



Stack Overflow Developer Survey 2019: Key Findings

Lipsita Tripathy

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EXECUTIVE SUMMARY



The following slides summarize key findings from an analysis of data collected as part of the **2019 Stack Overflow Developer Survey**.

The analysis yielded insights regarding the following:

- Programming Language Trends, Database Trends, the most popular webframes, the most popular platforms
- Attitudes reflecting which technologies will become most popular in the future
- Demographics- how the respondent count differed based upon gender, age, country, and education level

These findings are relevant particularly to current and aspiring developers, recruiters, educators, and policy makers.

INTRODUCTION



Since 2011, the online programming knowledge sharing platform, Stack Overflow, has been conducting the Stack Overflow Annual Developer Survey.

- The primary objective of the annual surveys is to gather data regarding technology usage and trends among developers.
- In this analysis, a subset of the 2019 dataset was examined (present dataset: $N = 11,398$; original dataset $N \approx 90,000$).
- Audience: Developers (current and aspiring), HR professionals, educators, policy makers

METHODOLOGY

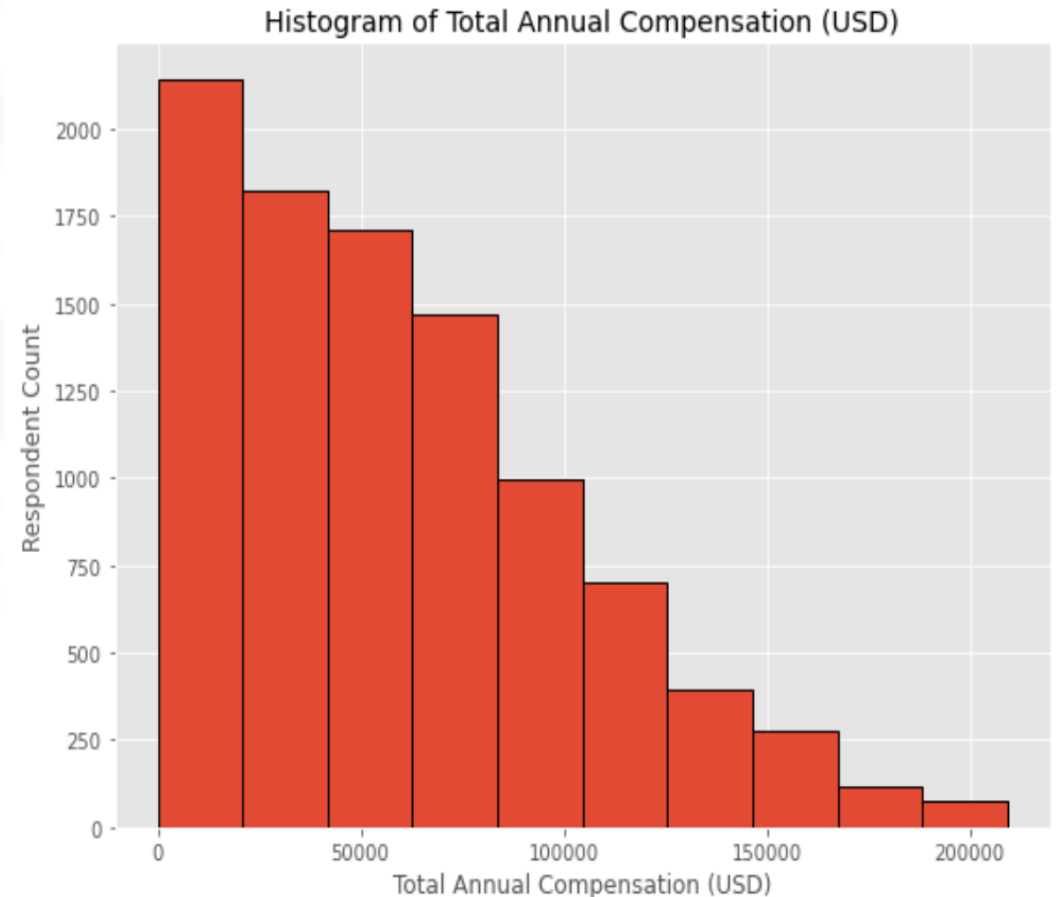


- **Data Source:** 2019 Stack Overflow Developer Survey
 - [Link to Stack Overflow's annual survey data and results](#) (Ctrl+Click)
- **Data Wrangling:** A portion of the dataset (provided by IBM) was loaded and cleaned using SQL and Python's pandas library.
 - Cleaning procedure: Duplicates removal, data imputation, data normalization
 - [Link to dataset provided by IBM](#) (Ctrl+Click)
- **Analysis & Visualization:** EDA and data visualization were conducted using various *Python libraries* and *Cognos*. Specifically, the following measures were examined:
 - Technologies (i.e., languages, databases, platforms, and web frames) used in 2019
 - Technologies most desired for the next year
 - Demographics (i.e., gender, country, age, and education)

RESULTS: COMPENSATION & DEMOGRAPHICS

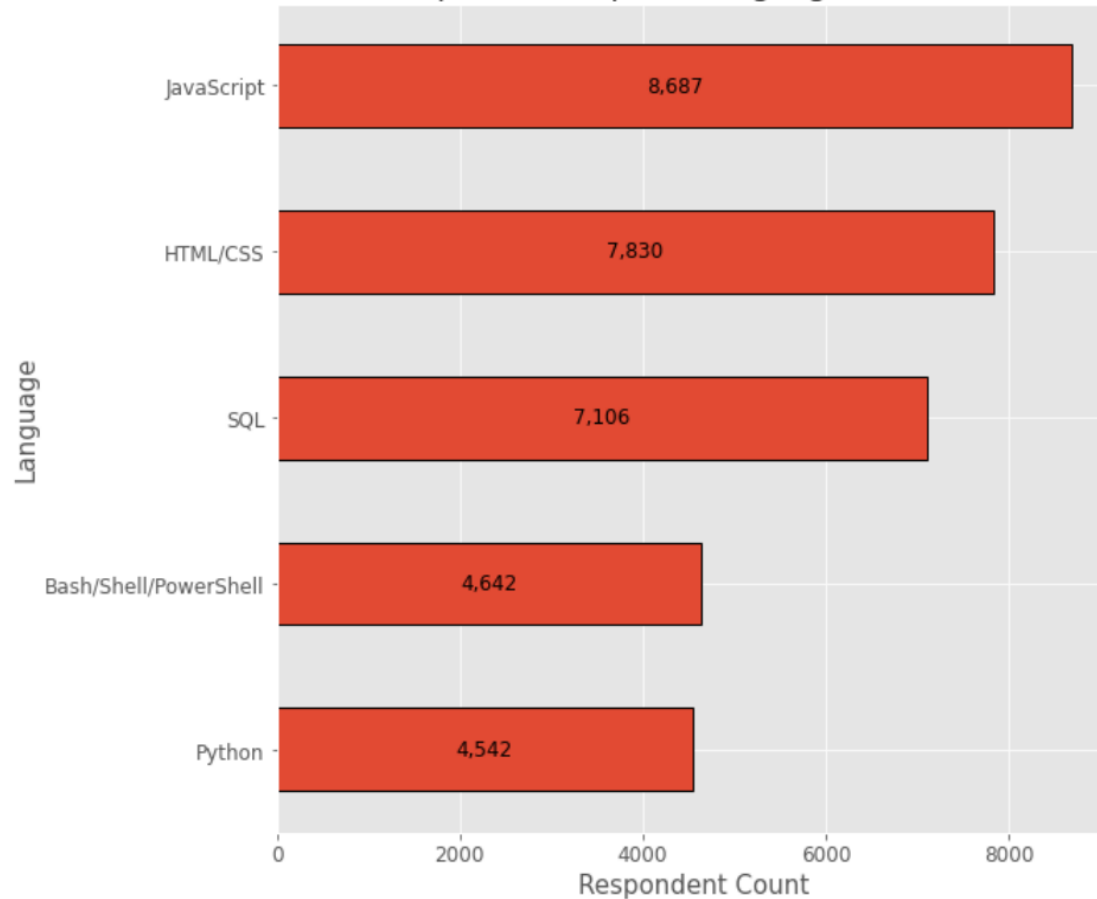
First, descriptive statistics regarding demographics and total annual compensation were computed

- Sample size after compensation outlier removal: N = 10,519 (vs. before removal: N = 11,398)
- The respondents had a median age of 29, and were predominantly male (i.e., 93.5% male vs. 6.5% female)
- Median compensation: \$52,704 USD per year.
- Compensation and Age were positively correlated: $r = .40$
- Median compensation was higher for women: \$54,956 than men: \$52,339

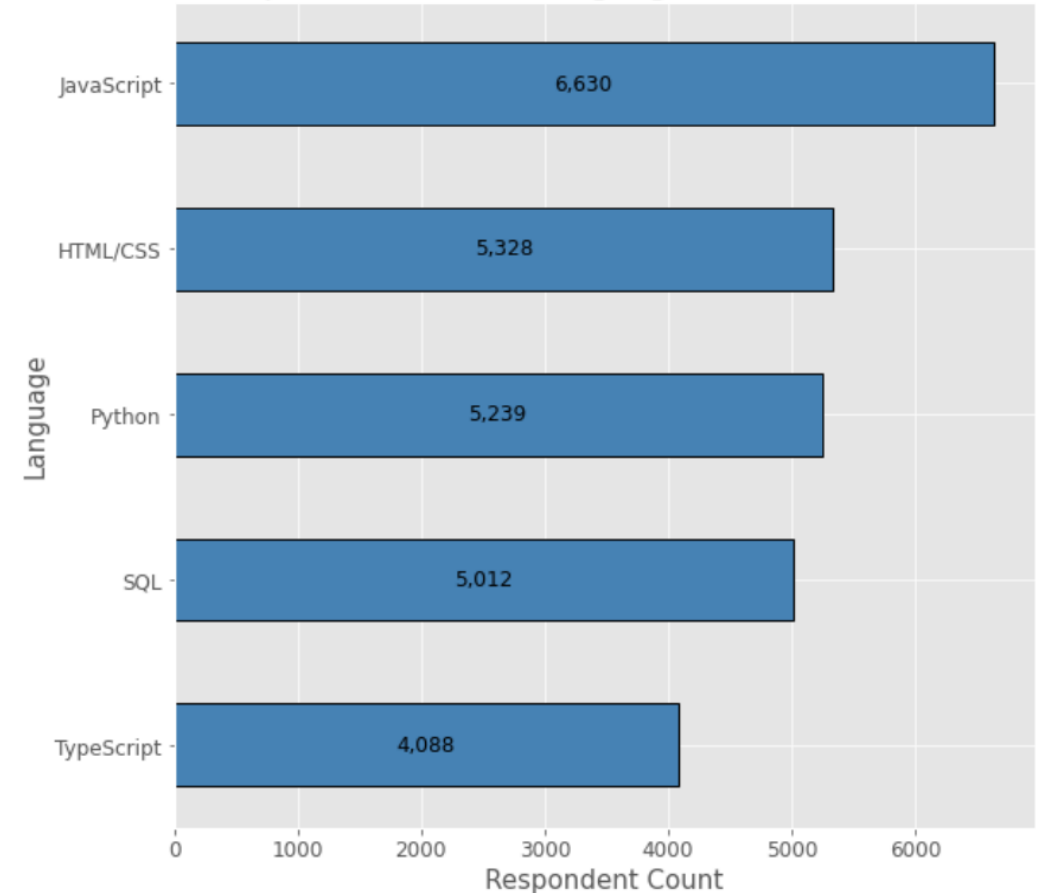


RESULTS: PROGRAMMING LANGUAGE TRENDS

Top 5 Most Popular Languages in 2019



Top 5 Most Desired Languages For the Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

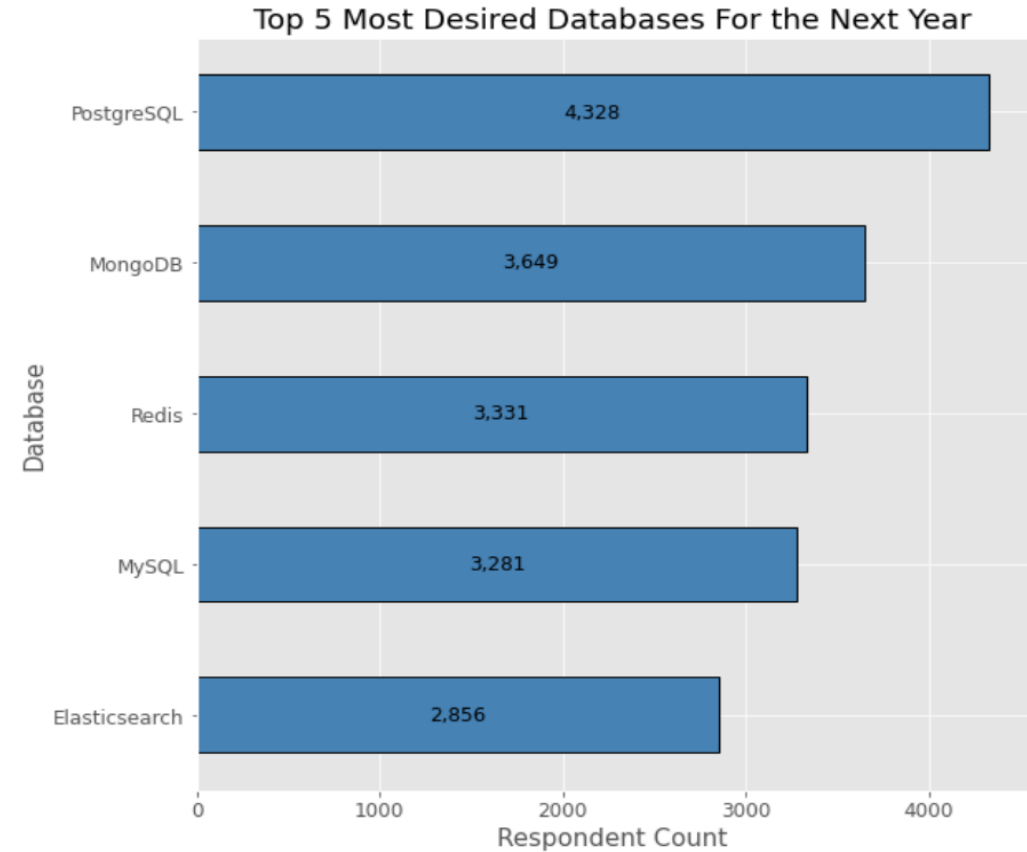
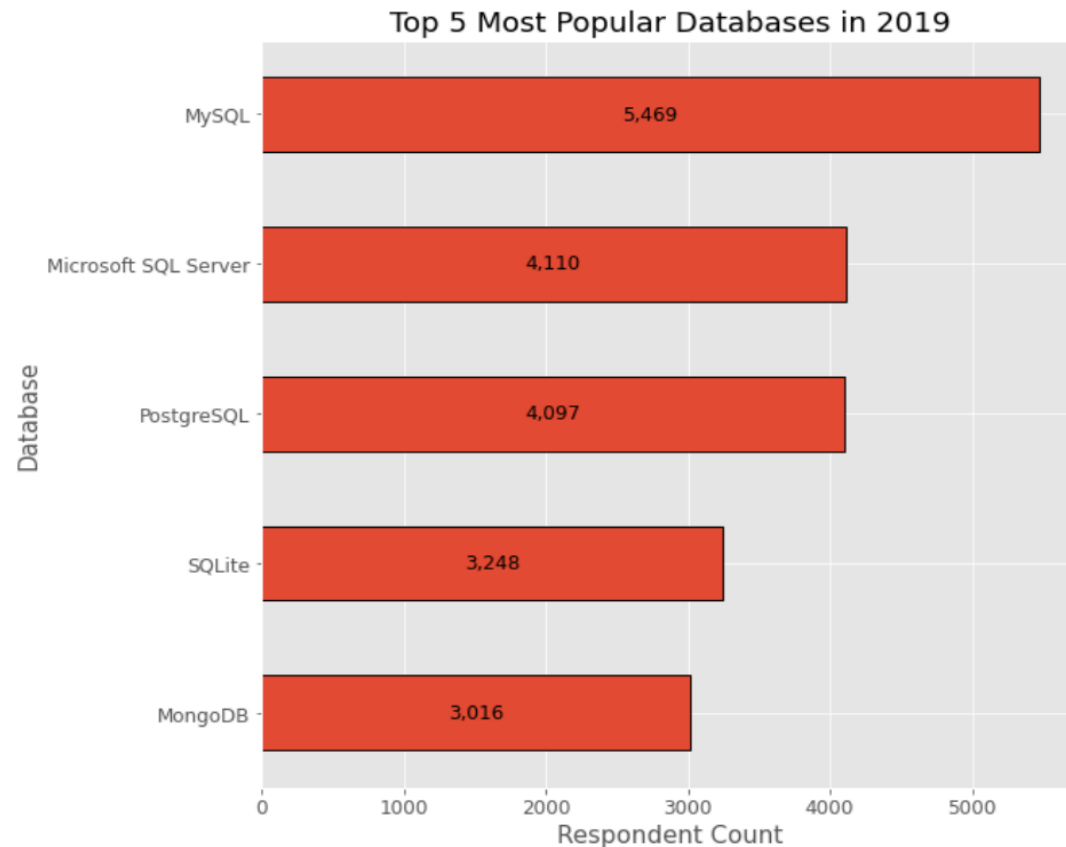
Findings

- Javascript and HTML/CSS were the most popular in 2019 and will likely remain so the following year.
- SQL was popular in 2019 and will likely remain so.
- Increasing interests in Python and TypeScript.
- Decreasing interest in PowerShell/Bash.

Implications

- Web development is still in high demand, and Javascript and HTML/CSS remain the dominant languages—however, TypeScript may catch up in the future.
- SQL remains the preferred language for big data storage and querying—it's not likely to go away anytime soon.
- Python's rising popularity likely reflects the growth of AI and ML work.

DATABASE TRENDS



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- SQL database programs were the most popular in 2019, with MySQL in the lead.
- PostgreSQL is gaining popularity over other SQL database programs, and it was the overall most desired database for the next year.
- MongoDB was popular in 2019 and gaining interest.
- Increasing interest in Elasticsearch

Implications

- There appears to be increasing developer preference toward open-source database programs.
- NoSQL database programs are gaining popularity, which likely reflects a growing need to handle nonrelational and unstructured data.
- Current and aspiring data analysts should develop competence in NoSQL in addition to SQL database programs.

DASHBOARD



The following link contains the full, interactive Cognos dashboard summarizing (a) current technology use, (b) future technology trend, and (c) demographics of the survey respondents:

[Click here for the Permanent link for the read-only view of the Cognos dashboard](#)(Ctrl+Click)

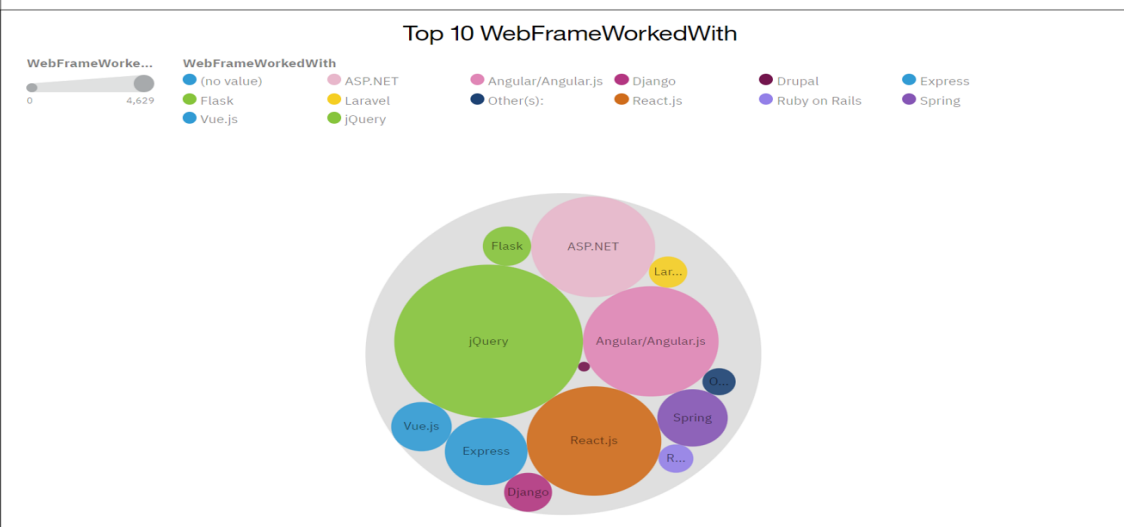
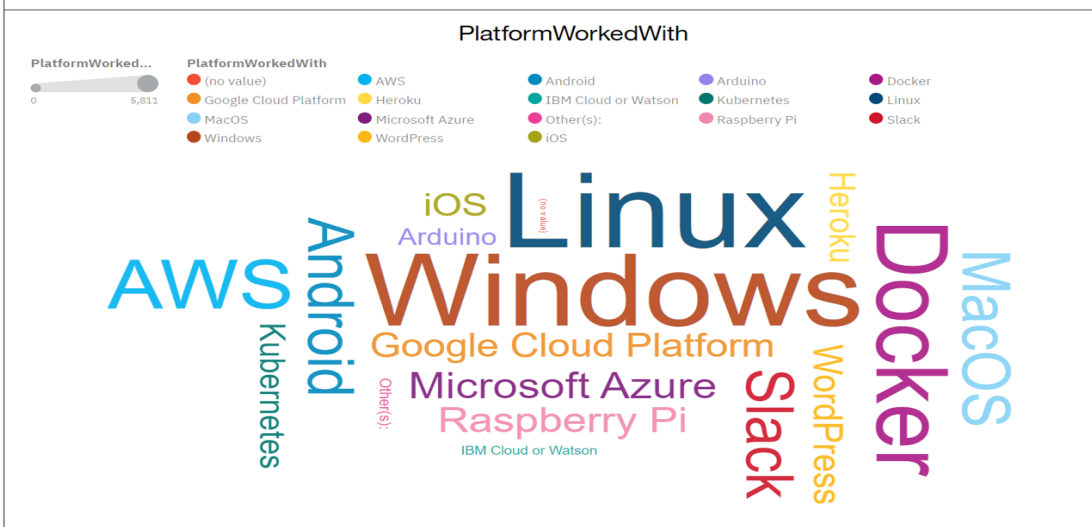
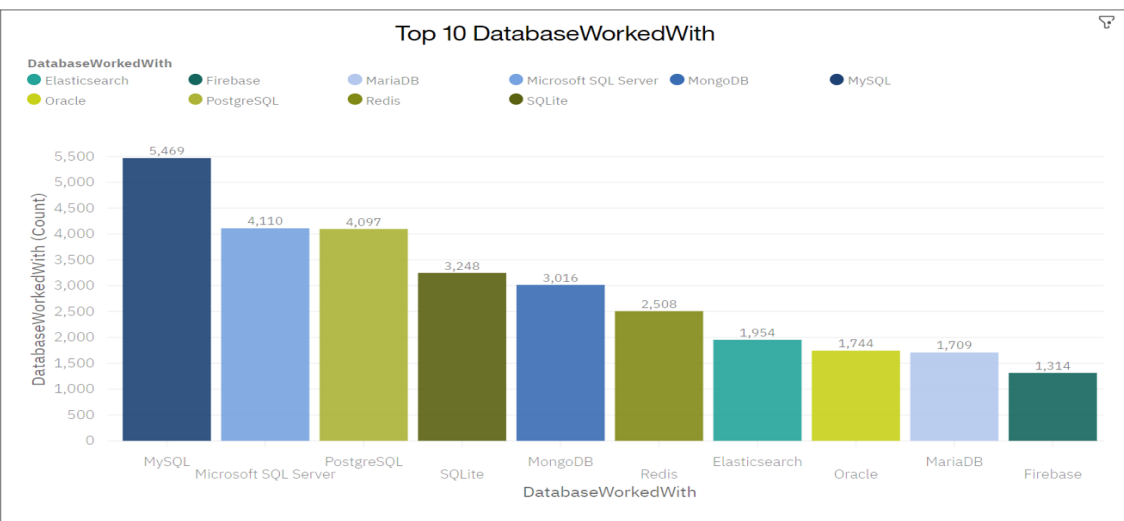
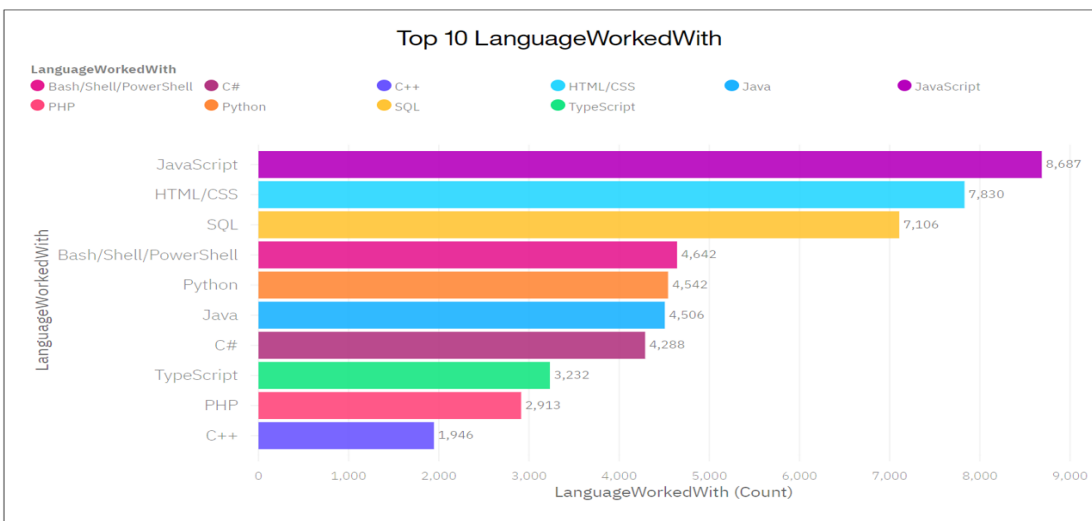
Static screenshots of the dashboard are shown in the next three slides.

DASHBOARD TAB 1: CURRENT TECHNOLOGY USAGE

Current Technology Usage

Future Technology Trend

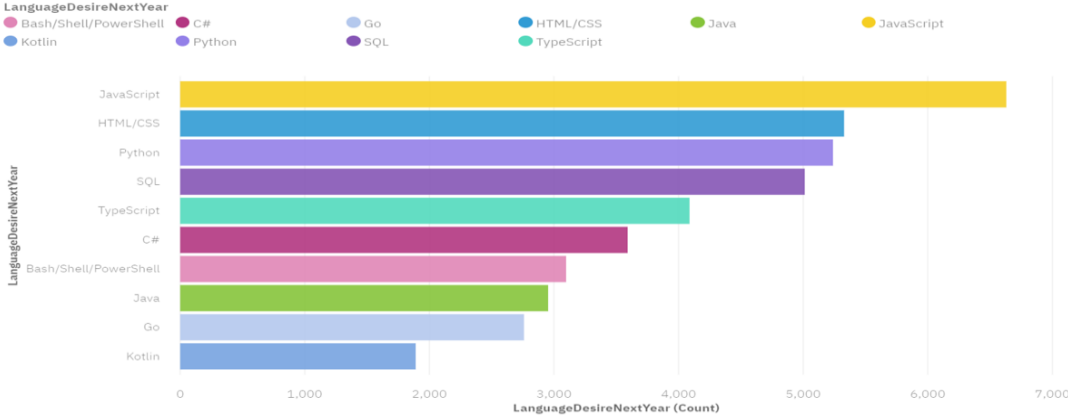
Demographics



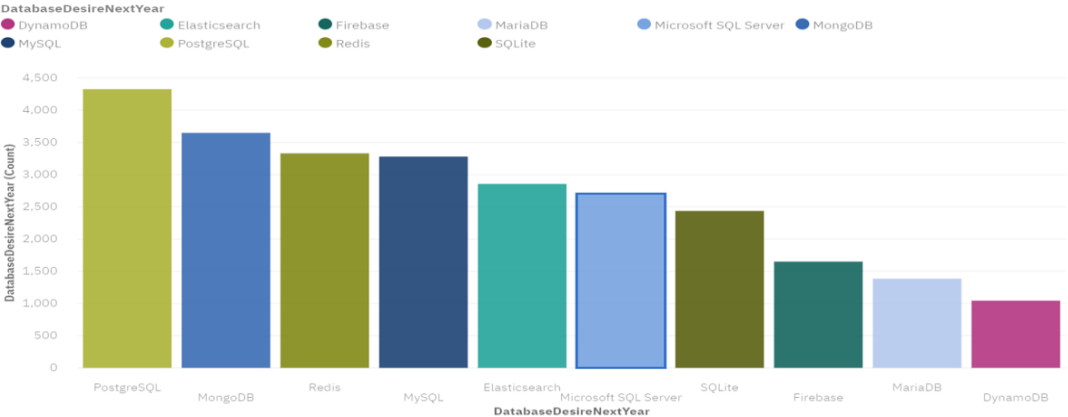
DASHBOARD TAB 2:FUTURE TECHNOLOGY TREND

Current Technology Usage **Future Technology Trend** Demographics

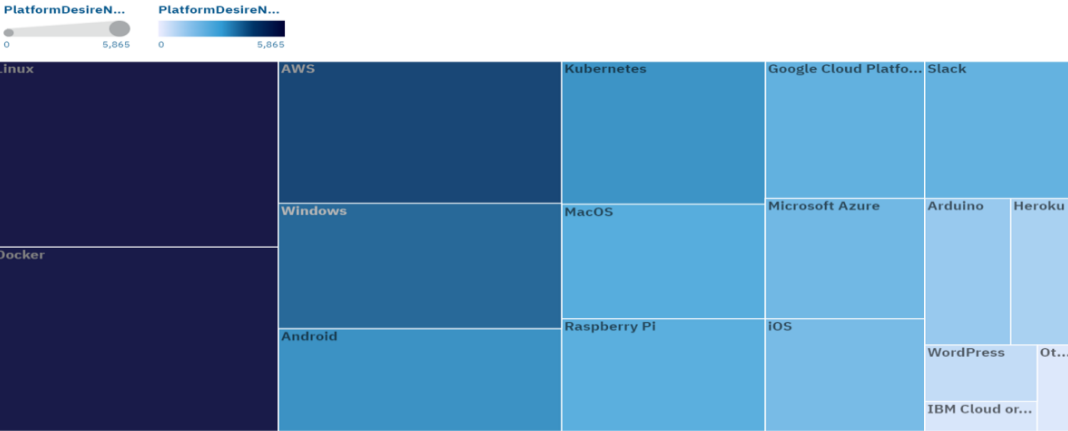
Top 10 LanguageDesireNextYear



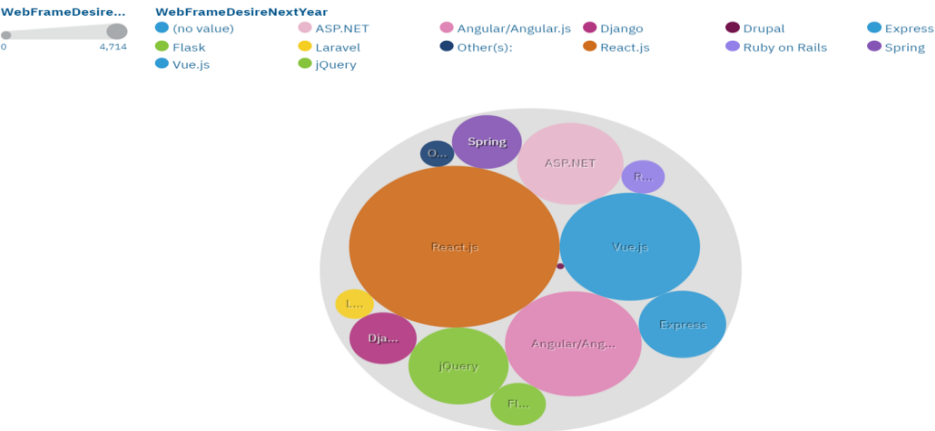
Top 10 DatabaseDesireNextYear



PlatformDesireNextYear



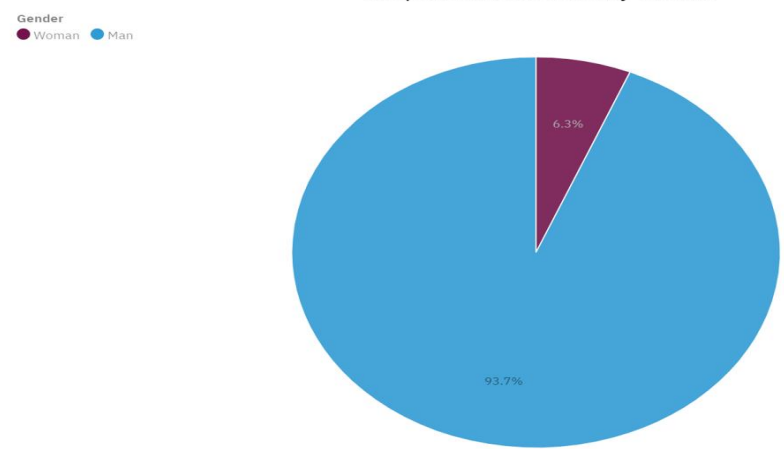
Top 10 WebFrameDesireNextYear



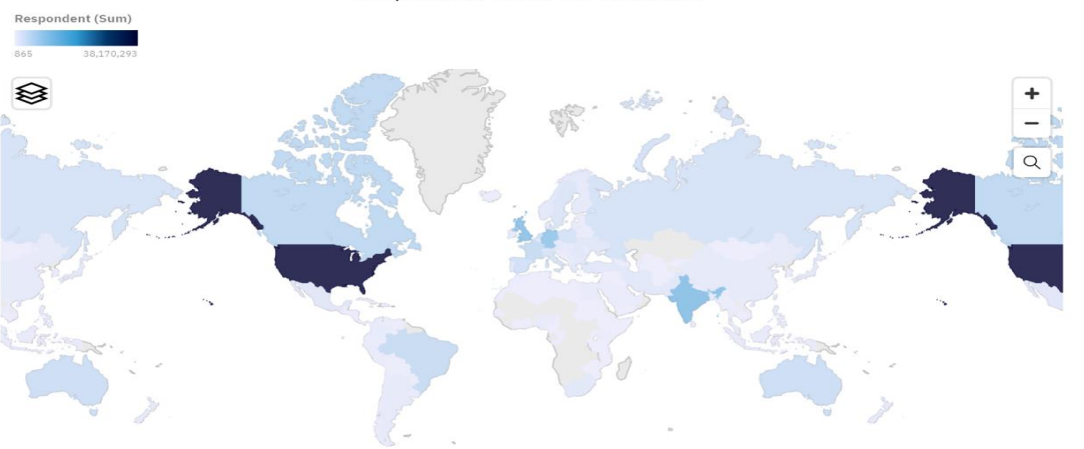
DASHBOARD TAB 3: DEMOGRAPHICS

Current Technology Usage Future Technology Trend **Demographics**

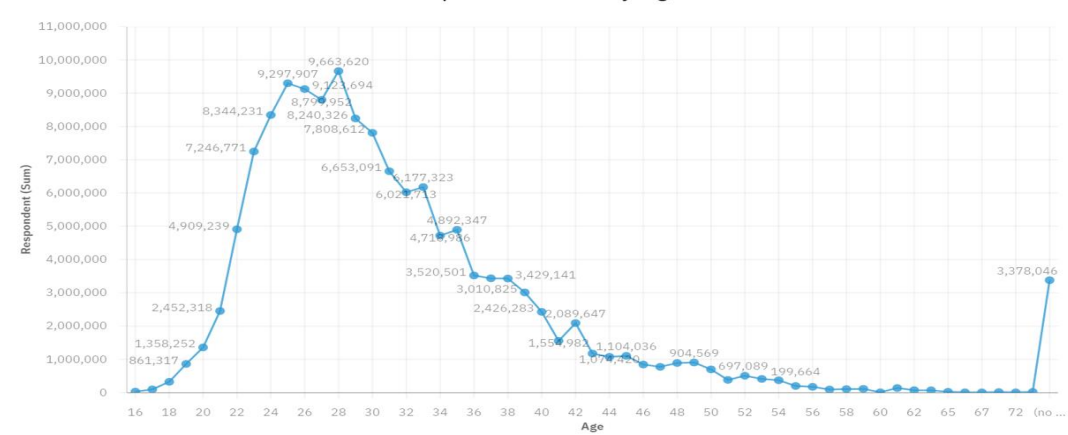
Respondent classified by Gender



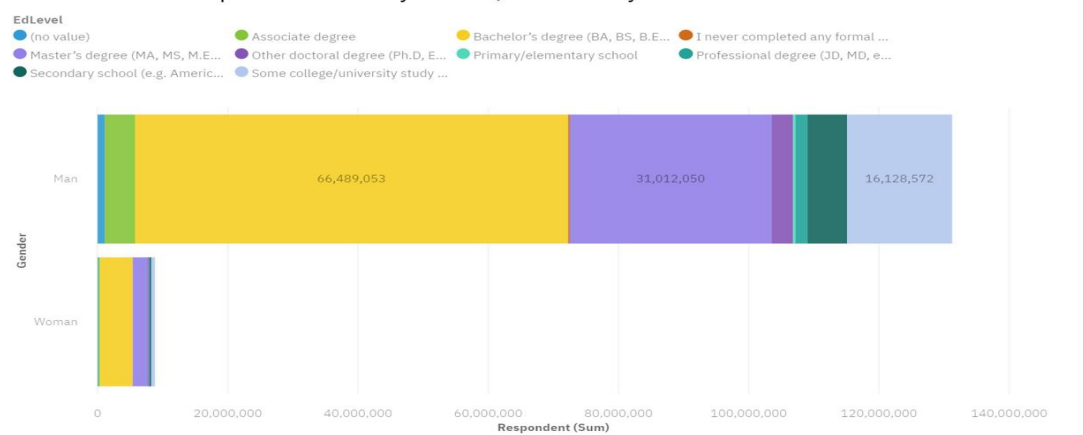
Respondent Count for Countries



Respondent Count by Age



Respondent Count by Gender, classified by Formal Education Level



DISCUSSION

The findings yield insights into the following questions:

- What kinds of developer technologies are in top demand?
- Which technologies should prospective developers and data professionals be learning?
- Which technologies should educators place more emphasis on teaching in upcoming years?
- What does the distribution of annual compensation for developers look like?
- What is the developer demographic like? Is there a gender representation gap?

OVERALL FINDINGS & IMPLICATIONS

Findings

- High usage and interest in Javascript and HTML/CSS remain high usage. There's also increasing interest in Typescript.
- Increasing interest in Python.
- High usage and interest in SQL. MySQL had the highest usage in 2019, but PostgreSQL is gaining interest and was the overall most desired database program for the next year
- NoSQL database programs gaining interest, of which MongoDB was the most used in 2019 and desired for the next year.
- A severe gender representation gap (in favor of men), despite median compensation being slightly higher for women.
- Technology divide between countries.

Implications

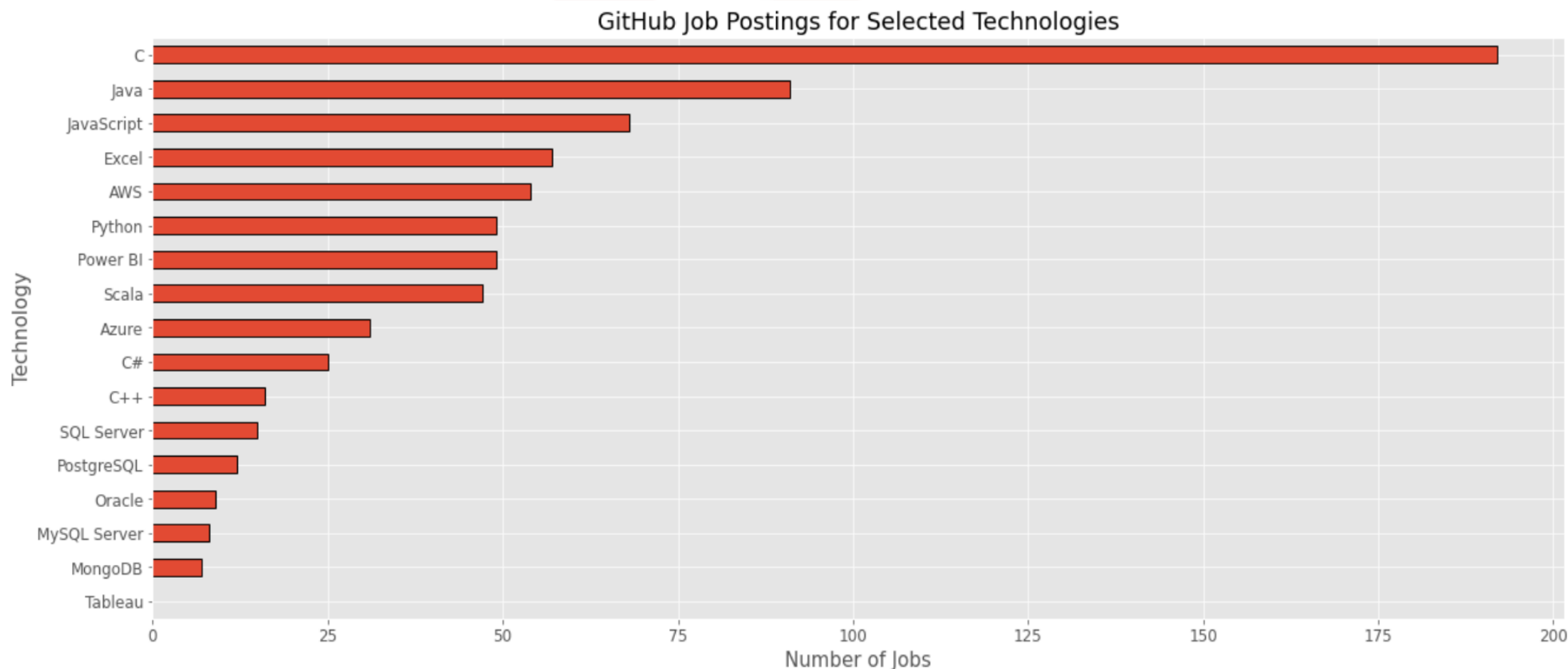
- Web development is still in high demand. Current and prospective developers may consider picking up Typescript in addition to Javascript and HTML/CSS.
- With the growing need to handle big data and perform AI and ML work, data professionals should continue to enhance SQL competence but also enhance competence with NoSQL database programs and Python.
- Businesses need to adapt to changing technology preferences, especially in terms of talent acquisition and development.
- Policy makers, educators, and organizations should work to minimize the gender representation gap in addition to the technology divide between countries.

CONCLUSION



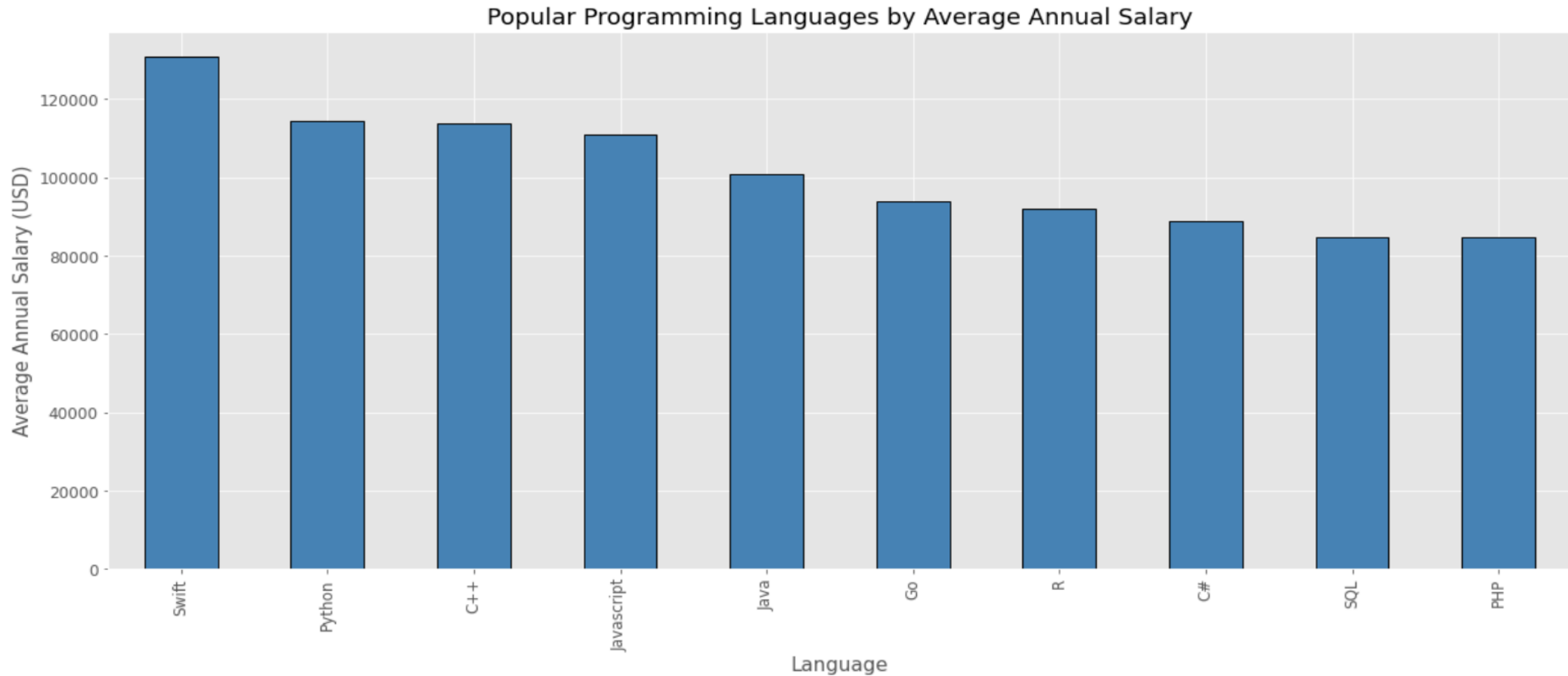
- A subset of data collected as part of the 2019 Stack Overflow Developer Survey was examined.
- The findings yielded numerous insights into the technologies most used and desired by developers in addition to the developer demographic.
- These insights should be particularly relevant for current and prospective developers aiming to remain competitive, businesses aiming to upskill their talent, educators in the field, and policy makers aiming to address gender and economic issues.

APPENDIX A: GITHUB JOB POSTINGS FOR SELECTED TECHNOLOGIES



Note: Data on GitHub job postings for the 15 selected technologies shown above were collected using the GitHub Jobs API

APPENDIX B: POPULAR LANGUAGES BY SALARY



Note: The figure above is based on survey data regarding popular programming languages provided by IBM. Link: [Popular Programming Languages](#)