**ADVANCED JAVA LAB**

**INDEX**

|  |  |  |
| --- | --- | --- |
| **Sr No** | **Practical** | **Signature** |
|  | **Collections and Generics** |  |
|  | FizzBuzz Class |  |
|  | Employee Class |  |
|  | Character Frequency |  |
|  | BankAccount Class |  |
|  | Array Utilities |  |
|  | MyStack V1 |  |
|  | MyStack V2 |  |
|  | LinkedList Class |  |
|  | Collections Demo |  |
|  | Calculator using Lambda |  |
|  | Pair Class |  |
|  | Box Class |  |
|  | **JSP** |  |
|  | Multiplication Table |  |
|  | Number Guesser |  |
|  | Counter using Cookies |  |
|  | Login Application with Beans |  |
|  | Login Application |  |
|  | Database Connectivity using JSTL |  |
|  | **Spring** |  |
|  | Mobile Application |  |
|  | Singer Application |  |
|  | Employee application |  |
|  | Circular Dependency |  |
|  | Spring AOP |  |
|  | **Advanced Spring** |  |
|  | Spring JDBC (Insert update delete) |  |
|  | Spring Boot Application |  |
|  | Spring Boot using JDBC |  |
|  | Spring Boot MVC |  |

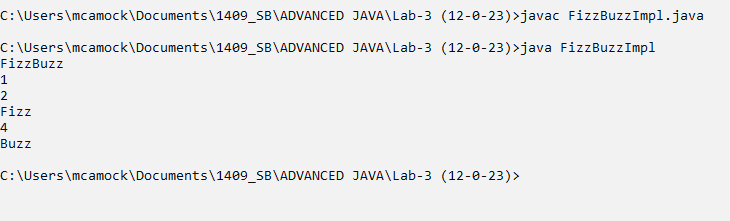
|  |  |
| --- | --- |
| **Program No:** | **1.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Fizz Buzz Class |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**FizzBuzzImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60** | **class FizzBuzzModel**  **{**  ***//Instance variables***  **private int number;**  ***//setter and getter***  **public void setNumber(int number)**  **{**  **this.number=number;**  **}**  **public int getNumber()**  **{**  **return this.number;**  **}**  ***//Utility Method***  **public String printFizzBuzz()**  **{**  **String result = ""; *//declare an empty string***  **if(number%3 == 0)**  **{**  **result+= "Fizz";**  **}**  **if(number%5 == 0)**  **{**  **result+= "Buzz";**  **}**  ***//-------------method-1-----------***  ***//if(number%3 == 0 && number%5 == 0)***  ***//{***  ***// result = "FizzBuzz";***  ***//}***  ***//----------method-2: result+= "Fizz"-----***  **if(result=="")**  **{**  **result = ""+number;**  **}**  **return result;**  **}**  **}**  **class FizzBuzzImpl**  **{**  **public static void main(String[] args)**  **{**  **FizzBuzzModel b1 = new FizzBuzzModel();**  **for(int i=0;i<=5;i++)**  **{**  **b1.setNumber(i);**  **System.out.println(b1.printFizzBuzz());**  **}**      **}**  **}** |

**Output:**

****

|  |  |
| --- | --- |
| **Program No:** | **2.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Employee Class |
| **Objective :** | **Collections and Generics** |

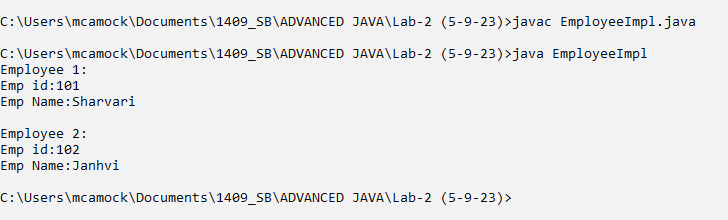
**Question:** Write a program to generate empid automatically.

**Source Code:**

**EmployeeImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53** | **class Employee**  **{**  ***//declare a static counter***  **static int counter=100;**  ***//declare instance variables***  **private int empId;**  **private String empName;**  ***//decalre a constructor***  **Employee(String empName)**  **{**  ***//auto-increment the empId***  **counter++;**    ***//assign empId***  **this.empId=counter;**  **this.empName=empName;**  **}**  ***//add setters amd getters***  **public void setEmpName(String empName)**  **{**  **this.empName=empName;**  **}**  **public String getEmpName()**  **{**  **return this.empName;**  **}**  **public int getEmpId()**  **{**  **return this.empId;**  **}**  **}**  **class EmployeeImpl**  **{**  **public static void main(String[] args)**  **{**  **Employee e1=new Employee("Sharvari");**  **Employee e2=new Employee("Janhvi");**  **System.out.println("Employee 1: ");**  **System.out.println("Emp id:"+e1.getEmpId());**  **System.out.println("Emp Name:"+e1.getEmpName());**  **System.out.println("\nEmployee 2: ");**  **System.out.println("Emp id:"+e2.getEmpId());**  **System.out.println("Emp Name:"+e2.getEmpName());**  **}**  **}** |

**Output:**

****

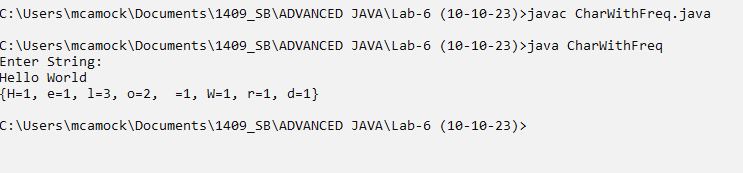
|  |  |
| --- | --- |
| **Program No:** | **3.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Character Frequency |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**CharWithFreq.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37** | ***//Java program to print the characters and Frequencies of characters in order of in occurence in a given array.***  **import java.util.\*;**  **class CharWithFreq**  **{**  ***//method to print chars with frequencies***  **public static void printFreq(String s)**  **{**  **Map<Character,Integer> m1=new LinkedHashMap<>();**  **for(int i=0; i<s.length();i++)**  **{**  **char c=s.charAt(i);**  **if(m1.containsKey(c))**  **{**  **int val=m1.get(c);**  **val=val+1;**  **m1.put(c,val);**  **}**  **else**  **{**  **m1.put(c,1);*//for the first occurence***  **}**  **}**  **System.out.println(m1);**  **}**  **public static void main(String[] args)**  **{**  ***//printFreq("KabhiKhushiKabhiGum");***  **Scanner sc= new Scanner(System.in);**  **System.out.println("Enter String: ");**  **String s=sc.nextLine();**  **printFreq(s);**  **}**  **}** |

**Output:**



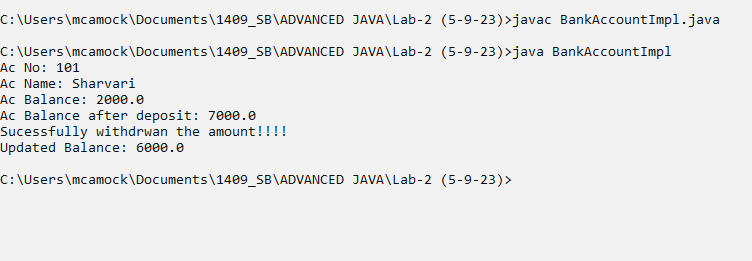
|  |  |
| --- | --- |
| **Program No:** | **4.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Bank Account Class |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**BankAccountImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68**  **69**  **70**  **71**  **72**  **73**  **74**  **75**  **76**  **77**  **78**  **79**  **80**  **81**  **82**  **83**  **84**  **85**  **86**  **87**  **88**  **89**  **90**  **91**  **92**  **93** | **class BankAccount**  **{**  ***//----------Instance Variables-------***  **private int accountNumber;**  **private String accountName;**  **private double accountBalance;**  ***//----------Setters and Getters-------------***  ***//---------------accountNumber----------------***  **public void setaccountNumber(int accountNumber)**  **{**  **this.accountNumber = accountNumber;**  **}**  **public int getaccountNumber()**  **{**  **return this.accountNumber;**  **}**  ***//--------------accountName-----------------------***  **public void setaccountName(String accountName)**  **{**  **this.accountName = accountName;**  **}**  **public String getaccountName()**  **{**  **return this.accountName;**  **}**  ***//--------------accountBalance-----------------------***  **public void setaccountBalance(double accountBalance)**  **{**  **this.accountBalance = accountBalance;**  **}**  **public double getaccountBalance()**  **{**  **return this.accountBalance;**  **}**  ***//--------------Utility Methods------------***  ***//---------------deposit-------------***  **public void deposit(double amount)**  **{**  **this.accountBalance+=amount;**  **}**  ***//---------------withdraw-------------***  **boolean withdraw(double amount)**  **{**    **if(this.accountBalance-amount >=0)**  **{**  ***//withdrawl is possible***  ***//withdraw***  **this.accountBalance-=amount;**  **return true;**  **}**  **else**  **{**  ***//withdrawl is not possible***  **return false;**  **}**  **}**  **}**  **class BankAccountImpl**  **{**  **public static void main(String[] args)**  **{**  **BankAccount b1=new BankAccount();**  **b1.setaccountNumber(101);**  **b1.setaccountName("Sharvari");**  **b1.setaccountBalance(2000);**  **System.out.println("Ac No: "+b1.getaccountNumber());**  **System.out.println("Ac Name: "+b1.getaccountName());**  **System.out.println("Ac Balance: "+b1.getaccountBalance());**  **b1.deposit(5000);**  **System.out.println("Ac Balance after deposit: "+b1.getaccountBalance());**  **if(b1.withdraw(1000))**  **{**  **System.out.println("Sucessfully withdrwan the amount!!!!");**  **System.out.println("Updated Balance: "+b1.getaccountBalance());**  **}**  **else**  **{**  **System.out.println("Insufficient Funds!!!!");**  **}**  **}**  **}** |

**Output:**

****

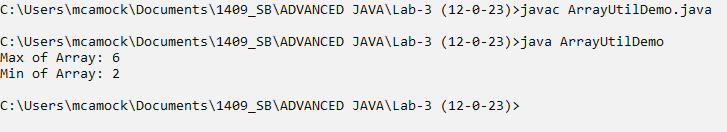
|  |  |
| --- | --- |
| **Program No:** | **5.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Array Utilities |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**ArrayUtilDemo.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60** | **class ArrayUtils**  **{**  **int[] data;**  ***//set the data***  **public void setData(int[] data)**  **{**  **this.data=data;**  **}**  ***//----------------Max Element-----------***  **public int maxEle()**  **{**  **int max=data[0];**  **for(int i=1;i<data.length;i++)**  **{**  **if(data[i]>max)**  **{**  **max=data[i];**  **}**  **}**  **return max;**  **}**    ***//------------------Min Element-----------------***  **public int minEle()**  **{**  **int min=data[0];**  **for(int i=1;i<data.length;i++)**  **{**  **if(data[i]<min)**  **{**  **min=data[i];**  **}**  **}**  **return min;**  **}**  **}**  **class ArrayUtilDemo**  **{**  **public static void main(String[] args)**  **{**  ***/\*---------------------Default Initialization-----------***  ***int[] arr=new int[3];***  ***System.out.println("Default Initialization");***  ***for(int i=0;i<arr.length;i++)***  ***{***  ***System.out.println("Index: "+i+" Value: "+arr[i]);***  ***}***  ***---------------------------\*/***  **int[] arr1={2,4,6};**  **ArrayUtils a1 = new ArrayUtils();**  **a1.setData(arr1);**  **System.out.println("Max of Array: "+a1.maxEle());**  **System.out.println("Min of Array: "+a1.minEle());**  **}**  **}** |

**Output:**

****

|  |  |
| --- | --- |
| **Program No:** | **6.** |
| **Roll No :** | **1409** |
| **Title of Program :** | MyStack V1 |
| **Objective :** | **Collections and Generics** |

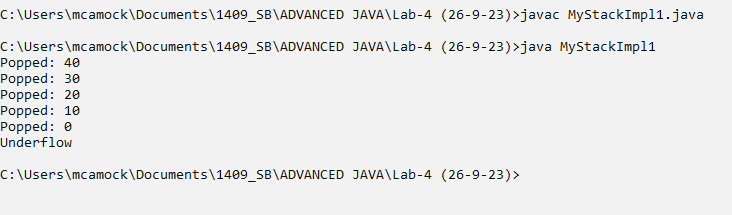
**Question:** Create a stack of integers with push and pop functions generic class

**Source Code:**

**MyStackImpl1.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54** | ***//Question-1: Create a stack of integers with push and pop functions***  ***//This is a Stack class for Integer***  **class MyStackV1**  **{**  **int[] data;**  **int size;**  **int tos=-1;**  **MyStackV1(int size)**  **{**  **this.size=size;**  **data=new int[size];**  **}**  **void push(int ele)**  **{**  **if(tos < (size-1))**  **{**  **data[++tos] = ele;**  **}**  **else**  **{**  **System.out.println("Overflow");**  **}**  **}**  **void pop()**  **{**  **if(tos >= 0)**  **{**  **System.out.println("Popped: "+data[tos--]);**  **}**  **else**  **{**  **System.out.println("Underflow");**    **}**  **}**  **}**  **class MyStackImpl1**  **{**  **public static void main(String args[])**  **{**  **MyStackV1 s1 = new MyStackV1(5);**  **for(int i=0;i<5;i++)**  **{**  **s1.push(i\*10);**  **}**  **s1.pop();**  **s1.pop();**  **s1.pop();**  **s1.pop();**  **s1.pop();**  **s1.pop(); *//underflow***  **}**  **}** |

**Output:**

****

|  |  |
| --- | --- |
| **Program No:** | **7.** |
| **Roll No :** | **1409** |
| **Title of Program :** | MyStack V2 |
| **Objective :** | **Collections and Generics** |

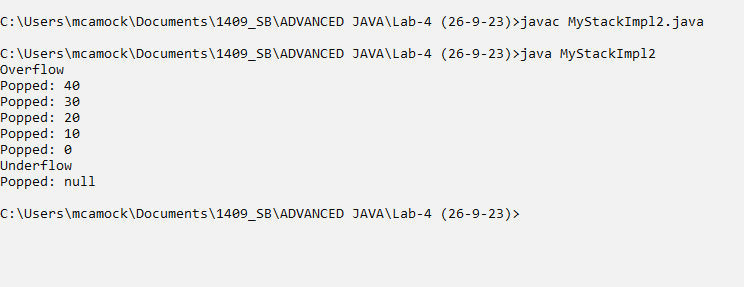
**Question:** Create a stack of integers with push and pop functions with generic class

**Source Code:**

**MyStackImpl2.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68**  **69**  **70** | ***//Generic version of Stack can work with any type - int,string,float or any type***  **import java.util.\*;**  **class MyStackV2<T>**  **{**  ***//a data structure to data***  **ArrayList<T> data;**  **int size;**  **int tos=-1;**  ***//constructor - to instantiate array with size***  **MyStackV2(int size)**  **{**  **this.size=size;**  **data=new ArrayList<T>(size);**  **}**  ***//push***  **void push(T ele)**  **{**  ***//increment tos***  **tos++;**  **if(tos<size)**  **{**  ***//push the element***  **data.add(tos,ele);**  **}**  **else**  **{**  **System.out.println("Overflow");**  **}**  **}*//end of push***  ***//get and return the popped value***  **T pop()**  **{**  **tos--;**  **if(tos>=0)**  **{**  **return data.remove(tos);**  **}**  **else**  **{**  **System.out.println("Underflow");**  **return null;**  **}**  **}*//end of pop***  **}**  **class MyStackImpl2**  **{**  **public static void main(String[] args)**  **{**  **MyStackV2<Integer> s1 = new MyStackV2<>(5);**  **for(int i=0;i<=5;i++)**  **{**  **s1.push(i\*10);**  **}**  **for(int j=0;j<=5;j++)**  **{**  **System.out.println("Popped: "+s1.pop());**  **}**  **}**  **}** |

**Output:**

****

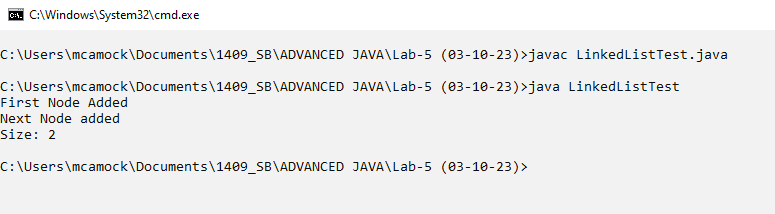
|  |  |
| --- | --- |
| **Program No:** | **8.** |
| **Roll No :** | **1409** |
| **Title of Program :** | LinkedList Class |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**LinkedListTest.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68**  **69**  **70**  **71** | ***//15 marks***  **class Node<T>**  **{**  **T data;**  **Node<T> next;**  **Node(T data)**  **{**  **this.data=data;**  **next=null;**  **}**  **}**  **class MyLinkedList<T>**  **{**  ***//data members***  **int size=0;**  **Node<T> head;**    ***//default constructor to create head reference***  **MyLinkedList()**  **{**  **head=null;**  **}**  **int getSize()**  **{**  **return size;**  **}**  ***//a method to add a node at the end***  **void add(T data)**  **{**  **Node<T> temp=new Node<T>(data);**  **if(head==null) *// check the first node***  **{**  **head=temp;**  **System.out.println("First Node Added");**  **}**  **else *// to add any other node in the list***  **{**  ***//start at the head***  **Node<T> x=head;**    ***//traverse to the end***  **while(x.next!=null)**  **{**  **x=x.next;**  **}**  **x.next=temp;**  **System.out.println("Next Node added");**  **}**  **size++;**    **}**  **}**  **class LinkedListTest**  **{**  **public static void main(String[] args)**  **{**  **MyLinkedList<Integer> m1= new MyLinkedList<>();**  **m1.add(10);**  **m1.add(20);**  **System.out.println("Size: "+m1.getSize());**  **}**  **}** |

**Output:**

****

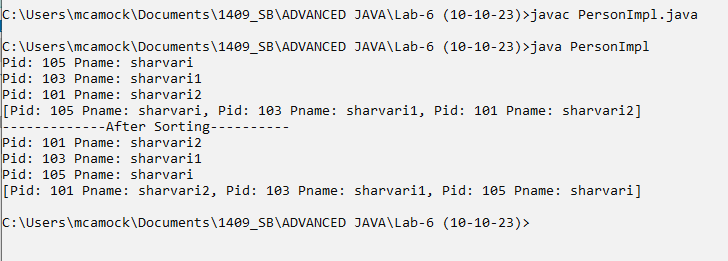
|  |  |
| --- | --- |
| **Program No:** | **9.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Collections Demo |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**PersonImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68**  **69**  **70**  **71**  **72**  **73**  **74**  **75**  **76**  **77**  **78**  **79**  **80**  **81**  **82**  **83**  **84**  **85**  **86**  **87**  **88**  **89**  **90** | ***//design a person class with attribute name and id which implements comparable interface and sort according to the id***  **import java.util.\*;**  **class Person implements Comparable<Person>**  **{**  **int pid;**  **String pname;**  **Person(int pid,String pname)**  **{**  **this.pid=pid;**  **this.pname=pname;**  **}**  ***//setters and getters***  **int getId()**  **{**  **return this.pid;**  **}**  **void setId(int pid)**  **{**  **this.pid=pid;**  **}**  **String getName()**  **{**  **return this.pname;**  **}**  **void setName(String pname)**  **{**  **this.pname=pname;**  **}**    ***//override compareTo for sorting pid***  **public int compareTo(Person p1)**  **{**  **int x;**  **if(this.pid <p1.getId())**  **{**  **x=-1;**  **}**  **else if(this.pid==p1.getId())**  **{**  **x=0;**  **}**  **else**  **{**  **x=1;**  **}**  **return x;**  **}**  **public String toString()**  **{**  **return "Pid: "+this.pid+" Pname: "+this.pname;**  **}**  **}**  **class PersonImpl**  **{**  **public static void main(String[] args)**  **{**  **ArrayList<Person> ppl = new ArrayList<>();**  **Person p1 = new Person(105,"sharvari");**  **Person p2 = new Person(103,"sharvari1");**  **Person p3 = new Person(101,"sharvari2");**  **ppl.add(p1);**  **ppl.add(p2);**  **ppl.add(p3);**  **for(Person p:ppl)**  **{**  **System.out.println("Pid: "+ p.getId()+" Pname: "+p.getName());**    **}**  ***//ppl will print only object so override toString() to get the values***  **System.out.println(ppl);**  **Collections.sort(ppl);**  **System.out.println("-------------After Sorting----------");**  **for(Person p:ppl)**  **{**  **System.out.println("Pid: "+ p.getId()+" Pname: "+p.getName());**  **}**  **System.out.println(ppl);**    **}**  **}** |

**Output:**

****

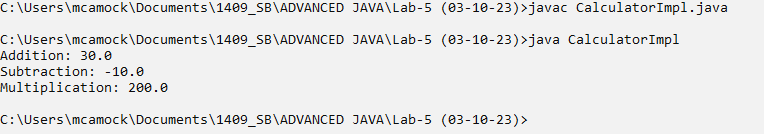
|  |  |
| --- | --- |
| **Program No:** | **10.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Calculator using Lambda |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**CalculatorImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22** | ***//Design a calculator interface and implement methods of it using lambda expressions(10 marks)***  **interface Calculator**  **{**  **double op(double A , double b);**  **}**  **class CalculatorImpl**  **{**  **public static void main(String[] args)**  **{**  ***//create an instance of calcultor interface***  **Calculator addImpl = (a,b)-> a+b;**  **Calculator subImpl = (a,b)-> a-b;**  **Calculator mulImpl = (a,b)-> {return a\*b;};**    ***//invoke the method***  **System.out.println("Addition: "+addImpl.op(10,20));**  **System.out.println("Subtraction: "+subImpl.op(10,20));**  **System.out.println("Multiplication: "+mulImpl.op(10,20));**  **}**  **}** |

**Output:**

****

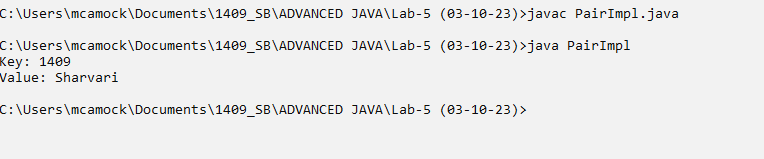
|  |  |
| --- | --- |
| **Program No:** | **11.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Pair Class |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**PairImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54** | ***//Design a pair class with key and value pairs***  **class Pair<K,V>**  **{**  ***//variables***  **K key;**  **V value;**    ***//constructor***  ***//Pair(K key, V value)***  ***//{***  ***// this.key=key;***  ***// this.value=value;***  ***//}***  ***//setter and getter***  **void setKey(K key)**  **{**  **this.key=key;**  **}**  **K getKey()**  **{**  **return this.key;**  **}**  **void setValue(V value)**  **{**  **this.value=value;**  **}**  **V getValue()**  **{**  **return this.value;**  **}**  **void print()**  **{**  **System.out.println("Key: "+key+"\nValue: "+value);**  **}**  **}**  **class PairImpl**  **{**  **public static void main(String[] args)**  **{**  **Pair <Integer,String> p1 = new Pair<>();**  **p1.setKey(1409);**  **p1.setValue("Sharvari");**  **p1.print();**  **}**  **}** |

**Output:**

****

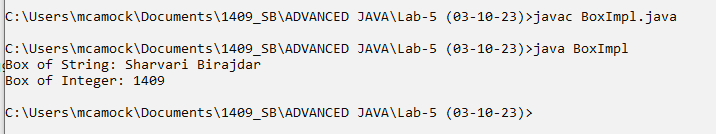
|  |  |
| --- | --- |
| **Program No:** | **12.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Box Class |
| **Objective :** | **Collections and Generics** |

**Source Code:**

**BoxImpl.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32** | ***//Design a generic box class with one generic type T. Implementaion will be String,Integer type(5 marks)***  **class Box<T>**  **{**  **T item;**  ***//setter and getter***  **void setItem(T item)**  **{**  **this.item=item;**  **}**  **T getItem()**  **{**  **return this.item;**  **}**  **}**  **class BoxImpl**  **{**  **public static void main(String[] args)**  **{**  **Box<String> b1 = new Box<>();**  **Box<Integer> b2 = new Box<>();**  **b1.setItem("Sharvari Birajdar");**  **b2.setItem(1409);**  **System.out.println("Box of String: "+b1.getItem());**  **System.out.println("Box of Integer: "+b2.getItem());**  **}**  **}** |

**Output:**

****

|  |  |
| --- | --- |
| **Program No:** | **13.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Multiplication Table |
| **Objective :** | **JSP** |

**Source Code:**

**index.jsp:**

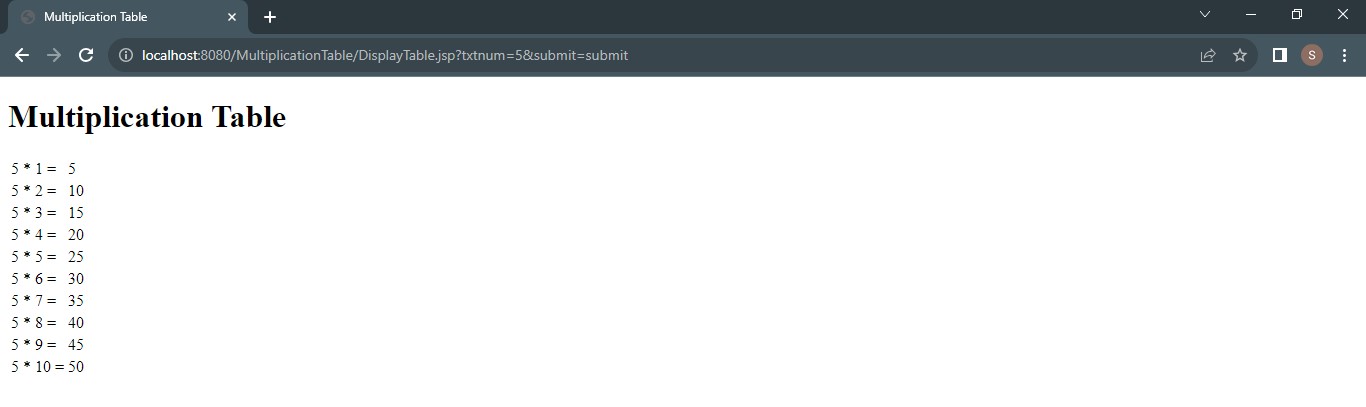
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>This is Simple JSP Application </title>**  **</head>**  **<body>**  **<form method="get" action="DisplayTable.jsp">**    **Enter a number: <input type="text" name="txtnum">**  **<br>**  **<input type="submit" name="submit" value="submit">**  **</form>**  **</body>**  **</html>** |

**DisplayTable.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Multiplication Table</title>**  **</head>**  **<body>**  **<%!**  ***//declare the variables***  **int num;**  **%>**  **<!-- Fetch the value from the text box -->**  **<Table>**  **<%**  **num = Integer.parseInt(request.getParameter("txtnum"));**  **out.println("<h1>Multiplication Table</h1>");**  **for(int i=1;i<=10;i++)**  **{**  **%>**  **<tr>**  **<td><%= num %> \* <%=i %> = </td>**  **<td><%= (num\*i) %></td>**  **</tr>**  **<%**  **}**  **%>**  **</Table>**    **</body>**  **</html>** |

**Output:**





|  |  |
| --- | --- |
| **Program No:** | **14.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Number Guesser |
| **Objective :** | **JSP** |

**Source Code:**

**index.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Number Guesser Game</title>**  **</head>**  **<body>**    **<form action="NextGuess.jsp">**  **<h1>Number Guesser</h1><br>**  **<h2>Select a number between 0 and 100</h2><br>**    **<input type="submit" name="btnSub" value="Start">**  **<input type="hidden" name="low" value="0">**  **<input type="hidden" name="high" value="100">**  **<input type="hidden" name="cntr" value="1">**    **</form>**  **</body>**  **</html** |

**NextGuess.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Next Guess</title>**  **</head>**  **<body>**  **<%! int guess; %>**  **<%**  **//fetch all the form fields**  **int hi = Integer.parseInt(request.getParameter("high"));**  **int lo = Integer.parseInt(request.getParameter("low"));**  **int cnt = Integer.parseInt(request.getParameter("cntr"));**    **guess =  (hi+lo)/2;**  **%>**  **<form action="CheckResult.jsp">**  **My Guess no: <%= cnt++ %> is: <%= guess %> <br>**  **<h2>How is my Guess?</h2><br>**    **<input type="radio" name="guesser" value="too\_low" onclick="submit()">Too Low**  **<input type="radio" name="guesser" value="too\_high" onclick="submit()">Too High**  **<input type="radio" name="guesser" value="perfect" onclick="submit()">Perfect**    **<input type="hidden" name="low" value="<%= lo %>">**  **<input type="hidden" name="high" value="<%= hi %>">**  **<input type="hidden" name="cntr" value="<%= cnt %>">**  **</form>**  **</body>**  **</html>** |

**CheckResult.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Check Result</title>**  **</head>**  **<body>**  **<%**  **int hi = Integer.parseInt(request.getParameter("high"));**  **int lo = Integer.parseInt(request.getParameter("low"));**  **int cnt = Integer.parseInt(request.getParameter("cntr"));**  **int guess = (hi+lo)/2;**  **String check = request.getParameter("guesser");**    **if(check.equals("perfect"))**  **{**  **%>**  **<jsp:forward page="Winner.jsp">**  **<jsp:param value="<%= cnt %>" name="cntr"/>**  **</jsp:forward>**  **<%**  **}**  **else if(hi<=lo || lo>=hi)**  **{**  **%>**  **<jsp:forward page="Cheater.jsp" />**  **<%**  **}**  **else**  **{**  **if(check.equals("too\_low"))**  **{**  **lo=guess;**  **}**  **else**  **{**  **hi=guess;**  **}**  **%>**  **<jsp:forward page="NextGuess.jsp">**  **<jsp:param value="<%= hi %>" name="high"/>**  **<jsp:param value="<%= lo %>" name="low"/>**  **<jsp:param value="<%= cnt %>" name="cntr"/>**  **</jsp:forward>**  **<%**  **}**  **%>**    **</body>**  **</html>** |

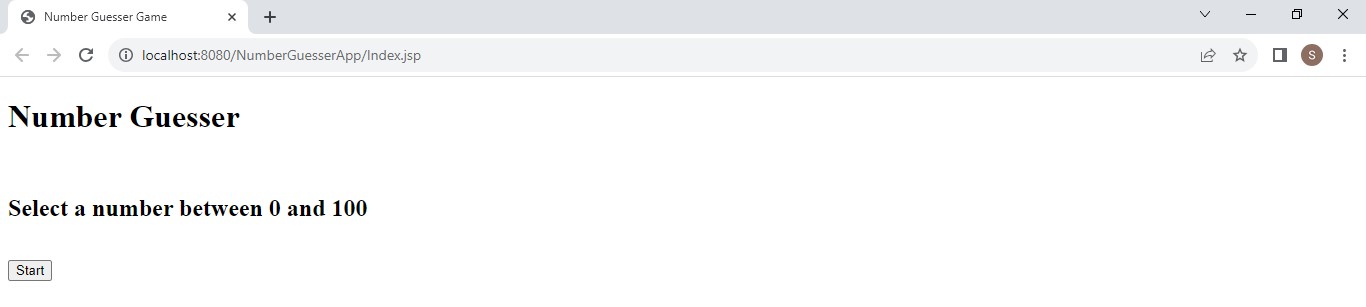
**Winner.jsp:**

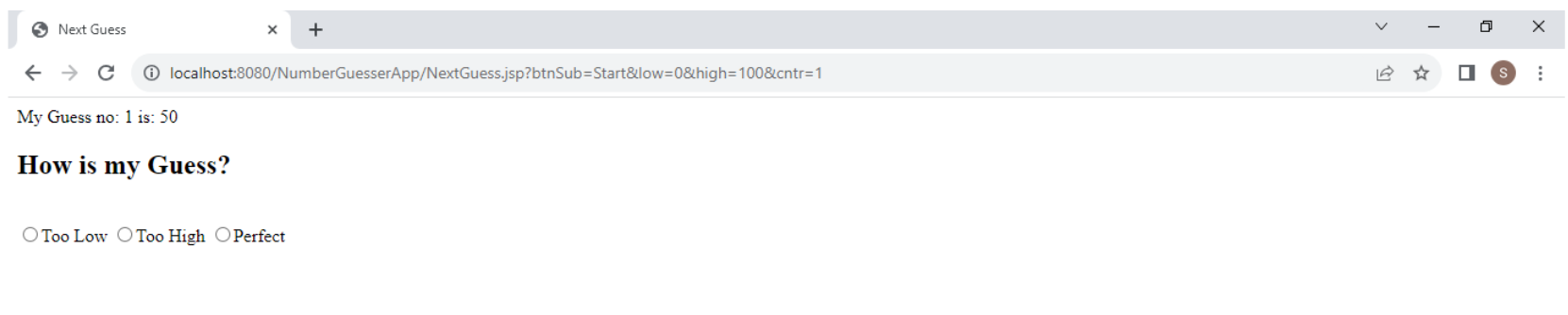
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Winner</title>**  **</head>**  **<body>**  **<h1>I guessed in <%= request.getParameter("cntr") %> attempts </h1>**  **<a href="Index.jsp">Play again</a>**  **</body>**  **</html>** |

**Cheater.jsp:**

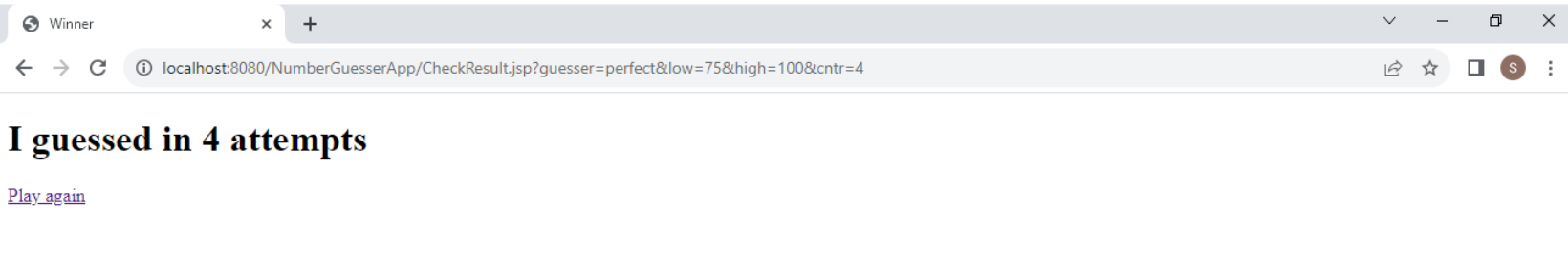
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Cheater</title>**  **</head>**  **<body>**  **<h2>You are a cheater! Stay Away</h2>**  **</body>**  **</html>** |

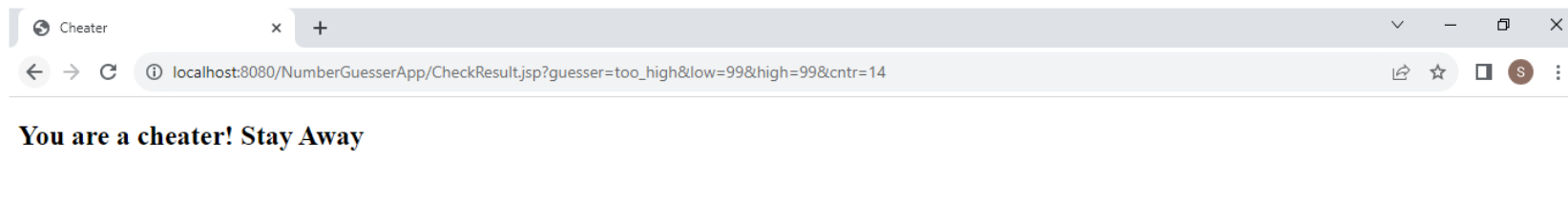
**Output:**











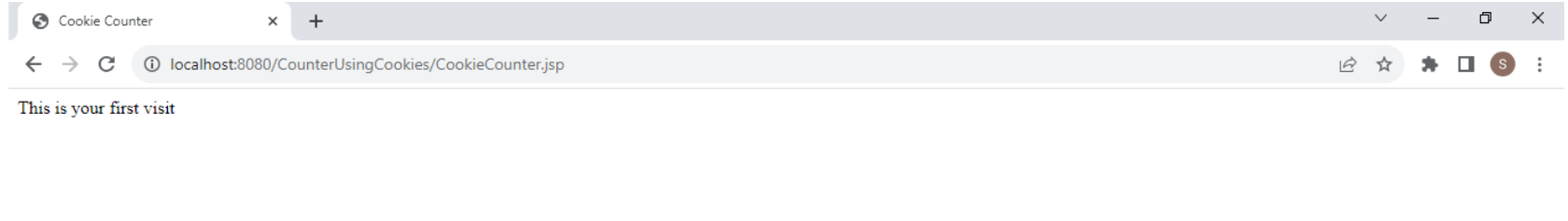
|  |  |
| --- | --- |
| **Program No:** | **15.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Counter Using Cookies |
| **Objective :** | **JSP** |

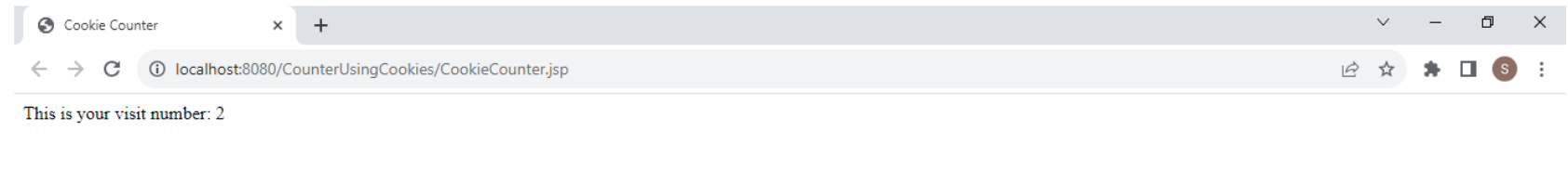
**Source Code:**

**CookieCounter.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1" import ="javax.servlet.http.\*" %>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Cookie Counter</title>**  **</head>**  **<body>**  **<%**  **Cookie[]  cookies = request.getCookies();**  **//check whether it is the first request**    **if(cookies == null)**  **{**  **//this is your request**  **out.println("This is your first visit");**    **//create a cookie**    **Cookie c1=new Cookie("cntr","1");**    **//add the cookie to the response**  **response.addCookie(c1);**  **}**  **else**  **{**  **for(Cookie temp:cookies)**  **{**  **if(temp.getName().equals("cntr"))**  **{**  **int val = Integer.parseInt(temp.getValue());**  **val++;**  **out.println("This is your visit number: "+val);**  **temp.setValue(""+val);//convert value to string**  **response.addCookie(temp);**  **break;**  **}**  **}**  **}**    **%>**  **</body>**  **</html>** |

**Output:**





|  |  |
| --- | --- |
| **Program No:** | **16.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Login Application with Beans |
| **Objective :** | **JSP** |

**Source Code:**

**LoginBean.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27** | **package edu.met;**  **public class LoginBean {**  **private String uname;**  **private String password;**  **public LoginBean()**  **{**  **super();**  **}**  **public String getUname()**  **{**  **return uname;**  **}**  **public void setUname(String uname)**  **{**  **this.uname = uname;**  **}**  **public String getPassword()**  **{**  **return password;**  **}**  **public void setPassword(String password)**  **{**  **this.password = password;**  **}**  **public boolean validate()**  **{**  **if ("sharvari".equals(this.uname) && "password".equals(this.password))**  **{**  **return true;**  **} else**  **{**  **return false;**  **}**  **}**  **}** |

**LoginPage.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<title>Login Page</title>**  **</head>**  **<body>**  **<form action="Controller.jsp" method="post">**  **<h1>MET ICS</h1>**  **User Name: <input type="text" name="txtUname">**  **<br><br>**  **Password: <input type="password" name="txtPwd">**  **<br><br>**  **<input type="submit" name="btnSubmit" value="Login">**  **</form>**  **</body>**  **</html>** |

**Controller.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-8859-1"%>**  **<%@ page import="edu.met.LoginBean" %>**  **<!DOCTYPE html>**  **<html>**  **<body>**  **<jsp:useBean id="userB" class="edu.met.LoginBean" />**  **<jsp:setProperty property="\*" name="userB" />**  **<%**  **if (userB.validate()) {**  **response.sendRedirect("Welcome.jsp");**  **} else {**  **response.sendRedirect("Invalid.jsp");**  **}**  **%>**  **</body>**  **</html>** |

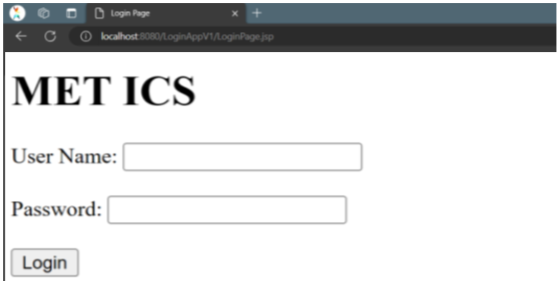
**Welcome.jsp:**

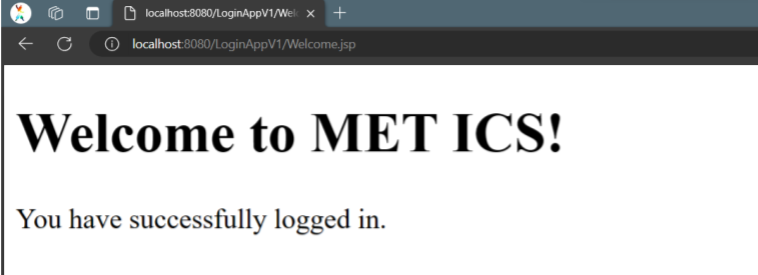
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<body>**  **<h1>Welcome to MET ICS!</h1>**  **<p>You have successfully logged in.</p>**  **</body>**  **</html>** |

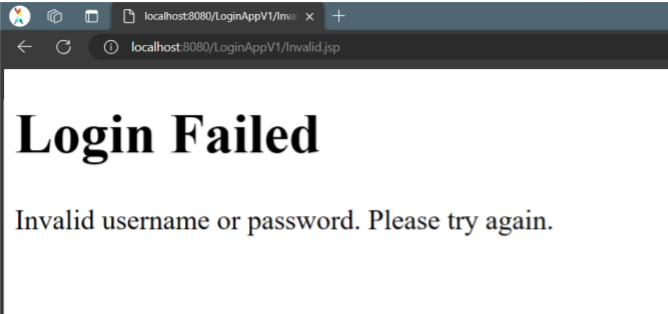
**Invalid.jsp**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<body>**  **<h1>Login Failed</h1>**  **<p>Invalid username or password. Please try again.</p>**  **</body>**  **</html>** |

**Output:**







|  |  |
| --- | --- |
| **Program No:** | **17.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Login Application |
| **Objective :** | **JSP** |

**Source Code:**

**index.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title> Home Page </title>**  **</head>**  **<body>**  **<form method="get" action="CheckLogin.jsp">**  **<h1>MET ICS </h1>**  **<br>**  **Username: <input type="text" name="txtuname">**  **<br>**  **<br>**  **Password: <input type ="password" name="txtpassword">**  **<br>**  **<br>**  **<input type="submit" name="btnSubmit" value="Login">**  **</form>**  **</body>**  **</html>** |

**CheckLogin.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Check Login Page</title>**  **</head>**  **<body>**  **<%! String uname,pwd; %>**    **<%**  **uname = request.getParameter("txtuname");**  **pwd = request.getParameter("txtpassword");**    **if(uname.equals("sharvari")&& pwd.equals("1234"))**  **{**  **response.sendRedirect("Welcome.jsp?txtuname="+uname);**  **}**  **else**  **{**  **response.sendRedirect("Invalid.jsp");**  **}**  **%>**  **</body>**  **</html>** |

**Welcome.jsp:**

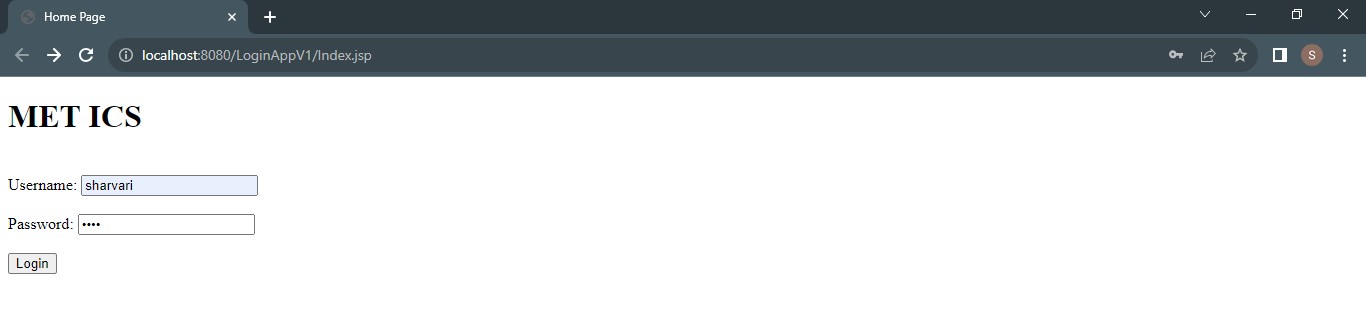
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Welcome Page</title>**  **</head>**  **<body>**  **<%**  **String name=request.getParameter("txtuname");**  **%>**  **<h1> Welcome:<%= name %></h1>**  **</body>**  **</html>** |

**Invalid.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Invalid Page</title>**  **</head>**  **<body>**  **<h1> Invalid credentials:(</h1> <br> <a href="Index.jsp">Go to Home Page!</a>**  **</body>**  **</html>** |

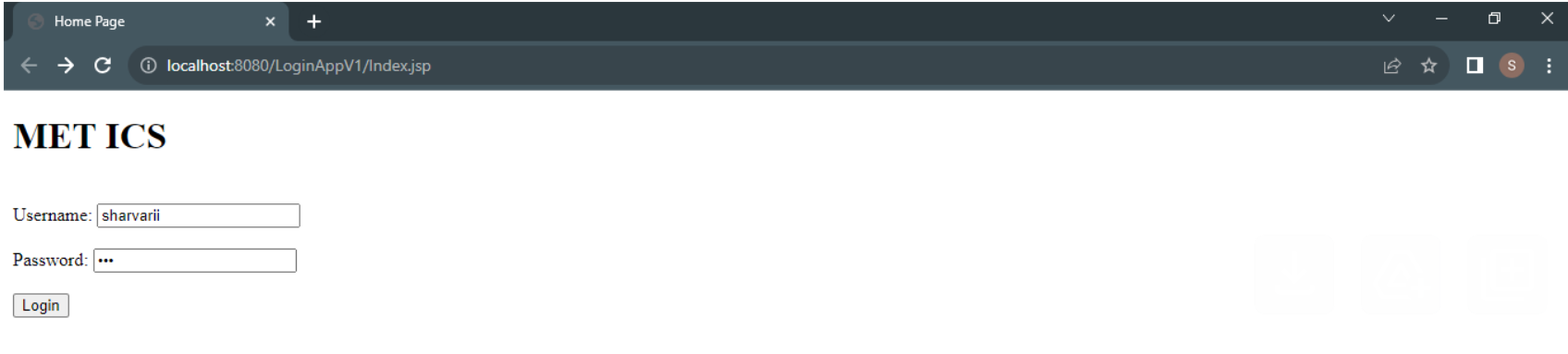
**Output:**

**(Correct Credentials)**





**(Incorrect Credentials)**





|  |  |
| --- | --- |
| **Program No:** | **18.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Database Connectivity using JSTL |
| **Objective :** | **JSP** |

**Source Code:**

**Queries:**

1. **create table Students (sid Integer, sname varchar(20), scity varchar(20),sage Integer);**
2. **insert into Students values(101,'Sharvari','Mumbai',20);**
3. **insert into Students values(102,'Ekta','Mumbai',21);**
4. **insert into Students values(103,'Pranit','Pune',22);**
5. **insert into Students values(104,'Aniket','Pune',23);**
6. **select \* from Students;**
7. **commit**

**ShowStudents.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**    **<%@ taglib uri ="http://java.sun.com/jsp/jstl/sql" prefix="sql" %>**  **<!-- taglib will be generated automatically , just add prefix -->**    **<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>**      **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Show Students</title>**  **</head>**  **<body>**  **<sql:setDataSource var="myDs" driver="org.postgresql.Driver"**  **url = "jdbc:postgresql://localhost:5432/postgres"**  **user="postgres" password="password" scope="application"></sql:setDataSource>**      **<sql:query var="rs" dataSource="${myDs}">**  **Select \* from Students**  **</sql:query>**  **<table border="1">**  **<tr>**  **<th>SID</th>**  **<th>SName</th>**  **<th>SCity</th>**  **<th>SAge</th>**  **</tr>**    **<c:forEach var="row" items="${rs.rows}">**  **<tr>**  **<td> <c:out value="${row.sid}"/> </td>**  **<td> <c:out value="${row.sname}"/> </td>**  **<td> <c:out value="${row.scity}"/> </td>**  **<td> <c:out value="${row.sage}"/> </td>**  **</tr>**  **</c:forEach>**    **</table>**  **</body>**  **</html>** |

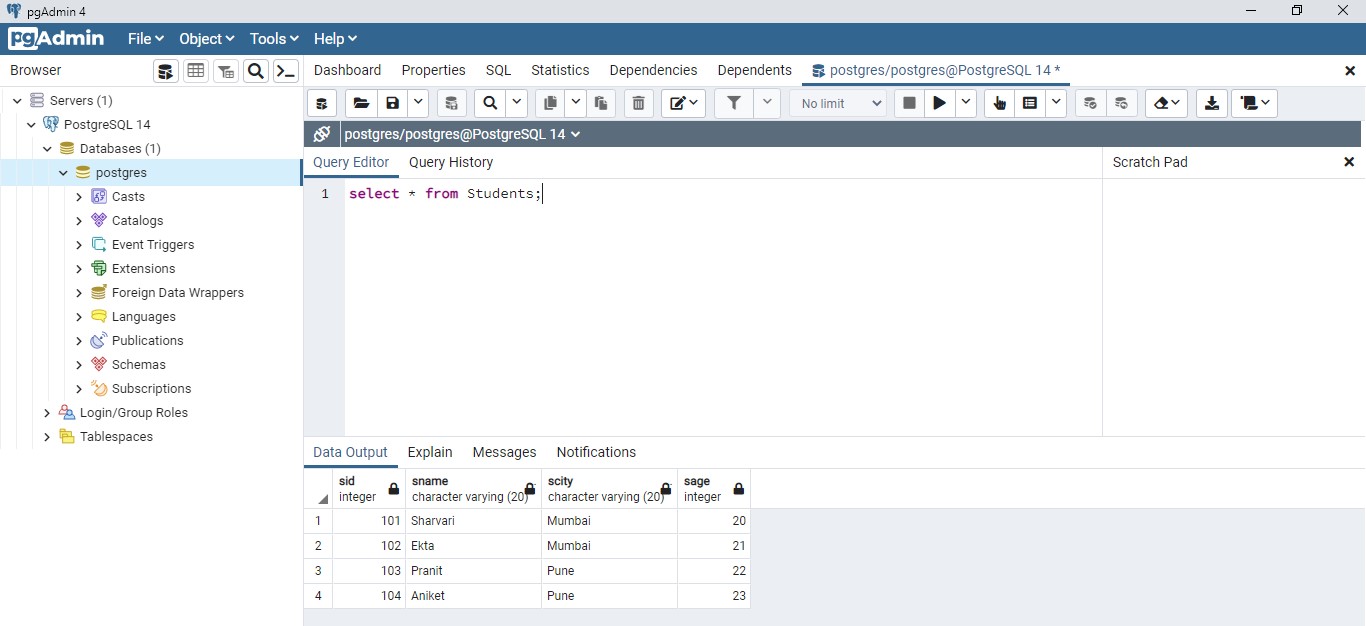
**InsertRecord.jsp:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Insert Record</title>**  **</head>**  **<body>**  **<form action="AddRecord.jsp">**  **Enter Id:<input type="text" name="txtId"> <br/>**  **Enter Name:<input type="text" name="txtName"> <br/>**  **Enter City:<input type="text" name="txtCity"> <br/>**  **Enter Age:<input type="text" name="txtAge"> <br/>**  **<input type="submit" name="submit" value="Add a Record">**  **</form>**  **</body>**  **</html>** |

**AddRecord.jsp:**

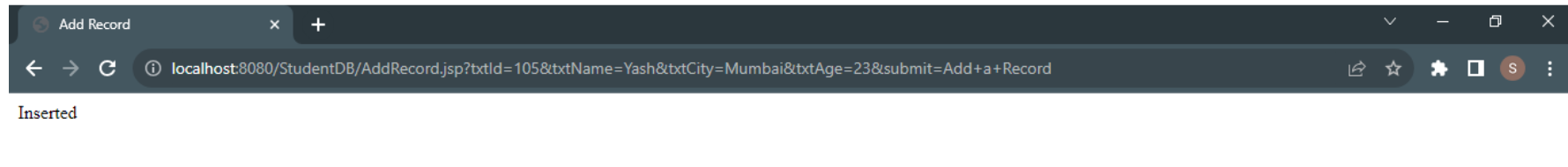
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42** | **<%@ page language="java" contentType="text/html; charset=ISO-8859-1"**  **pageEncoding="ISO-8859-1"%>**  **<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>**  **<%@ taglib uri="http://java.sun.com/jsp/jstl/sql" prefix="sql" %>**  **<%@ taglib uri="http://java.sun.com/jsp/jstl/fmt" prefix="fmt" %>**  **<!DOCTYPE html>**  **<html>**  **<head>**  **<meta charset="ISO-8859-1">**  **<title>Add Record</title>**  **</head>**  **<body>**  **<sql:setDataSource var="myDs"**  **driver="org.postgresql.Driver"**  **url="jdbc:postgresql://localhost:5432/postgres"**  **user="postgres"**  **password="password"**  **scope="application" />**  **<fmt:parseNumber var="id" value="${param.txtId}"></fmt:parseNumber>**  **<fmt:parseNumber var="age" value="${param.txtAge}"></fmt:parseNumber>**  **<sql:update var="rowCount" dataSource="${myDs}">**  **insert into Students values(?,?,?,?);**  **<sql:param value="${id}"></sql:param>**  **<sql:param value="${param.txtName}"></sql:param>**  **<sql:param value="${param.txtCity}"></sql:param>**  **<sql:param value="${age}"></sql:param>**  **</sql:update>**  **<c:if test="${rowCount>0 }">**  **<c:out value="Inserted"></c:out>**  **</c:if>**  **</body>**  **</html>** |

**Output:**









|  |  |
| --- | --- |
| **Program No:** | **19.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Mobile Application |
| **Objective :** | **Spring** |

**Source Code:**

**Mobile.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23** | **package edu.met;**  **public class Mobile {**  **String brand;**  **String model;**    **//Parameterized Constructor using fields**  **public Mobile(String brand, String model) {**  **super();**  **this.brand = brand;**  **this.model = model;**  **}**    **//toString method**  **@Override**  **public String toString() {**  **return "Mobile [brand=" + brand + ", model=" + model + "]";**  **}**        **}** |

**MobileStore.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22** | **package edu.met;**  **public class MobileStore {**  **int id;**  **Mobile m1;**  **double price;**    **//Parameterized Constructor using fields**  **public MobileStore(int id, Mobile m1, double price) {**  **super();**  **this.id = id;**  **this.m1 = m1;**  **this.price = price;**  **}**    **//toString method**  **@Override**  **public String toString() {**  **return "MobileStore [id=" + id + ", m1=" + m1 + ", price=" + price + "]";**  **}**    **}** |

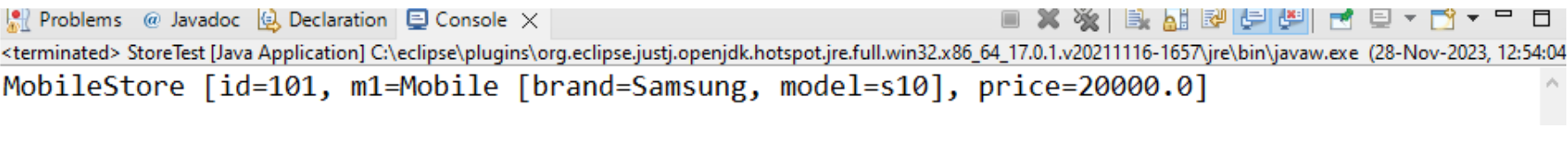
**AppCtx.xml:(Constructor Injection):**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans**  **xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:p="http://www.springframework.org/schema/p"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">**      **<bean id="mobile" class="edu.met.Mobile">**  **<constructor-arg index="0" value="Samsung"></constructor-arg>**  **<constructor-arg value="s10"></constructor-arg>**    **</bean>**    **<bean id="mobileS" class="edu.met.MobileStore">**  **<constructor-arg value="101">**  **</constructor-arg>**    **<constructor-arg>**  **<ref bean="mobile"/>**  **</constructor-arg>**    **<constructor-arg value="20000">**  **</constructor-arg>**    **</bean>**    **</beans>** |

**StoreTest.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class StoreTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **// TODO Auto-generated method stub**  **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**  **MobileStore m1 = (MobileStore)ctx.getBean("mobileS");**  **System.out.println(m1);**  **}**  **}** |

**Output:**



|  |  |
| --- | --- |
| **Program No:** | **20.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Singer Application |
| **Objective :** | **Spring** |

**Source Code:**

**Singer.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40** | **package edu.met;**  **public class Singer {**  **int id;**  **String name;**    **//Getters and Setters**  **public int getId() {**  **return id;**  **}**  **public void setId(int id) {**  **this.id = id;**  **}**  **public String getName() {**  **return name;**  **}**  **public void setName(String name) {**  **this.name = name;**  **}**    **//Constructor**  **public Singer(int id, String name) {**  **super();**  **this.id = id;**  **this.name = name;**  **}**  **public Singer() {**  **super();**  **// TODO Auto-generated constructor stub**  **}**    **//Override- To provide a more meaningful**  **//and human-readable representation of the object's state**  **@Override**  **public String toString() {**  **return "Singer{name=" + getName() + ", age=" + getId() + "}"; //**  **}**      **}** |

**AppCtx.xml(setter injection):**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans**  **xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:p="http://www.springframework.org/schema/p"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">**    **<bean id="SingerBean" class="edu.met.Singer" scope="prototype">**  **<property name="id" value="101"></property>**  **<property name="name" value="Sharvari"></property>**  **</bean>**  **</beans>** |

**SingerTest.java:**

**(1)**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class SingerTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **// TODO Auto-generated method stub**    **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**    **Singer s1=(Singer)ctx.getBean("SingerBean");**  **System.out.println("Id:"+s1.getId());**  **System.out.println("Name:"+s1.getName());**  **}**  **}** |

**SingerTest.java:**

**(2)**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class SingerTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **// TODO Auto-generated method stub**    **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**    **Singer s1=(Singer)ctx.getBean("SingerBean");**  **System.out.println("s1: "+s1);**    **Singer s2=(Singer)ctx.getBean("SingerBean");**  **System.out.println("s2: "+s2);**  **}**  **}** |

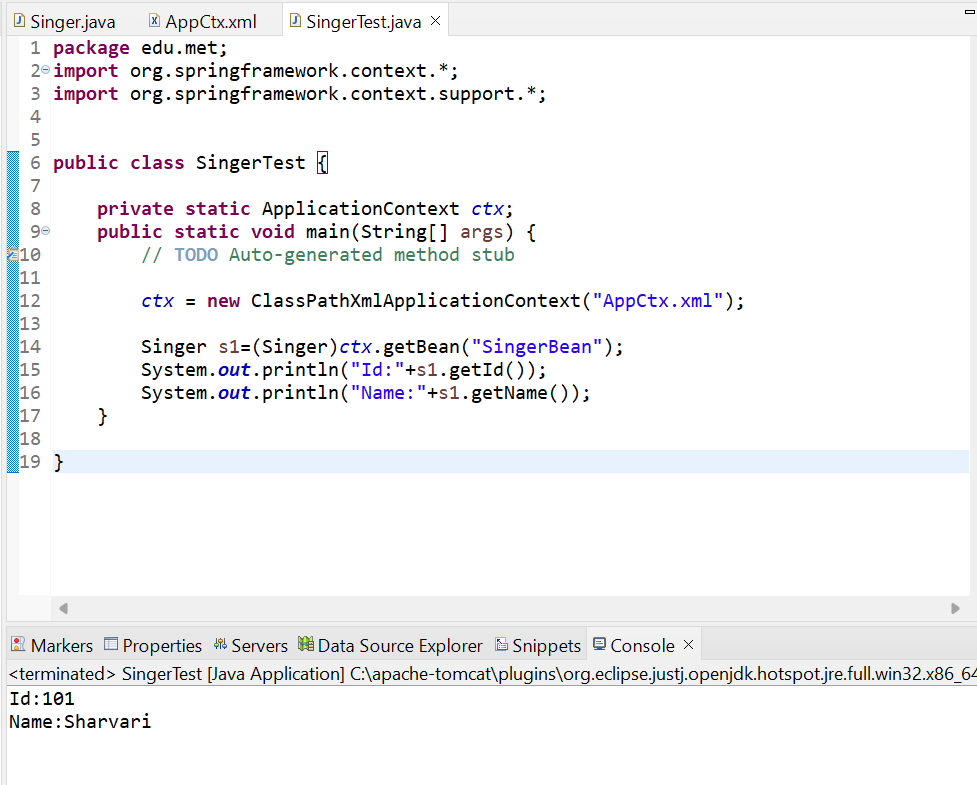
**SingerTest.java:**

**(3)**

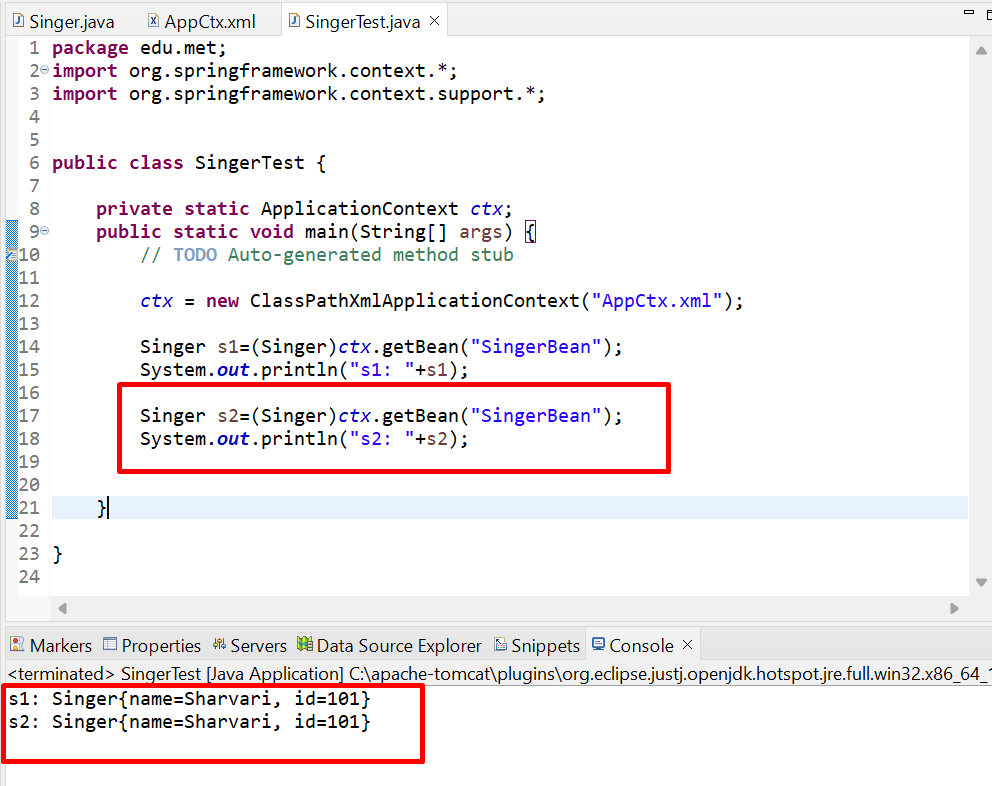
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class SingerTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **// TODO Auto-generated method stub**    **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**    **Singer s1=(Singer)ctx.getBean("SingerBean");**  **System.out.println("s1: "+s1);**      **Singer s2=(Singer)ctx.getBean("SingerBean");**  **s2.setId(102);**  **s2.setName("Birajdar");**    **System.out.println("s1: "+s1);**  **System.out.println("s2: "+s2);**  **}**  **}** |

**Output:**

**(1)**



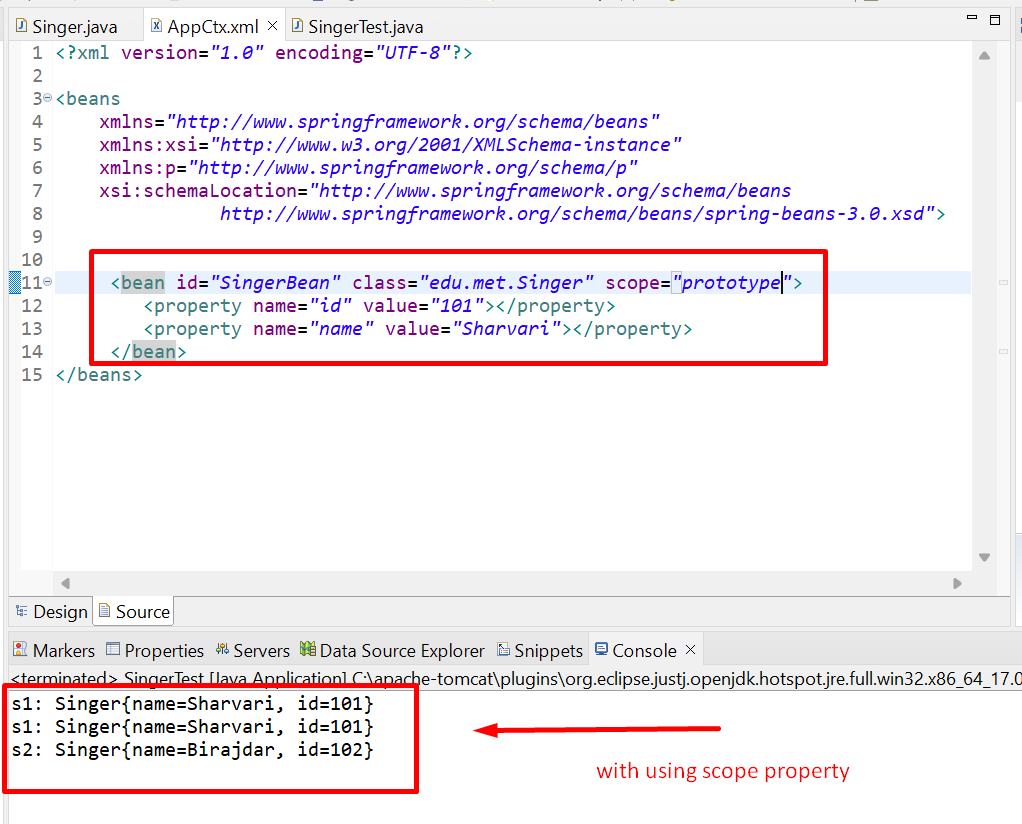
**(2)**



**(3)**



**(4)**



|  |  |
| --- | --- |
| **Program No:** | **21.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Employee Application |
| **Objective :** | **Spring** |

**Source Code:**

**Employee.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37** | **package edu.met;**  **public class Employee {**  **int id;**  **String name;**  **public Employee(int id, String name) {**  **super();**  **this.id = id;**  **this.name = name;**  **}**  **public Employee() {**  **super();**  **}**  **public int getId() {**  **return id;**  **}**  **public void setId(int id) {**  **this.id = id;**  **}**  **public String getName() {**  **return name;**  **}**  **public void setName(String name) {**  **this.name = name;**  **}**  **@Override**  **public String toString() {**  **return "Employee [id=" + id + ", name=" + name + "]";**  **}**  **}** |

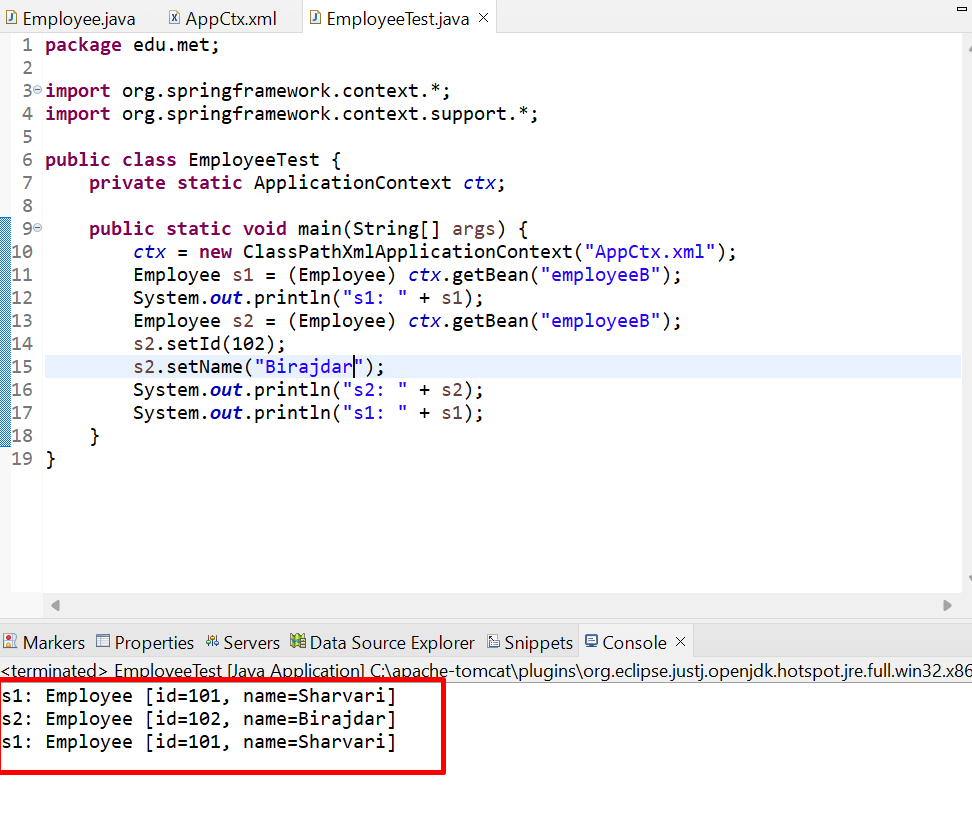
**AppCtx.xml:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:p="http://www.springframework.org/schema/p"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">**  **<bean id="employeeB" class="edu.met.Employee" scope="prototype">**  **<property name="id" value="101"></property>**  **<property name="name" value="Sharvari"></property>**  **</bean>**  **</beans>** |

**EmployeeTest.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class EmployeeTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**  **Employee s1 = (Employee) ctx.getBean("employeeB");**  **System.out.println("s1: " + s1);**  **Employee s2 = (Employee) ctx.getBean("employeeB");**  **s2.setId(102);**  **s2.setName("Birajdar");**  **System.out.println("s2: " + s2);**  **System.out.println("s1: " + s1);**  **}**  **}** |

**Output:**



|  |  |
| --- | --- |
| **Program No:** | **22.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Circular Dependency |
| **Objective :** | **Spring** |

**Source Code:**

**A.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10** | **package edu.met;**  **public class A {**  **B b1;**  **public A(B b1)**  **{**  **this.b1=b1;**  **System.out.println("This is class-A");**  **}**  **}** |

**B.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10** | **package edu.met;**  **public class B {**  **A a1;**  **public B(A a1)**  **{**  **this.a1=a1;**  **System.out.println("This is class-B");**  **}**  **}** |

**C.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12** | **package edu.met;**  **import org.springframework.context.annotation.Lazy;**  **public class C {**  **D d1;**  **public C(@Lazy D d1)**  **{**  **this.d1=d1;**  **System.out.println("This is class-C");**  **}**  **}** |

**D.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12** | **package edu.met;**  **import org.springframework.context.annotation.Lazy;**  **public class D {**  **C c1;**  **public D(@Lazy C c1)**  **{**  **this.c1=c1;**  **System.out.println("This is class-D");**  **}**  **}** |

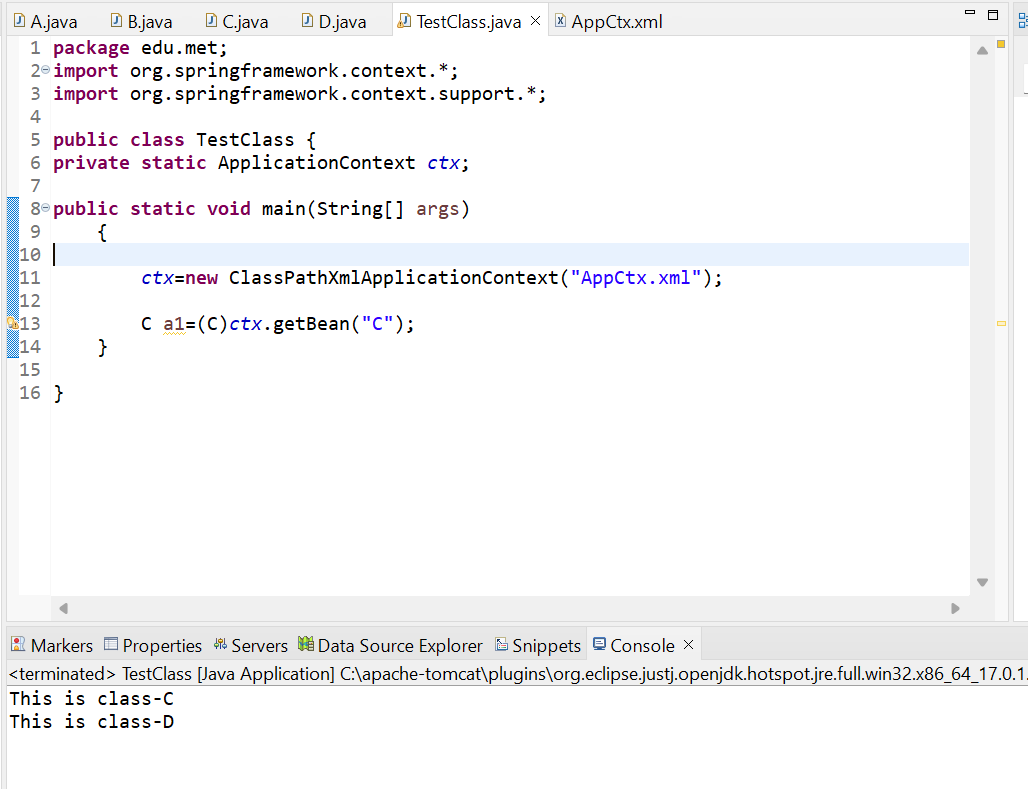
**AppCtx.xml:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:context="http://www.springframework.org/schema/context"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans-3.0.xsd**  **http://www.springframework.org/schema/context**  **http://www.springframework.org/schema/context/spring-context-3.0.xsd">**  **<bean id="C" class="edu.met.C">**  **</bean>**  **<bean id="D" class="edu.met.D">**  **</bean>**  **<context:annotation-config></context:annotation-config>**  **</beans>** |

**TestClass.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class TestClass {**  **private static ApplicationContext ctx;**    **public static void main(String[] args)**  **{**    **ctx=new ClassPathXmlApplicationContext("AppCtx.xml");**    **C a1=(C)ctx.getBean("C");**  **}**  **}** |

**Output:**



|  |  |
| --- | --- |
| **Program No:** | **23.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Spring AOP |
| **Objective :** | **Spring** |

**Source Code:**

**BankAccount.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68** | **package edu.met;**  **public class BankAccount {**  **int accNo;**  **String name;**  **double balance;**  **public BankAccount() {**  **super();**  **// TODO Auto-generated constructor stub**  **}**  **public BankAccount(int accNo, String name, double balance) {**  **super();**  **this.accNo = accNo;**  **this.name = name;**  **this.balance = balance;**  **}**  **public int getAccNo() {**  **return accNo;**  **}**  **public void setAccNo(int accNo) {**  **this.accNo = accNo;**  **}**  **public String getName() {**  **return name;**  **}**  **public void setName(String name) {**  **this.name = name;**  **}**  **public Double getBalance() {**  **return balance;**  **}**  **public void setBalance(Double balance) {**  **this.balance = balance;**  **}**  **public void credit(double amt)**  **{**  **this.balance+=amt;**  **System.out.println("Credited Succesfully");**  **}**  **public void debit(double amt)**  **{**    **if(balance-amt>0)**  **{**  **this.balance-=amt;**  **System.out.println("Debited Successfully");**  **}**  **else**  **{**  **//System.out.print("Insufficient Funds");**  **throw new RuntimeException();**  **}**    **}**  **@Override**  **public String toString() {**  **return "BankAccount [accNo=" + accNo + ", name=" + name + ", balance=" + balance + "]";**  **}**  **}** |

**AppCtx.xml:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:aop="http://www.springframework.org/schema/aop"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans.xsd**  **http://www.springframework.org/schema/aop**  **http://www.springframework.org/schema/aop/spring-aop.xsd">**  **<aop:aspectj-autoproxy />**  **<bean id="bankAcc" class="edu.met.BankAccount">**  **<property name="accNo" value="101" />**  **<property name="name" value="sharvari" />**  **<property name="balance" value="2000" />**    **</bean>**  **</beans>** |

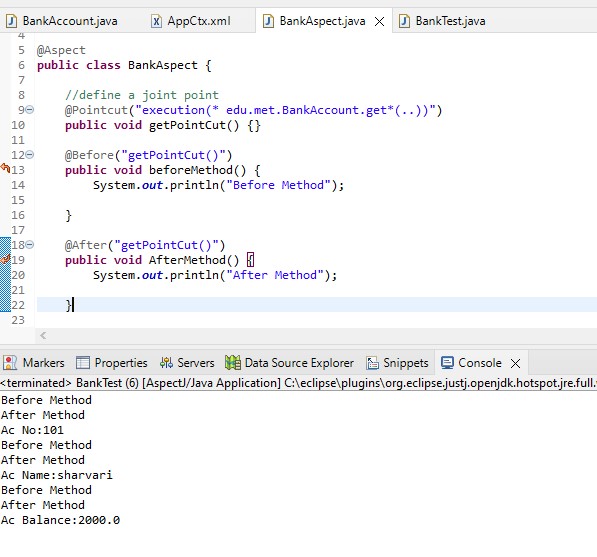
**BankAspect.java:**

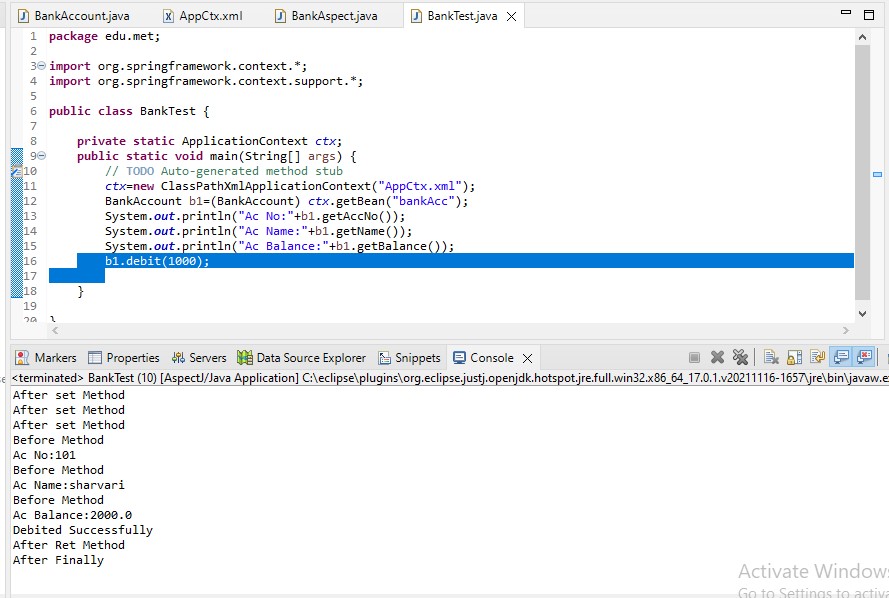
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47** | **package edu.met;**  **import org.aspectj.lang.annotation.\*;**  **@Aspect**  **public class BankAspect {**  **//define a joint point**  **@Pointcut("execution(\* edu.met.BankAccount.get\*(..))")**  **public void getPointCut() {}**      **@Before("getPointCut()")**  **public void beforeMethod() {**  **System.out.println("Before Method");**  **}**    **@After("execution (\* edu.met.BankAccount.set\*(..))")**  **public void AfterMethod() {**  **System.out.println("After set Method");**  **}**      **@Pointcut("execution(\* edu.met.BankAccount.debit\*(..))")**  **public void creditPt() {}**    **@AfterThrowing("creditPt()")**  **public void afterThrow()**  **{**  **System.out.println("Insufficient funds");**  **}**      **@AfterReturning("creditPt()")**  **public void afterRet()**  **{**  **System.out.println("After Ret Method");**  **}**    **@After("creditPt()")**  **public void after()**  **{**  **System.out.println("After Finally");**  **}**    **}** |

**BankTest.java:**

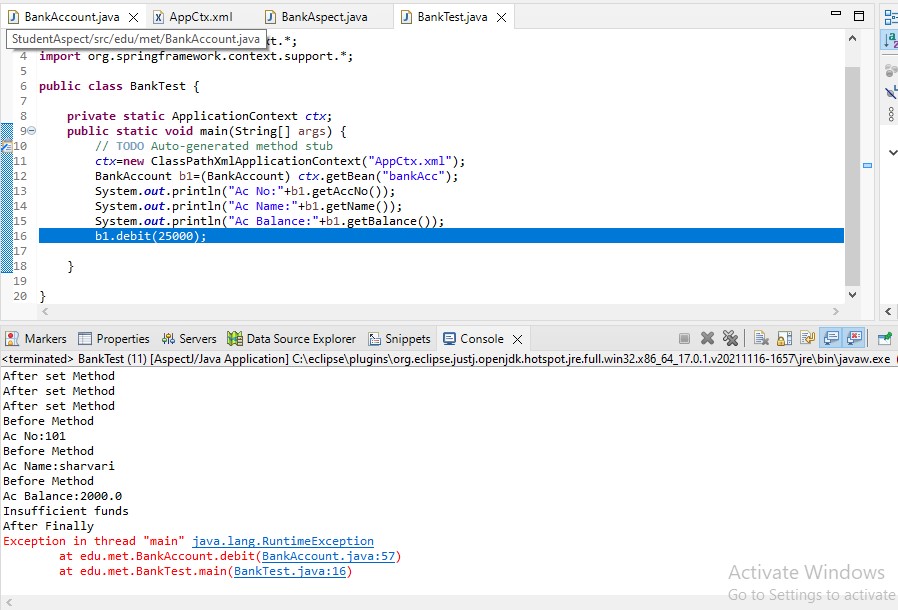
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20** | **package edu.met;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class BankTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args) {**  **// TODO Auto-generated method stub**  **ctx=new ClassPathXmlApplicationContext("AppCtx.xml");**  **BankAccount b1=(BankAccount) ctx.getBean("bankAcc");**  **System.out.println("Ac No:"+b1.getAccNo());**  **System.out.println("Ac Name:"+b1.getName());**  **System.out.println("Ac Balance:"+b1.getBalance());**  **b1.debit(25000);**    **}**  **}** |

**Output:**





**(With Exception)**



|  |  |
| --- | --- |
| **Program No:** | **24.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Spring JDBC (Insert ,Update, Delete) |
| **Objective :** | **Advanced Spring** |

**Source Code:**

**Queries:**

1. **create table movies23(mid integer,mname varchar, duration integer)**
2. **insert into movies23 values(101,'Tiger 3',165)**
3. **insert into movies23 values(102,'2 States',170)**
4. **insert into movies23 values(103,'Pathan',185)**
5. **select \* from movies23**
6. **alter table movies23 add primary key (mid)**

**Movie.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48** | **package edu.met;**  **public class Movie {**  **int mid;**  **String mname;**  **int duration;**    **//Super class**  **public Movie() {**  **super();**  **// TODO Auto-generated constructor stub**  **}**  **//Fields**  **public Movie(int mid, String mname, int duration) {**  **super();**  **this.mid = mid;**  **this.mname = mname;**  **this.duration = duration;**  **}**    **//Getters and Setters**  **public int getMid() {**  **return mid;**  **}**  **public void setMid(int mid) {**  **this.mid = mid;**  **}**  **public String getMname() {**  **return mname;**  **}**  **public void setMname(String mname) {**  **this.mname = mname;**  **}**  **public int getDuration() {**  **return duration;**  **}**  **public void setDuration(int duration) {**  **this.duration = duration;**  **}**      **}** |

**MovieDao.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28** | **package edu.met;**  **import org.springframework.jdbc.core.\*;**  **import java.util.\*;**  **public class MovieDao {**  **JdbcTemplate jdbcT;**  **public MovieDao(JdbcTemplate jdbcT) {**  **super();**  **this.jdbcT = jdbcT;**  **}**    **//insert into movies23 values()**  **public int saveMovie(Movie m1)**  **{**  **String insQ = "insert into movies23 values("+m1.getMid()+",'"+m1.getMname()+"',"+m1.getDuration()+")";**  **return jdbcT.update(insQ);**  **}**    **public List<Movie> getAll()**  **{**  **String selQ = "Select \* from movies23";**  **return jdbcT.query(selQ,new MovieRowMapper());**  **}**    **}** |

**AppCtx.xml:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34** | **<?xml version="1.0" encoding="UTF-8"?>**  **<beans**  **xmlns="http://www.springframework.org/schema/beans"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xmlns:p="http://www.springframework.org/schema/p"**  **xsi:schemaLocation="http://www.springframework.org/schema/beans**  **http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">**    **<bean id="dataSource" class="org.springframework.jdbc.datasource.DriverManagerDataSource">**  **<property name="driverClassName" value="org.postgresql.Driver" />**  **<property name="url" value="jdbc:postgresql://Localhost:5432/postgres" />**  **<property name="username" value="postgres" />**  **<property name="password" value="password" />**  **</bean>**    **<bean id="jdbcT" class="org.springframework.jdbc.core.JdbcTemplate">**  **<property name="dataSource" ref="dataSource"/>**  **</bean>**      **<bean id="movieD" class="edu.met.MovieDao">**  **<constructor-arg>**  **<ref bean="jdbcT"/>**  **</constructor-arg>**  **</bean>**    **<bean id="movie" class="edu.met.Movie">**  **<property name="mid" value="104"/>**  **<property name="mname" value="Krish 3"/>**  **<property name="duration" value="190"/>**  **</bean>**    **</beans>** |

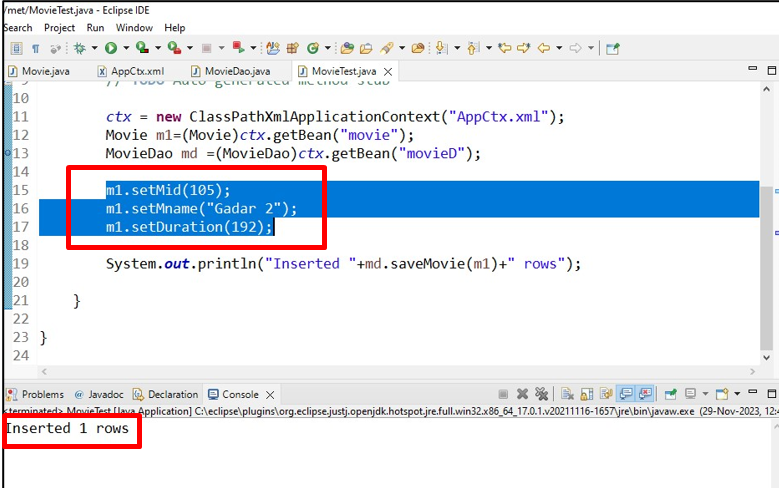
**MovieTest.java:**

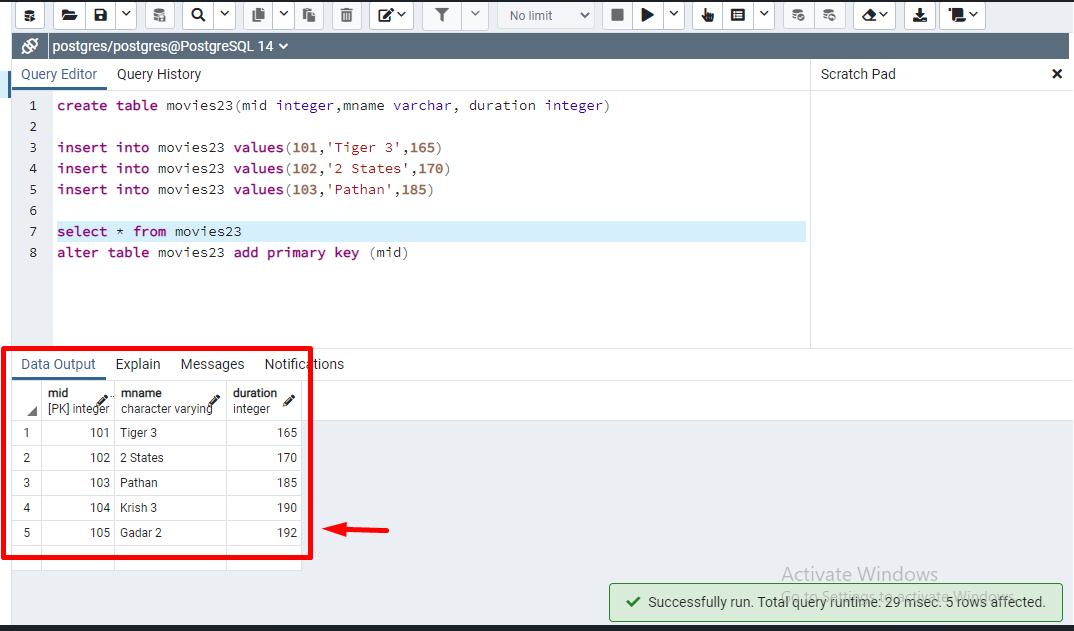
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31** | **package edu.met;**  **import java.util.\*;**  **import org.springframework.context.\*;**  **import org.springframework.context.support.\*;**  **public class MovieTest {**  **private static ApplicationContext ctx;**  **public static void main(String[] args)**  **{**  **// TODO Auto-generated method stub**  **ctx = new ClassPathXmlApplicationContext("AppCtx.xml");**  **Movie m1=(Movie)ctx.getBean("movie");**  **MovieDao md =(MovieDao)ctx.getBean("movieD");**    **m1.setMid(105);**  **m1.setMname("Gadar 2");**  **m1.setDuration(192);**    **//System.out.println("Inserted "+md.saveMovie(m1)+" rows");**    **List<Movie> mov = md.getAll();**  **for(Movie m : mov)**  **{**  **System.out.println(m.getMid()+"\t"+m.getMname()+"\t"+m.getDuration());**  **}**    **}**  **}** |

**MovieRowMapper.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21** | **package edu.met;**  **import java.sql.\*;**  **import org.springframework.jdbc.core.\*;**  **public class MovieRowMapper implements RowMapper<Movie>**  **{**  **@Override**  **public Movie mapRow(ResultSet arg0, int arg1) throws SQLException**  **{**  **// TODO Auto-generated method**  **Movie m1 = new Movie();**  **m1.setMid(arg0.getInt(1));**  **m1.setMname(arg0.getString(2));**  **m1.setDuration(arg0.getInt(3));**  **return m1;**  **}**      **}** |

**Output:**





|  |  |
| --- | --- |
| **Program No:** | **25.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Spring Boot Application |
| **Objective :** | **Advanced Spring** |

**Source Code:**

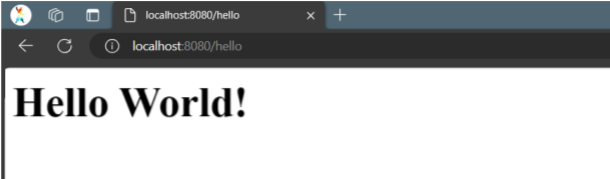
**Controller.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18** | **package com.example.demo;**  **import org.springframework.web.bind.annotation.GetMapping;**  **import org.springframework.web.bind.annotation.RequestMapping;**  **import org.springframework.web.bind.annotation.RestController;**  **@RestController**  **@RequestMapping("/")**  **public class Controller**  **{**  **@GetMapping("/hello")**  **public String sayHello()**  **{**  **return "<h1>Hello World!</h1>";**  **}**  **}** |

**SpringBootDemoApplication.java:**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13** | **package com.example.demo;**  **import org.springframework.boot.SpringApplication;**  **import org.springframework.boot.autoconfigure.SpringBootApplication;**  **@SpringBootApplication**  **public class SpringBootDemoApplication**  **{**  **public static void main(String[] args)**  **{**  **SpringApplication.run(SpringBootDemoApplication.class, args);**  **}**  **}** |

**Output:**



|  |  |
| --- | --- |
| **Program No:** | **26.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Spring Boot using JDBC |
| **Objective :** | **Advanced Spring** |

**Source Code:**

**Queries:**

1. **create table Products23(pid integer, pname varchar, pdesc varchar, pqty integer);**
2. **alter table Products23 add primary key (pid);**
3. **insert into Products23 values(1,'Monitor', 'Used as a display', 20);**
4. **insert into Products23 values(2,'Mouse', 'Used for pointing', 30);**
5. **insert into Products23 values(3,'Keyboard', 'Used for typing', 40);**
6. **select \* from Products23;**

**pom.xml :**

(Project Object Model which is responsible for downloading all dependencies)

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58**  **59**  **60**  **61**  **62**  **63**  **64**  **65**  **66**  **67**  **68**  **69**  **70**  **71** | **<?xml version="1.0" encoding="UTF-8"?>**  **<project xmlns="http://maven.apache.org/POM/4.0.0"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">**  **<modelVersion>4.0.0</modelVersion>**  **<parent>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-parent</artifactId>**  **<version>3.2.0</version>**  **<relativePath /> <!-- lookup parent from repository -->**  **</parent>**  **<groupId>com.example</groupId>**  **<artifactId>ProductServiceApp</artifactId>**  **<version>0.0.1-SNAPSHOT</version>**  **<name>ProductServiceApp</name>**  **<description>Demo project for Spring Boot</description>**  **<properties>**  **<java.version>17</java.version>**  **</properties>**  **<dependencies>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-actuator</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-data-jdbc</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-data-rest</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-web</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.data</groupId>**  **<artifactId>spring-data-rest-hal-explorer</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-devtools</artifactId>**  **<scope>runtime</scope>**  **<optional>true</optional>**  **</dependency>**  **<dependency>**  **<groupId>com.h2database</groupId>**  **<artifactId>h2</artifactId>**  **<scope>runtime</scope>**  **</dependency>**  **<dependency>**  **<groupId>org.postgresql</groupId>**  **<artifactId>postgresql</artifactId>**  **<scope>runtime</scope>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-test</artifactId>**  **<scope>test</scope>**  **</dependency>**  **</dependencies>**  **<build>**  **<plugins>**  **<plugin>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-maven-plugin</artifactId>**  **</plugin>**  **</plugins>**  **</build>**  **</project>** |

**application.properties**

|  |  |
| --- | --- |
| **1**  **2**  **3** | **spring.datasource.url = jdbc:postgresql://localhost:5432/postgres**  **spring.datasource.username = postgres**  **spring.datasource.password = password** |

**Product.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42** | **package com.example.demo;**  **public class Product {**  **int pid;**  **String pname;**  **String pdesc;**  **int pqty;**  **public Product() {**  **super();**  **// TODO Auto-generated constructor stub**  **}**  **public Product(int pid, String pname, String pdesc, int pqty) {**  **super();**  **this.pid = pid;**  **this.pname = pname;**  **this.pdesc = pdesc;**  **this.pqty = pqty;**  **}**  **public int getPid() {**  **return pid;**  **}**  **public void setPid(int pid) {**  **this.pid = pid;**  **}**  **public String getPname() {**  **return pname;**  **}**  **public void setPname(String pname) {**  **this.pname = pname;**  **}**  **public String getPdesc() {**  **return pdesc;**  **}**  **public void setPdesc(String pdesc) {**  **this.pdesc = pdesc;**  **}**  **public int getPqty() {**  **return pqty;**  **}**  **public void setPqty(int pqty) {**  **this.pqty = pqty;**  **}**  **}** |

**GreetingController.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17** | **package com.example.demo;**  **import org.springframework.web.bind.annotation.\*;**  **@RestController**  **public class GreetingController {**  **@GetMapping("/")**  **public String getWelcome()**  **{**  **return "<HTML><BODY><H1>Welcome to**  **MET</H1></BODY></HTML>";**  **}**  **@GetMapping("/welcome")**  **public String getWelcome2()**  **{**  **return "<HTML><BODY><H1>Welcome to MET!**  **Everyone</H1></BODY></HTML>";**  **}**  **}** |

**ProductController.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30** | **package com.example.demo;**  **import java.util.\*;**  **import org.springframework.beans.factory.annotation.Autowired;**  **import org.springframework.web.bind.annotation.GetMapping;**  **import org.springframework.web.bind.annotation.PathVariable;**  **import org.springframework.web.bind.annotation.RequestMapping;**  **import org.springframework.web.bind.annotation.RequestMethod;**  **import org.springframework.web.bind.annotation.RestController;**  **@RestController**  **public class ProductController**  **{**  **@Autowired**  **ProductRepo repo;**  **@GetMapping("/product")**  **public List<Product> getProducts()**  **{**  **return repo.getAll();**  **}**  **@RequestMapping(value="/product/{pid}",method=RequestMethod.DELETE)**  **public String deleteP(@PathVariable("pid") String pid)**  **{**  **repo.deleteProduct(pid);**  **return "<html><body>Object Deleted</body></html>";**  **}**  **}** |

**ProductRepo.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23** | **package com.example.demo;**  **import org.springframework.beans.factory.annotation.Autowired;**  **import org.springframework.jdbc.core.JdbcTemplate;**  **import org.springframework.stereotype.\*;**  **import java.util.\*;**  **@Repository**  **public class ProductRepo**  **{**  **@Autowired**  **JdbcTemplate jdbcT;**  **public List<Product> getAll()**  **{**  **String selQ = "SELECT \* FROM Products23";**  **return jdbcT.query(selQ, new ProductRowMapper());**  **}**  **public int deleteProduct(String pid)**  **{**  **String delQ = "DELETE FROM Products23 where pid=?";**  **return jdbcT.update(delQ,Integer.parseInt(pid));**  **}**  **}** |

**ProductRowMapper.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21** | **package com.example.demo;**  **import java.sql.ResultSet;**  **import java.sql.SQLException;**  **import org.springframework.jdbc.core.RowMapper;**  **public class ProductRowMapper implements RowMapper<Product>**  **{**  **@Override**  **public Product mapRow(ResultSet rs, int rowNum) throws SQLException**  **{**  **// TODO Auto-generated method stub**  **Product p1 = new Product();**  **p1.setPid(rs.getInt(1));**  **p1.setPname(rs.getString(2));**  **p1.setPdesc(rs.getString(3));**  **p1.setPqty(rs.getInt(4));**  **return p1;**  **}**  **}** |

**ProductServiceAppApplication.java**

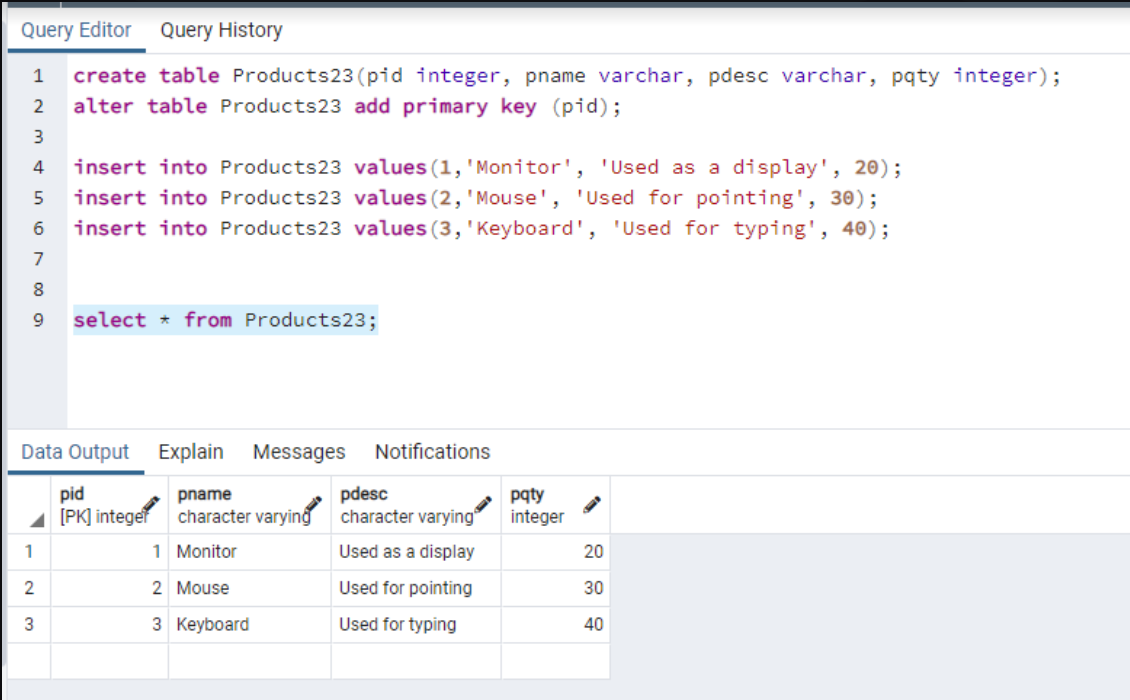
|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13** | **package com.example.demo;**  **import org.springframework.boot.SpringApplication;**  **import org.springframework.boot.autoconfigure.SpringBootApplication;**  **@SpringBootApplication**  **public class ProductServiceAppApplication {**  **public static void main(String[] args)**  **{**  **SpringApplication.run(ProductServiceAppApplication.class, args);**  **}**  **}** |

**Output:**

**Go to browser and type ->** [**http://localhost:8080/**](http://localhost:8080/)

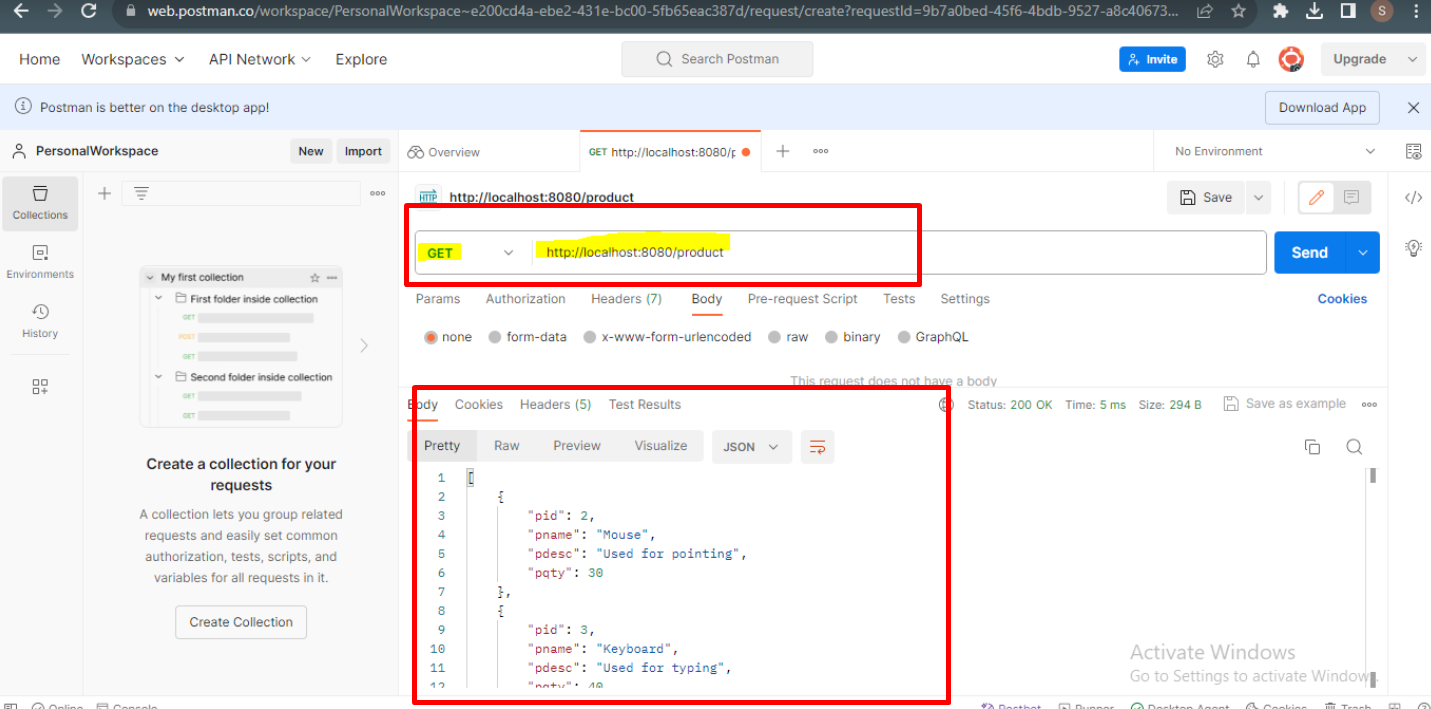


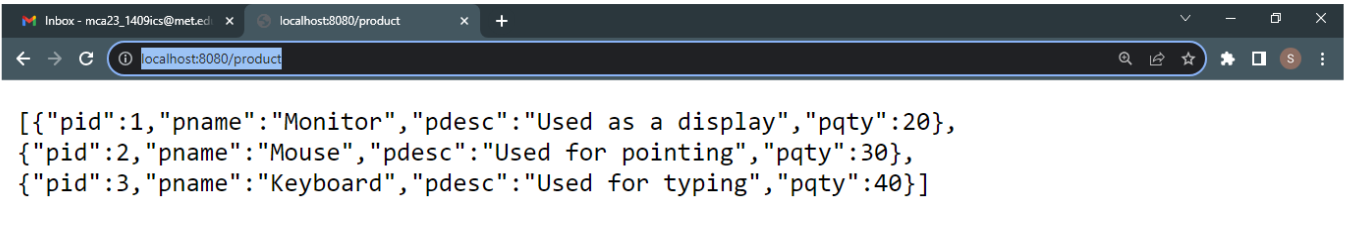
**Database View:**



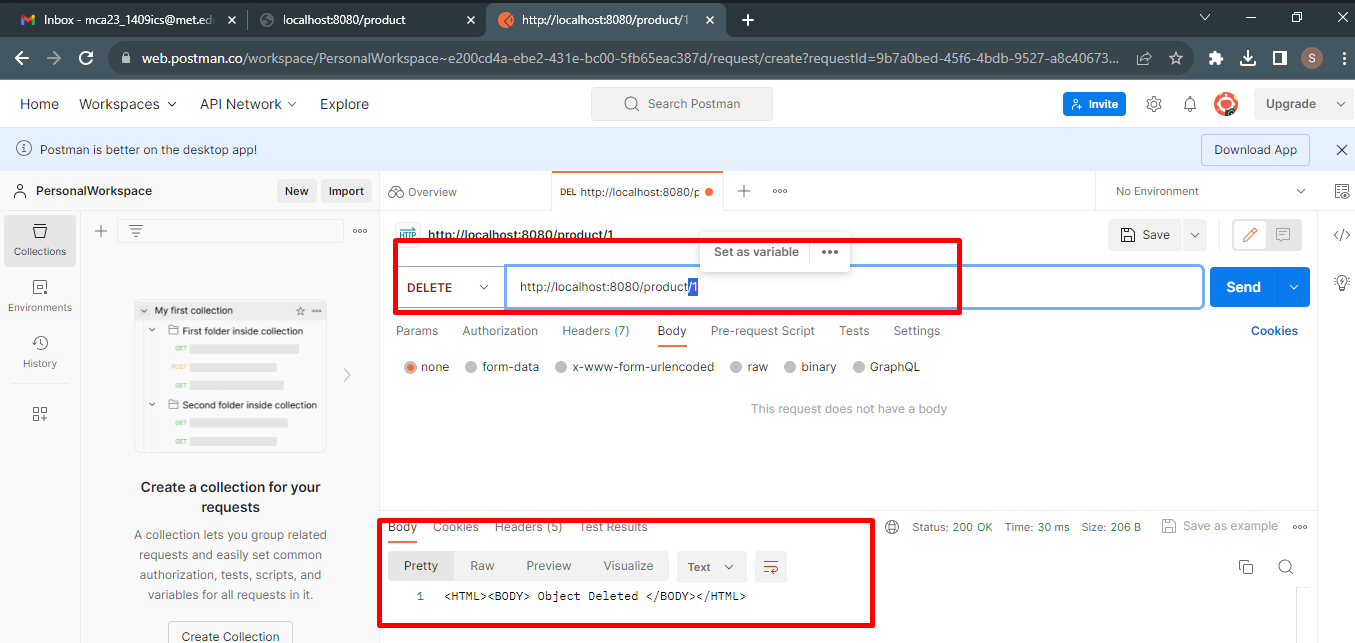
**Go to postman to test API ->** [**https://www.postman.com/**](https://www.postman.com/)

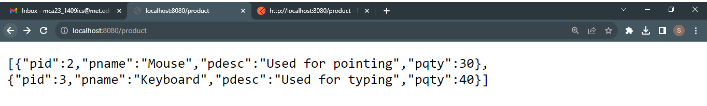
**GET -> ADD URL ->** [**http://localhost:8080/product**](http://localhost:8080/product)

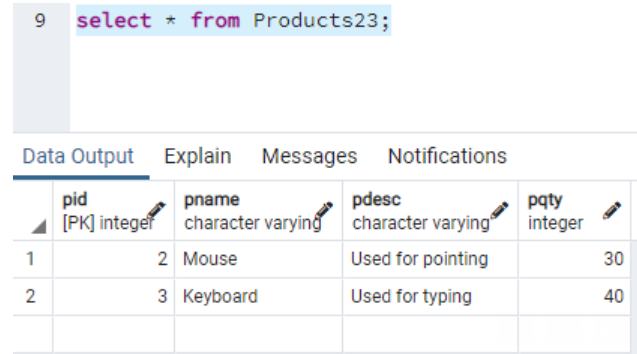




**DELETE -> ADD URL ->**[**http://localhost:8080/product/1**](http://localhost:8080/product/1)







|  |  |
| --- | --- |
| **Program No:** | **27.** |
| **Roll No :** | **1409** |
| **Title of Program :** | Spring Boot MVC |
| **Objective :** | **Advanced Spring** |

**Source Code:**

**User.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50** | **package com.example.demo;**  **public class User**  **{**  **int id;**  **String name;**  **String email;**  **public User(int id, String name, String email)**  **{**  **super();**  **this.id = id;**  **this.name = name;**  **this.email = email;**  **}**  **public User()**  **{**  **super();**  **// TODO Auto-generated constructor stub**  **}**  **public int getId()**  **{**  **return id;**  **}**  **public void setId(int id)**  **{**  **this.id = id;**  **}**  **public String getName()**  **{**  **return name;**  **}**  **public void setName(String name)**  **{**  **this.name = name;**  **}**  **public String getEmail()**  **{**  **return email;**  **}**  **public void setEmail(String email)**  **{**  **this.email = email;**  **}**  **}** |

**home.jsp**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7** | **<! DOCTYPE html>**  **<%@ page language="java" %>**  **<html>**  **<body>**  **<h1>This is home page</h1>**  **</body>**  **</html>** |

**application.properties**

|  |  |
| --- | --- |
| **1**  **2** | **spring.mvc.view.prefix=/WEB-INF/jsp/**  **spring.mvc.view.suffix=.jsp** |

**HomeController.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11** | **package com.example.demo;**  **import org.springframework.stereotype.Controller;**  **import org.springframework.web.bind.annotation.\*;**  **@Controller**  **public class HomeController**  **{**  **@RequestMapping(value="/", method=RequestMethod.GET)**  **public String getRoute()**  **{**  **return "home";**  **}**  **}** |

**pom.xml**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26**  **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37**  **38**  **39**  **40**  **41**  **42**  **43**  **44**  **45**  **46**  **47**  **48**  **49**  **50**  **51**  **52**  **53**  **54**  **55**  **56**  **57** | **<?xml version="1.0" encoding="UTF-8"?>**  **<project xmlns="http://maven.apache.org/POM/4.0.0"**  **xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"**  **xsi:schemaLocation="http://maven.apache.org/POM/4.0.0**  **https://maven.apache.org/xsd/maven-4.0.0.xsd">**  **<modelVersion>4.0.0</modelVersion>**  **<parent>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-parent</artifactId>**  **<version>3.2.0</version>**  **<relativePath /> <!-- lookup parent from repository -->**  **</parent>**  **<groupId>com.example</groupId>**  **<artifactId>UserMVCApp</artifactId>**  **<version>0.0.1-SNAPSHOT</version>**  **<name>UserMVCApp</name>**  **<description>Demo project for Spring Boot</description>**  **<properties>**  **<java.version>17</java.version>**  **</properties>**  **<dependencies>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-actuator</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-web</artifactId>**  **</dependency>**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-devtools</artifactId>**  **<scope>runtime</scope>**  **<optional>true</optional>**  **</dependency>**  **MUMBAI EDUCATIONAL TRUST**  **MET Institute of Computer Science**  **95 |**  **<dependency>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-starter-test</artifactId>**  **<scope>test</scope>**  **</dependency>**  **<dependency>**  **<groupId>org.apache.tomcat.embed</groupId>**  **<artifactId>tomcat-embed-jasper</artifactId>**  **</dependency>**  **</dependencies>**  **<build>**  **<plugins>**  **<plugin>**  **<groupId>org.springframework.boot</groupId>**  **<artifactId>spring-boot-maven-plugin</artifactId>**  **</plugin>**  **</plugins>**  **</build>**  **</project>** |

**UserMVCApplication.java**

|  |  |
| --- | --- |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **9**  **10**  **11**  **12**  **13** | **package com.example.demo;**  **import org.springframework.boot.SpringApplication;**  **import org.springframework.boot.autoconfigure.SpringBootApplication;**  **@SpringBootApplication**  **public class UserMvcAppApplication**  **{**  **public static void main(String[] args)**  **{**  **SpringApplication.run(UserMvcAppApplication.class, args);**  **}**  **}** |

**Output:**

