

Project presentation on

Time Table Automation

Project Guides:

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Topics included

- 1. Introduction: Need for Time Table Automation**
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IntroDuction: -

- ❑ Motivation...(How it started)
- ❑ Used by: Use Case Diagram
- ❑ Need for Time Table Automation

1. **User-friendly**
2. **Faculty substitute management**
3. **Abstracts essential features**
4. **Save time and efforts**
5. **Reduces error**



Objectives: -

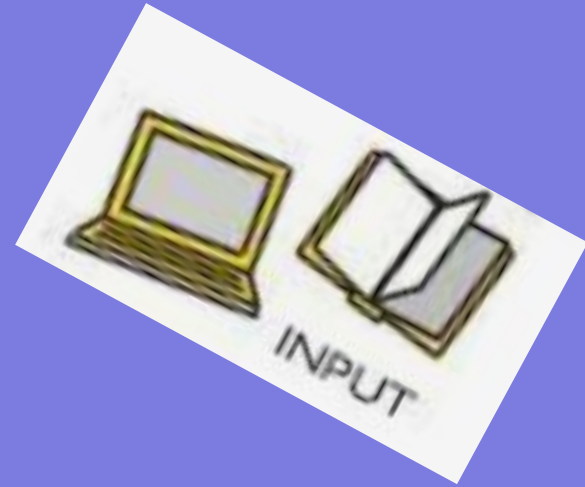
- ❑ Preparing Time Tables manually takes too much time.

Main Objective: -

- To design an algorithm to solve this problem effectively and efficiently.
- Generate particular year semester time tables provided other time tables are already generated.



User Input And Segregation of input.

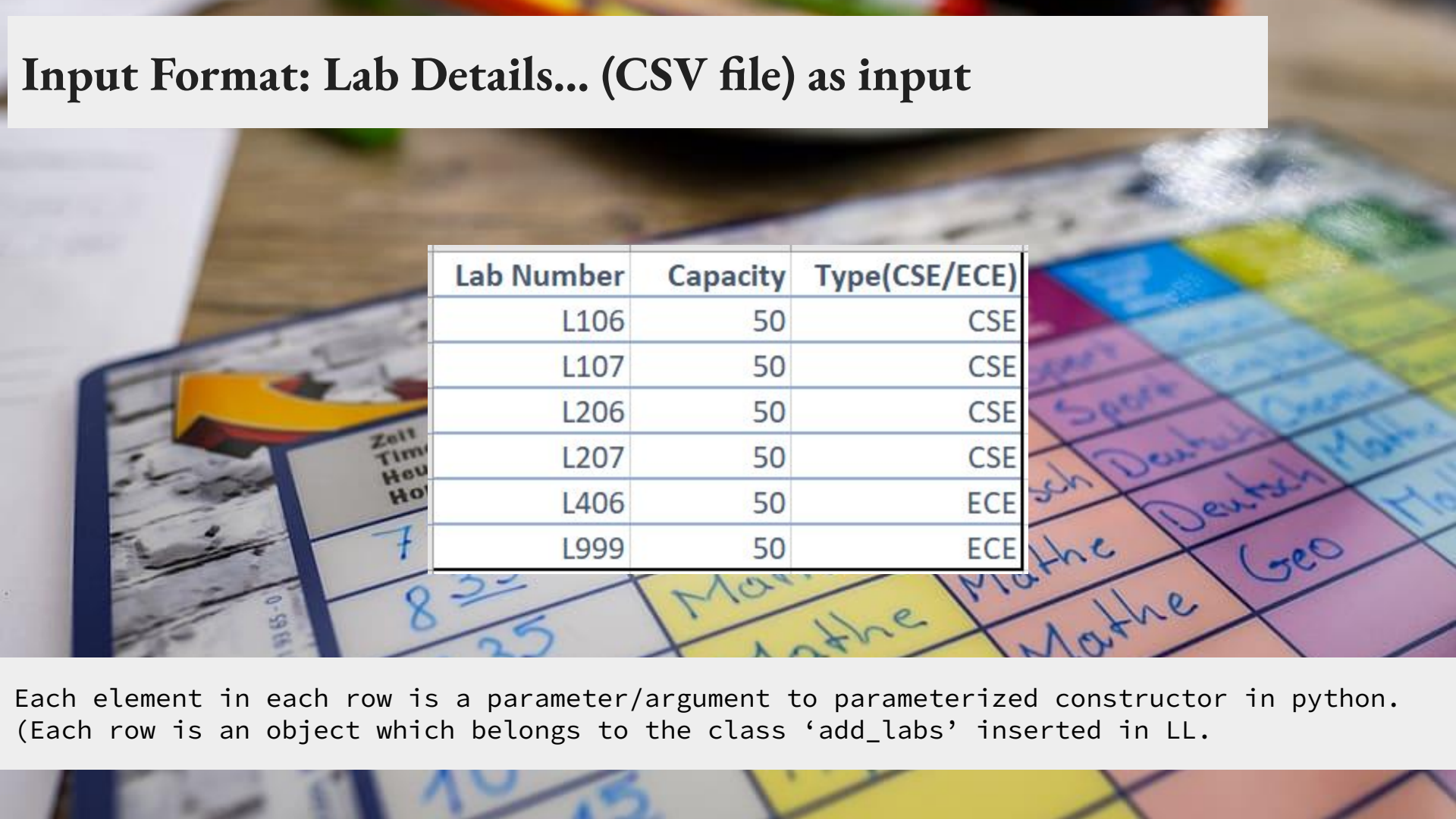


Input Format: CSV for Semester 3 (A and B section)...

<i>code</i>	<i>type</i>	<i>name</i>	<i>branch1</i>	<i>semester1</i>	<i>branch2</i>	<i>semester2</i>	<i>branch3</i>	<i>semester3</i>	<i>classroom_code1</i>	<i>classroom_code2</i>	<i>classroom_code3</i>	<i>faculty1</i>	<i>faculty2</i>	<i>faculty3</i>	<i>theory</i>	<i>tutorial</i>	<i>lab</i>	<i>lab_name</i>
MA201	c	Probability	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Lakshman	NA	NA	3	1	0	CS_LAB
CS201	c	DM	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Rashmi Agarwal	NA	NA	3	1	0	CS_LAB
CS207	c	OOP	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Vivekraj	NA	NA	3	0	2	CS_LAB
CS202	c	DAA	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Malay Kumar	NA	NA	3	1	2	CS_LAB
HS206	c	IP	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Anushree	NA	NA	3	1	0	CS_LAB
EC105	c	CA	CSE	Sem_3_A	NA	NA	NA	NA	C201	NA	NA	Dr. Jagadeesha R Bhat	NA	NA	0	0	2	CS_LAB
MA201	c	Probability	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Lakshman	NA	NA	3	1	0	CS_LAB
CS201	c	DM	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Rashmi Agarwal	NA	NA	3	1	0	CS_LAB
CS207	c	OOP	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Pramod Yelmewad	NA	NA	3	0	2	CS_LAB
CS202	c	DAA	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Radhika	NA	NA	3	1	2	CS_LAB
HS206	c	IP	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Anushree	NA	NA	3	1	0	CS_LAB
EC105	c	CA	CSE	Sem_3_B	NA	NA	NA	NA	C202	NA	NA	Dr. Jagadeesha R Bhat	NA	NA	0	0	2	CS_LAB
EC105	e	CA	CSE	Sem_3_A	CSE	Sem_3_B	NA	NA	C201	C202	NA	Dr. Jagadeesha R Bhat	New1	New2	3	0	2	CS_LAB

Each element in each row is a parameter/argument to parameterized constructor in python. (Each row is an object which belongs to the class 'node_for_courses').

Input Format: Lab Details... (CSV file) as input



Lab Number	Capacity	Type(CSE/ECE)
L106	50	CSE
L107	50	CSE
L206	50	CSE
L207	50	CSE
L406	50	ECE
L999	50	ECE

Each element in each row is a parameter/argument to parameterized constructor in python.
(Each row is an object which belongs to the class 'add_labs' inserted in LL.

More about: Class 'node_for_courses' and its parameterized constructor

What it does: -

Segregates Core and electives based on the 'type' parameter.

1. Adds a new classroom if found.
2. Adds a new Semester if found.
3. Adds a new lab if found.
4. Adds a lab node,theory node,tutorial node.

Question: Where it adds? -In one of the 8 linked lists.

Contents of Linked List: -

Linked List for Lab: -

```
code: CS207_LAB_(B1)
name: OOP
branch1 CSE
faculty1: Dr. Vivekraj
lab time in minutes: 120
```

```
code: CS207_LAB_(B2)
name: OOP
branch1 CSE
faculty1: Dr. Vivekraj
lab time in minutes: 120
```

Linked List for Lab: -

```
code: EC105_LAB_(B1)
name: CA
branch1 CSE
faculty1: Dr. Jagadeesha R Bhat
lab time in minutes: 120
```

```
code: EC105_LAB_(B2)
name: CA
branch1 CSE
faculty1: Dr. Jagadeesha R Bhat
lab time in minutes: 120
```

LL for Theory: -

```
code: CS207_TH
name: OOP
branch1 CSE
faculty1: Dr. Vivekraj
Theory time in minutes: 180
```

```
code: CS202_TH
name: DAA
branch1 CSE
faculty1: Dr. Malay Kumar
Theory time in minutes: 180
```

LL for tutorial: -

```
code: MA201_TUT
name: Probability
branch1 CSE
faculty1: Dr. Lakshman
Theory time in minutes: 60
```

```
code: CS201_TUT
name: DM
branch1 CSE
faculty1: Dr. Rashmi Agarwal
Theory time in minutes: 60
```

They are again divided into 3 linked lists Branch pointers...(not shown due to our initial data)

Converting Time from hours into minutes...

Contents of Linked List: -

LL for Faculty: -

Name: Dr. Jagadeesha R Bhat

Time Table:

```
['Day/Time', '8:30-9:30', '9:30-10:30', '10:30-11:30', '11:30-12:30', '12:30-1:30', '1:30-2:30', '2:30-3:30', '3:30-4:30', '4:30-5:30', '5:30-6:30', '6:30-7:30']
```

```
['Monday', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*']  
['Tuesday', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*']  
['Wednesday', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*']  
['Thursday', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*']  
['Friday', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*', '*']
```

Similarly:

LL for Labs

LL for Classroom

LL for Semesters

LL for electives

Segregating Input

Segregation of Codes based on;

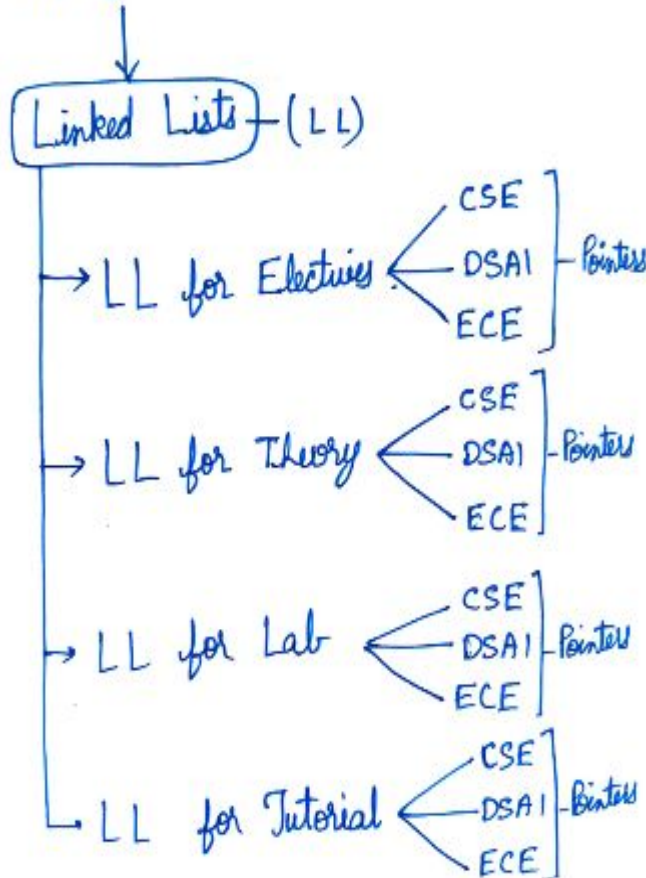
- ① Elective
- ② Core - Theory
- ③ Core - Tutorial
- ④ Core - Lab.

Input → Python class → segregation
↓
node for courses

Course Code
Type - core / elective
Subject Name
Branch.
Semester
Classroom No.
Faculty
Theory Hours /-
Tutorial Hours /-
Lab Hours /-
Lab Name

Workflow : Use Of LL

* Segregated Data.



* Each Node - in any LL - its own Time Table i.e., 2-D array.

* Creating each node:-

- if new faculty → LL for Faculty.
- if new semester → LL for Semester.
- if new lab → LL for Lab
- if new classroom → LL for CR.

* All Data is stored in the above mentioned 8 LL.

Busy Hours calculation for Faculty: -

Name: Dr. Jagadeesha R Bhat
Busy hours: 1561

Name: Dr. Rashmi Agarwal
Busy hours: 961

Name: Dr. Malay Kumar
Busy hours: 961

Name: Dr. Anushree
Busy hours: 961

Name: Dr. Lakshman
Busy hours: 961

Name: Dr. Radhika
Busy hours: 961

Name: Dr. Pramod Yelmewad
Busy hours: 841

Name: Dr. Vivekraj
Busy hours: 841

Name: New1
Busy hours: 1

Name: New2
Busy hours: 1

Each Faculty has a counter(initialized to 1), that holds the Faculty busy hours/mins(not exactly) which is calculated, Then we sort the faculty LL according to the busy hours.

1st: Sort the Faculty acc to busy hours: (shown in previous slide)
2nd: While traversing each faculty (considered as one iteration stage) i.e, one faculty in one iteration.

Scheduling Algorithm

* Function \rightarrow Plotting \rightarrow Main Task
 \downarrow
iterations.

1st - LL for CSE Lab
LL for DSAI Lab
LL for ECE Lab

2nd - LL for CSE Theory
LL for DSAI Theory
LL for ECE Theory.

3rd - LL for CSE Tutorial.
LL for DSAI Tutorial
LL for ECE Tutorial.

- In Each Iteration ...
- In Each LL ...
- In Each Node. **Already done!**

- Fetch Faculty Node
- Fetch Semester Node
- Fetch Classroom Node
- if Lab \rightarrow Fetch whole LL (CSE/ECE)

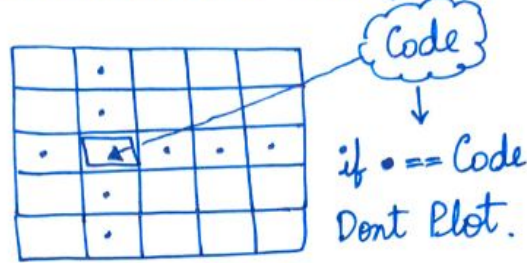
--Then--

- If Faculty Free
 - If Students Free
 - If Classroom Free
 - If Lab - Any Lab Free
- Book that particular Slot & decrement the time counter

Based on Priority. { Theory Hours
Tutorial Hours
Lab Hours.

Conditions while plotting...

* Condition while Plotting :-



* After few iterations, this rule is relaxed as we would have a random Time Table.

* Also if Faculty has a class before on that same day, do not plot.

* Worst Case - no possibilities are found - above rule is overwritten

→ End of Function Plotting.

◦ Function → Plotting → Electives .

↓
Iterations.

1st : Labs

2nd : Theory

3rd : Tutorial

No Segregation
Based on Branch

→ Same Procedure as Plotting Function.

→ Changes :

◦ Each Time :-

(i) Check which ever class is free.

(ii) Check which ever lab is free.

(iii) Faculty must be Free.

** (iv) Students need not be Free *

SAMPLE CODE OUTPUT:- (VERSION 1 BEGINNING...)(BEGINNING MOTIVATION FOR THIS PROJECT) 😊

-----STUDENTS TIME TABLE-----

Day	9:00-10:30	10:45-11:45	11:45-12:45	1:45-3:15	3:15-4:15	4:15-5:15
Monday	DSA	MPMC	*	*	*	*
Tuesday	MPMC	DSA	*	*	*	*
Wednesday	DSA	MPMC	*	*	*	*
Thursday	CSE	Math	*	*	*	*
Friday	CSE	Math	*	*	*	*

SAMPLE CODE OUTPUT:- (TO LATEST VERSION) (ALLOCATION OF LABS DO NOT USE THE LATEST APPROACH)

Semester : CSE_Sem_3_A(C201)

Branch : CSE

Day/Time	9:00-10:30	11:00-12:00	12:00-1:00	2:00-3:30	3:30-5:00	.
Monday	CS202_TH	EC105_LAB_(B1) L106 / CS207_LAB_(B2) L107	EC105_LAB_(B1) L106 / CS207_LAB_(B2) L107	CS202_TH	HS206_TH	.
Tuesday	CS202_TUT	EC105_LAB_(B2) L106 / CS207_LAB_(B1) L107	EC105_LAB_(B2) L106 / CS207_LAB_(B1) L107	MA201_TH	*	.
Wednesday	CS207_TH	CS202_LAB_(B1) L107	CS202_LAB_(B1) L107	CS201_TH	HS206_TUT	.
Thursday	MA201_TH	CS202_LAB_(B2) L107	CS202_LAB_(B2) L107	CS201_TH	EC105_TH(C201) /EC105_TH(C202) /EC105_TH(C203)	.
Friday	CS207_TH	MA201_TUT	CS201_TUT	HS206_TH	EC105_TH(C201) /EC105_TH(C202) /EC105_TH(C203)	.

Semester : CSE_Sem_3_B(C202)

Branch : CSE

Day/Time	9:00-10:30	11:00-12:00	12:00-1:00	2:00-3:30	3:30-5:00	.
Monday	MA201_TH	CS207_LAB_(B1) L206 / CS202_LAB_(B2) L207	CS207_LAB_(B1) L206 / CS202_LAB_(B2) L207	CS202_TH	CS201_TUT	.
Tuesday	MA201_TUT	CS207_LAB_(B2) L206 / CS202_LAB_(B1) L207	CS207_LAB_(B2) L206 / CS202_LAB_(B1) L207	CS201_TH	HS206_TH	.
Wednesday	CS207_TH	EC105_LAB_(B1) L106	EC105_LAB_(B1) L106	MA201_TH	*	.
Thursday	CS202_TH	EC105_LAB_(B2) L106	EC105_LAB_(B2) L106	HS206_TH	EC105_TH(C201) /EC105_TH(C202) /EC105_TH(C203)	.
Friday	CS207_TH	CS202_TUT	HS206_TUT	CS201_TH	EC105_TH(C201) /EC105_TH(C202) /EC105_TH(C203)	.

SIMILARLY WE HAVE THE FACULTY TIME TABLES, CLASSROOM TT, LAB TT GENERATED SIMULTANEOUSLY..

SAMPLE CODE OUTPUT(LATEST VERSION) (SAMPLE DATA IS GIVEN AS INPUT)

CSE_Sem_3_A

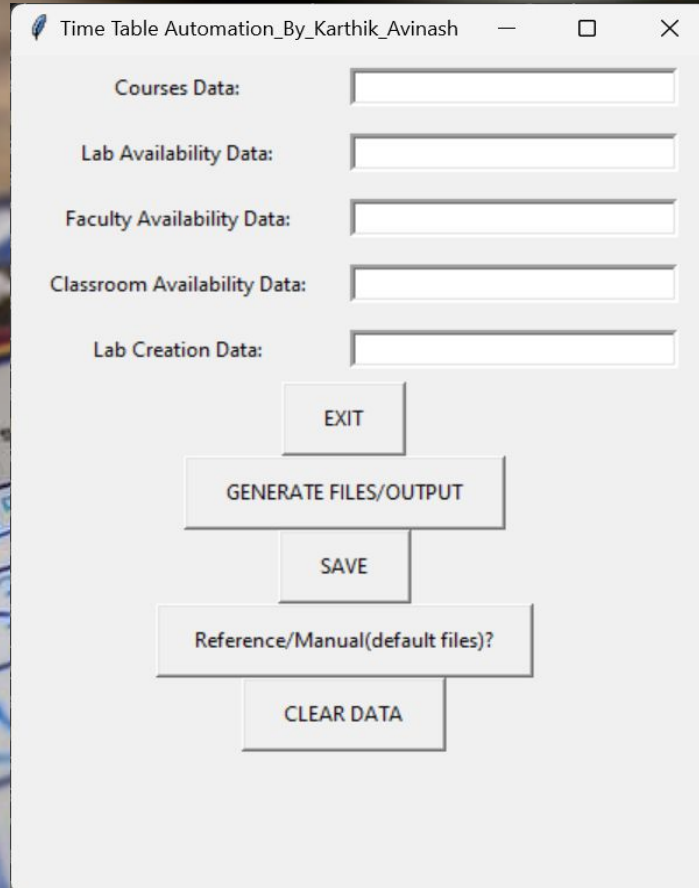
Slot	I		II	III		IV	V	VI	VII
Day/Time	9:00-10:30	B R E A K	11:00-12:00	12:00-1:00	L U N C H	2:00-3:30	3:30-5:00		.
Monday	CS201_TH		CS207_LAB_(B1) L106 / CS202_LAB_(B2) L107	CS207_LAB_(B1) L106 / CS202_LAB_(B2) L107		CS202_TH	EC105_LAB_(B2) L206	.	.
Tuesday	EC105_TH		CS207_LAB_(B2) L106 / CS202_LAB_(B1) L107	CS207_LAB_(B2) L106 / CS202_LAB_(B1) L107		CS201_TH	HS206_TH(C701) /HS206_TH(C201) /HS206_TH(C202) /	.	.
Wednesday	CS207_TH		CS202_TUT	MA201_TUT		EC105_TH	HS206_TH(C701) /HS206_TH(C201) /HS206_TH(C202) /	.	.
Thursday	CS202_TH		CS201_TUT	*		MA201_TH	HS206_TUT(C205) /HS206_TUT(C801) /	.	.
Friday	CS207_TH		EC105_LAB_(B1) L106	EC105_LAB_(B1) L106		MA201_TH	*HS206_TUT(C205) /	.	.

SAMPLE CODE OUTPUT (LATEST VERSION) (SAMPLE DATA IS GIVEN AS INPUT)

CSE_Sem_3_B

Slot	I		II	III		IV	V	VI	VII
Day/Time	9:00-10:30	B	11:00-12:00	12:00-1:00	L	2:00-3:30	3:30-5:00		.
Monday	CS207_TH	R	EC105_LAB_(B1) L206 / CS202_LAB_(B2) L207	EC105_LAB_(B1) L206 / CS202_LAB_(B2) L207	U	CS202_TH	MA201_TUT	.	.
Tuesday	MA201_TH	E	EC105_LAB_(B2) L206 / CS202_LAB_(B1) L207	EC105_LAB_(B2) L206 / CS202_LAB_(B1) L207	N	CS207_TH	HS206_TH(C701) /HS206_TH(C201) /HS206_TH(C202) /	.	.
Wednesday	EC105_TH	A	CS202_TUT	CS201_TUT	C	MA201_TH	HS206_TH(C701) /HS206_TH(C201) /HS206_TH(C202) /	.	.
Thursday	CS202_TH	K	CS207_LAB_(B1) L106	CS207_LAB_(B1) L106	H	CS201_TH	HS206_TUT(C205) /HS206_TUT(C801) /	.	.
Friday	EC105_TH		CS207_LAB_(B2) L107	CS207_LAB_(B2) L107		CS201_TH	*HS206_TUT(C205) /	.	.

COMMAND LINE VERSION



Time Table Automation_By_Karthik_Avinash

Courses Data:

Lab Availability Data:

Faculty Availability Data:

Classroom Availability Data:

Lab Creation Data:

EXIT

GENERATE FILES/OUTPUT

SAVE

Reference/Manual(default files)?

CLEAR DATA

We can create a time table for a separate semester which may have started early or late than the normal schedule with no conflict with running courses with the availability information passed to this interface.

Challenges Faced...

1. Distinguishing between Theory, Tutorial, Lab.
2. Labs not uniform across branches and semesters.
3. All students lab at 10:45-12:45.
4. Electives were totally different than normal courses.
5. Many faculty handling same course.
6. Few morning slots were not occupied.
7. No proper sample data for testing the program.
8. Building program based on assumptions/instructions given by our project guides.
9. Creating batches in lab for same section and Parallel labs conduction.

Challenges Faced...(contd..)

10. Class and lab numbers display was hardcoded.(Needed to be changed)
11. If students were in lab, their classrooms were empty, not utilized properly.
12. Acquiring entire column of courses and not possible to plot for any other subject in that column, but the faculty is free only in that column(Plotting not possible for that subject).
13. Time slots were not mentioned.(used same time slots for entire campus)-Later, Changed based on Branch, Semester, Section...
14. Time Slots changed based on semesters and students workload(or number of classes per week).
15. Creating Faculty's and Lab's time tables based on various time slots for different branches, semesters and sections...(Many more:)

New features added!!!

- 1. More than one teacher handling same Subject (MAX 3).**
- 2. Creation of separate Time Tables (provided some prior data is given).**
- 3. Not all students are allowed at the same time for lunch break in the afternoon.**
- 4. Minimize the number of extra classrooms needed for electives.**
- 5. Common courses among different branches.**
- 6. Able to create 1st year students Time Table given 2nd, 3rd and 4th year Time Table or their partial necessary details.**

CONCLUSION

- This project consists around 5,400 lines of python code, which can further be reduced dramatically using the ideas such as code reusability, oop, etc...
- This project taken up by us has resulted in creating the web page to create and display semester timetable in dynamic way.
- Each parameter of flexibility incorporated in Timetable, has posed challenges in coding and is accommodated.
- Good things always continues-Further the same project can be modified(acc to needs), improved and later be formally used for our time table creation.
- We did our best with the timely inputs shared by the faculty in designing Automated Timetable for IIIT Dharwad, all branches, all the semesters, all the sections.

We look forward for such innovative project ideas, which will enhance our creativity and research culture.

Acknowledgement

Project Guides:

Dr. Vivekraj V K

Dr. Radhika B S

Dr. Avantika Singh

