CET 3350
Applied Data Structures
Week 2

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Chapter 2 Topics

- Concepts
  - object oriented programming (OOP)
  - abstract data type (ADT)

- C++ basics
  - class vs. object / instance
  - public vs. private (vs. protected)
  - member (variable, function / method)
  - constructor & destructor
  - scope resolution operator ("::")
Test First Development

1. Require – what does the customer want?
2. Analyze and specify – what will we make?
3. Design – how will we make it?
4. Write tests – make sure it's good
5. Code & debug – build it right
6. Deploy – put it in service
7. Maintain – fix it and adjust it
class unit_test {
private:
  int num_failed;
protected:
  int get_num_failed();
public:
  unit_test();
  ~unit_test();
  bool test();
};
Chapter 2 Topics (2)

• C++ more topics
  • header files, implementation files
  • scope resolution operator ("::")
  • header macro guard
  • namespace, using namespace
  • typedef, static const, define
  • default arguments
  • inline member function
```cpp
class unit_test {
private:
    int num_failed;
protected:
    void assert(const bool x, char* msg) {
        if (!x) {
            cout << "Failed " << msg << endl;
            failed++;
        }
    }
public:
    unit_test() { num_failed = 0; }
    bool test();
};
```
Chapter 2 Topics (3)

- C++ more topics
  - Function parameters
    - Value parameter
    - Reference parameter
    - Const reference parameter
  - Operator overloading
    - Binary operator ("==","+")
    - Input and output ("<<",">>") – istream/ostream
  - Friend function
Data Structures

- Bag
- Set
- Sequence

**Examples:**
- Items in a shopping cart
- ToDo list
- Baseball/bowling box scores
- Books in a library
Chapter 3 Topics

• Bag
  • insert
  • erase_one
  • erase
  • size
  • count
  • +
  • +=

• Class invariant
Start Visual Studio
Select File-&gt;New
Set Location, name, type
Navigate to Location!!!
Set Location, name, type
“Hello World” App, then Finish
"File View" in Right Window
Expand files in “File View”
File->New again!!
“Header File”, enter name
Start Typing!!!
Initial Run

```
Hello World!
Got 7 expected 0 for initial size
Got 7 expected 5 for size after five inserts
Got 7 expected 1 for number of 0s
Got 7 expected 0 for number of 1s
Got 7 expected 2 for number of 4s
Got 7 expected 0 for number of 0s after erase
Got 7 expected 0 for number of 1s after erase
Got 7 expected 1 for number of 4s after erase
Got 7 expected 3 for size after insert 5 and erase 2
Failed 9 out of 9 tests.
Press any key to continue.
```
Assignment 1

• In class
  • Exercise 1: black box test
  • Exercise 8: keyed bag (name/value pairs)
    – Key must be unique, but not value
    – Phone book or birthday list
    – (hash table??)

• Homework Assignment (next week)
  • Exercise 2: implement “−” and “−=”
  • Exercise 3: sequence (not just bag)
  • Exercise 5: set (not just a bag, no duplicates)