

EMERGING SKILLS TRENDS



DHIVYA
01/30/2024

OUTLINE



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

EXECUTIVE SUMMARY



- Emerging future skills requirements
- Utilized surveys and other useful data sources to analyze
 - Which languages/database are in demand right now?
 - Which ones are growing in popularity and will be in demand soon?
- Used Python, IBM Cognos analytics for exploratory and explanatory data analytics
- Data pre-processing & analyzed results from various data sources
- Understood why certain technologies/databases are popular among the developers and present the implications
- Demographics overview

INTRODUCTION

About:

The organization, on a regular basis identifies future skill requirements to keep pace with the changing technologies

Big Idea:

Analyze trends in technologies and software development among developers across the world.

Audience:

Human Resources, Information Technology, Learning & Development, Finance

What's at stake?

- To remain competitive and be a market leader
- Identify learning and development opportunities for benefits of employees

METHODOLOGY



- Data collection from various sources including Job postings, blog posts, surveys
 - Kaggle “Naukri.com” Jobs dataset
 - GitHub Jobs API
 - Web Scraping
 - Survey - Stack
- Preparing data for analysis by using data wrangling techniques
- Apply statistical techniques to analyze the data and identify insights and trends
- IBM Cognos Analytics for dashboards and data visualization

DATA PRE-PROCESSING

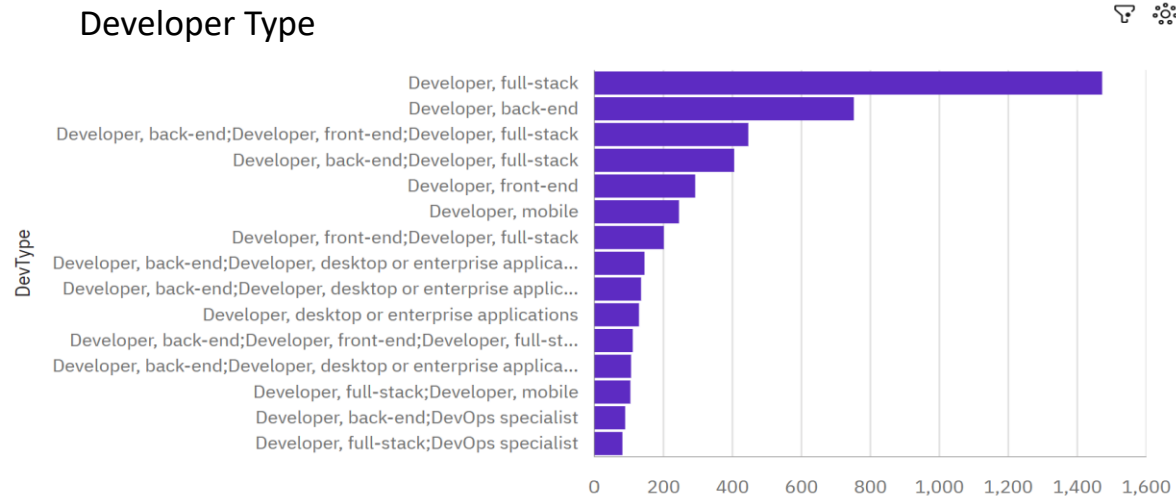
- Identified duplicate values in the dataset
 - 154 duplicate records were deleted
- Removed duplicate values from the dataset
- Identified missing values in the dataset
- Imputed the missing values in the dataset
 - Null values in “Work Location” and Employment columns are imputed with the “Mode” statistics
- Normalized data in the dataset
 - Compensation column was normalized on annual basis

RESULTS



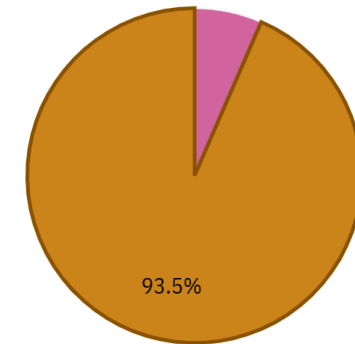
- Demographics of Stack Overflow survey respondents' overview
- Technology trends for current and next year from survey and other data sources
- Visualizations and Dashboards
- Findings and implications
- Actions to be taken

DEMOGRAPHICS - RESPONDENTS

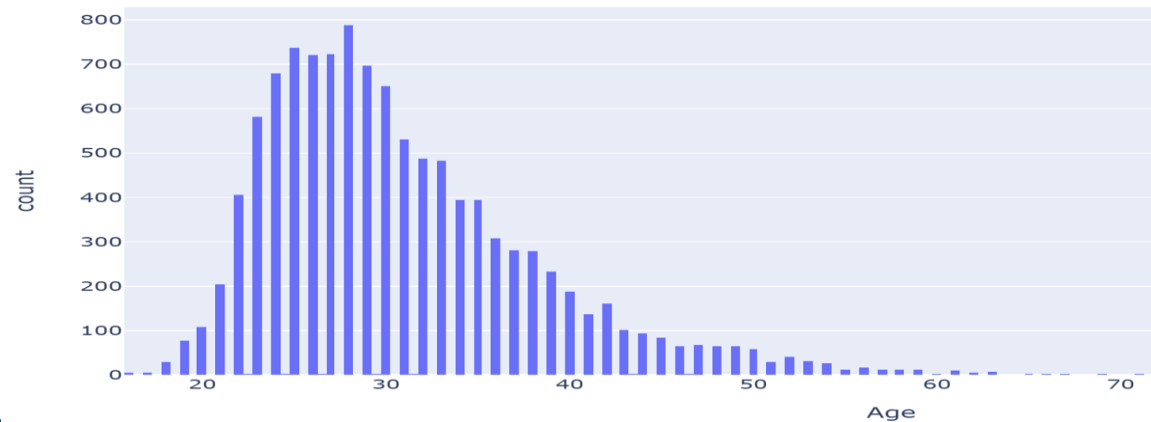


Gender

Woman Man

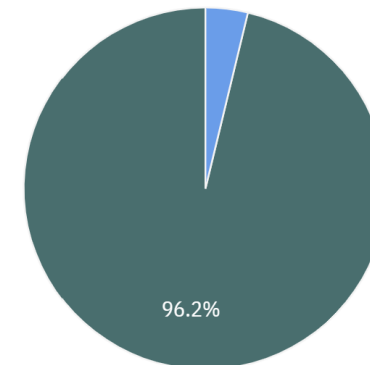


Distribution of Age

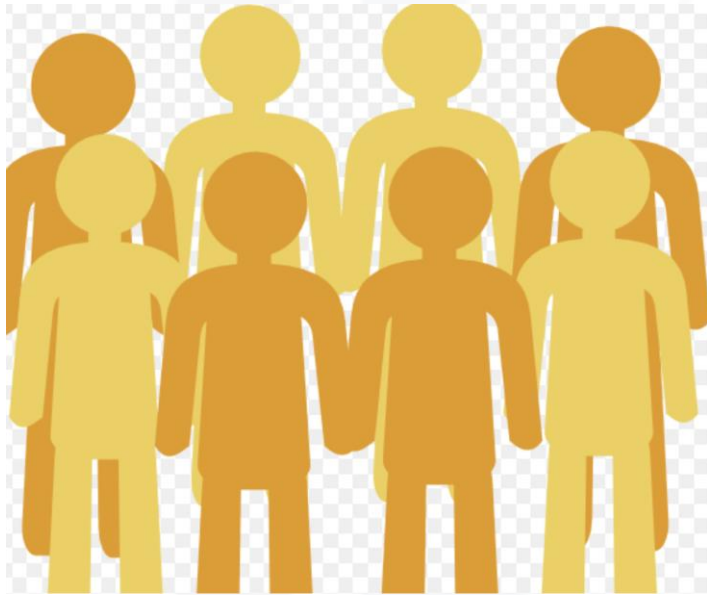


Employment

Employed part-time Employed full-time



DEMOGRAPHICS - Findings

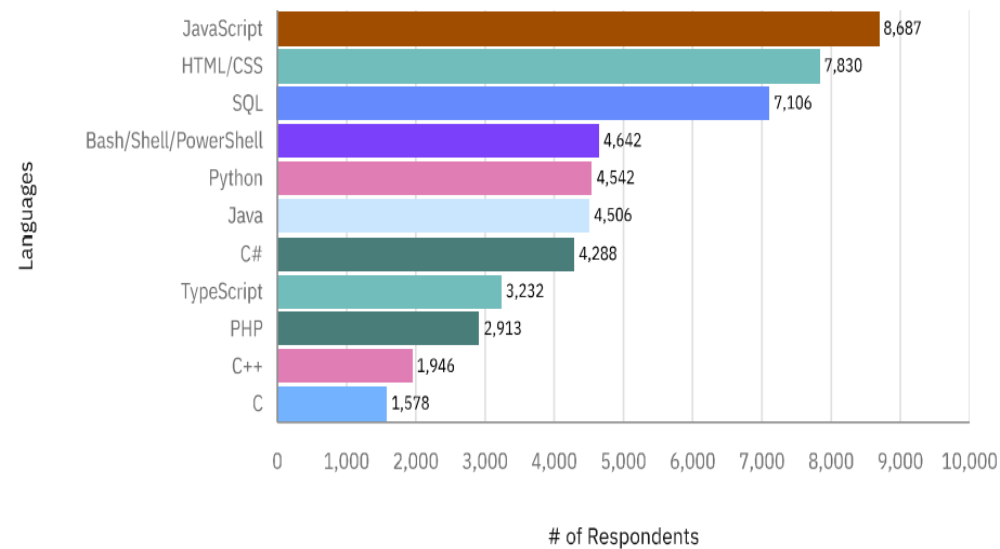


- Majority of the survey respondents are in the 24 – 32 age group
- 93.5% of the respondents are men
- Majority of the respondents (96.2%) are employed full-time
- Most of the survey respondents are developers by profession
- Around 28% of the respondents are in USA followed by India(~18%) and other parts of the world

PROGRAMMING LANGUAGE TRENDS

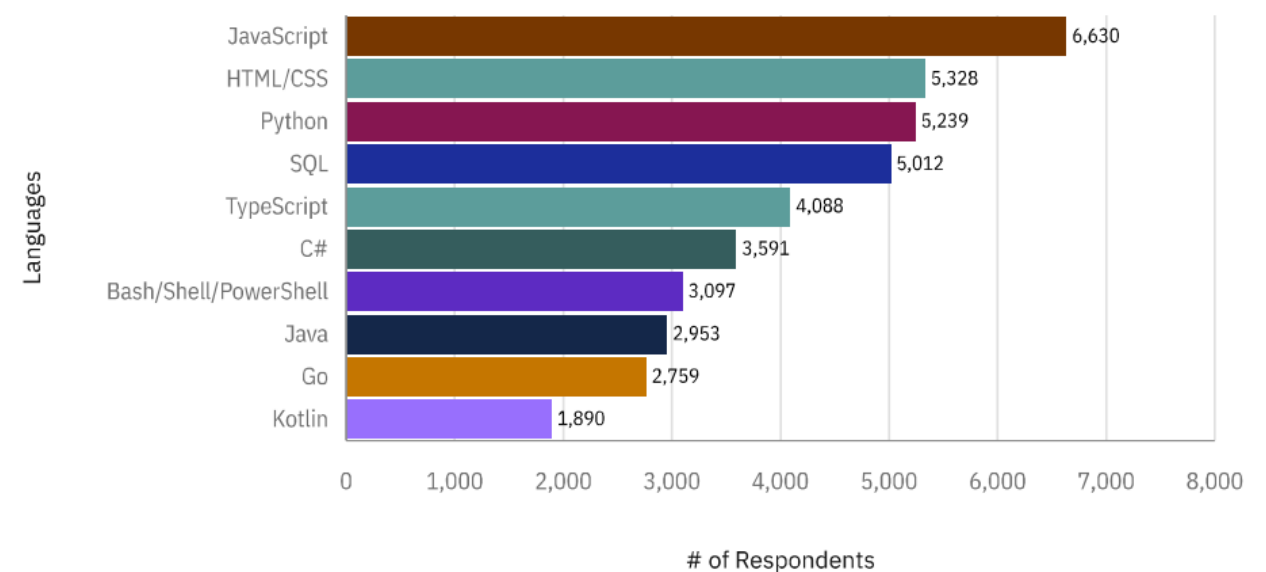
Current Year

Top 10 Languages Worked with by Respondents



Next Year

Top 10 Languages Desired Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings:

1. Currently JavaScript leads the show followed by HTML/CSS and SQL
2. Python has consistently held a top-five spot on the survey
3. SQL still ranks as the most used language in the programming industry
4. TypeScript are becoming more popular next year and so does C# language
5. Kotlin seems to emerge in top ten trending languages
6. Go – new language in top 10 & strong contender for Java
7. Bash/Power shell is losing its trend in the next year

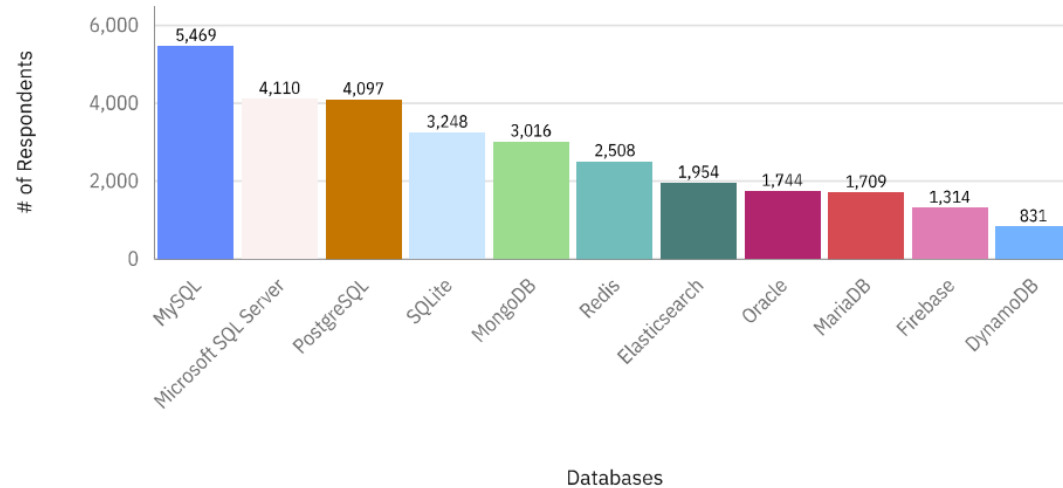
Implications:

1. JavaScript will continue to be a popular choice for web applications, gaming and mobile applications and HTML/CSS for front-end development, implying web developers will be in huge demand
2. Python will be in demand for AI & ML, Data Science
3. SQL for database management and business reporting
4. It is crucial to learn TypeScript to stay relevant in job market; C# is growing in popularity for developing web and desktop applications
5. Kotlin - popular choice for Android apps; Kotlin is the easy to learn/write competitor of Java
6. Go, a niche language requires low memory usage, ideal for stringent performance requirements
7. Python, AWS CLI, and JavaScript are the most popular alternatives and competitors to PowerShell

DATABASE TRENDS

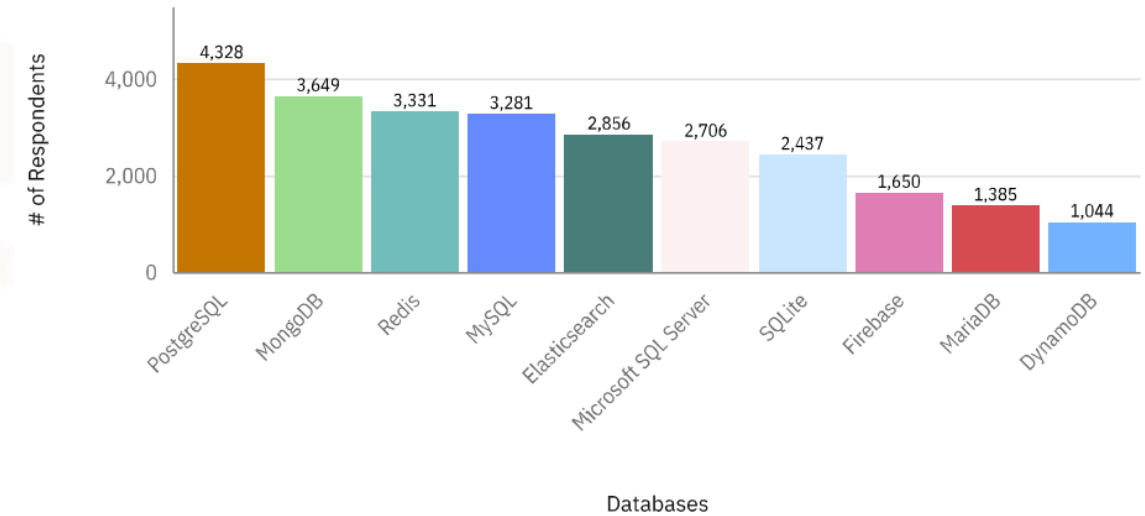
Current Year

Top 10 Databases Worked with by Respondents



Next Year

Top 10 Databases Desired Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings:

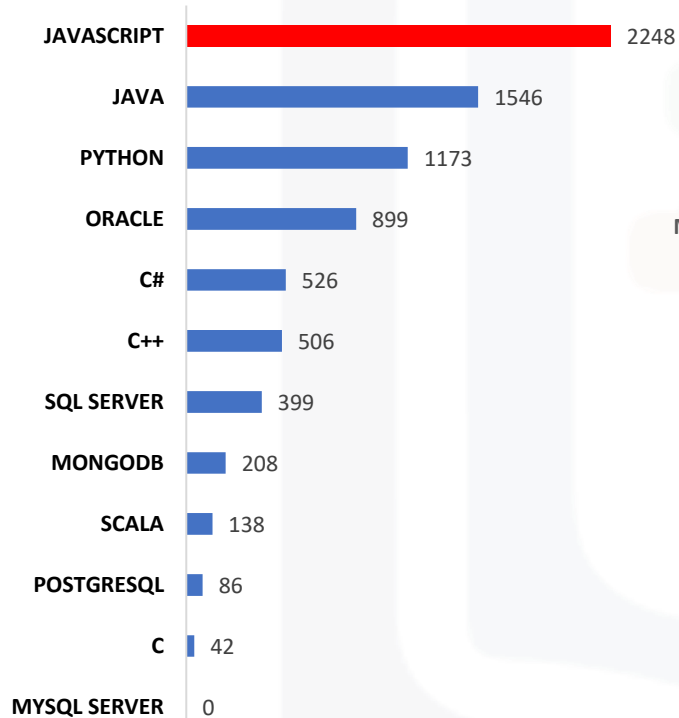
1. MySQL is most popular database currently and will still be in demand
2. Microsoft SQL Server is losing its trend in the future
3. PostgreSQL is desired the most in the next year
4. MongoDB and Redis are upcoming favorites in Database platforms
5. Elasticsearch emerges in top 5
6. Oracle will no longer be in demand as per the chart

Implications:

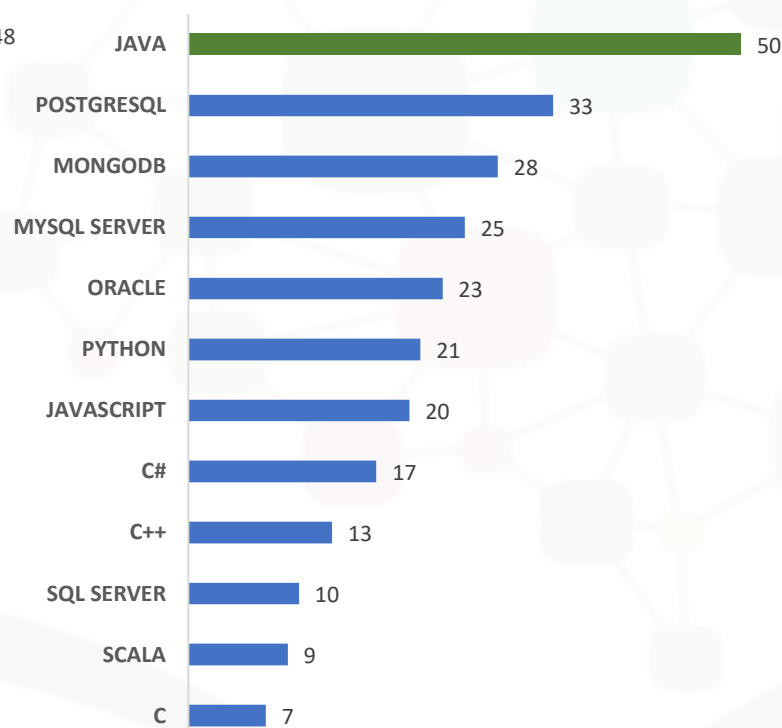
1. MySQL is free, open-source RDBMS solution that supports NoSQL to compete with other solutions like PostgreSQL
2. Microsoft SQL Server is expensive but excellent choice for companies that relies heavily on Microsoft products
3. PostgreSQL is getting preferred for web, mobile, geospatial and analytics applications
4. With emerge of massive unstructured data, MongoDB, NoSQL database is growing in demand and so does Redis DB that supports web applications
5. Elasticsearch helps in quickly building applications and for open search & analytics engine and caters to all data types
6. Oracle tends to be a high-cost solution that smaller organizations might not be able to afford but ideal choice for large organization that manages massive amount of data

OTHER DATA SOURCES – Popular Languages/DB

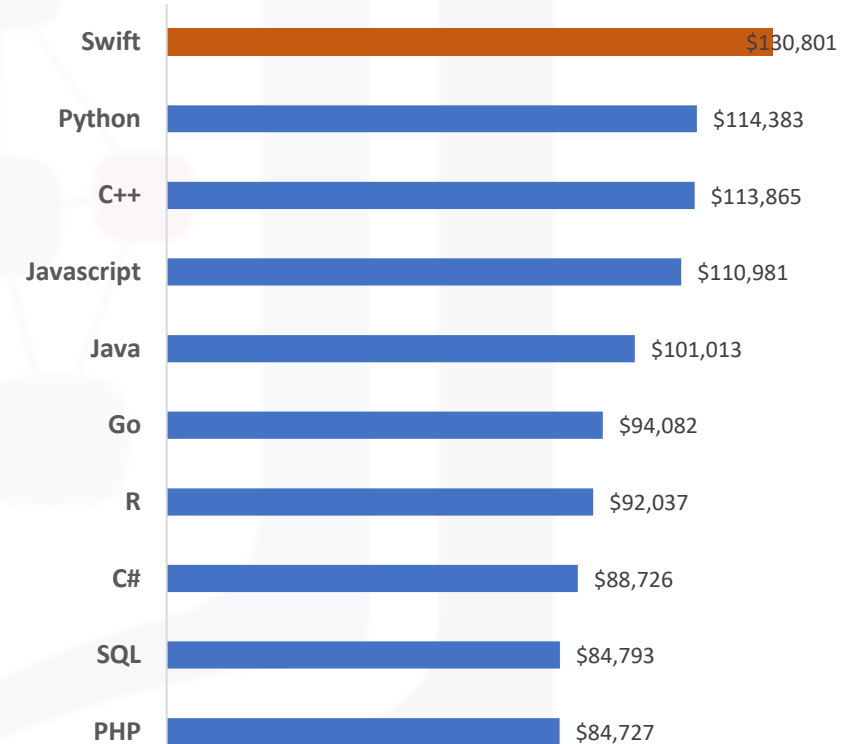
Naukri.com Job Postings



GITHUB Jobs postings



Web Scraping



OTHER DATA SOURCES – Popular Languages/DB

TIOBE Index

Jan 2023	Programming Language
1	Python
2	C
3	C++
4	Java
5	C#
6	Visual Basic
7	JavaScript
8	SQL
9	Assembly language
10	PHP

Jan 2024	Programming Language
1	Python
2	C
3	C++
4	Java
5	C#
6	JavaScript
7	PHP
8	Visual Basic
9	SQL
10	Scratch

Year	Winner
2023	C#
2022	C++
2021	Python
2020	Python
2019	C
2018	Python
2017	C
2016	Go
2015	Java
2014	JavaScript
2013	Transact-SQL
2012	Objective-C
2011	Objective-C
2010	Python
2009	Go
2008	C
2007	Python
2006	Ruby
2005	Java
2004	PHP
2003	C++

OTHER DATA SOURCES TRENDS - FINDINGS & IMPLICATIONS

Findings:

1. JavaScript, Java and Python - most popular skills in demand
2. C# is listed in all the data sources and in the top ten languages
3. Swift - highly paid skill followed by Python and C++
4. PostgreSQL and MongoDB - top three DB skills in demand (GitHub jobs postings)
5. Scala in top ten job listings
6. C is in top 3 spot in TIOBE index

Implications:

1. JavaScript popular choice for web development; Python, with low learning curve, used by non-technical people too; Java is always popular for web & back-end development
2. C# is programming language of the 2023 (TIOBE index)
3. Swift for iOS/macOS applications; C++ is a preferred language for the Internet of Things (IOT)
4. PostgreSQL(web analytics apps) and MongoDB (non-relational data)
5. Scala along with Apache Spark is a popular framework for Big Data processing
6. C is ideal for low-level applications (operating systems, embedded systems)

DASHBOARD



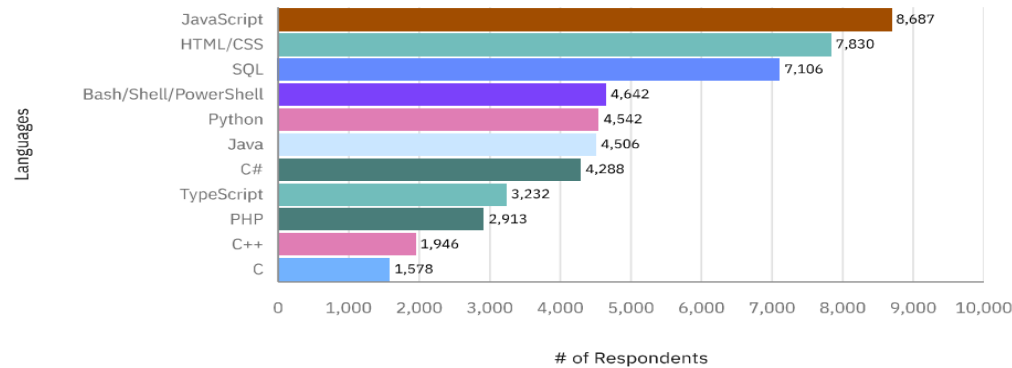
GitHub link of the Cognos dashboard:

[IBM-Coursera-Projects/FinalCognosProject.pdf at main · DhivyaDG/IBM-Coursera-Projects \(github.com\)](https://github.com/DhivyaDG/IBM-Coursera-Projects/blob/main/FinalCognosProject.pdf)

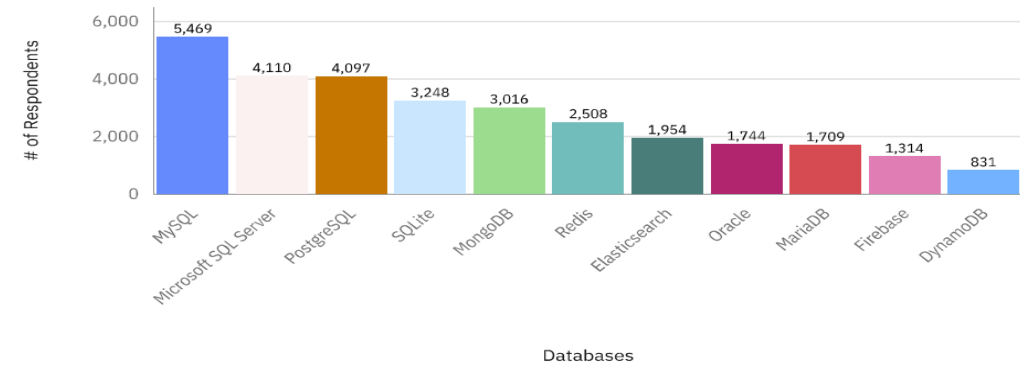
DASHBOARD – Current Technology Usage

Current Technology Usage

Top 10 Languages Worked with by Respondents



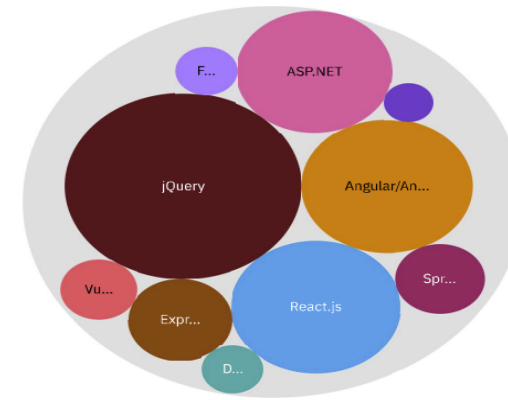
Top 10 Databases Worked with by Respondents



PlatformWorkedWith by # of Respondents



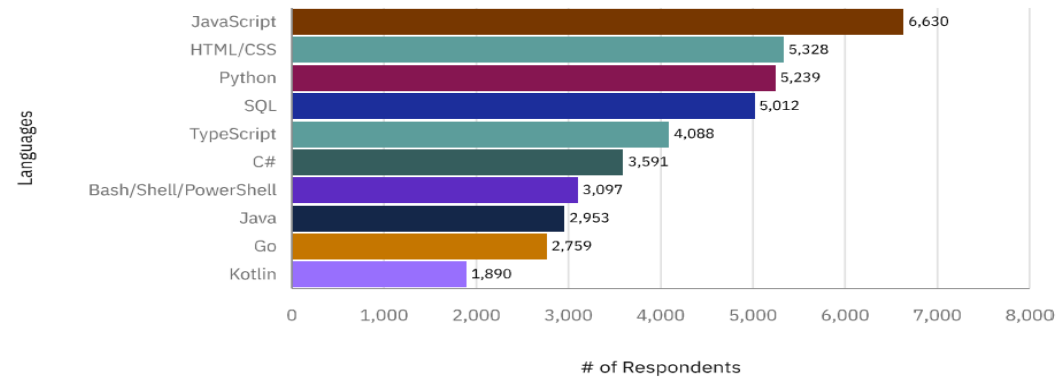
Top 10 WebFrames Worked with by Respondents



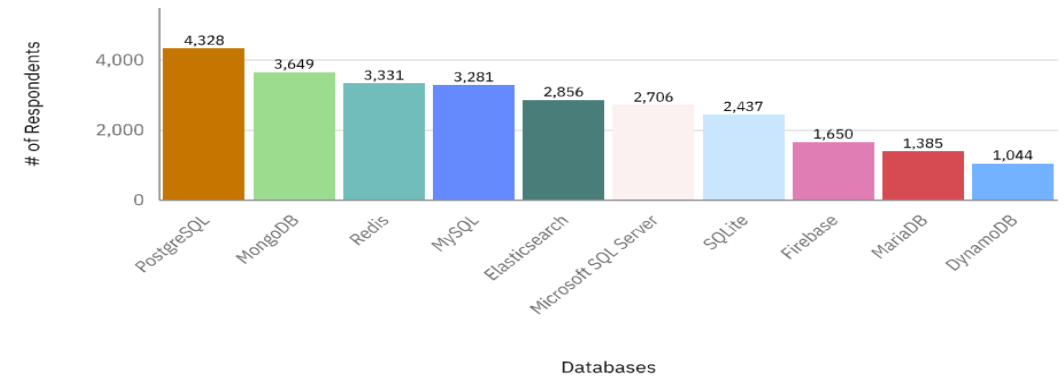
DASHBOARD – Future Technology Trend

Future Technology Trend

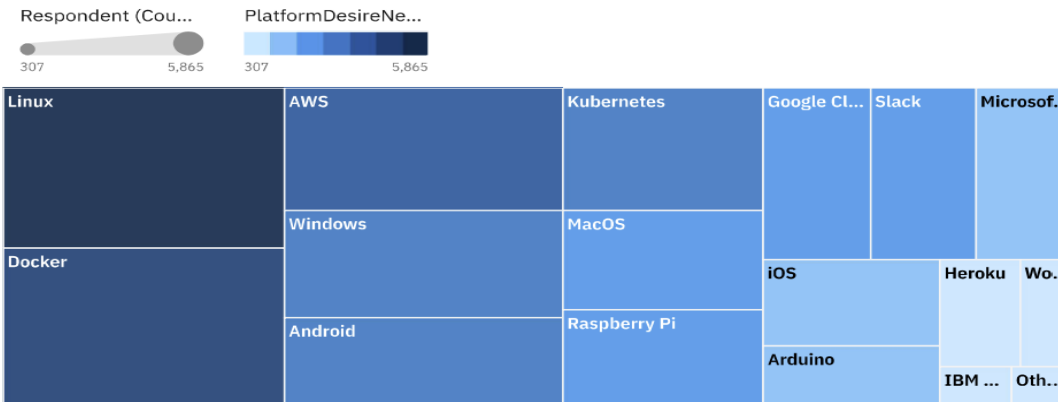
Top 10 Languages Desired Next Year



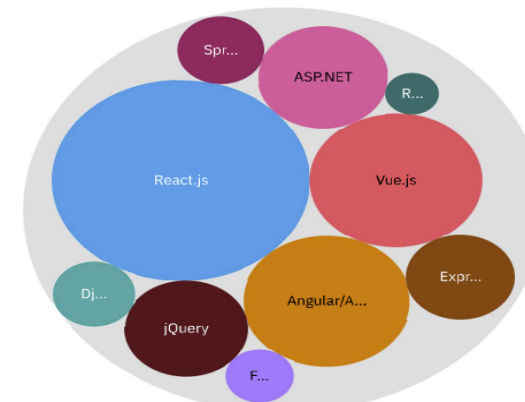
Top 10 Databases Desired Next Year



Platforms Desired Next Year by Respondents



Top 10 WebFrames Desired Next Year

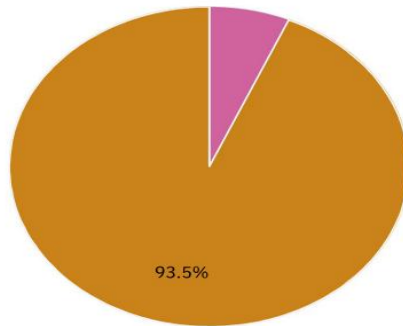


DASHBOARD - Demographics

Demographics

Respondents by Gender

Gender
Woman Man

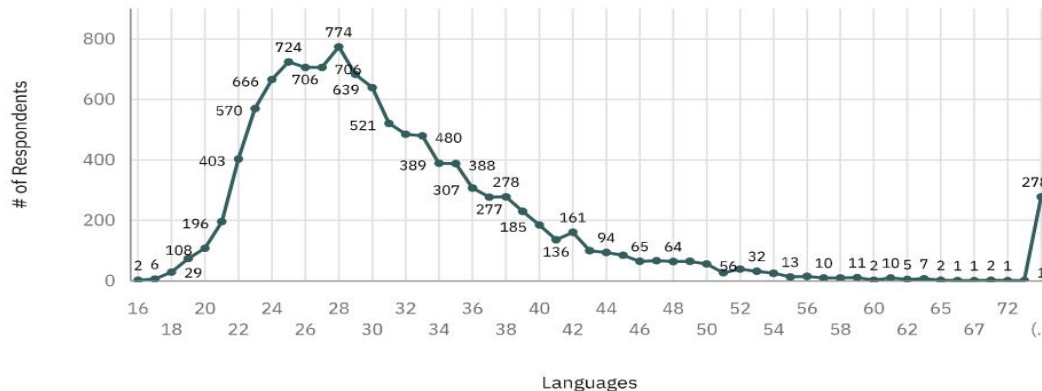


of Respondents by Country

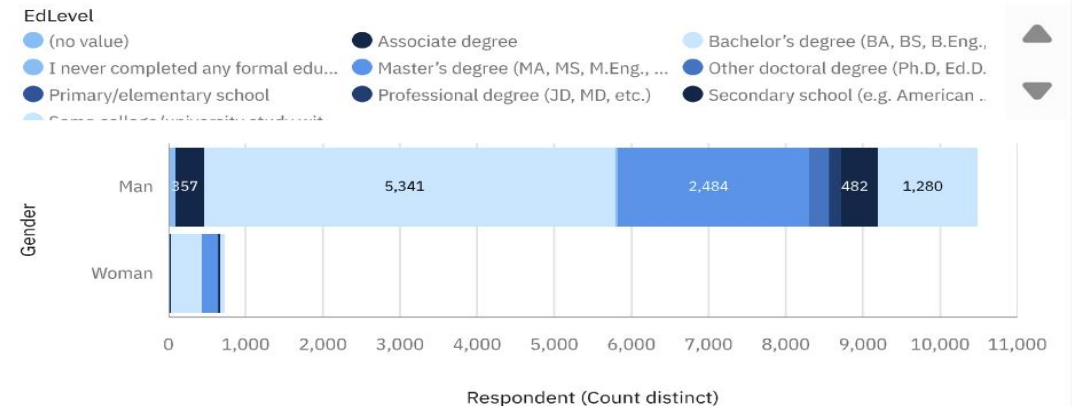
Respondent (Cou...
1 3,058



of Respondents by Age

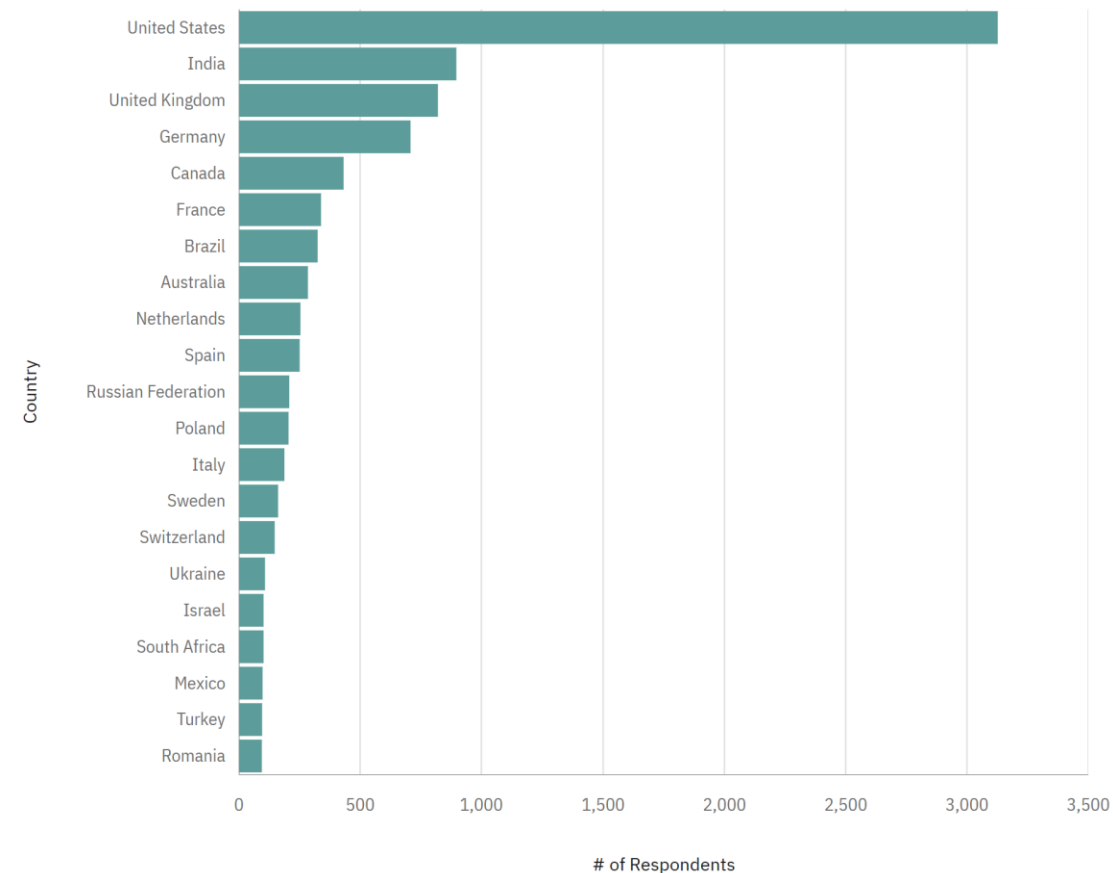


Respondent by Gender categorized by Formal Education Level

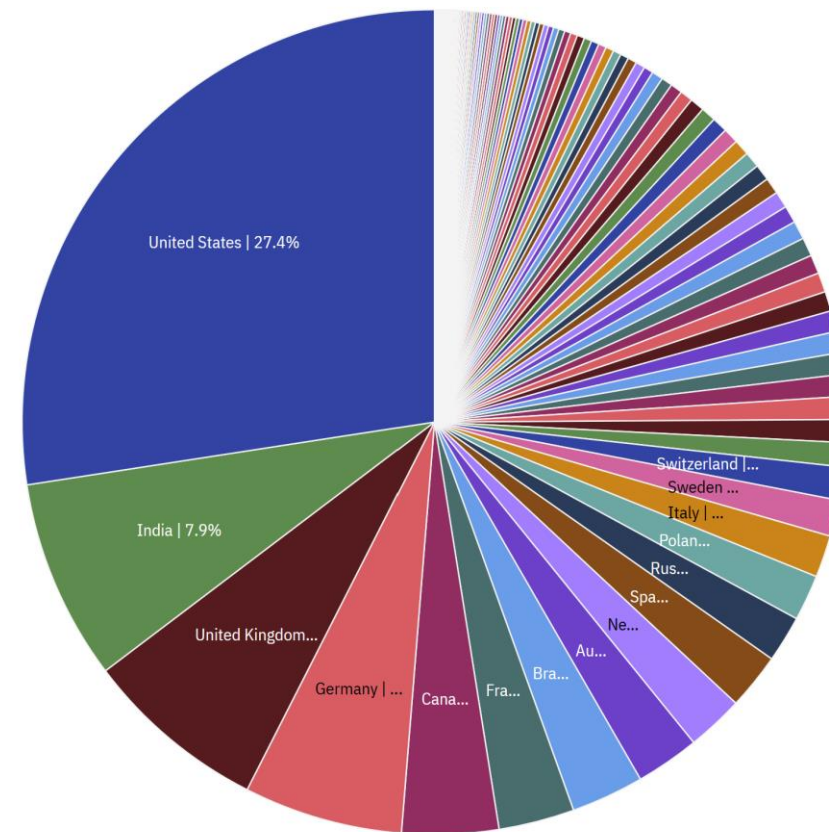


DASHBOARD - Demographics

Respondent by Country



Respondent by Country



DISCUSSION

- Open-Source Languages like Python, JavaScript are trending as they have thrived and are popular due to their strong community support
- C++ or C# (gaming industry); HTML/CSS, JavaScript and PHP (web applications); Java and Kotlin (Android mobile applications) or Swift (iOS & macOS applications)
- C++, C# and Java (desktop applications, business applications, and system software); Python predominantly for scientific computing
- To focus on gender imbalance and age discrimination
- Kotlin: A Preferred Choice for Android
- Legacy Languages such as C still in demand

OVERALL FINDINGS & IMPLICATIONS

Findings

1. Fast changing technology each year
2. JavaScript & HTML/CSS dominates web development
3. Python, JavaScript, and C# continue to dominate the future tech landscape;
4. TypeScript getting popular
5. USA is the top technology country followed by India; Results don't represent everyone in the developer community evenly; most of the respondents are developers from USA (~28%) followed by India (~18%);
6. Majority of the developers are very young (24-32 age group); Women developers amounted to less than five percent of all respondents

Implications

1. Organizations need to be highly updated and adapt to rapid changes; programmers should follow the latest technology trends
2. Two core technologies for web development JavaScript and HTML/CSS; JS importance in web development remains unparalleled
3. Python - AI and machine learning applications; C# - Microsoft's Language for Multi-platform Development
4. TypeScript will remain crucial for large-scale web applications.
5. Comprehensive plan in bridging the digital divide between developed and developing nations in technology
6. Gender/age should not one of the concerns or benefits of employment

CONCLUSION



- Fast changing technology trends every year due to changing needs of industries; Python which was least preferred two decades back, is popular now
- Choice of language depends on
 - Ease-of-use, flexibility and performance
 - Organization digital eco-system (mobile, web, enterprise-level)
 - Preference of clients
 - Learning curve of the organization
 - Portability, Integration & compatibility with existing/new systems
 - Types of Data feed(structured, semi-structured/unstructured)
- Since Cloud-computing services are on the rise, programming languages such as Python, Java, Go, PHP are popular
- Demographics overview presents other areas to focus such as gender imbalance, technology gap among countries
- Future research on skills trends after having clear knowledge on business strategy of organization, its long-term goals and projects requirements

ABBREVIATIONS

Abbreviation	Meaning
AI	Artificial Intelligence
ML	Machine Learning
AWS CLI	Amazon Web Services Command Line Interface
IDE	Integrated Development Environment
DB	Database
API	Application Programming Interface
RDBMS	Relational Database Management System
Apps	Applications
JS	JavaScript
SQL	Structured Query Language

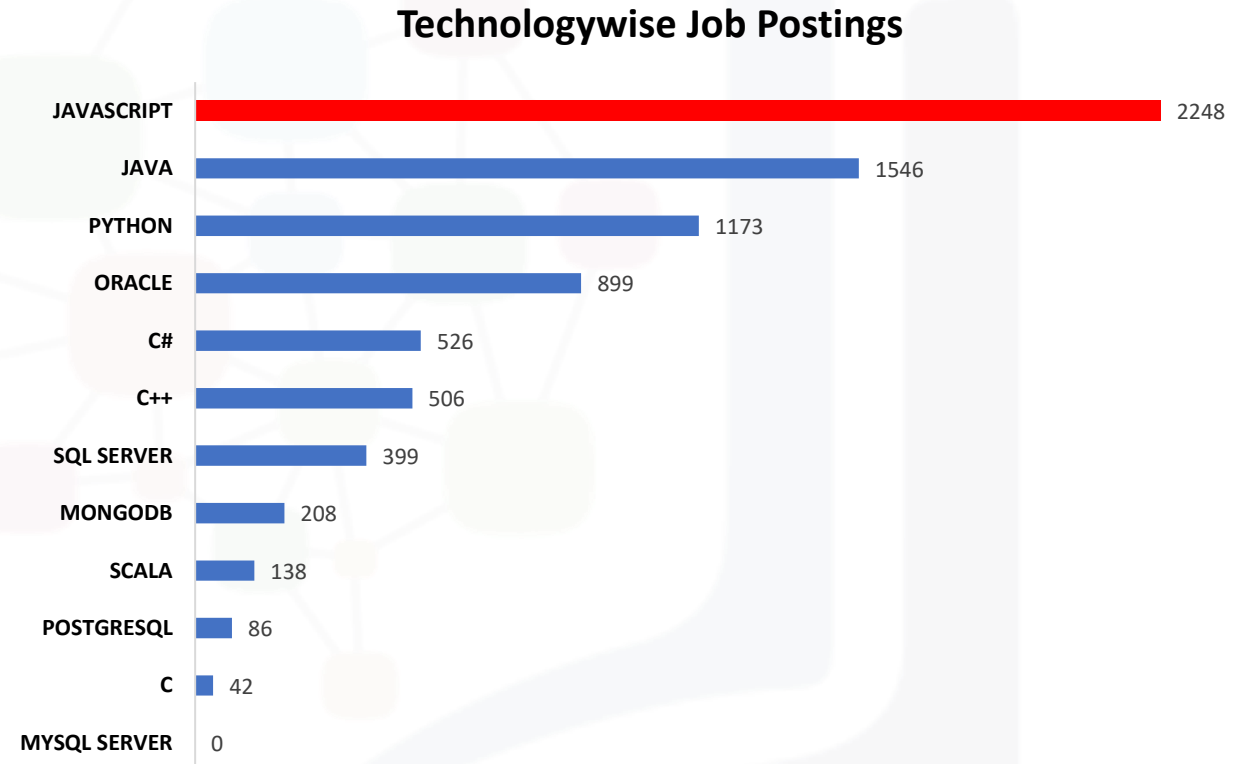
APPENDIX



- Data collection – sources:
 - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/labs/module%201/Accessing%20Data%20Using%20APIs/jobs.js_on
 - <https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/labs/module%201/datasets/githubposting.json>
 - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/labs/datasets/Programming_Languages.html
 - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/LargeData/m1_survey_data.csv
 - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/LargeData/m2_survey_data.csv
 - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/LargeData/m4_survey_data.sqlite
 - [TIOBE Index - TIOBE](#)

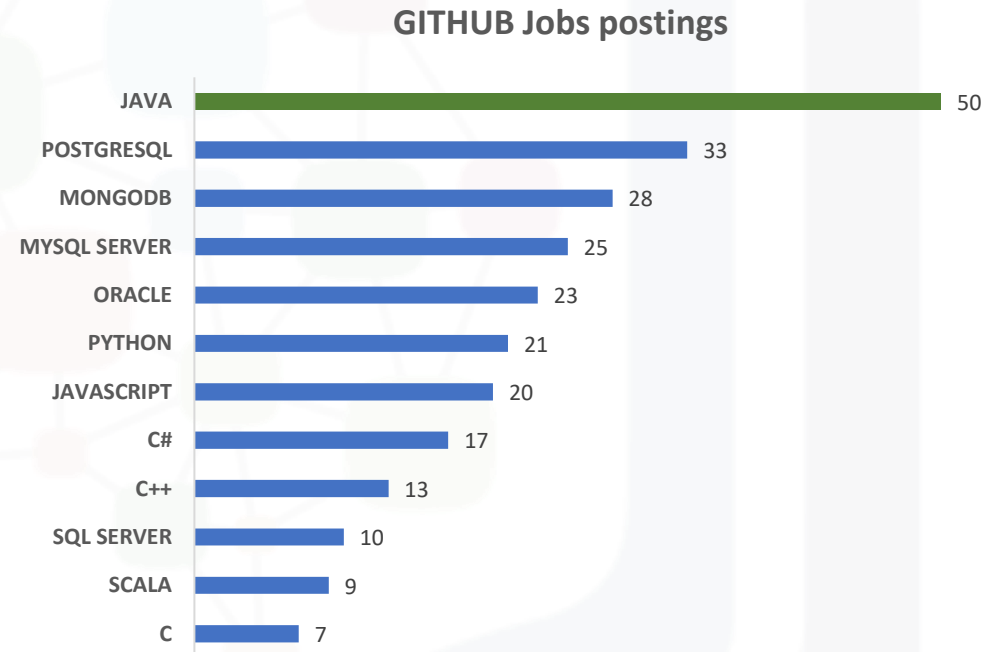
POPULAR LANGUAGES – Naukri.com Job Listing

- JavaScript ranks the highest with 2248 job postings, followed by Java and Python.
- The number of jobs listed for Java and Python are almost half of the jobs that require JavaScript.
- No job listed for MySQL Server



POPULAR LANGUAGES – GitHub Job Postings

- Java is the top skill in demand according to GitHub job postings
- PostgreSQL and MongoDB are also popular and listed among the top 3 skills in job postings



POPULAR LANGUAGES - Web Scraping

- Swift is the most popular language followed by Python and C++
- JavaScript and Java are among the top 5 popular languages

