Stack Overflow Developer Survey 2024

Survey-Driven Analytics on Tech Adoption & Career Directions

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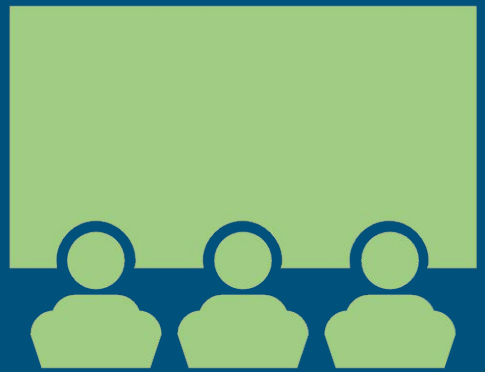
OUTLINE



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EXECUTIVE SUMMARY

Focus: This project analyzes the Stack Overflow 2024 Developer Survey to explore current technology usage, future trends, and developer demographics. Through a series of visualizations, we examined which programming languages, databases, platforms, and frameworks are most commonly used today—and which ones developers aspire to use in the future.

Findings: Though overall, there were no significant shifts across most technology categories, we did notice some changes that are worth highlighting:

- *Programming Languages* JavaScript and SQL continue to dominate both current and future preferences. TypeScript is gaining momentum, moving into third place for future interest, replacing HTML/CSS.
- *Databases* PostgreSQL remains the leading choice. Redis shows growing interest for future use, overtaking SQLite and MySQL.
- *Platforms* Cloud services such as Amazon AWS and Microsoft Azure maintain strong presence across both present and future usage.
- *Web Frameworks* This category saw the most noticeable shifts. jQuery dropped out of the top 10 for future preference, while Node.js and React continue to lead.

Demographic analysis reveals a high concentration of responses from the U.S., and age-education distributions reflect expected trends, with higher education levels clustered around the 25–44 age range.

Conclusion: The survey data points to an overall steady technology environment, with developers continuing to favor familiar and reliable tools. While innovation is happening, it's incremental rather than disruptive—suggesting a gradual evolution in developer preferences and industry trends.

INTRODUCTION

Purpose

- This project aims to analyze the Stack Overflow 2024 Developer Survey to understand developer preferences in current and future technologies. It focuses on trends across programming languages, databases, platforms, frameworks, and developer demographics.

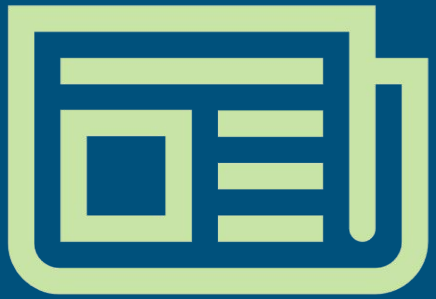
Target Audience

- This analysis is intended for stakeholders in the tech industry, including technology leaders, hiring managers, educators, and aspiring developers seeking insights into current trends and future directions in the developer ecosystem.

Value

- By identifying which tools developers use today—and which they want to use tomorrow—this report helps organizations make informed decisions about:
    - What skills to prioritize in hiring and training
    - Which technologies are gaining or losing popularity
    - How developer demographics may influence future technology needs

METHODOLOGY



Data Collection Data was gathered from three primary sources:
- *Job Listings via Job API* Programmatically collected real-world job postings to understand market demand for various technologies.
- *Stack Overflow 2024 Developer Survey* Provided insights into developer preferences, tool usage, and demographic data.
- *Web-Scraped Salary Data* Collected annual average salaries for programming languages through web scraping public sources.

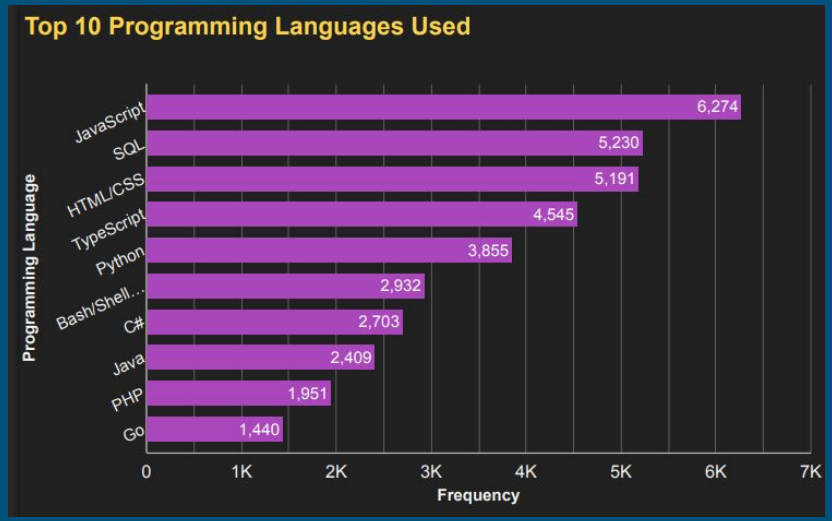
Data Wrangling
- Applied various data cleaning and transformation techniques to prepare the dataset.
- Parsed and exploded multi-select survey fields (e.g., technologies separated by semicolons) for accurate analysis.
- Standardized inconsistent values across datasets (e.g., education levels, country names).
- Removed duplicates and filtered outliers (e.g., abnormally high salary figures).

Exploratory Data Analysis
- Conducted a deep dive into the datasets to understand distributions, identify outliers, and detect patterns.
- Explored correlations between variables such as age, education, salary, and technology preferences.
- Grouped and segmented data to identify meaningful trends across developer demographics.

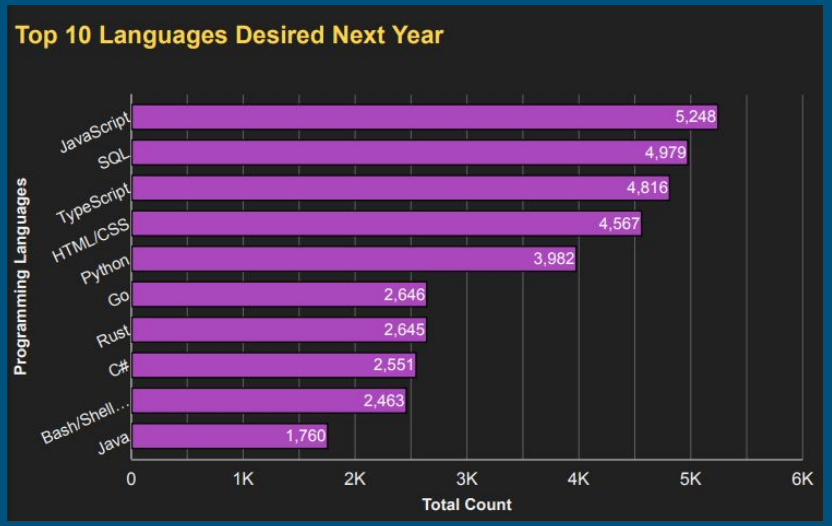
Visualization
- Built interactive, data-driven dashboards using Google Looker Studio.
- Created clear and insightful visualizations (bar charts, scatter plots, bubble charts, and stacked bars) to highlight:
  - Current and future technology preferences
  - Demographic breakdowns
  - Salary and experience distributions

PROGRAMMING LANGUAGE TRENDS

Current Year



Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

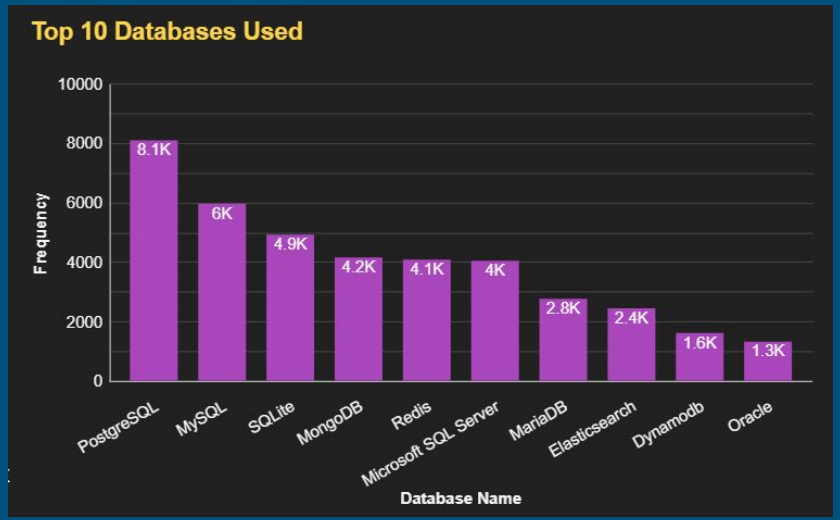
1. JavaScript and SQL continue to dominate both current usage and future interest, remaining the top programming languages among developers.
2. TypeScript has surpassed HTML/CSS in developer interest for future usage, reflecting a growing preference for typed and scalable JavaScript alternatives.
3. Go and Rust show significant growth: rising from 10th and 14th in current usage to 6th and 7th in anticipated future use, respectively.
4. Python remains consistently strong, holding its position at 5th in both current and future rankings.

Implications

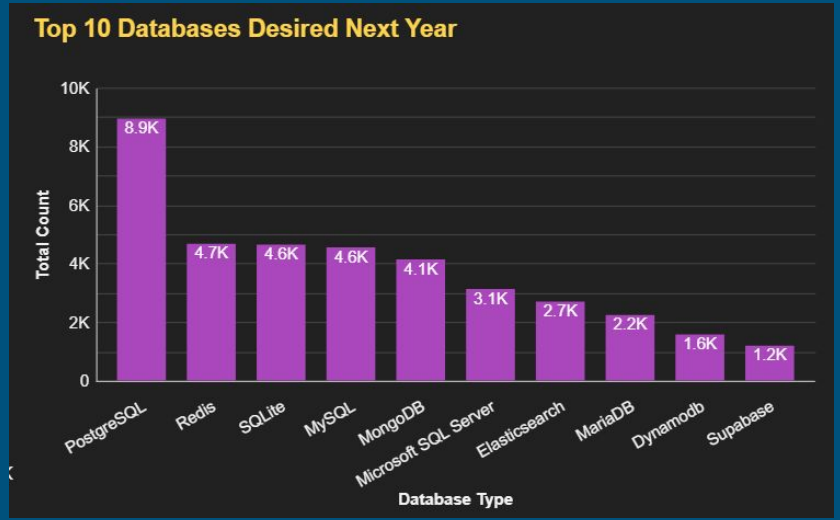
1. The continued dominance of JavaScript and SQL reinforces their essential role in web development and data management. Their wide applicability across domains ensures they remain core skills for developers.
2. The rise of TypeScript indicates increasing demand for scalable and maintainable codebases. Its growing popularity—recognized by platforms like GitHub—suggests it may soon become a new standard in front-end and full-stack development.
3. The upward trajectory of Go and Rust points to a shift toward more performance-oriented and efficient system-level programming.
    a. Go excels in concurrent networking tasks and API development, offering simplicity and speed for distributed systems.
    b. Rust provides unparalleled memory safety and control, ideal for performance-critical systems.
    c. Together, they offer complementary strengths—signaling a trend toward hybrid adoption in modern system architecture.

DATABASE TRENDS

Current Year



Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- PostgreSQL continues to dominate both current usage and future interest, holding the top spot among developers.
- Redis appears to have surpassed MySQL in future interest, but only by a narrow margin of 32 responses, indicating that their usage remains closely competitive.
- Oracle is currently in 10th place but is projected to drop to 15th based on future interest. While this suggests a potential decline, it may also reflect the rising popularity of lighter, more developer-friendly alternatives such as PostgreSQL, Redis, and cloud-native NoSQL solutions.

Implications

- PostgreSQL's continued dominance highlights its reliability, feature richness, and broad adoption in both enterprise and open-source environments.
- The minimal margin between Redis and MySQL suggests that developers are split between speed-focused and traditional relational databases, with no clear disruption to the established players.
- While our survey data alone doesn't definitively prove a long-term decline for Oracle, we found similar signals in industry commentary and supplementary surveys — e.g., developers increasingly favor PostgreSQL and Redis, and Oracle customers report concern over support, upgrade costs, and maintaining legacy versions.

DASHBOARD

My dashboard can be found on my Github as a pdf file. Please follow the link. The file contains dashboards on the following:

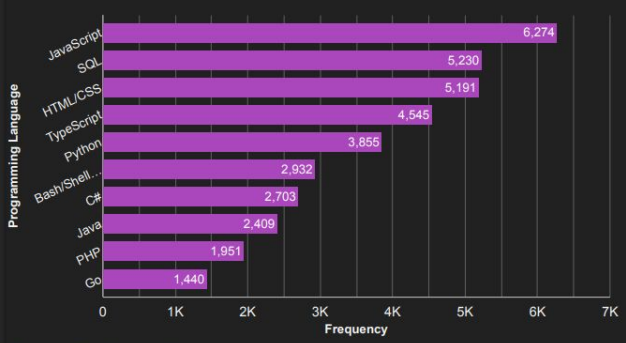
- Current Technology Usage
- Future Technology Trends
- Demographic data

Note: This github also contains all the lab works completed throughout the course.

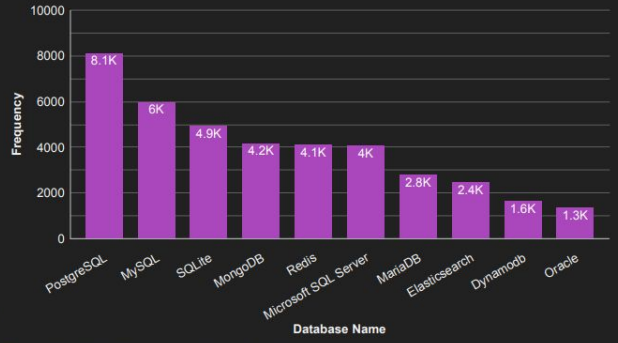
DASHBOARD TAB 1

Current Technology Usage

Top 10 Programming Languages Used

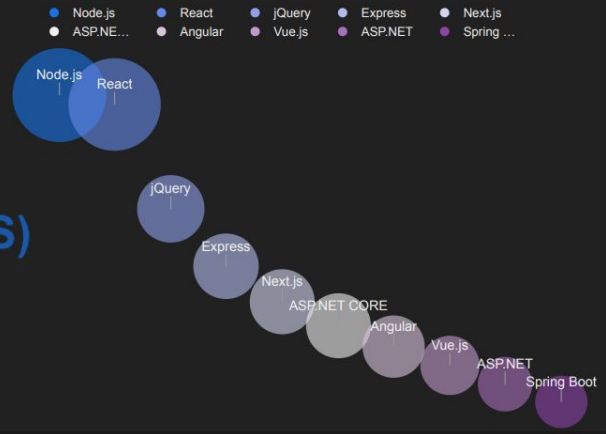


Top 10 Databases Used

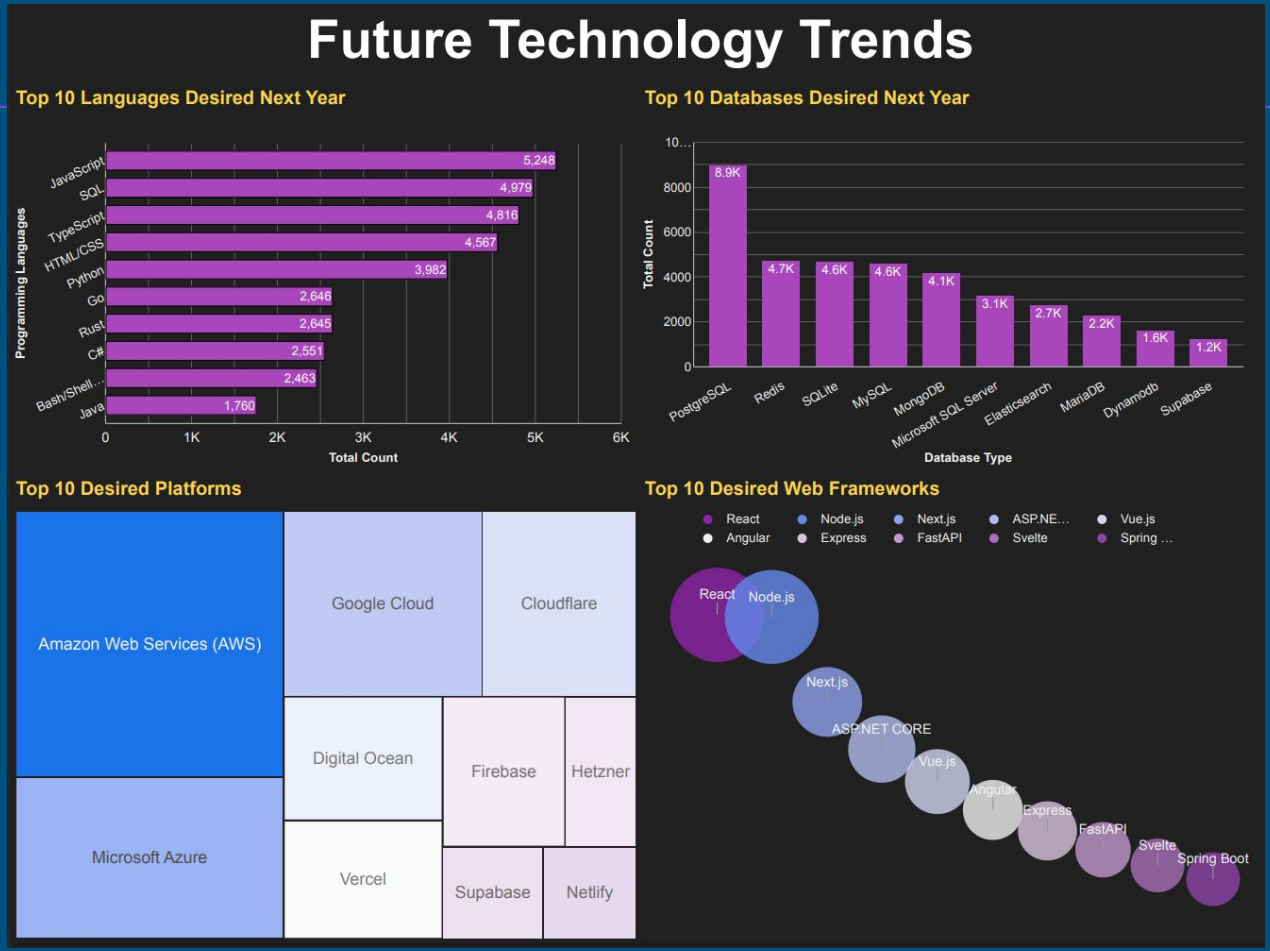


Top 10 Platforms Used

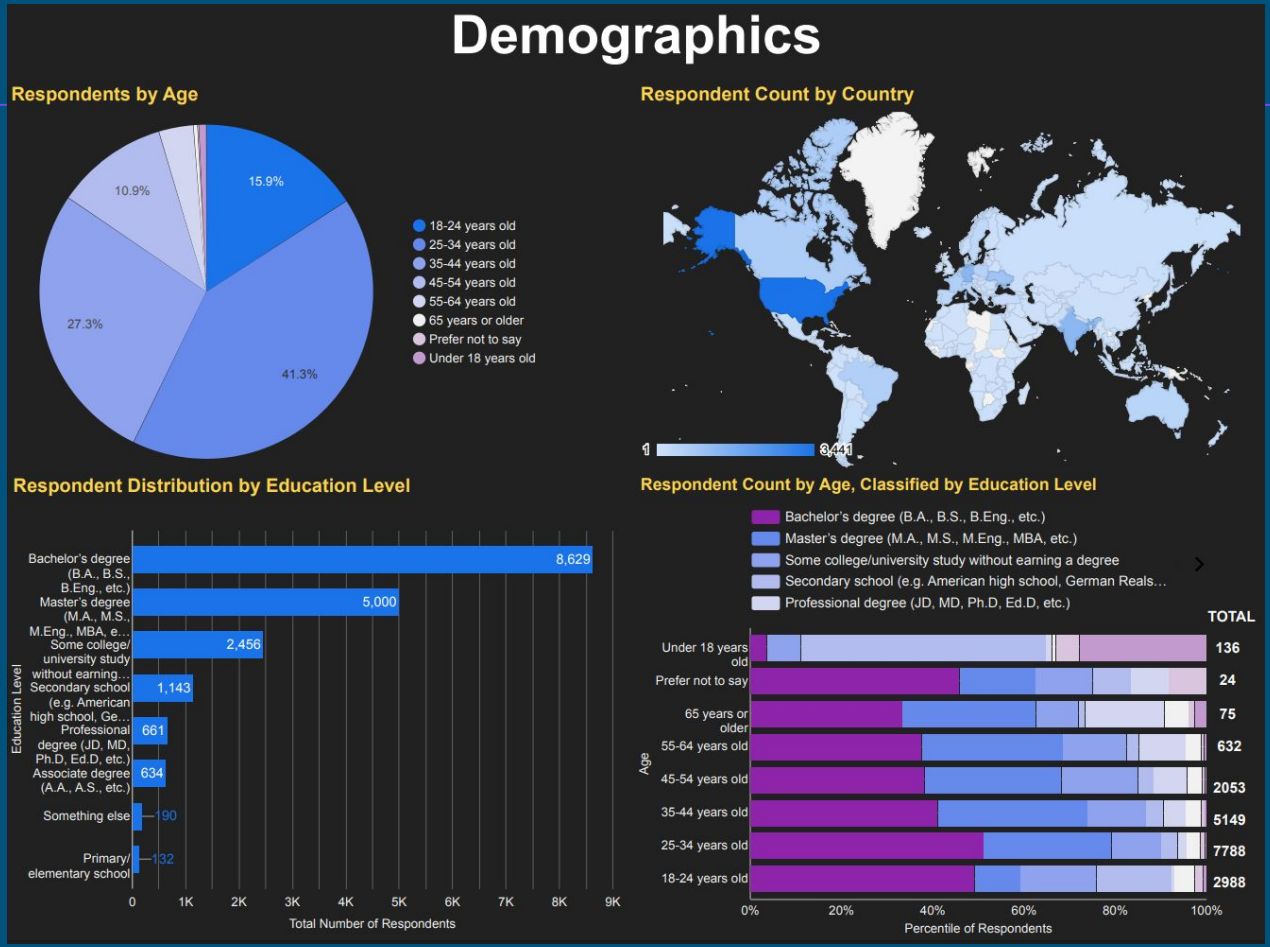
Top 10 Web Frameworks Used



DASHBOARD TAB 2



DASHBOARD TAB 3



DISCUSSION

1. Will the rise of AI change how companies hire developers?
    - As AI tools become more integrated into development workflows, will companies prioritize AI-augmented skill sets or reduce hiring for certain roles entirely?
2. Why isn't overall job satisfaction increasing with more experience?
    - Is it due to burnout, stagnation in learning, lack of upward mobility, or changes in workplace culture?
3. Why does such a large pay gap persist between developers in different countries, even when performing the same roles?
    - Are these gaps justified by cost of living, or do they reflect deeper issues in global tech equity and outsourcing?
4. How reliable is the data in capturing developer trends globally?
    - Given the high concentration of respondents from certain regions (like the U.S.), can we really generalize these results as global developer sentiment?
5. Does the data truly reflect the future of technology, or just the preferences of today's developers?
    - Are we seeing actual trends shaping the industry, or just what developers "hope" or "aspire" to use in the near term?

OVERALL FINDINGS & IMPLICATIONS

Findings

- There are no significant disruptions or paradigm shifts in the technological landscape between current and anticipated future trends. The most used technologies today are also the most desired in the near future.
- The United States had the highest number of survey respondents, followed by Germany and India, with only a 23-vote difference between them; therefore, positioning both as the second-highest.
- The largest age demographic was between 18 to 34 years old, comprising approximately 57.1% of all participants. The remaining 42.9% spanned other age groups, including under 18 and over 65.
- A majority of participants reported holding at least a Bachelor's degree, indicating a high level of formal education within the developer community.

Implications

- The lack of significant change between current and future technologies may point to two possible interpretations:
  - A "calm before the storm", where a disruptive technological breakthrough may soon alter the landscape.
  - A plateau year, where most developers are adequately satisfied with current tools and not actively seeking alternatives.
  - Alternatively, attention may be shifting toward emerging domains not captured in this survey, such as AI, blockchain, or FinTech technologies.
- With the USA and India consistently leading in technological development and innovation, their dominant participation aligns with expectations. However, this may also reflect survey biases or limitations (e.g., length or accessibility), which could discourage time-constrained professionals from participating, which can potentially skew results away from real-world enterprise insights.
- The largest responding age groups (18–24 & 25–34) suggest strong future potential for the industry. The presence of both early-career developers and seasoned professionals reinforces the observed shift in language preferences. With rising interest in Go and Rust hinting at a future where these languages could rival or replace Python in enterprise environments.
- The high proportion of respondents with at least a Bachelor's degree reflects a formally trained workforce. This level of education can drive not only adoption of new technologies but also more structured and scalable implementations, which fosters sustained innovation and growth in the tech sector.

CONCLUSION

- Technology usage remains stable, with JavaScript, SQL, and Python maintaining their dominance, while newer languages like Go and Rust gain traction for future development.
- Database trends reflect a shift toward modern, open-source tools, with PostgreSQL leading and Oracle showing signs of decline in developer preference.
- Demographic analysis shows strong participation from the 18–34 age group, signaling a vibrant, young developer base likely to influence future trends.
- Despite minimal disruption this year, the industry remains poised for change, whether through emerging technologies like AI or shifts in global developer focus.

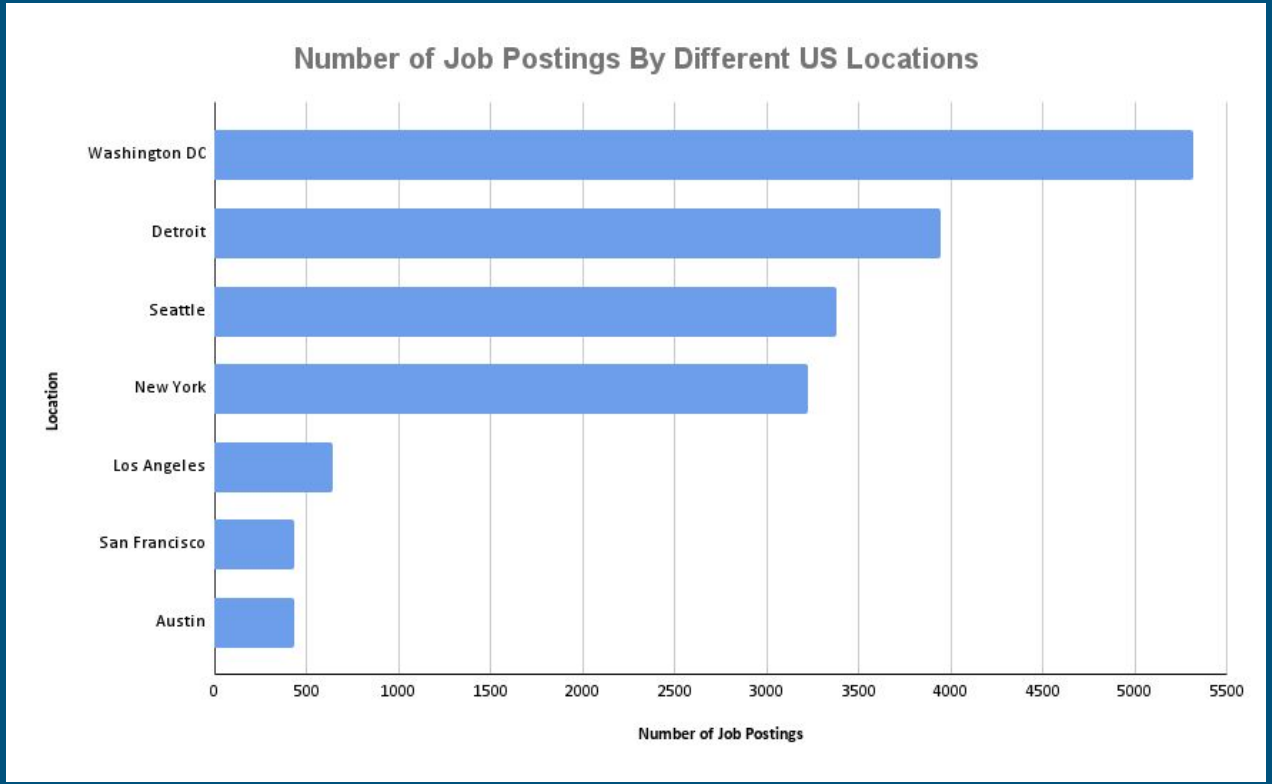
APPENDIX

	Programming Language (Current Technology)	Frequency
3.	HTML/CSS	5,191
4.	TypeScript	4,545
5.	Python	3,855
6.	Bash/Shell (all shells)	2,932
7.	C#	2,703
8.	Java	2,409
9.	PHP	1,951
10.	Go	1,440
11.	PowerShell	1,428
12.	C++	1,239
13.	C	1,109
14.	Rust	975

	Database Type (Future Trends)	Total Count
9.	Dynamodb	1583
10.	Supabase	1199
11.	Firebase Realtime Database	978
12.	BigQuery	936
13.	Cloud Firestore	882
14.	Cosmos DB	864
15.	Oracle	821
16.	Cassandra	820

	Country	Record Count
1.	United States of America	3,441
2.	Germany	1,339
3.	India	1,316
4.	United Kingdom of Great Britain and Northern...	1,053
5.	Ukraine	931
6.	Canada	661
7.	France	598
8.	Brazil	587
9.	Poland	494
10.	Netherlands	480

JOB POSTINGS



POPULAR LANGUAGES