Class Scheduler

SDDEC22-09
http://sddec22-09.sd.ece.iastate.edu
Advisor- Mai Zheng
Client- Vicky Thorland-Oster

Email: zmbunch@iastate.edu

Zachary Bunch, Connor Gaecke, Charlie Mulderink, and Chris Horvatich

Problem Statement

The ECpE department has been using an overly complicated and inefficient method of scheduling classes.

Our solution is to make a program that will assist in building the ECpE schedule by allowing the user to easily chart classes and see conflicts, as well as sort classes.

Requirements

The Application needs to…

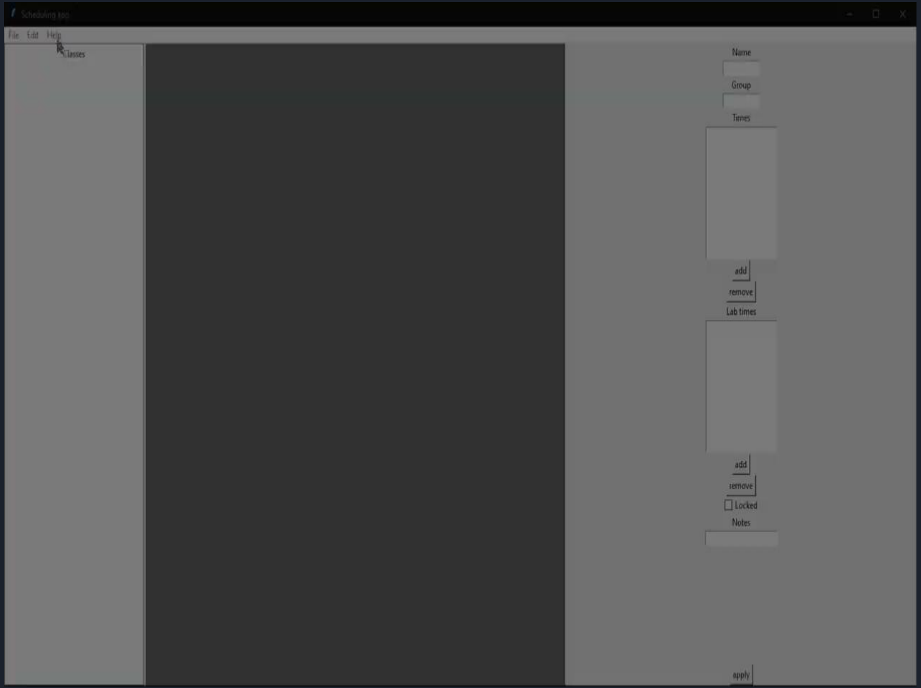
1. store classes and their parameters (such as times, location, sections, etc)
2. have functionality to add remove and edit courses and their parameters
3. chart the classes on a schedule
4. warn of classes and rooms that have scheduling conflicts
5. be easy to use and understand

Constraints and Considerations

1. Specific classes need specific rooms and lab rooms.
2. The amount of classes offered can be overwhelming to a user so methods to easily sort and view classes are necessary.
3. The calendar will need to be able to zoom both according to how many classes are currently being shown and manually.
4. Different configurations need to be able to be saved and loaded.

Demonstration of Application

Demonstration of Application



Frontend

We chose to make the gui with tkinter. A Python gui library.

This provided tools like creating windows and organizing widgets on the windows

Custom widgets could even be created but they needed to be a combination of pre-existing widgets

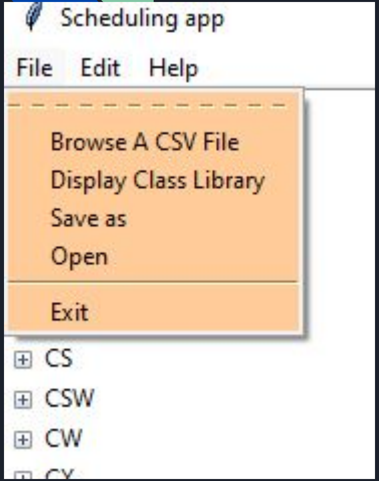
This was very helpful at first…

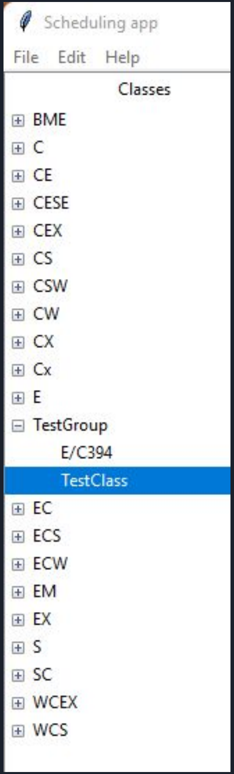
Tkinter lacked functionality in a few ways

Because custom widgets had to be comprised of other widgets there was no way to incorporate functionality that tkinter did not support.

Such as panning or even scrollbars in certain scenarios

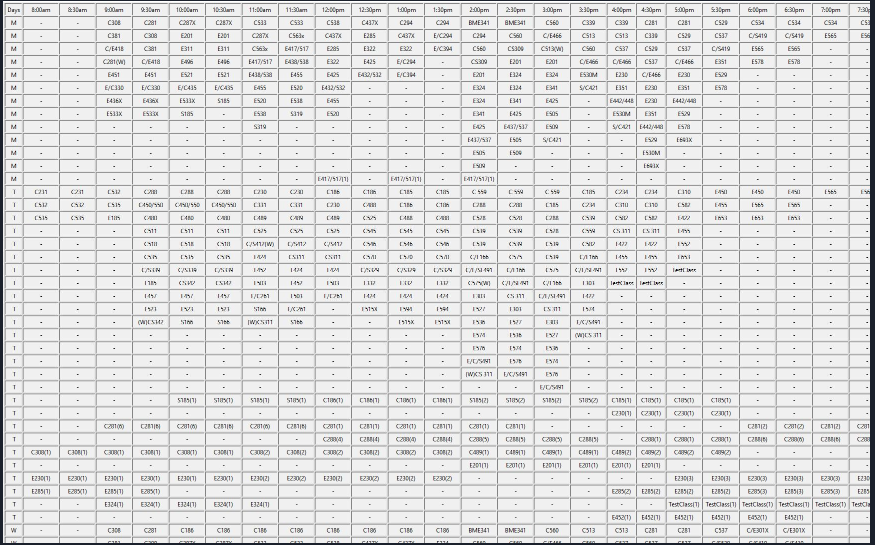
Frontend elements



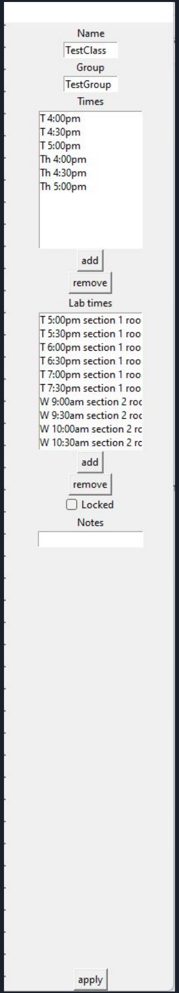


Classes

- BME
- C
- CE
- CESE
- CEX
- CS
- CSW
- CW
- CX
- Cx
- E
- TestGroup
  - E/C394
  - TestClass
- EC
- ECS
- ECW
- EM
- EX
- S
- SC
- WCEX
- WCS



Days	8:00am	8:30am	9:00am	9:30am	10:00am	10:30am	11:00am	11:30am	12:00pm	12:30pm	1:00pm	1:30pm	2:00pm	2:30pm	3:00pm	3:30pm	4:00pm	4:30pm	5:00pm	5:30pm	6:00pm	6:30pm	7:00pm	7:30p
M	-	-	C308	C281	C287X	C287X	C533	C533	C538	C437X	C294	C294	BME341	BME341	C560	C339	C339	C281	C281	C529	C534	C534	C534	C53
M	-	-	C381	C308	E201	E201	C287X	C563x	C437X	E285	C437X	E/C294	C294	C560	C/E466	C513	C513	C339	C529	C537	C/S419	C/S419	E565	E56
M	-	-	C/E418	C381	E311	E311	C563x	E417/517	E285	E322	E322	E/C394	C560	CS309	C513(W)	C560	C537	C529	C537	C/S419	E565	E565	-	-
M	-	-	C281(W)	C/E418	E496	E496	E417/517	E438/538	E322	E425	E/C294	-	CS309	E201	E201	C/E466	C/E466	C537	C/E466	E351	E578	E578	-	-
M	-	-	E451	E451	E521	E521	E438/538	E455	E425	E432/532	E/C394	-	E201	E324	E324	E530M	E230	C/E466	E230	E529	-	-	-	-
M	-	-	E/C330	E/C330	E/C435	E/C435	E455	E520	E432/532	-	-	-	E324	E324	E341	S/C421	E351	E230	E351	E578	-	-	-	-
M	-	-	E436X	E436X	E533X	S185	E520	E538	E455	-	-	-	E324	E341	E425	-	E442/448	E230	E442/448	-	-	-	-	-
M	-	-	E533X	E533X	S185	-	E538	S319	E520	-	-	-	E341	E425	E505	-	E530M	E351	E529	-	-	-	-	-
M	-	-	-	-	-	-	S319	-	-	-	-	-	E425	E437/537	E509	-	S/C421	E442/448	E578	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-	-	-	E437/537	E505	S/C421	-	-	E529	E693X	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-	-	-	E505	E509	-	-	-	E530M	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-	-	-	E509	-	-	-	-	E693X	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-	E417/517(1)	-	E417/517(1)	-	E417/517(1)	-	-	-	-	-	-	-	-	-	-	-
T	C231	C231	C532	C288	C288	C288	C230	C230	C186	C186	C185	C185	C 559	C 559	C 559	C185	C234	C234	C310	E450	E450	E450	E565	E56
T	C532	C532	C535	C450/550	C450/550	C450/550	C331	C331	C230	C488	C186	C186	C288	C288	C185	C234	C310	C310	C582	E455	E565	E565	-	-
T	C535	C535	E185	C480	C480	C480	C489	C489	C489	C525	C488	C488	C528	C528	C288	C539	C582	C582	E422	E653	E653	E653	-	-
T	-	-	-	C511	C511	C511	C525	C525	C525	C545	C545	C545	C539	C539	C528	C559	CS 311	CS 311	E455	-	-	-	-	-
T	-	-	-	C518	C518	C518	C/S412(W)	C/S412	C/S412	C546	C546	C546	C539	C539	C539	C582	E422	E422	E552	-	-	-	-	-
T	-	-	-	C535	C535	C535	E424	CS311	CS311	C570	C570	C570	C/E166	C575	C539	C/E166	E455	E455	E653	-	-	-	-	-
T	-	-	-	C/S339	C/S339	C/S339	E452	E424	E424	C/S329	C/S329	C/S329	C/E/SE491	C/E166	C575	C/E/SE491	E552	E552	TestClass	-	-	-	-	-
T	-	-	-	E185	CS342	CS342	E503	E452	E503	E332	E332	E332	C575(W)	C/E/SE491	C/E166	E303	TestClass	TestClass	-	-	-	-	-	-
T	-	-	-	E457	E457	E457	E/C261	E503	E/C261	E424	E424	E424	E303	CS 311	C/E/SE491	E422	-	-	-	-	-	-	-	-
T	-	-	-	E523	E523	E523	S166	E/C261	-	E515X	E594	E594	E527	E303	CS 311	E574	-	-	-	-	-	-	-	-
T	-	-	-	(W)CS342	S166	S166	(W)CS311	S166	-	-	E515X	E515X	E536	E527	E303	E/C/S491	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	E574	E536	E527	(W)CS 311	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	E576	E574	E536	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	E/C/S491	E576	E574	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	(W)CS 311	E/C/S491	E576	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E/C/S491	-	-	-	-	-	-	-	-	-
T	-	-	-	-	S185(1)	S185(1)	S185(1)	S185(1)	C186(1)	C186(1)	C186(1)	C186(1)	S185(2)	S185(2)	S185(2)	S185(2)	C185(1)	C185(1)	C185(1)	C185(1)	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C230(1)	C230(1)	C230(1)	C230(1)	-	-	-	-
T	-	-	C281(6)	C281(6)	C281(6)	C281(6)	C281(6)	C281(6)	C281(1)	C281(1)	C281(1)	C281(1)	C281(1)	C281(1)	-	-	-	-	-	-	C281(2)	C281(2)	C281(2)	C281
T	-	-	-	-	-	-	-	-	C288(4)	C288(4)	C288(4)	C288(4)	C288(5)	C288(5)	C288(5)	C288(5)	-	C288(1)	C288(1)	C288(1)	C288(6)	C288(6)	C288(6)	C288
T	C308(1)	C308(1)	C308(1)	C308(1)	C308(1)	C308(1)	C308(2)	C308(2)	C308(2)	C308(2)	C308(2)	C308(2)	C489(1)	C489(1)	C489(1)	C489(1)	C489(2)	C489(2)	C489(2)	C489(2)	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	E201(1)	E201(1)	E201(1)	E201(1)	E201(1)	E201(1)	-	-	-	-	-	-
T	E230(1)	E230(1)	E230(1)	E230(1)	E230(1)	E230(1)	E230(2)	E230(2)	E230(2)	E230(2)	E230(2)	E230(2)	-	-	-	-	-	-	E230(3)	E230(3)	E230(3)	E230(3)	E230(3)	E230
T	E285(1)	E285(1)	E285(1)	E285(1)	-	-	-	-	-	-	-	-	-	-	-	-	E285(2)	E285(2)	E285(2)	E285(2)	E285(3)	E285(3)	E285(3)	E285
T	-	-	E324(1)	E324(1)	E324(1)	E324(1)	E324(1)	-	-	-	-	-	-	-	-	-	-	-	TestClass(1)	TestClass(1)	TestClass(1)	TestClass(1)	TestClass(1)	TestCla
T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E452(1)	E452(1)	E452(1)	E452(1)	E452(1)	E452(1)	-	-
W	-	-	C308	C281	C186	C186	C186	C186	C186	C186	C186	C186	BME341	BME341	C560	C513	C513	C281	C281	C537	C/E301X	C/E301X	-	-



Name

TestClass

Group

TestGroup

Times

T 4:00pm
T 4:30pm
T 5:00pm
Th 4:00pm
Th 4:30pm
Th 5:00pm

add

remove

Lab times

T 5:00pm section 1 roo
T 5:30pm section 1 roo
T 6:00pm section 1 roo
T 6:30pm section 1 roo
T 7:00pm section 1 roo
T 7:30pm section 1 roo
W 9:00am section 2 roo
W 9:30am section 2 roo
W 10:00am section 2 rc
W 10:30am section 2 rc

add

remove

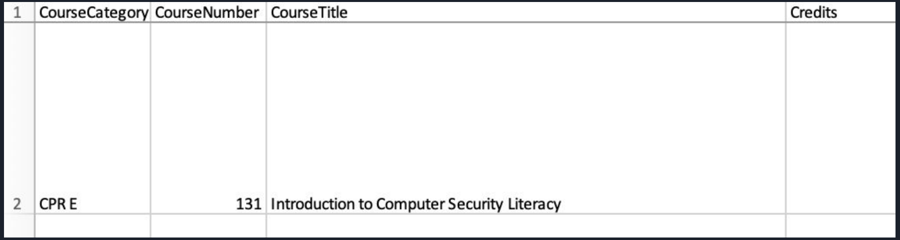
☐ Locked

Notes

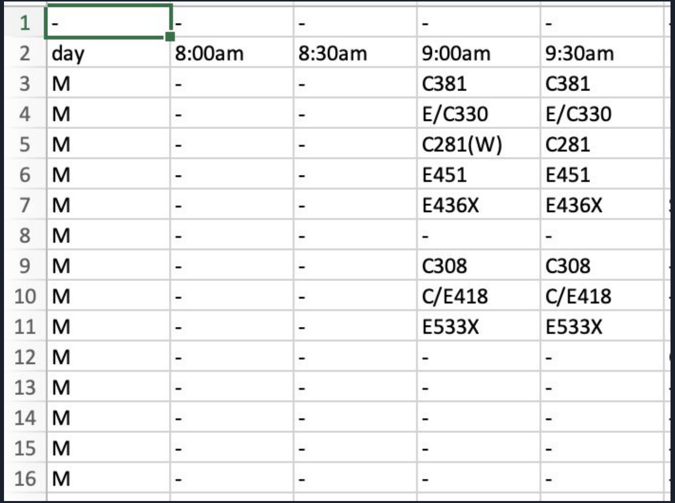
apply

Backend - Internal Database

- Goal: The goal was to create an internal database made up of CSV files
- CSV files were chose to make the data more accessible to any user
- Challenge: We were not able to get multiple CSV files to work together within the Frontend of the application
- Challenge: Getting the CSV files to leverage data from each other



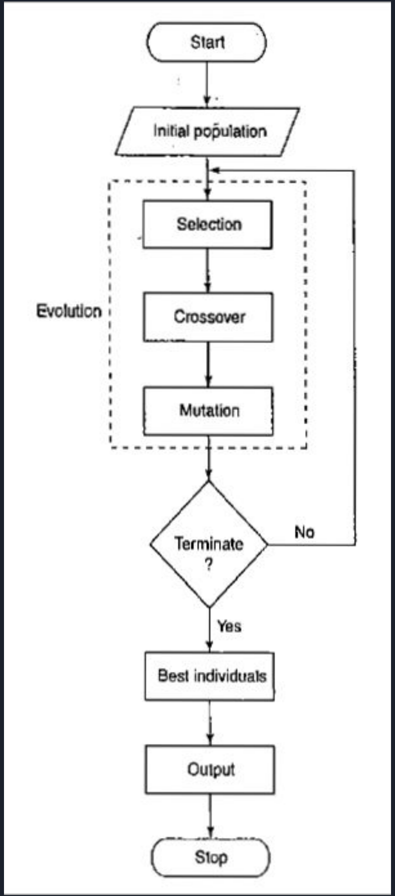
1	CourseCategory	CourseNumber	CourseTitle	Credits
2	CPR E	131	Introduction to Computer Security Literacy	



1	-	-	-	-	-
2	day	8:00am	8:30am	9:00am	9:30am
3	M	-	-	C381	C381
4	M	-	-	E/C330	E/C330
5	M	-	-	C281(W)	C281
6	M	-	-	E451	E451
7	M	-	-	E436X	E436X
8	M	-	-	-	-
9	M	-	-	C308	C308
10	M	-	-	C/E418	C/E418
11	M	-	-	E533X	E533X
12	M	-	-	-	-
13	M	-	-	-	-
14	M	-	-	-	-
15	M	-	-	-	-
16	M	-	-	-	-

Backend - Scheduling Algorithm

- Goal: Create an algorithm to optimize the schedule within specific criteria
- Genetic Algorithm was chosen to implement scheduling as it is a heuristic approach to optimization
- Challenge: Determining the optimal fitness for a chromosome(schedule)
- Challenge: Correctly parsing CSV/python dictionaries for needed information on courses
- Challenge: Determining functionality needed for each python class
- Currently unrealized but framework exists



Challenges

Frontend

- Improving the ease of use for the GUI
- Leveraging the CSV files from the backend
- Getting the various GUI components to work in unison

Backend

- Implementing working scheduling algorithm
    - Framework/python classes implemented
    - Logic to load course information not implemented
- Getting the CSV files to work with the frontend
- Having the CSV files leverage data from each other

Reflection

- Should have focused more on the technical complexity and less on ease of use
- Instead of a standalone application, used a web application
- Leveraged the connection between tools like Angular and Bootstrap to create the frontend
- Implemented the backend using MongoDB and Django

The End

Questions?