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Email: (odroun, meybodi)@ce.aut.ac.ir

¹ Deap
² Heap

Pipeline

[] []

i k (k-i) i

[]

[] log(n) p EREW-PRAM MH⁶

n	MH	SIMD
MH	logn/loglogn	$O(\log(n)/p + \log\log(n))$
		$O(n/p + \log(n))$
		$n/\log n$
		[] $O(\log(n)/p + \log\log(n))$

splay tree

³ Min Heap

⁴ Max Heap

pipeline

Min-path Heap

i n=1

i

n>1

i

MinPartner = $n - 2^{\lfloor \log(n) \rfloor - 1}$

MaxPartner =

if $(n + 2^{\lfloor \log(n) \rfloor - 1}) > n$ then

$(n + 2^{\lfloor \log(n) \rfloor - 1}) \text{ div } 2$

else

$(n + 2^{\lfloor \log(n) \rfloor - 1})$

MaxHeap(k, n)=

if $2^{\text{level}(n)} + 1 + 2^{\text{level}(n)-1} \geq n$ then

return(True) // n belongs to min heap

else

return(False) // n belongs to max heap

MaxPartner

n

MinPartner

Deap

lchild

MinPartner

i

rchild

$i := n - 2^{\lfloor \log(n) \rfloor - 1}, \quad \text{MinPartner} = \max(d[i], d[lchild(i)], d[rchild(i)]);$

AKU Cluster

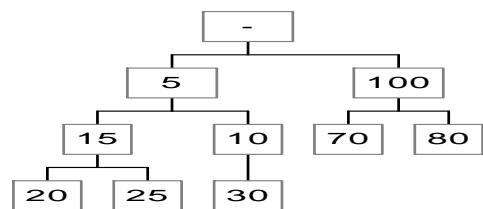
)

$\log(n)$

$\log(n)$

)

$\log(n)$



()

$$\log(n) + \log(n)/2$$

$$:(\quad\quad\quad)$$

$$:(\quad\quad\quad)$$

$$\log(n)$$

$$\log(n) - \log(n) + \log(n)/2$$

		min/max
		$\log(n)$
min/max	$\log(n)$	$\log(n) + \log(n)/2$

		min/max
min/max		$\log(n) + \log(n)/2$

		min/max
		$\log(n)$
min/max		$\log(n)$

		min/max
min/max		$\log(n)$

$$\log(n/p) =$$

$$\log(n) - \log(p)$$

•
•

[]

[]

p

n

n mod p

p p/4

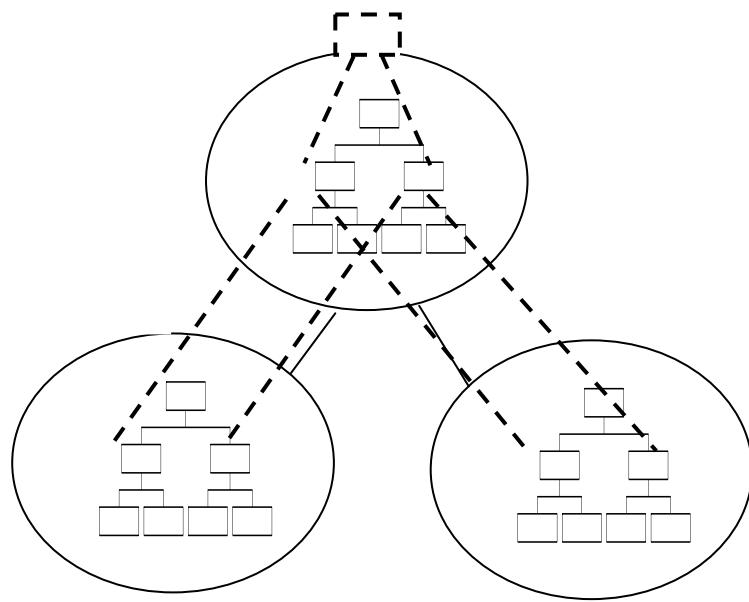
s

n mod (p+s)

p=16

(0, 5, 10, 15, 4, 9, 14, 3, 8, 13, 2, 7, 12, 1, 6, 11)

s=1



()

()

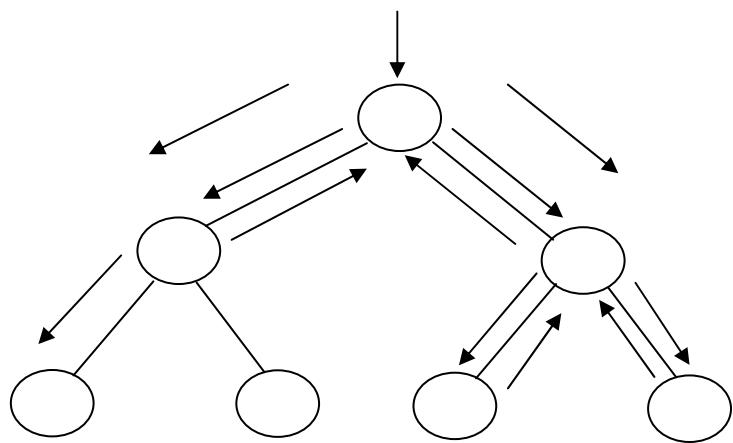
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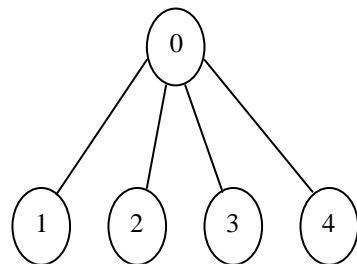
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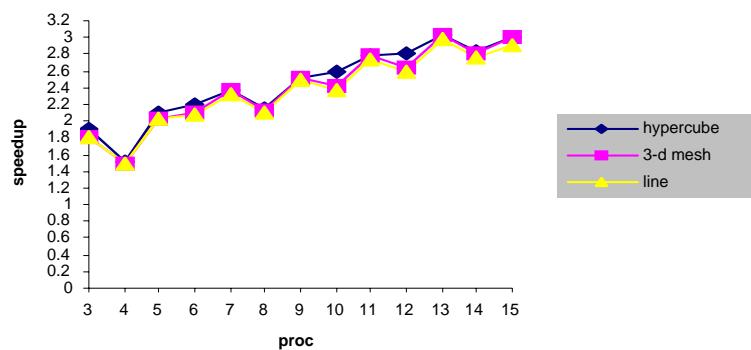
(

) Deap

:

		min/max
min/max		

p*1000



speedup

p

p

		min/max
		p
min/max		p

multi-pascal

AKU Cluster

[] AKU Cluster

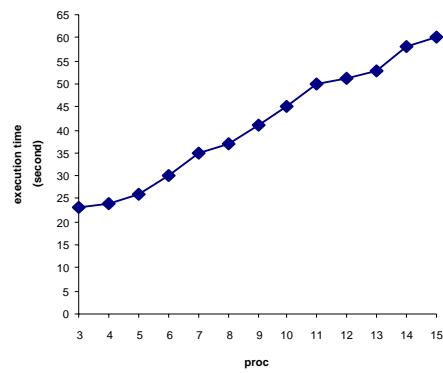
[] MPI

AKU Cluster

k

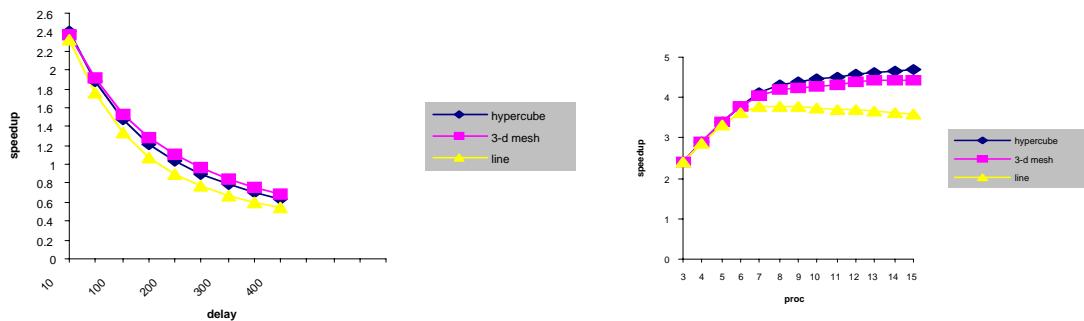
i

AKU Cluster

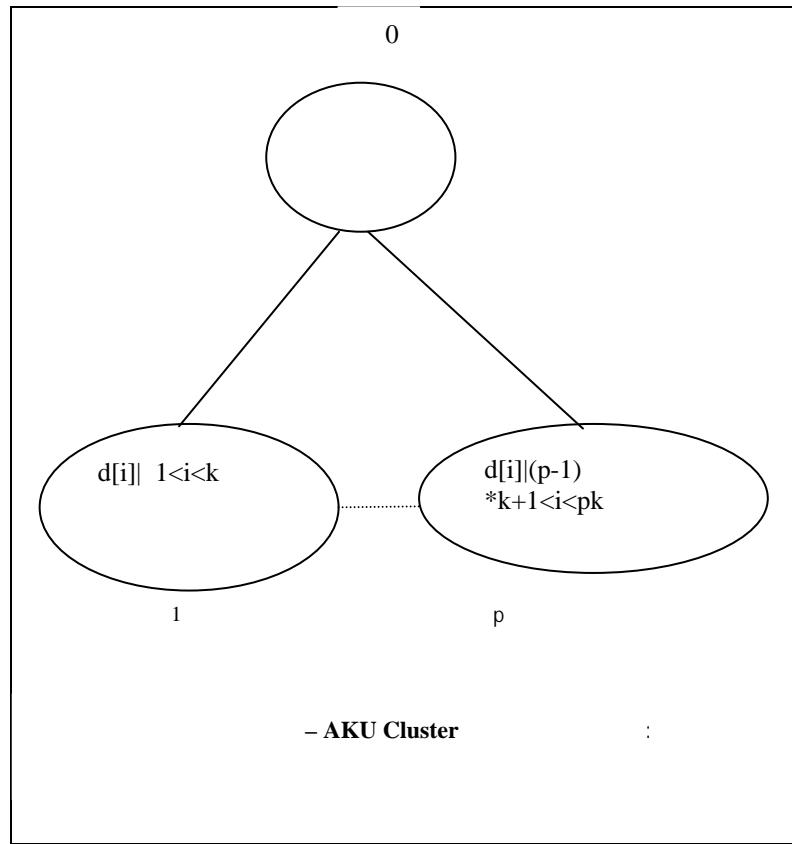


AKU

Deap Cluster



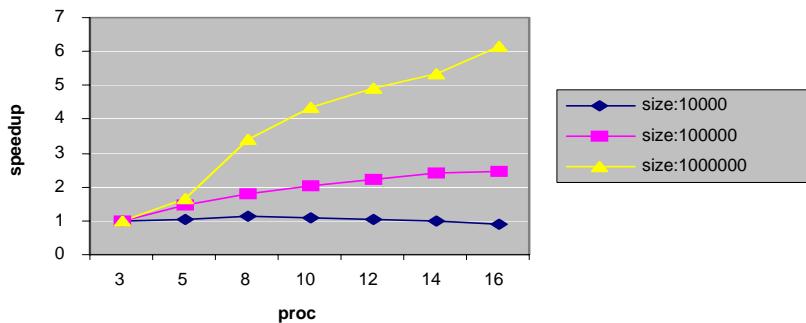
speedup



AKU Cluster

AKU Cluster

AKU Cluster



Deap AKU Cluster Deap

Deap

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