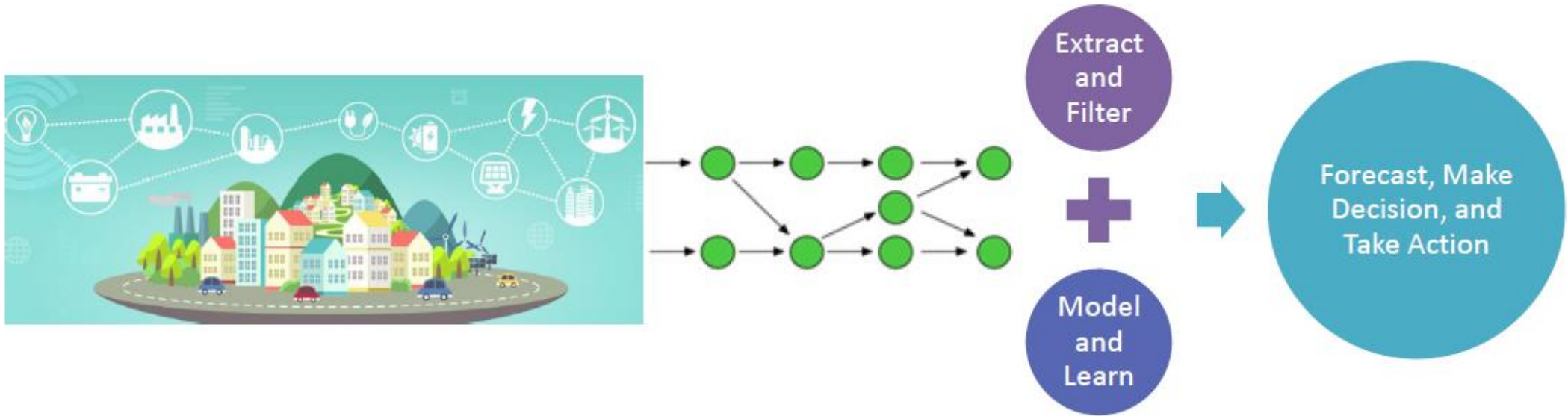


iFogSim

Nelson Fonseca

IoT



Fog Computing

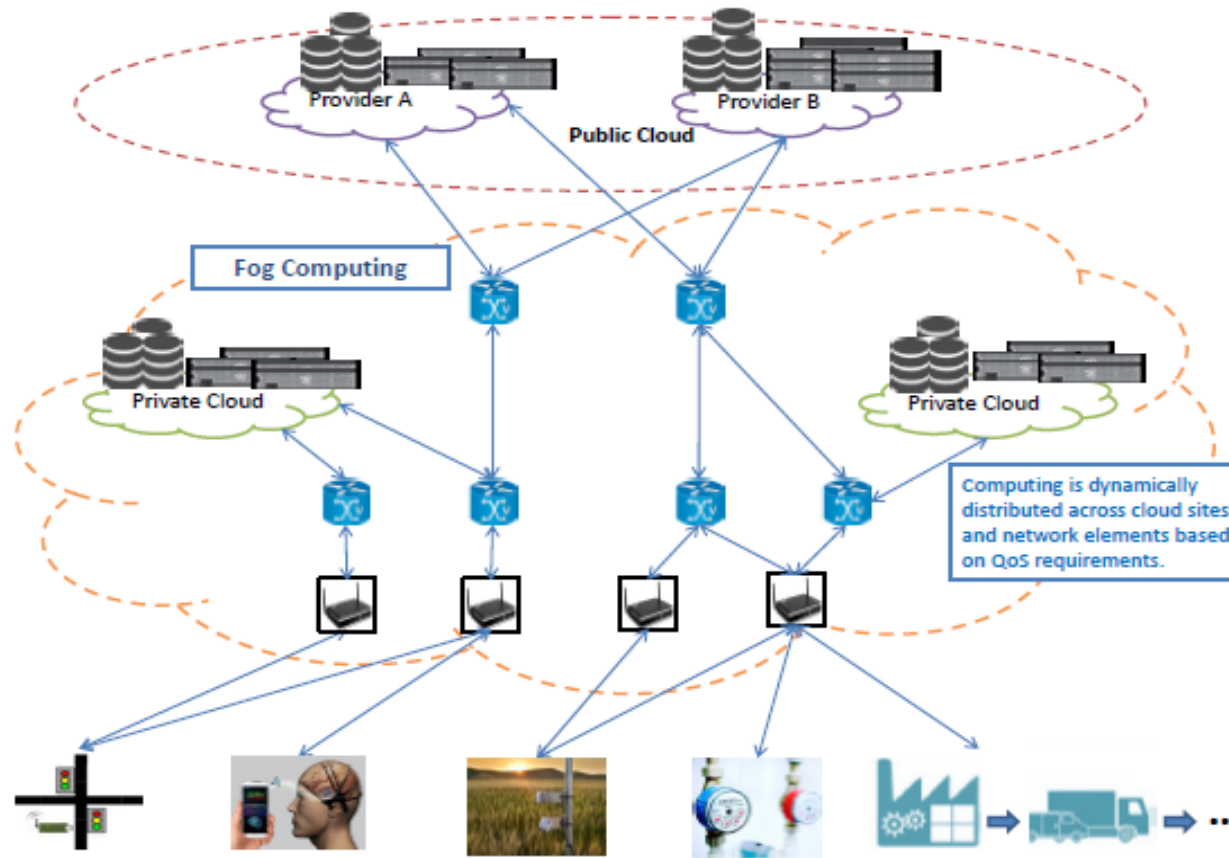


Figure 2. Distributed Data Processing in a Fog Computing Environment.

Fog Computing

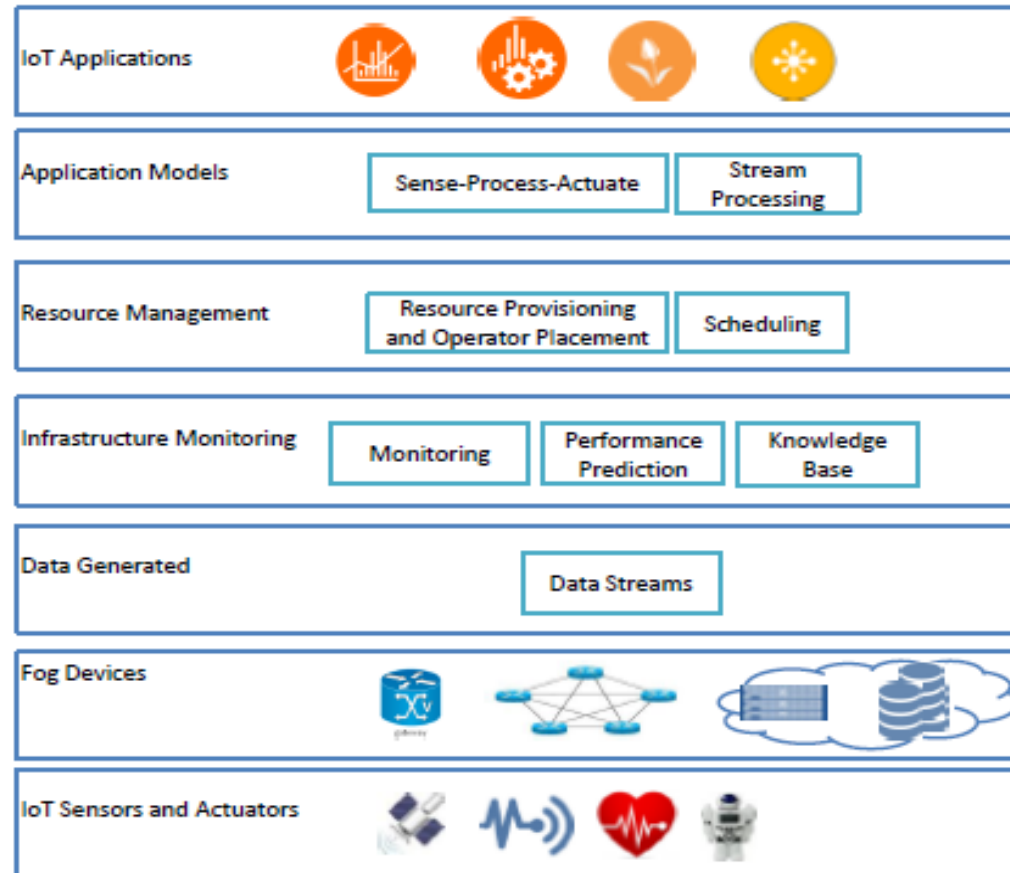


Figure 3. Fog Computing Architecture.

iFogSim

- CloudSim based

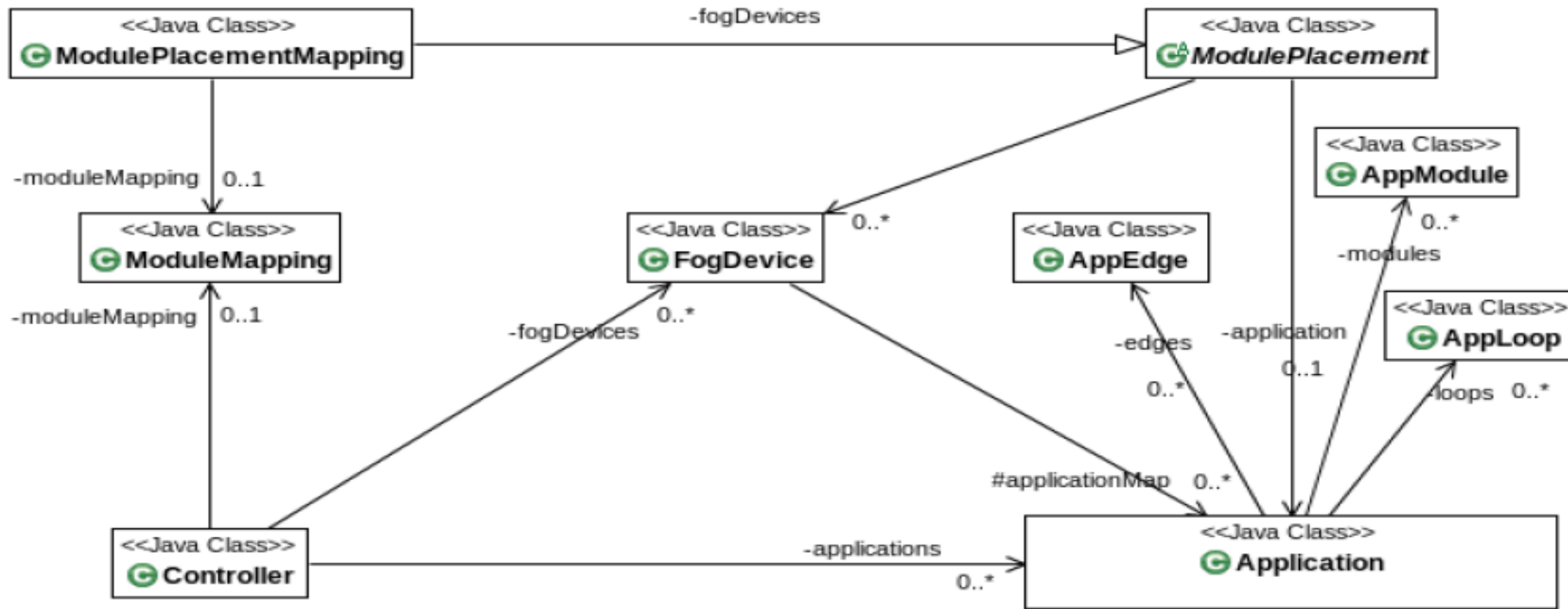


Figure 4. Main classes of iFogSim.

iFogSim

iFogSim is packaged with two application module placement strategies — *cloud-only placement* and *edge-ward placement*.

1. **Cloud-only placement:** The *cloud-only* placement strategy is based on the traditional cloud-based implementation of applications where all modules of an application run in data centers. The sense-process-actuate loop in such applications are implemented by having sensors transmitting sensed data to the cloud where it is processed and actuators are informed if action is required.
2. **Edge-ward placement:** Edge-ward placement strategy favours the deployment of application modules close to the edge of the network. However, devices close to the edge of the network — like routers and access points — may not be computationally powerful enough to host all operators of the application. In such a situation, the strategy iterates on Fog devices towards cloud and tries to place remaining operators on alternative devices. This strategy (shown in Algorithm 1) demonstrates the interplay between the Fog and the cloud by placing modules both near the network edge and the cloud.

Algorithm 1: Edge-ward module placement

```
for  $p \in PATHS$  do Across all paths
   $placeList := \{\}$ ;
  for Fog device  $d \in p$  do leaf-to-root traversal
    for module  $w \in app$  do
      if all predecessors of  $w$  are placed then
        | add  $w$  to  $placeList$ ;
      end
    end
    for module  $\theta \in placeList$  do
      if  $\theta$  is already placed on device  $f \in p$  then
        | Merge  $\theta$  with its upstream instance;
        |  $f :=$  device holding merged instance;
        | while  $CPU_{\theta}^{req} \geq CPU_f^{avail}$  do
          | |  $f := parent(f)$ ;
        | end
        | Place  $\theta$  on device  $f$ ;
      end
      else if  $CPU_{\theta}^{req} \leq CPU_d^{avail}$  then
        | Place  $\theta$  on device  $d$ ;
      end
    end
  end
end
```

iFogSim

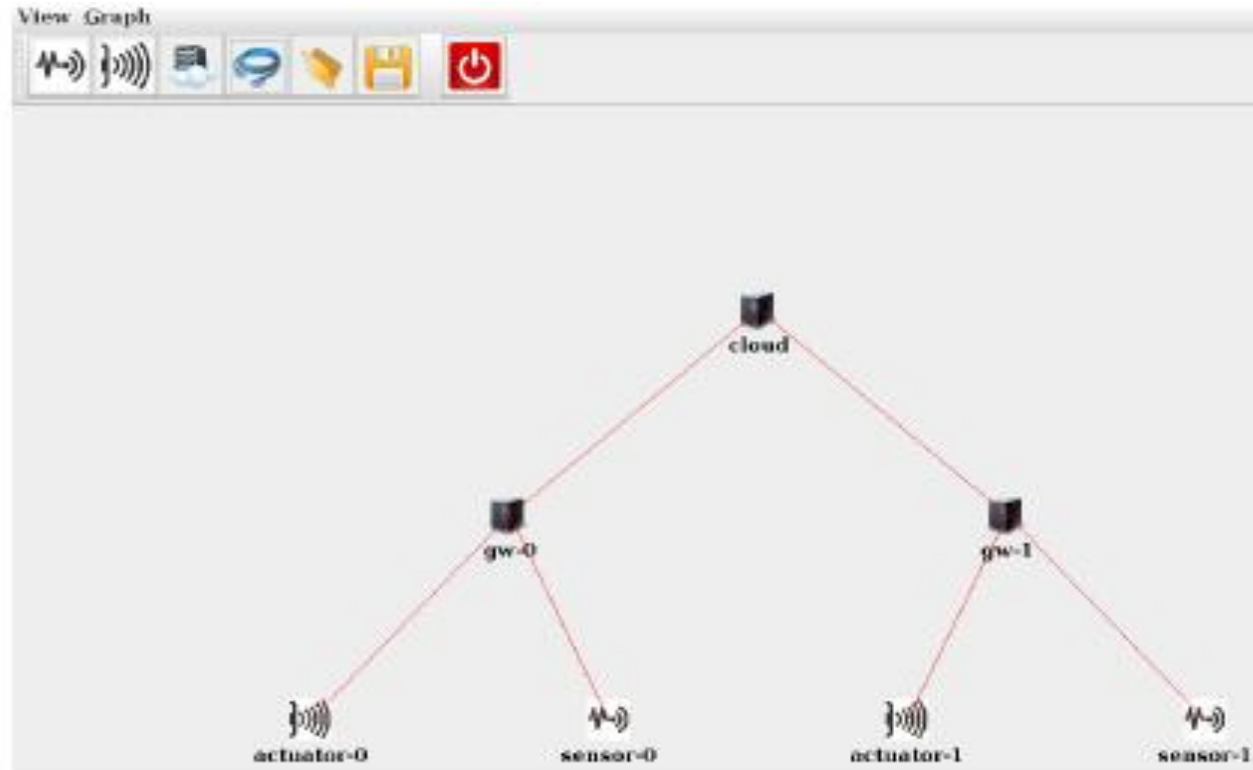


Figure 7. iFogSim GUI for building network topology.