

# Hierarchical Deployment

## Passing through Firewalls and NATs

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(presented by Mario Leyton)

ProActive User Group Grids@Work 2006

# Hierarchical Deployment

- The Big Picture

Resource  
Communication

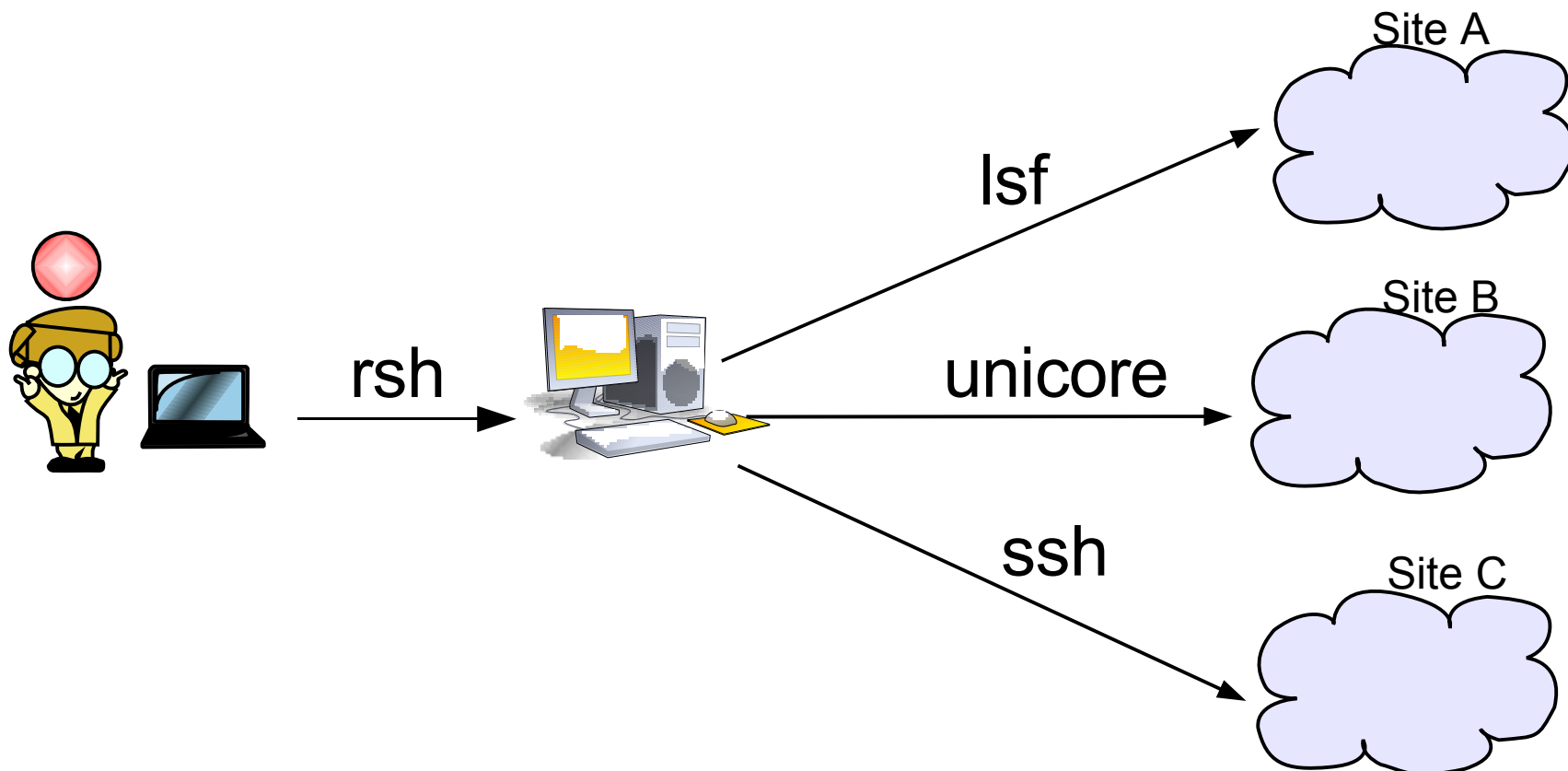
RMI, IBIS, HTTP, RMI-SSH  
etc...

Resource  
Acquisition

LSF, SGE, PBS, Unicore, SSH,  
RSH, OAR, OARGRID  
etc...

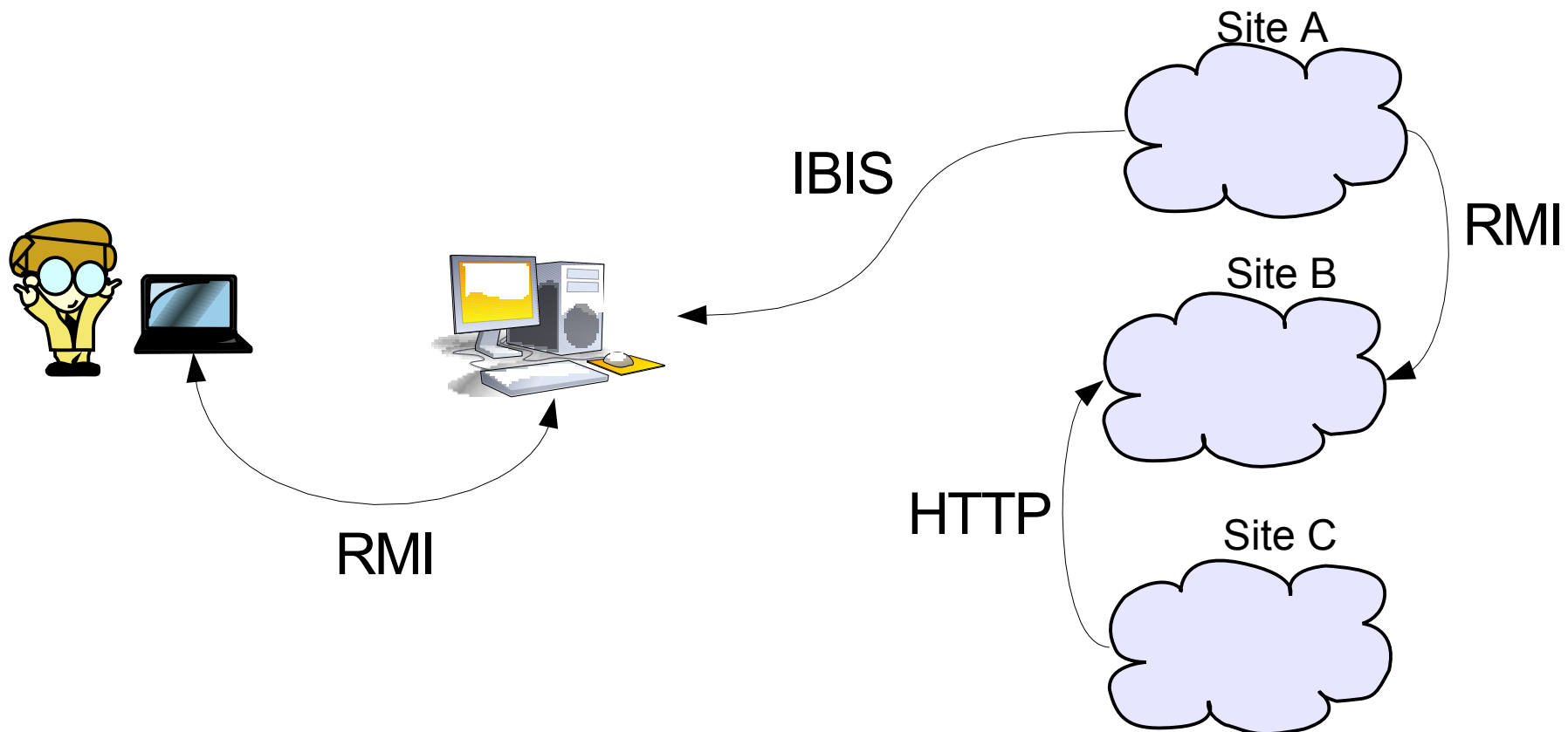
# Hierarchical Deployment

- Resource Acquisition



# Hierarchical Deployment

- Resource Communication

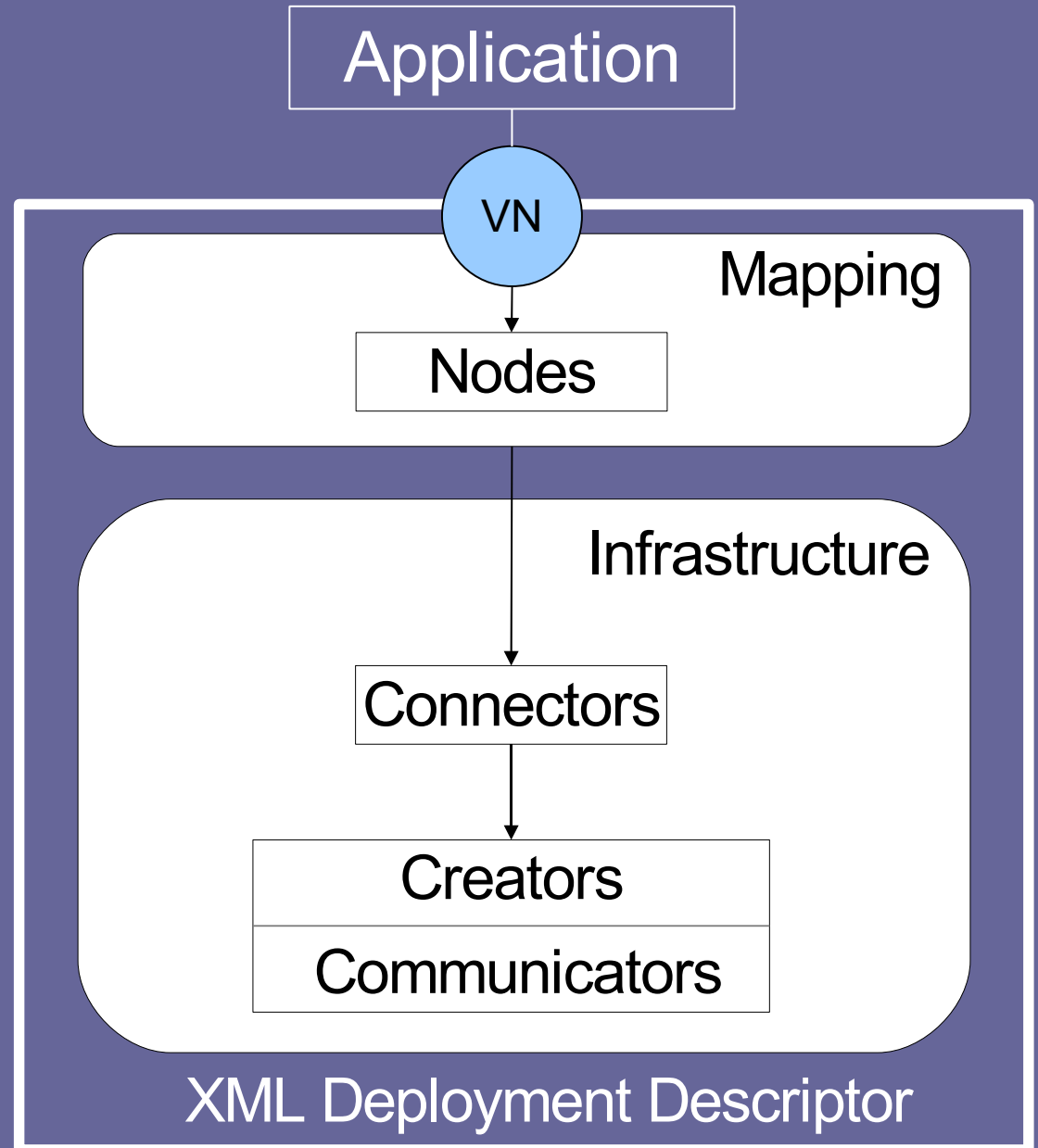


# ProActive Descriptor Deployment

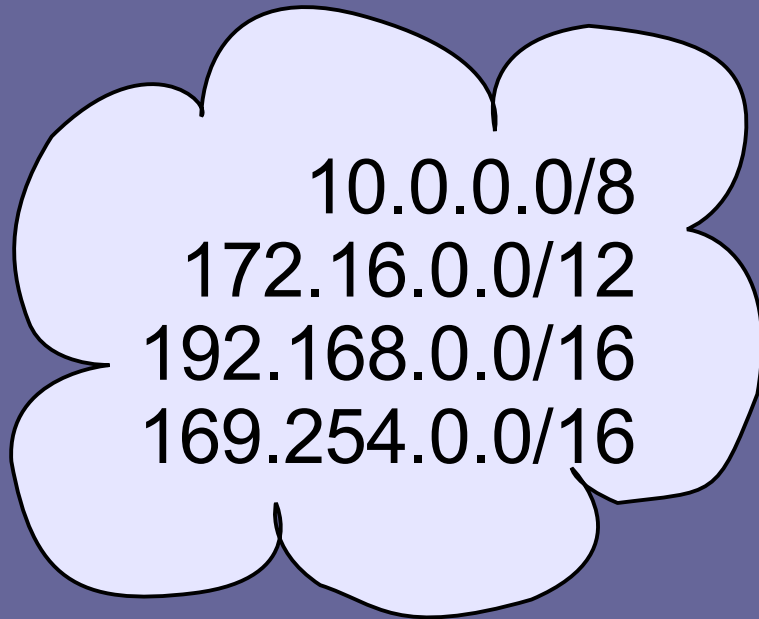
Connectors: ssh, rsh, ...

Creators: lsf, pbs, sge,  
unicore, ...

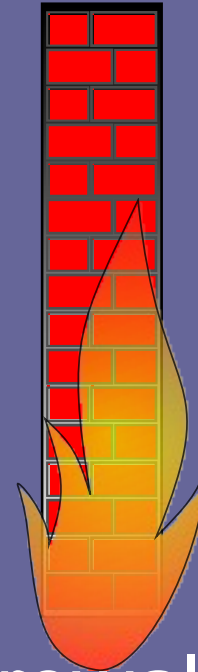
Communicators: rmi, ibis,  
http, ....



# Real World Problems



Private Networks

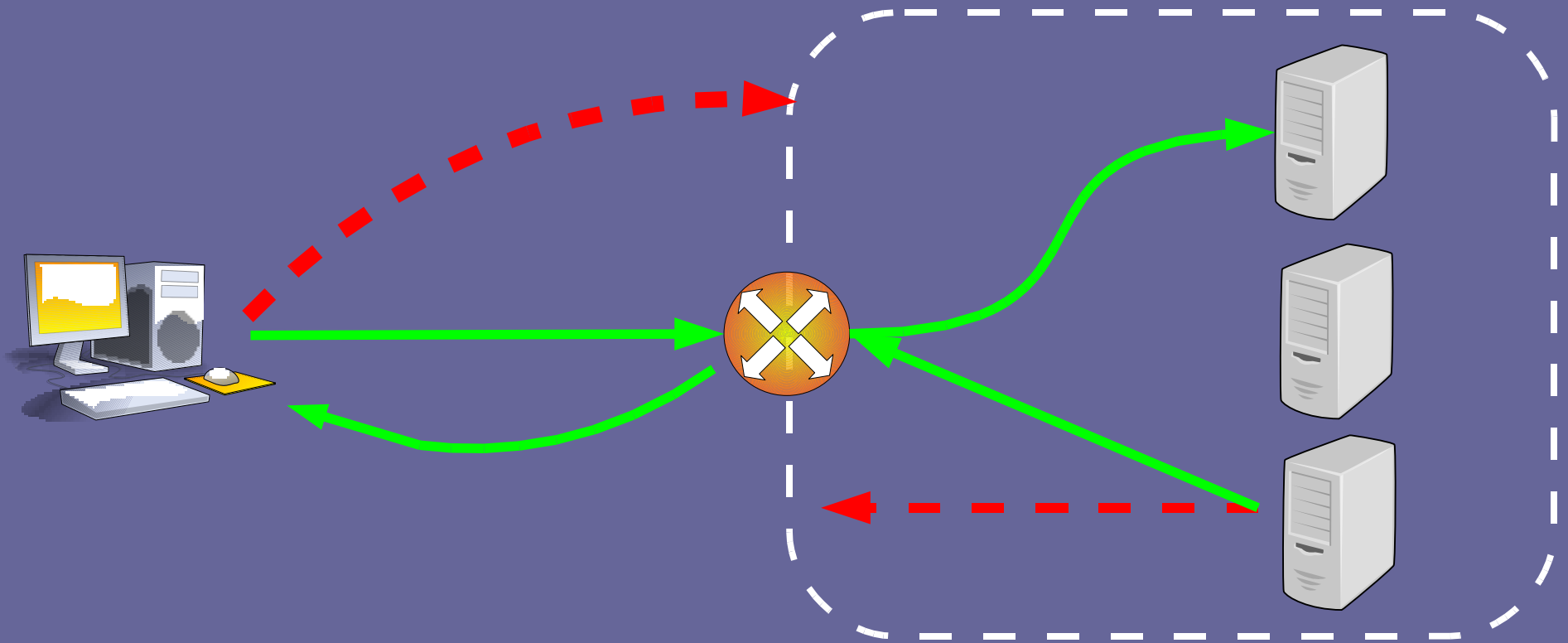


Firewalls

80% Plugtests Grid 2006

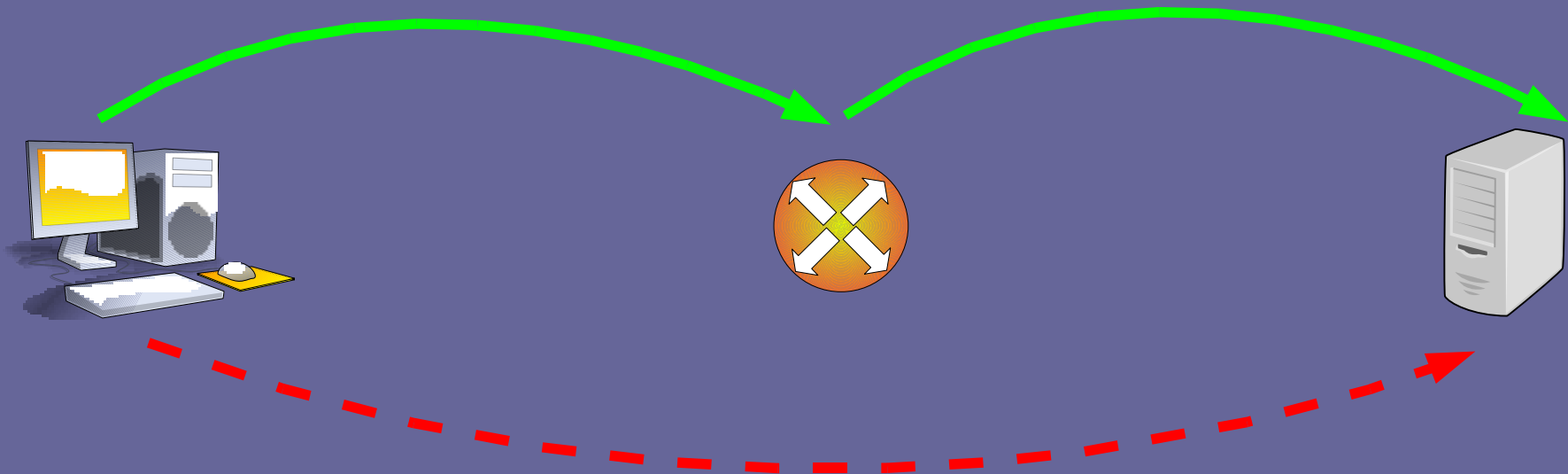
# Resource Masquerading (NAT)

- Forwarder: 



# Forwarder Problem

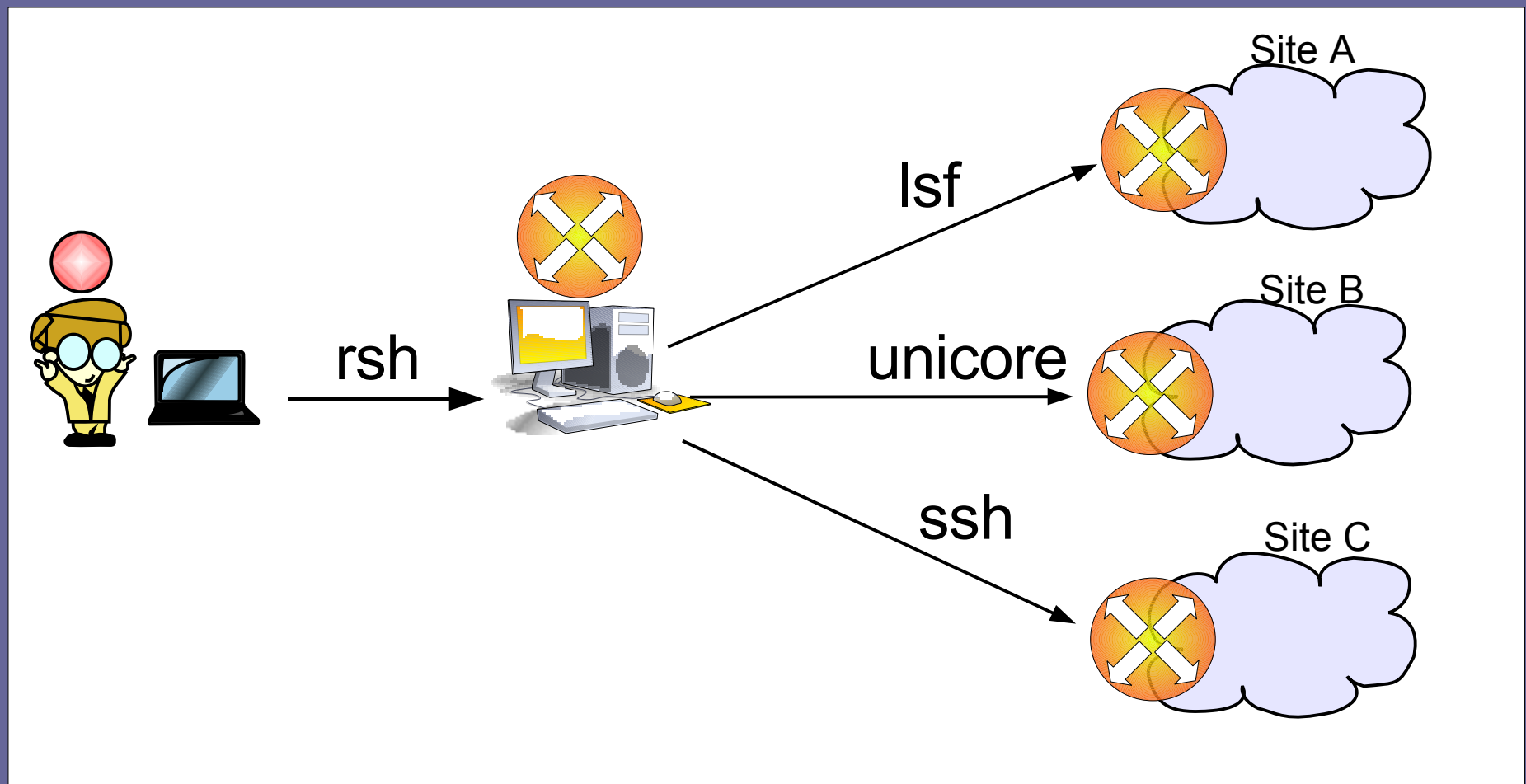
- How do we know where/when to put a forwarder?
- How do we find the forwarder later on?





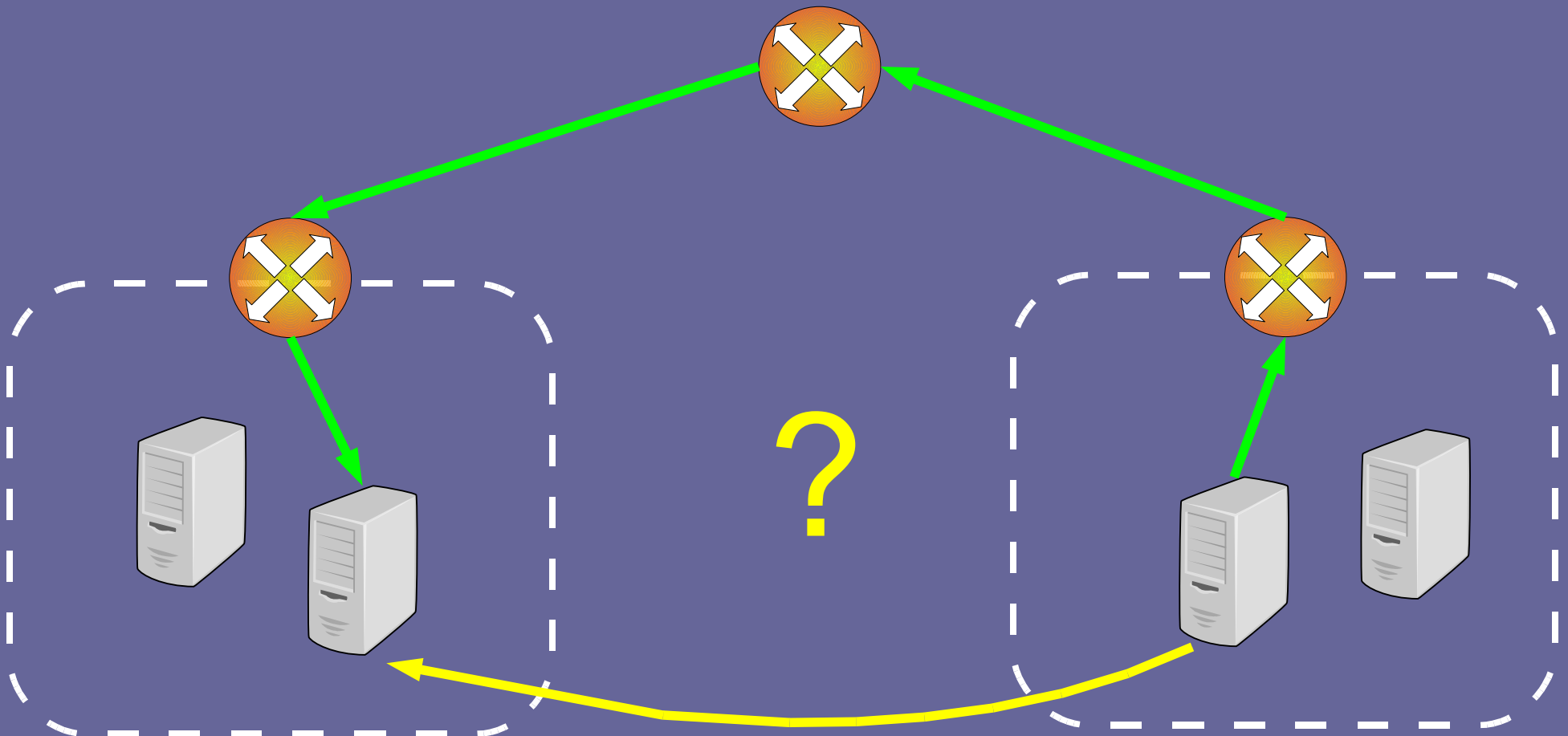
# Hierarchical Deployment Information

- Combine hierarchical deployment topology with communication forwarding.



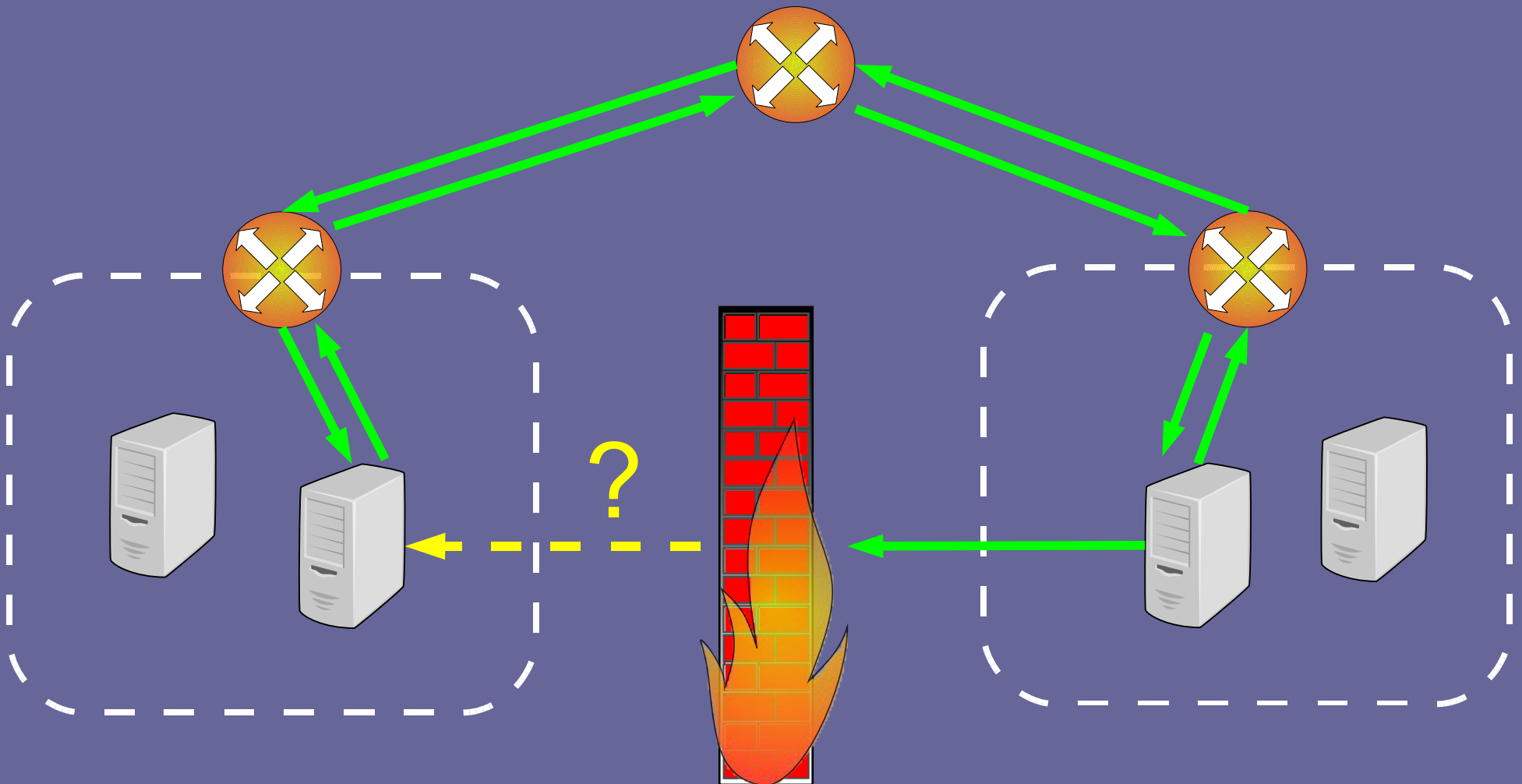
# Resource Masquerading (NAT)

- Pessimistic forwarding



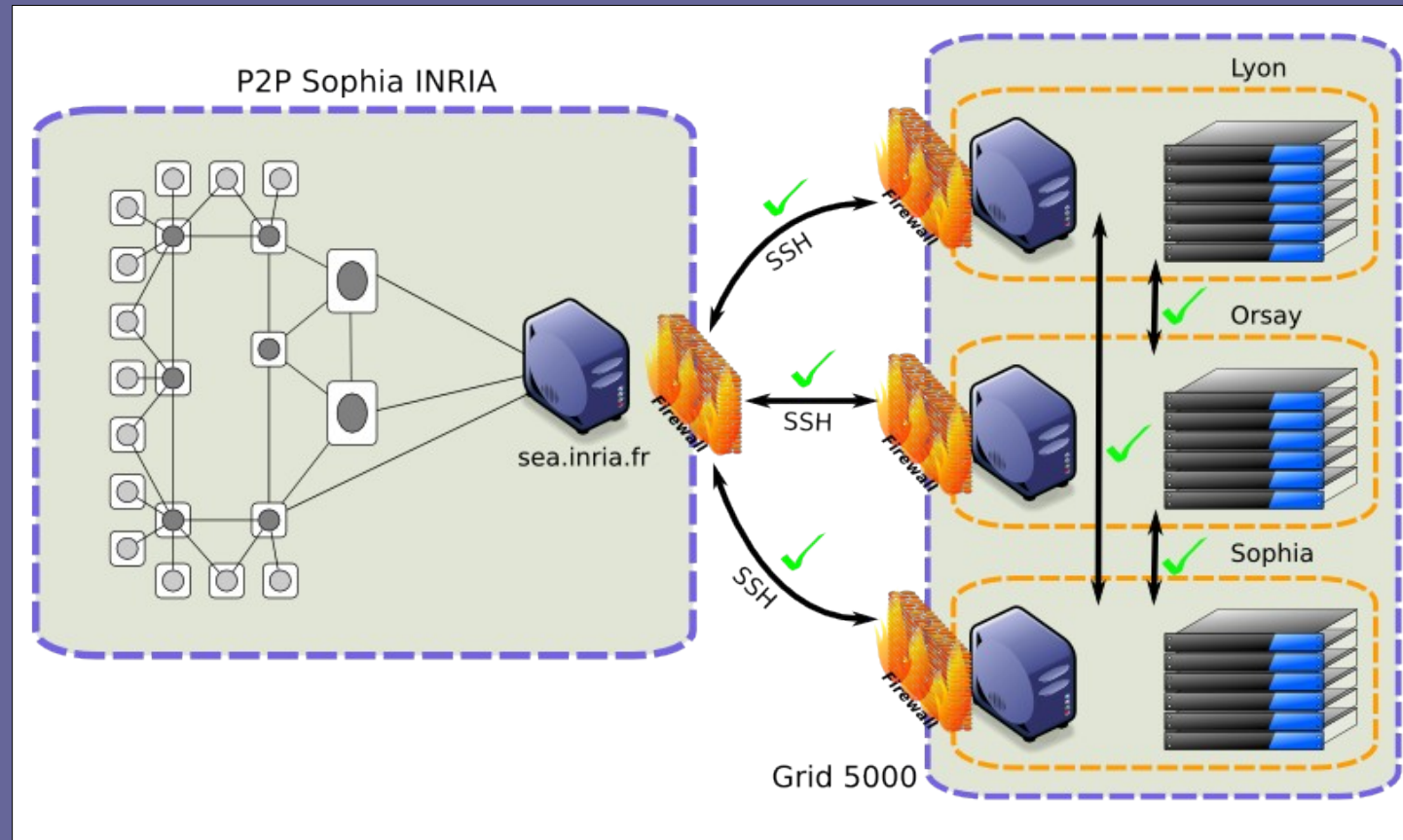
# Resource Masquerading (NAT)

- Dynamic path discovery using RTT.



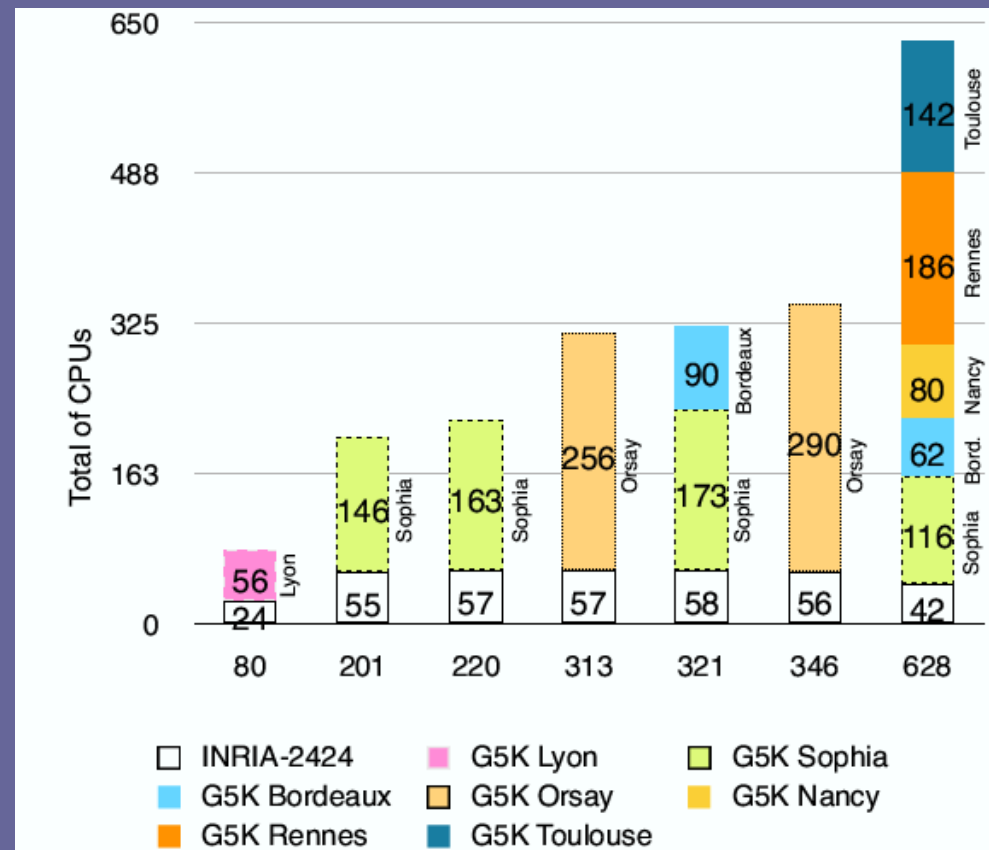
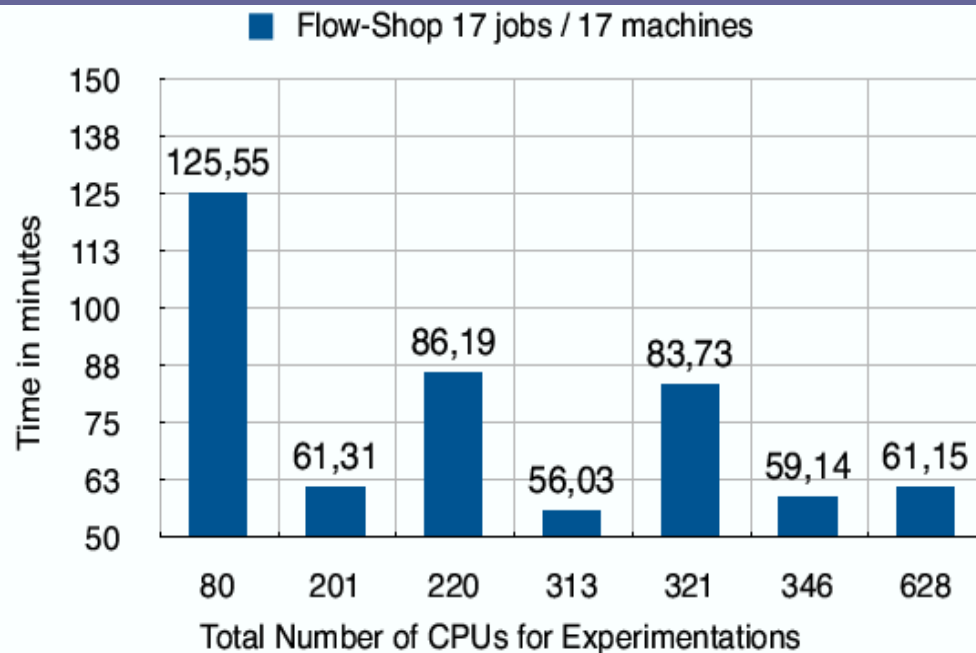
# Experimentation

- Grid5000
  - Lyon:
    - Private IPs
  - Orsay:
    - Private IPs
- Firewall
  - INRIA, outgoing allowed, incoming only ssh
  - G5K, outgoing/incoming only ssh



# Experimentation Results

- Nqueens: 1007 CPU, 6 sites
- Flowshop: 628 CPU, 6 sites



# Conclusions

- Hierarchical Deployment with Communication
- Masquerading at the middleware level of:
  - Firewalled resources
  - Private IP addressed resources
- Discovery of communication paths
- Activated in ProActive's deployment descriptors
- Transparent for the programmer

# Questions?

# RMI SSH Tunneling

