

MapReduce

Classroom example

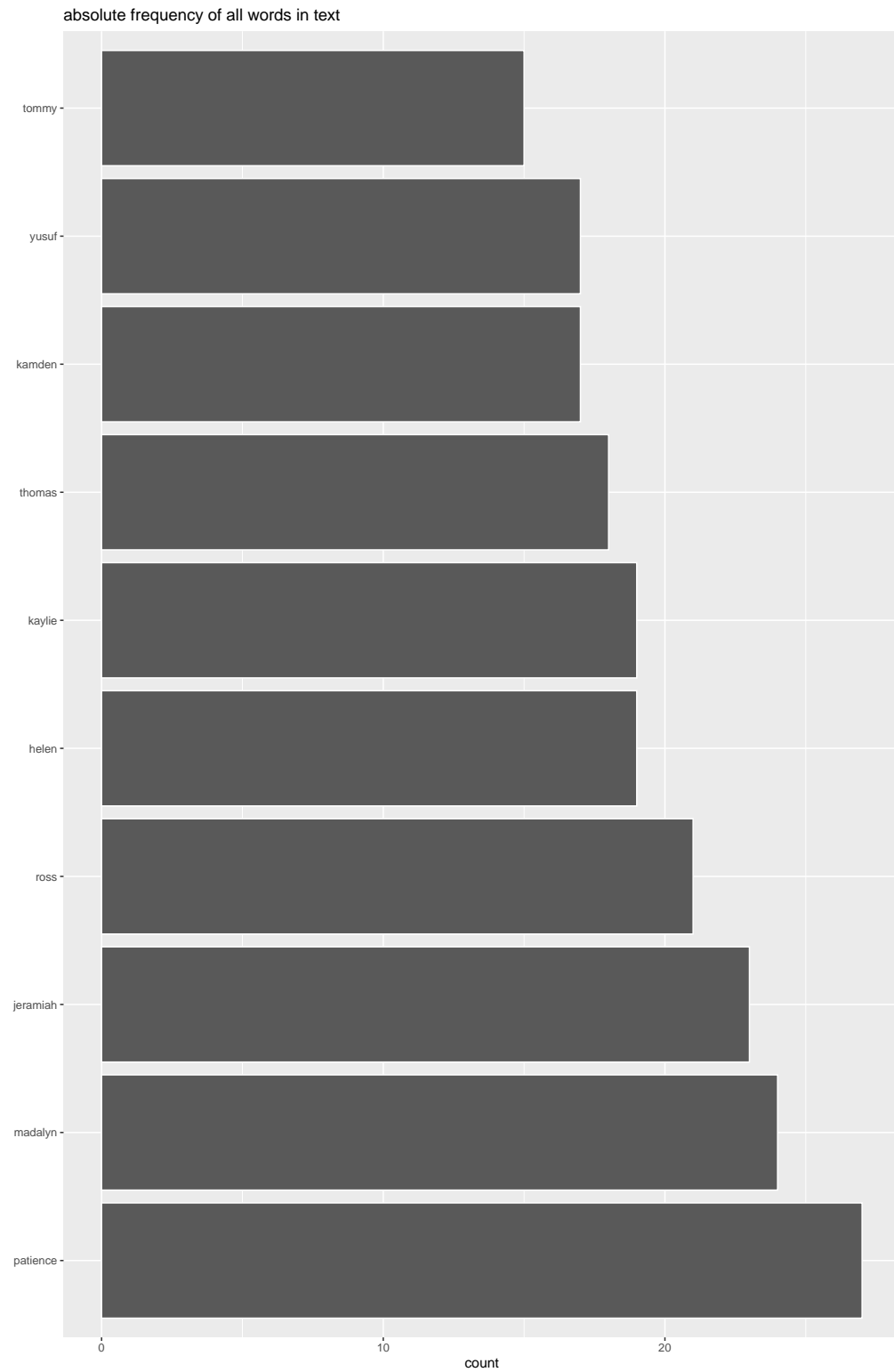
This is the file to create a map reduce classroom example. The setup is as follows

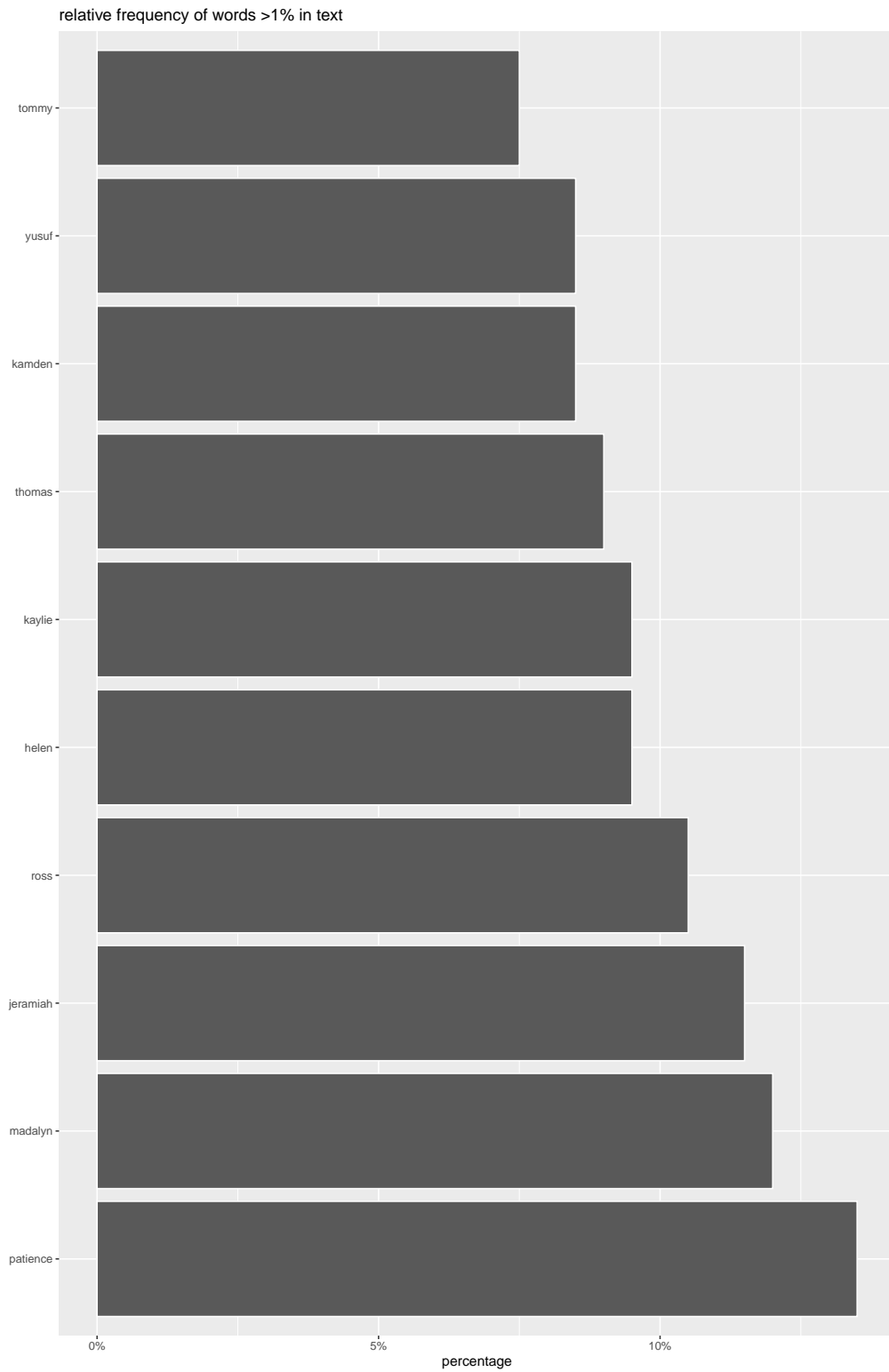
1. print this file
2. give the raw file to 1-4 students, they shall count the words. Measure the time. This is sequential processing.
3. give the chunked file to the respective number of students. There are $n = 2, 4, 5, 10$ groups available. The number of students is the chunk server.
4. one student 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?

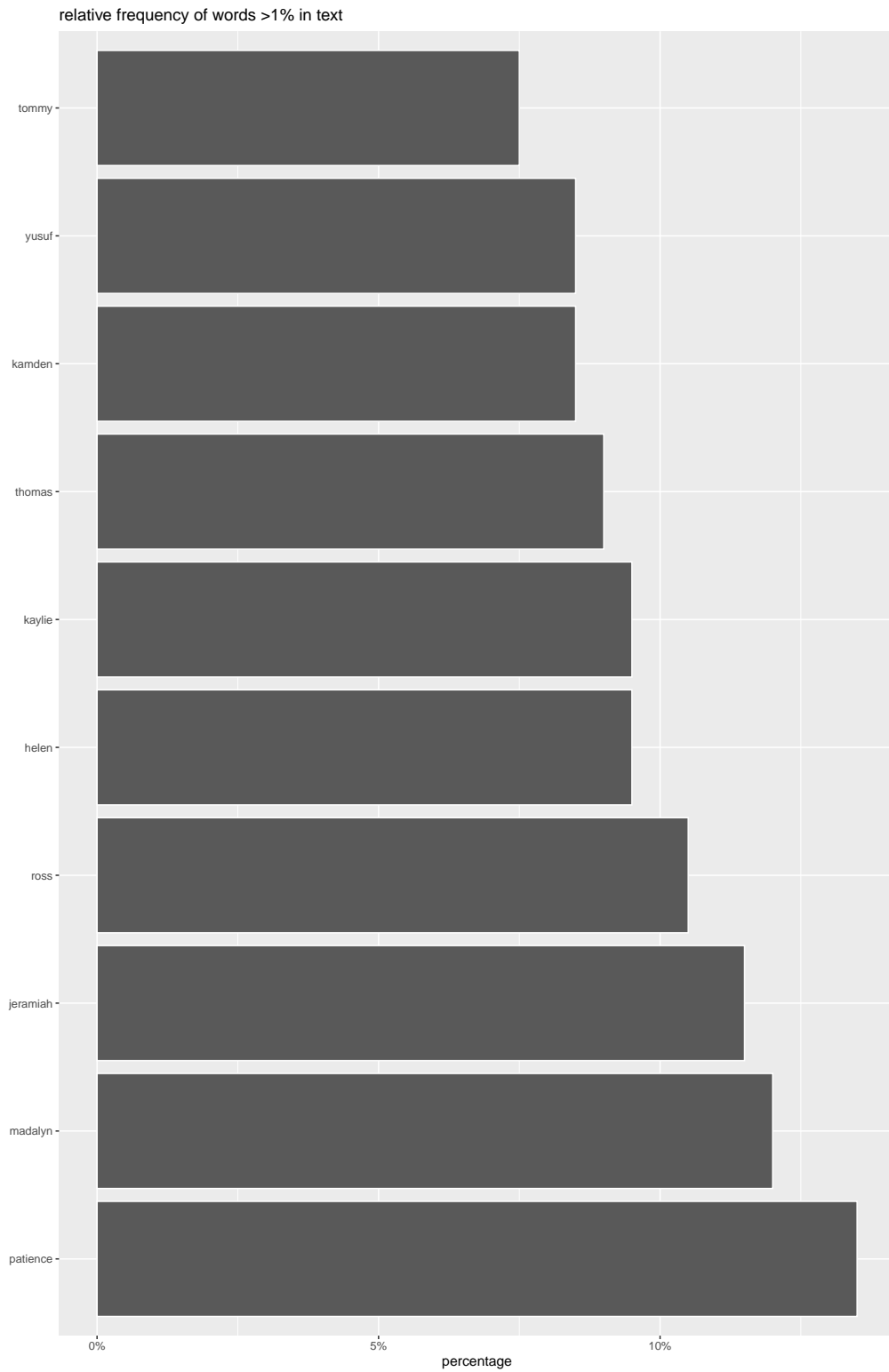
some summary statistics on the raw data

In total there are 200 words available.

words	Freq	percentage	percentage_round
patience	27	13.50%	13.50%
madalyn	24	12.00%	12.00%
jeramiah	23	11.50%	11.50%
ross	21	10.50%	10.50%
helen	19	9.50%	9.50%
kaylie	19	9.50%	9.50%
thomas	18	9.00%	9.00%
kamden	17	8.50%	8.50%
yusuf	17	8.50%	8.50%
tommy	15	7.50%	7.50%







The Raw data 01

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

The Raw data 02

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

The Raw data 03

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

The Raw data 04

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

Two Groups

Part 1 of 2 (100 words)

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

Part 2 of 2 (100 words)

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

Four Groups

Part 1 of 4 (50 words)

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

Part 2 of 4 (50 words)

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

Part 3 of 4 (50 words)

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

Part 4 of 4 (50 words)

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

Five Groups

Part 1 of 5 (40 words)

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

Part 2 of 5 (40 words)

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

Part 3 of 5 (40 words)

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

Part 4 of 5 (40 words)

ross helen thomas thomas helen jeramiah kaylie ross patience helen thomas ross kamden
thomas helen kaylie kaylie tommy kaylie yusuf jeramiah thomas ross thomas jeramiah thomas
kaylie kamden patience kaylie yusuf kamden patience helen patience ross helen thomas pa-
tience helen

Part 5 of 5 (40 words)

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

Ten Groups

Part 1 of 10 (20 words)

yusuf yusuf jeramiah madalyn yusuf kamden kamden kaylie thomas madalyn madalyn mada-
lyn kaylie madalyn patience kamden yusuf patience madalyn kaylie

Part 2 of 10 (20 words)

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

Part 3 of 10 (20 words)

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

Part 4 of 10 (20 words)

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

Part 5 of 10 (20 words)

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

Part 6 of 10 (20 words)

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

Part 7 of 10 (20 words)

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

Part 8 of 10 (20 words)

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

Part 9 of 10 (20 words)

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

Part 10 of 10 (20 words)

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

Twenty Groups

Part 1 of 20 (10 words)

yusuf jeramiah yusuf kamden thomas madalyn kaylie patience yusuf madalyn

Part 2 of 20 (10 words)

thomas patience madalyn madalyn jeramiah jeramiah yusuf tommy yusuf thomas

Part 3 of 20 (10 words)

madalyn patience kamden yusuf kamden kaylie helen yusuf patience helen

Part 4 of 20 (10 words)

ross helen patience kamden kaylie jeramiah jeramiah patience patience helen

Part 5 of 20 (10 words)

patience madalyn kamden kamden jeramiah thomas tommy kamden tommy tommy

Part 6 of 20 (10 words)

jeramiah thomas ross jeramiah ross yusuf kaylie tommy madalyn ross

Part 7 of 20 (10 words)

patience madalyn kaylie ross tommy kamden patience patience yusuf kaylie

Part 8 of 20 (10 words)

madalyn jeramiah yusuf jeramiah patience madalyn tommy kaylie ross helen

Part 9 of 20 (10 words)

helen jeramiah helen thomas tommy thomas thomas kaylie helen thomas

Part 10 of 20 (10 words)

jeramiah ross patience tommy patience helen jeramiah patience jeramiah patience

Part 11 of 20 (10 words)

yusuf madalyn kamden kaylie madalyn madalyn madalyn kamden patience kaylie

Part 12 of 20 (10 words)

kamden ross madalyn helen madalyn madalyn ross jeramiah kaylie thomas

Part 13 of 20 (10 words)

patience ross ross madalyn helen patience helen thomas thomas helen

Part 14 of 20 (10 words)

thomas kaylie thomas helen kaylie ross kaylie yusuf patience patience

Part 15 of 20 (10 words)

patience jeramiah madalyn helen kamden madalyn tommy helen jeramiah ross

Part 16 of 20 (10 words)

yusuf patience kaylie tommy tommy ross kaylie yusuf ross patience

Part 17 of 20 (10 words)

tommy patience ross kaylie jeramiah kaylie tommy jeramiah ross thomas

Part 18 of 20 (10 words)

tommy jeramiah patience jeramiah kamden jeramiah kamden helen madalyn madalyn

Part 19 of 20 (10 words)

thomas ross ross kaylie yusuf thomas kamden kamden ross helen

Part 20 of 20 (10 words)

thomas patience yusuf madalyn helen ross kamden madalyn jeramiah yusuf