Index

1. Index

```
Select ename from emp where
empid = 7934 ;
```

DBMS 는 어떻게 처리 할까 ?

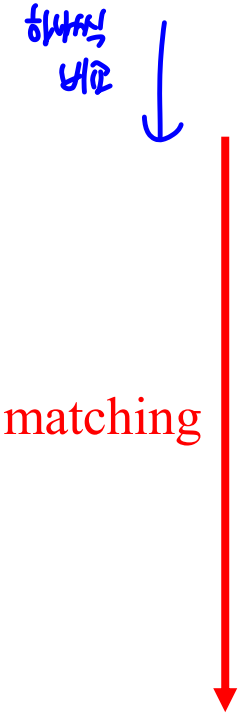
EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10
7844	TURNER	SALESMAN	7698	1981-08-08	1500.00	0.00	30
7654	MARTIN	SALESMAN	7698	1981-08-28	1250.00	1400.00	30
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	10
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10
7788	SCOTT	ANALYST	7566	1982-12-09	3000.00	NULL	20
7876	ADAMS	CLERK	7788	1983-01-12	1100.00	NULL	20

100만명의 정보

1. Index

- 방법 1: sequential search

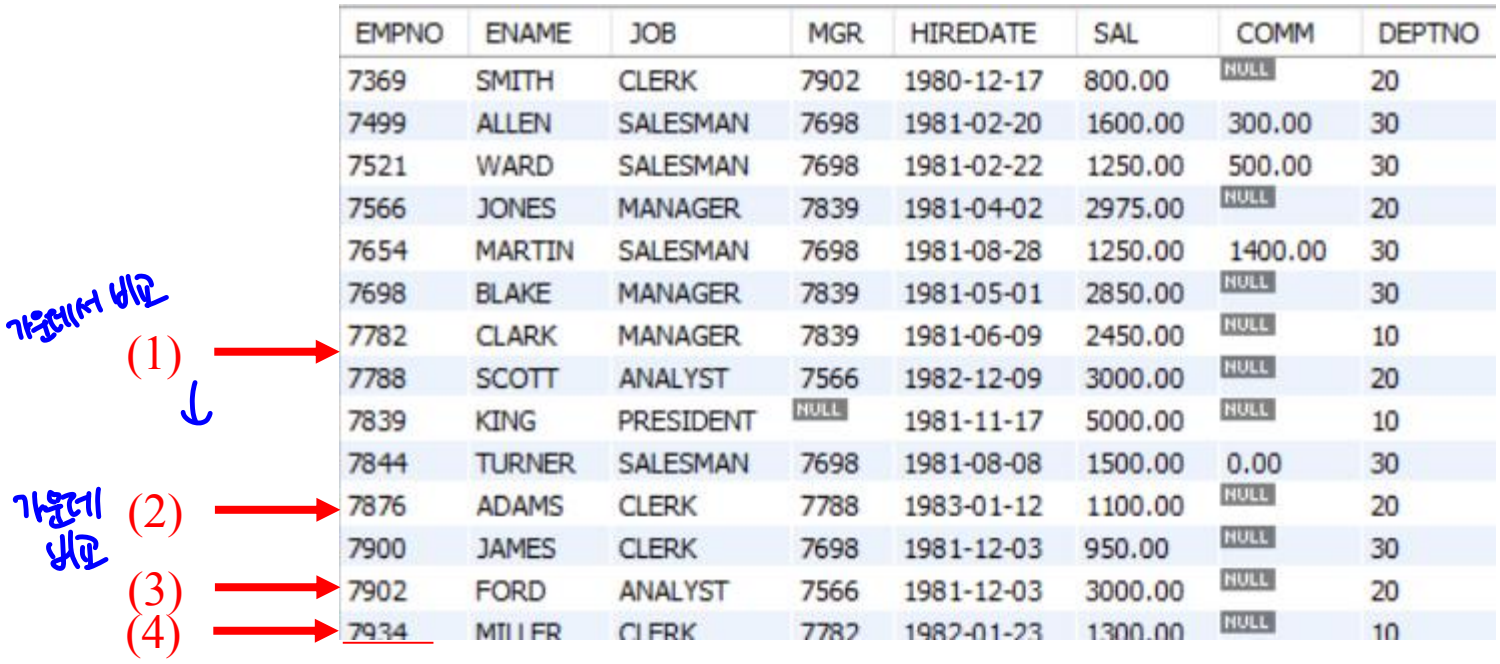
7934



EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10
7844	TURNER	SALESMAN	7698	1981-08-08	1500.00	0.00	30
7654	MARTIN	SALESMAN	7698	1981-08-28	1250.00	1400.00	30
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	10
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10
7788	SCOTT	ANALYST	7566	1982-12-09	3000.00	NULL	20
7876	ADAMS	CLERK	7788	1983-01-12	1100.00	NULL	20

1. Index

- 방법2: binary search
  - 데이터가 empno 기준으로 정렬되어 있는 경우

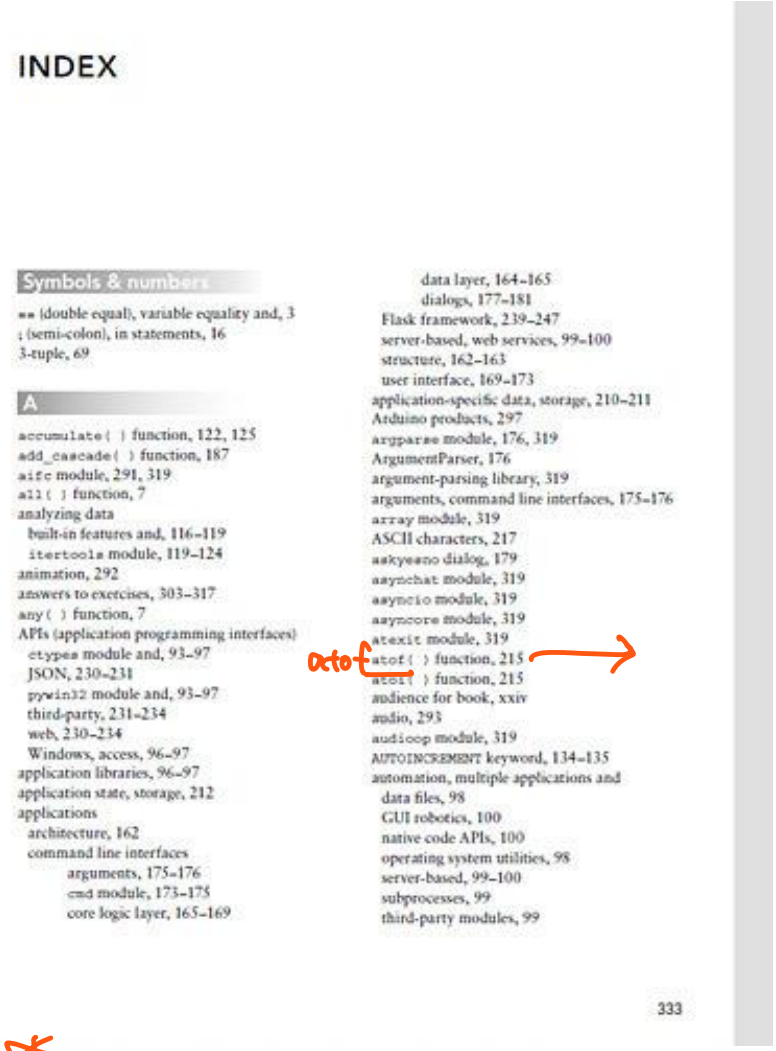


EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20
7654	MARTIN	SALESMAN	7698	1981-08-28	1250.00	1400.00	30
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10
7788	SCOTT	ANALYST	7566	1982-12-09	3000.00	NULL	20
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	10
7844	TURNER	SALESMAN	7698	1981-08-08	1500.00	0.00	30
7876	ADAMS	CLERK	7788	1983-01-12	1100.00	NULL	20
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10

  - 데이터가 갱신 될 때 마다 정렬작업을 하는 것은 비용부담이 크다

1. Index

- 방법3. Index 이용



INDEX

Symbols & numbers

== (double equal), variable equality and, 3
; (semi-colon), in statements, 16
3-tuple, 69

A

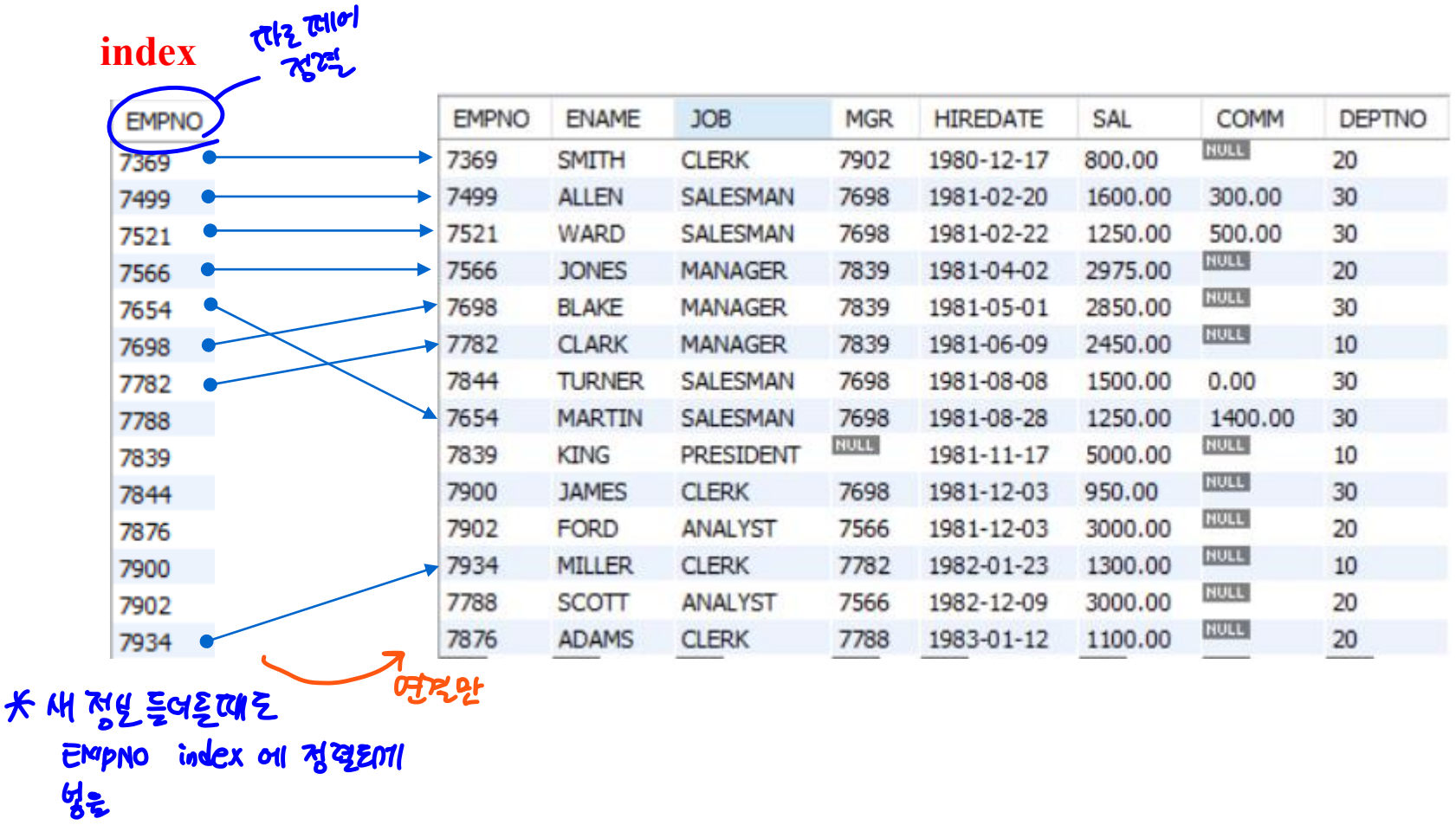
accumulate( ) function, 122, 125
add_cascade( ) function, 187
aifc module, 291, 319
all( ) function, 7
analyzing data
  built-in features and, 116–119
  itertools module, 119–124
animation, 292
answers to exercises, 303–317
any( ) function, 7
APIs (application programming interfaces)
  ctypes module and, 93–97
  JSON, 230–231
  pywin32 module and, 93–97
  third-party, 231–234
  web, 230–234
  Windows, access, 96–97
application libraries, 96–97
application state, storage, 212
applications
  architecture, 162
  command line interfaces
    arguments, 175–176
    cmd module, 173–175
    core logic layer, 165–169
    data layer, 164–165
    dialogs, 177–181
  Flask framework, 239–247
  server-based, web services, 99–100
  structure, 162–163
  user interface, 169–173
application-specific data, storage, 210–211
Arduino products, 297
argparse module, 176, 319
ArgumentParser, 176
argument-parsing library, 319
arguments, command line interfaces, 175–176
array module, 319
ASCII characters, 217
askyesno dialog, 179
asynchat module, 319
asyncio module, 319
asyncore module, 319
atexit module, 319
atof( ) function, 215
atoi( ) function, 215
audience for book, xxiv
audio, 293
audioop module, 319
AUTOINCREMENT keyword, 134–135
automation, multiple applications and
  data files, 98
  GUI robotics, 100
  native code APIs, 100
  operating system utilities, 98
  server-based, 99–100
  subprocesses, 99
  third-party modules, 99

333

Index= keyword + address

1. Index

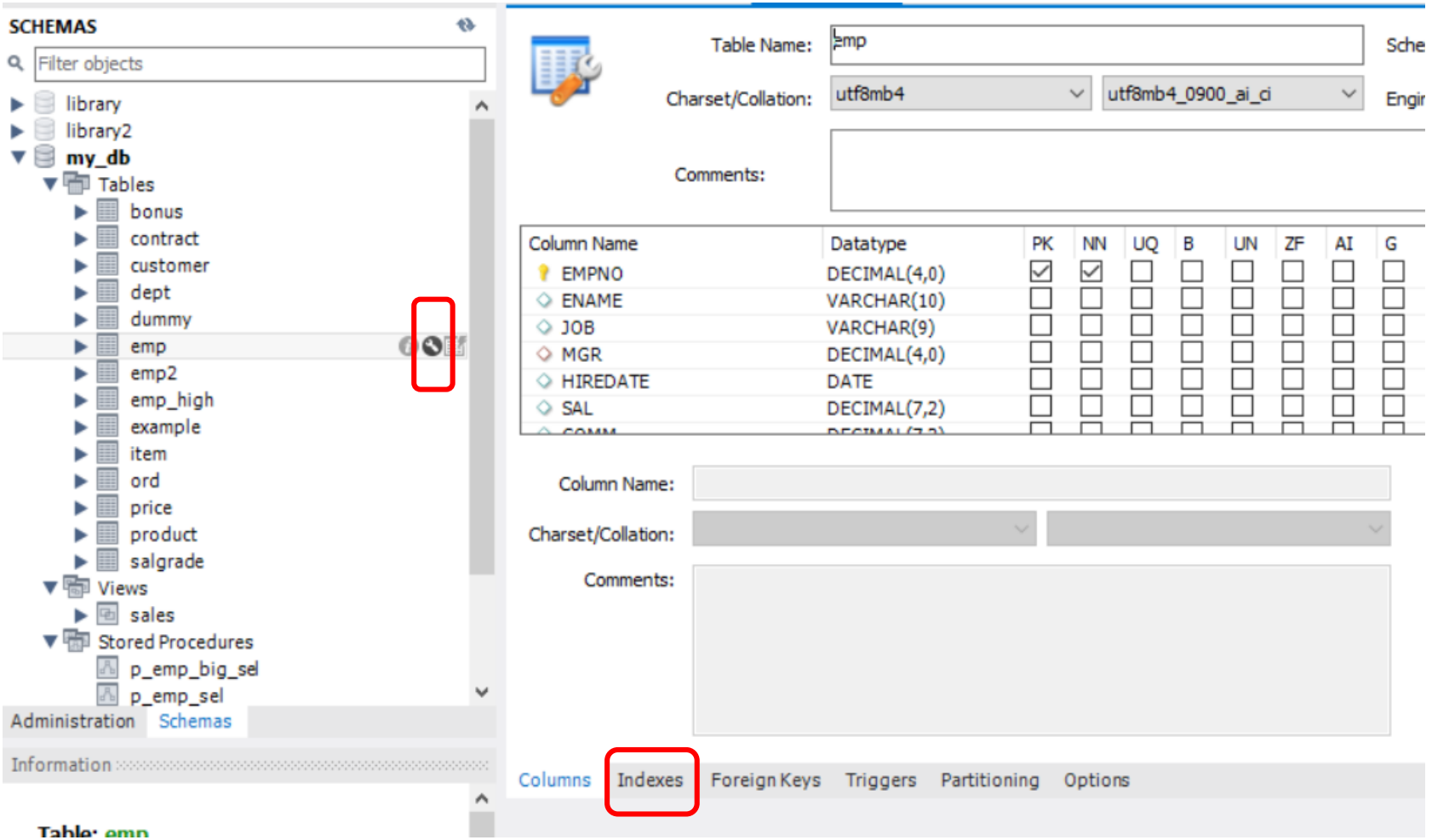
- 방법3. Index 이용



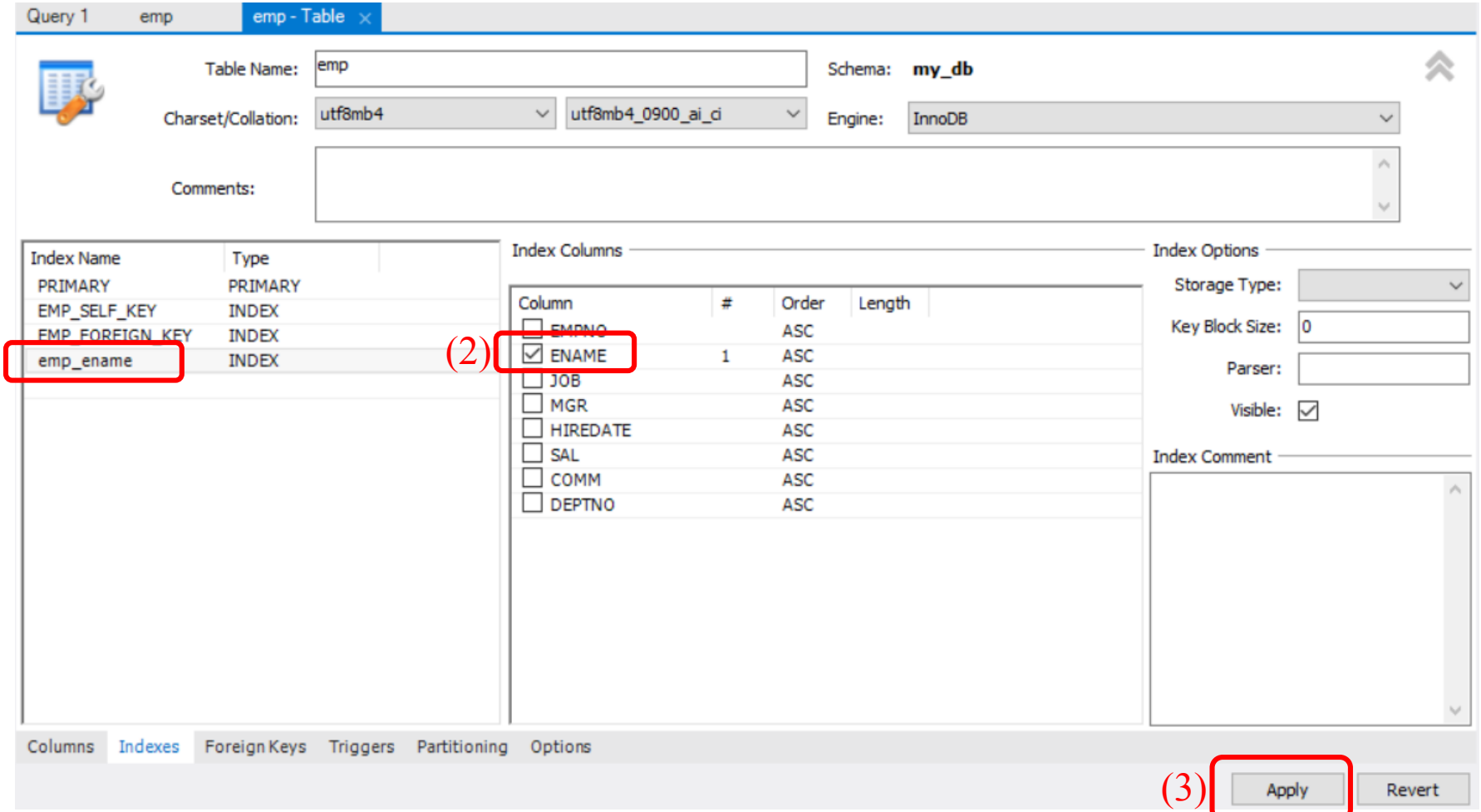
EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10
7844	TURNER	SALESMAN	7698	1981-08-08	1500.00	0.00	30
7654	MARTIN	SALESMAN	7698	1981-08-28	1250.00	1400.00	30
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	10
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10
7788	SCOTT	ANALYST	7566	1982-12-09	3000.00	NULL	20
7876	ADAMS	CLERK	7788	1983-01-12	1100.00	NULL	20

2. Index 의 설정

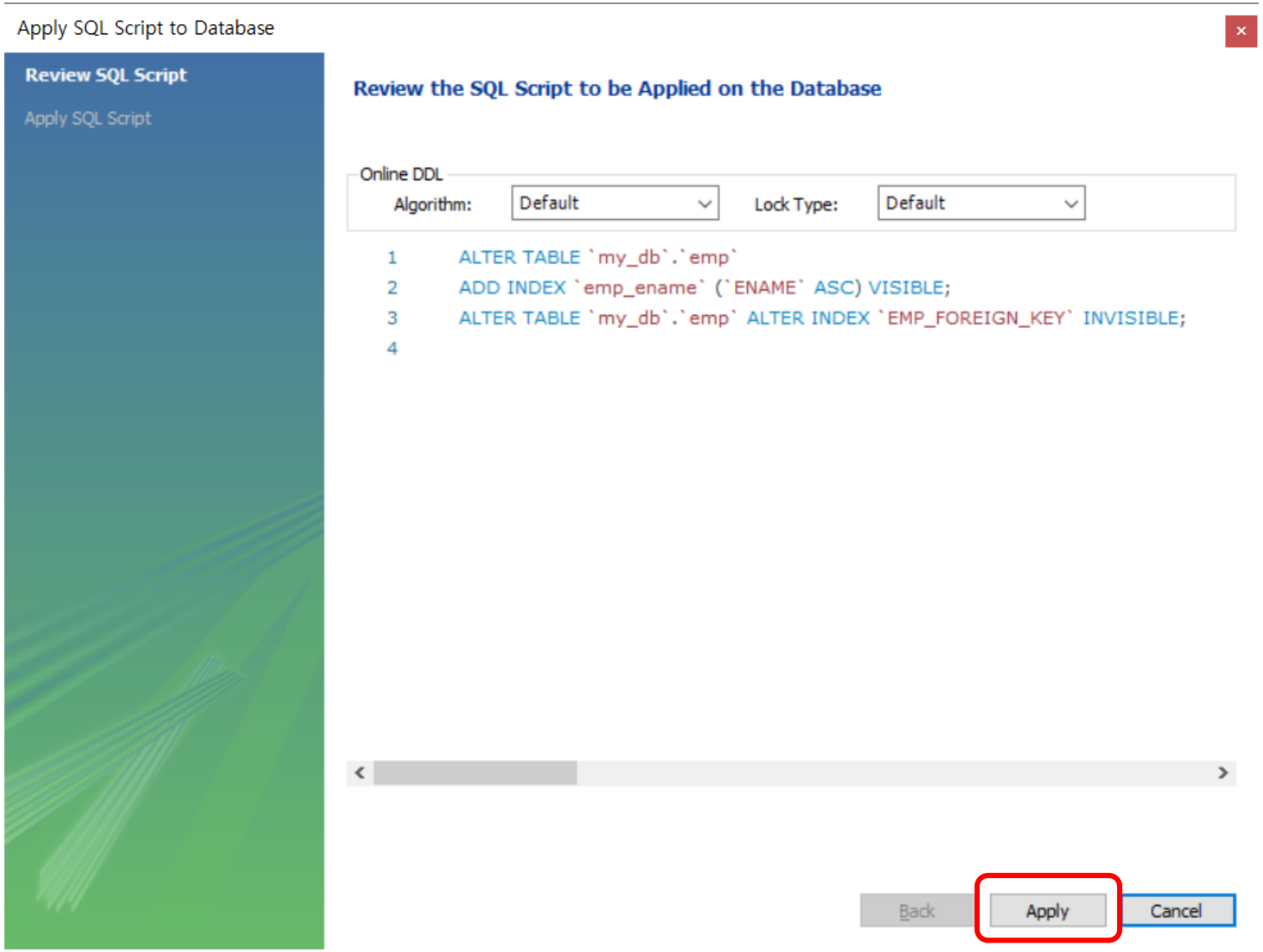
- Emp 테이블의 ename 컬럼에 인덱스 지정하기



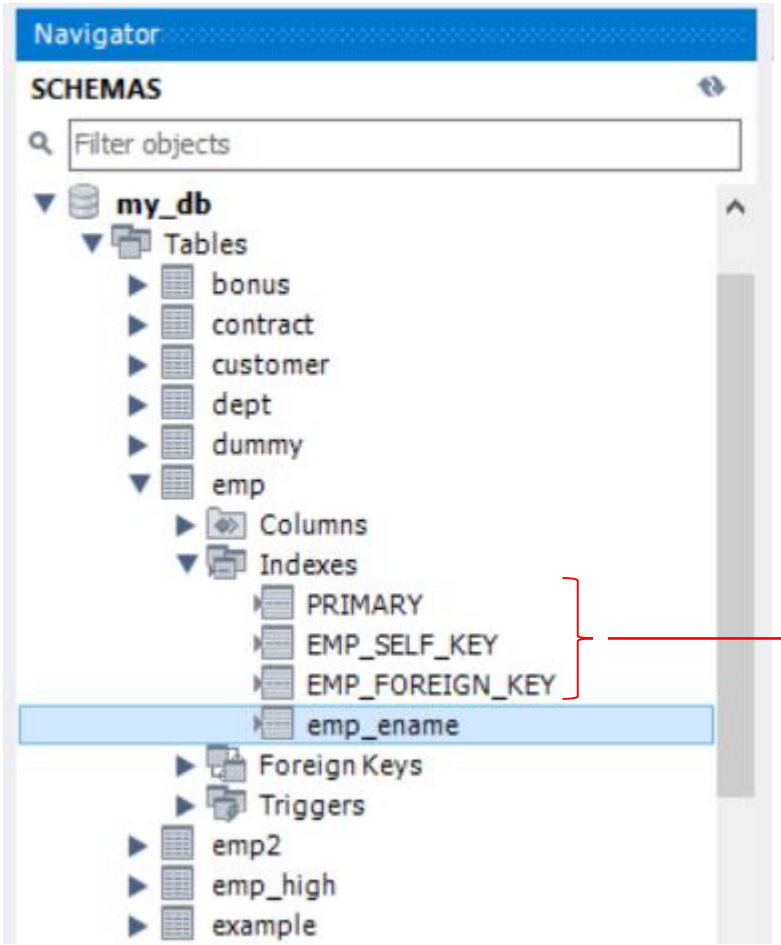
2. Index 의 설정


Query 1
emp
emp - Table
Table Name: emp
Schema: my_db
Charset/Collation: utf8mb4
utf8mb4_0900_ai_ci
Engine: InnoDB
Comments:
Index Name
Type
PRIMARY
PRIMARY
EMP_SELF_KEY
INDEX
EMP_FOREIGN_KEY
INDEX
emp_ename
INDEX
(1)
(2)
Index Columns
Column
#
Order
Length
EMPNO
ASC
ENAME
1
ASC
JOB
ASC
MGR
ASC
HIREDATE
ASC
SAL
ASC
COMM
ASC
DEPTNO
ASC
Index Options
Storage Type:
Key Block Size: 0
Parser:
Visible:
Index Comment
Columns
Indexes
Foreign Keys
Triggers
Partitioning
Options
(3)
Apply
Revert

2. Index 의 설정


Apply SQL Script to Database
Review SQL Script
Apply SQL Script
Review the SQL Script to be Applied on the Database
Online DDL
Algorithm:
Default
Lock Type:
Default
1 ALTER TABLE `my_db`.`emp`
2 ADD INDEX `emp_ename` (`ENAME` ASC) VISIBLE;
3 ALTER TABLE `my_db`.`emp` ALTER INDEX `EMP_FOREIGN_KEY` INVISIBLE;
4
Back
Apply
Cancel

2. Index 의 설정



대부분의 DBMS 는
Primary key, foreign key 에 대해서
자동으로 **index**를 설정한다

2. Index 의 설정

- SQL문으로 index 생성하기

```
create index idx_job on emp (job) ;
Show index on emp ;
```

emp Table의 job을 인덱스로 사용

```
1 • create index idx_job on emp (job) ;
2 • Show index from emp ;
3
4
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Table	Non_unique	Key_name	Seq_in_index	Column_name	Collation	Cardinality
emp	0	PRIMARY	1	EMPNO	A	14
emp	1	EMP_SELF_KEY	1	MGR	A	7
emp	1	EMP_FOREIGN_KEY	1	DEPTNO	A	3
emp	1	emp_ename	1	ENAME	A	14
emp	1	idx_job	1	JOB	A	5