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**Data Structures Assignment 1**

**Question : Write a program to implement Linear Search and Binary Search.**

**Code:**

#include <stdio.h>

void linearSearch(int arr[], int size, int key);

void binarySearch(int arr[], int size, int key);

int main() {

int arr[100], n, choice = 0, key, i;

printf("Enter the number of elements in the array: ");

scanf("%d", &n);

printf("Enter %d elements (sorted for Binary Search to work):\n", n);

for (i = 0; i < n; i++) {

scanf("%d", &arr[i]);

}

while (choice != 3) {

printf("\nMenu:\n");

printf("1. Linear Search\n");

printf("2. Binary Search\n");

printf("3. Exit\n");

printf("Enter your choice: ");

if (scanf("%d", &choice) != 1) {

printf("Invalid input. Please enter a valid choice.\n");

while (getchar() != '\n'); // Clear the input buffer

continue;

}

if (choice == 1) {

printf("Enter the element to search (Linear Search): ");

scanf("%d", &key);

linearSearch(arr, n, key);

} else if (choice == 2) {

printf("Enter the element to search (Binary Search): ");

scanf("%d", &key);

binarySearch(arr, n, key);

} else if (choice == 3) {

printf("Exiting the program.\n");

} else {

printf("Invalid choice! Please try again.\n");

}

}

return 0;

}

void linearSearch(int arr[], int size, int key) {

int i, comparisons = 0;

for (i = 0; i < size; i++) {

comparisons++;

if (arr[i] == key) {

printf("Element %d found at position %d.\n", key, i + 1);

printf("Number of comparisons: %d\n", comparisons);

return;

}

}

printf("Element %d not found in the array.\n", key);

printf("Number of comparisons: %d\n", comparisons);

}

void binarySearch(int arr[], int size, int key) {

int low = 0, high = size - 1, mid, comparisons = 0;

while (low <= high) {

comparisons++;

mid = (low + high) / 2;

if (arr[mid] == key) {

printf("Element %d found at position %d.\n", key, mid + 1);

printf("Number of comparisons: %d\n", comparisons);

return;

} else if (arr[mid] < key) {

low = mid + 1;

} else {

high = mid - 1;

}

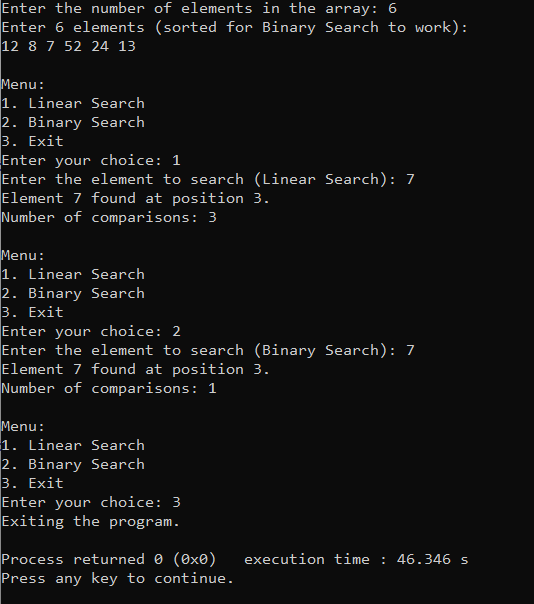
}

printf("Element %d not found in the array.\n", key);

printf("Number of comparisons: %d\n", comparisons);

}

**Output:**

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