

EE 453/717: Advanced Computing for Electrical Engineers

Indian Institute of Technology Bombay

Autumn 2010

Assignment 3 : 4 points

Due date: August 26, 2010

1. Write a C++ program which reads a sequence of integers and removes duplicate entries using a linked list, i.e. your program should store the integers in a linked list and then remove duplicates from the list.
2. In the class, we saw an implementation of a stack based on arrays. This is present in the file `stack.h` contained in the archive `stacks.tar` which was uploaded into the Moodle site of this course. The file `stack.cpp` uses this stack implementation to perform simple stack operations. Modify the implementation of the stack in `stack.h` so that it uses linked lists instead of arrays. The modifications should be such that `stack.cpp` compiles and executes without any changes.
3. Similarly, we saw an implementation of a queue based on arrays. This is present in the file `queue.h` contained in the archive `queues.tar` which was uploaded into the Moodle site of this course. The file `queue.cpp` uses this queue implementation to perform simple queue operations. Modify the implementation of the queue in `queue.h` so that it uses linked lists instead of arrays. The modifications should be such that `queue.cpp` compiles and executes without any changes.
4. Modify the image component labeling program `image.cpp` present in the archive `queues.tar` to convert it into a program which labels only the edge pixels of a component. A pixel which is part of a component is not an edge pixel if it is in the interior of the component, i.e. it has component pixels to the north, south, east, and west of itself. For example, for the input image on the left you should get the output on the right.

0 0 1 1 0 0 0	0 0 2 2 0 0 0
0 0 1 1 1 0 0	0 0 2 0 2 0 0
0 0 1 1 1 0 0	0 0 2 0 2 0 0
0 0 0 1 1 0 0	0 0 0 2 2 0 0
1 1 0 0 1 0 0	3 3 0 0 2 0 0
1 1 1 0 0 0 0	3 0 3 0 0 0 0
1 1 1 0 0 0 0	3 3 3 0 0 0 0