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Healthcare, Blockchain and Smart Contracts: Emerging Issues for Healthcare Counsel

Leveraging Distributed Ledger Technology in Healthcare, Protecting Privacy and Security

WEDNESDAY, OCTOBER 11, 2017

1pm Eastern | 12pm Central | 11am Mountain | 10am Pacific

Today's faculty features:

Jeffery T. Gorham, Esq., **Frost Brown Todd**, Indianapolis

Ryan S. Johnson, Shareholder, **Fredrikson & Byron**, Minneapolis

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Blockchains and Smart Contracts

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Blockchains and Distributed Ledgers Defined

- Blockchains
  - The technology behind cryptocurrencies.
  - Analogous to the TCP/IP Protocol that is the foundation of the internet
- Blockchains are Distributed Ledgers
  - Ledgers are historically centralized and private
  - Blockchains are Decentralized or Distributed

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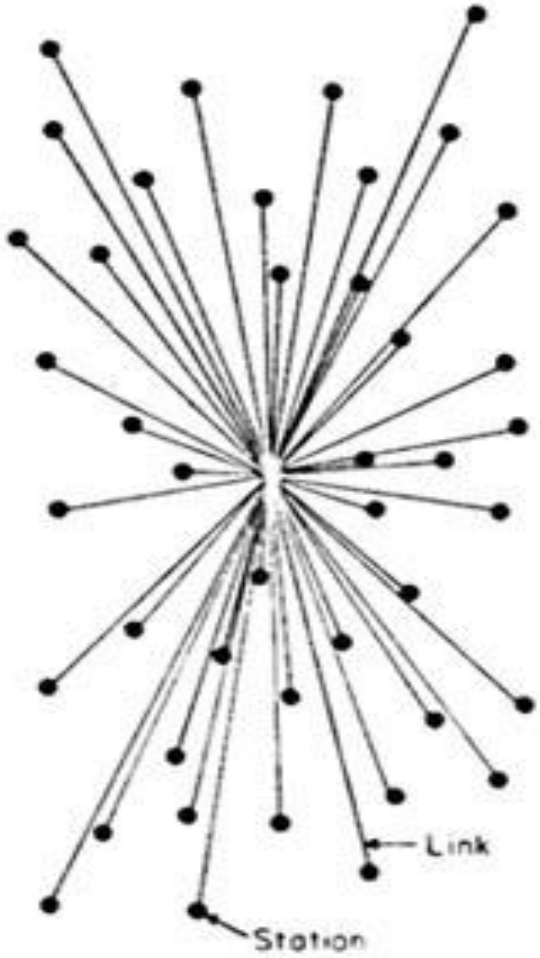

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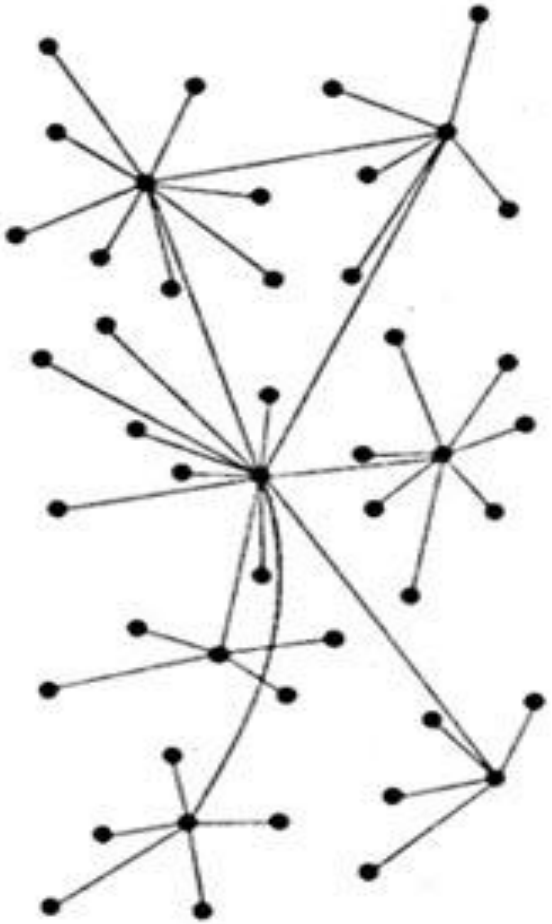

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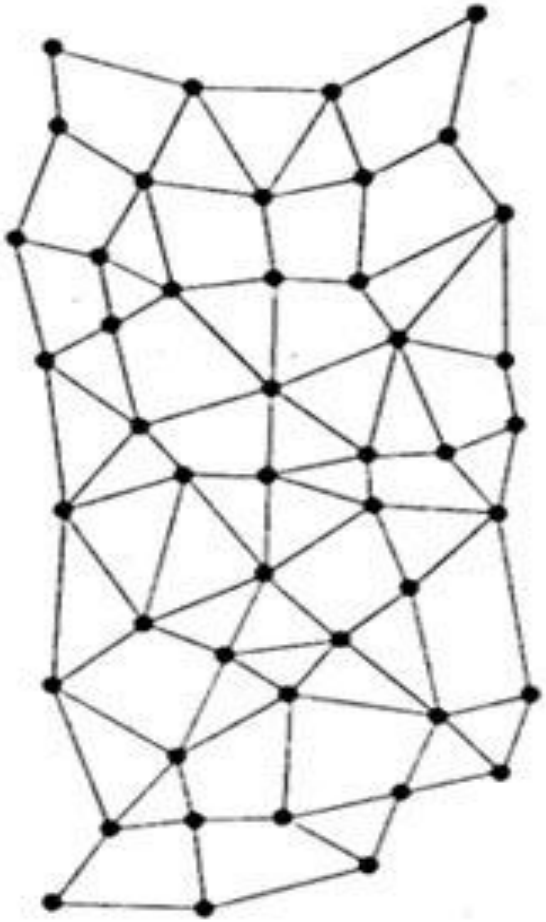

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Types of Blockchains

- Permissioned vs. Permissionless Blockchains
  - Centralized usually = “private”
    - i.e. only one party maintains
  - Decentralized usually = “permissioned”
    - i.e., must be “approved”
  - Distributed usually = “permissionless”
    - i.e., open to use; no approval

How Blockchains work: Basics

- Chronological Ledger
  - All transactions are “pseudo-anonymous”
  - All transactions are grouped together in “blocks”
  - Transactions are logged and stamped with information about the time, amount, and participants as if a notary is present at every transaction
- Blockchain is not centralized (does not have one owner), therefore there are strict rules about how it must be maintained

How Blockchains Work: Maintaining the Ledger

- The individuals who maintain and update the Blockchain are “miners”, and they are paid a reward
  - Solving a complex mathematical problem
- The Miners approve transactions by:
  - Bundling transactions into a block
  - Verifying the transactions are valid
  - Select a header of the previous block and insert it into the header of the new block as a “Hash” combined with an incremental number called a “Nonce”

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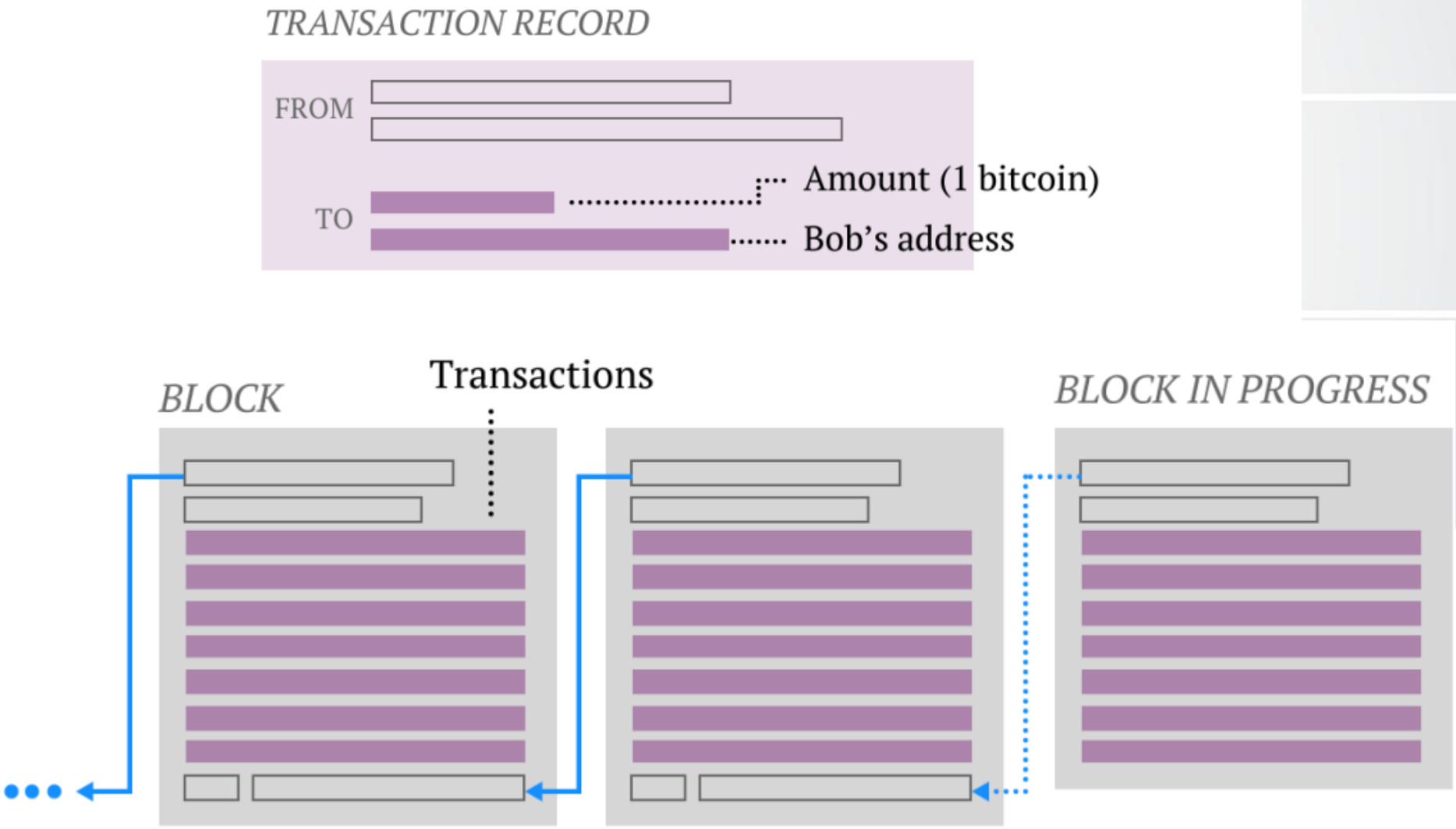

TRANSACTION RECORD
FROM
TO
Amount (1 bitcoin)
Bob's address
BLOCK
Transactions
BLOCK IN PROGRESS

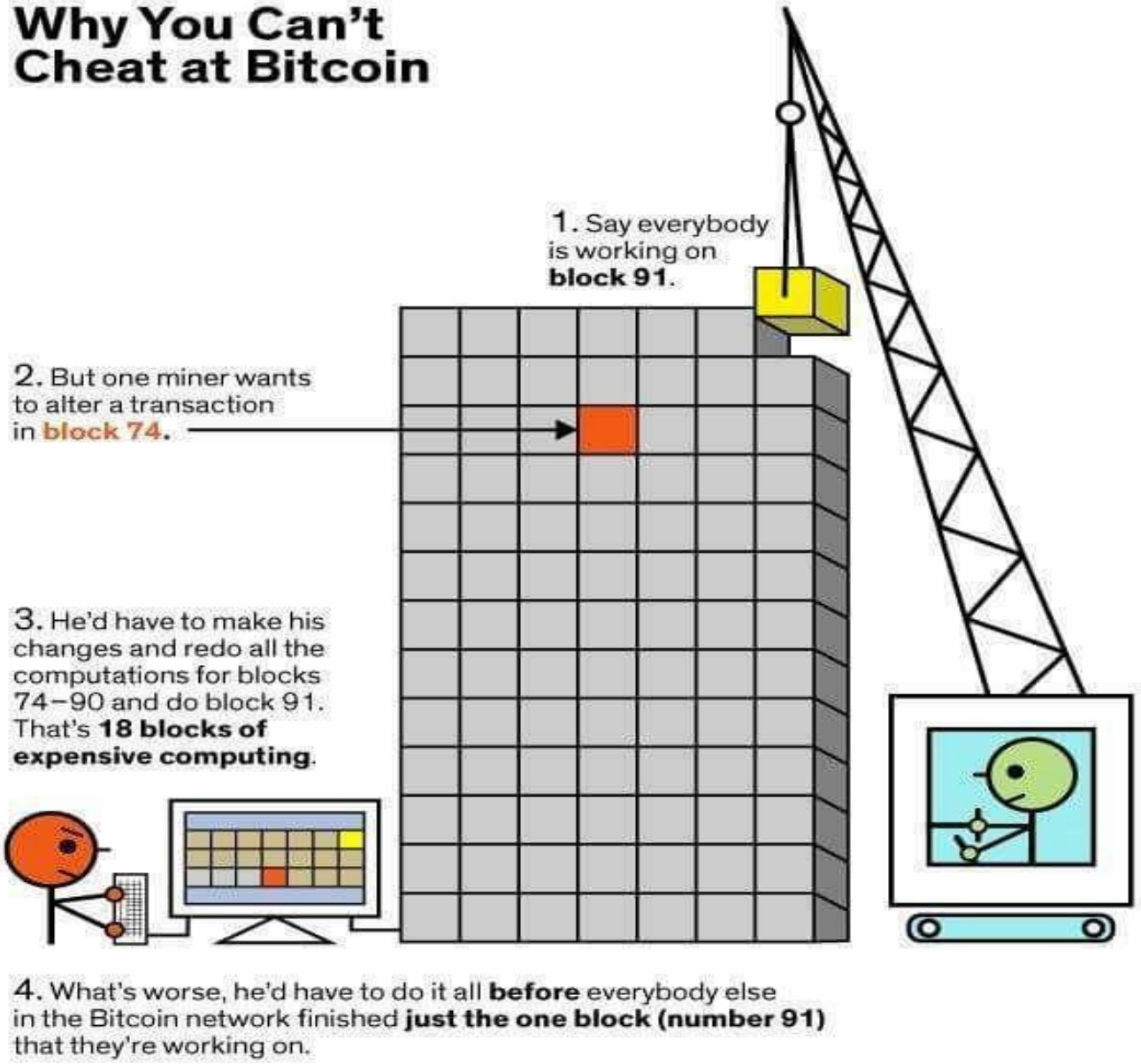
How Blockchains Work: Amending the Ledger (Hashing)

- When all miners agree the problem has been solved correctly, the block is added to the chain and is visible to the entire network
- The Hash is like a digital version of a wax seal.
- The unbroken Hash (seal) confirms that the block, and therefore every block before it, is legitimate

How Blockchains Work: Amending the Ledger (Hashing)

- Recall: Transactions must be validated by other network miners
- Miners incentivized to add “valid” transactions via a reward; invalid transactions are rejected, and thus, no reward is given

Why You Can't Cheat at Bitcoin



4. What's worse, he'd have to do it all **before** everybody else in the Bitcoin network finished **just the one block (number 91)** that they're working on.

Blockchain Characteristics

- Security
- Pseudo-anonymous but not secret
- Transactions are programmable (like monthly mortgage payments) or conditional (like holding and releasing an escrow)
- Has difficulty dealing with unanticipated events
  - "If/then" scenarios are easy to program
  - Variations to programmed tasked cannot be accounted for

SMART CONTRACTS

What Are “Smart Contracts”

- Self-automated computer programs that can carry out the terms of any contract
- Mostly based on objective conditions precedent
  - “If, then” criteria

What Are “Smart Contracts” (cont.)

- Variables: Readily Verifiable Data
- Reliable sources
  - Social Security DMF
  - FAA Records
  - National Weather Service
- Crowdsourcing
  - Voting

What Are “Smart Contracts” (cont.)

- Think: Escrow Agreements
  - Money held in escrow until performance is met
  - Once performance is validated, money released
  - Regulated by an unbiased party, which only seeks the objectively “right” answer, devoid of outside influence

Distributed Autonomous Organization (DAO)

- DAO: the most popular Smart Contracts platform
- A DAO is “a tightly packed collection of smart contracts written on the Ethereum blockchain”
- A DAO’s smart contracts amount to a series of by-laws that determine how its constituency — anyone around the world who has bought DAO tokens with ethers — votes on decisions.

Distributed Autonomous Organization (DAO) (cont.)

- Ether: Entry Token used to:
  - Record transactions
  - Vote on outcomes
  - Purchase other tokens within the ecosystem
- Transactional process (sharding)
  - Top level retains “master ledger”
  - Lower level nodes run Proof of Stake
  - Much more efficient from a scaling perspective (compared to Bitcoin simple Proof of Work)

Healthcare and Blockchain

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Healthcare: Current System

- Closed, controlled operating systems
- Lack of interoperability
- Inefficiencies
- Security Issues

Healthcare: Blockchain Potential

- Data Integrity
- Data Sharing
- Connectivity

- Part of Digital Health Revolution: AI, IoT, Big Data, etc.

Healthcare: Blockchain Potential Applications

- Audit and Compliance
- Financial and Contract Management
- Internet of Things (IoT)
- Data Liquidity
- Cyber Security

- More Efficient: cost reductions/faster transactions

Some Examples

- Sunshine Act Compliance
- Payment and Reimbursement
- Supply Chain Management

Legal Issues

- Privacy and Security
- Governance
- Fraud and Abuse

Privacy and Security

- HIPAA
- Other Federal and State Laws and Regulations

Governance

- No Central Authority
- Software as Law?

Fraud and Abuse

- Antickback
- Stark Law
- False Claims Act
- State Fraud and Abuse/Self-Referral Prohibitions

Closing Thoughts