Rcpp Quick Reference Guide

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Create simple vectors

```cpp
SEXP x; std::vector<double> y(10);

// from SEXP
NumericVector xx(x);

// of a given size (filled with 0)
NumericVector xx(10);
// ... with a default for all values
NumericVector xx(10, 2.0);

// range constructor
NumericVector xx( y.begin(), y.end() );

// using create
NumericVector xx = NumericVector::create(
    1.0, 2.0, 3.0, 4.0 );
NumericVector yy = NumericVector::create(
    Named["foo"] = 1.0,
    _["bar"]     = 2.0 );   // short for Named
```

Extract and set single elements

```cpp
// extract single values
double x0 = xx[0];
double x1 = xx(1);

double y0 = yy["foo"];
double y1 = yy["bar"];

// set single values
xx[0] = 2.1;
xx(1) = 4.2;

yy["foo"] = 3.0;

// grow the vector
yy["foobar"] = 10.0;
```

STL interface

```cpp
std::accumulate( xx.begin(), xx.end(),
    std::plus<double>(), 0.0 );
int n = xx.size();
```

Inline

```r
## Note - this is R code. inline allows rapid
testing.
require(inline)
testfun = cxxfunction(
        signature(x="numeric",
i="integer"),
        body = '
            NumericVector xx(x);
            int ii = as<int>(i);
            xx = xx * ii;
            return( xx );
        ', plugin="Rcpp")
testfun(1:5, 3)
```

Function

```cpp
Function rnorm("rnorm");
rnorm(100, _["mean"] = 10.2, _["sd"] = 3.2
);
```

Environment

```cpp
Environment stats("package:stats");
Environment env( 2 );  // by position

// special environments
Environment::Rcpp_namespace();
Environment::base_env();
Environment::base_namespace();
Environment::global_env();
Environment::empty_env();

Function rnorm = stats["rnorm"];
glob["x"] = "foo";
glob["y"] = 3;
std::string x = glob["x"];

glob.assign( "foo" , 3 );
int foo = glob.get( "foo" );
int foo = glob.find( "foo" );
CharacterVector names = glob.ls()
bool b = glob.exists( "foo" );
glob.remove( "foo" );

glob.lockBinding("foo");
glob.unlockBinding("foo");
bool b = glob.bindingIsLocked("foo");
bool b = glob.bindingIsActive("foo");

Environment e = stats.parent();
Environment e = glob.new_child();
```

Rcpp sugar

```cpp
NumericVector x = NumericVector::create(
  -2.0, -1.0, 0.0, 1.0, 2.0 );
IntegerVector y = IntegerVector::create(
  -2, -1, 0, 1, 2 );

NumericVector xx = abs( x );
IntegerVector yy = abs( y );

bool b = all( x < 3.0 ).is_true() ;
bool b = any( y > 2 ).is_true();

NumericVector xx = ceil( x );
NumericVector xx = ceiling( x );
NumericVector yy = floor( y );
NumericVector yy = floor( y );

NumericVector xx = exp( x );
NumericVector yy = exp( y );

NumericVector xx = head( x, 2 );
IntegerVector yy = head( y, 2 );

IntegerVector xx = seq_len( 10 );
IntegerVector yy = seq_along( y );

NumericVector xx = rep( x, 3 );
NumericVector xx = rep_len( x, 10 );
NumericVector xx = rep_each( x, 3 );

IntegerVector yy = rev( y );
```

Using matrices

```cpp
// Initializing from SEXP,
// dimensions handled automatically
SEXP x;
NumericMatrix xx(x);

// Matrix of 4 rows & 5 columns (filled with 0)
NumericMatrix xx(4, 5);

// Fill with value
int xsize = xx.nrow() * xx.ncol();
for (int i = 0; i < xsize; i++) {
    xx[i] = 7;
}
// Same as above, using STL fill
std::fill(xx.begin(), xx.end(), 8);

// Assign this value to single element
// (1st row, 2nd col)
xx(0,1) = 4;

// Reference the second column
// Changes propagate to xx (same applies for Row)
NumericMatrix::Column zzcol = xx( _, 1);
zzcol = zzcol * 2;

// Copy the second column into new object
NumericVector zz1 = xx( _, 1);
// Copy the submatrix (top left 3x3) into new object
NumericMatrix zz2 = xx( Range(0,2),
Range(0,2));
```

Random functions

```cpp
// Set seed
RNGScope scope;

// For details see Section 6.7.1--Distribution func-
// tions of the 'Writing R Extensions' manual. In some
// cases (e.g. rnorm), distribution-specific arguments
// can be omitted; when in doubt, specify all dist-specific
// arguments. The use of doubles rather than integers
// for dist-specific arguments is recommended. Unless
// explicitly specified, log=FALSE.

// Equivalent to R calls
NumericVector xx = runif(20);
NumericVector xx1 = rnorm(20);
NumericVector xx1 = rnorm(20, 0);
NumericVector xx1 = rnorm(20, 0, 1);

// Example vector of quantiles
NumericVector quants(5);
for (int i = 0; i < 5; i++) {
    quants[i] = (i-2);
}

// in R, dnorm(-2:2)
NumericVector yy = dnorm(quants) ;
NumericVector yy = dnorm(quants, 0.0, 1.0) ;

// in R, dnorm(-2:2, mean=2, log=TRUE)
NumericVector yy = dnorm(quants, 2.0, true) ;

// Note - cannot specify sd without mean
// in R, dnorm(-2:2, mean=0, sd=2, log=TRUE)
NumericVector yy = dnorm(quants, 0.0, 2.0,
true) ;

// To get original R api, use Rf_*
double zz = Rf_rnorm(0, 2);
```