Associative Arrays
(Maps in STL)

Jyh-Shing Roger Jang (張智星)
CSIE Dept, National Taiwan University

Intro to Associative Arrays

- Associative arrays — Aka dictionary
  - Collection of key-data pairs — key-value pairs
    - Dictionary ➔ key: word, data: word's definition
    - Yellow page ➔ key: name, data: phone number
  - Can be viewed as a vector indexed by keys of strings
  - Keys could be strings, numbers, or any objects (as long as they can be compared)
- Various ways to implement associative arrays
  - Trees, hash tables, simple lists, etc.

Implementations of Associative Arrays in STL

- Two types of associative arrays in STL

Quiz!

  - #include <map>
    - Sorted keys
    - Implementation based on trees
    - Complexity in search: O(log(n))
  - #include <unordered_map>
    - Unsorted keys
    - Implementation based on hash tables
    - Complexity in search: O(1)
- Examples

Summary

- Maps provide a way of using "associative arrays" that allow you to store data indexed by keys of any type
- Maps can be accessed using iterators with two members
  - "first" corresponds to the key
  - "second" is the value associated with the key
- Maps are fast to have O(log(n)) or O(1) time for insertion and lookup.
- You need to use multimap if a key is associated with multiple pieces of data.

References

- References
  - http://www.cprogramming.com/tutorial/stl/stlmap.html: A basic tutorial
  - http://www.yolinux.com/TUTORIALS/CppStlMultiMap.html: More working examples