## Chapter 5:

# Electronic Payment

Electronic Commerce

# Outline

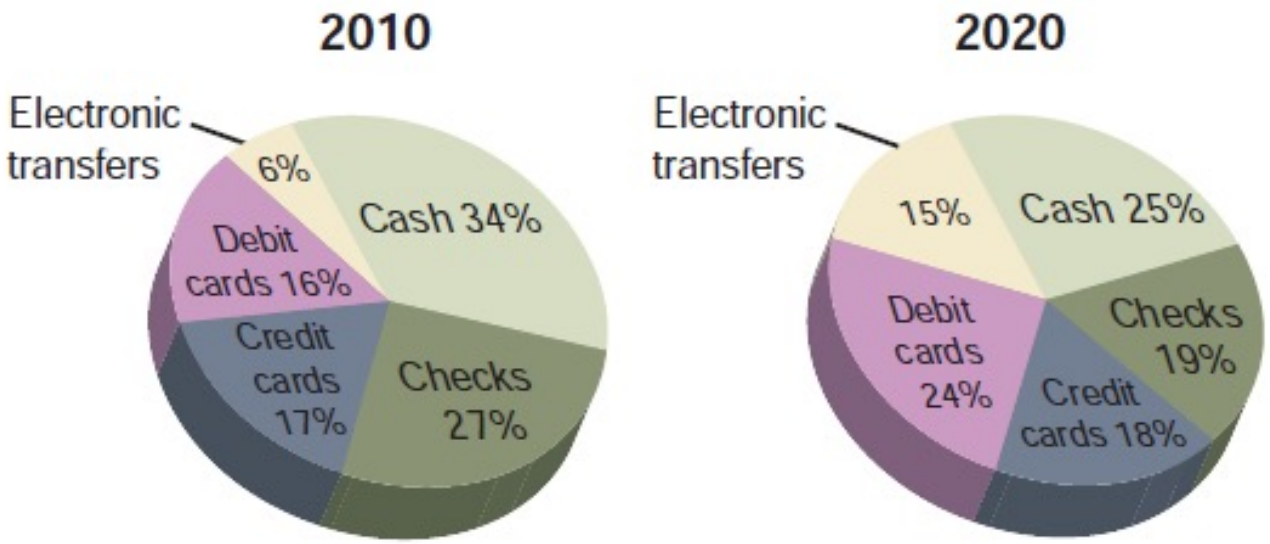
- Basic information
- Payment cards
- Electronic cash
- Electronic wallet
- Criminal activities
- Payment gateway in Vietnam

# Basic information

- Online payment: important function of e-commerce
- B2B payment transactions: using Electronic Fund Transfer (EFT) (also called wire transfer), in which transactions between accounts from the same or different banks occur, or through cash office, e.g. Western Union
- B2C transactions: online payments cost less than traditional methods (e.g. by mail) and more convenient

# Basic information

- Four main ways to purchase items in B2C (online and tradition): cash, check, credit card, and debit card
- Electronic transfer has a small percentage but is growing



# Basic information

- For online B2C payments
  - Worldwide: 90% by credit card
  - United States: 97% by credit card
- Scrip
  - Digital cash created by a company
  - Cannot be exchanged for cash, but can be exchanged for goods/services
  - Like a gift certificate: good at more than one store
- Payment methods' requirements
  - Safe
  - Convenient
  - Widely accepted

# Payment cards

- Payment card: plastic card consumers use to make purchases
- Categories: credit card, debit card, and charge card, prepaid card, gift card
- Credit card (Visa, MasterCard)
  - Spending limit based on users' credit history
  - User billing cycle: pay off entire credit card balance, or pay a minimum amount
  - Unpaid balance is charged an interest
  - Is accepted Worldwide
  - Consumers using credit cards are protected by 30-day period in which they can dispute an online credit card purchase

# Payment cards

- Debit card
  - Removes sales amount from cardholder's bank account
  - Transfers sales amount to seller's bank account
  - Issued by cardholder's bank with credit card issuers' name
  - Is accepted by merchants who recognize the brand name of the credit card issuer
- Charge card (American Express)
  - No spending limit
  - Entire balance due at end of billing period
  - No line of credit or interest charges

# Payment cards

- Advantages of payment cards
  - Advantage for merchants
    - Fraud protection (built-in security)
    - Charge paid through issuer of payment card
  - Advantage for U.S. consumers
    - According to the Consumer Credit Protection Act, liability of fraudulent card use: $50
    - Card issuer frequently waives $50 charge if card stolen
  - Good for merchants and consumers
    - Worldwide acceptance
    - Currency conversion handled by card issuer
    - Consumers do not need any special software or hardware to use their cards

# Payment cards

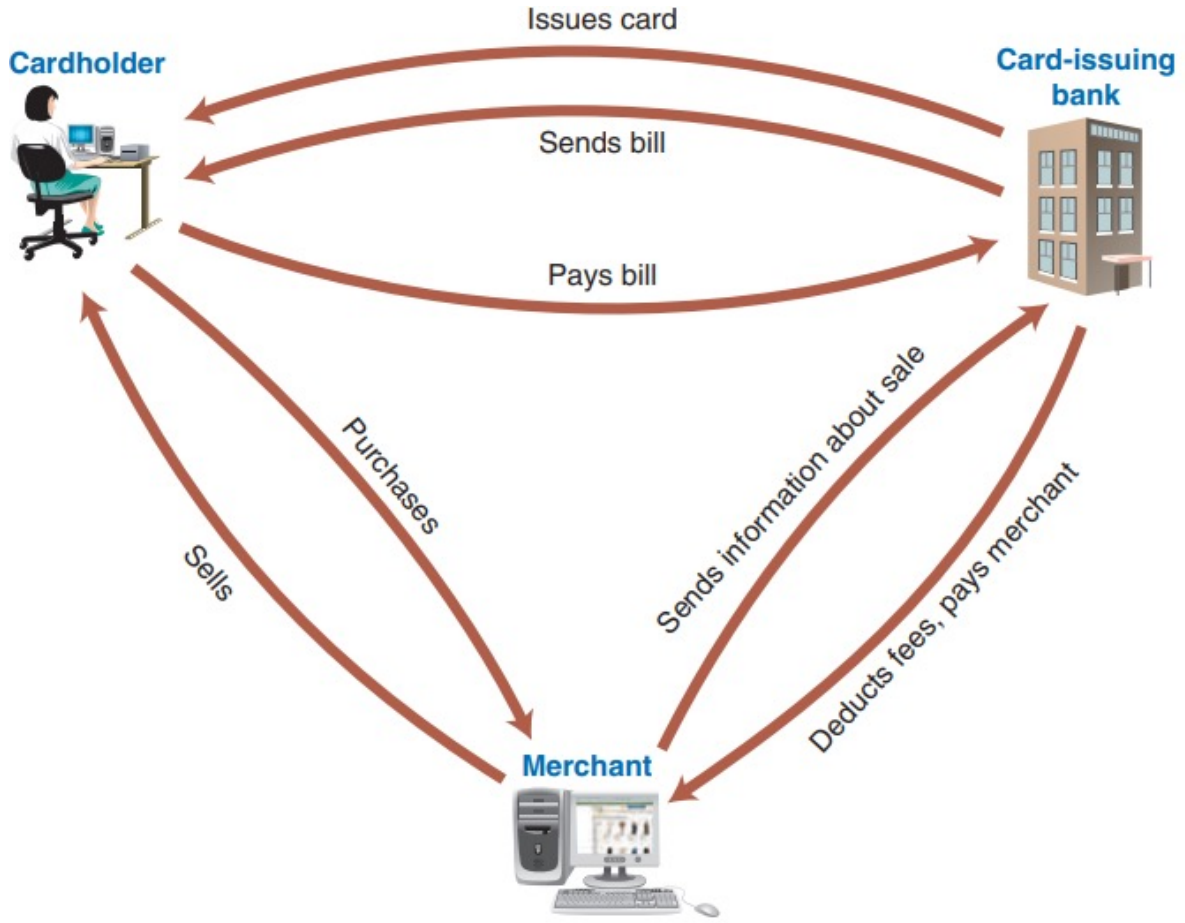
- Disadvantages of payment cards
  - Disadvantage for merchants
    - Per-transaction fees, monthly processing fees: cost of doing business
    - Goods and services prices are slightly higher: as opposed to environment free of payments cards
    - For payment, merchant must first set up merchant account
  - Disadvantage for consumers
    - Annual fee

# Payment cards

- Payment acceptance and processing
  - Standard for handling card payment EMV (Europay, MasterCard, Visa)
  - Must ship merchandise within 30 days of charging payment
    - Violation penalties are significant
    - Most merchants do not charge payment card accounts until merchandise shipped
  - General steps in payment card transactions
    - Merchant receives payment card information
    - Merchant authenticates payment
    - Merchant ensures funds are available and puts hold on credit line or funds to cover charge
    - Settlement occurs (few days after purchase)

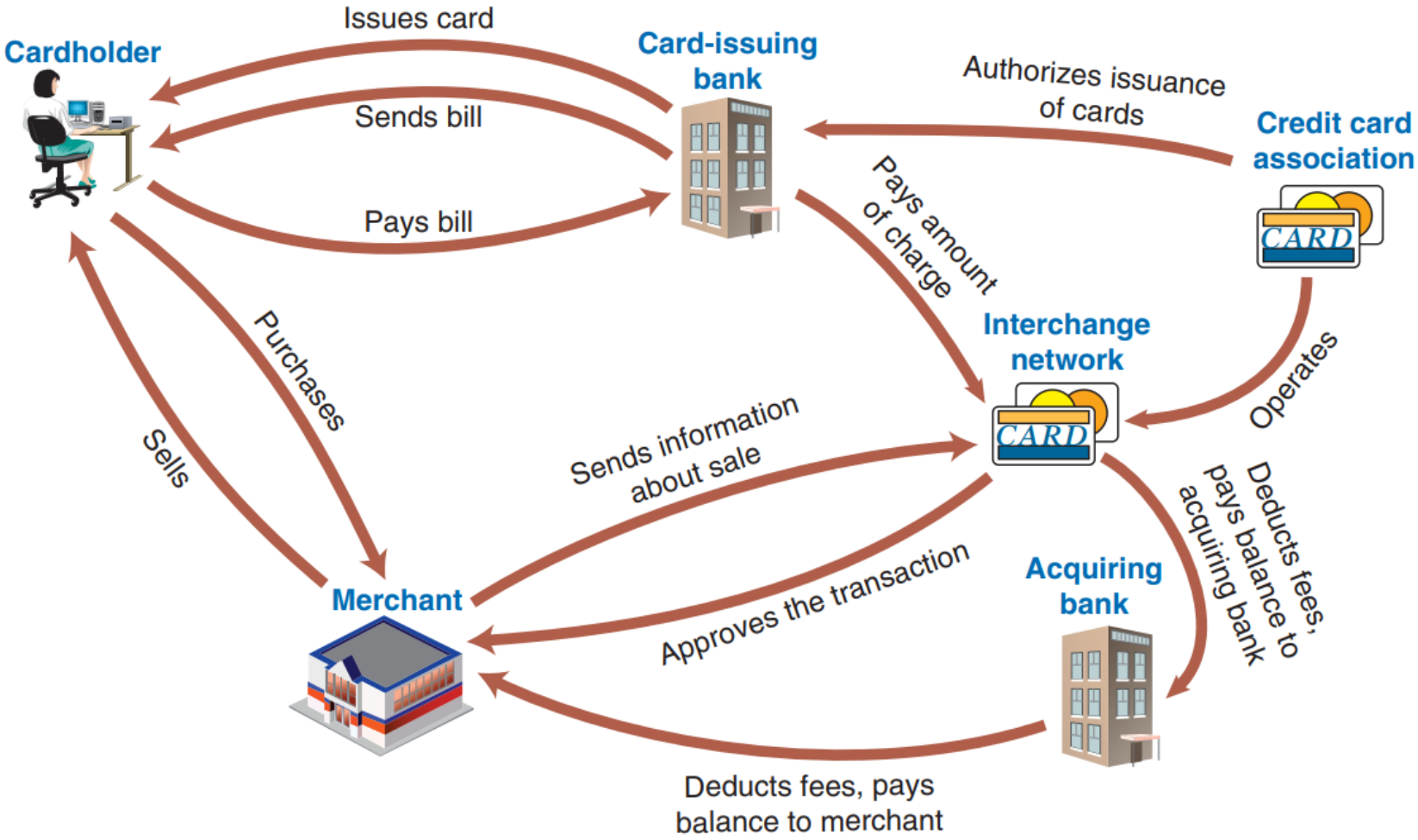
# Payment cards

- Closed loop system: card issuer pays the merchants that accept the card directly (American Express, Discover Card)



# Payment cards

- Open loop system: use intermediary banks (Visa, MasterCard)



# Electronic cash

- Electronic cash: value storage and exchange system created by a private entity that can serve as a substitute for government-issued physical currency
- Difference from scrip: electronic cash can be exchanged to physical cash
- Each electronic cash issuer has its own standards and electronic cash is not universally accepted

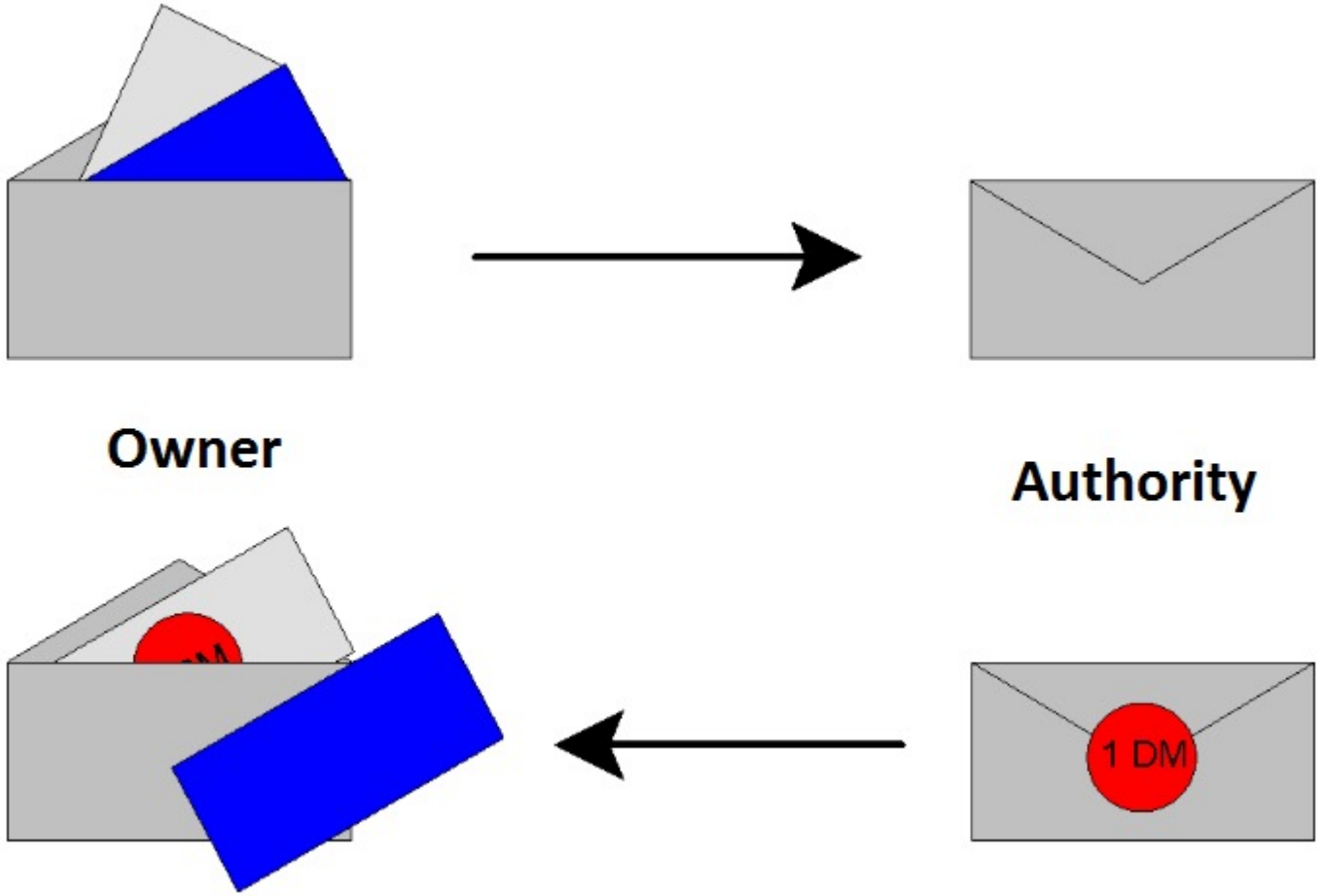
# Electronic cash

- When to use electronic cash
  - Market for Internet small purchases (below $10)
  - Solution to paying for online purchases when credit card is not available
- Advantages of electronic cash
  - Independent
    - Unrelated to any network or storage device
    - Ideally pass transparently across international borders; converted automatically to recipient country's currency
  - Portable
    - Freely transferable between any two parties

# Electronic cash

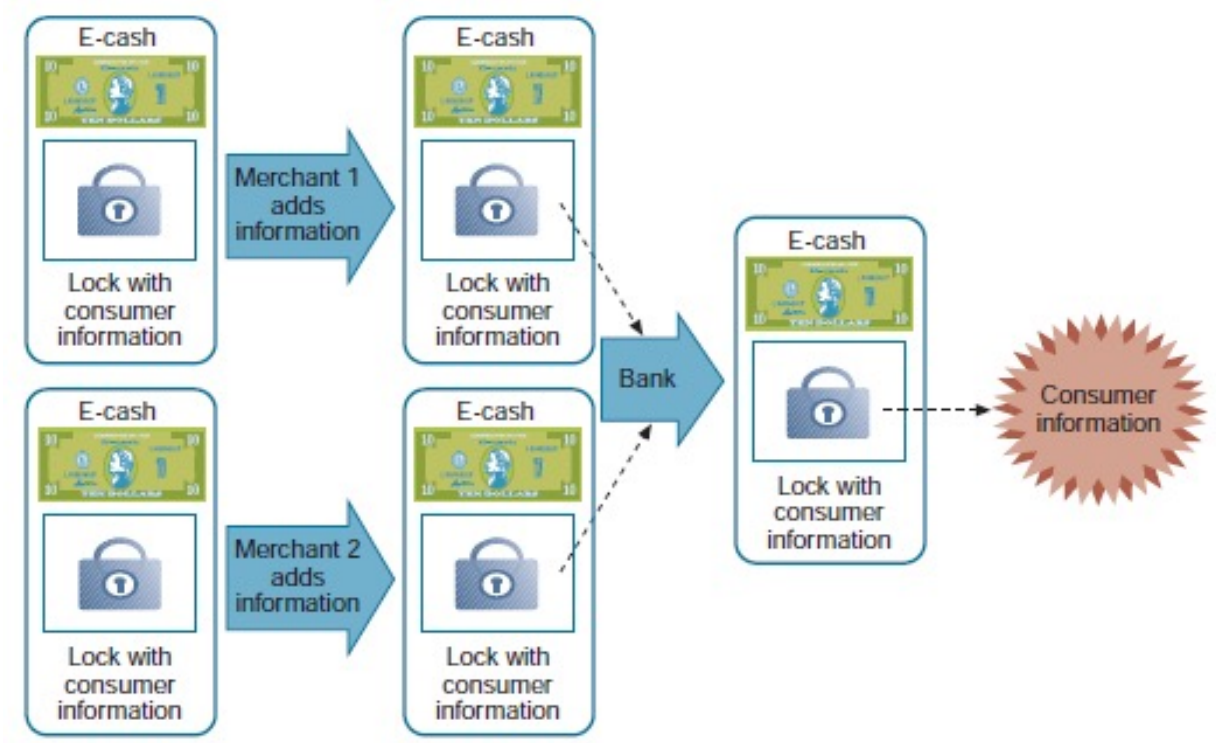
- Privacy and security of electronic cash
  - Possible to spend only once, not counterfeit, used in two different transactions
  - Anonymous use, prevents sellers from collecting information
  - Prevent double spending: using an online central trusted third party
  - Achieve anonymity: using blind signature
- Holding electronic cash
  - Online: consumer has no personal possession of electronic cash, trusted third party (online bank) involved in all transfers, holds consumers' cash accounts

# Electronic cash – Blind Signature



# Electronic cash

- Holding electronic cash
  - Offline: equivalent of money kept in wallet, customer holds it, no third party involved in transaction
    - To protect against fraud: hardware or software safeguards needed



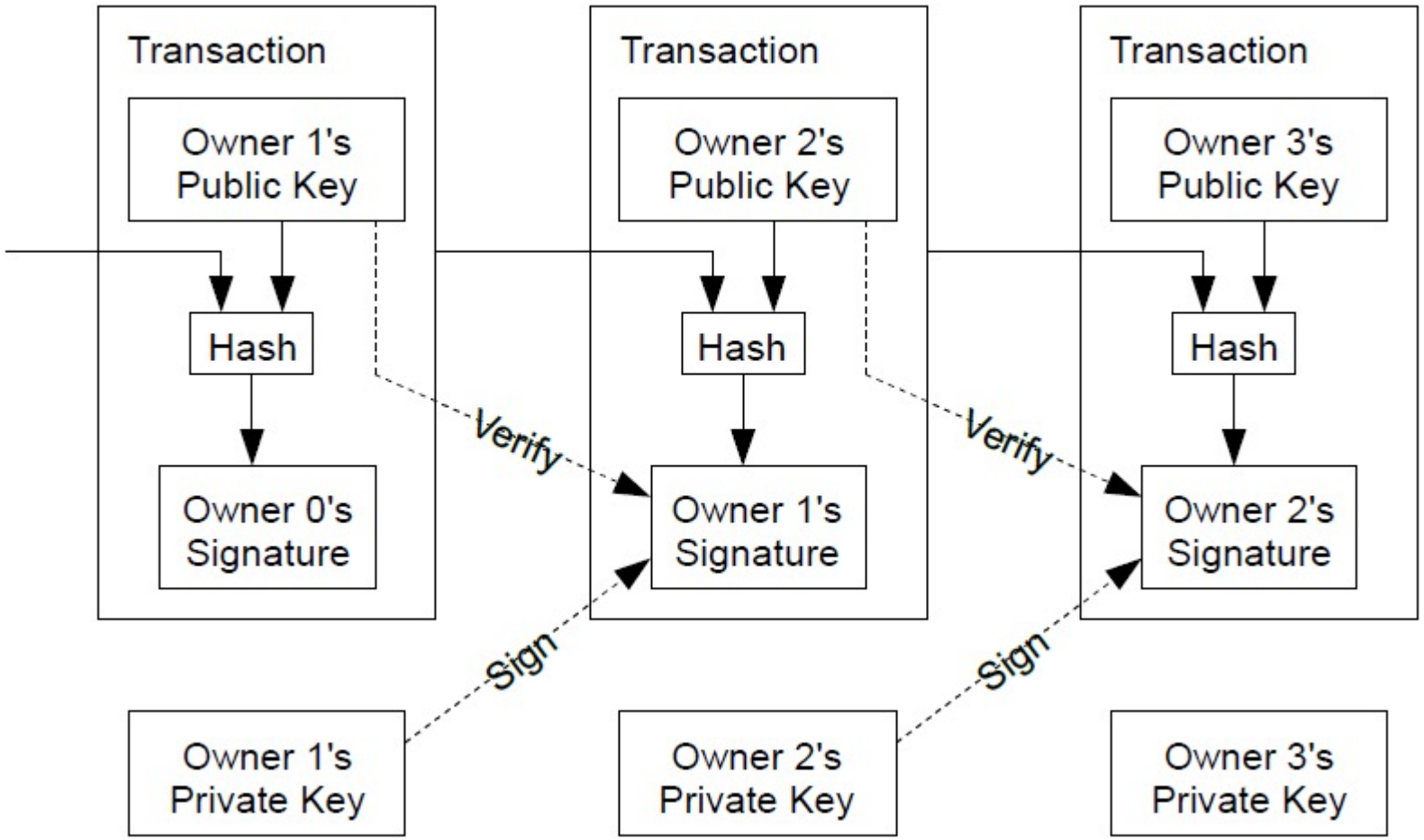
# Electronic cash

- Disadvantages of electronic cash
  - No audit trail (for real electronic cash)
  - Money laundering
    - Technique criminals use to convert money illegally obtained into spendable cash
    - Purchase goods, services with ill-gotten electronic cash
    - Goods sold for physical cash on open market
  - Electronic cash has not yet become a global commercial success, hence not widely accepted as a standard payment method

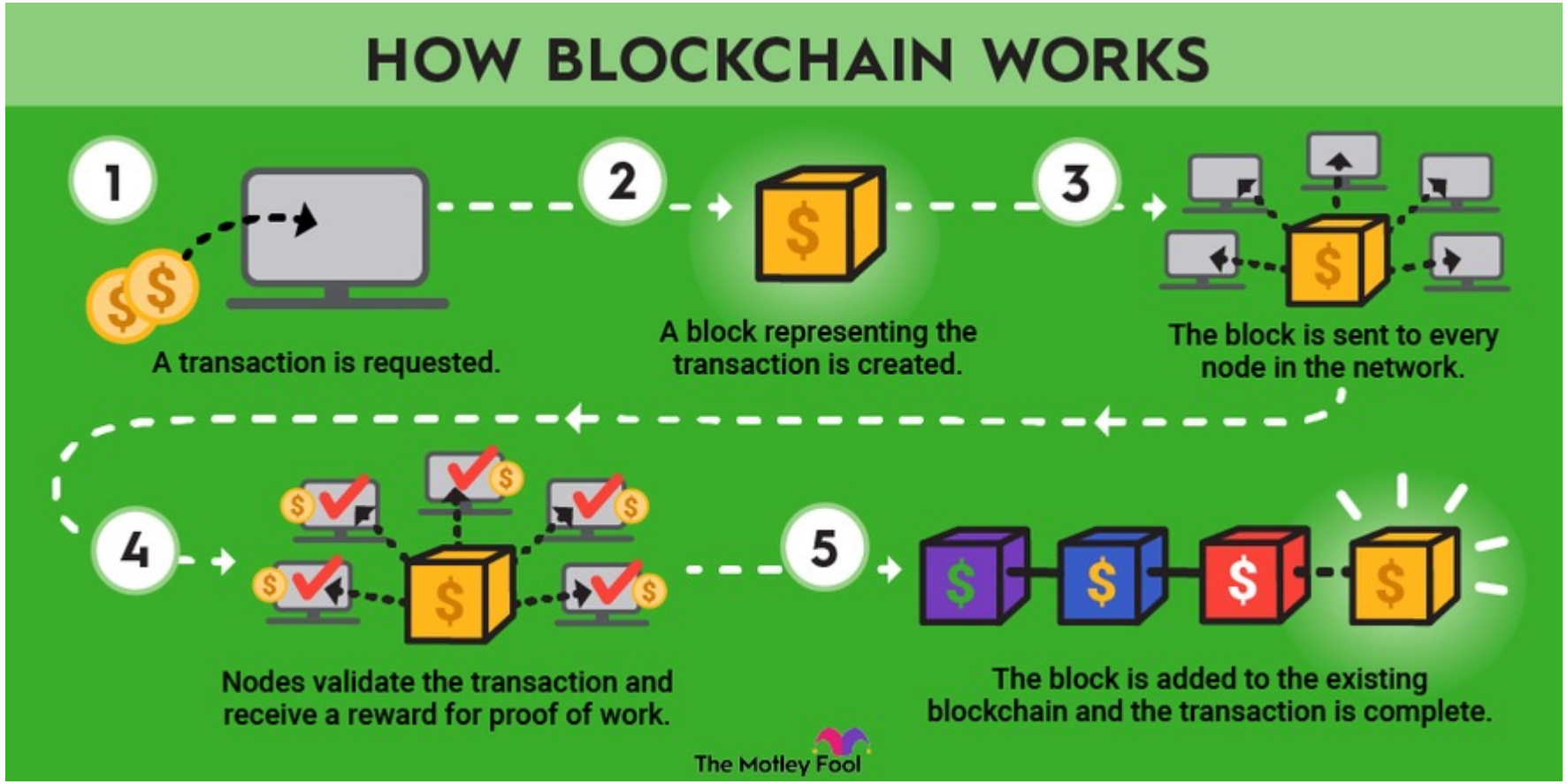
# Electronic cash - Bitcoin

- Example 1
  - Alice has one coin
  - Alice want to send that coin to Bob
  - $\text{Sign}_{\text{Alice's private key}}$ (Bob's public key)
- Bob want to send his new coin to Charlie
  - $\text{Sign}_{\text{Bob's private key}}$ (Charlie's public key)
- The problems with above protocol?
- Solution: chain all transactions together (blockchain)
- Sign(Previous transaction + public key of the next receiver)
- If transaction N-1 is valid, it can be used to check if transaction N is valid (no need to check from the beginning)

# Electronic cash - Bitcoin

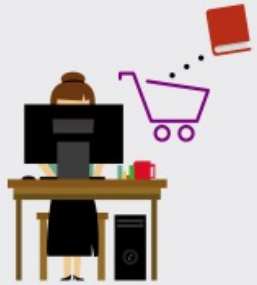


# Electronic cash - Bitcoin



# HOW THE BLOCKCHAIN WORKS

## The bitcoin illustration




**Anna buys a book online.**

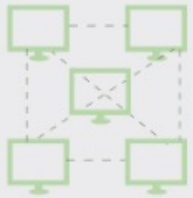
Her online book retailer accepts **bitcoin** and Anna already holds a bitcoin wallet.

The retailer sends Anna its bitcoin **address** (a chain of 26 to 35 characters).

Anyone can verify the transaction, with the public key.

Anna sends her payment to the address of her retailer. She signs the transaction with the private key of her own address, created for this given transaction, and adds her own public key to the transaction.

To ensure **privacy,** addresses are usually different for each transaction. An address is linked to a private key and a public key.



This is where the **miners come into play.** Miners are techy blockchain enthusiasts, located all around the world.

Transactions are recorded in **blocks.** The ledger is a chain of blocks. **Blockchain is the realisation of a public ledger.**

The blockchain, shared in real-time on the miners' computers, stores the record of all confirmed bitcoin transactions.

As a new block is created every 10 minutes, modifying a recorded block would require modifying all the following blocks, which is nearly impossible.

**A block contains the hashes of the previous and current blocks, and a 'nonce'** (a random number). All blocks are linked to one another. It can be viewed as a wax seal.

To store a transaction in the blockchain, miners' computers create cryptographic **hashes** (strings of letters and numbers).


A hash must look a certain way (starting with a number of zeros). **Miners must**

The successful miner is **rewarded** in bitcoins.

Anna's transaction is now complete and verified!

# Electronic wallet

- Customers: tire of repeatedly entering detailed shipping and payment information each time they make online purchases
- An electronic wallet: similar to a physical wallet, holds credit card numbers, electronic cash, owner identification, and owner contact information and provides that information at an electronic commerce site's checkout counter
- Electronic wallet benefit: customers entering their information just once

# Electronic wallet

- Electronic wallet implementation: server-side and client-side wallet
- Server-side electronic wallet
  - Stores customer's information on remote server of merchant or wallet publisher
  - No download time or installation on user's computer
  - Main weakness
    - Security breach can reveal thousands of users' personal information (credit card numbers)
    - Servers must employ strong security measures to minimize possibility of unauthorized disclosure

# Electronic wallet

- Client-side electronic wallet
  - Stores information on consumer's computer
  - Advantage
    - Sensitive information stored on user's computer
    - Attackers must launch many attacks on user computers (more difficult to identify)
    - Prevents easily identifiable wallet vendor's servers from attack
  - Disadvantages
    - Must download wallet software onto every computer
    - Not portable

# Electronic wallet

- Characteristics of useful wallets
  - Wallet accessibility: populate data fields in any merchant's forms for any site consumer visits
  - Electronic wallet manufacturer and merchants from many sites must coordinate efforts so that wallets can recognize consumer information going into each field of given merchant's forms
- Some popular wallet providers
  - Microsoft Windows Live ID
  - Momo
  - Grab moca

# Criminal activities

- Phishing

  Basic structure:

  - Attacker sends e-mail message to large number of recipients who may have accounts at targeted website
  - E-mail message tells recipient account is compromised and the recipient must log on to account to correct problem
  - E-mail message includes link that appears to be real website login page but actually points to attacker's website
  - Recipient enters login name, password
  - Attacker captures this information and uses to access recipient's account

# Criminal activities

- Phishing
  - Spear phishing: phishing attack that is carefully designed to target high-value victims and organizations
    - Requires considerable research
    - Increases chance of e-mail being opened
- Identity theft
  - Criminal act where perpetrator gathers victim's personal information
  - Uses information to obtain credit
  - Perpetrator runs up account charges and disappears

# Criminal activities

- Phishing attack countermeasures
  - Change protocol
    - Improve e-mail recipients' ability to identify message source
    - → Reduce phishing attack threat
  - Educate Web site users
  - Contract with consulting firms specializing in anti-phishing work
  - Monitor online chat rooms used by criminals

# Examples

- Scrip
- Electronic cash
- Payment card
- Electronic wallet

# Payment gateway in Vietnam

- Nganluong
- Baokim
- Momo
- Onepay
- Payoo
- 123Pay
- Smartlink
- VNPAY
- Senpay
- Zalopay
- Napas
- ...

# How t

## 2. Thanh toán bằng Tiki Xu

☐ Sử dụng 69.520 Xu (ứng với 69.520) để thanh toán.

Bạn có Phiếu quà tặng Tiki/Got It/Urbox muốn đổi thành Tiki Xu? Nhập tại đây

## 3. Chọn hình thức thanh toán

◉ Thanh toán tiền mặt khi nhận hàng

○ Thanh toán bằng thẻ quốc tế Visa, Master, JCB

○ Thẻ ATM nội địa/Internet Banking (Miễn phí thanh toán)

○ Thanh toán bằng ví MoMo - Chi tiết

○ ZaloPay Thanh toán bằng ZaloPay - Chi tiết

Nhập ZALOPAY15 giảm 15k cho đơn hàng từ 30k. Chỉ áp dụng tại TIKI APP

○ ưu đãi Thẻ quốc tế SCB giảm 100K cho đơn hàng từ 800K - Thứ 5 hằng tuần - Chú ý

Chưa đến thời gian tham gia chương trình hoặc số lượng đơn hàng ưu đãi đã hết!

○ ưu đãi Thẻ SeABank giảm 200.000đ cho đơn hàng từ 1.500.000đ - Thứ 5 hằng tuần - Chú ý

Chưa đến thời gian tham gia chương trình hoặc số lượng đơn hàng ưu đãi đã hết!

# Payment API

- https://developers.momo.vn/#/
- https://sandbox.vnpayment.vn/apis/docs/gioi-thieu/
- https://developer.baokim.vn/payment/