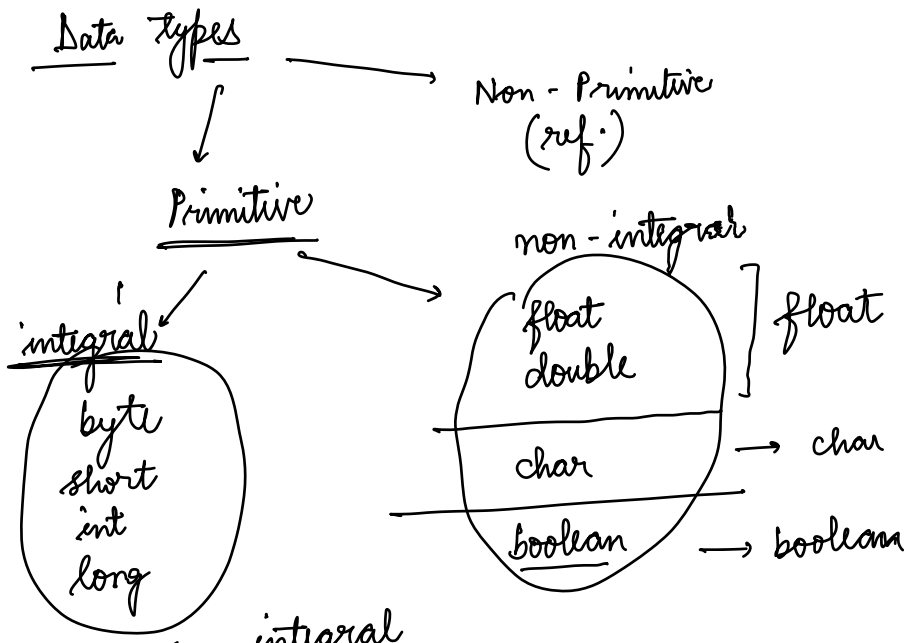
9:05pm

Java

- Things to discuss today:
  1. Data types
  2. Wrapper data types
     - ↳ immutability
     - ↳ Pass by value
  3. String / String pools
  4. OOP basics → classes and objects
     access modifiers
     constructors

Java
1. 13
2. 15
3. 23
4. 26_1



integral

1. Range - space — range of values
2. circularity
3. Promotion & demo — variable
   default.

	width (bits)
byte	1 / 8 bits
short	2 / 16 bits
int	4 / 32 bits
long	8 / 64 bits

4 bits p & n

16

0 0 0 0

1 1 1 1

smallest

largest

-7 to 8

-8 to 7

-7 to 8

-7 to 7

-8 to 7

decimal	binary
0	0 0 0 0
1	0 0 0 1
2	0 0 1 0
3	0 0 1 1
4	0 1 0 0
5	0 1 0 1
6	0 1 1 0
7	0 1 1 1

$n = 4$

2's complement

+1

① 0001 → 1110

② +1

16 1111

8 0010 → 1101 +1 → 1110

-3 ← +3 → 0011 → 1100 +1 → 1101

-1	1111	15
-2	1110	14
-3	1101	13
-4	1100	12
-5	1011	11
-6	1010	
-7	1001	
-8	1000	

1000 → 0111 + 1 → 1000

-1, -2, -3, .. → 2's comp of positive part

-4
-5
-6
-7
-8

-8 → 8

1000 → 2's comp

$n = 4$

-8 to 7

-2^{4-1} to $2^{4-1} - 1$

-2^3 to $2^3 - 1$

ϕ

n

-2^{n-1} to $2^{(n-1)} - 1$

---

4 bits → signed number

	(8) +ve	-ve
0	0000	-1
1	0001	-2
2	0010	-3
3	0011	-4
4	0100	-5
5	0101	-6
6	0110	-7
7	0111	-8

(8) -ve

0001 → 1110 → 1111

0010 → 1101 → 1110

-8 → 1000

8 → 1000 → 0111 + 1 = 1000

int a = -8 → 1000

(-) 0001 + 1 = 1000

- 8

→ 1111

a = -1

(-)

1111 → 1's

0000 → +1

0001

-1

n = 4

-8 to +7

-2^{n-1} to $2^{n-1} - 1$

byte — 8 bits / 1 byte

short — 16

int — 32

long — 64

byte — — — — — — — —

n = 8

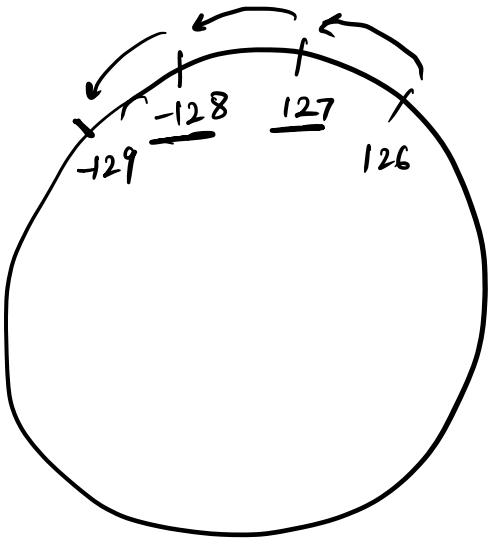
-2^{n-1} to $2^{n-1} - 1$

-2^7 to $2^7 - 1$

-128 to 127

-128 to 127 — 128 129

-128 -127



257 = 128
128
1

127 + 130

127 + 130 → 128 + 128 + 1

1

0 + 128 = -128

-128 + 128 = 0

+1 = 1

Range
circularity
promotion
demotion

float [4 bytes] | double [8 bytes] ✓

int a = 5;

long b = 10;
int

= 2.5
double

by default — double

2.5f

float f = (float) 2.5;

float f = 2.5;

4 8

float
32 bits
1.4×10^{-45} to 3.4×10^{38}

double
64 bits
4.9×10^{-324} to 1.8×10^{308}

char
boolean

i e
integral exponent

2.5

25×10^{-1}

25 -1
10

char → 1 char

short ← 2 bytes → +ve

short
-ve +ve

0 — 65,536

0 — $2^n - 1$

n = 4 → 0 to 15

0 to $2^4 - 1$

0 — $2^{16} - 1$

128 , 256 , 65,537

char ch = 'X'

ch = (char) (ch) + (double)

smaller = bigger

double

1 + 2.0 = 3.0

0 - 127 → [Unicode]

'A' (65) — 'Z' (90) → continuous 26

'a' (97) — 'z' (122) →

'0' (48) to '9' (57) — 10

[(ch) + (2.0)] = (91.5)

88 + 3.5

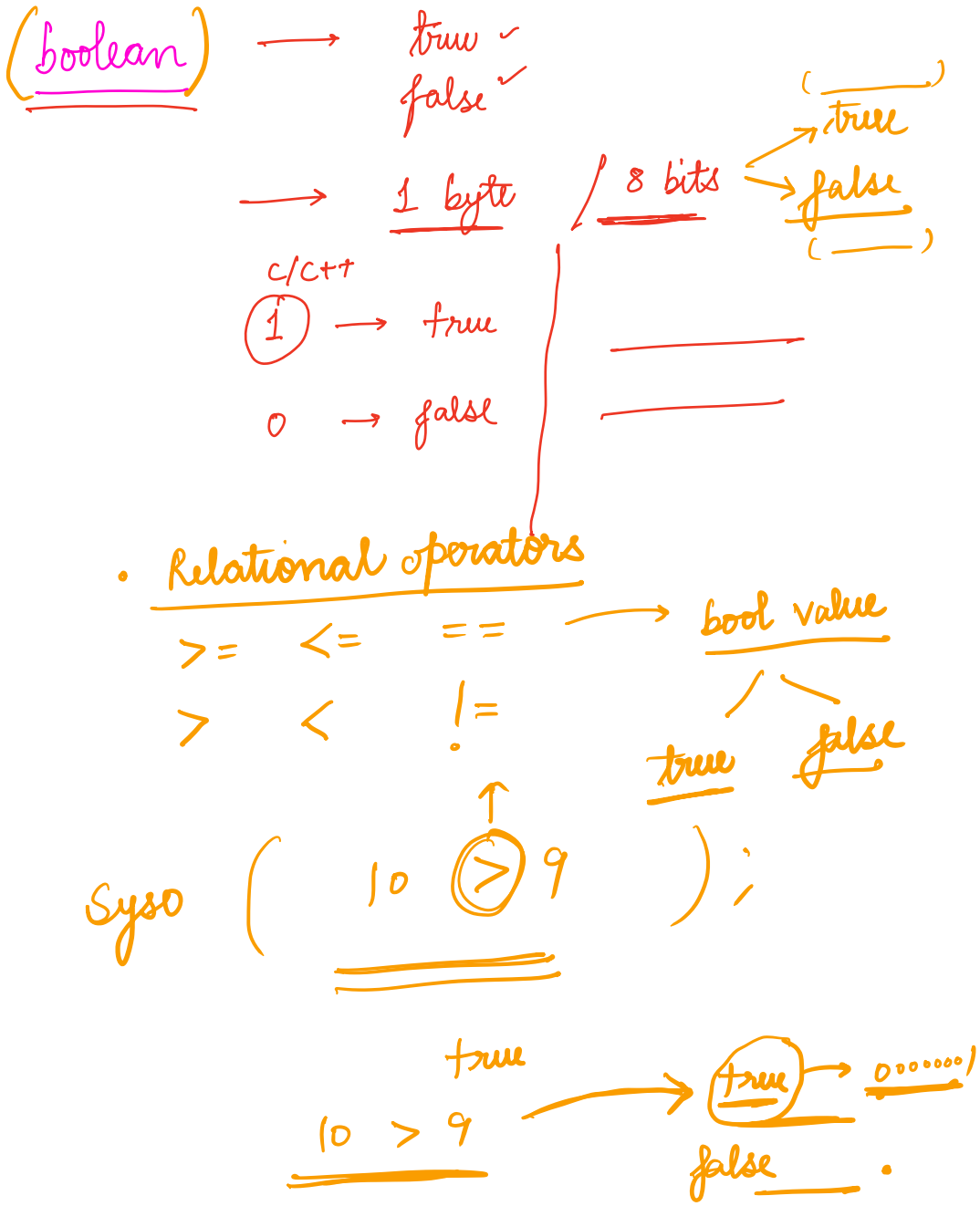
91

small

RHS bigger

ch = (char) 65538

0 — 65536


boolean
true
false
1 byte
8 bits
true
false
C/C++
1
true
0
false
Relational operators
>= <= ==
> < !=
bool value
true
false
Syso (10 > 9);
true
10 > 9
true
00000001
false

class and objects

Wrapper classes

Integer	(int)
Long	long
Boolean	boolean
Short	short

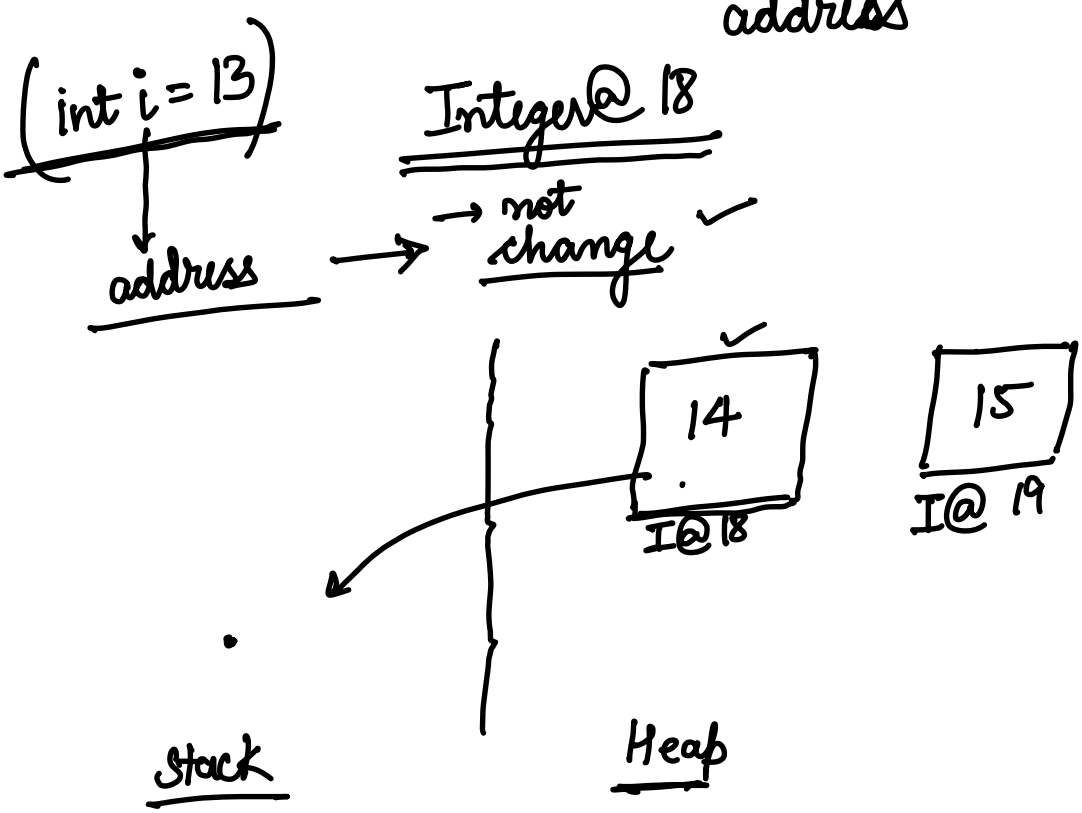
immutability ✓

Wrapper → reference → address

(int i = 13)

Integer@ 18

address → not change ✓



- **Strings** / String pool

Boolean ✓
- true ✓
- false ✓
- null ✓

Wrapper

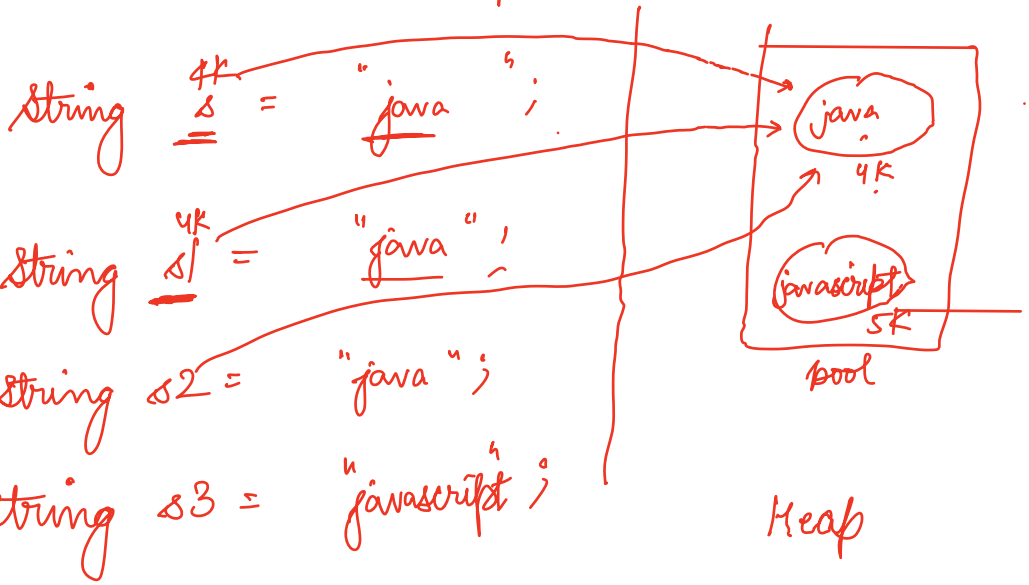
int a = 5;

String s = "Hello"; ← String literal

pool

String s1 = new String("Hello");

↳ Heap



String literals — pool

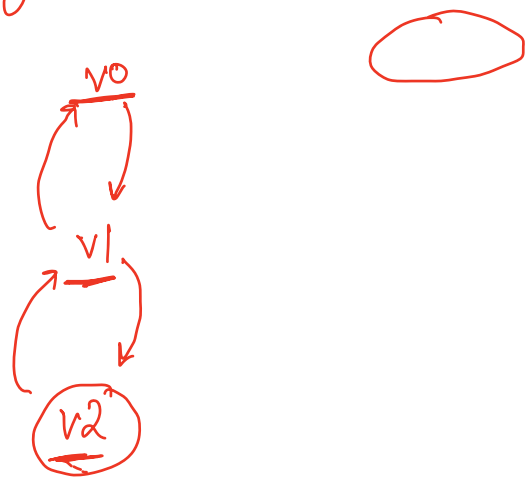
new → heap

literal → edit → heap

String → immutable

String name = "java"
name += "script" } →

github



→ how it is created
→ append / edit

StringBuilder / StringBuffer

Classes Objects Access Modifiers Constructors

String → non primitive always

String → String pool

Integer → reference

(primitive) → (non-primitive)

Integer $ int

NP

StringBuffer | StringBuilder

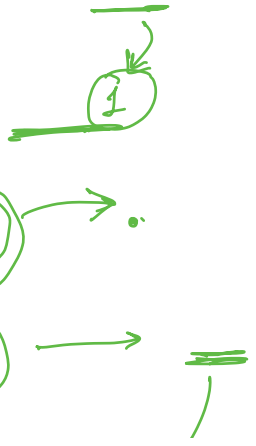
in = 65538

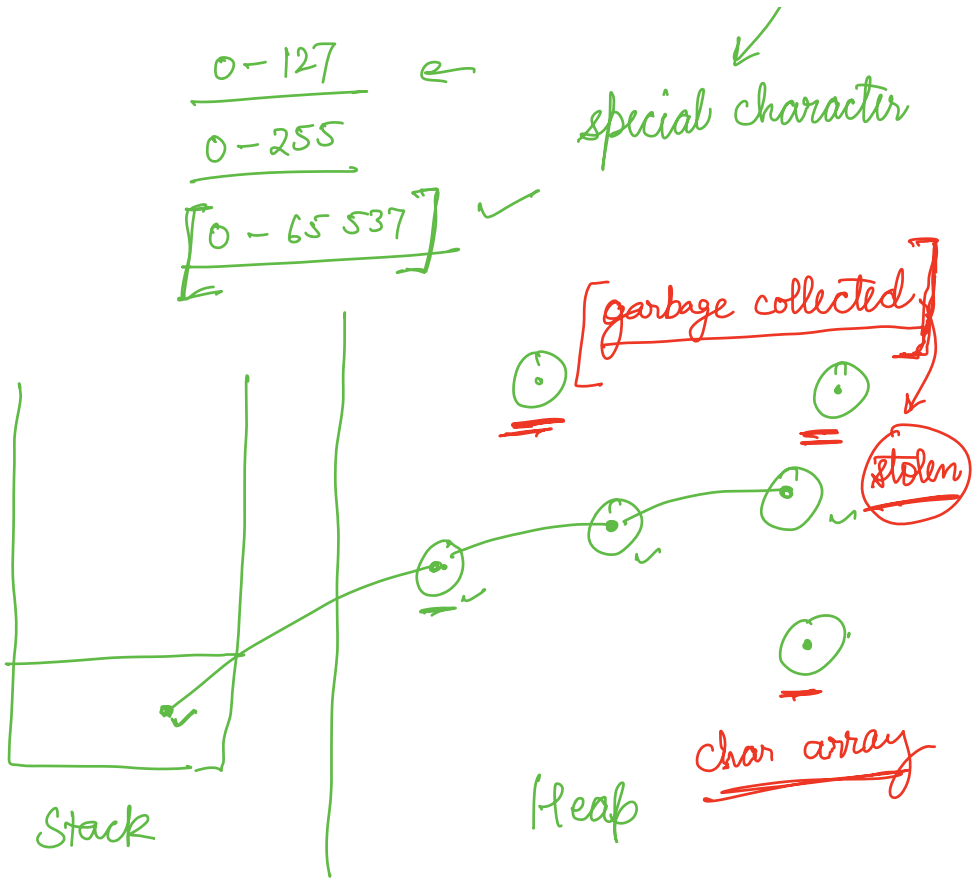
char ch = (char) in

(ch)

0 — 65536

65538




0-127
0-255
0-65537
special character
garbage collected
stolen
Stack
Heap
char array