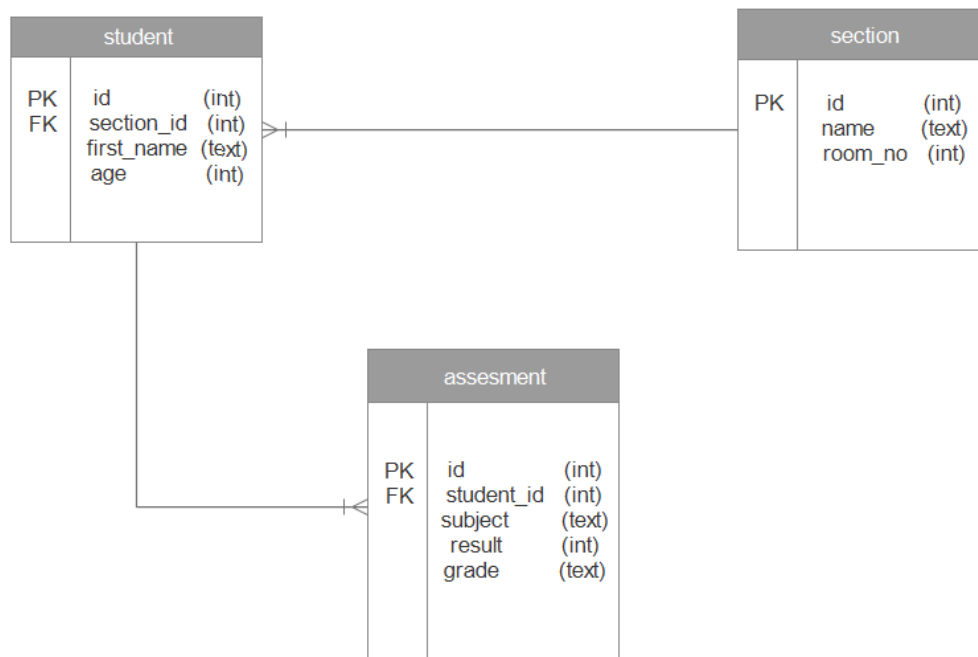


Illustration 1: Database Schema Diagram

2.3 Operations Performed

We connected to the MySQL database using the RMySQL library. A dictionary library has also been used to provide the key and value capabilities, implemented in setting the configuration settings for the database. The data inserted into the database is read from a CSV file with names eponymous to the tables.

Below are the answers to the instructions:

Step 1: Connecting to the database

The screenshot displays the RStudio interface on the left and a terminal window on the right. The RStudio console shows the R version (3.5.1) and the user's environment setup, including setting the working directory to ~/Documents/assignments/big_data and loading the RMySQL package. The user defines a function connect_db to establish a MySQL connection using the RMySQL::dbConnect function. The function takes a configuration dictionary as input and returns a database connection object. The user then calls connect_db with the configuration dictionary and assigns the result to db_instance.

```
R version 3.5.1 (2018-07-02) -- "Feather Spray"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin15.6.0 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[Workspace loaded from ~/.RData]

> # environment setup
> setwd("~/Documents/assignments/big_data")
>
> library(dict)
> library(DBI)
> library(RMySQL)
>
> # database connectivity function
> connect_db <- function(setup) {
+   mydb <- dbConnect(MySQL(), user=config$get("db_user"), password=config$get("db_password"), dbname=config$get("db_name"), host=config$get("db_host"), port=config$get("db_port"))
+   return(mydb)
+ }
>
> # database connectivity setup
> config <- dict()
>
> config[["db_user"]] <- "root"
> config[["db_password"]] <- "root"
> config[["db_name"]] <- "r_assig"
> config[["db_host"]] <- "127.0.0.1"
> config[["db_port"]] <- 3306
>
> db_instance <- connect_db(config)
>
```

The terminal window on the right shows the MySQL command-line interface. The user has entered the root password and is now at the MySQL prompt. The terminal output shows the MySQL version (8.0.12 Homebrew) and the copyright notice.

```
MacBook-Pro:~$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 29
Server version: 8.0.12 Homebrew

Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
```

Illustration 2: Screenshot - Connecting to DB

Step 2: Performing CRUD Operations

Q1b. Create a table from R program



Illustration 3: Screenshot - Creating Tables

Q1c i: Create operation

The screenshot displays the RStudio interface with the following components:

- Console:** Shows the R code for creating tables and inserting data.


```
> assesment_attrib <- "(id INT NOT NULL AUTO_INCREMENT, student_id int(11), subject varchar(32), result int(11), grade char(1), PRIMARY KEY (id), FOREIGN KEY (student_id) REFERENCES student(id))"
>
>
>
> # drop table if exists
> dbExecute(db_instance, paste("DROP TABLE IF EXISTS", student, ",", section, ",", assesment, ","))
[1] 0
>
> # create table function
> create_table <- function(db_instance, table_name, attributes){
+   create_table <- paste("create table if not exists ", table_name, attributes, ';')
+   dbExecute(db_instance, create_table)
+ }
>
>
> # create tables
> create_table(db_instance, section, section_attrib)
[1] 0
> create_table(db_instance, student, student_attrib)
[1] 0
> create_table(db_instance, assesment, assesment_attrib)
[1] 0
>
> # insert into table
> all_students <- read.csv("students.csv")
> all_sections <- read.csv("sections.csv")
> all_assesments <- read.csv("assesment.csv")
>
> #show sample of data read from csv file
> print(all_students)
  section_id first_name age
1          1      Chrom  76
2          2    Arisema  89
3          2      Tabor  12
4          2  Kes Moges  30
5          3  Kes Balcha  43
6          4  Enahoy Tsion 32
>
>
> # execute insert into table from data frame
> dbWriteTable(db_instance, value=all_sections, name=section, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_students, name=student, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=TRUE, row.names=F)
[1] TRUE
>
>

```
- Environment:** Shows the data objects: all_students (3 obs. of 4 va...), all_sections (5 obs. of 2 va...), all_st... (6 obs. of 3 va...), config (List of 8), and db_ins... (Formal class M...).
- Files:** Shows the project structure: New Folder, Delete, Rename, Home, Name, RData, Rhistory, Applications, Applications (Parallels), Creative Cloud Files, Desktop, Documents, Downloads, Library, Movies, Music, and Parallels.
- Database:** Shows the MySQL database structure and data.
 - Database changed
 - mysql> show tables;

Tables_in_r_assig
table_name
test

 2 rows in set (0.00 sec)
 - mysql> show tables;

Tables_in_r_assig
assesment
section
student
table_name
test

 5 rows in set (0.00 sec)
 - mysql> select * from section;
 Empty set (0.00 sec)
 - mysql> select * from student;
 Empty set (0.00 sec)
 - mysql> select * from assesment;
 Empty set (0.01 sec)
 - mysql>
 mysql>
 mysql>
 mysql>
 mysql>
 mysql> select * from section;

id	name	room_no
1	software	102
2	mechanical	201
3	electrical	301
4	chemical	402
5	it	228

 5 rows in set (0.00 sec)
 - mysql> select * from student;

id	section_id	first_name	age
1	1	Chrom	76
2	2	Arisema	89
3	2	Tabor	12
4	2	Kes Moges	30
5	3	Kes Balcha	43
6	4	Enahoy Tsion	32

 6 rows in set (0.00 sec)
 - mysql> select * from assesment;

id	student_id	subject	result	grade
1	1	Kolo Timhirt	20	
2	2	Tselot	99	
3	4	Sibket	78	

 3 rows in set (0.00 sec)
 - mysql>

Illustration 4: Screenshot - Inserting into DB

Q1c ii: Read operation

The screenshot displays the RStudio interface with the following components:

- Console:** Contains R code for creating a database instance, tables, and reading data from a MySQL database. The code includes functions for creating tables, inserting data, and querying the database.
- Environment:** Shows the Global Environment with variables like `all_students`, `all_sections`, `all_assessments`, and `students`. It also lists database connections and functions.
- Files:** Shows the project structure with folders like `.RData`, `.Rhistory`, `Applications`, `Applications (Parallels)`, `Creative Cloud Files`, `Desktop`, `Documents`, `Downloads`, `Library`, `Movies`, `Music`, and `Parallels`.
- Output:** Displays the results of the database queries, including table structures and data rows.

Console Output:

```
> # create table function
> create_table <- function(db_instance, table_name, attributes){
+   create_table <- paste("create table if not exists ", table_name, attributes, ';')
+   dbExecute(db_instance, create_table)
+ }
>
>
>
> # create tables
> create_table(db_instance, section, section_attr)
[1] 0
> create_table(db_instance, student, student_attr)
[1] 0
> create_table(db_instance, assesment, assesment_attr)
[1] 0
>
>
> # insert into table
> all_students <- read.csv("students.csv")
> all_sections <- read.csv("sections.csv")
> all_assesments <- read.csv("assesment.csv")
>
> #show sample of data read from csv file
> print(all_students)
  section_id first_name age
1          1        Chrom 76
2          2       Arisema 89
3          2        Tabor 12
4          2      Kes Moges 30
5          3      Kes Balcha 43
6          4    Emahoy Tsion 32
>
>
> # execute insert into table from data frame
> dbWriteTable(db_instance, value=all_sections, name=section, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_students, name=student, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=TRUE, row.names=F)
[1] TRUE
>
> # read from table
> select_query <- "select * from "
> students <- dbGetQuery(db_instance, paste(select_query, student, ";"))
> print(students)
  id section_id first_name age
1 1          1        Chrom 76
2 2          2       Arisema 89
3 3          2        Tabor 12
4 4          2      Kes Moges 30
5 5          3      Kes Balcha 43
6 6          4    Emahoy Tsion 32
> |
```

Environment:

- Global Environment
- Data
 - all_students: 3 obs. of 4 va...
 - all_se: 5 obs. of 2 va...
 - all_st: 6 obs. of 3 va...
- config: List of 8
- db_ins: Formal class M...
- student: 6 obs. of 4 va...
- Values
 - assesment: "assesment"
 - assesment: "(id INT NOT NUL...
 - section: "section"
 - section: "(id INT NOT NUL...
 - select: "select * from "
 - student: "student"
 - student: "(id INT NOT NUL...
- Functions
 - connect: function (setu...
 - create_function: (db_i...

Files:

- New Folder
- Delete
- Renam...
- Home
- Name
- .RData
- .Rhistory
- Applications
- Applications (Parallels)
- Creative Cloud Files
- Desktop
- Documents
- Downloads
- Library
- Movies
- Music
- Parallels

Output:

```
Database changed
mysql> show tables;
+-----+
| Tables_in_r_assig |
+-----+
| table_name |
| test |
+-----+
2 rows in set (0.00 sec)

mysql> show tables;
+-----+
| Tables_in_r_assig |
+-----+
| assesment |
| section |
| student |
| table_name |
| test |
+-----+
5 rows in set (0.00 sec)

mysql> select * from section;
Empty set (0.00 sec)

mysql> select * from student;
Empty set (0.00 sec)

mysql> select * from assesment;
Empty set (0.01 sec)

mysql>
mysql>
mysql>
mysql>
mysql>
mysql> select * from section;
+-----+
| id | name | room_no |
+-----+
| 1 | software | 102 |
| 2 | mechanical | 201 |
| 3 | electrical | 301 |
| 4 | chemical | 402 |
| 5 | it | 228 |
+-----+
5 rows in set (0.00 sec)

mysql> select * from student;
+-----+
| id | section_id | first_name | age |
+-----+
| 1 | 1 | Chrom | 76 |
| 2 | 2 | Arisema | 89 |
| 3 | 2 | Tabor | 12 |
| 4 | 2 | Kes Moges | 30 |
| 5 | 3 | Kes Balcha | 43 |
| 6 | 4 | Emahoy Tsion | 32 |
+-----+
6 rows in set (0.00 sec)

mysql> select * from assesment;
+-----+
| id | student_id | subject | result | grade |
+-----+
| 1 | 1 | Kolo Timhirt | 20 | |
| 2 | 2 | Tselot | 99 | |
| 3 | 4 | Sibket | 78 | |
+-----+
3 rows in set (0.00 sec)

mysql> |
```

Illustration 5: Screenshot - Reading from DB

Q1c iii: Update operation

The screenshot displays the RStudio IDE with the following components:

- Source Editor:** Contains R code for reading CSV files, creating a database instance, inserting data, and querying tables.
- Environment Pane:** Shows variables like `all_students`, `all_sections`, `all_assessments`, `student_id`, `grade`, `update_query`, and `all_assessments`.
- Console:** Displays the output of the executed R commands, including data frames and query results.
- Files Pane:** Shows the project directory structure.
- Plots Pane:** Empty.
- Packages Pane:** Shows installed packages like `RData`, `Rhistory`, `Applications`, etc.

```

> all_students <- read.csv("students.csv")
> all_sections <- read.csv("sections.csv")
> all_assessments <- read.csv("assessment.csv")
> 
> #show sample of data read from csv file
> print(all_students)
  section_id first_name age
1          1         Chrom 76
2          2        Arisema 89
3          2         Tabor 12
4          2       Kes Moges 30
5          3      Kes Balcha 43
6          4     Emahoy Tsion 32
> 
> 
> 
> # execute insert into table from data frame
> dbWriteTable(db_instance, value=all_sections, name=section, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_students, name=student, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_assessments, name=assessment, append=TRUE, row.names=F)
[1] TRUE
> 
> # read from table
> select_query <- "select * from "
> students <- dbGetQuery(db_instance, paste(select_query, student, ";"))
> print(students)
  id section_id first_name age
1 1            1         Chrom 76
2 2            2        Arisema 89
3 3            2         Tabor 12
4 4            2       Kes Moges 30
5 5            3      Kes Balcha 43
6 6            4     Emahoy Tsion 32
> 
> # update tables
> student_id <- 2
> grade <- 'B'
> update_query = paste("UPDATE ", assessment, " SET grade=' ", grade, "' where student_id=", student_id, " ;", sep="")
> dbExecute(db_instance, update_query)
[1] 1
> 
> # read from table
> all_assessments <- dbGetQuery(db_instance, paste(select_query, assessment, ";"))
> print(all_assessments)
  id student_id subject result grade
1 1           1 Kolo Timhirt 20    B
2 2           2   Tselot    99    B
3 3           4   Sibket    78    B
  
```

Illustration 6: Screenshot - Updating the DB

Q1c iv: Delete operation

Console Terminal

```
~/Documents/assignments/big_data/

>
>
> # execute insert into table from data frame
> dbWriteTable(db_instance, value=all_sections, name=section, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_students, name=student, append=TRUE, row.names=F)
[1] TRUE
> dbWriteTable(db_instance, value=all_assesments, name=assessment, append=TRUE, row.names=F)
[1] TRUE
>
> # read from table
> select_query <- "select * from "
> students <- dbGetQuery(db_instance, paste(select_query, student, ";"))
> print(students)
  id section_id first_name age
1 1           1      Chrom  76
2 2           2    Arisema  89
3 3           2      Tabor  12
4 4           2    Kes Moges  30
5 5           3    Kes Balcha 43
6 6           4    Emahoy Tsion 32

> # update tables
> student_id <- 2
> grade <- 'B'
> update_query = paste("UPDATE ", assessment, " SET grade= ", grade, " where student_id=", student_id, ";", sep="")
> dbExecute(db_instance, update_query)
[1] 1
>
> # read from table
> all_assesments <- dbGetQuery(db_instance, paste(select_query, assesment, ";"))
> print(all_assesments)
  id student_id subject result grade
1 1           1    Kolo Timhirt    20
2 2           2      Tselot    99    B
3 3           4      Sibket    78

>
>
>
> # delete from table
> delete_query = paste("delete from ", student, "where id=3")
> dbExecute(db_instance, delete_query)
[1] 1
>
> # read from table
> select_query <- "select * from "
> students <- dbGetQuery(db_instance, paste(select_query, student, ";"))
> print(students)
  id section_id first_name age
1 1           1      Chrom  76
2 2           2    Arisema  89
3 4           2    Kes Moges  30
4 5           3    Kes Balcha 43
5 6           4    Emahoy Tsion 32

>
```

Environment History Connections

Global Environment
🔍

Data

- all_as... 3 obs. of 5 va...
- all_se... 5 obs. of 2 va...
- all_st... 6 obs. of 3 va...
- config List of 8
- db.ins... Formal class M...
- studen... 5 obs. of 4 va...

Values

- assesm... "assesment"
- assesm... "(id INT NOT NUL...
- delete... "delete from stu...
- grade "B"
- section "section"
- sectio... "(id INT NOT NUL...
- select... "select * from "
- student "student"
- studen... "(id INT NOT NUL...
- studen... 2
- update... "UPDATE assesmen...

Functions

- connec... function (setu...
- create... function (db_i...

Files Plots Packages Help

New Folder Delete Rename

Home

Name

- ☐ .RData
- ☐ .Rhistory
- ☐ Applications
- ☐ Applications (Parallels)
- ☐ Creative Cloud Files
- ☐ Desktop
- ☐ Documents
- ☐ Downloads
- ☐ Library
- ☐ Movies
- ☐ Music
- ☐ Parallels

Console Terminal

```
mysql> select * from student;
+----+-----+-----+----+
| id | section_id | first_name | age |
+----+-----+-----+----+
| 1 | 1 | Chrom | 76 |
| 2 | 2 | Arisema | 89 |
| 3 | 2 | Tabor | 12 |
| 4 | 2 | Kes Moges | 30 |
| 5 | 3 | Kes Balcha | 43 |
| 6 | 4 | Emahoy Tsion | 32 |
+----+-----+-----+----+
6 rows in set (0.00 sec)

mysql> select * from assesment;
+----+-----+-----+-----+-----+
| id | student_id | subject | result | grade |
+----+-----+-----+-----+-----+
| 1 | 1 | Kolo Timhirt | 20 | |
| 2 | 2 | Tselot | 99 | B |
| 3 | 4 | Sibket | 78 | |
+----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
mysql> select * from assesment;
+----+-----+-----+-----+-----+
| id | student_id | subject | result | grade |
+----+-----+-----+-----+-----+
| 1 | 1 | Kolo Timhirt | 20 | |
| 2 | 2 | Tselot | 99 | B |
| 3 | 4 | Sibket | 78 | |
+----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
mysql> select * from student;
+----+-----+-----+----+
| id | section_id | first_name | age |
+----+-----+-----+----+
| 1 | 1 | Chrom | 76 |
| 2 | 2 | Arisema | 89 |
| 4 | 2 | Kes Moges | 30 |
| 5 | 3 | Kes Balcha | 43 |
| 6 | 4 | Emahoy Tsion | 32 |
+----+-----+-----+----+
5 rows in set (0.00 sec)

mysql>
```

Illustration 7: Screenshot - Deleting from DB

Q1d: Performing operation on a column and reading rows. (Performed on 'assessment' table)

The screenshot displays the RStudio interface with a script editor on the left, a console on the bottom left, and a MySQL console on the right. The script editor contains R code for reading, updating, and writing data to a MySQL database. The console shows the output of these operations, including a table of student assessments and a message about a missing object. The MySQL console shows the results of SQL queries, including a table of student assessments and a message about a missing object.

R Script Editor:

```

4 5      3  Kes Balcha 43
5 6      4  Emahoy Tsion 32
>
>
>
>
>
>
>
> # read and update to table
> all_assesments <- dbGetQuery(db_instance, paste(select_query, assesment, ";"))
> print(all_assesments)
  id student_id  subject result grade
1 1          1  Kolo Timhirt    20    F
2 2          2    Tselot    99    B
3 3          4    Sibket    78
>
> grader <- vector(mode="character", length=length(all_assesments$grade))
> grader[all_assesments$result<40 ] <- "F"
> grader[all_assesments$result<= 40 & all_assesments$result<= 55] <- "D"
> grader[all_assesments$result<= 55 & all_assesments$result<= 70] <- "C"
> grader[all_assesments$result<= 70 & all_assesments$result<= 85] <- "B"
> grader[all_assesments$result<= 85 & all_assesments$result<= 100] <- "A"
>
> all_assesments$grade <- grader
>
> print(grader)
[1] "F" "A" "B"
>
>
>
>
>
>
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=FALSE, overwrite=TRUE)
[1] TRUE
>
> # read from table
> all_assesments <- dbGetQ
Error: object 'dbGetQ' not found
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=FALSE, overwrite=TRUE)
[1] TRUE
>
> # read from table
> all_assesments <- dbGetQuery(db_instance, paste(select_query, assesment, ";"))
> print(all_assesments)
  row_names id student_id  subject result grade
1         1 1          1  Kolo Timhirt    20    F
2         2 2          2    Tselot    99    A
3         3 3          4    Sibket    78    B
>
>
>
>

```

Console:

```

~/Documents/assignments/big_data/
4 5      3  Kes Balcha 43
5 6      4  Emahoy Tsion 32
>
>
>
>
>
>
>
> # read and update to table
> all_assesments <- dbGetQuery(db_instance, paste(select_query, assesment, ";"))
> print(all_assesments)
  id student_id  subject result grade
1 1          1  Kolo Timhirt    20    F
2 2          2    Tselot    99    B
3 3          4    Sibket    78
>
> grader <- vector(mode="character", length=length(all_assesments$grade))
> grader[all_assesments$result<40 ] <- "F"
> grader[all_assesments$result<= 40 & all_assesments$result<= 55] <- "D"
> grader[all_assesments$result<= 55 & all_assesments$result<= 70] <- "C"
> grader[all_assesments$result<= 70 & all_assesments$result<= 85] <- "B"
> grader[all_assesments$result<= 85 & all_assesments$result<= 100] <- "A"
>
> all_assesments$grade <- grader
>
> print(grader)
[1] "F" "A" "B"
>
>
>
>
>
>
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=FALSE, overwrite=TRUE)
[1] TRUE
>
> # read from table
> all_assesments <- dbGetQ
Error: object 'dbGetQ' not found
> dbWriteTable(db_instance, value=all_assesments, name=assesment, append=FALSE, overwrite=TRUE)
[1] TRUE
>
> # read from table
> all_assesments <- dbGetQuery(db_instance, paste(select_query, assesment, ";"))
> print(all_assesments)
  row_names id student_id  subject result grade
1         1 1          1  Kolo Timhirt    20    F
2         2 2          2    Tselot    99    A
3         3 3          4    Sibket    78    B
>
>
>
>

```

MySQL Console:

```

mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql> select * from student;
+----+-----+-----+-----+
| id | section_id | first_name | age |
+----+-----+-----+-----+
| 1 | 1 | Caron | 76 |
| 2 | 2 | Arisema | 89 |
| 4 | 2 | Kes Magee | 30 |
| 5 | 3 | Kes Balcha | 43 |
| 6 | 4 | Emahoy Tsion | 32 |
+----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql>
mysql>
mysql>
mysql>
mysql>
mysql> select * from section;
+----+-----+-----+-----+
| id | name | room_no |
+----+-----+-----+-----+
| 1 | software | 102 |
| 2 | mechanical | 201 |
| 3 | electrical | 301 |
| 4 | chemical | 402 |
| 5 | it | 228 |
+----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql>
mysql> select * from assesment;
+----+-----+-----+-----+
| id | student_id | subject | result | grade |
+----+-----+-----+-----+
| 1 | 1 | Kolo Timhirt | 20 | F |
| 2 | 2 | Tselot | 99 | B |
| 3 | 4 | Sibket | 78 | B |
+----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select * from assesment;
+----+-----+-----+-----+
| row_names | id | student_id | subject | result | grade |
+----+-----+-----+-----+
| 1 | 1 | 1 | Kolo Timhirt | 20 | F |
| 2 | 2 | 2 | Tselot | 99 | A |
| 3 | 3 | 4 | Sibket | 78 | B |
+----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>

```

Illustration 8: Screenshot - Manipulating a column

3. Conclusion

During the undertaking of this assignment we have learned and managed to perform basic database operations using the R language.