July - 13

13 July 2020 18:40

1. Doubts
2. Check if a number is even or odd
3. Time Complexity ->Prime Numbers example
4. Selection Sort
5. String Class

Print the left element

7 8 3 4 2 9 5

8 1 2 9 4 3 7 5

Sort → middle element

1 2 3 4 5

1 2 3 4 5 6

Check if a number is prime Ram

n

if n = 1 return true;

D $n=2$ return true

$2 \rightarrow n-1$ (i) $\left[\frac{n}{2}, \frac{n}{3}, \frac{n}{4} - - \frac{n}{n-1}\right]$

if ($n \% i == 0$) return false;

return true

Sham

$2 \rightarrow \sqrt{n}$

16 $\sqrt{16} = 4$

$a \times b = n$

2, 3, 4

$a > b$ or $b > a$

8×2

5, 6, 7, 8, 9 - - 2×8

$a \times b = n$

$a \times b = n \longrightarrow (a < \sqrt{n})$

if ($b > \sqrt{n}$) then

Definitely Shaun's Approach ✓

Ram	Shaun
n steps	$\sqrt{n}$ steps
1	1
10	3
100	10
10^4	100
10^8	10,000

Time Complexity

1. Atomic / Basic Statements
   - ↳ unit time

$x+1$, $x-1$ → Addition / Subtraction

$x == 0$ → true
→ false

$x = 5$ → Assignment

$x = x + 1$ → Time Complexity ?

1 + 1 = 2 units

Loops

```
for(int i=0; i<5; i++)
```

{

S.O.P(5);

}

1st iteration

i = 0

i<5

S.O.P

0

3

2nd iteration

i++ → i = i+1

1

i<5

S.O.P → 1 unit

2

1

1

4

3rd → 4 — 2

4th → 4 — 3

5 times → 4 ——— 4

i++ → 2
i<5 → 1
] → 3

Total line = 3 + 4 + 4 + 4 + 4 + 3

= 22 units

3 Notations

1 Big-Oh Notation 'O'

Worst Case $n \to \infty$

```
for(int i=0; i<n; i++)
{ sout(n);
}
```

i=0 → 3

i=1 → 4

] Total

$i = 2 \rightarrow 4$

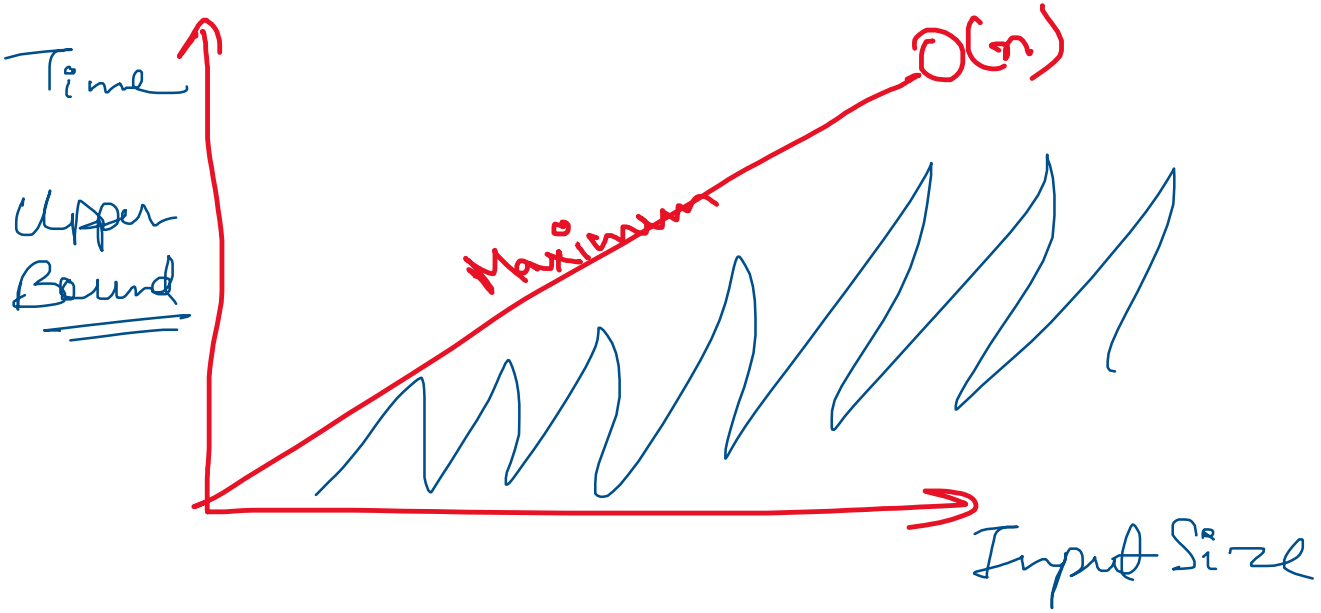
$i = n-1 \rightarrow 4$

$i = n \rightarrow 3$

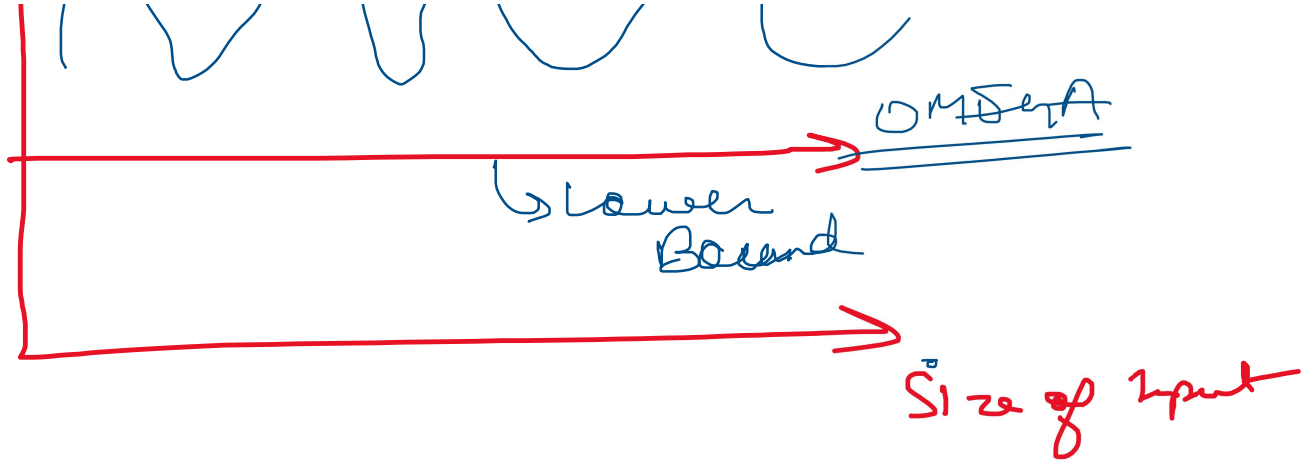
$3 + 4(n-1) + 3$

$O(n)$

time $\propto$ size of input

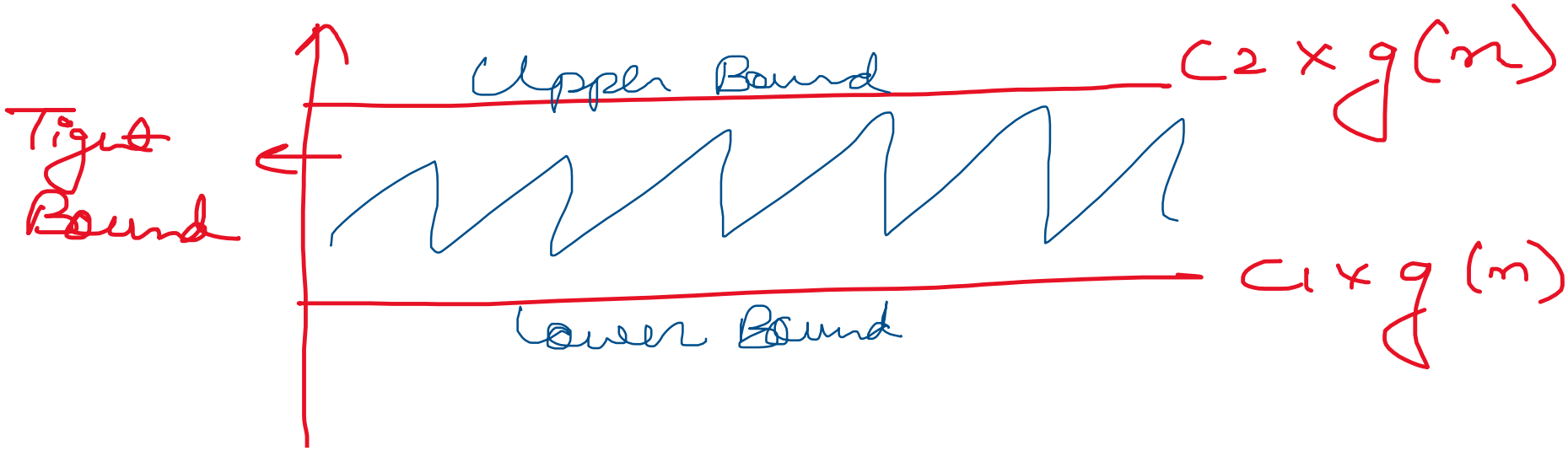


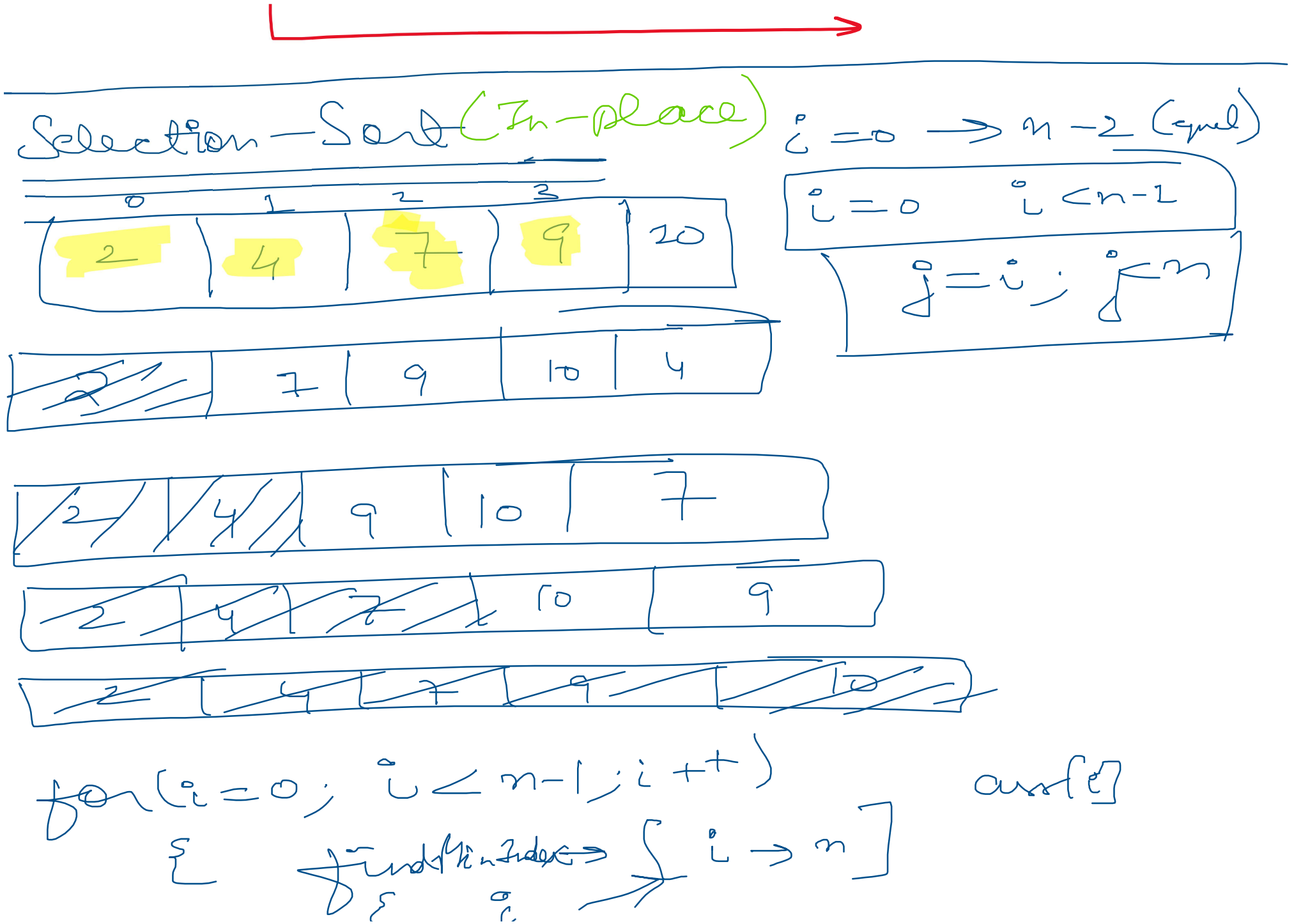
2 Ω (OMEGA Notation)

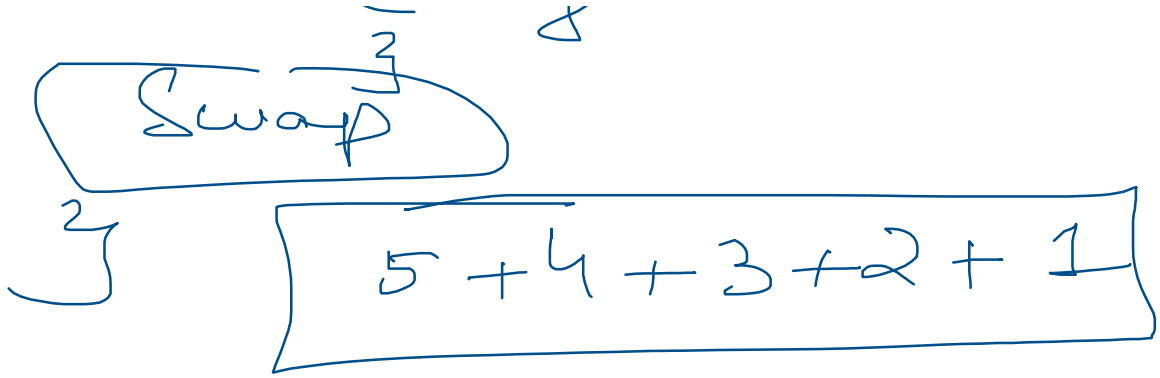


3 Theta → Θ — Notation

$c_1 \times g(n) < f(n) < c_2 \times g(n)$




Selection-Sort (In-place)
i = 0 → n-2 (equal)
0 1 2 3
2 4 7 9 10
i = 0 i < n-1
j = i ; j < n
2 7 9 10 4
2 4 9 10 7
2 4 7 10 9
2 4 7 9 10
for(i=0; i < n-1; i++)
arr[i]
{
findMinIndex
i → n
}
i



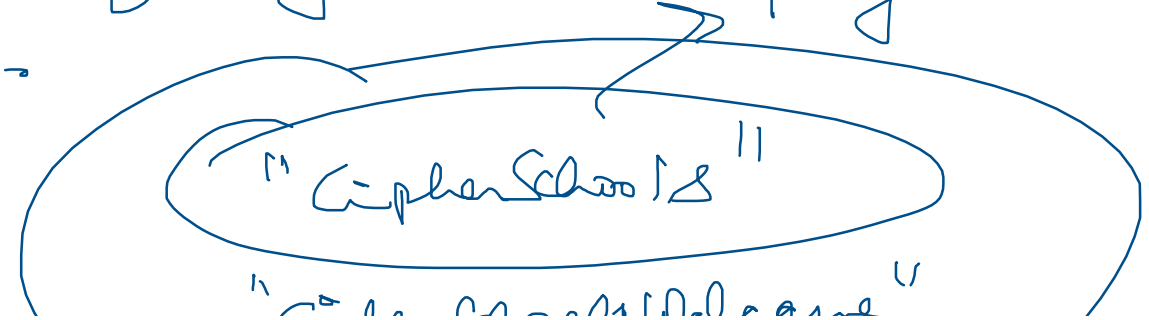
$T(n) \rightarrow n + n-1 + n-2 + \cdots 1$

$\Rightarrow \frac{n(n+1)}{2} \rightarrow O(n^2)$

Strings

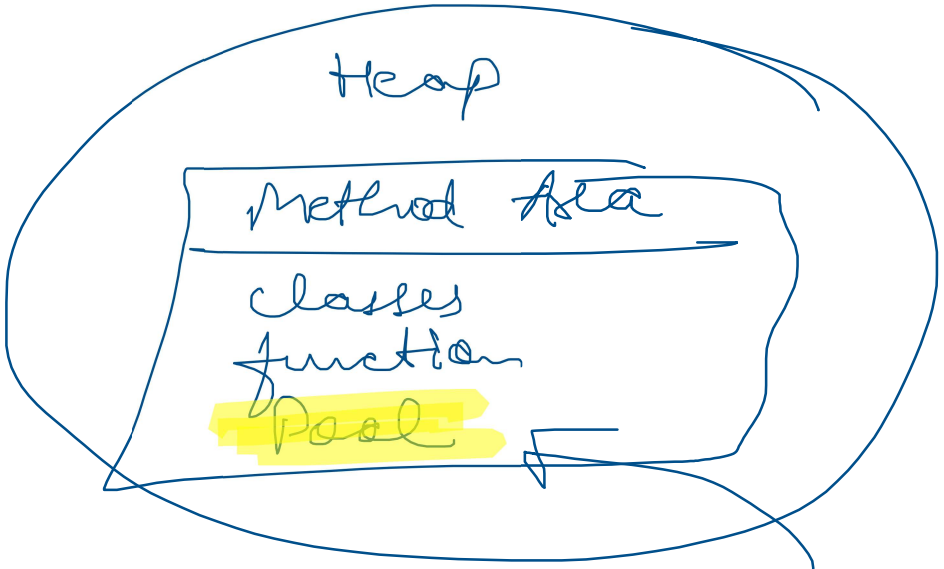
We work with objects of String class.

They are immutable.



Can be created using 2 ways

1. String literal
2. Constructors



1. String literal → (Go to pool)

String S1 = "Cipherschools"; → Point to the same object

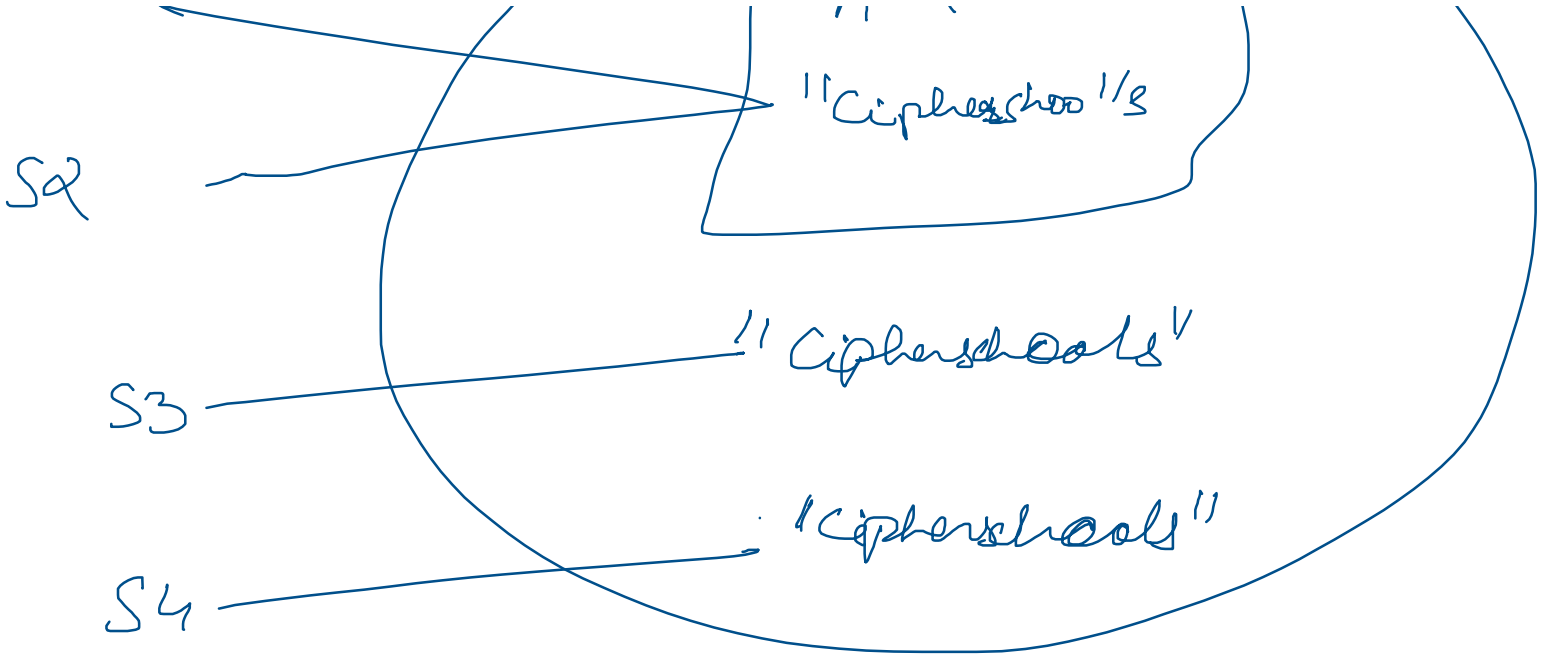
String S2 = "Cipherschools";

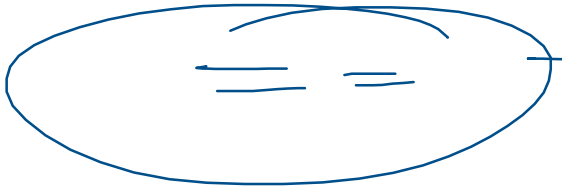
2) Constructor → (Not go to Pool) → Normal Heap

String S3 = new String("Cipherschools");

String S4 = new String("Cipherschools");

2 new objects created - Heap





→ Checks the reference of the variables.
True if the point to the same object.