

EX NO:02

DATE:21.02.24

Write a program for demonstration of encrypting and decrypting the messages by Playfair Substitution technique.

Aim: To write and execute a program for demonstration of encrypting and decrypting the messages by Playfair Substitution technique.

Algorithm:

1. Define a constant SIZE to represent the size of the key table (5x5 matrix).
2. Create a function prepareKeyTable that takes the user-provided key and fills a 5x5 key table with the characters of the key and the remaining alphabet (excluding 'J').
3. Use nested loops to iterate over the rows and columns of the key table until the character is found.
4. Create a function playfair that takes the key table, the message, and an empty result array.
5. Declare variables for the key, message, result, and key table.
6. Call the prepareKeyTable function to generate the key table.
7. Call the playfair function to perform encryption/decryption and store the result.
8. Print the encrypted/decrypted message,
9. Prompt the user to enter the key and the message.
10. Print the encrypted/decrypted message using printf.
11. Compile the C program using a C compiler (e.g., gcc).
12. Run the compiled program.

Program:

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

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

```
#define SIZE 5
```

```
// Function to prepare the Playfair Square key table
```

```
void prepareKeyTable(char key[], char keyTable[SIZE][SIZE]) {
```

```
    char *alpha = "ABCDEFGHIJKLMNOPQRSTUVWXYZ";
```

```
    for (int i = 0, k = 0; i < SIZE; i++)
```

```
        for (int j = 0; j < SIZE; j++)
```

```
            keyTable[i][j] = (i * SIZE + j < strlen(key)) ? key[k++] : *alpha++;
```

```
}
```

```
// Function to find the position of a character in the Playfair Square
```

```
void findPosition(char keyTable[SIZE][SIZE], char ch, int *row, int *col) {
```

```
    for (*row = 0; *row < SIZE; (*row)++)
```

```
        for (*col = 0; *col < SIZE; (*col)++)
```

```
            if (keyTable[*row][*col] == ch)
```

```
                return;
```

```
}
```

```
// Function to perform Playfair encryption or decryption
```

```
void playfair(char keyTable[SIZE][SIZE], char message[], char result[]) {
```

```
    for (int i = 0, k = 0; i < strlen(message); i += 2) {
```

```
        int row1, col1, row2, col2;
```

```
        findPosition(keyTable, message[i], &row1, &col1);
```

```
        findPosition(keyTable, message[i + 1], &row2, &col2);
```

```
        result[k++] = (row1 != row2 && col1 != col2) ? keyTable[row1][col2] :  
keyTable[row1][(col1 + 1) % SIZE];
```

```
        result[k++] = (row1 != row2 && col1 != col2) ? keyTable[row2][col1] :  
keyTable[row2][(col2 + 1) % SIZE];
```

```
    }
```

```
    result[strlen(message)] = '\0';
```

```
}
```

```
int main() {  
  
    char key[25], message[100], result[100];  
  
    char keyTable[SIZE][SIZE];  
  
    // Input the key  
  
    printf("Enter the key: ");  
  
    scanf("%s", key);  
  
    // Input the message  
  
    printf("Enter the message to be encrypted: ");  
  
    scanf("%s", message);  
  
    // Prepare the Playfair Square key table  
  
    prepareKeyTable(key, keyTable);  
  
    // Perform Playfair encryption or decryption  
  
    playfair(keyTable, message, result);  
  
    // Display the encrypted/decrypted message  
  
    printf("Encrypted/Decrypted message: %s\n", result);  
  
    return 0;  
}
```

Input and Output:

The screenshot displays a C++ IDE with the following components:

- Code Editor:** Contains the source code for `playfair.cpp`. The code includes headers, defines a constant `SIZE` as 5, and implements functions `prepareKeyTable`, `findPosition`, and `playfair`. The `main` function takes a key and a message as input.
- Output Window:** Shows the program's execution. It prompts for a key (EXAMPLE) and a message (HELLO), then outputs the encrypted message (DPEE). It also displays a message box indicating the process exited after 5.45 seconds.
- Compiler Output:** Shows a warning: "[Warning] deprecated conversion from string constant to 'char*' [-Wwrite-strings]".
- Status Bar:** Indicates the current line (33), column (31), and selection (0). It also shows the file length (1547) and parsing time (0.092 seconds).

Result: A c program for demonstration of encrypting and decrypting the messages by Playfair Substitution technique is successfully executed.

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