

CSE102-Assignment_9

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```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <string.h>
4 #define MAX_SIZE 500
5
6 typedef struct {
7     char map[MAX_SIZE][MAX_SIZE]; /* 2D array to represent the forest*/
8     int width;
9     int height;
10    int flower_x[MAX_SIZE]; /* X coordinate of the rare flower*/
11    int flower_y[MAX_SIZE]; /* Y coordinate of the rare flower*/
12 } Forest;
13
14 /* Define structure for the botanist*/
15 typedef struct {
16     int coord_x; /*X coordinate of the botanist*/
17     int coord_y; /*Y coordinate of the botanist*/
18     int number_of_bottles; /*Number of bottles the botanist has*/
19     int flowers_collected; /*Number of rare flowers collected*/
20 } Botanist;
21 void init_game(Forest* forest, Botanist* botanist);
22 void search(Forest* forest, Botanist* botanist);
23 void display_forest(Forest* forest, Botanist* botanist);
24 void save_game_state(Forest* forest, Botanist* botanist);
25 int search_flower(Forest* forest, Botanist* botanist);
26
```

Function prototypes and struct types.

```

1 void init_game(Forest *forest, Botanist *botanist)
2 {
3     int i, j, k = 0;
4     FILE *file = fopen("init2.txt", "r");
5     if (file == NULL)
6     {
7         printf("File could not be opened.");
8         exit(1);
9     }
10    fscanf(file, " %d,%d\n%d,%d,%d\n", &forest->height, &forest->width, &botanist->coord_y, &botanist->coord_x, &botanist->number_of_bottles);
11    /*Read the forest*/
12    for (i = 0; i < forest->height; i++)
13    {
14        for (j = 0; j < forest->width; j++)
15        {
16            fscanf(file, "%c", &forest->map[i][j]);
17        }
18        fscanf(file, "\n");
19    }
20    /*Find the flower coordinates*/
21    for (i = 0; i < forest->height; i++)
22    {
23        for (j = 0; j < forest->width; j++)
24        {
25            if (forest->map[i][j] == 'X')
26            {
27                forest->flower_x[k] = i;
28                forest->flower_y[k] = j;
29                k++;
30                break;
31            }
32        }
33    }
34    fclose(file);
35 }

```

The search function manages the gameplay in a botanist-themed game. It prompts the player to move their character through a forest using simple directional input (w, a, s, d). The character can collect rare flowers while avoiding obstacles like walls and trees. The function offers the option to save the game and exits gracefully when necessary.

```

1 void search(Forest* forest, Botanist* botanist) /*Function to handle the botanist's movements. It takes input from the user and moves the botanist accordingly.*/
2 {
3     char direction;
4     int flag = 1;
5     /*If botanist has no bottles left, end the game*/
6     if(botanist->number_of_bottles == 0)
7     {
8         printf("You have no bottles left. Game over!\n");
9         printf("Games last state saved in a file!\n");
10        save_game_state(forest, botanist);
11        exit(1);
12    }
13    printf("Enter your move (w/a/s/d): \n");
14    printf("If you want to end the game and save it to a file, press 'e'\n");
15    scanf(" %c", &direction);
16    switch(direction)
17    {
18        case 'u':
19            if(forest->map[botanist->coord_y - 1][botanist->coord_x] == 'X')
20            {
21                printf("You found the rare flower!\n");
22                botanist->flowers_collected += 1;
23                botanist->number_of_bottles -= 1;
24                forest->map[botanist->coord_y][botanist->coord_x] = ' ';
25                forest->map[botanist->coord_y-1][botanist->coord_x] = 'B';
26                botanist->coord_y -= 1;
27            }
28            else if((botanist->coord_y) == 0)
29            {
30                printf("You hit the wall. Try another move!\n");
31                break;
32            }
33            else if(forest->map[botanist->coord_y - 1][botanist->coord_x] == 'T')
34            {
35                printf("You hit the tree. Try another move!\n");
36                break;
37            }
38            else
39            {
40                printf("Moving in that location\n");
41                forest->map[botanist->coord_y][botanist->coord_x] = ' ';
42                forest->map[botanist->coord_y-1][botanist->coord_x] = 'B';
43                botanist->coord_y -= 1;
44            }
45            break;
46        case 'd':
47            if(forest->map[botanist->coord_y + 1][botanist->coord_x] == 'X')
48            {
49                printf("\nI've found it!\n");
50                botanist->flowers_collected += 1;
51                botanist->number_of_bottles -= 1;
52                forest->map[botanist->coord_y][botanist->coord_x] = ' ';
53                forest->map[botanist->coord_y + 1][botanist->coord_x] = 'B';
54                botanist->coord_y += 1;
55            }
56            else if((botanist->coord_y) == forest->height - 1)
57            {
58                printf("You hit the wall. Try another move!\n");
59                break;
60            }
61            else if(forest->map[botanist->coord_y + 1][botanist->coord_x] == 'T')
62            {
63                printf("You hit the tree. Try another move!\n");
64                break;
65            }
66            else
67            {
68                printf("Moving in that location\n");
69                forest->map[botanist->coord_y][botanist->coord_x] = ' ';
70                forest->map[botanist->coord_y + 1][botanist->coord_x] = 'B';
71                botanist->coord_y += 1;
72            }
73            break

```

```

1  case 'l':
2      if(forest->map[botanist->coord_y][botanist->coord_x - 1] == 'X')
3      {
4          printf("You found the rare flower!\n");
5          botanist->flowers_collected += 1;
6          botanist->number_of_bottles -= 1;
7          forest->map[botanist->coord_y][botanist->coord_x] = ' ';
8          forest->map[botanist->coord_y][botanist->coord_x-1] = 'B';
9          botanist->coord_x -= 1;
10     }
11     else if((botanist->coord_x) == 0)
12     {
13         printf("You hit the wall. Try another move!\n");
14         break;
15     }
16     else if(forest->map[botanist->coord_y][botanist->coord_x - 1] == 'T')
17     {
18         printf("You hit the tree. Try another move!\n");
19         break;
20     }
21     else
22     {
23         printf("Moving in that location\n");
24         forest->map[botanist->coord_y][botanist->coord_x] = ' ';
25         forest->map[botanist->coord_y][botanist->coord_x-1] = 'B';
26         botanist->coord_x -= 1;
27     }
28     break;
29 case 'r':
30     if(forest->map[botanist->coord_y][botanist->coord_x + 1] == 'X')
31     {
32         printf("You found the rare flower!\n");
33         botanist->flowers_collected += 1;
34         botanist->number_of_bottles -= 1;
35         forest->map[botanist->coord_y][botanist->coord_x] = ' ';
36         forest->map[botanist->coord_y][botanist->coord_x+1] = 'B';
37         botanist->coord_x += 1;
38     }
39     else if((botanist->coord_x) == forest->width - 1)
40     {
41         printf("You hit the wall. Try another move!\n");
42         break;
43     }
44     else if(forest->map[botanist->coord_y][botanist->coord_x + 1] == 'T')
45     {
46         printf("You hit the tree. Try another move!\n");
47         break;
48     }
49     else
50     {
51         forest->map[botanist->coord_y][botanist->coord_x] = ' ';
52         forest->map[botanist->coord_y][botanist->coord_x+1] = 'B';
53         botanist->coord_x += 1;
54     }
55     break;
56 case 'e':
57     save_game_state(forest, botanist); /*Pressing 'e' to end the game and save it*/
58     flag = 0;
59     break;
60 default: /*Default case for invalid input*/
61     printf("Enter a valid character!\n");
62     break;
63 }

```

The search function allows the botanist to navigate through the forest, searching for rare flowers while managing their resources. It takes input from the user to determine the direction of movement (up, down, left, or right) within the forest grid. The function checks for valid movements, such as avoiding walls and trees, and updates the botanist's position accordingly. If the botanist encounters a rare flower, it collects the flower, decrements the bottle count, and updates the forest map. Additionally, the function provides an option to end the game and save the current state to a file. After each movement, the function checks if all rare flowers have been collected. If so, it ends the game and saves the final state. If not, it continues the search until all flowers are found or the game is ended by the user.

```
1 void display_forest(Forest *forest, Botanist *botanist)
2 {
3     int i, j;
4     /*Loop through the forest map and print each cell's contents*/
5     for (i = 0; i < forest->height; i++)
6     {
7         for (j = 0; j < forest->width; j++)
8         {
9             printf("%c", forest->map[i][j]);
10            if (j < forest->width - 1)
11            {
12                printf(",");
13            }
14        }
15        printf("\n");
16    }
17    printf("\nNot used bottle number: %d\n", botanist->number_of_bottles);
18    printf("Number of flowers collected: %d\n", botanist->flowers_collected);
19    printf("Botanist coordinates: X:%d,Y:%d\n\n", botanist->coord_x, botanist->coord_y);
20 }
```

The `display_forest()` function is responsible for presenting the current state of the forest and the botanist to the user. It iterates through the forest map, printing the contents of each cell, separated by commas to represent the grid layout. Additionally, it prints the number of unused bottles, the number of flowers collected, and the coordinates of the botanist.

```

1 void save_game_state(Forest* forest, Botanist* botanist)
2 {
3     int i,j;
4     FILE *file = fopen("last.txt", "w");
5     if (file == NULL)
6     {
7         printf("File could not be opened.");
8         exit(1);
9     }
10    /*Write forest dimensions and botanist info to the file*/
11    fprintf(file, "%d,%d,%d,%d\n", forest->height, forest->width, botanist->coord_y, botanist->coord_x, botanist->number_of_bottles);
12    for (i = 0; i < forest->height; i++) /*Write the forest map to the file*/
13    {
14        for (j = 0; j < forest->width; j++)
15        {
16            fprintf(file, "%c,", forest->map[i][j]);
17        }
18        fprintf(file, "\n");
19    }
20    fprintf(file, "\nNot used bottle number: %d\n", botanist->number_of_bottles);
21    fprintf(file, "Number of flowers collected: %d\n", botanist->flowers_collected);
22    fprintf(file, "Botanist coordinates: X:%d,Y:%d\n\n", botanist->coord_x, botanist->coord_y);
23 }

```

The `save_game_state` function is responsible for storing the current state of the game to a file named "last.txt". It opens the file in write mode. Then, it writes important game data to the file, including the dimensions of the forest, the coordinates and number of bottles of the botanist, and the layout of the forest map. Additionally, it records the number of unused bottles, the number of flowers collected, and the current coordinates of the botanist. This function facilitates saving the game progress so that the player can resume the game later from the same state.

```

1 int search_flower(Forest* forest, Botanist* botanist)/*Function to search for rare flowers in the forest. Returns 1 if flower found, 0 otherwise.*/
2 {
3     int i, j;
4     for (i = 0; i < forest->height; i++) /*Loop through the forest map to search for the rare flower*/
5     {
6         for (j = 0; j < forest->width; j++)
7         {
8             if (forest->map[i][j] == 'X')
9             {
10                return 1; /*Rare flower found*/
11            }
12        }
13    }
14    return 0; /*Rare flower not found*/
15 }

```

The `search_flower` function iterates through the forest map to locate any rare flowers ('X'). If a rare flower is found, the function returns 1, indicating that a rare flower is present in the forest. If no rare flowers are found after searching the entire forest, the function returns 0, indicating that no rare flowers are present.

INPUT(Hitting the wall)-OUTPUT

```
T,T,T,T,T,T,T,T,T,T
B, , , ,T,T, , , ,T
T, ,T, , , , ,T, ,T
T, ,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , , ,T
T, ,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T
```

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:0,Y:1

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
l

You hit the wall. Try another move!

```
T,T,T,T,T,T,T,T,T,T
B, , , ,T,T, , , ,T
T, ,T, , , , ,T, ,T
T, ,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , , ,T
T, ,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T
```

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:0,Y:1

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'

█

INPUT(Hitting the tree)-OUTPUT

```
Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
r
T,T,T,T,T,T,T,T,T,T
, , ,B,T,T, , , ,T
T, ,T, , , , ,T, ,T
T, ,T,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , , ,T
T, ,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:3,Y:1

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
r
You hit the tree. Try another move!
T,T,T,T,T,T,T,T,T,T
, , ,B,T,T, , , ,T
T, ,T, , , , ,T, ,T
T, ,T,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , , ,T
T, ,T,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:3,Y:1

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
█
```


INPUT(Exit with "e")-OUTPUT

```
Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
r
T,T,T,T,T,T,T,T,T,T
, , , ,T,T, , , ,T
T, ,T, , , ,B,T, ,T
T, ,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , ,T
T, ,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:6,Y:2

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
e
Game saved to file (last.txt).
```

INPUT (The game ends when the flowers run out)-OUTPUT

```
If you want to end the game and save it to a file, press 'e'
d
Moving in that location
T,T,T,T,T,T,T,T,T,T
, , , ,T,T, , , ,T
T, ,T, , , ,T, ,T
T, ,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , ,T
T, ,T,T,T,T,B,T, ,T
T, , ,T, ,T,X,T,T,T

Not used bottle number: 100
Number of flowers collected: 0
Botanist coordinates: X:6,Y:8

Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
d

I've found it!
You have collected all the rare flowers!
Game saved to file (last.txt).
```

INPUT(The game ends when the bottles run out)-OUTPUT

```
Enter your move (w/a/s/d):
If you want to end the game and save it to a file, press 'e'
r
You found the rare flower!
T,T,T,T,T,T,T,T,T
, , , ,T,T, , , ,T
T, ,T, ,B, , ,T, ,T
T, ,T,T,T,T, ,T, ,T
T, ,T, , , , ,T,T,T
T, ,T, ,T, , , , ,T
T, ,T, ,T,T,T,T,T,T
T, ,T, , , , , , ,T
T, ,T,T,T,T, ,T, ,T
T, , ,T, ,T,X,T,T,T

Not used bottle number: 0
Number of flowers collected: 1
Botanist coordinates: X:4,Y:2

You have no bottles left. Game over!
Games last state savd in a file!
```

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