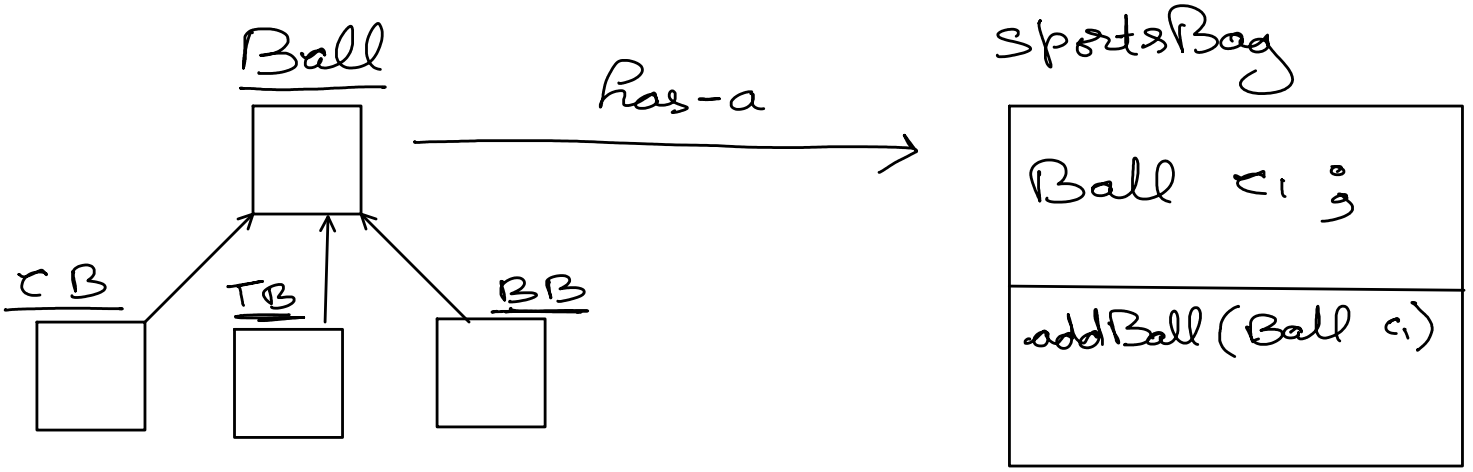
Monday, March 30, 2020 8:09 AM

Why Upcasting :-



CB c1 = new BB() X

CB c2 = new TB() X

CB c3 = new CB() ✓

TB c4 = new BB() X

TB c5 = new TB() ✓

TB c6 = new CB() X

BB c7 = new BB() ✓

BB c8 = new TB() X

BB c9 = new CB() X

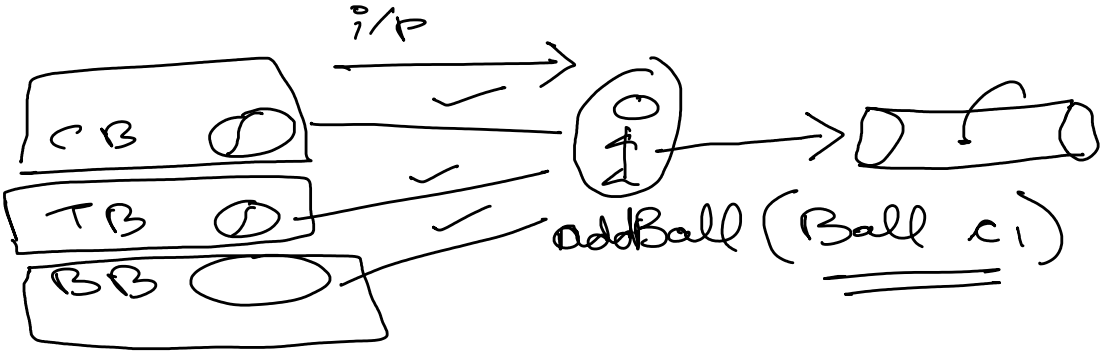
Ball c10 = new BB() ; ✓ (upcasting)

Ball c11 = new TB() ; ✓ (upcasting)

Ball c12 = new CB() ; ✓ (upcasting)

Note:

1. by creating a reference variable of Super-class type we can store the reference of any sub-class type, with the help of upcasting.
2. With the help of upcasting we can achieve Generalization



For Example, refer **online/jp/day6/app1**

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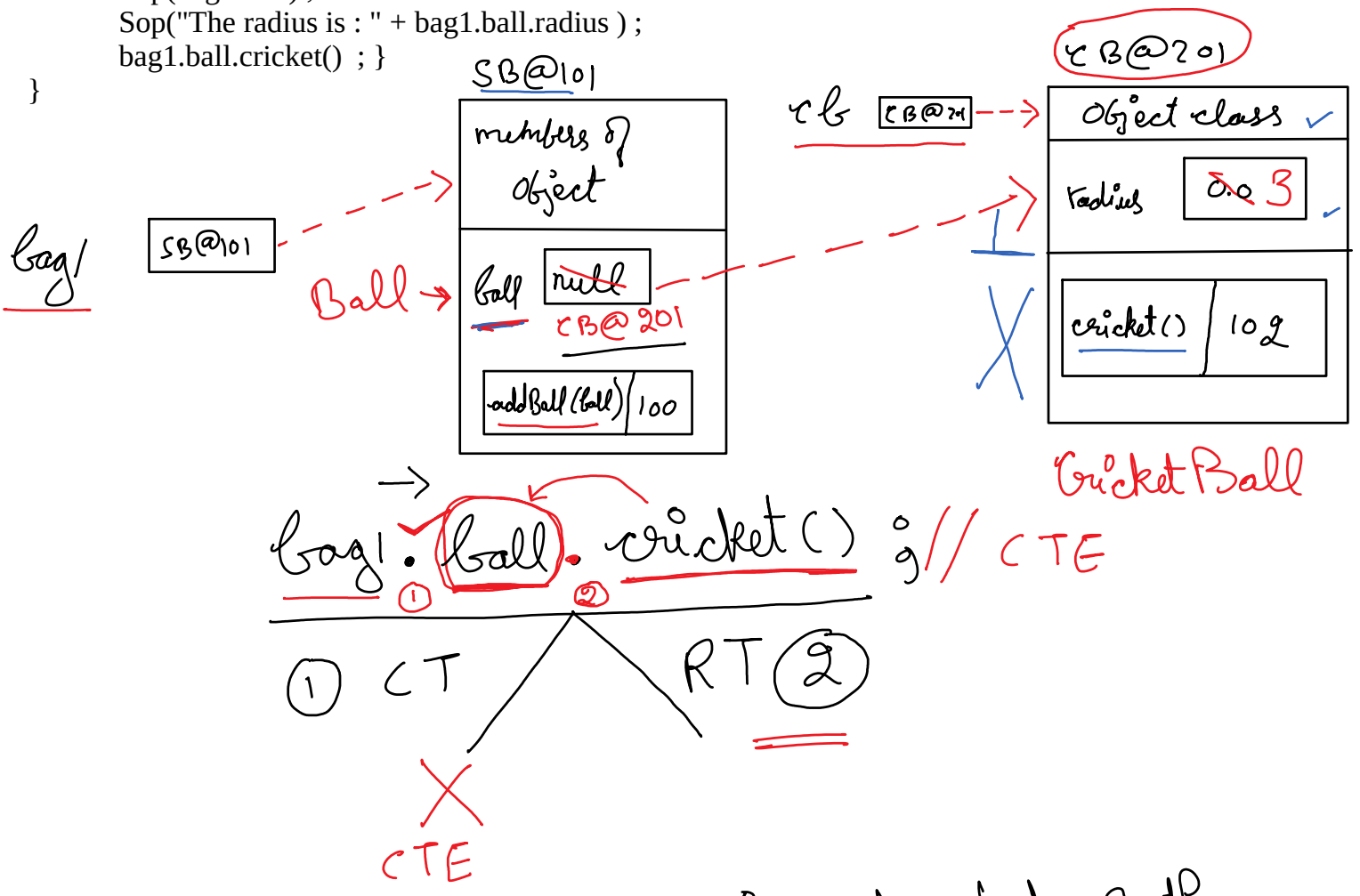
```
class Driver1
{
    public static void main(String[] args)
    {
        SportsBag  bag1 = new SportsBag()  ;
        Sop( bag1.ball ) ;
        CricketBall cb = new CricketBall(3) ;
        bag1.addBall(  cb  )  ;
        Sop(bag1.ball) ;
        Sop("The radius is : " + bag1.ball.radius ) ;
        bag1.ball.cricket()  ; }
}
```

o/p : null



bag1.ball.cricket() ; // CTE

① CT RT ②

CTE

Note: If the reference is upcasted & the programmer want to use the member of sub-class, then it is necessary for the programmer to perform downcasting.

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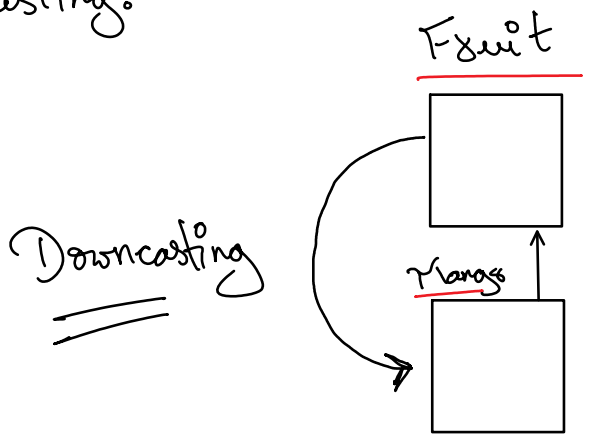
1 Downcasting:

The process of converting Super-class reference type into sub-class reference type is known as Downcasting.




```
class Fruit {

}

class Mango extends Fruit
{

}
```

1. `Fruit f1 = new Fruit();` ✓
2. `Fruit f2 = new Mango();` ✓
3. `Mango m1 = new Mango();` ✓
4. `Mango m2 = new Fruit();` //CTE

mango child — Fruit parent — Downcasting

Note:

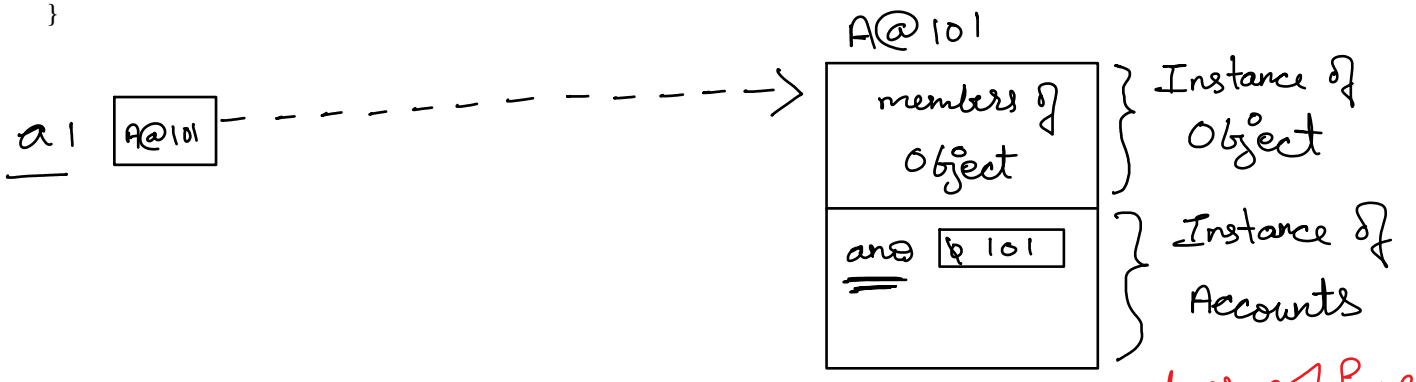
1. Downcasting, is not done implicitly by the compiler. It should be done explicitly by the programmer with the help of type cast operator → typecast operator

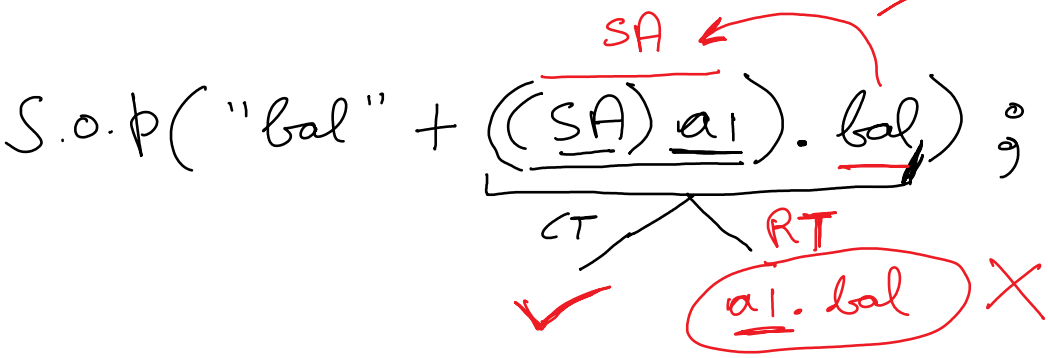
```
Mango m1 = (Mango) new Fruit();
```

Note 2: When we downcast a reference to subclass type & if the object doesn't have instance of subclass, then it becomes a Runtime problem known as ClassCast-Exception.

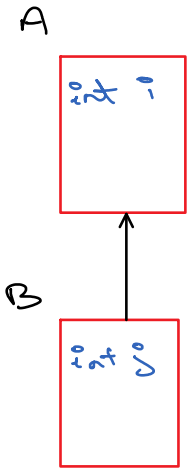
Refer: Pg5 case 2

```
class Accounts
{
	int ano  ;
	Accounts() {}
	Accounts(int ano ) {
		this.ano = ano  ;
	}
}

class SA extends Accounts
{
	double bal  ;
	SA() {}
	SA(int ano  , double bal ) {
		super( ano ) ;
		this.bal = bal  ;
	}
}

class  Driver6
{
	public static void main(String[] args)
	{
		Accounts a1 = new Accounts(101) ;
		Sop("Account number : " + a1.ano ) ; //  101
		// account balance
		Sop( "Account Balance : " +  ((SA)a1).bal  ) ;
	}
}
```





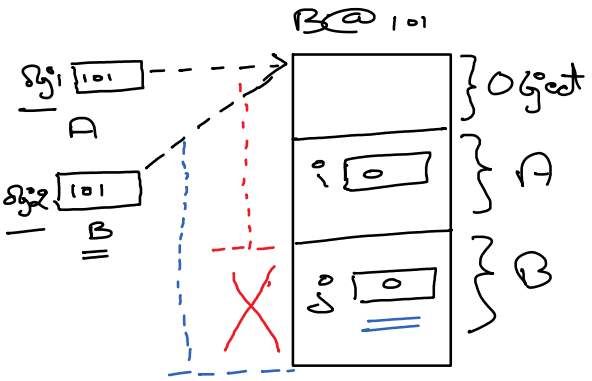
Case 1:



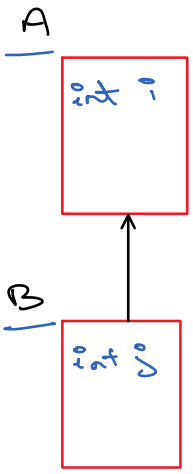
A obj1 = new B(); upcasted

B obj2 = (B) obj1 ;

B — child, A — parent, downcasting



Case 2:



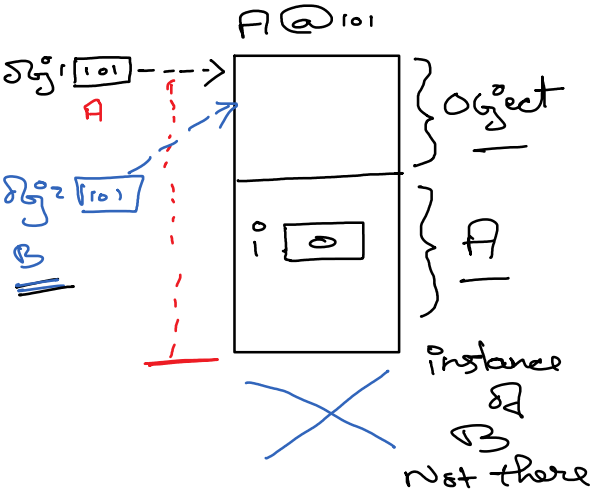
A obj1 = new A();

B obj2 = (B) obj1 ;

B ? A P

CT — RT

Exception (ClassCastException)



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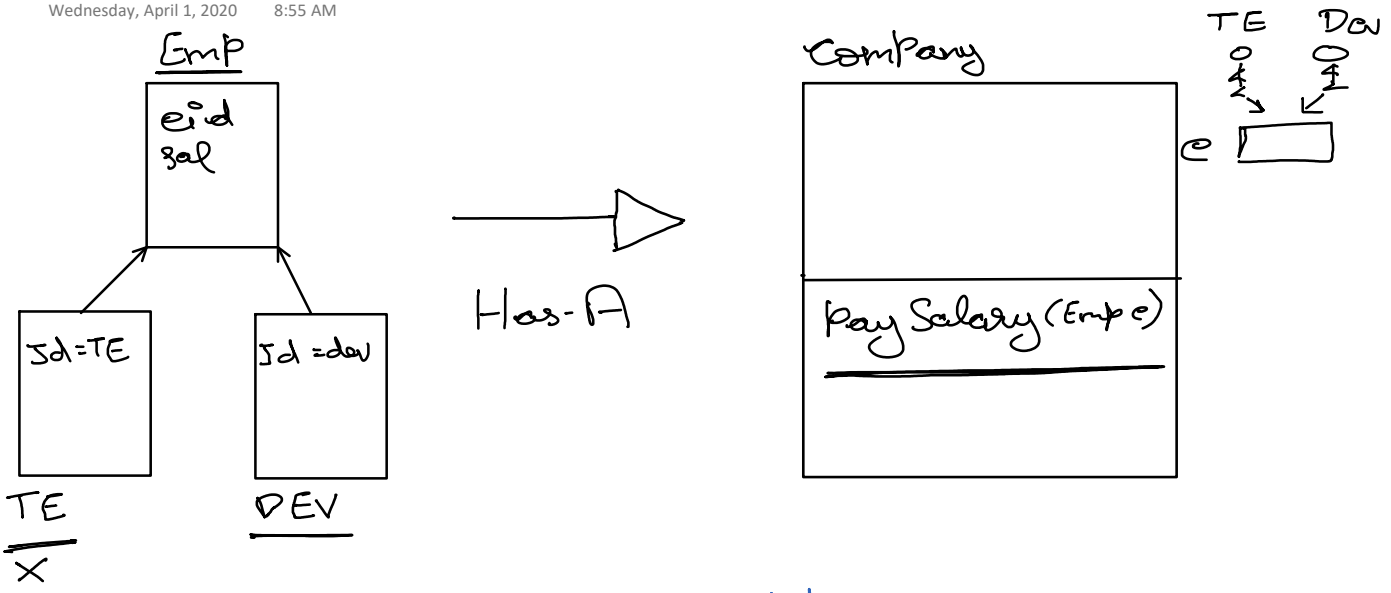
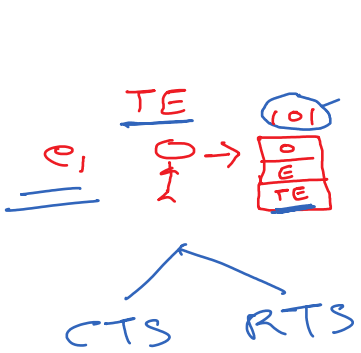
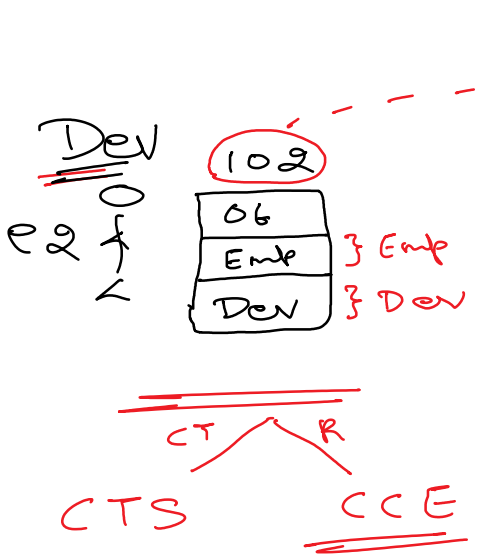





```
void paySalary ( Emp e )
    {
        Sop("The employee with ID " + e.eid ) ; // CTS

        Sop("Who is working as a " + ((TE)e).desg ) ; CTS

        Sop("His account is credited with " + e.salary ) ;
    }
```




```
void paySalary ( Emp e )
    {
        Sop("The employee with ID " + e.eid ) ; // CTS

        Sop("Who is working as a " + ((TE)e).desg ) ;//CTS

        Sop("His account is credited with " +
        e.salary ) ;
    }
```

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instanceof operator

instanceof operator is used to check whether the object has instance of a particular class.

Syntax :

```
object_reference  instanceof  class_name
```

Note :

1. The return type of instanceof operator is boolean
2. It returns true if the object has instance of the given class
3. It returns false if the object does not have the instance of the given class
4. It throws a Compile time error if the reference and the class does not have Is-A relationship

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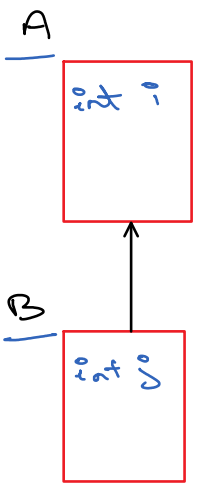

Case 1 : B obj = new B();

1.) Sop(obj instanceof Object)

2.) Sop(obj instanceof A) True

3.) Sop(obj instanceof B) T

Case 2 : A obj = new A();

1.) Sop(obj instanceof Object) // T

2.) Sop(obj instanceof A) // T

3.) Sop(obj instanceof B) // F

For examples: Refer online/day6/app3 folder.