IBM Data Analyst Capstone

Coty Feith

02.21.25

Skills Network

IBM

OUTLINE

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

EXECUTIVE SUMMARY

- Current Programming Trends
  - The analysis revels that the most commonly used programming technologies among developers include **HTML/CSS;JavaScript; Typescript**, and **C#;HTML/CSS; JavaScript; SQL; TypeScript**, indicating a strong preference for versatile and widely applicable languages in today's development landscape.

- Database Preferences:
  - The top three databases currently in use are **PostgreSQL, Microsoft SQL Server and MySQL**, reflecting a trend towards robust and reliable database solutions in enterprise environments.

- Preferred Platforms and Frameworks:
  - Microsoft Azure emerges as the leading platform utilized by developers, while **Spring Boot** and **React** rank as the most popular web frameworks, highlighting the importance of cloud services and modern development frameworks in current projects.

- Future Language Demand:
  - Looking ahead, **C#; HTML/CSS; JavaScript; TypeScript** is identified as the most desired programming language combination for the upcoming year, signifying a potential shift in skill requirements as organizations adapt to new technologies.

- Demographic Insights:
  - The survey shows that **41.3%** of respondents are aged **25-34**, indicated a young and dynamic workforce. Additionally, the majority of respondents hold at least a bachelor's degree, emphasizing the important of educational qualifications in the tech industry.

Skills Network

IBM

INTRODUCTION

This report aims to analyze job market trends by collecting and visualizing job postings data using the JOBS API. The primary objective is to identify the most in-demand job titles and technologies, helping learners and professionals make data-driven career decisions.

The target audience for this report includes job seekers, career advisors, and industry professionals who want to understand hiring trends. By presenting key insights, such as the most frequently posted job titles and required skills, this analysis provides valuable guidance for individuals looking to align their career paths with market demand.

METHODOLOGY

- Data Sources
  - Stack Overflow Developer Survey
- Data Collection and Preparation
  - The data was collected in various formats including CSV files, Excel Sheets and API extractions.
  - Data Cleaning techniques as removing duplicated, handing missing values and normalizing categorical variables.
- Analytics Techniques
  - Descriptive statistics, filtering and ranking, cluster analysis and regression analysis.
- Visualization and Dashboard Development
  - Google Looker Studio was used to create an interactive dashboard, incorporating many charts for trend analysis. Data was segmented into three key themes: Current Technology Usage, Future Technology Trends, and Developer Demographics.
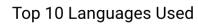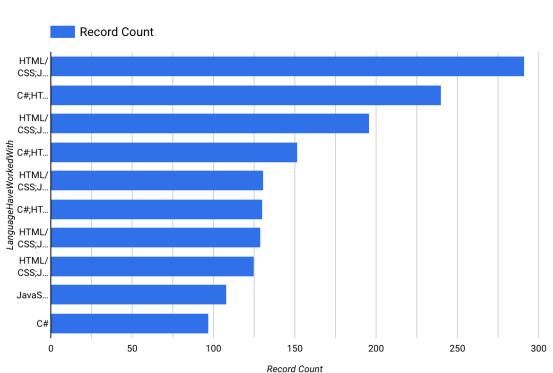
Skills Network

RESULTS

The data analysis aimed to identify current and future technology trends within the developer community, using insights from the latest **Stack Overflow Developer Survey** and additional sources such as **job postings and training portals**. The process involved data collection, organization, and analysis to extract meaningful trends and insights.

The analysis provided insights into both the **most commonly used technologies today** and the **skills expected to be in demand next year**, supporting data-driven decision-making for IT professionals and organizations.
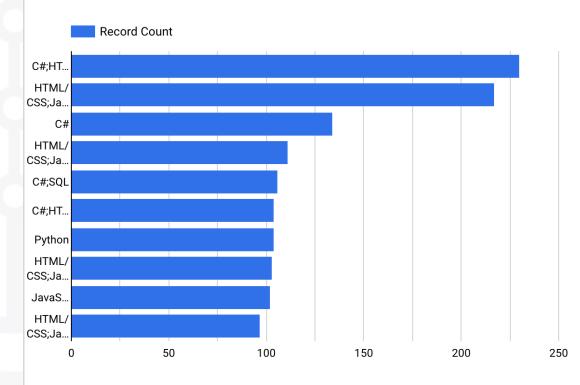
PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

- **Shift in Focus from Current to Desired Languages**: While HTML/CSS and JavaScript remain the top languages currently used, C# has shifted from a lower position in current usage (ranked 2nd) to a leading position in the desired languages for next year (ranked 1st). This suggests a growing recognition of the importance of C# in future development projects.

- **Increased Complexity in Desired Skill Sets**: The desired language combinations show a trend towards more complex stacks (e.g., C#; HTML/CSS; JavaScript; SQL; TypeScript) compared to the current usage, which indicates a preference for full-stack or multi-skilled developers who can navigate both frontend and backend technologies.

- **Emerging Trends in Technology Adoption**: Python's inclusion in multiple desired language combinations suggests a shift towards adopting technologies that facilitate data-driven development, reflecting the growing trend of integrating data science and analytics into software development.
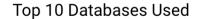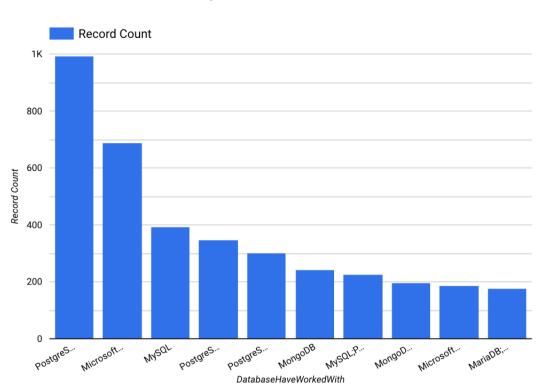
Implications

- **Adapt Training Programs to Anticipated Changes**: Organizations should adapt their training programs to prioritize C# and other languages that are expected to be in demand next year. This may involve updating curriculum and resources to prepare developers for emerging technologies and frameworks.

- **Encourage Multi-Disciplinary Skill Development**: Companies should promote a culture of continuous learning that encourages developers to acquire multi-disciplinary skills, particularly in the integration of frontend and backend technologies. This could include cross-training in both web development frameworks and database technologies.

- **Focus on Data Science and Analytical Skills**: Given Python's rise in the desired languages, businesses should invest in training that enhances employees' data science and analytical capabilities. This may involve partnerships with educational institutions to offer specialized courses in Python, data analysis, and machine learning.
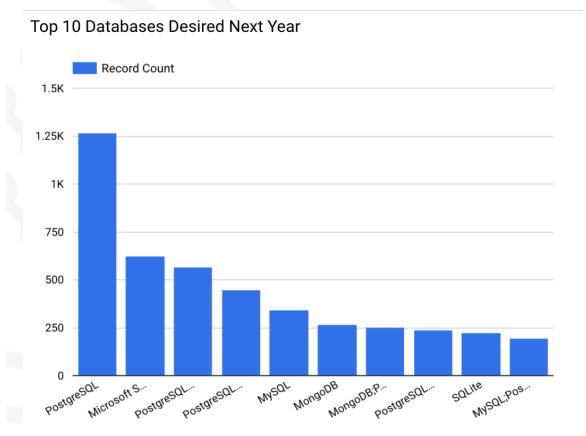
Skills Network

IBM

DATABASE TRENDS

Current Year

Top 10 Databases Used

Next Year

Top 10 Databases Desired Next Year

Skills Network

IBM

DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- **Stability of Popular Databases**: The top three databases—PostgreSQL, Microsoft SQL Server, and MySQL—remain consistently in high demand both this year and for the next year. This stability indicates their established roles in the industry and their reliability for various applications.

- **Emerging Trends with NoSQL Databases**: MongoDB appears in both the current and desired lists, reflecting a continued trend towards NoSQL databases. Its presence in multiple combinations highlights its versatility and growing acceptance among developers as a solution for handling unstructured data.

- **Continued Interest in Hybrid Solutions**: The presence of databases like PostgreSQL paired with SQLite and Redis in desired combinations indicates a trend toward using hybrid solutions. This suggests that developers are increasingly looking for ways to integrate multiple database types to enhance performance and scalability.

Implications

- **Focus on PostgreSQL Training**: Given PostgreSQL's consistent presence as a top database in both current and desired lists, organizations should prioritize training programs around PostgreSQL to ensure their teams are equipped with the skills needed to leverage this technology effectively.

- **Incorporate NoSQL in Learning Pathways**: As MongoDB continues to gain traction, it is essential for companies to incorporate NoSQL training into their development programs. This will help developers understand when to use NoSQL solutions and how to integrate them effectively with traditional SQL databases.

- **Encourage Hybrid Database Solutions**: Organizations should explore the benefits of hybrid database solutions and encourage their teams to become proficient in integrating different database technologies. This could involve training sessions or workshops focused on using multiple databases in tandem to optimize performance based on project needs.
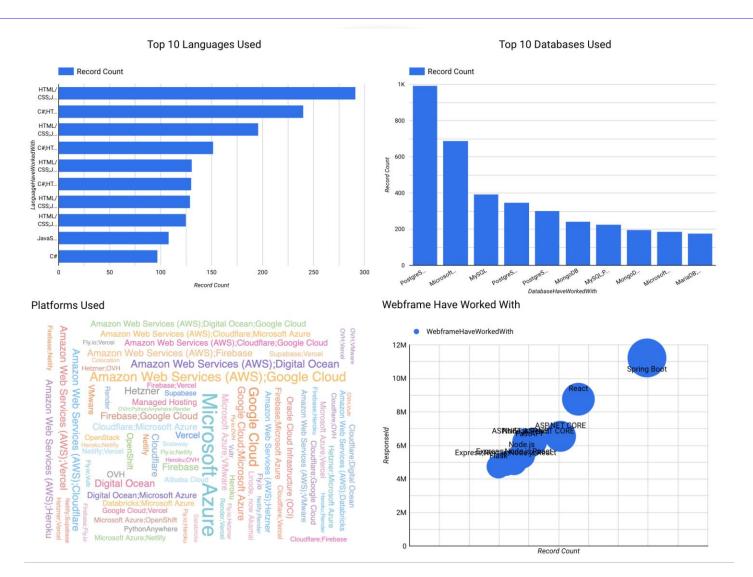
Skills Network

IBM

DASHBOARD

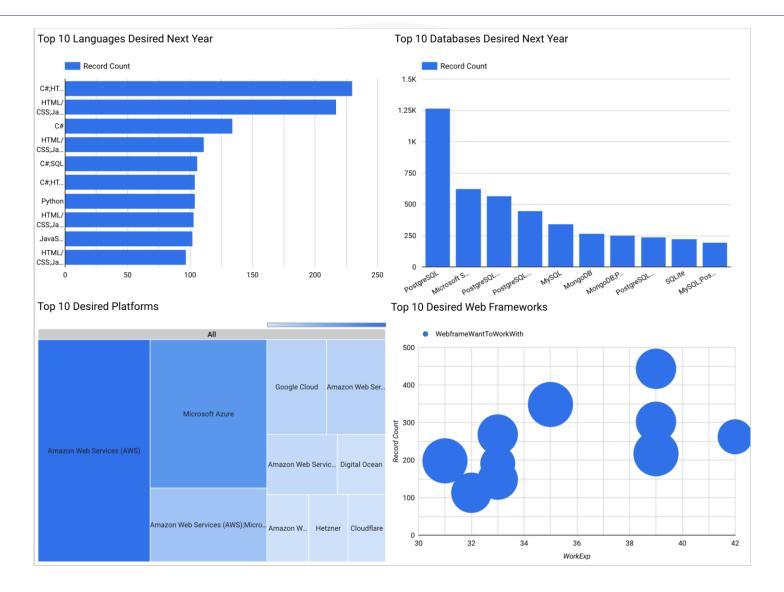https://github.com/cotyfeith15/IBM-Data-Analyst-Capstone/blob/19e426cf817342a22790708301e8fe6d1415e610/Capstone_-_Programming_Trends_-_CF.pdf
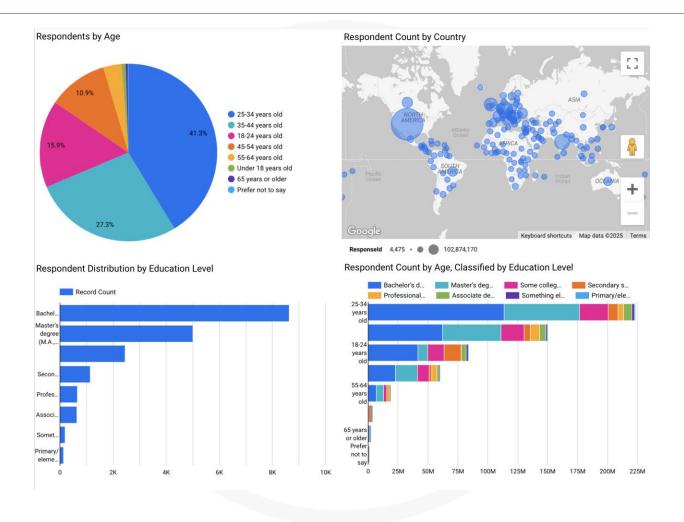
DASHBOARD TAB 1

DASHBOARD TAB 2

DASHBOARD TAB 3

DISCUSSION

- The analysis of current and future technology trends provides valuable insights into the evolving landscape of programming languages, databases, and platforms. Understanding these trends is critical for developers, employers, and educators in making informed decisions about skills development, hiring strategies, and curriculum planning.

Programming Languages: Specialization vs. Versatility

- One of the key takeaways from the programming language trends is the dominance of **C#, JavaScript, TypeScript, HTML/CSS, and SQL** in both current usage and future demand. The steady rise of **C#**, moving from the **10th most used language this year to the 3rd most desired next year**, indicates an increasing industry preference for its versatility in web development, enterprise applications, and game development.

- This raises important questions: Should developers focus on mastering one in-demand language like C#, or is it more beneficial to gain proficiency in multiple languages? The data suggests that **versatility is key**, as most top-ranked languages appear in various combinations. Employers likely favor candidates who can work with multiple technologies, reinforcing the importance of continuous learning.

- Moreover, **Python's growing demand** highlights the increasing need for **data science, AI, and backend development skills**. While not yet dominant, Python's presence in both current and desired lists signals a gradual shift toward data-centric roles in the job market.

Databases: The Rise of Hybrid Solutions

- PostgreSQL maintains its **number-one position in both current usage and future demand**, reinforcing its reputation as a scalable, open-source database that supports complex queries. However, the continued presence of **SQLite and Redis in combination with PostgreSQL** suggests a trend toward hybrid database usage, where developers utilize different databases for distinct purposes.

- For instance, developers might use **PostgreSQL for structured data** and **Redis for caching or real-time processing**, demonstrating a shift away from a single-database approach. **MongoDB's persistent presence** also signals a growing need for flexible, NoSQL solutions, particularly in applications dealing with large volumes of unstructured data.

- These findings imply that **modern developers need to be proficient in not just SQL-based databases but also NoSQL alternatives**, ensuring they can work efficiently in environments requiring both structured and unstructured data management.

Platforms & Frameworks: The Growing Influence of Microsoft Technologies

- Microsoft's influence is clear across multiple categories. **Microsoft Azure** is the dominant platform for both current and future usage, while **ASP.NET Core** emerges as the most desired web framework for next year. This suggests that enterprises continue to rely on Microsoft's ecosystem for cloud computing and web development.

- The continued dominance of Microsoft technologies has implications for both developers and businesses. For developers, **learning Microsoft-based technologies like Azure, C#, and ASP.NET Core can significantly boost job prospects**. For organizations, investing in Microsoft's infrastructure means access to an integrated suite of services, potentially improving efficiency and scalability.

Key Takeaways for Developers and Organizations

- **Versatility is more valuable than ever** – Developers should aim to master multiple programming languages rather than specializing in just one.

- **Hybrid database solutions are becoming the norm** – Employers and educators should emphasize SQL and NoSQL database management skills.

- **Microsoft's ecosystem is growing in dominance** – Developers should consider learning Azure, C#, and ASP.NET Core to align with future industry needs.

- Ultimately, these findings reinforce the importance of adaptability in the tech industry. Developers and organizations that stay ahead of these trends will be better positioned for long-term success in an evolving digital landscape.

OVERALL FINDINGS & IMPLICATIONS

- **Findings & Implications**

- **1. C# is Rapidly Gaining Popularity**

- **Finding:** C# moved from the 10th most used programming language this year to the 3rd most desired next year.
  Implication: Developers should consider learning or improving their C# skills, as demand is increasing for enterprise applications, game development, and full-stack development.

- **2. Versatility in Programming Languages is Key**

- **Finding:** Most commonly used and desired languages appear in combinations (HTML/CSS, JavaScript, SQL, TypeScript, C#) rather than standalone.
  Implication: Developers should aim to master multiple languages rather than just one, as companies favor candidates with diverse technical skills.

- **3. PostgreSQL is the Leading Database Choice**

- **Finding:** PostgreSQL ranks first in both current usage and future demand, often appearing alongside Redis, SQLite, and MongoDB.
  Implication: Developers should focus on PostgreSQL while also gaining exposure to complementary databases, particularly hybrid SQL-NoSQL solutions.

- **4. Microsoft Technologies are Expanding Their Dominance**

- **Finding:** Microsoft Azure is the top cloud platform for both current and future use, and ASP.NET Core is the most desired web framework.
  Implication: Learning Microsoft-based technologies (Azure, ASP.NET Core, C#) will provide a competitive edge in the job market, especially for enterprise-level roles.

- **5. The Developer Workforce is Highly Educated and Young**

- **Finding:** 41.3 percent of developers are between 25 and 34 years old, and the majority hold a bachelor's or master's degree.
  Implication: Employers should tailor recruitment strategies toward early-career professionals while ensuring continued education and upskilling opportunities for developers.

Skills Network

CONCLUSION

The analysis of current and future technology trends highlights key shifts in programming languages, database preferences, and platform adoption. C# is experiencing a significant rise in demand, reinforcing the need for developers to expand their skill sets beyond traditional web development. PostgreSQL remains the dominant database, with increasing adoption of hybrid database solutions, suggesting a growing need for flexibility in data management. Additionally, Microsoft technologies, including Azure and ASP.NET Core, continue to shape the tech landscape, emphasizing the importance of enterprise-focused tools and platforms.

Next Steps
- **Upskilling & Training:** Developers should prioritize learning C#, ASP.NET Core, and PostgreSQL to align with future industry demands.
- **Industry Adaptation:** Organizations should invest in training programs for emerging technologies to remain competitive.
- **Further Research:** Future studies can explore regional variations in technology adoption, industry-specific trends, and the impact of AI on programming language preferences.

Strategic Recommendations:

- **Align Education & Training Programs with Industry Needs**
  - Universities and coding bootcamps should expand **C# and ASP.NET Core training**, as these skills are seeing increased demand.

- **Future-Proofing Development Teams**
  - Businesses should **provide continuous learning opportunities** for their developers, particularly in **Python and cloud-based solutions**, ensuring adaptability to shifting tech trends.

- **Database & Cloud Migration Planning**
  - Organizations should assess whether their **database strategies align with industry trends**, particularly considering the strong position of **PostgreSQL and Microsoft SQL Server** in both current and future usage.

This research provides a data-driven foundation for both developers and businesses to make informed decisions about technology investments and career development.
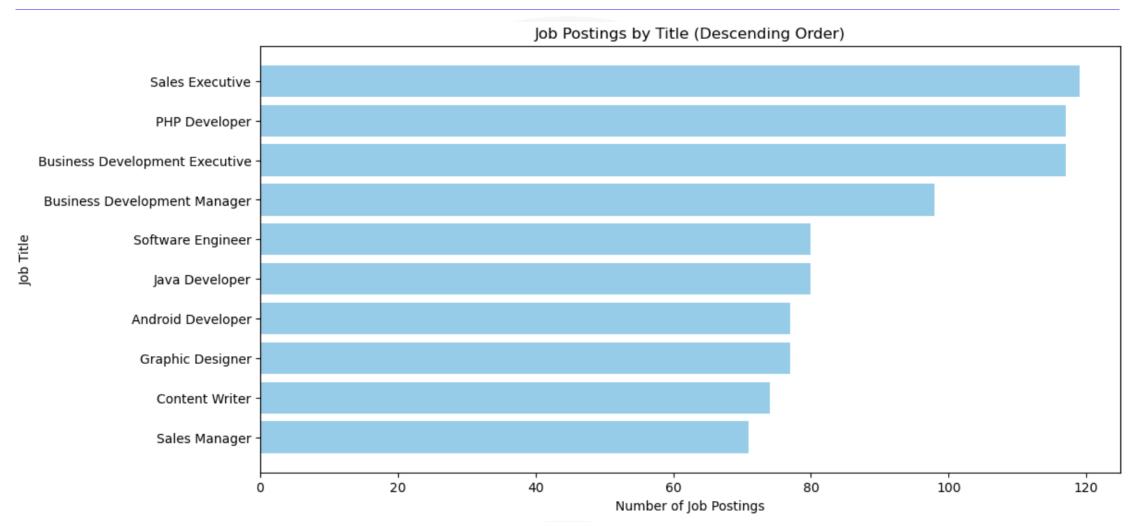
APPENDIX

- Data Source: The data set used in this assignment is the Stack Overflow Developer Survey data is available at: https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/HLOosvsPgIwt5dgOOh1RSg/survey-data-updated.csv

IBM

JOB POSTINGS

Job Postings by Title (Descending Order)

POPULAR LANGUAGES