Code:

```c
// Headers for library functions
#include <stdio.h>
#include <stdbool.h>
#include <stdlib.h>

// Global variables
int size;
int count;
double *v;

// Initalize the global variables. Allocate some space for the vector
void initalize() {
    size = 2;
    count = 0;
    v = malloc(size * sizeof(double));
}

// Free the allocated memory
void finalize() {
    free(v);
}


// Print the menu and get a selection from the user
int print_menu() {
    int sel;

    printf("Main menu:\n\n" );
    printf("1. Print the array\n" );
    printf("2. Append element at the end\n" );
    printf("3. Remove last element\n" );
    printf("4. Insert one element\n" );
    printf("5. Exit\n\n" );
    printf("Select an option: " );

    // Scan a digit from the user
    scanf("%d", &sel);

    // Return the chosen digit
    return sel;
}
```

```
// Run the main loop
int run() {
    int sel;

    // While true
    while(true) {

    // Print the menu and get selection
    sel = print_menu();

        // Next step depends on the selection made
        switch(sel) {

            // User chose 1
            case 1:
                printf("You selected \"Print the Array\"\n\n");
                break;

            // User chose 2
            case 2:
                printf("You selected \"Append element at the end\"\n\n");
                break;

            // User chose 3
            case 3:
                printf("You selected \"Remove last element\"\n\n");
                break;

            // User chose 4
            case 4:
                printf("You selected \"Insert one element\"\n\n");
                break;

            // User chose 5
            case 5:
                printf("You selected \"Exit\"\n\n");

                // Return here, with no erros, to exit the function.
                // Clean up will be next
                return 0;
```

```
            // User chose something else
            default:
                printf("Please enter a valid number from the menu!\n\n");
                break;
        }
    }
}
```

```
// Main function, argc and argv are unused in this case
int main (int argc, char *argv[]) {

    // Initalize the globals
    initalize();

    // Run the loop
    run();

    // Clean up
    finalize();

    // Return with no errors
    return 0;
}
```

Running the program:

```
Linok-2 :: Desktop/Embedded Des Enabling Robotics/lab1 » gcc lab1.c -o lab1
Linok-2 :: Desktop/Embedded Des Enabling Robotics/lab1 » ./lab1
Main menu:

1. Print the array
2. Append element at the end
3. Remove last element
4. Insert one element
5. Exit

Select an option:
```

```
Select an option: 1
You selected "Print the Array"

Main menu:

1. Print the array
2. Append element at the end
3. Remove last element
4. Insert one element
5. Exit

Select an option:
```

```
Select an option: 2
You selected "Append element at the end"
```

```
Select an option: 3
You selected "Remove last element"
```

```
Select an option: 4
You selected "Insert one element"
```

```
Select an option: 5
You selected "Exit"

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```

```
Select an option: 6
Please enter a valid number from the menu!
```