Contractor:
A Remote Computation Environment for Java^{TM} Applications

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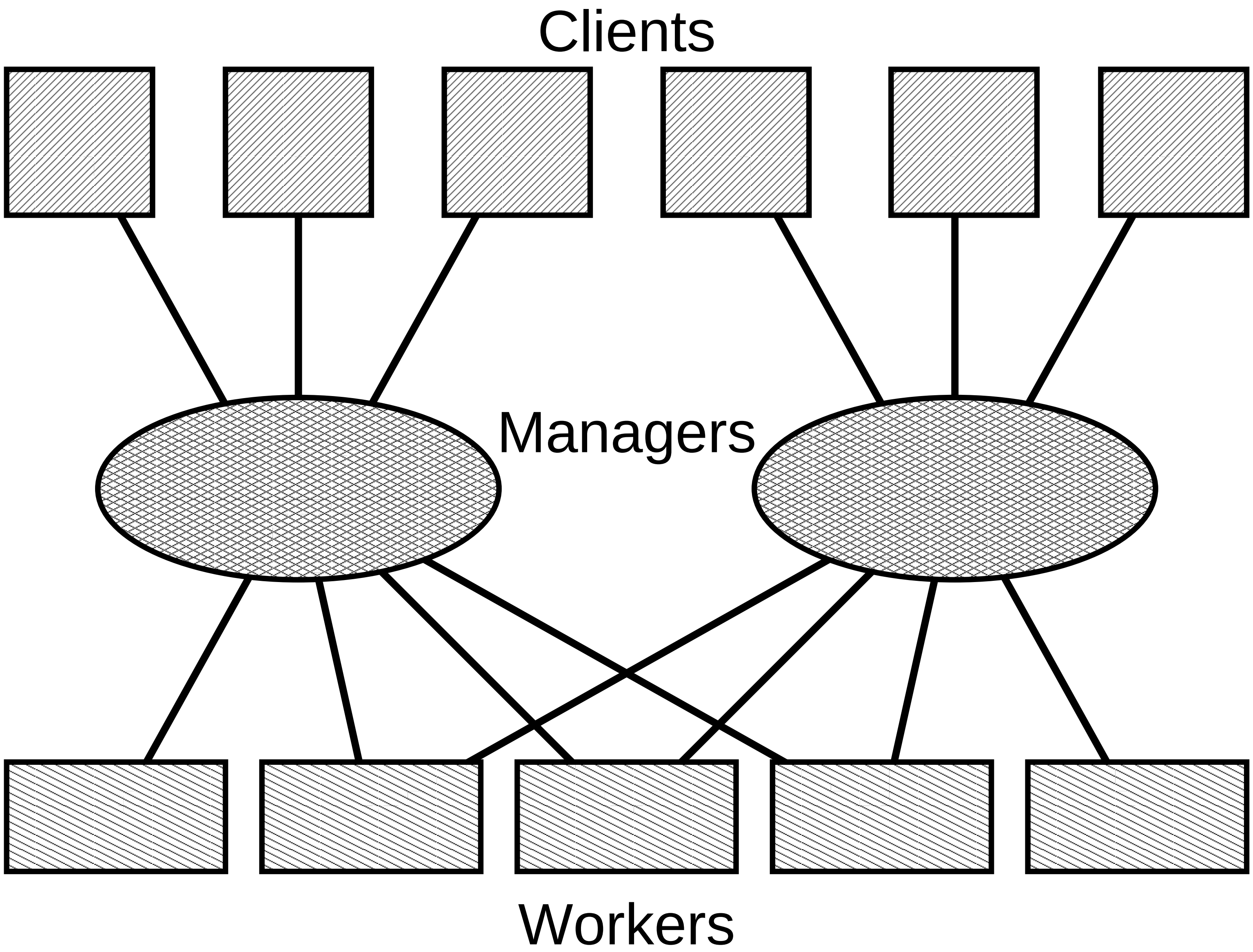
Motivation

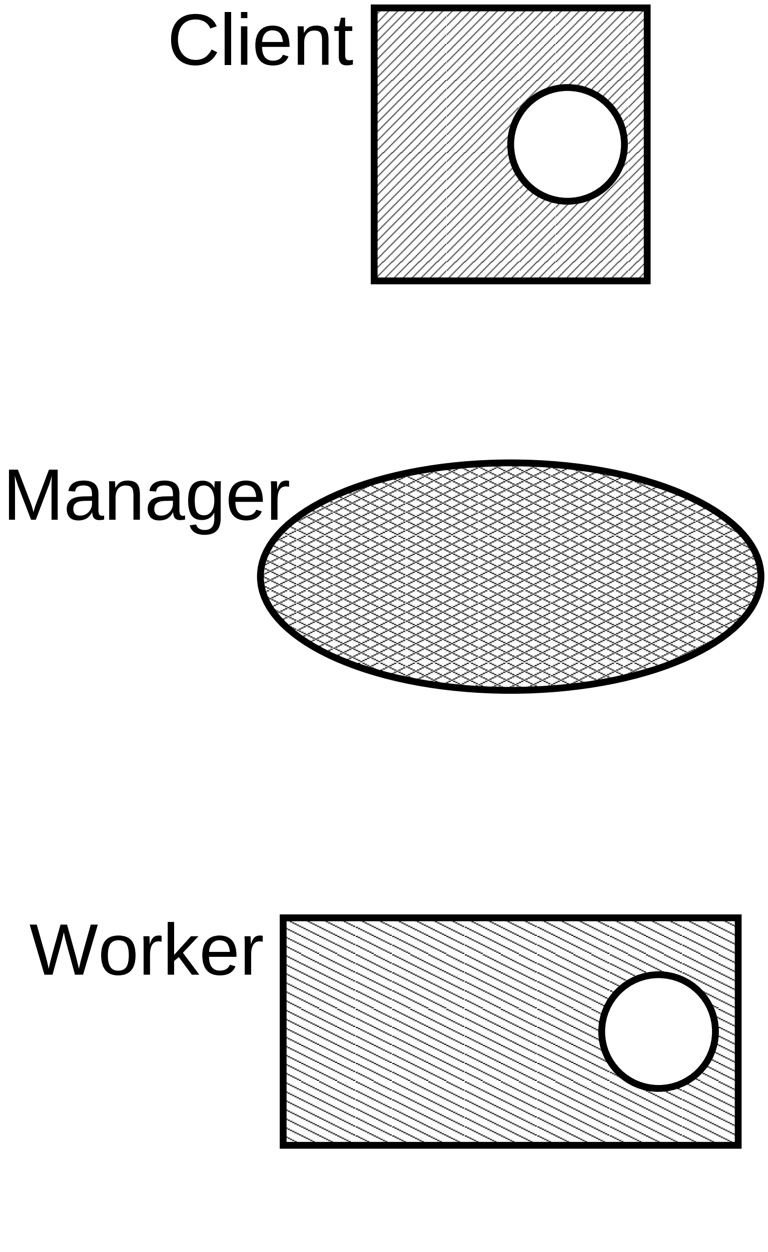
- Utilize idle resources on the internet
- Provide compute power for impoverished network devices
- Place agents or proxies in the network

Desirable Properties

- Scalability and portability
- Safety for servers
- Load balance to avoid hot-spots
- Fair access to shared resources
- Ease of use
- Performance

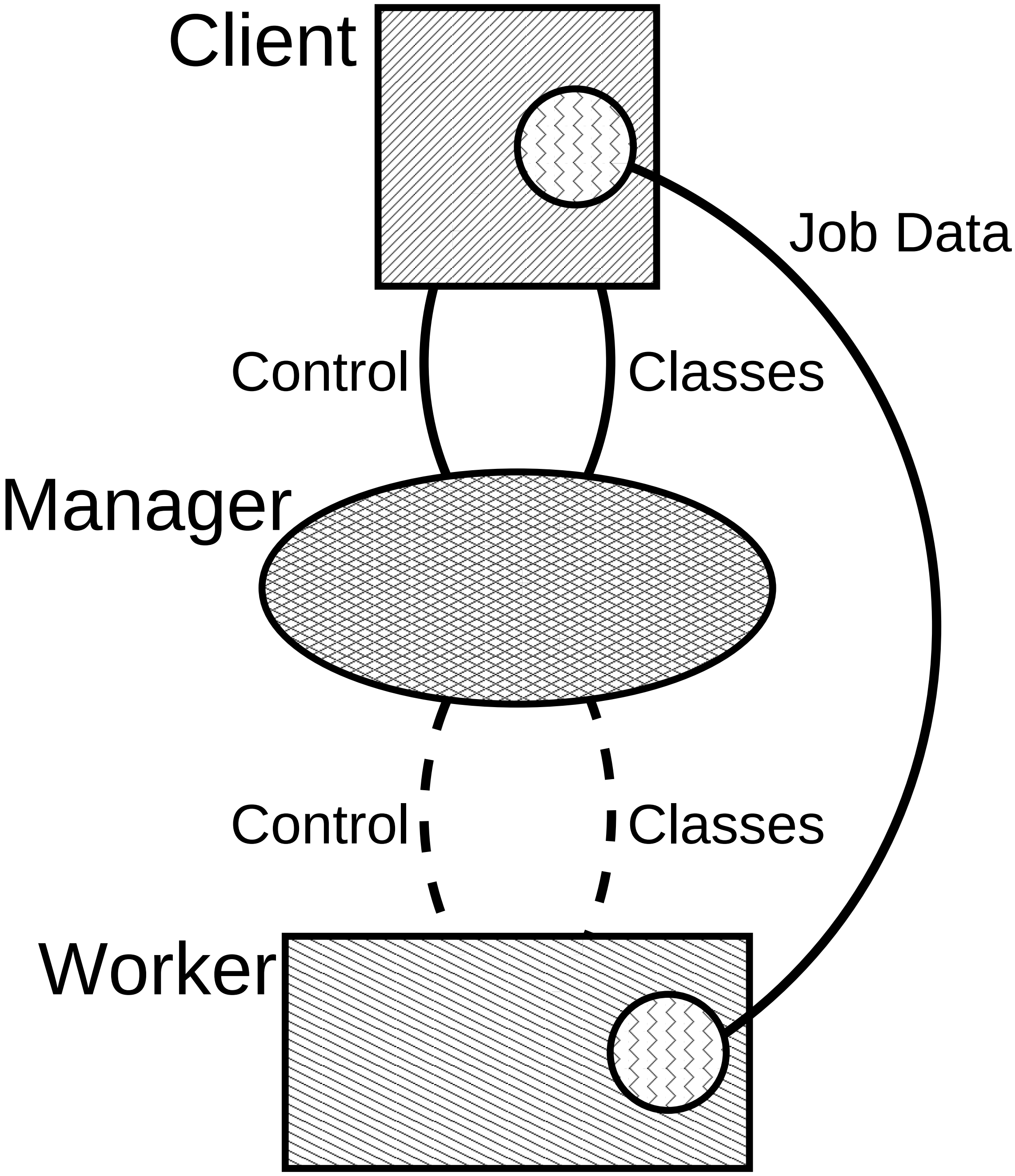

Clients
Managers
Workers

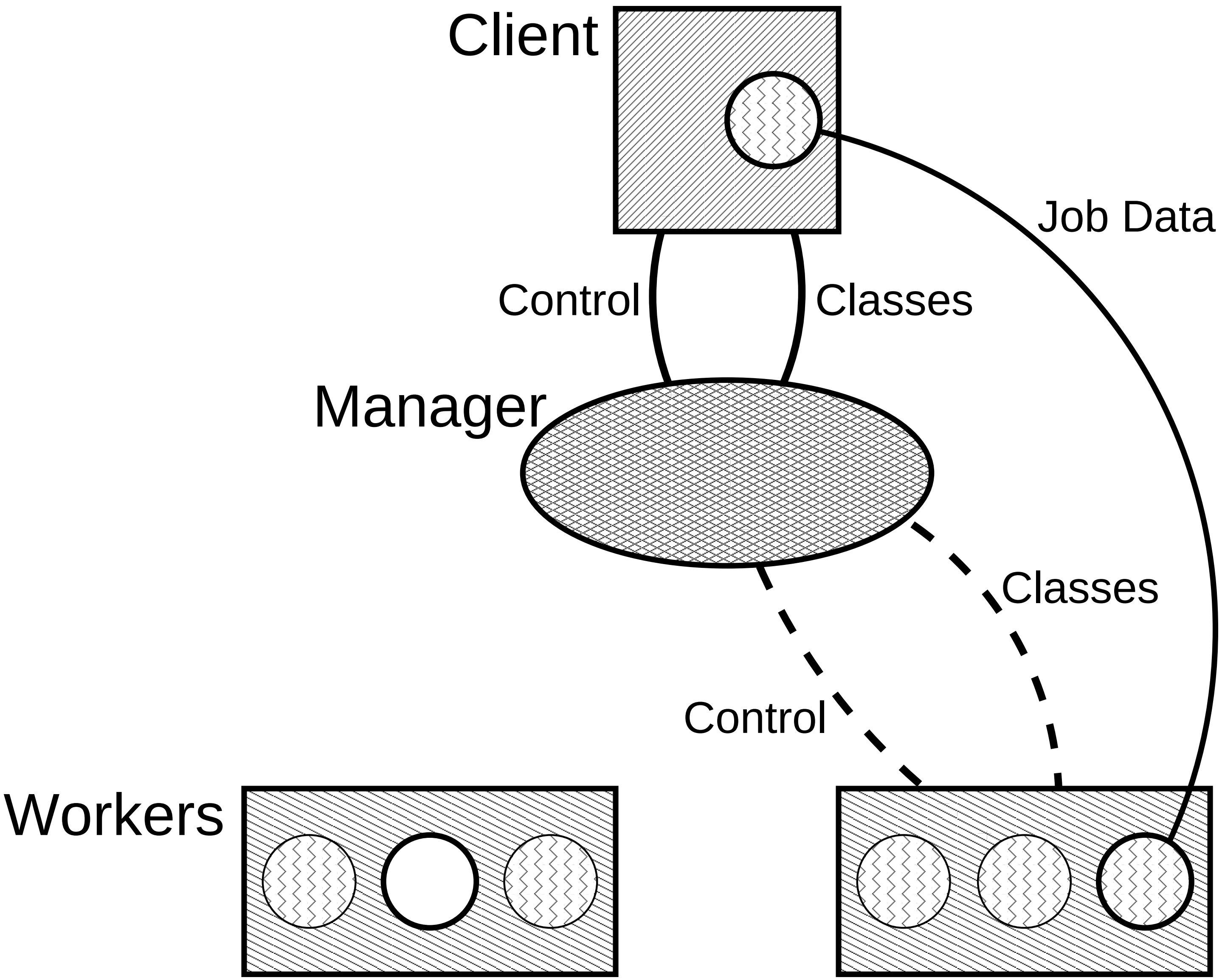
- Clients:
  - Submit jobs to a manager
- Managers:
  - Accept jobs submitted by clients
  - Dispatch jobs to workers
  - Cache classes
- Workers:
  - Receive and execute jobs


Client
Manager
Worker

Executing a Job

- Client connects to manager
- Manager sends job info to a worker and the client
- Job data connection established
- Worker executes remote job and client executes local job
- Classes are retrieved via the manager as required
- Job terminates and connections are closed.


Client
Job Data
Control
Classes
Manager
Control
Classes
Worker


Client
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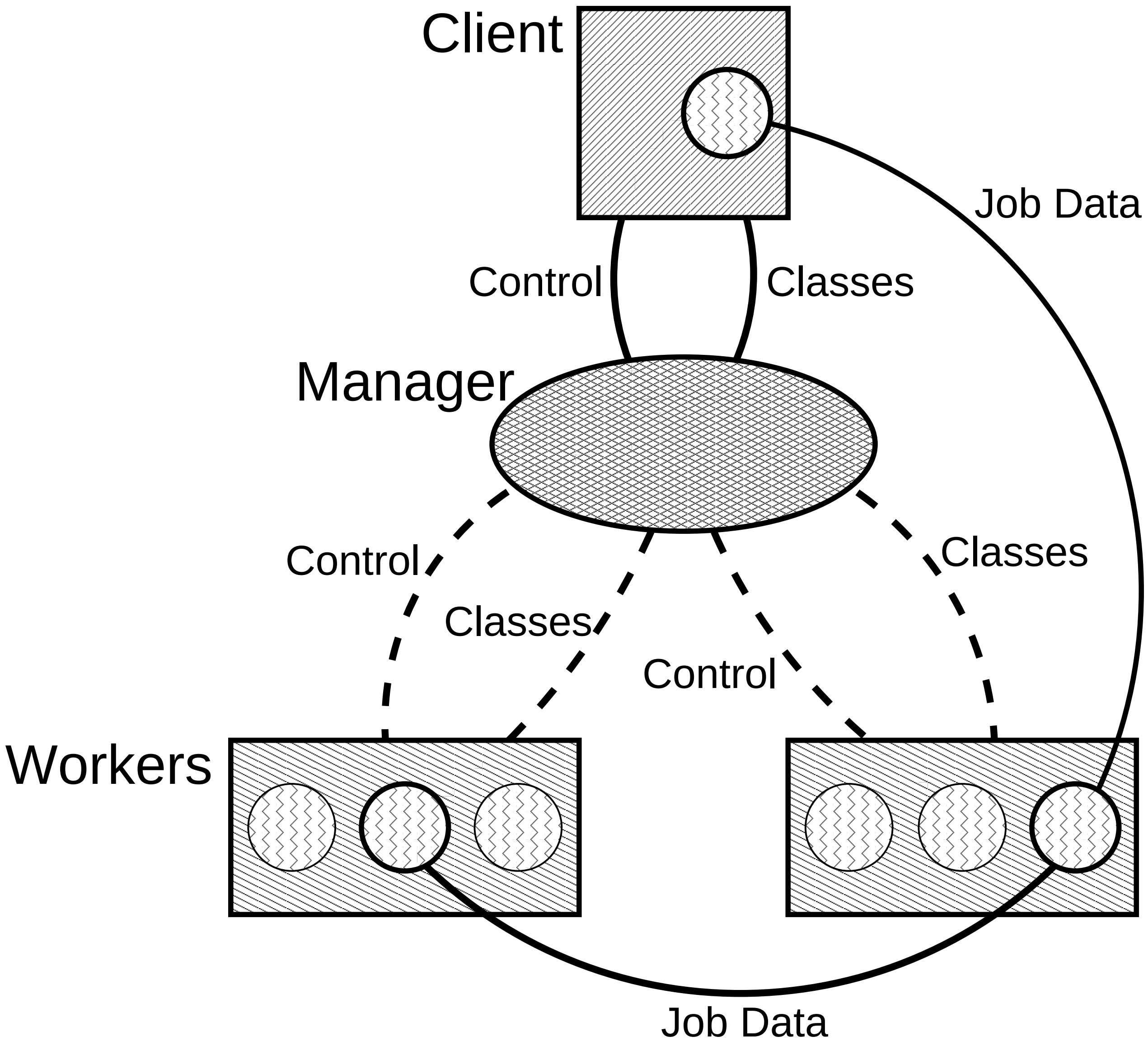
Subjobs

- Jobs can submit subjobs (child jobs)
- Subjobs share the manager-based controller and class loader
- Subjobs have data connections to their parent


Client
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Control
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Manager
Control
Classes
Classes
Control
Workers
Job Data

Resource management

CPU Implemented

Memory Not possible with standard Java VM

Network Implemented

Disk Not yet implemented

Did not address fairness between the worker and other processes.

CPU allocation

- ThreadGroup based
- Allocation proportional to group precedence
- Absolute limits to control termination and deadlock
- May under-utilize processors

Network allocation

- Bandwidth based
- Absolute limits, rather than proportional.

Future Work

- Improved client interface

- Robust behaviour under network failures

- Additional resource management

- Authentication and accounting

- Debugging environment

- Support for hierarchies

Safety and Security

- Most security and safety is provided by the language and VM
- A security manager checks file accesses and other key operations
- Classes are always loaded locally if available