An Interactive Science Platform in CANFAR (P5-11)

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Reproducible Science in Arcade

For a number of years, CANFAR has offered virtual machines (VMs) as a way to do both interactive computing and batch processing in the cloud. A VM is a general and flexible base offering that can suit nearly any given astronomy compute project, but demands of users a thorough understanding of the intricacies of software installation and maintenance, and requires significant effort to achieve initial benefits. Arcade is an effort by the Canadian Astronomy Data Centre (CADC) to offer the CANFAR community an astronomy-focussed, easier-to-use, and more intuitive science platform for conducting reproducible science.
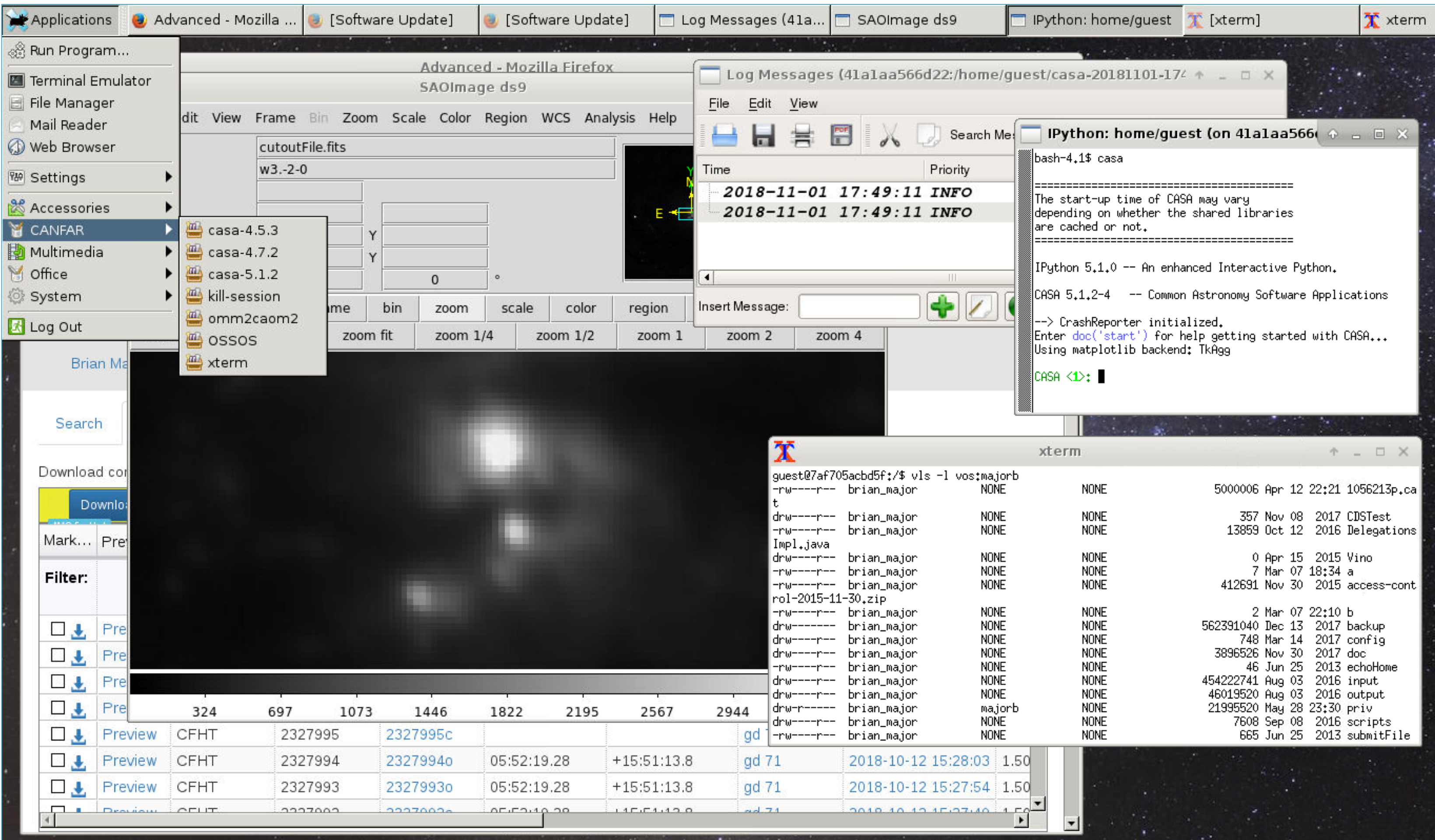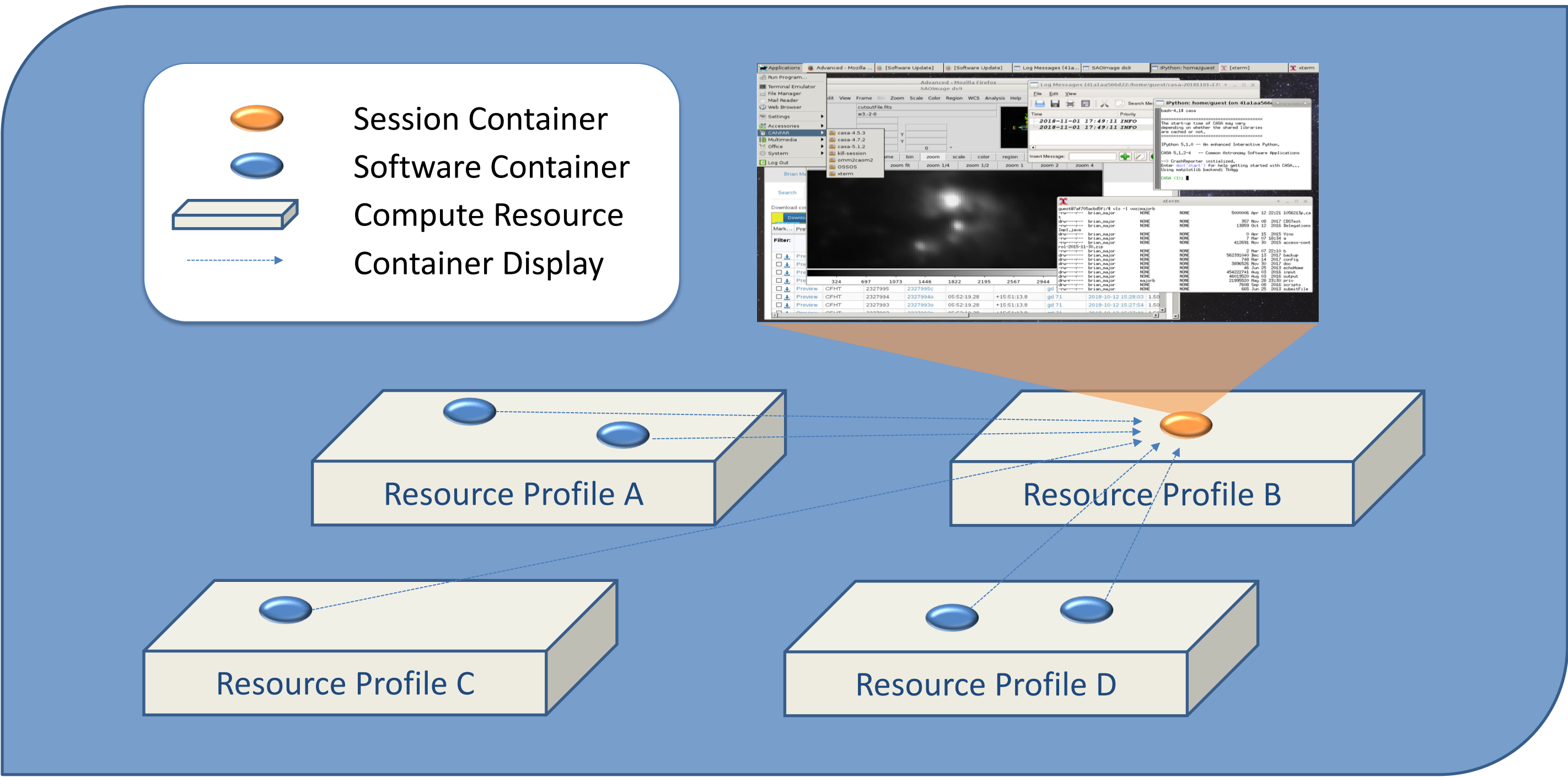

Arcade Session

The Arcade NoVNC session is a place where the display from various software containers is shown. Here we have an instance of CASA running, an instance of DS9, a terminal listing a VOSpace directory, and a browser being used to query for data products. The session menu also provides a convenient menu for launching the currently available software containers.

Problems and Challenges

- Combining software from two different containers in a python program
- Dealing with software container maintenance and curation
- A performant, distributed file system across a Kubernetes cluster?
- How to best leverage existing open source projects and developments?

The Future for Arcade

- Moving to Kubernetes (next)
- Containers to run on the hardware and resources that are most appropriate for the container
- Add different types of *sessions*, such as JutyperLab notebooks
- Promote a container for *batch execution,* directly from a session
- Users can save modified software containers?
- Integrate CADC Cavern VOSpace implementation (data & metadata all represented through POSIX)
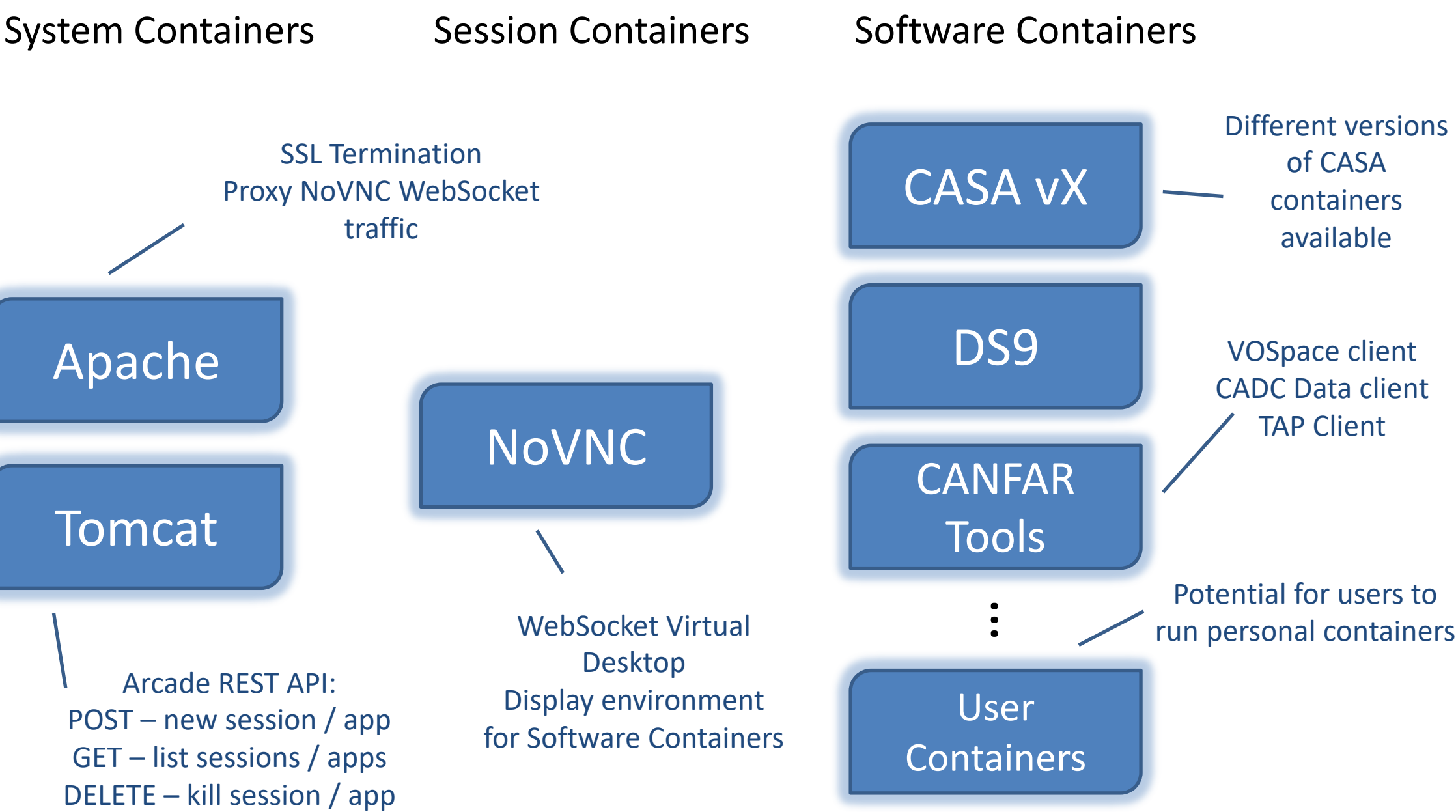

Containers run on Optimal Compute Resource Profiles
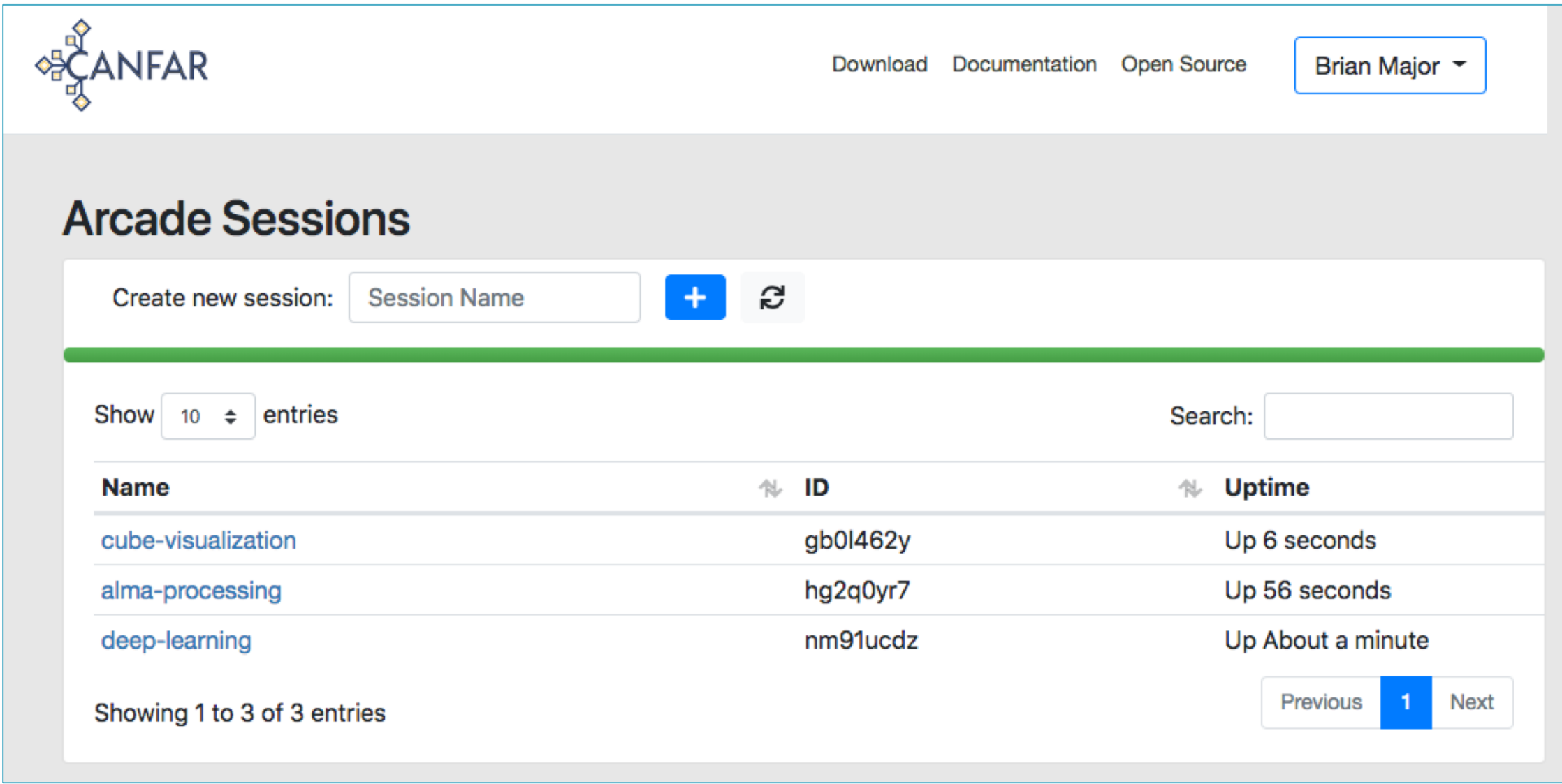
Arcade Landing Page

The Arcade landing page displays the list of sessions the user (who is logged in) has open. This page uses the Arcade REST API to display, create, manage, and connect to Arcade session containers.

Everything is a Container

There are three levels of Docker containers in the Arcade system. *System Containers* operate the Arcade system and make available the Arcade REST API. *Session Containers* are the landing place for the suite of *Software Containers.* Currently, there is only one type of Session Container: NoVNC . The NoVNC container is used to show the display of the set of Software Containers, and gives users a number of ways to interact with the Arcade API. Software Containers are small, specialized components intended to perform specific tasks.
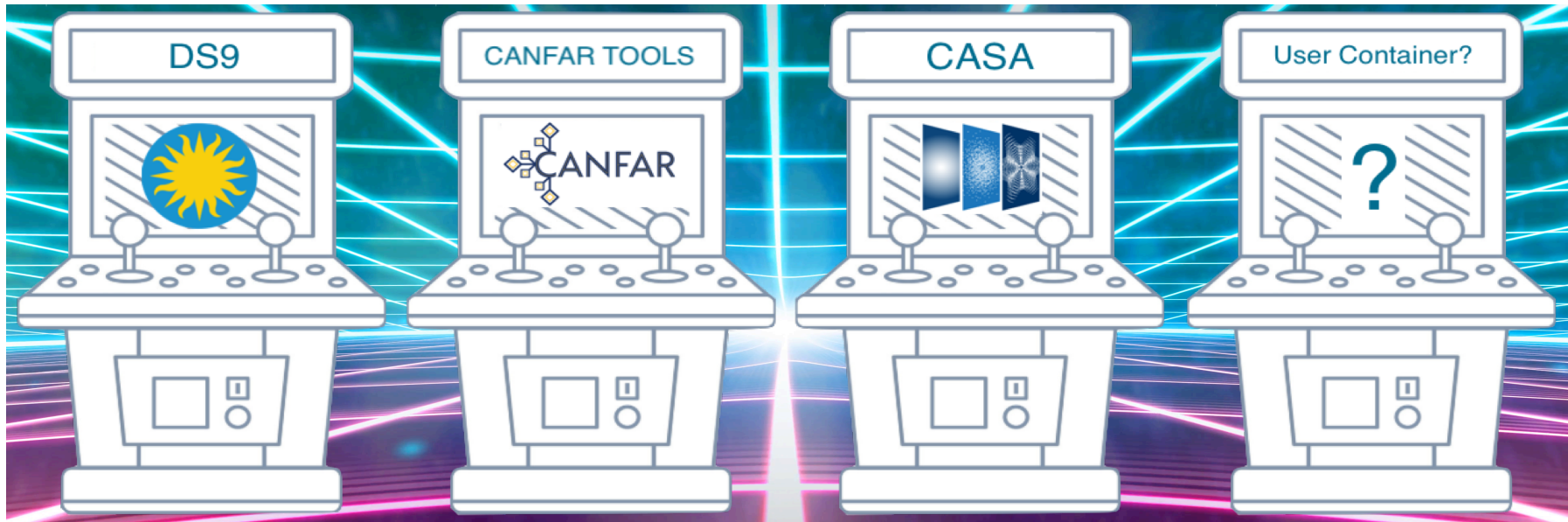
Shared $HOME, Shared Credentials

Each container that is launched has common characteristics. The $HOME directory, and the $SCRATCH directory are the same, providing a means for sharing data between containers. Each container is also loaded with the user's credentials (in the form of a proxy certificate) that can be used to access any service requiring authentication.

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