**Comparing deployment methods for learnr**

The current plan is to develop the online course with the R package *Learnr.*

Learnr is part Shiny application, and Shiny applications can be embedded in a webpage or can be a markdown document opened in a browser. For either method to be reactive the application must be run from an R session.

We want our tutorials to be run on a server, so that the student can begin without the need to set up/install anything. There are four services that can support this: Rstudio server (Pro) and Shiny server (Pro) (the Pro variants have a paid plan/yearly enrollment for education tier). Later edit: Rstudio cloud (free and paid) and Rstudio connect (paid only) are also possible, see the next chapter. This chapter will focus on Rstudio- and Shiny server.

**Free vs Pro**

The free services are each slightly different.   
The **Shiny Server** can host a Shiny application, which can be accessed on certain website. **Starting would be really easy**. However, the free version does not allow logins. This means we cannot track progress per student, unless we ask them to send one or more files during the process. Thus, **tracking would be hard**.

The Rstudio Server is the opposite: to access your Rstudio, you log with your login credentials, **making tracking easy**. But from the Rstudio, the Shiny application still needs to be started manually. This *should* be effortless (press the play button), but isn’t very flashy.

Login to Rstudio Server with your server credentials (source: <https://support.rstudio.com/hc/en-us/articles/221303588-What-is-my-username-on-my-RStudio-Server-> )

Each user can have one instance of Rstudio open at the same time:

“The open source edition of RStudio Server is limited to one session **per user**, not one session **per server**.”

Source: Rstudio employee, <https://community.rstudio.com/t/multiple-rstudio-server-sessions-for-multiple-users/56002>

**Conlusion**

I set up both on my PC, and both work as expected. However, Rstudio gives the user the option to run other commands. The additional log allows for separated folders (versatility), and the option for tracking. We also discovered that Shiny Server cannot handle too many concurrent users at once, making it a hard choice for a course. Due to this, we will proceed with Rstudio Server.

The remained of this document contains pros, cons and setup steps for each free server.

**### SHINY SERVER**

shinyserver docs: https://docs.rstudio.com/shiny-server/

Shiny server limitations:

-required websocket compatible browser (no IE/Edge)

-free: must recreate environment

-free: no autentication

-free: single core only

-pro: must run as root

**-max 20 concurrent users:** [**https://support.rstudio.com/hc/en-us/articles/220760228-Concurrent-Users-in-Shiny-Server-Pro**](https://support.rstudio.com/hc/en-us/articles/220760228-Concurrent-Users-in-Shiny-Server-Pro)

**workflow:**

# 1) Install shiny server

server docs: https://rstudio.com/products/shiny/download-server/ubuntu/

learnr docs: https://rstudio.github.io/learnr/publishing.html#Shiny\_Server\_(Open\_Source\_and\_Pro\_versions)

install r-base (>=3.2.2) `sudo apt-get install r-base` (installed 3.6.2 for me)

- free: cannot control this later on, so it must be >= dev-version: 3.6.1

install shiny

```

sudo su - -c "R -e \"install.packages('shiny', repos='https://cran.rstudio.com/')\""

```

install rmarkdown `sudo su - -c "R -e \"install.packages('rmarkdown')\""`

install gdebi `sudo apt-get install gdebi-core`

install shiny server

```

wget https://download3.rstudio.org/ubuntu-14.04/x86\_64/shiny-server-1.5.14.948-amd64.deb

sudo gdebi shiny-server-1.5.14.948-amd64.deb

```

# 2) setup

tweak shiny-server.conf

- check port availability (default=3838)

move course directory to `site\_dir` (defailt=/srv/shiny-server)

- make sure all paths are correct, including those in .Rprofile

overwrite default server files

`mv shiny-server.conf /etc/shiny-server/shiny-server.conf`

restart server (if it was running already)

`sudo systemctl restart shiny-server`

make sure all libraries used by the course are installed

(https://community.rstudio.com/t/change-system-wide-library-path-for-shiny-server/24231)

(https://community.rstudio.com/t/change-default-loading-of-shiny-to-specific-libpaths-on-shinyserver/18211)

(https://github.com/grst/rstudio-server-conda)

# 3) upload tutorials

Default location: /srv/shiny-server

<https://docs.rstudio.com/shiny-server/#hosting-model>

# 4) run

on server boot: `sudo systemctl start shiny-server`

**### RSTUDIO SERVER**

Rstudio-free official "docs": https://support.rstudio.com/hc/en-us/articles/200552306-Getting-Started

Rstudio-free "docs" (better but still...): https://support.rstudio.com/hc/en-us/articles/234653607-Getting-Started-with-RStudio-Server

Rstudio-free install: https://www.youtube.com/watch?v=zvH\_fdt7GjE

Rstudio-pro docs: https://docs.rstudio.com/ide/server-pro/

comparisson between free and pro: https://rstudio.com/products/rstudio-server-pro/comparison/

Rstudio server limitations:

-single version of R

-single session per user

-no proper docs for the free version!?

**Unlimited concurrent users it seems:** [**https://support.rstudio.com/hc/en-us/articles/218294957-Is-there-a-limit-on-the-number-of-concurrent-connections-per-server-for-Shiny-Server-**](https://support.rstudio.com/hc/en-us/articles/218294957-Is-there-a-limit-on-the-number-of-concurrent-connections-per-server-for-Shiny-Server-)

**workflow:**

# 1) Install Rstudio server

https://rstudio.com/products/rstudio/download-server/

sudo apt-get install r-base

sudo apt-get install gdebi-core

wget https://download2.rstudio.org/server/bionic/amd64/rstudio-server-1.3.1073-amd64.deb

sudo gdebi rstudio-server-1.3.1073-amd64.deb

# 2) setup

See “Setting up Rstudio Server” and/or “Setting up learnr” and/or <https://gitlab.science.ru.nl/slrinzema/rimls-fnwi-bioinf-support/-/issues/3>

~~I think some steps are ran before we can set .libPaths(). These must then be run from system libraries:~~

~~Assert the following packages are updated on the server’s R library (`/usr/lib/R`)~~

~~Rmarkdown>=1.13  
Shiny~~

~~Alternatively: let students run a startup script, that runs a config script that runs shiny.~~

~~Install R environment with conda (use environment.yaml)~~

~~Direct `Rserver.conf` to use this R~~

~~Direct Shiny application to use this environment’s libraries~~

# 3) run

on server boot: ` sudo rstudio-server start`

**### Notes:**

Default web address:

http://127.0.0.1:8787

default wd = $HOME

```

> getwd()

[1] "/home/siebrenf"

```

The R instance used by all users is the same, and is set in the config.

Startup scripts:

`[R\_HOME](https://stat.ethz.ch/R-manual/R-devel/library/base/html/Rhome.html)/etc/.Rprofile` and `$HOME/.Rprofile` are searched (in this order). These files are read as R scripts and run on startup.

**Connecting to Rstudio Server (on passer)**

In a terminal, forward the ports:

# SSH, with port forwarding, over a gateway server

ssh -fN -l siebrenf -L 2222:passer:22 lilo.science.ru.nl && \

ssh -fN -l siebrenf -p 2222 -L 8787:localhost:8787 localhost;

In the browser, go to the server address:

localhost:8787

**Rstudio server CLI**

sudo rstudio-server –help