Project

Miller Kodish

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Loading In Datasets

```
# Geekbench datasets
recent_cpu <- read.csv(here("Datasets", "Geekbench", "recent-cpu-v6.csv"))
recent_gpu <- read.csv(here("Datasets", "Geekbench", "recent-gpu-v6.csv"))
single_core <- read.csv(here("Datasets", "Geekbench", "single-core-v4.csv"))
```

```
top_multi <- read.csv(here("Datasets", "Geekbench", "top-multi-core-v6.csv"))
top_single <- read.csv(here("Datasets", "Geekbench", "top-single-core-v6.csv"))

# Kaggle datasets
gpu_benchmarks <- read.csv(here("Datasets", "Kaggle", "GPU_benchmarks_v7.csv"))
gpu_scores <- read.csv(here("Datasets", "Kaggle", "GPU_scores_graphicsAPIs.csv"))
```

Verifying Datasets Loaded In Correctly

```
# Print basic info for each dataset
datasets <- list(
  recent_cpu = recent_cpu,
  recent_gpu = recent_gpu,
  single_core = single_core,
  top_multi = top_multi,
  top_single = top_single,
  gpu_benchmarks = gpu_benchmarks,
  gpu_scores = gpu_scores
)

for (name in names(datasets)) {
  cat("===== Dataset:", name, "=====\n")
  cat("Rows:", nrow(datasets[[name]]), " | Columns:", ncol(datasets[[name]]), "\n\n")
  cat("Column Names:\n")
  print(names(datasets[[name]]))
  cat("\nStructure:\n")
  str(datasets[[name]], max.level = 1)
  cat("\n\n")
}
```

```
## ===== Dataset: recent_cpu =====
## Rows: 3000  | Columns: 11
##
## Column Names:
##  [1] "Uploaded"          "System"            "CPU.Details"
##  [4] "Frequency_MHz"     "Cores"             "Platform"
##  [7] "User"              "Single.Core.Score" "Multi.Core.Score"
## [10] "Result.URL"        "Schema"
##
## Structure:
## 'data.frame':    3000 obs. of  11 variables:
##  $ Uploaded         : chr  "Nov 06, 2025" "Nov 06, 2025" "Nov 06, 2025" "Nov 06, 2025" ...
##  $ System           : chr  "iPhone 15" "Xiaomi Poco X6 Pro" "ASUS ROG Phone 3" "NVIDIA NVIDIA Jetson
##  $ CPU.Details      : chr  "Apple A16 Bionic 3460 MHz (6 cores)" "ARM ARMv8 2200 MHz (8 cores)" "ARM
##  $ Frequency_MHz    : num  3460 2200 1804 2201 2400 ...
##  $ Cores            : int  6 8 8 1 8 8 8 8 6 8 ...
##  $ Platform         : chr  "iOS" "Android" "Android" "Linux" ...
##  $ User             : chr  "" "" "" "" ...
##  $ Single.Core.Score: int  2641 1169 1253 1002 2533 2137 1919 2601 1611 982 ...
##  $ Multi.Core.Score : int  6615 3993 2943 6813 7755 6587 4819 9255 6380 4613 ...
##  $ Result.URL       : chr  "/v6/cpu/14887487" "/v6/cpu/14887486" "/v6/cpu/14887485" "/v6/cpu/1488748
##  $ Schema           : chr  "v6" "v6" "v6" "v6" ...
##
##
## ===== Dataset: recent_gpu =====
## Rows: 3000  | Columns: 11
##
## Column Names:
##  [1] "Uploaded"      "System"        "CPU.Details"   "Frequency_MHz"
##  [5] "Cores"         "Platform"      "API"           "Score.Label"
##  [9] "Compute.Score" "Result.URL"    "Schema"
##
## Structure:
## 'data.frame':    3000 obs. of  11 variables:
##  $ Uploaded     : chr  "Nov 06, 2025" "Nov 06, 2025" "Nov 06, 2025 gcouegnat" "Nov 06, 2025" ...
##  $ System       : chr  "Xiaomi 22101316UG" "ASUS System Product Name" "System manufacturer System Pr
##  $ CPU.Details  : chr  "ARM MT6877V/TTZA 2000 MHz (8 cores)" "AMD Ryzen 9 9950X 4300 MHz (16 cores)"
##  $ Frequency_MHz: num  2000 4300 2800 3801 2100 ...
##  $ Cores        : int  8 16 6 6 20 8 6 8 8 6 ...
##  $ Platform     : chr  "Android" "Windows" "Linux" "Windows" ...
##  $ API          : chr  "OpenCL" "OpenCL" "OpenCL" "OpenCL" ...
##  $ Score.Label  : chr  "OpenCL Score" "OpenCL Score" "OpenCL Score" "OpenCL Score" ...
##  $ Compute.Score: int  2408 136623 3993 113380 123443 5516 45718 22516 18275 21309 ...
##  $ Result.URL   : chr  "/v6/compute/5152150" "/v6/compute/5152149" "/v6/compute/5152148" "/v6/comput
##  $ Schema       : chr  "v6-compute" "v6-compute" "v6-compute" "v6-compute" ...
##
##
## ===== Dataset: single_core =====
## Rows: 3000  | Columns: 10
##
## Column Names:
##  [1] "Uploaded"          "Model"             "CPU.Details"
##  [4] "Frequency_MHz"     "Cores"             "Platform"
##  [7] "User"              "Single.Core.Score" "Multi.Core.Score"
## [10] "Model.URL"
##
## Structure:
## 'data.frame':    3000 obs. of  10 variables:
##  $ Uploaded         : chr  "Thu, 13 Oct 2022 12:54:18 +0000" "Tue, 16 Jan 2024 09:24:50 +0000" "Tue,
##  $ Model            : chr  "OPPO PCRT00" "Asus ASUS_I005DA" "ASRock Z790I Lightning WiFi" "Gigabyte T
##  $ CPU.Details      : chr  "Intel Core i7-8750H" "AMD Ryzen 7 PRO 4750G" "Intel(R) Core(TM) i9-14900K
##  $ Frequency_MHz    : num  500 2400 3200 800 2995 ...
##  $ Cores            : int  6 8 5 8 4 8 8 6 8 8 ...
##  $ Platform         : chr  "Android 32-bit" "Android 32-bit" "Windows 64-bit" "Windows 64-bit" ...
##  $ User             : chr  "" "" "splave" "" ...
##  $ Single.Core.Score: int  43186 14674 14546 14372 14253 14244 14172 14061 14041 14041 ...
##  $ Multi.Core.Score : int  161825 49072 10500 13511 13344 89160 88309 70401 88822 88822 ...
##  $ Model.URL        : chr  "/v4/cpu/16641262" "/v4/cpu/17163115" "/v4/cpu/17443838" "/v4/cpu/1669932
##
##
## ===== Dataset: top_multi =====
## Rows: 3000  | Columns: 11
##
## Column Names:
##  [1] "Uploaded"          "System"            "CPU.Details"
##  [4] "Frequency_MHz"     "Cores"             "Platform"
##  [7] "User"              "Single.Core.Score" "Multi.Core.Score"
## [10] "Result.URL"        "Schema"
##
## Structure:
## 'data.frame':    3000 obs. of  11 variables:
##  $ Uploaded         : chr  "Oct 24, 2025" "Jul 23, 2025 CENS" "Aug 22, 2025" "Sep 12, 2025" ...
##  $ System           : chr  "ASUS System Product Name" "ASUS System Product Name" "ASUS System Product
##  $ CPU.Details      : chr  "Intel Core Ultra 9 285K 3700 MHz (24 cores)" "AMD Ryzen Threadripper PRO
##  $ Frequency_MHz    : num  3700 4000 5651 3200 3200 ...
##  $ Cores            : int  24 64 64 64 64 64 64 1 64 64 ...
##  $ Platform         : chr  "Windows" "Windows" "Linux" "Windows" ...
##  $ User             : chr  "" "CENS" "" "" ...
##  $ Single.Core.Score: int  12229 3644 3552 3370 3425 3369 3381 3048 3380 3385 ...
##  $ Multi.Core.Score : int  88162 37967 37578 35399 35392 35358 35231 35216 35177 35174 ...
##  $ Result.URL       : chr  "/v6/cpu/14645176" "/v6/cpu/12989688" "/v6/cpu/13446932" "/v6/cpu/1377231
##  $ Schema           : chr  "v6" "v6" "v6" "v6" ...
##
##
## ===== Dataset: top_single =====
## Rows: 3000  | Columns: 11
##
## Column Names:
##  [1] "Uploaded"          "System"            "CPU.Details"
##  [4] "Frequency_MHz"     "Cores"             "Platform"
##  [7] "User"              "Single.Core.Score" "Multi.Core.Score"
## [10] "Result.URL"        "Schema"
##
## Structure:
## 'data.frame':    3000 obs. of  11 variables:
##  $ Uploaded         : chr  "Oct 24, 2025" "Aug 05, 2025" "Aug 05, 2025" "Jul 31, 2025" ...
##  $ System           : chr  "ASUS System Product Name" "ASUS System Product Name" "ASUS System Product
##  $ CPU.Details      : chr  "Intel Core Ultra 9 285K 3700 MHz (24 cores)" "Intel Core i7-12700 4800 M
##  $ Frequency_MHz    : num  3700 4800 4800 4800 4800 4800 0 4900 4900 4800 ...
##  $ Cores            : int  24 12 12 12 12 12 2 12 12 12 ...
##  $ Platform         : chr  "Windows" "Linux" "Linux" "Linux" ...
##  $ User             : chr  "" "" "" "" ...
##  $ Single.Core.Score: int  12229 6705 6705 6705 6705 6518 6164 5961 5961 5697 ...
##  $ Multi.Core.Score : int  88162 6705 6705 6705 6705 6518 3392 5961 5961 5697 ...
##  $ Result.URL       : chr  "/v6/cpu/14645176" "/v6/cpu/13178923" "/v6/cpu/13178914" "/v6/cpu/1310841
##  $ Schema           : chr  "v6" "v6" "v6" "v6" ...
##
##
## ===== Dataset: gpu_benchmarks =====
## Rows: 2317  | Columns: 9
##
## Column Names:
## [1] "gpuName"          "G3Dmark"          "G2Dmark"          "price"
## [5] "gpuValue"         "TDP"              "powerPerformance" "testDate"
## [9] "category"
##
## Structure:
## 'data.frame':    2317 obs. of  9 variables:
##  $ gpuName         : chr  "GeForce RTX 3090 Ti" "GeForce RTX 3080 Ti" "GeForce RTX 3090" "Radeon RX 
##  $ G3Dmark         : int  29094 26887 26395 25458 24853 23367 23364 22867 22122 22093 ...
##  $ G2Dmark         : int  1117 1031 999 1102 1003 1003 1078 984 832 969 ...
##  $ price           : num  2100 1200 1750 1120 999 ...
##  $ gpuValue        : num  13.8 22.4 15.1 22.7 24.9 ...
##  $ TDP             : num  450 350 350 300 320 290 300 230 300 220 ...
##  $ powerPerformance: num  64.7 76.8 75.4 84.9 77.7 ...
##  $ testDate        : int  2022 2021 2020 2020 2020 2021 2020 2021 2021 2020 ...
##  $ category        : chr  "Unknown" "Desktop" "Desktop" "Desktop" ...
##
##
## ===== Dataset: gpu_scores =====
## Rows: 1213  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Structure:
## 'data.frame':    1213 obs. of  6 variables:
##  $ Manufacturer: chr  "Nvidia" "Nvidia" "Nvidia" "Nvidia" ...
##  $ Device      : chr  "GeForce RTX 3090 Ti" "A100 80GB PCIe" "A100-PCIE-80GB" "GeForce RTX 3090" ...
##  $ CUDA        : int  260346 259828 256292 238123 237220 235513 233910 224604 219037 216224 ...
##  $ Metal       : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ OpenCL      : int  229738 214586 207124 204921 190489 209081 196825 200330 NA 186147 ...
##  $ Vulkan      : int  141134 NA NA 138859 NA 131975 NA 109243 NA NA ...
```

Filtering GPU Datasets By Manufacturer

```r
unique(gpu_scores$Manufacturer)
```

```
## [1] "Nvidia"   "AMD"      "Apple"    "Qualcomm" "Intel"    "Other"    "ARM"
## [8] "PowerVR"  "Samsung"
```

```r
manufacturers <- c("Nvidia", "AMD", "Apple", "Qualcomm", "Intel",
                   "Other", "ARM", "PowerVR", "Samsung")

gpu_split <- split(gpu_scores, factor(gpu_scores$Manufacturer, levels = manufacturers))
```

```r
for (m in manufacturers) {
  assign(
    paste0(tolower(m), "_gpu_scores"),   # variable name
    subset(gpu_scores, Manufacturer == m)   # filtered dataset
  )
}

# This creates:
#   nvidia_gpu_scores
#   amd_gpu_scores
#   apple_gpu_scores
#   qualcomm_gpu_scores
#   intel_gpu_scores
#   other_gpu_scores
#   arm_gpu_scores
#   powervr_gpu_scores
#   samsung_gpu_scores
```

```r
# Sort manufacturers alphabetically, but move "Other" to the end
sorted_manufacturers <- sort(manufacturers[manufacturers != "Other"])
sorted_manufacturers <- c(sorted_manufacturers, "Other")

# Print summary for each manufacturer dataset
for (m in sorted_manufacturers) {
  var_name <- paste0(tolower(m), "_gpu_scores")
  df <- get(var_name)

  cat("==== Dataset for:", m, "====\n")
  cat("Rows:", nrow(df), " | Columns:", ncol(df), "\n\n")

  cat("Column Names:\n")
  print(names(df))

  cat("\nHead (first 3 rows):\n")
  print(head(df, 3))

  cat("\n\n")
}
```

```
## ==== Dataset for: AMD ====
## Rows: 546  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer  Device CUDA Metal OpenCL Vulkan
## 267          AMD 15D8:C8   NA    NA  14666  14730
## 268          AMD 15D8:C9   NA    NA  11132  12149
## 269          AMD 15D8:CA   NA    NA  12963     NA
##
##
## ==== Dataset for: Apple ====
## Rows: 21  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer   Device CUDA Metal OpenCL Vulkan
## 279        Apple  A10 GPU   NA  3065     NA     NA
## 280        Apple A10X GPU   NA  6910     NA     NA
## 281        Apple  A11 GPU   NA  3805     NA     NA
##
##
## ==== Dataset for: ARM ====
## Rows: 58  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer   Device CUDA Metal OpenCL Vulkan
## 573          ARM Mali-G31   NA    NA     NA    362
## 574          ARM Mali-G51   NA    NA    992   1020
## 575          ARM Mali-G52   NA    NA   1866   1152
##
##
## ==== Dataset for: Intel ====
## Rows: 144  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer                                 Device CUDA Metal OpenCL
## 315        Intel AlderLake-S Mobile Graphics Controller   NA    NA   8753
## 316        Intel              Amber Lake (Kabylake) GT2   NA    NA     NA
## 317        Intel                     Arc A350M Graphics   NA    NA  23107
##     Vulkan
## 315   8526
## 316    738
## 317     NA
##
##
## ==== Dataset for: Nvidia ====
## Rows: 404  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 2       Nvidia      A100 80GB PCIe 259828    NA 214586     NA
## 3       Nvidia      A100-PCIE-80GB 256292    NA 207124     NA
##
##
## ==== Dataset for: PowerVR ====
## Rows: 10  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer               Device CUDA Metal OpenCL Vulkan
## 648      PowerVR  PowerVR Rogue G6110   NA    NA     NA     71
## 649      PowerVR PowerVR Rogue GE8100   NA    NA     NA     43
## 650      PowerVR PowerVR Rogue GE8300   NA    NA     NA     69
##
##
## ==== Dataset for: Qualcomm ====
## Rows: 22  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer      Device CUDA Metal OpenCL Vulkan
## 294     Qualcomm Adreno  430   NA    NA     NA    520
## 295     Qualcomm Adreno  506   NA    NA     NA    130
## 296     Qualcomm Adreno  509   NA    NA     NA    229
##
##
## ==== Dataset for: Samsung ====
## Rows: 1  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer              Device CUDA Metal OpenCL Vulkan
## 1165      Samsung Samsung Xclipse 920   NA    NA   8523   8418
##
##
## ==== Dataset for: Other ====
## Rows: 7  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer                           Device CUDA Metal OpenCL Vulkan
## 567         Other llvmpipe (LLVM 12.0.0, 256 bits)   NA    NA     NA    265
## 634         Other                       MuMu GL/VK   NA    NA     NA  42318
## 1167        Other                     SKL Graphics   NA    NA   4048     NA
```

Filtering GPU Dataset By Test Ran

```
cuda_tests    <- subset(gpu_scores, !is.na(CUDA))
metal_tests   <- subset(gpu_scores, !is.na(Metal))
opencl_tests  <- subset(gpu_scores, !is.na(OpenCL))
vulkan_tests  <- subset(gpu_scores, !is.na(Vulkan))

test_types <- c("CUDA", "Metal", "OpenCL", "Vulkan")
test_datasets <- list(
  CUDA   = cuda_tests,
  Metal  = metal_tests,
  OpenCL = opencl_tests,
  Vulkan = vulkan_tests
)

for (t in test_types) {
  df <- test_datasets[[t]]

  cat("==== GPUs With", t, "Tests Ran ====\n")
  cat("Rows:", nrow(df), " | Columns:", ncol(df), "\n\n")

  cat("Column Names:\n")
  print(names(df))

  cat("\nHead (first 3 rows):\n")
  print(head(df, 3))

  cat("\n\n")
}
```

```
## ==== GPUs With CUDA Tests Ran ====
## Rows: 266  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 2       Nvidia      A100 80GB PCIe 259828    NA 214586     NA
## 3       Nvidia      A100-PCIE-80GB 256292    NA 207124     NA
##
##
## ==== GPUs With Metal Tests Ran ====
## Rows: 241  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##    Manufacturer                      Device  CUDA Metal OpenCL Vulkan
## 88       Nvidia TITAN Xp COLLECTORS EDITION 59596 41063  66294     NA
## 93       Nvidia         GeForce GTX 1080 Ti 55628 30624  61295  85662
## 95       Nvidia            GeForce GTX 1080 51531 23824  54640  66552
##
##
## ==== GPUs With OpenCL Tests Ran ====
## Rows: 976  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 2       Nvidia      A100 80GB PCIe 259828    NA 214586     NA
## 3       Nvidia      A100-PCIE-80GB 256292    NA 207124     NA
##
##
## ==== GPUs With Vulkan Tests Ran ====
## Rows: 629  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 4       Nvidia    GeForce RTX 3090 238123    NA 204921 138859
## 6       Nvidia GeForce RTX 3080 Ti 235513    NA 209081 131975
```

Filtering by Manufacturer AND Test Ran

```r
# Manufacturer × Test combinations
tests <- c("CUDA", "Metal", "OpenCL", "Vulkan")

# Build a nested list: manufacturer -> test -> dataset
manu_test_split <- list()

for (m in manufacturers) {
  manu_test_split[[m]] <- list()

  for (t in tests) {
    # Filter by manufacturer AND test ran (non-NA)
    df <- subset(gpu_scores, Manufacturer == m & !is.na(gpu_scores[[t]]))

    manu_test_split[[m]][[t]] <- df
  }
}

# Print summaries (sorted manufacturers, "Other" last)
sorted_manufacturers <- sort(manufacturers[manufacturers != "Other"])
sorted_manufacturers <- c(sorted_manufacturers, "Other")

for (m in sorted_manufacturers) {
  for (t in tests) {
    df <- manu_test_split[[m]][[t]]

    cat("====", m, "-", t, "Test ====\n")
    cat("Rows:", nrow(df), " | Columns:", ncol(df), "\n\n")

    if (nrow(df) > 0) {
      cat("Column Names:\n")
      print(names(df))

      cat("\nHead (first 3 rows):\n")
      print(head(df, 3))
    } else {
      cat("No rows for this combination.\n")
    }

    cat("\n\n")
  }
}
```

```
## ==== AMD - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== AMD - Metal Test ====
## Rows: 123  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer       Device CUDA Metal OpenCL Vulkan
## 322          AMD FirePro D300   NA 23163  21243  19931
## 323          AMD FirePro D500   NA 23398  20890  24101
## 324          AMD FirePro D700   NA 32000  28896  33106
##
##
## ==== AMD - OpenCL Test ====
## Rows: 452  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
```

```
## Head (first 3 rows):
##     Manufacturer  Device CUDA Metal OpenCL Vulkan
## 267          AMD 15D8:C8   NA    NA  14666  14730
## 268          AMD 15D8:C9   NA    NA  11132  12149
## 269          AMD 15D8:CA   NA    NA  12963     NA
##
##
## ==== AMD - Vulkan Test ====
## Rows: 251  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer  Device CUDA Metal OpenCL Vulkan
## 267          AMD 15D8:C8   NA    NA  14666  14730
## 268          AMD 15D8:C9   NA    NA  11132  12149
## 271          AMD 15D8:CC   NA    NA   5048   5436
##
##
## ==== Apple - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Apple - Metal Test ====
## Rows: 20  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer   Device CUDA Metal OpenCL Vulkan
## 279        Apple  A10 GPU   NA  3065     NA     NA
## 280        Apple A10X GPU   NA  6910     NA     NA
## 281        Apple  A11 GPU   NA  3805     NA     NA
##
##
## ==== Apple - OpenCL Test ====
## Rows: 5  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer Device CUDA Metal OpenCL Vulkan
## 284        Apple   A12Z   NA    NA  11391     NA
## 568        Apple     M1   NA 20440  18171     NA
## 570        Apple M1 Max   NA 64708  56581     NA
##
```

```
##
## ==== Apple - Vulkan Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== ARM - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== ARM - Metal Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== ARM - OpenCL Test ====
## Rows: 41  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer       Device CUDA Metal OpenCL Vulkan
## 574          ARM     Mali-G51   NA    NA    992   1020
## 575          ARM     Mali-G52   NA    NA   1866   1152
## 576          ARM Mali-G52 MC1   NA    NA    531    489
##
##
## ==== ARM - Vulkan Test ====
## Rows: 30  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer   Device CUDA Metal OpenCL Vulkan
## 573          ARM Mali-G31   NA    NA     NA    362
## 574          ARM Mali-G51   NA    NA    992   1020
## 575          ARM Mali-G52   NA    NA   1866   1152
##
##
## ==== Intel - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Intel - Metal Test ====
## Rows: 25  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer           Device CUDA Metal OpenCL Vulkan
## 448        Intel     Graphics 630   NA  4424     NA     NA
## 477        Intel HD Graphics 4000   NA   147    990     NA
## 486        Intel HD Graphics 5000   NA   408   3444     NA
##
##
## ==== Intel - OpenCL Test ====
## Rows: 94  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer                                 Device CUDA Metal OpenCL
## 315        Intel AlderLake-S Mobile Graphics Controller   NA    NA   8753
## 317        Intel                     Arc A350M Graphics   NA    NA  23107
## 436        Intel      Gen12 Desktop Graphics Controller   NA    NA  15964
##     Vulkan
## 315   8526
## 317     NA
## 436  14128
##
##
## ==== Intel - Vulkan Test ====
## Rows: 85  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer                                 Device CUDA Metal OpenCL
## 315        Intel AlderLake-S Mobile Graphics Controller   NA    NA   8753
## 316        Intel              Amber Lake (Kabylake) GT2   NA    NA     NA
## 318        Intel                              Bay Trail   NA    NA     NA
##     Vulkan
## 315   8526
## 316    738
## 318    156
##
##
## ==== Nvidia - CUDA Test ====
## Rows: 266  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 2       Nvidia      A100 80GB PCIe 259828    NA 214586     NA
## 3       Nvidia      A100-PCIE-80GB 256292    NA 207124     NA
##
##
## ==== Nvidia - Metal Test ====
## Rows: 73  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##    Manufacturer                      Device  CUDA Metal OpenCL Vulkan
## 88       Nvidia TITAN Xp COLLECTORS EDITION 59596 41063  66294     NA
## 93       Nvidia         GeForce GTX 1080 Ti 55628 30624  61295  85662
## 95       Nvidia            GeForce GTX 1080 51531 23824  54640  66552
##
##
## ==== Nvidia - OpenCL Test ====
## Rows: 381  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 2       Nvidia      A100 80GB PCIe 259828    NA 214586     NA
## 3       Nvidia      A100-PCIE-80GB 256292    NA 207124     NA
##
##
## ==== Nvidia - Vulkan Test ====
## Rows: 225  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##   Manufacturer              Device   CUDA Metal OpenCL Vulkan
## 1       Nvidia GeForce RTX 3090 Ti 260346    NA 229738 141134
## 4       Nvidia    GeForce RTX 3090 238123    NA 204921 138859
## 6       Nvidia GeForce RTX 3080 Ti 235513    NA 209081 131975
##
##
## ==== PowerVR - CUDA Test ====
## Rows: 0  | Columns: 6
##
```

```
## No rows for this combination.
##
##
## ==== PowerVR - Metal Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== PowerVR - OpenCL Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== PowerVR - Vulkan Test ====
## Rows: 10  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer               Device CUDA Metal OpenCL Vulkan
## 648      PowerVR  PowerVR Rogue G6110   NA    NA     NA     71
## 649      PowerVR PowerVR Rogue GE8100   NA    NA     NA     43
## 650      PowerVR PowerVR Rogue GE8300   NA    NA     NA     69
##
##
## ==== Qualcomm - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Qualcomm - Metal Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Qualcomm - OpenCL Test ====
## Rows: 1  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer          Device CUDA Metal OpenCL Vulkan
## 678     Qualcomm QUALCOMM Adreno   NA    NA   2381     NA
##
##
## ==== Qualcomm - Vulkan Test ====
## Rows: 21  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##     Manufacturer      Device CUDA Metal OpenCL Vulkan
## 294     Qualcomm Adreno  430   NA    NA     NA    520
## 295     Qualcomm Adreno  506   NA    NA     NA    130
## 296     Qualcomm Adreno  509   NA    NA     NA    229
##
##
## ==== Samsung - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Samsung - Metal Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Samsung - OpenCL Test ====
## Rows: 1  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer              Device CUDA Metal OpenCL Vulkan
## 1165      Samsung Samsung Xclipse 920   NA    NA   8523   8418
##
##
## ==== Samsung - Vulkan Test ====
## Rows: 1  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer              Device CUDA Metal OpenCL Vulkan
## 1165      Samsung Samsung Xclipse 920   NA    NA   8523   8418
##
##
## ==== Other - CUDA Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
```

```
##
## ==== Other - Metal Test ====
## Rows: 0  | Columns: 6
##
## No rows for this combination.
##
##
## ==== Other - OpenCL Test ====
## Rows: 1  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer       Device CUDA Metal OpenCL Vulkan
## 1167        Other SKL Graphics   NA    NA   4048     NA
##
##
## ==== Other - Vulkan Test ====
## Rows: 6  | Columns: 6
##
## Column Names:
## [1] "Manufacturer" "Device"       "CUDA"         "Metal"        "OpenCL"
## [6] "Vulkan"
##
## Head (first 3 rows):
##      Manufacturer                           Device CUDA Metal OpenCL Vulkan
## 567         Other llvmpipe (LLVM 12.0.0, 256 bits)   NA    NA     NA    265
## 634         Other                       MuMu GL/VK   NA    NA     NA  42318
## 1169        Other SwiftShader Device (LLVM 10.0.0)   NA    NA     NA    435
```

For GPUs, geekbench reports testbench results based on these tests