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FACULTY OF ENGINEERING AND TECHNOLOGY

BACHELOR OF TECHNOLOGY

**BIG DATA ANALYSIS**

**(203105348)**

7th SEMESTER

7A13

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**PRACTICAL 1**

**Aim:** To Understand the overall programing architecture using Map Reduce API.

**Solution:**

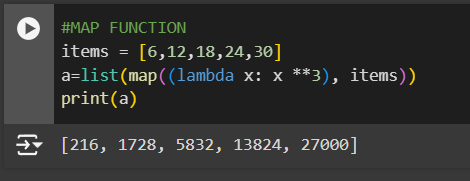
* **MapReduce** and **HDFS** are the two major components of Hadoop which makes it so powerful and efficient to use.
* Reduce is a programming model used for efficient processing in parallel over large data-sets in a distributed manner.
* The data is first split and then combined to produce the final result.
* The libraries for MapReduce is written in so many programming languages with various different-different optimizations.
* The purpose of MapReduce in Hadoop is to Map each of the jobs and then it will reduce it to equivalent tasks for providing ess overhead over the cluster network and to reduce the processing power.
* MapReduce task is mainly divided into two phases Map Phase and Reduce Phase.
* map ( ), filter(), and reduce() in Python.
* These functions are most commonly used with Lambda function.

### Map() Function:

A map function executes certain instructions or functionality provided to it on every item of an iterable. "The iterable could be a list, tuple, set, etc.

Syntax:

map(function, iterable)



The Map() function passes each element in the list to a lambda function and return the mapped object.

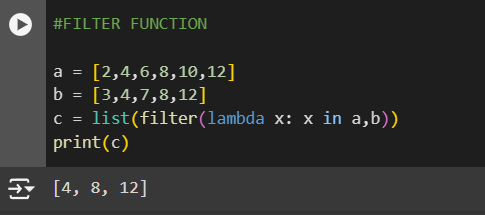
## Filter() Function:

A Filter function in Python tests a specific user defined condition for a function and returns an iterable for the elements and values that satisfy the condition or, in other words, return True.

Syntax:

Filter(function, iterable)

Example:



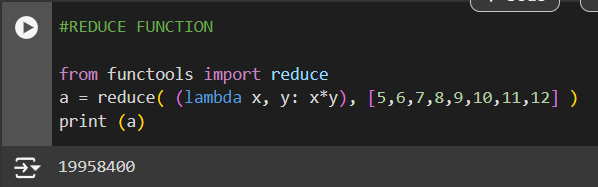
## Reduce() Function:

Reduce functions apply a function to every item of an iterable and gives back a single value as a resultant.

We have to import to reduce function from Functools module using the statement. Syntax:

Reduce(function, iterable)

Example:



**PRACTICAL 2**

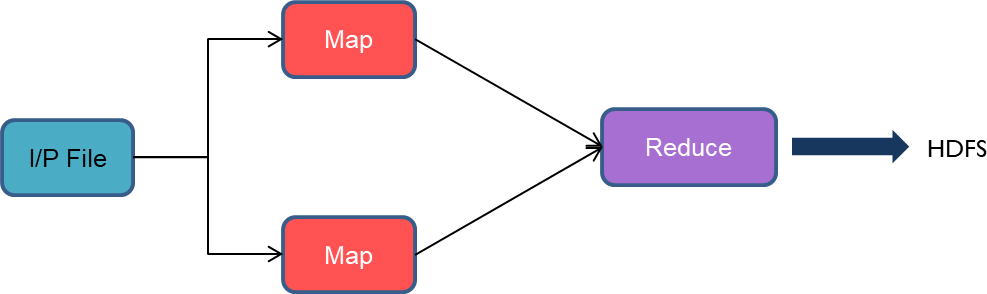
**Aim:** Write a program of Word Count in Map Reduce over HDFS.

### Description:

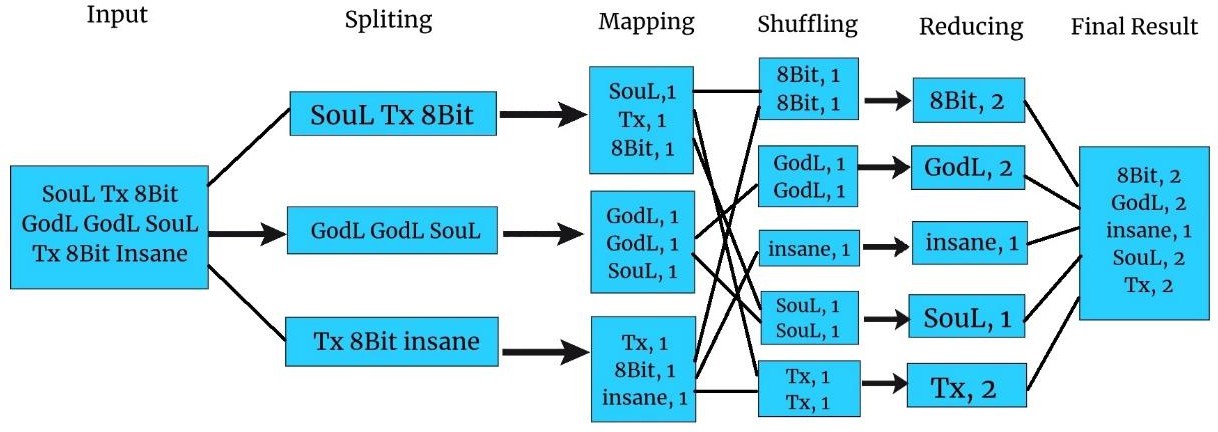
MapReduce is a framework for processing large datasets using a large number of computers (nodes), collectively referred to as a cluster. Processing can occur on data stored in a file system (HDFS).A method for distributing computation across multiple nodes.Each node processes the data that is stored at that node.

Consists of two main phases Mapper Phase

Reduce phase



Input data set is split into independent blocks – processed in parallel. Each input split is converted in Key Value pairs. Mapper logic processes each key value pair and produces and intermediate key value pairs based on the implementation logic. Resultant key value pairs can be of different type from that of input key value pairs. The output of Mapper is passed to the reducer. Output of Mapper function is the input for Reducer. Reducer sorts the intermediate key value pairs. Applies reducer logic upon the key value pairs and produces the output in desired format.Output is stored in HDFS



## Code:

import urllib.request import random

from operator import itemgetter

current\_word = {} current\_count = 0

story = ['http://sixty](http://sixty-north.com/c/t.txt%27)-[north.com/c/t.txt'](http://sixty-north.com/c/t.txt%27) request = urllib.request.Request(story)

def map\_function(line): words = line.split()

return [(word.lower(), 1) for word in words]

def reduce\_function(mapped\_values): word\_counts = {}

for word, count in mapped\_values: if word in word\_counts:

word\_counts[word] += count else:

word\_counts[word] = count return word\_counts

def map\_reduce():

global current\_word, current\_count

with urllib.request.urlopen(request) as response: text = response.read().decode('utf-8')

mapped = []

for line in text.split('\n'): mapped.extend(map\_function(line))

random.shuffle(mapped)

reduced = reduce\_function(mapped)

sorted\_counts = sorted(reduced.items(), key=itemgetter(1), reverse=True) if sorted\_counts:

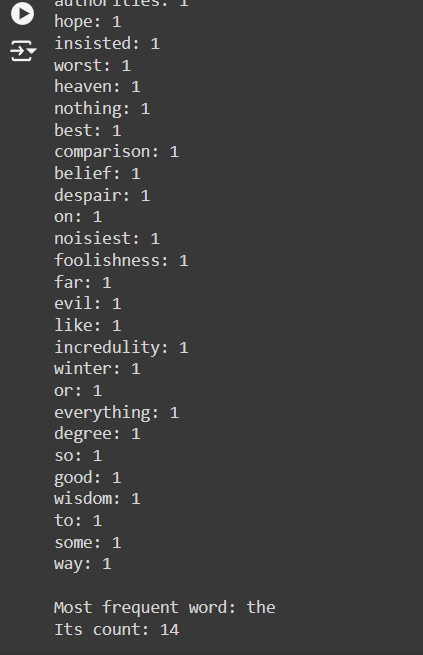
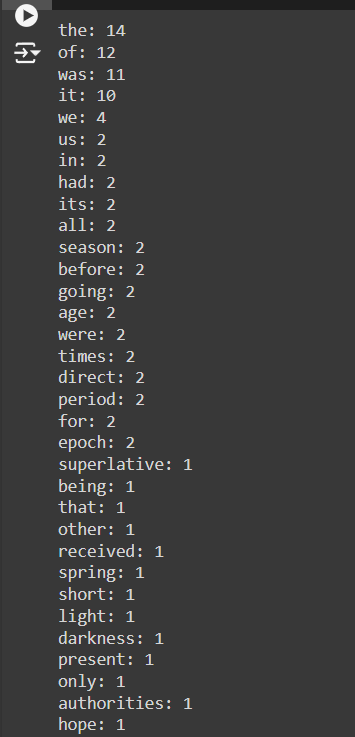
current\_word, current\_count = sorted\_counts[0] return sorted\_counts

result = map\_reduce()

for word, count in result: print(f"{word}: {count}")

print(f"\nMost frequent word: {current\_word}") print(f"Its count: {current\_count}")

**Output:**



# PRACTICAL 3

**Aim:** To study Basic CRUD operations in MongoDB.

### Description:

CRUD is an acronym from the world of computer programming and refers to the four functions considered necessary to implement a persistent storage application: create, read, update and delete. Persistent storage refers to any data storage device that retains power after the device is powered off, such as a hard disk or a solid-state drive. In contrast, random access memory and internal caching are two examples of volatile memory. they contain data that will be erased when they lose power.

**Key takeaways**

* The CRUD acronym identifies all of the major functions that are inherent to relational databases and the applications used to manage them, which include Oracle Database, Microsoft SQL Server, MySQL, and others.
* The four CRUD functions can perform different types of operations on selected data within the database.
* CRUD operations are widely used in many applications that are supported by underlying relational databases.

Sumo Logic's log aggregation capabilities can be used to monitor the total volume of CRUD commands over time, correlate the results with other important metrics, and help identify and rectify the causes of poor performance.

**Program:** db.createCollection("employees"); db.employees.insertMany([

]);

{empId: 1, name: 'Clark', dept: 'Sales' },

{empId: 2, name: 'Dave', dept: 'Accounting' },

{empId: 3, name: 'Ava', dept: 'Sales' }

db.employees.find({dept: 'Sales'});

db.employees.insert({empId: 4, name: 'Raja', dept: 'marketing' }) db.employees.update({name:'Raja'},{$set:{name:'Alise'}}); db.employees.find({dept: 'marketing'}); db.employees.remove({dept:'Accounting'});

db.createCollection("orders") db.orders.insertMany( [

{ id: 0, name: "Pepperoni", size: "small", price: 19, quantity: 10, date: ISODate( "2021-03-13T08:14:30Z" ) },

{ id: 1, name: "Pepperoni", size: "medium", price: 20, quantity: 20, date : ISODate( "2021-03-13T09:13:24Z" ) },

{ id: 2, name: "Pepperoni", size: "large", price: 21,

quantity: 30, date : ISODate( "2021-03-17T09:22:12Z" ) },

{ id: 3, name: "Cheese", size: "small", price: 12,

quantity: 15, date : ISODate( "2021-03-13T11:21:39.736Z" ) },

{ id: 4, name: "Cheese", size: "medium", price: 13,

quantity:50, date : ISODate( "2022-01-12T21:23:13.331Z" ) },

{ id: 5, name: "Cheese", size: "large", price: 14,

quantity: 10, date : ISODate( "2022-01-12T05:08:13Z" ) },

{ id: 6, name: "Vegan", size: "small", price: 17,

quantity: 10, date : ISODate( "2021-01-13T05:08:13Z" ) },

{ id: 7, name: "Vegan", size: "medium", price: 18,

quantity: 10, date : ISODate( "2021-01-13T05:10:13Z" ) }

] )

db.orders.find({size: "medium"});

db.orders.insert({id: 9, name: "Vegan", size: "medium", price: 8, quantity: 5, date : ISODate( "2021-01-22T05:10:13Z" )})

db.orders.updateMany({name:'Vegan'},{$set:{name:'Veg'}}) db.orders.find({name: 'Veg'}); db.orders.remove({name:'Pepperoni'})

db.orders.find({ $and: [ {name: 'Veg'}, { size: "small"} ] }) db.orders.find()

**Output:**



**Practical 4**

**Aim:** Store the basic information about students such as roll no, name, date of birth and address of student using various collection types such as List, Set and Map.

**Program 1 :**

use studentdb;

db.createCollection("student");

// Insert multiple documents using insertMany with an array

db.student.insertMany([

{

no: 1,

name: "Vishal",

dob: "19-11-2002",

e\_mail: "vumavane@gmail.com",

phone: "9322694060",

address: {

building: "1234",

street: "main road",

zipcode: "421306"

},

Branch: "CSE",

marks: [50, 70, 60]

},

{

no: 2,

name: "Harsh",

dob: "17-07-2003",

e\_mail: "harshsingh@gmail.com",

phone: "8208629356",

address: {

building: "5678",

street: "main road",

zipcode: "431511"

},

Branch: "CSE",

marks: [45, 20, 80]

},

{

no: 3,

name: "Akash",

dob: "30-09-2003",

e\_mail: "akashpanchal@gmail.com",

phone: "9890898563",

address: {

building: "1256",

street: "main road",

zipcode: "431511"

},

Branch: "CSE",

marks: [59, 89, 68]

},

{

no: 4,

name: "Vidya",

dob: "15-04-2003",

e\_mail: "vidya85@gmail.com",

phone: "9698741235",

address: {

building: "3478",

street: "main road",

zipcode: "431511"

},

Branch: "CSE",

marks: [53, 29, 33]

},

{

no: 5,

name: "Sahil",

dob: "13-05-2003",

e\_mail: "sahil168@gmail.com",

phone: "9642317893",

address: {

building: "2525",

street: "ain road",

zipcode: "431511"

},

Branch: "CSE",

marks: [61, 20, 66]

}

]);

db.student.find()

db.student.update({no:1},{$set:{name:"Rishikesh"}})

db.student.find({name:/^R/})

db.student.find({name:/l$/})

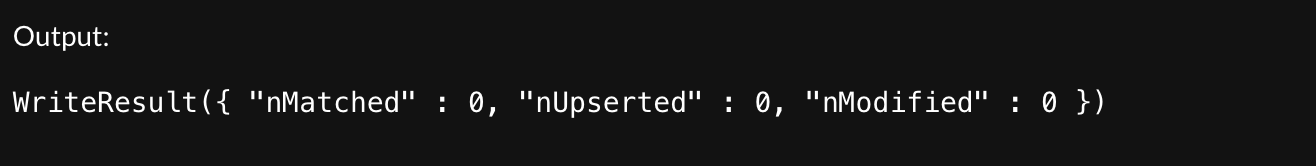
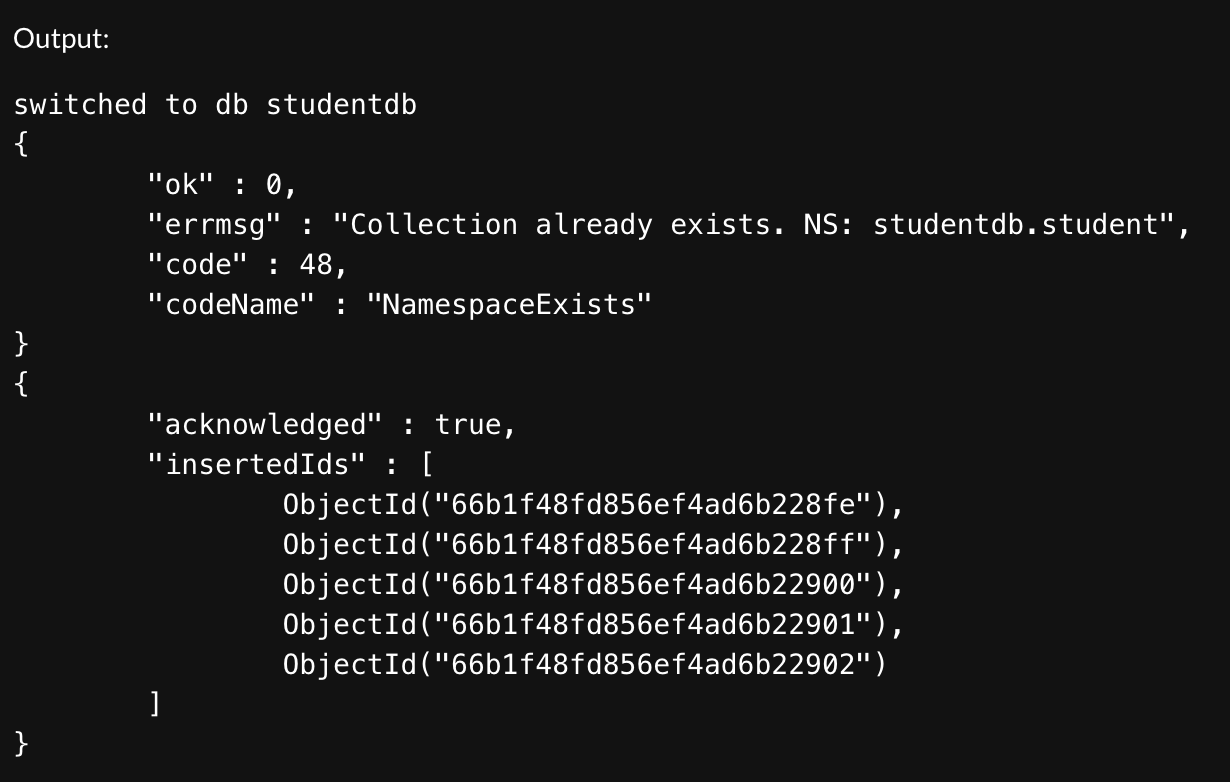
db.student.find({name:/S/})

db.student.count()

db.studnet.find().forEach(function(myDoc) {print("name: Vidya "+myDoc.name);})

db.student.find().limit(2);

db.student.find().sort({"name": -1})

Output :

**Program-2**

db.grades.insertMany([

{\_id: 1, quizzes: [5,6,7]},

{\_id: 2, quizzes: []},

{\_id: 3, quizzes: [3,8,9]}

])

db.grades.aggregate(

[

{

$project:

{

adjustedGrades:

{

$map:

{

input: "$quizzes",

as: "grade",

in: {$add: ["$$grade",2]}

}

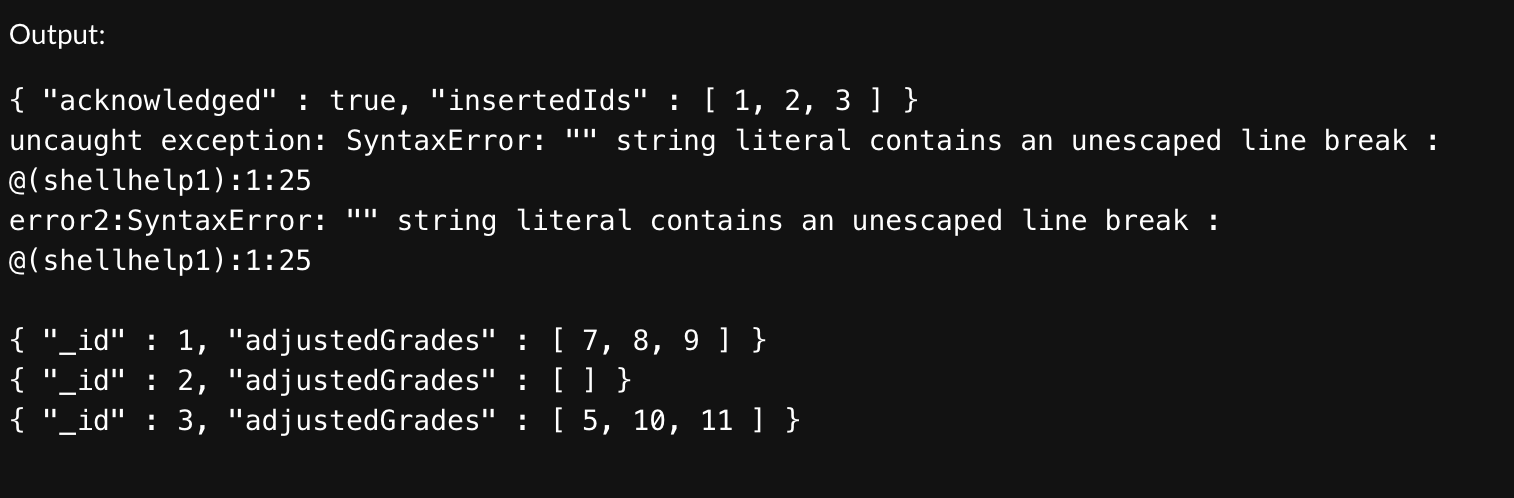
}

}

}

]

)



**Program-3**

db.scores.insertMany([

{\_id: 1, student: "Maya", homework: [10,5,10], quiz: [10,8],extraCredit: 0},

{\_id: 2, student: "Ryan", homework: [5,6,5], quiz: [8,8],extraCredit: 8}

])

db.scores.aggregate([

{

$set:{

totalHomework:{$sum: "$homework"},

totalQuiz:{$sum:"$quiz"}

}

},

{

$set:{

totalScore:{$add:["$totalHomework","$totalQuiz","$extraCredit"]}

}

}

])

