• Supports research into Earth's cryosphere
• Manages and distributes scientific data
• Creates tools for data access
• Supports data users
• Performs scientific research
• Performs public education and outreach
• Distributes more than 500 cryospheric data sets
ABOUT US

- One of Several NSIDC Development Teams
- Dataset Production
- Visualizations
- Dataset Access
- Python
- JavaScript
- A Bit of Ruby
- We are hiring!
- Have we mentioned we're hiring?
THE CHALLENGE
YEAH, WE'RE GONNA NEED YOU TO CREATE A SITE REAL QUICK.

THAT'D BE GREAT
ARCTIC CHANGE

- Showcase Remote Sensing Datasets
- Focus on the Arctic Region
- Long Time-Series Datasets
- Accessible to Non-Specialists
THE RESULT

Satellite Observations of Arctic Change
VIRTUAL MACHINES:
OVERVIEW
WHYYYY?!?!
WHAT IF I TOLD YOU
YOU COULD RUN A MACHINE ON YOUR MACHINE?
ISOLATION OF APPLICATION

- From resource contention
- From server failures
- From maintenance
- From people failures
DEVELOPER CONTROL

- Different version of commonly installed software
- Uncommon/specialty software
- Quick turnaround... as long as devs can figure it out
- Less hassle for sys admins... as long as devs can figure it out
SAME ENVIRONMENT EVERYWHERE

EVERYWHERE = \{\text{LOCAL, INTEGRATION, STAGING, QA, BLUE}\}
VAGRANT AND VIRTUALBOX
VAGRANT USES VIRTUALBOX OUT OF THE BOX

VIRTUALBOX PROVIDES VIRTUAL MACHINES

VMWARE, AWS, HYPER-V PROVIDE VIRTUAL MACHINES

VAGRANT USES THESE AND MORE AS PLUGINS
EXAMPLE. LET’S:

- Define a VM
- Create and run a VM
- Login to the VM
- Stop the VM
PUPPET
ONE DOES NOT SIMPLY INSTALL THINGS AT THE COMMAND LINE.
WHY DO I NEED A PUPPET?

- AUTOMATION!
- Create users, directories, etc
- Install packages (apt-get install)
- Ensure things are running
- Declarative
BEST OF ALL

Vagrant can tell Puppet to provision the box after it's been created
EXAMPLE. LET’S:

- Install nginx
- Make sure it's running
FABRIC
WHAT’S FABRIC?

Fabric is a simple, Pythonic tool for remote execution and deployment.
WHAT DO WE USE IT FOR?

- Deploy our application to the target machine(s)
  
  > fab deploy_application HOSTNAME

- Make sure it's restarted / running

  > fab restart_application HOSTNAME
FABRIC HAS TWO MAIN PARTS:

- Define tasks
- Run remote commands
EXAMPLE USAGE:

```python
@task
def deploy():
    undeploy()

    sudo('mkdir -p /var/www/maps-of-arctic-change')
    sudo('chown -R vagrant:vagrant /var/www/maps-of-arctic-change')

    rsync_project(local_dir=os.path.join(PROJECT_DIR, 'dist/mac'),
                  remote_dir='/var/www/maps-of-arctic-change')

    restart_gunicorn()
```
OTHER ALTERNATIVES

- Puppet!
- Capistrano (Ruby on Rails)
- Language / Platform Specific Tools
VAGRANT + VSHERE
Build your own private cloud.
vSphere is just another vagrant provider

PLEASE SIR...

MAY I HAVE A VM

meme-generator.net
vSphere runs VMs in the datacenter

(actual NSIDC datacenter pictured)
THINGS YOU WILL NEED:

- vagrant-vsphere plugin (available on github)
- server hostname for vSphere API
- username and password for vSphere
- RSA key for vagrant user in vSphere template
WHAT ELSE DOES VSPHERE DO?

- provides load balancing and failover
- scales horizontally across physical machines
- provides templates for new VMs
- manages names and IP addresses
ONE LAST THING...

ALMOST...

...THERE
DYNECT : CLOUD DNS

apps.nsiddc.org

- puts applications in their own sub-domain
- provides a rich DNS management API
- can be integrated with vSphere
- allows teams to create DNS aliases
- enables blue / green deployment
BLUE / GREEN DEPLOYMENT

Follow the VM!
ACTUALLY, WE DO IT LIKE THIS:

- Users connect to `soac.apps.nsidc.org`.
- Dev team accesses `blue.soac.apps.nsidc.org`.
- Operations access `red.soac.apps.nsidc.org`.

This diagram illustrates the flow of users and teams accessing specific domains and virtual machines.
VIRTUAL GOODNESS WITH VIRTUAL MACHINES