Исходный текст программы

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

#define MAXLEN 256

typedef struct userStruct {
    int id;
    char *fullName;
    int age;
    char *profession;
    float friendsRating;
    float publicRating;
    int friendsCount;
    int friendsId[MAXLEN];
} User;

char **simpleSplit(char *str, int length, char sep);
void simpleSplitInt(const char *str, char sep, int arr[]);
User *fillStruct(char **str);
int cmp(const void *a, const void *b);
void sortStructs(User **users, int count);
void printHeader();
void printUser(User *user);
void printAllUsers(User **users, int count);
void trim(char *str);
void clearConsole();
void addUser(User ***usersPtr, int *count, int *n);
int startsWithIgnoreCase(const char *str, const char *prefix);
void clearStruct(User *user);

int main() {
    User **users = NULL;
    int slen, i, n, count, j;
    char sep;
    char temp[MAXLEN];
    char **splitArray;
    char ask;
```

```
FILE *file;

file = fopen("index.csv", "r");
if (file != NULL) {
    n = 0;
    while ((fgets(temp, MAXLEN, file)) != NULL) n++;
    rewind(file);

    users = (User **)malloc((n + 50) * sizeof(User *));
    if (users != NULL) {
        sep = ';';
        puts("Initial array:");
        printHeader();

        for (i = 0, count = 0; i < n; i++, count++) {
            fgets(temp, MAXLEN, file);
            slen = strlen(temp);
            temp[slen - 1] = '\0';

            splitArray = simpleSplit(temp, slen, sep);
            if (splitArray != NULL) {
                users[i] = fillStruct(splitArray);
                if (users[i] != NULL) printUser(users[i]);
                else {
                    puts("Structure not allocated!");
                    i = n;
                }
            }
            else {
                puts("Error data reading");
                i = n;
            }
        }
    }
    else puts("Out of memory!");
    fclose(file);
}
else perror("Failed to open file");

if (users && n && count == n) {
```

```
do {
    printf("\nDo you want to add another user? (y/n): ");
    scanf(" %c", &ask);
    getchar();
    if (ask == 'y' || ask == 'Y') {
        clearConsole();
        addUser(&users, &count, &n);
    }
} while (ask == 'y' || ask == 'Y');

clearConsole();
printf("Press ENTER to see all users sorted by number of friends ");
getchar();
sortStructs(users, count);
printAllUsers(users, count);

printf("\nYou can now sort users by either name or profession. Choose one option (1 or 2): ");
scanf("%c", &ask);
if (ask != '1' && ask != '2') {
    printf("invalid option");
} else if (ask == '1') {
    clearConsole();
    printf("Enter the user name: ");
    scanf("%s", temp);
    getchar();
    printf("\n");
    printHeader();
    j = 0;
    for (i = 0; i < count; i++) {
        if (startsWithIgnoreCase(users[i]->fullName, temp)) {
            printUser(users[i]);
            j++;
        }
    }
    if (j == 0) {
        printf("\nNo user seems to match your input.\n");
    }
} else {
    clearConsole();
    printf("Enter the name of profile image : ");
```

```
            scanf("%s", temp);
            getchar();
            printf("\n");
            printHeader();
            j = 0;
            for (i = 0; i < count; i++) {
                if (startsWithIgnoreCase(users[i]->profession, temp)) {
                    printUser(users[i]);
                    j++;
                }
            }
            if (j == 0) {
                printf("\nNo user seems to match your input.\n");
            }
        }

        for (i = 0; i < count; i++) clearStruct(users[i]);
        free(users);
        users = NULL;
    } else puts("No data found!");

    return 0;
}

char **simpleSplit(char *str, int length, char sep) {
    int count = 0;
    int i = 0;
    int start = 0;
    int j = 0;
    int wordLen = 0;
    char **result = NULL;
    char *newStr = NULL;
    int allocError = 0;

    for (i = 0; i < length; i++) {
        if (str[i] == sep) count++;
    }
    count++;

    result = malloc(count * sizeof(char *));
```

```
    if (result == NULL) {
        perror("Memory allocation failed");
    } else {
        for (i = 0; i < length; i++) {
            if (str[i] == sep || str[i] == '\0') {
                wordLen = i - start;
                newStr = malloc((wordLen + 1) * sizeof(char));
                if (newStr == NULL) {
                    perror("Memory allocation failed");
                    allocError = 1;
                    i = length;
                } else {
                    strncpy(newStr, str + start, wordLen);
                    newStr[wordLen] = '\0';
                    result[j++] = newStr;
                    start = i + 1;
                }
            }
        }

        if (allocError) {
            for (i = 0; i < j; i++) {
                free(result[i]);
            }
            free(result);
            result = NULL;
        }
    }

    return result;
}

void simpleSplitInt(const char *str, char sep, int arr[]) {
    int count = 0;
    int start = 0;
    int i, len;
    char tempStr[MAXLEN];

    for (i = 0; i < MAXLEN; i++) {
        arr[i] = 0;
```

```
    }

    for (i = 0; str[i] != '\0'; i++) {
        if (str[i] == sep || str[i + 1] == '\0') {
            len = (str[i] == sep) ? (i - start) : (i - start + 1);
            strncpy(tempStr, str + start, len);
            tempStr[len] = '\0';

            arr[count++] = atoi(tempStr);

            start = i + 1;
        }
    }
}

User *fillStruct(char **str) {
    User *user = NULL;
    user = (User*)malloc(sizeof(User));

    if (user != NULL) {
        user->id = atoi(str[0]);
        free(str[0]);
        user->fullName = str[1];
        user->age = atoi(str[2]);
        free(str[2]);
        user->profession = str[3];
        user->friendsRating = atof(str[4]);
        free(str[4]);
        user->publicRating = atof(str[5]);
        free(str[5]);
        user->friendsCount = atoi(str[6]);
        free(str[6]);

        simpleSplitInt(str[7], ',', user->friendsId);
        free(str[7]);

        free(str);
    }

    return user;
```

```
}


void printHeader() {
    printf("%-3s %-20s %-5s %-15s %-15s %-15s %-15s %-20s\n",
           "ID", "Full Name", "Age", "Profession", "Friends Rating", "Public Rating", "Friends Count",
"Friends IDs");
}


void printUser(User *user) {
    int i;
    printf("%-3d %-20s %-5d %-15s %-15.1f %-15.1f %-15d ",
           user->id, user->fullName, user->age, user->profession, user->friendsRating, user->publicRating,
user->friendsCount);


    printf("[");
    for (i = 0; i < user->friendsCount; i++) {
        printf("%d", user->friendsId[i]);
        if (i < user->friendsCount - 1) {
            printf(", ");
        }
    }
    printf("]\n");
}


void addUser(User ***usersPtr, int *count, int *n) {
    User **newUsers;
    User *newUser;
    char tempStr[MAXLEN];
    int tempId, tempAge;
    float tempFriendsRating, tempPublicRating;
    int tempFriendsCount;
    char *tempFullName, *tempProfileImg;


    if (*(count) == *(n)) {
        newUsers = realloc(*usersPtr, ((*count) * 2) * sizeof(User *));
        (*n) = (*count) * 2;
    } else {
        newUsers = *usersPtr;
    }
    if (newUsers == NULL) {
        perror("Memory allocation failed");
```

```
} else {
    *usersPtr = newUsers;

    newUser = malloc(sizeof(User));
    if (newUser == NULL) {
        perror("Memory allocation failed");
    } else {
        (*usersPtr)[*count] = newUser;

        printf("Enter user ID: ");
        scanf("%d", &tempId);
        getchar();
        newUser->id = tempId;

        printf("Enter full name: ");
        newUser->fullName = malloc(MAXLEN * sizeof(char));
        if (newUser->fullName == NULL || fgets(newUser->fullName, MAXLEN, stdin) == NULL) {
            perror("Failed to read full name or allocate memory");
            free(newUser);
        } else {
            trim(newUser->fullName);
            printf("Enter age: ");
            scanf("%d", &tempAge);
            getchar();
            newUser->age = tempAge;

            printf("Enter profession: ");
            newUser->profession = malloc(MAXLEN * sizeof(char));
            if (newUser->profession == NULL || fgets(newUser->profession, MAXLEN, stdin) == NULL) {
                perror("Failed to read image filename or allocate memory");
                free(newUser->fullName);
                free(newUser);
            } else {
                trim(newUser->profession);
                printf("Enter friends rating: ");
                scanf("%f", &tempFriendsRating);
                newUser->friendsRating = tempFriendsRating;

                printf("Enter public rating: ");
                scanf("%f", &tempPublicRating);
```

```
                    newUser->publicRating = tempPublicRating;

                    printf("Enter friends count: ");
                    scanf("%d", &tempFriendsCount);
                    getchar();
                    newUser->friendsCount = tempFriendsCount;

                    printf("Enter friends IDs (example: 1,2,3,4): ");
                    scanf("%s", tempStr);
                    getchar();
                    simpleSplitInt(tempStr, ',', newUser->friendsId);

                    printf("\nNew user successfully added!\n");

                    (*count)++;
                }
            }
        }
    }
}

void clearStruct(User *user) {
    if (user != NULL) {
        free(user->fullName);
        user->fullName = NULL;

        free(user->profession);
        user->profession = NULL;

        free(user);
    }
}

int cmp(const void *a, const void *b) {
    User *userA = *(User**)a;
    User *userB = *(User**)b;

    return userB->friendsCount - userA->friendsCount;
}
```

```
void sortStructs(User **users, int count) {
    qsort(users, count, sizeof(User*), cmp);
}

void printAllUsers(User **users, int count) {
    int i;
    printHeader();
    for (i = 0; i < count; i++) {
        printUser(users[i]);
    }
}

void clearConsole() {
    #if defined(_WIN32) || defined(_WIN64)
        system("cls");
    #else
        system("clear");
    #endif
}

void trim(char *str) {
    int i = 0;

    for (i = 0; i < MAXLEN; i++) {
        if (str[i] == '\n' || str[i] == '\r') {
            str[i] = '\0';
            i = MAXLEN;
        }
    }
}

int startsWithIgnoreCase(const char *str, const char *prefix) {
    int isPrefix = 1;

    while (*str && *prefix && isPrefix) {
        if (tolower(*str) != tolower(*prefix)) {
            isPrefix = 0;
        }
        str++;
        prefix++;
```

```
    }
    if (*prefix != '\0') {
        isPrefix = 0;
    }

    return isPrefix;
}
```

Контрольные примеры

Пример:

```
Initial array:
ID  Full Name           Age   Profession      Friends Rating  Public Rating   Friends Count   Friends IDs
1   John Doe            30    teacher         4.5             3.9             3               [2, 5, 7]
2   Jane Smith          25    engeneer        3.8             4.1             2               [1, 3]
3   Alice Johnson       28    driver          4.2             3.7             4               [1, 2, 6, 8]
4   Michael Brown       33    pilot           3.9             4.0             5               [3, 6, 9, 10, 2]
5   Emily Davis         27    dentist         4.1             3.8             3               [1, 2, 3]
6   David Wilson        35    actor           4.0             4.2             2               [5, 2]
7   Linda Martinez      32    actor           3.9             3.7             4               [4, 6, 5, 1]
8   Robert White        29    teacher         4.3             3.8             3               [1, 2, 3]
9   Sarah Taylor        31    teacher         4.0             4.1             5               [8, 5, 6, 3, 1]
10  James Anderson      34    pilot           4.2             3.9             2               [1, 2]
11  Davidios Morgan     20    teacher         2.0             1.0             0               []


Do you want to add another user? (y/n): y


Enter user ID: 12
Enter full name: newUser
Enter age: 12
Enter profession: pilot
Enter friends rating: 4.3
Enter public rating: 4.0
Enter friends count: 3
Enter friends IDs (example: 1,2,3,4): 1,4,6


New user successfully added!
Do you want to add another user? (y/n): n


Press ENTER to see all users sorted by number of friends
ID  Full Name           Age   Profession      Friends Rating  Public Rating   Friends Count   Friends IDs
9   Sarah Taylor        31    teacher         4.0             4.1             5               [8, 5, 6, 3, 1]
4   Michael Brown       33    pilot           3.9             4.0             5               [3, 6, 9, 10, 2]
3   Alice Johnson       28    driver          4.2             3.7             4               [1, 2, 6, 8]
```

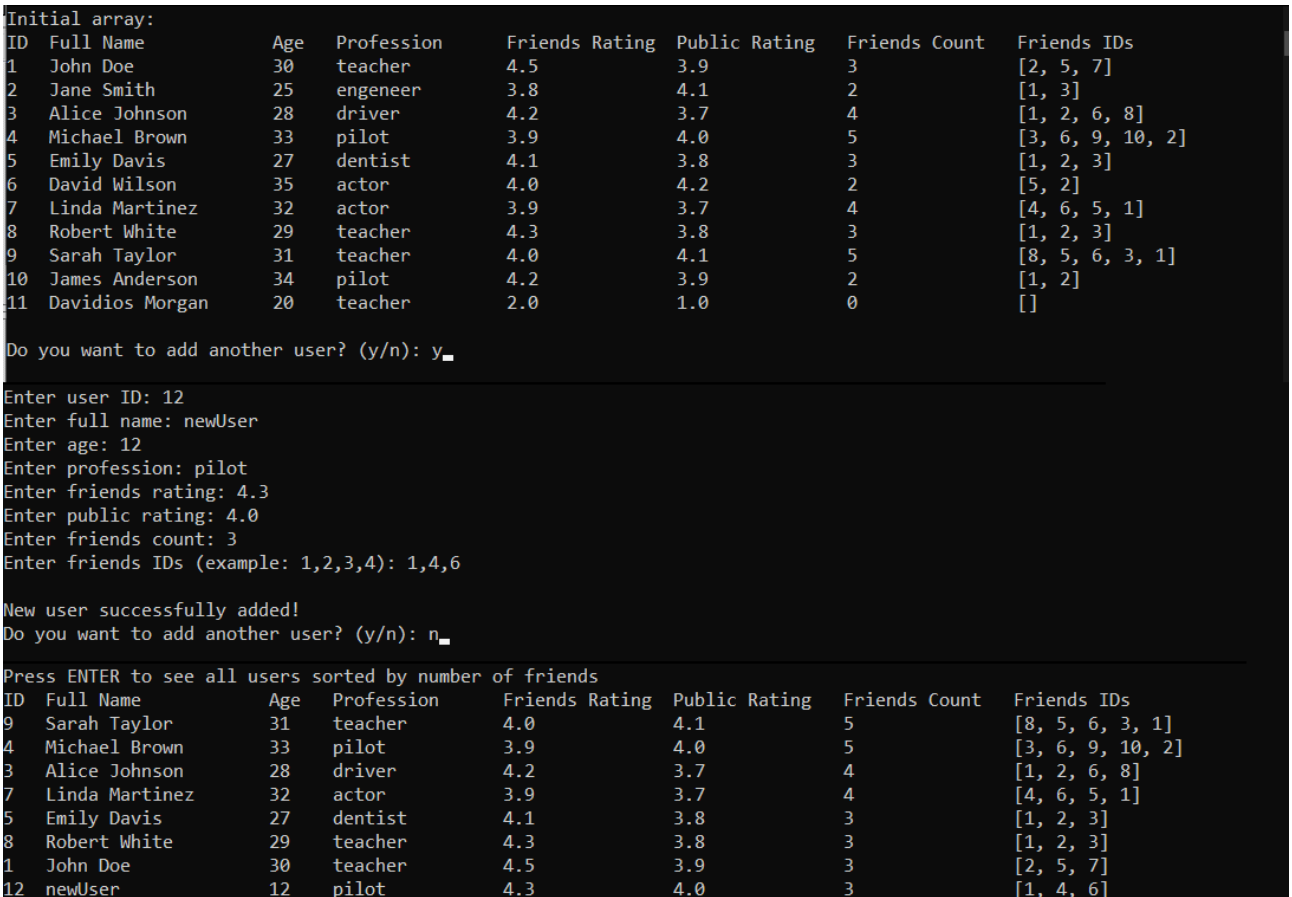
```
7   Linda Martinez      32   actor        3.9             3.7             4              [4, 6, 5, 1]
5   Emily Davis         27   dentist      4.1             3.8             3              [1, 2, 3]
8   Robert White        29   teacher      4.3             3.8             3              [1, 2, 3]
1   John Doe            30   teacher      4.5             3.9             3              [2, 5, 7]
12  newUser             12   pilot        4.3             4.0             3              [1, 4, 6]
10  James Anderson      34   pilot        4.2             3.9             2              [1, 2]
2   Jane Smith          25   engeneer     3.8             4.1             2              [1, 3]
6   David Wilson        35   actor        4.0             4.2             2              [5, 2]
11  Davidios Morgan     20   teacher      2.0             1.0             0              []


You can now sort users by either name or profession. Choose one option (1 or 2): 1


Enter the user name: dav


ID  Full Name           Age   Profession      Friends Rating  Public Rating   Friends Count   Friends IDs
6   David Wilson        35   actor        4.0             4.2             2              [5, 2]
11  Davidios Morgan     20   teacher      2.0             1.0             0              []
```

Примеры выполнения программы



Выводы.

В результате выполнения лабораторной работы были получены навыки работы с указателями на структуры и функциями в С.