

# Работа со смарт-контрактом.

## Основы работы со смарт-контрактом

### Взаимодействие со смарт-контрактом

Взаимодействие со смарт-контрактом происходит посредством вызова функций контракта с указанием параметров. Для взаимодействия необходимо знать адрес смарт-контракта. А на основе адреса нужно получить ABI-интерфейс. По ABI интерфейсу можно вызвать целевую функцию.

### Получение ABI интерфейса

Для получения интерфейса вам необходимо:

1. открыть <https://etherscan.io/>
2. В правом верхнем углу в окне с надписью «search by address» ввести адрес целевого смарт-контракта и нажать «go»
3. Затем нажать на вкладку «contract source»:

The screenshot shows the Etherscan website interface. At the top, there's a search bar with the text 'Search by Address / Txhash / Block / Token / Ens' and a 'GO' button. Below the search bar, there are navigation tabs: HOME, BLOCKCHAIN, ACCOUNT, TOKEN, CHART, and MISC. The 'ACCOUNT' tab is selected. Below the navigation bar, there's a section for 'Contract Address' with a blurred address. To the right of the address, there's a breadcrumb trail: Home / Contract Accounts / Address. Below this, there's a sponsored link: 'Buy your 1st Ethereum in 5 minutes. Trusted by more than 100k buyers.' Below the sponsored link, there's a 'Contract Overview' section with a QR code and a 'Misc' section with a 'More Options' dropdown. The 'Contract Overview' section contains the following information: ETH Balance: 0 Ether, ETH USD Value: \$0, No Of Transactions: 2 txns. The 'Misc' section contains: Address Watch (Add To Watch List), Contract Creator (a blurred address). Below the 'Contract Overview' and 'Misc' sections, there are tabs: Transactions, Internal Transactions, Contract Source (highlighted with a red box), Read Smart Contract, and Comments. Below the 'Contract Source' tab, there's a table showing the latest 2 transactions. The table has columns: TxHash, Block, Age, From, To, Value, and [TxFee]. The first transaction is from 0x0dea7d79cd089... to 0x40316cd0a888c... with a value of 0 Ether and a fee of 0.003944628. The second transaction is from 0x99ce35b2d5d1e4... to Contract Creation with a value of 0 Ether and a fee of 0.004979904. At the bottom right of the table, there's a link: [Download CSV Export].

TxHash	Block	Age	From	To	Value	[TxFee]
0x0dea7d79cd089...	4500793	24 mins ago	0xea15adb66dc92a...	0x40316cd0a888c...	0 Ether	0.003944628
0x99ce35b2d5d1e4...	4500769	29 mins ago	0xea15adb66dc92a...	Contract Creation	0 Ether	0.004979904

4. Найти поле с надписью «Contract ABI» и нажать на кнопку «copy» справа от надписи. Интерфейс ABI контракта теперь скопирован в буфер обмена.

# Вызов функции

1. Откройте кошелек <https://www.myetherwallet.com>

Transactions

Internal Transactions

Contract Source

Read Smart Contract

Comments

Contract Source Code Verified

Contract Name:Deployer

Optimization Enabled:Yes

Compiler Version:v0.4.18+commit.9cf6e910

Runs (Optimiser):200

Contract Source Code </>

Copy

Find Similar Contracts

```
1 pragma solidity ^0.4.18;
2
3 /**
4  * @title ERC20Basic
5  * @dev Simpler version of ERC20 interface
6  * @dev see https://github.com/ethereum/EIPs/issues/179
7  */
8 contract ERC20Basic {
9     uint256 public totalSupply;
10    function balanceOf(address who) public constant returns (uint256);
11    function transfer(address to, uint256 value) public returns (bool);
12    event Transfer(address indexed from, address indexed to, uint256 value);
13 }
14
15 /**
16  * @title ERC20 interface
17  * @dev see https://github.com/ethereum/EIPs/issues/20
18  */
19 contract ERC20 is ERC20Basic {
20    function allowance(address owner, address spender) public constant returns (uint256);
21    function transferFrom(address from, address to, uint256 value) public returns (bool);
22    function approve(address spender, uint256 value) public returns (bool);
23    event Approval(address indexed owner, address indexed spender, uint256 value);
24 }
25
26 /**
27  * @title SafeMath
```

Contract ABI

Copy

Export ABI

```
[{"constant":true,"inputs":[],"name":"ico","outputs":[{"name":"","type":"address"}],"payable":false,"stateMutability":"view","type":"function"}, {"constant":false,"inputs":[],"name":"deploy","outputs":[],"payable":false,"stateMutability":"nonpayable","type":"function"}, {"constant":true,"inputs":[],"name":"owner","outputs":[{"name":"","type":"address"}],"payable":false,"stateMutability":"view","type":"function"}, {"constant":false,"inputs":[{"name":"newOwner","type":"address"}],"name":"transferOwnership","outputs":[],"payable":false,"stateMutability":"nonpayable","type":"function"}, {"constant":true,"inputs":[],"name":"token","outputs":[{"name":"","type":"address"}],"payable":false,"stateMutability":"view","type":"function"}, {"constant":true,"inputs":[],"name":"presale","outputs":[{"name":"","type":"address"}],"payable":false,"stateMutability":"view","type":"function"}, {"anonymous":false,"inputs":[{"indexed":true,"name":"previousOwner","type":"address"}, {"indexed":true,"name":"newOwner","type":"address"}],"name":"OwnershipTransferred","type":"event"}]
```

2. Выберите вкладку «контракты» и заполните поля **адрес** и **ABI** (мы его получали в предыдущей части инструкции) и нажмите на «подключиться»

MyEtherWallet

3.10.4.8

Русский

Цена газа: 1 Gwei

Network: Kovan (Etherscan.io)

New Wallet

Перевести эфир (ether) и токены

Обмен

Офлайн-перевод

контракт

Check TX Status

Информация о кошельке

Help

Interact with Contract or Опубликовать контракт

Адрес контракта

mewtopia.eth or 0x7cB57B5A97eAbe94205C07890BE4c1e

Выбрать имеющийся контракт

Select a contract...

ABI / JSON интерфейс

[{"type":"constructor","inputs":[{"name":"param1","type":"uint256","indexed":true}],"name":"Event"}, {"type":"function","inputs":[{"name":"a","type":"uint256"}],"name":"foo","outputs":[]}]

Подключиться

3. После этого в нас станет доступен список функций контракта. Выбираем целевую функцию и заполняем параметры

Interact with Contract or Опубликовать контракт

Адрес контракта

0x82C4271E84E7c24093B075F96D70697B8ed974fc

Выбрать имеющийся контракт

Select a contract...

ABI / JSON интерфейс

```
[{"name": "", "type": "address"}, {"payable": false, "stateMutability": "view", "type": "function"}, {"constant": true, "inputs": [{"name": "presale", "outputs": [{"name": "", "type": "address"}, {"payable": false, "stateMutability": "view", "type": "function"}, {"anonymous": false, "inputs": [{"indexed": true, "name": "previousOwner", "type": "address"}, {"indexed": true, "name": "newOwner", "type": "address"}], "name": "OwnershipTransferred", "type": "event"}]
```

Подключиться

Прочитать / записать контракт

0x82C4271E84E7c24093B075F96D70697B8ed974fc

prelCO

ico

prelCO

deploy

owner

transferOwnership

dbf1bd55f472c8fab1859cd162216

4. После выбора функции и заполнения параметров получите доступ к кошельку-владельцу смарт-контракта удобным вам способом и нажмите на кнопку «записать» и «Да, я уверен, выполнить транзакцию». Внимание — перед тем как нажать «записать» внимательно проверьте введенные данные. Часто формат данных отличается от привычного пользователю вида.

```
["indexed":true,"name":"newOwner","type":"address"}],{"name":"OwnershipTransferred","type":"event"}]
```

Подключиться

Прочитать / записать контракт  
0x82C4271E84E7c24093B075F96D70697B8ed974fc

deploy ▾

Каким способом Вы хотите получать доступ к своему кошельку?

- Metamask / Mist
- Ledger Wallet
- TREZOR
- Digital Bitbox
- Файл Keystore (UTC / JSON)
- Кодовая фраза
- Закрытый ключ

Parity Phrase: No longer supported

ЗАПИСАТЬ

- После этого внизу появится зеленая панель со ссылкой «Verify transaction». Нажмите на эту ссылку и откроется Etherscan. Ждите пока транзакция не выполнится.


## Как посмотреть интерфейс смарт-контракта

- открыть <https://etherscan.io/>
- В правом верхнем углу в окне с надписью «search by address» ввести адрес целевого смарт-контракта и нажать «go»
- Появится окно в котором надо нажать на вкладку «Read smart contract»

**Etherscan** KOVAN (POA) TESTNET Search by Address / Txhash / Block / Token GO

HOME BLOCKCHAIN ACCOUNT TOKEN CHART MISC

Contract Address 0x82C4271E84E7c24093B075F96D70697B8ed974fc Home / Contract Accounts / Address

**Contract Overview**  **Misc** More Options ▾

ETH Balance: 0 Ether Contract Creator 0xb8600b335332724... at txn 0xe27fde52b736a8d...

No Of Transactions: 3 txns

Transactions Internal Transactions Contract Source Yes **Read Smart Contract**

Latest 3 txns

TxHash	Block	Age	From		To	Value	[TxFee]
0x8c71c825c414d60...	4353301	2 days 18 hrs ago	0x445c94f566abf8e...	IN	0x82c4271e84e7c24...	0 Ether	0.004463578
0x978baac502cad9b...	4353293	2 days 18 hrs ago	0xb8600b335332724...	IN	0x82c4271e84e7c24...	0 Ether	0.000030572
0xe27fde52b736a8d...	4353255	2 days 18 hrs ago	0xb8600b335332724...	IN	Contract Creation	0 Ether	0.005746979

## Подготовка к работе — только если контракт заливали самостоятельно!

Адрес смарт-контракта конфигуратора:

Для начала работы со смарт-контрактами их необходимо проинициализировать. Для этого нужно у контракта-конфигуратора вызывать функцию deploy. Во время ее вызова MyEtherWalet может не определить количество газа, необходимое для вызова функции. И поэтому поставит «-1».

Внимание!

×

You are about to **execute a function on contract** on the **KOVAN ETH** chain.  
The **KOVAN ETH** node you are sending through is provided by **Etherscan.io**.

Сумма перевода

Лимит газа

Сформировать транзакцию

Исправьте число на 4600000 и нажмите «Записать транзакцию» а затем «Да, я уверен! Выполнить транзакцию».

## Внимание!

You are about to **execute a function on contract** on the **KOVAN ETH** chain.  
The **KOVAN ETH** node you are sending through is provided by **Etherscan.io**.

### Сумма перевода

0

### Лимит газа

4600000

Сформировать транзакцию

### Готовая транзакция

```
{"nonce": "0xbd", "gasPrice": "0x3b9aca00", "gasLimit": "0x4630c0", "to": "0x82C4271E84E7c24093B0"}
```


### Подписанная транзакция

```
0xf86981bd843b9aca00834630c09482c4271e84e7c24093b075f96d70697b8ed974fc8084775c300c77a06619
```

Нет, отменить транзакцию!

Да, я уверен! Выполнить транзакцию.

После выполнения транзакции (вам нужно дождаться ее выполнения). Вы можете открыть интерфейс смарт-контракта и вы увидите 4 поля с ненулевыми адресами:




LOGIN

Search by Address / Txhash / Block / Token / Ens

GO

HOMEBLOCKCHAINACCOUNTTOKENCHARTMISC

Contract Address0x32dA8923f36936684262E34D6BE1d5fA26708D36Home / Contract Accounts / Address

Sponsored Link Download the Monaco app for Android and iOS on Aug 31 - [www.mona.co](http://www.mona.co)

**Contract Overview**

ETH Balance:0 Ether

ETH USD Value:\$0

No Of Transactions:1 txn

Misc

Address Watch

Add To Watch List

Contract Creator

0xea15adb66dc92a... at txn 0x3d9f8df1a1ee9d5...

Transactions

Internal Transactions

Contract SourceYes

Read Smart Contract

Comments

Read Contract Information

[Reset]

1. > ico → 0x381c23667cdb85514b8bc8ebe7406fec9d0c8f3c address

2. > owner → 0x379264af7dfcf8141a23bc989aa44266ddd2c62 address

3. > token → 0x29548baf82278c4207dce57d1a44c4ef07981b03 address

4. > presale → 0xa9c970503955f3faec20d84b60ab2466b57be3f5 address

Важные для нас адреса смарт-контрактов:

1. presale — адрес Presale контракта — именно на него инвесторы должны закидывать эфир во время presale-распродажи. Также все даты распродажи, а также цена и функция завершения распродажи вызывается по этому адресу.
2. Ico - адрес ICO контракта — именно на него инвесторы должны закидывать эфир во время ICO-распродажи. Также все даты распродажи, а также цена и функция завершения распродажи вызывается по этому адресу.
3. Token — адрес смарт-контракта токена. Этот адрес пользователи будут добавлять себе в кошелек для отображения токена.

## Конфигурация

Адреса кошельков:

Presale	Сбор	0x4bB656423f5476FeC4AA729aB7B4EE0fc4d0B314
	Баунти	0xcACBE5d8Fb017407907026804Fe8BE64B08511f4
	Разработчики	0xa20C62282bEC52F9dA240dB8cFFc5B2fc8586652
	Консультанты	0xD3D85a495c7E25eAd39793F959d04ACcDf87e01b
	Владелец	0x379264aF7df7CF8141a23bC989aa44266DDD2c62
	Разработчики смарт-контрактов	0xEA15Adb66DC92a4BbCcC8Bf32fd25E2e86a2A770
ICO	Сбор	0x65954fb8f45b40c9A60dffF3c8f4F39839Bf3596
	Банути	0x6b9f45A54cDe417640f7D49D13451D7e2e9b8918
	Разработчики	0x55A9E5b55F067078E045c72088C3888Bbcd9a64b
	Консультанты	0x3e11Ff0BDd160C1D85cdf04e012eA9286ae1A964
	Владелец	0x379264aF7df7CF8141a23bC989aa44266DDD2c62

Адреса контрактов:

Контракт	Адрес
Токен	0x959B06600405760D95B5be11A2D36c1e8E7517Aa
Presale	0x7950d074CaF142bDaD0C11B2402cD85344f8C7bD
ICO	0x8C556A7bb74B4979a6B4dC654492C3f6fa102a95

Ссылки:

Контракт	Адрес
Токен	<a href="https://etherscan.io/token/0x959b06600405760d95b5be11a2d36c1e8e7517aa">https://etherscan.io/token/0x959b06600405760d95b5be11a2d36c1e8e7517aa</a>
Presale	<a href="https://etherscan.io/address/0x7950d074caf142bdad0c11b2402cd85344f8c7bd">https://etherscan.io/address/0x7950d074caf142bdad0c11b2402cd85344f8c7bd</a>
ICO	<a href="https://etherscan.io/address/0x8c556a7bb74b4979a6b4dc654492c3f6fa102a95">https://etherscan.io/address/0x8c556a7bb74b4979a6b4dc654492c3f6fa102a95</a>

**Функция finishMinting — должна вызываться у каждой распродажи после того, как закончился срок распродажи**



## Рекомендованные значения для отправки транзакции инвестора

Обычно кошельки сами способны определить количество газа и цену. Но не всегда. Поэтому вводятся рекомендованные значения:

1. Меньше чем 0.01 эфира контракт не принимает.
2. Количество газа 200 000
3. Цена газа — не менее 21 Gwei. Транзакции с меньшим количеством газа идти будут дольше. Так транзакции с ценой газа в 1 Gwei при большой нагрузке на сеть могут идти несколько недель.

## Памятка владельцу контрактов

Владелец контрактов должен после каждой распродажи вызвать функцию *finishMinting()* у соответствующего контракта распродажи. А именно.

1. По окончании распродажи у контракта presale вызвать *finishMinting()*, адрес контракта: **0x7950d074CaF142bDaD0C11B2402cD85344f8C7bD**
2. По окончании распродажи у контракта ICO вызвать *finishMinting()*, адрес контракта: **0x8C556A7bb74B4979a6B4dC654492C3f6fa102a95**
3. Для вывода средств с контракта Presale нужно вызвать функцию *withdraw*.

Перед вызовом убедитесь, что адрес контракта соответствует текущей распродаже!

## Расположение адресов в смарт-контракте

```
pragma solidity ^0.4.18;
```

```
/**
```

```
 * @title ERC20Basic
```

```
 * @dev Simpler version of ERC20 interface
```

```
 * @dev see https://github.com/ethereum/EIPs/issues/179
```

```
 */
```

```
contract ERC20Basic {
```

```
    uint256 public totalSupply;
```

```
    function balanceOf(address who) public constant returns (uint256);
```

```
    function transfer(address to, uint256 value) public returns (bool);
```

```
    event Transfer(address indexed from, address indexed to, uint256 value);
```

```
}
```

```
/**
```

```
 * @title ERC20 interface
```

```
 * @dev see https://github.com/ethereum/EIPs/issues/20
```

```
 */
```

```

contract ERC20 is ERC20Basic {
    function allowance(address owner, address spender) public constant returns (uint256);
    function transferFrom(address from, address to, uint256 value) public returns (bool);
    function approve(address spender, uint256 value) public returns (bool);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

```

```

/**

```

```

 * @title SafeMath

```

```

 * @dev Math operations with safety checks that throw on error

```

```

 */

```

```

library SafeMath {

```

```

    function mul(uint256 a, uint256 b) internal pure returns (uint256) {

```

```

        uint256 c = a * b;

```

```

        assert(a == 0 || c / a == b);

```

```

        return c;

```

```

    }

```

```

    function div(uint256 a, uint256 b) internal pure returns (uint256) {

```

```

        // assert(b > 0); // Solidity automatically throws when dividing by 0

```

```

        uint256 c = a / b;

```

```

        // assert(a == b * c + a % b); // There is no case in which this doesn't hold

```

```

        return c;

```

```

    }

```

```

    function sub(uint256 a, uint256 b) internal pure returns (uint256) {

```

```

        assert(b <= a);

```

```

        return a - b;

```

```

    }

```

```

    function add(uint256 a, uint256 b) internal pure returns (uint256) {

```

```

        uint256 c = a + b;

```

```

        assert(c >= a);

```

```

        return c;

```

```

    }

```

```

}

```

```

/**

```

```

 * @title Basic token

```

```

 * @dev Basic version of StandardToken, with no allowances.

```

```

 */

```

```

contract BasicToken is ERC20Basic {

```

```

    using SafeMath for uint256;

```

```

    mapping(address => uint256) balances;

```

```

    /**

```

```

     * @dev transfer token for a specified address

```

```

     * @param _to The address to transfer to.

```

```

     * @param _value The amount to be transferred.

```

```

     */

```

```

    function transfer(address _to, uint256 _value) public returns (bool) {

```

```

require(_to != address(0));
require(_value <= balances[msg.sender]);

// SafeMath.sub will throw if there is not enough balance.
balances[msg.sender] = balances[msg.sender].sub(_value);
balances[_to] = balances[_to].add(_value);
Transfer(msg.sender, _to, _value);
return true;
}

/**
 * @dev Gets the balance of the specified address.
 * @param _owner The address to query the the balance of.
 * @return An uint256 representing the amount owned by the passed address.
 */
function balanceOf(address _owner) public constant returns (uint256 balance) {
    return balances[_owner];
}

}

/**
 * @title Standard ERC20 token
 *
 * @dev Implementation of the basic standard token.
 * @dev https://github.com/ethereum/EIPs/issues/20
 * @dev Based on code by FirstBlood:
 * https://github.com/Firstbloodio/token/blob/master/smart\_contract/FirstBloodToken.sol
 */
contract StandardToken is ERC20, BasicToken {

    mapping (address => mapping (address => uint256)) internal allowed;

    /**
     * @dev Transfer tokens from one address to another
     * @param _from address The address which you want to send tokens from
     * @param _to address The address which you want to transfer to
     * @param _value uint256 the amount of tokens to be transferred
     */
    function transferFrom(address _from, address _to, uint256 _value) public returns (bool) {
        require(_to != address(0));
        require(_value <= balances[_from]);
        require(_value <= allowed[_from][msg.sender]);

        balances[_from] = balances[_from].sub(_value);
        balances[_to] = balances[_to].add(_value);
        allowed[_from][msg.sender] = allowed[_from][msg.sender].sub(_value);
        Transfer(_from, _to, _value);
        return true;
    }
}

```

```

/**
 * @dev Approve the passed address to spend the specified amount of tokens on behalf of
msg.sender.
 *
 * Beware that changing an allowance with this method brings the risk that someone may use both
the old
 * and the new allowance by unfortunate transaction ordering. One possible solution to mitigate
this
 * race condition is to first reduce the spender's allowance to 0 and set the desired value
afterwards:
 * https://github.com/ethereum/EIPs/issues/20#issuecomment-263524729
 * @param _spender The address which will spend the funds.
 * @param _value The amount of tokens to be spent.
 */
function approve(address _spender, uint256 _value) public returns (bool) {
    allowed[msg.sender][_spender] = _value;
    Approval(msg.sender, _spender, _value);
    return true;
}

/**
 * @dev Function to check the amount of tokens that an owner allowed to a spender.
 * @param _owner address The address which owns the funds.
 * @param _spender address The address which will spend the funds.
 * @return A uint256 specifying the amount of tokens still available for the spender.
 */
function allowance(address _owner, address _spender) public constant returns (uint256 remaining)
{
    return allowed[_owner][_spender];
}

/**
 * approve should be called when allowed[_spender] == 0. To increment
 * allowed value is better to use this function to avoid 2 calls (and wait until
 * the first transaction is mined)
 * From MonolithDAO Token.sol
 */
function increaseApproval (address _spender, uint _addedValue) public returns (bool success) {
    allowed[msg.sender][_spender] = allowed[msg.sender][_spender].add(_addedValue);
    Approval(msg.sender, _spender, allowed[msg.sender][_spender]);
    return true;
}

function decreaseApproval (address _spender, uint _subtractedValue) public returns (bool success)
{
    uint oldValue = allowed[msg.sender][_spender];
    if (_subtractedValue > oldValue) {
        allowed[msg.sender][_spender] = 0;
    } else {
        allowed[msg.sender][_spender] = oldValue.sub(_subtractedValue);
    }
    Approval(msg.sender, _spender, allowed[msg.sender][_spender]);
}

```

```

    return true;
}

function () public payable {
    revert();
}

}

/**
 * @title Ownable
 * @dev The Ownable contract has an owner address, and provides basic authorization control
 * functions, this simplifies the implementation of "user permissions".
 */
contract Ownable {
    address public owner;

    event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);

    /**
     * @dev The Ownable constructor sets the original `owner` of the contract to the sender
     * account.
     */
    function Ownable() public {
        owner = msg.sender;
    }

    /**
     * @dev Throws if called by any account other than the owner.
     */
    modifier onlyOwner() {
        require(msg.sender == owner);
        _;
    }

    /**
     * @dev Allows the current owner to transfer control of the contract to a newOwner.
     * @param newOwner The address to transfer ownership to.
     */
    function transferOwnership(address newOwner) onlyOwner public {
        require(newOwner != address(0));
        OwnershipTransferred(owner, newOwner);
        owner = newOwner;
    }
}

contract LockableChanges is Ownable {

```

```

bool public changesLocked;

modifier notLocked() {
    require(!changesLocked);
    _;
}

function lockChanges() public onlyOwner {
    changesLocked = true;
}

}

/**
 * @title Mintable token
 * @dev Simple ERC20 Token example, with mintable token creation
 * @dev Issue: * https://github.com/OpenZeppelin/zeppelin-solidity/issues/120
 * Based on code by TokenMarketNet:
https://github.com/TokenMarketNet/ico/blob/master/contracts/MintableToken.sol
 */
contract GENSharesToken is StandardToken, Ownable {

    using SafeMath for uint256;

    event Mint(address indexed to, uint256 amount);

    event MintFinished();

    string public constant name = "GEN Shares";

    string public constant symbol = "GEN";

    uint32 public constant decimals = 18;

    bool public mintingFinished = false;

    address public saleAgent;

    function setSaleAgent(address newSaleAgent) public {
        require(saleAgent == msg.sender || owner == msg.sender);
        saleAgent = newSaleAgent;
    }

    function mint(address _to, uint256 _amount) public returns (bool) {
        require(!mintingFinished);
        require(msg.sender == saleAgent);
        totalSupply = totalSupply.add(_amount);
        balances[_to] = balances[_to].add(_amount);
        Mint(_to, _amount);
        Transfer(address(0), _to, _amount);
        return true;
    }

```

```

}

function finishMinting() public returns (bool) {
    require(!mintingFinished);
    require(msg.sender == owner || msg.sender == saleAgent);
    mintingFinished = true;
    MintFinished();
    return true;
}

}

```

```

contract CommonCrowdsale is Ownable, LockableChanges {

    using SafeMath for uint256;

    uint public constant PERCENT_RATE = 100;

    uint public price;

    uint public minInvestedLimit;

    uint public hardcap;

    uint public start;

    uint public end;

    uint public invested;

    uint public minted;

    address public wallet;

    address public bountyTokensWallet;

    address public devTokensWallet;

    address public advisorsTokensWallet;

    uint public bountyTokensPercent;

    uint public devTokensPercent;

    uint public advisorsTokensPercent;

    struct Bonus {
        uint periodInDays;
        uint bonus;
    }

    Bonus[] public bonuses;
}

```

```

GENSharesToken public token;

modifier saleIsOn() {
    require(msg.value >= minInvestedLimit && now >= start && now < end && invested <
hardcap);
    _;
}

function setHardcap(uint newHardcap) public onlyOwner notLocked {
    hardcap = newHardcap;
}

function setStart(uint newStart) public onlyOwner notLocked {
    start = newStart;
}

function setBountyTokensPercent(uint newBountyTokensPercent) public onlyOwner notLocked {
    bountyTokensPercent = newBountyTokensPercent;
}

function setAdvisorsTokensPercent(uint newAdvisorsTokensPercent) public onlyOwner
notLocked {
    advisorsTokensPercent = newAdvisorsTokensPercent;
}

function setDevTokensPercent(uint newDevTokensPercent) public onlyOwner notLocked {
    devTokensPercent = newDevTokensPercent;
}

function setBountyTokensWallet(address newBountyTokensWallet) public onlyOwner notLocked
{
    bountyTokensWallet = newBountyTokensWallet;
}

function setAdvisorsTokensWallet(address newAdvisorsTokensWallet) public onlyOwner
notLocked {
    advisorsTokensWallet = newAdvisorsTokensWallet;
}

function setDevTokensWallet(address newDevTokensWallet) public onlyOwner notLocked {
    devTokensWallet = newDevTokensWallet;
}

function setEnd(uint newEnd) public onlyOwner notLocked {
    require(start < newEnd);
    end = newEnd;
}

function setToken(address newToken) public onlyOwner notLocked {
    token = GENSharesToken(newToken);
}

```



```

function setWallet(address newWallet) public onlyOwner notLocked {
    wallet = newWallet;
}

function setPrice(uint newPrice) public onlyOwner notLocked {
    price = newPrice;
}

function setMinInvestedLimit(uint newMinInvestedLimit) public onlyOwner notLocked {
    minInvestedLimit = newMinInvestedLimit;
}

function bonusesCount() public constant returns(uint) {
    return bonuses.length;
}

function addBonus(uint limit, uint bonus) public onlyOwner notLocked {
    bonuses.push(Bonus(limit, bonus));
}

function mintExtendedTokens() internal {
    uint extendedTokensPercent =
bountyTokensPercent.add(devTokensPercent).add(advisorsTokensPercent);
    uint extendedTokens =
minted.mul(extendedTokensPercent).div(PERCENT_RATE.sub(extendedTokensPercent));
    uint summaryTokens = extendedTokens + minted;

    uint bountyTokens = summaryTokens.mul(bountyTokensPercent).div(PERCENT_RATE);
    mintAndSendTokens(bountyTokensWallet, bountyTokens);

    uint advisorsTokens = summaryTokens.mul(advisorsTokensPercent).div(PERCENT_RATE);
    mintAndSendTokens(advisorsTokensWallet, advisorsTokens);

    uint devTokens = summaryTokens.sub(advisorsTokens).sub(bountyTokens);
    mintAndSendTokens(devTokensWallet, devTokens);
}

function mintAndSendTokens(address to, uint amount) internal {
    token.mint(to, amount);
    minted = minted.add(amount);
}

function calculateAndTransferTokens() internal {
    // update invested value
    invested = invested.add(msg.value);

    // calculate tokens
    uint tokens = msg.value.mul(price).div(1 ether);
    uint bonus = getBonus();
    if(bonus > 0) {
        tokens = tokens.add(tokens.mul(bonus).div(100));
    }
}

```

```

    }

    // transfer tokens
    mintAndSendTokens(msg.sender, tokens);
}

function getBonus() public constant returns(uint) {
    uint prevTimeLimit = start;
    for (uint i = 0; i < bonuses.length; i++) {
        Bonus storage bonus = bonuses[i];
        prevTimeLimit += bonus.periodInDays * 1 days;
        if (now < prevTimeLimit)
            return bonus.bonus;
    }
    return 0;
}

function createTokens() public payable;

function() external payable {
    createTokens();
}

function retrieveTokens(address anotherToken) public onlyOwner {
    ERC20 alienToken = ERC20(anotherToken);
    alienToken.transfer(wallet, token.balanceOf(this));
}

}

contract Presale is CommonCrowdsale {

    uint public devLimit;

    uint public softcap;

    bool public refundOn;

    bool public softcapAchieved;

    bool public devWithdrawn;

    address public devWallet;

    address public nextSaleAgent;

    mapping (address => uint) public balances;

    function setNextSaleAgent(address newNextSaleAgent) public onlyOwner notLocked {
        nextSaleAgent = newNextSaleAgent;
    }
}

```

```

function setSoftcap(uint newSoftcap) public onlyOwner notLocked {
    softcap = newSoftcap;
}

function setDevWallet(address newDevWallet) public onlyOwner notLocked {
    devWallet = newDevWallet;
}

function setDevLimit(uint newDevLimit) public onlyOwner notLocked {
    devLimit = newDevLimit;
}

function refund() public {
    require(now > start && refundOn && balances[msg.sender] > 0);
    uint value = balances[msg.sender];
    balances[msg.sender] = 0;
    msg.sender.transfer(value);
}

function createTokens() public payable saleIsOn {
    balances[msg.sender] = balances[msg.sender].add(msg.value);
    calculateAndTransferTokens();
    if(!softcapAchieved && invested >= softcap) {
        softcapAchieved = true;
    }
}

function withdrawDev() public {
    require(softcapAchieved);
    require(devWallet == msg.sender || owner == msg.sender);
    if(!devWithdrawn) {
        devWithdrawn = true;
        devWallet.transfer(devLimit);
    }
}

function withdraw() public {
    require(softcapAchieved);
    require(owner == msg.sender);
    withdrawDev();
    wallet.transfer(this.balance);
}

function finishMinting() public onlyOwner {
    if(!softcapAchieved) {
        refundOn = true;
        token.finishMinting();
    } else {
        mintExtendedTokens();
        token.setSaleAgent(nextSaleAgent);
    }
}

```

```
}
```

```
contract ICO is CommonCrowdsale {
```

```
    function finishMinting() public onlyOwner {  
        mintExtendedTokens();  
        token.finishMinting();  
    }
```

```
    function createTokens() public payable saleIsOn {  
        calculateAndTransferTokens();  
        wallet.transfer(msg.value);  
    }
```

```
}
```

```
contract Deployer is Ownable {
```

```
    Presale public presale;
```

```
    ICO public ico;
```

```
    GENSharesToken public token;
```

```
    function deploy() public onlyOwner {  
        owner = 0x379264aF7df7CF8141a23bC989aa44266DDD2c62; // 1
```

```
        token = new GENSharesToken();
```

```
        presale = new Presale();  
        presale.setToken(token);  
        token.setSaleAgent(presale);  
        presale.setMinInvestedLimit(40000000000000000000);  
        presale.setPrice(25000000000000000000);  
        presale.setBountyTokensPercent(4);  
        presale.setAdvisorsTokensPercent(2);  
        presale.setDevTokensPercent(10);  
        presale.setSoftcap(40000000000000000000);  
        presale.setHardcap(50000000000000000000);  
        presale.addBonus(7,50);  
        presale.addBonus(7,40);  
        presale.addBonus(100,35);  
        presale.setStart(1511571600);  
        presale.setEnd(1514156400);  
        presale.setDevLimit(60000000000000000000);
```

```
        presale.setWallet(0x4bB656423f5476FeC4AA729aB7B4EE0fc4d0B314); // 2
```

```
        presale.setBountyTokensWallet(0xcACBE5d8Fb017407907026804Fe8BE64B08511f4); // 3
```

```
        presale.setDevTokensWallet(0xa20C62282bEC52F9dA240dB8cFFc5B2fc8586652); // 4
```

```
        presale.setAdvisorsTokensWallet(0xD3D85a495c7E25eAd39793F959d04ACcDf87e01b); // 5
```

```
        presale.setDevWallet(0xEA15Adb66DC92a4BbCcC8Bf32fd25E2e86a2A770); // 6
```

```

ico = new ICO();
ico.setToken(token);
presale.setNextSaleAgent(ico);
ico.setMinInvestedLimit(1000000000000000000);
ico.setPrice(25000000000000000000);
ico.setBountyTokensPercent(4);
ico.setAdvisorsTokensPercent(2);
ico.setDevTokensPercent(10);

ico.setHardcap(2060000000000000000000);
ico.addBonus(7,25);
ico.addBonus(7,10);
ico.setStart(1514163600);
ico.setEnd(1517356800);
ico.setWallet(0x65954fb8f45b40c9A60dffF3c8f4F39839Bf3596); // 7
ico.setBountyTokensWallet(0x6b9f45A54cDe417640f7D49D13451D7e2e9b8918); // 8
ico.setDevTokensWallet(0x55A9E5b55F067078E045c72088C3888Bbcd9a64b); // 9
ico.setAdvisorsTokensWallet(0x3e11Ff0BDd160C1D85cdf04e012eA9286ae1A964); // 10

presale.lockChanges();
ico.lockChanges();

presale.transferOwnership(owner);
ico.transferOwnership(owner);
token.transferOwnership(owner);
}

}

```

Контракт токена	Владелец	1
Контракт presale	Владелец	1
	Разработчики смарт-контракта	6
	Сбор	2
	Консультанты	5
	Баунти	3
	Разработчики	4
Контракт ICO	Владелец	1
	Сбор	7
	Баунти	8
	Разработчики	9
	Консультанты	10

[illegible]

Адрес в etherscan


[illegible]

# Контракт токена

Адрес в etherscan

<https://etherscan.io/token/0x959b06600405760d95b5be11a2d36c1e8e7517aa#readContract>

Token Transfers   Token Holders   Read Smart Contract   Comments

 Read Contract Information

[Reset]

1. > mintingFinished → False *bool*

2. > name → GEN Shares *string*

3. > totalSupply → 0 *uint256*

4. > decimals → 18 *uint32*

5. > balanceOf

↳ balance *uint256*

6. > owner → 0x379264af7df7cf8141a23bc989aa44266ddd2c62 *address*

7. > symbol → GEN *string*

8. > saleAgent → 0x7b918c11398d485fcae7f2864f09701857d7549 *address*

9. > allowance

↳ remaining *uint256*