



Loan Syndication

*Tokenizing syndicated loans using smart contracts on the
ethereum blockchain*

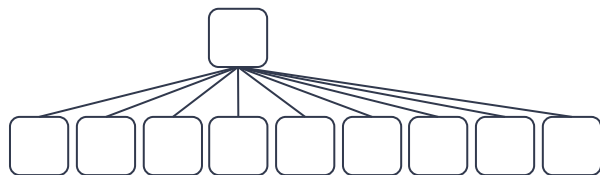
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Syndicated loan primer

Definition:

- Loan syndication: process of distributing a portion of a loan to a **group of lenders**;
- Usually when a **borrower requires an amount too large for a single lender**; or
- Outside risk appetite of a single lender



Market Statistics:

- ~\$2.1 trillion est. volume of corporate lending in North America (p.a)
- Estimate >\$10bn p.a. in fees to banks for underwriting, credit analysis, documentation

>\$10bn

Recent Transaction:

- In a recent government telecommunication auction **AT&T requested \$14bn in bank financing** 5G airwaves
- Assuming 50bps in transaction costs **AT&T may have paid \$70m in fees**





Syndicated loan roles

Borrower



Looking to borrow a large amount of money that any one bank would not be willing to provide given concentration and counterparty risk

Underwriter/ Lead Arranger

JPM

CITI

BofA

- Perform **borrower and market diligence**
- **Bid on pricing structure** of the loan
- **Large balance sheets**, able to absorb undersubscribed offering

Purchase tranches of the loan which mitigates the risk but still gives them exposure

Syndicate Participants

MUFG

MIZ

DB

BNP

SG

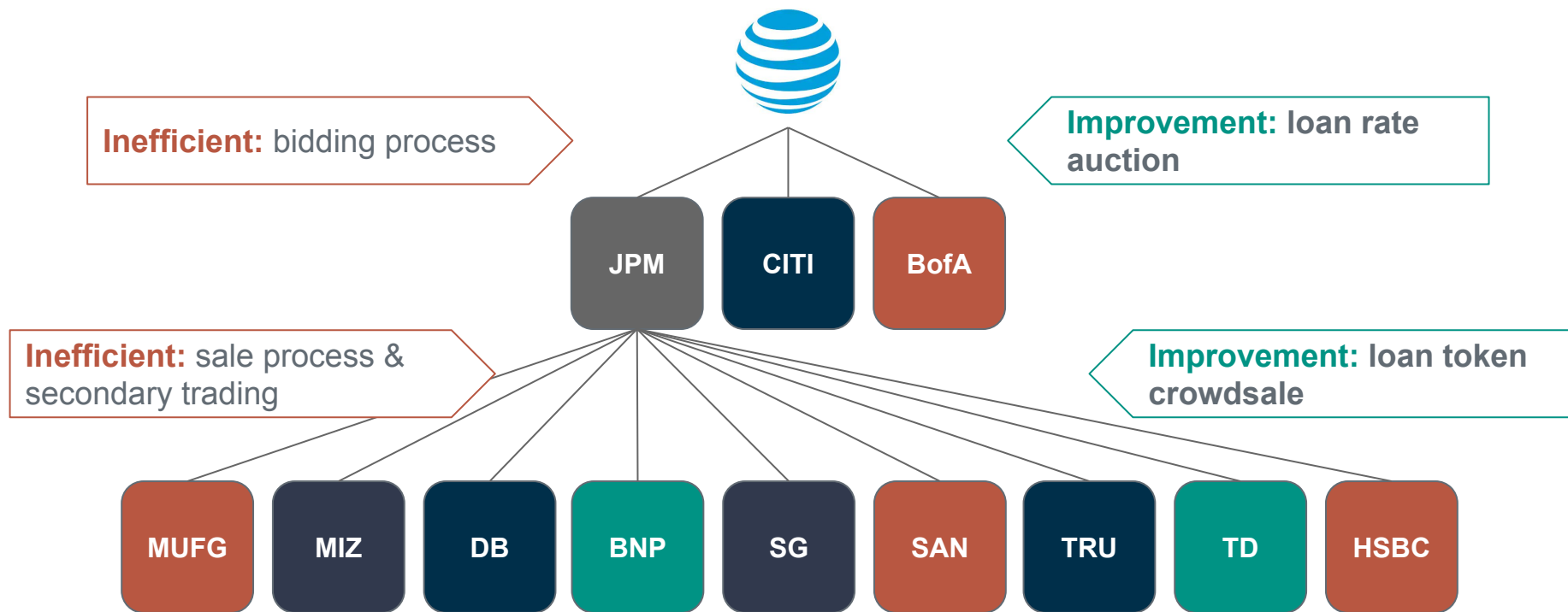
SAN

TRU

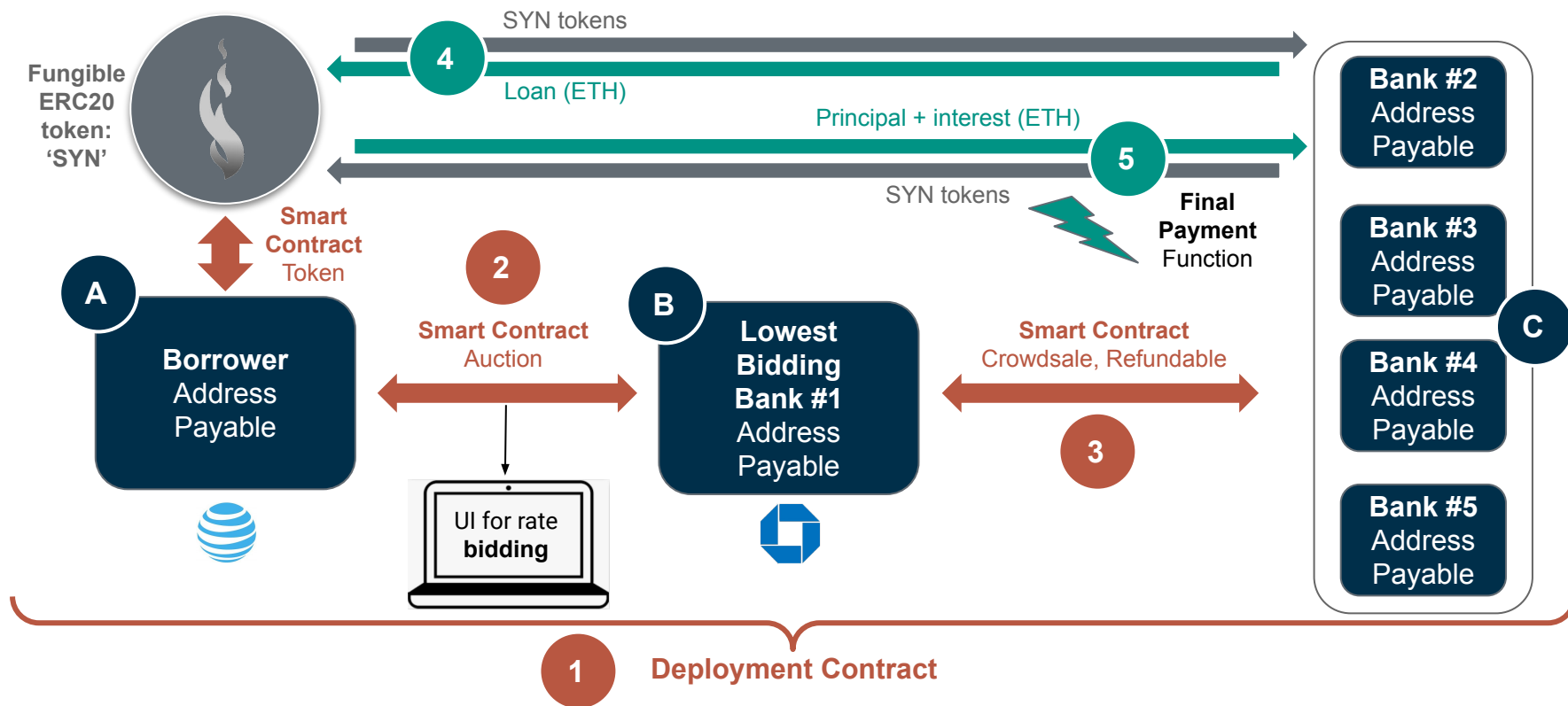
TD

HSBC

Identifying and reducing inefficiencies



Contract design





Code snippet: Auction

```
constructor(string memory name, string memory symbol, address payable wallet, uint goal, uint cap) public {  
  
    // Token creation  
    MyToken token = new MyToken(name, symbol, 0);  
    token_address = address(token);  
  
    // Auction Portion to determine interest rate, token ownership (transfer to bank)  
  
    borrower = msg.sender;  
  
    LoanAuction winner = new LoanAuction(wallet, goal, borrower);  
    auction_address = address(winner);  
  
    // Crowdsale portion  
    uint open = now;  
  
    // Set this to the desired duration of the crowdsale  
    uint close = now + 2 minutes;  
  
    // Set this to the desired duration of the loan contract  
    paytime = now + 365 days;  
  
    // Wallet should be address of bank  
    MyTokenSale my_token_sale = new MyTokenSale(1, wallet, token, symbol, goal, open, close, cap);  
    token_sale_address = address(my_token_sale);  
  
    // make the MyTokenSale contract a minter, then have the MyTokenSaleDeployer renounce its minter role  
    token.addMinter(token_sale_address);  
    token.renounceMinter();  
  
}
```

lowestBidder

0: address: 0x201c0d08E9717a821Ab0436
a2b0cD7Ee90fB3e4F

lowestRate

0: uint256: 150

Address of winning bidder, and winning bid (in bps)

Auction:

Determines the **interest rate** of the loan and which bank will be conducting the crowdsale of the tokens



Code snippet: Crowdsale

Crowdsale:

Source of funding for the loan from smaller banking institutions. They receive tokens that are exchangeable in future for principal and interest.

```
// Crowdsale portion
uint open = now;

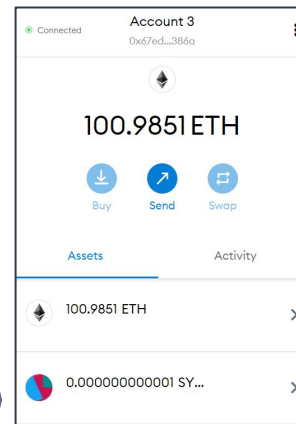
// Set this to the desired duration of the crowdsale
uint close = now + 2 minutes;

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paytime = now + 365 days;

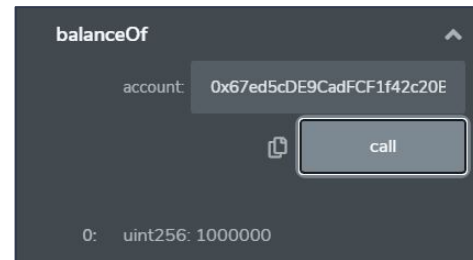
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token_sale_address = address(my_token_sale);

// make the MyTokenSale contract a minter, then have the MyTokenSaleDeployer renounce its minter role
token.addMinter(token_sale_address);
token.renounceMinter();

}
```



*Participant lender
account showing
SYN tokens bought*



*Borrower can check token balance of lender
accounts before verifying final payment*

- ### Loan Rate Auction (Lowest bid rate wins)

All bids must be in basis points (1% = 100bps)



For Borrowers: Register a New Loan

Borrower's Project...

Image:

Choose File

 No file chosen

Pinata API Key

Pinata Secret API Key

Note: Pinata requests are done locally via your browser. Your keys are not shared with any party except Pinata.

CREATE NEW LOAN

Caveat: the ice cream problem



- Contracts most closely mimic an **underwriting model** for a simple **term loan**
- This is **one 'flavor' amongst many** in the syndicated loan market
- Other syndicated loan types include:
 - Best efforts syndication, club deal, amend-to-extend, amend-and-upsize, reverse enquiry, self-arranged, ESG-linked etc
 - Bridge-to-bond, Revolving Credit Facility ('RCF'), Term Loan A, Term Loan B, Delayed Draw, Asset Backed Lending ('ABL'), Infrastructure or Project Financing ('Turnkey'), Private Placement, Schuldschein





Lessons learned, challenges, enhancements

- Solidity contracts do not allow for **time + uint variables** to be combined. Solidity does not support fractions - makes arithmetic operations / interest rate calculations difficult.
- Add "**selfdestruct**" function into Auction Contract to automatically return ether to lenders if loan parameters are not met, terminate contract, and clear contract's data. Beneficial gas consequences as opposed to using an "address.send(this.balance)" function.
- Build out **secondary market functionality** for exchange of fungible SYN tokens prior to expiration of loan to allow for additional trading opportunities among banks
- Solidity appears to lack native **periodic payment automation** nor does it have an **automatic termination** at the end of the loan (contracts can only execute when something/someone outside the blockchain calls them)
 - Drawback in the modelling of periodic interest payments (3 months, 6 months, etc) - makes it very difficult
 - Possibly a web3 / Python solution to automate this process



Q&A

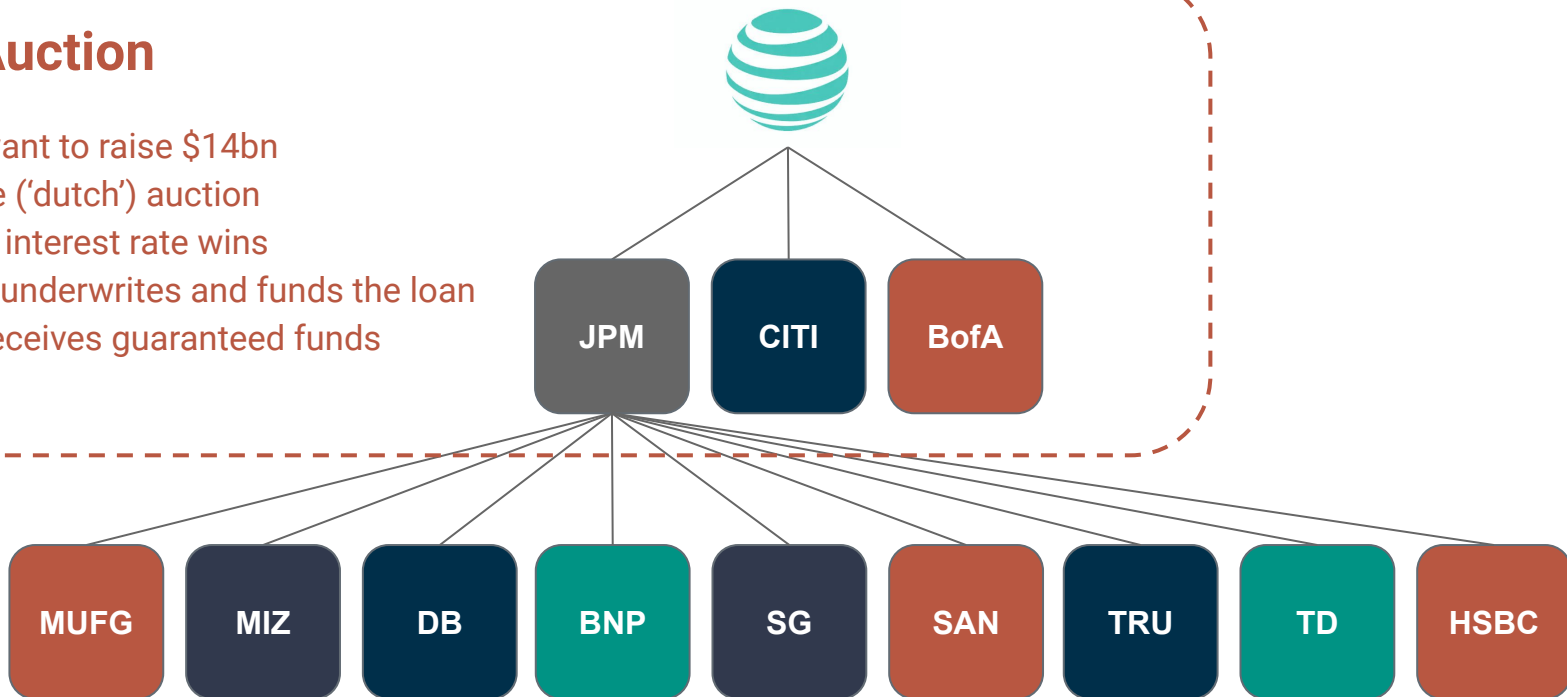


Appendix

Simplified contract specification

Step 1: Auction

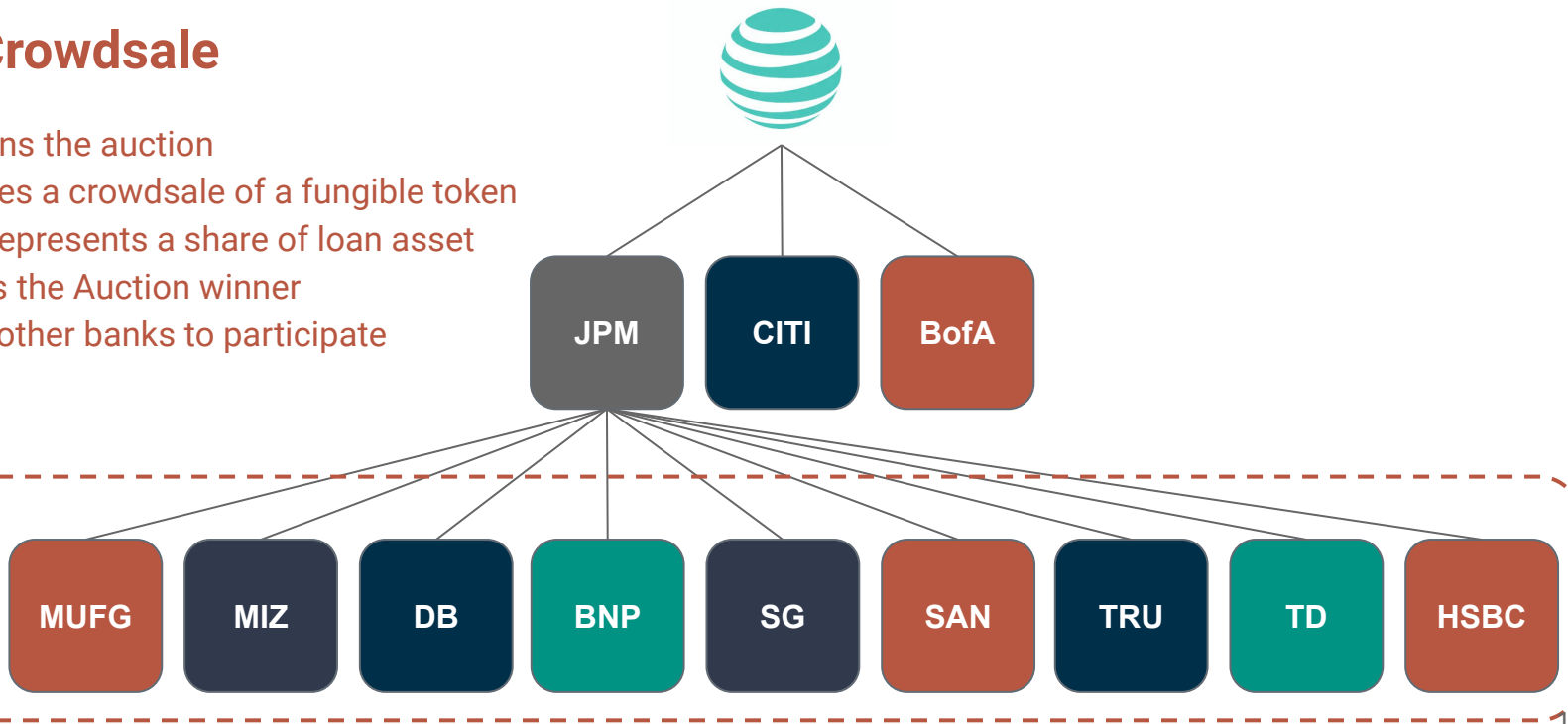
- AT&T want to raise \$14bn
- Reverse ('dutch') auction
- Lowest interest rate wins
- Winner underwrites and funds the loan
- AT&T receives guaranteed funds



Simplified contract specification

Step 2: Crowdsale

- JPM wins the auction
- Launches a crowdsale of a fungible token
- Token represents a share of loan asset
- De-risks the Auction winner
- Allows other banks to participate



Simplified contract specification

Step 3: pay interest and principal

- Interest and principal paid by AT&T
- Paid direct to participants at end of loan term
- Simplified model

