THE ANNUAL DEVELOPER SURVEY UGANDA 2019

Powered by Andela

THE TEAM

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INTRODUCTION

We are pleased to present to you the report for Uganda's first-ever nationwide developer survey; The 2019 Annual Developer Survey. We are excited to finally share it with you.

We started working on this idea after several conversations with members of Uganda's tech ecosystem; from tech companies, government representatives, investors, bloggers to developers across the nation at various experience levels. From these interactions, it became clear that we all deeply care about the ecosystem and want to do our part to grow it.

However, in order to do so, we must first understand it. The conversations we took part in revealed that collectively, we do not know enough about the trends and patterns in our ecosystem to enable us to take targeted action. So we figured, why not ask the developers - and so the Annual Developer Survey was born. They indulged us and we got an overwhelmingly positive response with over 800 developers completing the survey.

When we launched the survey, our commitment was that we would process the anonymous data provided with the highest level of integrity and share the results (including any insights, patterns, and trends observed) with an unprecedented level of transparency. This report is our way of fulfilling that promise.

The report details the insights that we have drawn from the survey data, but more important is what comes next – the nature of conversations we can all have as we start to gain a better understanding of our unique Ugandan tech ecosystem.

We hope that this will be the spark that ignites more in-depth and progressive conversations about our ecosystem.

A special thank you to everyone who filled the survey, we are gearing up for an even bigger response this year! Also, this would not have been possible without the support and guidance of Jackie Ochola, Country Director at Andela, Uganda.

Appreciation

Elias Mukasa

Charity Mugasha

Vincent Asante Hokie

David Mwebaza

Edward Tian

Get a copy of this report at annualsurvey.dev

BACKGROUND

The inaugural Annual Developer Survey was launched in Uganda on May 30, 2019, and was closed in October 2019, after a period of 5 months.

Methodology/Mode of Data Collection

The survey was delivered digitally and availed to the public via our website (www.annualsurvey.dev). This link was primarily shared as a post through social networking platforms like Facebook, Twitter and LinkedIn. Emails were also sent out to the participants in the Andela Learning Community 2019, and the Andela Women In Tech program. The survey was also shared with co-working spaces like Outbox hub and the Innovation village. All data collected was anonymous and responses were only recorded upon one's completion of the entire survey – no partial survey responses were included in the final dataset.

Sample Size and Completion

1,053 individuals visited the survey page and/or started the survey.
800 individuals completed the survey, yielding a completion rate of 75.97%. The average time spent by individuals to complete the survey was 34.5 minutes.

Devices

Over 50% (407 individuals) of respondents completed the survey on a desktop computer, averaging 52 minutes as time spent to complete the survey. The completion rate for individuals accessing the survey via a desktop computer was 95.5%

About 46% (372 individuals) of respondents completed the survey on a Mobile phone, averaging 14.33 minutes as time spent to complete the survey. The completion rate for individuals accessing the survey via mobile phone was 57.5%.

About 3% (21 individuals) of respondents completed the survey on a tablet device, averaging 11.19 minutes as time spent to complete the survey. The completion rate for individuals accessing the survey via a tablet device was 62.5%.

Acronyms

ALC:
Andela Learning Community

CI/CD:
Continuous Integration / Continous Delivery

DBA:
Database Administrator

Dev:
Developer

Dev Circles:
Facebook Developer Circles

GDG:
Google Developer Groups

NGO:
Non-Governmental Organization

PaaS:
Platform as a Service

QA:
Quality Assurance

SVN:
Apache Subversion

S/W:
Software

HTML:
HyperText Markup Language

CSS:
Cascading Style Sheets

DEFINITION OF TERMS

Software Engineer/Developer

A software engineer or developer is a person who applies the principles of software engineering to the design, development, maintenance, testing and evaluation of computer software / application.
- Wikipedia

Startup

A startup or start-up is a company or project initiated by an entrepreneur or entrepreneurs to seek, effectively develop, and validate a scalable business model. - Wikipedia

Hackathon

An event, typically lasting several days, in which a large number of people meet to engage in collaborative problem-solving through computer programming. - Dictionary

Co-working Hub

A co-working hub is a flexible workspace offering an "office when needed" service for modern micro-businesses and mobile workers. These shared facilities typically include bookable "hot" desks, formal and informal meeting spaces, high-speed broadband and costly or space-hungry professional equipment.
- Workhubs.com

Coding Bootcamp

Coding bootcamps, are structured and intensive educational programs designed to help attendees gain key programming and technical problem-solving skills through short but highly-focused instructional sessions.

Open-source Software

Open-source software is computer software in which source code is released under a free license. The copyright holder grants users the rights to study, change, and distribute the software to anyone and for any purpose.
- Wikipedia

Data Science Engineer

Data Scientist analyses and interprets complex digital data using the skill and knowledge of advanced statistical analysis, machine learning, data conditioning etc.
- edureka.co

Front-end Developer

A frontend developer is a developer who writes HTML, CSS and Javascript for a website or Web Application so that a user can see and interact with the application/system. Their responsibilities include basic website or application design (layout, content, images, colour schemes e.t.c.) and user experience (scrolling, optimisation for smartphones, navigation).

Back-end Developer

A back-end developer primarily develops and maintains the core functional logic and operations of a software application or system. Their key role is to ensure that the data or services requested by the front-end application or software are delivered through programmatic means. Back-end developers also create and maintain the entire back-end of a system, which consists of the core application logic, databases, data and application integration, API and other backend processes.

Full-stack Developer

A Full-stack developer is a developer who can develop both client (frontend) and server (backend) software. In addition, they are comfortable working with databases. - W3schools

Mobile Developer

A mobile developer is a software developer who specialises in creating software for mobile devices and technologies such as Google's Android, Apple's iOS and Microsoft's Windows Phone platforms.

QA Engineer

A QA engineer is an engineer responsible for making sure all developed features of an application meet the company and industry quality standards.

DevOps Engineer

It is often difficult to understand this role because the DevOps Engineer is the product of a dynamic workforce that has not yet finished evolving. Devops is a culture and philosophy that, in a nutshell, aims to unify the formerly separate silos of software development and operations into a single team. The DevOps Engineer is expected to have a good understanding of the Software Development Lifecycle (SDLC) and bring S/W engineering tools and processes to solve operations challenges such as code releases and deployments.

THE SECTIONS

Developer Demographics

This section introduces, in detail, the demographic data about the different software engineers in Uganda. These include but are not limited to gender, age and developer distribution across districts.

Developer Engineering Journey

This section highlights the journey of a software engineer, looking at when they wrote their first line of code, the programming language(s) they are currently using, and what level of expertise they think they are at, coupled with their area of specialisation.

Developer Employment and Remuneration

In this section, we analyse the employment status and nature of employers of the different categories of software engineers in our ecosystem, from students, to senior engineers. We go a step further to analyse the variations in salaries paid to the different engineers based on their areas of specialisation.

Developer Internet usage

The internet has unlocked a world our ancestors only dreamed about. Today one cannot develop a software solution without the internet as it is the backbone for this industry. In this section, we look at the different internet service providers and how much they charged for the different data plans they offered at the time of carrying out the survey.

Developer Workplace

In this section, we look at the different environments in which developers work and explore what their preferences are and why.

Developer Workflow

When developing software solutions, every team has a workflow they use to ensure efficiency and effectiveness in their work. In this section, we review the tools and resources used by software engineers to ensure that they produce high quality software products in an effective and efficient way.

Project Management

In this section, we review the different tools used by the different teams to keep track of their product lifecycle.

Developer Learning

This section describes the resources and tools used by software engineers to learn what they need to, to deliver software solutions and grow from one level to another.

Open Source Software

According to zdnet.com, 78% of companies run open-source software. This clearly shows that most of the software engineers / teams use open source software when developing their solutions. This section highlights the percentage of Ugandan Software Engineers that use open source software as well as those that contribute to it.

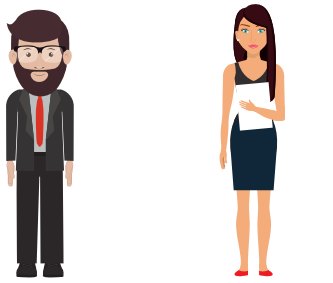
Startup Ecosystem

This section highlights the type of startup companies that we have in Uganda and how much they have raised in funding to date.

DEVELOPER DEMOGRAPHICS

Uganda's developer ecosystem is a budding one, with a spike in developer numbers seen over the last 5 years. The most experienced developers in our ecosystem started out over 20 years ago, but we only began to see real growth in the industry 10 years ago. This is evident in our age group data, with 85.5% of the respondents lying between the ages of 18 and 30. These developers are currently distributed in and around the capital, Kampala, with a few scattered in other major cities in the country. The industry is still concentrated with more male developers than female developers.

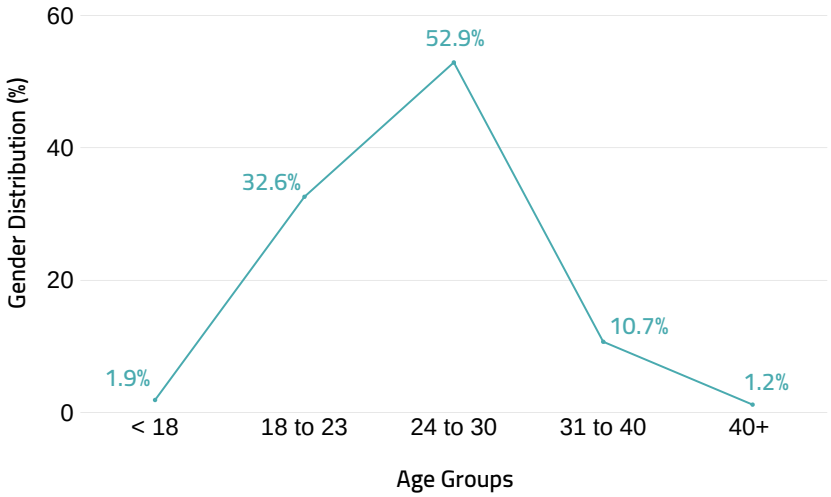
Gender



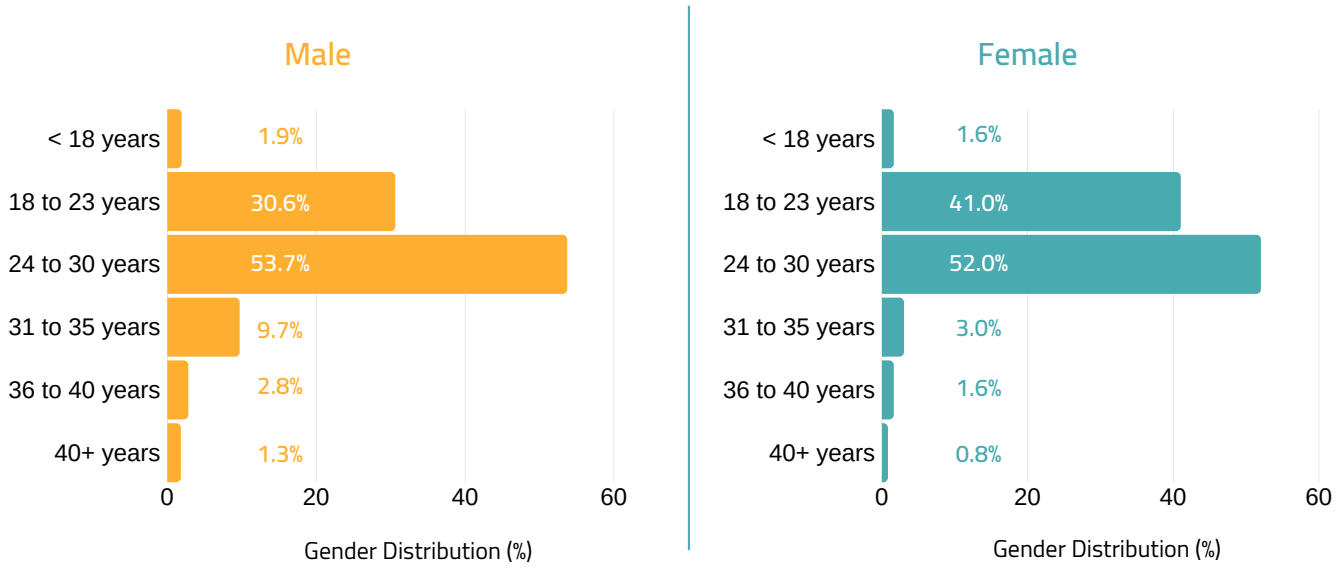
83% Male

16% Female

Age Distribution of respondents

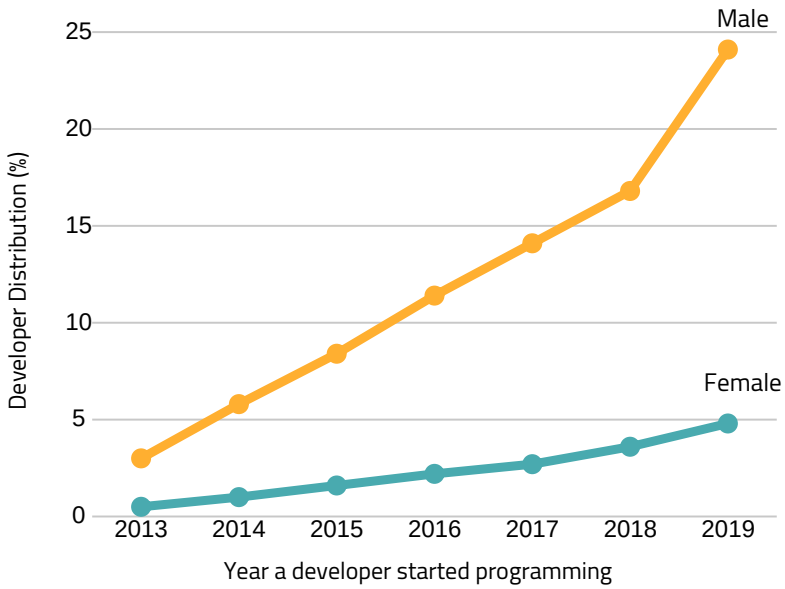


Percentage Distribution of the gender across age groups

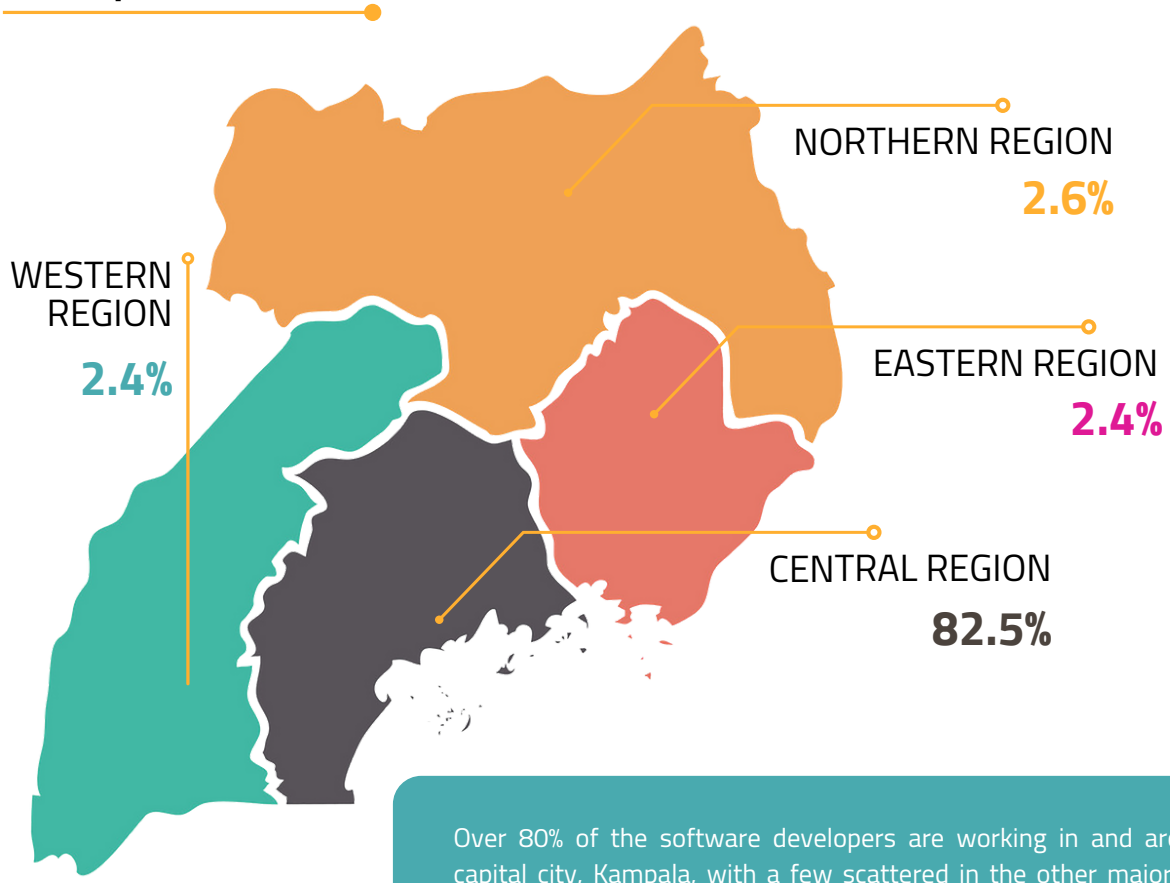


Depiction of growth in the number of developers over time

Basing on when the respondents wrote their first line of code, we can see that there has been a gradual increase in the number of both male and female software developers over the past 5 years.

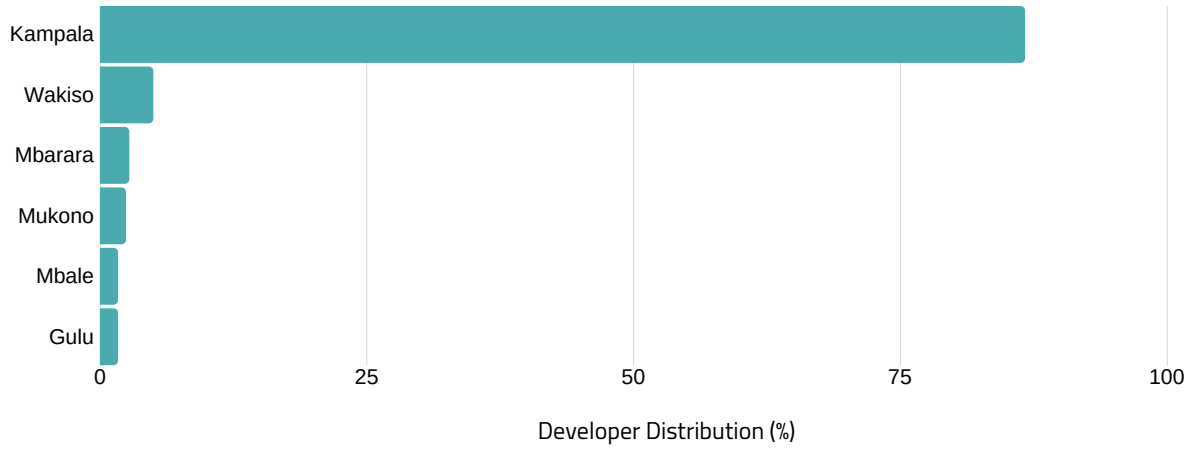


Developer Distribution



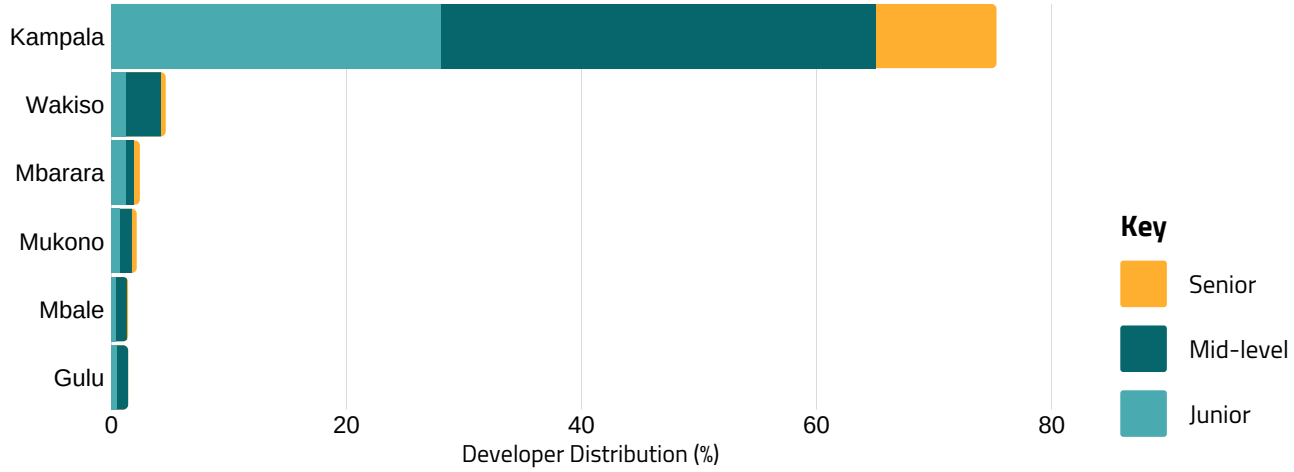
Over 80% of the software developers are working in and around the capital city, Kampala, with a few scattered in the other major cities of Uganda. This is most likely due to market demand. Most companies that need software developers are concentrated in these areas.

Percentage distribution of developers across the top 5 districts



Evidence from our findings indicates that most developers are concentrated in Kampala and Wakiso districts, with a few scattered in Mbarara, Mukono, Mbale and Gulu districts. 67% of these developers between the ages of 19 and 30 years are located in the aforementioned two districts.

Skill level distribution across the top 5 districts



Our ecosystem is comprised of mostly junior and mid-level developers with a larger concentration of mid-level developers and a few senior developers. In the coming years, we expect to have a balance in the distribution of developers at all levels as the mid-level developers go on to become Senior and the Juniors become Mid-level developers. It is also expected that there will be a gradual increase in the Junior developer numbers basing on our respondents data on when they wrote their first line of code. That number has seen a spike in recent years indicating a growing interest in the industry and this guarantees continuity.

88% of the Senior Developers are in Kampala, 3.4% are in Wakiso, 4.2% are in Mbarara, 3.4% in Mukono and 0.8% are in Mbale. We, however, did not get any senior developer respondents in Gulu.

87.5% of Mid-level Developers are in Kampala, 3.8% are in Wakiso, 3.8% are in Mbarara, 2.2% are in Mukono, 1.3% are in Mbale and 1.6% are in Gulu.

87.4% of Junior Developers are in Kampala, 3.7% are in Wakiso, 3.7% are in Mbarara, 2.3% are in Mukono, 1.2% are in Mbale and 1.6% are in Gulu.

DEVELOPER ENGINEERING JOURNEY

Software Engineering is an ever-changing profession that requires one to constantly adapt to new technologies and standards. In respect to its ever-changing nature, there are various ways to get into the profession.

Today, thanks to the internet, there is a big pool of online learning resources (both free and paid for) that make it possible for those interested in embarking on a software engineering journey to start learning.
Other avenues such as bootcamps, University courses or course units and computer classes in school also play a role in instilling interest and providing a foundation for software engineers.

One can start to learn the basics of computer programming from as early as they are able to do basic mathematical computations. In fact, there are visual programming languages like Scratch designed to teach children, as young as 8 years, basic programming skills.

From the data collected, we also identified people who have never been to University, and others with non-tech related degrees actively pursuing software engineering as a career. This shows that through interest and/or passion, coupled with hard work and consistency, one can become just as good or even better than a software engineer with a formal education in the same field.

How developers got into Programming

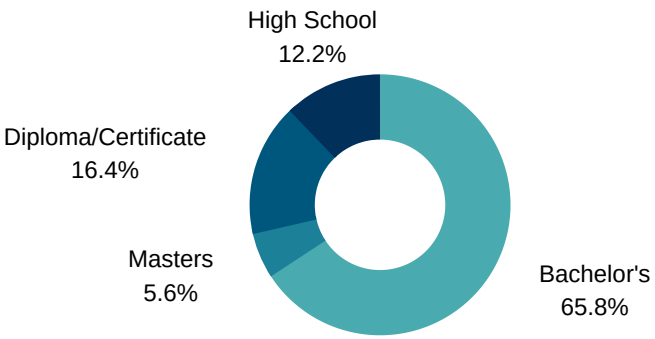
School & University	51.8%
Self-taught	37.7%
Community	6.5%
Coding Bootcamps	2.5%
Hackathons	0.3%

First time a developer wrote a line of Code

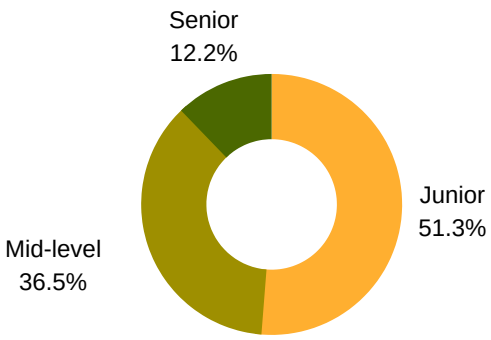
< 1 year ago	14.2%
1 to 2 years ago	23.7%
3 to 4 years ago	23.9%
5+ years ago	38.1%

While learning institutions like universities are the major contributors to introducing people to programming, Developer Communities like Google Developer Groups, coding bootcamps, hackathons, and the big pool of online learning resources also play a significant role in introducing people to programming.

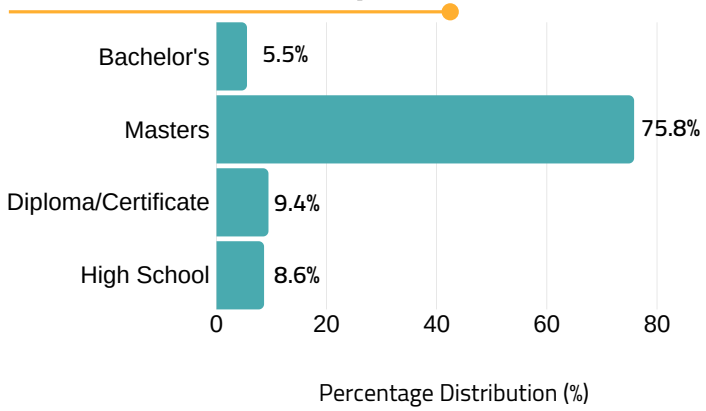
Highest level Of Education



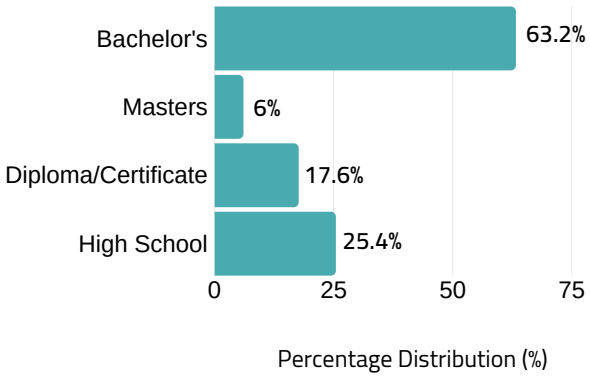
Level Of Expertise



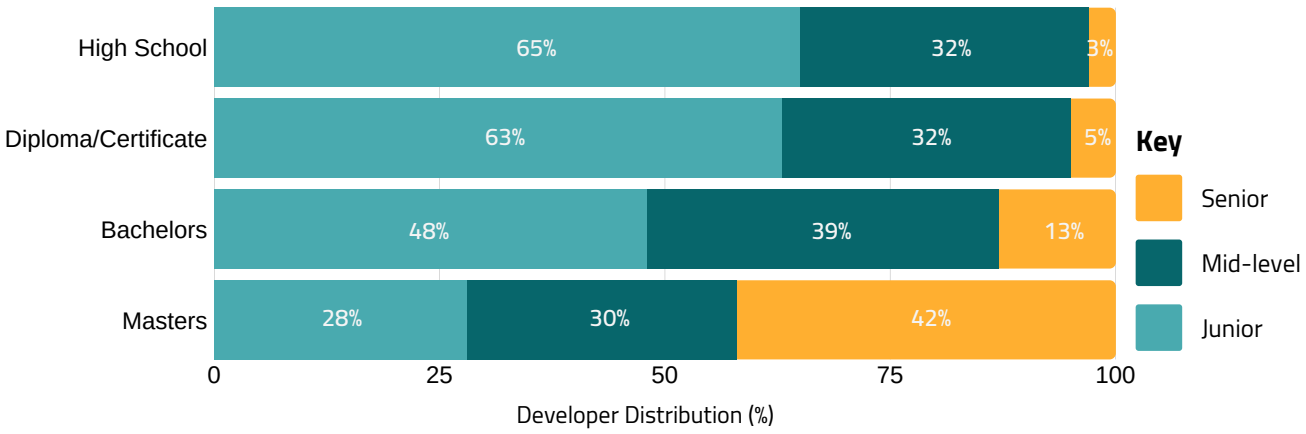
Highest Education level of Females in the Tech space



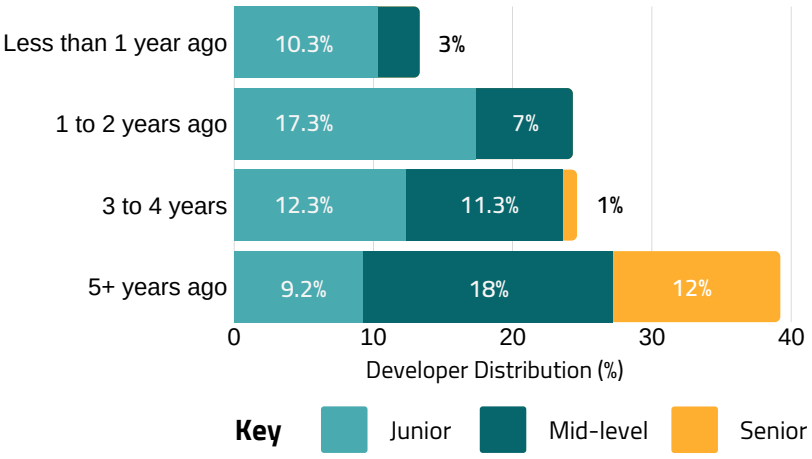
Highest Education level of Males in the Tech space



Percentage Distribution of Expertise across highest level of Education



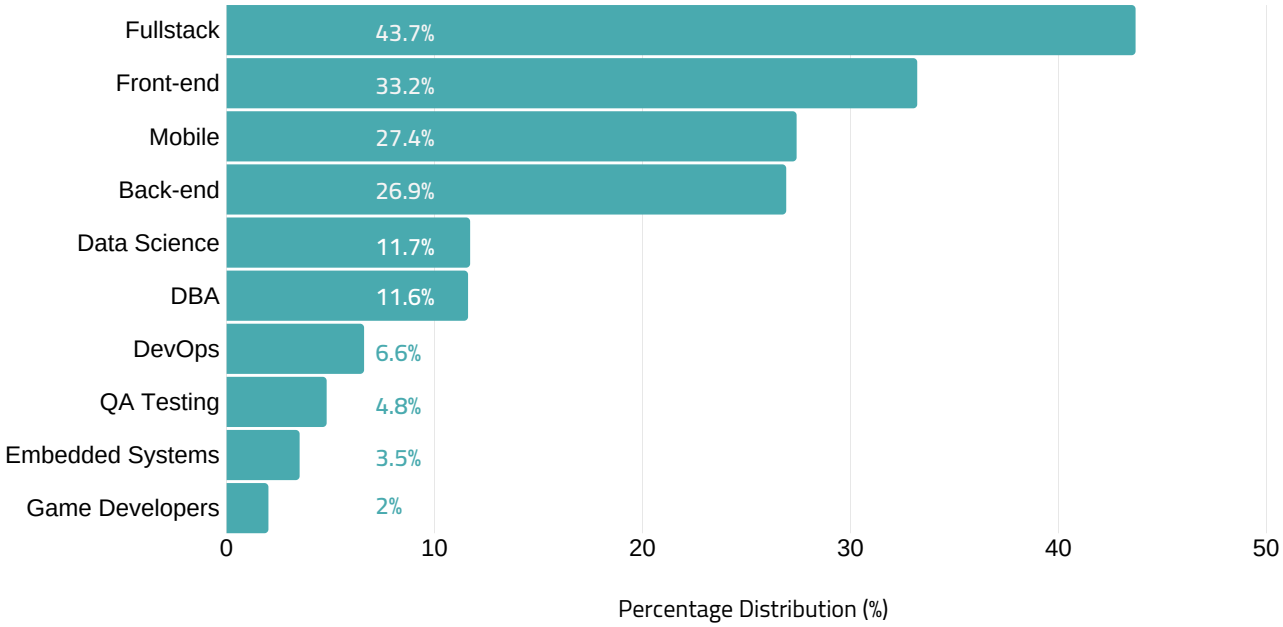
Percentage Distribution of Expertise across the time when developers wrote their first line of code



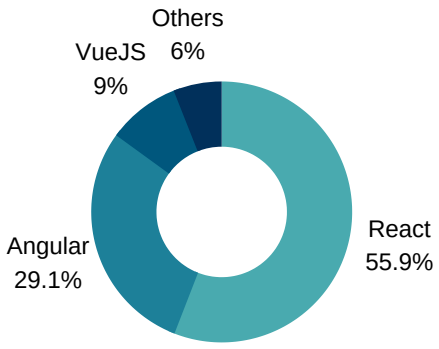
11% of Senior developers and 5% of Mid-level developers wrote their first line of code 5+ years ago. This suggests that they've been in the field longer and therefore have gained good experience over the years.

13% of Junior developers, wrote their first line of code less than a year ago. This suggests that the Ugandan market has a good number of growing Junior developers.

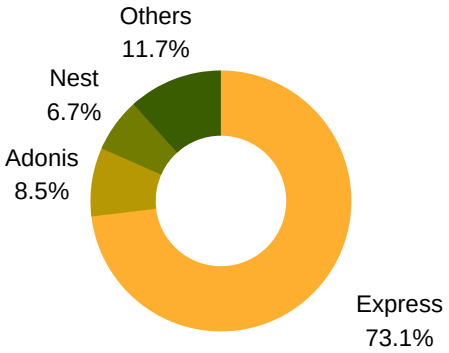
Percentage Distribution of Area of Specialisation



Front-end JavaScript Frameworks



Back-end JavaScript Frameworks

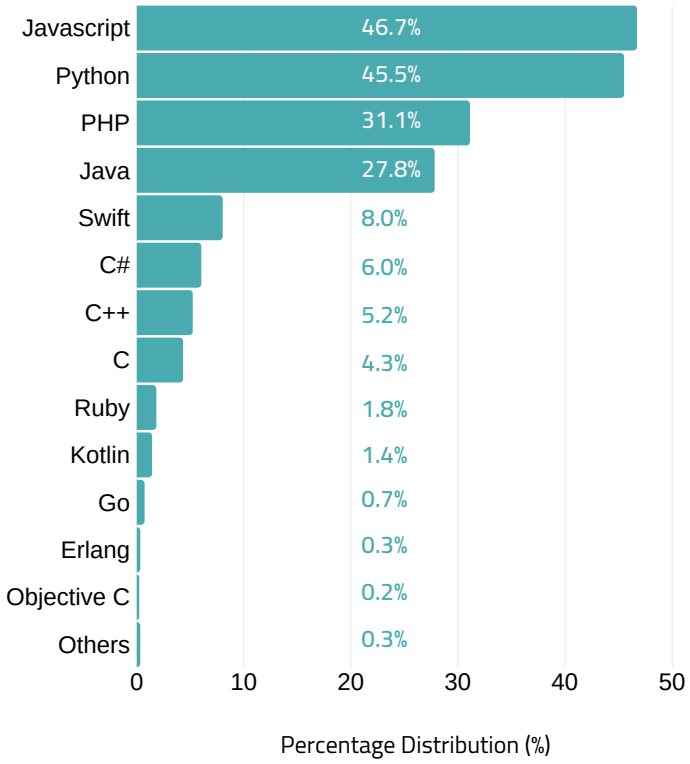


Think of a framework as a collection of useful programs that make the developer's work in a given language much easier. There seems to be a new Javascript framework coming out every other month, and keeping up with the trends is a challenge. It's so frequent, someone created a website that tracks the days since the last Javascript framework was released. You can check it out at https://dayssincelastjavascriptframework.com/.

Choosing which framework to use for your application, is an even bigger challenge. From our data, you can see that Express.js is the preferred framework for backend development, while React.js is the preferred framework for frontend development.

Javascript frameworks like Angular and Vue are also popular among developers in Uganda when it comes to frontend development. This is a result of the market demand i.e. the skills recruiters are looking out for, learning curve, popularity on the global market, usability and ease of integration with other technologies.

Percentage Distribution of Languages Used by Developers



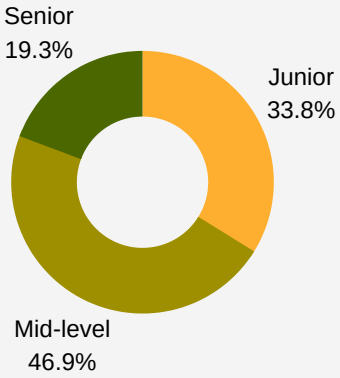
Javascript is currently the most used language in our community, followed by Python. This is consistent with global trends.

Javascript is a core component of web technology so its popularity comes as no surprise. It is supported across all browsers and is executable on the client and server side (thanks to Nodejs). Having started out as a lightweight scripting language for browsers, it is now considered a general purpose language that is relatively easy for a first time learner to grasp.

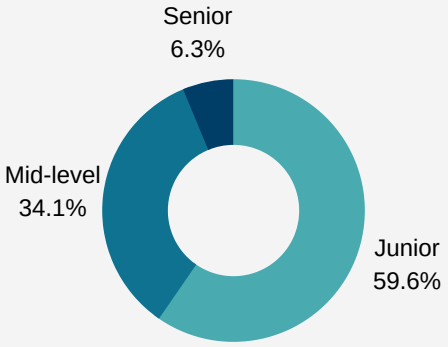
Python is also a general purpose language with a simple programming syntax that reads and writes quite a bit like plain English. It is powerful and immensely versatile, allowing it to cover multiple areas and industries. It has applications ranging from Scripting, Web Development, Data science, AI, et.c. These are probably the reasons why it is the language most Ugandan developers would like to learn and it is the fastest growing language globally, according to the Stackoverflow developer survey of 2019.

Distribution of expertise across different developer specialisations

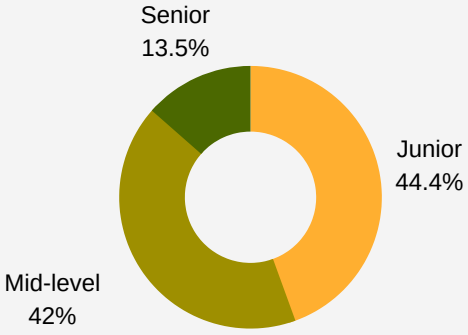
Fullstack



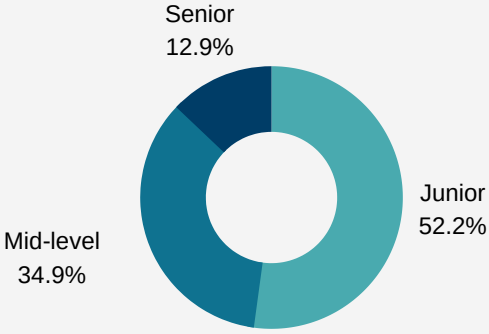
Front-end



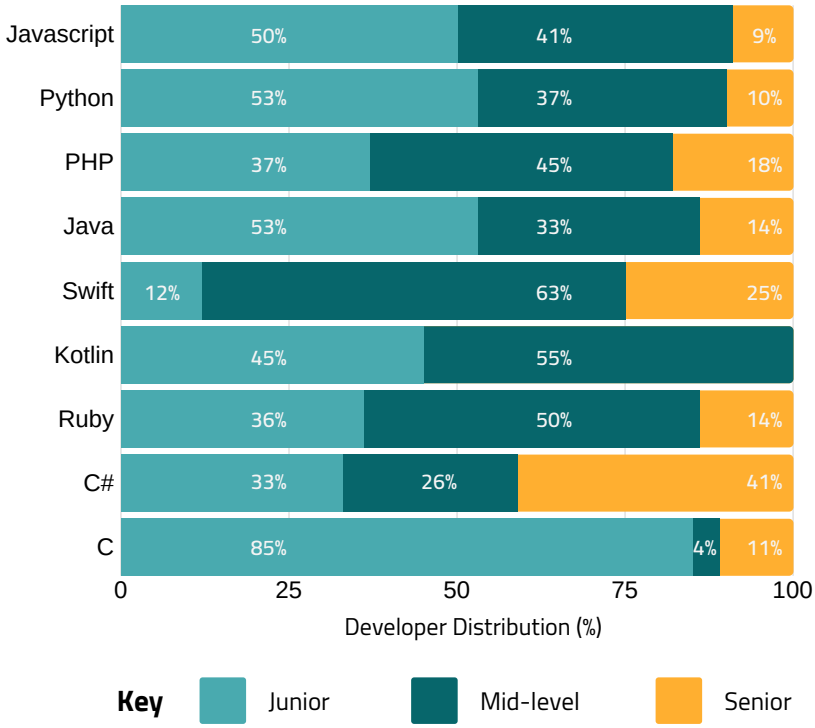
Back-end



Mobile



Distribution of expertise across different languages used by developers



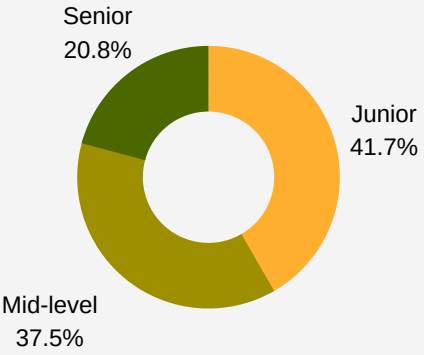
Over the last few years Javascript and Python have grown, globally, in usage and as a result, popularity. From the data, you can see that most of the junior developers, mid-level developers and a good number of the senior developers are proficient in these languages.

Arguably, Andela has played a significant role in boosting the number of developers in these languages, particularly the Junior developer numbers. From 2017, Andela has shared learning resources and guidance particularly through the bootcamps, the ALC program, the Women In Tech program and provided employment opportunities for software engineers.

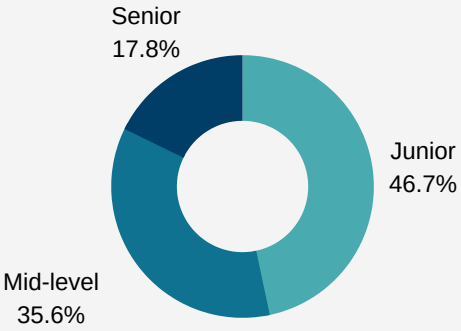
PHP is a skill that a good percentage of senior and mid-level engineers possess. There was a time when it was one of the most popular programming languages but it has since been replaced by the not-so-new comers, Javascript and Python. Basing on that history, it makes sense that there are a significant number of developers with PHP experience.

Distribution of expertise across different developer specialisations Cont..

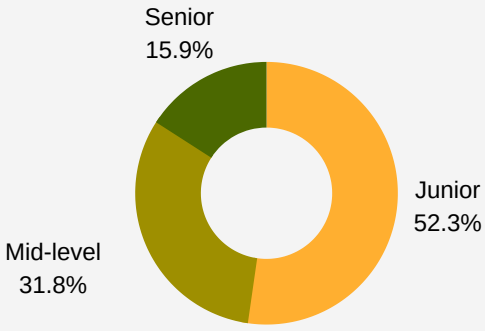
DevOps



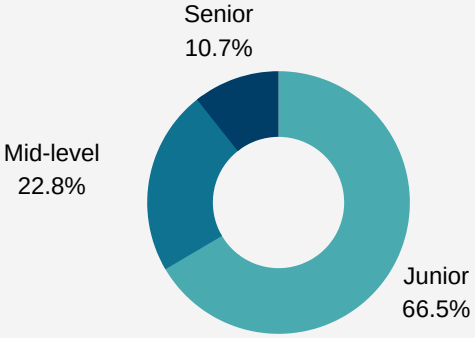
Data Science



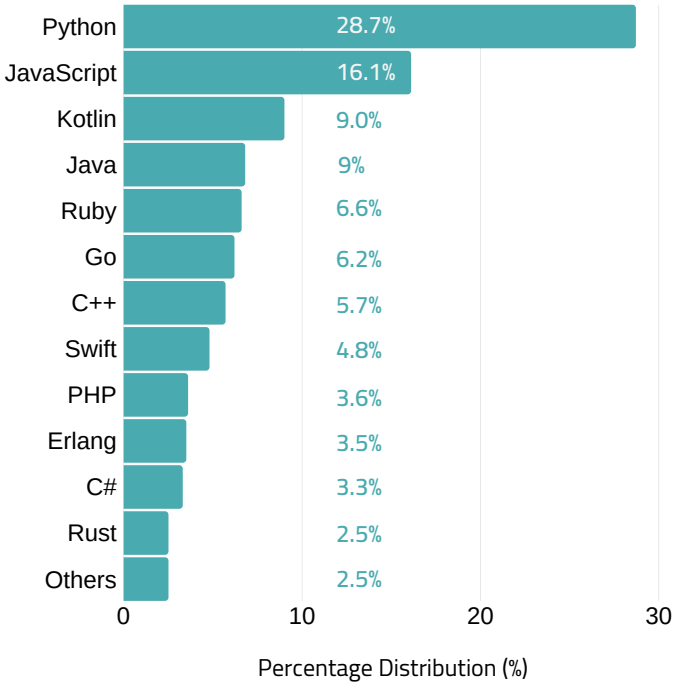
DBA



QA Testing



Percentage Distribution of Languages that Developers want to learn

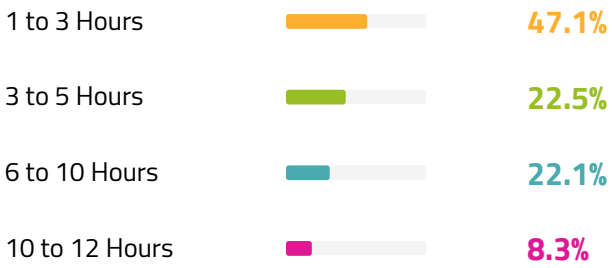


Python is overwhelmingly the language most Ugandan developers would like to learn. It is the fastest rising programming language today, according to the TIOBE index.

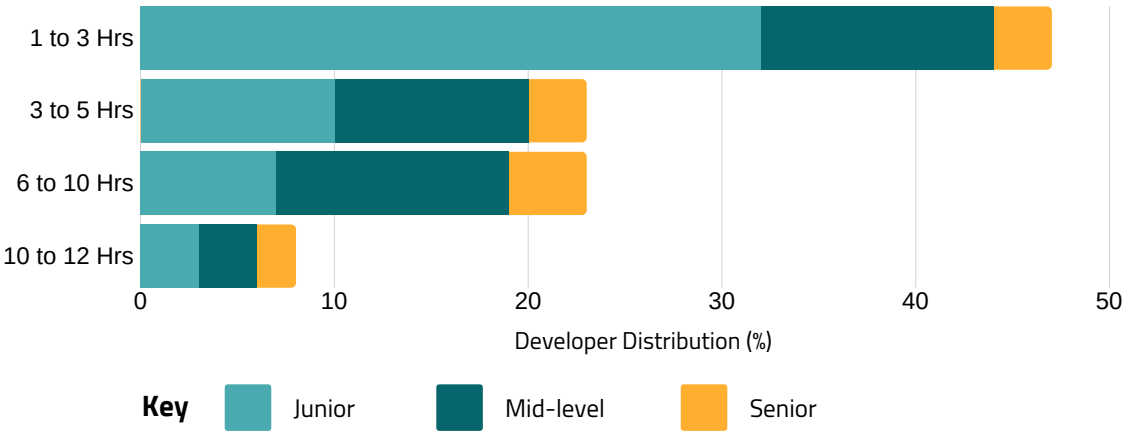
JavaScript, Java and Kotlin also seem to be popular among Mid-Level developers and Junior developers. Senior Developers on the other hand seem to prefer to learn, Erlang, Go and Swift.

Notably the number of people interested in learning PHP is significantly lower than people who know the language, as compared to several of the newer languages: Go, Kotlin, Ruby, Swift, where there are not as many existing developers. Javascript and Python are clearly the dominant languages.

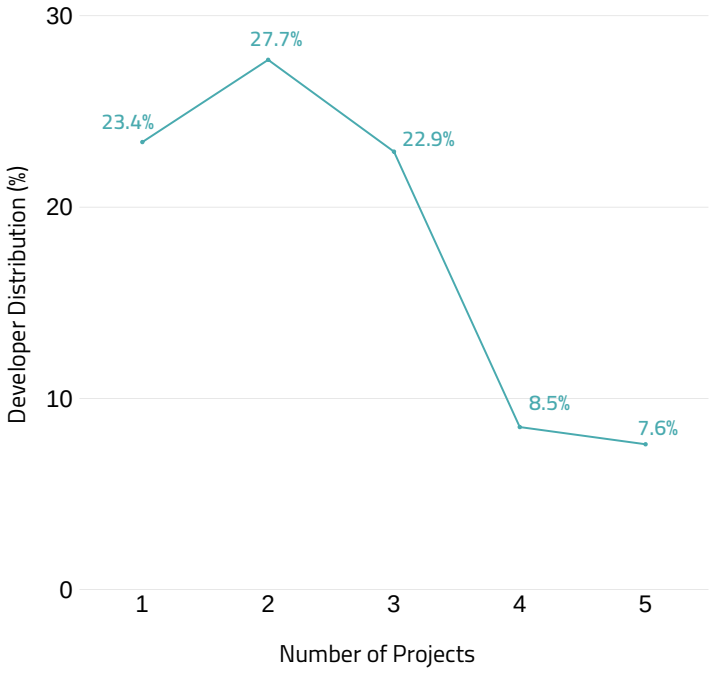
Hours spent coding daily



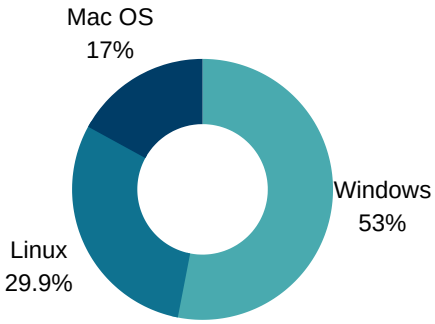
Percentage Distribution of expertise across the Hours spent coding



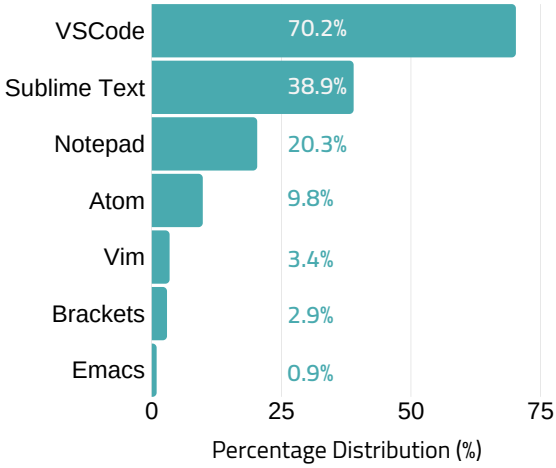
Number of Software Projects a developer is engaged with at a time



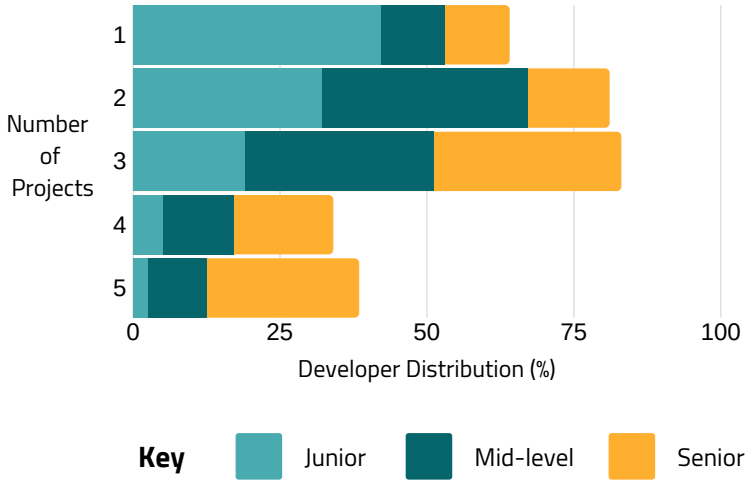
Operating Systems used



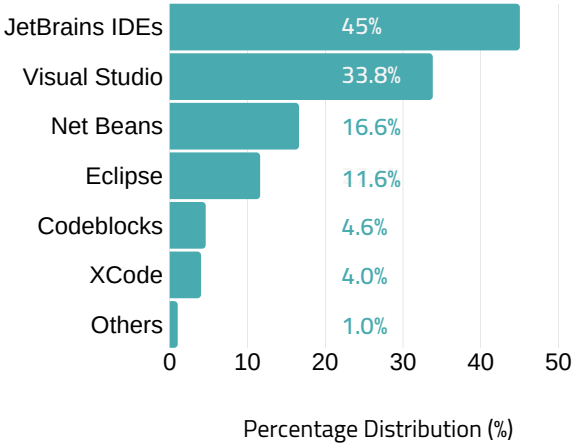
Percentage Distribution of Text Editors used by Developers



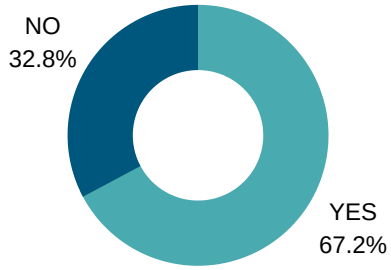
Number of Projects Developers at different levels work on at a time



Percentage Distribution of IDEs used by Developers



Developers working on a team

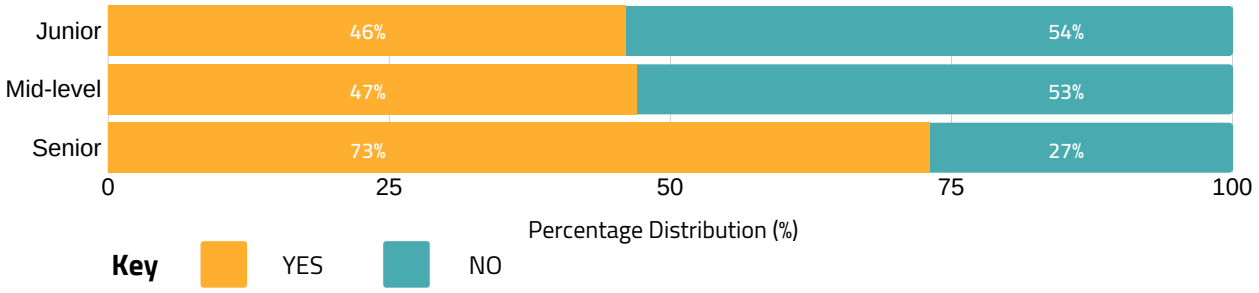


Developers working as team leads

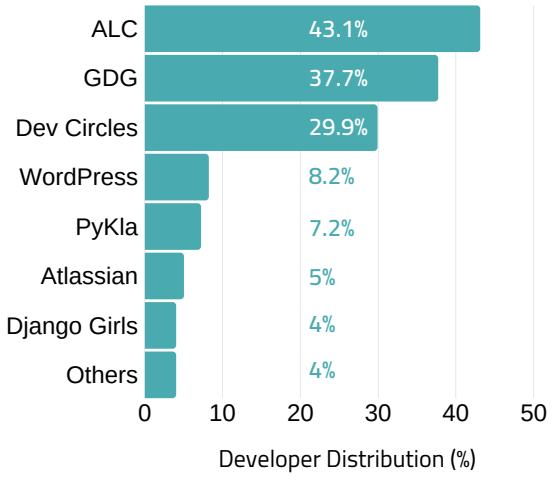
Many software development projects require more than one engineer to take on the tasks. That's where teamwork comes in and as with every team, there needs to be a leader, preferably someone with more experience working on teams to draw from that experience.

From the data, you can see that over 70% of the senior engineers, about 50% the mid-level engineers and only 37% of the junior engineers have been entrusted with leadership roles on their teams. This demonstrates that experience is preferred when choosing someone to lead a team and the software development industry is not an exception.

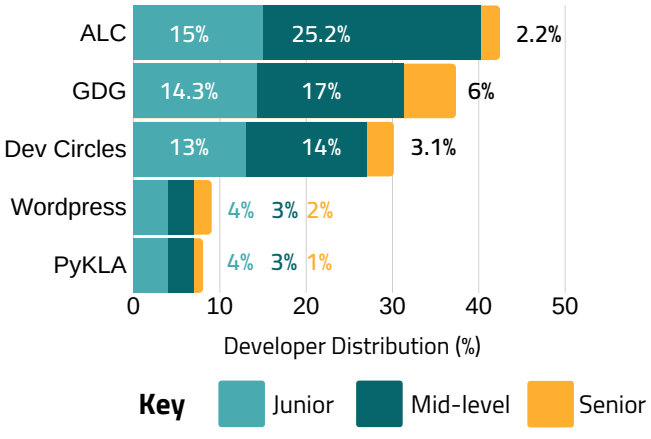
Distribution of team leads by level of expertise



Percentage Distribution of Developer engagement with Dev. Communities

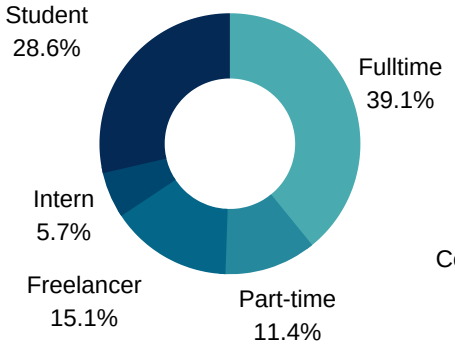


Percentage Distribution of expertise across Developer Communities

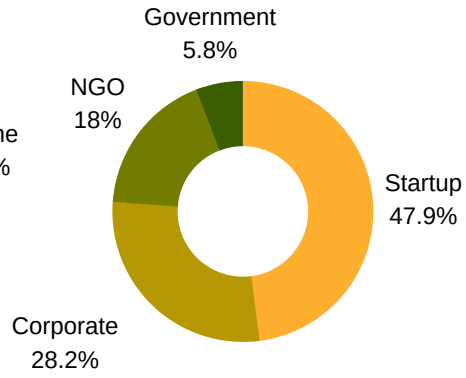


DEVELOPER EMPLOYMENT

Employment Status



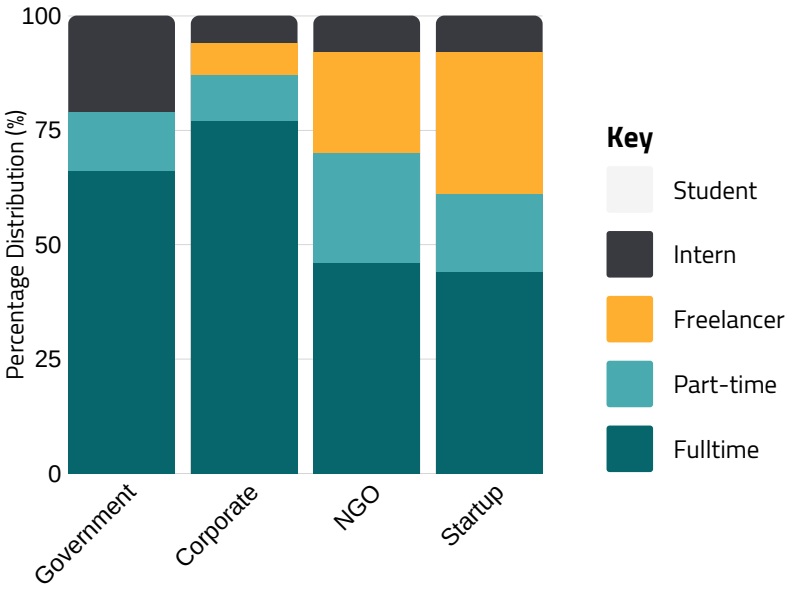
Nature of Employer



Industry of Operation

Education	14.6%
Banking / Fintech	13.8%
Health	9.4%
Telecommunications	8.8%
Mobility Solutions	5.0%
Agriculture	4.4%
Accounting	3.7%
Entertainment	2.7%
Civic Engagement	1.3%
Manufacturing	1.0%
Security	0.8%
Architecture	0.6%
Others	33.8%

Distribution of Employee Types in Organizations



Length of Employment

0 - 2 years	53.4%
2 - 5 years	20.7%
5+ years	10.4%

15.5% are students who are not yet in any form of professional employment.

15.5%

Students make up 28% of the developer survey respondents, and it is assumed that the majority of them are not employed, at least not in the software development industry. This is partly attributed to the local market structure, where the average employer requires academic qualifications as a prerequisite for employment.

39.1% of the respondents are full-time employees, 11.4% are part-time employees, 15.1% are freelancers with 5.7% working as interns.

Of the total number of employed respondents, 47.9% work for Startups, 28.2% work for Corporate organisations, 18% work for NGOs and 5.8% work for government entities. Most free-lancers are working with Startups and NGOs with a few developers working for corporate entities. Notably, there isn't a single free-lancer working with government, possibly due to the regulations around eligibility for working on government contracts.

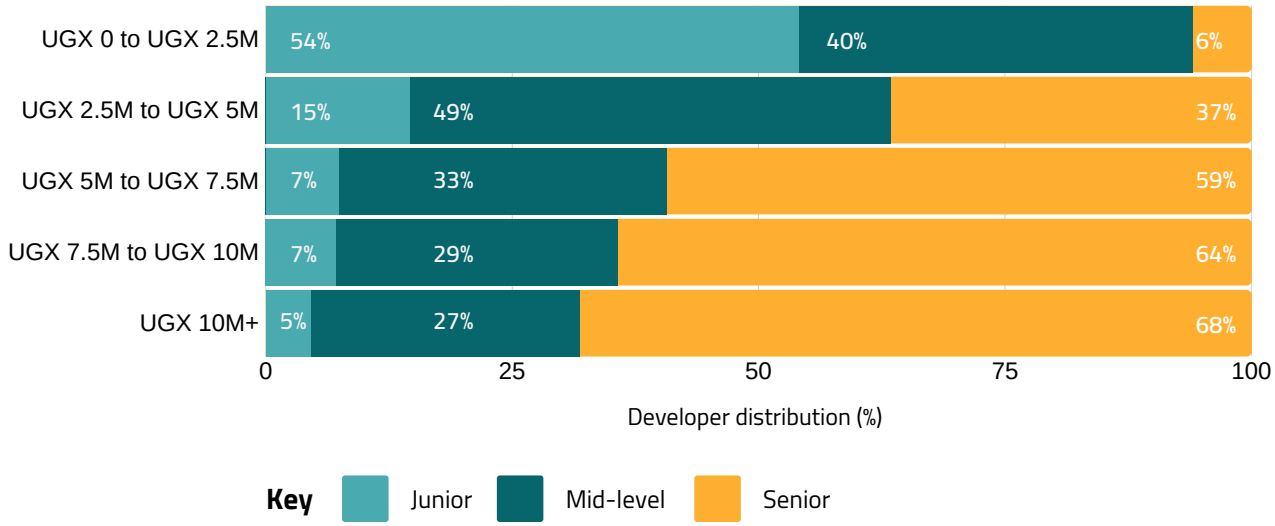
DEVELOPER REMUNERATION

Software development, as with any other industry, is geared at earning a living. According to Glassdoor, one of the largest jobs and recruitment website, 6 of the 15 highest paying jobs as of 2019 are in the software development industry. While a number of developers start out in the industry out of curiosity, and for some it becomes a passion, most if not all would like to get paid commensurately for their skills and/or products.

Naturally, in our work environments, the more years of experience one has, the more money they expect to earn. The study does not differ much from that expectation and we see that respondents with 5+ years of experience earn significantly more, upwards of UGX 5M per month. Most of these are expected to be mid-level to senior developers but most of the mid-level developers are earning a gross monthly salary between 2.5M to 7M. More of senior developers are earning a gross salary of 5M+ per month. There is an overlap in the 5M range for the mid-level and senior developers which can be attributed to varying skills and years of experience as the industry starts to differentiate the mid-level to senior developers; the type of employer maybe a factor as well.

Most junior developers earn a gross monthly salary between 0-2.5M with the few in the 2.5M-5M range most likely being at the stage when they start to transition to mid-level developers. This might also be attributed to the type of employer as we are seeing corporate organisations and government paying more than local start-ups which are limited in what they can afford to pay as they try to break even.

Distribution of Gross Monthly Salary over expertise



From the study, we also observed that software developers who work remotely, from Uganda, for companies outside Uganda, mostly in the US, seem to earn a lot more than the employees working for local companies. The highest gross salaries are above UGX 10M for those working remotely.

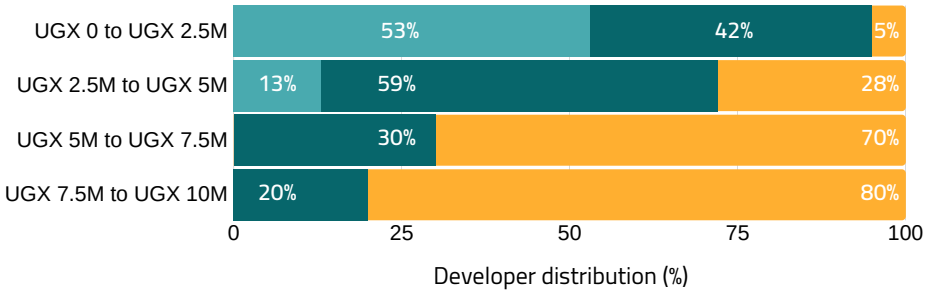
They are closely followed by people who work in corporate and multinational companies with an average gross salary of UGX 5.5M.

The rest of the employees seem to be within the range of 0 to 2.5M with the more senior developers in the 2.5M to 5M bracket. Employees in startup companies exhibit the lowest salaries recorded.

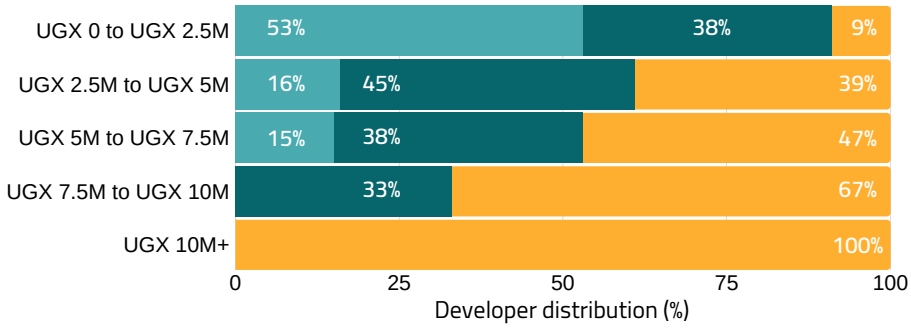
Distribution of Gross Monthly Salary over expertise

Key Junior Mid-level Senior

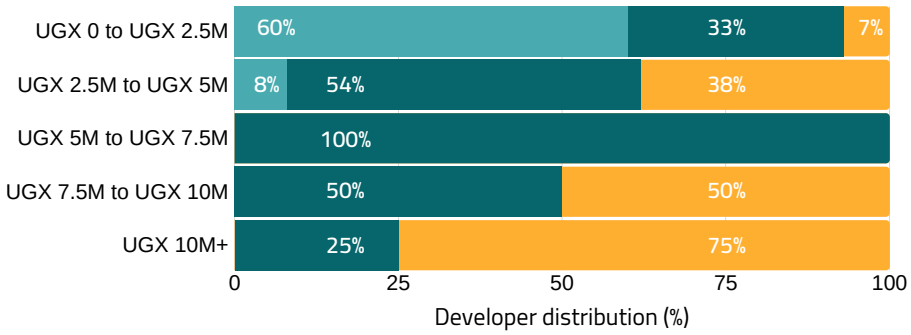
Salaries Across Local Startups



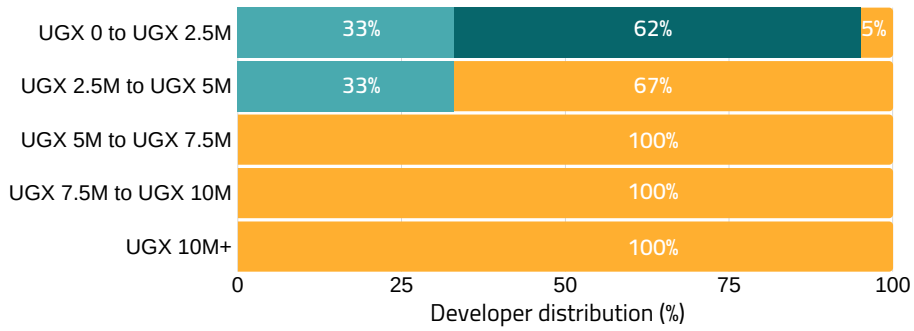
Salaries Across Corporate Organizations



Salaries Across Non-Government Organizations



Salaries Across Government



The local startups pay the least in our ecosystem which is understandable given the financial constraints faced when starting any business. Their staff is also mostly comprised of junior developers. This is partly due to their high staff turnover rates as these developers are always in search of better paying jobs especially as they start to grow their skills.

Corporate and multinational organisations pay better than the local startups and offer benefits on top of the basic pay. This results in better staff retention. Foreign startups in the market also pay at a similar scale. There is the exception of those working remotely from Uganda, for companies out of the country who earn significantly more than the average market rates.

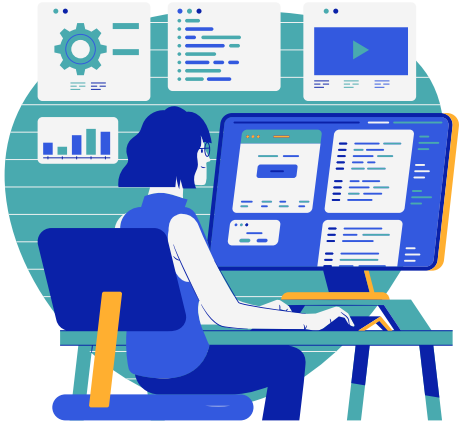
According to the data, Government and Non Government Organisations pay quite well. NGOs are mostly funded with donor money and this generally comes with stipulations. The skills required and the salary to go with them are usually outlined by the donor and those figures are set to attract the best possible talent, local or expatriate.
Some of the government contracts, particularly in the tech space are also donor funded and this might partly explain the somewhat higher salary ranges.

DEVELOPER INTERNET USAGE

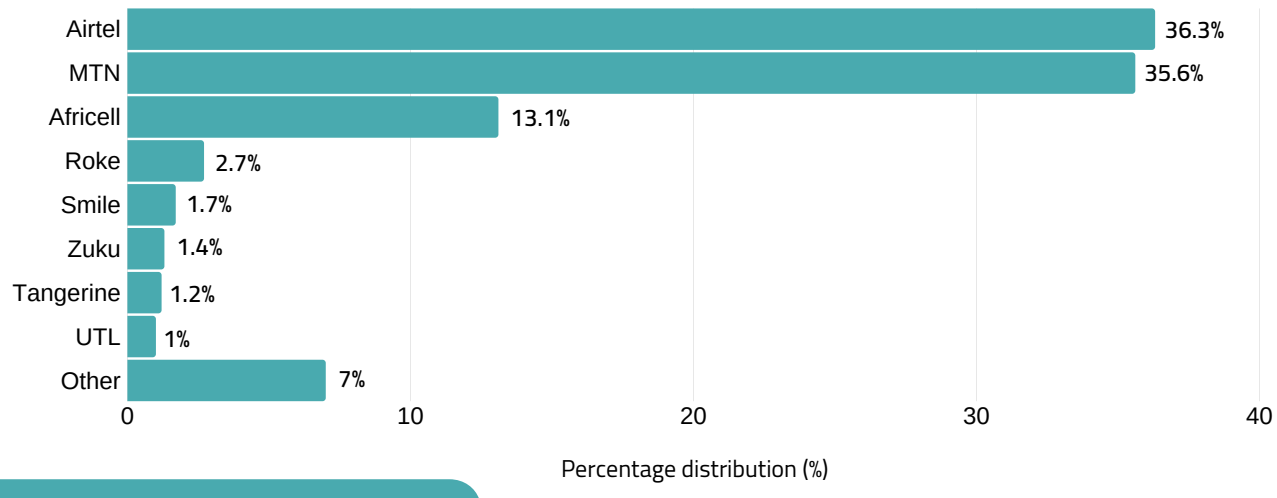
Dr. Bitange Ndemo, the former Permanent Secretary of the Ministry of ICT, Kenya, jokingly said, "The internet is probably more important than water". The average person will dismiss the statement as lunacy but if you said this to a software developer today, they most likely will take a moment to think about the merits of the statement. There have been times at the office, when the internet connection goes off and the entire office comes to a standstill. That is a strong indicator of how integral the internet is in a developer's day to day workflow.

A great percentage of software developers have honed their skills over the internet. When they get an error they don't recognise, usually their first reaction is to copy the error and paste it in their web browser. When they want to learn something new, usually the first place they look for learning resources is the internet; There is a multitude of resources available online ranging from documentation, tutorials in various forms, test exercises, entire courses and even sandbox environments to try out what they are learning.

The internet is also needed to access platforms that are considered work tools like Github, CI/CD platforms, PaaS, et.c. With all this knowledge about the relationship between developers and the internet, you can see how Dr. Ndemo's joke might have had more truth to it than many thought at the time.



Preferred Internet Service Provider

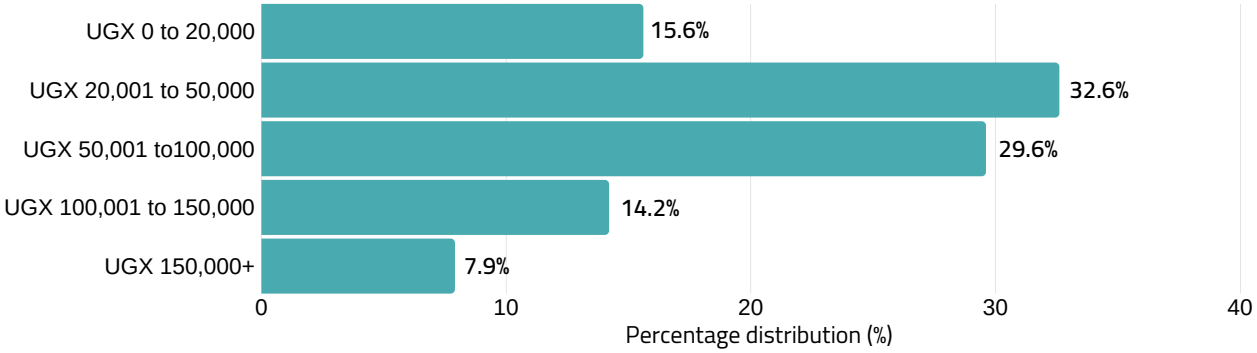


Currently, the most common internet packages are wireless mobile bundles. Bundles are quantities of megabytes usually valid for a particular period of time. MTN and Airtel are the preferred Internet Service Providers (ISPs) because they have wider internet coverage in and around the city. Their connections are also considered the more reliable ones in the market.

All things considered, the ISPs could do better, particularly around the issue of quantity. As mentioned earlier, most of the developers pay for bundles. These bundles could be cheaper, in fact, in a better managed internet sector, we would be paying for speeds and not bundles. In 2009, the first undersea cable to bring high-speed internet access to East Africa went live. This brought down the cost for 1MB of data through a satellite link by up to 80%. In the years that followed, our neighbour, Kenya, took steps to have even distribution of broadband internet around the country as well as lowering the price of the internet. These steps led to a boom in their tech industry and they are now miles ahead of Uganda in this regard. It is clear that the value of access to stable, affordable internet in the tech industry cannot be understated and yet 10 years later, we are still far off that mark.

In 2019, the government of Uganda introduced a new tax, Over The Top Tax (OTT), on the internet, making it even more expensive. To hear it being explained, it was meant to curb "gossip" in the country but it led to a significant reduction in the internet usage in the country. Meanwhile, over in Kenya, their biggest ISP, Safaricom, recently removed expiration of bundles and they have had home fibre packages for close to 4 years now with the price of a 5Mbps unlimited home connection approximately the same price as the cost of a 30GB monthly data bundle with MTN or Airtel in Uganda; at approximately $29. Decisions like this significantly affect how sectors that rely on the internet perform and grow.

Total Monthly Internet expenditure



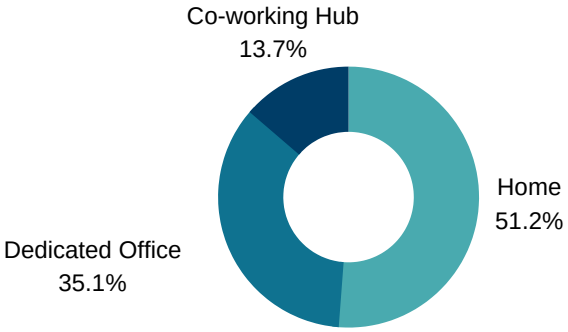
Junior developers spend the least on internet per month, an average of UGX 50,000 while senior developers spend the most, an average of UGX 100,000. Mid-level developers spend an average of UGX 75,000 per month. As developers, irrespective of the level, there are platforms on the internet that we all need to access, particularly those considered work tools like Github, CI/CD platforms et.c. Beyond that, developers need the internet for their day to day work with varying levels of access/quantity. The sad reality is that the junior developers need way more internet than they are paying for and yet they are not able to afford it. Their limited knowledge and experience means they spend more time online looking for solutions to their problems and or learning. As a result of their lack of experience, they might need to look at several resources while a senior developer would not.

People who earn less than UGX 1M spend, at most, UGX 20,000 on internet monthly.
People who earn an average of UGX 1M - 2.5M do not spend more than UGX 100,000 on internet monthly
People who earn above UGX 2.5M spend over UGX 100,000 on internet monthly.

As you may have seen from our remuneration breakdown, we have developers at all levels of experience earning above UGX 2.5M. We have also discussed the internet needs of developers at different levels of experience in the above paragraph. This internet usage breakdown clearly illustrates that people are only paying for what they can afford and not what they need.

DEVELOPER WORKPLACE

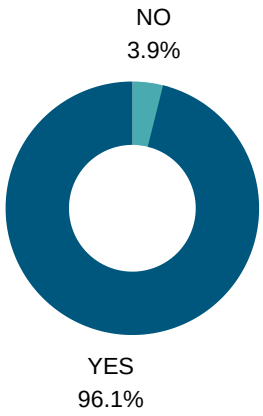
Preferred workspace



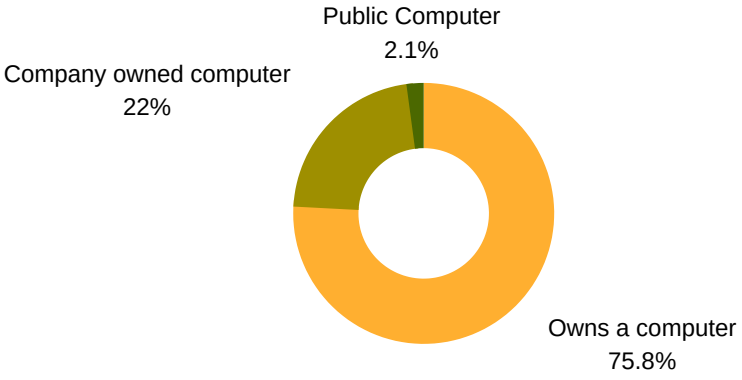
Hub / Co-working place usage

Outbox	19.0%
Innovation Village	17.1%
Design Hub	10.5%
HiveColab	7.6%
Tribe Kampala	3.8%
Resilient Africa Network	1.0%
Others	41.0%

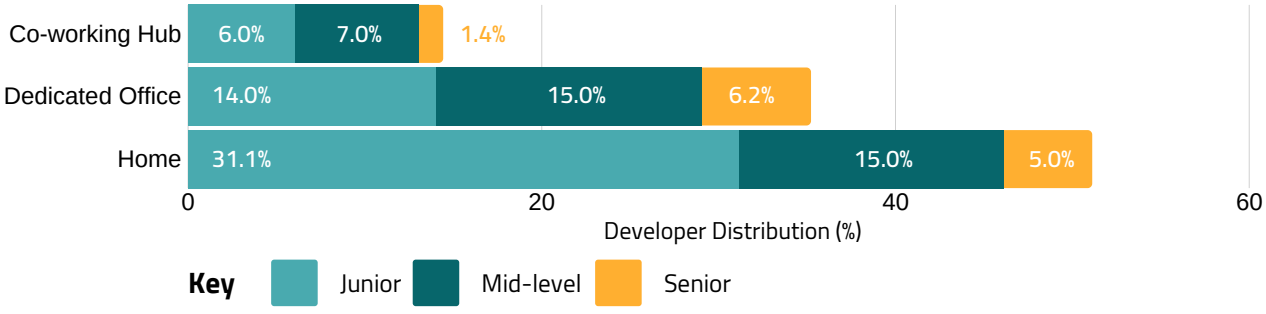
Access to a Computer



Form of Computer Access



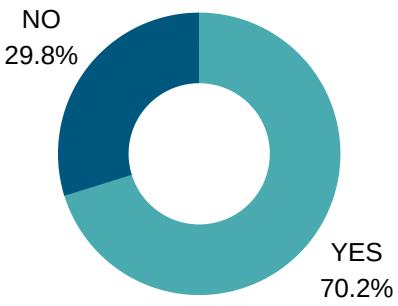
Percentage Distribution of expertise over preferred workspace



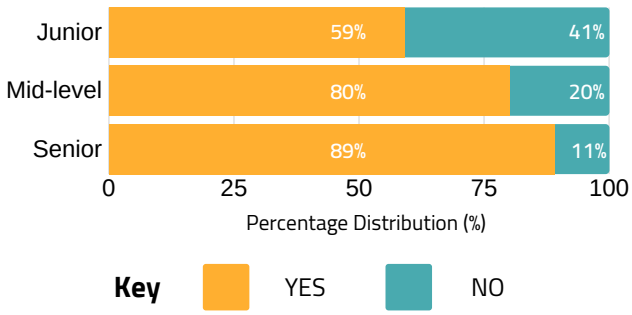
DEVELOPER WORKFLOW

There are several steps involved in the process of creating software. Over time, engineers have created solutions to make some of these steps easier. Without these solutions, given how complex the software development process has become, it would probably be taking developers twice the time it does now to start adding value on the projects they are working on. Some of these invaluable solutions are, version control systems, which help engineering teams to keep track of changes to source code over time, Continuous Integration/Continuous Deployment(CI/CD), as well as platforms to host applications. These tools and platforms are integral to the average developer's workflow.

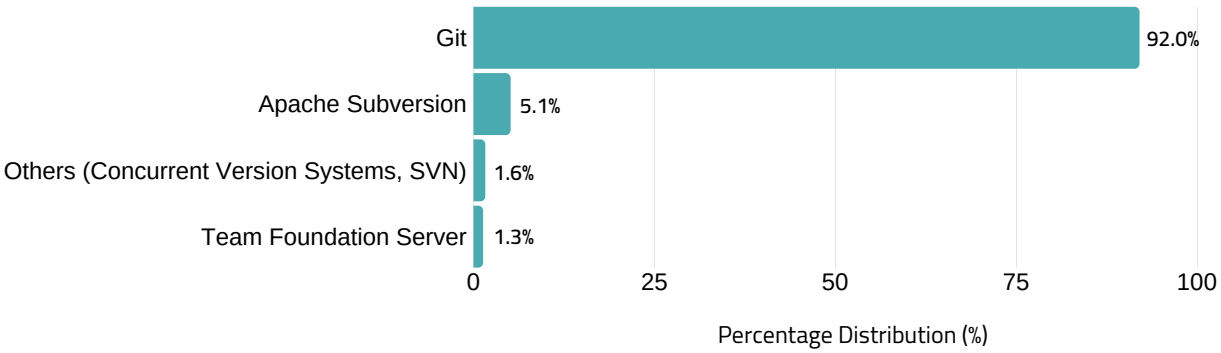
Developers who use Version Control systems



Distribution of expertise over Version Control use



Type of Version Control used

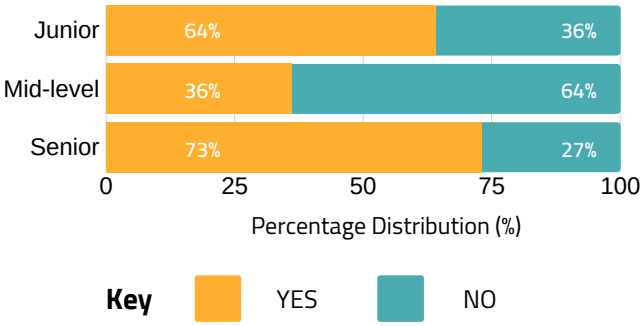


Why some developers don't use Version Control

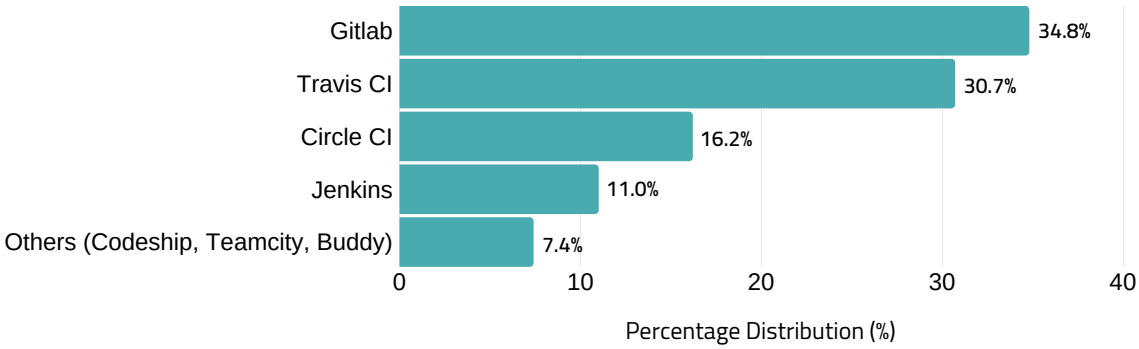
Of the 29.8% that don't use version control, 51.3% don't know what version control is. 47% know what version control is, know its value, but don't use it anyway. 1.7% know about version control, but they don't think it is valuable.

Developers who use CI/CD

Distribution of expertise over use of CI/CD



CI/CD used



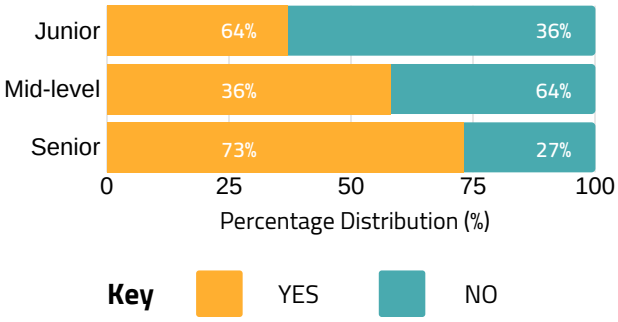
Why some developers don't use CI/CD

Of the 49.1% that don't use CI/CD, 53.7% don't know what CI/CD is. 43.9% know about CI/CD, know it is value, but they don't use it. 2.4% know about CI/CD, know what it is, but don't think it is valuable.

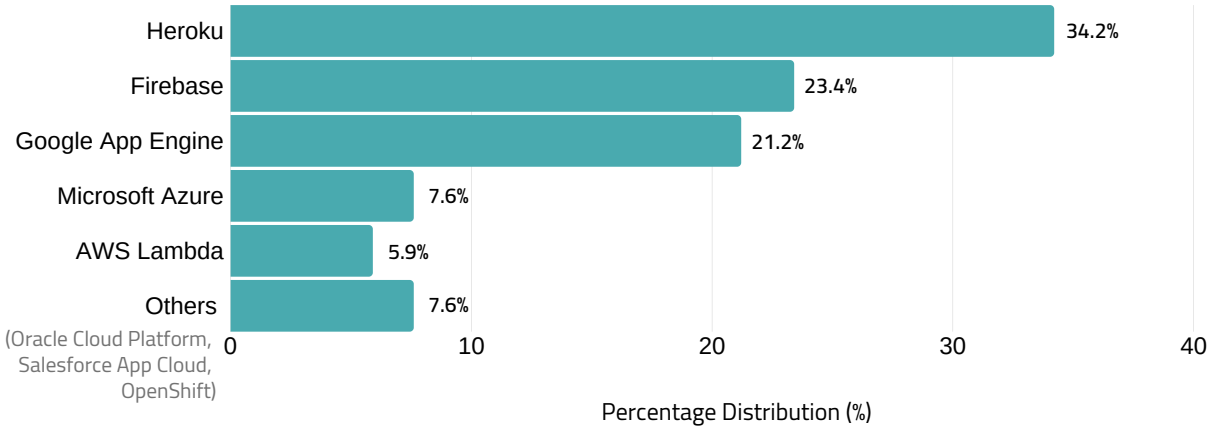
A CI/CD pipeline

Developers who use PaaS

Distribution of expertise over use of PaaS



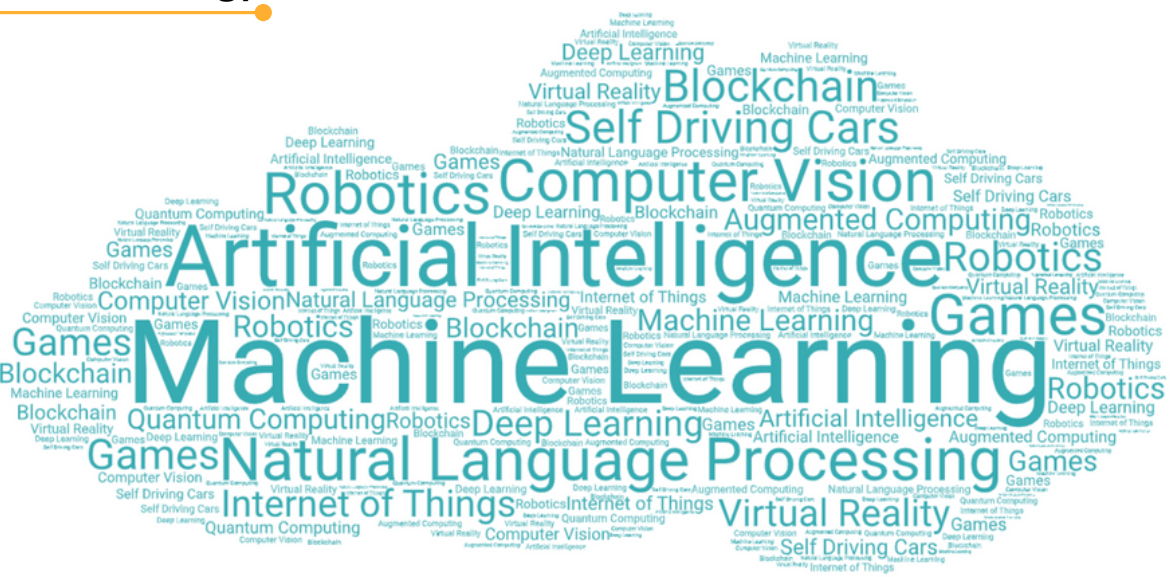
PaaS Platforms used



Why some developers don't use PaaS

Of the 50.7% developers that don't use PaaS, 57.6% don't know what PaaS is.36.2% Know what PaaS is, know its value, but haven't used it. 6.2% know what PaaS is, but they don't think it is valuable.

Future of Technology



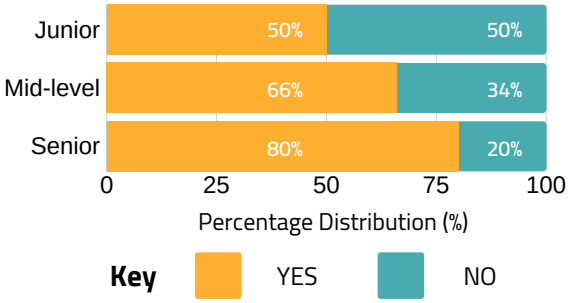
PROJECT MANAGEMENT

Project management in every industry is generally meant to serve the same primary goal; To help keep teams organised and establish and maintain clear lines of communication between stakeholders working toward achieving a set goal. This is achieved using tools designed for this purpose and a team will pick a tool/s depending on how they would like to achieve their primary goals.

In a software engineering team, where it is possible to make several changes to a product in a day, these tools are invaluable. They empower project managers and their reports to be agile in their work.

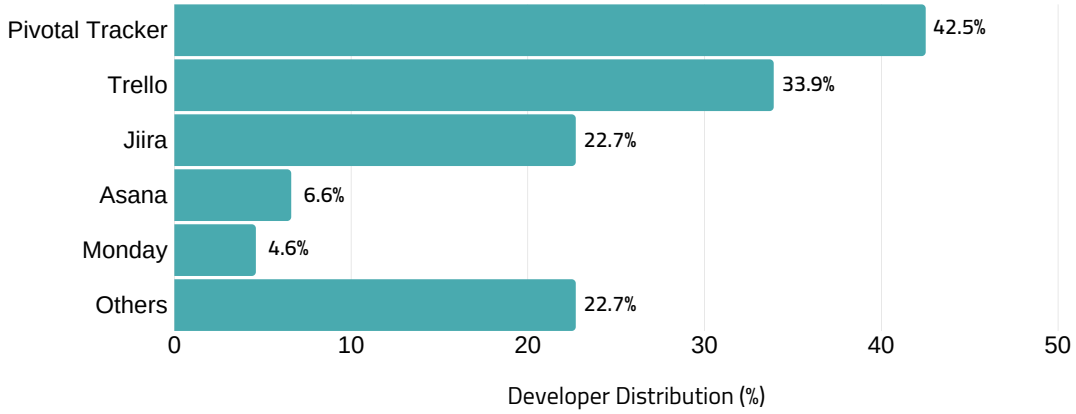
Developers who use Project Management tools

Distribution of expertise over use of Project Management tools



50% of Junior developers, 60% of Mid-level developers and 80% of Senior developers use project management tools. Considering that a significant percentage of the Senior developers are also team leads, it makes sense that most of them use project management tool as they are integral for working on and managing teams.

Project Management tools used by Developers



DEVELOPER LEARNING

Peter Drucker is quoted to have said, "We now accept the fact that learning is a lifelong process of keeping abreast with change and the most pressing task is to teach people how to learn".

I think this is quite an apt quote for the software development industry where there's always a new technology coming up and changes are being made to the existing ones. When you're just starting out as a software engineer, it quickly dawns on you that you will always be actively learning something new or adjusting to new ways to get something done.

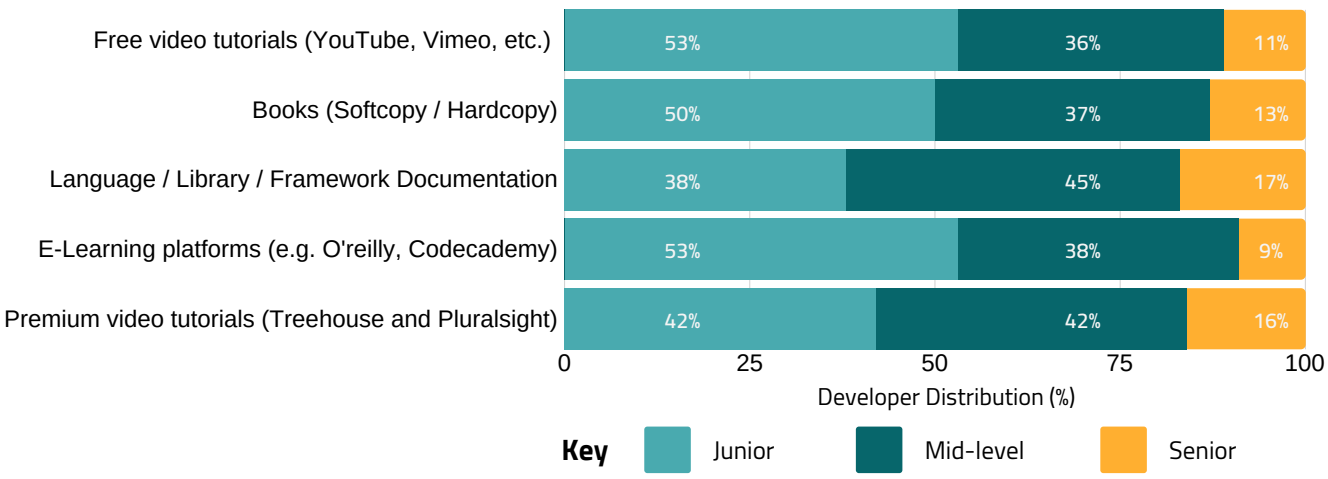
It is imperative that you learn how to learn if you are to succeed. As a result, engineers are continuously on the lookout for learning resources and we are lucky enough to be living in a time where knowledge is readily available in various forms and on several platforms.

Resources used to learn

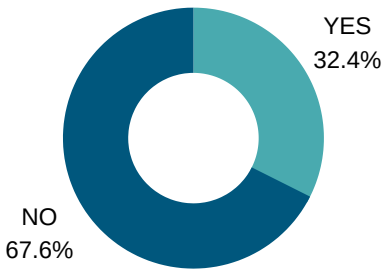
Free video tutorials (YouTube, Vimeo, e.t.c.)	83.4%
Books (Softcopy / Hardcopy)	45.8%
Language / Library / Framework Documentation	39.5%
E-Learning platforms (e.g. O'reilly, Codecademy)	31.5%
Premium video tutorials (Treehouse and Pluralsight)	30.8%
Others	4.6%

Free video tutorials are the most prefered learning resources alongside e-books and e-learning platforms. Developers also engage in hackathons and writing technical articles to help sharpen their skills.

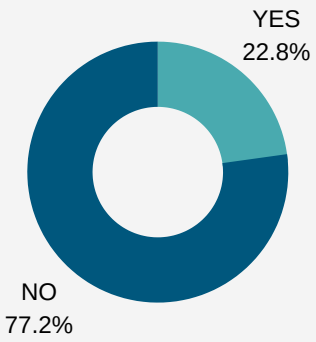
Distribution of resources used to learn over level of expertise



Developers who participate in Hackathons



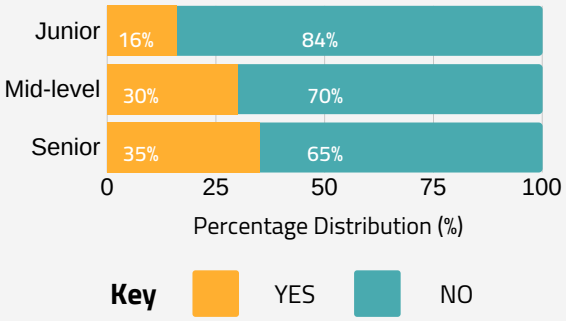
Developers who write technical articles



Industries targeted by Hackathons

Health	26.5%
Agriculture	14.7%
Others	12.2%
Education	9.8%
Transport / Mobility Solutions	9.8%
Banking / Fintech	8.6%
Telecommunications	4.9%
Security	3.7%
Entertainment	3.3%
Civic Engagement	2.9%
Accounting	2.4%
Architecture & Planning	1.2%

Distribution of expertise across developers who write on tech



Platforms where Developers publish their articles

Medium	60.1%
Personal Website	24.3%
Others	18.5%
Blogger	11.6%
Wordpress	10.4%
Scotch	1.2%
Sitepoint	0.6%

OPEN-SOURCE SOFTWARE

People generally prefer going with the free option, even more so in a country where every penny counts. In tech today, at least in software development, most free tools meet the users' requirements. With these two thoughts in mind, it comes as no surprise that nearly 90% of the tools listed as being used by developers in Uganda are open-source tools.

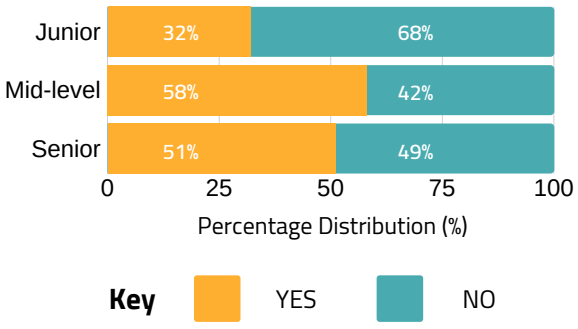
Most open-source tools are created and maintained by small teams that are usually overwhelmed by the workload. As users of these tools, it is great to see that we are also volunteering our time to contribute to the maintenance of those tools.

78% According to the Business Value of Open-source white paper,78% of businesses are now operating on open source software;

More than 50% find open-source to be more secure than proprietary software **50%**

Developers that contribute to Open-source software

Distribution of expertise over Open-source contributions



Why some developers don't contribute to Open-source software

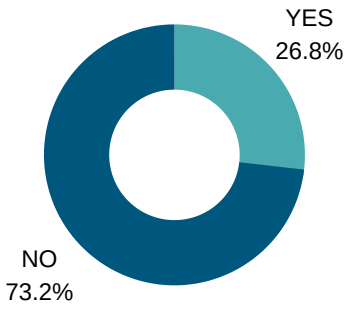
Of the 55.9% developers that don't contribute to open-source software, 63.7% are afraid of contributing. 20.6% don't know what open-source software is. 15.7% know what open-source software is, but they don't think contributing to it is valuable.

STARTUP ECOSYSTEM

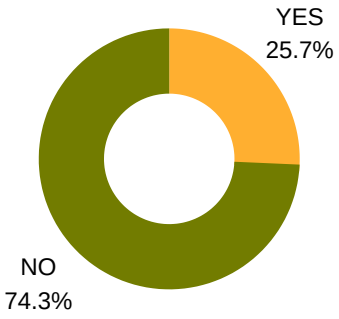
Start-ups are where ideas are brought to life. They play a significant role in boosting entrepreneurship and innovation. A good number of developers have honed their skills at start-ups in the country and you will find several clusters of youth at the hubs in the city, working on their own start-up idea. The beauty of tech start-ups is that the barrier of entry is not quite as steep as in other industries. All you need is a few developers, sometimes just one, with the skills, coupled with the idea and your start-up is off the ground. Depending on how quickly you move, this position might be short lived but it allows you to start building on your idea and have something to show for it. For a developer, even if the start up never really takes off, the time spent in the trenches working on the application to bring the idea to a reality is invaluable.

Randy Pausch, a Professor of computer science at Carnegie Mellon in the Last Lecture said, "Experience is what you get when you didn't get what you wanted. And experience is often the most valuable thing you have to offer." If you've looked for a job before, you know this to be true.

Developers that own a Startup



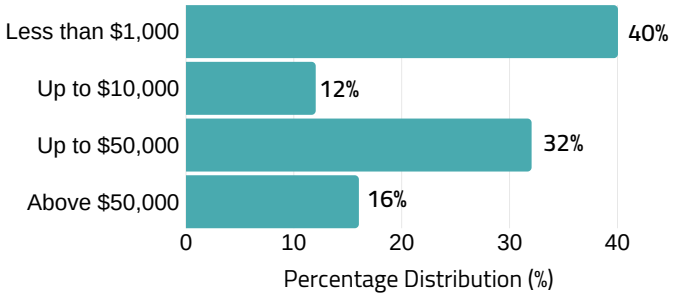
Startups that have raised funding



Startup Category

Education	12.4%
Banking / Fintech	12.4%
Health	9.7%
Entertainment	6.9%
Telecommunications	5.9%
Agriculture	5.4%
Security	5.0%
Accounting	3.0%
Civic Engagement	2.0%
Transport / Mobility Solutions	2.0%
Architecture & Planning	1.0%
Others	36.1%

Amount (USD) raised from funding



Health, Banking/Fintech and Education industries have received the most funding with some startups in the health industry raising above $50,000. We have a few startups in the Others category that have raised more than $50,000 but it is unclear in what industry they belong.

The startups focusing on the other industries that we looked at are yet to raise more than $5000 with those in the civic engagement yet to raise any money.

CONCLUSION

This report was born out of a need to know the trends and patterns of Uganda's tech ecosystem, having realised that there was no one place where sufficient information about it could be found. What we have come up with should meet that need, at the very least, give those in search of this knowledge, a place to start. We look at various demographics such as sex, age, level of expertise, level of education and so forth and draw educated insights from the various data sets, attempting to answer the what, where and why of our tech ecosystem.

This being the first report, we don't have anything to compare it to, however, from the data, it would not be too hopeful to say that while we could be much further on along the way, the industry is on the right track. The engineers competent in the currently popular languages significantly outnumber the ones competent in the languages that used to hold that position. From this information we may infer that there are way more people interested in software development today than there were a few years ago.

As stakeholders in this industry, our hope is that each and every one of us, using the knowledge shared here, will take deliberate steps to affect the industry in a positive way, however they can.

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