



teaching R online with RStudio Cloud!



bit.ly/teach-r-online-mats

dr. mine çetinkaya-rundel
dr. colin rundel

Activity

while we wait to get started...

- Go to bit.ly/teach-r-online-cloud
- Log in with Google or GitHub, or create a new account
- Once you join our workspace, start the assignment titled **COVID-19**
- Knit the document titled **covid-19.Rmd** and inspect the visualisation
- Then, in the R Markdown document, change one of the countries plotted to a country of your own choice
- Knit again, and inspect

why RStudio in the cloud?

lots of friction points

- Install R
- Install RStudio
- Install the following packages:
 - rmarkdown
 - tidyverse
 - ...
- Load these packages
- Install git

much less friction

- Go to rstudio.cloud
- Log in

```
>hello R!
```

you used to have this



Photos by Jonathan Borba and Sincerely Media on Unsplash.

and now you have this



How RStudio in the cloud?

RStudio Server Pro *

You have...

- sysadmin experience / IT support
- hardware / local VM / cloud computing credit
- RStudio experience

See [RStudio Academic Pricing](#), freely licensed for teaching purposes.

RStudio Cloud

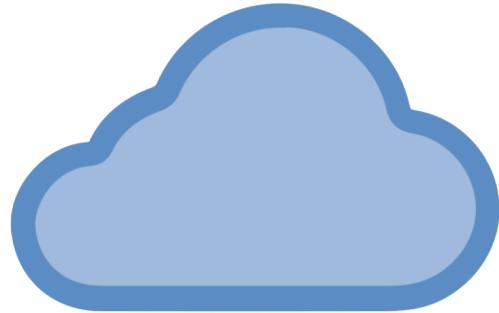
You have...

- RStudio experience

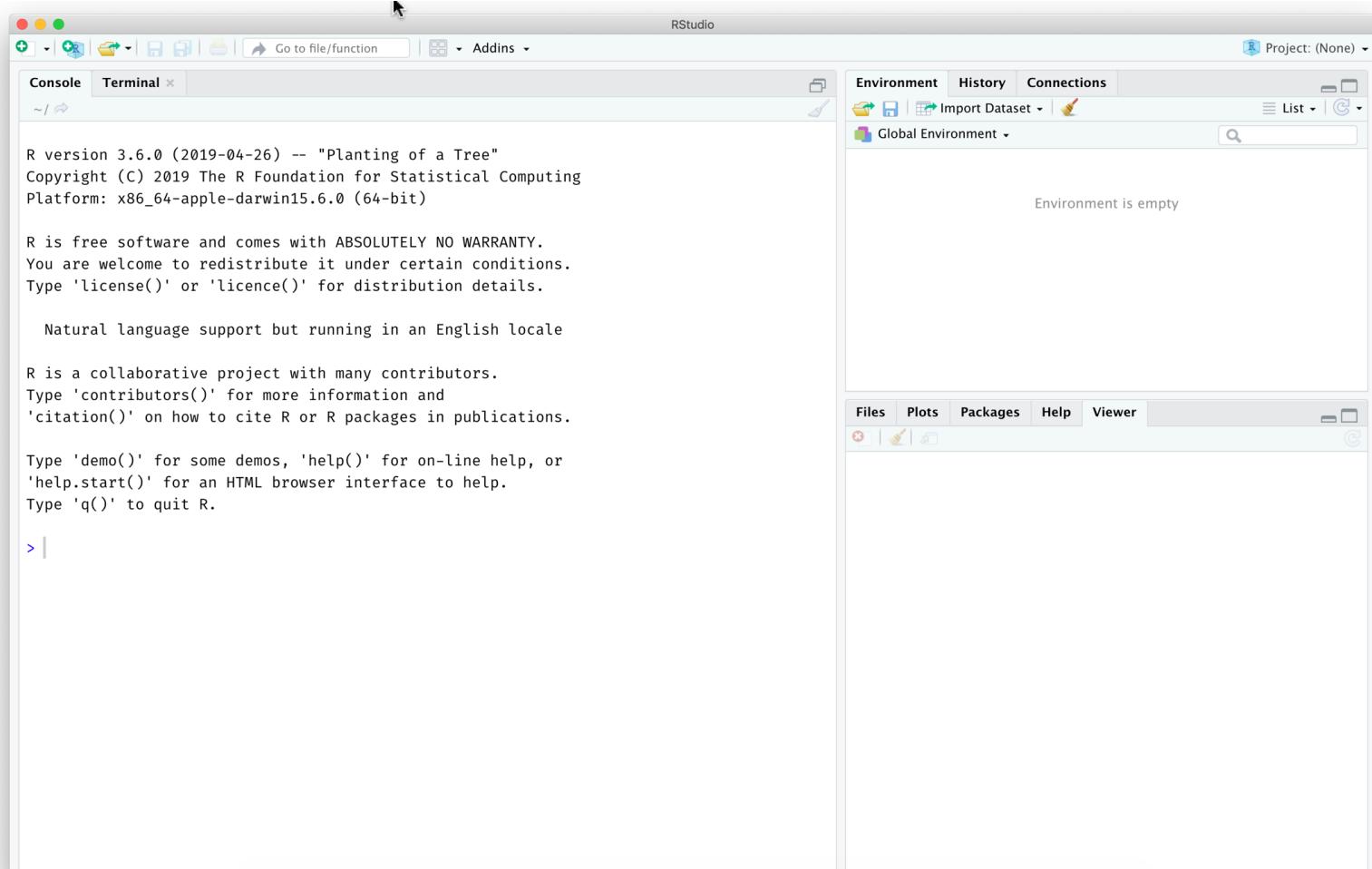
* Çetinkaya-Rundel, Mine, and Rundel, Colin. "Infrastructure and tools for teaching computing throughout the statistical curriculum." *The American Statistician* (2018). Part of the Practical Data Science for Stats collection. [\[Peer J\]](#) [\[TAS\]](#)

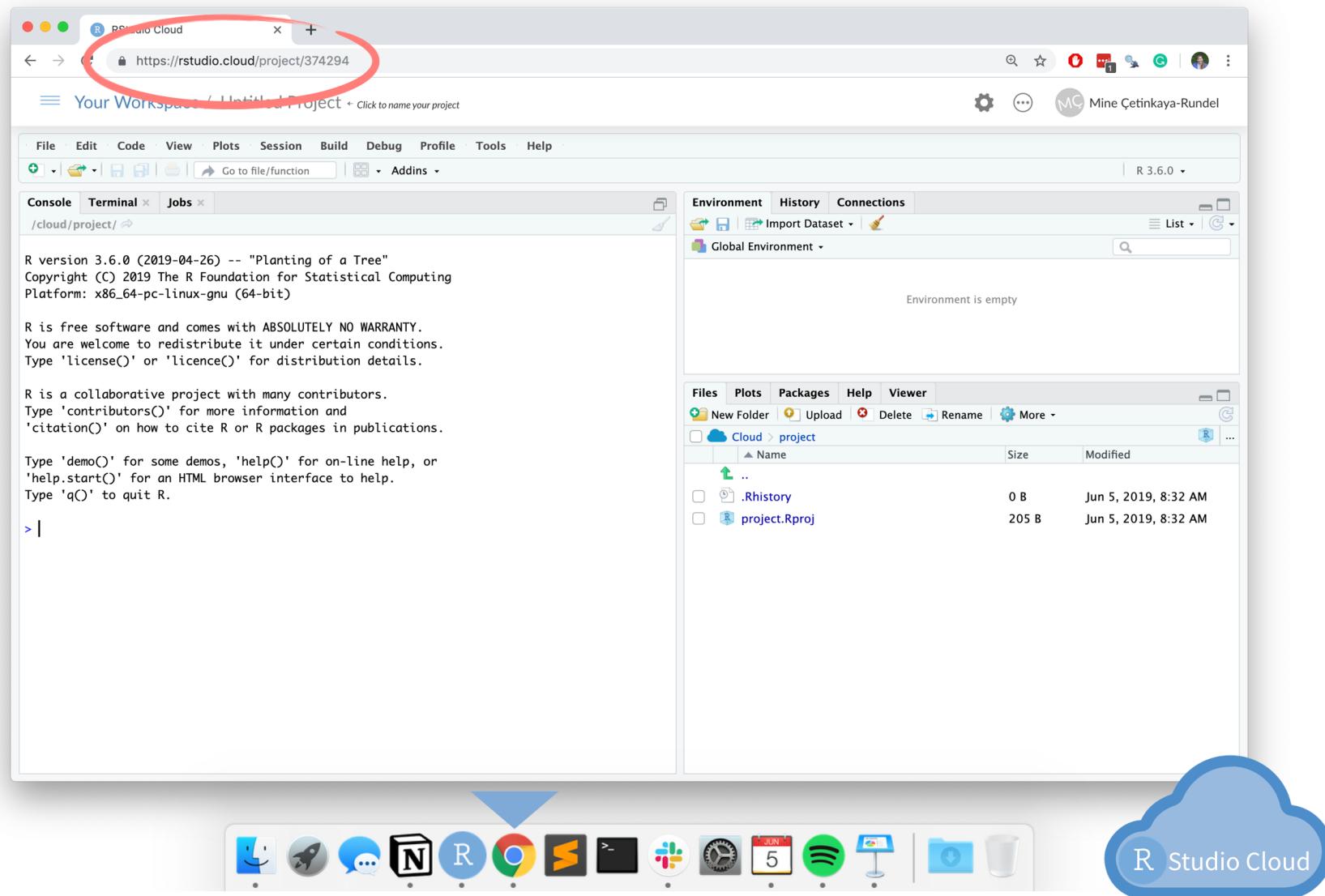
Hello RStudio Cloud

What is RStudio Cloud?



We created **RStudio Cloud** to make it easy for professionals, hobbyists, trainers, teachers, and students to do, share, teach, and learn data science using R.





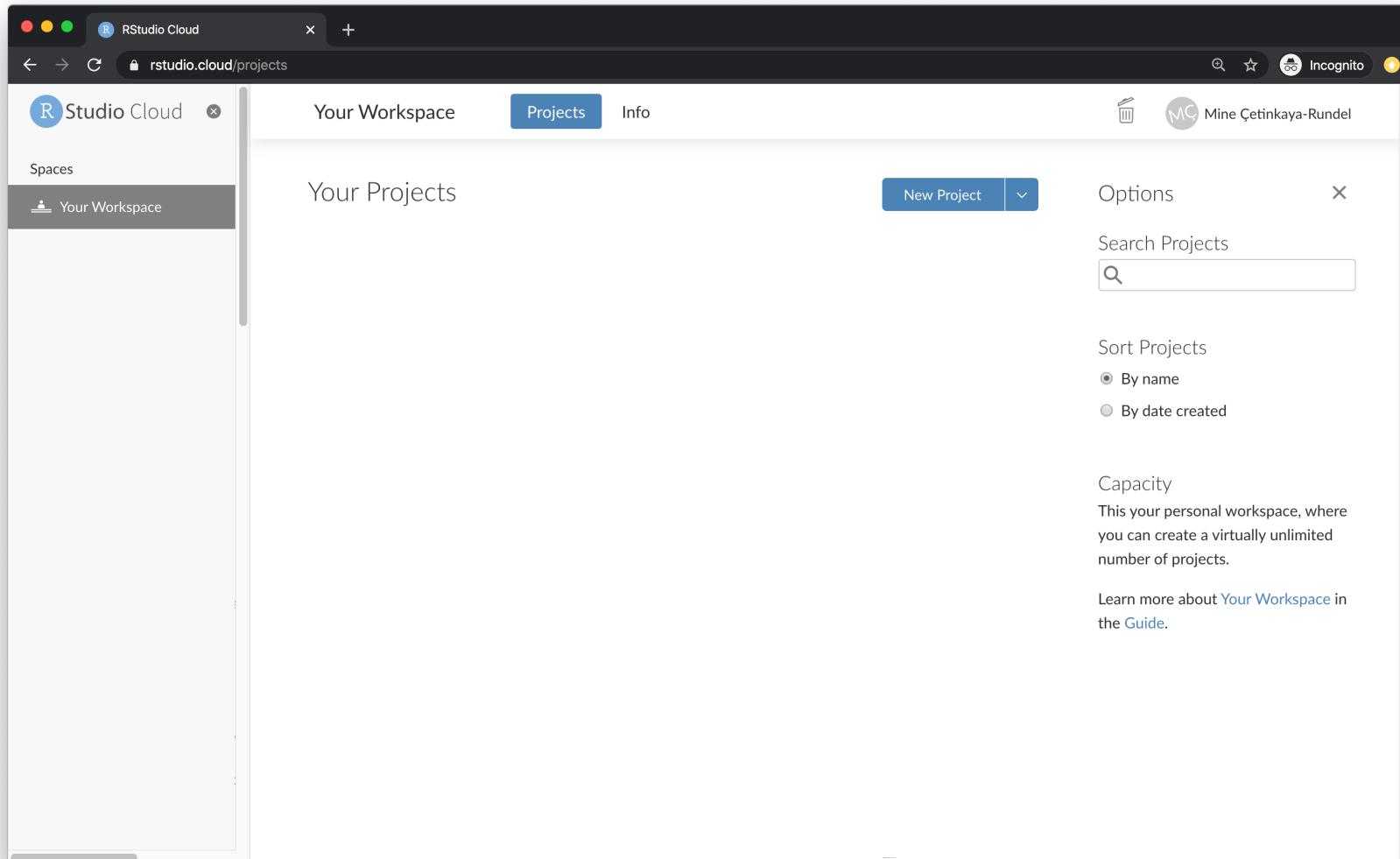
Why RStudio Cloud?

- Does not require IT support
- Git works out of the box
- Knit to PDF and Word works out of the box
- Features designed for instructors

Contexts

- Shorter workshops: Likely no opportunity to communicate pre-workshop instructions, varied computing background and learning goals
- Semester long courses
 - Intro data science / statistics: little to no background in stats, data science, programming
 - Upper level data science / statistics: Varied computing background and different computer setups

RStudio Cloud: First look



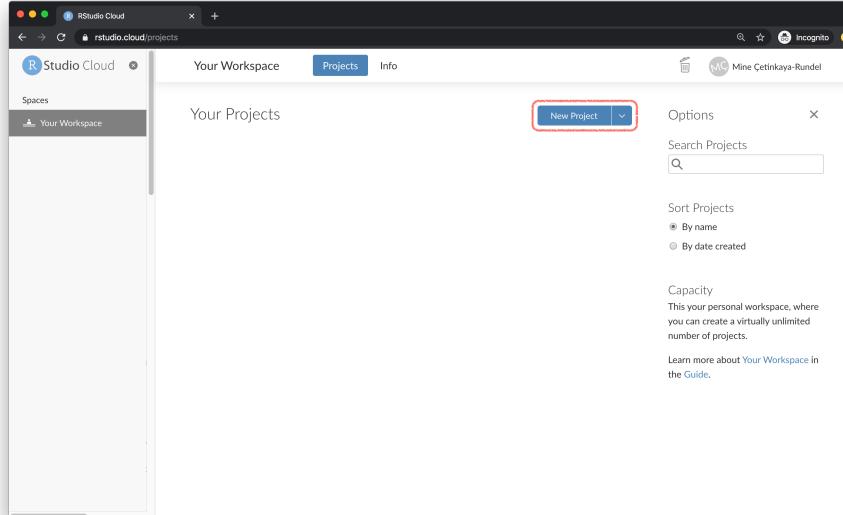
Workspaces

- When you create an account on RStudio Cloud you get a workspace of your own
- You can add a new workspace and control its permissions
- Projects in either workspace can be public or private

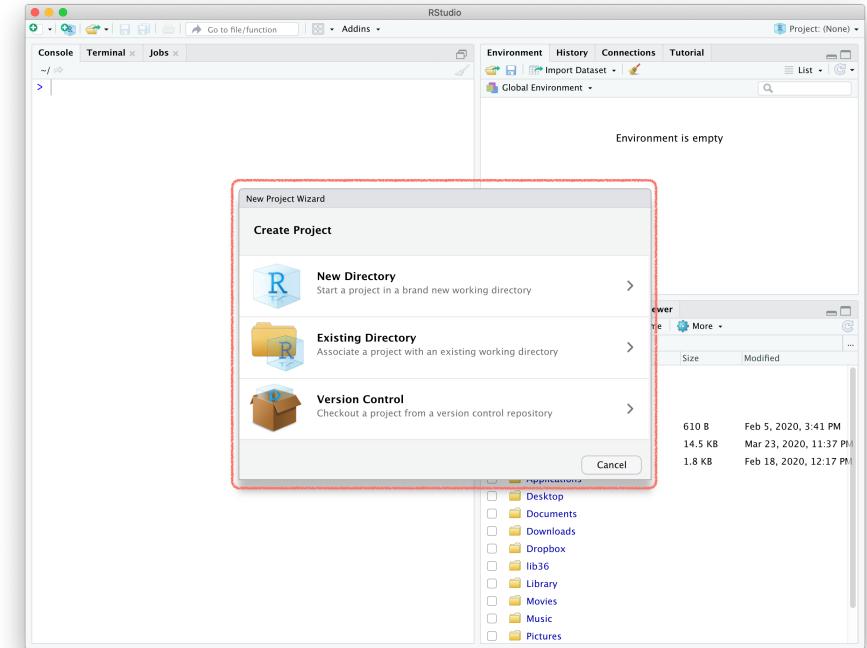
A framework for workspaces

Projects

A new project in RStudio Cloud



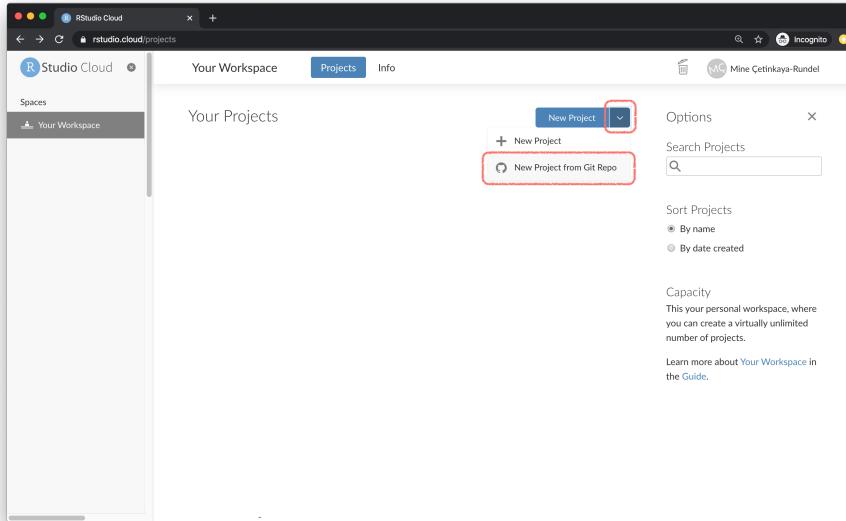
is a new project in RStudio IDE



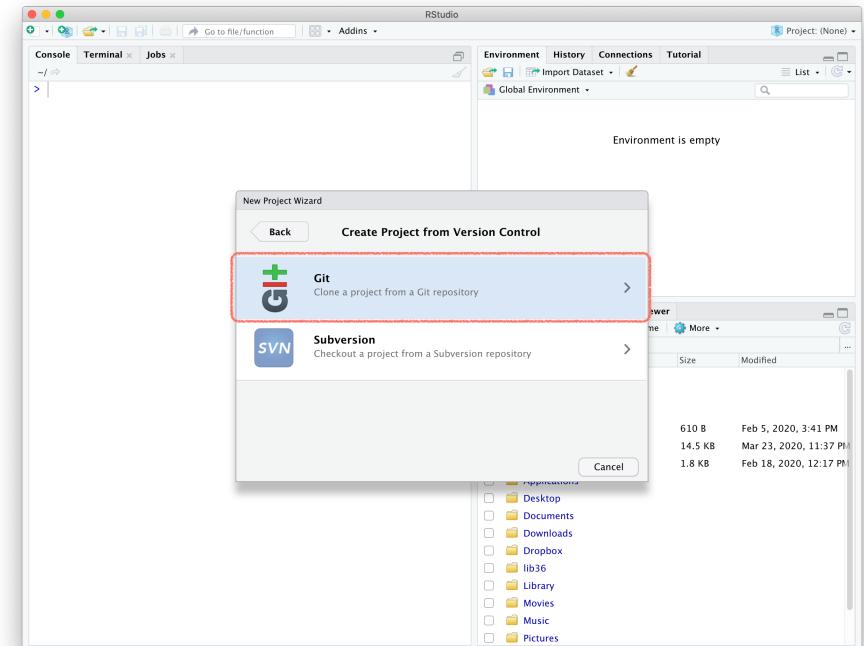
PSA: If you use RStudio, use projects! Trust me, you won't regret it. Find out more on [R for Data Science](#).

Projects from Git

A new project from Git repo in RStudio Cloud



is the same as a new project from Git in RStudio IDE



Both options **clone** a Git repo

Sharing options

- Option 1: Share a single project
- Option 2: Invite users to a workspace (presumably with many projects)

Sharing option



Mine CetinkayaRundel

@minebocek

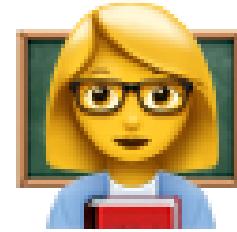


Replying to @noamross @rstudio

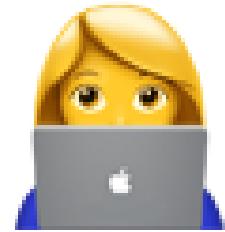
Easy peasy, it'll even fit in a tweet:

- Go to [rstudio.cloud](#) -> Login -> New Project
- Install packages, add scripts, Rmds etc.
- Gear icon -> Access -> Everyone
- Copy URL and share

3:06 PM - 29 May 2019



teacher



student



Creating and sharing a single project





Receiving and working on a shared project



Your turn!

 Identify one person in the group as **instructor** (Tip: Choose someone *without* a second / large display)

 Rest of the group are **students**

Instructor:

- Create a new project and give it a name
- Install a package of your choice
- Create a template R Markdown document in the project
- Change the access level of the project so others can see it as well
- Copy the project URL and share it with the rest of the group in the chat box

Students:

Access your instructor's project and pick up where they left off

10 : 00

Pros / cons: Sharing a single project

Good!

- Students land directly in a project upon login
- Works well for workshops where all work will be completed in a single project
- Also great for sharing code in general, e.g. collaboration, reprexes, etc.

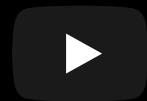
Not so good...

- Students need to remember to make a copy of the project (which means you need to remember to remind them!)
- You can't keep track which students started their assignment
- Students control permissions
- You can't easily peek into student projects -- they would need to explicitly share the project with you

Sharing option



Creating a workspace





Workspace membership

The screenshot shows the 'Members' tab selected in the RStudio Cloud interface. A red box highlights the 'Members' tab in the navigation bar. The main area displays 'All Members' with a 'Current Members' tab selected. A single member, 'Mine Çetinkaya-Rundel', is listed with the role 'Admin'. To the right, there are sections for 'Options', 'Access', and 'Permissions'. The 'Access' section includes radio buttons for 'Invitation required' (selected) and 'Shared'. The 'Permissions' section contains several checkboxes, most of which are checked.

RStudio Cloud Webinar Projects Members Info

Add Member Leave Space Options

All Members

Current Members Invitations

Name Role

Mine Çetinkaya-Rundel Admin

Access

Invitation required
Add specific members to the space by sending invitations.

Shared
Anyone with the sharing link can access the space.

Permissions

Contributors can see the members list

Contributors can make their projects visible to all members

Contributors can change project resources (e.g. memory)

Viewers can see the members list

RStudio Cloud beta

Terms and Conditions System Status

Twitter GitHub LinkedIn Facebook

© 2020 RStudio, PBC



Role permissions

| role | permission | course role |
|-------------|--|-------------|
| admin | manage users, view, edit and manage all projects | instructor |
| moderator | view, edit and manage all projects | TA |
| contributor | create, edit and manage their own projects | student |
| viewer | view projects shared with everyone | auditor |



Other permissions

Under the Members tab:

Permissions

- Contributors can see the members list
- Contributors can make their projects visible to all members
- Contributors can change project resources (e.g. memory)

- Viewers can see the members list

- By default, all permissions are turned off
- Think carefully before checking these boxes



Options

Under the Members tab:

Options



Access

Invitation required

Add specific members to the space by sending invitations.

Shared

Anyone with the sharing link can access the space. Members will be assigned the "Initial Role" selected at the time they join the space.

Initial Role



Contributor



Copy Sharing Link

Reset Link

- Make workspace shared for a short period of time, share link with students, enrol them as contributors.
- After initial round of enrolment (e.g. drop/add) switch over to this access level
- Use invitations for visitors added mid-semester



Inviting a student to a workspace

The screenshot shows the RStudio Cloud interface for managing workspace members. The top navigation bar includes 'RStudio Cloud' and the URL 'rstudio.cloud/spaces/58719/members'. The tabs 'Projects', 'Members' (which is selected), and 'Info' are visible. On the left, under 'All Members', there are tabs for 'Current Members' (selected) and 'Invitations'. A search bar is present. The main list shows one member: 'Mine Çetinkaya-Rundel' with a role of 'Admin'. On the right, the 'Options' panel is open, showing the 'Access' section. It has two radio button options: 'Invitation required' (disabled) and 'Shared' (selected). The 'Shared' section includes a description, a dropdown for 'Initial Role' set to 'Contributor', and a button to 'Copy Sharing Link' (which is highlighted with a red box). Below this are 'Permissions' checkboxes: 'Contributors can see the members list' (checked), 'Contributors can make their projects visible to all members' (checked), 'Contributors can change project resources (e.g. memory)' (unchecked), and 'Viewers can see the members list' (checked). The bottom of the page features the RStudio Cloud logo, links to 'Terms and Conditions' and 'System Status', and social media icons for Twitter, GitHub, LinkedIn, and Facebook.

Base projects

One of the most attractive features of RStudio Cloud!

- Packages you want *installed* on all student projects
- Text documents you want to appear on **all** student projects (e.g. code of conduct, turn-in instructions, etc.)
- Applies to all projects created **after** base project has been specified, doesn't apply retroactively
- Can be updated as many times as you like throughout the course (without having to convince your IT!!!)



Setting up your base project



Your turn!

Instructor:

- Create a new workspace, give it a name, and add a short description
- Change the settings of your workspace to Shared
- Change the permissions of your workspace how you like
- Add a base project to your workspace:
 - Create a new project
 - Install one or two of your favourite packages
 - Start an R Markdown document so necessary packages get installed
 - Add a code-of-conduct.md or some other plain text document
 - Make this project visible to everyone
 - In the settings menu for the workspace, set it as base project
- Create a new assignment: [Homework 01](#).
- Grab the sharing link for your workspace and share with your group.

Students:

- Join your instructor's workspace and start the assignment.

15 : 00

Git integration

- 🛑 Only relevant if teaching with Git & GitHub!
- 😊 Base project template can be used, so new project from Git also has the right packages installed!

More on this in Workshop 3 on 17 July!

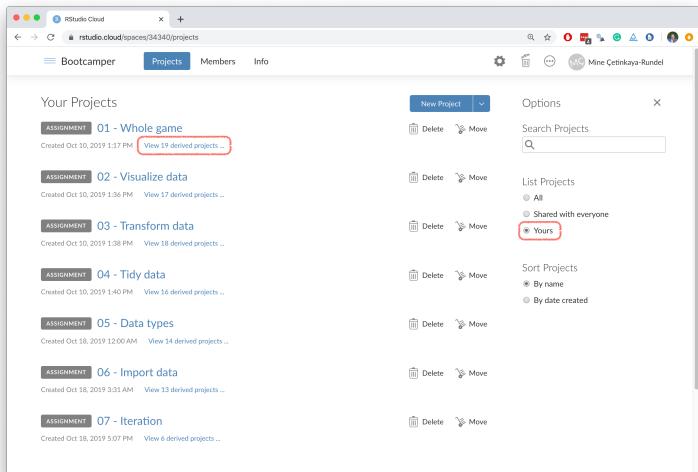
Pros / cons: Sharing a workspace

Good!

- Various permission levels
- Base projects with desired packages installed
- Assignments -- no more "make a copy of the project before starting work"
- Peek into students' projects

Not so good...

- Students land in the workspace, may need to provide instructions for the next steps
- Git config for each project can get tedious and doesn't reflect realistic practice

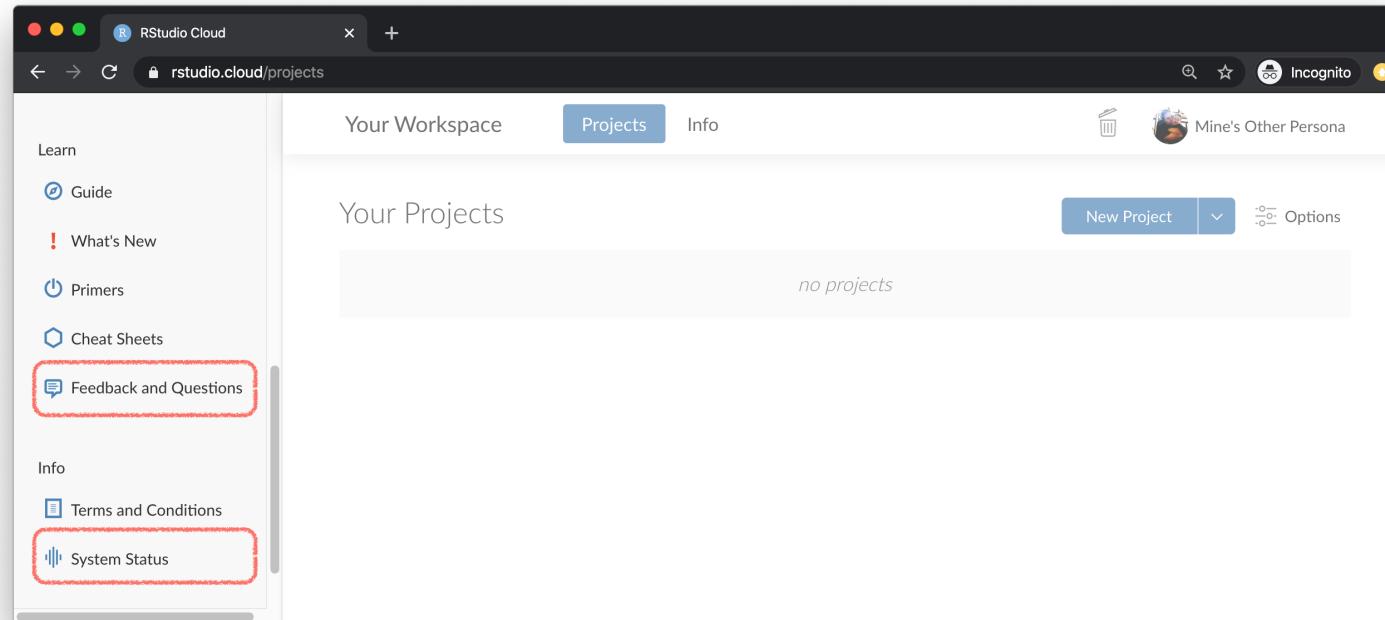


Common pitfalls

- Changes you make after student launches a project under either model (single project or workspace) won't propagate to their project
- Packages in the base project will be **installed** in all projects in the workspace, but not **loaded**
 - If you need students to run code in the Console that requires a package, your instructions should remind them to load the package first
 - If using Rmd document, add a **load-package** chunk on top

Feedback / questions / troubleshooting

- Check out status.rstudio.com
- Post on [RStudio Community](#)
- Email support@rstudio.cloud



Parting remarks

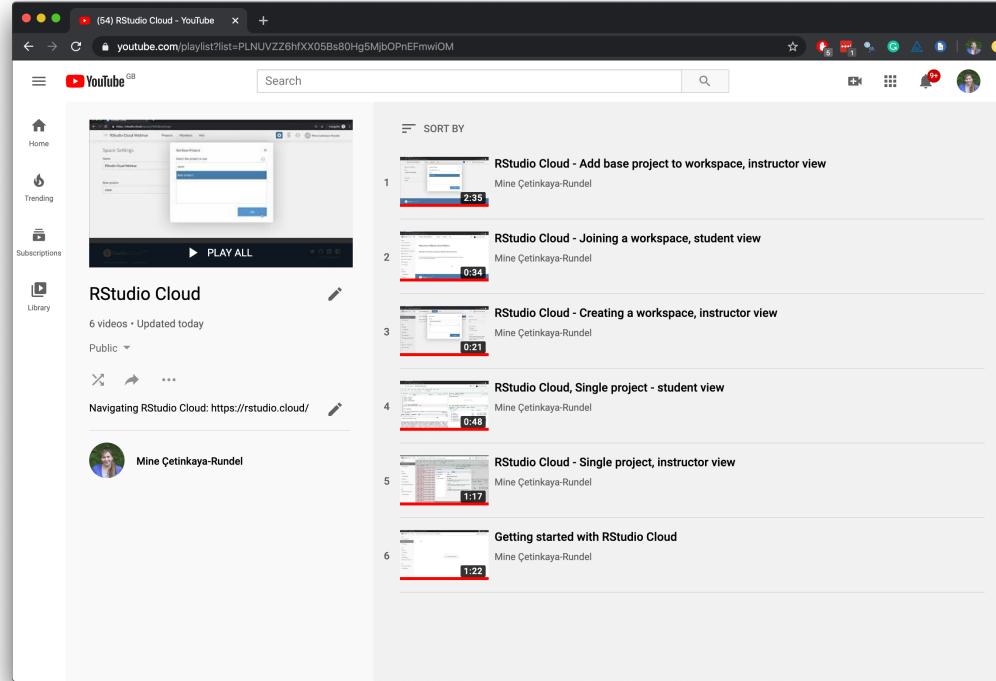
Tips

- Each project is allocated 1GB of RAM
 - Test things out before assignments involving large datasets
- What your students see is not always what you see
 - Create a secondary account and add as a student

More tips

Make brief screencasts for getting students oriented with the platform (especially if remote teaching), or use mine!

Navigating RStudio Cloud on YouTube



More tips

Remind students how to hide the sidebar!

More tips

- Read the RStudio Cloud guide

The screenshot shows a web browser window for 'RStudio Cloud' at the URL rstudio.cloud/learn/guide. The page is titled 'R Studio Cloud Guide' and features a blue header bar with the text 'Get started with RStudio Cloud.' Below the header, there's a section titled 'Projects' with a sub-section 'Your Workspace'. A 'New Project' button is visible. To the right, a sidebar titled 'Projects' lists various options: Your Workspace, Shared Spaces, Courses & Workshops, Learn, Navigation, Accounts, Limits, Advanced Topics, and Questions & Feedback. The 'Projects' tab in the sidebar is highlighted.

R Studio Cloud Guide

Get started with RStudio Cloud.

Projects

A project is the fundamental unit of work on RStudio Cloud. It encapsulates your R code, packages and data files and provides isolation from other analyses. If you are familiar with projects in the desktop RStudio IDE, an RStudio Cloud project is the same thing, plus some additional metadata for access and sharing.

Your Workspace Projects Info

To create a new project from scratch, simply press the New Project button from the Projects area. Your new project will open in the RStudio IDE.

New Project

To create a new project from an existing git repository, press the down arrow on the right side of the New Project button, and choose 'New Project from Git Repo' from the menu that appears. Note that your git credentials need

Projects

- Your Workspace
- Shared Spaces
- Courses & Workshops
- Learn
- Navigation
- Accounts
- Limits
- Advanced Topics
- Questions & Feedback



- You can access RStudio Cloud's API to manage space members programmatically using the **rscloud** package:
- You will need to create client credentials to use the package. You can create credentials at login.rstudio.cloud/identity.

```
# install.packages("rscloud")
devtools::install_github("rstudio/rscloud")
```

Primers: rstudio.cloud/learn/primers

Free primers made with the **learnr** package, companion to R4DS by Grolemund and Wickham

The screenshot shows a web browser window for RStudio Cloud with the URL rstudio.cloud/learn/primers. The page is titled "Primer" and features a navigation bar with "Learn", "Guide", "What's New", "Primer" (which is highlighted in blue), and "Cheat Sheets". A user profile for "Mine Çetinkaya-Rundel" is visible on the right.

The Basics: Features three large blue circles containing the numbers 1, 2, and 3. Below the circles is a brief description: "Start here to learn the skills that you will rely on in every analysis (and every primer that follows): how to inspect, visualize, subset, and transform your data, as well as how to run code."

Work with Data: Shows a 4x4 grid of colored squares. The first column contains a 2x2 grid of small squares. The second column has a single blue square at position (2,2). The third column has a single blue square at position (3,2). The fourth column has a single blue square at position (1,2). Below the grid is a description: "Learn the most important data handling skills in R: how to extract values from a table, subset tables, calculate summary statistics, and derive new variables."

Visualize Data: Shows a cluster of blue triangles forming a larger triangle shape. Below the image is a description: "Learn how to use ggplot2 to make any type of plot with your data. Then learn the best ways to visualize patterns within values and relationships between variables."

Tidy Your Data: Shows a 4x4 grid with four blue circles at positions (1,1), (2,1), (3,1), and (4,1). Below the grid is a description: "Unlock the tidyverse by learning how to make and use tidy data, the data format"

Iterate: Shows a conveyor belt with four blue flower pots moving along it. Below the image is a description: "Master a core programming paradigm with the purrr package: for each ___ do ___."

Write Functions: Shows a blue cartoon robot. Below the image is a description: "Functions are the key to programming in R. This primer will teach you how to write and"

Pricing

Cloud
Free

Cloud
Premium

Cloud
Instructor

Cloud
Organization

Cloud Free

If you make limited, occasional use of RStudio Cloud, or have your usage covered by your school/organization or an instructor, our free plan is all you need.

- ✓ Up to 15 projects total i
- ✓ 1 shared space (5 members and 10 projects max) i
- ✓ 15 project hours per month i
- ✓ Up to 1 GB RAM per project i
- ✓ Up to 1 CPU per project i

Pricing

Cloud
Free

Cloud
Premium

Cloud
Instructor

Cloud
Organization

Cloud Instructor

We offer our premium features to qualified instructors at a deep discount for instructional use because we want to make it an easy decision for you to teach with RStudio Cloud. The fees help us offset the cost of operating the service.

\$15

/month + tax + overage fees i

Subscribe

If you or your organization needs a fixed price per class for both instructors and students with no usage fees, tell us how many students you'll have, and for how long, and we can give you a custom quote for the entire cost. Payment must be made by credit card or purchase order before class begins.

Request a Quote

Pricing

Cloud
Free

Cloud
Premium

Cloud
Instructor

Cloud
Organization

Cloud Organization

Enable multiple people in your organization to teach, learn, or do research and analysis.

- ✓ All Cloud Premium features i
- ✓ Self-service access management i
- ✓ SAML integration for SSO i
- ✓ Flexible pricing - talk to us! i

[Request a Quote](#)

thank you!

- All materials at bit.ly/teach-r-online-mats
- Sign up for the upcoming workshops at bit.ly/teach-r-online:
 - 10 July: Building interactive tutorials in R
 - 17 July: Teaching computing with Git and GitHub