

## **Do Python Developers Earn More Than JavaScript and Java Developers?**

**By: Timothy Myers, Harden Gage, and Anthony Stribling**

### **Executive Summary**

In this research paper, we looked at whether developers who mainly use Python earn different salaries than developers who mainly use JavaScript and or Java. We used the Stack Overflow Annual Developer Survey 2025 dataset, which includes information about annual salary, years of coding experience, and which languages people work with (Stack Overflow, 2025). We grouped developers into four experience levels (1–5 years, 6–10 years, 11–20 years, and 21–30 years) and compared salaries across languages within each group. We found that at lower experience levels (1–10 years), salaries for Python and JavaScript developers are very similar and the differences are not statistically significant. However, at higher experience levels (11–20 and 21–30 years), Python developers earn more on average than JavaScript developers, and these differences are statistically significant based on independent samples t-tests. Overall, Python developers in this dataset earn around 7% more than JavaScript developers on average. These results suggest that companies may need to budget more for senior Python roles, that Python training can be especially valuable for data and backend teams, and that aspiring developers who enjoy data or automation may see stronger long-run payoffs from focusing on Python, while JavaScript and Java remain strong paths for front-end and traditional software development careers.

### **Introduction**

Tech companies need to know how much to pay their developers to stay competitive. If companies underpay developers in a certain language, they might lose them to other firms.

Python, JavaScript, and Java are three of the most popular programming languages in modern software development, and they appear regularly among the top languages in large developer surveys (Stack Overflow, 2025). Python is often used in data science, automation, and backend work, especially in areas like analytics and machine learning (Mah, 2020). JavaScript is the main language of front-end web development and many interactive web applications (Built In, 2025). Java is widely used in enterprise software, Android development, and large backend systems. Because these languages are used in different types of roles, it is reasonable to ask if the people who mainly use them are paid differently.

Prior work has shown that language choice matters in education. For example, McMaster, Sambasivam, Rague, and Wolthuis (2017) compared Java and Python by examining how introductory textbooks cover basic programming concepts, and found that the two languages emphasize different aspects of programming. Their study suggests that the language chosen can shape how people first experience programming. Our project takes a related idea into the job market by asking whether language choice is also linked to differences in pay between working developers.

Our main research question is: ***Do developers who primarily use Python earn significantly different salaries than those who primarily use JavaScript and or Java?*** To answer this, we use the Stack Overflow Annual Developer Survey 2025 as our data source to create experience groups, summarize the data, visualize the patterns, and run t-tests to see if the salary differences are statistically significant (Stack Overflow, 2025).

## Data and Methods

The dataset used in this project comes from the **Stack Overflow Annual Developer Survey 2025** (Stack Overflow, 2025). The raw file contains 49,123 responses and 170 variables,

with each row representing one developer. For our analysis, the key variables are annual salary (ConvertedCompYearly), years of coding experience (YearsCode), and the list of programming languages used (LanguageHaveWorkedWith).

We first restricted the data to respondents who match our target population. We kept only developers located in the United States, who reported being employed, with annual salaries between \$30,000 and \$500,000 and between 1 and 30 years of professional coding experience. We also removed observations with missing salary values and then kept only the variables needed for our analysis.

Next, we focused on the languages of interest by filtering respondents who reported using Python, JavaScript, or Java. To make the comparison clearer, we formed one group of Python-focused developers and a combined JavaScript/Java group by excluding rows where Python appeared together with JavaScript and or Java. We then created four experience bands based on YearsCode: 1–5, 6–10, 11–20, and 21–30 years. For each language group and experience band, we computed descriptive statistics such as the number of developers, mean salary, and median salary, and used these to build tables and visualizations that compare salary patterns across groups.

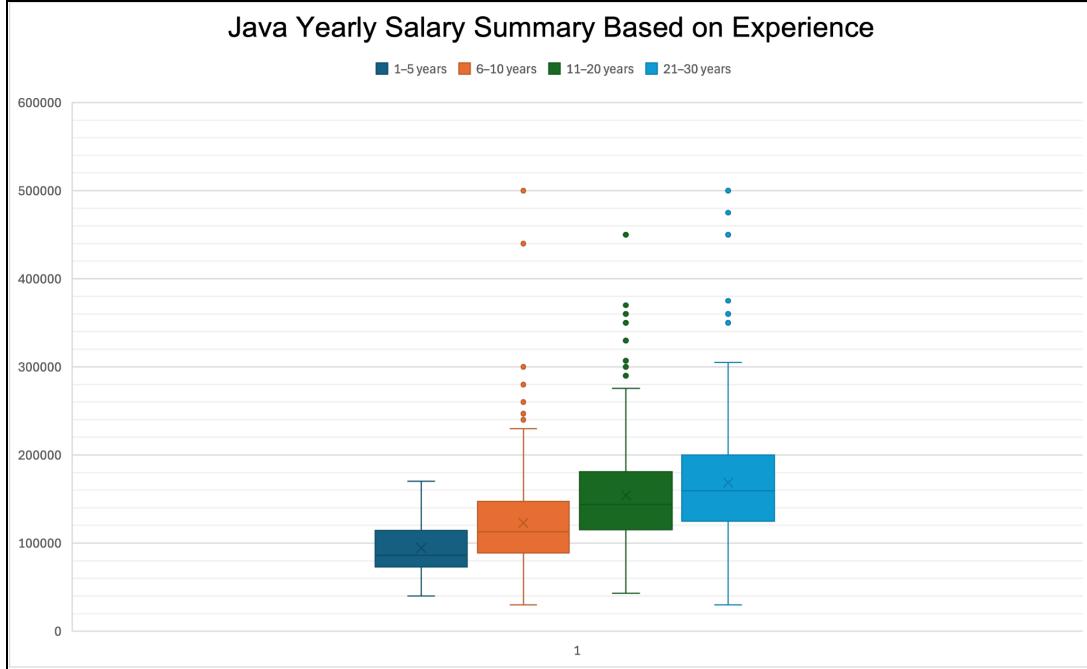
Finally, to check whether the salary differences between Python and JavaScript/Java developers were statistically significant, we ran independent samples t-tests assuming unequal variances (Welch's t-tests) within each experience band. In each case, we compared Python salaries to JavaScript/Java salaries using a significance level of  $\alpha = 0.05$  and used the resulting p-values to decide whether the observed differences in mean salary were statistically meaningful.

## Results and Discussion

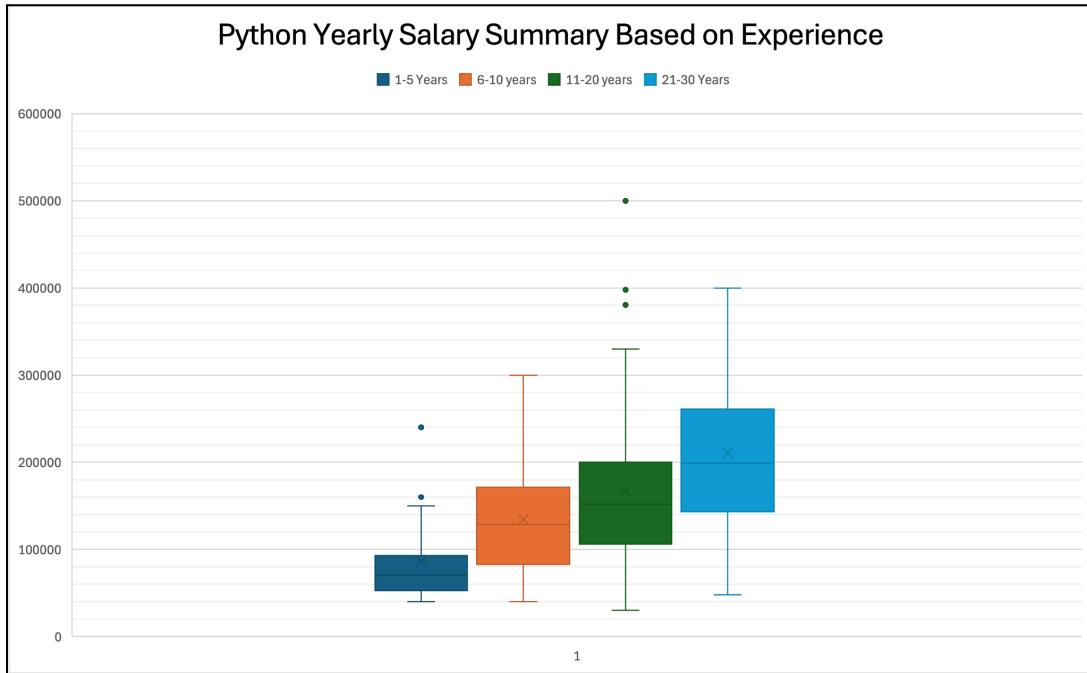
ExperienceGroup	N Python	N JS/Java	Mean Python	Mean JS/Java	MeanDiff (J - Py)	%Diff J vs Py
1–5 yrs	40	42	108746.125	94552.19048	-14193.93452	-13.0523589%
6–10 yrs	143	191	126272.3357	122581.5864	-3690.749277	-2.9228487%
11–20 yrs	243	442	169421.5638	154082.5633	-15339.00044	-9.0537474%
21–30 yrs	132	323	202895.9697	168408.7895	-34487.18022	-16.9974693%

**Table 1. Comparison Summary**

From **Table 1**, we see that salaries rise with experience for both language groups. For 1–5 years of experience, Python developers earn about \$109,000 on average, while JavaScript/Java developers earn about \$95,000. For 6–10 years, Python is around \$126,000, and JavaScript/Java is around \$123,000. For 11–20 years, Python developers earn about \$169,000, compared to \$154,000 for JavaScript. For 21–30 years, Python is roughly \$203,000, and JavaScript is about \$168,000.



**Figure 1.**



**Figure 2.**

In **Figure 1** and **Figure 2**, the boxes for Python and JavaScript/Java overlap a lot at lower experience levels, but for 11–20 and 21–30 years, the Python boxes are clearly higher on the

salary axis. This suggests that the gap between the languages becomes larger later in a career. Overall, the descriptive results suggest that Python developers tend to earn a bit more than JavaScript/Java developers, and the difference is especially large for very experienced developers.

ExperienceGroup	T Stat Welch	P Value Two Tailed
1–5 yrs	1.295546455	0.200303288
6–10 yrs	0.526885971	0.598676378
11–20 yrs	2.481988005	0.013498141
21–30 yrs	4.138285331	5.08553E-05

**Table 2. T-test Results**

In **Table 2**, summarizing the t-test results; for the 1–5 year group, the difference between Python and JavaScript/Java salaries is about \$14,000, with JavaScript/Java lower, but the p-value is about 0.20, which is larger than 0.05. This means we do not have enough evidence to say the salaries are truly different for this group. For the 6–10 year group, the salary difference is small (around \$3,700), and the p-value is about 0.60, again much larger than 0.05. So salaries for Python and JavaScript/Java developers with 6–10 years of experience are also not significantly different. Things change in the higher experience bands. For 11–20 years, Python developers earn about \$15,000 more on average (around 9% higher), and the p-value is about 0.0135, which is below 0.05. This means the salary difference is statistically significant. For 21–30 years, the gap is even larger: Python developers earn about \$34,000 more on average (about 17% higher),

and the p-value is extremely small (around 0.000051). This is strong evidence that senior Python developers earn more than senior JavaScript/Java developers in this dataset.

When we ignore experience and do an **overall t-test**, Python developers earn about \$161,900 on average, while JavaScript developers earn about \$150,200. The difference is about \$11,700, and the p-value is around 0.0047, which is also significant. So overall, Python developers **earn more** than JavaScript/Java developers in this sample.

From a business point of view, this means language choice seems to matter more as developers gain experience. For junior roles, the market treats Python and JavaScript similarly. For mid-level and especially senior roles, Python skills appear to be connected with higher pay. This fits with the idea that Python is heavily used in areas like data science and machine learning, which may bring more direct business value and therefore higher salaries (Mah, 2020). Education research that compares languages like Java and Python (McMaster et al., 2017) shows that language choice matters in the classroom; our results show that language choice can also be linked to different salary outcomes later in a developer's career. Although our statistical tests focus on Python versus JavaScript, Java remains an important comparison language and part of the broader picture of high-demand programming skills in the labor market.

### **Limitations, Conclusion, and Managerial Implications**

There are several limitations to keep in mind when assessing these findings. First, the data are self-reported, so some salary or experience values might be inaccurate. In addition to that, the respondents come from one survey, so the sample might not represent all Python, JavaScript, and Java developers in the world (Stack Overflow, 2025). We also do not control for important factors like location, company size, industry, or job title. For example, a Python data scientist in a large city might earn much more than a JavaScript/Java developer in a small town,

and this would affect our results. Finally, the dataset is a snapshot in time, so results could change if the job market shifts. Within these limits, our results show that developers who primarily use Python and developers who primarily use JavaScript/Java do not have clearly different salaries at lower experience levels (1–10 years). However, for more experienced developers (11–30 years), Python developers in this dataset earn significantly higher salaries than JavaScript/Java developers. Overall, Python developers earn about 7% more on average, and in the broader context of popular languages like JavaScript and Java, this suggests that Python is especially valuable in advanced, specialized roles (Mah, 2020; Stack Overflow, 2025). Based on this dataset, companies that want to build strong data, analytics, and backend teams should seriously consider investing in Python training for their developers. Python developers in the 11–20 and 21–30 year experience groups earn more on average than JavaScript/Java developers, and these differences are statistically significant. This suggests that Python skills are especially valuable in more advanced roles. However, that does not mean JavaScript or Java are unimportant. JavaScript/Java is still essential for front-end and many full-stack web applications, and Java is central in many enterprise and Android environments (Built In, 2025). A reasonable strategy is to keep JavaScript and Java training for web-focused and traditional software teams, but put extra training budget into Python for roles related to data science, automation, and backend work, where the salary premium appears strongest in this dataset (Mah, 2020).

For businesses, our results suggest that programming language skills should be treated as a strategic part of compensation planning. At lower experience levels, companies can reasonably offer similar salary ranges to Python, JavaScript, and Java developers, because pay differences are small and not clearly significant in our data. However, as developers gain more experience, Python roles in areas like data analytics, automation, and advanced back end work appear to

receive higher pay. This means firms that rely on data driven projects should expect to invest more in recruiting, training, and retaining experienced Python developers if they want to stay competitive (Mah, 2020).

Looking ahead, both firms and employees can use these patterns to guide their decisions. Employers may want to build clearer career paths and training programs around high value Python roles, while still supporting JavaScript and Java for front end and traditional software needs. Developers who choose to build skills in languages and roles that support critical business functions, such as data and decision making, may have stronger salary growth and bargaining power over time. Companies that pay attention to these trends and adjust their talent strategies accordingly are more likely to attract the people they need and avoid falling behind in a market where skilled developers always have other options (Stack Overflow, 2025).

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