COV882

dApp in Ethereum for time locked pension fund

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1 Steps to run the dApp

1.1 Dashboard

To start our app, first we need to run ganache-cli in one of our terminal and then we can run our app using truffle. This is our main initial dashboard page, which we see when we run our app.

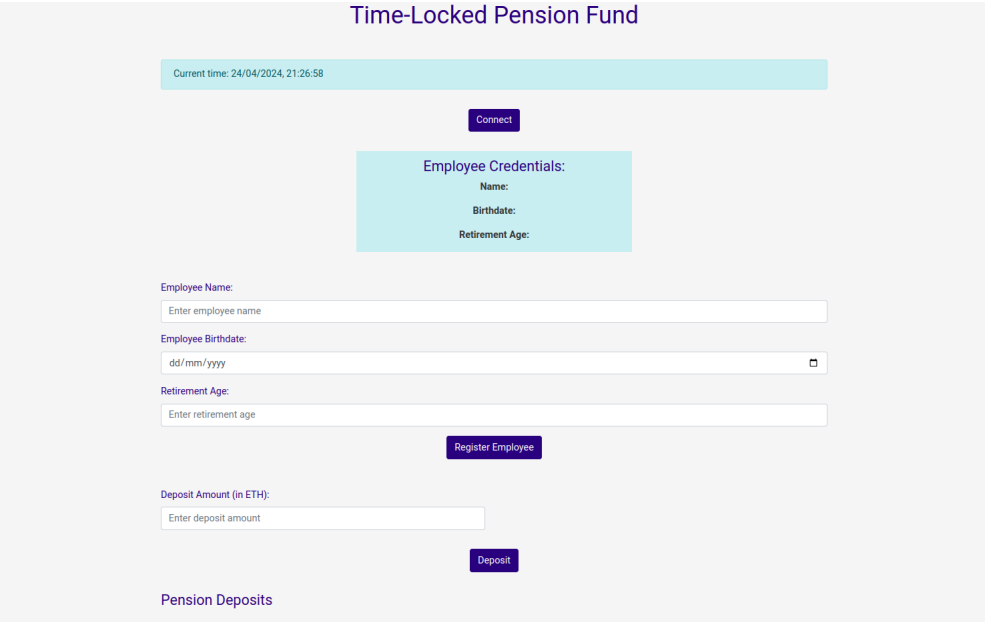

Figure 1: Empty Dashboard Page

Then, we need to add our account to Metamask extension on our browser by importing it using a private key from the ganache-cli. The steps are shown here.

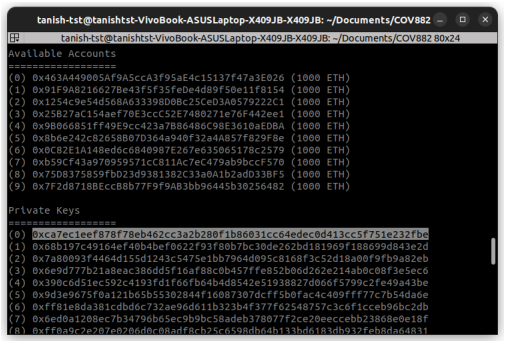

Figure 2: Copying private key from Ganache-cli

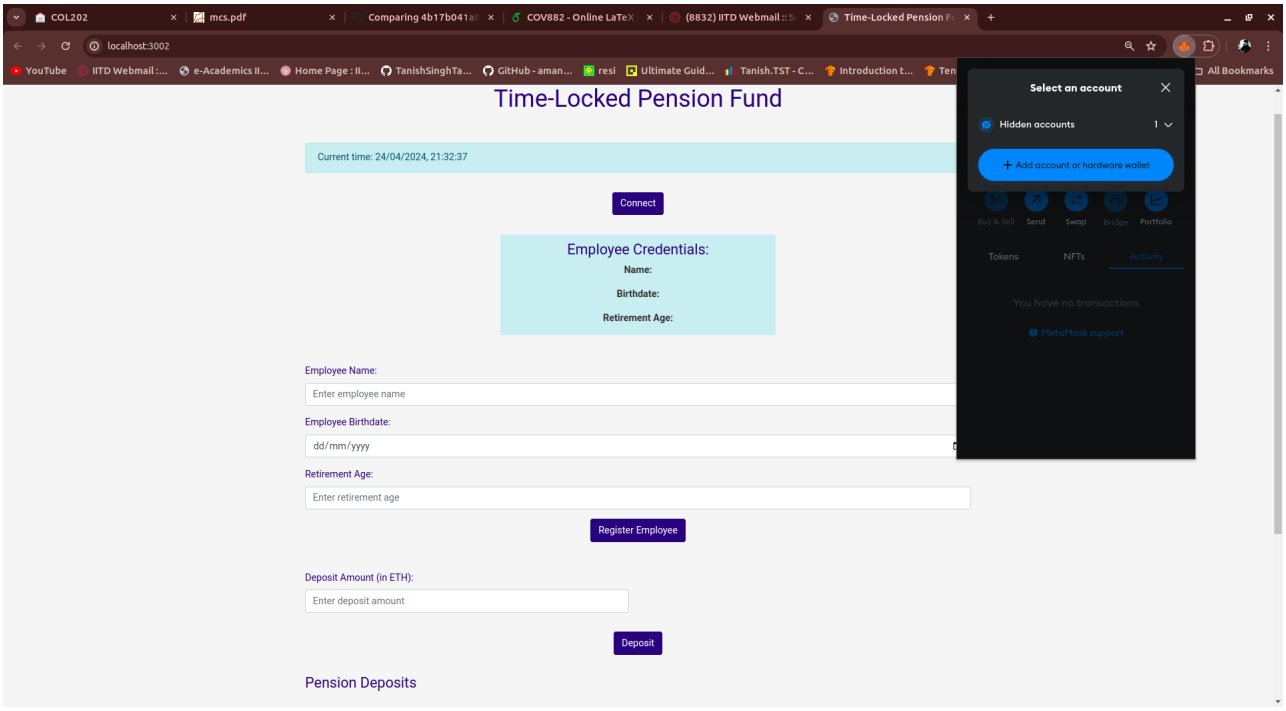

Figure 3: Add account to Metamask

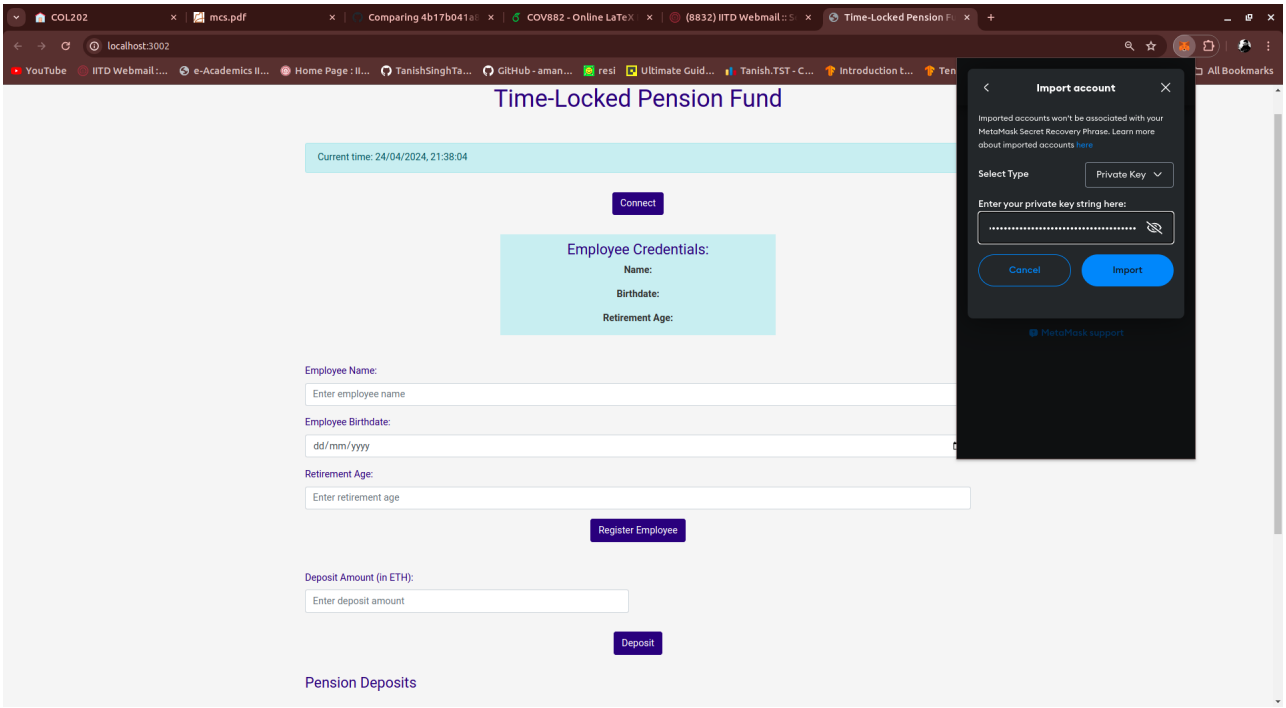

Figure 4: Paste private key taken from ganache-cli

After these steps, we can see the balance in our account in the metamask extension. Now we need to register our user through the website for that corresponding account. We can fill in the user details in the form given. But before that we need to connect the account with our dApp using the connect button at the top.

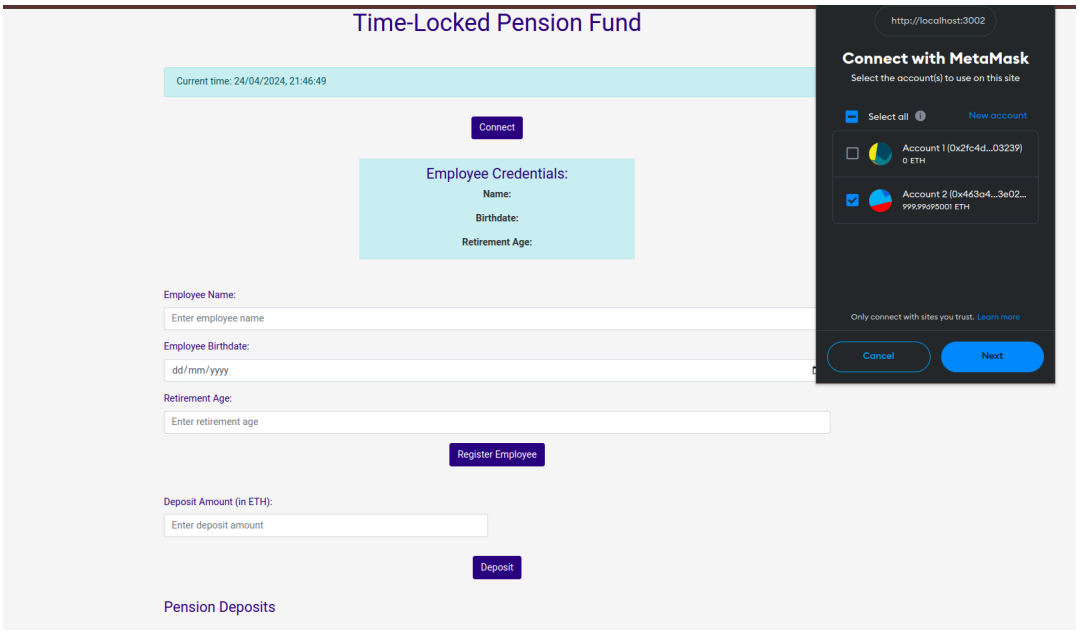

Figure 5: Choose the account with which you want to connect your user

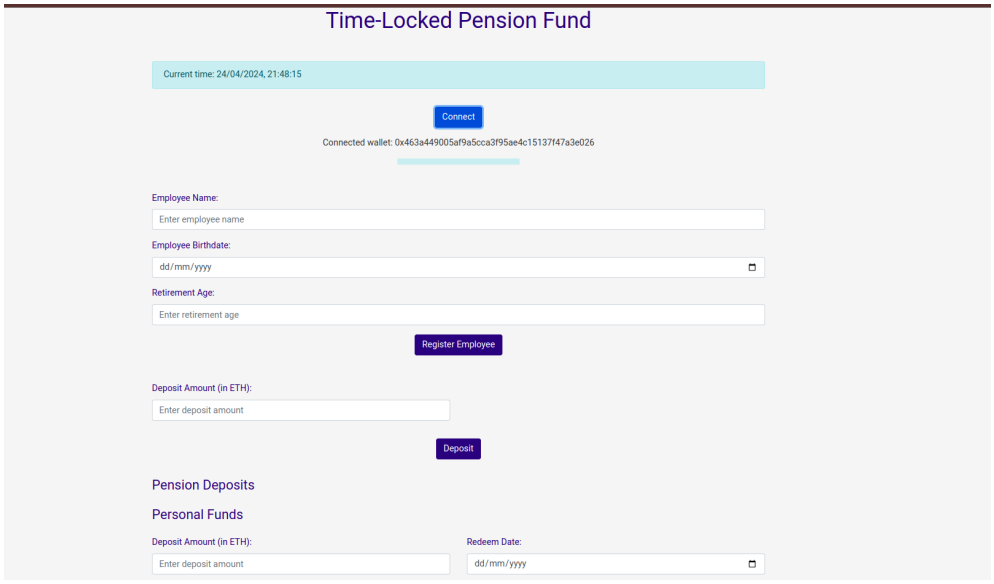

Figure 6: We can see our account whose private key we used to connect.

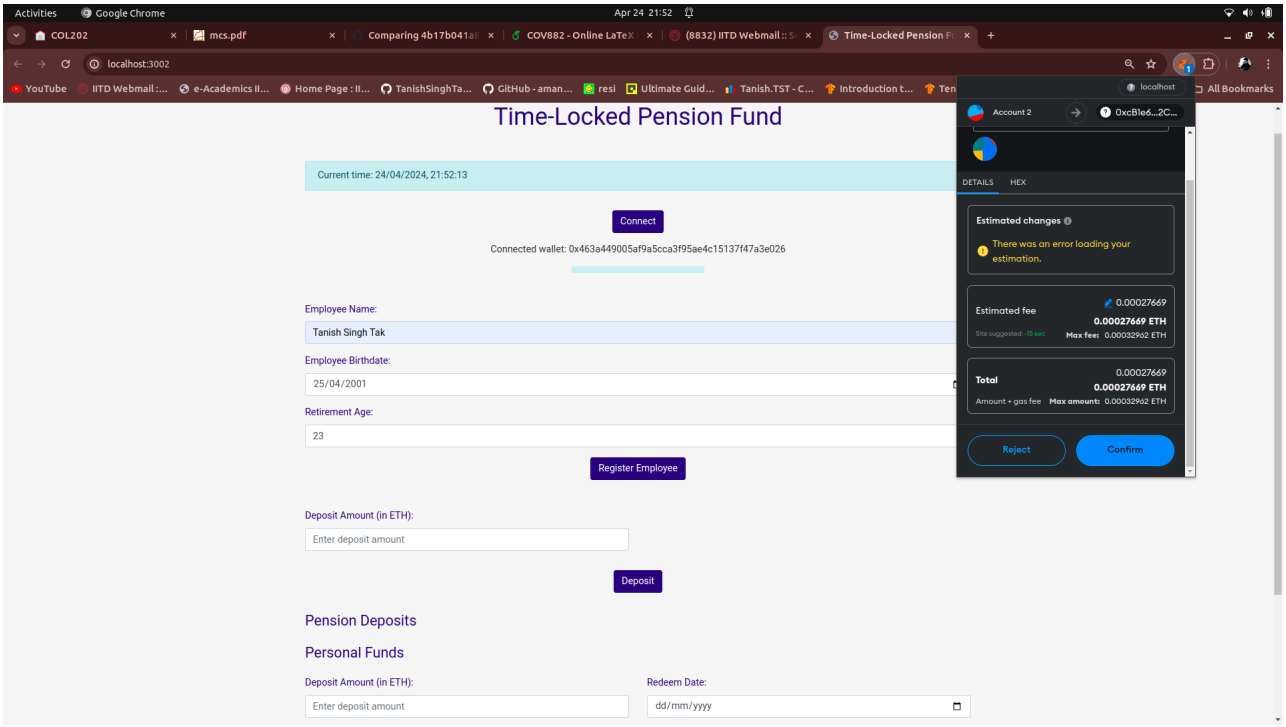

Figure 7: Fill in user details and the age in which we want to redeem our pension funds.

After completing the registration, we can see our employee details on the app.

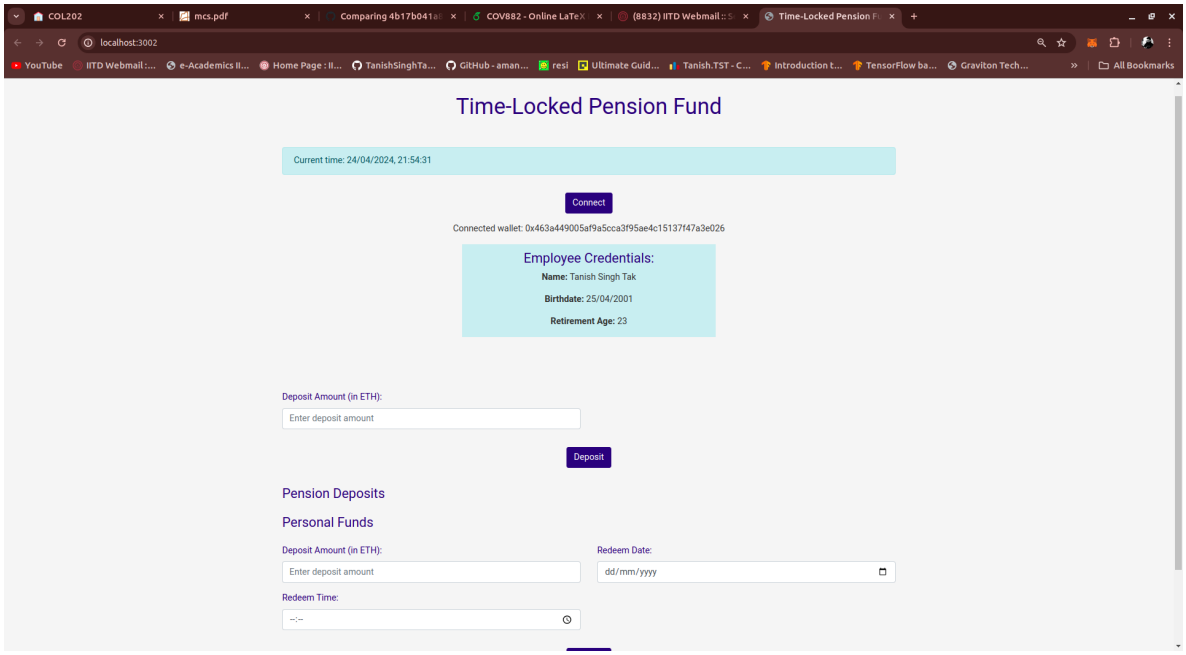

Figure 8: Employee registered successfully.

Now, we can make deposits to our pension fund, which can be redeemed only after the employee reaches the required date. For making a deposit, we can enter the amount in the Deposit amount field and click on deposit to open our Metamask extension, on which we need to confirm our transaction. After confirming the transaction, the filled-out amount will be deducted from our account, and that money will be locked out till the employee reaches the age to claim their pension fund. The steps are shown below:

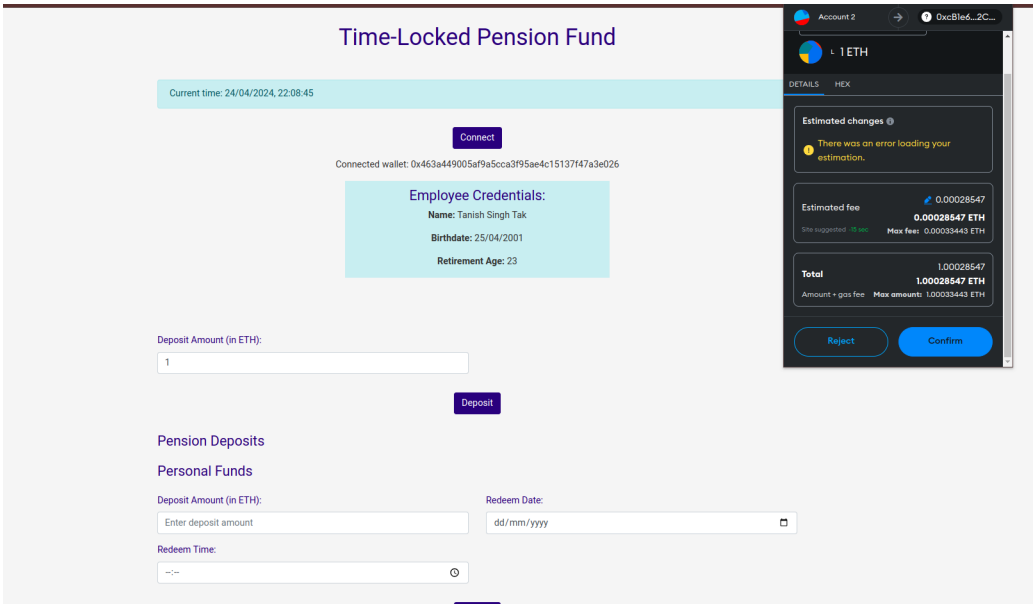

Figure 9: Enter the deposit amount and click on deposit to get the metamask window to confirm transaction.

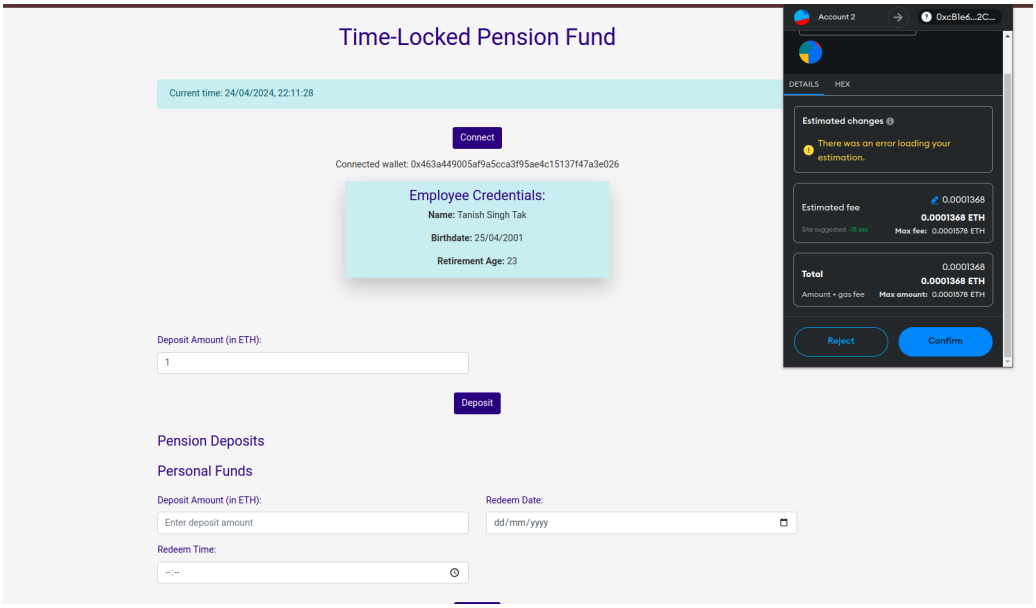

Figure 10: Confirm the lock on the transaction after confirming the transaction.

After locking our transaction, we can see our deposit in the Pension Deposits section, from where the employee can redeem their deposits at the end of their pension period. We can also see that the Deposit amount is deducted from the user account in the Metamask window.

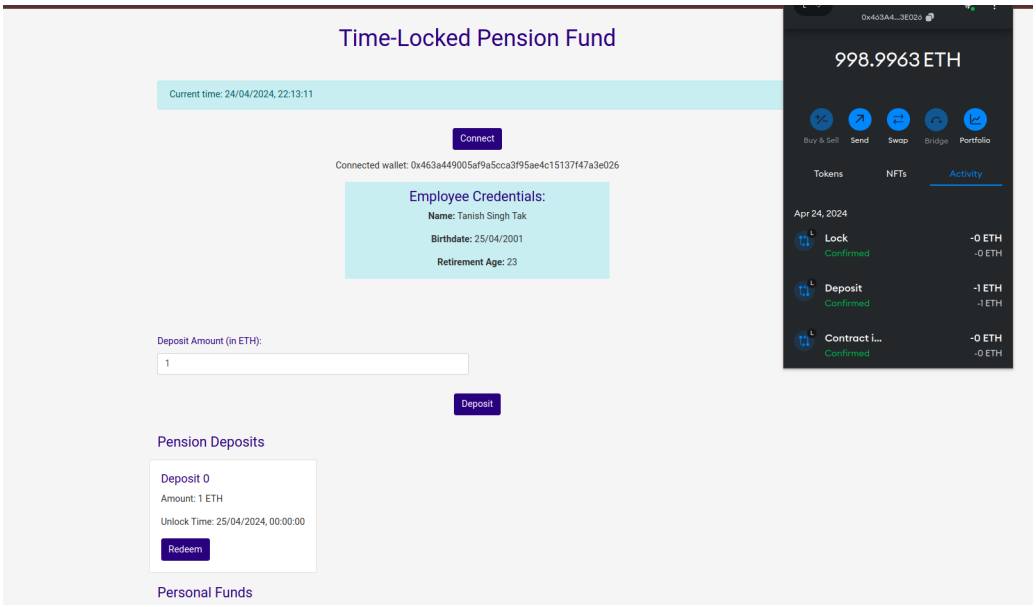

Figure 11: Transaction Complete

Now, to redeem your pension funds, we can redeem them directly from the Pension Deposits list on the app. If we try to redeem before the pension period is complete, we will get a warning like this:

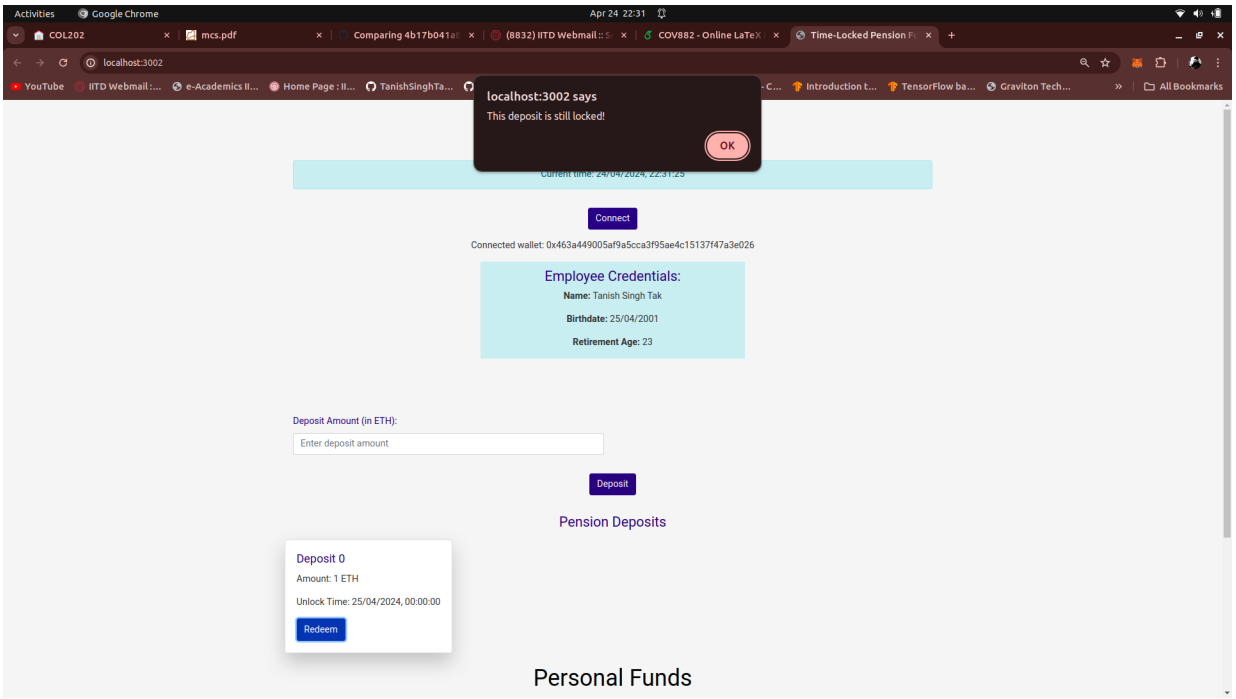

Figure 12: Warning shown if we try to redeem before pension period.

We have also created a personal fund option in which we can fill in our redeem date and time by our choice so that we can redeem our funds after the pension period is over. Now, to redeem, when we click on some pension fund, metamask extension will open to ask for confirmation.

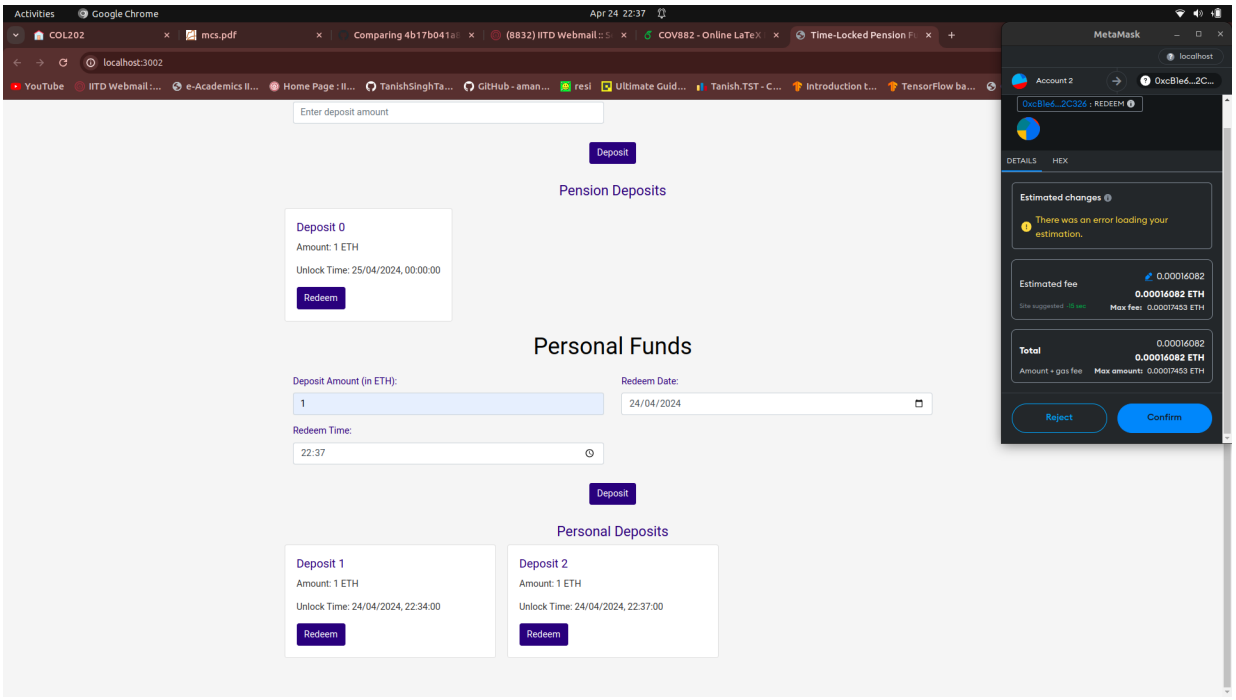

Figure 13: Confirm the redeem from the metamask extension.

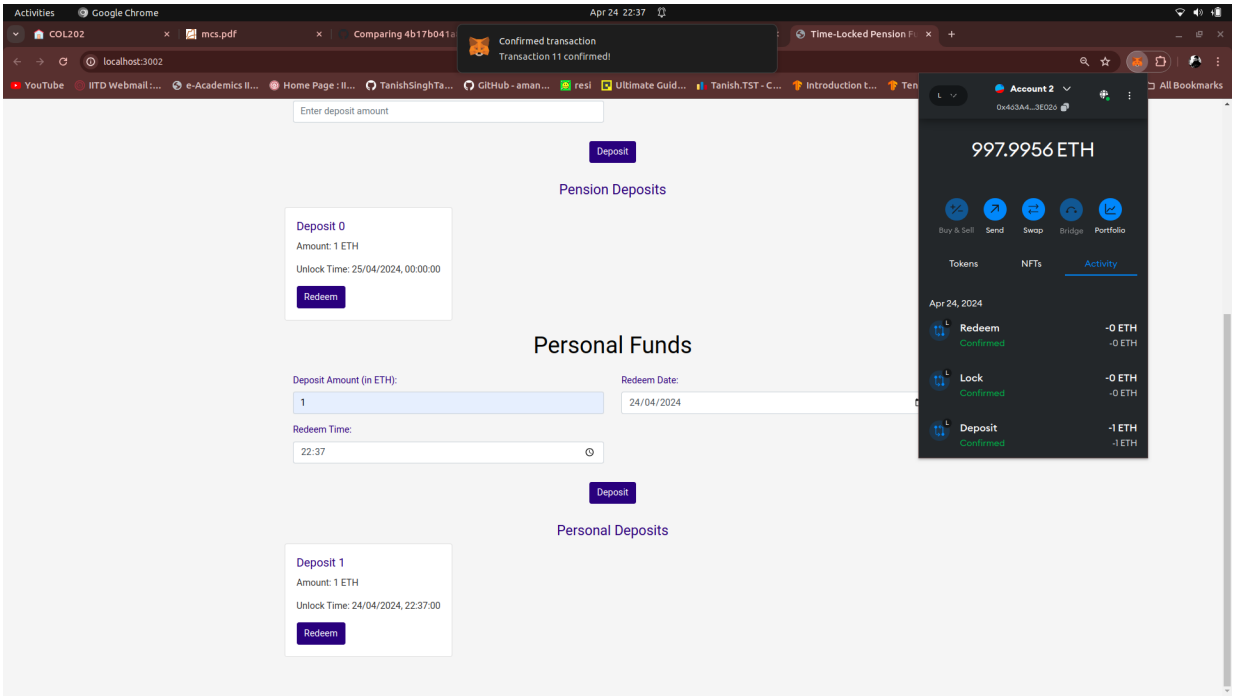

Figure 14: Pension fund redeemed back to employee's account successfully.

2 Design Decisions

- **Data Structures**: The contract uses mappings to store employee information and deposits. Mappings provide efficient key-value storage and retrieval, which is a good design choice for this use case.
- **Error Handling**: The contract uses require statements to validate input and revert transactions in case of errors. This is a good practice to prevent invalid state transitions and save gas costs.
- **User Interface**: We created a user interface for interacting with the contract. The UI design choices include:
  - Responsive design using Bootstrap and CSS.
  - Separation of concerns between HTML, CSS, and JavaScript
  - Integration with Web3.js library for interacting with Ethereum
- **Creation of personal funds**: We also created a section of personal funds where an employee can choose the pension redeem date and time according to themselves. This also helps us to confirm us that we can redeem our pension funds after the pension period is over.
- **Multiple Users**: We created the app so that we could link multiple users and run their pension funds.