

# Assignment 2 Report

## 1. Overview

In assignment 2, a parallelized version of Game of World (GOL) is implemented using Julia's distribution, and the performance of the parallel program is analyzed.

## 2. Experiment Setup

- All the experiments are performed on the DAS-5 cluster.
- The parallel GOL program's performance is evaluated on two kinds of tasks: **medium task(40000x40000)** and **large task(60000x60000)**, with a step of 10
- For each kind of task, the parallel GOL program's performance is tested with a different **number of processes(ranks): 2,4,8,16**
- For the scenario using X processors, the parallel GOL program's performance is tested with a different **number of nodes (1,2,4)**.
- **Each task will be repeated 4 times.**
- For each individual test, the efficiency will be calculated and discussed.

## 3. Experiment Result

### 3.1 Baseline

The sequential version of the GOL program provided by this course is run as the baseline.

Task Size	Time consumption(s) (minimum of 4 repeated run)
Medium	18.039
Large	55.564

### 3.2 Performance of parallel GOP program

#### 3.2.1 Performance for medium tasks

Time Consumption(seconds) of Parallel GOP program on Medium Task

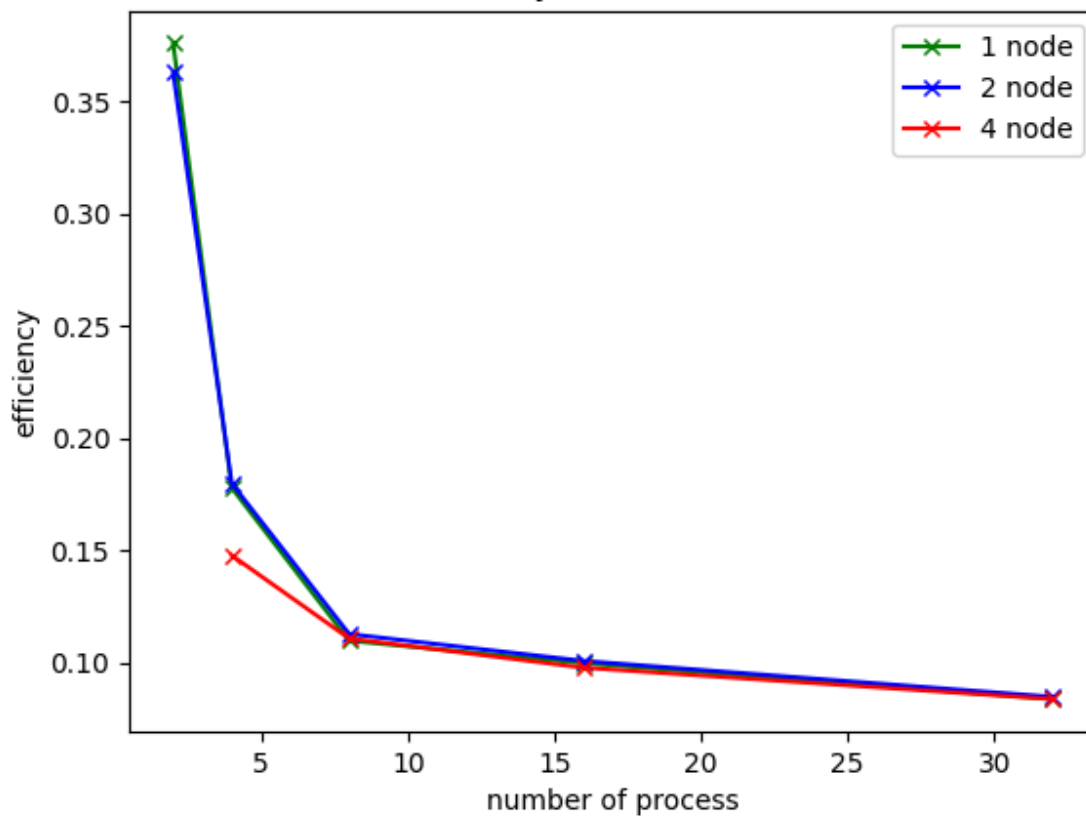
	2 processors	4 processors	8 processors	16 processors	32 processors
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1 node	24.393	29.494	24.073	12.552	6.857
2 nodes	24.790	34.334	21.539	11.528	7.574
4 nodes	N/A	32.316	22.733	12.582	7.187

Efficiency of Parallel GOP program on Medium Task

	2 processors	4 processors	8 processors	16 processors	32 processors
1 node	0.376	0.178	0.110	0.100	0.084
2 nodes	0.363	0.180	0.113	0.101	0.085
4 nodes	N/A	0.148	0.111	0.098	0.084

Effieiciency for medium task



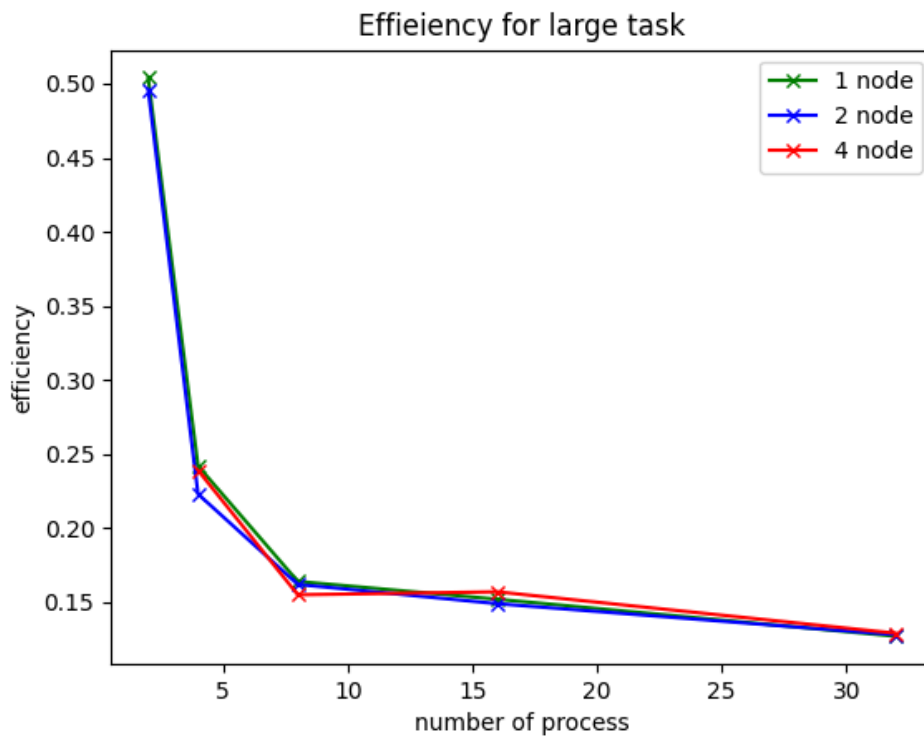
### 3.2.2 Performance for large tasks

	2 processors	4 processors	8 processors	16 processors	32 processors
1 node	58.860	62.815	50.273	25.219	24.284
2 nodes	57.420	76.584	53.159	25.319	14.143
4 nodes	N/A	72.648	48.867	24.632	14.647

Average Time Consumption(seconds) of Parallel GOP program on Large Task

Efficiency of Parallel GOP program on Large Task

	2 processors	4 processors	8 processors	16 processors	32 processors
1 node	0.504	0.242	0.164	0.152	0.127
2 nodes	0.496	0.223	0.162	0.149	0.128
4 nodes	N/A	0.239	0.155	0.157	0.129



### 3.2.3 Discussion

- It seems that the number of nodes does not have an outstanding influence on it, which is a result different from the C-MPI assignment. It is probably because that efficiency is too low compared with the C-MPI version, thus the difference between inter-node or in-node is not significant.
- When the number of processes increases, the efficiency drops dramatically to 10%.