Hostel Room Allocation Logic Explained

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Overview

The application takes two CSV files as input:

1. **Groups CSV (file1)** - Contains details about various groups needing accommodation.
2. **Hostels CSV (file2)** - Contains details about available hostel rooms and their capacities..

The goal is to allocate groups to hostel rooms based on gender and capacity constraints.

Group CSV Structure

The Group CSV file has the following columns:

1. **Group ID**: A unique identifier for each group.
2. **Members**: The number of members in the group.
3. **Gender**: The gender composition of the group. It can be a single gender (e.g., "Male") or multiple genders (e.g., "2 Male & 1 Female").

Hostel CSV Structure

The Hostel CSV file has the following columns:

1. **Hostel Name**: The name of the hostel.
2. **Room Number**: The number of the room within the hostel.
3. **Capacity**: The number of members the room can accommodate.
4. **Gender**: The gender the room is designated for (e.g., "Male" or "Female").

Allocation Process

The allocation process involves matching groups to available rooms based on their gender and capacity requirements. The key steps are:

1. **Read and Parse Input CSVs**: The CSV files are read into pandas DataFrames for processing.
2. **Rename Columns for Clarity**: Columns are renamed for better understanding and consistency.
3. **Iterate Over Each Group**: For each group, the application checks their gender and member count to find suitable rooms.

Detailed Steps

1. **Group Processing**:
   - For each group, extract the `Group ID`, `Members`, and `Gender`.
   - If the gender contains multiple entries (e.g., "2 Male & 1 Female"), split it into separate gender counts and types.
2. **Room Allocation**:
   - For each gender type within the group, check the available rooms that match the gender and have enough capacity.
   - Sort available rooms by capacity to find the best fit.
   - Allocate the room if a suitable one is found. If the room's capacity exceeds the number of members, adjust the room's capacity for future allocations.
   - If no suitable room is found, mark the allocation as "NA".
3. **Handle Remaining Members**:
   - If a room can only partially accommodate the group, allocate the room and reduce the remaining member count. Continue the process until all members are allocated or no suitable rooms are left.
4. **Generate Allocation Output**:
   - Create a DataFrame from the allocation results and convert it to CSV format for download.
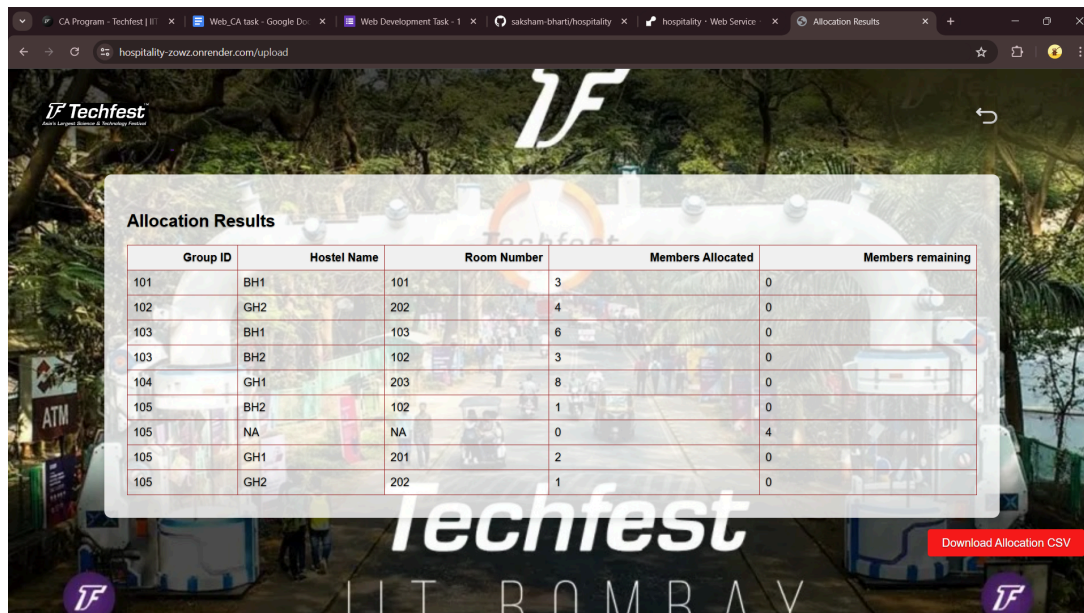
Example Walkthrough

Example Group CSV:

Group ID	Members	Gender
101	3	Boys
102	4	Girls
103	9	Boys
104	8	Girls
105	8	5 Bovs & 3 Girls

Example Hostel CSV:

Hostel Name	Room Number	Capacity	Gender
BH1	101	3	Boys
BH2	102	4	Boys
GH1	201	2	Girls
GH2	202	5	Girls
BH1	103	6	Boys
GH1	203	9	Girls

Result

Allocation Results

Group ID	Hostel Name	Room Number	Members Allocated	Members remaining
101	BH1	101	3	0
102	GH2	202	4	0
103	BH1	103	6	0
103	BH2	102	3	0
104	GH1	203	8	0
105	BH2	102	1	0
105	NA	NA	0	4
105	GH1	201	2	0
105	GH2	202	1	0

Error Handling

- If the CSV files are not properly formatted or contain errors, the application will return an error message.
- If no suitable rooms are found for a group, it will be marked with "NA" in the allocation output.

Usage

1. **Upload Page**: Users upload the two CSV files
2. **Upload Handling**: The application processes the uploaded files and performs the allocation.
3. **Result Display**: The allocation results are displayed in a table format on the result page.
4. **Download**: Users can download the allocation results as a CSV file.
5. **Retry**: Users can start the process again by visiting the upload page.

How to run code:

Method-1

1. Download the hospitality folder from github.
2. And directly run the app.py file.

Method-2

1. This webapp is available on the internet - https://hospitality-zowz.onrender.com. Click on this link and then upload the files in correct order and in correct format.

Remark:

- Please let me know other changes that I can make to improve it.

- I haven't handled all the error possibilities like duplicates, null values etc. Also these error handling was not asked to count. Although I have handled some basic errors. Please contact me on sakshambharti1805@gmail.com for improvements.
- This webapp is available on internet - https://hospitality-zowz.onrender.com

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