Powerfarm: a power and emergency management thread-based software tool for the ATLAS Napoli Tier2

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Powerfarm is a modular software system that monitors the state of critical quantities such as power supply and room temperature and promptly responds with the appropriate actions of turning off/on devices. It has been developed for the *SCOPE project* and for ATLAS Tier2 Grid center of INFN Napoli. Powerfarm is fully customizable and can be deployed in any computing center.

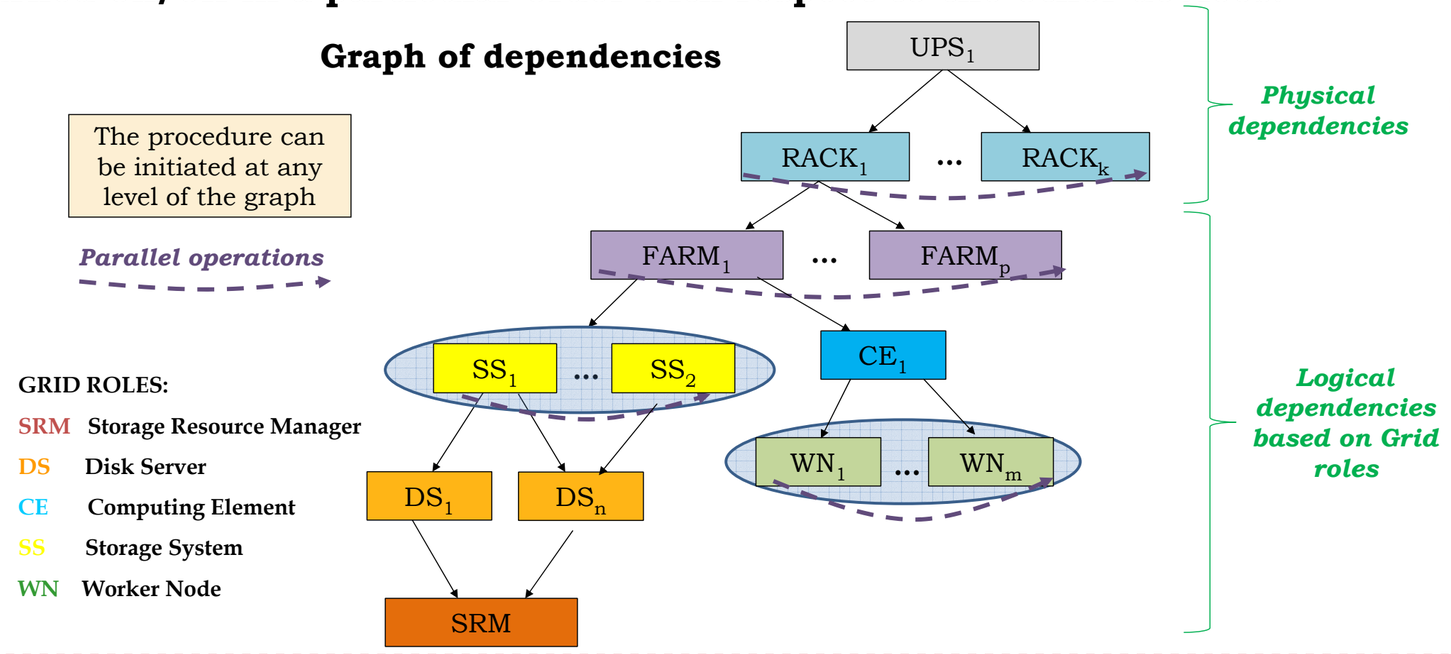
Logical and Physical Dependencies Schema

Each device has to be turned on/off in a particular order with respect to the other devices.

Powerfarm represents power on/off **dependencies** through a **directed acyclic graph (DAG)** of dependencies.

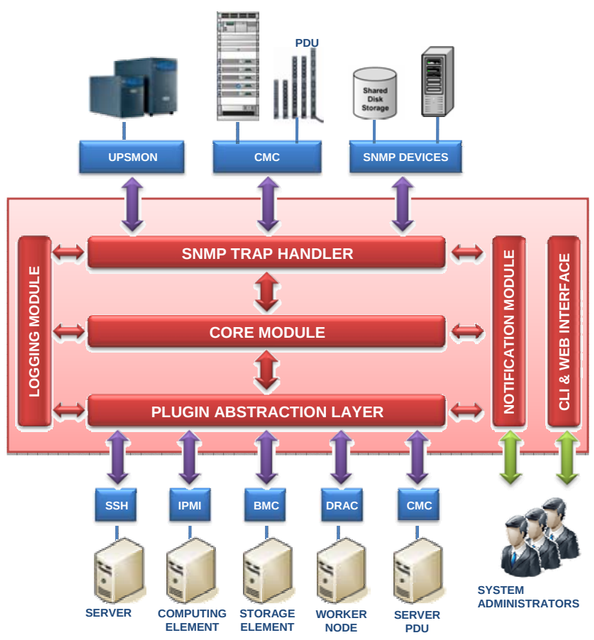
Powerfarm uses **threads** in order to perform parallel operations on set of nodes at the same time (e.g. shutting down all the worker nodes).

Graph of dependencies



Architecture

Powerfarm is made up of several independent modules, each with its own function.



Powerfarm can be triggered by three events:

1. change in the power supply (e.g. UPS switched from AC to battery functioning);
2. sensors reporting out-of-range values (e.g. an anomalous temperature peak, a smoke/fire alert, etc.);
3. manually by the farm administrator for maintenance operations.

Features

Priority scheduling queue manages several instances of Powerfarm that may be simultaneously running ensuring both the fairness and the emergency management of the different instances.

Emergency instances of Powerfarm (e.g. triggered by a high temperature alarm) have higher priority than regular instances (e.g. manually triggered for maintenance purposes).

Flexibility: Multiple instances, emergency management, several functioning modalities, double interface, XML configuration files and SNMP capable functionalities.

Abstraction layer realized by the use of plugins enables Powerfarm to manage virtually any kind of device.

Working time dramatically reduced by using threads to perform parallel operations on set of nodes at the same time.

Use Case

AC power loss occurs: UPS on, Powerfarm executes controlled shutdown after a configurable delay