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**Introduction to List Operations in R Programming**

R programming is a languages which is specifically used for statistical analysis, graph representations and reporting .A R studio software is used to perform R programming commands .A R language provides a multiple facilities to work on data. R provides List concept to us for gathering data together in single field and performing operations on data. A list a kind of data structure used in R. List is a collection of heterogeneous elements which means a list can contains different types of data, types of data is nothing but data types in programming like integer, float, character, string etc. A list can contains the number of vectors, list with in list and matrices. R provides the different operations of list that performed on list data for illustrating then data in different forms. An operations of list is as below:

* Create a list
* Assign name to the list
* Merge the two or more lists
* Convert list into vector
* Display list elements

**Experiments:**

**1. Create four vector to maintain product information like product name, quantity, price and discount. Create product details list by combining all vectors.**

1. **Vector: -** A vector is a basic data structure used in R programming. A vector stores the same type of element, the types of element is may be an integer, float, string or character. A vector concept is same as “Array” concept in procedural programming language and object oriented programming language. For creating a vector in R, R provides **c() function** for this.
2. **List: -** A list is a basic data structure used in R programming. A list is a collection of different data type elements , the types of element is may be an integer , float , string or character.For creating a list in R , R provides list()function followed by list elements/ vectors.
3. Combine all vectors in list using list() function followed by the vectors name separated by commas.
4. **Print() :-**  A print() function provided by R is used to print the data/elements on R.

**Introduction:**

The purpose of this experiment is to understand the concept of vector and list in R. And create a number of vectors after successfully creating of vectors then combine this vectors in list.

**Procedure:-**

1. Open R studio take a new script.
2. Write rm(list=ls()) command on script to clear workspace.
3. Create four vectors with name Product name, Price, Quantity and Discount.
4. Create a list with name myList which contains all vectors as a list elements.
5. Print the myList list.
6. Run all commands by pressing ctrl+enter .
7. Save the script R\_code with extension .r on desired location like R\_code.r

**Code & Result:-**

**Open R studio take a new script.**

#1.open R studio and take new script

#2. Write rm(list=ls()) command in script for clearing all workspace.

rm(list=ls())

#3.1 create a first vector as Product\_name which contains name of products

Product\_Name<-c("soap","shampoo","conditionar","notebook","book","blackboard","laptop","rice","sugar","wheat")

#3.2 create a first vector as Quantity which quantities of product in numeric form of data.

Quantity<-c(10,20,30,40,50,60,70,80,90,100)

#3.3 create a third vector as Price which contains price of products in numeric form.

Price<-c(20,2,5,30,180,250,1000,100,70,40)

#3.4 create fourth vector as Discount which contains discount offered on product.

Discount<-c(10,5,2,13,15,45,30,60,50,20)

**Create a list with name myList which contains all vectors as a list elements.**

#4 create a list with name myList and pass argument to the list as vectors created previously to list() function**.**

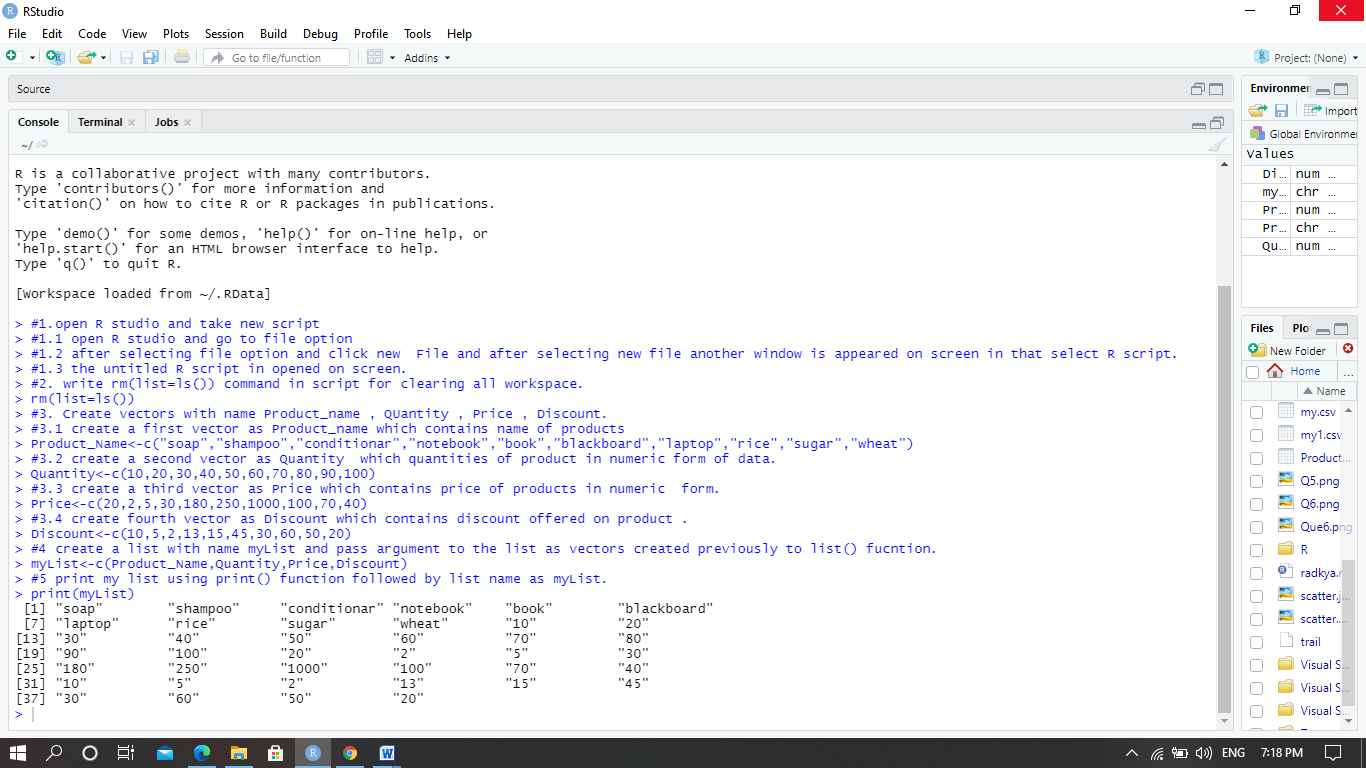
myList<-c(Product\_Name,Quantity,Price,Discount)

**Print the myList list.**

#5 print my list using print() function followed by list name as myList.

print (myList)

**Output –**



**Conclusion –**

We created a vectors in R and combine those vectors in list and print the data of list. The list can contains different types of data whereas vectors contains same type of data.

2. **Provide name to the list elements.**

**Assign names to the list elements?**

1. **names() function :-** A names() concept is used to assign names to the list elements in R.
2. **Data Frame :-** A data frame two dimensional structure of data used in R. It is a special case of list which contains equal length of components. It takes components from column and contents from rows. We can create a data data frame suing **data.frame()** function provided by R.

**Introduction:**

The purpose of this experiment is to understand the concept of names() function which is used to naming the list elements and data.frame() to create the data frame.

**Procedure:-**

1. Open R studio open R\_code.r script
2. Create data frame with name myframe .
3. Assign this data frame to list .
4. Use names() function to assign names to list element.
5. Print the myList list.
6. Run all commands by pressing ctrl+enter .
7. Save the script save option from file.

**Code and Result:-**

**Open R studio take a new script.**

#1.open R studio to open a script

#2.Take a variable myframe and create data frame using data.frame() fucntion followed by vectors name Product\_name, Quantity,Price,Discount

myframe<-data.frame(Product\_Name,Quantity,Price,Discount)

**Assign this data frame to list .**

#3.Assign myframe data frame to myList

myList<-myframe

**Use names() function to assign names to list element.**

#4. Assign names to list elements using names() fucntion followed by list name as myList and assign names as per need in vector in double quotes.

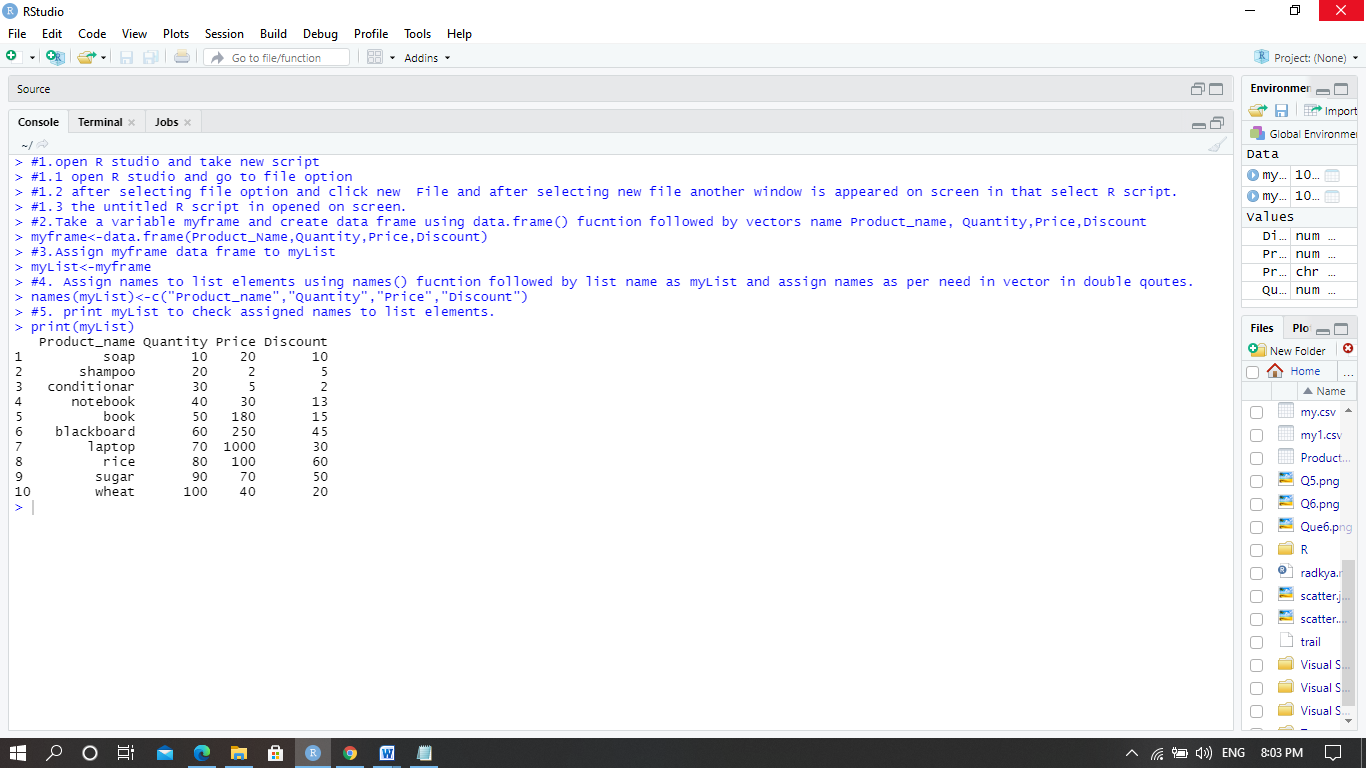
names (myList)<-c("Product\_name","Quantity","Price","Discount")

**Print the myList list.**

#5 print my list using print() function followed by list name as myList.

print(myList)

**Output –**



**Conclusion –**

We combine number of vectors in R using data.frame() function which contains vectors and it will displays the data in columns and rows formats. We assign the names to the list elements using the names() function provided by the R.

3. **Display product name and discount.**

**Access the elements of list:**

1. Accessing an list elements we can use the **$** symbol preceding list name and followed by with element name.

**Syntax of accessing list elements :**

List\_name$Element\_name

Here $ symbol is must used to access the elements of list preceding with list name and followed by element name .

**Note :** In cases of accessing number of elements use comma to separate those elements .

**Introduction:**

The purpose of this experiment is to understand the concept of accessing the elements of list using their $ symbol. And display elements from list.

**Procedure:-**

1. Open R studio open a R\_code.r srcipt .
2. Create data frame as show\_data which contains the vectors Product\_name and Discount.
3. Print show\_data using print() function.
4. Run all commands by pressing ctrl+enter .
5. Save the script with save option .

**Code and Result:-**

**Open R studio take a new script.**

#1.open R studio to open a script

#1.1 open R studio and go to file option

#1.2 after selecting file option and click open script and after selecting open script option another window is appeared on screen in that you have to select script from source and click to open button.

#1.3 the R\_code.r R script in opened on screen.

**Create data frame as show\_data which contains the vectors Product\_name and Discount.**

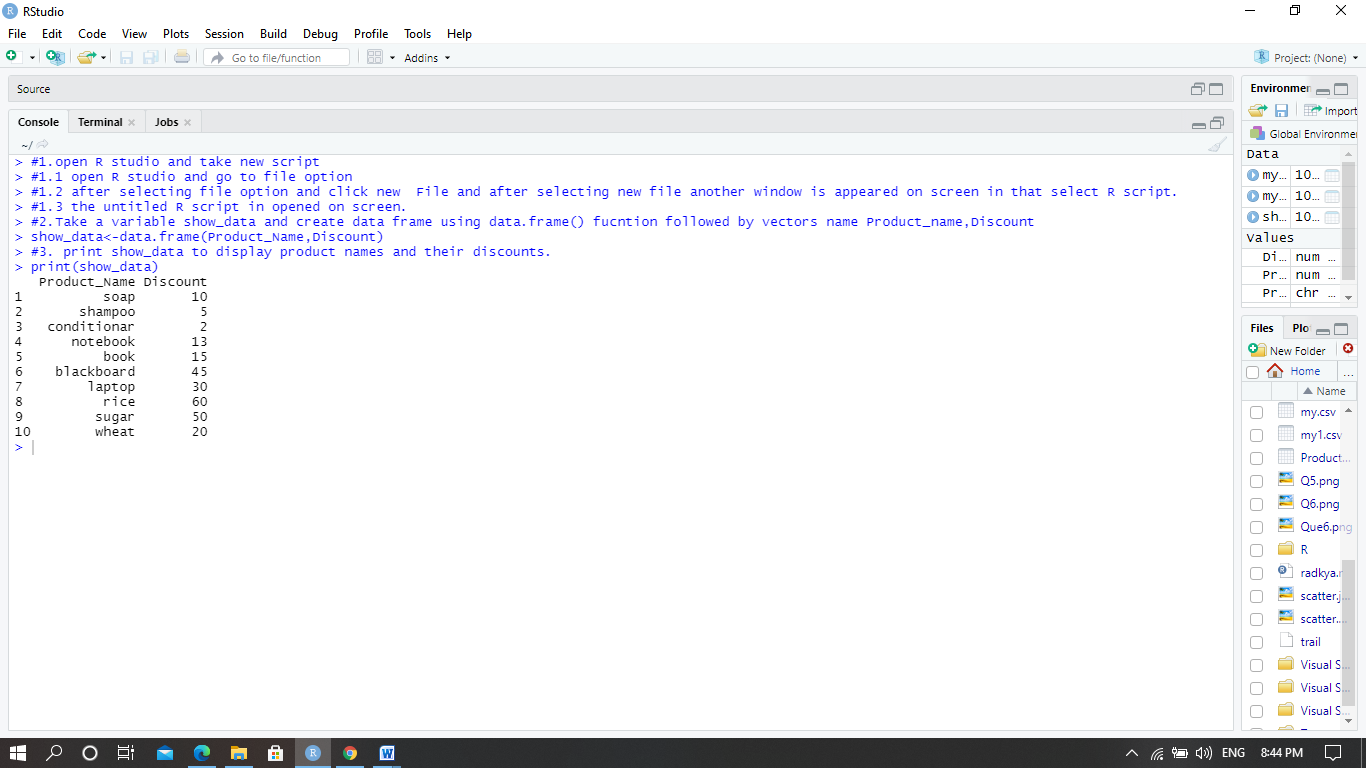
#2.Take a variable show\_data and create data frame using data.frame() fucntion followed by vectors name Product\_name,Discount

show\_data<-data.frame(Product\_Name,Discount)

**Print the show\_data.**

#3 print myList using print() function followed by variable name as show\_data .

print(show\_data)

**Output –**

**Conclusion –**

We can access single element as well as multiple elements of list using $ symbol and separating those elements using comma.

**4. Display quantity and price of last product.**

**Access the value of elements list by their index:**

1. In list an elements are stored in index format .Incase of accessing a particular element value in list with their index preceding by element name and list name.

**Syntax for accessing value of element in list:**

List\_name$element\_name[index\_number]

Here $ symbol used to access the element from list. An index number is must a numeric value and it must written in square braces [].

**Note:** An index number of list is always start with 1.

**Introduction:**

The purpose of this experiment is to understand the concept of accessing the values of elements in list using their index number. Display particular values of elements.

**Procedure:-**

1. Open R studio open R\_code.r script.
2. Take variable last and create a vector which contains list element Quantity and Price with index number 1 in square braces for first product.
3. Print last using print() function.
4. Run all commands by pressing ctrl+enter.
5. Save the script with save option.

#2.Take a variable data and create vector using c() fucntion followed b by list elements Quantity and Price with index number 10 for last product .

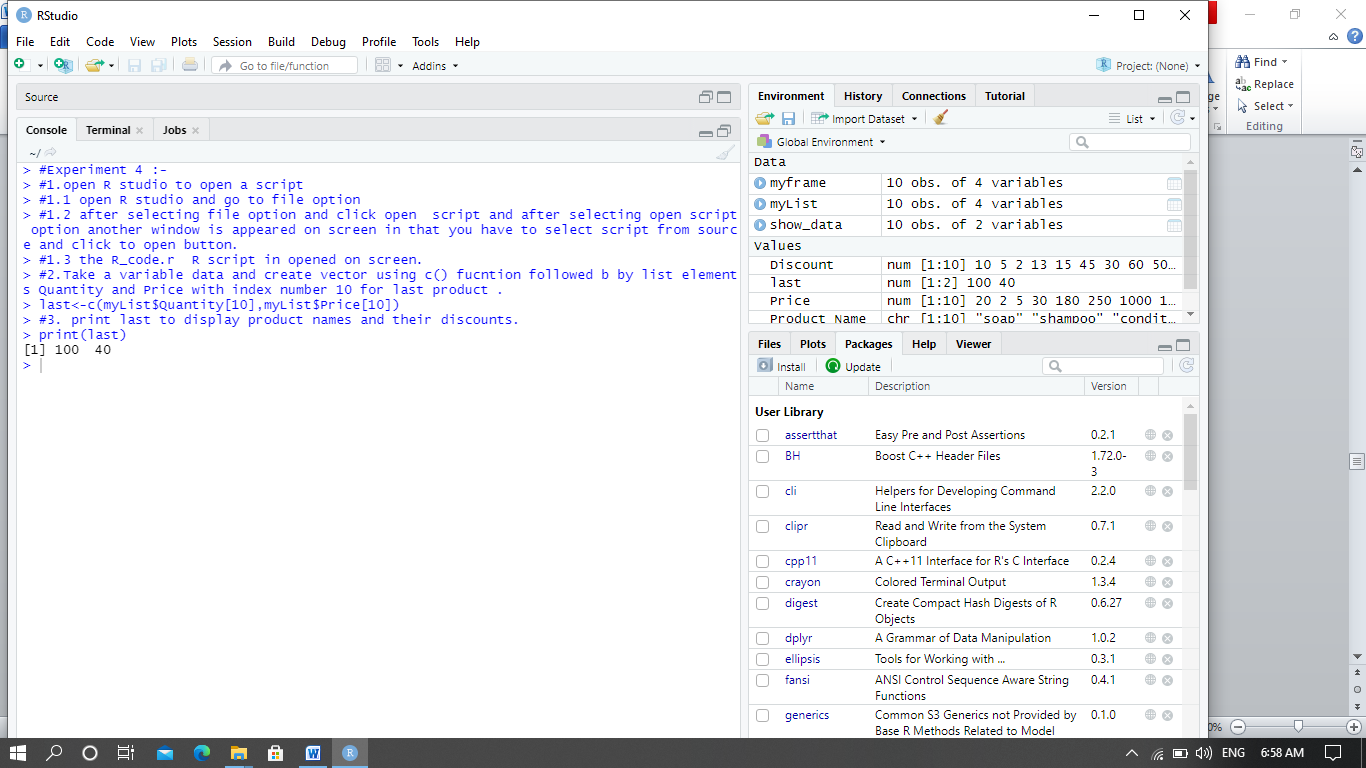
last<-c(myList$Quantity[10],myList$Price[10])

**Print the last.**

#3 print last variable using print() function.

print(last)

**Output –**



**Conclusion –**

We can access values of element from list using their index. We can access the values of elements from list using comma to separate them. An index number should be greater than zero. An index number must be numeric and it started with 1 always.

**5. Modify/increase quantity of first product by 5.**

**How to modify the values of element in list?**

1. We can modify the values of element in list by directly by assigning the new values value to that element.
2. Using **<-** arrow operator we can directly assign the new values to elements.

**Introduction:**

The purpose of this experiment is to understand the concept modifying the values of element in list using <- arrow operator.

**Procedure:-**

1. Open R studio open a R\_code.r script.
2. First print quantity of first product using their index number in square braces.
3. Take variable temp and create a vector which contains myList element Quantity with first product index [1] like myList$Quantity[i] and increase quantity by 5 as myList$Quantity[1]+5.
4. print temp variable to displaying the modified quantity of first product.

**Code & Result :-**

**Open R studio take a new script.**

#1.open R studio to open a script

#1.1 open R studio and go to file option

#1.2 after selecting file option and click open script and after selecting open script option another window is appeared on screen in that you have to select script from source and click to open button.

#1.3 the R\_code.r R script in opened on screen.

**First print quantity of first product using their index number in square braces.**

#2.First print quantity of first product using their index number in square braces.

print(myList$Quantity[1])

**Take variable temp and create a vector which contains myList element Quantity with first product index [1] like myList$Quantity[i] and increase quantity by 5 as myList$Quantity[1]+5.**

#3.Take variable temp and create a vector which contains myList element Quantity with first product index [1] like myList$Quantity[i] and increase quantity by 5 as myList$Quantity[1]+5.

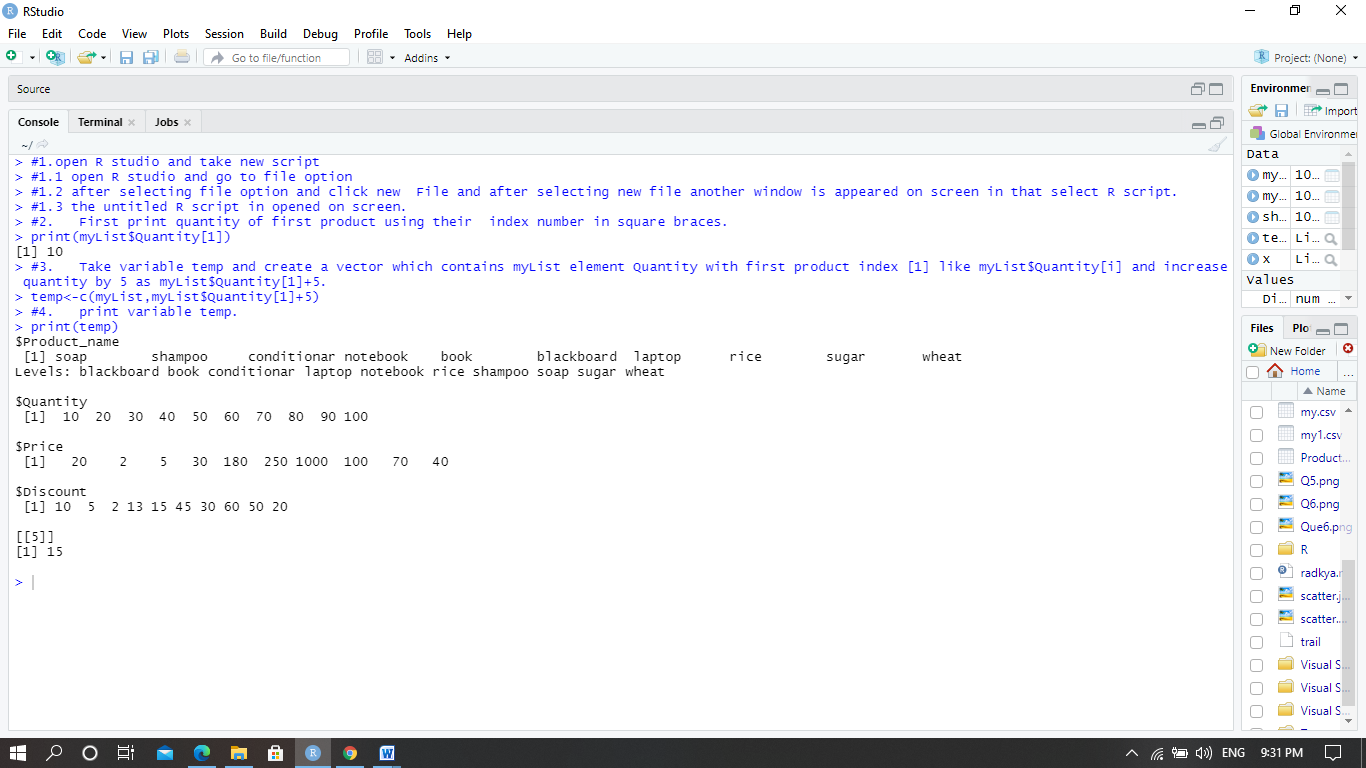
temp<-c(myList,myList$Quantity[1]+5)

**Print temp variable.**

#4. Print temp using print() function for displaying modified quantity of first product.

print(temp)

**Output –**



**Conclusion –**

We can access values of element from list and also can modify their values directly by assign them new values using <- arrow operator. We can perform basic arithmetic operations on data directly in vectors.

**6. Create a new list Brand and merge Brand list and myList list .**

**How to merge the two lists?**

1. We can merge the two or more lists using a Map() function provided by R.
2. **Map() function :-** A Map() function is used to combine/ merge the two list .It merge the list as per the sequence given in the comman

**Introduction:**

The purpose of this experiment is to understand the concept merge the list. For merge the list we can use Map() function for merge the lists.

**Procedure:-**

1. Open R studio open R\_code.r script.
2. First create a new list as Brand which contains brand names to products.
3. Take variable merged\_list and assign Map() function with it followed by arguments as c , myList and Brand as merged\_list<-Map(c,myList,Brand)
4. print merged\_list to display new merged list.

**Code & Result:-**

**Open R studio take a new script.**

#1.open R studio to open a script

#2.First create a new list as Brand which contains brand names to products.

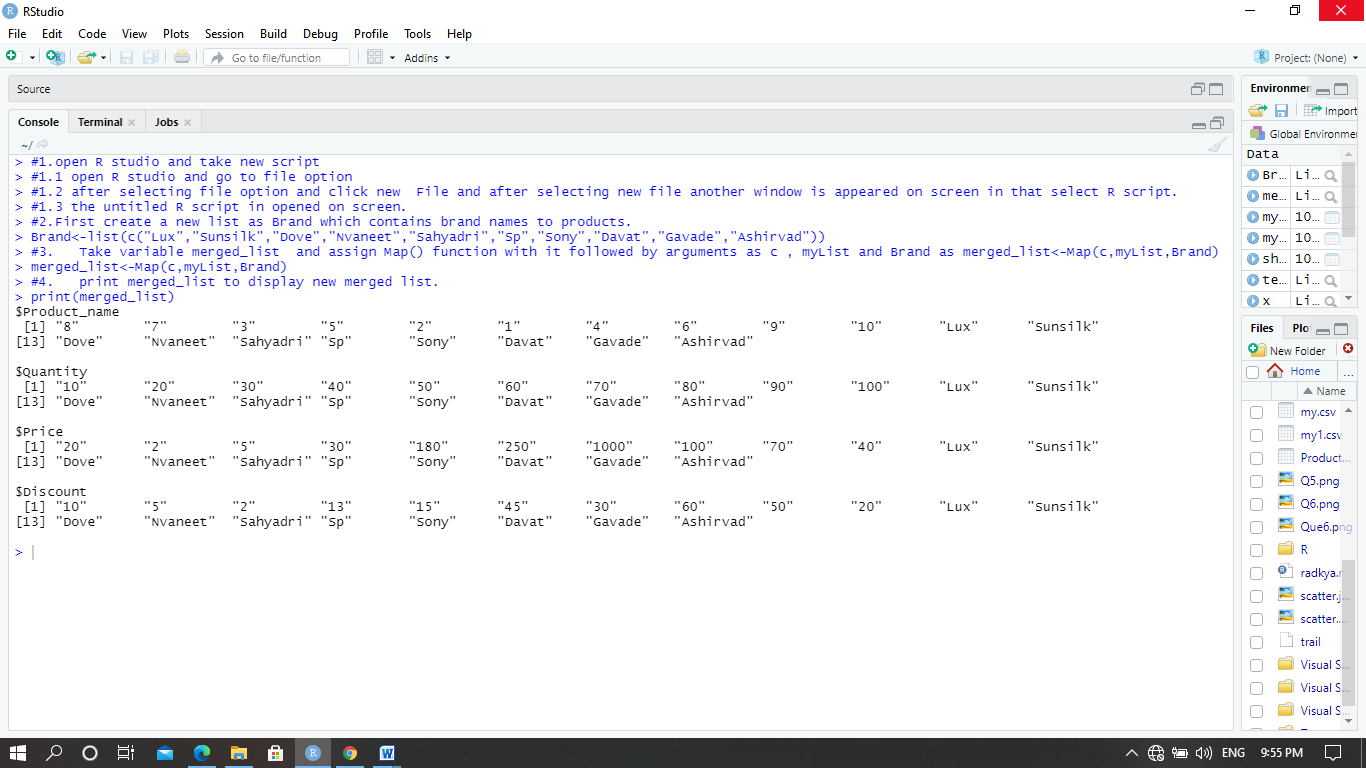
Brand<-list(c("Lux","Sunsilk","Dove","Nvaneet","Sahyadri","Sp","Sony","Davat","Gavade","Ashirvad"))

#3.Take variable merged\_list and assign Map() function with it followed by arguments as c , myList and Brand as merged\_list<-Map(c,myList,Brand)

merged\_list<-Map(c,myList,Brand)

#4.print merged\_list to display new merged list.

print(merged\_list)

**Output –**

**Conclusion –**

We can merge the two list in R using Map() function . A Map() function can marge the different data elements in the list means a list contains the different types of data elements so in R we can collect the multiple types of data elements together .

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