DIGITAL EDUCATION
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INFORMATION TECHNOLOGY

Data Structure

Hand Notes For GATE, PSUs & Competitive Exam

Hand Notes

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Data * Structure

25-4-2012

Data structure

1) Defination

a logical or mathematical model.

Ex:- stack



physical structure

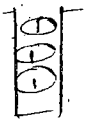
1) Defination

implementation of model in physical memory

Array stack



Linked stack



Datatypes :- problem Solving

Q. Why data structures ...?

Sol Solving a problem : FAST by occupying optimum memory

FAST → time analysis

optimum memory → space analysis

ARRAYS

Q. Calculate the location of an element A(0) in an array of a : array [-5 ..... +5] elements and starting location is 1000 and each element occupies 2 memory locations.

Sol

upper boundary − (lower boundary) + 1

⇒ +5 − (−5) + 1

⇒ 11

char 1
int 2
float 4
double 8
long double 10

$Loc(A[i]) = L_b + (i - L_b) * C.$

$A(0) = 1000 + [0 - (-5)] * 2 \Rightarrow 1000 + 10$

Address arithmatic

$$loc(a[i]) = l_o + (i - \text{lower boundary}) * C$$

10	11	12	13
a_3	a_4	a_5	a_6

$loc(A[6]) \rightarrow 10 + (6-3)$

$\Rightarrow 13.$

char $\rightarrow 10 + (1)_{x1} = 11$

int $\rightarrow 10 + (1)_{x2} = 12$

float $\rightarrow 10 + (1)_{x4} = 14$

double $\rightarrow 10 + (1)_{x8} = 18$

long double $\rightarrow 10 + (1)_{x10} = 20$

Java Supports a UNI code. It is a Super Code of ASCII

- UNI code is universal code.

$$loc(A[i]) = l_o + (i - l_b) * C.$$

$A = \text{array}[l_b \ldots u_b)$ of elements.

l_o = Starting location

l_b = lower boundary

C → Count

Row major order ↑ Column major order ↑

Q. Calculate the location of A(0,5) element using i) RMO ii) CMO for A = array [-2 .... 2, 3 ... 7] of elements and starting location is 1000 and each element occupies 2 memory cells.

Sol

2-D arrays

$A = \text{array}[\underbrace{l_{b_1} \ldots u_{b_1}}_{i}, \underbrace{l_{b_2} \ldots u_{b_2}}_{j}]$ of element

i → Row

j → Column

$u_{b_1} - l_{b_1} + 1 \quad \ldots \quad u_{b_2} - l_{b_2} + 1$

$r_1 \times r_2$