Aim:

To write a program to predict the marks scored by a student using the simple linear regression model.

Algorithm: Predicting Student Marks Using Simple Linear Regression

1. Start

2. Input: Dataset containing number of study hours (X) and marks scored (Y).

3. Load Dataset into memory.

4. Preprocess Data:

Separate features (X = hours) and target variable (Y = marks).

5. Split Dataset: Divide the dataset into training set and test set (e.g., 80% training, 20% testing).

6. Train Model:

a. Initialize a Linear Regression model.

b. Fit the model on the training set (X_train, Y_train).

7. Evaluate Model:

a. Use the trained model to predict marks on the test set (X_test).

b. Calculate accuracy metrics (Mean Squared Error, R² Score, etc.).

8. Make Predictions:

a. Take user input (study hours).

b. Use the trained model to predict marks for the given input.

9. Output: Display predicted marks.

10. Stop

In [1]:

```
#step 1: Import libraries and load the dataset (Hours vs Marks)
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split as tts
from sklearn.linear_model import LinearRegression as lr
from sklearn.metrics import mean_squared_error as mse
from sklearn.metrics import r2_score as r2
```

In [37]:

```
#step2 Create or Load data set
data = { "Hs": [1,2,3,4,5,6,7,8,9,10],
         "Ms": [39,44,52,50,60,62,73,77,80,90]
}
df= pd.DataFrame(data)
print('Dataset:\n',df.head(10))
df
```

```
Dataset:
    Hs  Ms
0    1  39
1    2  44
2    3  52
3    4  50
4    5  60
5    6  62
6    7  73
7    8  77
8    9  80
9   10  90
```

Out[37]:

	Hs	Ms
0	1	39
1	2	44
2	3	52
3	4	50
4	5	60
5	6	62
6	7	73
7	8	77
8	9	80
9	10	90

In [38]:

```
#Step3 Separate features and target
x= df[['Hs']] #independent variable(2d)
y=df['Ms'] #dependent variable(1d)
```

In [39]:

```
#Step4 Train Test Split
xtrain,xtest,ytrain,ytest=tts(x,y,test_size=0.2,random_state=42)
```

In [40]:

```
#step5 Train linear regression model
model = lr()
model.fit(xtrain,ytrain)
```

Out[40]:

▾ LinearRegression

▶ Parameters

In [41]:

```
#step6 prediction variable creation
ypred=model.predict(xtest)
```

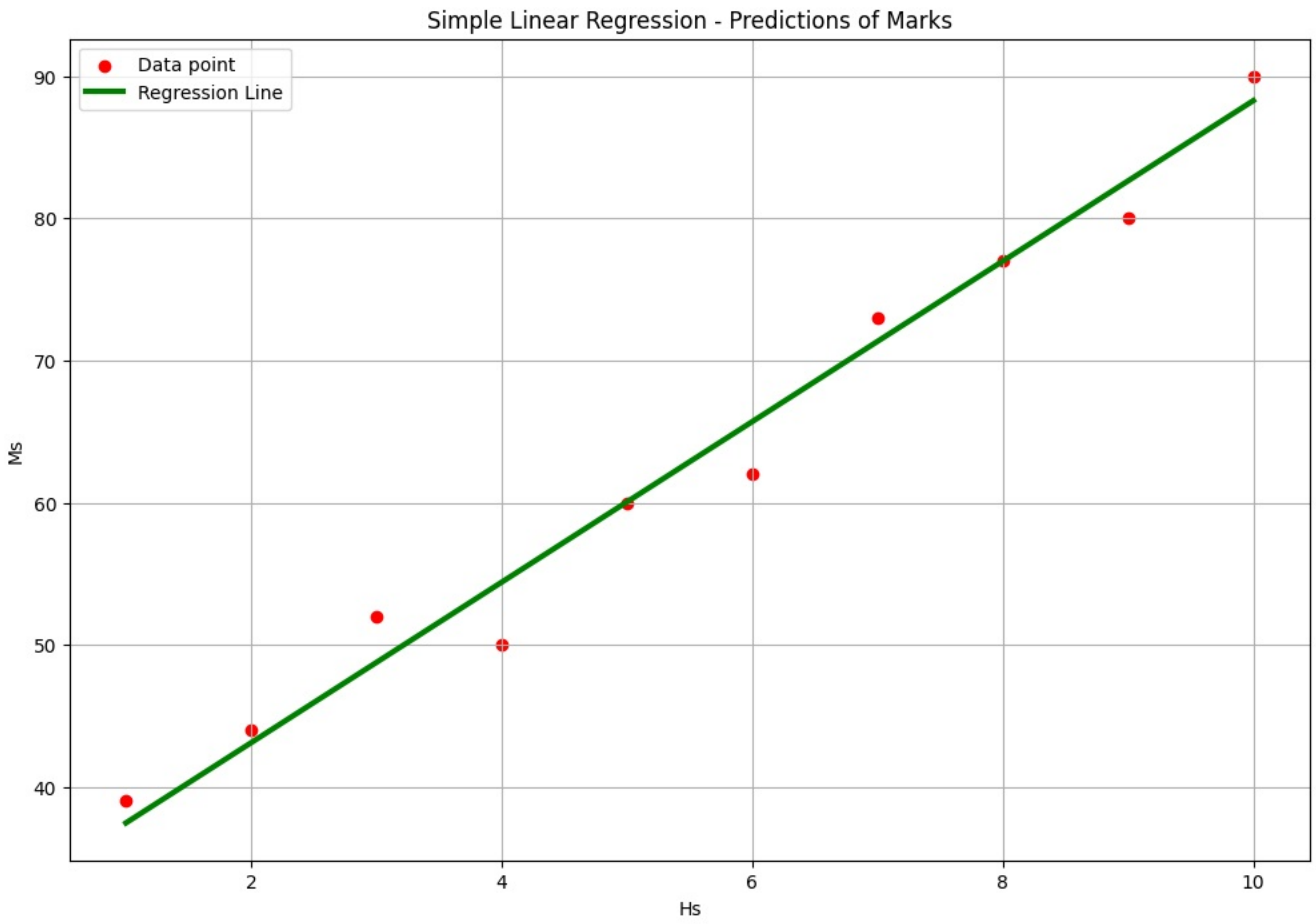
In [42]:

```
#step7 Model evaluation
print("\nModel Parameters")
print('b0-intercept=',model.intercept_)
print('b1-Slope=',model.coef_[0])

print('\nEvaluation Metrics')
print('Mean Squared Errors:',mse(ytest,ypred))
print('R^2 Score:',r2(ytest,ypred))
```

```
Model Parameters
b0-intercept= 31.818965517241377
b1-Slope= 5.6465517241379315

Evaluation Metrics
Mean Squared Errors: 3.8735508323424597
R^2 Score: 0.9880445961964739
```

In [43]:

```
#step 8 Visualisation
plt.figure(figsize=(12,8))
plt.scatter(x,y,color='red',label='Data point')
plt.plot(x,model.predict(x),color='Green',linewidth=3,label='Regression Line')
plt.xlabel('Hs')
plt.ylabel('Ms')
plt.title('Simple Linear Regression - Predictions of Marks')
plt.legend()
plt.grid(True)
plt.show()
```



In [45]:

```
#step 9 perfomance for given input
hours=float(input("Enter your studied hour:"))
prediction=model.predict([[hours]])
print(f'\nPredicted marks for you with {hours} hours of study = {prediction[0]:.2f}')
```

```
Predicted marks for you with 8.0 hours of study = 76.99
```

```
C:\Users\israv\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\utils\validation.py:2749: UserW
arning: X does not have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(
```

Result:

Succesfully wrote a program to predict the marks scored by a student using the simple linear regression model.