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DIRAC universal pilots

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In the last few years, new types of computing models, such as IAAS (Infrastructure as a Service) and IAAC (Infrastructure as a Client), gained popularity. New resources may come as part of pledged resources, while others are in the form of opportunistic ones. Most but not all of these new infrastructures are based on virtualization techniques. In addition, some of them, present opportunities for multi-processor computing slots to the users. Virtual Organizations are therefore facing heterogeneity of the available resources and the use of an Interware software like DIRAC to provide the transparent, uniform interface has become essential. The transparent access to the underlying resources is realized by implementing the pilot model. DIRAC's newest generation of generic pilots (the so-called Pilots 2.0) are the "pilots for all the skies", and have been successfully released in production more than a year ago. They use a plugin mechanism that makes them easily adaptable. Pilots 2.0 have been used for fetching and running jobs on every type of resource, being it a Worker Node (WN) behind a CREAM/ARC/HTCondor/DIRAC Computing element, a Virtual Machine running on IaaC infrastructures like Vac or BOINC, on IaaS cloud resources managed by Vcycle, the LHCb High Level Trigger farm nodes, and any type of opportunistic computing resource. Make a machine a "Pilot Machine", and all diversities between them will disappear. This contribution describes how pilots are made suitable for different resources, and the recent steps taken towards a fully unified framework, including monitoring. Also, the cases of multi-processor computing slots either on real or virtual machines, with the whole node or a partition of it, will be discussed.

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