Software Engineer Coding Assignment

General

Important: please do not publish your implementation publicly, we don't want other candidates to copy your implementation.

Task

3D Object-based audio applications work with the concept of audio objects - entities consisting of audio data and metadata. For this assignment, we will ignore the audio data and assume that an *AudioObject* contains only two metadata members: *Position* (3D) and *Id*. The goal of this task is to implement an *AudioObjectManager* data structure which is responsible for the organisation of *AudioObject* instances and is able to perform *Actions* on these *AudioObjects*. As part of this coding assignment, the following *Actions* must be implemented:

- **Add** - The *AudioObjectManager* stores a new *AudioObject*. Undoing this action means removing the added object (with the same unique Id).
- **Remove** - Removes an existing *AudioObject* which has previously been added by the manager. Undoing this action means re-creating the removed object.
- **ChangePosition** - changes the Position member of the audio object with the selected Id. **Note**: Undoing this action should revert the Position change of the object with the selected Id not only to its previous Position, but to the Position held by this object before all successive (!) *ChangePosition* actions on this object. In other words, all successive *ChangePosition* actions on a specific object ("successive" in the sense that they are not interleaved with different action types for any objects) shall be reverted by a single undo operation (see the example below).
- **Undo** - reverts the effects of the last action as described above. In the case of sequential *ChangePosition* actions done on the same object, reverts to the state before the first *ChangePosition* action for that object in the sequence

Please implement the actions as described and also fill in a simple implementation of the declared types (*Position*, *Id*, *AudioObject*) as you see fit. Provide a solution which can correctly demonstrate the state of *AudioObjects* after the following sequence of actions:

- Add object with first id and position A
- Add object with second id and position B
- Change position of object with first id to position C
- Add object with third id and position D
- Change position of object with second id to position E
- Remove object with first id
- Change position of object with third id to position F
- Change position of object with third id to position G
- Undo
- Undo

The correct state of objects should be the following:

- Object with first id has position C
- Object with second id has position E
- Object with third id has position D

Optional: For an additional challenge feel free to extend your implementation with redo functionality.

How to submit

Solutions to this assignment will be accepted in either **Rust or C++**. Please submit your solution as an archive including source code and instructions on how to install/run your application. Feel free to include additional documentation if needed.