

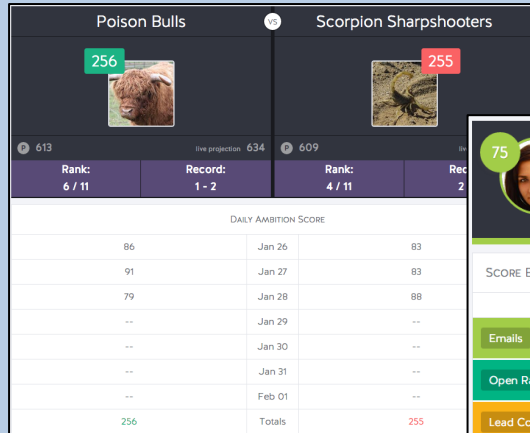
# **Minimizing Django Growing Pains in a Fast Paced Startup**

Wes Kendall, Micah Hausler,  
Rob deCarvalho, Jeff McRiffey

# What is Ambition?

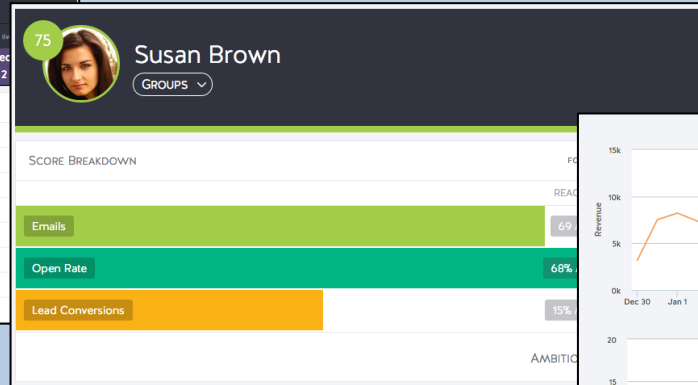
Ambition is an engagement platform for businesses

Achievement



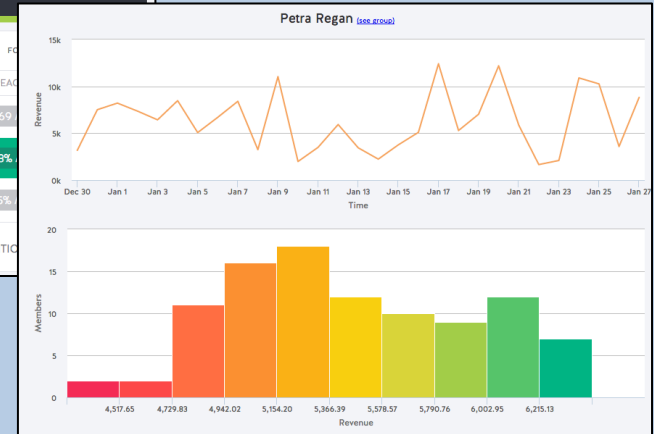
Competition,  
Leaderboard,  
Highlights

Accountability



Dashboard

Awareness



Reporting

# Over The Past Two Years...

- Scaled to 8 engineers
- Scaled to over 50+ apps and 5 projects
- Over 1M lines of Python code
- All while going through YCombinator and scaling up customer base with product pivots



AMBITION

# Minimizing Growing Pains

While growing, we have been able to:

- Automate code reliability, quality, and standards
- Minimize product pivot overhead by architecting key software abstractions
- Apply same principles in UI / Javascript design

# **Automating Best Development Practices**

Micah Hausler

# Code Quality

# 100% Test Coverage

- But not all bugs are caught with 100% coverage!
- That last 1% of coverage are often edge cases: here be dragons
- High degree of confidence that a PR is not introducing a new regression
- Broken window theory

# Static Analysis

- Flake8/pylint are your friends
- Reduce unused code statements
- Reduce complexity
- Increase standardization



# Continuous Integration

- This ties it all together
- You should be running your tests/static analysis on every commit
- You will always know the state of the code

# Documentation

# Documentation

- Zero examples = no one using your code
- The more complicated something becomes, the more likely you are to forget it
- Written documentation distributes knowledge within your organization

# README

Original

📖 README.md

## django-query-builder

Current

📖 README.rst

build: passing coverage: 95% pypi: 0.5.9 downloads: 1525/month

## django-query-builder

querybuilder is a django library for assisting with the construction and execution of sql. This is not meant to replace django querysets; it is meant for managing complex queries and helping perform database operations that django doesn't handle.

### Why use querybuilder?

The django querybuilder allows you to control all parts of the query construction. This is happens more clearly because the function calls more closely represent the actual sql keywords.

### Why not just use django's `.raw()` function?

While the raw function lets you execute custom sql, it doesn't provide any way for the developer to build the query dynamically. Users lacking experience writing "raw" sql should avoid using querybuilder and stick with django's querysets. The querybuilder's query construction closely mirrors writing sql, where django querysets simplify the sql generation process for simple queries.

### Requirements

- Python 2.7
- Python 3.3, 3.4
- Django 1.4+

### Installation

To install the latest release, type:

```
pip install django-query-builder
```

The screenshot shows a web browser displaying the Django Query Builder documentation on Read the Docs. The browser's address bar shows the URL `django-query-builder.readthedocs.org/en/latest/usage_examples.html`. The page has a dark blue sidebar on the left with a search bar and a navigation menu. The main content area has a light blue header with the title "Usage Examples" and a link to "Edit on GitHub". The page content includes a section titled "Selecting records as dictionaries" with a code block showing a Django Query Builder query and a table of results.

**django-query-builder**

Search docs

django-query-builder Documentation

Installation

Usage Examples

- Selecting records as dictionaries
- Selecting records as models
- Sorting
- Limit and Offset
- Filtering
- Joins
- Date functions
- Window functions
- Inner queries
- Connection Setup
- Reference Material

Query API documentation

Field API documentation

Tables API documentation

Contributing

Release Notes

Read the Docs v: latest

Docs » Usage Examples [Edit on GitHub](#)

## Usage Examples

### Selecting records as dictionaries

Select all fields from a table:

```
from querybuilder.query import Query

query = Query().from_table('account')
query.select()
# [{"id": 1, "name": "Person 1"}, {"id": 2, "name": "Person 2"}]
query.get_sql()
# "SELECT account.* FROM account"
```

id	name
1	Person 1
2	Person 2

Alias a table and fields:

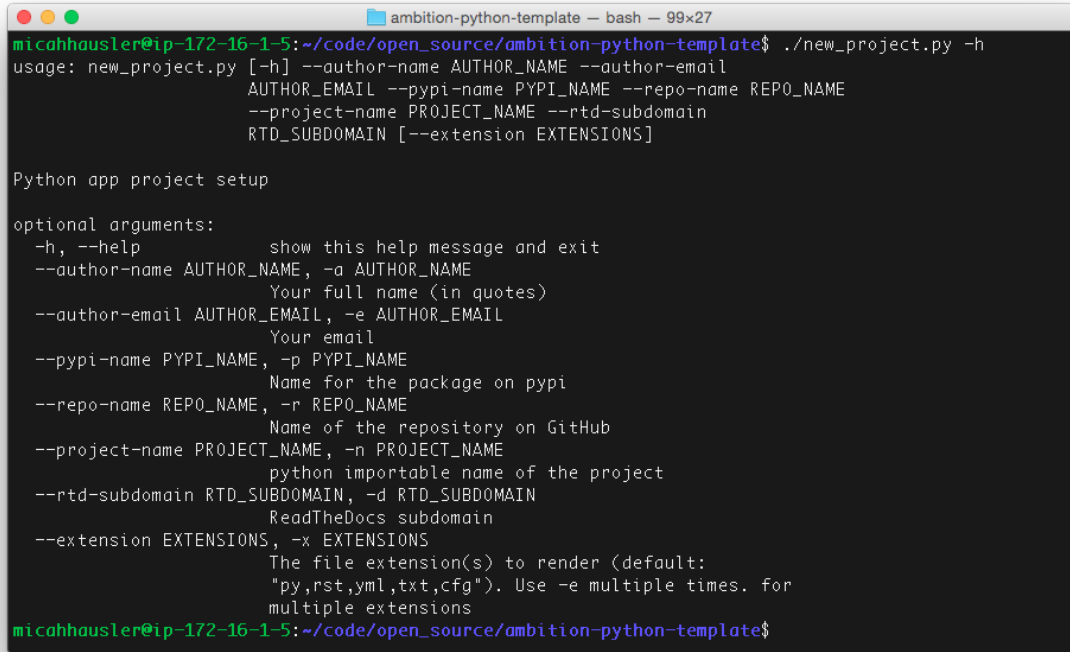
```
from querybuilder.query import Query

query = Query().from_table(
    table={
        'my_table': Account
    },
```

# Code Cleanup

# Splitting Up Code

- Lots of apps in one project → lots of external apps
- Made possible by templating python and django apps and projects



```
ambition-python-template — bash — 99x27
micahhausler@ip-172-16-1-5:~/code/open_source/ambition-python-template$ ./new_project.py -h
usage: new_project.py [-h] --author-name AUTHOR_NAME --author-email
                     AUTHOR_EMAIL --pypi-name PYPI_NAME --repo-name REPO_NAME
                     --project-name PROJECT_NAME --rtd-subdomain
                     RTD_SUBDOMAIN [--extension EXTENSIONS]

Python app project setup

optional arguments:
  -h, --help            show this help message and exit
  --author-name AUTHOR_NAME, -a AUTHOR_NAME
                        Your full name (in quotes)
  --author-email AUTHOR_EMAIL, -e AUTHOR_EMAIL
                        Your email
  --pypi-name PYPI_NAME, -p PYPI_NAME
                        Name for the package on pypi
  --repo-name REPO_NAME, -r REPO_NAME
                        Name of the repository on GitHub
  --project-name PROJECT_NAME, -n PROJECT_NAME
                        python importable name of the project
  --rtd-subdomain RTD_SUBDOMAIN, -d RTD_SUBDOMAIN
                        ReadTheDocs subdomain
  --extension EXTENSIONS, -x EXTENSIONS
                        The file extension(s) to render (default:
                        "py,rst,yml,txt,cfg"). Use -e multiple times. for
                        multiple extensions
micahhausler@ip-172-16-1-5:~/code/open_source/ambition-python-template$
```


# Django Apps

GitHub

Search GitHub

ExploreFeaturesEnterpriseBlog

Sign upSign in



Ambition









Chattanooga, TN

http://ambition.com

hello@ambition.com

People

7 >



Filters

only:sources django

**django-entity**

Entity relationship management for Django

Updated 2 days ago

Python★12↗5

**django-manager-utils**

Model manager utils for Django

Updated 3 days ago

Python★12↗6

**django-dynamic-initial-data**

Dynamic initial data for Django apps

Updated 9 days ago

Python★4↗2

**django-entity-event**

Newsfeed-style event tracking and subscription management for django-entity.

Updated 15 days ago

Python★3↗3

**django-user-guide**

Show configurable HTML guides to users.

Updated 16 days ago

Python★3↗2

**django-tour**

Navigate a user through a series of pages and ensures that each step is successfully completed

Updated on Jan 5

Python★2↗2

**django-app-template**

The template used for standalone opensource Django apps in Ambition

Updated on Dec 22, 2014

Python★4↗3

**django-entity-emailer**

Send email to Entities.

Updated on Dec 16, 2014

Python★3↗2

**django-issue**

An app for tracking ongoing issues within your web application. In a nutshell: a ticketing system for use by software components!

Updated on Nov 4, 2014

Python★0↗0

<b>django-entity-history</b> History about Django Entities Updated on Oct 20, 2014	Python★2↗2
<b>django-activatable-model</b> Properties and signals for models that are activated/deactivated Updated on Oct 16, 2014	Python★3↗2
<b>django-localized-recurrence</b> Store events that recur in users' local times. Updated on Oct 2, 2014	Python★4↗2
<b>django-entity-subscription</b> Make subscription management easy and entity-based. Updated on Sep 29, 2014	Python★4↗3
<b>django-smart-manager</b> Create and manage Django models with serializable templates Updated on Sep 8, 2014	Python★7↗3
<b>django-data-schema</b> Data Schemas for Django Models and Dictionaries Updated on Sep 4, 2014	Python★2↗4
<b>django-db-mutex</b> Acquire a mutex via the DB in Django Updated on Sep 3, 2014	Python★10↗6
<b>django-narrative</b> A Django app for creating a narrative of application events within a web application. This enables some neat application monitoring and quality assurances capabilities. Updated on Aug 20, 2014	Python★4↗2
<b>django-query-builder</b> Build complex queries for Django Updated on Jul 29, 2014	Python★59↗5
<b>django-kmatch</b> Django utilities for the kmatch library Updated on Jul 9, 2014	Python★2↗1
<b>django-regex-field</b> Store regexs in a Django model Updated on Mar 11, 2014	Python★3↗1



### [ambitioninc/generator-ambition](#) JavaScript ★ 0 | 1

Yeoman generator for Ambition.

Updated on Apr 8, 2014

### [ambitioninc/ambition-py-tests-guide](#) Python ★ 1 | 1

A guide for writing tests for Ambition python projects

Updated on Jul 22, 2014

### [ambitioninc/ambition-slack](#) Python ★ 1 | 1

Slack integration for Ambition

Updated on Oct 23, 2014

### [ambitioninc/newrelic-api](#) Python ★ 7 | 2

 A Python interface to New Relic's API

Updated 24 days ago

### [ambitioninc/ambition-docs-guide](#) Python ★ 1 | 0

A guide for getting spun up on documenting python and reStructuredText

Updated on Jul 17, 2014

### [ambitioninc/gclient-service-account-auth](#) Python ★ 0 | 2

Easily create an authorized service-object for interacting with google's client APIs using google service-account credentials.

Updated 13 days ago

### [ambitioninc/pip-conflict-checker](#) Python ★ 5 | 2

A tool that checks installed packages against all package requirements to ensure that there are no dependency version conflicts.

Updated on May 29, 2014

### [ambitioninc/clickjacket](#) JavaScript ★ 0 | 1

A simple JavaScript library for click-jacking protection.

Updated on Jun 11, 2014

### [ambitioninc/container-transform](#) Python ★ 7 | 1

Transform fig project configs to ECS

Updated on Dec 29, 2014

### [ambitioninc/ambition-python-template](#) Python ★ 1 | 4

A template for open-source python projects

Updated an hour ago

### [ambitioninc/flux-tools](#) JavaScript ★ 2 | 1

JavaScript helpers for the flux architecture.


Updated on Sep 16, 2014

### [ambitioninc/react-ui](#) JavaScript ★ 9 | 3

A collection of UI components for React.

Updated 10 days ago

### [ambitioninc/pagerduty-api](#) Python ★ 3 | 2

 A Python wrapper to PagerDuty's API

Updated 24 days ago

### [ambitioninc/engineering-blog](#) CSS ★ 0 | 2

Ambition Engineering Blog

Updated on Aug 18, 2014

### [ambitioninc/gagrab](#) Python ★ 0 | 1

When want to grab your data from Google Analytics: gagrab it.

Updated on Aug 15, 2014

### [ambitioninc/kmatch](#) Python ★ 31 | 4

A language for filtering, matching, and validating Python dictionaries

Updated on Sep 9, 2014

### [ambitioninc/fleming](#) Python ★ 43 | 5

Python functions for manipulating datetime objects with respect to their time zone

Updated 2 hours ago

# **Architecting Useful Abstractions**

Rob deCarvalho

# The Principles of Good Abstractions



## Common Things Easy

- Simplify the common



## Stable Interfaces / APIs

- Strive for uniformity
- Follow expectations



## Loose Coupling

- Independent components
- Connected through well-defined interfaces

# Abstractions for Loose Coupling

- Loose coupling: Independent blocks of code that interact through well-defined interfaces
- Python: packages, modules, functions, classes
- Django: apps ... BUT!
  - Giant mutable shared state-machine: database
  - Changes to database structure often lead to painful code refactoring

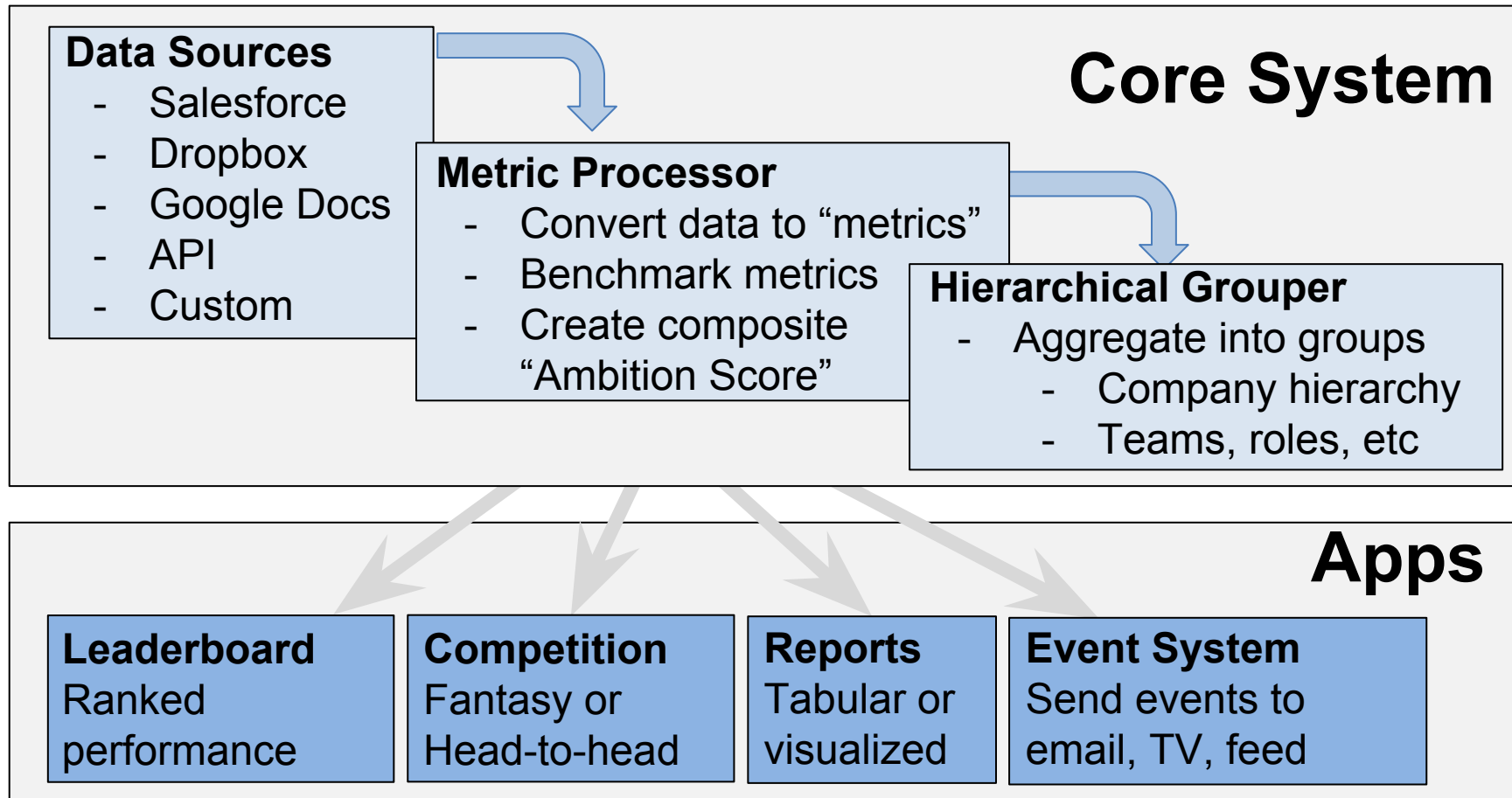
# Abstractions for Loose Coupling

- Loose coupling: Independent blocks of code that interact through well-defined interfaces
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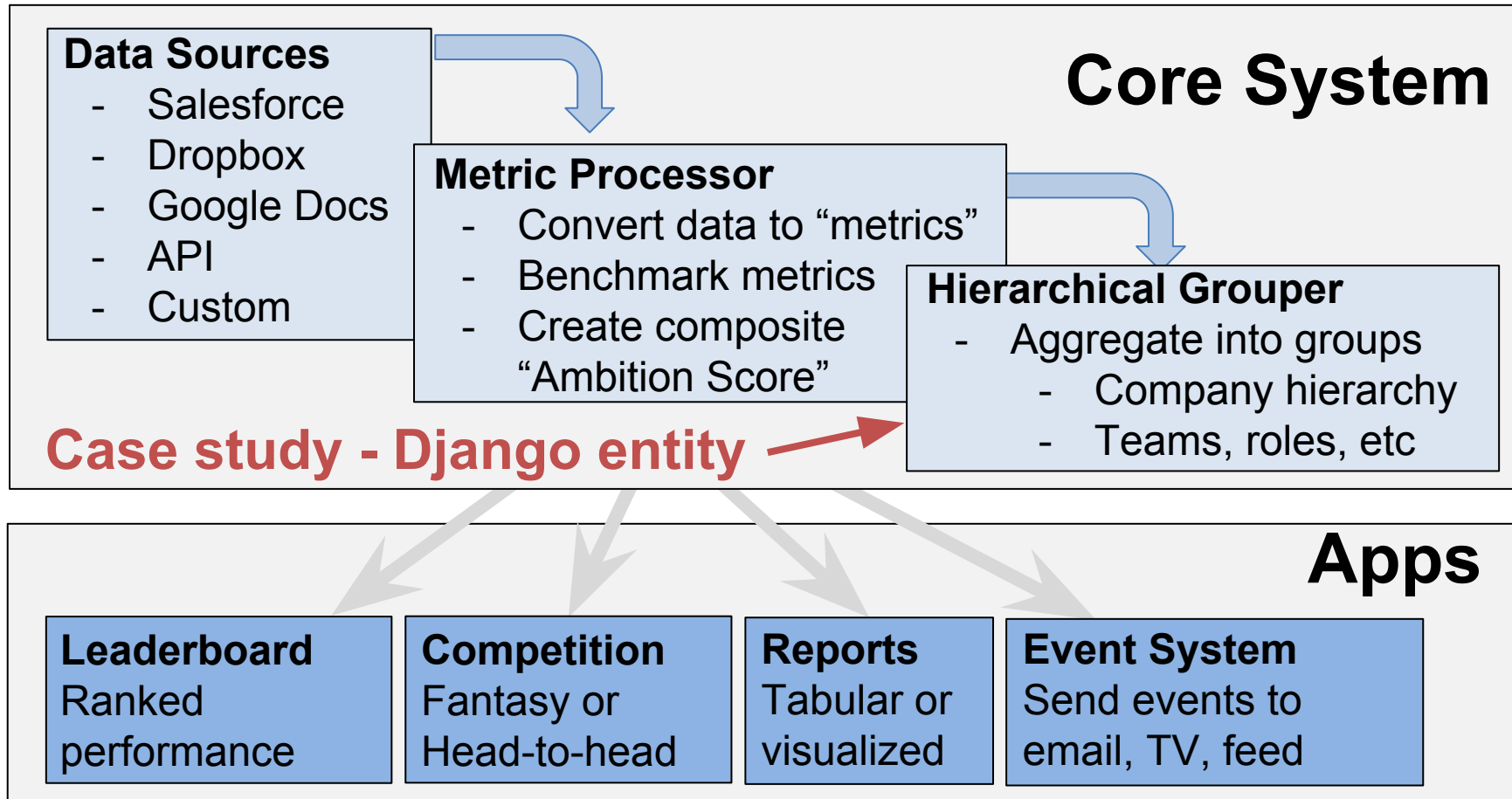


**Examine case-study that helps with this problem**

# How Ambition Works



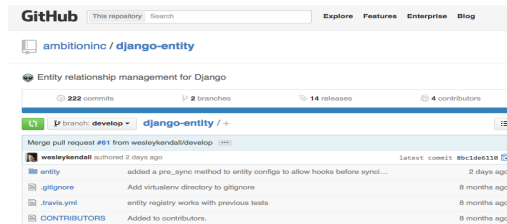
# How Ambition Works



# Django Entity

## Github app from Ambition

`github.com/ambitioninc/django-entity`

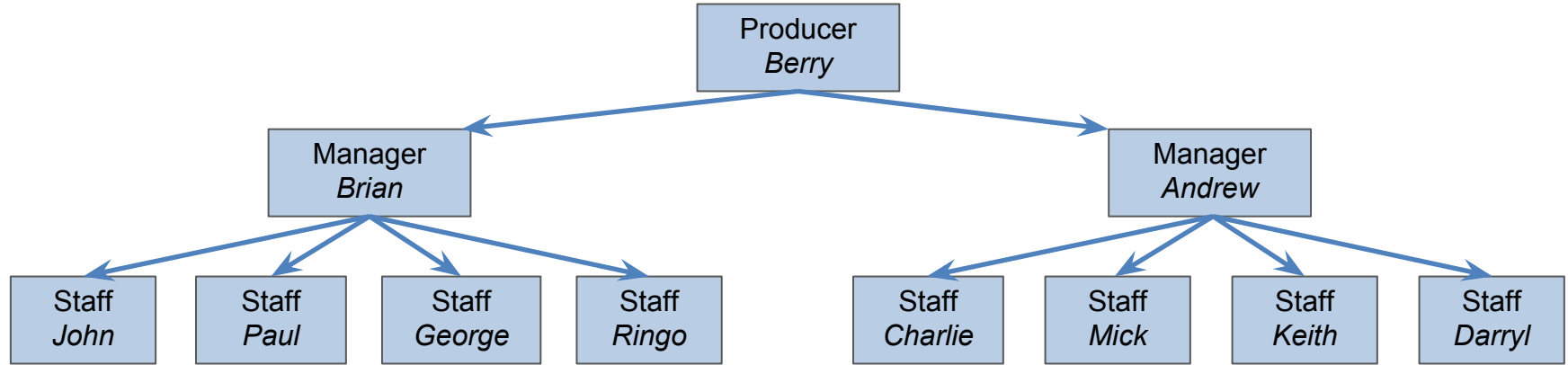


## Model-agnostic hierarchical abstraction

- Solves common use case
- Interface has semantics for hierarchies
- Enables more effective decoupling between apps and the database



# Concrete Example - Music Studio

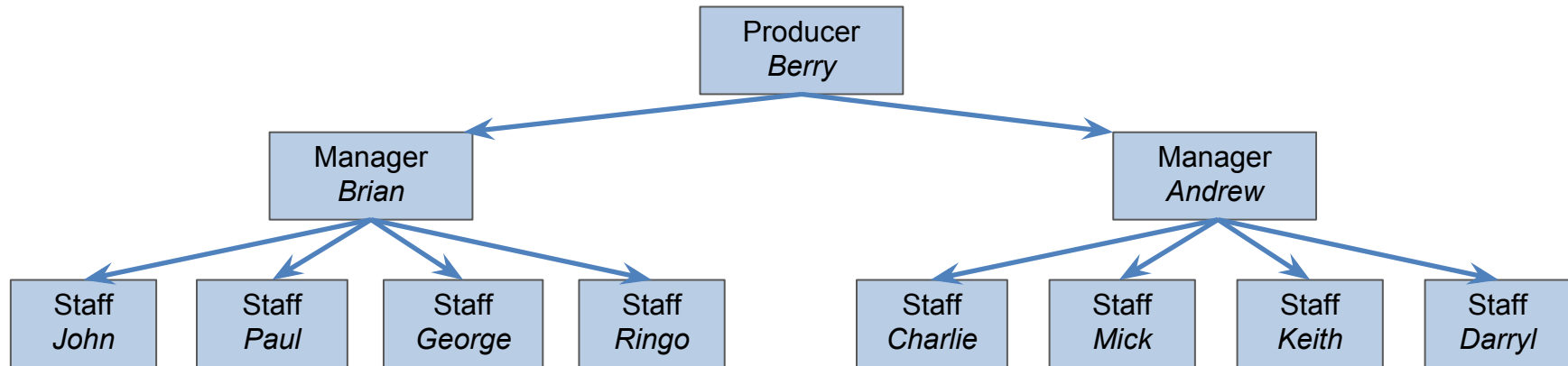


```
class Producer(models.Model):
    name = models.StringField(unique=True)

class Manager(models.Model):
    name = models.StringField(unique=True)
    producer = models.ForeignKey(Producer)

class Staff(models.Model):
    name = models.StringField()
    manager = models.ForeignKey(Manager)
```

# Entity Mirroring



## Entity Table

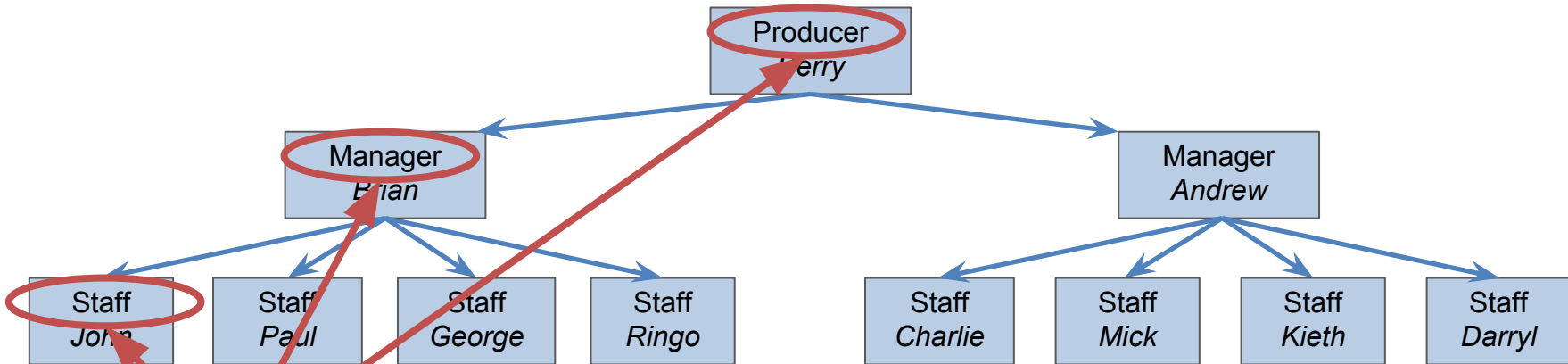
- entity\_type: Class of mirrored entity
- entity\_id: pk of mirrored entity
- (other stuff)

## Entity Relationships Table

- super\_entity
- sub\_entity
- (other stuff)

**Configured with registration process similar to django-admin**

# Entity Mirroring



## Entity Table

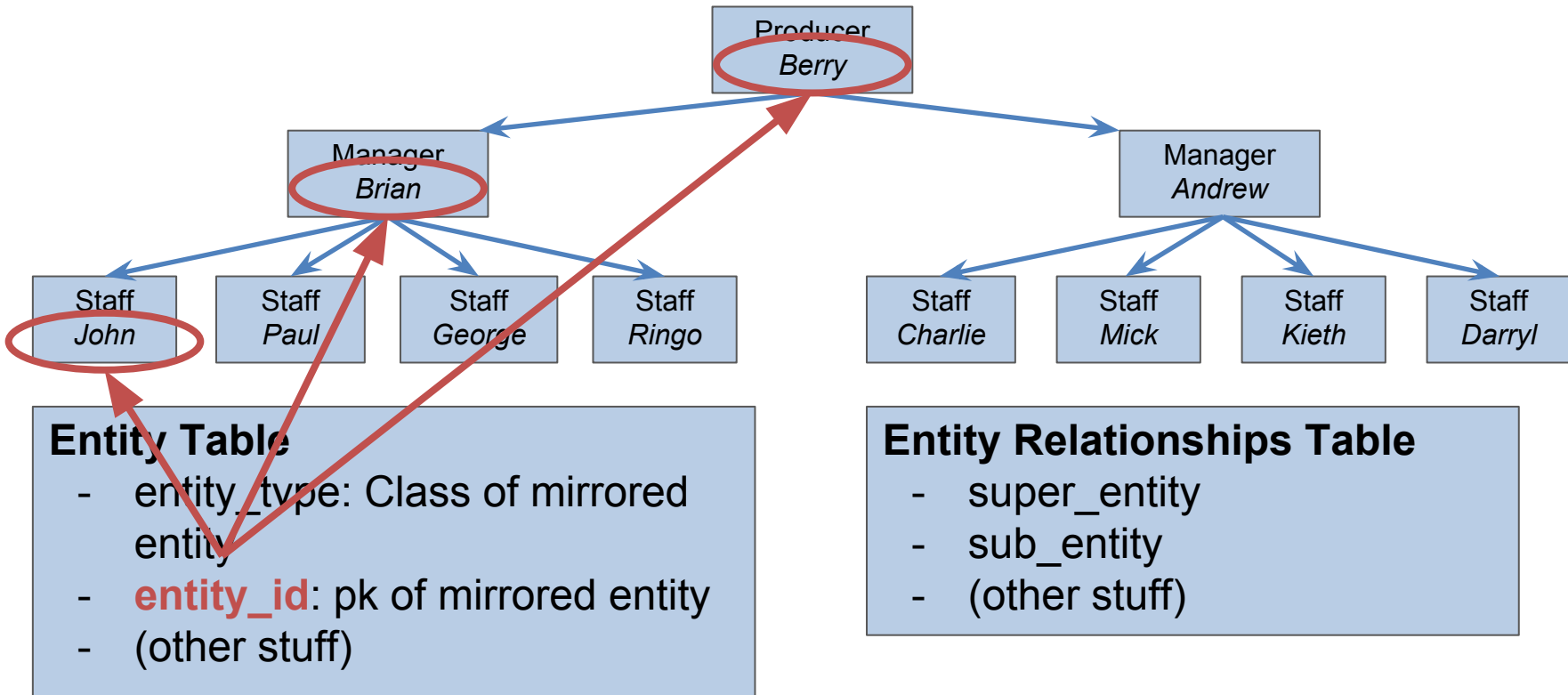
- **entity\_type**: Class of mirrored entity
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- super\_entity
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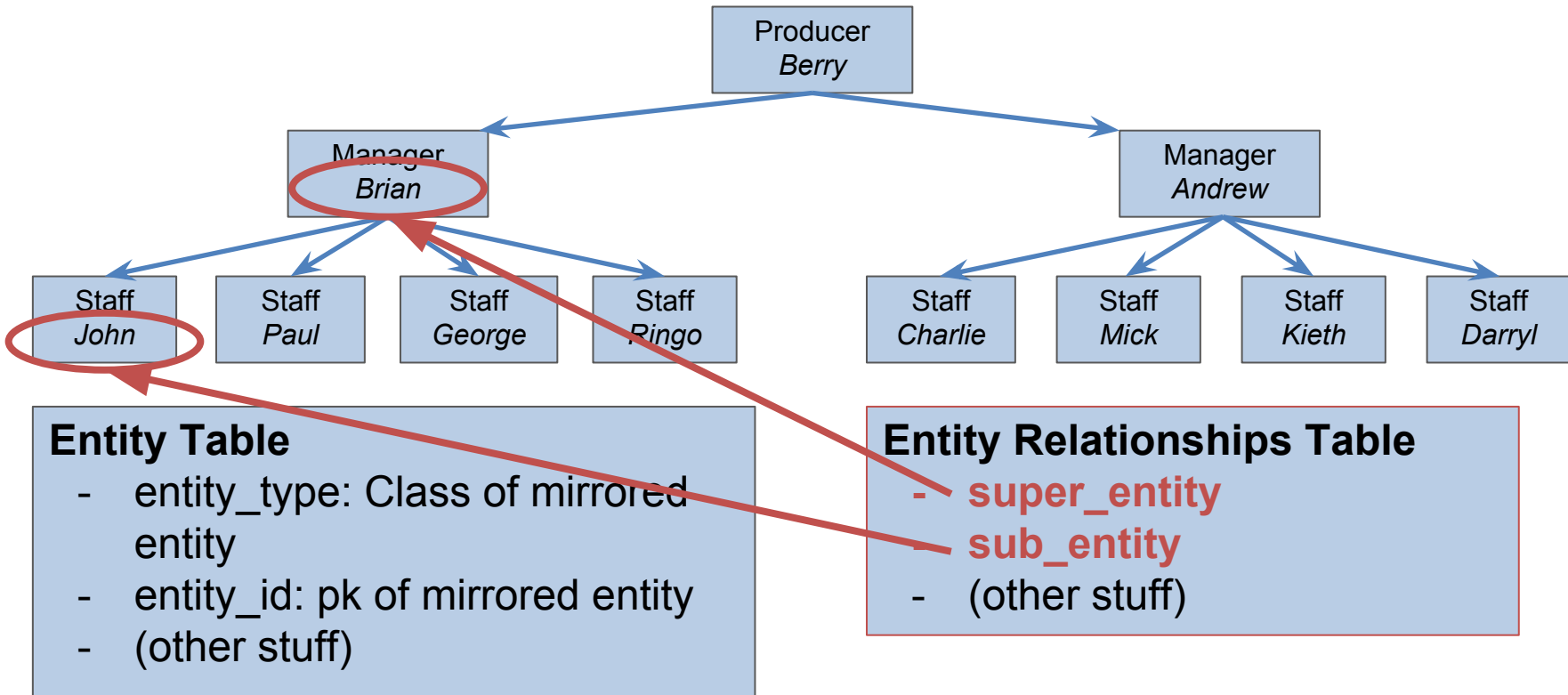
Configured with registration process similar to django-admin

# Entity Mirroring



Configured with registration process similar to django-admin

# Entity Mirroring



Configured with registration process similar to django-admin

# Adding an Analytics App to Project

```
from studio.models import Staff
```

```
class Rehearsals(models.Model):  
    staff = models.ForeignKey(Staff)  
    week = models.DateTimeField()  
    percent_attended = models.FloatField()
```

models.py

```
from django.db.models import Avg  
import pandas as pd  
from activities.models import Rehearsals
```

```
by_producer = Rehearsals.objects.all().values(  
    'staff__manager__producer').annotate(  
    Avg('percent_attended'))
```

```
by_manager = Rehearsals.objects.all().values(  
    'staff__manager').annotate(  
    Avg('percent_attended'))
```

```
by_staff = Rehearsals.objects.all().values(  
    'staff').annotate(  
    Avg('percent_attended'))
```

```
df = pd.DataFrame(  
    by_producer + by_manager + by_staff)
```

stats.py

# Adding an Analytics App to Project

```
from studio.models import Staff
```

```
class Rehearsals(models.Model):  
    staff = models.ForeignKey(Staff)  
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models.py

```
from django.db.models import Avg  
import pandas as pd  
from activities.models import Rehearsals
```

```
by_producer = Rehearsals.objects.all().values(  
    'staff_manager_producer').annotate(  
    Avg('percent_attended'))
```

```
by_manager = Rehearsals.objects.all().values(  
    'staff_manager').annotate(  
    Avg('percent_attended'))
```

```
by_staff = Rehearsals.objects.all().values(  
    'staff').annotate(  
    Avg('percent_attended'))
```

```
df = pd.DataFrame(  
    by_producer + by_manager + by_staff)
```

stats.py

## Dependencies

- Explicit dependency on studio app
- Changing any studio model means code changes in stats module

# Adding an Analytics App to Project

```
from studio.models import Staff

class Rehearsals(models.Model):
    staff = models.ForeignKey(Staff)
    week = models.DateTimeField()
    percent_attended = models.FloatField()
```

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by_manager = Rehearsals.objects.all().values(
    'staff__manager').annotate(
    Avg('percent_attended'))

by_staff = Rehearsals.objects.all().values(
    'staff').annotate(
    Avg('percent_attended'))

df = pd.DataFrame(
    by_producer + by_manager + by_staff)
```

```
class Rehearsals(models.Model):
    entity = models.ForeignKey(Entity)
    week = models.DateTimeField()
    percent_attended = models.FloatField()
```

## Entity decouples apps!

```
KIND = 'staff'

# aggregate over staff
df1 = pd.DataFrame(
    Rehearsals.objects.filter(
        entity__entity_kind.name=KIND).values(
        'entity').annotate(
        Avg('percent_attended'))))

# find relationships of staff to superiors
df2 = pd.DataFrame(
    EntityRelationships.objects.filter(
        sub_entity__entity_kind.name=KIND).values(
        'super_entity', 'sub_entity'))

# join rehearsal info with superior info
df = pd.merge(df1, df2, left_on='entity',
    right_on='sub_entity').group_by(
    'super_entity').mean()
```



# Django Entity Helped Ambition Scale

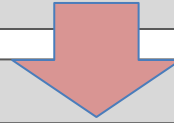
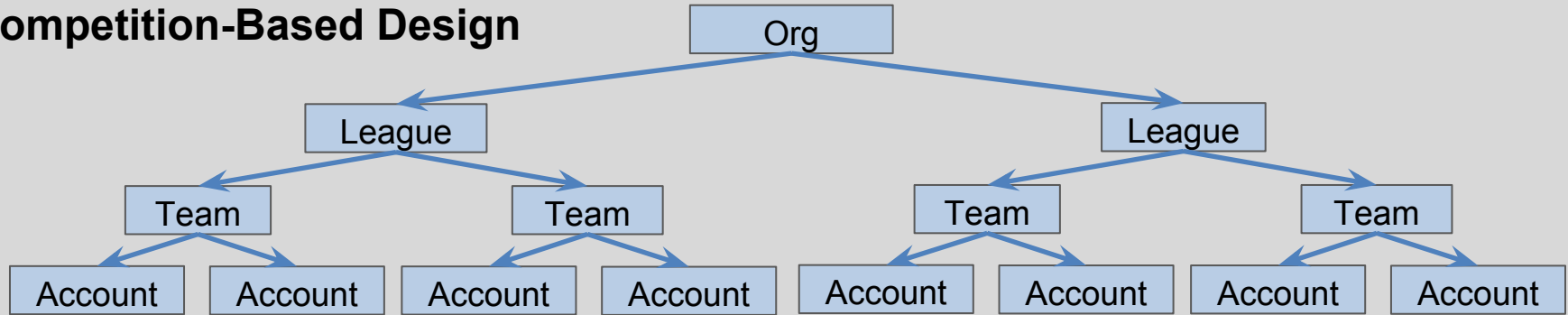
## Over 25 Ambition apps use Django Entity

account\_management, ambition-business-calendar, ambition-competition, ambition-headlines, ambition-integration, ambition-notification, ambition-onboarding, ambition-trigger, calendar\_management, collection\_management, django-animal, django-entity-emailer, django-entity-event, django-entity-history, django-entity-subscription, django-lucy, fantasy, fantasy\_management, insights, leaderboard, transport, trigger, tv, tv\_management, ...

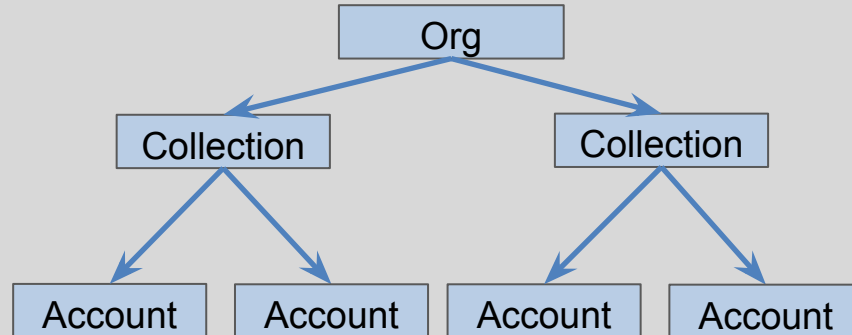
**Django Entity is just an example.  
We employ similar strategies for various levels of abstraction.**

# Huge Refactor Just Deployed

## Competition-Based Design



## Generic Design



# Summary

- Three properties of good abstractions
- Loose coupling is hard for database apps
- Django entity helps us decouple our apps
- The proof is in the pudding! Our enormous refactor went very smoothly

# Front End Architecture

Jeff McRiffey

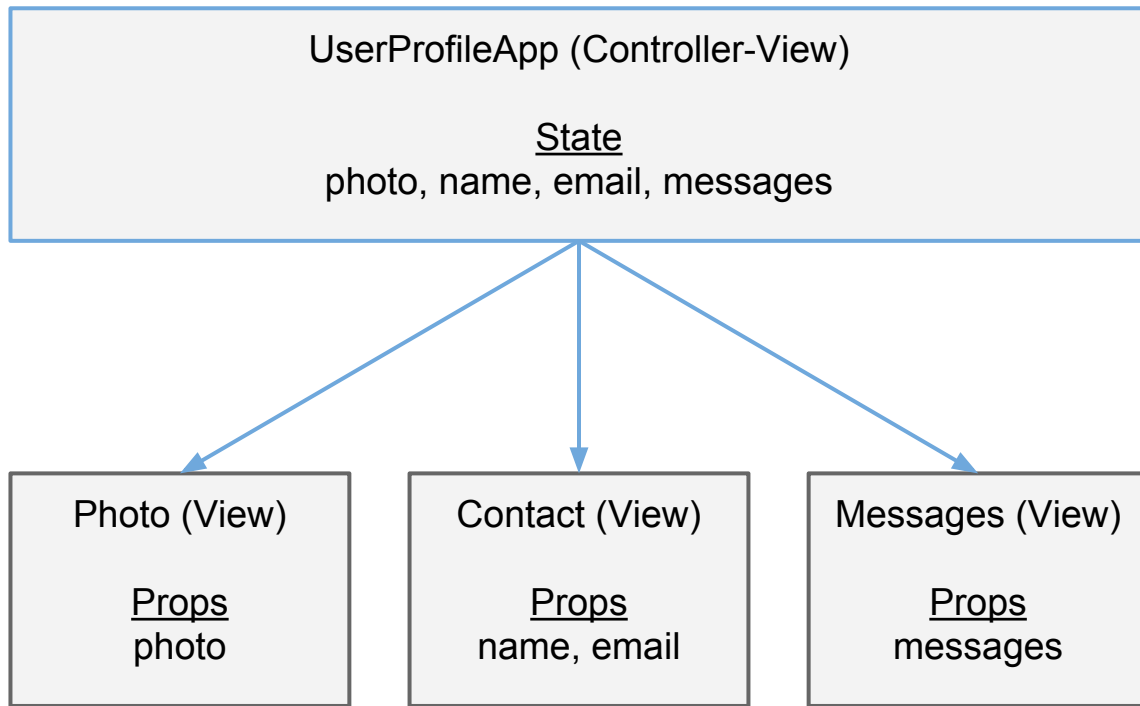
# Front End Practices

- Back end practices make much life easier
  - Useful abstractions => stable APIs
  - Stable APIs => Predictable UI
- Applies to front end too
  - Code quality (coverage + static analysis)
  - Loose coupling in JS/CSS (es6 + stylus)
  - Good abstractions (React + Flux)

# React

- Components
  - Declarative view layer
  - We distinguish views and controller-views
- State
  - Mutable - managed by component
- Props
  - Immutable - managed by parent

# React

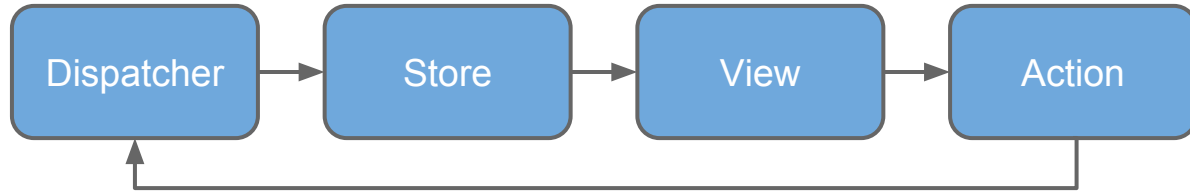


# Flux

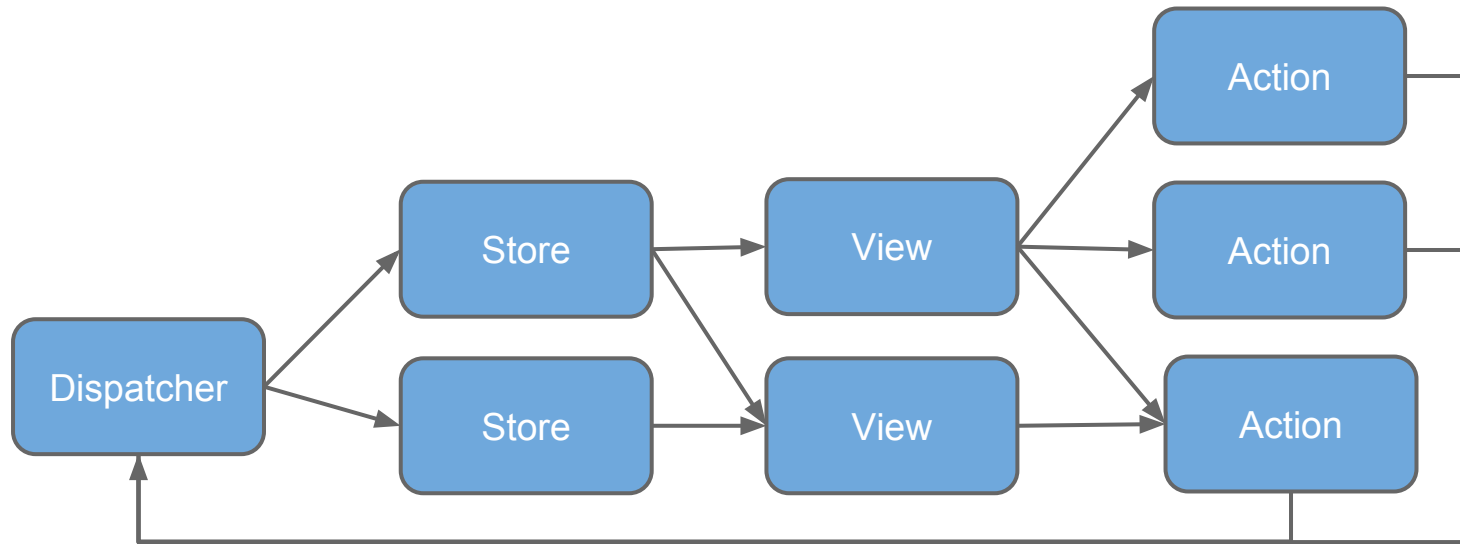
- Data flow
  - Unidirectional, reliable source of truth
- Dispatcher
  - Coordinates communication
- Stores
  - Holds state
- Actions
  - Changes state



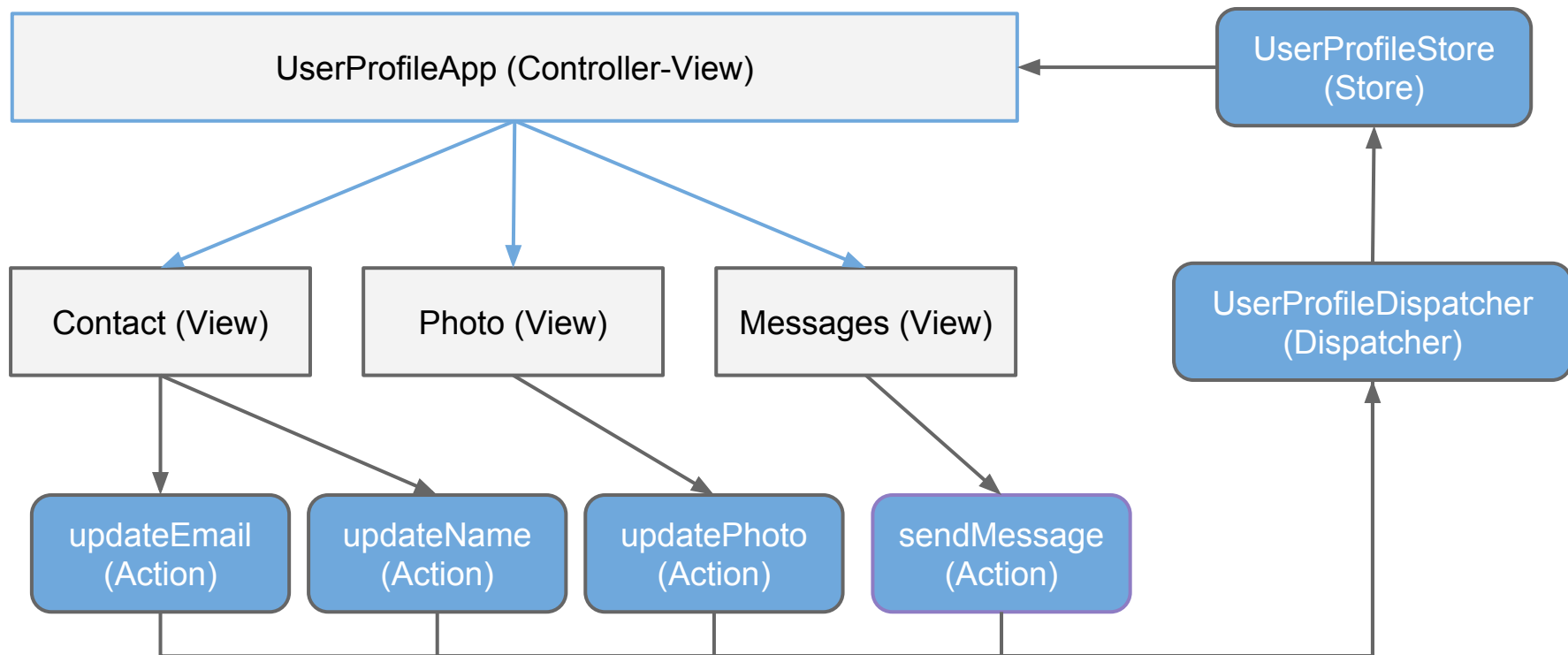
# Flux



# Flux



# React + Flux App Example



**DEMO**

# Conclusion

Don't ever degrade coding practices just to ship code.

1. Automate best practices. Reduces energy barriers to do the right thing.
2. When seeing patterns, develop an abstraction.
3. Maintain these practices on the UI and treat it as a first-class citizen. We did this with React and Flux.

# Resources

- Slides/Examples - <https://github.com/ambitioninc/ambition-pytennessee>
- Our open source apps:
  - Django Entity - <http://github.com/ambitoninc/django-entity>
  - React UI - <http://github.com/ambitioninc/react-ui>
  - All of them - <http://github.com/ambitioninc/>
- Static Analysis
  - Flake8 - <http://flake8.readthedocs.org/en/latest/>
  - Pylint - <http://www.pylint.org/>
- Continuous Integration
  - TravisCI <http://travis-ci.org/>
  - CircleCI <https://circleci.com/>
- Documentation
  - RTD - <https://readthedocs.org/>
  - MkDocs - <http://www.mkdocs.org/>
  - Sphinx - <http://sphinx-doc.org/index.html>
- Google Python Style Guide - <https://google-styleguide.googlecode.com/svn/trunk/pyguide.html>
- Ambition Project Templates (MIT Licensed)
  - <https://github.com/ambitioninc/ambition-python-template>
  - <https://github.com/ambitioninc/django-app-template>