Assignment Title
Resource Scheduling & Capacity Analysis for Live Production Projects

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Background
You are helping a media production company plan and schedule its workforce for live broadcast projects.
The company produces live events (sports, news, entertainment), most of which have **fixed schedules** and cannot move.

Given Information
Workforce

- The company has **100 employees**
- Each employee works **up to 8 hours per day** at a regular rate
- Any work beyond 8 hours per day is considered **overtime**
- Overtime is paid at **1.3×** the regular hourly cost

You may assume:

- A base labor cost of **1 unit per hour**
- Overtime costs **1.3 units per hour**
- You may normalize all costs (no real currency needed)

Projects

- The company executes **100 projects per year**
- Most projects are **live events** with **fixed dates and times**
- Each project requires **exactly 5 people**, each with a **different skill**

Example skills (you may add or rename):

- Producer
- Editor
- Graphics Designer
- Colorist
- Audio Engineer

Goals
The company wants to:

1. Assign people to projects without double-booking
2. Balance workload across employees
3. Minimize unnecessary overtime
4. Understand whether **100 employees is too many, too few, or about right**

Your Tasks

Task 1 – Problem Modeling (Logic First)

Describe how you would **represent this problem** in a program.

You may use:

- Written explanation
- Pseudocode or prompts or AI logic
- Diagrams
- Tables
- Simple data structures

At minimum, describe how you would represent:

- Employees (skills, availability, hours worked)
- Projects (time window, required skills)
- Time (days, hours, or events)

You are not required to optimize anything yet. Focus on clarity.

Task 2 – Basic Scheduling Logic

Describe or implement a **simple scheduling approach** that:

- Assigns 5 qualified people to each project
- Avoids scheduling the same person on overlapping projects
- Tracks regular hours vs. overtime hours

This does **not** need to be optimal or complete.

You may:

- Use pseudocode
- Use Java (preferably) or python, or any language you know
- Make reasonable simplifying assumptions

Task 3 – Capacity, Utilization & Cost Analysis

Answer the following:

1. How would you calculate:
    - Utilization per employee?
    - Overall team utilization?
2. How would you identify:
    - Under-utilized employees?
    - Overworked employees?
3. How would you compare:
    - Paying overtime (1.3×)
    - Hiring additional employees

Explain **how this model could help decide** whether to hire more people or rely on overtime.

Task 4 – Assumptions & Trade-offs (Required)
List **at least 5 assumptions** you made to solve this problem.
For each assumption:

- Explain why you made it
- Explain how changing it might affect the outcome

Task 5 – Using AI as a Tool (Important)
You are **allowed and encouraged** to use AI tools (e.g., ChatGPT, Copilot).
Please describe:

- How you used AI
- What kinds of questions you asked
- One AI suggestion you accepted
- One AI suggestion you rejected or modified, and why

We care about **how you think with AI**, not whether you use it.

Deliverables

- A short document or notebook (approximately **2–4 pages**)
- Follow-up questions to client. Note that
- Code is optional but encouraged
- Clarity of thinking matters more than completeness or optimization

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Time Expectation
This assignment is designed to take approximately **3–5 hours**.
Please do **not** over-engineer the solution.

What We Are Looking For

- Logical problem decomposition
- Clear assumptions
- Thoughtful trade-offs
- Ability to reason about cost, capacity, and constraints
- Responsible and critical use of AI

There is **no single correct answer**.