02
computing infrastructure

teaching data science

don't start like this

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

start like this

- Go to rstudio.cloud
- Log in

```
> hello R!
```

why RStudio in the cloud?

reduce friction at first exposure to R

avoid local installation

install R and RStudio on a server and provide access to students:

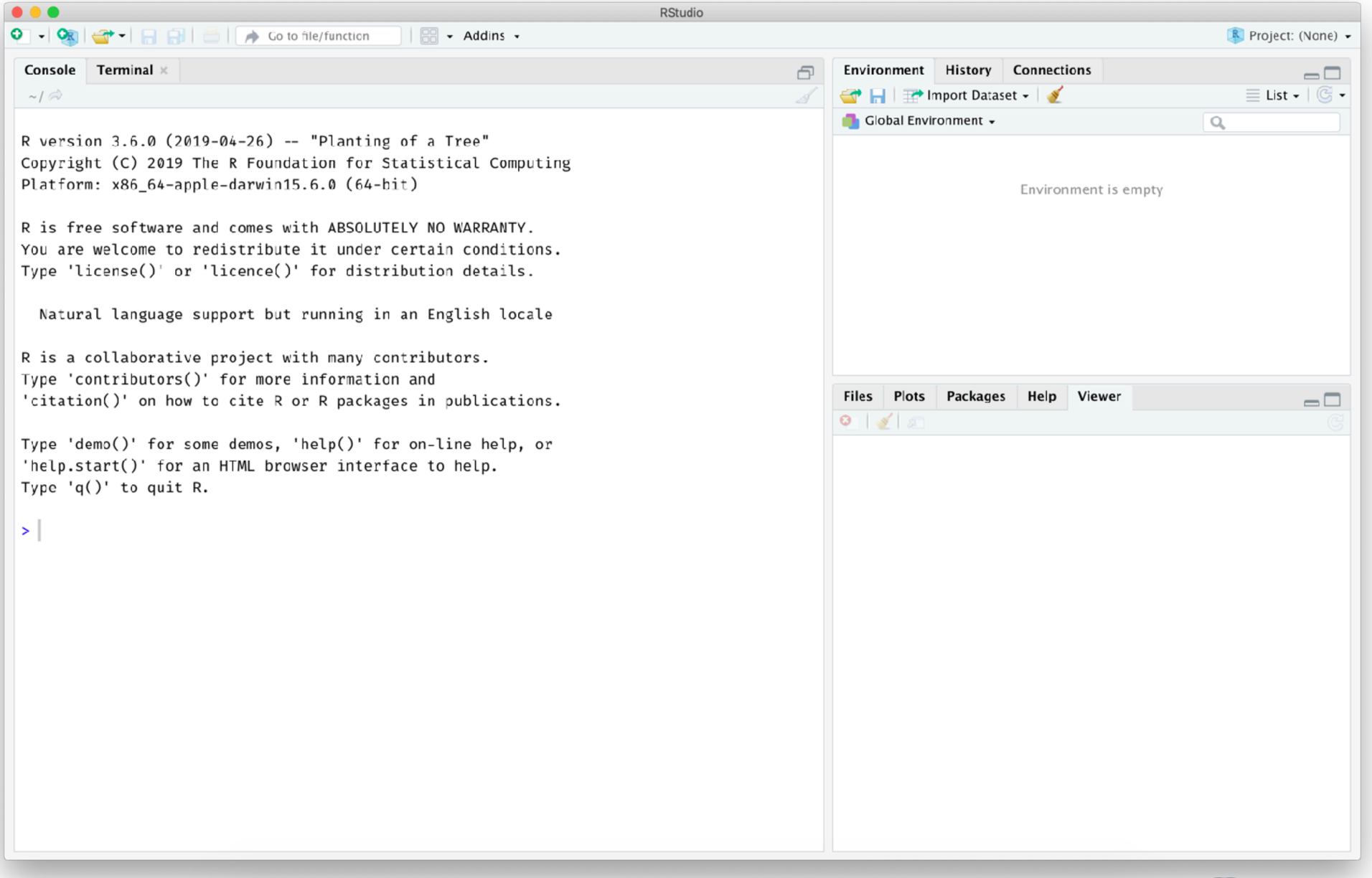
- Centralized RStudio server
- Dockerized RStudio server
- RStudio Cloud

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.

this workshop 😀

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.


RStudio
Go to file/function
Addins
Project: (None)
Console
Terminal
R version 3.6.0 (2019-04-26) -- "Planting of a Tree"
Copyright (C) 2019 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin15.6.0 (64-bit)
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.
Natural language support but running in an English locale
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
>
Environment
History
Connections
Import Dataset
List
Global Environment
Environment is empty
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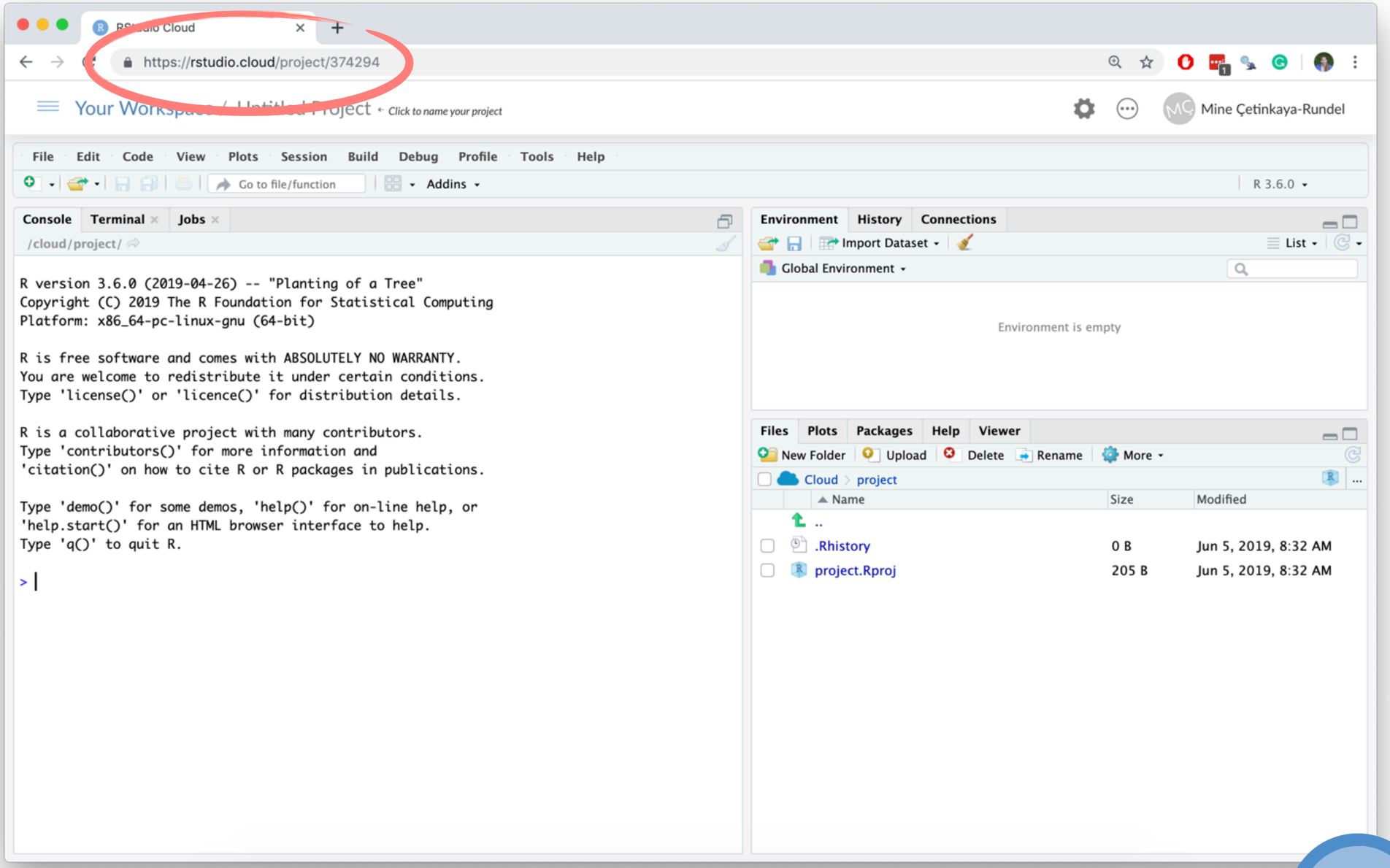
Packages
Help
Viewer


https://rstudio.cloud/project/374294
Your Workspace / Untitled Project
Click to name your project
Mine Çetinkaya-Rundel
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
R 3.6.0
Console
Terminal
Jobs
/cloud/project/
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project.Rproj
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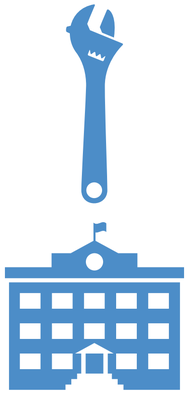
Jun 5, 2019, 8:32 AM

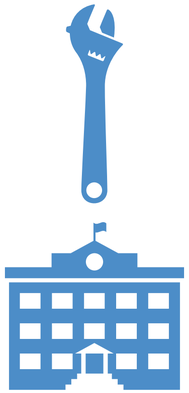
why RStudio Cloud?



does not require IT support

features designed for instructors:

why RStudio Cloud?



does not require IT support

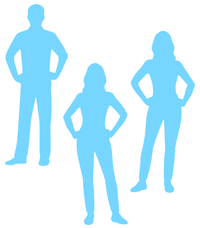
features designed for instructors:

- classes can be organized in workspaces
- members can be assigned different roles: instructor, TA, student
- projects can be public or private
- projects can be made into assignments
- students can make copies of projects created by instructor
- instructor can peek into student projects
- a base project template can ensure same packages in each new project created in the workspace
- git works out of the box

contexts

intro stat /
data science

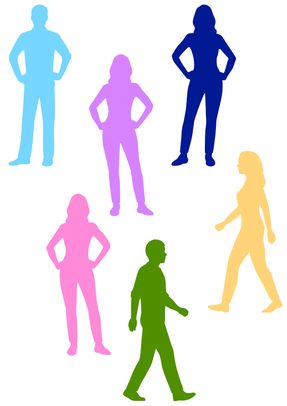
upper level stats / data science / programming

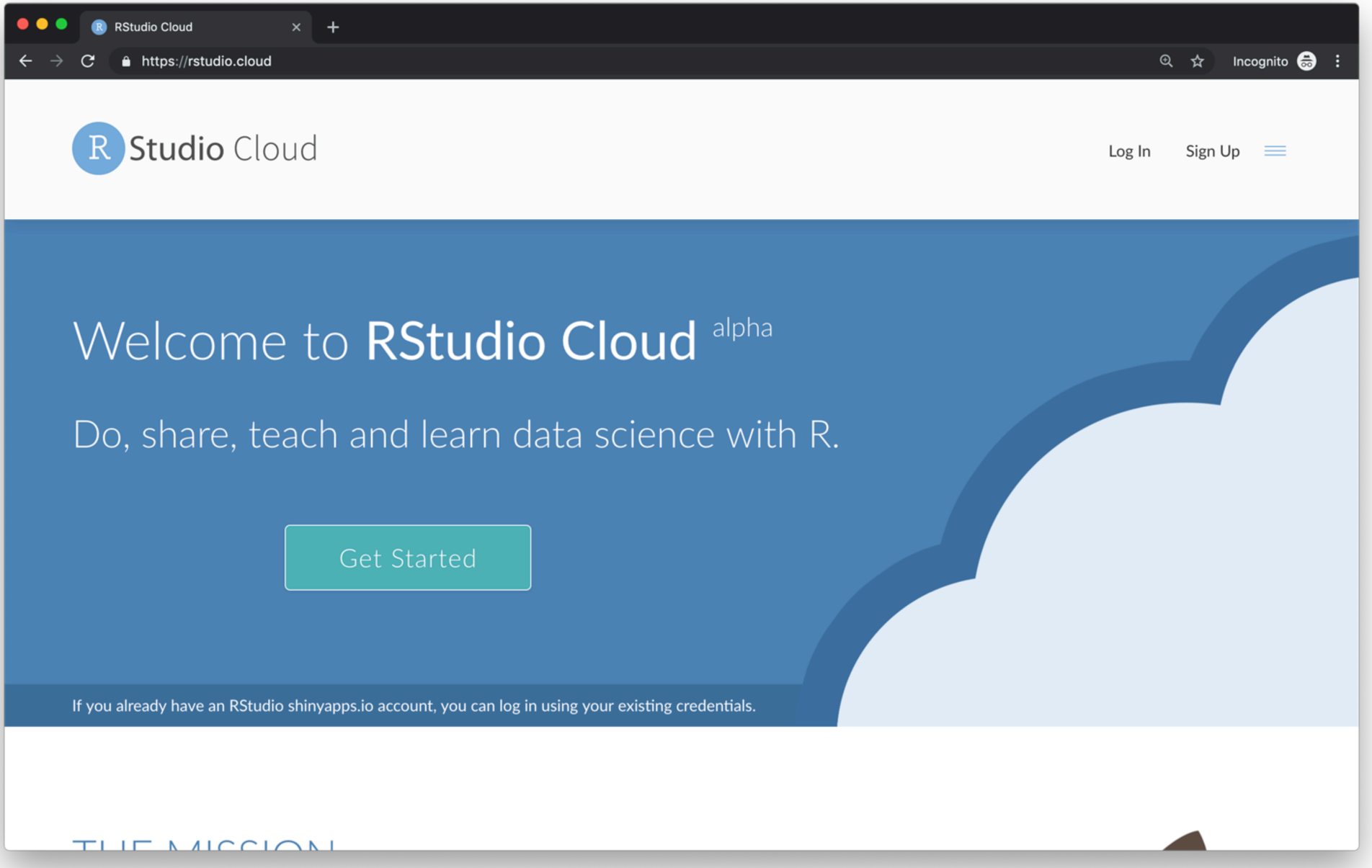


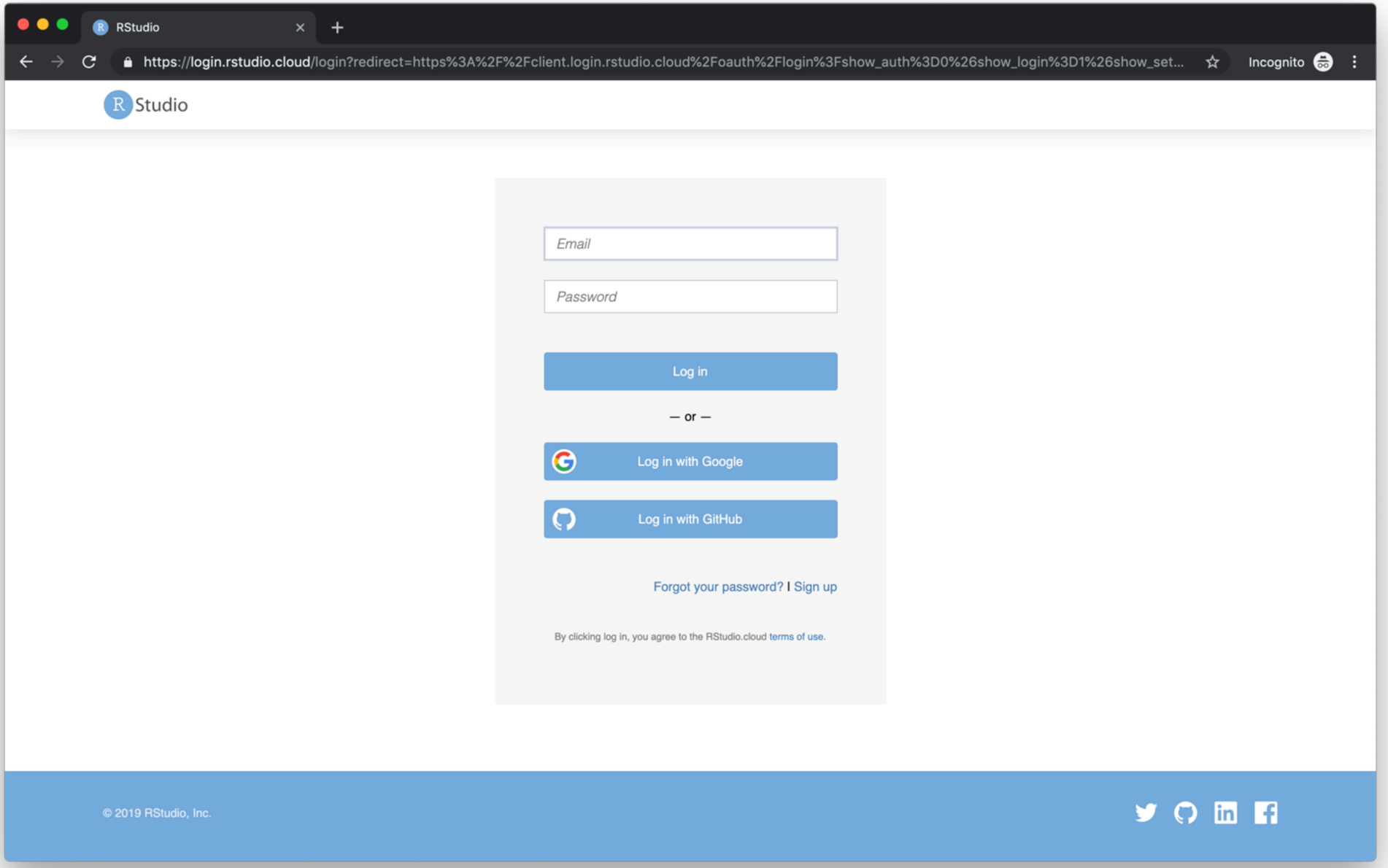
little to no background in stats, data science, programming

varied computing background and different computer setups

workshops




RStudio Cloud
https://rstudio.cloud
Incognito
RStudio Cloud
Log In
Sign Up
Welcome to RStudio Cloud alpha
Do, share, teach and learn data science with R.
Get Started
If you already have an RStudio shinyapps.io account, you can log in using your existing credentials.

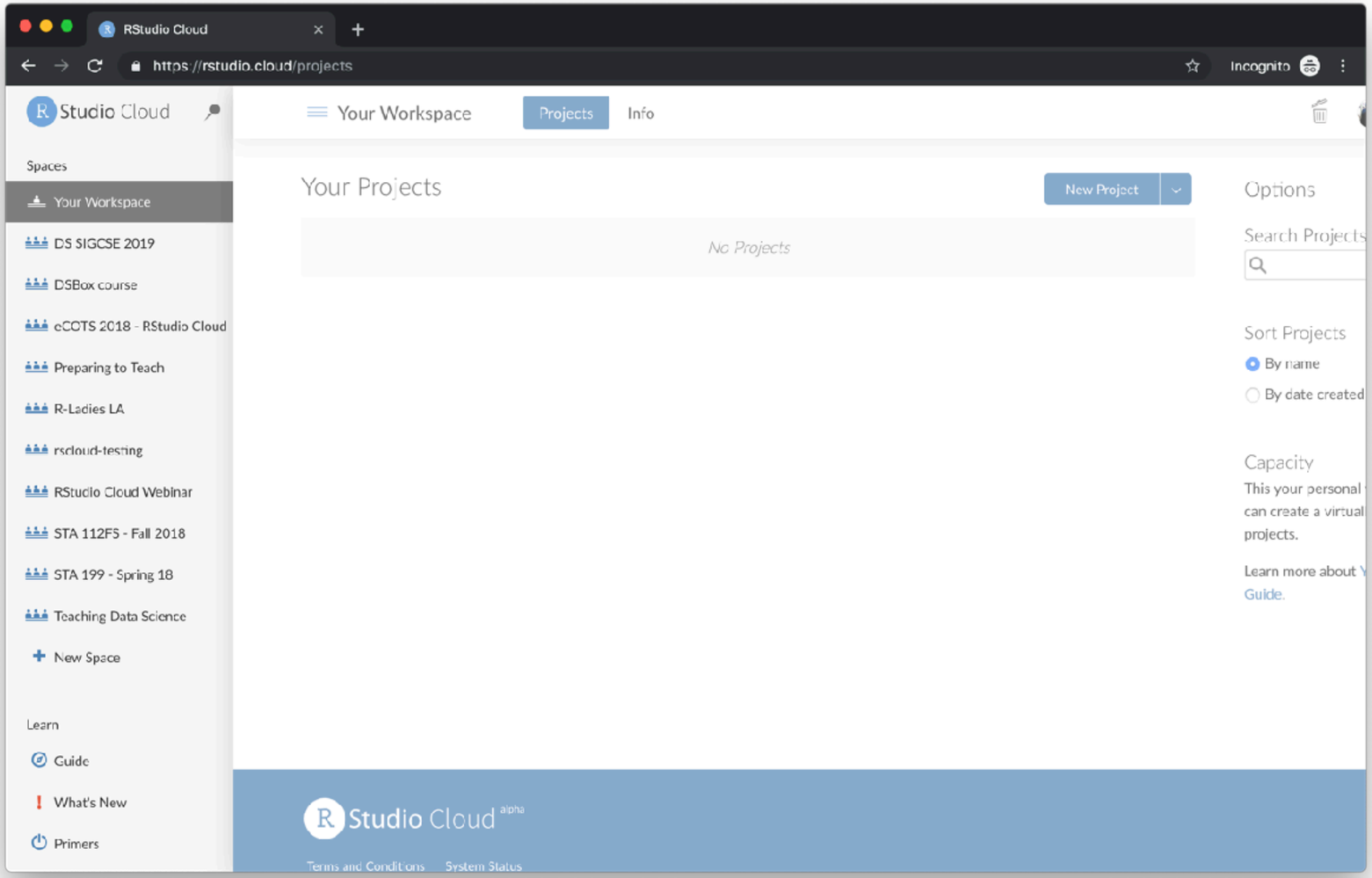


log in with Google, GitHub, or shinyapps.io

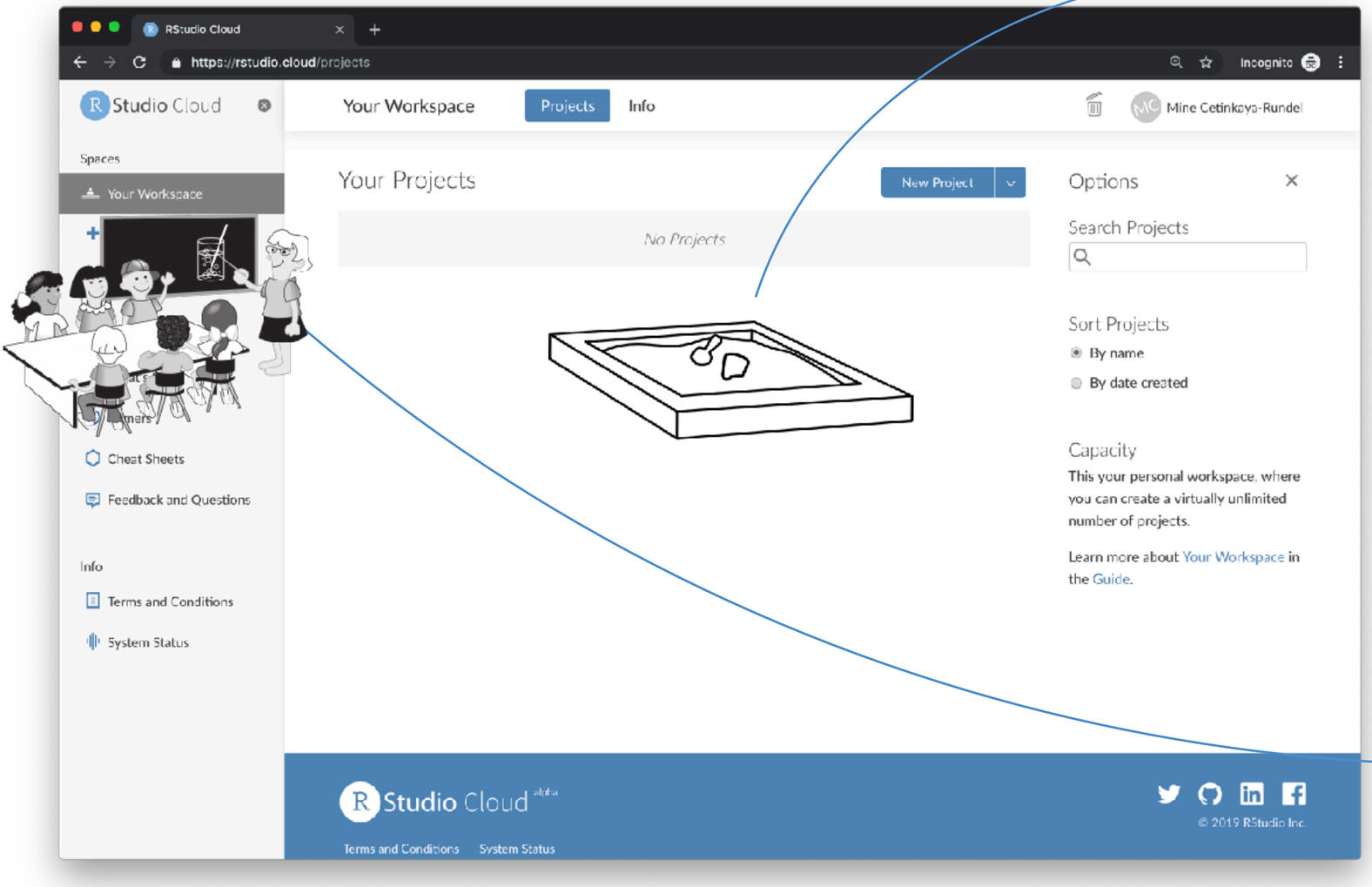
or create a new account

> Your turn!

Log out of RStudio Cloud and log back in.



workspaces



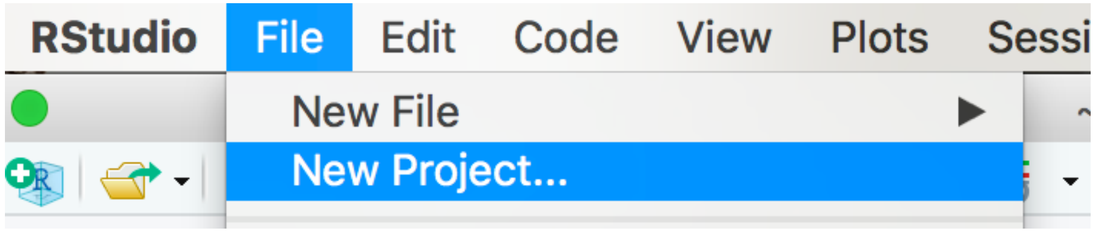
when you create an account on RStudio Cloud you get a workspace of your own - projects you create here are can be public or private

you can add a new workspace and control its permissions - projects you create here can also be public or private

projects

a new project in RStudio Cloud

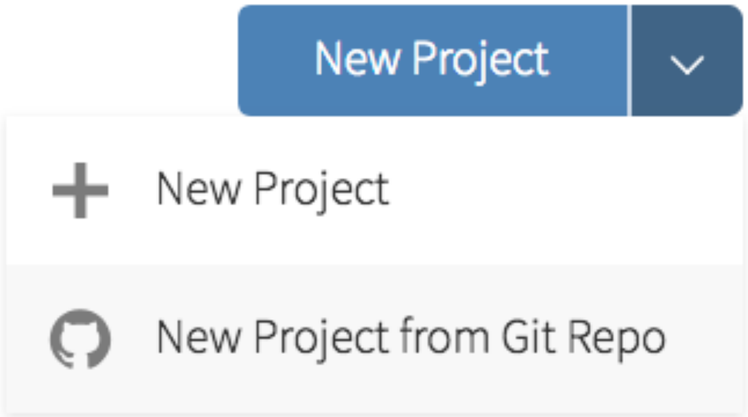
is a new project in RStudio



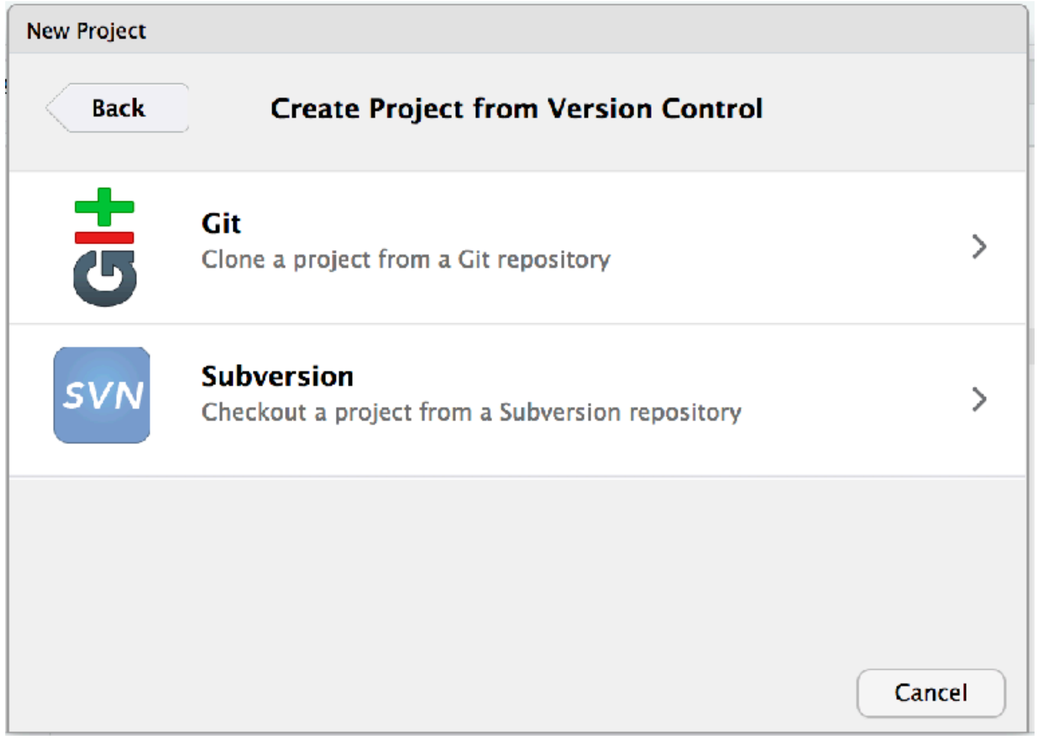
If you use RStudio, use projects! Trust me, you won't regret it.
Find out more at r4ds.had.co.nz/workflow-projects.html.

projects from git

a new project from Git Repo in RStudio Cloud



is creating (cloning) a project from a Git repository RStudio



teaching a
short workshop

teaching a
longer course

teaching a
short workshop

teaching a
longer course

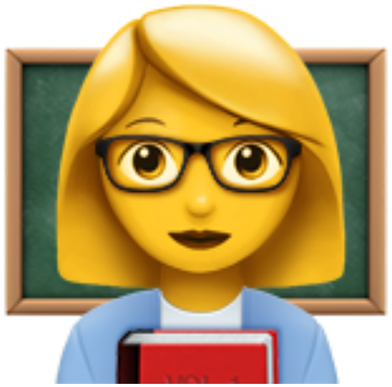
Mine CetinkayaRundel
@minebocek

Replying to @noamross @rstudio

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

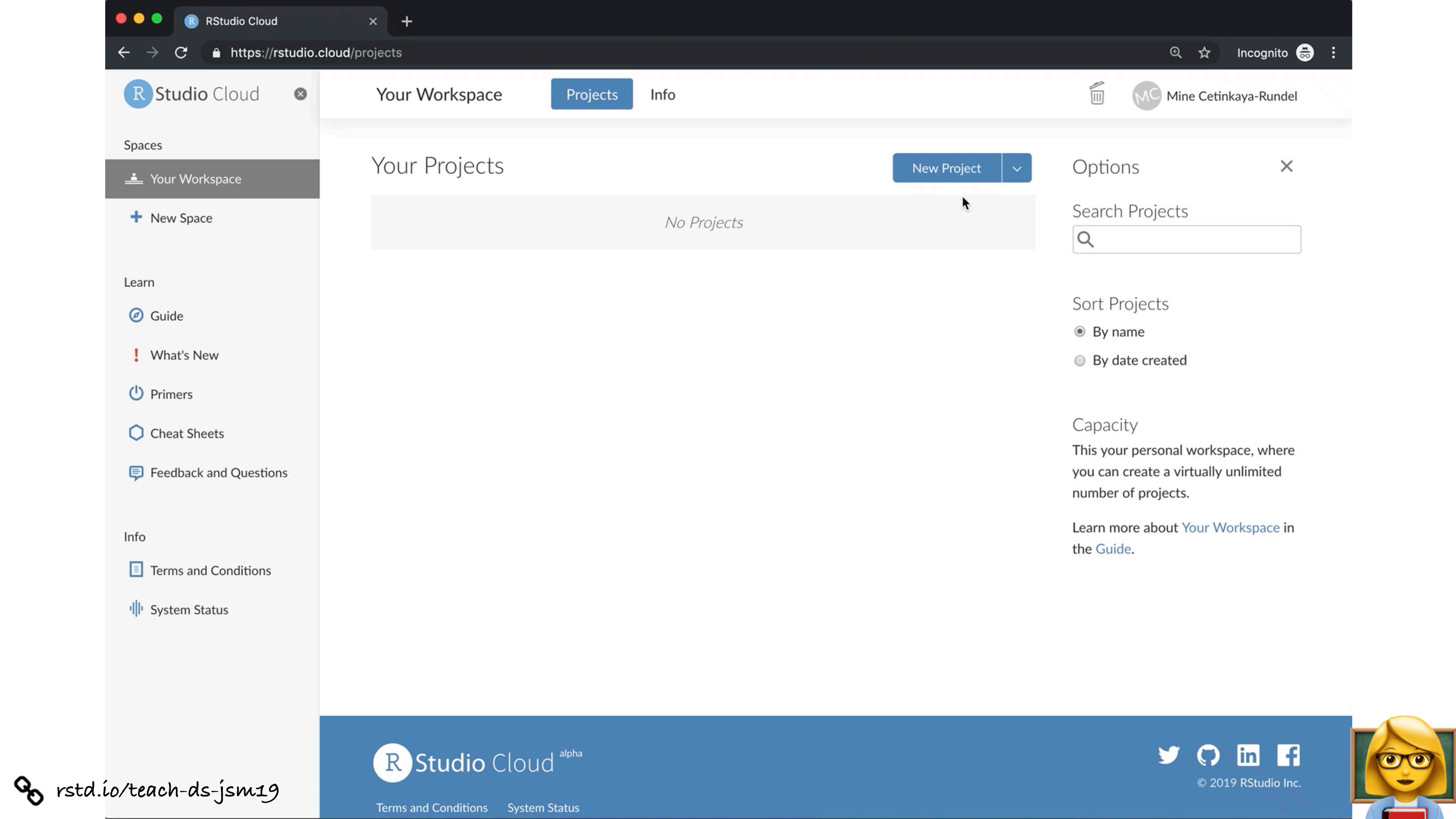
- Go to rstudio.cloud -> Login -> New Project
- Install packages, add scripts, Rmds etc.
- Gear icon -> Access -> Everyone
- Copy URL and share

3:06 PM - 29 May 2019



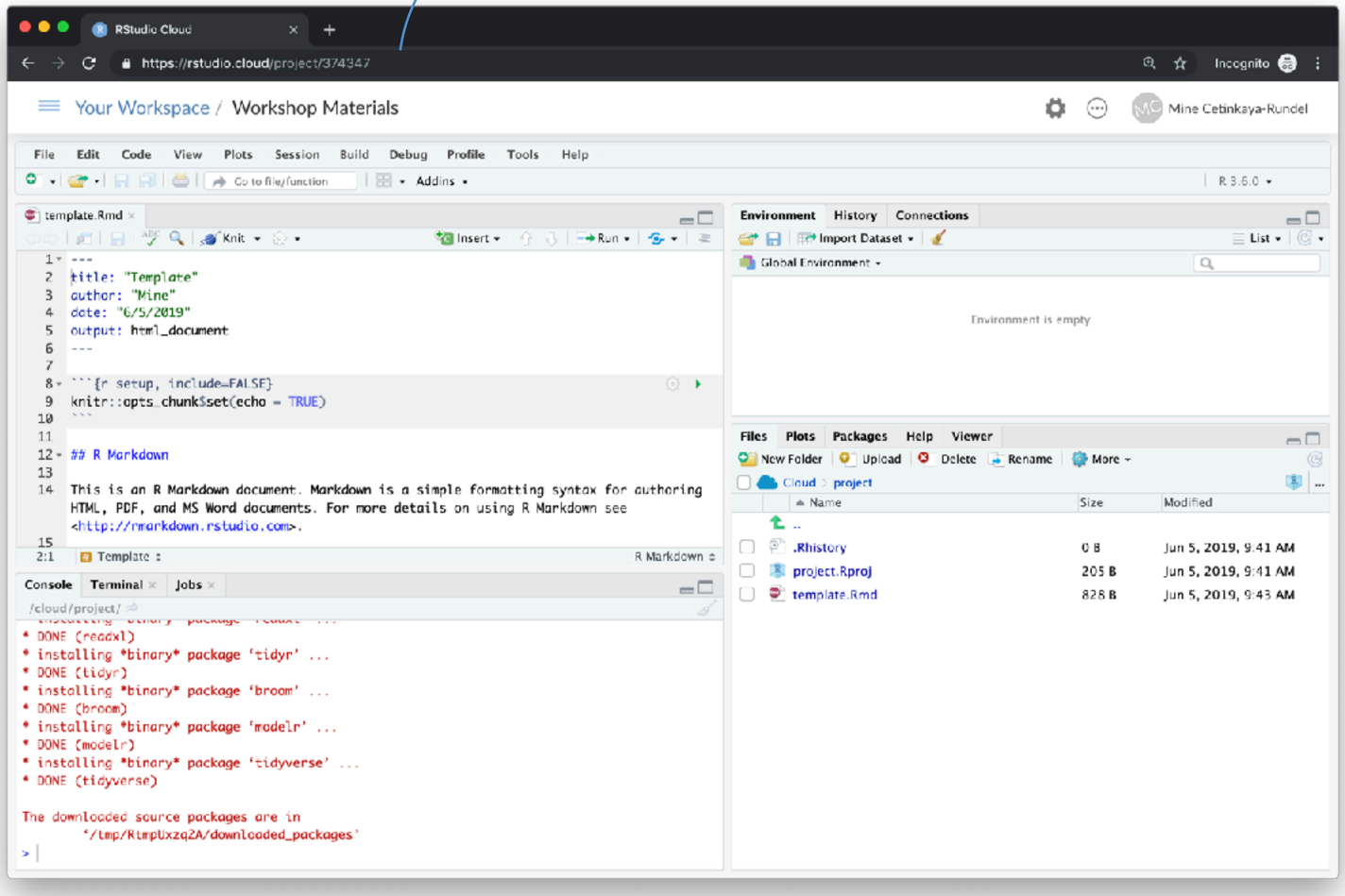
instructor

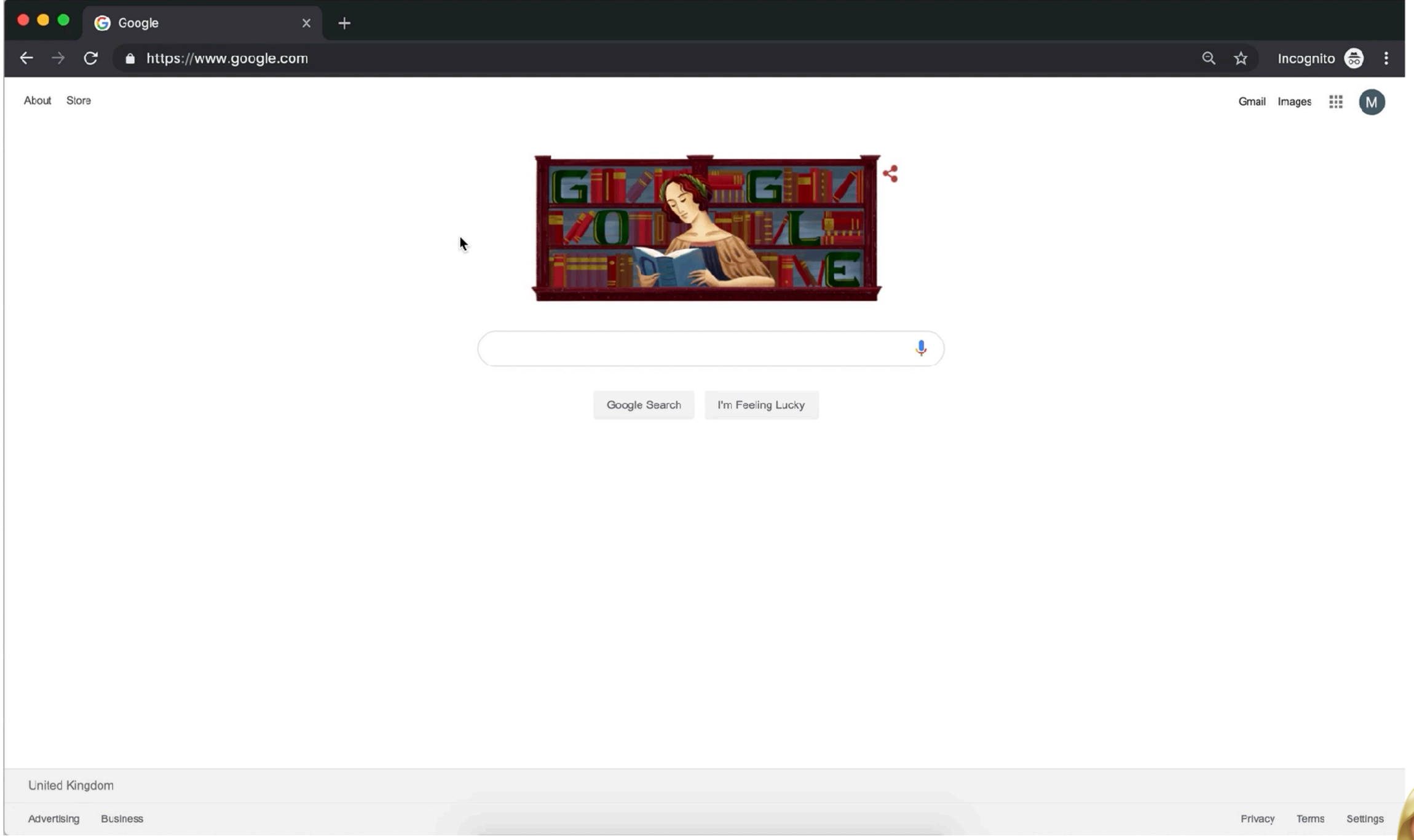
student



rstd.io/teach-ds-jsm19

rstd.io/cloud-workshop-project





rstd.io/teach-ds-jsm19

sharing an individual project

try it out at **rstd.io/cloud-workshop-project**

✓ 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.

! students need to remember to make a copy of the project (which means you need to remember to remind them!)

! changes you make after student launches the project won't propagate to their project

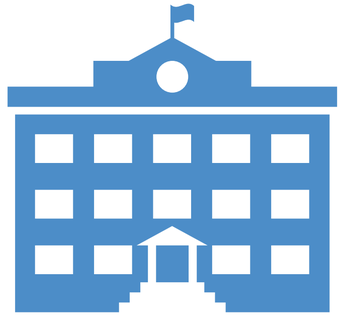
> Your turn!

You're the instructor:

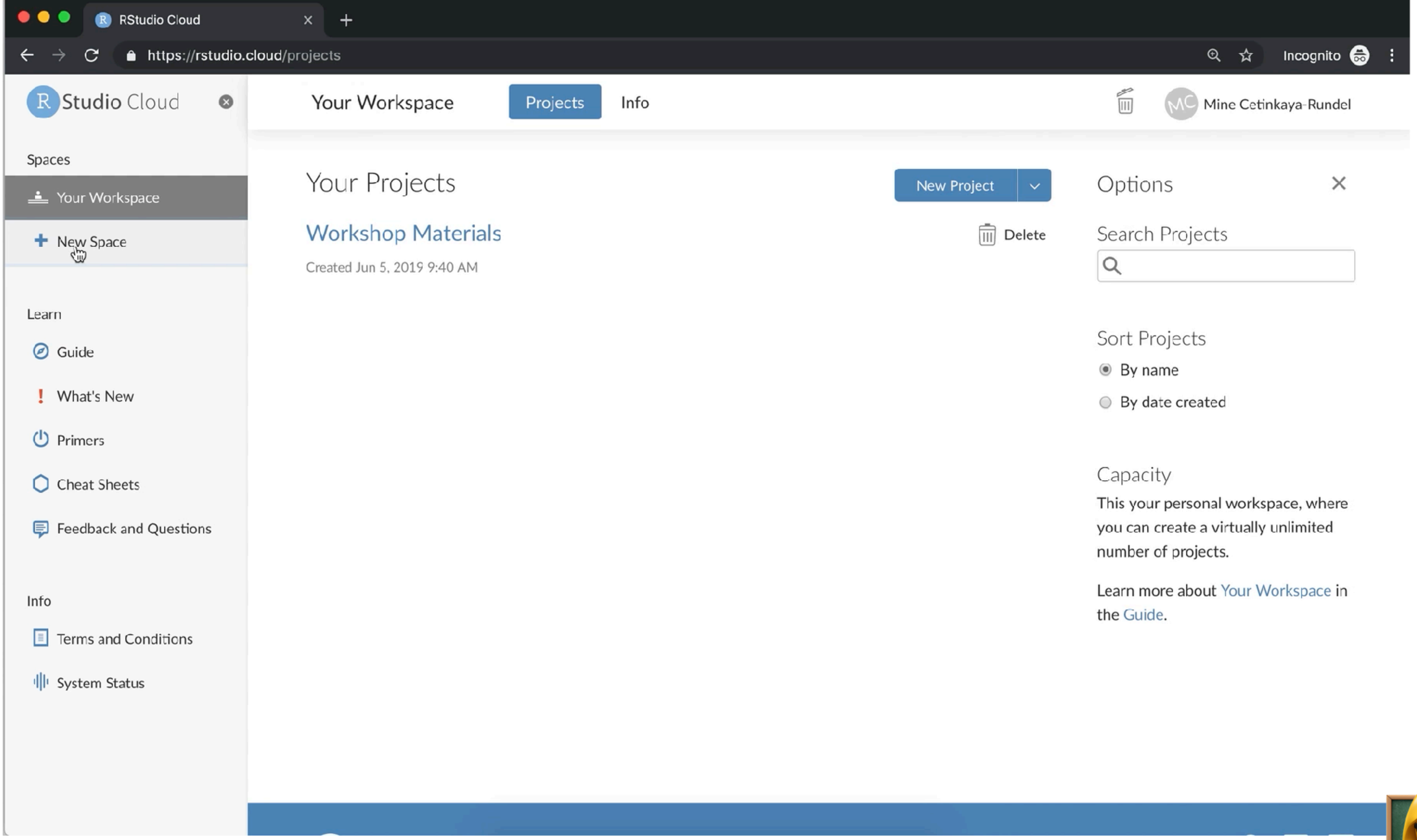
- Create a new **project** and give it a name.
- Create a template R Markdown document in the project.
- Change the access level of the project so others can see it as well.
- Grab the project URL and share it with your neighbor:
  - *Tip:* You can create a short link for the URL at bitly.com.

Now you're the student: Access your neighbor's project as if you're the student and they're the instructor.

teaching a
short workshop



teaching a
longer course

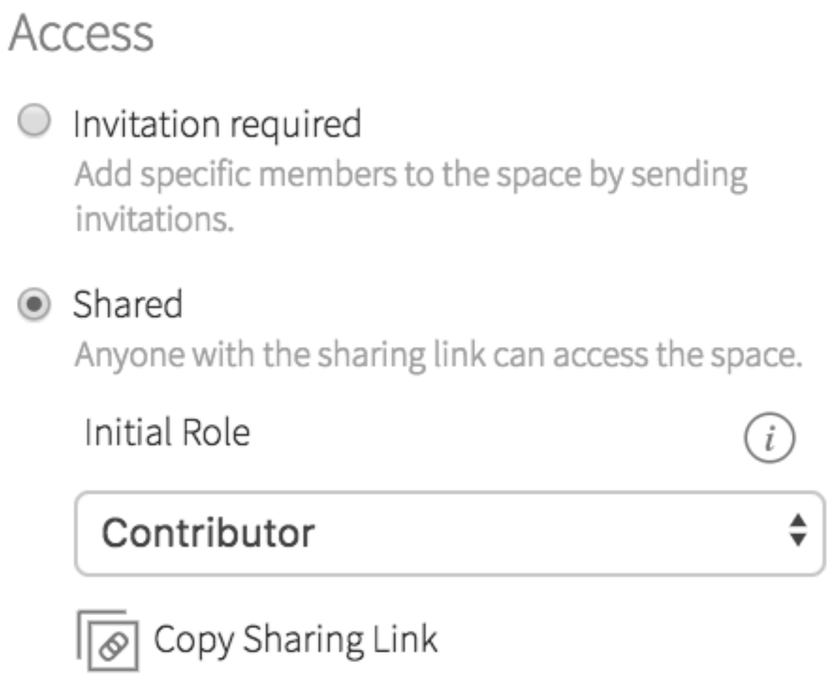

RStudio Cloud
https://rstudio.cloud/projects
Incognito
Studio Cloud
Your Workspace
Projects
Info
Mine Cetinkaya-Rundel
Spaces
Your Workspace
New Space
Learn
Guide
What's New
Primers
Cheat Sheets
Feedback and Questions
Info
Terms and Conditions
System Status
Your Projects
New Project
Workshop Materials
Delete
Created Jun 5, 2019 9:40 AM
Options
Search Projects
Sort Projects
By name
By date created
Capacity
This your personal workspace, where you can create a virtually unlimited number of projects.
Learn more about Your Workspace in the Guide.

> Your turn!

You're the instructor:

- Create a new **workspace** and give it a name.
  - *Tip:* Check in with your neighbor and use a different name.
- Add a short description.

getting students into class workspace



after drop/add switch over to this access level, use invitations for visitors added mid-semester

make workspace shared for a short period of time, share link with students, enroll them as contributors

permission levels

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**

permissions

Permissions

- [x] Contributors can see the members list
- [ ] Contributors can make their projects visible to all members
- [ ] Viewers can see the members list

students can see each others' names, but cannot change the visibility of their projects

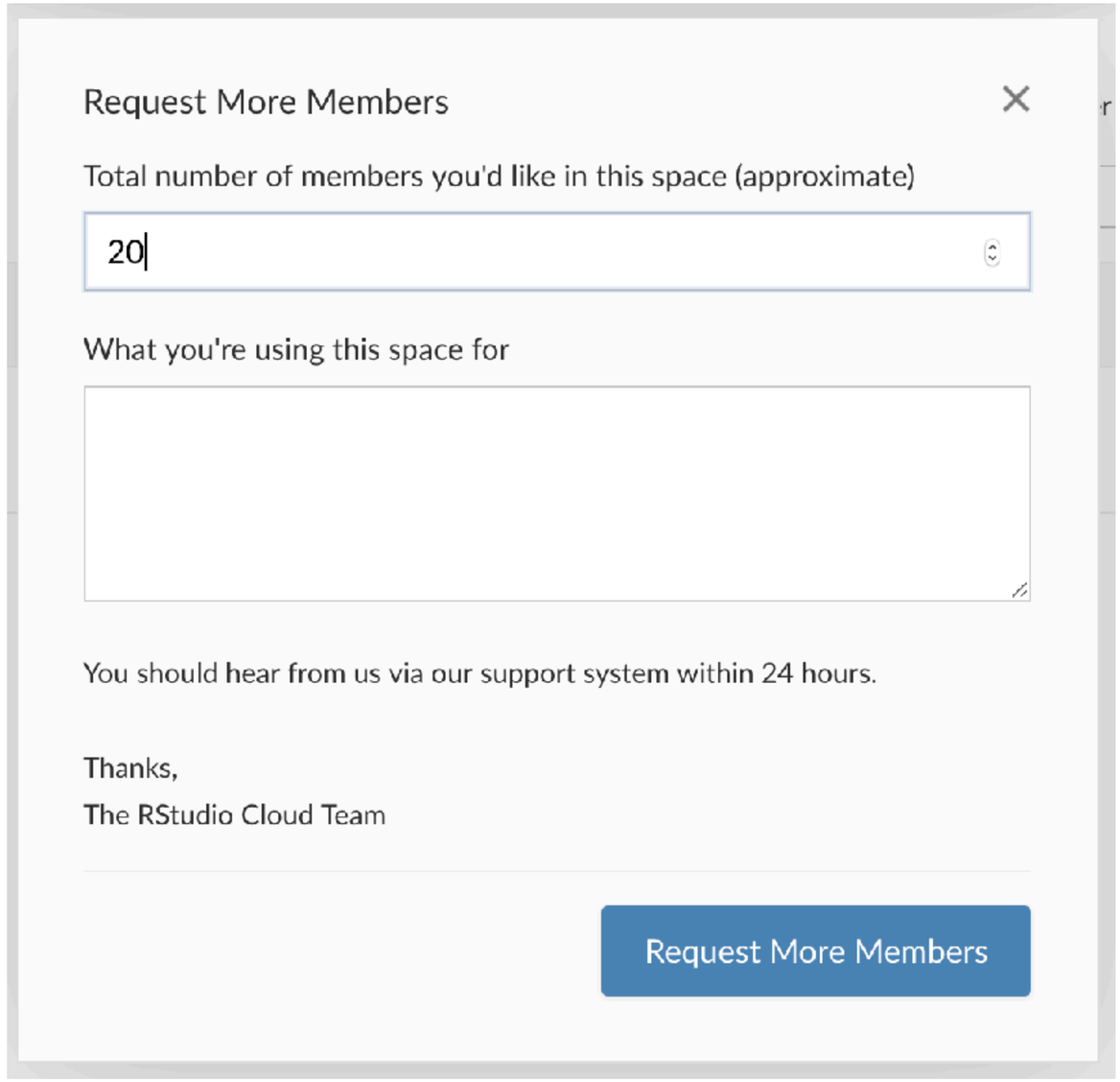
auditors / visitors can't see students' names

capacity

Capacity

This space can have up to 9 more members.

Request More Members

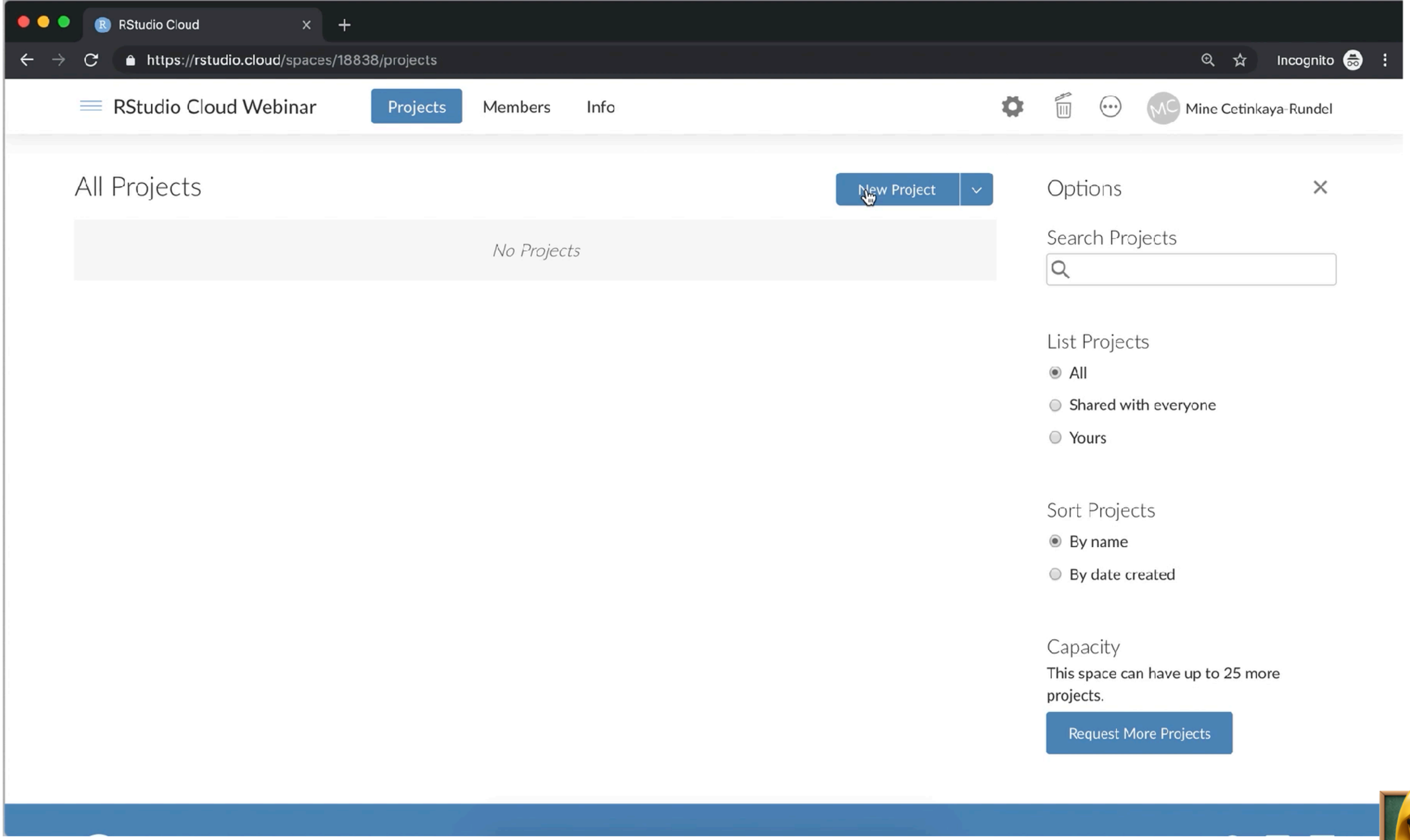


> Your turn!

You're the instructor:

- Change the settings of your workspace to Shared.

- Change the permissions so that contributors or viewers can't see the list of members and can't change the visibility of their projects.



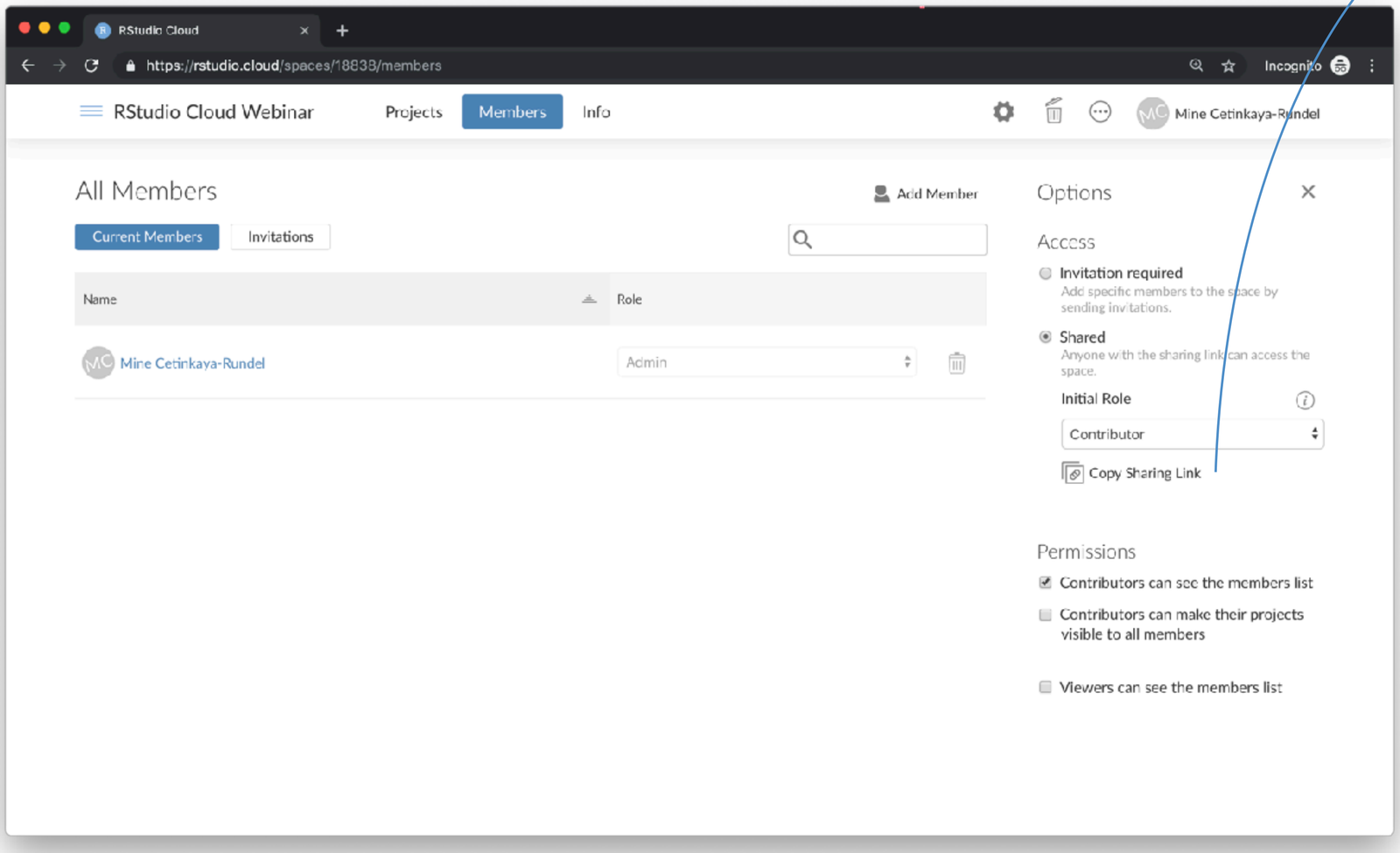
rstd.io/teach-ds-jsm19

> Your turn!

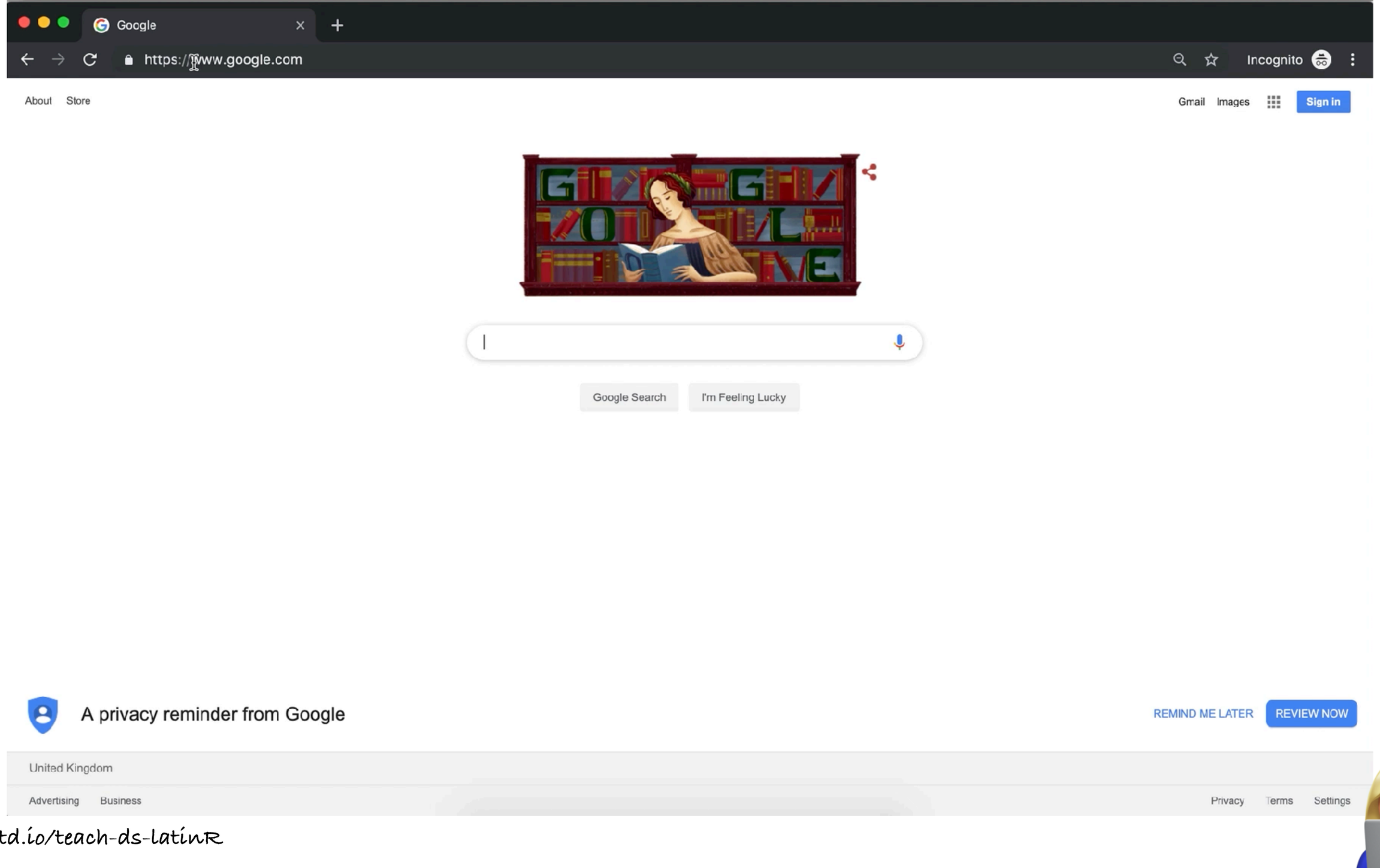
You're the instructor:

- Add a base project to your workspace:
  - Install one or two of your favorite packages.
  - Start an R Markdown document so necessary packages get installed.
  - Add a `code-of-conduct.md`.
  - Make this project visible to everyone.
- In the settings menu, set this project as the base project.
- Create a new assignment: **hw-01**.

rstd.io/cloud-course-workspace



rstd.io/teach-ds-latinR


Google
https://www.google.com
Incognito
About
Store
Gmail
Images
Sign in
Google Search
I'm Feeling Lucky
A privacy reminder from Google
REMIND ME LATER
REVIEW NOW
United Kingdom
Advertising
Business
Privacy
Terms
Settings

> Your turn!

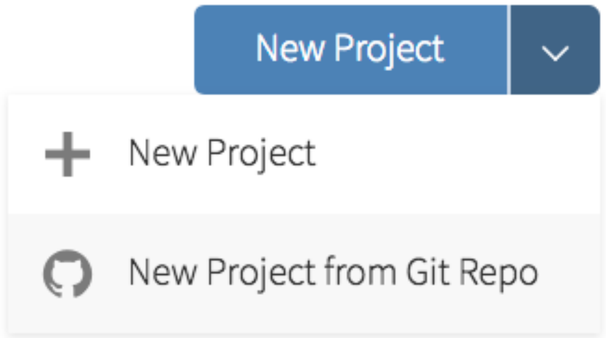
You're the instructor:

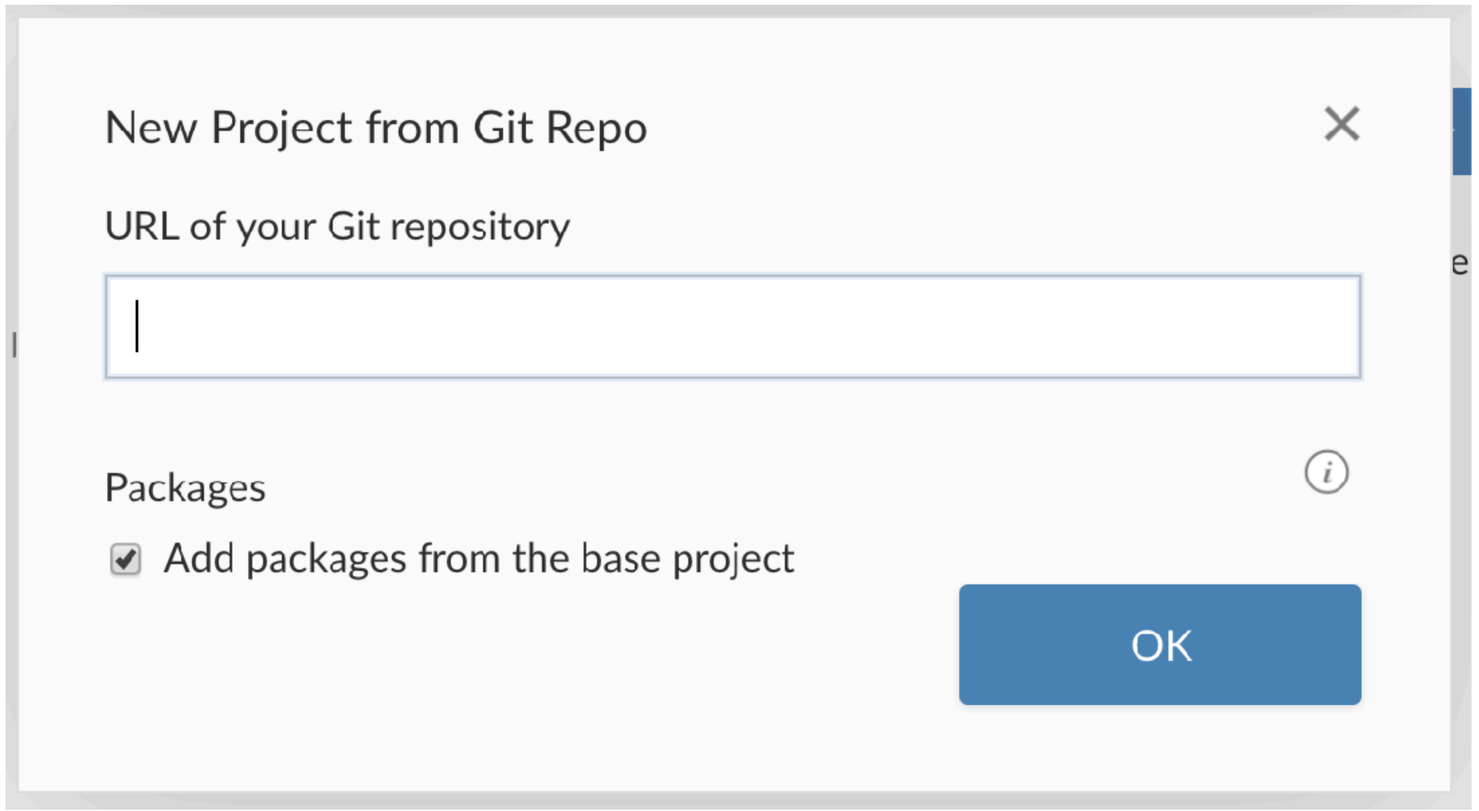
- Grab the sharing link for your workspace.
- Make a short link for it.
- Share it with your neighbor.

Now you're the student:

- Access your neighbor's workspace and start the assignment.

git integration





+ base project template can be used, so new project from git also has the right packages installed!

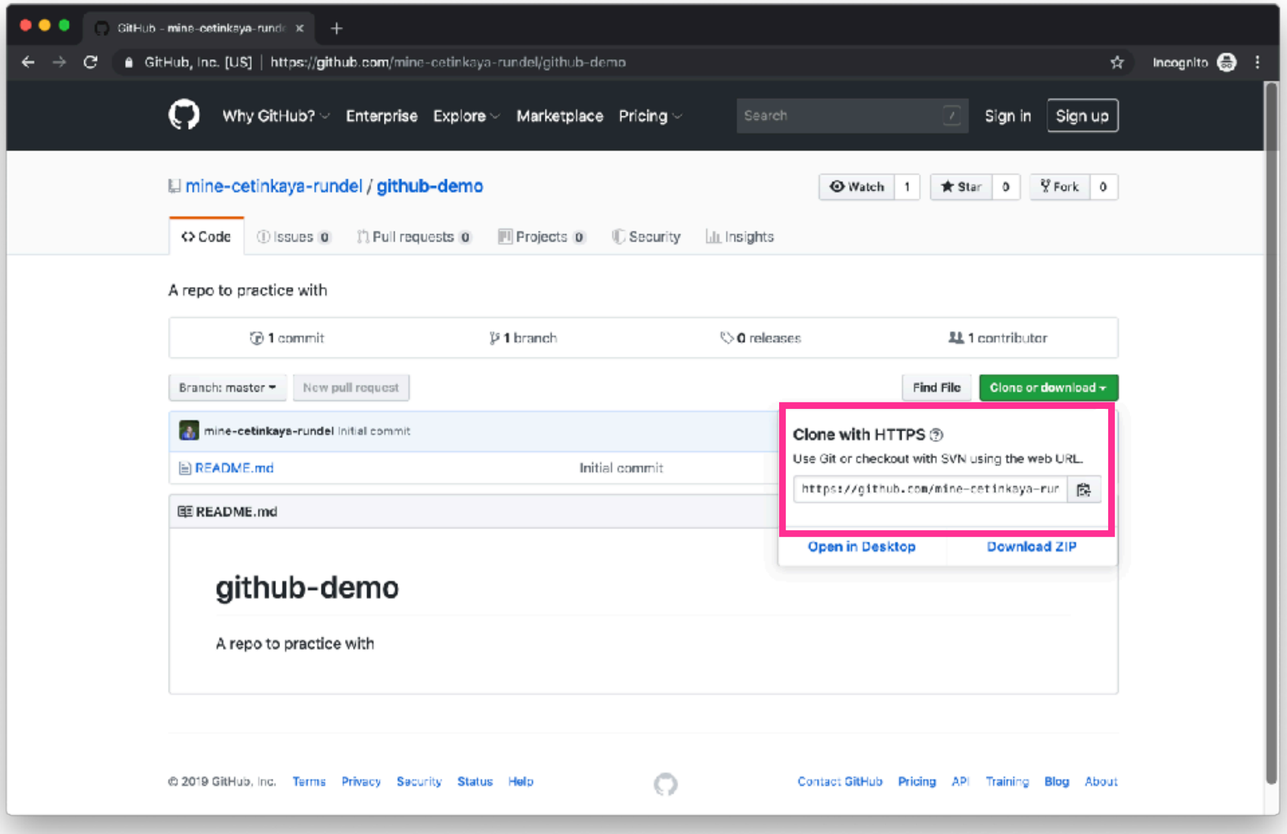
> Your turn!

You're still the student:

- Stay in your neighbor's workspace.

- Grab the HTTPS URL of a GitHub repo of your own. If you don't have one, you can use **rstd.io/gh-demo**.

- Start a new project from the GitHub repo.



sharing a workspace

try it out at **rstd.io/cloud-course-workspace**

✔ various permission levels

✔ base projects with desired packages installed

✔ assignments, which remove the need to remind students to make a copy of the project before starting work

✔ ability to peek into students' projects

! students land in the workspace, may need to provide instructions for the next steps

! you can update the base project throughout the course, but it will only be applied to projects created going forward

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

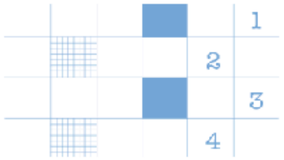
RStudio Primers

Learn data science basics with the interactive tutorials below.

The Basics

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

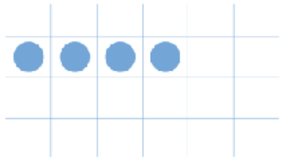


Learn the most important data handling skills in R: how to extract values from a table, subset tables, calculate summary statistics, and derive new variables.

Visualize Data

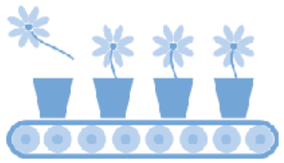
Learn how to use ggplot2 to make any type of plot with your data. Then learn the best ways to visualize patterns within values and relationships between variables.

Tidy Your Data



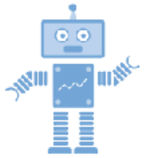
Unlock the tidyverse by learning how to make and use tidy data, the data format designed for R.

Iterate



Master a core programming paradigm with the purrr package: for each ___ do ___.

Write Functions



Functions are the key to programming in R. This primer will teach you how to write and use your own reusable functions.

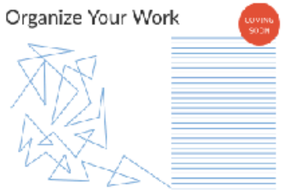
Report Reproducibly

Learn to report, reproduce, and parameterize your work with the best authoring format for Data Science: R Markdown.

Build Interactive Web Apps

Say hello to Shiny, R's package for building interactive web apps. Learn to turn your analyses into elegant tools to share with others

Organize Your Work



Become an R guru by mastering all of the tools built into the RStudio IDE. Discover best practices for programming, debugging, version control, package building and more.

rstd.io/teach-ds-jsm19

WIP

WORK IN PROGRESS

We're in alpha and still adding important features and improving performance, reliability and availability. Please reach out with any questions or feedback at https://community.rstudio.com/c/rstudio-cloud.

FREE LUNCH?

RStudio Cloud is currently free to use. As we learn what it costs to operate the service and how it is used by the community, we will offer free and paid plans, as we do with shinyapps.io. We will be asking you for feedback on our ideas along the way.

> Your turn!

You're the instructor:

- Go back to your workspace.
- Create a new project with one of your existing assignments to it.
  - If you don't have one of your own assignments you want to use, you can also use **https://github.com/rstudio-education/datascience-box/tree/master/assignments/hw-02**.
- Make the project an assignment.

Now you're the student:

- Go back to your neighbor's workspace and peek at their new assignment.