Scala Evaluation

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Evaluation Criteria

- Performance
- Employability
- Support/Troubleshooting
- Concurrency
- Support for Object Oriented Programming (OOP)
- Support for Functional Programming
- Reliability

Performance

The Performance evaluation attempts to answer the following question: “How well does Scala perform in comparison to other languages?”

The Performance of Scala is evaluated by:

- Compile Time
- Runtime

Performance

Benchmark	*Compile Time (Seconds)*	*Factor*
Scala	3.5	5.8x
C++	3	5.0x
Java	3	5.0x
Go	0.6	1.0x

Performance

Benchmark	*Runtime (Seconds)*	*Factor*
Scala	82	3.6x
C++	23	1.0x
Java	134	5.8x
Go	126	5.5x

Employability

The criteria of Employability attempts to answer the following question: “How easy is it to get a job using the Scala language?”

The Employability of Scala was measured by:

- Resulting number of posts on job board websites such as Indeed, Monster, and Dice when searching for “Scala Developer” positions
- Average salary for a Scala Developer

Employability

- Scala is good if you're looking for a mid-level or higher positions, but if you're looking for something quickly then you may have better chances with a well-known language such as Java or Python as shown by:
  - 81 entry-level positions in the DC area on Indeed; 285 mid-level and senior positions on Monster; 38,313 positions on Dice. Scala also has its own job board.
  - Scala is used by major companies such as Facebook and Google, but there weren't a lot of positions available that used Scala
  - Average salary tended to vary based on the website; Glassdoor reported $76,526 while Zip Recruiter reported $128,988

Support/Troubleshooting

- The criteria of Support and Troubleshooting attempts to answer the following question: "How many resources are available for resolving bugs and other issues?"

- Support and Troubleshooting related to Scala was measured by:
  - # of posts on Stack Overflow
  - # of books on websites such as Amazon, Barnes and Noble, Books-a-Million
  - Appearance of official documentation
  - Appearance of forums and chat rooms

Support/Troubleshooting

- Overall, there are plenty of resources available if you are having trouble and the language itself continues to evolve as shown by:
  - 100,643 questions on Scala on StackOverflow, while Java has about 1.7 million questions
  - 454 books on Scala on Amazon, 61 on Barnes & Noble, 14 on Books-a-million
  - Lots of official documentation, with Martin Odersky (the original developer) being listed as the author
  - Scala has their own official forums and chat rooms, with various other unofficial chat rooms on Discord, Slack, Mattermost (open-source alternative to Slack, etc.

Support for Concurrency

The evaluation of Concurrency attempts to answer the following question: "How well does Scala incorporate and handle concurrency?"

The support for Concurrency in Scala was measured by support of:

- Coroutines
- Fork/Join
- Async
- Multithreading

Concurrency

	Scala	Java	C	Javascript
Coroutines	Yes	No	No	No
Fork/Join	Yes	Yes	Yes	No
Async	Yes	Not Natively	No	Yes
Multithreading	Yes	Yes	Not Natively	Not Natively (Node.js)

Support for Object Oriented Programming

- The criteria of Support for Object Oriented Programming attempts to answer the following question: "How well does Scala support Object Oriented Programming?"
- The support for Object Oriented Programming was measured by support for:
  - Inheritance
  - Polymorphism
  - Abstraction
  - Encapsulation

Support for Object Oriented Programming

	Scala	Java and C++
Inheritance	Yes - Extend user traits	Native
Polymorphism	Not Natively - Through virtual functions and overloading	Native
Abstraction	Yes	Native
Encapsulation	Not natively - avoids explicit use of get/set	Native

Support for Functional Programming

- The criteria of Support for Functional Programming attempts to answer the following question: "How well does Scala support Functional Programming?"
  - Real-world examples:
    - Twitter: Custom libraries for functional data transfers
    - Netflix: Machine learning and functional data transfers
- The Support for Functional Programming was measured by support for:
  - Currying
  - Immutability
  - Referential Transparency
  - Pattern Matching

Support for Functional Programming

	Scala	Erlang	Swift (Hybrid)
Currying	Yes	Not Natively	Yes
Immutability	Yes (val)	Yes - Memory is not shared	Yes
Referential Transparency	Yes	Yes	Yes
Pattern Matching	Yes	Yes	Not Natively

Reliability

The criteria of Reliability attempts to answer the following question: “How consistent and error averse is the Scala language ?”

The Reliability of Scala was evaluated by:

- Type checking
- Exception Handling
- Keyword reservation
- Consistency Rules

Reliability

	Scala	Java	C	Python
Type Checking	Static/Strong	Static/Strong	Static/Weak	Dynamic/Strong
Exception Handling	Compile/Runtime	Compile/Runtime	N/A	Compile/Runtime
Keywords Reserved	Fully	Fully	Fully	Fully
Consistent Rules	Mostly	Mostly	No	Fully

Final Takeaways

Like its predecessor Java, Scala attempts to have something for everyone. However in order to better support concurrency and functional programming paradigms, it had to make some sacrifices in its support for OOP.

Scala embodies the phrase “With great power, comes great responsibility”.

Now onto the project…

A Scala Pokedex

The Objective

The Vision

Create a web application that can be used by Pokémon "main" (e.g. Pokémon Sword and Shield) and Pokémon Go players to get important information related to a chosen Pokémon and simulate battles between Pokémon of their choosing based on their type (e.g. Fire, Water) and overall strength

Technology & Features

- Scala (Release 2.13.3)
- IntelliJ IDE with Scala plug-ins
- PokéAPI (online repository for all Pokemon stats)
- Play Framework for Web Development
- xHTML/CSS for front-end of website
- Primitive cache as a Map

- Pokédex
  - Allows choosing of Pokémon based on their name and/or description
  - Types (e.g. Fire,Water,etc.) and Stats
  - Height/Weight
  - First generation pokemon was found
- Battle Simulator
  - Compares 2 Pokémon and then determines the winner of a simulated battle based on their overall type and strength

Constraints

- Time/Scope
  - Only have about a month to complete the project
- Skill
  - Scala is a completely new language to all team members
- How PokéAPI returns information which will effect:
  - How Pokémon types are compared
    - Map
    - Strings
    - Doubles
- How advanced the simulator will be
  - How Pokémon with two types will be compared
  - Pokémon levels
  - Special Attacks

PROJECT APPLICATIONS

- Can be used by players of “main” Pokémon games (e.g. Pokémon Sword and Shield) and Pokémon Go in order to make decisions before entering a battle
- Can be used by new Pokémon players to learn about type match-ups

Questions?

THANK YOU

Original author of the Pikachu Powerpoint Template

作者信息: