# Faculty of Informatics and Computer Science

# 25CSCI05I

# Logic and Artificial Intelligence

## User Manual

## Cloud Resource Allocation

## Group 5

## Submitted to TA.Haneen Qandil

# 1. Overview

This manual's purpose is to explain how to install and use the Cloud Resource Allocation System program. The system has a simple GUI, three selection methods, dataset size selection and graphs that shows the algorithm's performance.

# 2. System Requirements

The System requires python 3.9 or higher. It depends on NumPy, matplotlib and tkinter. A computer can run it with the following requirements:
8 GB of RAM along with windows 10 or Linux or macOS can run it.

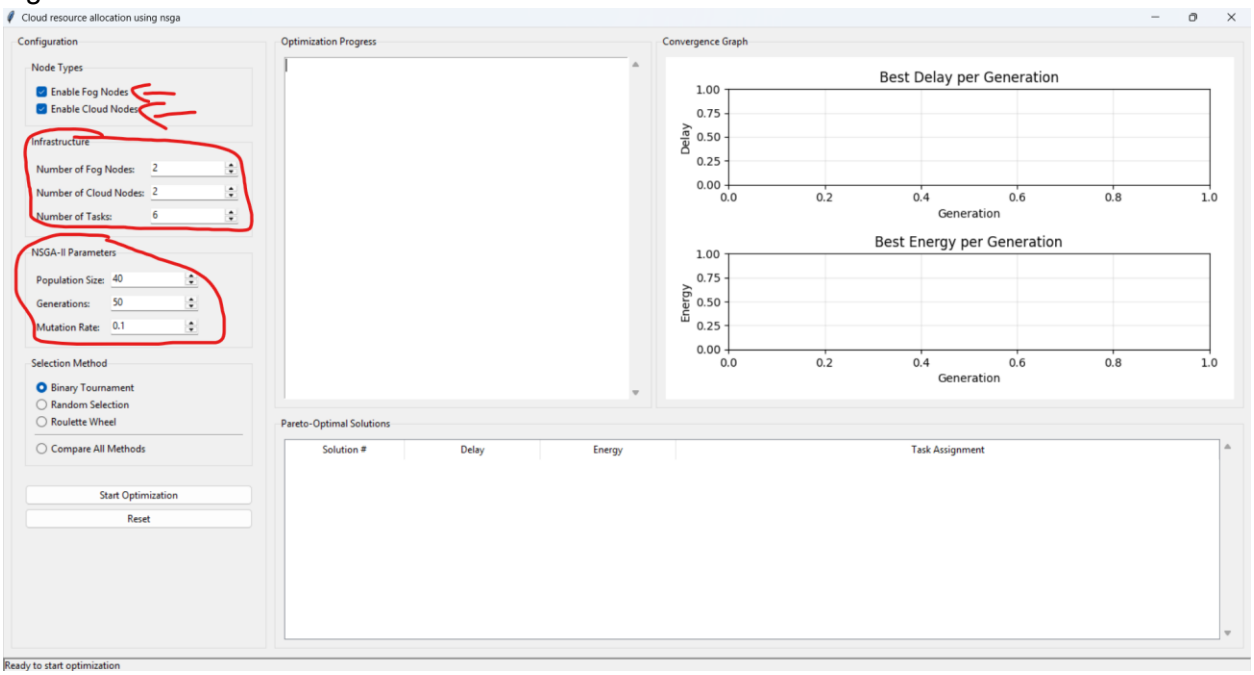
# 3. Installation

To install the system, run pip install -r requirements.txt.

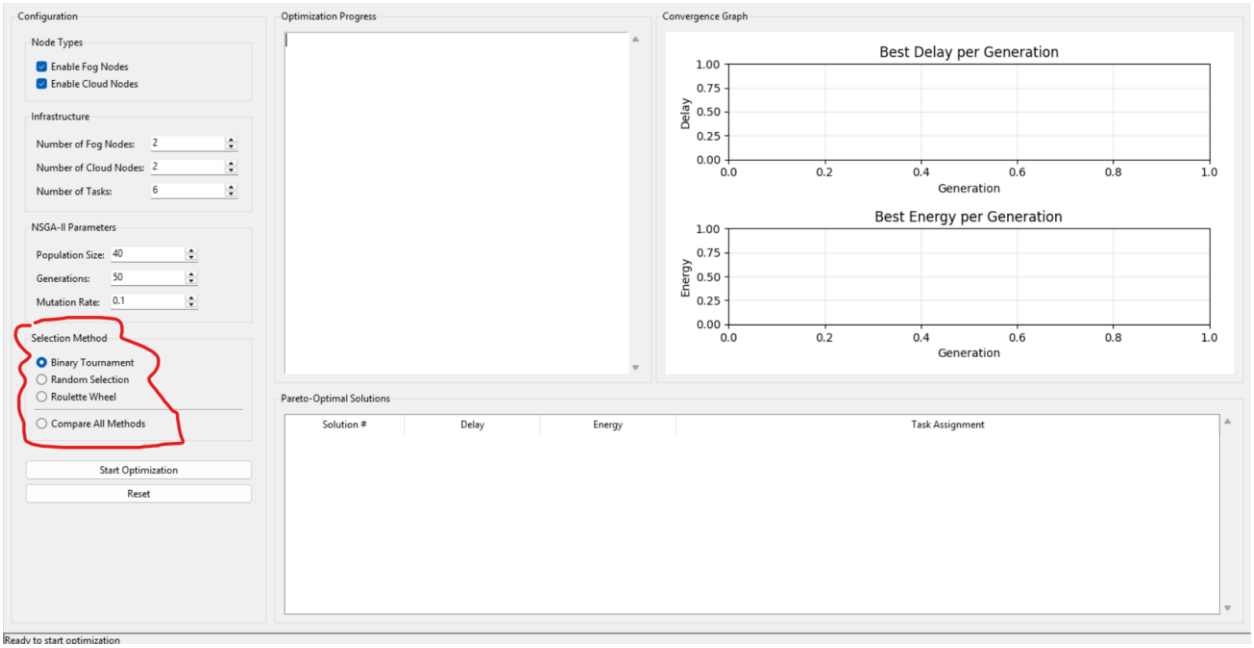
# 4. Running the Application

To run the application, enter python gui.py. The window that opens allows you to choose your dataset size and run whatever variant of the algorithm you wish.

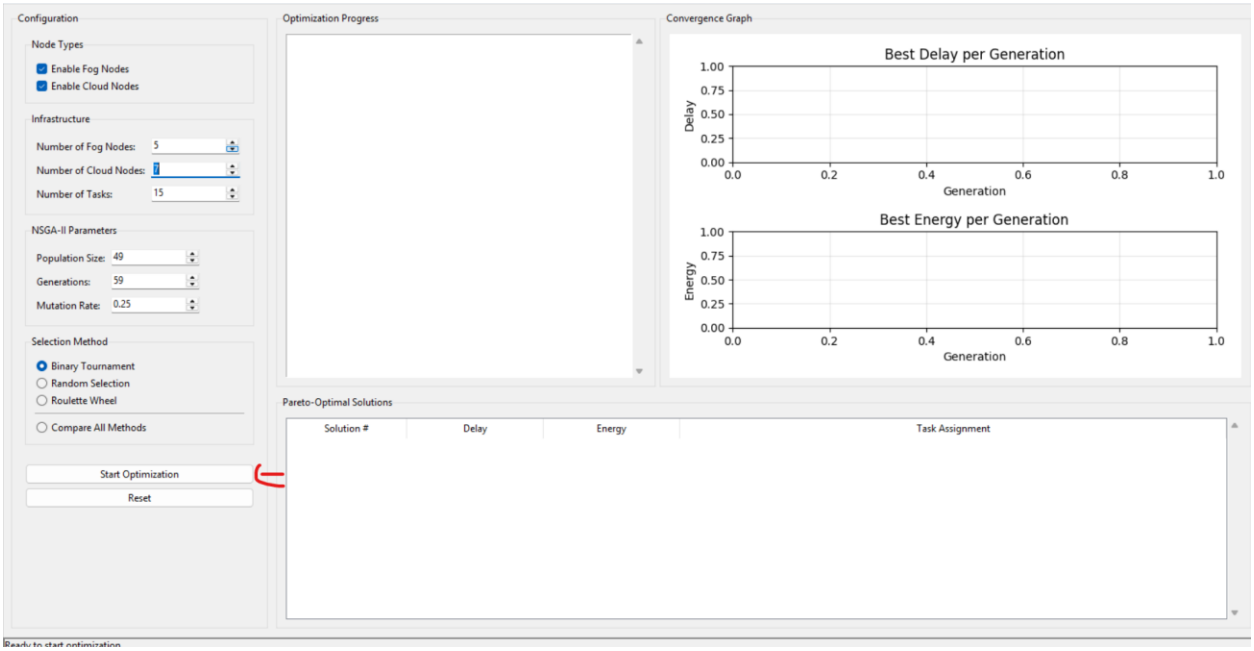
The following picture illustrates the data which you can edit to your likings before running the algorithm.



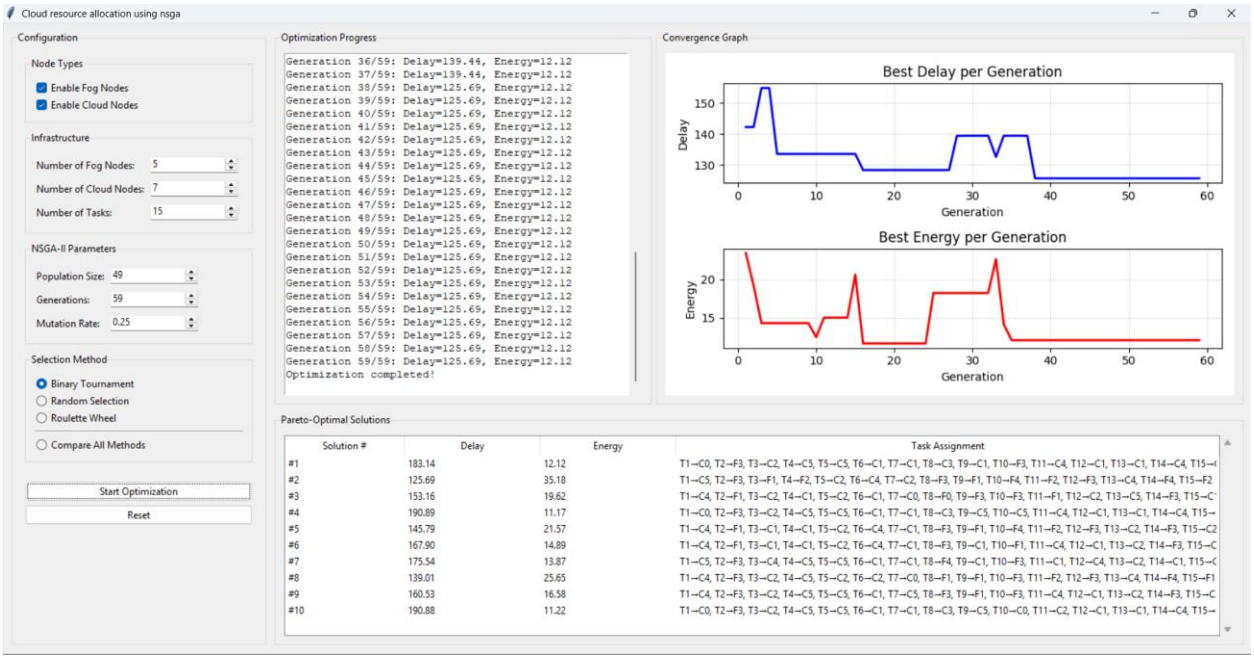
This picture shows where to pick the selection methods and if you want to compare between all methods



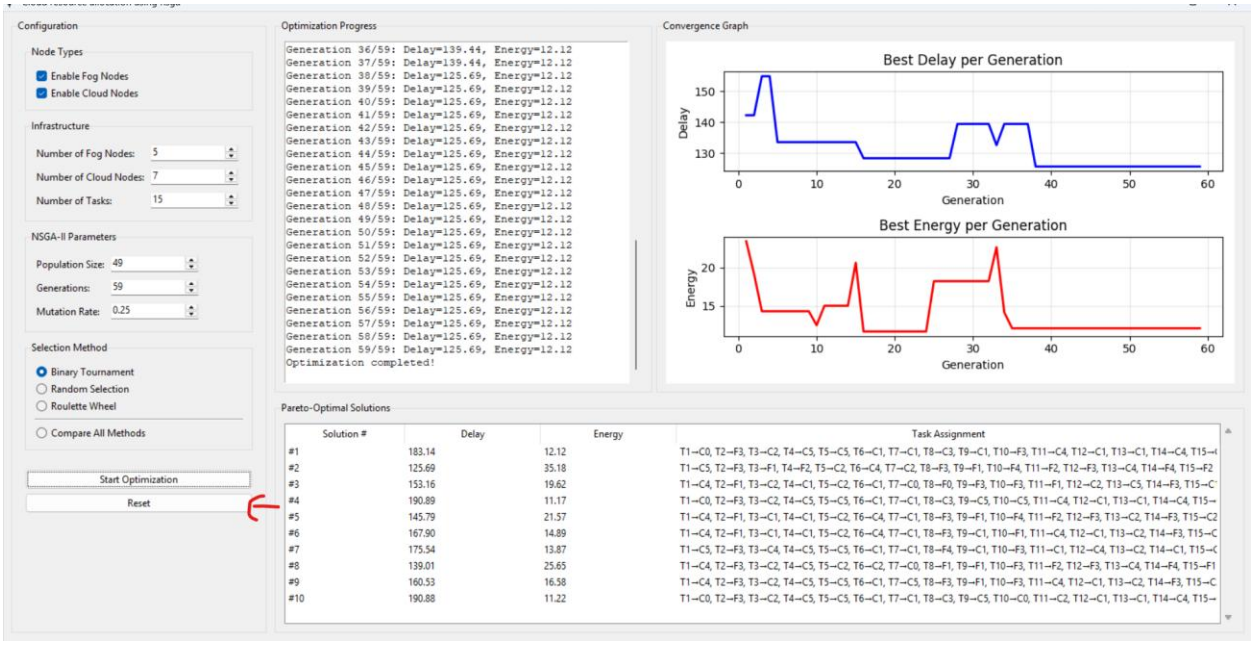

After Selecting your desired configuration and your selection method, just run Start Optimization as shown in this picture



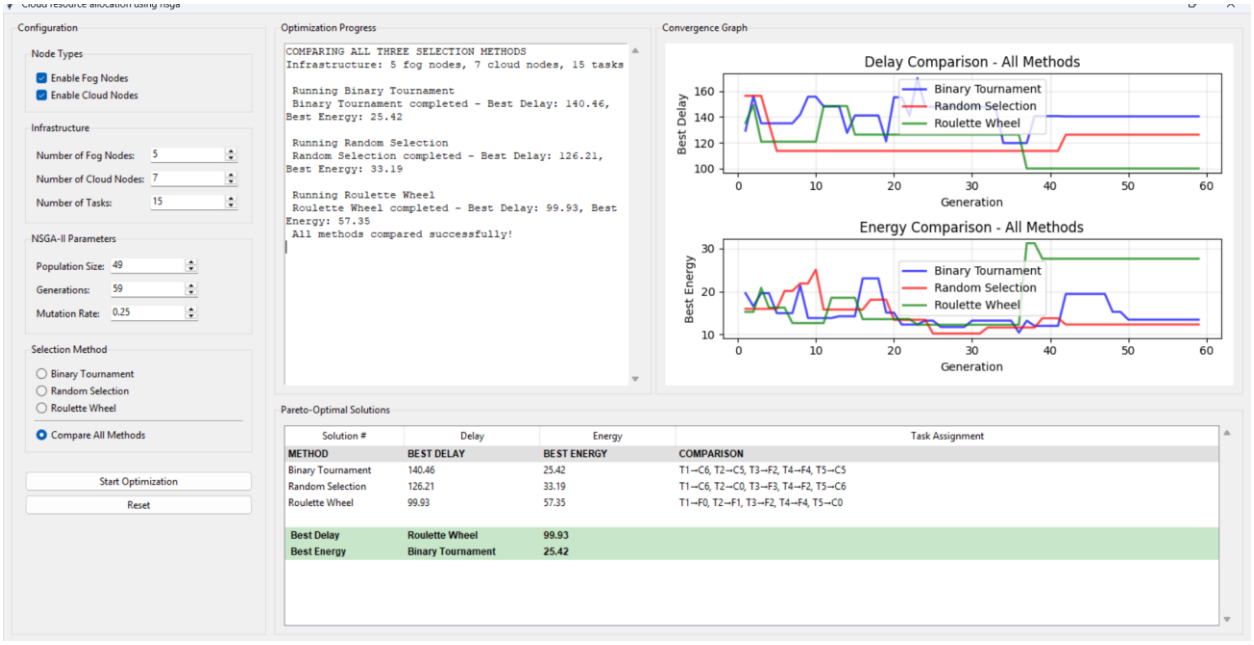

The GUI will show you the results along with the pareto front optimal solutions and graphs of the delay and energy as shown here.




After which you Press on reset to reset the display in case you want to choose another selection method.




In case you want to compare all methods, this is how it looks like:


Configuration
Node Types
Enable Fog Nodes
Enable Cloud Nodes
Infrastructure
Number of Fog Nodes: 5
Number of Cloud Nodes: 7
Number of Tasks: 15
NSGA-II Parameters
Population Size: 49
Generations: 59
Mutation Rate: 0.25
Selection Method
Binary Tournament
Random Selection
Roulette Wheel
Compare All Methods
Start Optimization
Reset
Optimization Progress
COMPARING ALL THREE SELECTION METHODS
Infrastructure: 5 fog nodes, 7 cloud nodes, 15 tasks
Running Binary Tournament
Binary Tournament completed - Best Delay: 140.46, Best Energy: 25.42
Running Random Selection
Random Selection completed - Best Delay: 126.21, Best Energy: 33.19
Running Roulette Wheel
Roulette Wheel completed - Best Delay: 99.93, Best Energy: 57.35
All methods compared successfully!
Convergence Graph
Delay Comparison - All Methods
Best Delay
Generation
Binary Tournament
Random Selection
Roulette Wheel
Energy Comparison - All Methods
Best Energy
Generation
Pareto-Optimal Solutions
Solution # | Delay | Energy | Task Assignment
METHOD | BEST DELAY | BEST ENERGY | COMPARISON
Binary Tournament | 140.46 | 25.42 | T1→C6, T2→C5, T3→F2, T4→F4, T5→C5
Random Selection | 126.21 | 33.19 | T1→C6, T2→C0, T3→F3, T4→F2, T5→C6
Roulette Wheel | 99.93 | 57.35 | T1→F0, T2→F1, T3→F2, T4→F4, T5→C0
Best Delay | Roulette Wheel | 99.93
Best Energy | Binary Tournament | 25.42