

E5 ELMS FANO

ENCODE $S = 11, 14, 16, 19, 20, 21, 22$ WITH ELMS-FANO AND SHOW HOW TO ANSWER

- ① ACCESS(5)
- ② NEXTGEQ(17)

HINT REDUCE THE UNIVERSE ~~TO~~ TO $u = 12$

SUBTRACT $S[1]$ TO OBTAIN $S' = (0, 3, 5, 8, 9, 10, 11)$

$u = 12 \quad n = 7 \quad b = \lceil \log u \rceil = 4 \quad l = \lceil \log \frac{u}{n} \rceil = \lceil \log \frac{12}{7} \rceil = 1 \quad h = b - l = 3$

	$h=3$ bits	$l=1$ bit
0	000	0
3	001	1
5	010	1
8	100	0
9	100	1
10	101	0
11	101	1

$L = 0110101$

FOR H WE HAVE $2^h = 8$ BUCKETS

$H = \frac{10}{0} \frac{10}{1} \frac{10}{2} \frac{0}{3} \frac{110}{4} \frac{110}{5} \frac{0}{6} \frac{0}{7}$

① ACCESS(5) → LOW PART $L[5] = 1$

↘ HIGH PART = SELECT₁(5) - 5 = 9 - 5 = 4 = $(100)_2$
 h bits

RETURN $S[1] + (1001)_2 = 11 + 9 = 20$

② NEXTGEQ(17 - 5[1]) = NEXTGEQ(6) = NEXTGEQ(~~100~~ $\overline{0110}$)
 $H(6)$

$n = \text{SELECT}_0(3) + 1 = 6 + 1 = 7$

$H[7] = 0$ SO WE RETURN $S[1] + \text{ACCESS}(n - H(6))$
 $= S[1] + \text{ACCESS}(7 - 3)$
 $= S[1] + \text{ACCESS}(4)$
 $= 11 + 8 = 19$