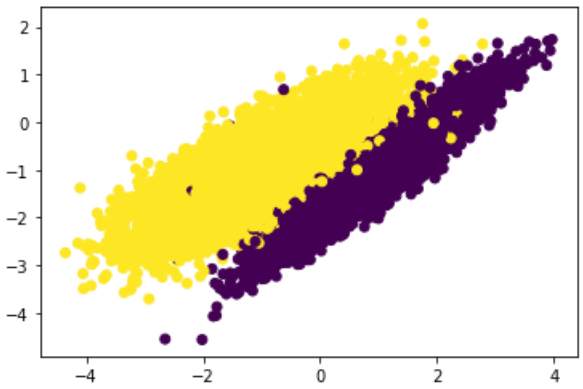
In [27]:

```
from sklearn.datasets import make_classification
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
import numpy
from tqdm import tqdm
import numpy as np
from sklearn.metrics.pairwise import euclidean_distances


x,y = make_classification(n_samples=50000, n_features=2, n_informative=2, n_redundant= 0,
n_clusters_per_class=1, random_state=60)
X_train, X_test, y_train, y_test = train_test_split(x,y,stratify=y,random_state=42)
```

In [28]:

```
%matplotlib inline
import matplotlib.pyplot as plt
#colors = {0:'orange', 1:'blue'}
plt.scatter(X_test[:,0], X_test[:,1],c=y_test)
plt.show()
```



Implementing Customer Random Search

In [29]:

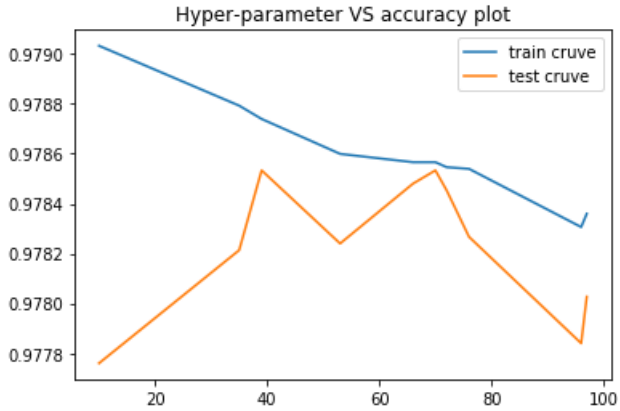
```
from sklearn.metrics import accuracy_score
import random

def range_of_params(param_range):
    sorted_val=random.sample(range(1,param_range),10)
    sorted_val.sort()
    return sorted_val

def RandomSearch(x_train,y_train,classifier, params, folds):
    trainscores = []
    testscores  = []

    params={'n_neighbors' : range_of_params(param_range)}

    for k in tqdm(params['n_neighbors']):

        trainscores_folds = []
        testscores_folds  = []
        for j in range(0, folds):

            boundary = int(len(x_train)/folds)

            test_indices=list(set(list(range((boundary*j), (boundary*(j+1))))))
            train_indices = list(set(list(range(1,len(x_train)))) - set(test_indices))

            # selecting the data points based on the train_indices and test_indices
            X_train = x_train[train_indices]
```

```
            Y_train = y_train[train_indices]
            X_test  = x_train[test_indices]
            Y_test  = y_train[test_indices]

            classifier.n_neighbors = k
            classifier.fit(X_train,Y_train)

            Y_predicted = classifier.predict(X_test)
            testscores_folds.append(accuracy_score(Y_test, Y_predicted))

            Y_predicted = classifier.predict(X_train)
            trainscores_folds.append(accuracy_score(Y_train, Y_predicted))
        trainscores.append(np.mean(np.array(trainscores_folds)))
        testscores.append(np.mean(np.array(testscores_folds)))
    return trainscores,testscores,params
```

In [33]:

```
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings("ignore")


neigh = KNeighborsClassifier()

param_range = 100
folds = 5

trainscores, testscores, params = RandomSearch(X_train, y_train, neigh, param_range, folds)


plt.plot(params['n_neighbors'],trainscores, label='train cruve')
plt.plot(params['n_neighbors'],testscores, label='test cruve')
plt.title('Hyper-parameter VS accuracy plot')
plt.legend()
plt.show()
```

```
100%|██████████████████████████████████████████████████████████████████████████████| 10/10
[01:51<00:00, 11.14s/it]
```



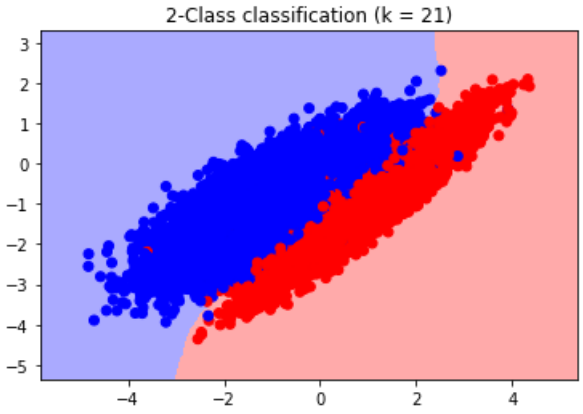
In [34]:

```
def plot_decision_boundary(X1, X2, y, clf):
        # Create color maps
    cmap_light = ListedColormap(['#FFAAAA', '#AAFFAA', '#AAAAFF'])
    cmap_bold = ListedColormap(['#FF0000', '#00FF00', '#0000FF'])

    x_min, x_max = X1.min() - 1, X1.max() + 1
    y_min, y_max = X2.min() - 1, X2.max() + 1

    xx, yy = np.meshgrid(np.arange(x_min, x_max, 0.02), np.arange(y_min, y_max, 0.02))
    Z = clf.predict(np.c_[xx.ravel(), yy.ravel()])
    Z = Z.reshape(xx.shape)

    plt.figure()
```

```
    plt.pcolormesh(xx, yy, Z, cmap=cmap_light)
    # Plot also the training points
    plt.scatter(X1, X2, c=y, cmap=cmap_bold)

    plt.xlim(xx.min(), xx.max())
    plt.ylim(yy.min(), yy.max())
    plt.title("2-Class classification (k = %i)" % (clf.n_neighbors))
    plt.show()
```

In [35]:

```
from matplotlib.colors import ListedColormap
neigh = KNeighborsClassifier(n_neighbors = 21)
neigh.fit(X_train, y_train)
plot_decision_boundary(X_train[:, 0], X_train[:, 1], y_train, neigh)
```



In [ ]:

```
```