

MapReduce

Classroom example

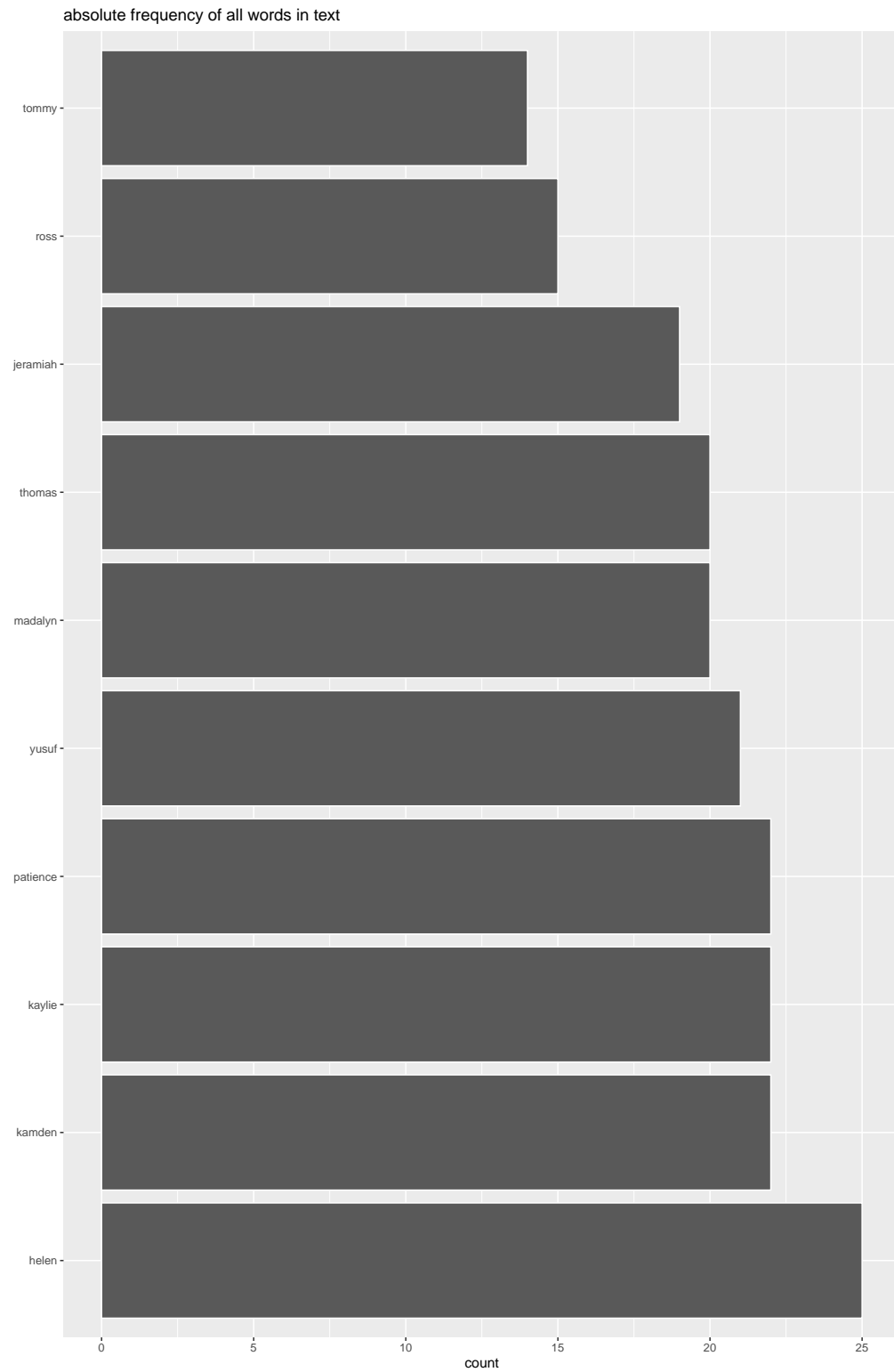
This is the file to create a map reduce classroom example. The setup is as follows

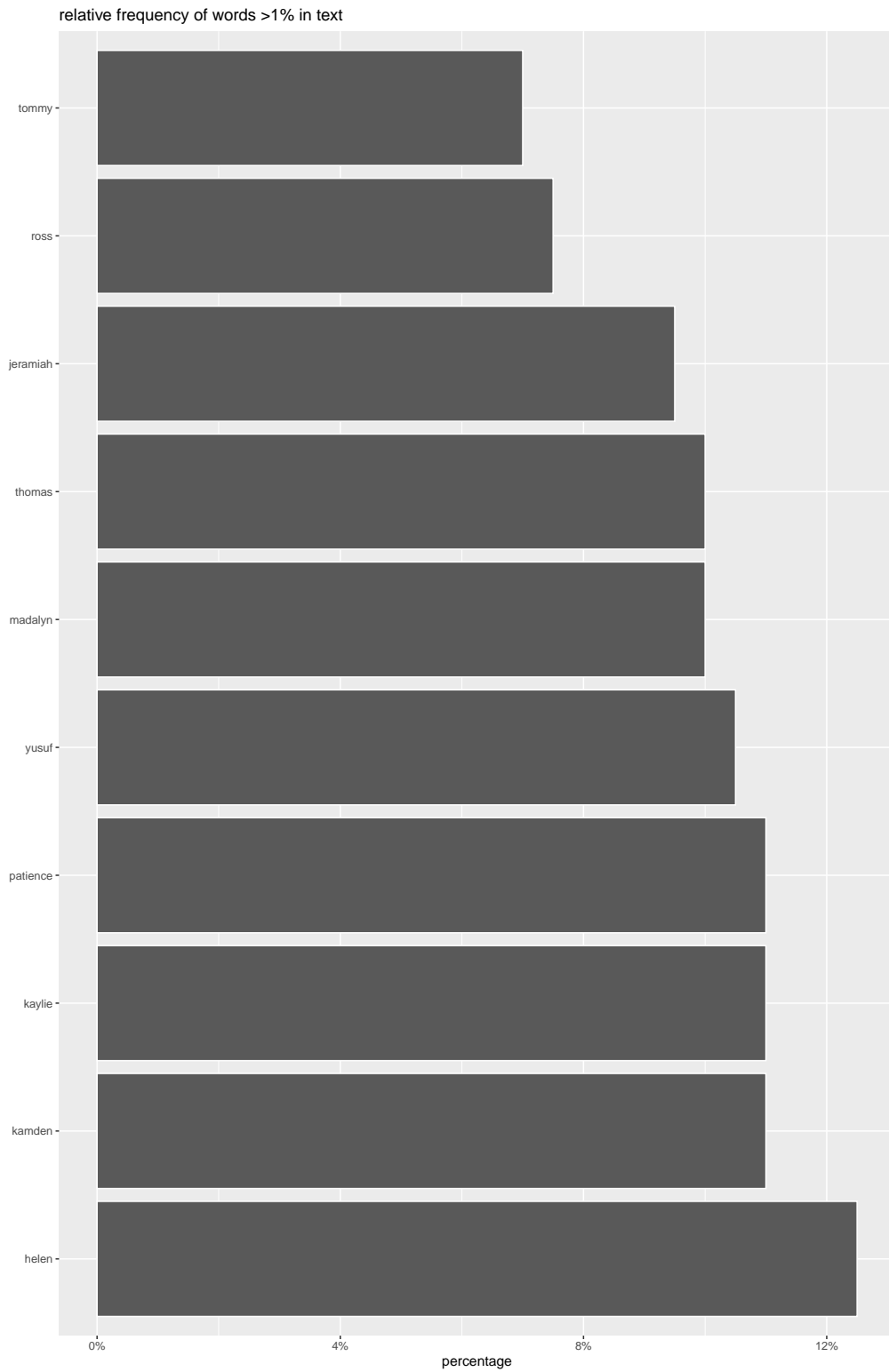
1. print this file
2. give the raw file to 1-4 students, they shall count the words. Measure the time. This is sequential processing.
3. give the chunked file to the respective number of students. There are $n = 2, 4, 5, 10$ groups available. The number of students is the chunk server.
4. one student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

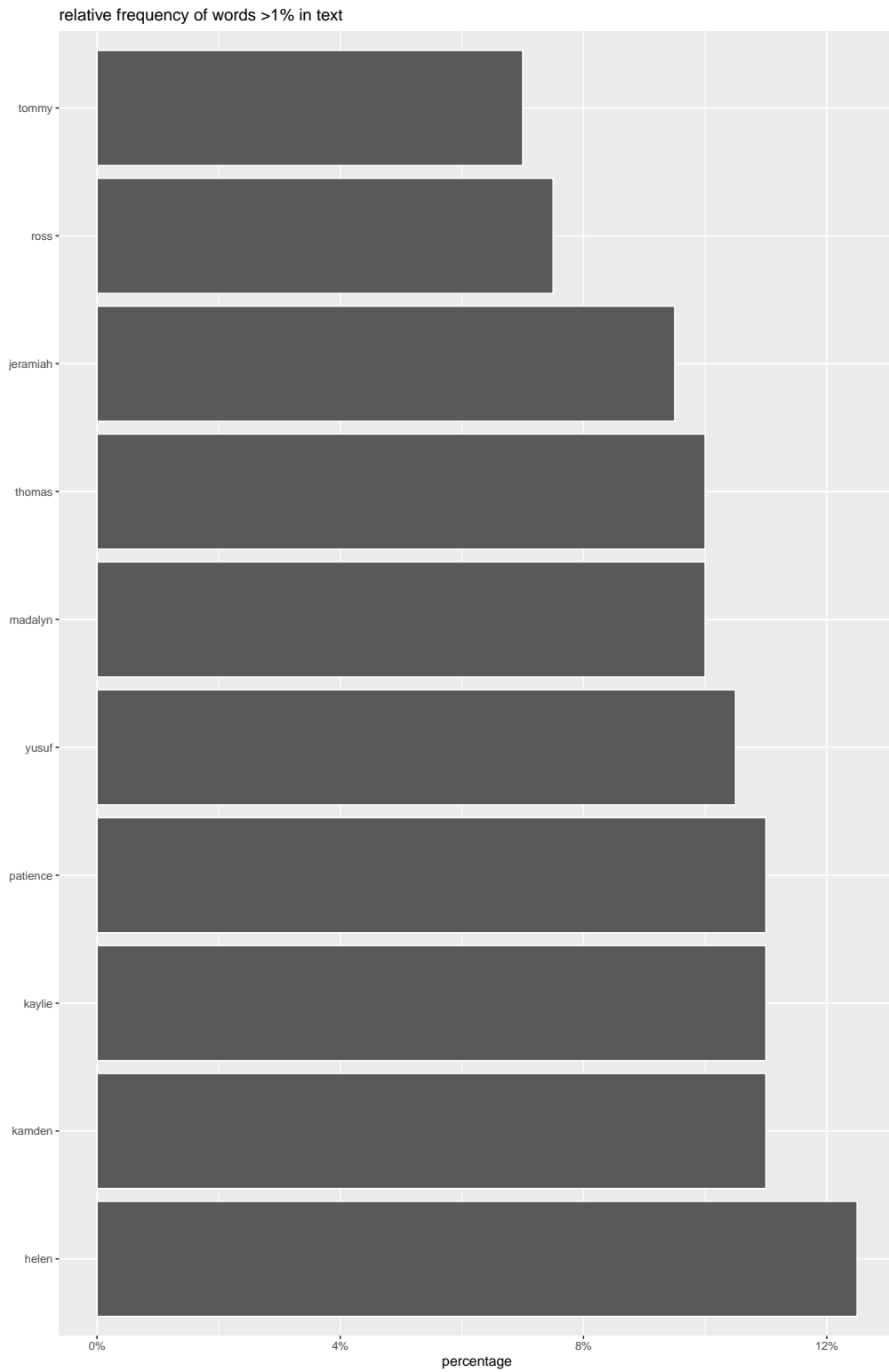
some summary statistics on the raw data

In total there are 200 words available.

words	Freq	percentage	percentage_round
helen	25	12.50%	12.50%
kamden	22	11.00%	11.00%
kaylie	22	11.00%	11.00%
patience	22	11.00%	11.00%
yusuf	21	10.50%	10.50%
madalyn	20	10.00%	10.00%
thomas	20	10.00%	10.00%
jeramiah	19	9.50%	9.50%
ross	15	7.50%	7.50%
tommy	14	7.00%	7.00%







The Raw data 01

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

The Raw data 02

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

The Raw data 03

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

The Raw data 04

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

Two Groups

Part 1 of 2 (100 words)

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

Part 2 of 2 (100 words)

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

Four Groups

Part 1 of 4 (50 words)

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

Part 2 of 4 (50 words)

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

Part 3 of 4 (50 words)

ross patience tommy kaylie patience yusuf patience madalyn kaylie helen kamden jeramiah
kamden yusuf thomas kamden patience kaylie helen madalyn helen madalyn helen yusuf
jeramiah kaylie madalyn ross jeramiah tommy helen kaylie patience yusuf yusuf thomas he-
len helen thomas thomas jeramiah jeramiah madalyn thomas kamden jeramiah kaylie yusuf
patience ross

Part 4 of 4 (50 words)

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

Five Groups

Part 1 of 5 (40 words)

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

Part 2 of 5 (40 words)

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

Part 3 of 5 (40 words)

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

Part 4 of 5 (40 words)

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

Part 5 of 5 (40 words)

kaylie helen kaylie thomas tommy madalyn kaylie madalyn tommy ross yusuf kaylie thomas
jeramiah helen madalyn kamden thomas yusuf tommy ross ross jeramiah tommy yusuf he-
len yusuf patience yusuf kaylie thomas helen thomas madalyn thomas helen patience helen
patience madalyn

Ten Groups

Part 1 of 10 (20 words)

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

Part 2 of 10 (20 words)

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

Part 3 of 10 (20 words)

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

Part 4 of 10 (20 words)

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

Part 5 of 10 (20 words)

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

Part 6 of 10 (20 words)

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

Part 7 of 10 (20 words)

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

Part 8 of 10 (20 words)

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

Part 9 of 10 (20 words)

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

Part 10 of 10 (20 words)

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

Twenty Groups

Part 1 of 20 (10 words)

kaylie kaylie madalyn yusuf kamden tommy madalyn patience yusuf yusuf

Part 2 of 20 (10 words)

tommy madalyn ross ross patience kamden tommy kamden kaylie jeramiah

Part 3 of 20 (10 words)

ross yusuf kamden kamden helen kaylie helen thomas jeramiah jeramiah

Part 4 of 20 (10 words)

jeramiah kaylie helen jeramiah yusuf tommy helen madalyn jeramiah ross

Part 5 of 20 (10 words)

kaylie tommy tommy thomas kamden ross yusuf yusuf thomas patience

Part 6 of 20 (10 words)

kamden patience kamden helen thomas helen kaylie patience patience yusuf

Part 7 of 20 (10 words)

patience patience jeramiah patience madalyn madalyn kaylie helen jeramiah kaylie

Part 8 of 20 (10 words)

yusuf yusuf kamden jeramiah ross kamden kaylie thomas helen kaylie

Part 9 of 20 (10 words)

thomas kaylie kaylie jeramiah ross madalyn patience thomas jeramiah jeramiah

Part 10 of 20 (10 words)

helen madalyn ross jeramiah thomas ross helen kaylie madalyn helen

Part 11 of 20 (10 words)

tommy madalyn kamden kaylie helen ross patience helen madalyn yusuf

Part 12 of 20 (10 words)

thomas yusuf tommy patience jeramiah yusuf kamden helen thomas madalyn

Part 13 of 20 (10 words)

patience patience tommy helen madalyn helen jeramiah patience yusuf jeramiah

Part 14 of 20 (10 words)

helen patience helen helen kamden thomas patience yusuf kaylie kaylie

Part 15 of 20 (10 words)

kaylie kaylie yusuf helen yusuf jeramiah yusuf thomas thomas patience

Part 16 of 20 (10 words)

thomas kamden kamden kaylie ross kamden jeramiah helen patience thomas

Part 17 of 20 (10 words)

ross patience kamden thomas kamden thomas tommy kamden tommy ross

Part 18 of 20 (10 words)

madalyn ross helen madalyn yusuf kaylie kamden yusuf madalyn kamden

Part 19 of 20 (10 words)

patience helen thomas madalyn jeramiah tommy yusuf thomas kamden ross

Part 20 of 20 (10 words)

thomas madalyn kaylie madalyn tommy tommy patience helen helen madalyn