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Mid-Atlantic CIO Forum

IT AT THE EDGE

How the Forces of Decentralization will permeate the future of IT

February 15, 2018

Michael Bisignani, SVP and CTO
Essextec

About the Speaker

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Chief Technology Officer

Consultant

Chef (Aspiring)

Genesis of this Talk

It's all coming together:

Cloud, Cognitive, Containers and Chains

Core Inquiry

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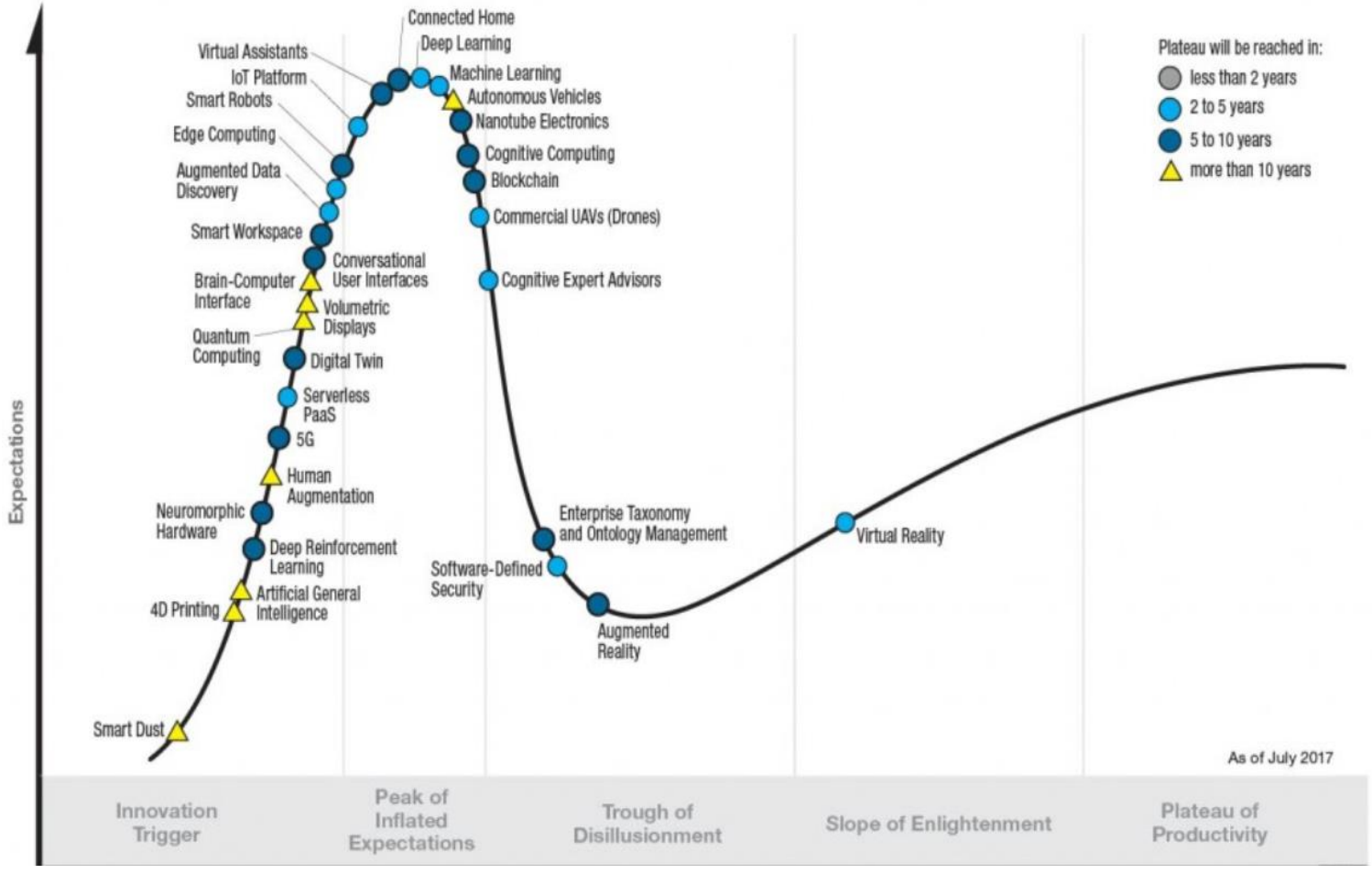
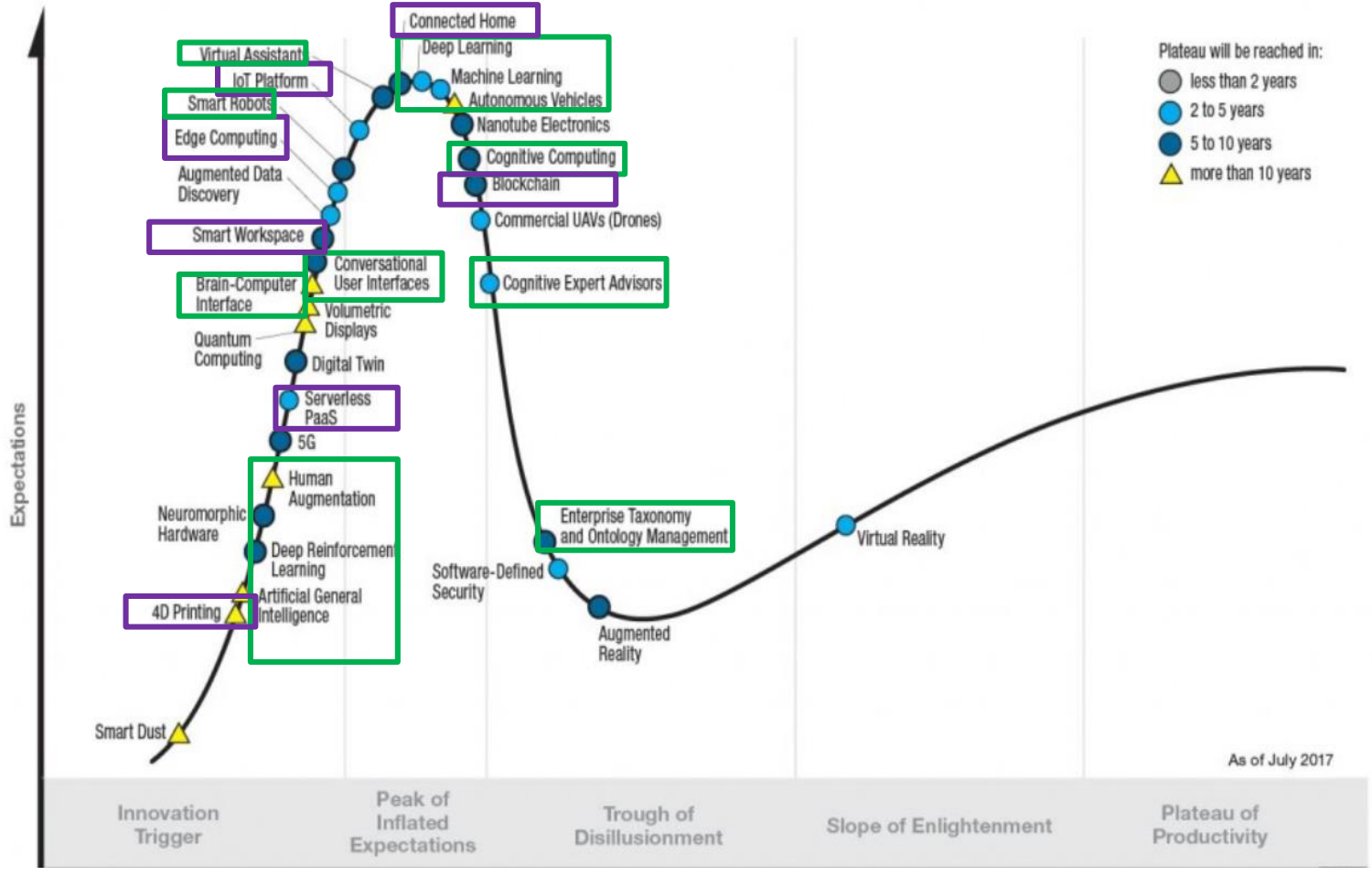
An Exploration of emerging and disruptive technologies at the intersection of two forces:

- Decentralization
- Artificial Intelligence

Gartner Hype Cycle for Emerging Technologies, 2017



Gartner Hype Cycle for Emerging Technologies, 2017



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Legend

AI/Cognitive

Decentralized

2018 Predictions

1 CX hits a wall

2 The digital crisis

3 Talent widens the digital divide

4 The empowered machine

5 The algorithm wars

6 The intelligent agent cocoon

7 The advertising correction

8 The GDPR challenge

9 Open banking lays siege

10 Retail experience harmonization

11 The AI reset

12 Blockchain inches forward

13 Security for profit

Legend

AI/Cognitive

Decentralized

Quick Agenda

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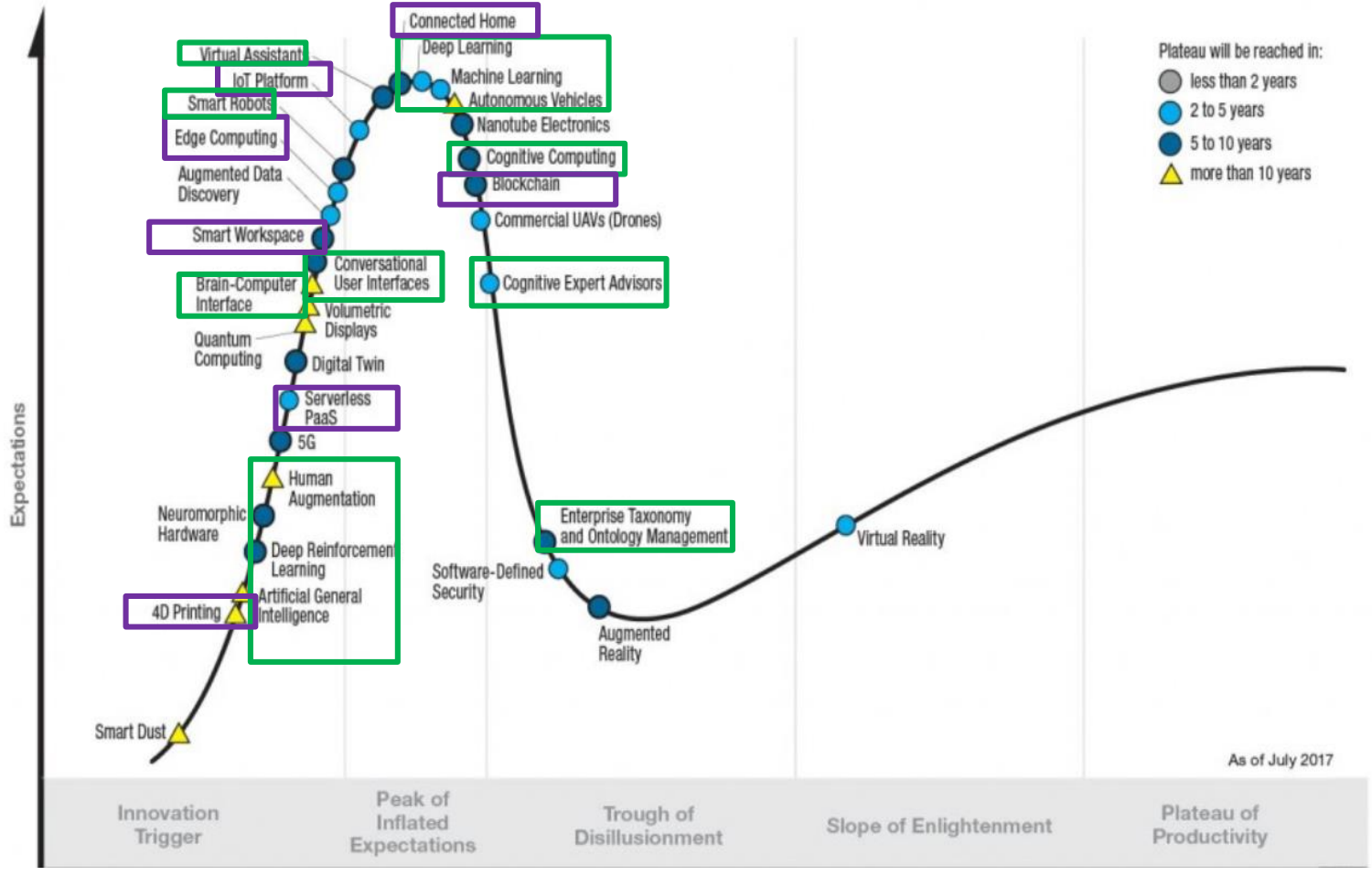
- Decentralization
- Serverless Computing and Containers
- AI/Cognitive Update
- Blockchain PoV

Gartner Hype Cycle for Emerging Technologies, 2017



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Legend

AI/Cognitive

Decentralized

ETG Insights

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- Shift to **Software Defined*** will continue to move forward and become the norm

- **AI Trends**: Intelligent agents pervading every aspect of business and personal interactions

- **Serverless computing** (Function as a Service)will replace current distributed models Data Models will become hyper-distributed, virtualized and **trusted**
- Network boundaries are dissolving to a **perimeterless structure**

IT at the Edge: Areas

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- **Decentralizing Data**
  - Blockchain Revolution, the "institution of One"

"IT at the Edge" is about the tendency for IT to move towards decentralized structures

- **Operating our Companies**
  - Packaging v 2.0 Enabling a Microservice foundation
  - Batch Computing: Time to Stop Dating Yourself
  - Serverless Edge Computing: Move the Code to the Data

Discussion Framework

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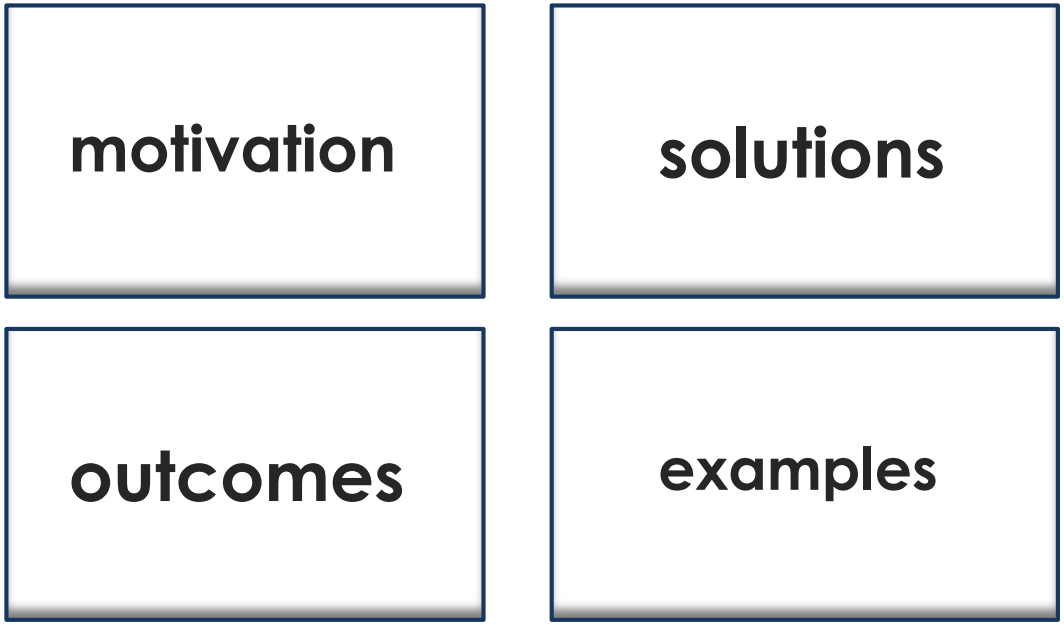

Decentralizing IT: Motivation

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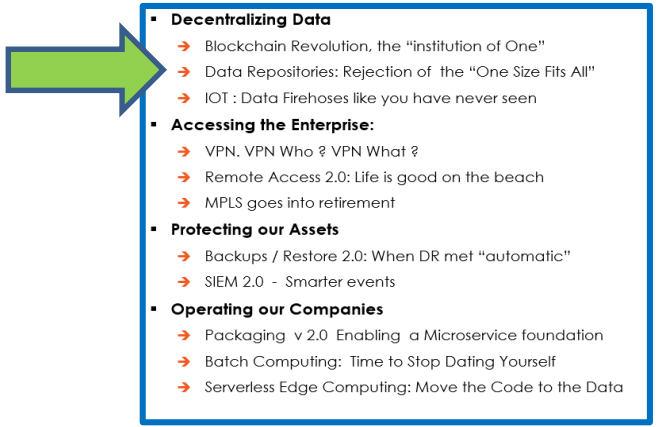
- Scale (volume, velocity, variety) has exceeded operating parameters of traditional centralized data management platforms
- Data duplication is common practice in multi-party transaction within and across enterprises
- Centralized identity and verification models pose significant security and force “under” or “over” specification of data access levels for resources and attributes
- Governance, audit and guaranteed compliance are external to core transactional processes
- Key aspects of the IoT are inefficient, lack privacy and trust



Decentralizing: Solutions

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- Broad set of data layer implementation choices
- Distributed Ledger Technology
- “Edge” distributed logic drives scale and efficiency
- IPFS-like objectstores

Decentralizing: Outcomes

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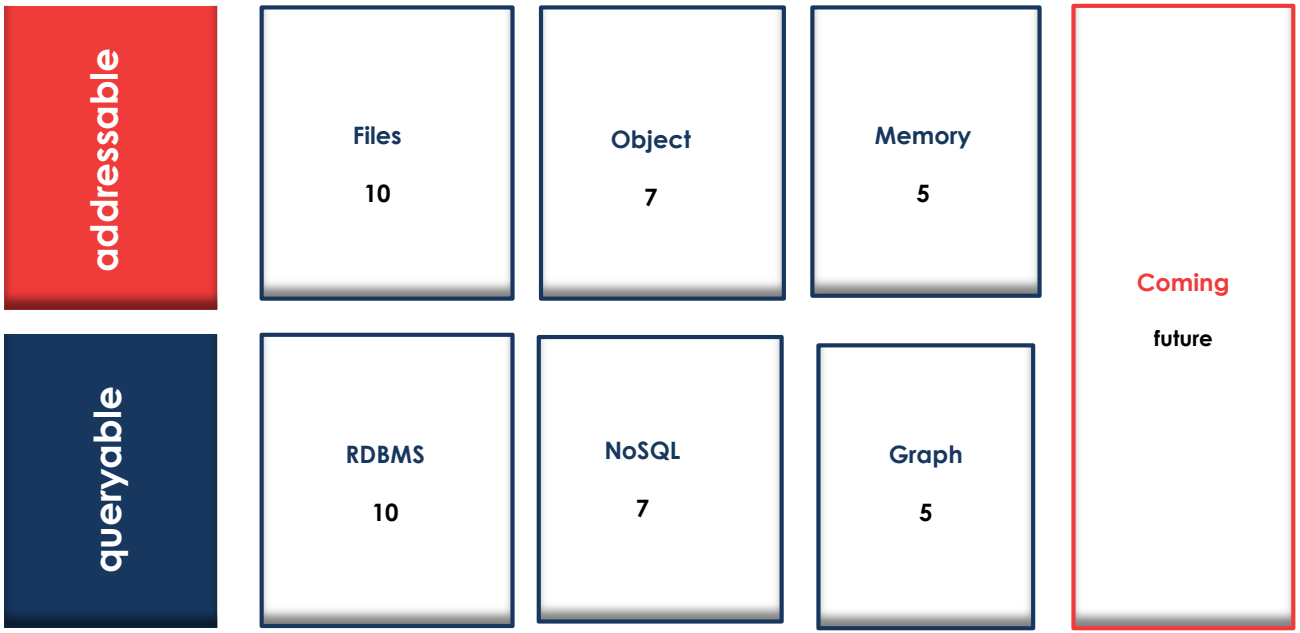
- Decentralized storage models enable the hyperscale
- Distributed consensus allows networks to increase trust and self-organize
- Data owners can exercise fine-grained control and distribution to key and sensitive attributes
- IOT event and data producers can become inherently intelligent, offload logic and efficient

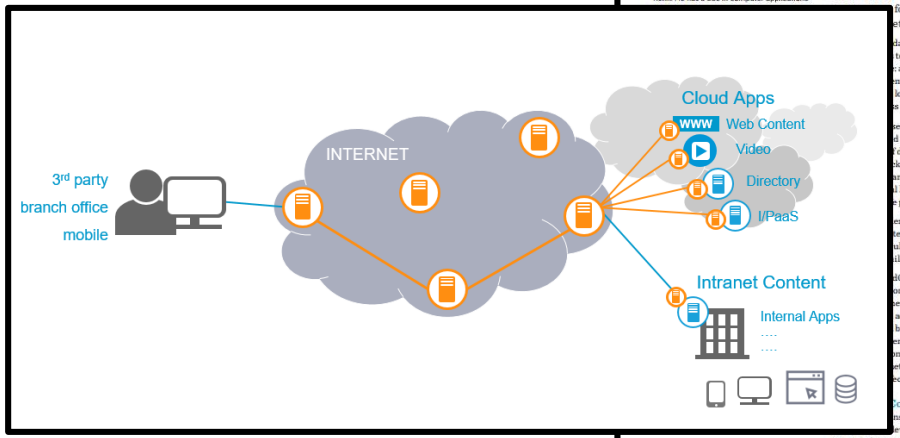
Decentralizing: Example

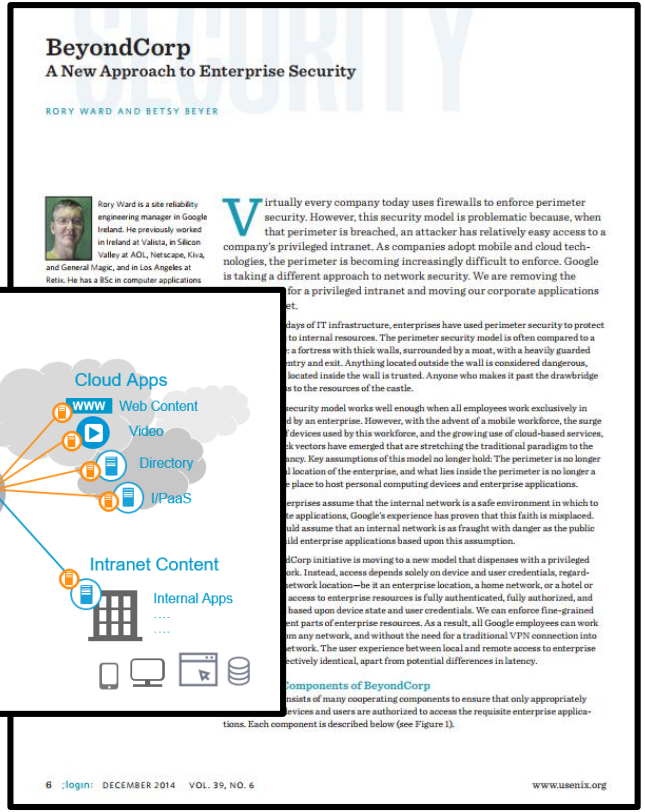
(Data Layer Evolution)



Accessing: Example

Spurred by SaaS adoption, Enterprises are moving towards IT delivery models where all services are external to the organization





BeyondCorp

A New Approach to Enterprise Security

RORY WARD AND BETSY BEYER

Rory Ward is a site reliability engineering manager in Google Ireland. He previously worked in Ireland at Valista, in Silicon Valley at AOL, Netscape, Kiva, and General Magic, and in Los Angeles at Retix. He has a BSc in computer applications

Virtually every company today uses firewalls to enforce perimeter security. However, this security model is problematic because, when that perimeter is breached, an attacker has relatively easy access to a company's privileged intranet. As companies adopt mobile and cloud technologies, the perimeter is becoming increasingly difficult to enforce. Google is taking a different approach to network security. We are removing the

for a privileged intranet and moving our corporate applications

st.

days of IT infrastructure, enterprises have used perimeter security to protect to internal resources. The perimeter security model is often compared to a a fortress with thick walls, surrounded by a moat, with a heavily guarded ntry and exit. Anything located outside the wall is considered dangerous, located inside the wall is trusted. Anyone who makes it past the drawbridge s to the resources of the castle.

ecurity model works well enough when all employees work exclusively in d by an enterprise. However, with the advent of a mobile workforce, the surge devices used by this workforce, and the growing use of cloud-based services, k vectors have emerged that are stretching the traditional paradigm to the ncy. Key assumptions of this model no longer hold: The perimeter is no longer l location of the enterprise, and what lies inside the perimeter is no longer a e place to host personal computing devices and enterprise applications.

erprises assume that the internal network is a safe environment in which to e applications, Google's experience has proven that this faith is misplaced. uld assume that an internal network is as fraught with danger as the public ild enterprise applications based upon this assumption.

dCorp initiative is moving to a new model that dispenses with a privileged rk. Instead, access depends solely on device and user credentials, regard- etwork location—be it an enterprise location, a home network, or a hotel or access to enterprise resources is fully authenticated, fully authorized, and based upon device state and user credentials. We can enforce fine-grained ent parts of enterprise resources. As a result, all Google employees can work m any network, and without the need for a traditional VPN connection into etwork. The user experience between local and remote access to enterprise ectively identical, apart from potential differences in latency.

Components of BeyondCorp

sists of many cooperating components to ensure that only appropriately evices and users are authorized to access the requisite enterprise applica- tions. Each component is described below (see Figure 1).

6 ;login: DECEMBER 2014 VOL. 39, NO. 6 www.usenix.org

contractors/partners/vendors/franchises /customers/temp workers

For Additional Analysis
Refer to Supplemental Slides

Serverless, Containers: Moving Code to the Data

(Traditional N-Tier Architecture)

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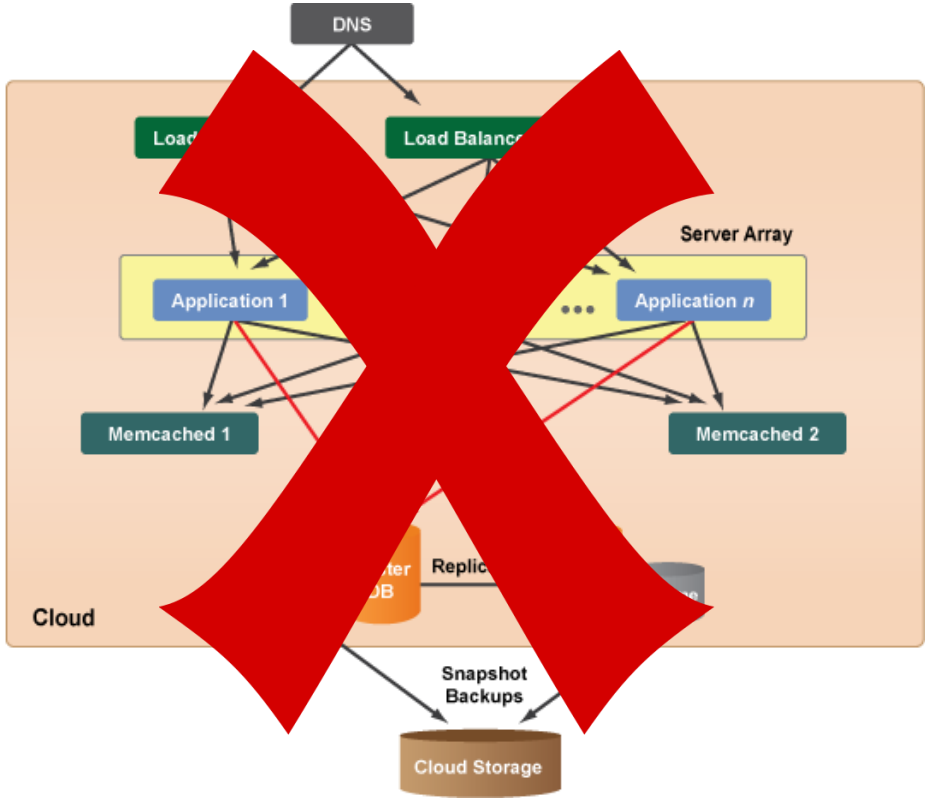

Shift to Software Defined

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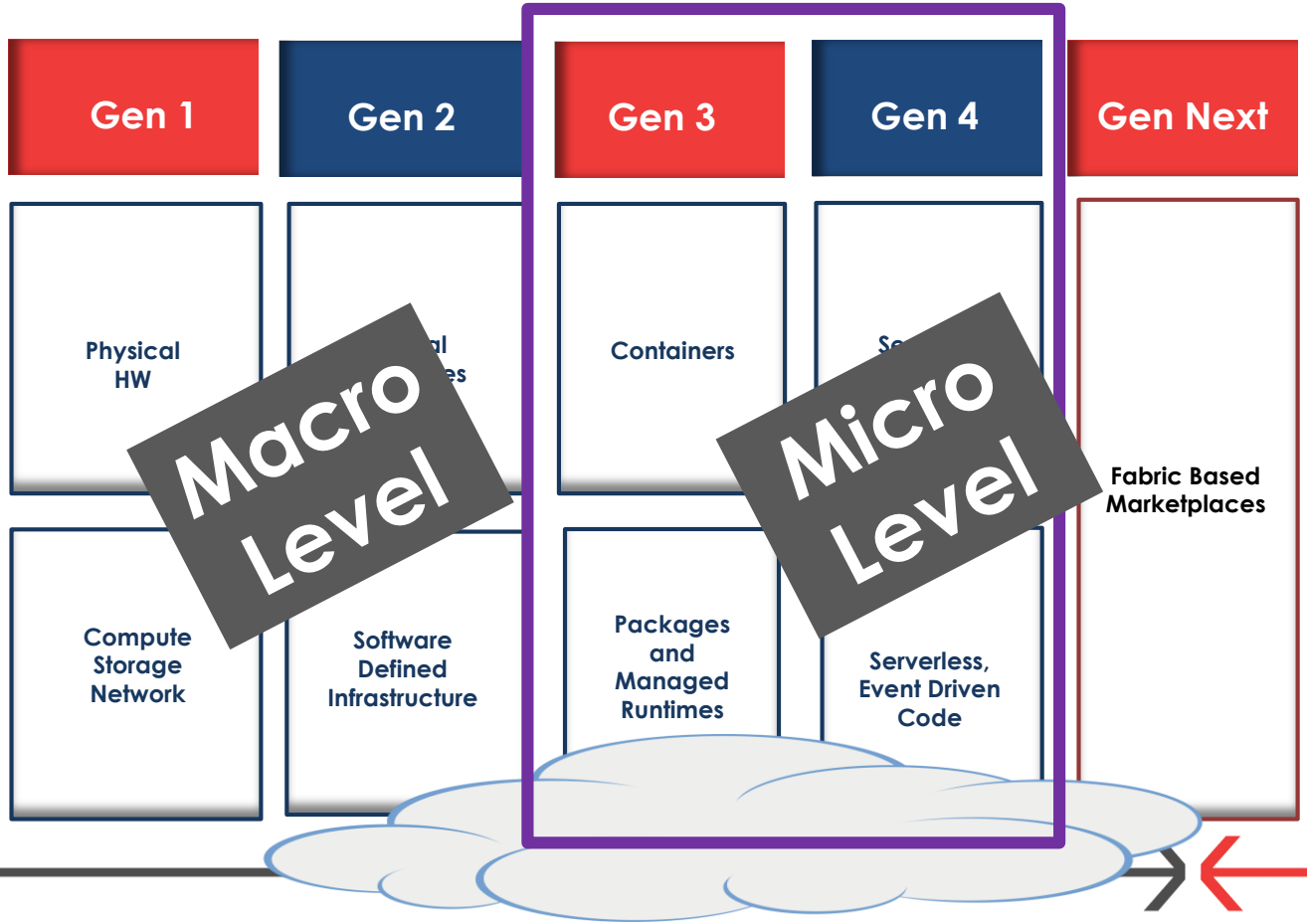

What's "dockerfile" ?

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```
# A very rudimentary mysql service
#
# This is intended to have mysql client run remotely. It has a default user setup as
'admin' with password 'mysql-server'
#
# So you might run two instances of this container. One as server, then run your client in
a separate temporary container.
#
# docker build -t="mysql-server" .
#
# Launch the server
#
# docker run -d mysql-server
#
# Find the IP of the server
#
# MYSQL_IP=`docker inspect CONTAINER_ID | python -c 'import
json,sys;obj=json.load(sys.stdin);print obj[0]["NetworkSettings"]["IPAddress"]'`
#
# docker run -i -t mysql-server mysql -u admin -p -h $MYSQL_IP

FROM ubuntu:12.04

MAINTAINER Kimbro Staken version: 0.1

ADD ./mysql-setup.sh /tmp/mysql-setup.sh
RUN /bin/sh /tmp/mysql-setup.sh

# Adding this will expose mysql on a random host port. It's recommended to avoid this.
Other containers on the same
# host can use the service without it.
#EXPOSE 3306

CMD ["/usr/sbin/mysqld"]
```

```
#!/bin/sh

# Keep upstart from complaining
RUN dpkg-divert --local --rename --add /sbin/initctl
RUN ln -s /bin/true /sbin/initctl

apt-get update && apt-get install -y mysql-server && apt-get clean && rm -rf /var/lib/apt/lists/*

sed -i -e"s/^bind-address\s*=\s*127.0.0.1/bind-address = 0.0.0.0/" /etc/mysql/my.cnf

/usr/sbin/mysqld &
sleep 5
echo "GRANT ALL ON *.* TO admin@'%' IDENTIFIED BY 'mysql-server' WITH GRANT OPTION; FLUSH PRIVILEGES" | mysql
```

Serverless Architectures

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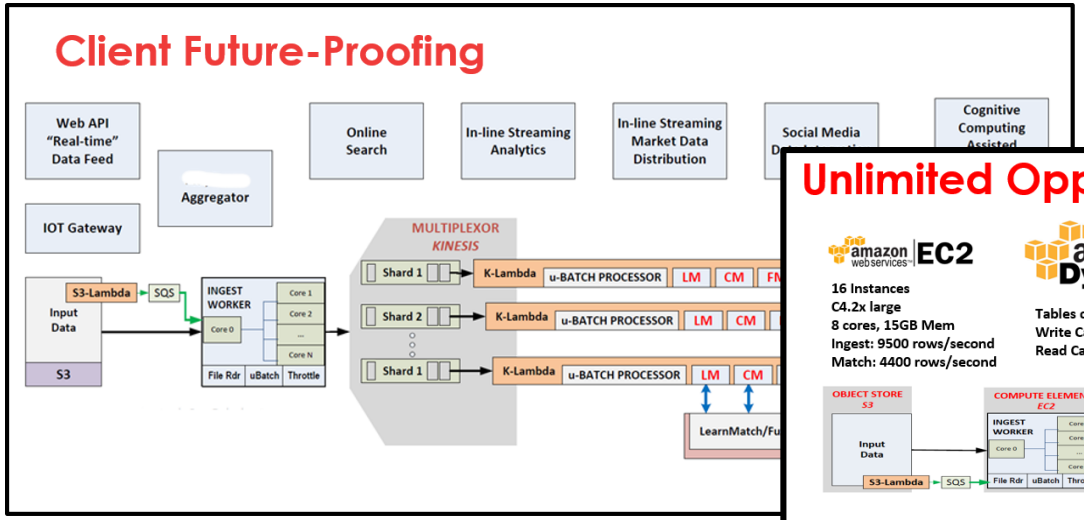

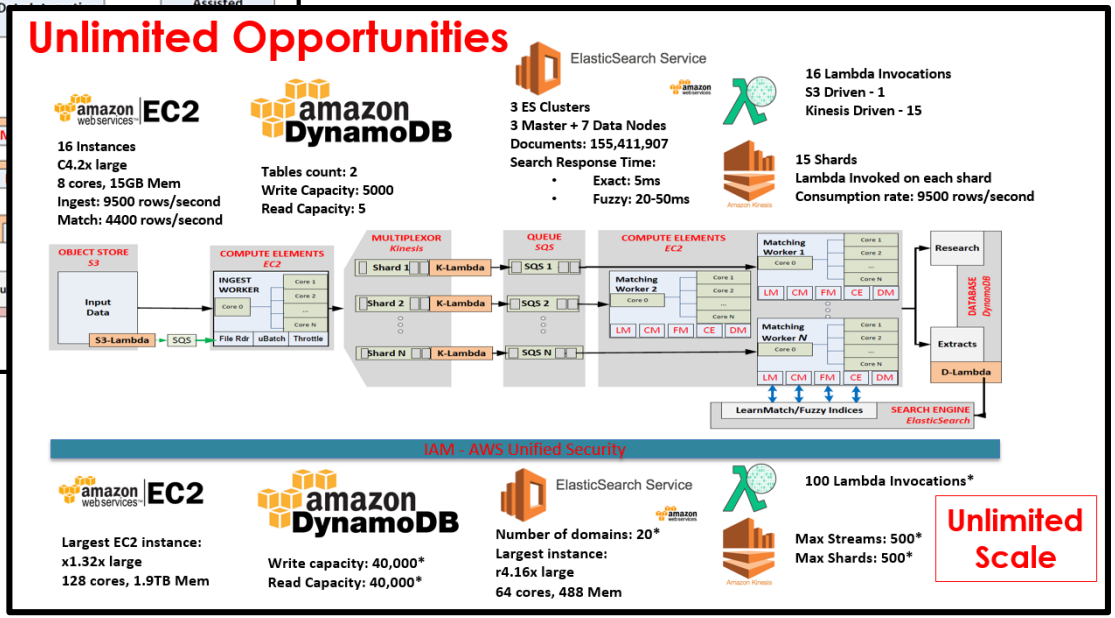

Serverless Containers?

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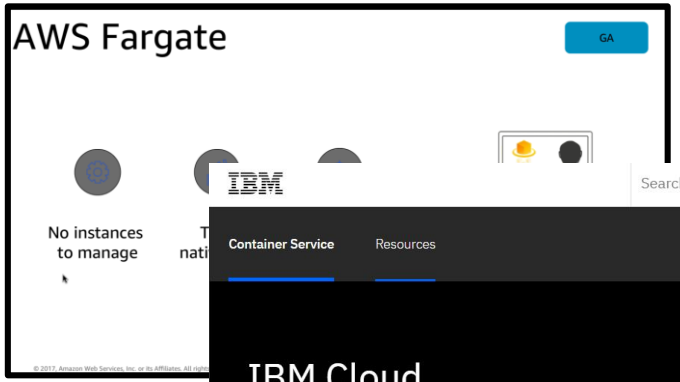

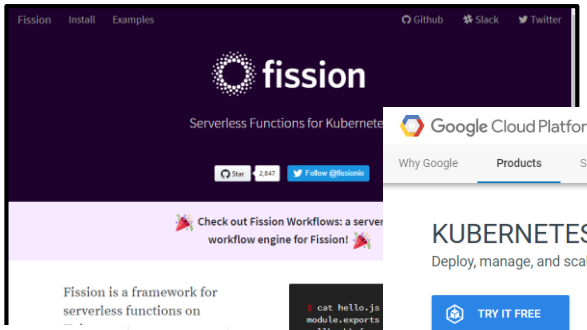

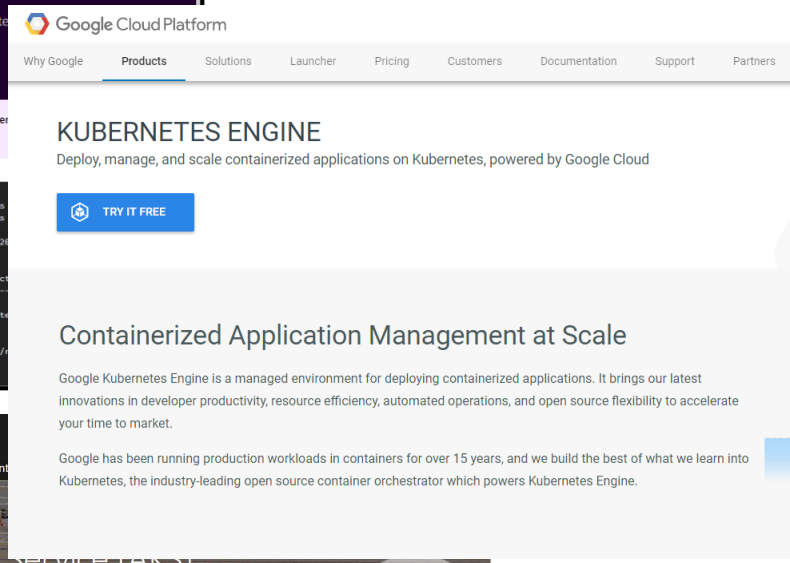

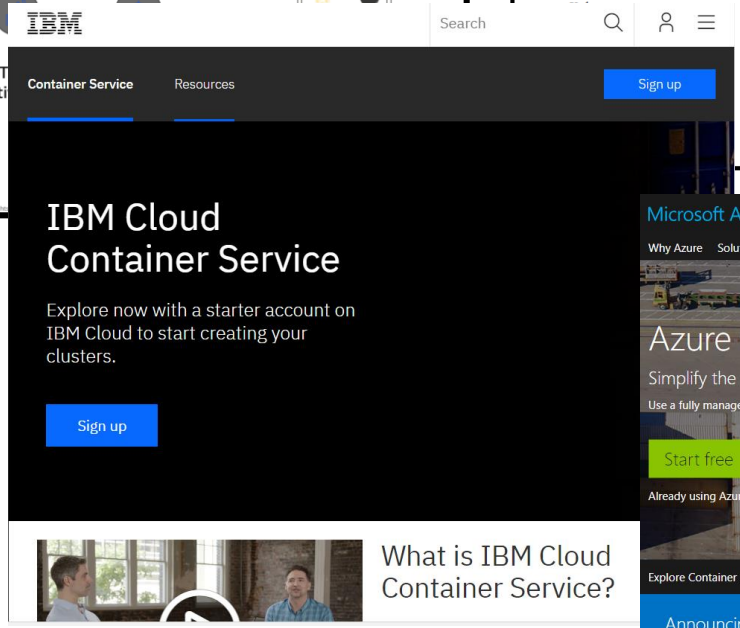

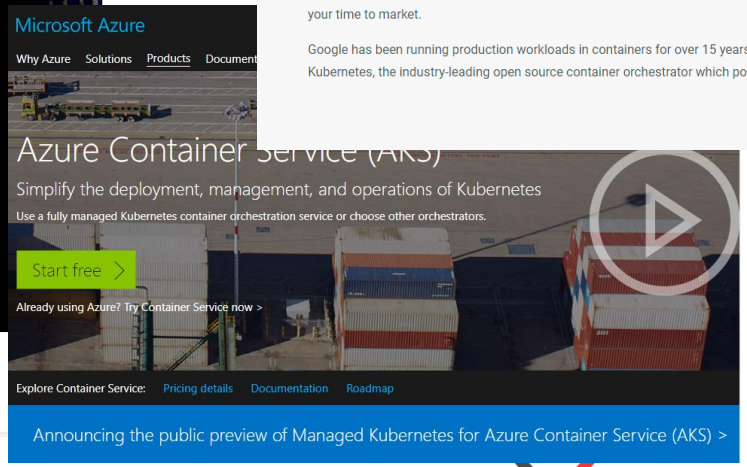


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COGNITIVE INNOVATIONS
CI

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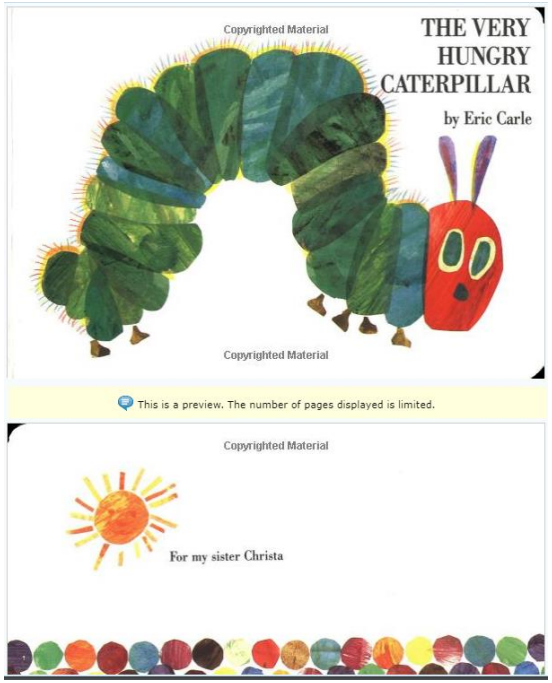
We are heading to places we have never been before

We've come a long way since …

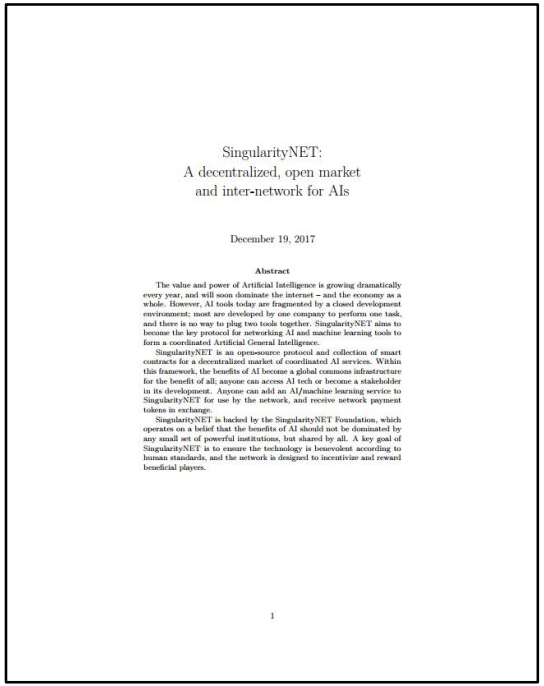
AR for Children



Next Gen Grocery Store: IoT+AI

Social Robots: Meet Sophia

SingularityNET: AI+Blockchain



SingularityNET:
A decentralized, open market
and inter-network for AIs

December 19, 2017

Abstract

The value and power of Artificial Intelligence is growing dramatically every year, and will soon dominate the internet – and the economy as a whole. However, AI tools today are fragmented by a closed development environment; most are developed by one company to perform one task, and there is no way to plug two tools together. SingularityNET aims to become the key protocol for networking AI and machine learning tools to form a coordinated Artificial General Intelligence.

SingularityNET is an open-source protocol and collection of smart contracts for a decentralized market of coordinated AI services. Within this framework, the benefits of AI become a global commons infrastructure for the benefit of all; anyone can access AI tech or become a stakeholder in its development. Anyone can add an AI/machine learning service to SingularityNET for use by the network, and receive network payment tokens in exchange.

SingularityNET is backed by the SingularityNET Foundation, which operates on a belief that the benefits of AI should not be dominated by any small set of powerful institutions, but shared by all. A key goal of SingularityNET is to ensure the technology is benevolent according to human standards, and the network is designed to incentivize and reward beneficial players.

1

Project Description

SingularityNET is an open source protocol that lets you acquire and monetize Artificial Intelligence services and machine learning tools. By creating an open infrastructure that all parties involved can benefit from, SingularityNET aims to accelerate the growth and development of the AI sector. On the SingularityNET platform, you can offer any AI-related software/hardware service in exchange for another service, or get paid in AGI, SingularityNET's token.

The exchange of these services is even more eye-catching when you consider the fact that AI agents (nodes running on the network and fulfilling AI tasks in interaction with other agents) are heavily dependent on each other, and when these agents combine, they can form a big group of decentralized datasets. These datasets have great functionality, and they can be bought by companies that want to use them for their product's activities.

As a result, SingularityNET is not only a marketplace for selling or buying AI tools, but also a platform for forming profitable partnerships and mutually beneficial exchange of tools. The more functional the AI agent, the more beneficial it will be to the whole ecosystem, and the higher its reward in AGI. Subsequently, agents that aren't doing so well will have their stakes reduced.

Reality Check
How Urgent Is This For Me ?

Artificial Intelligence is Not a Silo

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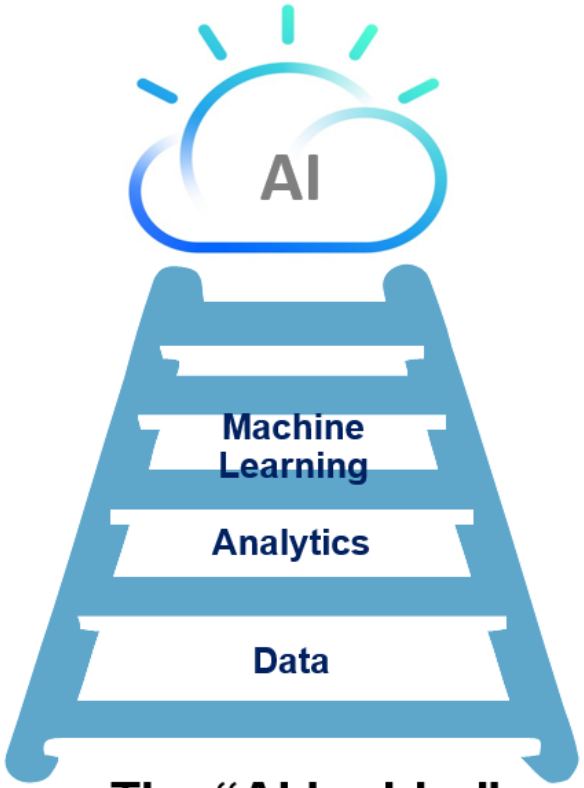

The “AI Ladder”

Watson is a Set of Cognitive Capabilities

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Context: Watson vs Bluemix*

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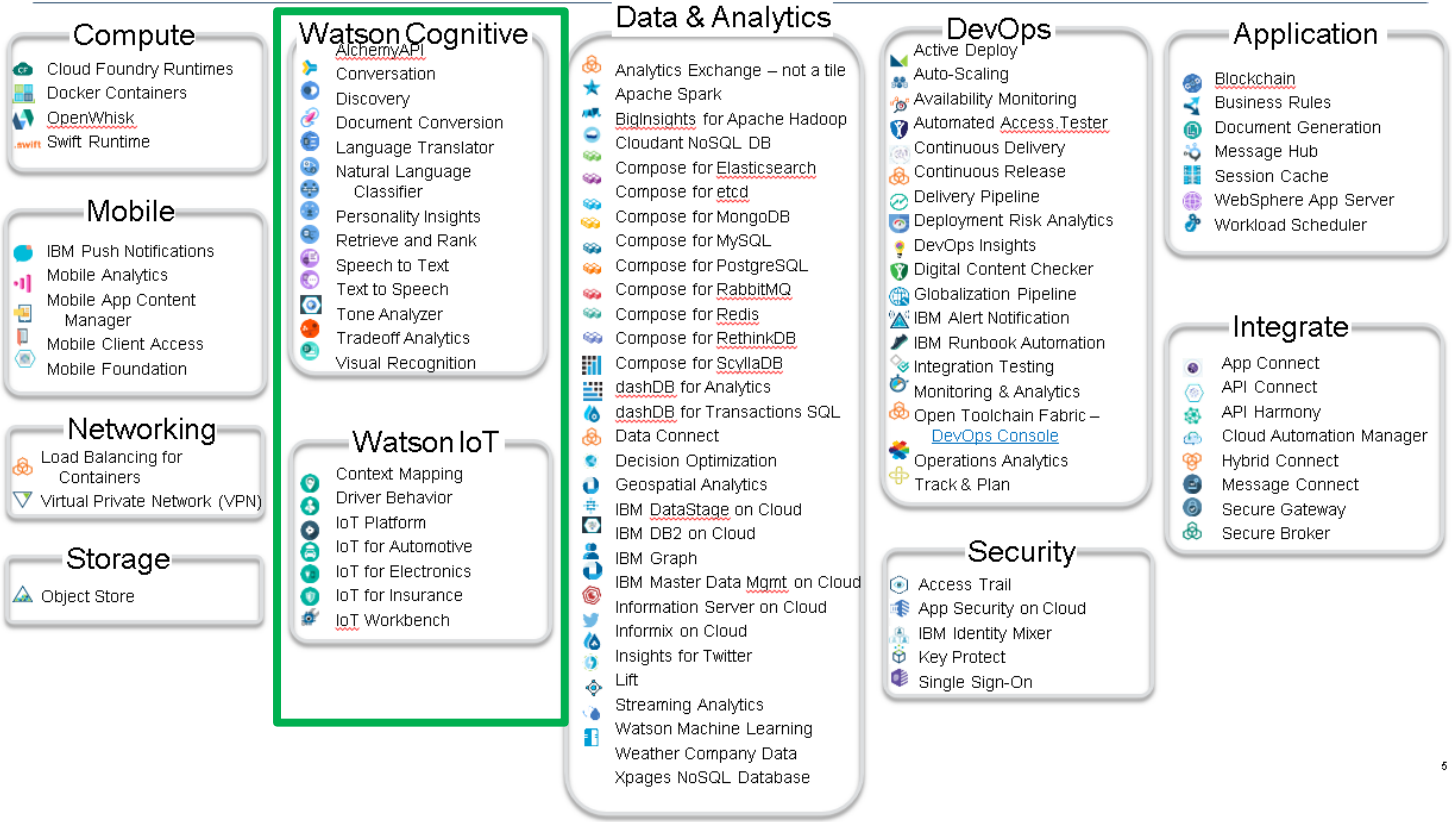
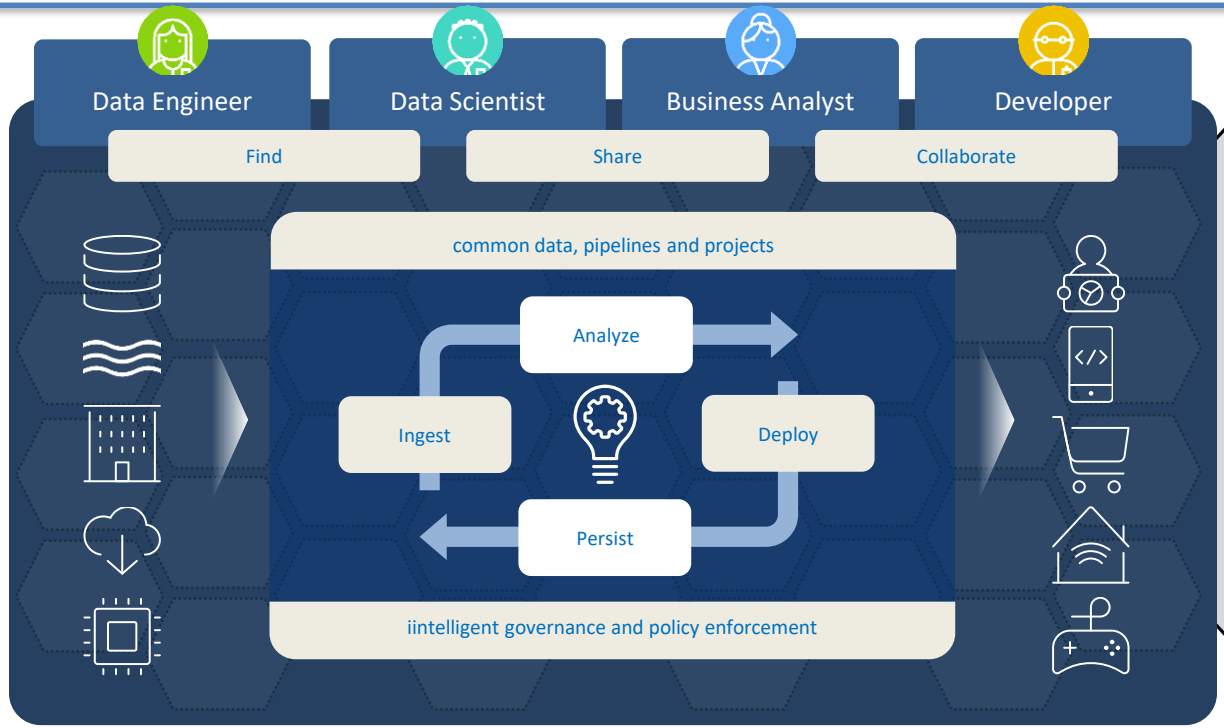


A Complete Story: Watson Data Platform



Core Tenets

- Intelligent by Design
- Collaborative for Teams
- Self-service access to trusted data
- Best in class streaming and real-time analytics
- Open and Extensible

Premier content hub

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Cognitive is about…

Cognitive is about **Scaling Expertise**

Cognitive is about **Intelligent Data**

Cognitive is about **Intelligent Applications**

Cognitive + Machine Learning = Power to Scale Expertise

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Cognitive

- You are training people to follow steps in the process
- It involves reading and understanding text
- "An intern could do it"
- **Ultimately, you are taking unstructured content - like text - and turning it into data in a human-intensive way**

Machine Learning

- When content is already "data"
- You want to find patterns in the data, but you do not know what they are
- Or each time the pattern is different, so describing an algorithm is daunting
- **Ultimately, you have the inputs and the answers, but want the machine to find the path from former to the latter**

What Our Customers Are Building

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- Customer Agents
- Semantic Knowledge
- Anomaly Detection
- Optimization

Starter Projects

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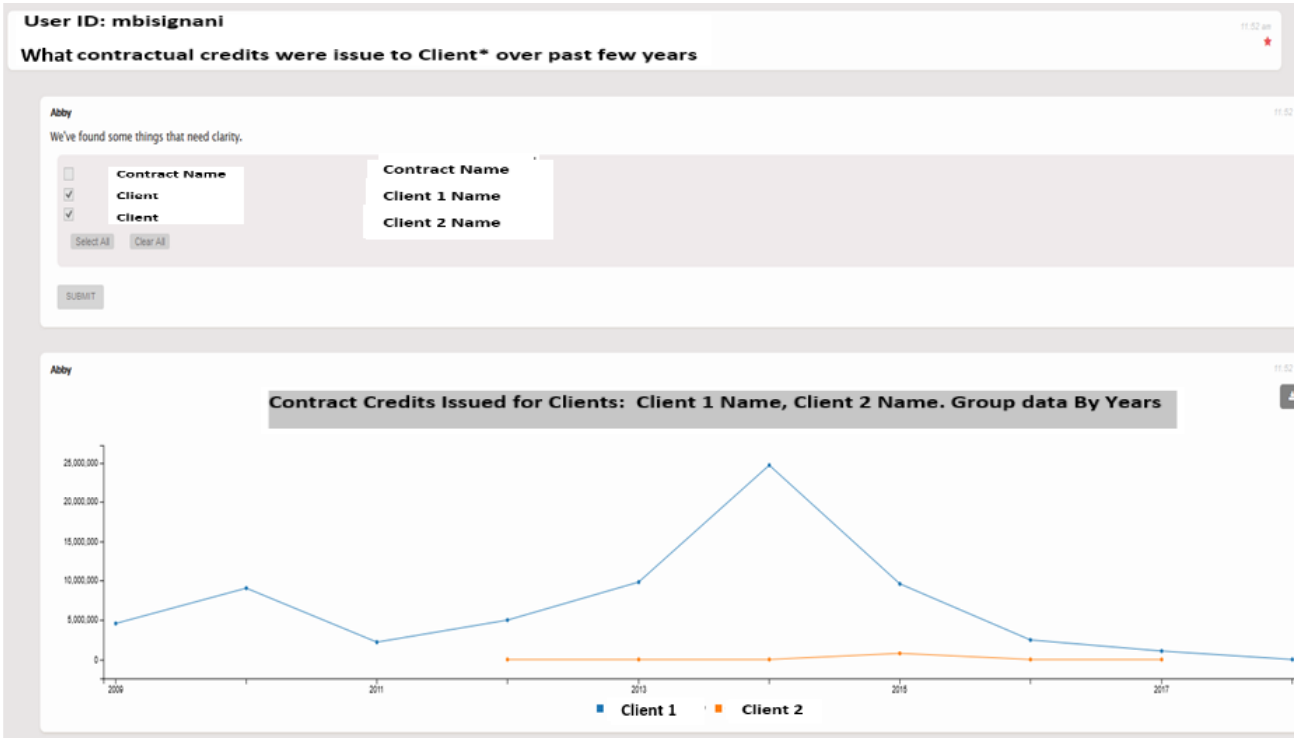
1. Virtual [Personal] Assistant

2. Master Data Matching

3. Collaborative [Business] Agents

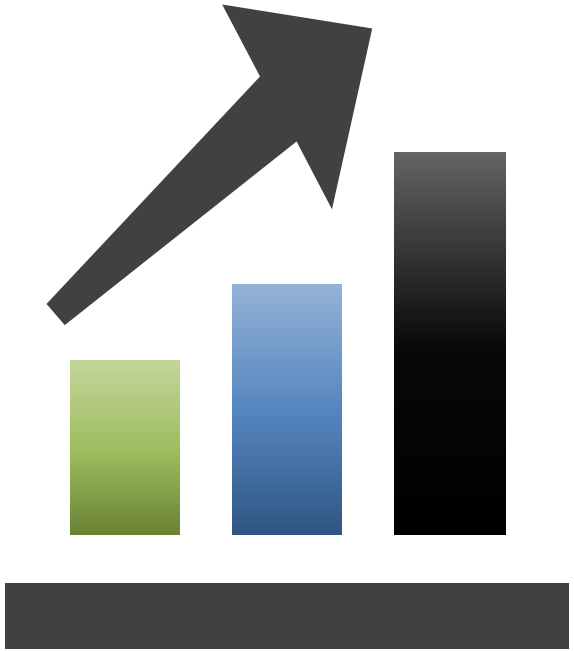
4. Next Best Action

CUA: Saving Execs 8H/Week via Smart Analytics



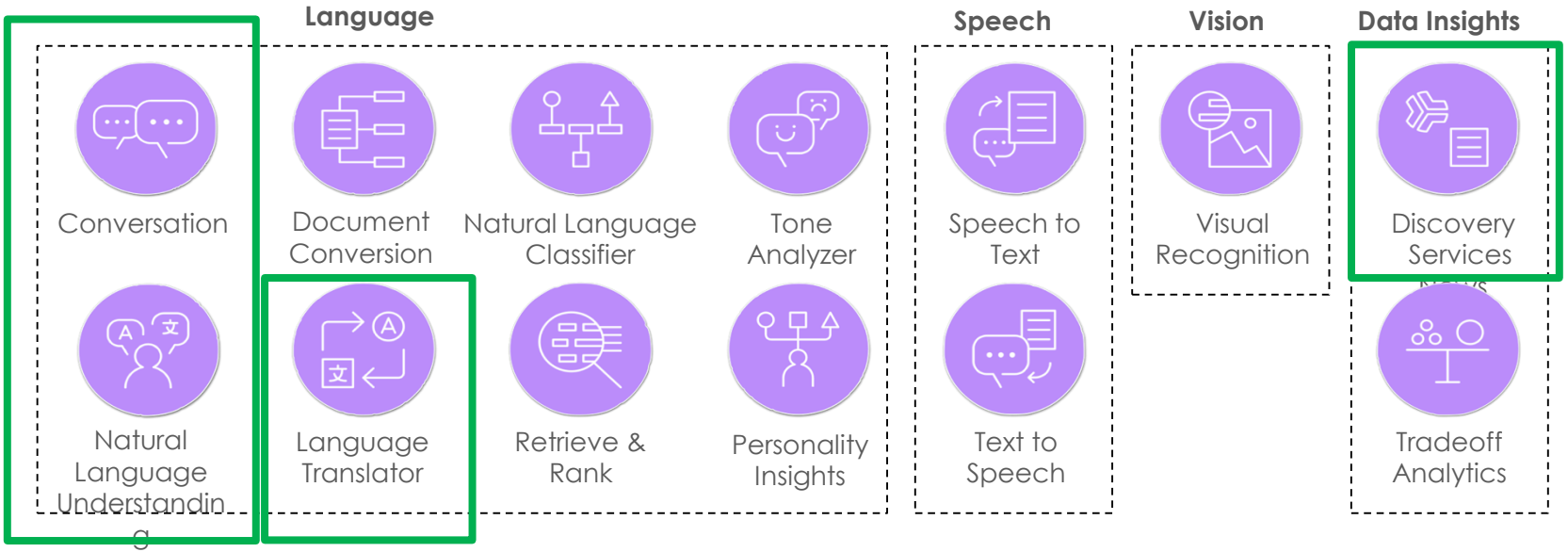
Return on Investment in Chatbots

- A recent study[1] estimated the impact that chatbots will have on two sectors, banking and healthcare, by 2022:
  - **$0.70** saved per customer interaction
  - **4 minutes average time savings** per chat (compared to call center)
  - **$8 billion in total savings**, up from less than $100 million in 2017
- Live chatbots in customer service have show the ability to handle as much as **80% of inquiries** without human intervention[2]



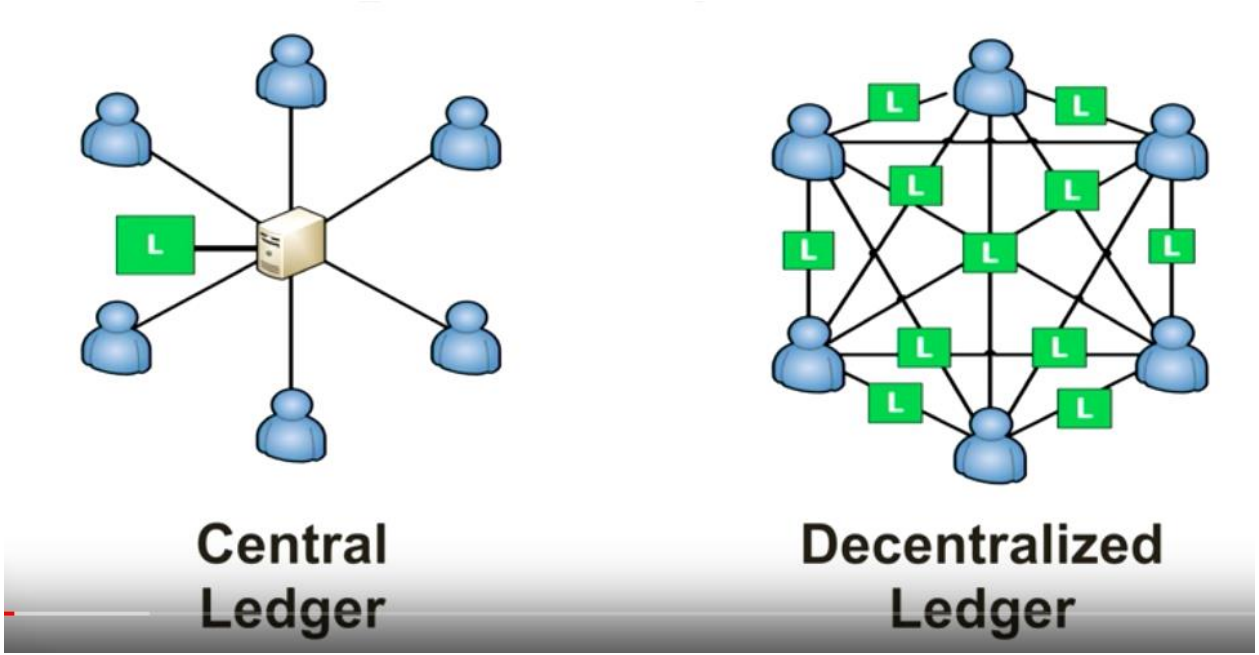
1 – Juniper Research, Chatbots: Retail, e-commerce, Banking & Healthcare 2017-2022 (link)
2 – Accenture, Chatbots in Customer Service (link)

Chatbot Building Blocks



The Blockchains are Comin’

The Blockchains are Comin’



Blockchain Revolution 1

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In the **Internet** of the early 2000's, Amazon, eBay and Google broke through as "***Trust Brokers***", elevating the World Wide Web as "*The Killer App*". Today, we understand this era of human endeavor pretty well. And while, Smart Phones, have made accessibility ubiquitous, we might look back at this progress as just a set of marginal improvement.

Blockchain Revolution Cont'd

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With **Blockchain** technology, institutions, government, business, will have access to a **NEW FORM of TRUST** founded in mathematics, not human subjectivity, to define most aspects of our lives.

Blockchain revolution represents the portal to a **new era** with societal and business implications, both positive and negative, implications yet to be grasped and explored.

Enterprises can not ignore this force for much longer without compromising their long term viability.

Blockchain Lingo

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self-organizing networks

tokenized asset offering

decentralized

global experiments

digital scarcity

sovereign identity

TRUST

mining

intermediary

protocols

Crypto

cryptoeconomics

Genesis block

CONSENSUS

whitepaper

forks

SMART CONTRACTS

portable identity

uncertainty elimination

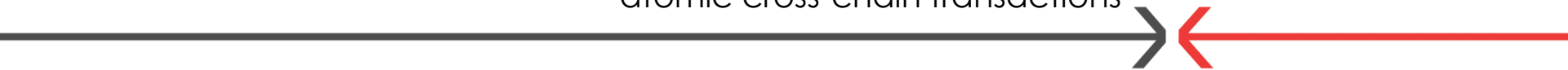
Immutable Records

ICO

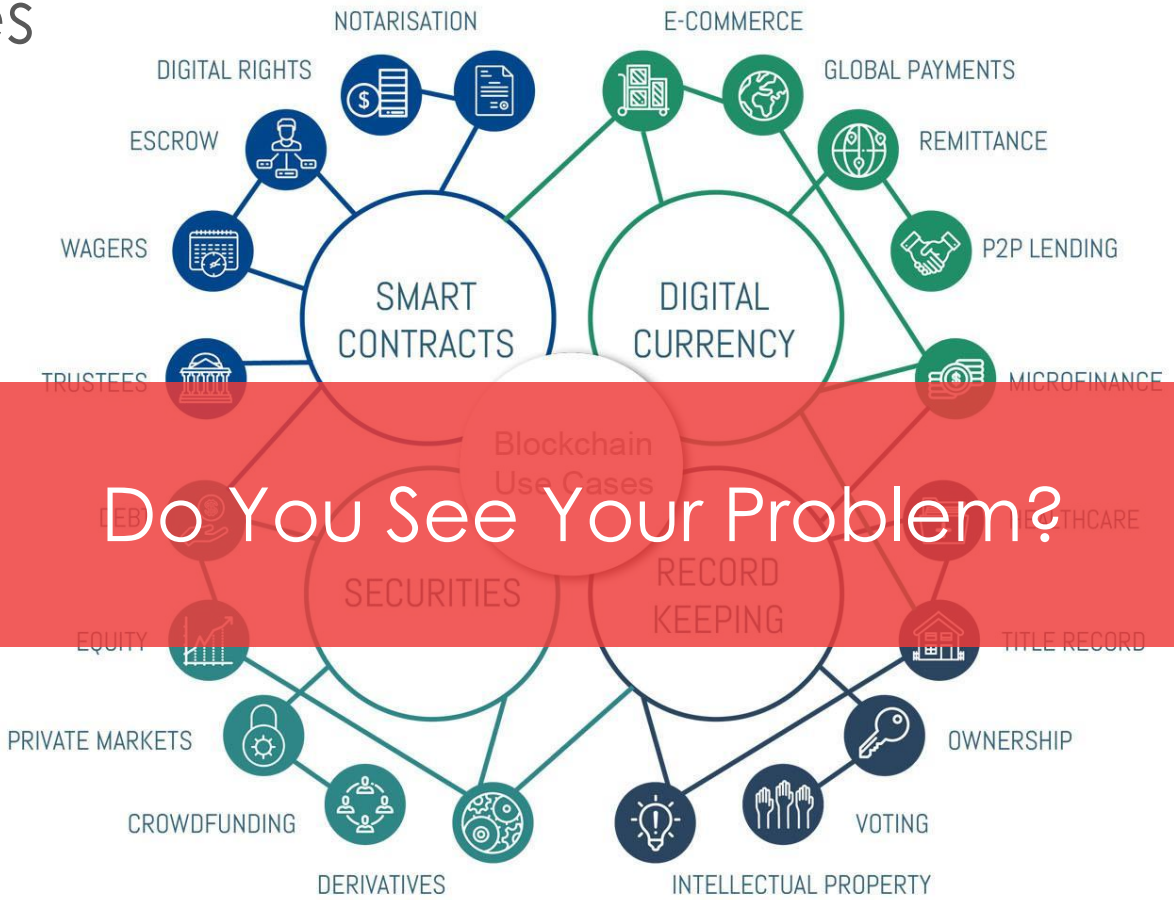
Distributed Ledgers

user controlled data

atomic cross-chain transactions



Use Cases



Do You See Your Problem?

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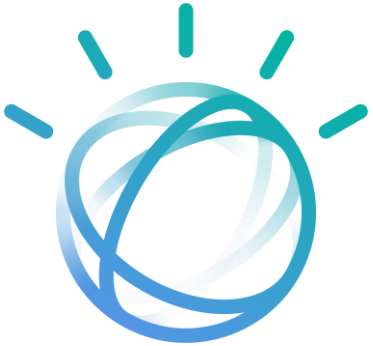

Are you ready to be a disruptor?

Thank You

Cognitive Business

Digital Business + Digital intelligence

Supplemental Slides

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Mid-Atlantic CIO Forum

Mid-Atlantic CIO Forum: Meeting Announcement
Topic: Emerging Technologies, Including Block chain
Date: February 15, 2018 Location: Towson University

Please join members of the Mid-Atlantic CIO Forum and their invited guests at this February 15th Forum. We encourage you to invite your 2nd Lieutenants that might be interested in emerging technologies and possible implications to your organizations. CIO's have to always be aware of emerging technologies. They use resources like Gartner and many others to be informed of those technologies that will disrupt, and must surely be up to date on those technologies that will enable their organizations to stay ahead. Is Block chain just hype and industry noise, or will it revolutionize financial transactions? What are other emerging technologies that are important to your company's success?

First, several of our CIO's will set the stage. They will cover technologies that they are using or tracking, and other emerging technologies that Gartner has noted as critical to understand and leverage in the right way for 2018 and over the next three to five years. Analysts say that enterprises need to understand the business potential of Block chain, artificial intelligence, and augmented reality. Digital platforms are evolving too with serverless PaaS and ubiquitous Cloud services. What is "immersive experience" and can VR and AR help increase productivity? Which present and emerging technologies will prove important and critical to competing and winning in the future?

Next Michael (Mick) Bisignani, SVP and CTO at Essextec, will share his views on IT at the Edge and the impacts of the "forces of decentralization". He states that decentralization and AI make possible a new computing model that changes the way we have traditionally engineered our IT structures and processes. Bleeding edge ideas like Augmented Reality become "reality". Mick will update us on AI and cognitive computing, with some insight on progress made with IBM's Watson. Due to their prominence in the marketplace, special attention will be paid to the topic of Serverless Computing, which incorporates aspects of container technology as well as how AI will drive and thrive within the IoT and Block chain space beyond Cognitive.

Then Richard Gordon who is the Block chain Solution Sales Leader for IBM North America will share what leaders need to know about the next major business disruptor – Block chain. Is it possible that what the internet did for communications, Block chain will do for trusted transactions? Block chain has shifted from hype to reality across many industries. Viewed as both an opportunity and a threat, Block chain technology is allowing businesses to reimagine business networks and the fundamental ways they exchange value and information. As a recent data point in the continuing evolution of Block chain for business, IBM is partnering with Danish shipping giant Maersk to form a Block chain logistics company. Block chain looks to be here to stay. Will it be important for each of us – and sooner than we think?

Please join our members and their guests at this Full Membership meeting. The meeting starts at 8:00 AM and ends by 1PM. Brunch and lunch are provided. Pre-registration is required. Meeting logistics including agenda, directions to the meeting place and parking information will be emailed to you after you register. For registration for this meeting, please reply to the meeting request send out by Bonnie Lawson or contact her at blawson@towson.edu or 410-704-4252.

Emerging Technologies, including Block Chain and Containers

February 15 @ 8:00 am - 1:00 pm

CIO's have to always be aware of emerging technologies. They use resources like Gartner and many others to be informed of those technologies that will disrupt, and must surely be up to date on those technologies that will enable their organizations to stay ahead. What does digital transformation and digitization bring? What are the Cloud services that make a key difference for our organizations? How far should IoT go? Can security be assured in the Cloud and with IoT? Is Blockchain just hype and industry noise, or will it revolutionize financial transactions? What are "containers" and how important are they for our future plans and strategies? Do we need to "turbo" charge our company's social engagement, or contain and control it? As always there is plenty to ponder on the road ahead, and opportunity to make the right or wrong decisions. This Forum and presentations by our members and other experts will help us in making the right ones!

Format: Full Membership

+ GOOGLE CALENDAR + ICAL EXPORT

Details

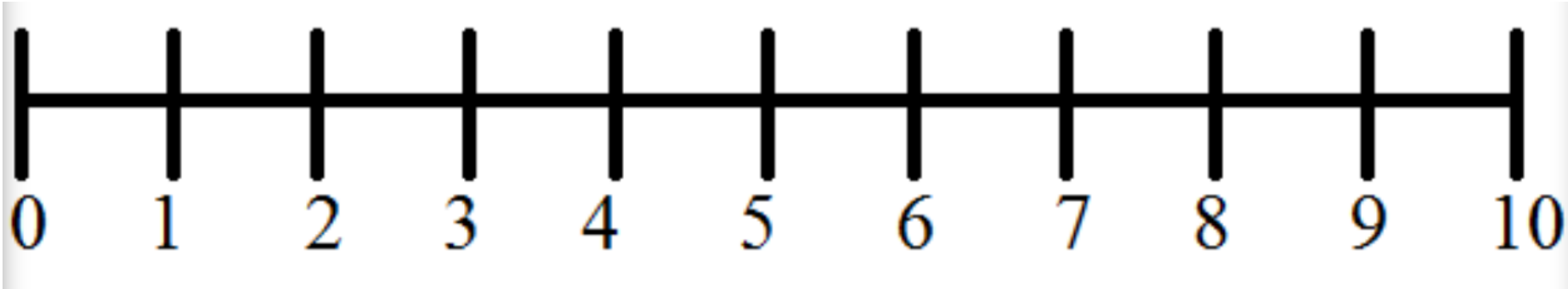
Date:
February 15

Time:
8:00 am - 1:00 pm

Venue

Cisco

8135 Maple Lawn Boulevard
Fulton, MD 20759 United States
+ Google Map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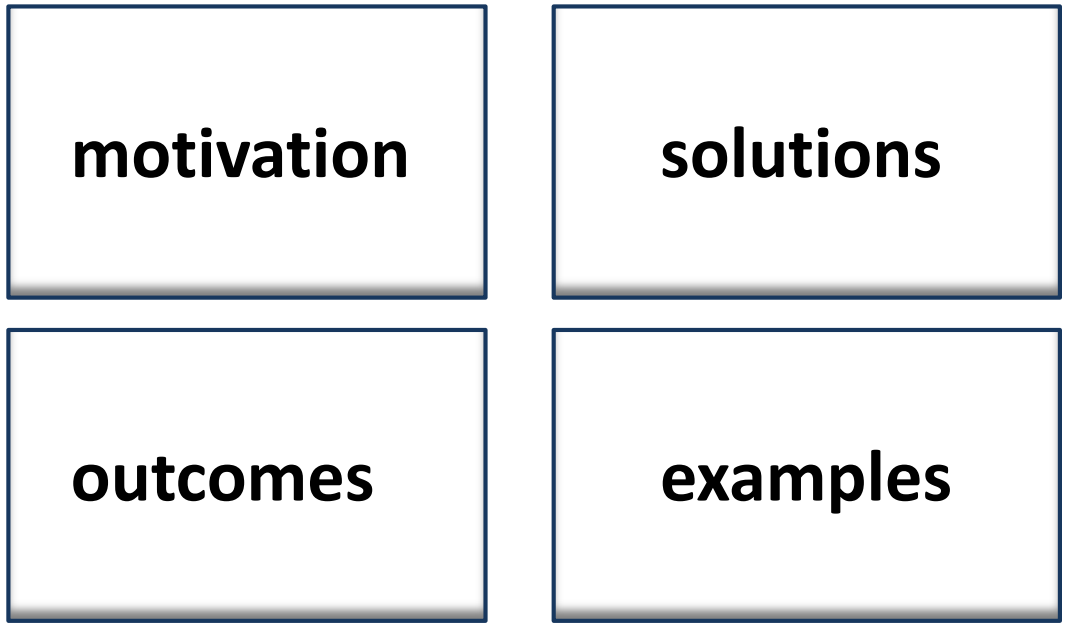
Discussion Framework



Decentralizing IT: Motivation

- Scale (volume, velocity, variety) has exceeded operating parameters of traditional centralized data management platforms
- Data duplication is common practice in multi-party transaction within and across enterprises
- Centralized identity and verification models pose significant security and force “under” or “over” specification of data access levels for resources and attributes
- Governance, audit and guaranteed compliance are external to core transactional processes
- Key aspects of the IoT are inefficient, lack privacy and trust

- **Decentralizing Data**
  - Blockchain Revolution, the “institution of One”
  - Data Repositories: Rejection of the “One Size Fits All”
  - IOT : Data Firehoses like you have never seen
- **Accessing the Enterprise:**
  - VPN. VPN Who ? VPN What ?
  - Remote Access 2.0: Life is good on the beach
  - MPLS goes into retirement
- **Protecting our Assets**
  - Backups / Restore 2.0: When DR met “automatic”
  - SIEM 2.0 - Smarter events
- **Operating our Companies**
  - Packaging v 2.0 Enabling a Microservice foundation
  - Batch Computing: Time to Stop Dating Yourself
  - Serverless Edge Computing: Move the Code to the Data

Decentralizing: Solutions

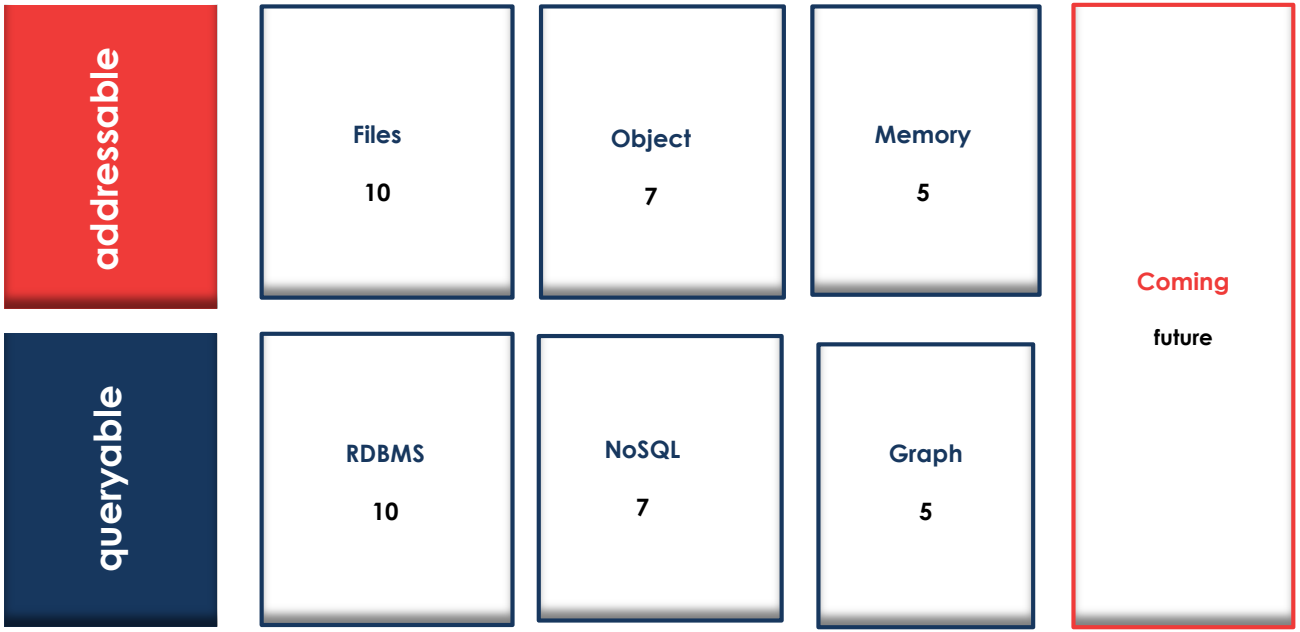
- Broad set of data layer implementation choices
- Distributed Ledger Technology
- Edge distributed logic drives scale and efficiency
- IPFS-Like objectstores

Decentralizing: Outcomes

- Decentralized storage models enable the hyperscale
- Distributed consensus allows networks to increase trust and self-organize
- Data owners can exercise fine-grained control and distribution to key and sensitive attributes
- IOT event and data producers can become inherently intelligent, offload logic and efficient

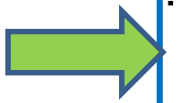
Decentralizing: Example

(Data Layer Evolution)



Accessing: Motivation

- Increasing 3rd Party Access as Remote Users continues to impact overall security posture
- WAN Infrastructure inflexibility limits organizational growth and nimbleness
- Complex remote access infrastructure poses maintenance and performance challenges



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Accessing: Solutions

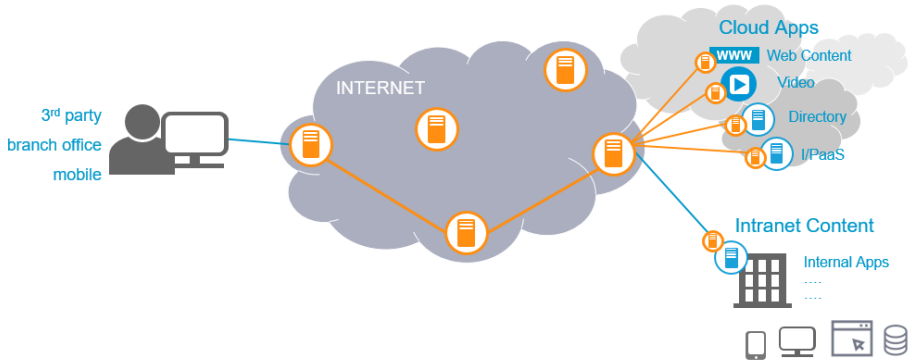
- Identity aware proxies
- Dispersive Network Technology
- Perimeter-less Organizations
- Conversational User Interfaces (CUA)

Accessing: Outcomes

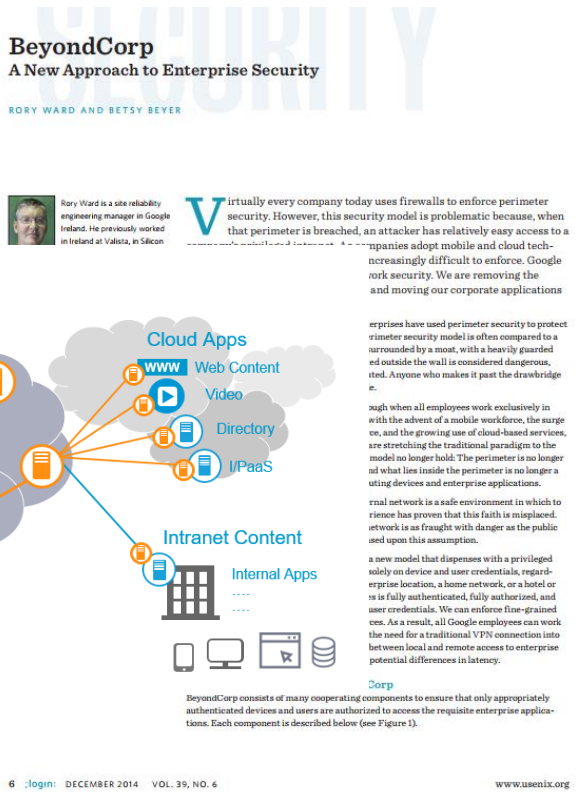
- Reduction or elimination of WAN circuits
- Elimination of most remote access infrastructure
- Coarser grained Application access and auditability
- Endpoint management promises fulfilled

Accessing: Example

Spurred by SaaS adoption, Enterprises are moving towards IT delivery models where all services are external to the organization



contractors/partners/vendors/franchises/customers/temp workers



BeyondCorp
A New Approach to Enterprise Security

RORY WARD AND BETSY BEYER

Rory Ward is a site reliability engineering manager in Google Ireland. He previously worked in Ireland at Valista, in Silicon

Virtually every company today uses firewalls to enforce perimeter security. However, this security model is problematic because, when that perimeter is breached, an attacker has relatively easy access to a

ncreasingly difficult to enforce. Google ork security. We are removing the and moving our corporate applications

erprises have used perimeter security to protect rimeter security model is often compared to a urrounded by a moat, with a heavily guarded ed outside the wall is considered dangerous, ted. Anyone who makes it past the drawbridge e.

ugh when all employees work exclusively in with the advent of a mobile workforce, the surge ce, and the growing use of cloud-based services, are stretching the traditional paradigm to the model no longer hold: The perimeter is no longer nd what lies inside the perimeter is no longer a uting devices and enterprise applications.

rnal network is a safe environment in which to rience has proven that this faith is misplaced. etwork is as fraught with danger as the public sed upon this assumption.

a new model that dispenses with a privileged solely on device and user credentials, regard- erprise location, a home network, or a hotel or s is fully authenticated, fully authorized, and user credentials. We can enforce fine-grained ces. As a result, all Google employees can work the need for a traditional VPN connection into between local and remote access to enterprise potential differences in latency.

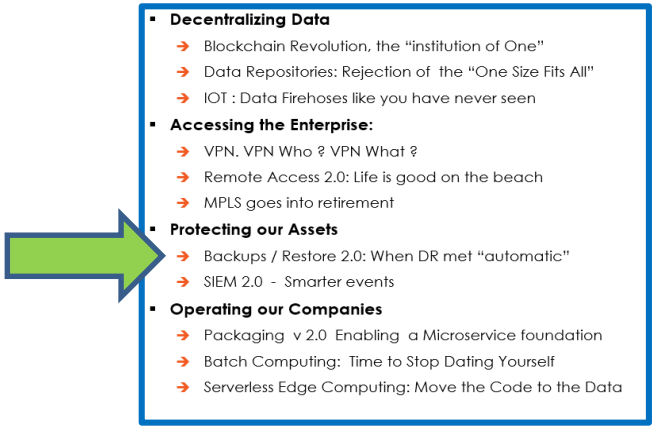
Corp

BeyondCorp consists of many cooperating components to ensure that only appropriately authenticated devices and users are authorized to access the requisite enterprise applications. Each component is described below (see Figure 1).

6 ;login: DECEMBER 2014 VOL. 39, NO. 6 www.usenix.org

Protecting: Motivation

- Tighter RTO/RPO requirements
- Data growth & dispersion challenges
- Expanded regulatory compliance
- Proactive monitoring network endpoints (consumers and producers)



Protecting: Solution

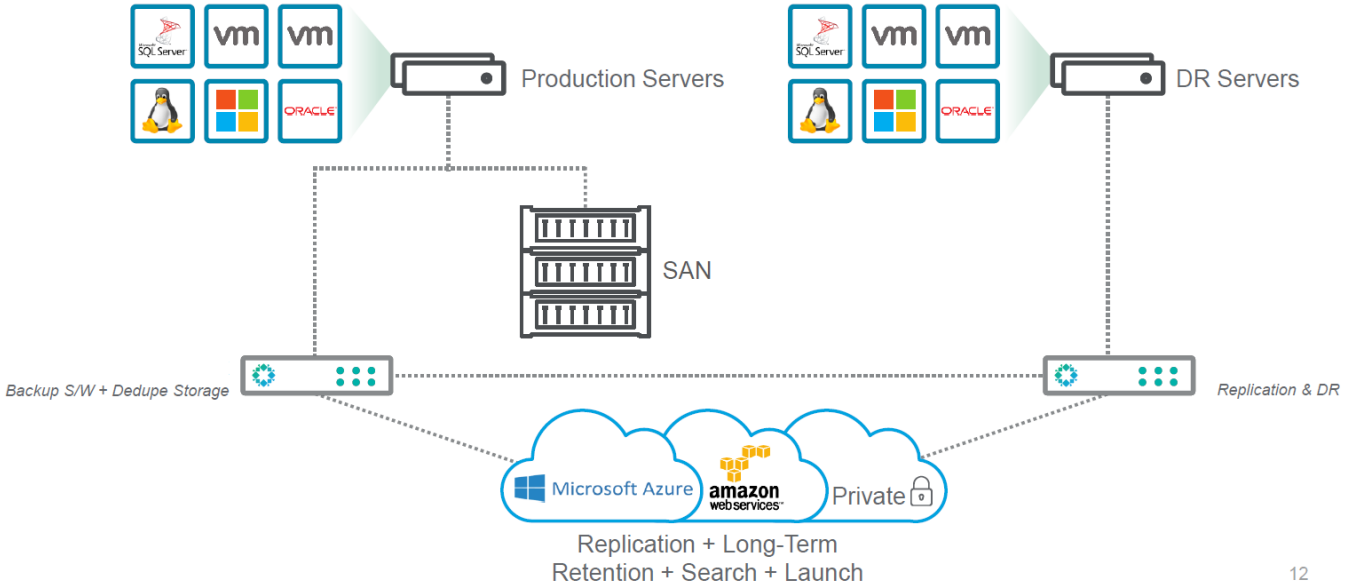
- Dispersive Networks
- Next-gen backup and restore
- Software Defined Data Center (SDDC)
- Homomorphic encryption-based services

Protecting: Outcomes

- SLAs as central recovery configuration parameter
- Inherent Disaster Recovery
- Continuous Compliance (internal , external)

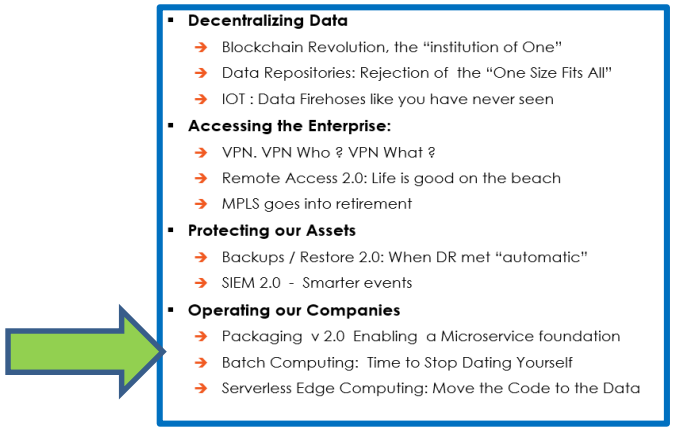
Protecting: Example

Next-gen data protection solutions blur the lines between storage and backup in a multi-cloud vendor context



Operating: Motivation

- DevSecOps has moved SDLC to a continuous process
- Microservice oriented architectures
- Streaming Data/Events
- Polyglot environments (code, data persistence)



Operating: Solutions

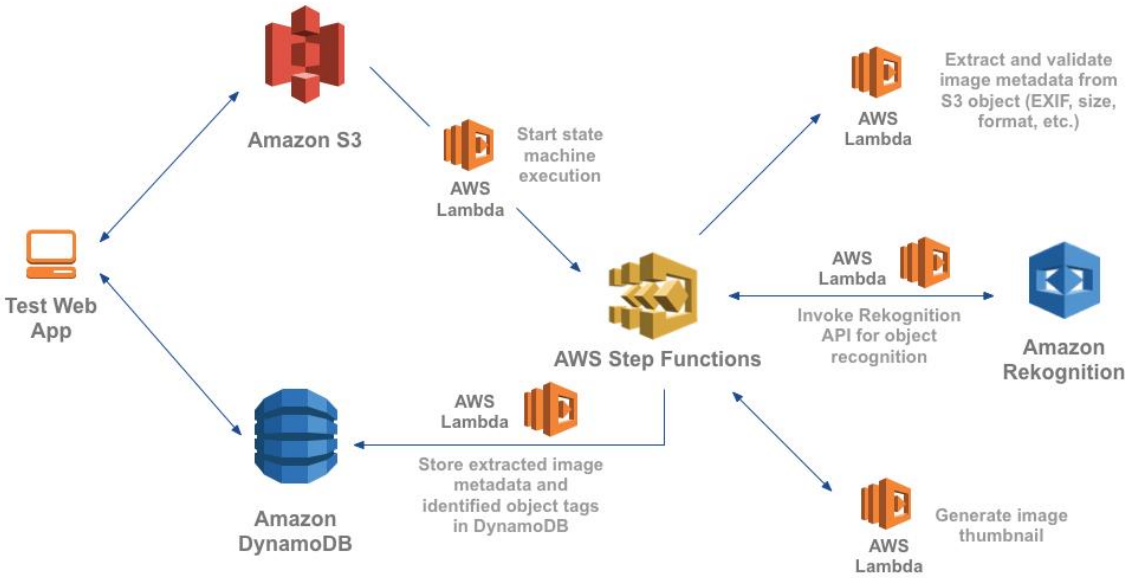
- Enterprise PaaS : Runtimes (Logic, Data), Toolchains
- Enterprise PaaS: AuthN/AuthZ, Compliance, Orchestration
- Edge Computing

Operating: Outcomes

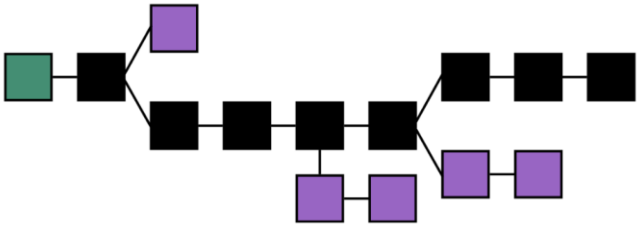
- *aaS Provider responsible for management responsibilities
- Continuous [Integration | Delivery | Compliance]
- Intelligent Fabric Computing

Operating: Example

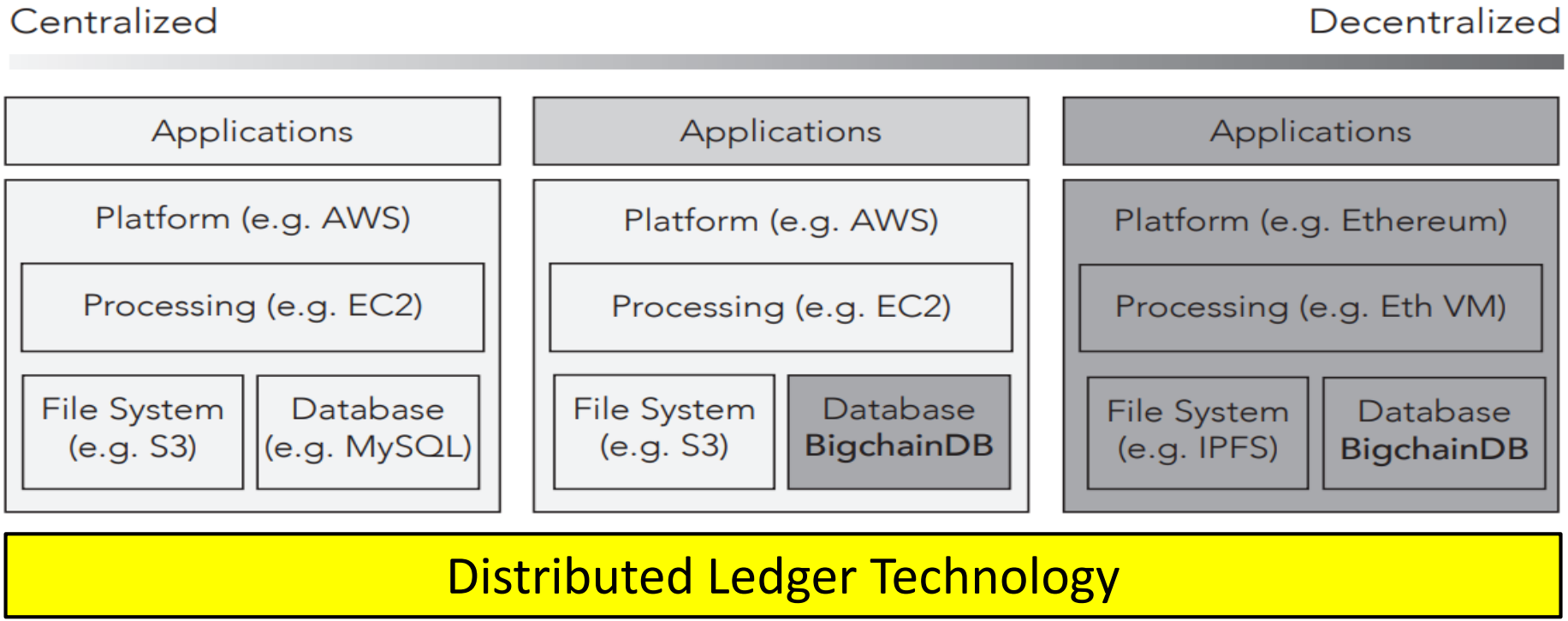
Event driven micro-services replace batch oriented operations, while creating opportunities for inline validation and compliance



Supplemental

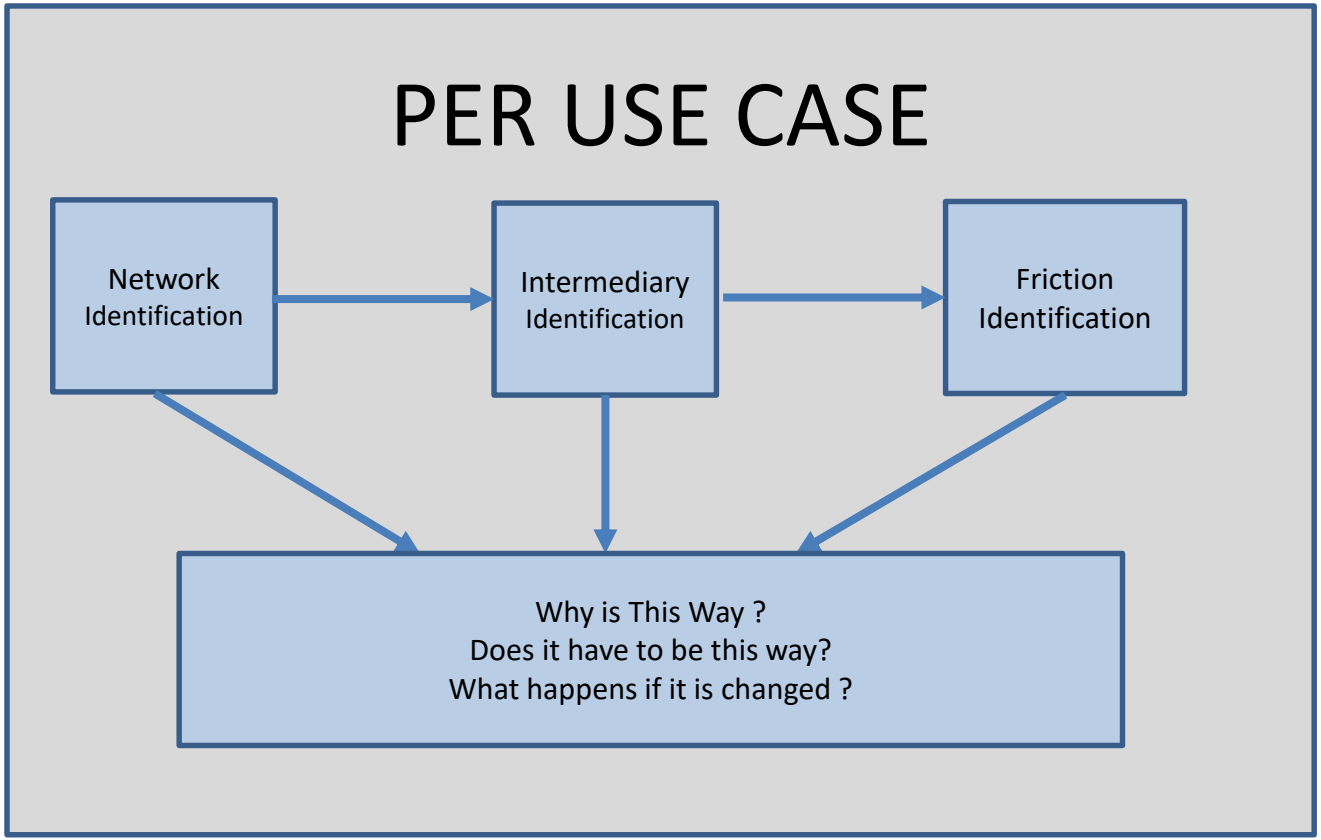


Cloud Operating System Evolution



Source: BigchainDB

Getting Started



The Rise of Edge Computing

essextec
GETTING IT DONE TOGETHER

Edge Computing will become a new "hub" for data analytics in 2018. We will see much more attention paid to computing at the "edge" of the network, far from centralized data centers, in 2018. In fact, the "edge" will become an extension of businesses' overall cloud environment that is necessary to support a sensor-based IoT world. City infrastructure (e.g., streets and traffic flow), retail stores, oil-rigs, factories, farms and sports stadiums – are all generating rapid growth for remote data, which must be filtered and analyzed to find actionable data for the business. Edge computing becomes a necessity for analyzing this data at the point of origin because of cost – and latency associated with data transmission. Once data has been analyzed at the edge, it can be efficiently shipped to a central location to inform business planning.

Source: Hurwitz and Associates:
2018 Predictions http://mailchi.mp/hurwitz/what-to-expect-in-2017-1mkj8bj2sc?e=328d31641f