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MongoDB as Document-Oriented NOSQL System

Project report

**Project 2**

Implement an application that helps to learn usage of MongoDB as an example of a document oriented NOSQL system and how data is stored and queried in one.

**Programming Language**:- Python3

**Database** **Used**:- MySQL, Mongo

**I) Import the data in MySQL**

We generated tables for each of the input text files and imported the data into the appropriate MySQL tables. The schema "company" is used to generate all tables.

1. **project table**:

Loaded data from PROJECT.txt file into project table using the below mentioned query –

LOAD DATA LOCAL INFILE 'C:/Users/surbh/Downloads /DB2/db2\_project2/PROJECT.txt' INTO TABLE company.project FIELDS TERMINATED BY ', ' OPTIONALLY ENCLOSED BY '"'LINES TERMINATED BY '\n';

Created table **project** in MySQL using the below mentioned query:-

create table company.project

(PNAME varchar(15),

PNUMBER int(5),

PLOCATION varchar(25),

DNUMBER int(5));

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1. **employee table**:

Loaded data from EMPLOYEE.txt file into employee table using the below mentioned query-

LOAD DATA LOCAL INFILE 'C:/Users/surbh/Downloads/DB2/db2\_project2/EMPLOYEE.txt' INTO TABLE company.employee FIELDS TERMINATED BY ', ' OPTIONALLY ENCLOSED BY '"'LINES TERMINATED BY '\n';

Created table **employee** in MySQL using the below mentioned query:-

create table company.employee

(FNAME varchar(20),

MIDDLENAME varchar(3),

LNAME varchar(20),

SSN varchar(20),

BDATE varchar(20),

ADDRESS varchar(30),

SEX varchar(2),

SALARY int(5),

SUPER\_SSN varchar(20),

DNUMBER int(5));

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1. **department table:**

Loaded data from DEPARTMENT.txt file into department table using the below mentioned query-

LOAD DATA LOCAL INFILE 'C:/Users/surbh/Downloads /DB2/db2\_project2/DEPARTMENT.txt' INTO TABLE company.department FIELDS TERMINATED BY ', ' OPTIONALLY ENCLOSED BY '"'LINES TERMINATED BY '\n';

Created table **department** in MySQL using the below mentioned query:-

create table company.department

(DNAME varchar(15),

DNUMBER int(5),

MGR\_SSN varchar(20),

MGR\_START\_DATE varchar(20));

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1. **works\_on table**:

Loaded data from WORKS\_ON.txt file into works\_on table using the below mentioned query-

LOAD DATA LOCAL INFILE 'C:/Users/surbh/Downloads /DB2/db2\_project2/WORKS\_ON.txt' INTO TABLE company.works\_on FIELDS TERMINATED BY ', ' OPTIONALLY ENCLOSED BY '"'LINES TERMINATED BY '\n';

Created table **works\_on** in MySQL using the below mentioned query:-

create table company.works\_on

(ESSN varchar(20),

PNUMBER int(5),

HOURS decimal(3,1));

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**II) PROJECT document**

Each PROJECT document will include the following data about each PROJECT object (document): PNAME, PNUMBER, DNAME (for the controlling DEPARTMENT), and a collection of the workers (EMPLOYEES) who work on the project. This will be nested within the PROJECT object (document) and will include for each worker: EMP\_LNAME, EMP\_FNAME, HOURS.

Name of the table: **project\_data**

project: PNUMBER,PNAME

department: DNAME

employee: EMP\_LNAME, EMP\_FNAME

works\_on: HOURS

Created table **project\_data** in MySQL using the below mentioned query:-

create table company.project\_data

(PNUMBER int(5),

PNAME varchar(15),

DNAME varchar(15),

EMP\_LNAME varchar(20),

EMP\_FNAME varchar(20),

HOURS decimal(3,1));

Insert query for project\_data table is as mentioned below:-

Insert into company.project\_data select p.PNAME,p.PNUMBER,d.DNAME,e.LNAME,e.FNAME,w.HOURS from department d,employee e,works\_on w,project p where d.DNUMBER=e.DNUMBER and e.SSN=w.ESSN and p.PNUMBER=w.PNUMBER order by p.PNUMBER;

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**III) DEPARTMENT document**

Each DEPARTMENT document will include the following data about each DEPARTMENT object (document): DNAME, MANAGER\_LNAME (the last name of the employee who manages the department), MGR\_START\_DATE, and a collection of the employees who work for that department. This will be nested within the DEPARTMENT object (document) and will include for each employee: E\_LNAME, E\_FNAME, SALARY.

Name of the table: **department\_data**

department: DNAME, MGR\_START\_DATE

employee: LNAME, FNAME,SALARY

Created table **department\_data** in MySQL using the below mentioned query:-

create table company.department\_data

(DNAME varchar(15),

MANAGER\_LNAME varchar(20),

MGR\_START\_DATE varchar(20),

E\_LNAME varchar(20),

E\_FNAME varchar(20),

SALARY int(5));

Insert query for department\_data table is as mentioned below:-

Insert into company.department\_data select DISTINCT d.DNAME,e1.LNAME,d.MGR\_START\_DATE,e2.LNAME,e2.FNAME,e2.SALARY from department d,employee e1,employee e2,project p where d.MGR\_SSN=e1.SSN and d.DNUMBER=e2.DNUMBER order by d.DNUMBER;

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**IV) EMPLOYEES document**

Each EMPLOYEE document will include the following data about each EMPLOYEE object (document): EMP\_LNAME, EMP\_FNAME, DNAME (department where the employee works), and a collection of the projects that the employee works on. This will be nested within the EMPLOYEE object (document) and will include for each project: PNAME, PNUMBER, HOURS.

Name of the table: **employee\_data**

employee: EMP\_LNAME, EMP\_FNAME

department: DNAME

project: PNUMBER,PNAME

works\_on: HOURS

Created table **employee\_data** in MySQL using the below mentioned query:-

create table company.employee\_data

(EMP\_LNAME varchar(20),

EMP\_FNAME varchar(20),

DNAME varchar(15),

PNAME varchar(20),

PNUMBER int(5),

HOURS decimal(3,1));

Insert query for employee\_data table is as mentioned below:-

Insert into company.employee\_data select e.LNAME,e.FNAME,d.DNAME,p.PNAME,p.PNUMBER,w.HOURS from department d,employee e,works\_on w,project p where d.DNUMBER=e.DNUMBER and e.SSN=w.ESSN and p.PNUMBER=w.PNUMBER order by p.PNUMBER;

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**V) Pseudo code**

1. **Pseudo code for converting to JSON format**

We used Python to convert with MySQL and converted the data into JSON format

**Step 1**) Import Mysql.connector

**Step 2**) Connect to MySQL database

mydb = mysql.connector.connect(

host='127.0.0.1',

user = 'root',

password = '',

database="company"

)

**Step 3**) Used mydb.cursor() to iterate through the instance of the specific table.

**Step 4**) Built the MySQL select query then executed it using the below mentioned command

cursor.execute(sql) -> It executes the SQL query

eg) department\_results = cursor.fetchall() -> It fetches all the result of the query result

**Step 5**) Then iterated through the department\_result to build the JSON file using **write()** function

1. **Pseudo code for Importing to MongoDB**

We used Python to convert the generated JSON files in MySQL and imported them to MongoDB.

**Step 1**) Import all the necessary libraries Json, Pymongo, Pymsql.connector, JsonComment

**Step 2**) Connect to MongoDB using

myclient = MongoClient("mongodb://127.0.0.1:27017/")

**Step 3**) Create new **schema** with name **company**.

db = myclient["company"]

**Step 4**) Create new **collection** with the name **project**

Collection = db["project\_data"]

Open project\_doc.json file and read json data.

with open('C:/Users/surbh/Downloads/DB2/db2\_project2/project\_doc.json') as file:

file\_data = json.load(file)

insert json data to mongodb project collection.

1. Collection.insert\_many(file\_data) -> Used when more than one data to insert
2. Collection.insert\_one(file\_data) -> Used when only one data to insert

**Step 5**) Create new **collection** with the name **department**

Collection = db["department\_data"]

Open department\_doc.json file and read json data.

with open('C:/Users/surbh/Downloads/DB2/db2\_project2/department\_doc.json') as file:

file\_data = json.load(file)

insert json data to mongodb project collection.

1. Collection.insert\_many(file\_data) -> Used when more than one data to insert
2. Collection.insert\_one(file\_data) -> Used when only one data to insert

**Step 6)** Create new **collection** with the name **employee**

Collection = db["employee\_data"]

Open employee\_doc.json file and read json data.

with open('C:/Users/surbh/Downloads/DB2/db2\_project2/employee\_doc.json') as file:

file\_data = json.load(file)

insert json data to mongodb project collection.

1. Collection.insert\_many(file\_data) -> Used when more than one data to insert
2. Collection.insert\_one(file\_data) -> Used when only one data to insert

**VI) MongoDB Usage**

MongoDB version:- **Community version(5.0)**

Imported the generated Json files from MySQL to MongoDB compass

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**Sample MongoDB query to retrieve the data**

We have written the query to find all the employees with PNAME=”Middleware” in the employee\_data table using filter option in MongoDB compass

**In Filter:- {“EMPLOYEE.0.PNAME”: “Middleware”}**

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