

MICHIGAN STATE
UNIVERSITY

Beta Presentation

Training Scheduling and Optimization

System II

The Capstone Experience

Team United Airlines

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From Students...
...to Professionals

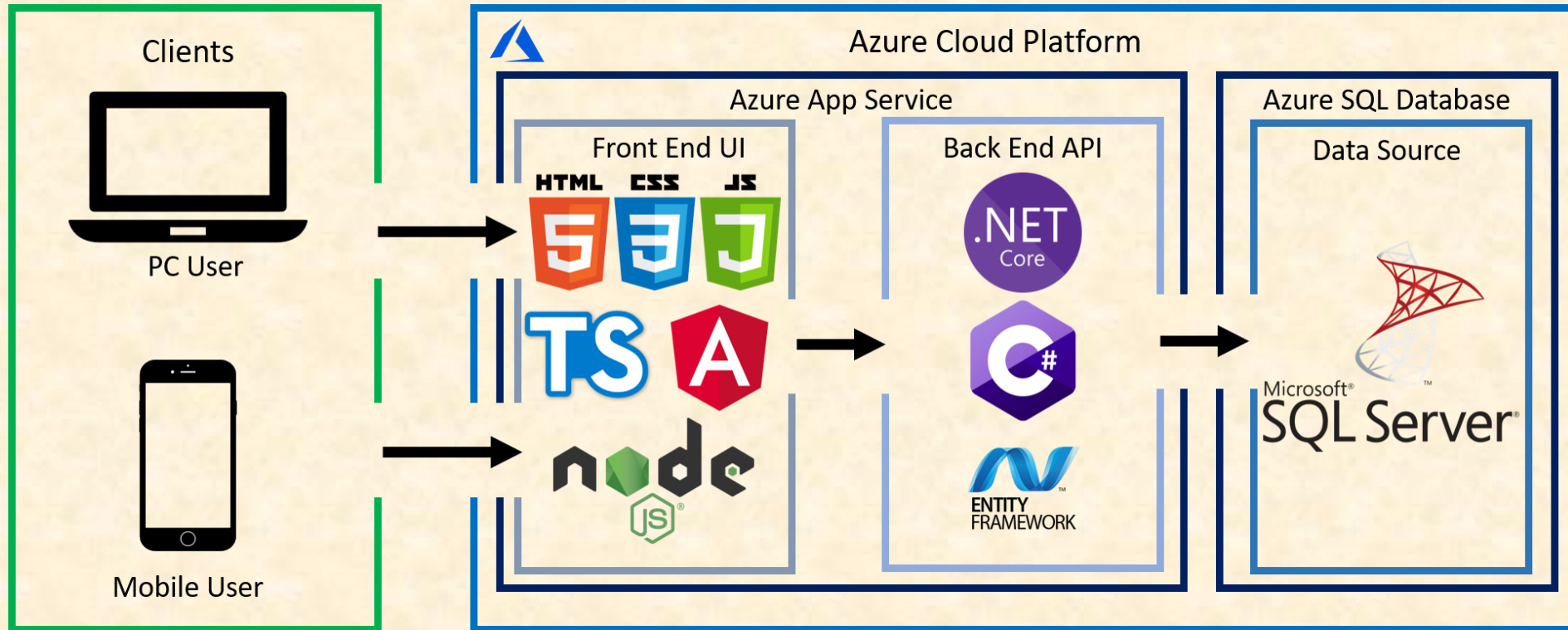
Department of Computer Science and Engineering
Michigan State University
Fall 2019

Project Overview

- Update and enhance the training scheduling system from the spring semester
- Implement an optimizer to recommend a schedule based off different priorities
- Expand the functionality of the application's calendars to include filtering, a course calendar, and more
- Highlight scheduled classes that have conflicting resources with other classes



System Architecture



Calendar Pop Outs

The screenshot displays the Learning Scheduling System interface. The main header includes the "UNITED" logo and the text "Learning Scheduling System". A sidebar on the left contains navigation links: HOME, CALENDARS, COURSE SCHEDULING, SCHEDULE PAGE, ADD A CLASS, SCHEDULE CHANGES, CONFLICT OF INTEREST, TRAINING REQUEST, COURSE CATALOG, EXCEPTIONS, INSTRUCTOR QUALIFICATION, ATTENDANCE, and ADMIN.

The main content area features a "Location Calendar" pop-out window. This window has a title bar "Learning Scheduling System - Google Chrome" and a URL "localhost:51017/popout/scheduleCalendar/locationCalendar". It contains four buttons: "Location Calendar" (highlighted in blue), "Instructor Calendar", "Instructor Availability Calendar", and "Course Calendar". Below these buttons are input fields for "Class Filter:" and "Location Filter:". A legend indicates "Published" (purple square) and "Planned" (red square).

The calendar displays two months: November 2019 and December 2019. The November 2019 calendar shows dates from 17 to 22. The December 2019 calendar shows dates from 1 to 7. The calendar is overlaid on a larger calendar view showing January 2020.

The calendar data includes the following events:

Event	Start Date	End Date	Status
EWB: Hangar 100: 217	November 17, 2019	November 17, 2019	Published
EWB: Hangar 55: Flr-2	November 17, 2019	November 17, 2019	Published
EWB: Hangar 55: Flr-3	November 17, 2019	November 17, 2019	Published
B777 Systems Avionics and Reliability (2 Week)	November 17, 2019	November 22, 2019	Planned
GUM: AO General Office: AT-3	November 17, 2019	November 17, 2019	Published
B757 Main Entry Door (MED) Rig	November 17, 2019	November 17, 2019	Planned
B757 Main Entry Door (MED) Rig	November 17, 2019	November 17, 2019	Planned
HNL: Hangar: A	November 17, 2019	November 17, 2019	Published
HOU: Building 2: 1	November 17, 2019	November 17, 2019	Published
HOU: Building 2: 4	November 17, 2019	November 17, 2019	Published
IAD: Hangar: 217	November 17, 2019	November 17, 2019	Published
737MAX Systems / Avionics Differences	November 17, 2019	November 22, 2019	Planned
IAD: Local	November 17, 2019	November 17, 2019	Published
A319_A320: A04TI096	January 1, 2020	January 1, 2020	Published
A319_A320: A04TI100	January 1, 2020	January 1, 2020	Published

Schedule Optimizer – 1 of 2

The screenshot displays the 'Learning Scheduling System' web application. The browser address bar shows 'localhost:51017/schedule-optimizer'. The application has a dark blue header with the 'UNITED' logo and the title 'Learning Scheduling System'. A left sidebar contains navigation links: HOME, CALENDARS, COURSE SCHEDULE, SCHEDULE PLANNER, ADD A CLASS, SCHEDULE OPTIMIZER (highlighted), CONFLICT OVERVIEW, TRAINING REQUESTS, COURSE CATALOG, EXCEPTIONS, INSTRUCTOR QUALIFICATIONS, ATTENDANCE, and ADMIN. The main content area features a date range selector 'Optimize schedule from: 01/01/2020 to 03/31/2020' with 'Optimize' and 'Add Class' buttons. Below this is a 'Schedule Optimizer' section with a search bar and a table of scheduled classes.

Action	Course Code	Course Title [hrs]	Start Time	Location	Frequency
<input checked="" type="checkbox"/>	TS87	Taxi/Engine Run Student B787 - 8/9	00:00:00	SFO	2
<input checked="" type="checkbox"/>	DT757PW	DT-B757 PW ETOPS Systems	08:00:00	SFO	1
<input checked="" type="checkbox"/>	737SAR	B737 NG Systems Avionics and Reliability	10:00:00	OPC	1
<input checked="" type="checkbox"/>	ICRP	Inspection Composite Repair Processes	08:00:00	IAD	1
<input checked="" type="checkbox"/>	TSRI	Taxi/Engine Run Designated Trainer	12:00:00	LAS	2
<input checked="" type="checkbox"/>	57DOOR	B757 Main Entry Door	08:00:00	CLE	1
<input checked="" type="checkbox"/>	EDC1	Eddy Current Theory and Procedures	11:00:00	EWR	1
<input checked="" type="checkbox"/>	GMMNT	GEN MX Manual - New DT	14:00:00	NHC	1

Schedule Optimizer – 2 of 2

UNITED

HOME

CALENDARS

COURSE SCHEDULE

SCHEDULE PLANNER

ADD A CLASS

SCHEDULE OPTIMIZER

CONFLICT OVERVIEW

TRAINING REQUESTS

COURSE CATALOG

EXCEPTIONS

INSTRUCTOR QUALIFICATIONS

ATTENDANCE

ADMIN

Scheduler

Optimizer Results

Class Filter: Location Filter:

Switch to Instructor View Switch to Location View

Published

Planned

Optimizer Results

< November 2019 >

Su	Mo	Tu	We	Th	Fr	Sa
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30


December 2019

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

January 2020

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4		
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25

	2	3	4	5	6	7	8	9
<input type="checkbox"/> OPC: South Building: S215								
<input type="checkbox"/> OPC: South Building: S216								
<input type="checkbox"/> ORD: Service Center: 7								
<input type="checkbox"/> ORD: Service Center: 8								
<input type="checkbox"/> ORD: Service Center: 9								
<input type="checkbox"/> SAT: Vendor								
<input type="checkbox"/> SEA: Local								
<input type="checkbox"/> SFO: Bldg 10: CRF01								
<input type="checkbox"/> SFO: Bldg 47: 01		B737NG Pneumati	B737NG Pneumati	B737NG Pneumati	Train The Trainer			
<input type="checkbox"/> SFO: Bldg 47: 02		Train The Trainer			B737NG Pneumati			
<input type="checkbox"/> SFO: Bldg 47: 03		DT-B757 RR ETOF	DT-B757 RR ETOF	Taxi/Engine Run M				
<input type="checkbox"/> SFO: Bldg 47: 04		GEN MX Manual - New DT						
<input type="checkbox"/> SFO: Bldg 47: 05		Boeing SRM Familiarization						
<input type="checkbox"/> SFO: Bldg 47: 06								
<input type="checkbox"/> SFO: Bldg 47: 07								

The Capstone Experience

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Schedule Conflict Alerts

The screenshot displays the 'Learning Scheduling System' interface. The top navigation bar includes the 'UNITED' logo and the system name. A left sidebar lists various functions: HOME, CALENDARS, COURSE SCHEDULE, SCHEDULE PLANNER (selected), ADD A CLASS, SCHEDULE OPTIMIZER, CONFLICT OVERVIEW, TRAINING REQUESTS, COURSE CATALOG, EXCEPTIONS, INSTRUCTOR QUALIFICATIONS, ATTENDANCE, and ADMIN. The 'SCHEDULE PLANNER' section features a search bar, an 'Export' button, and a table of scheduled classes. Above the table are buttons for 'Location Calendar', 'Instructor Calendar', 'Instructor Availability Calendar', 'Course Calendar', 'Add Class', and 'Publish'.

Schedule Planner Table:

Action	Conflict(s)	Course Code	Course Title [hrs]	Start Date	End Date	Start Time	Created At	Location	Room	Point	Supervisor
		ULT2	Ultrasonic Theory (Practical) [16]	1/1/20	1/2/20	08:00:00	012ort	DEN	Ftc - A001	OPC	
	<ul style="list-style-type: none">Instructor already in planner during this time/location	TS87	Taxi/Engine Run Student B787-8/9 [16]	1/1/20	1/2/20	00:00:00	012ort	SFO	Bldg 47 - 03	SFO	
	<ul style="list-style-type: none">Instructor already in planner during this time/location	ULT2	Ultrasonic Theory (Practical) [16]	1/2/20	1/3/20	00:00:00	012ort	DEN	Ftc - A011	SFO	

What's left to do?

- Continue testing and improving the run time for the optimizer
- Finish additional modifications to OAM authentication
- Verify Internet Explorer 11 compatibility
- Add resource conflict highlighting to calendars

Questions?

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