Skill Up

2016

Developer Skills Report

The tools and trends that define how software developers work today.

Brought to you by Packt

Contents

1 Introduction & Demographics

There is one constant in the world of tech - change. Packt wants to keep you relevant and responsive in your job role, and that's what Skill Up is all about. Our annual Skill Up survey is all about capturing a snapshot of the modern tech community, to discover the tools and techniques developers are using to succeed in 2016.

What technology has taken hold in your industry - and what are developers doing with it?

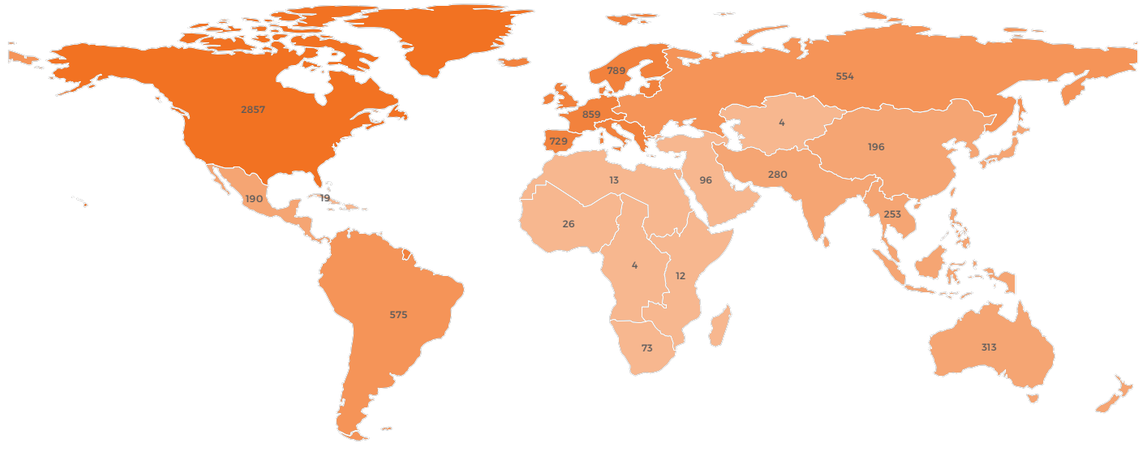
The Skill Up Survey 2016 asked developers what tech tool they used the most, why they chose it, and what tasks they performed with it. More than just a salary survey, our research reaches for a deep insight into the most vital skills in modern development. The Skill Up report gives you the trends, the figures, and the knowledge you need to develop your future.

As part of Skill Up 2016, we're excited to be launching the Mapt skills management platform. Mapt is your direct route to the most in-demand skills in tech. Based on Skill Up and our extensive industry research, Mapt curates and delivers the most relevant content to keep you ahead of the curve. There's no better way to Skill Up than Mapt - and it's totally free to try. We've indicated throughout the report where you can use Mapt to fill any gaps in your knowledge and learn the skills that our survey identifies as most important in your industry.

Who responded to the Skill Up survey?

The Skill Up Survey 2016 had over 11,000 responses from developers in every region of the world, working in a range of industries for a broad variety of company sizes.

The Skill Up survey was completed by respondents from every continent (except Antarctica). The largest number of respondents hailed from the United States (2,272), the U.K. (509), and Germany (366).



Who do respondents work for?

The Skill Up survey draws from developers and IT Professionals working for all different kinds of companies, including:

Company and team size

Skill Up respondents represent a wide variety of industries. Developers make up the largest segment by a significant margin. This includes those working with SaaS, web development, and mobile app creation.

The next top segments are IT consulting and education. These segments encompassed academics and researchers.

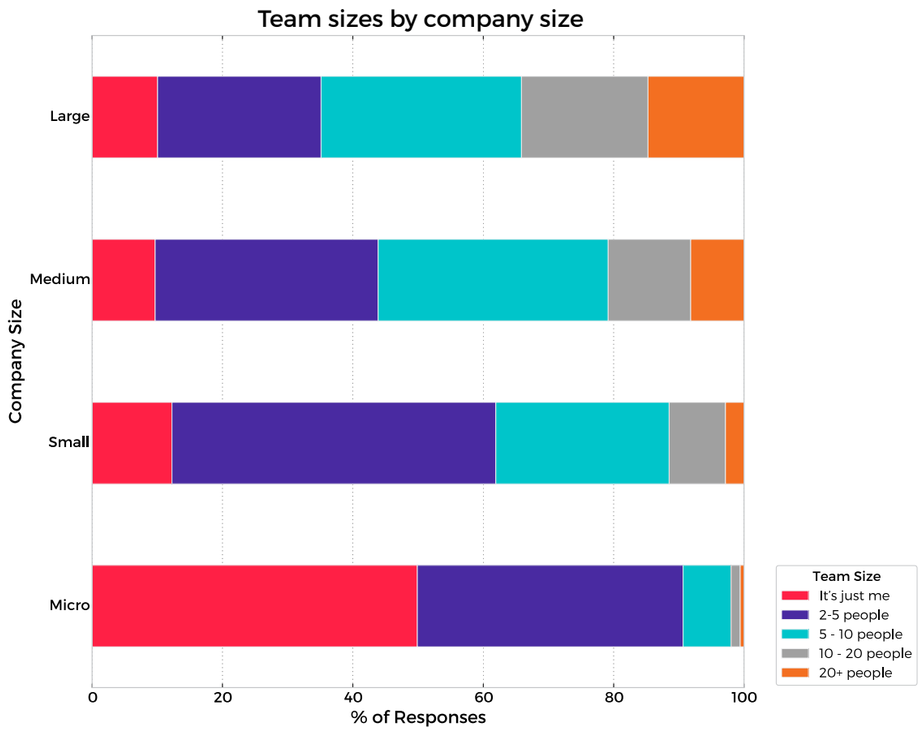
People worked for companies of a variety of sizes:

- More than 2,500 people worked for micro organizations of less than 20 employees
- More than 1,000 people worked for small organizations of 20-100 employees
- More than 1,500 people worked for medium organizations of 100-1000 employees
- Over 3,000 people worked for large organizations with more than 1000 employees

Within their organizations, most respondents were part of small teams. Over 45% worked in teams of ten people or less, and 23% said that their team consisted of `just me'.

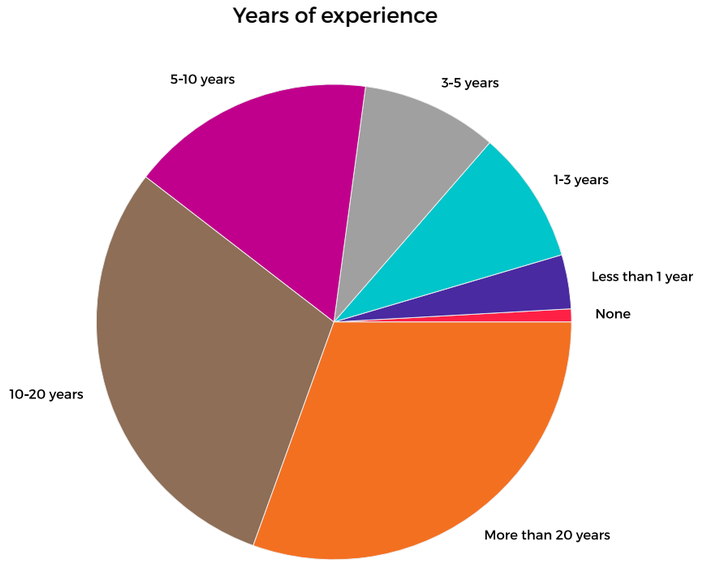
Perhaps unsurprisingly, the biggest companies tend to be the most likely to have big teams of tech workers. But even in companies with more than a thousand employees, the majority of people are working in teams of less than ten. Are we seeing the end of the sprawling `IT Department' in favor of management through Agile small teams?

Respondents to the Skill Up survey included people working at IBM, Oracle, Microsoft, Google and Amazon.



Industry experience

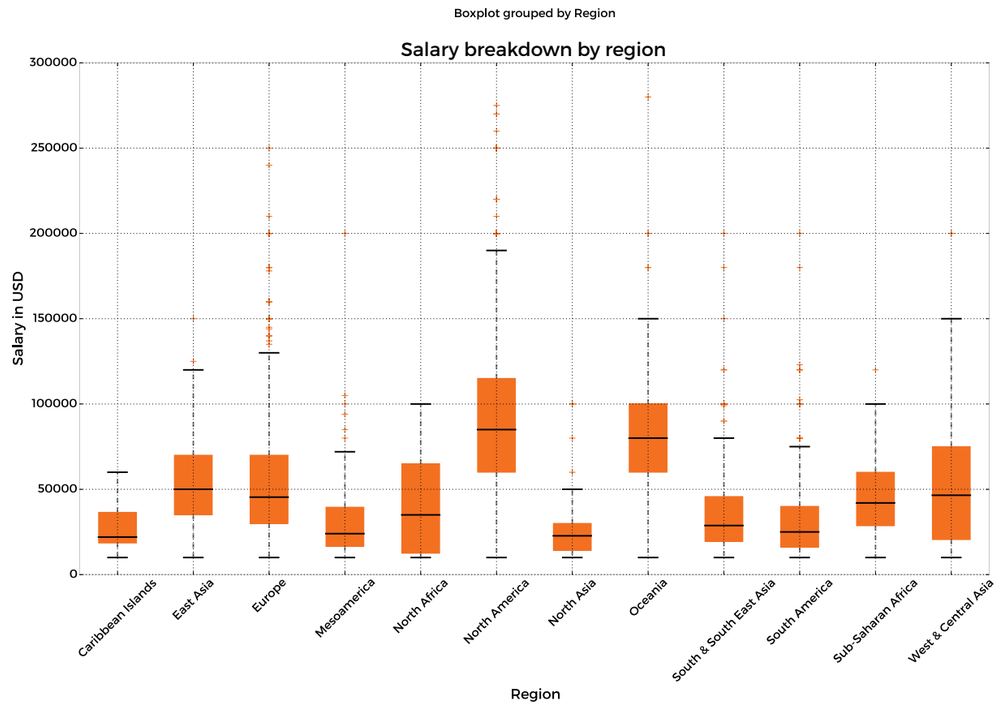
Over 75% of respondents had over five years experience in IT. This means Skill Up data used throughout this report represents the experience of dedicated industry professionals.



Salary breakdown

The average salary of respondents was $66,553, with the highest paid hailing from North America and the Australias.

In these two regions, pay rates are consistently better across all levels of experience, industry, and job role.

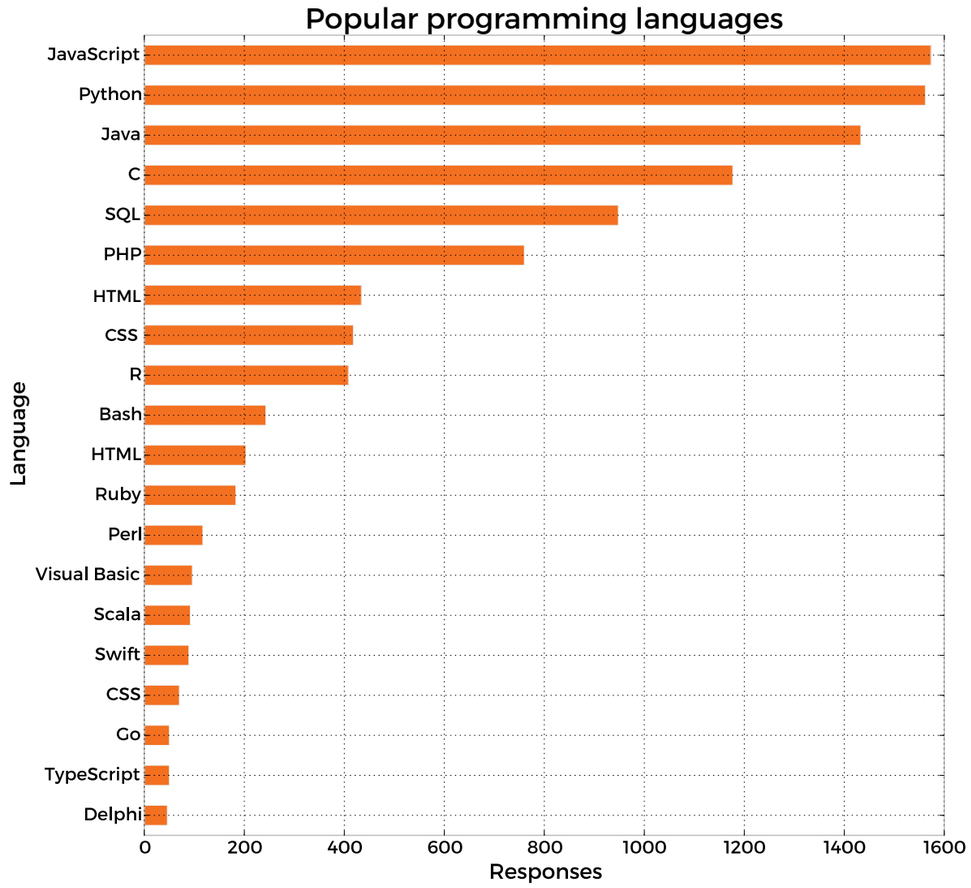


Tools: What are people using?

At the heart of Skill Up is our desire to take a deep dive into what tools IT professionals are using every day to get the job done. What does the tech community consider the best tool for a particular job - and why?

Programming languages

Our 2015 survey report had developers listing JavaScript and Python as the most valuable new skills they have learned. That trend holds true in 2016 with our data placing them neck and neck in terms of popularity.



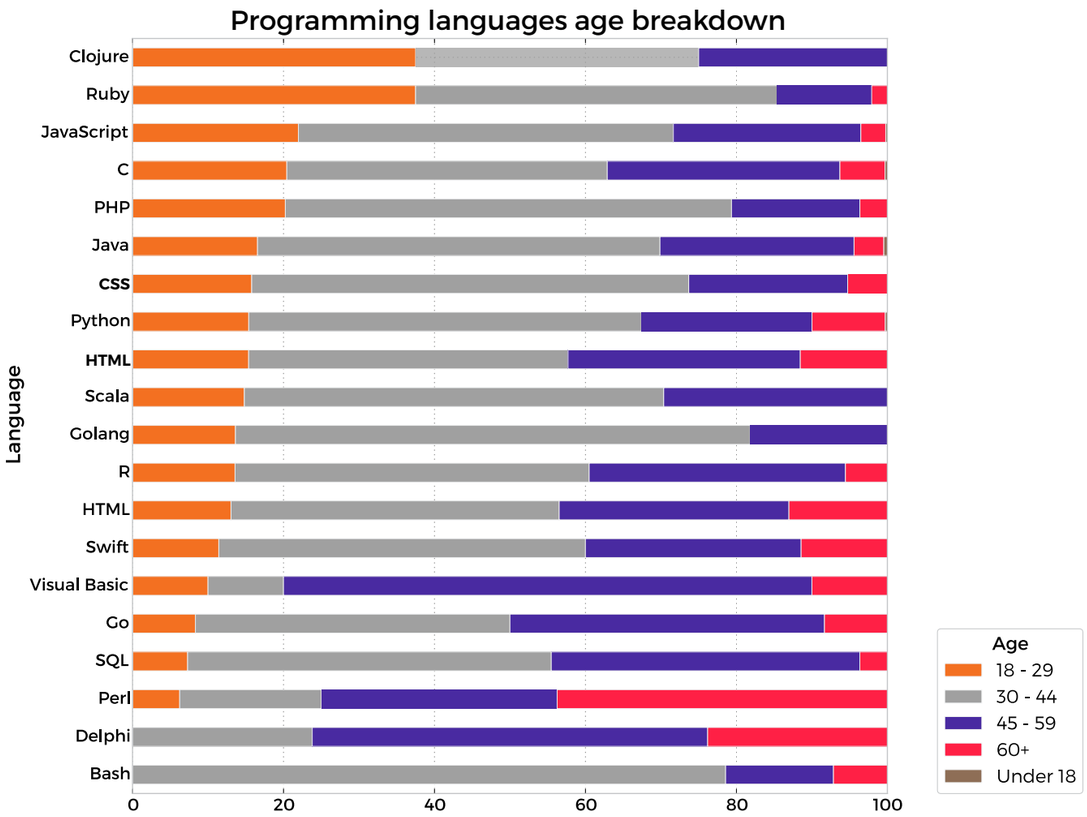
JavaScript and Python are both essential in their respective fields of web development and data science. But they are also useful to know for many other tasks. For example, as enterprise and business apps move off of the desktop and into the browser, JavaScript becomes more and more important to different kinds of developers.

Python's ease of learning makes it a popular new language to adopt, and it is versatile enough to be used for everything from penetration testing to web development. Alongside Python and JavaScript, the old powerhouses of Java and C continue to remain relevant to modern development.

Programming languages by age and company

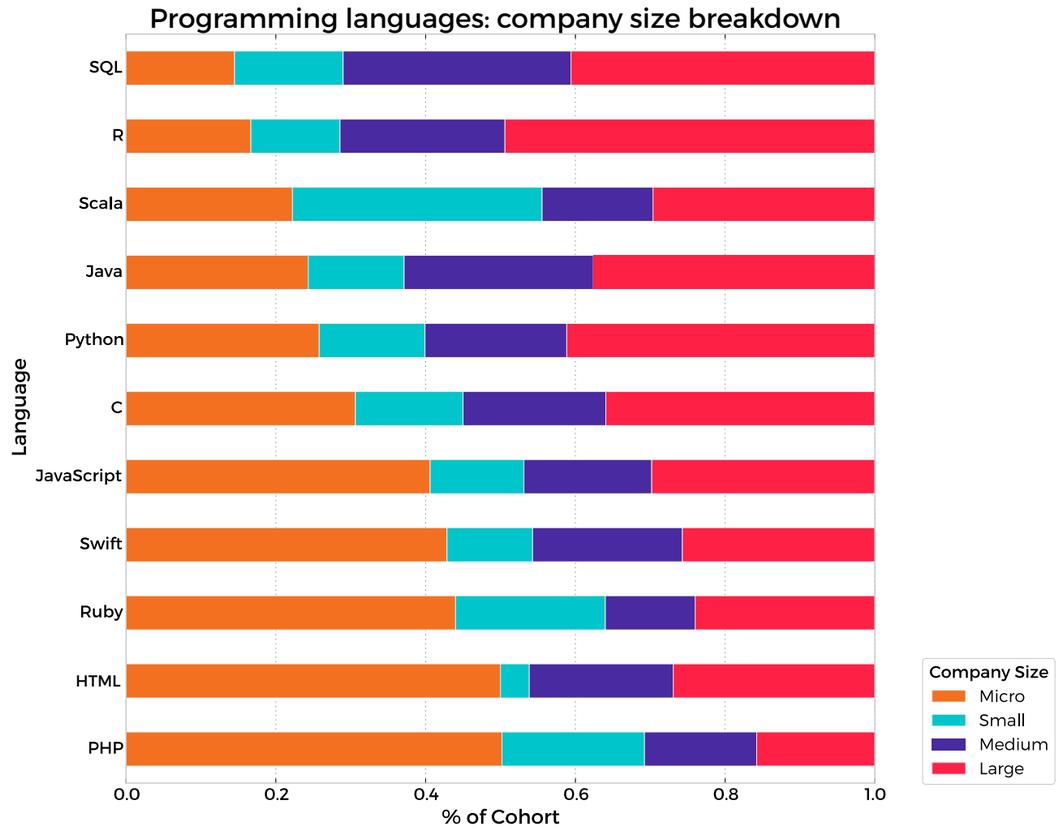
Are there any notable differences between what languages developers are using daily based on their age and experience?
We analysed the breakdown of languages by age group to find out what was favored by younger professionals and what is popular with older programmers.

The languages most popular with those under 30 are Clojure and Ruby. Perl and SQL, meanwhile, draw their user base almost entirely from more mature developers.
Why is this? To answer that question, we need to dive into the sort of companies that are working with these languages.



Programming languages by company size

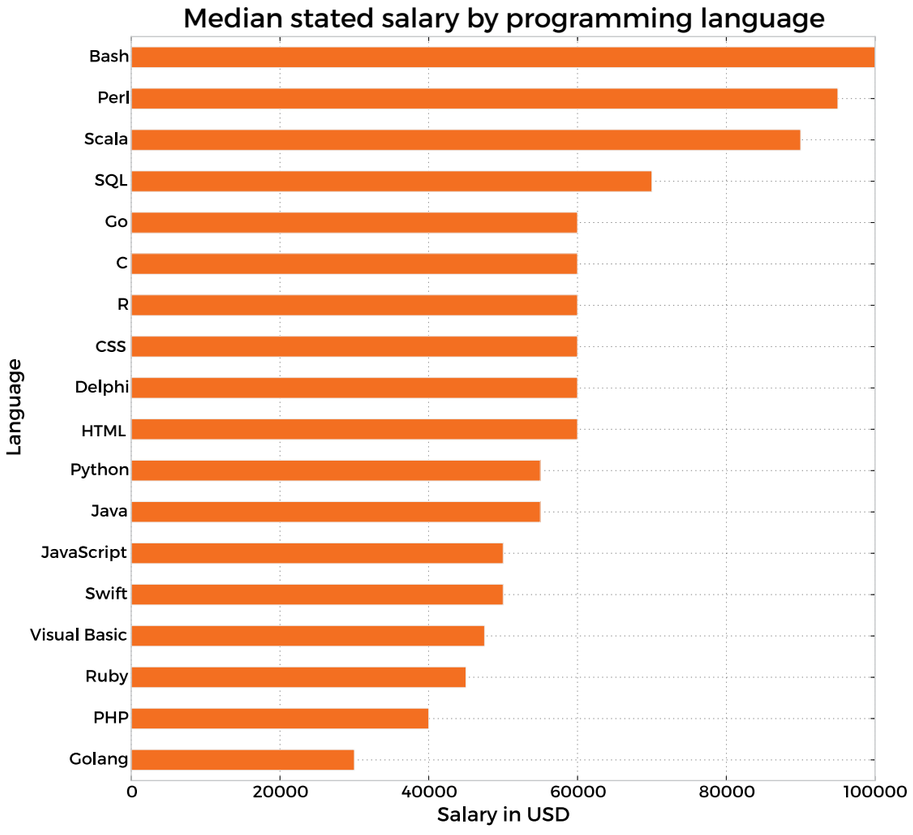
Let's break down the sorts of companies people are working in with these programming languages.



More traditional enterprise languages based on the JVM or SQL remain popular among larger companies. Web and mobile development languages are the top choice of micro companies with very few employees, demonstrating the explosion of web and app-based startup companies in the last few years. The most exciting new tools of modern development are being used in these small companies building apps for Android, iOS, and the web.

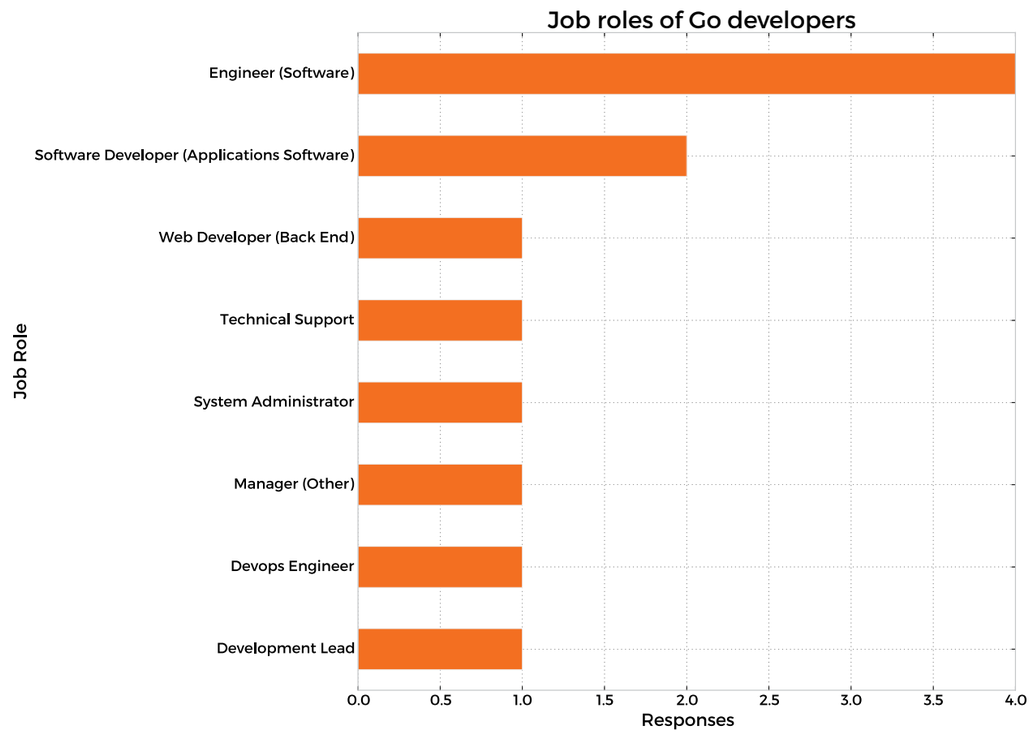
What programming languages pay the most?

We've now seen what languages are the most popular - but what languages are the most lucrative in 2016? Our data shows that languages favored by more experienced developers command the highest salaries; it pays to be a Perl Monk or a Bash Scripter. Scala developers also manage to command high salaries, while the more ubiquitous JavaScript and Python hover around the middle, as they are likely favoured by both highly-paid and more junior alike. If you're still working with Visual Basic or PHP, you might want to consider an upgrade.

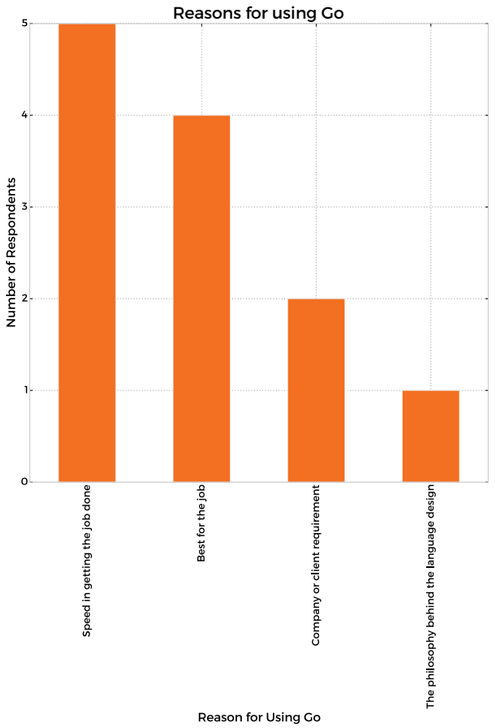


Spotlight: Google Go

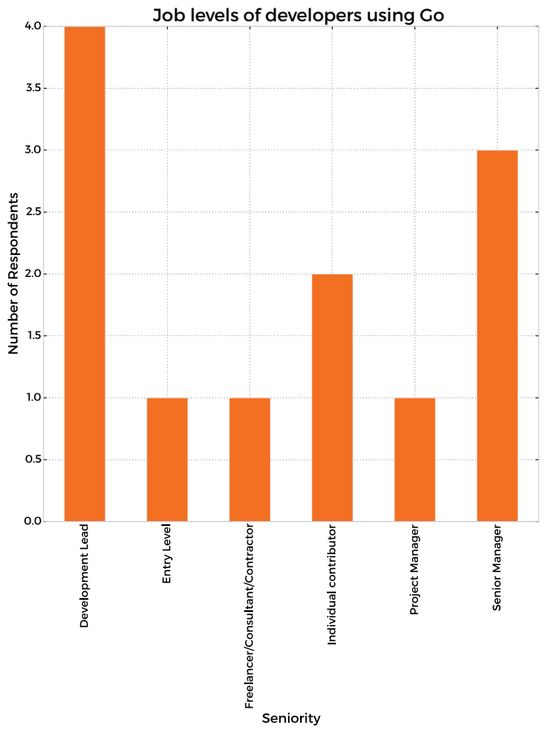
Golang has established itself in 2016. It has notably become favored by a certain type of developer. We can see Go being adopted across a range of company sizes and industries, but generally by the same type of job role - *senior Software Engineers.*



So, why are people using Go?

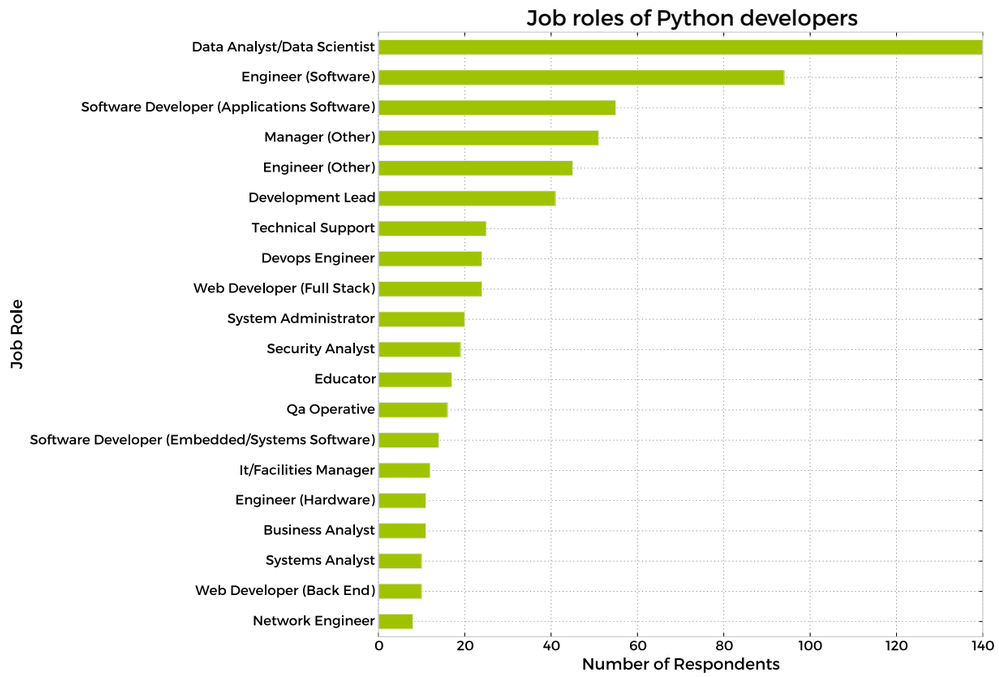


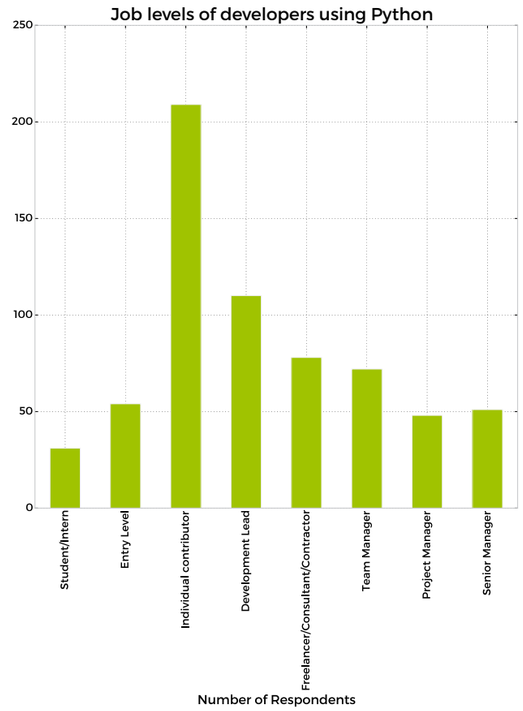
Overwhelmingly, people are choosing Go for its speed - so it's clearly fulfilled its design objective. If you're finding yourself busy with senior duties, Go is likely the perfect language to look into for quick coding.



Spotlight: Python

If there's one language that's defined 2015 and 2016, it's Python. So who's using it?





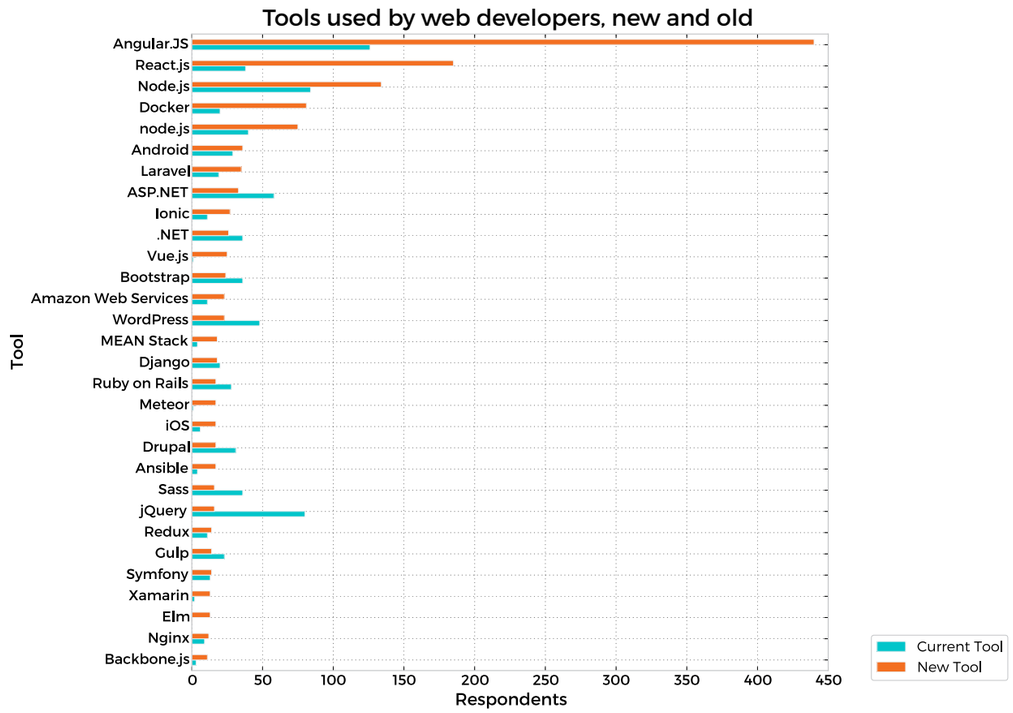
Python is still gaining ground on many, many fronts - as a data analysis tool, as a general purpose programming language, and even a tool to facilitate web development. So, what sort of developers are choosing to work with Python?

According to our data, it looks like a very diverse range of developers are using Python - almost all of them! Python really is a tool for all trades, which explains why it's so ubiquitous as respondents' `most useful tool'. If you want to develop in 2016, you increasingly need to know Python.

Spotlight: Battle of the web frameworks

Everyone loves a good battle, especially web developers. So which web development framework looks like it's winning the struggle for dominance in 2016?

We took a look at what frameworks our respondents were either presently working with or were planning on picking up over the next six months.

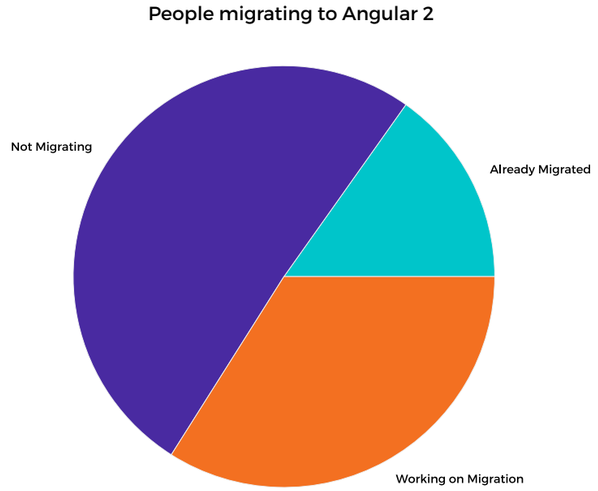


Angular is still the leader when it comes to JavaScript frameworks. It is way out in front in terms of both current users and those looking to adopt the ng. Second in terms of current users remains the powerhouse of Node.JS. After Angular the thing developers are most excited about learning is Facebook's React.

Overall, we can see the momentum towards full-stack JavaScript architecture really picking up pace. Classic front-end frameworks like jQuery and Ruby-on-Rails remain as a shrinking part of the market, losing out against frameworks like Angular. What's really interesting is the rise that we are seeing in containerization technology among web developers: Docker and Ansible. We'll touch on containers later in the report. We're also intrigued by newcomer Vue.JS. Made for building interactive interfaces, this hot little framework has very few current users, but looks like it might be making a big splash in the next few months. Watch this space!

Angular - JS or 2?

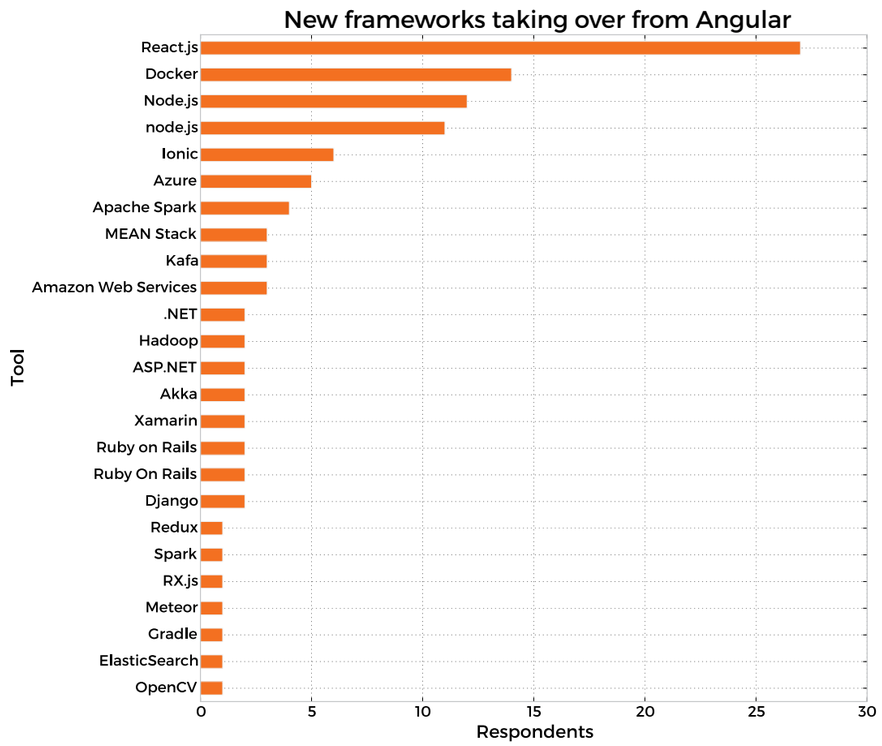
It's the next big question to ask of web frameworks - of those using AngularJS, how many are planning on migrating to the new but very different Angular 2?



People migrating to Angular 2

15% of AngularJS users have already migrated to Angular 2; 34% are either currently migrating, or are doing so in the next few months; and the remaining 51% do not indicate if they have any current plans to migrate to Angular 2. So where are they heading instead?

If an AngularJS developer isn't heading to Angular 2, they're generally looking to get into React instead. 30% of the cohort of non-migrating AngularJS developers are looking to learn React in the next 6 months.



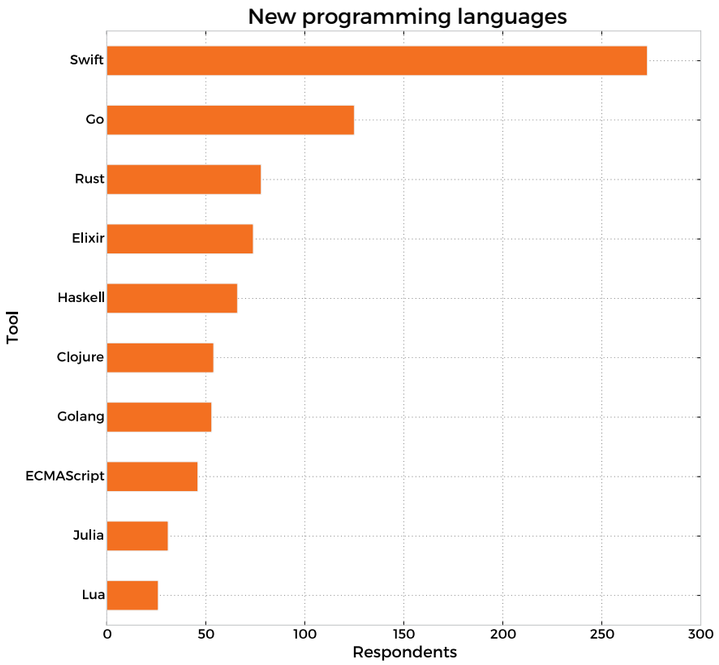
New and upcoming tools

What new and exciting tools have developers started using over the last six months? What are they planning on picking up and using over the next six months? We went and found out.

New programming languages

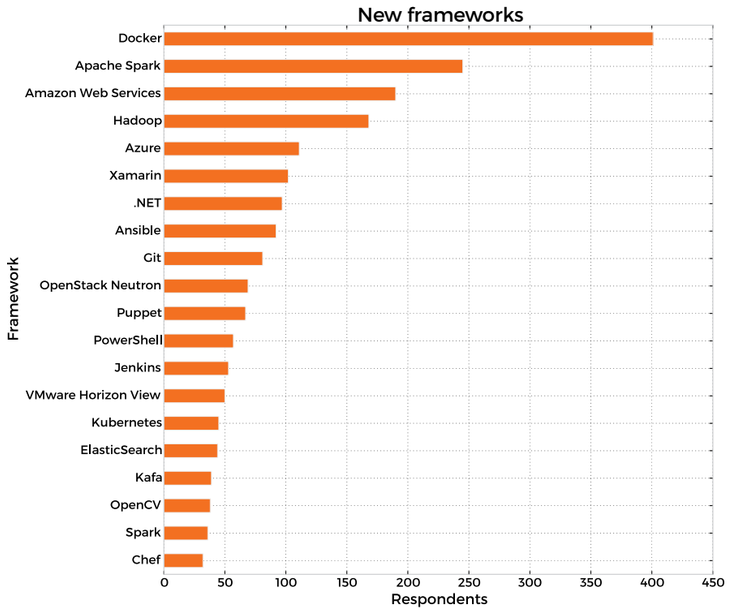
We've seen that the big four of Python, JavaScript, Java and C are still the languages of choice for most developers - but what younger languages are starting to make a splash? We stripped out the big languages from our respondents and considered only new releases to see what's making a splash.

Swift has really taken off, suggesting it has quickly become the de facto language for anyone who wants to develop for iOS. Go continues to grow. One of the biggest changes we can see from 2015 is that it looks like the promise of Julia hasn't really materialized. We're sorry to see that it's failed to gain traction, despite its promise!



New frameworks

Outside the world of JavaScript and web development, what new frameworks are making waves? There are three distinct trends present in the data.



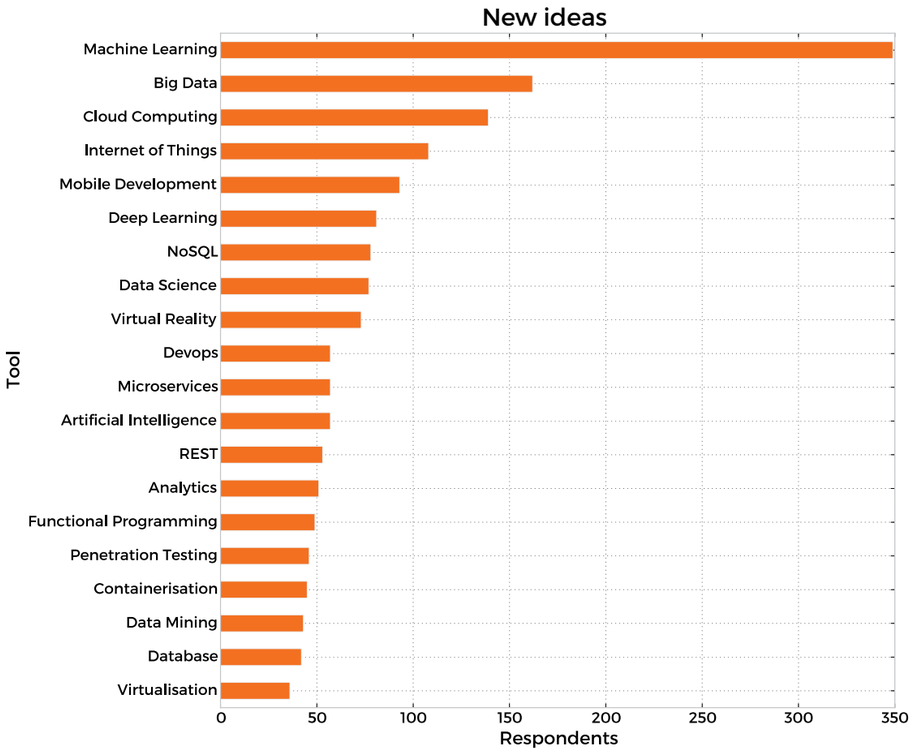
1. Containerization and virtualization: Docker, OpenStack, VMWare, AWS, Puppet, and Jenkins are all tools that speak of a world increasingly operating off-premises and in the cloud.

2. Big Data: ElasticSearch, Azure, Hadoop, and Spark become increasingly important to every job role as Big Data grows ever more ubiquitous. This matches the predictions of Skill Up 2015 that we would see Big Data become increasingly more important for the modern developer skillset.

3. DevOps and Continuous Delivery: Related to containerization and virtualization, DevOps methodology aims at the effective delivery and deployment of software through the tools such as Jenkins and Docker, as well as cloud-related software too. This trend represents the overarching theme of all these tools - they are all about more intelligent and more efficient ways of working.

New ideas and approaches

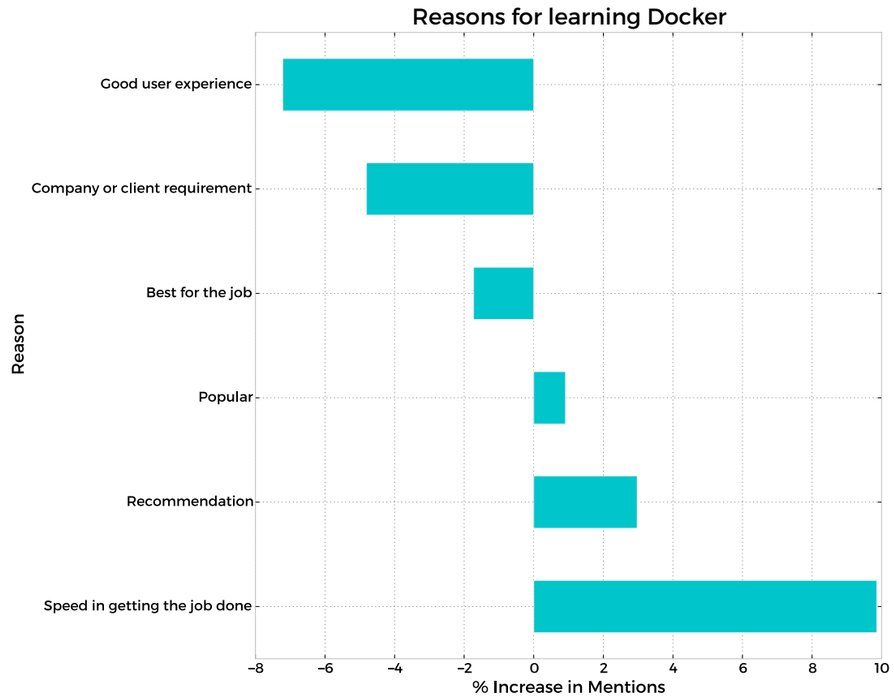
We've seen the tools - but what specific ideas, techniques, and approaches to tech are people getting excited about?



Machine Learning and Big Data maintain their status as the top topics in the industry, just as in 2015. The insurgency of new topics like Deep Learning and NoSQL speak of the ever-changing nature of data, and the rise of thinking about artificial intelligence. Cloud Computing, the Internet of Things and Mobile Development are the next key areas of interest - which shows how computing has spread so considerably off the desktop.

Why learn something new?

One of the principle things that Skill Up 2016 looked to uncover was what motivated developers and IT professionals to pick up new tools. We took a deep dive into some of the most popular or most interesting tools that respondents said they were learning, and asked why they chose to switch.

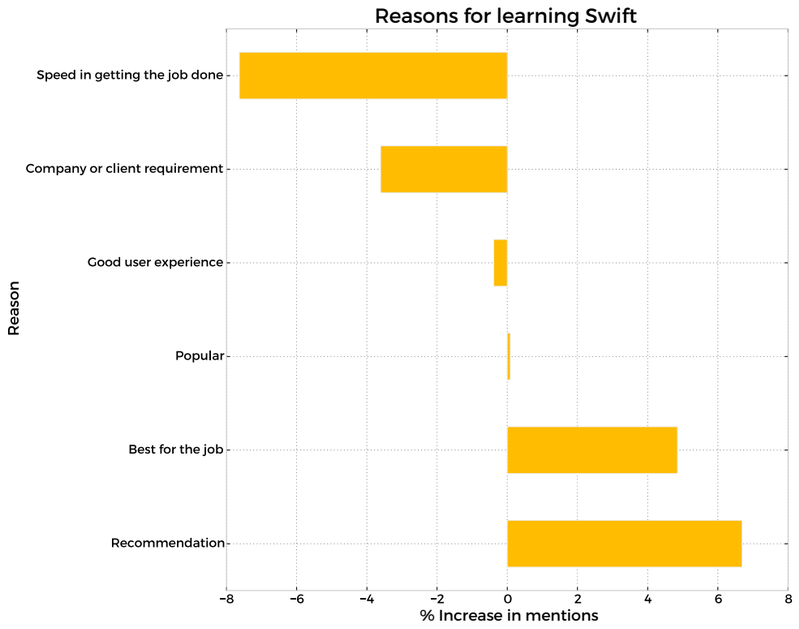


Reasons for learning Docker

It's clear that Docker's popularity has been driven primarily by a need for speed. It's also interesting to note that this need isn't coming from managerial or client pressure, but instead a move from developers themselves.

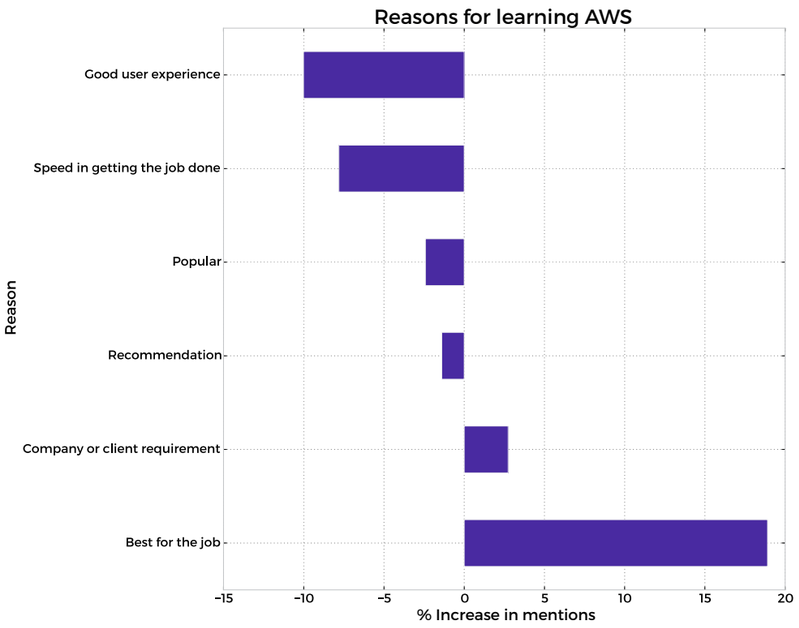
Reasons for learning Swift

By contrast, speed isn't the primary reason when it comes to learning Swift. However, our data indicates that it's very well suited to perform the tasks it has been designed to, and has clearly been recommended throughout the Apple developer community.



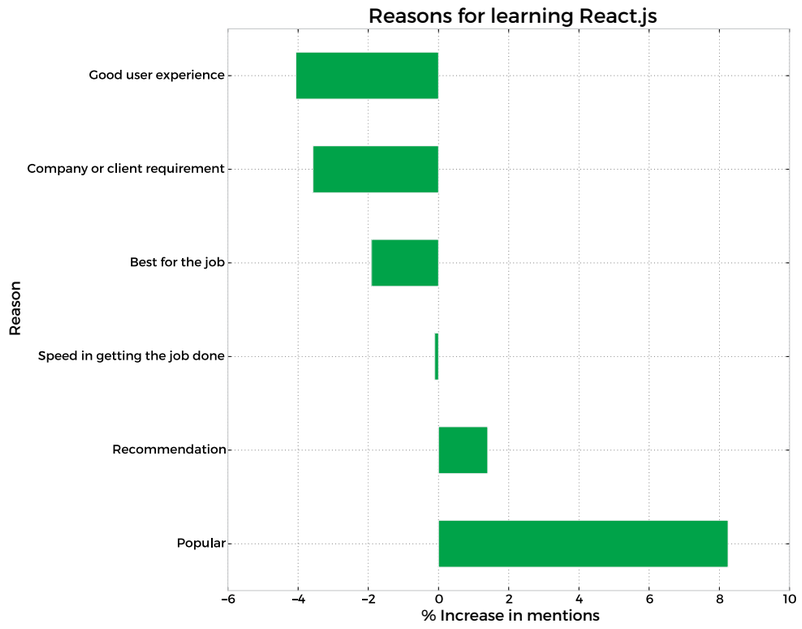
Reasons for learning AWS

AWS is being learnt overwhelmingly because it is 'the best tool for the job'. It's worth noting as well that, in comparison with the other tools here, its usage is being driven by operational and organizational strategies as much as developer innovation.



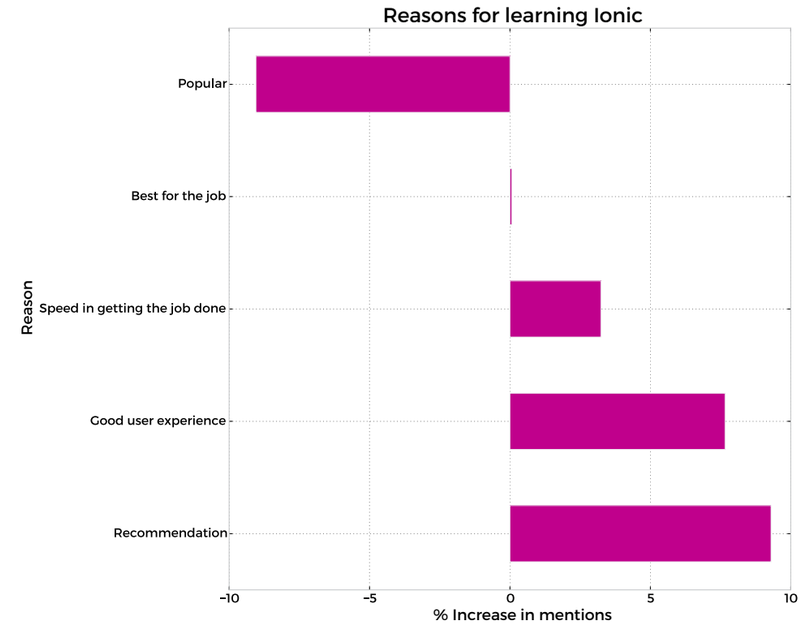
Reasons for learning React.js

What's great about the adoption of React is that it's a word of mouth success, its adoption being driven by recommendations. Although clearly important at a time when dynamic SPAs are all the rage, it is arguably still at an early stage, with developers experimenting with it rather than absolutely needing to use it. It may prove to become more mainstream as the year progresses.



Reasons for learning Ionic

The results for Ionic suggest that, like other tools we've seen here, it is being adopted because of community endorsement. Here, the key driver isn't so much its ability to 'get the job done' (although it certainly does help if you're a mobile developer), but instead the pleasure and ease of using it.



What tools are breaking out in different industries?

We've found out what people are picking up in general - but what about specific companies and industries? Where are these things being learnt the most, and by whom? We took all mentions of people learning a new tech, and then looked at the breakdown of the different company sizes they're being used at.

What are smaller companies using?

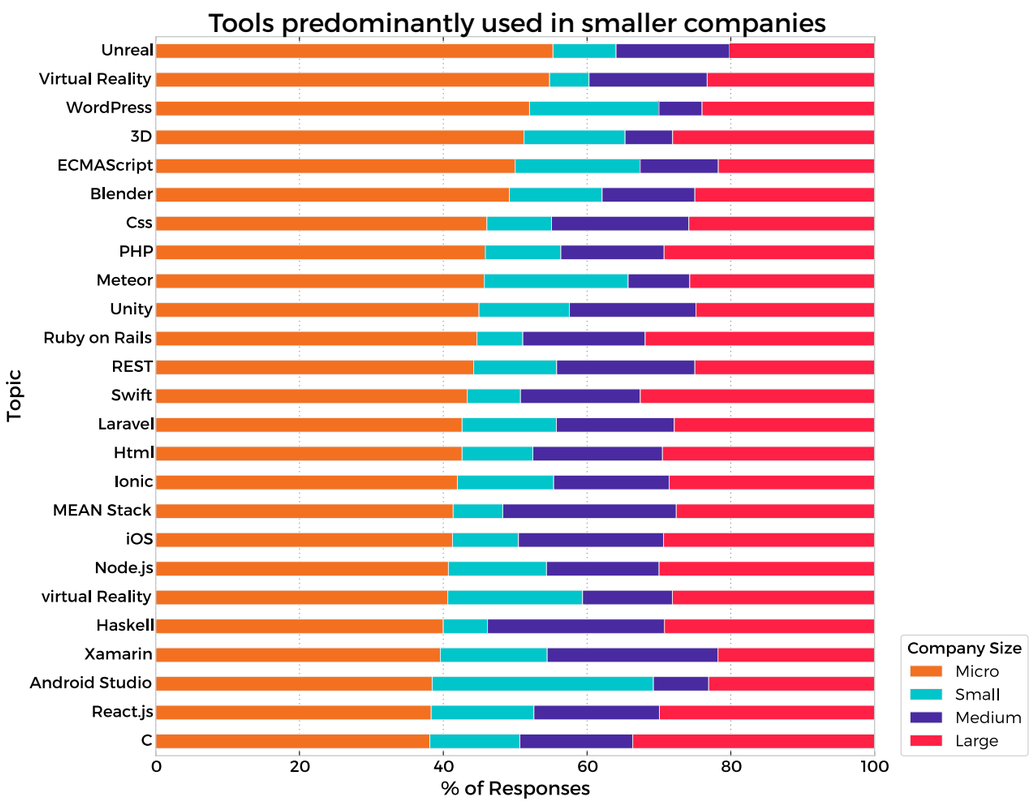
More than half of our respondents who are looking to learn Unreal Engine are working in small companies. Is Unreal the game engine of choice for indie devs?

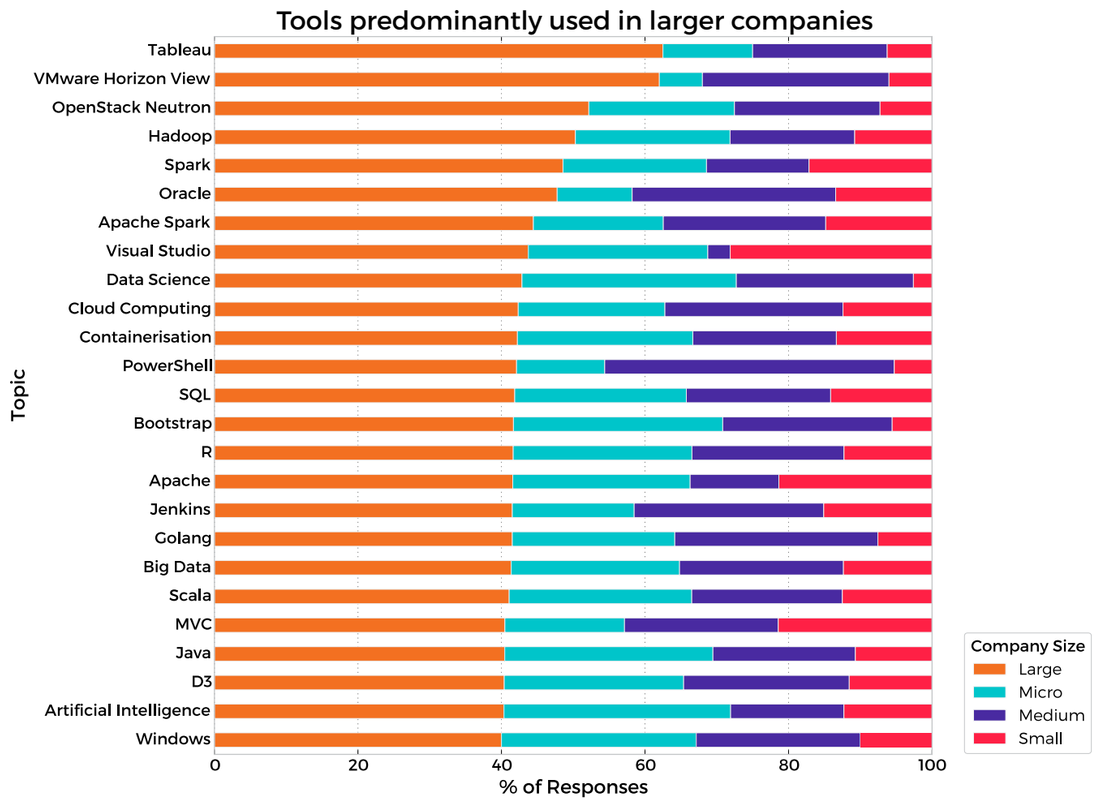
Smaller companies are overwhelmingly the principal users of visual and web development technologies. This speaks of the modern culture of start-ups working to make it big with apps and web tools.

What are larger companies using?

The tools at the top are built for the Enterprise market first and foremost. Tableau is all about successful analytics of vast data sets. VMWare Horizon View is a classic enterprise type tool, and OpenStack Neutron is a premier networking-as-a-service tool.

There is still a huge and thriving ecosystem of Enterprise-first products and companies, providing stability and piece of mind all for the cost of an expensive seat.



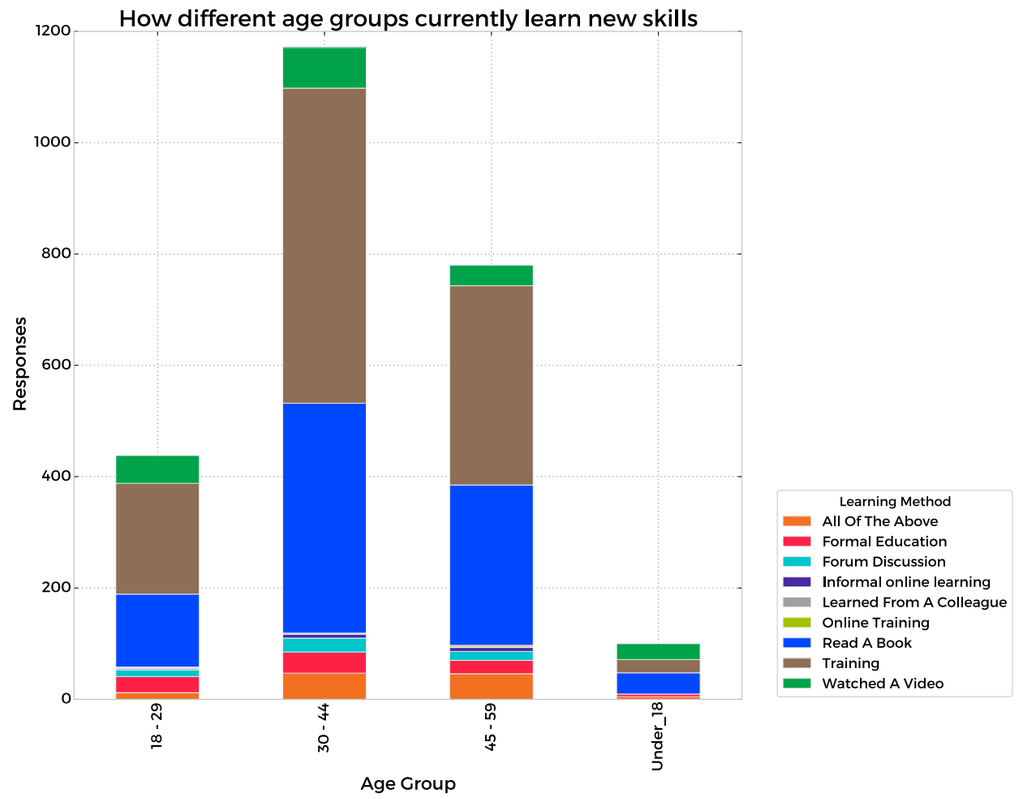


Attitudes to learning

Skill Up is all about the best way to acquire the most vital new skills - so we asked people how they learned their current stack, and how they were planning on learning the next big thing they were picking up.

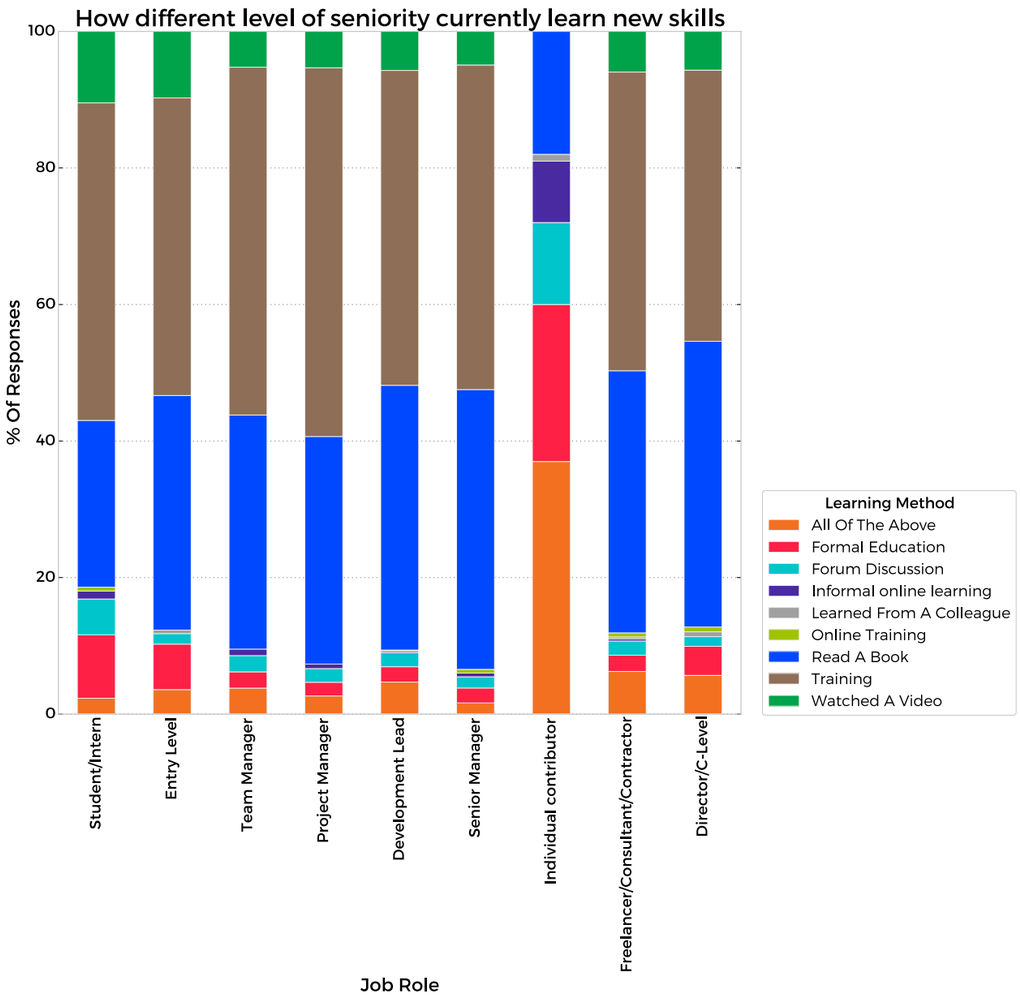
How did people learn their current tool stack?

Younger developers strongly prefer to learn from video training, which is much less favored by older developers as a learning medium. Formal education is also favored by the young - those lucky enough to get a decent education in computer science from university and college.



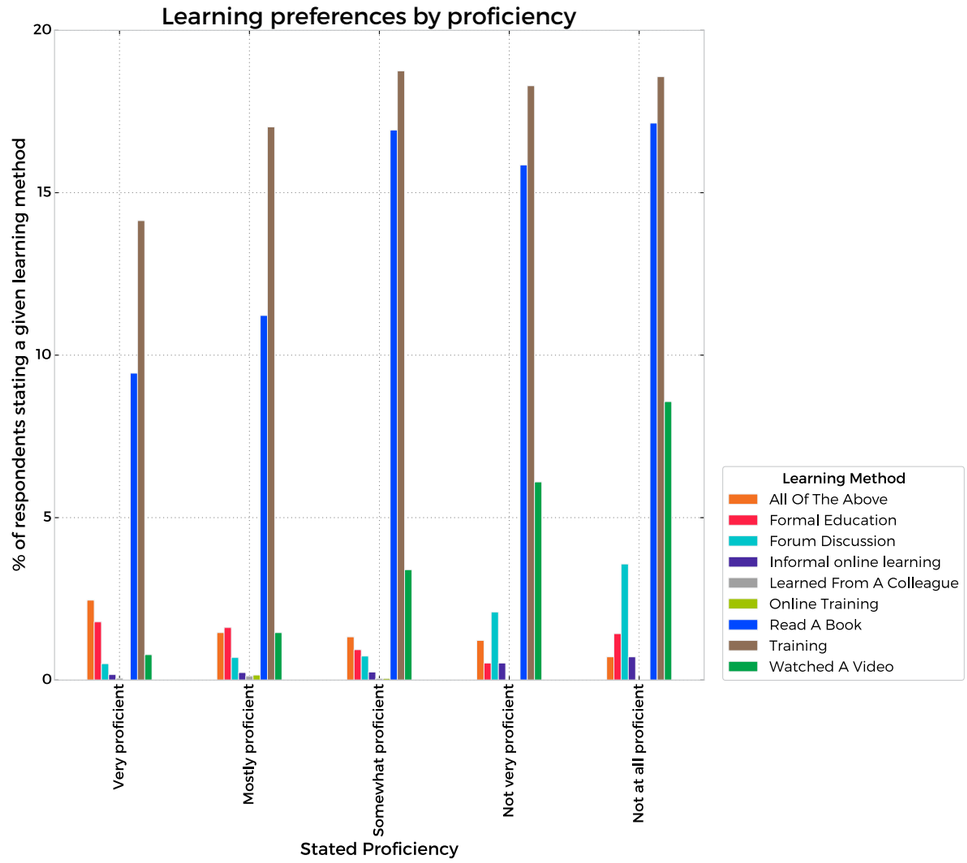
How different level of seniority currently learn new skills

More junior professionals show a preference for more informal learning; senior professionals still like to read a good book.



Learning by proficiency - how do the experts learn?

Is there is any difference in attitudes to learning between people who are very proficient at their chosen skill, and those who only picked it up more recently? We wanted to find out.



From this data, we can see that classic methods such as books and training are still ultimately the most used sources of learning. Teaching videos are picking up traction, but more so amongst the more recent learners and less proficient than experienced developers.

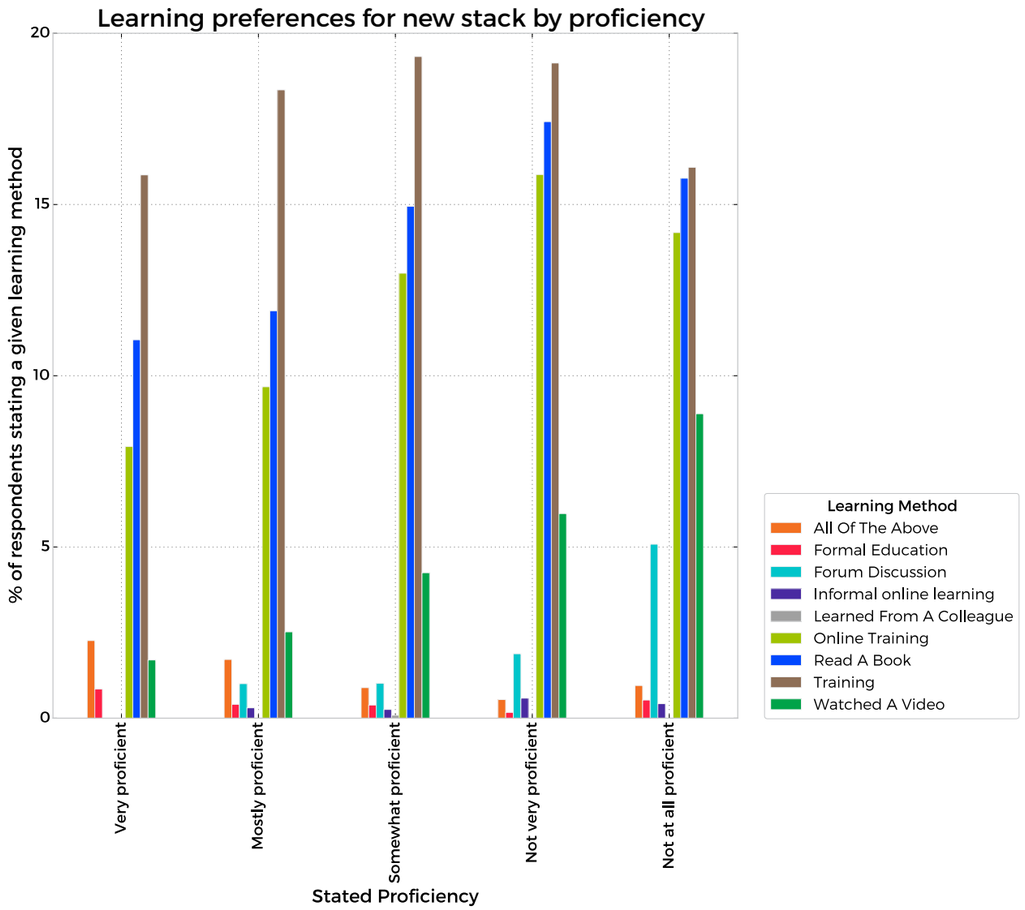
As we move towards more proficient people, the tendency to use some formal or online training increases greatly, as does the tendency to use a greater variety of different methods.

We also asked the same questions regarding a new, exciting tool they had been using recently.

New Stack

For a lot of people, their current stack is something they've likely been using for quite a while. We were therefore interested in finding out specifically at how our respondents are learning their most recent new skill.

As we can see, the results are quite different. Online training is a much greater driver for new skill acquisition, and we can see a much greater tendency for people to use a mix of different methods than just one form of media. There are many ways to learn in 2016 - and people are using them all.

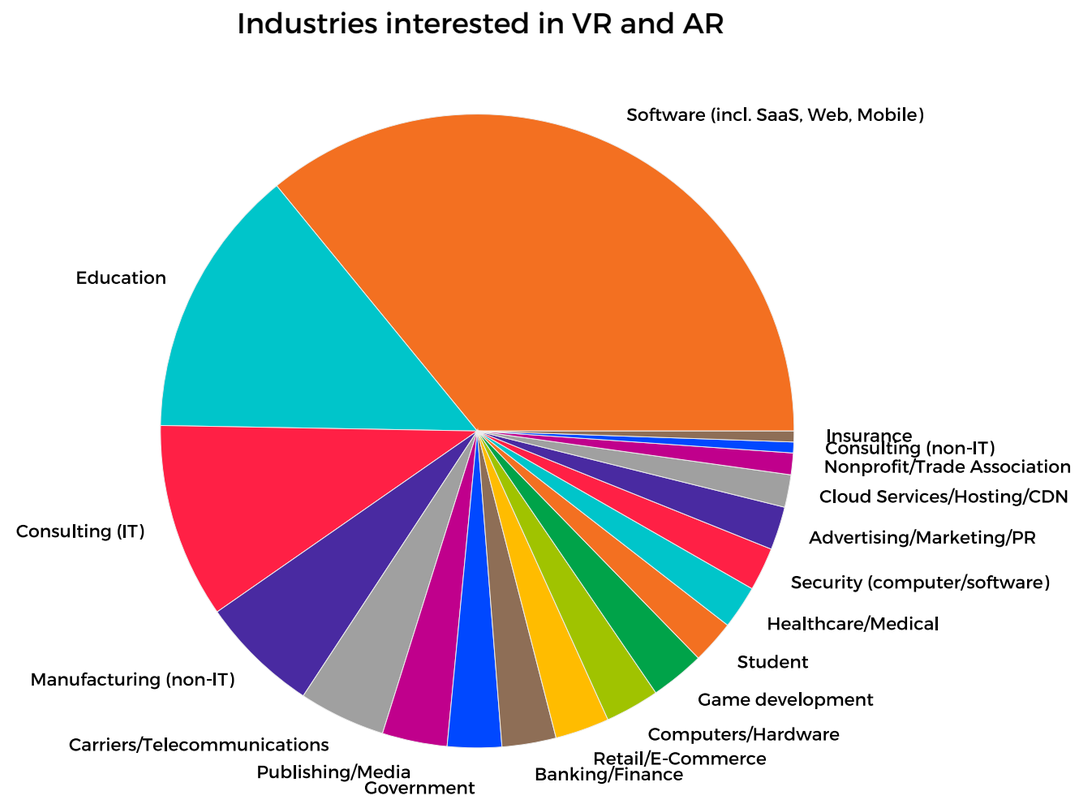


The next big thing

Respondents were asked what they thought the next big thing in their field was going to be. The results were interesting and varied - but there were some stand out responses.

Virtual and augmented reality

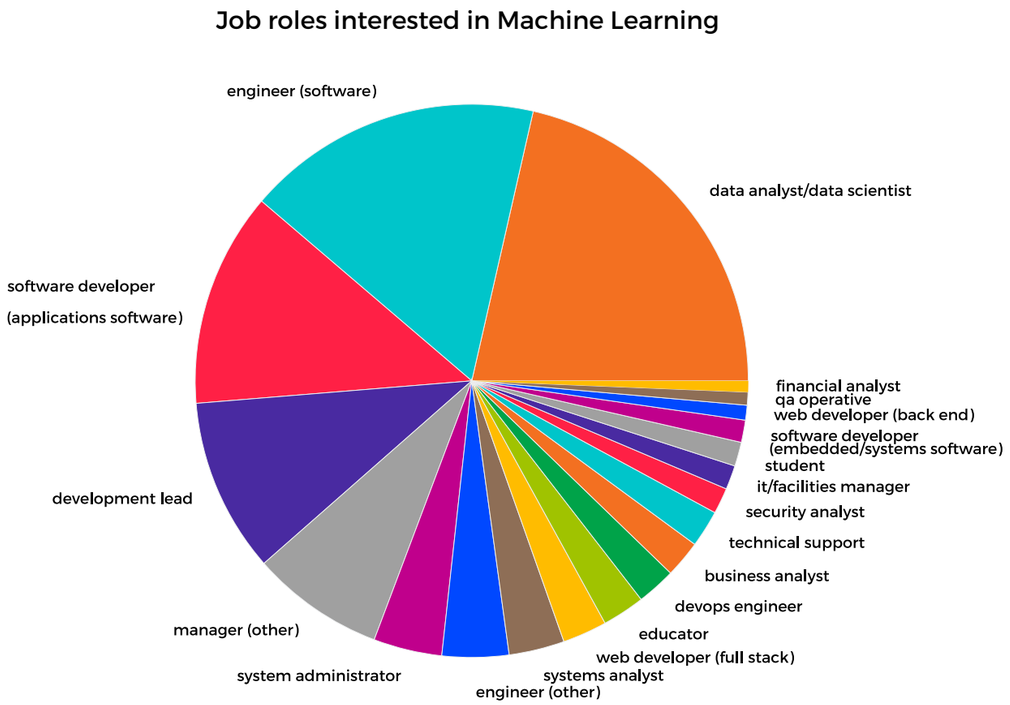
Over 300 respondents said they considered VR and AR to be a real game changer to their industry. Which industries were the most excited about the possibilities?



There's serious interest across a wide spread of job areas in the potential of VR/AR. After the obvious interest of software developers, it is those working in education who are most intrigued by the possibility of virtual and augmented reality. Are we going to see the rise of the virtual classroom?

Machine learning
And big data analytics

The rise of machine learning continues unabated - around 300 respondents said it was going to revolutionize their field.



Data analysts are the ones most looking forward to more machine learning tools and techniques hitting the mainstream. Software engineers and developers come in afterwards, showing that machine learning and big data analytics are nearing maturity, and are increasingly vital to a wider array of areas.

The internet of things

Is 2016 the year that the Internet of Things hits the mainstream? Again, around 300 respondents identified IoT as the next big thing for their industry. Of principal interest were ideas of the industrial Internet of Things. More than just a WiFi connected toaster, Industrial IoT brings connected devices to the world of manufacturing. Incorporating machine learning and big data tech with sensor data and IoT communication, the Industrial Internet of Things aims to automate the data collection and communication aspect of manufacturing. Smart machines are better than humans at accurately, consistently capturing and communicating data.
Also of increasing importance is security for the Internet of Things. When even your toaster has started to collect your personal data, you want to make sure it's safe.

Cyber security

Cyber security has been an important issue for years - but now it seems that everyone realizes just how vital it is. Over 150 respondents said that cyber security would be an essential new trend for their industry. As we saw earlier, security is one of the highest paying industries - particularly for freelancers. If you're looking for a lucrative career, you can definitely do worse than cyber security and penetration testing.

Open sourcing of .NET

Skill Up 2016 saw a lot of buzz around the recent Open sourcing of .NET, with a distinct proportion of respondents saying that it would change the way they worked with Microsoft's major platform. Although concentrated in larger organizations, .NET is used in companies of all sizes - this change is going to be a change for all.

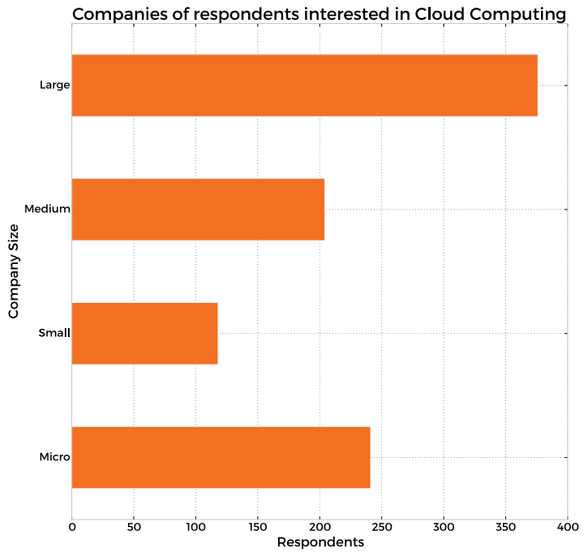
Cloud, virtualization, and containerization

When asked about next big trends, we saw large numbers responding about the following four tools:

- Cloud
- Docker
- Containers
- Devops

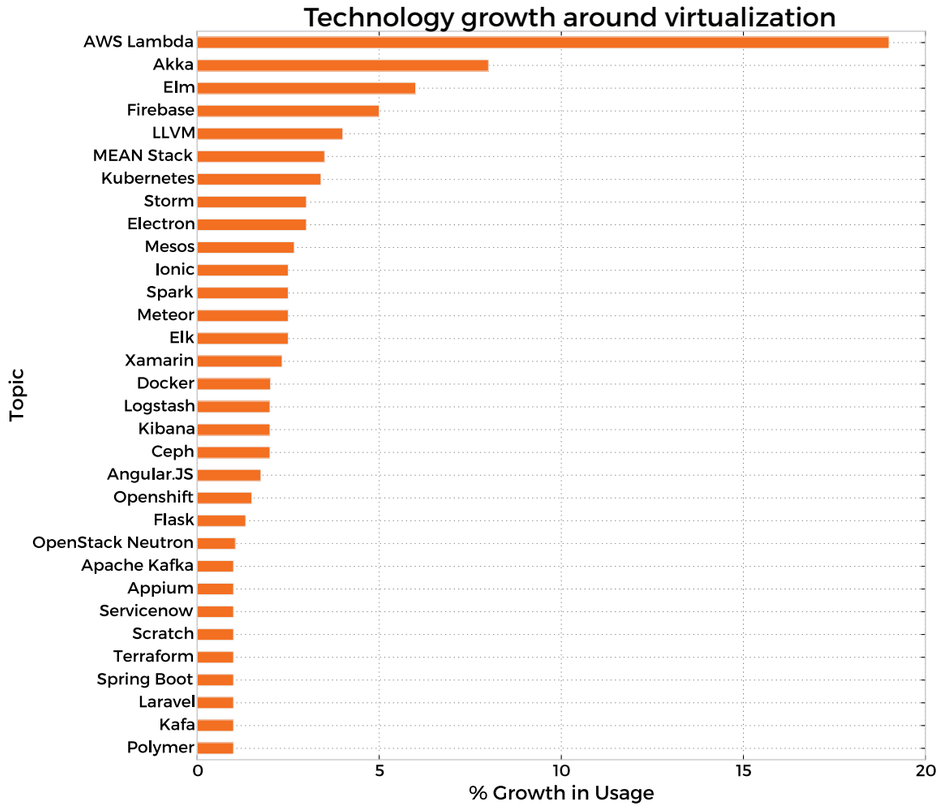
These four topics are intimately linked, and mark one of the real paradigm shifts we've seen in the tech world in the last five years. This shift is just now hitting the mainstream in a big way, and we should expect it to continue to disrupt the way the technology world works.

Over 1,000 of our respondents say that they are currently working on, or are planning to work with some kind of Cloud provider. These respondents tend to either work for very big companies, or very small ones.



The move to the Cloud seems to be motivated by two different reasons. Large organisations are making savings by taking everything off premises, in a cheaper way than just buying space in a large datacenter. Meanwhile, a plethora of new start-ups are taking advantage of this wave of cheap access to processing power - cutting costs significantly by just making EC2 instances suited to them, spinning up or down as necessary.

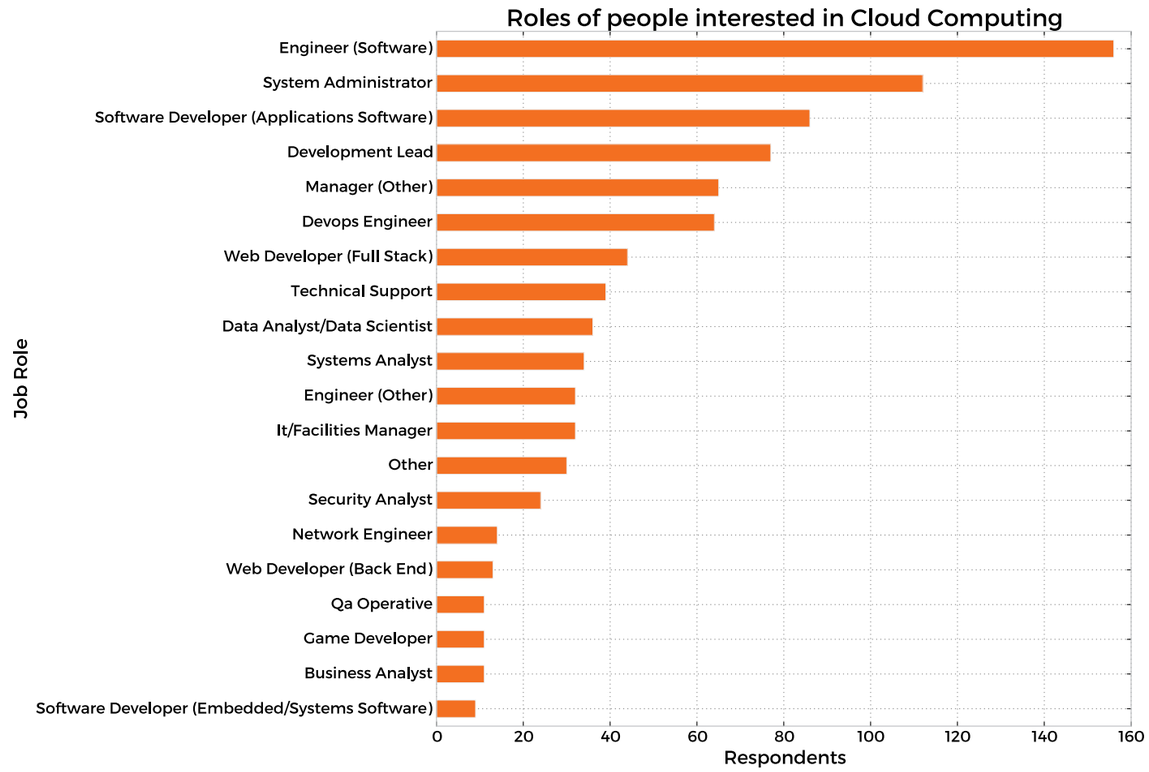
So what tools are being used in this great exodus to the Cloud?



The tech of choice is AWS Lambda. A powerful, serious, and innovative piece of technology, Lambda has empowered its users to do a number of things they would have had no other easy way to accomplish. Akka also proves popular, showing that distributed systems are still a very powerful idea.

The strength of Apache projects (Storm, Mesos, Spark, Kafka) also further corroborate our notion that large scale distributed and cloud based applications are the way of the future. Especially of note is the preponderance of open source tools in this list and interesting new players like Elm.

Much of the surrounding topics not directly related to virtualization and containerization remain focused on web development - speaking of the Cloud as a serious growth topic in the web development community. What other job roles are talking about virtualization as the next big thing? As we can see opposite, it's primarily system administration.



6. Conclusion

The predictions of Skill Up 2015 are coming true in 2016 - Python and JavaScript rule the roost of programming languages, and Big Data and DevOps continue to become more and more vital to every kind of developer. So what do you plan on learning in order to stay relevant? Mapt has been built on the data of our Skill Up surveys and numerous other sources, to provide you with clear guidance to achieve your career goals. Technology can change overnight - so make sure you change with it. Start planning your future success in tech by learning with Mapt today.

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