

Dynamic Provisioning with sNow! Cluster Manager

Jordi Blasco
Co-founder & CTO

Business Model

GNU + Professional Support

sNow! is available under the GNU General Public License.



Why sNow!?

Main Features

Painless Deployment

sNow! domains are unattended deployed by pre-defined roles. Those roles, are shell scripts which make them easy to develop and to understand.

Easy to Integrate

sNow! domains allow integrating site-specific needs without overhead. The hook rich architecture allows integrating uncommon needs easily.



Fault Tolerant

The sNow! architecture has been designed to leverage fault tolerant services for HPC environments, where downtime is not an option.

DevOps Friendly

sNow! domains are key to develop a real DevOps friendly solution, easy to interact, develop, rebuild and also accommodate Continuous Integration needs.

Community Driven

Your feedback, suggestions, and requirements have an impact on the development and in the roadmap of the project.

sNow! as Convergence Solution

HPC Cluster, Singularity, Docker Swarm, OpenNebula

HPC users need more than just compute solution

- * **Workflow:** Pre-processing and post-processing, workflow frameworks,...
- * **Web services:** RStudio, Galaxy, Jupyter notebook, JMS,...
- * **Software managers:** Anaconda, EasyBuild, Spack,...
- * **Prebuilt software:** Docker, Singularity, VM image (NeuroDebian,..),...



sNow! as Convergence Solution

HPC Cluster, Singularity, Docker Swarm, OpenNebula

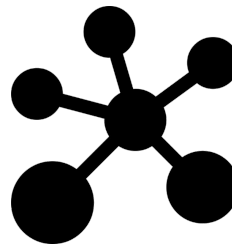
sNow! has setup the fundamental technology to deliver complete HPC solutions and extended to cover other critical needs.



+Training



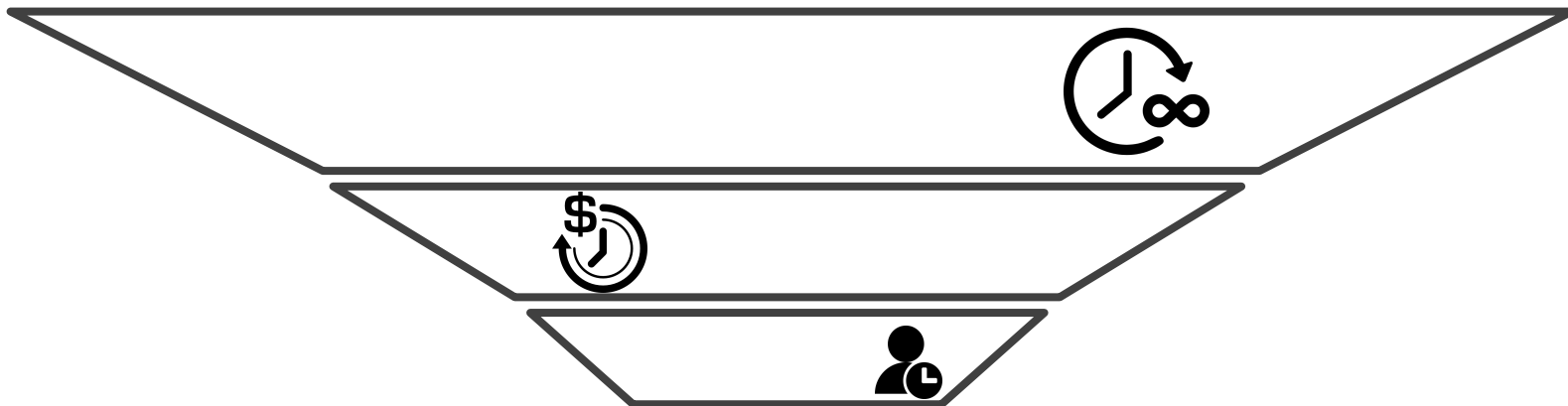
+Tools



+Hardware



+ Staff



sNow! as Convergence Solution

HPC Cluster, Singularity, Docker Swarm, OpenNebula

sNow! provides response to the long tail of research and engineering needs and also allows to **dynamically re-architect/re-purpose the HPC** solution to accommodate them.



sNow! as Convergence Solution

cluster provisioning improvements

1

Faster Cluster Provisioning

Reduced network load from ~1GB/node to ~28MB/node. If TFTP broadcast is used, then the load is reduced to ~28MB/cluster.

2

Smaller Memory Footprint

Stateless image and SSL provisioning memory footprint has been reduced from several Gigabytes to just 35MB.

3

Easier Administration

Single System Image (SSI) allows applying changes online atomically. One change in the shared rootfs is applied everywhere at the same time.

4

Cost Reduction

License cost is mitigated thanks to the SSI architecture. Also, there is no longer need for local disks for provisioning the OS.

5

Improved Resilience

Moving the rootfs from unreliable local disks to cluster file system improve the resilience significantly.

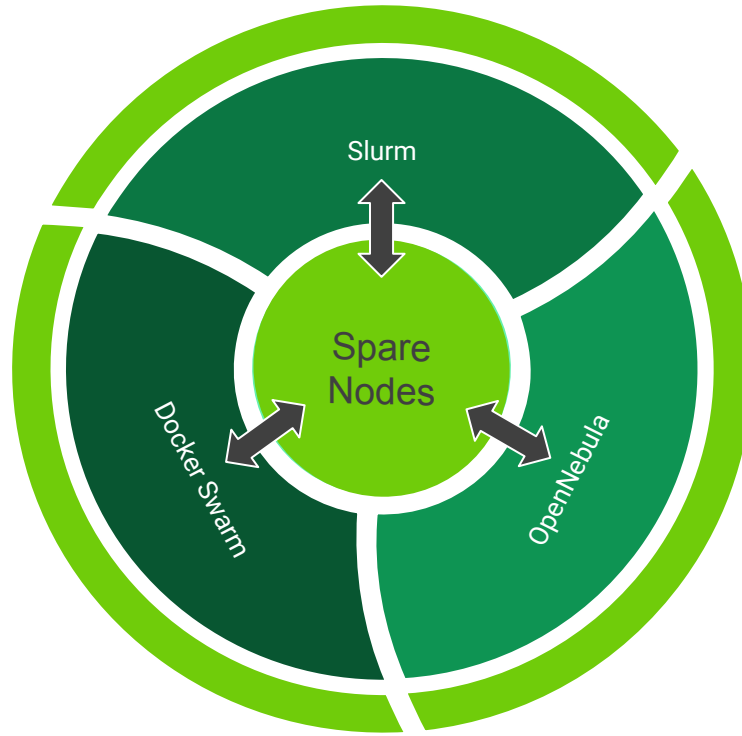
sNow! as Convergence Solution

HPC Cluster, Singularity, Docker Swarm, OpenNebula



sNow! as Convergence Solution

Hybrid Solution: HPC Cluster, Docker Swarm & OpenNebula*



* Manual intervention required

sNow! as Convergence Solution

Current Challenges

elasticity

Docker Swarm and OpenNebula do not support auto-scaling services based based on metrics out of the box.

scaling

Docker Swarm and OpenNebula do not support auto-scaling machines out of the box.

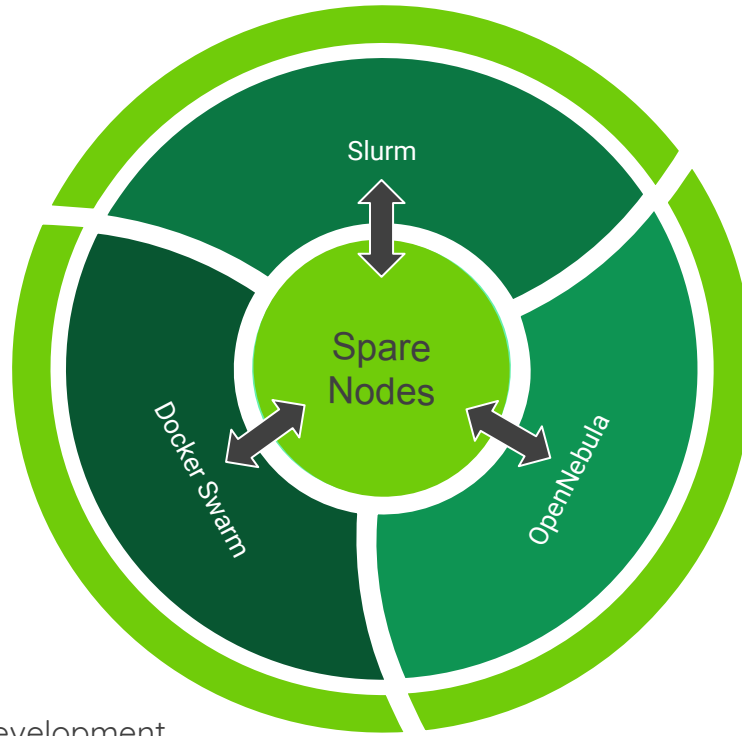
power

Docker Swarm and OpenNebula do not support scale down by draining and removing nodes.

* Manual intervention required

sNow! as Convergence Solution

Dynamic Provisioning of HPC Cluster, Docker Swarm & OpenNebula*



* Dynamic and Unattended - Under development

sNow! as Convergence Solution

claim and release resources



Claim Resource

```
snow set node X --state=slurm  
snow set node X --state=one  
snow set node X --state=swarm
```



Use Resource

```
scontrol update node=X state=RESUME  
onehost enable X  
docker node update --availability active X
```



Release Resource

```
snow set node X --state=idle
```



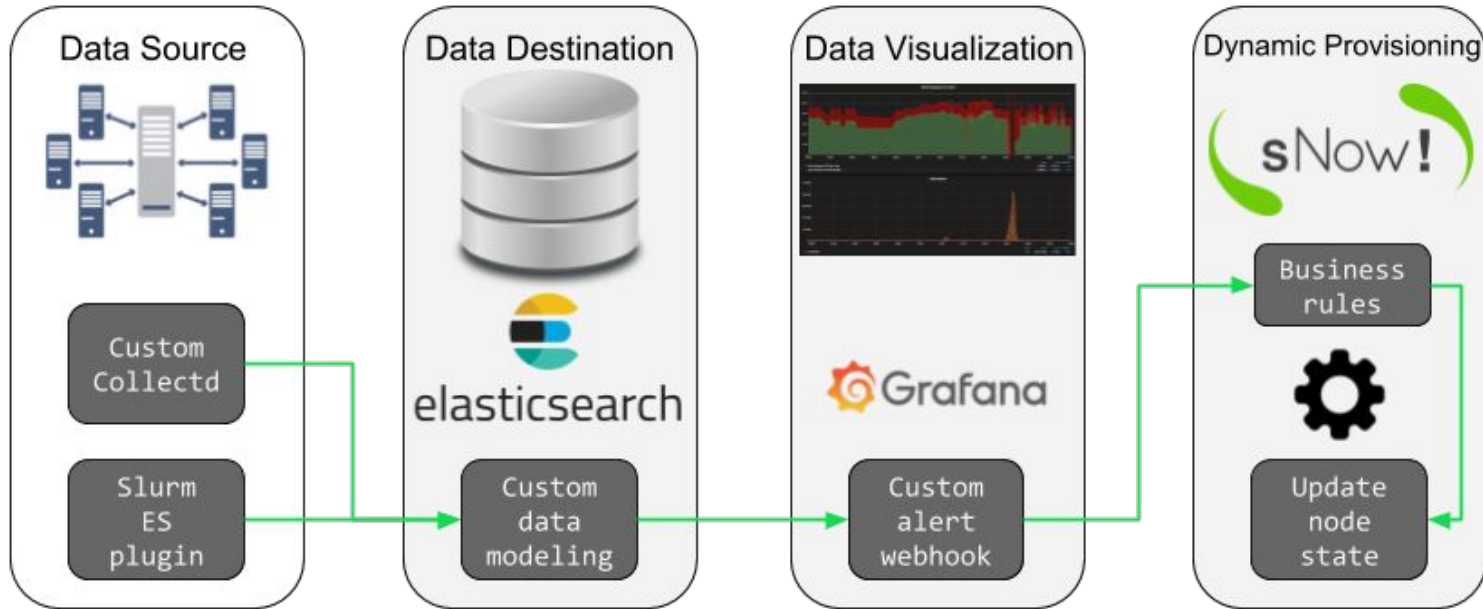
Release Resource

```
scontrol update node=X state=DOWN  
onehost offline X  
docker node update --availability drain X
```

* Dynamic provisioning is under development. Expected to be available in the new major release 2.0

sNow! as Convergence Solution

next step: sensors and business rules



* Dynamic provisioning is under development. Expected to be available in the new major release 2.0



*“The best way to predict
the future is to invent it.”*

-- Alan Kay

HPCNow!



✉ info@hpcnow.com

🌐 www.hpcnow.com

📍 Marie Curie, 8 - 08042 Barcelona (Spain)

📍 34 Fernly Rise, 2019 Auckland (New Zealand)