

BART and json data

Today we are going to take a look at the BART website and look at the visualizations presented on the website analytics.bart.gov.

We will take a look at *json* formatted data, which is a very common data format for sharing data on the internet.

Directions:

1. Create an R Project call BART.
2. Download the devices data.
3. Try the following R code to make the bar graph for the devices used to access the BART website.

Load the libraries used.

```
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.2.1 --
## v ggplot2 3.2.1    v purrr   0.3.2
## v tibble  2.1.3    v dplyr  0.8.3
## v tidyr   1.0.0    v stringr 1.4.0
## v readr   1.3.1    v forcats 0.4.0

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(jsonlite)

##
## Attaching package: 'jsonlite'
##
## The following object is masked from 'package:purrr':
##
##   flatten
```

Read in the json data.

```
json_file <- "devices.json"

json_data <- fromJSON(json_file)
json_data
```

```
##      date   device visits
## 1 20190625 desktop  15551
## 2 20190625  mobile  41997
## 3 20190625  tablet   1582
## 4 20190626 desktop  14352
## 5 20190626  mobile  40869
## 6 20190626  tablet   1389
## 7 20190627 desktop  14031
## 8 20190627  mobile  41155
## 9 20190627  tablet   1399
## 10 20190628 desktop  13956
## 11 20190628  mobile  46090
```

##	12	20190628	tablet	1385
##	13	20190629	desktop	7288
##	14	20190629	mobile	42827
##	15	20190629	tablet	1693
##	16	20190630	desktop	6957
##	17	20190630	mobile	46933
##	18	20190630	tablet	1633
##	19	20190701	desktop	14139
##	20	20190701	mobile	38068
##	21	20190701	tablet	1369
##	22	20190702	desktop	18289
##	23	20190702	mobile	50373
##	24	20190702	tablet	1628
##	25	20190703	desktop	14613
##	26	20190703	mobile	43388
##	27	20190703	tablet	1439
##	28	20190704	desktop	6201
##	29	20190704	mobile	36832
##	30	20190704	tablet	1467
##	31	20190705	desktop	8421
##	32	20190705	mobile	31632
##	33	20190705	tablet	1329
##	34	20190706	desktop	5436
##	35	20190706	mobile	27554
##	36	20190706	tablet	1392
##	37	20190707	desktop	6248
##	38	20190707	mobile	28532
##	39	20190707	tablet	1446
##	40	20190708	desktop	14268
##	41	20190708	mobile	37497
##	42	20190708	tablet	1338
##	43	20190709	desktop	14128
##	44	20190709	mobile	38507
##	45	20190709	tablet	1332
##	46	20190710	desktop	13849
##	47	20190710	mobile	38642
##	48	20190710	tablet	1413
##	49	20190711	desktop	13324
##	50	20190711	mobile	38617
##	51	20190711	tablet	1314
##	52	20190712	desktop	12875
##	53	20190712	mobile	40607
##	54	20190712	tablet	1451
##	55	20190713	desktop	6057
##	56	20190713	mobile	32788
##	57	20190713	tablet	1412
##	58	20190714	desktop	6576
##	59	20190714	mobile	31689
##	60	20190714	tablet	1565
##	61	20190715	desktop	14451
##	62	20190715	mobile	38308
##	63	20190715	tablet	1481
##	64	20190716	desktop	14449
##	65	20190716	mobile	39815

##	66	20190716	tablet	1455
##	67	20190717	desktop	13814
##	68	20190717	mobile	40983
##	69	20190717	tablet	1399
##	70	20190718	desktop	14773
##	71	20190718	mobile	44951
##	72	20190718	tablet	1508
##	73	20190719	desktop	12483
##	74	20190719	mobile	42166
##	75	20190719	tablet	1421
##	76	20190720	desktop	5824
##	77	20190720	mobile	34133
##	78	20190720	tablet	1451
##	79	20190721	desktop	6225
##	80	20190721	mobile	30953
##	81	20190721	tablet	1505
##	82	20190722	desktop	14416
##	83	20190722	mobile	39063
##	84	20190722	tablet	1435
##	85	20190723	desktop	14384
##	86	20190723	mobile	40504
##	87	20190723	tablet	1468
##	88	20190724	desktop	14448
##	89	20190724	mobile	48106
##	90	20190724	tablet	1483
##	91	20190725	desktop	14138
##	92	20190725	mobile	41832
##	93	20190725	tablet	1421
##	94	20190726	desktop	12373
##	95	20190726	mobile	40817
##	96	20190726	tablet	1433
##	97	20190727	desktop	6221
##	98	20190727	mobile	34308
##	99	20190727	tablet	1538
##	100	20190728	desktop	6509
##	101	20190728	mobile	33180
##	102	20190728	tablet	1538
##	103	20190729	desktop	13715
##	104	20190729	mobile	37370
##	105	20190729	tablet	1383
##	106	20190730	desktop	13974
##	107	20190730	mobile	39914
##	108	20190730	tablet	1395
##	109	20190731	desktop	13914
##	110	20190731	mobile	40389
##	111	20190731	tablet	1407
##	112	20190801	desktop	13443
##	113	20190801	mobile	39901
##	114	20190801	tablet	1391
##	115	20190802	desktop	12011
##	116	20190802	mobile	38891
##	117	20190802	tablet	1329
##	118	20190803	desktop	5964
##	119	20190803	mobile	32214

##	120	20190803	tablet	1543
##	121	20190804	desktop	6325
##	122	20190804	mobile	30814
##	123	20190804	tablet	1494
##	124	20190805	desktop	14191
##	125	20190805	mobile	38980
##	126	20190805	tablet	1568
##	127	20190806	desktop	14548
##	128	20190806	mobile	39724
##	129	20190806	tablet	1505
##	130	20190807	desktop	15100
##	131	20190807	mobile	42427
##	132	20190807	tablet	1445
##	133	20190808	desktop	13973
##	134	20190808	mobile	41476
##	135	20190808	tablet	1436
##	136	20190809	desktop	12491
##	137	20190809	mobile	42376
##	138	20190809	tablet	1387
##	139	20190810	desktop	6137
##	140	20190810	mobile	35757
##	141	20190810	tablet	1507
##	142	20190811	desktop	6227
##	143	20190811	mobile	32941
##	144	20190811	tablet	1644
##	145	20190812	desktop	13949
##	146	20190812	mobile	38668
##	147	20190812	tablet	1460
##	148	20190813	desktop	14696
##	149	20190813	mobile	41031
##	150	20190813	tablet	1540
##	151	20190814	desktop	14319
##	152	20190814	mobile	42195
##	153	20190814	tablet	1531
##	154	20190815	desktop	14720
##	155	20190815	mobile	42568
##	156	20190815	tablet	1621
##	157	20190816	desktop	13626
##	158	20190816	mobile	43009
##	159	20190816	tablet	1773
##	160	20190817	desktop	6267
##	161	20190817	mobile	35854
##	162	20190817	tablet	1707
##	163	20190818	desktop	6941
##	164	20190818	mobile	33712
##	165	20190818	tablet	1752
##	166	20190819	desktop	15277
##	167	20190819	mobile	41562
##	168	20190819	tablet	1541
##	169	20190820	desktop	14928
##	170	20190820	mobile	42863
##	171	20190820	tablet	1536
##	172	20190821	desktop	14592
##	173	20190821	mobile	42507

##	174	20190821	tablet	1520
##	175	20190822	desktop	14561
##	176	20190822	mobile	43354
##	177	20190822	tablet	1573
##	178	20190823	desktop	12792
##	179	20190823	mobile	41510
##	180	20190823	tablet	1547
##	181	20190824	desktop	6538
##	182	20190824	mobile	37138
##	183	20190824	tablet	1739
##	184	20190825	desktop	6922
##	185	20190825	mobile	34530
##	186	20190825	tablet	1675
##	187	20190826	desktop	14618
##	188	20190826	mobile	40365
##	189	20190826	tablet	1530
##	190	20190827	desktop	14132
##	191	20190827	mobile	41772
##	192	20190827	tablet	1541
##	193	20190828	desktop	14145
##	194	20190828	mobile	41277
##	195	20190828	tablet	1449
##	196	20190829	desktop	14593
##	197	20190829	mobile	43854
##	198	20190829	tablet	1532
##	199	20190830	desktop	13155
##	200	20190830	mobile	44778
##	201	20190830	tablet	1575
##	202	20190831	desktop	6009
##	203	20190831	mobile	36380
##	204	20190831	tablet	1703
##	205	20190901	desktop	5929
##	206	20190901	mobile	33740
##	207	20190901	tablet	1573
##	208	20190902	desktop	7410
##	209	20190902	mobile	36017
##	210	20190902	tablet	1664
##	211	20190903	desktop	15390
##	212	20190903	mobile	44009
##	213	20190903	tablet	1647
##	214	20190904	desktop	14520
##	215	20190904	mobile	42503
##	216	20190904	tablet	1589
##	217	20190905	desktop	14474
##	218	20190905	mobile	44053
##	219	20190905	tablet	1503
##	220	20190906	desktop	13282
##	221	20190906	mobile	45707
##	222	20190906	tablet	1616
##	223	20190907	desktop	6371
##	224	20190907	mobile	38548
##	225	20190907	tablet	1702
##	226	20190908	desktop	6632
##	227	20190908	mobile	35898

```

## 228 20190908 tablet 1633
## 229 20190909 desktop 15896
## 230 20190909 mobile 46659
## 231 20190909 tablet 1538
## 232 20190910 desktop 15182
## 233 20190910 mobile 43902
## 234 20190910 tablet 1546
## 235 20190911 desktop 15143
## 236 20190911 mobile 44537
## 237 20190911 tablet 1597
## 238 20190912 desktop 14927
## 239 20190912 mobile 52976
## 240 20190912 tablet 1673
## 241 20190913 desktop 12930
## 242 20190913 mobile 45278
## 243 20190913 tablet 1475
## 244 20190914 desktop 6293
## 245 20190914 mobile 38741
## 246 20190914 tablet 1676
## 247 20190915 desktop 6771
## 248 20190915 mobile 38084
## 249 20190915 tablet 1627
## 250 20190916 desktop 15142
## 251 20190916 mobile 46061
## 252 20190916 tablet 1544
## 253 20190917 desktop 14549
## 254 20190917 mobile 43660
## 255 20190917 tablet 1494
## 256 20190918 desktop 14440
## 257 20190918 mobile 43491
## 258 20190918 tablet 1483
## 259 20190919 desktop 25108
## 260 20190919 mobile 62112
## 261 20190919 tablet 1734
## 262 20190920 desktop 13503
## 263 20190920 mobile 46900
## 264 20190920 tablet 1527
## 265 20190921 desktop 5957
## 266 20190921 mobile 35927
## 267 20190921 tablet 1519
## 268 20190922 desktop 6353
## 269 20190922 mobile 32894
## 270 20190922 tablet 1578

```

Fix the visits column so that it is a numeric value.

```

json_data <- json_data %>% mutate(visits = as.numeric(visits))
json_data

```

```

##      date device visits
## 1 20190625 desktop 15551
## 2 20190625 mobile 41997
## 3 20190625 tablet 1582
## 4 20190626 desktop 14352
## 5 20190626 mobile 40869

```

## 6	20190626	tablet	1389
## 7	20190627	desktop	14031
## 8	20190627	mobile	41155
## 9	20190627	tablet	1399
## 10	20190628	desktop	13956
## 11	20190628	mobile	46090
## 12	20190628	tablet	1385
## 13	20190629	desktop	7288
## 14	20190629	mobile	42827
## 15	20190629	tablet	1693
## 16	20190630	desktop	6957
## 17	20190630	mobile	46933
## 18	20190630	tablet	1633
## 19	20190701	desktop	14139
## 20	20190701	mobile	38068
## 21	20190701	tablet	1369
## 22	20190702	desktop	18289
## 23	20190702	mobile	50373
## 24	20190702	tablet	1628
## 25	20190703	desktop	14613
## 26	20190703	mobile	43388
## 27	20190703	tablet	1439
## 28	20190704	desktop	6201
## 29	20190704	mobile	36832
## 30	20190704	tablet	1467
## 31	20190705	desktop	8421
## 32	20190705	mobile	31632
## 33	20190705	tablet	1329
## 34	20190706	desktop	5436
## 35	20190706	mobile	27554
## 36	20190706	tablet	1392
## 37	20190707	desktop	6248
## 38	20190707	mobile	28532
## 39	20190707	tablet	1446
## 40	20190708	desktop	14268
## 41	20190708	mobile	37497
## 42	20190708	tablet	1338
## 43	20190709	desktop	14128
## 44	20190709	mobile	38507
## 45	20190709	tablet	1332
## 46	20190710	desktop	13849
## 47	20190710	mobile	38642
## 48	20190710	tablet	1413
## 49	20190711	desktop	13324
## 50	20190711	mobile	38617
## 51	20190711	tablet	1314
## 52	20190712	desktop	12875
## 53	20190712	mobile	40607
## 54	20190712	tablet	1451
## 55	20190713	desktop	6057
## 56	20190713	mobile	32788
## 57	20190713	tablet	1412
## 58	20190714	desktop	6576
## 59	20190714	mobile	31689

##	60	20190714	tablet	1565
##	61	20190715	desktop	14451
##	62	20190715	mobile	38308
##	63	20190715	tablet	1481
##	64	20190716	desktop	14449
##	65	20190716	mobile	39815
##	66	20190716	tablet	1455
##	67	20190717	desktop	13814
##	68	20190717	mobile	40983
##	69	20190717	tablet	1399
##	70	20190718	desktop	14773
##	71	20190718	mobile	44951
##	72	20190718	tablet	1508
##	73	20190719	desktop	12483
##	74	20190719	mobile	42166
##	75	20190719	tablet	1421
##	76	20190720	desktop	5824
##	77	20190720	mobile	34133
##	78	20190720	tablet	1451
##	79	20190721	desktop	6225
##	80	20190721	mobile	30953
##	81	20190721	tablet	1505
##	82	20190722	desktop	14416
##	83	20190722	mobile	39063
##	84	20190722	tablet	1435
##	85	20190723	desktop	14384
##	86	20190723	mobile	40504
##	87	20190723	tablet	1468
##	88	20190724	desktop	14448
##	89	20190724	mobile	48106
##	90	20190724	tablet	1483
##	91	20190725	desktop	14138
##	92	20190725	mobile	41832
##	93	20190725	tablet	1421
##	94	20190726	desktop	12373
##	95	20190726	mobile	40817
##	96	20190726	tablet	1433
##	97	20190727	desktop	6221
##	98	20190727	mobile	34308
##	99	20190727	tablet	1538
##	100	20190728	desktop	6509
##	101	20190728	mobile	33180
##	102	20190728	tablet	1538
##	103	20190729	desktop	13715
##	104	20190729	mobile	37370
##	105	20190729	tablet	1383
##	106	20190730	desktop	13974
##	107	20190730	mobile	39914
##	108	20190730	tablet	1395
##	109	20190731	desktop	13914
##	110	20190731	mobile	40389
##	111	20190731	tablet	1407
##	112	20190801	desktop	13443
##	113	20190801	mobile	39901

##	114	20190801	tablet	1391
##	115	20190802	desktop	12011
##	116	20190802	mobile	38891
##	117	20190802	tablet	1329
##	118	20190803	desktop	5964
##	119	20190803	mobile	32214
##	120	20190803	tablet	1543
##	121	20190804	desktop	6325
##	122	20190804	mobile	30814
##	123	20190804	tablet	1494
##	124	20190805	desktop	14191
##	125	20190805	mobile	38980
##	126	20190805	tablet	1568
##	127	20190806	desktop	14548
##	128	20190806	mobile	39724
##	129	20190806	tablet	1505
##	130	20190807	desktop	15100
##	131	20190807	mobile	42427
##	132	20190807	tablet	1445
##	133	20190808	desktop	13973
##	134	20190808	mobile	41476
##	135	20190808	tablet	1436
##	136	20190809	desktop	12491
##	137	20190809	mobile	42376
##	138	20190809	tablet	1387
##	139	20190810	desktop	6137
##	140	20190810	mobile	35757
##	141	20190810	tablet	1507
##	142	20190811	desktop	6227
##	143	20190811	mobile	32941
##	144	20190811	tablet	1644
##	145	20190812	desktop	13949
##	146	20190812	mobile	38668
##	147	20190812	tablet	1460
##	148	20190813	desktop	14696
##	149	20190813	mobile	41031
##	150	20190813	tablet	1540
##	151	20190814	desktop	14319
##	152	20190814	mobile	42195
##	153	20190814	tablet	1531
##	154	20190815	desktop	14720
##	155	20190815	mobile	42568
##	156	20190815	tablet	1621
##	157	20190816	desktop	13626
##	158	20190816	mobile	43009
##	159	20190816	tablet	1773
##	160	20190817	desktop	6267
##	161	20190817	mobile	35854
##	162	20190817	tablet	1707
##	163	20190818	desktop	6941
##	164	20190818	mobile	33712
##	165	20190818	tablet	1752
##	166	20190819	desktop	15277
##	167	20190819	mobile	41562

##	168	20190819	tablet	1541
##	169	20190820	desktop	14928
##	170	20190820	mobile	42863
##	171	20190820	tablet	1536
##	172	20190821	desktop	14592
##	173	20190821	mobile	42507
##	174	20190821	tablet	1520
##	175	20190822	desktop	14561
##	176	20190822	mobile	43354
##	177	20190822	tablet	1573
##	178	20190823	desktop	12792
##	179	20190823	mobile	41510
##	180	20190823	tablet	1547
##	181	20190824	desktop	6538
##	182	20190824	mobile	37138
##	183	20190824	tablet	1739
##	184	20190825	desktop	6922
##	185	20190825	mobile	34530
##	186	20190825	tablet	1675
##	187	20190826	desktop	14618
##	188	20190826	mobile	40365
##	189	20190826	tablet	1530
##	190	20190827	desktop	14132
##	191	20190827	mobile	41772
##	192	20190827	tablet	1541
##	193	20190828	desktop	14145
##	194	20190828	mobile	41277
##	195	20190828	tablet	1449
##	196	20190829	desktop	14593
##	197	20190829	mobile	43854
##	198	20190829	tablet	1532
##	199	20190830	desktop	13155
##	200	20190830	mobile	44778
##	201	20190830	tablet	1575
##	202	20190831	desktop	6009
##	203	20190831	mobile	36380
##	204	20190831	tablet	1703
##	205	20190901	desktop	5929
##	206	20190901	mobile	33740
##	207	20190901	tablet	1573
##	208	20190902	desktop	7410
##	209	20190902	mobile	36017
##	210	20190902	tablet	1664
##	211	20190903	desktop	15390
##	212	20190903	mobile	44009
##	213	20190903	tablet	1647
##	214	20190904	desktop	14520
##	215	20190904	mobile	42503
##	216	20190904	tablet	1589
##	217	20190905	desktop	14474
##	218	20190905	mobile	44053
##	219	20190905	tablet	1503
##	220	20190906	desktop	13282
##	221	20190906	mobile	45707

```

## 222 20190906  tablet  1616
## 223 20190907  desktop 6371
## 224 20190907  mobile 38548
## 225 20190907  tablet  1702
## 226 20190908  desktop 6632
## 227 20190908  mobile 35898
## 228 20190908  tablet  1633
## 229 20190909  desktop 15896
## 230 20190909  mobile 46659
## 231 20190909  tablet  1538
## 232 20190910  desktop 15182
## 233 20190910  mobile 43902
## 234 20190910  tablet  1546
## 235 20190911  desktop 15143
## 236 20190911  mobile 44537
## 237 20190911  tablet  1597
## 238 20190912  desktop 14927
## 239 20190912  mobile 52976
## 240 20190912  tablet  1673
## 241 20190913  desktop 12930
## 242 20190913  mobile 45278
## 243 20190913  tablet  1475
## 244 20190914  desktop 6293
## 245 20190914  mobile 38741
## 246 20190914  tablet  1676
## 247 20190915  desktop 6771
## 248 20190915  mobile 38084
## 249 20190915  tablet  1627
## 250 20190916  desktop 15142
## 251 20190916  mobile 46061
## 252 20190916  tablet  1544
## 253 20190917  desktop 14549
## 254 20190917  mobile 43660
## 255 20190917  tablet  1494
## 256 20190918  desktop 14440
## 257 20190918  mobile 43491
## 258 20190918  tablet  1483
## 259 20190919  desktop 25108
## 260 20190919  mobile 62112
## 261 20190919  tablet  1734
## 262 20190920  desktop 13503
## 263 20190920  mobile 46900
## 264 20190920  tablet  1527
## 265 20190921  desktop 5957
## 266 20190921  mobile 35927
## 267 20190921  tablet  1519
## 268 20190922  desktop 6353
## 269 20190922  mobile 32894
## 270 20190922  tablet  1578

```

Make a table of the most recent day's data.

```

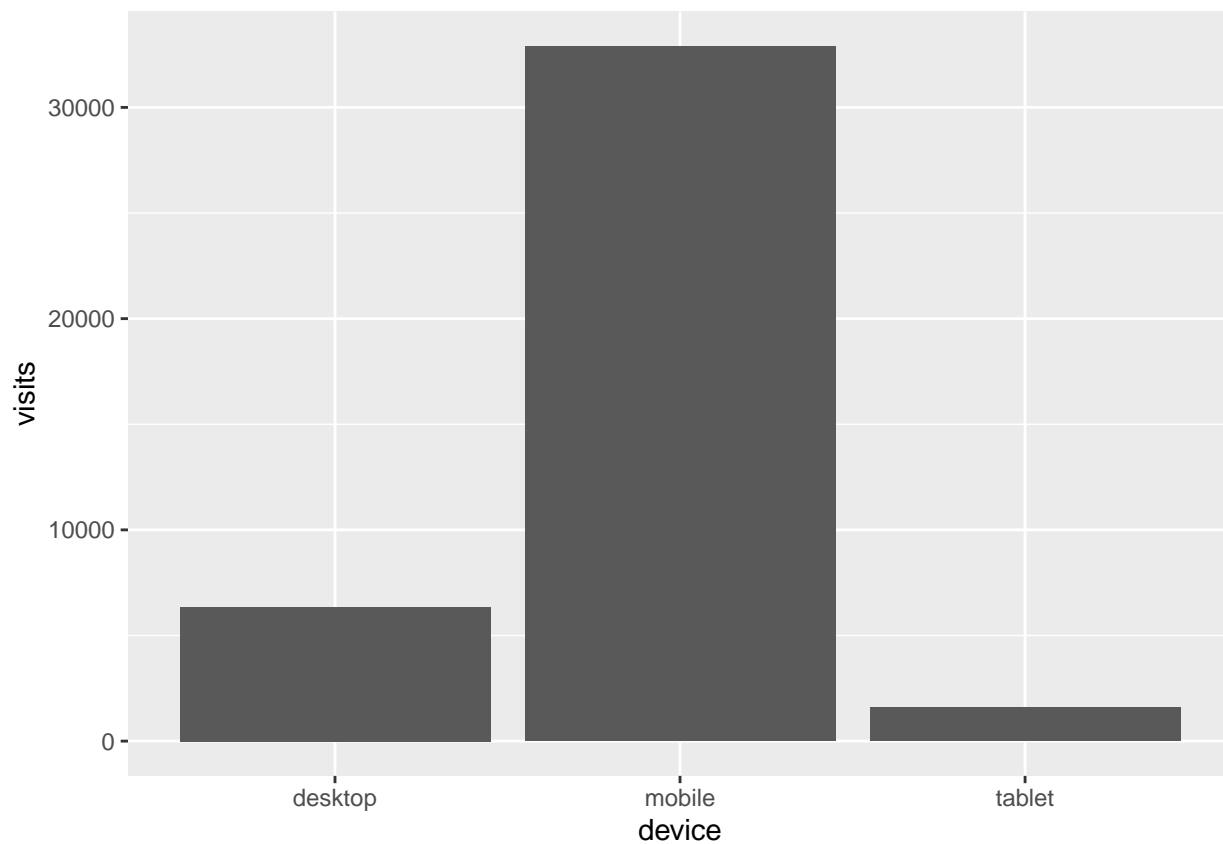
json_data %>% filter( date == "20190922" ) %>%
  group_by(device)

```

```
## # A tibble: 3 x 3
## # Groups:   device [3]
##   date     device visits
##   <chr>    <chr>  <dbl>
## 1 20190922 desktop  6353
## 2 20190922 mobile  32894
## 3 20190922 tablet   1578
```

Make a bar plot.

```
json_data %>% filter( date == "20190922" ) %>%
  ggplot(aes(y = visits, x = device)) +
  geom_bar(stat="identity")
```



Make a bar plot using percentages.

```
json_data <- json_data %>% filter( date == "20190922" ) %>%
  mutate(visits_percentage = 100*visits/sum(visits))
json_data
```

```
##       date     device visits visits_percentage
## 1 20190922 desktop  6353         15.561543
## 2 20190922 mobile  32894         80.573178
## 3 20190922 tablet   1578          3.865279
```

```
json_data %>% ggplot(aes(y = visits_percentage, x = device)) +
  geom_bar(stat="identity") +
  coord_flip()
```

