Subject: The best ever binomial heap pseudocode ever?  
Posted by lustrh on Fri, 04 Nov 2016 18:30:14 GMT

I have placed a first draft of the best binomial heap pseudocode ever onto beastie:

http://beastie.cs.ua.edu/binomial/

Subject: Re: The best ever binomial heap pseudocode ever?  
Posted by btlindow on Mon, 07 Nov 2016 03:39:30 GMT

Thanks for the awesome pseudo code! Followed it word for word and it made sense and worked (after a small addition). The added line below sets the old index to NULL since the two combined subheaps will no longer occupy that index. This is also crucial when putting the array items back into the rootlist.

function updateConsolidationArray(D,spot)  
    {  
        set a variable degree to the number of spot's children (using linked-list size)  
        while (D[degree] != null)  
            {  
                combine spot and D[degree], setting spot to the combined subheap  
                /*added following line*/  
                set D[degree] to NULL;  
                increment degree  
            }  
        set D[degree] to spot  
    }

Subject: Re: The best ever binomial heap pseudocode ever?  
Posted by lustrh on Tue, 08 Nov 2016 18:00:48 GMT

Good catch! I'll update the pseudocode.

Subject: Re: The best ever binomial heap pseudocode ever?  
Posted by jmtucker6 on Thu, 10 Nov 2016 01:15:27 GMT

The parent pointers must be kept up to date for Bubble-Up to work, correct? In the pseudocode, only the initial insert manipulates the parent pointer of a node. Would it be updated in the consolidate method? Also, extract min would need to update the parent pointers of the child list as they are merged into
the root list, right?

Please correct me if I am misunderstanding this, I just don't see these updates in the pseudocode.

^ You are correct. I've updated the combine method (the one that does the union-by-rank of two subheaps) to reset the parent pointers.

The pseudocode is marked as the third draft.

I added a alternative version of the pseudocode that has the children of a node stored in a binomial heap, rather than a linked list (ala Mr. Meads' suggestion - correct me if I have mis-attributed this idea).

wget beastie.cs.ua.edu/cs201/binomial2.html

New version (4th) of the binomial heap pseudocode.

What changed with the latest version?

The fact that decreaseKey needs to return the node where the updated value ended up (via
New version (5th). Notes that the binomial heap's extreme value may need to be updated after bubbleUp finishes.

New version (6th). Adds the fact that when extractMin merges the children into the rootlist, those children need to update their parent pointers to point to themselves (since they will become roots).

Also, added pseudocode for the bubble up routine. Here is part of my implementation of bubbleUp in C:

```c
//swap the values
void *temp1 = n->value;
void *temp2 = n->parent->value;
n->value = temp2;
n->parent->value = temp1;
//swap the value's owner
((vertex *)temp1)->owner = n->parent;
((vertex *)temp2)->owner = n;
```

I will discuss in class a better way to swap the owners.

With the updated pseudocodes, the function declaration from the assignment description for decreaseKey no longer matches. Should the new function declaration be

```c
node *decreaseKeyBinHeap(binheap *,node *,void *);
```

Also, do our function parameters have to exactly match yours or are you just looking for the function name/use?
I'm just looking for the name so I can quickly find your implementation.

I fixed this last week. Have you refreshed that web page?

Subject: Re: The best ever binomial heap pseudocode ever?
Posted by jgmurphy1 on Tue, 22 Nov 2016 00:09:56 GMT

Is any formatted name okay as long as you can tell what it is?
such as binheap_decrease_key(binheap *,node *,void *) ?

Subject: Re: The best ever binomial heap pseudocode ever?
Posted by lusht on Tue, 22 Nov 2016 13:07:33 GMT

The names should match the spec.

Subject: Re: The best ever binomial heap pseudocode ever?
Posted by jgmurphy1 on Thu, 24 Nov 2016 06:12:52 GMT

is extractBinHeap extracting the min?

Subject: Re: The best ever binomial heap pseudocode ever?
Posted by btlindow on Thu, 24 Nov 2016 07:07:10 GMT

It sure is! ^^^