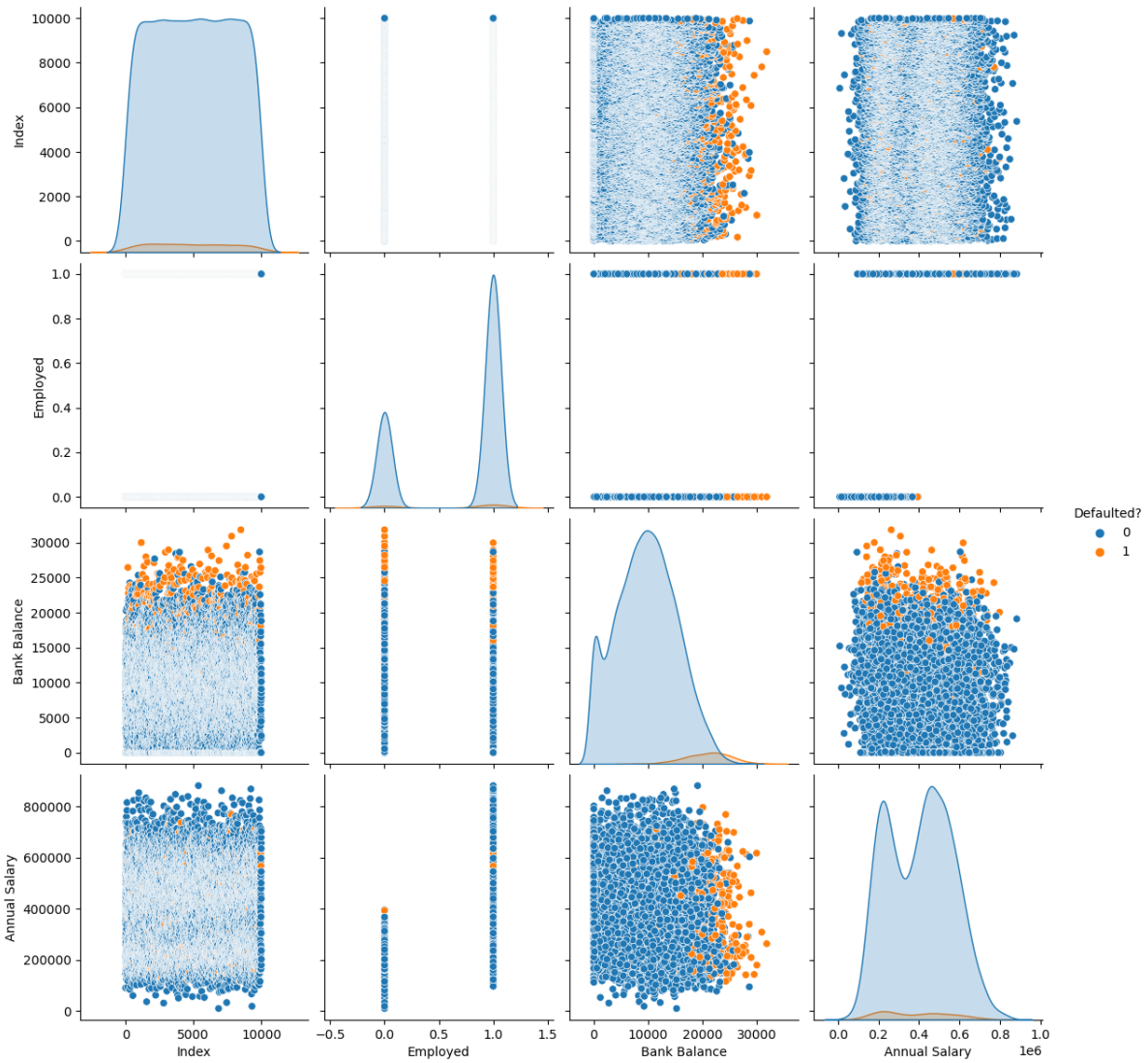
In [1]:
```
import  pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
```

In [2]:
```
data=pd.read_csv("D:\ml\Default_Fin.csv")
```

In [4]:
```
sns.pairplot(data,hue='Defaulted?',size=3)
```

```
E:\annakonda\Lib\site-packages\seaborn\axisgrid.py:2095: UserWarning: The `size` p
arameter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```

Out[4]:
```
<seaborn.axisgrid.PairGrid at 0x1cd22ca3b90>
```



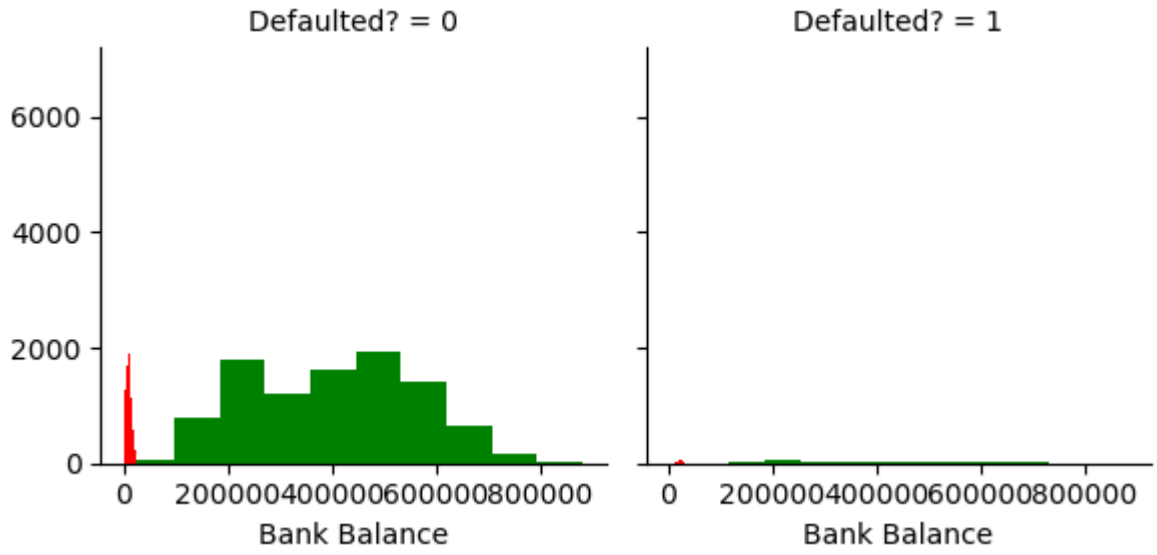
In [9]:
```
data.head()
```

Out[9]:

	Index	Employed	Bank Balance	Annual Salary	Defaulted?
0	1	1	8754.36	532339.56	0
1	2	0	9806.16	145273.56	0
2	3	1	12882.60	381205.68	0
3	4	1	6351.00	428453.88	0
4	5	1	9427.92	461562.00	0

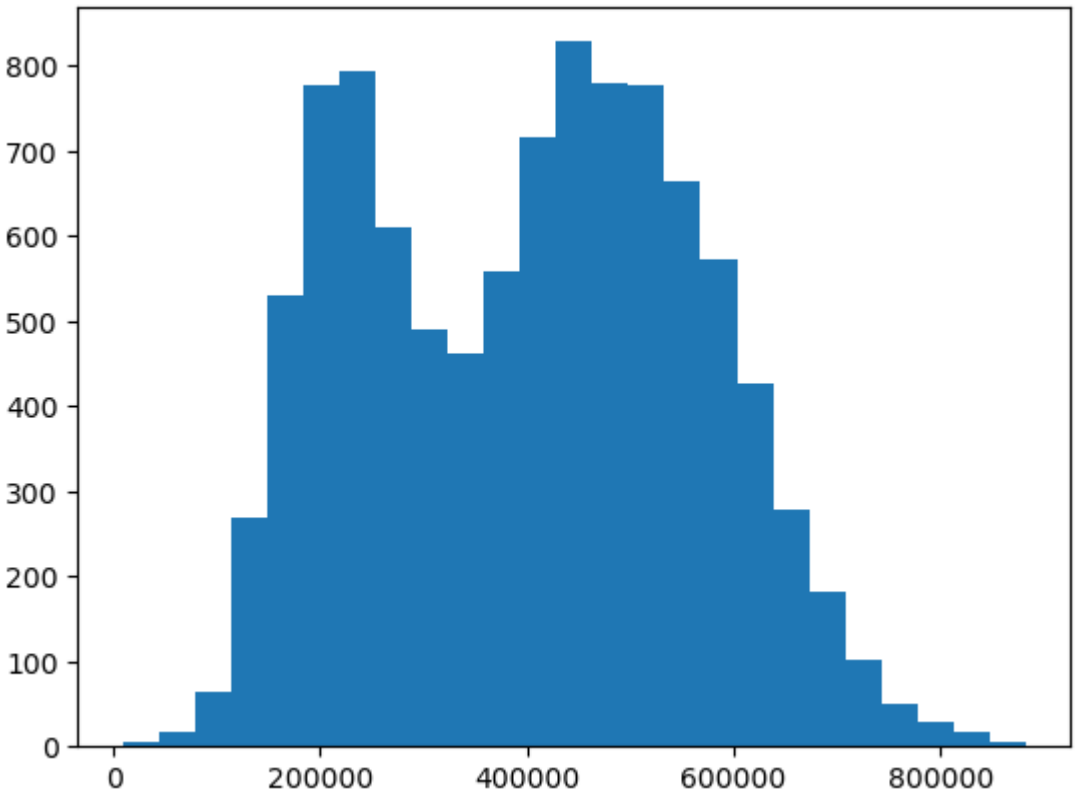
In [9]:
```
plot=sns.FacetGrid(data,col="Defaulted?",margin_titles=True)
plot.map(plt.hist,'Annual Salary',color='green')
plot.map(plt.hist,'Employed',color='blue')
plot.map(plt.hist,'Bank Balance',color='red')
```

Out[9]:
```
<seaborn.axisgrid.FacetGrid at 0x1cd2752c4d0>
```



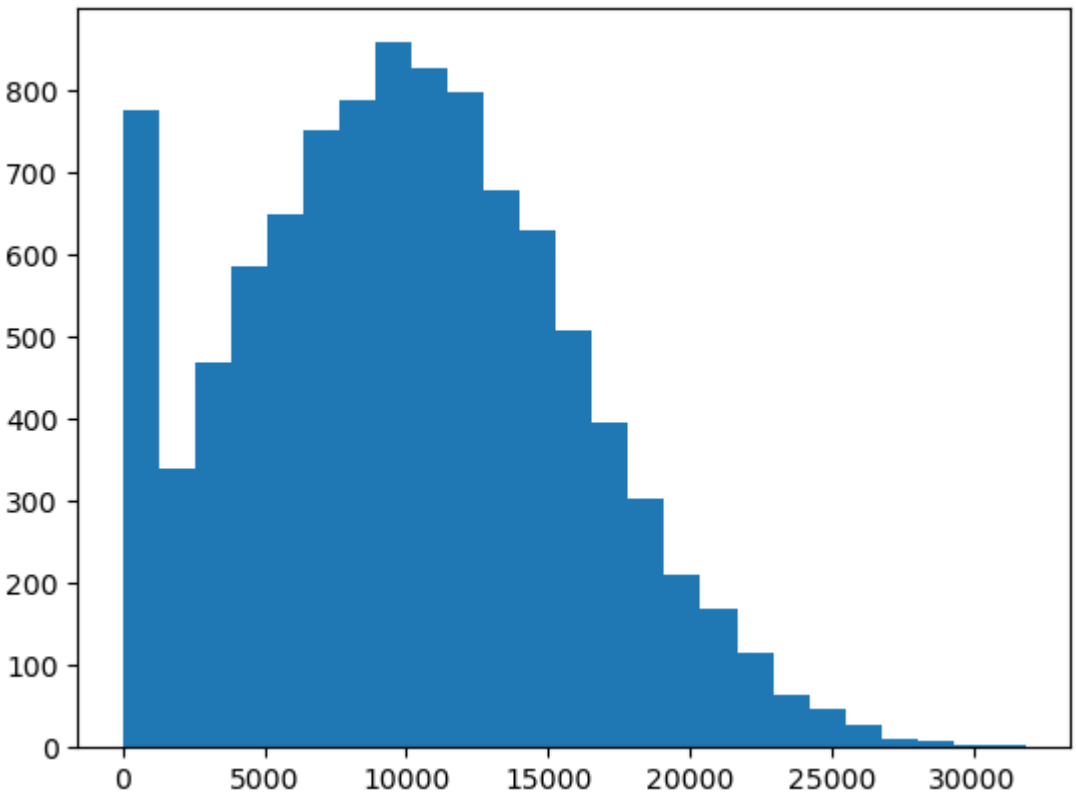
In [16]:
```
plt.hist(data['Annual Salary'],bins=25)
```

Out[16]:
```
(array([  5.,  16.,  65., 268., 529., 778., 793., 611., 489., 462., 559.,
        716., 828., 779., 778., 664., 573., 427., 278., 182., 101.,  49.,
         28.,  17.,   5.]),
 array([  9263.64  ,  44199.1248,  79134.6096, 114070.0944, 149005.5792,
        183941.064 , 218876.5488, 253812.0336, 288747.5184, 323683.0032,
        358618.488 , 393553.9728, 428489.4576, 463424.9424, 498360.4272,
        533295.912 , 568231.3968, 603166.8816, 638102.3664, 673037.8512,
        707973.336 , 742908.8208, 777844.3056, 812779.7904, 847715.2752,
        882650.76  ]),
 <BarContainer object of 25 artists>)
```



In [17]:
```
plt.hist(data['Bank Balance'],bins=25)
```

Out[17]:
```
(array([774., 339., 469., 585., 649., 751., 787., 857., 827., 797., 677.,
        628., 507., 394., 303., 209., 168., 116.,  65.,  46.,  28.,  11.,
          8.,   3.,   2.]),
 array([    0.    ,  1274.0736,  2548.1472,  3822.2208,  5096.2944,
         6370.368 ,  7644.4416,  8918.5152, 10192.5888, 11466.6624,
        12740.736 , 14014.8096, 15288.8832, 16562.9568, 17837.0304,
        19111.104 , 20385.1776, 21659.2512, 22933.3248, 24207.3984,
        25481.472 , 26755.5456, 28029.6192, 29303.6928, 30577.7664,
        31851.84  ]),
 <BarContainer object of 25 artists>)
```



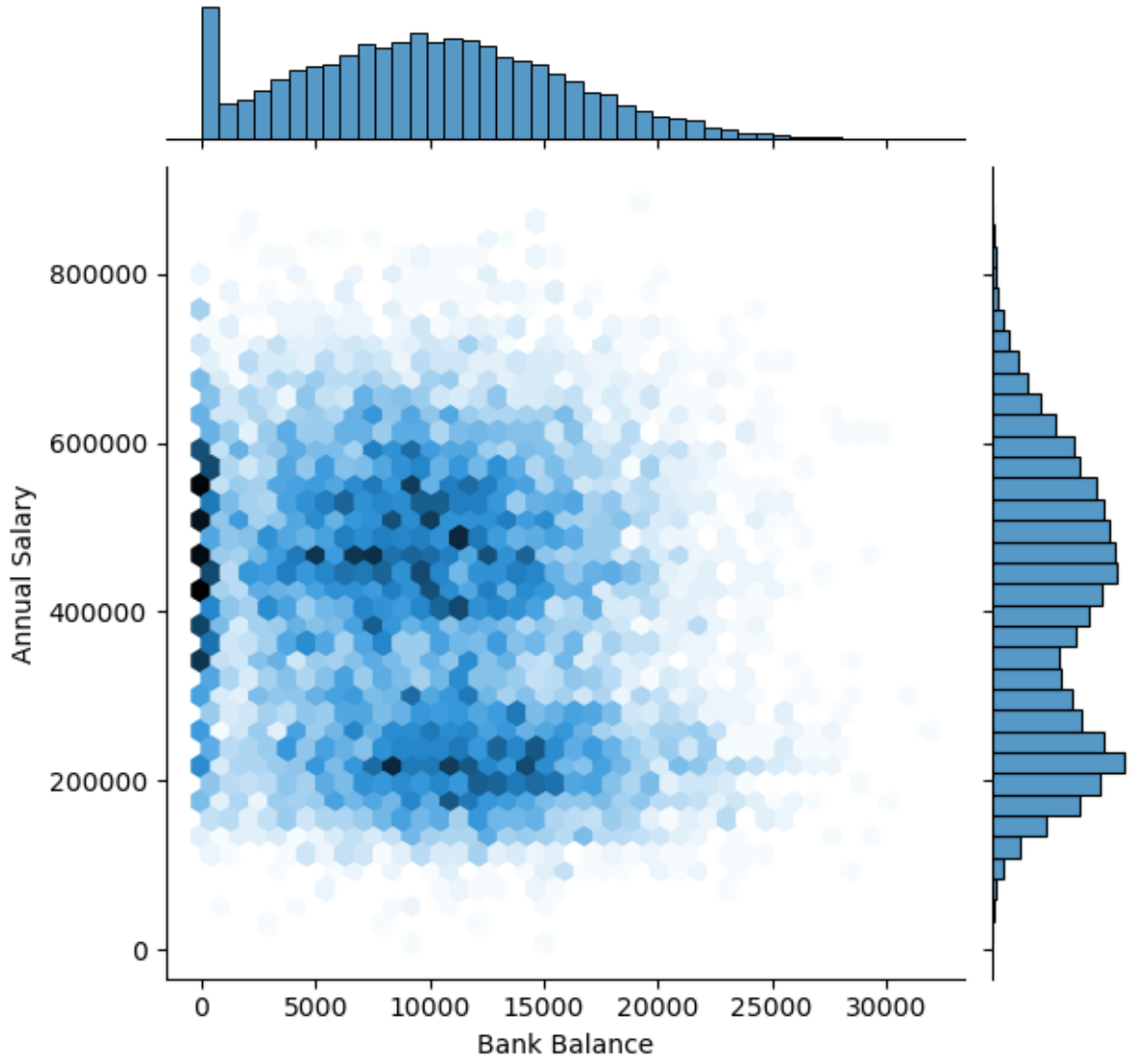
In [10]:
```
data.tail()
```

Out[10]:

	Index	Employed	Bank Balance	Annual Salary	Defaulted?
9995	9996	1	8538.72	635908.56	0
9996	9997	1	9095.52	235928.64	0
9997	9998	1	10144.92	703633.92	0
9998	9999	1	18828.12	440029.32	0
9999	10000	0	2411.04	202355.40	0

In [14]:
```
sns.jointplot(x=data['Bank Balance'],y=data['Annual Salary'],kind='hex')
```

Out[14]:
```
<seaborn.axisgrid.JointGrid at 0x1cd2b19cb10>
```



In [38]:
```
x=data.iloc[:,[1,2,3]]
y=data.iloc[:,4]
```

In [55]:
```
x
x.describe()
```

Out[55]:

	Employed	Bank Balance	Annual Salary
count	10000.000000	10000.000000	10000.000000
mean	0.705600	10024.498524	402203.782224
std	0.455795	5804.579486	160039.674988
min	0.000000	0.000000	9263.640000
25%	0.000000	5780.790000	256085.520000
50%	1.000000	9883.620000	414631.740000
75%	1.000000	13995.660000	525692.760000
max	1.000000	31851.840000	882650.760000

In [40]:
```
y
```

Out[40]:
```
0       0
1       0
2       0
3       0
4       0
       ..
9995    0
9996    0
9997    0
9998    0
9999    0
Name: Defaulted?, Length: 10000, dtype: int64
```

In [41]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25,random_state=0)
x_test
```

Out[41]:

	Employed	Bank Balance	Annual Salary
9394	0	0.00	166937.28
898	1	4763.88	665455.56
2398	1	12557.04	571179.72
5906	1	10036.08	414709.92
2343	0	6416.28	224754.84
...	...	...	...
8764	1	12868.56	239502.48
4359	0	8698.80	199717.56
2041	1	9073.92	633336.60
1108	0	6147.84	299395.44
3332	1	17292.84	406232.16

2500 rows × 3 columns

In [42]:
```
from sklearn.ensemble import RandomForestClassifier
classifier=RandomForestClassifier(n_estimators=10,criterion='entropy')
classifier.fit(x_train,y_train)
```

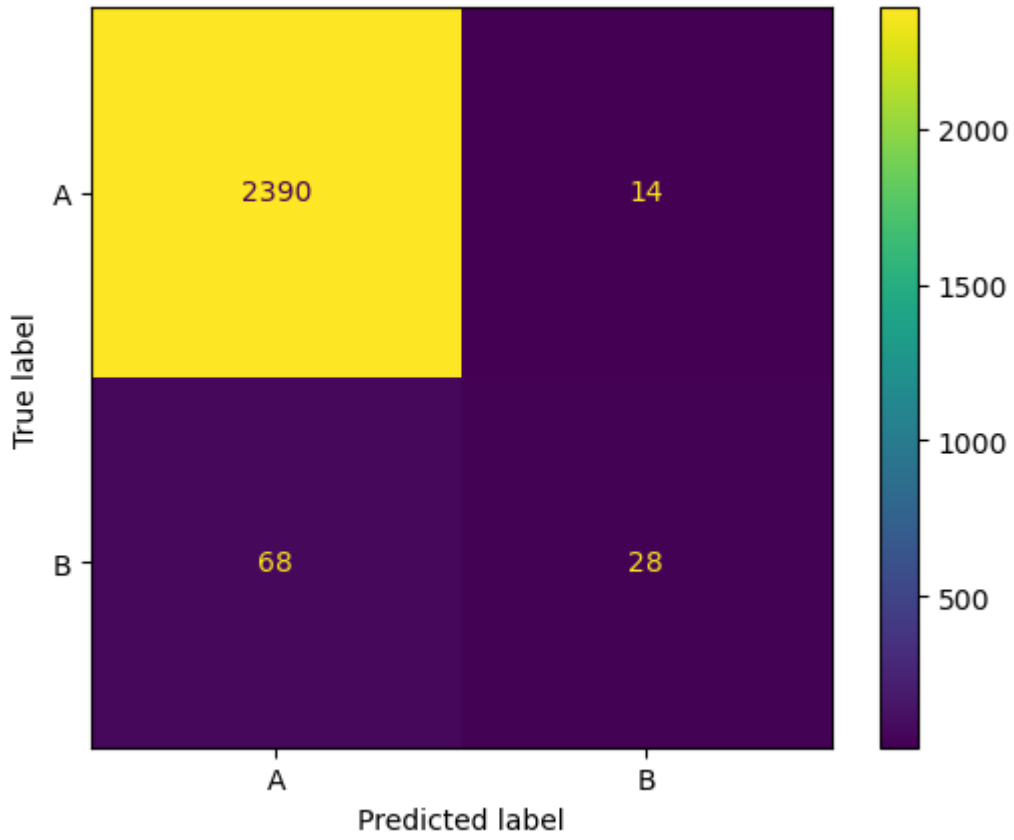
Out[42]:
```
RandomForestClassifier
RandomForestClassifier(criterion='entropy', n_estimators=10)
```

In [44]:
```
y_predict=classifier.predict(x_test)
```

In [45]:
```
y_predict
```

Out[45]:
```
array([0, 0, 0, ..., 0, 0, 0], dtype=int64)
```

In [51]:
```
from sklearn import metrics
confusion_matrix=metrics.confusion_matrix(y_test,y_predict)
eff=metrics.ConfusionMatrixDisplay(confusion_matrix=confusion_matrix,display_labels
eff.plot()
plt.show()
```



In [53]:
```
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score

# Assuming y_test and y_predict are defined somewhere in your code

accuracy = accuracy_score(y_test, y_predict)
precision = precision_score(y_test, y_predict, average='weighted')
recall = recall_score(y_test, y_predict, average='weighted')
f1 = f1_score(y_test, y_predict, average='weighted')

print("Accuracy:", accuracy)
print("Precision:", precision)
print("Recall:", recall)
print("F1 Score:", f1)
```

```
Accuracy: 0.9672
Precision: 0.9605975589910497
Recall: 0.9672
F1 Score: 0.9609647559601524
```

In [63]:
```
user_input = {
    'Employed': int(input("if Employed:1,if not Employed:0 ")),
    'Bank Balance': float(input("Enter balance: ")),
    'Annual Salary': float(input("Enter Annual Salary: "))

}
user_df = pd.DataFrame([user_input])
prediction = classifier.predict(user_df)

# Display the prediction
print("Predicted class for the user input:", prediction[0])
```

```
if Employed:1,if not Employed:0 1
Enter balance: 5000
Enter Annual Salary: 8850000
Predicted class for the user input: 0
```

In [ ]: