



Developer Ecosystem Analysis

Current Trends and Future Demands

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EXECUTIVE SUMMARY

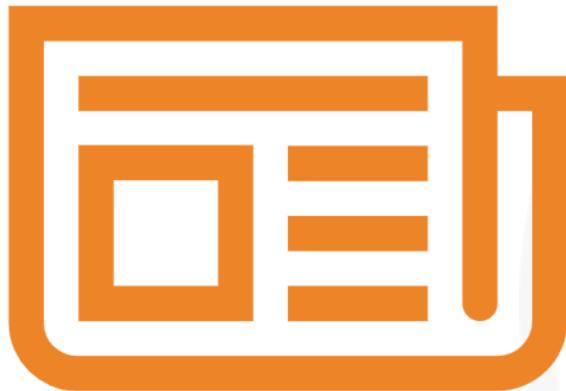
- This project analyzes 18,845 developer responses from the '`survey_data_updated.csv`' dataset to identify key technology trends.
- **Current Usage:** JavaScript (14.9k), PostgreSQL (11.5k), and Amazon Web Services (AWS) (10.8k) dominate the current developer stack.
- **Future Demand:** The most-desired technologies reveal a focus on fundamentals and modern stacks: PostgreSQL (12.1k) is the #1 desired database, while JavaScript (11.5k) and SQL (10.9k) are the top 2 desired languages.
- **Key Insight:** While foundational skills like SQL and JavaScript remain critical for the future, the rise of TypeScript (10.4k desired) shows a clear industry trend towards type-safety.

INTRODUCTION



- **Purpose:** To analyze the 2024 developer survey data to understand the current technology landscape and identify emerging developer preferences for the coming year.
- **Audience:** Tech Recruiters, Chief Technology Officers (CTOs), Engineering Managers, and developers seeking to future-proof their skills.
- **Value:** To provide actionable, data-driven insights for making strategic decisions about technology adoption, hiring focus, and personal skill development.

METHODOLOGY



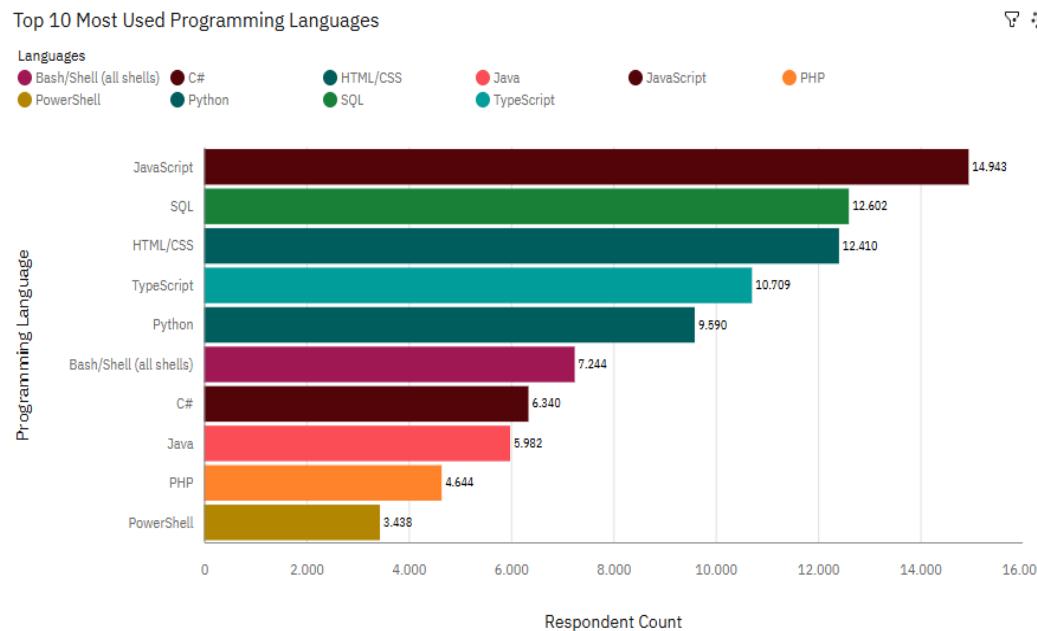
- **Data Source:** Raw survey data from 'survey_data_updated.csv' (18,845 respondents).
- **Data Preparation (ETL):** The primary challenge was handling complex, multi-value fields separated by semicolons (e.g., "JavaScript; Python").
- **Our Solution:** Used Python (Pandas) to "melt" (unpivot) and "explode" (split) the complex data into two clean, analysis-ready CSV files:
 - Project_Technologies.csv (Normalized technology data)
 - Project_Demographics.csv (Cleaned demographic data)
- **Visualization Tool:**
 - The two new CSVs were loaded as data assets into IBM Cognos Analytics.
 - A 3-tab interactive dashboard was built to visualize the 12 key metrics required by the project.



PROGRAMMING LANGUAGE TRENDS

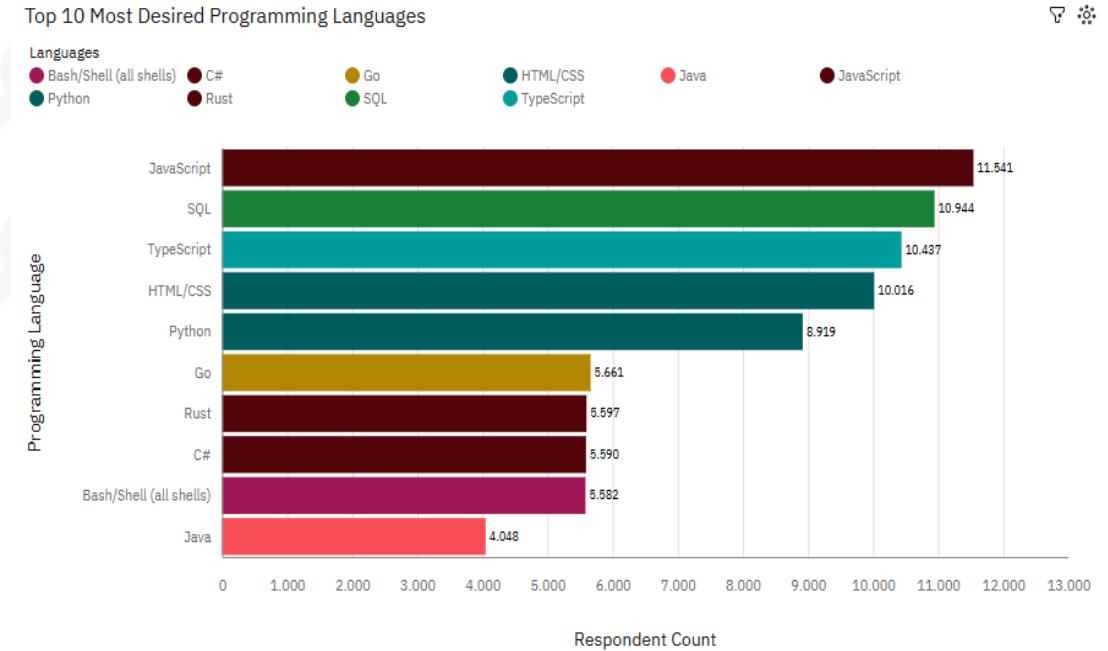
• Current Year

➤ Top 10 Most Used Programming Languages



• Next Year

➤ Top 10 Most Desired Programming Languages



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

- JavaScript is the undisputed leader. It is the #1 most-used language (14.9k) AND the #1 most-desired language (11.5k) by developers.
- Foundational skills are critical. SQL is the #2 most-desired "language" (10.9k), highlighting the universal importance of database skills for all developer roles.
- TypeScript (10.4k desired) follows closely behind SQL. Its popularity as the #4 most-used language (10.7k) shows it's not just a trend but a new standard replacing plain JavaScript.

Implications

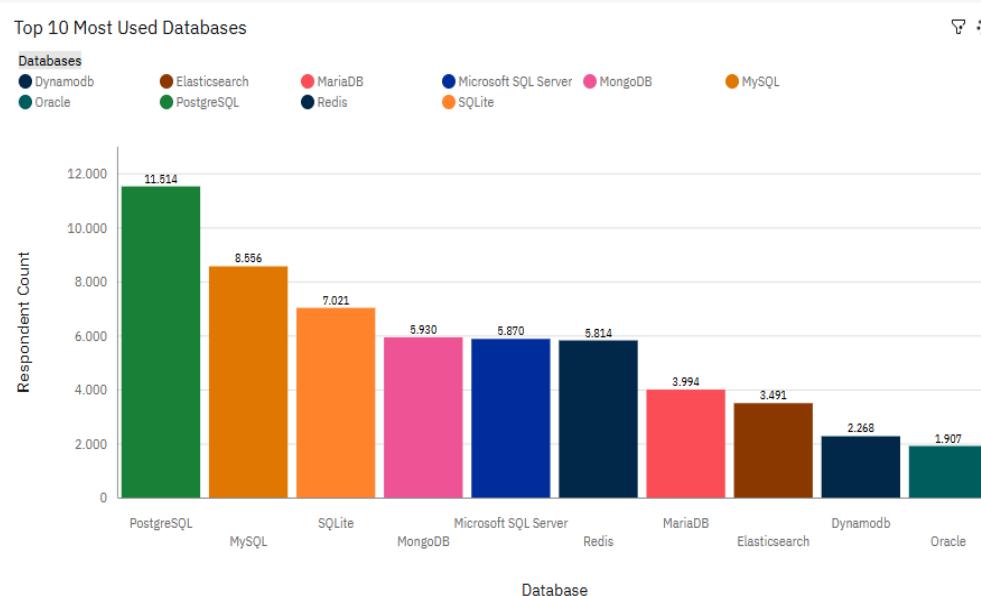
- Developers must have strong SQL skills; it is not just for database administrators. It is the second most-requested skill for future projects.
- While JavaScript is essential, the growth of TypeScript suggests that new projects should strongly consider adopting it for better scalability and maintenance.



DATABASE TRENDS

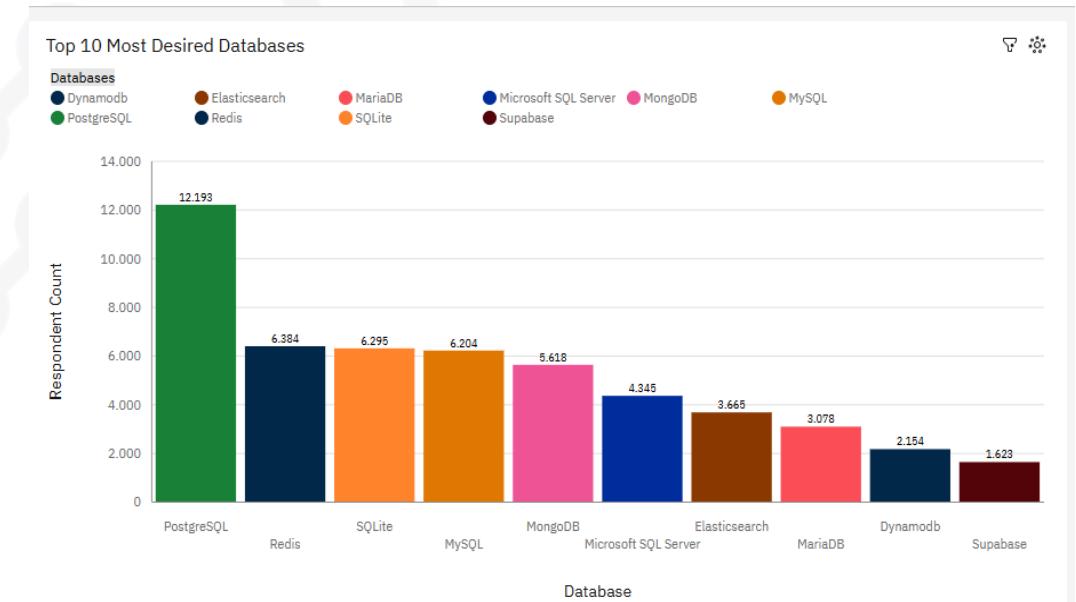
• Current Year

➤ Top 10 Most Used Databases



• Next Year

➤ Top 10 Most Desired Databases



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- PostgreSQL is the undisputed champion. It is the #1 most-used database (11.5k) AND the #1 most-desired database (12.1k).
- While MySQL (8.5k) is heavily used, developer interest is shifting. More developers desire Redis (6.3k) and SQLite (6.2k) over MySQL (6.2k) for future projects.

Implications

- Proficiency in PostgreSQL is now a critical skill for all back-end and full-stack developers.
- Companies still relying heavily on MySQL should evaluate the growing ecosystem and strong developer preference for PostgreSQL.



DASHBOARD

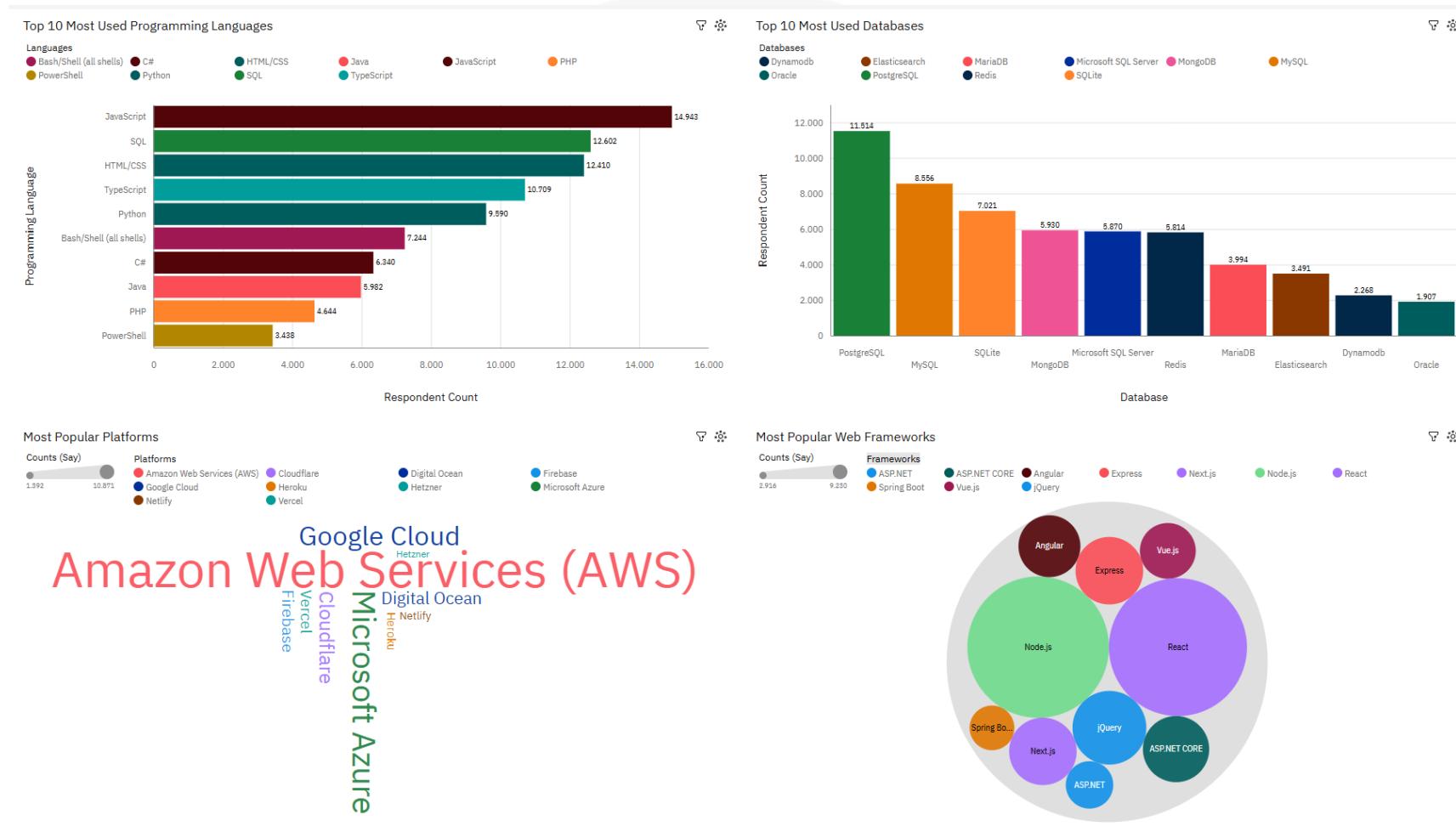
IBM Cognos Dashboard Screenshots



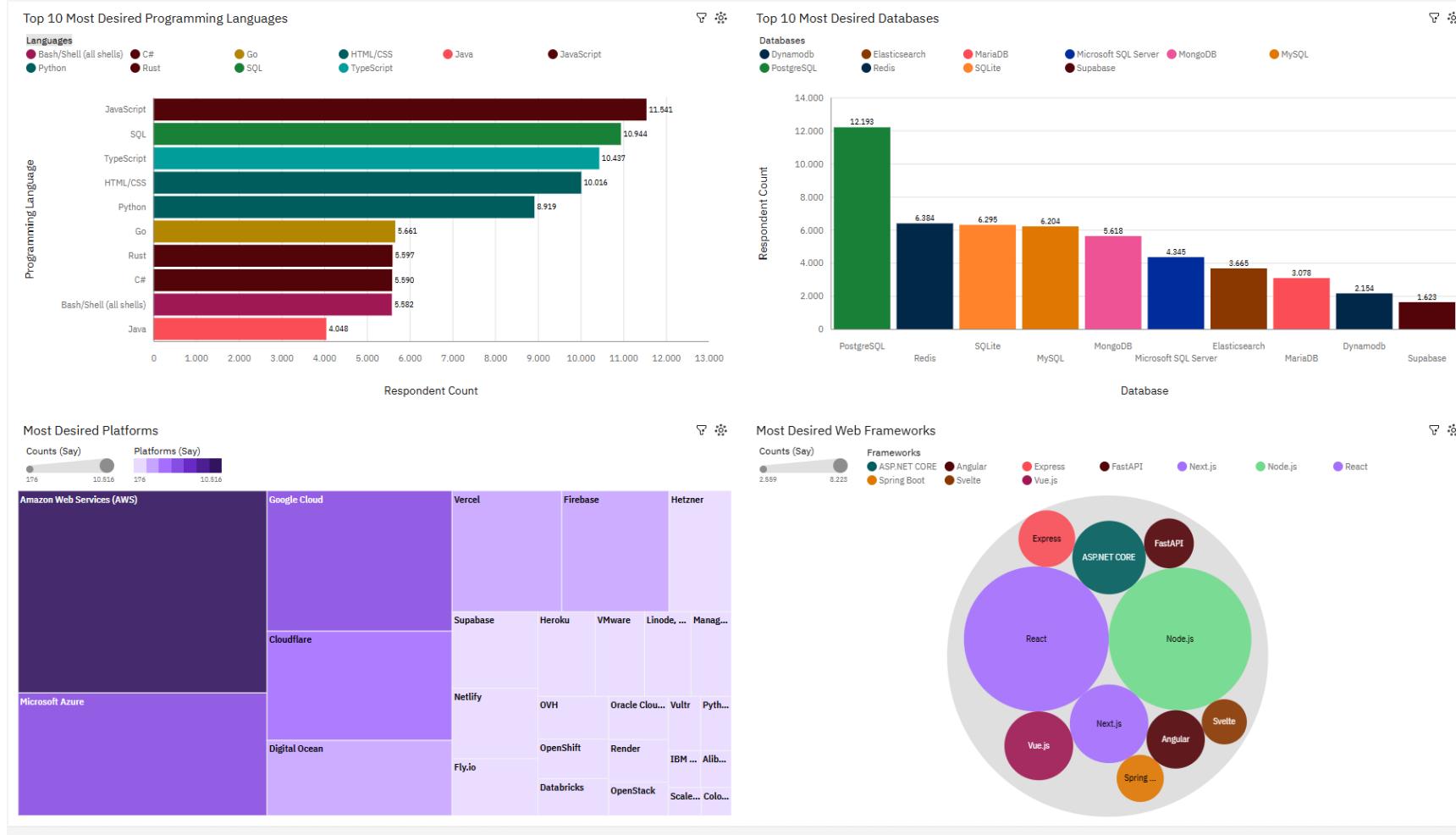
Skills Network



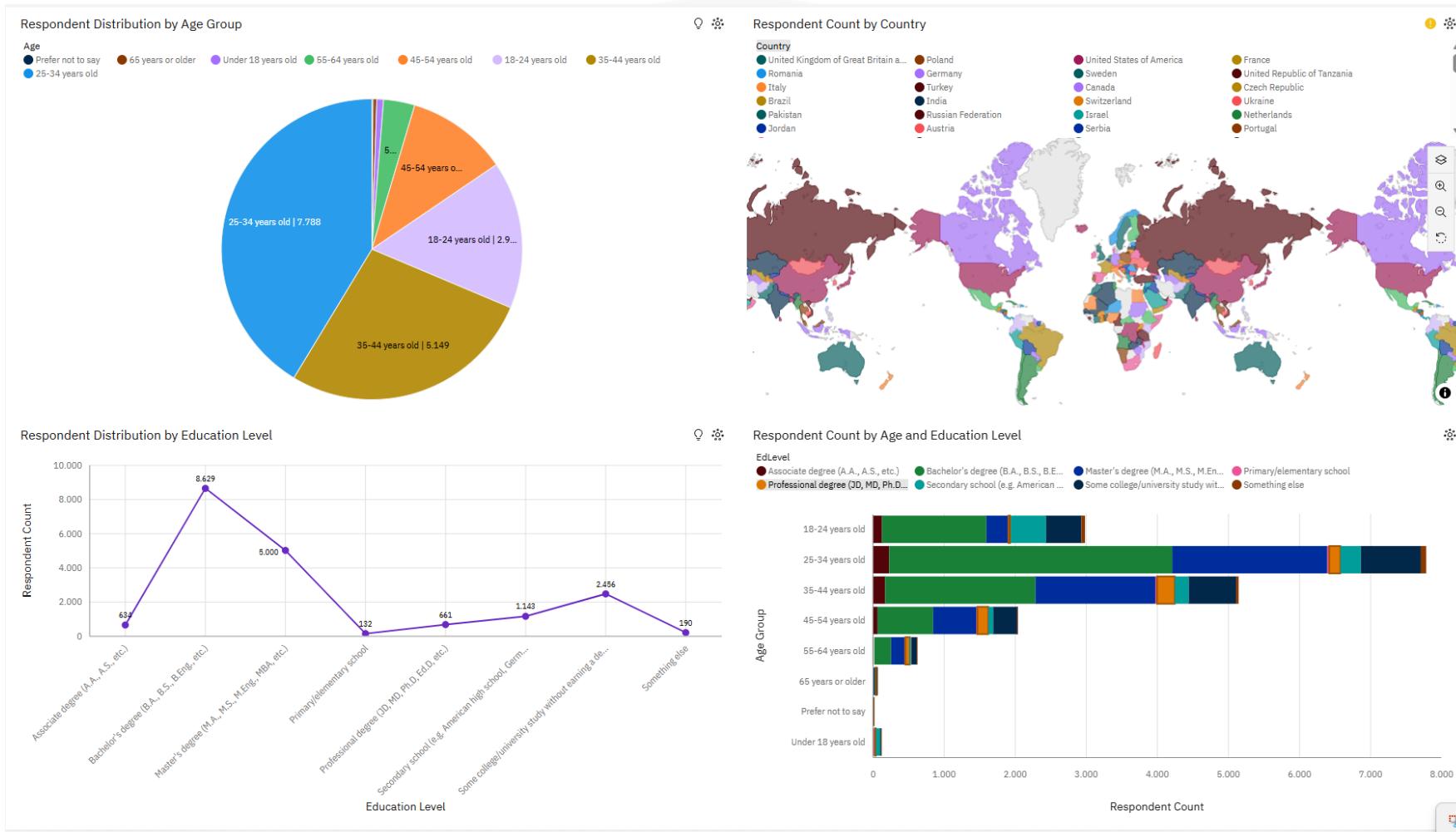
Dashboard: Current Technology Usage



Dashboard: Future Technology Trend



Dashboard: Demographics



DISCUSSION



- **(Platform):** Cloud computing is dominated by the "Big 3". AWS (10.8k) is the most-used platform, followed by Microsoft Azure (6.6k) and Google Cloud (5.5k). Developer desire remains strongest for these same three platforms.
- **(Framework):** The JavaScript ecosystem is king. Node.js (9.2k) and React (8.9k) are the most-used web frameworks by a large margin. Future demand remains highest for React (7.7k) and Node.js (6.9k).
- **(Demographics):** The primary developer demographic consists of professionals aged 25-34 (6.9k respondents), holding a Bachelor's degree (8.3k respondents), and primarily based in the USA (4k respondents).



OVERALL FINDINGS & IMPLICATIONS

Findings (What We Saw in the Data)

- **JavaScript and SQL are the Undisputed Foundations**
 - JavaScript is not only the **#1 most-used language (14.9k)** but also the **#1 most-desired language (11.5k)**. It remains the "lingua franca" of the web.
 - SQL is the **#2 most-used "language" (12.6k)** and the **#2 most-desired (10.9k)**. This proves that database literacy is no longer a niche skill but a core requirement for *all* developer roles.
- **The "Big 3" Cloud Standard is Unbreakable**
 - The cloud market is dominated by **Amazon Web Services (AWS) (10.8k)**, **Microsoft Azure (6.6k)**, and **Google Cloud (5.5k)** as the top 3 most-used platforms.
 - Crucially, they are *also* the **top 3 most-desired platforms**, in the exact same order. This indicates high market stability; skills in these three platforms are a safe and highly transferable career investment.
- **A Clear "Changing of the Guard" is Visible**
 - **In Databases:** **PostgreSQL** is the clear champion. It's the **#1 most-used (11.5k)** and the **#1 most-desired (12.1k)** database, showing massive community trust. While MySQL is still heavily used (#2 at 8.5k), developer interest has shifted: more developers desire high-performance tools like **Redis** (#2 desired at 6.3k) over MySQL (#4 desired at 6.2k).
 - **In Frameworks:** The **React ecosystem (React/Node.js)** is dominant. Legacy tools like **jQuery** (#3 used at 4.8k) are still *used* (in maintenance projects), but they have almost zero *desire* from developers. The future is clearly **React** (#1 desired at 8.2k) and **Node.js** (#2 desired at 8.0k), with modern frameworks like **Next.js** rising fast.
 - **The Big Language Shift:** The most significant trend is **TypeScript**. It's the **#4 most-used language (10.7k)** but the **#3 most-desired (10.4k)** (right behind JavaScript and SQL). This signals a massive, industry-wide adoption of type-safety, moving away from plain JavaScript for large-scale applications.

Implications (What This Means)

- **The "Modern Full-Stack" Profile is Clearly Defined**
 - Based on this data, the ideal, most "hireable" developer profile for 2024+ is proficient in:
 - **Frontend/Backend:** JavaScript, TypeScript, React, and Node.js
 - **Database:** PostgreSQL (and strong SQL skills)
 - **Cloud:** AWS (or, as a strong alternative, Azure)
- **For Companies - Adapt or Lose Talent**
 - Companies still running on legacy stacks (like jQuery, classic ASP.NET, or older database systems) will face extreme difficulty hiring new talent. The data clearly shows developers *want* to work with modern tools (React, Next.js) and reliable databases (PostgreSQL).
 - Investing in migration to PostgreSQL and adopting TypeScript are no longer "trendy" moves; they are data-backed strategies required to attract and retain top engineering talent.
- **For Developers - Focus Your Learning**
 - **Safe Bets:** Mastering SQL, PostgreSQL, and AWS are the safest long-term career investments.
 - **High Growth:** The fastest way to stand out is by mastering **TypeScript**.
 - **The Baseline:** JavaScript, React, and Node.js are no longer optional skills; they are the baseline expectation for the vast majority of web development roles.



CONCLUSION



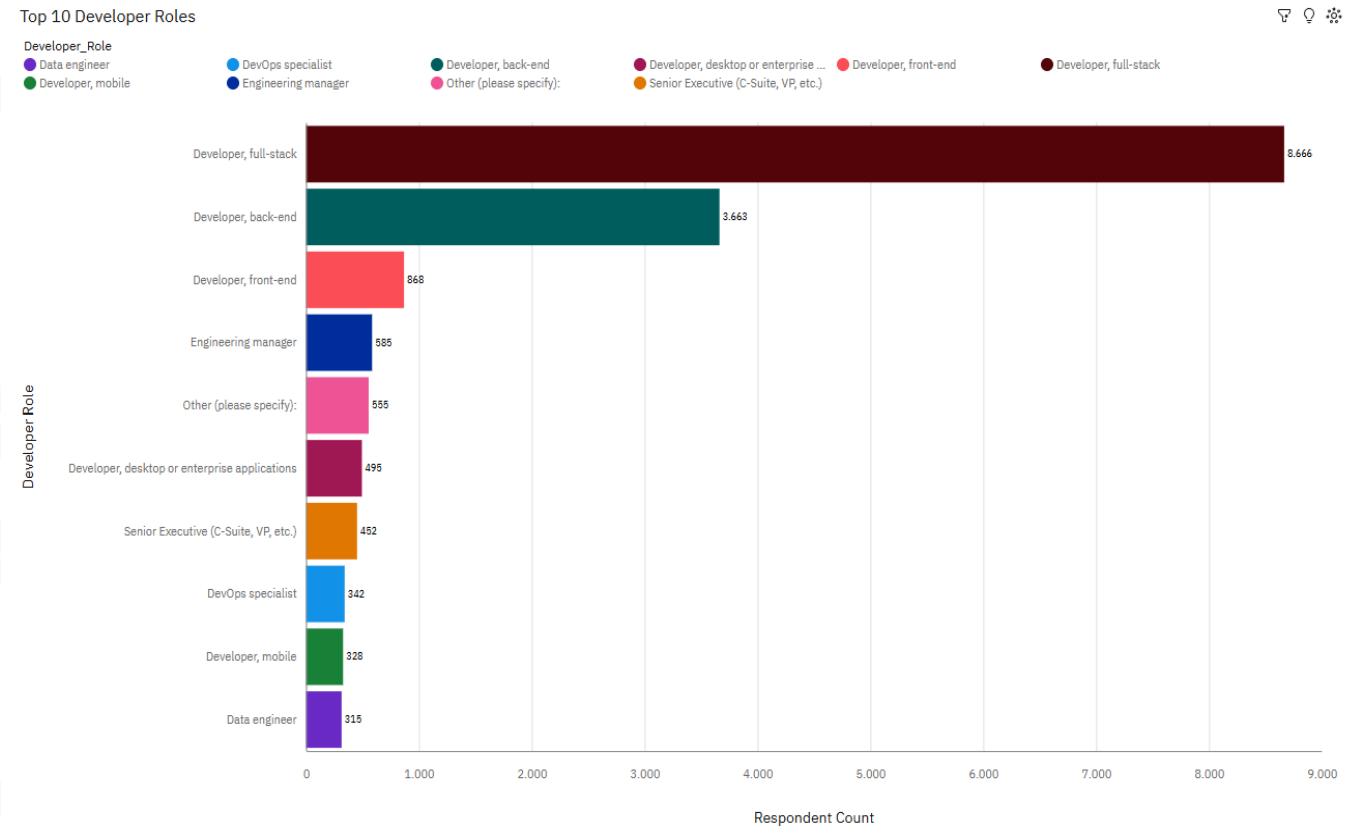
- **The "Modern Stack" is No Longer a Guess; It's a Data-Proven Standard**
 - The data clearly shows the ecosystem is consolidating around a core stack: JavaScript/TypeScript, React/Node.js, PostgreSQL, and the "Big 3" cloud providers (AWS, Azure, Google Cloud).
- **The Most Critical Insight is the "Desire Gap"**
 - The *real* trend is seen in the gap between what developers *use* (e.g., jQuery, MySQL) and what they *desire* (e.g., React, PostgreSQL, Redis). This "desire" is the leading indicator of all future technology shifts.
- **This Dashboard is a Strategic Roadmap for Both Developers and Companies**
 - For developers, this data provides a clear learning path: master TypeScript and PostgreSQL for high-growth careers.
 - For companies, it is a hiring and retention warning: adapt to the "desired stack" or lose the war for talent.
- **This Project Successfully Transformed Complex Data into Actionable Insight**
 - We successfully demonstrated an end-to-end data pipeline, turning 18,845 "dirty" survey responses into a clean, interactive dashboard by leveraging Python (Pandas) for ETL and IBM Cognos for visualization.



APPENDIX: Additional Insights

Finding (The Insight from this Chart)

- The Developer workforce is overwhelmingly concentrated in Full-Stack and Back-End roles.
- This analysis of the DevType (Developer Role) data from our 18,845 respondents reveals that "Developer, full-stack" (**8,666** responses) and "Developer, back-end" (**3,663** responses) are, by a massive margin, the two most dominant specializations.
- The third most common role, "Developer, front-end" (**868** responses), is significantly smaller, highlighting that most web developers identify as either "full-stack" or "back-end" first.



Top 10 Most Desired AI Models

Description

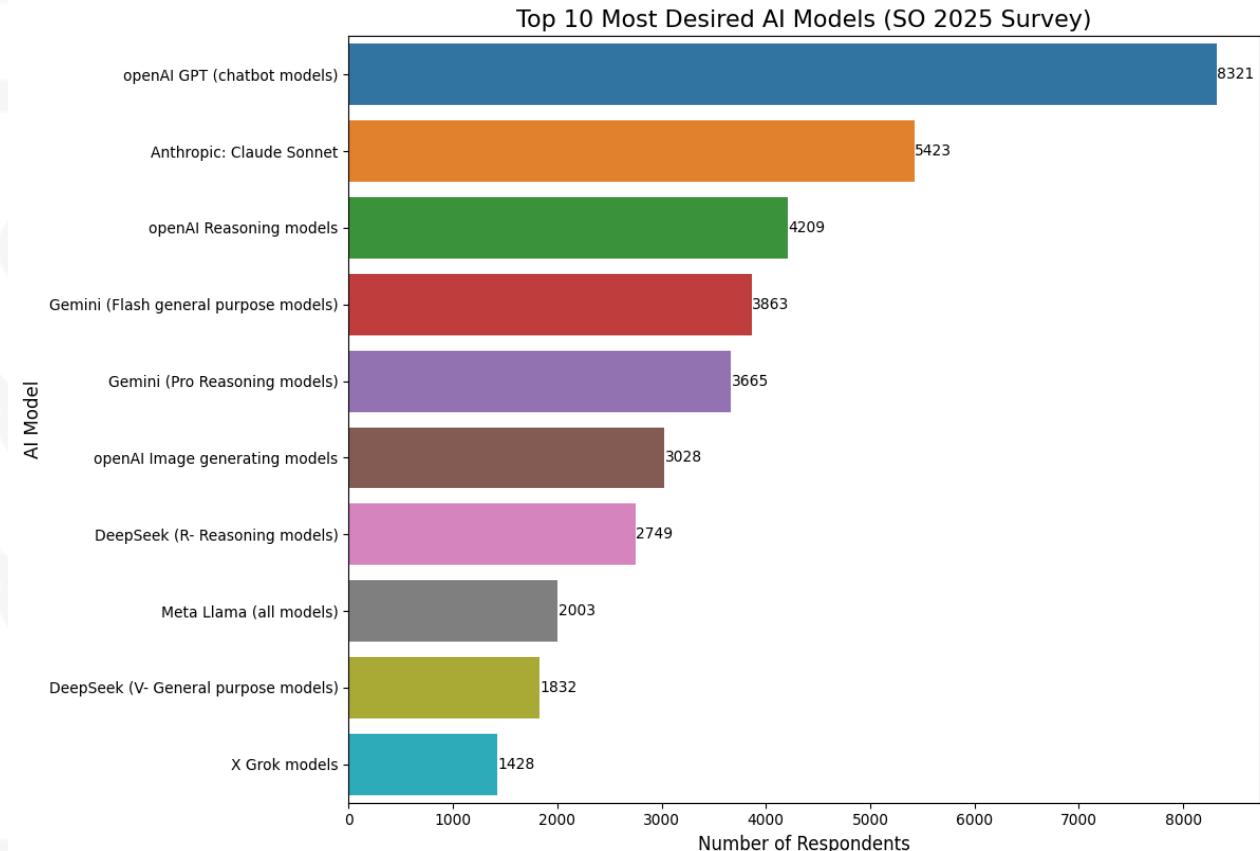
- This chart shows the AI models that developers most want to work with and learn in 2025, based on data from the **Stack Overflow Developer Survey 2025**.

Findings

- Market Leaders:** OpenAI (GPT, Reasoning, Image) and Anthropic (Claude Sonnet) dominate developer interest. The top three models all come from these two companies.
- Consolidation Trend:** The AI ecosystem is converging around the “Big Three” — OpenAI, Anthropic, and Google. Gemini (Flash and Pro) ranks 4th and 5th, showing strong market traction.
- Shift Toward Reasoning Models:** Developers are increasingly drawn to models with reasoning and planning capabilities (e.g., OpenAI Reasoning, DeepSeek-R), not just general-purpose chatbots.
- Emerging Players:** Models like Meta Llama, DeepSeek, and X Grok have entered the Top 10 but still trail significantly behind the leaders.

Implications

- For Developers:**
Mastering the OpenAI and Anthropic ecosystems is no longer optional — it's becoming the industry standard. Skills in GPT API, Claude Sonnet, and Gemini models will directly impact hiring potential.
- For Companies:**
Building products or integrations with platforms developers already favor (OpenAI, Anthropic, Google) reduces hiring friction and retention costs.
- For the Market:**
Developer preference is shaping the future AI landscape. OpenAI and Anthropic models are expected to dominate application development platforms within the next 1–2 years.



Top 10 Highest-Paid Programming Languages

Description

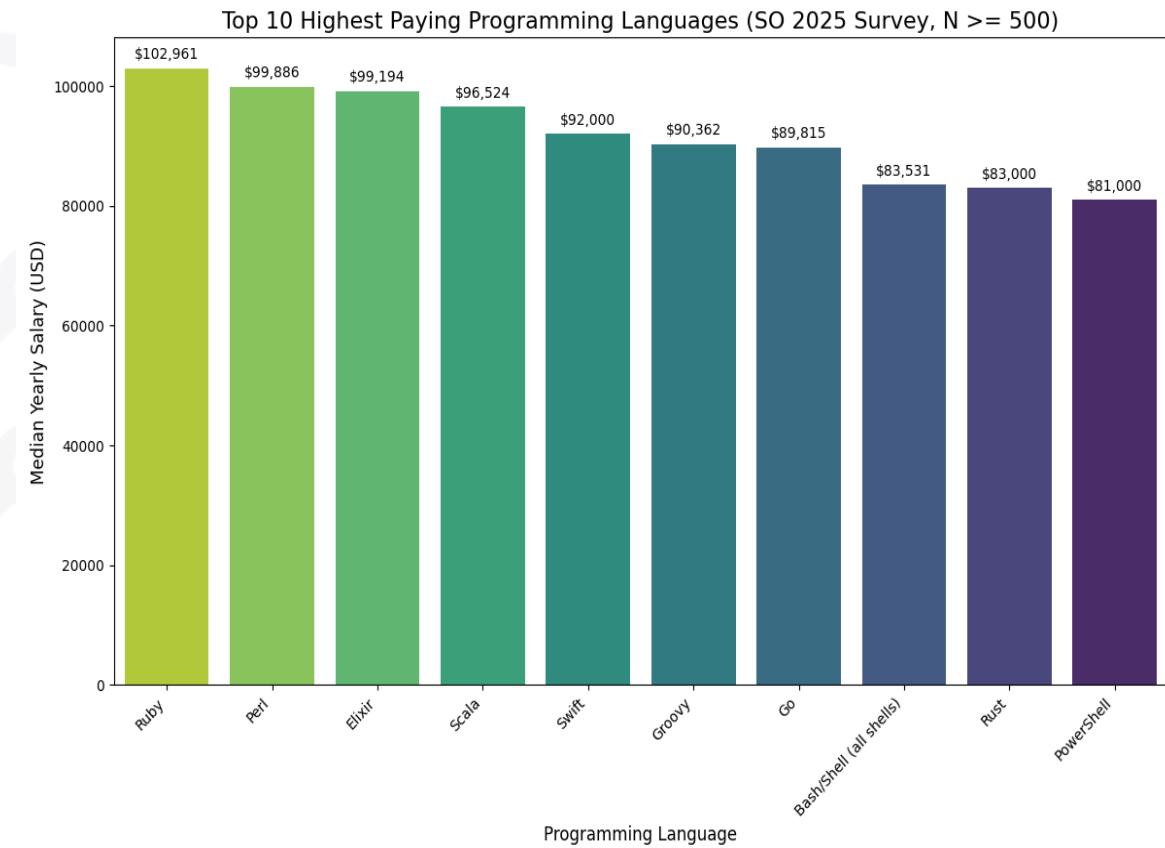
- This chart presents the median annual salaries for programming languages used by at least 500 developers, according to the **Stack Overflow Developer Survey 2025**.

Findings

- Popularity ≠ High Pay:** Languages with the highest salaries (Ruby, Perl, Elixir, Scala) are not the most common ones. Their strength lies in specialized, high-demand domains.
- Power of Niche Expertise:**
 - Ruby:** Mature web ecosystem (Ruby on Rails)
 - Perl:** Still critical in legacy enterprise and DevOps systems
 - Elixir & Scala:** Strong concurrency and functional programming for scalable architectures
- Modern System Languages:** Go and Rust maintain strong salary positions as performance-focused, modern alternatives.
- DevOps Effect:** Bash/Shell and PowerShell command high salaries (>\$80,000), highlighting the importance of automation and system management roles.

Implications

- For Developers:**
 - Differentiate Strategically:** Going beyond popular languages like JavaScript to master Elixir, Scala, Go, or Rust can significantly boost earning potential.
 - Legacy Advantage:** Ruby and Perl specialists remain in high demand due to critical legacy systems that require ongoing maintenance.
- For Companies:** Hiring Elixir or Scala talent can be challenging; competitive pay and retention strategies are essential.
- For the Market:** The tech industry increasingly values deep specialization — developers who can solve complex system-level problems rather than generalists.





Thanks for your attention!



Questions or Comments?

I'd be happy to discuss further insights.

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Data Visualization • IBM Cognos • Stack Overflow 2025 Analysis



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Key Takeaway:

“From raw data to clear insights – every dataset tells a story.”



Skills Network

