Finding a way out

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How do we make programming better?

2004 - 2009

2009 - 2011

Still broken.

How do we make programming better?

What is programming?

And what's wrong with it?

Programming is unobservable

person.walk()

Programming is unobservable

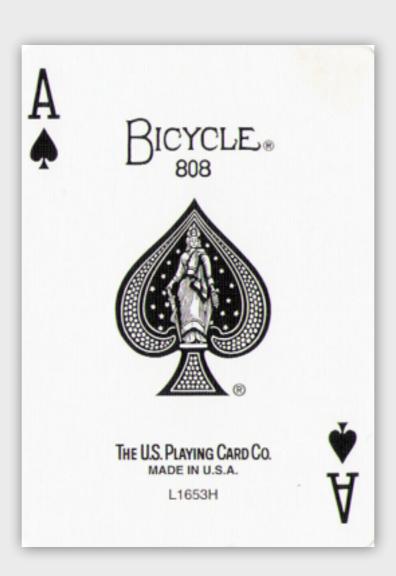
Programming is indirect

```
#include <algorithm>
#include <iostream>
#include <iterator>
#include <cmath>
#include <vector>
#include <iterator>
#include <numeric>
template <typename Iterator>
double standard dev( Iterator begin , Iterator end ) {
   double mean = std::accumulate( begin , end , 0 ) / std::distance( begin , end ) ;
   std::vector<double> squares ;
   for( Iterator vdi = begin ; vdi != end ; vdi++ )
      squares.push back( std::pow( *vdi - mean , 2 ) ) ;
   return std::sqrt( std::accumulate( squares.begin( ) , squares.end( ) , 0 ) /
squares.size( ) );
int main( ) {
   double demoset[] = { 2 , 4 , 4 , 4 , 5 , 5 , 7 , 9 };
   int demosize = sizeof demoset / sizeof *demoset ;
   std::cout << "The standard deviation of\n" ;</pre>
   std::copy( demoset , demoset + demosize , std::ostream iterator<double>( std::cout, "
"));
   std::cout << "\nis " << standard dev( demoset , demoset + demosize ) << " !\n" ;</pre>
   return 0 ;
```

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \overline{x})^2}.$$

Programming is indirect

cards[0][12]



Programming is indirect

Programming is incidentally complex

unobservable

indirect

incidentally complex

```
teacup
teacup
 teacup
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  teacup
   teacup
     teacup
    teacup
     teacup
      teacup
     teacup
     teacup
     teacup
```

Data transformation.

observable, direct, simple

medium

an agency or means of doing something.

aurora