Do Python Developers Earn More Than JavaScript and Java Developers?

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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 today. Python is often used in data science, automation, and backend work. JavaScript is the main language of front-end web development and many web applications. 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.

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.

Data and Methods

The dataset used in this project comes from the **Stack Overflow Annual Developer Survey 2025** (Stack Overflow, 2025). The raw CSV file contains 49,123 individual responses and 170 columns, with each row representing one developer. It includes many types of information, such as a unique response ID, how the person works, education level, and other background questions. For this project, the most important variables needed for our analysis are the respondent's annual salary (ConvertedCompYearly), years of coding experience (YearsCode), and the list of programming languages they have worked with (LanguageHaveWorkedWith). At this raw stage, the file has not been filtered or cleaned, so it still includes missing values, extreme salary values, and people from many different countries.

To clean this dataset, we first used Google Colab, since it allowed us to work with a large CSV file quickly and efficiently. After importing the raw survey file into Colab as a CSV, we

filtered the data to include only respondents from the United States by using the Country column. Next, we removed all rows that had missing values in the ConvertedCompYearly column so that our later analysis would not be affected by unknown salaries. We then filtered the sample to include only respondents who reported being employed, using the Employment column, because our research question focuses on developers who are currently working and earning a salary. To account for extreme outliers, we kept only respondents with annual salaries between $30,000 and $500,000 and with between 1 and 30 years of professional coding experience. We did this because very small or very large values for salary or experience can pull the averages in unrealistic ways and lead us away from an accurate conclusion. Finally, we dropped all columns that were not needed for our analysis, leaving only LanguageHaveWorkedWith, ConvertedCompYearly, YearsCode, and ResponseId. This made the dataset easier to work with in the next step, where we moved our analysis into Microsoft Excel.

After exporting this cleaned dataset as *survey_USA_cleaned.csv*, we imported the file into Microsoft Excel to finish the data wrangling. We first filtered the respondents to keep only those who reported using **Python, JavaScript, or Java** in the LanguageHaveWorkedWith column. We used Conditional Formatting as well as the Sort & Filter tools and simple "contains" searches to find and remove rows that did not involve any of these languages. Next, we needed to separate developers into clear language groups for comparison. Because many respondents reported using multiple languages (for example both Python and JavaScript, or Python and Java), and our goal was to compare Python to other major languages, we focused on building groups where we could tell which language was primary. For our final analysis, we created distinct groups of Python-focused developers and a combined JavaScript/Java group by removing rows where Python appeared together with JavaScript and or Java. We refer to this combined group as

"JavaScript/Java" in our tables and figures. To analyze the data in Excel, we used a combination of formulas, charts, and built-in statistical tools to create experience groups by adding a new column and using nested IF statements to place each respondent into one of four bands: 1–5 years, 6–10 years, 11–20 years, or 21–30 years of coding experience. Then, for each language and experience group, we calculated descriptive statistics using functions such as AVERAGEIF (to find mean salary by group) and MEDIAN combined with conditional logic (to estimate median salary by group). We summarized these results in a small descriptive table that showed the number of developers, mean salary, and median salary for each experience band and language.

We then used these grouped salary columns to create box-and-whisker plots by selecting the relevant ranges and inserting a Box and Whisker chart in Excel, which allowed us to visually compare the salary distributions of Python and JavaScript/Java developers across experience groups. Finally, to test whether the differences in average salaries between the two languages were statistically significant, we used Excel's Data Analysis ToolPak and ran "t-Test: Two-Sample Assuming Unequal Variances" (Welch's t-test) for each experience group. For each test, we selected the Python salary range as Variable 1, the JavaScript/Java salary range as Variable 2, set the hypothesized mean difference to 0, and used $\alpha = 0.05$. The output gave us the mean of each group, the t-statistic, and the p-value, which we used to decide whether the salary differences between Python and JavaScript developers were statistically significant in each experience band.

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.
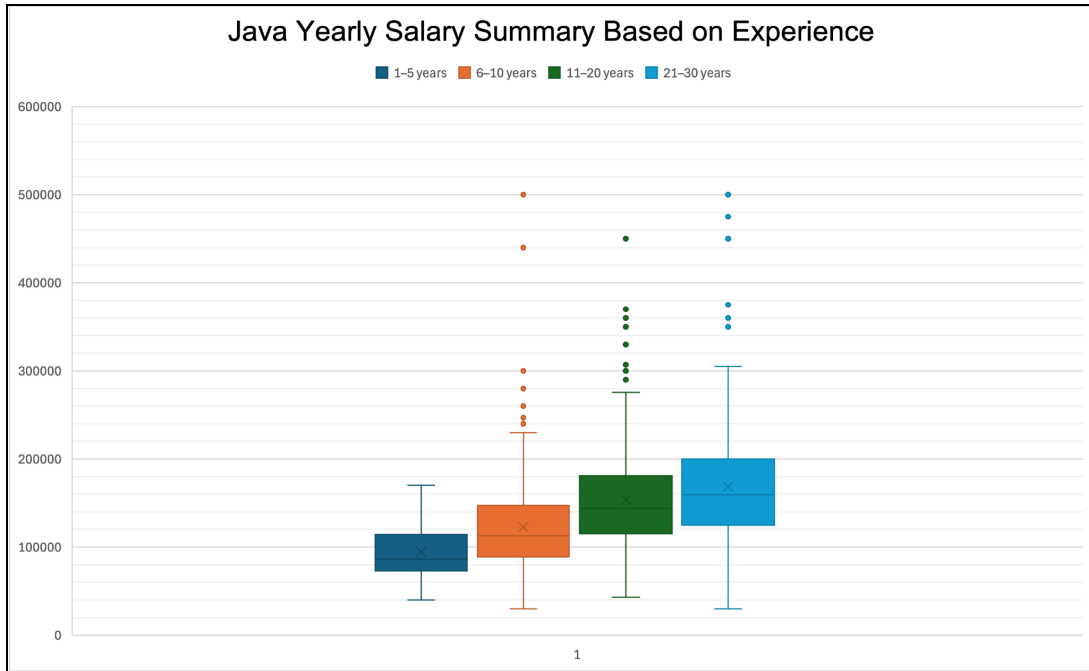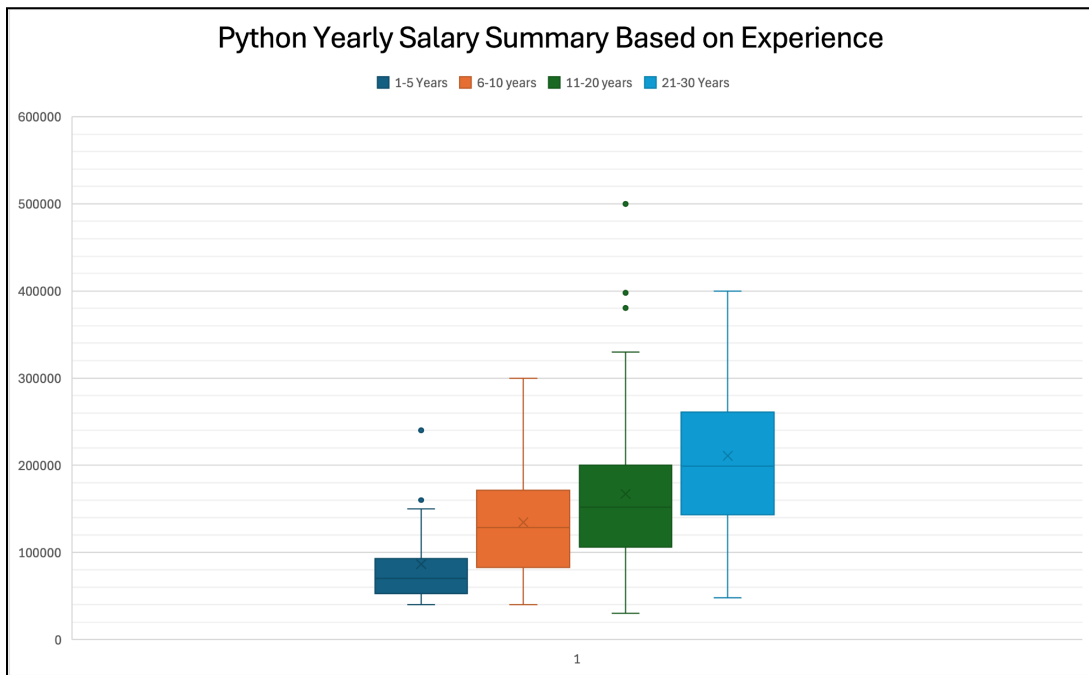
Figure 1.

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. 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. 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. 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. 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.

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.

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.

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