

Searching Multimaps Solutions

- Describe the `lower_bound()` and `upper_bound()` member functions of `multimap` and `multiset`
 - `lower_bound` returns an iterator to the first element which is greater than or equal than its argument
 - `upper_bound` returns an iterator to the first element which is greater than its argument

- What are the results of calling `upper_bound()` and `lower_bound()` with a key that is not in the container?
 - `lower_bound` and `upper_bound` will both return an iterator to the first element that is greater than its argument
- How can we use the returned iterators in a loop?
 - `for (auto it = c.lower_bound(x); it != c.upper_bound(x); ++it)` will iterate over all the elements which have the value `x`
- Write a simple program to demonstrate the use of `lower_bound()` and `upper_bound()`

- Write a program which
 - Calls `lower_bound()` and `upper_bound()`
 - Uses a loop to find an element which has a given key and value
 - Displays the element's key and value

- Write a program which
 - Uses `lower_bound()` and `upper_bound()` to find all the elements which have a given key and value
 - Calls a standard algorithm to store these elements in a vector
 - Displays the contents of the vector

- Describe the `equal_range()` member function
 - `equal_range` returns a pair of iterators. The first iterator in the pair is the result of calling `lower_bound()` and the second iterator is the result of calling `upper_bound()`
- Rewrite the last program to use `equal_range()`

- Write a program which creates a vector with some duplicate elements and calls `lower_bound()`, `upper_bound()` and `equal_range()` on it
 - Are there any particular requirements that apply to the vector?
 - The vector must be sorted
 - The element must define a `<` operator