

OOM Assignment 2

Part 1

A time table for this institute has the following slots for taking classes: 9-10, 10-11, 11:15-12:15, 12:15-1:15, 3-4, 4-5, and 5-6. The time table spans from Monday to Friday. Make the time table for 1 batch.

Each course has a number of slots with durations. Like IOOM332C has 2 slots in the time table, one for 2 hours and one for 1 hour. The slots must be strictly such that the entire duration of the slot must be available as continuous. So a 2 hour class cannot be taken as 10:00-11:00 and 11:15-12:15. The theory, labs and tutorials are entered as separate courses with different course codes.

The allocation of time table for every course happens in a prioritized manner. All courses have a priority which is an integer. The lower is the numeric priority value, the more is the importance of the course. You first allocate the first slot associated with the highest priority course. Then you allocate the first slot associated with the second highest priority course and so on till all courses have one slot filled up. Then you allocate the 2nd slot associated with every course in the same order of priority, and so on.

Every slot has a preference, which is both in terms of the time of the day that a course should preferably run (primary) and the day on which the course should run (secondary). The day preference is specified by a string 143 means that the preference is 1 (Monday), followed by 4 (Thursday), followed by 3 (Wednesday), and thereafter any day which are all equally good. The time preference is specified by a string where every 4 consecutive integers denote a time so a preference 090010001115 means, in increasing order of preference, the slots, 09:00-10:00, 10:00-11:00, 11:15-12:15, and so on.

While allocating a course, you first try to find the best slot available as per the primary and secondary time and day preferences. If none of the preferences are available, then the allocation takes place so as to balance the workload, and the day of the week with the least number of working hours is selected (primary), in the preference order from Monday to Friday (secondary). The selection of time is done so as to have classes as early as possible, and the first feasible and available slot is selected.

Consider requested time slots are (for a 1 hour class) 10-11 and 11:15-12:15, while the requested day slots are T and W. Consider the total working load so far is M: 1, T: 3, W: 4, Th: 6, F: 2. So a typical day preference as per the time table is M(1), F(2), T(3), W(4), Th(6). The following are the attempts made to place a course:

Attempt 1, best time, in the order of day preference:	(10-11, T), (10-11, W)
Attempt 2, best time, other than preferred day as per time table preference:	(10-11, M), (10-11, F), (10-11, Th)
Attempt 3, 2nd best time, in the order of day preference:	(11:15-12:15, T), (11:15-12:15, W)
Attempt 4, 2nd best time, other than preferred day as per time table preference:	(11:15-12:15, M), (11:15-12:15, F), (11:15-12:15, Th)

Attempt 5, best day, time as per time table preference, earliest first	(T, 9-10), (T, 10-11), (T, 11:15-12:15), (T, 12:15-1:15), (T, 3-4), (T, 4-5), (T, 5-6), (W, 9-10), (W, 10-11), (W, 11:15-12:15), (W, 12:15-1:15), (W, 3-4), (W, 4-5), (W, 5-6)
Attempt 6, any day as per time table preference, any time as per time table preference	(M, 9-10), (M, 10-11), (M, 11:15-12:15), (M, 12:15-1:15), (M, 3-4), (M, 4-5), (M, 5-6), (F, 9-10), (F, 10-11), (F, 11:15-12:15), (F, 12:15-1:15), (F, 3-4), (F, 4-5), (F, 5-6) (Th, 9-10), (Th, 10-11), (Th, 11:15-12:15), (Th, 12:15-1:15), (Th, 3-4), (Th, 4-5), (Th, 5-6)
Attempt 7, Saturday	Saturday (no time)

If a course cannot be allocated due to no available slots, then, it is notionally added on a Saturday. The Saturday courses have no time specified and are taken as per the wish of the instructor. All Saturday courses should be appended in a sorted order, sorted by course code.

Input:

The first input is the number of test cases. Each test case starts with the number of courses for the batch followed by the details of all courses.

Each course specifies the course code, name of the course, instructor's name, course priority and the number of slots needed by the course. These details are followed by the details of each slot.

The slot details include the duration, day preference and time preference. NIL means no preference.

Output:

Print the time table in the format "Monday", "Tuesday"... "Saturday" in separate lines. Each line additionally prints in the increasing order of time slot the time followed by the course details. Saturday courses are sorted as per course code. Blank means no courses for the particular day.

Sample Input

Number of test cases	1
Number of courses	9
Details of SMAT330C	SMAT330C Maths Anand 3 2
Details for 1 st slot	1 12 09001000
Details for 2 nd slot	2 23 09001000
Details of IOOM332C	IOOM332C ObjectOrientedMethodologies Vyas 1 2
Details for 1 st slot	1 145 10000300
Details for 2 nd slot	2 145 10000300
Details of IOOM332C-Lab	IOOM332C-Lab ObjectOrientedMethodologiesLab Kala 2 1
Details for 1 st slot	3 12 1000

Details of ITOC330C	ITOC330C TheoryOfComputation Manish 5 2
Details for 1 st slot	2 NIL 1115
Details for 2 nd slot	1 NIL 1115
Details of ITOC330C-Tut	ITOC330C-Tutorial TheoryOfComputationTutorial Manish 9 1
Details for 1 st slot	2 NIL NIL
Details of EMIP332C	EMIP332C Microprocessor Arun 6 2
Details for 1 st slot	1 NIL NIL
Details for 2 nd slot	2 NIL NIL
Details of EMIP332C-Lab	EMIP332C-Lab MicroprocessorLab Arun 8 1
Details for 1 st slot	3 1 NIL
Details of IOPS332C	IOPS332C OperatingSystem Jagpreet 4 2
Details for 1 st slot	2 24 030012151115
Details for 2 nd slot	1 24 030012151115
Details of IOPS332C-Lab	IOPS332C-Lab OperatingSystemLab Jagpreet 7 1
Details for 1 st slot	3 NIL NIL

Sample Output

Monday

9:00-10:00 SMAT330C Maths Anand

10:00-11:00 IOOM332C ObjectOrientedMethodologies Vyas

3:00-6:00 IOOM332C-Lab ObjectOrientedMethodologiesLab Kala

Tuesday

9:00-11:00 ITOC330C-Tutorial TheoryOfComputationTutorial Manish

12:15-1:15 IOPS332C OperatingSystem Jagpreet

3:00-5:00 IOPS332C OperatingSystem Jagpreet

Wednesday

9:00-11:00 SMAT330C Maths Anand

11:15-1:15 ITOC330C TheoryOfComputation Manish

3:00-5:00 IOOM332C ObjectOrientedMethodologies Vyas

Thursday

9:00-10:00 EMIP332C Microprocessor Arun

11:15-1:15 EMIP332C Microprocessor Arun

3:00-6:00 EMIP332C-Lab MicroprocessorLab Arun

Friday

11:15-12:15 ITOC330C TheoryOfComputation Manish

3:00-6:00 IOPS332C-Lab OperatingSystemLab Jagpreet

Saturday

Explanation

Allocations to be done:

S. No.	Course	Priority	Slot Duration	Day Preference	Time Preference
1.	SMAT330C	3	1	M, T	09:00, 10:00
2.	SMAT330C	3	2	T, W	09:00, 10:00
3.	IOOM332C	1	1	M, Th, F	10:00, 03:00
4.	IOOM332C	1	2	M, Th, F	10:00, 03:00
5.	IOOM332C-Lab	2	3	M, T	10:00

6.	ITOC330C	5	2	NIL	11:15
7.	ITOC330C	5	1	NIL	11:15
8.	ITOC330C-Tut	9	2	NIL	NIL
9.	EMIP332C	6	1	NIL	NIL
10.	EMIP332C	6	2	NIL	NIL
11.	EMIP332C-Lab	8	3	M	NIL
12.	IOPS332C	4	2	T, Th	03:00, 12:15, 11:15
13.	IOPS332C	4	1	T, Th	03:00, 12:15, 11:15
14.	IOPS332C-Lab	7	3	NIL	NIL

Allocations in the order of priority:

S. No.	Course	Priority	Slot Duration	Day Preference	Time Preference
1.	IOOM332C	1	1	M, Th, F	10:00, 03:00
2.	IOOM332C-Lab	2	3	M, T	10:00
3.	SMAT330C	3	1	M, T	09:00, 10:00
4.	IOPS332C	4	2	T, Th	03:00, 12:15, 11:15
5.	ITOC330C	5	2	NIL	11:15
6.	EMIP332C	6	1	NIL	NIL
7.	IOPS332C-Lab	7	3	NIL	NIL
8.	EMIP332C-Lab	8	3	M	NIL
9.	ITOC330C-Tut	9	2	NIL	NIL
10.	IOOM332C	1	2	M, Th, F	10:00, 03:00
11.	SMAT330C	3	2	T, W	09:00, 10:00
12.	IOPS332C	4	1	T, Th	03:00, 12:15, 11:15
13.	ITOC330C	5	1	NIL	11:15
14.	EMIP332C	6	2	NIL	NIL

Time Table Numbers in () point to the S.No. in the table

	9:00-10:00	10:00-11:00		11:15-12:15	12:15-1:15		3:00-4:00	4:00-5:00	5:00-6:00
M	SMAT330C (3)	IOOM332C (1)					IOOM332C-Lab (2)		
T	ITOC330C-Tut (9)				IOPS332C (12)		IOPS332C (4)		
W	SMAT330C (11)			ITOC330C (5)			IOOM332C (10)		
Th	EMIP332C (6)			EMIP332C (14)			EMIP332C-Lab (8)		
F				ITOC330C (13)			IOPS332C-Lab (7)		
S									

Part 2

There are more than one batches running in this institute. You need to make a time table for all of them, instead of just one. Ensure adherence of the constraint that no faculty can simultaneously take two classes, and no student can simultaneously attend two lectures.

Input Format

The first input is the number of test cases. Each test case starts with the number of batches followed by the names of all batches. Thereafter, the next input is the number of faculty and names of all faculty. Thereafter the next input is the number of courses and details of all courses.

Each course specifies the course code, name of the course, instructor's name, course priority, batch for which the course runs and the number of slots needed by the course. These details are followed by the details of each slot.

The slot details include the duration, day preference and time preference. NIL means no preference.

Sample Input

Number of test cases	1
Number of batches	2
Names of batches	First Second
Number of faculty	10
Names of faculty	Anand Arun Jagpreet Kala Manish Pragya Pramod Shashikant Sunny Vyas
Number of courses	24
Details of SMAT330C	SMAT330C Maths Anand 6 Second 2
Details for 1 st slot	1 12 09001000
Details for 2 nd slot	2 23 09001000
Details of IOOM332C	IOOM332C ObjectOrientedMethodologies Vyas 2 Second 2
Details for 1 st slot	1 145 10000300
Details for 2 nd slot	2 145 10000300
Details of IOOM332C-Lab	IOOM332C-Lab ObjectOrientedMethodologiesLab Kala 4 Second 1
Details for 1 st slot	3 12 1000
Details of ITOC330C	ITOC330C TheoryOfComputation Manish 10 Second 2
Details for 1 st slot	2 NIL 1115
Details for 2 nd slot	1 NIL 1115
Details of ITOC330C-Tut	ITOC330C-Tutorial TheoryOfComputationTutorial Manish 18 Second 1
Details for 1 st slot	2 NIL NIL
Details of EMIP332C	EMIP332C Microprocessor Arun 12 Second 2
Details for 1 st slot	1 NIL NIL
Details for 2 nd slot	2 NIL NIL
Details of EMIP332C-Lab	EMIP332C-Lab MicroprocessorLab Arun 16 Second 1
Details for 1 st slot	3 1 NIL
Details of IOPS332C	IOPS332C OperatingSystem Jagpreet 8 Second 2
Details for 1 st slot	2 24 030012151115
Details for 2 nd slot	1 24 030012151115
Details of IOPS332C-Lab	IOPS332C-Lab OperatingSystemLab Jagpreet 14 Second 1

Details for 1 st slot	3 NIL NIL
Details of LAL	LAL LinearAlgebra Anand 27 First 3
Details for 1 st slot	1 NIL NIL
Details for 2 nd slot	1 NIL NIL
Details for 3 rd slot	1 NIL NIL
Details of LAL-Tut	LAL-Tut LinearAlgebraTut Anand 15 First 1
Details for 1 st slot	2 NIL NIL
Details of PHY	PHY Physics Pramod 17 First 1
Details for 1 st slot	2 NIL NIL
Details of PHY Lab	PHY-Lab PhysicsLab Pramod 13 First 1
Details for 1 st slot	2 NIL NIL
Details of PHY Tut	PHY-Tut PhysicsTutorial Pramod 9 First 1
Details for 1 st slot	2 NIL NIL
Details of ITP	ITP Intro2Programming Vyas 1 First 1
Details for 1 st slot	2 NIL NIL
Details of ITP-Tut	ITP-Tut Intro2ProgrammingTut Vyas 7 First 1
Details for 1 st slot	2 NIL NIL
Details of ITP-Lab	ITP-Lab Intro2ProgrammingLab Vyas 5 First 1
Details for 1 st slot	2 NIL NIL
Details of FEE	FEE Fee Sunny 28 First 1
Details for 1 st slot	2 NIL NIL
Details of FEE-Tut	FEE-Tut FeeTut Sunny 19 First 1
Details for 1 st slot	2 NIL NIL
Details of FEE Lab	FEE-Lab FeeLab Sunny 3 First 1
Details for 1 st slot	2 NIL NIL
Details of PFC	PFC ProfessionalCommunication Pragya 11 First 1
Details for 1 st slot	1 NIL NIL
Details of PFC-Lab	PFC-Lab ProfessionalCommunicationLab Pragya 25 First 1
Details for 1 st slot	2 NIL NIL
Details of POM	POM PrinciplesOfManagement Shashikant 21 First 1
Details for 1 st slot	1 NIL NIL
Details of POM-Tut	POM-Tut PrinciplesOfManagementTut Shashikant 23 First 1
Details for 1 st slot	2 NIL NIL

Sample Output

First

Monday

9:00-11:00 ITP Intro2Programming Vyas

11:15-12:15 PFC ProfessionalCommunication Pragya

12:15-1:15 POM PrinciplesOfManagement Shashikant

3:00-5:00 POM-Tut PrinciplesOfManagementTut Shashikant

Tuesday

9:00-11:00 FEE-Lab FeeLab Sunny

11:15-1:15 PHY-Lab PhysicsLab Pramod

3:00-5:00 PFC-Lab ProfessionalCommunicationLab Pragya

Wednesday

9:00-11:00 ITP-Lab Intro2ProgrammingLab Vyas

11:15-1:15 LAL-Tut LinearAlgebraTut Anand

3:00-4:00 LAL LinearAlgebra Anand
 4:00-5:00 LAL LinearAlgebra Anand
 Thursday
 9:00-11:00 PHY Physics Pramod
 11:15-1:15 ITP-Tut Intro2ProgrammingTut Vyas
 3:00-5:00 FEE Fee Sunny
 Friday
 9:00-11:00 PHY-Tut PhysicsTutorial Pramod
 11:15-1:15 FEE-Tut FeeTut Sunny
 3:00-4:00 LAL LinearAlgebra Anand
 Saturday
 Second
 Monday
 9:00-10:00 SMAT330C Maths Anand
 11:15-12:15 ITOC330C TheoryOfComputation Manish
 3:00-6:00 IOOM332C-Lab ObjectOrientedMethodologiesLab Kala
 Tuesday
 9:00-11:00 ITOC330C-Tutorial TheoryOfComputationTutorial Manish
 12:15-1:15 IOPS332C OperatingSystem Jagpreet
 3:00-5:00 IOPS332C OperatingSystem Jagpreet
 Wednesday
 9:00-11:00 SMAT330C Maths Anand
 11:15-1:15 ITOC330C TheoryOfComputation Manish
 3:00-5:00 IOOM332C ObjectOrientedMethodologies Vyas
 Thursday
 10:00-11:00 IOOM332C ObjectOrientedMethodologies Vyas
 11:15-1:15 EMIP332C Microprocessor Arun
 3:00-6:00 IOPS332C-Lab OperatingSystemLab Jagpreet
 Friday
 9:00-10:00 EMIP332C Microprocessor Arun
 3:00-6:00 EMIP332C-Lab MicroprocessorLab Arun
 Saturday

Part 3

In part 2, print the faculty time table for all faculty in the same order as supplied in the input (which may not be the alphabetical order).

Sample Input

Same as above

Sample Output

Anand
 Monday
 9:00-10:00 SMAT330C Maths Anand
 Tuesday
 Wednesday
 9:00-11:00 SMAT330C Maths Anand
 11:15-1:15 LAL-Tut LinearAlgebraTut Anand
 3:00-4:00 LAL LinearAlgebra Anand

4:00-5:00 LAL LinearAlgebra Anand

Thursday

Friday

3:00-4:00 LAL LinearAlgebra Anand

Saturday

Arun

Monday

Tuesday

Wednesday

Thursday

11:15-1:15 EMIP332C Microprocessor Arun

Friday

9:00-10:00 EMIP332C Microprocessor Arun

3:00-6:00 EMIP332C-Lab MicroprocessorLab Arun

Saturday

Jagpreet

Monday

Tuesday

12:15-1:15 IOPS332C OperatingSystem Jagpreet

3:00-5:00 IOPS332C OperatingSystem Jagpreet

Wednesday

Thursday

3:00-6:00 IOPS332C-Lab OperatingSystemLab Jagpreet

Friday

Saturday

Kala

Monday

3:00-6:00 IOOM332C-Lab ObjectOrientedMethodologiesLab Kala

Tuesday

Wednesday

Thursday

Friday

Saturday

Manish

Monday

11:15-12:15 ITOC330C TheoryOfComputation Manish

Tuesday

9:00-11:00 ITOC330C-Tutorial TheoryOfComputationTutorial Manish

Wednesday

11:15-1:15 ITOC330C TheoryOfComputation Manish

Thursday

Friday

Saturday

Pragya

Monday

11:15-12:15 PFC ProfessionalCommunication Pragya

Tuesday

3:00-5:00 PFC-Lab ProfessionalCommunicationLab Pragya

Wednesday

Thursday

Friday
 Saturday
 Pramod
 Monday
 Tuesday
 11:15-1:15 PHY-Lab PhysicsLab Pramod
 Wednesday
 Thursday
 9:00-11:00 PHY Physics Pramod
 Friday
 9:00-11:00 PHY-Tut PhysicsTutorial Pramod
 Saturday
 Shashikant
 Monday
 12:15-1:15 POM PrinciplesOfManagement Shashikant
 3:00-5:00 POM-Tut PrinciplesOfManagementTut Shashikant
 Tuesday
 Wednesday
 Thursday
 Friday
 Saturday
 Sunny
 Monday
 Tuesday
 9:00-11:00 FEE-Lab FeeLab Sunny
 Wednesday
 Thursday
 3:00-5:00 FEE Fee Sunny
 Friday
 11:15-1:15 FEE-Tut FeeTut Sunny
 Saturday
 Vyas
 Monday
 9:00-11:00 ITP Intro2Programming Vyas
 Tuesday
 Wednesday
 9:00-11:00 ITP-Lab Intro2ProgrammingLab Vyas
 3:00-5:00 IOOM332C ObjectOrientedMethodologies Vyas
 Thursday
 10:00-11:00 IOOM332C ObjectOrientedMethodologies Vyas
 11:15-1:15 ITP-Tut Intro2ProgrammingTut Vyas
 Friday
 Saturday

Part 4

The time table was floated to all faculty and the faculty gave some suggestions that need to be incorporated into the time table, if admissible. Each suggestion has a priority and needs to be incorporated in the same order of priority. The suggestions include the course code, slot number and new preference in day and time format. The allocation is done as per the same

principles as above and may result in a slot being placed in a poorer location as before when none of the preferences are met.

Sample Input

<following part 2>

Number of suggestions	5
Suggestion 1	SMAT330C 1 1 53 10001115
Suggestion 2	IOOM332C 2 3 4 1115
Suggestion 3	IOPS332C 2 2 32 03000400
Suggestion 4	PFC 1 4 2 03001215
Suggestion 5	POM 1 5 14 09000400

Sample Output

First

Monday

9:00-11:00 ITP Intro2Programming Vyas

3:00-5:00 POM-Tut PrinciplesOfManagementTut Shashikant

Tuesday

9:00-11:00 FEE-Lab FeeLab Sunny

11:15-1:15 PHY-Lab PhysicsLab Pramod

3:00-5:00 PFC-Lab ProfessionalCommunicationLab Pragya

5:00-6:00 PFC ProfessionalCommunication Pragya

Wednesday

9:00-11:00 ITP-Lab Intro2ProgrammingLab Vyas

11:15-1:15 LAL-Tut LinearAlgebraTut Anand

3:00-4:00 LAL LinearAlgebra Anand

4:00-5:00 LAL LinearAlgebra Anand

Thursday

9:00-11:00 PHY Physics Pramod

11:15-1:15 ITP-Tut Intro2ProgrammingTut Vyas

3:00-5:00 FEE Fee Sunny

Friday

9:00-11:00 PHY-Tut PhysicsTutorial Pramod

11:15-1:15 FEE-Tut FeeTut Sunny

3:00-4:00 LAL LinearAlgebra Anand

4:00-5:00 POM PrinciplesOfManagement Shashikant

Saturday

Second

Monday

11:15-12:15 ITOC330C TheoryOfComputation Manish

3:00-6:00 IOOM332C-Lab ObjectOrientedMethodologiesLab Kala

Tuesday

9:00-11:00 ITOC330C-Tutorial TheoryOfComputationTutorial Manish

11:15-1:15 IOOM332C ObjectOrientedMethodologies Vyas

3:00-5:00 IOPS332C OperatingSystem Jagpreet

Wednesday

9:00-11:00 SMAT330C Maths Anand

11:15-1:15 ITOC330C TheoryOfComputation Manish

4:00-6:00 IOOM332C ObjectOrientedMethodologies Vyas

5:00-6:00 IOPS332C OperatingSystem Jagpreet

Thursday

10:00-11:00 IOOM332C ObjectOrientedMethodologies Vyas

11:15-1:15 EMIP332C Microprocessor Arun

3:00-6:00 IOPS332C-Lab OperatingSystemLab Jagpreet

Friday

9:00-10:00 EMIP332C Microprocessor Arun

10:00-11:00 SMAT330C Maths Anand

3:00-6:00 EMIP332C-Lab MicroprocessorLab Arun

Saturday