**SimPy (Python-based)**

🔹 **What it is:**

* A **discrete-event simulation library** in Python.
* General-purpose, but we can use it to **simulate fog computing systems**.

🔹 **Why it’s useful:**

* Lightweight and easy to learn.
* Perfect for simulating **users sending requests → fog nodes → cloud**.
* You can implement **dynamic pricing and game theory easily** in Python.

🔹 **Features relevant to our project:**

* Simulate **user requests as events** (e.g., ECG data every 5 seconds).
* Define **fog nodes** as resources with limited capacity.
* Simulate **queues, waiting time, resource allocation**.
* Collect **metrics** like cost, latency, resource usage.

🔹 **Why better for your project:**

* Python is simpler and more flexible.
* Easy to plot graphs (with **Matplotlib**).
* Matches your project’s **game theory + pricing logic** better.

**How We’ll Use SimPy in This Project**

1. **Define players:**
   * Users = request generators.
   * Fog nodes = limited-capacity servers.
2. **Create events:**
   * Users send requests (CPU, memory, latency).
   * Fog nodes process them based on availability.
3. **Add dynamic pricing logic:**
   * If too many users → increase price.
   * If fewer users → decrease price.
4. **Run simulation loop:**
   * Until equilibrium is reached.
5. **Collect outputs:**
   * Latency, cost, utilization, equilibrium prices.

**For SimPy (Recommended)**

* Install: pip install simpy matplotlib numpy
* Tutorial: Official SimPy docs → https://simpy.readthedocs.io/
* Learn basics:
  + Create **resources** (fog nodes).
  + Generate **processes** (user requests).
  + Track **waiting times & resource use**.
* Practice: Write a toy simulation of 5 users competing for 2 fog nodes.