

CS1083 Week 3: Polymorphism

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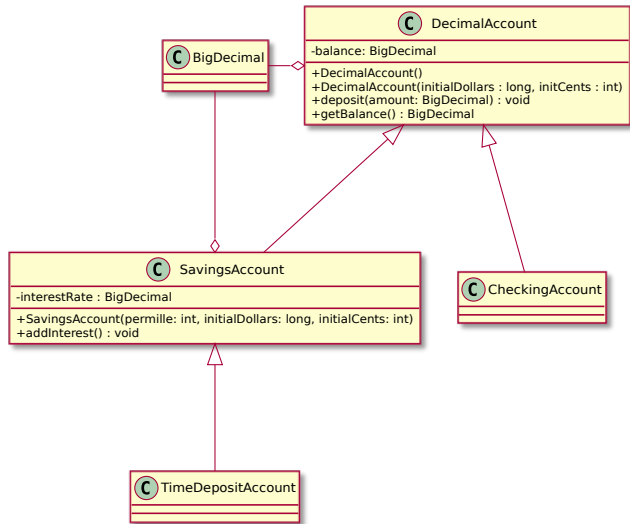
2018-01-18

Polymorphic Methods

Late Binding

Container Polymorphism

More kinds of accounts



Checking fees for transactions

TimeDeposit penalty for early withdrawal.

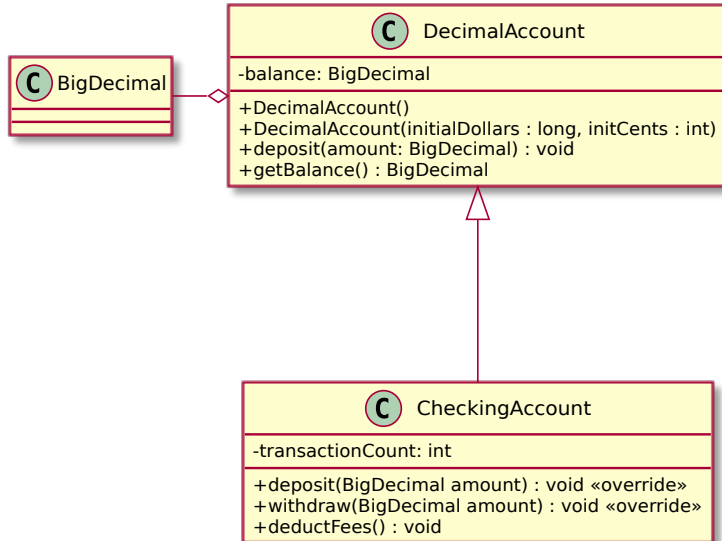
Polymorphic method parameters

```
public static void main(String[] args) {
    SavingsAccount momsSavings = new SavingsAccount(5,0,0);
    TimeDepositAccount collegeFund =
        new TimeDepositAccount(1, 3);
    CheckingAccount harrysChecking=new CheckingAccount(0,0)
    printBalance("mom's_savings", momsSavings);
    printBalance("the_college_fund", collegeFund);
    printBalance("Harry's_checking", harrysChecking);
}

public static void printBalance(String name,
                                DecimalAccount account) {
    System.out.println("The_balance_of_" + name
        + "_account_is_" + account.getBalance());
}
```

AccountTest

CheckingAccount



Combining with Overloading

AccountTest

```
public static void main(String[] args) {  
    :  
    endOfMonth(momsSavings);    // 1  
    endOfMonth(collegeFund);    // 1  
    endOfMonth(harrysChecking); // 2  
}  
// 1  
public static void endOfMonth(SavingsAccount savings) {  
    savings.addInterest();  
}  
// 2  
public static void endOfMonth(CheckingAccount checking) {  
    checking.deductFees();  
}
```

Polymorphic Methods

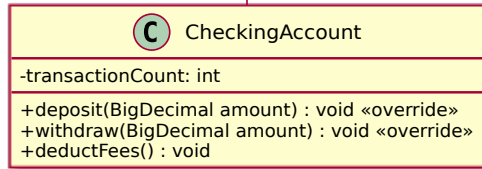
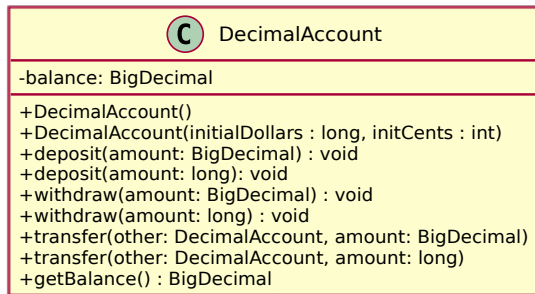
Late Binding

Container Polymorphism

Late Binding Example 1

- ▶ What withdraw methods are called?

```
CheckingAccount account  
    =new CheckingAccount(1000,0);  
account.withdraw(500);
```



Late Binding Example 1

DecimalAccount

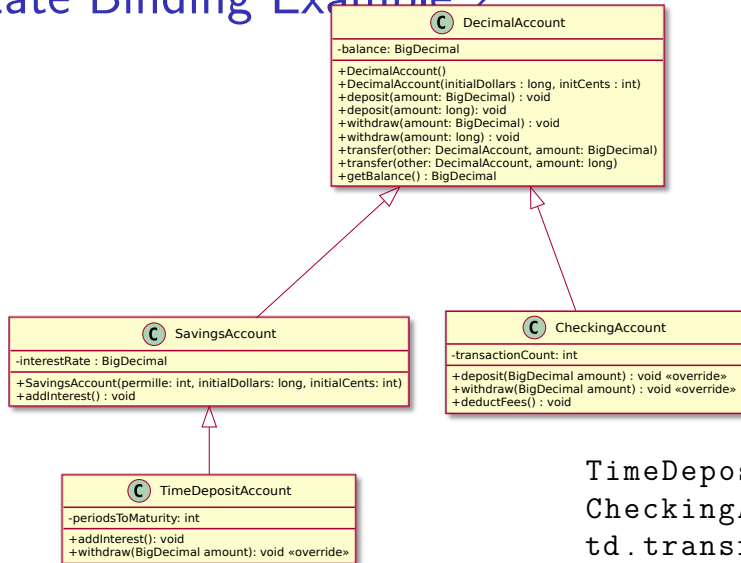
```
public void withdraw(long amount) {  
    this.withdraw(new BigDecimal(amount));  
}
```

CheckingAccount

```
final public void withdraw(BigDecimal amount) {  
    transactionCount++;  
    super.withdraw(amount);  
}
```

- note use of final

Late Binding Example 2



```
TimeDepositAccount td = ...
CheckingAccount check = ...
td.transfer(check, 200);
```

Late Binding Example 2

DecimalAccount

```
public void transfer(DecimalAccount other, long amount) {  
    withdraw(amount);  
    other.deposit(amount);  
}
```

TimeDepositAccount

```
public final void withdraw(BigDecimal amount) {  
    if (periodsToMaturity > 0)  
        super.withdraw(EARLY_WITHDRAWAL_PENALTY);  
    super.withdraw(amount);  
}
```

Polymorphic Methods

Late Binding

Container Polymorphism

Polymorphic Arrays

- ▶ Why doesn't this work?
- ▶ What should we do instead?

```
DecimalAccount [] accounts = new DecimalAccount [3];  
accounts[0]=momsSavings;  
accounts[1]=collegeFund;  
accounts[2]=harrysChecking;  
for (DecimalAccount account : accounts) {  
    endOfMonth(account);  
}
```