



#### FOR IMMEDIATE RELEASE

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Average market value for 573 non-certified tech skills rose from July to September, driven by Applications Development tools and platforms, Data/Database, and Management/Methodology/process skills.

497 tech certifications declined for the fifth consecutive calendar quarter, with market value losses spread across a wide variety of certifications.

The only viable enterprise solution to constant skills gaps and job deficits has been discovered, and it's accessible to any public and private sector organization.

NOTE: This news release is a summary extract of content in the 4<sup>th</sup> Quarter update of Foote Partners' *Tech Skills Demand and Pay Trends Report*, a market intelligence trend report updated every 3 months from data contributed by 3,421 U.S. and Canadian employers. It contains tech jobs and skills compensation published in the firm's *IT Professional Salary Survey* and *IT Skills and Certifications Pay Index*<sup>TM</sup> and deep-dive supply/demand benchmark research from Foote Partners field interviews.

Vero Beach, FL – November 11, 2019 - Extra pay awarded by employers to talented tech professionals for 573 non-certified tech skills ---also known as cash pay premiums---increased slightly in the third calendar quarter of 2019. Currently averaging the equivalent of 9.4 percent of base salary on average for a single non-certified skill, this pay is now near its 19-year high. Conversely, average market values for 497 tech certifications decreased, down nearly one percent overall, currently earning the equivalent of 7.3 percent of base salary on average for a single certification. That's the lowest average pay premium in 5 years.

This according to the latest quarterly update of Foote Partners' *IT Skills and Certifications Pay Index™* (ITSCPI) based on compensation data provided by 3,421 private and public-sector employers in 83 U.S. and Canadian cities who partner with the firm to report pay for their 310,222 technology professionals in the U.S. and Canada.



Since its launch in 1999, the *IT Skills and Certifications Pay Index<sup>TM</sup>* has continuously tracked cash pay premiums paid to tech professionals by their employers for an ever-increasing number of popular tech skills and certifications. Rigorously validated data and detailed market analyses are updated and published by Foote Partners every 90 days. Currently, premiums are reported for 1,070 certifications and non-certified skills.

### Pay Performance, 3/12/24/24/36 months Certified vs. Non-certified Tech Skills

(78,234 IT professionals, data through 10/1/2019)

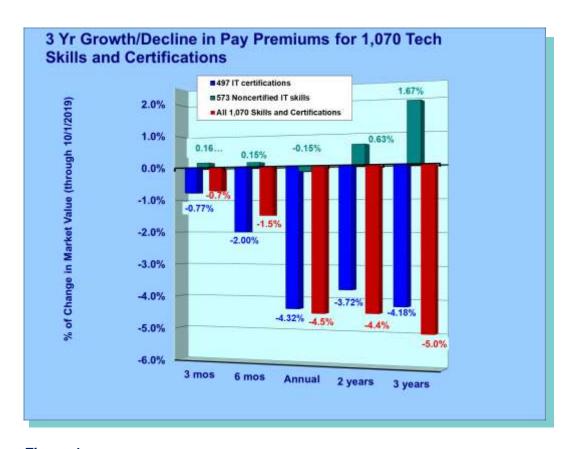


Figure 1

Source: Foote Partners, IT Skills and Certifications Pay Index™ (3Q2016 – 3Q2019 data)



#### SUMMARY: Quarterly and Annual Results – Through October 1, 2019

#### A. TECH SKILLS AND CERTIFICATIONS PAY PERFORMANCE: BY CATEGORY

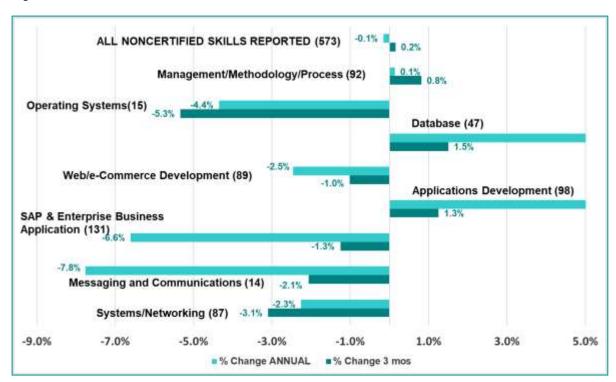
**NON-CERTIFIED TECH SKILLS.** 149 surveyed non-certified tech skills changed market value in the third quarter of 2019, with average **c**ash pay premiums for **573 non-certified skills** increasing slightly overall.

Pay performance in the third quarter of 2019 was higher for three non-certified tech skills categories reported: **Data/Database**; **Applications Development** and **Management/Methodology/Process** skills. For the twelve-month period ending October 1, pay was higher across the same categories plus **Operating Systems**.

# Noncertified Tech Skills - % Growth/Decline 3 months & 12 months

(573 skills, data through 10/1/2019)

Figure 2



Source: Foote Partners IT Skills & Certifications Pay Index<sup>TM</sup>, 3<sup>rd</sup> Quarter 2019 data



# NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Largest Market Value Gainers That are Also Highest Paying

These noncertified tech skills *gained 10% or more in market value in the three months ending October 1, 2019* vs. prior quarter (seen below grouped by segment). Listed in *descending order of amount of % gain and cash pay premium* (including ties). Highest paying skills listed on right in alphabetical order.

TECH SKILLS (noncertified)			Highest Paying – Cash Premiums (A-Z)
Applications Development skills Progress 4GL/Development tools Oracle Applications Developer Framework Apache Flex Java SE/Java EE Cobol Selenium Eclipse  Database Skills OpenEdge ABL (Progress 4GL) Oracle Application Server Oracle DB 10g/11i/12c  Web/SOA/E-Commerce skills CSS/CSS3 Umbraco Spring MVC RESTful Django Node.js Spring Cloud Apex Code Magnolia Mule/MuleESB Redux Microsoft BizTalk Server SailPoint	Systems/Networking skills Microsoft SCVMM Microsoft Virtual Server Citrix Hypervisor (XenServer) Vagrant  SAP/ERP skills Oracle CRM Oracle Retail SAP SRM (Supplier Relationship Management) SAP PI (NetWeaver Process Integration) SAP Forecasting and Replenishment (SAP F&R) SAP EHS (Environment, Health & Safety) SAP BSP (Business Server Pages) SAP Business Workflow/Webflow Oracle E-Business suite Oracle BPM SAP FI - FSCM (Financial Supply Chain Management) Lawson Software AG webMethods SAP Hybris SAP WM (Warehouse Management) SAP GTS (Global Trade Services)	Management, Process & Methodology skills  Prescriptive Analytics Webtrends analytics HL7 Predictive Analytics and Modeling Big Data analytics Business performance management (software/systems)  Messaging/Communications skills Apache Camel TIBCO Rendezvous  Operating Systems skills CoreOS	<ul> <li>Amazon Athena</li> <li>Amazon RedShift</li> <li>Apache Hive</li> <li>Apache Pig</li> <li>Apache Zookeeper</li> <li>Big Data analytics</li> <li>Blockchain</li> <li>Data Architecture</li> <li>Data Engineering</li> <li>Data Science</li> <li>DevSecOps</li> <li>Ethereum</li> <li>HBase</li> <li>Machine Learning</li> <li>Metadata design and development</li> <li>Microservices</li> <li>Oracle Exadata</li> <li>Predictive Analytics and Modeling</li> <li>Risk analytics/assessment</li> <li>Scala</li> <li>Security architecture and models</li> </ul>



### NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Market Value Losers

These noncertified IT skills **declined 10% or more in market value in the three months ending October 1, 2019** (grouped by segment). Listed in **descending order of amount of % decline**, including ties.

### **TECH SKILLS (Noncertified) Losers**

#### **Applications Development skills**

NetWeaver MapReduce

#### Web/E-commerce Development skills

Apache Wicket

Microsoft Commerce Server

Microsoft Internet Security and Acceleration

Server (ISA)

Jetty

Microsoft Identity Integration Server (MIIS)
Microsoft Sharepoint/Sharepoint Server

Web Content Development

**JSON** 

Elasticsearch

Front End Development

Apache Velocity

Docker/Docker Swarm

#### Management, Process & Methodology

TIBCO ActiveMatrix BusinessWorks

Complex Event Processing/Event Correlation

Data Acquisition and Control Systems

#### **Messaging & Communications Skills**

Java Messaging Service

#### **SAP & Enterprise Business Applications skills**

Siebel/Siebel Analytics

SAP PLM (Product Lifecycle Management)

SAP PSCD (Collection and Disbursement)
SAP Point-of-Sale Data Management (SAP POS DM)

SAP Fiori

SAP Business One

Remedy

Oracle Payroll/Receivables SAP HCM (SAP HR)

Oracle HRMS SAP BI (SAP BW)

SAP QM (Quality Management)

SAP PP (Production Planning)

SAP IS-U (Utilities) SAP Solution Manager

SAP HANA (In-Memory Analytics Appliance)

SAP ALE (Application Link Enabling)
SAP SCM (Supply Chain Management)

SAP UI development toolkit for HTML5 (SAP UI5)

Data/Database

Sybase Adaptive Server Enterprise

Oracle Enterprise Manager

TIBCO Spotfire

#### Systems/Networking skills

Apache Flume Cisco UCCE

Web services security

) vCloud Cisco CUCM

Infrastructure architecture

Microsoft Hyper-V Cisco UCCX

Microsoft Application Virtualization (AppV)

VMware NSX Cisco Prime Ansible

#### **Operating Systems skills**

SUSE Solaris Linux

Mobile operating systems (iOS, Android, etc.)

AIX

Red Hat Enterprise Linux

Unix (all)

Source: Foote Partners IT Skills & Certifications Pay Index™, 3rd Quarter 2019 data

#### SUMMARY - cont'd.

#### **TECH CERTIFICATIONS**

**TECH CERTIFICATIONS**. Cash pay for tech certifications is currently near its five-year low. In the quarter ending October 12019, **497 tech certifications lost even more value**, **down an average of nearly 1 percent in the quarter.** 

Pay performance in the third quarter of 2019 was lower for six certification segments: Architecture/Project

Management/Process; Info/Cyber Security; Systems Admin/Engineering; Networking & Communications;

Data/Database; and Applications Development/Programming Languages. For the twelve-month period ending October 1 pay was higher in only two segments: Web Development and Foundation Level & Training certifications.

# Tech Certifications - % Growth/Decline 3 months & 12 months

(497 certifications, data through 10/1/2019)

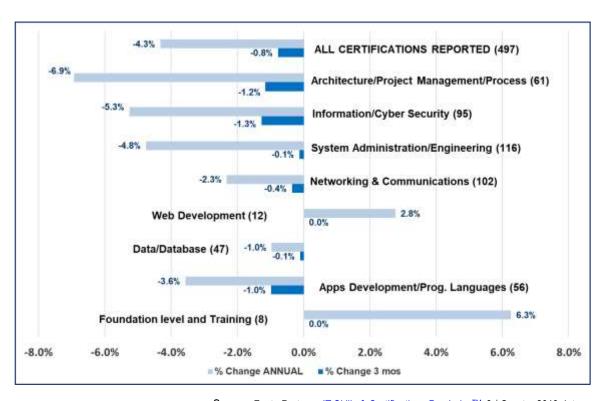


Figure 3

Source: Foote Partners <u>IT Skills & Certifications Pay Index™</u>, 3<sup>rd</sup> Quarter 2019 data



# TECH CERTIFICATION PAY TREND HIGHLIGHTS: Largest Market Value Gainers That are Also Highest Paying

These tech certifications gained 10% or more in market value in the three months ending October 1, 2019 (seen below grouped by segment). Listed in descending order of amount of % gain in cash pay premium (including ties). Highest paying skills listed on right in alphabetical order.

#### **TECH CERTIFICATION Gainers**

#### Info/Cyber Security certifications

InfoSys Security Architecture Professional (ISSAP/CISSP)

EC-Council Certified Security Analyst (ECSA)

Cisco Certified Network Professional - Security

Check Point Certified Security Administrator (CCSA)

GIAC Certified Forensics Analyst (GCFA)

GIAC Certified Forensics Examiner (GCFE)

GIAC Enterprise Defender (GCED)

GIAC Certified Windows Security Administrator (GCWN)
CompTIA Security+

Systems Security Certified Practitioner (SSCP))

#### **Database certifications**

Microsoft Certified Solutions Associate: SQL 2016 DBA Microsoft Certified Solutions Expert: Data Management and Analytics

Microsoft Certified Solutions Expert: Data Platform

# <u>Architecture, Project Management and Process</u> certifications

ITIL Foundation Certification
Certified Associate in Project Management (CAPM)
TOGAF 9 Certified
Prince2 Foundation

Prince2 Practitioner

#### **Networking and Communications certifications**

Juniper Networks Certified Internet Associate (JNCIA) CompTIA Network (Network+)

BICSI ITS Technician

Cisco Certified Internetwork Expert (CCIE, all variations)

#### **Systems Administration certifications**

NetApp Certified Storage Associates – Hybrid Cloud Linux Professional Institute certification (LPIC-Level 2) Citrix Certified Associate - Virtualization Citrix Certified Administrator - Networking (CCA) NetApp Certified Data Administrator, ONTAP (NCDA) VMware Certified Advanced Professional (all) HP Master Accredited Solutions Expert (MASE - all) Red Hat Certified System Administrator in Red Hat OpenStack

Red Hat Certified Systems Administrator (RHCSA) VMware Certified Design Expert - Cloud Mgt and Automation

#### <u>Applications Development/Programming Languages</u>

Microsoft Office Specialist

Oracle Certified Associate - Java SE Programmer

Source: Foote Partners

IT Skills & Certifications Pay Index™, 3rd Quarter 2019 data

### **Highest Paying – Cash Premiums (A – Z)**

- Certified Cyber Forensics Professional
- Certified Forensic Computer Examiner
- Certified in Risk and Information Systems Control
- Certified in the Governance of Enterprise IT (CGEIT)
- Certified Information Systems Security Professional
- Certified ScrumMaster
- Certified Secure Software Lifecycle Professional
- Cisco Certified Architect
- Cisco Certified Network Professional Security
- Cybersecurity Forensic Analyst
- GIAC Exploit Researcher and Advanced Penetration Tester
- GIAC Security Expert
- Information Systems Security Architecture Professional (ISSAP/CISSP)
- PMI Portfolio Management Professional
- PMI Professional in Business Analysis
- PMI Program Management Professional
- PMI Risk Management Professional



### TECH CERTIFICATION PAY TREND HIGHLIGHTS: Market Value Losers

These tech IT certifications **declined 10% or more in market value in the six months ending October 1, 2019** vs. prior quarter (grouped by segment). Listed in **descending order of amount of % decline**, including ties.

#### **TECH CERTIFICATIONS Losers**

#### Application Development/Programming Languages

Oracle Certified Associate - WebLogic Server Administrator AWS Certified DevOps Engineer - Professional AWS Certified Developer - Associate

# Architecture, Project Management, and Process Certifications

Six Sigma Master Black Belt ITIL Master Microsoft Specialist in Windows 10 PMI Professional in Business Analysis Six Sigma Yellow Belt Certified Software Quality Analyst Six Sigma Green Belt

#### Data/Database

Oracle Certified Professional - MySQL 5 Developer Oracle Certified Professional - MySQL 5 Database Administrator

Oracle Certified Master - DBA

#### **Networking & Communication certifications**

Cisco Certified Network Associate
Juniper Networks Certified Internet Specialist
AWS Certified Solutions Architect - Associate (Cloud)
Cisco Certified Network Professional - Data Center
Cisco Certified Network Professional
Cisco Cert

Cisco Certified Network Professional - Routing and Switching AWS Certified Solutions Architect - Professional (Cloud)

# Systems Administration certifications Red Hat Certified Architect

Red Hat Certified Architect: Cloud

Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure

VMware Certified Associate - Cloud

VMware Certified Associate - Data Center Virtualization

Microsoft Certified Solutions Associate(all)

Microsoft Certified Solutions Associate: Cloud Platform

Microsoft Certified Solutions Expert: Business Intelligence

HP Accredited Solutions Expert (ASE - all)

Red Hat Certified Engineer

#### Info/Cyber Security certifications

EC-Council Certified Incident Handler Infosys Security Management Professional (ISSMP/CISSP)

Professional Certified Investigator
EC-Council Computer Forensic Investigator
EC-Council Certified Network Defender
GIAC Certified Project Manager
GIAC Security Essentials
GIAC Certified Intrusion Analyst
GIAC Web Application Penetration Tester
Certified Cyber Forensics Professional
Certified Penetration Testing Engineer
GIAC Certified Perimeter Protection Analyst
GIAC Information Security Professional

Source: Foote Partners IT Skills & Certifications Pay Index™, 3rd Quarter 2019 data



#### SUMMARY - cont'd.

#### B. NON-CERTIFIED TECH SKILLS EARNING HIGH PAY---AND STILL GROWING IN VALUE

The following non-certified tech skills meet two prerequisites: (1) they are earned workers cash pay premiums well above the average of all 573 skills reported in our *IT Skills and Certifications Pay Index™*, and (2) they recorded gains in cash market value in the six months ending October 1, 2019. No skill below is earning less than the equivalent of 15 percent of base salary—significant considering the average for all skills reported is 9.4 percent of base—and are listed in descending ranked order of cash premium first and market value increases (including ties) second.

#### 1. Big Data Analytics

Market Value Increase: 11.8 percent (in the six months through October 1, 2019)

**Big Data Analytics** related skills and certifications have grown in market value every quarter in the past two years. Cash premiums for 103 Big Data related non-certified skills have as a group increased 3.5 percent in market value in the past six months, averaging the equivalent of 12.2 per cent of base salary. For all the interest in the use of advanced data analytics to enable companies to understand, package, and visualize data for enhanced decision making, the truth is that the marketplace for so-called Big Data skills has been surprisingly volatile: 38 (or 37 percent) of Big Data skills tracked in our benchmark research changed market value in the first quarter of 2019.

#### 2. Risk analytics/assessment

Market Value Increase: 12.5 percent (in the six months through October 1, 2019)

Evaluating risk is an obsession for most businesses; for others it is something to ignore at great peril to their future success. The field of risk analytics has entered its prime: recent projections put the global fraud detection and prevention market at \$41.59 billion by 2022, up from \$16.62 billion in 2017. The spike in interest for non-certified skills to prevent misappropriation of assets, bribery and corruption, fraud, data theft or money laundering in financial services, government or public utilities is in full force in our latest findings. Most employers are rewarding people who can incorporate data and insights from many sources to better identify, measure, and mitigate risk. McKinsey & Company recently published an excellent paper describing what this is all about.

# 3. Security architecture & models Ethereum

Market Value Increase: 5.9 percent (in the six months through October 1, 2019)

Two fundamental concepts in computer and information security are the **security model**, which outlines how security is to be implemented—in other words, providing a "blueprint"—and the **security architecture** of a computer system, which fulfills this blueprint. Security architecture is a view of the overall system architecture from a security point and how the system is put together to satisfy the security requirements. It describes the components of the logical hardware, operating system, and software security components, and how to implement those components to architect, build and evaluate the security of computer systems.

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### SUMMARY - cont'd.

With cybersecurity related skills gaining nearly 3 percent in cash market value in the past year and the threat landscape continuing to be a core business issue, we expect security models and architecting skills to continue to be strong going forward.

Blockchain! Ethereum is arguably the most popular open source, public blockchain-based distributed computing platform and OS for smart contract functionality. If you want to become a blockchain expert, learning how to build apps on Ethereum is a great place to start.

#### **Predictive Analytics and Modeling**

Market Value Increase: 13.3 percent (in the six months through October 1, 2019)

**Predictive analytics** is a form of advanced analytics that uses both new and historical data to forecast activity, behavior and trends. It involves applying statistical analysis techniques, analytical queries and automated machine learning algorithms to data sets to create predictive models that place a numerical value--or score--on the likelihood of a particular event happening. It uses a number of data mining, *predictive modeling* and analytical techniques to bring together the management, information technology, and modeling business processes to make predictions. The patterns found in historical and transactional data can be used to identify risks and opportunities for the future.

#### **Blockchain**

Market Value Increase: 6.3 percent (in the six months through October 1, 2019)

At a high level, blockchain technology is a way of securely managing access and information. What makes DLT so interesting to businesses and some governments is how it is positioned to make vast improvements in an almost endless array of transactional activities. Skills shortages will continue for blockchain developers but especially for the architects. project managers, and quality engineers who can design, build, and test Blockchain operating models. Understanding how Blockchain integrates with IoT, Artificial Intelligence, Machine Learning, Robotics, and other technologies is a plus now for architects but will be a requirement in the future as these other technologies mature and adoption rates increase.

# 6. Apache Zookeeper **Data Science**

Oracle Exadata

Market Value Increase: 6.7 percent (in the six months through October 1, 2019)

Apache ZooKeeper is essentially a service for distributed systems offering a hierarchical key-value store, which is used to provide a distributed configuration service, synchronization service, and naming registry for large distributed systems. Introduced as a sub-project of Hadoop, it is now a top-level Apache project in its own right. ZooKeeper's architecture supports high availability through redundant services. The clients can thus ask another ZooKeeper leader if the first fails to answer. ZooKeeper nodes store their data in a hierarchical name space, much like a file system or a tree data structure. Clients can read from and write to the nodes and in this way have a shared configuration service.



### SUMMARY - cont'd.

Some of the prime features of Apache ZooKeeper are:

- Reliable System: This system is very reliable as it keeps working even if a node fails.
- Simple Architecture: The architecture of ZooKeeper is quite simple as there is a shared hierarchical namespace which helps coordinating the processes.
- Fast Processing: ZooKeeper is especially fast in "read-dominant" workloads (i.e. workloads in which reads are much more common than writes).
- Scalable: The performance of ZooKeeper can be improved by adding nodes.

**Data science** is a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data. Data science is the same concept as data mining and big data: using the most powerful hardware, the most powerful programming systems, and the most efficient algorithms to solve problems.

Data science continues to evolve as one of the most promising and in-demand career paths for skilled professionals. Today, successful data professionals understand that they must advance past the traditional skills of analyzing large amounts of data, data mining, and programming skills. In order to uncover useful intelligence for their organizations, data scientists must master the full spectrum of the data science life cycle and possess a level of flexibility and understanding to maximize returns at each phase of the process.

Used by 77% of Fortune Global 100 corporations, *Oracle Exadata* has become almost ubiquitous over the last decade in powering the world's most important database workloads. Exadata can be described as a purpose-built engine for running SQL, the Structured Query Language, which was designed to deal with every aspect of data: creating it, analyzing it, and protecting it. With us for more than 40 years, SQL should make any short list of most important computer innovations. And especially when powered by Exadata, SQL shows no sign of losing its appeal in the modern era. Originally intended to work with relational data (think orderly rows and columns), SQL has been extended over the years to work with almost any type of data: documents, event streams, graphs, and even spatial data. It's also kept pace with increasingly sophisticated analysis. Depending on the implementation, literally hundreds of analytics functions can be built in, from simple statistics to sophisticated machine learning models.

#### 7. Prescriptive Analytics

Market Value Increase: 25 percent (in the six months through October 1, 2019)

**Prescriptive analytics** is the third and final phase of business analytics, which also includes descriptive and predictive analytics. Referred to as the "final frontier of analytic capabilities", prescriptive analytics entails the application of mathematical and computational sciences and suggests decision options to take advantage of the results of descriptive and predictive analytics.

The first stage of business analytics is descriptive analytics, which accounts for the majority of all business analytics today. That phase looks at past performance and understands that performance by mining historical data to look for the reasons behind past success or failure. Most management reporting – such as sales, marketing, operations, and finance – uses this type of post-mortem analysis. The next phase, predictive analytics, answers the question what is likely to happen. This is when historical data is combined with rules, algorithms, and occasionally external data to determine the probable future outcome of an event or the likelihood of a situation occurring. The final phase is prescriptive

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### SUMMARY - cont'd.

analytics, which goes beyond predicting future outcomes by also suggesting actions to benefit from the predictions and showing the implications of each decision option.

Prescriptive analytics can be used in two ways:

- Inform decision logic with analytics. Decision logic needs data as an input to make the decision. The veracity and timeliness of data will ensure that the decision logic will operate as expected. It doesn't matter if the decision logic is that of a person or embedded in an application in both cases, prescriptive analytics provides the input to the process. Prescriptive analytics can be as simple as aggregate analytics about how much a customer spent on products last month or as sophisticated as a predictive model that predicts the next best offer to a customer. The decision logic may even include an optimization model to determine how much, if any, discount to offer to the customer.
- Evolve decision logic. Decision logic must evolve to improve or maintain its effectiveness. In some cases, decision logic itself may be flawed or degrade over time. Measuring and analyzing the effectiveness or ineffectiveness of enterprises decisions allows developers to refine or redo decision logic to make it even better. It can be as simple as marketing managers reviewing email conversion rates and adjusting the decision logic to target an additional audience. Alternatively, it can be as sophisticated as embedding a machine learning model in the decision logic for an email marketing campaign to automatically adjust what content is sent to target audiences.

### 8. Grails/Groovy

Market Value Increase: 15.4 percent (in the six months through October 1, 2019)

**Grails** (previously known as "Groovy on Grails") is an open source web application framework that uses the Apache Groovy programming language (which is in turn based on the Java platform). It is intended to be a high-productivity framework by following the "coding by convention" paradigm, providing a stand-alone development environment and hiding much of the configuration detail from the developer. Inspired by Ruby on Rails, Grails promotes "coding by convention" and development best practices.

Grails was developed to address a number of goals:

- Provide a web framework for the Java platform.
- Re-use existing Java technologies such as Hibernate and Spring under a single interface
- Offer a consistent development framework.
- Offer documentation for key portions of the framework:
  - The Persistence framework.
  - Templates using GSP (Groovy Server Pages).
  - Dynamic tag libraries for creating web page components.
  - Customizable and extensible Aiax support.
- Provide sample applications that demonstrate the framework.
- Provide a complete development mode, including a web server and automatic reload of resources



### SUMMARY - cont'd.

# 9. Amazon DynamoDB Data Integration Prometheus Penetration Testing

Market Value Increase: 7.1 percent (in the six months through October 1, 2019)

**Amazon DynamoDB** is a fully managed proprietary NoSQL database service that supports key-value and document data structures and is part of the Amazon Web Services portfolio. DynamoDB exposes a similar data model to (and derives its name from) Dynamo, but has a different underlying implementation. DynamoDB uses synchronous replication across multiple data centers for high durability and availability. It differs from other Amazon services by allowing developers to purchase a service based on throughput, rather than storage. Administrators can request throughput changes and DynamoDB will spread the data and traffic over a number of servers using solid-state drives, allowing predictable performance. It offers integration with Hadoop via Elastic MapReduce.

**Data integration** involves combining data residing in different sources and providing users with a unified view of them. This process becomes significant in a variety of situations, which include both commercial (such as when two similar companies need to merge their databases) and scientific domains (combining research results from different bioinformatics repositories, for example). Data integration appears with increasing frequency as the volume (that is, big data) and the need to share existing data explodes. It has become the focus of extensive theoretical work, and numerous open problems remain unsolved. Data integration encourages collaboration between internal as well as external users.

**Prometheus** is an open-source software application used for event monitoring and alerting, recording real-time metrics in a time series database (allowing for high dimensionality). This software is built using a HTTP pull model, with flexible queries and real-time alerting. It's written in Go and licensed under the Apache 2 License, with source code available on GitHub, and is a graduated project of the Cloud Native Computing Foundation, along with Kubernetes and Envoy. Prometheus has become the mainstream, open source monitoring tool of choice for those that lean heavily on containers and microservices. It has the advantage of being highly customizable and designed to deliver rich metrics without creating a drag on system performance.

**Penetration testing**, also called pen testing or ethical hacking, is the practice of testing a computer system, network or web application to find security vulnerabilities that an attacker could exploit. Penetration testing can be automated with software applications or performed manually. Either way, the process involves gathering information about the target before the test, identifying possible entry points, attempting to break in -- either virtually or for real -- and reporting back the findings. The primary objective of penetration testing is to identify security weaknesses but can also be used to test an organization's security policy, its adherence to compliance requirements, its employees' security awareness and the organization's ability to identify and respond to security incidents.

The sustained demand for pen testing has placed on both non-certified and in our opinion certified pen testing skills will continue unabated for as long as threat levels and breaches continue to grow.



SUMMARY - cont'd.

# C. TECH CERTIFICATIONS CURRENTLY EARNING WELL ABOVE-AVERAGE PAY AND STILL GAINING IN IN CASH MARKET VALUE

Average market values for 497 tech certifications decreased in the third quarter of 2019 for the fifth consecutive quarter, down nearly one percent overall, and lost 4.3 percent of their value in the last twelve months. Pay premiums for single certifications are averaging the equivalent of 7.3% of base salary in July/August/September of 2019.

Why are more certifications losing value than gaining value? Certifications decline in market value for a number of obvious and not so obvious reasons. Pay premiums may diminish as a certification expires, is retired, or is replaced with more appropriate certifications as technology evolves. Also, there remains a lingering bias that taking a proctored exam does not confer expertise in a subject on the test taker, especially when the pass rate is 70 percent correct answers. The certification industry has fought back against this bias by adding laboratory requirements and even peer review panels that decide if the candidate has qualified to receive designation.

But just as often it's their <u>popularity</u> that drives down pay premiums for a certification: as interest in a certification escalates and more people attain the certification the gap between supply and demand for the certification narrows, driving down its market value as the laws of scarcity would dictate. This has been documented in the case of dozens of certifications over the 18 years Foote Partners has been tracking and reporting their market values in the *IT Skills and Certifications Pay Index*.

Which ones are bucking the trend---highest paying and still growing in value? The following tech certifications recorded impressive above-average gains in cash market value in the six months ending October 1, 2019 and they are also earning cash pay premiums significantly above the average of all 497 skills reported. They are listed below in descending ranked order of cash premium first, and market value increases (including ties) second.

#### APPLICATIONS DEVELOPMENT

#### **Certified Secure Software Lifecycle Professional (CSSLP)**

Market Value Increase: 6.7 percent (in the six months through October 1, 2019)

Like other (ISC)2 certifications, the CSSLP is a vendor-neutral credential relevant to many kinds of programming and development projects. Aimed at software developers, engineers, architects, QA and penetration testers, security specialists and the like, the CSSLP recognizes competency in securing applications throughout the software development lifecycle. Prerequisites include at least four years' full-time work-related experience in the software development lifecycle (SDLC) in at least one of eight CSSLP domains, or three years' experience plus a bachelor's degree or equivalent in an IT-related field such as computer science or information technology. The required exam covers all phases of this lifecycle, including secure software concepts, requirements, design, implementation and coding, and testing. Candidates should also be up to speed on the eight CSSLP Common Body of Knowledge (CBK) domains which include software concepts, requirements, design, implementation/programming, testing, lifecycle management, deployment, and operations.



#### SUMMARY - cont'd

#### INFO / CYBERSECURITY

#### Information Systems Security Architecture Professional (ISSEP/CISSP)

Market Value Increase: 23.1 percent (in the six months through October 1, 2019)

#### **Certified Information Systems Security Architecture Professional (CISSP)**

Market Value Increase: 8.3 percent (in the six months through October 1, 2019)

Corporate America and the U.S. government have been sounding the cybersecurity alarm bell for years: There's a significant shortage of skilled information security professionals in this country. Although numbers vary among various sources, a conservative estimate is that North

America is lacking almost 500,000 security professionals (as of 2018), and the global shortfall for such jobs is expected to reach 4 million or more by 2021. Adding cybersecurity professionals to this equation and this shortfall is expected to rise to 6 million globally by 2019.

Almost every day, around 10,000 positions are available on U.S. job sites that request a Certified Information Systems Security Professional (CISSP). This clearly points to a need for skilled infosec workers, and CISSPs in particular, which is great news for aspiring CISSP candidates. A CISSP is a seasoned employee or consultant, usually with a title such as security manager, security analyst or chief information security officer, to name just a few. This person has been on the job for five or more years, and has thorough knowledge of the IT threat landscape, including emerging and advanced persistent threats, as well as controls and technology to minimize attack surfaces. A CISSP also creates policies that set a framework for proper controls, and can perform or oversee risk management and software development security.

The Information Systems Security Architecture Professional (ISSAP) is for network security experts with a minimum of two years of architecture experience who are placed in key roles and generally design, develop and analyze a complete security plan. They specialize in designing security solutions and providing management with risk-based guidance to meet organizational goals. ISSAPs facilitate the alignment of security solutions within the organizational context (e.g., vision, mission, strategy, policies, requirements, change, and external factors). The broad spectrum of topics included in the ISSAP Common Body of Knowledge (CBK) ensure its relevancy across all disciplines in the field of information security. Successful candidates are competent in the following six domains:

- Identity and Access Management Architecture
- Security Operations Architecture
- Infrastructure Security
- Architect for Governance, Compliance, and Risk Management
- Security Architecture Modeling
- Architect for Application Security





#### SUMMARY - cont'd

#### **Certified Forensic Computer Examiner (CFCE)**

Market Value Increase: 6.7 percent (in the six months through October 1, 2019)

The International Association of Computer Investigative Specialists (IACIS) is the organization behind the Certified Forensic Computer Examiner (CFCE) credential. This organization caters primarily to law enforcement personnel, and you must be employed in law enforcement to qualify for regular IACIS membership. A formal application form, along with an application fee, is necessary to join IACIS. Regular membership includes current computer/digital forensic practitioners who are current or former government or law enforcement employees or forensic contractors to a government agency. To obtain the CFCE credential, candidates must demonstrate proficiency with CFCE core competencies which can be achieved via an expensive IACICS two-week training program; candidates completing the training course can enroll directly in the CFCE program upon completion of the course. Another way is to attend a comparable course (subject to IACIS approval), pay a registration fee, and successfully pass a background check to enroll in the CFCE program and sit for the exam.

The CFCE exam is a two-step testing process that includes a peer review and CFCE certification testing. The peer review consists of accepting and completing four assigned practical problems based on core knowledge and skills areas for the credential. These must be solved and then presented to a mentor for initial evaluation (and assistance, where needed) before being presented for peer review. Candidates have 30 days to complete each of the practical problems.

Upon successful conclusion of the peer review, candidates automatically progress to the certification phase. Candidates must begin work on a hard-drive practical problem within seven days of the completion of the peer review phase. Forty days are allotted to candidates to independently analyze and report upon a forensic image of a hard drive provided to them. Following specific instructions, a written report is prepared to document the candidate's activities and findings. Once that report is accepted and passed, the process concludes with a 100-question written exam (which includes true/false, multiple-choice, matching and short-answer questions). Candidates have 14 days to complete the written examination. A passing score of 80 percent or better is required for both the forensic report and the written exam to earn the CFCE.

#### Cisco Certified Network Professional - Security

Market Value Increase: 18.2 percent (in the three months through October 1, 2019)

The **Cisco Certified Network Professional** (CCNP) takes aim at platforms and products from a leading networking equipment vendor found at most communications and internet service providers, not to mention enterprises and businesses of all sizes, including government, research and academia. It's hard to go wrong with Cisco certification nowadays, and the CCNP is its most important midrange credential across a wide variety of specialties. One of those is the CCNP – Security certification which is aligned specifically to the job role of Cisco Network Security Engineer responsible for security in routers, switches, networking devices and appliances as well as choosing, deploying, supporting and troubleshooting firewalls, VPNs, and IDS/IPS solutions for their networking environments.





#### SUMMARY - cont'd.

#### **GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)**

Market Value Increase: 8.3 percent (in the six months through October 1, 2019)

A white hat hacker, or ethical hacker, uses penetration testing techniques to test an organization's IT security and to identify vulnerabilities. IT security staff then uses the results of such penetration tests to remediate vulnerabilities, strengthen security and lower an organization's risk factors. Penetration testing is never a casual undertaking; it involves lots of planning, which includes getting explicit permission from management to perform tests, and then running tests as safely as possible. These tests often involve the very same techniques that attackers use to breach a network for real.

White hat hacking involves a great deal of problem solving, as well as communication skills. A white hat hacker also requires a balance of intelligence and common sense, strong technical and organizational skills, impeccable judgement and the ability to remain cool under pressure.

At the same time, a white hat needs to think like a black hat hacker, with all their nefarious goals and devious skills and behavior. Some top-rate white hat hackers are former black hat hackers who got caught, and for various reasons decided to leave a life of crime behind and put their skills to work in a positive (and legal) way. There are no standard education criteria for a white hat hacker — every organization can impose its own requirements on that position — but a bachelor's or master's degree in information security, computer science or even mathematics provides a strong foundation. For those who aren't college bound, a military background, especially in intelligence, can help your resume get noticed by hiring managers. Military service is also a plus for employers who require or prefer those with security clearances.

The *GIAC Exploit Researcher and Advanced Penetration Tester* certification targets security personnel whose job duties involve assessing target networks, systems and applications to find vulnerabilities. The GXPN certifies that candidates have the knowledge, skills, and ability to conduct advanced penetration tests, model the behavior of attackers to improve system security, and the knowledge to demonstrate the business risk associated with these behaviors

#### **EC-Council Certified Security Analyst (ECSA)**

Market Value Increase: 33.3 percent (in the six months through October 1, 2019)

**EC-Council Certified Security Analysts** are required to demonstrate the application of the penetration testing methodology that is presented in the ECSA program, and are able to perform a comprehensive security audit of an organization. They perform advanced network scans beyond perimeter defenses, leading to automated and manual vulnerability analysis, exploit selection, customization, launch, and post exploitation maneuvers.

# GIAC Certified Forensics Analyst (GCFA) Check Point Certified Security Administrator (CCSA)

Market Value Increase: 22.2 percent (in the six months through October 1, 2019)

The GIAC Certified Forensics Analyst focuses on computer forensics in the context of investigation and incident response, and thus also focus on the skills and knowledge needed to collect and analyze data from Windows and/or Linux computer systems during such activities. Candidates must possess the necessary skills, knowledge, and ability to conduct formal incident investigations and advanced incident handling, including dealing with internal and external data breaches, intrusions, and



#### SUMMARY - cont'd.

cyberthreats; collecting and preserving evidence; understanding anti-forensic techniques; and building and documenting advanced digital forensic cases.

The *Check Point Certified Security Administrator* certification validates the ability to install, configure, and manage Check Point Security Gateway and Management Software Blade systems on the GAiA operating system. Holders of this certification are tested to be able to: Defend against network threats; evaluate existing security policies and optimize the rule base; manage user access to corporate LANs; monitor suspicious network activities and analyze attacks; troubleshoot network connections; and implement Check Point backup techniques. More specially the skills the holders of this certification embrace are:

- Installing R80 management and a security gateway in a distributed environment
- Configuring objects, rules, and settings to define a security policy
- Working with multiple concurrent administrators and define permission profiles
- Configuring a Virtual Private Network and work with Check Point clustering
- Performing periodic administrator tasks as specified in administrator job descriptions

#### D. TECH CERTIFICATIONS LOSING THE MOST IN CASH MARKET VALUE

In the table below are tech certifications currently recording the largest market value losses in the six months ending October 1, 2019. In some cases, these declines can be attributed to a narrowing of the gap between supply and demand as more candidates achieve certification. However as stated earlier in this report, not all employers recognize certification to be an adequate measure of talent in a technology discipline, preferring alternative forms of accreditation to fit their needs.

CERTIFICATION	Average Pay Premium (% of base salary equivalent)	6-mo. Market Value Decrease (April 2019 to October 2019)
- Red Hat Certified Architect	4 %	<b>-</b> 45.5 %
- EC-Council Certified Incident Handler (ECIH)	9 %	-35.7 %
- Information Systems Security Management Professional (ISSMP/CISSP)	10 %	-33.3 %
- Oracle Certified Associate - WebLogic Server Admin.	5 %	-28.6 %
- Red Hat Certified Architect: Cloud	6 %	-25.0 %
- Professional Certified Investigator	8 %	-20.0 %
<ul> <li>AWS Certified DevOps Engineer – Professional</li> <li>EC-Council Certified Network Defender</li> <li>EC-Council Computer Forensic Investigator (CHFI)</li> <li>GIAC Certified Project Manager (GCPM)</li> </ul>	9 %	-18.2 %
GIAC Certified Intrusion Analyst (GCIA)     Six Sigma Master Black Belt	10 %	-16.7 %
<ul> <li>Cisco Certified Network Associate (CCNA)</li> <li>GIAC Security Essentials (GSEC)</li> <li>Juniper Networks Certified Internet Specialist (JNCIS)</li> <li>Microsoft Certified Solutions Associate(all)</li> <li>Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure</li> <li>VMware Certified Associate - Cloud</li> <li>VMware Certified Associate - Data Center Virtualization</li> </ul>	5 %	-16.7 %



# 4Q 2019 Tech Labor Trends Discussion & Analysis

# IT Skills and Certifications Pay Index™

Data collected through October 1, 2019



#### **TECH LABOR TRENDS DISCUSSION & ANALYSIS**

#### A. INTRODUCTION

It's difficult to find an employer that isn't struggling to come up with its own unique tech staffing model that balances three things: the urgencies of digital transformation and cybersecurity threats, combating ever deepening security threats, and keeping increasingly complex systems and networks running smoothly and efficiently.

The staffing challenge has moved well beyond simply having to choose between contingent workers, full-time tech professionals, and a variety of third-party services options. Over the next few years managers will continue to be tasked with leading a massive transformation of the technology and tech-business hybrid workforce to focus on delivering a wide variety of operational solution and revenue-generating opportunities including:

- Next-gen Internet of Everything
- Al-driven development
- Machine Learning
- Blockchain
- Mobility
- Big Data//Information Integration/ BI analytics
- Cybersecurity
- Autonomous things & robotics
- Edge computing
- Quantum computing
- Cloud computing
- Healthcare tech/loMT/Telemedicine
- Carbon-reducing technology/exponential energy

All of these depend on solving the puzzle of getting the mix of critical technology and business skills and experience *just right* when shortages of skills and talent have never been more profound or more constraining in effecting business transformation.

These changes don't happen overnight. Practically speaking, it takes a few fiscal cycles to get budgets in line and recruiting and training efforts in place to build any new foundation for an optimally restructured workforce. To be sure, 'clean sheeting' your organizational systems and practices isn't realistic: you need to build a new human resource foundation under what you're already doing, incrementally strengthening that foundation over time. This takes a well-thought out job role architecture plus carefully crafted agile compensation models to get people paid to true competitive market levels and incented to perform at high levels.

# Dramatic changes in the corporate tech workforce, driven by disruptive digital technology, continues to define 2019 tech labor supply and demand

Employers have been facing conspicuously harder tech labor challenges in 2019 than any year in recent history. And their people problems are about to get exponentially worse unless they start laying the groundwork *right now* for a new staffing paradigm that will soon be thrust upon each and every one of them.

We've conducted interviews in 2019 with 500+ senior tech execs. Our findings? Most not only realize this threat but are conspicuously stressed out about it. Two long time labor trends have shifted recently that will help them in the short term.

First, market value volatility in pay for tech skills is the lowest it's been the past decade. The 1,070 certified and non-certified tech skills tracked in Foote Partners' **Tech Skills and Certifications Volatility Index** are averaging market value fluctuations of 21.5% in the last twelve months (quarter-to-quarter percent of skills changing value) compared to 27% to 31% four years ago (see page 42 - 46).



Second, the constant frenzy surrounding short term skills gaps and unfilled jobs targeted at point solutions has quieted down according to our recent quarterly labor market benchmark research. There are many indicators for this including the fact that growth in pay for the 1,070 skills and certifications in our quantitative research is down for the past six months and negative for the year 2019. In other words, the gap between supply and demand for tech skills has narrowed broadly across all certified and non-certified skills surveyed in the past 12 months.

What's overtaking these two trends is something more urgent and potentially catastrophic when it comes to managing tech professionals: several game-changing emerging technologies that are altering the landscape of not just businesses but the private lives of billions of people. Among them are Artificial Intelligence-driven development, Blockchain, the next generation of IoE (Internet of Everything), Automation, Big Data, and countless digital innovations. Layered into all of these is continuing efforts in to building deeper cybersecurity capabilities for constantly escalating threat levels.

The upshot is 2020 will continue the trend of employers taking stock in how poorly prepared they are from a talent perspective for consuming these revolutionary technologies. And trust us, they will all be enthusiastically deepening their commitment to them within the next three years.

The hardest truth and most difficult barrier are that the human resource management function supporting technology professionals at most companies has for years been unable to get in front of the unique demands of the technology workforce. They've been barely getting by for years with short-term fixes. Here's what it looks like from the perspective of HR leaders:

- People management systems and practices to tech professionals that have become frighteningly ineffective. Even ad hoc work-around solutions are failing
- Persistent fallout
  - Too many tech job titles
  - High tech staff churn in key roles, especially the most experienced tech workers.
  - Skills gaps. Difficulty finding and hiring tech professionals
  - Overreliance on consultants, contractors, temps
- **Confusion about pay.** Constant uncertainty about how much to pay tech professionals, especially new jobs and the "Swiss Army knife" hybrid positions.
- **Job Definition/Design Chaos.** Managing independently created tech jobs that don't fit in very well with established tech roles...that are themselves ill-defined
- Job Path Uncertainty: tech workers have trouble navigating their careers and employers aren't helping them very much

If these new blockbuster technologies existed independent of one another it would not be nearly as frightening from a labor demand perspective. But they don't: they're all part of one gigantic dynamic mesh. This mesh will demand an unprecedented level of talent that will place a stunning labor strain on employers regardless of whether they are developing, supporting, or consuming these pervasive groundbreaking technologies.

And here's the rub: employers cannot aspire to capitalize on these transformation technologies without first climbing out of the deep hole they've been digging for years. That means replacing HR management systems and practices that lack the power, agility and flexibility necessary to do competitive combat in a labor environment substantially different than what has existed heretofore. The next few years will test employers' people management capabilities will like never before.





There is a window of opportunity right now while these new technologies are maturing. More employers are commencing the serious work of repairing broken or underperforming people management systems and practices.

#### Architecture to the rescue—but this time for managing tech professionals

Foote Partners has worked with countless employers over more than 25 years in rethinking how they define the work of their tech professionals and how they can shape an enterprise tech workforce to deliver on business goals. But even more important, how they need to think about and build capabilities for the future, executing on business strategies that are not yet fully formed but which we, as experienced forecasters and analysts, have helped them understand capabilities which will need to be operational in their future.

Our observation across more than 3,400 employers is that the only approach to this particular work that has ever achieved *consistent* success—much less any proven success—has been one based on a strong architectural foundation. Not business architecture or technical architecture but rather *people architecture*.

By this we mean applying, to human capital management, traditional architecture principles and practices. Adopting a framework for tech people and pay that properly defines, classifies, and aligns job roles, levels, skills and competencies across the enterprise and allows for accurate matching of people and jobs to a constantly evolving marketplace. And perhaps most importantly, one that that is flexible in principle and agile enough in practice to enable job and pay scalability, meet forecasted labor needs, and accommodate growth and change with minimal pressure while also not creating new problems as a byproduct.

Architecturally driven tech people management practices have been commonplace for years at consulting industry employers and virtually nowhere else. The business models and competitive focus of these employers relies on people performing services and as such their chief assets "walk out the door every night". They operate within business models that have specialized people practices and budgets that simply are not easily replicated in other industries.

This shouldn't be a novel idea but it is. It's similar to how architecture thinking and practices were applied to technology inventorying and acquisition in the early 1990s and to businesses since the day they began. Enterprise architecture later became its own discipline as technology and business converged over the last two decades.

**Tech People Architecture** is similar in principle to traditional IT architecture initiatives but applied instead to workforce management and tech human capital. There are strategy and capability roadmaps, phase gate blueprints, benchmarks, performance metrics, and stakeholder management is critical. Governance issues need careful attention and business strategy drives it all. **Agile Compensation** is the answer to the chaos created by the proliferation of technology related job titles and lack of consistency in job definition and pay programs across the enterprise for the same work performed.

(For a detailed explanation of Tech People Architecture: WorldatWorld Journal - November/December 2019 issue)

But with Agile Compensation and Tech People Architecture it's about how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, business strategy, organizational goals, and culture and performance philosophies, and it promotes flexibility and scalability, like any disciplined architecture approach.



People architecture approaches correct lack of job title standardization in the marketplace and too many job titles floating around IT departments, corporate departments, and business lines. With so many dimensions and variability in tech jobs, employers are unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs. For many, serious retention and hiring problems are showing up for the first time. Recruiters are picking off your best people and candidates are suddenly rejecting offers.

Tensions are palpable and that's one of the factors driving Tech People Architecture and Agile Compensation right now. Let's take a deeper dive into two of these emerging technologies to see why they're going to succeed and what skills will be most in demand.

#### **LABOR FORECAST: Tech Workforce Transformation**

Popularity of Agile Compensation and Tech People Architecture practices as solutions to persistent IT labor problems.

Clearly the widespread acceptance of technology's singular role as an engine of innovation and competitiveness is an unquestioned, as is the energized role that has been thrust upon technology professionals and organizations everywhere to monetize technology. Too often those in the C-suite have been reluctant to hold their IT leaders accountable for such a heavy responsibility, instead choosing to create tech innovation departments and/or hire expensive consulting firms to do what they believe their IT leaders and tech workers are not capable of doing.

In the past few years senior business management has been asking tech leadership and business line leaders to be more accountable in managing large segments of technology talent---for architecting, building and securing new products and services that are largely technology based. And as these leaders are held accountable for higher levels of information and tech management, their performance is being more closely scrutinized. Examples include advanced analytics (for making more informed decisions), greater security (against dreaded cyber-attacks), and capitalizing on fast moving trends such as Blockchain, Machine learning, and digital innovation in general. Meanwhile, for the CIO, the imperative to streamline operations, reduce costs in every possible manner, and ensure compliance with countless regulations must still be met.

Taken together, this has placed tremendous pressure on tech leadership to execute flawlessly and predictably in unfamiliar areas. For many employers this can only be achieved with a dramatic transformation of the tech workforce to a more appropriately skilled group of professionals who are capable of a level of agility, flexibility and aptitude not commonly associated with their predecessors. Companies must be able to architect their human capital to meet business needs now and especially in the future.

Employers are having more difficulty finding and retaining tech talent which can perform at a high caliber on increasingly more difficult tasks. At the same time managers are feeling immense performance pressure. Plus, today the tech workforce is spread throughout the enterprise doing multidimensional jobs that are hard to categorize, price and manage. In this environment architecting of people management is the last and most logical frontier.



Our analysts are learning from tech executives that people architecture practices have been instrumental in dealing with lack of job title standardization in the marketplace and having too many job titles among their internal technology workforce. With so many dimensions and variability in tech jobs, employers have been progressively unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs *that is consistent across the enterprise*.

For many, serious retention and hiring problems were showing up for the first time. Work around solutions used for years to cope with systemic weaknesses in their HR systems were no longer effective. Recruiters started picking off their best people and candidates were suddenly rejecting offers.

The Agile Compensation and Tech People Architecture practices mentioned earlier focus on how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, shifting business strategy and organizational imperatives, culture, and performance philosophies.

Together they propel flexibility and scalability, like any disciplined architecture approach. This is exactly what has been missing for decades in the HR functions at many employers, resulting in constant labor gaps, skills deficits, and failure to execute consistently.

For employers, Agile Compensation and Tech People Architecture has solved these problems:

- Reducing by 50% to 70% the number of tech-related job titles used to plan and administer pay without changing the
  actual job titles bestowed on tech workers.
- Reducing tech staff churn in key roles, especially the most experienced tech workers.
- Streamlining and simplifying compensation administration, giving employers the capacity to classify and market price any
  job, no matter how unique it is.
- Reducing uncertainty about how much to pay tech professionals, especially new jobs and the "Swiss Army knife" hybrid positions.
- Reducing job definition/design chaos around tech jobs that don't fit in with established tech roles.
- Increasing consistent availability and quality of skills and workers and achieving higher utilization rates.

Why do we think that **Tech People Architecture** is a viable alternative for most employers? Because architecture practices are familiar to technology executives. Technical architecture practices have been successful for decades because, when done well, companies have achieved an understanding of what they have systems-wise and could then connect it to where they were going and how they were going to get there, all within a process inclusive of all the various stakeholders who shared the risk in the outcome. A technical architecture helped to clearly define enterprise technology capabilities and give companies more options and flexibility going forward.



#### LABOR ANALYSIS: Training becomes the critical differentiator

A 2018 Cyentia Institute study entitled "Unraveling the Cyber Skills Gap & Talent Shortage" found that 80% of respondents do not feel adequately prepared to defend their organizations. 68% of the 3,109 international tech professionals surveyed (81% working in cybersecurity) express doubts about their organization's readiness to thwart advanced threats.

Foote Partner's latest *IT Skills and Certifications Pay Index™* provides evidence of employers' response to the cybersecurity talent retention gap: The Certified Cyber Forensics Professional certification is earning the highest certification cash premium among all 458 reported in the *Pay Index*, averaging the equivalent of 17% of base salary. Further, in the most recent October data update of our *IT Professional Salary Survey*, Cybersecurity Specialists with three years of experience are averaging \$107,000 in base salary in 65 U.S. cities. Senior level cyber specialists with five years' experience are averaging \$137,000.

But with a nagging lack of consistency nationally in cybersecurity career definitions, and a shocking dearth of experienced cyber professionals, employers can expect to experience difficulties in attracting and retaining cybersecurity talent for months or even years to come.

Employers are more aware that they don't have the right people in their security departments. What's missing are enough experienced security professionals who understand:

- Threat Intelligence and Analysis
- Valuing Asset Inventory
- Access/Identity Mgt
   Information Risk
- Visibility
- Cryptography
- Audit log analysis
- Compliance and policy
- Secure Data Management
- Information Risk Management
- Network Security
- Process Optimization and Agile Controls
- Secure and defensive programming
- Business Continuity Management

Chief Security Officers are desperate for qualified talent to determine whether or not there's been an attack, to identify root cause, and to figure out what information has been exposed. They're allocating more financial resources to security challenges according to our data. But the linkage between the business and the information security and cybersecurity organizations is still too weak from a labor perspective.

A common refrain in our interviews has been "We're going to need as many people as possible to 'hit the ground running' to meet the demand". That's going to be a tall order not to mention a bit unrealistic in the short term. The fact is it's going to take another three to five years to narrow this particular skills gap. Employers will get there because indications are that the money and incentives are sufficient to get vendors, employers, and training organizations focused on the solution. And of course, it will take that long to get the requisite experience in place, which is typically 4 to 6 years of hands-on experience.



Cybersecurity skill sets are still evolving in training protocols. Hands-on experience in a cyber security environment is more critical to cyber security jobs than just academic learning. Only 7% of the top universities around the world offer a technical cybersecurity degree at the undergraduate level. Cybersecurity curriculum has to dramatically expand and colleges need to aggressively pursue internship opportunities for their students to expose them real-world conditions. There need to be clear channels for attracting people into a profession that do not have the cache of software development.

This Cyentia Institute study concludes that organizations that invest in training show improved preparedness at both the employee and corporate level. The problem is that not enough companies are investing in training cybersecurity skills: half of the respondents pay for their own training and only 15% reported that their employers cover all cybersecurity training expenses. Moreover, 60% reported using personal time for IT and security training. Only 13% of companies conduct training during normal business hours and 35% of respondents report spending at least \$1,000 annually in training-related expenses.

Figure 4 shows where investment intersects with value according to the perceptions, experience, and activities of Security Operations Center (SOC) and Incident Response (IR) staff. In theory, activities in the upper-left would offer good value at comparatively low cost. The only activity squarely in that quadrant? Training.







One of the key findings in our own recent in-depth interviews with more than 90 Chief Security Officers and Chief Information Security Officers is an expanded definition of "security professional" that is being taken more into account in hiring decisions. It's a long list but it can be distilled down to these:

- Ability to translate technology risk to business risk.
- Think business and learn business speak
- Understand your industry
- Be open-minded and think outside the box (be strategic and not just tactical)
- · Develop your people skills and work at being trustworthy.
- Be able to write and present high-level concepts coherently and succinctly. Keeping in mind the language of business

Cybersecurity leadership and governance issues. In some cases, it's going to become apparent that organizations simply don't have the right security leadership in place. Organizations have to ask themselves if security itself is sitting in the right place within the organization, who is accountable for security, and how to hold them accountable. You can't avoid every serious incident, and while many businesses are good at incident management, too few have an established, organized approach for evaluating what went wrong and how to fix it. As a result, they are incurring unnecessary costs and accepting inappropriate risks.

Organizations of all sizes need to take stock now in order to ensure they are fully prepared and engaged to deal with these emerging security challenges and in particular cyber security strategy. By adopting a realistic, broad-based, collaborative approach to cyber security and resilience, government departments, regulators, senior business managers and information security professionals will better understand the true nature of cyber threats and how to respond quickly and appropriately.

Some companies are augmenting their staffing with machine learning technology and probability theory to model patterns of behavior and flag anomalous activity. Machine learning technology is increasingly being adopted as a way to reduce the noise (alerts) that traditional security products produce and to bubble up mid- and high-level concerns to IT staff. The discipline of machine learning finds its way into many large companies through the hiring of data scientists, who use algorithms to efficiently analyze event logs for their security teams.

Overall, we expect an increase in high-profile breaches in the near future. This will push corporate boards and senior business executives even farther to face <u>decades</u> of inadequately staffing their security operations and must now conquer a severe cybersecurity talent gap. They only solution will be to train, train over the next four years until as the gap narrows organically.



# IT Skills & Certifications Pay Data Trend Charts

# IT Skills and Certifications Pay Index™ – 3rd Quarter 2019 data edition

(Data collected through October 1, 2019)

- Tech Certifications
- Noncertified Teck Skills
- Tech Skills & Certifications Volatility Index™

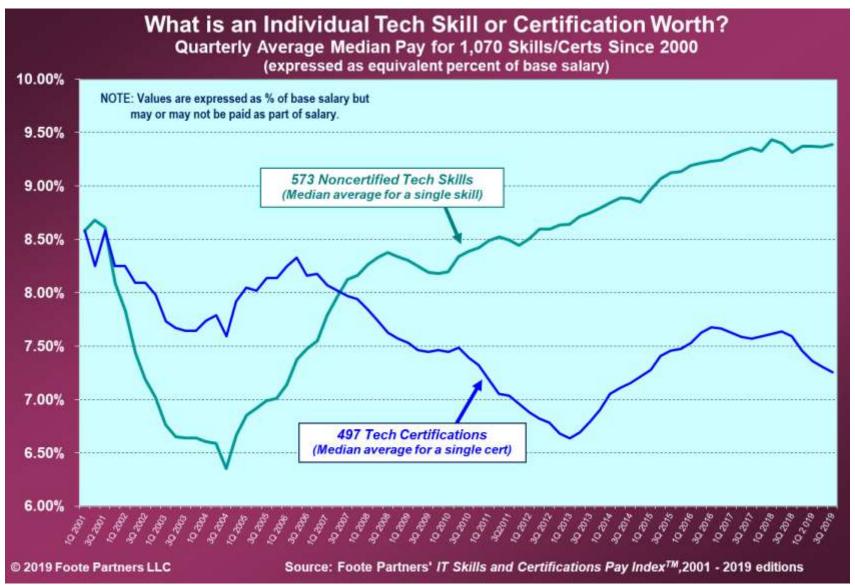


# How to interpret gains and losses in IT skills and certifications pay premiums

Quarterly gains and losses in premium pay reflect a widening or narrowing, respectively, in the gap between supply and demand for skills and certifications. This may occur for any number of reasons. For example, a quarterly decline in pay for a skill may signal that the market supply of talent for that skill is catching up to demand—not necessarily that demand is starting to wane. IT professionals are often attracted to a skill or certification if they perceive that it has rising value in the marketplace and therefore can help them to achieve higher pay, greater job security, a promotion, or more flexibility in their career choices. As they pursue greater competency in that skill or as more workers attain certification, supply increases and market pricing (which is elastic to the laws of supply and demand) will be driven downward unless demand is rising at the same proportional rate. Conversely, if demand rises and supply is not increasing to match that level of demand, pay premiums for specific skills and certifications will increase.

Therefore, when interpreting gains and losses in market pay it is important to consider all factors that could be driving supply and demand and market perception. Those factors range from:

- aggressive marketing of certifications by vendors;
- changes in certification programs (e.g. certification extensions or retirement);
- new technology and evolution/maturation of current technologies;
- technology adoption rate;
- product integration strategies,
- economic conditions;
- employment opportunities;
- mergers/acquisitions;
- budget cycles and the timing of skills and talent acquisition by employers;
- changes in labor sourcing plans pursuant to company strategies.

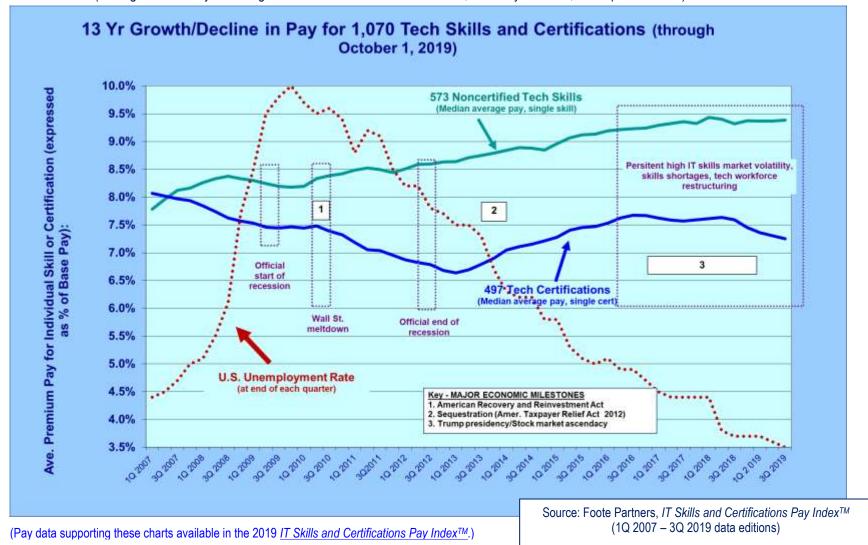


SOURCE: Foote Partners *IT Skills and Certifications Pay Index™* 2000 to 2019 quarterly editions



Fig 5 - Premium Pay for Tech Certifications Wanes as Non-Certified Tech Skills Show Gains as Disruptive Technologies Intensify

(Average Median Pay for a Single Certified vs. Noncertified Tech Skill, Last 13 years – 78,234 IT professionals)





# **Tech Certifications:** Latest market value trends

(Data collected through October 1, 2019)



### 2-YEAR TECH CERTIFICATIONS PAY TRENDS

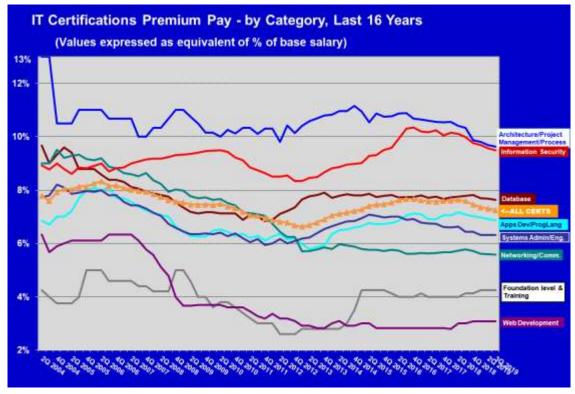
(Through 10/1/2019 – 78,234 IT Professionals)

# 3 & 12 MONTH TECH CERTIFICATIONS PAY TRENDS BY CATEGORY

(Through 10/1/2019 - 78,234 IT Professionals)

% Change in Average Median Pay for a Single IT Certification

	Change in Average Premium Pay by Category						
IT CERTIFICATIONS CATEGORIES	# of certs surveyed	% Change 3 mos	% Change 6 mos	% Change ANNUAL	% Change 2 yrs	% Change 3 yrs	% Change 4 yrs
Foundation level and Training	8	0.0%	3.0%	6.3%	6.3%	6.3%	0.0%
Apps Development/Prog. Languages	56	-1.0%	-1.6%	-3.6%	0.0%	0.7%	2.2%
Data/Database	47	-0.1%	-1.7%	-1.0%	-0.3%	-0.6%	-2.2%
Web Development	12	0.0%	0.0%	2.8%	9.4%	9.4%	2.8%
Networking & Communications	102	-0.4%	-2.3%	-2.3%	-0.5%	-2.5%	-3.0%
System Administration/Engineering	116	-0.1%	-1.9%	-4.8%	-6.5%	-10.0%	-10.8%
Information/Cyber Security	95	-1.3%	-1.9%	-5.3%	-5.9%	-3.6%	3.1%
Architecture/Project Management/Process	61	-1.2%	-1.8%	-6.9%	-8.6%	-10.9%	-8.1%
ALL CERTIFICATIONS REPORTED	497	-0.8%	-2.0%	-4.3%	-3.7%	-4.2%	-1.4%



SOURCE: Foote Partners <u>IT Skills and Certifications Pay Index™</u> 2004 to 2019 quarterly editions

#### Foote Partners, LLC Foote Research Group

### **497 Tech Certifications Reported**

#### Foote Partners News Release - November 11, 2019

Avava Certified Implementation Specialist Avaya Certified Professional Design Specialist Avaya Certified Solution Specialist AWS Certified Solutions Architect - Associate

AWS Certified Solutions Architect - Professional

AWS Certified SysOpsAdministrator-Associate AWS Certified Developer - Associate

AWS Certified DevOps Engineer - Professional

BICSI ITS Technician

BICSI Technician and Registered Communications Distribution Designer

Brocade Certified Network Engineer Brocade Certified Network Professional

**Brocade Certified Fabric Designer** 

Brocade Certified Fabric Professional (BCFP)

Certificate of Cloud Security Knowledge

Certification Authorization Professional (CAP)

Certification of Competency in Business Analysis Certification Partners Convergence Technologies Professional (CTP)

Certified Analytics Professional (CAP)

Certified Associate in Project Management)

Certified Business Analysis Professional (CBAP)

Certified Business Continuity Professional (CBCP)

Certified Cloud Architect

Certified Cloud Security Professional

Certified Cloud Technology Professional Certified Computer Examiner (CCE)

Certified Computing Professional (CCP-ISC2)

Certified Cyber Forensics Professional

Certified Database Design Specialist

Certified Data Centre Management Professional

Certified Data Management Professional

Certified Disaster Recovery Engineer (C/DRE)

Certified Forensic Computer Examiner

Certified Fraud Examiner

Certified Healthcare Information Security and Privacy Practitioner (HCISPP)

Certified in Convergent Network Technologies (CCNT)

Certified in Risk and Information Systems Control (CRISC)

Certified in the Governance of Enterprise IT

Certified Information Privacy Manager- all countries Certified Information Privacy Professional - all countries

Certified Information Privacy Technologist- all

Certified Information Security Manager (CISM)

Certified IT Compliance Professional

Certified Manager of Software Quality (CMSQ)

Certified Penetration Testing Engineer (C)PTE)

Certified Project Management Practitioner

Certified Protection Professional

Certified Salesforce Advanced Developer

Certified Salesforce Developer

Certified ScrumMaster

Certified Scrum Coach

Certified Scrum Developer

Certified Scrum Product Owner

Certified Scrum Professional

Certified Scrum Trainer

Certified Secure Software Lifecycle Professional

Certified Software Quality Analyst (CSQA)

Certified Technical Architect (Salesforce.com)

Certified Telecommunications Network Specialist

Check Point Certified Master Architect (CCMA)

Check Point Certified Security Administrator (CCSA)

Check Point Certified Security Expert (CCSE)

Cisco Certified Architect

Cisco Certified Design Associate (CCDA)

Cisco Certified Design Expert (CCDE)

Cisco Certified Design Professional (CCDP)

Cisco Certified Entry Network Technician (CCENT)

Cisco Certified Internetwork Expert (CCIE) Cisco Certified Network Administrator - Cloud

Cisco Certified Network Associate (CCNA)

Cisco Certified Network Associate - CyberOps

Cisco Certified Network Associate - Data Center

Cisco Certified Network Associate - Routing and

Switching

Cisco Certified Network Associate - Security Cisco Certified Network Associate - Wireless Cisco

Certified Network Professional (CCNP)

Cisco Certified Network Professional - Cloud

Cisco Certified Network Professional - Collaboration

Cisco Certified Network Professional - Data Center

Cisco Certified Network Professional - Routing and Switching

Cisco Certified Network Professional - Security

Cisco Certified Network Professional - Wireless Cisco Certified Systems Instructor (CCSI)

Cisco Data Center Unified Fabric Design Specialist

Cisco Data Center Unified Fabric Support Specialist

Cisco Data Center Unified Computing Design Specialist

IBM Advanced Systems Administrator (all)

Cisco Data Center Unified Computing Support Specialist

Citrix Certified Administrator - Networking (CCA)

Citrix Certified Associate - Virtualization

Citrix Certified Expert – Networking Citrix Certified Expert - Virtualization

Citrix Certified Instructor (CCI - Virtualization, Networking, or Mobility)

Citrix Certified Professional – Mobility (CCP-M)

Citrix Certified Professional - Networking

Citrix Certified Professional-Virtualization (CCP-VCIW

Certified Database Design Specialist

CIW Certified Database Design Specialist

CIW Network Technology Associate

CIW Web Design Professional

CIW Web Development Professional

CIW Web Foundations Associate

Cloud U (Rackspace)

Cloudera Certified Associate Administrator

Cloudera Certified Associate Data Analyst

Cloudera Certified Associate Spark and Hadoop

Developer

Cloudera Certified Professional: Data Engineer

CompTIA A+

CompTIA Advanced Security Practitioner (CASP) CompTIA Certified Technical Trainer (CTT+)

CompTIA Cloud Essentials

CompTIA Cloud+

CompTIA Cybersecurity Analyst+ (CySA+)

CompTIA Linux+

CompTIA Mobile App Security+

CompTIA Mobility+

CompTIA Network (Network+)

CompTIA PenTest (CPT+)

CompTIA Project+

CompTIA Security+

CompTIA Server+ CompTIA Storage+

Convergence Technologies Professional (CTP)

CSX Cybersecurity Practitioner (CSXP)

CWNP Certified Wireless Security Professional (CWSP) CWNP/Certified Wireless Analysis Professional (CWAP)

CWNP/Certified Wireless Design Professional (CWDP)

CWNP/Certified Wireless Network Administrator (CWNA) CWNP/Certified Wireless Network Trainer (CWNT)

CWNP/Certified Wireless Network Expert (CWNE) CWNP/Certified Wireless Technology Specialist (CWTS)

Cyber Security Forensic Analyst

EC-Council Certified Advanced Network Defense (CAND)

**EC-Council Certified Application Security** Engineer (CASE)

**EC-Council Certified Encryption Specialist** (ECES)

EC-Council Certified Ethical Hacker (CEH)

**EC-Council Certified Incident Handler** 

EC-Council Certified Network Defender

EC-Council Certified Secure Programmer (ECSP)

EC-Council Certified Security Analyst (ECSA)

EC-Council Computer Forensic Investigator (CHFI)

EC-Council Disaster Recovery Professional (EDRP)

EC-Council Licensed Penetration Tester (LPT)

**EMC Cloud Architect Expert** 

**EMC Cloud Architect Specialist** 

EMC Cloud Engineer (EMCCE)

EMC Data Center Architect (EMCDCA - all versions)

EMC Data Science Associate

EMC Data Science Specialist, Advanced

EMC Implementation Engineer - Expert (EMCIE)

EMC Implementation Engineer - Specialist

(EMCIE)

EMC Information Storage Associate (EMCISA)

EMC Platform Engineer - Specialist (EMCPE)

EMC Storage Administrator - Associate (EMCSA-

EMC Storage Administrator - Expert (EMCSA-E) EMC Storage Administrator - Specialist (EMCSA-

EMC System Administrator – Documentum

Specialist (Emsie) EMC Technology Architect - Expert (EMCTA)

EMC Technology Architect - Specialist (EMCTA) GIAC Certified Forensics Analyst (GCFA)

GIAC Certified Forensics Examiner

GIAC Certified Incident Handler (GCIH) GIAC Certified Intrusion Analyst (GCIA)

GIAC Certified Penetration Tester (GPEN) GIAC Certified Perimeter Protection Analyst

GIAC Certified Project Manager (GCPM) GIAC Certified Unix Security Administrator

(GCUX) GIAC Certified Web Application Defender

GIAC Certified Windows Security Administrator

#### Foote Partners, LLC Foote Research Group

### **497 Tech Certifications Reported**

#### Foote Partners News Release - November 11, 2019

Certified Information Systems Auditor (CISA) Certified Information Systems Security Professional Certified IP Telecom Network Specialist (CIPTS) Certified IT Architect (IASA CITA)

GIAC Critical Controls Certifications (GCCC)

GIAC Cyber Threat Intelligence (GCTI)

GIAC Enterprise Defender (GCED) GIAC Exploit Researcher and Advanced

Penetration Tester (GWAPT)

GIAC Information Security Fundamentals (GISF)

GIAC Information Security Professional (GISP)

GIAC Mobile Device Security Analyst (GMOB)

GIAC Network Forensic Analyst (GNFA)

GIAC Python Coder (GPYC)

GIAC Reverse Engineering Malware (GREM)

GIAC Secure Software Programmer -- .NET

GIAC Secure Software Programmer--Java

GIAC Security Essentials (GSEC)

GIAC Security Expert (GSE)

GIAC Security Leadership (GSLC)

GIAC Systems and Network Auditor (GSNA)

GIAC Web Application Penetration Tester (GWAPT)

Google Associate Cloud Engineer

Google Cloud Certified Professional Cloud Architect

Google Cloud Certified Professional Data Engineer

Google Professional Cloud Developer

Google Professional Cloud Network Engineer

Google Professional Cloud Security Engineer

HDI Customer Service Representative

HDI Desktop Support Manager

HDI Desktop Support Technician

**HDI Support Center Analyst** 

**HDI Support Center Director** 

HDI Support Center Manager

HDI Support Center Team Lead

**HDI Technical Support Professional** 

Help Desk Analyst: Tier 1 Support Specialist/Ed2Go

Help Desk Team Lead/RCCSP

Hitachi Qualified Professional - Storage

Administration

HP Accredited Integration Specialist (AIS)

HP Accredited Solutions Expert (ASE - all)

HP Accredited Technical Professional (ATP - all)

HP ASE - Cloud Integrator V2

HP ASE - Storage Solutions Architect V1 N2

HP ASE Cloud Architect V2

HP ASE Vertica Big Data Solutions Administrator

HP ATP - Cloud Administrator V1

IBM Certified Administrator for SOA Solutions:

WebSphere Process Server

IBM Advanced Systems Administrator (all)

IBM Certified Administrator - Cognos

IBM Certified Advanced Application Developer (all)

IBM Certified Application Developer (all)

IBM Certified Data Engineer - Big Data

IBM Certified Database Administrator - DB2

IBM Certified Designer - Cognos BI

IBM Certified Developer - Cognos

IBM Certified Solution Advisor - Cloud Computing Architecture V5

IBM Certified Solution Advisor - DevOps V2

IBM Certified Solution Architect - Cloud Computing

Infrastructure V1

IBM Certified Solution Designer (all)

IBM Certified Solution Developer - DB2 SQL

IBM Certified Solution Developer: WebSphere (all)

IBM Certified Specialist - z System (all)

IBM Certified Specialist - Virtualized Storage V1

IBM Certified Systems Administrator: WebSphere DataPower SOA

IBM Certified Systems Administrator - AIX V1 IBM Certified Systems Administrator - WebSphere

IBM Certified Systems Administrator (all)

InfoSys Security Architecture Professional (ISSAP/ CISSP)

InfoSvs Security Engineering Professional (ISSEP/ CISSP)

InfoSys Security Management Professional (ISSMP/ CISSP)

ITIL Expert Certification

ITIL Foundation Certification

ITIL Intermediate Certification

ITIL Master Certification

JBoss Certified Developer (Seam. Persistence.

Juniper Networks Certified Internet Associate

Juniper Networks Certified Internet Expert

Juniper Networks Certified Internet Professional Juniper Networks Certified Internet Specialist

Linux Professional Institute certification (LPIC-2)

Linux Professional Institute certification (LPIC- 3) Magento 2 Certified Professional Developer

Microsoft Certified Professional

Microsoft Certified: Azure Administrator Associate

Microsoft Certified Solutions Associate(all)

Microsoft Certified Solutions Associate: BI Reporting

Microsoft Certified Solutions Associate: Cloud Platform Microsoft Certified Solutions Associate: Microsoft

Dynamics 365

Microsoft Certified Solutions Associate: SQL 2016 DBA Microsoft Certified Solutions Associate: SQL Server

2012/2014/2016

Microsoft Certified Solutions Associate: Web Applications Microsoft Certified Solutions Associate: Windows Server 2012/2016

Microsoft Certified Solutions Developer (MCSD)

Microsoft Certified Solutions Developer: Applications

Microsoft Certified Solutions Expert (MCSE) - Server Infrastructure

Microsoft Certified Solutions Expert: Business Applications

Microsoft Certified Solutions Expert: Business Intelligence Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure

Microsoft Certified Solutions Expert: Core Infrastructure Microsoft Certified Solutions Expert: Data Management

Microsoft Certified Solutions Expert: Data Platform Microsoft Certified Solutions Expert: Desktop Infrastructure

Microsoft Certified Trainer (MCT)

Microsoft Office Specialist

Microsoft Specialist in Windows 10

Mongo DB Certified DBA

Mongo DB Certified Developer

MongoDB Certified Developer Associate

NetApp Certified Data Administrator, ONTAP (NCDA) NetApp Certified Implementation Engineer (NCIE)

NetApp Certified Storage Associates - Hybrid Cloud

NetScout/nGenius Certified Analyst (nCA) NetScout/nGenius Certified Expert (nCE)

NetScout/nGenius Certified Master (nCM)

NetScout/nGenius Certified Professional (nCP)

Novell/Certified Administrator (CNA)

Novell/Certified Novell Engineer (CNE)

Novell Certified Instructor

Novell Certified Linux Engineer (Novell CLE)

Novell Certified Linux Professional (Novell CLP)

Novell Identity Manager Administrator

Open Group Certified Architect (Open CA)

Open Group Certified IT Specialist (Open CITS) Oracle Business Intelligence Foundation Suite 11G

Certified Implementation Specialist Oracle Certified Associate - DBA (OCA) Oracle Certified Associate - Java SE Programmer

Oracle Certified Associate - MvSQL 5

Oracle Certified Associate - WebLogic Server Administrator

Oracle Certified Expert - Java Platform EE Developer (all)

Oracle Certified Expert - MySQL 5.1 Cluster Database Administrator

Oracle Certified Expert - Siebel CRM Business Analyst

Oracle Certified Expert - Solaris 10 Network Administrator for Solaris

Oracle Certified Master - DBA (OCM)

Oracle Certified Master - Java EE Enterprise

Oracle Certified Master - Java SE Developer Oracle Certified Professional - Advanced PL/SQL

Developer Oracle Certified Professional - Application Server

Administrator Oracle Certified Professional - Database Cloud

Administrator Oracle Certified Professional - DBA (OCP)

Oracle Certified Professional - E-Business Suite 12

Oracle Certified Professional - Forms Developer Oracle Certified Professional - Java EE Web Services Developer

Oracle Certified Professional - Java SE

Programmer Oracle Certified Professional - MySQL 5

**Database Administrator** Oracle Certified Professional - MvSQL 5

Developer Oracle Certified Professional - PL/SQL Developer Oracle Certified Professional - Solaris 10 Systems Administrator

Oracle Certified Professional, Java EE Web Component Developer

Oracle Certified WebLogic Server System Administrator Certified Expert

Oracle Exadata 11g Certified Implementation Specialist

Oracle Linux Certified Administrator (OCA) Oracle SOA Infrastructure Implementation

Certified Expert Oracle VM 3.0 for x86 Certified Implementation Specialist

# Foote Partners, LLC Foote Research Group

### **497 Tech Certifications Reported**

#### Foote Partners News Release - November 11, 2019

HP ATP - Storage Solutions V1 /V2
HP ATP Big Data Vertica Solutions V1
HP Master Accredited Solutions Expert (MASE - all)
Huawei Certified Network Professional (all)

Huawei Certified Network Professional (all)
Huawei Certified Network Expert (all)

Pegasystems Certified Lead System Architect Pegasystems Certified Senior Systems Architect Pegasystems Certified System Architect

Pegasystems Certified Pegan Business Architect Pegasystems Certified UI Specialist

PHP Certification

Pivotal Application Architect

Pivotal Cloud Foundry Operator certification

Pivotal Developer

PMI Agile Certified Practitioner (PMI-ACP)

PMI Portfolio Management Professional (PfMP)

PMI Professional in Business Analysis (PMI-PBA)

PMI Program Management Professional (PgMP)
PMI Project Management Professional (PMP)

PMI Risk Management Professional (PMI-RMP)

Prince2 Foundation
Prince2 Practitioner

Professional Certified Investigator

Professional in Project Management (GAQM)

Qualified Information Security Professional Q/ISP

Rackspace Certified Technician

Red Hat Certified Architect

Red Hat Certified Architect: Application Development

Red Hat Certified Architect: Application Platform

Red Hat Certified Architect: Cloud Red Hat Certified Architect: DevOps

Red Hat Certified Datacenter Specialist

Red Hat Certified Engineer in Red Hat OpenStack

Red Hat Certified Engineer

Red Hat Certified Specialist in Virtualization

Red Hat Certified System Administrator in Red Hat

OpenStack

Red Hat Certified Systems Administrator RSA Certified Administrator (RSA/CA)

RSA Certified Instructor (RSA/CI)

Salesforce.com Certified Force.com Advanced

Developer

Salesforce.com Certified Force.com Developer Salesforce.com Certified Technical Architect

Salesforce.com Certified Administrator

Salesforce.com Certified Advanced Administrator

SAS Certified Advanced Programmer for SAS 9

SAS Certified Base Programmer for SAS 9

SAS Certified Big Data Professional Using SAS 9

SAS Certified Data Integration Developer for SAS 9

SAS Certified Data Scientist Using SAS 9

SAS Certified Predictive Modeler - SAS Enterprise Miner 14

SAS Certified Statistical Business Analyst - SAS 9 SAS® Certified Advanced Analytics Professional

Using SAS®9

SAS® Certified BI Content Developer for SAS®9

SAS® Certified Data Quality Steward for SAS®

Siebel 8 Consultant Certified Expert

Six Sigma Black Belt

Six Sigma Green Belt

Six Sigma Master Black Belt

Six Sigma Yellow Belt

SNIA Certified Storage Architect

SNIA Certified Storage Networking Expert (SCSN-E)

SNIA Certified Storage Professional

SNIA Certified Systems Engineer Sniffer Certified

Expert

SolarWinds Certified Professional (SCP)

SUSE Certified Administrator

SUSE Enterprise Engineer (SCE)

SUSE Enterprise Architect or (SEA)

Systems Security Certified Practitioner (SSCP)

Teradata 14 Certified Associate

Teradata 14 Certified Database Administrator

Teradata 14 Certified Enterprise Architect

Teradata 14 Certified Master

Teradata 14 Certified Professional

Teradata 14 Certified Solutions Developer

Teradata 14 Certified Technical Specialist

TIBCO Certified Professional TIBCO Certified SOA Architect

TOGAF 9 Certified

VMware Certified Advanced Professional 6.5- Data

Center Virtualization Design

VMware Certified Advanced Professional – Network

Virtualization

VMware Certified Advanced Professional (all)
VMware Certified Advanced Professional 6– Data

Center Virtualization Deployment

VMware Certified Advanced Professional 6/7 -

Cloud Mgt and Automation Deployment
VMware Certified Advanced Professional 6/7 -

Cloud Mgt and Automation Design

VMware Certified Associate - Cloud

VMware Certified Associate - Data Center Virtualization

VMware Certified Design Expert - Network Virtualization

VMware Certified Design Expert - Cloud Mgt and

Automation

VMware Certified Design Expert (all)

VMware Certified Design Expert 6 - Data Center

Virtualization

VMware Certified Professional – Desktop and Mobility

VMware Certified Professional - Digital Workspace

VMware Certified Professional - Network Virtualization

VMware Certified Professional 6 - Data Center

Virtualization (VCP6-DCV)

VMware Certified Professional 6.5 - Data Center

Virtualization (VCP6.5-DCV)

VMware Certified Professional 6/6.5

VMware Certified Professional 6/7 - Cloud Mgt and

Automation



# Tech Skills (Non-certified): Latest market value trends

(Data collected through October 1, 2019)



### 2-YEAR NON-CERTIFIED TECH SKILLS PAY TRENDS

(Through 10/1/2019 – 78,234 IT Professionals)

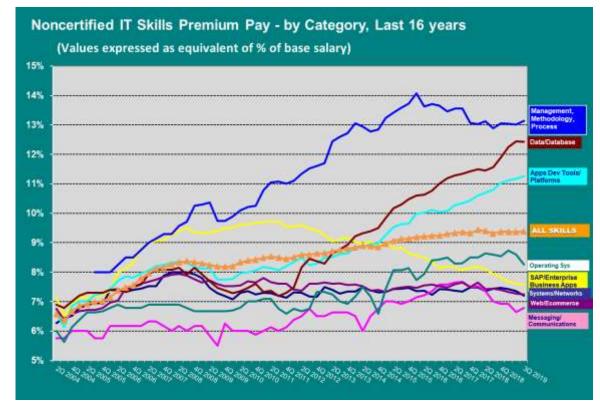
NON-CERTIFIED TECH SK	ILLS PAY TRENDS		
BY CATEGORY			

Average Median Pay for a Single Tech Skill (Non-certified)

(Through 10/1/2019 – 78,234 IT Professionals)

SOURCE: Data supporting these charts is from Foote Partners *IT Skills* & Certifications Pay Index<sup>TM</sup> (2004 to 2019 quarterly editions)

	Change in Average Premium Pay by Category  # of skills % Change %						
NONCERTIFIED IT SKILLS CATEGORIES	surveyed	% Change 3 mos	6 mos	ANNUAL	2 yrs	3 yrs	4 yrs
Systems/Networking	87	-3.1%	-3.7%	-2.3%	-2.3%	-2.3%	-3.0%
Messaging and Communications	14	-2.1%	-2.1%	-7.8%	-11.2%	-5.9%	-3.1%
SAP & Enterprise Business Applications	131	-1.3%	-3.1%	-6.6%	-7.2%	-10.9%	-13.9%
Apps Development Tools & Platforms	98	1.3%	2.0%	5.2%	9.5%	12.4%	18.1%
Web/e-Commerce Development	89	-1.0%	-2.0%	-2.5%	-4.6%	-3.9%	-2.6%
Data/Database	47	1.5%	4.5%	8.5%	10.1%	17.0%	22.2%
Operating Systems	15	-5.3%	-3.1%	-4.4%	-0.2%	4.2%	2.4%
Management/Methodology/Process	92	0.8%	0.7%	0.1%	-3.1%	-3.6%	-2.0%
ALL NONCERTIFIED SKILLS REPORTED	573	0.2%	0.1%	-0.1%	0.6%	1.9%	3.5%



SOURCE: Foote Partners IT Skills and Certifications Pay Index™ 2004 to 2019 quarterly editions

Grunt

# 573 Non-Certified Tech Skills Reported

## Foote Partners News Release - November 11, 2019

Apps Dev. Tools/Platforms	Hibernate/NHibernate	SAP & Enterprise Bus. Apps.	SAP CO
Agile software development	HP ALM (App. Lifecycle Mgt)	ABAP (all modules)	SAP CO-PA
Amazon Kinesis	HP Unified Functional Testing	Baan	SAP CRM
Amazon Web Services (EC2, S3, ASW,	Integration Testing	Enterprise Application Integration	SAP CS
SQS, ELB, et. al.)	iRise	(EAI)	SAP EBP
Apache Ant	Jasmine	IBM Sterling	SAP EDI
Apache Cloudstack	Java SE/Java EE	J.D. Edwards /Oracle	SAP EHS
Apache Cordova	JBehave	Lawson	SAP EPM
Apache Gordova  Apache Flex	Jenkins	Microsoft Dynamics	SAP ERP
•	JIRA	NetWeaver	SAP ESA
Apache Hadoop	JUnit		SAP Exchange Infrastructure (XI)
Apache Lucene	MapReduce	NetWeaver Portal (SAP EP)	SAP FI (Financial Accounting)
Apache Maven	MATLAB	Oracle BPM	SAP FI - CA
Apache Pig/Pig Latin	Microsoft Azure	Oracle CRM	SAP FI – FSCM
Apache Spark	Microsoft SQL Server Mgt Studio	Oracle E-Business suite	SAP FI - Travel Management
Apache Struts/Struts2	Microsoft Team Foundation Server	Oracle Eloqua	SAP Fiori
Apache Tomcat	NetWeaver	Oracle ERP	SAP F&R
Apache Zookeeper		Oracle Financials	
Automated Testing	Nim	Oracle HFM (Hyperion Fin. Mgt)	SAP FS (Insurance)
AWS CloudFormation	NUnit	Oracle HRMS	SAP GRC
AWS Lambda	Objective-C	Oracle NetSuite	SAP GTS
Bitbucket	Objective Caml (Ocaml)	Oracle Payables	SAP HANA
Boost C++	OpenShift	Oracle Payroll	SAP HCM (SAP HR)
Business Objects	Oracle APEX	Oracle Retail	SAP HCM ESS/MSS
C	Oracle Apps Developer Framework	Oracle SCM	SAP HR-PA
C#	PL/SQL	Oracle SOA Suite	SAP Hybris
C++	Powerbuilder	Pega	SAP Integrated Business Planning
C++ /CLI	Progress 4GL/Development tools	PeopleSoft (CRM/Financials/HCM)	SAP IS-Retail
CA PPM (Clarity PPM)	Prometheus	Remedy	SAP IS-U (Utilities)
Cerner Millennium	R language	Salesforce	SAP ITS
Clojure	Rstudio	Accelerated SAP (SLM)	SAP Leonardo
Cloudera software	Ruby	SAP AFS	SAP LES
Cloud Foundry PaaS	Ruby on Rails	SAP ALE	SAP LO
Cobol	SaaS	SAP APO	SAP Lumira
Cognos	SAS	SAP Auto-ID infrastructure	SAP Manufacturing
Confluence	Scala	SAP Digital Banking	SAP MDG (Master Data Governance)
Cucumber	Scrum	SAP Basis Components	SAP MDM
	Selenium	•	SAP MDX
Delphi	ServiceNow ITSM	SAP BODI	SAP MI
Drupal	SPSS	SAP BODI	SAP MII
Eclipse	SQL	SAP Data Services (SAP BODS)	SAP MM
Epic Systems applications	Swift	SAP BOXI/Crystal Reports	SAP MRO
Ethereum	Tcl	SAP BPC	SAP MRS
F#	TestNG	SAP BSP	SAP Netweaver Applications Server
Git/GitHub	TransacT-SQL/tSQLt	SAP Business One	SAP Netweaver BW (BIW)
GitLab		SAP Business Workflow/Webflow	
Go language (Golang)	UML (unified modeling language)	SAP CA	SAP NetWeaver Visual Composer
Google Kubernetes	Visual Basic 6.0	SAP CAF	SAP NWDI
Gosu/Guidewire	Visual C++	SAP CAR	SAP NWDS
Gradle	VMware Cloud Foundry PaaS	SAP CCM	SAP Oil & Gas
Grails/Groovy	WebSphereMQ,	SAP CE	SAP PI (NetWeaver Process Integ.)
Crunt	Xcode	CAD CEM	SAP PI M

SAP CFM

CO CO-PA CRM CS EBP EDI EHS EPM ERP ESA Exchange Infrastructure (XI) FI (Financial Accounting) FI - CA FI - FSCM FI - Travel Management Fiori F&R FS (Insurance) GRC GTS HANA HCM (SAP HR) HCM ESS/MSS HR-PA Hybris Integrated Business Planning IS-Retail IS-U (Utilities) ITS Leonardo LES LO Lumira Manufacturing MDG (Master Data Governance) MDM MDX MI	SAP PM SAP POSDM SAP PP SAP PS SAP PSCD SAP Public Sector Management SAP PY (Payroll) SAP QM SAP Service & Asset Mgt SAP S/4HANA SAP SCM SAP SD SAP SD - GTS SAP SEU SAP SEM SAP SM SAP SM SAP SM SAP SM SAP SM SAP SH SAP SH SAP Web Application Server SAP WEBI SAP WM SAP WM - EWM SAP XCelsius Siebel/Siebel Analytics Software AG webMethods SuccessFactors Web Dynapro Workday HCM

Xcode

SAP PLM

# 573 Non-Certified Tech Skills Reported

### Foote Partners News Release - November 11, 2019

#### **Web/e-Commerce Development**

Active Server Pages

ActiveX

Adobe Experience Manager

Aiax AngularJS Apache Solr Apache web server Apache Velocity Apache Wicket Apex Code

Backbone.is CGI

Cold Fusion MX

Content management systems

CSS/CSS3 Diango Docker Documentum Elasticsearch Ember.is

Front End Development Google Analytics Google App Engine Google Cloud Platform

HTMI 5

JavaBeans/EJB 3.0

JavaFX HTML5

JavaBeans/EJB 3.0 JavaFX **JavaScript JavaScript** Java Server Pages JBoss Wildfly Jetty Joomla! **¡Query** 

JSON KnockoutJS Laravel PHP Magento Magnolia Microsoft .NET

Microsoft BizTalk Server Microsoft Commerce Server Microsoft Identity Integration Server Microsoft Internet Information Services Microsoft Internet Security and Acceleration Server (ISA)

Microsoft SharePoint/SharePoint

Server

Microsoft Silverlight Microsoft Visual Studio

Mobile applications development

Mule/MuleESB Node.is Oracle Fusion Oracle WebLogic Oracle Workflow

Pandas Perl PHP (all) Python React.is Redux **RFST** 

RESTful SailPoint

Scalable Vector Graphics (SVG) Secure software development

Sitecore CMS SOAP

Social Media/Networks Spring Framework Spring Boot Spring Cloud Spring MVC TIBCO UDDI Umbraco **VBScript** 

Video/graphics editing Visual Interdev VoiceXML

Web collaboration appliances Web collaboration appliances Web Content Development Web Design/Development

WebSphere

WebSphere Datapower

Wikis WSDL XAML/XACML XHTMI MP XML (all variants Management, Methodology

and Process

Artificial Intelligence Big Data Analytics Bioinformatics **Business Analysis Business Analytics** Business intelligence

Business process management/

modeling/improvement Business performance

management (software/systems) Capacity Planning/Management

Change management

COBIT

Collaboration software

Complex Event Processing/Event

Correlation

**Configuration Management** Continuous Improvement Continuous Integration CRM Cryptography (encryption, VPN)

Cybersecurity

Cyber Threat Intelligence Data Acquisition and Control

Systems Data Analytics Data Architecture Data Cleansing Data Engineering Data Governance Data Integration Data Management Data Modelling Data Quality Data Science Data Visualization

Data Security DevOps DevSecOps Digital Analytics Digital Forensics eDiscovery E-Procurement FRP

Game Development

General Data Protection Regulation

(GDPR) (EU) 2016/679 Google TensorFlow

HL7

Incident Management

Information management

IT Audit IT Governance ITIL V3 Kanban Machine Learning

Marketo Metadata design and development

Microservices

Microsoft SQL Server Analysis Servs.

Microsoft Visio Network Architecture

NIST

Penetration testing

Predictive Analytics and Modeling

Prescriptive Analytics Program Management

Project management/governance

**QlikView** 

Quality Assurance

Quality management/TQM

Quantitative Analysis/Regression Analysis

Requirements Engineering/Analysis

Risk analytics/assessment Risk management Robotic Process Automation Security architecture and models

SEO

Service Management Six Sigma/Lean Six Sigma Social media analysis/analytics Software development lifecycle

management Splunk Tableau Test automation

Test Driven Development/Scripting TIBCO ActiveMatrix BusinessWorks TOGAF (Enterprise Architecture) User Acceptance Testing User Experience/Interface Design Usability Research/Human Factors

Research Waterfall Web Analytics Webtrends analytics Zachman Framework

Riak

### Messaging & Communications

ActiveMQ Apache Camel

Apache Kafka IBM Domino

Java Messaging Service

Message-oriented Middleware (Wave,

XMPP/Jabber, etc.) Microsoft Exchange Novell Groupwise

Oracle Comm Messaging Server Outlook/cc:mail/various clients

RabbitMO

TIBCO Enterprise Message Service

TIBCO Rendezvous

Unified Communications/Messaging

### **Operating Systems**

Apache Cloudstack

CoreOS HP-UX Linux Mac OS X

Mobile operating systems (iOS, Android)

OpenStack

Red Hat Enterprise Linux

Solaris SUSF Unix (all) VMware vSphere Windows 8/10

Windows NT

Windows Server 2008/2012

# 573 Non-Certified Tech Skills Reported

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### Systems/Networks

Active Directory Ansible Apache Flume Arista

ATM Azure Active Directory

Business continuity and disaster recovery

planning CA Endevor Chef/Opscode Cisco ASA Cisco CUCM Cisco ICM

Cisco ISE/Identity Services Engine

Cisco IPCC
Cisco Nexus
Cisco Prime
Cisco UCCE
Cisco UCCX

Citrix Virtual Apps (XenApp) Citrix Hypervisor (XenServer)

Cloud architecture Cloud security DHCP EIGRP Ethernet Fast Ethernet

Gigabit Ethernet (1 GigE/10 GigE) HP Converged System

HP Quality Center

HTTPS

laaS (Infrastructure as a Service) Infrastructure architecture

Intrusion prevention/detection systems

IPX/SPX Juniper LAN LTE

Microsoft Application Virtualization

Microsoft Hyper-V Microsoft SCCM Microsoft SCVMM Microsoft Virtual Server Mobile device management

Mobile security

Multiprotocol Label Switching

NAS/Network Attached Storage Network access control/Identity mgt systems

Network security management

Novell Netware

PaaS

Performance Analysis/Tuning Performance Testing

Puppet Rackspace Cloud RedHat OpenShift Routing (e.g. OSPF)

Salt

SAN/Storage Area Networks Security skills (project-based) Security Information and Event

Management (SIEM)
Smart Contract

SMTP SNA SolarWinds

Storage virtualization/administration

TCP/IP
Terraform
Tivoli
Vagrant
vCloud

Virtualization (various) Virtual security

VMware Server/ESX, ESXi Server

VMware NSX VoIP/IP telephony VPN/OpenVPN WAN/3G/4G services Web Infrastructure Web services security Wireless Network Mgmnt

Wireless security
Wireless sensors/RFID

Wireline Networking/Telecomm.

WML

### **Database**

Amazon Athena
Amazon Athena
Amazon DynamoDB
Apache Cassandra
Apache CouchDB
Apache Hive
Azure Cosmos DB
Azure Data Factory
Azure SQL Database
Amazon RedShift
Azure SQL Database
Amazon RedShift
Base SAS
Blockchain
Cloudera Impala
Couchbase Server

Database management Data mining Data security DB2

dBASE/xBASE

ETL (Extract, transform, load)

Hbase Informatica

Java Database Connectivity Master data management

Microsoft Access Microsoft Exchange Server

2003/2007/2010/2013 Microsoft SQL Server

2016/2014/2012/2008/2005

MongoDB MySQL NoSQL

OpenEdge ABL (Progress 4GL) Oracle Application Server

Oracle Business Intelligence Enterprise Edition Plus Oracle Coherence

Oracle DB 9i/10g/11i/12c Oracle Enterprise Manager Oracle Exadata

Oracle Forms
Oracle Reports
PostgreSQL
Redis

**Smart Contract** 

Sgoop

Sybase Adaptive Server

Teradata
TIBCO Spotfire
Visual SQL



# **Q3 2019 Data Trend Charts**

# 2019 IT Skills & Certifications Volatility Index™

(Data collected through October 1, 2019)

Demand dynamics in benchmarked certified and non-certified IT skills pay



## TREND HIGHLIGHTS

### 2019 IT Skills & Certifications Volatility Index™

Volatility in market value for individual IT skills and certifications---defined as incidence of gains or declines over a period of time in premium pay earned by IT professionals for specific technical and business skills---increased from July 1, 2019 to October 1, 2019 according to the latest update of Foote Partners' long-running *IT Skills and Certifications Pay Index*<sup>TM</sup> of market values for tech skills. Market value is measured by tracking additional cash compensation paid to workers by their employers for specific certified and non-certified skills they possess.

## Current Quarterly Recap (data collected through October 1, 2019)

### **TOTAL: All Skills and Certifications**

- 17.4% of skills and certifications (184 of 1,057) changed in market value in 3rd Quarter 2019 compared to 23% in the prior quarter
- 88 gained value and 96 declined in value

#### **CERTIFIED SKILLS**

- 7.1% of reported certifications (80 of 479) changed market value in 2nd Quarter 2019, up slightly from 16.5% volatility in the prior quarter.
- 14 certifications gained market value; 21 declined in value

#### **NON-CERTIFIED SKILLS**

- 26.3% of reported skills (149 of 567) changed value in 3rd Quarter 2019, down from 28.5% in the prior quarter.
- 74 gained in market value; 75 declined in value

Tracking skills volatility is useful in many ways: analyzing and forecasting demand for skills; monitoring IT workforce transition; and understanding IT management decision making. In fact, we believe statistical volatility in IT skills pay offers a more complete story of true labor market conditions than salary movements and hiring behavior, among other common indicators. Important in this distinction is that skills can be segmented and benchmarked more meaningfully than jobs allowing to microanalyses.

Similar to jobs, IT skills have broad skills categories that can be tracked (e.g., security, networking, systems, database, applications development). But unlike jobs, skills pay can be pinpointed to hundreds of niches and specialization. Also, unlike most job trends analyses, within skills categories and niches are *vendor-specific* and *vendor independent* skill specializations for more granular tracking, analysis, and forecasting.

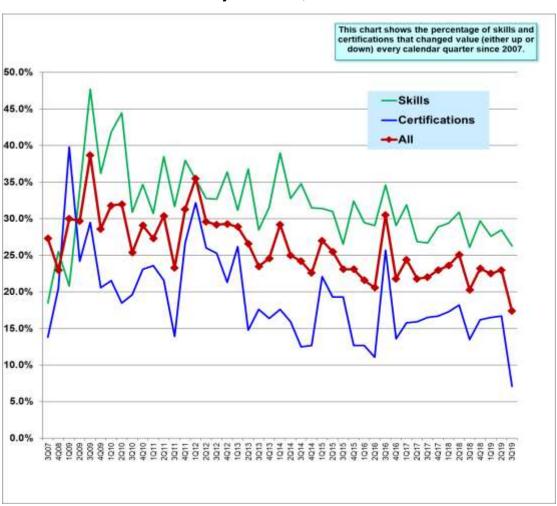
Skills and certifications volatility prior to 2008 averaged in the 14% - 19% range. Quarterly volatility in the last two years has been in the 20% to 31% range. This is an important shift that we believe signals a move that employers are taking a more long-term view to building their tech workforces for emerging technologies such as Blockchain, Al/Machine learning, and a variety of digital solutions. Tech leaders right now are demanding more agility, faster reaction times, and more predictable execution; this is keeping volatility high as skills markets constantly adjust to meet surges in demand for specific certified and non-certified skills.

They will be able to achieve those capabilities through applying architecture principles and practices to people management. We discuss this in greater detail earlier in this report.



# TECH SKILLS VOLATILITY HIGHLIGHTS - 13 Year Trending

## IT Skills and Certifications Volatility Index<sup>™</sup> – 1,070 Skills and Certifications



### Recent IT skills and certifications volatility trends

### **QUARTERLY SUMMARY**

3rd Quarter 2019 volatility in skills and certifications values measured 17.4%, well below the 2-year and (22.3%) average volatility for all 1,070 certified and noncertified skills we follow.

**NON-CERTIFIED SKILLS VOLATILITY** in this quarter was two points lower than the prior quarter: 26.3% vs. 28.5%.

FINDING: Q3 volatility is lower than 2-year running average of 28.4%.

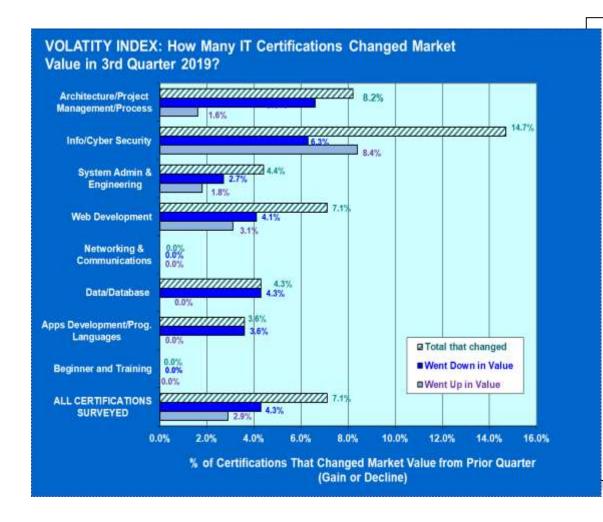
IT CERTIFICATIONS VOLATILITY in this quarter was substantially below the prior quarter, 7.1% vs. 16.7%.

<u>FINDING</u>: Q3 volatility is the lowest quarterly volatility in the past 12 years.

(Pay data supporting these charts available in the <u>IT Skills and</u> <u>Certifications Pay Index<sup>TM</sup></u> – 2007 to 2019 quarterly data edition)



# VOLATILITY HIGHLIGHTS Tech Certifications – 3rd Quarter 2019



# IT Skills and Certifications Volatility Index<sup>™</sup> 3Q 2019 data edition findings: Tech Certifications

### **IT Certifications Volatility Highlights**

Among 497 certifications surveyed, highest volatility (≥15%) occurred in these segments (ranked highest to lowest):

- Info/Cyber Security
- Architecture/Project Mgt/Process
- Web Development

Within segments, notable upward volatility (value **gains**) occurred most in these (ranked):

Info/Cyber Security

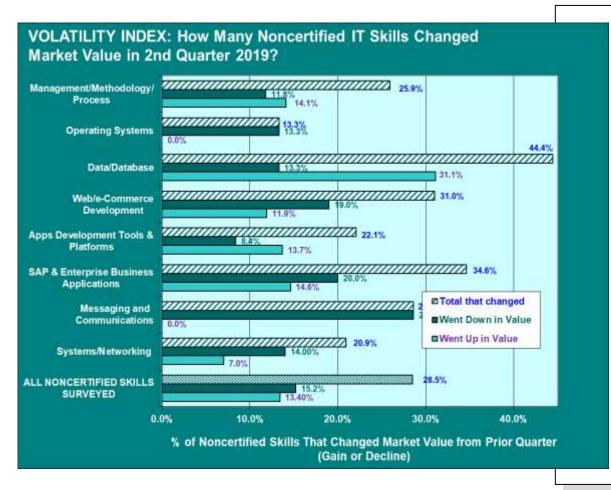
Within segments, notable downward volatility (value declines) occurred most in these (ranked):

- Architecture/Project Mgt/Process
- Web Development

(Source: Foote Partners LLC, 2019 IT Skills & Certifications Pay Index<sup>TM</sup>)



# VOLATILITY HIGHLIGHTS Noncertified Tech Skills – 3rd Quarter 2019



# IT Skills and Certifications Volatility Index<sup>™</sup> 3Q 2019 data edition findings: Non-certified Tech Skills

### Noncertified IT Skill Pay Volatility Highlights

Among 573 noncertified IT skills surveyed, high volatility (>20%) occurred in these segments (ranked highest to lowest):

- Operating Systems
- Data/Database
- [Tie] Management/Methodology/Process Web/Ecommerce Development
- SAP & Enterprise Business Apps
- Messaging & Communications

Within segments, notable upward volatility (value **gains**) occurred most in these (ranked):

Operating Systems

(Source: Foote Partners LLC, <u>2019 IT Skills & Certifications Pay</u> Index<sup>™</sup>)



# IT Skills and Certifications Pay Index™

- Pay premiums for 1,070 certified and noncertified IT skills
  - Three data points for each position: 10<sup>th</sup>, 50<sup>th</sup>, 90<sup>th</sup> percentile
- Verified and validated IT skills pay data from 78,234 IT professionals at 3,421 employers in US and Canada
- Current data collected through October 1, 2019 (updated guarterly)
- Excel format data tables. Master agreements for data loading in place with MarketPay, CompAnalyst, WillisTowersWatson.
- Certifications Guide containing basic information about surveyed IT certifications (pre-requisites; costs; test content; lab requirements, etc.)

Pricing: \$5,800 single edition. \$19,800 annual subscription

### **Definition of IT skills premium pay**

- Pay that IT workers receive for possessing high-value IT and business skills used on the job
- Given in the form of a bonus, or embedded in base salary to adjust for the presence of a dominant vendor or technology central to job performance (examples: Cisco Network Engineer, Python Software Engineer, Redhat Linux Systems Administrator, or SAP Developer.)
- Often used to adjust either base pay or total pay in situations where job title does not match actual on-the-job duties and responsibilities, and changing the job title is not an attractive option
- May be used as a reward, recruiting inducement, retention tool, or as a guide for creating consulting rate cards



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### **ABOUT THIS RESEARCH**

Foote Partners' primary research survey for tracking IT skills and certifications pay and supply/demand volatility is the industry-leading *IT Skills and Certifications Pay Index<sup>TM</sup>* (ITSCPI), launched in 1999 and updated every three months since that time. Data covering 310,222 tech professionals at 3,421 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 222 positions and 1,070 certified and noncertified technical and business skills. Verified and validated pay data for 78,234 tech workers has been included in the 3rd Quarter 2019 data edition of the ITSCPI, compiled from data collected through October 1, 2019.

Demographics of the participating organizations for our latest update are as follows, measured most appropriately for the type of business, by revenues, assets, total premiums and operating budgets:

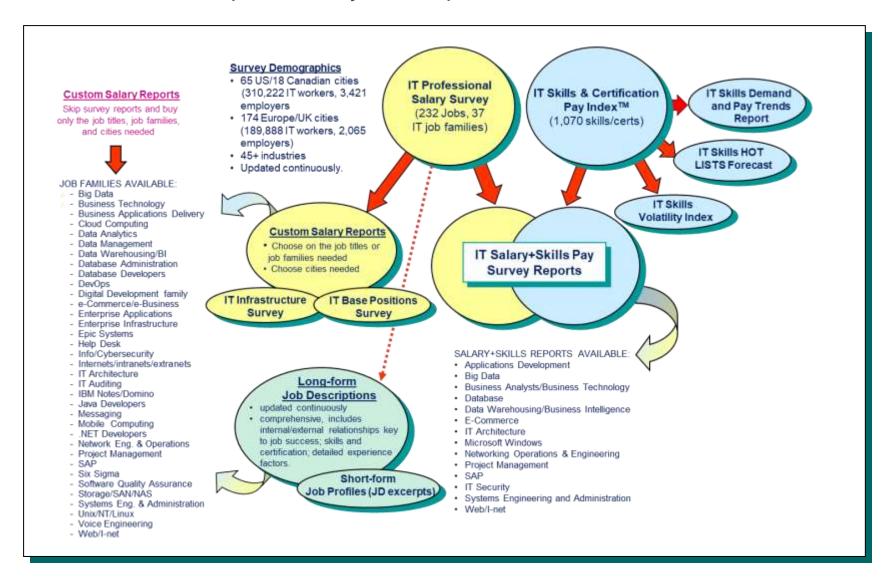
- 18% of participating organizations have \$5 billion+ in sales/\$15+ billion in total assets
- 28% of participating organizations earn more than \$1 billion in annual revenues or more than \$5 billion in total assets
- 46% of participating organizations have \$500+ million in sales/\$1+ billion in total assets/\$500+ million in premiums/\$500+ million operating budget (government, educational, not-for-profit)
- 54% of participating organizations fall in the SMB (small-to-medium sized business) segment, generally defined as organization under \$500 million in sales.
- [Public sector] 5% have operating budgets of \$500 million or more, [nonprofit/educational sectors] 4% with operating budgets \$100 million to less than \$500 million

### TO OBTAIN A COPY OF THE LATEST IT SKILLS AND CERTIFICATIONS PAY INDEX™

Please visit the Foote Partners web site: IT Skills and Certifications Pay Index



# Foote Partners 3Q 2019 Tech Compensation Survey Product Map





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#### **ABOUT FOOTE PARTNERS**

Foote Partners, LLC is a technology analyst firm and independent benchmark research organization focusing on the people (versus vendor) side of managing technology and technology value creation. A thought leader and trusted advisor to thousands of employers on five continents who purchase our products and services, our company provides pragmatic benchmark research and forward-thinking advice and market intelligence targeting the tech workforce in the modern highly integrated business/IT hybrid environment in which all private and public organizations now operate.

Our products are deeply grounded in specialized proprietary data-driven statistical and empirical research, benchmark surveys, and business intelligence collected from thousands of North American employers with whom we have deep longstanding research partnerships. These partnerships have been created and supported specifically to enable unique market intelligence views and difficult-to-find decision support research on the multiple facets of IT human capital management. As a group, these U.S., Canadian, and European partners were selected to meet strict criteria for what we believe is the most meaningful demographic representation for tech professionals in each local labor markets.

Founded in 1997 and comprised of former Gartner industry analysts, McKinsey & Company, Mercer and WillisTowersWatson senior consultants, and former corporate HR, IT, and business executives, the firm's research division publishes 70+ quarterly-updated benchmarking, analytical research and forecasting products that help employers benchmark their IT compensation, solve difficult information technology management and workforce problems, and strengthen their ability to execute complex business solutions.

Foote Partners tech compensation survey findings and labor market trend analyses are featured regularly in countless business, HR, and IT media sources and periodicals around the globe, including *Bloomberg BusinessWeek, Forbes, Fortune, Wall Street Journal*, *New York Times, CIO Magazine, ComputerWorld,* and WorldatWork's *Journal* and *Workspan Magazine*; and in appearances on network and cable television, National Public Radio, and countless podcasts and webcasts.

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