



# Basics

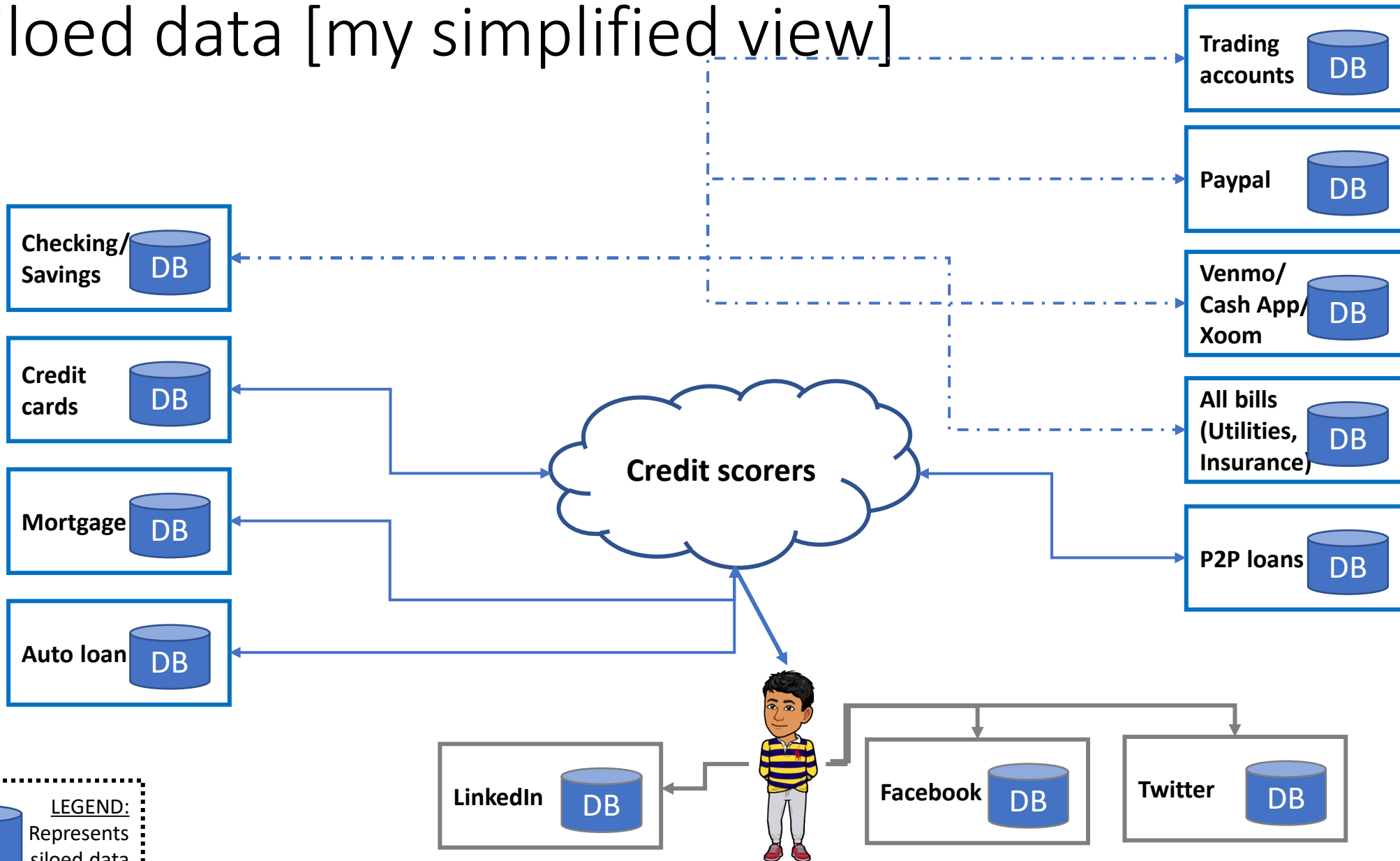
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# What is open banking?

- Definition of “open banking” differs based on stakeholder
- At its core: open banking is *a financial ecosystem that gives service providers access to a consumer’s financial history **at the request of the consumer.***
- Open banking aims to break down silos of consumers’ transaction and payment histories collected and guarded by existing financial institutions.
- Regulations around open banking are attempting to *transfer property rights* of consumer data *to the consumer* and make financial institutions the custodian.

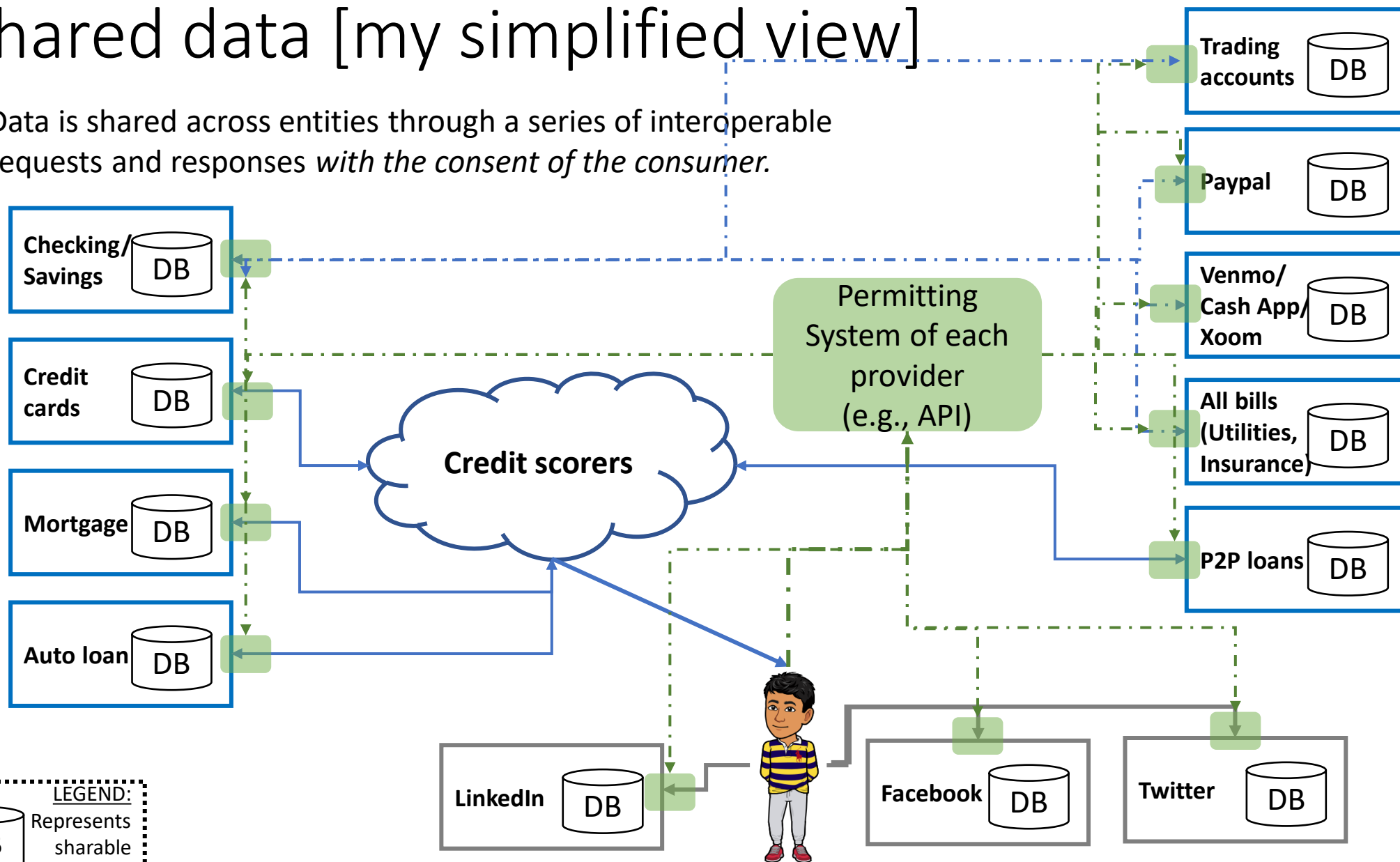
# Siloed data [my simplified view]



**LEGEND:**  
DB Represents siloed data

# Shared data [my simplified view]

Data is shared across entities through a series of interoperable requests and responses *with the consent of the consumer*.

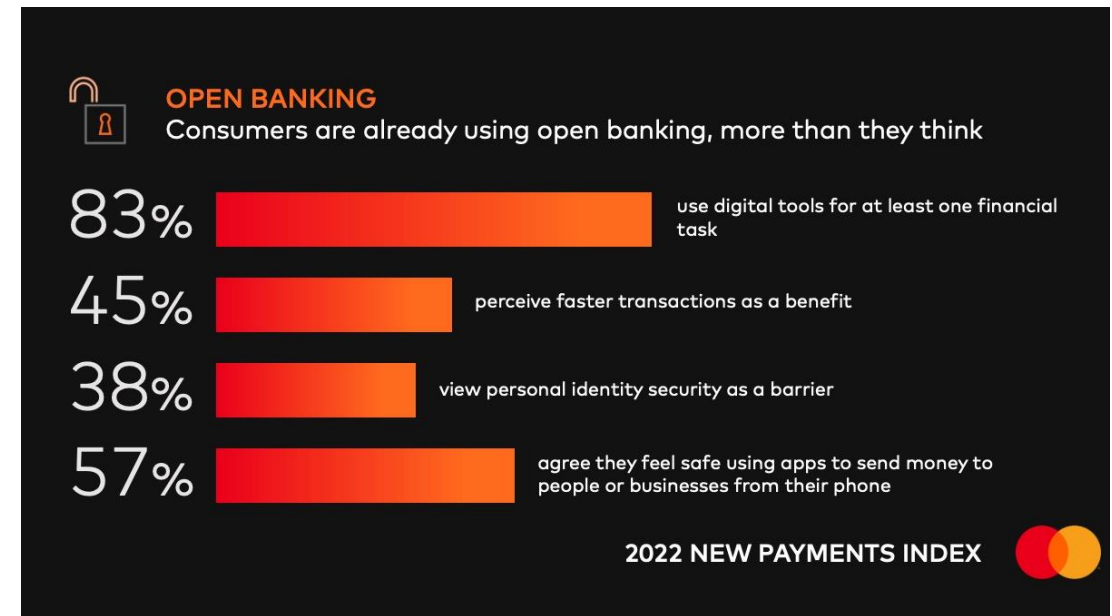


*A version of open data world we are approaching!*

**LEGEND:**  
DB Represents sharable data

# How does open banking and data sharing work?

- Most of are already in an [ad hoc] open banking world.
  - Do you use Mint, Robinhood, Wealthfront?
- Technology has enabled financial institutions to share consumer information at least since 2005.
- Open banking is attempting to make this process formal and set standards.
  - Plus, allow for sharing payments data.
- Mechanisms of data sharing:
  - Upload data
  - Screen scraping
  - Application programming interface (APIs)



Source: Mastercard's Global consumer survey of 35,040 respondents in 40 countries.  
<https://www.mastercard.com/news/perspectives/2022/open-banking-101>

# Mechanisms of data sharing: Upload data

- **Upload data:** Customer must type/upload his transactions to the portal of a service provider.
  - A few years ago, mortgage lenders would have requested you to upload bank statements to their portal (some still do).
  - In 2021 while filing taxes with TurboTax, users had to manually enter any cryptocurrency transactions they did on Binance US platform.
- Archaic for today!

# Mechanisms of data sharing: Screen scraping

- **Screen scraping:** Customers will type in their user ID and password for each financial institution (FI) on a service provider's portal. The service provider then logs into each FI website posing as the customer and scrapes the screen (underlying html/asp) for relevant information.
  - Even smaller online mortgage lenders collect additional data on borrowers using this route now.
  - Mint, the financial aggregator, used to screen scrape at least till 2015.
- [See video for demonstration]
- Advantages:
  - Faster and less hassle for customers
  - Service provider gets additional information on customers
- Disadvantages
  - Customers need to share their ID and password which may get compromised
  - Privacy issues: Service provider can scrape more data than required (see JPMorgan case study)
  - Data monetization issues: Service providers may sell customer data to others (Yodlee sold data to hedge funds: <https://www.forbes.com/sites/elenabotella/2020/12/14/another-reason-not-to-buy-and-sell-individual-stocks-hedge-funds-buy-your-credit-card-transaction-data-to-predict-the-market/?sh=1a1f9439450b>)
  - FIs cannot track who is downloading the data and may lead to security issues.
  - Algorithms will fail if FIs change the page structure and lead to errors in data collection.

# Mechanisms of data sharing: APIs

- **Application Programming Interface (API)** is a way for two computers to communicate with each other so they can share data.
  - A common language between two systems that otherwise speak different languages.
  - Is a collection of commands that allows authenticated users to query data from a host system and modify data if allowed.
- [See video for demonstration in Census context]
- **Advantages:**
  - A structured language that allows interoperability
  - Can be extended to multiple systems/companies with relative ease
  - Data can be divided and permissioned based on level of security clearance
  - Relatively quicker download and cleaning process for service providers since data will already be tagged
  - Hassle free for customers
- **Disadvantages:**
  - FIs can shut off access to APIs at their discretion (Robinhood does not allow Mint to refresh data often)
  - Without a universal standard the syntax for API requests can easily become fragmented and complicated.
  - Without co-ordination among all FIs/service providers or regulatory directives there will be too many bilateral APIs



# How does an API work?

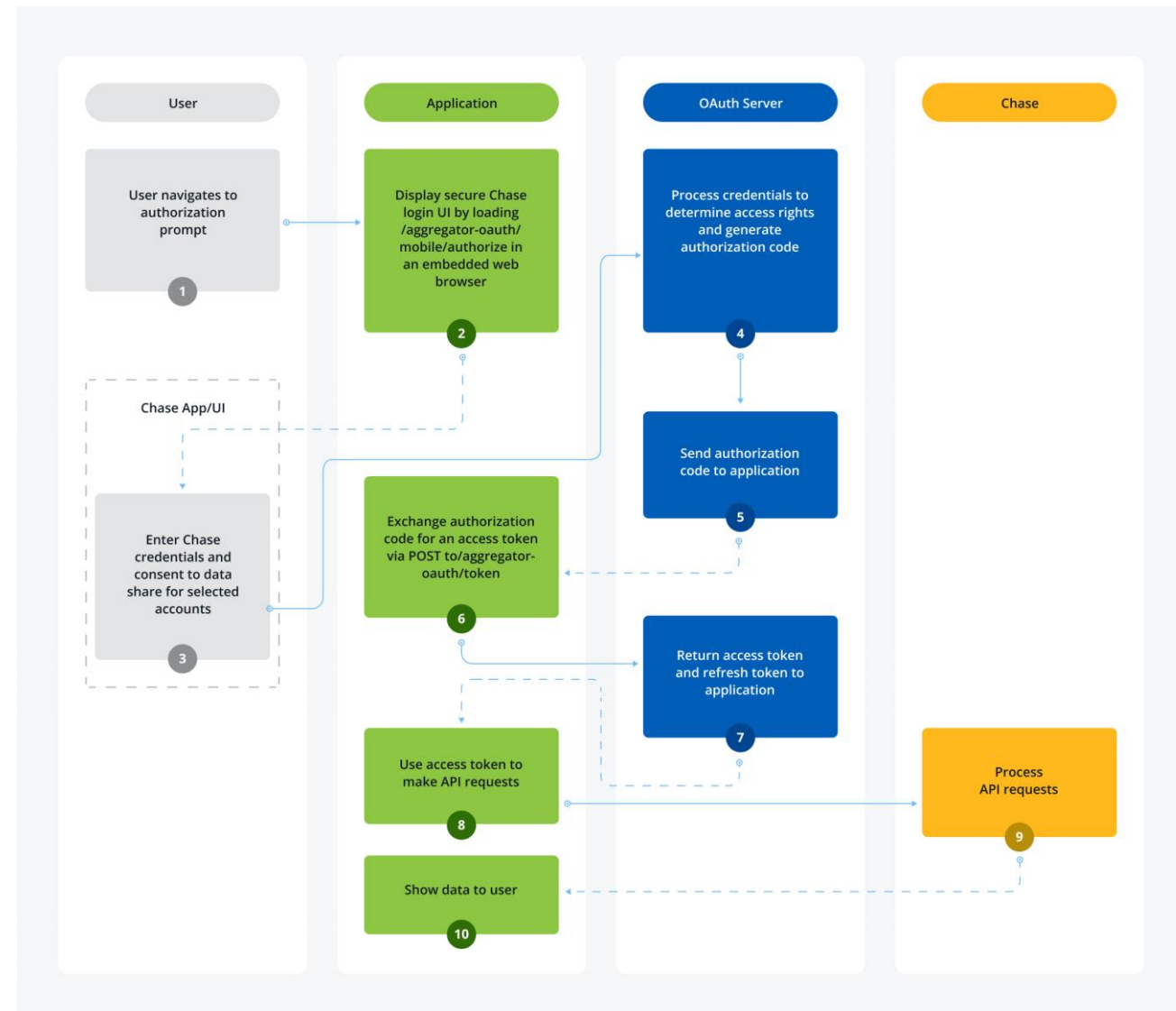
- **Application Programming Interface (API)** is a way for two computers to communicate.
- Popular APIs use the Representational State Transfer standard and are called RESTful APIs.
  - A set of rules that have been used since early 2000s for applications to communicate with servers
  - The standards ensure that the system:
    - Has a uniform interface
    - Follows client-server model
    - Is stateless
    - Is cacheable
    - Is Layered (so can be easily scaled)
- API normally organize data around “noun” endpoints called Uniform Resource Identifiers
  - E.g., product, accounts, organizations, people, etc.
- Common ‘CRUD’ commands:
  - POST – Create
  - GET – Read
  - PUT – Update
  - DELETE – Delete

# How does an API work?

Example: How a financial aggregator (e.g., Mint) gets data from Chase on a customer.

- Initiate consent and authorize the use
  - GET /aggregator-oauth/mobile/authorize
- Retrieve data access token
  - POST /aggregator-oauth/token
  - Response:

```
{  "token_type": "bearer",  "access_token": "AAIEVFRBWNbglyVtsc7mUj8f...",  "expires_in": 259200,  "consented_on": 1546546773,  "scope": "aggregator",  "refresh_token": "AAJBny8U9UTEfJee8X1Rv2uoa0b73...",  "refresh_token_expires_in": 31536000}
```
- Search and retrieve account IDs and transactions (curl -X 'GET'\chase\api\):
  - GET/accounts
  - GET/accounts/{accountId}
  - GET/accounts/{accountId}/transactions
  - GET/accounts/{accountId}/payment-networks



Source: Chase Developer. <https://developer.chase.com/products/aggregation-fdx/>

# Mechanisms of data sharing

- For more example from Chase see <https://developer.chase.com/>
- For examples from Goldman Sachs Transaction Banking (TxB) see <https://developer.gs.com/>
- For more on why APIs are essential for open banking, see Basel Committee on Banking Supervision's report:
- See the US Department of Commerce report on Cybersecurity considerations for Open banking for more on API security considerations: <https://doi.org/10.6028/NIST.IR.8389-draft>

# Benefits of open banking

- Customer:

- Gets a hassle-free interface that could allow for free movement across FIs (increase in competition)
- Gets ownership of personal data (and potentially paid for allowing use)
- Gets more customized service and targeted products
- Potential for financial inclusion

- Incumbent financial institutions:

- Could allow for new business opportunities: e.g., banks could commercialize their infrastructure that allows others to connect via their API and provide Banking-as-a-Service (i.e., become a platform).
- Allows for startups that focus on product creation to adopt their system and potentially acquire them

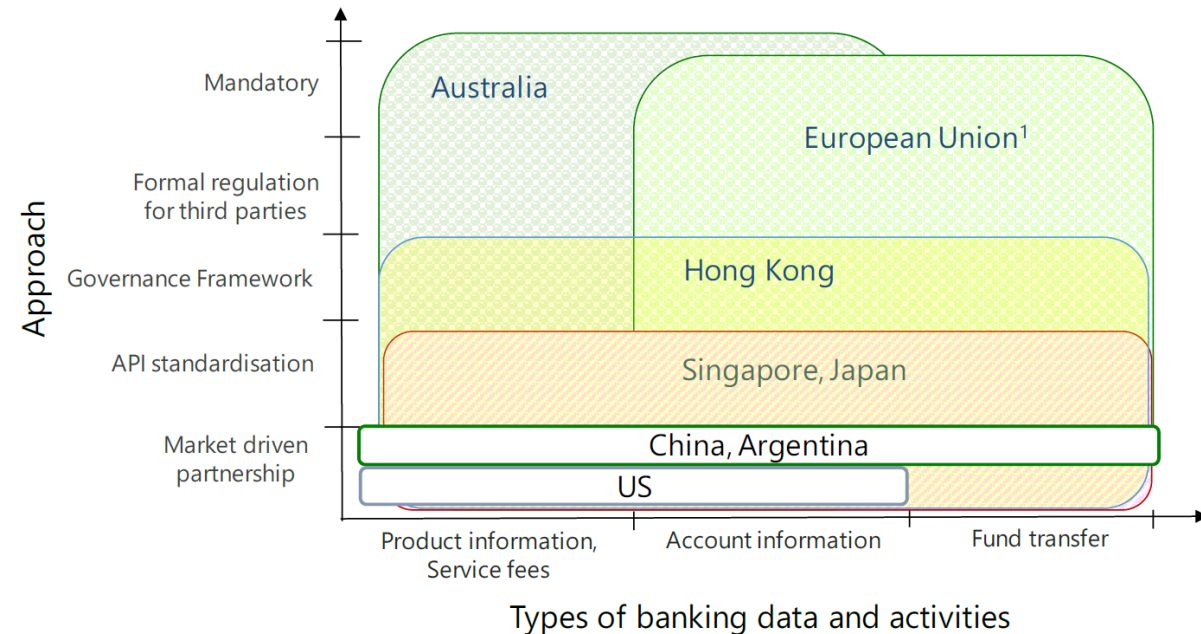
# Benefits of open banking

- Startups:
  - Get access to vast amounts of data
  - Find new business models
- Regulators:
  - Increased transparency for end-users
  - Potentially allow for better audits and oversight

# Evolution of open banking

Push for open banking has come from different sides and is geography specific

- Regulator driven: UK and EU
  - PSD2, SCA implementation started in 2018
- Market-driven: US
  - Initiated in Section 1033 of 2010 Dodd-Frank but no proposal till Oct 2020.
  - July 2021 CFPB order to complete rule making process
  - Clearing House, JPMorgan, Citi, Goldman Sachs, and many more have already created frameworks
- Facilitated partner/consumer driven: India
  - “India stack” (universal digital ID, interoperable payment systems, API standards) we created to facilitate mobile-based financial services by the government in partnership with private sector.



# Payment Services Directive 2 (PSD2) overview

- PSD2 went into effect on Jan 13, 2018.
  - More secured transactions
  - Better consumer rights
  - A guiding framework for open banking
  - Foster innovation and creation of new business opportunities

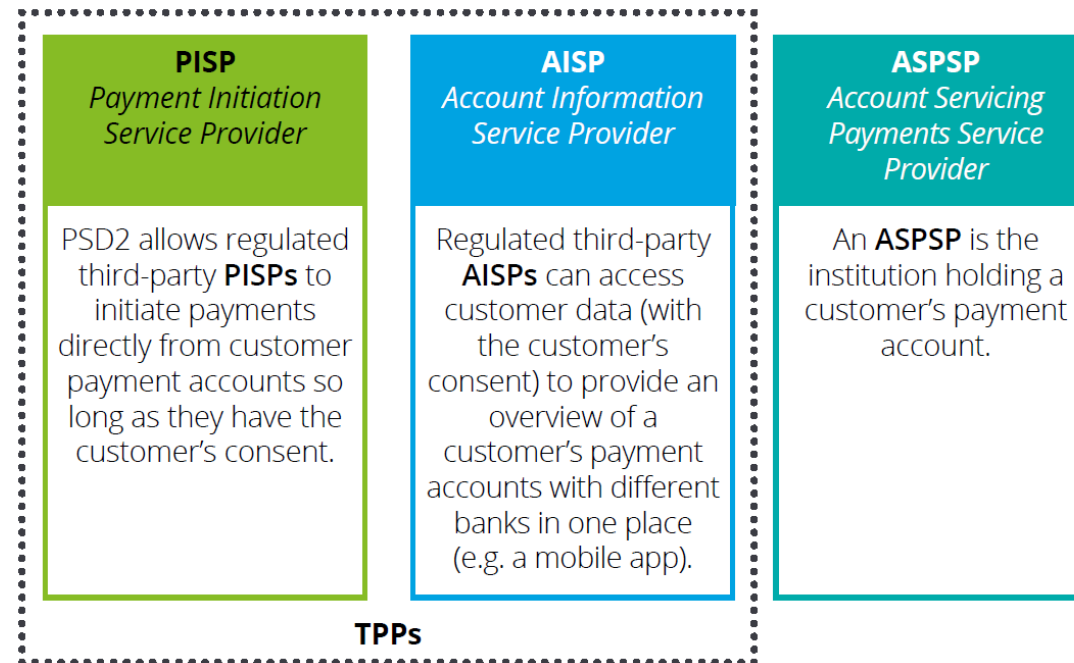
# Payment Services Directive 2 (PSD2) overview

- Security was to be ensured by Strong Customer Authentication (SCA): **2 of 3 forms of ID**
  - Possession: phone, card, NFC secure key, etc.
  - Knowledge: PIN, password
  - Inherence: biometrics
  - 3D Secure 2.0 (i.e., two factor authentication) became mandatory
- Better consumer rights:
  - Surcharge ban
  - Prompt return of any earmarked funds
  - Clear timeframes for processing any customer complaints or requests
  - Ownership of personal data (byproduct of GDPR)



# Payment Services Directive 2 (PSD2) overview

- Open banking framework:
  - Allow for permissioned access of customer data via APIs to “trusted” Third party providers (TPPs)
    - Account information service provider
    - Payment initiation service provider



Source: The Second Payment Services Directive (PSD2) – A briefing from Payments UK, Payments UK, July 2016. See also: <https://www.paymentsuk.org.uk/sites/default/files/PSD2%20report%20June%202016.pdf>; Deloitte analysis

# Payment Services Directive 2 (PSD2) overview

- Foster innovation and creation of new business opportunities

## Retail use cases

Account aggregation

Peer-to-peer payments services

Consumer-to-business payments

Products cross-selling

Banking products

Nonbanking products

Lifestyle offerings

Identification and authentication services

## Opportunities

Link all accounts; track expenses; set and plan savings goals; self-administration

Mobile money transfer directly from account

Point-of-service money transfer directly from account (offline and online)

Identify leads for lending or investment products

Identify leads for insurance and utilities offers

Enable payments and services beyond payments; offer alternative payments methods on bank's platform (eg, Alipay)

Provide digital identity, eg, for secure login to tax department

## Corporate use cases

Balance sheet simulation

Multi-account management

Integrated cash management

Enhanced risk scoring

## Opportunities

Balance sheet/P&L simulation across accounts

Improve multi-account aggregation and management

Cash pooling and liquidity management across accounts

Use multi-account data to enhance risk scoring for lending

Source: McKinsey Analysis.

<https://www.mckinsey.com/industries/financial-services/our-insights/psd2-taking-advantage-of-open-banking-disruption>

# Payment Services Directive 2 (PSD2) so far

While PSD2 is an important step towards open banking, it has faced some issues.

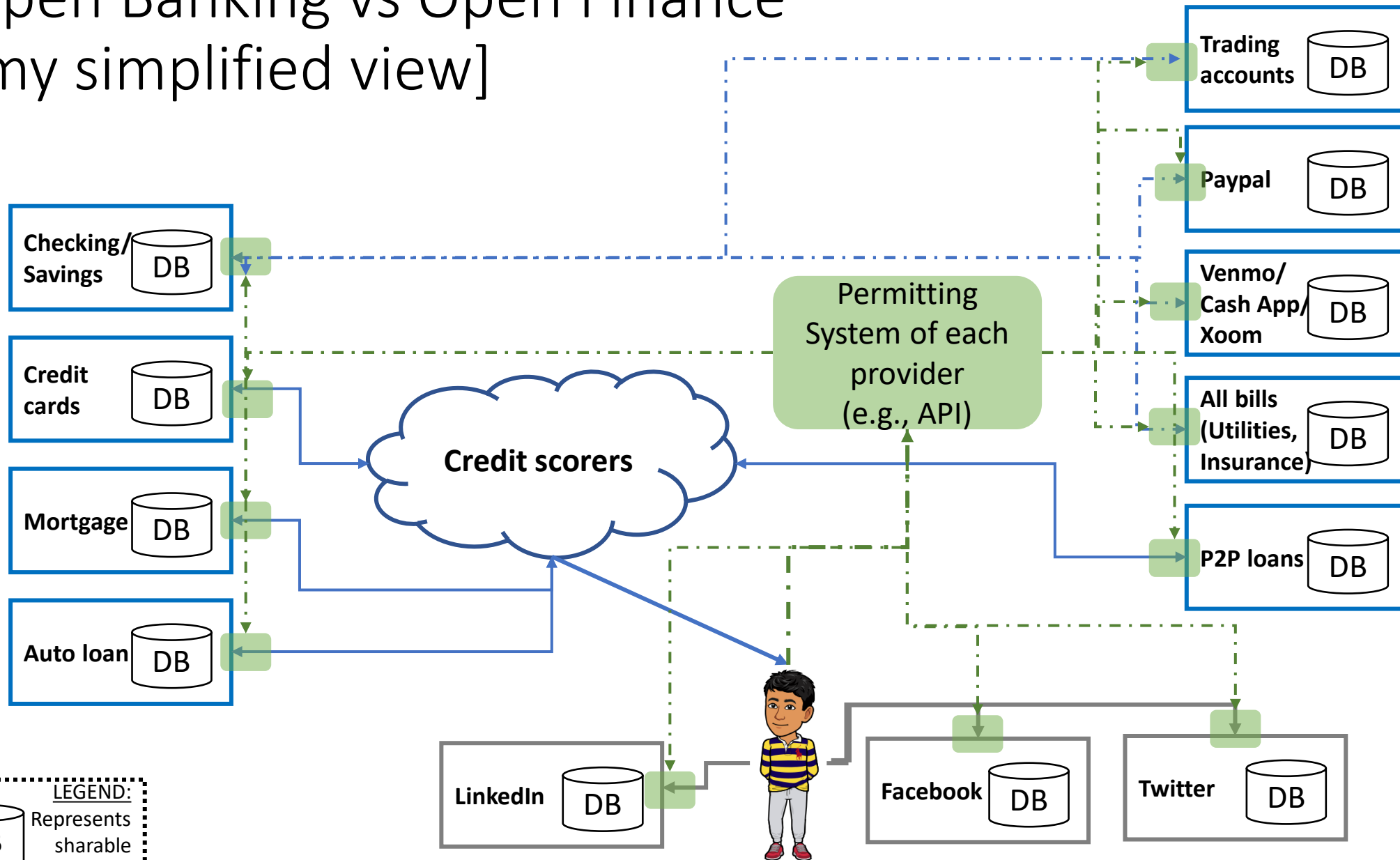
- Some players have seen this as an exercise in minimum compliance
- Poor quality APIs
- Poor quality apps that redirect customers to desktop versions
- API call limits
- Inconsistent adoption across markets

# Examples of open banking initiatives

- **BBVA:** In 2018, BBVA launched its BaaS platform, Open Platform, in the US. Open Platform utilizes APIs that allow third parties to offer customers financial products without needing to provide a full suite of banking services.
- **HSBC:** HSBC launched its Connected Money app in May 2018 in response to the UK's open banking regulations that attempt to place more control of financial data into the hands of consumers. Connected Money allows customers to view various bank accounts as well as loans, mortgages, and credit cards, in one place.
- **Citi:** Citi's Developer Hub enables developers from various digital companies to connect to Citi via API. Notably, Intuit uses this connection to authorize data sharing with Quickbooks and Mint, Quantas uses it for their credit card offerings, and SingSaver uses it for instant account verification with Citi cards. The offerings in the developer hub vary by country, but Citi allows account aggregation, access to transaction data, authorization, and reward information in many places. By creating this developer hub, Citi is positioning itself for flexibility and stronger connections for their customers who use third-party apps, resulting in customer satisfaction and retention. (<https://sandbox.developerhub.citi.com/us/home>)

# Open Banking vs Open Finance

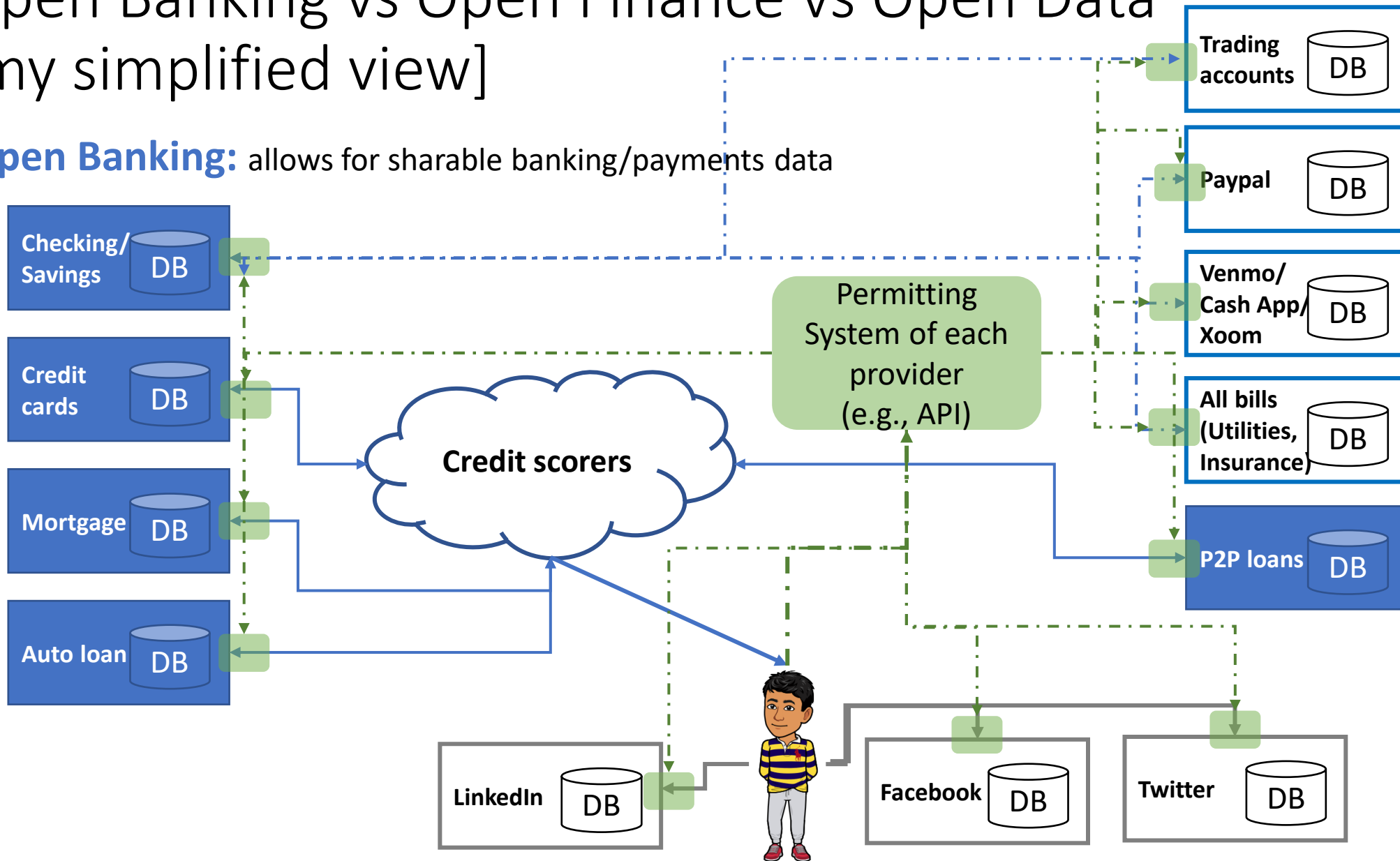
[my simplified view]



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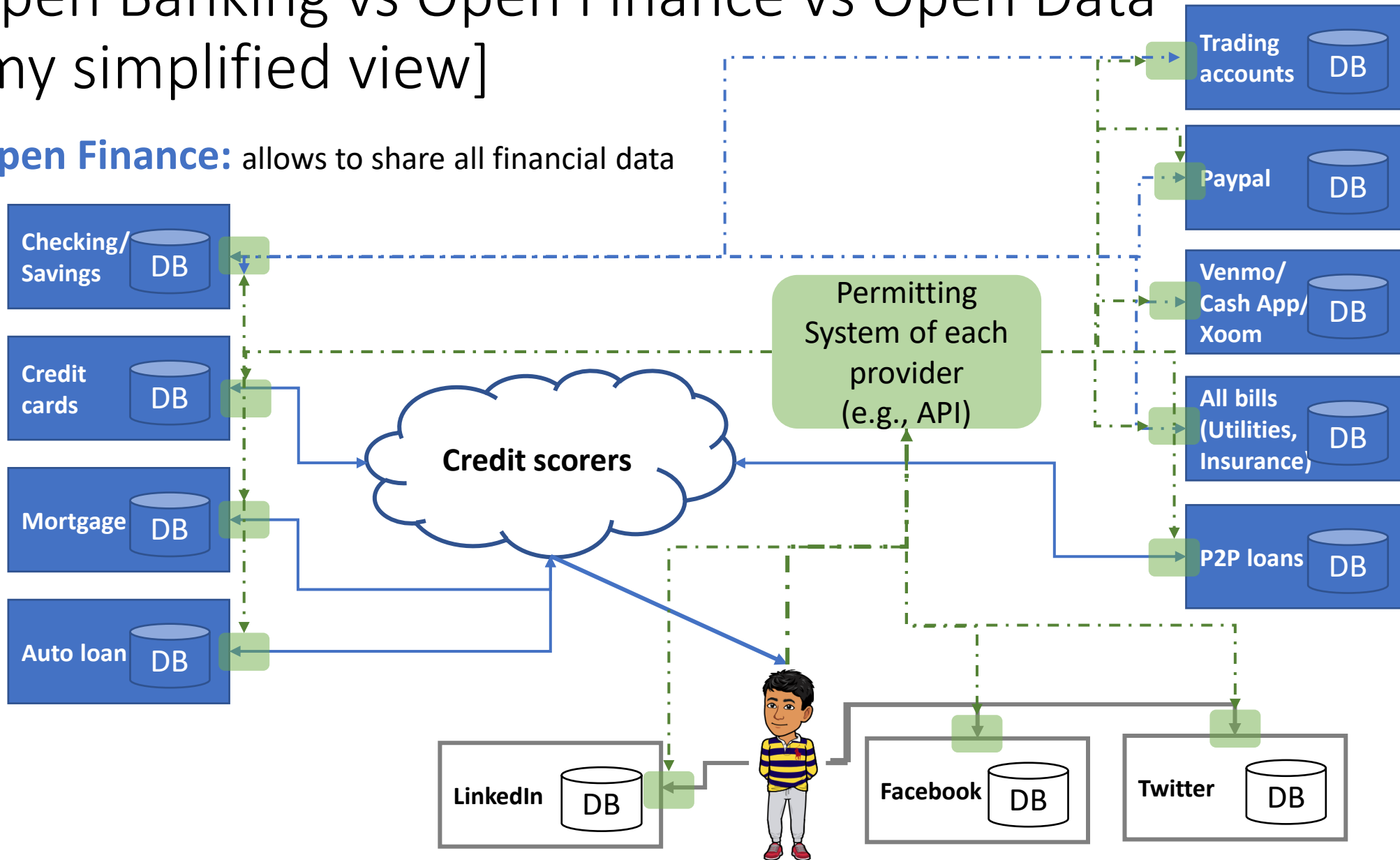
# Open Banking vs Open Finance vs Open Data [my simplified view]

**Open Banking:** allows for sharable banking/payments data



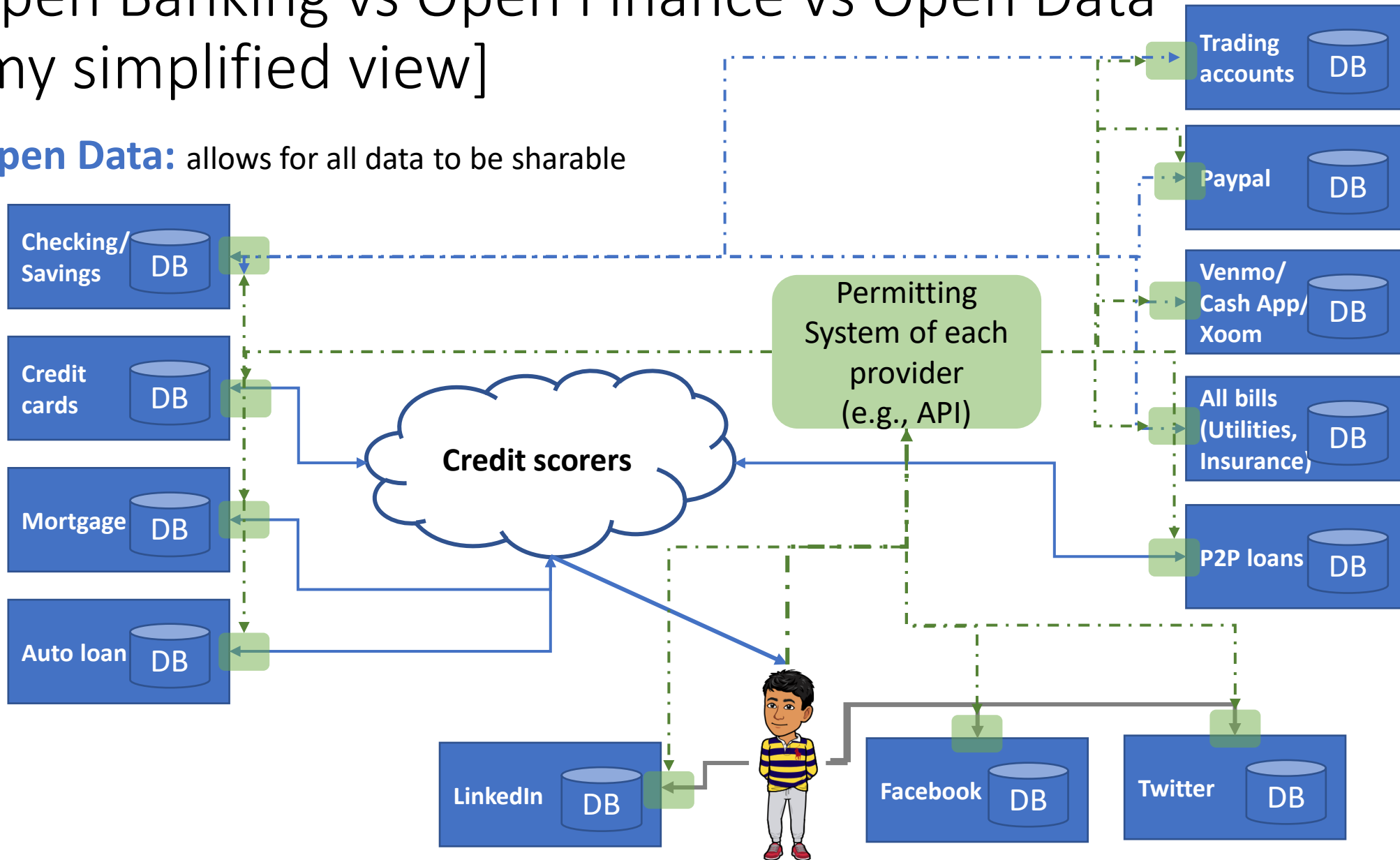
# Open Banking vs Open Finance vs Open Data [my simplified view]

**Open Finance:** allows to share all financial data



# Open Banking vs Open Finance vs Open Data [my simplified view]

**Open Data:** allows for all data to be sharable





# Platform banking

- *Open banking amplified.*
- Digital platforms have altered business models, competitive structure, pricing, and customer behavior (recollect Uber, Facebook and AirBnB examples from previous lecture)
- Platformification allows facilitators to offer services beyond a limited portfolio.
- Platform banking is a digital marketplace, owned and operated by a bank or another (potentially nonbank) entity, that provides banking and possibly nonbanking services.
- Platforms can become a one-stop shop for all customer needs while increasing convenience, choice, pricing, and ability to compare products.
- E.g., Mortgages: Platforms can provide loans, become matchmakers in helping customers buy homeowner's insurance, house maintenance services, or even furniture on the bank's platform.
- Platform banks (or closer) already exist.
  - WeChat in China allows users to do anything from chat with friends, order food, and buy stocks
  - India's Paytm, an e-commerce payment company, allows users to buy airline, bus, and movie tickets; reserve hotels; and rent cars from other providers.
  - M-pesa is another well-known example
  - Facebook payments is modelling after WeChat.