Time series is a series of data points in which each data point is associated with a timestamp. A simple example is the price of a stock in the stock market at different points of time on a given day. Another example is the amount of rainfall in a region at different months of the year. R language uses many functions to create, manipulate and plot the time series data. The data for the time series is stored in an R object called **time-series object**. It is also a R data object like a vector or data frame.

The time series object is created by using the **ts()** function.

Syntax

The basic syntax for **ts()** function in time series analysis is –

```
timeseries.object.name <-  ts(data, start, end, frequency)
```

Following is the description of the parameters used –

- - **data** is a vector or matrix containing the values used in the time series.
- - **start** specifies the start time for the first observation in time series.
- - **end** specifies the end time for the last observation in time series.
- - **frequency** specifies the number of observations per unit time.

Except the parameter "data" all other parameters are optional.

Example

Consider the annual rainfall details at a place starting from January 2012. We create an R time series object for a period of 12 months and plot it.

```
# Get the data points in form of a R vector.
rainfall <-
c(799,1174.8,865.1,1334.6,635.4,918.5,685.5,998.6,784.2,985,882.8,1071
)

# Convert it to a time series object.
rainfall.timeseries <- ts(rainfall,start = c(2012,1),frequency = 12)

# Print the timeseries data.
print(rainfall.timeseries)

# Give the chart file a name.
png(file = "rainfall.png")

# Plot a graph of the time series.
plot(rainfall.timeseries)
```
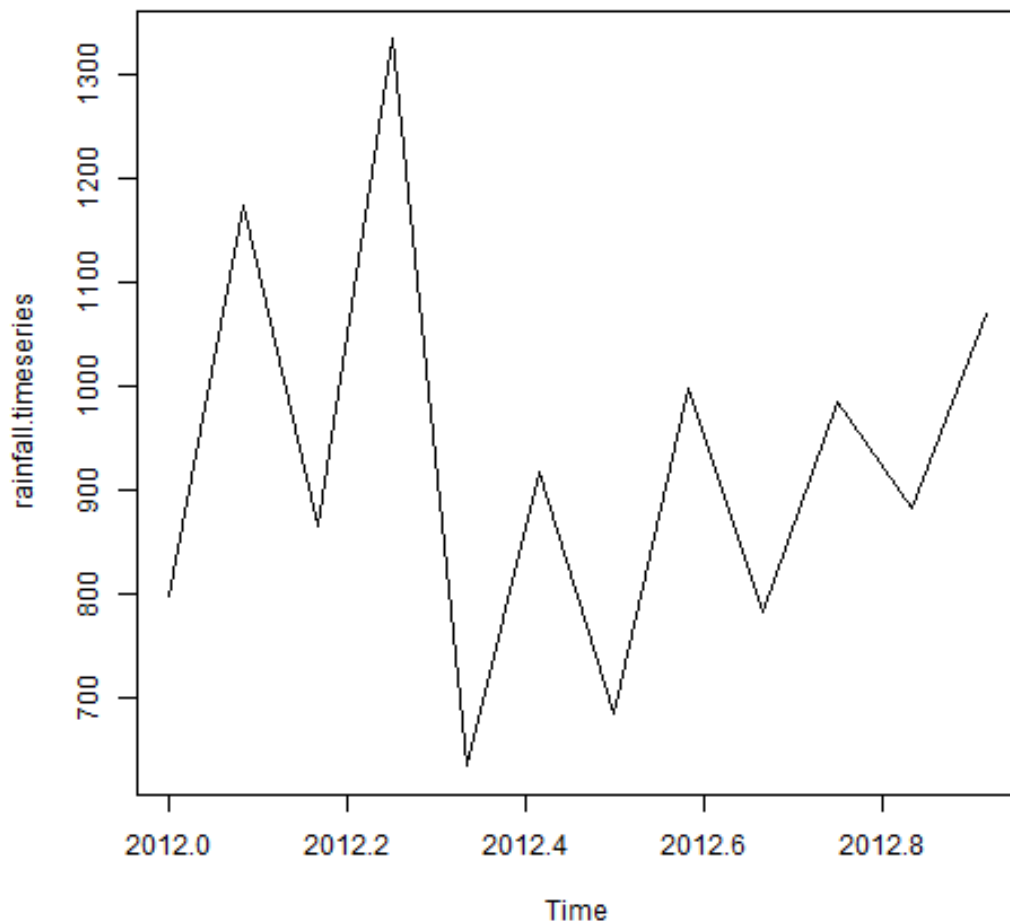
```
# Save the file.
dev.off()
```

When we execute the above code, it produces the following result and chart –

```
     Jan    Feb    Mar    Apr    May    Jun    Jul    Aug    Sep
2012 799.0 1174.8  865.1 1334.6  635.4  918.5  685.5  998.6  784.2
            Oct    Nov    Dec
2012 985.0  882.8 1071.0
```

The Time series chart –

Different Time Intervals

The value of the **frequency** parameter in the ts() function decides the time intervals at which the data points are measured. A value of 12 indicates that the time series is for 12 months. Other values and its meaning is as below –

- **- frequency = 12** pegs the data points for every month of a year.

- **- frequency = 4** pegs the data points for every quarter of a year.

- **- frequency = 6** pegs the data points for every 10 minutes of an hour.
- **- frequency = 24*6** pegs the data points for every 10 minutes of a day.

Multiple Time Series

We can plot multiple time series in one chart by combining both the series into a matrix.

```
# Get the data points in form of a R vector.
rainfall1 <-
c(799,1174.8,865.1,1334.6,635.4,918.5,685.5,998.6,784.2,985,882.8,1071
)
rainfall2 <-

c(655,1306.9,1323.4,1172.2,562.2,824,822.4,1265.5,799.6,1105.6,1106.7,
1337.8)

# Convert them to a matrix.
combined.rainfall <-  matrix(c(rainfall1,rainfall2),nrow = 12)

# Convert it to a time series object.
rainfall.timeseries <- ts(combined.rainfall,start =
c(2012,1),frequency = 12)

# Print the timeseries data.
print(rainfall.timeseries)

# Give the chart file a name.
png(file = "rainfall_combined.png")

# Plot a graph of the time series.
plot(rainfall.timeseries, main = "Multiple Time Series")

# Save the file.
dev.off()
```

When we execute the above code, it produces the following result and chart –

```
          Series 1  Series 2
Jan 2012     799.0     655.0
Feb 2012    1174.8    1306.9
Mar 2012     865.1    1323.4
Apr 2012    1334.6    1172.2
May 2012     635.4     562.2
Jun 2012     918.5     824.0
Jul 2012     685.5     822.4
Aug 2012     998.6    1265.5
Sep 2012     784.2     799.6
```

```
Oct 2012      985.0    1105.6
Nov 2012      882.8    1106.7
Dec 2012     1071.0    1337.8
```

The Multiple Time series chart –

Multiple Time Series