

# updates



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### motivation



```
int add( int a, int b ){
   return a + b ;
}
```



### C/RAPI



```
#include <R.h>
#include <Rinternals.h>
int add(int a, int b){
      return a + b;
SEXP add_fun( SEXP a_, SEXP b_ ){
 int a = INTEGER(a_)[0], b = INTEGER(b_)[0];
 int res = add( a, b );
 SEXP result = PROTECT(allocVector(INTSXP, 1) );
 INTEGER(result)[0] = res ;
 UNPROTECT(1);
 return result;
```

```
$ R CMD SHLIB add.c
clang -I/Library/Frameworks/R.framework/Resources/include -DNDEBUG
I/usr/local/include -I/usr/local/include/freetype2 -I/opt/X11/include
-fPIC -Wall -mtune=core2 -g -02 -c add.c -o add.o
clang -dynamiclib -Wl,-headerpad_max_install_names -undefined
dynamic_lookup -single_module -multiply_defined suppress -L/Library/
Frameworks/R.framework/Resources/lib -L/usr/local/lib -o add.so add.o
-F/Library/Frameworks/R.framework/.. -framework R -Wl,-framework -
Wl, CoreFoundation
> dyn.load( "add.so" )
> add <- function(a, b){</pre>
+ .Call( "add_c", a, b )
+ }
> add( 33L, 9L )
[1] 42
> add( 33, 9 )
Error in add(33, 9):
```

INTEGER() can only be applied to a 'integer', not a 'double'

# RCDD



```
#include <Rcpp.h>
// [[Rcpp::export]]
int add(int a, int b){
    return a + b;
       > sourceCpp( "add.cpp" )
       > add(17L, 25L)
       Γ17 42
       > add(17, 25)
        1] 42
```

```
#include <Rcpp.h>
using namespace Rcpp
```

```
// [[Rcpp::export]]
double sum_cpp( NumericVector x){
  int n = x.size();
  double res = 0.0;
  for( int i=0; i<n; i++){
    res += x[i];
  return res;
```

### SUGAI



```
pdistR <- function(x, ys) {
   sqrt((x - ys) ^ 2)
}</pre>
```



#### sugar

```
NumericVector pdistCpp( double x, NumericVector ys) {
  int n = ys.size();
  NumericVector res(n) ;
  for(int i=0; i<n; i++){
    res[i] = sqrt(pow(x-ys[i], 2.0);
  return res;
```

NumericVector pdistCpp2( double x, NumericVector ys){
 return sqrt( pow( x - ys, 2 ) );
}

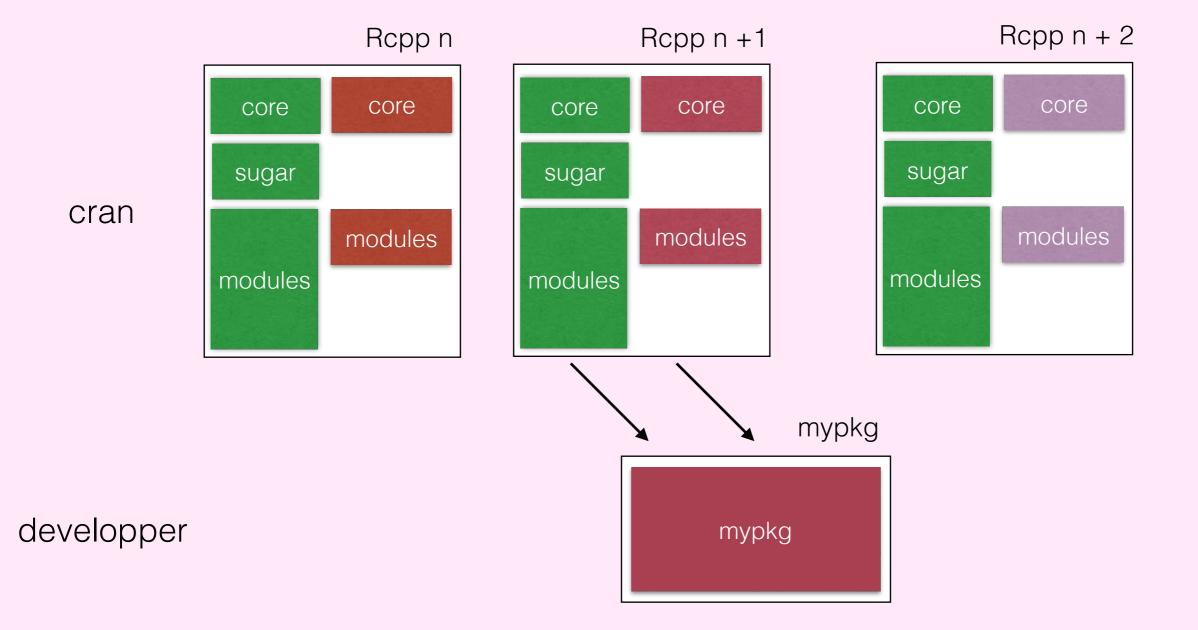
### modules



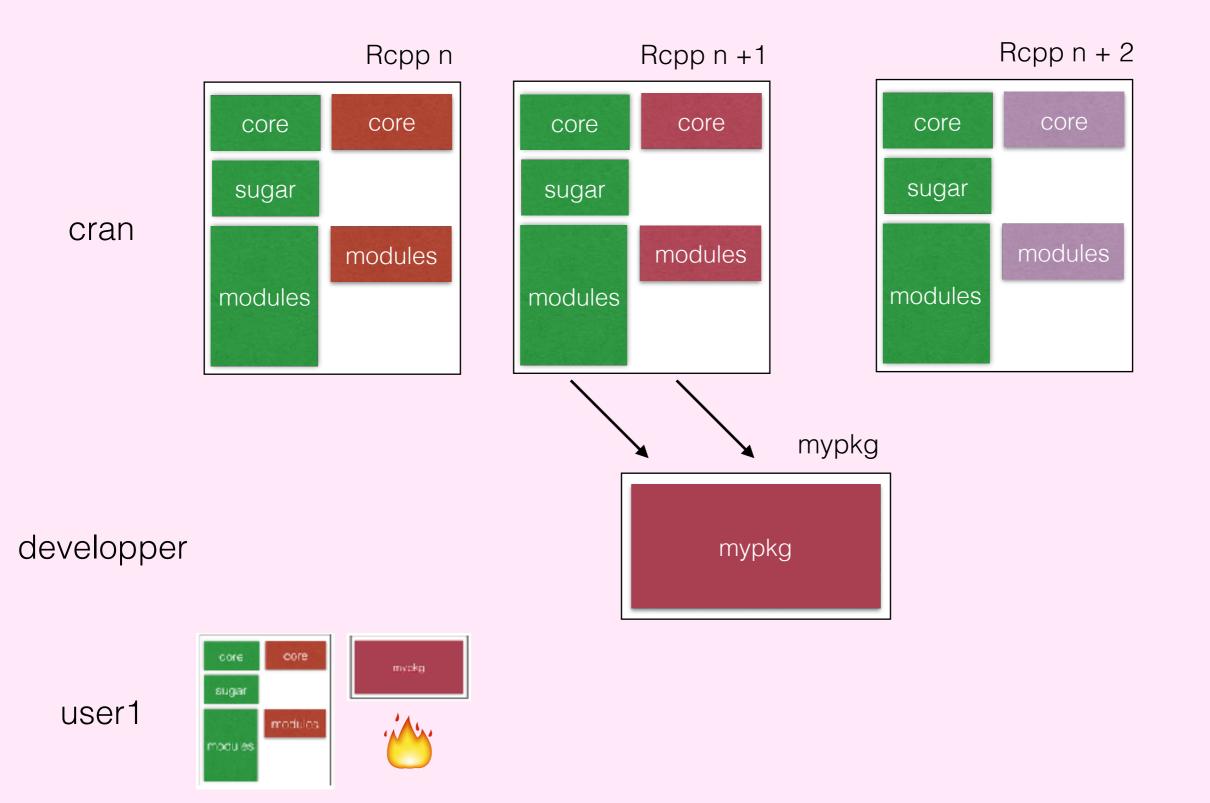
```
class Kittens {
public:
  Kittens( int n_{-} ) : n(n_{-}) ;
  void meow() { ... };
  void purr() { ... };
  int n;
           RCPP_MODULE(Cats){
             class_<Kittens>( "Kittens" )
                .constructor<int>()
                .field( "n", &Kittens::n )
                .method( "meow", &Kittens::meow )
                .method( "purr", &Kittens::purr )
                          kittens <- new( Kittens, 10 )</pre>
                          kittens$n
                          kittens$meow()
                          kittens$purr()
```

# dependency problem

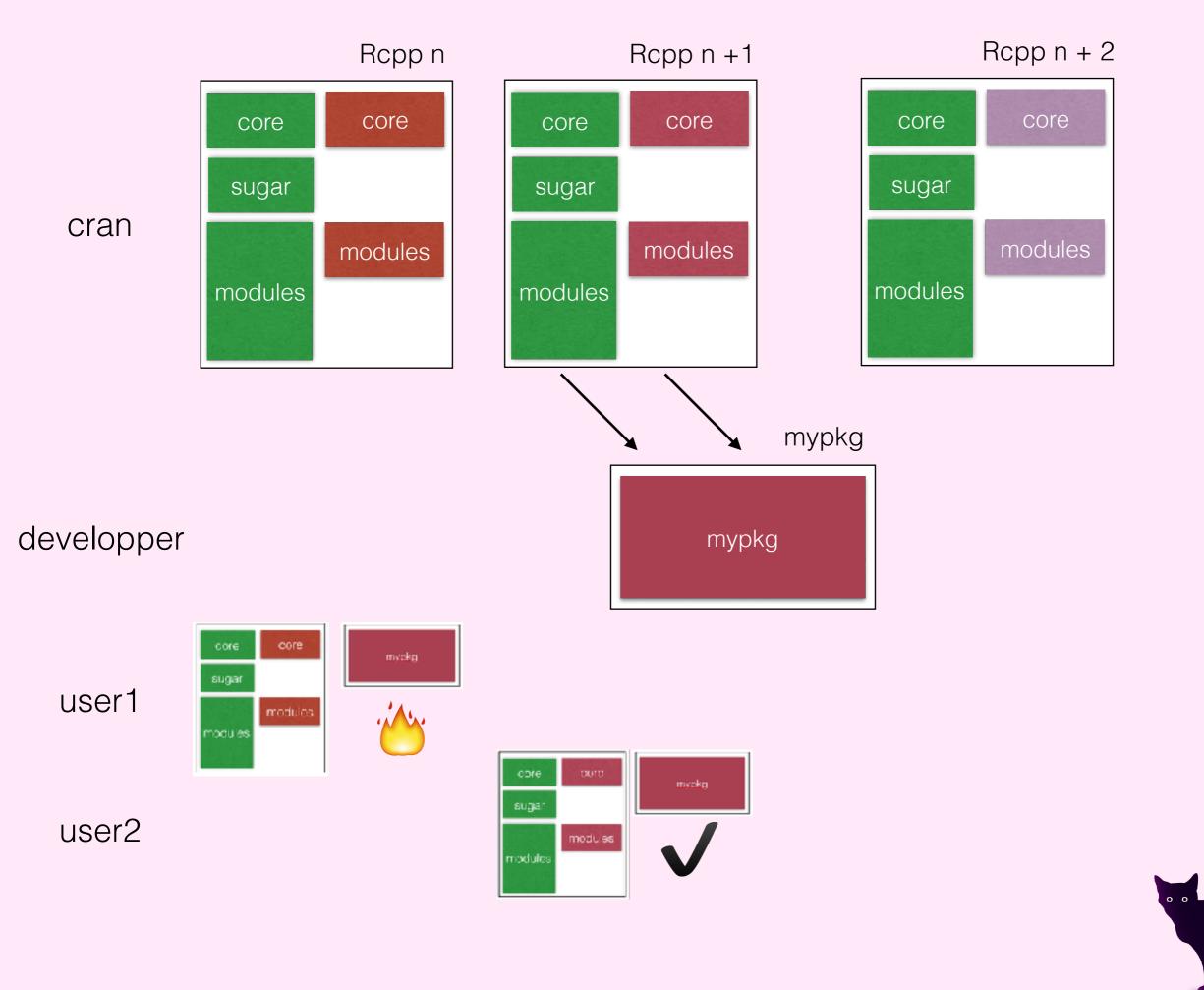


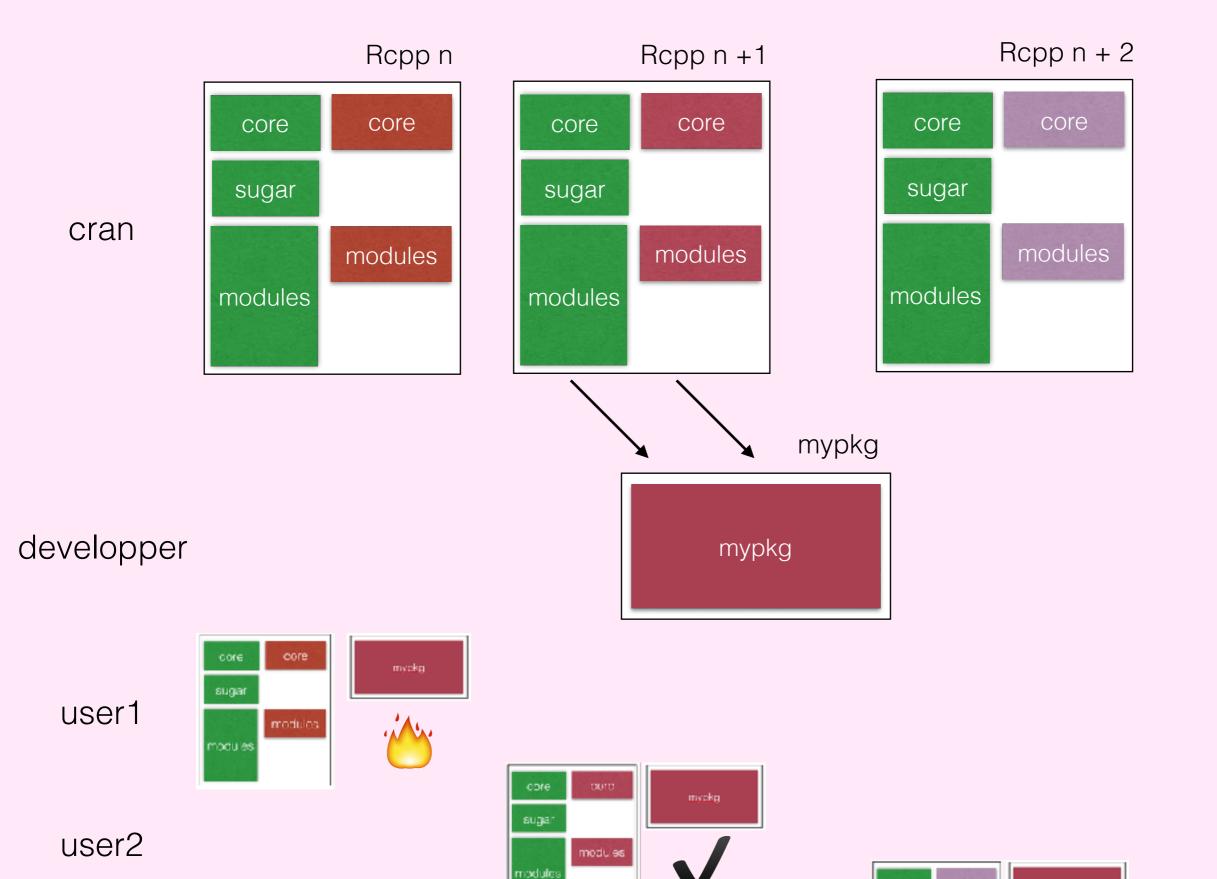












sugar

modules

user3

### proposal



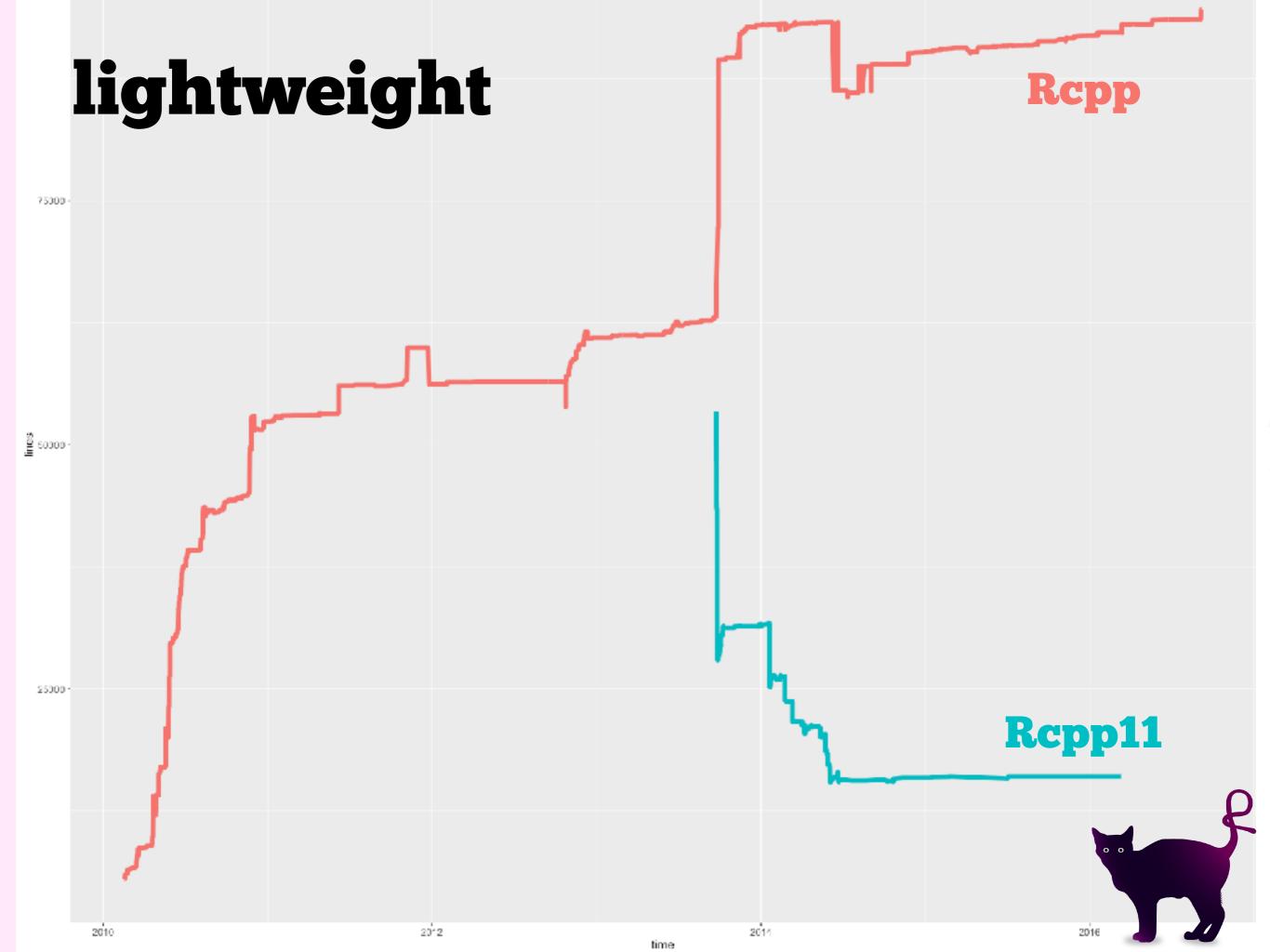


## RCDD11

• 
$$C++=C++11$$

- header only / no runtime dependency
- lightweight & modular

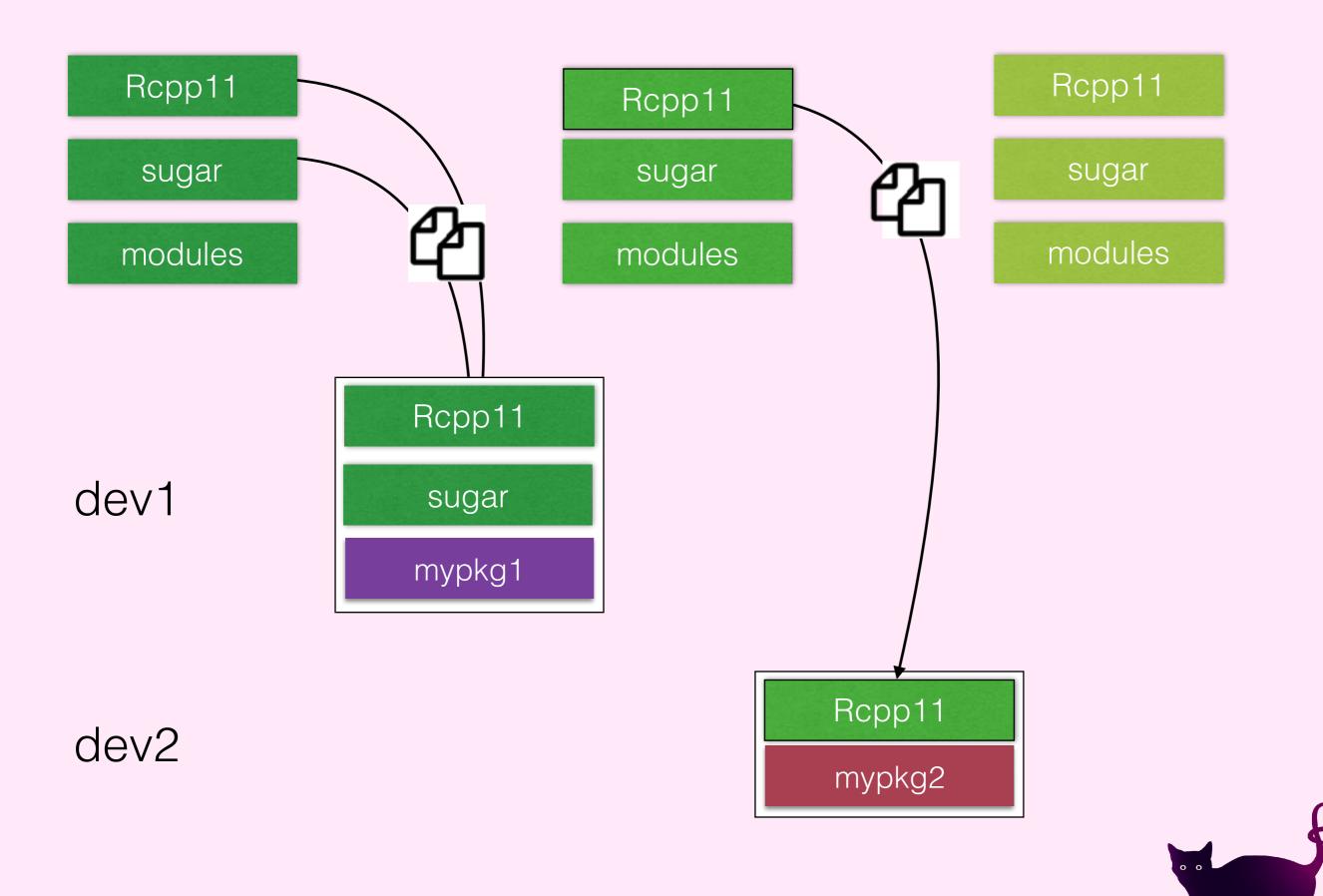




# Rcpp11 sugar modules

#### modular





# why C++11



### uniform initialization

NumericVector  $x = \{ 1.0, 2.3, 3.3 \}$ ;



#### for

```
double sum( NumericVector x ){
  double res = 0.0;
  for( double d: x) res += d;
  return res;
}
```



#### lambdas

```
NumericVector pdist( double x, NumericVector ys ){
  return sapply( ys, [&x]( double y ){
    return sqrt( pow(x-y, 2.0) ) ;
  });
}
```



#### auto

```
NumericVector pdist( double x, NumericVector ys ){
   auto fun = [&x]( double y ){
     return sqrt( pow(x-y, 2.0) ) ;
   };
   return sapply( ys, fun) ;
}
```



