```
#include <iostream>
#include <vector>
using namespace std;

// Function to perform Shell Sort
void shellSort(vector<int>& arr) {
    int n = arr.size();
    // Start with a big gap, then reduce the gap
    for (int gap = n / 2; gap > 0; gap /= 2) {
        // Do a gapped insertion sort
        for (int i = gap; i < n; i++) {
            int temp = arr[i];
            int j;
            for (j = i; j >= gap && arr[j - gap] > temp; j -= gap) {
                arr[j] = arr[j - gap];
            }
            arr[j] = temp;
        }
    }
}

// Function to display the array
void display(const vector<int>& arr) {
    cout << "Array: ";
    for (int num : arr)
        cout << num << " ";
    cout << endl;
}

// Function to input the array from the user
vector<int> inputArray() {
    int n;
    cout << "Enter number of elements: ";
    cin >> n;
    vector<int> arr(n);
    cout << "Enter the elements:\n";
    for (int i = 0; i < n; i++)
        cin >> arr[i];
    return arr;
}

// Main function with menu
int main() {
    vector<int> array;
    int choice;

    do {
        cout << "\n--- Shell Sort Menu ---\n";
        cout << "1. Input Array\n";
        cout << "2. Display Array\n";
        cout << "3. Perform Shell Sort\n";
        cout << "4. Exit\n";
        cout << "Enter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1:
                array = inputArray();
                break;

            case 2:
                if (!array.empty())
```

```
                    display(array);
                else
                    cout << "Array not initialized. Please input the array first.\n";
                break;

            case 3:
                if (!array.empty()) {
                    shellSort(array);
                    cout << "Array sorted using Shell Sort.\n";
                } else {
                    cout << "Array not initialized. Please input the array first.\n";
                }
                break;

            case 4:
                cout << "Exiting program...\n";
                break;

            default:
                cout << "Invalid choice. Please try again.\n";
        }
    } while (choice != 4);

    return 0;
}
```