Strategic Insights on emerging IT Technology skills

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OUTLINE

- Executive Summary

- Introduction

- Methodology

- Results
  - Visualization – Charts
  - Dashboard

- Discussion
  - Findings & Implications

- Conclusion

- Appendix

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EXECUTIVE SUMMARY

- Objective: Identify emerging technology skills in IT field critical for organizational competitiveness through data-driven analysis of global market trends.

- Data Sources: Job Postings, Training Portals and Surveys.

- Key Trends
    - Top Programming Language – Java Script for current as well as next year
    - Top Databases - Current: MySQL and Next Year: PostgreSQL
    - Top Web frame- Current: jQuery and Next Year: React.js
    - Top Platform- Current: Linux for current as well as next year

- Strategic Actions
    - Upskill Teams: Focus on Docker, Python, React.js and PostgreSQL.

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INTRODUCTION

- Purpose: Analyse current/future IT Technology trends to guide hiring, training, and strategy.

- Audience: IT professionals, HR managers, educators, and policymakers.

- Key Questions:

  - Which Programming Languages/Database/Platform/web frame are most in demand?
  - What skills will be critical in the next coming years?
  - How age , gender and education background affect the IT field?

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METHODOLOGY

- Data Sources:
  - Job Postings: Collected using APIs to gather programming language demand data.
  - Average Salary Data: Obtained through web scraping (e.g., salary trends for programming languages).
  - Stack Overflow Survey Dataset: Analysed to understand developer preferences and skill trends.

- Data Wrangling:
  - Cleaning: Removed duplicate datasets.
  - Handling Missing Data: Replaced missing values with suitable alternatives (e.g., mean, median, or domain-specific logic).
  - Normalization: Standardized column formats (e.g., consistent naming conventions, unit conversions).
  - Filtering: Dropped incomplete or half-filled datasets to ensure data quality.

- Data Analysis and Exploration:
  - Outlier Removal: Processed abnormal datasets by identifying and removing outliers.
  - Statistical Analysis: Applied correlation techniques to identify relationships between variables.
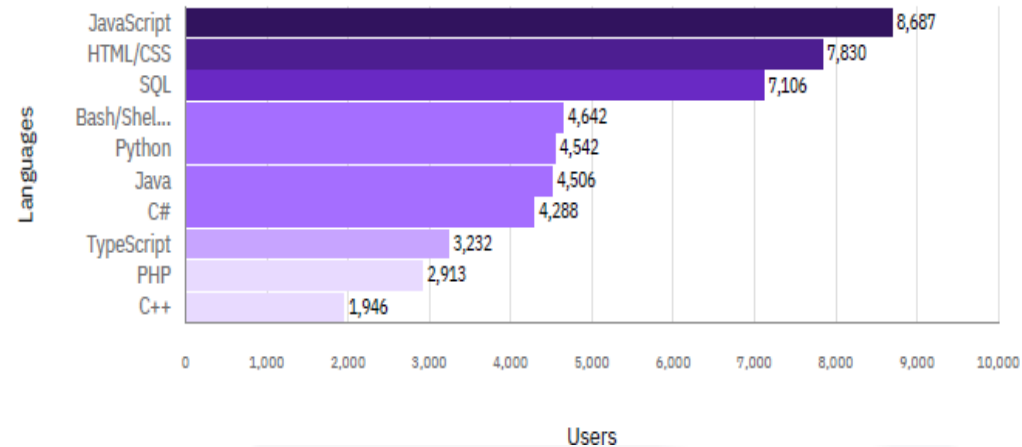 - Visualization: Used histograms and pie charts to analyse and present trends in the data.

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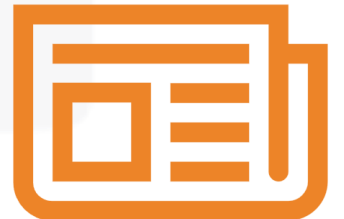
RESULTS

PROGRAMMING LANGUAGE TRENDS

Current Year

Top 10 Languages

Respondent (Cou...
1,946 — 8,687

Languages	Users
JavaScript	8,687
HTML/CSS	7,830
SQL	7,106
Bash/Shel...	4,642
Python	4,542
Java	4,506
C#	4,288
TypeScript	3,232
PHP	2,913
C++	1,946

Next Year

Top 10 language desired to be learned for next year

Respondent (Cou...
1,890 — 6,630

Language desired next year	Users
Kotlin	1,890
Go	2,759
Java	2,953
Bash/Shel...	3,097
C#	3,591
TypeScript	4,088
SQL	5,012
Python	5,239
HTML/CSS	5,328
JavaScript	6,630
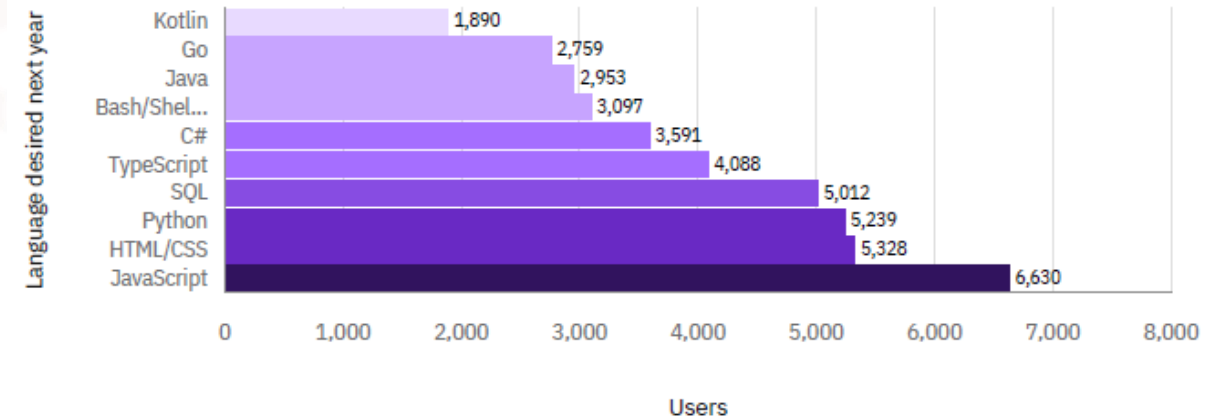
PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

1. **Established Languages Lead Current Usage:** JavaScript is the most widely used language (8,687 respondents), followed by HTML/CSS, SQL, Python, and Java. These languages remain central to web development, data management, and automation.

2. **Growing Interest in Emerging Languages:** Kotlin, Go, and TypeScript appear in the top 10 desired languages for next year, indicating a shift toward tools suited for modern applications like mobile development and cloud-native systems.

3. **JavaScript's Ongoing Relevance:** JavaScript holds the top spot in both current usage and desired learning, highlighting its continued importance across tech roles.

4. **Lower Demand for Newer Languages:** Current usage numbers (e.g., 8,687 for JavaScript) are notably higher than the top desired language (6,630), suggesting that adoption of newer languages is still in early stages despite rising interest.

Implications

- **For Developers:** Focus on mastering JavaScript, Python, and SQL for current job opportunities, while gradually learning Kotlin or TypeScript to prepare for future trends.

- **For Organizations:** Maintain expertise in established languages (e.g., Java, PHP) for existing projects, but invest in training for Go or TypeScript to stay competitive.

- **For Educators:** Combine foundational training in HTML/CSS and JavaScript with introductory courses on Kotlin or Go to meet evolving industry needs.
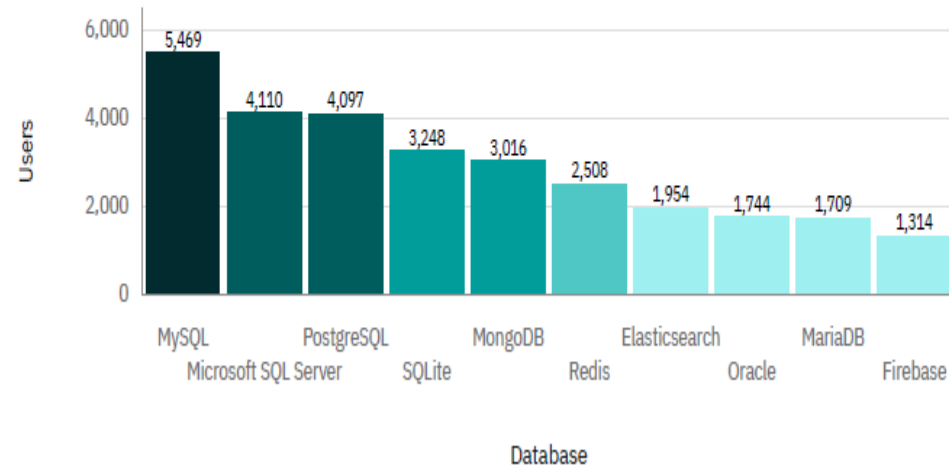
Key Insight: Balancing proficiency in widely used languages with exploration of emerging tools ensures adaptability to both current demands and future innovations.

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DATABASE TRENDS

Current Year

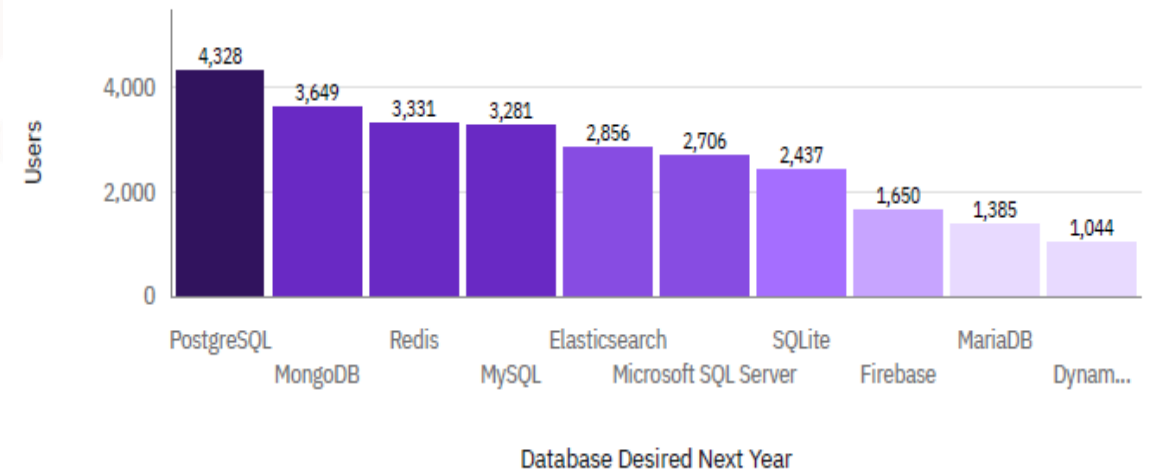Top 10 Databases

Respondent (Cou...

1,314   5,469

Next Year

Top 10 Databases desired to be worked on next year

Respondent (Cou...

1,044   4,328

DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

1. **PostgreSQL Dominance**: PostgreSQL is the most desired database for next year (4,328 users), surpassing MySQL (3,281 users), indicating a shift toward open-source relational databases.

2. **NoSQL Growth**: MongoDB and Redis show strong demand (3,649 and 3,331 users, respectively), highlighting increased adoption of NoSQL and in-memory databases.

3. **Legacy Decline**: Traditional databases like Microsoft SQL Server and Oracle rank lower in desired usage, signaling reduced preference for legacy systems.

4. **Cloud & Lightweight Adoption**: Firebase (cloud) and SQLite (lightweight) maintain steady interest, reflecting trends toward cloud-native and embedded solutions.

Implications

- **Open-Source Priority**: Organizations should invest in PostgreSQL and MongoDB expertise for scalability and flexibility.

- **NoSQL Training**: Developers need upskilling in Redis and MongoDB to handle unstructured data and real-time applications.

- **Legacy Modernization**: Companies relying on Oracle or Microsoft SQL Server may need migration strategies to modern databases.

- **Cloud Integration**: Firebase's presence underscores the need for cloud database management skills.

Key Insight: PostgreSQL overtakes MySQL as the most desired database next year, reflecting a shift toward open-source adoption and NoSQL growth, alongside declining interest in legacy systems.

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DASHBOARD

https://github.com/Dansena-O/Assignment_IBM/blob/main/Assignment_dashboard.pdf

(QR code for dashboard is attached)

DASHBOARD TAB 1

Current Technology Usage

Top 10 Languages

Respondent (Cou...

1,946 — 8,687

Languages	Users
JavaScript	8,687
HTML/CSS	7,830
SQL	7,106
Bash/Shel...	4,642
Python	4,542
Java	4,506
C#	4,288
TypeScript	3,232
PHP	2,913
C++	1,946

Top 10 Databases

Respondent (Cou...

1,314 — 5,469

- MySQL: 5,469
- Microsoft SQL Server: 4,110
- PostgreSQL: 4,097
- SQLite: 3,248
- MongoDB: 3,016
- Redis: 2,508
- Elasticsearch: 1,954
- Oracle: 1,744
- MariaDB: 1,709
- Firebase: 1,314
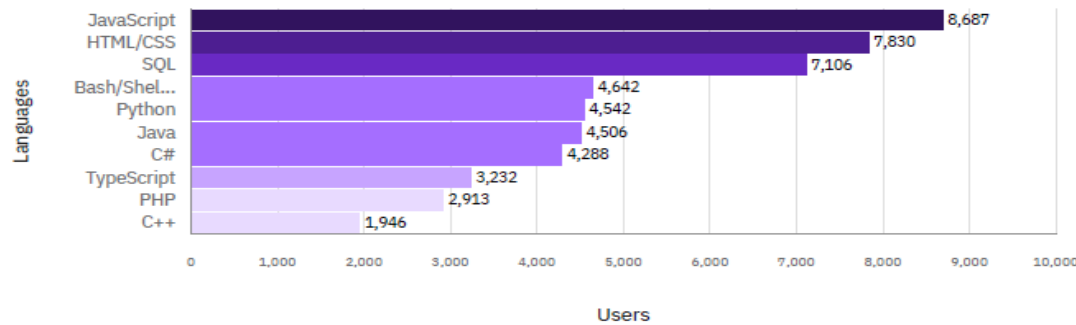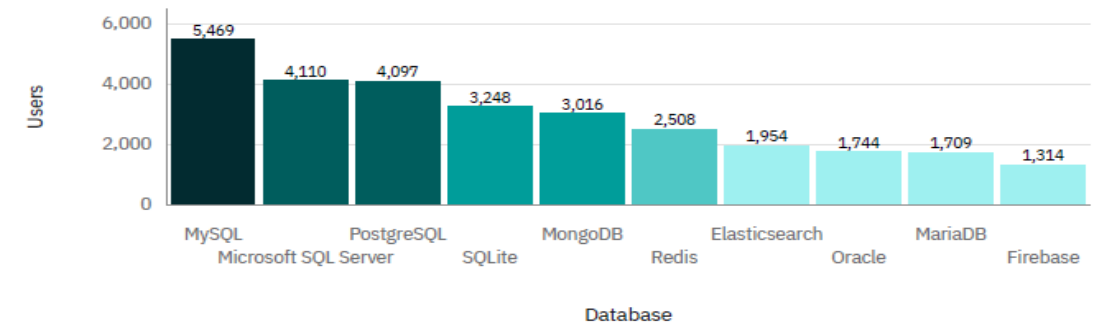
Platforms used

Respondent (Cou...

215 — 5,811

PlatformWorkedWith
- AWS
- Android
- Arduino
- Docker
- Google Cloud Platform
- Heroku
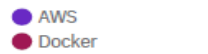
Top 10 Web Frame Used hierarchy wise

Respondent (Cou...

939 — 4,629

WebFrameWorkedWith
- ASP.NET
- Angular/Angular.js
- Django
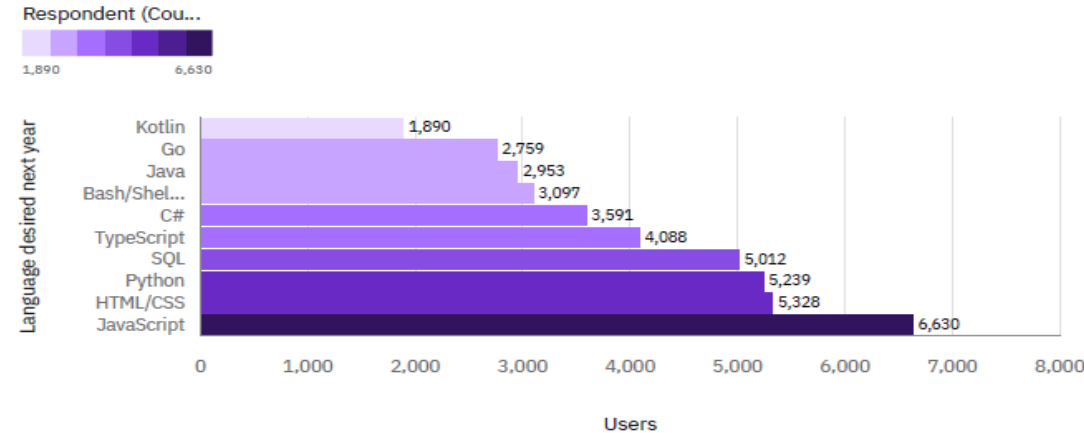- Express
- Flask
- Laravel
- React.js
- Spring
- Vue.js
- jQuery
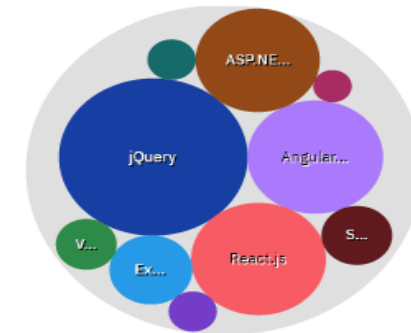
DASHBOARD TAB 2

Future Technology Trend

Top 10 language desired to be learned for next year

Respondent (Cou...

1,890 — 6,630

Language desired next year:
- Kotlin — 1,890
- Go — 2,759
- Java — 2,953
- Bash/Shel... — 3,097
- C# — 3,591
- TypeScript — 4,088
- SQL — 5,012
- Python — 5,239
- HTML/CSS — 5,328
- JavaScript — 6,630

(x-axis: Users — 0 to 8,000)

Top 10 Databases desired to be worked on next year

Respondent (Cou...

1,044 — 4,328

Users:
- PostgreSQL — 4,328
- MongoDB — 3,649
- Redis — 3,331
- MySQL — 3,281
- Elasticsearch — 2,856
- Microsoft SQL Server — 2,706
- SQLite — 2,437
- Firebase — 1,650
- MariaDB — 1,385
- Dynam... — 1,044

Database Desired Next Year
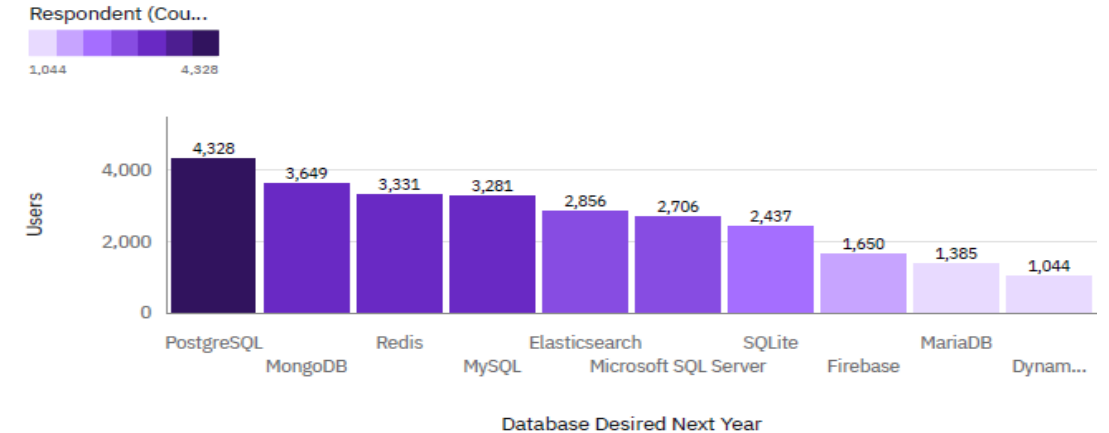
Heat map for desired platform to be worked with next year

Respondent (Count)   Respondent (Cou...

307 — 5,865   307 — 5,865

Linux, Docker, AWS, Windows, Android, Kubernetes, MacOS, Raspberry Pi, Google Cl..., Slack, iOS, Arduino, Heroku, Wo..., Microsof..., IBM..., Oth...
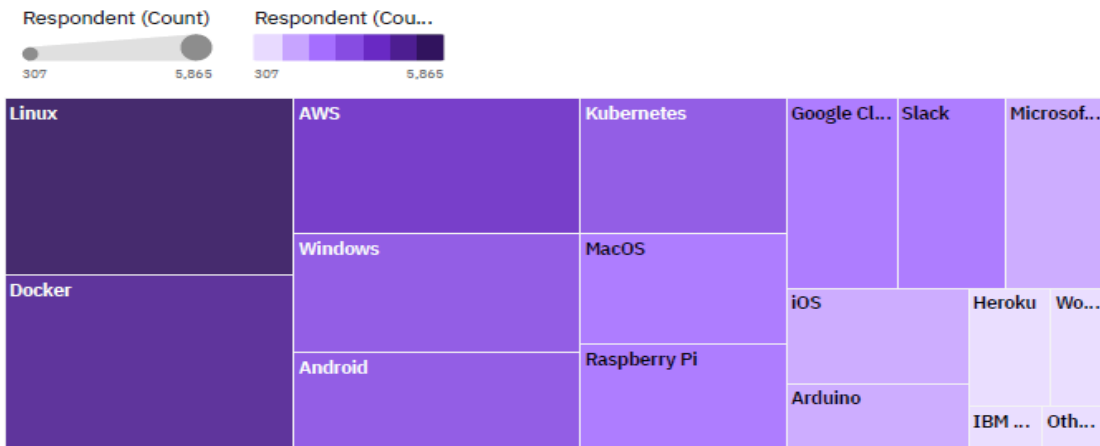
Top 10 Web frame desired for next year
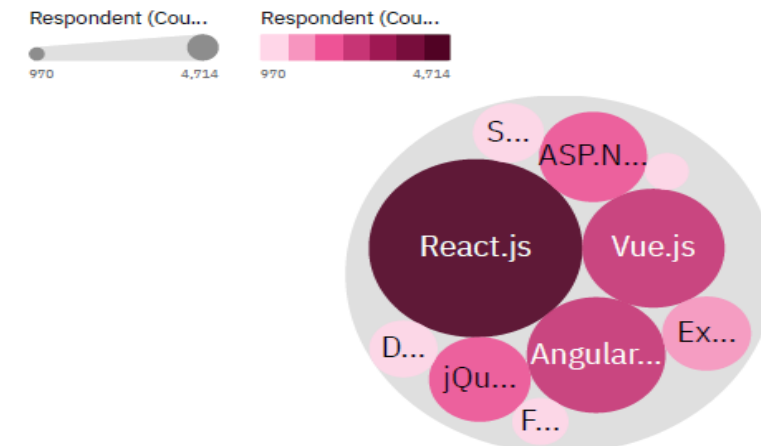
Respondent (Cou...   Respondent (Cou...

970 — 4,714   970 — 4,714

React.js, Vue.js, Angular..., ASP.N..., jQu..., Ex..., S..., D..., F...

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DASHBOARD TAB 3
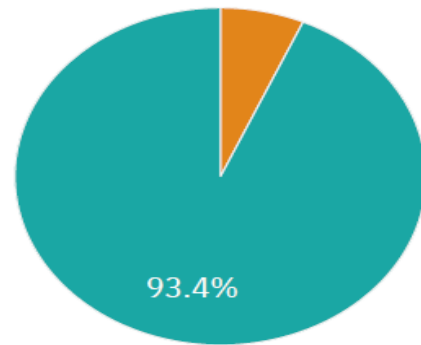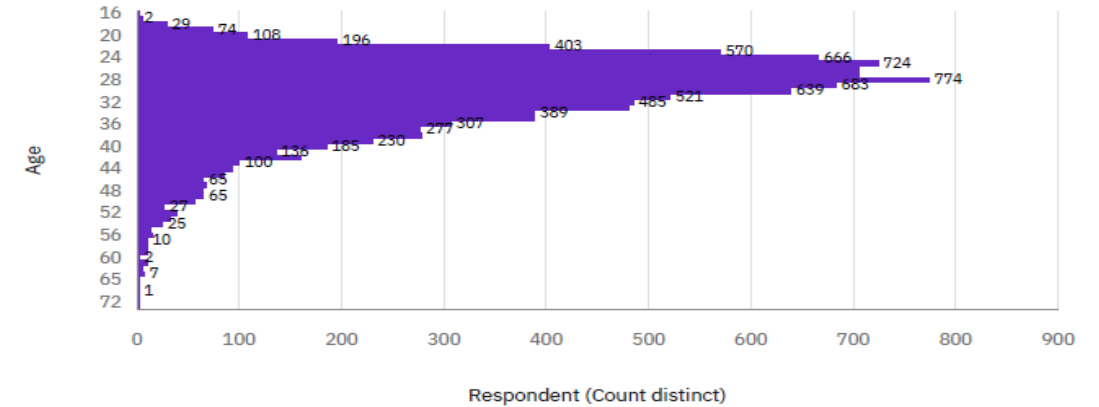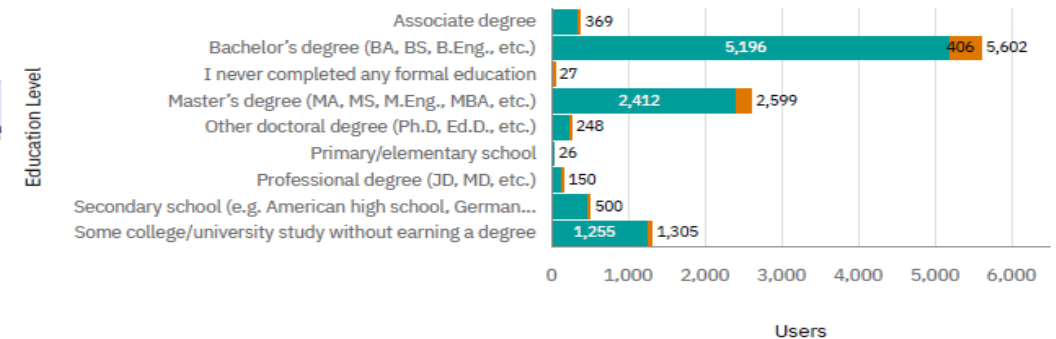
DISCUSSION

- Geographic Talent Imbalance → How to balance recruitment between developed cities and emerging regions to diversify talent?

- Gender & Age Diversity → What strategies can address the male-dominated, young workforce and improve inclusivity?

- Skills vs. Degrees → Should hiring prioritize skills over degrees to widen the talent pool?

- Tech Modernization → How to modernize infrastructure with open-source/NoSQL tools amid legacy decline?

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OVERALL FINDINGS & IMPLICATIONS

Findings

- Developers are concentrated in developed cities.
- Over 90% of respondents are young males.
- Average developer age is 29 years.
- Bachelor's degrees are most common; advanced degrees are rare.
- Only 10% work in large companies (>10k employees).
- PostgreSQL overtakes MySQL as the most desired database.
- JavaScript/HTML dominate usage, but Kotlin/Go are rising.

Implications

- Target recruitment in developed cities but explore emerging talent pools.
- Prioritize diversity initiatives to attract underrepresented groups.
- Foster learning programs to retain younger, tech-savvy employees.
- Hire based on skills, not just formal education.
- Build tools for SMEs while nurturing enterprise partnerships.
- Modernize infrastructure with open-source/NoSQL databases (e.g., MongoDB).
- Train teams in both core languages and emerging tools.
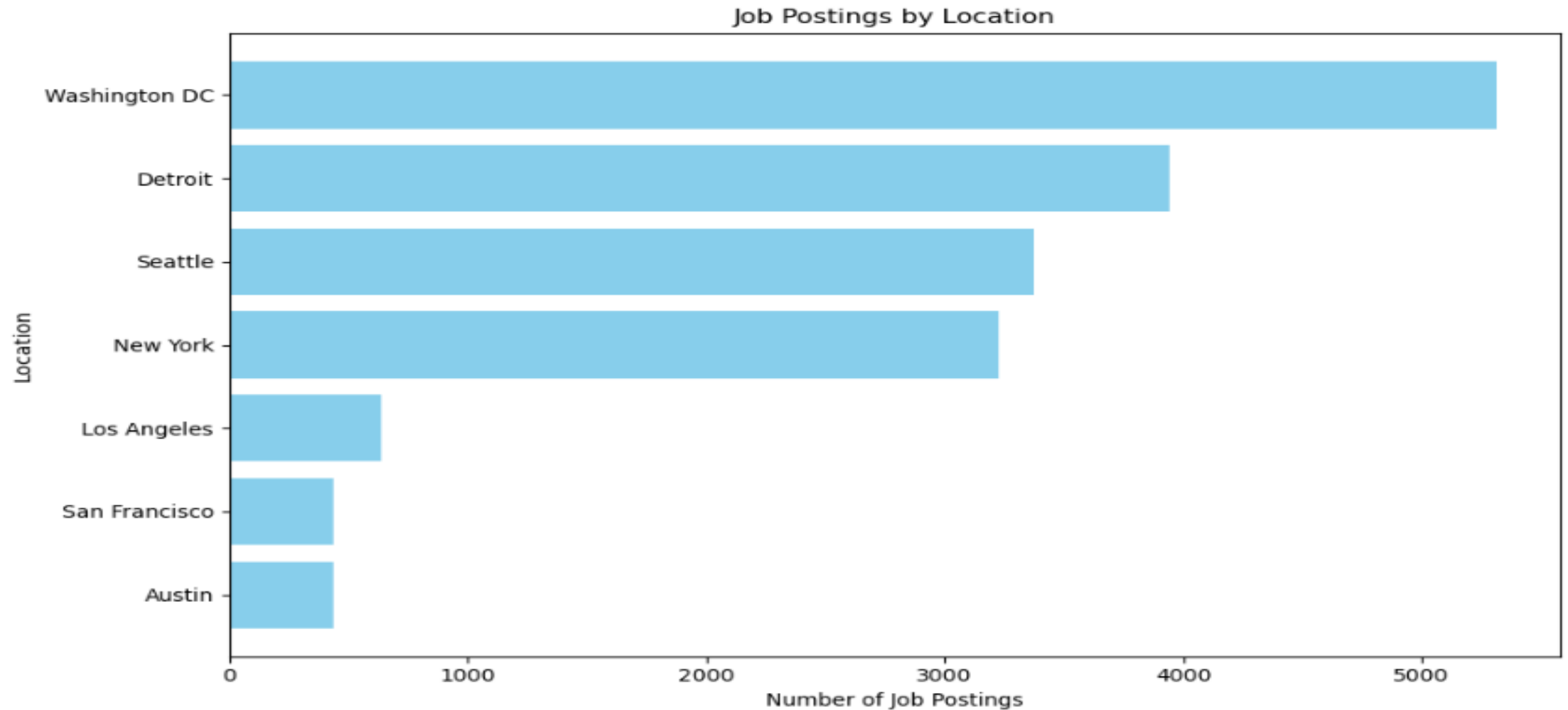
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CONCLUSION

1. **Geographic Focus:** Developers and jobs cluster in developed cities—recruit strategically there but diversify into emerging regions.
2. **Demographic Gap:** Male-dominated, young workforce signals a need for diversity initiatives to attract underrepresented groups.
3. **Youth-Driven Workforce:** Younger employees (avg. 29) demand continuous learning programs to boost retention and innovation.
4. **Skill > Degrees:** Bachelor's degrees dominate—prioritize skills-based hiring to widen talent pipelines.
5. **SME-Centric Market:** Majority work in SMEs/startups—tailor tools for cost-effectiveness while scaling enterprise partnerships.
6. **Tech Modernization:** Shift to open-source/NoSQL databases (e.g., PostgreSQL, MongoDB) to stay competitive.
7. **Balanced Skill Development:** Train teams in core languages (JavaScript) **and** emerging tools (Kotlin, Go) for future readiness.

Final Takeaway: Align recruitment, infrastructure, and training with workforce trends to drive innovation and inclusivity.

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APPENDIX

JOB POSTINGS

Job Postings by Location

POPULAR LANGUAGES

Job Postings Data Ordered by Salary