

# SCIENTIFIC COMPUTING REPORT 05

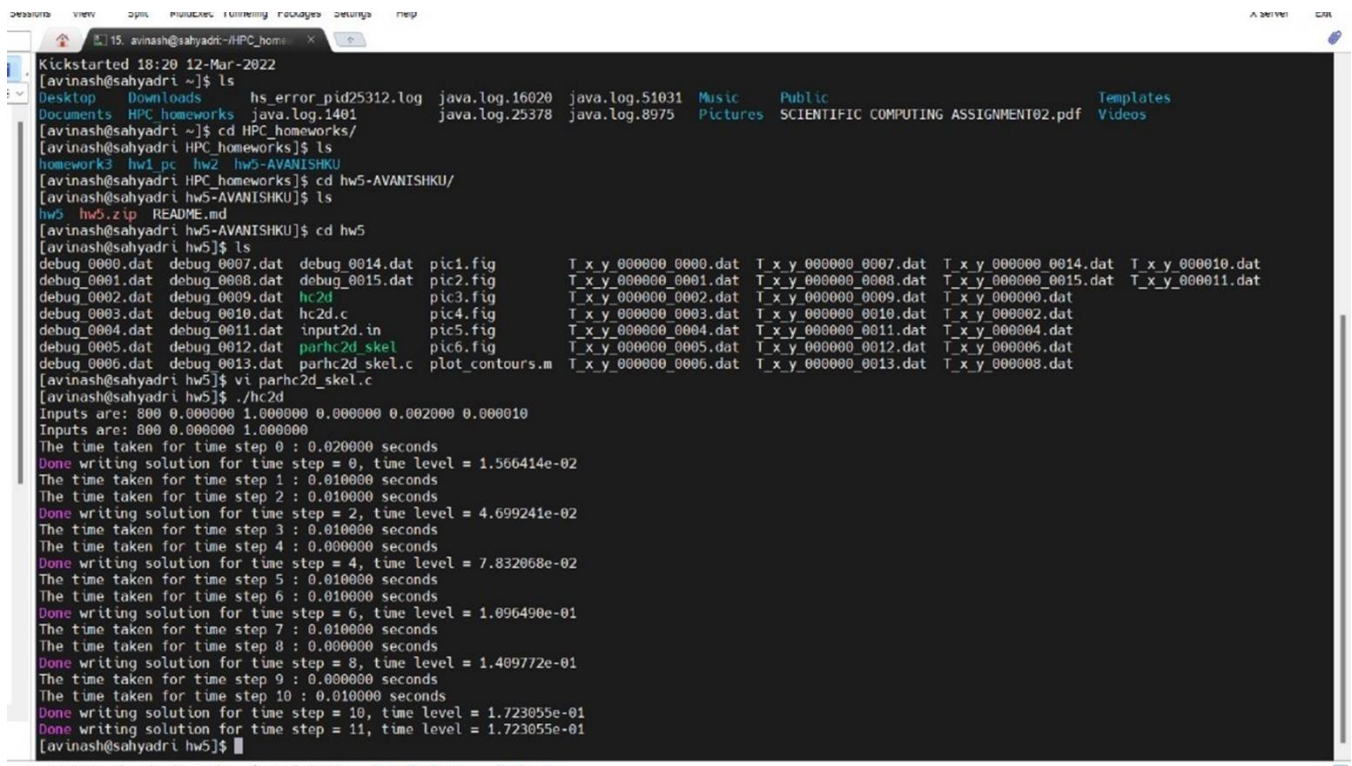
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Course Code: ME5470

Question 01:

Time taken by serial run is shown below:



```
Kickstarted 18:20 12-Mar-2022
[avinash@sahyadri ~]$ ls
Desktop  Downloads  hs_error_pid25312.log  java.log.16020  java.log.51031  Music  Public  Templates
Documents  HPC_homeworks  java.log.1401  java.log.25378  java.log.8975  Pictures  SCIENTIFIC COMPUTING ASSIGNMENT02.pdf  Videos
[avinash@sahyadri ~]$ cd HPC_homeworks/
[avinash@sahyadri HPC_homeworks]$ ls
homework3  hw1_pc  hw2  hw5-AVANISHKU
[avinash@sahyadri HPC_homeworks]$ cd hw5-AVANISHKU/
[avinash@sahyadri hw5-AVANISHKU]$ ls
hw5  hw5.zip  README.md
[avinash@sahyadri hw5-AVANISHKU]$ cd hw5
[avinash@sahyadri hw5]$ ls
debug_0000.dat  debug_0007.dat  debug_0014.dat  pic1.fig  T_x_y_000000_0000.dat  T_x_y_000000_0007.dat  T_x_y_000000_0014.dat  T_x_y_000010.dat
debug_0001.dat  debug_0008.dat  debug_0015.dat  pic2.fig  T_x_y_000000_0001.dat  T_x_y_000000_0008.dat  T_x_y_000000_0015.dat  T_x_y_000011.dat
debug_0002.dat  debug_0009.dat  hc2d  pic3.fig  T_x_y_000000_0002.dat  T_x_y_000000_0009.dat  T_x_y_000000_0010.dat  T_x_y_000000_0011.dat
debug_0003.dat  debug_0010.dat  hc2d.c  pic4.fig  T_x_y_000000_0003.dat  T_x_y_000000_0010.dat  T_x_y_000000_0011.dat  T_x_y_000000_0012.dat
debug_0004.dat  debug_0011.dat  input2d.in  pic5.fig  T_x_y_000000_0004.dat  T_x_y_000000_0011.dat  T_x_y_000000_0012.dat  T_x_y_000000_0013.dat
debug_0005.dat  debug_0012.dat  parhc2d_skel  pic6.fig  T_x_y_000000_0005.dat  T_x_y_000000_0012.dat  T_x_y_000000_0013.dat  T_x_y_000000_0014.dat
debug_0006.dat  debug_0013.dat  parhc2d_skel.c  plot_contours.m  T_x_y_000000_0006.dat  T_x_y_000000_0013.dat  T_x_y_000000_0014.dat  T_x_y_000000_0015.dat
[avinash@sahyadri hw5]$ vi parhc2d_skel.c
[avinash@sahyadri hw5]$ ./hc2d
Inputs are: 800 0.000000 1.000000 0.000000 0.002000 0.000010
Inputs are: 800 0.000000 1.000000
The time taken for time step 0 : 0.020000 seconds
Done writing solution for time step = 0, time level = 1.566414e-02
The time taken for time step 1 : 0.010000 seconds
The time taken for time step 2 : 0.010000 seconds
Done writing solution for time step = 2, time level = 4.699241e-02
The time taken for time step 3 : 0.010000 seconds
The time taken for time step 4 : 0.000000 seconds
Done writing solution for time step = 4, time level = 7.832068e-02
The time taken for time step 5 : 0.010000 seconds
The time taken for time step 6 : 0.010000 seconds
Done writing solution for time step = 6, time level = 1.096490e-01
The time taken for time step 7 : 0.010000 seconds
The time taken for time step 8 : 0.000000 seconds
Done writing solution for time step = 8, time level = 1.409772e-01
The time taken for time step 9 : 0.000000 seconds
The time taken for time step 10 : 0.010000 seconds
Done writing solution for time step = 10, time level = 1.723055e-01
Done writing solution for time step = 11, time level = 1.723055e-01
[avinash@sahyadri hw5]$
```

Time taken by parallel run is shown below:

```
15. avinash@sahyadri:~/HPC_homs
-----
Hostname: sahyadri
Inputs are: 800 800 0.000000 1.000000
Inputs are: 0.000000 1.000000 0.000000 0.002000 1.000000
Inputs are: 0.000010 0.000400 2 2
Done writing solution for rank = 0, time step = 0, time level = 0.000000e+00
Working on time step no. 0, time = 0.000010
Done writing solution for rank = 1, time step = 0, time level = 0.000000e+00
Done writing solution for rank = 3, time step = 0, time level = 0.000000e+00
Done writing solution for rank = 2, time step = 0, time level = 0.000000e+00
The time taken at it th step 0, time_taken at ith step = 0.005459
The time taken at it th step 0, time_taken at ith step = 0.000666
The time taken at it th step 0, time_taken at ith step = 0.016083
The time taken at it th step 0, time_taken at ith step = 0.003203
Done writing solution for rank = 1, time step = 0, time level = 1.000000e-05
Done writing solution for rank = 0, time step = 0, time level = 1.000000e-05
Working on time step no. 1, time = 0.000020
Done writing solution for rank = 2, time step = 0, time level = 1.000000e-05
Done writing solution for rank = 3, time step = 0, time level = 1.000000e-05
The time taken at it th step 1, time_taken at ith step = 0.064258
The time taken at it th step 1, time_taken at ith step = 0.005544
The time taken at it th step 1, time_taken at ith step = 0.002926
The time taken at it th step 1, time_taken at ith step = 0.048114
Working on time step no. 2, time = 0.000030
The time taken at it th step 2, time_taken at ith step = 0.002739
The time taken at it th step 2, time_taken at ith step = 0.002845
Working on time step no. 3, time = 0.000040
The time taken at it th step 2, time_taken at ith step = 0.002896
The time taken at it th step 2, time_taken at ith step = 0.002948
The time taken at it th step 3, time_taken at ith step = 0.002863
The time taken at it th step 3, time_taken at ith step = 0.002878
The time taken at it th step 3, time_taken at ith step = 0.002847
Working on time step no. 4, time = 0.000050
The time taken at it th step 3, time_taken at ith step = 0.002902
The time taken at it th step 4, time_taken at ith step = 0.002897
The time taken at it th step 4, time_taken at ith step = 0.002837
The time taken at it th step 4, time_taken at ith step = 0.002864
The time taken at it th step 4, time_taken at ith step = 0.002861
Working on time step no. 5, time = 0.000060
The time taken at it th step 5, time_taken at ith step = 0.002832
The time taken at it th step 5, time_taken at ith step = 0.002880
The time taken at it th step 5, time_taken at ith step = 0.002866
```

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rk5
The time taken at it th step 2, time_taken at ith step = 0.002896
The time taken at it th step 2, time_taken at ith step = 0.002948
The time taken at it th step 3, time_taken at ith step = 0.002863
The time taken at it th step 3, time_taken at ith step = 0.002878
The time taken at it th step 3, time_taken at ith step = 0.002847
Working on time step no. 4, time = 0.000050
The time taken at it th step 3, time_taken at ith step = 0.002902
The time taken at it th step 4, time_taken at ith step = 0.002897
The time taken at it th step 4, time_taken at ith step = 0.002837
The time taken at it th step 4, time_taken at ith step = 0.002864
The time taken at it th step 4, time_taken at ith step = 0.002861
Working on time step no. 5, time = 0.000060
The time taken at it th step 5, time_taken at ith step = 0.002832
The time taken at it th step 5, time_taken at ith step = 0.002880
The time taken at it th step 5, time_taken at ith step = 0.002866
The time taken at it th step 5, time_taken at ith step = 0.002881
Working on time step no. 6, time = 0.000070
The time taken at it th step 6, time_taken at ith step = 0.002867
The time taken at it th step 6, time_taken at ith step = 0.002858
The time taken at it th step 6, time_taken at ith step = 0.002852
The time taken at it th step 6, time_taken at ith step = 0.003438
Working on time step no. 7, time = 0.000080
The time taken at it th step 7, time_taken at ith step = 0.003452
The time taken at it th step 7, time_taken at ith step = 0.003461
The time taken at it th step 7, time_taken at ith step = 0.003478
The time taken at it th step 7, time_taken at ith step = 0.003064
Working on time step no. 8, time = 0.000090
The time taken at it th step 8, time_taken at ith step = 0.003063
The time taken at it th step 8, time_taken at ith step = 0.003063
The time taken at it th step 8, time_taken at ith step = 0.003067
The time taken at it th step 8, time_taken at ith step = 0.003058
Working on time step no. 9, time = 0.000100
The time taken at it th step 9, time_taken at ith step = 0.003063
The time taken at it th step 9, time_taken at ith step = 0.003058
The time taken at it th step 9, time_taken at ith step = 0.002832
Working on time step no. 10, time = 0.000110
The time taken at it th step 9, time_taken at ith step = 0.003825
The time taken at it th step 10, time_taken at ith step = 0.002849
The time taken at it th step 10, time_taken at ith step = 0.002846
The time taken at it th step 10, time_taken at ith step = 0.002855
The time taken at it th step 10, time_taken at ith step = 0.002852
[avinash@sahyadri: hws]$
```

