Databases in R

Introduction

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Exegetic Analytics
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What are we learning?

Objectives for this lesson are:

1. To access a database from within R.
2. To execute SQL queries in R using `dplyr`.

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Why?

What do you think?

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1. To access a database from within R.
2. To execute SQL queries in R using `dplyr`.

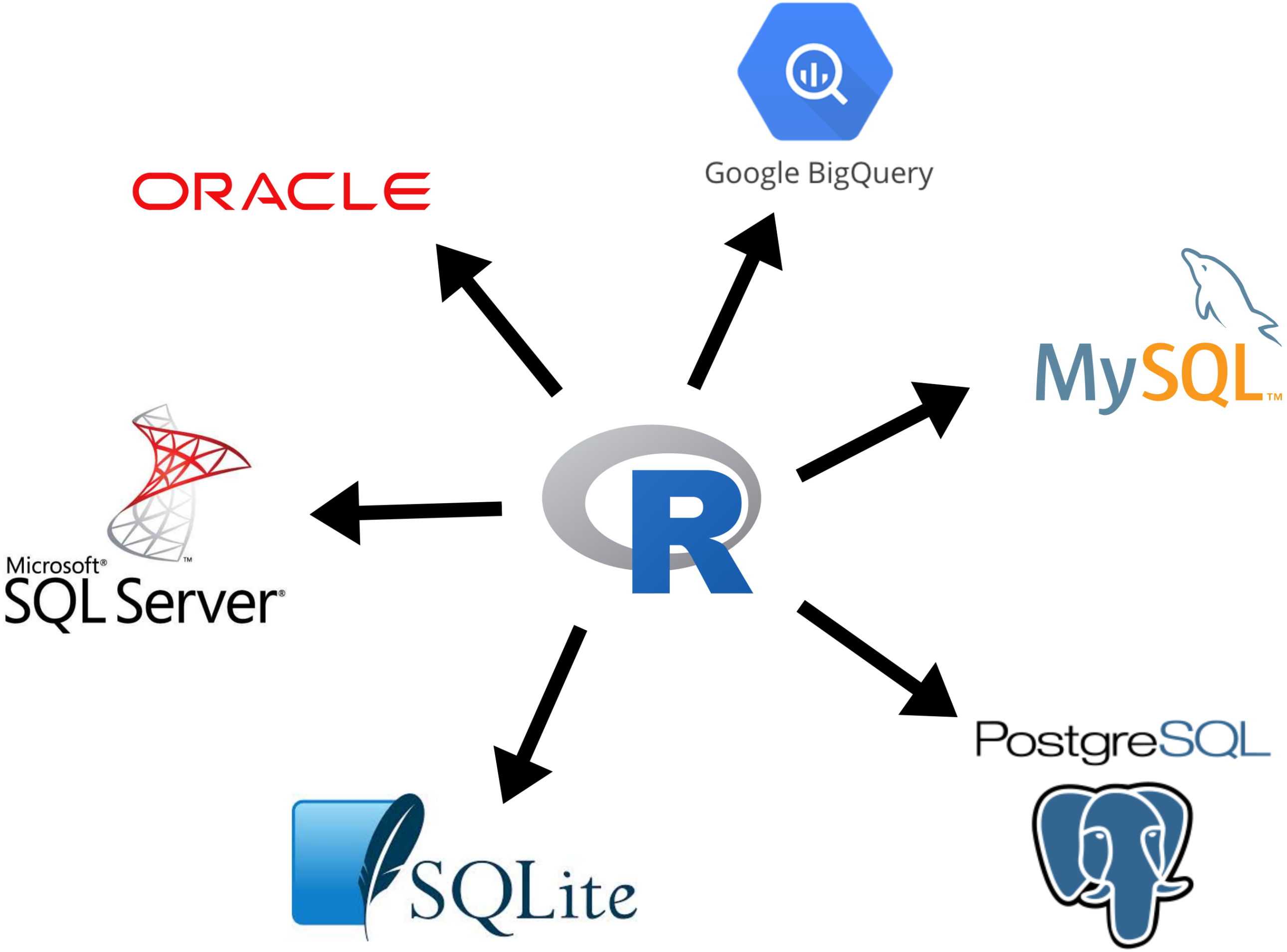
Why?

- Your data is already in a database.
- You have too much for your computer's memory to handle at once.
- Retrieve only what you need.
- All of your code is in R! :)

1. Connect to a database

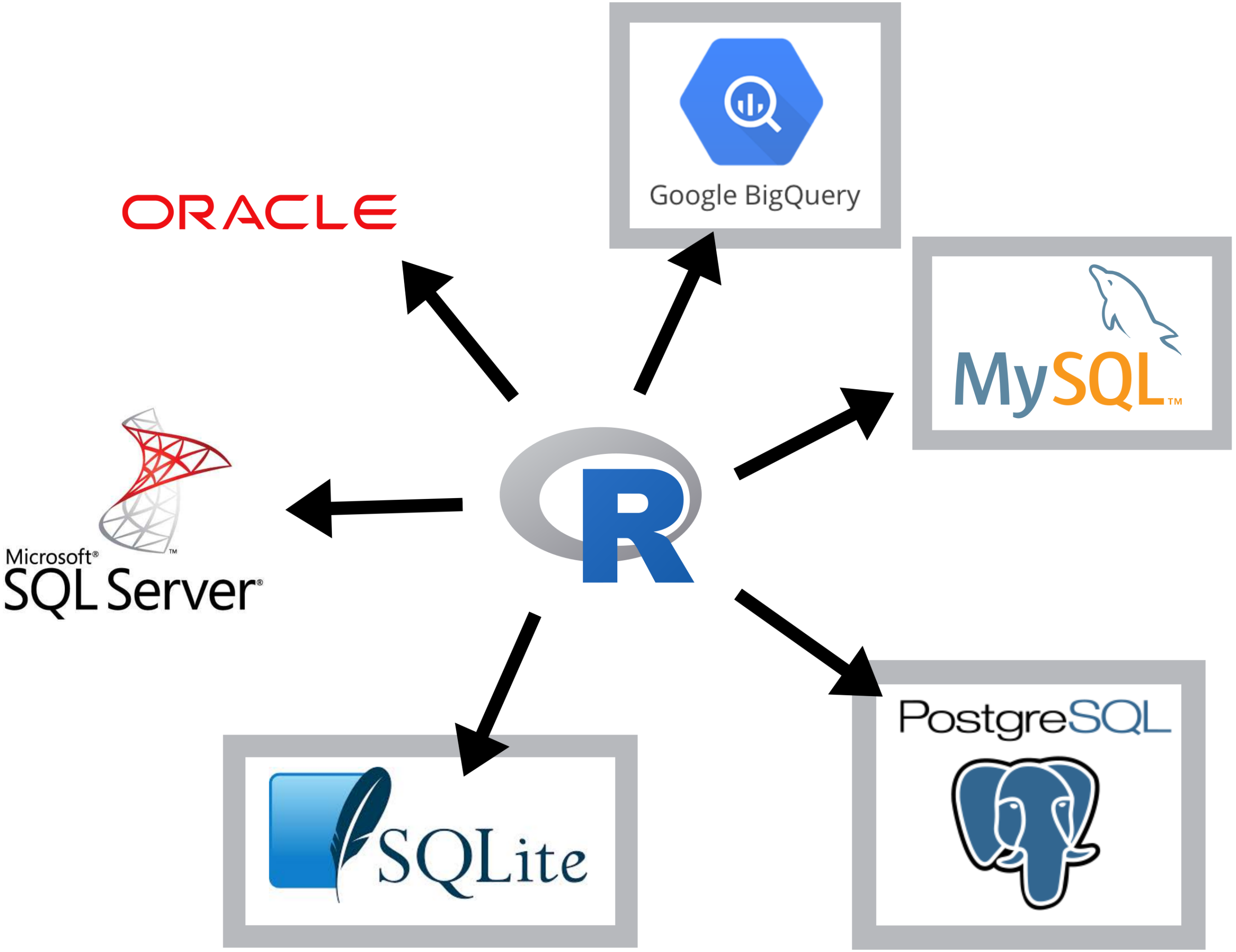
Connect to a database

Many different databases



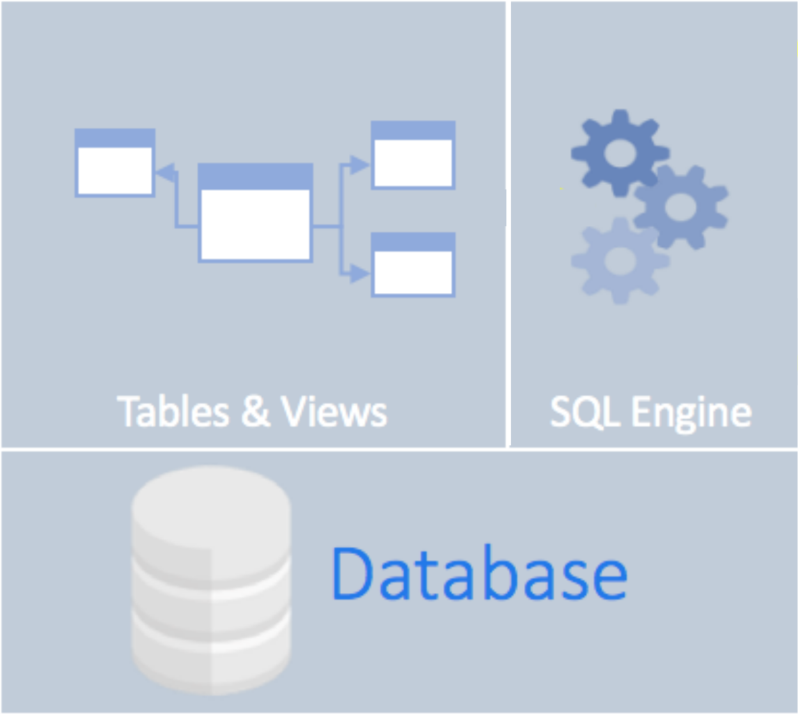
Connect to a database

Common databases have R packages



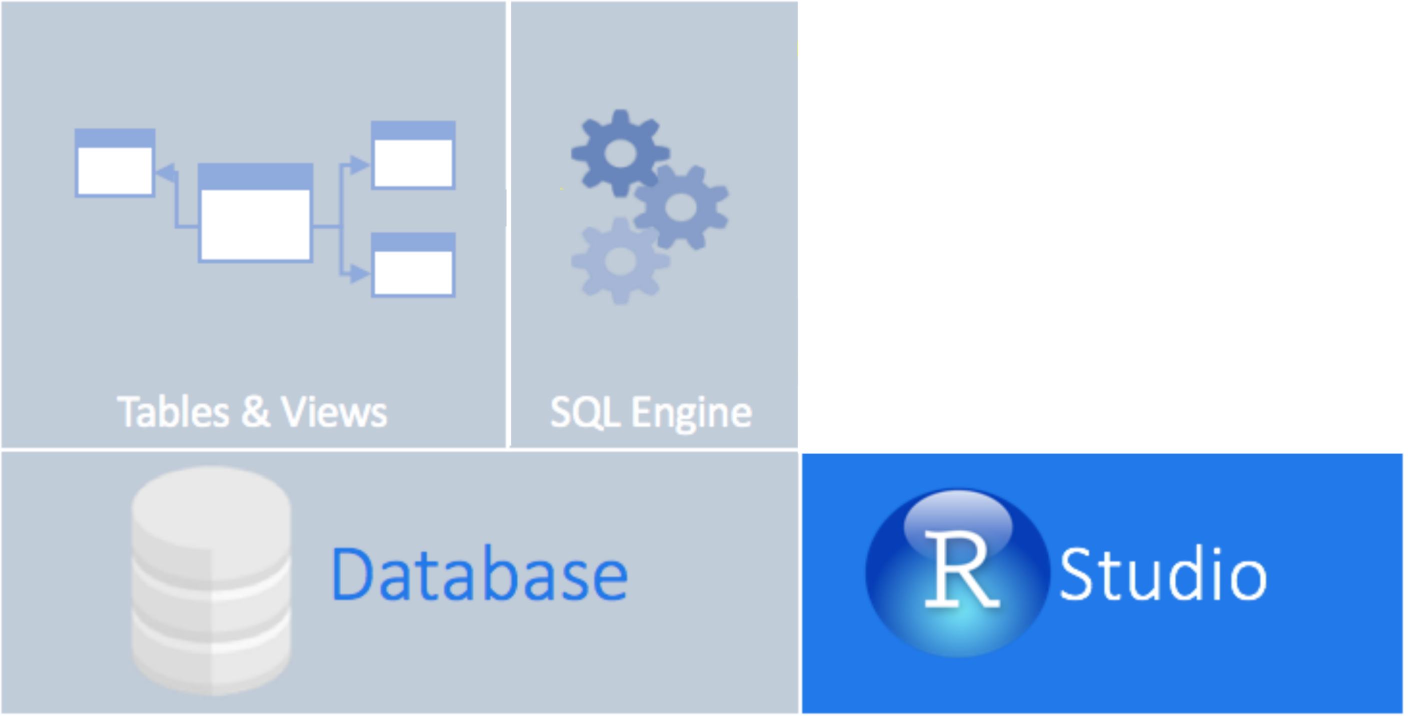
Connect to a database

Using *dplyr*



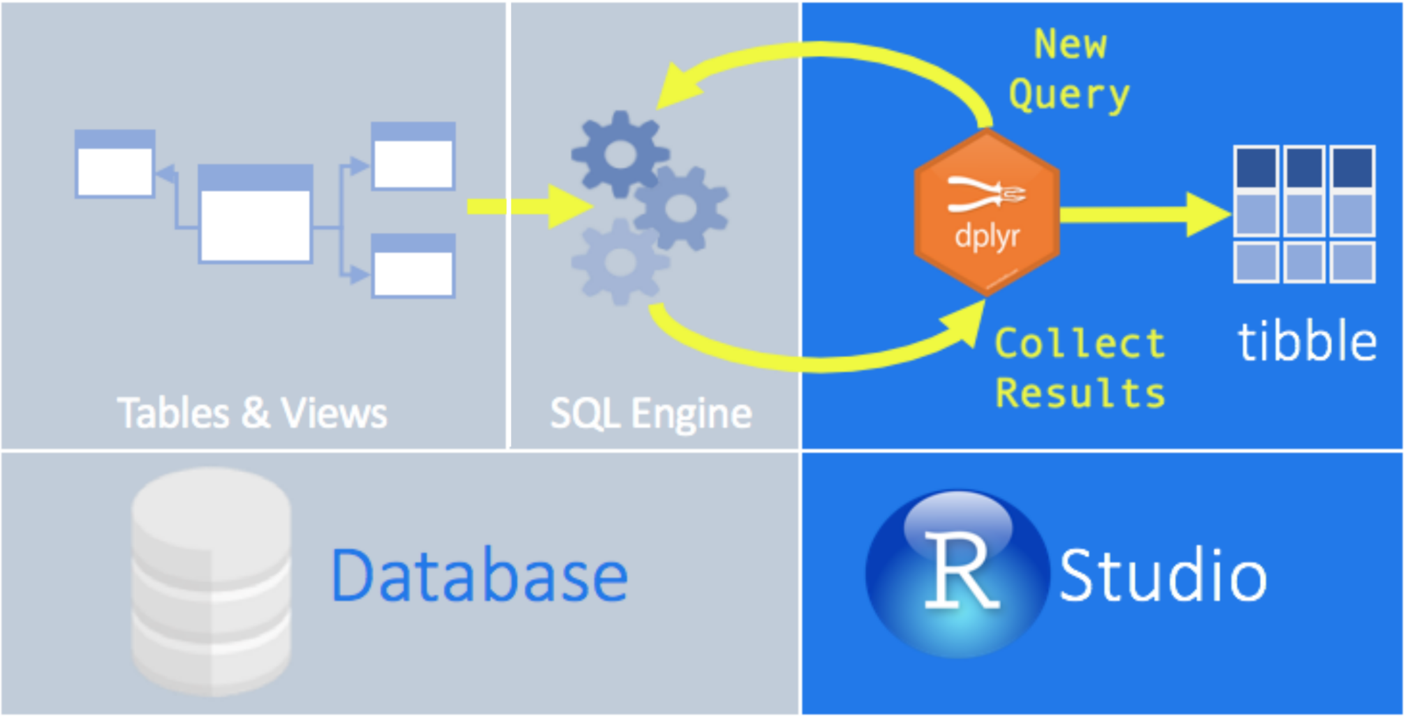
Connect to a database

Using *dplyr*



Connect to a database

Using *dplyr*



```
install.packages("dbplyr")
```

Connect to a database

Create the connection

```r
library(dplyr)
library(dbplyr)

con <- DBI::dbConnect(RSQLite::SQLite(), path = "data/my_database.sqlite")
```

A more realistic connection to a database on a server:

```r
con <- DBI::dbConnect(RMySQL::MySQL(),
                      dbname = "my_database"
                      host = "database.lsdkjfslfj.uk-west-1.rds.amazonaws.com",
                      user = "student",
                      password = "my_password")
```

Check your understanding

What is the most likely output from running the following piece of code and why?

```r
library(dplyr)

con <- DBI:dbConnect(RSQLite::SQLite(), "data/mammals.sqlite")

data <- tbl(con, "species")

nrow(data)
```

A. `NA` - as the `species` table is empty and therefore the `data` dataframe in R is empty.

B. `NA` - as `dplyr` is "lazy" and only pulls the data into R when explicitly asked.

C. `TRUE` - as we have created a successful connection to a database table.

D. `54` - as we have created a `data` dataframe in R from the `species` table in the database, which has 54 rows.

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D. `54` - as we have created a `data` dataframe in R from the `species` table in the database, which has 54 rows.

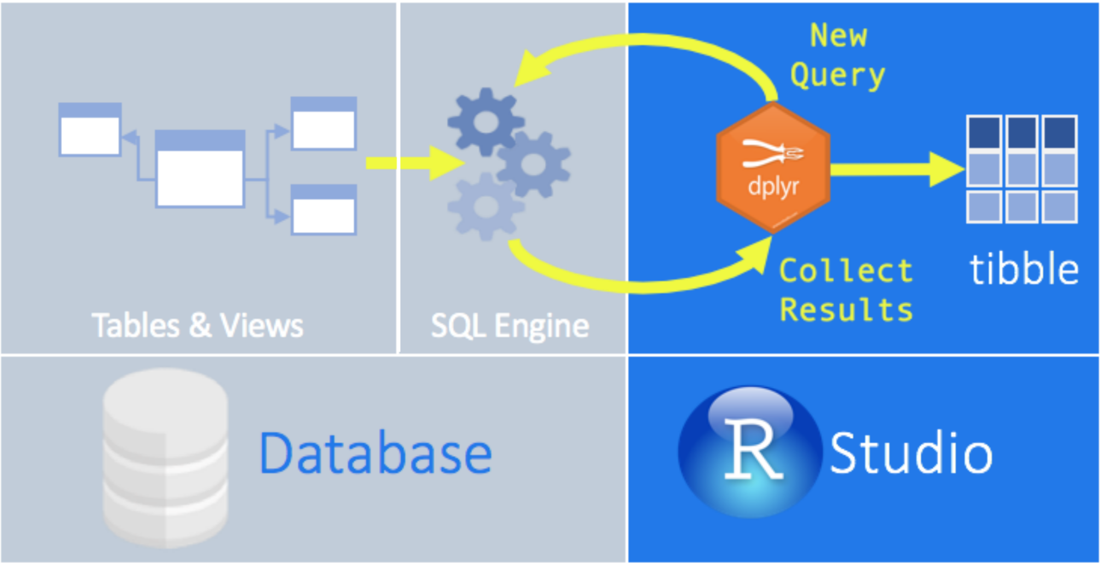
2. Query a database

Query a database

Using the dplyr syntax

Behind the scenes, `dbplyr` and `dplyr`:

- translates R into SQL
- submits to database
- translates response from database into a R dataframe



Check your understanding

Arrange the steps in order to find out the number of animals surveyed per year in the mammals database.

1: Use `tbl` to create a reference to the `surveys` table.

2: `group_by` the year.

3: Create a connection to the database using `DBI`.

4: `collect` the data.

5: `summarise` by counting the number of observations in each group.

Check your understanding

Arrange the steps in order to find out the number of animals surveyed per year in the mammals database.

3: Create a connection to the database using `DBI`.

1: Use `tbl` to create a reference to the `surveys` table.

2: `group_by` the year.

5: `summarise` and count the number of observations in each group.

4: `collect` the data.

```
mammals <- dbConnect(SQLite(),
                     "data/mammals.sqlite")

year_sum <- tbl(mammals, "surveys") %>%
  group_by(year) %>%
  summarise(N = n()) %>%
  collect()
```

Let's practice!

Exercise 1