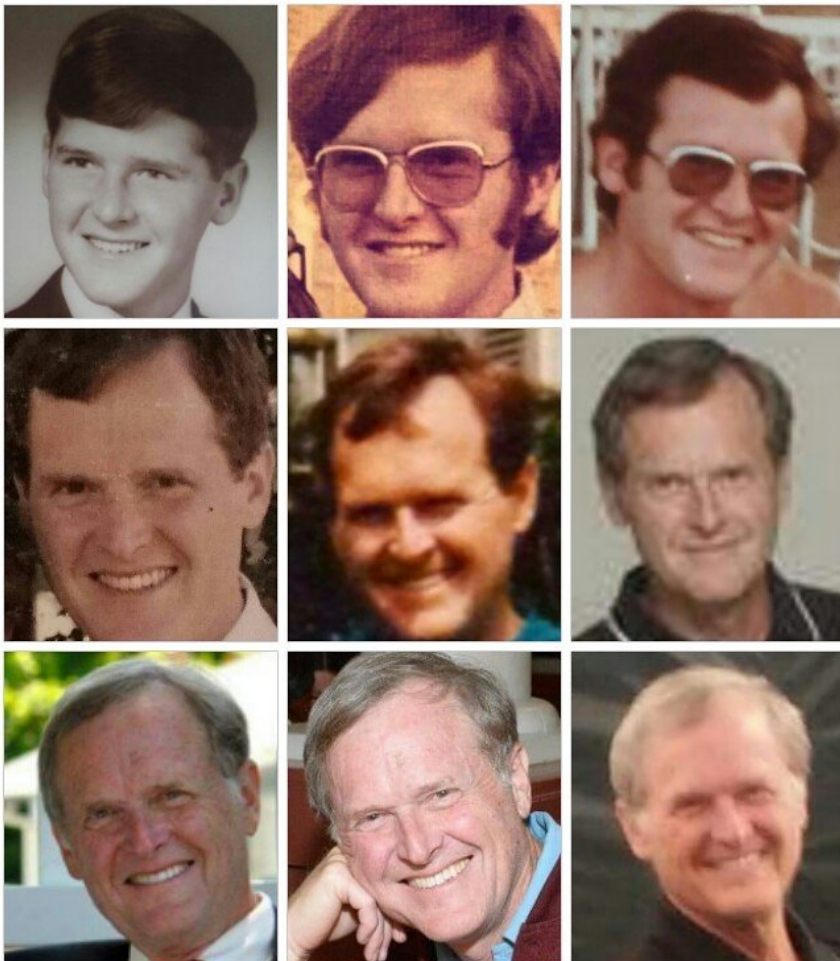


Blockchain Overview for Mainfamers

VM Workshop 2019 @ VCU



Presenter:

Bill Carico

bcarico@actscorp.com



THE TRUTH ABOUT MAINFRAMES



Competitors lie!

Technology vendors offering less robust technologies have been predicting the death of the mainframe since the early 1990's.

Is it wise to believe those who claim mainframes are dead?

The truth!

Mainframe computers are an essential technology component offering numerous advantages in specific information processing applications

HOW ESSENTIAL ARE MAINFRAMES?



Without them ...

- Your airplane might not land safely (air traffic control)
- Your ATM might not give you \$\$ (banking)
- May be unable to make purchases online (transaction processing)
- Trains might not run everywhere (transportation)
- Hospitals access to patient records limited (healthcare)
- Packages might not ship (transportation)
- The internet might not work (infrastructure)

WHO IS USING MAINFRAMES



92
of the top
100
worldwide
banks

10
out of 10 of
the world's
largest
insurers



23
of the top
25
US retailers

23
out of 25 of
the world's
largest
airlines



80 percent

of the world's corporate data
resides or originates on
mainframes

55 percent

of all enterprise applications
need a mainframe to complete
transactions

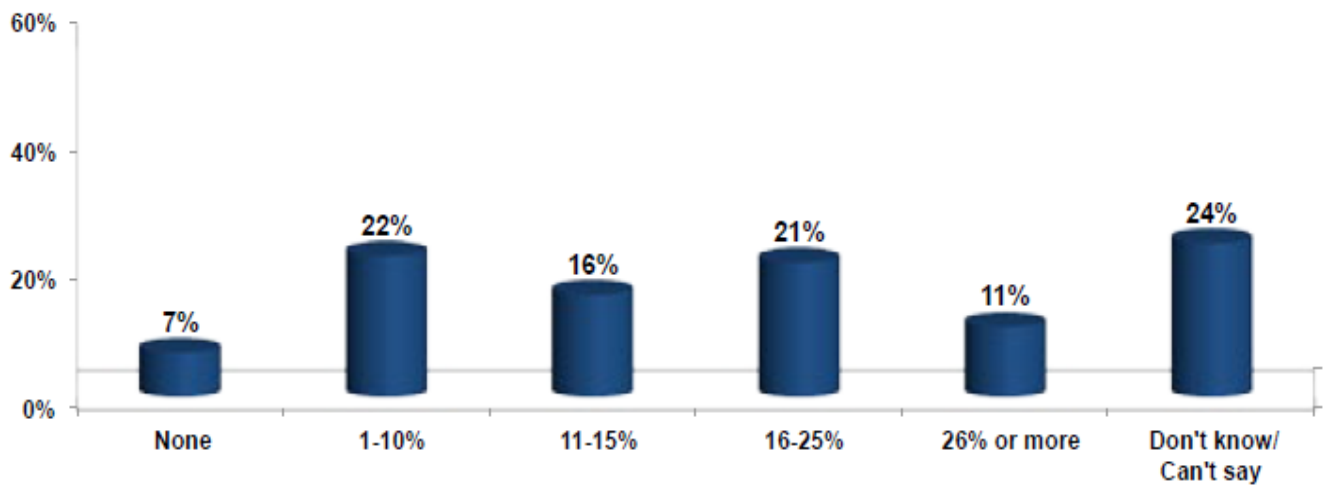
30 billion

business transactions
are processed on mainframes
every day



EYE ON THE ENTERPRISE: Opportunity for you!

FIGURE 1 Percentage of Individuals in Organization Currently Working on or Maintaining IBM Mainframe Applications Who Will be Retiring Over the Next 5 Years



Source: Mainframe Skills Special Report in IBM Systems Magazine
http://www.ibmssystemsmagmainframedigital.com/nxtbooks/ibmsystems_mag/MFSkills/

- **The job market for mainframe resources is booming and will continue for 5 years or longer**
- **Newcomers who complete our *Mastering IT* curriculum will compete well for a broad range of enterprise entry level IT jobs**



Mastering IT

Blockchain

WHO WE ARE



Our core team of curriculum designers and subject matter experts consists of IT professionals sharing their combined 250+ years of experience working with the world's largest and most advanced implementations of technology.

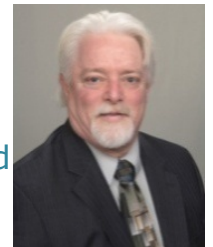
This team was hand-picked by Bill Carico, CEO of ACTS Corp. Since 1981, ACTS has worked with industry giants including IBM, Hewlett Packard, numerous Fortune 500 companies, and over 1800 other companies and government agencies on training their IT professionals.



CURRICULUM DESIGN TEAM



[James W. Collins](#) - Jim is a Vice President and Senior Systems DB Engineer and Associate VP at Wells Fargo where he optimizes performance for their massive production systems.



[John A. Kirschner](#) - John is a certified architect, systems engineer, and cyber- security specialist who supports businesses and governments worldwide to optimize IT solutions. He received an award from President George W. Bush for his work on counterterrorism



[Ken Mauriello](#) - Ken is a veteran IT professional specializing in building and managing multi-million dollar computer centers . Most recently, Ken served as an IT Director for Automatic Data Processing.

[Leonard Santalucia](#) - Len's career includes 30 years working as a Certified Systems and IT Specialist at IBM. He is currently Chief Technology Officer (CTO) and Business Dev Manager for Vicom Infinity and advisory board member for multiple colleges.

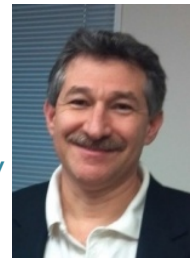


CURRICULUM DESIGN TEAM



Montgomery Bauman - Monte is a Certified IT Specialist who began his IT career in 1983 at the IBM Glendale Lab developing a diagnostic operating system for enterprise servers where he earned a Division Award for his work.

Marc Smith - Marc is a 33 year veteran at IBM where he assisted with operating system development, marketing, and channel enablement. Marc became an active volunteer for the IBM Academic Initiative program to teach advanced technology courses to address the growing need for enterprise-level skills.



Dr. Gururaj Rao - IBM Fellow and Vice President of Business Partners. Guru worked through the dramatic decline and rebirth of IBM's server division and was a key contributor in laying out a roadmap for the long-term strategy for IBM's enterprise server division.

James Porell - Jim is president of his own consulting firm which he started after an illustrious career as a Distinguished Engineer at IBM. Over the last two years, Jim has been conducting a STEM education program at a local school, targeting grades 3 to 5.



Blockchain Intro

Companies interested in digital transformation and modernization are monitoring progress being made on several technology fronts including Cloud Computing, Internet of Things (IoT), Artificial Intelligence (AI), Quantum Computing, and Blockchain.

*Some high-level distinctions worth noting are that Cloud and IoT center around the **placement** of machines and applications, AI and Quantum Computing center around a machine's **performance**, while blockchain centers around streamlining and securing **procedures**, when conducting business transactions online. Neither Cloud computing, IoT, or Blockchain are new technologies. They are based on new ways of using and combining different technologies that have existed for a long time.*

For example, both cryptography and double-entry accounting were around long before the first computers. Ledger is an accounting term referring to a record-keeping mechanism for tracking business transactions. The double entry bookkeeping system means that accounts debited must balance with accounts credited. Each transaction involves a debit and a

credit for at least two accounts, or more.

SHEET NO. _____		ACCOUNT NO. _____												
TERMS				NAME										
RATING				ADDRESS										
CREDIT LIMIT				BUSINESS										
DATE	ITEMS	FOLIO	✓	DEBITS			DATE	ITEMS	FOLIO	✓	CREDITS			

Blockchain technology adds a third entry to cryptographically seal the double entries.

Blockchains provide an efficient and secure way for people to make any type of transaction online without having to trust anyone.

This lesson will focus on understanding how blockchain technology accomplishes that feat, and also look at who is having an impact in the marketplace.

For starters, please take 2 minutes now to view this video from IBM “Securing The Diamond Trade With Blockchain” to learn about the key characteristics of the blockchain ledger. which is used to create an auditable and indisputable record of every transaction from the mine to the consumer. [click here to watch](#) (When finished, please return here and continue reading.)

Here is a short definition for blockchain touching on a few of the main points:

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A blockchain is a triple-entry digital ledger used to record status of a digital asset. This ledger is shared by multiple parties to a transaction, thereby eliminating the need for each party involved in a transaction to maintain their own ledger. Participants in a transaction may be individuals, institutions, businesses, government agencies, or programs called smart contracts.

Ledger sharing among all participants can greatly reduce the time it takes to complete a complicated business deal. All associated transactions regarding that digital asset, and all the conditions surrounding the disposition of that digital asset are recorded and linked together to form a chain of records. The blockchain technology also provides a permanent, secure, decentralized, tamper-proof environment for conducting business, which further explains why it is attractive to its users. If somebody tries to change a blockchain record in their copy of the ledger, it is easily detectable by any and all of the keepers of the other copies.

In the beginning the first blockchain was a triple-entry ledger system Bitcoin used for administration. Bitcoin was the first asset recorded using a blockchain ledger. While many cryptocurrencies today are using more advanced blockchain technology, blockchain applications continue to be developed for many other uses than just cryptocurrency.

Here is a more comprehensive definition reflecting how blockchain technology has evolved:

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A blockchain consists of permanent accounting records linked together to track something of value, including any and all changes in ownership, status, or location, for two or more parties, who may or may not know each other or trust each other.

Blockchain technology provides the framework for maintaining a persistent, highly-secured, transparent, decentralized, append-only, trusted, shared ledger, used by either the public or permissioned groups, to track exchanges of, or changes to, something of value to each party that is directly involved in the transaction, thereby eliminating the oversight and involvement, and any fees charged, by intermediaries who were needed previously to complete the transaction (e.g. accountants, lawyers, or bankers)

Bitcoin and Ethereum represent the first two generations of blockchain technology, respectively.

As mentioned, Bitcoin used the first blockchain to track ownership of digital currency called bitcoins. Bitcoin also uses operators of network nodes, called “miners,” who must agree by consensus when adding new blocks to chain. The consensus mechanism is called Proof of Work (PoW), which requires network nodes to compete with each other by performing extensive computational work. The operator who is the winner of the competition gets paid in bitcoin and is allowed to add the next block of records to the chain. This approach of adding payment, difficulty, and expense to the administration of the

ledger is intended to keep hackers or other bad actors from operating network nodes. The payments made to reward network operators explain why cryptocurrencies are mandatory in a public blockchain but are not needed in a permissioned blockchain.

Ethereum came along years later offering a number of improvements over Bitcoin's implementation, along with extensive development capabilities and tools that anyone can use as a development platform to build their own blockchain applications. Ethereum also introduced its own cryptocurrency called Ether (ETH) and replaced the PoW consensus mechanism with a Proof of Stake (PoS) protocol that requires less overall computation. One of its more significant additions was a protocol including custom programs called "smart contracts" that are stored on the ledger and invoked while processing a transaction to enforce rules and conditions in negotiation of legal contracts. To do this, a smart contract can invoke external systems. This is how blockchains become integrated with existing business applications to expand their capabilities. The bottom line is that Ethereum smart contracts enable the exchange of digital assets between parties in a more sophisticated and reliable manner and are the mechanism used to eliminate intermediaries.

The advent of the Ethereum platform has spawned thousands of startup companies in the blockchain space. The failure rate has always been high for high-tech startups and blockchain is no different. But there is a twist in that a blockchain app can try to create a new cryptocurrency. Startups have been issuing and

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selling their own currency tokens in exchange for Bitcoin and Ether. Like selling shares of stock, it's a way to raise capital bypassing the scrutiny of banks, venture capitalists, and government regulations and controls. The process is called an Initial Coin Offering (ICO) and it's a new way to raise funds necessary for development and expansion. An ICO is similar to crowd funding in that a startup company promotes its idea for a product and its currency tokens, and if it raises enough money in the time allotted, work begins. If not, the ICO fails and the money is returned. Eventually successful privately-owned companies go public, selling shares of stock through an Initial Public Offering (IPO). The Initial Coin Offering (ICO) in the cryptocurrency space's is far easier than an IPO in the mainstream investment world. Startups connect with interested investors who buy into the offering, either with fiat currency or with preexisting digital tokens like Bitcoin or Ether, and in return investors receive equivalent cryptocurrency tokens specific to the ICO. Naturally investors are speculating that the their newly acquired tokens' value will grow over time. The startup then launches its product, and/or its new digital currency and many don't last more than a year. An article from Fortune (<http://fortune.com/2018/02/25/cryptocurrency-ico-collapse/>) reported some lasted only a few months. This is an excerpt from the same article:

We here at Fortune have cast a curious but frequently skeptical eye on ICOs, which from the get-go were ripe for scams. It turns out that skepticism was well warranted:

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cryptocurrency news site Bitcoin.com has surveyed last year's ICOs and found that of 902 tracked by TokenData, 142 failed before raising funding, and another 276 failed after fundraising.

That's a 46% failure rate — but wait, there's more.

Bitcoin.com found another 113 projects that it calls "semi-failed," because their teams have gone off the radar or their community has withered away. Add those, and the failure rate jumps to 59%. Bitcoin.com says the total funding of failed projects from 2017 was \$233 million.

=====

Nonetheless, since literally thousands of blockchain startups have embraced Ethereum and Ether, the founders are dreaming of the day when Ethereum becomes the world's "decentralized computer," as explained below in a video by Dr. Gavin Woods.

The complexity of blockchain applications like Bitcoin, and those built with cryptocurrency options using Ethereum, can become confusing very quickly by examining in greater detail the workings of the underlying cryptography and consensus mechanisms. The higher level concepts regarding decentralized design, security benefits, scalability challenges,

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trust, and immutability are easier to digest. This is important because new ways to use blockchain continue to be discovered at a rapid pace. That's because a digital asset can be almost anything of interest between two or more parties. Therefore, blockchain technology has created quite a stir among innovators and investors world-wide who predict it will ultimately change how the economy works when intermediaries in any given market are no longer needed to handle payment, clearing, and settlement.

In a nutshell, through resource sharing and consolidation, blockchain applications offer the advantages of simplification by logically centralizing processes while mitigating multiple negative effects of operating over a distributed network. They are sometimes referred to as De-centralized Applications, or dAPPs.

Permanent means Immutable

Thus far we've noted that blockchain solutions consist of an encrypted ledger, distributed and shared across a network, that can be managed in a highly secure manner. Part of the security is derived from the fact that recorded transactions are immutable and immediately propagated to all copies of the ledger residing across the network, creating a permanent historical record. Immutable means once a record is added it cannot be altered or deleted, ever. Having copies everywhere makes tampering attempts easy to detect.

A Ledger Can Track Anything

A digital asset can be tangible or intangible property that one party either owns or controls. The information recorded for each transaction includes all the related documents like contracts, orders, invoices, pictures, certificates, or other artifacts, which remain viewable to permissioned parties forever.



Think of a ledger record as a blank sheet of paper that can be used to keep track of anything. A blockchain ledger can securely track the exchange of goods, services, money, votes, data, intellectual property, etc.

Since blockchain applications function across a peer-to-peer network without a central hub, copies of the single shared ledger of these chained blocks of transaction records are replicated and synchronized across nodes around the network, which is why it is called a distributed ledger.

Public or Permissioned

A blockchain ledger is either open to the public, or requires permission to access. Regardless, all parties to a transaction must give consensus before a new record is appended to the blockchain.

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Permissioned blockchain applications are far less complicated to design and manage than public implementations, and are rapidly expanding into numerous other industries like medical, pharmaceutical, the food industry, insurance, and manufacturing. From the supply chain to the food chain to the voting booth blockchain ledgers can be used to improve efficiency and prevent fraud.

Efficiency can be obtained when distributed ledger technologies expand the number of financial actors and enable new areas of value transactions directly with other financial actors both within and across borders allowing the direct exchange of assets virtually instantaneously without the help of intermediaries.

These will provide new ways for a small to medium enterprise to raise working capital apart from obtaining a bank loan.

Expectations are especially high in the financial industry because use of a blockchain ledger to eliminate intermediaries can dramatically reduce the time it takes to complete a complex financial transaction from a few days or weeks to a few minutes or a few seconds. Blockchain has improved global money remittance through the use of smart contracts and automated banking ledgers.

As stated previously, smart contracts are computer programs stored on the ledger that follow a protocol to handle verification and enforce the negotiation or performance of a contract thereby eliminating the need for trusted third parties to serve

as intermediaries. The actual business contracts and related documents and files are embedded into the ledger making a permanent record for each transaction. As conditions surrounding a pending transaction change, events are automatically triggered that eliminate delays, risks, and uncertainties of completing the transaction.

The blockchain industry is relatively young. Ethereum has been credited for bringing a new paradigm and the second generation of blockchain technology. Other prominent emerging players to watch include QTUM, Cardano, NEO (in China), and there are many more with grandiose plans.

Under the oversight of the Linux Foundation, a consortium of companies and communities started an Open Source project called Hyperledger to standardize and accelerate development and implementation of



HYPERLEDGER

permissioned blockchain applications and solutions for businesses. Hyperledger projects focus on implementations of blockchain frameworks, tools, and modules that are offered to developers worldwide to use for free. The startups adopting this platform are side-stepping cryptocurrencies and are instead using blockchain technology to solve business problems. R3 is doing something similar with its Corda open source blockchain development platform. R3 has gotten significant traction in the Fintech space with Corda Enterprise. The main differences are that Hyperledger is part of a

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multi-project effort, hosted by The Linux Foundation and originally sourced by IBM, and is looking to interconnect different business sectors, while Corda is being rapidly adopted among financial institutions as a global independent network.

As mentioned previously, some who have tried to understand the complexities of Bitcoin or Ethereum design, will readily admit they haven't even been able to find someone who can explain it to them. Feel free to take a look at the website of The Ethereum Foundation (www.ethereum.org) to test your technical acuity.

There are issues unique to blockchain implementations by cryptocurrencies that pertain to security in the way they use "miners" to maintain distributed copies of the public ledger. Also, since anyone can view a public ledger there will always be concerns regarding lack of scalability - the inability to handle large volumes of transactions concurrently. Obviously, scalability isn't likely to be an issue for private ledger implementations (permissioned) where transaction volumes are low and entirely predictable. Still, the biggest inhibitor to growth of ANY distributed or decentralized platform or application or computer network will likely be it's lack of scalability.

All blockchain implementations use encryption and are technically susceptible to a cryptography breach. Encryption that may considered bulletproof by today's standards could become less secure in the future as technology advances. For

example, no one really knows the impact powerful quantum computers will have on cryptography.

The inability to scale up to handle increased demand is a real threat for any distributed application, whether blockchain-based or not. Obviously, if a cryptocurrency can't handle demand that would have serious ramifications including making the currency non-viable.

By 2018, after its first 8 years of existence Bitcoin only could complete 7 transactions per second. Ethereum's changes to the consensus algorithm and reducing the size of blocks yielded a 2 fold increase... 13 to 15 transactions per second. Ripple XRP had become the fastest major cryptocurrency processing 1,500 per second. They all still have a ways to go to rival a company like Visa who reports its network can process 24,000 credit card transactions per second and averages 150 million transactions per day.

So in 2019 Facebook came onto the scene saying it has fixed the scalability concerns, and announced plans for a new decentralized blockchain, complete with its own low-volatility cryptocurrency and a smart contract platform that will enhance the world's ability to utilize a new financial ecosystem. See [Libra White Paper](#)

The following videos and articles will explain how blockchain works, and identify the most common barriers to its implementation. Before interviewing for an IT job, keep in mind that those who understand blockchain and how it works are in high demand across the IT industry.

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Activities:

1. View 3 short videos.
 - a) (this was assigned earlier so skip if you already viewed it)
This is a 2 minute video from IBM “Securing The Diamond Trade With Blockchain” to learn about the key characteristics of the blockchain ledger which make for an auditable and indisputable record of every transaction from the mine to the consumer. [click here to watch](#)
 - b) a 7 minute video on how blockchain will be used in everyday life, presented by an IBM Fellow
[click here](#)
 - c) a 2 minute video on banks serving small business
[click here](#)

2. “Nearly 6 in 10 Large Corporations Considering Blockchain Deployment,” from Juniper Research: [click here to read](#)

3. “What is Blockchain” from IBM’s website: [click here](#)

4. Read 7 short explanations of basic blockchain terminology aimed at developers new to the space. [click here to read](#)

5. Watch *“DEVCON1: Ethereum for Dummies”* from Dec of 2015 by Ethereum’s CTO Dr. Gavin Wood. He explains how his appreciation for the technology changed over time, and in this 23 minute presentation explains his vision for Ethereum to

become the first global computer, and how that will impact the world. [click here](#)

Staying at a high level and considering risks surrounding the use of a blockchain application, here are a few excerpts from a very long legal agreement pulled from the [ethereum.org](#) website, requiring anyone downloading its platform to acknowledge the risks. Interesting that what isn't mentioned below is that the majority of blockchain attacks have been designed to steal cryptographic keys rather than attack the actual blockchain:

“Risk of Weaknesses or Exploitable Breakthroughs in the Field of Cryptography

Cryptography is an art, not a science. And the state of the art can advance over time. Advances in code cracking, or technical advances such as the development of quantum computers, could present risks to cryptocurrencies and the Ethereum Platform, which could result in the theft or loss of ETH. To the extent possible, Stiftung Ethereum intends to update the protocol underlying the Ethereum Platform to account for any advances in cryptography and to incorporate additional security measures, but it cannot predict the future of cryptography or guarantee that any security updates will be made in a timely or successful manner.

Risk of Ether Mining Attacks

As with other cryptocurrencies, the blockchain used for the Ethereum Platform is susceptible to mining attacks, including but not limited to:

- Double-spend attacks

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- Majority mining power attacks,
- “Selfish-mining” attacks
- Race condition attacks.

Any successful attacks present a risk to the Ethereum Platform, expected proper execution and sequencing of ETH transactions, and expected proper execution and sequencing of contract computations. Despite the efforts of the Ethereum Stiftung and Team, known or novel mining attacks may be successful.

Risk of Rapid Adoption and Increased Demand

If the Ethereum Platform is rapidly adopted, the demand for ETH could rise dramatically and at a pace that exceeds the rate with which ETH miners can create new ETH tokens. Under such a scenario, the entire Ethereum Platform could become destabilized, due to the increased cost of running distributed applications. In turn, this could dampen interest in the Ethereum Platform and ETH. Instability in the demand of for ETH may lead to a negative change of the economical parameters of an Ethereum based business which could result in the business being unable to continue to operate economically or to cease operation.

Risk of Rapid Adoption and Insufficiency of Computational Application Processing Power on the Ethereum Platform

If the Ethereum Platform is rapidly adopted, the demand for transaction processing and distributed application computations could rise dramatically and at a pace that exceeds the rate with which ETH miners can bring online additional mining power. Under such a scenario, the entire

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Ethereum Platform could become destabilized, due to the increased cost of running distributed applications. In turn, this could dampen interest in the Ethereum Platform and ETH. Insufficiency of computational resources and an associated rise in the price of ETH could result in businesses being unable to acquire scarce computational resources to run their distributed applications. This would represent revenue losses to businesses or worst case, cause businesses to cease operations because such operations have become uneconomical due to distortions in the crypto-economy.”

6. “*Blockchain Technology Overview.*” National Institute of Standards and Technology, U.S. Department of Commerce, is one of the best introductions to blockchain because it’s written in simple terms while maintaining nuances. This document includes a glossary of terms and acronyms.

[click here to visit NIST website and download the pdf](#)

7. Use resources from the Hyperledger Project to find more information on any blockchain-related topics you find interesting. Here are two resources to get you started:

a. The Hyperledger Vision is a slide deck that sums up some “Blockchain 101” type of information and the founding vision for Hyperledger. It can be downloaded as a pdf at hyperledger.org/resources/publications.

b. The Hyperledger Wiki contains a wealth of technical information, available at wiki.hyperledger.org/

8. What is FinTech? Here is a detailed definition from Investopedia: [click here to read](#)

9. Learn about how Corda Enterprise from R3 which has a huge market share of providing blockchain development at large banks. R3 is an enterprise blockchain software firm working with a broad ecosystem of more than 300 members and partners across multiple industries from both the private and public sectors to develop on Corda, an open-source blockchain platform. Corda Enterprise is R3's commercial version of Corda. [click here to read](#) the 4 page enterprise brochure and [click here to read](#) the 56 page Corda white paper by Mike Hearn.

10. Governments have less control wherever a blockchain is deployed. Here is a speech by a Federal Reserve Board Governor - "The Use of Distributed Ledger Technologies in Payment, Clearing, and Settlement, [click here to read](#)

Bio: The speaker is Dr. Lael Brainard, who became a member of the Board of Governors of the Federal Reserve System on June 16, 2014, to fill an unexpired term ending January 31, 2026. Prior to her appointment to the Board, Dr. Brainard served as Undersecretary of the U.S. Department of Treasury from 2010 to 2013 and Counselor to the Secretary of the Treasury in 2009. During this time, she was the U.S. Representative to the G-20 Finance Deputies and G-7 Deputies and was a member of the Financial Stability Board.

11. “Redrawing the lines: FinTech’s growing influence on Financial Services,” is a report from PwC: [click here to read](#)

82%

of incumbents expect to increase FinTech partnerships in the next three to five years

77%

expect to adopt blockchain as part of an in production system or process by 2020

20%

expected annual ROI on FinTech related projects

12. “IBM has a new blockchain for banks to speed up cross-border payments,” CNBC: [click here](#)
note: IBM partnered with non-profit blockchain organization Stellar and currency exchange service KlickEx to develop the platform. There are 2 short videos included in the article.

13. a. Read a brief overview of Visa’s new service ‘B2B Connect’ being announced at a financial conference in 2017, “Transforming B2B payments for the Digital Age,” [click here](#)

b. Look at Visa’s website to learn how businesses can use their B2B Connect service: [click here](#)

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14. “Survey: Only 11% of Organizations Are Ready for Digital Disruption,” PRNewsWire, Association for Financial Professionals:

[click here to read](#)

15. "Emerging Technologies and the Finance Function: Prepare for Disruption." This is a white paper prepared by AFP, Marsh & McLennan Companies' Global Risk Center and Starfish Leadership. [click here to read](#)

16. Switzerland has been trying to be the incubator for start up companies in the crypto-currency space. As a result they've been nicknamed Crypto Valley, similar to Silicon Valley, which got its nickname for being ground zero of the technology revolution spawned by micro-processors and silicon-based chips. [click here](#)

17. The new government of Malta, established in 2013, has made a big play to become a hub for blockchain and other trendy technologies. Malta is even calling itself Blockchain Island. However, it has been attracting shadowy characters. CBS reported allegations of bribery and money laundering: [click here](#) to watch 13 minute video segment from the “60 Minutes” new program.

18. Read pdf file “Integrating Blockchain with the Mainframe”
[click here to read](#)

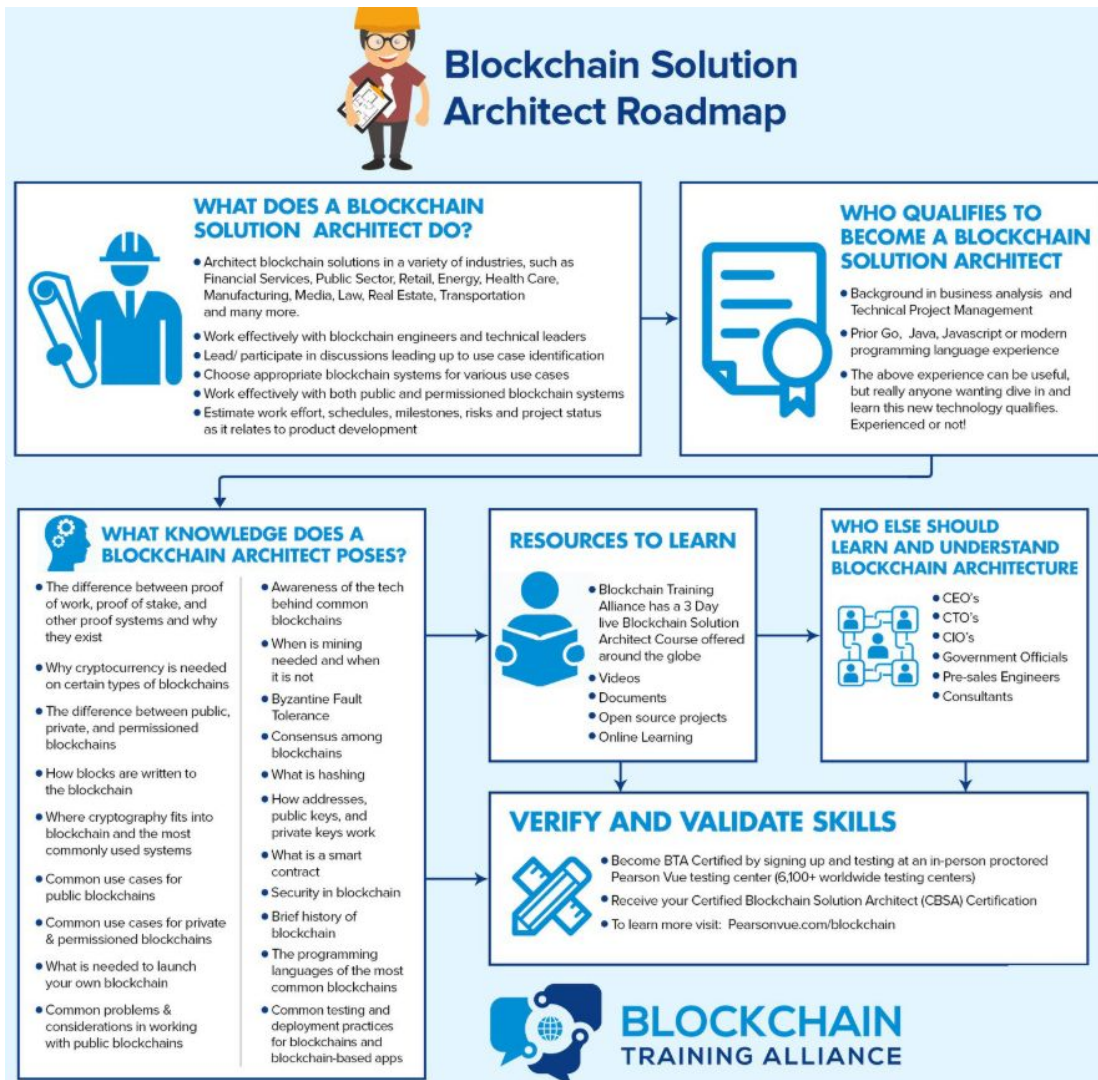
Optional Activities List:

19. Consider taking introductory online courses on blockchain from edX.org such as LinuxFoundationX: LFS170x “Blockchain: Understanding Its Uses and Implications” Enrollment is free to audit the course for a fixed time period and NOT receive a completion certificate, or you can pay \$99 to take as long as you like to complete the course and to receive an official completion certificate at the end.

20. Consider focusing your study to become a blockchain solutions architect or other blockchain specialist. Blockchain Training Alliance offers certification exams for \$300 to take the 70 question test and become a certified specialist in one of the technical areas listed below.

Here is a roadmap from the Blockchain Training Alliance for becoming a Solutions Architect. Notice the above right box stating that no experience is necessary if you’re willing to dive in. Remember, passing a certification test does NOT guarantee employment. The smart approach is to become conversant in the topic, convey your competence and desire to learn in a job interview, and go to work at a company who is

willing to pay for employee education and certs.



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Here is the list of exams from the Pearsonvue website at <https://home.pearsonvue.com/blockchain> and the links to the Blockchain Training Alliance website.

Blockchain Certification Exams:

Certification	Exam	
Certified Blockchain Business Foundations	<u>CBBF:</u> <u>Certified</u> <u>Blockchain</u> <u>Business</u> <u>Foundations</u>	This examination will test proficiency in understanding blockchain basics and why an organization should or should not use blockchain.
Certified Blockchain Solution Architect	<u>CBSA:</u> <u>Certified</u> <u>Blockchain</u> <u>Solution</u> <u>Architect</u>	This examination will test proficiency in designing blockchain solutions - including selecting the appropriate technology and defining system architecture.
Certified Blockchain	<u>CBSP:</u> <u>Certified</u>	This examination will test proficiency in identifying

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Security Professional	<u>Blockchain Security Professional</u>	security threats and attacks on a blockchain network, blockchain security methods, best practices, and risk mitigation.
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Certified Blockchain Developer - Ethereum	<u>CBDE: Certified Blockchain Developer - Ethereum</u>	This examination will test proficiency in understanding smart contracts and writing distributed applications (DApps) on the Ethereum blockchain using solidity.
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Certified Blockchain Developer – Hyperledger Fabric	<u>CBDH: Certified Blockchain Developer – Hyperledger Fabric</u>	This examination will test proficiency in creating enterprise blockchain applications using Hyperledger Fabric and Composer.
-----------------------------------------------------	----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------

ACTS Confidential Data - Do not share

This document is from the “ACTS Mastering Technology” curriculum containing hundreds of self-study topics that prepare future IT professionals for the highest paying jobs.

See actscorp.com or call 434-933-2287

21. Optional: “Distributed ledger technology in payments, clearing, and settlement” a 34 page pdf document from the Federal Reserve Board: [click here to read](#)

If you find this document too difficult to understand, consider purchasing 255 page book:

“Blockchain Basics: A Non-Technical Introduction in 25 Steps.”

Daniel Drescher. Apress. March 2017. Explains blockchain concepts with analogies, metaphors, and pictures, not mathematical formulas or program code.

22. Optional: Sign up at Juniper Research to receive their weekly white papers on all technology trends. Review their archives for white papers of interest.

[click here to register](#)



Mastering IT

Our Vision

OUTLOOK FOR 2020

A photograph of a server room with rows of server racks illuminated by blue and green lights.

Due to an anticipated massive skills shortage, there is great need for human resources with knowledge of IT and the ability to be productive in an entry-level position in a much shorter timeframe.

Opportunities:

The U.S Bureau of Labor statistics predicts demand for workers will outpace supply by 1.4 million in 2020 due to the shortage of tech-savvy workers.

- IBM reports 60 to 89 thousand enterprise IT jobs vacated each year by retiring IT workers for which replacements can't be found.
- Blockchain freelance jobs up 600% since 2015 (source: Upwork)

The **ACTS Mastering IT Self-Study Program™** prepares you for a broader range of IT jobs than any other educational program.

WHO WE ARE TARGETING



ACTS Mastering IT Self-Study Program is ideally suited for:

- IT workers with narrow skills sets, whose careers have stagnated, or who want more upward mobility
- IT managers with little or outdated technical knowledge
- IT professionals whose knowledge lacks breadth or depth
- Newcomers to IT looking for an advantage in landing an entry level tech job or doing freelance work
- Existing and future entrepreneurs



WHO WE ARE TARGETING



Even more ideal candidates for the program:

- **High School graduates**
- **High schoolers who lack motivation and direction, or are bored with school, or who have dropped out**
- **College graduates who can't find a good paying job**
- **Programming bootcamp graduates who want to do more than just write code all day or wish for better pay**
- **People leaving the military starting new careers**
- **K-12 students and homeschoolers, to give them an early advantage, starting as early as 4th grade**

MISSION STATEMENT



To provide a comprehensive practical curriculum that instills the essential knowledge and skills necessary for anyone to launch an Information Technology career or enhance an existing one. To raise up competent independent-thinking leaders who will now understand best practices and possess the actionable knowledge to make a positive and powerful impact wherever their destiny takes them.

MASTERING INFORMATION TECHNOLOGY (IT)

A photograph of a server room with rows of server racks on both sides, illuminated with blue light. The racks are filled with equipment and have various lights glowing.

Assisting
Augmenting
Achieving
Accentuating



Assisting

We are committed to assisting anyone with a goal to start a career in IT, or enhance an existing career to maximize earning potential.

MASTERING INFORMATION TECHNOLOGY (IT)



Assisting
Augmenting
Achieving
Accentuating



Augmenting

Augmenting anyone's knowledge, education, and skills with practical knowledge and curation of content from outside sources.

MASTERING INFORMATION TECHNOLOGY (IT)



Assisting
Augmenting
Achieving
Accentuating



Achieving

Achieving more in less time and for a fraction of the cost of a degree or private education alternatives.

MASTERING INFORMATION TECHNOLOGY (IT)



Assisting
Augmenting
Achieving
Accentuating



Accentuating

Accentuating the skills and disciplines necessary to become an accomplished professional, entrepreneur, innovator, and thought leader.

Where are you in your career?



Want to start?

Options are:

- University or College
- Community College
- Trade School
- Private education alternatives (see next page)

So many have spent a small fortune to earn a degree yet cannot find a fulfilling job, why not use your gap year and try something new and exciting?

COMPARE – BEWARE of ALTERNATIVES



Fall of 2017 new coding bootcamp is announced:

WOZ U – Apple founder Steve Wozniak:

“Our goal is to educate and train people in employable digital skills without putting them into years of debt,” said Wozniak, who co-founded Apple Computer and invented the Apple II computer that launched the personal computing revolution.

“People often are afraid to choose a technology-based career because they think they can’t do it. I know they can, and I want to show them how.”

See One year later (Oct of 2018) Next Page >

ONE YEAR LATER...



Student of Apple co-founder Steve Wozniak's \$13,000 'Woz U' coding program says 'it's broken'

Michael Potuck - Oct. 1st 2018

Venturebeat –

Steve Wozniak's online institute Woz U slammed with student complaints

“Woz U promised to start by training software developers and tech support specialists for “high-paying technology” jobs, using a “new approach” that wouldn't put students into “years of debt.” Personally unveiled by Wozniak in Phoenix, Arizona, the institute offers a 33-week, \$13,200 program conducted entirely online that can be covered at least partially by student loans.”

I DON'T KNOW ANYTHING ABOUT...




kif  @kifleswing · Oct 1, 2018 

Steve Wozniak comment on Woz U report: "I'm not involved in any operations aspects so I can't answer your questions. I don't know anything about those aspects."



kif 
@kifleswing

Steve Wozniak told me this morning that he's "not involved" in the "operational aspects" of Woz U and doesn't know anything about the report this morning that accused the coding bootcamp of being a ripoff. [businessinsider.com/former-woz-u-s...](https://www.businessinsider.com/former-woz-u-s...)

♡ 3 9:40 AM - Oct 1, 2018 

WHERE ARE YOU IN YOUR CAREER?



Currently Working in an IT Position Early in Career

Is it crazy to *believe* that a team of proven IT professionals can impart a deeper and more practical understanding of technology in considerably less time than it takes to complete a college degree costing > \$60,000?

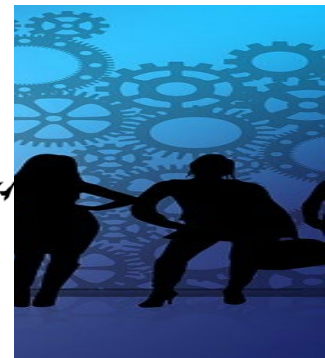
WHERE ARE YOU IN YOUR CAREER?



Currently Working in an IT Position Established Career

Is it crazy to think a person's competitive advantage in the workplace would increase substantially if they possessed a much broader and deeper practical knowledge of IT than their peers?

IMPLEMENTATION TEAM LEADERS



Kathy Brown – SOUTHWEST VIRGINIA

Kathy is a retired school teacher and a graduate of Milligan College and the University of Virginia. During her career she received numerous awards and honors, including the 2014 Champions of Literacy award from Scientific Learning which is an international computer based program.

Christopher Mathews - TIDEWATER AREA

Christopher teaches 5th grade at Hampton Roads. He has worked with educational communities and The YMCA of South Hampton Roads. He is an advocate for marginalized students.



Ken Mauriello – SOUTHSIDE VIRGINIA

Ken is the program's Chief Technology Officer and primarily responsible for course delivery strategy.

Leonard Santalucia – RICHMOND AND NORTHERN VA

Len is an Advisory Board member at Virginia Commonwealth University, NC A&T, Hofstra, Marist College, and consultant to Binghamton U ES2 Research Center.



Bill Carico – CENTRAL VIRGINIA

Primary author of pilot program courses and case studies, overseer of subject matter experts and the course development team.



The PROGRAM



ACTS Mastering IT Self-Study Program

A background image showing a person in a dark suit and tie, with their hands interacting with a glowing digital interface. The interface features various icons such as a globe, a laptop, a smartphone, and a server rack, all connected by a network of lines. The word 'TECHNOLOGY' is visible on the interface. The overall color scheme is teal and blue.

Curation

We define **curation** as the selection, organization, and presentation of quality content and information using our professional and expert knowledge and experience. We apply curation to relevant cutting technology topics, providing you with the best options available and what poses the highest risks.

ACTS Mastering IT Self-Study Program

*Convenient and
Comprehensive*

A background image showing a person in a dark suit and tie, with their hands interacting with a glowing digital interface. The interface features various icons such as a globe, a laptop, a smartphone, and a server rack, all connected by a network of lines. The overall color scheme is dark with blue and white highlights.

Online self-study that is also self-paced

- **22 main topics**
- **Hundreds of subtopics**
- **Targeted topics relevant to public and private sector**
- **Real-life case studies involving cutting edge technologies**
- **Emphasis on intellectual acuity and critical thinking**

ACTS Mastering IT Self-Study Program

Benefits Summary

A background image showing a person in a dark suit and tie, with their hands interacting with a glowing blue digital interface. The interface features various icons such as a globe, a laptop, a smartphone, and a server rack, connected by a network of lines. The overall aesthetic is futuristic and tech-oriented.

- **Online self-study & self-paced – You train on Your schedule**
- **Comprehensive course material / 22 main topics / hundreds of subtopics**
- **Courses designed and tailored to make you stand out in job interviews and on the job**
- **Guidance for targeting enterprise-level IT jobs**
- **Affordable and flexible pricing**

Plus:

- **Income generating potential as an entrepreneur**
- **Creates opportunity to get an IT intern position**
- **Formal certifications are optionally available**
- **Some employers will pay for an employee's college education**

CASE STUDIES

ACTS case studies are unique and extremely valuable

Become accustomed to dazzling others...



Get inside details about how ACTS Corp.:

- **created an IT roadmap for a major government health care organization that propelled them from being ranked 34th in the world to being ranked #2**
- **helped another organization increase yearly revenue by \$1B**
- **created a methodology to predict the longevity of technology maximizing IT asset value while avoiding unnecessary migration costs**

Plus, gain wisdom and insights offered by over 12,000 CxO-level* executives contributed over 20 years. *CxO = CEO, CTO, CIO, CFO, COO

Our case studies provide you with the insight to dazzle in job interviews and open up additional opportunities for advancement in the workplace.

COMPARE – BEWARE of ALTERNATIVES

MIT MANAGEMENT EXECUTIVE EDUCATION



STARTS ON
February 14, 2019



DURATION
3 months, online
6-8 hours per week



PROGRAM FEES
\$3,300
Flexible payment available

Innovation and Design Thinking



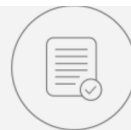
128 Video Lectures



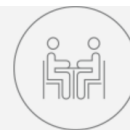
3 Live Teaching Sessions



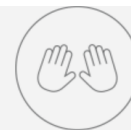
3 Group Projects



10 Assignments



1 Capstone Project



7 Real World Applications

Orientation Module: Welcome to your Online Campus

Module 1: Design Thinking Skills

Module 2: Identifying Customer Needs

Module 3: Product Specifications

Module 4: Applied Creativity

Module 5: Prototyping

Module 6: Design for Services

Module 7: Product Architecture

Module 8: Financial Analysis

Module 9: Design for Environment

Module 10: Product Development Processes

- **Fees: \$3300 for one 3 month online course taking 6 - 8 hrs/week**
- **One of MIT's 7 real world applications examines:**
"How IBM went against all odds and decided to use ordinary commodity chips to create an effective microprocessor."
BEWARE - that never happened!
- **ACTS students will learn what really happened and why commodity chips were never used and therefore did NOT influence this technology transition at IBM.**

BEGIN NOW - Pilot Package

*Assisting,
Augmenting,
Achieving,
Accentuating*



First modules include:

- **Computer Basics**
- **Cloud Computing**
- **Blockchain Technology**
- **Enterprise Computing Overview**
- **Mobile App Development**



Plus – several real-world case studies
...and more

ACTS Mastering IT Self-Study Program

***Assisting,
Augmenting,
Achieving,
Accentuating***




Let us share with you the hottest emerging technologies then walk you through how we got there. This creates numerous advantages:

- Fosters innovative thinking and thought leadership**
- Enhances study of computer history**
- Provides immediate competitive advantages for performing well on the job**

...supplemented with special activities to expand your Intellectual acuity and appreciation for mathematics.

WHERE IS THE HIGHEST PAY?

The real question is
“if not now,
when?”

A close-up photograph of a person's hand in a dark suit jacket interacting with a futuristic digital interface. The interface is overlaid on a globe and features various technology-related icons such as a laptop, a smartphone, a server rack, and a cloud. The scene is lit with a cool blue light, creating a high-tech atmosphere.

The truth – for the most part the highest paying jobs in IT do not require a person to code, which is why we are not a coding boot camp and do not require nor preclude students from programming.

If you are going to write code, we can show you the best platforms to maximize your earning potential.

REALISTIC EXPECTATIONS

*SMART and
AFFORDABLE
ALTERNATIVE*



The Smart

Our ACTS Mastering IT Self-Study Program will give you the practical knowledge that can allow you to become successful working in high paying positions in any enterprise IT organization. Potential positions include management, technical leadership roles, and even IT sales.

Sales reps could become more effective and more confident in their ability to sell solutions in the IT marketplace, just like you.

This program can assist you in your career no matter what the area of specialty.

REALISTIC EXPECTATIONS

*SMART and
AFFORDABLE
ALTERNATIVE*



The Affordable

We offer a variety of individual module licensing options. These include:

- Individual module purchase
- Unlimited license
- Enterprise license
- Special Pilot Offer
- Scholarships and financial assistance available

Here is how to participate!

Call 434-426-ACTS or email infoacts@actscorp.com

INTERNS



ACTS Intern Projects:

- Course delivery and production support
- Course content production for K–12
- Research on various subject matter
- Research on Analytics and Psychometrics
- Research on X4 Internet
- MeghaVault zero-coding platform
- Injustice Project & CJS reforms
- Enhancing ACTS Testing/Survey software
- Mobile application design and development
- Inmate Study Bible Project

