CS 225

#13: Queues and Iterators

September 28, 2017

Queue Implementation #1

Queue.h

```
4  template <class QE>
5  class Queue {
6    public:
7
8
9
10
11   private:
12
13
14
15
16 };
```

A queue is a _____ data structure!

What type of implementation if this Queue?

How is the data stored in this Queue?

Which pointer is entry and which pointer is exit?

What is the running time of enqueue()?

What is the running time of dequeue()?

Queue Implementation #2

Queue.h

```
4  template <class QE>
5  class Queue {
6    public:
7      void enqueue(QE e);
8      QE dequeue();
9      bool isEmpty();
10
11   private:
12     QE *items;
13     unsigned capacity_;
14     unsigned count_;
15
16
17
18 };
```

What type of implementation if this Queue?

How is the data stored in this Queue?

Example 1

```
Queue<int> q;
q.enqueue(3);
q.enqueue(8);
q.enqueue(4);
q.dequeue();
q.enqueue(7);
q.dequeue();
q.dequeue();
q.enqueue(2);
q.enqueue(1);
q.enqueue(3);
q.enqueue(5);
q.dequeue();
q.enqueue(9);
```

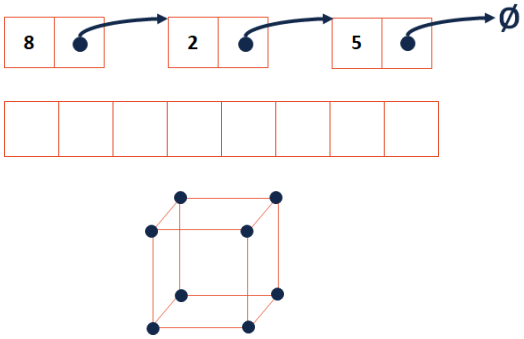
Example 2

```
Queue<char> q;
q.enqueue(m);
q.enqueue(o);
q.enqueue(n);
…
q.enqueue(d);
q.enqueue(a);
q.enqueue(y);
q.enqueue(i);
q.enqueue(s);
q.dequeue();
q.enqueue(h);
q.enqueue(a);
```

Iterators

Purpose:

…on what data structures?



Operators:

Iterator Types:

stlList.cpp

```
1  #include <list>
2  #include <string>
3  #include <iostream>
4
5  struct Animal {
6    std::string name, food;
7    bool big;
8    Animal(std::string name = "blob", std::string food = "you", bool
   big = true) :
9      name(name), food(food), big(big) { /* none */ }
10 }
11
12 int main() {
13   Animal g("giraffe", "leaves", true),
            p("penguin", "fish", false), b("bear");
14   std::list<Animal> zoo;
15
16   zoo.push_back(g);
17   zoo.push_back(p);   // std::list's insertAtEnd
18   zoo.push_back(b);
19
20   for ( std::list<Animal>::iterator it = zoo.begin();
                                        it != zoo.end(); it++ ) {
21     std::cout << (*it).name << " " << (*it).food << std::endl;
22   }
23
24   return 0;
25 }
```

CS 225 – Things To Be Doing:

1. Exam #3 finishes today ("Theory Exam", Advanced C++)
2. MP3 is released! Complete early for up to +7 extra credit!
3. Lab Extra Credit → Attendance in your registered lab section!
4. Daily POTDs