Blockchain Adapter for Salesforce

User Guide for Spring 2019 V 1.1 with an Example

Table of Contents

Installation *3*

Preparation for Configuration *4*

Preparation in Salesforce (Already done in Test Organization) 4

Voting app – A simple custom object 4

Platform Events 5

Process Builder 5

Enable the Remote Site 7

Preparation in Blockchain (Reviewer may execute these steps to perform full functional tests) 8

Deploy Smart contract to Blockchain 8

Adapter Configuration 12

Adapter Runtime – Salesforce to Ethreum Blockchain *17*

Save a new Vote 17

View Dashboard 17

Test in Remix 18

Adapter Runtime – Ethreum Blockchain to Salesforce *19*

Adapter REST Endpoint 19

Blockchain Event Schema 19

Congratulations *20*

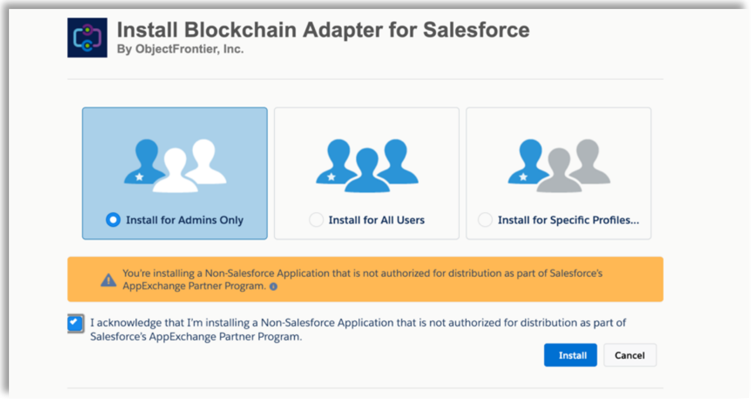
Appendix: Technical Details on Event to Contract Field Mapping *21*

Installation

Prerequisites :

Will work in Salesforce Developer Edition and any Org that is Lighting enable and can support Platform Events

Ensure you have enable **My Domain** under **Company Settings** in Setup.



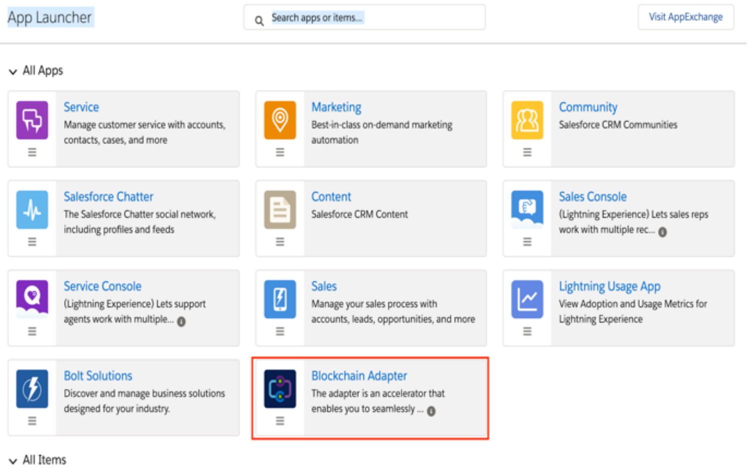
Install Blockchain Adapter for Salesforce
By ObjectFrontier, Inc.

● Install for Admins Only
○ Install for All Users
○ Install for Specific Profiles...

You're installing a Non-Salesforce Application that is not authorized for distribution as part of Salesforce's AppExchange Partner Program.

☑ I acknowledge that I'm installing a Non-Salesforce Application that is not authorized for distribution as part of Salesforce's AppExchange Partner Program.

Once the package has completed the installation, go to the App Launcher and pick the **Blockchain Adapter**



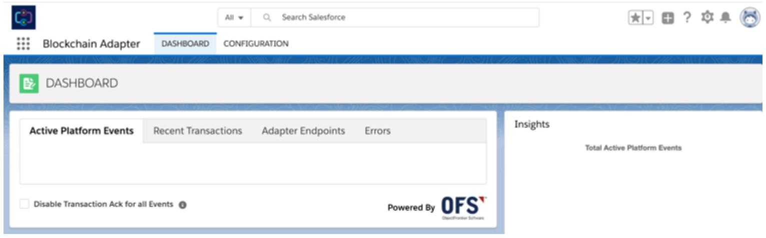
App Launcher

All Apps

- Service: Manage customer service with accounts, contacts, cases, and more
- Marketing: Best-in-class on-demand marketing automation
- Community: Salesforce CRM Communities
- Salesforce Chatter: The Salesforce Chatter social network, including profiles and feeds
- Content: Salesforce CRM Content
- Sales Console: (Lightning Experience) Lets sales reps work with multiple rec...
- Service Console: (Lightning Experience) Lets support agents work with multiple...
- Sales: Manage your sales process with accounts, leads, opportunities, and more
- Lightning Usage App: View Adoption and Usage Metrics for Lightning Experience
- Bolt Solutions: Discover and manage business solutions designed for your industry.
- Blockchain Adapter: The adapter is an accelerator that enables you to seamlessly ...

All Items

Which will look like this if you have the package installed correctly and My Domain configured.



□ Disable Transaction Ack for all Events

This user guide will walk you through the set-up process using an example. As you progress though the document you will also learn about the features of the Adapter.

This example will create a Voting app in Salesforce. Let's say that the app is expected to record every vote and the voter details to blockchain as the vote is cast.

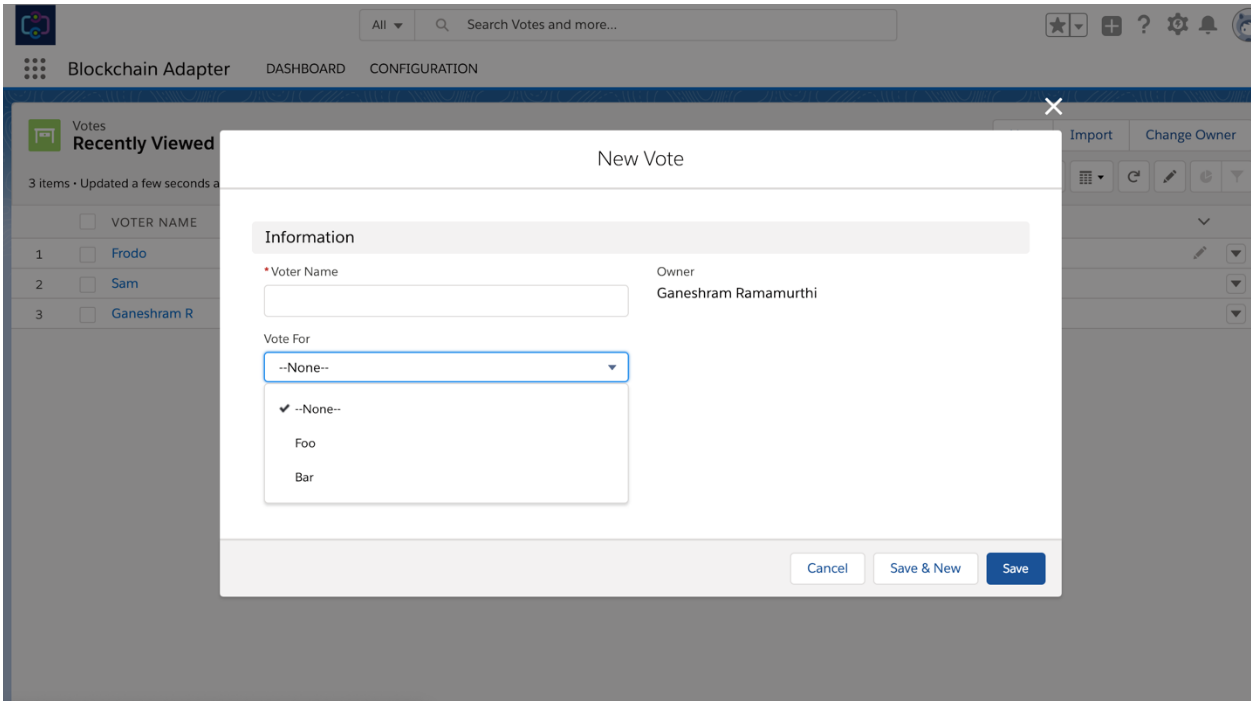
Following are the steps to execute in order to use the adapter to integrate your salesforce application with Blockchain.

Preparation for Configuration

Preparation in Salesforce (Already done in Test Organization)

Voting app – A simple custom object

In this example we create a simple Custom Object



	VOTER NAME
1	Frodo
2	Sam
3	Ganeshram R

New Vote

Information

*Voter Name

Owner: Ganeshram Ramamurthi

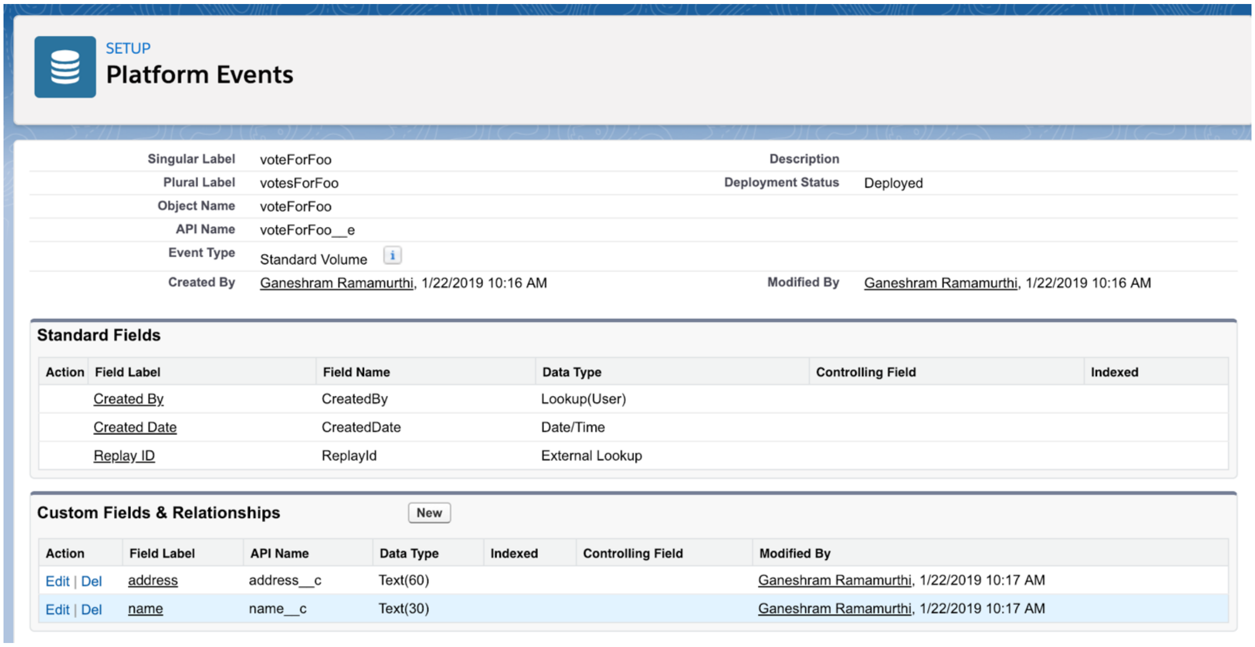
Vote For: --None--

- ✓ --None--
- Foo
- Bar

Platform Events

This Adapter is entirely platform events driven. To execute our example, we will need a platform event that the adapter should listen to. So, we create a platform event that will trigger when a someone votes for Foo.

Note that the event has 2 custom fields Name and Address. At this point just keep in mind that these are the fields that will be written to the blockchain.



SETUP

Platform Events

Singular Label	voteForFoo	Description	
Plural Label	votesForFoo	Deployment Status	Deployed
Object Name	voteForFoo		
API Name	voteForFoo__e		
Event Type	Standard Volume		
Created By	Ganeshram Ramamurthi, 1/22/2019 10:16 AM	Modified By	Ganeshram Ramamurthi, 1/22/2019 10:16 AM

Standard Fields

Action	Field Label	Field Name	Data Type	Controlling Field	Indexed
	Created By	CreatedBy	Lookup(User)		
	Created Date	CreatedDate	Date/Time		
	Replay ID	ReplayId	External Lookup		

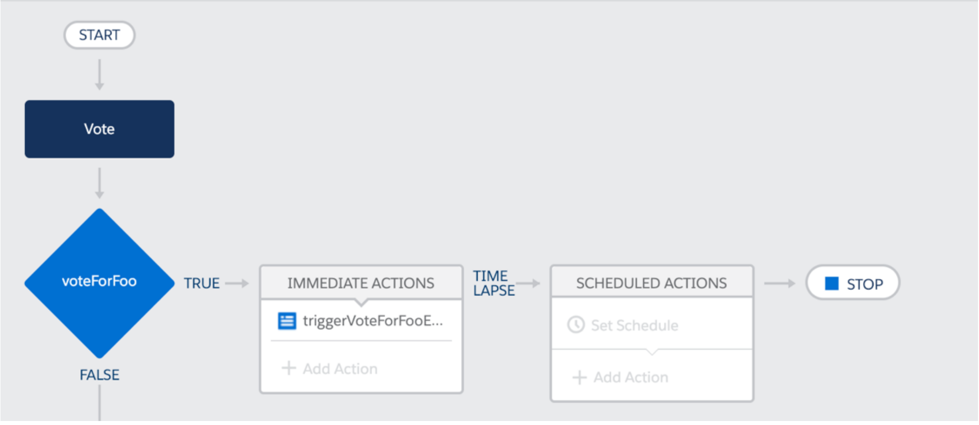
Custom Fields & Relationships

Action	Field Label	API Name	Data Type	Indexed	Controlling Field	Modified By
Edit | Del	address	address__c	Text(60)			Ganeshram Ramamurthi, 1/22/2019 10:17 AM
Edit | Del	name	name__c	Text(30)			Ganeshram Ramamurthi, 1/22/2019 10:17 AM

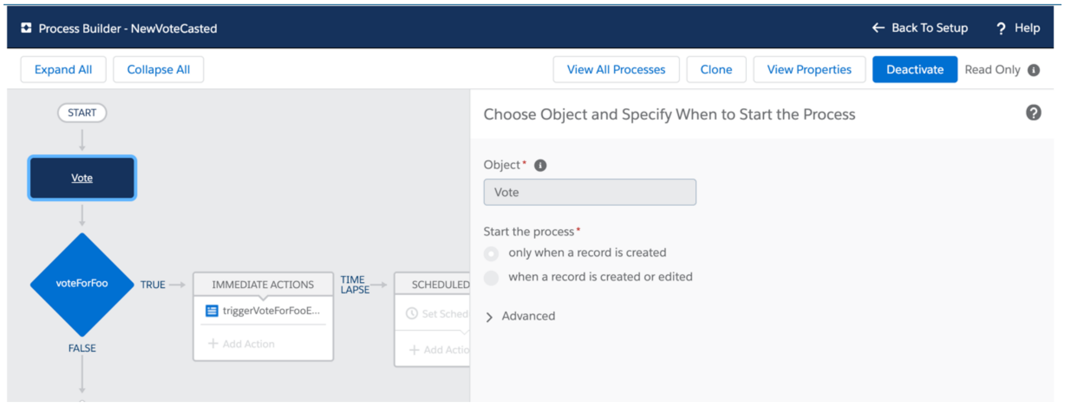
Process Builder

Develop and deploy a process that will trigger the above said event when a vote is cast for Foo.

Process



Trigger



Choose Object and Specify When to Start the Process

Object*

Vote

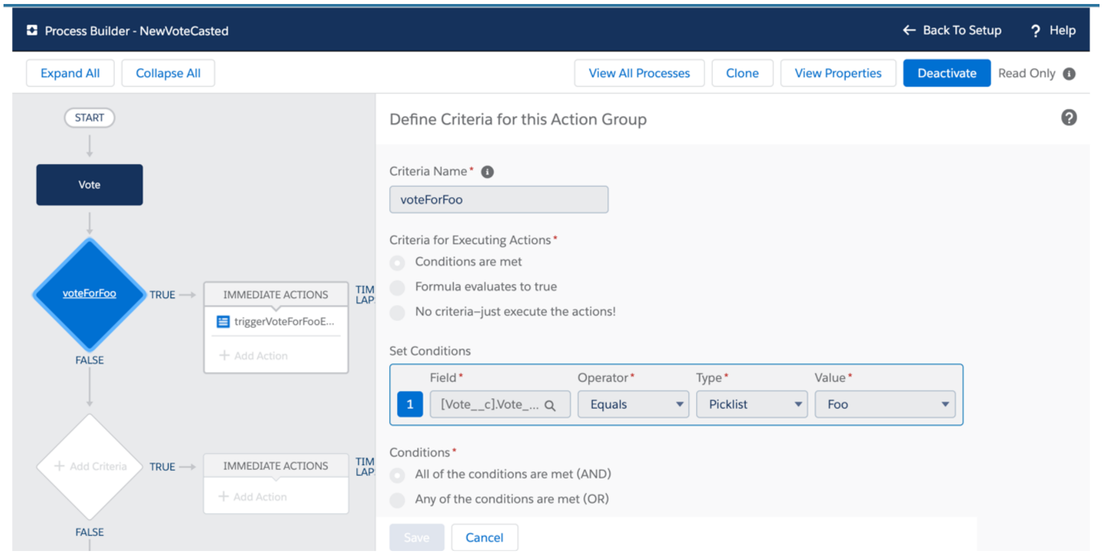
Start the process*

○ only when a record is created

○ when a record is created or edited

› Advanced

Condition



Define Criteria for this Action Group

Criteria Name*

voteForFoo

Criteria for Executing Actions*

○ Conditions are met

○ Formula evaluates to true

○ No criteria—just execute the actions!

Set Conditions

	Field*	Operator*	Type*	Value*
1	[Vote__c].Vote__...	Equals	Picklist	Foo

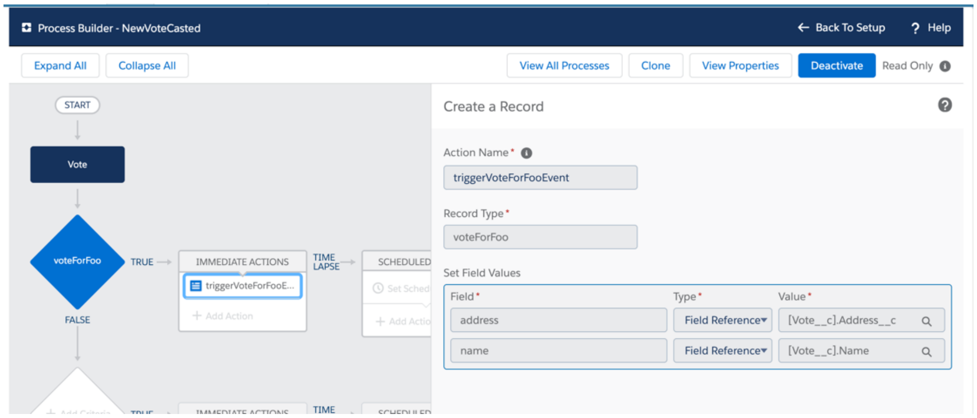
Conditions*

○ All of the conditions are met (AND)

○ Any of the conditions are met (OR)

Save Cancel

Action



Create a Record

Action Name*

triggerVoteForFooEvent

Record Type*

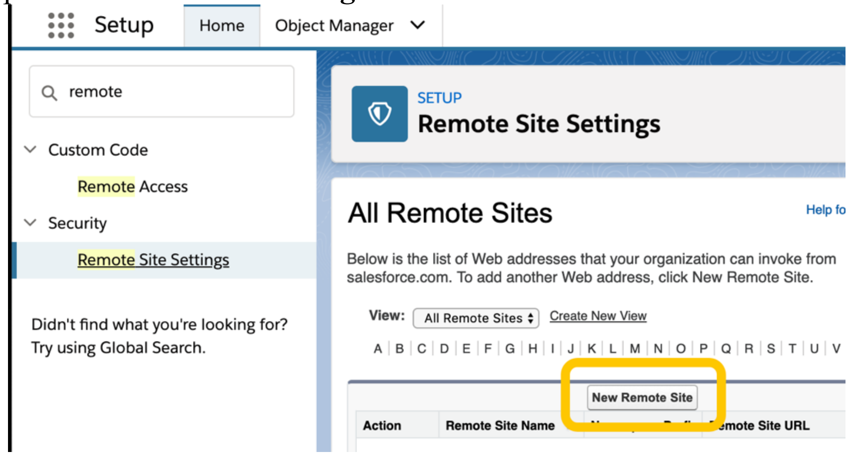
voteForFoo

Set Field Values

Field*	Type*	Value*
address	Field Reference▾	[Vote__c].Address__c
name	Field Reference▾	[Vote__c].Name

Enable the Remote Site

In Setup find **Remote Site Settings** and click **New Remote Site**

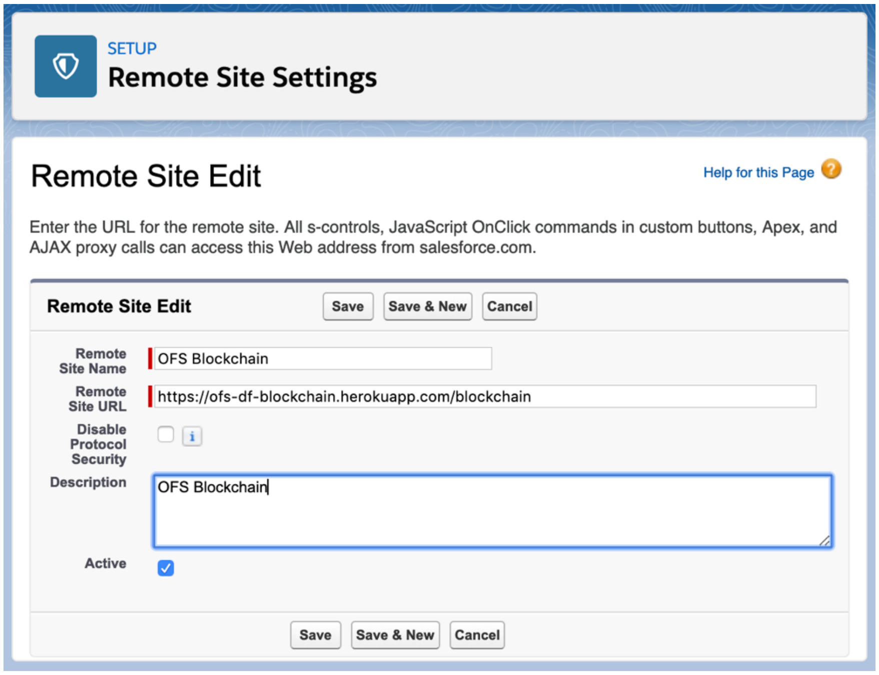


Didn't find what you're looking for? Try using Global Search.

All Remote Sites

Below is the list of Web addresses that your organization can invoke from salesforce.com. To add another Web address, click New Remote Site.

Enter the details as follows, most importantly use this URL if you are following this guide.
https://ofs-df-blockchain.herokuapp.com/blockchain



Remote Site Edit

Enter the URL for the remote site. All s-controls, JavaScript OnClick commands in custom buttons, Apex, and AJAX proxy calls can access this Web address from salesforce.com.

Remote Site Edit

Remote Site Name	OFS Blockchain
Remote Site URL	https://ofs-df-blockchain.herokuapp.com/blockchain
Disable Protocol Security	□
Description	OFS Blockchain
Active	☑

Preparation in Blockchain (Reviewer may execute these steps to perform full functional tests)

You can use any Ethereum Blockchain that allows RPC calls. For the purpose of security review, you use

https://ofs-df-blockchain.herokuapp.com/blockchain

This is an Ethereum blockchain hosted in Heroku for testing purpose.

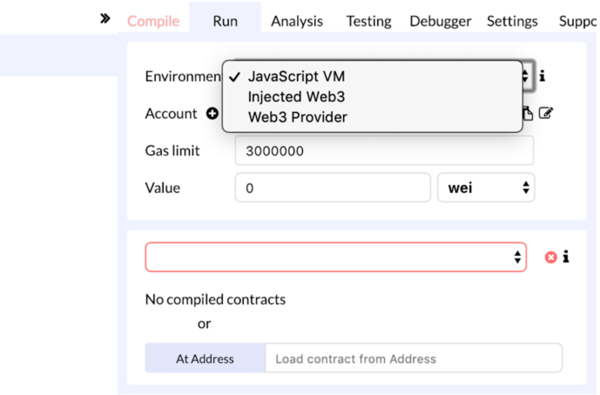
Deploy Smart contract to Blockchain

Deploy the smart contract given below to the blockchain using Remix

1. Launch Remix - https://remix.ethereum.org/

2. Set up Web3 Provider

   a. From the Environment drop down select "Web3 Provider" and accept any warnings



Environmen

Account

Gas limit 3000000

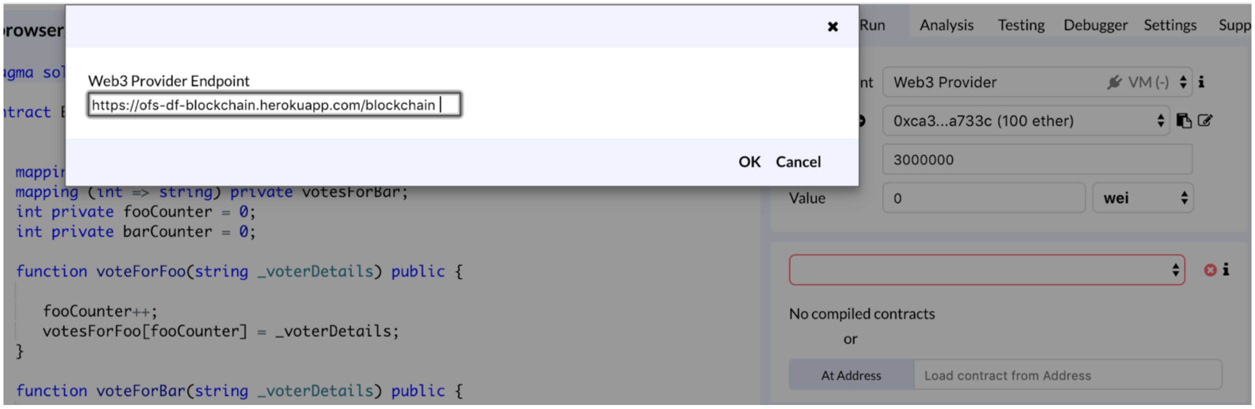
Value 0 wei

No compiled contracts

or

Load contract from Address

Enter: **https://ofs-df-blockchain.herokuapp.com/blockchain** .Then click OK .



Web3 Provider Endpoint

https://ofs-df-blockchain.herokuapp.com/blockchain

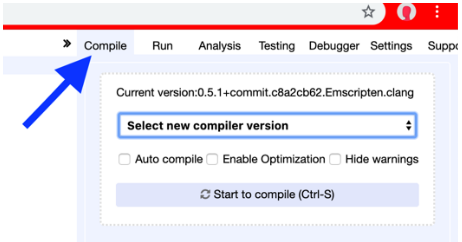
OK Cancel

```
mapping (int => string) private votesForBar;
int private fooCounter = 0;
int private barCounter = 0;

function voteForFoo(string _voterDetails) public {

   fooCounter++;
   votesForFoo[fooCounter] = _voterDetails;
}

function voteForBar(string _voterDetails) public {
```

3. Copy and paste the Smart Contract given below – Ballot.sol

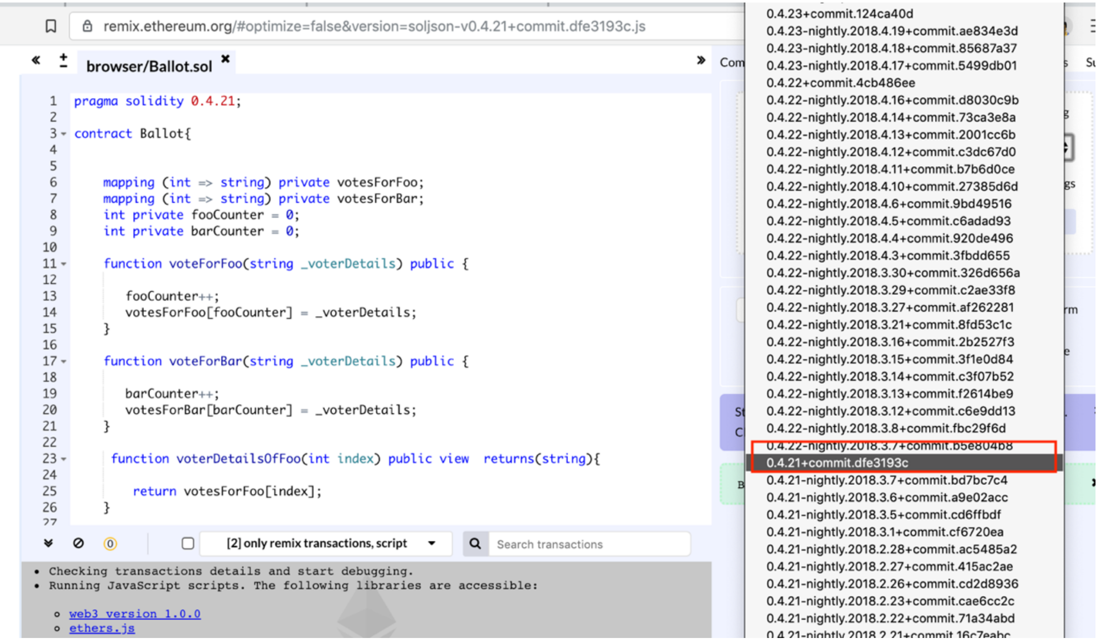
   https://github.com/objectfrontiergit/smartContractsForAdapterTest

4. Pick the compiler version to use
   a. Click on **Compile** in the top right



Current version:0.5.1+commit.c8a2cb62.Emscripten.clang

   b. Expand the **Select new compiler version** and pick the committed version number in the solidity file (in the following image it is version 0.4.21)



remix.ethereum.org/#optimize=false&version=soljson-v0.4.21+commit.dfe3193c.js

browser/Ballot.sol

```
pragma solidity 0.4.21;

contract Ballot{


    mapping (int => string) private votesForFoo;
    mapping (int => string) private votesForBar;
    int private fooCounter = 0;
    int private barCounter = 0;

    function voteForFoo(string _voterDetails) public {

       fooCounter++;
       votesForFoo[fooCounter] = _voterDetails;
    }

    function voteForBar(string _voterDetails) public {

       barCounter++;
       votesForBar[barCounter] = _voterDetails;
    }

     function voterDetailsOfFoo(int index) public view  returns(string){

        return votesForFoo[index];
    }
```

[2] only remix transactions, script

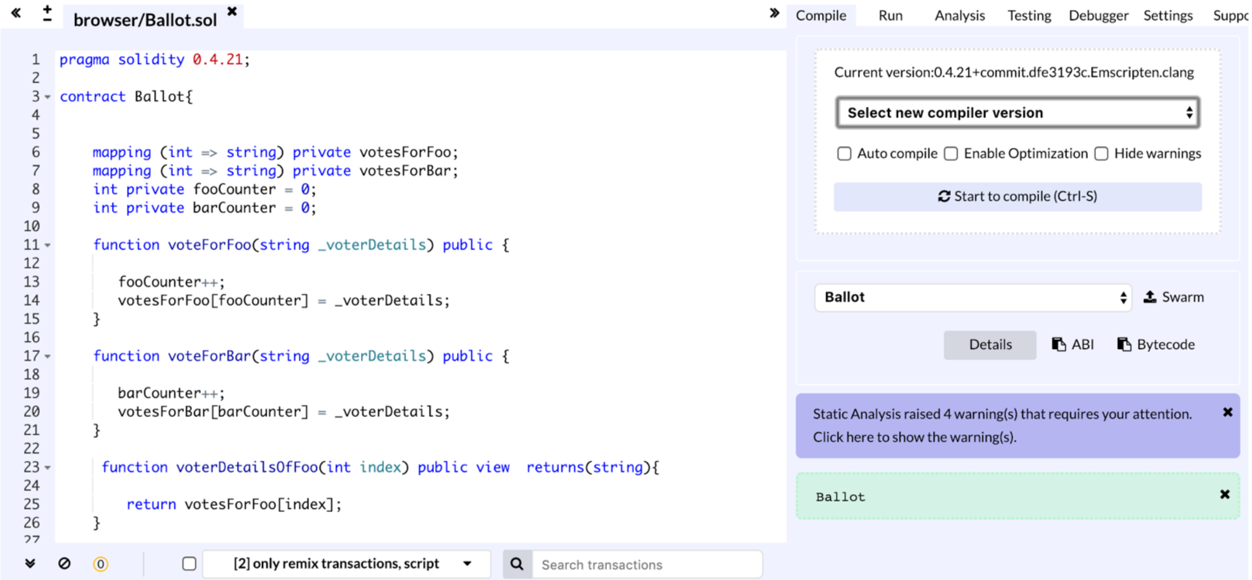
Search transactions

```
• Checking transactions details and start debugging.
• Running JavaScript scripts. The following libraries are accessible:

  ○ web3 version 1.0.0
  ○ ethers.js
```

```
0.4.23+commit.124ca40d
0.4.23-nightly.2018.4.19+commit.ae834e3d
0.4.23-nightly.2018.4.18+commit.85687a37
0.4.23-nightly.2018.4.17+commit.5499db01
0.4.22+commit.4cb486ee
0.4.22-nightly.2018.4.16+commit.d8030c9b
0.4.22-nightly.2018.4.14+commit.73ca3e8a
0.4.22-nightly.2018.4.13+commit.2001cc6b
0.4.22-nightly.2018.4.12+commit.c3dc67d0
0.4.22-nightly.2018.4.11+commit.b7b6d0ce
0.4.22-nightly.2018.4.10+commit.27385d6d
0.4.22-nightly.2018.4.6+commit.9bd49516
0.4.22-nightly.2018.4.5+commit.c6adad93
0.4.22-nightly.2018.4.4+commit.920de496
0.4.22-nightly.2018.4.3+commit.3fbdd655
0.4.22-nightly.2018.3.30+commit.326d656a
0.4.22-nightly.2018.3.29+commit.c2ae33f8
0.4.22-nightly.2018.3.27+commit.af262281
0.4.22-nightly.2018.3.21+commit.8fd53c1c
0.4.22-nightly.2018.3.16+commit.2b2527f3
0.4.22-nightly.2018.3.15+commit.3f1e0d84
0.4.22-nightly.2018.3.14+commit.c3f07b52
0.4.22-nightly.2018.3.13+commit.f2614be9
0.4.22-nightly.2018.3.12+commit.c6e9dd13
0.4.22-nightly.2018.3.8+commit.fbc29f6d
0.4.22-nightly.2018.3.7+commit.b5e804b8
0.4.21+commit.dfe3193c
0.4.21-nightly.2018.3.7+commit.bd7bc7c4
0.4.21-nightly.2018.3.6+commit.a9e02acc
0.4.21-nightly.2018.3.5+commit.cd6ffbdf
0.4.21-nightly.2018.3.1+commit.cf6720ea
0.4.21-nightly.2018.2.28+commit.ac5485a2
0.4.21-nightly.2018.2.27+commit.415ac2ae
0.4.21-nightly.2018.2.26+commit.cd2d8936
0.4.21-nightly.2018.2.23+commit.cae6cc2c
0.4.21-nightly.2018.2.22+commit.71a34abd
0.4.21-nightly.2018.2.21+commit.16c7eabc
```

c. The code will automatically compile and show the current version in the top right

5. Successful Compilation



```
pragma solidity 0.4.21;

contract Ballot{


    mapping (int => string) private votesForFoo;
    mapping (int => string) private votesForBar;
    int private fooCounter = 0;
    int private barCounter = 0;

    function voteForFoo(string _voterDetails) public {

        fooCounter++;
        votesForFoo[fooCounter] = _voterDetails;
    }

    function voteForBar(string _voterDetails) public {

        barCounter++;
        votesForBar[barCounter] = _voterDetails;
    }

     function voterDetailsOfFoo(int index) public view  returns(string){

        return votesForFoo[index];
    }
```

Current version:0.4.21+commit.dfe3193c.Emscripten.clang

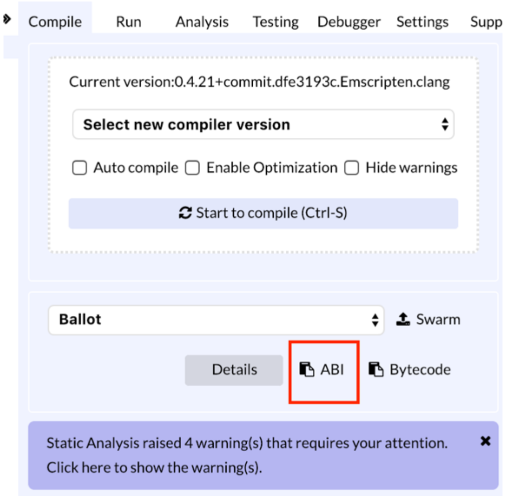
□ Auto compile □ Enable Optimization □ Hide warnings

Ballot

Static Analysis raised 4 warning(s) that requires your attention. Click here to show the warning(s).

Ballot

6. Copy ABI and **save** it in a file by clicking **ABI** which will automatically copy the structure to your copy & paste buffer. Then create a file or save the contents somewhere as you will need it in the next section.



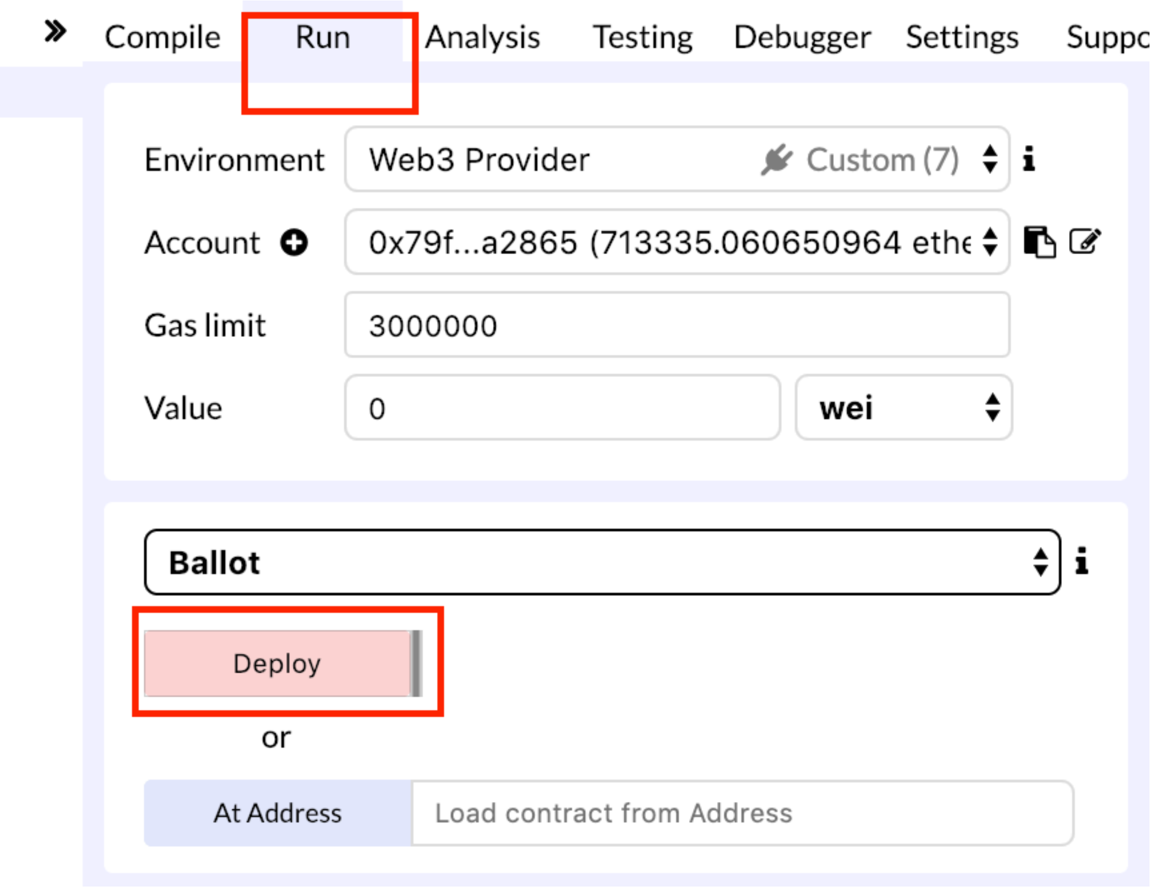
Current version:0.4.21+commit.dfe3193c.Emscripten.clang

□ Auto compile □ Enable Optimization □ Hide warnings

Ballot

Static Analysis raised 4 warning(s) that requires your attention. Click here to show the warning(s).

7. Deploy Smart Contract



Environment: Web3 Provider — Custom (7)

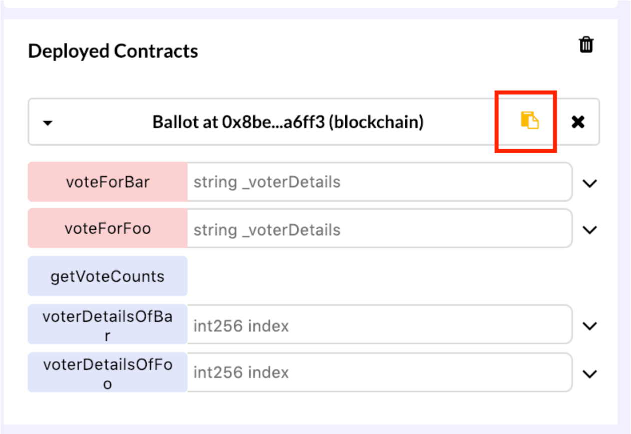
Account: 0x79f...a2865 (713335.060650964 ethe

Gas limit: 3000000

Value: 0 wei

Ballot

8. Make a note of Contract Id, you can copy it to the clipboard with the icon highlight here in the **Deployed Contracts** section on the **Run** tab. You will need this value later.

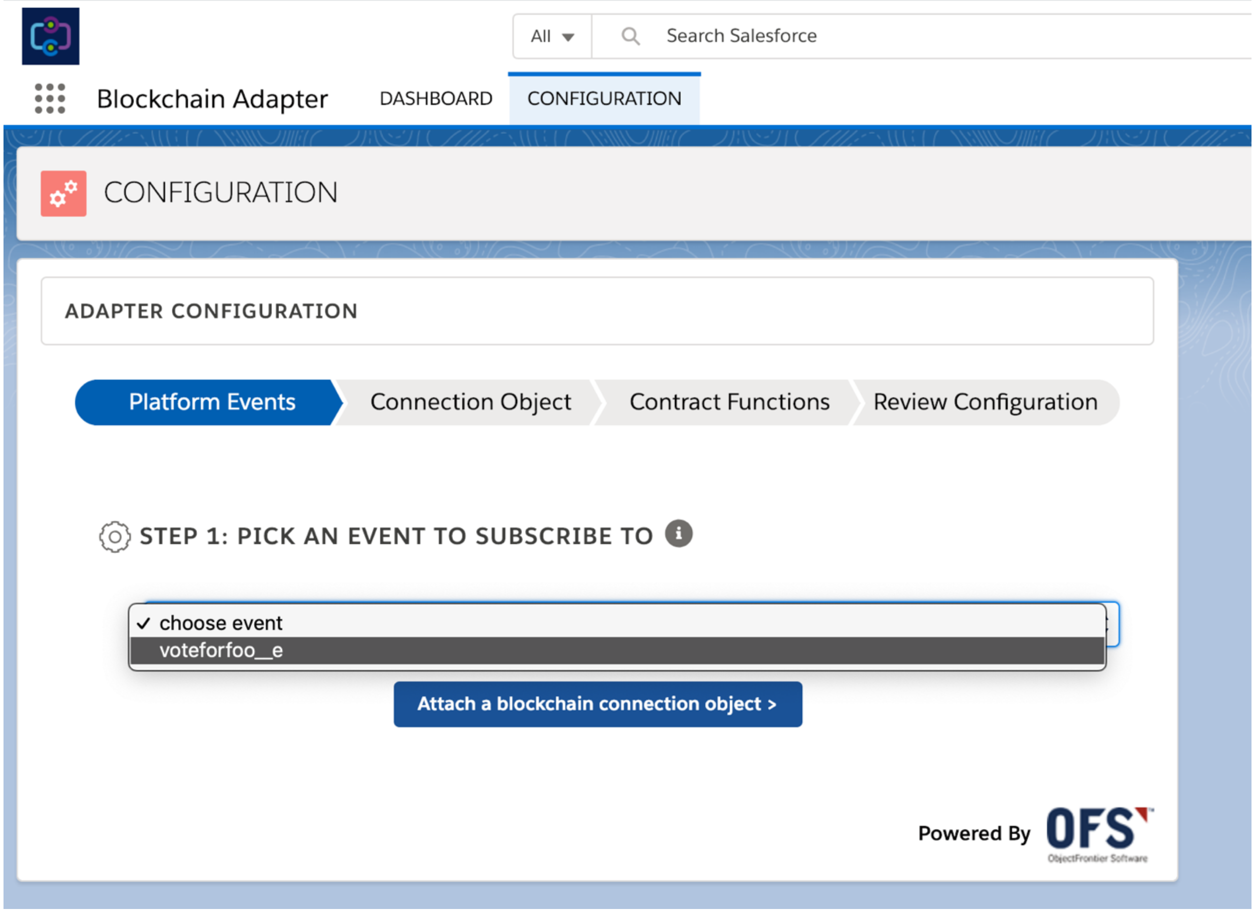

Deployed Contracts

Ballot at 0x8be...a6ff3 (blockchain)

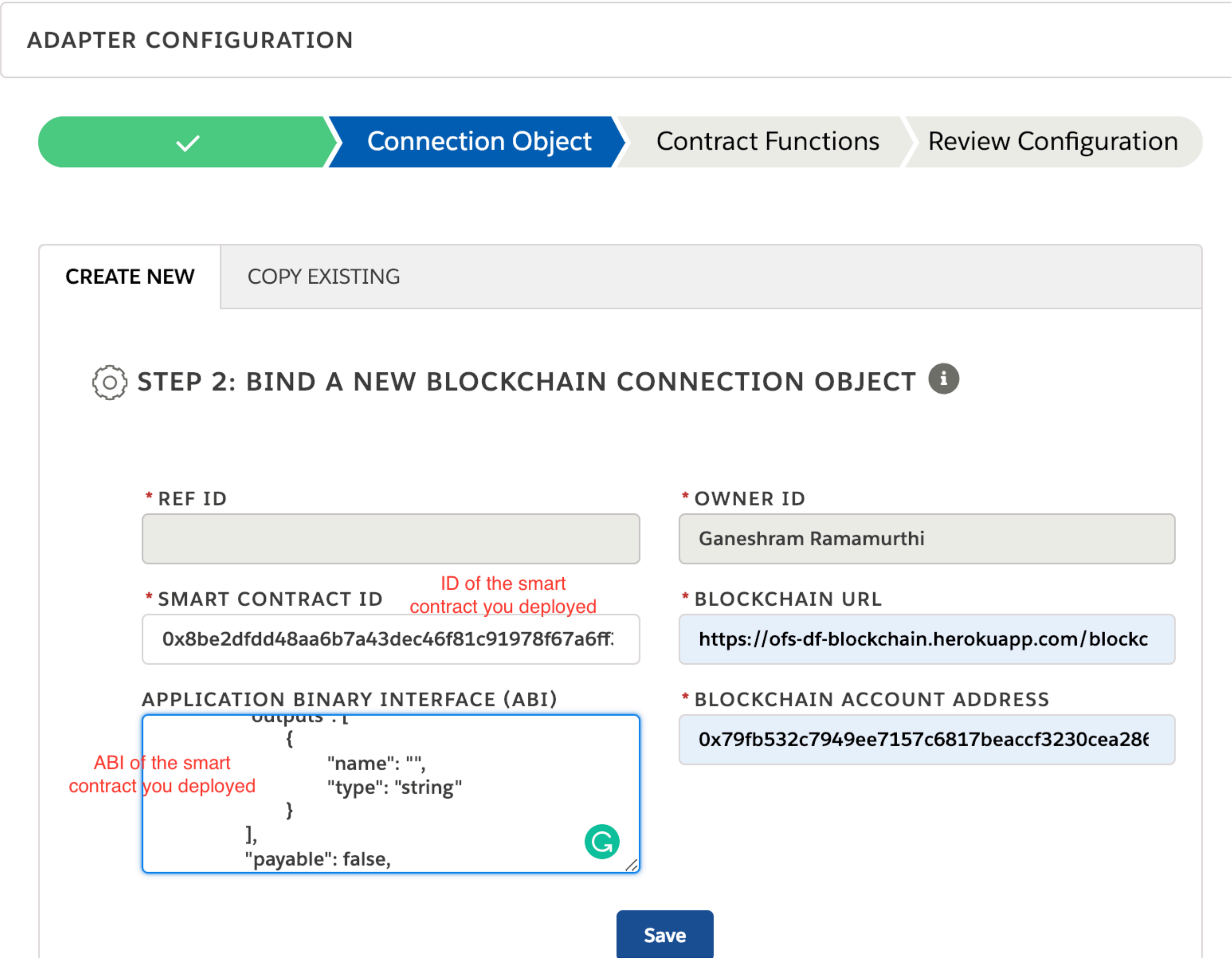
voteForBar	string _voterDetails
voteForFoo	string _voterDetails
getVoteCounts	
voterDetailsOfBar	int256 index
voterDetailsOfFoo	int256 index

DO NOT CLOSE THIS TAB, you will need it for testing at the end of the document.At this point you are all set to go configure the Adapter.

Adapter Configuration



**Troubleshooting: if you don't see the Adapter Configuration but only the "CONFIGURATION" header then you likely have not setup up My Domain, enabled it for all users and logged in using that domain.



STEP 2: BIND A NEW BLOCKCHAIN CONNECTION OBJECT

* REF ID	* OWNER ID
	Ganeshram Ramamurthi
* SMART CONTRACT ID	* BLOCKCHAIN URL
0x8be2dfdd48aa6b7a43dec46f81c91978f67a6ff	https://ofs-df-blockchain.herokuapp.com/blockc
APPLICATION BINARY INTERFACE (ABI)	* BLOCKCHAIN ACCOUNT ADDRESS
	0x79fb532c7949ee7157c6817beaccf3230cea28

ID of the smart contract you deployed

```
                "outputs": [
                    {
                        "name": "",
                        "type": "string"
                    }
                ],
                "payable": false,
```

ABI of the smart contract you deployed

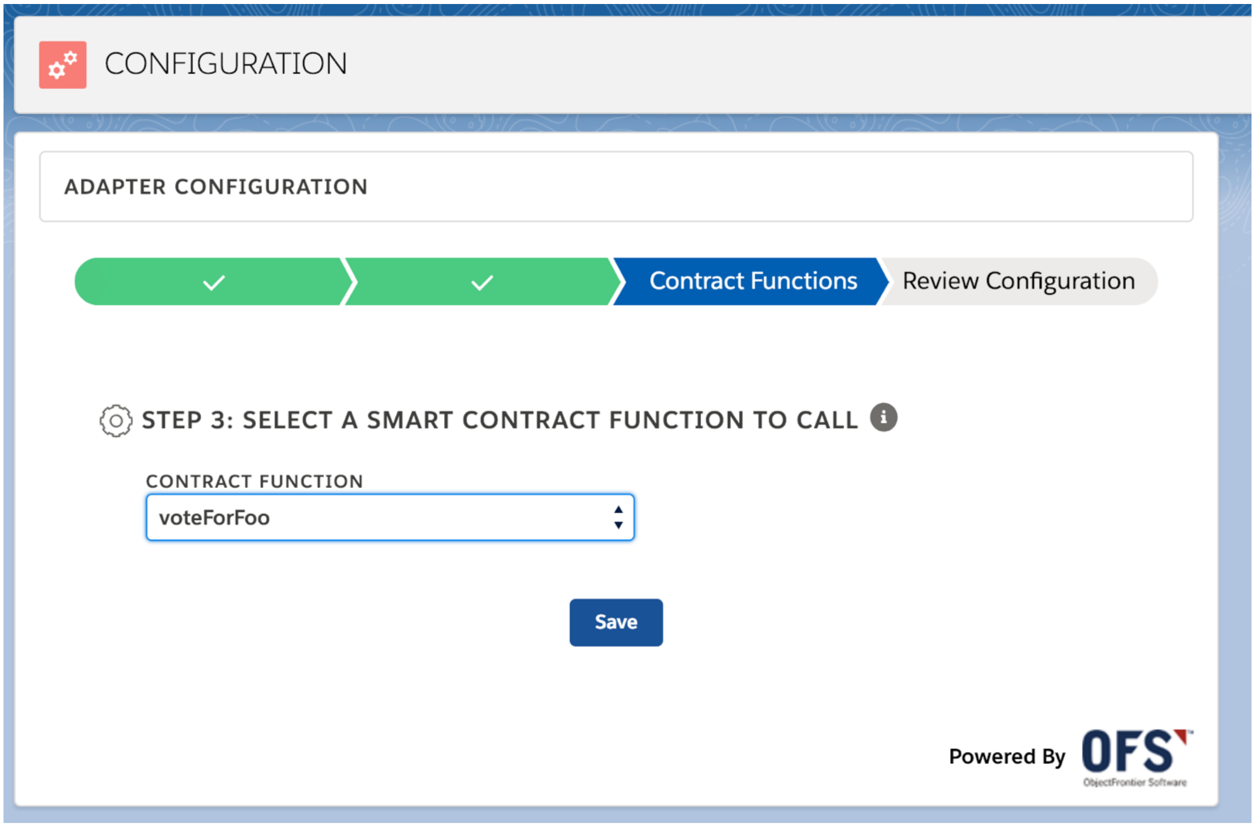
The URL is: https://ofs-df-blockchain.herokuapp.com/blockchain

You can use the Blockchain Test Account Address:
0x79fb532c7949ee7157c6817beaccf3230cea2865

The **REF ID** will remain blank.

Click **Save.**

You will then pick the Smart Contract Function defined in the Solidity code you have placed in ttps://remix.ethereum.org/. For this flow, we will use **voteForFoo**

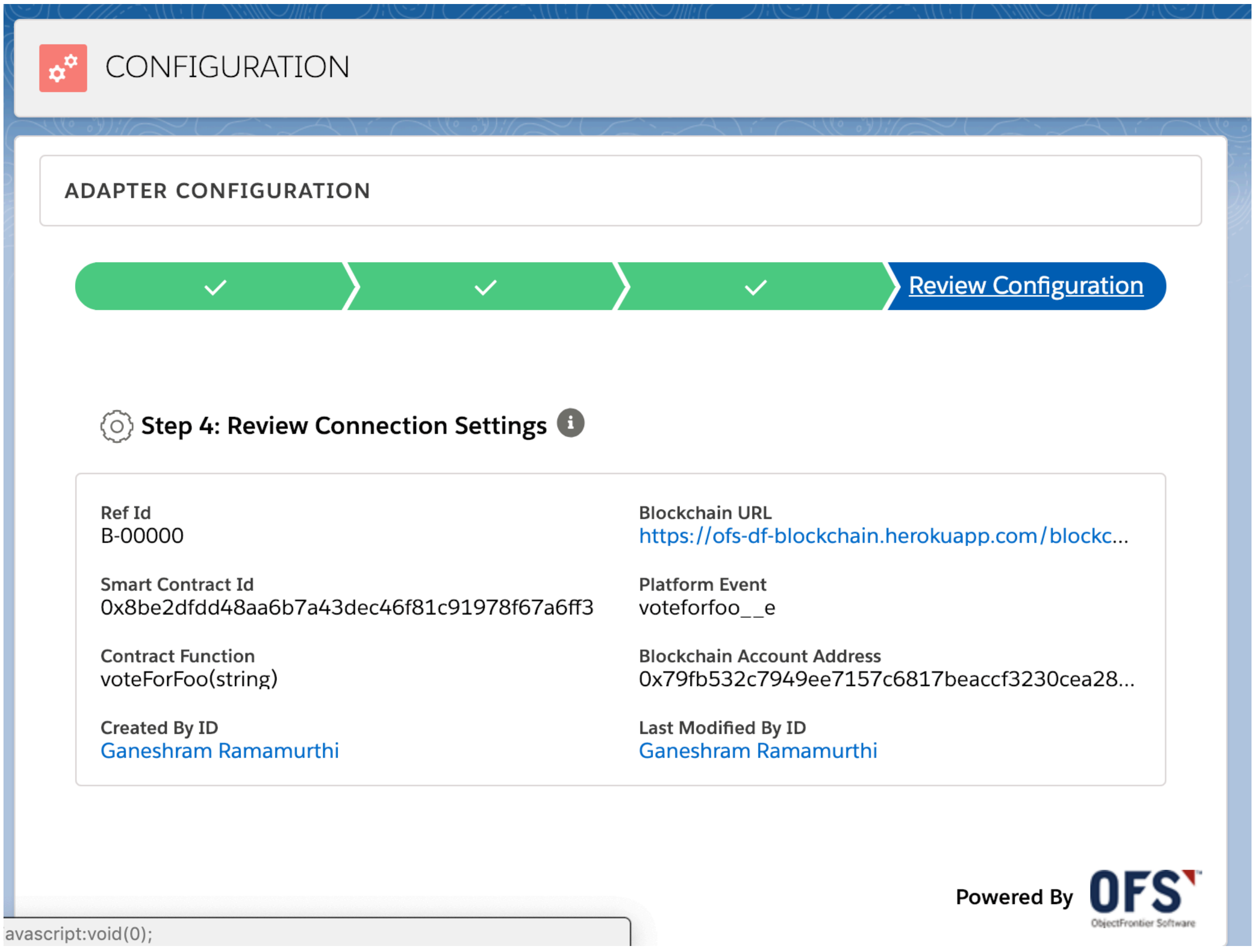


CONFIGURATION

ADAPTER CONFIGURATION

STEP 3: SELECT A SMART CONTRACT FUNCTION TO CALL

CONTRACT FUNCTION: voteForFoo



CONFIGURATION

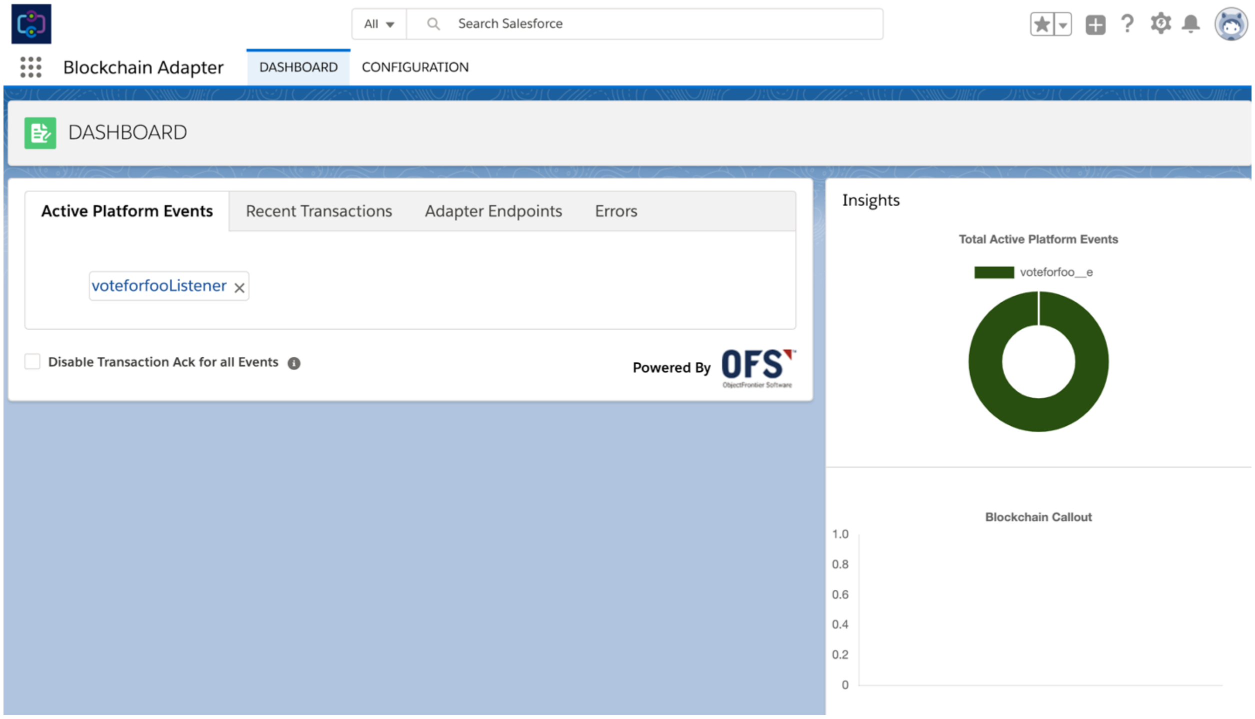
ADAPTER CONFIGURATION

Step 4: Review Connection Settings

Ref Id B-00000	Blockchain URL https://ofs-df-blockchain.herokuapp.com/blockc...
Smart Contract Id 0x8be2dfdd48aa6b7a43dec46f81c91978f67a6ff3	Platform Event voteforfoo__e
Contract Function voteForFoo(string)	Blockchain Account Address 0x79fb532c7949ee7157c6817beaccf3230cea28...
Created By ID Ganeshram Ramamurthi	Last Modified By ID Ganeshram Ramamurthi

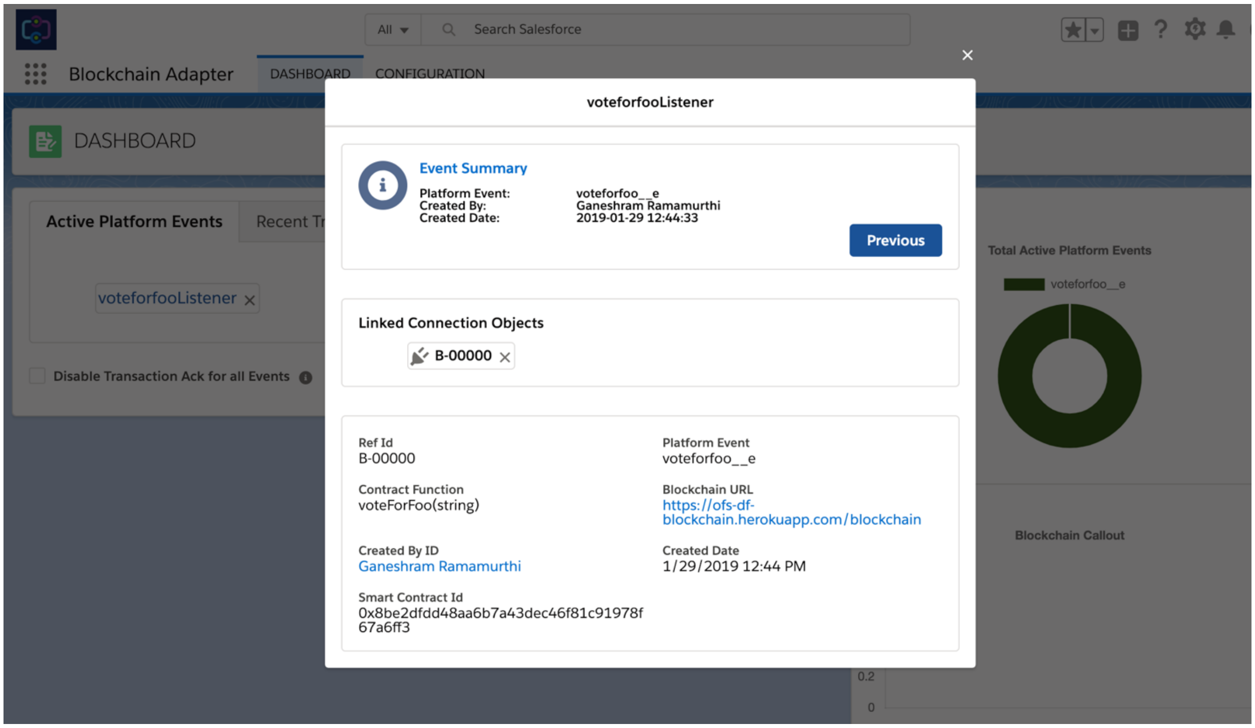
Powered By OFS ObjectFrontier Software

avascript:void(0);



voteforfooListener ×

□ Disable Transaction Ack for all Events



voteforfooListener

Event Summary

Platform Event:	voteforfoo__e
Created By:	Ganeshram Ramamurthi
Created Date:	2019-01-29 12:44:33

Linked Connection Objects

B-00000 ×

Ref Id
B-00000

Platform Event
voteforfoo__e

Contract Function
voteForFoo(string)

Blockchain URL
https://ofs-df-blockchain.herokuapp.com/blockchain

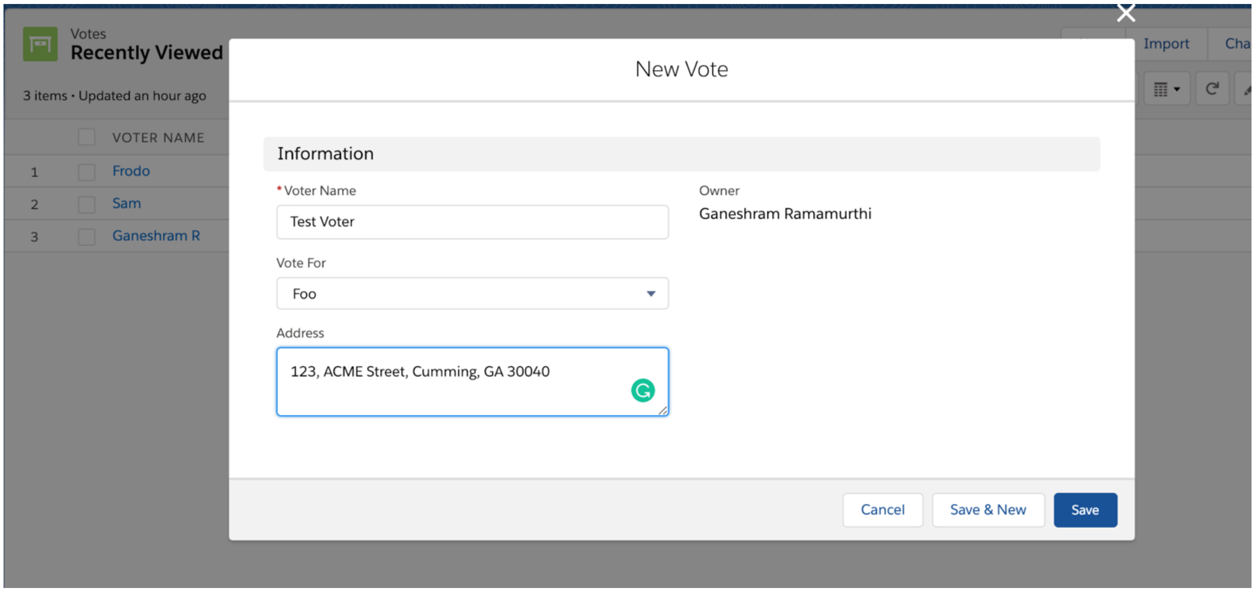
Created By ID
Ganeshram Ramamurthi

Created Date
1/29/2019 12:44 PM

Smart Contract Id
0x8be2dfdd48aa6b7a43dec46f81c91978f67a6ff3

Adapter Runtime – Salesforce to Ethreum Blockchain

Save a new Vote



	VOTER NAME
1	Frodo
2	Sam
3	Ganeshram R

New Vote

Information

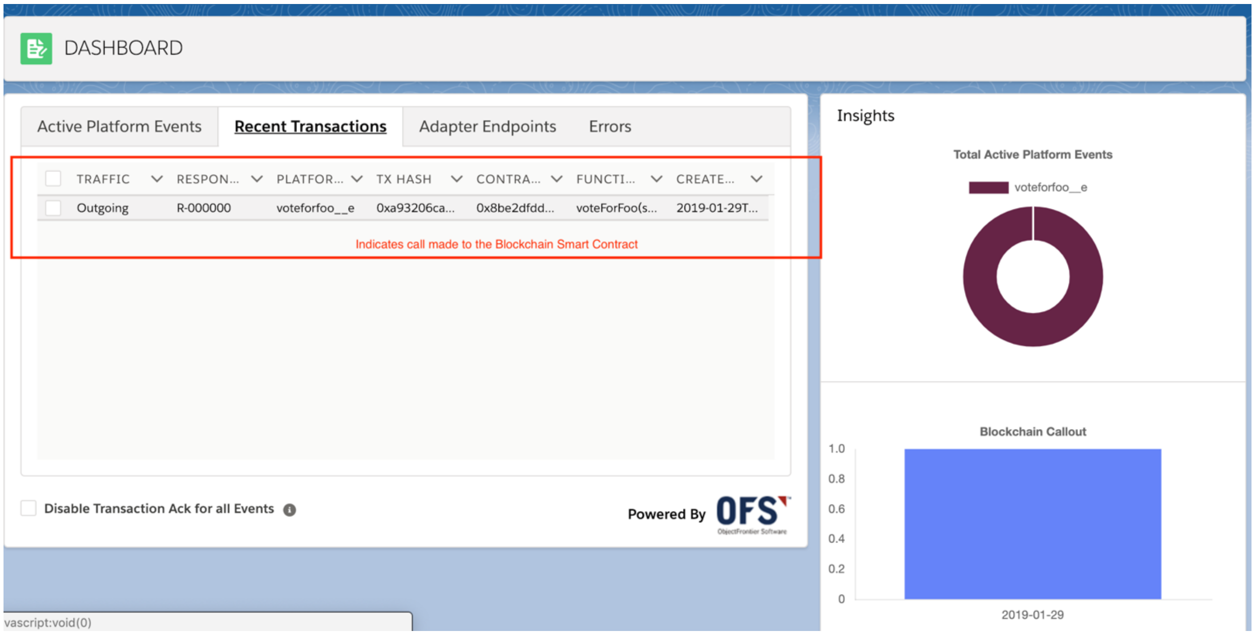
*Voter Name: Test Voter

Owner: Ganeshram Ramamurthi

Vote For: Foo

Address: 123, ACME Street, Cumming, GA 30040

View Dashboard



TRAFFIC	RESPON...	PLATFOR...	TX HASH	CONTRA...	FUNCTI...	CREATE...
Outgoing	R-000000	voteforfoo__e	0xa93206ca...	0x8be2dfdd...	voteForFoo(s...	2019-01-29T...

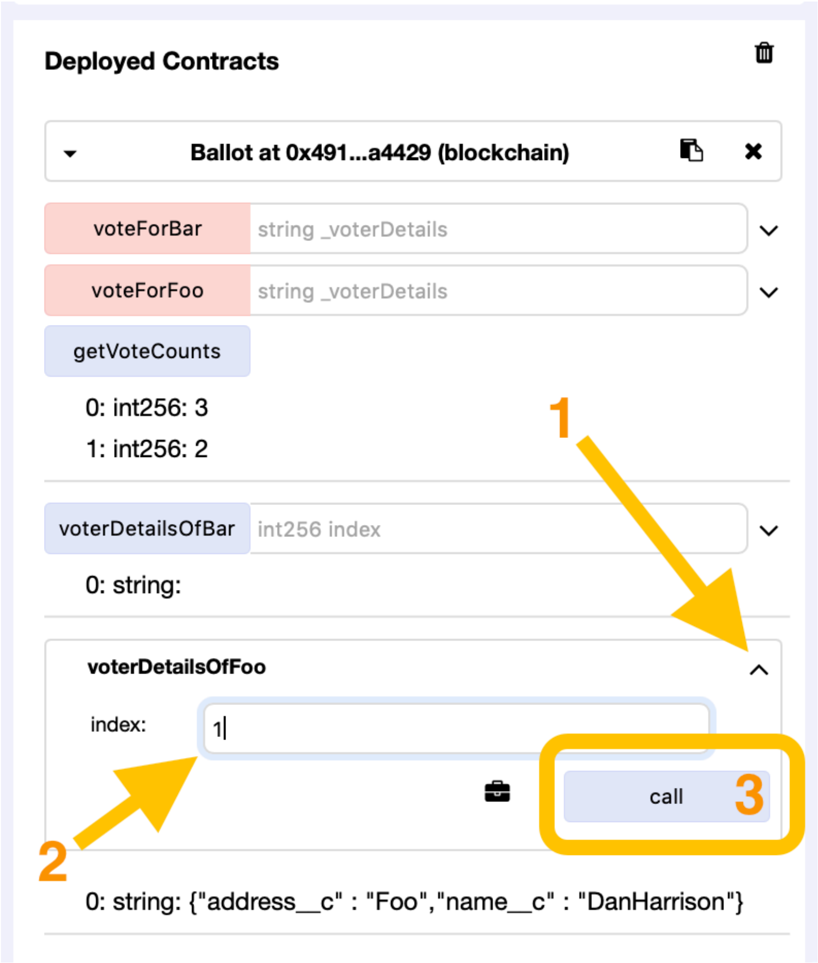
Indicates call made to the Blockchain Smart Contract

□ Disable Transaction Ack for all Events

Test in Remix

If this is the first call you will be able to go to **Deployed Contracts** section of the https://remix.ethereum.org/ browser tab you have *LEFT OPEN* from earlier so it is still pointing at the same contract. This will not work if you have closed the tab.

1) Click to expand the **voteDetailsOfFoo** section of the Deployed Contract section.
2) Enter the index value you want to retrieve, it is likely **1** if you have followed this exactly but you can try 0, 2 or 3 if you have been playing around a bit. In the image, you can see how many *getVoteCounts* have been gathered to confirm there is at least some registered.
3) By clicking **call** you will retrieve the data that shows at the bottom of the screen.



0: int256: 3
1: int256: 2

0: string:

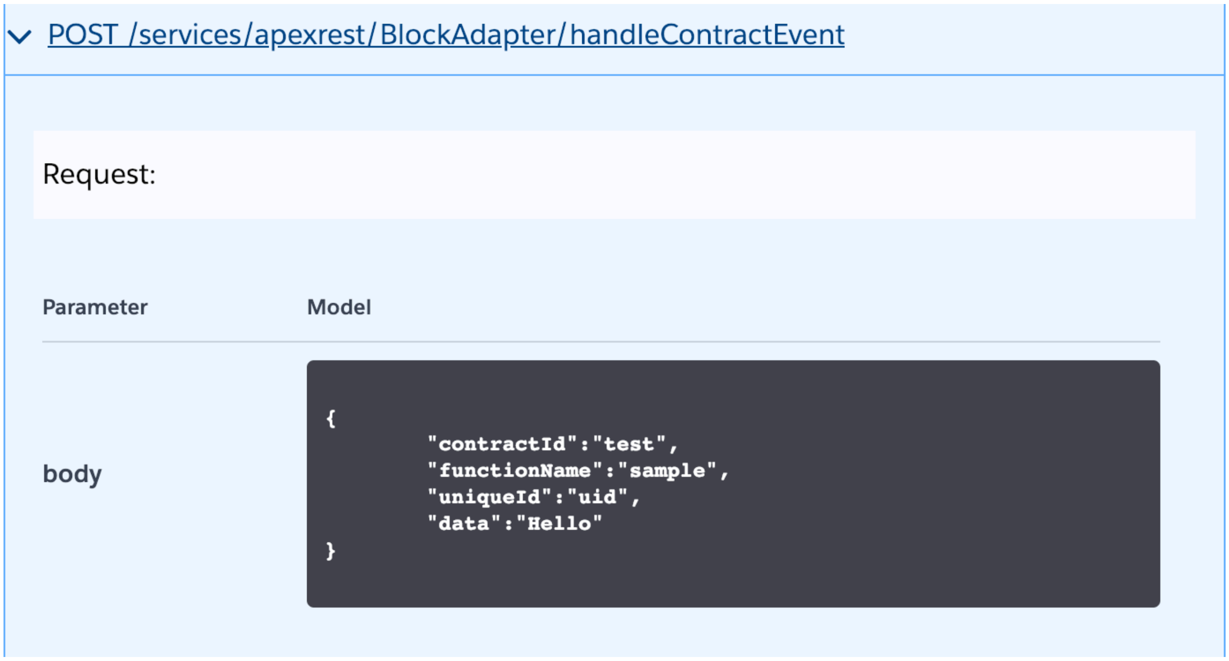
index: 1

0: string: {"address__c" : "Foo","name__c" : "DanHarrison"}

Adapter Runtime – Ethreum Blockchain to Salesforce

Adapter REST Endpoint

The adapter exposes the following REST endpoint



POST /services/apexrest/BlockAdapter/handleContractEvent

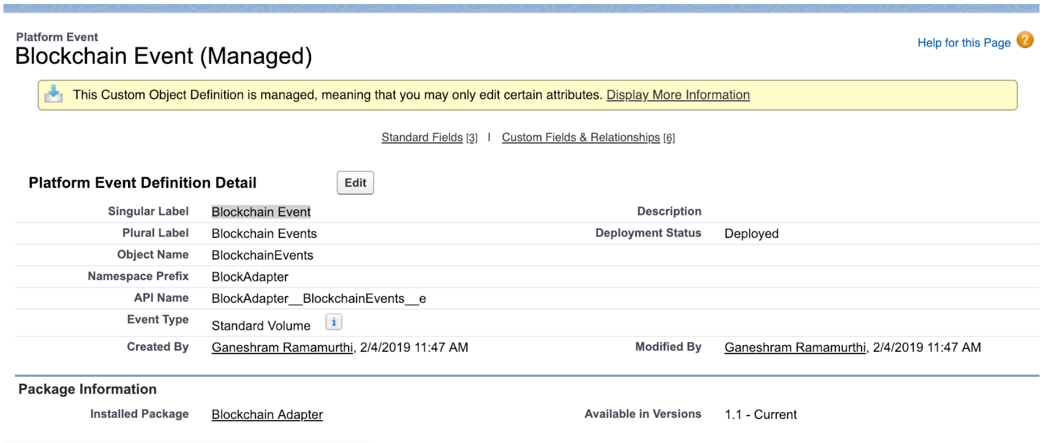
Request:

Parameter	Model
body	see below

```
{
        "contractId":"test",
        "functionName":"sample",
        "uniqueId":"uid",
        "data":"Hello"
}
```

An external component/app listening to the Smart contract events can invoke this end point when the Smart contract event happens. This Adapter wndpoint when called will trigger a prepackaged platform event **(Blockchain Event)** that Salesforce components can listen to and take action.

Blockchain Event Schema



Platform Event

Blockchain Event (Managed)

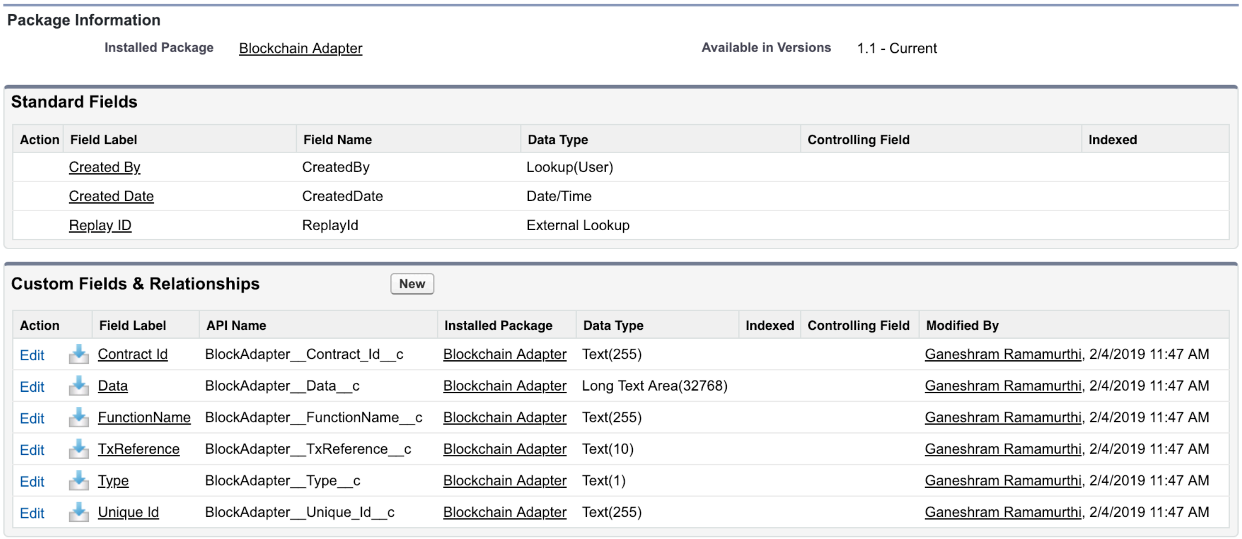
This Custom Object Definition is managed, meaning that you may only edit certain attributes. Display More Information

Platform Event Definition Detail

Singular Label	Blockchain Event	Description	
Plural Label	Blockchain Events	Deployment Status	Deployed
Object Name	BlockchainEvents		
Namespace Prefix	BlockAdapter		
API Name	BlockAdapter__BlockchainEvents__e		
Event Type	Standard Volume		
Created By	Ganeshram Ramamurthi, 2/4/2019 11:47 AM	Modified By	Ganeshram Ramamurthi, 2/4/2019 11:47 AM

Package Information

Installed Package	Blockchain Adapter	Available in Versions	1.1 - Current



Package Information

Installed Package Blockchain Adapter Available in Versions 1.1 - Current

Standard Fields

Action	Field Label	Field Name	Data Type	Controlling Field	Indexed
	Created By	CreatedBy	Lookup(User)		
	Created Date	CreatedDate	Date/Time		
	Replay ID	ReplayId	External Lookup		

Custom Fields & Relationships New

Action	Field Label	API Name	Installed Package	Data Type	Indexed	Controlling Field	Modified By
Edit	Contract Id	BlockAdapter__Contract_Id__c	Blockchain Adapter	Text(255)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM
Edit	Data	BlockAdapter__Data__c	Blockchain Adapter	Long Text Area(32768)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM
Edit	FunctionName	BlockAdapter__FunctionName__c	Blockchain Adapter	Text(255)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM
Edit	TxReference	BlockAdapter__TxReference__c	Blockchain Adapter	Text(10)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM
Edit	Type	BlockAdapter__Type__c	Blockchain Adapter	Text(1)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM
Edit	Unique Id	BlockAdapter__Unique_Id__c	Blockchain Adapter	Text(255)			Ganeshram Ramamurthi, 2/4/2019 11:47 AM

Congratulations

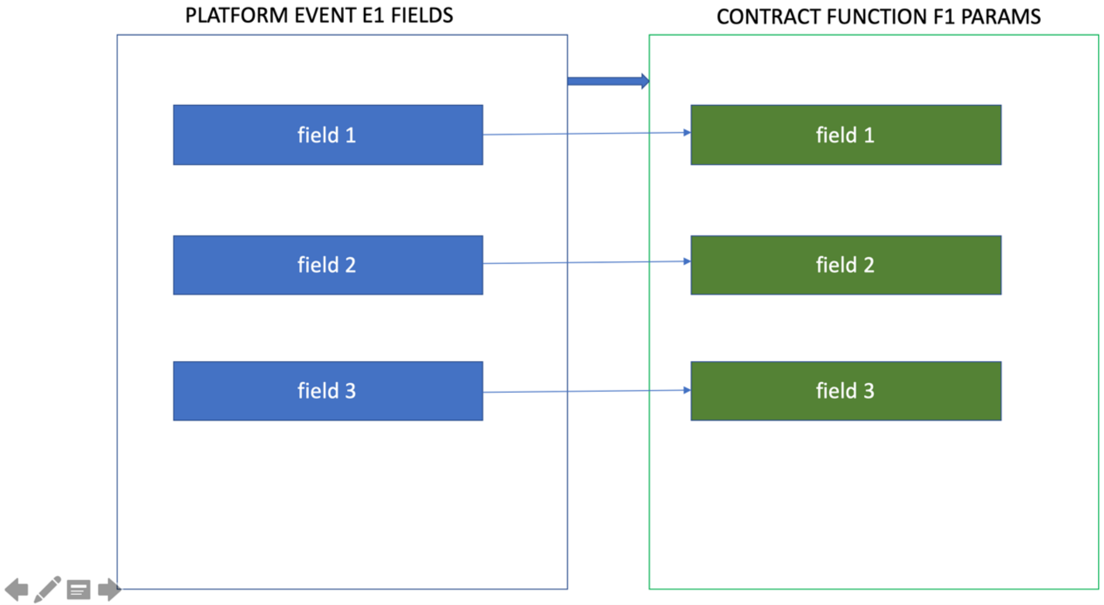
You have now completed a basic call from Salesforce to an Ethereum blockchain.

Next step is to capture changes in Ethereum and related that back to Salesforce.

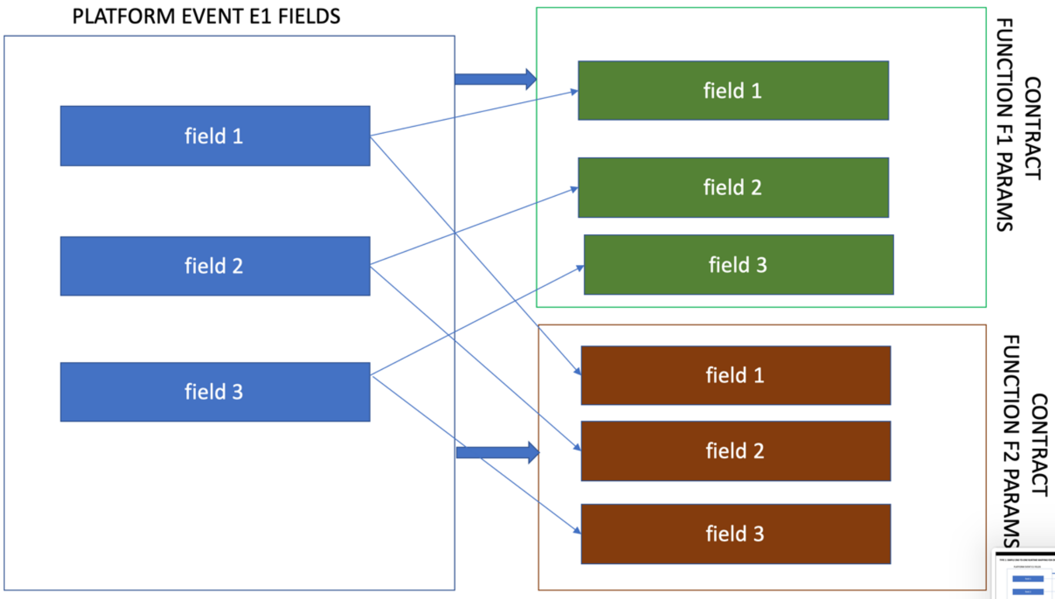
You can now edit the Solidity code to create your own logic.

Appendix: Technical Details on Event to Contract Field Mapping

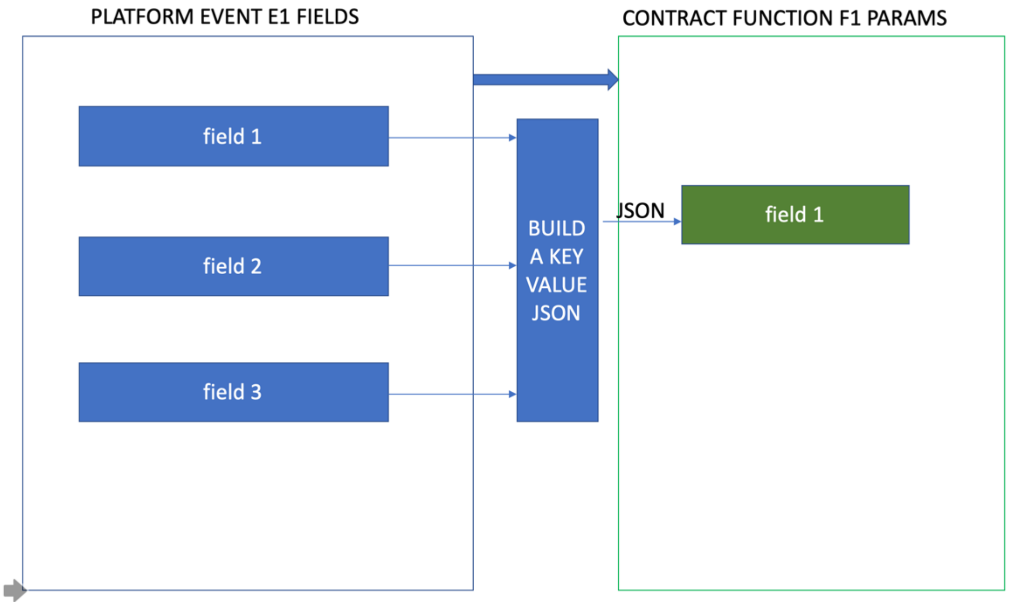
TYPE 1: SIMPLE ONE-TO-ONE RUNTIME MAPPING FOR ONE CONTRACT FUNCTION



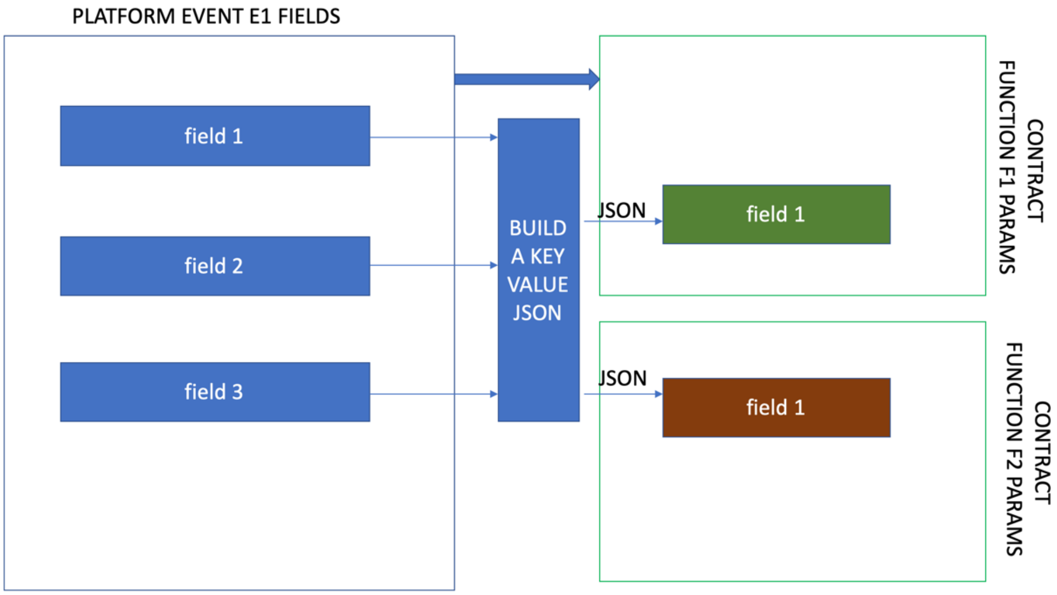
TYPE 2: SIMPLE ONE-TO-ONE RUNTIME MAPPING FOR MORE THAN ONE CONTRACT FUNCTION



TYPE 3: MANY-TO-ONE RUNTIME MAPPING FOR ONE CONTRACT FUNCTION



TYPE 4: MANY-TO-ONE RUNTIME MAPPING FOR MORE THAN ONE CONTRACT FUNCTION



Note:

Validation error will be thrown when the number of fields in the event doesn't match the number of params in the contract function during configuration

Runtime exception will be thrown when The number of fields in the events change after theconfiguration. These runtime exceptions will be recorded and reported in the “Recent Transactions”