**CSE-467 - Parallel and Distributed Computing**

**Assignment No 7**

**Objective: Develop a Vector Dot-Product system using MPI**

The complexity of calculating dot product is O(N). Assuming that if calculating the dot-product of 1-billion numbers taking 60 minutes then the same program will take 600 minutes (10x60) for 10 billion numbers on the same computer. By distributing this task over multiple computers will reduce the execution time significantly while the complexity of the program will remains the same O(N).

You have to write a **cluster computing application (SPMD)** where Supervisor will distribute the data over network and ask the Worker to perform the given task on provided data. The flow of the applications is given below.

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| --- | --- |
| **Supervisor Application** | **Worker Applications** |
| **W = Number of Workers Available**  **S = Number of Data element**  **WL = workload = S/W**  **//distribute data**  **For(i=0; i<W; i++ )**  **Send WL Data Elements to the Worker[i]**  **If( S % W != 0)**  **Then perform the operation for remaining data elements.**  **//gather results**  **For(i=0; i<W; i++ )**  **Receive Partial Result from Worker[i]**  **Combine all results**  **Show Final Result** | **Worker # 1**   1. **Waiting for the Task and Data** 2. **Perform Operation** 3. **Return result** |
| **.**  **.**  **.**  **.**  **.** |
| **Worker # W**   1. **Waiting for the Task and Data** 2. **Perform Operation** 3. **Return result** |

**Step 1 (Data Distribution)**

**Supervisor send() Worker recv()**

**Step 2 (Perform Computing )**

**Step 3 (Results Gathering)**

**Supervisor recv() Worker send()**