Write a MPI Program demonstration of MPI_Scatter and MPI_Gather

```
#include <mpi.h>
#include <stdio.h>
int main(int argc, char** argv) {
    MPI_Init(&argc, &argv);  // Initialize MPI
    int rank, size;
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);  // Process ID
    MPI_Comm_size(MPI_COMM_WORLD, &size);  // Total number of processes
    int send_data[100];  // Large enough for demo
    int recv_value;
    int result[100];     // To gather results
    if (rank == 0) {
        // Root initializes an array with values
        for (int i = 0; i < size; i++) {
            send_data[i] = (i + 1) * 10;
        }
        printf("Root is scattering: ");
        for (int i = 0; i < size; i++) {
            printf("%d ", send_data[i]);
        }
        printf("\n");
    }
    // Scatter one element to each process
    MPI_Scatter(send_data, 1, MPI_INT, &recv_value, 1, MPI_INT, 0,
MPI_COMM_WORLD);
    // Each process multiplies its number by 2
    recv_value *= 2;
    // Gather results at root
    MPI_Gather(&recv_value, 1, MPI_INT, result, 1, MPI_INT, 0, MPI_COMM_WORLD);
    if (rank == 0) {
        printf("Root gathered: ");
```

```
        for (int i = 0; i < size; i++) {
            printf("%d ", result[i]);
        }
        printf("\n");
    }
    MPI_Finalize();
    return 0;
}
```

Output:

Root is scattering: 10 20

Root gathered: 20 40