DBMS-LAB-2 (ANSWER SCRIPT)

1. Develop an implementation package using 'C' program to process a FILE containing student details for the given queries.

```
A student record has the following format: Std_rollno, Std_name, Dept, C1, C1_c, C1_g, C2, C2_c, C2_g, C3, C3_c, C3_g
```

Note: C1 refers to Course1, C1_c refers to credit of the course, C1_g refers to the grade in that course and so on.

Every student should have a unique rollno.

A student should have at least 3 courses and maximum four.

A grade point is in integer: S - 10; A - 9; B - 8; C - 7; D - 6; E - 5; F - 0.

Create a file and develop a menu driven system for the following queries.

- a. Insert at least 5 student records.
- b. Create a column 'GPA' for all the students.
- c. For a student with four courses, delete(deregister) a course name.
- d. For the same student you deleted in 'c', insert a new course name.
- e. Update the name of a course for two different students.
- f. Calculate GPA of all students using the GPA formula. Refer the following.
- g. Upgrade the grade point of a student who has secured '7' in a course.
- h. Calculate the updated GPA of the student in 'g'.
- i. Generate a Grade report of a student given the roll no. or name.

Answer:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define FILENAME "students.dat"
#define MAX NAME LENGTH 100
#define MAX COURSES 4
typedef struct {
  char rollno[20];
  char name[MAX NAME LENGTH];
  char dept[MAX NAME LENGTH];
  char courses[MAX COURSES][MAX NAME LENGTH];
  int credits[MAX COURSES];
  int grades[MAX COURSES];
  int num courses;
  float gpa;
} Student;
int gradeToPoint(char grade) {
  switch (grade) {
    case 'S': return 10;
    case 'A': return 9;
    case 'B': return 8;
    case 'C': return 7;
    case 'D': return 6;
    case 'E': return 5;
```

```
case 'F': return 0;
     default: return 0;
  }
}
void addStudent() {
  FILE *file = fopen(FILENAME, "ab");
  if (!file) {
     perror("Failed to open file");
     return;
  }
  Student student;
  printf("Enter roll number: ");
  scanf("%s", student.rollno);
  printf("Enter name: ");
  scanf(" %[^\n]", student.name);
  printf("Enter department: ");
  scanf(" %[^\n]", student.dept);
  printf("Enter number of courses (3 or 4): ");
  scanf("%d", &student.num courses);
  if (student.num courses < 3 || student.num courses > MAX COURSES) {
     printf("Invalid number of courses.\n");
     fclose(file);
     return;
  }
  for (int i = 0; i < student.num courses; i++) {
     printf("Enter course %d name: ", i + 1);
     scanf(" %[^\n]", student.courses[i]);
     printf("Enter credits for course %d: ", i + 1);
     scanf("%d", &student.credits[i]);
     char grade;
     printf("Enter grade for course %d (S/A/B/C/D/E/F): ", i + 1);
     scanf(" %c", &grade);
     student.grades[i] = gradeToPoint(grade);
  }
  fwrite(&student, sizeof(Student), 1, file);
  fclose(file);
  printf("Student added successfully!\n");
}
void calculateGPA(Student *student) {
  int totalCredits = 0;
  int weightedSum = 0;
  for (int i = 0; i < student -> num courses; <math>i++) {
     totalCredits += student->credits[i];
     weightedSum += (student->credits[i] )* (student->grades[i]);
  }
  student->gpa = (float)weightedSum / totalCredits;
}
void displayStudent(const Student *student) {
  printf("Roll No: %s\n", student->rollno);
  printf("Name: %s\n", student->name);
  printf("Department: %s\n", student->dept);
  for (int i = 0; i < student->num courses; i++) {
     printf("Course %d: %s, Credits: %d, Grade: %d\n", i + 1, student->courses[i], student->credits[i], student-
>grades[i]);
  }
```

```
printf("GPA: %.2f\n", student->gpa);
}
void updateStudentGPA(FILE *file) {
  fseek(file, 0, SEEK_SET);
  Student student;
  while (fread(&student, sizeof(Student), 1, file)) {
     calculateGPA(&student);
     fseek(file, -sizeof(Student), SEEK_CUR);
     fwrite(&student, sizeof(Student), 1, file);
  }
}
void deleteCourse(const char *rollno, int courseIndex) {
  FILE *file = fopen(FILENAME, "r+b");
  if (!file) {
     perror("Failed to open file");
     return;
  }
  FILE *tempFile = fopen("temp.dat", "wb");
  if (!tempFile) {
     perror("Failed to open temp file");
     fclose(file);
     return;
  }
  Student student;
  while (fread(&student, sizeof(Student), 1, file)) {
     if (strcmp(student.rollno, rollno) == 0) {
       for (int i = courseIndex; i < student.num_courses - 1; i++) {
          strcpy(student.courses[i], student.courses[i + 1]);
          student.credits[i] = student.credits[i + 1];
          student.grades[i] = student.grades[i + 1];
       }
       student.num_courses--;
     fwrite(&student, sizeof(Student), 1, tempFile);
  }
  fclose(file);
  fclose(tempFile);
  remove(FILENAME);
  rename("temp.dat", FILENAME);
  printf("Course deleted successfully!\n");
}
void addCourse(const char *rollno) {
  FILE *file = fopen(FILENAME, "r+b");
  if (!file) {
     perror("Failed to open file");
     return;
  }
  FILE *tempFile = fopen("temp.dat", "wb");
  if (!tempFile) {
     perror("Failed to open temp file");
     fclose(file);
     return;
  }
  Student student;
```

```
while (fread(&student, sizeof(Student), 1, file)) {
     if (strcmp(student.rollno, rollno) == 0) {
       if (student.num courses >= MAX COURSES) {
          printf("Cannot add more courses.\n");
          fclose(file);
          fclose(tempFile);
          return;
       int index = student.num_courses;
       student.num courses++;
       printf("Enter new course name: ");
       scanf(" %[^\n]", student.courses[index]);
       printf("Enter credits for new course: ");
       scanf("%d", &student.credits[index]);
       char grade;
       printf("Enter grade for new course (S/A/B/C/D/E/F): ");
       scanf(" %c", &grade);
       student.grades[index] = gradeToPoint(grade);
     fwrite(&student, sizeof(Student), 1, tempFile);
  }
  fclose(file);
  fclose(tempFile);
  remove(FILENAME);
  rename("temp.dat", FILENAME);
  printf("Course added successfully!\n");
}
void updateCourseName(const char *oldName, const char *newName) {
  FILE *file = fopen(FILENAME, "r+b");
  if (!file) {
     perror("Failed to open file");
     return;
  }
  Student student;
  while (fread(&student, sizeof(Student), 1, file)) {
     for (int i = 0; i < student.num courses; i++) {
       if (strcmp(student.courses[i], oldName) == 0) {
          strcpy(student.courses[i], newName);
          fseek(file, -sizeof(Student), SEEK_CUR);
          fwrite(&student, sizeof(Student), 1, file);
          break;
     }
  }
  fclose(file);
  printf("Course name updated successfully!\n");
void upgradeGradePoint(const char *rollno) {
  FILE *file = fopen(FILENAME, "r+b");
     perror("Failed to open file");
     return;
  }
  FILE *tempFile = fopen("temp.dat", "wb");
  if (!tempFile) {
     perror("Failed to open temp file");
```

```
fclose(file);
     return;
  }
  Student student;
  while (fread(&student, sizeof(Student), 1, file)) {
     if (strcmp(student.rollno, rollno) == 0) {
       for (int i = 0; i < student.num courses; i++) {
          if (student.grades[i] == 7) {
             student.grades[i] = 8; // Upgrade from 7 to 8
          }
       }
     fwrite(&student, sizeof(Student), 1, tempFile);
  }
  fclose(file);
  fclose(tempFile);
  remove(FILENAME);
  rename("temp.dat", FILENAME);
  printf("Grade point upgraded successfully!\n");
}
void generateGradeReport(const char *rollno) {
  FILE *file = fopen(FILENAME, "rb");
  if (!file) {
     perror("Failed to open file");
     return;
  }
  Student student;
  while (fread(&student, sizeof(Student), 1, file)) {
     if (strcmp(student.rollno, rollno) == 0) {
        displayStudent(&student);
       fclose(file);
        return;
     }
  }
  fclose(file);
  printf("Student with roll number %s not found.\n", rollno);
}
void menu() {
  int choice;
  char rollno[20];
  char oldCourseName[MAX_NAME_LENGTH];
  char newCourseName[MAX NAME LENGTH];
  while (1) {
     printf("\nStudent Management System\n");
     printf("1. Add Student\n");
     printf("2. Update GPA for all students\n");
     printf("3. Delete a course\n");
     printf("4. Add a course\n");
     printf("5. Update course name\n");
     printf("6. Upgrade grade point\n");
     printf("7. Generate grade report\n");
     printf("8. Exit\n");
     printf("Enter your choice: ");
     scanf("%d", &choice);
```

```
switch (choice) {
       case 1:
          addStudent();
          break;
       case 2:
            FILE *file = fopen(FILENAME, "r+b");
               updateStudentGPA(file);
               fclose(file);
            }
          break;
       case 3:
          printf("Enter roll number: ");
          scanf("%s", rollno);
          printf("Enter course index to delete (0 to 3): ");
          int index;
          scanf("%d", &index);
          deleteCourse(rollno, index);
          break;
       case 4:
          printf("Enter roll number: ");
          scanf("%s", rollno);
          addCourse(rollno);
          break;
       case 5:
          printf("Enter old course name: ");
          scanf(" %[^\n]", oldCourseName);
          printf("Enter new course name: ");
          scanf(" %[^\n]", newCourseName);
          updateCourseName(oldCourseName, newCourseName);
          break;
       case 6:
          printf("Enter roll number: ");
          scanf("%s", rollno);
          upgradeGradePoint(rollno);
          break;
       case 7:
          printf("Enter roll number to generate report: ");
          scanf("%s", rollno);
          generateGradeReport(rollno);
          break;
       case 8:
          exit(0);
          printf("Invalid choice! Please try again.\n");
     }
  }
int main() {
  menu();
  return 0;
```

}

OUTPUT:

```
Student Management System
                                                           Student Management System
a. Add Student
                                                           a. Add Student
Update GPA
                                                           2. Update GPA
c. Delete a course
                                                          c. Delete a course
d. Add a course
                                                           d. Add a course
e. Update course name
f. Upgrade grade point
                                                           e. Update course name
g. Generate grade report
                                                           f. Upgrade grade point
h. Exit
                                                           g. Generate grade report
Enter your choice: g
                                                           h. Exit
Enter roll number to generate report: 2
                                                           Enter your choice: f
Roll No: 2
Name: mughil
                                                           Enter roll number: 2
Department: cse
                                                           Grade point upgraded successfully!
Course 1: se, Credits: 23, Grade: 9
Course 2: dbms, Credits: 50, Grade: 10
                                                           Student Management System
Course 3: cn, Credits: 10, Grade: 10
                                                           a. Add Student
GPA: 9.76
                                                           2. Update GPA
Student Management System
                                                           c. Delete a course
a. Add Student
                                                           d. Add a course
2. Update GPA
                                                           e. Update course name
c. Delete a course

    Upgrade grade point

d. Add a course
e. Update course name
                                                           q. Generate grade report
f. Upgrade grade point
                                                           h. Exit
g. Generate grade report
                                                           Enter your choice: Invalid choice! Please try again.
h. Exit
Enter your choice: Invalid choice! Please try again.
                                                           Student Management System
                                                           a. Add Student
Student Management System
a. Add Student
                                                           Update GPA
2. Update GPA
                                                           c. Delete a course
c. Delete a course
                                                           d. Add a course
d. Add a course
                                                           e. Update course name
e. Update course name
f. Upgrade grade point
                                                           f. Upgrade grade point
g. Generate grade report
                                                           g. Generate grade report
h. Exit
                                                           h. Exit
Enter your choice: c
                                                           Enter your choice: d
Enter roll number: 3
                                                           Enter roll number: 2
Enter course index to delete (0 to 3):
                                                           Enter new course name: cnms
Course deleted successfully!
                                                           Enter credits for new course: 10
                                                           Enter grade for new course (S/A/B/C/D/E/F): S
Student Management System
                                                           Enter new course name: ghs
a. Add Student
                                                           Enter credits for new course: 10
2. Update GPA
                                                           Enter grade for new course (S/A/B/C/D/E/F): A
c. Delete a course
d. Add a course
                                                           Enter new course name: ^C
```

```
Student Management System
Student Management System
                                                            a. Add Student
a. Add Student
                                                            2. Update GPA
2. Update GPA
                                                            c. Delete a course
c. Delete a course
                                                            d. Add a course
d. Add a course
                                                            e. Update course name
e. Update course name

    Upgrade grade point

f. Upgrade grade point
                                                            g. Generate grade report
g. Generate grade report
                                                            h. Exit
h. Exit
                                                             Enter your choice: 1
Enter your choice: g
                                                            Invalid choice! Please try again.
Enter roll number to generate report: 3
Roll No: 3
Name: kishore
                                                            Student Management System
Department: cse
                                                            a. Add Student
Course 1: cns, Credits: 10, Grade: 10
                                                            2. Update GPA
Course 2: cnms, Credits: 10, Grade: 10
                                                            c. Delete a course
Course 3: vns, Credits: 10, Grade: 10
                                                            d. Add a course
GPA: 0.00
                                                            e. Update course name
                                                            f. Upgrade grade point
Student Management System
                                                            g. Generate grade report
a. Add Student
                                                            h. Exit
2. Update GPA
                                                            Enter your choice: Invalid choice! Please try again.
c. Delete a course
d. Add a course
                                                            Student Management System
e. Update course name
                                                            a. Add Student
f. Upgrade grade point
g. Generate grade report
                                                            2. Update GPA
                                                            c. Delete a course
h. Exit
Enter your choice: Invalid choice! Please try again.
                                                            d. Add a course
                                                            e. Update course name
Student Management System
                                                            f. Upgrade grade point
a. Add Student
                                                            g. Generate grade report
2. Update GPA
                                                            h. Exit
c. Delete a course
                                                            Enter your choice: a
d. Add a course
                                                            Enter roll number: 1
e. Update course name
                                                            Enter name: kesav
f. Upgrade grade point
                                                             Enter department: cse
g. Generate grade report
                                                             Enter number of courses (3 or 4): 3
h. Exit
                                                             Enter course 1 name: se
Enter your choice: g
Enter roll number to generate report: 1
                                                             Enter credits for course 1: 10
                                                             Enter grade for course 1 (S/A/B/C/D/E/F): S
Roll No: 1
Name: kesav
                                                             Enter course 2 name: dbms
Department: cse
                                                             Enter credits for course 2: 10
Course 1: Os, Credits: 23, Grade: 0
                                                             Enter grade for course 2 (S/A/B/C/D/E/F): S
Course 2: se, Credits: 23, Grade: 0
                                                             Enter course 3 name: eh
GPA: 0.00
                                                            Enter credits for course 3: 18
                                                             Enter grade for course 3 (S/A/B/C/D/E/F): A
Student Management System
                                                            Student added successfully!
a. Add Student
Update GPA
                                                            Student Management System
c. Delete a course
                                                            a. Add Student
d. Add a course
                                                             Update GPA
e. Update course name
```

```
Student Management System
a. Add Student
                                                           Student Management System
2. Update GPA
                                                           a. Add Student
c. Delete a course
                                                           2. Update GPA
d. Add a course
                                                           c. Delete a course
e. Update course name
                                                           d. Add a course
f. Upgrade grade point
                                                           e. Update course name
g. Generate grade report
                                                           f. Upgrade grade point
h. Exit
                                                           g. Generate grade report
Enter your choice: c
                                                           h. Exit
Enter roll number: 2
                                                           Enter your choice: Invalid choice! Please try again.
Enter course index to delete (0 to 3): 3
Course deleted successfully!
                                                           Student Management System
                                                           a. Add Student
Student Management System
                                                           2. Update GPA
a. Add Student
                                                           c. Delete a course
2. Update GPA
                                                           d. Add a course

    c. Delete a course

                                                           e. Update course name
d. Add a course
                                                           f. Upgrade grade point
e. Update course name
                                                           g. Generate grade report
f. Upgrade grade point
                                                           h. Exit
g. Generate grade report
                                                           Enter your choice: a
h. Exit
                                                           Enter roll number: 2
Enter your choice: Invalid choice! Please try again.
                                                           Enter name: mughil
                                                           Enter department: cse
Student Management System
                                                           Enter number of courses (3 or 4): 4
a. Add Student
                                                           Enter course 1 name: cns
2. Update GPA
                                                           Enter credits for course 1: 10
c. Delete a course
                                                           Enter grade for course 1 (S/A/B/C/D/E/F): S
d. Add a course
                                                           Enter course 2 name: cbms
e. Update course name
                                                           Enter credits for course 2: 10
f. Upgrade grade point
                                                           Enter grade for course 2 (S/A/B/C/D/E/F): S
g. Generate grade report
                                                           Enter course 3 name: dns
h. Exit
                                                           Enter credits for course 3: 10
Enter your choice: g
                                                           Enter grade for course 3 (S/A/B/C/D/E/F): S
Enter roll number to generate report: 2
                                                           Enter course 4 name: eh
Roll No: 2
                                                           Enter credits for course 4: 10
Name: mughil
                                                           Enter grade for course 4 (S/A/B/C/D/E/F): S
Department: cse
                                                           Student added successfully!
Course 1: se, Credits: 23, Grade: 9
Course 2: dbms, Credits: 50, Grade: 10
                                                           Student Management System
Course 3: cn, Credits: 10, Grade: 10
                                                           a. Add Student
GPA: 9.76
                                                           2. Update GPA
                                                           c. Delete a course
Student Management System
                                                           d. Add a course
a. Add Student
                                                           e. Update course name
Update GPA
                                                           f. Upgrade grade point
c. Delete a course
                                                           g. Generate grade report
d. Add a course
                                                           h. Exit
e. Update course name
                                                           Enter your choice: Invalid choice! Please try again.
f. Upgrade grade point
g. Generate grade report
                                                           Student Management System
h. Exit
                                                           a. Add Student
Enter your choice: Invalid choice! Please try again.
                                                           2. Update GPA
```

```
Student Management System
a. Add Student
2. Update GPA
c. Delete a course
d. Add a course
e. Update course name
f. Upgrade grade point
g. Generate grade report
h. Exit
Enter your choice: f
Enter roll number: 2
Grade point upgraded successfully!
Student Management System
a. Add Student
2. Update GPA
c. Delete a course
d. Add a course
e. Update course name
f. Upgrade grade point
g. Generate grade report
h. Exit
Enter your choice: Invalid choice! Please try again.
Student Management System
a. Add Student
2. Update GPA
c. Delete a course
d. Add a course
e. Update course name
f. Upgrade grade point
g. Generate grade report
h. Exit
Enter your choice: d
Enter roll number: 2
Enter new course name: cnms
Enter credits for new course: 10
Enter grade for new course (S/A/B/C/D/E/F): S
Enter new course name: ghs
Enter credits for new course: 10
Enter grade for new course (S/A/B/C/D/E/F): A
```

Enter new course name: ^C

```
Student Management System
a. Add Student
2. Update GPA
c. Delete a course
d. Add a course
e. Update course name
f. Upgrade grade point
g. Generate grade report
Enter your choice: g
Enter roll number to generate report: 3
Roll No: 3
Name: kishore
Department: cse
Course 1: cns, Credits: 10, Grade: 10
Course 2: cnms, Credits: 10, Grade: 10
Course 3: vns, Credits: 10, Grade: 10
GPA: 0.00
Student Management System
a. Add Student
Update GPA
c. Delete a course
d. Add a course
e. Update course name

    Upgrade grade point

g. Generate grade report
h. Exit
Enter your choice: Invalid choice! Please try again.
Student Management System
a. Add Student
2. Update GPA
c. Delete a course
d. Add a course
e. Update course name
f. Upgrade grade point
g. Generate grade report
h. Exit
Enter your choice: g
Enter roll number to generate report: 1
Roll No: 1
Name: kesav
Department: cse
Course 1: Os, Credits: 23, Grade: 0
Course 2: se, Credits: 23, Grade: 0
GPA: 0.00
Student Management System
a. Add Student
Update GPA
c. Delete a course
```

d. Add a course

e. Update course name

2) Create a Student schema using the student details given in Q.No.1 and execute the following basic queries.

Note: When defining the schema, exclude the following columns: Course_credit and Course_grade for all the courses.

Make sure you have the following constraints: Course is declared in char datatype. DoB should be in date (dd/mm/yyyy) format. Provide a not-null constraint for dob. Email should have the following format: xxx@nitt.edu

a) Insert at least 5 student records into the Student table.

Ans: Insert into Student_record1 (Std_rollno, Std_name, Dept, Course1, Course2, Course3, dob, email) Values

```
(101, 'karthik', 'CSE', 'DBMS', 'OS', 'CN', '2000-09-03', 'karthik@nitt.edu'),
```

- (102, 'navaneeth', 'CSE', 'CN', 'OS', 'DBMS', '2003-07-01', 'navaneeth@nitt.edu'),
- (103, 'krishna', 'EEE', 'Power', 'Machines', 'electrical', '2002-01-01', 'krishna@nitt.edu'),
- (104, 'charlie', 'CSE', 'CN', 'DBMS', 'OS', '2001-02-05', 'charli@nitt.edu'),
- (105, 'andrew', 'CSE', 'DBMS', 'CN', 'OS', '2001-04-06', 'andrew@nitt.edu');

Output:

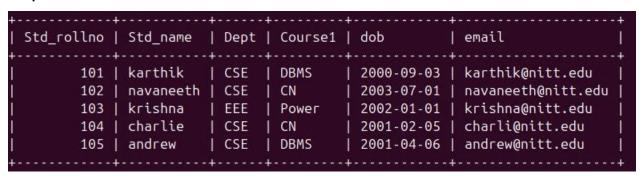
td_rollno	Std_name	Dept	Course1	Course2	Course3	dob	email
101	karthik	CSE	DBMS	OS	CN	2000-09-03	karthik@nitt.edu
102	navaneeth	CSE	CN	OS	DBMS	2003-07-01	navaneeth@nitt.edu
103	krishna	EEE	Power	Machines	electrical	2002-01-01	krishna@nitt.edu
104	charlie	CSE	CN	DBMS	OS	2001-02-05	charli@nitt.edu
105	andrew	CSE	DBMS	CN	OS	2001-04-06	andrew@nitt.edu

b) Delete Course2 and Course3 attributes from the Student table.

Ans: alter table Student_record1 drop course2;

alter table Student record1 drop course3;

Output:



c) Insert two new columns DoB and email into the Student table.

Ans: alter table Student_record1 add dob DATE NOT NULL; alter table Student_record1 add email varchar(50) CHECK (email LIKE '%@nitt.edu');

Output:

Std_rollno	000 - 1000 - 1000 - 1000 - 1								Course3		dob	email
101	karthik	, c	SE	İ	DBMS CN	İ	0S 0S]	CN DBMS	i	2000-09-03	karthik@nitt.edu navaneeth@nitt.edu
103	krishna	İΕ	EE	į.	Power	-	Machines		electrical	İ	2002-01-01	krishna@nitt.edu
104	charlie andrew		SE SE	85	CN DBMS	l	DBMS CN		OS OS			charli@nitt.edu andrew@nitt.edu

d) Change Course1 datatype to varchar2.

Ans: alter table Student record1 MODIFY COLUMN Course1 VARCHAR(2);

Output:

```
Query OK, 0 rows affected (0.08 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

e) Update the column name 'Std_rollno' to 'Std_rno'.

Ans: alter table Student_record1 CHANGE Std_rollno Std_rno INT;

Output:

```
Query OK, 0 rows affected
```

f) Update all student records who pursue a course named "DBMS" to "OS".

Ans: update Student_record1 set Course1 = 'OS' WHERE Course1 = 'DBMS';

Output:

std_rollno	100				email
	karthik				karthik@nitt.edu
102	navaneeth	CSE	CN	2003-07-01	navaneeth@nitt.edu
103	krishna	EEE	Power	2002-01-01	krishna@nitt.edu
104	charlie	CSE	CN	2001-02-05	charli@nitt.edu
105	andrew	CSE	OS	2001-04-06	andrew@nitt.edu

g) Delete a student record with student name starting with letter 'S'.

Ans: delete from Student_record1 where Std_name LIKE 'S%';

Output:

```
Query OK, 0 rows affected (0.08 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

h) Display all records in which a student has born after the year 2005.

Ans: select * from Student record1 where YEAR(dob) > 2005;

Output:

i) Simulate RENAME, COMMENT, TRUNATE and DROP.

Ans: drop table Student_record1;
 TRUNCATE table Student_record1;

Output:

Query OK, 0 rows affected