

HW4 Question 1

For the “Wallet” entity with the attributes “wallet_id”, “address”, “name”, and “name_tag”, the functional dependencies are: The attributes address, name, and name_tag are functionally dependent on the wallet_id. Each wallet should have a unique ID and the attributes are related to a specific wallet. The wallet_id attribute is functionally dependent on the address attribute because each wallet address should correspond to a unique wallet_id.

Applying 3NF normalization:

Wallet table:

wallet_id -> name, name_tag

address -> wallet_id

Result:

wallet_id_1, My Wallet, Personal, 0x1234(address)

wallet_id_2, Savings, Business, 0x5678(address)

For the “Prices” entity with the attributes “price_id”, “price”, “name”, and “value_date”. The functional dependencies are: The attributes price, name, and value_date are functionally dependent on the price_id. This means that each price record is identified uniquely by its price_id. The values of the price, name, and value_date are dependent on the price_id value. The attributes price and value_date are functionally dependent on the attribute name. This means that for a given name there is a unique combination of price and value_date.

Applying 3NF normalization:

Prices table:

price_id -> price, value_date

name -> price_id

Result:

price_id_1, \$100, 2023-04-22, Bitcoin

price_id_2, \$200, 2023-04-22, Ethereum

For the “Exchange” entity with the attributes “exchange_id”, “country”, “name”, and “date_created”. The attributes country, name, date_created are functionally dependent on exchange_id. This shows that for a given exchange_id, there is a unique combination of country, name, and date_created. This means that for each exchange record, there is a unique exchange_id that identifies them. The values of country, name, and date_created attributes for said record depends on the exchange_id.

Applying 3NF normalization:

Exchange table:

exchange_id -> country, name, date_created

Result:

exchange_id_1, USA, Binance, 2020-01-01

exchange_id_2, Japan, Coinbase, 2022-03-15