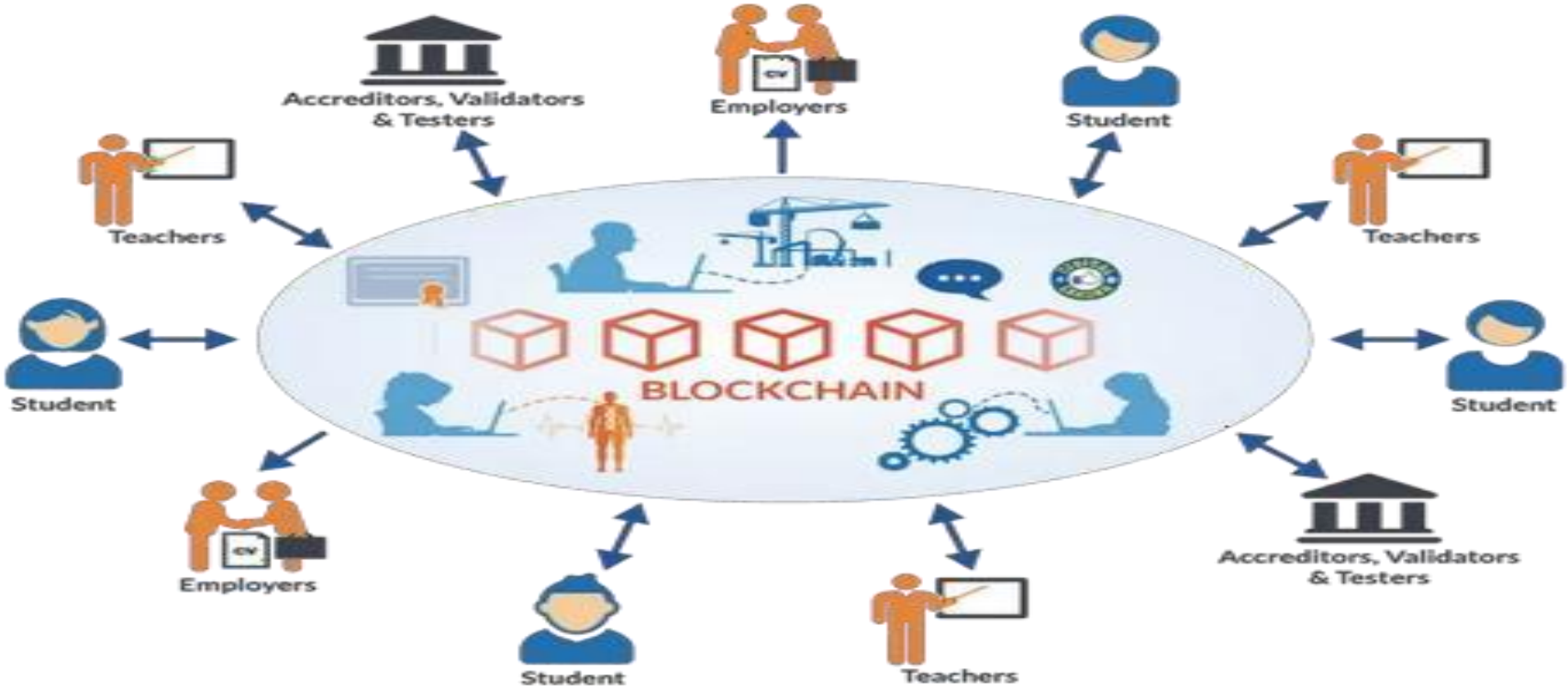
Blockchain in Public sector

- In this lecture, we look in to adoption of BCT from the government perspective.
- How this BCT gives the government a ubiquitous or uniform computation platform to execute different government applications.
- We will consider several examples in this lecture that how BCT can be applied to make the life of people better.

Image Source: http://blockchain.open.ac.uk/



Blockchain in Government - I

Introduction

- When there are multiple organizations or institutions under different authoritative domain and they want to share certain data/information among themselves.
- This information needs to be validated, audited or you want certain level of security on the top of shared data.
- As an example, you want to send an email over a network then you are not bother whether the person live in USA or Canada or Singapore, etc. What you bother is the email id of the concern person.
- **In this scenario**, the whole architecture is useful because you have a central control like email platform, which can talk with each other and their communication is not dependent on the border of a specific country.

Introduction

- On the other hand, consider a postal email where you want to send the postal email from any small village of India to any village in Canada then this type of scenario will be handled by at least two different Govt (Indian post and Canadian post)
- When multiple organizations handling some asset together then the problem comes that you need to trust on the other party for the required information.
- If your parcel or post gets lost at Canada and you are at India then you can not directly blame the Canadian post or you do not have any way to verify at what location the post or parcel gets stolen
- You only rely on the information provided to Indian post by the Canadian post
- So there is a **requirement to establish the trust relationship** among the two governments

Introduction

- This postal delivery works good in a practical environment because these individual postal agencies they completely trust on each other,
- There is certain level of trust that if I am delivering a post from Indian Post to the Canadian post then the other end is responsible to deliver the post/parcel to the final destination.
- Another problem, difference of rules between the two Govts (Indian and Canadian) and if you bring them to a common platform then it becomes very difficult because proving faulty party is difficult due to non access of global data.
- The aforementioned issues are the motivation to use BCT in this scenario
- From the Govt perspective, Govt needs to maintain multiple assets all together like assets in the form of digital or printed

Blockchain and Government

- Government needs to maintain (in digital or in paper form)
  - Daily operations and activities
  - Government assets (land records, buildings etc.)
  - Details of people, organizations and institutions
  - Records of people
  - Business transactions

Blockchain and Government

- How will you keep the records of the transactions, if you keep them in paper format then it is always vulnerable. If you keep them in digital format then who is going to host that particular information
- **For example,** If the Indian Govt has business relation ship with Walmart (a private agency) then this Tx information who will be maintaining ?
- **Choice-1:** Govt is maintaining his own part of the Txs and Walmart is maintaining his own part of the Txs. If certain dispute will comes then that dispute needs to be resolved by the auditor or law makers or that will go to the court. You know it very well it takes years to resolve the dispute because proving something wrong has happened is very difficult in multi-organizational scenario when the information is distributed among multiple parties
- If you want to store all the information to a central data store in which both the Govt and Walmart can insert their own Txs.

Blockchain and Government

- But problems with this architecture are as follows.
  1. Cost: You need to pay more money to the third party
  2. You need to **rely on the services provided by the third party** (It just like that if the cloud hosting platform crashes then all the Txs are no where or you can not validate the correctness of the recovered TXs)

- These are the problems that central or state Govt are facing on day to day basis.
- BCT can provide ubiquitous platform over this architecture to build a kind of relation ship among multiple organizations all together
- In couple of few slides, we will see some use cases how it can be done

Multi-Institutional or Multi-Organization

- Different levels of governance

Village, Panchyat, Cities

District

State

Country

Multi-Institutional or Multi-Organization

- Every level builds its own ledger of data
  - Different access management policies
  - Role based access control or access management

- Different priority of data
  - High priority or highly secured data - restricted access - needs to prevent from unauthorized access (example: AADHAAR Data)

Blockchain and Government

- Blockchain can help in management of government data at different levels

- **Note**
  - The blocks can contain huge amount of data
  - The data can not be altered without colluding majority of the blocks
  - Data access as transactions - can check or verify who has accessed what

Government and Cyber Crime

- Government database is a major target for hackers
  - In 2015, 77,183 cyber security incidents were reported by federal agencies in the United States (*Cyber Strategy Doctrine by U.S. Department of Defense*)

- **"Cyber War" -** actions by a nation-state to penetrate another nation's computers or networks (*Richard Clarke*)

For example, Facebook data got public or FB data shared with some third agency
Although it is very difficult to validate the correctness of such news because there is no such log which says that it actually happened or not
To analyze that log, you need to have a strong team of cyber security experts to look in to the committed TXs, different data transfer happened over Internet.

Theft Of Government Data

THE WALL STREET JOURNAL.

MONDAY, OCTOBER 18, 2010 - VOL. CCLVI NO. 92

What's News—

Business & Finance

World-Wide

Facebook in Privacy Breach

Top-Ranked Applications Transmit Personal IDs, a Journal Investigation Finds

WHAT THEY KNOW

Tensions Lead to Dueling Protests in China and Japan

UIDAI rubbishes report claiming massive Aadhaar data breach

ET Online | Updated: Jan 04, 2018, 02.52 PM IST

11 Comments

The Unique Identification Authority of India (UIDAI) has refuted a report by The Tribune newspaper that claimed to have gained access to the entire Aadhaar database for just Rs 500.

List of data breaches

From Wikipedia, the free encyclopedia

For a broader coverage related to this topic, see Data breach.

This is a list of **data breaches**, using data compiled from various sources, including press reports, government news releases and mainstream news articles. The list includes those involving the theft or compromise of 30,000 or more records, although many more smaller breaches occur continually. Breaches of large organizations where the number of records is still unknown are also listed. The various methods used in the breaches are also listed, with hacking being the most common.

Most breaches occur in North America. It is estimated that the average cost of a data breach will be over $150 million by 2020, with the global annual cost forecast to be $2.1 trillion.[1][2] It is estimated that in 2015 alone, 707 million records were exposed as a result of data breaches.[3] Vigilante.pw[4] lists over 2,100 websites which have had their databases breached, containing over 2 billion user entries in total.

Entity	Year	Records	Organization type	Method	Sources
21st Century Oncology	2016	2,200,000	healthcare	hacked	[4][5]
Accendo Insurance Co.	2011	175,350	healthcare	poor security	[6][7]
Adobe Systems	2013	152,000,000	tech	hacked	[8][9]
Advocate Medical Group	2013	4,000,000	healthcare	lost / stolen media	[10][11]
Affinity Health Plan, Inc.	2009	344,579	healthcare	lost / stolen media	[12]

Processing of Government Data

- Data is shared among multiple organizations at different level of government structure

- The problem of data breaches increases at every level
  - Data duplication
  - Data multiplicity

  For example, if you are submitting copy of your AADHAR card to some bank or some mobile company then you are actually making the duplication of the data

- Protection of data gets diluted if multiple copies of same data exist

Use Case: Sharing Of Passport Data

Airport/ Sea port
Custom Check

Review
exit/enter

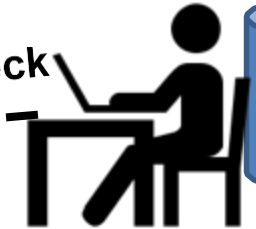
National Army
Defense Agency

Investigation

National Police Agency
CBI/CID - Crime department

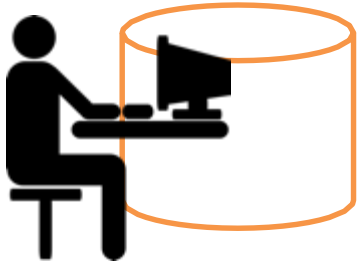
Passport
Data

Periodic Check



Income Tax Department
National Intelligence
National Audit Agency

Ministry of foreign
Affairs - Passport
data management

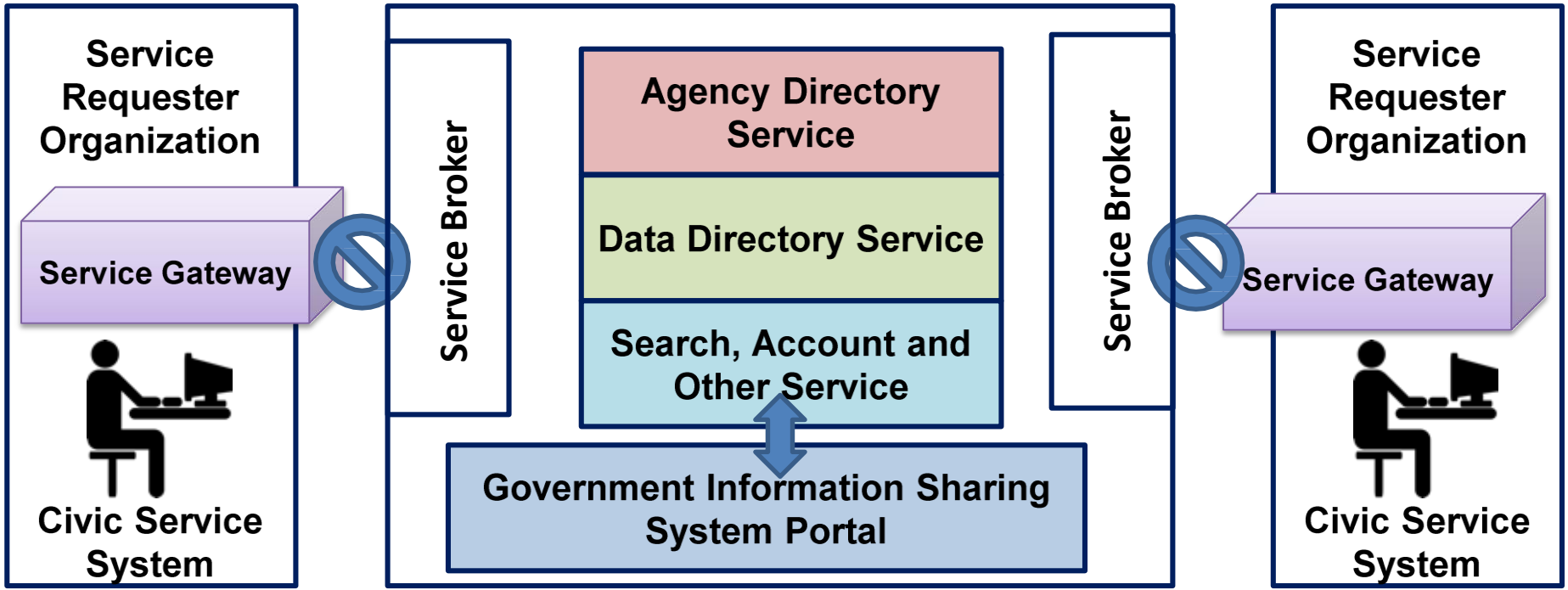


Public Service
Identity
Database

Ministry of Public Service

Other agencies also have passport data and if something wrong happened with your passport data then who is responsible ? Very difficult to prove? Then, BCT comes in to picture HOW??

Government Information Sharing System



In this, you have service requestor, which request the service from data collector through some service broker (who help you to get access of the data) **for example**, In AADHAR, UADAI is the responsible service broker

How Blockchain Helps

- **Access and verification of a central data**
  - Data is in a central database
  - Access to the database are the transaction
  - Every such transactions (access to the data) is logged in a blockchain
  - Data can be accessed **only** through the blockchain
  - Anyone can verify who has accessed data and for what purpose

How Blockchain Helps

- **Sharing of data**

Means, Instead of putting the access in the form of TX in the BC you put data in the BC itself

  - Data is in the blockchain
  - Everyone can verify which data has been shared
  - Data cannot be altered

- **Sharing of data and access control**
  - Keep both the data and the access at a blockchain
  - Anyone can verify the data and the access
  - Neither data nor access can be altered
  - Access cannot be denied

Government Use Cases - Worldwide

- **Russia:** The state run back Sberbank partnered with Russia's Federal Antimonopoly Service (FAS) to implement document transfer and storage via Blockchain

Source:
https://cointelegraph.com/news/first-government-blockchain-implementation-for-russia

Government Use Cases-Worldwide

- **South Korea:** Dayli Financial Group, a house of Korean fintech startups, is working on creating a Blockchain based ecosystem, called ICON, which will allow government departments, universities, hospitals, banks etc. to interact without third party networks.

Source:
https://www.forbes.com/sites/elaineramirez/2017/08/09/dayli-icon-blockchain-south-korea/#44c5823425a7


AUG 9, 2017 @ 11:11 PM 38,140

The Little Black Book of Billionaire Secrets

Could This Blockchain In Korea Be The First To Connect An Entire Country?

Elaine Ramirez, CONTRIBUTOR

FULL BIO

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Government Use Cases - Worldwide

- **Singapore:** Government has initiated project **Ubin**, to explore the use of distributed ledger technology for clearing and settlement of payment and securities (example: Domestic inter-bank payments)
  - Issue and transfer funds among participants

Project Ubin: Central Bank Digital Money using Distributed Ledger Technology

Project Ubin is a collaborative project with the industry to explore the use of Distributed Ledger Technology (DLT) for clearing and settlement of payments and securities. DLT has shown potential in making financial transactions and processes more transparent, resilient and at lower cost. The project aims to help MAS and the industry better understand

Source: http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/Project-Ubin.aspx

Government Use Cases - Worldwide

- **India:** IndiaChain - a trial solution for utilizing blockchain technology for digitization and validation of educational degree certificates, has been taken as a pilot project by Government of India.

Source:
http://www.cio.in/feature/indiachain-inside-gois-blockchain-network

Government Use Cases - Worldwide

- **USA:** *General Services Administration*, an agency of the United States Government (manages basic functioning of federal agencies), is interested to evaluate distributed ledger technologies for
  - Financial Management
  - Procurement
  - IT asset and supply chain management
  - Patents, copyright management
  - Federal personnel workforce data and so on

Source:
https://www.gsa.gov/technology/government-it-initiatives/emerging-citizen-technology/blockchain

Summary

- This Lecture gives you overall view of how Govt utilizing BCT to secure the data as well as to ensure access and auditing of information at the Govt level