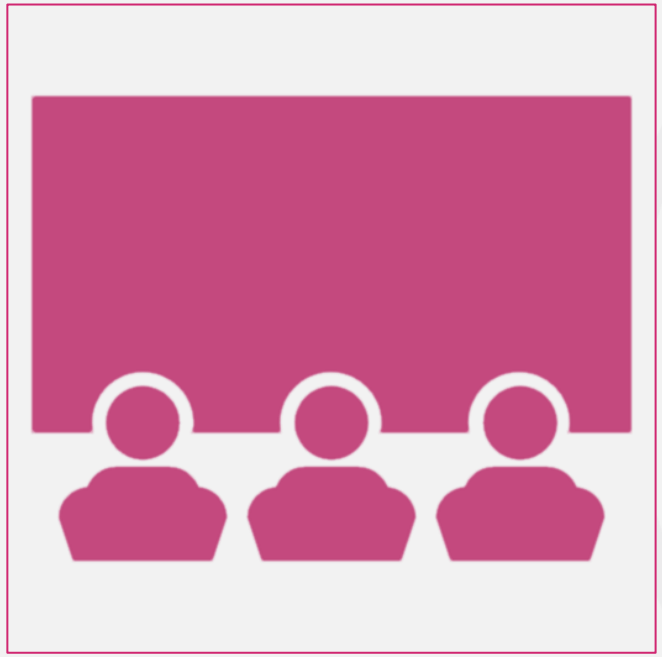
IBM Data Analyst Capstone Project

Programming Languages, Databases, and Developer Trends: A Data-Driven Analysis

A Presentation by DIKSHA SAINI | 6th September 2025

OUTLINE



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

EXECUTIVE SUMMARY

- **Purpose of the Study**:
  Analyze tech trends in programming, databases & demographics for global IT competitiveness.

- **Data & Methodology**:
  Sources: Stack Overflow, IBM, GitHub
  Cleaning + EDA + Visualization
  Dashboard insights generated

- **Key Findings in Programming Languages**:
  JavaScript → most used & future-dominant

- **Databases Trends**:
  MySQL → highest current usage
  PostgreSQL → strong future demand

- **Demographics Insights**:
  Majority male respondents
  Mostly from USA
  Median age ~28 years

INTRODUCTION

- **Purpose**: To analyze current and future technology trends in programming languages and databases.

- **This report uses data analytics to highlight current and projected trends in IT skills, focusing on:**
  - Programming Languages
  - Databases
  - Platforms & Web Frameworks

- **Key Research Questions**
  1. Which programming languages are most in demand today?
  2. What are the most in-demand database skills?
  3. Which platforms, IDEs, and web frameworks are gaining traction?

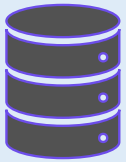
- **Target Audience**

  IT Professionals

  HR & Hiring Managers

  Tech Enthusiasts

METHODOLOGY



Data in several formats, such as the number of jobs currently available for different technologies and for different places, were gathered using the Github jobs API on python.

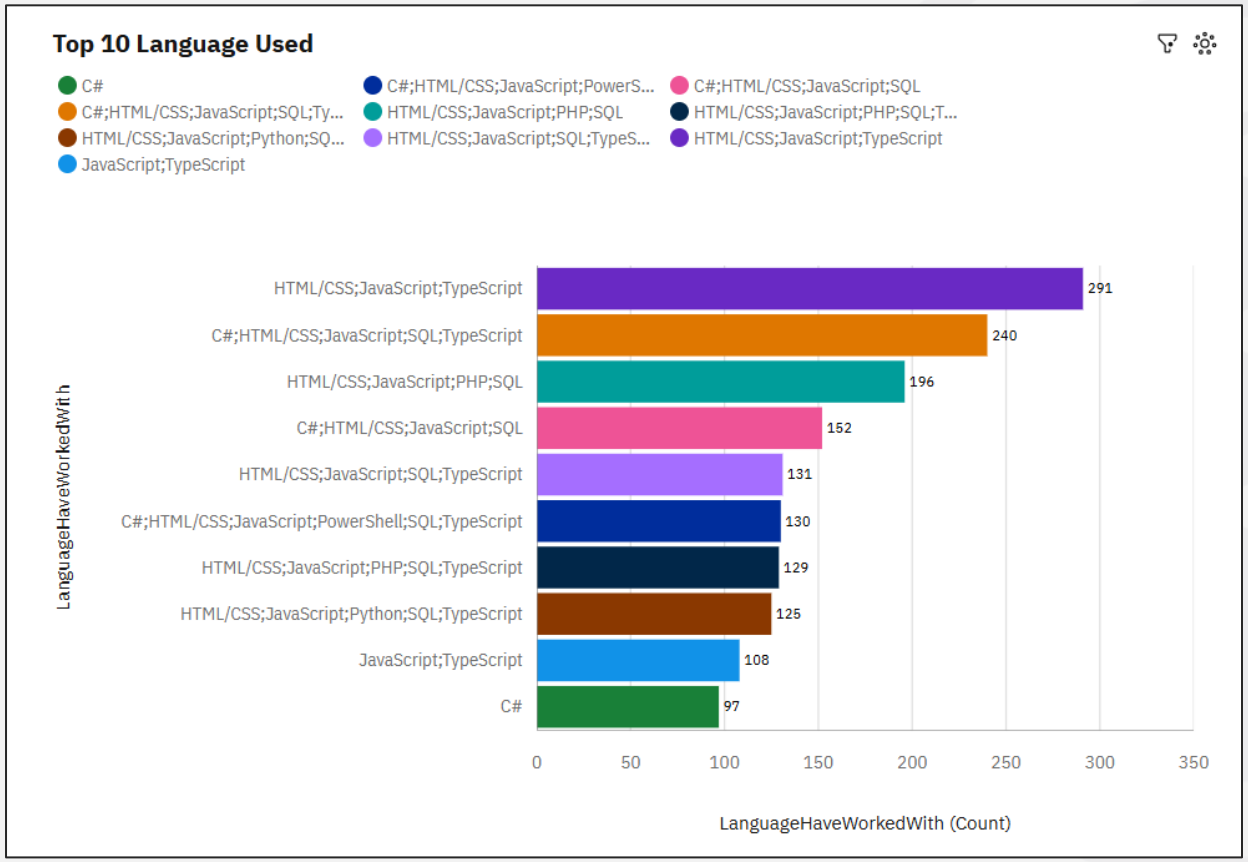
To obtain the names of the programming languages and their yearly wages, the IBM website was scraped. The dataset from a 2019 Stack Overflow developer survey was downloaded and saved.

Python was used to clean and analyze the data. To assess the distribution of data, the presence of outliers, and the correlation between various columns in the dataset, an exploratory data analysis was carried out.

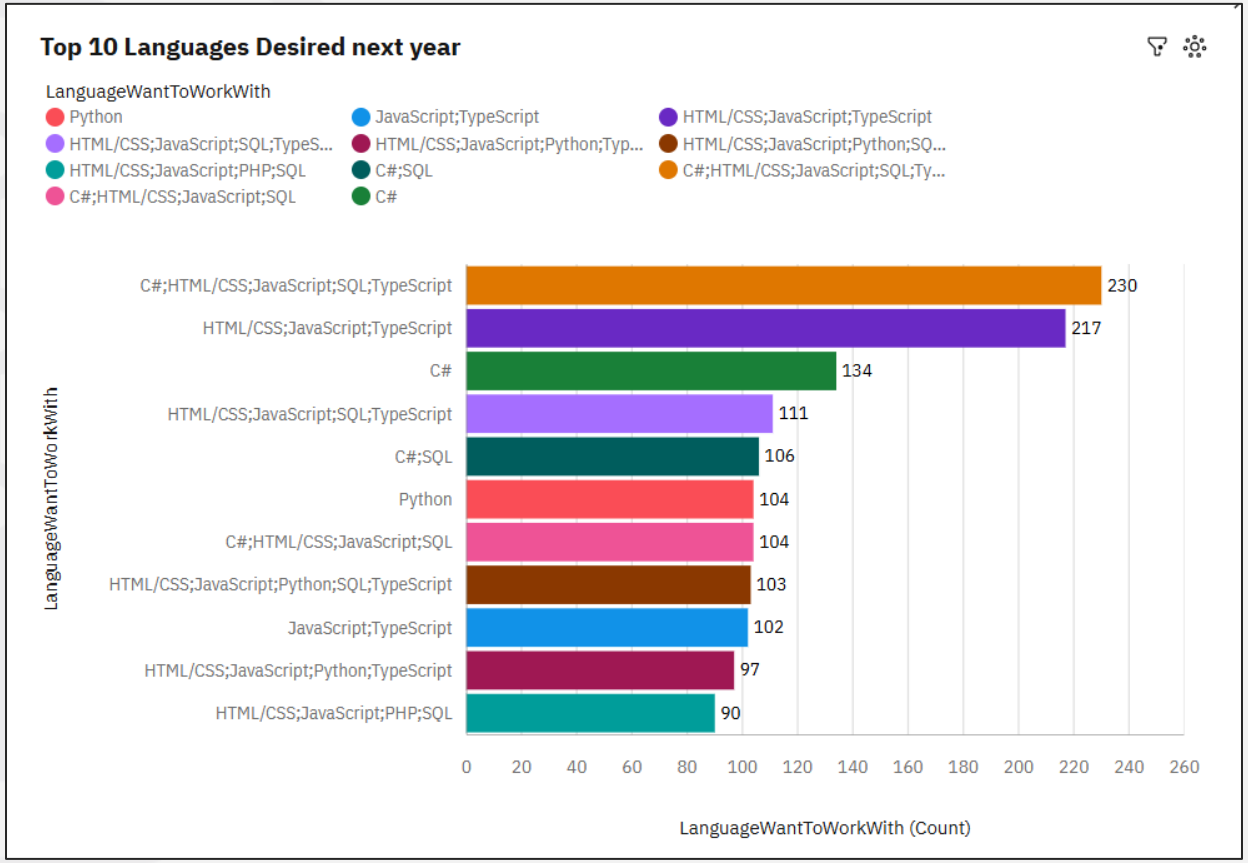
Charts, graphs, and dashboards were created using Python and Cognos analytics to visualize the data. All the python analyses were carried out on Jupyter notebook through visual studio.

PROGRAMMING LANGUAGE TRENDS

Current Year



Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

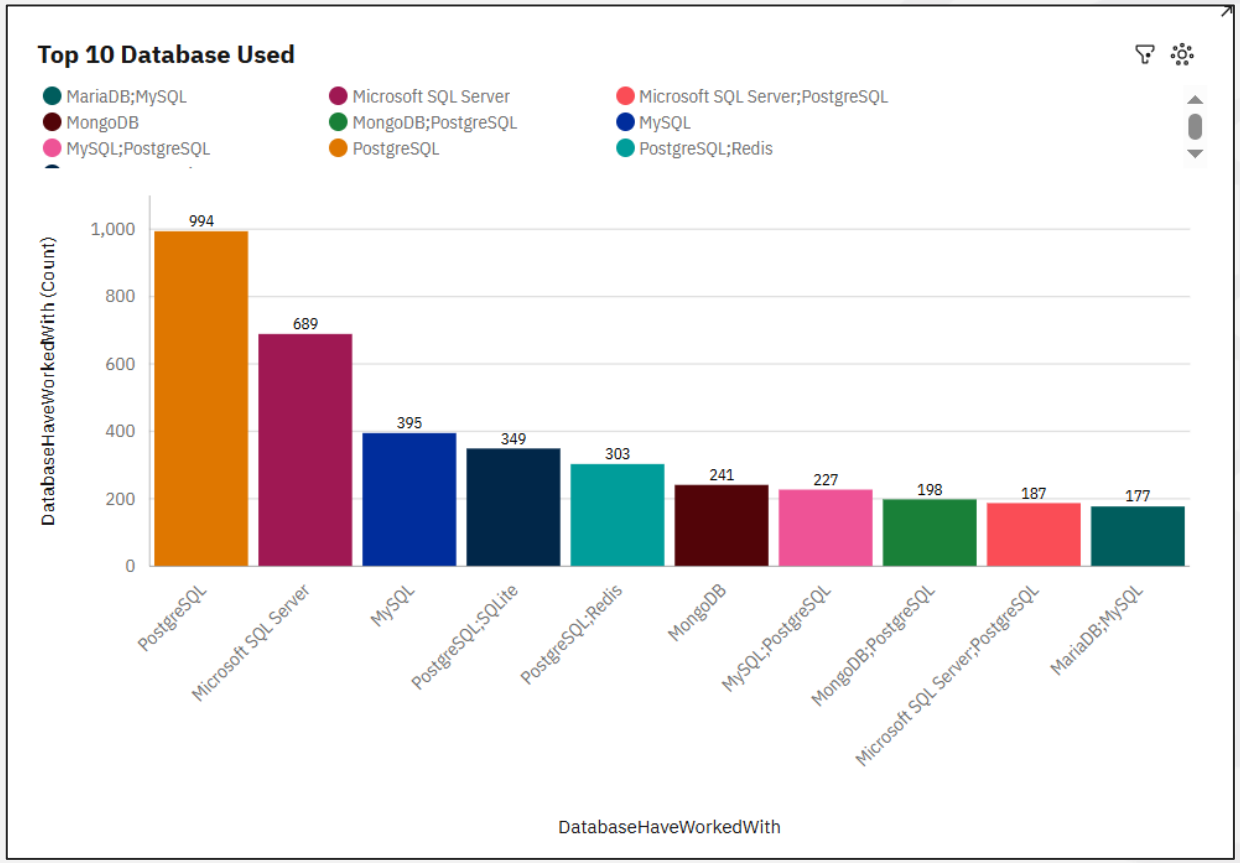
- **Web stack dominance** – HTML/CSS, JavaScript, TypeScript, and SQL remain the most widely used this year and continue to be in demand next year.
- **Shift in developer preference** – Python, currently not the most used, is one of the most desired languages for next year, showing growing interest in data science, AI, and automation.
- **Decline of C# usage** – While C# is heavily used currently, fewer developers want to continue with it, suggesting a shift toward more versatile and open-source ecosystems.

Implications

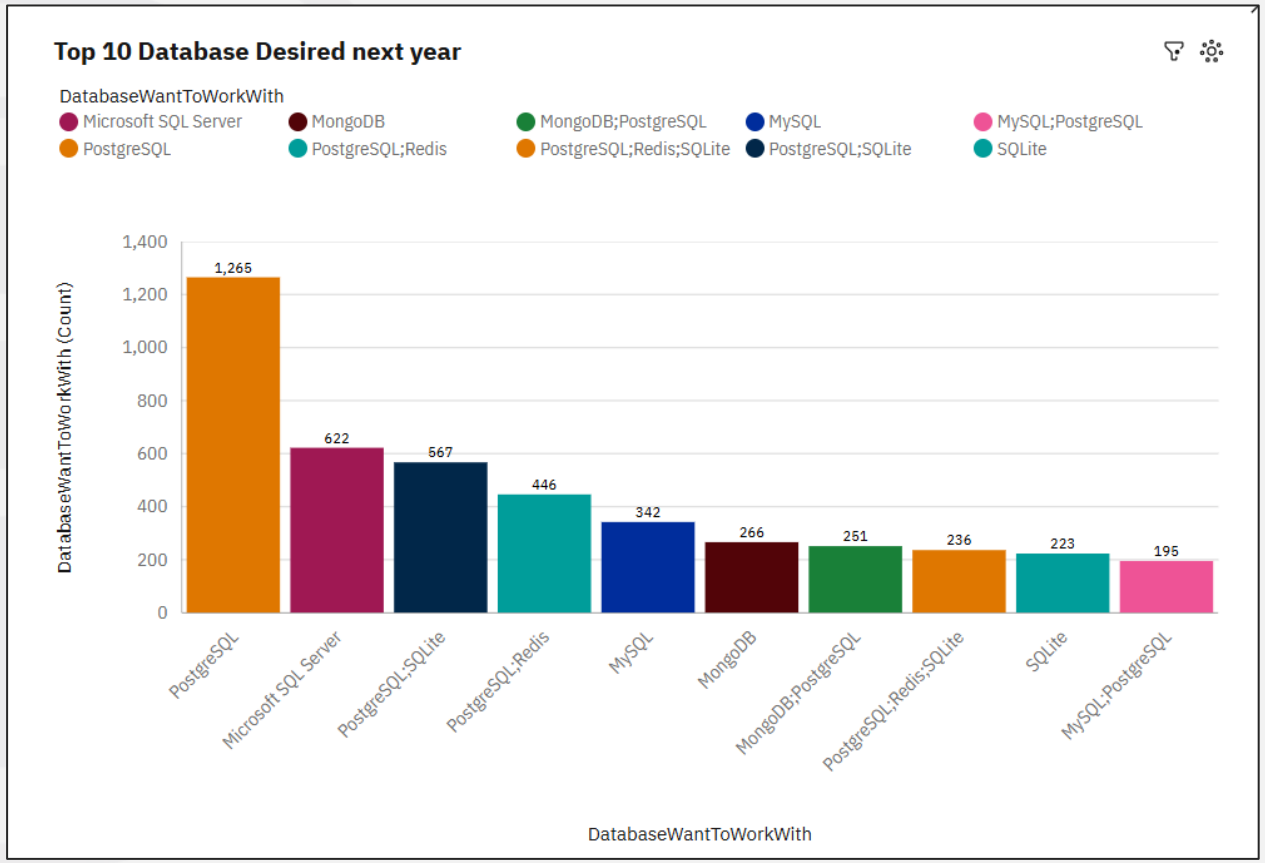
- **Upskilling opportunities** – Developers should prioritize learning Python and modern web stacks (TypeScript, SQL) to stay relevant in the coming year.
- **Hiring trends** – Companies may face challenges recruiting for high-demand skills like Python and TypeScript, requiring strategic talent development.
- **Technology strategy** – Organizations heavily invested in C# may need to balance legacy system maintenance with gradual adoption of more popular, future-oriented languages.

DATABASE TRENDS

Current Year



Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- **PostgreSQL dominates**: Most used now (994) and most desired next year (1265).
- **SQL Server steady**: Consistently second in both current (669) and future (622).
- **MySQL losing traction**: Significant current use (395) but lower demand ahead (342).
- **MongoDB stable**: Current (241) to future (266) shows steady NoSQL adoption.
- **Rising lightweight DBs**: PostgreSQL+SQLite (567), PostgreSQL+Redis (446), and SQLite (223) highlight demand for flexible, modern options.

Implications

- **Prioritize PostgreSQL skills** – Developers and companies should invest in PostgreSQL expertise for future growth.
- **Balance legacy & modern DBs** – Continue supporting SQL Server/MySQL while gradually modernizing with PostgreSQL and NoSQL.
- **Adopt hybrid strategies** – Combine SQL (PostgreSQL, SQL Server) with NoSQL (MongoDB, Redis) for scalability and flexibility.
- **Cloud & mobile focus** – Growing interest in SQLite and Redis shows demand for lightweight, embedded, and cloud-native database solutions.

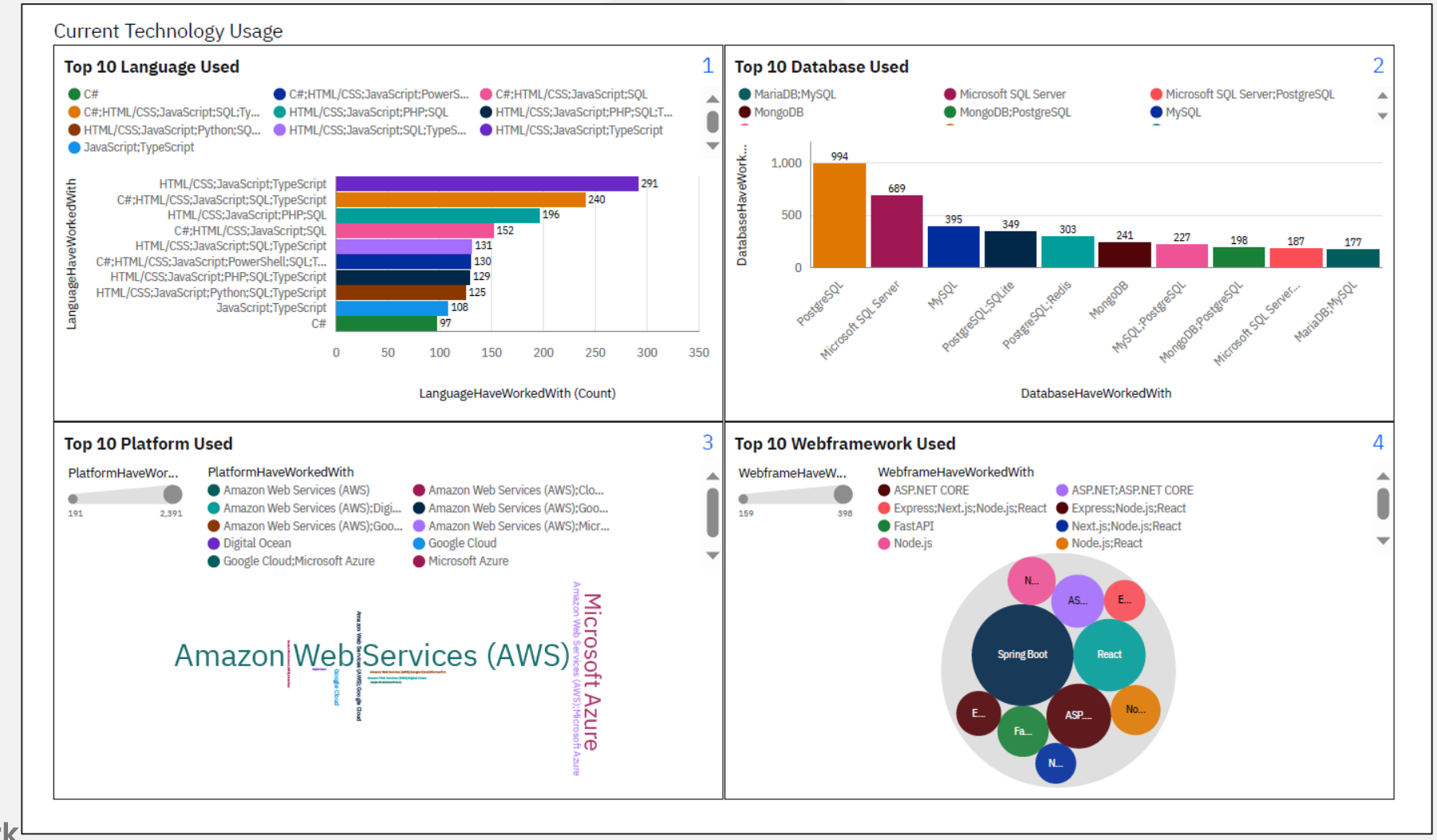
DASHBOARD

The permanent link of the Cognos dashboard:

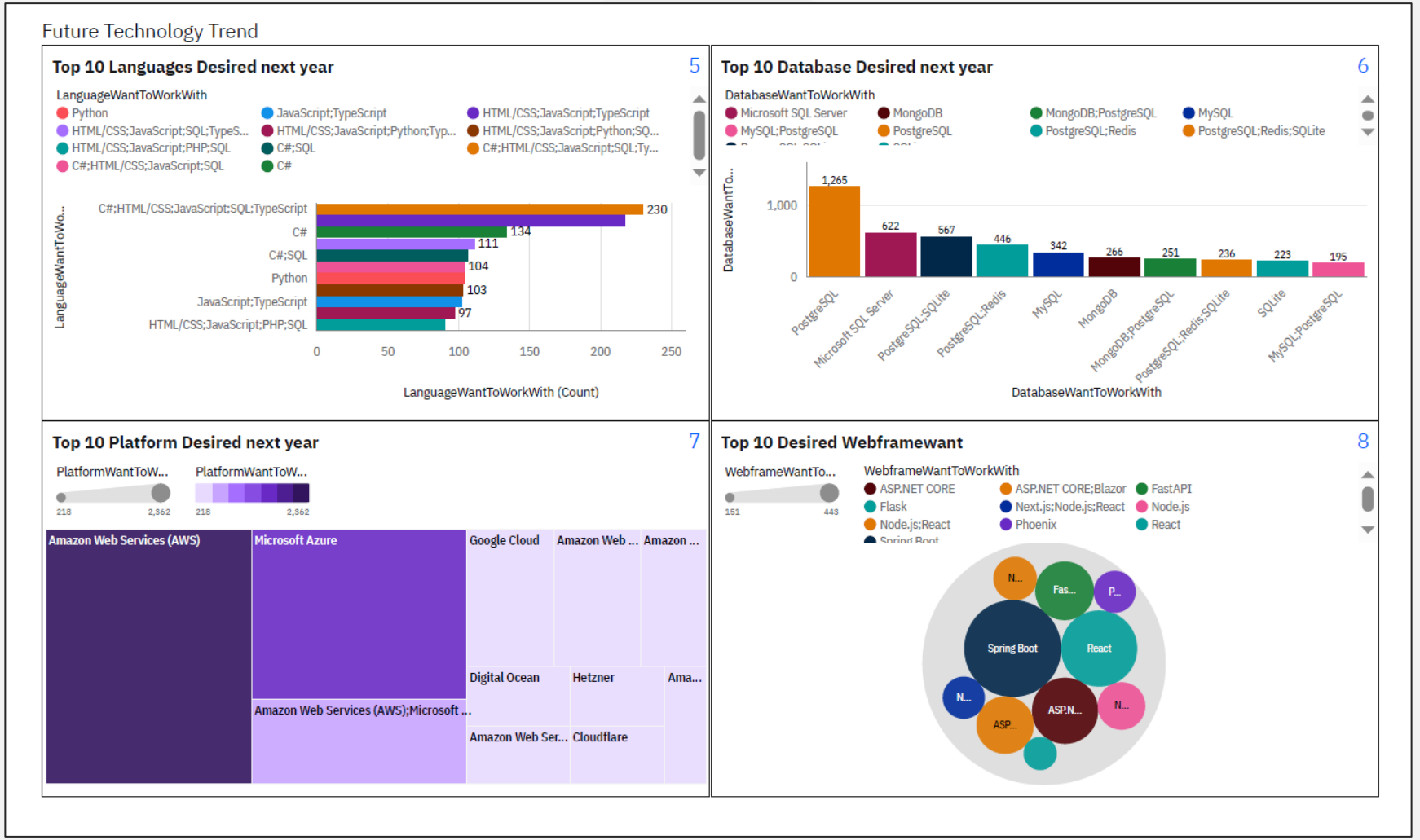
Press ctrl + click

https://ap1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.public_folders%2FMine%2FCapstone%2BProject&action=view&mode=dashboard&subView=model000001991d67f422_00000000

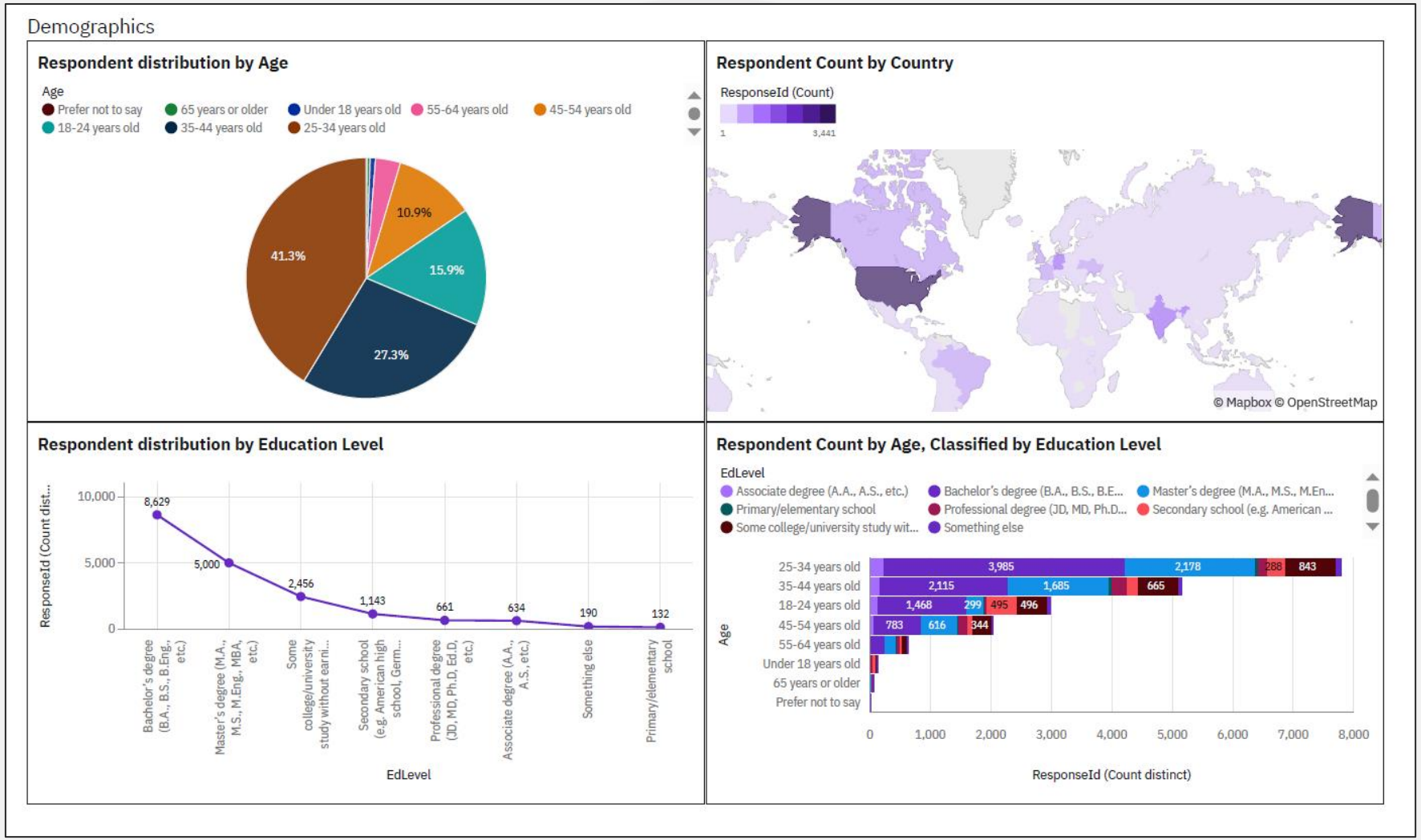
DASHBOARD TAB 1



DASHBOARD TAB 2



DASHBOARD TAB 3



DISCUSSION

Points

- Upskilling and continuous learning in the technology sector
- Strategies to close the gender gap in tech roles and leadership
- Is a master’s or doctorate degree necessary for career advancement?
- Rising demand for mobile development as Kotlin and Flutter gain popularity
- Expanding tech education and access in Southeast Asia, South America, Africa, and parts of Europe
- The future relevance of Oracle SQL in a rapidly evolving database landscape
- Impact of Artificial Intelligence and Machine Learning on future job roles
- Remote and hybrid work trends – how they affect tech hiring and retention
- Importance of open-source contribution for career growth and innovation
- Cybersecurity skills gap – are we preparing enough professionals?
- Cloud-native technologies and the growing need for DevOps skills
- Ethical concerns in AI and data privacy – what role should developers play?

OVERALL FINDINGS & IMPLICATIONS

Findings

- Most IT professionals hold a **Bachelor's degree**, and the sector is dominated by a **younger workforce under 40**.
- **Web development skills** (HTML, CSS, JavaScript, React JS) remain the most popular and in-demand tools.
- **PostgreSQL leads database adoption**, with rising interest in NoSQL solutions and future learning in PostgreSQL + React JS.
- Global data indicates **unequal access to tech training** in less developed regions, creating a digital skills gap.

Implications

- **Upskilling is essential** – Professionals need expertise in both SQL and NoSQL databases, plus modern frameworks like React JS.
- **Web development stays lucrative**, making it a reliable career and investment path for organizations.
- **Bridging the global skills gap** – Expanding access to tech education in less developed regions is crucial for inclusive growth.
- **Future-ready workforce** → Young talent must be guided toward long-term career growth through mentorship and advanced skills development.

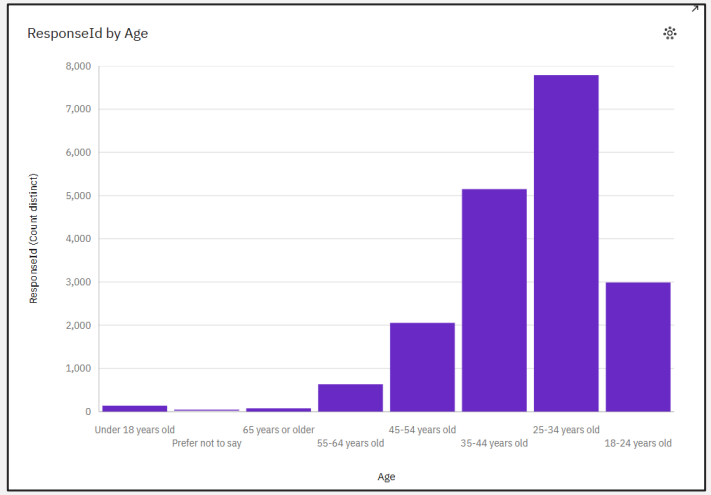
CONCLUSION

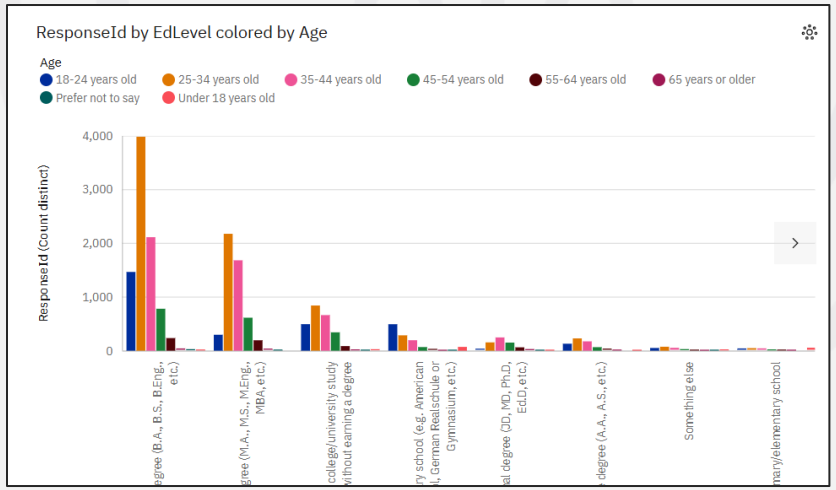
- **Open-source technologies dominate the future** – PostgreSQL, Python, and React JS are driving demand and shaping industry direction.
- **Continuous learning is the real currency** – Practical skills, certifications, and adaptability outweigh formal higher degrees.
- **Web development remains a cornerstone** – HTML, CSS, JavaScript, and React ensure strong career stability in tech.
- **Databases are evolving** – SQL remains essential, but professionals must also embrace NoSQL for hybrid solutions.
- **Young workforce fuels innovation** – With most professionals under 40, the sector has strong potential for long-term growth and adaptability.
- **Global disparities in tech education persist** – Expanding access in underdeveloped regions is critical for digital inclusivity.
- **Emerging technologies are reshaping roles** – AI, cloud computing, DevOps, and mobile development (Kotlin, Flutter) will redefine career paths.
- **Industry and academia must collaborate** – To align education with market needs, closing the skills gap faster.

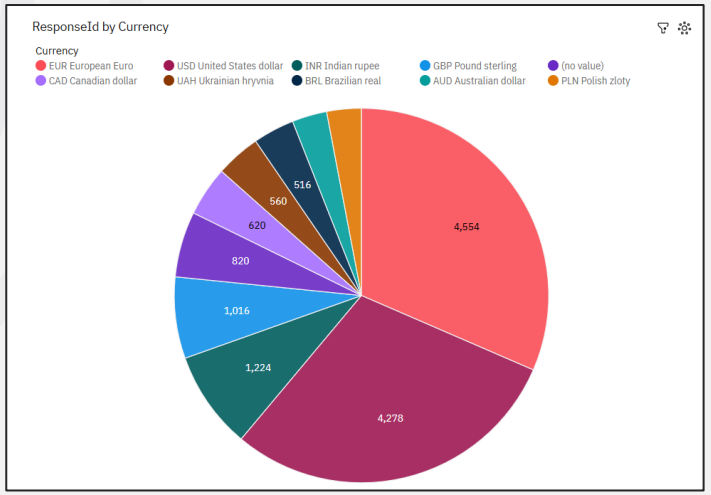
APPENDIX

ResponseId, Age, EdLevel, RemoteWork and Employment

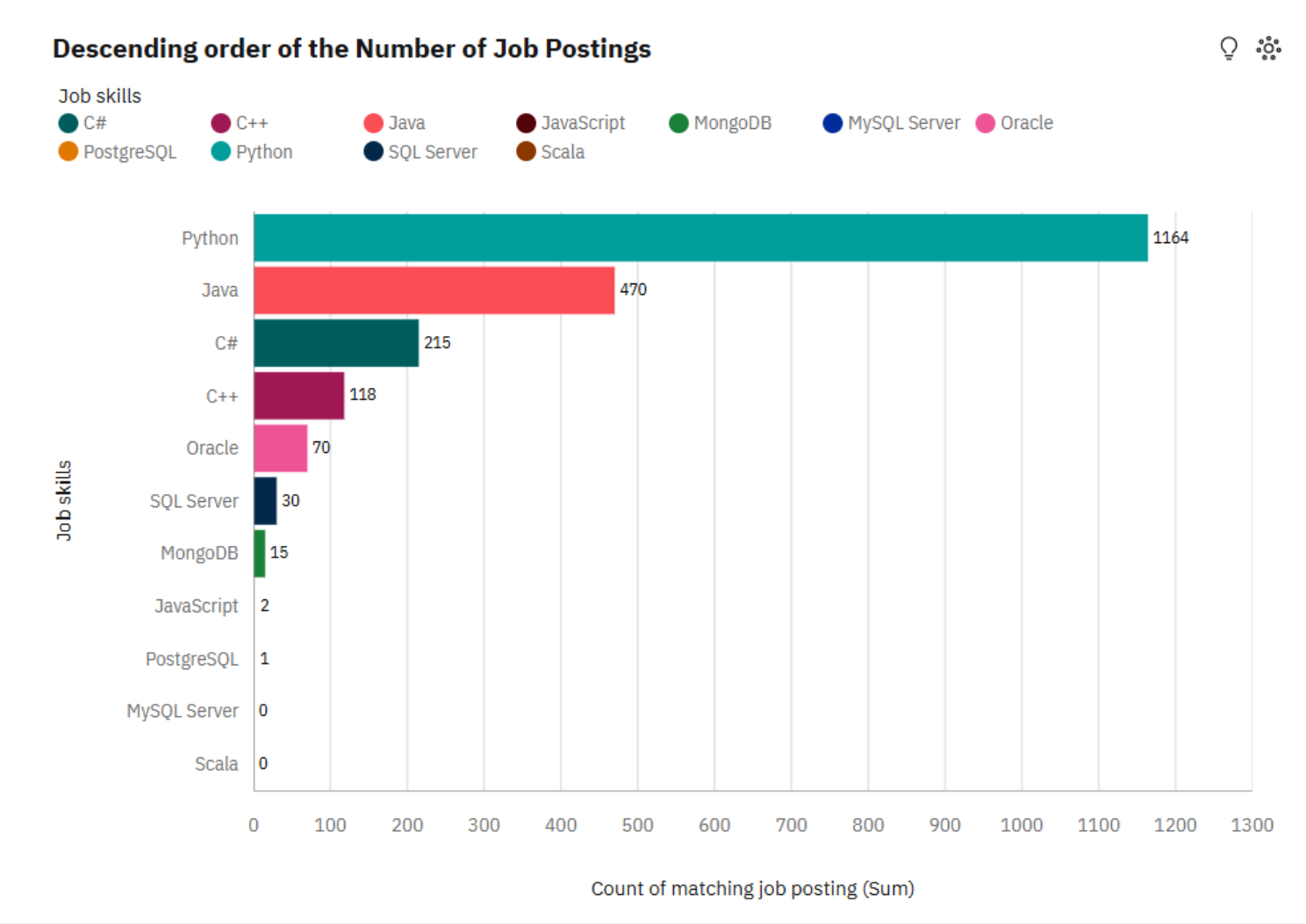
ResponseId	Age	EdLevel	RemoteWork	Employment
2	35-44 years old	Bachelor's degree (B....	Remote	Employed, full-time
3	45-54 years old	Master's degree (M.A....	Remote	Employed, full-time
10	35-44 years old	Master's degree (M.A....	Remote	Independent contrac...
11	35-44 years old	Bachelor's degree (B....	Remote	Employed, full-time
12	45-54 years old	Professional degree (...	In-person	Employed, full-time
19	25-34 years old	Some college/univers...	Hybrid (some remote,...	Employed, full-time
23	45-54 years old	Bachelor's degree (B....	Remote	Employed, full-time
24	55-64 years old	Bachelor's degree (B....	Hybrid (some remote,...	Employed, full-time







JOB POSTINGS



POPULAR LANGUAGES