smartcontract code coverage

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Meetup

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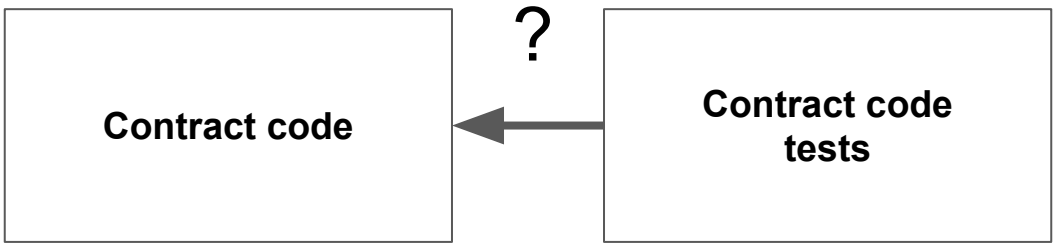
Code coverage?



Quick intro

1. Set up truffle project
2. git clone http://github.com/adriamb/solcover.git ; cd solcover
3. npm install
4. remove convertlib
5. create network called ‘test’ with gasPrice: 1, gas: 0xffffffff,
6. node ./runCoveredTests.js
7. open ./coverage/lcov-report/index.html
8. check how to integrate with travis & codecov.io
   https://github.com/adriamb/vaultcontroller/blob/master/package.json

Truffle/Solidity/Codecov.io current limitations

1. Slow
2. Libraries not supported
3. Codecov.io does not process solcov instrumentation
4. Does not support `uint a = b>1?1:2`
5. Solidity <= 0.8 :(
6. No inline assembly support :(

LoC coverage limitations

1. **Condition coverage** : `if ( a || b ) { … }`
2. **Parameter value coverage** : large/0 values/addresses bad EVM inputs
3. **Loop coverage** : more than one loop?
4. **State-machine coverage** : `enum State { PENDING, PAID, REFUND }`
5. **Path coverage** : paths through decision points
6. **Data-flow coverage** : paths through variable assignments

JJ-Path / Linear code sequence and jump

```
10 int main (void)
11 {
12     int count = 0, totals[MAXCOLUMNS], val = 0;
13
14     memset (totals, 0, MAXCOLUMNS * sizeof(int));
15
16     count = 0;
17     while ( count < ITERATIONS )
18     {
19         val = abs(rand()) % MAXCOLUMNS;
20         totals[val] += 1;
21         if ( totals[val] > MAXCOUNT )
22         {
23             totals[val] = MAXCOUNT;
24         }
25         count++;
26     }
27
28     return (0);
29
30 }
```

LCSAJ Number	Start Line	Finish Line	Jump To Line
1	10	17	28
2	10	21	25
3	10	26	17
4	17	17	28
5	17	21	25
6	17	26	17
7	25	26	17
8	28	28	–1

0x57 JUMPI 2 0 Conditionally alter the program counter.

$$J_{\text{JUMPI}}(\boldsymbol{\mu}) \equiv \begin{cases} \boldsymbol{\mu}_{\mathbf{s}}[0] & \text{if } \boldsymbol{\mu}_{\mathbf{s}}[1] \neq 0 \\ \boldsymbol{\mu}_{pc} + 1 & \text{otherwise} \end{cases}$$

This has the effect of writing said value to $\boldsymbol{\mu}_{pc}$. See section 9.