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Key features
- Install and configure a large number of nodes
  - Install several cluster in one shot
  - Support for concurrent deployments
  - Control several clusters from a single client
- Manage a library of pre-configured system images
  - User-provided images
  - Visibility of images (shared, private)
- Reliability of the installation process
  - Customizable workflow engine
  - Windowed operations
  - Escalation of low-level remote commands
- Hardware compatibility
  - Built on top of PXE, DHCP, TFTP/HTTP
  - Remote operations based on SSH
  - Customizable remote low-level operations (IPMI, ...)
- Software compatibility
  - Support any operating system (Linux, *BSD, Windows, ...)
  - Integration with batch scheduler and network isolation tools
  - Remote control API

Reliability
- Reliable workflow engine
  - Goal: Manage the installation process
  - Challenge: Handle hardware & network failures, customization
    - Engine based on event automata
    - Fallback methods in case of failure
    - Timeouts and retries at every step
    - A typical workflow example:
      1. Configure PXE profiles on TFTP or HTTP server
      2. Trigger reboot
      3. Wait for nodes to reboot
      4. Configure nodes (partition disk, ...)

Scalability
- System image broadcast
  - Goal: Send a big file on thousands of nodes
  - Challenge: Avoid network bottlenecks, saturation of links
  - Several alternatives available
    - Chain, Tree, BitTorrent, ...
  - Default alternative: Topology-aware chain broadcast
    - Parallel tree-based initialization of the chain
    - Saturation of full-duplex network in both directions
    - Efficient on networks composed of hierarchy of switches

Parallel operations
- Goal: Executing commands on thousands of nodes
- Challenge: Avoid client overloading, gather commands outputs
  - Based on TakTuk (http://taktuk.gforge.inria.fr)
  - Hierarchical connections between nodes
  - Adaptive work-stealing algorithm
  - Auto-propagation mechanism

Software suite
- Management of images
  - User custom images
- Rights management
  - Compatibility with batch scheduler
- Statistics collection
  - Identify hardware issues, ...
- Frontends to low-level tools
  - Reboot and power on/off operations, serial consoles
- DEB and RPM packages
- Actively developed since 2009

Evaluation
- Key software on Grid’5000 since 2009
  - 25 clusters on 10 sites
  - 620 users, 170 000 deployments
  - about 10 mins to deploy 130 nodes
  - Virtualized infrastructure
    - 4000 VMs dispatched on 635 physical nodes
    - 3838 nodes successful in a single shot in less than 1 hour

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http://kadeploy3.gforge.inria.fr/