2024 State of Tech Talent Report

Survey-Based Insights into the Current State of Technical Talent Acquisition, Retention, and Management Globally

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Adrienn Lawson, The Linux Foundation
Stephen Hendrick, The Linux Foundation

Foreword by Clyde Seepersad, SVP & General Manager, Linux Foundation Training & Certification

2024 State of Tech Talent Report

Cross-skilling (47%) & upskilling (43%) are key strategies for technical talent management.

Across all technology domains, on average, 48% of organizations would **prioritize upskilling or cross-skilling existing staff over hiring new employees or engaging consultants in 2024.**

Certifications rank higher than college or university degrees (23% to 16%) when asssessing technical skills.

98% of organizations consider upskilling an important strategy, **with 36% rating it extremely important.**

Despite the news headlines, less than 1/3 of organizations surveyed reduced their technical headcount in 2023.

External hiring is both lengthy and risky: It takes on average **10 months to hire & onboard new technical hires,** and nearly **40% experience turnover.**

A significantly higher number of organizations **involve only training methods (39%)** in their talent agenda compared to those who only involve hiring methods (29%).

Cloud (55%), DevOps (51%), Cybersecurity (49%), & AI/ML (43%) stand out as the key technology domains prioritized for staffing.

The top training challenges include **nurturing a continuous learning environment (39%) and translating knowledge into practical applications (36%)** - highlighting the effectiveness of performance-based training.

The most cited benefits of upskilling emphasize its ability to diversify employee **skillsets for redeployment (40%), advance careers (40%), and develop junior potential (40%).**

Technical talent can broaden skills while their organizations optimize processes through **GenAI** primarily in data analysis (45%), IT infrastructure monitoring (42%), and software development (35%).

The **impact of GenAI is complex**: In 2024, **27%** of organizations **intend to reduce their technical headcount,** while **23% plan to increase** due to GenAI.

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Foreword

It is a pleasure to present the 2024 State of Tech Talent Survey results. I am confident you will find the report to be a valuable resource as you seek to understand current IT professional staffing trends and as a guide to your own retention, recruitment, and training efforts.

Continuing a trend we saw last year, organizations are continuing to increase their use of upskilling and cross-skilling to address technical talent gaps. This recognizes the value of investing in existing staff and the challenges of finding, onboarding, and retaining the right external candidates. Organizations increasingly agree that talent is something you should build as well as buy.

Another important accelerating trend is the acceptance of real-life experience and certifications as proof of knowledge and skills for non-degreed candidates across the IT spectrum.

You may be surprised to read that despite all the headlines about IT layoffs over the last year, the post-2023 reality appears to be more of a shift in roles (mostly toward more junior folks) than any significant, across-the-board reduction in overall technical headcounts. Unsurprisingly, demand for cloud, DevOps, cybersecurity, and AI / ML talent continues to grow.

We couldn't look at today's IT talent market without attempting to ascertain the impact of generative artificial intelligence (GenAI) on hiring as well as work roles. GenAI continues to drive intelligent automation across the workforce, with organizations planning to use it for data analysis and reporting, IT infrastructure monitoring, and software development. While some organizations are reducing headcount due to GenAI, many are planning to maintain or increase their overall technical headcount. While much is uncertain about the actual impacts of GenAI on the workforce, one trend is clear: knowing how to work effectively with GenAI will be a competitive advantage for organizations and IT professionals.

Taking a step back to the big picture, the major trends we have seen for more than a decade continue. The pace of technological evolution continues to accelerate along with the challenges of identifying, recruiting, retaining, and upskilling IT talent. It appears, however, that organizations are shifting their approach. The hire-at-all-costs perspective is carefully being replaced by an approach focused on identifying smart, talented, IT professionals and providing them with the tools they need to keep themselves—and the organizations they work for—along, if not ahead of, the curve.

Clyde Seepersad
SVP & General Manager, Training & Certification, The Linux Foundation

Photo: KubeCon + CloudNativeCon Europe 2024

Executive summary

The 2024 State of Tech Talent Report by The Linux Foundation offers a comprehensive analysis of global trends in technology talent acquisition, retention, and management. Through a survey-based approach involving individuals responsible for hiring and training IT professionals, the report provides valuable insights into the evolving landscape of technical skill development and organizational strategies in response to emerging technologies and economic challenges.

Key findings and trends

The report highlights a significant shift in organizational priorities toward upskilling and cross-skilling strategies, with 47% and 43% of respondents, respectively, identifying these approaches as key to technical talent management (Figure 1a). A significantly greater number of organizations prioritize training methods exclusively (39%), showcasing a strong commitment to employee development, compared to those focusing solely on hiring methods (29%) (Figure 1b). This is further strengthened by future plans, where across all technology areas, the majority of organizations will prioritize upskilling / cross-skilling instead of hiring new employees or engaging consultants (Figure 3).

Despite concerns about economic uncertainty, the majority of organizations surveyed did not reduce their technical headcount in 2023 (Figure 4). This resilience underscores the strategic value placed on technical expertise within organizations, particularly in areas such as cloud, DevOps, cybersecurity, and AI / ML, which emerged as the top technology domains prioritized for staffing (Figure 7).

The report also sheds light on the impact of emerging technologies, notably GenAI, on workforce planning. While GenAI presents opportunities for streamlining processes and optimizing workflows, it also poses challenges and opportunities in terms of workforce restructuring, with 27% of organizations intending to reduce their technical headcount in response to these advancements, while 23% would increase it (Figure 8).

Demand for skilled technical talent

In addressing the challenges of talent management, organizations are presented with significant opportunities to capitalize on the potential of upskilling and cross-skilling initiatives. By prioritizing these strategies, organizations can empower their existing workforce to adapt to evolving technology trends and bridge the gap between theoretical knowledge and practical application. Performance-based training emerges as an important tool in fostering a culture of continuous learning, enabling employees to enhance their problem-solving skills and drive innovation within the organization.

We gained insight into the timeline of talent acquisition and turnover rates. The hiring and onboarding process on average now takes 10.2 months, and 38% of new hires experience turnover, with both numbers increasing from last year (Figures 14 and 16). With the rising turnover rates and increased hiring expenses, possibly influenced by GenAI automation, prioritizing upskilling and cross-skilling is vital for effective resource management.

Introduction

The 2024 Tech Talent report offers a comprehensive analysis of talent management practices in the ever-evolving landscape of the IT sector. Our findings are based on a survey conducted among individuals responsible for hiring or training within the IT sector. With 418 respondents contributing their insights, this report offers a deep understanding of the diverse talent management approaches adopted across industries and geographies. For a detailed understanding of our methodology, detailed demographics, and survey framework, please refer to the Methodology section.

In this report, we shed light on the critical concepts of upskilling and cross-skilling. Upskilling refers to the process of enhancing the skills of existing employees, equipping them with the latest technological competencies and domain knowledge to meet evolving job requirements. In contrast, cross-skilling involves diversifying the skillsets of technical staff, enabling them to proficiently handle tasks beyond their primary expertise, thus enhancing organizational flexibility and resilience. Throughout this report, we examine the effectiveness of these strategies in conjunction with hiring practices in addressing the challenges and opportunities that the rapidly changing technological landscape presents.

Photo: KubeCon + CloudNativeCon Europe 2024

Upskilling takes center stage: Diverse approaches to technical talent management in 2023 and beyond

In 2023 and beyond, organizations are expected to embrace new approaches to managing technical talent, moving away from traditional methods. Previously, organizations primarily focused on hiring to acquire technical talent. This proved to be time-consuming, expensive, and sometimes unsuccessful, as revealed in our report. Upskilling and cross-skilling are in the spotlight, with 64% of tech leaders saying that their candidates for IT and tech positions lack essential skills or experience as reported by the MIT Technology Review[1]. Moreover, shifts in the economic landscape have prompted organizations to reconsider their talent management strategies, a trend that our survey findings also support.

The table in **FIGURE 1** illustrates a range of strategies that organizations employ for technical talent management, highlighting not only hiring (49%) but also cross-skilling (47%), upskilling (43%), and other approaches. Following some data transformations, the right-hand panel of **FIGURE 1** shows that 29% of organizations utilize only hiring methods in their technical talent agenda, whereas for training methods, the number is much higher: 39% of organizations utilize only training methods. The response, "Hiring inexperienced professionals and upskilling them," was included in both the hiring and training counts. This demonstrates the increased focus that organizations now have on training relative to hiring.

FIGURE 2 indicates the growing importance of upskilling as a strategy, emphasizing

1   MIT Technology Review Insights (2023), New Approaches to the Tech Talent Shortage. Available at: **https://www.technologyreview. com/2023/09/21/1079695/new-approaches-to-the-tech-talent-shortage/**

Figure 1: Organizations employ various strategies beyond simply hiring to address their technological needs

How does your organization ensure that its technical staff have the necessary skills to fulfill the technological needs of the organization? (select all that apply)

Hiring new IT professionals with experience in the new technology	49%
Cross-skilling existing technical staff	47%
Hiring inexperienced professionals and upskilling them	43%
Upskilling inexperienced existing staff for technical roles	43%
Hiring consultants to support projects	19%

2024 Tech Talent Survey, Q25, Sample Size = 418, Valid Cases = 418, Total Mentions = 843

How does your organization ensure that its technical staff have the necessary skills to fulfill the technological needs of the organization? (select all that apply)

Involves only hiring methods — 29%

Involves only training methods — 39%

2024 Tech Talent Survey, Q25, Sample Size = 418

that both upskilling and hiring are deemed essential by more than 94% of organizations. However, there is a disparity on one end of the perceived importance levels—74% of organizations find upskilling at least very important compared to 54% for hiring, and this is further strengthened by 36% rating upskilling as extremely important compared to 17% for hiring.

Figure 2: A greater emphasis is being placed on upskilling within organizations

How important is upskilling as a strategy to address technical talent needs? (select one)

36%	38%	24%	2%

■ Extremely important　■ Very important　■ Important　■ Not very important　■ Not important at all

How important is hiring full-or part-time staff to address technical talent needs? (select one)

17%	37%	40%	5%	1%

■ Extremely important　■ Very important　■ Important　■ Not very important　■ Not important at all

2024 Tech Talent Survey, Q26, Sample Size =414 (DKNS and 'No experience' excluded)
2024 Tech Talent Survey, Q27, Sample Size =415 (DKNS excluded)

Upskilling or cross-skilling staff is at the top of the talent agenda across all technology areas for 2024

While understanding overarching trends is valuable, it's crucial to recognize that preferences in technical talent management can vary significantly across different technology domains. Among the 19 technology areas we examined, upskilling or cross-skilling current staff emerged as the preferred strategy over hiring new personnel or engaging consultants. These technology areas are ranked in **FIGURE 3** according to their perceived priority (the priority percentages are not shown in the figure).

Cloud technology stands out as the top priority on this list, with open hardware ranking at the bottom. Notably, 54% of organizations expressed a preference for cross-skilling or upskilling existing employees in cloud technologies, whereas only 24% prioritized hiring technical staff, and 22% favored hiring consultants.

Figure 3: Across all technology areas upskilling / cross-skilling are the most preferred methods

For the following technology areas, which approach would you prioritize in 2024 to meet the organization's needs? (select one response per row)

Technology Area	Hire new technical staff	Upskill or cross-skill existing technical staff	Hire consultants
Cloud, Containers & Virtualization	24%	54%	22%
DevOps, CI/CD & Site Reliability	28%	51%	21%
Cybersecurity	27%	47%	27%
AI, ML, Data & Analytics	32%	48%	20%
Web & Application Development	26%	49%	25%
System Engineering	26%	50%	23%
Cross-Technology	22%	53%	26%
System Administration	26%	52%	22%
Networking & Edge	23%	49%	29%
Privacy & Security	19%	51%	30%

Highest priority → Order of priority

■ Hire new technical staff　■ Upskill or cross-skill existing technical staff　■ Hire consultants

2024 Tech Talent Survey, Q42, Sample Size = 354-403 (DKNS and 'Not a priority or Unsure' excluded)

For the following technology areas, which approach would you prioritize in 2024 to meet the organization's needs? (select one response per row)

Technology Area	Hire new technical staff	Upskill or cross-skill existing technical staff	Hire consultants
Linux Kernel	23%	50%	27%
Open Source & Compliance Best Practices	22%	50%	28%
Safety-Critical Systems	23%	48%	29%
IoT & Embedded	24%	46%	30%
Supply Chain	23%	46%	31%
Blockchain	30%	45%	25%
Visual Effects	24%	47%	29%
Open Source Program Offices (OSPO)	27%	45%	28%
Open Hardware	25%	40%	34%

Order of priority → Lowest priority

■ Hire new technical staff　■ Upskill or cross-skill existing technical staff　■ Hire consultants

2024 Tech Talent, Q42, Sample Size=321-348 (DKNS and 'Not a priority or Unsure' excluded)

This same pattern, where training (upskilling or cross-skilling) is the dominant approach, persists across each of these technologies. However, subtle differences do emerge in areas such as blockchain and AI, ML, data, and analytics, where hiring staff is given greater emphasis likely due to the complexity of the subject area and the need for more highly specialized capabilities.

The impact of the economy on technical talent management

Despite the news headlines, the majority of IT organizations did not reduce their headcount in 2023

Since the spring of 2022, there has been a noticeable increase in negative news sentiment in the media and a rapidly growing number of technology companies implementing layoffs to demonstrate responsible fiscal management as recessionary concerns loomed in the Americas. Layoffs escalated throughout 2022 and peaked in 2023 Q1, but they have persisted at a moderate level even as we close out 2024 Q1[2].

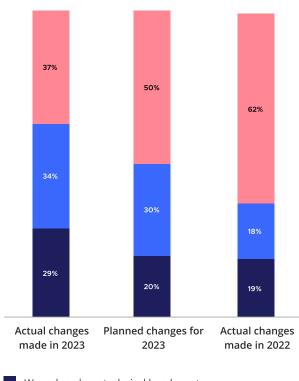However, our data depicted in **FIGURE 4** suggests that the situation may not be as dire as perceived in the news. Of those laid off in 2022, according to a Boston Consulting Group (BCG) survey, nine out of ten tech workers found new jobs and improved their positions[3]. Among the 2024 Tech Talent Survey sample, 29% reported a reduction in their technical headcount in 2023, while 34% remained unchanged, and 37% even increased their headcount. When compared to the planned changes reported in the previous year's survey, it appears that more organizations implemented reductions than initially intended. Although the severity of reductions does not match news headlines, this certainly shows the powerful impact of the 2023 economic recession on headcount especially when compared to the reductions made in 2022 (19%).
Segmenting the data for 2023 headcount changes reveals insights into which types of

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2   https://layoffs.fyi
3   BCG (2023), The Race for Tech Talent Hasn't Stopped. Available at: **https://www.bcg.com/publications/2023/the-race-for-tech-talent-has-not-stopped**

Figure 4: One-third of organizations surveyed reduced their technical headcount in 2023

Please identify what changes were made to or what changes you are planning to your technical headcount during 2023 or 2022.
(select one)

	Actual changes made in 2023	Planned changes for 2023	Actual changes made in 2022
We increased our technical headcount	37%	50%	62%
We didn't make any changes to our technical headcount	34%	30%	18%
We reduced our technical headcount	29%	20%	19%

■ We reduced our technical headcount

■ We didn't make any changes to our technical headcount
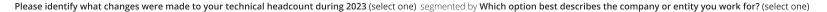
■ We increased our technical headcount

2024 Tech Talent Survey, Q21, Sample Size = 408 (DKNS excluded)
2023 Tech Talent Survey, Q34-35, Sample Size = 418 (DKNS excluded)
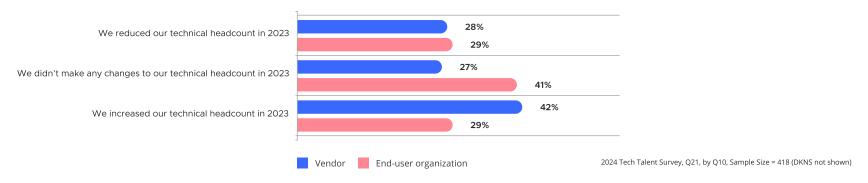2023 Tech Talent Survey, Q15, Sample Size = 414 (DKNS excluded)

organizations experienced more reductions. Both vendors and end-user organizations reduced their headcount at similar rates, but vendors increased their headcount by 70% more (**FIGURE 5**). IT organizations operating across industries also increased their headcount at a higher rate compared to industry-specific organizations (**TABLE A1**). In terms of company size, large organizations with 5,000 or more employees experienced the highest reduction rate at 33%, while nearly half of small organizations increased their technical headcount in 2023 (**TABLE A2**).

Figure 5: Vendors experienced a higher percentage increase in technical headcount compared to end-user organizations

Please identify what changes were made to your technical headcount during 2023 (select one) segmented by **Which option best describes the company or entity you work for?** (select one)

	Vendor	End-user organization
We reduced our technical headcount in 2023	28%	29%
We didn't make any changes to our technical headcount in 2023	27%	41%
We increased our technical headcount in 2023	42%	29%

2024 Tech Talent Survey, Q21, by Q10, Sample Size = 418 (DKNS not shown)

Overall sentiment about the 2024 economy among most organizations is not positive, with 46% expressing similar levels of concern as in 2023 and 34% reporting heightened concerns. Regional disparities exist with the U.S. / Canada showing slightly less concern compared to Europe or the Asia-Pacific region, while Europe exhibits slightly higher concern. However, these early sentiments are subject to change based on the latest economic news updates, which show positive signs of economic recovery (**FIGURE 6**).

Figure 6: Organizations continue to express concerns about the economy

Is your organization more or less concerned about the general economy and its impact on your organization in 2024 compared to 2023? (select one) segmented by **In what country or region does your organization have its headquarters?** (select one)

	Total	United States or Canada	Europe	Asia Pacific
Less concerned compared to 2023	15%	17%	13%	14%
As concerned as for 2023	46%	50%	40%	47%
More concerned compared to 2023	34%	28%	40%	35%

2024 Tech Talent Survey, Q16, by Q9, Sample Size = 369 (Excludes 'Other' regions)

Organizations aim to adapt to the continuously changing technology landscape

As shown in **FIGURE 7**, 55% of organizations have technical headcount allocated to cloud services, followed closely by 51% in DevOps and 49% in cybersecurity. Additionally, the field of AI, ML, data, and analytics is gaining traction, with 43% of organizations surveyed reporting technical staff dedicated to this domain. Conversely, there has been a slight decline in web and application development compared to the previous year.

The fluctuating rankings reflect the dynamic nature of the technology landscape, where organizations that adapt effectively are rewarded in the market. The table in **FIGURE 7** shows the top five technology areas staffed by headcount in 2023 and 2024. Cloud services, cybersecurity, and DevOps remain the top three categories in terms of allocation of technical headcount. However, web and application development has dropped from the top five, while the AI, ML, and data field have surged in popularity, possibly driven by the growing interest in GenAI applications across IT operations and development.

Figure 7: Cloud, DevOps, cybersecurity and AI/ML stand out as the key technology domains prioritized for staffing

Which of the following technology areas are staffed by technical headcount in your organization? (select all that apply)

Technology area	2024 rank	2023 rank
Cloud, Containers & Virtualization	1	1
DevOps, CI/CD & Site Reliability	2	3
Cybersecurity	3	2
AI, ML, Data & Analytics	4	6
Networking & Edge	5	4

2024 Tech Talent Survey, Q22, Sample Size = 418, Valid Cases = 418, Total Mentions = 1,965

GenAI continues to drive intelligent automation across the workforce, presenting an opportunity for upskilling

We were interested in understanding the impact of GenAI on technical talent management. **FIGURE 8** shows that in 2023, 18% of organizations decreased their headcount using GenAI technologies. The projected impact in 2024 is that 27% of organizations plan to reduce their headcount. The reduction of technical staff due to GenAI is also more pronounced in middle-sized organizations (**TABLE A3**). If there is any good news in this data, it is that only 5.3% of organizat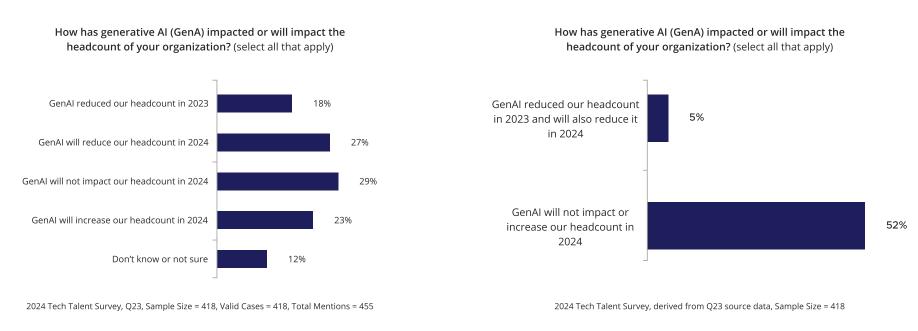ions reduced or are reducing staff in both years. This means that GenAI has not yet reached a capability that is causing persistent annual reductions in organizational headcount. Other notable findings in **FIGURE 8** are that 23% of organizations intend to increase staff and GenAI is not projected to cause any headcount changes at 29% of organizations.

Unfortunately, we currently lack data on the specific roles being affected by these changes brought about by GenAI. It is likely it will involve the streamlining of routine tasks, which presents an opportunity to upskill headcount on a broad skillset that can be utilized beyond GenAI processes. Executives are aware of this trend, as revealed by the BCG AI Radar survey, where 46% of tech leaders surveyed report that their workforce will need to undergo upskilling in the next three years due to GenAI[4].

Figure 8: GenAI will have a diverse impact on organizations' headcount

How has generative AI (GenA) impacted or will impact the headcount of your organization? (select all that apply)

GenAI reduced our headcount in 2023	18%
GenAI will reduce our headcount in 2024	27%
GenAI will not impact our headcount in 2024	29%
GenAI will increase our headcount in 2024	23%
Don't know or not sure	12%

2024 Tech Talent Survey, Q23, Sample Size = 418, Valid Cases = 418, Total Mentions = 455

How has generative AI (GenA) impacted or will impact the headcount of your organization? (select all that apply)

GenAI reduced our headcount in 2023 and will also reduce it in 2024	5%
GenAI will not impact or increase our headcount in 2024	52%

2024 Tech Talent Survey, derived from Q23 source data, Sample Size = 418

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4   BCG (2023), BCG AI Radar. Available at: **https://www.bcg.com/publications/2024/from-potential-to-profit-with-genai**

FIGURE 9 provides insight into the use cases of GenAI. The majority of organizations are planning to use it for data analysis and reporting (45%), followed by IT infrastructure monitoring (42%) and software development (35%). These three domains represent relatively new fronts in automation, prompting fresh reflections about the future of high-value work. IT professionals should ensure the relevance and currency of their skills, delivering value beyond what GenAI can provide.

Surprisingly, customer support and helpdesk services rank lower on the list, possibly due to existing automation in many processes. Only 5% of organizations stated that they have no plans to use GenAI.

Figure 9: The primary applications of GenAI include data analysis, IT infrastructure monitoring, and software development

In which activities does your organization plan to use GenAI?
(select all that apply)

Activity	Percentage
Data analysis and reporting	45%
IT infrastructure monitoring	42%
Software development (e.g., code generation, testing)	35%
Network management and Security	29%
Project management tasks	29%
System maintenance and updates	28%
Quality assurance and testing	23%
Customer support and helpdesk services	21%
Sales and marketing	12%
No plans to use GenAI	5%
Other (please specify)	0%
Don't know or not sure	6%

2024 Tech Talent Survey, Q24, Sample Size = 418, Valid Cases = 418, Total Mentions = 1,159

Upskilling presents a solution to adapt staff to technological changes

While GenAI is bound to significantly influence how technical professionals carry out their work, a promising avenue arises wherein organizations can enhance employees' skills to achieve even greater business outcomes. **FIGURE 10** shows that the most cited benefit of upskilling and cross-skilling is the diverse skillsets individuals can acquire (40%). These initiatives also offer opportunities for career advancement (40%) and enhance the capabilities of junior staff (40%). These combined benefits illustrate how organizations are creatively leveraging resources amid changes, focusing on talent development rather than external recruitment.

Figure 10: Upskilling presents an opportunity to reassign existing staff as technology needs evolve and economic concerns prevail

What are the main benefits to upskilling or cross-skilling staff? (select all that apply)

Benefit	%
Upskilling produces employees with varied skillsets that can be redeployed more effectively than a new hire	40%
Upskilling and cross-skilling presents career development opportunities to staff members which can lead to higher job satisfaction	40%
Upskilling is an ideal way to help junior technical staff expand their capabilities	40%
Upskilling rather than hiring new employees is more cost effective way to increase technical expertise	35%
Upskilling brings people into roles who are already familiar with and have relationships with the company	34%
Upskilling is an effective way to fill senior positions where we can't find a technical headcount	34%
Upskilling works best for learning narrowly focused skills	32%
Our organization sees no benefits to upskilling	1%
Other (please specify)	0%
Don't know or not sure	2%

2024 Tech Talent Survey, Q40, Sample Size = 418, Valid Cases = 418, Total Mentions = 1,082
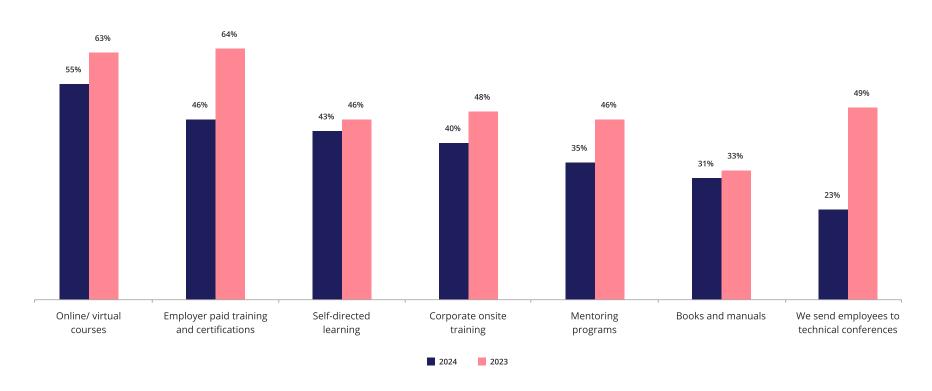
Thoughtful planning is essential for effective training strategies

Various options are available for training and certifying technical staff, with the most popular methods being online virtual courses and employer-funded training and certifications, as shown in FIGURE 11. This figure also illustrates a decrease in available training opportunities compared to 2023, likely a result of budget cuts amid economic challenges. Nevertheless, as highlighted in this report, 2024 appears to be a pivotal year for upskilling, suggesting that organizations will adjust their training strategies and provide more opportunities.

Figure 11: Various opportunities exist to train and certify technical staff

Which of the following training or professional development opportunities does your organization use to train and certify technical staff? (select all that apply)

Category	2024	2023
Online/ virtual courses	55%	63%
Employer paid training and certifications	46%	64%
Self-directed learning	43%	46%
Corporate onsite training	40%	48%
Mentoring programs	35%	46%
Books and manuals	31%	33%
We send employees to technical conferences	23%	49%

■ 2024   ■ 2023

2024 Tech Talent Survey, Q39, Sample Size = 413 (DKNS and other excluded)
2023 Tech Talent Survey, Q28, Sample Size = 414 (DKNS and other excluded)

The primary challenge (FIGURE 12) in training is creating and nurturing an environment for continuous learning (39%), as it demands considerable effort and time. Another obstacle is the difficulty in effectively translating new knowledge into practical applications (35%). Only a minority of organizations (23%) encounter issues with backfilling during training. However, by implementing strategic planning and thoughtfully selecting training courses, organizations can effectively address these challenges. For example, instructor-led training offers expert guidance and structured learning, while performance-based training emphasizes practical application, problem solving, and measurable outcomes, both fostering continuous learning within companies.

Figure 12: The top challenges in training staff include nurturing a continuous learning environment and effectively translating knowledge into practical applications

What are the main challenges to upskilling or cross-skilling staff?
(select all that apply)

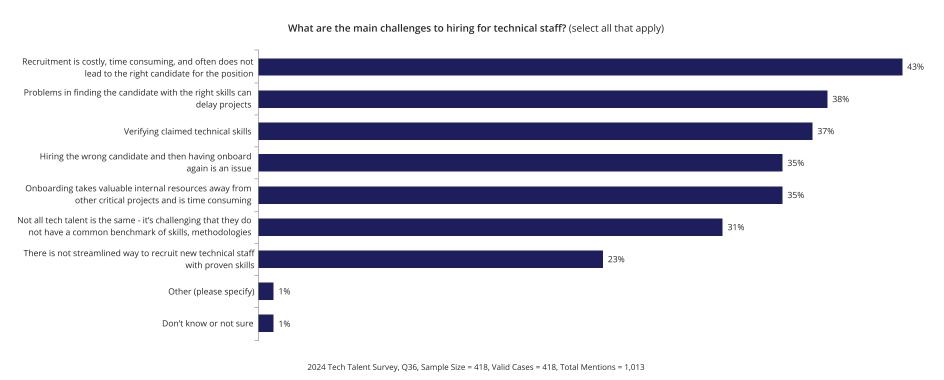| Challenge	%
Creating and nurturing an environment for continuous learning takes effort and time	39%
It can be difficult to translate new knowledge into practical applications	36%
Upskilling takes time and can be ineffective at training for complex roles	35%
Resources are pulled away from other priority areas	34%
Finding the appropriate training materials is a challenge	33%
Upskilling doesn't work for senior roles because you can't teach broad subject matter expertise	26%
Upskilled staff doesn't help us to fill new positions because we still have to backfill for the positions vacated	23%
Our organization has not experienced any challenges to upskilling	2%
Other (please specify)	1%
Don't know or not sure	2%

2024 Tech Talent Survey, Q41, Sample Size = 418, Valid Cases = 418, Total Mentions = 971
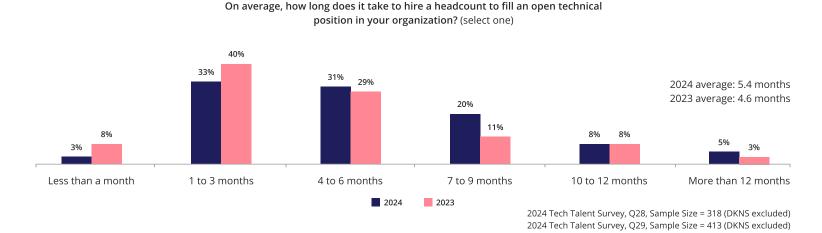
Technical recruiting remains a challenge

FIGURE 13 shows that the primary challenge in hiring, as reported by 43% of organizations, is that it is costly, time-consuming, and often does not lead to the right candidate. This issue is compounded by the 38% of organizations reporting that problems in finding suitable candidates can lead to project delays, while verifying claimed technical skills poses an additional hurdle, as cited by 37%.

Figure 13: According to 43% of respondents, recruitment is costly, time consuming, and often does not lead to the right candidate

What are the main challenges to hiring for technical staff? (select all that apply)

Challenge	%
Recruitment is costly, time consuming, and often does not lead to the right candidate for the position	43%
Problems in finding the candidate with the right skills can delay projects	38%
Verifying claimed technical skills	37%
Hiring the wrong candidate and then having onboard again is an issue	35%
Onboarding takes valuable internal resources away from other critical projects and is time consuming	35%
Not all tech talent is the same - it's challenging that they do not have a common benchmark of skills, methodologies	31%
There is not streamlined way to recruit new technical staff with proven skills	23%
Other (please specify)	1%
Don't know or not sure	1%

2024 Tech Talent Survey, Q36, Sample Size = 418, Valid Cases = 418, Total Mentions = 1,013

Further investigation into these challenges included explicit questions on the time spent on hiring processes. On average, organizations spend 5.4 months on hiring, with 64% of them requiring over four months to fill open positions. For 33% of organizations, this process extends beyond seven months, and the trend seems to be getting worse compared to 2023, when the average time to hire was 4.6 months (**FIGURE 14**).

Figure 14: On average, 64% of organizations spend more than four months to fill an open position

On average, how long does it take to hire a headcount to fill an open technical
position in your organization? (select one)

2024 average: 5.4 months
2023 average: 4.6 months

■ 2024   ■ 2023

2024 Tech Talent Survey, Q28, Sample Size = 318 (DKNS excluded)
2024 Tech Talent Survey, Q29, Sample Size = 413 (DKNS excluded)

We asked the same question for different technical roles (see **FIGURE 15**). Notably, filling an open position typically takes at least five months for all roles. Executive management roles are the most time-consuming to fill, averaging 6.2 months, followed by AI / ML engineers and SRE / Platform engineers, which aligns with the high demand for these positions. Conversely, front-end / back-end developers and network administrators generally have shorter hiring periods.

Figure 15: Hiring front-end/back-end developers and network administrators is typically quicker, whereas recruiting executive management positions or SRE/AI engineers tend to require more time

About how long does it take to hire a headcount to fill an open position in your organization for the following technical roles? (select one response per row)

Role	Average time to hire (months)
Executive Management	6.2
AI/ML Engineer	6.1
SRE / Platform Engineer	6.0
Project Manager	5.9
Data Analyst / Scientist	5.9
Systems Administrator	5.9
IT Management	5.9
Data Management	5.8

Role	Average time to hire (months)
DevOps / DevSecOps / GitOps	5.8
Cloud Architect / Engineer	5.8
Security Professional	5.6
Front-end / Back-end developer	5.5
Network Administrator	5.3

2024 Tech Talent Survey, Q29, Sample size = 292-311 (DKNS excluded)

Regarding onboarding (**FIGURE 16**), the average time is 4.8 months, with 58% of organizations requiring more than four months to onboard new hires to achieve normal productivity. Additionally, the process to take on a new hire typically spans at least eight months for most organizations. In 2024, a significant rate of resignation or layoff among new hires can be observed from the sample in the right-hand panel of **FIGURE 16**. On average, two out of five new technical hires experience turnover within the first six months, which is a higher rate compared to the rate observed in 2023 (29%).

The combined duration for hiring and onboarding stands at 10.2 months and shows an increase of 34% from 7.6 months in 2023. In addition to the high turnover rates, the hiring process has become significantly more expensive. This trend is possibly aggravated by the impact of GenAI automation, which is reducing the need for lower-level positions and leading to a higher demand for senior technical staff. This highlights the importance of prioritizing upskilling and cross-skilling as a key strategy for resource management.

Certifications are key criteria in the hiring process

Employers utilize various methods to evaluate candidates' skills during the hiring process. **FIGURE 17** shows that the most crucial aspect they seek is relevant hands-on experience from previous employment, deemed extremely or very important by 71% of respondents. Additionally, the importance of showcasing a portfolio of past achievements to demonstrate skills is increasing. However, candidates who might not have relevant experience in the roles advertised can demonstrate their capabilities through university degrees or certificates. Certificates rank higher than university degrees in importance, but all factors listed above are very influential for hiring managers.

The findings above reveal the dilemmas hiring managers encounter in a job market where having a degree is still highly valued. In 2022, in the United States, 69% of computer programmer positions and 95% of mobile application
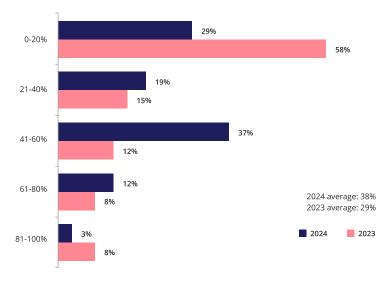
Figure 16: It takes more time to onboard compared to 2023, and more technical staff resigned or were asked to leave than in the previous year

How long does the onboarding process take for a new technical headcount to reach normal productivity? (select one)

2024 average: 4.8 months
2023 average: 3 months
■ 2024   ■ 2023

2024 Tech Talent Survey, Q30, Sample Size = 321 (answered by those who hire in Q25)
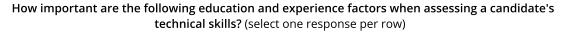2023 Tech Talent Survey, Q30, Sample Size = 414

On average, what percentage of new technical staff hires resign or were asked to leave within 6 months of being onboarded? (select one)
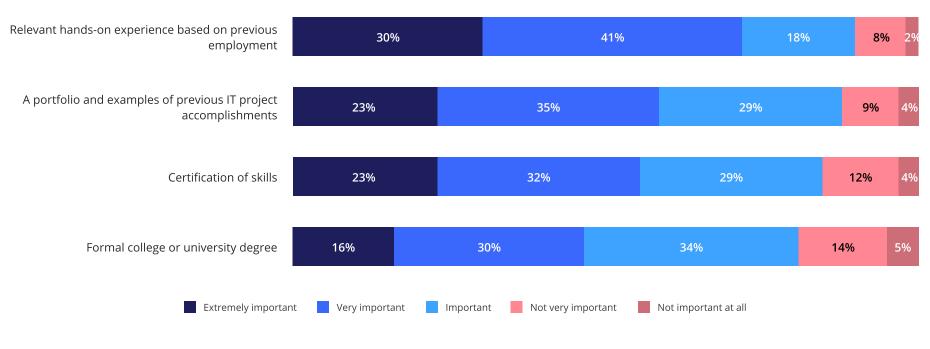
2024 average: 38%
2023 average: 29%
■ 2024   ■ 2023

2024 Tech Talent Survey, Q32, Sample Size = 310 (answered by those who hire in Q25) 2023 Tech Talent Survey, Q31, Sample Size = 381

developer jobs still required a degree[5]. However, research shows that focusing on skills during hiring is five times better at predicting job performance than hiring for education[6]. The situation becomes more intricate when managers aim to hire candidates with strong non-technical skills, particularly problem-solving, which are also highly valued (TABLE A4).

Figure 17: When assessing technical skills, certifcations rank above a college or university degree in terms of importance

How important are the following education and experience factors when assessing a candidate's technical skills? (select one response per row)

	Extremely important	Very important	Important	Not very important	Not important at all
Relevant hands-on experience based on previous employment	30%	41%	18%	8%	2%
A portfolio and examples of previous IT project accomplishments	23%	35%	29%	9%	4%
Certification of skills	23%	32%	29%	12%	4%
Formal college or university degree	16%	30%	34%	14%	5%

■ Extremely important ■ Very important ■ Important ■ Not very important ■ Not important at all
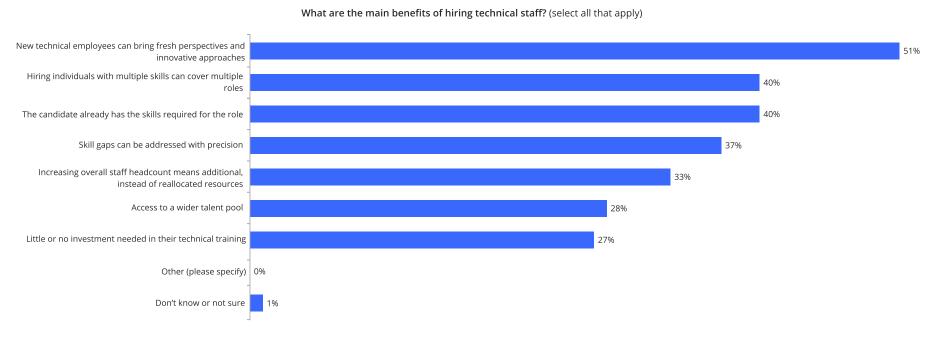
2024 Tech Talent Survey, Q34, Sample size = 325 (DKNS excluded)
(answered by those who hire in Q25)

Based on the most commonly cited benefits of hiring in FIGURE 18, organizations have reached a stage where they prioritize candidates with diverse skillsets that can be utilized effectively. Rather than focusing solely on specific skills, organizations seek individuals capable of handling a variety of tasks. More than half of the hiring managers are keen on hiring new perspectives and innovative approaches, which are often challenging to obtain from existing employees. This need for fresh perspectives is particularly pronounced in the IT industry, where companies must stay abreast of the latest advancements.

5   BCG (2023), Competence over Credentials: The Rise of Skills-Based Hiring. Available at: **https://www.bcg.com/publications/2023/rise-of-skills-based-hiring**

6   John E. Hunter and Rhonda F. Hunter, "Validity and utility of alternative predictors of job performance." Psychology Bulletin, 1984, Volume 96, Issue 1; "Skills-based sourcing & hiring playbook", Rework America Alliance, April 2022.

Figure 18: Fresh perspectives and innovative approaches are the most cited benefits of hiring technical staff

What are the main benefits of hiring technical staff? (select all that apply)

Benefit	Percentage
New technical employees can bring fresh perspectives and innovative approaches	51%
Hiring individuals with multiple skills can cover multiple roles	40%
The candidate already has the skills required for the role	40%
Skill gaps can be addressed with precision	37%
Increasing overall staff headcount means additional, instead of reallocated resources	33%
Access to a wider talent pool	28%
Little or no investment needed in their technical training	27%
Other (please specify)	0%
Don't know or not sure	1%

2024 Tech Talent Survey, Q35, Sample Size = 418, Valid Cases = 418, Total Mentions = 1,077

Methodology

This study is based on a web survey conducted by the LF and its partners from the end of December 2023 through the beginning of February 2024. The survey's goal was to gain fresh insights into the current state of technology talent acquisition, retention, and management globally. In the following, we present the study methodology, context regarding how we analyzed the data, and the demographics of the respondents.

From a research perspective, it was important to eliminate any perception of sample bias and ensure high data quality. We handled the elimination of sample bias by sourcing our usable sample from the LF membership, partner communities, social media, and a third-party panel provider. We addressed data quality through extensive prescreening, survey screening questions, and data quality checks to ensure that respondents had sufficient professional experience to answer questions accurately on behalf of the organization they worked for.

We collected survey data from industry-specific, IT vendors and service providers, nonprofit, academic, and government organizations. Respondents spanned many vertical industries and companies of all sizes, and we collected data from several geographies, including the Americas, Europe, and Asia-Pacific.

The 2024 State of Tech Talent Survey comprised 42 questions that addressed the topic of cloud native computing, containers, Kubernetes, cybersecurity, and webAssembly. For information about access to the 2024 State of Tech Talent Survey, its dataset, and survey frequencies, see the Data.World access heading below.

Survey screening involves the use of five variables to validate the respondent. The respondent needed to answer all the demographic questions:

- The respondent had to hire or recruit IT professionals.
- The respondent needed to self-identify as a real person.
- The respondent had to be employed.
- The respondent had to speak from the perspective of their team.
- The respondent had to accurately answer a verbatim question.

A total of 1,455 candidates started the survey. There were 993 candidates disqualified due to the screening criteria outlined above, 34 were eliminated because of data quality concerns, and 418 records remained as the basis for this analysis. The margin of error for this sample size was ±4.1% at a 90% confidence level.

We stratified the data collection by company size, geographic region, and organization type. The data was primarily segmented by geographic region (Q9), company size (Q14), and industry (Q10 and Q13).

Although respondents were required to answer nearly all questions in the survey, there were times when the respondent was unable to answer one because it was outside the scope of their role or experience. For this reason, we added a "Don't know or not sure" (DKNS) response to the list of responses for nearly all questions. However, this creates a variety of analytical challenges.

One approach was to treat a DKNS just like any other response so that the percentage of respondents that answered the DKNS is known. The advantage of this approach is that it shows the exact distribution of data collected. The challenge with this approach is that it can distort the distribution of valid responses, i.e., responses where respondents could answer the question.

Some of the analyses in this report exclude DKNS responses. This is because we can classify the missing data as either missing at random or missing completely at random. Excluding DKNS data from a question does not change the distribution of data (counts) for the other responses, but it does change the size of the denominator used to calculate the percent of responses across the remaining responses. This has the effect of proportionally increasing the percentage values of the remaining responses. Where we have elected to exclude DKNS data, the footnote for the figure includes the phrase "DKNS responses excluded."

The percentage values in this report may not total to exactly 100% due to rounding.

Data.World access

LF Research makes each of its empirical project datasets available on Data.World. Included in this dataset are the survey instrument, raw survey data, screening and filtering criteria, and frequency charts for each question in the survey. LF research datasets, including this project, can be found at data.world/thelinuxfoundation.

One approach is to treat it just like any other response. In this way, report readers can see the percentage of respondents that answered DKNS. The advantage of this approach is that it reports back the exact distribution of the data collected. The challenge with this approach is that it distorts the distribution of valid responses—those responses where respondents could answer the question.

Some of the analyses in this report excluded the DKNS. This can occur when the data missing can either be classified as missing at random (MAR) or missing completely at random (MCAR). Excluding DKNS data from a question does not change the distribution of data (counts) for the other responses, but it does change the size of the denominator used to calculate the percentage of responses across the remaining responses. This has the effect of proportionally increasing the percent values of the remaining responses relative to the number of DKNS responses. The number of valid cases is adjusted accordingly. Where we have elected to exclude DKNS data, a careful examination of the footnote for the figure will enable the reader to determine the number of DKNS responses based on the difference between the sample size (DKNS inclusive) and valid cases (DKNS excluded).

Finally, percentage values in this report may not add up to exactly 100% due to rounding.

Demographics

These demographics provide you with a profile of the 2024 State of Tech Talent Survey respondents.
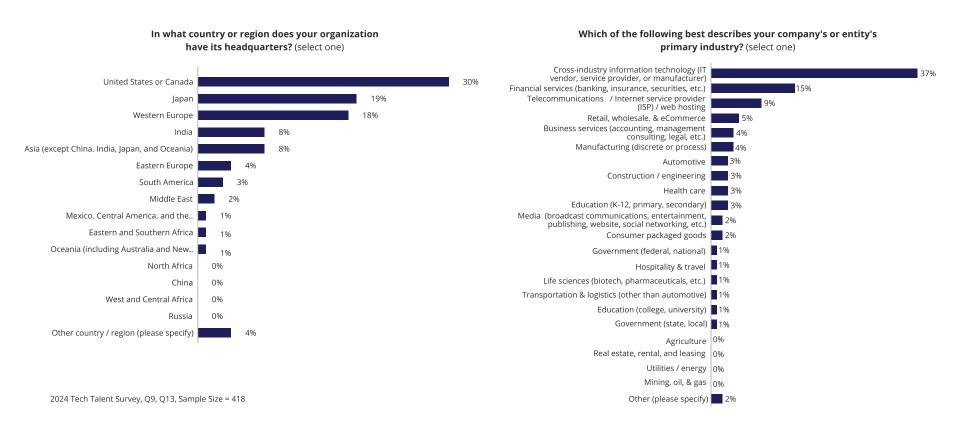
The left-hand panel of FIGURE 19 shows that the majority of the sample hire for their team or department. The other 25% of respondents are HR / talent managers or recruitment / learning professionals. The center panel shows the perspectives our respondents were able to take: 46% of respondents were able to speak for their entire company or organization, while 45% were only able to speak for the team or department they work for. The right-hand panel asked respondents about their roles, and at least 64% of respondents were in technical roles.

Figure 19: Selected demographics from the 2024 Tech Talent Survey I

What type of hiring or sourcing person are you? (select one)

I hire technical staff to work for my team or department	75%
Internal human resource or talent manager	16%
Internal recruiter	6%
Internal learning and development professional	4%
Other (please specify)	0%

24 Tech Talent Survey, Q2, Q4, Q8, Sample Size = 418

When talking about your organisation's hiring plans and practices, what perspective will you speak for in this survey? (select one)

I can speak for the entire company or enterprise that i work for	46%
I can only speak for the department or group that I work with	45%
I work for multiple entitles and can speak for what I see in the industry	9%
I can speak only for myself	0%
Don't know or not sure	0%

Professionally, which role or field do you most closely identify with? (select one)

Software development - developer, engineer, architect	22%
IT development – Director or Vice President	18%
IT operations – Director or Vice President	18%
C-level (CEO, CFO, CTO, CIO, CISO, CSO)	10%
Systems operations, administration, SRE, or ITSM	10%
Software delivery (testing, packaging, release)	7%
Data scientist or machine learning	4%
Security team	3%
Talent management and recruiting	2%
Product or project management	2%
Technical training	1%
Sales and marketing	1%
Open source program office (OSPO) team	1%
Business analyst	0%
Academic or educator	0%
Legal counsel	0%
Other (please specify)	1%

In the left chart of FIGURE 20, we see a balanced sample between the three regions: North America (30%), Europe (22%), and Asia-Pacific (35%). Responses from Japan are purposefully overrepresented to filter for this specific country and create a separate analysis and report. The right-hand panel of Figure 20 shows that most organizations in the sample are operating across industries, the second-largest industry present is financial services, and the third is telecommunications.

Figure 20: Selected demographics from the 2024 Tech Talent Survey II

In what country or region does your organization have its headquarters? (select one)

United States or Canada	30%
Japan	19%
Western Europe	18%
India	8%
Asia (except China. India, Japan, and Oceania)	8%
Eastern Europe	4%
South America	3%
Middle East	2%
Mexico. Central America. and the..	1%
Eastern and Southern Africa	1%
Oceania (including Australia and New..	1%
North Africa	0%
China	0%
West and Central Africa	0%
Russia	0%
Other country / region (please specify)	4%

2024 Tech Talent Survey, Q9, Q13, Sample Size = 418

Which of the following best describes your company's or entity's primary industry? (select one)

Cross-industry information technology (IT vendor, service provider, or manufacturer)	37%
Financial services (banking, insurance, securities, etc.)	15%
Telecommunications / Internet service provider (ISP) / web hosting	9%
Retail, wholesale. & eCommerce	5%
Business services (accounting, management consulting, legal, etc.)	4%
Manufacturing (discrete or process)	4%
Automotive	3%
Construction / engineering	3%
Health care	3%
Education (K-12, primary, secondary)	3%
Media (broadcast communications, entertainment, publishing, website, social networking, etc.)	2%
Consumer packaged goods	2%
Government (federal, national)	1%
Hospitality & travel	1%
Life sciences (biotech, pharmaceuticals, etc.)	1%
Transportation & logistics (other than automotive)	1%
Education (college, university)	1%
Government (state, local)	1%
Agriculture	0%
Real estate, rental, and leasing	0%
Utilities / energy	0%
Mining, oil, & gas	0%
Other (please specify)	2%

An important variable used for segmentation is shown in the left-hand panel of FIGURE 21. This question helped us to differentiate between vendors and end-user organizations. The sample consisted of 55% vendors and 43% end-user organizations. The right-hand panel shows company size, with 57% of the employees in middle organizations between 250 and 4,999 in the sample.IT products and services to support their business activities. This contrasts with vendors and service providers (55%), whose primary activity is creating horizontal and vertical IT products and services for sale to end users. This leaves 10% of organizations that are in academia, research, government, nonprofits, foundations, or other areas.

Figure 21: Selected demographics from 2024 Tech Talent Survey III

Which option best describes the
company or entity you work for? (select one)

Our primary revenue stream comes from providing IT (Information Technology) products or services	55%
Our primary revenue stream comes from providing industry-specific products or services	43%
Other type of entity (e.g., government entity non-profit. academic institution)	2%

Please estimate how many total employees are in
the company or entity you work for. (select one)

1 to 249 employees	17%
250 to 4,999 employees	57%
5000 or more employees	26%

2024 Tech Talent Survey, Q10, Q14, Sample Size = 418

Appendix A

A1	Please identify what changes were made to your technical headcount during 2023. (select one) segmented by Cross-industry IT vs. industry specific	Cross-industry IT	Industry specific
	We reduced our technical headcount in 2023	24%	31%
	We didn't make any changes to our technical headcount in 2023	28%	37%
	We increased our technical headcount in 2023	46%	31%
	Don't know or not sure	3%	2%

A2	Please identify what changes were made to your technical headcount during 2023. (select one) segmented by company size (regrouped)	Total	1 to 249 employees	250 to 4,999 employees	5,000 or more employees
	We reduced our technical headcount in 2023	28%	22%	27%	33%
	We didn't make any changes to our technical headcount in 2023	33%	25%	39%	27%
	We increased our technical headcount in 2023	36%	49%	32%	36%
	Don't know or not sure	2%	4%	1%	4%

A3	How has generative AI (GenAI) impacted or how will it impact the headcount of your organization? (select all that apply) segmented by company size (regrouped)	Total	1 to 249 employees	250 to 4,999 employees	5,000 or more employees
	GenAI reduced our headcount in 2023	19%	17%	21%	13%
	GenAI will reduce our headcount in 2024	27%	20%	30%	24%
	GenAI will not impact our headcount in 2024	29%	29%	29%	29%
	GenAI will increase our headcount in 2024	24%	19%	24%	26%
	Don't know or not sure	11%	23%	7%	14%

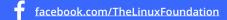| A4	What are the top three core skills that you look for in a candidate outside of their technical capabilities? (select up to three responses)	Column %
	Problem-solving skills	64%
	Communication skills	52%
	Critical thinking	49%
	Collaboration and teamwork	43%
	Learning agility	32%
	Cultural fit	12%
	Other (please specify)	0%
	Don't know or not sure	0%

About the authors

ADRIENN LAWSON is a data analyst at the Linux Foundation. Adrienn obtained a master's degree from the University of Oxford in social data science. She supports LF Research with survey development, analysis, and report writing. Adrienn has previously conducted research at the University of Oxford, the Budapest Institute for Policy Analysis, and the U.K.'s Office for National Statistics.
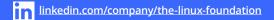
STEPHEN HENDRICK is the vice president of research at the Linux Foundation, where he is the principal investigator on a variety of research projects core to the Linux Foundation's understanding of how OSS is an engine of innovation for producers and consumers of IT. Steve specializes in primary research techniques developed over 30 years as a software industry analyst. Steve is a subject matter expert in application development and deployment topics, including DevOps, application management, and decision analytics. Steve brings experience in a variety of quantitative and qualitative research techniques that enable deep insight into market dynamics and has pioneered research across many application development and deployment domains. Steve has authored over 1,000 publications and provided market guidance through syndicated research and custom consulting to the world's leading software vendors and high-profile start-ups.

Acknowledgments

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