Bhartiya Vidya Bhavan's
Sardar Patel Institute of Technology, Mumbai-400058
Department of Computer Science and Engineering
OEIT1:Blockchain Technology and Applications

Lab5A: Ethereum Blockchain and DApp
Building an auction DApp (Do It Yourself)

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Branch: COMPS B

Objective: Building an auction DApp
Outcomes: After successful completion of lab students should be able to
Implement an Ethereum private blockchain and an auction DApp
Write a smart contract using Solidity Language
Compile and run the DApp on Ethereum Blockchain
Use Web3/REST API

System Requirements:
PC (C2D, 8GB RAM, 100GB HDD space and NIC),Ubuntu Linux 14.04/20.04
Internet connectivity,Python Cryptography and Pycrypto,Nodejs, Truffle,Ganache-cli
, solidity,REST API

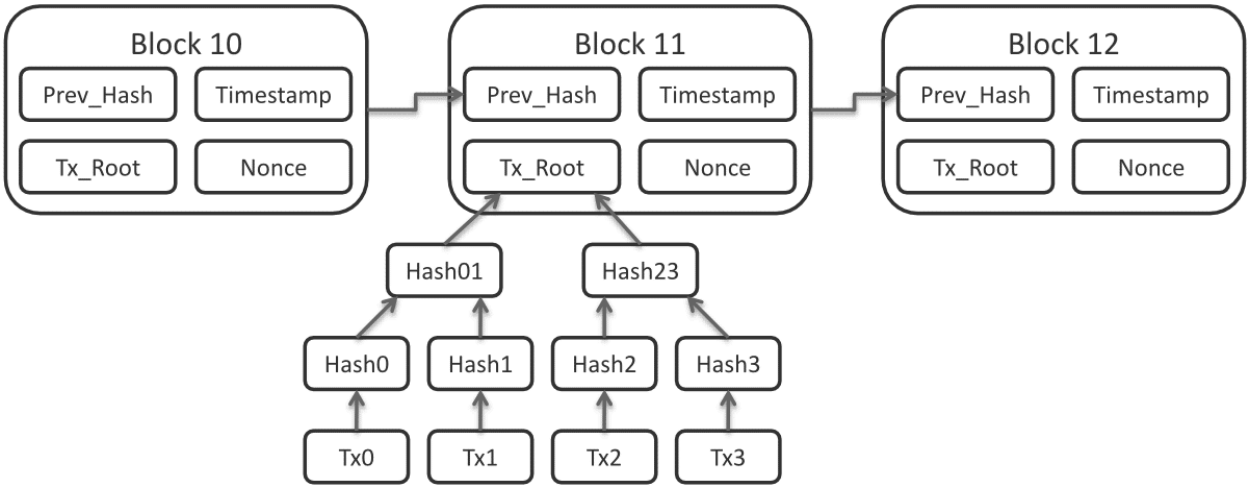


Figure-1: Blockchain Implementation

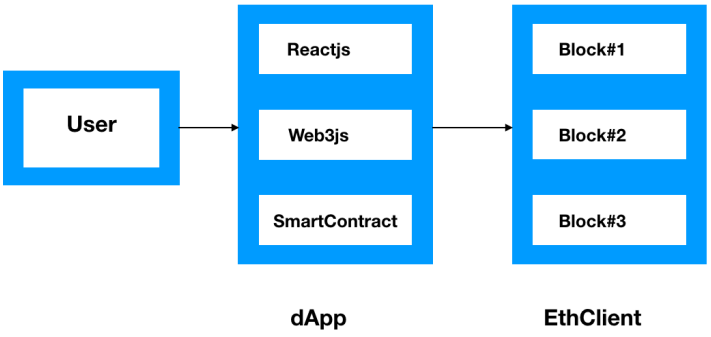


Figure-2: Ethereum and DApp

Procedure:

Stage-0: **Create an Ethereum Dapp with React and Docker by Shubham Chadokar**

Read this article carefully.

https://medium.com/hackernoon/create-an-ethereum-dapp-with-react-and-docker-211223005f17

Step-1: Install docker and docker-compose

$sudo apt-get install docker.io docker-compose

Step-2: Check for docker images

$sudo docker images

Step-3: Check for running container

$sudo docker ps

Step-4: Clone the project using this GitHub link

$mkdir lab5a

$git clone https://github.com/schadokar/docker-ethereum.git

Step-5: Build the DApp project

$sudo docker-compose build

Follow the instructions as per the article.

Take screenshots and complete it.

Stage-1:

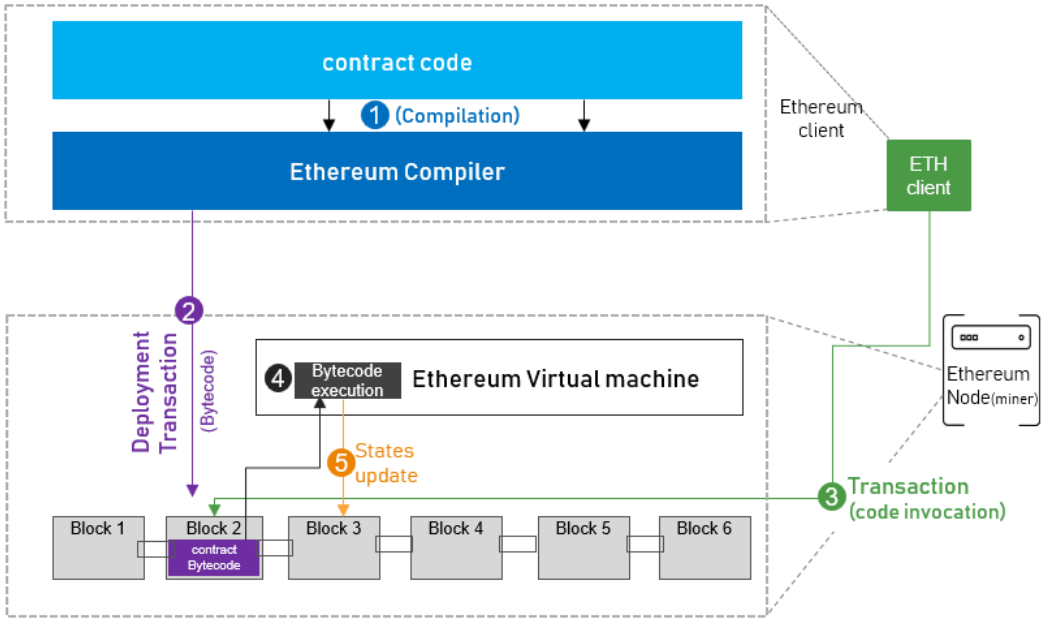


Figure-3: Ethereum virtual machine and smart contracts

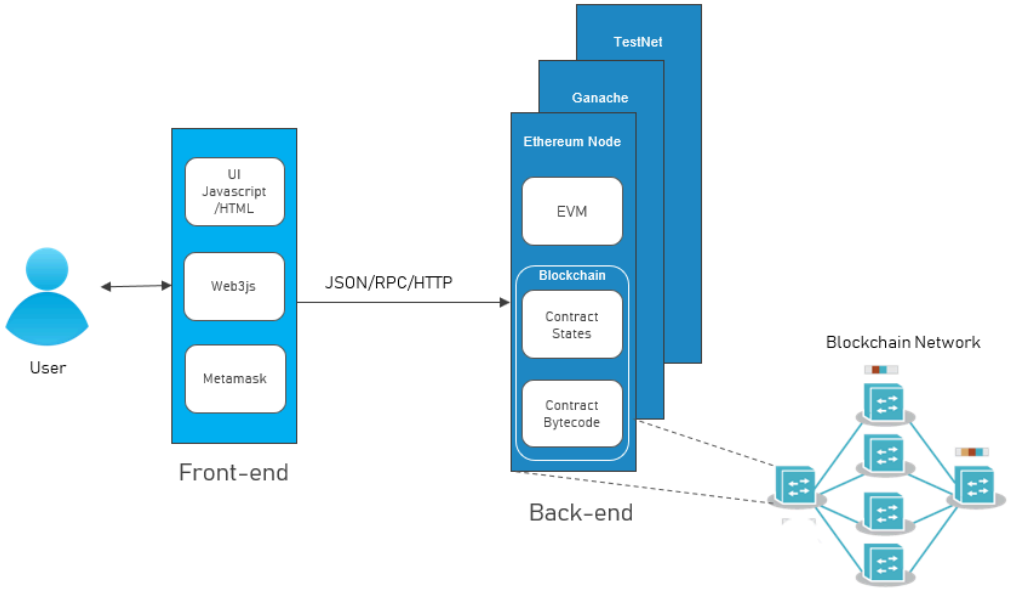


Figure-4: DApp architecture

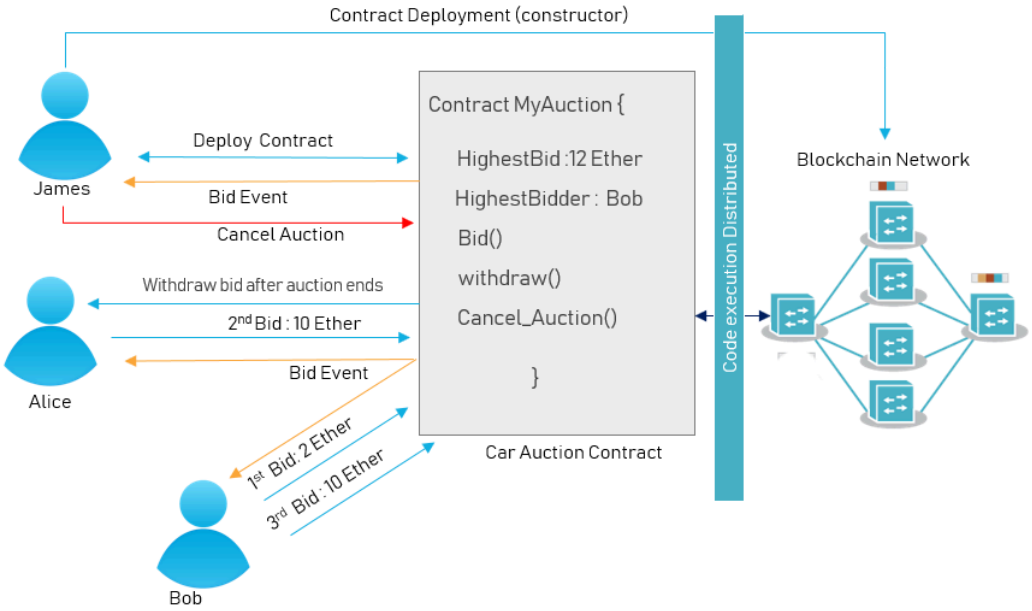


Figure-5: Auction Contract in Solidity

Procedure for stage-1:

Refer to Peer-to-Peer Auctions in Ethereum [1], chapter 4 of Blockchain by Example online free learning edition by Packt Publications.

Auction DApp summary:

DApp is a web application that enables users to start in auctions using ether.

- Write (in Solidity) and compile the auction contract

  Smart Contract auction.sol:

  pragma solidity ^0.4.24;

  contract Auction {

  address internal auction_owner; uint256 public auction_start; uint256 public auction_end; uint256 public highestBid; address public highestBidder;

  enum auction_state { CANCELLED, STARTED

  }

  struct car { string Brand;

  string Rnumber;

  }

  car public Mycar; address[] bidders;

  mapping(address => uint) public bids; auction_state public STATE;

  modifier an_ongoing_auction() { require(now <= auction_end);

  _;

  }

  modifier only_owner() { require(msg.sender == auction_owner);

  _;

}

function bid() public payable returns (bool) {} function withdraw() public returns (bool) {} function cancel_auction() external returns (bool) {}

event BidEvent(address indexed highestBidder, uint256 highestBid); event WithdrawalEvent(address withdrawer, uint256 amount);

event CanceledEvent(string message, uint256 time);

}

- Interact with your contract through a web page
- Deploy our smart contract on different environments and set up a local blockchain

Accounts generated using Ganache CLI

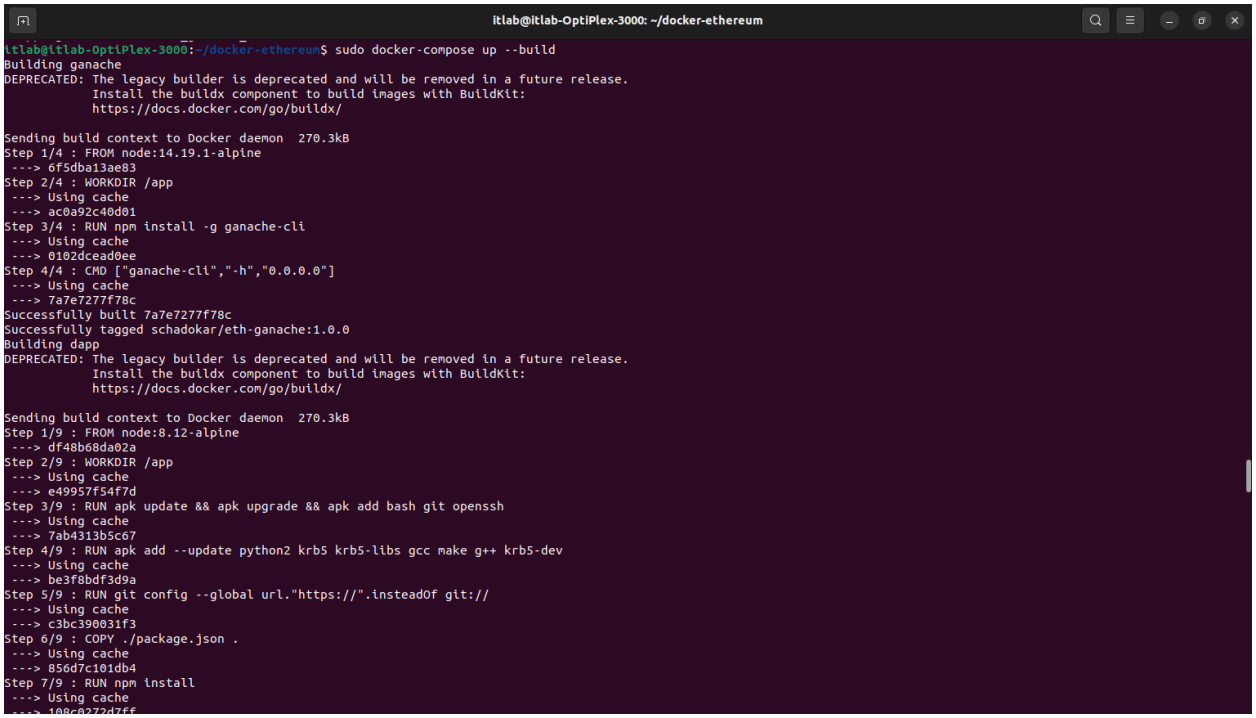
Set compiler to older version.

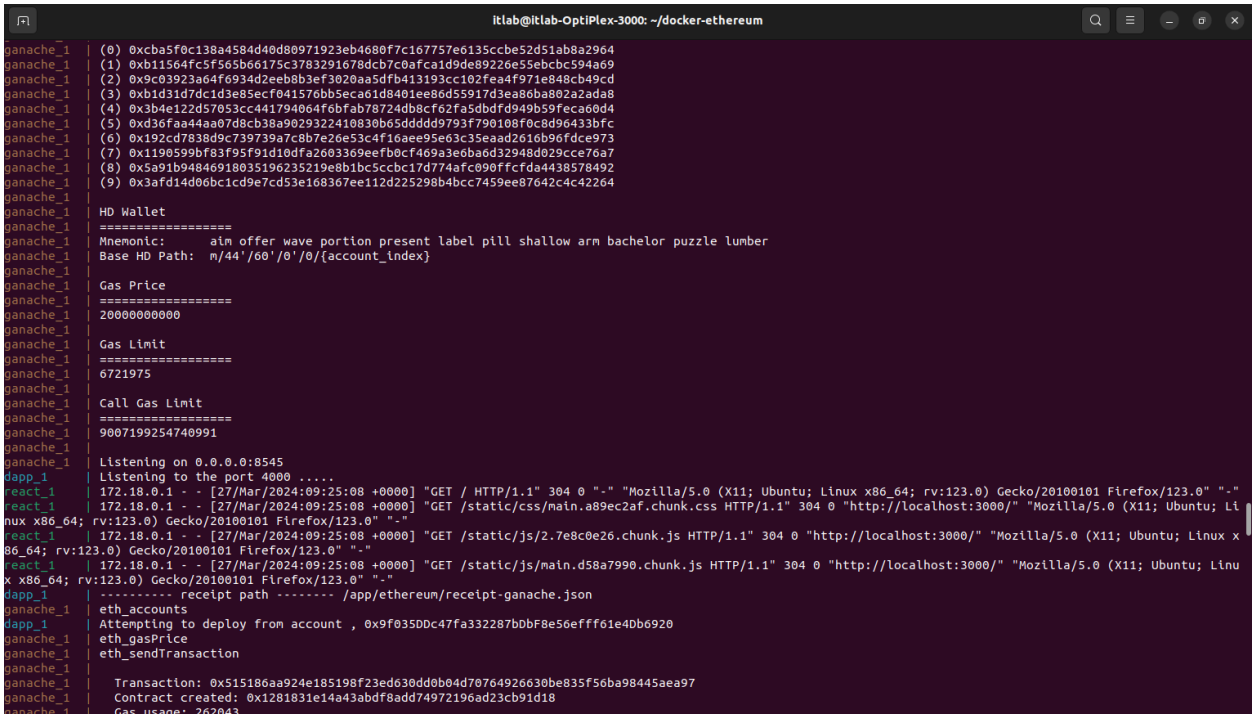
Remix Environment set to Web3 Provider.

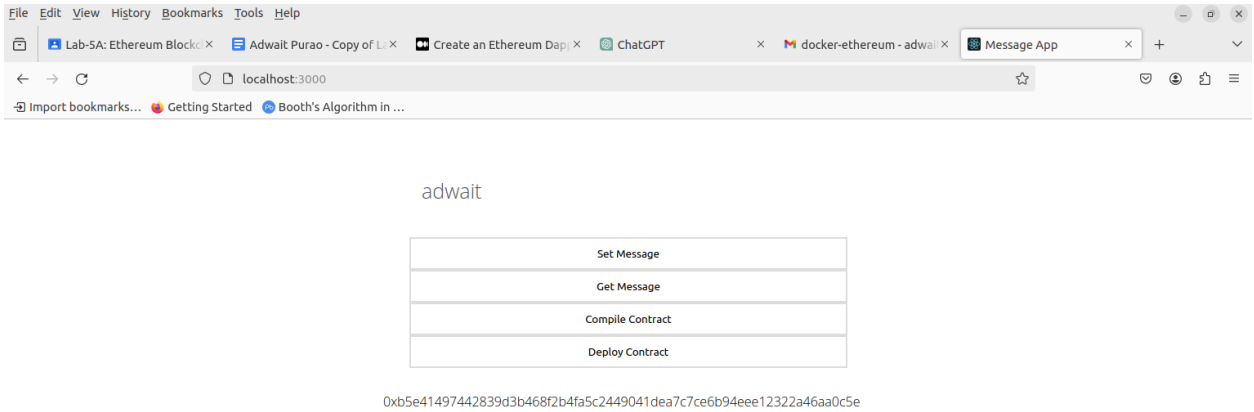
Deploy Smart Contract

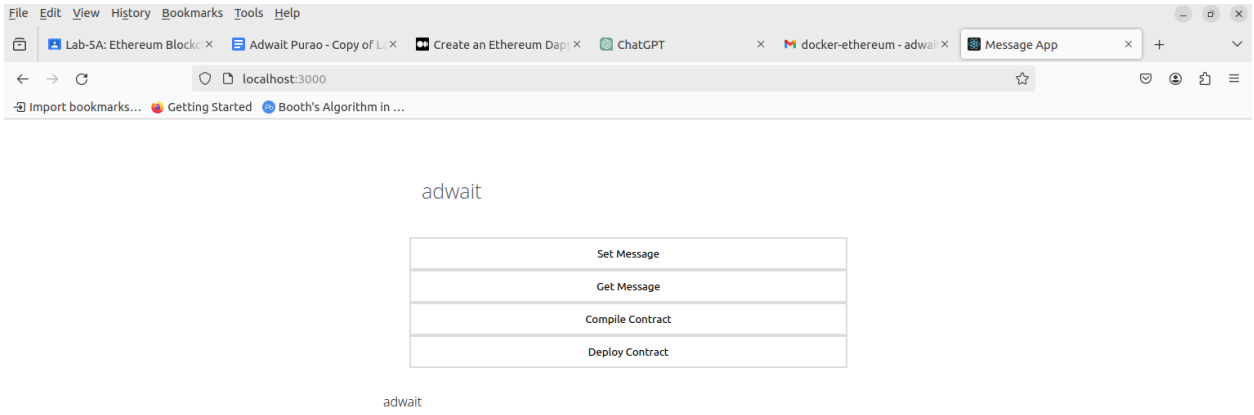
Set bid value and click bid button

Output:


itlab@itlab-OptiPlex-3000: ~/docker-ethereum
itlab@itlab-OptiPlex-3000:~/docker-ethereum$ sudo docker-compose up --build
Building ganache
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/
Sending build context to Docker daemon 270.3kB
Step 1/4 : FROM node:14.19.1-alpine
---> 6f5dba13ae83
Step 2/4 : WORKDIR /app
---> Using cache
---> ac0a92c40d01
Step 3/4 : RUN npm install -g ganache-cli
---> Using cache
---> 0102dcead0ee
Step 4/4 : CMD ["ganache-cli","-h","0.0.0.0"]
---> Using cache
---> 7a7e7277f78c
Successfully built 7a7e7277f78c
Successfully tagged schadokar/eth-ganache:1.0.0
Building dapp
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/
Sending build context to Docker daemon 270.3kB
Step 1/9 : FROM node:8.12-alpine
---> df48b68da02a
Step 2/9 : WORKDIR /app
---> Using cache
---> e49957f54f7d
Step 3/9 : RUN apk update && apk upgrade && apk add bash git openssh
---> Using cache
---> 7ab4313b5c67
Step 4/9 : RUN apk add --update python2 krb5 krb5-libs gcc make g++ krb5-dev
---> Using cache
---> be3f8bdf3d9a
Step 5/9 : RUN git config --global url."https://".insteadOf git://
---> Using cache
---> c3bc390031f3
Step 6/9 : COPY ./package.json .
---> Using cache
---> 856d7c101db4
Step 7/9 : RUN npm install
---> Using cache


itlab@itlab-OptiPlex-3000: ~/docker-ethereum
ganache_1 | (0) 0xcba5f0c138a4584d40d80971923eb4680f7c167757e6135ccbe52d51ab8a2964
ganache_1 | (1) 0xb11564fc5f565b66175c3783291678dcb7c0afca1d9de89226e55ebcbc594a69
ganache_1 | (2) 0x9c03923a64f6934d2eeb8b3ef3020aa5dfb413193cc102fea4f971e848cb49cd
ganache_1 | (3) 0xb1d31d7dc1d3e85ecf041576bb5eca61d8401ee86d55917d3ea86ba802a2ada8
ganache_1 | (4) 0x3b4e122d57053cc441794064f6bfab78724db8cf62fa5dbdfd949b59feca60d4
ganache_1 | (5) 0xd36faa44aa07d8cb38a90293224108306 5ddddd9793f790108f0c8d96433bfc
ganache_1 | (6) 0x192cd7838d9c739739a7c8b7e26e53c4f16aee95e63c35eaad2616b96fdce973
ganache_1 | (7) 0x1190599bf83f95f91d10dfa2603369eefb0cf469a3e6ba6d32948d029cce76a7
ganache_1 | (8) 0x5a91b9484691803519623 5219e8b1bc5ccbc17d774afc090ffcfda4438578492
ganache_1 | (9) 0x3afd14d06bc1cd9e7cd53e168367ee112d225298b4bcc7459ee87642c4c42264
ganache_1 |
ganache_1 | HD Wallet
ganache_1 | ==================
ganache_1 | Mnemonic: aim offer wave portion present label pill shallow arm bachelor puzzle lumber
ganache_1 | Base HD Path: m/44'/60'/0'/0/{account_index}
ganache_1 |
ganache_1 | Gas Price
ganache_1 | ==================
ganache_1 | 20000000000
ganache_1 |
ganache_1 | Gas Limit
ganache_1 | ==================
ganache_1 | 6721975
ganache_1 |
ganache_1 | Call Gas Limit
ganache_1 | ==================
ganache_1 | 9007199254740991
ganache_1 |
ganache_1 | Listening on 0.0.0.0:8545
dapp_1 | Listening to the port 4000 .....
react_1 | 172.18.0.1 - - [27/Mar/2024:09:25:08 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:123.0) Gecko/20100101 Firefox/123.0" "-"
react_1 | 172.18.0.1 - - [27/Mar/2024:09:25:08 +0000] "GET /static/css/main.a89ec2af.chunk.css HTTP/1.1" 304 0 "http://localhost:3000/" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:123.0) Gecko/20100101 Firefox/123.0" "-"
react_1 | 172.18.0.1 - - [27/Mar/2024:09:25:08 +0000] "GET /static/js/2.7e8c0e26.chunk.js HTTP/1.1" 304 0 "http://localhost:3000/" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:123.0) Gecko/20100101 Firefox/123.0" "-"
react_1 | 172.18.0.1 - - [27/Mar/2024:09:25:08 +0000] "GET /static/js/main.d58a7990.chunk.js HTTP/1.1" 304 0 "http://localhost:3000/" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:123.0) Gecko/20100101 Firefox/123.0" "-"
dapp_1 | ---------- receipt path -------- /app/ethereum/receipt-ganache.json
ganache_1 | eth_accounts
dapp_1 | Attempting to deploy from account , 0x9f035DDc47fa332287bDbF8e56efff61e4Db6920
ganache_1 | eth_gasPrice
ganache_1 | eth_sendTransaction
ganache_1 |
ganache_1 | Transaction: 0x515186aa924e185198f23ed630dd0b04d70764926630be835f56ba98445aea97
ganache_1 | Contract created: 0x1281831e14a43abdf8add74972196ad23cb91d18
ganache_1 | Gas usage: 262043


File Edit View History Bookmarks Tools Help
Lab-5A: Ethereum Block
Adwait Purao - Copy of L
Create an Ethereum Dap
ChatGPT
docker-ethereum - adwai
Message App
localhost:3000
Import bookmarks...
Getting Started
Booth's Algorithm in ...
adwait
Set Message
Get Message
Compile Contract
Deploy Contract
0xb5e41497442839d3b468f2b4fa5c2449041dea7c7ce6b94eee12322a46aa0c5e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Getting Started
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adwait
Set Message
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Compile Contract
Deploy Contract
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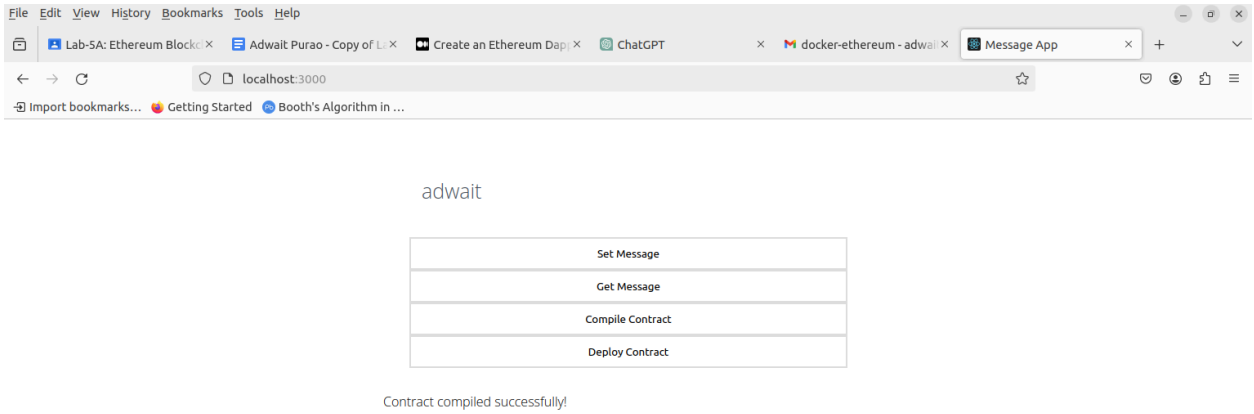

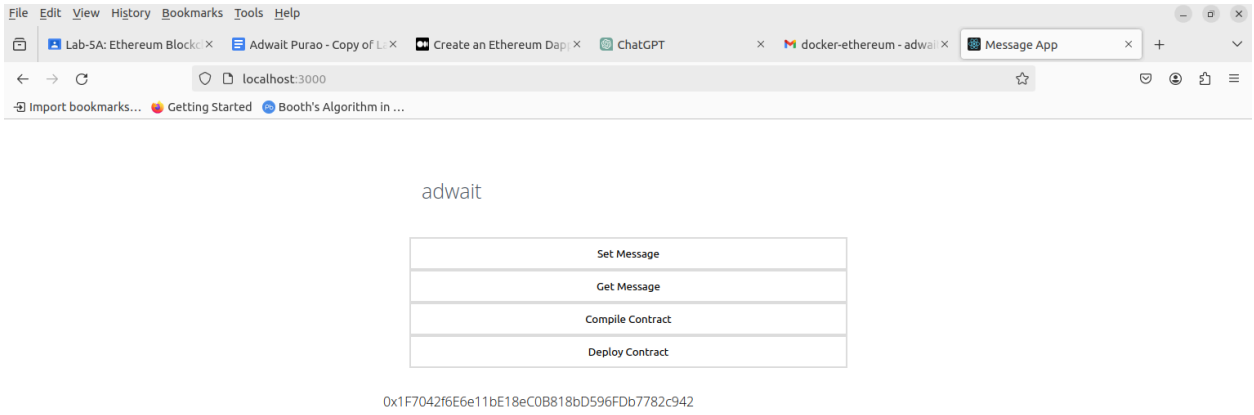

Conclusion:

Hence, we conclude that the provided Auction smart contract offers a robust framework for conducting peer-to-peer auctions on the Ethereum blockchain. With features for initializing

auctions, managing states, facilitating bidding, withdrawal, and cancellation, along with the use of modifiers and events for contract integrity and transparency, it presents a comprehensive solution for decentralized auction applications. By enabling interaction through web interfaces, the contract ensures accessibility and usability for users, thus serving as a foundational component for diverse auction-based decentralized applications.

References:

[1] Create an Ethereum Dapp with React and Docker
https://medium.com/hackernoon/create-an-ethereum-dapp-with-react-and-docker-211223005f17

[2] Peer-to-Peer Auctions in Ethereum

https://subscription.packtpub.com/book/big-data-and-business-intelligence/9781788475686/4

[3] How To Install Node.js on Ubuntu 20.04

How To Install Node.js on Ubuntu 20.04 | DigitalOcean