

Map Solutions

Map

- What is the main difference between a set and a map?
 - The elements of a set are a single data item
 - The elements of a map are an `std::pair` of data items
- What is the function of the "key" and the "value" in a map?
 - The key is the first element of the pair
 - It is used to look up elements
 - It is also used to order the elements
 - The value is the second element of the pair
 - It is used to store data

Adding and removing elements

- Which member function is called to add elements to an `std::map`?
 - `insert()`
- What happens if the element we want to add is already present in the map?
 - The insert will fail, because the elements must be unique
- How can we find out whether this has happened?
 - By inspecting the return value, which is an `std::pair`
 - The second member is a boolean (true if insert succeeded)

Adding and Removing Elements

- Write a simple program that populates an `std::map`
- Add an element to the map with the same key as an element which is already in the map
- Does this succeed? If not, why not?
 - This fails, because duplicates are not allowed
- Erase the original element with this key and try again
- Does this succeed? If not, why not?
 - This now succeeds, because the new element is not a duplicate of an existing element

Finding Elements

- Write a simple program that populates an `std::map` object
- Use the `find()` and `count()` member functions to check whether an element with a given key is in the map
- Make sure your program works correctly if the element is not present

std::map and Algorithms

- What type of algorithms from the Standard Library can be used with a map?
 - Read-only algorithms which take a predicate
- Why can we not use other algorithms?
 - The elements in a map are const (to maintain the ordering constraint)
 - Algorithms which modify elements cannot be used
 - Algorithms which change the order of elements cannot be used

std::map Pros and Cons

- Give some examples of programming problems where std::map could be useful
 - An application which indexes data, or where the data is already indexed (contacts list, employee records, database query results, etc)
 - An application which uses data which is in key-value form (JSON, XML, etc)