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/* The following code example is taken from the book
 * "The C++ Standard Library – A Tutorial and Reference"
 * by Nicolai M. Josuttis, Addison-Wesley, 1999
 *
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 */
/* *****
 * Queue.hpp
 * – safer and more convenient queue class
 * *****/
#ifndef QUEUE_HPP
#define QUEUE_HPP

#include <deque>
#include <exception>

template <class T>
class Queue {
protected:
    std::deque<T> c;          // container for the elements

public:
    /* exception class for pop() and top() with empty queue
    */
    class ReadEmptyQueue : public std::exception {
    public:
        virtual const char* what() const throw() {
            return "read empty queue";
        }
    };

    // number of elements
    typename std::deque<T>::size_type size() const {
        return c.size();
    }

    // is queue empty?
    bool empty() const {
        return c.empty();
    }

    // insert element into the queue
    void push (const T& elem) {
        c.push_back(elem);
    }

    // read element from the queue and return its value
    T pop () {
        if (c.empty()) {
            throw ReadEmptyQueue();
        }
        T elem(c.front());

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        c.pop_front();
        return elem;
    }

    // return value of next element
    T& front () {
        if (c.empty()) {
            throw ReadEmptyQueue();
        }
        return c.front();
    }
};

#endif /* QUEUE_HPP */
```