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](https://analytics.bart.gov/bart).

We will take a look at *json* formated 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](https://www.bart.gov/sites/default/files/analytics/devices.json) 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 ──

## ✔ ggplot2 3.2.1 ✔ purrr 0.3.2  
## ✔ tibble 2.1.3 ✔ dplyr 0.8.3  
## ✔ tidyr 1.0.0 ✔ stringr 1.4.0  
## ✔ readr 1.3.1 ✔ forcats 0.4.0

## ── Conflicts ─────────────────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ 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  
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## 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  
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## 98 20190727 mobile 34308  
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## 103 20190729 desktop 13715  
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## 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

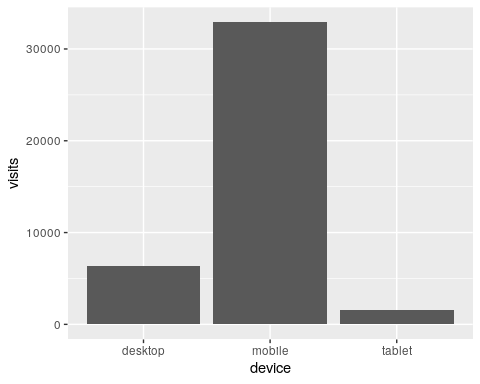
Make a table of the most recent day’s data.

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()

