

Parshvanath Charitable Trust's

A. P. SHAH HARMEN OF THERMER A.

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Subject :- ADSAA

SEM -V (I.T)

PAGE 1 Recurrence Relation	PAGE 2
fun" calls it self	
7001 0000	Let's consider
Step1: How to write r.r.	Now check value of 1 of
5	Let's consider 2=30 Now check value of ili i=0, j=06
Step2:- How to solve xx.	
	First find mid - (1)
Let's write r.r. for Binary Search	First find mid = $(i+j)/2$ = $(0+6)/2$ = 3 a[3] = 40 mid = 40 mid = 40 0 20 30 0 50 60 70
1 Binary 10 Search 2 Searching an element in the Sorted array	7-7-10
1 Binary 10 Search &	a 2 3 3 = 40
Searching an element in the	mid = 40
Sorted array	mid (1) 50 00 70
	10 20 30 (40) 30 60 70
Let's consider the array we have is	
have 15 is	So the problem I nave with
0 1 2 3 4 5 6	So the problem i have with size n, is divided into 2 parts n/2 & n/2
10 20 30 40 50 GO 70	parts 11/2 4 11/2
	n
Algorithm:- B5(2a, i, i, x)	
B5(20a,i,j,2)	h/2 n/2
1 60.0010	
mid = (i+j)/2	Alua chak
if a[mid] = = x)	Now check if (a [mid] = = x)
return (mid)	40 \$ 50
650	10 7 50
if (a[mid]>z)	TC ancider 2 = 40 the
B5 (a,j, mid-1,x)	If consider 2 = 40 the element is found & our
esc boll ox	Search operation is complete
B5 (a, mid+1, j,x)	Search operation is compared
30	So time required for execution
	is O(C) mostant time for
	So time required for execution is O(C), constant time for finding mid a comparaision. Department of Information Technology
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	Subject :- ADSAA		SEM -V (I.1)
PAGE 3	Now let's antique	.	PAGE 4
	with x = 30		//
			n/2 mid n/2
	a [mid] = 2e	-	n/2 1110
5	40 \$ 30		if dement we want to
		1	Search is Smaller than
	so you need to go to else.	1 ~	aid than we are interested
	so you need to go to else part of jour algorithm	1	n first part of problem. Ind we don't consider econd part of problem.
		A	Ind up don't consider
10	check ifalmid)>xe	5	ermal part of problem.
	40 > 30		CLOTTO JA
	condition is true		2
	your problem is now divided into 2 parts		/ /n/2
	divided into 2 parts	1 35	(np) (np) (np)
15			
(3)	(40)		
	10 20 30 50 60 70	N	loving further left
	10 20 30 50 60 70	5	ubproblem n/2 is
		di	vided into subparts.
20	so either we will go to		
	left side i.e. first		(40)
	Sub problem or we will go		0 1/2
	Sub problem or we will go second subproblem	1	0 20 30 50 60 70
		Ĭ	the Jack of
25	AS 40>30 let's go to left sub problem	m	id = (i+j)/2
	to left sub problem		= (0+2)12
		E	
- 4	Let's say for problem of size n,	al	[mid] = 20
	size n,		
30	ņ	Let	'5 compare mid with re
			a [mid] > 2
101	n/2 mid n/2		o[mid] > 20 20 > 30 (False)
. 14.11			

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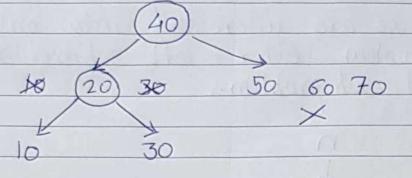
A D SHALL HASHING OF THEOLISM HAS OF

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In that case we will go for the second condition & check a [mid] < 20



50 we say for problem with size n.

n/2 n/2 n/4

As a [mid] < & i.e. 20<30 is True we are further going with second subpart of problem

n/4 n/4



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A. P. SIIVII IIXSIHHHHHHD OD THXCIIIVOLOCKY

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Subject :- ADSAA SEM -V (I.T) Now let's see that we have a problem with size n, we divide it into 2 parts h/2 & n/2. But we are interested into only one subproblem either left subproblem or either right sub problem. Further this n/2 we divide into two more Subproblems n/4 & n/4 But we are interested into only one subproblem from left subproblem & right subproblem So what is the recurrence relation T(n) = T(n/2)+C/ constant time for finding mid So this the recurrence relation for Binory search. or companisions



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SEM -V (I.T)

Now next problem is how to solve recurrence Before we see how to solve a recurrence relation, let's take one more example of how we write recurrence relation. Let's we have an algorithm os given below. Void Test (int n) if (n>0) print ("1.d",n)

Test (n-1) Let's to= take n=3 Test (2) Test(1) Test (o As 0 >0 False Tracing Tree for recursive funn

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In every call if no it is printing a value of calling funn again For There are 2 tasks O print a value of call the funn again For n=3 1) 3 times print statement is executed 2) 4 times the recursive call is made to for n, $n+1 \rightarrow call 5$ n > printing a value Let's ignore time for printing a value as it constant. we have only (n+1) So time complexity of given algorithm is f(n) = O(n+1) f(n) = O(n)Now let's see how to write a recurrence relation for the same. Time taken by our algorithm is let's say So, T(n) = C + T(n-1)constant time for

a value printing Camlin Parshvanath Chartable Trust's

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	Page : Date :
Therefore,	for n=0
T(n) = (T(n-1) + c)	
This 95 the recurrence megiven algorithm.	elation for the
Solving Recurrence Relation:-	
15 The substitution Method 15 Recursive Tree Method 3 Master's Method	
The second second second	