Solution Provider Name: Mrunali Mahesh Sawant (MCA Student)
College: V.P.Institute of Mangement Studies & Research, Sangli
R Version : R i386 3.6.3
R studio : 1.3.1093

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.

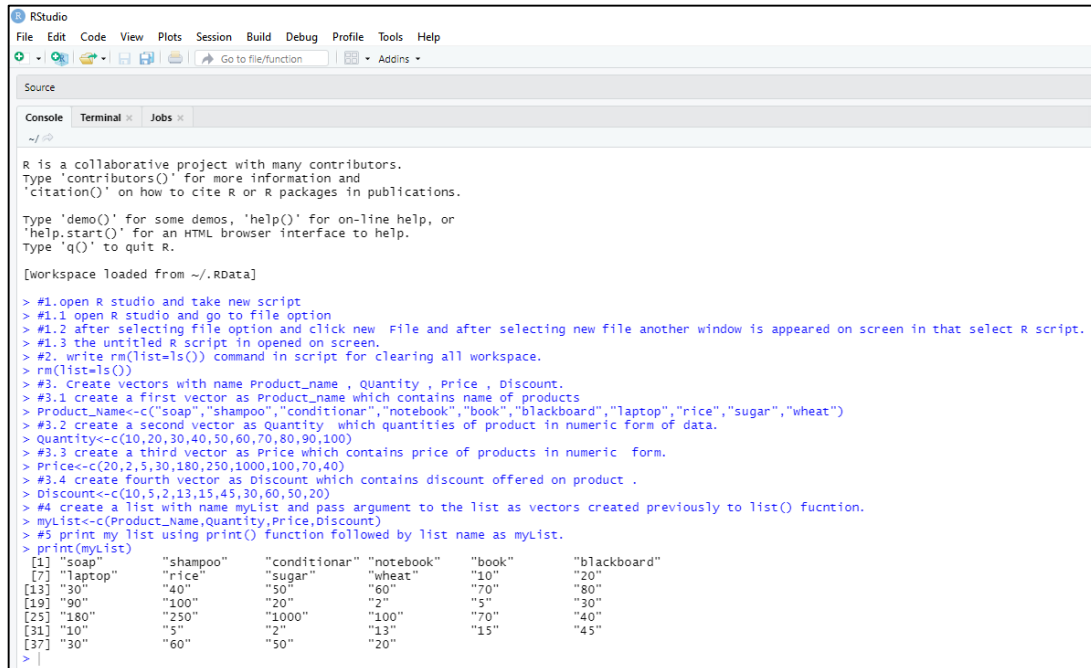#4 create a list with name myList and pass argument to the list as vectors created previously to list() function**.**

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 –


```
R RStudio
File  Edit  Code  View  Plots  Session  Build  Debug  Profile  Tools  Help
           Go to file/function        Addins

Source

Console  Terminal x  Jobs x
~/

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

> #1.open R studio and take new script
> #1.1 open R studio and go to file option
> #1.2 after selecting file option and click new  File and after selecting new file another window is appeared on screen in that select R script.
> #1.3 the untitled R script in opened on screen.
> #2. write rm(list=ls()) command in script for clearing all workspace.
> rm(list=ls())
> #3. Create vectors with name Product_name , Quantity , Price , Discount.
> #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 second 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)
> #4 create a list with name myList and pass argument to the list as vectors created previously to list() fucntion.
> myList<-c(Product_Name,Quantity,Price,Discount)
> #5 print my list using print() function followed by list name as myList.
> print(myList)
 [1] "soap"        "shampoo"     "conditionar" "notebook"    "book"        "blackboard"
 [7] "laptop"      "rice"        "sugar"       "wheat"       "10"          "20"
[13] "30"          "40"          "50"          "60"          "70"          "80"
[19] "90"          "100"         "20"          "2"           "5"           "30"
[25] "180"         "250"         "1000"        "100"         "70"          "40"
[31] "10"          "5"           "2"           "13"          "15"          "45"
[37] "30"          "60"          "50"          "20"
> |
```

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.
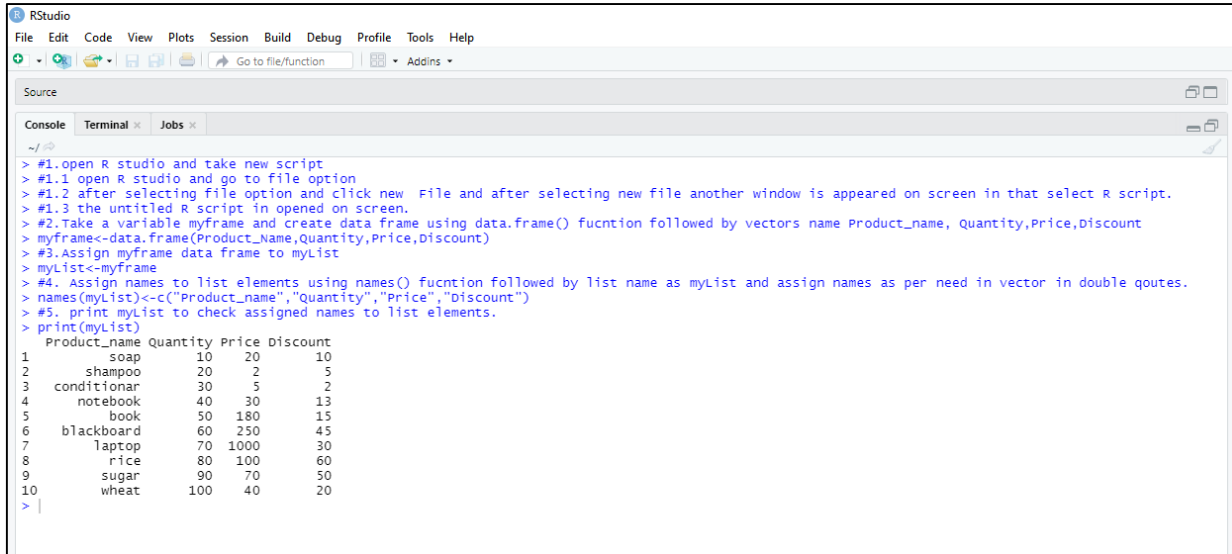
names (myList)<-c("Product_name","Quantity","Price","Discount")

Print the myList list.

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

print(myList)

Output –

```
> #1.open R studio and take new script
> #1.1 open R studio and go to file option
> #1.2 after selecting file option and click new  File and after selecting new file another window is appeared on screen in that select R script.
> #1.3 the untitled R script in opened on screen.
> #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)
> #3.Assign myframe data frame to myList
> myList<-myframe
> #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 qoutes.
> names(myList)<-c("Product_name","Quantity","Price","Discount")
> #5. print myList to check assigned names to list elements.
> print(myList)
    Product_name Quantity Price Discount
1           soap       10    20       10
2        shampoo       20     2        5
3     conditionar      30     5        2
4       notebook       40    30       13
5           book       50   180       15
6      blackboard       60   250       45
7         laptop       70  1000       30
8           rice       80   100       60
9          sugar       90    70       50
10         wheat      100    40       20
> |
```

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 –

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R RStudio
File  Edit  Code  View  Plots  Session  Build  Debug  Profile  Tools  Help
                        Go to file/function          Addins

Source

Console   Terminal ×   Jobs ×
~/
> #1.open R studio and take new script
> #1.1 open R studio and go to file option
> #1.2 after selecting file option and click new  File and after selecting new file another window is appeared on screen in that select R script.
> #1.3 the untitled R script in opened on screen.
> #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)
> #3. print show_data to display product names and their discounts.
> print(show_data)
   Product_Name Discount
1          soap       10
2       shampoo        5
3    conditionar        2
4      notebook       13
5          book       15
6    blackboard       45
7        laptop       30
8          rice       60
9         sugar       50
10        wheat       20
> |
```

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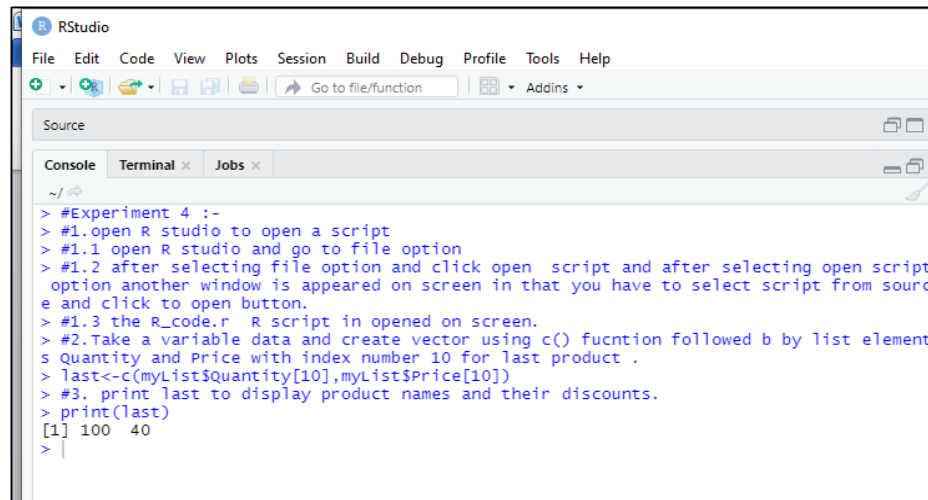
last<-c(myList$Quantity[10],myList$Price[10])

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 –


```
> #1.open R studio and take new script
> #1.1 open R studio and go to file option
> #1.2 after selecting file option and click new  File and after selecting new file another window is appeared on screen in that select R script.
> #1.3 the untitled R script in opened on screen.
> #2.   First print quantity of first product using their  index number in square braces.
> print(myList$Quantity[1])
[1] 10
> #3.   Take variable temp and create a vector which contains myList element Quantity with first product index [1] like myList$Quantity[i] and increase
  quantity by 5 as myList$Quantity[1]+5.
> temp<-c(myList,myList$Quantity[1]+5)
> #4.   print variable temp.
> print(temp)
$Product_name
 [1] soap         shampoo      conditionar notebook    book         blackboard laptop      rice         sugar        wheat
Levels: blackboard book conditionar laptop notebook rice shampoo soap sugar wheat

$Quantity
 [1]  10  20  30  40  50  60  70  80  90 100

$Price
 [1]   20    2    5   30  180  250 1000  100   70   40

$Discount
 [1] 10  5  2 13 15 45 30 60 50 20

[[5]]
[1] 15

>
```

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.
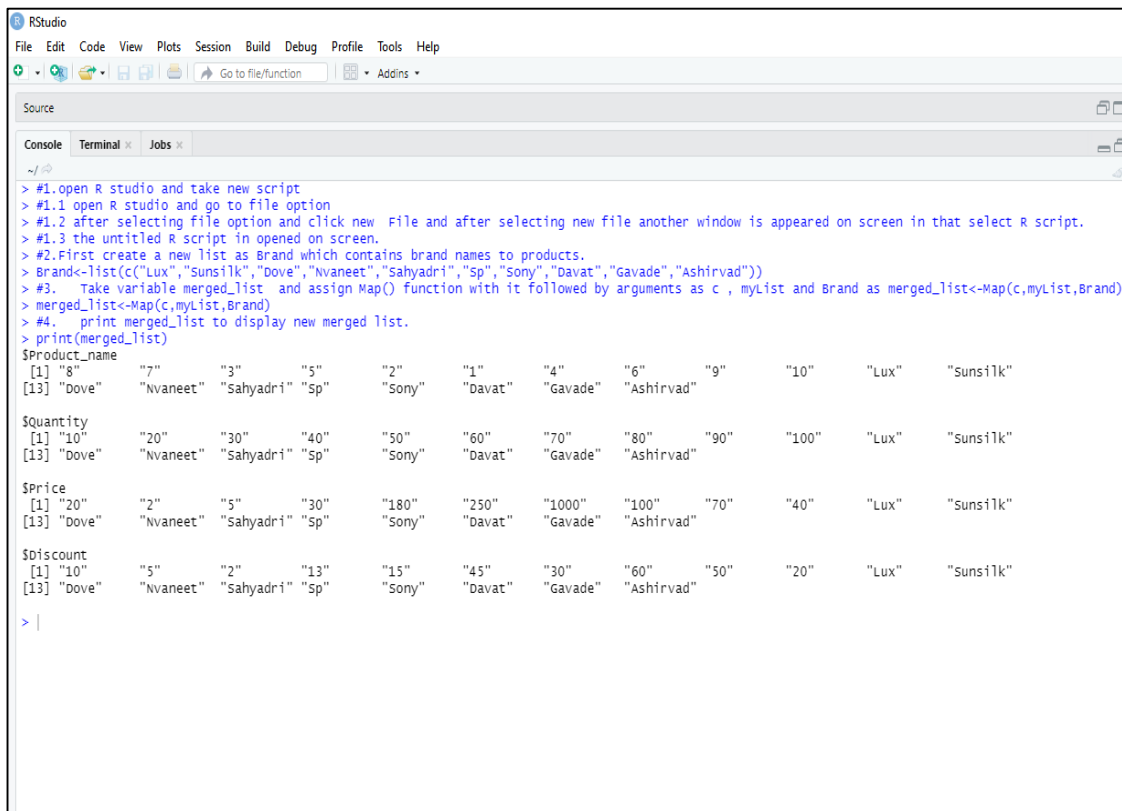2. First create a new list as Brand which contains brand names to products.
3. Take variable merged_list and assign Map() function with it followed by arguments as c , myList and Brand as merged_list<-Map(c,myList,Brand)
4. print merged_list to display new merged list.

Code & Result:-

Open R studio take a new script.

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

merged_list<-Map(c,myList,Brand)

print(merged_list)

Output –


```
R RStudio
File  Edit  Code  View  Plots  Session  Build  Debug  Profile  Tools  Help
  •  •  Go to file/function  •  Addins •

Source

Console  Terminal ×  Jobs ×
~/
> #1.open R studio and take new script
> #1.1 open R studio and go to file option
> #1.2 after selecting file option and click new  File and after selecting new file another window is appeared on screen in that select R script.
> #1.3 the untitled R script in opened on screen.
> #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)
$Product_name
 [1] "8"       "7"       "3"       "5"       "2"       "1"       "4"       "6"       "9"       "10"      "Lux"     "Sunsilk"
[13] "Dove"    "Nvaneet" "Sahyadri" "Sp"      "Sony"    "Davat"   "Gavade"  "Ashirvad"

$Quantity
 [1] "10"      "20"      "30"      "40"      "50"      "60"      "70"      "80"      "90"      "100"     "Lux"     "Sunsilk"
[13] "Dove"    "Nvaneet" "Sahyadri" "Sp"      "Sony"    "Davat"   "Gavade"  "Ashirvad"

$Price
 [1] "20"      "2"       "5"       "30"      "180"     "250"     "1000"    "100"     "70"      "40"      "Lux"     "Sunsilk"
[13] "Dove"    "Nvaneet" "Sahyadri" "Sp"      "Sony"    "Davat"   "Gavade"  "Ashirvad"

$Discount
 [1] "10"      "5"       "2"       "13"      "15"      "45"      "30"      "60"      "50"      "20"      "Lux"     "Sunsilk"
[13] "Dove"    "Nvaneet" "Sahyadri" "Sp"      "Sony"    "Davat"   "Gavade"  "Ashirvad"

>
```

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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