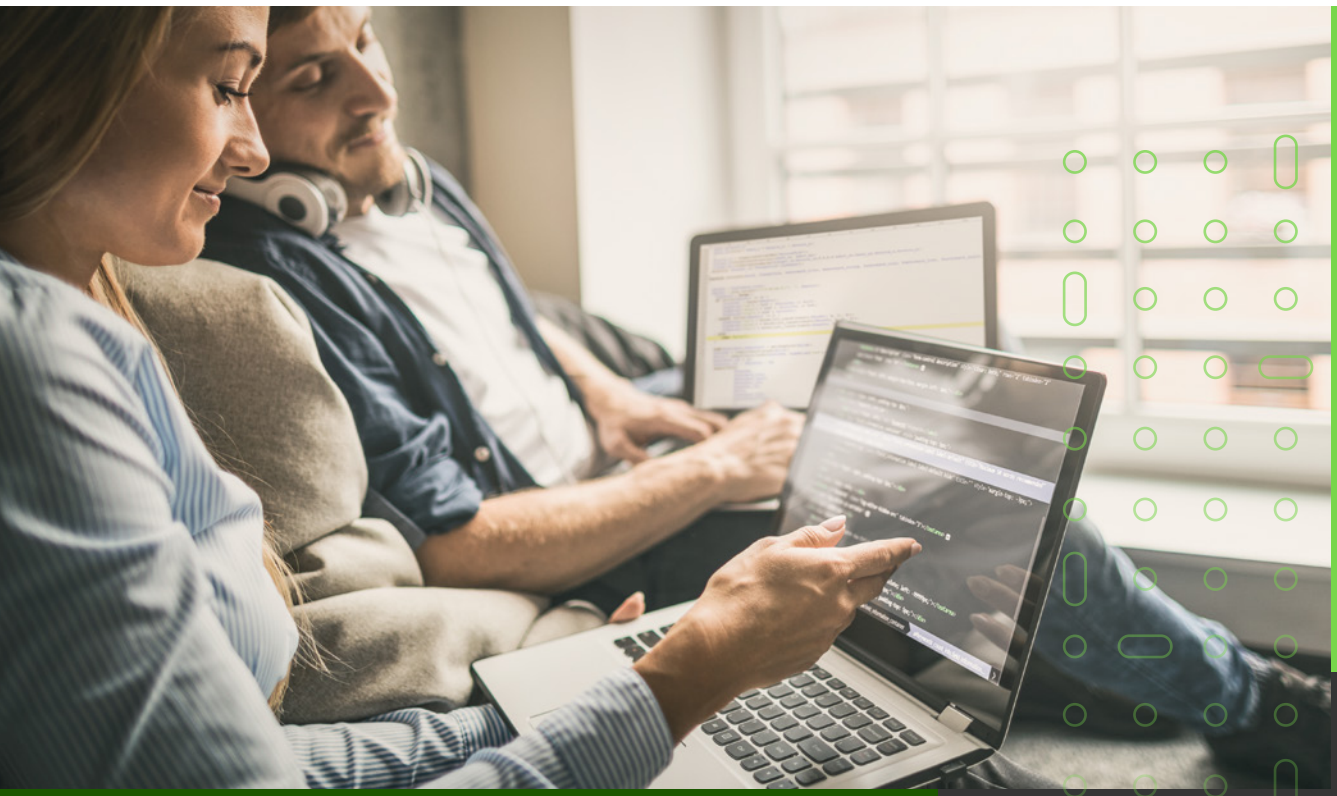
Hiring the Right Software Developers

Scoring's impact on inclusion, candidate strengths, and coding language preferences in software developer hiring.



SHL.

Introduction

Recent headlines about layoffs across the world's largest tech companies might cause one to think that the demand for technical talent is slowing, but in fact demand for technical talent remains high.[1] After all, organizations across industries need to have the right technical talent to maintain their competitive position. The number of open positions for developers in major markets continue to outpace developer availability. In the US, the Bureau of Labor Statistics anticipates that the number of open roles for software engineers will grow 25% from 2021 to 2031. The shortage of developers has been estimated at 500k in Europe, and job placement rates are high in India at 93.5%.[2]

1 2023, The Tech Jobs Report, CompTIA
2 2023, Hiring Technical Talent: Top 5 Global Trends in 2023, SHL

Given these conditions, and as organizations compete fiercely for the right developers and evaluate their internal talent pools, it is vital that hiring teams take a closer look at candidate experience. This starts with candidate-friendly, job-relevant, technical assessments that can predict performance in-role.

In this report, we reveal findings that answer the following questions:

1. How can selecting the right technical skills assessment for developers ensure fairness and drive inclusion?
2. Which programming languages are favored for use within selection assessments?
3. How has the popularity of programming languages changed over the last three years?
4. Do candidates score higher when using particular programming languages to complete assessments?
5. Which programming languages do candidates prefer when solving different types of challenges?

Key Findings

1. Automated scoring that reduces false negatives can improve hiring outcomes for developers, especially for those that identify as female.
2. The top five most popular languages are C, Python, C++, Java, and JavaScript.
3. Candidates score the highest when using C++ and the lowest when using JavaScript.
4. Candidate quality and programming ability has been consistent over the last three years.
5. Junior developers enter the workforce with strong command of Programming and Algorithms, but need on the job experience to improve in Optimization.
6. Candidates prefer different languages for solving different types of coding challenges.
7. Providing candidates access to a variety of coding languages will improve hiring outcomes.

Report Methodology

To investigate which programming languages candidates prefer, and whether certain types of challenges lend themselves to specific languages, we leveraged our real-world data gathered from SHL Technology Hiring's coding simulation. This report is based on **1.9 million responses from over 655,000 candidates** around the world who completed our coding simulations in the last three years.

1.9 million responses from over 655,000 candidates

The coding simulation tests candidates' ability to solve realistic coding challenges in a simulated development environment. It presents candidates two challenges from an **extensive library of over 1,500 items** spanning a range of programming domains including Programming and Algorithms, General Programming Problem Solving, Data Structures, Optimization, and more.

Insights and Takeaways

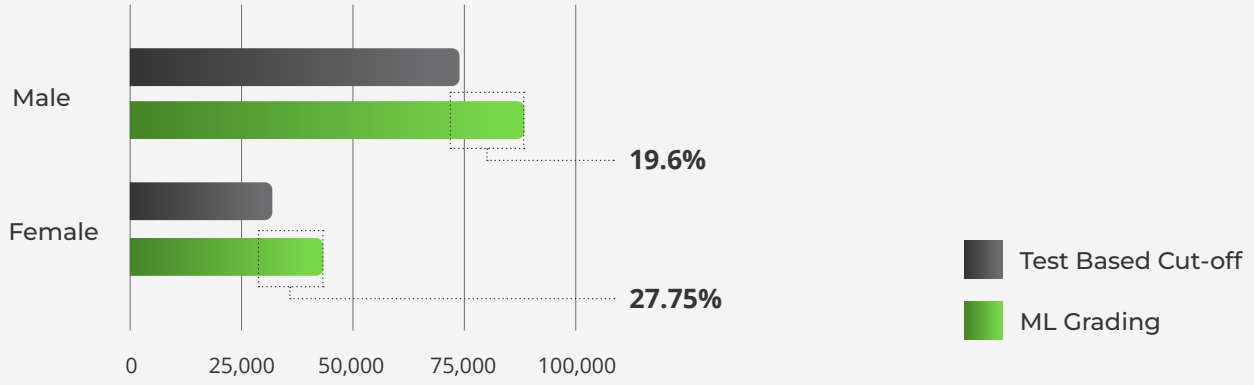
1. Inclusion in Technology Hiring

Technical assessments are often a first step in the process of hiring software engineers. Typical technical assessments are evaluated using test cases: the more a candidate passes, the better their chances are at getting through to the next stage. In these assessments, under time pressure a simple miss of a comma means the code will not compile, the 'pass' score is not reached, and a brilliant developer's chances of getting hired are jeopardized.

In SHL's coding simulations, we move beyond the rigid test cases approach and use machine learning based techniques to assess the developer's logic, programming skills, and problem solving abilities. By using this approach, we found that among 200k software developer candidates, 25% more candidates would qualify for the next round.[3]

Interestingly, employing this approach has a larger impact on self-identified females than males (Figure 1). There was a striking 27.75% jump in the number of females qualifying (i.e., clearing the cut-off score) for the role after we adopted our machine learning based grading in comparison to a 19.6% for males.

Figure 1. **The Impact of Machine Learning Based Grading on Clearing the Coding Simulation**



Total number of men appearing for test = 134,203 Total number of women appearing for test = 75,641

Top Tip

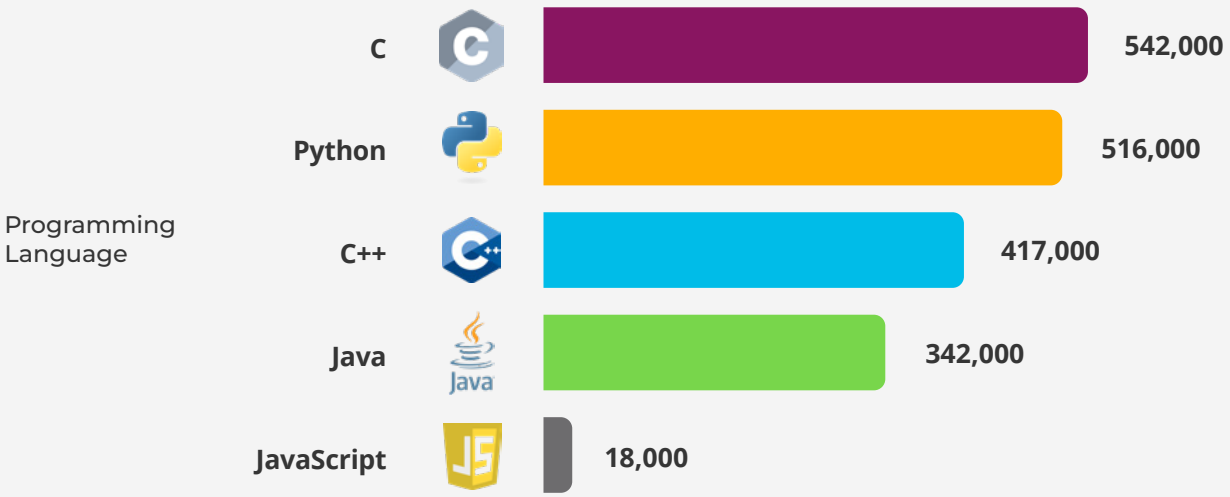
Don't miss out on brilliant candidates by eliminating them for minor code mistakes that might have been avoided in a less pressurized environment. By incorporating AI-assisted scoring of code with minor syntax errors into your technical hiring process, you can improve the diversity and quality of candidates being hired for technology roles.

3 2023, Using AI to Address Gender Diversity in Technology Teams, SHL

2. Programming Languages

Programming Languages by Popularity
To investigate the popularity of different programming languages, we compared the number of coding challenges completed in each language across all 655,000 candidates with each candidate being presented with two items on average. Figure 2 shows the top five programming languages.

Figure 2. **The Top Five Programming Languages**



Number of Test Sessions Completed by Programming Language (2020-2022)

Top Tip

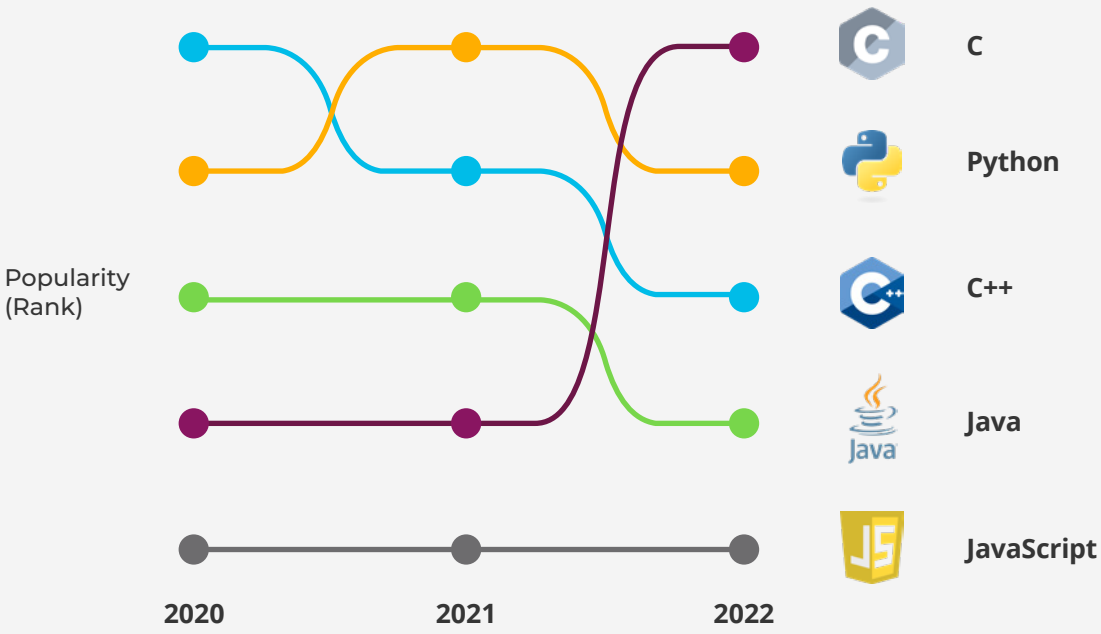
Knowing what programming languages are popular helps you select assessments that include the languages candidates prefer and use. This helps attract more candidates, ensures higher completion rates, and increases hiring funnel throughput.

Programming Language Popularity Over Time

In addition to looking at the overall popularity of programming languages, we explored the trajectory of the top five programming languages over the last three years and how this ranking has changed (Figure 3).

In 2022, we noticed a surge in the popularity of C. It increased in popularity from fourth to first place. Python remains a steady favorite for candidates (consistently hovering at first or second place), and JavaScript remains the fifth most popular language. Our findings mirror those found by the TIOBE index, one of the most established sources for programming language popularity rankings.[4] The current TIOBE ranking places Python, C, C++, and Java as the top four most popular languages.

Figure 3. **The Top Five Programming Languages** (2020-2022)



Top Tip

To encourage more candidates to complete the assessments, monitor the popularity of programming languages to ensure your assessments are up to date and include the languages candidates prefer.

4 2023. TIOBE Index for March 2023. TIOBE

Performance by Programming Language and Time
We examined the relationship between programming language preference and performance (Figure 4).

Candidates who use C++ tend to score the highest on the coding challenges, although interestingly, C++ has decreased in popularity over the last two years. The fifth most popular programming language, JavaScript, is the language candidates score the lowest on among the top five languages.

Figure 4. **The Programming Languages Candidates Score the Highest On**

Did You Know?

Hiring teams may experience peaks and troughs in candidate quality, though our data suggests that candidates' average ability has remained stable.

Additionally, when we tracked the candidates' average score over time, we found that candidate programming ability has remained stable over the last three years.

3. Early Career Developers

The Skills of Early Career Developers

Early career candidates taking the technical assessments produced solutions for programming challenges from a variety of topics chosen by hiring companies. These topics fall into four major skill categories: Programming and Algorithms, General Programming Problem Solving, Data Structures, and Optimization (Table 1).

Table 1. **Description of the Four Major Skill Categories Assess**

Programming and Algorithms
Items assessing concepts such as basic and advanced algorithms, dynamic programming, and searching and sorting.

General Programming Problem Solving
Items assessing concepts such as feature scaling, effective communication, logical ability, and regularization.

Data Structures
Items assessing concepts such as linked lists, trees, and arrays.

Optimization
Item assessing different optimization algorithms such as local search methods, exact algorithms, and heuristic algorithms.

To highlight the types of skills employers search for, we classified the 1.9 million responses in our sample into one of these four main domains. From this we can see Programming and Algorithms is a primary focus for recruiters (65%). In second place with a sharp drop in popularity were items focusing on Data Structures (22%), and the least assessed items were General Programming and Problem Solving (7%), followed by Optimization (6%) (Figure 5).

Figure 5. **Distribution of Items Administered from Each Skill** (2020-2022)

Top Tip

Programming and Algorithms are included in 65% of technical assessments used. The skills being assessed and the distribution of the questions reflect the skillset needed by entry level developers. Knowing what other companies assess in early careers developers can help you refine your job descriptions, hiring process, selected assessments, and the skillsets you prioritize when making hiring decisions.

A Stack Ranking of Junior Developers' Strengths
To investigate the relative strengths and development areas of early careers developers, we analyzed candidate scores over the four key skills domains. Our results showed that junior developers perform best on Programming and Algorithms and are likely to need more support in Optimization (Figure 6).

Figure 6. **Junior Developers Average Score Ranking by Skill**

Top Tip

Early career developers can expect to come across challenges involving Programming and Algorithms or General Problem Solving in their day-to-day roles, so this is where organizations should focus their assessment efforts. Being able to offer assessments relevant to the role and experience level is more engaging for candidates and gives them the opportunity to shine. Equally, knowing where junior developers need support (e.g., Optimization programming challenges) enables you to build a structured development plan to retain those hired.

Programming Language Choice by Skill
Investigating programming language popularity among early careers developers further, we explored what languages candidates prefer when tackling challenges from each of our four skills domains (Figure 7). Candidates preferred using C++ for all challenges aside from Programming and Algorithms, where C is the language of choice.

Figure 7. **The Top Three Preferred Programming Languages for Different Skills**

	Programming and Algorithms	General Programming Problem Solving	Data Structures	Optimization
1st	C	C++	C++	C++
2nd	Python	Python	C	Python
3rd	C++	C	Python	C

Top Tip

As a minimum, make these top three coding languages available to candidates in your assessments. You may also benefit from hiring candidates that can flexibly interchange between different programming languages. Prioritize and support the learning of other languages as part of early career developers' development.

Conclusion

Software-driven businesses continue to face persistent talent shortages and hiring teams must adopt more inclusive approaches in their assessment and selection processes. It is encouraging to see that the quality of talent has remained consistent over the past few years, however, identifying the right software engineering talent and reducing false negatives remains a challenge. To overcome this, using more inclusive automated scoring methods can help retain more candidates in the hiring process and can significantly improve outcomes for all candidates, especially females.

Understanding today's candidates holistically and taking note of their strengths and programming language preferences is vital for the hiring process and beyond. Teams are more likely to find the right developers if candidates are given assessments that are job-relevant, and are given the flexibility to select coding languages they are most comfortable with. When hiring early career software developers, teams should consider what skills they are willing to train and develop as developers embark on their career with them and upskill.

Teams should assess for more than job readiness, but also for potential to succeed on the job. It is essential for recruiting strategies to move beyond qualifications and resumes or traditional coding assessments that eliminate talent with potential from the funnel. Using the latest technologies provides rich insights that help teams make the best hiring decisions.

SHL's Technology Hiring Solution delivers a fast, fair, and accurate technical evaluation process. It uses the power of artificial intelligence to score solutions that are not compilable due to forgivable errors. By identifying additional candidates, you can improve throughput by at least 25% and improve outcomes for 27% of female candidates. Leading organizations across technology, banking, automobile, and education and more rely on us to identify the right software engineers to move their businesses forward.

Assess and hire the right software developers

Learn more about SHL's Technology Hiring Solution at **shl.com/tech-hiring.**

SHL brings powerful and transparent AI technology, data science, and objectivity to help companies attract, develop, and grow the workforce they need to succeed in the digital era.

We empower talent strategies to unlock the full potential of your greatest asset—people.

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