What is Semester.ly?
Semester.ly Stack

- React
- Django
- Redux
The Problem
The Problem

- Advising is time-consuming for both students and advisors
  - 80% of students have some significant issue with the advising process

- Student’s aren’t receiving the support they need
  - 40% of students state that their advisors don’t give them helpful advice or information
Our Findings - From Students

- Semester.ly can help streamline the advising process
  - 91.3% of students stated that they would like to easily share their schedules with their advisors via Semester.ly
  - 96% of students stated that they would like some type of degree planning feature on Semester.ly
  - 70% of students stated that they would like a chat or comment system with their advisors on Semester.ly
Our Findings - From Advisors

- “Students are not always proactive in lining up their course choices, or tracking their progress”
- “Students change their course selections after their advising meeting and don’t check with their advisor to make sure their new courses meet their requirements”
- “[Planning with] the advising spreadsheet and a lot of emails is very cumbersome”
Brainstorming
# Course Planning

## Computer Science

### Distribution Requirements (KSAS)

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirement</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Humanities</td>
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<tr>
<td>Social Science</td>
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<td>6.0/9.0</td>
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<tr>
<td>NS/Q/E</td>
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### Degree Requirements

<table>
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<th>Requirement</th>
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<td>Gateway Computing: JAVA</td>
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<tr>
<td>Intermediate Programming</td>
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<td>CSF</td>
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### Schedule

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tue</th>
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<th>Fri</th>
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<tbody>
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</table>

### Notes

- Classes are listed in a table format with days of the week and time slots.
- The schedule includes introductory chemistry, calculus, social science, and other computer science courses.
- Distribution requirements include humanities, social science, and NS/Q/E credits.
- Degree requirements include specific courses and credits.

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*Image courtesy of Semester.ly*
Four Year Plan

Year 1
- Fall 2019
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

- Spring 2020
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

Year 2
- Fall 2020
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

- Spring 2021
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

Year 3
- Fall 2021
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

- Spring 2022
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

Year 4
- Fall 2022
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

- Spring 2023
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience
  - AS.050.236 (01) Neuroscience

Planned Four Year Summary

- Engineering (E) 29
- Natural Sciences (N) 14
- Quantitative Studies (Q) 24
- Humanities (H) 27
- Social & Behavioral Sciences (S) 15
- Writing Intensive 3
- CS Core 17
- CS Upper Level 12
- CS Other 6
- Mathematics 24
- Foreign Language 26

Total Credits 109
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The Minimum Viable Product
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That feature requires a JHU account...

- Share Schedules
- Chat with Advisors
- Plan Courses

It's all free

More Burritos!

Semester.ly will NEVER post to your timeline. Your course selections will not be shared with any other user without your permission.

Link JHED
Import Data from SIS

In order to share and connect to your official courses from SIS to Advisors, you must agree to import data from SIS (or something like this). Click the button below to be taken to the Consent Page on SIS.

Go to SIS
Data Sharing Agreement

Purpose of form: An eligible educational institution, such as a college or university, or a lender of a student loan must get your correct identifying number to file certain information returns with the IRS and to furnish a statement to you. For students, this will be your social security number (SSN) or, if you are not eligible to obtain an SSN, your individual taxpayer identification number (ITIN). The returns they must file contain information about qualified tuition and related expenses (Form 1098-T, Tuition Statement) and student loan interest (Form 1098-E, Student Loan Interest Statement). The information about your tuition will help to determine whether you, or the person who can claim you as a dependent, may take either the tuition and fees deduction or claim an education credit to reduce federal income tax. The information about your student loan interest will help to determine your deduction for such interest. For more information, see Pub. 970, Tax Benefits for Education. You are required to provide the requested information.

Note: The educational institution or lender may request your SSN or ITIN and certification on paper or electronically.

If you are a foreign national/nonresident alien and have either been assigned a JHU 988 number OR do not have a SSN or ITIN, follow the link below to certify/acknowledge this fact.

Penalties: Failure to furnish correct SSN or ITIN. If you fail to furnish your correct SSN or ITIN to the requester, you are subject to a penalty of $50 unless your failure is due to reasonable cause and not to willful neglect.

I affirm the following statements:

- I have read and understand the purpose of the Certification.
- I understand that the lack of adherence to provide a correct SSN or ITIN will result in a penalty, unless the failure is due to reasonable cause and not to willful neglect.

Click the link below to indicate that you have reviewed, understand and will abide by the statements above. This is a mandatory step and all students must complete it. Clicking on the link below will redirect you to a page that displays your SSN or ITIN information of record.

TIN Certification Acknowledgement

Agree
## Advising Dashboard

### Fall 2021 Schedule

<table>
<thead>
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<th>Time</th>
<th>Course</th>
<th>Credits</th>
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<tr>
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<td>Data Analytics</td>
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</tr>
<tr>
<td></td>
<td>A. Bisi, D. Prieto Santa, R. Wang</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business Analytics</td>
<td>2 credits</td>
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<td>B. Hathaway, N. Turken, G. Diavanshir, E. Kaoan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Business Analytics</td>
<td>2 credits</td>
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<tr>
<td></td>
<td>A. Fattahi</td>
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<tr>
<td></td>
<td>Introduction to Abstract Algebra</td>
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<tr>
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### Planned Courses

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<tr>
<td>Business Analytics</td>
<td>2 credits</td>
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<tr>
<td>Advanced Business Analytics</td>
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### Registered Courses

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<td>Business Analytics</td>
<td>2 credits</td>
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<tr>
<td>Advanced Business Analytics</td>
<td>2 credits</td>
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</tbody>
</table>

### Comments

Type your message here...
Advising Dashboard

Fall 2021 Schedule

13.00 credits

Planned Courses
- BU.510.650 Data Analytics
  A. Bi, D. Prieto Santa, R. Wanq
  2 credits

- BU.520.601 Business Analytics
  B. Hathaway, N. Turken, G. Divanshir, E. Kaoan
  2 credits

Registered Courses
- BU.510.650 Data Analytics
  A. Bi, D. Prieto Santa, R. Wanq
  2 credits

- BU.520.601 Business Analytics
  B. Hathaway, N. Turken, G. Divanshir, E. Kaoan
  2 credits

- BU.520.620 Advanced Business Analytics
  A. Fattahi
  2 credits

- AS.110.401 Introduction to Abstract Algebra
  N. Kitchloc
  4 credits

Comments

Invite Advisors to start chatting

+ Yair Amir
+ Linda Moulton
+ Steven Marra

Copy Link

jhu.semester.ly/share-schedule/

Type your message here...
### Advising Dashboard

#### Fall 2021 Schedule

<table>
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<td>A. Bisi, D. Prieto Santa, R. Wanq</td>
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<tr>
<td>BU.520.601</td>
<td>Business Analytics</td>
<td>3 credits</td>
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<td></td>
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<tr>
<td>BU.520.620</td>
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<tr>
<td>AS.110.401</td>
<td>Introduction to Abstract Algebra</td>
<td>3 credits</td>
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</tbody>
</table>

#### Comments

Type your message here...

#### Invite Advisors to start chatting

+ Yair Amir
+ Linda Moulton
+ Steven Marra

[Copy Link](jhu.semester.ly/share-schedule/)
Comments

Yair Amir

Could you look over my schedule and let me know what you think? Thanks!

It looks good to me, but you may want to consider registering for more courses.

Linda Moulton

I agree with Yair. However, it looks like you'll be taking some challenging courses, so it's really up to you.

If you'd like to set up a meeting soon, I'm available tomorrow afternoon.
Could you look over my schedule and let me know what you think? Thanks!

Yair Amir

It looks good to me, but you may want to consider registering for more courses.

Linda Moulton

I agree with Yair. However, it looks like you’ll be taking some challenging courses, so it’s really up to you.

If you’d like to set up a meeting soon, I’m available tomorrow afternoon.
<table>
<thead>
<tr>
<th>Mon</th>
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</tbody>
</table>

Advisor Dashboard
Could you look over my schedule and let me know what you think? Thanks!

Jeanie Fung

It looks good to me, but you may want to consider registering for more courses.

Jeanie Fung

I agree with Yair. However, it looks like you’ll be taking some challenging courses, so it’s really up to you.

Linda Moulton

If you’d like to set up a meeting soon, I’m available tomorrow afternoon.
Implementation
The Advising System

Features (shown from advisor side):

- Course Summary for Sebastian Cabrejos
- 15.00 credits
- Courses:
  - EN 501.425: Functional Programming in Software Engineering (3 credits)
  - AS 300.161: Automating One's Own: Modernism and Privacy (3 credits)
  - AS 300.162: Visions of the Home: Communities and Collective Living in American Culture (3 credits)
  - EN 501.416: Artificial Intelligence (3 credits)
  - EN 501.421: Object Oriented Software Engineering (3 credits)

- Fall 2021
- Spring 2021
- Fall 2020

- Comments Forum
The student can add/remove their advisors

The student and any (added) advisor can view and post comments in the forum
How Django, React, and Redux Work

Database: (Tabular, Relational)

Models: Classes for Data storage

Urls/Views: HTTP Requests

Serializers: Sending Model Data from Database to Frontend

React-Redux Frontend:

UI: Displayed Components

Reducers: Component State Change

Container: Data for Component

HTTP REQUEST

ADD OR DELETE

PULL

CALL
Model Design

Comment Model
- Transcript id
- Content
- Author (Student id)
- Timestamp

Transcript Model
- Semester id
- Owner (Student id)
- Timetable (Personal Timetable id)
- Advisors (Student id)
- Pending Advisors (Advisor id)

Student Model

Model Key:
- Pre-existing
- New

Semester Model

Personal Timetable Model
Serializers

One Serializer per new Model
- Comment
- Transcript
  - Comments ordered by Timestamp
  - Advisors - matters whether or not they are pending
Handling HTTP Requests

- **POST**
  - Used to post **Comments**
  - Stores **Comments** in Database

- **GET**
  - Used to get **Transcripts**
  - Pulls **Transcripts** up from Database

- **PATCH**
  - Used to add/remove **Advisors** from **Transcripts**
  - Adds or deletes **Advisors** from **Transcript-Advisor** tables
Forum: Posting/Viewing Comments

What happens when a user posts a comment?

Student: Comments “How does my coursework look?” in Fall 2021 Forum

Data: String, Author id, Transcript id, ...

Frontend

HTTP POST REQUEST

Urls/Views: Process POST Req

Database

Comment Details | Transcript id
---|---
“How does my coursework look?” | 1

<table>
<thead>
<tr>
<th>id</th>
<th>content</th>
<th>timestamp</th>
<th>author_id</th>
<th>transcript_id</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How does my coursework look?</td>
<td>2021-04-29 21:23:57.107388</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
What happens when a user wants to view a comment?

**Forum: Posting/Viewing Comments**

<table>
<thead>
<tr>
<th>Database</th>
<th>Comment Details</th>
<th>Transcript id</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“How does my coursework look?”</td>
<td>1</td>
</tr>
</tbody>
</table>

**Urls/Views:**
- Process
- GET Req

**Advisor 1:** Pulls up transcript

**Advisor 1:** Display in Forum

**Frontend:**
- HTTP GET REQUEST
- Data: Transcript id

**Serialize Transcript**
Forum: Adding/Removing Advisors

What happens when a student adds an advisor?

__Advisors User id__ | __Transcript id__ | __Student id__
---|---|---
3 | 1 | 1

Urls/Views: Process PATCH Req

HTTP PATCH REQUEST

Frontend

SERIALIZE TRANSCRIPT

Student: Adds Advisor 2

Advisor 2: Now in forum
Forum: Adding/Removing Advisors

What happens when a student removes an advisor?

Student: Removes Advisor 2

Advisor 2: Now not in forum

Urls/Views:
- Process PATCH Req

HTTP PATCH REQUEST

Frontend

Database

Advisor's User id | Transcript id | Student id
---|---|---
2 | 1 | 1

SERIALIZE TRANSCRIPT
Forum: Pending Advisors

- What happens if advisors don’t have an account?
  - Transcript.advisors is a ManyToManyField of Student

- Students are Users - they need an associated account
- But advisees want to add their advisors easily

<table>
<thead>
<tr>
<th>Transcript id</th>
<th>Student id</th>
<th>Advisor id</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
The Solution: Pending Advisors

- Have a table for **actual** advisors and **pending** advisors
- Connect the two when the advisor first logs in
- Provide feedback for advisees in the frontend
Student SIS API Design

- Need to get student information from, Student Information System (SIS), Hopkins official course scheduling platform.

- Send HTTP POST request and get the student information from there.
  - Name
  - JHED ID
  - Email Address
  - Primary Major
  - Non-primary major(s)
  - Minor(s)
  - Advisors’ Info → Name, JHED, Email Address
  - COURSES!
JSFiddle - Emulate Encrypted Data

- Used to create JSON Web Tokens (JWT) to replicate encryption during SIS connection.
Postman - For All Your API Testing Needs

- Used to handle basic POST requests
Persevering through Issues...
Enabling Hopkins Login

- Microsoft authentication
- Working with Ali
**Python/Django support**

`django_microsoft_auth` follows the same support cycle as Django, with one exception: **no Python 2 support.** If you absolutely need Python 2.7 support, everything should largely already work, but you may need to patch `microsoft_auth_admin` and/or other files to get it to work.

Supported python versions: 3.5+

**Supported Django version: 1.11 LTS, 2.1+**


Note: Even though Django 1.11 LTS supports Python 3.4, I do not and you should not either. Official support for 3.4 was dropped in March 2019.
django-microsoft-auth

Python/Django support

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Supported python versions: 3.5+

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Note: Even though Django 1.11 LTS supports Python 3.4, I do not and you should not either. Official support for 3.4 was dropped in March 2019.
There's Hope!
Django 1.9.2 -> Django 1.11 LTS

- I had no clue what I was doing
- Brute force
- One at a time
## Hacking Django-Microsoft-Auth

- Finding Python 3 -> Python 2 incompatibilities
- Downloading local versions of repositories
- Python package dependency issues

### InvalidClientError at /microsoftauth-callback/
```python
super() takes at least 1 argument (0 given)
```

**Request Method:** POST  
**Request URL:** http://huy.sem.ly/microsoftauth-callback/  
**Django Version:** 1.11.29  
**Exception Type:** TypeError  
**Exception Value:** super() takes at least 1 argument (0 given)  
**Exception Location:** /usr/local/lib/python2.7/dist-packages/microsoft_auth/views.py in dispatch, line 47  
**Python Executable:** /usr/bin/python  
**Python Version:** 2.7.15  
**Python Path:** ['/code', '/usr/lib/python2.7', '/usr/lib/python2.7/plat-x86_64-linux-gnueabihf', '/usr/lib/python2.7/lib-dynload', '/usr/lib/python2.7/site-packages', '/usr/lib/x86_64-linux-gnu/libpython2.7.so.1.0', '/usr/lib/python2.7/lib-dynload', '/usr/local/lib/python2.7/dist-packages', '/usr/lib/python2.7/lib-dynload', '/usr/lib/python2.7/site-packages', '/usr/lib/python2.7/site-packages', '/code']  
**Server time:** Fri, 5 Mar 2021 13:49:16 -0500
And Then I Read Semester.ly’s Code

- Semester.ly uses a package called Python Social Auth
  ```python
  SOCIAL_AUTHAUTHENTICATION_BACKENDS = (  
    'social.backends.facebook.facebook.OAuth2Backend',  
    'social.backends.google.googleplus.OAuth2Backend',  
    'social.backends.google.googleoauth2.OAuth2Backend',  
  )
  ```

- This package supports Microsoft-Azure-Authentication

- We’d have to connect Facebook, Google, and Microsoft accounts together eventually anyways
Python Social Auth/Social Core

- Broke when upgrading to Django 1.11: Need to upgrade!

Migrating from python-social-auth to split social

Since Dec 03 2016, python-social-auth is marked as deprecated and the community is recommended to migrate towards the packages created in the organization repository.
Python Social Auth Migrations

Migrations

Several errors were reported due to migrations not applying properly when migrating to the new app, most of them are caused because the app switched names a few times from `default` to `social_auth`, and probably something else in between. That's the reason the migrations define the `replaces` attribute, that way Django can identify already applied migrations and not run them again.

In order to make complete the move to the new project setup, first ensure to move to `python-social-auth==0.2.21`, run the migrations at that point, then continue with the move to the new project and run the migrations again. Steps:

1. Update to `0.2.21`

   ```bash
   pip install "python-social-auth==0.2.21"
   ```

2. Run migrations

   ```bash
   python manage.py migrate
   ```

3. Move to the new project

4. Run migrations again

   ```bash
   python manage.py migrate
   ```
The Last Version to Support Python 2

- 3.4.0 is the last version to support Python 2

4.0.0 Release Notes

- Fixed Python 2 support from testing stack
- Remove discontinued Google OpenId backend
- Remove discontinued Yahoo OpenId backend
- Fix jwt.decode() passed algorithm
- Prevent PyJWT v2.0.0 being installed
- Update Facebook Graph API to 8.0
- Update Amazon fetch-profile URL
- Fix Azure AD Tenant, unable to load certificate
- Fix Okta well-known URL
- Updated Discord's API hostname from discordapp.com to discord.com
- Pass client_secret in auth-complete on Kakao backend
When All Hope Was Lost

- What if we just upgrade to 4.0.0 anyways?

It just works!
Smooth Sailing At Last

- Adding on to the code that was already written
- Hopkins Login finally works.
- Could completely remove django-microsoft-auth
Changes in Project Structure

- Up until now, we’ve been creating PRs to the master branch.
- After this change to Python Social Auth was merged, we swapped to a new branch: cs310-spring21

New pull requests
1 Month Later: I Broke Semester.ly!
Deployment Process

- Pull Request >> master --> staging --> production

- As a result, separate commits and PRs can all get merged at once from staging to production.

- At some point, my changes moved from staging to production altogether.
1 Month Ago:

**Migrations**

Several errors were reported due to migrations not applying properly when migrating to the new app. Most of them are caused because the app switched names a few times, from `default` to `social_auth`, and probably something else in between. That's the reason the migrations define the `replaces` attribute, that way Django can identify already applied migrations and not run them again.

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   ```
2. Run migrations
   ```
   python manage.py migrate
   ```
3. Move to the new project
4. Run migrations again
   ```
   python manage.py migrate
   ```
What Do We Do?

- My way of fixing this was to **delete** the database
  - Obviously, that’s not feasible

Migration broken from 0.2.19 (and older) #28

GitHub discussion posts?
Ali Saves The Day

Ali Soylu  6:45 PM
FB login works

I think I fixed it?

@James S. Wang I compared prod and dev and created missing data like below

```
ALTER TABLE public.social_auth_usersocialauth
ADD created timestamp with time zone NULL;
ALTER TABLE public.social_auth_usersocialauth
ADD modified timestamp with time zone NULL;

UPDATE public.social_auth_usersocialauth
SET created = current_date;

UPDATE public.social_auth_usersocialauth
SET modified = current_date;

ALTER TABLE public.social_auth_usersocialauth
ALTER COLUMN created SET NOT NULL;
ALTER TABLE public.social_auth_usersocialauth
ALTER COLUMN modified SET NOT NULL;
```
Moral of the Story?

- Keep code up to date
- Understand the codebase
- Research all options before choosing one

Praise Ali
An Undetected Bug: Separate Accounts

- More noticeable due to the fact that we now have Hopkins login.
- If a student has two separate accounts and wants to connect them, what do we do?
- Semester.ly currently doesn't have Google authentication
An In-depth Look

User logs in with Facebook

User creates timetables

User logs out

Different timetables

User logs in with Hopkins

User creates timetables
The Solution Work Around

- No real easy solution
- Intercept this exception
- Redefine how it’s handled

Separate Accounts Detected!

Your attempt to connect with another account has failed. This most likely occurred if you logged into one account without being logged into another. If you wish to connect your accounts, you must delete one of the accounts by following these three steps:

1. Log into Semester.ly with the account you want to delete.
2. Go to account settings by clicking the button below or by the dropdown in the top right.
3. Delete your account and all related information.
Demo!
Moving Forward...
<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
</tr>
<tr>
<td>8:00</td>
</tr>
<tr>
<td>9:00</td>
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<td>16:00</td>
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<tr>
<td>17:00</td>
</tr>
<tr>
<td>18:00</td>
</tr>
</tbody>
</table>

### Shifting from Development to Production

- **Release into Beta** before next registration period
- **More Testing!**
- Move from our current development site to staging, then production
- Collect feedback from beta feature to determine most requested improvements
Marketing to Advisors & Students

- Announcements directly on our existing platform
- Contacting colleagues in Academic Advising and CS Department
- Discussions in University Group Chats
- Expanding social media presence
More Ideas To Consider

- **Notifications System** (i.e. emails and in-app)

- **Freedom to choose specific timetable** directly in advising dashboard

- **Reaching beyond our product**
  - Speaking with Advisors & Advisees to understand best practices to improve advising relationships
More Ideas To Consider

- Allow advisees to share schedule with other mentors/advisors

- Ensure Authentication all login choices remain usable
  - Google Authentication is currently questionable
  - Must be certain JHED Authentication will not break
Thank You!