INRIA

Basic Objects, Conditionals and Loops

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Conditionals and Loops

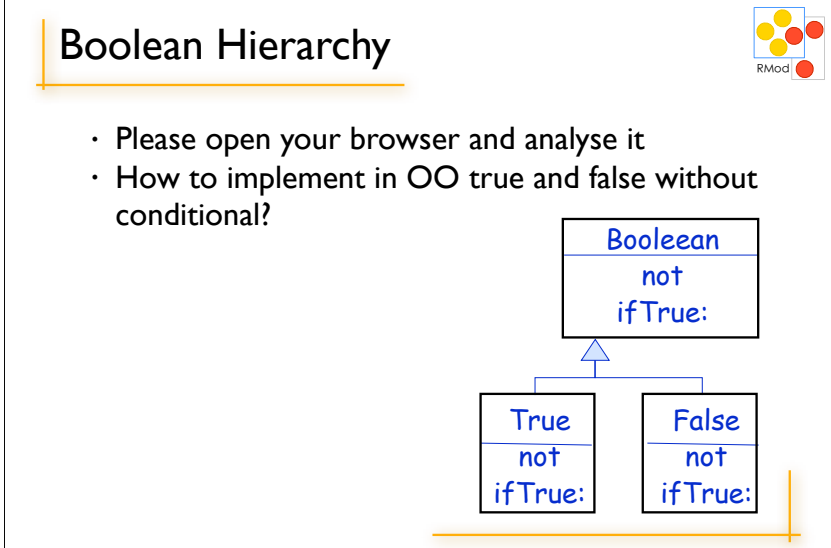
- Booleans
- Basic Loops
- Overview of the Collection hierarchy— more than 80 classes: (Bag, Array, OrderedCollection, SortedCollection, Set, Dictionary...)
- Loops and Iteration abstractions
- Common object behavior

Booleans

Boolean Objects

- false and true are objects described by classes Boolean, True and False
- Uniform, but optimized and inlined (macro expansion at compile time)
- Logical Comparisons &, |, xor:, not
  - aBooleanExpr comparison anotherBooleanExpr
  - (1 isZero) & false

Boolean Hierarchy



- Please open your browser and analyse it
- How to implement in OO true and false without conditional?

Boolean Lazy Logical Operators

- Lazy Logical operators
  aBooleanExpr and: andBlock
- andBlock will only be valued if aBooleanExpression is true
- aBooleanExpression or: orBlock
  orBlock will only be valued if aBooleanExpression is false

```
false and: [1 error: 'crazy']
```

Prlt-> false and not an error

Conditional are Messages to Boolean

- aBoolean ifTrue: aTrueBlock ifFalse: aFalseBlock
- aBoolean ifFalse: aFalseBlock ifTrue: aTrueBlock
- aBoolean ifTrue: aTrueBlock
- aBoolean ifFalse: aFalseBlock

- Hint: Take care — true is the boolean value and True is the class of true, its unique instance!

Why Block Use in Conditional

- Why do conditional expressions use blocks?
- Because, when a message is sent, the receiver and the arguments of the message are *always* evaluated. Blocks are necessary to avoid evaluating both branches.

Collections

A lot but key abstraction
Key iterators

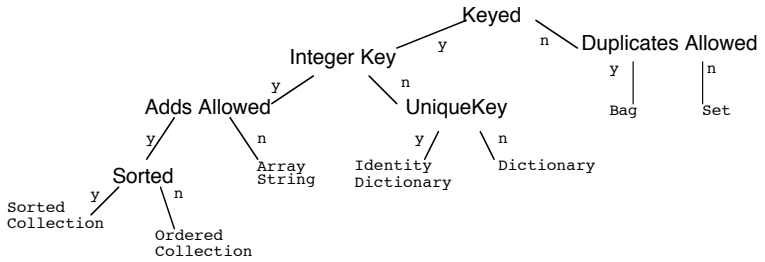
Collections

- Some criteria to identify them
  - Access: indexed, sequential or key-based.
  - Size: fixed or dynamic.
  - Element type: any or well-defined type.
  - Order: defined, defineable or none.
  - Duplicates: possible or not

Essential Collection

Sequenceable	ordered
ArrayedCollection	fixed size + key = integer
Array	any kind of elements
CharacterArray	elements = character
String	
IntegerArray	
Interval	arithmetique progression
LinkedList	dynamic chaining of the element
OrderedCollection	size dynamic + arrival order
SortedCollection	explicit order
Bag	possible duplicate + no order
Set	no duplicate + no order
IdentitySet	identification based on identity
Dictionary	element = associations + key based

Essential Collections: Another View



Some Collection Methods

- Will be defined, redefined, optimized or forbidden in the subclasses
- Accessing: size, capacity, at: anInteger, at: anInteger put: anElement
- Testing: isEmpty, includes: anElement, contains: aBlock, occurencesOf: anElement
- Adding: add: anElement, addAll: aCollection
- Removing: remove: anElement, remove:anElement ifAbsent: aBlock, removeAll: aCollection
- Enumerating (See generic enumerating): do: aBlock, collect: aBlock, select: aBlock, reject: aBlock, detect:, detect: aBlock ifNone: aNoneBlock, inject: avalue into: aBinaryBlock
- Converting: asBag, asSet, asOrderedCollection, asSortedCollection, asArray, asSortedCollection: aBlock
- Creation: with: anElement, with:with:, with:with:with:, with:with:with:with:, with:All: aCollection

Sequenceable Specific (Array)


```
|arr|
arr :=  (calvin hates suzie).
arr at: 2 put:  loves.
arr
PrIt->  ( calvin  loves  suzie)
```

- Accessing: first, last, atAllPut: anElement, atAll: anIndexCollection: put: anElement
- Searching (*: + ifAbsent:): indexOf: anElement, indexOf: anElement ifAbsent: aBlock
- Changing: replaceAll: anElement with: anotherElement
- Copying: copyFrom: first to: last, copyWith: anElement, copyWithout: anElement

KeyedCollection Specific (Dictionary)


```
|dict|
dict := Dictionary new.
dict at: 'toto' put: 3.
dict at: 'titi' ifAbsent: [4]. -> 4
dict at: 'titi' put: 5.
dict removeKey: 'toto'.
dict keys -> Set ('titi')
```

- Accessing: at: aKey, at: aKey ifAbsent: aBlock, at: aKey ifAbsentPut: aBlock, at: aKey put: aValue, keys, values, associations
- Removing: removeKey: aKey, removeKey: aKey ifAbsent: aBlock
- Testing: includeKey: aKey

Common Shared Behavior

Common Shared Behavior

- Object is the root of the inheritance tree
- Defines the common and minimal behavior for all the objects in the system.

- Comparison of objects: ==, ~~, =, =~, isNil, notNil

Identity vs. Equality

- = anObject returns true if the structures are equivalent (the same hash number)
- (Array with: 1 with: 2) = (Array with:1 with:2) PrIt-> true

- == anObject returns true if the receiver and the argument point to the same object. == should never be overridden.

```
Object>>= anObject
    ^ self == anObject

~= is: not =
~~  is: not ==
```

(Array with: 1 with: 2) == (Array with: 1 with:2) PrIt-> false
(Array with: 1 with: 2) = (Array with: 1 with:2) PrIt-> true

Common Behavior: Printing

- Print and store objects: printString, printOn: aStream. printString calls printOn: aStream

```
(123 1 2 3) printString
        -> ' (123 1 2 3)'
Date today printString
        -> 'October 5, 1997'
```


Storing

- storeString, storeOn: aStream.
- storeString calls storeOn: aStream

```
Date today storeString
 -> '(Date readFromString: "10/5/1997")'
OrderedCollection new add: 4 ; add: 3 ; storeString
-> '((OrderedCollection new) add: 4; add: 3; yourself)'
```

- You need the compiler, so for a deployment image this is not convenient

readFromString: recreating Objects

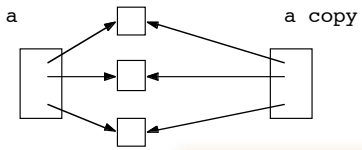
- Create instances from stored objects: class methods readFrom: aStream, readFromString: aString
- Object readFromString: '((OrderedCollection new) add: 4; yourself)'
- -> OrderedCollection (4)

Notifying the Programmer

- error: aString,
- doesNotUnderstand: aMessage,
- halt, halt: aString,
  - To invoke the debugger
  - Input defaultState ifTrue:[self halt]
- shouldNotImplement
  - Sign of bad design: subclassing

Copying in VW

- Copying of objects: shallowCopy, copy
- shallowCopy : the copy shares instance variables with the receiver.
- default implementation of copy is shallowCopy



Copying in VW


```
Object>>copy
    ^ self shallowCopy postCopy

Object>>postCopy
    ^ self
```

- postCopy is a hook method
- copy is a template method

Summary

timesRepeat:, to:do:,
Array, OrderedCollection, Dictionary, Set
do:, select:, collect: