LOOKING FOR GROUP SYNCHRONIZATION

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DEADLOCK

- Deadlock can occur depending on how the grouping conditions are defined and the condition for “completing” the dungeon
- Groups were formed under the assumption that players were treated as a queue, and were taken from as needed for when dungeon instances are free and enough players of each type are sufficient
- No locks are used in the solution as each dungeon instance is independent of each other, and since the only condition for a dungeon to clear is for a set amount of time to pass, no deadlocks can occur

COFFMAN CONDITIONS

Deadlocks cannot occur since not all conditions are met

CONDITION	DEFINITION	IMPLEMENTATION
MUTUAL EXCLUSION	THREAD IS ABLE TO HOLD EXCLUSIVE ACCESS OVER A RESOURCE	✅NO OTHER GROUPS CAN ENTER A DUNGEON UNTIL IT IS FINISHED
HOLD AND WAIT	THREAD IS ABLE TO HOLD A RESOURCE WHILE WAITING FOR ANOTHER	❌GROUPS ARE ONLY ABLE TO BE A PART OF ONE DUNGEON INSTANCE AT A TIME
NO PREEMPTION	RESOURCES CAN BE TAKEN FROM A THREAD ONCE BEING HELD, MUST BE RELEASED VOLUNTARILY	✅DUNGEON INSTANCES ARE ONLY RELEASED ONCE THE PARTY IS FINISHED
CIRCULAR WAIT	THERE IS A CLOSED CHAIN OF THREADS WHERE EACH THREAD WAITS FOR A RESOURCE HELD BY THE OTHER	❌ GROUPS ARE ONLY ABLE TO BE PART OF ONE DUNGEON INSTANCE AT A TIME, MEANING IT CAN ONLY WAIT FOR ONE OR HOLD ONE

STARVATION

- Starvation can occur for both the dungeon instances and players depending on how its defined
- If the players were not assigned groups on a FCFS basis, it could lead to players never getting to enter a dungeon
    - Since it is assumed that players are taken from as a queue, as long as there are sufficient players of each type then they will be assigned groups
- If groups complete the dungeons faster than groups are made, if groups are assigned to the first available dungeon then it could lead to the other dungeons never receiving any groups
    - Application makes use of a round robin dispatcher, starting from the index after the last dungeon that received a group