Simple Data Structures with Slightly Worse Bounds ?

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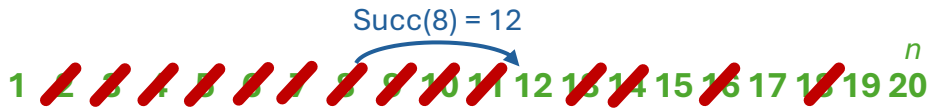
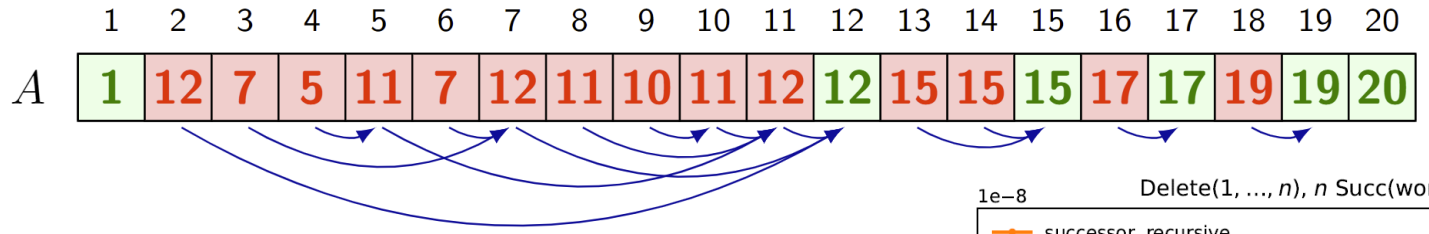
Example : *A Simple Integer Successor-Delete Data Structure*, Brodal, SEA 25

Problem : Internal union-find Init(n) Delete(i) Succ(i)

Amortized $O(1)$ time [Gabow, Tarjan JCSS 81]





simple

Proc INIT(n)
Create $A[1..n]$
for $i \leftarrow 1$ **to** n **do**
$A[i] \leftarrow i$

Proc DELETE(i)
$A[i] \leftarrow i+1$

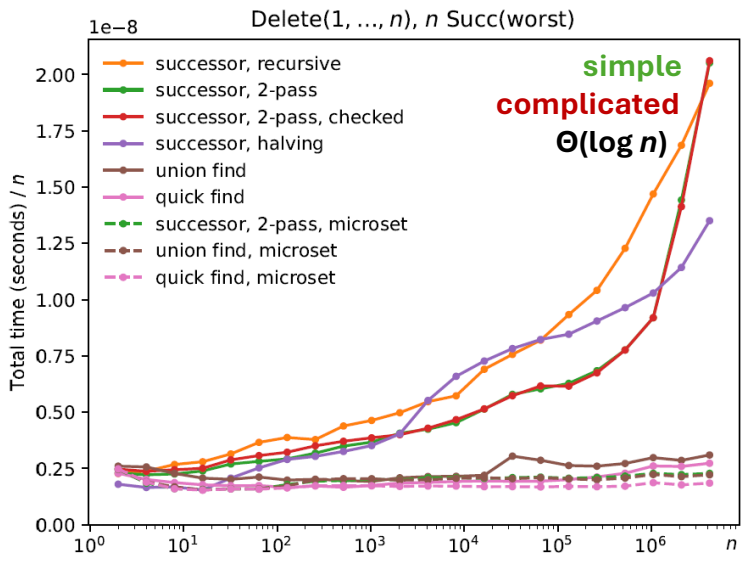
Proc DELETE(i)
if $A[i] = i$ **then**
$A[i] \leftarrow i+1$

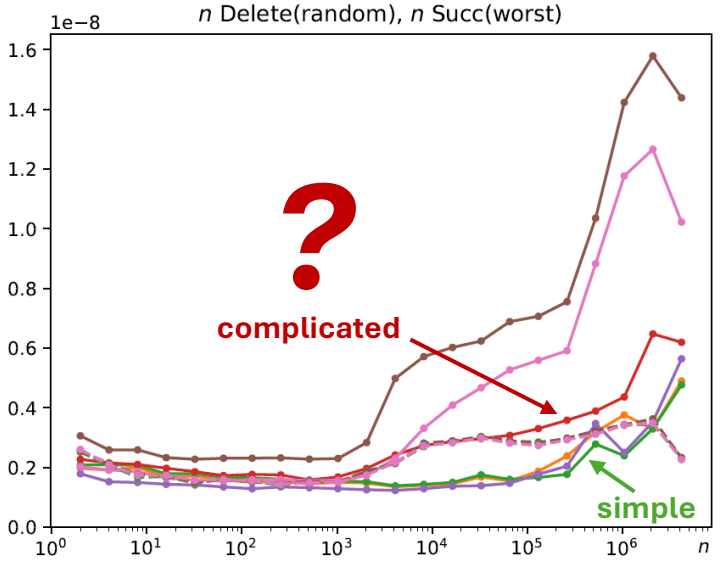
complicated

Proc SUCC(i)
$j \leftarrow i$
while $j < A[j]$ **do**
$j \leftarrow A[j]$
while $i < A[i]$ **do**
$i' \leftarrow A[i]$
$A[i] \leftarrow j$
$i \leftarrow i'$
return j

2-pass path compression

$$\mathcal{O}\left(n + d + s \cdot \left(1 + \log_{\max(2,s/n)} \min(s,n)\right)\right)$$





Open problem ▶ Find complicated data structure ▶ Do something simpler ▶ Prove its efficiency ▶ Algorithm engineer it