

**EXP NO:2**

**DATE:**

## **PLAYFAIR CIPHER**

**Aim:**To implement an encryption algorithm using Playfair Cipher technique.

### **Algorithm:**

- Step 1: "Algorithm" (as the key) and "ulroaliocvrX" (as the encrypted text).
- Step 2: Remove spaces and convert to lowercase.
- Step 3: Create a 5x5 key table based on the modified key.
- Step 4: Apply Playfair Cipher decryption to the encrypted text using the generated key table.
- Step 5: Display the deciphered text.

### **Program:**

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#define SIZE 30

void toLowerCase(char plain[], int ps) {
    int i;
    for (i = 0; i < ps; i++) {
        if (plain[i] > 64 && plain[i] < 91)
            plain[i] += 32;
    }
}

int removeSpaces(char* plain, int ps) {
    int i, count = 0;
    for (i = 0; i < ps; i++)
        if (plain[i] != ' ')
```

```

        plain[count++] = plain[i];
    plain[count] = '\0';
    return count;
}

void generateKeyTable(char key[], int ks, char keyT[5][5]) {
    int i, j, k, flag = 0, *dicty;
    dicty = (int*)calloc(26, sizeof(int));

    for (i = 0; i < ks; i++) {
        if (key[i] != 'j')
            dicty[key[i] - 97] = 2;
    }
    dicty['j' - 97] = 1;
    i = 0;
    j = 0;
    for (k = 0; k < ks; k++) {
        if (dicty[key[k] - 97] == 2) {
            dicty[key[k] - 97] -= 1;
            keyT[i][j] = key[k];
            j++;
            if (j == 5) {
                i++;
                j = 0;
            }
        }
    }
    for (k = 0; k < 26; k++) {
        if (dicty[k] == 0) {
            keyT[i][j] = (char)(k + 97);
            j++;
            if (j == 5) {
                i++;
                j = 0;
            }
        }
    }
}

```

```
    }  
  }  
}
```

```
void search(char keyT[5][5], char a, char b, int arr[]) {  
    int i, j;  
    if (a == 'j')  
        a = 'i';  
    else if (b == 'j')  
        b = 'i';  
  
    for (i = 0; i < 5; i++) {  
        for (j = 0; j < 5; j++) {  
            if (keyT[i][j] == a) {  
                arr[0] = i;  
                arr[1] = j;  
            }  
            else if (keyT[i][j] == b) {  
                arr[2] = i;  
                arr[3] = j;  
            }  
        }  
    }  
}
```

```
int mod5(int a) {  
    if (a < 0)  
        a += 5;  
    return (a % 5);  
}
```

```
void decrypt(char str[], char keyT[5][5], int ps) {  
    int i, a[4];  
    for (i = 0; i < ps; i += 2) {  
        search(keyT, str[i], str[i + 1], a);  
    }  
}
```

```

        if (a[0] == a[2]) {
            str[i] = keyT[a[0]][mod5(a[1] - 1)];
            str[i + 1] = keyT[a[0]][mod5(a[3] - 1)];
        }
        else if (a[1] == a[3]) {
            str[i] = keyT[mod5(a[0] - 1)][a[1]];
            str[i + 1] = keyT[mod5(a[2] - 1)][a[1]];
        }
        else {
            str[i] = keyT[a[0]][a[3]];
            str[i + 1] = keyT[a[2]][a[1]];
        }
    }
}

void decryptByPlayfairCipher(char str[], char key[]) {
    char ps, ks, keyT[5][5];
    ks = strlen(key);
    ks = removeSpaces(key, ks);
    toLowerCase(key, ks);
    ps = strlen(str);
    toLowerCase(str, ps);
    ps = removeSpaces(str, ps);

    generateKeyTable(key, ks, keyT);

    decrypt(str, keyT, ps);
}

int main() {
    char str[SIZE], key[SIZE];

    strcpy(key, "Vaishnavi");
    printf("Key text: %s\n", key);
    strcpy(str, "ulroaliocvrX");

```

```
printf("Plain text: %s\n", str);

decryptByPlayfairCipher(str, key);

printf("Deciphered text: %s\n", str);

return 0;
}
```

**Output:**

```
/tmp/GoaXRaBtJp.o
Key text: Vaishnavi
Plain text: ulroaliocvrX
Deciphered text: yfqtsgvqniqy

=== Code Execution Successful ===
```

**Result:**