SUSE

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HA for OpenStack, from the control plane to instances

Theory

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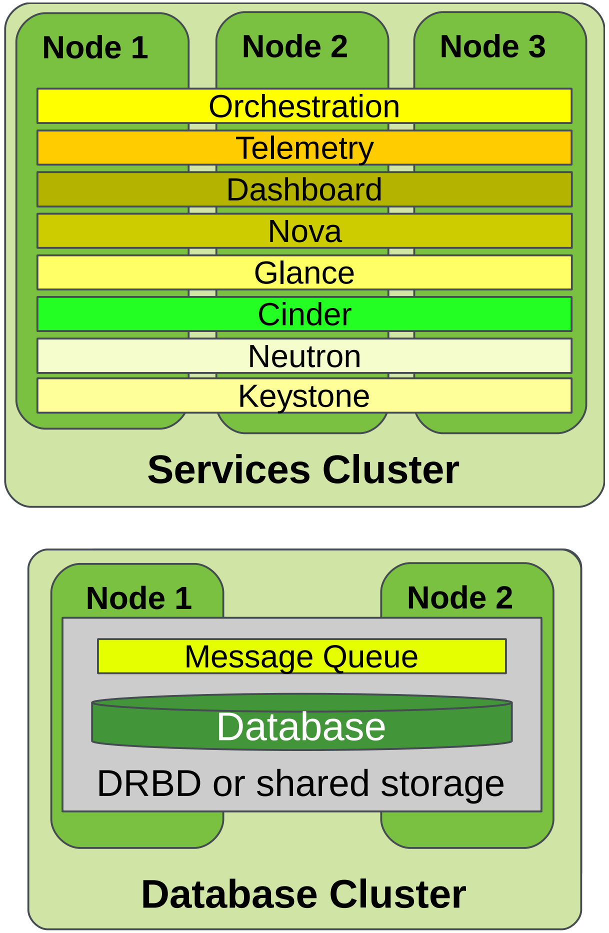
Agenda

- HA in a Typical OpenStack Cloud Today
- When do we need HA for Compute Nodes?
- Architectural Challenges
- Solution in SUSE OpenStack Cloud

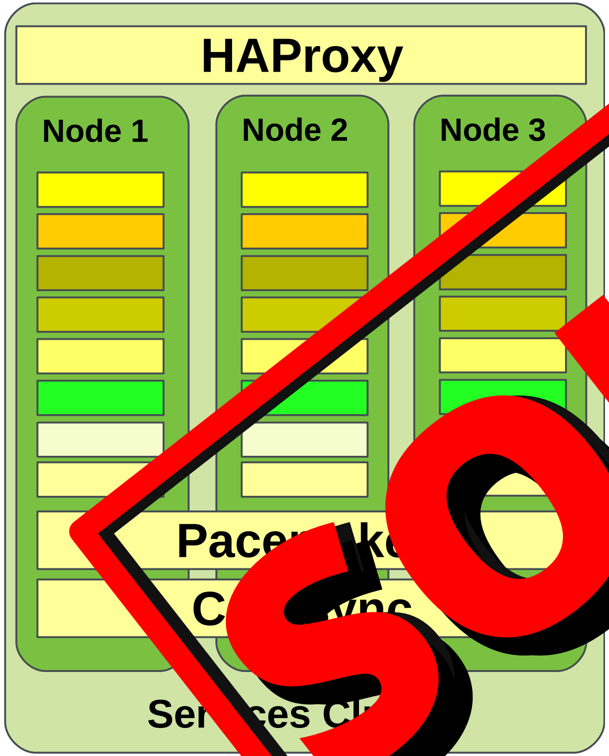
HA in OpenStack Today

Typical HA Control Plane



- Automatic restart of controller services
- Increases uptime of cloud

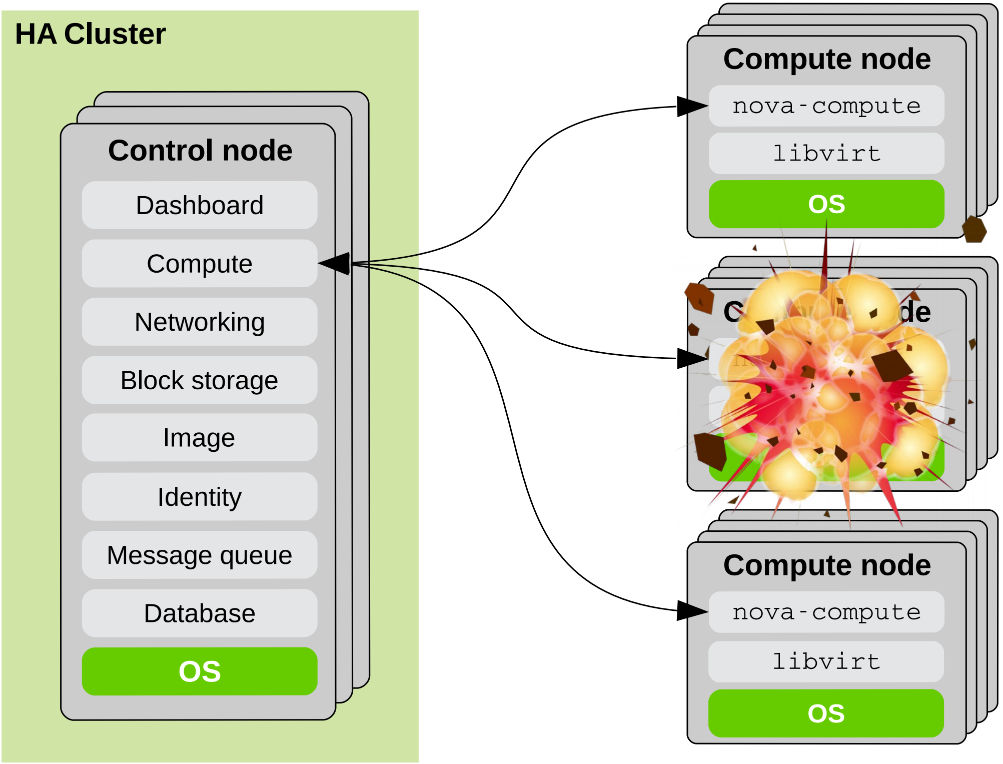
Under the Covers



- Recommended by official HA guide

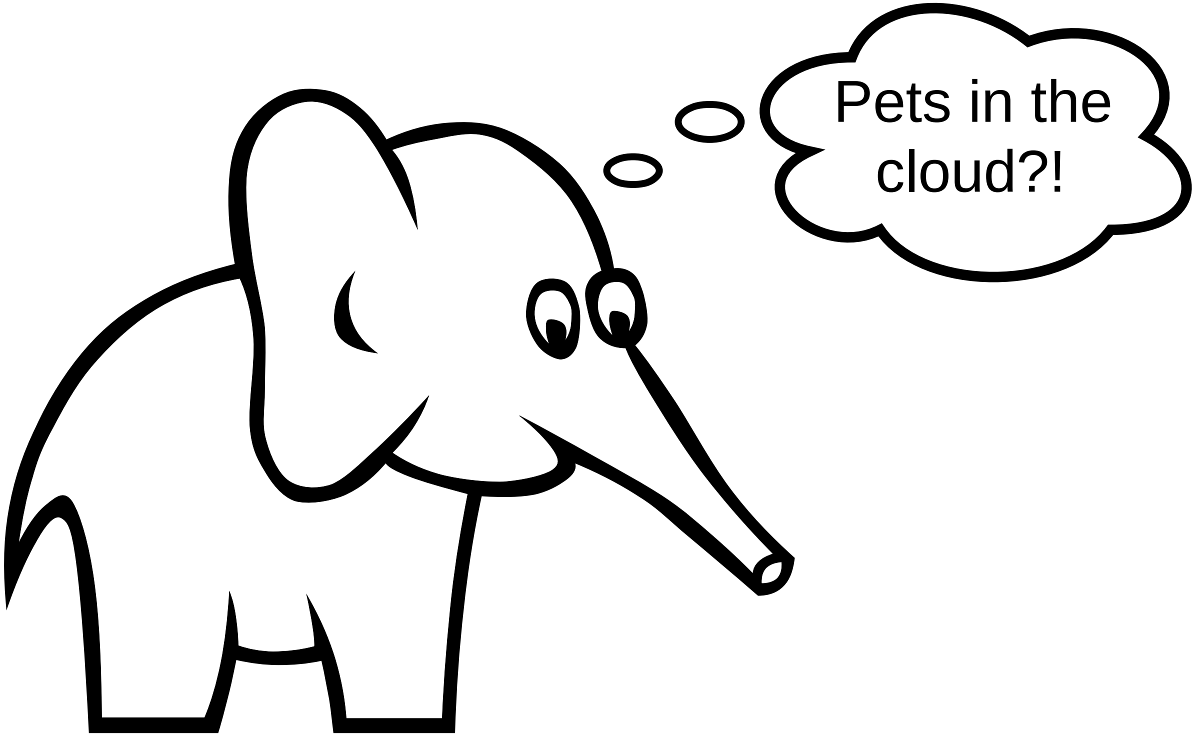
SOLVED
(mostly)

If Only the Control Plane is HA...

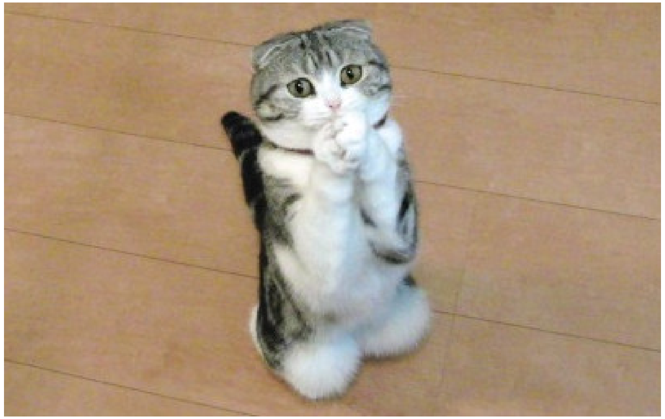


When is Compute HA important?

Addressing the White Elephant in the Room



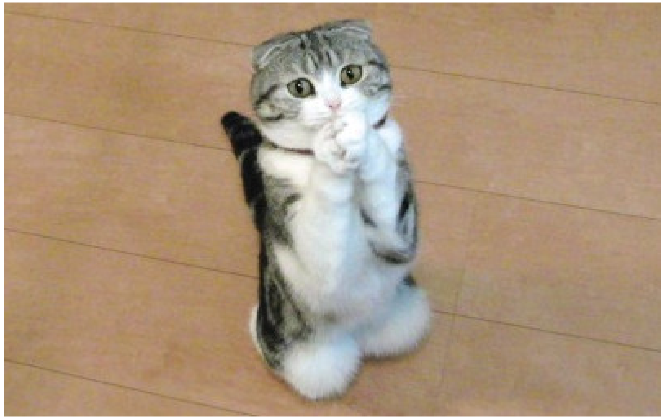
Pets vs Cattle



- Pets are given names like `mittens.mycompany.com`
- Each one is unique, lovingly hand-raised and cared for
- When they get ill, you nurse them back to health

- Cattle are given names like `vm0213.cloud.mycompany.com`
- They are almost identical to other cattle
- When one gets ill, you get another one

What does that mean in practice?



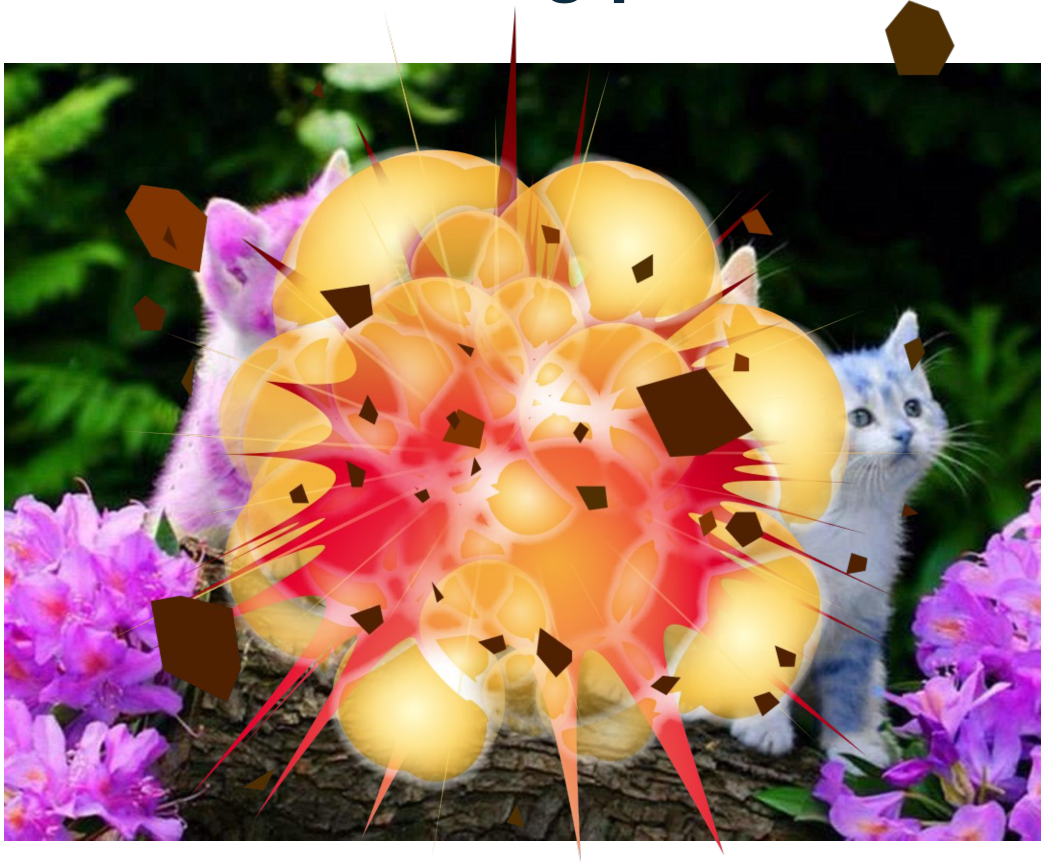
- Service downtime when a pet dies
- VM instances often stateful, with mission-critical data
- Needs automated recovery with data protection

- Service resilient to instances dying
- Stateless, or ephemeral (disposable) storage
- Already ideal for cloud … but automated recovery still needed!

If compute node is hosting cattle …

… to handle failures at scale, we need to automatically restart VMs somehow.

If compute node is hosting pets …



… we have to resurrect very carefully in order to avoid any zombie pets!

Do we really need compute HA in OpenStack?

Why?

- Compute HA needed for cattle as well as pets
- Valid reasons for running pets in OpenStack
  - Manageability benefits
  - Want to avoid multiple virtual estates
  - Too expensive to cloudify legacy workloads

☑ Yes

□ No

Architectural Challenges

Configurability

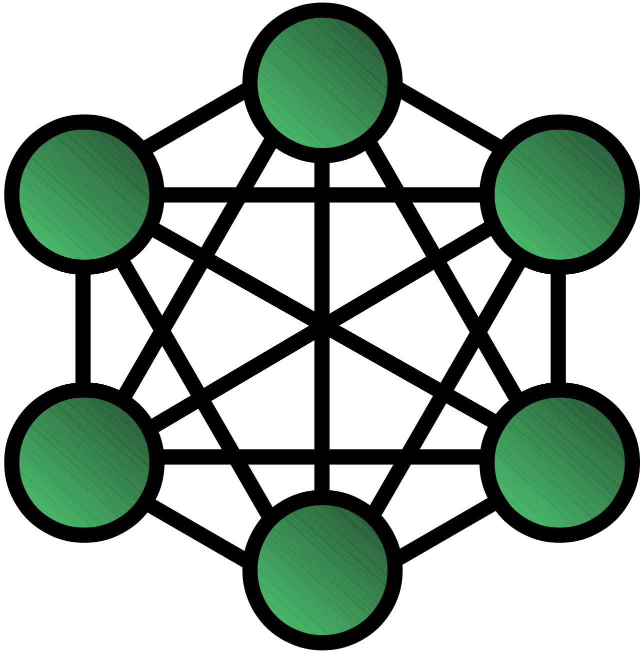
Different cloud operators will want to support different SLAs with different workflows, e.g.

- Protection for pets:
  - per availability zone?
  - per project?
  - per *pet*?
- If `nova-compute` fails, VMs are still perfectly healthy but unmanageable
  - Should they be automatically killed? Depends on the workload.

Compute Plane Needs to Scale

CERN datacenter © Torkild Retvedt CC-BY-SA 2.0

Full Mesh Clusters Don't Scale

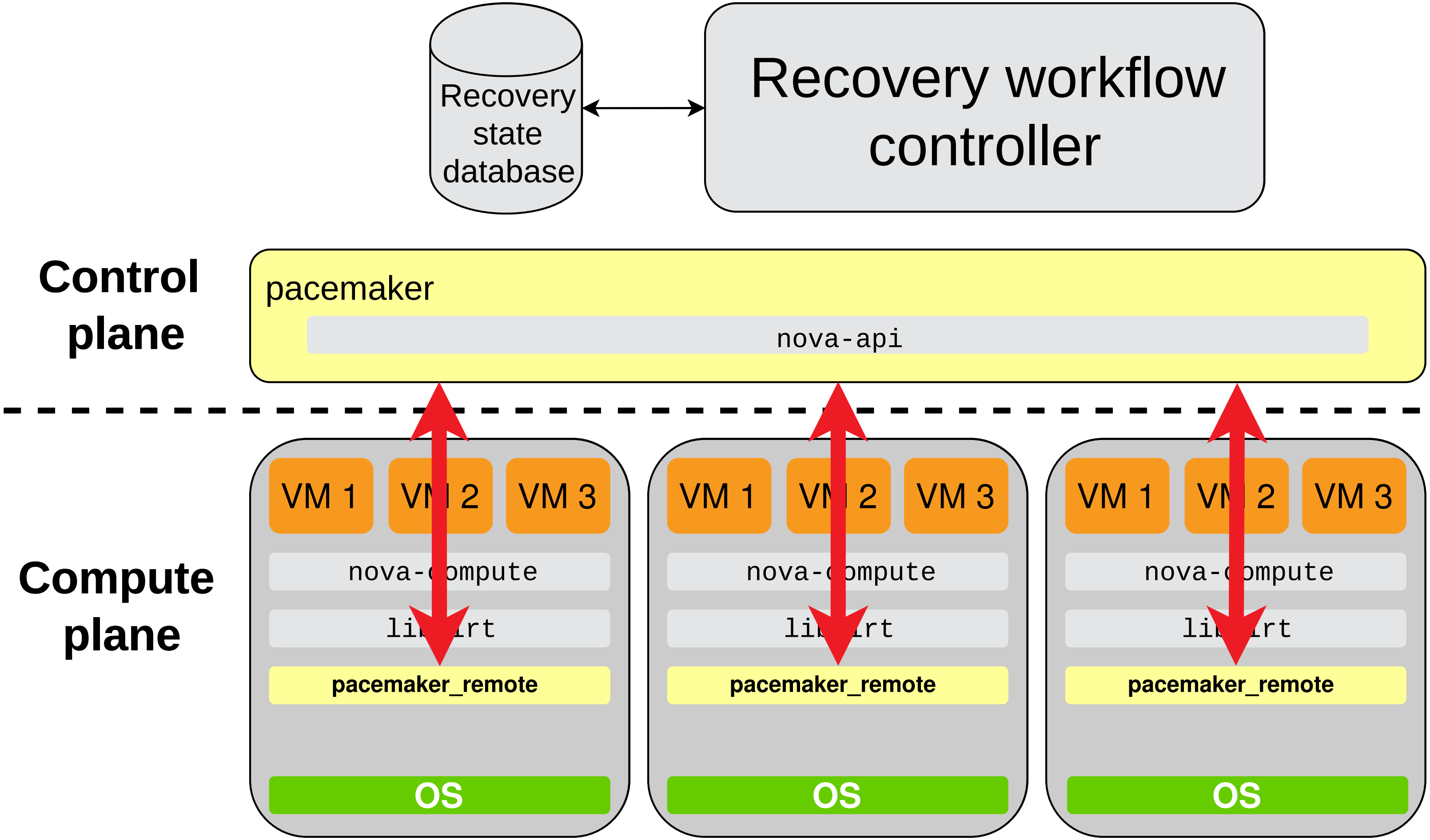


Addressing Scalability

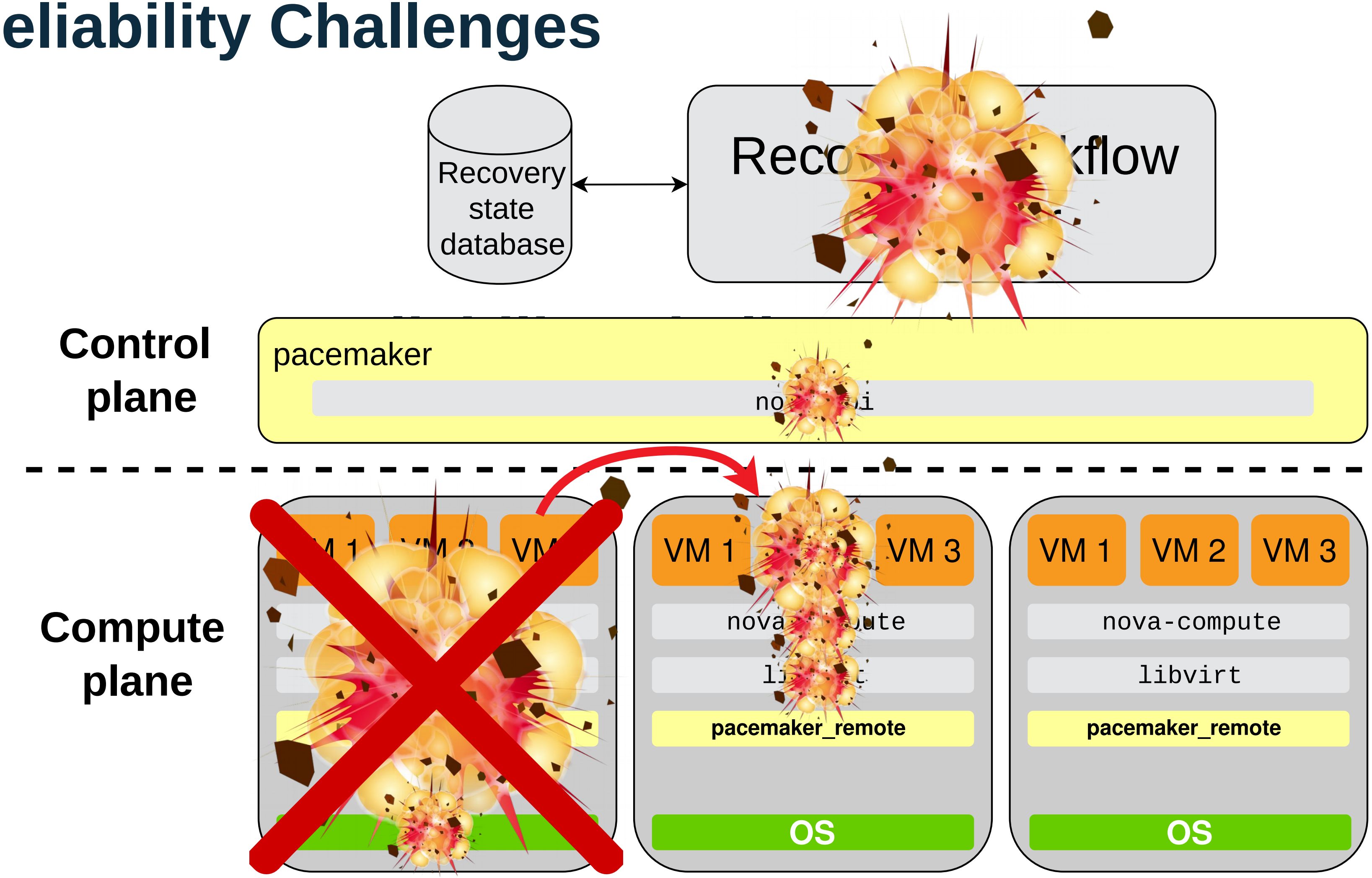
The obvious workarounds are *ugly*!

- Multiple compute clusters introduce unwanted artificial boundaries
- Clusters inside / between guest VM instances are not OS-agnostic, and require cloud users to modify guest images (installing & configuring cluster software)
- Cloud is supposed to make things easier not harder!

Common Architecture

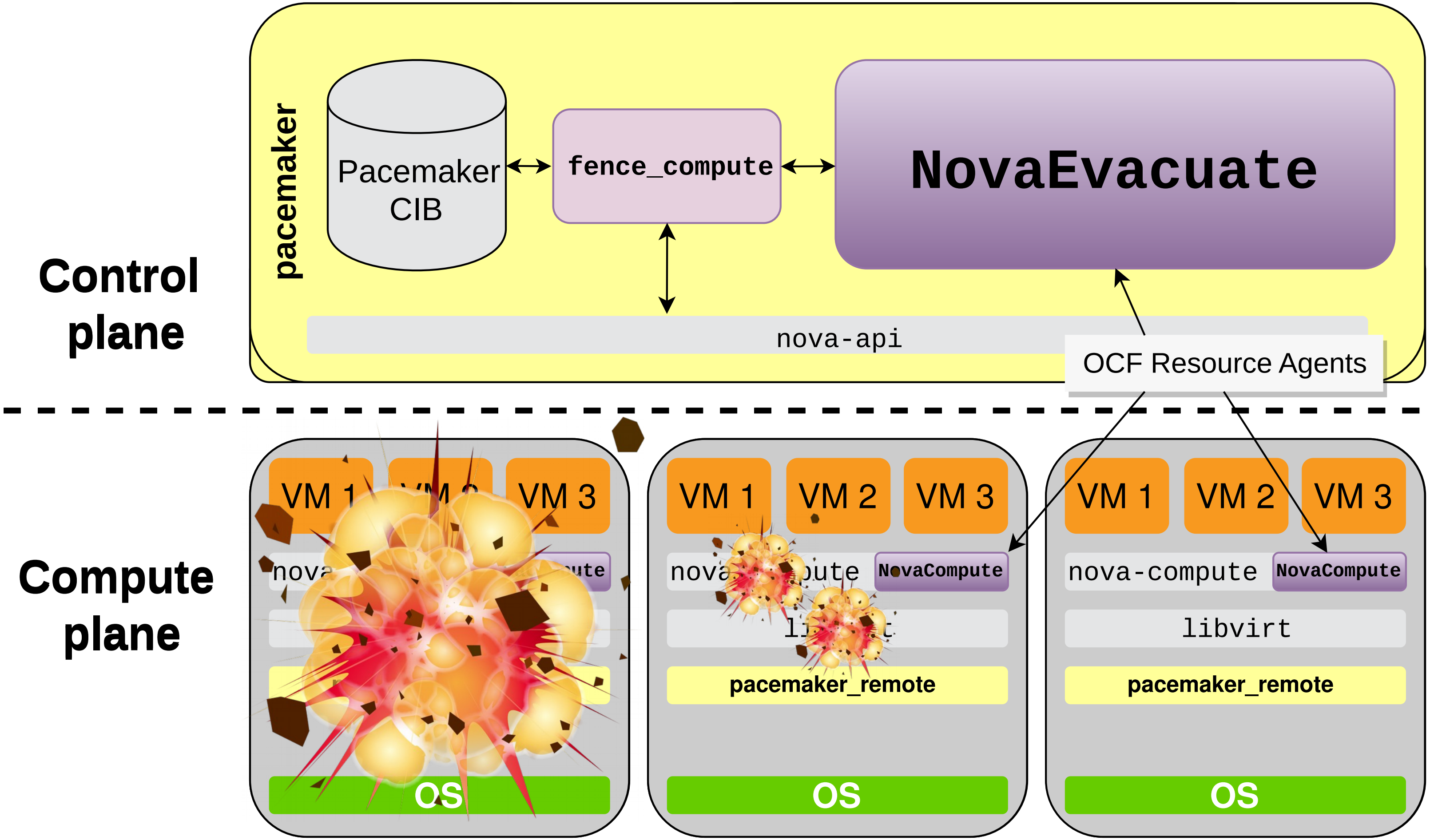


Reliability Challenges



Compute HA in SUSE OpenStack Cloud

NovaCompute / NovaEvacuate OCF Agents



`NovaCompute` / `NovaEvacuate` OCF Agents

Pros

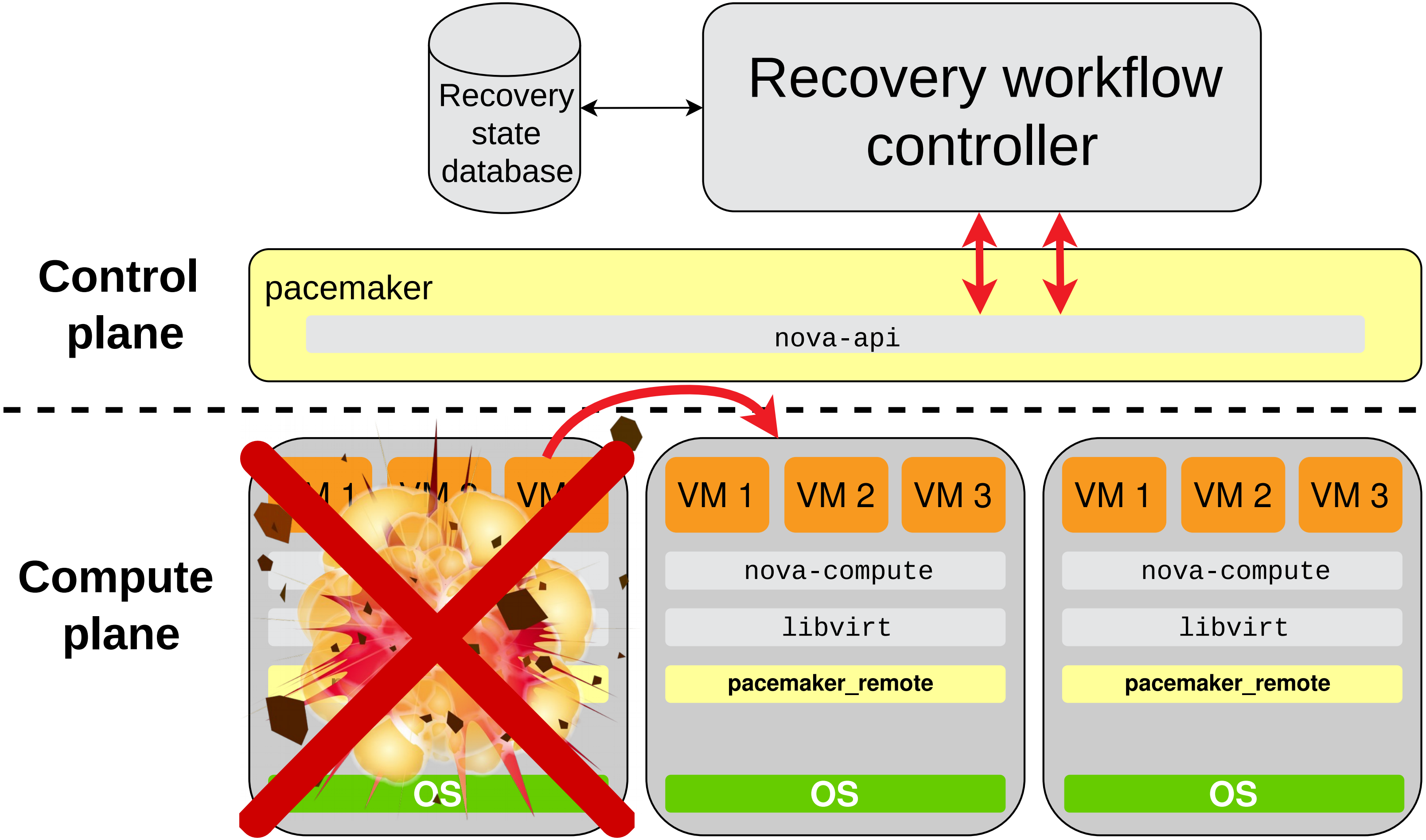
- Ready for production *now*
- Commercially supported by SUSE
- RAs upstream in openstack-resource-agents repo

Cons

- Known limitations (known bugs):
  - Only handles failure of compute node, not of VMs, or `nova-compute`
  - Some corner cases still problematic, e.g. if `nova` fails during recovery

Brief Interlude: `nova evacuate`

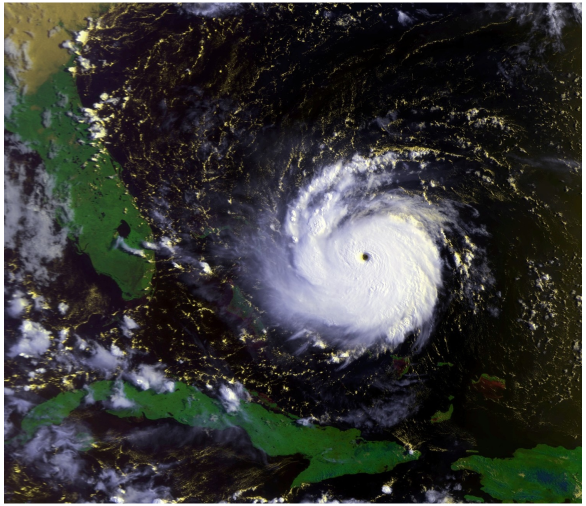
nova's Recovery API



Public Health Warning

`nova evacuate` does not really mean evacuation!

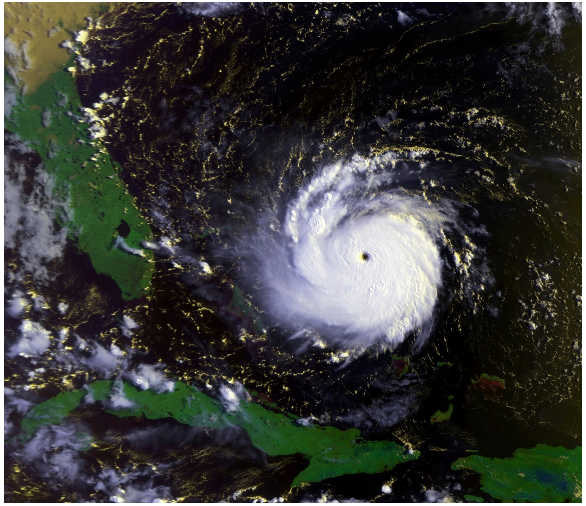
Think About Natural Disasters



Not too late to evacuate

Too late to evacuate

nova Terminology



nova live-migration

nova evacuate ?!

Public Health Warning

- In Vancouver, `nova` developers considered a rename
  - Has not happened yet
  - Due to impact, seems unlikely to happen any time soon

Whenever you see “*evacuate*” in a `nova`-related context, pretend you saw “*resurrect*”

Shared Storage

Where can we have Shared Storage?

Two key areas:

- `/var/lib/glance/images` on *controller* nodes
- `/var/lib/nova/instances` on *compute* nodes

When do we need Shared Storage?

- If `/var/lib/nova/instances` is shared:
  - VM's ephemeral disk will be preserved during recovery
- Otherwise:
  - VM disk will be lost
  - recovery will need to rebuild VM from image
- Either way, `/var/lib/glance/images` should be shared across all controllers (unless using Swift / Ceph)
  - otherwise `nova` might fail to retrieve image from `glance`

Questions?

We adapt. You succeed.