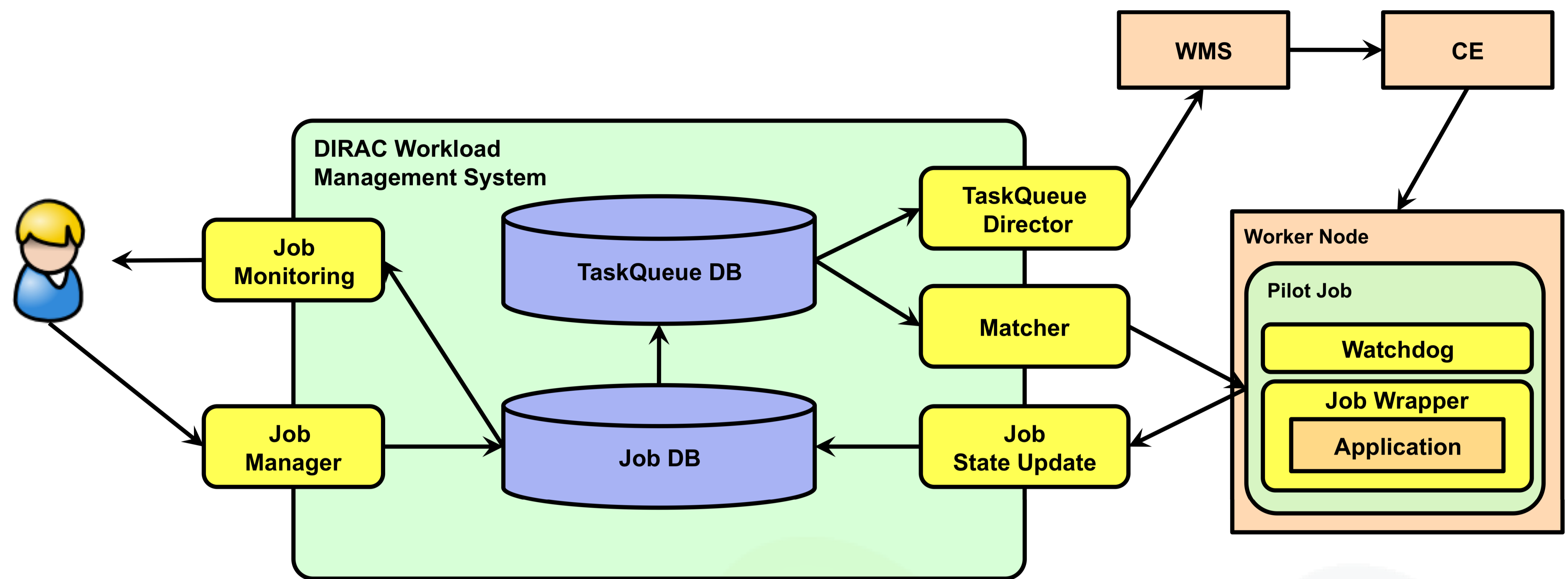


**DIRAC** is the LHCb solution to interact with distributed computing resources. For Workload Management tasks DIRAC implements pull scheduling mechanism and was the first system to introduce the usage of Pilot Jobs in the Grid.

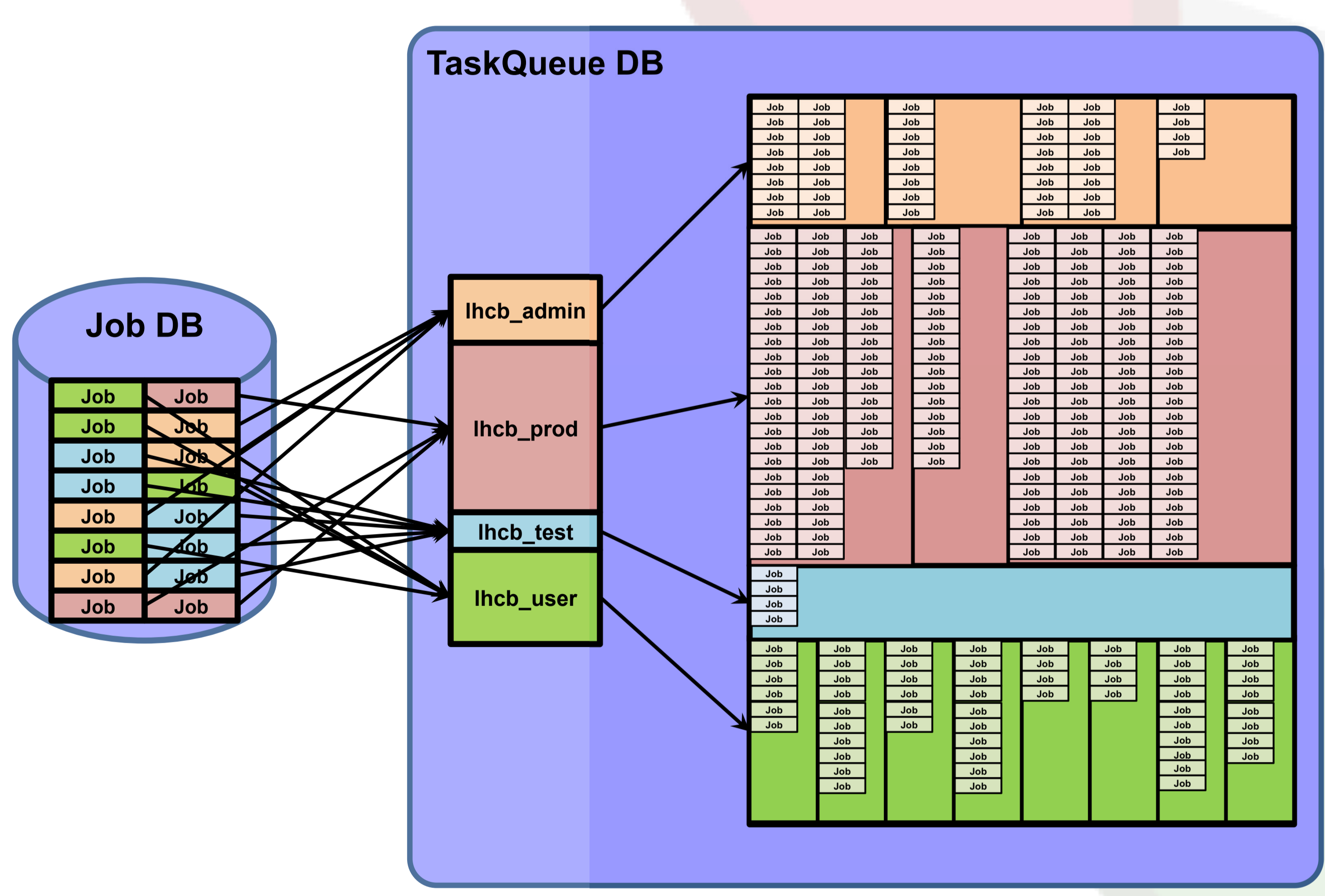


**Pilot Jobs** are a special type of jobs, submitted to a computing resource, that only has the payload fully defined once it is safely running on the Worker Node. This strategy has several benefits with respect to the classic middleware push approach:

- Pilots create an overlay network that mask heterogeneity of underlying resources.
- Late binding of resource to payload allows to apply VO priorities independently of the local batch systems.
- Pull scheduling allows to find the payload that currently best fits the resources reserved by the pilot.

**Directors** are the DIRAC component submitting pilots jobs to the resources.

**Generic Pilot Jobs** are able to change the user identity as required by the payload. They are the latest advance in this field. A special DIRAC group (lhcb\_pilot) and VOMS role (/lhcb/Role=pilot) are used for pilot job submission. This special group is later allowed to retrieve payload limited proxies (full glexec support already included). Security aspects on [90].



In the DIRAC Workload Management System new user Tasks are organized into TaskQueues for optimizations purposes.

**TaskQueues** are groups of tasks, pending for execution, with identical execution requirements: Owner, OwnerGroup, Allowed/Banned Sites, CPUTime,... They may have different priorities assigned by their owner.

Each **DIRAC group** has a basic Priority assigned by the VO. This priority is distributed among all the TaskQueues of the same group using the priorities the Owner has assigned to each of his/her tasks.

**Directors** submit pilot jobs to the resources (via gLite WMS) following the priorities and number of pending Tasks in the system.

**Pilot Jobs**, once running at a given computing resource, request a pending task following the assigned priorities.

**Private Pilot Jobs** include the full identity of the user and can only match tasks for this identity. They do not allow to apply VO policies since late binding is limited.

**Generic Pilot Jobs** use a special identity and can match tasks from any user. Before executing the task the execution changes to the proper user identity (glexec).

**Summary:** DIRAC WMS uses pilot jobs and late matching based on TaskQueues to provide LHCb with the best handle to applied VO policies and priorities for the use of its computing resources.

