File Transfer, Native and MPI Wrapping with Control

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File Transfer

- File Transfer during deployment
- File Transfer during application execution
- File Transfer during retrieval (post-execution)

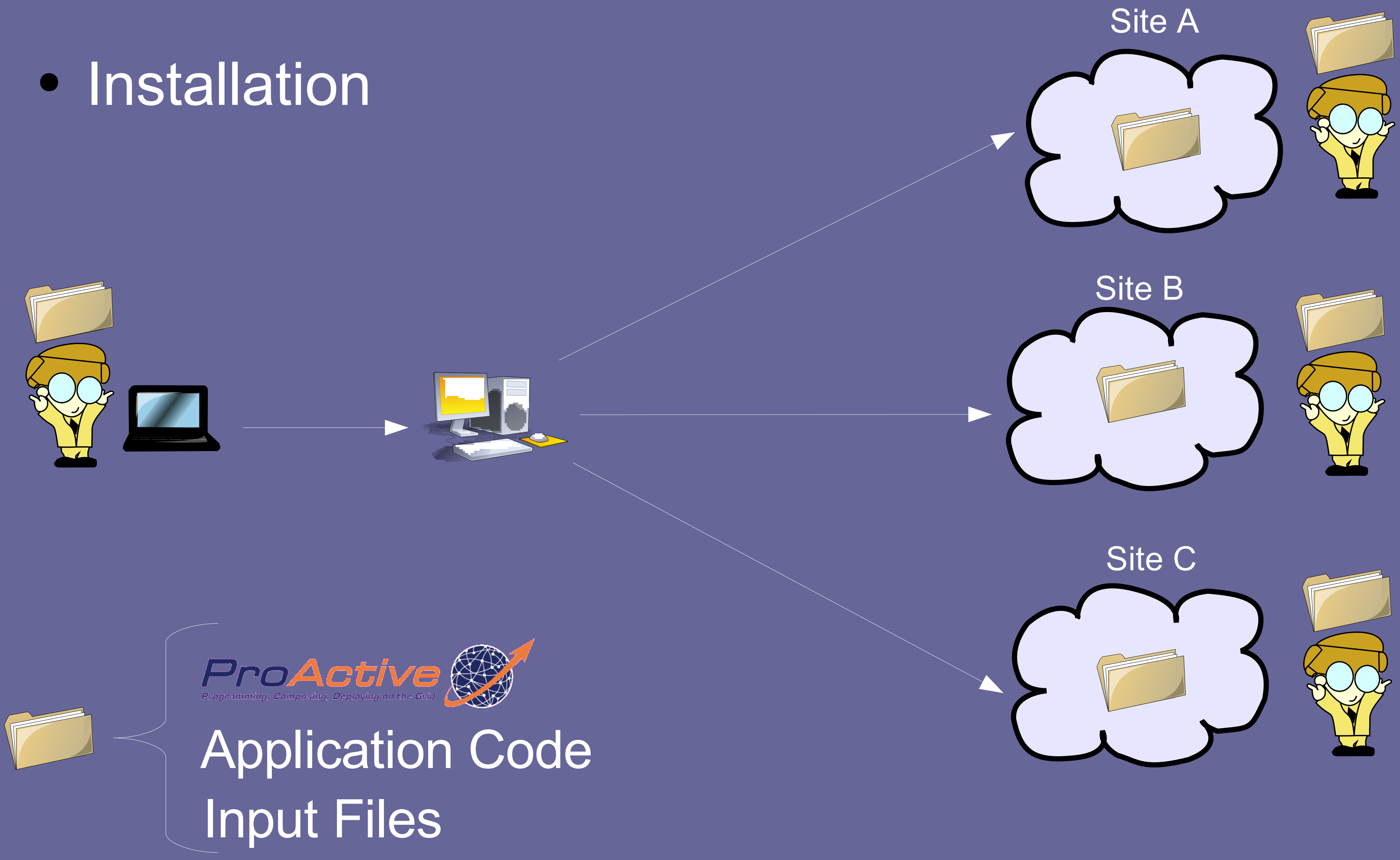
Deployment File Transfer

- What is Grid Deployment?

1. Grid infrastructure setup. Ex: protocol configuration, installation of middleware libraries
2. Application setup. Ex: application code, input files
3. Job submission (resource acquisition)
4. Application logic deployment: remote object instantiation

Deployment File Transfer

- Installation

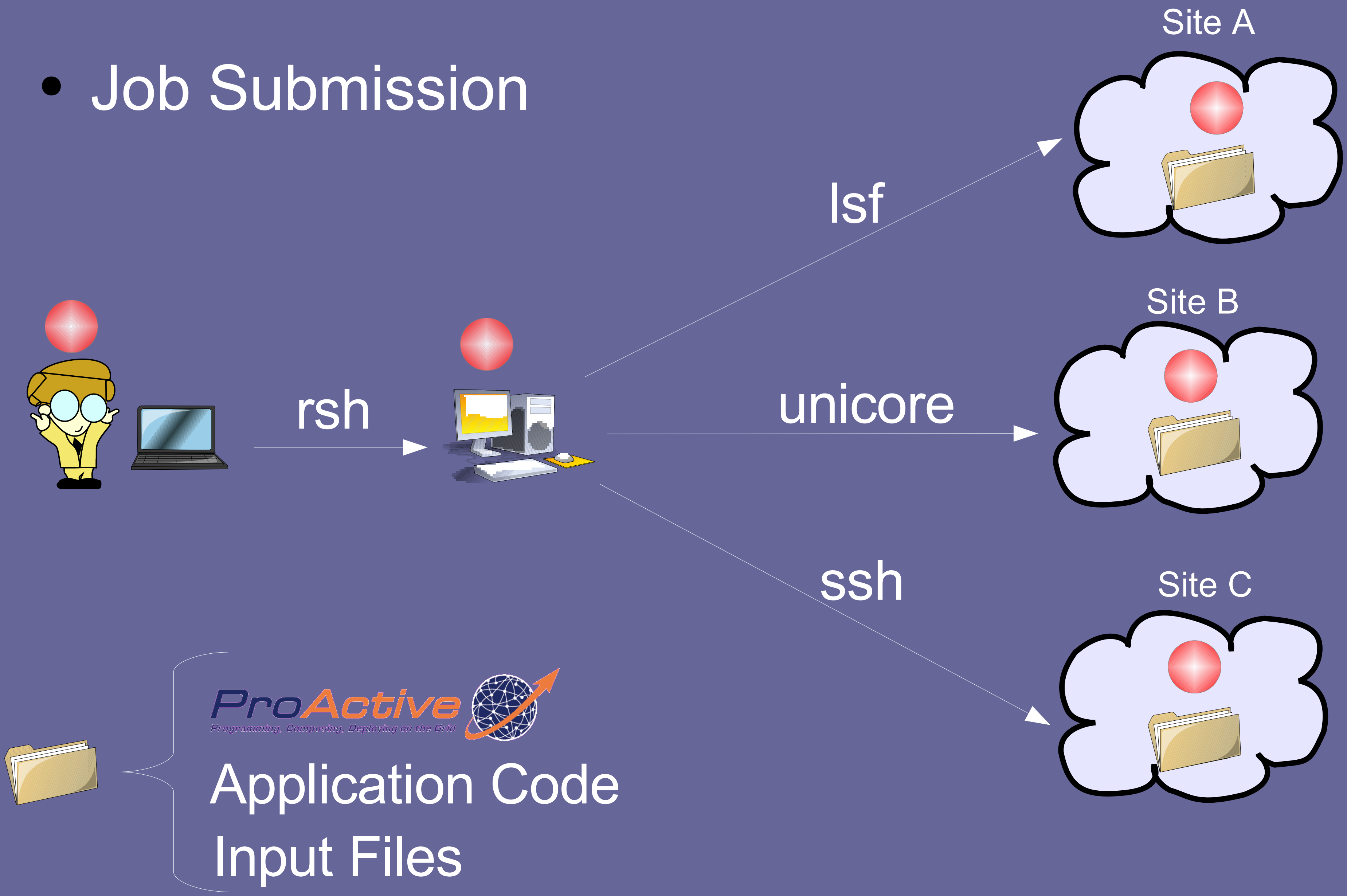


Application Code

Input Files

Deployment File Transfer

- Job Submission



Site A

Site B

Site C

rsh

lsf

unicore

ssh

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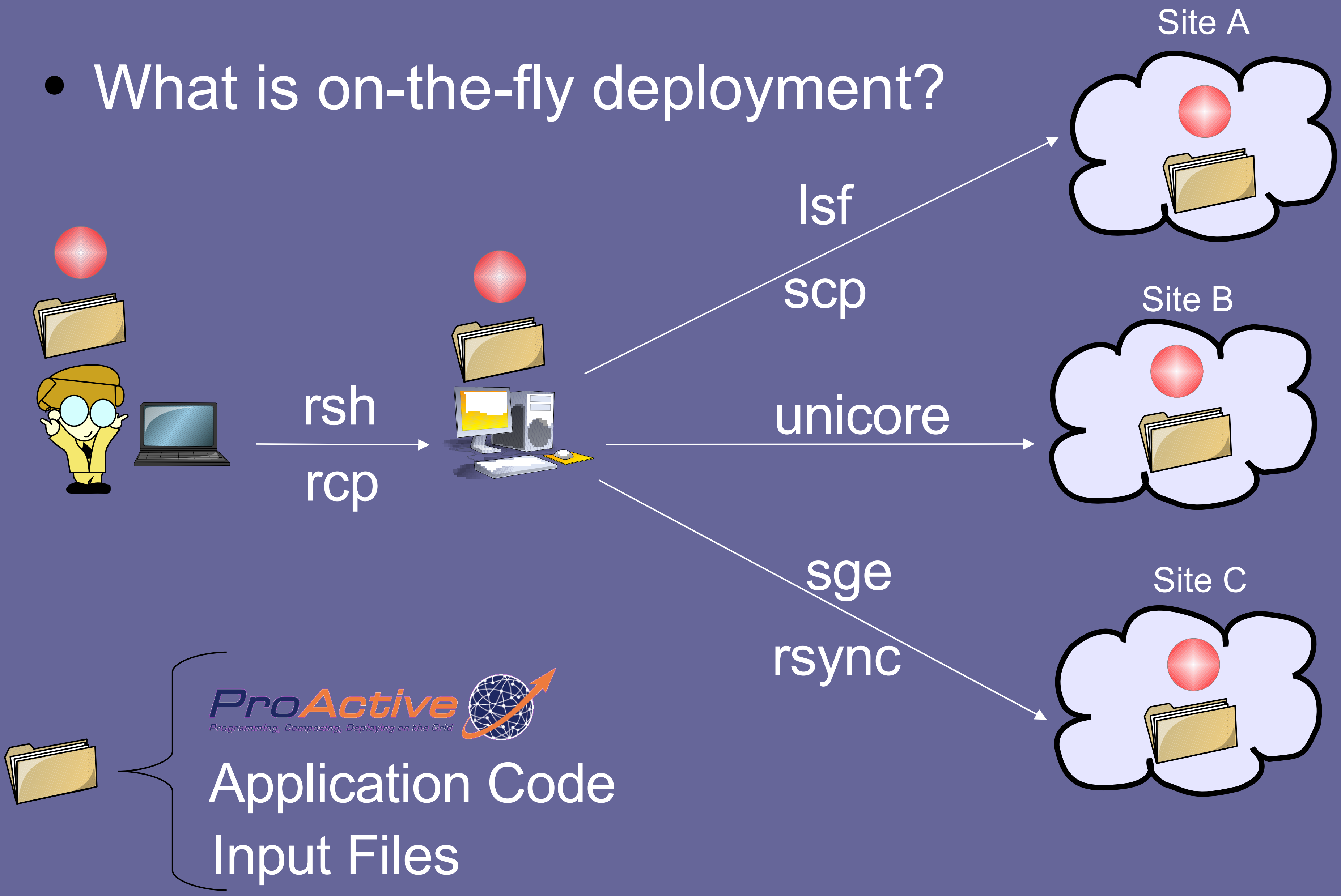
Application Code

Input Files

Deployment File Transfer

- What is on-the-fly deployment?



Application Code

Input Files

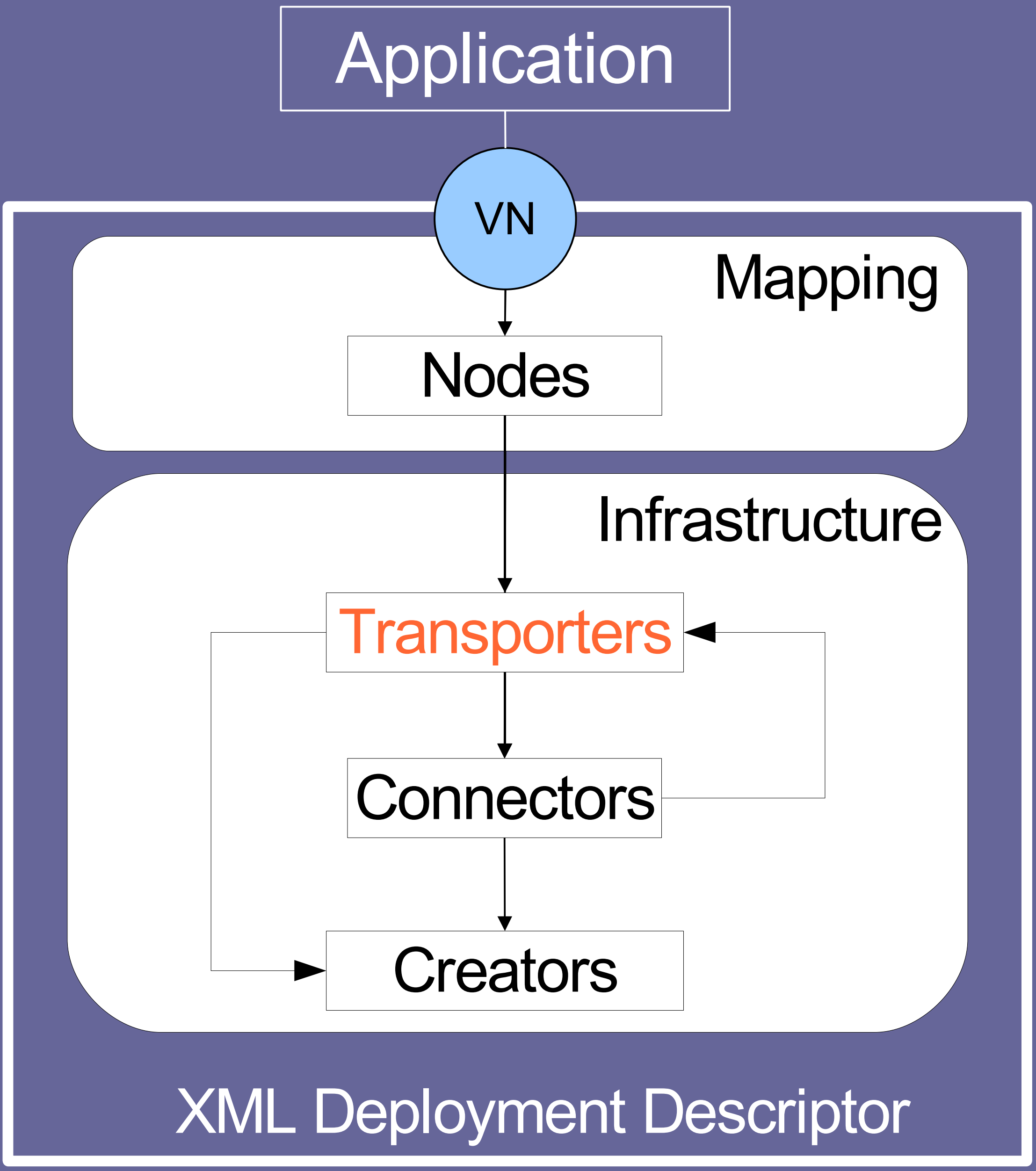
Deployment File Transfer

- How to integrate file transfer and resource acquisition?

Transporters: scp, rcp, rsync, ...

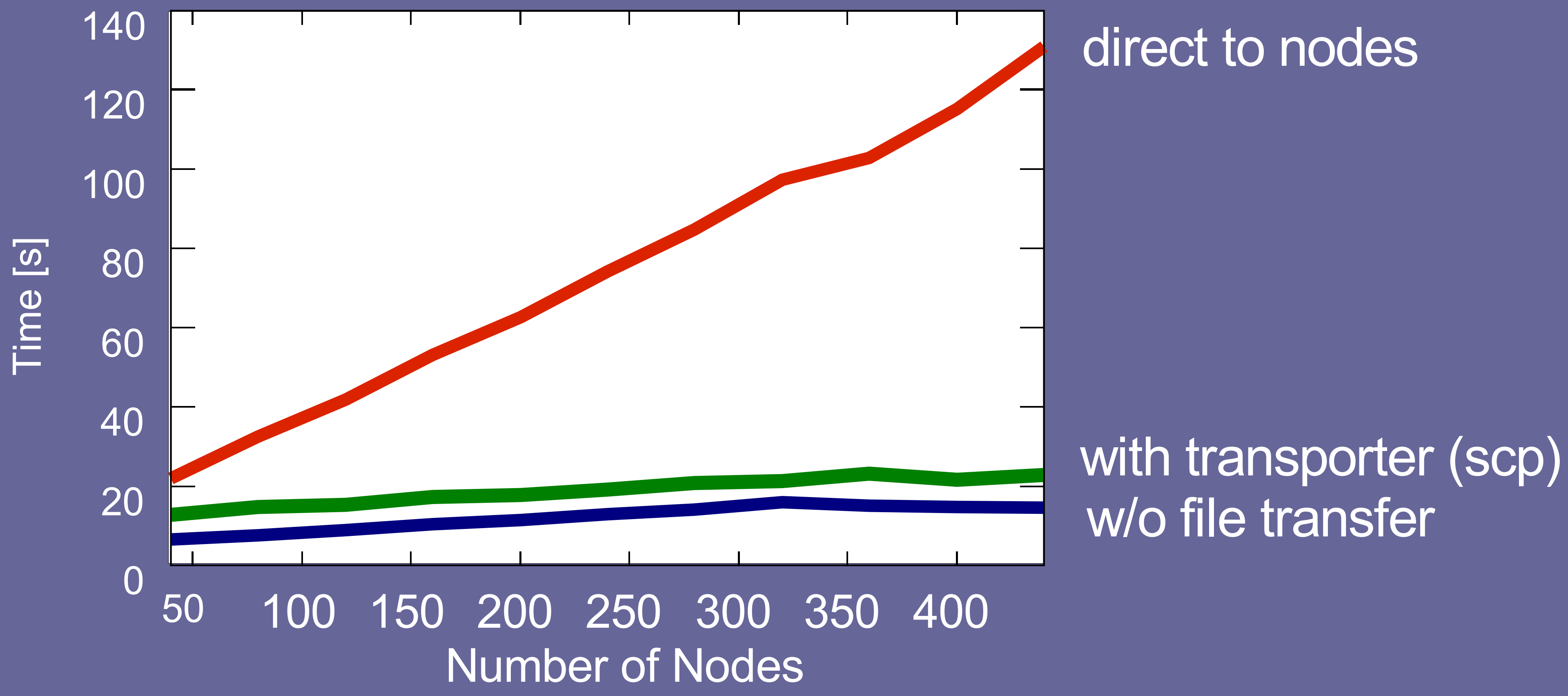
Connectors: ssh, rsh, ...

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



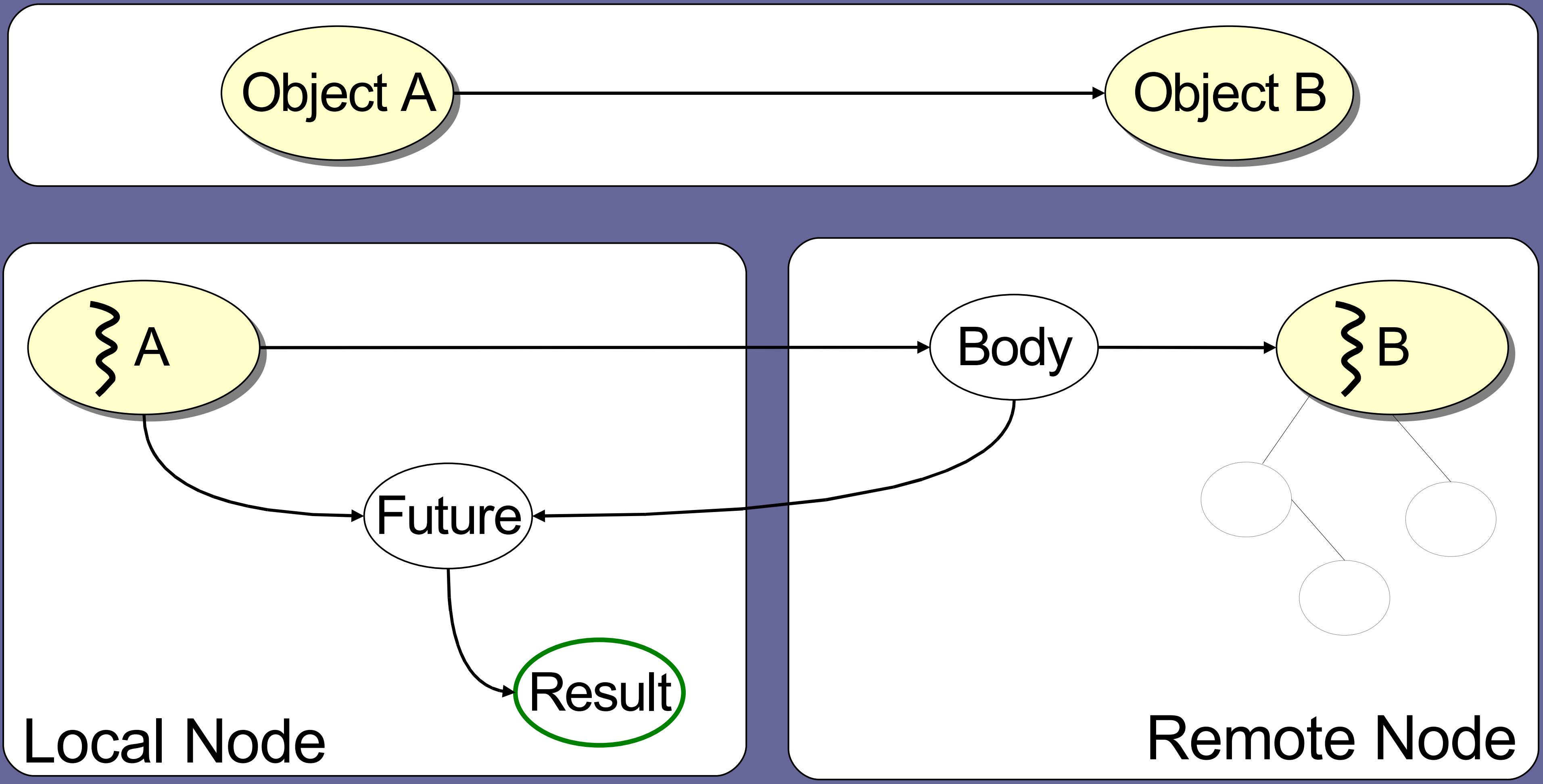
Deployment File Transfer

- Benchmarks



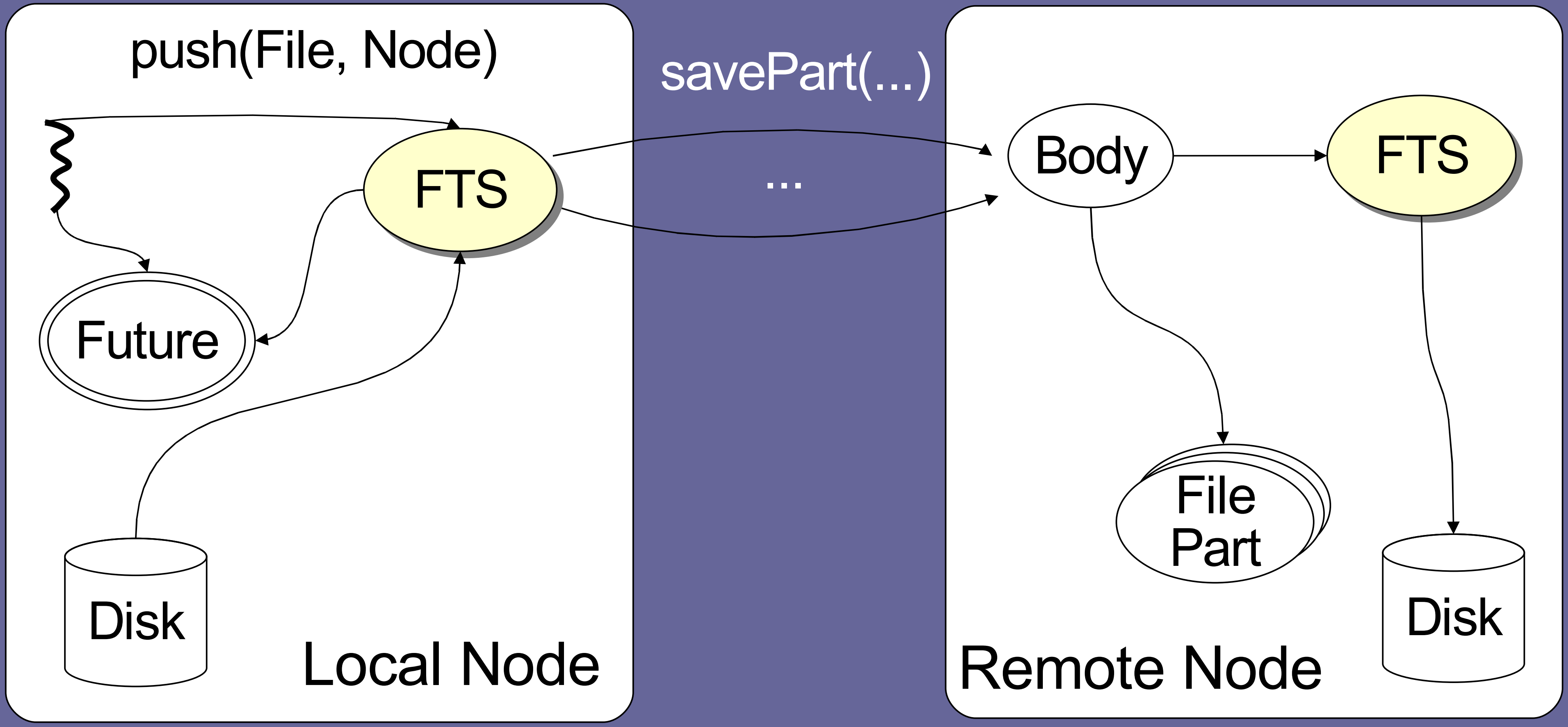
Execution File Transfer

- Background on Active Objects



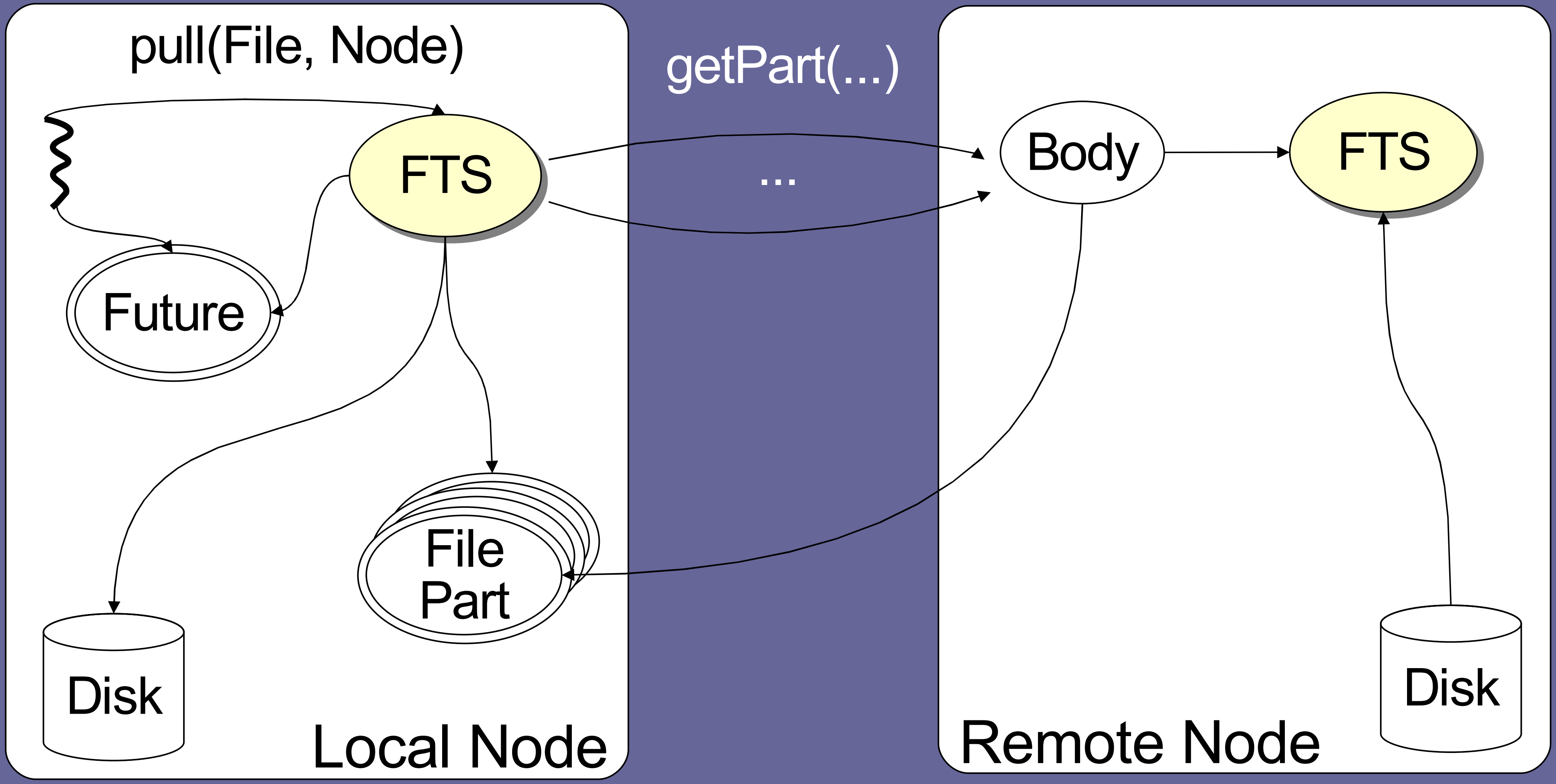
Execution File Transfer

- Pushing of Files



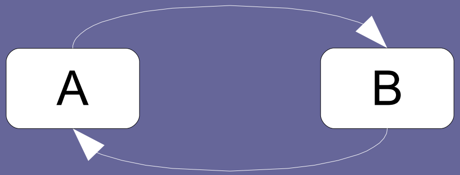
Execution File Transfer

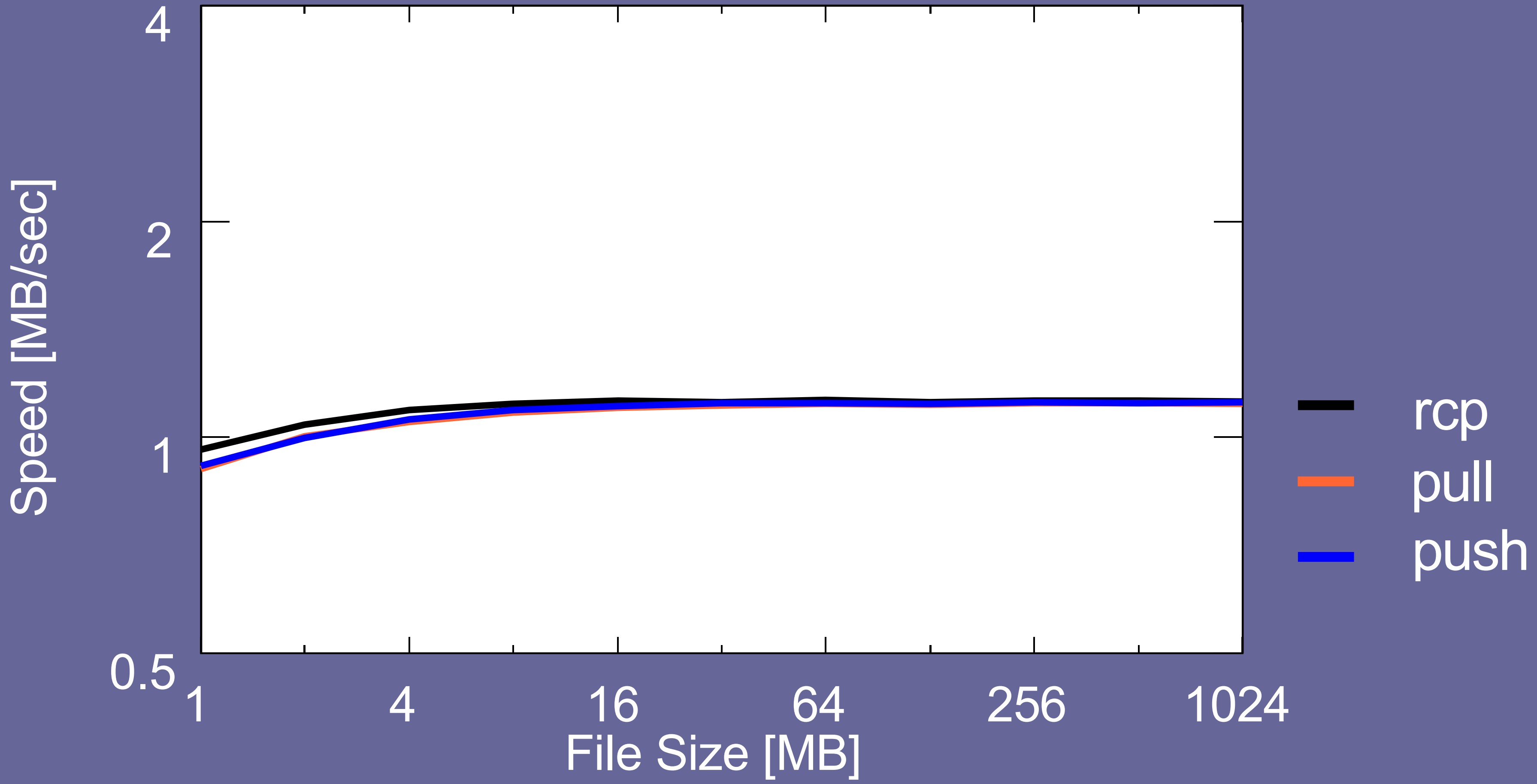
- Pulling of Files



Execution File Transfer

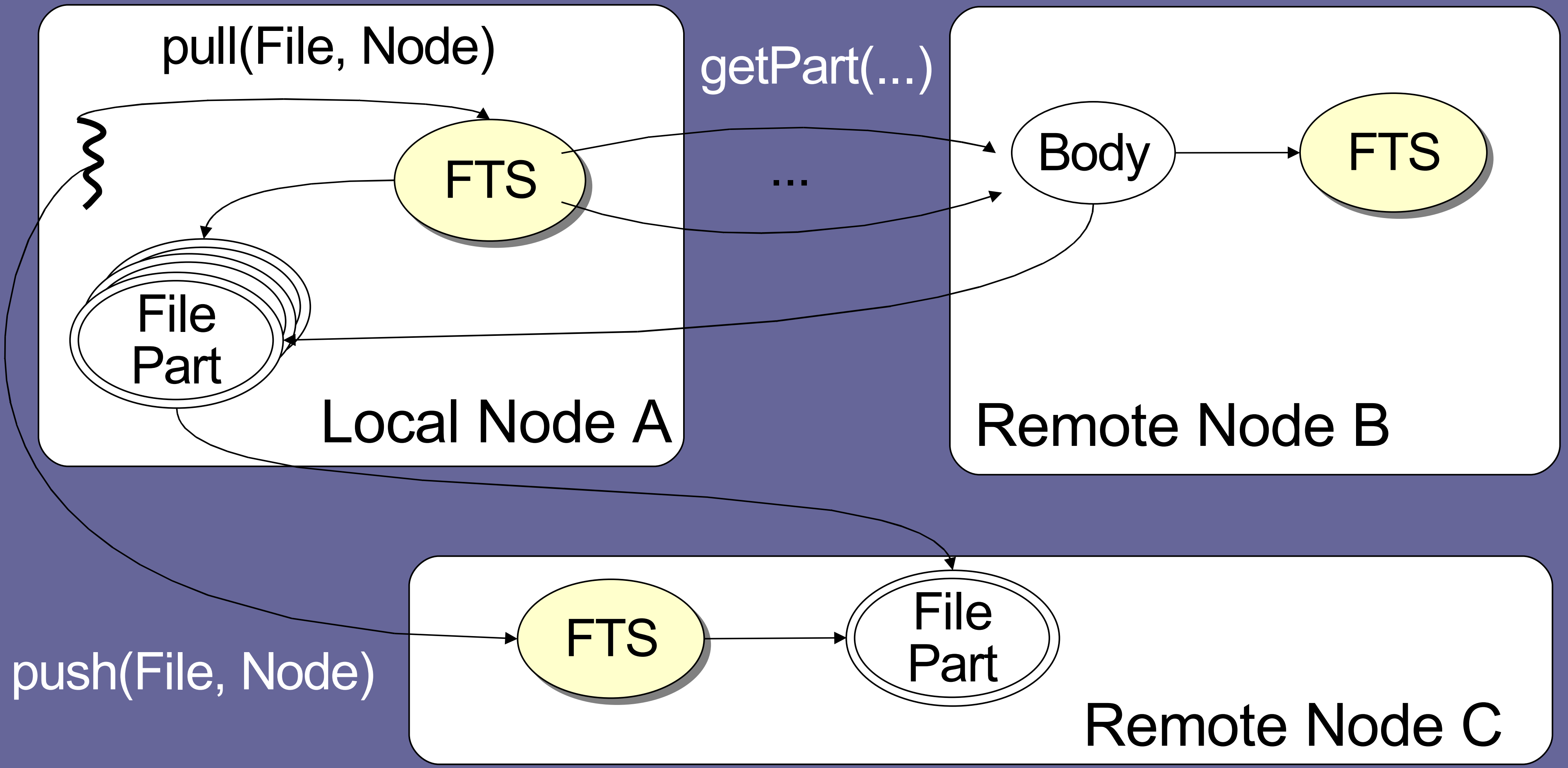
- Benchmarks





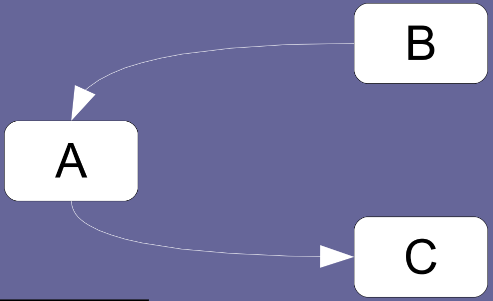
Execution File Transfer

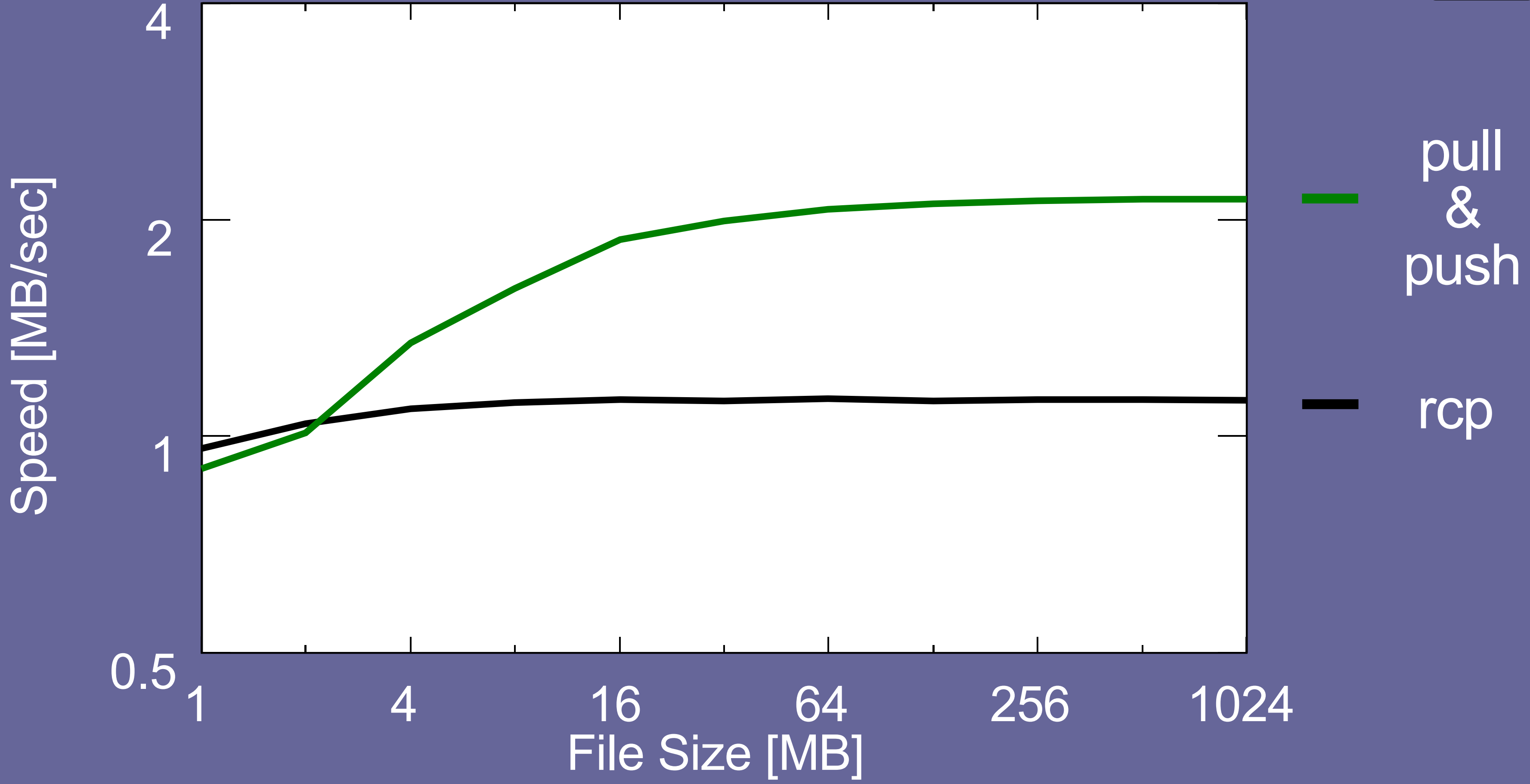
- Peer to Peer File Sharing



Execution File Transfer

- Benchmarks





Retrieval File Transfer

- API triggered
- Uses Pulling of Files

```
ProActiveDescriptor pad=...;
VirtualNode vnode = pad.getVirtualNode("example");
...
FileWrapper fw = vnode.fileTransferRetrieve();
...
File f[]=fw.getFiles() //wait-for-files to arrive
```

File Transfer - Conclusions

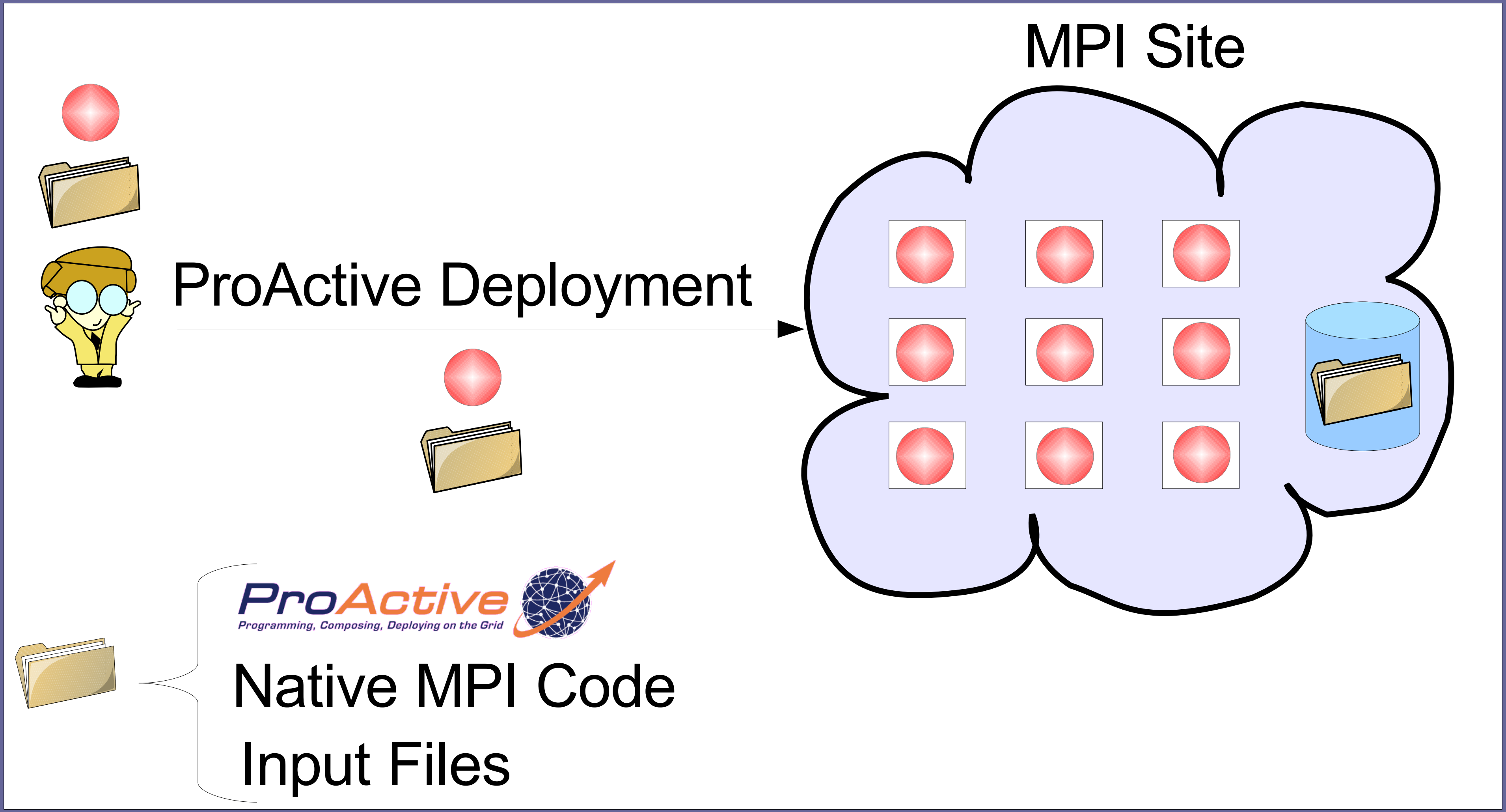
- Deployment File Transfer
  - Integrated resource acquisition and file transfer
  - On-the-fly deployment
  - Extension of XML Deployment Descriptors
- Execution File Transfer
  - Built on top of active objects: push and pull
  - Provided as a java API
  - Benefit from futures for peer sharing of files
- Retrieval
  - User triggered API. Based on file pulling

MPI Wrapping

MPI Wrapping

- Deploying MPI Applications
- Controlling MPI Applications
- Coupling ProActive with MPI

Deployoing MPI Applications



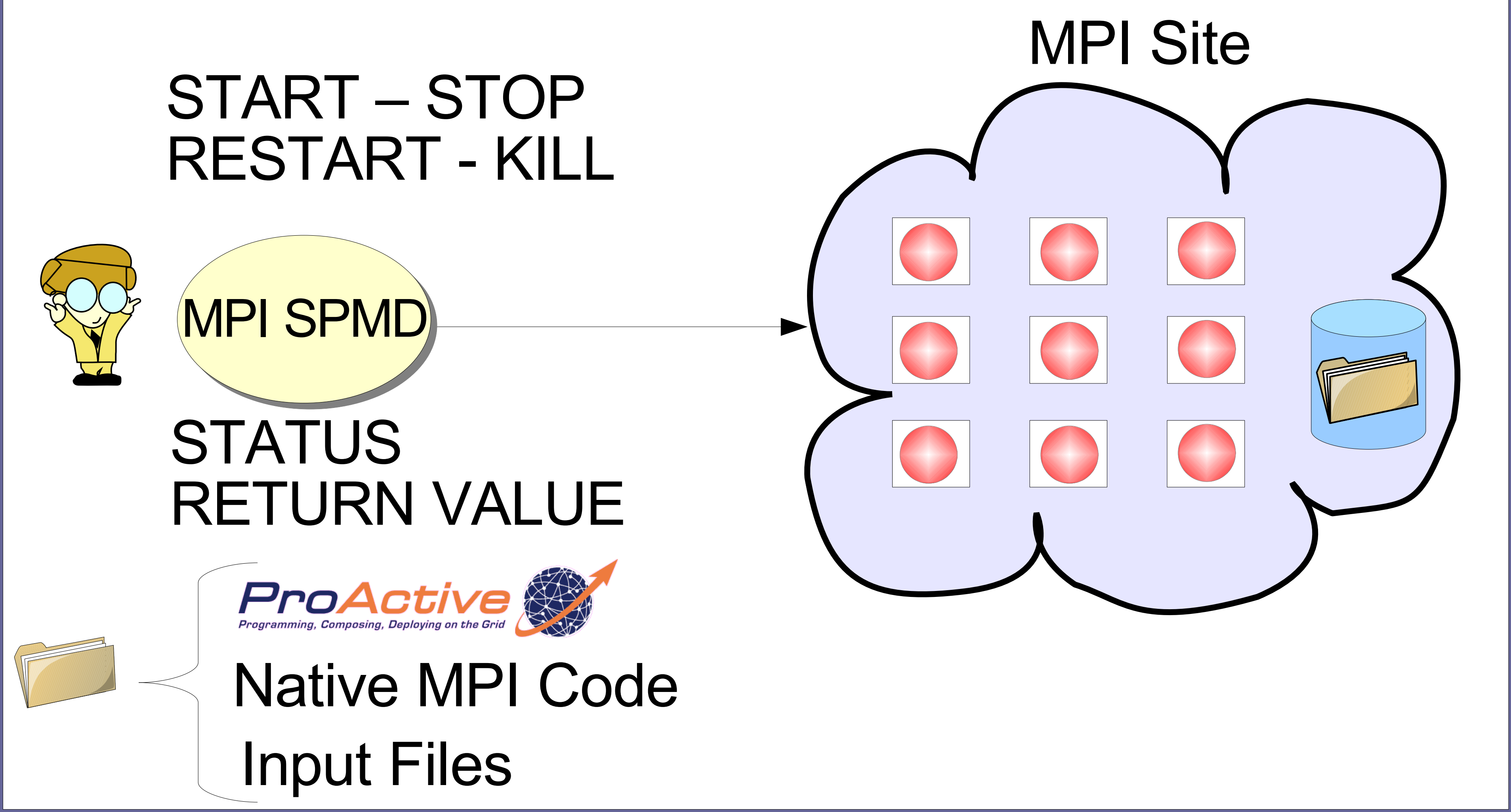
MPI Site

ProActive Deployment

Native MPI Code

Input Files

Controlling MPI Applications



MPI Site

START – STOP
RESTART - KILL

MPI SPMD

STATUS
RETURN VALUE

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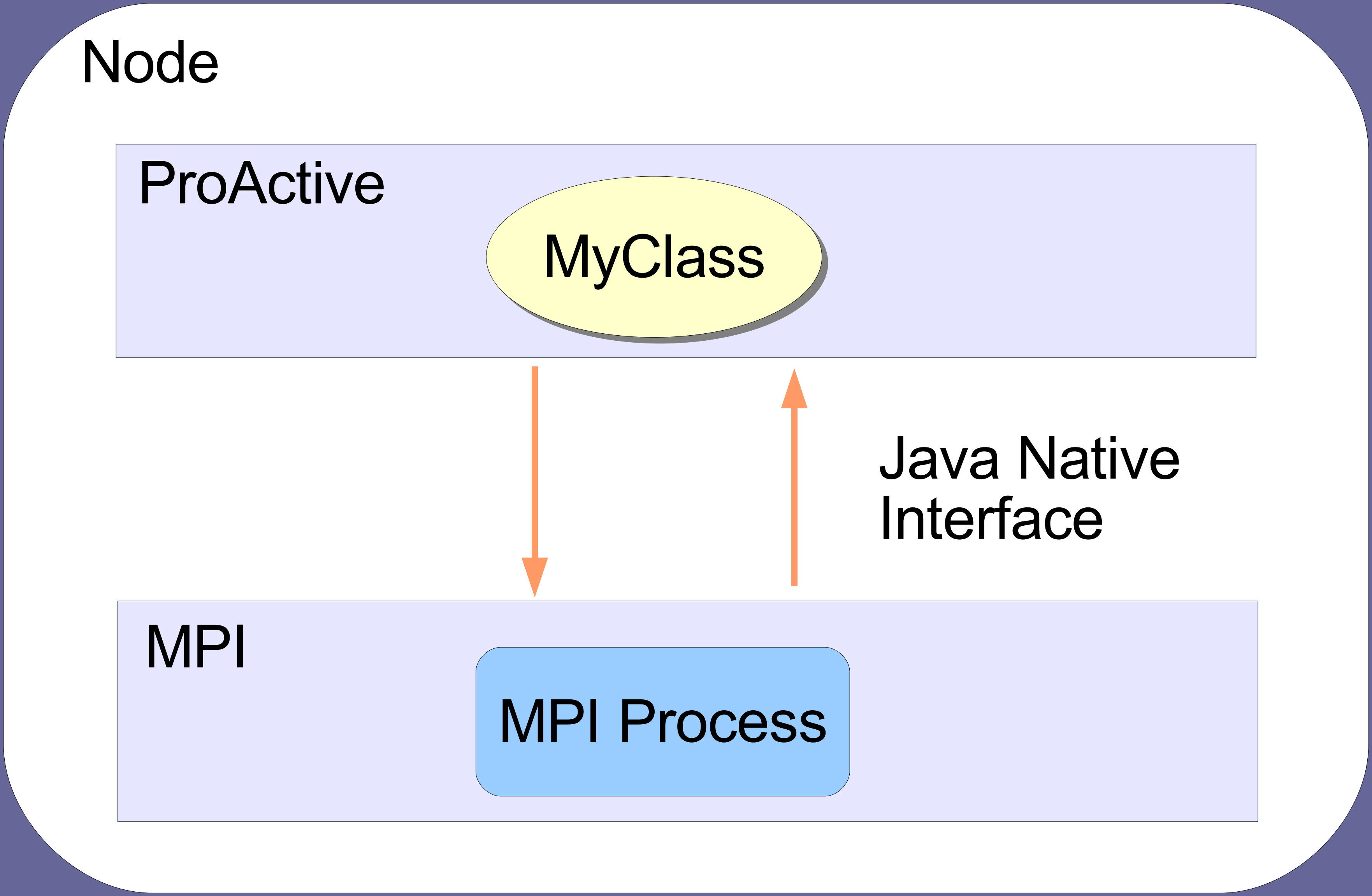
Native MPI Code

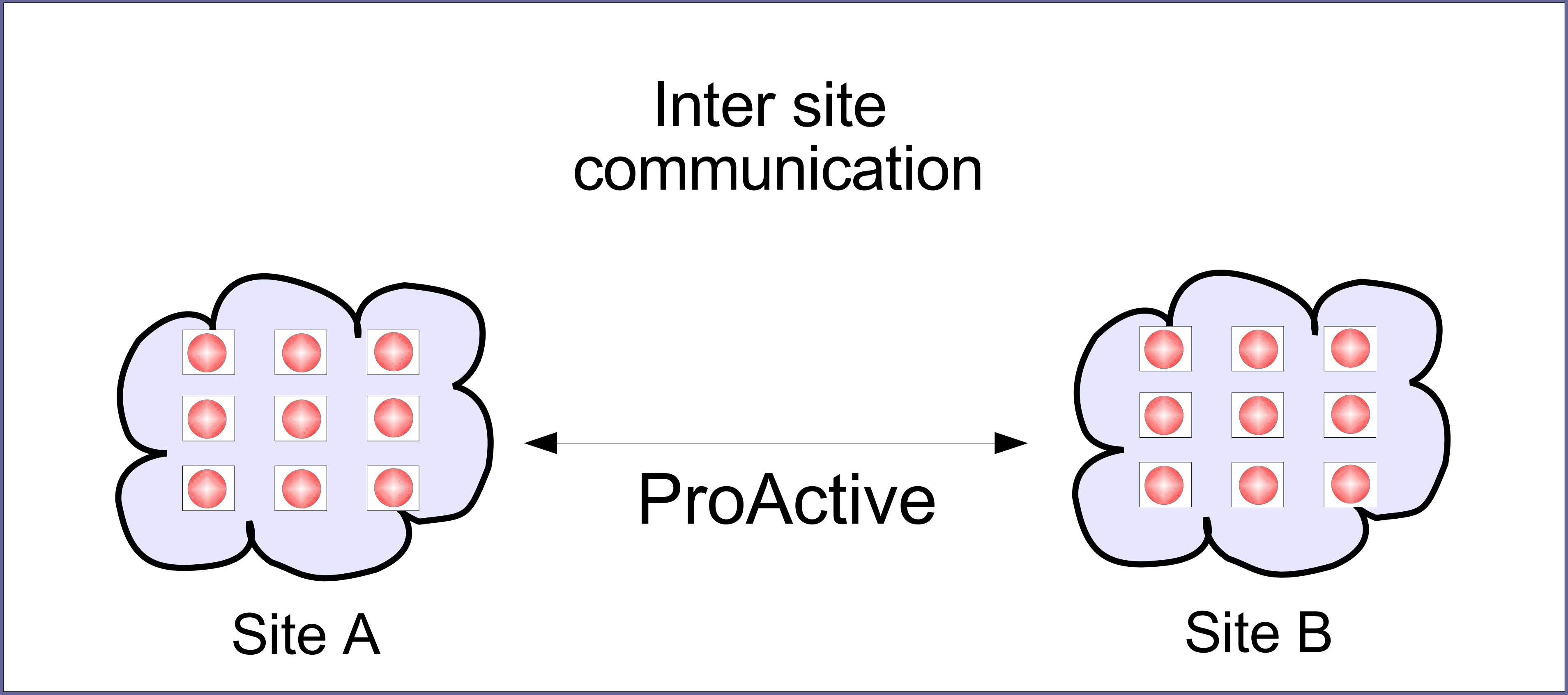
Input Files

Coupling MPI with ProActive

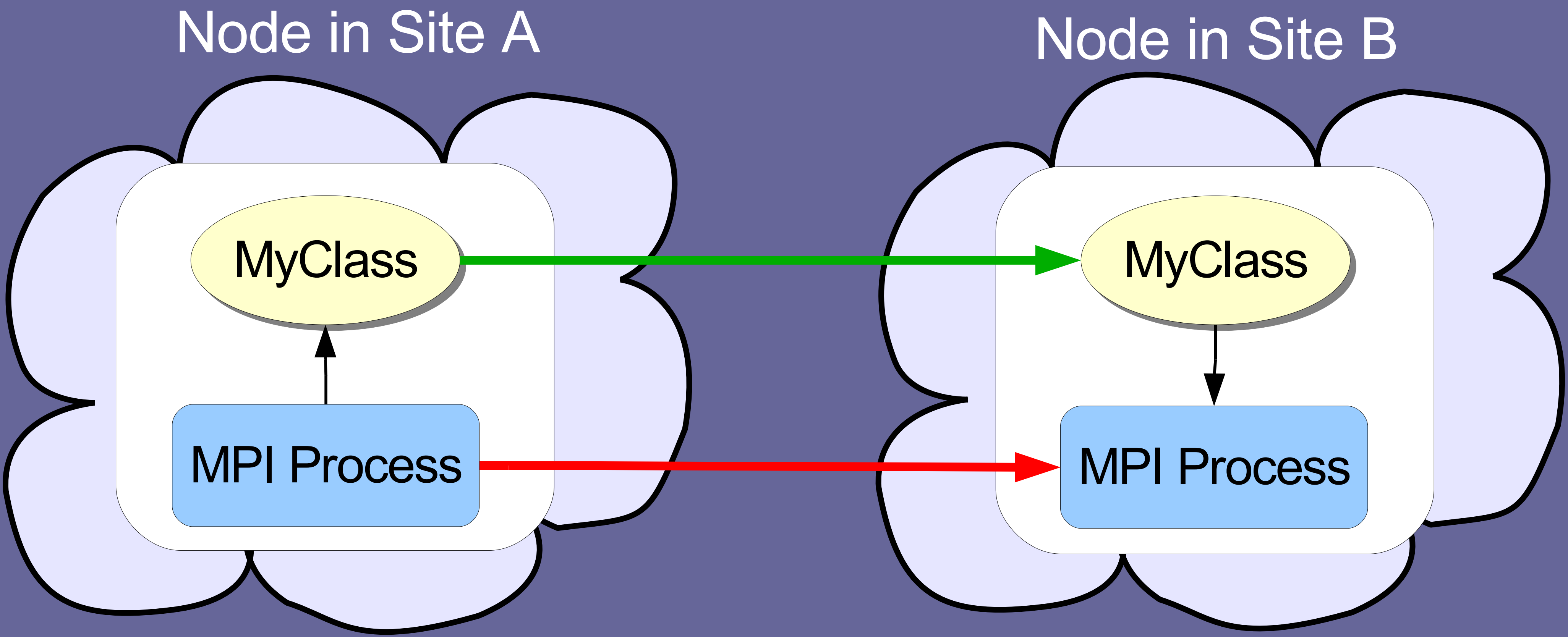


MPI Communication

- Intra site: regular MPI
- Inter site: coupling with ProActive



Inter Site Communication



MPI - Conclusions

- Deployment of MPI Applications
  - Deployment Descriptors with File Transfer
- Controlling MPI Applications
  - MPI-SPMD Controlling active object
- Coupling ProActive with MPI
  - Inter MPI site communication
  - Synchronization and control of several MPI Codes

Questions?

- ProActive

  http://proactive.objectweb.org

Deployment File Transfer

- Benchmark details

  Transporter overhead is proportional to the number of grid sites: NFS

  Most Grid Sites use NFS

  - Grid Plugtests: 40 sites, 14 Countries, 2700 CPU http://www.gridtoday.com/grid/520958.html

Execution File Transfer

- Failsafe mechanism

  If no transporter can be used, then use a failsafe file transfer

  Our implementation is based on push algorithm

- Advantage

  Reliable file transfer

- Drawbacks

  Cannot use on-the-fly deployment of middleware

  Overhead proportional to the number of nodes