In [1]:

```
"""# I. Preparing the dataset """
#1 Importing essential libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import statsmodels.api as sm

#2 Importing the dataset
dataset = pd.read_csv('Salary_Data.csv')
```

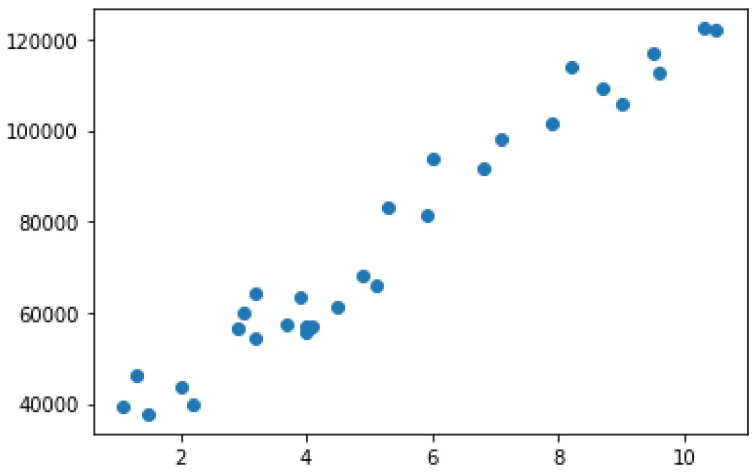
In [2]:

```
#3 Classify dependent and independent variables
X = dataset.iloc[:,:-1].values  #independent variable YearsofExperience
y = dataset.iloc[:,-1].values  #dependent variable salary

print("\nIdependent Variable (Experience):\n", X)
print("\nDependent Variable (Salary):\n", y)

plt.scatter(X, y, alpha=1)
```

```
Idependent Variable (Experience):
 [[ 1.1]
 [ 1.3]
 [ 1.5]
 [ 2. ]
 [ 2.2]
 [ 2.9]
 [ 3. ]
 [ 3.2]
 [ 3.2]
 [ 3.7]
 [ 3.9]
 [ 4. ]
 [ 4. ]
 [ 4.1]
 [ 4.5]
 [ 4.9]
 [ 5.1]
 [ 5.3]
 [ 5.9]
 [ 6. ]
 [ 6.8]
 [ 7.1]
 [ 7.9]
 [ 8.2]
 [ 8.7]
 [ 9. ]
 [ 9.5]
 [ 9.6]
 [10.3]
 [10.5]]

Dependent Variable (Salary):
 [ 39343.  46205.  37731.  43525.  39891.  56642.  60150.  544
45.  64445.
  57189.  63218.  55794.  56957.  57081.  61111.  67938.  6602
9.  83088.
  81363.  93940.  91738.  98273. 101302. 113812. 109431. 10558
2. 116969.
 112635. 122391. 121872.]
```

Out[2]:

```
<matplotlib.collections.PathCollection at 0x1f5bd99f688>
```


120000
100000
80000
60000
40000
2
4
6
8
10

In [3]:

```
#4 Creating training set and testing set
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X ,y, test_size = 1/3,r
andom_state = 0)

print("\n\nTraining Set :\n----------------\n")
print("X = \n", X_train)
print("y = \n", y_train)

print("\n\nTest Set :\n----------------\n")
print("X = \n",X_test)
print("y = \n", y_test)
```

```
Training Set :
----------------

X =
 [[ 2.9]
 [ 5.1]
 [ 3.2]
 [ 4.5]
 [ 8.2]
 [ 6.8]
 [ 1.3]
 [10.5]
 [ 3. ]
 [ 2.2]
 [ 5.9]
 [ 6. ]
 [ 3.7]
 [ 3.2]
 [ 9. ]
 [ 2. ]
 [ 1.1]
 [ 7.1]
 [ 4.9]
 [ 4. ]]
y =
 [ 56642.  66029.  64445.  61111. 113812.  91738.  46205. 1218
72.  60150.
  39891.  81363.  93940.  57189.  54445. 105582.  43525.  3934
3.  98273.
  67938.  56957.]


Test Set :
----------------

X =
 [[ 1.5]
 [10.3]
 [ 4.1]
 [ 3.9]
 [ 9.5]
 [ 8.7]
 [ 9.6]
 [ 4. ]
 [ 5.3]
 [ 7.9]]
y =
 [ 37731. 122391.  57081.  63218. 116969. 109431. 112635.  557
```

```
94.  83088.
 101302.]
```

In [4]:

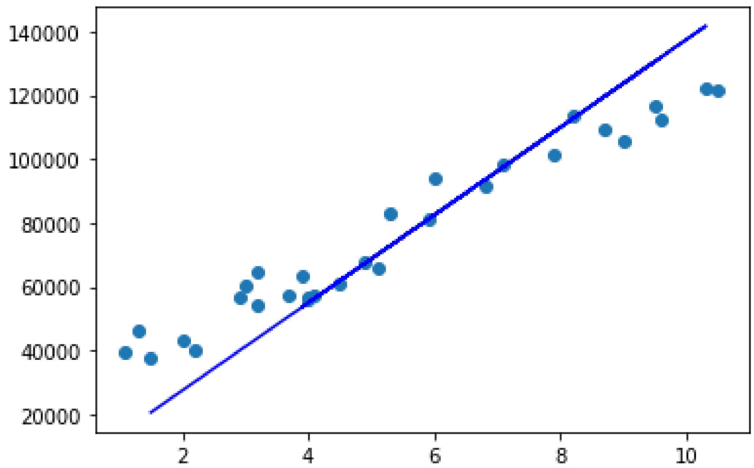
```
#5 Train the Regressor with training set
model = sm.OLS(y_train, X_train).fit()

#6 predict the outcome of test sets
y_Pred = model.predict(X_test)
```

In [5]:

```
#7 Mapping the Regression Line
plt.scatter(X, y, alpha=1)
plt.plot(X_test, y_Pred, c = 'blue')
```

Out[5]:

```
[<matplotlib.lines.Line2D at 0x1f5be23c3c8>]
```



In [6]:

```
#8 Calculating the Accuracy of the predictions
from sklearn import metrics
print("Prediction Accuracy = ", metrics.r2_score(y_test, y_Pred))

# Print out the statistics
print(model.summary())
```

```
Prediction Accuracy =  0.8111465166115929
                                 OLS Regression Results
==============================================================
=========================
Dep. Variable:                     y   R-squared (uncentere
d):                   0.965
Model:                           OLS   Adj. R-squared (uncent
ered):              0.963
Method:                Least Squares   F-statistic:
525.3
Date:                Sat, 14 Sep 2019   Prob (F-statistic):
2.64e-15
Time:                        19:21:29   Log-Likelihood:
-219.36
No. Observations:                  20   AIC:
440.7
Df Residuals:                      19   BIC:
441.7
Df Model:                           1
Covariance Type:            nonrobust
==============================================================
================
                 coef    std err          t      P>|t|
[0.025      0.975]
--------------------------------------------------------------
----------------
x1          1.375e+04    600.077     22.920      0.000    1.25
e+04     1.5e+04
==============================================================
================
Omnibus:                        0.809   Durbin-Watson:
2.456
Prob(Omnibus):                  0.667   Jarque-Bera (JB):
0.454
Skew:                          -0.361   Prob(JB):
0.797
Kurtosis:                       2.843   Cond. No.
1.00
==============================================================
================

Warnings:
[1] Standard Errors assume that the covariance matrix of the e
rrors is correctly specified.
```

In [7]:

```
#9 Some more inights
print ('MAE:', metrics.mean_absolute_error(y_Pred, y_test))
print ('RMSE:', np.sqrt(metrics.mean_squared_error(y_Pred, y_test)))
print ('R-Squared:', metrics.r2_score(y_Pred, y_test))
```

```
MAE: 10828.326955554774
RMSE: 12581.660968849912
R-Squared: 0.9016135955873352
```

In [8]:

```
#10 Comparing Actual and Predicted Salaries for he test set
print("\nActual vs Predicted Salaries \n-------------------------\n")
print("Actual :\n ", y_test)
print("Predicted :\n ", y_Pred)
```

```
Actual vs Predicted Salaries
-------------------------

Actual :
  [ 37731. 122391.  57081.  63218. 116969. 109431. 112635.  55
794.  83088.
 101302.]
Predicted :
  [ 20630.47442402 141662.59104493  56389.96342565  53639.2335
0245
 130659.67135212 119656.75165931 132035.03631372  55014.598464
05
  72894.34296487 108653.8319665 ]
```