A Comparison of Rc^2, RStudio, and RCloud

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Various cloud-based frontends have been or are being developed for the *R* statistical computing environment. This talk compares and contrasts three: Rc^2, RStudio, and RCloud.

Rc^2 is a cloud-based, collaborative interface to *R* that currently works with client iPads and computers running OS X. Rc^2 is highly scalable and allows real-time research collaborations and high-performance, big-data computing. The clients provide a native look and feel, but use HTML5 for generated output, thus allowing development for other platforms. With Rc^2, *R* sessions are no longer tied to a specific device/computer or user.

Rc^2 is an Integrated Development Environment (IDE) designed for simplicity and ease-of-use, allowing students or researchers to learn *R* without solely imposing a command-line interface. At the same time, power users will find the system flexible enough to meet most of their needs, including the development of *R* packages. Rc^2 is organized by projects and projects can have multiple sharable workspaces. This allows researchers to collaborate over the Internet without concern for code or data becoming out of sync.

The Java-based server side of Rc^2 spawns *R* sessions (using Rserve). Rc^2 is driven by and interfaces with both SQL and NoSQL databases. Full support for Sweave allows users to easily include, update, and format *R* output within LaTeX documents for publishable papers. R markdown and other input types, e.g., SAS, are also supported.

RStudio is a powerful, open-source IDE for *R*. It is provides a productive user interface to *R* that works on all major platforms. A server version is also available for *R* code development over the web.

As an IDE, RStudio supports syntax highlighting, code completion, and smart indentation. *R* code can be directly executed from the source editor. It supports integrated *R* help, the use of projects, and has a workspace browser. An interactive debugger allows the developer to find and fix errors quickly. It has extensive support for developing packages.

RStudio supports both Sweave and R Markdown. It also supports interactive web application development using Shiny and Shiny Server.

RCloud is an HTML5 frontend to *R* for data analysis, which allows users to collaboratively create and share R scripts. Since it is HTML5 based, it is platform independent. It provides a notebook interface that lets you easily record a session and annotate it with text, equations, and supporting images.

RCloud allows you to easily browse other users's notebooks, comment on notebooks, fork notebooks, and use them as function calls in your own notebooks. It provides an environment in which *R* packages can create rich HTML content, e.g., using D3. It also provides a transparent, integrated version control system. RCloud notebooks are Github gists.

Rc^2, RStudio, and RCloud target different audiences. Rc^2 is an accessible IDE for students and researchers who have limited technical skills. Rc^2 sessions allow real-time collaboration which is ideal for students taking distance-based courses and researchers in different locations. On the other hand, Rc^2 is not yet platform independent. RStudio is a powerful IDE, but its completeness necessarily involves complexity. It does not support collaboration although users could share information using group permissions on the Linux server version. RCloud is HTML5 based and thus platform independent. Its most powerful feature is its implementation of notebooks. This allow users to flexibly share and extend notebooks.