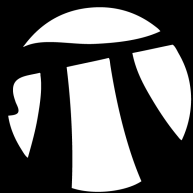


Canadians Land on Jupyter

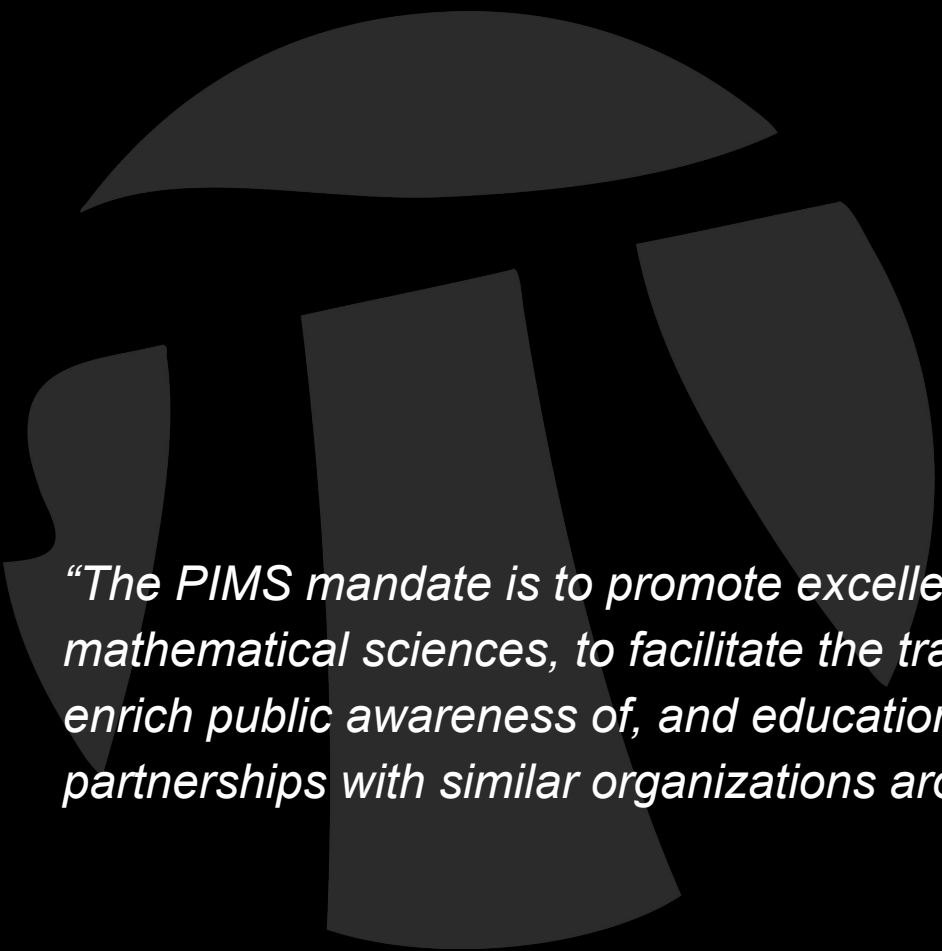
Dr. Ian Allison

Dr. James Colliander

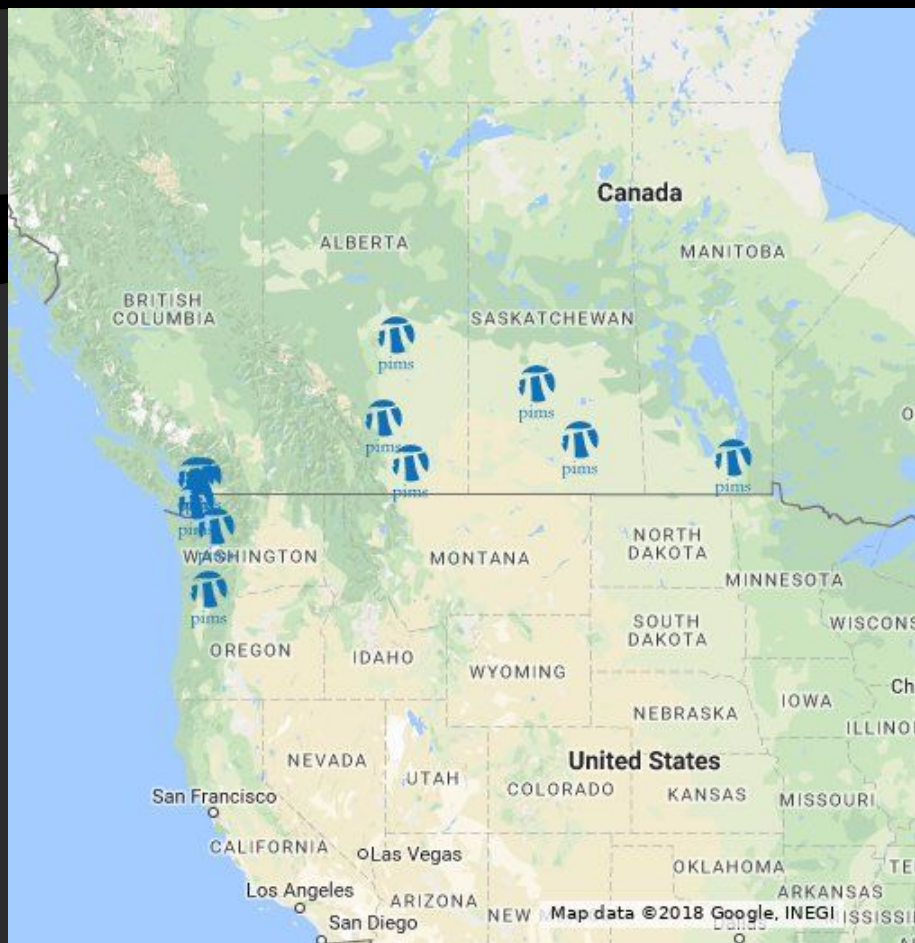


Pacific Institute *for the*
Mathematical Sciences





“The PIMS mandate is to promote excellent research and applications of the mathematical sciences, to facilitate the training of highly qualified personnel, to enrich public awareness of, and education in, mathematics, and to create partnerships with similar organizations around the world.”





How do we ensure that students and researchers have access to the tools they need?

syzygy

```
mirror_mod = modifier_ob.modifiers.new("Mirror Mod")
# Create mirror object to mirror_ob
mirror_mod.mirror_object = mirror_ob

# MIRROR_X:
mirror_mod.use_x = True
mirror_mod.use_y = False
mirror_mod.use_z = False
# MIRROR_Y:
mirror_mod.use_x = False
mirror_mod.use_y = True
mirror_mod.use_z = False
# MIRROR_Z:
mirror_mod.use_x = False
mirror_mod.use_y = False
mirror_mod.use_z = True
```

```
# Selection at the end -add back the deselected objects
mirror_ob.select= 1
mirror_ob.select=1
context.scene.objects.active = mirror_ob
# "selected" + str(modifier_ob)) # modifier object selected
mirror_ob.select = 0
# Add to syzy.context.selected_objects[0]
context.objects[one.name].select = 1

print("please select exactly two objects, else error")

OPERATOR CLASSES -----
```

```
class MirrorOperator(bpy.types.Operator):
    """Mirror object to the selected object"""
    bl_idname = "mirror_mirror_x"
    bl_label = "Mirror X"

    def execute(self, context):
        if context.active_object is not None
```

syzygy

'sizijē/ *noun* ASTRONOMY; 'sizijē/ *noun* MATHEMATICS; 'sizijē/ *noun* BIOLOGY;

'sizijē/ *noun*; A collaboration between PIMS, Cybera and Compute Canada to make institutional JupyterHub's available across Canada



computecanada

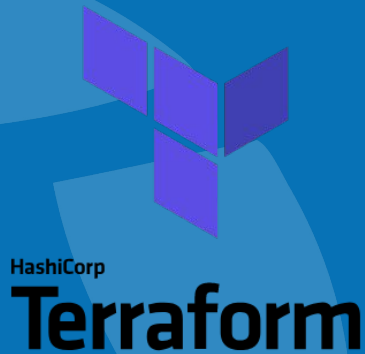
cybera

syzygy: Design Goals



GitHub

- *Super simple access*
- *Automate and minimize admin*
- *Be hardware agnostic*
- *Partition resources*
- *Share everything!*



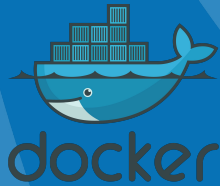
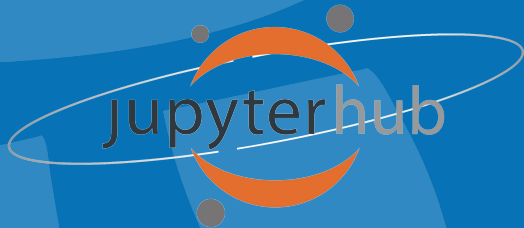
Terraform - *Infrastructure as code*



ANSIBLE

Ansible - *Simple IT Automation*

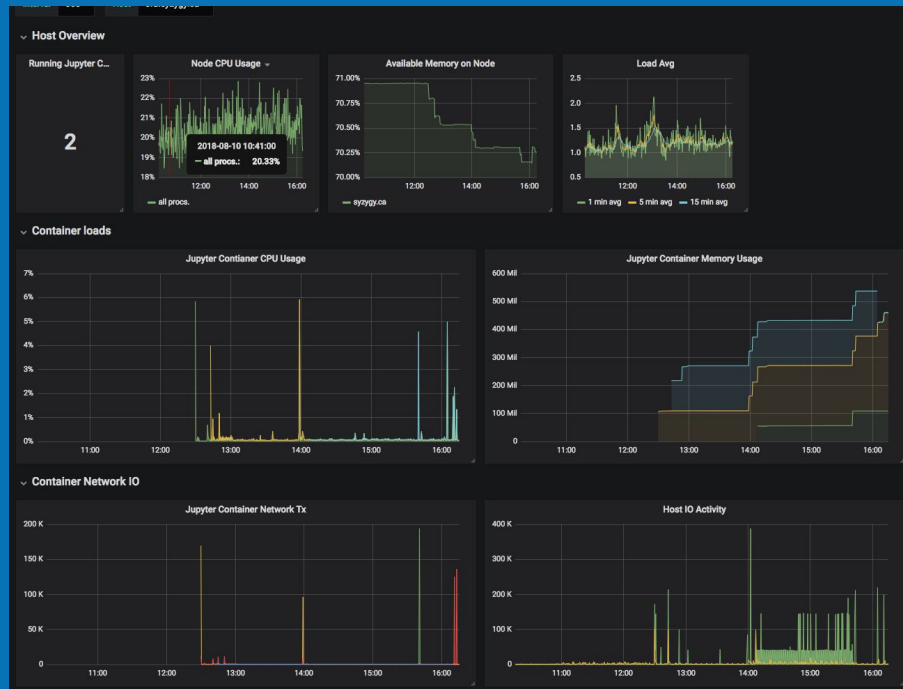
syzygy - The Moving parts



ZFS

- *JupyterHub*
- *Shibboleth*
- *DockerSpawner*
- *ZFS, dehydrated, ...*

Monitoring: Prometheus & Grafana



syzygy Today

```
mirror_mod = modifier_ob.modifiers.new("mirror_mod")
# Create mirror object to mirror_ob
mirror_mod.mirror_object = mirror_ob

# operation == "MIRROR_X":
mirror_mod.use_x = True
mirror_mod.use_y = False
mirror_mod.use_z = False
# operation == "MIRROR_Y":
mirror_mod.use_x = False
mirror_mod.use_y = True
mirror_mod.use_z = False
# operation == "MIRROR_Z":
mirror_mod.use_x = False
mirror_mod.use_y = False
mirror_mod.use_z = True
```

```
# Selection at the end -add back the deselected objects
mirror_ob.select= 1
for one in context.objects.active:
    one.select=1
context.objects.active = modifier_ob
# modifier_ob.select= 0
mirror_ob.select= 0
# Add to key.context.selected_objects[0]
key.context.objects[one.name].select = 1

print("please select exactly two objects,")
```

OPERATOR CLASSES -----

```
class MirrorOperator(Operator):
    """Mirror object to the selected object"""
    bl_label = "Mirror"
    bl_options = {'PRESET'}
    mirror_mirror_x = False
```

```
def execute(self, context):
    """Mirror object to the selected object"""
    if context.active_object is not None
```

By the Numbers

- *19 Hubs; 14 universities + “others”*
- *3 clouds + some metal*
- *~8000 users (400,000 have access)*
- *5 TB of Disk used (/home + docker)*
- *567 GB of memory*
- *124 CPU cores*

Testimonials

“Syzygy gives my students access to modern, cloud-based computing in a format that feels natural to them, even those unfamiliar with computing.”

“[Jupyter] matches the expectations and needs of students in many disciplines working with data to build arguments.”

- Meghan Allen & Steve Wolfman, CS103

Testimonials

“In 2017 and 2018, I co-hosted the BC Data Science Workshop, featuring an array of student teams collaborating with their respective industry mentors ... Using syzygy and JupyterHub as the interface for the participants streamlined both their experience and ours. The configuration was painless and allowed us to minimize the number of moving parts with which students needed to be familiarized”

- Aaron Berk, PhD student, Organizer: BCdata workshop

Testimonials

“I estimate the number of hours students are engaged with software and data has increased 10-fold. Syzygy has removed significant barriers to entry for math students pursuing careers in data and computation.”

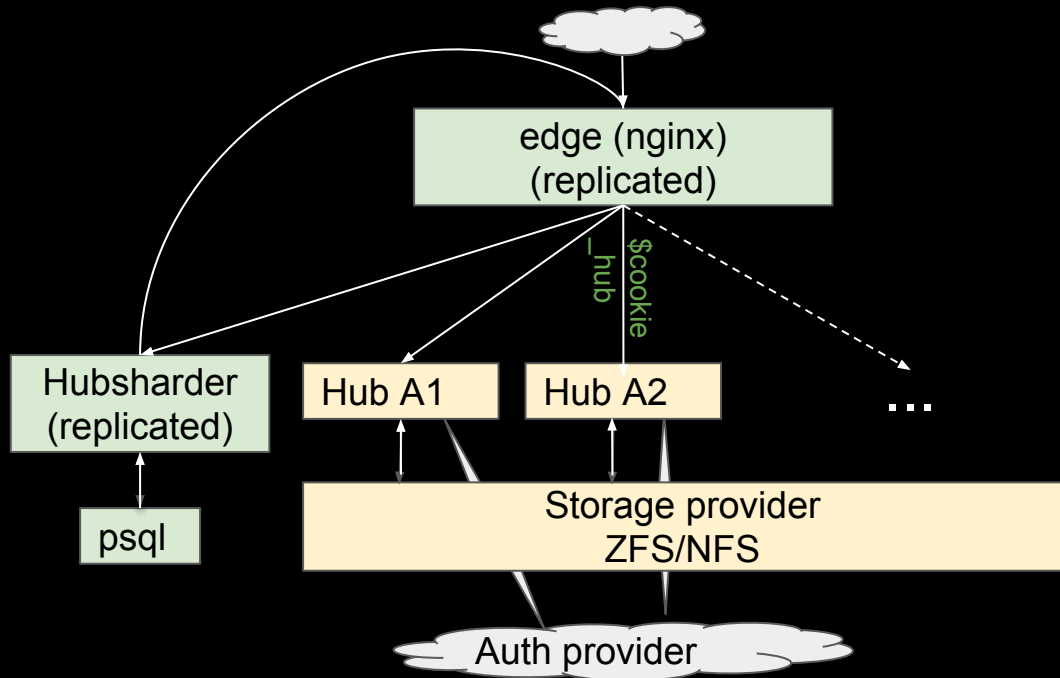
- Patrick Walls, S^3 + Math 210 Introduction to Mathematical Computing

syzygy Tomorrow

Plans - Technical

How many users can a Hub handle?

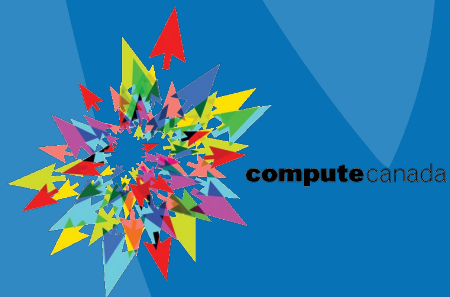
*What about $10 * N$, $100 * N$, ... ?*



Plans - Community

- *More syzygy hubs!*
- *Teaching and Research*
- *Social Collaboration Structures*
 - *Workshops*
 - *University-Industry*
 - *University-Government*

Félix-Antoine Fortin



- *Compute Canada Clusters*
- *github.com/cmd-ntrf/jupyter-lmod + CVMFS*
- *Clusters cloud-init*
- *Cloud-init deployments; Workshops*

Effort > Expertise

- Most of this is implementation not development
- There's a huge appetite for that implementation!

Canadians Have Landed on Jupyter.





Callysto

A stylized orange smiley face is centered on a black background. The face is composed of two thick orange curved lines forming the upper and lower arcs. Four small gray dots are positioned around the face: two at the top (left and right) and two at the bottom (left and right).

Thank You