Assignment 4B Index effect study

- For viewing the index structures already available in each table, we use the following command:

```
show index from student
```

- The corresponding output for the student table is the following:

Table	Non_unique	Key_name	Seq_in_index	Column_name	Collation	Cardinality	Sub_part	Packed	Null	Index_type	Comment	Index_comment	Visible	Expression
student	0	PRIMARY	1	rollNo	A	2003	NULL	NULL		BTREE			YES	NULL
student	1	deptNo	1	deptNo	A	20	NULL	NULL	YES	BTREE			YES	NULL
student	1	advisor	1	advisor	A	50	NULL	NULL	YES	BTREE			YES	NULL

- We can similarly do this for each table to view the already existing index structures
- The query used for this assignment is the following:

- List students' roll numbers, names, the course names they enrolled in, and their grades, **for department 20**, **in an even semester**, **in 2012**

```
EXPLAIN SELECT s.rollNo, s.name, c.cname, e.grade
FROM student s, enrollment e, course c
WHERE s.rollNo = e.rollNo
  AND e.courseId = c.courseId
  AND c.deptNo = 20
  AND e.sem = 'even'
  AND e.year = 2012
```

Output before using index structure:

id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered
1	SIMPLE	e	NULL	ALL	PRIMARY,courseId	NULL	NULL	NULL	13586	1.00
1	SIMPLE	c	NULL	eq_ref	PRIMARY,deptNo	PRIMARY	34	academic_insti.e.courseId	1	10.00
1	SIMPLE	s	NULL	eq_ref	PRIMARY	PRIMARY	22	academic_insti.e.rollNo	1	100.00

- We see there are 13586 rows for enrolment table, and no key
- We add the following index structure:

```
CREATE INDEX idx_enrollment_sem_year_courseId ON enrollment(sem, year, courseId);
```

Output after re-running the query on adding this index structure:

id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered
1	SIMPLE	e	NULL	ref	PRIMARY,courseId,...	idx_enrollment_sem_year_courseId	28	const,const	1	100.00
1	SIMPLE	s	NULL	eq_ref	PRIMARY	PRIMARY	22	academic_insti.e.rollNo	1	100.00
1	SIMPLE	c	NULL	eq_ref	PRIMARY,deptNo	PRIMARY	34	academic_insti.e.courseId	1	10.00

- We now see that the rows reduce to 1, due to the new key idx_enrollment_sem_year_courseId, which is due to the index structure that we created
- This makes optimises the process significantly