

Лабораторная работа № 2	Студент, группа	Чечеткин И. А.
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	Подпись	
	Дата отчёта	
	Оценка	
	Подпись	

## Задание 0 – Предустановки

```

1 [robo05phi@node31 ~]$ export ICCROOT=/opt/intel/compilers/composerxe
2 [robo05phi@node31 ~]$ export MPIROOT=/opt/intel/compilers/impi/4.1.1.045
3 [robo05phi@node31 ~]$ export MPIROOT=/opt/intel/compilers/impi/4.1.3.045
4 [robo05phi@node31 ~]$ sudo scp $ICCROOT/lib/mic/libiomp5.so mic0:/lib64/
5 [sudo] password for robo05phi:
6 libiomp5.so 100% 1067KB 1.0MB/s 00:00
7 [robo05phi@node31 ~]$ sudo scp $ICCROOT/lib/mic/libcilkrts.so.5 mic0:/lib64/
8 libcilkrts.so.5 100% 300KB 300.3KB/s 00:00
9 [robo05phi@node31 ~]$ source $ICCROOT/bin/compilervars.sh intel64
10 [robo05phi@node31 ~]$ source $MPIROOT/intel64/bin/mpivars.sh
11 [robo05phi@node31 ~]$ which icc mpiicc
12 /opt/intel/compilers/composer_xe_2013_sp1.1.106/bin/intel64/icc
13 /opt/intel/compilers/impi/4.1.3.045/intel64/bin/mpiicc
14 [robo05phi@node31 ~]$ ssh mic0 hostname
15 node31-mic0.cluster
16 [robo05phi@node31 ~]$ ssh mic0 which mpiicc
17 /bin/mpiicc
18 [robo05phi@node31 ~]$ export I_MPI_MIC=1

```

## Задание 1 – Основы Чистый MPI. Нативная модель

```

1 [robo05phi@node31 ~]$ cd Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel\ (R\)/part3/intel_mpi_lab_C/1_Basic/
2 [robo05phi@node31 1_Basic]$ export MICHOME=/home/$USER/
3 [robo05phi@node31 1_Basic]$ mpiicc -o test test.c
4 [robo05phi@node31 1_Basic]$ export I_MPI_FABRICS=shm:tcp
5 [robo05phi@node31 1_Basic]$ mpirun -n 2 ./test
6 Hello world: rank 0 of 2 running on node31.cluster
7 Hello world: rank 1 of 2 running on node31.cluster
8 [robo05phi@node31 1_Basic]$ mpiicc -mmic -o test.MIC test.c
9 [robo05phi@node31 1_Basic]$ scp test.MIC mic0:$MICHOME
10 test.MIC 100% 13KB 12.9KB/s 00:00
11 [robo05phi@node31 1_Basic]$ mpirun -wdir $MICHOME -host node31-mic0 -n 2 ./test.MIC
12 Hello world: rank 0 of 2 running on node31-mic0.cluster
13 Hello world: rank 1 of 2 running on node31-mic0.cluster

```

## Запуск MPI приложения с хоста с использованием NFS директории

```

1 [robo05phi@node31 1_Basic]$ export MICHOME=/var/public/$USER
2 [robo05phi@node31 1_Basic]$ cp test.MIC $MICHOME
3 [robo05phi@node31 1_Basic]$ cp test $MICHOME
4 [robo05phi@node31 1_Basic]$ cd $MICHOME
5 [robo05phi@node31 robo05phi]$ ls
6 Lab1.2_Intel_MPI_Xeon_PHI test.c test-openmp.MIC test_run4.txt
7 Lab1.2_Intel_MPI_Xeon_PHI.zip test.MIC test_run1.txt test_run5.txt
8 machinefile test-openmp test_run2.txt test_run6.txt
9 test test-openmp.c test_run3.txt
10 [robo05phi@node31 robo05phi]$ mpirun -wdir /var/public/$USER -host node31-mic0 -n 2 ./test.MIC
11 Hello world: rank 0 of 2 running on node31-mic0.cluster
12 Hello world: rank 1 of 2 running on node31-mic0.cluster

```

## Запуск MPI приложения непосредственно из окружения файловой системы Xeon Phi

```

1 [robo05phi@node31 robo05phi]$ scp test.MIC mic0:~
2 test.MIC 100% 13KB 12.9KB/s 00:00
3 [robo05phi@node31 robo05phi]$ ssh mic0
4 robo05phi@node31-mic0:~$ ls
5 test.MIC
6 robo05phi@node31-mic0:~$ mpirun -host mic0 -perhost 60 -np 120 ./test.MIC
7 Hello world: rank 0 of 120 running on node31-mic0.cluster
8 Hello world: rank 1 of 120 running on node31-mic0.cluster
9 Hello world: rank 2 of 120 running on node31-mic0.cluster
10 Hello world: rank 3 of 120 running on node31-mic0.cluster
11 Hello world: rank 4 of 120 running on node31-mic0.cluster
12 Hello world: rank 5 of 120 running on node31-mic0.cluster
13 Hello world: rank 6 of 120 running on node31-mic0.cluster
14 Hello world: rank 7 of 120 running on node31-mic0.cluster
15 Hello world: rank 8 of 120 running on node31-mic0.cluster
16 Hello world: rank 9 of 120 running on node31-mic0.cluster
17 Hello world: rank 10 of 120 running on node31-mic0.cluster
18 Hello world: rank 11 of 120 running on node31-mic0.cluster
19 Hello world: rank 12 of 120 running on node31-mic0.cluster
20 Hello world: rank 13 of 120 running on node31-mic0.cluster
21 Hello world: rank 14 of 120 running on node31-mic0.cluster

```

[illegible]

```
120 Hello world: rank 113 of 120 running on node31-mic0.cluster
121 Hello world: rank 114 of 120 running on node31-mic0.cluster
122 Hello world: rank 115 of 120 running on node31-mic0.cluster
123 Hello world: rank 116 of 120 running on node31-mic0.cluster
124 Hello world: rank 117 of 120 running on node31-mic0.cluster
125 Hello world: rank 118 of 120 running on node31-mic0.cluster
126 Hello world: rank 119 of 120 running on node31-mic0.cluster
127 robo05phi@node31-mic0:~$ exit
128 logout
129 Connection to mic0 closed.
130 [robo05phi@node31 robo05phi]$ ssh mic0
131 robo05phi@node31-mic0:~$ cd /var/public/$USER/
132 robo05phi@node31-mic0:/var/public/robo05phi$ ls
133 Lab1.2_Intel_MPI_Xeon_PHI test.c
134 Lab1.2_Intel_MPI_Xeon_PHI.zip test_run1.txt
135 machinefile test_run2.txt
136 test test_run3.txt
137 test-openmp test_run4.txt
138 test-openmp.MIC test_run5.txt
139 test-openmp.c test_run6.txt
140 test.MIC
141 robo05phi@node31-mic0:/var/public/robo05phi$ mpirun -host mic0 -perhost 60 -np 120 ./test.MIC
142 Hello world: rank 0 of 120 running on node31-mic0.cluster
143 Hello world: rank 1 of 120 running on node31-mic0.cluster
144 Hello world: rank 2 of 120 running on node31-mic0.cluster
145 Hello world: rank 3 of 120 running on node31-mic0.cluster
146 Hello world: rank 4 of 120 running on node31-mic0.cluster
147 Hello world: rank 5 of 120 running on node31-mic0.cluster
148 Hello world: rank 6 of 120 running on node31-mic0.cluster
149 Hello world: rank 7 of 120 running on node31-mic0.cluster
150 Hello world: rank 8 of 120 running on node31-mic0.cluster
151 Hello world: rank 9 of 120 running on node31-mic0.cluster
152 Hello world: rank 10 of 120 running on node31-mic0.cluster
153 Hello world: rank 11 of 120 running on node31-mic0.cluster
154 Hello world: rank 12 of 120 running on node31-mic0.cluster
155 Hello world: rank 13 of 120 running on node31-mic0.cluster
156 Hello world: rank 14 of 120 running on node31-mic0.cluster
157 Hello world: rank 15 of 120 running on node31-mic0.cluster
158 Hello world: rank 16 of 120 running on node31-mic0.cluster
159 Hello world: rank 17 of 120 running on node31-mic0.cluster
160 Hello world: rank 18 of 120 running on node31-mic0.cluster
161 Hello world: rank 19 of 120 running on node31-mic0.cluster
162 Hello world: rank 20 of 120 running on node31-mic0.cluster
163 Hello world: rank 21 of 120 running on node31-mic0.cluster
164 Hello world: rank 22 of 120 running on node31-mic0.cluster
165 Hello world: rank 23 of 120 running on node31-mic0.cluster
166 Hello world: rank 24 of 120 running on node31-mic0.cluster
167 Hello world: rank 25 of 120 running on node31-mic0.cluster
168 Hello world: rank 26 of 120 running on node31-mic0.cluster
169 Hello world: rank 27 of 120 running on node31-mic0.cluster
170 Hello world: rank 28 of 120 running on node31-mic0.cluster
171 Hello world: rank 29 of 120 running on node31-mic0.cluster
172 Hello world: rank 30 of 120 running on node31-mic0.cluster
173 Hello world: rank 31 of 120 running on node31-mic0.cluster
174 Hello world: rank 32 of 120 running on node31-mic0.cluster
175 Hello world: rank 33 of 120 running on node31-mic0.cluster
176 Hello world: rank 34 of 120 running on node31-mic0.cluster
177 Hello world: rank 35 of 120 running on node31-mic0.cluster
178 Hello world: rank 36 of 120 running on node31-mic0.cluster
179 Hello world: rank 37 of 120 running on node31-mic0.cluster
180 Hello world: rank 38 of 120 running on node31-mic0.cluster
181 Hello world: rank 39 of 120 running on node31-mic0.cluster
182 Hello world: rank 40 of 120 running on node31-mic0.cluster
183 Hello world: rank 41 of 120 running on node31-mic0.cluster
184 Hello world: rank 42 of 120 running on node31-mic0.cluster
185 Hello world: rank 43 of 120 running on node31-mic0.cluster
186 Hello world: rank 44 of 120 running on node31-mic0.cluster
187 Hello world: rank 45 of 120 running on node31-mic0.cluster
188 Hello world: rank 46 of 120 running on node31-mic0.cluster
189 Hello world: rank 47 of 120 running on node31-mic0.cluster
190 Hello world: rank 48 of 120 running on node31-mic0.cluster
191 Hello world: rank 49 of 120 running on node31-mic0.cluster
192 Hello world: rank 50 of 120 running on node31-mic0.cluster
193 Hello world: rank 51 of 120 running on node31-mic0.cluster
194 Hello world: rank 52 of 120 running on node31-mic0.cluster
195 Hello world: rank 53 of 120 running on node31-mic0.cluster
196 Hello world: rank 54 of 120 running on node31-mic0.cluster
197 Hello world: rank 55 of 120 running on node31-mic0.cluster
198 Hello world: rank 56 of 120 running on node31-mic0.cluster
199 Hello world: rank 57 of 120 running on node31-mic0.cluster
200 Hello world: rank 58 of 120 running on node31-mic0.cluster
201 Hello world: rank 59 of 120 running on node31-mic0.cluster
202 Hello world: rank 60 of 120 running on node31-mic0.cluster
203 Hello world: rank 61 of 120 running on node31-mic0.cluster
204 Hello world: rank 62 of 120 running on node31-mic0.cluster
205 Hello world: rank 63 of 120 running on node31-mic0.cluster
206 Hello world: rank 64 of 120 running on node31-mic0.cluster
207 Hello world: rank 65 of 120 running on node31-mic0.cluster
208 Hello world: rank 66 of 120 running on node31-mic0.cluster
209 Hello world: rank 67 of 120 running on node31-mic0.cluster
210 Hello world: rank 68 of 120 running on node31-mic0.cluster
211 Hello world: rank 69 of 120 running on node31-mic0.cluster
212 Hello world: rank 70 of 120 running on node31-mic0.cluster
213 Hello world: rank 71 of 120 running on node31-mic0.cluster
214 Hello world: rank 72 of 120 running on node31-mic0.cluster
215 Hello world: rank 73 of 120 running on node31-mic0.cluster
216 Hello world: rank 74 of 120 running on node31-mic0.cluster
217 Hello world: rank 75 of 120 running on node31-mic0.cluster
```

```

218 Hello world: rank 76 of 120 running on node31-mic0.cluster
219 Hello world: rank 77 of 120 running on node31-mic0.cluster
220 Hello world: rank 78 of 120 running on node31-mic0.cluster
221 Hello world: rank 79 of 120 running on node31-mic0.cluster
222 Hello world: rank 80 of 120 running on node31-mic0.cluster
223 Hello world: rank 81 of 120 running on node31-mic0.cluster
224 Hello world: rank 82 of 120 running on node31-mic0.cluster
225 Hello world: rank 83 of 120 running on node31-mic0.cluster
226 Hello world: rank 84 of 120 running on node31-mic0.cluster
227 Hello world: rank 85 of 120 running on node31-mic0.cluster
228 Hello world: rank 86 of 120 running on node31-mic0.cluster
229 Hello world: rank 87 of 120 running on node31-mic0.cluster
230 Hello world: rank 88 of 120 running on node31-mic0.cluster
231 Hello world: rank 89 of 120 running on node31-mic0.cluster
232 Hello world: rank 90 of 120 running on node31-mic0.cluster
233 Hello world: rank 91 of 120 running on node31-mic0.cluster
234 Hello world: rank 92 of 120 running on node31-mic0.cluster
235 Hello world: rank 93 of 120 running on node31-mic0.cluster
236 Hello world: rank 94 of 120 running on node31-mic0.cluster
237 Hello world: rank 95 of 120 running on node31-mic0.cluster
238 Hello world: rank 96 of 120 running on node31-mic0.cluster
239 Hello world: rank 97 of 120 running on node31-mic0.cluster
240 Hello world: rank 98 of 120 running on node31-mic0.cluster
241 Hello world: rank 99 of 120 running on node31-mic0.cluster
242 Hello world: rank 100 of 120 running on node31-mic0.cluster
243 Hello world: rank 101 of 120 running on node31-mic0.cluster
244 Hello world: rank 102 of 120 running on node31-mic0.cluster
245 Hello world: rank 103 of 120 running on node31-mic0.cluster
246 Hello world: rank 104 of 120 running on node31-mic0.cluster
247 Hello world: rank 105 of 120 running on node31-mic0.cluster
248 Hello world: rank 106 of 120 running on node31-mic0.cluster
249 Hello world: rank 107 of 120 running on node31-mic0.cluster
250 Hello world: rank 108 of 120 running on node31-mic0.cluster
251 Hello world: rank 109 of 120 running on node31-mic0.cluster
252 Hello world: rank 110 of 120 running on node31-mic0.cluster
253 Hello world: rank 111 of 120 running on node31-mic0.cluster
254 Hello world: rank 112 of 120 running on node31-mic0.cluster
255 Hello world: rank 113 of 120 running on node31-mic0.cluster
256 Hello world: rank 114 of 120 running on node31-mic0.cluster
257 Hello world: rank 115 of 120 running on node31-mic0.cluster
258 Hello world: rank 116 of 120 running on node31-mic0.cluster
259 Hello world: rank 117 of 120 running on node31-mic0.cluster
260 Hello world: rank 118 of 120 running on node31-mic0.cluster
261 Hello world: rank 119 of 120 running on node31-mic0.cluster
262 robo05phi@node31-mic0:/var/public/robo05phi$ exit
263 logout
264 Connection to mic0 closed.

```

Запуск тестового MPI приложения с хоста в симметричном режиме на хостовых CPU и сопроцессоре Xeon Phi

```

1 [robo05phi@node31 robo05phi]$ export MICHOME=/var/public/$USER
2 [robo05phi@node31 robo05phi]$ cd $MICHOME
3 [robo05phi@node31 robo05phi]$ ls
4 Lab1.2_Intel_MPI_Xeon_PHI      test.c          test-openmp.MIC  test_run4.txt
5 Lab1.2_Intel_MPI_Xeon_PHI.zip  test.MIC        test_run1.txt    test_run5.txt
6 machinefile                    test-openmp     test_run2.txt    test_run6.txt
7 test                          test-openmp.c   test_run3.txt
8 [robo05phi@node31 robo05phi]$ mpirun -host node31 -n 2 ./test : -wdir $MICHOME -host mic0 -n 4 ./test.MIC
9 Hello world: rank 0 of 6 running on node31.cluster
10 Hello world: rank 1 of 6 running on node31.cluster
11 Hello world: rank 2 of 6 running on node31-mic0.cluster
12 Hello world: rank 3 of 6 running on node31-mic0.cluster
13 Hello world: rank 4 of 6 running on node31-mic0.cluster
14 Hello world: rank 5 of 6 running on node31-mic0.cluster
15 [robo05phi@node31 robo05phi]$ echo node31:2 > machinefile
16 [robo05phi@node31 robo05phi]$ echo mic0:4 >> machinefile
17 [robo05phi@node31 robo05phi]$ export I_MPI_MIC_POSTFIX=.MIC
18 [robo05phi@node31 robo05phi]$ mpirun -machinefile machinefile -n 6 ./test
19 Hello world: rank 0 of 6 running on node31.cluster
20 Hello world: rank 1 of 6 running on node31.cluster
21 Hello world: rank 2 of 6 running on node31-mic0.cluster
22 Hello world: rank 3 of 6 running on node31-mic0.cluster
23 Hello world: rank 4 of 6 running on node31-mic0.cluster
24 Hello world: rank 5 of 6 running on node31-mic0.cluster
25 [robo05phi@node31 robo05phi]$ export -n I_MPI_MIC_POSTFIX=.MIC
26 [robo05phi@node31 robo05phi]$ export I_MPI_DEBUG=4
27 [robo05phi@node31 robo05phi]$ mpirun -n 2 ./test
28 [1] MPI startup(): shm and tcp data transfer modes
29 [0] MPI startup(): shm and tcp data transfer modes
30 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
31 [0] MPI startup(): 0        32637   node31.cluster {0,1,2,3,4,5,6,7,16,17,18,19,20,21,22,23}
32 [0] MPI startup(): 1        32638   node31.cluster {8,9,10,11,12,13,14,15,24,25,26,27,28,29,30,31}
33 Hello world: rank 0 of 2 running on node31.cluster
34 Hello world: rank 1 of 2 running on node31.cluster
35 [robo05phi@node31 robo05phi]$ mpirun -host mic0 -n 2 ./test.MIC
36 [0] MPI startup(): shm and tcp data transfer modes
37 [1] MPI startup(): shm and tcp data transfer modes
38 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
39 [0] MPI startup(): 0        16094   node31-mic0.cluster {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,
40 19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,
41 34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,
42 49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,
43 64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,
44 79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,
45 94,95,96,97,98,99,100,101,102,103,104,105,
46 106,107,108,109,110,111,112,113,114,115,116,

```

```

47                                     117,118,119,120}
48 [0] MPI startup(): 1          16095    node31-mic0.cluster {0,121,122,123,124,125,126,127,128,129,130,
49                                     131,132,133,134,135,136,137,138,139,140,141,
50                                     142,143,144,145,146,147,148,149,150,151,152,
51                                     153,154,155,156,157,158,159,160,161,162,163,
52                                     164,165,166,167,168,169,170,171,172,173,174,
53                                     175,176,177,178,179,180,181,182,183,184,185,
54                                     186,187,188,189,190,191,192,193,194,195,196,
55                                     197,198,199,200,201,202,203,204,205,206,207,
56                                     208,209,210,211,212,213,214,215,216,217,218,
57                                     219,220,221,222,223,224,225,226,227,228,229,
58                                     230,231,232,233,234,235,236,237,238,239}
59 Hello world: rank 0 of 2 running on node31-mic0.cluster
60 Hello world: rank 1 of 2 running on node31-mic0.cluster
61 [robo05phi@node31 robo05phi]$ mpirun -host node31 -n 2 ./test : -host mic0 -n 4 ./test.MIC
62 [1] MPI startup(): shm and tcp data transfer modes
63 [0] MPI startup(): shm and tcp data transfer modes
64 [3] MPI startup(): shm and tcp data transfer modes
65 [4] MPI startup(): shm and tcp data transfer modes
66 [2] MPI startup(): shm and tcp data transfer modes
67 [5] MPI startup(): shm and tcp data transfer modes
68 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
69 [0] MPI startup(): 0          32666    node31.cluster {0,1,2,3,4,5,6,7,16,17,18,19,20,21,22,23}
70 [0] MPI startup(): 1          32667    node31.cluster {8,9,10,11,12,13,14,15,24,25,26,27,28,29,30,31}
71 [0] MPI startup(): 2          16100    node31-mic0.cluster {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,
72                                     19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,
73                                     34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,
74                                     49,50,51,52,53,54,55,56,57,58,59,60}
75 [0] MPI startup(): 3          16101    node31-mic0.cluster {61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,
76                                     76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,
77                                     91,92,93,94,95,96,97,98,99,100,101,102,103,104,
78                                     105,106,107,108,109,110,111,112,113,114,115,116,
79                                     117,118,119,120}
80 [0] MPI startup(): 4          16102    node31-mic0.cluster {121,122,123,124,125,126,127,128,129,130,
81                                     131,132,133,134,135,136,137,138,139,140,141,142,
82                                     143,144,145,146,147,148,149,150,151,152,153,154,
83                                     155,156,157,158,159,160,161,162,163,164,165,166,
84                                     167,168,169,170,171,172,173,174,175,176,177,178,
85                                     179,180}
86 [0] MPI startup(): 5          16103    node31-mic0.cluster {0,181,182,183,184,185,186,187,188,189,
87                                     190,191,192,193,194,195,196,197,198,199,200,201,
88                                     202,203,204,205,206,207,208,209,210,211,212,213,
89                                     214,215,216,217,218,219,220,221,222,223,224,225,
90                                     226,227,228,229,230,231,232,233,234,235,236,237,
91                                     238,239}
92 Hello world: rank 0 of 6 running on node31.cluster
93 Hello world: rank 1 of 6 running on node31.cluster
94 Hello world: rank 2 of 6 running on node31-mic0.cluster
95 Hello world: rank 3 of 6 running on node31-mic0.cluster
96 Hello world: rank 4 of 6 running on node31-mic0.cluster
97 Hello world: rank 5 of 6 running on node31-mic0.cluster
98 [robo05phi@node31 robo05phi]$ mpirun -env I_MPI_PIN_DOMAIN auto -n 2 ./test
99 [1] MPI startup(): shm and tcp data transfer modes
100 [0] MPI startup(): shm and tcp data transfer modes
101 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
102 [0] MPI startup(): 0          32727    node31.cluster {0,1,2,3,4,5,6,7,16,17,18,19,20,21,22,23}
103 [0] MPI startup(): 1          32728    node31.cluster {8,9,10,11,12,13,14,15,24,25,26,27,28,29,30,31}
104 Hello world: rank 0 of 2 running on node31.cluster
105 Hello world: rank 1 of 2 running on node31.cluster
106 [robo05phi@node31 robo05phi]$ mpirun -env I_MPI_PIN_DOMAIN auto -host mic0 -n 2 ./test.MIC
107 [0] MPI startup(): shm and tcp data transfer modes
108 [1] MPI startup(): shm and tcp data transfer modes
109 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
110 [0] MPI startup(): 0          16121    node31-mic0.cluster {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,
111                                     19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,
112                                     34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,
113                                     49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,
114                                     64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,
115                                     79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,
116                                     94,95,96,97,98,99,100,101,102,103,104,105,
117                                     106,107,108,109,110,111,112,113,114,115,116,
118                                     117,118,119,120}
119 [0] MPI startup(): 1          16122    node31-mic0.cluster {0,121,122,123,124,125,126,127,128,129,130,
120                                     131,132,133,134,135,136,137,138,139,140,141,142,
121                                     143,144,145,146,147,148,149,150,151,152,153,154,
122                                     155,156,157,158,159,160,161,162,163,164,165,166,
123                                     167,168,169,170,171,172,173,174,175,176,177,178,
124                                     179,180,181,182,183,184,185,186,187,188,189,190,
125                                     191,192,193,194,195,196,197,198,199,200,201,202,
126                                     203,204,205,206,207,208,209,210,211,212,213,214,
127                                     215,216,217,218,219,220,221,222,223,224,225,226,
128                                     227,228,229,230,231,232,233,234,235,236,237,238,
129                                     239}
130 Hello world: rank 0 of 2 running on node31-mic0.cluster
131 Hello world: rank 1 of 2 running on node31-mic0.cluster
132 [robo05phi@node31 robo05phi]$ mpirun -env I_MPI_PIN_DOMAIN 4 -host node31 -n 2 ./test : -env I_MPI_PIN_DOMAIN 12 \
133 -host mic0 -n 4 ./test.MIC
134 [0] MPI startup(): shm and tcp data transfer modes
135 [1] MPI startup(): shm and tcp data transfer modes
136 [2] MPI startup(): shm and tcp data transfer modes
137 [3] MPI startup(): shm and tcp data transfer modes
138 [4] MPI startup(): shm and tcp data transfer modes
139 [5] MPI startup(): shm and tcp data transfer modes
140 [0] MPI startup(): Rank      Pid      Node name      Pin cpu
141 [0] MPI startup(): 0          315      node31.cluster {0,1,16,17}
142 [0] MPI startup(): 1          316      node31.cluster {2,3,18,19}
143 [0] MPI startup(): 2          16130    node31-mic0.cluster {1,2,3,4,5,6,7,8,9,10,11,12}
144 [0] MPI startup(): 3          16131    node31-mic0.cluster {13,14,15,16,17,18,19,20,21,22,23,24}

```



```

145 [0] MPI startup(): 4      16132    node31-mic0.cluster {25,26,27,28,29,30,31,32,33,34,35,36}
146 [0] MPI startup(): 5      16133    node31-mic0.cluster {37,38,39,40,41,42,43,44,45,46,47,48}
147 Hello world: rank 0 of 6 running on node31.cluster
148 Hello world: rank 1 of 6 running on node31.cluster
149 Hello world: rank 2 of 6 running on node31-mic0.cluster
150 Hello world: rank 3 of 6 running on node31-mic0.cluster
151 Hello world: rank 4 of 6 running on node31-mic0.cluster
152 Hello world: rank 5 of 6 running on node31-mic0.cluster

```

## Знакомство с гибридными MPI/OpenMPI приложениями для сопроцессора

```

1 [robo05phi@node31 robo05phi]$ diff test.c test-openmp.c
2 22a23,25
3 > #ifdef _OPENMP
4 > #include <omp.h>
5 > #endif
6 36a40,46
7 > #ifdef _OPENMP
8 > #pragma omp parallel
9 > {
10 >     printf ("Hello world: rank %d of %d running on %s: thread %d\n", rank, size, name, omp_get_thread_num());
11 > }
12 > #endif
13 >
14 [robo05phi@node31 robo05phi]$ mpiicc -openmp -o test-openmp test-openmp.c
15 [robo05phi@node31 robo05phi]$ mpiicc -openmp -mmic -o test-openmp.MIC test-openmp.c
16 [robo05phi@node31 robo05phi]$ unset I_MPI_DEBUG
17 [robo05phi@node31 robo05phi]$ mpirun -n 2 ./test-openmp
18 Hello world: rank 0 of 2 running on node31.cluster: thread 0
19 Hello world: rank 0 of 2 running on node31.cluster: thread 11
20 Hello world: rank 0 of 2 running on node31.cluster: thread 1
21 Hello world: rank 0 of 2 running on node31.cluster: thread 9
22 Hello world: rank 0 of 2 running on node31.cluster: thread 13
23 Hello world: rank 0 of 2 running on node31.cluster: thread 3
24 Hello world: rank 0 of 2 running on node31.cluster: thread 12
25 Hello world: rank 0 of 2 running on node31.cluster: thread 2
26 Hello world: rank 0 of 2 running on node31.cluster: thread 4
27 Hello world: rank 0 of 2 running on node31.cluster: thread 6
28 Hello world: rank 0 of 2 running on node31.cluster: thread 10
29 Hello world: rank 1 of 2 running on node31.cluster: thread 0
30 Hello world: rank 1 of 2 running on node31.cluster: thread 9
31 Hello world: rank 1 of 2 running on node31.cluster: thread 14
32 Hello world: rank 1 of 2 running on node31.cluster: thread 4
33 Hello world: rank 1 of 2 running on node31.cluster: thread 6
34 Hello world: rank 1 of 2 running on node31.cluster: thread 3
35 Hello world: rank 1 of 2 running on node31.cluster: thread 2
36 Hello world: rank 1 of 2 running on node31.cluster: thread 8
37 Hello world: rank 1 of 2 running on node31.cluster: thread 10
38 Hello world: rank 1 of 2 running on node31.cluster: thread 1
39 Hello world: rank 1 of 2 running on node31.cluster: thread 15
40 Hello world: rank 1 of 2 running on node31.cluster: thread 5
41 Hello world: rank 0 of 2 running on node31.cluster: thread 7
42 Hello world: rank 0 of 2 running on node31.cluster: thread 5
43 Hello world: rank 0 of 2 running on node31.cluster: thread 14
44 Hello world: rank 0 of 2 running on node31.cluster: thread 8
45 Hello world: rank 1 of 2 running on node31.cluster: thread 11
46 Hello world: rank 1 of 2 running on node31.cluster: thread 12
47 Hello world: rank 1 of 2 running on node31.cluster: thread 7
48 Hello world: rank 1 of 2 running on node31.cluster: thread 13
49 Hello world: rank 0 of 2 running on node31.cluster: thread 15
50 Hello world: rank 0 of 2 running on node31.cluster
51 Hello world: rank 1 of 2 running on node31.cluster
52 [robo05phi@node31 robo05phi]$ mpirun -host mic0 -n 2 ./test-openmp.MIC
53 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 0
54 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 66
55 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 77
56 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 108
57 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 98
58 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 60
59 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 35
60 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 61
61 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 23
62 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 15
63 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 30
64 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 78
65 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 16
66 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 37
67 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 55
68 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 56
69 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 49
70 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 85
71 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 68
72 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 95
73 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 53
74 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 83
75 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 4
76 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 80
77 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 12
78 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 9
79 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 10
80 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 6
81 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 96
82 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 18
83 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 19
84 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 3
85 Hello world: rank 1 of 2 running on node31-mic0.cluster: thread 114

```

[illegible]

[illegible]



[illegible]

[illegible]

```
[robo05phi@node31 robo05phi]$ mpirun --prepend-rank -env KMP_AFFINITY verbose --env OMP_NUM_THREADS 4 \
--env I_MPI_PIN DOMAIN auto -n 2 ./test-openmp 2>&1 | sort > test run1.txt
```

```

576 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose -env OMP_NUM_THREADS 4 \
577 -env I_MPI_PIN_DOMAIN omp -host mic0 -n 2 ./test-openmp.MIC 2>&1 | sort > test_run2.txt
578 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose -env OMP_NUM_THREADS 4 \
579 -env I_MPI_PIN_DOMAIN 4 -host node31 -n 2 ./test-openmp : -env KMP_AFFINITY verbose -env OMP_NUM_THREADS 6 \
580 -env I_MPI_PIN_DOMAIN 12 -host mic0 -n 4 ./test-openmp.MIC 2>&1 | sort > test_run3.txt
581 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose,granularity=thread,scatter -env OMP_NUM_THREADS 4 \
582 -env I_MPI_PIN_DOMAIN auto -n 2 ./test-openmp > test_run4.txt
583 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose,granularity=thread,compact -env OMP_NUM_THREADS 4 \
584 -env I_MPI_PIN_DOMAIN omp -host mic0 -n 2 ./test-openmp_mic 2>&1 | sort > test_run_05.txt
585 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose,granularity=thread,compact -env OMP_NUM_THREADS 4 \
586 -env I_MPI_PIN_DOMAIN 4 -host node31 -n 2 ./test-openmp : -env KMP_AFFINITY verbose,granularity=thread,balanced \
587 -env OMP_NUM_THREADS 6 -env I_MPI_PIN_DOMAIN 12 -host mic0 -n 4 ./test-openmp_mic 2>&1 | sort > test_run_06.txt

```

## MPI+OFFLOAD

```

1 [robo05phi@node31 robo05phi]$ cp Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel\ (R\)/part3/intel_mpi_lab_C/\
2 1_Basic/test-offload.c test-offload.c
3 [robo05phi@node31 robo05phi]$ diff test.c test-offload.c
4 22a23,26
5 > #ifdef _OPENMP
6 > #include <omp.h>
7 > #endif
8 > #include <unistd.h>
9 36a41,58
10 > #ifdef _OPENMP
11 > #pragma offload target(mic) in(rank,size)
12 > {
13 > #ifdef __INTEL_OFFLOAD
14 > char micname[MPI_MAX_PROCESSOR_NAME];
15 > gethostname(micname, MPI_MAX_PROCESSOR_NAME);
16 > int i;
17 > #pragma omp parallel private(i)
18 > //for (i=0; i<100000; i++) // Use 100000 loops to check core usage with "micsmc"
19 > for (i=0; i<1; i++)
20 > printf ("Hello MIC : rank %d of %d running on %s: thread %d\n", rank, size, micname, omp_get_thread_num());
21 > #else
22 > #pragma omp parallel
23 > printf ("Hello world: rank %d of %d running on %s: thread %d\n", rank, size, name, omp_get_thread_num());
24 > #endif
25 > }
26 > #endif
27 >
28 [robo05phi@node31 robo05phi]$ mpiicc -openmp test-offload.c -o test-offload
29 [robo05phi@node31 robo05phi]$ OFFLOAD_REPORT=2 mpirun -prepend-rank -env KMP_AFFINITY granularity=thread,scatter \
30 -env OMP_NUM_THREADS 4 -n 2 ./test-offload
31 [1] [Offload] [MIC 0] [File] test-offload.c
32 [1] [Offload] [MIC 0] [Line] 42
33 [1] [Offload] [MIC 0] [Tag] Tag 0
34 [1] [Offload] [HOST] [Tag 0] [CPU Time] 0.660415(seconds)
35 [1] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
36 [1] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.025298(seconds)
37 [1] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
38 [1]
39 [0] [Offload] [MIC 0] [File] test-offload.c
40 [0] [Offload] [MIC 0] [Line] 42
41 [0] [Offload] [MIC 0] [Tag] Tag 0
42 [0] [Offload] [HOST] [Tag 0] [CPU Time] 0.720346(seconds)
43 [0] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
44 [0] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.030983(seconds)
45 [0] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
46 [0]
47 [0] Hello world: rank 0 of 2 running on node31.cluster
48 [0] Hello world: rank 1 of 2 running on node31.cluster
49 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 0
50 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 1
51 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 2
52 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 3
53 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 0
54 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 1
55 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 2
56 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 3
57 [robo05phi@node31 robo05phi]$ mpirun -prepend-rank -env KMP_AFFINITY verbose,granularity=thread,scatter \
58 -env OMP_NUM_THREADS 4 -n 2 ./test-offload 2>&1 | grep bound | sort
59 [0] OMP: Info #147: KMP_AFFINITY: Internal thread 0 bound to OS proc set {1}
60 [0] OMP: Info #147: KMP_AFFINITY: Internal thread 1 bound to OS proc set {5}
61 [0] OMP: Info #147: KMP_AFFINITY: Internal thread 2 bound to OS proc set {9}
62 [0] OMP: Info #147: KMP_AFFINITY: Internal thread 3 bound to OS proc set {13}
63 [1] OMP: Info #147: KMP_AFFINITY: Internal thread 0 bound to OS proc set {1}
64 [1] OMP: Info #147: KMP_AFFINITY: Internal thread 1 bound to OS proc set {5}
65 [1] OMP: Info #147: KMP_AFFINITY: Internal thread 2 bound to OS proc set {9}
66 [1] OMP: Info #147: KMP_AFFINITY: Internal thread 3 bound to OS proc set {13}
67 [robo05phi@node31 robo05phi]$ OFFLOAD_REPORT=2 mpirun -prepend-rank -env KMP_AFFINITY \
68 granularity=thread,proclist=[1-16:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload : -env KMP_AFFINITY \
69 granularity=thread,proclist=[17-32:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload
70 [0] [Offload] [MIC 0] [File] test-offload.c
71 [0] [Offload] [MIC 0] [Line] 42
72 [0] [Offload] [MIC 0] [Tag] Tag 0
73 [0] [Offload] [HOST] [Tag 0] [CPU Time] 0.605680(seconds)
74 [0] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
75 [0] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.029693(seconds)
76 [0] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
77 [0]
78 [0] Hello world: rank 0 of 2 running on node31.cluster
79 [1] [Offload] [MIC 0] [File] test-offload.c
80 [1] [Offload] [MIC 0] [Line] 42
81 [1] [Offload] [MIC 0] [Tag] Tag 0

```

```

82 [1] [Offload] [HOST] [Tag 0] [CPU Time] 0.698045(seconds)
83 [1] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
84 [1] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.029509(seconds)
85 [1] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
86 [1]
87 [0] Hello world: rank 1 of 2 running on node31.cluster
88 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 0
89 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 1
90 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 3
91 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 2
92 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 0
93 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 1
94 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 2
95 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 3
96 [robo05phi@node31 robo05phi]$ OFFLOAD_REPORT=2 mpirun -prepend-rank -env KMP_AFFINITY \
97 granularity=thread,proclist=[1-16:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload : -env KMP_AFFINITY \
98 granularity=thread,proclist=[17-32:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload &2>1 | grep bound | sort
99 [1] 6833
100 [robo05phi@node31 robo05phi]$ [0] [Offload] [MIC 0] [File] test-offload.c
101 [0] [Offload] [MIC 0] [Line] 42
102 [0] [Offload] [MIC 0] [Tag] Tag 0
103 [0] [Offload] [HOST] [Tag 0] [CPU Time] 0.596048(seconds)
104 [0] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
105 [0] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.024082(seconds)
106 [0] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
107 [0]
108 [0] Hello world: rank 0 of 2 running on node31.cluster
109 [1] [Offload] [MIC 0] [File] test-offload.c
110 [1] [Offload] [MIC 0] [Line] 42
111 [1] [Offload] [MIC 0] [Tag] Tag 0
112 [1] [Offload] [HOST] [Tag 0] [CPU Time] 0.688274(seconds)
113 [1] [Offload] [MIC 0] [Tag 0] [CPU->MIC Data] 8 (bytes)
114 [1] [Offload] [MIC 0] [Tag 0] [MIC Time] 0.025497(seconds)
115 [1] [Offload] [MIC 0] [Tag 0] [MIC->CPU Data] 0 (bytes)
116 [1]
117 [0] Hello world: rank 1 of 2 running on node31.cluster
118 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 0
119 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 1
120 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 3
121 [0] Hello MIC : rank 0 of 2 running on node31-mic0.cluster: thread 2
122 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 0
123 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 2
124 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 1
125 [1] Hello MIC : rank 1 of 2 running on node31-mic0.cluster: thread 3
126
127 [1]+ Done OFFLOAD_REPORT=2 mpirun -prepend-rank -env KMP_AFFINITY granularity=thread,
128 proclist=[1-16:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload : -env KMP_AFFINITY
129 granularity=thread,proclist=[17-32:4],explicit -env OMP_NUM_THREADS 4 -n 1 ./test-offload

```

## Задание 2 – Гибридные приложения MPI/OpenMP

```

1 [robo05phi@node31 robo05phi]$ cd Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel(R)/part3/intel_mpi_lab_C/2_MPI_OpenMP/
2 [robo05phi@node31 2_MPI_OpenMP]$ make clean; make
3 rm -f poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o
4 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias poisson.c
5 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias parameter.c
6 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias timer.c
7 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias grid.c
8 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias compute.c
9 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias _aux.c
10 mpiicc -c -DUSE_MPI -openmp -O3 -xHost -ansi-alias -fno-alias comm.c
11 mpiicc -o poisson -openmp poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o -lm
12 [robo05phi@node31 2_MPI_OpenMP]$ make MIC
13 rm -f poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o
14 make MMIC=mmic EXE=poisson.MIC
15 make[1]: Entering directory
16 /home/robo05phi/Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel(R)/part3/intel_mpi_lab_C/2_MPI_OpenMP'
17 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias poisson.c
18 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias parameter.c
19 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias timer.c
20 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias grid.c
21 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias compute.c
22 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias _aux.c
23 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -fno-alias comm.c
24 mpiicc -o poisson.MIC -openmp -mmic poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o -lm
25 make[1]: Leaving directory
26 /home/robo05phi/Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel(R)/part3/intel_mpi_lab_C/2_MPI_OpenMP'
27 [robo05phi@node31 2_MPI_OpenMP]$ mpirun -env OMP_NUM_THREADS 12 -n 1 ./poisson -n 3500 -iter 10
28 Parameter for Poisson
29
30 Grid size n : 3500
31 Grid size m : 3500
32 Max iterations: 10
33 Output file : out
34 number of procs: 1 = 1 x 1
35
36 Residuum after 10 iterations = 12.516994
37 Compute time = 0.202555 [sec]
38 Perf = 6.047742 [Gflops]
39 [robo05phi@node31 robo05phi]$ mpirun -env OMP_NUM_THREADS 12 -host mic0 -n 1 ./poisson.MIC -n 3500 -iter 10
40 Parameter for Poisson
41
42 Grid size n : 3500
43 Grid size m : 3500
44 Max iterations: 10
45 Output file : out

```



```

46     number of procs: 1 = 1 x 1
47
48     Residuum after 10 iterations = 12.516994
49     Compute time = 0.499603 [sec]
50     Perf          = 2.451947 [Gflops]
51 [robo05phi@node31 robo05phi]$ mpirun -env OMP_NUM_THREADS 12 -host node31 -n 1 ./poisson -n 3500 -iter 10 : \
52 -env OMP_NUM_THREADS 12 -host mic0 -n 1 ./poisson.MIC -n 3500 -iter 10
53     Parameter for Poisson
54
55     Grid size n      : 3500
56     Grid size m      : 3500
57     Max iterations: 10
58     Output file      : out
59     number of procs: 2 = 2 x 1
60
61     Residuum after 10 iterations = 12.516994
62     Compute time = 0.439214 [sec]
63     Perf          = 2.789073 [Gflops]

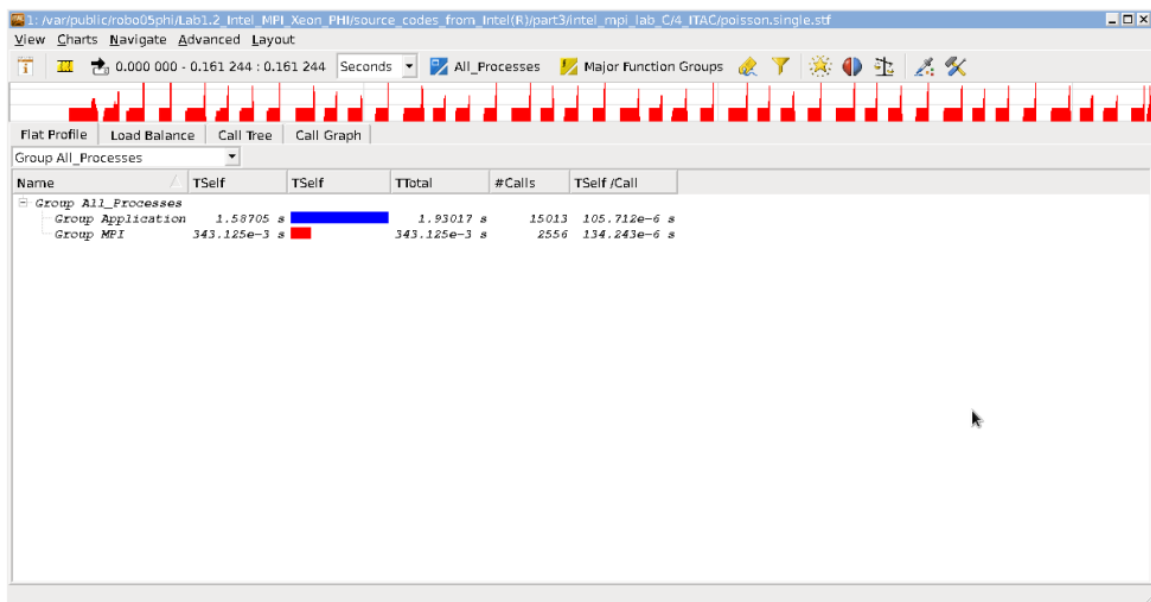
```

### Задание 3 – Использование Intel Trace Analyzer and Collector

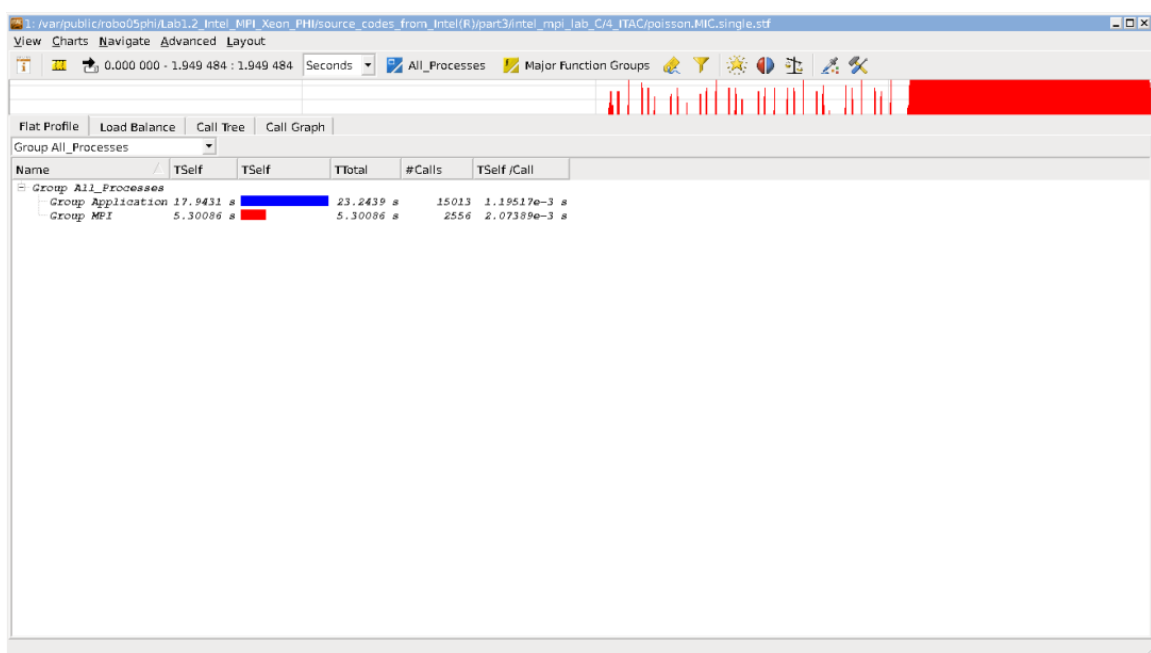
```

1 [robo05phi@node31 robo05phi]$ source /opt/intel/compilers/itac/8.1.3.037/intel64/bin/itacvars.sh
2 [robo05phi@node31 robo05phi]$ export I_MPI_FABRICS=shm:tcp
3 [robo05phi@node31 robo05phi]$ export I_MPI_MIC=1
4 [robo05phi@node31 robo05phi]$ cd ../4_ITAC
5 [robo05phi@node31 4_ITAC]$ make clean; make
6 rm -f poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o
7 mpiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect poisson.c
8 mpiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect parameter.c
9 mpiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect timer.c
10 mpiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect grid.c
11 mpiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect compute.c
12 mampiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect _aux.c
13 kmppiicc -c -DUSE_MPI -openmp -O3 -ansi-alias -tcollect comm.c
14 empiicc -o poisson -openmp -tcollect poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o -lm
15 [robo05phi@node31 4_ITAC]$ make clean; make MIC
16 rm -f poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o
17 rm -f poisson.o parameter.o timer.o grid.o compute.o _aux.o comm.o
18 make MMIC=mmic EXE=poisson.MIC
19 make[1]: Entering directory
20   '/home/robo05phi/Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel(R)/part3/intel_mpi_lab_C/4_ITAC'
21 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect poisson.c
22 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect parameter.c
23 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect timer.c
24 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect grid.c
25 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect compute.c
26 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect _aux.c
27 mpiicc -c -DUSE_MPI -openmp -O3 -mmic -ansi-alias -tcollect comm.c
28 mpiicc -o poisson.MIC -openmp -mmic -tcollect -L/opt/intel/compilers/itac/8.1.3.037/mic/lib poisson.o parameter.o timer.o
29   grid.o compute.o _aux.o comm.o -lm
30 make[1]: Leaving directory
31   '/home/robo05phi/Lab1.2_Intel_MPI_Xeon_PHI/source_codes_from_Intel(R)/part3/intel_mpi_lab_C/4_ITAC'
32 [robo05phi@node31 4_ITAC]$ export VT_LOGFILE_FORMAT=stfsingle
33 [robo05phi@node31 4_ITAC]$ mpirun -env OMP_NUM_THREADS 1 -n 12 ./poisson -n 3500 -iter 10
34     Parameter for Poisson
35
36     Grid size n      : 3500
37     Grid size m      : 3500
38     Max iterations: 10
39     Output file      : out
40     number of procs: 12 = 4 x 3
41
42     Residuum after 10 iterations = 12.516994
43     Compute time = 0.182100 [sec]
44     Perf          = 6.727071 [Gflops]
45 [robo05phi@node31 robo05phi]$ traceanalyzer poisson.single.stf
46 [robo05phi@node31 robo05phi]$ mpirun -env OMP_NUM_THREADS 1 -host mic0 -n 12 ./poisson.MIC -n 3500 -iter 10
47     Parameter for Poisson
48
49     Grid size n      : 3500
50     Grid size m      : 3500
51     Max iterations: 10
52     Output file      : out
53     number of procs: 12 = 4 x 3
54
55     Residuum after 10 iterations = 12.516994
56     Compute time = 0.515740 [sec]
57     Perf          = 2.375228 [Gflops]
58 [0] Intel(R) Trace Collector INFO: Writing tracefile poisson.MIC.single.stf in /var/public/robo05phi
59 [robo05phi@node31 robo05phi]$ traceanalyzer poisson.MIC.single.stf
60 [robo05phi@node31 robo05phi]$ mpirun -env OMP_NUM_THREADS 1 -host node31 -n 12 ./poisson -n 3500 -iter 10 : \
61 -env OMP_NUM_THREADS 1 -host mic0 -n 12 ./poisson.MIC -n 3500 -iter 10
62     ... lost ...
63 [robo05phi@node31 robo05phi]$ traceanalyzer poisson.single.stf

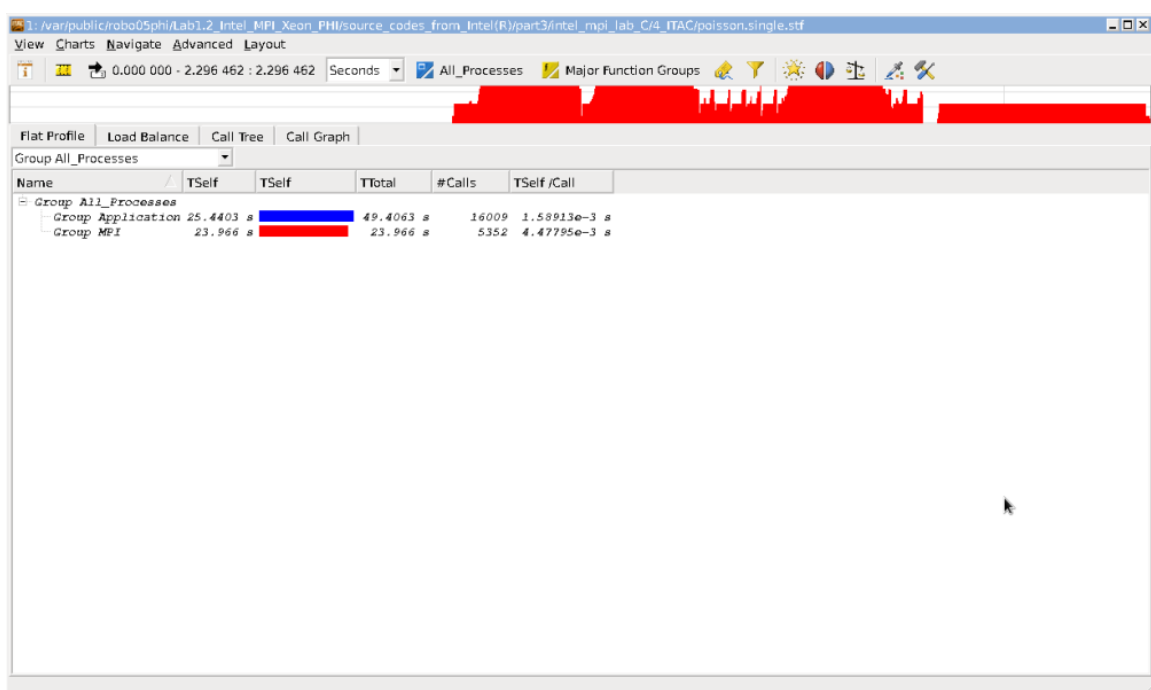
```



poisson.single.stf #1



poisson.MIC.single.stf



poisson.single.stf #2