

Past, Present, Future of System Administration

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LISA.18

October 29–31, 2018 | Nashville, TN, USA

www.usenix.org/lisa18

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Social Media

Women In Linux

- [@womeninlinux](#)
- www.youtube.com/womeninlinux



TOPICS

PAST

- Infrastructure/Automation Engineer
- System Architect

PRESENT

- Site Reliability Engineer
- Blockchain Infrastructure Engineer
- Cloud Architect/Engineer

FUTURE

- Chaos/Intuition Engineer
- Quantum Computing
- Quantum Key Distribution and Cryptography



Common Skills

- Problem Solving/Analytical Skills
- Virtualization
- Cloud
- AI/ML/Block Chain/Big Data
- Communication
- Scripting/Programming language
- Repositories (git/github/gitlab)
- Networking/DNS/DHCP/SDN
- Automation
- Performance/Tuning
- Testing
- Security



Past Skill Sets

SCRIPTS

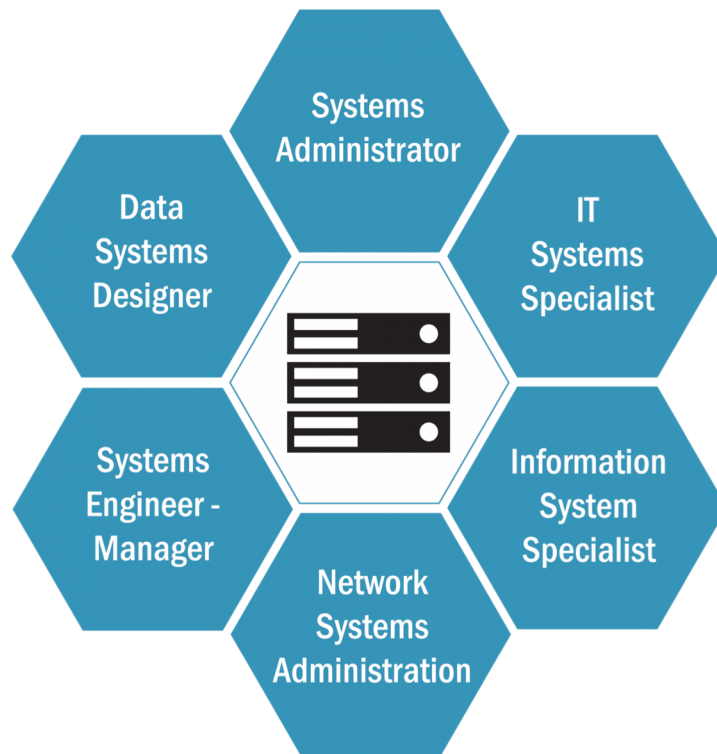
- Perl
- Bash
- PHP

NO AUTOMATION TOOLS

- Building RPMS

FILESERVERS

- NFS
- SAMBA
- Window File Shares
- ISCSI



Past Skill Sets

AUTHENTICATION

- Nis/OpenLdap
- IDM

METHODOLOGIES

- Waterfall Methodology

ADMINISTRATION

- Web Admin
- PXE Booting Bare Metal Machines



Past Skill Sets

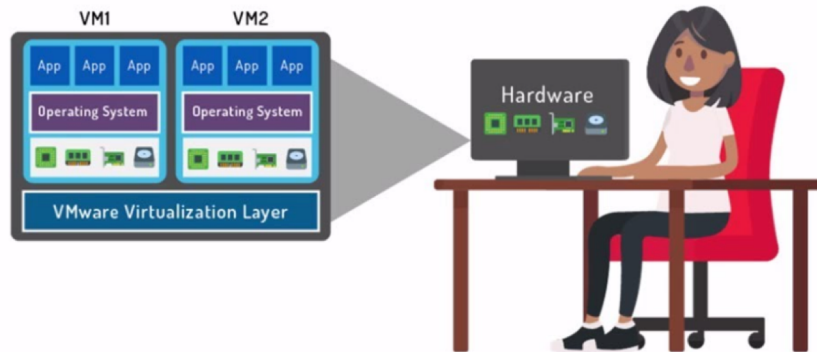
- **Security was an after thought**
- **Backups**
 - *Bacula*
 - *Commvault*
 - *Symantec*
- **System Monitoring**
 - *Zabbix*
 - *Zenoss*
 - *Nagios*
- **Databases**
 - *Xml*
 - *Mysql*
 - *Postgres*



Past Skill Sets

- **File systems and Raids**
 - Ext2, ext3, ext4
 - Raids
 - Raid 0, 1, 5, 6, 10, 50, 60
- **Virtualization**
 - Jails
 - HyperV
 - Kvm
 - VMware

What is Virtualization?

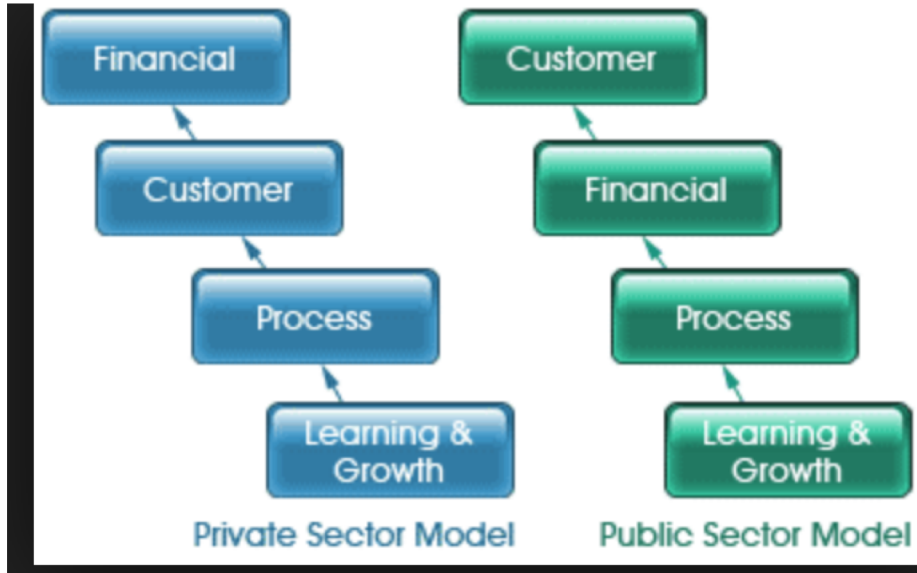


Forms of Communication

- Slack
- IRC
- Mailing lists
- Newsletters
- YouTube
- Github
- Rocket
- Facebook groups
- Forums
- Wikis



Sector Dependent

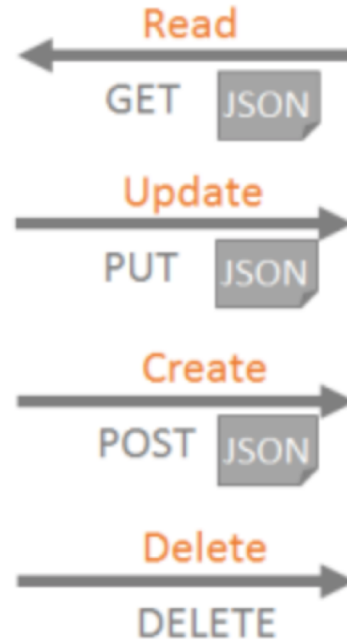


PRESENT



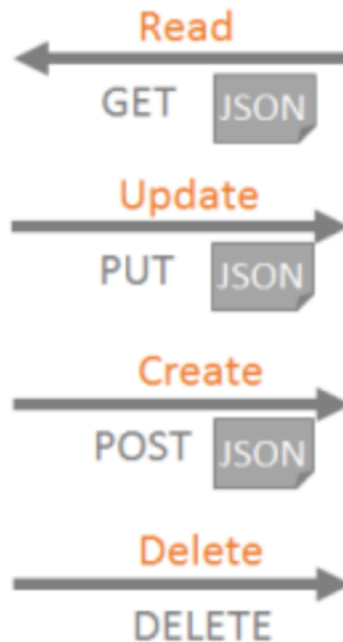
Infrastructure/Automation Engineer (PRESENT)

- Infrastructure/Automation Engineer
 - App development
 - Backend Engineer
 - Creating APIs
 - Service Discovery
 - Automated Documentation
 - Hybrid Cloud
 - Distributed Systems
 - Big Data



Infrastructure/Automation Engineer (PRESENT)

- System Monitoring
 - Prometheus
 - Grafana
- Logging
 - ElasticSearch/Machine Learning
- Security on levels



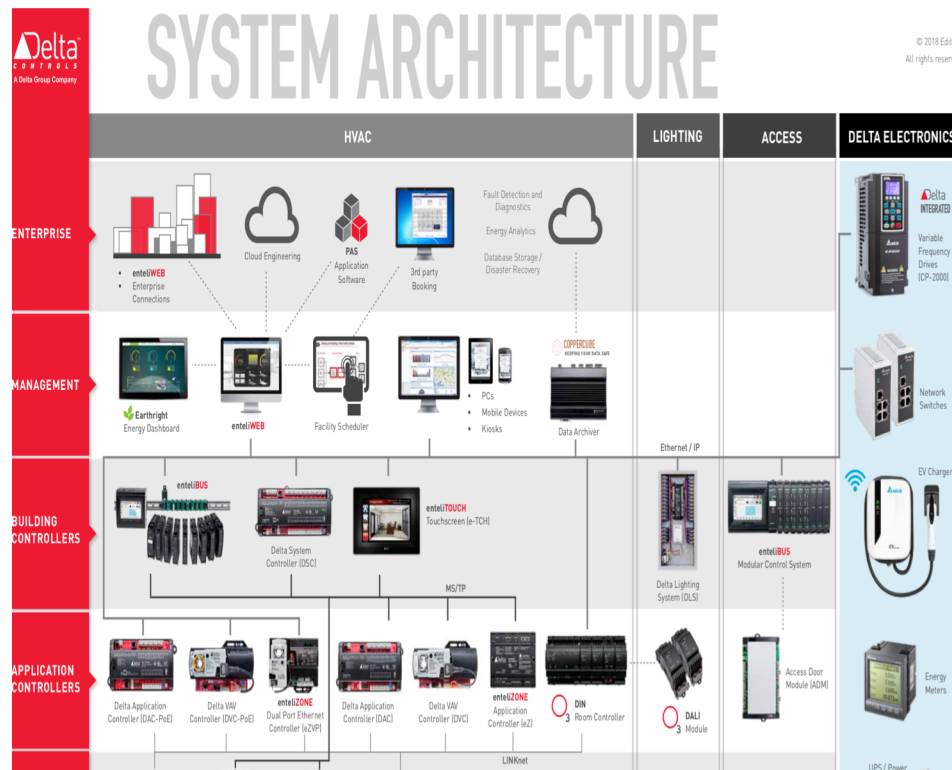
Infrastructure/Automation Engineer

- **Public**
 - Virtualization
 - Vmware
 - Hyper V
 - Kvm
 - System Monitoring
 - Backups
 - Netbackup
 - Commvault
 - Documentation
 - Webhooks
 - Pages of documents
 - Sometimes no documents
- **Automation**
 - Salt Stack
 - Puppet
 - Chef
- **CI/CD**
 - Jenkins
 - Gitlab
- **Security**
 - STIGS
 - EVSS Scans
 - Compliance
- **Single Point of Failure**
- **On premise Cloud**
 - Openstack
 - Openshift
 - Kubernetes
 - Vcloud
- **Public Cloud**
 - AWS
 - Azure
 - GCP

System Architecture

• System Architecture

- Design and Deploy Architecture
- Design Backup Strategies
- Design Security Strategy
- ITIL
- Agile
- Evaluate Public and OnPrem Cloud
- Plan and Coordinate with Vendors
- Leadership to Engineering Teams
- Provide Technology Roadmap
- Define Metrics and KPIs
- Technical Ownership
- TOGAF
 - Architecture Development Method
 - Architecture Development Phases
 - Ensure Business Needs Are Met
 - Costs are met

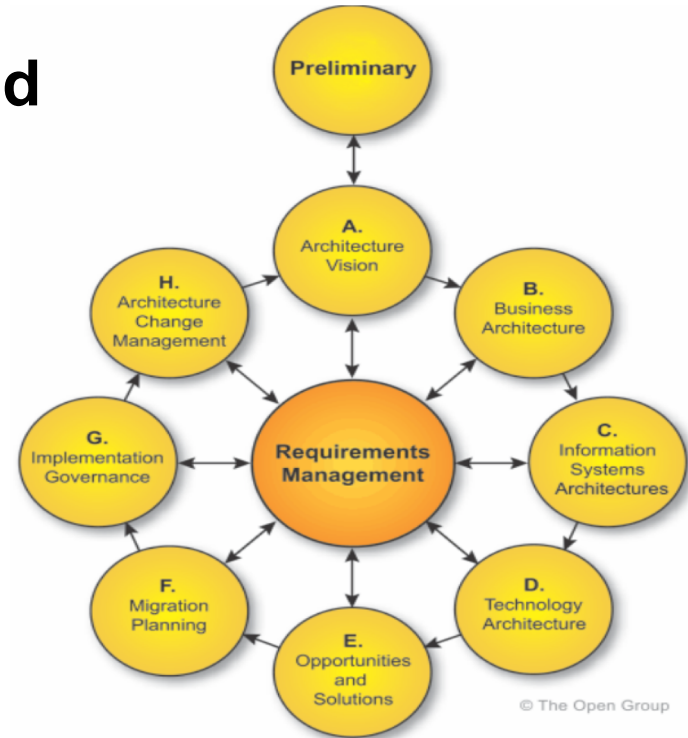


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TOGAF

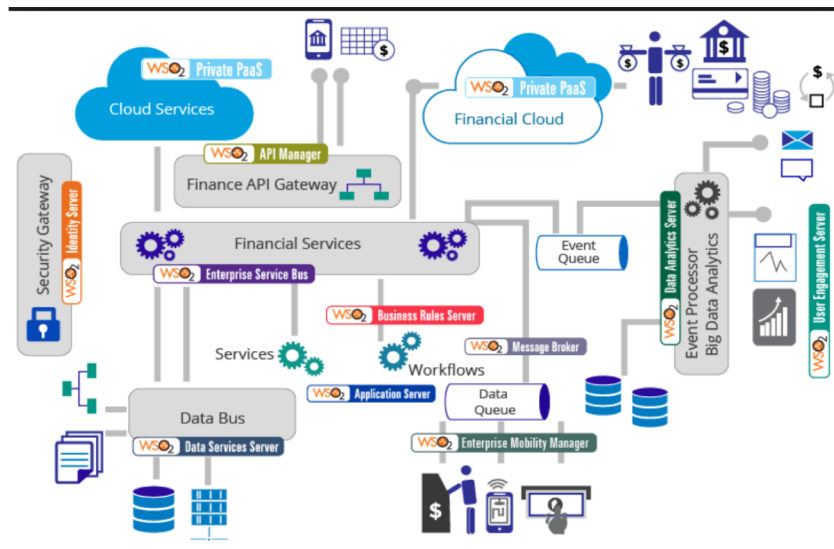
Architecture Development Method

- Architecture Development Phases
- Ensure Business Needs Are Met
- Costs are met



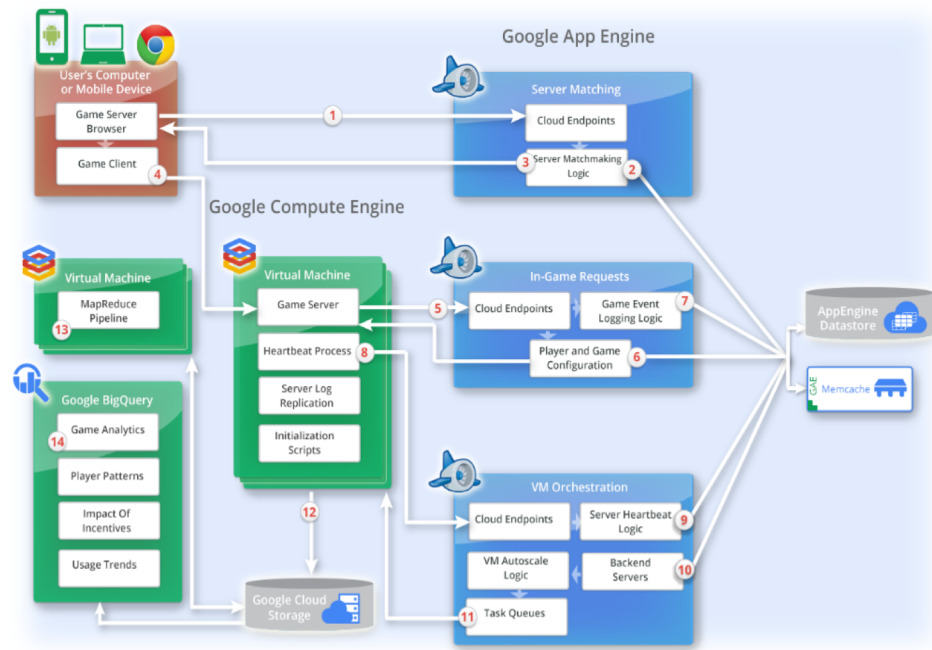
Finance

- App development
- Backend Engineer
- Creating APIS
- Service Discovery
- Automated Documentation
- Hybrid Cloud
- Distributed Systems
- Big Data
- System Monitoring
 - Prometheus
 - Grafana
- Machine Learning



Private

- Gaming
- Auto
- Bloomberg



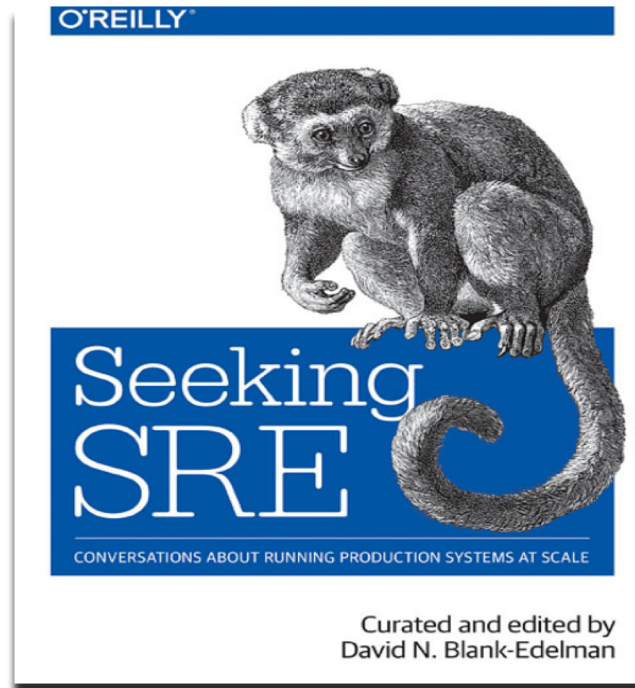
FUTURE



Kidsⁱⁿ**LINUX**

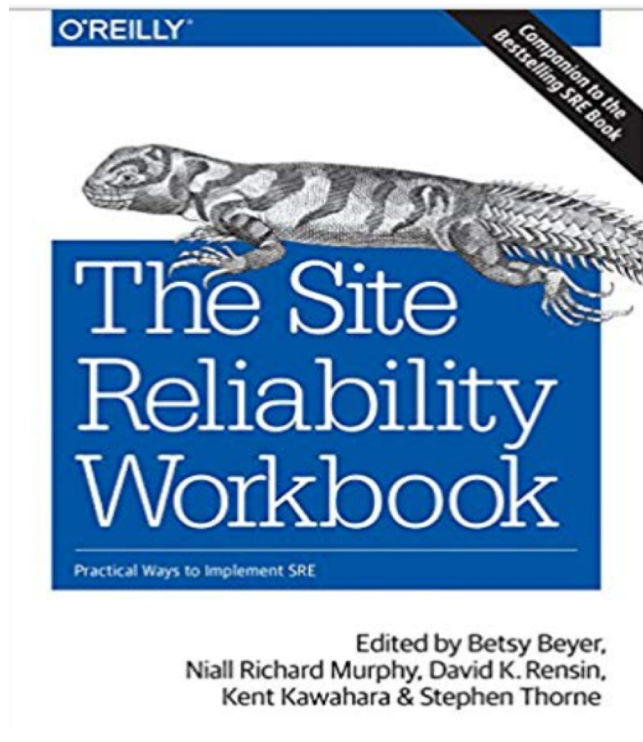
Site Reliability Engineer

- Resources
- Books
- Weblinks
- CAP Theorem
 - Capacity
 - Availability
 - Partition Tolerance
- Reduce Silos
- Accept Failure as Normal
- Reduce costs of Failures
- Measure Reliability
 - SLO
 - SLA
 - Time to Mitigate
 - Time To Detect
 - Time to Fix
 - Time to Engage



Site Reliability Engineer

- Incident Management
- Postmortem
- Distributed Systems
 - Understand what it is
 - Example clustered databases
 - Scaling vertically is upgrading hardware
 - Ability to Scale Horizontally
 - Adding more databases
 - Fault Tolerance
 - Low Latency

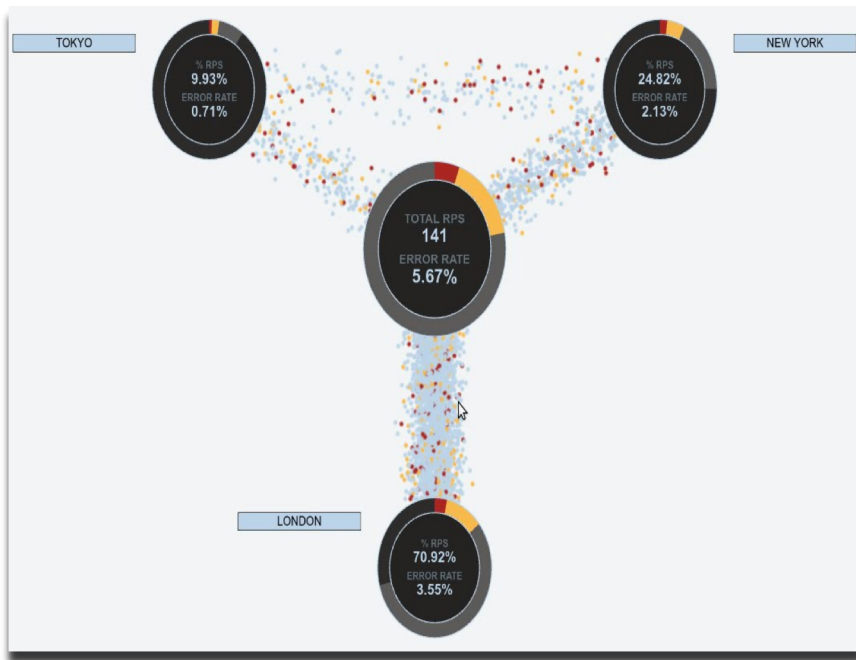


Site Reliability Engineer

- Distributed Computing
- Distributed Filesystems
 - IPFS
- Distributed Messaging
- Understanding System Architecture
- Kubernetes
- Golang
- Scientific Principles
- Overall User Experience
- Why be an SRE
 - What is the role of a Site Reliability Engineer?
 - Cloud Academy Blog - <https://cloudacademy.com/blog/what-is-the-role-of-a-site-reliability-engineer/>

Chaos/Intuition Engineer

- Role of Chaos Engineer
 - Simulating workloads
 - Testing hardware conditions
 - Identify performance issues
 - Collaboration skills
 - Data Analytics
 - Understanding microservices
 - Auditing



Chaos/Intuition Engineer

- Breaking the steady state
 - How applications are built
 - Introduce problems
 - Break/ Fix
- Basic Linux understanding
- How networks work and packets flow
- Log/Analysis management
- Scripting/Programming
 - Python
 - Go

CHAOS IN PRACTICE

To specifically address the uncertainty of distributed systems at scale, Chaos Engineering can be thought of as the facilitation of experiments to uncover systemic weaknesses. These experiments follow four steps:

1. Start by defining 'steady state' as some measurable output of a system that indicates normal behavior.
2. Hypothesize that this steady state will continue in both the control group and the experimental group.
3. Introduce variables that reflect real world events like servers that crash, hard drives that malfunction, network connections that are severed, etc.
4. Try to disprove the hypothesis by looking for a difference in steady state between the control group and the experimental group.

The harder it is to disrupt the steady state, the more confidence we have in the behavior of the system. If a weakness is uncovered, we now have a target for improvement before that behavior manifests in the system at large.

Chaos/Intuition Engineer

- Testing
 - Applications
 - Hardware
- CI/CD
- Distributed Systems
- Networking
- Principles
- Log analysis
- Traffic flow
- Performance
- Network issues
- FluxDB
- Gremlin



Blockchain Engineer

- Blockchain Infrastructure Engineer
 - Jobs
 - Blockchain Enterprise Architect
 - Private Blockchain
 - Public Blockchain
 - Hyperledger Fabric/Sawtooth/Indy
 - Understanding distributed systems
 - Description distributed computing - <https://www.ethos.io/understand-blockchains-from-a-distributed-computing-perspective>

We are seeking a Blockchain Architect to help drive the responses to RFPs, evaluate different Blockchain Platforms and advise on the most suitable platform with a detailed solution overview and technical architecture for a given Business Problem. Blockchain Architects will become trusted Technical and Architectural advisors and help the practice to create a portfolio of potential Technical solutions and conduct experiments to prove value in the marketplace and oversee the implementation of scalable blockchain solutions.

Successful candidates will have in-depth knowledge on the different blockchain platforms, blockchain based solution designing expertise and the ability to work on multiple projects simultaneously in a fast paced, fluid environment. They will have good experience in interacting with clients and business partners.

Senior Enterprise Blockchain Architect with experience providing advisory, strategy, and architecture services in the use of Blockchains in enterprises. Experience with multiple Blockchain platforms a must.

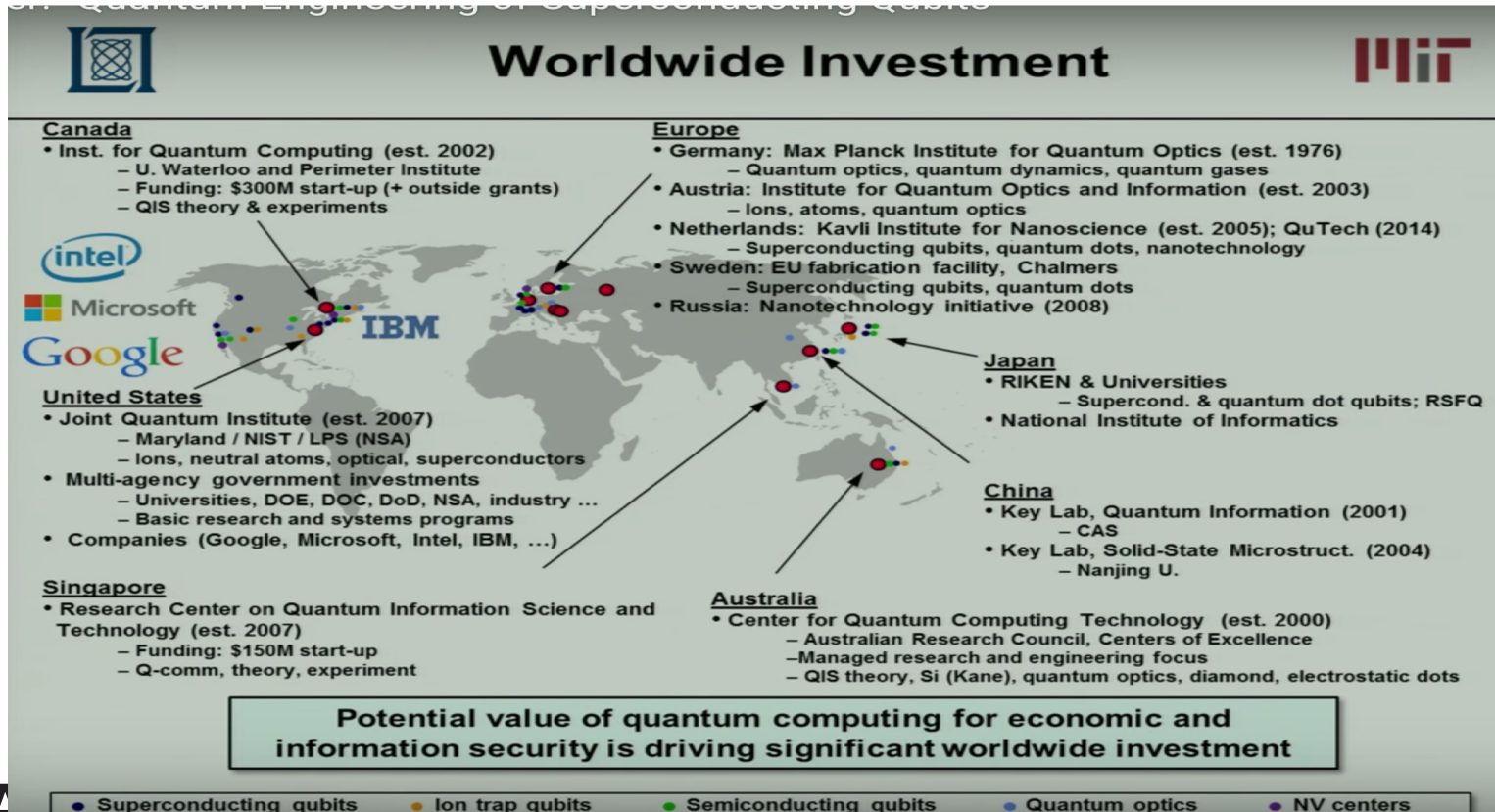
Responsibilities:

- 1) Provide Strategy & Advisory services to Clients in the Blockchain space.
- 2) Architect solutions using various tools in the Blockchain space

Qualifications:

- 1) Experience with Hyperledger, Ethereum, Corda and other Blockchain Platforms
- 2) Experience provide consulting services
- 3) 15-20 years + experience in IT
- 4) Progressive growth from Development into distributed systems development

Quantum Computing



Quantum Computing

- Qubits
- HPC
- Diversity of cores
- Entanglement
- Dwarves, NASA, Google, IBM
- Lincoln labs and William Oliver
 - Classical vs Quantum
 - Parallelism and interference
- PKI encryption and classical methods
 - Double the encryption key
- Data analytics

Quantum Computing

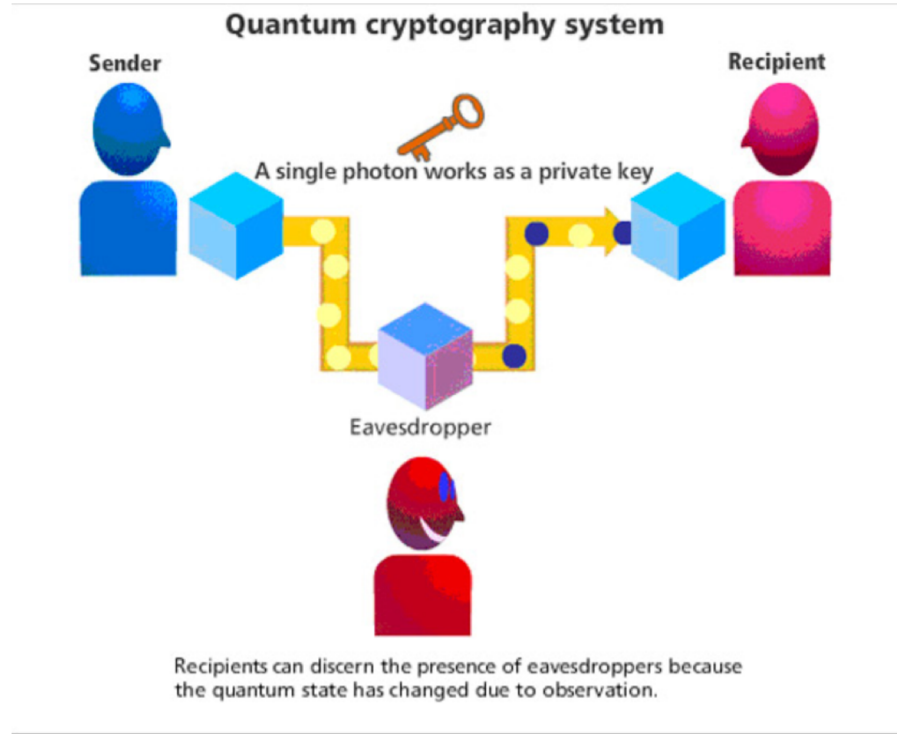
- Architectural Leadership
- Lead new technology solutions
- Mentoring
- CPU Architecture
- Power and Performance Tradeoff
- Compiler Development and Optimization
- Quantum Information Science

Entanglement

Quantum entanglement is a physical phenomenon which occurs when pairs or groups of [particles](#) are generated, interact, or share spatial proximity in ways such that the [quantum state](#) of each particle cannot be described independently of the state of the other(s), even when the particles are separated by a large distance—instead, a quantum state must be described for the system as a whole

Source: https://en.wikipedia.org/wiki/Quantum_entanglement

Quantum Cryptography Example

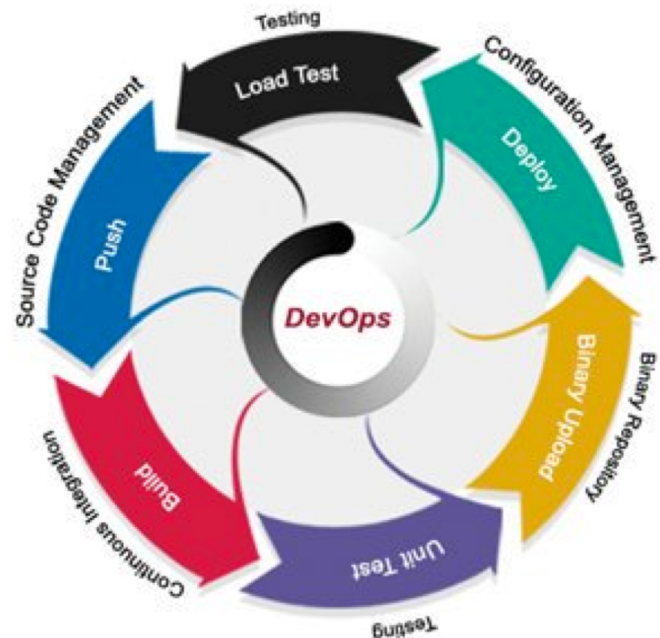


Other Thriving Areas

- HPC Computing
 - OpenMosix, Beowulf, Rocks, OpenHPC
 - <https://sc18.supercomputing.org/>, insidiehpc.com
 - 1.8 billion dollar plan to expand HPC in Europe
 - MIT Makes Billion-Dollar Bet on Ai and Machine Learning
- DevSecOps
 - CiscoDevNet, APIs, Appliances
- IOT
 - VMware, Cloud(Aws, GCP, MS), IBM, Redhat
- Gaming
- Automotive Grade Linux

Common Skills

- Problem Solving/Analytical Skills
- Virtualization
- Cloud
- Communication
- Scripting/Programming language
- Repositories (git/github/gitlab)
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- Performance/Tuning
- Testing
- Security



Summary

- Your skillsets still apply today but you have to evolve
- Look at problems from a 30,000 ft view
- Try the opensource version of product
- Read the documentation
- You don't always have to work at big names to gain valuable experience
- Check out market trends
 - TechCrunch/Opensource/LinuxJournal/Webinars
 - Create a tutorial of a product/Build a product