Enabling Grids for E-sciencE

gLite Package Manager

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Information Society

Talk Outline

- **Introduction**
  - gLite services and Package Manager
- **Design**
  - Interface
- **Use Cases**
  - Interaction with other services
- **Outlook**

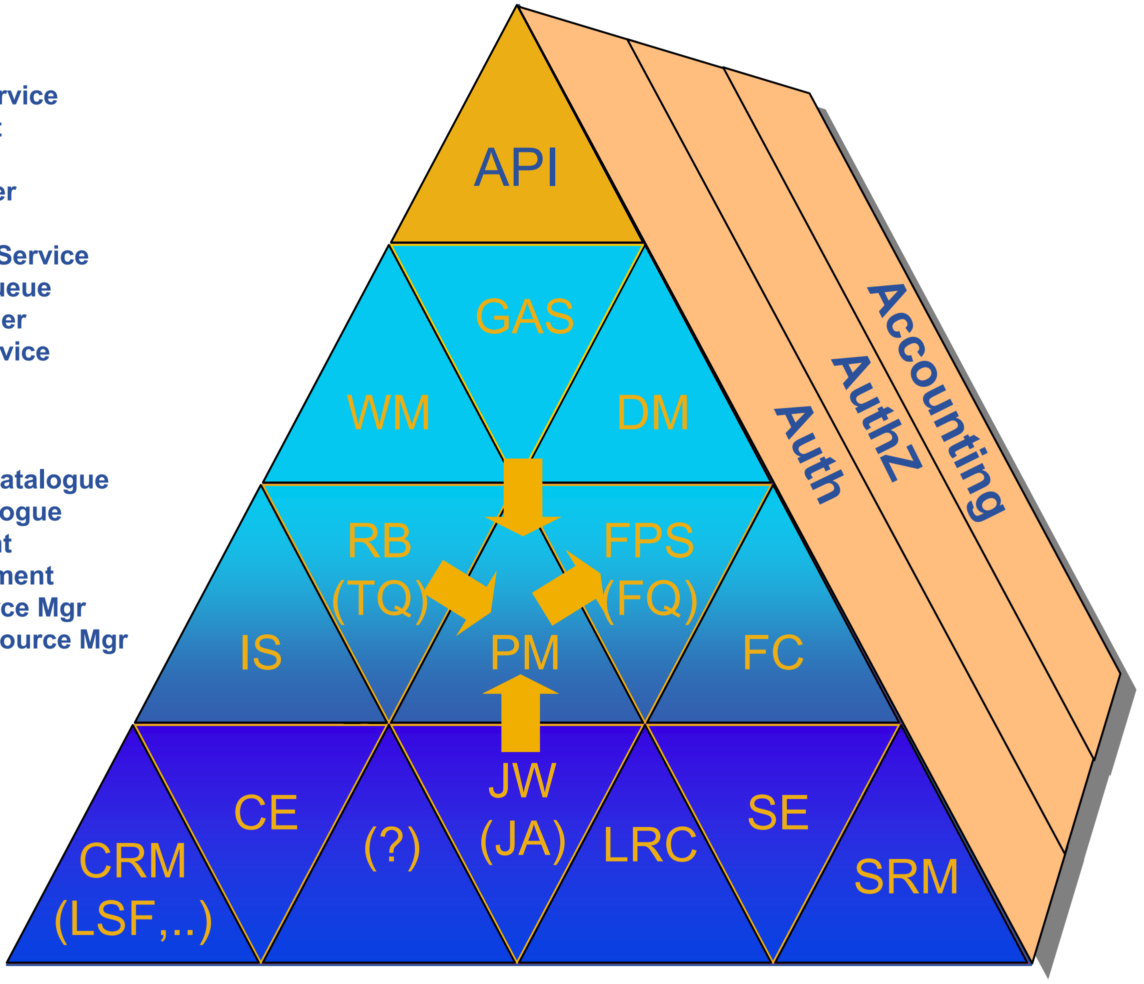
- **Discussion**

Package Manager Service

- **This service is a helper service that automates the process of installing, upgrading, configuring, and removing software packages from a shared area (software cache) on a Grid site**
- **The Package Manager Service does not pretend solve the problem of sharing a software cache between worker nodes**
  - There are many possible deployment scenarios and solutions which are ultimately matter of choice and responsibility of a site managers
    - Shared file system (AFS, NFS, ..)
    - Another service dedicated to this purpose
- **The Package Manager Service does not manage the installation of middleware software**
- **No root access**
- **Traditional package managers (apt, rpm..) could provide backend**

Middleware Services in gLite

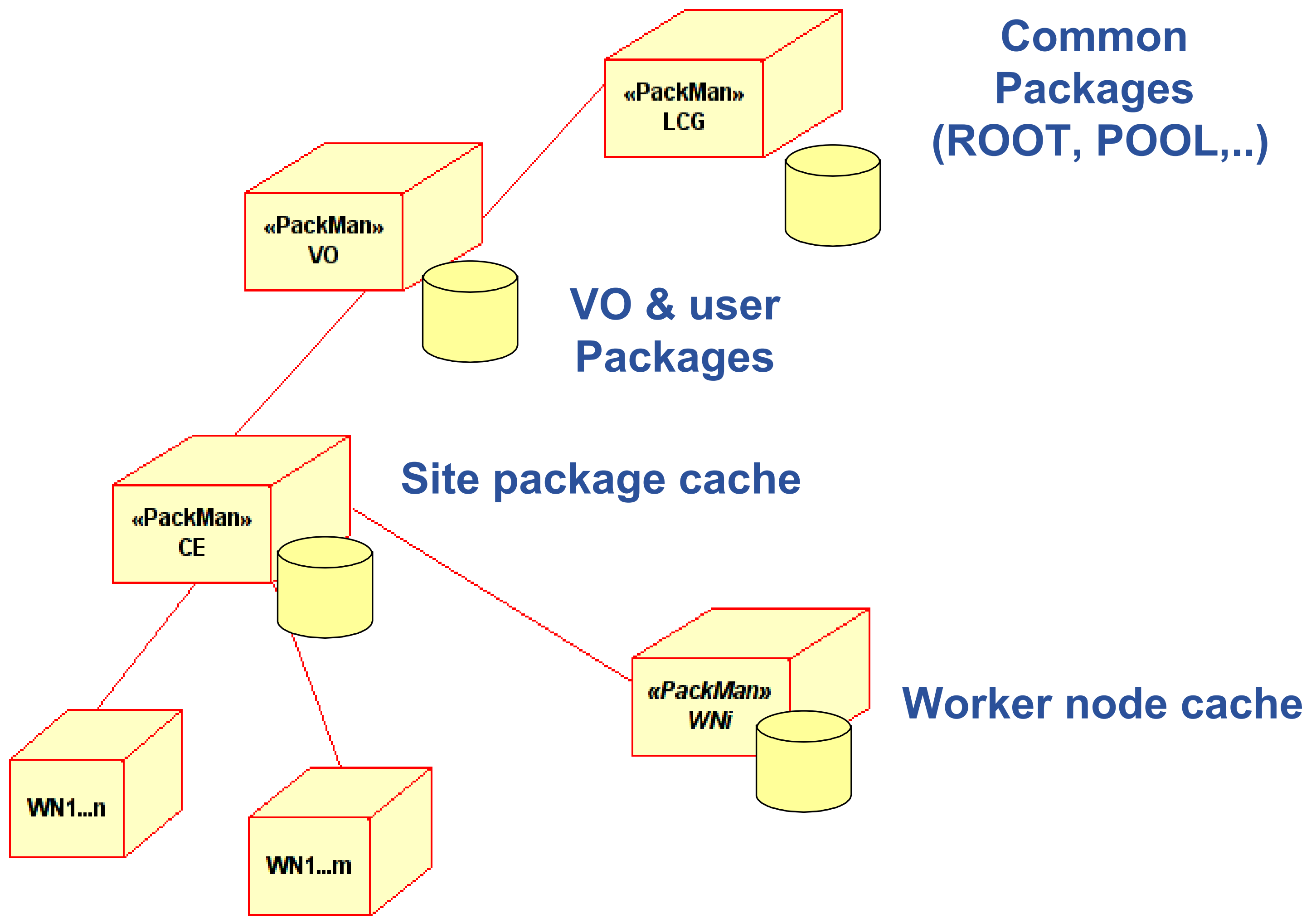
GAS	Grid Access Service
WM	Workload Mgmt
DM	Data Mgmt
RB	Resource Broker
TQ	Task Queue
FPS	File Placement Service
FQ	File Transfer Queue
PM	Package Manager
IS	Information Service
FC	File Catalogue
JW	Job Wrapper
JA	Job Agent
LRC	Local Replica Catalogue
?	Local Job Catalogue
SE	Storage Element
CE	Computing Element
SRM	Storage Resource Mgr
SCE	Computing Resource Mgr (LSF, PBS,…)



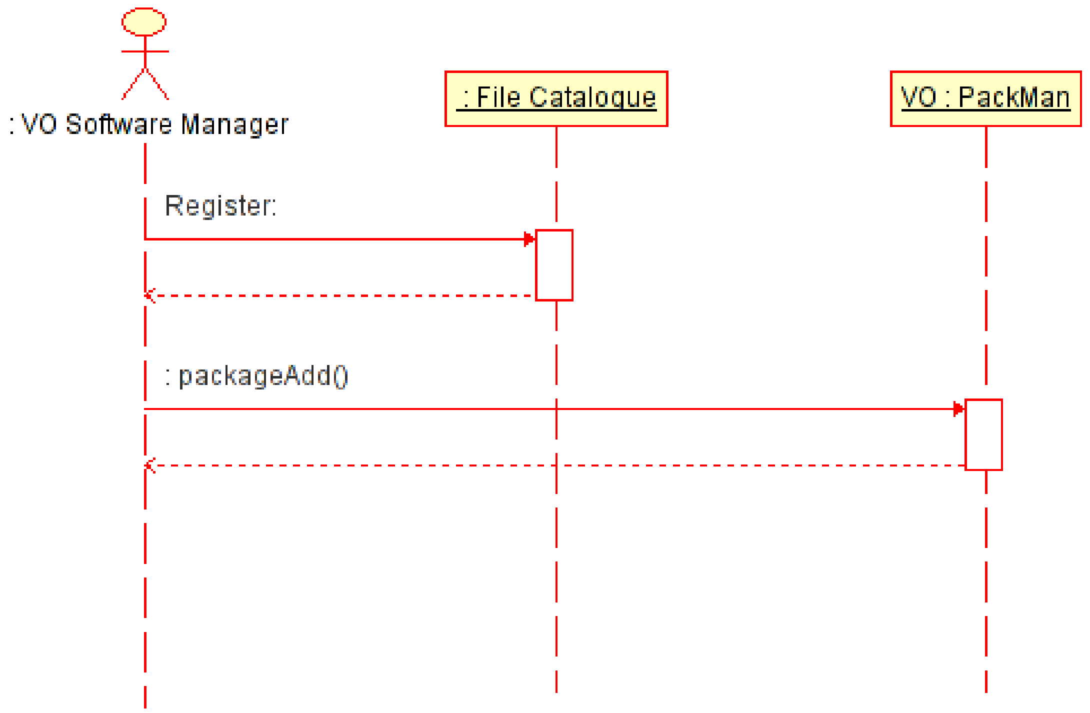
Interface

- ***packageAdd(user, packageName, version, url)****
  - Registers the package *packageName* of a given *version* that belongs to *user* and can be found at *url*
- ***packageInstall(user, packageName, version, TTL)***
  - Installs and verifies the package *packageName* of a given *version* (if not already installed) and extends a lease time for *TTL* (time-to-live) hours in the name of *user* (or *service@host*, *job@host*)
- ***listPackages()***
  - Returns the list of packages currently installed in the cache of a package manager instance
- ***removePackage(user, packageName, version)***
  - Unconditionally removes the package *packageName* of a given *version* from the package manager cache

(Possible) deployment scenarios



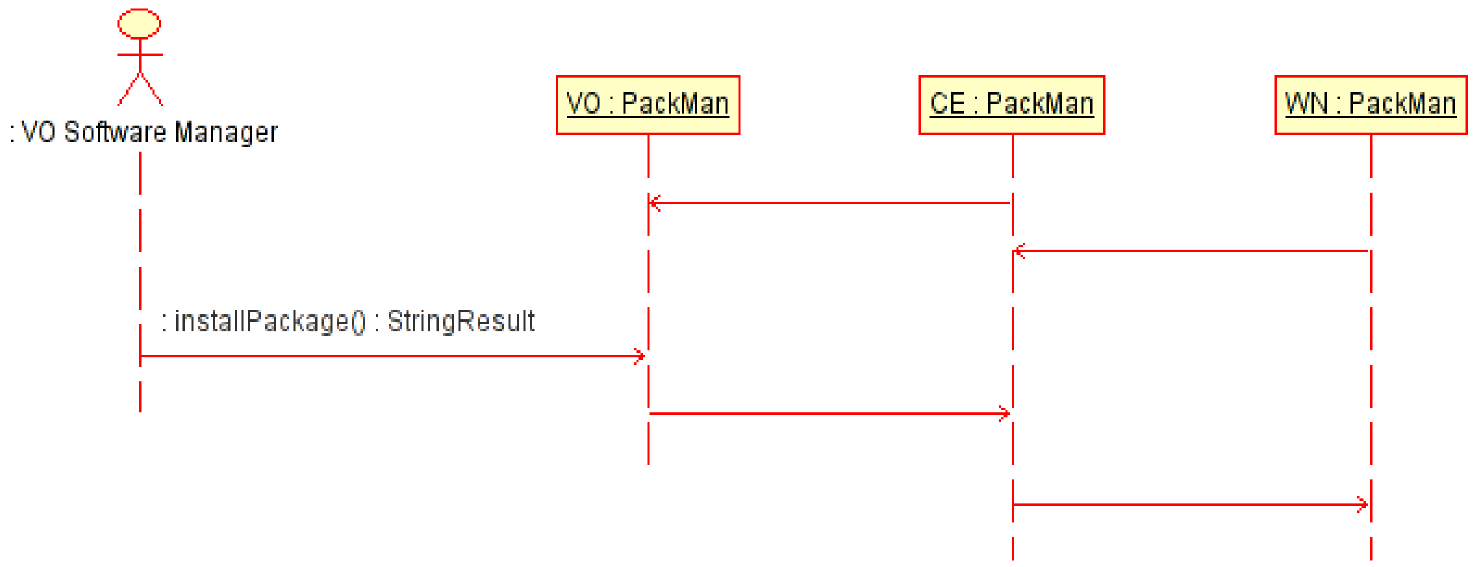
Package creation (GAS,DM interaction)



✓ VO Software Mgr (or a user) can register a package

1. VO package manager (or a user) creates the binary package for one or more platforms and registers the content and metadata in the file catalogue
2. Package is registered with VO Package Manager Service
   - This is not yet implemented in the prototype

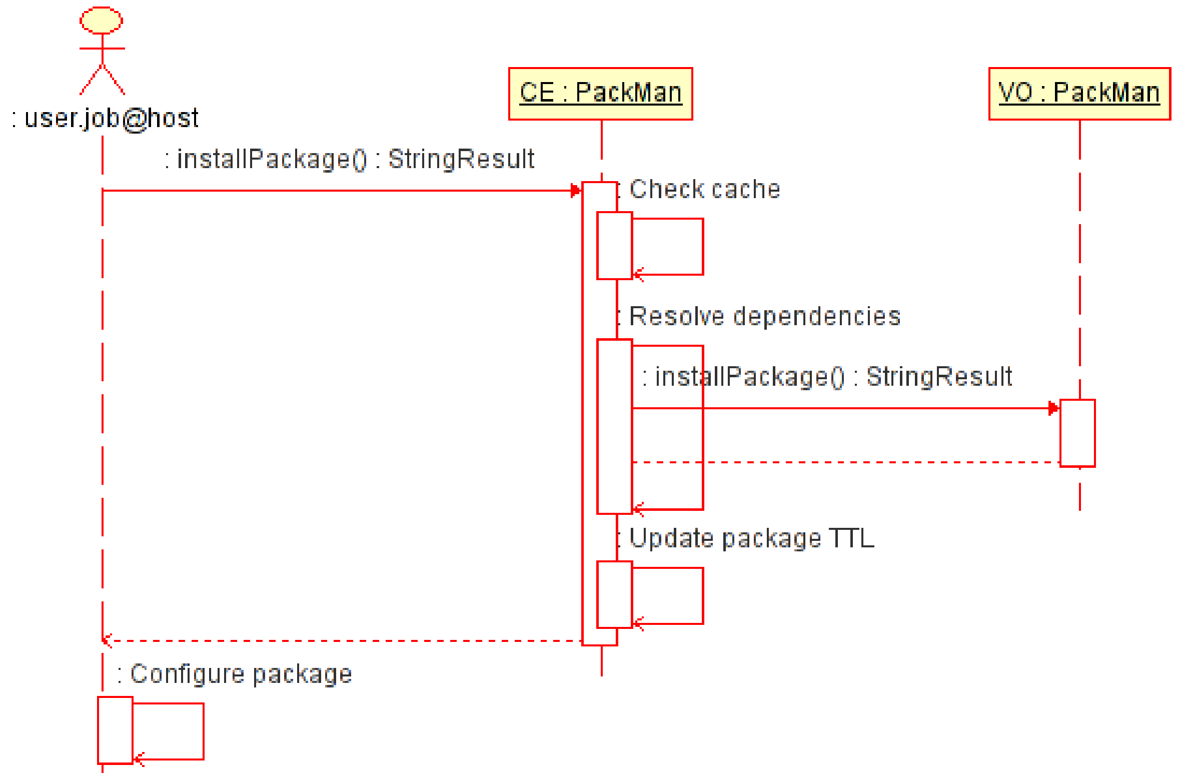
Pre-installation (SM interaction)



✓ **In this case the installation is triggered by the VO Software Manager**

1. Site PM registers with VO PM upon startup
2. Any other PM service on the site registers with Site PM
3. VO Software Manages issues installPackage command
4. This is propagated down the hierarchy and appropriate TTL is set

Installation on demand (JW interaction)



- ✓ **The installation is triggered by a Job Wrapper (Agent) executing a job on WN**
  1. JW requests a package from local PM
  2. PM checks the cache and if does not find a package, asks parent manager
  3. Local PM installs all dependencies in the cache
  4. JW obtains a lease for the package (PM extends TTL)
  5. Job Agent receives an instruction how to setup the environment before executing a jol

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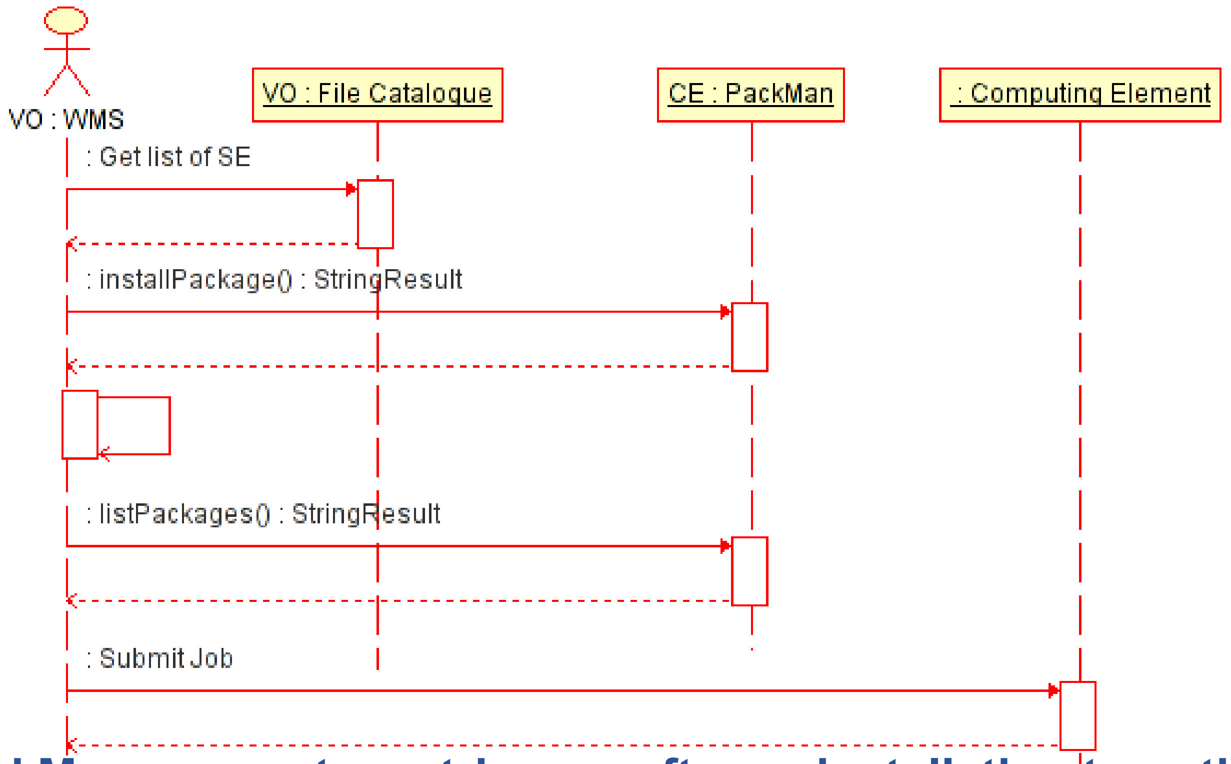
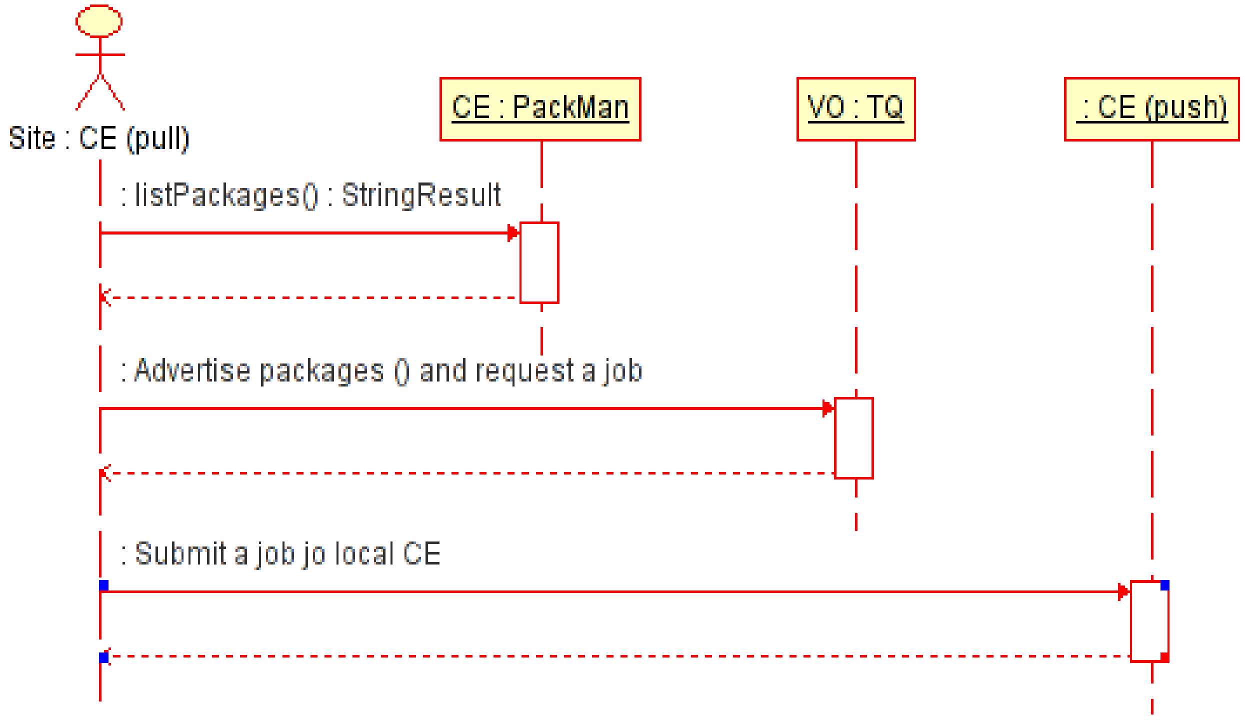
Interaction with WMS



✓ **Workload Management can trigger software installation to optimize job execution**

1. WMS consults FC (and other services) to find out about possible sites for job execution
2. It issues installPackage() command on PM associated with given CE and obtains the lease for the package
3. It pushes jobs on the sites on which listPackages() confirms that package exists

WMS (pull mode) interaction


Site : CE (pull)
CE : PackMan
VO : TQ
: CE (push)
: listPackages() : StringResult
: Advertise packages () and request a job
: Submit a job jo local CE

✓ **The CE running in the pull mode**

1. CE periodically monitors local resources and lists the packages available at its PM
2. The packages are advertised together with other parameters in a JDL which is presented to Task Queue
3. If CE is given a task, it builds a Job Wrapper (Agent) and sends it to the local CE (push)

Cleanup

- **The Package Manager manages the local disk cache and will clear the disk space only if it needs the disk space to install new packages**
  - It won't remove the packages for which someone holds the lease
  - The maximum lease time for the packages is a configurable parameter
- **While any user or process can list already installed packages, only the VO administrator can remove a package from the local cache regardless of its current lease status**
- **Removing a package does not remove the packages that depend on it**
- **If any of removed packages are requested again, they will be automatically installed again**

Current Status

- **We are using exclusively the File Catalogue to deliver package and metadata content**
- **At present, we do not publish packages and do not implement Package Manager hierarchy**
  - we search for packages in the /packages, $VO/packages and $HOME/packages directory
- **Using AliEn package manager as a backend**

- **Creating the package**

1. Creating tar file

```
tar czf ROOT.tar.gz
```

1. Registering the package in the catalogue:

```
(from the glite prompt)
    mkdir ~/packages/ROOT/4.0.8
    add  ~/packages/ROOT/4.0.8/Linux-i686 file://myhost/ROOT.tar
```

2. In the JDL of a job, require the package

```
Executable="myExec.";
Packages="ROOT:4.0.8";
InputFile=….
```

Additional package info

- **It is possible to define additional package metadata**
  - Size
  - Dependencies
  - configuration script
  - pre- and post-installation scripts
  - installation script
  - pre- and post- remove scripts

- **To define any metadata the user has to :**
  - Create the metadata structure for that directory

    addTag ~/packages/AliROOT PackageDef
  - Populate the metadata

    addTagValue ~/packages/AliROOT/4.0.2 PackageDef
    Dependencies='ROOT:4.0.8'

Evolution path

- **The PM Service should be part of the hierarchy of package managers to assure scalability and provide a fail-over capability.**
- **Access to VO packages should be controlled and possibly restricted and audited**
  - To some extent this could be achieved by running “public” and “protected” instances of the service
- **The package metadata information (including checksum information) should be digitally signed**
  - The metadata should come from the database and be digitally signed while payload could be replicated
- **The package metadata could contain the description of the package payload content**
  - This way we could preserve current practices and re-use existing software packages
- **Command line interface**
- **Alternative package managers as a backend (apt, portage, pacman,..)**