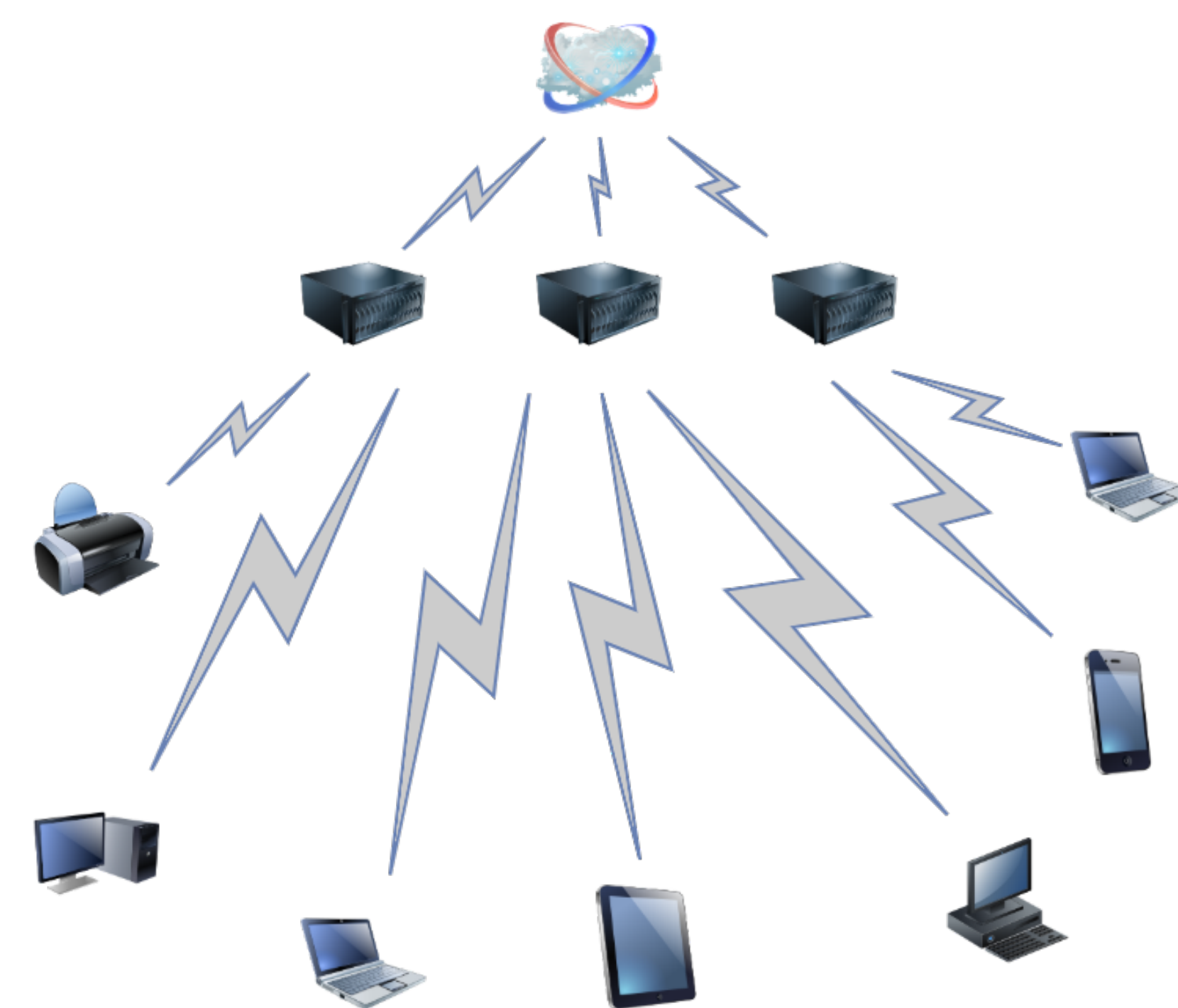


Optimizing Resource Allocation in Fog Computing

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Introduction

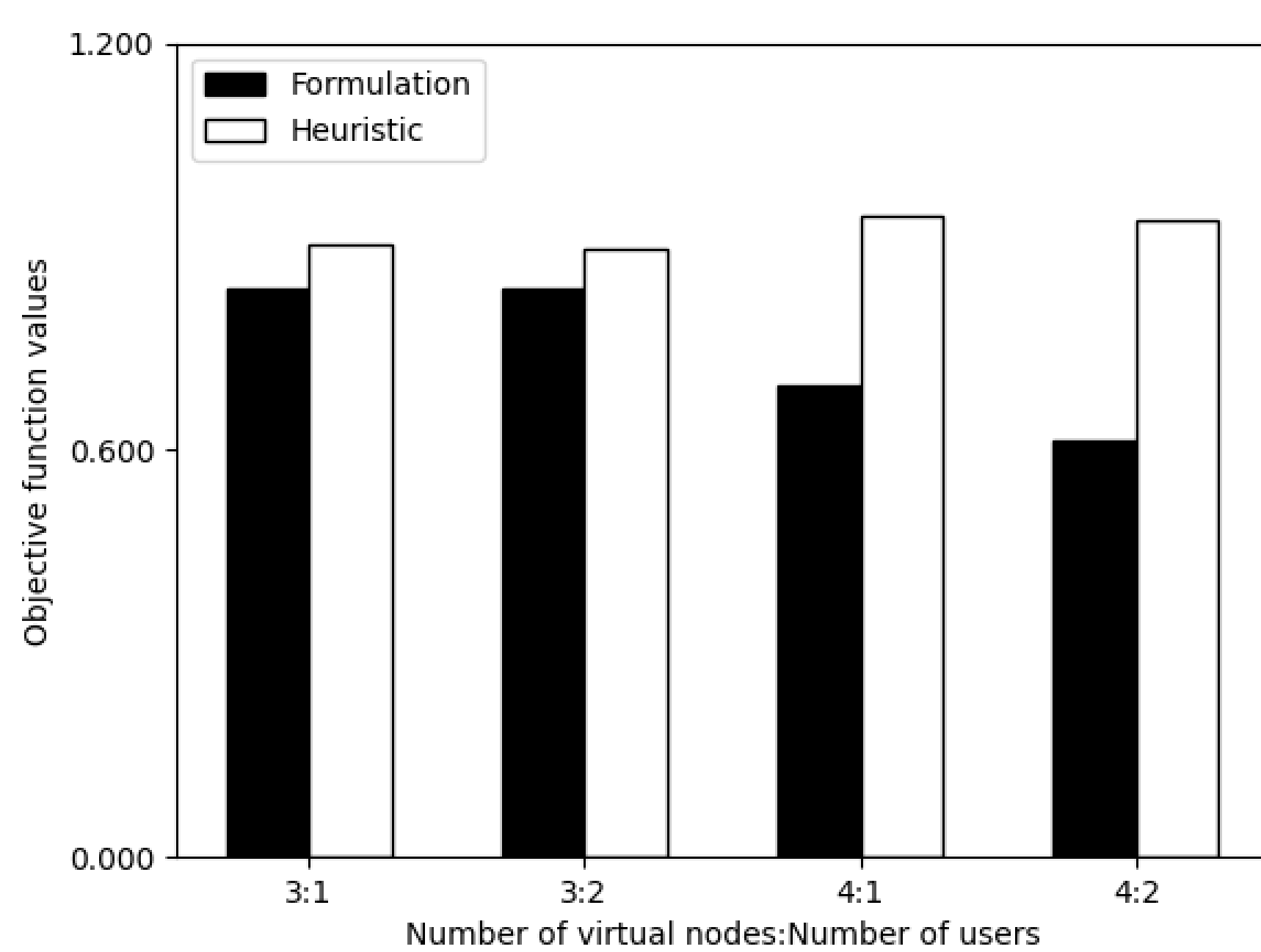
- Fog computing has been proposed to deal with the increase of IoT devices.
- Several resource allocation problems arise due to the resource constraints of fog devices.
- **Service Placement** aims to choose (virtual or physical) devices to allocate a set of services.
- **Virtual Network Embedding** aims to allocate virtual network requests on the physical network.
- When there are failures on the network or devices become overloaded, it is necessary to perform **Migration**.
- It may be necessary to optimize more than one objective/metric. Then, the aim is to apply multi-objective optimization techniques.



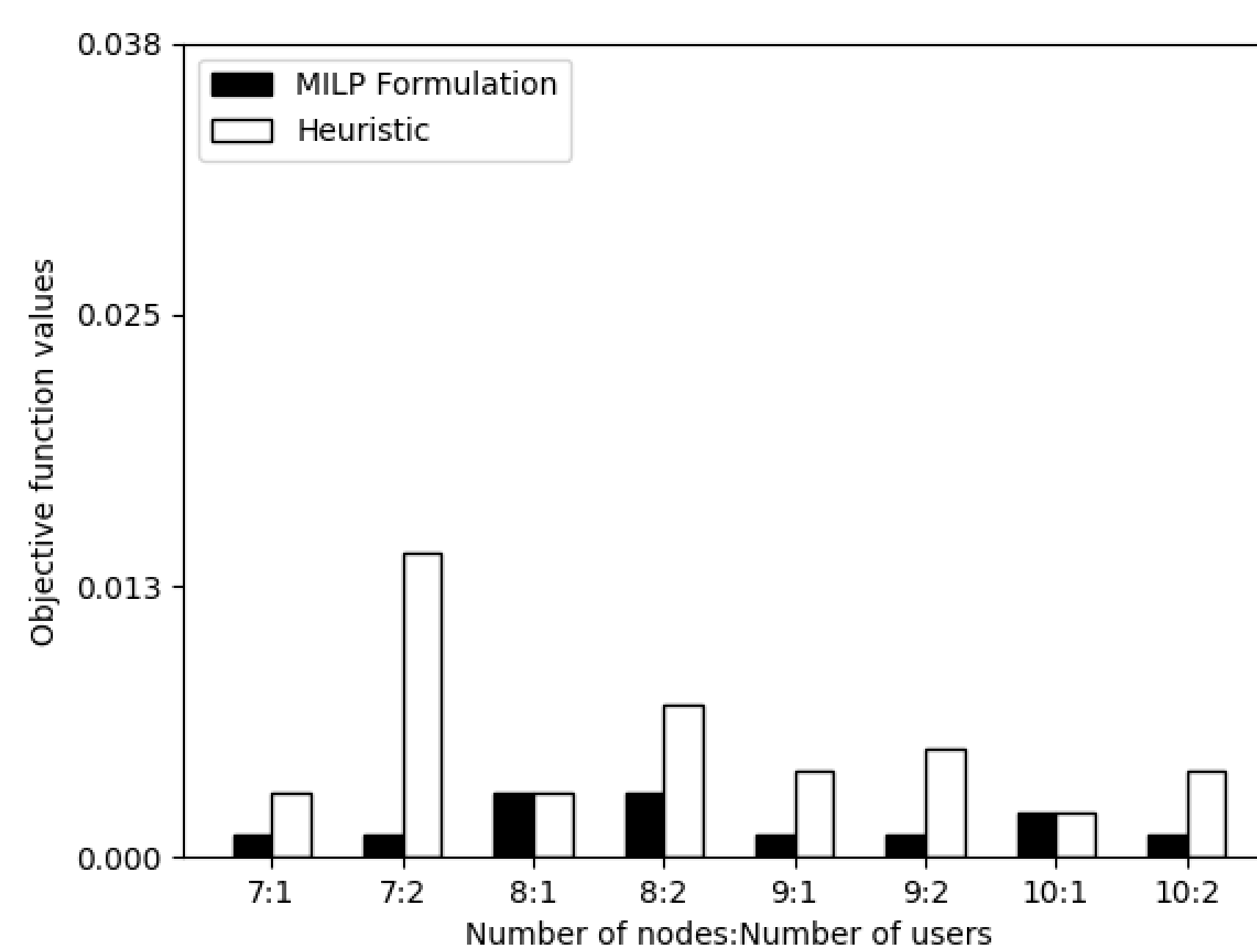
Fog computing architecture

Experimental Analysis

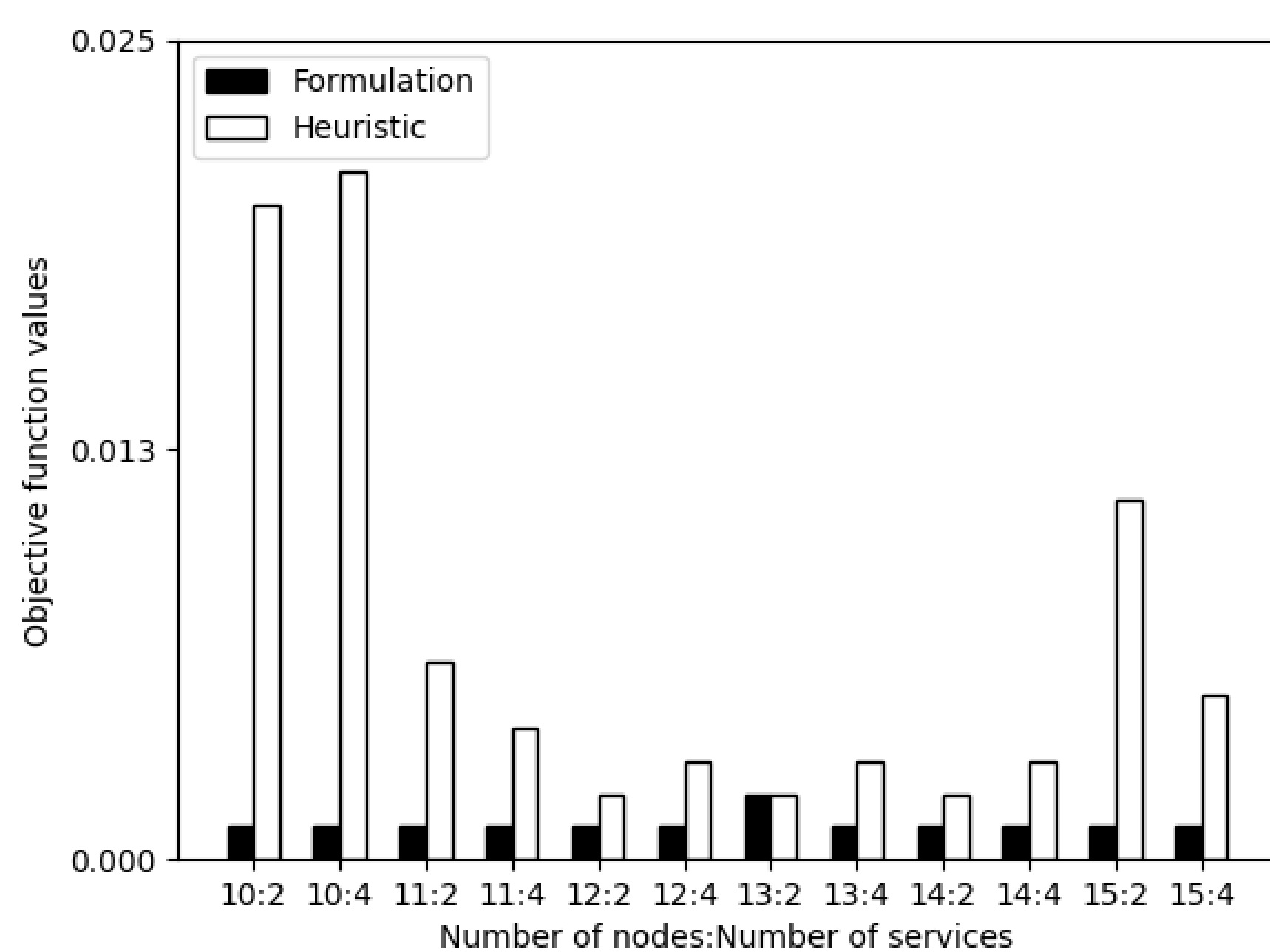
- This work presents an in-depth experimental analysis of an ILP solver and an heuristic for the three problems above: Service Placement, Virtual Network Embedding and Migration.
- Min-max approaches aim to obtain solutions that take into consideration all objectives, without explicit definition of preferences.
- Heuristics are useful for realistic environments, due to their lower time complexity.
- The solutions have been normalized between 0 and 1 to be comparable.
- The solutions from the heuristics are close to the optimum.



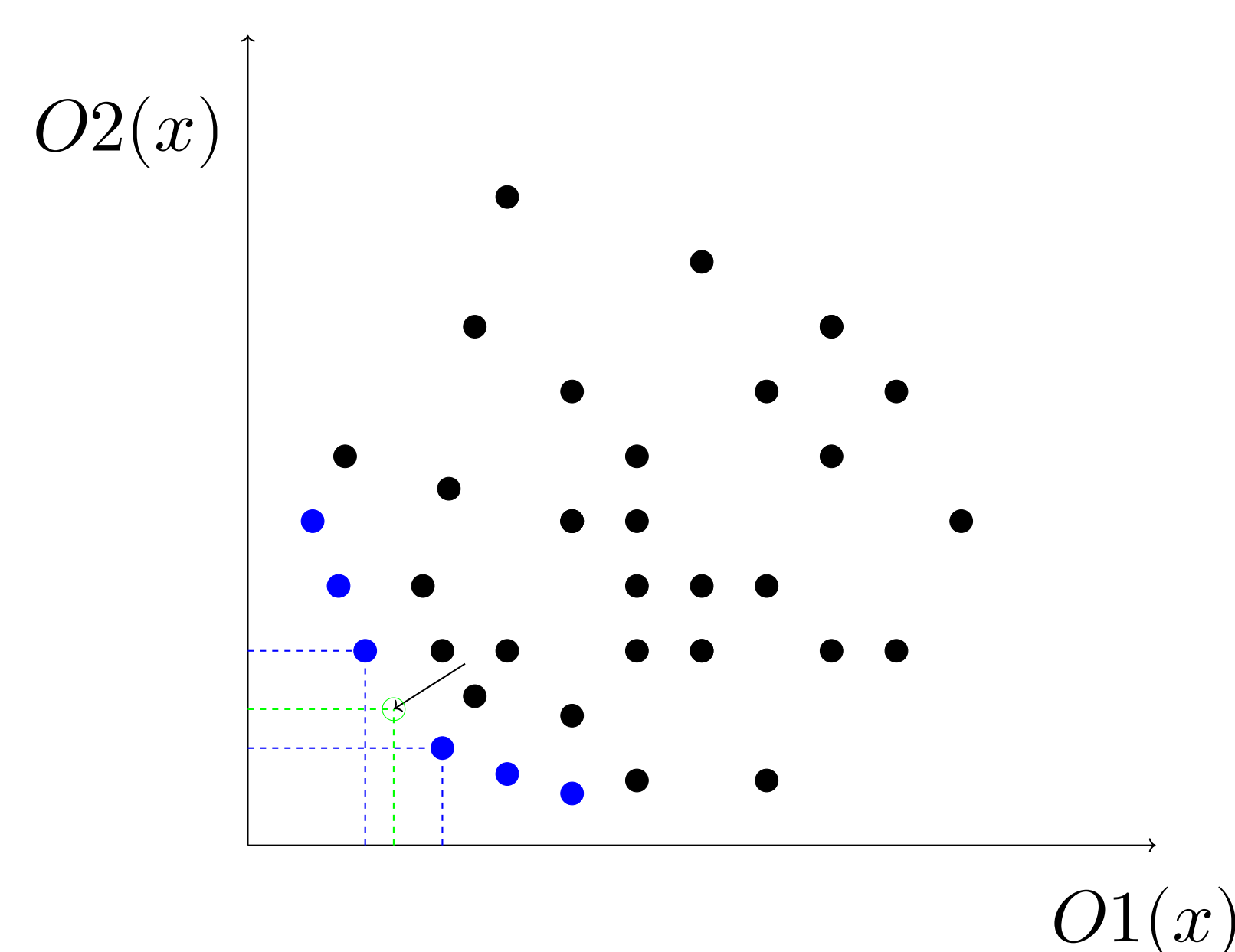
ILP solver, Virtual Network Embedding



ILP solver, Migration



ILP solver, Service Placement



Multi-objective optimization, min-max example

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 Noé Godinho wishes to acknowledge the Portuguese funding institution FCT - Foundation for Science and Technology for supporting his research under the Ph.D. grant 'DFA/BD/7293/2020'.

