LiquidApps

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- vRAM guide for experts
- EOS dApps and Their RAM Expenses

1.2.2 Videos

- Developer Explains - Decentralized Dapp Scaling w/ IPFS! How LiquidApps Dapp Service Providers Work
- EOS Weekly - The LiquidApps Game-Changer

- EOS Weekly - Unlimited DSP Possibilities

1.2.3 Have questions?

- Join our Dev Telegram channel
- Join our Telegram channel

1.2.4 Want more information?

- Read our whitepaper and subscribe to our Medium posts.

1.3 Zeus Getting Started

1.3.1 Overview

Zeus-cmd is an extensible command line tool. SDK extensions come packaged in "boxes" and are served through IPFS. Zeus is currently in alpha.

- zeus-sdk
- overview of boxes

1.3.2 Features:

- Smart contract templating with a single command
- Install nodeos, keosd, cleos, and eosio.cdt with a single command
- Simulate a blockchain node with a single command
- Test, compile, and deploy smart contracts
- Easily migrate a contract to a different EOSIO chain such as the Kylin and Jungle testnets or the mainnet
- Design fluid dApp frontends
- Cross-platform (Windows, OS X, Linux)
- Easily install necessary libraries with a package manager
- Truffle-like interface
- Manage development lifecycle with version control
- Open source (BSD License)
- And more…

1.3.3 Hardware Requirements

- 16GB RAM
- 2 CPU Cores

1.3.4 Prerequisites

- nodejs == 10.x (nvm recommended, install at bottom of doc)
- curl
- cmake
- make

1.3.5 Recommended eosio.cdt and eosio versions

Automatically installed with `zeus unbox helloworld`

- eosio.cdt v1.6.1
- eosio v1.8.4

1.3.6 Install Zeus

```
npm install -g @liquidapps/zeus-cmd
```

1.3.7 Update

```
npm update -g @liquidapps/zeus-cmd
```

1.3.8 Test

```
zeus unbox helloworld
cd helloworld
zeus test
```

1.3.9 Try out a game!

LiquidApps' take on Elemental Battles: https://cardgame1112.dnsregistry1.com/ | code

The game incorporates:

- vRAM - light-weight caching solution for EOSIO based RAM
- LiquidAccounts - EOSIO accounts that live in vRAM instead of RAM
- LiquidDNS - DNS service on the blockchain | contract table
- Frontend stored on IPFS
- user data is stored in the vRAM `dapp::multi_index` table (vRAM) | code
- keys stored in `dapp::multi_index` table | code
- keys created using the account name and password as seed phrases | code
- eosjs-ecc's `seedPrivate` method is used to create the keypair | code
- logic to create LiquidAccount transactions | code

To launch locally:

```
zeus unbox cardgame
cd cardgame
zeus migrate
zeus run frontend main
```

1.3.10 Samples Boxes

```
zeus unbox <INSERT_BOX>
```

vRAM Boxes

- coldtoken - vRAM based eosio.token
- deepfreeze - vRAM based cold storage contract
- vgrab - vRAM based airgrab for eosio.token
- registry - vRAM based item registration

Zeus Extension Boxes

- contract-migrations-extensions - contract create/deployment command template, deploy contract and allocate DAPP tokens
- test-extensions - provides logic to test smart contract with unit tests
- eos-extensions - install eos/eosio.cdt, launch local nodeos, launch system contracts
- unbox-extensions - logic to unbox zeus boxes, list all boxes, and deploy a new box
- demux - install EOSIO's demux backend to capture events for contracts using the state-history plugin

DAPP Services Boxes

- ipfs-dapp-service - utilize the dapp::multi_index table to store data in IPFS (vRAM) instead of RAM
- cron-dapp-service - schedule CRON tasks on-chain
- oracle-dapp-service - provide oracle services
- readfn-dapp-service - read a contract function without the need to submit a trx to the chain
- vaccounts-dapp-service - EOSIO accounts that live in vRAM instead of RAM

Miscellaneous Boxes

- microauctions - twin reverse dutch auctions used in DAPP's generation event
- eos-detective-reports - EOS Detective Reports - by EOSNation - https://eosdetective.io/
- helloworld - Hello World
- token - Standard eosio.token
- airhodl - First ever Air-HODL

1.3.11 Zeus Options

please note: zeus commands are directory sensitive, all commands should be performed in root of box

Zeus compile

Compile a smart contract

```
zeus compile

# optional flags:

--all # compile all contracts
# default: true
--chain # chain to work on
# default: eos
```

Zeus migrate

Compile and migrate a smart contract to another network such as the Kylin Testnet, Jungle Testnet, or Mainnet

```
zeus key import <CONTRACT_ACCOUNT_NAME> --owner-private-key <KEY> --active-private-
↪key <KEY>
zeus create contract-deployment <CONTRACT_FILE_NAME> <CONTRACT_ACCOUNT_NAME>
zeus migrate --network=kylin --creator=<CONTRACT_ACCOUNT_NAME> --creator-key=<ACTIVE_
↪PRIVATE_KEY>

# optional flags:

--compile-all # compile all contracts
# default: true
--wallet # keosd wallet to use
# default: zeus
--creator-key # contract creator private key
# default: (eosio test key) 5KQwrPbwdL6PhXujxW37FSSQZ1JiwsST4cqQzDeyXtP79zkvFD3
--creator # account to set contract to
# default: eosio
--reset # reset testing environment
# default: true
--chain # chain to work on
# default: eos
--network # network to work on (other options, kylin, jungle, mainnet)
# default: development (local)
--verbose-rpc # verbose logs for blockchain communication
# default: false
--storage-path # path for persistent storage',
# default: path.join(require('os').homedir(), '.zeus')
--stake # account EOSIO staking amount
# default: '30.0000'
--no-compile-all # do not compile contracts
--no-reset # do not reset local testing environment
```

Zeus test

Compile and unit test a smart contract

```
zeus test

# optional flags:

--compile-all # compile all contracts
# default: true
--wallet # keosd wallet to use
# default: zeus
--creator-key # contract creator key
# default: (eosio test key) 5KQwrPbwdL6PhXujxW37FSSQZ1JiwsST4cqQzDeyXtP79zkvFD3
--creator # account to set contract to
# default: eosio
--reset # reset testing environment
# default: true
--chain # chain to work on
# default: eos
--network # network to work on (other options, kylin, jungle, mainnet)
# default: development (local)
--verbose-rpc # verbose logs for blockchain communication
# default: false
--storage-path # path for persistent storage',
# default: path.join(require('os').homedir(), '.zeus')
--stake # account EOSIO staking amount
# default: '30.0000'
--no-compile-all # do not compile contracts
--no-reset # do not reset local testing environment
```

Zeus Import/Export Keys

Import and export keys to your Zeus wallet. **Please note by default keys are imported without encryption.**

```
zeus key import <ACCOUNT_NAME> --owner-private-key <KEY> --active-private-key <KEY>

# optional flags:

--encrypted # encrypt the account keys with a password
# default: false
--storage # path to the wallet which will store the key
# default: ${home}/.zeus/networks
--network # network to work on (other options, kylin, jungle, mainnet)
# development (local)
--password # password to encrypt the keys with

zeus key export <ACCOUNT_NAME>

# optional flags:

--encrypted # exports encrypted key
# default: false
--storage # path to where the key is stored
# default: ${home}/.zeus/networks
--network # network to work on (other options, kylin, jungle, mainnet)
# default: development (local)
--password # password to decrypt the keypair
```

Help

```
zeus --help
```

List Boxes

Lists all available zeus boxes that can be unboxed.

```
zeus list-boxes
```

Update Boxes

Updates zeus boxes for currently unboxed project

```
zeus update --boxes
```

1.3.12 Project structure

Directory structure

```
    extensions/
    contracts/
    frontends/
    models/
    test/
    migrations/
    utils/
    services/
    zeus-box.json
    zeus-config.js
```

zeus-box.json

Add commands, NPM intalls, ignores, and command hooks

```
    {
      "ignore": [
        "README.md"
      ],
      "commands": {
        "Compile contracts": "zeus compile",
        "Migrate contracts": "zeus migrate",
        "Test contracts": "zeus test"
      },
      "install":{
          "npm": {

          }
      },
      "hooks": {
```

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```
        "post-unpack": "echo hello",
        "post-install": "git clone ..."
      }
    }
```

zeus-config.js

Configure zeus environments available to interact with

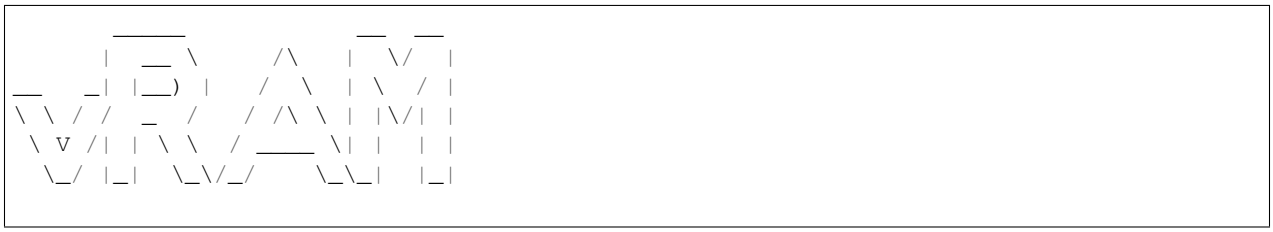
```
    module.exports = {
        defaultArgs:{
          chain:"eos",
          network:"development"
        },
        chains:{
            eos:{
                networks: {
                    development: {
                        host: "localhost",
                        port: 7545,
                        network_id: "*", // Match any network id
                        secured: false
                    },
                    jungle: {
                        host: "jungle2.cryptolions.io",
                        port: 80,
                        network_id: "*", // Match any network id
                        secured: false
                    },
                    kylin: {
                        host: "api.kylin.eosbeijing.one",
                        port: 80,
                        network_id: "*",
                        secured: false
                    },
                    mainnet:{
                        host: "bp.cryptolions.io",
                        port: 8888,
                        network_id: "*", // Match any network id
                        secured: false
                    }
                }
            }
        }
    };
```

1.3.13 Notes regarding permissions errors:

Recommend using Node Version Manager (nvm)

```
curl -o- https://raw.githubusercontent.com/creationix/nvm/v0.34.0/install.sh | bash
# use install instructions provided to set PATH
nvm install 10
nvm use 10
```

1.4 vRAM Getting Started



1.4.1 Prerequisites

- Zeus
- Kylin Account
- If testing on Kylin: eosio v1.8.1

1.4.2 Unbox sample template

This box supports all DAPP Services and unit tests and is built to integrate your own vRAM logic.

```
mkdir mydapp; cd mydapp
zeus unbox dapp --no-create-dir
zeus create contract mycontract
```

1.4.3 Or use one of our template contracts

```
# unbox coldtoken contract and all dependencies
zeus unbox coldtoken
cd coldtoken
# unit test coldtoken contract locally
zeus test
```

1.4.4 Add your contract logic

in contract/eos/mycontract/mycontract.cpp

```
#pragma once

#include "../dappservices/log.hpp"
#include "../dappservices/plist.hpp"
#include "../dappservices/plisttree.hpp"
#include "../dappservices/multi_index.hpp"

#define DAPPSERVICES_ACTIONS() \
  XSIGNAL_DAPPSERVICE_ACTION \
  LOG_DAPPSERVICE_ACTIONS \
  IPFS_DAPPSERVICE_ACTIONS

/*** IPFS: (xcommit)(xcleanup)(xwarmup) | LOG: (xlogevent)(xlogclear) ***/
```

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```
#define DAPPSERVICE_ACTIONS_COMMANDS() \
  IPFS_SVC_COMMANDS()LOG_SVC_COMMANDS()

/*** UPDATE CONTRACT NAME ***/
#define CONTRACT_NAME() mycontract

using std::string;

CONTRACT_START()
  public:

  /*** YOUR LOGIC ***/

  private:
    struct [[eosio::table]] vramaccounts {
      asset    balance;
      uint64_t primary_key()const { return balance.symbol.code().raw(); }
    };

    /*** VRAM MULTI_INDEX TABLE ***/
    typedef dapp::multi_index<"vaccounts"_n, vramaccounts> cold_accounts_t;

    /*** FOR CLIENT SIDE QUERY SUPPORT ***/
    typedef eosio::multi_index<".vaccounts"_n, vramaccounts> cold_accounts_t_v_abi;
    TABLE shardbucket {
      std::vector<char> shard_uri;
      uint64_t shard;
      uint64_t primary_key() const { return shard; }
    };
    typedef eosio::multi_index<"vaccounts"_n, shardbucket> cold_accounts_t_abi;

/*** ADD ACTIONS ***/
CONTRACT_END((your)(actions)(here))
```

1.4.5 Add your contract unit tests

in tests/mycontract.spec.js

```
import 'mocha';
require('babel-core/register');
require('babel-polyfill');
const { assert } = require('chai');
const { getCreateKeys } = require('../extensions/helpers/key-utils');
const { getNetwork } = require('../extensions/tools/eos/utils');
var Eos = require('eosjs');
const getDefaultArgs = require('../extensions/helpers/getDefaultArgs');
const artifacts = require('../extensions/tools/eos/artifacts');
const deployer = require('../extensions/tools/eos/deployer');
const { genAllocateDAPPTokens } = require('../extensions/tools/eos/dapp-services');

/*** UPDATE CONTRACT CODE ***/
var contractCode = 'mycontract';

var ctrt = artifacts.require(`./${contractCode}/`);
const delay = ms => new Promise(res => setTimeout(res, ms));
```

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```
describe(`${contractCode} Contract`, () => {
  var testcontract;

  /*** SET CONTRACT NAME(S) ***/
  const code = 'airairairai1';
  const code2 = 'testuser5';
  var account = code;

  before(done => {
    (async () => {
      try {

        /*** DEPLOY CONTRACT ***/
        var deployedContract = await deployer.deploy(ctrt, code);

        /*** DEPLOY ADDITIONAL CONTRACTS ***/
        var deployedContract2 = await deployer.deploy(ctrt, code2);

        await genAllocateDAPPTokens(deployedContract, 'ipfs');
        var selectedNetwork = getNetwork(getDefaultArgs());
        var config = {
          expireInSeconds: 120,
          sign: true,
          chainId: selectedNetwork.chainId
        };
        if (account) {
          var keys = await getCreateKeys(account);
          config.keyProvider = keys.active.privateKey;
        }
        var eosvram = deployedContract.eos;
        config.httpEndpoint = 'http://localhost:13015';
        eosvram = new Eos(config);
        testcontract = await eosvram.contract(code);
        done();
      } catch (e) {
        done(e);
      }
    })();
  });

  /*** DISPLAY NAME FOR TEST, REPLACE 'coldissue' WITH ANYTHING ***/
  it('coldissue', done => {
    (async () => {
      try {

        /*** SETUP VARIABLES ***/
        var symbol = 'AIR';

        /*** DEFAULT failed = false, SET failed = true IN TRY/CATCH BLOCK TO FAIL␣
↪TEST ***/
        var failed = false;

        /*** SETUP CHAIN OF ACTIONS ***/
        await testcontract.create({
          issuer: code2,
          maximum_supply: `1000000000.0000 ${symbol}`
```

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```
        }, {
          authorization: `${code}@active`,
          broadcast: true,
          sign: true
        });

        /*** CREATE ADDITIONAL KEYS AS NEEDED ***/
        var key = await getCreateKeys(code2);

        var testtoken = testcontract;
        await testtoken.coldissue({
          to: code2,
          quantity: `1000.0000 ${symbol}`,
          memo: ''
        }, {
          authorization: `${code2}@active`,
          broadcast: true,
          keyProvider: [key.active.privateKey],
          sign: true
        });

        /*** ADD DELAY BETWEEN ACTIONS ***/
        await delay(3000);

        /*** EXAMPLE TRY/CATCH failed = true ***/
        try {
          await testtoken.transfer({
            from: code2,
            to: code,
            quantity: `100.0000 ${symbol}`,
            memo: ''
          }, {
            authorization: `${code2}@active`,
            broadcast: true,
            keyProvider: [key.active.privateKey],
            sign: true
          });
        } catch (e) {
          failed = true;
        }

        /*** ADD CUSTOM FAILURE MESSAGE ***/
        assert(failed, 'should have failed before withdraw');

        /*** ADDITIONAL ACTIONS ... ***/

        done();
      } catch (e) {
        done(e);
      }
    })();
  });

  /*** USE it.skip TO CONTINUE WITH UNIT TEST IF TEST FAILS ***/
  it.skip('it.skip does not assert and continues test if fails' ...
});
```

1.4.6 Compile and test

```
zeus test
```

1.4.7 Deploy Contract

```
export DSP_ENDPOINT=https://kylin-dsp-1.liquidapps.io
export KYLIN_TEST_ACCOUNT=<ACCOUNT_NAME>
export KYLIN_TEST_PUBLIC_KEY=<ACTIVE_PUBLIC_KEY>
# Buy RAM:
cleos -u $DSP_ENDPOINT system buyram $KYLIN_TEST_ACCOUNT $KYLIN_TEST_ACCOUNT "50.0000␣
↪EOS" -p $KYLIN_TEST_ACCOUNT@active
# Set contract code and abi
cleos -u $DSP_ENDPOINT set contract $KYLIN_TEST_ACCOUNT ../contract -p $KYLIN_TEST_
↪ACCOUNT@active

# Set contract permissions
cleos -u $DSP_ENDPOINT set account permission $KYLIN_TEST_ACCOUNT active "{\
↪"threshold\":1,\"keys\":[{\"weight\":1,\"key\":\"$KYLIN_TEST_PUBLIC_KEY\"}],\
↪"accounts\":[{\"permission\":{\"actor\":\"$KYLIN_TEST_ACCOUNT\",\"permission\":\
↪"eosio.code\"},\"weight\":1}]}" owner -p $KYLIN_TEST_ACCOUNT@active
```

1.4.8 Select and stake DAPP for DSP package

- Use the faucet to get some DAPP tokens on Kylin
- Information on: DSP Packages and staking DAPP/DAPPHDL (AirHODL token)

```
export PROVIDER=uuddlrlrbass
export PACKAGE_ID=package1

# select your package:
export SERVICE=ipfsservice1
cleos -u $DSP_ENDPOINT push action dappservices selectpkg "[\"$KYLIN_TEST_ACCOUNT\",\"
↪$PROVIDER\",\"$SERVICE\",\"$PACKAGE_ID\"]" -p $KYLIN_TEST_ACCOUNT@active

# Stake your DAPP to the DSP that you selected the service package for:
cleos -u $DSP_ENDPOINT push action dappservices stake "[\"$KYLIN_TEST_ACCOUNT\",\"
↪$PROVIDER\",\"$SERVICE\",\"50.0000 DAPP\"]" -p $KYLIN_TEST_ACCOUNT@active
```

1.4.9 Test

Finally you can now test your vRAM implementation by sending an action through your DSP's API endpoint

```
cleos -u $DSP_ENDPOINT push action $KYLIN_TEST_ACCOUNT youraction1 "[\"param1\",\
↪"param2\"]" -p $KYLIN_TEST_ACCOUNT@active

# coldtoken (issue / transfer use vRAM):
cleos -u $DSP_ENDPOINT push action $KYLIN_TEST_ACCOUNT create "[\"$KYLIN_TEST_ACCOUNT\
↪",\"1000000000 TEST\"]" -p $KYLIN_TEST_ACCOUNT
cleos -u $DSP_ENDPOINT push action $KYLIN_TEST_ACCOUNT issue "[\"$KYLIN_TEST_ACCOUNT\
↪",\"1000 TEST\",\"yay vRAM\"]" -p $KYLIN_TEST_ACCOUNT
cleos -u $DSP_ENDPOINT push action $KYLIN_TEST_ACCOUNT transfer "[\"$KYLIN_TEST_
↪ACCOUNT\",\"natdeveloper\",\"1000 TEST\",\"yay vRAM\"]" -p $KYLIN_TEST_ACCOUNT
```

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The result should look like:

```
executed transaction:␣
↪865a3779b3623eab94aa2e2672b36dfec9627c2983c379717f5225e43ac2b74a  104 bytes  67049␣
↪us
#  yourcontract <= yourcontract::youraction1         {"param1":"param1","param2":
↪"param2"}
>> {"version":"1.0","etype":"service_request","payer":"yourcontract","service":
↪"ipfsservice1","action":"commit","provider":"","data":"DH......"}
```

1.4.10 Get table row

```
# zeus:
zeus get-table-row "CONTRACT_ACCOUNT" "TABLE_NAME" "SCOPE" "TABLE_PRIMARY_KEY" --
↪endpoint $DSP_ENDPOINT | python -m json.tool
# curl:
curl http://$DSP_ENDPOINT/v1/dsp/ipfsservice1/get_table_row -d '{"contract":"CONTRACT_
↪ACCOUNT","scope":"SCOPE","table":"TABLE_NAME","key":"TABLE_PRIMARY_KEY"}' | python -
↪m json.tool

# coldtoken:
zeus get-table-row $KYLIN_TEST_ACCOUNT "accounts" $KYLIN_TEST_ACCOUNT "TEST" --
↪endpoint $DSP_ENDPOINT | python -m json.tool
curl http://$DSP_ENDPOINT/v1/dsp/ipfsservice1/get_table_row -d '{"contract":"CONTRACT_
↪ACCOUNT","scope":"CONTRACT_ACCOUNT","table":"accounts","key":"TEST"}' | python -m␣
↪json.tool
```

1.5 vRAM Getting Started - without zeus

```
       ______                __  __
      |  __ \      /\       |  \/  |
__    _| |__) |    /  \      | \  / |
\ \  / /  _  /    / /\ \     | |\/| |
 \ V /| | \ \   / ____ \|  |  | |
  \_/ |_|  \_\/_/    \_\_|  |_|
```

1.5.1 Hardware Requirements

1.5.2 Prerequisites

- eosio.cdt v1.6.1
- eosio v1.7.4
- If testing on Kylin: eosio v1.8.1
- Kylin Account

1.5.3 Install

Clone into your project directory:

```
git clone  --single-branch --branch v1.4 --recursive https://github.com/liquidapps-io/
↪dist
```

1.5.4 Modify your contract

vRAM provides a drop in replacement for the `eosio::multi_index` table that is also interacted with in the same way as the traditional `eosio::multi_index` table making it very easy and familiar to use. Please note that secondary indexes are not currently implemented for `dapp::multi_index` tables.

To access the vRAM table, add the following lines to your smart contract:

At header:

```
#include "../dist/contracts/eos/dappservices/multi_index.hpp"

#define DAPPSERVICES_ACTIONS() \
    XSIGNAL_DAPPSERVICE_ACTION \
    IPFS_DAPPSERVICE_ACTIONS

#define DAPPSERVICE_ACTIONS_COMMANDS() \
    IPFS_SVC_COMMANDS()

#define CONTRACT_NAME() mycontract

CONTRACT_START()
   public:
```

Replace eosio::multi_index

```
/*** REPLACE ***/
typedef eosio::multi_index<"accounts"_n, account> accounts_t;

/*** WITH ***/
typedef dapp::multi_index<"accounts"_n, account> accounts_t;

/*** ADD (for client side query support): ***/
typedef eosio::multi_index<".accounts"_n, account> accounts_t_v_abi;
TABLE shardbucket {
    std::vector<char> shard_uri;
    uint64_t shard;
    uint64_t primary_key() const { return shard; }
};
typedef eosio::multi_index<"accounts"_n, shardbucket> accounts_t_abi;
```

Add actions dispatcher

```
CONTRACT_END((youraction1)(youraction2)(youraction2))
```

1.5.5 Compile

```
eosio-cpp -abigen -o contract.wasm contract.cpp
```

1.5.6 Deploy Contract

```
export DSP_ENDPOINT=https://kylin-dsp-1.liquidapps.io
export KYLIN_TEST_ACCOUNT=
export KYLIN_TEST_PUBLIC_KEY=
# Set contract code and abi
cleos -u $DSP_ENDPOINT set contract $KYLIN_TEST_ACCOUNT ../contract -p $KYLIN_TEST_
↪ACCOUNT@active
# Set contract permissions
cleos -u $DSP_ENDPOINT set account permission $KYLIN_TEST_ACCOUNT active "{\
↪"threshold\":1,\"keys\":[\"$KYLIN_TEST_PUBLIC_KEY\"],\"accounts\":[{\"permission\":
↪{\"actor\":\"eosio.code\",\"permission\":\"active\"},\"weight\":1}]}" active -p
↪$KYLIN_TEST_ACCOUNT@active
```

1.5.7 Select and stake DAPP for DSP package

DSP Package and staking

1.5.8 Test

Finally you can now test your vRAM implementation by sending an action through your DSP's API endpoint.

The endpoint can be found in the package table of the dappservices account on all chains.

```
cleos -u $DSP_ENDPOINT push action $KYLIN_TEST_ACCOUNT youraction1 "[\"param1\",\
↪"param2\"]" -p $KYLIN_TEST_ACCOUNT@active
```

The result should look like:

```
executed transaction:␣
↪865a3779b3623eab94aa2e2672b36dfec9627c2983c379717f5225e43ac2b74a  104 bytes  67049␣
↪us
#  yourcontract <= yourcontract::youraction1         {"param1":"param1","param2":
↪"param2"}
>> {"version":"1.0","etype":"service_request","payer":"yourcontract","service":
↪"ipfsservice1","action":"commit","provider":"","data":"DH......"}
```

1.5.9 Get table row

```
curl http://$DSP_ENDPOINT/v1/dsp/ipfsservice1/get_table_row -d '{"contract":"CONTRACT_
↪ACCOUNT","scope":"SCOPE","table":"TABLE_NAME","key":"TABLE_PRIMARY_KEY"}' | python -
↪m json.tool
```

1.6 Packages and Staking

1.6.1 List of available Packages

DSPs who have registered their service packages may be found in the package table under the dappservices account on every supported chain.

DSP Portals for viewing/interacting with packages:

- Bloks.io
- EOS Nation
- Malta Block
- Mission Control
- Aloha EOS
- MinerGate
- DSP HQ

1.6.2 DSP Package Explanation

DSP packages have several fields which are important to understand:

- **api_endpoint** - endpoint to direct DSP related trxs/api requests to
- **package_id** - ID of the package that can be selected with the **selectpkg** action
- **service** - the DSP service to be used. Currently LiquidApps supports 6 DSP services; however DSPs are encouraged to create services of their own as well as create bundled DSP services. The use of these resources is measured in QUOTA.

1. ipfsservice1 - providing IPFS services to the dapp::multi_index container of a smart contract
2. cronservices - enable CRON related tasks such as continuous staking
3. oracleservic - provide oracle related services
4. readfndspsvc - return a result from a smart contract function based on current conditions without sending an EOSIO trx
5. accountless1 - virtual accounts that do not require RAM storage for account related data, instead data and accounts are stored in vRAM

- **provider** - DSP account name
- **quota** - QUOTA represents the amount of actions that a DSP supports based on the package_period. You can think of QUOTA like cell phone minutes in a plan. For a cell phone plan you could pay $10 per month and get 1000 minutes. 1 QUOTA always equals 10,000 actions. Said differently .0001 QUOTA equals 1 action. Instead of $10 per month perhaps you would be required to stake 10 DAPP and/or 10 DAPPHDL (Air-HODL) tokens for a day to receive .001 QUOTA or 10 actions.
- **package_period** - period of the package before restaking is required. Upon restaking the QUOTA and package period are reset.
- **min_stake_quantity** - the minimum quantity of DAPP and/or DAPPHDL (Air-HODL) tokens to stake to receive the designated amount of QUOTA for the specified package_period
- **min_unstake_period** - period of time required to pass before **refund** action can be called after **unstake** command is executed

- **enabled** - bool if the package is available or not

1.6.3 Select a DSP Package

Select a service package from the DSP of your choice.

```
export PROVIDER=someprovider
export PACKAGE_ID=providerpackage
export MY_ACCOUNT=myaccount

# select your package:
export SERVICE=ipfsservice1
cleos -u $DSP_ENDPOINT push action dappservices selectpkg "[\"$MY_ACCOUNT\",\"
↪$PROVIDER\",\"$SERVICE\",\"$PACKAGE_ID\"]" -p $MY_ACCOUNT@active
```

1.6.4 Stake DAPP Tokens for DSP Package

```
# Stake your DAPP to the DSP that you selected the service package for:
cleos -u $DSP_ENDPOINT push action dappservices stake "[\"$MY_ACCOUNT\",\"$PROVIDER\",
↪\"$SERVICE\",\"50.0000 DAPP\"]" -p $MY_ACCOUNT@active
```

1.6.5 Stake DAPPHDL (AirHODL) Tokens for DSP Package

If you were a holder of the EOS token on February 26th, 2019 then you should have a balance of DAPPHDL tokens. These tokens possess the ability to 3rd party stake and unstake tokens throughout the duration of the AirHODL, until February 26th 2021.

```
# Stake your DAPPHDL to the DSP that you selected the service package for:
cleos -u $DSP_ENDPOINT push action dappairhodl1 stake "[\"$MY_ACCOUNT\",\"$PROVIDER\",
↪\"$SERVICE\",\"50.0000 DAPPHDL\"]" -p $MY_ACCOUNT@active
```

1.6.6 Unstake DAPP Tokens

The amount of time that must pass before an unstake executes a refund action and returns DAPP or DAPPHDL tokens is either the current time + the minimum unstake time as stated in the package table, or the end of the current package period, whichever is greater.

```
cleos -u $DSP_ENDPOINT push action dappservices unstake "[\"$MY_ACCOUNT\",\"$PROVIDER\
↪\",\"$SERVICE\",\"50.0000 DAPP\"]" -p $MY_ACCOUNT@active
```

1.6.7 Unstake DAPPHDL (AirHODL) Tokens

```
cleos -u $DSP_ENDPOINT push action dappairhodl1 unstake "[\"$MY_ACCOUNT\",\"$PROVIDER\
↪\",\"$SERVICE\",\"50.0000 DAPPHDL\"]" -p $MY_ACCOUNT@active
# In case unstake deferred trx fails, you can manually refund the unstaked tokens:
cleos -u $DSP_ENDPOINT push action dappairhodl1 refund "[\"$MY_ACCOUNT\",\"$PROVIDER\
↪\",\"$SERVICE\"]" -p $MY_ACCOUNT@active
```

1.6.8 Withdraw DAPPHDL (AirHODL) Tokens

Please note: withdrawing your DAPPHDL tokens immediately makes you ineligible for further vesting and forfeits all your unvested tokens. **This action is irrevocable.** Vesting ends February 26th 2021. Also, you must hold DAPP token before executing this action. If you do not, use the *open* action below to open a 0 balance.

```
# Withdraw
cleos -u $DSP_ENDPOINT push action dappairhodl1 withdraw "[\"$MY_ACCOUNT\"]" -p $MY_
↪ACCOUNT@active
# Open DAPP balance to withdraw if needed
cleos -u $DSP_ENDPOINT push action dappservices open "[\"$MY_ACCOUNT\",\"4,DAPP\",\"
↪$MY_ACCOUNT\"]" -p $MY_ACCOUNT@active
```

1.6.9 Check DAPPHDL (AirHODL) Token Balance & Refresh Data

In the dappairhodl1 contract under the accounts table, enter your account as the scope to retrieve its information.

```
# Refresh accounts table data
cleos -u $DSP_ENDPOINT push action dappservices refresh "[\"$MY_ACCOUNT\"]" -p $MY_
↪ACCOUNT@active
```

1.6.10 Third Party Staking

Third parties may stake to a DSP package on behalf of a DAPP by calling the `staketo` and `unstaketo` actions. In order for a DAPP to select a new package after third parties have staked to them, all third party stakes must be removed.

The following two actions remove third party stakes, `preselectpkg` allows users to be removed in batches by supplying a `depth` parameter to indicate how many accounts to remove at a time. The second action is `retirestakes` which allows for the removal of specific third party stakes from a list of `delegators` account names.

Third party stakers can be identified by supplying the `ID` of the `accountext` table entry that matches the account, provider, service, and package (or pending package) selected by the account being staked to as the scope of the `stakingext` table, for example: `150`.

Examples:

```
cleos -u $DSP_ENDPOINT push action dappservices retirestake "{\"owner\":\"$MY_ACCOUNT\
↪\",\"provider\":\"heliosselene\",\"service\":\"cronservices\",\"package\":\
↪"cronservices\",\"delegators\":["dappservice2","natdeveloper","oracletest22"]}" -p
↪$MY_ACCOUNT

cleos -u $DSP_ENDPOINT push action dappservices preselectpkg "{\"owner\":\"$MY_
↪ACCOUNT\",\"provider\":\"heliosselene\",\"service\":\"cronservices\",\"package\":\
↪"cronservices\",\"depth\":\"10\"}" -p $MY_ACCOUNT

cleos -u $DSP_ENDPOINT push action dappservices staketo "{\"from\":\"$MY_ACCOUNT\",\
↪"to\":\"asdfasdfasdy\",\"provider\":\"heliosselene\",\"service\":\"cronservices\",\
↪"quantity\":\"10.0000 DAPP\"}" -p $MY_ACCOUNT

cleos -u $DSP_ENDPOINT push action dappservices unstaketo "{\"from\":\"$MY_ACCOUNT\",\
↪"to\":\"asdfasdfasdy\",\"provider\":\"heliosselene\",\"service\":\"cronservices\",\
↪"quantity\":\"10.0000 DAPP\"}" -p $MY_ACCOUNT
```

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```
// if deferred trx for refund fails after unstaketo
cleos -u $DSP_ENDPOINT push action dappservices refundto "{\"from\":\"$MY_ACCOUNT\",\
↪"to\":\"asdfasdfasdy\",\"provider\":\"heliosselene\",\"service\":\"cronservices\",\
↪"symcode\":\"DAPP\"}" -p $MY_ACCOUNT
```

More on `preselectpkg` and `retirestakes`

`preselectpkg` allows the DAPP to simply supply a `depth` (number of third party stakes) to remove per tx ordered by the `ID` of "payer". The DAPP may simply execute this as many times as required until no more third party stakes remain. If a depth that is too deep is selected (for example, 100) the trx will simply fail, and a smaller depth can be selected. This method requires no external knowledge of who has staked to the account.

`retirestakes` is a more explicit and selective method for a DAPP. A list of third party stake payers (`name[] delegators`) can be provided. If the list is too large, the tx may time out. In order to discover who has staked to the DAPP's package the following steps can be utilized:

1. Determine the `id` of their package's `accountext` table entry. accountext entries all use the scope `DAPP`. The correct entry is the entry that has that same account, service, provider, and package (or pending_package) as the selected package. bloks.io accountext table
2. Find the `stakingext` entries, using the `id` from the `accountext` table as the scope. bloks.io stakingext table
3. Each entry under this scope will have payers equal to the account names of the third parties. These payers can be used to populate the delegators for the `retirestakes` action.

For both actions, if the `depth` is deeper than the number of stakes, or the `delegators` list includes payers that haven't actually staked, it will succeed gracefully, ignoring the erroneous entries and executing for the correct ones.

The `dappairhodl1` contract is the exception to all of this. It does not get added to the `stakingext` table since while it is a third party stake mechanically, it is essentially the same as a first party stake. We do not support third party staking using AirHODL'd DAPP.

1.7 Zeus Boxes

1.7.1 Browse Boxes:

- regression-tests
- helloworld
- coldtoken
- airhodl
- airdrop
- bancor-extensions
- cardgame
- dapp-services-deploy
- templates-emptycontract-eos-cpp
- all-dapp-services

- sample-zeus-extension
- deepfreeze
- vgrab
- dapp
- game
- ide
- dgoods
- eoscraft
- search

CHAPTER 2

DSPs

2.1 Getting started

2.1.1 Overview

Overview

Architecture

2.1.2 Prerequisites

Account

2.1.3 Deploy

EOSIO Node

IPFS Node

PostgreSQL Database

DSP Service Node

2.1.4 Configuration

Packages

Testing

2.1.5 Claiming Rewards

Claim

2.1.6 Upgrade Version

Upgrade

2.1.7 Replay Contract and Cleanup IPFS Entries

Replay Contract

Cleanup IPFS Entries

2.2 Overview

2.2.1 Articles

- vRAM guide for experts
- EOS dApps and Their RAM Expenses

2.2.2 Videos

- Developer Explains - Decentralized Dapp Scaling w/ IPFS! How LiquidApps Dapp Service Providers Work
- EOS Weekly - The LiquidApps Game-Changer
- EOS Weekly - Unlimited DSP Possibilities

2.2.3 Have questions?

- Join our Dev Telegram channel
- Join our Telegram channel

2.2.4 Want more information?

- Read our whitepaper and subscribe to our Medium posts.

2.3 Architecture

A DSP consists of an EOS state history node (non block producing node without a full history setup), an IPFS cluster, a PostgreSQL Database, and a DSP API endpoint. All 4 of these operations may be run on the same machine or separately. All necessary settings may be found in the `config.toml` file.

- EOS state history node - to run a DSP requires running a non block producing EOS node. A full history node is also not required. The EOS node is configured with a backend storage mechanism: `state_history_plugin`.

- IPFS Cluster node - the IPFS cluster stores all vRAM information so that it may be loaded into RAM as a caching mechanism. The InterPlanetary File System is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices. The documentation shows how to setup a local IPFS cluster, but you may also configure an external IPFS cluster in the `config.toml` file.
- PostgreSQL Database - a PostgreSQL database is utilized to prevent duplicate transactions by creating, updating, and retrieving transaction data.
- DSP API - the DSP API is responsible for performing all DAPP service logic such as a vRAM `get_table_row` call, parsing and sending a LiquidAccount transaction, servicing an oracle call, etc.

2.4 Demux Backend

In the `config.toml` file in the DSP Node Setup you can configure the `state_history_plugin`.

You can also configure the `HEAD_BLOCK` to sync demux from. If you experience any issues with demux syncing from an older block, you may try syncing demux at the head block by finding it at bloks.io and setting it to `head_block`.

```
[demux]
backend = "state_history_plugin"

# head block to sync demux from
head_block = 35000000
```

2.5 Account

2.5.1 Prerequisites

Install cleos from: https://github.com/EOSIO/eos/releases

2.5.2 Create Account

Mainnet

```
cleos create key --to-console > keys.txt
export DSP_PRIVATE_KEY=`cat keys.txt | head -n 1 | cut -d ":" -f 2 | xargs echo`
export DSP_PUBLIC_KEY=`cat keys.txt | tail -n 1 | cut -d ":" -f 2 | xargs echo`
```

Save keys.txt somewhere safe!

Have an exising EOS Account

- Getting started on eos mainnet

First EOS Account

Fiat:

- EOS Account Creator
- EOS Lynx
- Scatter

Bitcoin/ETH/Bitcoin Cash/ALFAcoins:

- ZEOS

Kylin

Create an account

```
# Create a new available account name (replace 'yourdspaccount' with your account name):
export DSP_ACCOUNT=yourdspaccount
curl http://faucet.cryptokylin.io/create/$DSP_ACCOUNT > keys.json
curl http://faucet.cryptokylin.io/get_token/$DSP_ACCOUNT
export DSP_PRIVATE_KEY=`cat keys.json | jq -e '.keys.active_key.private'`
export DSP_PUBLIC_KEY=`cat keys.json | jq -e '.keys.active_key.public'`
```

Save keys.json somewhere safe!

2.5.3 Account Name

```
# Create wallet
cleos wallet create --file wallet_password.pwd
```

Save wallet_password.pwd somewhere safe!

2.5.4 Import account

```
cleos wallet import --private-key $DSP_PRIVATE_KEY
```

2.6 EOSIO Node

A non block / non full history node is required for the DSP API to interact with. This node may be hosted with the rest of the DSP architecture or standalone.

2.6.1 Hardware Requirements

2.6.2 Prerequisites

- jq
- wget
- curl

2.6.3 Get EOSIO binary

```
# install 1.8 even if chain is sub 1.7.*
VERSION=1.8.4
```

Ubuntu 18.04

```
FILENAME=eosio_$VERSION-1-ubuntu-18.04_amd64.deb
INSTALL_TOOL=apt
```

Ubuntu 16.04

```
FILENAME=eosio_$VERSION-1-ubuntu-16.04_amd64.deb
INSTALL_TOOL=apt
```

Fedora

```
FILENAME=eosio_$VERSION-1.fc27.x86_64.rpm
INSTALL_TOOL=yum
```

Centos

```
FILENAME=eosio_$VERSION-1.el7.x86_64.rpm
INSTALL_TOOL=yum
```

2.6.4 Install

```
wget https://github.com/EOSIO/eos/releases/download/v$VERSION/$FILENAME
sudo $INSTALL_TOOL install ./$FILENAME
```

2.6.5 Prepare Directories

```
#cleanup
rm -rf $HOME/.local/share/eosio/nodeos || true

#create dirs
mkdir $HOME/.local/share/eosio/nodeos/data/blocks -p
mkdir $HOME/.local/share/eosio/nodeos/data/snapshots -p
mkdir $HOME/.local/share/eosio/nodeos/config -p
```

Kylin

```
URL="http://storage.googleapis.com/eos-kylin-snapshot/snapshot-2019-06-10-09(utc)-
↪0312d3b9843e2efa6831806962d6c219d37200e0b897a0d9243bcab40b2b546b.bin"
P2P_FILE=https://raw.githubusercontent.com/cryptokylin/CryptoKylin-Testnet/master/
↪fullnode/config/config.ini
GENESIS=https://raw.githubusercontent.com/cryptokylin/CryptoKylin-Testnet/master/
↪genesis.json
CHAIN_STATE_SIZE=256000
wget $URL -O $HOME/.local/share/eosio/nodeos/data/snapshots/boot.bin
```

Mainnet

```
URL=$(wget --quiet "https://eosnode.tools/api/bundle" -O- | jq -r '.data.snapshot.s3')
P2P_FILE=https://eosnodes.privex.io/?config=1
GENESIS=https://raw.githubusercontent.com/CryptoLions/EOS-MainNet/master/genesis.json
CHAIN_STATE_SIZE=131072
cd $HOME/.local/share/eosio/nodeos/data
wget $URL -O - | tar xvz
SNAPFILE=`ls snapshots/*.bin | head -n 1 | xargs -n 1 basename`
mv snapshots/$SNAPFILE snapshots/boot.bin
```

Snapshots

If you would like an up to date snapshot, please visit: snapshots.eosnation.io and find the latest snapshot for the chain you are using. You will want to unpack the file and store it here with the following file name: `$HOME/.local/share/eosio/nodeos/data/snapshots/boot.bin`

2.6.6 Configuration

```
cd $HOME/.local/share/eosio/nodeos/config

# download genesis
wget $GENESIS
# config
cat <<EOF >> $HOME/.local/share/eosio/nodeos/config/config.ini
agent-name = "DSP"
http-server-address = 0.0.0.0:8888
p2p-listen-endpoint = 0.0.0.0:9876
blocks-dir = "blocks"
abi-serializer-max-time-ms = 3000
max-transaction-time = 150000
wasm-runtime = wabt
reversible-blocks-db-size-mb = 1024
contracts-console = true
p2p-max-nodes-per-host = 1
allowed-connection = any
max-clients = 100
sync-fetch-span = 500
connection-cleanup-period = 30
http-validate-host = false
access-control-allow-origin = *
access-control-allow-headers = *
access-control-allow-credentials = false
```

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```
verbose-http-errors = true
http-threads=8
net-threads=8
read-mode = head
trace-history-debug-mode = true
trace-history = true
plugin = eosio::producer_plugin
plugin = eosio::chain_plugin
plugin = eosio::chain_api_plugin
plugin = eosio::net_plugin
plugin = eosio::state_history_plugin
state-history-endpoint = 0.0.0.0:8887
chain-state-db-size-mb = $CHAIN_STATE_SIZE
EOF

curl $P2P_FILE > p2p-config.ini
cat p2p-config.ini | grep "p2p-peer-address" >> $HOME/.local/share/eosio/nodeos/
↪config/config.ini
```

2.6.7 Run

First run (from snapshot)

```
nodeos --disable-replay-opts --snapshot $HOME/.local/share/eosio/nodeos/data/
↪snapshots/boot.bin --delete-all-blocks
```

You will know that the node is fully synced once you see blocks being produced every half second at the head block. You can match the block number you are seeing in the nodeos logs to what bloks.io is indicating as the head block on the chain you are syncing (mainnet, Kylin etc). Once you have confirmed that it is synced press `CTRL+C` once, wait for the node to shutdown and proceed to the next step.

2.6.8 systemd

```
export NODEOS_EXEC=`which nodeos`
export NODEOS_USER=$USER
sudo -E su - -p
cat <<EOF > /lib/systemd/system/nodeos.service
[Unit]
Description=nodeos
After=network.target
[Service]
User=$NODEOS_USER
ExecStart=$NODEOS_EXEC --disable-replay-opts
[Install]
WantedBy=multi-user.target
EOF

systemctl start nodeos
systemctl enable nodeos
exit
sleep 3
systemctl status nodeos
```

2.6.9 Optimizations

- atticlab - cpu performance presentation

2.7 IPFS

The InterPlanetary File System is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices. The DSPs utilize this as the storage layer to request and serve information to and from vRAM <> RAM as a caching solution.

2.7.1 Standalone

go-ipfs

Hardware Requirements

Prerequisites

- golang
- systemd

Ubuntu/Debian

```
sudo apt-get update
sudo apt-get install golang-go -y
```

Centos/Fedora/AWS Linux v2

```
sudo yum install golang -y
```

Install

```
sudo su -
VERS=0.4.22
DIST="go-ipfs_v${VERS}_linux-amd64.tar.gz"
wget https://dist.ipfs.io/go-ipfs/v$VERS/$DIST
tar xvfz $DIST
rm *.gz
mv go-ipfs/ipfs /usr/local/bin/ipfs
exit
```

Configure systemd

```
sudo su -
ipfs init
ipfs config Addresses.API /ip4/0.0.0.0/tcp/5001
ipfs config Addresses.Gateway /ip4/0.0.0.0/tcp/8080
cat <<EOF > /lib/systemd/system/ipfs.service
[Unit]
Description=IPFS daemon
After=network.target
[Service]
ExecStart=/usr/local/bin/ipfs daemon
Restart=always
[Install]
WantedBy=multi-user.target
EOF

systemctl start ipfs
systemctl enable ipfs

exit
```

Adding Peers

To connect with your peers you may open port 4001 to the selected IPs that you wish to communicate with or open the port to all addresses.

Bootstrap Peers | Documentation

Bootstrap peers default to IPFS nodes provided by the core development team. They are scattered across the world. These peers are what your IPFS node will initially monitor upon startup. You may add our mainnet and kylin testnet IPFS nodes with the following commands:

```
# kylin

ipfs bootstrap add /ip4/18.212.96.94/tcp/4001/ipfs/
↪QmZ5gLTZwvfD5DkbbaFFX4YJCi7f4C5oQAgq8qpjL8S1ur
ipfs bootstrap add /ip4/18.212.76.109/tcp/4001/ipfs/
↪QmcCX4b3EF3eXaDe5dgxTL9mXbyci4FwcJAjWqpub5vCXM

# mainnet

ipfs bootstrap add /ip4/35.170.64.183/tcp/4001/ipfs/
↪QmZpyMnBJKwyPJNBUYVuCZEJuKQBEwM6qVHsSp179B3yao
```

Swarm Peers | Documentation

Swarm peers are addresses that the local daemon will listen on for connections from other IPFS peers. They are what your IPFS node will look to first when requesting a file that is not cached locally. Both your node as well as the node you are trying to connect to must run the following commands:

```
# kylin

ipfs swarm connect /ip4/18.212.96.94/tcp/4001/ipfs/
↪QmZ5gLTZwvfD5DkbbaFFX4YJCi7f4C5oQAgq8qpjL8S1ur
ipfs swarm connect /ip4/18.212.76.109/tcp/4001/ipfs/
↪QmcCX4b3EF3eXaDe5dgxTL9mXbyci4FwcJAjWqpub5vCXM

# mainnet

ipfs swarm connect /ip4/35.170.64.183/tcp/4001/ipfs/
↪QmZpyMnBJKwyPJNBUYVuCZEJuKQBEwM6qVHsSp179B3yao
```

Reconnecting Periodically | Medium Article

Peers have a tendency to disconnect from each other if not reconnected manually periodically, so to combat this, you may add the following two files to periodically reconnect to your swarm peers.

```
sudo su -
cat <<EOF > /lib/systemd/system/gateway-connector.service
[Unit]
Description=Job that periodically connects this IPFS node to the gateway node
[Service]
ExecStart=/usr/local/bin/ipfs swarm connect <ADD_MULTIPLE_CONNECTIONS_HERE_SPACE_
↪SEPARATED> # /ip4/18.212.96.94/tcp/4001/ipfs/
↪QmZ5gLTZwvfD5DkbbaFFX4YJCi7f4C5oQAgq8qpjL8S1ur /ip4/18.212.76.109/tcp/4001/ipfs/
↪QmcCX4b3EF3eXaDe5dgxTL9mXbyci4FwcJAjWqpub5vCXM /ip4/35.170.64.183/tcp/4001/ipfs/
↪QmZpyMnBJKwyPJNBUYVuCZEJuKQBEwM6qVHsSp179B3yao
Environment="IPFS_PATH=/root/.ipfs"
EOF
exit
```

```
sudo su -
cat <<EOF > /lib/systemd/system/gateway-connector.timer
[Unit]
Description=Timer that periodically triggers gateway-connector.service
[Timer]
OnBootSec=3min
OnUnitActiveSec=1min
[Install]
WantedBy=timers.target
EOF
exit
```

Now you can enable and start the service:

```
sudo systemctl enable gateway-connector.timer
sudo systemctl start gateway-connector.timer
```

To double checked this worked, run:

```
systemctl list-timers
```

You should see an entry for your gateway connector service. You can also check the status of its last execution attempt by running:

```
systemctl status gateway-connector
```

Finally you can monitor the process with:

```
journalctl -f | grep ipfs
```

Running a private network | Documentation

Running a private IPFS network is possible by removing all default IPFS bootstrap peers and only adding those of your private network.

```
ipfs bootstrap rm all - Remove all peers from the bootstrap list
```

2.7.2 Cluster

IPFS-Cluster | Documentation

Bootsrapping from an existing IPFS Cluster | Documentation

IPFS is designed so that a node only stores files locally that are specifically requested. The following is one way of populating a new IPFS node with all existing files from a pre-existing node.

To do so, first create a secret from `node0`, the original node, then share that secret with `node1`, the node you want to bootstrap from `node0`. Then `node1` runs the bootstrap command specifying the cluster's address and setting the `CLUSTER_SECRET` as an env variable.

node0

- `export CLUSTER_SECRET=$(od -vN 32 -An -tx1 /dev/urandom | tr -d ' \n')`
- `echo $CLUSTER_SECRET`
- `ipfs-cluster-service init`
- `ipfs-cluster-service daemon`

node1 (bootstrapping from node0)

- `export CLUSTER_SECRET=<copy from node0>`
- `ipfs-cluster-service init`
- `ipfs-cluster-service daemon --bootstrap /ip4/192.168.1.2/tcp/9096/ipfs/QmZjSoXUQgJ9tutP1rXjjNYwTrRM9QPhmD9GHVjbtgWxEn` // replace with what you see from running node0's daemon
- `ipfs-cluster-ctl peers ls` check your peers to see you've added node0 correctly

node0

- if you want to remove a peer after the bootstrapping is complete, the following command will do that and shut down the IPFS cluster
- `ipfs-cluster-ctl peers rm QmYFYwnFUkjFhJcSJJGN72wwedZnpQQ4aNpAtPZt8g5fCd`

2.8 PostgreSQL Database Backend

A PostgreSQL databse is utilized to prevent duplicate DSP transactions by creating, getting, and updating service events as needed. An external database can be set by ensuring the `node_env` variable in the `config.toml` file is set to `production`. The database settings may be specified with the `url` variable, e.g., `postgres://user:pass@example.com:5432/dbname`.

2.8.1 config.toml:

```
[database]

# url syntax: postgres://user:pass@example.com:5432/dbname, only necessary for␣
↪production

url = "postgres://user:pass@example.com:5432/dbname"

# production (uses above database_url for database)

node_env = "production"
```

2.9 DSP Node

2.9.1 Prerequisites

- git

Linux

```
sudo su -
curl -o- https://raw.githubusercontent.com/creationix/nvm/v0.34.0/install.sh | bash
export NVM_DIR="${XDG_CONFIG_HOME/:-$HOME/.}nvm"
[ -s "$NVM_DIR/nvm.sh" ] && \. "$NVM_DIR/nvm.sh" # This loads nvm
nvm install 10
nvm use 10
exit
```

Ubuntu/Debian

```
sudo apt install -y make cmake build-essential python
```

Centos/Fedora/AWS Linux:

```
sudo yum install -y make cmake3 python
```

2.9.2 Install

```
sudo su -
npm install -g pm2
npm install -g @liquidapps/dsp --unsafe-perm=true
exit
```

2.9.3 Configure Settings

Any changes to the `config.toml` file will require `setup-dsp` to be run again. Link to `sample-config.toml`

```
sudo su -
mkdir ~/.dsp
cp $(readlink -f `which setup-dsp` | xargs dirname)/sample-config.toml ~/.dsp/config.
↪toml
nano ~/.dsp/config.toml
exit
```

2.9.4 Launch DSP Services

```
sudo su -
setup-dsp
systemctl stop dsp
systemctl start dsp
systemctl enable dsp
exit
```

2.9.5 Check logs

```
sudo su -
pm2 logs
exit
```

Output sample:

```
/root/.pm2/logs/readfn-dapp-service-node-error.log last 15 lines:
/root/.pm2/logs/dapp-services-node-out.log last 15 lines:
0|dapp-ser | 2019-06-03T00:46:49: services listening on port 3115!
0|dapp-ser | 2019-06-03T00:46:49: service node webhook listening on port 8812!

/root/.pm2/logs/demux-out.log last 15 lines:
1|demux    | 2019-06-05T14:41:12: count 1
```

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```
/root/.pm2/logs/ipfs-dapp-service-node-out.log last 15 lines:
2|ipfs-dap | 2019-06-04T19:03:04: commited to: ipfs://
↪zb2rhXKc8zSVppFhKm8pHLBuyGb7vPeCnpZqcmjFnDLA9LLBb

/root/.pm2/logs/log-dapp-service-node-out.log last 15 lines:
3|log-dapp | 2019-06-03T00:46:49: log listening on port 13110!
3|log-dapp | 2019-06-03T00:46:52: LOG SVC NODE 2019-06-03T00:46:52.413Z INFO  index.
↪js:global:0             Started Service

/root/.pm2/logs/vaccounts-dapp-service-node-out.log last 15 lines:
4|vaccount | 2019-06-03T00:46:50: vaccounts listening on port 13129!

/root/.pm2/logs/oracle-dapp-service-node-out.log last 15 lines:
5|oracle-d | 2019-06-03T00:46:50: oracle listening on port 13112!

/root/.pm2/logs/cron-dapp-service-node-out.log last 15 lines:
6|cron-dap | 2019-06-03T00:46:50: cron listening on port 13131!

/root/.pm2/logs/readfn-dapp-service-node-out.log last 15 lines:
7|readfn-d | 2019-06-03T00:46:50: readfn listening on port 13141!
```

2.10 Packages

2.10.1 Register

Prepare and host dsp.json

```
{
    "name": "acme DSP",
    "website": "https://acme-dsp.com",
    "code_of_conduct":"https://...",
    "ownership_disclosure" : "https://...",
    "email":"dsp@acme-dsp.com",
    "branding":{
      "logo_256":"https://....",
      "logo_1024":"https://....",
      "logo_svg":"https://...."
    },
    "location": {
      "name": "Atlantis",
      "country": "ATL",
      "latitude": 2.082652,
      "longitude": 1.781132
    },
    "social":{
      "steemit": "",
      "twitter": "",
      "youtube": "",
      "facebook": "",
      "github":"",
      "reddit": "",
      "keybase": "",
```

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```
      "telegram": "",
      "wechat":""
    }

}
```

Prepare and host dsp-package.json

```
{
    "name": "Package 1",
    "description": "Best for low vgrabs",
    "dsp_json_uri": "https://acme-dsp.com/dsp.json",
    "logo":{
      "logo_256":"https://....",
      "logo_1024":"https://....",
      "logo_svg":"https://...."
    },
    "service_level_agreement": {
        "availability":{
            "uptime_9s": 5
        },
        "performance":{
            "95": 500
        }
    },
    "pinning":{
        "ttl": 2400,
        "public": false
    },
    "locations":[
        {
          "name": "Atlantis",
          "country": "ATL",
          "latitude": 2.082652,
          "longitude": 1.781132
        }
    ]
}
```

Register Package

Warning: packages are read only and can't be removed yet.

- Mainnet DSP packages
- Kylin DSP packages

```
npm install -g @liquidapps/zeus-cmd
# the package must be chosen from the following list:
# packages: (ipfs, cron, log, oracle, readfn, vaccounts)
export PACKAGE=ipfs
export DSP_ACCOUNT=
# active key to sign package creation trx
export DSP_PRIVATE_KEY=
```

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```
# customizable and unique name for your package
export PACKAGE_ID=package1
export EOS_CHAIN=mainnet
# or
export EOS_CHAIN=kylin
# the minimum stake quantity is the amount of DAPP and/or DAPPHDL that must be staked␣
↪to meet the package's threshold for use
export MIN_STAKE_QUANTITY="10.0000"
# package period is in seconds, so 86400 = 1 day, 3600 = 1 hour
export PACKAGE_PERIOD=86400
# the time to unstake is the greater of the package period remaining and the minimum␣
↪unstake period, which is also in seconds
export MIN_UNSTAKE_PERIOD=3600
# QUOTA is the measurement for total actions allowed within the package period to be␣
↪processed by the DSP.  1.0000 QUOTA = 10,000 actions. 0.0001 QUOTA = 1 action
export QUOTA="1.0000"
export DSP_ENDPOINT=https://acme-dsp.com
# package json uri is the link to your package's information, this is customizable␣
↪without a required syntax
export PACKAGE_JSON_URI=https://acme-dsp.com/package1.dsp-package.json

cd $(readlink -f `which setup-dsp` | xargs dirname)
zeus register dapp-service-provider-package \
    $PACKAGE $DSP_ACCOUNT $PACKAGE_ID \
    --key $DSP_PRIVATE_KEY \
    --min-stake-quantity $MIN_STAKE_QUANTITY \
    --package-period $PACKAGE_PERIOD \
    --quota $QUOTA \
    --network $EOS_CHAIN \
    --api-endpoint $DSP_ENDPOINT \
    --package-json-uri $PACKAGE_JSON_URI \
    --min-unstake-period $MIN_UNSTAKE_PERIOD
```

Or in cleos:

```
# currently available services: (ipfsservice1, cronservices, logservices1,␣
↪oracleservic, readfndspsvc, accountless1)
# the services use EOS account names to fascilitate usage
# service contract names may be found in the boxes/groups/services/SERVICE_NAME/
↪models/dapp-services/*.json file as the ( contract ) parameter
export SERVICE=ipfsservice1
# zeus command automatically adds QUOTA / DAPP, so we must add it here
export QUOTA="1.0000 QUOTA"
export MIN_STAKE_QUANTITY="10.0000 DAPP"
export EOS_ENDPOINT=https://kylin-dsp-2.liquidapps.io # or mainnet: https://api.
↪eosnewyork.io
cleos -u $EOS_ENDPOINT push action dappservices regpkg "{\"newpackage\":{\"api_
↪endpoint\":\"$DSP_ENDPOINT\",\"enabled\":0,\"id\":0,\"min_stake_quantity\":\"$MIN_
↪STAKE_QUANTITY\",\"min_unstake_period\":\"$MIN_UNSTAKE_PERIOD\",\"package_id\":\"
↪$PACKAGE_ID\",\"package_json_uri\":\"$PACKAGE_JSON_URI\",\"package_period\":\"
↪$PACKAGE_PERIOD\",\"provider\":\"$DSP_ACCOUNT\",\"quota\":\"$QUOTA\",\"service\":\"
↪$SERVICE\"}}" -p $DSP_ACCOUNT
```

Example service contract name for LiquidAccounts: https://github.com/liquidapps-io/zeus-sdk/blob/master/boxes/groups/services/vaccounts-dapp-service/models/dapp-services/vaccounts.json#L7

List of all services, please note some of which may not be testable yet: https://github.com/liquidapps-io/zeus-sdk/tree/master/boxes/groups/services, see the stage for each service to monitor its development maturity (WIP - work in progress, Alpha, Beta, Stable).

output should be:

```
registering package:package1
✓package:package1 registered successfully
```

For more options:

```
zeus register dapp-service-provider-package --help
```

Don't forget to stake CPU/NET to your DSP account:

```
cleos -u $DSP_ENDPOINT system delegatebw $DSP_ACCOUNT $DSP_ACCOUNT "5.000 EOS" "95.
↪000 EOS" -p $DSP_ACCOUNT@active
```

Modify Package metadata:

Currently only `package_json_uri` and `api_endpoint` are modifyable. To signal to DSP Portals / Developers that your package is no longer in service, set your `api_endpoint` to `null`.

To modify package metadata: use the "modifypkg" action of the dappservices contract.

Using cleos:

```
cleos -u $DSP_ENDPOINT push action dappservices modifypkg "[\"$DSP_ACCOUNT\",\"
↪$PACKAGE_ID\",\"ipfsservice1\",\"$DSP_ENDPOINT\",\"https://acme-dsp.com/modified-
↪package1.dsp-package.json\"]" -p $DSP_ACCOUNT@active
```

2.11 Testing

2.11.1 Test your DSP with vRAM

Please note, if you wish to test on the mainnet, this will require the purchase of DAPP tokens or the use of DAPPHDL tokens (Air-HODL). In the case of Kylin, we provide a DAPP token faucet.

Create Mainnet or Kylin Account:

- Kylin
- Mainnet

Install Zeus:

```
npm install -g @liquidapps/zeus-cmd
```

Unbox coldtoken contract:

```
zeus unbox coldtoken
cd coldtoken
```

Compile and deploy contract for testing:

```
# your DSP's API endpoint
export DSP_ENDPOINT=
# a new account to deploy your contract to
export ACCOUNT=
# your new account's active public key
export ACTIVE_PUBLIC_KEY=
# compile coldtoken contract
zeus compile
cd contracts/eos
# set eosio.code permission
cleos -u $DSP_ENDPOINT set account permission $ACCOUNT active "{\"threshold\":1,\
↪"keys\":[{\"weight\":1,\"key\":\"$ACTIVE_PUBLIC_KEY\"}],\"accounts\":[{\"permission\
↪":{\"actor\":\"$ACCOUNT\",\"permission\":\"eosio.code\"},\"weight\":1}]}" owner -p
↪$ACCOUNT@active
# set contract
cleos -u $DSP_ENDPOINT set contract $ACCOUNT ./coldtoken
```

Select and stake to DSP:

```
# your DSP's account
export DSP_ACCOUNT=
# your DSP's service
export DSP_SERVICE=
# your DSP's package
export DSP_PACKAGE=
# your DSP's minimum stake quantity in DAPP or DAPPHDL (example: 10.0000 DAPP or 10.
↪0000 DAPPHDL)
export MIN_STAKE_QUANTITY=
# select DSP package
cleos -u $DSP_ENDPOINT push action dappservices selectpkg "{\"owner\":\"$ACCOUNT\",\
↪"provider\":\"$DSP_ACCOUNT\",\"service\":\"$DSP_SERVICE\",\"package\":\"$DSP_
↪PACKAGE\"}" -p $ACCOUNT
# stake to DSP package with DAPP
cleos -u $DSP_ENDPOINT push action dappservices stake "{\"owner\":\"$ACCOUNT\",\
↪"provider\":\"$DSP_ACCOUNT\",\"service\":\"$DSP_SERVICE\",\"quantity\":\"$MIN_STAKE_
↪QUANTITY\"}" -p $ACCOUNT
# stake to DSP package with DAPPHDL, only available on mainnet
cleos -u $DSP_ENDPOINT push action dappairhodl1 stake "{\"owner\":\"$ACCOUNT\",\
↪"provider\":\"$DSP_ACCOUNT\",\"service\":\"$DSP_SERVICE\",\"quantity\":\"$MIN_STAKE_
↪QUANTITY\"}" -p $ACCOUNT
```

Run test commands:

```
# create coldtoken
cleos -u $DSP_ENDPOINT push action $ACCOUNT create "{\"issuer\":\"$ACCOUNT\",\
↪"maximum_supply\":\"1000000000 TEST\"}" -p $ACCOUNT
```

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```
# issue some TEST
cleos -u $DSP_ENDPOINT push action $ACCOUNT issue "{\"to\":\"$ACCOUNT\",\"quantity\":\
↪"1000 TEST\",\"memo\":\"Testing issue\"}" -p $ACCOUNT
```

Test vRAM get table row:

```
# you must be in the root of the box to run this command
cd ../../
zeus get-table-row $ACCOUNT "accounts" $ACCOUNT "TEST" --endpoint $DSP_ENDPOINT |␣
↪python -m json.tool
# with curl:
curl http://$DSP_ENDPOINT/v1/dsp/ipfsservice1/get_table_row -d '{"contract":"CONTRACT_
↪ACCOUNT","scope":"SCOPE","table":"TABLE_NAME","key":"TABLE_PRIMARY_KEY"}' | python -
↪m json.tool
```

Transfer:

```
cleos -u $DSP_ENDPOINT push action $ACCOUNT transfer "{\"from\":\"$ACCOUNT\",\"to\":\
↪"natdeveloper\",\"quantity\":\"1000 TEST\",\"memo\":\"Testing transfer\"}" -p
↪$ACCOUNT
zeus get-table-row $ACCOUNT "accounts" "natdeveloper" "TEST" --endpoint $DSP_ENDPOINT␣
↪| python -m json.tool
```

Check logs on your DSP Node

```
pm2 logs
```

vRAM related actions to look for in a block explorer:

Look for "xcommit" and "xcleanup" actions on your contract: https://bloks.io/

- **xcommit** - The commit request instructs a DSP to write new data to their local IPFS cluster node. A developer can utilize the setData function from within their smart contract to first hash the new data in order to return a URI, before dispatching a commit request which is caught by the DSP node. In a similar way the getData function can be utilized in order to fetch the data for the smart contract or request a Warmup in case it is missing.
- **xcleanup** - A cleanup request sends a request to the DSP to evict a file from the cache. This is an asynchronous request.

More information on vRAM related actions can be found here: https://medium.com/@liquidapps/vram-guide-for-experts-f809c8f82a27

2.12 Claim Rewards

2.12.1 Claim your DAPP daily rewards:

```
cleos push action dappservices claimrewards "[\"$DSP_ACCOUNT\"]" -p $DSP_ACCOUNT
```

2.12.2 With Bloks.io:

Claim

2.13 Replay Contract

As a DSP, you will want the ability to replay a contract's vRAM (IPFS) related transactions to load that data into your IPFS cluster. We provide a file that does just that replay-contract.js.

To do this you will need to sign up for an API key from dfuse.io, you can select the *Server to Server* option from the dropdown when creating it. Dfuse offers free keys that last 24 hours, so there's no need to pay.

There are some mandatory and optional environment variables.

2.13.1 Mandatory:

```
export DFUSE_API_KEY=
# contract to replay
export CONTRACT=
export NODEOS_CHAINID=
↪"aca376f206b8fc25a6ed44dbdc66547c36c6c33e3a119ffbeaef943642f0e906" # < mainnet |␣
↪kylin > "5fff1dae8dc8e2fc4d5b23b2c7665c97f9e9d8edf2b6485a86ba311c25639191"
```

2.13.2 Optional:

```
export LAST_BLOCK= # defaults to 35000000, this is the last block to sync from, find␣
↪the first vRAM transaction for the contract and set the block before it
export DFUSE_ENDPOINT= # defaults to 'mainnet.eos.dfuse.io', can set to `kylin.eos.
↪dfuse.io`
export BLOCK_COUNT_PER_QUERY= # defaults to 1000000
export NODEOS_SECURED= # defaults to true
export NODEOS_HOST= # defaults to localhost
export NODEOS_PORT= # defaults to 13115
```

Once you've set those, simply run with:

```
sudo find / -name replay-contract.js
node /root/.nvm/versions/node/v10.16.0/lib/node_modules/@liquidapps/dsp/utils/ipfs-
↪service/replay-contract.js

# sent 6513 saved 7725.26KB 6.42KB/s Block:77756949
```

2.14 Cleanup IPFS Entries

Sometimes IPFS entries are not evicted from a developer's contract due to the DSP experiencing unpredictable behavior. This causes the developer's smart contract RAM supply to increase as the ipfsentry table rows are not evicted. If this happens, you may run the cleanup.js file with the following environment variables:

2.14.1 Mandatory:

```
# contract to clean IPFS entries
export CONTRACT=
export NODEOS_CHAINID=
↪"aca376f206b8fc25a6ed44dbdc66547c36c6c33e3a119ffbeaef943642f0e906" # < mainnet |␣
↪kylin > "5fff1dae8dc8e2fc4d5b23b2c7665c97f9e9d8edf2b6485a86ba311c25639191"
```

2.14.2 Optional:

```
export NODEOS_SECURED= # defaults to true
export NODEOS_HOST= # defaults to localhost
export NODEOS_PORT= # defaults to 13115
```

Then run with:

```
sudo find / -name cleanup.js
node /root/.nvm/versions/node/v10.16.0/lib/node_modules/@liquidapps/dsp/utils/ipfs-
↪service/cleanup.js
```

2.15 Upgrade DSP Node

For all new releases, please test on the Kylin testnet for at least one week before deploying to a production environment.

Link: sample-config.toml

```
sudo su -
systemctl stop dsp
systemctl stop ipfs
systemctl stop nodeos
# if changes to sample-config.toml syntax:
nano ~/.dsp/config.toml
pm2 del all
pm2 kill
npm uninstall -g @liquidapps/dsp
exit

# as USER
sudo chown ubuntu:ubuntu /home/ubuntu/.pm2/rpc.sock /home/ubuntu/.pm2/pub.sock
npm uninstall -g @liquidapps/dsp

sudo su -
npm install -g @liquidapps/dsp --unsafe-perm=true
# Ensure no new updates to the `sample-config.toml` file are present, if so, update␣
↪your config.toml accordingly.
sudo find / -name sample-config.toml
# nano <PATH>
setup-dsp
systemctl start nodeos
systemctl start ipfs
systemctl start dsp
exit
```

- search

CHAPTER 3

Services

3.1 LiquidAuthenticator Service

3.1.1 Overview

Authentication of offchain APIs and services using EOSIO permissions and contract

3.1.2 Stage

WIP

3.1.3 Version

0.0

3.1.4 Contract

`authfndspsvc`

3.1.5 Box

auth-dapp-service

3.1.6 Service Commands

authusage

3.1.7 Tests

- auth-client.spec.js
- authenticator.spec.js

3.1.8 Implementation

3.2 LiquidScheduler Service

3.2.1 Overview

Scheduled Transactions

3.2.2 Stage

beta

3.2.3 Version

0.9

3.2.4 Contract

`cronservices`

3.2.5 Box

cron-dapp-service

3.2.6 Service Commands

schedule

3.2.7 Tests

- cron.spec.js
- Consumer Contract Example

3.2.8 Implementation

3.3 LiquidDNS Service

3.3.1 Overview

DSP Hosted DNS Service

3.3.2 Stage

WIP

3.3.3 Version

0.0

3.3.4 Contract

`dnsservices1`

3.3.5 Box

dns-dapp-service

3.3.6 Service Commands

dnsq

3.3.7 Tests

- dnsconsumer.spec.js
- Consumer Contract Example

3.3.8 Implementation

3.4 LiquidArchive Service

3.4.1 Overview

History API Provisioning

3.4.2 Stage

WIP

3.4.3 Version

0.0

3.4.4 Contract

`historyservc`

3.4.5 Box

history-dapp-service

3.4.6 Service Commands

hststore

hsthold

hstserve

hstreg

3.4.7 Tests

- history.spec.js

3.4.8 Implementation

3.5 LiquidVRAM Service

3.5.1 Overview

Virtual Memory Service

3.5.2 Stage

Stable

3.5.3 Version

1.1

3.5.4 Contract

`ipfsservice1`

3.5.5 Box

ipfs-dapp-service

3.5.6 Service Commands

commit

cleanup

warmup

3.5.7 Tests

- dappservices.spec.js
- ipfsconsumer.spec.js
- Consumer Contract Example

3.5.8 Implementation

3.6 LiquidLog Service

3.6.1 Overview

Log Service

3.6.2 Stage

Beta

3.6.3 Version

0.9

3.6.4 Contract

`logservices1`

3.6.5 Box

log-dapp-service

3.6.6 Service Commands

logevent

logclear

3.6.7 Tests

- logconsumer.spec.js
- Consumer Contract Example

3.6.8 Implementation

3.7 LiquidOracle Service

3.7.1 Overview

Web/IBC/XIBC Oracle Service

3.7.2 Stage

Beta

3.7.3 Version

0.9

3.7.4 Contract

`oracleservic`

3.7.5 Box

oracle-dapp-service

3.7.6 Service Commands

geturi

orcclean

3.7.7 Tests

- oracleconsumer.spec.js
- Consumer Contract Example

3.7.8 Implementation

3.8 LiquidLens Service

3.8.1 Overview

Read Functions Service

3.8.2 Stage

Alpha

3.8.3 Version

0.5

3.8.4 Contract

`readfndspsvc`

3.8.5 Box

readfn-dapp-service

3.8.6 Service Commands

rfnuse

3.8.7 Tests

- readfnconsumer.spec.js
- Consumer Contract Example

3.8.8 Implementation

3.9 LiquidLink Service

3.9.1 Overview

IBC MultiSig Service

3.9.2 Stage

Alpha

3.9.3 Version

0.5

3.9.4 Contract

`signfndspsvc`

3.9.5 Box

sign-dapp-service

3.9.6 Service Commands

signtrx

sgcleanup

3.9.7 Tests

- sign.spec.js

3.9.8 Implementation

3.10 LiquidStorage Service

3.10.1 Overview

Distributed storage and hosting

3.10.2 Stage

WIP

3.10.3 Version

0.0

3.10.4 Contract

`liquidstorag`

3.10.5 Box

storage-dapp-service

3.10.6 Service Commands

strstore

strhold

strserve

3.10.7 Tests

- storage.spec.js

3.10.8 Implementation

3.11 LiquidAccounts Service

3.11.1 Overview

Allows interaction with contract without a native EOS Account

3.11.2 Stage

Beta

3.11.3 Version

0.9

3.11.4 Contract

`accountless1`

3.11.5 Box

vaccounts-dapp-service

3.11.6 Service Commands

vexec

3.11.7 Tests

- vaccountsconsumer.spec.js
- Consumer Contract Example

3.11.8 Implementation

- search

CHAPTER 4

DAPP Tokens

4.1 DAPP Token Overview

The DAPP token is a multi-purpose utility token that grants access to the DAPP Network. It is designed to power an ecosystem of utilities, resources, and services specifically serving the needs of dApp developers building user-centric dApps.

4.1.1 Videos

- EOS Weekly - The LiquidApps Game-Changer
- EOS Weekly - Unlimited DSP Possibilities

4.1.2 Have questions?

- Join our Telegram channel

4.1.3 Want more information?

- Read our whitepaper and subscribe to our Medium posts.

4.2 DAPP Tokens Tracks

Link to auction: https://liquidapps.io/auction

4.2.1 Instant Track

Users wishing to purchase DAPP with EOS tokens can do so through the instant track. Simply send EOS to the Instant Registration Track Vendor Smart Contract and you will receive your DAPP tokens at the end of the current cycle (see "Claiming DAPP Tokens" for further information about the claiming process).

4.2.2 Regular Track

The Regular Registration Track provides flexibility in purchasing DAPP tokens. You can use EOS tokens for any desired purchase amount. For amounts exceeding 15,000 Swiss Franc (CHF) you may also purchase with ETH, BTC or Fiat.

In order to open up the opportunity to all potential purchasers the DAPP Generation Event includes a verified track for buyers who wish to use their ETH, BTC, FIAT or EOS to purchase DAPP tokens.

If you wish to participate in the DAPP Generation Event through the Regular Registration Track, you must complete a KYC (Know Your Customer) verification process, facilitated by Altcoinomy, a Swiss-based licensed KYC operator.

4.3 Claiming DAPP Tokens

4.3.1 Automatic

The auto claim mechanism does not require participants to push an action themselves to claim the tokens. This is handled by the website automatically at the end of each cycle.

4.3.2 Manual

The manual claim function is always available and participants can claim their DAPP Tokens immediately after the cycle ends by sending an explicit action depending on the track they selected.

Instant Registration Track

Regular Registration Track

Login with the wallet of your choice and enter your account in the "payer" field (**YOUR_ACCOUNT_HERE**) and hit "Push Transaction".

4.4 DAPP Tokens Distribution

The year-long DAPP token Generation Event began on February 26th, 2019 and will last until January 2020, for a total of 333 days. These 333 days will be split into 444 18-hour cycles, with each cycle receiving an allocation of 1,127,127 tokens.

The DAPP tokens are distributed through two unique independent purchase tracks—the Instant Registration Track and the Regular Registration Track. At the end of each cycle, each one of the two Registration Tracks distributes 563,063.0630 DAPP tokens amongst that cycle's participants, proportional to the amount of EOS sent by each purchaser in that cycle.

4.4.1 Integrity is Our Priority

Blockchain technology has the potential to enable a more free and fair economy to emerge by introducing an unprecedented level of transparency and accountability to markets. At LiquidApps, we are firm proponents of the free market ethos. Maintaining the integrity of the DAPP Generation Event is of the utmost importance to us, and, as such, LiquidApps hereby commits to abstaining from participation in the DAPP Token Generation Event.

More information may be found in our whitepaper

4.5 Air-HODL

A total amount of 100,000,000 DAPP will be allocated and divided between all the accounts that hold EOS at block #36,568,000 ("Pioneer Holders") and distributed via our unique Air-HODL mechanism.

You can view all snapshot information here.

The Air-HODLed DAPP tokens will be distributed on a block by block basis, matching up to a maximum of 3 million EOS per account. The tokens will be continuously vested on a block to block basis over a period of 2 years, so the complete withdrawal will only be possible at the end of this period. These 2 years began as soon as the DAPP Generation Event was launched. Any Pioneer Holder choosing to withdraw the Air-HODLed tokens before the end of those 2 years will only receive the vested portion (i.e. 50% of the distributed DAPP tokens will be vested after 1 year). The remainder of their unvested DAPP tokens will be distributed to Pioneer Holders who are still holding their Air-HODL DAPP tokens.

HODLers are allowed to stake their vested Air-HODLed tokens immediately using our new staking mechanics. Withdrawing the tokens will transfer the vested tokens to their DAPP account, forfeiting the unvested portion to be redistributed amongst remaining eligible participants.

You can get more information on the Air-HODL and view your balance at: https://liquidapps.io/air-hodl

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CHAPTER 5

FAQs

5.1 Frequently Asked Questions The DAPP Token

5.1.1 What is the DAPP token?

The DAPP token is a multi-purpose utility token designed to power an ecosystem of utilities, resources, & services specifically serving the needs of dApp developers building user-centric dApps.

5.1.2 What is the supply schedule of DAPP token?

DAPP will have an intial supply of 1 billion tokens. The DAPP Token Smart Contract generates new DAPP Tokens on an ongoing basis, at an annual inflation rate of 1-5%.

5.1.3 How are DAPP tokens distributed?

50% of the DAPP tokens will be distributed in a year-long token sale, while 10% will be Air-Hodl'd to EOS holders. The team will receive 20% of the DAPP tokens, of which 6.5% is unlocked and the rest continuously vested (on a block-by-block basis) over a period of 2 years. Our partners and advisors will receive 10% of the DAPP tokens, with the remaining 10% designated towards our grant and bounty programs.

5.1.4 Why do you need to use DAPP Token and not just EOS?

While we considered this approach at the beginning of our building journey, we decided against it for a number of reasons:

- We look forward to growing the network exponentially and will require ever more hardware to provide quick handling of large amounts of data accessible through a high-availability API. It is fair to assume that this kind of service would require significant resources to operate and market, thus it would not be optimal for a BP to take on this as a "side-job" (using a "free market" model that allows adapting price to cost).
- The BPs have a special role as trusted entities in the EOS ecosystem. DSPs are more similar to a cloud service in this respect, where they are less reputational and more technical. Anyone, including BPs, corporate entities, and private individuals, can become a DSP.
- Adding the DAPP Network mechanism as an additional utility of the EOS token would not only require a complete consensus between all BPs, but adoption by all API nodes as well. Lack of complete consensus to adopt this model as an integral part of the EOS protocol would result in a hard fork. (Unlike a system contract update, this change would require everyone's approval, not only 15 out of 21).
- Since the DAPP Network's mechanism does not require the active 21 BPs' consensus, it doesn't require every BP to cache ALL the data. Sharding the data across different entities enables true horizontal scaling. By separating the functions and reward mechanisms of BPs and DSPs, The DAPP Network creates an incentive structure that makes it possible for vRAM to scale successfully.
- We foresee many potential utilities for vRAM. One of those is getting vRAM to serve as a shared memory solution between EOS side-chains when using IBC (Inter-Blockchain Communication). This can be extended to chains with a different native token than EOS, allowing DAPP token to be a token for utilizing cross-chain resources.
- We believe The DAPP Network should be a separate, complementary ecosystem (economy) to EOS. While the EOS Mainnet is where consensus is established, the DAPP Network is a secondary trustless layer. DAPP token, as the access token to the DSPs, will potentially power massive scaling of dApps for the first time.

5.1.5 Why is the sale cycle 18 hours?

An 18 hour cycle causes the start and end time to be constantly changing, giving people in all time zones an equal opportunity to participate.

5.1.6 What is an airHODL?

An Air-HODL is an airdrop with a vesting period. EOS token holders on the snapshot block receive DAPP tokens on a pro-rata basis every block, with the complete withdrawal of funds possible only after 2 years. Should they choose to sell their DAPP tokens, these holders forfeit the right to any future airdrop, increasing the share of DAPP tokens for the remaining holders.

5.1.7 Is this an EOS fork?

The DAPP Network is not a fork nor a side-chain but a trustless service layer (with an EOSIO compatible interface to the mainnet), provided by DSPs (DAPP Service providers). This layer potentially allows better utilization of the existing resources (the RAM and CPU resources provided to you as an EOS token holder). It does not require a change in the base protocol (hard fork) nor a change in the system contract. DSPs don't have to be active BPs nor trusted/elected entities and can price their own services.

5.2 Frequently Asked Questions DAPP Service Providers (DSPs)

5.2.1 What is a DSP?

DSPs are individuals or entities who provide external storage capacity, communication services, and/or utilities to dApp developers building on the blockchain, playing a crucial role in the DAPP network.

5.2.2 Who can be a DSP?

DSPs can be BPs, private individuals, corporations, or even anonymous entities. The only requirement is that each DSP must meet the minimum specifications for operating a full node on EOS.

5.2.3 Are DSPs required to run a full node?

While DSPs could use a third-party node, this would add latency to many services, including vRAM. In some cases, this latency could be significant. LiquidApps does not recommend running a DSP without a full node.

5.2.4 How are DSPs incentivized?

DSPs receive 1-5% of token inflation proportional to the total amount of DAPP tokens staked to their service packages.

5.3 Frequently Asked Questions vRAM

5.3.1 Why do I need vRAM?

RAM is a memory device used to store smart contract data on EOS. However, its limited capacity makes it difficult to build and scale dApps. vRAM provides dApp developers with an efficient and affordable alternative for their data storage needs.

5.3.2 How is vRAM different from RAM?

vRAM is a complement to RAM. It is an alternative storage solution for developers building EOS dApps that are RAM-compatible, decentralized, and enables storing & retrieving of potentially unlimited amounts of data affordably and efficiently. It allows dApp developers to cache all relevant data in RAM to distributed file storage systems (IPFS, BitTorent, HODLONG) hosted by DAPP Service Providers (DSPs), utilizing RAM to store only the data currently in use. vRAM transactions are still stored in chain history and so are replayable even if all DSPs go offline.

5.3.3 How can we be sure that data cached with DSPs is not tampered with?

DSPs cache files on IPFS, a decentralized file-storage system that uses a hash function to ensure the integrity of the data. You can learn more about IPFS here: https://www.youtube.com/watch?time_continue=2&v=8CMxDNuuAiQ

5.3.4 How much does vRAM cost?

Developers who wish to use the vRAM System do so by staking DAPP tokens to their chosen DSP for the amount specified by the Service Package they've chosen based on their needs. By staking DAPP, they receive access to the DSP services, vRAM included.

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