Comp 401
Metamorphosis: Casting vs. Conversion

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Prerequisite

- Interfaces
- Types Math
- Deep vs. Shallow Copy (Optional)

Metamorphosis?

```
Point point =  new ACartesianPoint (50, 100);
point = (APolarPoint) point;
```

Class cast exception, Java cast does not automatically convert an instance of a class to an instance of another class

It does not even automatically (deep) copy

Ambiguous semantics

```
Point point =  new AMutablePoint (50, 100);
point = (ABoundedPoint) point;
```

Value of additional properties (upper and lower right corner)?

As Methods for Metamorphosis

```
public class AConvertibleCartesianPoint
    extends AMutablePoint implements ConvertiblePoint {
  public AConvertibleCartesianPoint(int theX, int theY) {
    super (theX, theY);
  }
  public ConvertiblePoint asCartesianPoint() {
    return this; // could also clone
  }
  public ConvertiblePoint asPolarPoint() {
    return
       new AConvertiblePolarPoint(getRadius(), getAngle());
  }
}
```

```
ConvertiblePoint point =
                  new AConvertibleCartesianPoint (50, 100);
point = point.asPolarPoint();
```

Programmer decides what correct conversion means

Automatic Conversion of Primitive Values

Java cast does not automatically convert an instance of a class to an instance of another class

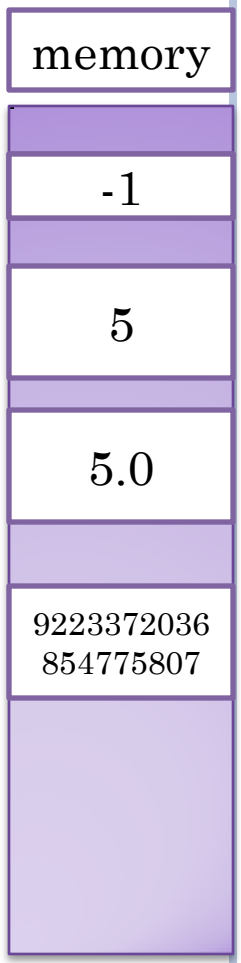
```
int intVal = 5;
long longVal = intVal;
double doubleVal = intVal;
longVal = Long.MAX_VALUE;
intVal =  (int) longVal;
```

In each of the multi-type assignments, a primitive memory value copied and stored in another primitive memory value of different size

In the last case, cast forces conversion

Primitive→Another Primitive

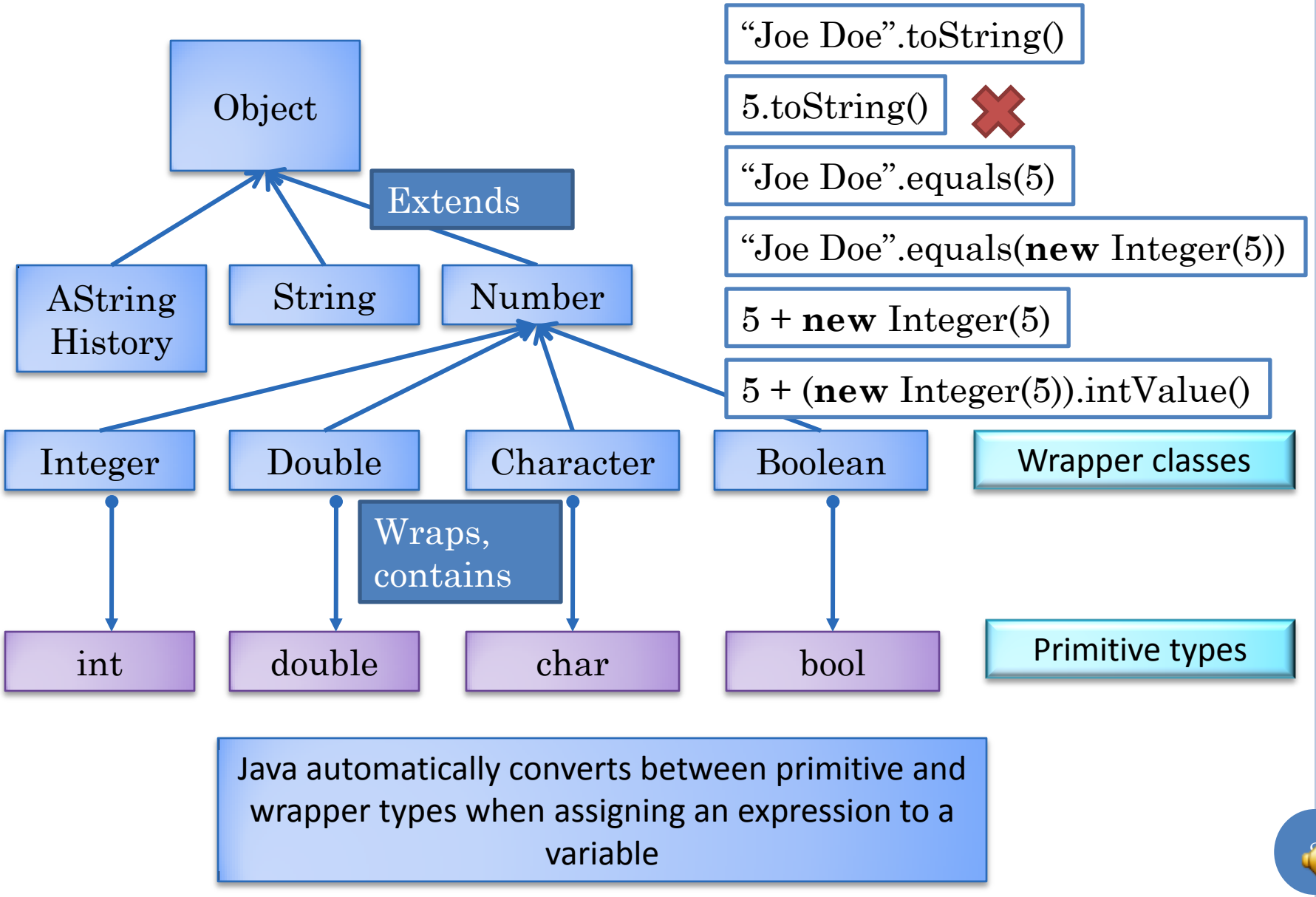
```
int intVal = 5;
long longVal = intVal;
double doubleVal = intVal;
longVal = Long.MAX_VALUE;
intVal =  (int) longVal;
```



Primitive ←→ Object

```
intVal =  (int) longVal;
Integer integerVal = intVal;
int intVal2 = integerVal;
```

Wrapper Types



Java automatically converts between primitive and wrapper types when assigning an expression to a variable

Manual Wrapping and Unwrapping

- Integer
  - **public** Integer(**int** value)
  - **public int** intValue()
- Double
  - **public** Double(**double** value)
  - **public double** doubleValue()
- Boolean
  - **public** Boolean(**boolean** value)
  - **public boolean** booleanValue()
- Character
  - **public** Character(**char** value)
  - **public char** charValue()
- Float, Short, Long

Storage of Primitives and Wrapped Values