

MapReduce

Classroom example

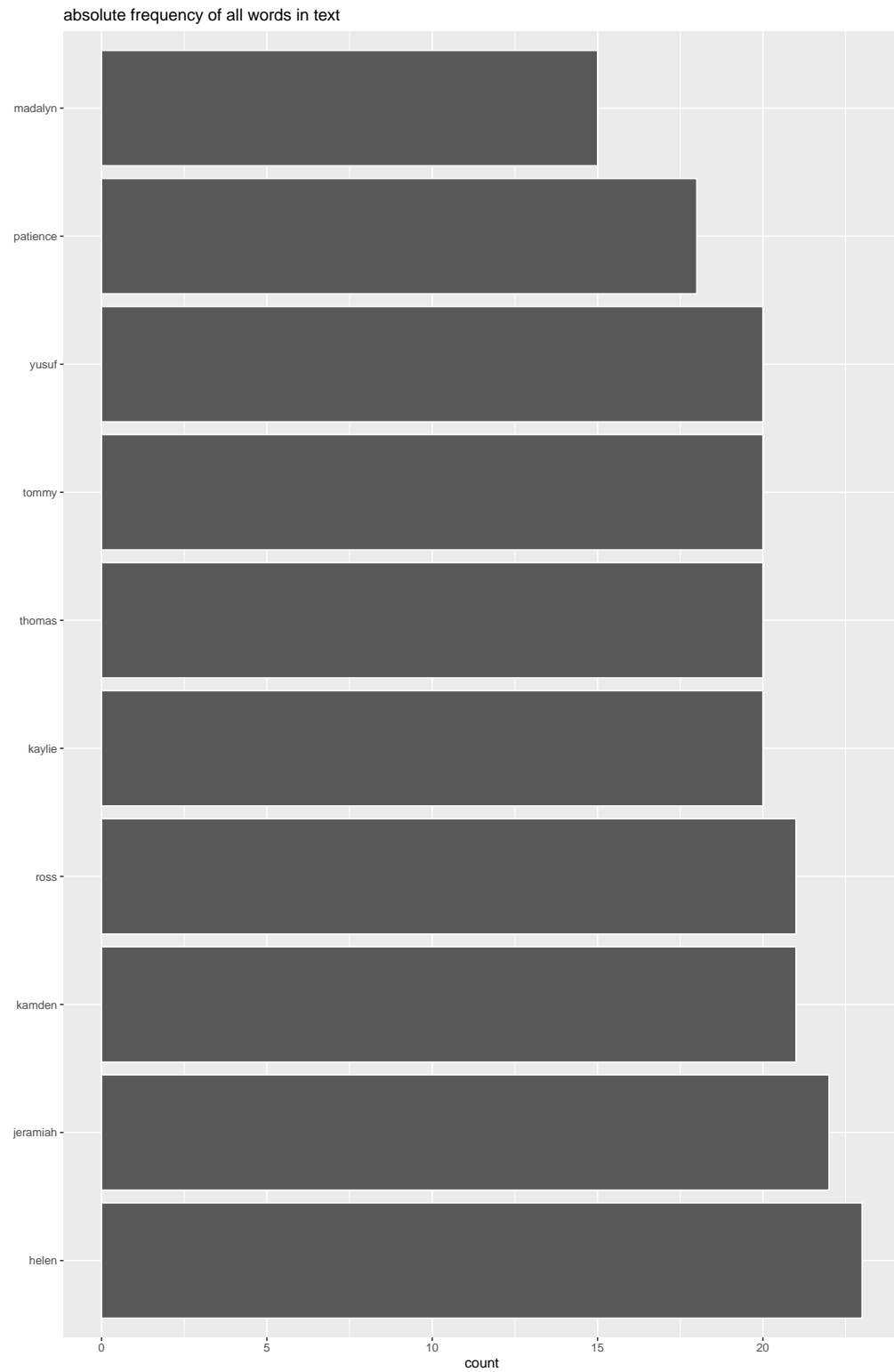
This is the file to create a map reduce classroom example. The setup is as follows

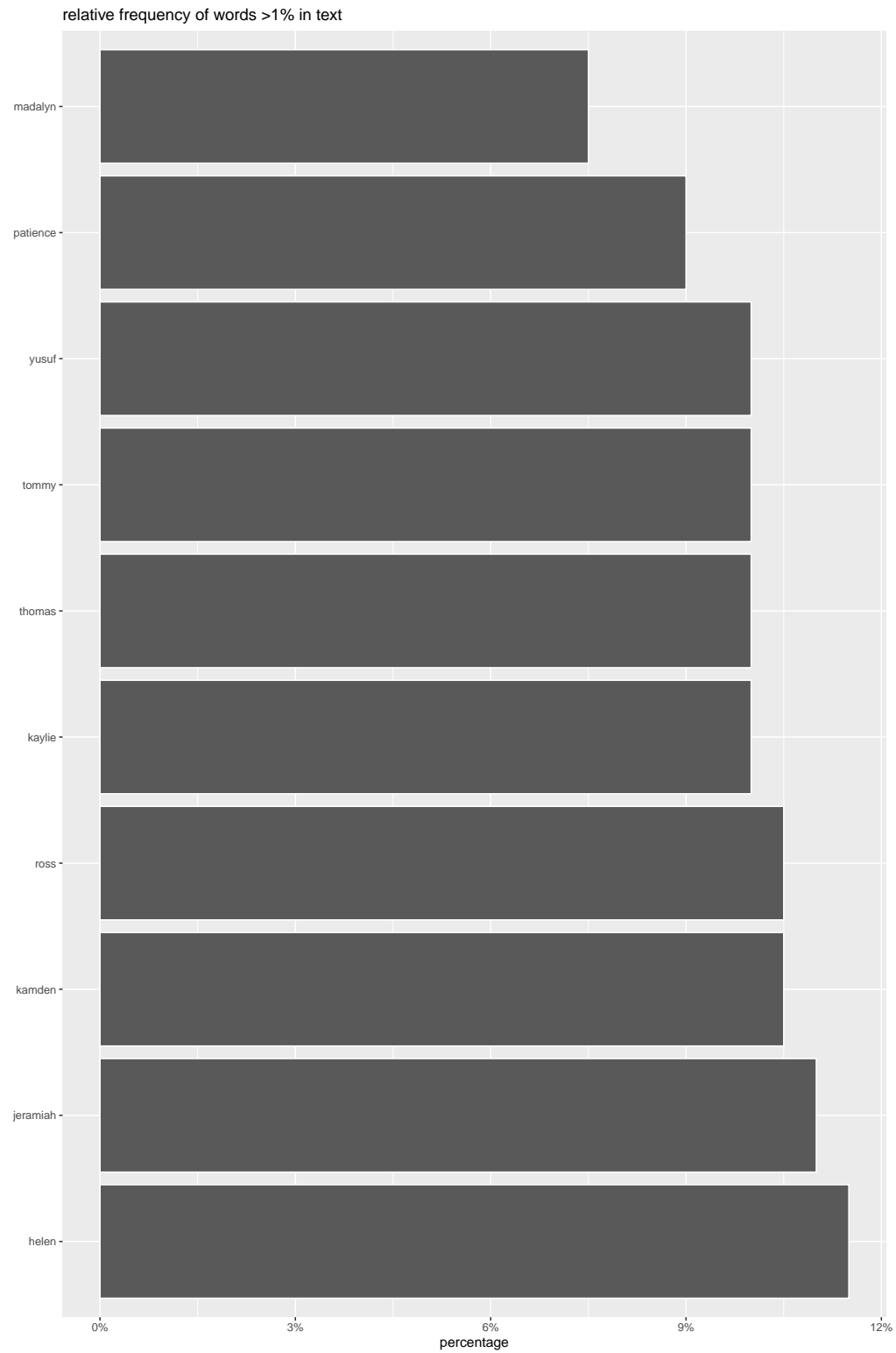
1. print this file
2. give the raw file to 1-4 students, they shall count the words. Measure the time. This is sequential processing.
3. give the chunked file to the respective number of students. There are $n = 2, 4, 5, 10$ groups available. The number of students is the chunk server.
4. one student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

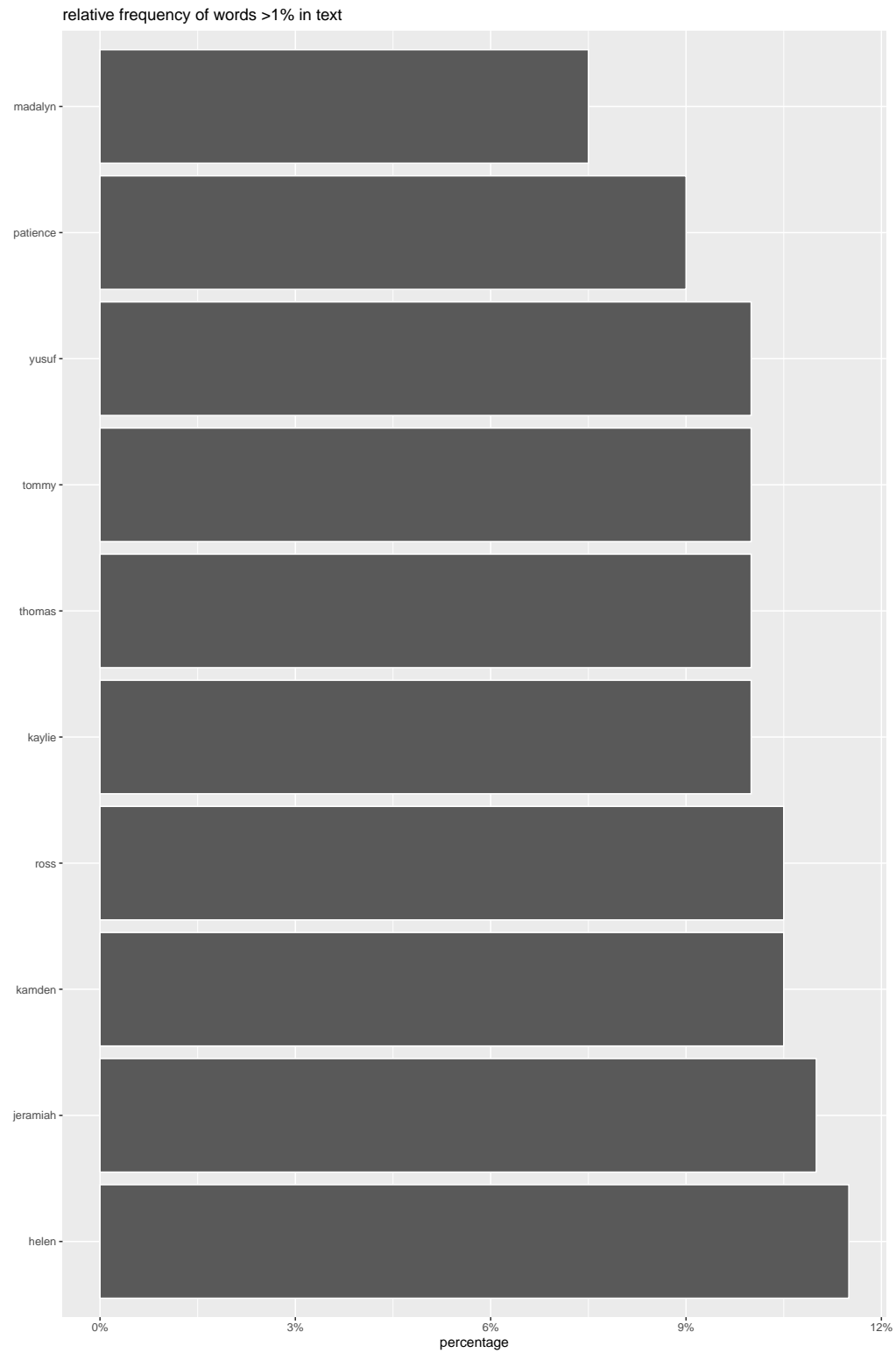
some summary statistics on the raw data

In total there are 200 words available.

words	Freq	percentage	percentage_round
helen	23	11.50%	11.50%
jeramiah	22	11.00%	11.00%
kamden	21	10.50%	10.50%
ross	21	10.50%	10.50%
kaylie	20	10.00%	10.00%
thomas	20	10.00%	10.00%
tommy	20	10.00%	10.00%
yusuf	20	10.00%	10.00%
patience	18	9.00%	9.00%
madalyn	15	7.50%	7.50%







The Raw data 01

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

The Raw data 02

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

The Raw data 03

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

The Raw data 04

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

Two Groups

Part 1 of 2 (100 words)

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

Part 2 of 2 (100 words)

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

Four Groups

Part 1 of 4 (50 words)

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

Part 2 of 4 (50 words)

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

Part 3 of 4 (50 words)

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

Part 4 of 4 (50 words)

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

Five Groups

Part 1 of 5 (40 words)

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

Part 2 of 5 (40 words)

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

Part 3 of 5 (40 words)

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

Part 4 of 5 (40 words)

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

Part 5 of 5 (40 words)

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

Ten Groups

Part 1 of 10 (20 words)

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

Part 2 of 10 (20 words)

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

Part 3 of 10 (20 words)

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

Part 4 of 10 (20 words)

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

Part 5 of 10 (20 words)

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

Part 6 of 10 (20 words)

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

Part 7 of 10 (20 words)

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

Part 8 of 10 (20 words)

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

Part 9 of 10 (20 words)

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

Part 10 of 10 (20 words)

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

Twenty Groups

Part 1 of 20 (10 words)

jeramiah thomas madalyn kaylie jeramiah kaylie madalyn kaylie thomas yusuf

Part 2 of 20 (10 words)

yusuf kaylie kaylie patience yusuf kaylie madalyn kaylie jeramiah helen

Part 3 of 20 (10 words)

patience ross jeramiah tommy patience tommy patience helen patience patience

Part 4 of 20 (10 words)

patience jeramiah madalyn thomas jeramiah ross thomas jeramiah jeramiah thomas

Part 5 of 20 (10 words)

ross jeramiah helen helen ross kamden tommy yusuf ross yusuf

Part 6 of 20 (10 words)

jeramiah ross kamden helen thomas kamden yusuf tommy tommy kaylie

Part 7 of 20 (10 words)

helen helen madalyn yusuf yusuf tommy kaylie madalyn kamden ross

Part 8 of 20 (10 words)

yusuf helen helen tommy madalyn patience yusuf madalyn tommy kaylie

Part 9 of 20 (10 words)

helen kaylie tommy ross madalyn kamden kaylie ross tommy patience

Part 10 of 20 (10 words)

jeramiah yusuf madalyn jeramiah yusuf thomas ross ross tommy kamden

Part 11 of 20 (10 words)

helen thomas helen ross patience ross yusuf ross helen kamden

Part 12 of 20 (10 words)

tommy tommy helen thomas madalyn patience kamden ross kamden thomas

Part 13 of 20 (10 words)

kamden tommy thomas kamden jeramiah ross helen kaylie patience jeramiah

Part 14 of 20 (10 words)

jeramiah madalyn tommy thomas tommy kaylie kaylie kamden patience patience

Part 15 of 20 (10 words)

patience helen patience kamden jeramiah madalyn ross yusuf helen yusuf

Part 16 of 20 (10 words)

ross jeramiah yusuf kaylie patience helen kamden kamden kaylie kaylie

Part 17 of 20 (10 words)

kamden helen thomas madalyn jeramiah kamden helen jeramiah yusuf thomas

Part 18 of 20 (10 words)

kamden ross tommy yusuf helen tommy kaylie thomas thomas thomas

Part 19 of 20 (10 words)

kamden ross patience yusuf jeramiah jeramiah thomas madalyn thomas tommy

Part 20 of 20 (10 words)

kamden helen thomas kaylie kamden helen jeramiah ross tommy yusuf