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Ganeti

Ganeti Core Team - Google

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Latest version of these slides

Please find the latest version of these slides at:

https://code.google.com/p/ganeti/wiki/LISA2013

htools

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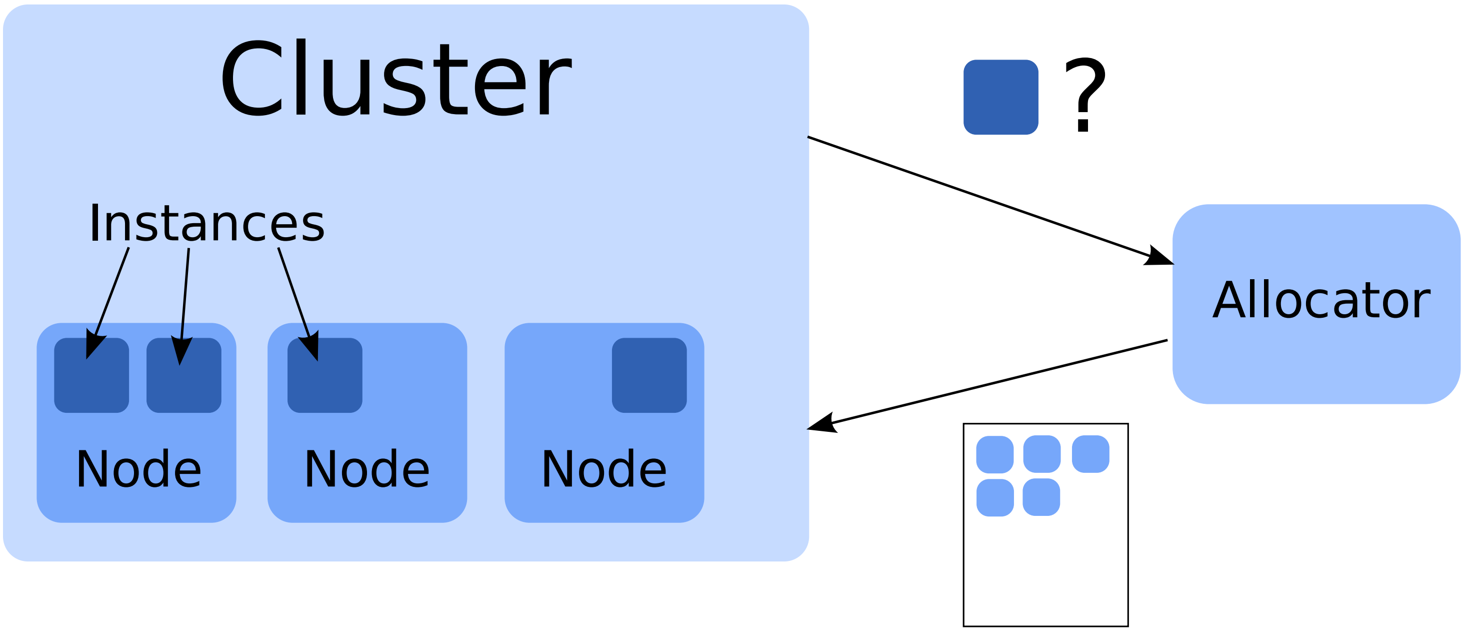
What is htools?

- A collection of tools to provide auxiliary functionality to Ganeti
- Written in Haskell, separate binaries
- Include:
    - hbal: cluster balancing
    - hail: instance allocation
    - hspace: capacity planning
    - hroller: reboot scheduling
    - (future) hsqueeze: huddle instances together

hail

(Instance) allocation



hail

(Instance) allocation

Where to put an instance? - let the cluster figure it out!

```
gnt-instance add [--iallocator hail] myinstance.example.com
```

- the allocator is a separate binary, `hail`
- technically, it is an interface, you can write your own
- protocol:
  - JSON over pipes
  - input: cluster's state + request-specific info
  - output: suggestions where to place which instance
- supported requests: allocate, relocate, change-group, node-evacuate, multi-allocate

hbal

A tool to balance a cluster

Read cluster configuration, calculate, and balance:

```
hbal -L -X
```

Read cluster configuration, calculate, don't execute:

```
hbal -L
```

Minimal moves to evacuate any "drained" nodes:

```
hbal -L --evac-mode -X
```

Migrate only. Don't move any disks:

```
hbal -L --no-disk-moves
```

hspace

Introduction

Capacity planning

- How many more instances can I add to my cluster?
- Which resource will I run out first?

So simulate sequentially adding new machines

- until we run out of resources
- allocation done as with hail
- start with maximal size of an instance (as allowed by the policy)
- reduce size if we hit the limit for one resource

hspace

On a live cluster

Use Luxi backend to get live cluster data

BASH

```
# hspace -L
The cluster has 3 nodes and the following resources:
  MEM 196569, DSK 10215744, CPU 72, VCPU 288.
There are 2 initial instances on the cluster.
Tiered (initial size) instance spec is:
  MEM 1024, DSK 1048576, CPU 8, using disk template 'drbd'.
Tiered allocation results:
  -   4 instances of spec MEM 1024, DSK 1048576, CPU 8
  -   2 instances of spec MEM 1024, DSK 258304, CPU 8
  - most likely failure reason: FailDisk
  - initial cluster score: 1.92199260
  -   final cluster score: 2.03107472
  - memory usage efficiency:  3.26%
  -   disk usage efficiency: 92.27%
  -   vcpu usage efficiency: 18.40%
[...]
```

hspace

The simulation backend

One of the lesser known backends (hspace and hail)
Mainly for cluster planning

- Simulates an empty cluster with given data
- Format
  - allocation policy (p=preferred, a=last resort, u=unallocatable)
  - number of nodes (in this group)
  - disk space per node (in MiB)
  - ram (in MiB)
  - number of physikal CPUs
- use --simulate several times for more node groups

hspace

Planning a cluster

What if I bought 10 times more disks?

BASH

```
$ hspace --simulate=p,3,34052480,65523,24 \
> --disk-template=drbd --tiered-alloc=1048576,1024,8
The cluster has 3 nodes and the following resources:
  MEM 196569, DSK 102157440, CPU 72, VCPU 288.
There are no initial instances on the cluster.
Tiered (initial size) instance spec is:
  MEM 1024, DSK 1048576, CPU 8, using disk template 'drbd'.
Tiered allocation results:
  -  33 instances of spec MEM 1024, DSK 1048576, CPU 8
  -   3 instances of spec MEM 1024, DSK 1048576, CPU 7
  - most likely failure reason: FailCPU
  - initial cluster score: 0.00000000
  -   final cluster score: 0.00000000
  - memory usage efficiency: 18.75%
  -   disk usage efficiency: 73.90%
  -   vcpu usage efficiency: 100.00%
[...]
```

hroller

Introduction

When rebooting all nodes (e.g., kernel update), there are several things to take care of.

- Don't reboot primary and secondary at the same time.
    - Machine/disks might not come back after reboot.
- When doing live migration, have enough memory.
    - No two nodes with primaries, that have the same secondary.
- When fully evacuating, plan for disk space.

hroller

The Default

hroller suggests groups of nodes to be rebooted together.
By default, plan for live migration.

BASH

```bash
# hroller -L
'Node Reboot Groups'
node-00,node-10,node-20,node-30
node-01,node-11,node-21,node-31
```

Also possible to only avoid primary/secondary reboots (`--offline-maintenance`) or to plan complete node evacuation (`--full-evacuation`).

BASH

```bash
# hroller -L --full-evacuation
'Node Reboot Groups'
node-01,node-11
node-00,node-10
node-20,node-30
node-21,node-31
```

hroller

Moves

For the full evacuation, moves can also be shown (`--print-moves`). Typically, together with `--one-step-only`.

BASH

```bash
# hroller -L --full-evacuation --print-moves --one-step-only
'First Reboot Group'
node-01
node-11
  inst-00 node-00 node-20
  inst-00 node-00 node-10
  inst-10 node-10 node-21
  inst-11 node-10 node-00
```

hroller

Tags

Nodes to be considered can also be selected by tags. This allows reboots interleaved with other operations.

BASH

```
GROUP=`hroller --node-tags needsreboot --one-step-only --no-headers -L`
for node in $GROUP; do gnt-node modify -D yes $node; done
for node in $GROUP; do gnt-node migrate -f --submit $node; done
# ... wait for migrate jobs to finish
# reboot nodes in $GROUP
# verify...
for node in $GROUP; do gnt-node remove-tags $node needs-reboot; done
for node in $GROUP; do gnt-node modify -D no $node; done
hbal -L -X
```

Thank You!

Questions?

Survey at https://www.usenix.org/lisa13/training/survey