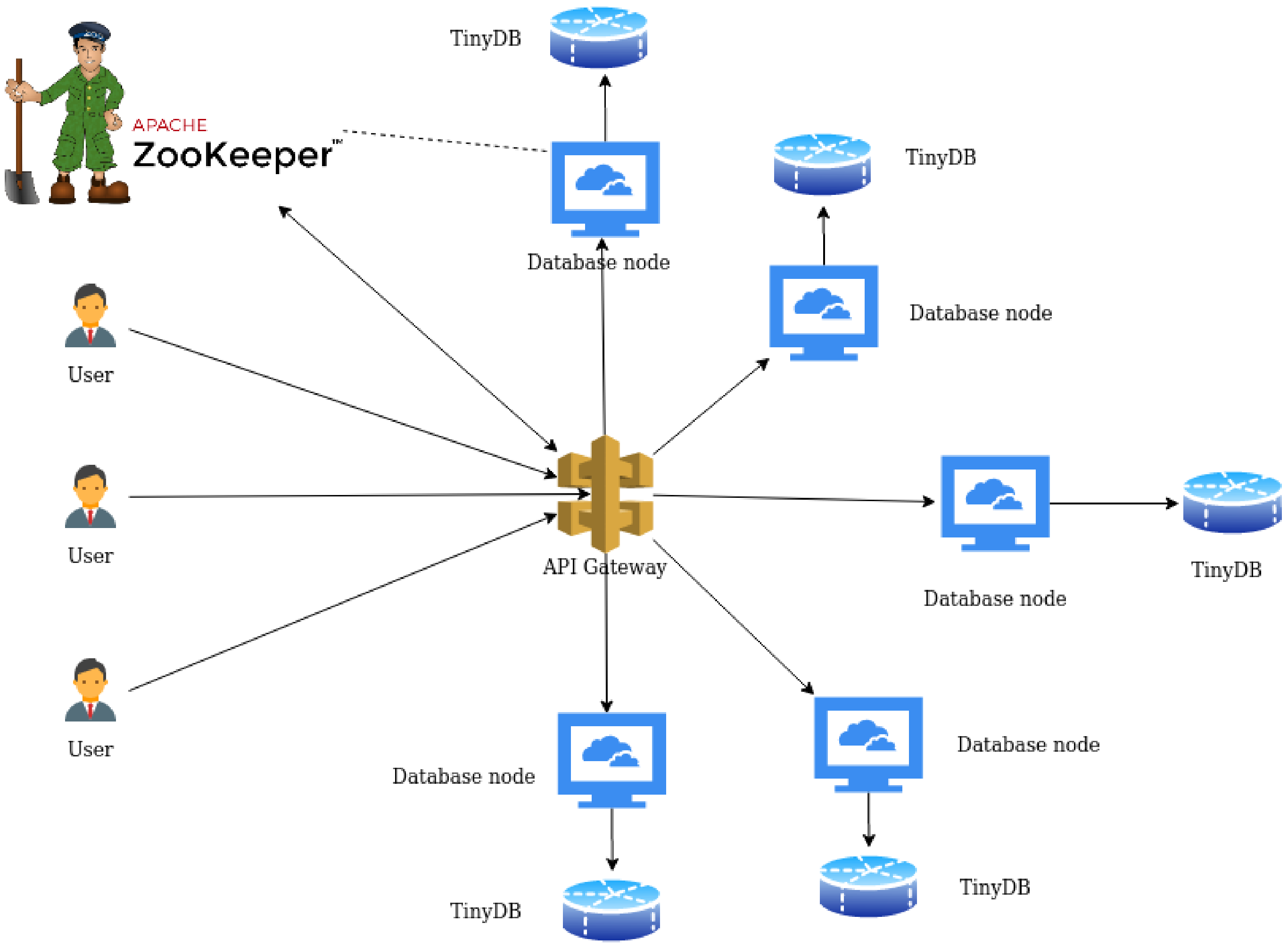
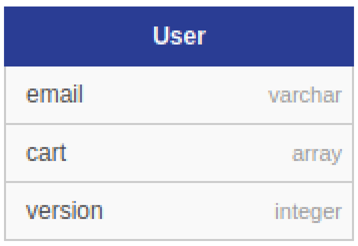
Shopping Cart API Assignment

Problem Statement Breakdown

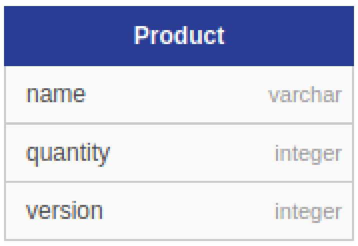
- Architecture



- Schema Design



User	
email	varchar
cart	array
version	integer



Product	
name	varchar
quantity	integer
version	integer

- Database nodes API design
    - Database used in each node - `TinyDB`.
    - Endpoints provided

        - `GET /productslist`
            - Returns the list of products present in that node
        - `GET /product`
            - Takes as query parameter, the name of the product, and returns its quantity and version
        - `POST /product`
            - Takes product's name, quantity and version as input, and updates the information in the database
        - `GET /userslist`
            - Returns the list of users present in that node
        - `GET /user`
            - Takes as query parameter, the email of the user, and returns its cart and version
        - `POST /user`
            - Takes user's email and version as input, and updates the information in the database
        - `POST /addtocart`
            - Takes user's email, cart and version as input, and updates the information in the database

- Database Node Architecture

    - Registers itself to zookeeper, with its IP and flask app port number as data
    - Starts the database API

- Gateway API design

    - Endpoints provided
        - `GET /productslist`
            - Calls `GET /productslist` for each database node registered in zookeeper, returns union of the lists.
        - `GET /product`
            - Takes as query parameter, the name of the product
            - Internally hashes it to an integer
            - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
            - Calls `GET /product` on each node found above
            - Checks if some data is stale `(version number != latest version)`
            - Performs read-repair if required, takes the `minimum of quantities of all latest versions` as the latest value
            - Returns the latest quantity and version back.
        - `POST /product`
            - Takes product's name and quantity as input
            - Internally hashes it to an integer
            - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
            - Calls `GET /product` on each node found above
            - Checks if some data is stale `(version number != latest version)`

    - Performs read-repair if required, takes the `minimum of quantities of all latest versions` + `the quantity present in the request` as the latest value
    - Calls `POST /product` on each node found from CRUSH hash function with the latest data
- `GET /userslist`
    - Calls `GET /userslist` for each database node registered in zookeeper, returns union of the lists.
- `GET /user`
    - Takes as query parameter, the email of the user
    - Internally hashes it to an integer
    - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
    - Calls `GET /user` on each node found above
    - Checks if some data is stale `(version number != latest version)`
    - Performs read-repair if required, takes the `maximum of quantities of each product in cart among all the latest versions`
    - Returns the latest cart and version back.
- `POST /user`
    - `GET /userslist`
    - Calls `GET /userslist` for each database node registered in zookeeper, returns union of the lists.
- `GET /user`
    - Takes as query parameter, the email of the user
    - Internally hashes it to an integer
    - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
    - Calls `GET /user` on each node found above
    - Checks if some data is stale `(version number != latest version)`
    - Performs read-repair if required, takes the `maximum of quantities of each product in cart among all the latest versions`
    - Returns the latest cart and version back.
- `POST /createuser`
    - Takes user's email as input
    - Internally hashes it to an integer
    - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
    - Calls `POST /createuser` on each node found from CRUSH hash function
- `POST /addtocart`
    - Takes user's email and products and quantities to be added (cart) as input
    - Internally hashes email to an integer
    - Finds the mapping of the value to the nodes from **CRUSH** hash function using read quorum of `(number of nodes + 1)/2`
    - Calls `GET /user` on each node found above
    - Checks if some data is stale `(version number != latest version)`

        - Performs read-repair if required, takes the `maximum of quantities of each product in cart among all the latest versions`
        - Calls `POST /addtocart` on each node found from CRUSH hash function with the latest data

Group Members

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Resources

- DB Schema plotter
- Flowchart maker - draw.io
- Containerization Books
    - Containerization with LXC
    - Practical LXC and LXD
- Eventually Consistent Key-Value Storage -Java
- Cassandra Arhitecture
- Python- Distributed Key Value Store
- Cassandra notes
- Netflix Dynomite