Campus Catalog

Phase 2 Technical Report

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I. Motivation

University is not just a place to learn. It is a place where you will find a community filled with new people and experiences. It is a place where you will make friends for life and explore your own potentials. It is a place where you will discover new opportunities and reach new heights. It is a place where you start a new chapter of life. However, a question remains: how do you decide which university to attend?

We created campuscatalog.me to help people make more educated university decisions. 43.2 million students in the U.S are in debt by an average of $39,351 each and we would like to help. By providing a wide range of helpful information, our website will help students make one of the most important decisions in their life. We want to help you find the best university option for the price you deem acceptable by providing information regarding the university, cost of living on or off-campus, and other amenities available.

II. User Stories

Here's all of the user stories we gave, with responses in blue:

More information on class attendance policy

> *"Hello, I am a user worried about the risks of disease transmission during classes. I would like an option to filter classes by their attendance policy, whether in-person, fully online, or a hybrid of both. This will help students feel more comfortable with the classes on their schedule."*

Hmm it might be a little bit difficult to sort based off of Corona restrictions since that information isn't available outside of UT's credential system (aka outside the course schedule). However, we are going to be pulling syllabus information through web scraping eventually, and we can incorporate their coronavirus policy within the sorting process most likely. This user story is more dynamic so we will tackle it in the future phases!

See which courses/professors are more project based

> *"I'm a user who's thinking about which classes I want to take next semester. I personally find that I learn a lot better in classes where the grades are focused on projects rather than tests, but I also have friends who prefer testing and homework to projects. Is it possible to provide me a way to view only classes that are more project based or more test based?"*

Unfortunately, we most likely will not be able to implement this feature, since we do not have an API to pull course specific information about projects, tests, etc. Additionally, we don't know if we can scrape the information either, since most classes don't seem to provide an up-to-date course syllabus. We will still, however, try to see if this is a viable option while scraping for course information in the future.

Splash page summary

> *"As a user, I want to be able to have some sort of idea about what the website is about from just the splash page. Maybe by adding a brief summary or the purpose (one or two sentences) of the website somewhere on the splash page. There could maybe also be some descriptive or eye-catching media on the page as well."*

I wasn't able to find a good way to add sentences to the splash page without it feeling a bit cluttered, but I added some additional info about the purpose of the website in the About Us page. To fill up the empty space on the splash page, I made the search bar (which isn't functional yet) a little larger, and added some large buttons that allow users to jump directly to the model pages. It definitely looks a lot better now with those changes.

Which courses have a smaller workload

> *"Hi development team, I am a student who is trying to balance out job hunt and school work at the same time. I would like to find courses with a smaller workload so that I can spend more time on job hunting and other activities. Is there a filter that I can use for finding courses with a smaller workload?"*

This information should be present in our website! There are ratings which specify the difficulty and quality of each course. In phase 2, we'll be adding sorting in which we'll sort each course by their rating, so you can sort and find the classes that are super light weight and easy and breeze right through college!

Extra Materials

> *"I am a user who wants to save money! I would like to see which courses require extra materials which will cost me money (such as textbooks, iclicker, calculator, etc), so I can pick a cheap class. Please make a sortable attribute for how much extra money I will have to pay for this class."*

This user story is a little bit outside of the scope of what we're aiming to do, but I can definitely see the benefit of it. If the materials are listed on the class websites, we can search them on maybe an Amazon API and determine the base process for a particular textbook or iClicker or Mathematica, but it would be much more difficult if that can't be found on Amazon or has student discounts attached to it. However, when working with the coronavirus user story, we can do a similar mechanism to sort by the budget in a later phase.

More info regarding class size

> *"Hi, I am a student who enjoys more interactions with the professor. I find it extremely hard to do in a class with over 50 students. Would it be possible to see how many students are usually enrolled in each course?"*

We were able to scrape the size of each section and our website will show the maximum number of students in each course. In Phase 3, we will add the ability to sort/filter by this value so you can quickly find exactly what you need.

Get professor ratings for specific courses

> *"Some professors are better at teaching some subjects than other subjects. As a user, I would appreciate the ability to see what other students rated a class taught by a specific professor. This would come in handy when choosing classes, particularly when multiple professors teach multiple classes."*

We are planning to add a ratings section hopefully in the next phase by implementing a comments and numbered ratings feature for users to fill out. This will allow us to aggregate all the responses and display the results to see.

See if Professors allow auditing for each course

> *"Hello, I'm a college student with interest in many different classes across several majors. I'd love to take more classes, but having too many grades makes life extremely stressful; so, I often like to audit (i.e. attend a course without any grade or credit) a course that sounds interesting but isn't relevant to my major. Is it possible for me to check whether a Professor or class typically allows students to audit that course?"*

Auditing is a common practice, and I'm sure it would be really helpful to have that information on our website. Unfortunately, we were unable to find a centralized location which contains this information. If you know of one, please let us know and we can attempt to scrape it in the next phase of the project.

Course grade distribution

> *"Course grade distributions could be a good indicator of how a course will be like. As a user I would like to be able to see previous grade distributions for a course. This could be in a form of a table/chart or a graph."*

This data is obtainable by scraping this page - https://reports.utexas.edu/spotlight-data/ut-course-grade-distributions. Unfortunately, we did not have time to implement it for this phase, since the website provides the data in one large image. We will definitely make an effort to scrape it in the next phase of the assignment since the data is really useful.

Professor Activities

> *"Hi, I am a student who likes to get involved on campus. I would like to see if the professor is involved in research or organizations around campus. For example, I would like to know if the professor chaperones study abroad programs or works in a lab with students outside of teaching."*

We know it's important to get background information about professors. Any professor with a CV on the UT syllabus website will have their CV displayed on our website. Their instance page will also list their publications, which should give you some idea about their research interests. This may not necessarily include all the information you wanted, but hopefully it will give you a starting point to look further into a professor's involvements.

Here's all of the user stories we received, along with our responses:

More information on Animal Friendly Filter

> *"Hello, I am a user looking for an animal-friendly apartment, but my pet is a large dog whose breed is not frequently allowed in apartments. In the Animal Friendly filter, I'd like more information on which animals are allowed at a particular apartment. This will help prevent misunderstandings when looking into animal-friendly apartments, and it will help me narrow my search more effectively."*

We have addressed this request by adding more detailed pet limitation data in our API response body including the number of pets allowed and weight restrictions. However, due to the lack of available APIs, we will not be able to provide breed limitations by building.

Search Filter for Apartments with Accessible Amenities

> *"Hi development team, I am a university student who has some friends with disabilities. I would like a feature that would allow me to filter for apartments that are*

wheelchair or handicapped accessible. This will be particularly useful for those with limited mobility."

We have addressed this request by including accessibility features in the building amenity section on our housing pages. We will be utilizing both Apartments.com API and Google Places API to search for accessibility features. The only existing limitation is that Apartments.com contains client property posts that may not include all the accessibility details.

Search feature for Amenities for Apartments

"Hi! I'm a user who would like to know about any amenities that an apartment offers. These include free electricity, free wifi, free water, gyms, pool, elevator, roof terrace, etc. While price helps me choose an apartment, allowing me to search for common amenities will make the apartment search a lot easier."

We have addressed this request by including lists of amenities provided by listed properties in our property pages. Users will be able to search for certain desired amenity options. We have also provided types of utilities that properties will cover.

Safety rating attribute for each student apartment

"Hello, I'm a user who heavily prioritizes how safe the area around an apartment is when choosing where to live and to figure this out, I typically have to search a lot on Google for crime statistics and safety ratings of neighborhoods. I was wondering if you could add some more information to the website regarding how safe the area around each student apartment is to ease this process. For example, maybe you could add a general safety rating for each apartment based on this website which has a map showing the safety of specific areas in cities like Austin."

We have not yet provided support for this request due to the lack of APIs. We plan to address this request by including safety scores on our property pages as demonstrated on our Postman design documentation which we work on for the next phase.

Affiliated Safety Resources for University Students

> *"Hello, I am a user who enjoys going out for entertainment until late in the night. However, I do not have a car, and I am worried about my safety if I have no ride home. Is there a way to check if a certain university has any affiliated safety resources to help me get back home? Some examples of this include UT Austin's Sure Walk system and UT Night Rides."*

We will not be able to address this request because there is no available API for retrieving this information. Finding this information for each school will require scraping over hundreds of official school websites and our team does not have the capacity to write a scraper at the moment.

Campus Gallery

> *"Hi development team, I am a high school graduate looking for Universities. For each of the universities, I'd like to be able to see photos of the campus to grasp the situation on hand. It would be great to have a carousel of photos or any other sort of format to display the gallery."*

We will have images available for the top 200 schools in the US, available for viewing on the page for each University! We won't be able to display those images on the grid for picking universities during this phase, but perhaps in a future phase we'll be able to add that feature.

University Major Rankings

> *"I'm a student interested in the rankings of different universities. I know what I want to major in, and I want to know more about how different universities compare for this field. It would be nice if I could see the rankings of universities based on majors."*

Major information like ranking is definitely something to consider when applying for a school. However, we will not be able to address your use cases in any upcoming phases. Our team members had to get general ranking info by hand due to the limited availability of appropriate APIs. I hope you can understand our limitations and hope you can keep contributing new ideas that will help build a better platform.

Link to Entertainment instance website

> *"Hi, I'm a user who is interested in buying tickets or items from different entertainment venues. I was wondering if you could link the venue's website so I could check out their products and prices without having to google them. Thanks!"*

We get all of our entertainment information from Yelp API which doesn't include any links to the business itself. We regret to tell you that we might not be able to fulfill your needs during the upcoming phases.

Proximity to current location ranking

> *"Hi development team, I'm a student looking for something fun to do within the entertainment section of the website, and I want what I'm going to do to be as close to my current location as possible. However, right now the website seems to provide solely the address of each entertainment, so to find what's closest to me, I must manually check how far each address is on Google maps which is a time-consuming process. Would it be possible to add the ability to sort/rank the entertainments based on how close they are to my current location?"*

The idea of getting info based on proximity sure sounds interesting and useful. However, that involves the user granting us permission to get their current location. Furthermore, the purpose of our site is to provide info on entertainment available in locations near the university or housing instead of your current location. I am afraid there is nothing we can do at this point to address your use case.

Contact Information for Apartment

> *"Hi development team, I am a user who likes some of the apartments that are listed on the apartments page. I would like to contact the apartments that I like, so I can schedule a tour or sign up for a lease. Can you include the phone number or email of the apartment on the apartment's instance page?"*

We will try our best to meet your needs during the next phase. We have run out of credits on our API keys to get contact information this month. Hopefully, we will be able to verify if we can make that information available to you.

III. RESTful API

You can find our postman API here:

https://documenter.getpostman.com/view/17627995/UUy3A7Rd

IV. Models

University

- Name (Search)
- Alias (Search)
- City (Search)
- State (Search)
- Zip Code (Search)
- Longitude (Search)
- Latitude (Search)
- Number of Enrolled Students (Sort)
- Ownership (Public/Private) (Filter)
- Acceptance Rate (Filter)
- Graduation Rate (Filter)
- In-state tuition (Sort)
- Out-of-state tuition (Sort)
- Ranking (Sort)
- Average Financial Aid Granted (Search)
- Average SAT scores (Search)
- Carnegie Undergrad (Search)
- School Website URL (Search)

Housing

- Property Name (Search)

- Alias (Search)
- Property Type (e.g. apartment, condo, house) (Filter)
- City (Search)
- State (Search)
- Neighborhood (Search)
- Longitude (Search)
- Latitude (Search)
- Min & Max Rent (Filter)
- Min & Max Bedroom (Filter)
- Min & Max Bathroom (Filter)
- Min & Max Square footage (Filter)
- Pet Friendly (Filter)
- Pet Limitations (Search)
- Schools nearby (Search)
- Building Amenities (Search)
- Walk Score & Transit Score (Search)
- Rating (Sort)
- Accessibility Features (Search)
- Safety Score (Search)
- Included Utilities (Search)

Amenity

- Name (Search)
- Alias (Search)
- Category (Search)
- Rating (Sort)
- Number of Reviews (Sort)
- City (Search)
- State (Search)
- Zip Code (Search)
- Longitude (Search)
- Latitude (Search)
- Age Restriction (Filter)
- Pricing (Search)
- Delivery / Takeout (For restaurants) (Filter)

- Operating Hours (Filter)

Media

University: Pictures, Videos, Map, News Feed

Housing: Pictures, Texts, Map, Property Description

Amenity: Pictures, Map, Yelp Reviews

Connection

University: University connects to Housing because most universities provide their housing and some people live in housing areas near universities for an easier commute. It also connects to amenities because universities provide students with entertainment, shops, and restaurant. Otherwise, students will go to these areas near campus because they are more accessible.

Housing: Housing connects to universities because housing is an essential part of universities. You most certainly have to live in the city where the university is located. Housing also connects to Amenities because a lot of places provide their amenities to residents or they have amenities like restaurants and convenience stores nearby.

Amenity: Amenities connects to university because universities provide students with amenities or they have many amenities located nearby. Amenities also connect to housing because many apartments and condos have their amenities. They also tend to have an abundance of amenities nearby.

V. Tools

We used a large variety of tools to make this project possible. Here's a list of tools we used, a link to their original pages, and the purpose we used them for:

- GitLab (https://gitlab.com)
    - GitLab provides us flexible source control, good issue tracking, communication with other teams, and more
- Postman (https://www.postman.com)
    - Postman allows us to manage the API for our website

- React (https://reactjs.org)
    - React provides a more usable framework for front end development
- React Bootstrap (https://react-bootstrap.github.io)
    - React Bootstrap is a CSS framework that incorporates React
- TypeScript (https://www.typescriptlang.org)
    - TypeScript provides a typing system on top of JS, allowing us to be more explicit about how functions work and what to expect from our code
- Namecheap (https://www.namecheap.com)
    - Namecheap allowed us to procure a domain for our website
- Discord (https://discord.com)
    - Discord allows us to have very active discussions and voice chats to keep all the members of our team as informed as possible.
- Amazon Web Service (https://aws.amazon.com)
    - Amazon Web Service helped us host our GitLab repository online and even incorporates live redistributing new code
- NodeJS (https://nodejs.org/en)
    - NodeJS provides a more useful JS runtime for us to experiment with our changes on
- Node Package Manager (https://www.npmjs.com)
    - NPM allows us to easily manage dependencies and packages for our code
- Jest (https://jestjs.io)
    - Jest allows us to write effective unit tests for front-end components
- Axios (https://axios-http.com)
    - Axios provides an API to streamline and simplify our GET requests
- Selenium (https://www.selenium.dev)
    - Selenium allows us to run effective end-t--end and acceptance tests
- Python (https://python.org)
    - Python provides a deep and useful language to manage our back end functions
- NGINX (https://www.nginx.com)
    - NGINX allows us to host our back-end servers

- AWS Elastic Beanstalk (https://aws.amazon.com/elasticbeanstalk)
    - Elastic Beanstalk helps us manage back-end server deployment
- Docker (https://www.docker.com)
    - Docker allows us to create portable containers for our front-end and back-end
- Amazon RDS (https://aws.amazon.com/rds)
    - Allows us to create a manageable relational database
- Marshmallow (https://marshmallow.readthedocs.io/en/stable)
    - Allows us to serialize python objects and convert them to JSON
- Flask (https://flask.palletsprojects.com/en/1.1.x)
    - Provides a framework for our Python web development
- SQLAlchemy (https://www.sqlalchemy.org)
    - Provides a toolkit for running SQL queries in Python
- Different API and Data sources:
    - https://www.yelp.com/developers/documentation/v3
        - Amenity reviews
    - https://collegescorecard.ed.gov/data/documentation/
        - All data for colleges apart from ranks and images
        - The College ScoreCard API provided a huge list of values so we had to decide which fields are relevant. This requires some digging through their data dictionary.
    - https://apify.com/tugkan/apartments-scraper#apartments-scraper
        - Data for housing
        - There was no publicly available API for scraping housing information as thorough as the scraper found on APIFY. APIFY will execute the scraper and store the results into their data storage. Then we can use their RESTful API to get the data stored in APIFY storage.
    - https://developers.google.com/maps/documentation/places/web-service/overview
        - Images for the models

- https://docs.gitlab.com/ee/api/api_resources.html
  - GitLab commit and issue information

VI. Hosting

FRONTEND

We used NameCheap to obtain our domain name campuscatalog.me. We hosted our frontend using AWS Amplify, which syncs to our GitLab repository and redeploys when any changes are made to the production branch.

BACKEND

We then deployed the Flask app to AWS. We started by setting up development and production Docker images. Next, we deployed to elastic beanstalk by creating an environment and application. Finally, we got an AWS certificate and connected it with the DNS.

VII. Phase II Features

The primary features of phase 2 were the database population, the API, and the pagination.

- **Pagination** was implemented on the front-end. Whenever a user accesses a model page, the page requests every instance of that model. However, the table/grid built from that information only shows a small slice of the entire response. There are buttons which, when clicked, change the portion of the response that is sliced. This means that the model pages may take some time to load initially, but will not run a new query when the page is changed.
- For our database, we decided to use **PostgreSQL** provided by AWS because that's the one our phase leader is most comfortable with. The details of implementations are visible in the UML diagram we posted. All three models are linked to each other by their locations. Each model also has their own children tables with more images.

- We implemented our **RESTful API** using Flask and Marshmallow with the support of SQLAlchemy. SQLAlchemy allows us to establish connections to our Database and execute queries using python. Marshmallow enabled us to generate prettier JSON results with ease. Flask is used for routing to different endpoints.

VIII. GitLab

You can find our repository here: https://gitlab.com/RG8452/campus-catalog