

The University of Iowa

22c22: Object-Oriented Software Development

Fall 2011

Introducing Scala

Scala: A Scalable language

- Multi-paradigm language
- Small core
- Designed with scalability in mind
- Runs on the Java virtual machine
- Interoperates seamlessly with Java

Scala: A Scalable language

- Builds new constructs from basic, simple components
- Can reuse and adapt components
- Can add libraries that appear as language extensions
 - delayed argument evaluation
 - infix syntax for methods

Scala: A Scalable language

- Supports programming in the large
 - Classes, packages, libraries, ...
 - Static-typing
 - separate compilation
- Supports programming in the small
 - interpreter with REPL
 - scripting abilities
 - concise syntax

Multi-paradigm language

- Integrates features of
 - object-oriented
 - functional
 - concurrentlanguages
- The three programming styles complement one another

Purely Object-Oriented

- Every value is an object
- Types and object behavior are defined by **classes** and **traits**
- Classes are extended by **subclassing** and **mixin**-style composition
- Operators are methods
 - $3+2$ is syntactic sugar for $3.+(4)$

Highly Functional

- Every function is a value
- Almost everything is an expression
- Anonymous and higher-order functions
- Curried functions/partial application
- Lazy evaluation
- Pattern matching

Concurrent

- Actor model
- Simple but expressive and scalable
- Based on message passing between asynchronous actors
- Appears like a native aspect of the language
- In reality, just a library built on top of JVM threads

Expressive and concise

- very powerful constructs
- statically typed but rarely requiring type annotations
- very little boilerplate code
- higher-level than mainstream OO languages
- intuitive and readable syntax

Concise

Java

```
class MyClass {  
    private int index;  
    private String name;  
    public MyClass(int index, String name) {  
        this.index = index;  
        this.name = name;  
    }  
}
```

Scala

```
class MyClass(index: Int, name: String)
```

Expressive

Java

```
boolean nameHasUpperCase = false;
for (int i = 0; i < name.length(); ++i) {
    if (Character.isUpperCase(name.charAt(i))) {
        nameHasUpperCase = true; break;
    }
}
```

Scala

```
val nameHasUpperCase = name.exists(_.isUpperCase)
```

Resources

A comprehensive starting point is
Scala's official website:

<http://www.scala-lang.org>