

# Assignment Project Exam Help

## Smalltalk Lecture 7

Add WeChat powcoder

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<https://powcoder.com>

Add WeChat powcoder



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## Three kinds of variables associated with classes

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**Instance variable:** each instance of the class and each instance of its subclasses gets its own copy

<https://powcoder.com>

**Class variable:** only one copy, which is shared by all instances of the class and all instances of its subclasses

**Class instance variable:** one copy which is shared by all instances of the class, and each subclass gets its own copy which is shared by all instances of that subclass

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## Account class

### Add WeChat powcoder

---

Object subclass: #Account.

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Account instanceVariableNames: 'balance income outgo'.

<https://powcoder.com>

"instance variables"

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Account **addClassName:** 'Total'. "class variable"

Account **class** instanceVariableNames: 'Subtotal'.

"class instance variable"

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## Account instance methods

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```
Account extend [  
  open: b [  
    balance := b.  
    Total := Total + b.  
    self class addSubtotal: b  
    income := Dictionary new.  
    outgo := Dictionary new  
  ]  
  getBalance [ ^ balance ]  
]
```

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## Account class methods

### Add WeChat powcoder

```
Account class extend [  
  new [  
    Total isNil ifTrue: [ Total := 0 ].  
    Subtotal isNil ifTrue: [ Subtotal := 0 ].  
    ^ super new  
  ]  
  addSubtotal: b [ Subtotal := Subtotal + b ]  
  getTotal [ ^ Total ]  
  getSubtotal [ ^ Subtotal ]  
]
```

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## CheckingAccount subclass

### Add WeChat powcoder

Account subclass: #CheckingAccount.

CheckingAccount instanceVariableNames:

'checksUsed checksLeft'.  
<https://powcoder.com>

CheckingAccount extend [

open: b [

super open: b.

checksUsed := 0.

checksLeft := 0

]

]

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## SavingsAccount subclass

### Add WeChat powcoder

Account subclass: #SavingsAccount.

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SavingsAccount instanceVariableNames: 'interestRate'.  
<https://powcoder.com>

SavingsAccount extend [Add WeChat powcoder  
open: b [  
super open: b.  
interestRate := 0  
]  
]

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## Client code – accessing instance vars

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a1 := Account new open: 100.

a2 := Account new open: 200.

c1 := CheckingAccount new open: 400.

c2 := CheckingAccount new open: 500.

s1 := SavingsAccount new open: 700.

s2 := SavingsAccount new open: 800.

a1 getBalance printNl.

a2 getBalance printNl.

c1 getBalance printNl.

c2 getBalance printNl.

s1 getBalance printNl.

s2 getBalance printNl.

100

200

400

500

700

800



# Assignment Project Exam Help

## Accessing class vars and class instance vars

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Account getTotal printNl.

2700

Account getSubtotal printNl.

300

CheckingAccount getTotal printNl.

2700

CheckingAccount getSubtotal printNl.

900

SavingsAccount getTotal printNl.

2700

SavingsAccount getSubtotal printNl.

1500

Recall:

- balance (instance var) – each instance has its own copy
- Total (class var) – only one copy that is shared by all
- Subtotal (class instance var) – each subclass has its own copy, which is shared by all instances of that subclass

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## More Account instance methods

### Add WeChat powcoder

```
Account extend [  
  deposit: amount from: source [  
    balance := balance + amount.  
    income at: source  
    put: (amount + (self totalReceivedFrom: source)).  
    Total := Total + amount.  
    self class addSubtotal: amount  
  ]  
  totalReceivedFrom: source [  
    ^ (income includesKey: source)  
    ifTrue: [ income at: source ]  
    ifFalse: [ 0 ]  
  ]  
]
```

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## Still more Account instance methods

### Add WeChat powcoder

```
Account extend [  
  withdraw: amount for: reason [  
    balance := balance - amount.  
    outgo at: reason  
      put: (amount + (self totalSpentFor: reason)).  
    Total := Total - amount.  
    self class addSubtotal: 0 - amount  
  ]  
  totalSpentFor: reason [  
    ^ (outgo includesKey: reason)  
      ifTrue: [ outgo at: reason ]  
      ifFalse: [ 0 ]  
  ]  
]
```

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## Account client

### Add WeChat powcoder

a1 deposit: 1000 from: 'dad'.

a1 withdraw: 400 for: 'car'.

a1 deposit: 800 from: 'dad'.

a1 withdraw: 100 for: 'party'.

a1 deposit: 700 from: 'dad'.

a1 withdraw: 200 for: 'car'.

Transcript display: 'Total from dad = ';

display: (a1 totalReceivedFrom: 'dad'); cr.

Transcript display: 'Total for car = ';

display: (a1 totalSpentFor: 'car'); cr.

Total from dad = 1700  
Total for car = 600

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## Yet another Account instance method

### Add WeChat powcoder

Account extend [Assignment Project Exam Help  
display [<https://powcoder.com>  
Transcript display: 'Balance = '; display: balance; cr  
]  
]

a1 display.  
a2 display.

<b>Balance = 1900</b>
<b>Balance = 200</b>

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## More CheckingAccount instance methods

### Add WeChat powcoder

```
CheckingAccount extend [  
  orderNewChecks: number [  
    checksLeft := checksLeft + number  
  ]  
  writeCheck: amount for: reason [  
    checksUsed := checksUsed + 1.  
    checksLeft := checksLeft - 1.  
    self withdraw: amount for: reason  
  ]  
]
```

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## CheckingAccount client

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<https://powcoder.com>

c1 deposit: 3000 from: 'inheritance'.

c1 orderNewChecks: 100.

c1 writeCheck: 800 for: 'vacation'.

c1 writeCheck: 400 for: 'vacation'.

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## Another CheckingAccount instance method

### Add WeChat powcoder

CheckingAccount extend [

display [

super display.

Transcript display: 'Checks used = ';

display: checksUsed; cr.

Transcript display: 'Checks left = ';

display: checksLeft; cr

]

]

c1 display.

c2 display.

```
Balance = 2200
Checks used = 2
Checks left = 98
Balance = 500
Checks used = 0
Checks left = 0
```



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## More SavingsAccount instance methods

### Add WeChat powcoder

```
SavingsAccount extend [  
  setRate: percentage [  
    interestRate := percentage  
  ]  
  earnInterest [  
    | temp |  
    temp := (balance * interestRate / 100).  
    self deposit: temp from: 'interest'  
  ]  
]
```

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## SavingsAccount client

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## Assignment Project Exam Help

s1 setRate: 2.00. <https://powcoder.com>  
s1 deposit: 2000 from: 'paycheck'.  
s1 earnInterest.  
s1 deposit: 300 from: 'cash'.  
s1 earnInterest.

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## Another SavingsAccount instance method

### Add WeChat powcoder

SavingsAccount extend [

display [

super display.

Transcript display: 'Interest rate = '  
display: interestRate; cr.

Transcript display: 'Total interest = '  
display: (self totalReceivedFrom: 'interest'); cr

]

]

s1 display.

s2 display.

```
Balance = 3115.08
Interest rate = 2.0
Total interest = 115.08
Balance = 800
Interest rate = 0
Total interest = 0
```

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**Client code**

Add WeChat powcoder

a1 getBalance printNI.

1900

a2 getBalance printNI.

200

c1 getBalance printNI.

1200

c2 getBalance printNI.

500

s1 getBalance printNI.

3115.08

s2 getBalance printNI.

800

Account getTotal printNI.

8715.08

Account getSubtotal printNI.

2100

CheckingAccount getTotal printNI.

8715.08

CheckingAccount getSubtotal printNI.

2700

SavingsAccount getTotal printNI.

8715.08

SavingsAccount getSubtotal printNI.

3915.08