In [11]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error
```

In [18]:
```
# Generating synthetic data
np.random.seed(0)
days = np.arange(1, 101)
temperature = np.random.randint(20, 35, size=100)
humidity = np.random.randint(30, 80, size=100)
rainfall = 0.5 * temperature + 0.2 * humidity + np.random.normal(0, 3, size=100)
```

In [14]:
```
# Creating a feature matrix
X = np.column_stack((temperature, humidity))
X
```

Out[14]:
```
array([[32, 77],
       [25, 33],
       [20, 42],
       [23, 66],
       [31, 70],
       [23, 44],
       [27, 45],
       [29, 50],
       [23, 65],
       [25, 53],
       [22, 45],
       [24, 43],
       [27, 51],
       [26, 78],
       [28, 79],
       [28, 35],
       [32, 71],
       [30, 65],
       [21, 30],
       [26, 61],
       [27, 35],
       [27, 60],
       [34, 30],
       [28, 79],
       [21, 66],
       [25, 64],
       [29, 78],
       [33, 59],
       [28, 33],
       [29, 64],
       [24, 72],
       [23, 43],
       [20, 78],
       [23, 69],
       [25, 51],
       [34, 39],
       [20, 30],
       [22, 40],
       [23, 73],
       [28, 53],
       [21, 32],
       [23, 64],
       [33, 65],
       [23, 60],
       [23, 33],
       [34, 48],
       [27, 76],
       [20, 65],
       [21, 50],
       [29, 47],
       [29, 57],
       [20, 44],
       [30, 71],
       [24, 31],
       [27, 66],
       [23, 40],
       [34, 52],
       [31, 73],
       [22, 70],
       [27, 41],
       [32, 32],
       [22, 46],
       [20, 62],
       [20, 30],
       [24, 68],
       [25, 49],
       [25, 76],
       [26, 72],
       [28, 70],
       [24, 43],
       [21, 60],
       [24, 54],
       [29, 32],
       [30, 33],
       [30, 60],
       [28, 64],
       [21, 73],
       [21, 43],
       [27, 78],
       [29, 70],
       [29, 38],
       [23, 49],
       [26, 61],
       [27, 38],
       [31, 56],
       [34, 32],
       [22, 33],
       [31, 74],
       [20, 44],
       [34, 62],
       [23, 34],
       [25, 33],
       [32, 75],
       [29, 41],
       [30, 52],
       [24, 43],
       [31, 75],
       [24, 41],
       [26, 46],
       [24, 54]])
```

In [16]:
```
# Splitting the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, rainfall, test_size=0.2, random_state=0)
X_train, X_test, y_train, y_test
```

Out[16]:
```
(array([[23, 60],
        [20, 62],
        [23, 66],
        [24, 54],
        [34, 48],
        [21, 50],
        [27, 45],
        [24, 54],
        [26, 61],
        [21, 73],
        [32, 32],
        [29, 38],
        [23, 34],
        [28, 70],
        [20, 44],
        [33, 59],
        [21, 30],
        [34, 52],
        [20, 30],
        [30, 60],
        [25, 33],
        [22, 46],
        [33, 65],
        [23, 64],
        [31, 70],
        [28, 35],
        [30, 65],
        [21, 32],
        [23, 73],
        [23, 44],
        [25, 33],
        [27, 41],
        [32, 77],
        [25, 51],
        [28, 33],
        [29, 57],
        [24, 43],
        [34, 39],
        [28, 79],
        [30, 71],
        [22, 45],
        [23, 43],
        [25, 76],
        [31, 73],
        [29, 70],
        [34, 32],
        [20, 78],
        [31, 56],
        [28, 79],
        [34, 62],
        [26, 61],
        [29, 64],
        [29, 47],
        [24, 41],
        [26, 46],
        [24, 43],
        [27, 35],
        [30, 52],
        [29, 32],
        [21, 43],
        [25, 64],
        [22, 40],
        [23, 49],
        [27, 76],
        [28, 53],
        [25, 49],
        [22, 70],
        [27, 51],
        [20, 44],
        [21, 60],
        [31, 74],
        [20, 30],
        [27, 60],
        [27, 38],
        [25, 53],
        [31, 75],
        [26, 72],
        [24, 68],
        [20, 65],
        [23, 33]]),
 array([[29, 78],
        [22, 33],
        [20, 42],
        [23, 40],
        [28, 64],
        [29, 41],
        [32, 71],
        [30, 33],
        [27, 66],
        [24, 43],
        [24, 31],
        [32, 75],
        [27, 78],
        [26, 78],
        [29, 50],
        [24, 72],
        [34, 30],
        [21, 66],
        [23, 69],
        [23, 65]]),
 array([28.47782992, 21.95658341, 25.27343043, 21.28410678, 31.11751509,
        22.9583051 , 15.16865195, 22.49270891, 24.12420647, 26.12125185,
        25.85552645, 20.11556693, 16.4948742 , 30.6770455 , 19.6137465 ,
        26.57757397, 17.27920396, 30.52352505, 21.05148236, 24.89793073,
        22.01893974, 20.61412864, 33.94453983, 20.47055936, 34.31432821,
        21.18693603, 26.86023266, 16.47459996, 23.0099435 , 16.03992222,
        17.4585086 , 22.49735717, 36.66832109, 24.92838714, 19.84259721,
        21.58527435, 18.63502495, 22.53505542, 23.36993369, 27.12819063,
        24.20132025, 20.36826687, 26.92861679, 30.000291912, 19.8666638 ,
        25.16674266, 23.81701789, 26.5909004 , 28.2974837 , 33.34137807,
        20.15595407, 30.41954036, 25.10856932, 17.59122298, 25.87028374,
        20.31027162, 17.74961558, 21.84224245, 16.81198662, 21.28772507,
        23.62533224, 12.62523919, 23.41778517, 29.01356277, 23.04764441,
        27.12302203, 25.19692384, 22.93262793, 21.30164035, 21.36852895,
        31.72901007, 15.58515186, 25.1423277 , 23.29594736, 26.13385596,
        32.14085607, 32.82945306, 28.51549638, 22.29187055, 18.10041884]),
 array([[32.54271695, 15.26109558, 13.74664267, 26.09067308, 21.4949563 ,
         24.97670647, 28.73311465, 24.99938109, 22.16330806, 23.3881983 ,
         16.15540107, 32.82895238, 25.83493853, 26.45684317, 18.33098435,
         26.32956142, 21.66116816, 23.7301133 , 24.98290962, 21.52322735]]))
```

In [20]:
```
# Creating a Linear Regression model
model = LinearRegression()

model
```

Out[20]:
```
LinearRegression
LinearRegression()
```

In [21]:
```
# Training the model
model.fit(X_train, y_train)
```

Out[21]:
```
LinearRegression
LinearRegression()
```

In [23]:
```
# Making predictions
y_pred = model.predict(X_test)
y_pred
```

Out[23]:
```
array([30.1524372 , 17.53289253, 18.19046616, 19.44713974, 26.87286495,
       22.93571906, 30.43387859, 21.92426972, 26.71403567, 20.58120119,
       18.24064396, 31.21406434, 29.0545929 , 28.50567075, 24.69113699,
       26.23754784, 23.53481901, 23.42050278, 25.10348638, 24.32330064])
```

In [24]:
```
# Evaluating the model
mse = mean_squared_error(y_test, y_pred)
print("Mean Squared Error:", mse)
```

```
Mean Squared Error: 10.922227803320354
```

In [ ]:
```

```