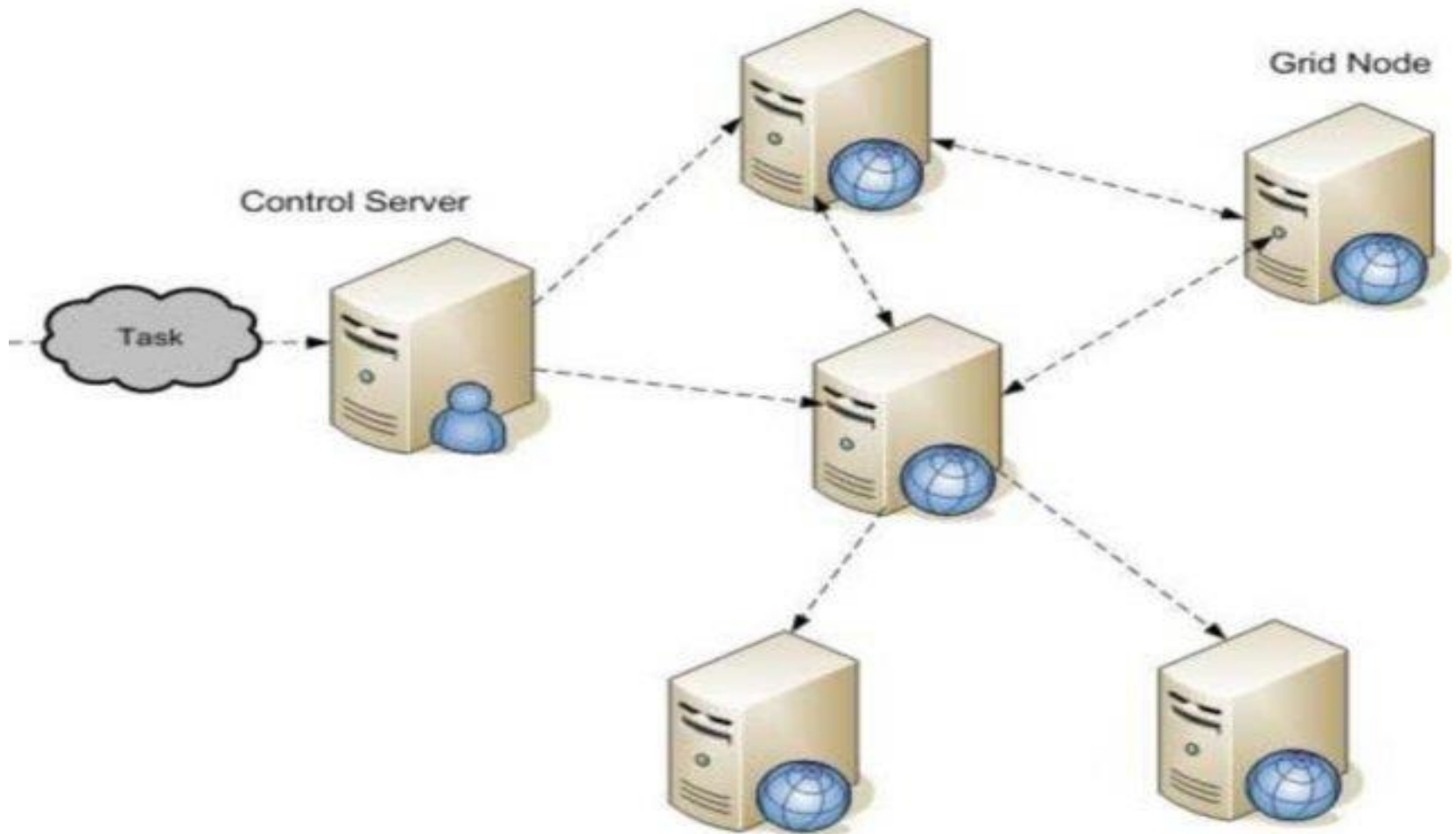# Grid and Utility Computing

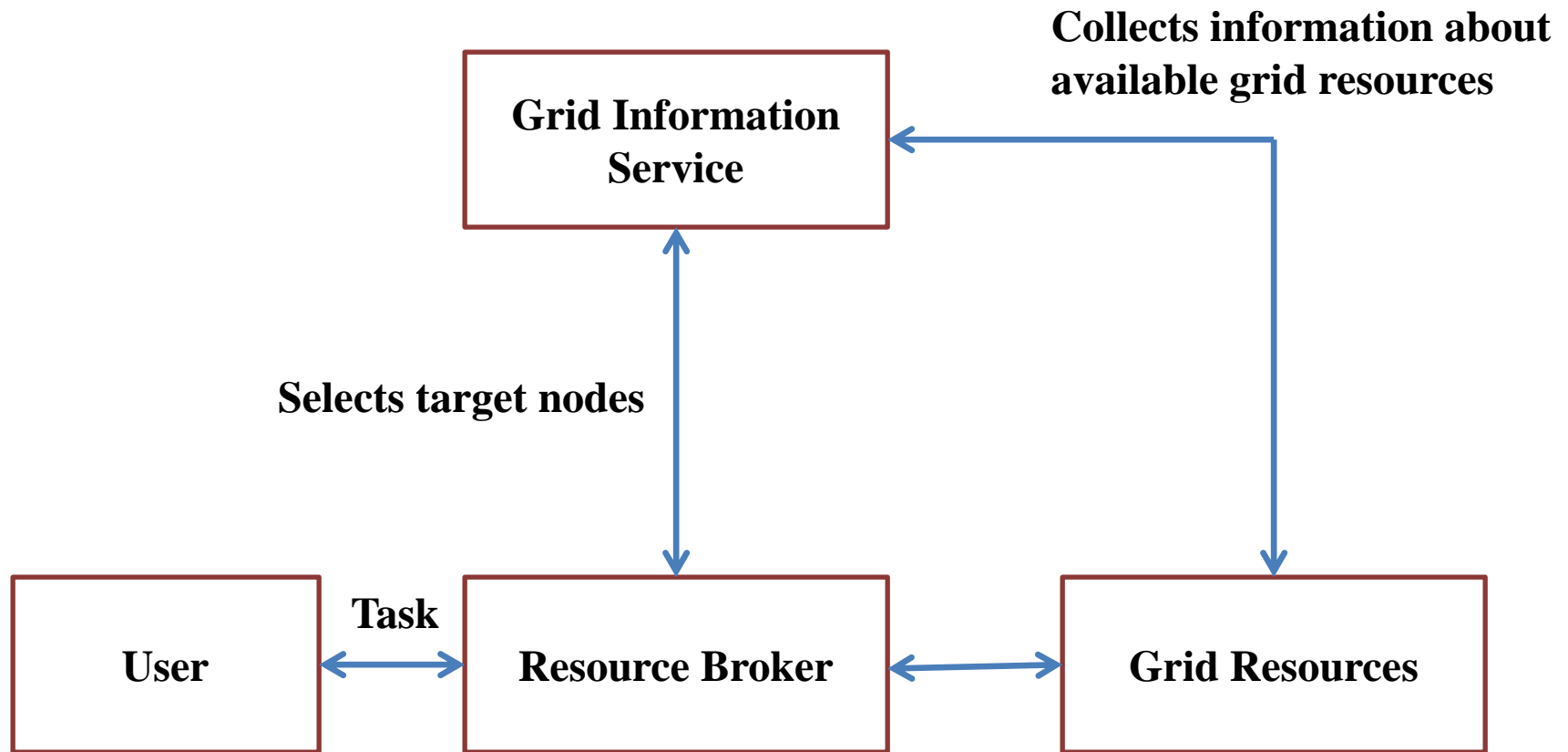# A Definition for a Grid

- A Grid is a system that :
  - coordinates resources that are not subject to centralized control
  - uses standard, open, general-purpose protocols and interfaces
  - delivers nontrivial qualities of service

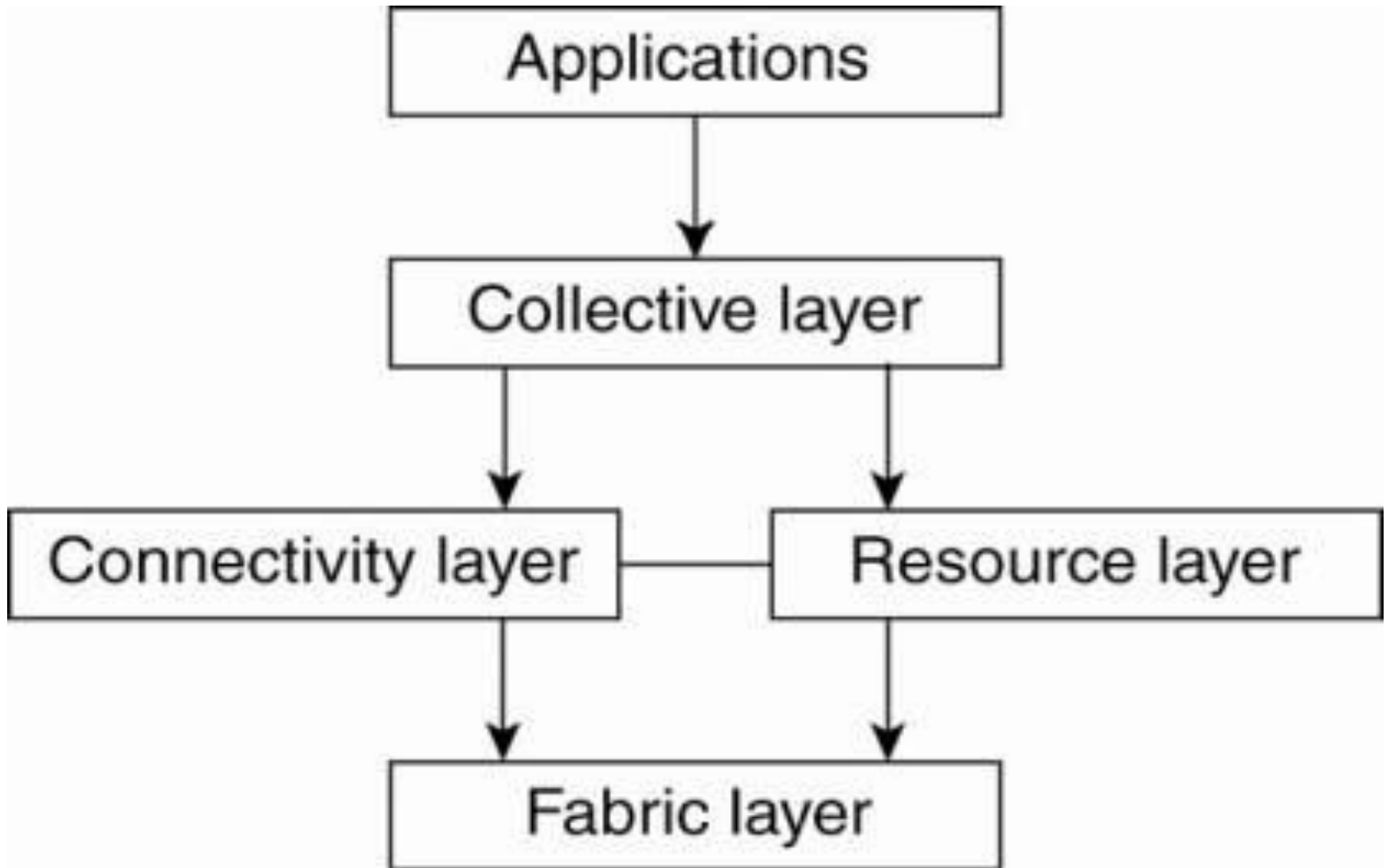[Ian Foster, What is the Grid? A Three Point Checklist]

Grid Computing Architecture

How Grid Computing Works

How Grid Computing Works

Types of Grids

- **Computational Grids**
  - Network of high performance servers
- **Scavenging Grids**
  - Network of desktop computers
  - Use idle CPU cycles ("scavenging") to execute tasks
- **Data Grids**
  - Access, modify or transfer huge amounts of data

Design Issues in Grids

- **Heterogeneity** – Connected systems may run different OS, have different architecture
- **Security** – How do we trust the solution returned by a node?
- **Dynamic Nature** – When nodes come and go dynamically, how do we obtain the result?
- **Network Connectivity** – What happens if nodes cannot periodically connect?
- **Is Grid Computing available for the masses?**

A Look Back at the "Grid" Analogy

- An electric grid possesses the following features:
  - Interconnected nodes acting like a single entity
  - Users do not know which node serves their requests
  - Users pay for what they use
- Grid computing is a collaborative effort, and users usually do not pay for the services they receive

Utility Computing

- Computing is considered as a utility, similar to how electricity is provided to homes
- Every connection is metered
- Users can utilize computing power according to their needs
- Pay-as-you-use model