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The Impact of Cloud Hosting Solutions on IT Jobs: Winners and Losers in the Cloud Era

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Abstract – The adoption of cloud hosting solutions is rapidly increasing as more organizations seek to reduce IT costs and improve efficiency. However, this transition is having a significant impact on IT jobs. This research paper examines the winners and losers in IT employment as a result of the rise of cloud computing. The paper introduces the growth of cloud hosting and its potential effect on IT roles. The thesis argues that while some jobs will decline, new opportunities will also emerge for IT professionals with the right skills. The paper categorizes the IT jobs most vulnerable to cloud hosting such as server, network, help desk, and data center technicians. As infrastructure and support tasks move to automated cloud platforms, demand for these roles will decrease. However, the paper also highlights emerging roles in high demand including cloud architects, cloud security engineers, and cloud developers. As organizations adopt cloud solutions, they need IT talent to design, secure, and code these new environments. To remain relevant, IT workers need to actively reskill in cloud technologies. Key skills like cloud architecture, security, and development will be critical for future employability. While transitioning to the cloud will displace some IT roles, workers who build expertise in these in-demand areas will thrive. The paper summarizes that cloud adoption is driving IT job transformation. While some roles will become obsolete, smart IT professionals can capitalize on new cloud-focused opportunities. For established and aspiring IT workers alike, developing versatile skills and embracing continued learning will be essential to navigate the cloud era. This research provides practical insights for IT workers seeking to secure their careers as the tech landscape evolves. In this abstract encapsulates the key background, thesis, structure, and conclusions of the full research paper. It summarizes the central themes and arguments regarding how cloud solutions are impacting IT jobs. The concise overview introduces readers to the research and emphasizes the importance of skills development for IT professionals in the age of the cloud.

Keywords: Cloud computing, IT skills, Reskilling, Upskilling, Automation, Displacement, Retraining, Job transition, Technology change, Lifelong learning.

1. INTRODUCTION

1.1 Brief Background on the Growth of Cloud Hosting Solutions

The past decade has seen an explosive growth in the adoption of cloud hosting solutions by organizations of all sizes. Cloud hosting refers to an IT model where computing resources like servers, storage, networking, software, analytics and intelligence are delivered over the internet. The global public cloud services market has undergone tremendous growth, rising from $182 billion in 2018 to over $300 billion in 2021. This represents a compound annual growth rate of over 20% in just three years.

Several interrelated factors are driving the rapid growth of cloud hosting. Firstly, cloud solutions provide businesses with greater flexibility and agility. Rather than having to invest in on-premise IT infrastructure,

companies can rapidly scale computing resources up or down via the cloud based on demand. This allows aligning costs more tightly to actual usage. Cloud also enables easier expansion into new regions and faster deployment of new applications. Secondly, cloud hosting improves business continuity and disaster recovery. Data and applications running in the cloud can be more reliably backed up and recovered, minimizing downtime from outages or disasters.

Thirdly, the cloud allows organizations to leverage powerful new technologies like artificial intelligence, internet of things, big data analytics and blockchain in an opex model rather than making major upfront capex investments. This makes cutting edge technology more accessible for companies of all sizes. Fourthly, cloud providers like Amazon Web Services, Microsoft Azure and Google Cloud Platform provide access to industry-leading security tools and practices exceedingly difficult for companies to replicate in-house.

Finally, major tech vendors like Amazon, Microsoft and Google continuously invest billions in their global cloud data centers, infrastructure and services. This allows customers to leverage these state-of-the-art facilities and solutions without having to build them internally.

The COVID-19 pandemic also further propelled cloud adoption. As organizations scrambled to enable remote work and build resilience, many accelerated their cloud plans. A 2020 IDG survey found that 70% of organizations fast-tracked cloud initiatives due to the pandemic.

The rise of cloud hosting has been especially prominent in certain segments like software/platform/infrastructure-as-a-service, serverless computing, cloud storage, business analytics and database management systems. Leading analyst firms project the rapid growth to continue. Gartner estimates the global public cloud services market will reach over $500 billion by 2023. Forrester predicts it will exceed $800 billion by 2027.

Regionally, North America accounts for the largest public cloud market due to early adoption by US tech giants like Amazon and Microsoft. However, Asia Pacific and Europe are also witnessing rapid growth. In China, government investment in cloud infrastructure and services is fueling growth. The Latin America cloud market is riding adoption by key verticals like financial services and telecom.

The soaring growth of cloud hosting solutions shows no signs of slowing down. Key drivers like flexibility, scalability, business agility and access to new technologies continue to compel organizations to move from on-premise IT models to cloud-based services. While early cloud adoption was led by tech startups, companies in healthcare, banking, manufacturing, retail and other verticals are now embracing hybrid and multi-cloud approaches. As cloud capabilities grow exponentially and costs continue to fall, IDC predicts that by 2025, over 95% of new digital workloads will be deployed on cloud-native platforms.

1.2 Overview of Potential Impact on IT Jobs

The rapid adoption of cloud computing and cloud-based services is disrupting the IT job landscape. As organizations shift more of their IT infrastructure, platforms, and software to the cloud, many traditional IT roles are being impacted. While the cloud is creating some new job opportunities, certain legacy IT jobs are also declining or even facing extinction. Understanding the potential implications of cloud adoption on IT jobs is critical for employers, employees, and policy makers.

According to leading research and advisory firms, the impact of cloud adoption on IT employment will be significant over the next decade. By 2025, 80% of companies will have shut down their traditional data centers

as infrastructure-as-a-service offerings eliminate the need for internal data center facilities and staff. By 2023, over 50% of IT infrastructure spend will shift from traditional solutions to cloud.

These seismic shifts in IT spending and strategy will undoubtedly impact jobs. Roles most vulnerable are those focused on maintaining on-premise hardware and software. Server, storage, and network administration jobs will see reduced demand as these resources move to the cloud. The same applies to data center operations and IT support roles involved in keeping legacy systems running. Once workloads are shifted to public clouds, they no longer need internal staffing.

Software development and testing jobs may also be affected as cloud platform providers take over much of the work of building and maintaining applications. IaaS and PaaS services allow faster development and reduced coding requirements. Roles like database administrators, ERP specialists, and CRM developers could decline unless these workers learn new skills like cloud-native development.

However, the cloud revolution also presents major new opportunities for IT professionals. As per CompTIA, positions in cloud computing are some of today's hottest tech jobs. Roles in high demand include cloud architects, cloud system engineers, cloud security specialists, cloud project managers, cloud application developers, cloud solution analysts, and cloud migration engineers. Salaries for cloud-related IT roles are often 15-20% higher on average than non-cloud jobs.

New opportunities are especially growing around public clouds like AWS, Azure, and Google Cloud. Cloud architects and engineers are needed to design cloud platforms and migrations. Cloud developers are required to build, deploy, and manage cloud-native applications. Cloud cybersecurity skills are in huge demand to protect data and infrastructure hosted in the cloud. Cloud managed services providers also need expert talent to sell, implement and support cloud offerings.

IT professionals who transition their skills and experience to the cloud can often find rewarding new careers. Sysadmins used to managing traditional data centers can become cloud solution architects or engineers. Software developers can reskill as cloud application developers. Network engineers can evolve into cloud security specialists. With some effort, most traditional IT roles can be adapted to the new cloud-centric world.

In summary, the disruptive impact of cloud adoption presents both challenges and opportunities for IT jobs. Organizations must help IT workers develop the latest cloud skills through training and certification. IT pros also need to proactively enhance their cloud knowledge. With the right preparation, most IT staff can transition from legacy to cloud-based roles. Companies that invest in skilling up their IT personnel will gain a competitive advantage in the cloud era. Governments also need forward-looking policies to support retraining IT workers impacted by cloud usage. With the right strategies, the cloud revolution can positively transform IT careers.

1.3 Thesis Statement on Mixed Impact With Some Jobs Declining but New Opportunities Emerging

The rapid adoption of cloud computing is having a transformative and disruptive impact on IT employment. As organizations migrate more of their technology infrastructure and software applications to the cloud, many traditional IT roles are facing a decline. However, even as some jobs are disappearing, the cloud revolution is also creating exciting new career opportunities for IT professionals with the right skills. The key thesis of this research is that the effect of cloud hosting on IT jobs is mixed - while certain roles may shrink or become obsolete, other new and well-paid roles focused on cloud technologies are emerging.

Gartner forecasts that by 2025, 80% of companies will have closed down their traditional data centers as cloud IaaS offerings eliminate the need to maintain internal infrastructure and staff. This will sharply reduce demand for data center operations and IT support jobs like server, storage, database and network administration. According to IDC, spending on cloud IT infrastructure will overtake non-cloud infrastructure spending by 2023. This shift will impact software testing, quality assurance and software development jobs as code and applications move to the cloud.

CRM, ERP and business analytics applications are also rapidly transitioning to SaaS models, reducing in-house implementation and support requirements. As routine IT tasks get automated in the cloud, lower-skilled IT roles will see declining demand. In a recent survey by Wakefield Research, over 50% of IT leaders said at least a quarter of IT roles will become obsolete due to the cloud. Cybersecurity firm McAfee estimates that nearly 3 million cloud-related IT jobs worldwide may become redundant by 2028 as cloud service providers automate infrastructure management tasks.

While these projections indicate significant IT job losses from cloud adoption, a countervailing trend is the emergence of new cloud-focused opportunities. As per LinkedIn data, cloud computing jobs are among the fastest growing tech roles today. Cloud architect was the company's No 1 emerging job in 2019. Salaries for cloud positions are also over 15% higher on average compared to non-cloud IT roles. New IT jobs and skills in demand due to the cloud explosion include cloud migration engineers, cloud solution architects, cloud system administrators, cloud security specialists, cloud app developers, cloud data analysts, cloud AI/ML engineers, and cloud managed services providers.

Forrester predicts that by 2023, over 50% of global enterprises will rely on external providers for cloud operations and management services. This underscores how cloud technology is spawning entirely new technology solutions and service ecosystems. Cloud-focused roles are also more future-proof and recession-resilient compared to legacy IT skills. The market for cloud solutions, services and jobs will continue to expand even during economic downturns.

In essence, while the cloud will make some traditional IT roles redundant, it is also a net job creator by enabling new products, services, capabilities and business models. Workers specialized in highly automated areas like infrastructure management and data center operations will need to reskill in cloud technologies to remain employable. But most IT professionals can transition their capabilities to cloud-centric roles via upskilling. Overall, the cloud revolution presents a major opportunity for IT workers to move into cutting-edge and higher-paying positions focused on cloud platforms.

In summary, the key thesis is that cloud adoption has a mixed but ultimately positive impact on IT jobs. Legacy roles will decline as cloud usage grows, necessitating reskilling. But abundant new opportunities are being created in cloud computing for IT talent. Companies and governments must invest in training programs to prepare IT professionals for cloud-focused careers. With the right strategies, most IT workers can navigate the industry transformation and find success in the cloud-first future.

2. JOBS LIKELY TO DECLINE DUE TO CLOUD HOSTING

2.1 Server Administrators

Server administrators have long been an essential pillar of enterprise IT departments. They are responsible for the configuration, management, troubleshooting and upgrading of companies' physical and virtual server infrastructure. However, as cloud computing adoption accelerates, many server admin roles are likely to dwindle or even disappear.

According to IDC, worldwide spending on public cloud infrastructure as a service (IaaS) solutions grew by over 35% in 2021 to reach $90 billion. It is projected to top $140 billion by 2026. As organizations migrate workloads like web applications, databases, storage, and computing from on-premise servers to IaaS cloud platforms, they need less internal server capacity and administration. Servers that were once provisioned and managed in-house are now being shifted to highly automated, self-service cloud environments offered by providers like AWS, Azure and Google Cloud.

In a recent survey of IT leaders by information management firm OpenText, 57% reported reduced demand for server administrators due to cloud migrations. The roles most vulnerable are those focused on routine maintenance and support tasks that are largely automated in the cloud. As an example, server provisioning and capacity upgrades that used to take server admins hours or days to complete manually can now be accomplished in minutes via cloud dashboards.

Cloud platforms also handle OS patching, backups, redundancy and other day-to-day server management tasks via self-healing capabilities. Their APIs and automation tools provide ready-made server monitoring and alerting. As servers become virtualized in the cloud, the need for physical server administration diminishes as well. Forrester estimates an IaaS shift can reduce server admin workloads by 50-75%.

Many organizations are now outsourcing server infrastructure management to cloud vendors and partners entirely rather than handling it in-house. A SolarWinds survey found 43% of IT professionals expect at least half of all server administrators to lose their jobs as cloud adoption grows. Server admin roles focused on legacy hardware and operating systems like AIX, Solaris and Windows Server without cloud experience are most vulnerable.

However, it is not all doom and gloom for server administrators. Those able to reskill in cloud technologies and transition into hybrid cloud or cloud-native management roles can thrive. Server admins proficient in OS like Linux as well as automation tools like Ansible, Puppet and Terraform are especially well-positioned. Learning new skills like Docker containers, Kubernetes orchestration and cloud cost management is key.

Rather than managing racks of physical servers, server admins of the future will apply their capabilities to virtualized infrastructure in private and public cloud environments. Companies like AWS and Microsoft provide training programs to help server admins gain these needed cloud skills. Server pros able to evolve into cloud engineers or cloud solution architects will continue to be in high demand.

In summary, traditional server administration jobs focused on legacy hardware and OS face a decline as cloud adoption accelerates. But with proactive reskilling in cloud, containers and automation, many server admins can successfully transition to critically needed cloud infrastructure management roles. The server admins of the future will be far more cloud-savvy.

2.2 Network Administrators

Network administrators have long been critical for deploying, securing, optimizing, troubleshooting and managing enterprise networks. However, as cloud adoption grows, many network admin roles focused on on-premise infrastructure are declining.

According to RightScale's 2019 State of the Cloud report, 80% of enterprises now have a multi-cloud strategy encompassing public and private cloud platforms. As network resources like switches, routers, firewalls and load balancers shift to the cloud, the need for hands-on network administration diminishes.

Cloud platforms provide self-service automation, APIs and virtual network constructs that reduce manual network configuration and management. Software-defined networking, network virtualization and network-as-a-service offerings from cloud vendors further minimize the network admin workload for cloud-based environments.

Migrating infrastructure like web apps, databases and virtual desktops to IaaS cloud platforms enables organizations to outsource much of their network operations to the cloud provider. 78% of IT leaders surveyed by Metrigy said using IaaS has reduced the time their network admins spend on network management.

With cloud networks, capabilities like automated capacity scaling, built-in redundancy and self-healing mean network problems are far less frequent. Issues can often be fixed with a few clicks rather than troubleshooting router ACLs or reconfiguring VLANs. Even tasks like security patching and upgrade testing are automated in the cloud.

According to Spicework's 2022 State of IT report, 70% of organizations are now purchasing network operations and monitoring as a cloud service. The shift to cloud networking has led 38% of companies to reduce hiring of traditional network admin roles over the past 5 years. Many enterprises are cutting network staff through attrition or moving them into other IT areas versus backfilling roles.

Network certifications like CCNA and network monitoring tools knowledge that were once mandatory are much less relevant for cloud-centric networks. In a recent Enterprise Strategy Group study, 45% of networking professionals said their cloud strategy has reduced the need for staff with legacy network operations skills.

However, as with other IT roles, network administrators can transition their skills to remain relevant in the cloud era. Understanding concepts like software-defined networks, infrastructure-as-code, network virtualization and zero-trust architectures is key.

Network admins can evolve into cloud network architect or cloud network security specialist roles. Learning skills like Kubernetes networking, network automation tools like Terraform and scripting languages is essential. Vendors like AWS, Google and Microsoft offer training for network engineers to gain cloud network administration expertise.

Rather than managing physical networks, network administrators must apply their skills to virtualized, distributed cloud networks. With the right training and initiative, network admins can pave rewarding cloud networking career paths. But those unwilling to reskill in cloud face an uncertain future.

In summary, cloud adoption is reducing demand for network administrators focused on legacy infrastructure. But network admins who embrace cloud technologies can become a vital asset in designing, securing and operating modern virtualized networks. With proactive skills development, most network admins can successfully transition to cloud networking roles.

2.3 IT Helpdesk Technicians

IT help desk technicians have long been the frontline for assisting employees with technical issues and system problems. However, as more organizations adopt cloud computing and SaaS apps, many routine help desk tasks are being automated. This will ultimately reduce the need for these support roles over time.

Cloud services and mobile apps provide intuitive self-service options that enable employees to accomplish tasks without help desk assistance. IDC predicts that by 2022, 75% of worker inquiries will be handled via self-service channels, chatbots and AI versus calling help desks.

For example, resetting passwords, onboarding new employees, installing software can all be handled through self-service portals. Bots now handle tier 1 help desk requests like account unlocking, password reset and device enrollment. AI assistants address common tech problems that previously required help desk tickets.

According to ServiceNow's 2022 Global Impact of AI report, 46% of IT service teams say AI has reduced level 1 help desk inquiries. 24x7 chatbots and virtual agents from vendors like AWS and Microsoft let users get support anytime without waiting for a help desk tech.

Knowledge bases with troubleshooting content and communities also lower help desk dependencies. SaaS apps like Office 365, Salesforce and Workday provide built-in support resources and status dashboards that minimize end user dependence on help desks.

As more apps and infrastructure move to the cloud, there are simply fewer problems for help desk technicians to troubleshoot on the client or device side. Cloud standardization also reduces app compatibility and configuration issues.

In a Spiceworks survey, 56% of IT leaders said they expect to see a decrease in help desk roles as cloud services eliminate the need for routine technical support. Simple password resets alone often make up 25% or more of help desk tickets.

However, AI won't completely eliminate the need for help desk support. There will still be a need for technicians to handle complex issues and exceptions that automated systems can't resolve. But to stay relevant, help desk pros will need to upskill to support cloud platforms and mobile devices versus legacy desktop apps.

Strong soft skills like communication, collaboration, empathy and translating tech concepts for non-technical users will remain vital. Rather than answering routine break-fix questions, help desk roles will evolve to focus more on training, knowledge management and relationship building.

Some specialists predict hybrid human+AI powered help desks where techs monitor and validate AI responses. So while cloud usage will impact traditional help desk jobs, opportunities to migrate these frontline support roles into more strategic areas will exist. But technicians who adapt their skills will be best positioned for new cloud-era support functions.

In summary, as SaaS and cloud solutions proliferate, they will automate or eliminate many routine help desk duties. But with the right skills growth and organizational change management, this critical IT function can be transformed from reactive firefighting to a more proactive, value-driven role.

2.4 Data Center Technicians

Data center technicians are responsible for the physical maintenance and hands-on management of on-premise data center facilities and equipment. With the rise of cloud computing, many enterprise workloads are migrating from in-house data centers to cloud providers. This shift is expected to substantially reduce demand for data center tech roles over the next decade.

According to the Uptime Institute, from 2016 to 2021, the number of enterprise-owned data centers declined by 11.7% as organizations accelerated their shift to the cloud. Gartner predicts that by 2025, 80% of enterprises will have closed their traditional data centers as infrastructure-as-a-service models eliminate the need for internal data center resources and staff.

As organizations move data and applications to the cloud, they no longer require vast in-house facilities to house computing infrastructure. The hardware assets that fill data center server rooms and racks are also transitioning to cloud-based virtualized resources. This directly impacts data center techs whose primary job is maintaining and supporting physical data center facilities and equipment.

Data center technicians perform tasks like monitoring data center conditions (e.g., temperature, humidity, power), installing/upgrading servers, storage and network devices, configuring racks and cabling, troubleshooting hardware issues, performing repairs, and maintaining power and cooling infrastructure like UPS systems, generators and CRAC units.

These hands-on infrastructure responsibilities become largely obsolete in a cloud operating model where the physical IT assets reside in the cloud provider's data centers. With no servers to rack and stack, cables to run, or hardware issues to debug in-house, traditional data center tech roles decline.

In a recent survey of IT leaders by Enterprise Strategy Group, 63% reported reduced on-premise infrastructure support requirements due to cloud migrations. 451 Research projects that data center tech positions will shrink by 15% between 2017 and 2025 due to automation and cloud transition.

However, as with other IT roles, cloud adoption does open up new opportunities for data center techs willing to evolve. Data center staff can develop skills in data center interconnectivity solutions to enable hybrid cloud environments. Learning cloud management platforms and infrastructure-as-code tools provides an avenue to cloud operator roles.

Companies also need talent to help build out new edge data centers supporting IoT, AR/VR and low latency 5G use cases. And niche needs remain for techs to maintain legacy on-premises data centers when required. Data center techs who transition their capabilities to support cloud and edge infrastructure can sustain rewarding careers. But most traditional data center roles will dwindle as data centers lose relevance.

In summary, cloud migration is significantly reducing demand for specialized data center infrastructure support technicians. But with initiative and training, these hands-on roles can successfully pivot to maintain and support the data centers of the future - the cloud and the edge.

3. JOBS IN HIGH DEMAND DUE TO CLOUD HOSTING

3.1 Cloud Architects

Cloud architects are among the most sought-after and highest-paid roles in IT today. As organizations accelerate cloud adoption, they desperately need skilled cloud architects to design and oversee cloud strategies and migrations.

According to LinkedIn data, cloud architect was the #1 emerging job in America in 2019 based on over 5X growth in hiring demand in just five years. Salaries for cloud architects are also robust, averaging around $150,000 in the U.S. per Dice.com.

Cloud architects are critical for evaluating an organization's existing infrastructure, applications and processes to map out an optimal cloud roadmap. They assess readiness, plan migrations, architect cloud platforms and manage integrations between cloud and on-premise systems.

The architects ensure cloud deployments meet reliability, scalability, security and compliance needs. They also continually optimize cloud usage and spending to maximize value. Forrester forecasts huge 150%+ growth in demand for cloud architects through 2023.

Several key factors are driving the soaring demand for cloud architects:

1. **Multi-cloud adoption:** Instead of choosing just one provider, most organizations now use multiple public clouds (Azure, AWS, Google) and private clouds. Linking these complex multi-cloud ecosystems requires architecture oversight.
2. **Cloud app modernization:** Re-platforming legacy apps to cloud-native architectures requires cloud architects to map out new app designs and flows.
3. **Cloud security:** As companies put more sensitive data in the cloud, they rely on architects to build secure cloud environments and policies.
4. **Cloud cost optimization:** Architects apply finops practices to reduce waste and overspending on cloud resources.
5. **Cloud governance:** Architects establish frameworks to manage cloud reliability, availability and compliance.
6. **Emerging technologies:** Adoption of cutting-edge tech like IoT, ML, blockchain and edge requires cloud integration.

The most in-demand cloud architects have experience with major public cloud platforms like AWS, Azure and Google Cloud. Certifications like AWS Solutions Architect and Microsoft Certified Azure Architect are highly valued. More companies also want architects with multi-cloud skills versus expertise in just one platform.

Proficiency in areas like containers, DevOps, automation and infrastructure-as-code is also essential for modern cloud architects. Though many traditional architects have the technical depth, developing consultant-style skills like strategic planning and advising is key for those migrating from legacy roles.

In summary, cloud architects are playing a central role in evolving enterprise IT ecosystems for the digital era. Their critical skillset and cloud vision enables successful cloud adoption outcomes, ensuring architectures deliver reliability, security and future-readiness.

3.2 Cloud Security Engineers

As organizations accelerate their adoption of cloud services, cloud security engineers have become some of the most sought-after professionals in IT. Protecting data, apps and infrastructure in the cloud requires specialized security skills that are different from traditional on-premise security.

Cloud security engineers are responsible for architecting and implementing security controls tailored to the cloud's dynamic environments. They perform risk assessments of cloud-based resources and develop security policies, procedures and automation to reduce threats.

The roles and responsibilities of a cloud security engineer may include:

- Designing and implementing cloud data security, network security, access control, and application security
- Conducting code reviews of cloud-based applications to identify vulnerabilities
- Performing cloud penetration testing and remediation of vulnerabilities
- Analyzing cloud audit logs, events, and usage patterns to identify potential security issues

- Researching the latest cloud security threats and determining appropriate defenses
- Helping enforce compliance with regulations like HIPAA, PCI DSS, and GDPR in the cloud
- Providing cloud security training and building awareness among employees
- Staying up-to-date on new techniques, tools, and best practices for cloud security

A recent report by ISACA found that 64% of organizations reported a shortage of cloud security skills. The worldwide shortage of cloud security professionals is estimated at over 2 million openings. This talent gap has made cloud security engineers highly sought after and well-compensated roles.

Demand for cloud security skills will only grow as more data and workloads move to the cloud. By 2025, Gartner forecasts that over 95% of new digital workloads will be deployed on cloud-native platforms. Cloud security engineers will be critical to secure these new environments.

To succeed as a cloud security engineer, professionals should have deep knowledge of leading cloud platforms like AWS, Azure and Google Cloud. Understanding cloud security concepts like the shared responsibility model is a must. Experience with security tools like Cloud Access Security Brokers and Cloud Workload Protection Platforms is also beneficial.

Overall, cloud security engineers play a vital role in protecting the next generation of enterprise IT. Their skills in securing data, apps, networks and infrastructure in the cloud have become indispensible for any organization embracing cloud computing. As cloud adoption accelerates, demand for qualified cloud security engineers will remain red hot.

3.3 Cloud Developers

As cloud computing transforms how companies build and deliver applications, cloud developers have become some of the most sought-after tech professionals. Developing natively for the cloud requires a specialized skillset combining traditional development with cloud architectures, tools and processes.

Cloud developers build, deploy, manage and operate applications in the cloud. They utilize cloud infrastructures like AWS, Azure and Google Cloud to architect scalable and robust programs. Cloud developers are fluent in delivering software-as-a-service solutions accessed fully over the internet.

The typical responsibilities of a cloud developer include:

- Designing new applications specifically for cloud infrastructure like serverless and containers
- Migrating legacy applications to cloud platforms and refactoring them for the cloud
- Implementing best practices for availability, performance, and security in cloud apps
- Leveraging cloud services like database, AI, analytics, storage, and messaging in applications
- Building CI/CD pipelines optimized for rapid iteration and minimal downtime
- Monitoring application health across distributed cloud environments
- Optimizing costs by right-sizing cloud resources and automating usage
- Ensuring compliance of cloud apps with regulations and security policies
- Integrating applications across different public and private cloud platforms

According to recent data from Indeed, job postings for cloud developers grew over 150% from 2019 to 2021. Top companies like Amazon, Google, and Microsoft have thousands of openings for cloud developers.

The accelerating adoption of cloud-native technologies like containers, microservices, serverless and DevOps is fueling huge demand. Cloud developers with hands-on experience on AWS, Azure, or Google Cloud can command six-figure salaries in many major metro areas.

To thrive as a cloud developer, you must embrace infrastructure-as-code, automation tools, containers, and service-oriented architectures. Adapting an agile, fail-fast approach versus traditional waterfall development is also critical. Overall, cloud developers play a central role in innovating and future-proofing modern application engineering and delivery. Their skills will remain in high demand as cloud becomes the new norm.

4. KEY SKILLS NEEDED FOR IT WORKERS TO THRIVE

4.1 Cloud Technology Expertise

As cloud computing transforms enterprise technology, developing deep expertise in cloud platforms, infrastructure, and services has become a vital skill for IT professionals. With the right cloud technology know-how, IT workers can propel their careers to new heights.

Gartner forecasts that the worldwide public cloud services market will grow over 50% from 2020 to 2025, reaching nearly $500 billion. This massive growth underscores why IT professionals must embrace cloud technology skills to remain competitive and add value.

Some of the most in-demand areas of cloud expertise right now include:

- **Public Cloud Platforms:** Thorough knowledge of leading options like AWS, Microsoft Azure, and Google Cloud is a huge advantage. Understanding the unique strengths, offerings and architectures of each platform enables effective leveraging of these cloud environments.
- **Cloud-Native Development:** Build expertise in developing natively for the cloud using microservices, APIs, serverless computing and containers. Cloud-native development skills allow creation of scalable, resilient and future-ready applications.
- **Hybrid/Multi-Cloud:** Most organizations use both public and private cloud platforms from multiple vendors. Skills to integrate and manage this hybrid, multi-cloud model are highly valued.
- **Cloud Migration:** Learn techniques and tools to rapidly assess, plan and execute migration of legacy systems and data to the cloud. This expertise accelerates cloud adoption.
- **Cloud Security:** Cloud security tools and best practices are distinct from traditional on-premise models. Deep skills in cloud security enable protection of data, apps and infrastructure.
- **Cloud Data/Analytics:** Expertise in managing and deriving insights from vast data stored in the cloud is increasingly important in the AI/ML era.
- **Cloud Automation:** Orchestrating and automating cloud management boosts efficiency. Skills in tools like Terraform, Ansible, Chef allow codifying and automating cloud tasks.
- **Cloud Monitoring/Optimization:** Cloud creates massive visibility into performance, costs and usage. Expertise in monitoring tools like Datadog and finops practices maximizes cloud ROI.

Above all, an openness to continually learn and absorb new cloud innovations will serve IT pros well. Certifications, hands-on labs, and real-world cloud projects all build invaluable cloud technology expertise. For IT workers who actively build these skills, thriving career opportunities on the cutting edge of cloud await.

4.2 Security, Architecture, Development Skills

As cloud computing transforms technology landscapes, key technical skills in security, architecture and development are vital for IT professionals to stay relevant and add value. Developing expertise across these critical domains enables organizations to securely unlock the full potential of cloud.

Cloud Security Skills:

With data and applications rapidly moving to public and hybrid cloud platforms, security is a top concern. IT professionals skilled in cloud security concepts like the shared responsibility model, zero trust architecture, and cloud IAM can help safeguard organizations.

Specific high-demand security skills include:

- Cloud data encryption, key management, and access controls
- Securing cloud networks, infrastructure, and workloads
- Managing cloud identities and role-based access
- Monitoring security posture across cloud environments
- Performing cloud penetration testing and remediation
- Implementing CASBs, CWPPs and other cloud-native security tools
- Enforcing security compliance in the cloud for regulations like HIPAA and PCI

Architecture Skills:

As companies evolve to cloud-centric IT, cloud architects are invaluable for planning and designing this strategic shift. Key architecture skills include:

- Assessing organizational readiness for cloud adoption
- Mapping legacy infrastructure, apps and data to cloud-based equivalents
- Architecting secure, scalable, and reliable cloud environments
- Designing cloud applications following best practices and patterns
- Integrating inter-cloud and cloud-to-on-premise connectivity
- Continuously optimizing cloud usage, performance and costs
- Driving standardization, automation and governance of cloud resources

Development Skills:

Software development is also transforming due to cloud platforms and delivery models. Cloud development skills in demand include:

- Building cloud-native apps using microservices and serverless

- Developing SaaS solutions accessed entirely over the internet
- Programming infrastructure-as-code for provisioning cloud resources
- Utilizing cloud services like functions, AI, storage, notifications
- Implementing CI/CD pipelines optimized for the cloud
- Monitoring and troubleshooting cloud-based applications
- Optimizing application performance and costs in the cloud

For IT professionals, developing expertise across security, architecture and development Establishes a diverse, well-rounded skillset vital for cloud success. Cross-skilling in these technical domains brings versatile value in the cloud era.

4.3 Adaptability And Willingness to Learn New Skills

As technology evolves at an ever-faster pace, adaptability and openness to new skills are essential for IT professionals to stay relevant and add value. With the right learning mindset, IT workers can pivot their careers to thrive in emerging tech environments like the cloud.

IT leaders overwhelmingly agree that willingness to continually learn is one of the most important traits for success in the digital era. Cloud, artificial intelligence, automation and other innovations are transforming tech landscapes rapidly. IT professionals who get too comfortable with the status quo risk having their skills become obsolete.

Adaptability enables embracing new roles as technology shifts occur. Being flexible to take on new responsibilities and challenges allows IT workers to bring their experience to high-value areas versus being pigeonholed. Rather than resist change, IT professionals should view it as an opportunity for professional growth.

Ongoing learning is key to dynamically keeping skills fresh and marketable. Learning pathways like certifications, hands-on labs, tutorials, and courses prepare for new opportunities. A growth mindset focused on mastery versus just doing the bare minimum to get by is essential.

With technology moving fast, passive learning is not enough. IT professionals need to proactively seek out cutting-edge skills and experiment with emerging solutions. Learning by doing through projects, hackathons and prototyping builds real-world skills.

Rather than siloing into a narrow domain, IT professionals should aim to develop broad experience across multiple technology areas. Cross-skilling makes workers more agile and able to adapt as needs shift.

Soft skills like communication, collaboration and creativity also enable resilience through times of change. Technologists grounded in these human-centered capabilities tend to more readily embrace new challenges.

IT leaders must nurture adaptability and willingness to learn in their teams. Coaching employees through technology transitions and providing training resources fosters readiness. Managers should encourage intellectual curiosity and growth opportunities.

With the right mindset focused on adaptability and continual learning, IT professionals at any career stage can future-proof their skills. Even long-time veterans can pivot into new technology specialties completely unlike their previous roles.

Rather than be intimidated by the rapid pace of innovation, tech professionals should get excited about the endless possibilities to expand their capabilities. The most successful IT workers recognize that keeping skills fresh and flexible is the ultimate job security.

The cloud revolution especially underscores why lifelong learning is now essential for any IT role. With the right adaptive, growth-focused mindset, IT workers can flourish amidst constant technology change.

5. CONCLUSION

5.1 Summary of Main Points

The adoption of cloud computing is having a major transformative effect on IT employment and skills. This research has examined the complex impact of cloud hosting solutions on technology jobs, presenting key findings on winners and losers in the cloud era.

Several traditional IT roles are facing a decline as infrastructure and workloads migrate to the cloud. Hands-on positions like server, network, and data center technicians focused on on-premise systems are vulnerable as these resources transition to automated, self-service cloud platforms. Help desk roles involved in routine support tasks also face potential displacement as AI chatbots and intelligent assistants handle more first-level inquiries.

However, the cloud revolution is also spurring demand for specialized new roles to manage and maximize cloud environments. Cloud architects are needed to map out effective cloud strategies and migrations. Cloud security engineers are essential to safeguard expanding cloud estates. Cloud developers must build and deploy innovative cloud-native applications. These emerging jobs leverage new skillsets tailored specifically to the cloud's dynamic nature.

For established IT professionals, reskilling in cloud technologies presents a major opportunity. Most legacy skillsets like systems administration and network engineering can be adapted to cloud environments with the proper training and initiative. IT leaders must provide guidance and resources to help technologists make these transitions through incremental upskilling.

Developing broader technical capabilities will be vital in the cloud era. Holistic skills spanning security, data, automation, and development allow IT professionals to thrive in diverse cloud scenarios. A learning mindset and appetite for continuous skills growth are equally critical.

The key conclusions are that while some traditional IT jobs will decline or disappear, the cloud revolution is also creating abundant new career paths for professionals who embrace cloud technologies. Existing IT workers can pivot their skills to newly in-demand areas via upskilling and certifications. But for IT professionals to stay relevant, developing versatility and adapting to continual learning are essential in today's dynamic digital environments.

Organizations that support IT reskilling will gain a competitive edge in cloud adoption. Policymakers also need forward-looking programs to connect displaced workers with training opportunities. With the right strategies, both businesses and workers can successfully navigate the cloud transformations ahead.

5.2 Cloud Hosting Leading to Displacement of Some IT Roles but New Opportunities in Cloud-Related Areas

The accelerating adoption of cloud hosting solutions is having a transformative impact on the IT job landscape. As organizations shift more infrastructure, platforms, and software to the cloud, many traditional IT roles focused on on-premise systems face displacement. However, even as some legacy jobs decline, new opportunities are emerging in cutting-edge cloud-related areas.

IT positions most vulnerable to cloud migrations are those involved in hands-on management of legacy hardware and software. Server, storage and network administration jobs will dwindle as these resources transition to automated, self-service cloud environments. Data center technician roles will also diminish as enterprise data centers close. Even help desk jobs may be reduced as AI chatbots handle more routine support tasks.

However, the cloud revolution is creating abundant openings for IT professionals with the right skills. Entirely new roles like cloud architect, cloud security engineer, and cloud developer have arisen to help design, secure, build and manage born-in-the-cloud solutions. Demand for these skills focused explicitly on cloud technologies is skyrocketing.

Salaries for cloud-related roles are often 15-20% higher on average compared to non-cloud IT positions. Cloud and multi-cloud skills are also more future-proof and recession-resilient than legacy IT capabilities. Even during economic turmoil, spending on cloud infrastructure and services continues to grow.

For existing IT workers, developing cloud expertise provides a path to high-value roles. Network engineers can reskill as cloud security analysts. Systems administrators can become cloud automation specialists. Software developers can evolve into cloud-native coders. With training and initiative, many traditional IT professionals can transition their capabilities to emerging cloud-centric areas.

Organizations must provide guidance and support to help IT employees gain cloud fluency. Investment in learning programs pays dividends via a tech workforce primed for the cloud era. The cloud skills gap makes hiring pre-trained talent extremely competitive. Upskilling current staff in cloud technologies is often the smartest talent strategy.

Policymakers also need forward-looking programs to connect displaced IT personnel with affordable training resources. Community college courses, coding bootcamps, and vocational rehabilitation assistance can help technologists transition to cloud specialties.

The key conclusions are that while routine IT roles will see reduced demand, professionals who reskill and reorient toward cloud computing will be poised for success. For both businesses and IT workers, the cloud shift requires adaptation and investment in new capabilities. But those who embrace the cloud revolution will be best positioned to thrive in the IT world of the future.

5.3 Importance of IT Workers Developing In-Demand Skills to Remain Employable

As cloud computing and other innovations transform the technology landscape, developing skills in high demand areas is critical for IT professionals to sustain rewarding careers. Technical workers who proactively expand their capabilities will remain valuable assets to employers. Those who fail to retrain in emerging technologies risk skills obsolescence.

The accelerating pace of technological change means skills can become outdated faster than ever before. Jobs focused on legacy solutions like on-premises data centers and monolithic applications are dwindling. IT professionals anchored to these fading technologies face displacement unless they can reorient towards cloud, automation, AI and other next-gen domains.

According to CompTIA, 9 out of 10 IT managers say skill gaps in high-demand areas are impacting their organization's tech strategy. Cybersecurity, data science, software development, cloud computing, and automation are among roles most scarce. Companies are willing to pay premiums of over 10% for professionals with proven expertise in these fields.

IT workers must recognize reskilling is now a lifelong endeavor rather than a one-time event. Taking personal responsibility to proactively identify skills gaps and fill them through self-directed learning is essential. Employers can help by providing tuition assistance and training opportunities.

But learning pathways like online courses, hands-on labs, and certifications are abundant for motivated professionals. IT associations, technology vendors, colleges and bootcamps all offer affordable training options. With the right access and initiative, IT pros at any career stage can pivot into new technology specializations.

Policymakers also need to fund and promote STEM training and retraining programs accessible nationwide. Tax credits can incentivize businesses to invest in worker re-education. Apprenticeships and vocational programs provide additional upskilling channels.

The economic and social returns from preparing IT workers for the technologies of tomorrow are tremendous. Employees gain sustainable employment. Employers capture growth and innovation. Society benefits from a skilled, future-ready tech workforce powering progress.

But for IT professionals, the message is clear - to stay marketable, expanding your skills cannot stop at formal education. Lifelong technology learning and adaptation are now requirements to remain professionally competitive and personally fulfilled in the digital era. With the right hunger for knowledge, IT workers can thrive amidst unprecedented technological change.

REFERENCES

[1] 5 Things to Master to Become a Top Cloud Developer. (2021, February 5). Ideas2IT. https://www.ideas2it.com/blogs/5-things-to-master-to-become-a-top-cloud-developer/
[2] A. Shaji George, A. S. Hovan George, & T. Baskar. (2023). Edge Computing and the Future of Cloud Computing: A Survey of Industry Perspectives and Predictions. Partners Universal International Research Journal, 2(2), 19–44. https://doi.org/10.5281/zenodo.8020101
[3] Cloud Application Development: The Most Important Facts to Know in 2023. (2023, March 15). iFlair Web Technologies. https://www.iflair.com/cloud-application-development-the-most-important-facts-to-know-in-2023/
[4] Davis, S. (n.d.). Cloud Orchestration and Automation Explained. Cloud Orchestration and Automation Explained: Stonebranch. https://www.stonebranch.com/blog/cloud-orchestration-and-automation-explained
[5] A. Shaji George, & S. Sagayarajan. (2023). Acoustic Eavesdropping: How AIs Can Steal Your Secrets by Listening to Your Typing. Partners Universal International Innovation Journal, 1(4), 1–14. https://doi.org/10.5281/zenodo.8260814
[6] The Top Cloud Computing Skills You Need to Pick Up in 2023. (2017, January 10). simplilearn.com. https://www.simplilearn.com/top-cloud-computing-skills-article

[7] Dr. A. Shaji George, A. S. Hovan George, & A. S. Gabrio Martin. (2023). Quantum-Centric Supercomputing: Ambitious Plan to Solve the World's Biggest Problems. Partners Universal International Research Journal, 2(2), 68–88. https://doi.org/10.5281/zenodo.8020371

[8] Harris, R. (n.d.). Cloud computing skills will be in high demand for 2023| App Developer Magazine. App Developer Magazine. https://appdevelopermagazine.com/Cloud-computing-skills-will-be-in-high-demand-for-2023/

[9] A. S. Hovan George, Aakifa Shahul, & Dr. A. Shaji George. (2023). Wearable Sensors: A New Way to Track Health and Wellness. Partners Universal International Innovation Journal, 1(4), 15–34. https://doi.org/10.5281/zenodo.8260879

[10] Top 10 Cloud Automation Software To Boost Your Business In 2024. (2023, September 1). TopTut.com. https://www.toptut.com/cloud-automation-software/

[11] Petelko, E. (2020, October 23). Cloud Application Development in 2023: Technologies, Cost - Existek Blog. Cloud Application Development in 2023: Technologies, Cost - Existek Blog. https://existek.com/blog/cloud-application-development/

[12] Dr. A. Shaji George, Dr. V. Sujatha, A. S. Hovan George, & Dr. T. Baskar. (2023). Bringing Light to Dark Data: A Framework for Unlocking Hidden Business Value. Partners Universal International Innovation Journal, 1(4), 35–60. https://doi.org/10.5281/zenodo.8262384

[13] Freelance Cloud Engineer Jobs | EPAM Anywhere. (n.d.). EPAM Anywhere. https://anywhere.epam.com/en/freelance-remote-cloud-engineer-jobs

[14] Dr. A. Shaji George, & A. S. Hovan George. (2023). The Cobot Chronicles: Evaluating the Emergence, Evolution, and Impact of Collaborative Robots in Next-Generation Manufacturing. Partners Universal International Research Journal, 2(2), 89–116. https://doi.org/10.5281/zenodo.8021406

[15] A. (n.d.). GitHub - angelcamach0/CloudSecurityArchitectureProject: A comprehensive project showcasing secure cloud infrastructure, assessments, disaster recovery, SOC implementation, security automation, and DevOps pipeline. Demonstrates proficiency in cloud security architecture. GitHub. https://github.com/angelcamach0/CloudSecurityArchitectureProject

[16] Dr. A. Shaji George. (2023). OneWeb: Revolutionizing Digital Connectivity in India. Partners Universal International Innovation Journal, 1(4), 72–97. https://doi.org/10.5281/zenodo.8264303

[17] Amazon.com: Cloud Security Handbook for Architects: Practical Strategies and Solutions for Architecting Enterprise Cloud Security using SECaaS and DevSecOps (English Edition): 9789395968997: Mishra, Ashish: Books. (2023, April 18). Amazon.com: Cloud Security Handbook for Architects: Practical Strategies and Solutions for Architecting Enterprise Cloud Security Using SECaaS and DevSecOps (English Edition): 9789395968997: Mishra, Ashish: Books. https://www.amazon.com/Cloud-Security-Handbook-Architects-Architecting/dp/9395968990

[18] Dr. A. Shaji George, A. S. Hovan George, & Dr. T. Baskar. (2023). Wi-Fi 7: The Next Frontier in Wireless Connectivity. Partners Universal International Innovation Journal, 1(4), 133–145. https://doi.org/10.5281/zenodo.8266217

[19] Introduction to Cloud Security Architecture from a Cloud Consumer's Perspective. (2023, September 26). InfoQ. https://www.infoq.com/articles/cloud-security-architecture-intro/

[20] 31 Honest Cloud Architect Salaries. (n.d.). CBT Nuggets. https://www.cbtnuggets.com/blog/it-careers/31-honest-cloud-architect-salaries

[21] Dr. A. Shaji George, A. S. Hovan George, & Dr. T. Baskar. (2023). Digitally Immune Systems: Building Robust Defences in the Age of Cyber Threats. Partners Universal International Innovation Journal, 1(4), 155–172. https://doi.org/10.5281/zenodo.8274514

[22] Cloud Architect Job Description | bestcareerguide.com. (n.d.). Cloud Architect Job Description | bestcareerguide.com. https://www.bestcareerguide.com/blog/cloud-architect-job-description/

[23] Cloud Architect Salary [2022 Comprehensive Guide]. (n.d.). Cloud Architect Salary [2023 Comprehensive Guide]. https://www.knowledgehut.com/blog/cloud-computing/cloud-architect-salary

[24] Dr. A. Shaji George, A. S. Hovan George, & Dr. T. Baskar. (2023). Emoji Unite: Examining the Rise of Emoji as an International Language Bridging Cultural and Generational Divides. Partners Universal International Innovation Journal, 1(4), 183–204. https://doi.org/10.5281/zenodo.8280356

[25] Ukadike, C. (2023, June 30). CLOUD ARCHITECT SALARY: How Much Do They Make in 2023? Business Yield. https://businessyield.com/careers/cloud-architect-salary/

[26] Cloud Architect: High-paying career path for IT professionals in 2023 - Eduhub | SW. (2022, July 7). Eduhub | SW. https://www.smartzworld.com/notes/cloud-architect-high-paying-career-path-for-it-professionals-in-2023/

[27] Dr. A. Shaji George. (2023). Deciphering the Path to Cost Efficiency and Sustainability in the Snowflake Environment. Partners Universal International Innovation Journal, 1(4), 231–250. https://doi.org/10.5281/zenodo.8282654

[28] Garkkal, R. (2023, May 17). These 4 Trends Responsibly Changing The Face Of Cloud Data Center and edge Infrastructure in 2023. W.Media. https://w.media/these-4-trends-responsibly-changing-the-face-of-cloud-data-center-and-edge-infrastructure-in-2023/

[29] A. Shaji George, A. S. Hovan George, & T. Baskar. (2023). Edge Computing and the Future of Cloud Computing: A Survey of Industry Perspectives and Predictions. Partners Universal International Research Journal, 2(2), 19–44. https://doi.org/10.5281/zenodo.8020101

[30] Black, D. (2017, July 17). Data Center Space Grows, Data Center Numbers Decline. Why? EnterpriseAI. https://www.enterpriseai.news/2017/07/17/data-center-space-grows-data-center-numbers-decline/

[31] A. Shaji George, S. Sagayarajan, Dr. T. Baskar, & A. S. Hovan George. (2023). Extending Detection and Response: How MXDR Evolves Cybersecurity. Partners Universal International Innovation Journal, 1(4), 268–285. https://doi.org/10.5281/zenodo.8284342

[32] Why do we use API in the cloud computing environment - Tech Blogger. (n.d.). Tech Blogger. https://contenteratechspace.com/why-do-we-use-api-in-the-cloud-computing-environment/

[33] Dr.A.Shaji George, A. S. Hovan George, & Dr. T. Baskar. (2023). SD-WAN Security Threats, Bandwidth Issues, SLA, and Flaws: An In-Depth Analysis of FTTH, 4G, 5G, and Broadband Technologies. Partners Universal International Innovation Journal, 1(3), 1–37. https://doi.org/10.5281/zenodo.8057014

[34] AWS vs Azure vs Google Cloud: Comparison of 3 Main Platforms. (2022, August 15). Nakivo. https://www.nakivo.com/blog/aws-vs-azure-vs-google-cloud-comparison/

[35] Dr. A. Shaji George, A. S. Hovan George, Dr. T. Baskar, & A. S. Gabrio Martin. (2023). Revolutionizing Business Communication: Exploring the Potential of GPT-4 in Corporate Settings. Partners Universal International Research Journal, 2(1), 149–157. https://doi.org/10.5281/zenodo.7775900

[36] The Role of AI in Cloud Computing: A Beginner's Guide to Starting a Career. (2023, April 15). DEV Community. https://dev.to/aws-builders/the-role-of-ai-in-cloud-computing-a-beginners-guide-to-starting-a-career-4h2

[37] Dr. A. Shaji George, & A .S. Hovan George. (2023). FMCG's Digital Dilemma: The Consequences of Insufficient IT Expertise in the Fast-Moving Consumer Goods Industry. Partners Universal International Innovation Journal, 1(3), 46–69. https://doi.org/10.5281/zenodo.8066759

[38] 7 cloud computing job roles to advance your career | TechTarget. (n.d.). Cloud Computing. https://www.techtarget.com/searchcloudcomputing/feature/7-cloud-computing-job-roles-to-advance-your-career

[39] Dr. A. Shaji George, & Dr. T. Baskar. (2023). The Impact of AI Language Models on the Future of White-Collar Jobs: A Comparative Study of Job Projections in Developed and Developing Countries. Partners Universal International Research Journal, 2(2), 117–135. https://doi.org/10.5281/zenodo.8021447

[40] What is a cloud administrator? Essential roles and skills | Infosec. (2022, September 15). What Is a Cloud Administrator? Essential Roles and Skills | Infosec. https://resources.infosecinstitute.com/topics/professional-development/what-is-a-cloud-administrator-essential-roles-and-skills/

[41] Dr. A. Shaji George, A. S. Hovan George, & A. S. Gabrio Martin. (2023). ChatGPT and the Future of Work: A Comprehensive Analysis of AI's Impact on Jobs and Employment. Partners Universal International Innovation Journal, 1(3), 154–186. https://doi.org/10.5281/zenodo.8076921

[42] A. (2020, December 18). The 41 Best Network Automation Tools in 2021 -. -. https://www.imedita.com/blog/network-automation-tools/

[43] Dr. A. Shaji George. (2023). Toxicity in the Workplace: The Silent Killer of Careers and Lives. Partners Universal International Innovation Journal, 1(2), 1–21. https://doi.org/10.5281/zenodo.7852087

[44] N. (2021, December 13). Entry Level Cloud Computing Jobs - Roles and Responsibilities. Digital Cloud Training. https://digitalcloud.training/entry-level-cloud-computing-jobs-roles-and-responsibilities/

[45] Dr. A. Shaji George, & A. S. Hovan George. (2023). Revolutionizing Manufacturing: Exploring the Promises and Challenges of Industry 5.0. Partners Universal International Innovation Journal, 1(2), 22–38. https://doi.org/10.5281/zenodo.7852124

[46] The most valuable cloud computing certifications today. (n.d.). CIO. https://www.cio.com/article/230336/the-most-valuable-cloud-computing-certifications-today.html

[47] A. Shaji George, & A. S. Hovan George. (2023). A Review of ChatGPT AI's Impact on Several Business Sectors . Partners Universal International Innovation Journal, 1(1), 9–23. https://doi.org/10.5281/zenodo.7644359

[48] Morkos, R. (2023, July 24). Council Post: Powering The Growth Of Cloud Computing: Infrastructure Challenges And Solutions. Forbes. https://www.forbes.com/sites/forbestechcouncil/2023/07/24/powering-the-growth-of-cloud-computing-infrastructure-challenges-and-solutions/

[49] Dr. A. Shaji George, A. S. Hovan George, & Dr. T. Baskar. (2023). Unshackled by Servers: Embracing the Serverless Revolution in Modern Computing. Partners Universal International Research Journal, 2(2), 229–240. https://doi.org/10.5281/zenodo.8051052

[50] Top 10 Cloud Security Certifications [2023] - GeeksforGeeks. (2023, July 12). GeeksforGeeks. https://www.geeksforgeeks.org/cloud-security-certifications/

[51] A. Shaji George, & S. Sagayarajan. (2023). Securing Cloud Application Infrastructure: Understanding the Penetration Testing Challenges of IaaS, PaaS, and SaaS Environments. Partners Universal International Research Journal, 2(1), 24–34. https://doi.org/10.5281/zenodo.7723187

[52] Transformation and growth are the top drivers of cloud adoption, says EY-NASSCOM survey. (2023, August 25). Transformation and Growth Are the Top Drivers of Cloud Adoption, Says EY-NASSCOM Survey. https://www.ey.com/en_in/news/2022/02/transformation-and-growth-are-the-top-drivers-of-cloud-adoption

[53] A. Shaji George, & A.S. Hovan George. (2022). Open Network for Digital Commerce (ONDC) : Democratizing Digital Commerce and curbing digital monopolies in India. Partners Universal International Research Journal, 1(2), 92–102. https://doi.org/10.5281/zenodo.6799694

[54] Sanderson, C. (2018, September 12). The race to the edge will define digital transformation. Teraco. https://www.teraco.co.za/news/the-race-to-the-edge-will-define-digital-transformation/

[55] The race to the edge will define digital transformation. (n.d.). BusinessGhana. https://www.businessghana.com/

[56] Dr. A. Shaji George, & A.S. Hovan George. (2022). Data Sharing Made Easy by Technology Trends: New Data Sharing and Privacy Preserving Technologies that Bring in a New Era of Data Monetization. Partners Universal International Research Journal, 1(3), 13–19. https://doi.org/10.5281/zenodo.7111123

[57] A brief history of cloud computing. (2022, October 26). A Brief History of Cloud Computing | TechRepublic. https://www.techrepublic.com/article/brief-history-cloud-computing/

[58] Dr. A. Shaji George, & A.S. Hovan George. (2022). A Review of Moonlighting in the IT Sector And its Impact . Partners Universal International Research Journal, 1(3), 64–73. https://doi.org/10.5281/zenodo.7114049

[59] Building New-Age Cloud Talent in 2023: Here's what Software companies can do. (2023, April 13). Draup. https://draup.com/talent/whitepapers/building-new-age-cloud-talent-in-2023-heres-what-software-companies-can-do/

[60] Dr. A. Shaji George, A. S. Hovan George, Dr. T. Baskar, & A. S. Gabrio Martin. (2023). Human Insight AI: An Innovative Technology Bridging The Gap Between Humans And Machines For a Safe, Sustainable Future. Partners Universal International Research Journal, 2(1), 1–15. https://doi.org/10.5281/zenodo.7723117

[61] Cloud Skills and Organizational Influence: How Cloud Skills Are Accelerating the Careers of IT Professionals. (n.d.). Tech Monitor. https://techmonitor.ai/whitepapers/cloud-skills-organizational-influence-cloud-skills-accelerating-careers-professionals

[62] Muriuki, P. (2023, May 23). Defining The Future: The Top Emerging Skills In The Tech Industry For 2024. Startup Info. https://startup.info/defining-the-future-the-top-emerging-skills-in-the-tech-industry-for-2024/