

MapReduce

Classroom example

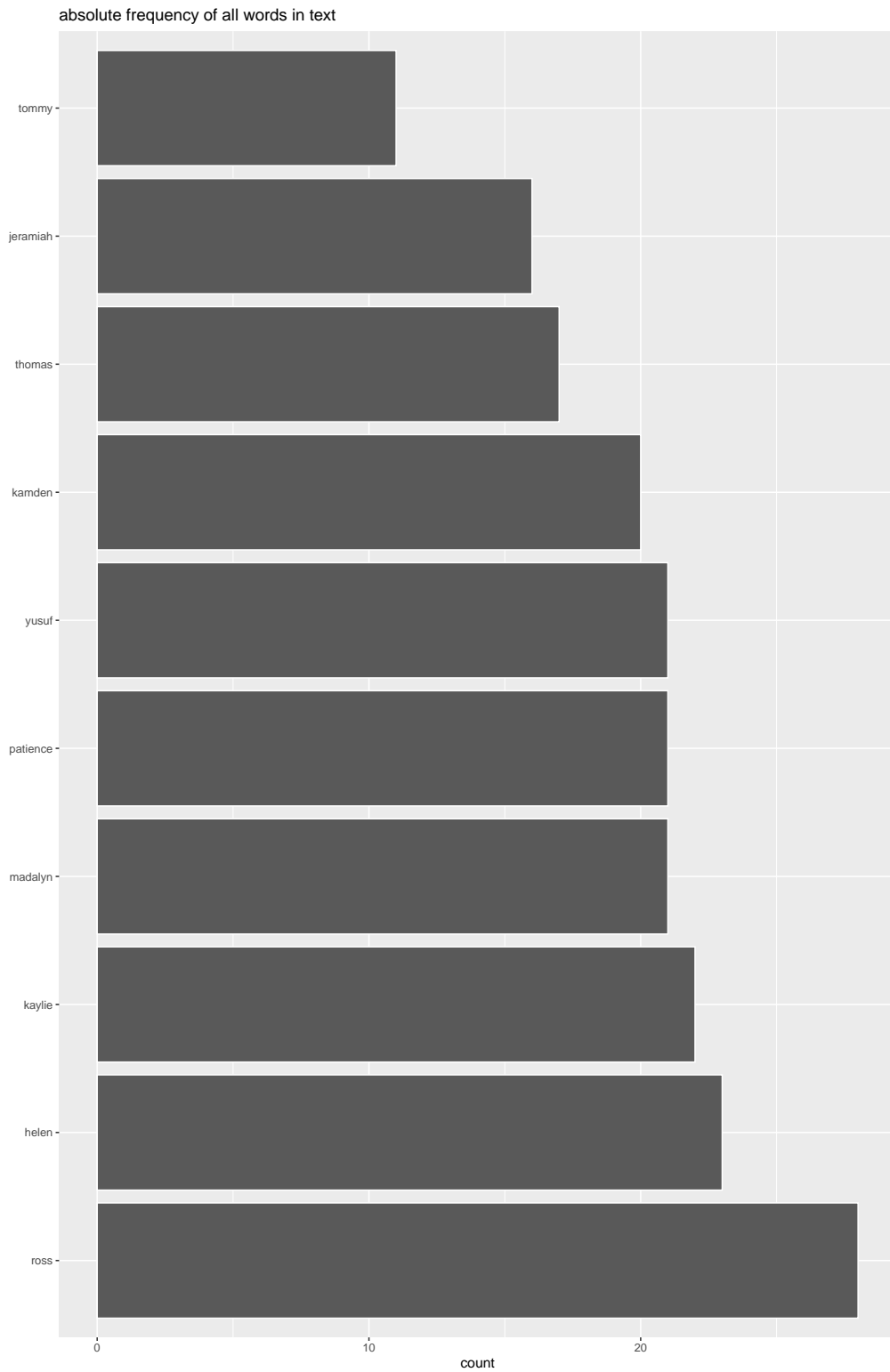
This is the file to create a map reduce classroom example. The setup is as follows

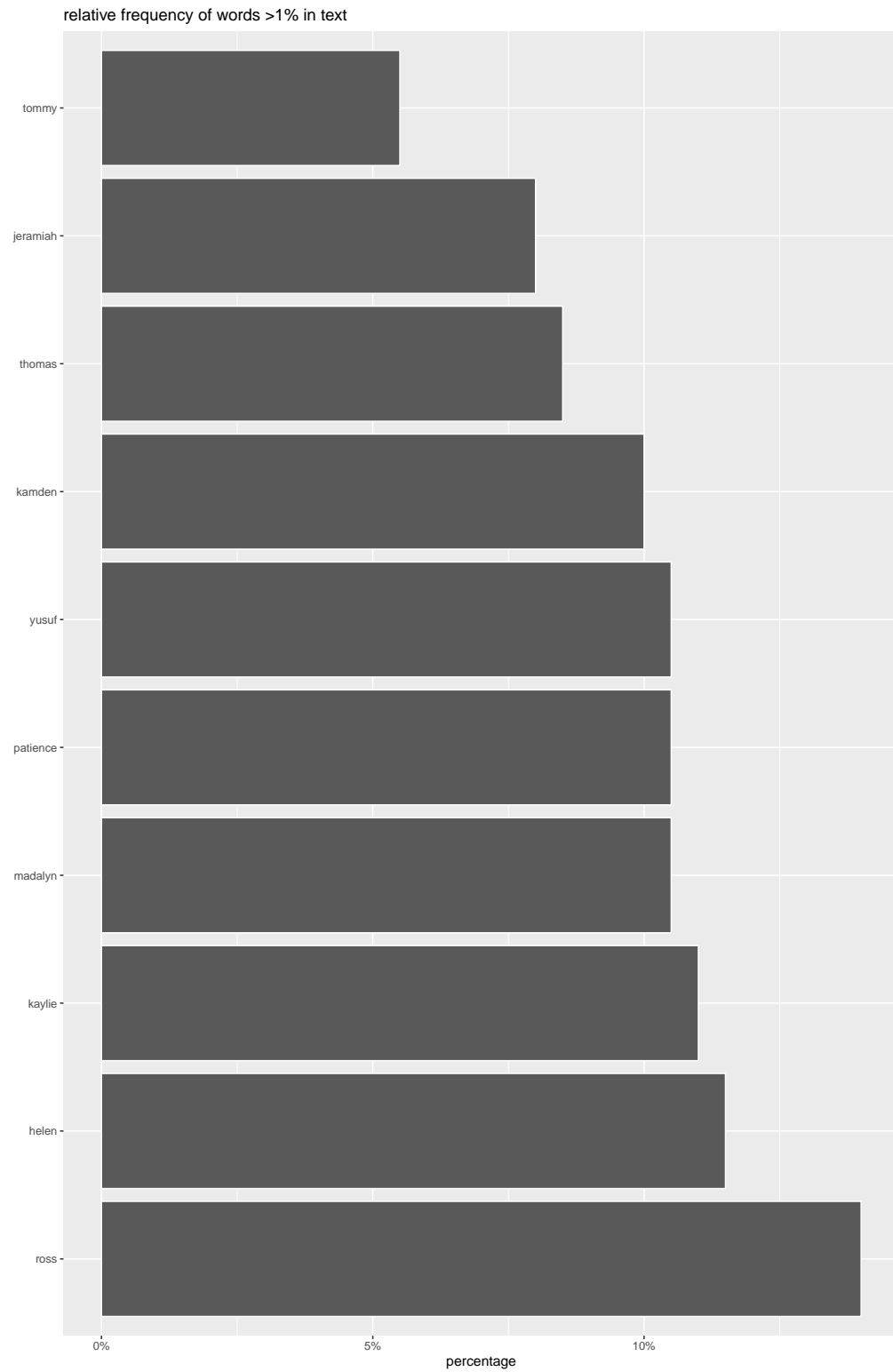
1. print this file
2. give the raw file to 1-4 students, they shall count the words. Measure the time. This is sequential processing.
3. give the chunked file to the respective number of students. There are $n = 2, 4, 5, 10$ groups available. The number of students is the chunk server.
4. one student acts as the “reduce” server, collecting all the counts.
5. write the counts on the whiteboard including the times
6. which number of groups is the most efficient and which produces considerable overhead?

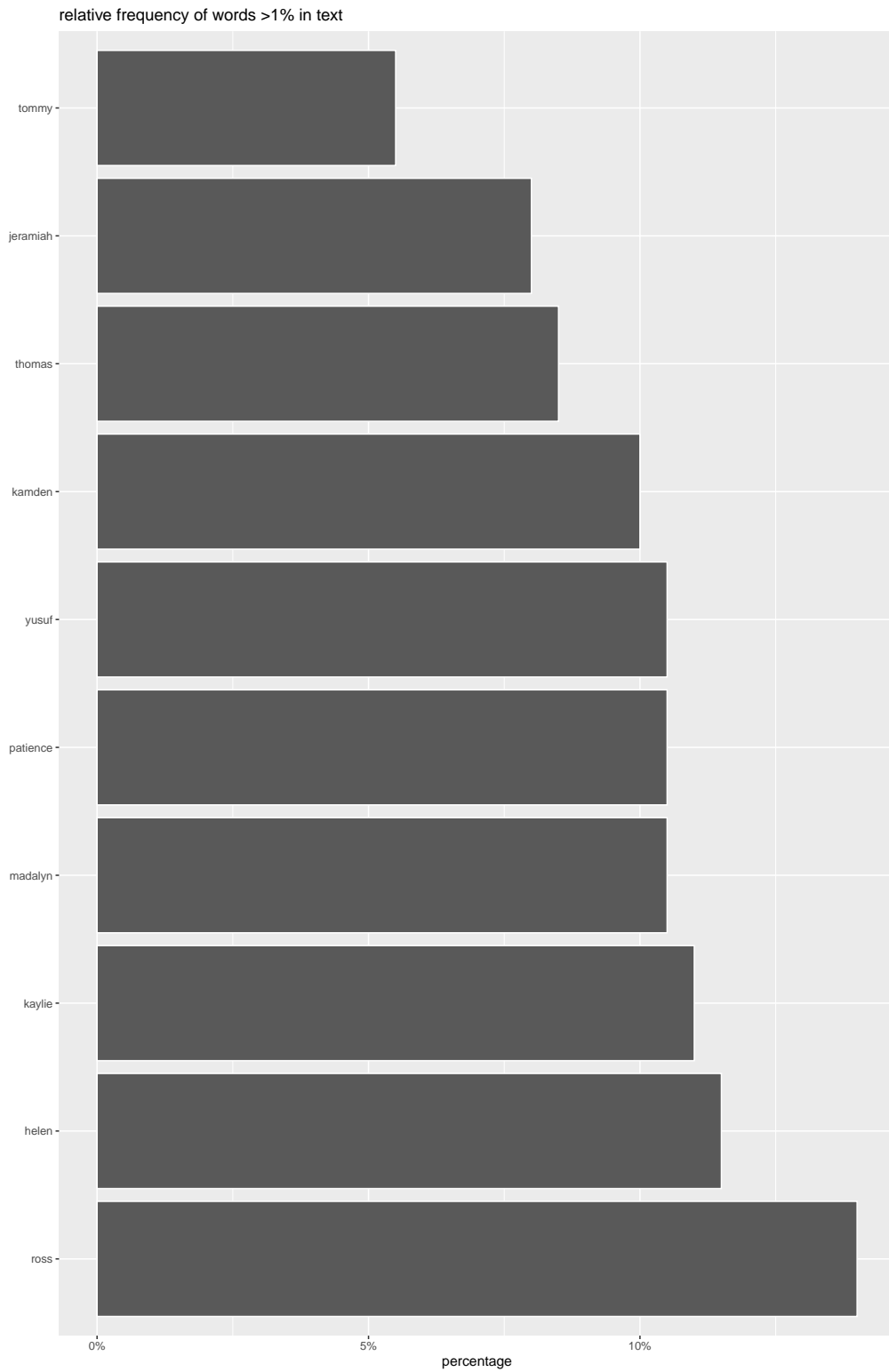
some summary statistics on the raw data

In total there are 200 words available.

| words | Freq | percentage | percentage_round |
|----------|------|------------|------------------|
| ross | 28 | 14.00% | 14.00% |
| helen | 23 | 11.50% | 11.50% |
| kaylie | 22 | 11.00% | 11.00% |
| madalyn | 21 | 10.50% | 10.50% |
| patience | 21 | 10.50% | 10.50% |
| yusuf | 21 | 10.50% | 10.50% |
| kamden | 20 | 10.00% | 10.00% |
| thomas | 17 | 8.50% | 8.50% |
| jeramiah | 16 | 8.00% | 8.00% |
| tommy | 11 | 5.50% | 5.50% |







The Raw data 01

Tommy, Ross , Ross , Thomas, Ross , Yusuf, Jeramiah, Madalyn, Kamden, Patience, Patience, Kaylie, Kaylie, Helen, Kamden, Kamden, Helen, Yusuf, Yusuf, Kaylie, Madalyn, Helen, Thomas, Madalyn, Madalyn, Kaylie, Patience, Yusuf, Thomas, Kamden, Helen, Helen, Jeramiah, Patience, Yusuf, Tommy, Helen, Patience, Thomas, Patience, Madalyn, Jeramiah, Thomas, Yusuf, Tommy, Tommy, Thomas, Jeramiah, Helen, Thomas, Thomas, Patience, Kaylie, Yusuf, Thomas, Tommy, Helen, Ross , Kaylie, Madalyn, Kaylie, Helen, Helen, Patience, Thomas, Ross , Patience, Helen, Yusuf, Patience, Helen, Patience, Helen, Kaylie, Tommy, Yusuf, Thomas, Patience, Yusuf, Ross , Thomas, Ross , Ross , Ross , Kaylie, Ross , Patience, Kamden, Thomas, Ross , Patience, Yusuf, Patience, Madalyn, Kaylie, Helen, Madalyn, Ross , Yusuf, Madalyn, Ross , Jeramiah, Ross , Ross , Yusuf, Kaylie, Jeramiah, Patience, Yusuf, Kamden, Kaylie, Tommy, Jeramiah, Thomas, Madalyn, Jeramiah, Patience, Ross , Madalyn, Kaylie, Yusuf, Kaylie, Patience, Yusuf, Helen, Ross , Jeramiah, Jeramiah, Kamden, Madalyn, Kaylie, Ross , Ross , Jeramiah, Kamden, Ross , Kaylie, Thomas, Kaylie, Tommy, Yusuf, Kamden, Madalyn, Helen, Helen, Kamden, Madalyn, Jeramiah, Thomas, Yusuf, Yusuf, Kamden, Madalyn, Jeramiah, Ross , Kamden, Patience, Madalyn, Jeramiah, Kamden, Kaylie, Helen, Patience, Jeramiah, Jeramiah, Madalyn, Helen, Madalyn, Tommy, Yusuf, Ross , Ross , Kamden, Tommy, Helen, Kamden, Ross , Kaylie, Kaylie, Helen, Kamden, Ross , Madalyn, Kaylie, Tommy, Helen, Patience, Kamden, Thomas, Ross , Kamden, Madalyn, Kaylie, Helen, Kamden, Madalyn, Ross , Kamden, Ross , Yusuf

The Raw data 02

Tommy, Ross , Ross , Thomas, Ross , Yusuf, Jeramiah, Madalyn, Kamden, Patience, Patience, Kaylie, Kaylie, Helen, Kamden, Kamden, Helen, Yusuf, Yusuf, Kaylie, Madalyn, Helen, Thomas, Madalyn, Madalyn, Kaylie, Patience, Yusuf, Thomas, Kamden, Helen, Helen, Jeramiah, Patience, Yusuf, Tommy, Helen, Patience, Thomas, Patience, Madalyn, Jeramiah, Thomas, Yusuf, Tommy, Tommy, Thomas, Jeramiah, Helen, Thomas, Thomas, Patience, Kaylie, Yusuf, Thomas, Tommy, Helen, Ross , Kaylie, Madalyn, Kaylie, Helen, Helen, Patience, Thomas, Ross , Patience, Helen, Yusuf, Patience, Helen, Patience, Helen, Kaylie, Tommy, Yusuf, Thomas, Patience, Yusuf, Ross , Thomas, Ross , Ross , Ross , Kaylie, Ross , Patience, Kamden, Thomas, Ross , Patience, Yusuf, Patience, Madalyn, Kaylie, Helen, Madalyn, Ross , Yusuf, Madalyn, Ross , Jeramiah, Ross , Ross , Yusuf, Kaylie, Jeramiah, Patience, Yusuf, Kamden, Kaylie, Tommy, Jeramiah, Thomas, Madalyn, Jeramiah, Patience, Ross , Madalyn, Kaylie, Yusuf, Kaylie, Patience, Yusuf, Helen, Ross , Jeramiah, Jeramiah, Kamden, Madalyn, Kaylie, Ross , Ross , Jeramiah, Kamden, Ross , Kaylie, Thomas, Kaylie, Tommy, Yusuf, Kamden, Madalyn, Helen, Helen, Kamden, Madalyn, Jeramiah, Thomas, Yusuf, Yusuf, Kamden, Madalyn, Jeramiah, Ross , Kamden, Patience, Madalyn, Jeramiah, Kamden, Kaylie, Helen, Patience, Jeramiah, Jeramiah, Madalyn, Helen, Madalyn, Tommy, Yusuf, Ross , Ross , Kamden, Tommy, Helen, Kamden, Ross , Kaylie, Kaylie, Helen, Kamden, Ross , Madalyn, Kaylie, Tommy, Helen, Patience, Kamden, Thomas, Ross , Kamden, Madalyn, Kaylie, Helen, Kamden, Madalyn, Ross , Kamden, Ross , Yusuf

The Raw data 03

Tommy, Ross , Ross , Thomas, Ross , Yusuf, Jeramiah, Madalyn, Kamden, Patience, Patience, Kaylie, Kaylie, Helen, Kamden, Kamden, Helen, Yusuf, Yusuf, Kaylie, Madalyn, Helen, Thomas, Madalyn, Madalyn, Kaylie, Patience, Yusuf, Thomas, Kamden, Helen, Helen, Jeramiah, Patience, Yusuf, Tommy, Helen, Patience, Thomas, Patience, Madalyn, Jeramiah, Thomas, Yusuf, Tommy, Tommy, Thomas, Jeramiah, Helen, Thomas, Thomas, Patience, Kaylie, Yusuf, Thomas, Tommy, Helen, Ross , Kaylie, Madalyn, Kaylie, Helen, Helen, Patience, Thomas, Ross , Patience, Helen, Yusuf, Patience, Helen, Patience, Helen, Kaylie, Tommy, Yusuf, Thomas, Patience, Yusuf, Ross , Thomas, Ross , Ross , Ross , Kaylie, Ross , Patience, Kamden, Thomas, Ross , Patience, Yusuf, Patience, Madalyn, Kaylie, Helen, Madalyn, Ross , Yusuf, Madalyn, Ross , Jeramiah, Ross , Ross , Yusuf, Kaylie, Jeramiah, Patience, Yusuf, Kamden, Kaylie, Tommy, Jeramiah, Thomas, Madalyn, Jeramiah, Patience, Ross , Madalyn, Kaylie, Yusuf, Kaylie, Patience, Yusuf, Helen, Ross , Jeramiah, Jeramiah, Kamden, Madalyn, Kaylie, Ross , Ross , Jeramiah, Kamden, Ross , Kaylie, Thomas, Kaylie, Tommy, Yusuf, Kamden, Madalyn, Helen, Helen, Kamden, Madalyn, Jeramiah, Thomas, Yusuf, Yusuf, Kamden, Madalyn, Jeramiah, Ross , Kamden, Patience, Madalyn, Jeramiah, Kamden, Kaylie, Helen, Patience, Jeramiah, Jeramiah, Madalyn, Helen, Madalyn, Tommy, Yusuf, Ross , Ross , Kamden, Tommy, Helen, Kamden, Ross , Kaylie, Kaylie, Helen, Kamden, Ross , Madalyn, Kaylie, Tommy, Helen, Patience, Kamden, Thomas, Ross , Kamden, Madalyn, Kaylie, Helen, Kamden, Madalyn, Ross , Kamden, Ross , Yusuf

The Raw data 04

Tommy, Ross , Ross , Thomas, Ross , Yusuf, Jeramiah, Madalyn, Kamden, Patience, Patience, Kaylie, Kaylie, Helen, Kamden, Kamden, Helen, Yusuf, Yusuf, Kaylie, Madalyn, Helen, Thomas, Madalyn, Madalyn, Kaylie, Patience, Yusuf, Thomas, Kamden, Helen, Helen, Jeramiah, Patience, Yusuf, Tommy, Helen, Patience, Thomas, Patience, Madalyn, Jeramiah, Thomas, Yusuf, Tommy, Tommy, Thomas, Jeramiah, Helen, Thomas, Thomas, Patience, Kaylie, Yusuf, Thomas, Tommy, Helen, Ross , Kaylie, Madalyn, Kaylie, Helen, Helen, Patience, Thomas, Ross , Patience, Helen, Yusuf, Patience, Helen, Patience, Helen, Kaylie, Tommy, Yusuf, Thomas, Patience, Yusuf, Ross , Thomas, Ross , Ross , Ross , Kaylie, Ross , Patience, Kamden, Thomas, Ross , Patience, Yusuf, Patience, Madalyn, Kaylie, Helen, Madalyn, Ross , Yusuf, Madalyn, Ross , Jeramiah, Ross , Ross , Yusuf, Kaylie, Jeramiah, Patience, Yusuf, Kamden, Kaylie, Tommy, Jeramiah, Thomas, Madalyn, Jeramiah, Patience, Ross , Madalyn, Kaylie, Yusuf, Kaylie, Patience, Yusuf, Helen, Ross , Jeramiah, Jeramiah, Kamden, Madalyn, Kaylie, Ross , Ross , Jeramiah, Kamden, Ross , Kaylie, Thomas, Kaylie, Tommy, Yusuf, Kamden, Madalyn, Helen, Helen, Kamden, Madalyn, Jeramiah, Thomas, Yusuf, Yusuf, Kamden, Madalyn, Jeramiah, Ross , Kamden, Patience, Madalyn, Jeramiah, Kamden, Kaylie, Helen, Patience, Jeramiah, Jeramiah, Madalyn, Helen, Madalyn, Tommy, Yusuf, Ross , Ross , Kamden, Tommy, Helen, Kamden, Ross , Kaylie, Kaylie, Helen, Kamden, Ross , Madalyn, Kaylie, Tommy, Helen, Patience, Kamden, Thomas, Ross , Kamden, Madalyn, Kaylie, Helen, Kamden, Madalyn, Ross , Kamden, Ross , Yusuf

Two Groups

Part 1 of 2 (100 words)

tommy ross ross jeramiah kamden patience kaylie kamden helen yusuf madalyn thomas madalyn patience thomas helen jeramiah yusuf helen thomas madalyn thomas tommy thomas helen thomas kaylie thomas helen kaylie kaylie helen thomas patience yusuf helen helen tommy thomas yusuf thomas ross kaylie patience thomas patience patience kaylie madalyn yusuf ross ross yusuf jeramiah yusuf kaylie jeramiah madalyn patience madalyn yusuf patience helen jeramiah kamden kaylie ross kamden kaylie kaylie yusuf madalyn helen madalyn thomas yusuf madalyn ross patience jeramiah kaylie patience jeramiah helen tommy ross kamden helen ross kaylie kamden madalyn tommy patience thomas kamden kaylie kamden ross ross

Part 2 of 2 (100 words)

ross thomas yusuf madalyn patience kaylie helen kamden yusuf kaylie helen madalyn kaylie
yusuf kamden helen patience tommy patience patience jeramiah yusuf tommy jeramiah thomas
patience yusuf tommy ross madalyn helen patience ross helen patience patience kaylie yusuf
patience ross ross ross ross kamden ross yusuf madalyn helen ross madalyn jeramiah ross kaylie
patience kamden tommy thomas jeramiah ross kaylie kaylie yusuf ross jeramiah madalyn ross
jeramiah ross thomas tommy kamden helen kamden jeramiah yusuf kamden jeramiah kamden
madalyn kamden helen jeramiah madalyn madalyn yusuf ross tommy kamden kaylie helen
ross kaylie helen kamden ross madalyn helen madalyn kamden yusuf

Four Groups

Part 1 of 4 (50 words)

tommy ross kamden kaylie helen madalyn madalyn thomas jeramiah helen madalyn tommy
helen kaylie helen kaylie thomas yusuf helen thomas thomas kaylie thomas patience madalyn
ross yusuf yusuf jeramiah patience yusuf helen kamden ross kaylie yusuf helen thomas madalyn
patience kaylie jeramiah tommy kamden ross kamden tommy thomas kaylie ross

Part 2 of 4 (50 words)

ross yusuf patience helen yusuf helen kaylie kamden patience patience jeramiah tommy thomas
yusuf ross helen ross patience kaylie patience ross ross ross madalyn ross jeramiah kaylie
kamden thomas ross kaylie ross madalyn jeramiah thomas kamden kamden yusuf jeramiah
madalyn helen madalyn yusuf tommy kaylie ross helen ross helen kamden

Part 3 of 4 (50 words)

ross jeramiah patience kamden yusuf thomas patience helen yusuf thomas thomas thomas
thomas thomas kaylie helen patience helen tommy yusuf ross patience patience kaylie yusuf ross
jeramiah kaylie madalyn madalyn patience jeramiah kaylie kamden kaylie madalyn madalyn
yusuf ross jeramiah patience helen ross helen kaylie madalyn patience kamden kamden ross

Part 4 of 4 (50 words)

thomas madalyn kaylie kamden kaylie madalyn yusuf helen tommy patience yusuf jeramiah
patience tommy madalyn patience helen patience yusuf ross ross kamden yusuf helen madalyn
ross patience tommy jeramiah kaylie yusuf jeramiah ross ross tommy helen jeramiah kam-
den kamden kamden jeramiah madalyn ross kamden helen kaylie kamden madalyn madalyn
yusuf

Five Groups

Part 1 of 5 (40 words)

tommy yusuf patience kamden madalyn kaylie helen tommy madalyn tommy thomas tommy
kaylie ross helen yusuf thomas ross patience helen ross kaylie kaylie jeramiah yusuf ross kaylie
ross yusuf kamden yusuf kamden kaylie madalyn ross kamden kamden helen kamden mada-
lyn

Part 2 of 5 (40 words)

ross jeramiah kaylie helen helen patience helen helen jeramiah thomas patience helen helen patience patience thomas ross patience yusuf madalyn jeramiah jeramiah tommy patience kaylie jeramiah ross kaylie kamden madalyn kamden patience helen helen ross ross ross patience madalyn ross

Part 3 of 5 (40 words)

ross madalyn kaylie yusuf thomas yusuf jeramiah patience thomas jeramiah kaylie ross helen
helen helen patience ross kamden patience ross ross patience jeramiah ross patience jeramiah
ross thomas madalyn jeramiah madalyn madalyn patience madalyn kamden kaylie madalyn
kamden kaylie kamden

Part 4 of 5 (40 words)

thomas kamden helen yusuf madalyn thomas patience thomas yusuf helen yusuf kaylie patience
yusuf kaylie yusuf ross thomas madalyn yusuf ross yusuf thomas madalyn yusuf kamden
jeramiah kaylie helen thomas jeramiah jeramiah jeramiah tommy tommy kaylie kaylie thomas
helen ross

Part 5 of 5 (40 words)

ross patience kamden kaylie madalyn kamden yusuf patience tommy thomas thomas madalyn
thomas patience tommy ross kaylie ross kaylie madalyn yusuf kamden madalyn kaylie helen
madalyn kamden tommy helen yusuf ross kamden jeramiah yusuf helen helen tommy ross
kamden yusuf

Ten Groups

Part 1 of 10 (20 words)

tommy patience madalyn helen madalyn thomas kaylie helen thomas patience ross kaylie yusuf
kaylie yusuf yusuf kaylie ross kamden kamden

Part 2 of 10 (20 words)

ross kaylie helen helen jeramiah patience helen patience ross yusuf jeramiah tommy kaylie ross
kamden kamden helen ross ross madalyn

Part 3 of 10 (20 words)

ross kaylie thomas jeramiah thomas kaylie helen helen ross patience ross jeramiah patience
ross madalyn madalyn patience kamden madalyn kaylie

Part 4 of 10 (20 words)

thomas helen madalyn patience yusuf yusuf patience kaylie ross madalyn ross thomas yusuf
jeramiah helen jeramiah jeramiah tommy kaylie helen

Part 5 of 10 (20 words)

ross kamden madalyn yusuf tommy thomas thomas tommy kaylie kaylie yusuf madalyn helen
kamden helen ross jeramiah helen tommy kamden

Part 6 of 10 (20 words)

yusuf kamden kaylie tommy tommy tommy ross yusuf ross helen kaylie jeramiah ross ross
kamden kamden madalyn kamden helen madalyn

Part 7 of 10 (20 words)

jeramiah helen patience helen thomas helen patience thomas patience madalyn jeramiah patience jeramiah kaylie madalyn patience helen ross patience ross

Part 8 of 10 (20 words)

madalyn yusuf yusuf patience jeramiah ross helen patience kamden ross patience ross jeramiah
thomas jeramiah madalyn madalyn kaylie kamden kamden

Part 9 of 10 (20 words)

kamden yusuf thomas thomas helen kaylie yusuf yusuf thomas yusuf yusuf madalyn kamden
kaylie thomas jeramiah tommy kaylie thomas ross

Part 10 of 10 (20 words)

patience kaylie kamden patience thomas madalyn patience ross ross madalyn kamden kaylie
madalyn tommy yusuf kamden yusuf helen ross yusuf

Twenty Groups

Part 1 of 20 (10 words)

tommy madalyn madalyn kaylie thomas ross yusuf yusuf kaylie kamden

Part 2 of 20 (10 words)

ross helen jeramiah helen ross jeramiah kaylie kamden helen ross

Part 3 of 20 (10 words)

ross thomas thomas helen ross ross patience madalyn patience madalyn

Part 4 of 20 (10 words)

thomas madalyn yusuf patience ross ross yusuf helen jeramiah kaylie

Part 5 of 20 (10 words)

ross madalyn tommy thomas kaylie yusuf helen helen jeramiah tommy

Part 6 of 20 (10 words)

yusuf kaylie tommy ross ross kaylie ross kamden madalyn helen

Part 7 of 20 (10 words)

jeramiah patience thomas patience patience jeramiah jeramiah madalyn helen patience

Part 8 of 20 (10 words)

madalyn yusuf jeramiah helen kamden patience jeramiah jeramiah madalyn kamden

Part 9 of 20 (10 words)

kamden thomas helen yusuf thomas yusuf kamden thomas tommy thomas

Part 10 of 20 (10 words)

patience kamden thomas patience ross kamden madalyn yusuf yusuf ross

Part 11 of 20 (10 words)

patience helen thomas helen patience kaylie kaylie yusuf ross kamden

Part 12 of 20 (10 words)

kaylie helen patience patience yusuf tommy ross kamden ross madalyn

Part 13 of 20 (10 words)

kaylie jeramiah kaylie helen patience jeramiah ross madalyn kamden kaylie

Part 14 of 20 (10 words)

helen patience yusuf kaylie madalyn thomas jeramiah jeramiah tommy helen

Part 15 of 20 (10 words)

kamden yusuf thomas tommy kaylie madalyn kamden ross helen kamden

Part 16 of 20 (10 words)

kamden tommy tommy yusuf helen jeramiah ross kamden kamden madalyn

Part 17 of 20 (10 words)

helen helen helen thomas madalyn patience kaylie patience ross ross

Part 18 of 20 (10 words)

yusuf patience ross patience ross ross thomas madalyn kaylie kamden

Part 19 of 20 (10 words)

yusuf thomas kaylie yusuf yusuf madalyn kaylie jeramiah kaylie ross

Part 20 of 20 (10 words)

kaylie patience madalyn ross madalyn kaylie tommy kamden helen yusuf