Start by distributing 10,000 elements of vector A to each of the local memories (in Al) and summing each subset in parallel

\[
\text{sum} = 0; \\
\text{for } (i = 0; i < 10000; i = i + 1) \quad \text{sum} = \text{sum} + A[i]; \quad /* \text{sum local array subset} */
\]

The processors then coordinate in adding together the partial sums (Pn is the number of the processor, send(x,y) sends value y to processor x, and receive() receives a value)

\[
\text{half} = 10; \\
\text{limit} = 10; \\
\text{repeat} \\
\text{half} = (\text{half} + 1) / 2; \quad /* \text{dividing line} */ \\
\text{if} (\text{Pn} >= \text{half} \&\& \text{Pn} < \text{limit}) \quad \text{send(\text{Pn-half, sum});} \\
\text{if} (\text{Pn} < (\text{limit}/2)) \quad \text{sum} = \text{sum} + \text{receive();} \\
\text{limit} = \text{half;}
\text{until} (\text{half} == 1); \quad /* \text{final sum in P0’s sum} */
\]

1. Trace the second segment of code that adds together the partial sums assuming 10 processors.

\[
\begin{array}{ccccccccccc}
\text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} & \text{sum} \\
\text{P0} & \text{P1} & \text{P2} & \text{P3} & \text{P4} & \text{P5} & \text{P6} & \text{P7} & \text{P8} & \text{P9}
\end{array}
\]
2. For a 64 processor system, compare the interconnection network for each of the following topologies.

<table>
<thead>
<tr>
<th></th>
<th>Bus</th>
<th>Ring</th>
<th>Torus</th>
<th>6-cube</th>
<th>Fully connected</th>
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<tbody>
<tr>
<td>Network bandwidth</td>
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<td></td>
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</tr>
<tr>
<td>Bisection bandwidth</td>
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<td></td>
</tr>
<tr>
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<tr>
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<tr>
<td>Total # of links</td>
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