

Interfaces ^{*}

Unit-2

- I/f is an abstract type wh. acts as a blueprint for a class.
- In simple words, i/f is collection of undefined (or abstract) functions.
- I/f is meant to be implemented by class using implements kw.
- When a class implements an i/f, it must define all the fun in the i/f.
- It is similar to an abs. class.

eg interface myinterface { // create an i/f.
void set(int x, int y, int z);
void get();
}

- Any class wh. implements this i/f must override ((define)) these 2 fun w/ same name & param.
- These fun must be public in the class.

```
class box implements myinterface {
```

```
    private int l, w, h;
```

```
    // implemented from i/f
```

```
    public void set (int x, int y, int z) {
```

```
        l = x; w = y; h = z;
```

```
    }
```

↓
must be
public

```
    public void get () {
```

```
        println(l); println(w); println(h);
```

```
    }
```

// set & get must be overridden (defined) by
box class.

```
    public void vol () {
```

// This is not implemented from interface

```
        println(l * w * h);
```

```
    }
```

```
}  
C D 2 psuM (...) {
```

```
    // create obj
```

```
    box obj = new box();
```

```
    obj.set(1, 2, 3);
```

```
    obj.get();
```

```
    }
```

```
}
```

Rules for i/f:

- 1) fun in i/f must be public or no access specifier
- 2) when a class defines (overrides) i/f fun then the fun must be public
- 3) Any class sub. implements an i/f must override all the fun in the i/f.
- 4) class can implement i/f using implements kw.
- 5) obj of an i/f can't be created, but by it contains undefined fun. However, ref of an i/f can be created.
Ref can be used to pt. to a class obj.

What r the uses of an i/f

- 1) Abstraction
- 2) Multiple Inheritance
- 3) Dy. method Resolution (runtime poly).

1) Abstraction :-

- it provides abstraction, wh. means it simply specifies the fun name and param.
- These fun r implemented by the classes in their own way.

```
interface Shape
{
    void area();
}
```

```
class Rectangle
{
    void area() {
        return l * w;
    }
}
```

```
class Circle
{
    void area() {
        return Math.PI * r * r;
    }
}
```

- eg // There is an interface Shape.
It contains a blank/abstract/undefined fun area();
- when rectangle class implements the interface then area is calculated as $l * w$
- when circle class " " " " " " πr^2
- So each class implements/defines/overrides the fun differently.

2) Multiple Inheritance :-

- Java doesn't support multiple inh. thru classes, bcoz. Mul inh causes ambiguity

```
Class A {  
    public void get();  
}
```

```
Class B {  
    pub. void get();  
}
```

↓ ↓

```
Class C extends A, B {  
    // there r 2 copies of  
    // get from A & B  
    // So ambiguity arises
```

- eg. • Class A & B both contains get()
- Suppose Class C inherits A & B, then there will be 2 different copies of get().
 - Both get are defined in different manner so ambiguity can't be resolved.

Mul inh. thre interface :-

```
interface myinterface1  
{  
    void get();  
}
```

```
interface myinterface2  
{  
    void get();  
}
```

```
Class box implements myinterface1, myinterface2  
{  
    //implent the get()  
    //No ambiguity bcoz both get() r declared  
    //in same manner.  
}
```

- There r 2 interfaces with same function get().
- Class box implements both these interfaces,
so implementing mul interfaces is allowed.
- * Why is there no ambiguity with mul interface:
 - Bcoz interface only provide declaration of fun
so there will be 2 copies in box class with
same declaration.
 - With mul₂ classes, there will be 2 diffent
implementations, so ambiguity arises.
 - With mul, interfaces, implementation will be
provided by the class wh. implements these
interface.

3- Dy. Method Resolution / Runtime Poly

- I/f p/v runtime poly thru references.
- Obj of i/f can't be created, but ref can be created.
- This ref pt. to any class obj & can call fun. defined in the class.
- When a fun is called using i/f ref, then runtime poly occurs. i.e fun call is resolved at runtime dynamically.

```
interface myinterface {  
    public void get();  
}
```

↓

```
class box implements myinterface {  
    // get is defined here.  
}
```

→

```
class student implements myinterface {  
    // get is defined.
```

box & student class implements i/f

eg "myinterface" is implemented by 2 classes
box & student.

- To achieve RT poly, ~~if~~ create a ref of interface & point to class obj.
- ~~Call~~ Then call get() fun using ref.

• Suppose obj1 is of student class
obj2 is of box "

- Create interface ref.

interface ref;
// Point ref to objects & call get()

ref = obj1;

ref.get(); // Fun called is resolved at
runtime, so RT poly occurs

ref = obj2;

ref.get(); // ↑

What r the different ways to use an i/f:

- inheritance can be used w/ i/f
i.e one i/f can inherit another i/f

base-interface



derived-interface extends base-interface

- one i/f can't implement another i/f.
- interface can be implemented — one class can implement other i/f.

~~myclass~~ myinterface



myclass implements myinterface

Abstract Class	vs	Interface
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- 1) Ab. class can have abstract (undefined) as well as concrete methods.
- 2) abstract KW is used
- 3) Ab. class can't support mult inh.
- 4) ab class can have final, ~~non-final~~ non-final, static & non static var
- 5) ab class can implement an i/f
- 6) ab. class can extend another class
- 7) members can be private, protected etc

- 1) I/f can have only abstract methods
- 2) ~~at~~ interface KW is used.
- 3) interface can support mult inh ~~***~~.
- 4) i/f can have only static & final var.
- 5) i/f can't extend/ implement class.
- 6) i/f can be implemented w/ implements KW.
- 7) members r public by default.