



CAPSTONE PROJECT REPORT

NATALIA KNIAZEVA

03.03.2023

OUTLINE



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

EXECUTIVE SUMMARY



- The Capstone Project is aiming to find out the popularity of programming languages and identify future skill requirements.
- We choose two ways to identify the language popularity – counting the number of Google searches for each language and exploring salary surveys.
- Once the data have been collected we analyzed it and identified insights and trends which include the following:
 - What are the top programming languages in demand?
 - What are the top database skills in demand?
 - What are the popular platforms and web frames?
- The steps of the Projects include:
 - Webscraping and accessing APIs to collect the data
 - Wrangling in order to refine the data and make it ready for the analysis
 - Applying statistical techniques for analysis
 - Creating dashboards using IBM Cognos Analytics for visualization
 - Sharing the findings in a presentation

INTRODUCTION



- The Capstone Project Report summarizes the findings from GitHub and StackOverflow datasets, and a salary survey
- The Report provides information about the programming languages that are most in demand, and identifies trends, salaries, and future skill requirements in the IT-industry.
- The Report may be of interest to:
 - C-suite executives and HR specialists of IT-companies
 - Computer science students
 - IT-specialists working with programming languages
 - Labour market researchers
 - Career coaches

METHODOLOGY



- **Methods**

- **Statistical Methods:**

- Calculation of Mean
 - Correlation

- **Visualisation:**

- Bar Chart
 - Column Chart
 - Box Plot
 - Pie Chart
 - Line Chart
 - WordCloud

- **Job postings using the API were collected for the locations:**

- Los Angeles
 - New York
 - San Francisco
 - Washington DC
 - Seattle
 - Austin
 - Detroit

- **Data Sources**

- GitHub
 - Website Kaggle
 - Salary Survey

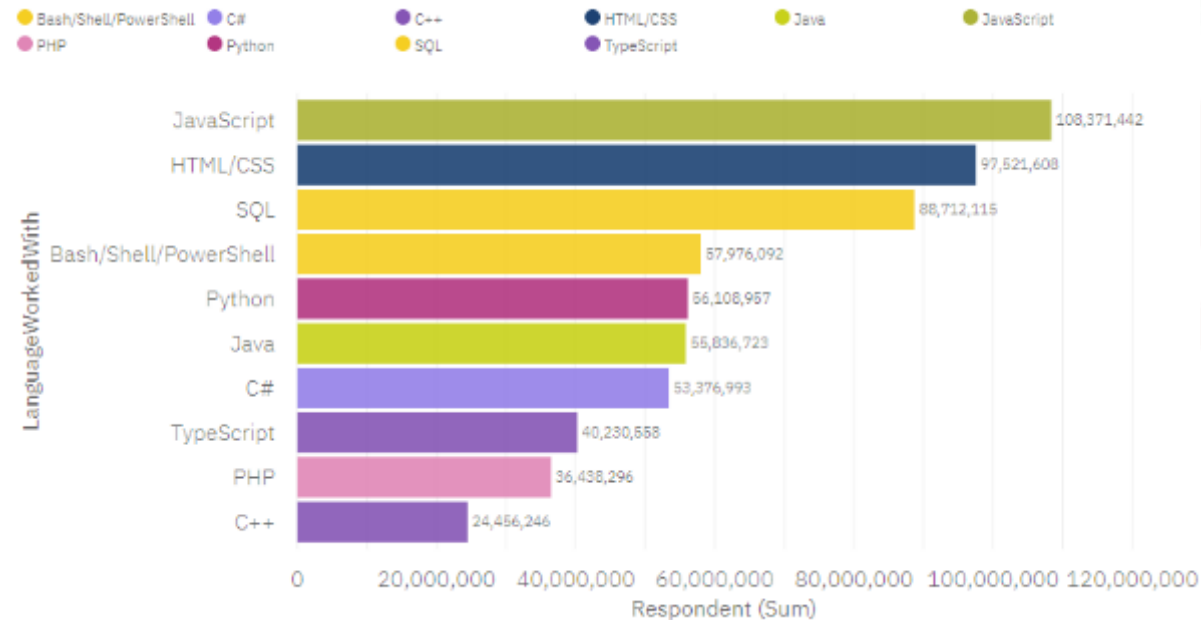
RESULTS

- Respondents:
 - Age scale is from 16 to 99 y.o. The average age is 29 y.o.
 - Men – 93,7 %, women – 6,3 %
 - Bachelor's degree – 51,1 %, master's degree - 23,9 %
- Average annual salary:
 - Max - \$130,801 for Swift, min – \$84,727 for PHP
- Job postings:
 - Max – 13,480 for C, min – 10 for PostgreSQL
- Programming language trends:
 - Java is the most popular language as a current and future language to work with
 - Python will probably increase its popularity significantly next year
- Database trends:
 - MySQL is currently the most popular database, but it can give way to Microsoft SQL Server next year
- Platform trends:
 - Linux and Windows are the most popular platforms now, and Docker can replace Windows next year
- Web Frames trends:
 - jQuery and Angular/Angular.js are on top of the list, whereas next year the popularity of jQuery may reduce considerably while React will take the first line in the list of the most desirable web frames to work with

PROGRAMMING LANGUAGE TRENDS

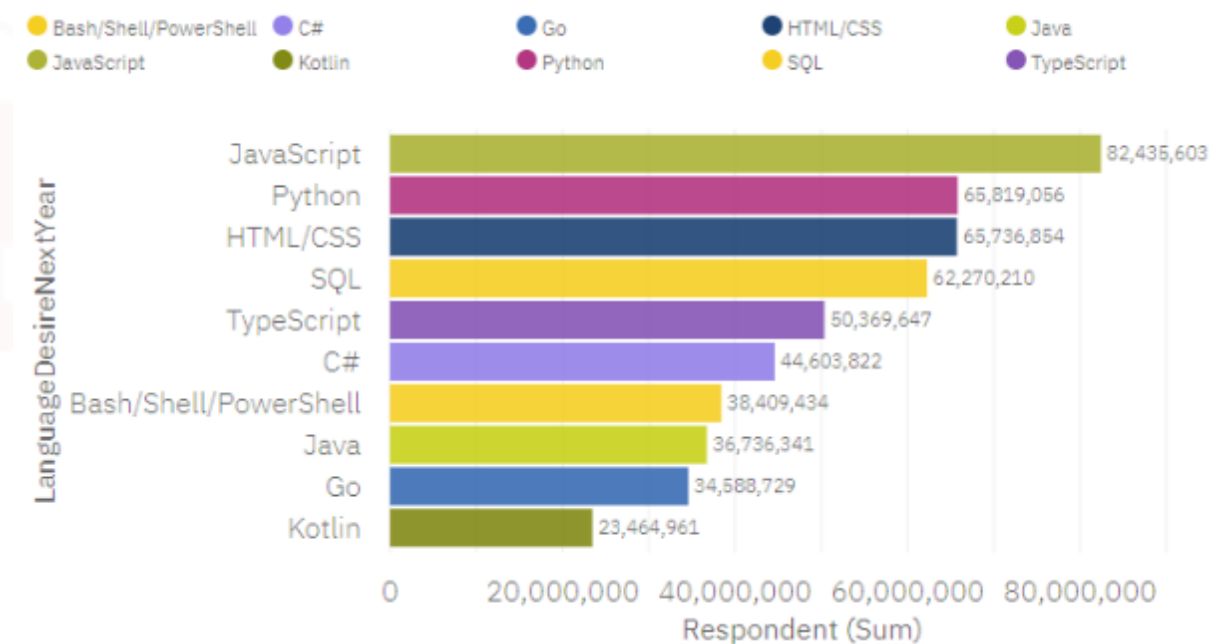
Current Year

Top 10 Languages Worked With



Next Year

Top 10 Languages Desired Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

- The most popular language is JavaScript, staying on top next year as well
- Python is moving up from 5th to 2^d position
- Bash/Shell/PowerShell and Java lose their popularity next year
- PHP and C## are in the bottom of the list, and are replaced by Go and Kotlin in next year trend

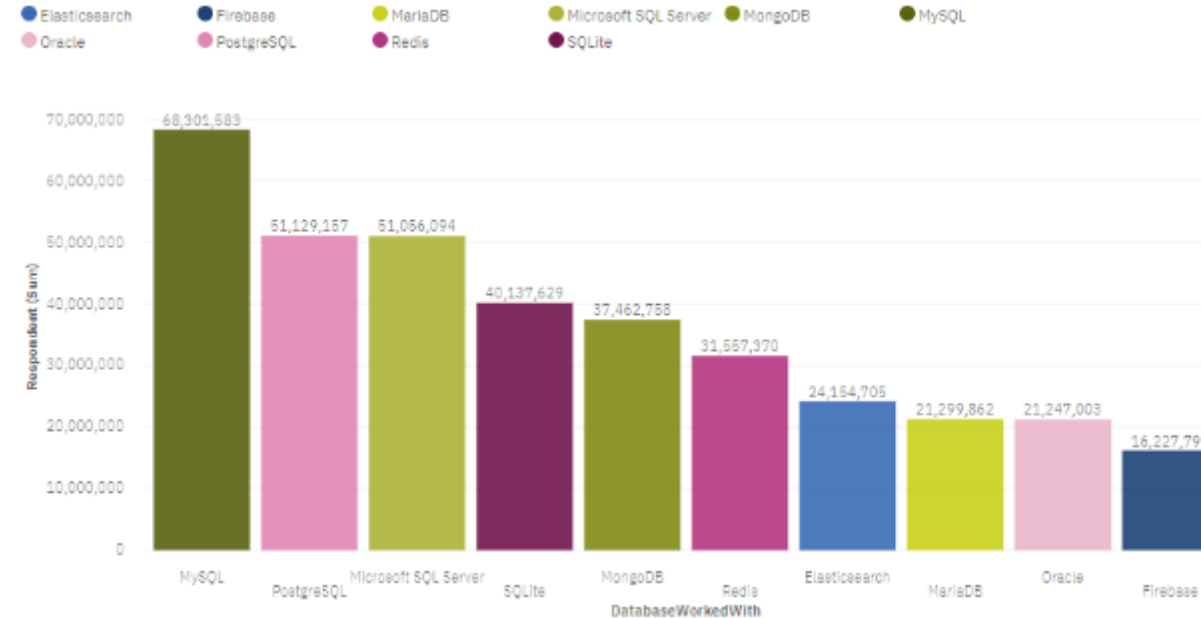
Implications

- Trends for the future are JavaScript, Python, and HTML/CSS
- As a general-purpose, versatile language with simple syntax, Python grows rapidly in popularity, and leaves behind HTML/CSS, SQL, and Bash/Shell/PowerShell
- Go and Kotlin are new emerging trends

DATABASE TRENDS

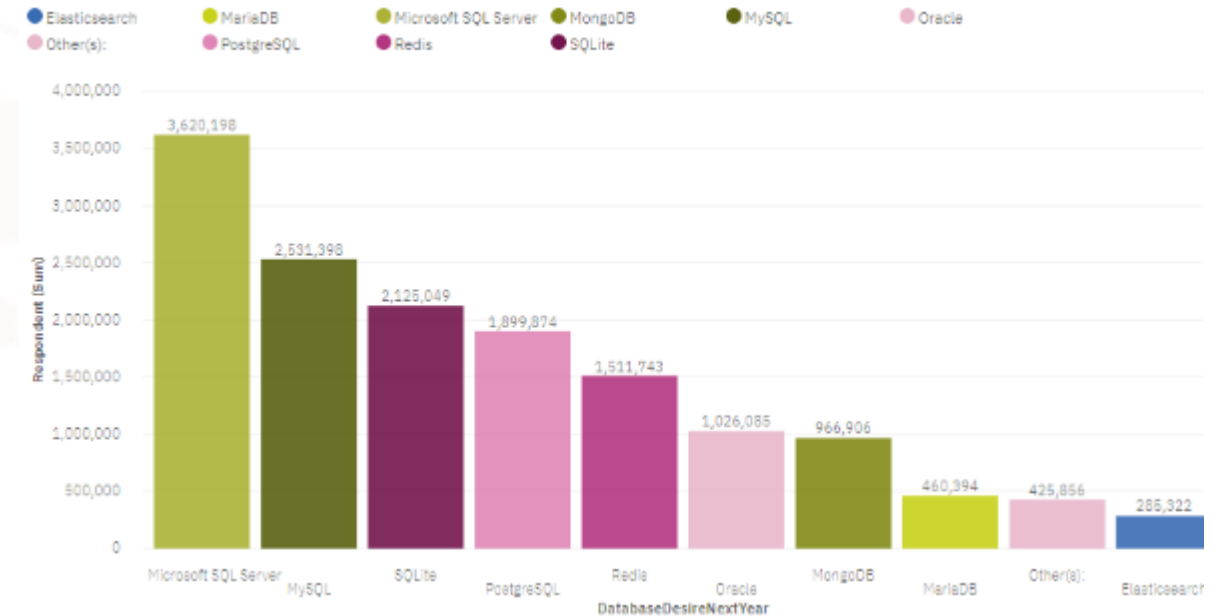
Current Year

Top 10 Databases Worked With



Next Year

Top 10 Databases Desired Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

- Currently MySQL is leading Top-10 of databases worked with
- Microsoft SQL Server wins the future trends. Its popularity can be 30% higher than of MySQL next year
- The least popular database is Firebase

Implications

- Microsoft SQL Server, MySQL, PostgreSQL and SQLite are in the current and future trends
- There will be no new databases in Top-10 next year

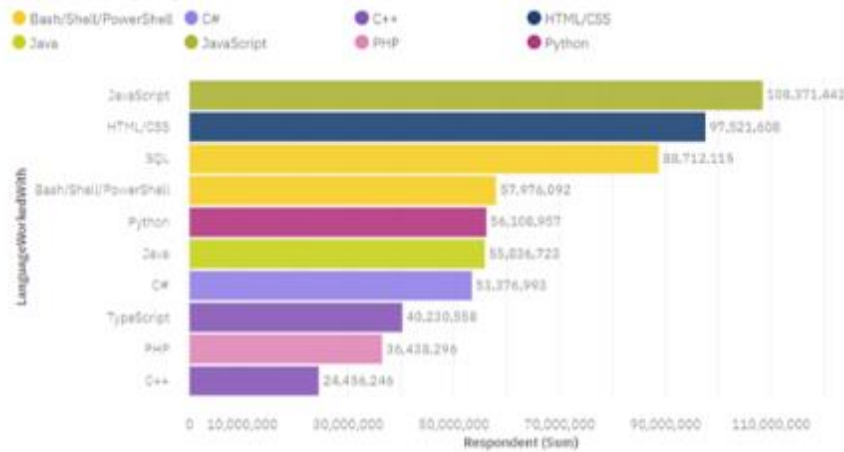
DASHBOARD



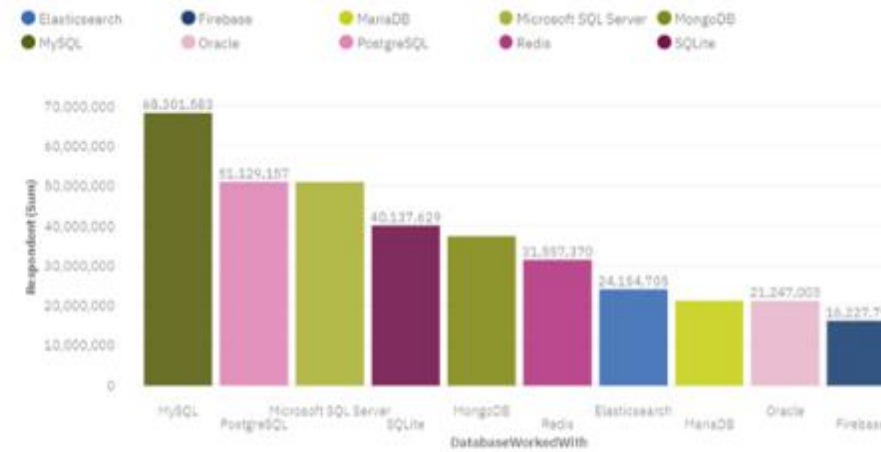
<https://eu-gb.datapatform.cloud.ibm.com/dashboards/c0adab1b-a109-490d-81b0-de6b8b1e9ef3/view/4324df7e338063ff77f2e2e4079c250f7a637709b5bbd507d5857b4959607797f33f1093c8291f09de430166a0bf405d9f>

DASHBOARD TAB 1

Top 10 Languages Worked With



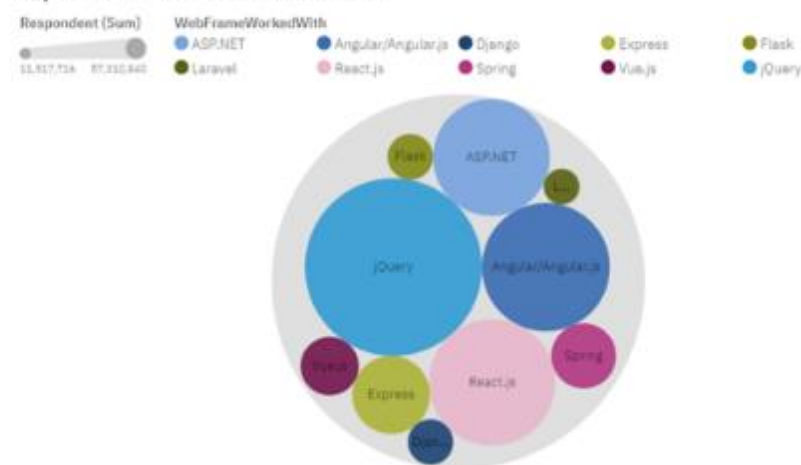
Top 10 Databases Worked With



Platforms Worked With

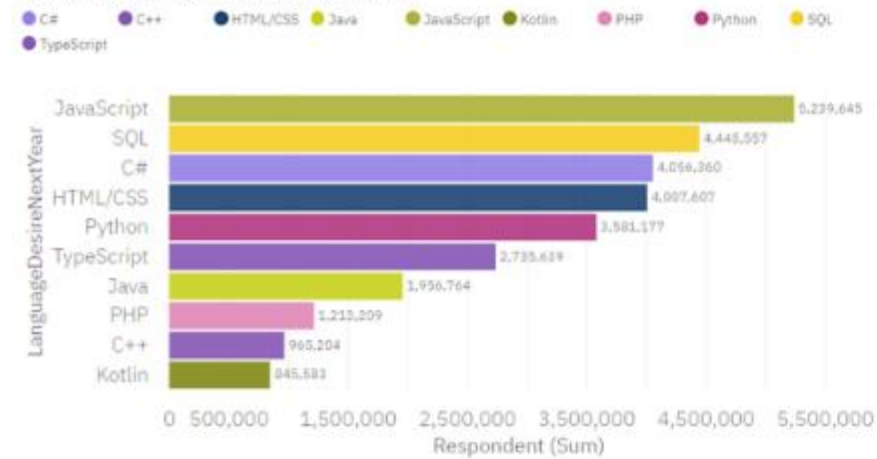


Top 10 Web Frames Worked With

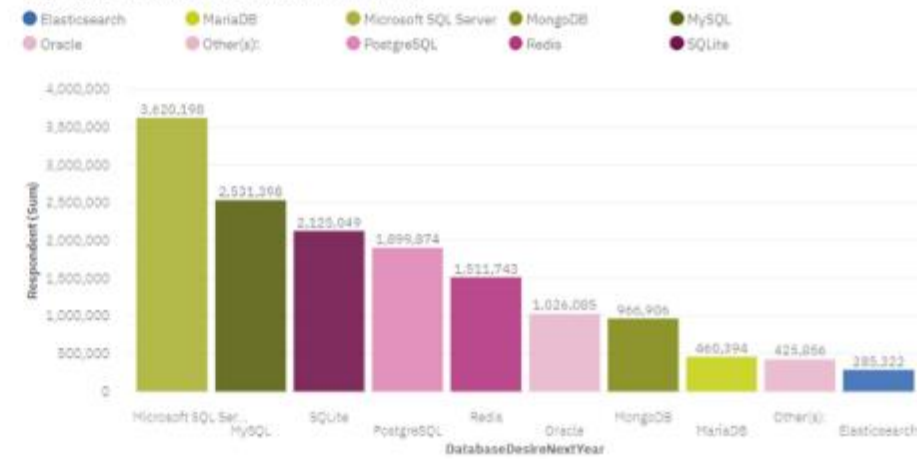


DASHBOARD TAB 2

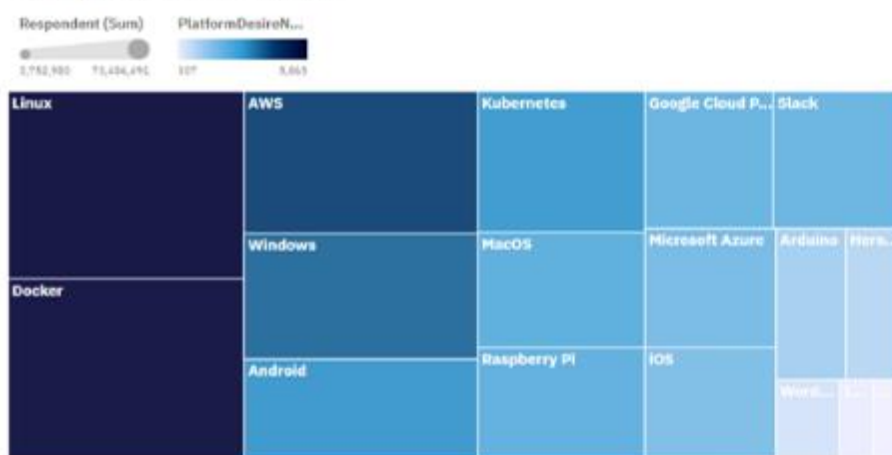
Top 10 Languages Desired Next Year



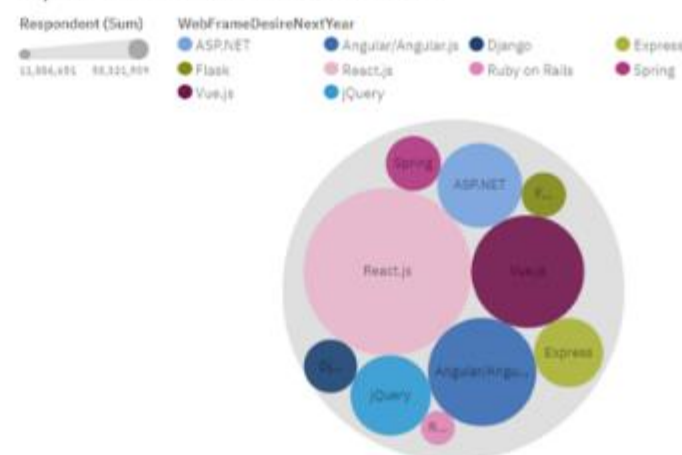
Top 10 Databases Desired Next Year



Platforms Desired Next Year



Top 10 Web Frames Desired Next Year



DASHBOARD TAB 3

Respondents Classified by Gender

Woman Man

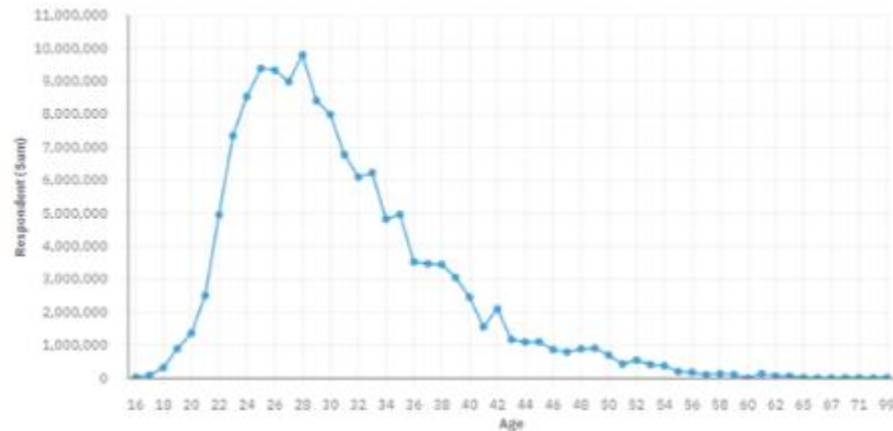


Respondents Classified by Countries

Respondent (Sum)
0k 29,154,245

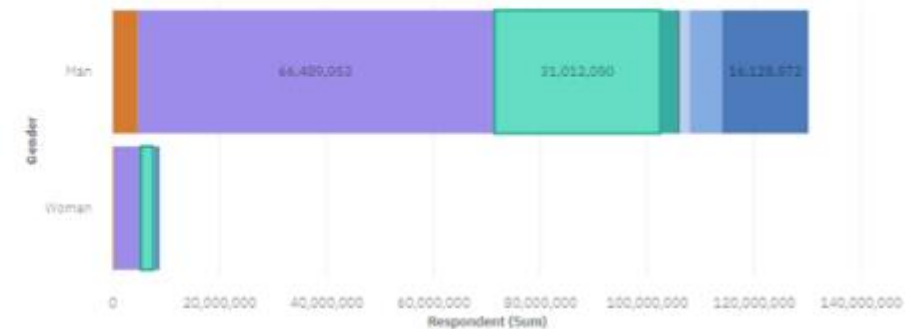


Respondents Classified by Age



Respondents Classified by Gender & Education Level

EdLevel
Associate degree Bachelor's degree (BA, BS, B.E., B.S.) I never completed any formal ...
Master's degree (MA, MS, M.E., M.S.) Other doctoral degree (Ph.D., E.D., etc.) Primary/elementary school
Professional degree (JD, MD, etc.) Secondary school (e.g. American high school) Some college/university study ...



DISCUSSION



- The presented analysis has proved the value of using such methods as collecting data via APIs, applying statistical techniques and visualization. It has enabled to answer the initial questions:
- What are the top programming languages in demand?
- What are the top database skills in demand?
- What are the popular platforms and web frames?

OVERALL FINDINGS & IMPLICATIONS

Findings

- Fast changing trends
- Gender imbalance in IT-professions

Implications

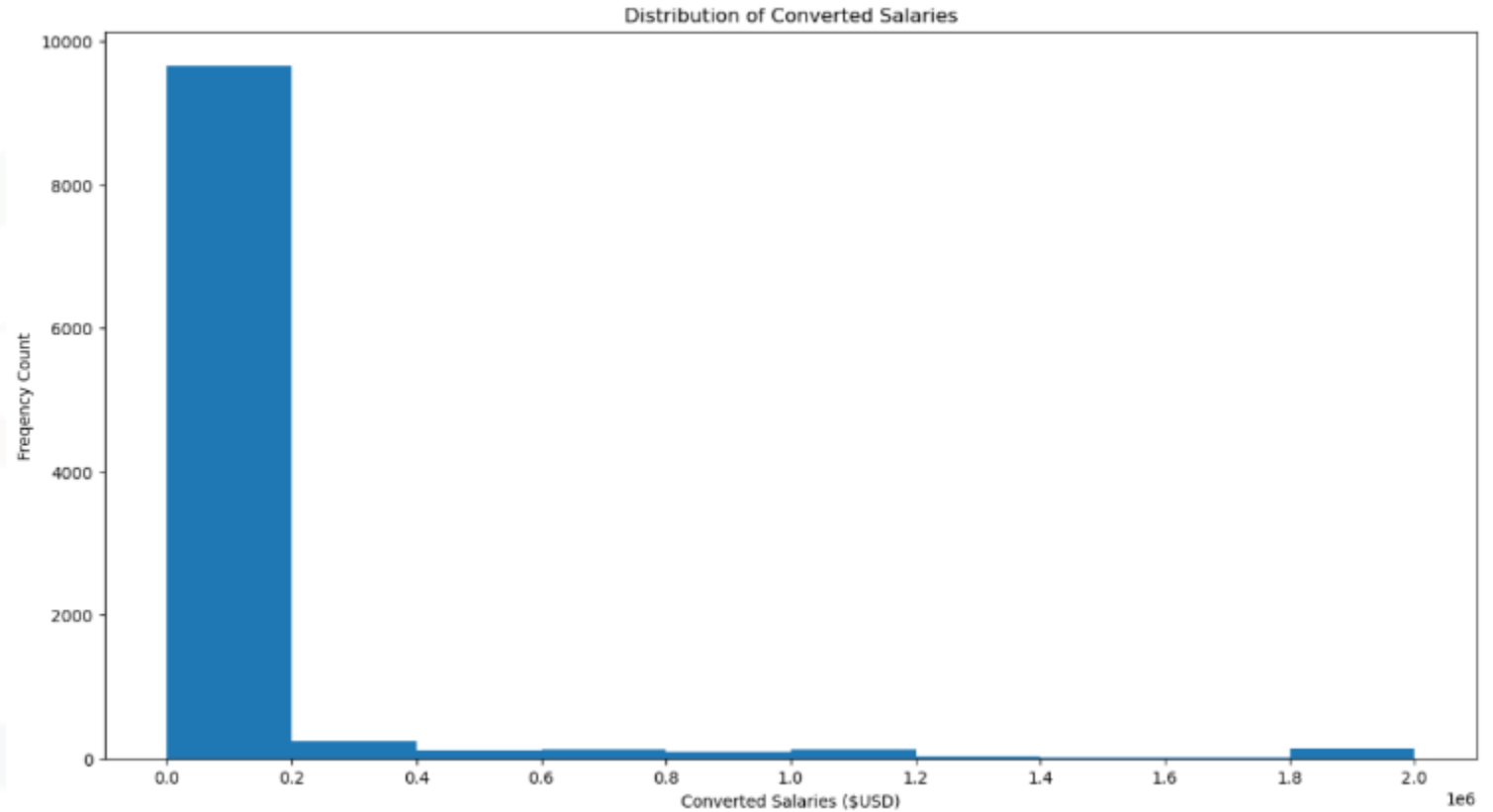
- IT-companies should take into consideration these fast changes when working on new web development or mobile app development projects
- IT-professionals should constantly gain new skills to stay competitive
- IT field needs equal representation of men and women. It will bring diversity in thoughts while producing software, and diversity in business decisions, which will be a competitive advantage

CONCLUSION

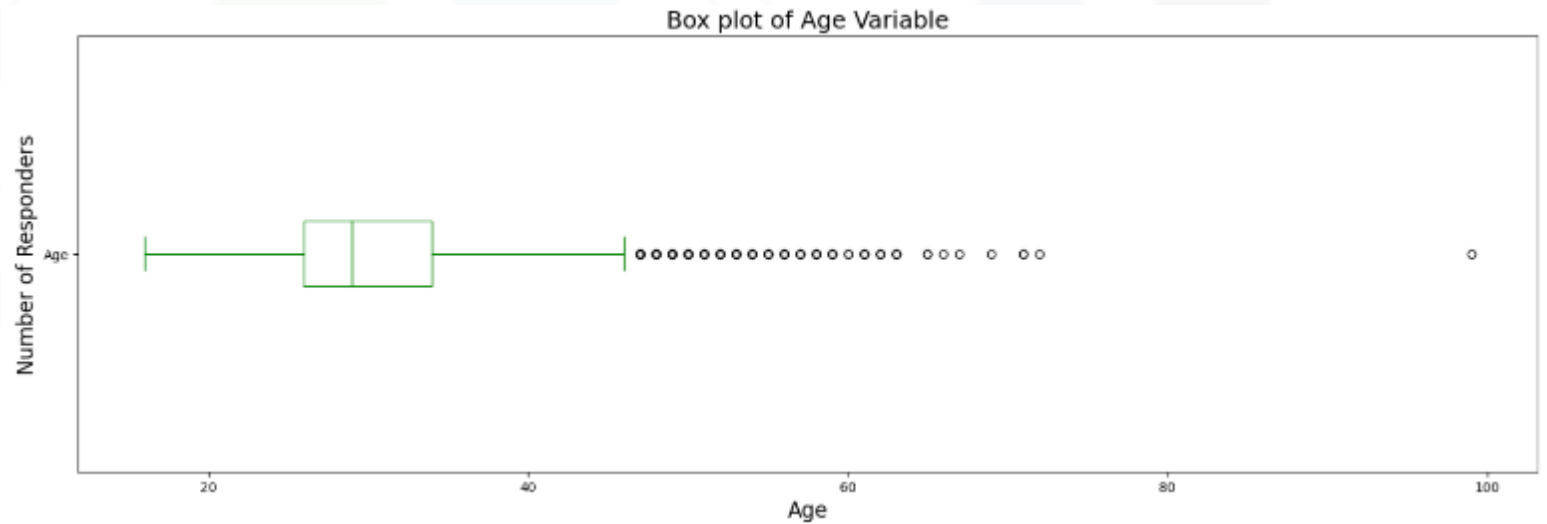


- Only C programmers are in relatively high demand
- Average annual salary is acceptable
- Remuneration listed for a number of programming languages from \$130,801 to \$84,727 with no apparent gender bias
- General preference for change in technology:
 - Increase use of Python and introduction of TypeScript
 - Among top 5 databases there is a continued use of 3 current databases and introduction of Redis & Elasticsearch
 - Declining preference for Windows as a platform,
 - React.js webframe, ranked in top 3 for the next year, voted to become future leading webframe. Angular/Angular.js and jQuery are competitors, but only Angular/Angular.js is to retain constant use in future

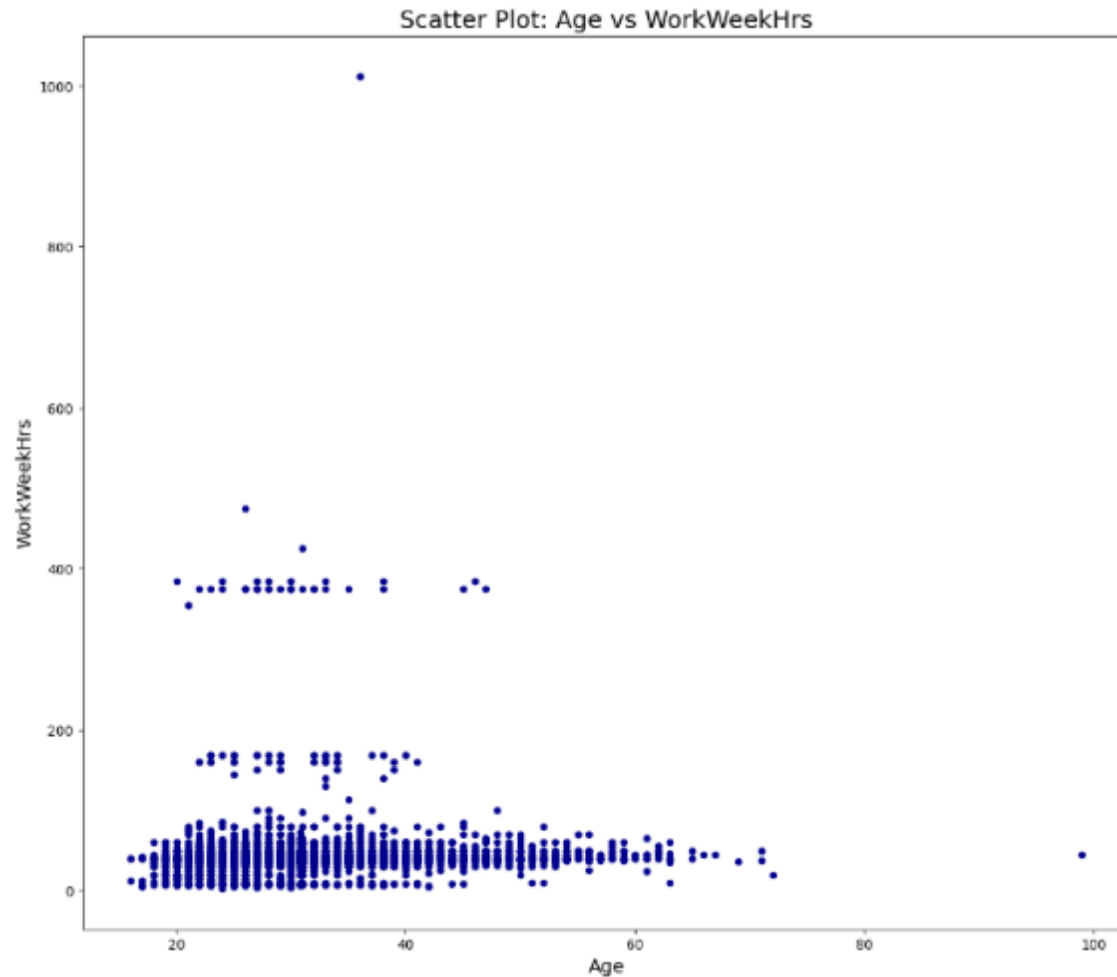
APPENDIX



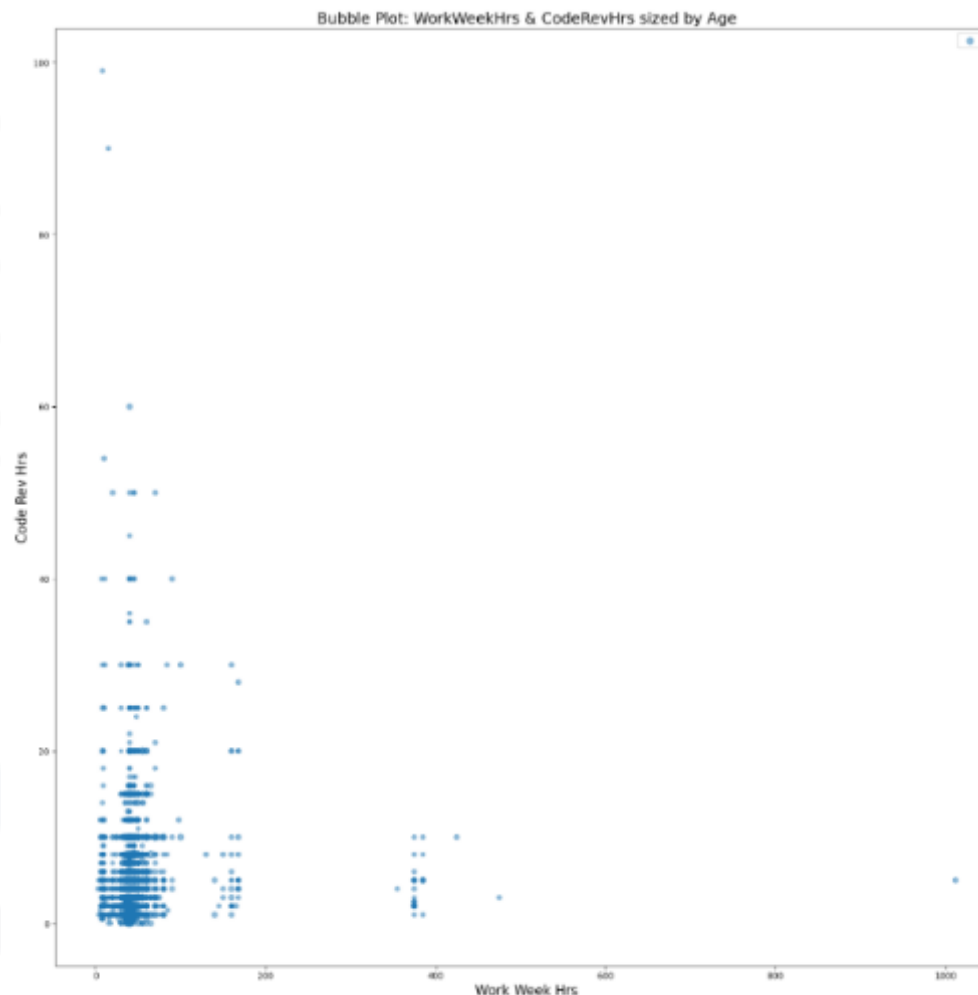
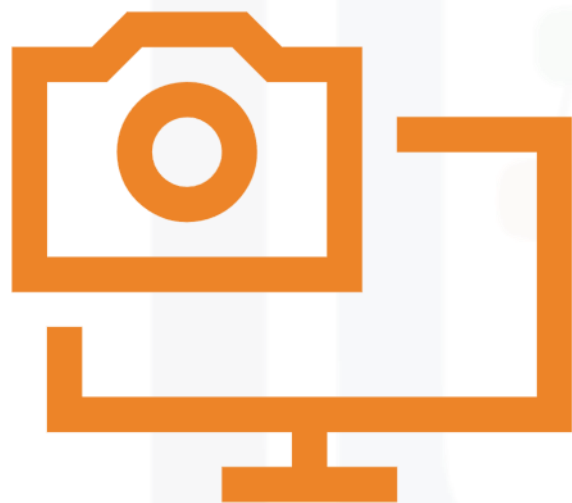
APPENDIX



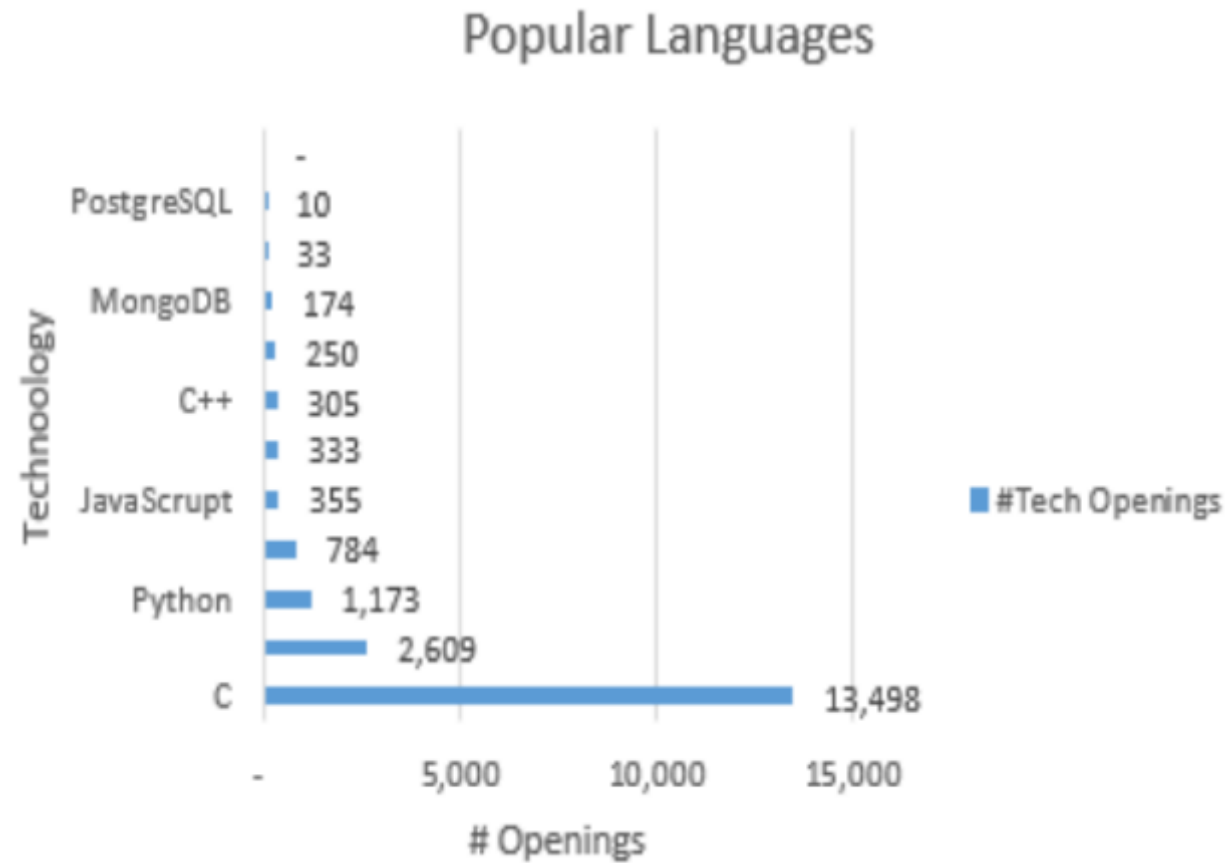
APPENDIX



APPENDIX



JOB POSTINGS



POPULAR LANGUAGES

