

Analysis:

Step 1: Change 4096 random array and use 4 physical processors and 1 logical processor

Step 2: Change 8192 random array and use 4 physical processors and 1 physical processor.

Step 3: Finally using LU algorithm for finding determinant. The running script is following:

```
#!/bin/bash
#PBS -m be
#PBS -e det.err
#PBS -o det.out
#PBS -N hw2
mpiexec hw2_566 -n 4096 -p 4 -k 1 > ./log
mpiexec hw2_566 -n 4096 -p 4 -k 4 >> ./log
```

Using 8192 at the array size. Run the following script:

```
#!/bin/bash
#PBS -m be
#PBS -e det.err
#PBS -o det.out
#PBS -N hw2
mpiexec hw2_566 -n 8192 -p 4 -k 1 > ./log
mpiexec hw2_566 -n 8192 -p 4 -k 4 >> ./log
```

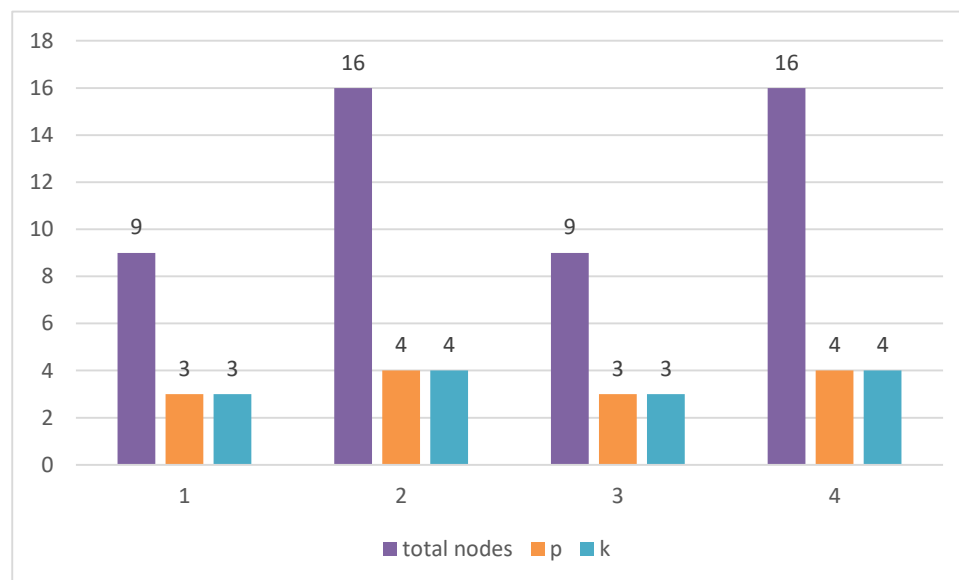
Results:

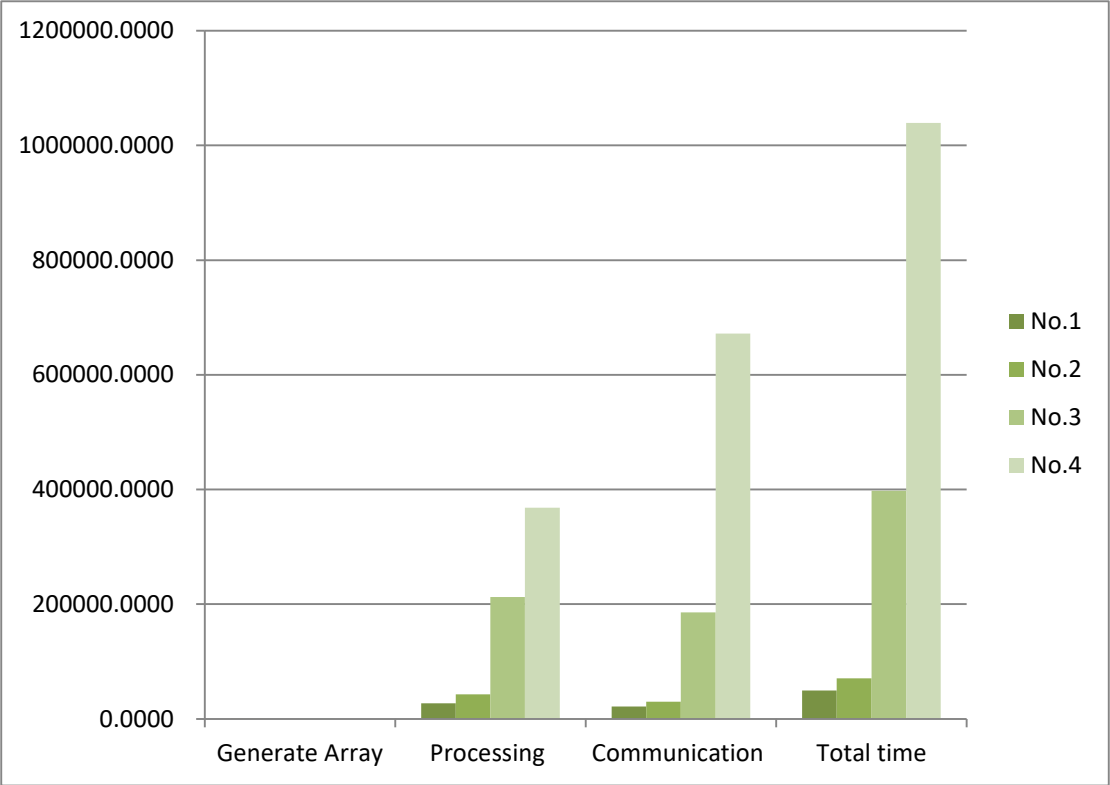
1. Tables

NO.	n	total nodes	p	k
1	4096	6	3	3
2	4096	9	4	4
3	8192	6	3	3
4	8192	9	4	4

NO.	Generate Array	Processing	Communication	Total time
1	1.4167	27423.7898	21846.1833	49346.7012
2	1.4012	42796.6366	29708.3422	70651.3676
3	5.5770	212319.1602	185635.9651	397937.6208
4	5.9805	368106.0951	672051.0921	1039038.7645

2. Graphs





Conclusion:

1. The processing time is more than the communication time and the more nodes we use, and the difference between the processing time and communication time grows.
2. On doubling the array size the communication and processing times significantly increases.
3. It takes a lot of computing time on serial computer as compared to the cluster since it comprises on large number of processors.
4. Physical nodes have worse communication times since they will communicate to each other over the network which costs significant time, and when the size of the random array is not very large, more logical processors in each physical processor will be more efficient.