Top/Emerging Development Languages for Vertex

By

Jennifer Morales

Overview of Top/Emerging Development Languages for Vertex & its significance

Vertex, Inc.

November 2022

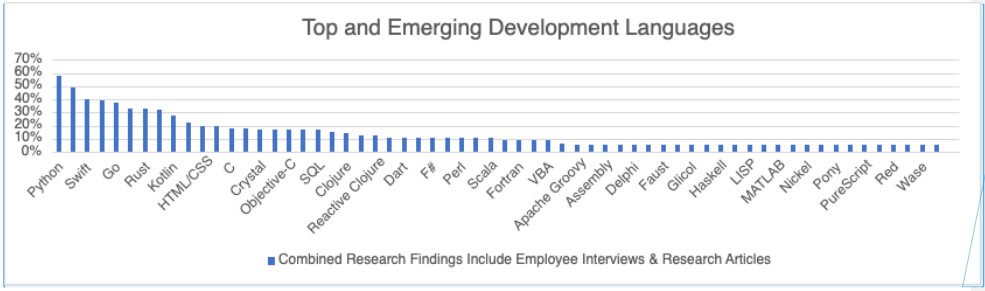
Contents

3

What are the Top and Emerging Development Languages for Vertex

Vertex wants to stay current with the best of what is currently out there and what is newly emerging. Through this article, we researched the top and emerging development languages to determine which are best for our business, employees, and projects. The research breaks down the top current and emerging languages based on various studies and interviews with current Vertex employees. It is important to note that different developing languages apply to multiple means of development, and not all currently apply to Vertex. For example, we don't have projects presently focused on gaming development.

It is important to note that each language was entered separately. The statistics below reflect the percentage of persons or articles that mentioned the language.



We have combined the data in the above chart to show the percentage of research articles and Vertex employee interviews that offer support for various languages.

Commented [SW1]: I would change the chart description to say 'Vertex Developers' instead of 'Employee'

Commented [J(2]: NTS give background and experience level of employees that I interviewed

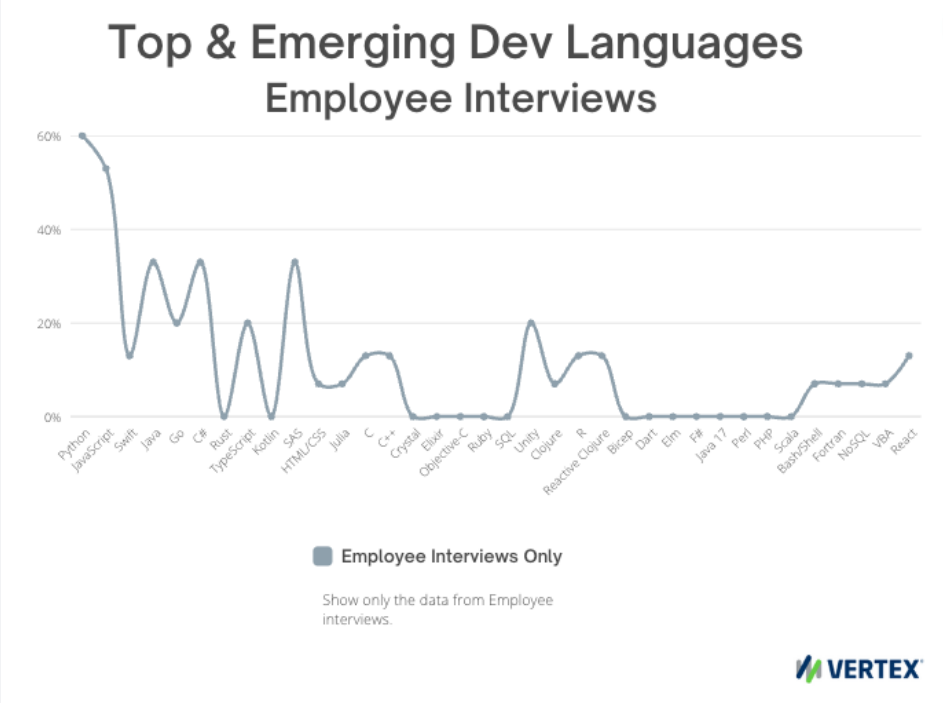
Commented [J(3R2]: Interview our UI groups to add to this

Commented [J(4R2]: Scott Dowel?

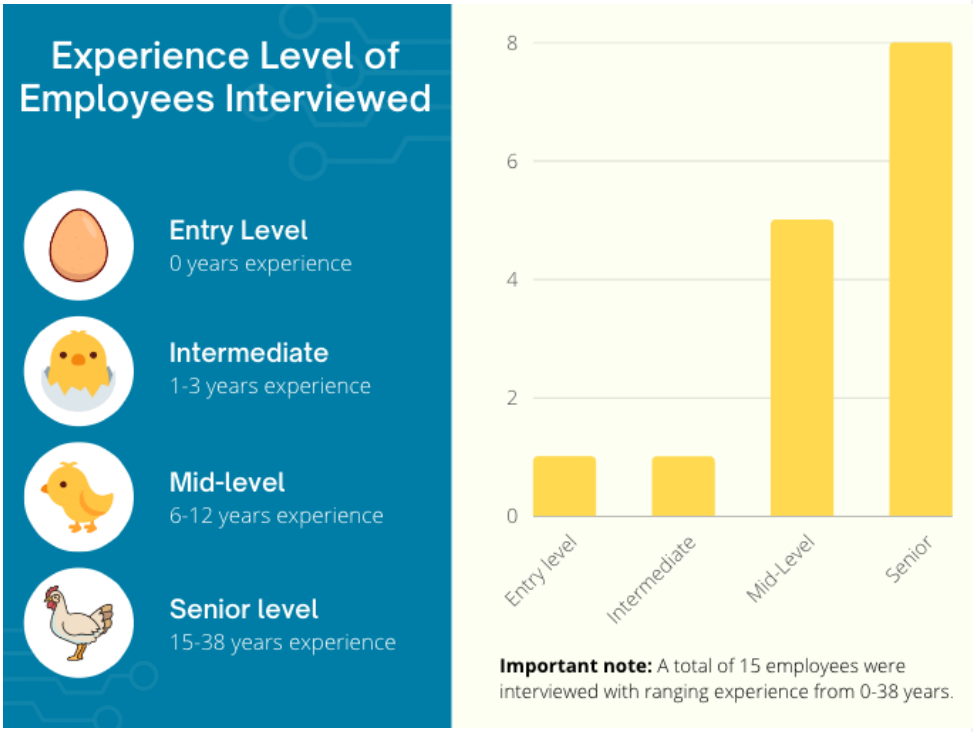
Commented [EM5]: I think I understand this but it would be good to explain why it doesn't add up to 100

4

Top and Emerging Development Languages from Employee interviews

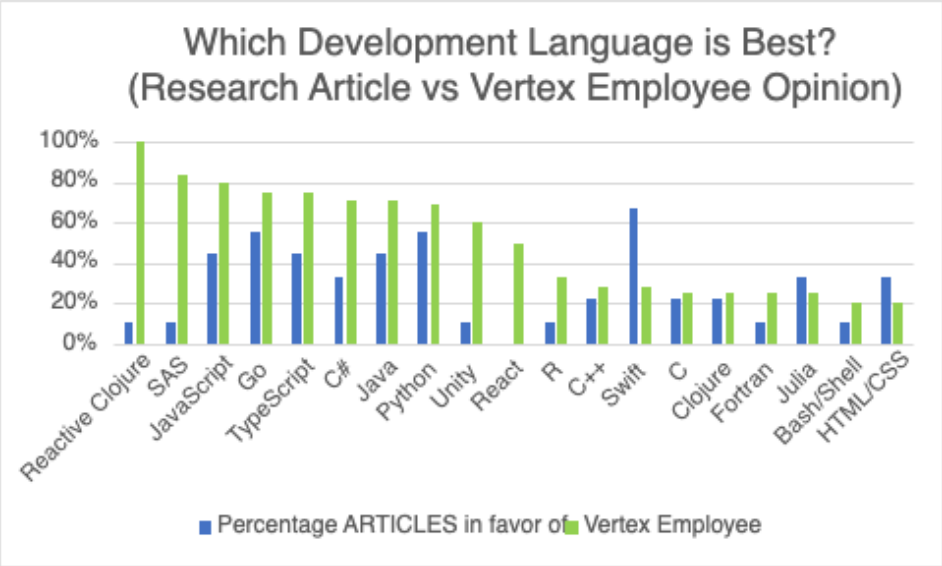


5



We interviewed 15 Vertex Employees on what they felt was the best of developer languages, both current and emerging. The employees ranged from Entry level (0 years of Experience) to senior level (with over 38 years of experience). Their titles included Architect, Enterprise Architect, Director, Software Engineer, Data Scientist, Technical Lead, and Innovation Operations Analyst.

The chart below shows the differences between the research's top findings (green) and the employee interviews (blue) based off the percentage of agreement.



The chart above shows the top 12 development languages based on the employee interviews. Blue shows the percentage of employees in favor of, while green shows the percentage of employees in opposition to.

Commented [EM6]: Doesn't agree with chart labels

The research and employee interviews show that Rust, Swift, Go, Java, JavaScript, and TypeScript as the top and emerging developer languages that Vertex should be paying attention to.

What are the Top/Emerging Development Languages that Vertex should be focusing on to get the best developers?

Vertex should look for diverse and knowledgeable developers with in-depth knowledge of the current languages and an understanding of the trends while anticipating beneficial changes. My research found that the Top and Emerging 10 Developer Languages are Python, JavaScript, Swift, Java, Go, C#, Rust, TypeScript, Kotlin, and SAS.

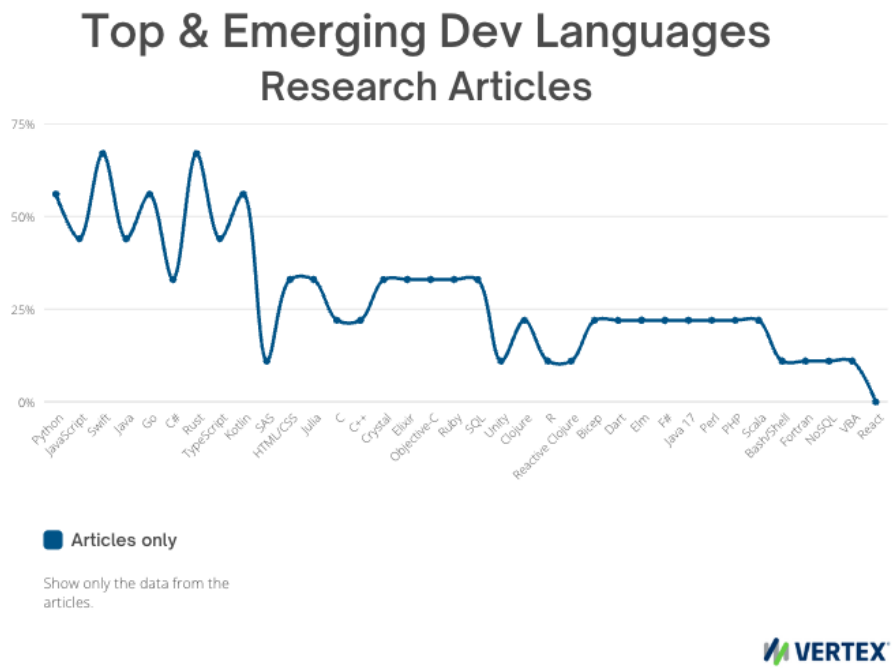
20 Top and Emerging Developer Languages

1. Python	6. C#	11. HTML/CSS	16. Elixir
2. JavaScript	7. Rust	12. Julia	17. Objective-C
3. Swift	8. TypeScript	13. C	18. Ruby
4. Java	9. Kotlin	14. C++	19. SQL
5. Go	10. SAS	15. Crystal	20. Unity

7

When comparing the information gathered in interviews with employees at Vertex, the opinions were comparable to those of the trending market. According to the articles, Swift, Rust, Python, Go, and Kotlin lead the pack for top and emerging developer languages.

Overview of all Research Article Rankings and Findings



Stack Overflow Ranking	11 new programming languages to make a coder's heart sing	The Most In-Demand Programming Languages for 2022	O'Reilly Emerging Programming Languages	Top programming languages that will rule in 2022	Tech Radar	Vertex Employee Opinion
JavaScript	Apache Groovy	Go	Rust	Rust	io-ts	Rust
HTML/CSS	Clojure	Python	Crystal	Elm	Kotest	Go
SQL	Crystal	Rust	Elixir	Go	NestJS	Swift
Python	Dart	C# (C Sharp)	Julia	Python	React Query	Java
TypeScript	Elixir	HTML/CSS	Kotlin	Java	Swift Package Manager	JavaScript
Java	F#	Java	Elm	JavaScript	Yjs	TypeScript
Bash/Shell	Go	JavaScript		Swift	Azure Bicep	C# (C Sharp)
C# (C Sharp)	Java 17	NoSQL		TypeScript	Camunda	React
C++	Julia	Perl		Objective-C	Gradle Kotlin DSL	

8

PHP	Kotlin	SQL	Ruby	Jetpack Media3
C	Pony		Scala	Ladle
PowerShell	PureScript		Unity	Moshi
Go	Python			Svelte
Rust	Reason			Aleph.js
Kotlin	Red			Astro
Dart	Rust			BentoML
Ruby	Swift			Carbon Aware SDK
Assembly	TypeScript			Cloudscape
Swift				Connect
R				Cross Device SDK
VBA				Cypress Comonent Testing
MATLAB				JobRunr
Lua				Million
Groovy				Soketi
Delphi				Stable Diffusion
Scala				Synthetic Data Vault
Objective-C				Carbon
Perl				
Haskell				
Elixir				
Julia				
Clojure				
Solidity				
LISP				
F#				
Fortran				
Erlang				
APL				
COBOL				
SAS				
OCaml				
Solidity				
VBA				

The articles that I used for this research include:

- Stackoverflow Ranking
- 11 new programming languages to make a coder's heart sing

Commented [J(7]: Do you think I should break down each article's summary individually or will the information including suffice?

9

- 18 New Programming Languages to Learn
- The Most In-Demand Programming Languages for 2022
- O'Reilly Emerging Programming Languages
- Top programming languages that will rule in 2022
- Programming Languages May Finally Be Reaching a Status Quo
- Redmonk Language Rankings 2022
- Tech Radar

Commented [J(8]: note to self. Link each article to its appropriate link so that later users can read more on the article should they want to.

Stack Overflow Summary

When looking strictly at the articles, I found the most significant study was StackOverflow's Survey. The findings are broken down individually below.

Programming, Scripting, and Markup Languages included in the Survey

APL	Clojure	Erlang	HTML/CSS	Lua	PowerShell	Scala
Assembly	COBOL	F#	Java	MATLAB	Python	Solidity
Bash/Shell	Crystal	Fortran	JavaScript	Objective-C	R	SQL
C	Dart	Go	Julia	OCaml	Ruby	Swift
C#	Delphi	Groovy	Kotlin	Perl	Rust	TypeScript
C++	Elixir	Haskell	LISP	PHP	SAS	VBA

Top Ranking:

Similar to our findings JavaScript took the lead in Stack Overflow's survey. What was surprising was that HTML/CSS came in second, beating out Python by 7%.

Language	Percentage
JavaScript	65.36
HTML/CSS	55.08%
SQL	49.43%
Python	48.07%

Differences in Data depending on Coding Experience:

It's important to note that developers with varying experience levels voted differently. Stack Overflow found that 58% of new coders chose Python, while only 44% of professionals chose it. Other samples of the differences can be seen below.

Language	People Learning to Code	Professional Developers
Python	58%	44%
C# (C Sharp)	35%	20%
C	32%	17%
SQL	53%	38%
TypeScript	40%	15%
Bahs/Shell	29%	19%

10

11

What are the benefits of Top/Emerging Development Languages for Vertex?

Development languages are beneficial for various use cases ranging from Software, Web, Back-end, Front-End, Full-stack, or Game development. Depending on the company's needs, different languages would prove beneficial. Below is the breakdown of the top languages and which uses apply to Vertex.

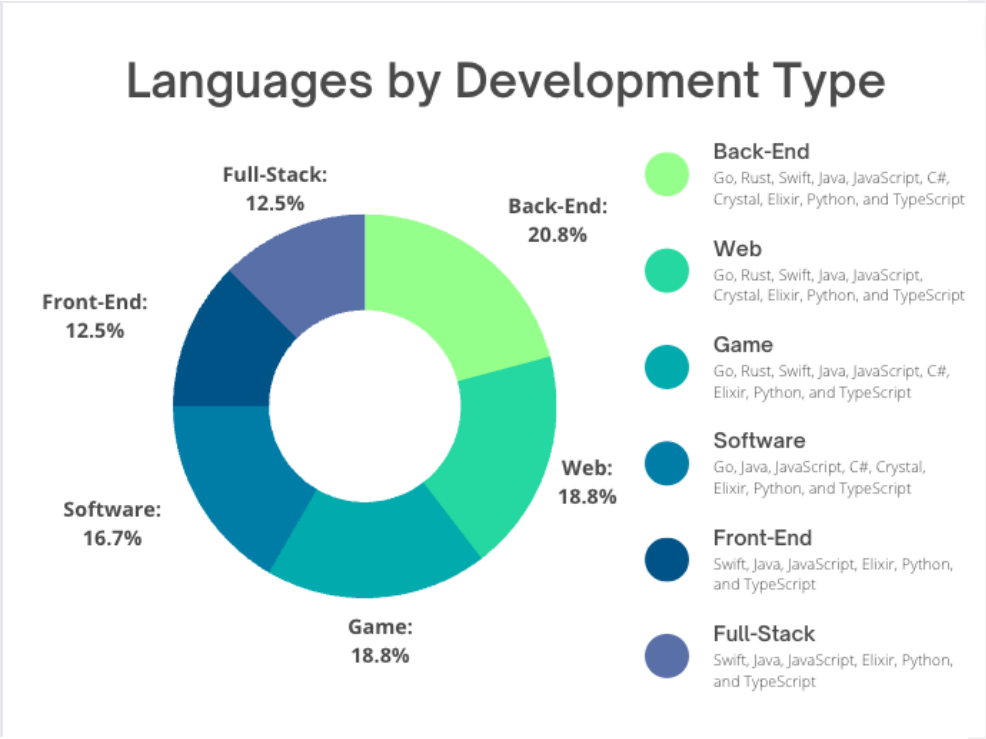
The top and Emerging 10 Developer Languages are:

1. **Rust –** is used for systems programming, web development, and virtual reality.
2. **Swift**- is used for mobile development and is specific to iOS.
3. **Go**- is used for back-end web development, system and network programming, and audio/video editing.
4. **Java**- is used for mobile development, E-commerce, Finance, and application development.
5. **JavaScript –**is used for front-end and back-end web and mobile development.
6. **TypeScript –** is used for front-end web development.
7. **Python –** is used for back-end web, desktop application development, and data science.
8. **Kotlin**- is used for back-end, mobile, and web development. This language is used by over 60% of professional Android developers.
9. **C#** - is used for virtual reality, desktop application, web, game, and mobile application development.
10. **Julia**- is used for back-end and web development.

Commented [J(9]: What makes Rust unique? The borrow checker makes the Rust language unique. The borrow checker feature forces the developer to manage ownership which then helps to eliminate memory violation bugs. This ensures that bugs are detected at compile time, eliminating the need for rubbish collection.

Commented [AC10]: iOS specifically

12



Type of Development with their applicable Development Languages

SOFTWARE	WEB	FRONT-END
• Go • Java, • JavaScript • C# • Crystal • Elixir • Python • TypeScript	• Go • Rust • Swift • Java • JavaScript • Crystal • Elixir • Python • TypeScript	• Swift • Java • JavaScript • Elixir • Python • TypeScript
BACK-END	**FULL-STACK**	**GAME**
• Go • Rust • Swift • Java	• Swift • Java • JavaScript • Elixir	• Go • Rust • Swift • Java

13

• JavaScript • C# • Crystal • Elixir • Python • TypeScript	• Python • TypeScript	• JavaScript • C# • Elixir • Python • TypeScript

How do the Top/Emerging Development Languages for Vertex benefit businesses?

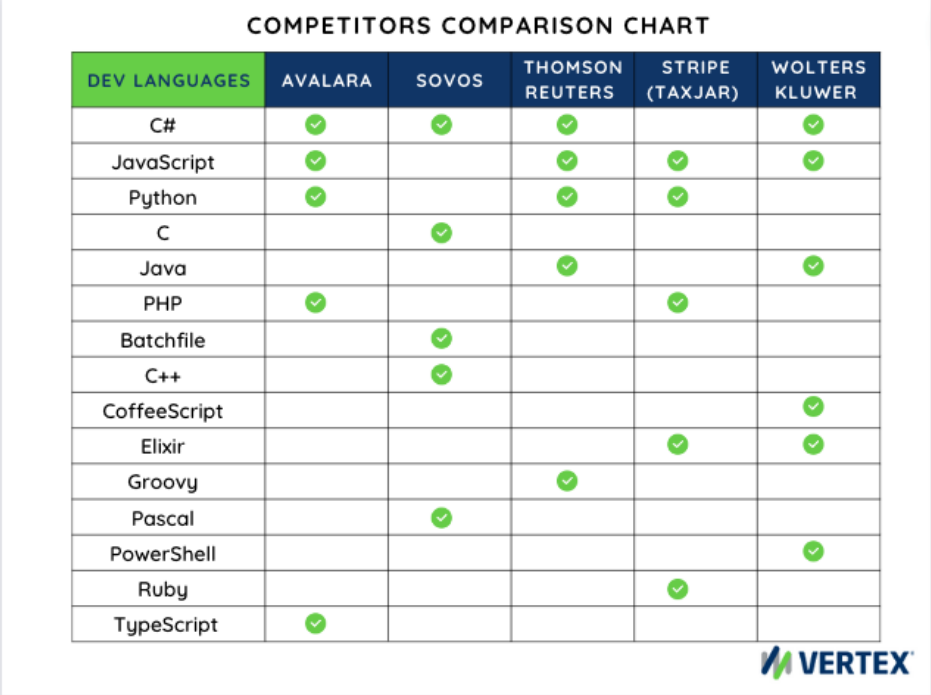
Each benefit and drawback are broken down by language in the table below.

Development Language	Benefits	Drawbacks
Rust	• Great memory efficiency • Fast and high performance • Secure • Portable	• It takes a longer time to build larger ecosystems • Single implementation
Swift	• Memory is automatically managed • Code errors are easily seen • Simplified syntax and grammar	• Limited library/information because of its newness • Lower numbers of experience Swift professionals
Go	• Good for large-scale projects • Impressive performance • Easy to learn and use	• Limited library/information because of its newness • Poor error handling
Java	• Easy to learn and use • Object Oriented • Platform independent • Secure • High-level programming language	• Poor memory efficiency • Slow speed • Raising cost of hardware
JavaScript	• Fast • Interoperable • Short compilation time • Accelerated program execution	• Always visible to everyone; anyone can view JavaScript code • Substantial amounts of bugs • Steep learning curve
TypeScript	• Fast • Scalable • Fast refactoring • Early spotted bugs	• It is an overly complicated typing system • Unsupportive of abstract classes • Browsers cannot interpret it, so users must transpile it
Python	• Easy to learn and use	• Poor memory efficiency

	• Highly compatible with other languages • Widely applicable	• Slow speed • Runtime errors
Kotlin	• Requires 40% fewer lines of code than Java • Bugs and errors are easier to find	• Slower compilation speed • Lower numbers of experienced Kotlin professionals
C#	• Easy to learn and understand • Scalable as engineers can adjust and build on top of any C# program • Most widely used languages around the world	• Needs to be compiled every time a change is made • Considered a high-level language because its syntax resembles human language
Julia	• Write easily understood code fast • Math friendly as users can utilize their scientific formulae as code	• Lack of static compilation means that it is incompatible with other languages • Does not generate an executable

Competitor activity

Based on our competitors, the top 5 languages are C#, JavaScript, Python, C, and Java. Two developer languages, JavaScript and C#, took the lead, with four out of the five competitors using them. Next came Python, with three out of five competitors using it. Two of the five competitors use C, Java, or PHP developer languages. Further breakdown of which competitors use which languages can be seen below with links to their GitHub.

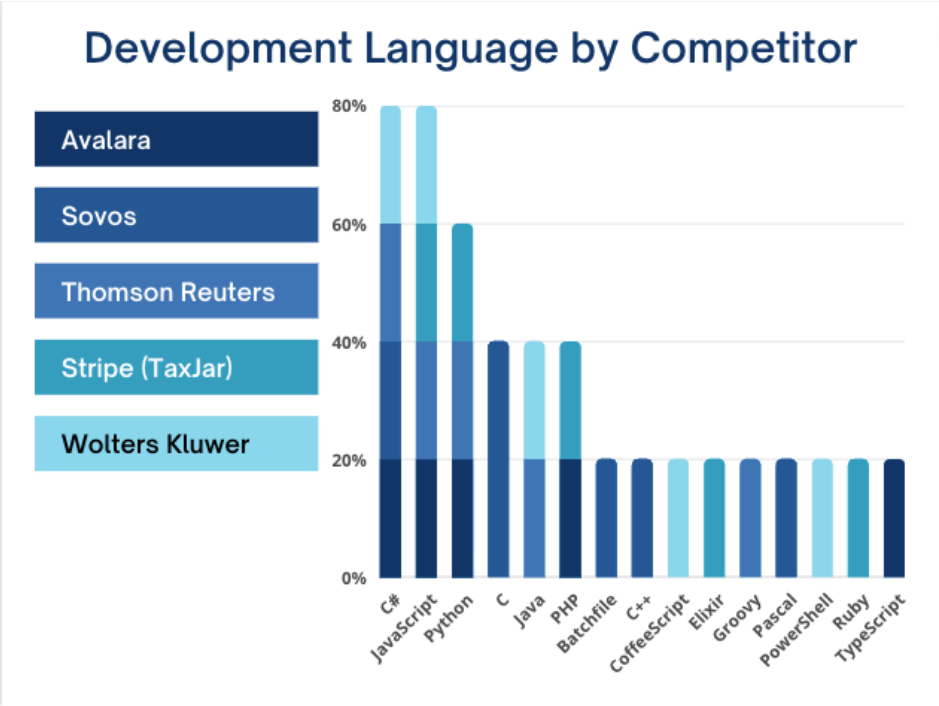


COMPETITORS COMPARISON CHART

DEV LANGUAGES	AVALARA	SOVOS	THOMSON REUTERS	STRIPE (TAXJAR)	WOLTERS KLUWER
C#	✓	✓	✓		✓
JavaScript	✓		✓	✓	✓
Python	✓		✓	✓	
C		✓			
Java			✓		✓
PHP	✓			✓	
Batchfile		✓			
C++		✓			
CoffeeScript					✓
Elixir				✓	✓
Groovy			✓		
Pascal		✓			
PowerShell					✓
Ruby				✓	
TypeScript	✓				

VERTEX

16



Top 15 languages that our competitors use in their ranking order. Further breakdown of our competitors can be seen below.

1. C#	6. PHP	11. Groovy
2. JavaScript	7. Batchfile	12. Pascal
3. Python	8. C++	13. PowerShell
4. C	9. CoffeeScript	14. Ruby
5. Java	10. Elixir	15. TypeScript

Avalara

Top Developer languages for Avalara include C#, Java, Javascript, Python, PHP, and Ruby. This is based on their GitHub. Job descriptions for developers at Avalara focus on experience with "ES'15 vanilla Javascript" and specifically request experience with "Javascript frameworks - React and Node."

Avalara Links:	Avalara Developer Language-Specific GitHub Links
• https://developer.avalara.com/sdk/ • https://github.com/Avalara	• JavaScript • PHP • C# • TypeScript • Python

Commented [EM11]: This kind of begs the question of what is in use (i.e. actually in Git repositories) versus what's newly in use - the differents between status quo and emerging. probably not easy to see what's emerging for competitors unless we keep our own list of what they've used updated over time to see trends

Commented [J(12R11]: I agree. I added information that I found in their job descriptions.

17

Sovos

Sovos job descriptions focused on developers that had experience with "SQL Scripting, JavaScript, and Python." top Developer languages for Sovos are C, Pascal, C#, C++, and Batchfile. Aside from these, Sovos wrote most of the language samples in JSON programming language. They were explicitly related to Global VAT and APIs.

Sovos Links:	Sovos Developer Language-Specific GitHub Links:
• https://developer.sovos.com/ • https://github.com/Sovos-Compliance • https://developer-guide.sovos.com/simple-connect-api/getting-started/quickstart-guide-for-sandbox-environment/ • https://developer.sovos.com/apis/configuration	• C • Pascal • C# • C++ • Batchfile

Thomson Reuters

The top Developer languages for Thomson Reuters are JavaScript, Java, Python, Groovy, and C#. While their GitHub showed these, other languages were specified within their job descriptions, including "Java" and "RESTful web services and web stack such as HTML, CSS, and Javascript."

Thomson Reuters Links:	Thomson Reuter Developer Language-Specific GitHub Links
• https://github.com/thomsonreuters?language=javascript • https://developerportal.thomsonreuters.com/	• JavaScript • Java • Python • Groovy • C#

Stripe (TaxJar)

Based on Stripe's GitHub, the top developer languages include Elixir, Ruby, PHP, JavaScript, and Python. While their GitHub highlighted these, their job description focuses on "Ruby, with some Scala and Go."

Commented [J(13]: https://www.google.com/search?q=Taxjar+software+developer+job&rlz=1C1GCEA_enUS1028US1028&oq=Wolters+Kluwer+software+developer+job&aqs=chrome..69i57j33i160l2.7066j0j7&sourceid=chrome&ie=UTF-8&ibp=htl;jobs&sa=X&ved=2ahUKEwiR85fr99b7AhVaRjABHUYFCDQQkd0GegQICxAB#fpstate=tldetail&sxsrf=ALiCzsaUcTT7klkrvC7iiMg2Ghh3Grin_g:1669846733821&htivrt=jobs&htidocid=kF38xhAsxd8AAAAAAAAAAA%3D%3D

Stripe (TaxJar)Stripe Links:	Stripe (TaxJar) Developer Language-Specific GitHub Links:
• https://github.com/taxjar	• Elixir • Ruby • PHP • JavaScript • Python

Wolters Kluwer

The top developer languages for Wolters Kluwer include C#, JavaScript, PowerShell, CoffeeScript, and Java. These top languages were confirmed by their GitHub and job description postings which focused on experience with ".NET Framework, REST, and C#."

18

Wolters Kluwer links:	Wolters Kluwer Developer Language-Specific GitHub Links:
• https://github.com/Twinfield • https://github.com/WoltersKluwerSoftwareUndService	• C# • JavaScript • PowerShell • CoffeeScript • Java

Potential/in-progress Vertex projects

Some research has already been completed on preferred microservices frameworks and preferred languages. This research is a work in progress by Ed Burnette, Kent Kingery, Brian Slocum, Andrew Glatts, Brent MacLeod, and Dan Greene.

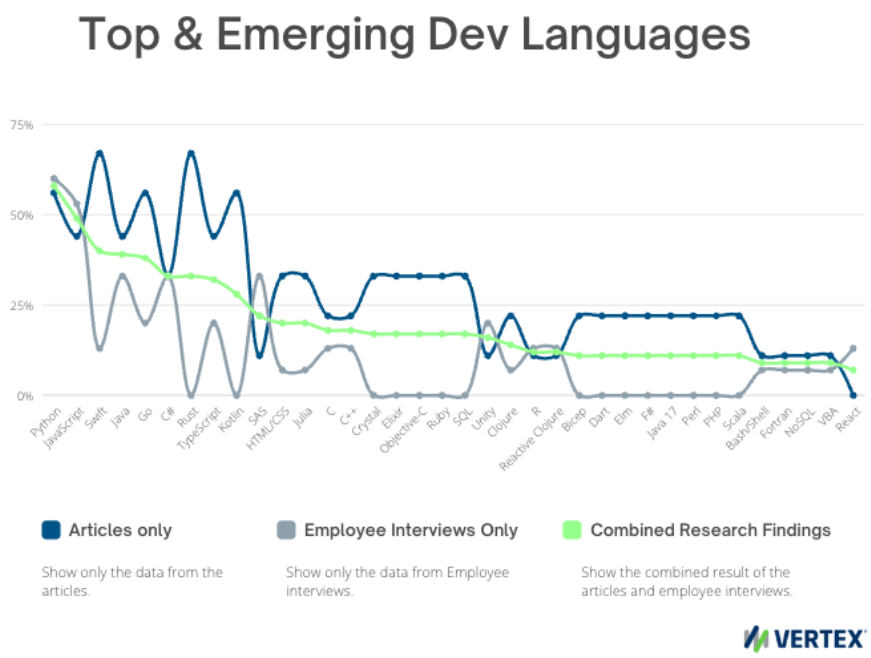
Preferred frameworks for microservices findings:

If a microservice must be written in Java, use Quarkus. Otherwise, use Gofiber. Compared to Java, Go provides a 2x increase in speed, a 2x reduction in size (i.e., half the size), and a 50x reduction in memory. Java programmers can pick up Go programming skills in a couple of weeks.

Preferred languages for microservices findings:

Adopt	We should use these in our projects	Proposed: JDK11, C# .NET 6
Trial	Build expertise and use where the risk is low	Proposed: Go, GraalVM, JDK17
Assess	Worth exploring to see how it can be used	Proposed: Node.JS, Python 3
Hold	Not recommended for new projects, but ok for existing ones	Proposed: JDK8, Clojure, C# .NET older than 6

Conclusion



Viewing all the aspects that can impact our decision when choosing the best developer languages is essential. My research found that the Top and Emerging 10 Developer Languages are Rust, Swift, Go, Java, JavaScript, TypeScript, Python, Kotlin, C#, and Julia. Each has its benefits and drawbacks. We need to look at the research, Vertex employee opinion, and our analysis of our competitors to make the best decision.

Research: When looking strictly at the research, we find that the top five developing languages are Rust, Swift, Go, Python, and Kotlin.

Vertex Employee- When looking strictly at the Vertex Employee opinions, we find that the top five developing languages are Rust, Swift, Go, Java, and JavaScript. We know that some plans have been put in place to adopt Go, but it would also be essential to add Rust as well.

Competitor Analysis: Our competitors focus their efforts on C#, JavaScript, Python, C, and Java . Our competitor's language shows us what typical customers are looking for. It is crucial to remain up to date but not be limited by the choices of our competitors.

When looking at all the data, it is easy to see that we are set up in an optimal position. We are comfortable with languages our research supports as being the top and emerging languages and are efficient in the languages used by our competitors.

21

References

https://survey.stackoverflow.co/2022/#most-popular-technologies-language

https://www.infoworld.com/article/3658204/11-new-programming-languages-to-make-a-coders-heart-sing.html

https://builtin.com/software-engineering-perspectives/new-programming-languages

https://bootcamp.berkeley.edu/blog/most-in-demand-programming-languages/

https://get.oreilly.com/ind_emerging-programming-languages.html

https://fireart.studio/blog/top-programming-languages-that-will-rule-in-2021/

https://www.wired.com/story/apple-swift-android-kotlin-rankings/

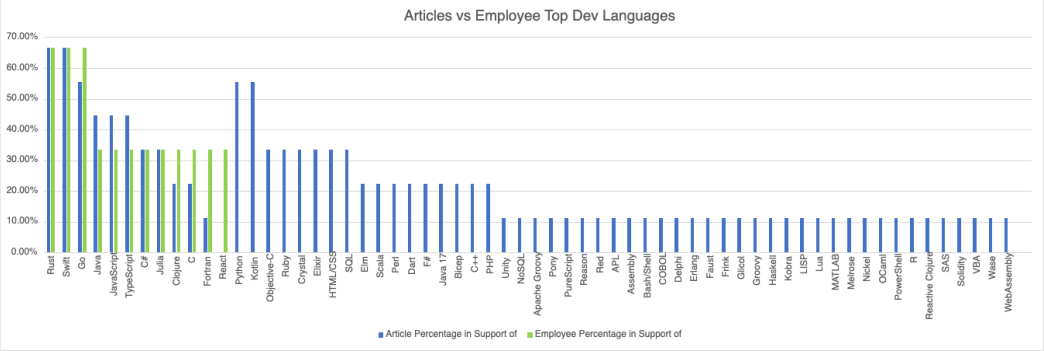
https://developer.avalara.com/sdk/

Glossary

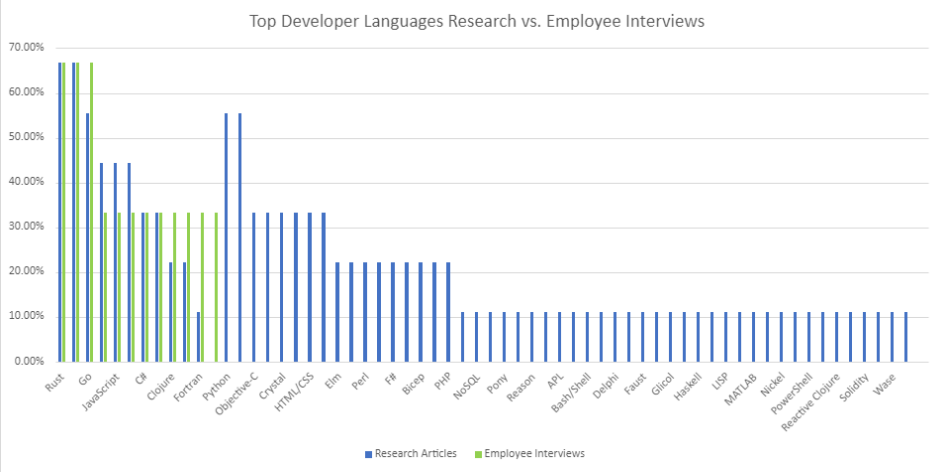
Compiling- Compiling is the general term for taking source code written in one language and transforming into another. (StackOverflow)

Transpiling- Transpiling is a specific term for taking source code written in one language and transforming into another language that has a similar level of abstraction. (StackOverflow)

Appendix

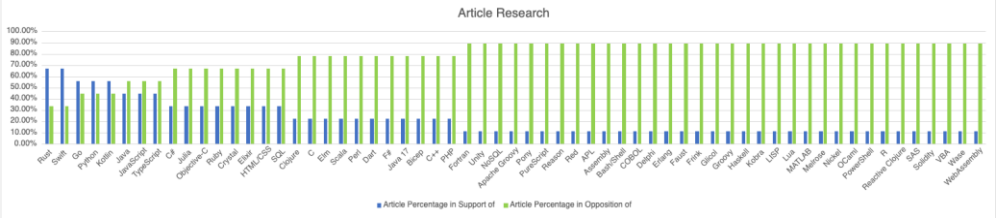


This chart below shows the percentage of the articles (blue) and employees (green) in support of each development language (listed horizontally).

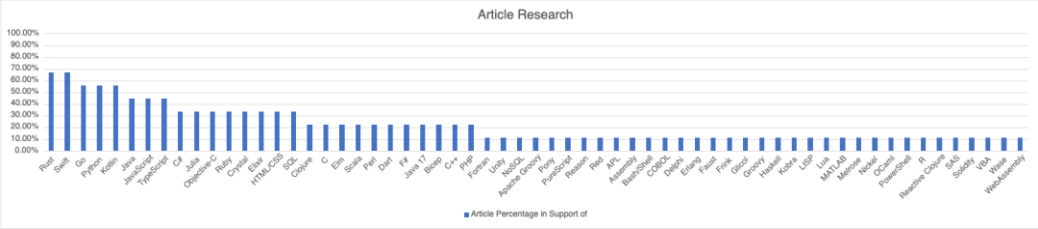


This chart below shows the percentage of support (blue) and opposition (green) of each development language (listed horizontally) based on Vertex employee interviews.

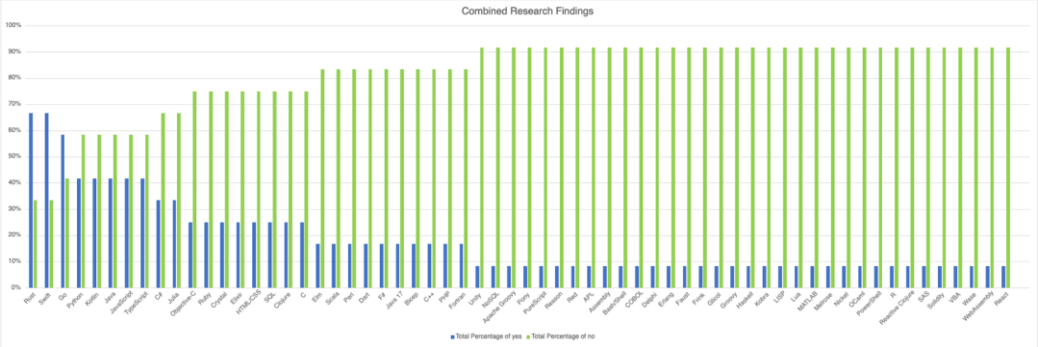
24



The chart below shows the percentage of support (blue) and opposition (green) of each development language (listed horizontally) based off research articles.

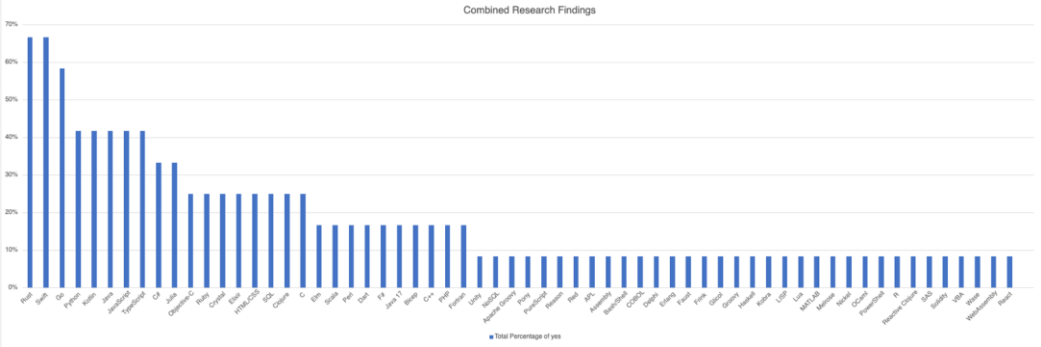


The chart below shows the support percentage of each development language (listed horizontally) based off research articles.



This chart shows the total percentage of support (blue) and opposition (green) of each development language (listed horizontally) based off both research articles and Vertex employee interviews.

25


Combined Research Findings
70%
60%
50%
40%
30%
20%
10%
0%
Rust
Swift
Go
Python
Kotlin
Java
JavaScript
TypeScript
C#
Julia
Objective-C
Ruby
Crystal
Elixir
HTML/CSS
SQL
Clojure
C
Elm
Scala
Perl
Dart
F#
Java 17
Bash
C++
PHP
Fortran
Unity
MongoDB
Apache Groovy
Prolog
PureScript
Reason
Red
APL
Assembly
Batchfile/Shell
COBOL
Delphi
Erlang
Fault
Fink
Gleam
Groovy
Haskell
Kotlin
Lisp
Lua
MATLAB
Mathnet
Nushell
OCaml
PowerShell
R
Reactive Cloure
SAS
Solidity
VBA
Wasm
WebAssembly
React
Total Percentage of yes