



What Can the Reid List of First Programming Languages Teach Us About Teaching CS1?



Robert M. Siegfried^{1*€}, Diane Liporace² and Katherine Herbert-Berger²

¹Department of Mathematics and Computer Science, College of Arts and Science, Adelphi University, Garden City, NY 11530
²Department of Computer Science College of Science and Mathematics, Montclair State University, Upper Montclair, NJ 07043-1624

<https://home.adelphi.edu/~siegfried/SIGCSE2019Poster.pptx>

Abstract

The CS1 course is arguably the most important course offered in a Computer Science major; if students struggle in the course, they are likely to drop out of the major, and if certain key topics are covered, they may struggle in other courses later in their undergraduate program. For this reason, it is not surprising that the programming language used in a CS1 course as well as the teaching methodology is frequently a contentious subject. Richard Reid of Michigan State University kept a list of programming languages used in CS1 courses from the early 1990s until his retirement in 1999, and Reid's former student, Frances Van Scoy, continued compiling the List until 2006. Siegfried et al. updated the List in 2011 and 2015. The historical data shows the different languages (and in some cases, approaches) used by the schools reported on the Reid List. Additionally, in compiling the last two lists, there were trends spotted, with some feedback from faculty at the Reid List schools, stating the reasons for changes that they made as well as why they currently use and previously used the various languages.

Richard Reid's List

Richard Reid - tracked programming languages used in computing programs in the early 1990s.
Colleges were included on the list if they replied to Dr. Reid with reliable information.
Richard Reid began tracking programming languages in computing programs in the early 1990s
The list was updated continuously.
A new list was released, when 10% of included colleges changed their language. (~ 2 per annum) until Reid's retirement in 1999.
Frances Van Scoy continued compiling the list until 2006.
Siegfried et al. - updated the list in 2011 and 2015.

Region	Colleges
New England	41
MidAtlantic (incl. DC)	87
Southeast	72
Kentucky and W. Virginia	10
MidWest	95
SouthWest	68
Northwest	16
Alaska and Hawaii	2

Table 1 - Geographic Distribution Breakdown of US Reid List Colleges

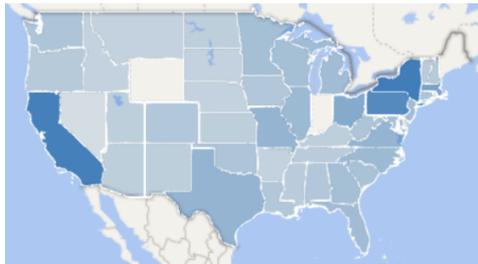


Figure 1- Geographical Distribution of Reid List schools by State; darkest colors indicate more Reid List schools

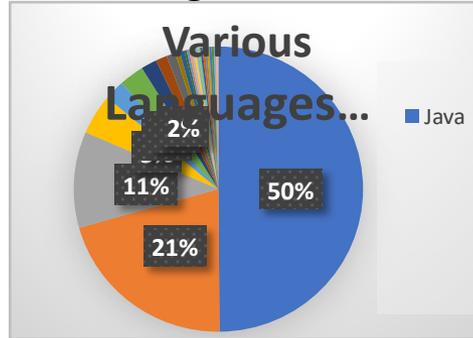


Figure 2 - Popularity of Programming Languages used in Reid List Programs in 2011

Methodology - Which Course?

The list was updated continuously.
A new list was released, when 10% of included colleges changed their language. (~ 2 per annum) until Reid's retirement in 1999.
Frances Van Scoy continued compiling the list until 2006.
Siegfried et al. (2011) - updated the list.

Methodology - Which Language?

The programming language was determined by:
Examining the syllabus
Checking the bookstore's website for a textbook adoption
Calling the bookstore
Members of the department were contacted to obtain this information.

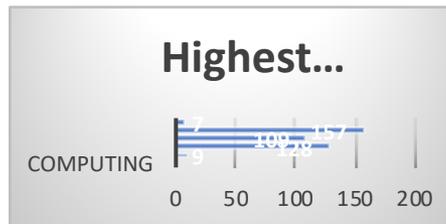


Figure 4 - Reid List Colleges by Highest Degree Offered in Computing

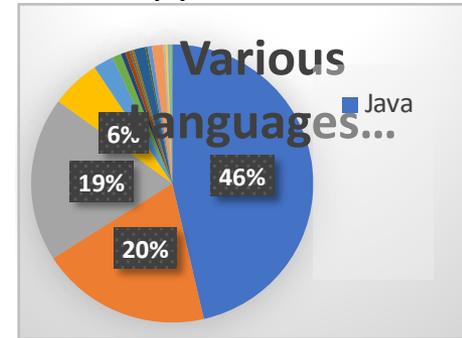


Figure 3 - Popularity of Programming Languages used in Reid List Programs in 2015

Trends

Faculty replies to e-mail provided additional information. A few trends appeared:
Many Programs Used Different Programming Languages after the Introductory Course
Movement Away From Java
Movement To Java
Different Themes and Language in the Introductory Course
Language Should Not Matter
There were various reasons for Choosing a Particular Language

Conclusions

Python's popularity is growing at the expense of Java.
88% of the Reid List schools use one of only 4 languages: Java, Python, C++, C.
More schools on the Reid List have shifted to Python than any other language.
More schools have shifted away from Java than any other language.
Python, Java and C++ remain the three most popular programming languages in CS1 courses.
Other languages may be used later in the curriculum.

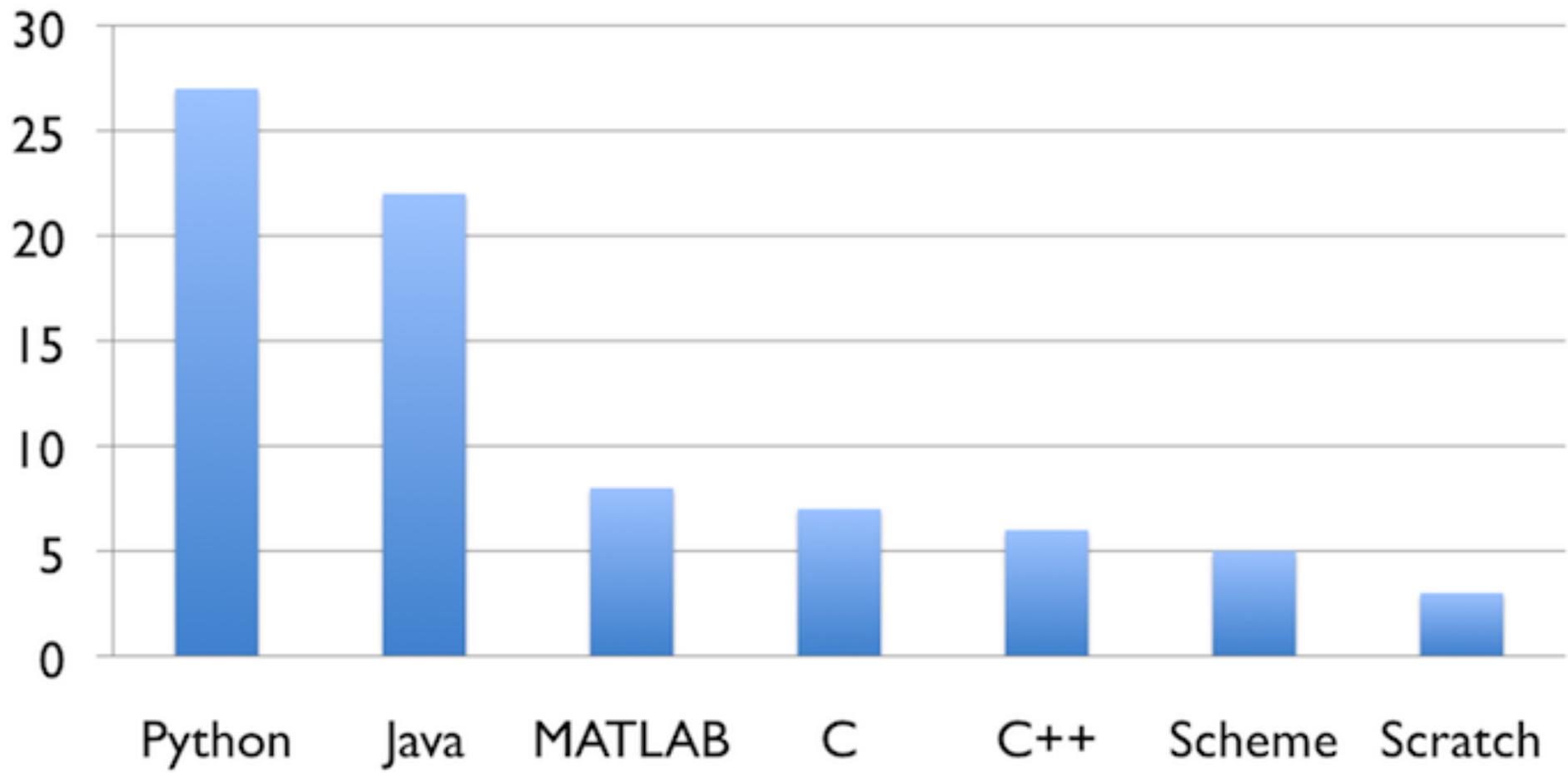
Plans for the 28th Reid List Survey

The survey for the 29th Reid List will take place during the Spring 2019 Term. In addition, to finding the language used in CS1 classes, the following information is also sought:
Language used in CS2 course
Paradigm used in CS1
Language previously used in CS1 and CS2 and reason for changing

Reference
[1] Reid Lists 6 - 24, <https://home.adelphi.edu/~siegfried/csReidList>

*Presenting Author: Katherine G. Herbert-Berger, herbertk@montclair.edu
€ to whom correspondence should be addressed: Professor Robert M. Siegfried, Department of Mathematics and Computer Science, Adelphi University, Garden City, NY, USA, 11530

Number of top 39 U.S. computer science departments that use each language to teach introductory courses



Analysis done by Philip Guo (www.pgbovine.net) in July 2014, last updated 2014-07-29

<https://sdtimes.com/softwaredev/tiobe-predicts-python-will-replace-java-as-top-programming-language/>



TIOBE predicts Python will replace Java as top programming language
Latest News Published: June 11th, 2019 - Christina Cardoza

“The main reason for this is that software engineering is booming. It attracts lots of newcomers to the field. Java’s way of programming is too verbose for beginners. In order to fully understand and run a simple program such as “hello world” in Java you need to have knowledge of classes, static methods and packages. In C this is a bit easier, but then you will be hit in the face with explicit memory management. In Python this is just a one-liner. Enough said,” the June 2019 TIOBE Index states.

So maybe the SD Times got it wrong?

TIOBE Index for February 2020

Feb 2020	Feb 2019	Change	Programming Language	Ratings	Change
1	1		Java	17.358%	+1.48%
2	2		C	16.766%	+4.34%
3	3		Python	9.345%	+1.77%
4	4		C++	6.164%	-1.28%
5	7		C#	5.927%	+3.08%

“Just like languages such as Java, C++ and C# survived by making small changes every new release.”

- The Reid survey is based on colleges that replied to a request for info
- The Philip Guo survey researched the languages used at top universities
- The SD Times article has not yet come to pass but the perception of Java that Ms. Cardoza describes is one I hear echoed frequently
- *While Java is holding its own in the workplace for now, it is losing its predominance in education*

Questions

- Is it the role of the JCP to address this?
- Should we have a committee to look at this more closely?
- What can we do to change the perception of Java as compared to Python?
- If JShell and Single File Source Code are initiatives to make Java friendlier then whose responsibility is it to promote these enhancements?