

# Creating a Local Development Environment

[Kurtosis](#) has created an easy way to spin up a local NEAR testing environment using [Docker container](#). This Kurtosis NEAR Package contains the following components:

- [Indexer for Explorer](#)
- [NEAR Explorer](#)
- [NEAR Wallet](#)
- Local RPC Endpoint

[Visit here](#) to see a short demo of the package in action.

## Prerequisites

- [Docker](#)
- [Yarn](#)
- [NEAR-CLI](#)
- [Kurtosis CLI](#)
- - Start Kurtosis engine after installation using:kurtosis engine start

## Setup

### Launch Kurtosis NEAR Package

Launch your Kurtosis NEAR Package in four easy steps!

1. Launch[Docker](#)
2. Copy the[Kurtosis NEAR Package launch script](#)
3. by running the following:

```
curl -o ~/launch-local-near-cluster.sh https://raw.githubusercontent.com/kurtosis-tech/near-package/master/launch-local-near-cluster.sh -L 1. Grant write permission to the script file you just downloaded:
```

```
chmod u+x ~/launch-local-near-cluster.sh 1. Launch the Kurtosis NEAR Package:
```

If you're running the NEAR-in-Kurtosis cluster on your local machine:

~/launch-local-near-cluster.sh If you're running your NEAR-in-Kurtosis cluster on a machine you intend to access remotely, replace 1.2.3.4 with the IP address of the machine you're running the cluster on:

~/launch-local-near-cluster.sh '{"backend\_ip\_address":"1.2.3.4"}' Example response: Created directory '/Users/zerix/.neartosis' for storing all NEAR-in-Kurtosis output INFO[2022-12-06T12:59:04+05:30] Creating a new enclave for Starlark to run inside... INFO[2022-12-06T12:59:14+05:30] Enclave 'near' created successfully INFO[2022-12-06T12:59:14+05:30] Kurtosis CLI is running in a non interactive terminal. Everything will work but progress information and the progress bar will not be displayed.

```
print "Starting the near-package with input struct(backend_ip_address = \"127.0.0.1\")" Starting the near-package with input struct(backend_ip_address = "127.0.0.1")
```

```
print "Launching contract helper postgresql" Launching contract helper postgresql
```

```
print "Adding contract helper Posgresql DB running on port '5432'" Adding contract helper Posgresql DB running on port '5432'
```

```
add_service service_id="contract-helper-db" Service 'contract-helper-db' added with service GUID 'contract-helper-db-1670311755'
```

```
exec service_id="contract-helper-db" command=["sleep", "10"] Command returned with exit code '0' with no output
```

```
exec service_id="contract-helper-db" command=["psql", "-U", "near", "-c", "\"] Command returned with exit code '0' and the following output: List of databases Name | Owner | Encoding | Collate | Ctype | Access privileges -----+-----+-----+-----+-----+----- near | near | UTF8 | en_US.utf8 | en_US.utf8 | postgres | near | UTF8 | en_US.utf8 | en_US.utf8 | template0 | near | UTF8 | en_US.utf8 | en_US.utf8 | =c/near + | | | | near=CTc/near template1 | near | UTF8 | en_US.utf8 | en_US.utf8 | =c/near + | | | | near=CTc/near (4 rows)
```

```
exec service_id="contract-helper-db" command=["psql", "-U", "near", "-c", "create database indexer with owner=near"] Command returned with exit code '0' and the following output: 'CREATE DATABASE'
```

```
exec service_id="contract-helper-db" command=["psql", "-U", "near", "-c", "create database analytics with owner=near"] Command returned with exit code '0' and the following output: 'CREATE DATABASE'
```

```
exec service_id="contract-helper-db" command=["psql", "-U", "near", "-c", "create database telemetry with owner=near"] Command returned with exit code '0' and the following output: 'CREATE DATABASE'
```

```

print "Contract helper postgresql db info struct(analytics_db = \"analytics\", db_user_password = \"near\", db_username = \"near\", indexer_db = \"indexer\", private_url = struct(ip_address = \"contract-helper-db\", path = \"\", port_number = 5432, protocol = \"postgres\"), telemetry_db = \"telemetry\")" Contract helper postgresql db info struct(analytics_db = "analytics", db_user_password = "near", db_username = "near", indexer_db = "indexer", private_url = struct(ip_address = "contract-helper-db", path = "", port_number = 5432, protocol = "postgres"), telemetry_db = "telemetry")

print "Launching contract helper dynamo db" Launching contract helper dynamo db

print "Adding contract helper DynamoDB running on default port '8000'" Adding contract helper DynamoDB running on default port '8000'

add_service service_id="contract-helper-dynamo-db" Service 'contract-helper-dynamo-db' added with service GUID 'contract-helper-dynamo-db-1670311770'

print "Contract helper dynamodb info struct(private_url = struct(ip_address = \"contract-helper-dynamo-db\", path = \"\", port_number = 8000, protocol = \"TCP\"))" Contract helper dynamodb info struct(private_url = struct(ip_address = "contract-helper-dynamo-db", path = "", port_number = 8000, protocol = "TCP"))

print "Launching indexer" Launching indexer

print "Adding indexer service..." Adding indexer service...

upload_files src="github.com/kurtosis-tech/near-package/static_files/near-configs/localnet" artifact_id="8f5279c5-d012-4543-88e7-e9829b6d6040" Files uploaded with artifact ID '8f5279c5-d012-4543-88e7-e9829b6d6040'

add_service service_id="indexer-node" Service 'indexer-node' added with service GUID 'indexer-node-1670311774'

exec service_id="indexer-node" command=["sleep", "10"] Command returned with exit code '0' with no output

exec service_id="indexer-node" command=["cat", "/root/.near/validator_key.json"] Command returned with exit code '0' and the following output: { "account_id": "test.near", "public_key": "ed25519:3Kuyi2DUXdoHgoaNEvCxa1m6G8xqc6Xs7WGajaqLhNmW", "secret_key": "ed25519:2ykcMLiM7vCmsSECcgfmUzihBtNdBv7v2CxNi94sNt4R8ar4xsrMMYvtsSNGQDfSRhNWxEnZvgx2wzS9ViBiS9jW" }

print "Indexer launched with struct(private_rpc_url = struct(ip_address = \"indexer-node\", path = \"\", port_number = 3030, protocol = \"http\"), public_rpc_url = struct(ip_address = \"127.0.0.1\", path = \"\", port_number = 8332, protocol = \"http\"), validator_key = { \"account_id\": \"test.near\", \"public_key\": \"ed25519:3Kuyi2DUXdoHgoaNEvCxa1m6G8xqc6Xs7WGajaqLhNmW\", \"secret_key\": \"ed25519:2ykcMLiM7vCmsSECcgfmUzihBtNdBv7v2CxNi94sNt4R8ar4xsrMMYvtsSNGQDfSRhNWxEnZvgx2wzS9ViBiS9jW\"})" Indexer launched with struct(private_rpc_url = struct(ip_address = "indexer-node", path = "", port_number = 3030, protocol = "http"), public_rpc_url = struct(ip_address = "127.0.0.1", path = "", port_number = 8332, protocol = "http"), validator_key = { "account_id": "test.near", "public_key": "ed25519:3Kuyi2DUXdoHgoaNEvCxa1m6G8xqc6Xs7WGajaqLhNmW", "secret_key": "ed25519:2ykcMLiM7vCmsSECcgfmUzihBtNdBv7v2CxNi94sNt4R8ar4xsrMMYvtsSNGQDfSRhNWxEnZvgx2wzS9ViBiS9jW" })

print "Launching contract helper" Launching contract helper

print "Adding contract helper service running on port '3000'" Adding contract helper service running on port '3000'

add_service service_id="contract-helper-service" Service 'contract-helper-service' added with service GUID 'contract-helper-service-1670311796'

print "Contract helper launched with struct(private_url = struct(ip_address = \"contract-helper-service\", path = \"\", port_number = 3000, protocol = \"http\"), public_url = struct(ip_address = \"127.0.0.1\", path = \"\", port_number = 8330, protocol = \"http\"))" Contract helper launched with struct(private_url = struct(ip_address = "contract-helper-service", path = "", port_number = 3000, protocol = "http"), public_url = struct(ip_address = "127.0.0.1", path = "", port_number = 8330, protocol = "http"))

print "Launching explorer backend" Launching explorer backend

print "Adding explorer backend service" Adding explorer backend service

add_service service_id="explorer-backend" Service 'explorer-backend' added with service GUID 'explorer-backend-1670311799'

print "Explorer backend launched with struct(private_url = struct(ip_address = \"explorer-backend\", path = \"\", port_number = 8080, protocol = \"http\"), public_url = struct(ip_address = \"127.0.0.1\", path = \"\", port_number = 18080, protocol = \"http\"))" Explorer backend launched with struct(private_url = struct(ip_address = "explorer-backend", path = "", port_number = 8080, protocol = "http"), public_url = struct(ip_address = "127.0.0.1", path = "", port_number = 18080, protocol = "http"))

print "Launching explorer frontend" Launching explorer frontend

print "Adding explorer frontend service running on port '3000'" Adding explorer frontend service running on port '3000'

add_service service_id="explorer-frontend" Service 'explorer-frontend' added with service GUID 'explorer-frontend-

```

```
print "Explorer frontend launched with struct(public_url = struct(ip_address = \"127.0.0.1\", path = \"\", port_number = 8331, protocol = \"http\"))" Explorer frontend launched with struct(public_url = struct(ip_address = "127.0.0.1", path = "", port_number = 8331, protocol = "http"))

print "Launching wallet" Launching wallet

print "Adding wallet service running on port '3004'" Adding wallet service running on port '3004'

print "Replacing variable 'NODE_URL' to 'http://127.0.0.1:8332' using regexp: '([,{}])NODE_URL:[^,[]]'" Replacing variable 'NODE_URL' to 'http://127.0.0.1:8332' using regexp: '([,{}])NODE_URL:[^,[]]'

print "Replacing variable 'ACCOUNT_HELPER_URL' to 'http://127.0.0.1:8330' using regexp: '([,{}])ACCOUNT_HELPER_URL:[^,[]]'" Replacing variable 'ACCOUNT_HELPER_URL' to 'http://127.0.0.1:8330' using regexp: '([,{}])ACCOUNT_HELPER_URL:[^,[]]'

print "Replacing variable 'EXPLORER_URL' to 'http://127.0.0.1:8331' using regexp: '([,{}])EXPLORER_URL:[^,[]]'" Replacing variable 'EXPLORER_URL' to 'http://127.0.0.1:8331' using regexp: '([,{}])EXPLORER_URL:[^,[]]'

print "Replacing variable 'NETWORK_ID' to 'localnet' using regexp: '([,{}])NETWORK_ID:[^,[]]'" Replacing variable 'NETWORK_ID' to 'localnet' using regexp: '([,{}])NETWORK_ID:[^,[]]'

print "Replacing variable 'ACCOUNT_ID_SUFFIX' to 'test.near' using regexp: '([,{}])ACCOUNT_ID_SUFFIX:[^,[]]'" Replacing variable 'ACCOUNT_ID_SUFFIX' to 'test.near' using regexp: '([,{}])ACCOUNT_ID_SUFFIX:[^,[]]'

print "Replacing variable 'ACCESS_KEY_FUNDING_AMOUNT' to '30000000000000000000000000000000' using regexp: '([,{}])ACCESS_KEY_FUNDING_AMOUNT:[^,[]]'" Replacing variable 'ACCESS_KEY_FUNDING_AMOUNT' to '30000000000000000000000000000000' using regexp: '([,{}])ACCESS_KEY_FUNDING_AMOUNT:[^,[]]'

add_service service_id="wallet" Service 'wallet' added with service GUID 'wallet-1670311807'

print "Explorer wallet struct(public_url = struct(ip_address = \"127.0.0.1\", path = \"\", port_number = 8334, protocol = \"http\"))" Explorer wallet struct(public_url = struct(ip_address = "127.0.0.1", path = "", port_number = 8334, protocol = "http"))
```

```
===== SUCCESS
===== ACTION Paste the
following in your terminal to declare the following variables so you can use them:
```

kurtosis clean -a

```
===== SUCCESS
===== tip The URLs and validator
key value above will be the same for each run of Kurtosis, so you can safely use these values in your config files. tip If you're running
Kurtosis on a remote machine, you'll also need to:
```

- kurtosis enclave inspect near

After deploying your Kurtosis NEAR Package, you will need to setup some environment variables to make life a lot easier. Notice the ACTION sections in your terminal log from the package deployment. You will be using these exact values to setup these variables.

1. Follow the first ACTION item from the deployment log by copying all of the export commands and running them in your terminal.

Example exports: (DO NOT COPY ~ yours will be slightly different)

```
export NEAR_ENV="local" export NEAR_CLI_LOCALNET_NETWORK_ID="localnet" export
NEAR_NODE_URL="http://127.0.0.1:8332" export NEAR_CLI_LOCALNET_KEY_PATH="/Users/zerix/.neartosis/2022-06-
03T18.04.32/validator-key.json" export NEAR_WALLET_URL="http://127.0.0.1:8334" export
NEAR_HELPER_URL="http://127.0.0.1:8330" export NEAR_HELPER_ACCOUNT="test.near" export
NEAR_EXPLORER_URL="http://127.0.0.1:8331" 1. Proceed to the second ACTION item which asks you to create an alias
for local_near 2. . This is what we will use when running near-cli 3. commands with our test environment.
```

Example alias: (DO NOT COPY ~ yours will be slightly different)

```
alias local_near="NEAR_ENV="local" NEAR_CLI_LOCALNET_NETWORK_ID="localnet" NEAR_NODE_URL="http://127.0.0.1:8332"
NEAR_CLI_LOCALNET_KEY_PATH="/Users/zerix/.neartosis/2022-06-03T18.04.32/validator-key.json"
NEAR_WALLET_URL="http://127.0.0.1:8334" NEAR_HELPER_URL="http://127.0.0.1:8330"
NEAR_HELPER_ACCOUNT="test.near" NEAR_EXPLORER_URL="http://127.0.0.1:8331" near' Now replacing near with local_near
when running near-cli commands will perform these actions in your local test environment.
```

Ensure that your alias is working correctly by checking the state of the root accounttest.near .

Run the following in your terminal:

`local_near` state `test.near` This should return something similar to the following output:

[illegible]

tip The Kurtosis Team has created a great [video presentation](#) that covers the above steps as well as demoing the functionality of this local network setup.

## Using Wallet and Explorer

## Local NEAR Wallet

Now that you have [everything setup](#) , create an account using your local NEAR Wallet at 127.0.0.1:8334.

The account creation is exactly the same as on mainnet or testnet but only the passphrase recovery mode will work here. Also note that the root account is `test.near` instead of `testnet` or `mainnet`. This means that all the accounts you create will be [subaccounts](#) of `test.near`. (ex. `benji.test.near`)

tip Because the Wallet will start on the same host and port, and the Wallet stores your account information in your browser's local storage, if you've created an account with a previous Kurtosis network then the Wallet will be storing the old account's information (which won't work with your new network). If this is the case for you, you'll need to clear the Wallet's storage by visiting [your Chrome's local storage](#), removing the 127.0.0.1 entry, and refreshing the Wallet. Now that you've created an account, try interacting with it using the local CLI. In order to use this account you will need to "login" with it via CLI which will save a full access key locally for that account. [near login](#) is the command to perform this action but as you are on localnet you will need to replace near with local near .

local\_near login This launches the local wallet site and will ask for confirmation for this action. Once you authorize you should see confirmation in your terminal similar to this:

Logged in as [ kevin.test.near ] with public key [ ed25519:8EaALn... ] successfully \* Export your account ID to an environment variable by running the following: (replacing YOUR\_ACCOUNT\_ID)

export ACCOUNT\_ID=YOUR\_ACCOUNT\_ID \* Now create a test transaction by sending 1 NEAR to the root accounttest.near \* :

local\_near send ACCOUNT\_ID test.near 1 Example response: Sending 1 NEAR to test.near from kevin.test.near Loaded master account test.near key from /Users/zerix/.neartosis/2022-06-03T18.04.32/validator-key.json with public key = ed25519:3Kuyi2DUXdoHgoaNEvCxa1m6G8xqc6Xs7WGajaqLhNmW Transaction Id 3e3H5zqj9noKGYTCMqeZ5pb4NWK7tQsjYKak6ybtpgvD To see the transaction in the transaction explorer, please open this url in your browser <http://127.0.0.1:8331/transactions/3e3H5zqj9noKGYTCMqeZ5pb4NWK7tQsjYKak6ybtpgvD>

## Local NEAR Explorer

Again, now that you have [everything setup](#) you can view the transaction details of the command you just performed at the end [the last section](#) . Notice that the last line of the terminal log displays a link to the transaction details in your local NEAR Explorer.

Sending 1 NEAR to test.near from kevin.test.near Loaded master account test.near key from /Users/zerix/.neartosis/2022-06-03T18.04.32/validator-key.json with public key = ed25519:3Kuyi2DUXdoHgoaNEvCxa1m6G8xqc6Xs7WGajaqLhNmW Transaction Id 3e3H5zqj9noKGYTCMqeZ5pb4NWK7tQsjYKak6ybtpgvD To see the transaction in the transaction explorer, please open this url in your browser <http://127.0.0.1:8331/transactions/3e3H5zqj9noKGYTCMqeZ5pb4NWK7tQsjYKak6ybtpgvD> \* Click on this link or copy/paste it into your browser:

Here everything behaves exactly like thetestnet ormainnet NEAR Explorer except it is retrieving data from your local NEAR blockchain!

- If you ever need to open your local NEAR Explorer, you can always visit 127.0.0.1:8331 or run:

echo NEAR\_EXPLORER\_URL Example Response:

<http://127.0.0.1:8331>

## Deploy a Smart Contract

With everything setup and yourtest.near account created, it's time to deploy a smart contract onlocalnet . For this example you will deploy an NFT use a pre-compiled WASM smart contract from[this NFT example](#) .

- Download the smart contract:

curl -o ~/main.wasm <https://github.com/near-examples/nft-tutorial/raw/main/out/main.wasm> -L \* Deploy the smart contract:

local\_near deploy --wasmFile ~/main.wasm --accountId ACCOUNT\_ID Example response: Loaded master account test.near key from /Users/benjaminkurrek/.neartosis/2021-12-02T13.37.41/validator-key.json with public key = ed25519:AnLHi4ZAxfxFAQSXniycZS6dpBqxhmVZH3zBCZbqAS6 Starting deployment. Account id: goteam.test.near, node: <http://127.0.0.1:62285>, helper: <http://127.0.0.1:62286>, file: /Users/benjaminkurrek/main.wasm Transaction Id 7atHm2piVehEitYeMF2FxFuRJVd6ZdRQEO3K83P98GuR To see the transaction in the transaction explorer, please open this url in your browser <http://127.0.0.1:62290/transactions/7atHm2piVehEitYeMF2FxFuRJVd6ZdRQEO3K83P98GuR> Done deploying to goteam.test.near \* Click on the clink to the Explorer and verify that the contract was deployed:

Now, let's interact with the deployed contract.

- First, initialize the contract by running the following command:

local\_near call ACCOUNT\_ID new\_default\_meta '{"owner\_id": "ACCOUNT\_ID"}' --accountId ACCOUNT\_ID This will initialize the contract with some default metadata and set our account ID as the owner of the contract.

- Now mint your first NFT!

local\_near call ACCOUNT\_ID nft\_mint '{"token\_id": "team\_token", "metadata": { "title": "Go Team!", "description": "Go Team!", "media": "https://bafybeiftczwrtyr3k7a2k4vutd3amkwsmagqyhrdzlhvpt33dyjivufusq.ipfs.dweb.link/goteam-gif.gif", "copies": 1}, "receiver\_id": "ACCOUNT\_ID"}' --accountId ACCOUNT\_ID --amount 0.1 Once the NFT has been minted, you can view the token on the local wallet's collectibles tab. If you already had the wallet site open, simply refresh. Otherwise open your local NEAR Wallet instance and view your collectible.

We won't spoil what the NFT is, but once you switch over to the collectibles tab your beautiful token should be there!

## Connecting a dApp tolocalnet

The ability to develop decentralized applications locally is a dream come true for dApp developers and the Kurtosis NEAR Package really simplifies this process. Here you'll integratelocalnet into one of the examples at[near.dev](#) .

## Clone Example dApp

- Clone the [NEAR Guestbook](#)
- repository:

```
git clone https://github.com/near-examples/guest-book-examples.git
```

## Configure Network

- Open the `src/config.js`
- file inside the guestbook repo and scroll down to the `local`
- config:

```
case
```

```
'local' : return
```

```
{ networkId :
```

```
'local' , nodeUrl :
```

```
'http://localhost:3030' , keyPath :
```

```
{ process . env . HOME } /.near/validator_key.json , walletUrl :
```

```
'http://localhost:4000/wallet' , contractName :
```

`CONTRACT_NAME` } ; Here you will need to update all of the values except the `contractName` . Copy the following into your `local` case. This will automatically assign the config to your environment variables if you've specified them. This way, you don't need to change anything when running new enclaves.

```
case
```

```
'local' : return
```

```
{ networkId : process . env . NEAR_CLI_LOCALNET_NETWORK_ID
```

```
||
```

```
'local' , nodeUrl : process . env . NEAR_NODE_URL
```

```
||
```

```
'http://localhost:3030' , keyPath : process . env . NEAR_CLI_LOCALNET_KEY_PATH
```

```
||
```

```
{ process . env . HOME } /.near/validator_key.json , walletUrl : process . env . NEAR_WALLET_URL
```

```
||
```

```
'http://localhost:4000/wallet' , contractName :
```

`CONTRACT_NAME` , } ; The last thing you will need to do is set your `NODE_ENV` in your terminal to `local` so your dApp will use the values we configured above.

- Run:

```
export NODE_ENV=local
```

Your dApp is now fully configured to use `localnet` !

## Create Contract Account

As mentioned earlier, you do not need to change the `contractName` in the `config.js` file you updated earlier. This is an environment variable you will configure now. Let's quickly create a subaccount from [the account you created earlier](#) to deploy the guest-book contract to.

- Using the `local_near` CLI
- , run the following command:

```
local_near create-account guest-book.ACCOUNT_ID --masterAccount ACCOUNT_ID --initialBalance 5
```

Example Response:

```
Loaded master account test.near key from /Users/benjaminkurrek/.neartosis/2021-12-02T13.37.41/validator-key.json with public key = ed25519:AnLHi4ZAxfFAQsXniyzyZS6dpBqxhmVZH3zBCZbqAS6 Saving key to 'undefined/localnet/guest-book.goteam.test.near.json' Account guest-book.goteam.test.near for network "localnet" was created. * Export the CONTRACT_NAME * environment variable as the account you just created:
```

```
export CONTRACT_NAME=guest-book.ACCOUNT_ID
```

## Deploy Contract to localnet

With the network setup and contract account created you are now ready to launch your dApp!

- Run the following command in the root directory of the guest book repo:

yarn && yarn start Example Response:

- Open the dApp by clicking on the server address in the terminal:

Server running at <http://localhost:1234> 🌟 Built in 1.20s. You should see the Guest Book landing page:

tip If you run into any problems signing in try clearing your browser's local storage. If you've used the guest-book before your browser might think you're still logged in with yourtestnet account and it will throw an error saying it can't find that account on localnet . Once you've logged in, you can sign a message with an optional donation.

- Sign the Guest Book which will create a transaction on localnet
- .
- Once complete, open your local NEAR explorer and you can view the transaction you just created!

Congratulations! You've successfully deployed and interacted with a dApp on a local NEAR blockchain!

## Managing NEAR Packages

The Kurtosis NEAR Packages you create will continue to run on your local machine for as long as your Docker engine is running. This package runs inside of a Kurtosis "enclave" which is an environment isolated from both your computer and other enclaves. In practice, this means that you can have multiple independent local NEAR clusters running on your machine simply by rerunning the script we executed from the [setup instructions](#) .

### View Package Status

- To see the status of your existing enclaves, run:

```
kurtosis enclave ls
```

### View Package Details

- To see detailed information about an enclave, copy an enclave ID and run:

```
kurtosis enclave inspect near
```

### Terminate Package

- To shut down your NEAR Package and free up resources on your machine, run the following:

```
kurtosis enclave stop near
```

note You will not be able to restart the cluster! If this is something you need, please [file an issue here](#) so we can prioritize it.

### Delete Package

- Stopping an enclave leaves its resources intact so that you can examine them if need be. To destroy a stopped enclave and free its resources, run:

```
kurtosis clean
```

### Delete All Package

If you would like to destroy all enclaves, regardless of if they're running, pass the -a flag to clean like so:

```
kurtosis clean -a
```

This can be a handy way to clear all your Kurtosis data. [Edit this page](#) Last updated on Feb 8, 2024 by matiasbenary

Was this page helpful? Yes No

[Previous Integration Tests](#) [Next Deploying and Using](#)