C++ for R programmers

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So "Why C++" ?

- Asking Google leads to 51,600,000 hits.
- I did not read all of them.
- Wikipedia starts with *C++ (pronounced "cee plus plus") is a statically typed, free-form, multi-paradigm, compiled, general-purpose, powerful programming language.*
- We could spend this session discussing just that sentence.
- C++ is industrial-strength, widely-used, vendor-independent and *still evolving*.
- In science and research, it is one of the most widely-used languages. If there is something you want to use or connect to, it probably has a C/C++ API.

Another popular view on "What C++ is"

From Scott Meyers highly-regarded "Effective C++"

Item 1: *"View C++ as a federation of languages"*

1. *C* provides a rich inheritance and interoperability as Unix, Windows, ... are all build on C
2. *Object-Oriented C++* just to provide endless discussions about the right notion of what OO is or should be (and R really helps here having three different ones to offer :-/)
3. *Templated C++* which is mighty powerful; template meta programming unequalled in other languages
4. *The STL* which is a specific template library which is powerful but has its own conventions

Barbells not bullets

- On my first job, "barbell" (portfolios) meant those comprised of both long and short duration bonds – as opposed to "bullet" portfolio concentrated at one (middle) duration.
- I feel language choice is similar: It is rare to have one single solution for all problems.
- Python may be close. Julia may well get there too.
- But I am a realist, and I have *never* been on a project or team that was single-language, single-solution.
- In practive, people will always mix. John Chambers has made that point eloquently too.
- So face this head-on and pick tools *which mix well*. It so happens that I think R and C++ mix well via Rcpp / RInside.

Sending R objects back and forth

Possible with R's API, easier with Rcpp

- Essentially, any R object is represented internally as a SEXP.
- The `.Call` interface lets you send SEXPs back and forth.
- SEXP can be nested just like R objects: lists of lists of ...
- Rcpp makes the interchange of R objects a little easier than the plain C API for R.
- "Empirically speaking", 68 CRAN packages (as of 3 June 2012) using Rcpp seem to agree.
- This make Rcpp the most widely used foreign-language interface package for R (as it overtook rJava recently). Of course, there is the plain C API...