

Summary of Set ADT Implementations

$m = |U|$

element ref + next ref

slots marked as deleted

Data Structure	Unsuccessful Search	Successful Search	Approximate Space Usage
Direct Addressing	1	1	m
Separate Chaining	$1 + \alpha$	$1 + \frac{\alpha}{2} - \frac{\alpha}{2n}$	$2n + m \approx n \left(3 + \frac{1}{\alpha} \right)$
Separate Chaining ($\alpha=1/2$)	1.5	≈ 1.25	$4n$
Separate Chaining ($\alpha=3/4$)	1.75	≈ 1.375	$3\frac{1}{3}n$
Separate Chaining ($\alpha=1$)	2	≈ 1.5	$3n$
Separate Chaining ($\alpha=3$)	4	≈ 2.5	$2\frac{1}{3}n$
Open Addressing	$\frac{1}{1-\alpha}$	$\frac{1}{\alpha} \ln \frac{1}{1-\alpha}$	$m = \frac{(n+d)}{\alpha}$
Open Addressing ($\alpha=1/4$)	$4/3$	≈ 1.15	$4(n+d)$
Open Addressing ($\alpha=1/2$)	2	≈ 1.39	$2(n+d)$
Open Addressing ($\alpha=3/4$)	4	≈ 1.85	$\frac{4}{3}(n+d)$

only good $n > m/4$

hash table # elements in set

$d=0$

$\alpha = n/m$ $m=n$

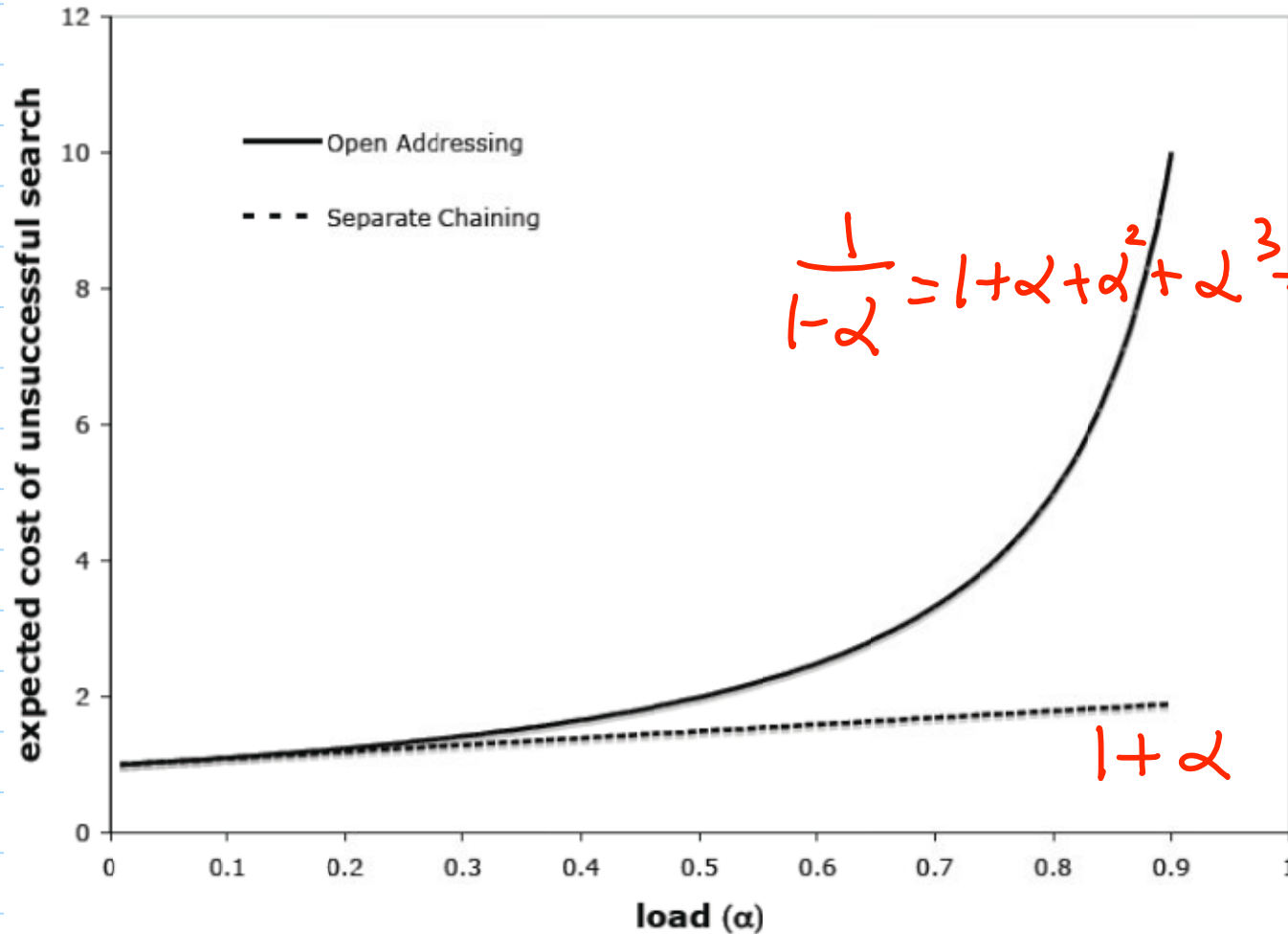
$\alpha = \frac{n+d}{m}$

$m=2(n+d)$

hash table size

Unsuccessful Search Cost as a Function of α

↗
load



Comparison of Search Cost for Space Usage of $\sim 3n$

