

Arrays of Objects

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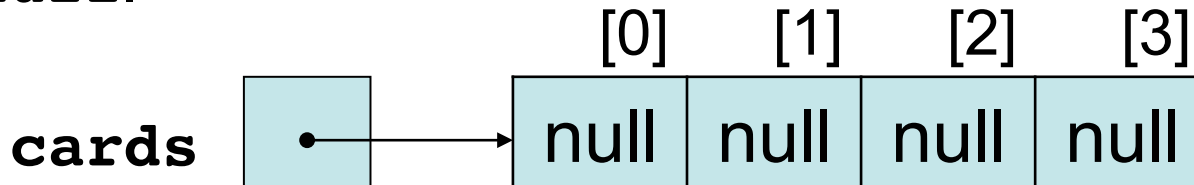
Array review

- Can an array have data of different types?
- How do you declare a variable `isOn` to be an array that holds `true/false` values?
- Has any space in memory been made available for the array?
- When you create an array you must specify
 - 1.
 - 2.
- Can you change the values stored in the array?
- Can you change the length of an array?
- How do you get the length of an array?

Array of Objects

- Arrays can store references to objects in addition to primitive values.
- E.g.,

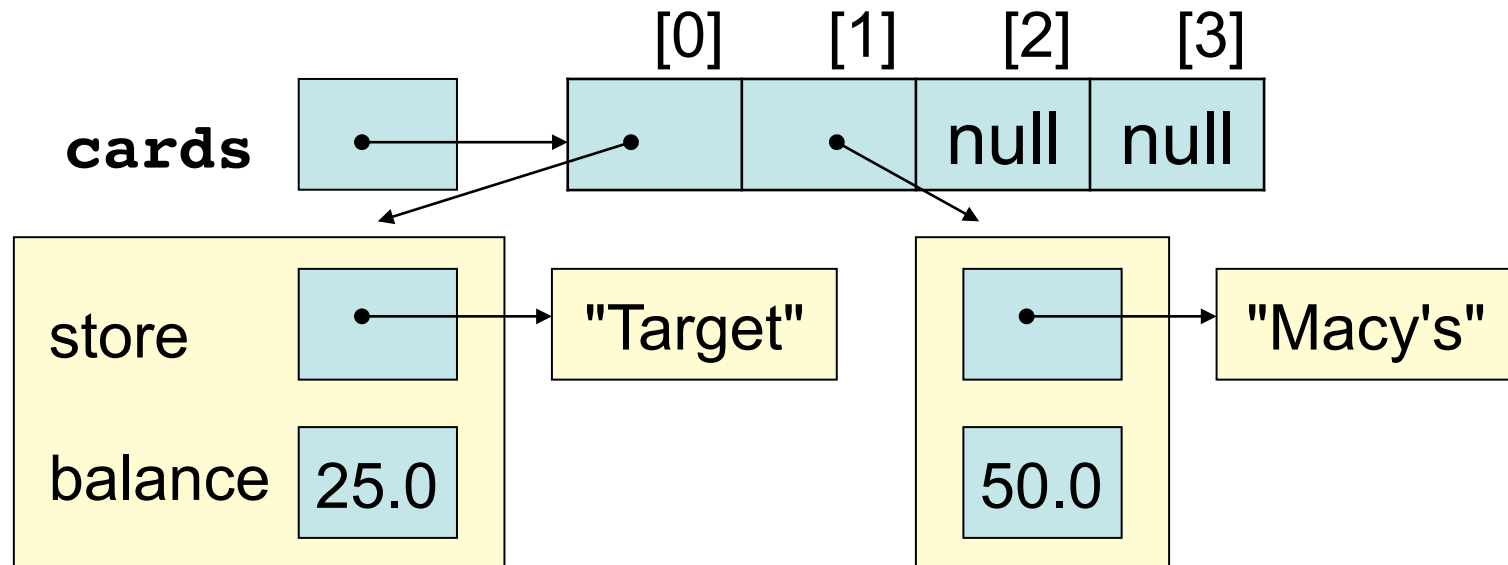
```
GiftCard[] cards = new GiftCard[4];
```
- Creating an array does **not** create the objects.
- Instead each element of the array is initialized to **null**.



Creating the Objects in the Array

- To fill the array, you need to create the objects in addition to creating the array.

```
cards[0] = new GiftCard("Target", 25.0);  
cards[1] = new GiftCard("Macy's", 50.0);
```



Using an Array of Objects

- As before, you can use an array element (array name with an index) in the same way you use a variable that is a reference to an object.
- E.g., Add \$20 to the gift card at index 1.

```
cards [ 1 ] . addMoney ( 20 . 0 ) ;
```

That is, `cards [1]` is a reference to a `GiftCard` object on which to invoke the `addMoney ()` method.

NullPointerException

- If program attempts to use `null` when an object is required, Java throws a **NullPointerException**:

- Invoke a method of a `null` object:

```
cards[3].buyGoods(30.0); (Error)
```

- Access or modify a field of a `null` object:

```
b = cards[2].balance; (Error)
```

- Access length or element of a `null` as if it were an array:

```
int[] data;  
if (data.length > 0) (Error)
```

Arrays as a Field of a Class

- When a class has a field that is an array, do not create the array when you declare the field.
- The constructor should create the array.

```
public class Wallet {
    GiftCard[] cards; // declare the field
    ...
    public Wallet(int numCards, String store,
                  double value) {
        cards = new GiftCard[numCards];
        for (i = 0; i < numCards; i++) {
            cards[i] = new GiftCard(store, value);
        }
    }
    ...
}
```