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CS 590 Homework 6: Union-Find Structures Application Exercises

Due Date: March 6, 2022

Problem 7.5.18:

The insert(i) and removeMin Algorithms are below. The insert (i) is similar to the Algorithm of union (x,y) in Section 7.4 since we are inserting an item, which is similar to making a union between 2 sets. For removeMin, we need to find the minimum and then remove it.

The Algorithm for insert (i) is below:

Algorithm union(x,y)
    If x.size <y.size then
        x.parent ← y
        y.size ← y.size + x.size
    else
        y.parent ← x
        x.size ← x.size + y.size

The Algorithm for removeMin is below:

Algorithm removeMin()
    r ← x
    while r.parent != r do
        r ← r.parent
    z ← x
    while z.parent != z do
        w ← z
        z ← z.parent
        w.parent ← r
    remove(x)

As described in Section 7.4, both Algorithms run in $O(n\alpha(n))$, and thereby solve the offline-min problem