DCS 229: Data Structures and Algorithms April 15th, 2024

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Reflection

Regarding the P.Q from slide 11, the program outputs as follows:

Output from reflection binary:

(4,C)
(5,A)(6,Z)
(15,K)(9,F)(7,Q)(20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)

(2,T)
(5,A)(4,C)
(15,K)(9,F)(7,Q)(6,Z)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

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(4,C)
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)

(2,T)
(5,A) (4,C)
(15,K) (9,F) (7,Q) (6,Z)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

Let us go one step at a time to see if the produced output is correct

Step 1: Insertion at bottom:

(4,C)
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(2,T)

Step 2: Check against parent. 20>2. Swap

(4,C)
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (2,T)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

Step 3: Check against parent. 6>2. Swap

(4,C)
(5,A) (2,T)
(15,K) (9,F) (7,Q) (6,Z)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

Step 4: Check against parent. 4>2. Swap

(2,T)
(5,A) (4,C)
(15,K) (9,F) (7,Q) (6,Z)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

Comparison

(2,T) ***Manual Output***

(5,A) (4,C)

(15,K) (9,F) (7,Q) (6,Z)

(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

(2,T) ***Actual Output***

(5,A) (4,C)

(15,K) (9,F) (7,Q) (6,Z)

(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)(20,B)

The output is proven to thus be correct, let us do the same with the P.Q from slides 18

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(4,C) *Pre-min_remove()*
(5,A)(6,Z)
(15,K)(9,F)(7,Q)(20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)

(5,A) *Post-min_remove()*
(9,F)(6,Z)
(15,K)(12,H)(7,Q)(20,B)
(16,X)(25,J)(14,E)(13,W)(11,S)

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(4,C) Pre-*min_remove()*
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)(13,W)

(5,A) *Post-min_remove()*
(9,F) (6,Z)
(15,K) (12,H) (7,Q) (20,B)
(16,X)(25,J)(14,E)(13,W)(11,S)

Step-by-step

Step 1: Removal of min and movement of last Entry to the front.

(13,W)
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S) Return: (4,C)

Step 2: Check against both right and left child Entries. 13>5 && 13 > 6

(13,W)
(5,A) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)

Step 3: Check both child Entried against each other. 5<6. Swap with (5,A)

(5,A)
(13,W) (6,Z)
(15,K) (9,F) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)

Step 4: Check against both right and left child Entries. 13<15 && 13>9. Swap with (9,F)

(5,A)
(9,F) (6,Z)
(15,K) (13,W) (7,Q) (20,B)
(16,X)(25,J)(14,E)(12,H)(11,S)

Step 4: Check against both right and left child Entries. 13<14 && 13>12. Swap with (12H)

(5,A)
(9,F) (6,Z)
(15,K) (12,H) (7,Q) (20,B)
(16,X)(25,J)(14,E)(13,W)(11,S)

Comparison:

(5,A) *Manual Output*
(9,F) (6,Z)
(15,K) (12,H) (7,Q) (20,B)
(16,X)(25,J)(14,E)(13,W)(11,S)

(5,A) *Actual output*
(9,F) (6,Z)
(15,K) (12,H) (7,Q) (20,B)
(16,X)(25,J)(14,E)(13,W)(11,S)