# Assignment-5 ME5470- Parallel Computing
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Q1] The following changes have been made to the skeleton code to MPI parallelise the code.

1)

```
void enforce_bcs(int nx, int nxglob, int ny, int nyglob, int istglob, int ienglob, int jstglob, int jenglob, double *x, double *y, double *
  int i, j;

  // Leftmost boundary
  if (istglob == 0) {
    for(j=0; j<ny; j++) T[0][j] = 0.0;
  }

  // Rightmost boundary
  if (ienglob == nxglob - 1) {
    for(j=0; j<ny; j++) T[nx-1][j] = 0.0;
  }

  // Bottommost boundary
  if (jstglob == 0) {
    for(i=0; i<nx; i++) T[i][0] = 0.0;
  }

  // Topmost boundary
  if (jenglob == nyglob - 1) {
    for(i=0; i<nx; i++) T[i][ny-1] = 0.0;
  }
}
```

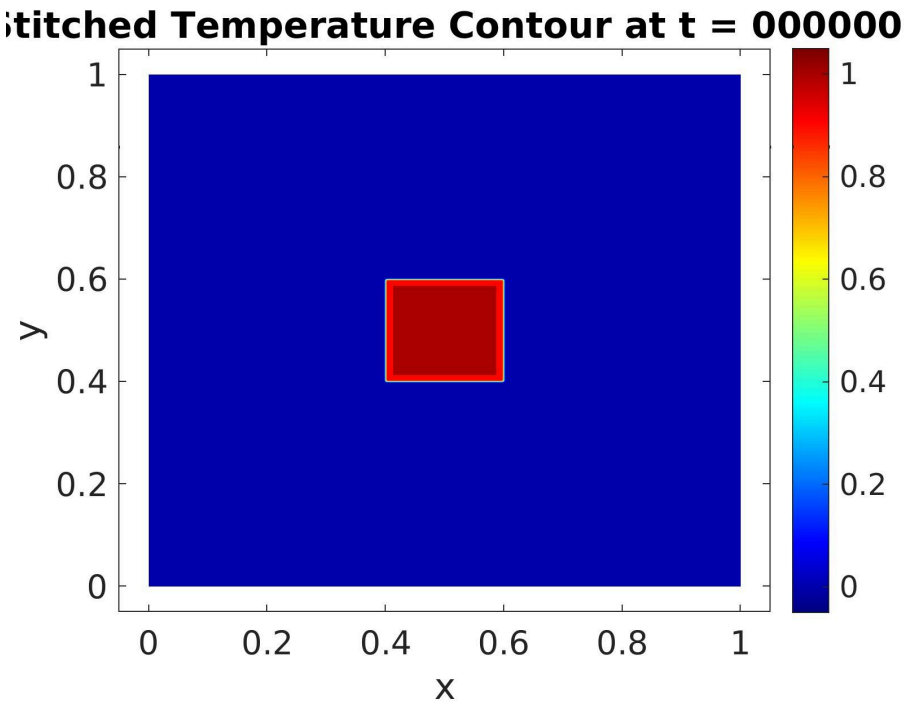
Since the boundary conditions have to be applied to only the global boundaries, and not the processor boundaries.

2)

```
void set_initial_condition(int nx, int nxglob, int ny, int nyglob, int istglob, int ienglob, int jstglob, int jenglob, double *x, double *y, double **T, double
{
  int i, j;
  double del=1.0;

  for(i=0; i<nx; i++)
    for(j=0; j<ny; j++)
    {
        T[i][j] = 0.25 * (tanh((x[i]-0.4)/(del*dx)) - tanh((x[i]-0.6)/(del*dx)))
                       * (tanh((y[j]-0.4)/(del*dy)) - tanh((y[j]-0.6)/(del*dy)));
    }
                                int nyglob
    enforce_bcs(nx, nxglob, ny, nyglob, istglob, ienglob, jstglob, jenglob, x, y, T); //ensure BCs are satisfied at t = 0
}
```

In all functions that use the enforce_bcs has to be updated to have passed all the arguments.


Stitched Temperature Contour at t = 000000
1
0.8
0.6
0.4
0.2
0
y
0
0.2
0.4
0.6
0.8
1
x
1
0.8
0.6
0.4
0.2
0