Enabling Business Transformation with Blockchain

Roc Paez
HPE Education Consultant

August 15, 2019
Introduction – Roc Paez

- 34 years in IT industry
- 26 years with HP Education Services
- 14 years as ITSM/ITIL consultant/instructor
- Contact: roc.paez@hpe.com

Roc Paez - June 29, 2019

<table>
<thead>
<tr>
<th>Event</th>
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<tbody>
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Agenda

Welcome itSMF & HDI Los Angeles County

– Evolution of Blockchain
– How Blockchain Works
– Centralized vs Decentralized Systems
– Closing the Trust Gap
– Blockchain Use Cases
ENTERPRISE-GRADE BLOCKCHAIN DEPLOYMENTS

Our expertise, purpose-built architectures, end-to-end delivery, and strong ecosystem of partners will accelerate your enterprise-grade blockchain deployments.

What is blockchain?

Blockchain is a tamper-proof, decentralized ledger that establishes a level of trust necessary for the exchange of value without the use of intermediaries. It can be used to record and provide proof of any transaction and is updated every time a transaction occurs. It is the system of record—the single source of truth shared by all transaction participants—and its transactions are authenticated and verifiable.

The future of blockchain technology extends to and provide value for every industry, enabling new business models and greater levels of efficiency. In financial services, blockchain enables banks to complete transactions automatically with greater efficiency. In manufacturing, it allows suppliers to trace individual parts from raw materials to the delivery of a product to a consumer. In healthcare, providers and insurers can authorize and deliver treatment seamlessly and instantly for every patient.

What can blockchain do for the enterprise?

Blockchain will do for the transaction of value what the internet did for information. Blockchain brings better efficiency, less oversight, reduced intermediaries, enhanced privacy, and improved auditability. The possibilities for use of blockchain are as limitless as the internet.
The more things change ...
The more things change ... the more they are the same.
The First Blockchain – 5000 years BC

Yap – the island of stone money
Rai Stones

- Ownership of Rai stones did not equal possession
- Villagers tracked ownership of stones mentally
- Regular meeting held to review ownership of Rai stones
- Ledgers of villagers kept in sync through "group consensus"
- Any Rai stone transactions since the last meeting would be announced at the following meeting

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Rai, or stone money (Yapese: raay), are more than 6,000 large, circular stone disks carved out of limestone formed from aragonite and calcite crystals. Rai stones were quarried on several of the Micronesian islands, mainly Palau, but briefly on Guam as well, and transported to Yap for use as money.

Rai stones - Wikipedia
Characteristics of currency system

- Characteristics of Yap Island currency system
  - No definitive source of truth
  - Duplication of effort
  - Transaction processing slow, waiting for everyone to be sync’d
  - The more villagers added, the slower a transaction
  - Very hard to manipulate the system
  - The more villagers added, the harder to corrupt the system.
  - High availability and accessibility of information

*Blockchain is the same, only with computers!*
Blockchain Today

• Nodes throughout the world agree to track transactions
Blockchain Today

- Nodes throughout the world agree to track transactions

• = miner
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a blockchain through group consensus

* = miner
\[= block of data\]
Blockchain Today

- Nodes throughout the world agree to track transactions.
- Periodically, a block of transactions are committed to a **blockchain** through group consensus.
- Each node maintains a copy of the blockchain.

![Map of the world with blockchain nodes and transactions](image)
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, a block of transactions are committed to a blockchain through group consensus
- Each node maintains a copy of the blockchain
- Node blockchains are kept in sync through group consensus

Group Consensus – when a discrepancy occurs, whatever 51% of the nodes agree on is the data

- = miner
- = block of data
- = blockchain

Hewlett Packard Enterprise
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a blockchain through group consensus
- Each node maintains a copy of the blockchain
- Node blockchains are kept in sync through group consensus
- Once a block is committed to the blockchain, it is immutable

Group Consensus – when a discrepancy occurs, whatever 51% of the nodes agree on is the data

Once committed, data is immutable
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a **blockchain** through group consensus
- Each node maintains a copy of the blockchain
- Node blockchains are kept in sync through group consensus
- Once a block is committed to the blockchain, it is immutable
- No definitive blockchain owner

Every time a new block is committed to the Blockchain, a different group of nodes may compose the 51% agreement.

Group Consensus – when a discrepancy occurs, whatever **51% of the nodes agree** on is the data.

Once committed, data is immutable.
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a blockchain through group consensus
- Each node maintains a copy of the blockchain
- Node blockchains are kept in sync through group consensus
- Once a block is committed to the blockchain, it is immutable
- No definitive blockchain owner
- Highly resource intensive

The data is maintained on multiple systems, and these systems need to be kept in sync.

Group Consensus – when a discrepancy occurs, whatever 51% of the nodes agree on is the data

The data is immutable once committed.

= miner
= block of data
= blockchain

block of transactions

Once committed, data is immutable

(block of transactions)

(block of transactions)

(block of transactions)
Blockchain Today

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a **blockchain** through group consensus
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- Once a block is committed to the blockchain, it is immutable
- No definitive blockchain owner
- Highly resource intensive
- High availability

Data is accessible from many locations. If data is lost in one location, it is easily recovered

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**Group Consensus** – when a discrepancy occurs, whatever 51% of the nodes agree on is the data

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= miner  
= block of data  
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Blockchain Today

- Nodes throughout the world agree to track transactions.
- Periodically, block of transactions are committed to a blockchain through group consensus.
- Each node maintains a copy of the blockchain.
- Node blockchains are kept in sync through group consensus.
- Once a block is committed to the blockchain, it is immutable.
- No definitive blockchain owner.
- Highly resource intensive.
- High availability.
- High data integrity.

Because data is immutable on the Blockchain, it has high data integrity.

Group Consensus – when a discrepancy occurs, whatever 51% of the nodes agree on is the data.
How does Decentralized Blockchain compare to Centralized Bank?

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a blockchain through group consensus
- Each node maintains a copy of the blockchain
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- Once a block is committed to the blockchain, it is immutable
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How does Decentralized Blockchain compare to Centralized Bank?

**Decentralized Blockchain**

- Nodes throughout the world agree to track transactions
- Periodically, block of transactions are committed to a **blockchain** through group consensus
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- No definitive blockchain owner
- Highly resource intensive
- High availability
- High data integrity

**Centralized Bank**

- Single bank tracks transactions
- Continual transactions are recorded by bank and written to a single **database**
- Bank is only entity to maintain a copy of the database
- No synchronization needed
- Once transaction is written, it can be retrofitted if necessary
- Bank is definitive owner of data
- Low resources required
- Single point of failure
- Integrity of data dependent of security procedures on bank
When has Trust in a Centralized Authority Gone Wrong?

2008 Mortgage Crisis

TRUMP RUSSIA SCANDAL

News, Analysis and Opinion from POLITICO

Any cover up is impossible on a Blockchain

Japanese prosecutors revise Ghosn indictment as scandal takes toll on Nissan’s bottom line

PUBLISHED TUE, MAY 14 2019 • 2:32 PM EDT  |  UPDATED TUE, MAY 14 2019 • 9:17 PM EDT
Trust, but verify.

- Ronald Reagan
Industrial Revolutions

Industrial Revolution #1
Machinery

Industrial Revolution #2
Assembly Line/Mass Prod

Industrial Revolution #3
Technology

Industrial Revolution #4
Artificial Intelligence

Power Gap
Supply/Demand Gap
Distance Gap
Trust Gap

Do I trust the machine with which I am communicating?
Do I trust the person on the other end?
Blockchain Example – Medical Records

06  Patient condition worsens  2001
05  Medication changed  2001
04  Emergency Visit – Chest pains  2001
03  Annual checkup – all is good  2000
02  Medication prescribed  1999
01  John Doe suffers stroke  1999
Blockchain Example – Medical Records

01 John Doe suffers stroke 1999
02 Medication prescribed 1999
03 Annual checkup – all is good 2000
04 Emergency Visit – Chest pains 2001
05 Medication changed 2001
06 Patient condition worsens 2001

I should not have change the medication.
Blockchain Example – Medical Records

01 John Doe suffers stroke 1999
02 Medication prescribed 1999
03 Annual checkup – all is good 2000
04 Emergency Visit – Chest pains 2001
05 Medication changed 2001
06 Patient condition worsens 2001

These last two entries could get me serious trouble.
Blockchain Example – Medical Records

Let's make a slight adjustment.

<table>
<thead>
<tr>
<th></th>
<th>Event Description</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>John Doe suffers stroke</td>
<td>1999</td>
</tr>
<tr>
<td>02</td>
<td>Medication prescribed</td>
<td>1999</td>
</tr>
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<td>05</td>
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<td>2001</td>
</tr>
<tr>
<td>06</td>
<td>Recommended rest</td>
<td>2001</td>
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</tr>
<tr>
<td>06</td>
<td>Recommended rest</td>
<td>2001</td>
</tr>
<tr>
<td>07</td>
<td>Patient has heart attack &amp; dies</td>
<td>2002</td>
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</tbody>
</table>
Blockchain Example – What if it were on a Blockchain?

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<tr>
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<tr>
<td>Medication changed</td>
<td>2001</td>
</tr>
<tr>
<td>Prim Physician</td>
<td></td>
</tr>
</tbody>
</table>

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**Emergency Dr 01**: John Doe suffers stroke (1999)

**Emergency Dr 02**: Medication prescribed (1999)

**Emergency Dr 03**: Annual checkup – all is good (2000)

**Emergency Dr 04**: Emergency Visit – Chest pains (2001)

**Emergency Dr 05**: Patient condition worsens (2001)

**Emergency Dr 06**: Medication changed (2001)
Blockchain Example – Medical Records

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<td>Emergency Visit – Chest pains</td>
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<tbody>
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<td>Emergency Dr 01</td>
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<td>1999</td>
</tr>
<tr>
<td>Emergency Dr 02</td>
<td>Medication prescribed</td>
<td>1999</td>
</tr>
<tr>
<td>Emergency Dr 03</td>
<td>Annual check up – all is good</td>
<td>2000</td>
</tr>
<tr>
<td>Emergency Dr 04</td>
<td>Emergency Visit – Chest pains</td>
<td>2001</td>
</tr>
<tr>
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<td>Medication changed</td>
<td>2001</td>
</tr>
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<td>Emergency Dr 06</td>
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</tr>
</tbody>
</table>

Let's make a slight adjustment.
## Blockchain Example – Medical Records

Data is on a blockchain. Everyone can see if I change.

<table>
<thead>
<tr>
<th>Emergency Dr</th>
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Blockchain Example – Medical Records

Do we really need to chain information so it cannot be tampered?

Emergency Dr 06 Patient condition worsens 2001
Emergency Dr 05 Medication changed 2001
Emergency Dr 04 Emergency Visit – Chest pains 2001
Prim Physician 03 Annual checkup – all is good 2000
Prim Physician 02 Medication prescribed 1999
Emergency Dr 01 John Doe suffers stroke 1999

Do you trust the people counting the ballots in the next presidential election?

Do you trust the agencies reporting SAT scores to colleges?
Why do we need to Trust?

The key component in the 4th Industrial Revolution will be ... Trust!
Why do we need to Trust?
The key component in the 4\textsuperscript{th} Industrial Revolution will be ... Trust!

REPORTED LIST OF INCIDENTS INVOLVING UBER AND LYFT ...
https://www.atchisontransport.com/.../reported-list-of-incidents-involving-uber-
Lyft...
Uber Driver Shoots and Kills Six People and Wounded Two Others in Kalamazoo ... Uber and
Uber Driver Sued for Negligence After Collision Kills Passenger in ...

A Murdered College Student's Family Is Calling On Uber And Lyft T...
https://www.buzzfeednews.com/.../samantha-josephson-funeral-family-uber-
Lyft ...
Apr 4, 2019 - After 21-year-old Samantha Josephson was found dead last week in ... allegedly
murdered by a man she thought was her Uber driver, her ... He also asked for passengers to be
careful when getting into an Uber or Lyft and ...

Pregnant Lyft driver brutally stabbed to death by passenger, unbor...
https://www.foxnews.com/.../lyft-rider-arrested-in-killing-of-pregnant-driver...
Jan 28, 2019 - TEMPE, Ariz. — A Lyft rider in suburban Phoenix stabbed his pregnant driver,
killing the woman and her unborn child before stealing her ...

They Thought It Was Their Uber. But the Driver Was a Predator. - T...
Apr 4, 2019 - A South Carolina college student was killed last weekend by a man posing as a ... They wave to passengers and say, "I'm your driver." Some ...

NYC Daily Trips: Taxi, Uber, and Lyft
Based on TLC summary data

400K Uber rides per day
100K Lyft rides per day
Airbnb in the U.S. as a share of the U.S. hotel industry

People also ask

How many Airbnb users are there?

General Statistics About Airbnb. There are over 4 million Airbnb listings worldwide. On any given night, 2 million people are staying in Airbnb rentals across the world.

How will we be able to trust these hospitality providers?

How to stay safe when renting an Airbnb

Source: CBRE, Airdna
Airbnb in the U.S. as a share of the U.S. hotel industry

People also ask

How many Airbnb users are there?

General Statistics About Airbnb. There are... On any given night, 2 million people are staying in Airbnb properties.

Airbnb host jailed for killing guest over unpaid bill - BBC News
Mar 19, 2019 - Australian Jason Colton carried out the "vicious" attack on a guest ... killed because he could not afford to pay for his room in an Airbnb property.

Carla Stefaniak: Family Sues Airbnb, Complex Owner Over Murder ...
https://www.insideedition.com/family-woman-murdered-birthday-trip-cost...
Dec 24, 2018 - The relatives of a Florida woman who was killed while staying at an Airbnb in Costa Rica last month are suing the company, claiming it was ...

airbnb assault Archives - Airbnb Hell
https://www.airbnbhell.com/tag/airbnb-assault/
Apr 9, 2019 - Crazy Airbnb Guest Breaks into my Home and Attacks Me. Posted on April 1 ..... My niece was lucky she did not get raped or murdered. Parents: ...

Source: CBRE, Airdna
Airbnb in the U.S. as a share of the U.S. hotel industry

Hey, I’m Jasper!
Amsterdam, Netherlands • Joined in August 2011

I gave up my finance career in 2010 to pursue a lifelong dream: to travel the world full time. To support myself, I rent out my apartment on Airbnb. It’s been a great experience, so great that I recently wrote a book about it! It’s called Get Paid For Your Pad and you can find it on Amazon.

I also started a podcast under the same name that you can find in iTunes.

I share my adventures with the world through my blog, The Traveling Dutchman. I love exploring the planet, learning different cultures and discovering new places.

I’m also a big fan of anything that involves the ocean and starts with an "s", such as scuba diving, swimming, surfing, sailing and snorkeling.

I love meeting people from different parts of the world and I look forward to connecting with you as a host or traveler. I will do my best to make stay as comfortable as possible or being a good guest, depending on my role.
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Blockchain is a fundamental shift in how business is transacted

- Increases innovation
  - Lowers barrier to entry and increases competition from new entrants, generating greater business value
- Reduces operation costs
  - Blockchain lowers operating costs, improves efficiency, and reduces transaction cycle times
- Creates new business models
  - Blockchain will bring to life new business models and shift how business is done
HPE Blockchain Solutions

BLOCKCHAIN SOLUTIONS AT ENTERPRISE SCALE

Blockchain is changing the face of entire industries — and HPE has the compute power, expertise, and partners to enable it at enterprise scale.

Read the article
ENTERPRISE-GRADE BLOCKCHAIN DEPLOYMENTS

Our expertise, purpose-built architectures, end-to-end delivery, and strong ecosystem of partners will accelerate your enterprise-grade blockchain deployments.

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The future of blockchain technology extends to and provide value for every industry, enabling new business models and greater levels of efficiency. In financial services, blockchain enables banks to complete transactions automatically with greater efficiency. In manufacturing, it allows suppliers to trace individual parts from raw materials to the delivery of a product to a consumer. In healthcare, providers and insurers can authorize and deliver treatment seamlessly and instantly for every patient.

What can blockchain do for the enterprise?
Blockchain will do for the transaction of value what the internet did for information. Blockchain brings better efficiency, less oversight, reduced intermediaries, enhanced privacy, and improved auditability. The possibilities for use of blockchain are as limitless as the internet.
The Internet in 1977
Blockchain on AWS

**Track and verify transactions with centralized ownership**

Manufacturers want to store data from multiple systems into a centralized ledger that accurately tracks the production and distribution lineage of their products. In case of issues manufacturers can quickly trace the root cause of defects and take preventive actions.

**Execute transactions and contracts with decentralized ownership**

Trade: Trade consortiums are looking to reduce time and complexity of cross-boundary payments and asset transfers (letter of credit) by directly transacting with multiple parties such as importers, exporters, insurance, and banks in a decentralized way.

Retail: Consortium of retailers want to partner with banks and third-party loyalty programs to streamline customer reward programs without needing a central entity that processes rewards.

HR and Payroll systems often have to track and maintain a record of an employee's details such as payroll, bonus, benefits, and performance history. By implementing a centralized ledger, customers can easily maintain a complete record of the digital history of their employees in a single place.
HPE Pointnext services help you on your Blockchain journey

Explore

HPE Blockchain Transformation Workshop is a one-day interactive session designed to help customers understand blockchain outcomes and challenges, align to a vision and strategy and identify best use cases and technologies.

Experiment

HPE Blockchain Platform Assessment and HPE Blockchain Proof-of-Value will gather and validate your use cases, demonstrate technology capabilities and provide a proof-of-value for select use case.

Evolve

HPE Blockchain Implementation to get you up and running with your blockchain solution: design & implement production-ready system, manage change and train teams and help you evolve for additional use cases.

Partnerships support full integration of blockchain solutions.
HPE Pointnext Education – Blockchain Courses

Select from our Market-Leading Blockchain Course Offerings

Blockchain represents a decentralized, distributed and public digital ledger that is used to record transactions across many computers so that any involved record cannot be altered retroactively, without the alteration of all subsequent blocks. Whether you’re a business leader evaluating ways to leverage blockchain within your organization or an architect or developer seeking technical training, we have the blockchain training you need to be successful.

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Duration</th>
<th>Schedule</th>
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</thead>
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<tr>
<td>HU0J8S</td>
<td>HPE Training for Blockchain Overview PDF</td>
<td>1 day</td>
<td>View</td>
</tr>
<tr>
<td>HU0J9S</td>
<td>HPE Training for Blockchain Architecture PDF</td>
<td>3 days</td>
<td>View</td>
</tr>
<tr>
<td>HU0K2S</td>
<td>Blockchain Training: An Overview for Business Professionals PDF</td>
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<td>HU0K3S</td>
<td>IoT and Blockchain PDF</td>
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<td>HU0K6S</td>
<td>Blockchain Ethereum Training: Hands-on Development Bootcamp PDF</td>
<td>3 days</td>
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<tr>
<td>HU0K9S</td>
<td>Blockchain Security Training PDF</td>
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Supply Chain – Fresh Organic Strawberries
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Blockchain Demo - https://anders.com/blockchain

- The Hash on a Blockchain is determined by the Nonce + Data + PrevBlockHash.

- If any of these 3 inputs change, the Hash for the block will change, making it easy to detect a block modification.
Blockchain technology will create significant business value

**Total business value generated to exceed $176B by 2025**

**$20B per year reduction in infrastructure costs by 2022** due to Blockchain

**Trust**
between un-trusted parties reduces need for trusted stakeholders and intermediaries

**New products & services**
VCs and Banks have allocated 40% of all fintech investments in Blockchain startups

**Improved regulatory reporting**
increased compliance, record transparency and ease of auditability

**Automation**
streamlines business processes across entities, building a secure value transfer system

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Discussion Questions

1. Do you think Blockchain will fade away, or will it be huge, or will it be somewhere in the middle?

2. What applications do you see for Blockchain?
Blockchain Types

- Blockchains may be **Opened** or **Closed** (read access)
- Blockchains may be **Public** or **Private** (write access)

- **Open and Public**
  - Bitcoin (crypto-currency)
  - Gaming/Gambling
  - Social networking
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  - Corporate earnings
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  - Government legislation
  - Product supply chains

- **Closed and Private**
  - Defense Contracting
  - Criminal records
  - College grades
  - Tax returns
  - Supply chain
Next steps for customers on HPE Blockchain

Take these steps today:

– Watch our recorded demo and other videos posted on the page
– Contact us for courses and information about Blockchain courses for your customers and you

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Thank you

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