IBM DATA ANALYST CAPSTONE PROJECT

EMERGING PROGRAMMING SKILLS: TRENDS AND INSIGHTS FOR 2019

SHUNKAI XIAO

5/18/2024

OUTLINE

- Executive Summary
- Introduction
- Methodology
- Results
  - Visualization – Charts
  - Dashboard
- Discussion
  - Findings & Implications
- Conclusion
- Appendix

EXECUTIVE SUMMARY

- This report analyzes data from the Stack Overflow Developer Survey 2019 to identify key trends in the tech industry.
- **Programming Languages:** JavaScript and HTML/CSS are the most popular, with growing interest in learning them.
- **Platforms:** Windows remains dominant, but Linux and Docker are gaining traction.
- **Databases:** MySQL leads but may face declining popularity in favor of alternatives like PostgreSQL and MongoDB.
- **Demographics:** The majority of programmers are male, based in the US, and hold at least a bachelor's degree.

INTRODUCTION

The tech industry is rapidly evolving, making it essential to understand current and emerging trends in programming languages, platforms, and developer demographics. This report uses data from the Stack Overflow Developer Survey 2019 to provide insights that can guide education, hiring, and organizational strategies.

Problem Statement

Identifying popular technologies and demographic trends among developers is crucial for staying competitive. This information helps shape educational programs, hiring practices, and future tech adaptations.

Research Questions

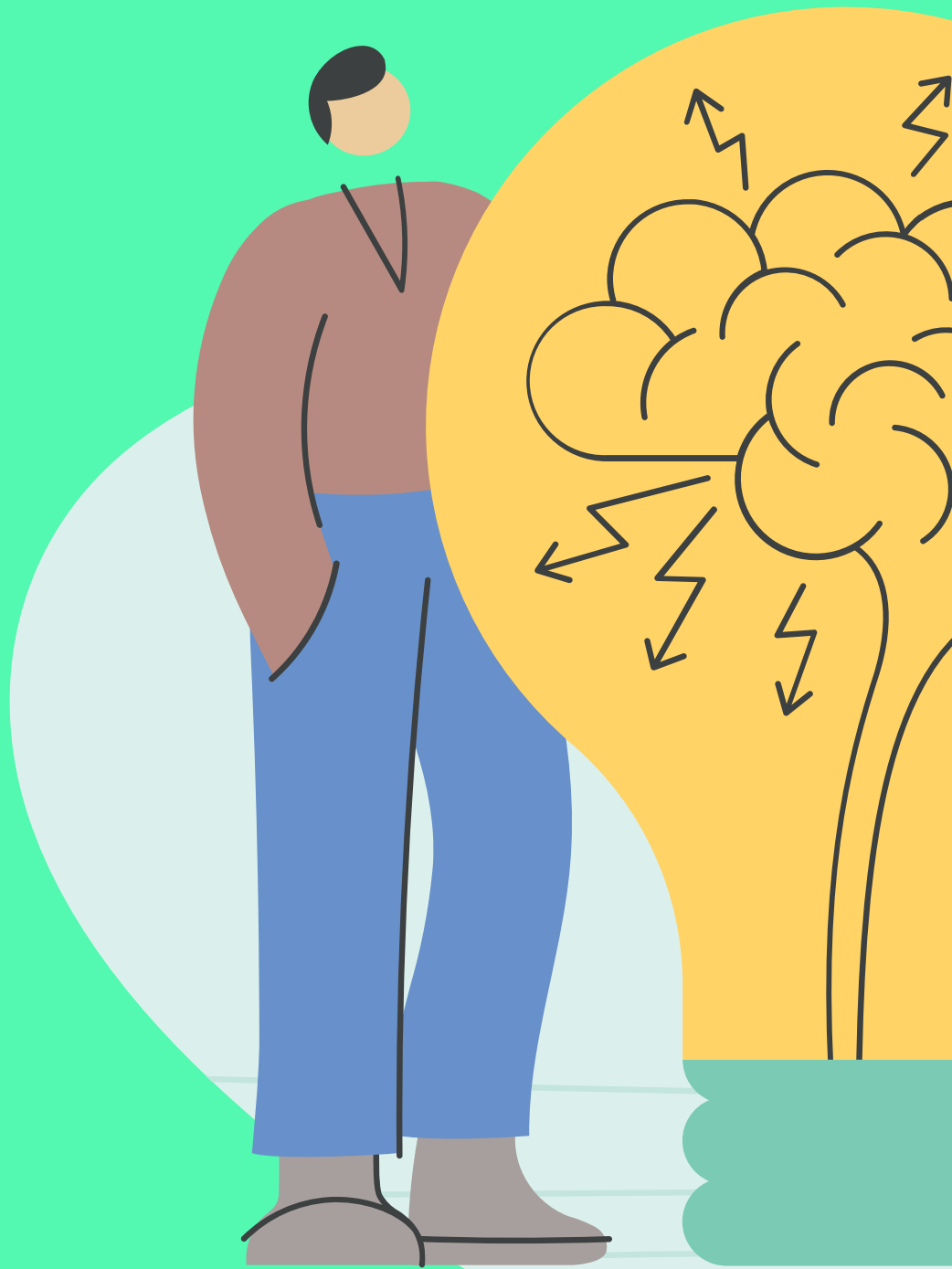
- What are the current most popular programming languages and platforms?
- How are these preferences changing?
- What are the demographic characteristics of the tech workforce?

METHODOLOGY

- Data Source: Stack Overflow Developer Survey 2019.
- Data Cleaning: Utilized Python for data cleaning, including removing duplicates, filling in missing data, and standardizing formatting.
- Data Visualization: Employed Matplotlib and Seaborn libraries to create visualizations.
- Dashboard Creation: Developed dashboards using IBM Cognos Analytics.

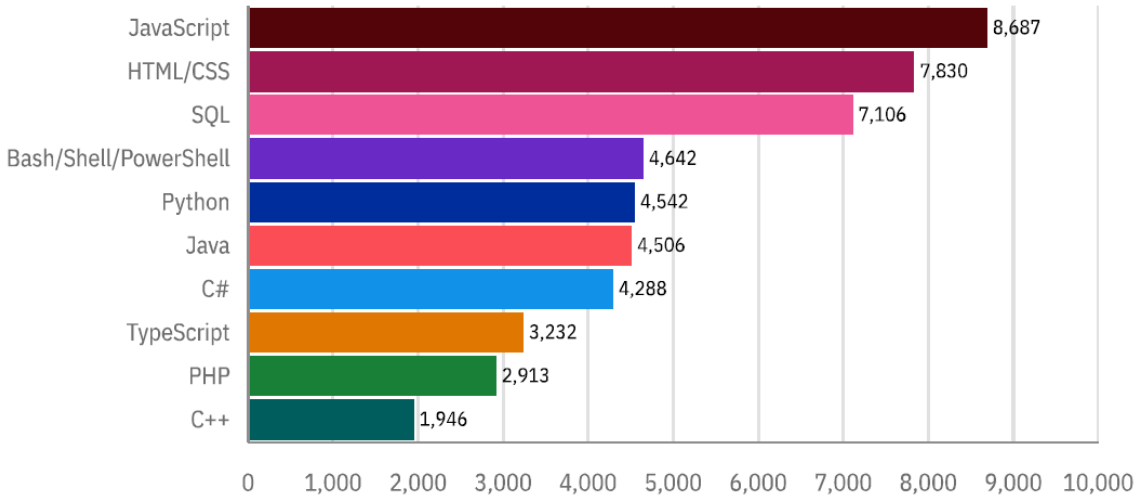
RESULT

Visualization – Charts & Dashboard

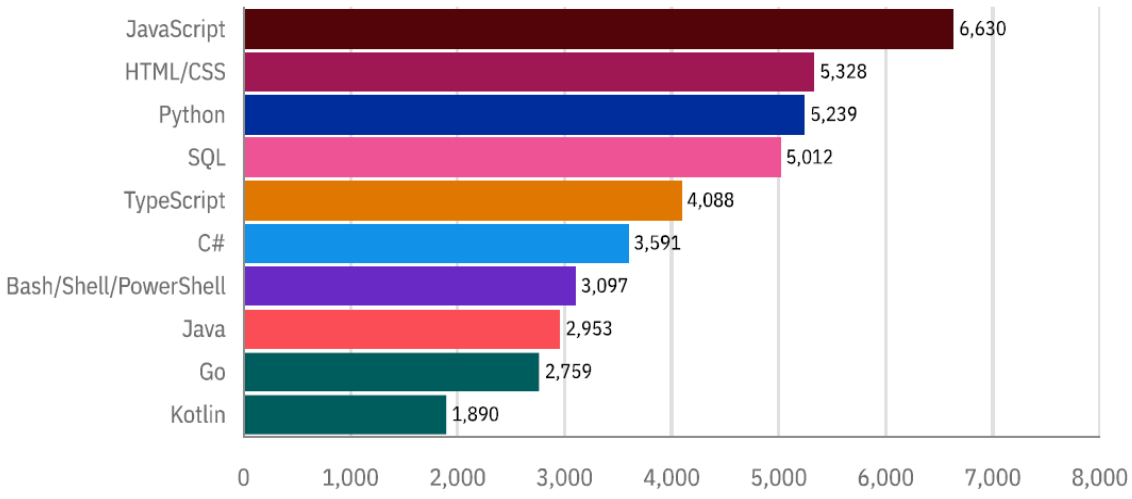


PROGRAMMING LANGUAGE TRENDS

Current Year
top 10 programming languages



Next Year
top 10 programming languages



- JavaScript is the most widely used programming language among respondents this year.
- HTML/CSS and SQL follow closely behind.
- Python, Java, and Bash/Shell/PowerShell are also popular choices.
- C# and PHP have moderate usage.
- TypeScript and C++ complete the top 10.

- JavaScript remains at the top for next year's desired language.
- Python shows significant interest, moving up in ranking.
- TypeScript gains popularity, surpassing PHP and C#.
- Java drops below Bash/Shell/PowerShell.
- Kotlin appears as a new entry.

PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

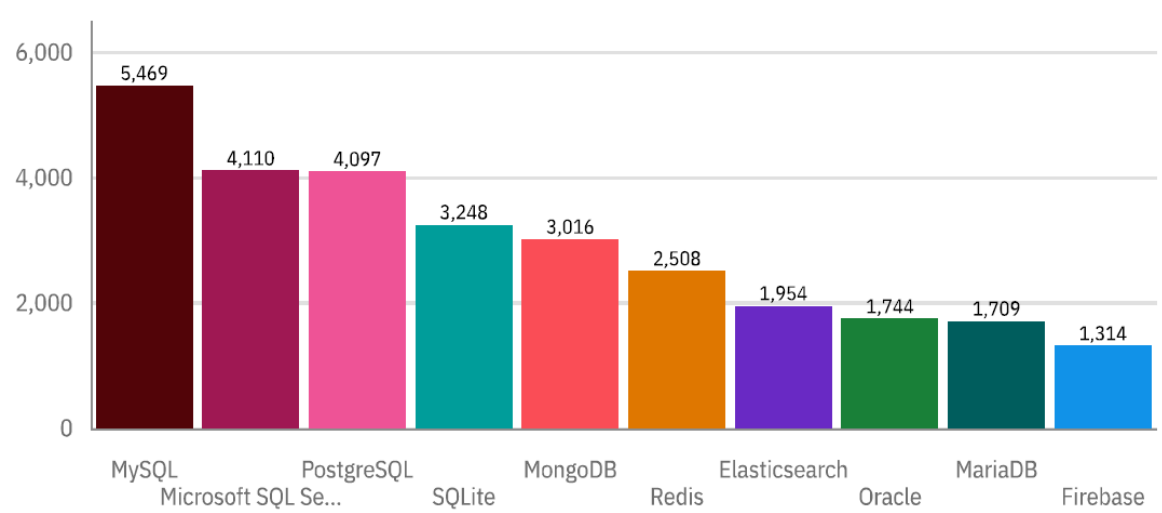
- JavaScript continues to be the most popular language.
- Python's rising interest suggests its versatility and relevance.
- TypeScript gains traction, possibly due to type safety.
- Java's decline may indicate a shift to other languages.

Implications

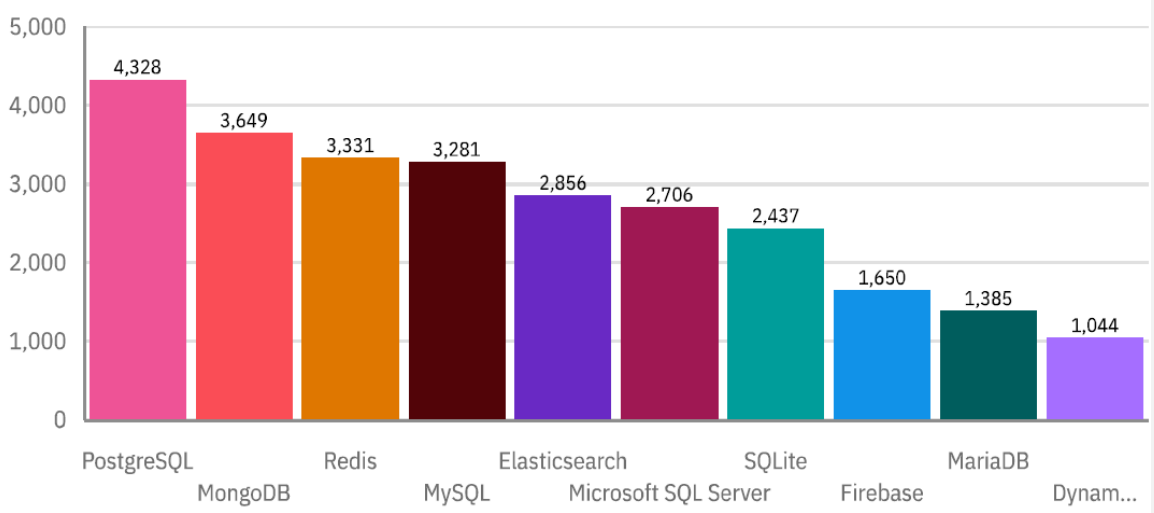
- Invest in JavaScript due to sustained popularity.
- Consider Python for data science and machine learning.
- Explore TypeScript for web development.
- Monitor Java's decline and adapt accordingly.

DATABASE TRENDS

Current Year
top 10 databases work with



Next Year
top 10 desired databases for next year



- MySQL is the most widely used database this year, with 5,649 respondents.
- Microsoft SQL Server follows closely with 4,120 users.
- PostgreSQL ranks third at 3,418 users.
- MongoDB, Oracle, and Elasticsearch are also popular choices.
- Redis and MariaDB complete the top 10.

- PostgreSQL is the most desired database for next year, with 4,328 respondents expressing interest.
- MongoDB follows closely with 3,831 respondents.
- Redis and Elasticsearch are also highly desired.
- MySQL and Microsoft SQL Server maintain relevance.
- Oracle, Firebase, Neo4j, and MariaDB complete the list.

PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

- PostgreSQL shows strong interest for next year.
- MongoDB remains popular.
- Redis and Elasticsearch gain traction.
- MySQL and Microsoft SQL Server maintain their positions.

Implications

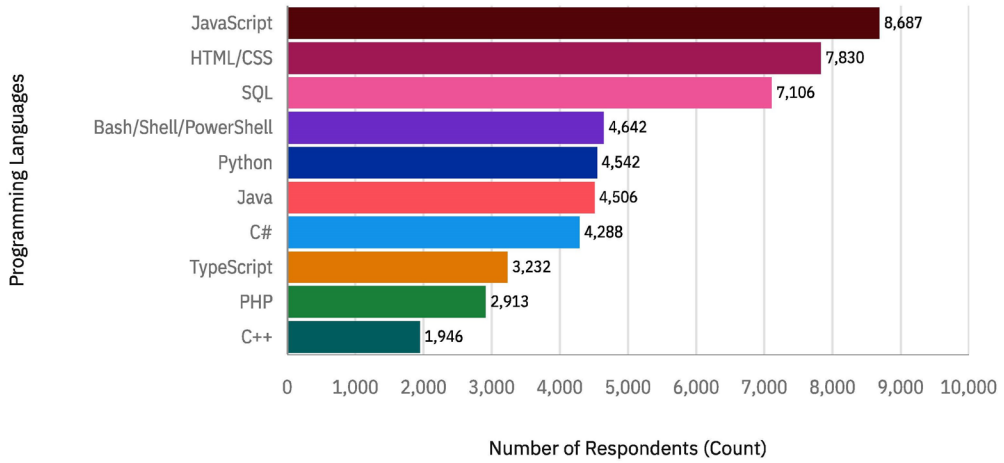
- Invest in PostgreSQL skills due to its projected demand.
- Consider MongoDB for its continued relevance.
- Explore Redis and Elasticsearch for emerging trends.
- Monitor changes in MySQL and Microsoft SQL Server usage.

DASHBOARD

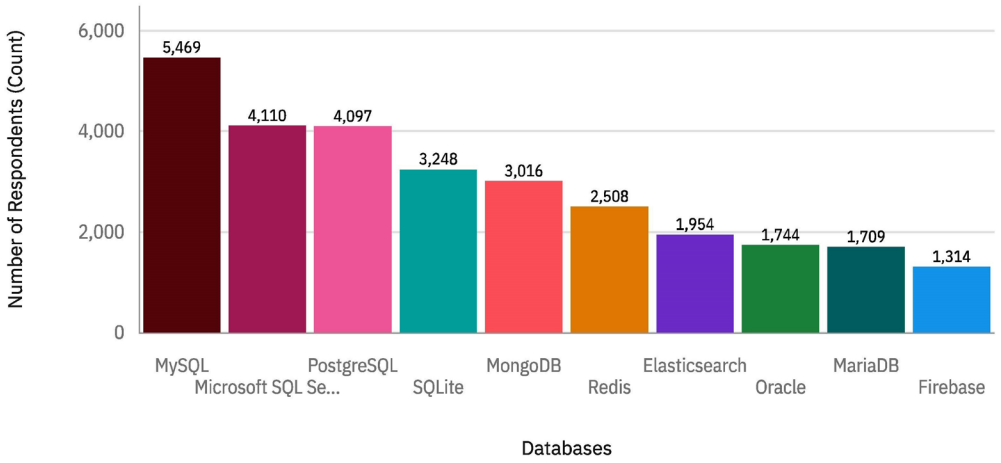
You could click here to interactive and online version of dashboard

DASHBOARD TAB 1
CURRENT TECHNOLOGY USAGE

Top 10 Programming Languages Worked With

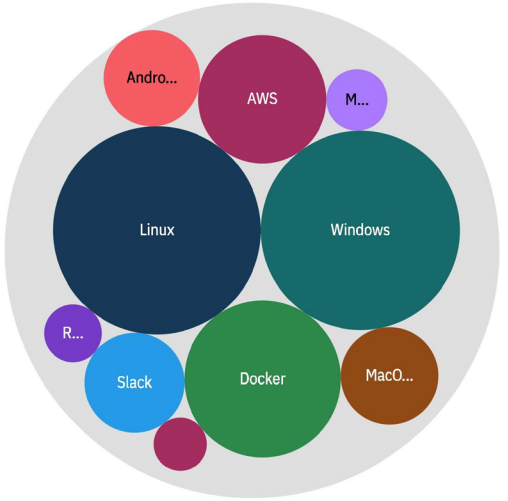


Top 10 Databases Worked With



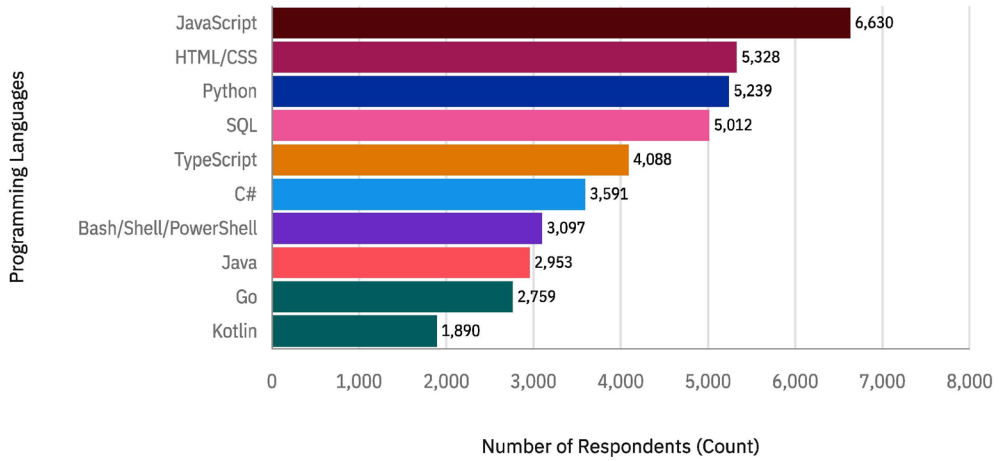
Platforms Worked With

Top 10 Web Frameworks Worked With

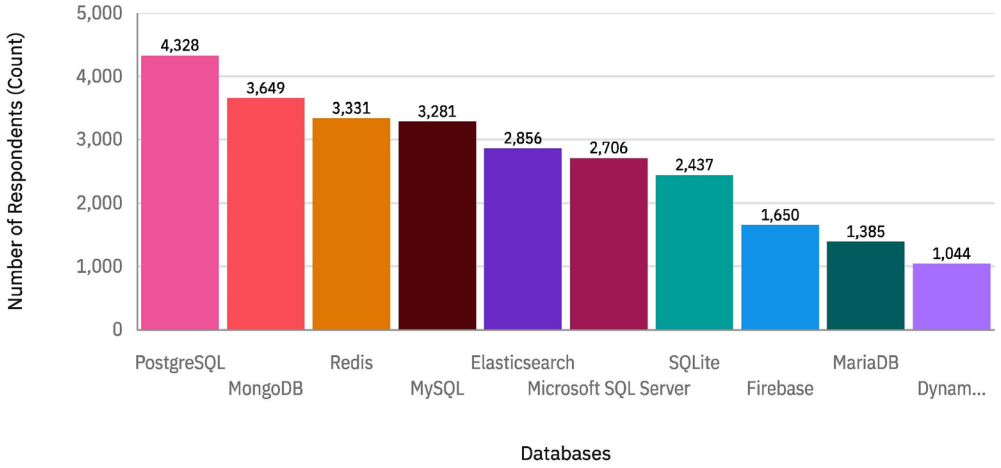


DASHBOARD TAB 2
FUTURE TECHNOLOGY TREND

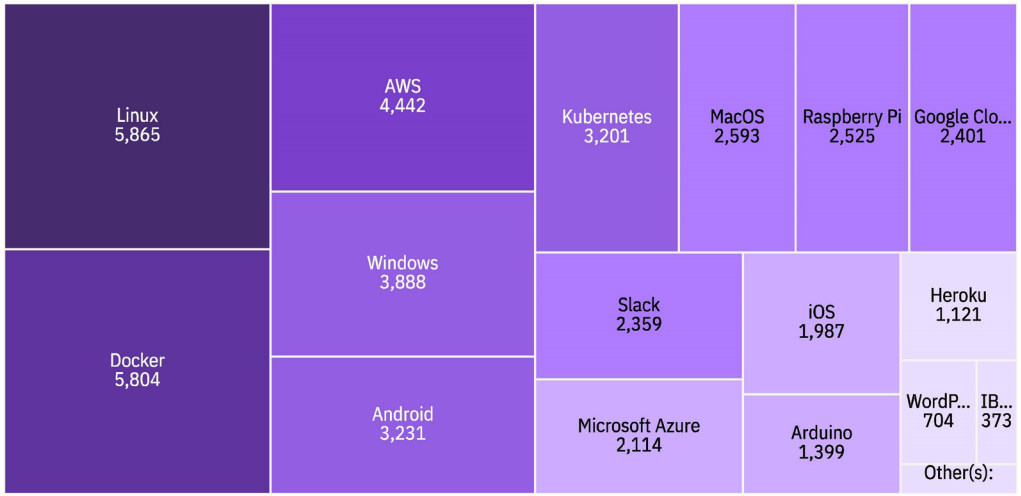
Top 10 Desired Programming Languages for Next Year



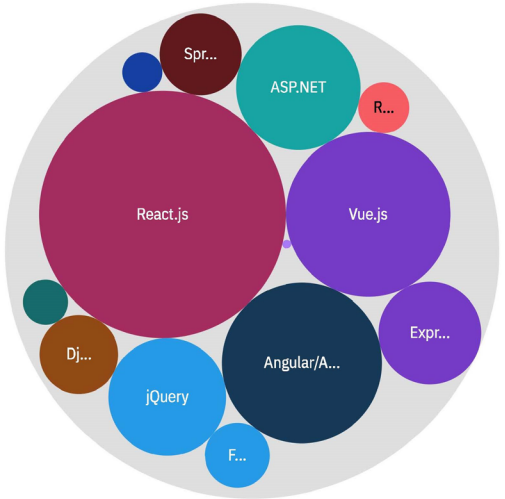
Top 10 Desired Databases for Next Year



Desired Platforms for Next Year

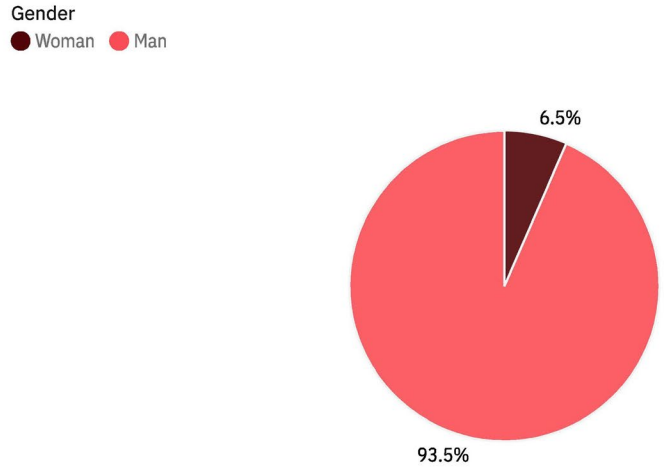


Top 10 Desired Web Frameworks for Next Year

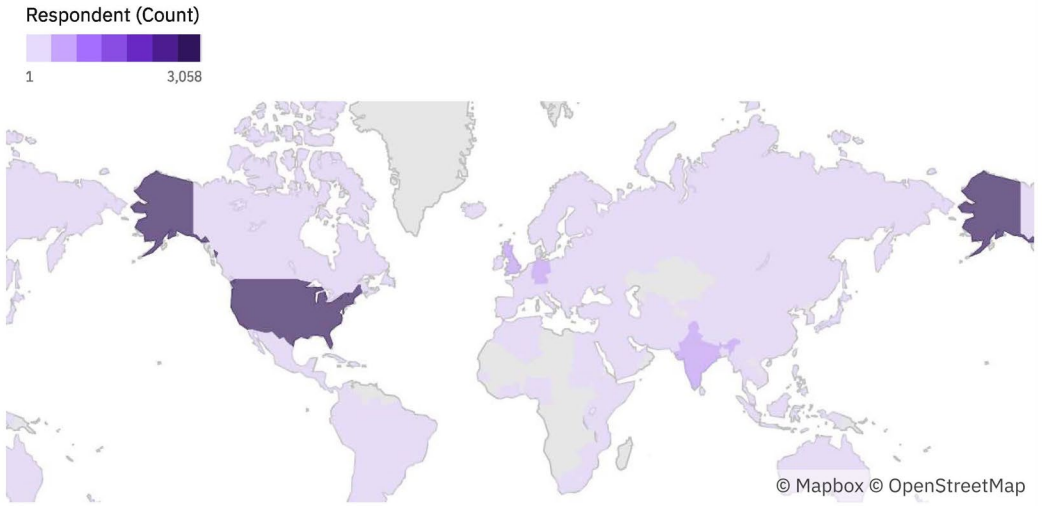


DASHBOARD TAB 3 DEMOGRAPHICS

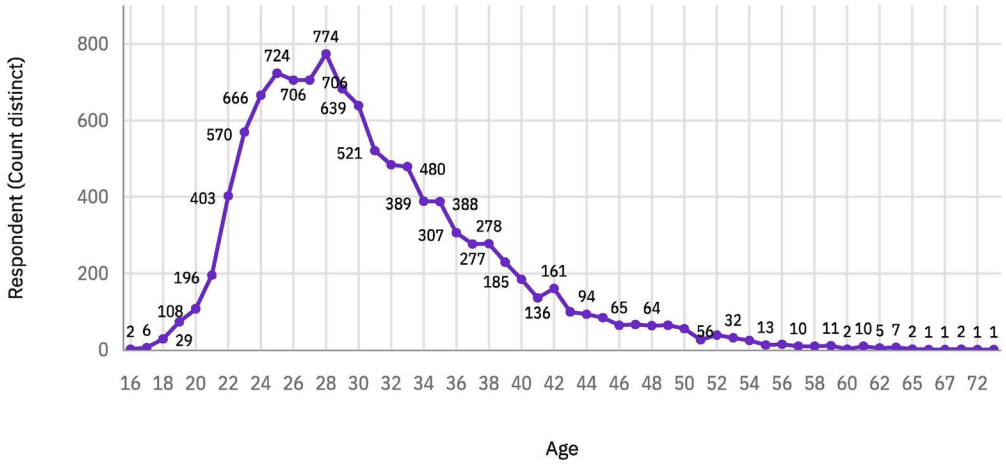
Respondent by Gender



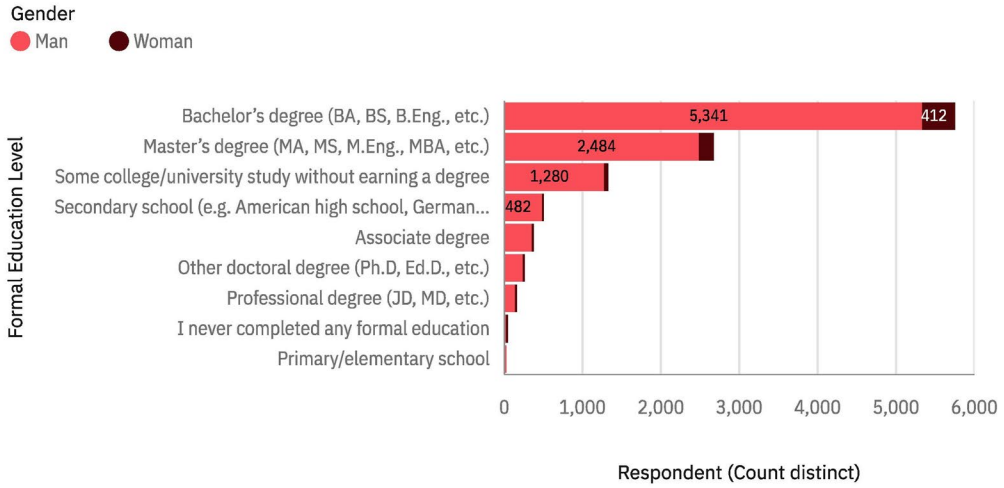
Respondent for Country regions



Respondent Distribution by Age



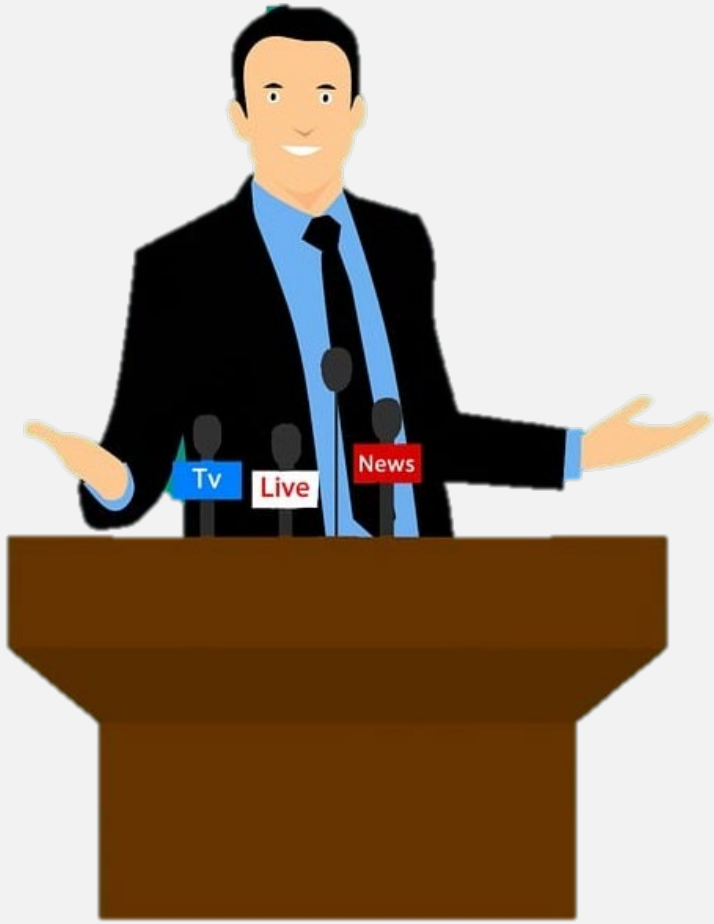
Respondent Count by Gender and Formal Education Level



DISCUSSION

DISCUSSION

- How can institutions scale JavaScript and HTML/CSS courses to meet demand?
- Which skills should companies prioritize in hiring for JavaScript, HTML/CSS, Linux, and Docker roles?
- Which alternative databases provide optimal performance and scalability?
- What strategies attract and retain more women in programming?
- What are best practices for managing globally distributed remote teams?
- What are the long-term impacts of these trends on the tech industry?



OVERALL FINDINGS & IMPLICATIONS

Findings

- JavaScript and HTML/CSS remain the most popular programming languages; many people aim to learn them next year.
- Windows is currently the most popular platform, but interest in Linux and Docker is growing.
- MySQL is the leading database, though its dominance may not last.
- Most programmers are male, based in the US, and have at least a bachelor's degree.

Implications

- Companies looking to hire web developers should focus on candidates proficient in JavaScript and HTML/CSS, as these skills will be prevalent among job seekers.
- As interest in Linux and Docker grows, development teams should consider investing in cross-platform development skills and tools. Training current employees on Linux and Docker can future-proof the workforce.
- Providers of MySQL may need to innovate and improve their offerings to maintain market share, while competitors can capitalize on the opportunity to attract MySQL users.
- Given the high level of education among programmers, policies that support higher education in STEM fields could be beneficial. Scholarships, grants, and other forms of support for students pursuing computer science degrees could help meet industry demand.

CONCLUSION

Our findings highlight key trends in the tech industry: the enduring popularity of JavaScript and HTML/CSS, growing interest in Linux and Docker, and shifting database preferences. These insights present significant opportunities:

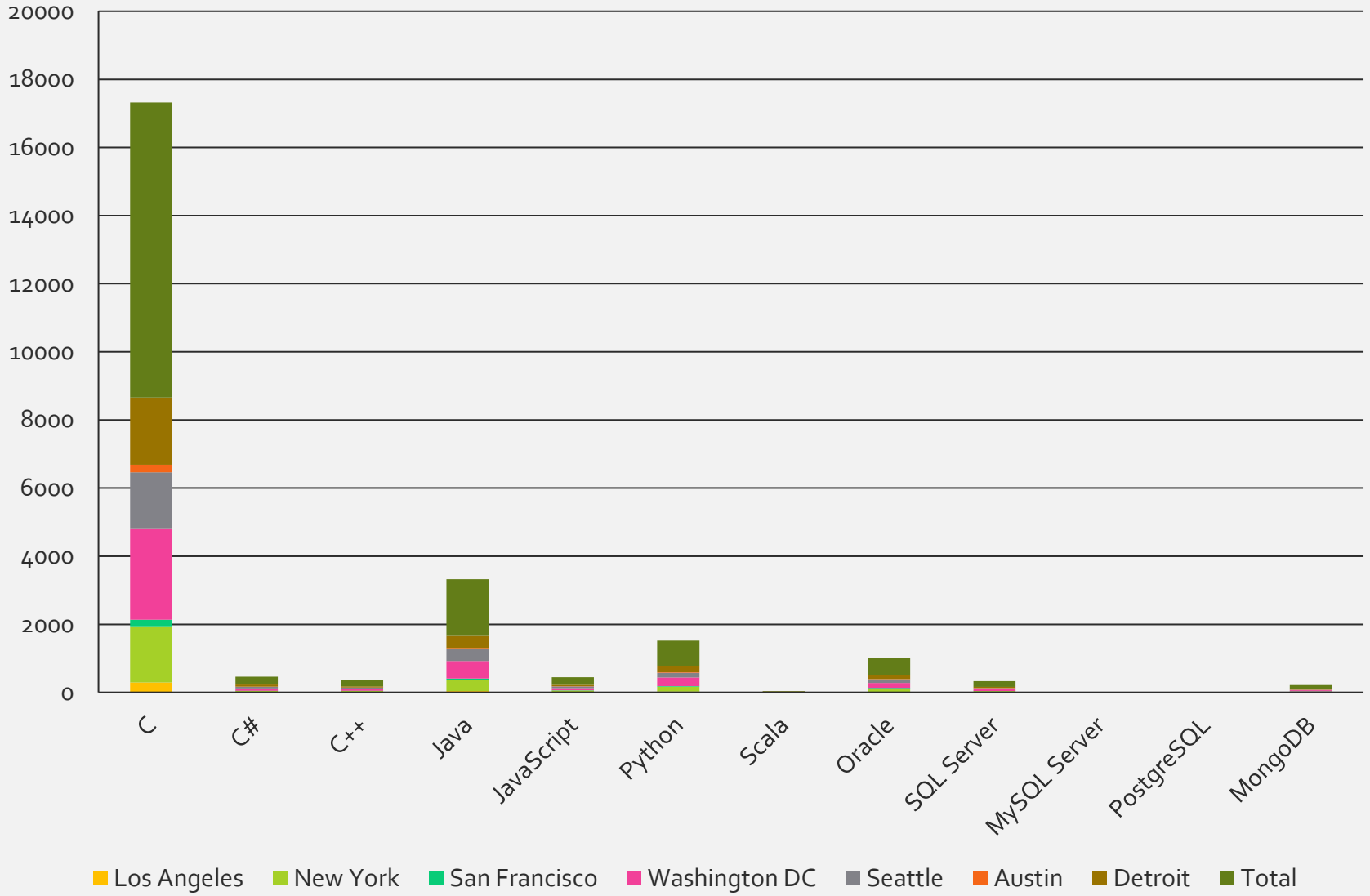
- Education and Training: Increased demand for JavaScript and HTML/CSS courses.
- Employment: Companies should prioritize skills in these areas for hiring.
- IT Infrastructure: Adapting to support Linux and Docker can attract tech talent.
- Database Management: Diversifying databases beyond MySQL is crucial.

Demographic analysis reveals a predominantly male, US-based workforce with high education levels, underscoring the need for diversity and inclusion initiatives and support for STEM education.

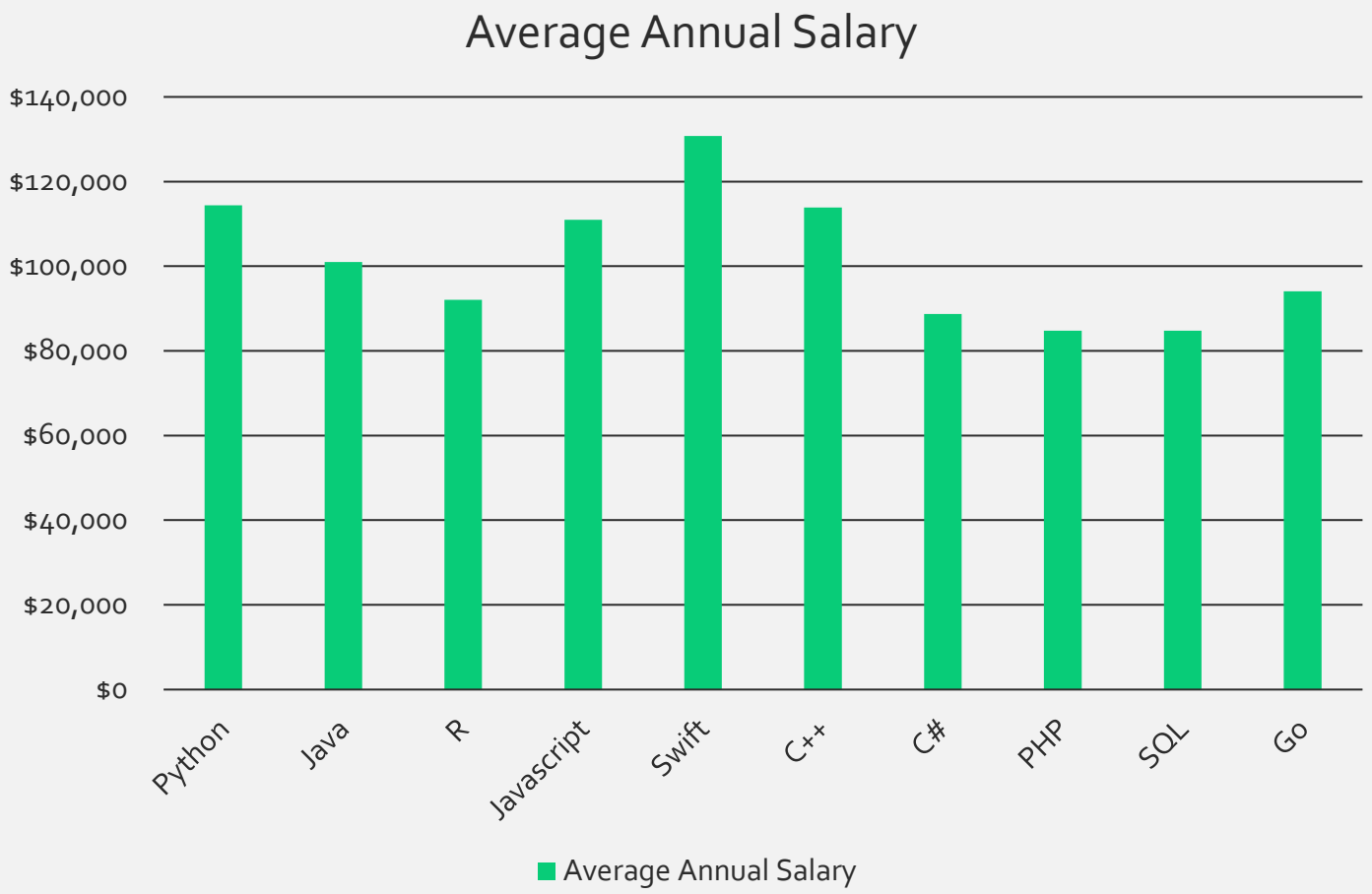
Looking ahead, these trends suggest future developments in education alignment, remote work adoption, and enhanced inclusivity in the tech industry. Embracing these insights will drive innovation and sustainable growth.

APPENDIX

JOB POSTINGS



POPULAR LANGUAGES



THANK YOU

Shunkai Xiao

xsk2001@outlook.com

Github

Linkedin