# RUNTIME POLYMORPHISM

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"IS-A" INHERITANCE IS A VERY POWERFUL CONCEPT IN COMPUTER SCIENCE

ANY PLACE THAT OUR CODE EXPECTS TO SEE A SHAPE OBJECT,

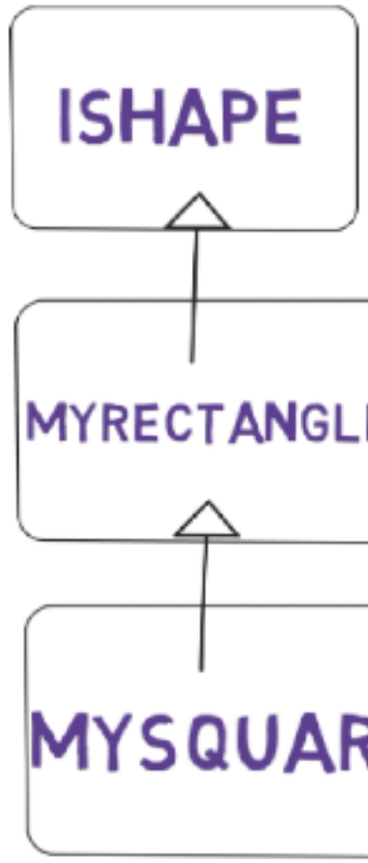
..WE COULD PASS IN A CIRCLE OBJECT, OR A SQUARE OBJECT, OR A RECTANGLE OBJECT..

THE CODE WOULD NOT EVEN KNOW, AHEAD OF TIME, WHETHER IT IS DEALING WITH A SQUARE, A RECTANGLE OR A CIRCLE

..AND OUR CODE WOULD RUN JUST FINE

```java
public interface IShape {

    public String introduceYourself();
```




```java
public String introduceYourself() {
    return "I am a rectangle";
}
```

```java
public String introduceYourself() {
    return "I am a square";
}
```

## OK - NOW WILL THE CODE BELOW WORK, AND IF SO WHAT WILL IT PRINT?

```java
IShape someRectangle = new MyRectangle(5,10);
IShape someSquare = new MySquare(5);
MyRectangle someOtherRectangle = new MySquare(7);

System.out.println(someRectangle.introduceYourself());
System.out.println(someSquare.introduceYourself());
System.out.println(someOtherRectangle.introduceYourself());
```

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YEP EACH LINE WILL WORK.

THAT IS BECAUSE A
SQUARE IS-A RECTANGLE,
AND RECTANGLE IS-A SHAPE,
AND SQUARE IS-A SHAPE

"I AM A RECTANGLE"

"I AM A SQUARE"

"I AM A SQUARE"
(JAVA WAS SMART ENOUGH
TO FIGURE OUT THE TYPE OF
THE OBJECT AT RUNTIME!)

(THIS IS A TRICKY ONE - THE
VARIABLE IS OF TYPE RECTANGLE,
BUT WAS INITIALIZED WITH AN
OBJECT OF TYPE SQUARE)

THEY CAN BE DRAWN "DRAW()"

THEY HAVE AN OUTLINE "GETBOUNDINGRECTANGLE()"

THEY HAVE SOME AREA "GETAREA()"

ALL SHAPES WILL SUPPORT
THESE 3 METHODS
"DRAW", "GETBOUNDINGRECTANGLE"
AND "GETAREA"

IN FACT THE PRESENCE
OF THESE 3 METHODS
IS THE DEFINING
CHARACTERISTIC OF ANY
TYPE THAT "IS-A"
(INHERITS FROM) SHAPE

THESE 3 METHODS
ARE CALLED THE

# INTERFACE OF THE CLASS

# NOTE TO SELF

"AN OBJECT CONTAINS BOTH DATA AND FUNCTIONS"

THE DATA ARE CALLED MEMBER VARIABLES AND THE FUNCTIONS ARE CALLED METHODS OR MEMBER FUNCTIONS

BUT - HOW DOES THE OBJECT KNOW WHICH VARIABLE IS A MEMBER VARIABLE, AND WHICH VARIABLE IS AN EXTERNAL VARIABLE?

## ANSWER: OBJECTS HAVE A STRONG SENSE OF SELF

"THIS" IS A SPECIAL KEYWORD IN JAVA USED TO REFER TO VARIABLES THAT BELONG TO THE OBJECT

"THIS" IN JAVA
"SELF" IN PYTHON,