The left_join verb

JOINING DATA WITH DPLYR

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Batmobile vs. Batwing

Recall: inner join

```
inventory_parts_joined <- inventories %>%
  inner_join(inventory_parts, by = c("id" = "inventory_id")) %>%
  select(-id, -version) %>%
  arrange(desc(quantity))

inventory_parts_joined
```

```
# A tibble: 258,958 x 4
   set_num  part_num color_id quantity
   <chr>    <chr>       <dbl>    <dbl>
 1 40179-1  3024           72      900
 2 40179-1  3024           15      900
 3 40179-1  3024            0      900
 4 40179-1  3024           71      900
 5 40179-1  3024           14      900
 6 k34434-1 3024           15      810
 7 21010-1  3023          320      771
 8 k34431-1 3024            0      720
 9 42083-1  2780            0      684
10 k34434-1 3024            0      540
# … with 258,948 more rows
```

Filter for LEGO sets

```
batmobile <- inventory_parts_joined %>%
  filter(set_num == "7784-1") %>%
  select(-set_num)
```

```
batwing <- inventory_parts_joined %>%
  filter(set_num == "70916-1") %>%
  select(-set_num)
```

Comparing tables

```
batmobile
```

```
# A tibble: 173 x 3
   part_num color_id quantity
   <chr>       <dbl>    <dbl>
 1 3023           72       62
 2 2780            0       28
 3 50950           0       28
 4 3004           71       26
 5 43093           1       25
 6 3004            0       23
 7 3010            0       21
 8 30363           0       21
 9 32123b         14       19
10 3622            0       18
# … with 163 more rows
```

```
batwing
```

```
# A tibble: 309 x 3
   part_num color_id quantity
   <chr>       <dbl>    <dbl>
 1 3023            0       22
 2 3024            0       22
 3 3623            0       20
 4 11477           0       18
 5 99207          71       18
 6 2780            0       17
 7 3666            0       16
 8 22385           0       14
 9 3710            0       14
10 99563           0       13
# … with 299 more rows
```

Parts and pieces

part + color = piece

Joining with multiple columns

```
batmobile %>%
  inner_join(batwing, by = c("part_num", "color_id"), suffix = c("_batmobile", "_batwing"))
```

```
# A tibble: 45 x 4
   part_num color_id quantity_batmobile quantity_batwing
   <chr>       <dbl>              <dbl>            <dbl>
 1 2780            0                 28               17
 2 50950           0                 28                2
 3 3004           71                 26                2
 4 43093           1                 25                6
 5 3004            0                 23                4
 6 3622            0                 18                2
 7 4286            0                 16                1
 8 3039            0                 12                2
 9 4274           71                 12                7
10 3001            0                 11                4
# … with 35 more rows
```

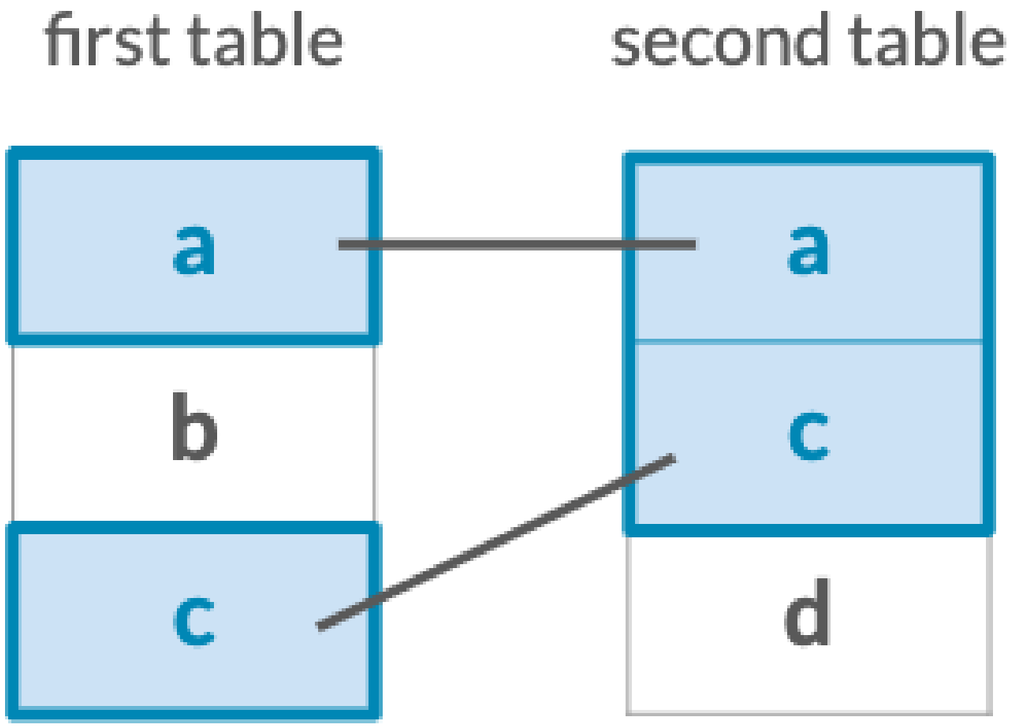
The left join

```
batmobile %>%
  left_join(batwing, by = c("part_num", "color_id"), suffix = c("_batmobile", "_batwing"))
```

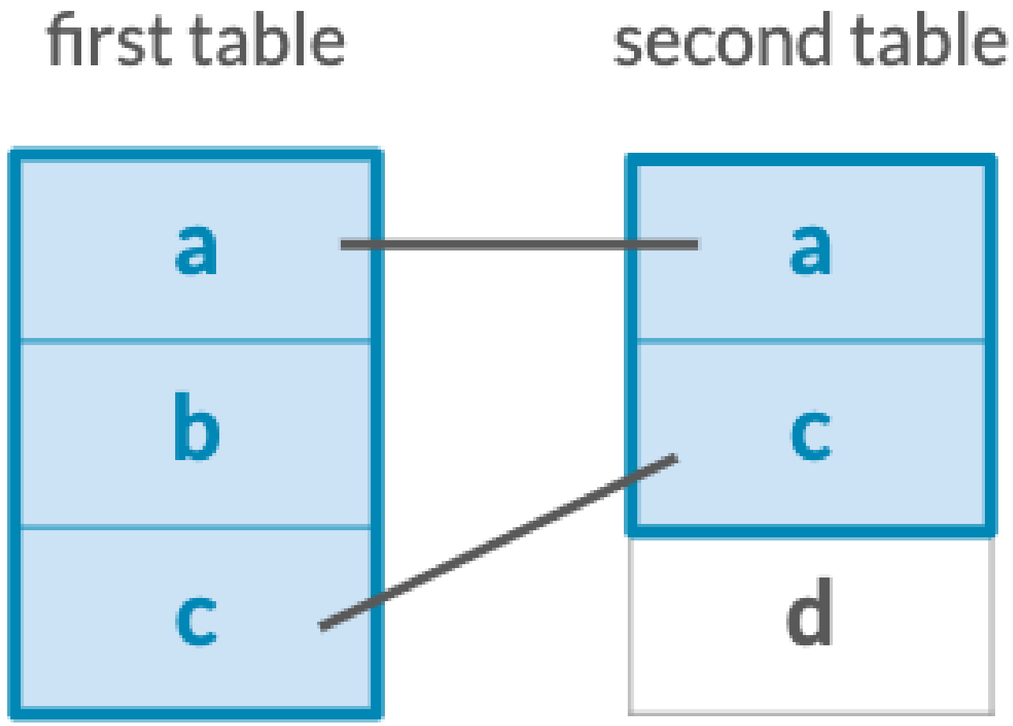
```
# A tibble: 173 x 4
   part_num color_id quantity_batmobile quantity_batwing
   <chr>       <dbl>               <dbl>            <dbl>
 1 3023           72                  62               NA
 2 2780            0                  28               17
 3 50950           0                  28                2
 4 3004           71                  26                2
 5 43093           1                  25                6
 6 3004            0                  23                4
 7 3010            0                  21               NA
 8 30363           0                  21               NA
 9 32123b         14                  19               NA
10 3622            0                  18                2
# … with 163 more rows
```

Join review

Inner join



Left join



Let's practice!

JOINING DATA WITH DPLYR

The right_join verb

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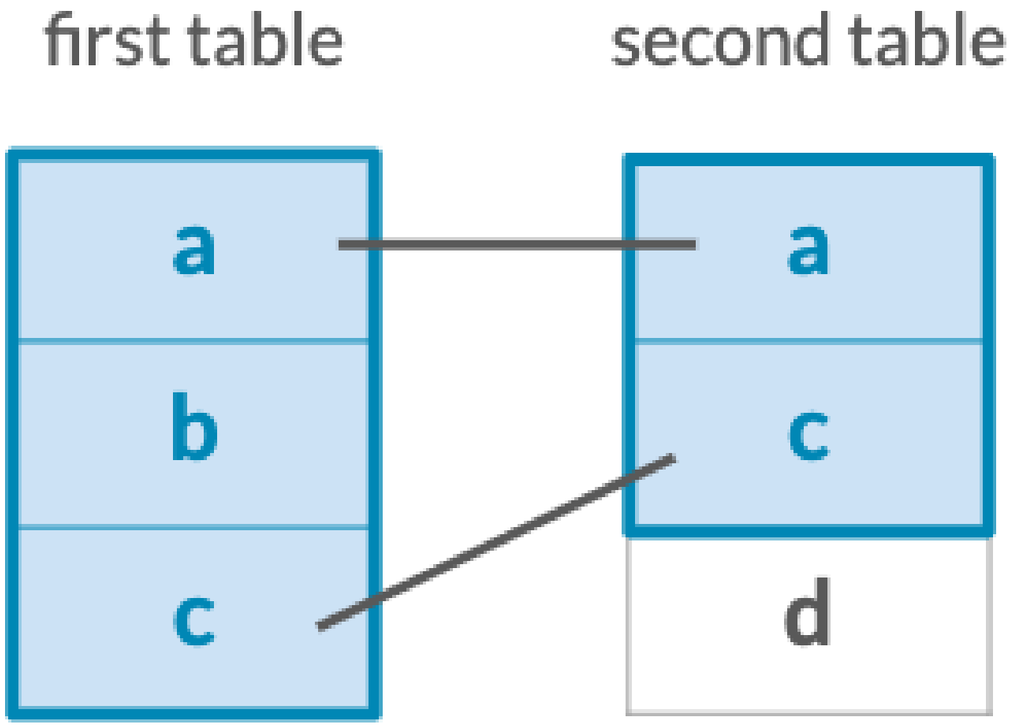
The right join

```
batmobile %>%
  left_join(batwing, by = c("part_num", "color_id"), suffix = c("_batmobile", "_batwing"))
```

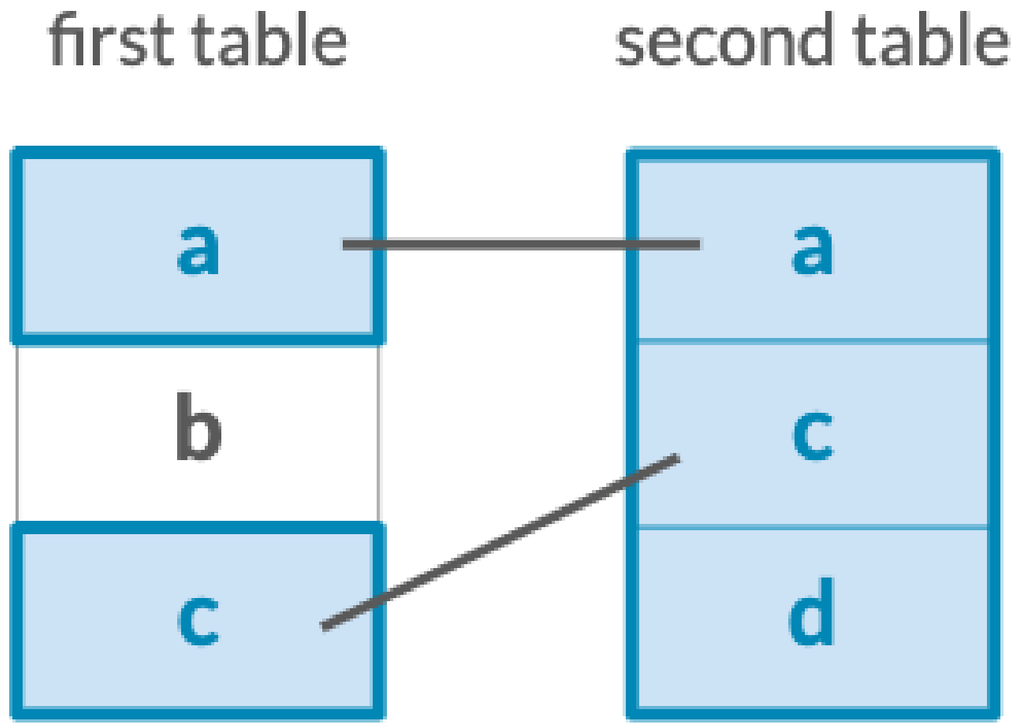
```
# A tibble: 173 x 4
   part_num color_id quantity_batmobile quantity_batwing
   <chr>       <dbl>               <dbl>            <dbl>
 1 3023           72                  62               NA
 2 2780            0                  28               17
 3 50950           0                  28                2
 4 3004           71                  26                2
 5 43093           1                  25                6
 6 3004            0                  23                4
 7 3010            0                  21               NA
 8 30363           0                  21               NA
 9 32123b         14                  19               NA
10 3622            0                  18                2
# … with 163 more rows
```

The left and right join

Left join



Right join



Mirror images

```
batmobile %>%
  right_join(batwing, by = c("part_num", "color_id"), suffix = c("_batmobile", "_batwing"))
```

```
# A tibble: 312 x 4
   part_num color_id quantity_batmobile quantity_batwing
   <chr>       <dbl>               <dbl>            <dbl>
 1 3023            0                  NA               22
 2 3024            0                   2               22
 3 3623            0                  10               20
 4 11477           0                  NA               18
 5 99207          71                  NA               18
 6 2780            0                  28               17
 7 2780            0                   1               17
 8 3666            0                  NA               16
 9 22385           0                  NA               14
10 3710            0                  NA               14
# … with 302 more rows
```

Count and sort

```
sets %>%
  count(theme_id, sort = TRUE)
```

```
# A tibble: 569 x 2
   theme_id     n
      <dbl> <int>
 1      501   122
 2      494   111
 3      435    94
 4      505    94
 5      632    93
 6      371    89
 7      497    86
 8      503    82
 9      516    78
10      220    72
# … with 559 more rows
```

Inner join

```
sets %>%
  count(theme_id, sort = TRUE) %>%
  inner_join(themes, by = c("theme_id" = "id"))
```

```
# A tibble: 569 x 4
   theme_id     n name              parent_id
      <dbl> <int> <chr>                 <dbl>
 1      501   122 Gear                     NA
 2      494   111 Friends                  NA
 3      435    94 Ninjago                  NA
 4      505    94 Basic Set               504
 5      632    93 Town                    504
 6      371    89 Supplemental            365
 7      497    86 Books                    NA
 8      503    82 Key Chain               501
 9      516    78 Duplo and Explore       507
10      220    72 City                    217
# … with 559 more rows
```

Right join

```
sets %>%
  count(theme_id, sort = TRUE) %>%
  right_join(themes, by = c("theme_id" = "id"))
```

```
# A tibble: 665 x 4
   theme_id     n name           parent_id
      <dbl> <int> <chr>              <dbl>
 1        1    58 Technic               NA
 2        2     1 Arctic Technic         1
 3        3     4 Competition            1
 4        4    13 Expert Builder         1
 5        5     6 Model                  1
 6        6     7 Airport                5
 7        7    20 Construction           5
 8        8    NA Farm                   5
 9        9     2 Fire                   5
10       10     3 Harbor                 5
# … with 655 more rows
```

Replace NAs

```
library(tidyr)

sets %>%
  count(theme_id, sort = TRUE) %>%
  right_join(themes, by = c("theme_id" = "id")) %>%
  replace_na(list(n = 0))
```

```
# A tibble: 665 x 4
   theme_id     n name           parent_id
      <dbl> <dbl> <chr>              <dbl>
 1        1    58 Technic               NA
 2        2     1 Arctic Technic         1
 3        3     4 Competition            1
 4        4    13 Expert Builder         1
 5        5     6 Model                  1
 6        6     7 Airport                5
 7        7    20 Construction           5
 8        8     0 Farm                   5
 9        9     2 Fire                   5
10       10     3 Harbor                 5
# … with 655 more rows
```

Let's practice!

JOINING DATA WITH DPLYR

Joining tables to themselves

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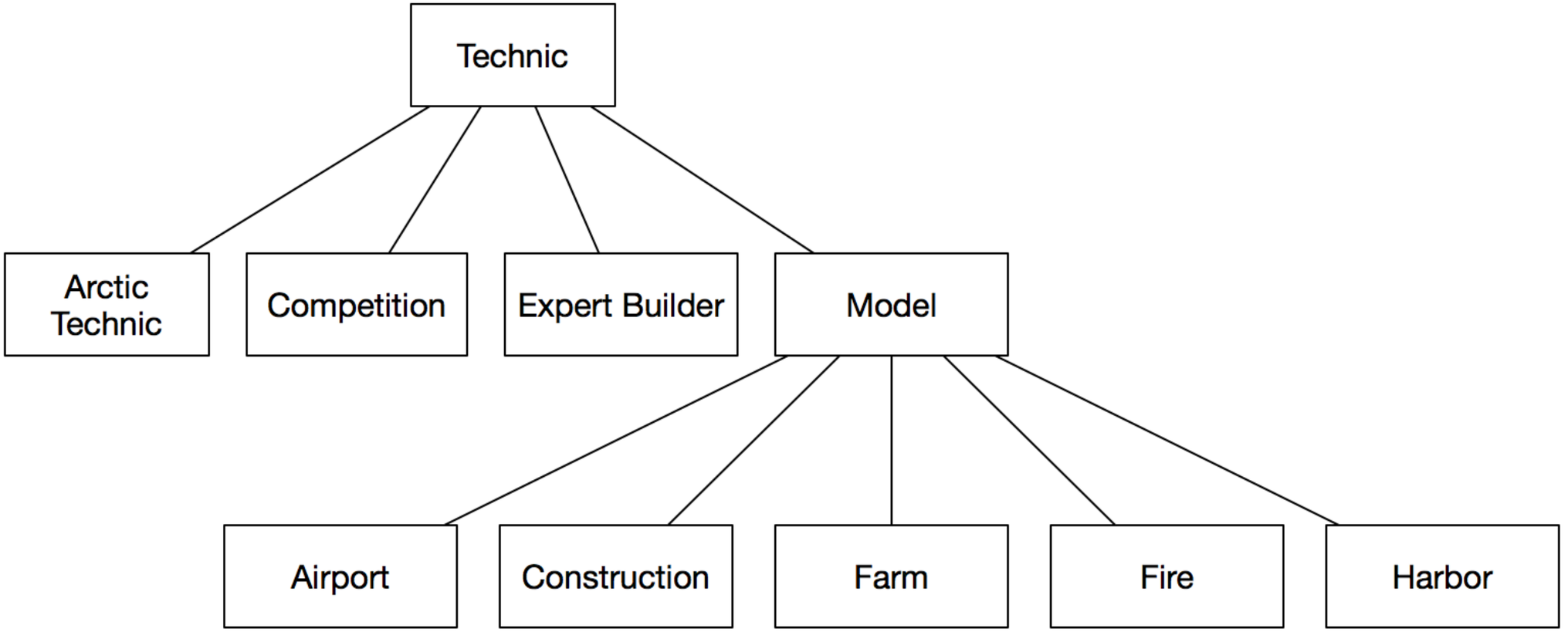
The themes table

```
themes
```

```
# A tibble: 665 x 3
      id name           parent_id
   <dbl> <chr>              <dbl>
 1     1 Technic               NA
 2     2 Arctic Technic         1
 3     3 Competition            1
 4     4 Expert Builder         1
 5     5 Model                  1
 6     6 Airport                5
 7     7 Construction           5
 8     8 Farm                   5
 9     9 Fire                   5
10    10 Harbor                 5
# … with 655 more rows
```

The hierarchy of themes



Child-parent table

```
themes %>%
  inner_join(themes, by = c("parent_id" = "id"))
```

```
# A tibble: 544 x 5
      id name.x         parent_id name.y  parent_id.y
   <dbl> <chr>              <dbl> <chr>         <dbl>
 1     2 Arctic Technic         1 Technic          NA
 2     3 Competition            1 Technic          NA
 3     4 Expert Builder         1 Technic          NA
 4     5 Model                  1 Technic          NA
 5     6 Airport                5 Model             1
 6     7 Construction           5 Model             1
 7     8 Farm                   5 Model             1
 8     9 Fire                   5 Model             1
 9    10 Harbor                 5 Model             1
10    11 Off-Road               5 Model             1
# … with 534 more rows
```

Adding a suffix

```
themes %>%
  inner_join(themes, by = c("parent_id" = "id"), suffix = c("_child", "_parent"))
```

```
# A tibble: 544 x 5
      id name_child     parent_id name_parent parent_id_parent
   <dbl> <chr>              <dbl> <chr>                  <dbl>
 1     2 Arctic Technic         1 Technic                   NA
 2     3 Competition            1 Technic                   NA
 3     4 Expert Builder         1 Technic                   NA
 4     5 Model                  1 Technic                   NA
 5     6 Airport                5 Model                      1
 6     7 Construction           5 Model                      1
 7     8 Farm                   5 Model                      1
 8     9 Fire                   5 Model                      1
 9    10 Harbor                 5 Model                      1
10    11 Off-Road               5 Model                      1
# … with 534 more rows
```

Lord of the Rings themes: parent

```
themes %>%
  inner_join(themes, by = c("parent_id" = "id"), suffix = c("_child", "_parent")) %>%
  filter(name_child == "The Lord of the Rings")
```

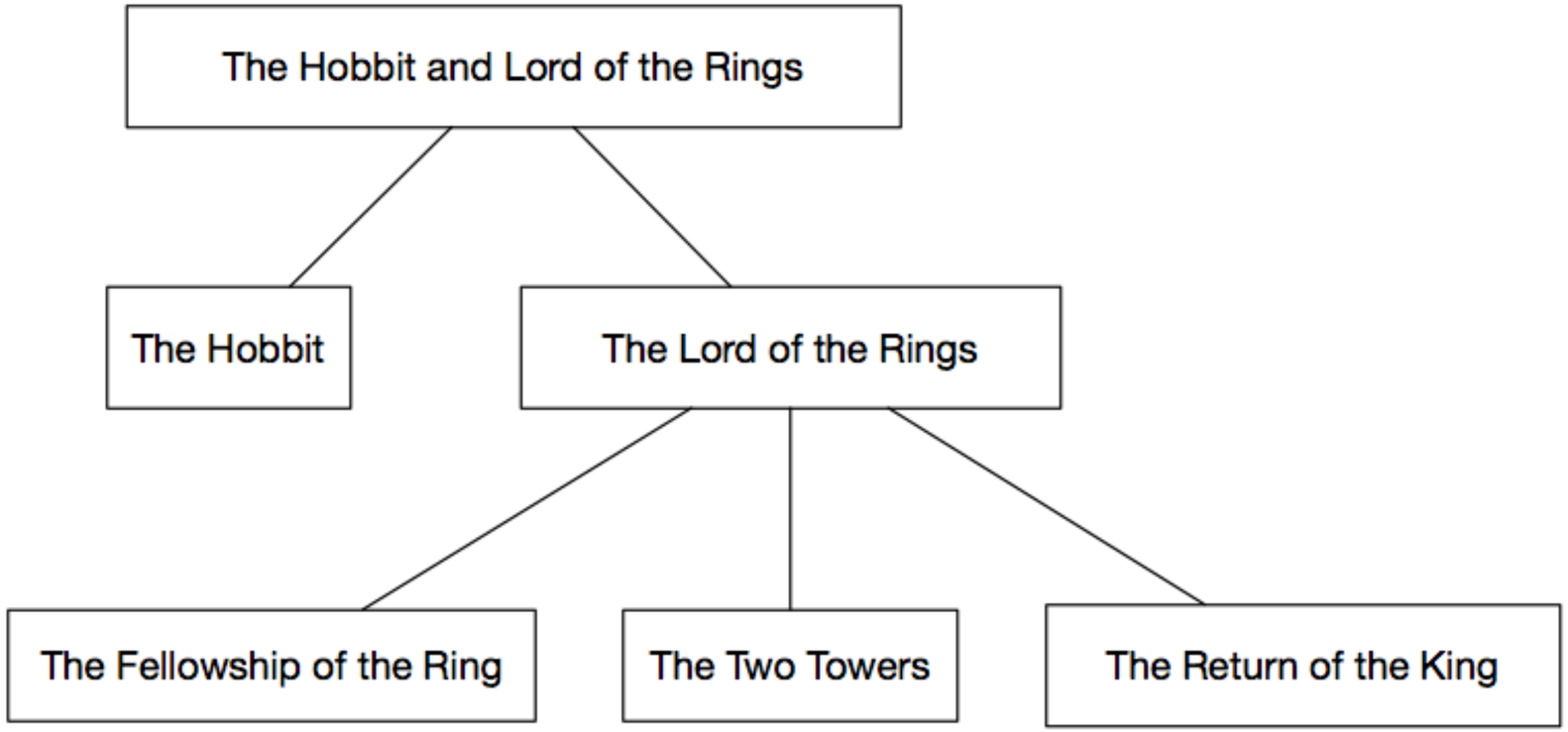
```
# A tibble: 1 x 5
     id name_child             parent_id name_parent                          parent_id_parent
  <dbl> <chr>                      <dbl> <chr>                                           <dbl>
1   566 The Lord of the Rings        561 The Hobbit and Lord of the Rings                   NA
```

Lord of the Rings themes: children

```
themes %>%
  inner_join(themes, by = c("parent_id" = "id"), suffix = c("_child", "_parent")) %>%
  filter(name_parent == "The Lord of the Rings")
```

```
# A tibble: 3 x 5
     id name_child                 parent_id name_parent           parent_id_parent
  <dbl> <chr>                          <dbl> <chr>                            <dbl>
1   567 The Fellowship of the Ring       566 The Lord of the Rings              561
2   568 The Two Towers                   566 The Lord of the Rings              561
3   569 The Return of the King           566 The Lord of the Rings              561
```

The Lord of the Rings trilogy



Let's practice!

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