

# Data Access for Astronomical Surveys

A brief description and demo of tools @ DESDM

DES Collaboration Phone Call

Matias Carrasco Kind @ NCSA/UIUC

# Introduction



- **DES : Gold (Data) Mine**
- **Excellent Job at mining the data**
- **Consumer outside the mine**
- **Need to bring gold (data) outside**
- **Tools and interfaces**
- **Getting ready for Y3!**

# Outline

- **easyaccess**
- **DESDM stats**
- **DES Labs**
- **JupyterHub + DESDM**
- **DES cutout services**
- **DES Science Portal**
- **Conclusions**

# easyaccess



DARK ENERGY SURVEY  
DATA MANAGEMENT

```
easyaccess 1.3.1. The DESDM Database shell.  
* Type 'help' or '?' to list commands. *
```

```
DESDB ~> █
```

# Motivations

- DES DB in Oracle
- Needed upgrade from older versions (trivialaccess)
- ☰ ○ **Enhanced SQL command line interpreter**  
Matias Carrasco Kind @ NCSA DES Coll. by Matti in Phone Call, September 12th, 2016
- Astronomically friendly
- Python API, web interface
- There are many other clients but needed one standard for beginners

# Some cool features 😊

- History of commands
- Smart TAB auto-completion of commands, columns, users, tables and path
- Very flexible configuration
- Completely open source and written in python
- Write tables in csv, tab, fits and hdf5 formats
- Load sql queries directly from a file
- Load table directly in to DB in one step, no memory issues
- Can be imported as python module (py2/py3)
- Tables are handled and displayed using pandas
- Can run python functions inside query (beta)
- Many more...



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# Installation

Making things even easier

- Clone it from [github](#)
- Using pip or easy\_install
- Using EUPS @ DESDM
- Pre-installed in Docker Image (and run outside the container)
- **New!** Install with [conda](#)

```
conda install easyaccess -c mgckind
```

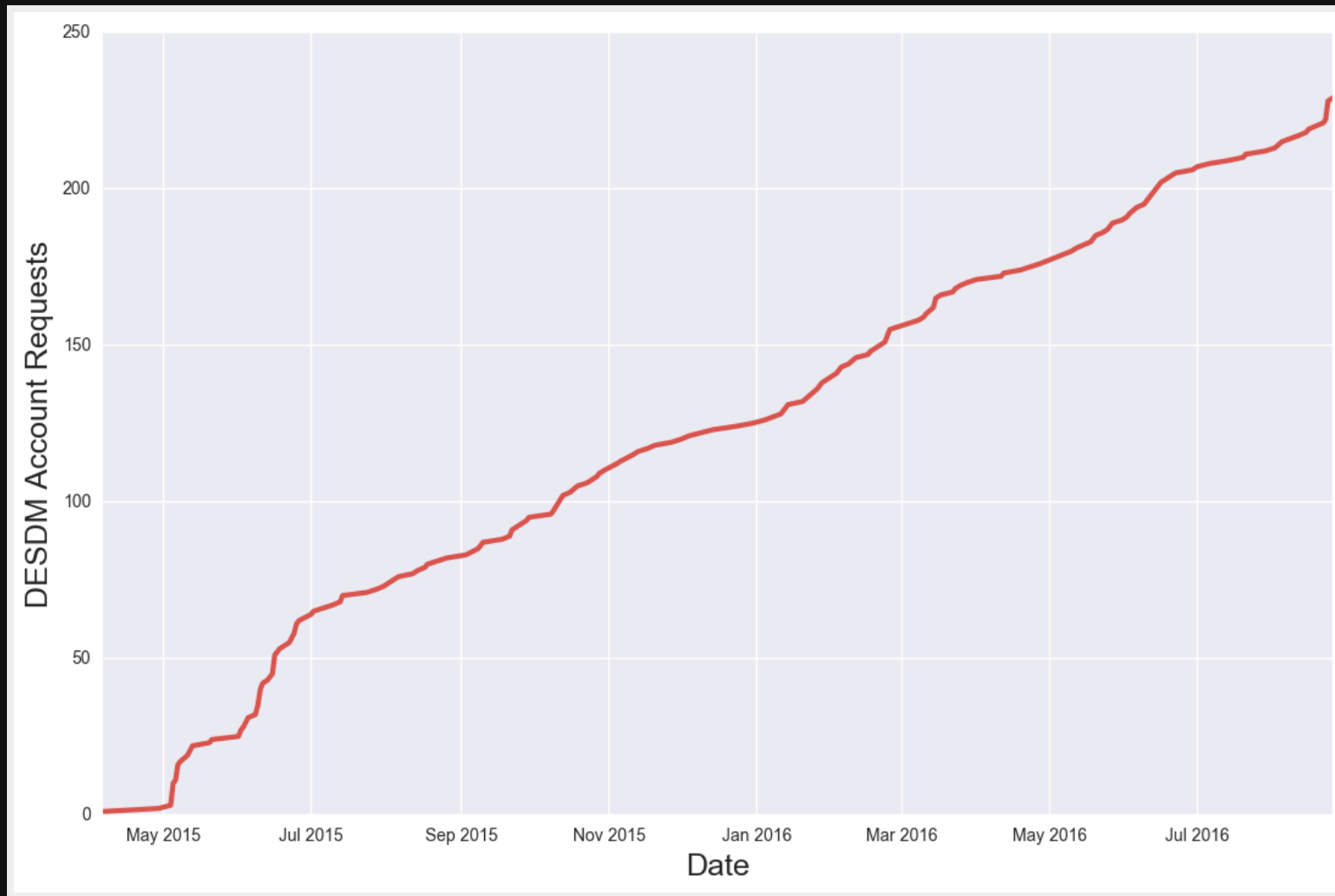
# Future and Demo

- Generalization (SQLAlchemy), in-query python functions, batch jobs, checkpoint, web, better Jupyter integration, more...
- easyaccess: Enhanced SQL interpreter for astronomical surveys (Carrasco Kind+, 2016?)
- For a more detailed tutorial check [Here](#)

[Live Demo!](#)



# DESDM New accounts

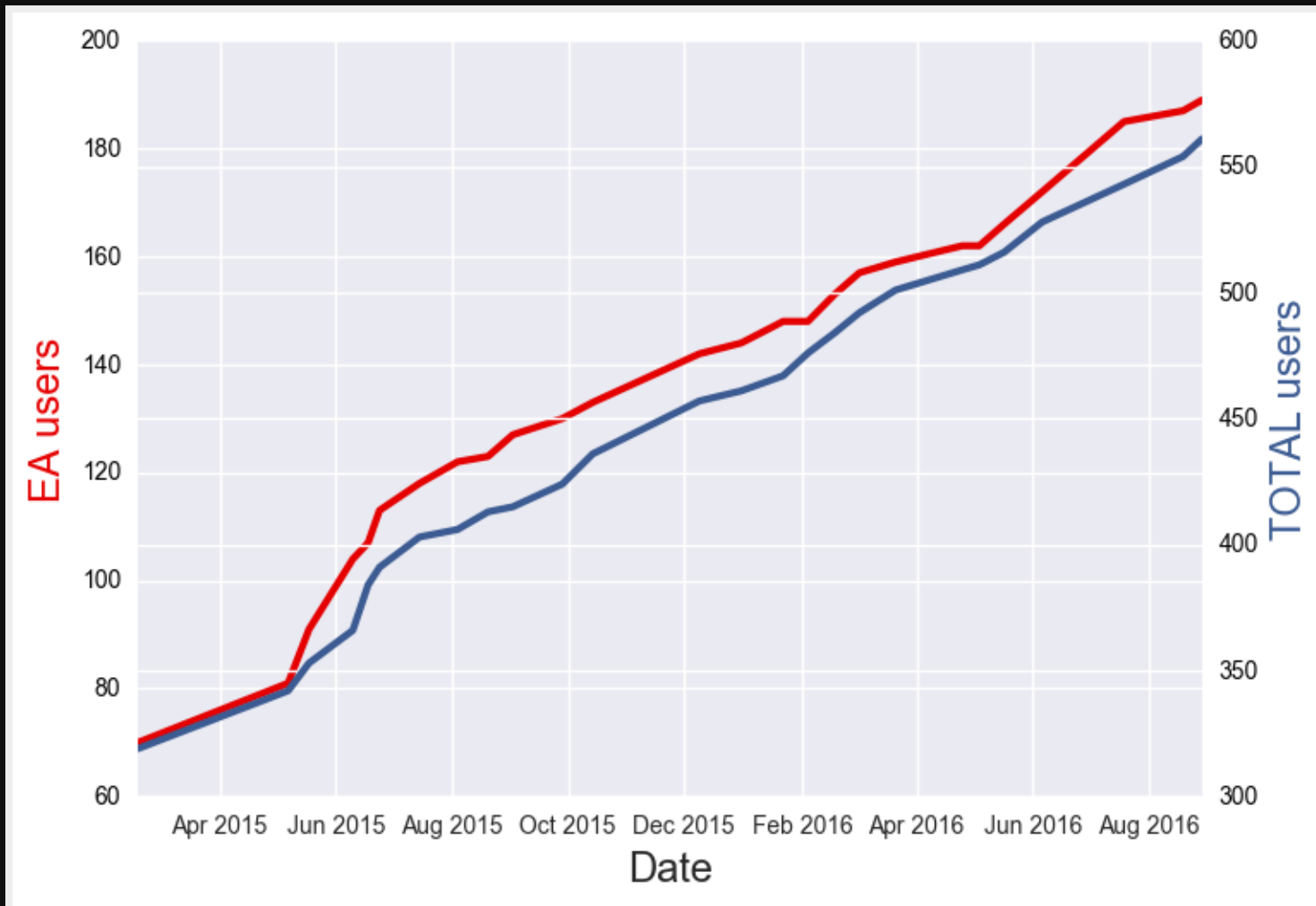


More than 220 New users since new On-boarding!

New DES Member? Check [Here](#)

Several Services: DB, Confluence, HipChat, BitBucket, Stackoverflow

# DB Users

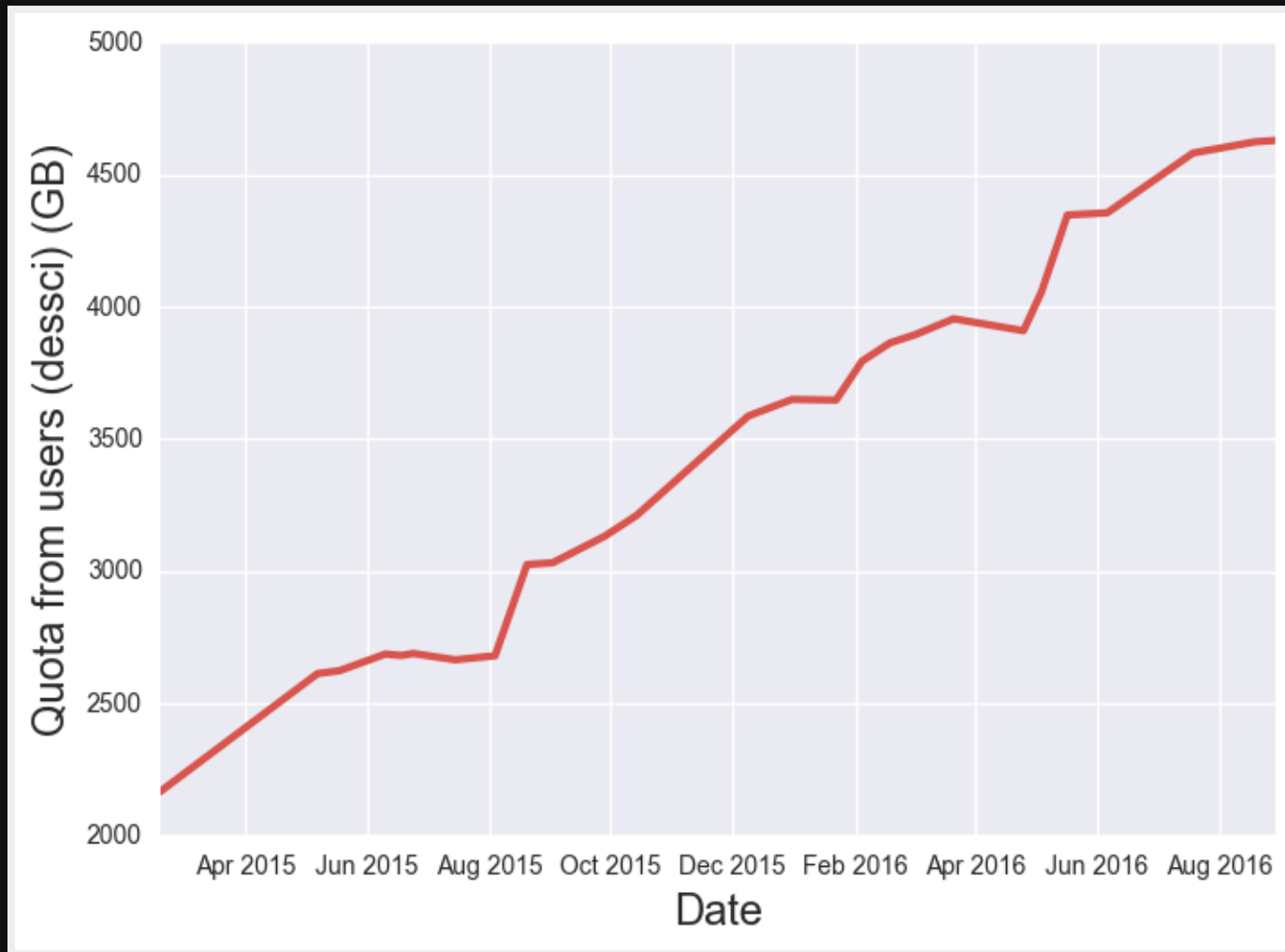


Doubled number of users since easyaccess

More than 180 users with easyaccess with different activity levels

Feedback via github issues, stack-overflow-like questions, email list and personal inquiries

# DB Quotas



Personal space actively used and constantly increasing

People create and share tables with one command

~ 4.5 TB in personal space, tables and index tables included

# Experimental UI projects being developed (Openstack + Docker)



DES Labs

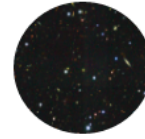
Easyaccess web



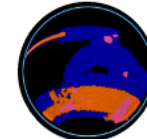
Jupyterhub +  
easyaccess



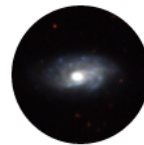
Des maps



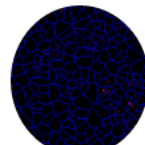
Footprint



DES cutouts



Map exploration



Easyaccess online

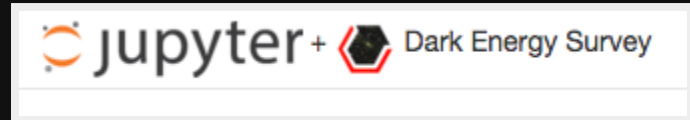


Science Server



[deslabs.ncsa.illinois.edu](http://deslabs.ncsa.illinois.edu)

# JupyterHub + easyaccess + DS9



### Sign in

Username (Use DES DB credentials here):

Password:

[Sign In](#)

- Multi-user jupyter notebook sessions
- Access with DB credentials
- Running in OpenStack ("The Cloud")
- Easy setup (Running from Docker container)
- Easyaccess and other tools installed
- <http://141.142.236.167:8000/hub/>
- Local JS9 (DS9 in Javascript) integration
- Still in beta mode, planning to scale up
- Open to DES collaborators

[Live demo!](#)

# Online Cutout Services

[descut.cosmology.illinois.edu](https://descut.cosmology.illinois.edu)

- Cutout Services for both: Coadd images and Single Epoch
- Nice REST API so can be also accessed from e.g. *python*
- Almost production-like services with GPFS mounted
- Soon to be "officially" released, we are merging both services


Live demo!




```
wget -i list.txt
```

Selectable list below to change between jobs

See the logfile 

Download All Tiles 

Get list of files 


#### Job list shortcut

 54fa1765-6394-4fe5-af42-343e26c9fe33

 **a63f764a-fc43-4db9-b64c-8ddc8d18517b**

 c014341a-dc09-4146-adfc-b26683ce9a9f

 04d5c1ca-8f39-47bb-be66-5f5721c91349

 2f13cd2c-43de-4aa5-bf9d-07cc67cbd228

 3b57c669-0a4e-4d1e-914f-5ecc5027dbf1

 77e0d861-27d8-430e-94ce-ec264c350acc

 6a2d2f77-fc83-4c31-b5eb-c066a864f0b0

 1203a043-d339-4426-97b4-82afe1ceaac9

Job : a63f764a-fc43-4db9-b64c-8ddc8d18517b ( 2 tiles)



# DES Science Portal

[desportal.cosmology.illinois.edu](https://desportal.cosmology.illinois.edu)

- @ NCSA by managed by LIneA
- Interactive Coadd Image exploration
- Moving some services from old-portal to the Science portal
- Already uploaded with Y3A1 Test data



# Conclusions

- Tools being developed to make data access easier
- Easyaccess, Cutouts, Jupyter, Js9, Science Portal, etc...
- Opensource and integrated software
- Bring software to the data!
- Want to help? Want some infrastructure? Let me know!

[deslabs.ncsa.illinois.edu](http://deslabs.ncsa.illinois.edu)

# Thanks!

Questions?

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