Sebastian Follow
Apr 22 · 8 min read · · Listen

Save

Learn
Full Stack Ethereum Development
4 Connecting React Front-End App To Smart Contract

Learn Full-Stack Ethereum Development — Part 4

Connecting React Front-End App To Smart Contract

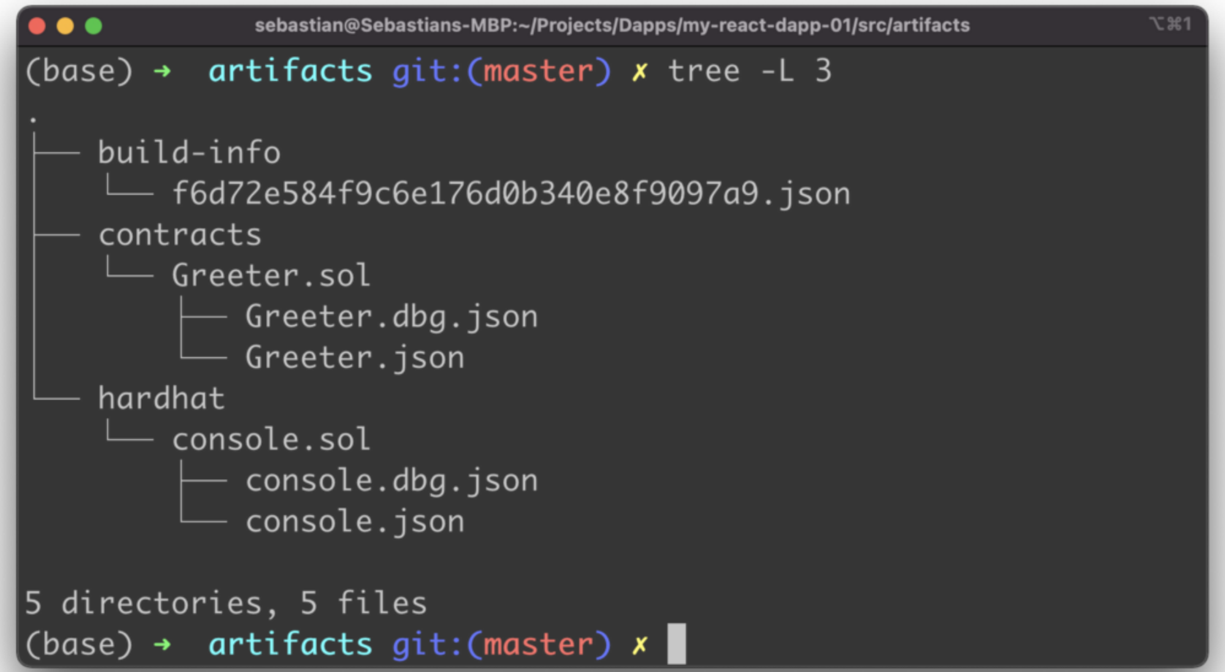
Welcome to the fourth part of the *Learn Full Stack Ethereum Development* series.

Step 1: Chang

First of all we need to make sure that the compiled smart contract is put into a folder within the *src* folder of the React project (e.g. *src/artifacts*). Therefore we're adding the *paths* configuration property to the *hardhat.config.js* file as you can see in the following code listing:

```
$ npx hardhat compile
```

The result should be available within folder *src/artifacts* like you can see in the following screenshot:



```
sebastian@Sebastians-MBP:~/Projects/Dapps/my-react-dapp-01/src/artifacts
(base) ➜  artifacts git:(master) ✗ tree -L 3
.
├── build-info
│   └── f6d72e584f9c6e176d0b340e8f9097a9.json
├── contracts
│   └── Greeter.sol
│       ├── Greeter.dbg.json
│       └── Greeter.json
└── hardhat
    └── console.sol
        ├── console.dbg.json
        └── console.json

5 directories, 5 files
(base) ➜  artifacts git:(master) ✗
```

The compile output is available in folder src/artifacts

This will now help us to access and import the Greeter ABI later in the React front-end application.

> *The* ***Contract Application Binary Interface*** *(ABI) is the standard way to interact with contracts in the Ethereum ecosystem, both from outside the blockchain and for contract-to-contract interaction.*

Step 2: Import Greeter Smart Contract In App Component

The next step is to change the default implementation of App component which is the

```
import {ethers} from ‘ethers’
import React, { useState } from ‘react’
import Greeter from ‘./artifacts/contracts/Greeter.sol/Greeter.json’
```

With those three import statements we’re making sure that the Ethers.js library is imported, the *useState* React Hook is made available and the Greeter Smart Contract ABI is imported as well.

Next we need to add a variable which holds the address of the smart contract on the blockchain:

```
const greeterAddress = “0x5FbDB2315678afecb367f032d93F642f64180aa3”
```

This address was part of the output you could see when having executed the deployment command for the Greeter smart contract.

Next we need a simple *App* component implementation in *App.js* which is the our starting point to add further implementation details.

```
function App() {
  const [greeting, setGreetingValue] = useState("")

  return (
    <div>
    </div>
  );
}

export default App;
```

Inside the *App* component function we’re making use of React’s useState Hook in order

Step 3: Implement fetchGreeting Function

Now it's time to add the first function to *App* component which is *fetchGreeting*. This function is used to retrieve the greeting message from the smart contract. In the following listing you can see the code:

```
async function fetchGreeting() {
  if (typeof window.ethereum !== 'undefined') {
    const provider = new ethers.providers.Web3Provider(window.ethereum)
    const contract = new ethers.Contract(greeterAddress, Greeter.abi,
provider)
    try {
      const data = await contract.greet()
      setGreetingValue(data)
      console.log('data: ', data)
    } catch (err) {
      console.log('Error: ', err)
    }
  }
}
```

First of all we need to check for *window.ethereum*. This is defined if MetaMask is installed in the browser. Next we're using Ethers.js to create a new instance of a *Web3Provider*. By using the provider object we're ready to retrieve a reference to the Greeter smart contract on the blockchain by creating a new *ethers.Contract* object.

On the *Contract* instance we can call the *greet()* function to retrieve the greeting message.

Step 4: Implement setGreeting Function

In order to provide a possibility to the user to set a new greeting message which is stored to the smart contract on the blockchain we do need a second function in *App* component: *setGreeting*. The following listing shows the code:

```
async function setGreeting(value) {
    const                                                               r.abi,
signer)
    const transaction = await contract.setGreeting(value)
    await transaction.wait()
    fetchGreeting()
  }
}
```

The new value to which the greeting message text which is stored in the smart contract should be set is passed in as an argument.

Again, we need to check if *window.ethereum* (MetaMask) is available, so that we're ready to interact with the smart contract by using Hardhat's test account which has been added to MetaMask client before.

Next we're using a function with name *requestAccount* (which is implemented later on) which helps us to retrieve the user account from the MetaMask client in the browser.

In order to call the method *setGreeting* on the *Greeter* smart contract to set our new greeting message text we first need to create a new *Web3Provider* instance. From there on we're able to retrieve the Signer by calling *provider.getSigner()*. This time a Signer is needed because we're using a method which is writing to the smart contract on the blockchain.

The reference to the *Greeter* smart contract is then created by setting up a new instance of *ethers.Contract* and passing three parameters to the constructor:

- The address of the smart contract on the blockchain which is available via *greeterAddress*.
- The Greeter smart contract ABI which is available via *Greeter.abi*.
- The signer which is available in variable *signer*.

We are then able to create the transaction for updating the greeting message text by and execute the transaction on the blockchain by calling

```
await transaction.wait()
```

Finally we're fetching the updated greeting message text again by calling function *fetchGreeting()*.

Step 5: Implement requestAccount Function

In the next step we need to add the missing implementation for the *requestAccount* function which we have used before. The implementation is simple and consists of the following lines of code:

```
async function requestAccount() {
  await window.ethereum.request({ method: 'eth_requestAccounts' })
}
```

Step 6: Implement the User Interface

Finally we need to implement the user interface of *App* component. In order to style our web application we'll use the library Tailwind CSS. Adding Tailwind CSS to your existing React project is very easy and is fully described in:

How To Use Tailwind CSS With React

Setting Up Tailwind CSS In Your React Project With Ease

medium.com

The complete user interface code which needs to be added in App.js is available in the

```
    <div                                                        ">
      <di
        React Ethereum Dapp
      </div>

      <div className=”w-full border-4 p-2 mb-4 rounded border-
gray-400">
        <div className=”text-gray-600 font-bold text-md mb-2">
          Fetch Greeting Message From Smart Contract
        </div>
        <div className=”flex ”>
          <button className=”bg-blue-500 hover:bg-blue-700 text-white
font-bold py-2 px-4 rounded” onClick={fetchGreeting}>Fetch
Greeting</button>
        </div>
      </div>

      <div className=”w-full border-4 p-2 mb-4 rounded border-
gray-400">
        <div className=”text-gray-600 font-bold text-md mb-2">
          Set Greeting Message On Smart Contract
        </div>
        <form
          className=”flex items-center justify-between”
          onSubmit={event=>handleSubmit(event)}
          >
          <input
            className=”shadow appearance-none border rounded py-2 px-3
text-gray-700 leading-tight focus:outline-none focus:shadow-outline”
            name=”greetingInput”/>
          <button className=”bg-red-500 hover:bg-blue-700 text-white
font-bold py-2 px-4 rounded”>Set Greeting</button>
        </form>
      </div>
      <div className=”w-full border-4 p-2 mb-4 rounded border-gray-400
bg-gray-100">
        <div className=”text-gray-600 font-bold text-md mb-2">
          Greeting Message
        </div>
        <p>
          {greeting}
        </p>
      </div>
    </div>
  </div>
  );
}
```

the followin

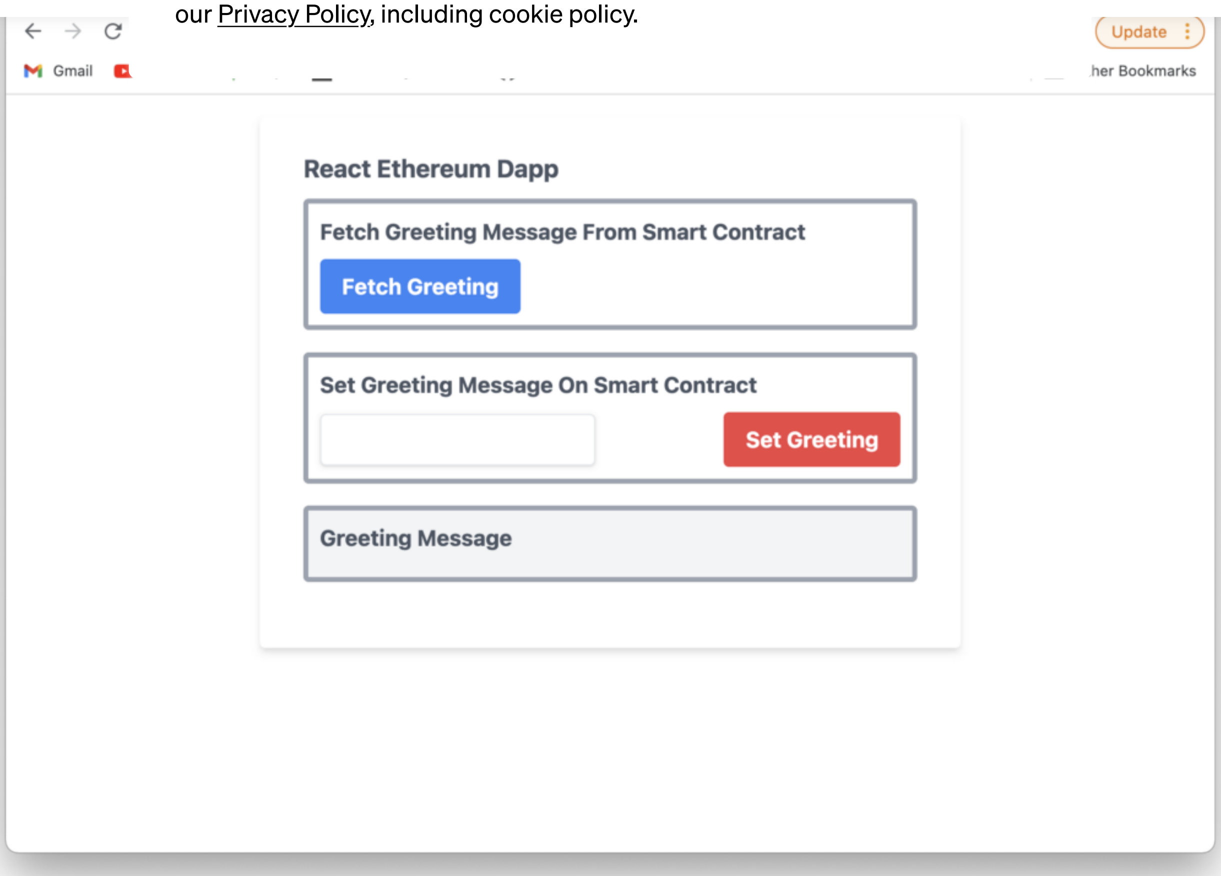
```
  async function handleSubmit(event) {
    event.preventDefault()
    await setGreeting(event.target.greetingInput.value)
  setGreetingValue(event.target.greetingInput.value)
    event.target.greetingInput.value = “”
  }
```

The *handleSubmit* function is called when the user submits the form (which consist of one text input field) by hitting button “Set Greeting”. The code within *handleSubmit* then takes care of preventing the default HTML form submit behavior (*event.preventDefault()*), calling *setGreeting*, updating the greeting component state and clearing the text input field.

Again, in the following listing you can find the complete implementation of *App* component in *App.js*:

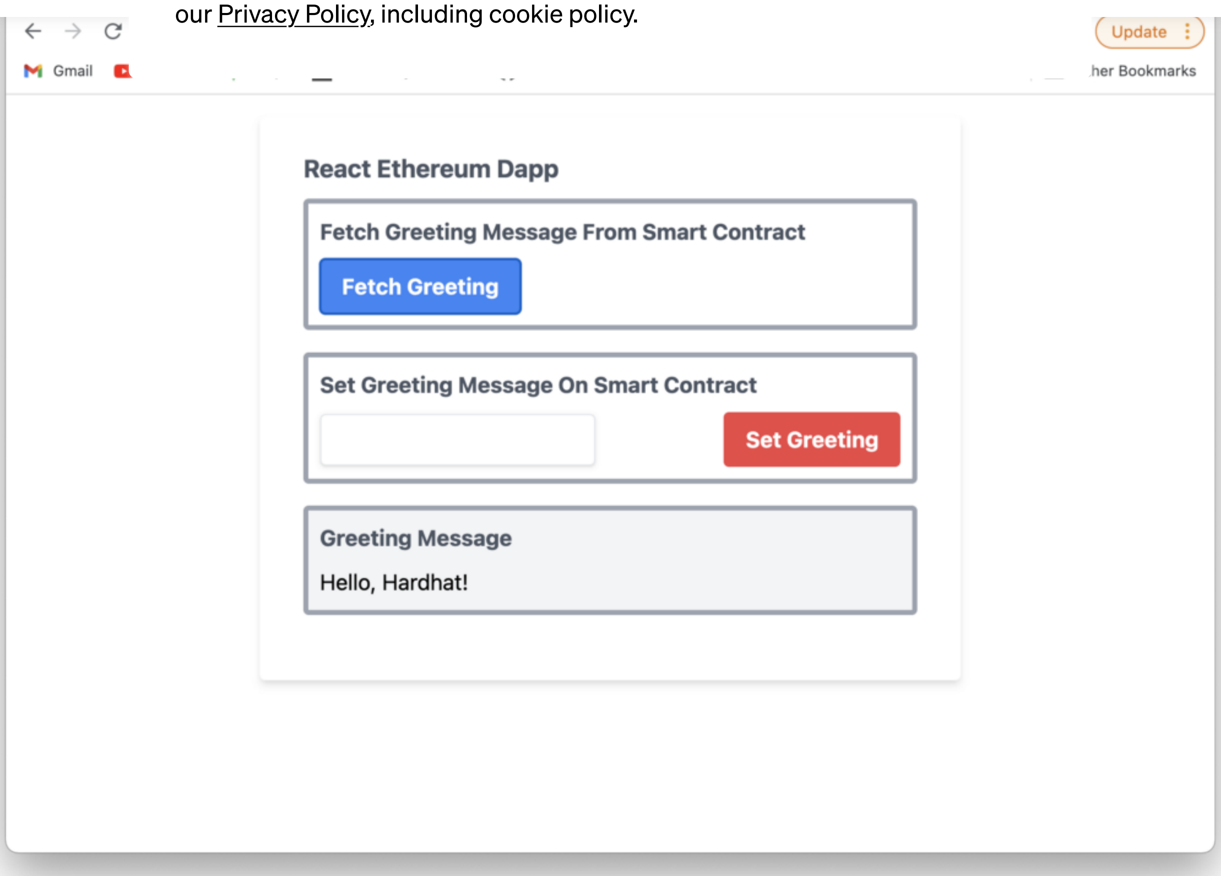
Step 7: Test The Application

Now it’s time to test the final React application. When opening the application in the browser you should be able to see the following:



The web-based React user interface enables us to interact with the smart contract

First, let's click on the Fetch Greeting button to retrieve the greeting message text from the smart contract on the local blockchain. The text is displayed in the *Greeting Message* section:



React Ethereum Dapp

Fetch Greeting Message From Smart Contract

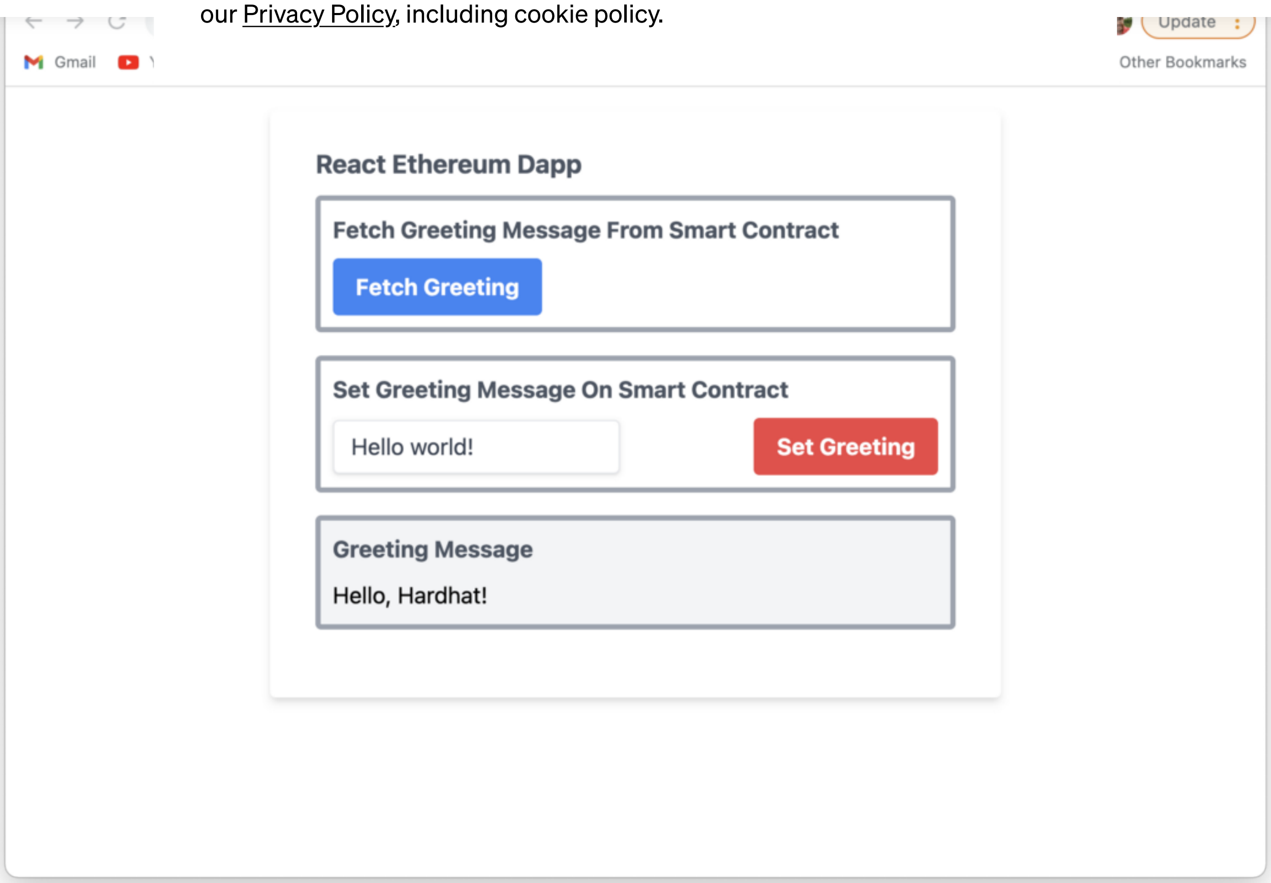
Set Greeting Message On Smart Contract

Greeting Message

Hello, Hardhat!

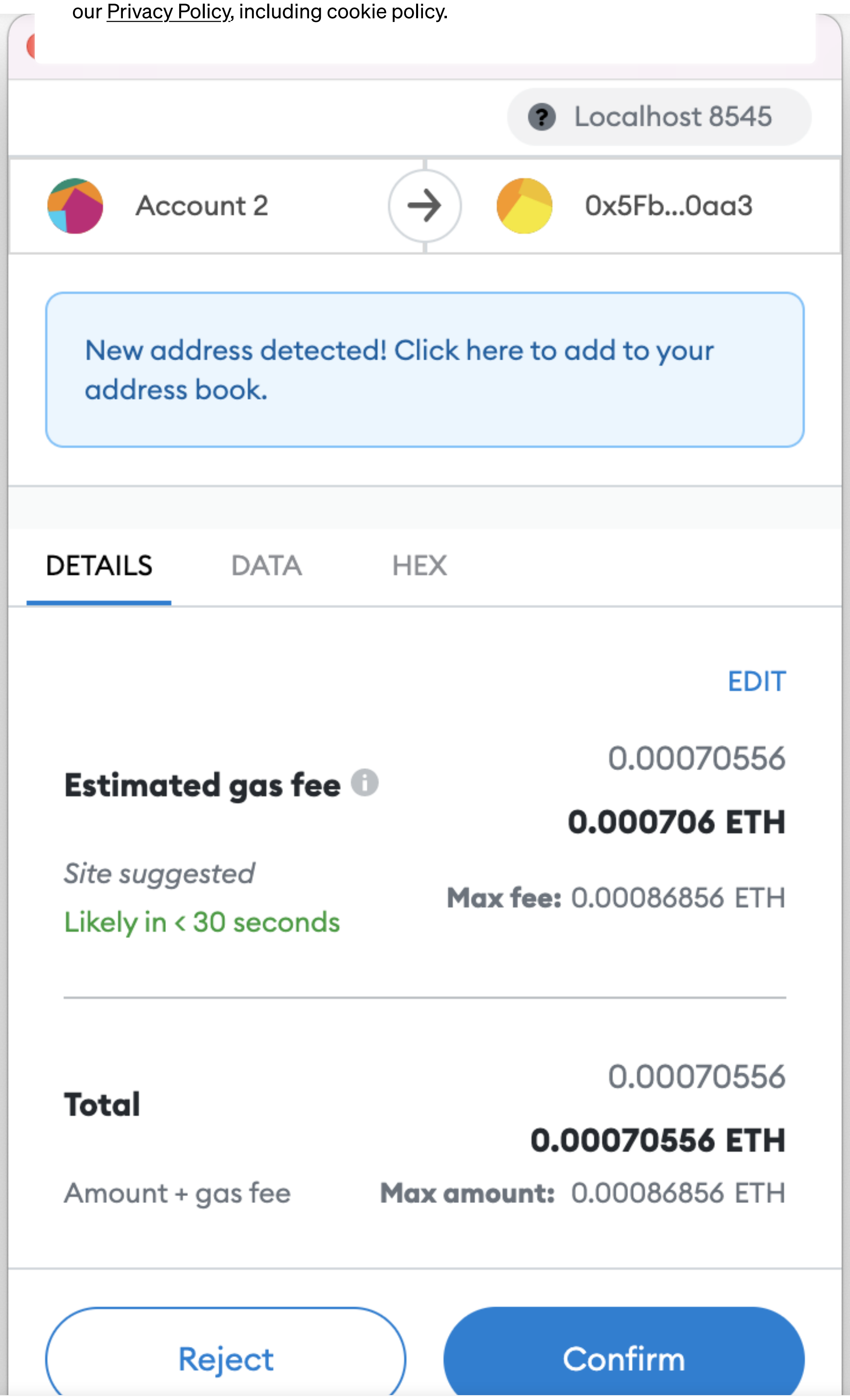
The message greeting text is displayed after clicking on button "Fetch Greeting"

By default the greeting message which is retrieved from the smart contract is "Hello, Hardhat!". In the second step we're now ready to set the greeting message text to a new value. Therefore the text input field is used:



Set a new greeting message by using the web user interface of the React-based Dapp

After having entered the new greeting message text click on button “Set Greeting”. Now you’ll see the MetaMask windows showing up and providing details of the transaction costs:



New address detected! Click here to add to your address book.

Estimated gas fee 0.00070556

0.000706 ETH

Site suggested

Likely in < 30 seconds

Max fee: 0.00086856 ETH

Total 0.00070556

0.00070556 ETH

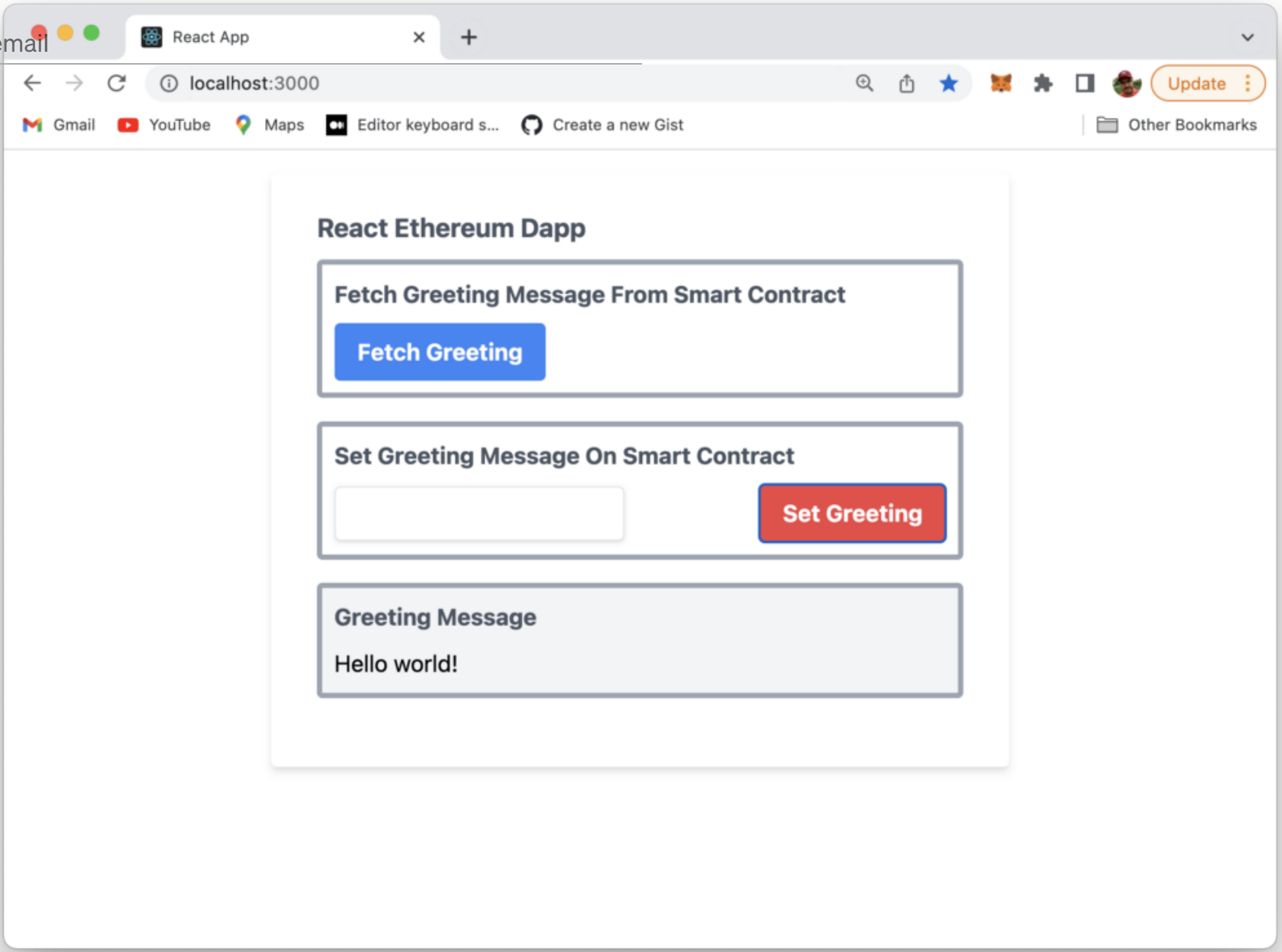
Amount + gas fee

Max amount: 0.00086856 ETH

In order to update the greeting message text which is stored on the blockchain you need to confirm the transaction by clicking on the *Confirm* button.

> *Remember, here we're dealing with one of the test accounts which is provided by Hardhat and has initial value of 10000 ETH, so you do not need to worry about the costs of the transaction.*

If the transaction is finished successfully you will be able to see the new message in the output area as well.



React Ethereum Dapp

Fetch Greeting Message From Smart Contract

Fetch Greeting

Set Greeting Message On Smart Contract

Set Greeting

Greeting Message

Hello world!

New greeting message has been update on the blockchain

blockchain a ith our smart contract.

In the next part of this tutorial series you'll learn how we can make use of one of Ethereum' live test networks instead of the local blockchain which is provided by Hardhat. We'll updat our deployment procedure accordingly and deploy the Greeter smart contract to the blockchain running on the test network.

Top Course Recommendation:
Ethereum and Solidity: The Complete Developer's Guide*
Use Ethereum, Solidity, and Smart Contracts to build production-ready apps based on the blockchain
Go To Course ...*

** Affiliate Link / Advertisement: This blog post contains affiliate links, which means that if you cli on one of the product links and buy a product, we'll receive a small commission. There are no additional costs for you. Thank you for the support!*