

cs6550

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1 Implementation

My implementation has the process with rank 0 initialize the bomb timer to a random value from 1 to 1000. It then sends the bomb to a random process.

Each process stays in an infinite loop and waits to receive the bomb. On receiving the bomb, a process outputs its rank and the current timer on the bomb before decrementing the timer and sending it to another process other than itself.

If a process decrements the bomb to a 0 then it is declared the loser and sends the final bomb timer to every other process so they can exit their loop.

2 Code

```
1 #include <iostream>
2 #include <mpi.h>
3 #include <stdlib.h>
4 #include <time.h>
5 #define MCW MPI_COMM_WORLD
6
7 using namespace std;
8
9 int main(int argc, char **argv){
10     int rank, size;
11     int data;
12     std::srand(time(nullptr));
13     int bomb = std::rand() % 1000 + 1; // Random timer from 1 - 1000
14
15     MPI_Init(&argc, &argv);
16     MPI_Comm_rank(MCW, &rank);
17     MPI_Comm_size(MCW, &size);
18
19     if (rank == 0)
20     {
21         MPI_Send(&bomb, 1, MPI_INT, std::rand() % size, 0, MCW);
22         std::cerr << "Start timer: " << bomb << std::endl;
23     }
24
25     while (true)
26     {
```

```

27     MPI_Recv(&bomb, 1, MPI_INT, MPI_ANY_SOURCE, 0, MCW,
28             MPI_STATUS_IGNORE);
29     {
30         break;
31     }
32
33     std::cerr << rank << " received bomb with " << bomb << "
34         seconds left!" << std::endl;
35
36     bomb--;
37     if (!bomb)
38     {
39         std::cerr << rank << " loses!" << std::endl;
40         for (int i = 0; i < size; i++)
41         {
42             if (i != rank)
43             {
44                 MPI_Send(&bomb, 1, MPI_INT, i, 0, MCW);
45             }
46             break;
47         }
48
49         int target = std::rand() % size;
50         while (target == rank)
51         {
52             target = std::rand() % size;
53         }
54         MPI_Send(&bomb, 1, MPI_INT, target, 0, MCW);
55     }
56
57     MPI_Finalize();
58
59     return 0;
60 }

```

3 Compile and Run Commands

```

1 mpic++ Assignment2/Assignment2.cpp -o Assignment2/run.out
2 mpirun -np 10 Assignment2/run.out

```

4 Output

```

1 Start timer: 287
2 4 received bomb with 287 seconds left!
3 3 received bomb with 286 seconds left!
4 4 received bomb with 285 seconds left!
5 6 received bomb with 284 seconds left!
6 4 received bomb with 283 seconds left!
7 8 received bomb with 282 seconds left!
8 4 received bomb with 281 seconds left!
9 7 received bomb with 280 seconds left!
10 4 received bomb with 279 seconds left!

```

```
11 6 received bomb with 278 seconds left!
12 3 received bomb with 277 seconds left!
13 6 received bomb with 276 seconds left!
14 8 received bomb with 275 seconds left!
15 3 received bomb with 274 seconds left!
16 8 received bomb with 273 seconds left!
17 6 received bomb with 272 seconds left!
18 4 received bomb with 271 seconds left!
19 5 received bomb with 270 seconds left!
20 4 received bomb with 269 seconds left!
21 6 received bomb with 268 seconds left!
22 7 received bomb with 267 seconds left!
23 3 received bomb with 266 seconds left!
24 4 received bomb with 265 seconds left!
25 7 received bomb with 264 seconds left!
26 6 received bomb with 263 seconds left!
27 5 received bomb with 262 seconds left!
28 3 received bomb with 261 seconds left!
29 7 received bomb with 260 seconds left!
30 8 received bomb with 259 seconds left!
31 4 received bomb with 258 seconds left!
32 7 received bomb with 257 seconds left!
33 4 received bomb with 256 seconds left!
34 0 received bomb with 255 seconds left!
35 3 received bomb with 254 seconds left!
36 6 received bomb with 253 seconds left!
37 7 received bomb with 252 seconds left!
38 6 received bomb with 251 seconds left!
39 7 received bomb with 250 seconds left!
40 5 received bomb with 249 seconds left!
41 6 received bomb with 248 seconds left!
42 0 received bomb with 247 seconds left!
43 6 received bomb with 246 seconds left!
44 1 received bomb with 244 seconds left!
45 4 received bomb with 245 seconds left!
46 6 received bomb with 240 seconds left!
47 2 received bomb with 242 seconds left!
48 1 received bomb with 239 seconds left!
49 3 received bomb with 238 seconds left!
50 4 received bomb with 243 seconds left!
51 4 received bomb with 241 seconds left!
52 3 received bomb with 232 seconds left!
53 6 received bomb with 234 seconds left!
54 6 received bomb with 231 seconds left!
55 6 received bomb with 227 seconds left!
56 6 received bomb with 225 seconds left!
57 8 received bomb with 236 seconds left!
58 8 received bomb with 228 seconds left!
59 8 received bomb with 219 seconds left!
60 2 received bomb with 233 seconds left!
61 1 received bomb with 226 seconds left!
62 1 received bomb with 220 seconds left!
63 7 received bomb with 235 seconds left!
64 7 received bomb with 230 seconds left!
65 7 received bomb with 222 seconds left!
66 7 received bomb with 217 seconds left!
67 0 received bomb with 229 seconds left!
```

```
68 5 received bomb with 237 seconds left!
69 5 received bomb with 224 seconds left!
70 5 received bomb with 218 seconds left!
71 4 received bomb with 223 seconds left!
72 4 received bomb with 221 seconds left!
73 5 received bomb with 214 seconds left!
74 6 received bomb with 213 seconds left!
75 6 received bomb with 210 seconds left!
76 6 received bomb with 206 seconds left!
77 6 received bomb with 203 seconds left!
78 8 received bomb with 204 seconds left!
79 2 received bomb with 211 seconds left!
80 2 received bomb with 205 seconds left!
81 2 received bomb with 202 seconds left!
82 1 received bomb with 216 seconds left!
83 7 received bomb with 212 seconds left!
84 7 received bomb with 207 seconds left!
85 9 received bomb with 209 seconds left!
86 4 received bomb with 215 seconds left!
87 4 received bomb with 208 seconds left!
88 4 received bomb with 201 seconds left!
89 9 received bomb with 200 seconds left!
90 9 received bomb with 191 seconds left!
91 9 received bomb with 189 seconds left!
92 3 received bomb with 199 seconds left!
93 5 received bomb with 195 seconds left!
94 6 received bomb with 194 seconds left!
95 6 received bomb with 190 seconds left!
96 8 received bomb with 193 seconds left!
97 8 received bomb with 188 seconds left!
98 2 received bomb with 186 seconds left!
99 1 received bomb with 197 seconds left!
100 7 received bomb with 198 seconds left!
101 7 received bomb with 196 seconds left!
102 7 received bomb with 192 seconds left!
103 7 received bomb with 187 seconds left!
104 7 received bomb with 185 seconds left!
105 4 received bomb with 181 seconds left!
106 4 received bomb with 175 seconds left!
107 9 received bomb with 182 seconds left!
108 9 received bomb with 171 seconds left!
109 9 received bomb with 169 seconds left!
110 5 received bomb with 179 seconds left!
111 6 received bomb with 183 seconds left!
112 6 received bomb with 173 seconds left!
113 6 received bomb with 168 seconds left!
114 8 received bomb with 177 seconds left!
115 2 received bomb with 184 seconds left!
116 2 received bomb with 180 seconds left!
117 2 received bomb with 174 seconds left!
118 0 received bomb with 176 seconds left!
119 0 received bomb with 167 seconds left!
120 7 received bomb with 178 seconds left!
121 7 received bomb with 172 seconds left!
122 7 received bomb with 170 seconds left!
123 7 received bomb with 166 seconds left!
124 0 received bomb with 165 seconds left!
```

125 0 received bomb with 163 seconds left!
126 0 received bomb with 160 seconds left!
127 4 received bomb with 153 seconds left!
128 5 received bomb with 162 seconds left!
129 6 received bomb with 164 seconds left!
130 6 received bomb with 159 seconds left!
131 6 received bomb with 150 seconds left!
132 8 received bomb with 154 seconds left!
133 8 received bomb with 152 seconds left!
134 2 received bomb with 158 seconds left!
135 2 received bomb with 156 seconds left!
136 1 received bomb with 151 seconds left!
137 7 received bomb with 161 seconds left!
138 7 received bomb with 157 seconds left!
139 7 received bomb with 155 seconds left!
140 1 received bomb with 130 seconds left!
141 0 received bomb with 147 seconds left!
142 0 received bomb with 142 seconds left!
143 0 received bomb with 133 seconds left!
144 0 received bomb with 131 seconds left!
145 9 received bomb with 144 seconds left!
146 9 received bomb with 138 seconds left!
147 4 received bomb with 145 seconds left!
148 4 received bomb with 139 seconds left!
149 4 received bomb with 136 seconds left!
150 4 received bomb with 134 seconds left!
151 4 received bomb with 132 seconds left!
152 5 received bomb with 143 seconds left!
153 5 received bomb with 140 seconds left!
154 6 received bomb with 137 seconds left!
155 8 received bomb with 149 seconds left!
156 2 received bomb with 148 seconds left!
157 7 received bomb with 146 seconds left!
158 7 received bomb with 141 seconds left!
159 7 received bomb with 135 seconds left!
160 2 received bomb with 125 seconds left!
161 2 received bomb with 123 seconds left!
162 1 received bomb with 128 seconds left!
163 1 received bomb with 122 seconds left!
164 1 received bomb with 113 seconds left!
165 4 received bomb with 124 seconds left!
166 4 received bomb with 120 seconds left!
167 4 received bomb with 117 seconds left!
168 4 received bomb with 114 seconds left!
169 5 received bomb with 129 seconds left!
170 5 received bomb with 126 seconds left!
171 5 received bomb with 116 seconds left!
172 6 received bomb with 127 seconds left!
173 6 received bomb with 118 seconds left!
174 6 received bomb with 115 seconds left!
175 8 received bomb with 119 seconds left!
176 7 received bomb with 121 seconds left!
177 7 received bomb with 112 seconds left!
178 2 received bomb with 109 seconds left!
179 2 received bomb with 94 seconds left!
180 3 received bomb with 105 seconds left!
181 3 received bomb with 103 seconds left!

```
182 3 received bomb with 100 seconds left!
183 0 received bomb with 110 seconds left!
184 0 received bomb with 102 seconds left!
185 0 received bomb with 98 seconds left!
186 0 received bomb with 96 seconds left!
187 9 received bomb with 92 seconds left!
188 1 received bomb with 111 seconds left!
189 1 received bomb with 107 seconds left!
190 1 received bomb with 95 seconds left!
191 4 received bomb with 106 seconds left!
192 4 received bomb with 99 seconds left!
193 6 received bomb with 108 seconds left!
194 6 received bomb with 101 seconds left!
195 7 received bomb with 104 seconds left!
196 7 received bomb with 97 seconds left!
197 7 received bomb with 93 seconds left!
198 6 received bomb with 84 seconds left!
199 6 received bomb with 79 seconds left!
200 2 received bomb with 81 seconds left!
201 0 received bomb with 87 seconds left!
202 0 received bomb with 83 seconds left!
203 9 received bomb with 90 seconds left!
204 9 received bomb with 88 seconds left!
205 9 received bomb with 78 seconds left!
206 9 received bomb with 76 seconds left!
207 1 received bomb with 80 seconds left!
208 1 received bomb with 75 seconds left!
209 5 received bomb with 86 seconds left!
210 4 received bomb with 77 seconds left!
211 7 received bomb with 91 seconds left!
212 7 received bomb with 89 seconds left!
213 7 received bomb with 85 seconds left!
214 7 received bomb with 82 seconds left!
215 7 received bomb with 74 seconds left!
216 4 received bomb with 68 seconds left!
217 6 received bomb with 61 seconds left!
218 3 received bomb with 73 seconds left!
219 2 received bomb with 66 seconds left!
220 9 received bomb with 67 seconds left!
221 9 received bomb with 62 seconds left!
222 9 received bomb with 60 seconds left!
223 1 received bomb with 72 seconds left!
224 1 received bomb with 70 seconds left!
225 1 received bomb with 63 seconds left!
226 5 received bomb with 71 seconds left!
227 5 received bomb with 65 seconds left!
228 7 received bomb with 69 seconds left!
229 7 received bomb with 64 seconds left!
230 8 received bomb with 47 seconds left!
231 8 received bomb with 42 seconds left!
232 5 received bomb with 50 seconds left!
233 6 received bomb with 58 seconds left!
234 6 received bomb with 53 seconds left!
235 6 received bomb with 45 seconds left!
236 3 received bomb with 44 seconds left!
237 2 received bomb with 55 seconds left!
238 2 received bomb with 52 seconds left!
```

239 2 received bomb with 43 seconds left!
240 9 received bomb with 57 seconds left!
241 9 received bomb with 51 seconds left!
242 9 received bomb with 49 seconds left!
243 1 received bomb with 56 seconds left!
244 7 received bomb with 59 seconds left!
245 7 received bomb with 54 seconds left!
246 7 received bomb with 48 seconds left!
247 7 received bomb with 46 seconds left!
248 1 received bomb with 41 seconds left!
249 8 received bomb with 30 seconds left!
250 8 received bomb with 25 seconds left!
251 8 received bomb with 18 seconds left!
252 4 received bomb with 21 seconds left!
253 5 received bomb with 34 seconds left!
254 5 received bomb with 29 seconds left!
255 0 received bomb with 32 seconds left!
256 0 received bomb with 27 seconds left!
257 0 received bomb with 23 seconds left!
258 2 received bomb with 40 seconds left!
259 2 received bomb with 38 seconds left!
260 2 received bomb with 36 seconds left!
261 2 received bomb with 33 seconds left!
262 2 received bomb with 28 seconds left!
263 2 received bomb with 26 seconds left!
264 2 received bomb with 22 seconds left!
265 9 received bomb with 39 seconds left!
266 9 received bomb with 37 seconds left!
267 9 received bomb with 31 seconds left!
268 9 received bomb with 20 seconds left!
269 7 received bomb with 35 seconds left!
270 7 received bomb with 24 seconds left!
271 7 received bomb with 19 seconds left!
272 9 received bomb with 17 seconds left!
273 9 received bomb with 6 seconds left!
274 9 received bomb with 4 seconds left!
275 8 received bomb with 15 seconds left!
276 8 received bomb with 12 seconds left!
277 4 received bomb with 10 seconds left!
278 4 received bomb with 2 seconds left!
279 6 received bomb with 9 seconds left!
280 5 received bomb with 13 seconds left!
281 5 received bomb with 7 seconds left!
282 0 received bomb with 16 seconds left!
283 0 received bomb with 5 seconds left!
284 2 received bomb with 14 seconds left!
285 2 received bomb with 11 seconds left!
286 2 received bomb with 3 seconds left!
287 2 received bomb with 1 seconds left!
288 2 loses!
289 7 received bomb with 8 seconds left!