

CL643 - Group 6

Exam Center Allotment



An optimisation problem

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Agenda

Overview of today's presentation

- Introduction
- Problem Description
 - Constraints
 - Objective function
- Example
- Code demonstration
- Project Scope & Highlights

About the Problem

Any large scale exam requires students to fill preferences regarding their choice of cities within a particular zone

GOALS

- Determine an allotment of students to centers
- Minimise the total number of centers in use
- Take student preferences into account
- Fill higher rated centers first
- Give higher priority to preferences of special classes, like PWD

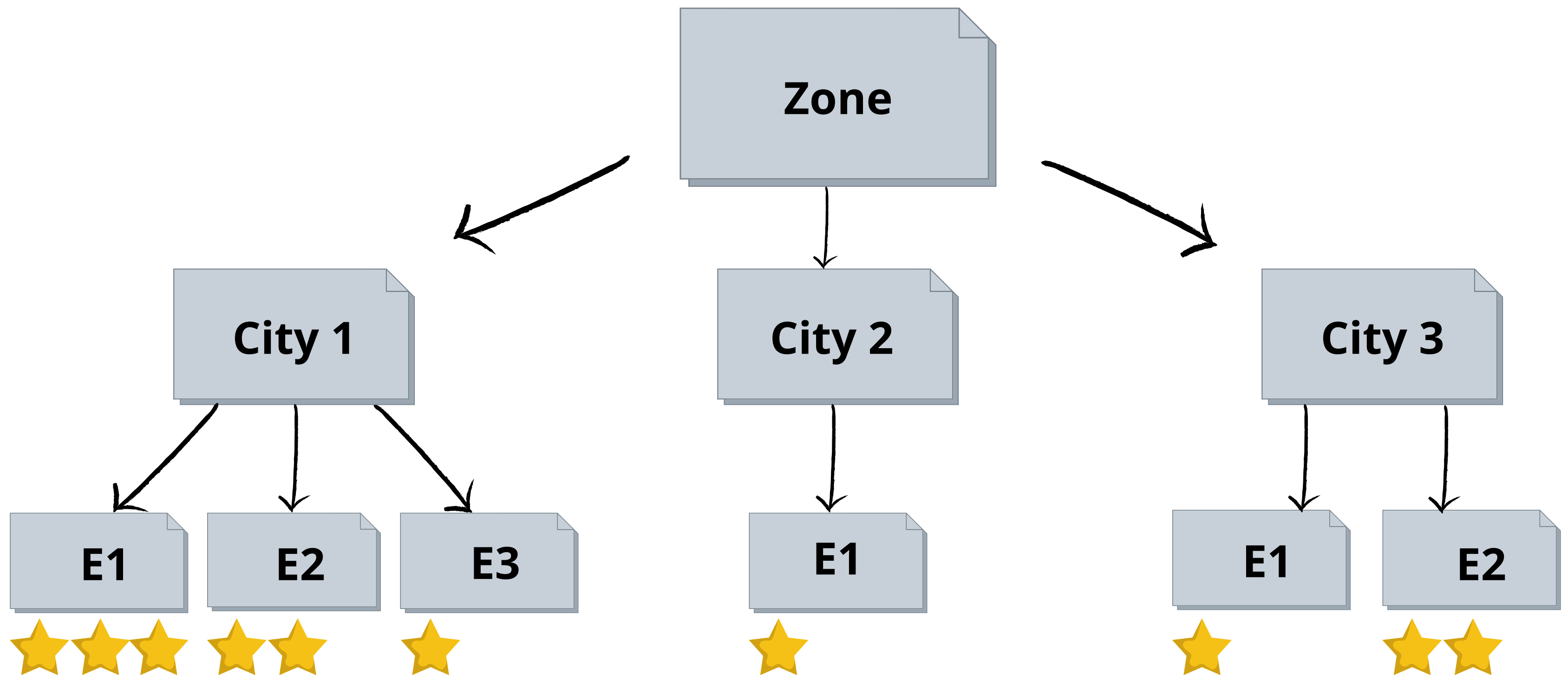


Problem

Description

What's known - data available

- List of cities in a zone
- Centers available in each city
- List of students to be allotted centers
- Class of each student
- Capacity of each center
- Rating of each center
- Preferences of each student for cities



Constraints

1

ALLOTTMENT

Each student should be assigned to exactly one center.

2

CAPACITY

Number of students allotted to a center should be no more than it's capacity.

3

PREFERENCE

Students should only be allotted a center in a city for which they have filled preference.

Constraints

4

CENTER RATINGS

Inferior centers shouldn't be allotted to students when seats in superior centers are available.

5

CLASS PREFERENCE

Prioritized students have special needs and should be allotted their best preference whenever possible.

6

SUPERIORITY

Prioritized class students should be given superior centers whenever possible.

Objectives

Determine an
assignment of
students to centers

- Minimise the total number of centers in use
- All students should be assigned their best preference possible
- Minimise the sum of preferences of all students corresponding to their allotted city - Added as penalty to objective function
- More penalty for prioritized students

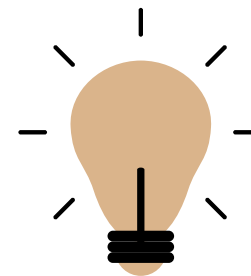
➤ Project Phases

PROJECT PHASE 1



Analyse the problem statement and the constraints deeply.

PROJECT PHASE 2



Develop a mathematical model to solve the problem

PROJECT PHASE 3



Implement the model using GAMS as a **Single Objective MILP** problem



Example

STUDENT VS CLASS TABLE

CLASS DESCRIPTION		STUDENT	CLASS
1	Female PWD	S1	1
2	Male PWD	S2	2
3	Female	S3	2
4	Male	S4	3
		S5	3
		S6	4
		S7	4
		S8	4

CITYWISE PREFERENCE TABLE

	C1	C2	C3	C4
S1	1	2	3	0
S2	1	0	3	2
S3	0	2	1	3
S4	1	3	0	2
S5	1	3	0	2
S6	0	1	3	2
S7	2	0	1	3
S8	2	0	3	1

CENTER VS CITY TABLE

	C1	C2	C3	C4
E1	1	0	0	0
E2	0	1	0	0
E3	0	0	0	1
E4	0	0	1	0
E5	0	0	1	0
E6	0	0	1	0

RATING

CENTER	RATING
E1	1
E2	1
E3	1
E4	1
E5	2
E6	3

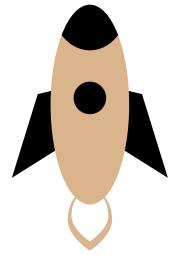
CAPACITY

CENTER	CAPACITY
E1	1
E2	3
E3	2
E4	1
E5	1
E6	2

Code Demonstration



➤ Project Scope and Highlights



Scalable

The proposed model can be used to allot exam centers for any large-scale exams like the Joint Entrance Exam (JEE) for engineering which sees participation from lakhs of students.



Deeper Analysis

A deeper analysis has been provided in the report to choose the scalar values used in mathematical equations.



Easy Input and Output

The whole Exam Center Allotment procedure is made easy by this model. Allotment can be done easily, by filling inputs in excel sheets and running the code. Output will be collected into a excel sheet automatically.



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Thank you!

Feel free to approach us
if you have any questions.