

Iterator & for cycle

- for (Object o : foo)
 - can be used if foo is an array or **foo can be iterated**
 - how to achieve it?
 - implement the **java.lang.Iterable** interface
- **Iterable** has a single method
java.util.Iterator iterator()
- methods of the **Iterator** interface
 - boolean hasNext()
 - Object next()
 - void remove()
- the iterator typically implemented as an anonymous inner class
- in reality, the Iterator is generic, i.e. **Iterator<T>**
 - we will ignore it for now

iterator example

```
public class MyArrayWithIterator implements Iterable {
    private Object[] arr = new Object [5];
    private int s = 0;

    public int size() {
        return s;
    }

    public void add(Object o) {
        ...
        arr[s++] = o;
        ...
    }
```

```
public Iterator iterator() {
    return new Iterator() {
        private int index = 0;
        public boolean hasNext() {
            return index < s;
        }
        public Object next() {
            return arr[index++];
        }
        public void remove() {
            throw new
                UnsupportedOperationException();
        }
    };
}
```

- since Java 8, remove() is **default**
- the implementation throws this exception

Assignment 1

- create the interface MyCollection with methods
 - void add(Object o)
 - Object get(int i)
 - void remove(Object o)
 - void remove(int i)
 - int size()
- create an implementation of MyCollection
 - use an array, which is reallocated if needed
 - handle all error states by exceptions
 - access out of bounds of the array
- add the iterator (see previous slides)

Assignment 2

- create a class representing a balanced binary search tree (e.g., AVL, RB, or any other)
 - for the `int` type
- add the iterator that iterates the tree from the smallest element till biggest one
- create a program, which uses the tree and loads data from arguments of the command-line
 - use `Integer.parseInt(String s)` to transform `String` into `int`
 - do not forget to handle exceptions the method throws in a case, the string cannot be transformed
- think how to update the tree in order it can be defined with the `Object` type
 - i.e. how to achieve that tree elements are comparable
 - implement it

Tests...

Test 1

- What is printed out – true or false

```
public class Test01 {
    public static void main(String[] argv) {
        System.out.println(test());
    }

    public static boolean test() {
        try {
            return true;
        } finally {
            return false;
        }
    }
}
```

Test 2

- What is printed out?

```
public class Test02 {  
  
    public static void main(String[] argv) {  
        try {  
            System.out.println("Hello world!");  
            System.exit(0);  
        } finally {  
            System.out.println("Goodbye");  
        }  
    }  
}
```

Test 3

- What is printed out

```
public class ParamsTest {
    public ParamsTest(Object o) {
        System.out.println("ParamsTest(Object o)");
    }
    public ParamsTest(long[] a) {
        System.out.println("ParamsTest(long[] a)");
    }
    public static void main(String[] argv) {
        new ParamsTest(null);
    }
}
```

- A cannot be compiled
- B ParamsTest(Object o)
- C ParamsTest(long[] a)

Test 3

- C is correct answer
- Why?
 - Searching a method/constructor
 - based on the **actual** parameters, all the methods/constructors that can be used, are selected
 - from the selected methods/constructors, the most specific one is selected based on the **formal** parameters
 - **ParamsTest(long[] a)** is more specific than **ParamTest(Object o)**
 - everything, that can assigned to **long[] a** can be also assigned to **Object**
 - but it is not true vice-versa

Test 4



Exam test

- What is printed out

```
class A {
    public static void foo() {
        System.out.println("foo");
    }
}
class B extends A {
    public static void foo() {
        System.out.println("bar");
    }
}
```

```
public class OverloadTest {
    public static void
        main(String[] argv) {
        A a = new A();
        A b = new B();
        a.foo();
        b.foo();
    }
}
```

- A foo bar
- B foo foo
- C bar bar
- D something else

Test 4

- B is correct
- static methods are not virtual



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