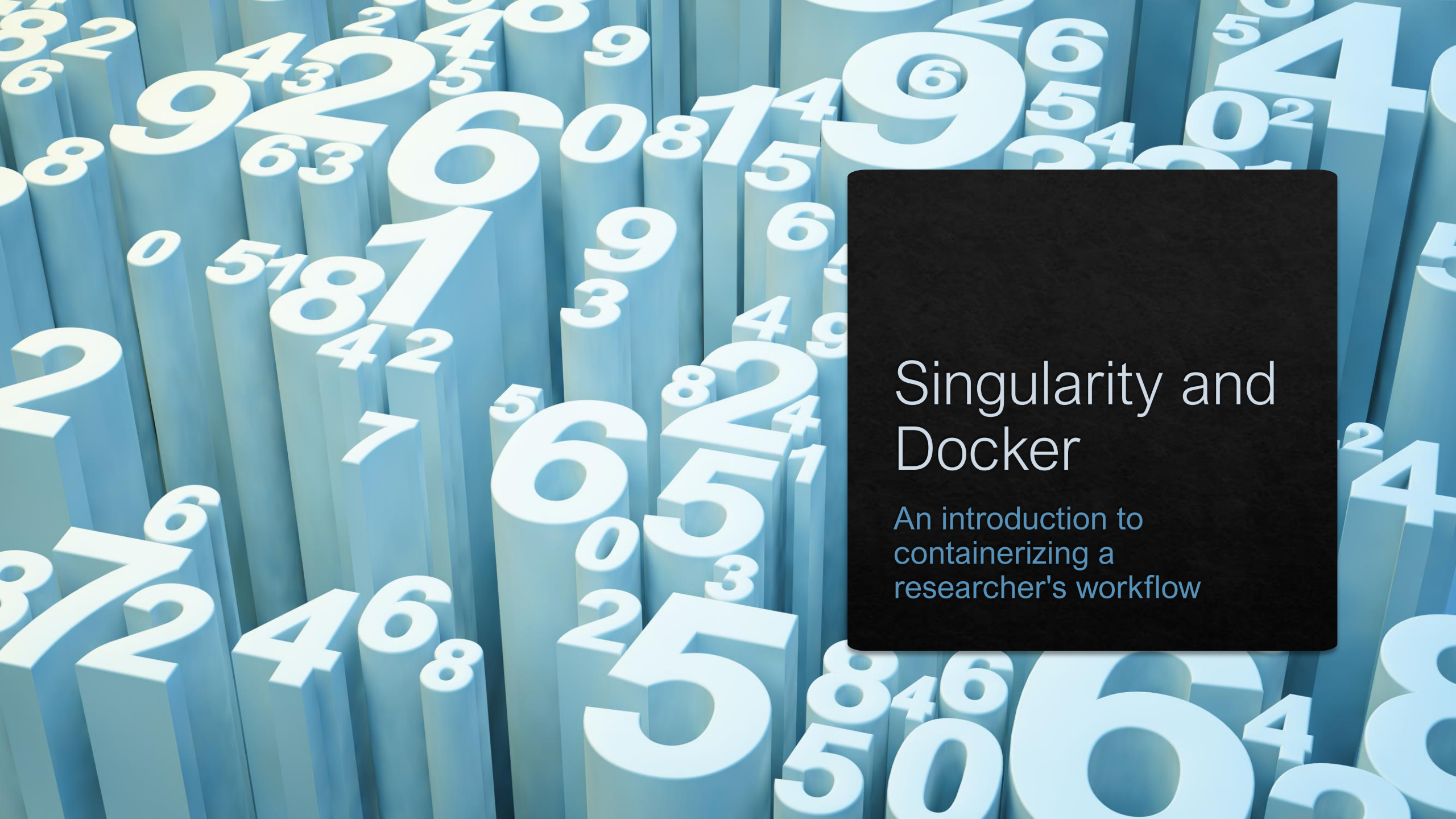

Singularity and Docker

An introduction to containerizing a researcher's workflow

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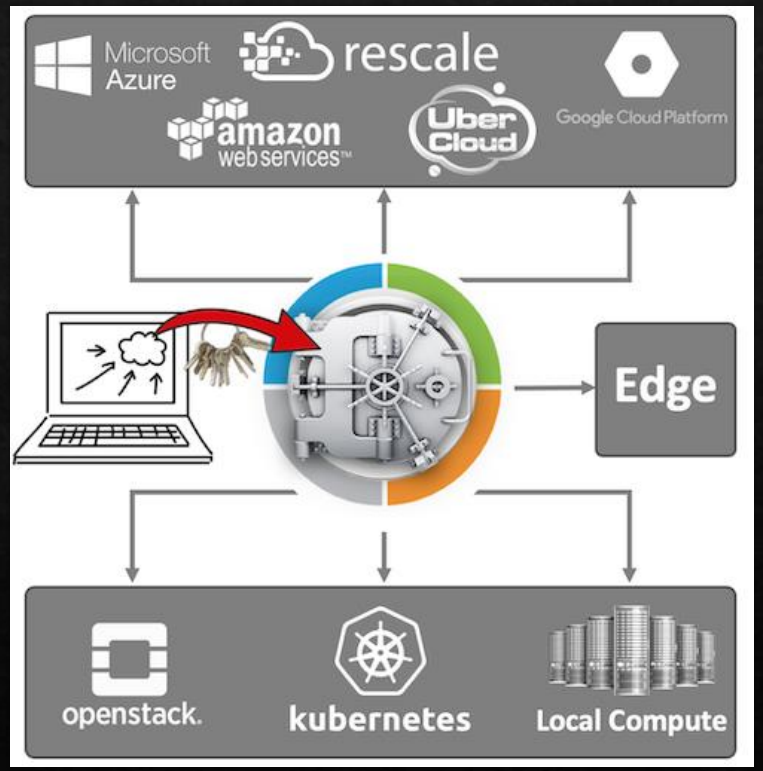
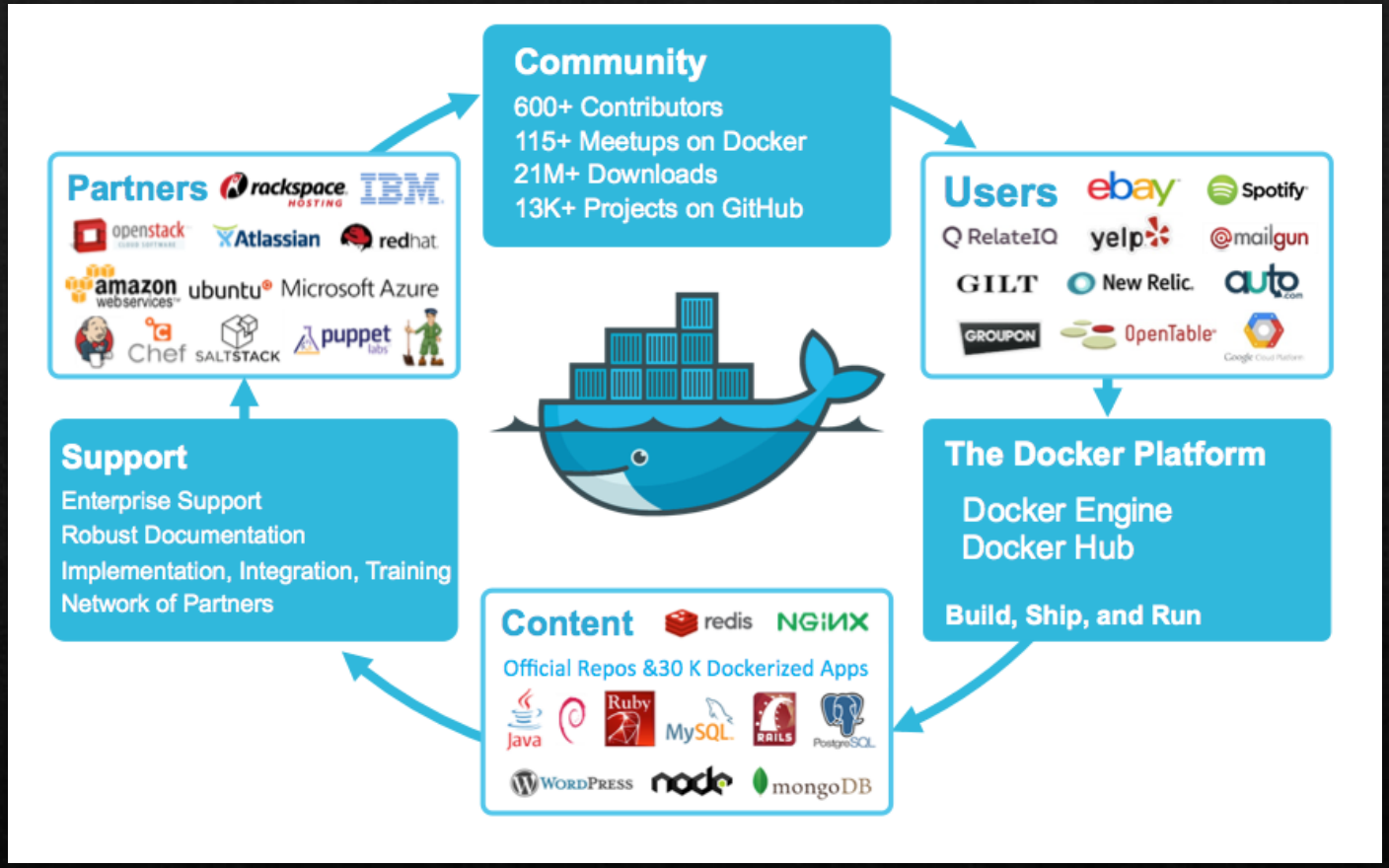
What is Singularity?

- The gold-standard for containerization on HPC clusters
- Preferred choice for mission-critical workflows — Used in aerospace, oil and gas, and biotechnology industries
- Security first mindset — No one is hacking you!
- Extremely portable — Can run in any environment that has singularity RE installed



What is Docker?

- Another popular, ubiquitous containerization software
- Heavily used in the tech industry
  - Kubernetes anyone?
- Extremely adaptable to any kind of workflow
- Cross-Platform
  - Works on Linux, MacOS, and Windows



The Pros and Cons of Singularity

The Pros ☺

- Uber secure
  - Singularity containers are read-only
- Space efficient
  - Containers are compressed to conserve available storage space
- Installed on Roar
- Can easily manage system-level dependencies
- Interoperable with Docker

The Cons ☹

- Only supports static environments
- Only available for use on Linux
  - Need to use a work-around to build containers on Windows and Mac
- User community isn’t as large as compared to Docker
  - Finding support can be a little difficult

The Pros and Cons of Docker

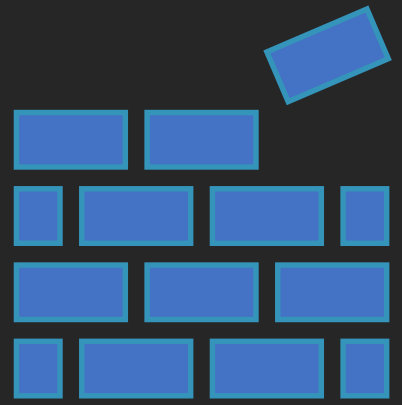
The Pros ☺

- Ubiquitous, virtually used everywhere
- Cached builds
  - Start from where you left off if build fails
- Support dynamic environments
- Can modify containers after being built from images
- Multithread container downloads and uploads

The Cons ☹

- Not installed on the cluster
- Security is managed by user, not built-in
  - Container security has become an entire industry because of Docker
- Not resource conscious
  - Bloated containers

Interactive Example Time



Set up your build environment!

- Open the terminal on your computer
- Create directory titled **VMs**
- Change into **VMs** directory and create **SINGULARITY** directory
- In **SINGULARITY** directory, enter the following commands:
  - `vagrant init sylabs/singularity-3.5-centos-7-64 --box-version 20191206.0.0`
  - `vagrant up`

Time to build your container!

- Use the following commands:
  - `vagrant ssh`
  - `git clone https://github.com/NucciTheBoss/iask_onboarding_spring_2021.git`
  - `cd iask_onboarding_spring_2021/day_2`
  - `sudo singularity build image.sif R-4.0.3-rstudio.def`
    - sudo password is “**vagrant**”
- Now we wait!


Demonstration!

Where should you go from here?

- Feel free to play around with my repository:
  - https://github.com/NucciTheBoss/iask_onboarding_spring_2021
- Experience is the greatest teacher!
  - Create your own containers
  - Play around with containers we already created
- Ask for help!
  - Will, Justin Petucci, and I use Singularity all the time
  - Add me as a collaborator on a git repository!
    - I can provide input if you need help!


"That's all Folks!"