

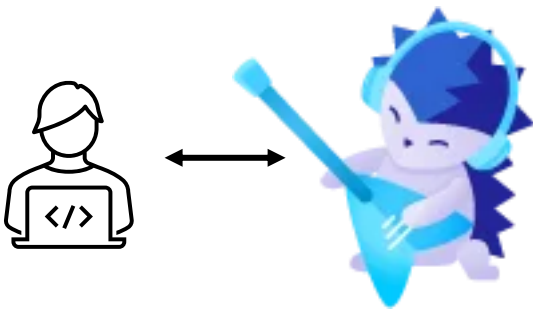


# 블록체인 실습

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- 실습구조

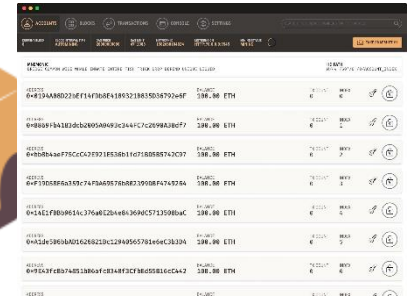
Metamask Wallet



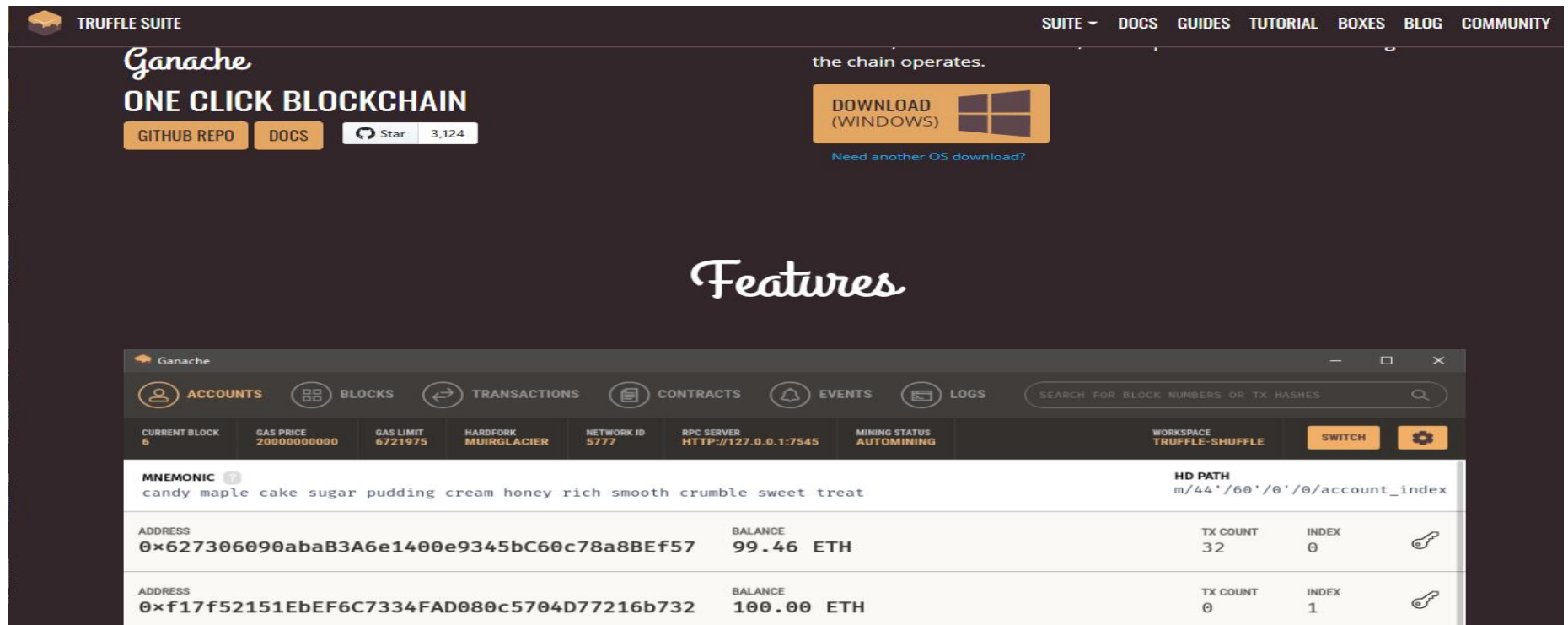
Remix Browser IDE



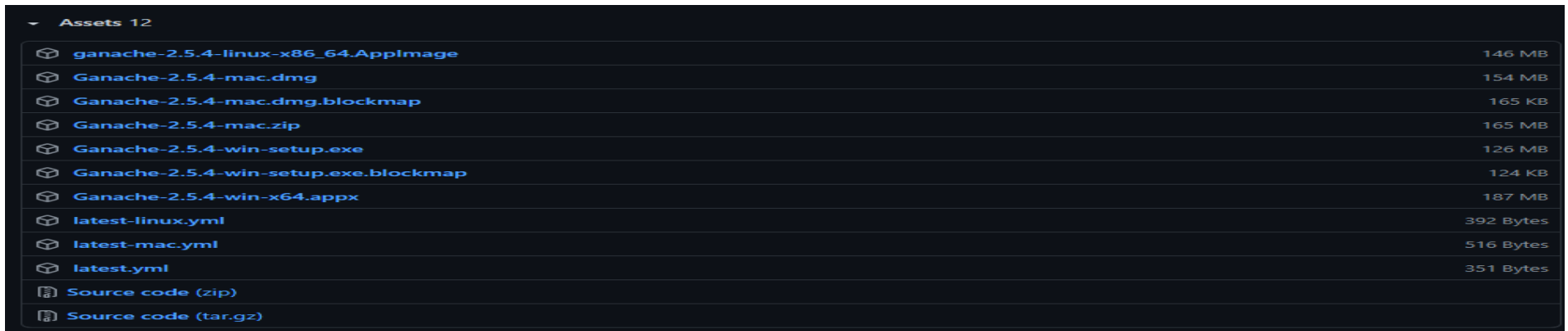
Ganache Blockchain Network



- <https://www.trufflesuite.com/ganache> (가나슈)
- 이더리움 개발 테스트에 사용할 수 있는 개인용(프라이빗) 블록체인
- 종류
  - Ganache CLI - Ethereum 개발을 위한 개인 블록체인 Ganache 의 명령행 버전
  - Ganache GUI - 아이콘 이미지 등 화려한 그래픽을 사용한 GUI

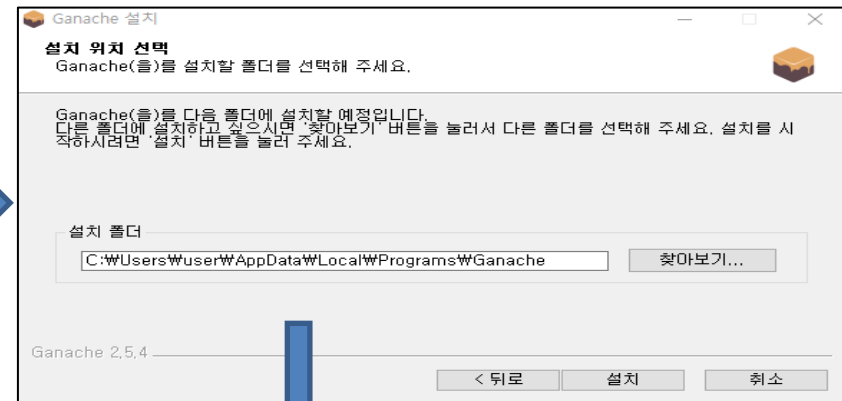
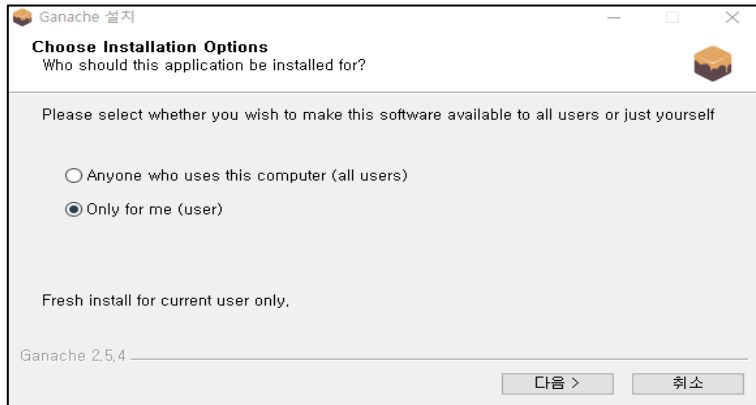


- ganache (가나슈) 설치
  - <https://github.com/trufflesuite/ganache/releases>

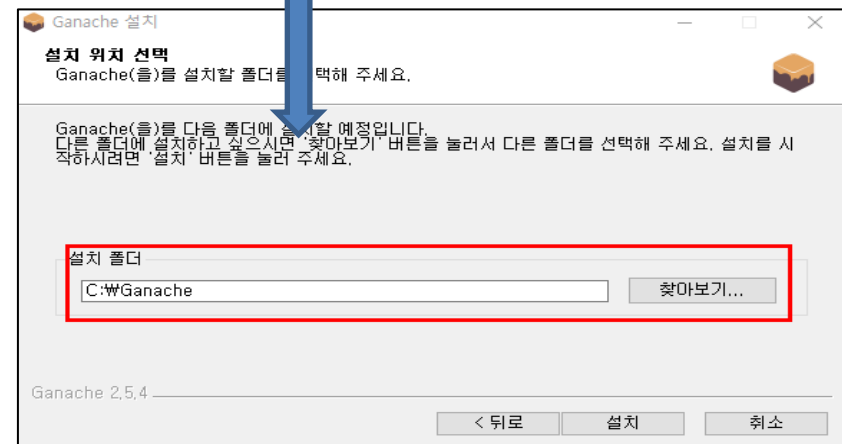
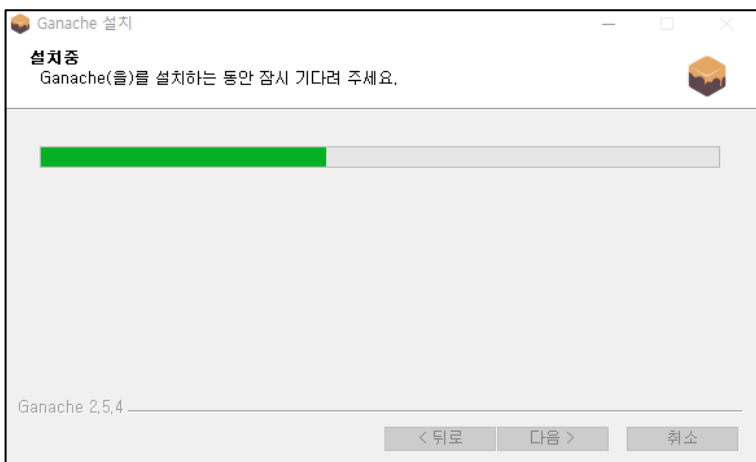


Assets 12	
ganache-2.5.4-linux-x86_64.AppImage	146 MB
Ganache-2.5.4-mac.dmg	154 MB
Ganache-2.5.4-mac.dmg.blockmap	165 KB
Ganache-2.5.4-mac.zip	165 MB
Ganache-2.5.4-win-setup.exe	126 MB
Ganache-2.5.4-win-setup.exe.blockmap	124 KB
Ganache-2.5.4-win-x64.appx	187 MB
latest-linux.yml	392 Bytes
latest-mac.yml	516 Bytes
latest.yml	351 Bytes
Source code (zip)	
Source code (tar.gz)	

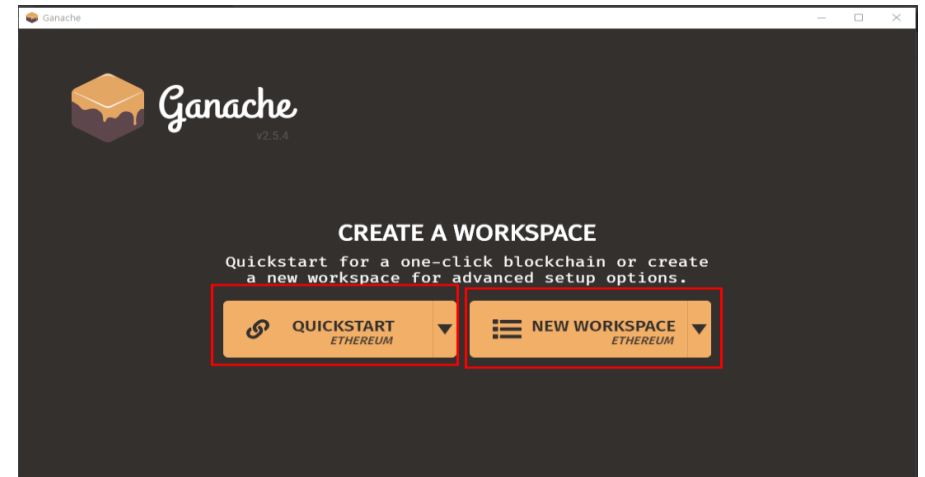
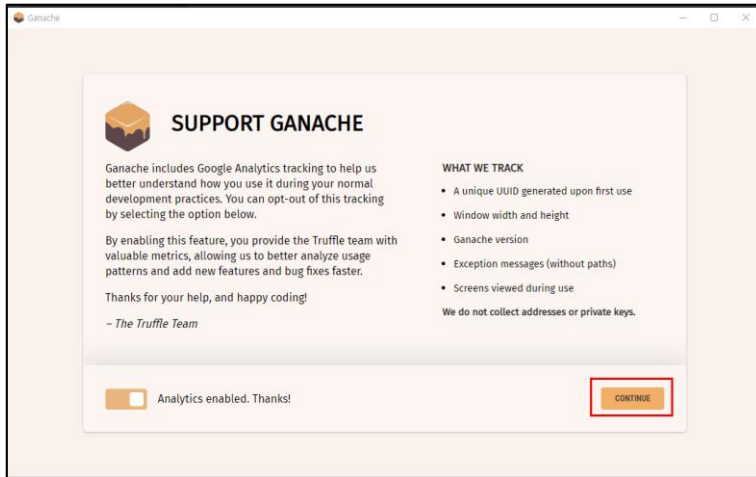
- ganache (가나슈) 설치



설치 경로 변경

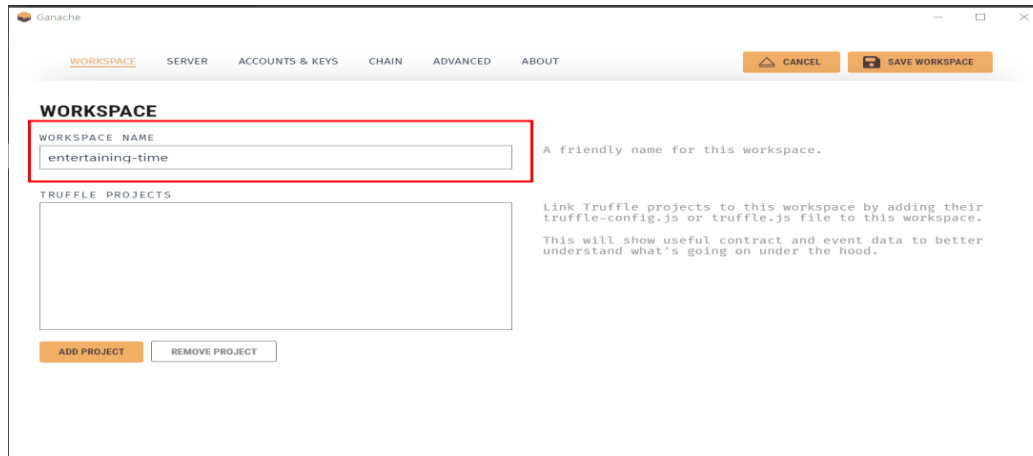


- ganache (가나슈) 설치



- Quickstart** : 작업 영역은 다시 시작할 때마다 블록체인을 재설정
- New Workspace** : 나중에 다시 불러올 수 있도록 블록체인을 새 작업 공간으로 저장

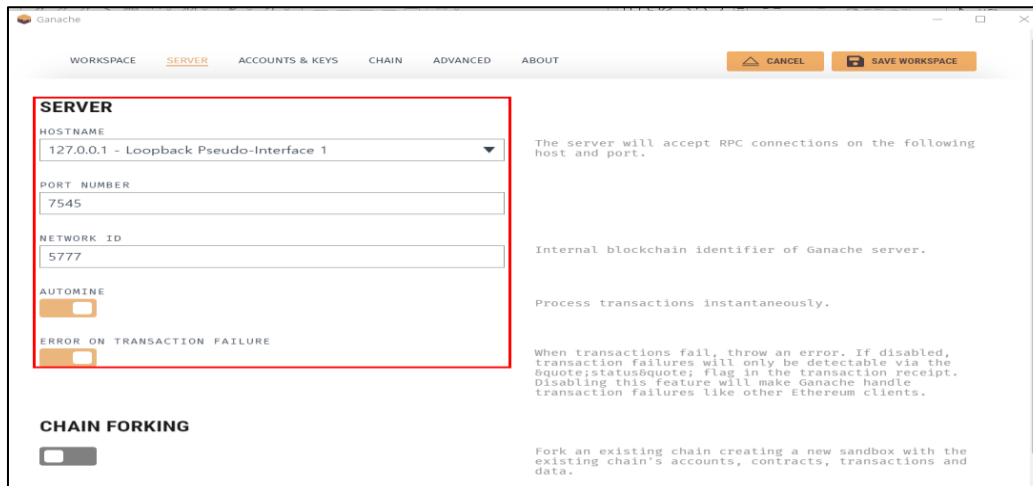
- ganache (가나슈) 설치



## WORKSPACE

- workspace name** : 작업공간 이름  
처음 작업 공간 이름은 무작위로 생성  
변경 가능.

**SAVE WORKSPACE** 저장



## SERVER

- HOSTNAME**: RPC연결 설정에 필요한  
호스트와 포트
- PORT NUMBER**: 포트
- NETWORK ID**: Ganache 서버의 내부  
블록체인 식별자
- AUTOMINE**: 자동 채굴

- ganache (가나슈) 설치

**ACCOUNTS & KEYS**

ACCOUNT DEFAULT BALANCE  
100  
The starting balance for accounts, in Ether.

TOTAL ACCOUNTS TO GENERATE  
10  
Total number of Accounts to create and pre-fund.

AUTOGENERATE HD MNEMONIC  
☐  
Turn on to automatically generate a new mnemonic and account addresses on each run.

access lift pluck system faint raccoon trumpet size grape time sm  
Enter the Mnemonic you wish to use.  
note: this mnemonic is not secure; don't use it on a public blockchain.

LOCK ACCOUNTS  
☐  
If enabled, accounts will be locked on startup.

## ACCOUNTS & KEYS

- ACCOUNT DEFAULT BALANCE : 기본 잔액 100 Eth
- TOTAL ACCOUNTS TO GENERATE: 기본 계정 10개
- AUTOGENERATE HD MNEMONIC : 니모닉 생성
- LOCK ACCOUNTS: 계정 잠금

**GAS**

GAS LIMIT  
6721975  
Maximum amount of gas available to each block and transaction. Leave blank for default.

GAS PRICE  
20000000000  
The price of each unit of gas, in WEI. Leave blank for default.

**HARDFORK**

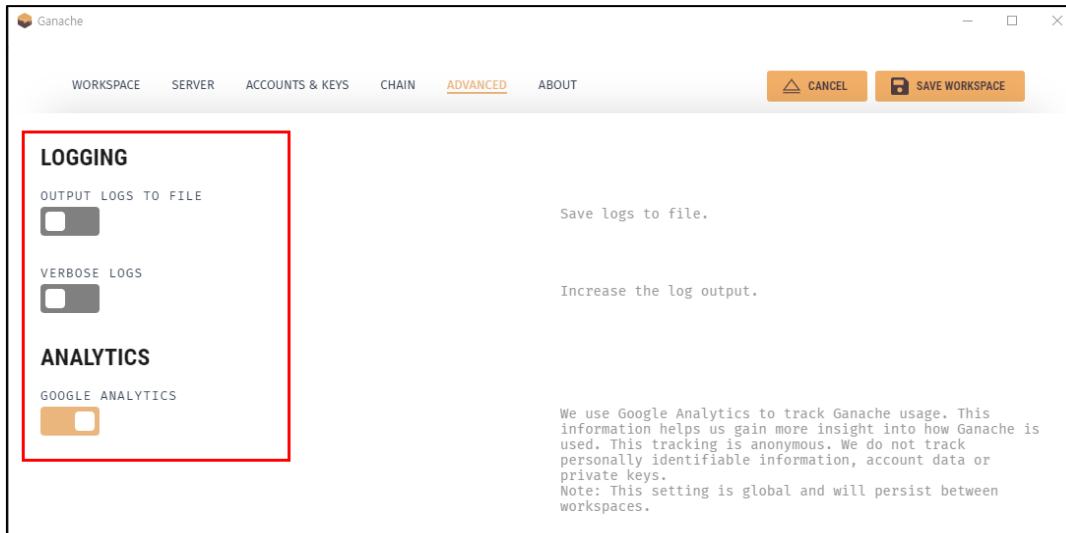
HARDFORK  
Muir Glacier  
The hardfork to use. Default is Petersburg.

## GAS

- GAS LIMIT - 6721975
- GAS PRICE : 20000000000(WEI)
- HARDFORK: Default is Petersburg.



- ganache (가나슈) 설치

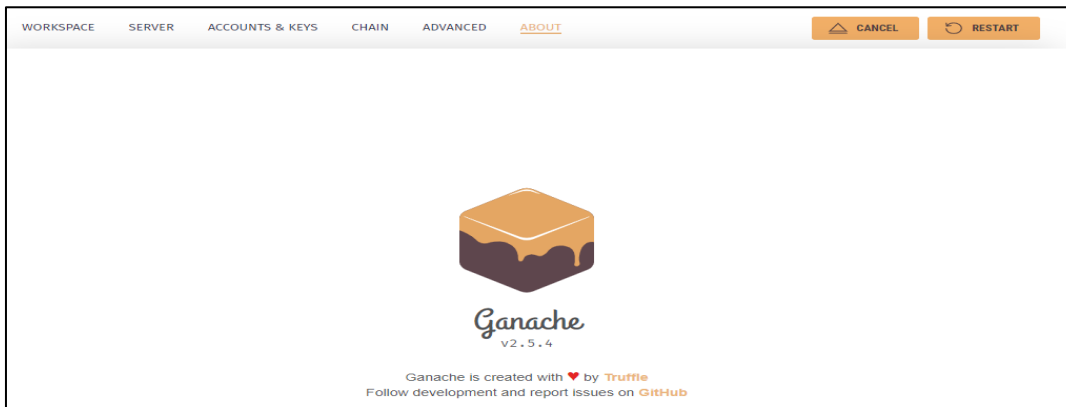


## LOGGING

- **OUTPUT LOGS TO FILE** : 로그 파일로 저장

- **VERBOSE LOGS** : 로그 출력

- **ANALYTICS : GOOGLE ANALYTICS**  
가나슈 사용 추적



- ganache (가나슈) 인터페이스

**ACCOUNTS**

CURRENT BLOCK: 0 | GAS PRICE: 20000000000 | GAS LIMIT: 6721975 | HARDFORK: MUIRGLACIER | NETWORK ID: 5777 | RPC SERVER: HTTP://127.0.0.1:7545 | MINING STATUS: AUTOMINING | WORKSPACE: ENTERTAINING-TIME

MNEMONIC: access lift pluck system faint raccoon trumpet size grape time smooth grab | HD PATH: m/44'/60'/0'/0/account\_index

ADDRESS	BALANCE	TX COUNT	INDEX
0xF433E191Bf92a62563465bB92740cE9e6cd5a3Aa	100.00 ETH	0	0
0x68AB3D9cd04eAd3FD212E252d57b2611439F57c2	100.00 ETH		
0xBcF0ce248299DBe241aff157E091e3dc60708381	100.00 ETH		
0x82dF3d50C5a333A42785Ab8cf438051e52676656	100.00 ETH		
0x61F79eA524368f4Dc3394dde7814D8c02ef751C4	100.00 ETH		

**ACCOUNT INFORMATION**

ACCOUNT ADDRESS  
0xF433E191Bf92a62563465bB92740cE9e6cd5a3Aa

PRIVATE KEY  
6087c88150c07e82aa4763311c0b1b0890644493a421a54b5fb5ace03b9421cb  
*Do not use this private key on a public blockchain; use it for development purposes only!*

DONE

## ACCOUNTS

- 기본 계정 10개
- 주소
- 금액
- 트랜잭션
- 키

- ganache (가나슈) 인터페이스

## BLOCKS

- 블록체인 블록 정보

## BLOCKS 상세

- ganache (가나슈) 인터페이스

The screenshot shows the Ganache web interface with the 'TRANSACTIONS' tab selected. It displays details for a specific transaction (TX 0xdd291f1f9d5685b46f0b5f8303516ccd3c6df64462faaf195965ec9b3da12ec1). The interface includes a top navigation bar with icons for ACCOUNTS, BLOCKS, TRANSACTIONS, CONTRACTS, EVENTS, and LOGS. Below this is a status bar showing current block, gas price, gas limit, hardfork, network ID, RPC server, and mining status. The transaction details section shows the sender address, to contract address, value (10.00 ETH), gas used (21000), gas price (20000000000), gas limit (21000), and TX data (0x). There is also a 'CONTRACT CALL' button and an 'EVENTS' section at the bottom.

## TRANSACTION

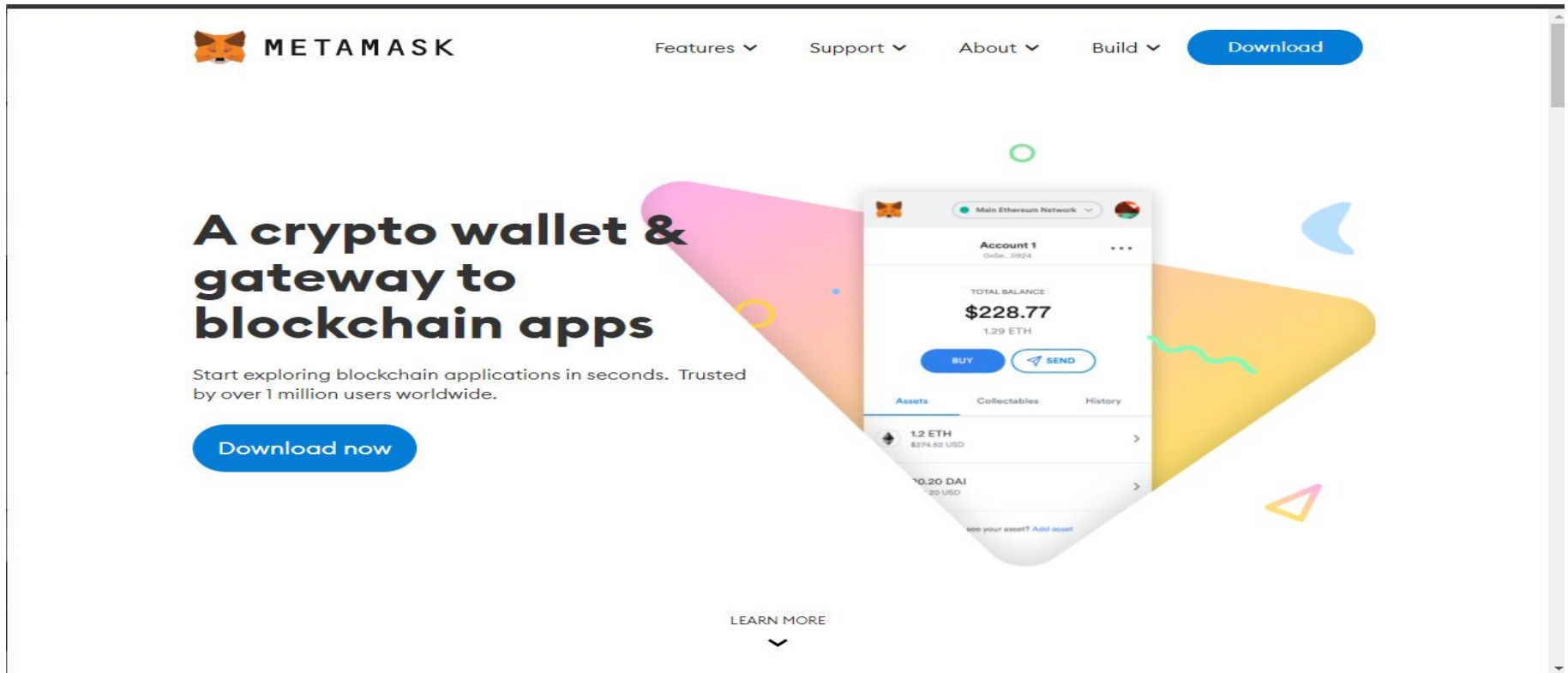
- 트랜잭션 정보

The screenshot shows the Ganache web interface with the 'LOGS' tab selected. It displays a list of log entries, including 'eth\_unsubscribe' and 'Starting server with initial configuration:'. The interface includes a top navigation bar with icons for ACCOUNTS, BLOCKS, TRANSACTIONS, CONTRACTS, EVENTS, and LOGS. Below this is a status bar showing current block, gas price, gas limit, hardfork, network ID, RPC server, and mining status. The logs section shows a list of log entries with timestamps and messages.

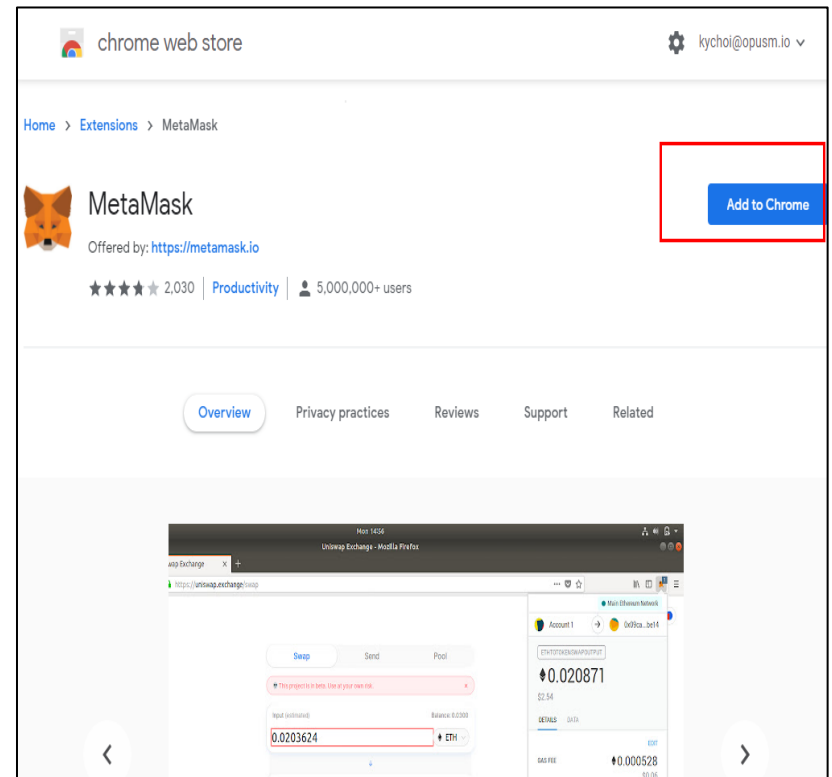
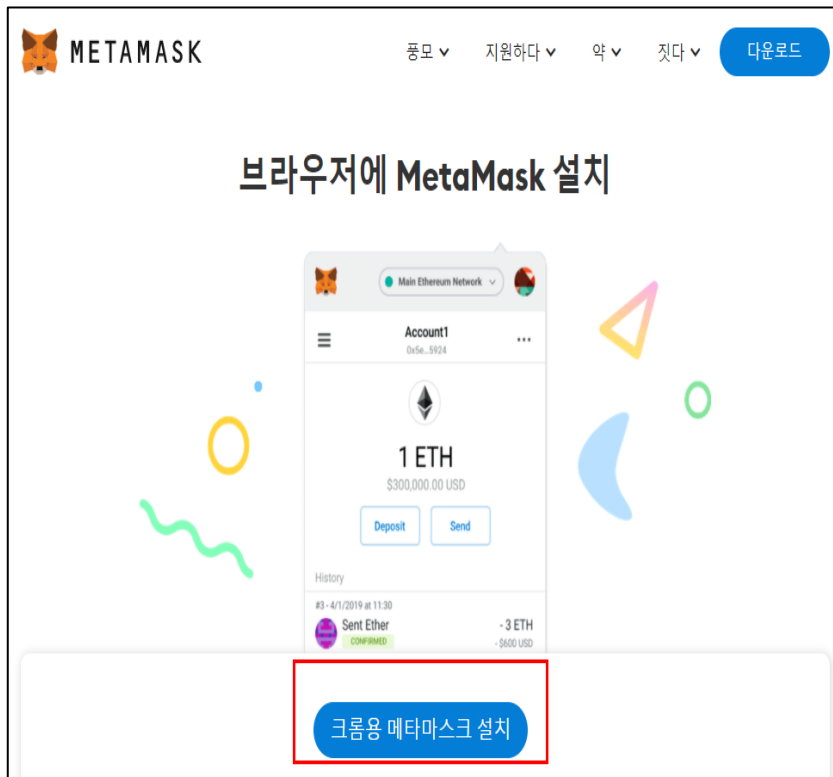
## LOGS

- 가나슈 로그 정보

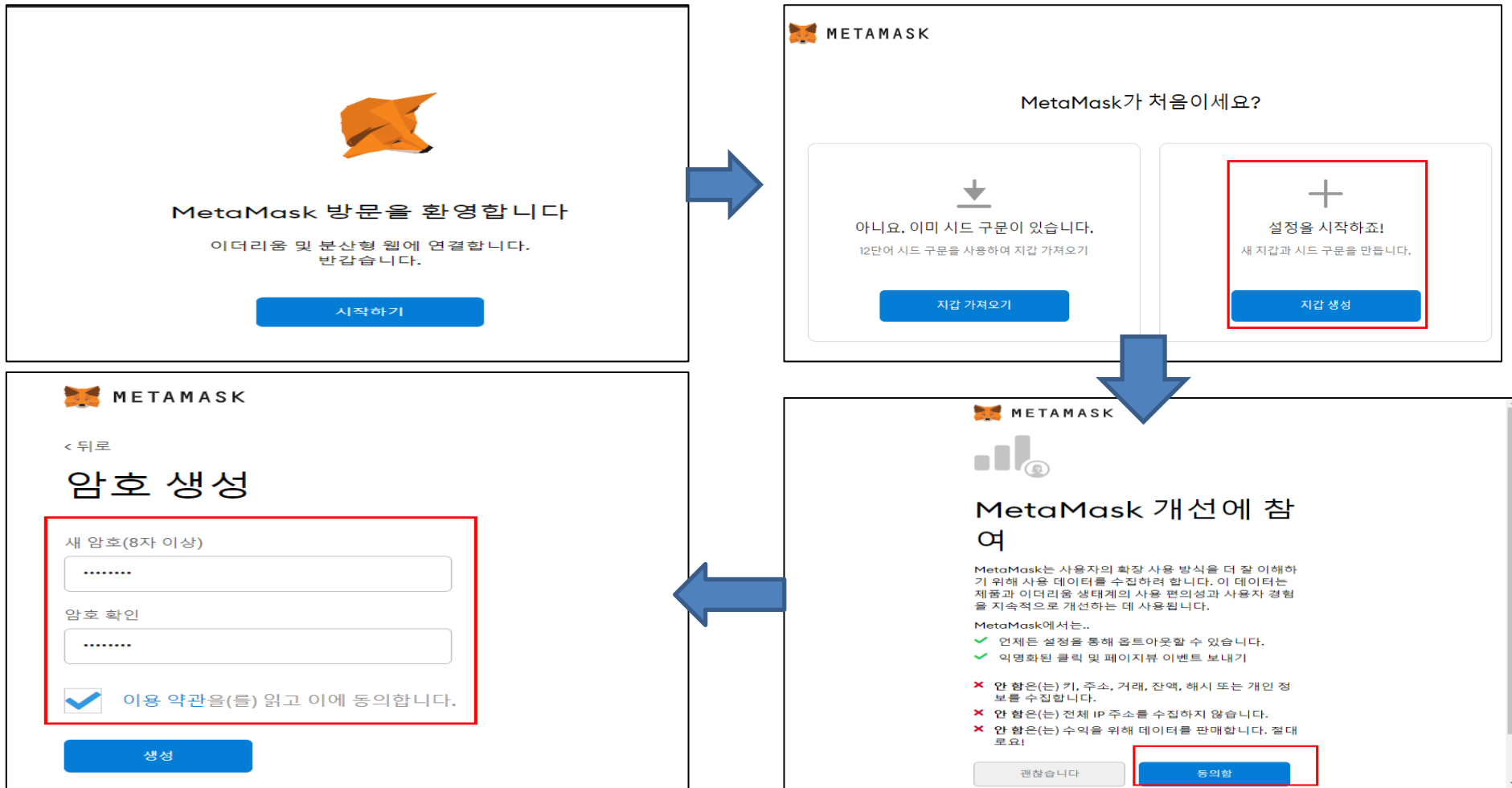
- <https://metamask.io/> (메타마스크)
    - 이더리움을 보유하고 송금 및 관리할 수 있는 암호화폐 지갑
- 구글 크롬 웹브라우저에서 플러그인 방식으로 사용하는 크롬 확장 프로그램



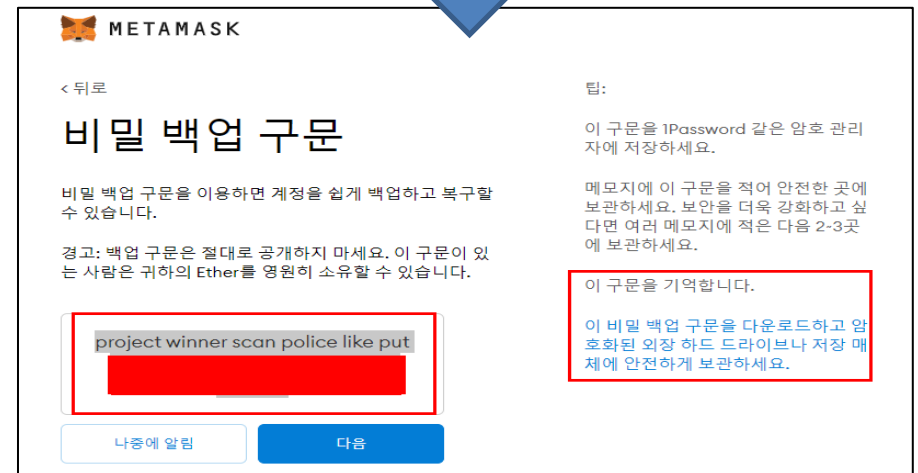
- <https://metamask.io/> (메타마스크) 설치
- <https://metamask.io/download.html>



- <https://metamask.io/> (메타마스크) 설치



- <https://metamask.io/> (메타마스크) 설치

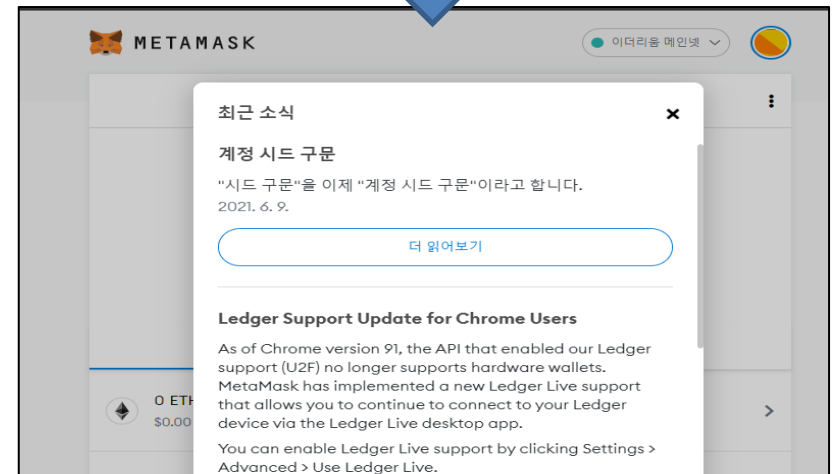
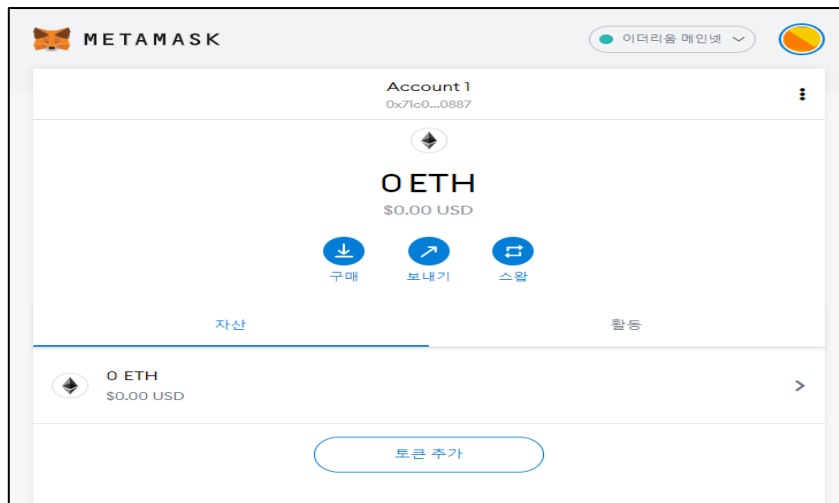
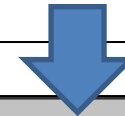
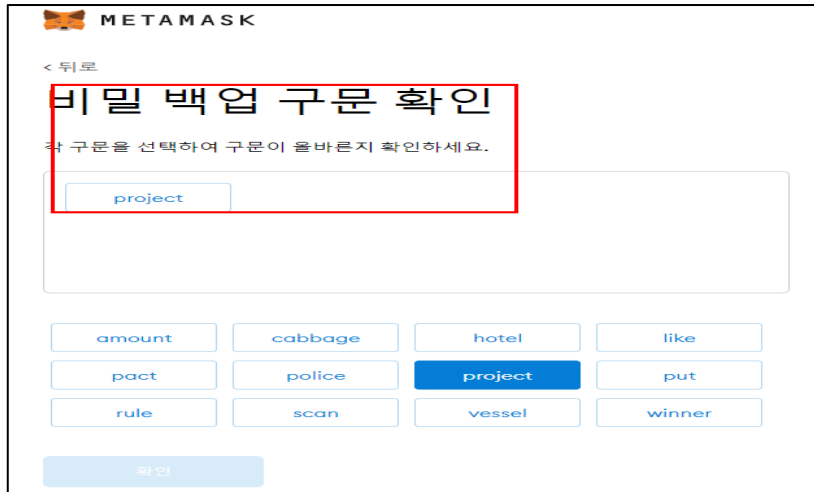


**비밀 백업 구문(니모닉)**

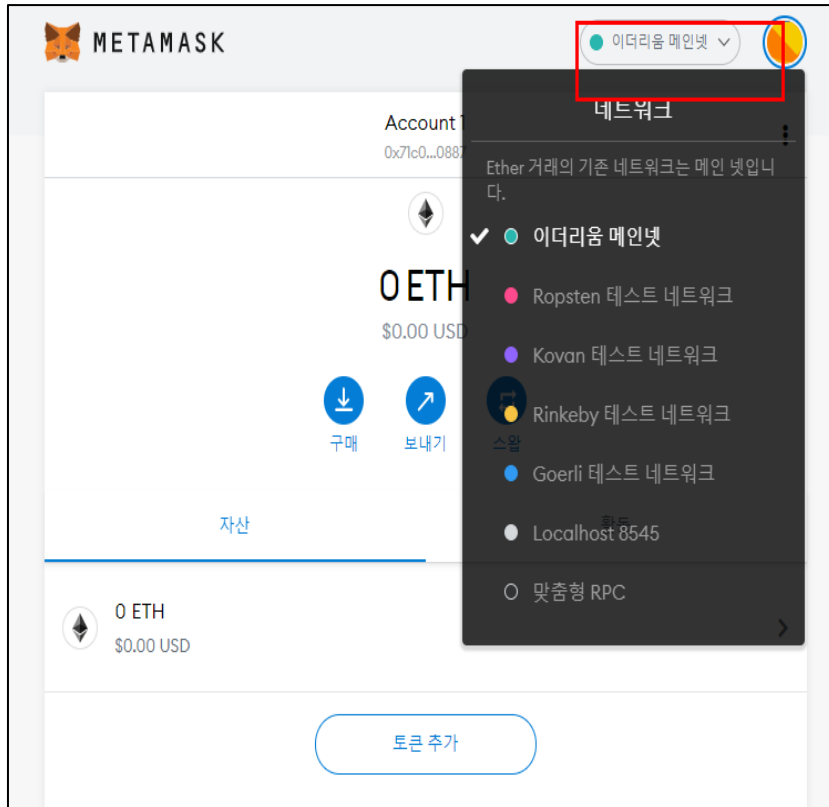
- 순서 기억
- USB등에 백업 저장



- <https://metamask.io/> (메타마스크) 설치



- <https://metamask.io/> (메타마스크) 네트워크



## Ropsten, Kovan, Rinkeby, Goerli Test Network

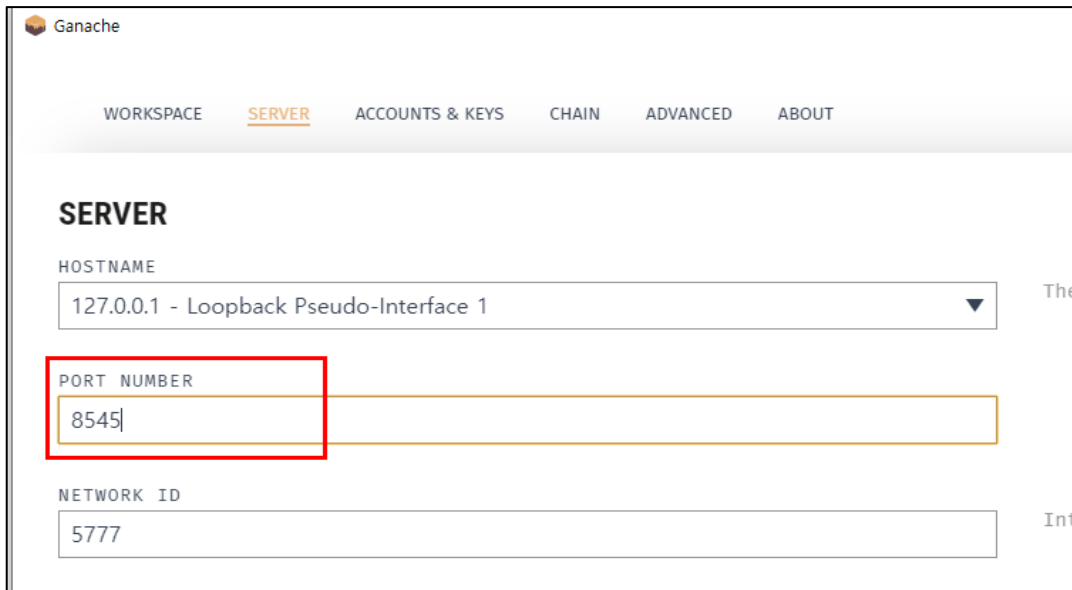
- Ropsten :
  - PoW testnet
  - Network id: 3
  - Block time: sub-30 seconds
- Kovan
  - PoA testnet started by the Parity team
  - Network id: 42
  - Block time: 4 seconds
- Rinkeby
  - PoA testnet started by the Ethereum team. Uses Clique PoA consensus protocol.
  - Network id: 4
  - Block time: 15 seconds
- Görli
  - PoA testnet

출처:<https://medium.com/coinmonks/ethereum-test-network-21baa86072fa>

## 1

## metamask

- ganache + metamask 연동



Ganache

WORKSPACE **SERVER** ACCOUNTS & KEYS CHAIN ADVANCED ABOUT

**SERVER**

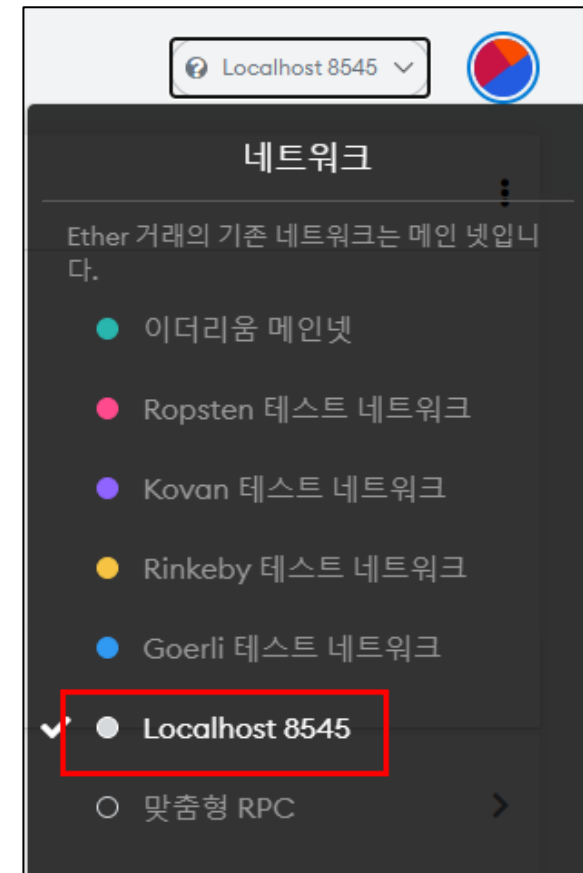
HOSTNAME  
127.0.0.1 - Loopback Pseudo-Interface 1

PORT NUMBER  
8545

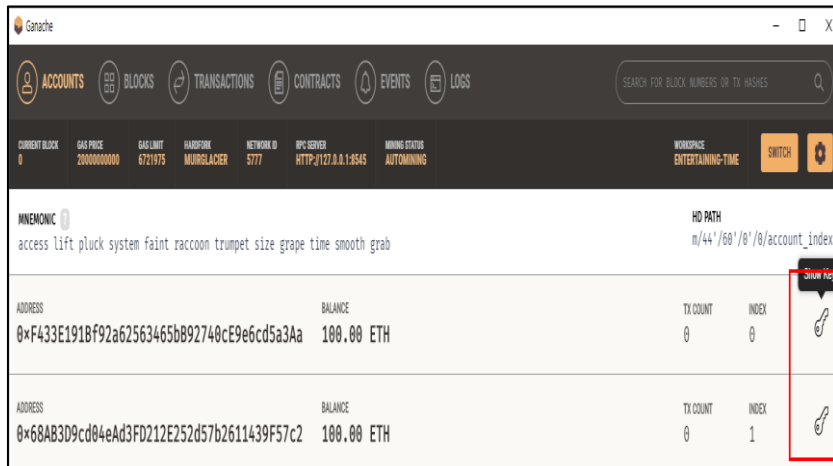
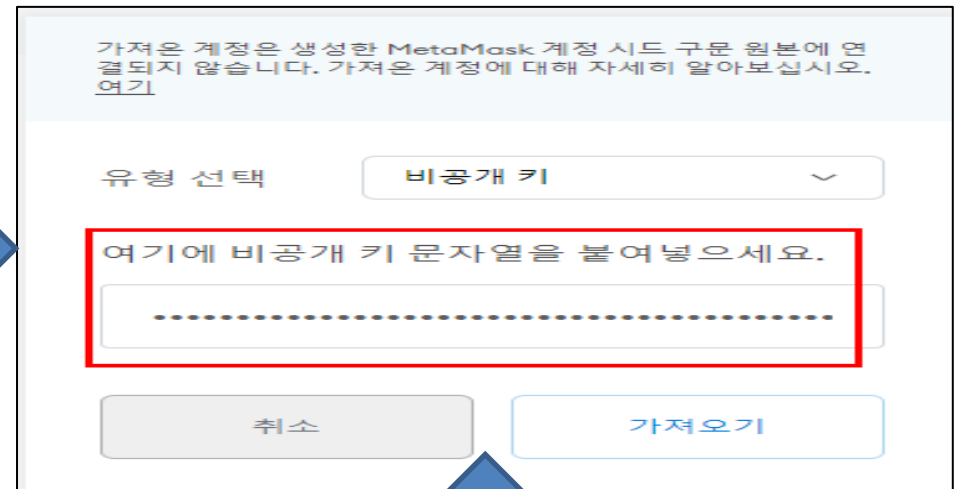
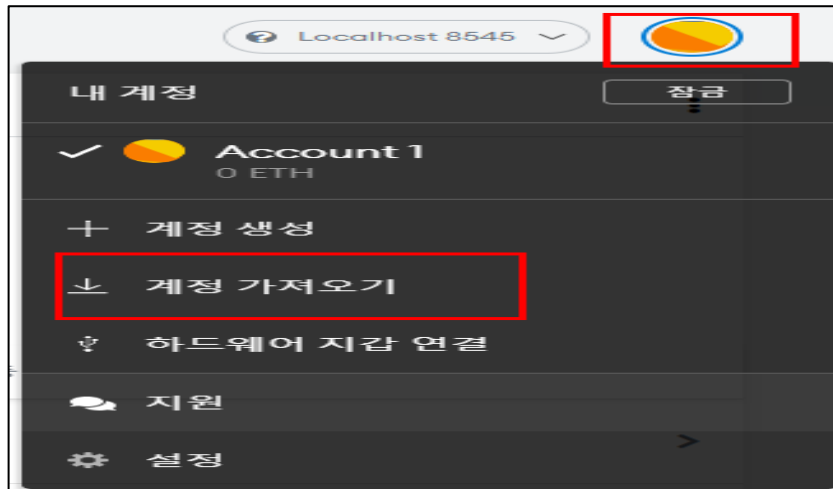
NETWORK ID  
5777

## Chain IDs

- Hex	Decimal	Network
0x1	1	Ethereum Main Network (Mainnet)
0x3	3	Ropsten Test Network
0x4	4	Rinkeby Test Network
0x5	5	Goerli Test Network
0x2a	42	Kovan Test Network
Ganache	1337	



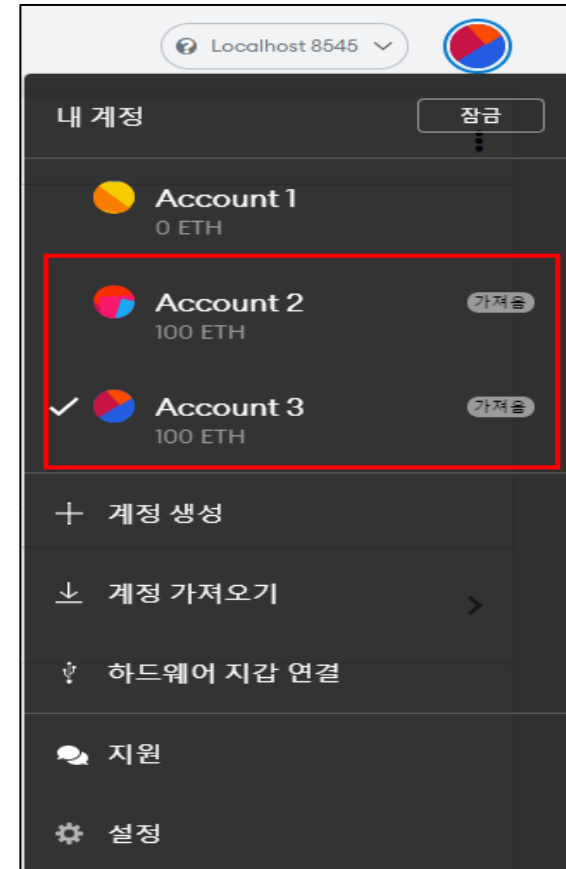
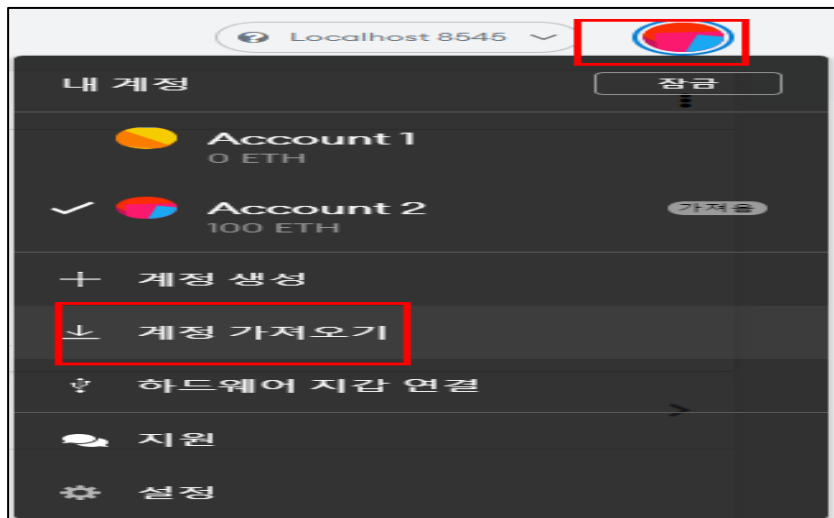
- ganache + metamask 연동



## 1

# metamask

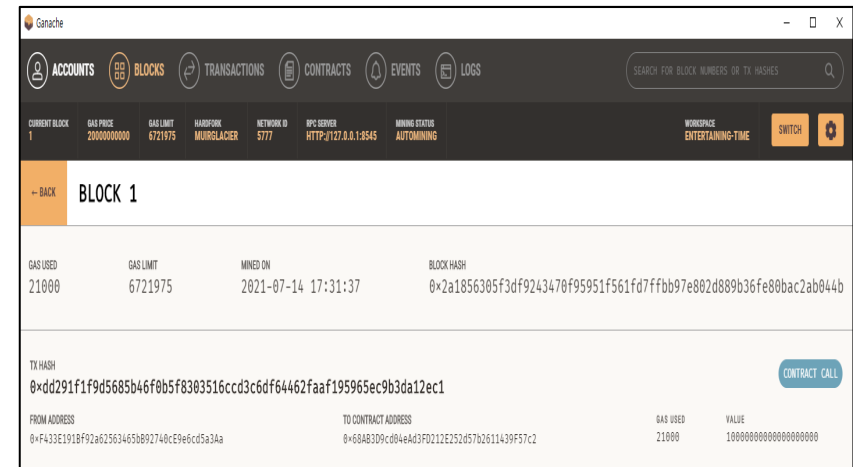
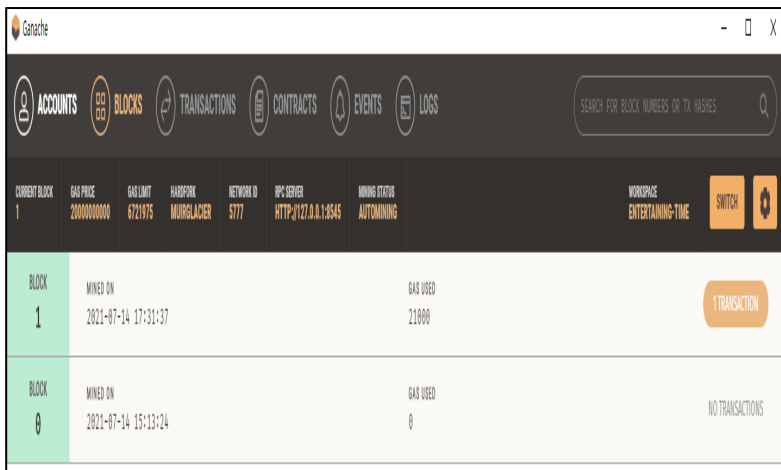
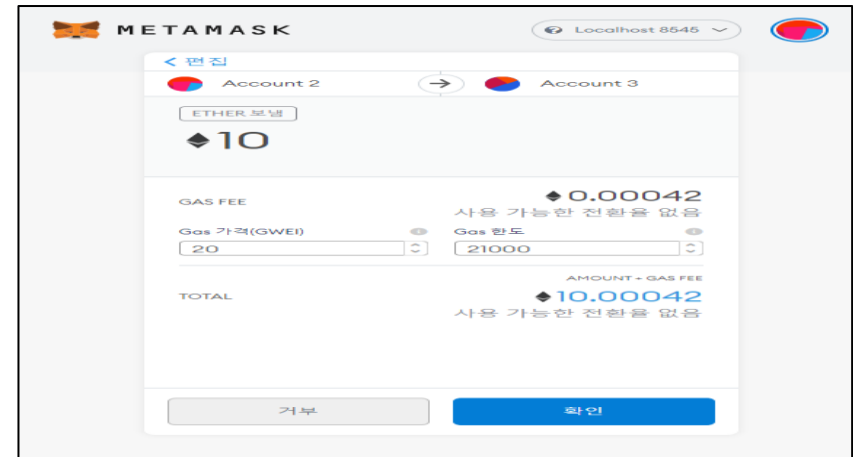
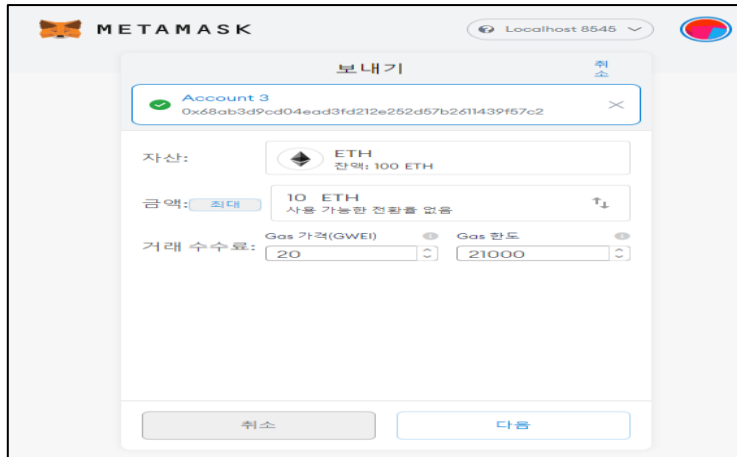
- ganache + metamask 연동



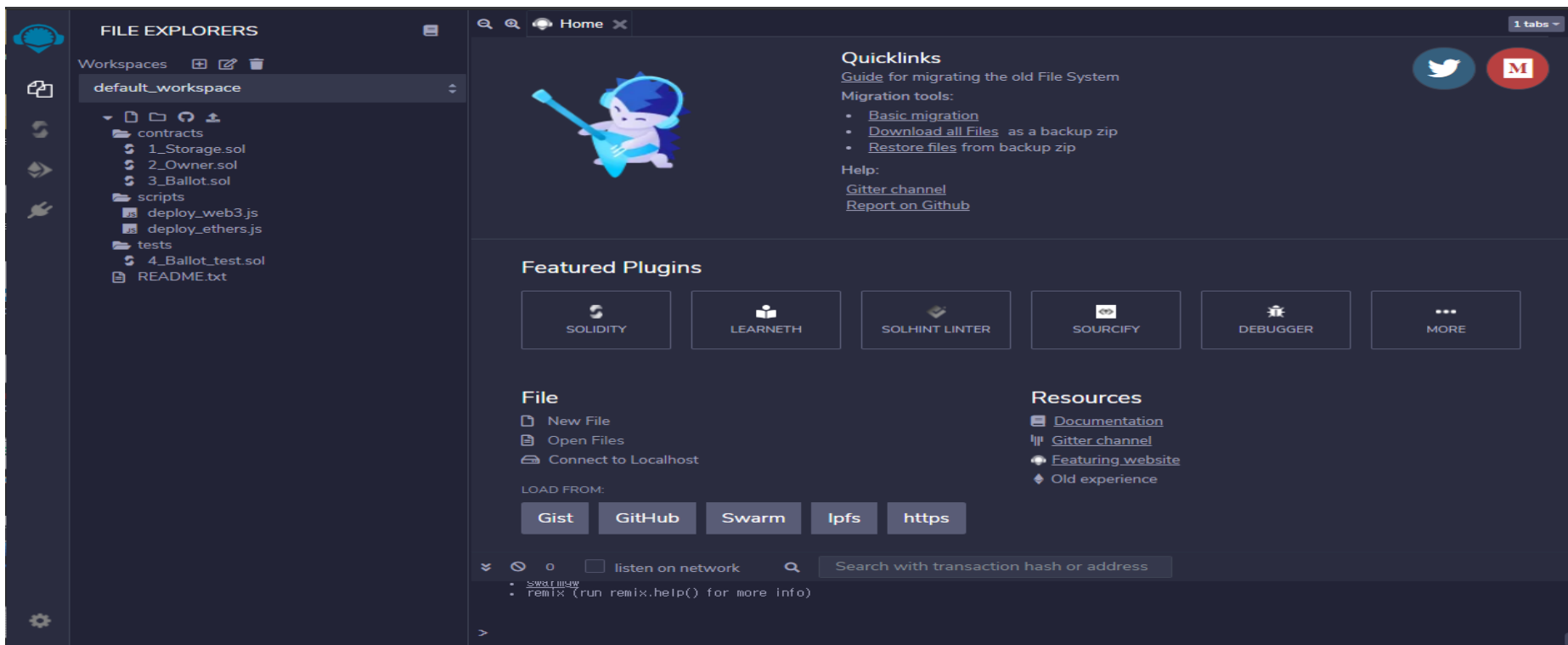
## 1

## metamask

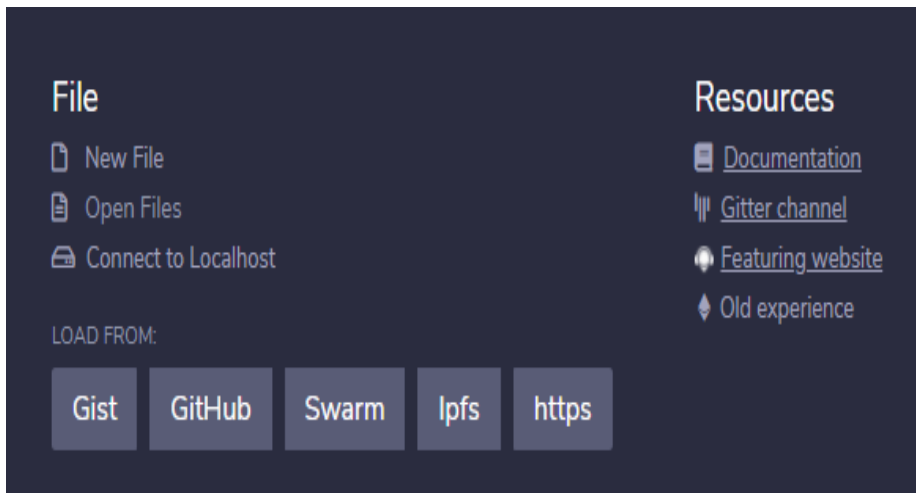
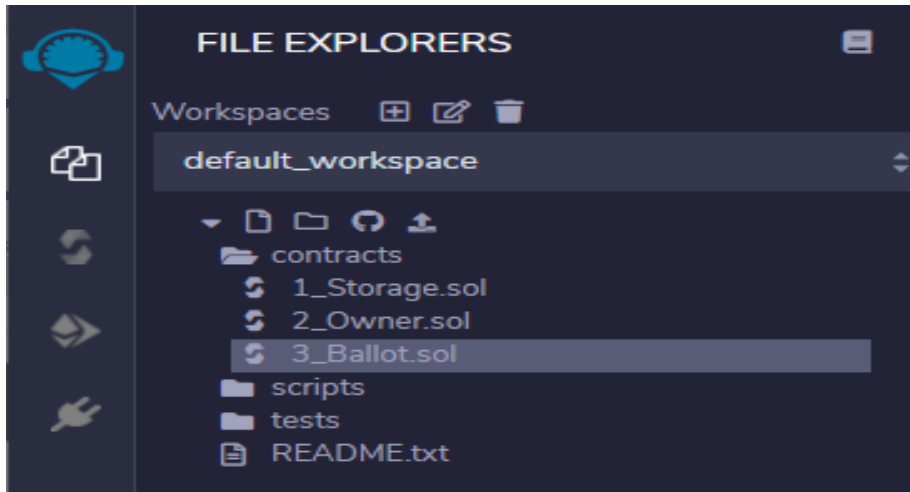
- ganache + metamask 연동



- <https://remix.ethereum.org/>(리믹스 브라우저)
  - 브라우저에서 솔리디티 프로그래밍 언어로 스마트 계약 개발과 구축을 지원하는 통합개발환경(IDE)
  - 브라우저로 사설망이나 테스트넷의 이더리움 블록체인에 연결해 스마트 계약 배포와 테스트.

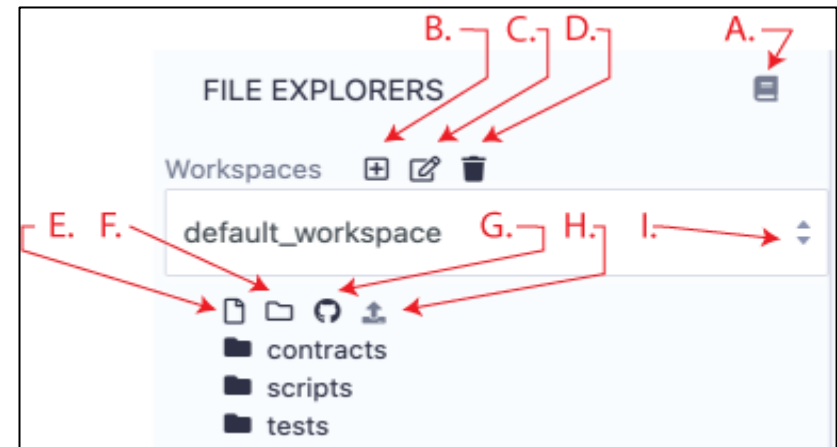


- remix 설정



## FILE EXPLORERS : 파일 스토리지

- 기본적으로 Remix IDE는 브라우저의 로컬 저장소에 있는 폴더인 작업 공간에 파일을 저장.
- 브라우저 저장소를 지우면 거기에 저장된 모든 파일이 영구적으로 삭제
- 브라우저 저장소를 사용하고 git repo를 IPFS에 저장하려면 DGIT 플러그인 사용.

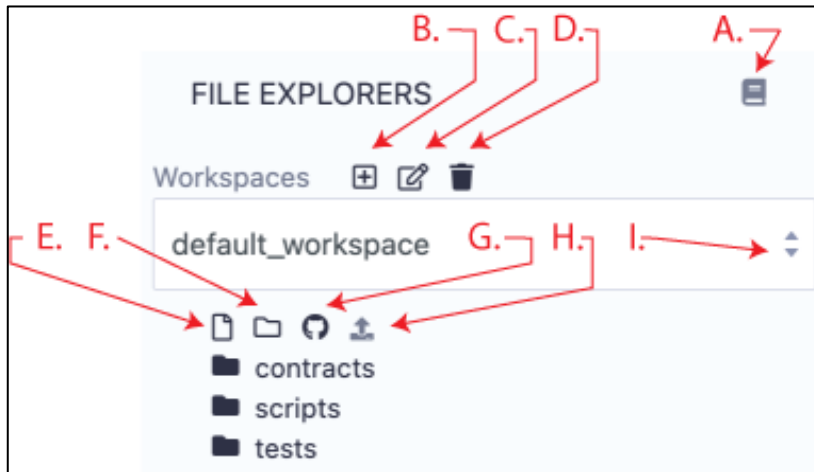


관련 메뉴:

[https://remix-ide.readthedocs.io/en/latest/file\\_explorer.html](https://remix-ide.readthedocs.io/en/latest/file_explorer.html)



- remix 설정



### FILE EXPLORERS :

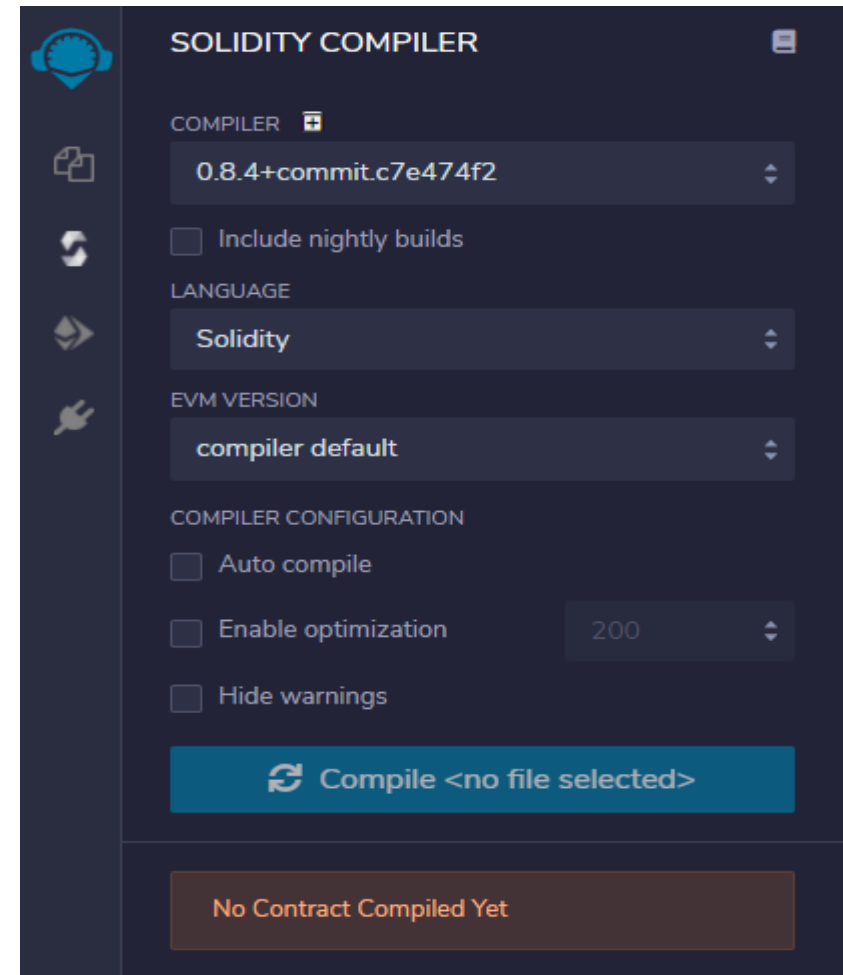
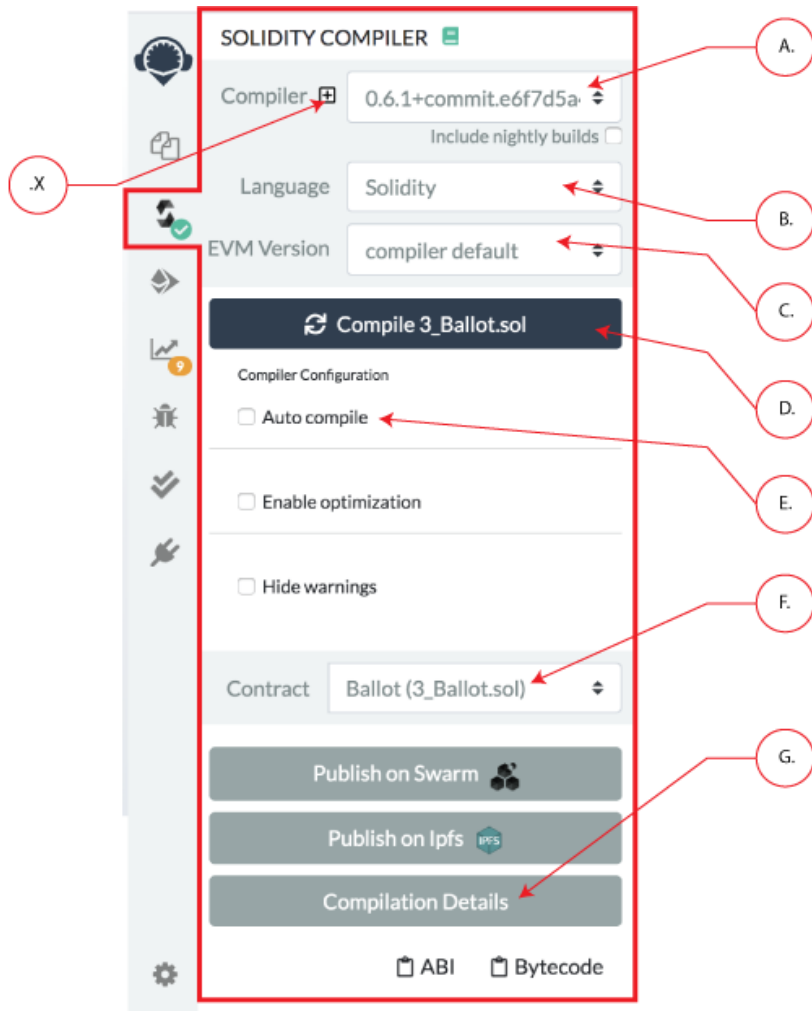
- A: 문서(이 페이지)에 대한 링크
- B: 작업 공간 추가
- C: 이름 바꾸기 작업 공간
- D: 삭제
- E: 새 파일 아이콘
- F: 현재 작업 공간에 새 폴더 생성
- G: 현재 작업 공간의 모든 파일을 Gistdp 게시  
브라우저 의 루트에 있는 파일만 게시
- H: 컴퓨터의 파일 시스템에서 브라우저의 로컬  
저장소로 파일을 업로드

관련 메뉴: [https://remix-ide.readthedocs.io/en/latest/file\\_explorer.html](https://remix-ide.readthedocs.io/en/latest/file_explorer.html)

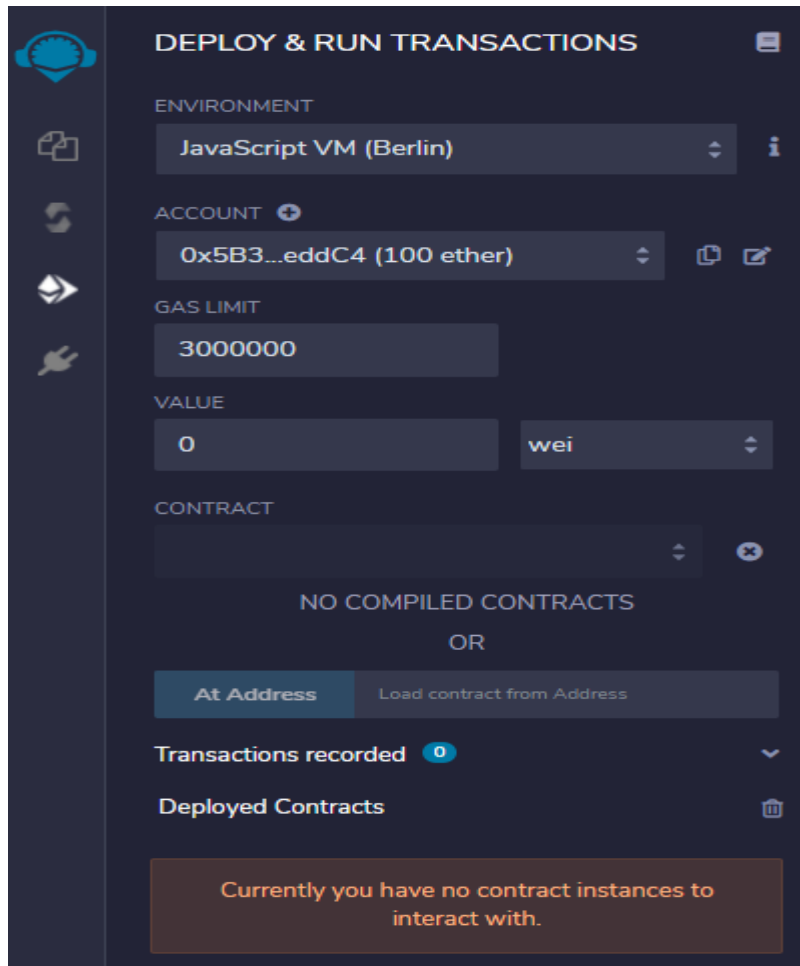
### GitHub Gist(깃허브 지스트)란

코드, 메모, 스니펫(작은 부분)을 즉시 공유할 수 있는 서비스  
(instantly share code, notes, and snippets.)

- remix 설정



- remix 설정

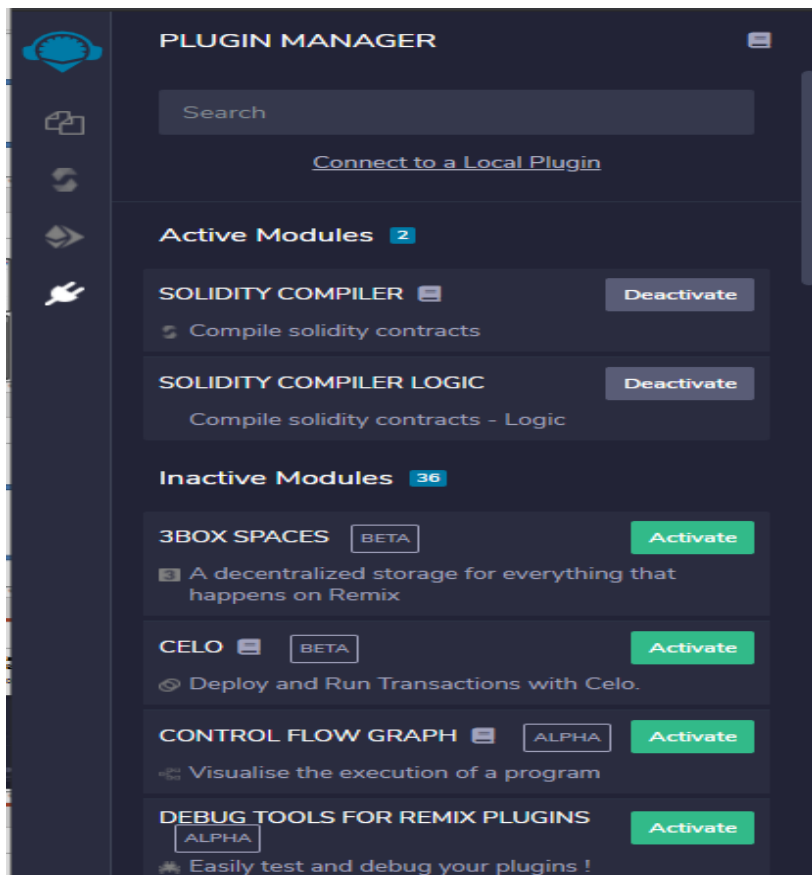


JavaScript VM: 모든 거래는 브라우저의 샌드박스 블록체인에서 실행됩니다. 이는 페이지를 새로고침할 때 아무 것도 지속되지 않음을 의미합니다. JsVM은 자체 블록체인이며 다시 로드할 때마다 새 블록체인을 시작하고 이전 블록체인은 저장되지 않습니다.

Injected Provider: Remix가 주입된 web3 공급자에 연결됩니다. Metamaskweb3를 주입하는 공급자의 예입니다.

Web3 Provider: Remix가 원격 노드에 연결됩니다. geth, parity 또는 모든 Ethereum 클라이언트와 같이 선택한 공급자에 대한 URL을 제공해야 합니다.

- remix 설정



- 플러그인 아키텍처를 통해 Remix 팀에서 만든 도구를 외부 팀에서 만든 도구와 통합 가능
- 아키텍처를 사용하면 Remix 또는 Remix의 일부만 다른 프로젝트에 통합 가능

### 권한 관리

플러그인이 작동을 위해 다른 플러그인에 액세스해야 하는 경우 권한을 요청하는 모달 창.

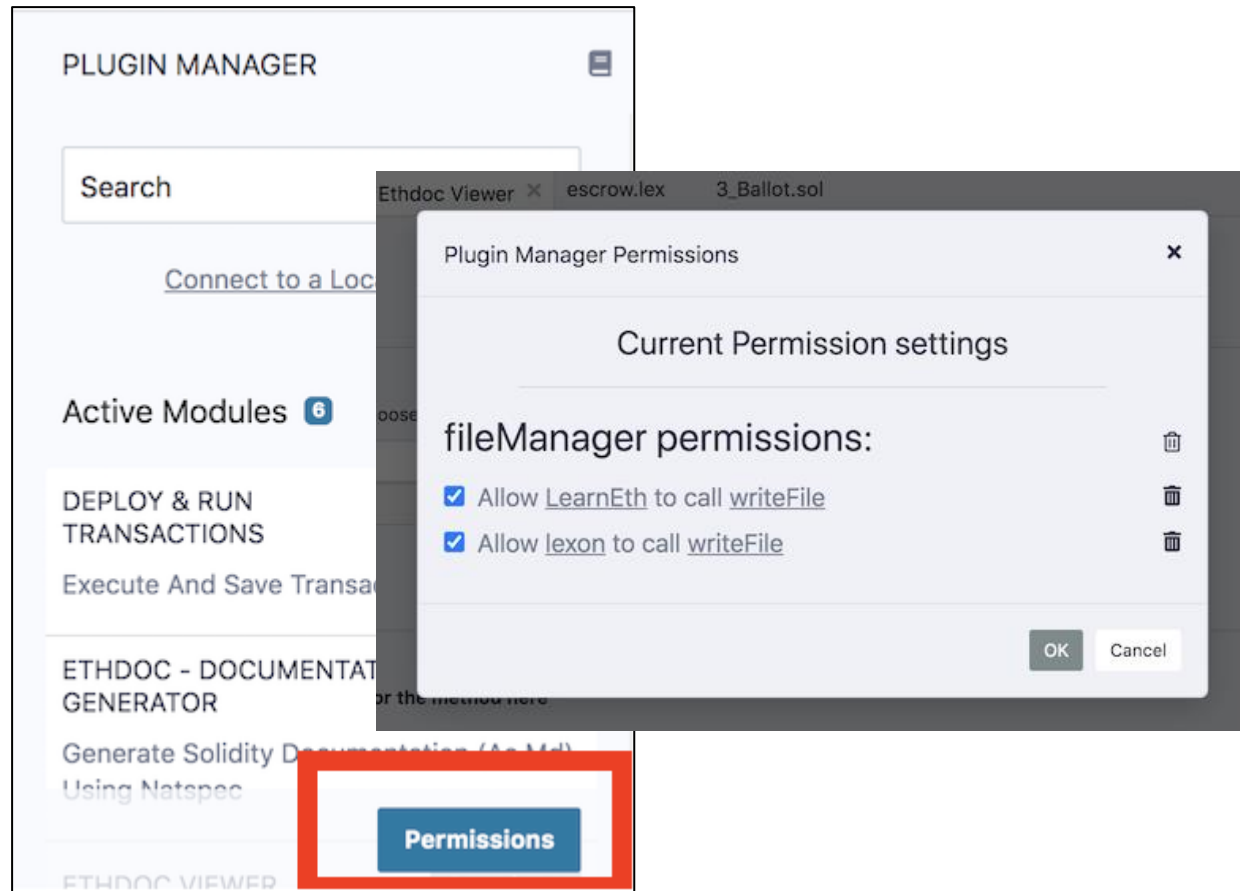
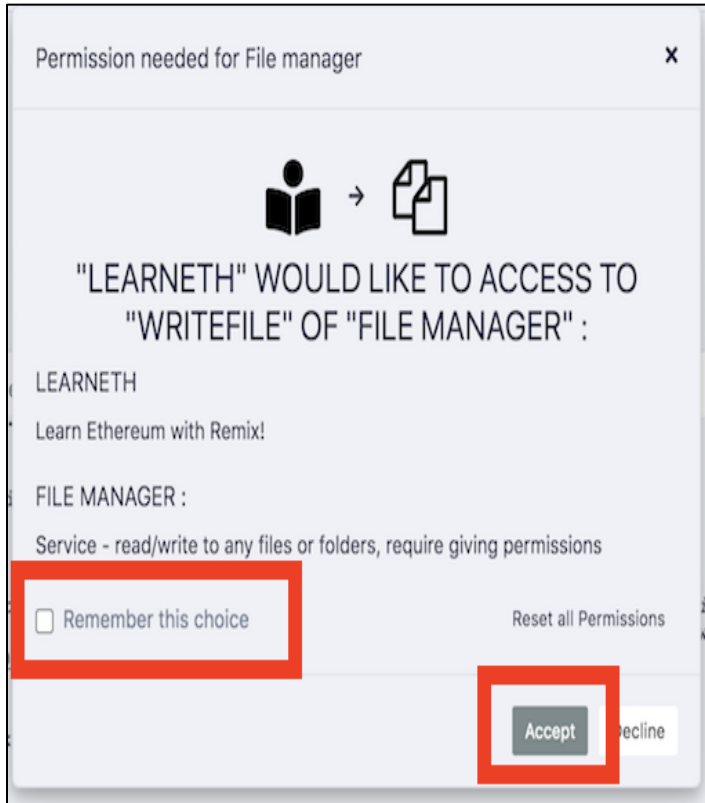
### 권한 보기

플러그인 관리자 하단 에 있는 권한 버튼을 클릭하면 플러그인에 부여한 권한

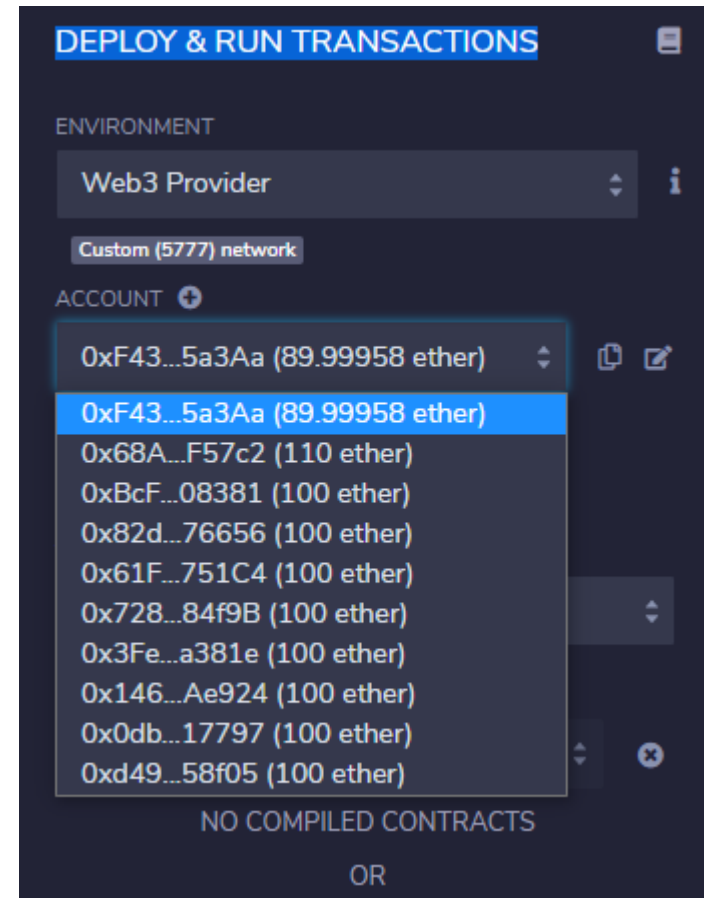
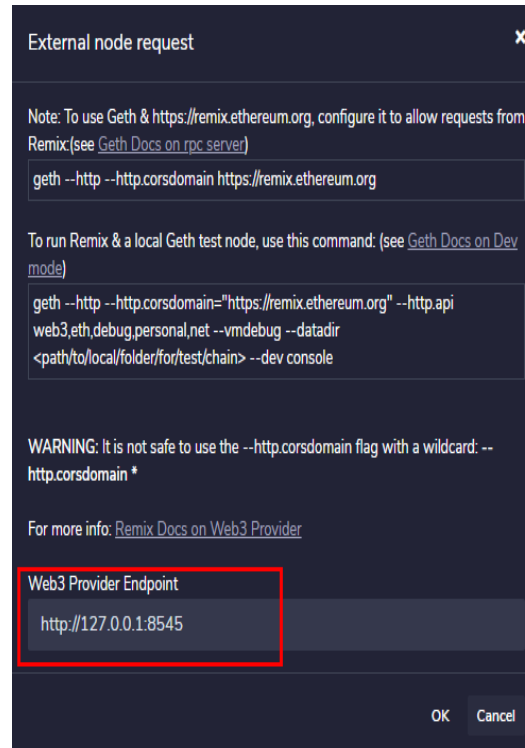
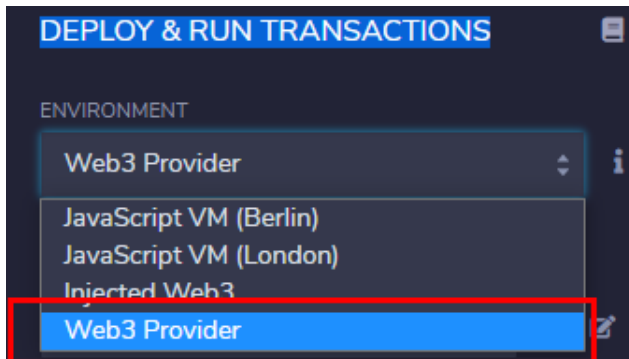
## 1

## remix

- remix 설정



- remix + ganache 연동



- Web3 Provider선택

- Web3 Provider URL확인

- 계정 연결 확인



# Q & A