Team # 14

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Additional Feature:

The additional feature implemented is a method that calculates and displays the average vaccinations per capita for each ZIP Code and sorts these results based on the total livable area within each ZIP Code. This feature utilizes data from the COVID records, population data, and property data. The method aggregates the vaccination data and combines it with the total livable area for each ZIP Code, then sorts the results to provide insights into how vaccination rates correlate with property livability.

To ensure this feature works correctly, we created a smaller dataset, and tested it on that to ensure it's working correctly.

Data Structures

1. **HashMap**
    - **Used in**: PopulationDataParser, PropertyDataParser, PropertyProcessor, and COVIDProcessor classes.
    - **Purpose**: To store population data, property data, COVID records, and aggregated data such as average market values and livable area values, indexed by ZIP Code or date.
    - **Reason for Choice**: HashMap provides average constant-time complexity (O(1)) for get and put operations, which is essential for efficient data retrieval based on keys such as ZIP Codes and dates.
    - **Alternatives Considered**: TreeMap (provides sorted order but with higher time complexity for insertion and retrieval), LinkedHashMap (maintains insertion order but was not needed for this use case).
2. **ArrayList**
    - **Used in**: COVIDDataParser and PropertyDataParser classes.
    - **Purpose**: To store lists of COVID records and property records.
    - **Reason for Choice**: ArrayList provides dynamic array capabilities with fast access time (O(1) for get operation) and is good for scenarios where the number of records is not known in advance.
    - **Alternatives Considered**: LinkedList (provides better performance for frequent insertions/removals but has higher memory overhead and slower access time).
3. **LinkedHashMap**
    - **Used in**: COVIDProcessor class (specifically in the createSortedMapByLivableArea method).

- **Purpose**: To maintain the sorted order of ZIP Codes based on total livable area when combining and displaying average vaccinations per capita and total livable area.
- **Reason for Choice**: LinkedHashMap maintains insertion order, which is essential for preserving the sorted order of entries after they are sorted by total livable area.
- **Alternatives Considered**: TreeMap (provides natural sorting by keys, but sorting by values requires additional steps), HashMap (does not maintain order).

Lessons Learned

We used Slack primarily to communicate, which worked very well. It is easy to send messages and files back and forth in Slack. We also used text messages to send updates on when we could work on the project. Both of us work fulltime in cross functional teams that operate in different time zones, so we had the experience of collaborating offline. After each of us finish updating a version and log off, we always clearly communicate what we have changed.

One challenge we had was the initial setup of the project. One partner began the project, sent it to the other, and he had some issues getting it running. But once the initial setup was done, it was easy to send versions back and forth. In the future, we may want to consider using Github for version control instead of zipping files and sending it on Slack. Using Github will also allow us to manage branching better, allowing us to work on different parts of the program, and merge to the main when it's ready.

We also didn't check Ed Discussion frequently enough and realized we should use Java 11 pretty late into the project. However, we read through a lot of threads in Ed Discussion and helped us greatly towards the end of the project with debugging.