Dashboards

What is a dashboard?

Build a dashboard

A *dashboard* gives you an at-a-glance view of your data and lets you track metrics through different visualizations.

Dashboards consist of *panels*, each representing a part of the story you want your dashboard to tell.

Every panel consists of a *query* and a *visualization*. The query defines *what* data you want to display, whereas the visualization defines *how* the data is displayed.

https://grafana.com/tutorials/grafana-fundamentals

Ingredients for a dashboard

- data
  - at a glance visualizations
  - **tracking!!!!!!!**
    - **Reading between the lines: incoming data and historical data**
    - **Reading between the lines: databases for storage and retrieval!**
    - **Reading between the lines: data transfer protocols**
  - multi-part (panels) that tell a story
    - Reading between the lines: pre-existing questions / concerns / goals

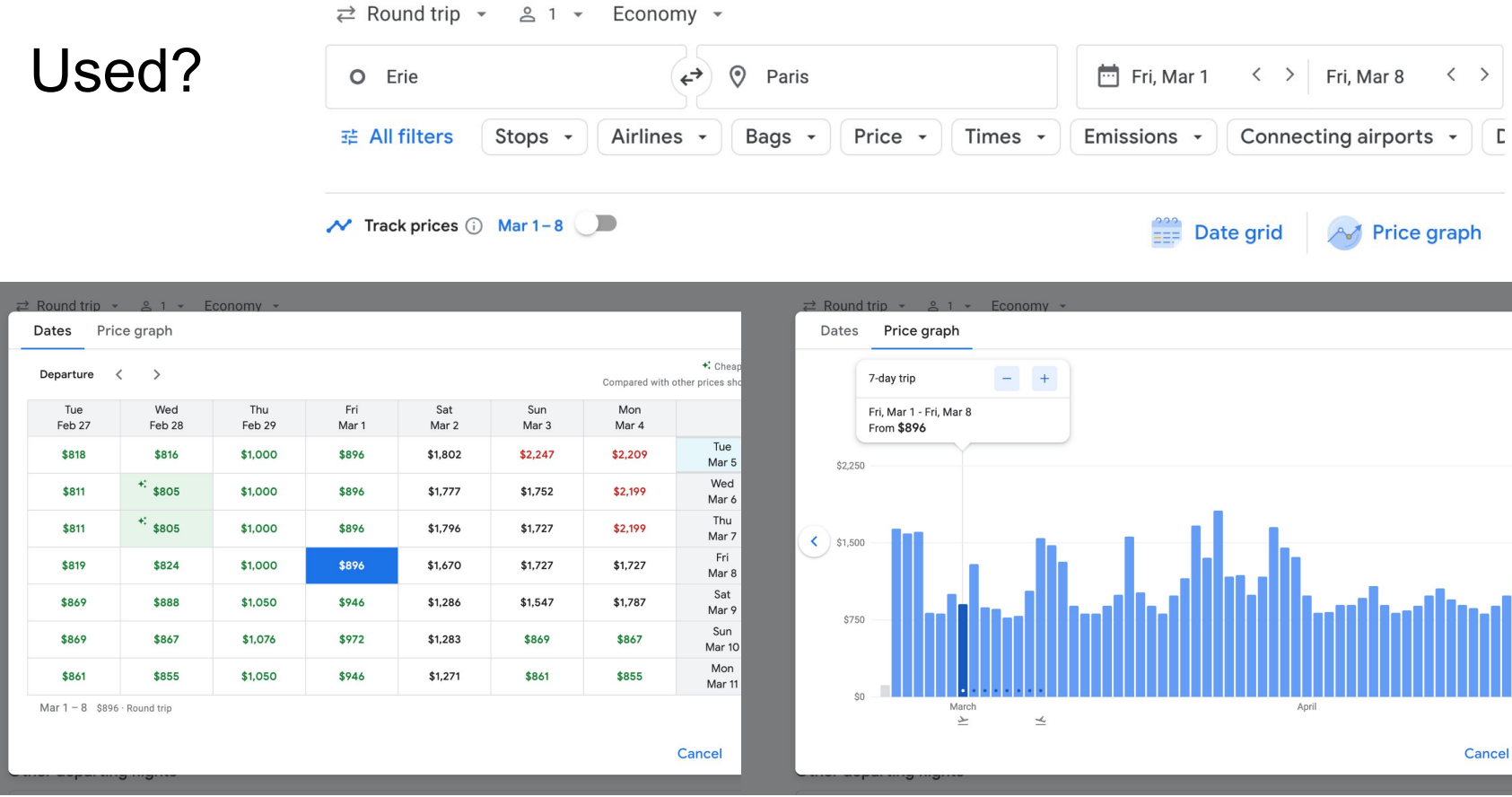
Questions

Have you used a dashboard?

Have you made a dashboard?

https://forms.gle/dVFxpqWJ71ijVL7q8

Used?


Round trip
1
Economy
Erie
Paris
Fri, Mar 1
Fri, Mar 8
All filters
Stops
Airlines
Bags
Price
Times
Emissions
Connecting airports
Track prices
Mar 1 – 8
Date grid
Price graph
Dates
Price graph
Departure
Tue Feb 27
Wed Feb 28
Thu Feb 29
Fri Mar 1
Sat Mar 2
Sun Mar 3
Mon Mar 4
$818 $816 $1,000 $896 $1,802 $2,247 $2,209 Tue Mar 5
$811 $805 $1,000 $896 $1,777 $1,752 $2,199 Wed Mar 6
$811 $805 $1,000 $896 $1,796 $1,727 $2,199 Thu Mar 7
$819 $824 $1,000 $896 $1,670 $1,727 $1,727 Fri Mar 8
$869 $888 $1,050 $946 $1,286 $1,547 $1,787 Sat Mar 9
$869 $867 $1,076 $972 $1,283 $869 $867 Sun Mar 10
$861 $855 $1,050 $946 $1,271 $861 $855 Mon Mar 11
Mar 1 – 8 $896 · Round trip
Cancel
7-day trip
Fri, Mar 1 - Fri, Mar 8
From $896
$2,250
$1,500
$750
$0
March
April
Cancel
OK

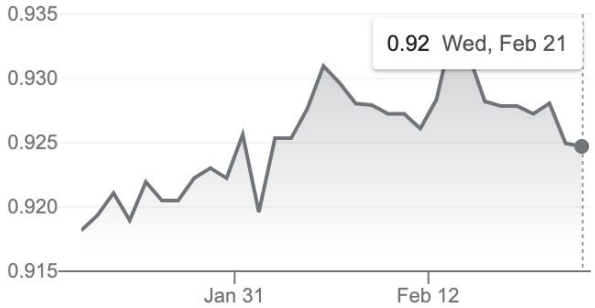
1 United States Dollar equals

0.92 Euro

Feb 21, 4:50AM UTC · Disclaimer

1	United States Dollar
0.92	Euro

1D 5D 1M 1Y 5Y Max



More about USD/EUR →

Feedback

American AA 5701

Charlotte to Erie

Mon, Feb 19 | Tue, Feb 20 | Wed, Feb 21 | Thu, Feb 22

9:00 PM
AA 5701

to Erie ERI

ARRIVED

CLT — 1h 57m → ERI

Charlotte · Tue, Feb 20			Erie · Tue, Feb 20		
Departed	Terminal	Gate	Arrived	Terminal	Gate
9:00 PM	-	E10	10:57 PM ~~10:49 PM~~	-	-

Updated 54m ago

Sources: OAG, FlightAware

Showing local airport times

Feedback

S&P Futures	Dow Futures	Nasdaq Futures	Russell 2000 Futures	Crude Oil
4,985.25	38,603.00	17,560.25	2,009.70	78.27
-6.25 (-0.13%)	-39.00 (-0.10%)	-47.00 (-0.27%)	-0.50 (-0.02%)	+0.09 (+0.12%)

Nasdaq 100 Mar 24 (NQ=F)

CME - CME Delayed Price. Currency in USD

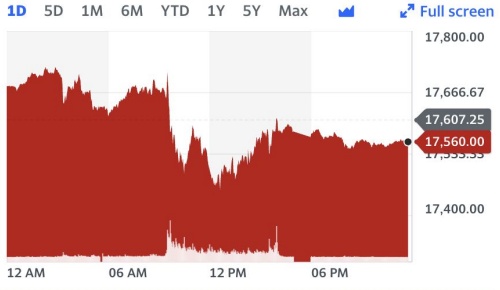
Follow

17,560.00 -47.25 (-0.27%)

As of 11:44PM EST. Market open.

Summary | Chart | Historical Data | Futures

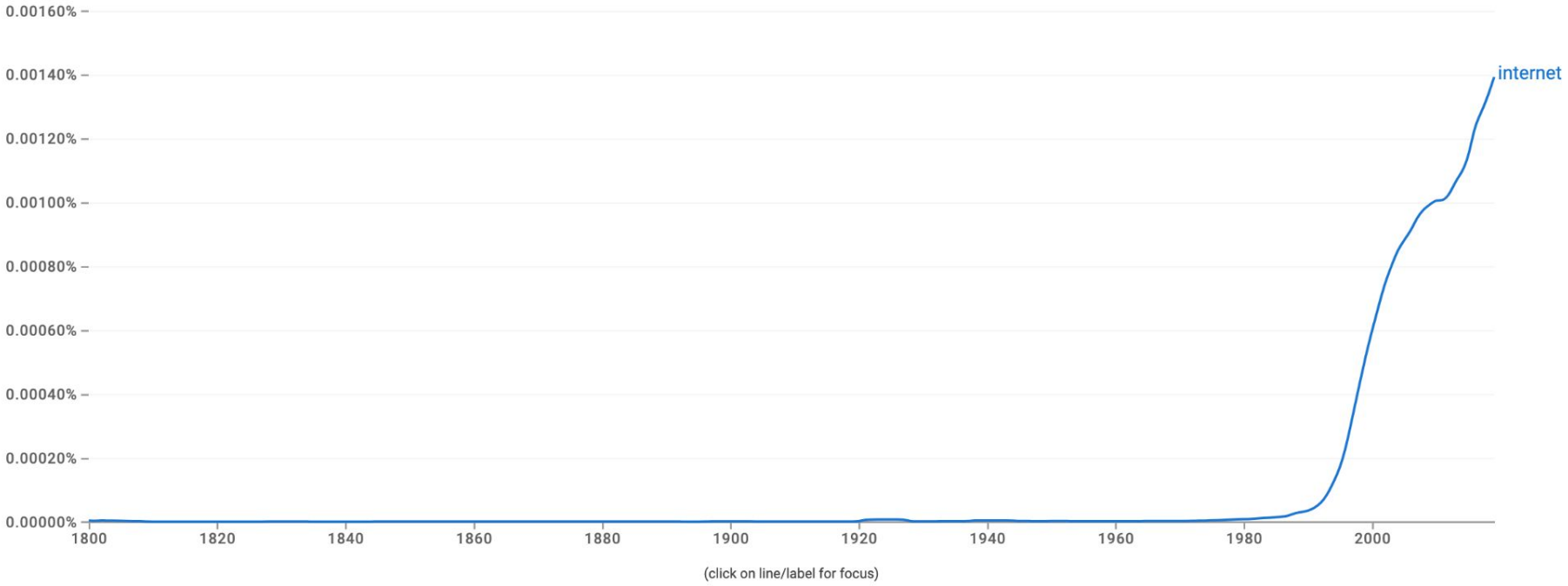
Pre. Settlement	N/A	Last Price	17,607.25
Settlement Date	2024-03-15	Day's Range	17,538.50 - 17,590.00
Open	17,729.25	Volume	21,335
Bid	17,550.75	Ask	17,551.00



Google Books Ngram Viewer

internet

1800 - 2019 | English (2019) | Case-Insensitive | Smoothing

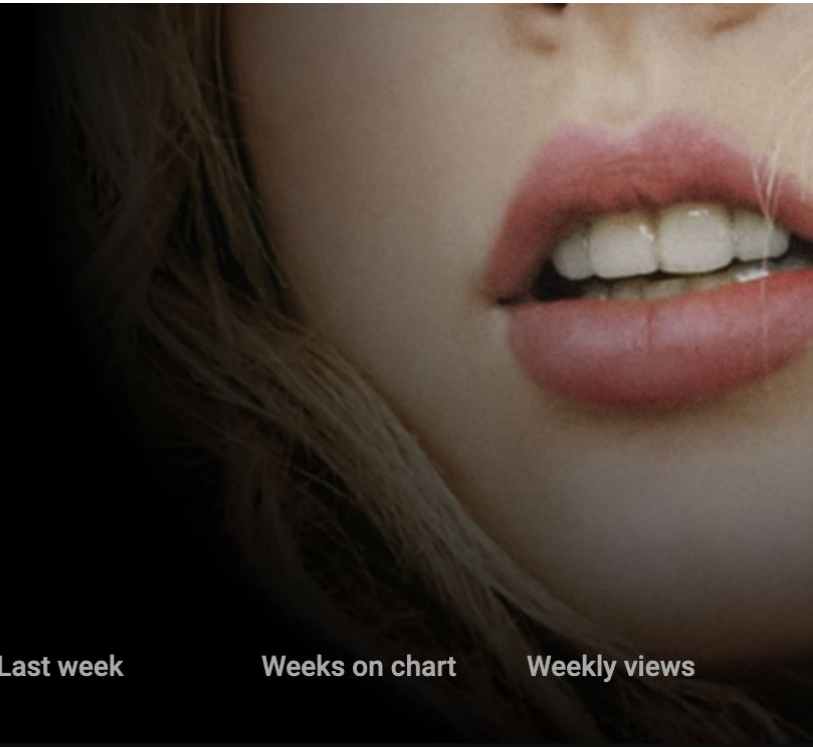


UNITED STATES

WEEKLY TOP ARTISTS

Feb 9 - Feb 15, 2024

Ranking of this week's most popular artists.



Feb 9 - Feb 15, 2024 ⌄ Most popular ⌄

Rank		Last week	Weeks on chart	Weekly views
1 ▲2	 Taylor Swift	3	386	35,470,724
				

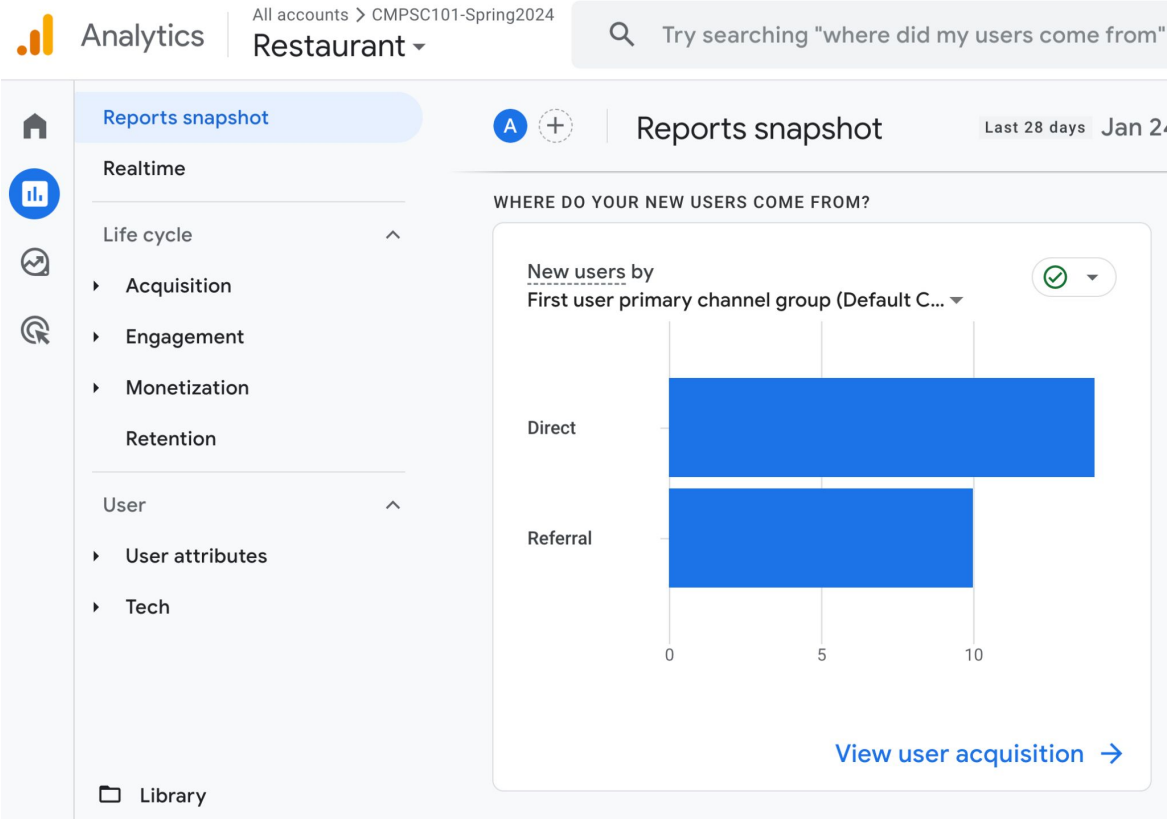
yuzu Early Access 1250 | Mario Kart 8 Deluxe

File Emulation View Tools Help


ECG
1 mV
81
89
60
87
117
100
II
Normal
Direct
Auto
On
170
110
50
Auto
Auto


YESTERDAY
10,099
Steps
1
Floor
4.54
Miles
2,531
Cals
75
Mins

Made?


Analytics
All accounts > CMPSC101-Spring2024
Restaurant
Try searching "where did my users come from"
Reports snapshot
Realtime
Life cycle
Acquisition
Engagement
Monetization
Retention
User
User attributes
Tech
Library
Reports snapshot
Last 28 days
Jan 2
WHERE DO YOUR NEW USERS COME FROM?
New users by
First user primary channel group (Default C...
Direct
Referral
0
5
10
View user acquisition

Engagement overview

Last 28 days Jan 24 - Feb 20, 2024

Event count by Event name

EVENT NAME	EVENT COUNT
page_view	118
user_engagement	92
scroll	54
session_start	35
first_visit	24
click	2

View events →

Views by Page title and screen class

PAGE TITLE AND SCREEN ...	VIEWS
about | Data Exploration Blog	63
Take it or Leave it Bakery | D...	27
contact | Data Exploration Bl...	8
explorations | Data Explorati...	8
amazing menu | Data Explor...	7
about | iScream	3
Analytics | Data Exploration ...	2

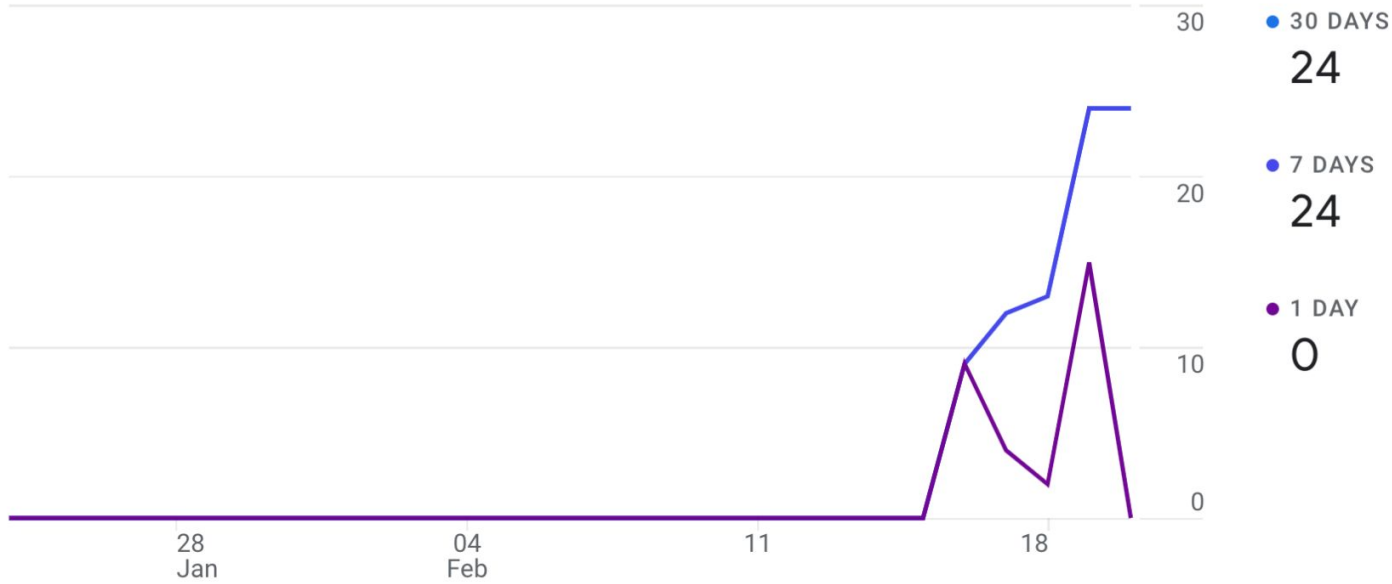
View pages and screens →

A

Engagement overview

Last 28 days Jan 24 - Feb 20, 2024

User activity over time

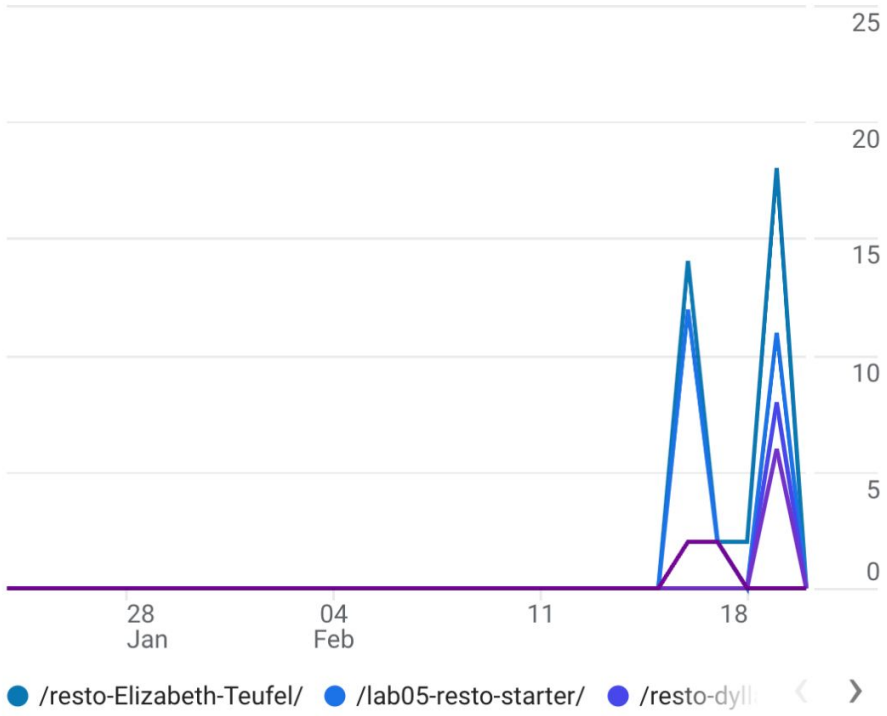


A

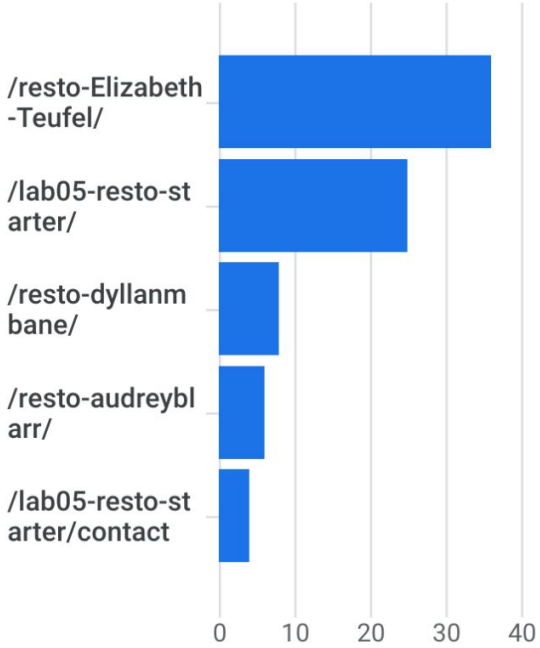
Pages and screens: Page path and screen class

Last 28 days Jan 2

Views by Page path and screen class over time



Views by Page path and screen class



Dashboard != Data source

Dashboards (process) and display data from a separate source

Both entities need to know about the other to do secure data transfers

- recall, you had to give google analytics a url
- recall, you had to give your website a tracking ID

! _config.yml

```yaml
# TODO: replace the title with the name of your restaurant!
title: "Data Exploration Blog"
# TODO: write your restaurateur alter ego name below, or your own nam
author:
# TODO: write your Google Analytics tracking ID below
google_analytics: G-FDG725B6FJ

theme: minima

collections:
  explorations:
    output: true
```

What can the data source be?

- online sources
  - clicks
  - visits
  - number visitors
  - duration of visit
  - location of user
  - etc
- offline
  - physiological signals
  - motion / gesture

Data storage

How can data be stored?

- small data files: .csv

Where does google analytics store all of its data?

Bigtable

13 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

Bigtable is a fully managed wide-column and key-value NoSQL database service for large analytical and operational workloads as part of the Google Cloud portfolio.

Google Bigtable

Developer(s)	Google
Initial release	February 2005; 19 years ago
Written in	C++ (core), Java, Python, Go, Ruby
Platform	Google Cloud Platform
Type	Cloud Storage
License	Proprietary
Website	cloud.google.com/bigtable/

History [edit]

Bigtable development began in 2004.[1] It is now used by a number of Google applications, such as Google Analytics,[2] web indexing,[3] MapReduce, which is often used for generating and modifying data stored in Bigtable,[4] Google Maps,[5] Google Books search, "My Search History", Google Earth, Blogger.com, Google Code hosting, YouTube,[6] and Gmail.[7] Google's reasons for developing its own database include scalability and better control of performance characteristics.[8]

Google's Spanner RDBMS is layered on an implementation of Bigtable with a Paxos group for two-phase commits to each table. Google F1 was built using Spanner to replace an implementation based on MySQL.[9]

Apache HBase and Cassandra are some of the best known open source projects that were modeled after Bigtable.

On May 6, 2015, a public version of Bigtable was made available as a part of Google Cloud under the name Cloud Bigtable.[2]

What is a database?

https://en.wikipedia.org/wiki/Database

Allegheny College CMPSC 305

```
dvdrental=# select title, release_year, length, replacement_cost from film
dvdrental-#   where length > 120 and replacement_cost > 29.50
dvdrental-#   order by title desc;
         title          | release_year | length | replacement_cost
------------------------+--------------+--------+------------------
 West Lion              |         2006 |    159 |            29.99
 Virgin Daisy           |         2006 |    179 |            29.99
 Uncut Suicides         |         2006 |    172 |            29.99
 Tracy Cider            |         2006 |    142 |            29.99
 Song Hedwig            |         2006 |    165 |            29.99
 Slacker Liaisons       |         2006 |    179 |            29.99
 Sassy Packer           |         2006 |    154 |            29.99
 River Outlaw           |         2006 |    149 |            29.99
                        |         2006 |    153 |            29.99
ini                     |         2006 |    177 |            29.99
ever                    |         2006 |    159 |            29.99
ally                    |         2006 |    140 |            29.99
on                      |         2006 |    181 |            29.99
rush                    |         2006 |    124 |            29.99
n                       |         2006 |    171 |            29.99
                        |         2006 |    135 |            29.99
ed                      |         2006 |    163 |            29.99
n                       |         2006 |    145 |            29.99
k                       |         2006 |    131 |            29.99
y Conquerer             |         2006 |    122 |            29.99
ft                      |         2006 |    163 |            29.99
                        |         2006 |    147 |            29.99
                        |         2006 |    139 |            29.99
radise                  |         2006 |    143 |            29.99
kingbird                |         2006 |    173 |            29.99
```

CMPSC 305 - Database Systems

CMPSC 305 - Database Systems

Credits: 4

A study of the application and evaluation of database management systems. Participating in hands-on activities that often require teamwork, students design, implement, and deploy database systems that store interdisciplinary data sets. In addition to learning how to develop and assess interfaces for databases, students study the efficiency and effectiveness of alternative data management systems. During a weekly laboratory session students use industry-grade technology to complete projects, reporting on their results through both written documents and oral presentations. Students are invited to use their own departmentally approved laptop in this course; a limited number of laptops are available for use during class and lab sessions.

Prerequisite: CMPSC 101.

Distribution Requirements: QR, SP.

From Wikipedia, the free encyclopedia

This article is about the computing concept. For instances of the general concept, see Lists of databases.

In computing, a **database** is an organized collection of data or a type of data store based on the use of a **database management system** (**DBMS**), the software that interacts with end users, applications, and the database itself to capture and analyze the data. The DBMS additionally encompasses the core facilities provided to administer the database. The sum total of the database, the DBMS and the associated applications can be referred to as a **database system**. Often the term "database" is also used loosely to refer to any of the DBMS, the database system or an application associated with the database.

```
dvdrental=# select title, release_year, length, replacement_cost from film
dvdrental-#   where length > 120 and replacement_cost > 29.50
dvdrental-#   order by title desc;
          title          | release_year | length | replacement_cost
-------------------------+--------------+--------+------------------
 West Lion               |         2006 |    159 |            29.99
 Virgin Daisy            |         2006 |    179 |            29.99
 Uncut Suicides          |         2006 |    172 |            29.99
 Tracy Cider             |         2006 |    142 |            29.99
 Song Hedwig             |         2006 |    165 |            29.99
 Slacker Liaisons        |         2006 |    179 |            29.99
 Sassy Packer            |         2006 |    154 |            29.99
 River Outlaw            |         2006 |    149 |            29.99
 Right Cranes            |         2006 |    153 |            29.99
 Quest Mussolini         |         2006 |    177 |            29.99
 Poseidon Forever        |         2006 |    159 |            29.99
 Loathing Legally        |         2006 |    140 |            29.99
 Lawless Vision          |         2006 |    181 |            29.99
 Jingle Sagebrush        |         2006 |    124 |            29.99
 Jericho Mulan           |         2006 |    171 |            29.99
 Japanese Run            |         2006 |    135 |            29.99
 Gilmore Boiled          |         2006 |    163 |            29.99
 Floats Garden           |         2006 |    145 |            29.99
 Fantasia Park           |         2006 |    131 |            29.99
 Extraordinary Conquerer |         2006 |    122 |            29.99
 Everyone Craft          |         2006 |    163 |            29.99
 Dirty Ace               |         2006 |    147 |            29.99
 Clyde Theory            |         2006 |    139 |            29.99
 Clockwork Paradise      |         2006 |    143 |            29.99
 Ballroom Mockingbird    |         2006 |    173 |            29.99
(25 rows)
```

An SQL select statement and its result

Small databases can be stored on a file system, while large databases are hosted on computer clusters or cloud storage. The design of databases spans formal techniques and practical considerations, including data modeling, efficient data representation and storage, query languages, security and privacy of sensitive data, and distributed computing issues, including supporting concurrent access and fault tolerance.

Computer scientists may classify database management systems according to the database models that they support. Relational databases became dominant in the 1980s. These model data as rows and columns in a series of tables, and the vast majority use SQL for writing and querying data. In the 2000s, non-relational databases became popular, collectively referred to as NoSQL, because they use different query languages.

Accessing data after storage

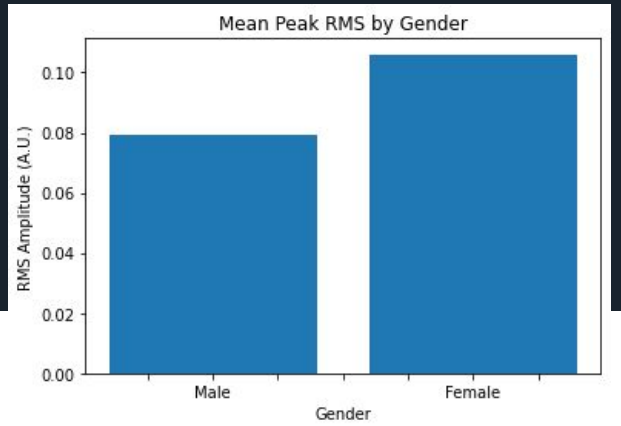
- database "queries" in database-specific language (CMPSC 305)
- code that reads into a matrix

```
filename,amplitude_limit,freq_limit,loudness_threshold,max_rms,max_cumu_freq,ma
01, 0.6, 200, -20, 0.065, 164, 187,M
02, 0.6, 300, -20, 0.105, 234, 257,F
03, 0.6, 300, -20, 0.280, 281, 281,M
04, 0.6, 400, -20, 0.110, 351, 281,F
05, 0.6, 400, -20, 0.061, 187, 234,M
06, 0.6, 600, -20, 0.147, 562, 539,F
07, 0.6, 600, -20, 0.054, 234, 210,F
08, 0.6, 600, -20, 0.102, 0, 257,F
09, 0.6, 600, -20, 0.130, 234, 468,M
10, 0.6, 600, -20, 0.487, 492, 468,F
11, 0.6, 600, -20, 0.086, 187, 187,M
12, 0.6, 600, -20, 0.075, 281, 281,F
13, 0.6, 600, -20, 0.019, 117, 117,M
14, 0.6, 600, -20, 0.033, 281, 281,F
15, 0.6, 600, -20, 0.045, 140, 234,M
16, 0.6, 600, -20, 0.036, 234, 257,F
17, 0.6, 600, -20, 0.072, 0, 140,M
18, 0.6, 700, -20, 0.149, 328, 656,F
19, 0.6, 700, -20, 0.026, 234, 164,M
20, 0.6, 700, -20, 0.015, 257, 562,F
21, 0.6, 700, -20, 0.066, 257, 281,M
22, 0.6, 700, -20, 0.025, 210, 210,F
23, 0.6, 700, -20, 0.023, 164, 164,M
24, 0.6, 700, -20, 0.04, 257, 257,F
```

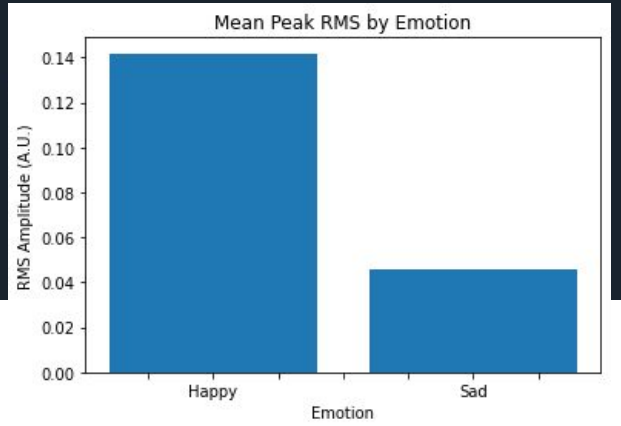
datamat - NumPy object array

	0	1	2	3	4	5	6	7
0	1	0.6	200	-20	0.065	164	187	0
1	2	0.6	300	-20	0.105	234	257	1
2	3	0.6	300	-20	0.28	281	281	0
3	4	0.6	400	-20	0.11	351	281	1
4	5	0.6	400	-20	0.061	187	234	0
5	6	0.6	600	-20	0.147	562	539	1
6	7	0.6	600	-20	0.054	234	210	1
7	8	0.6	600	-20	0.102	0	257	1
8	9	0.6	600	-20	0.13	234	468	0
9	10	0.6	600	-20	0.487	492	468	1
10	11	0.6	600	-20	0.086	187	187	0
11	12	0.6	600	-20	0.075	281	281	1
12	13	0.6	600	-20	0.019	117	117	0
13	14	0.6	600	-20	0.033	281	281	1
14	15	0.6	600	-20	0.045	140	234	0
15	16	0.6	600	-20	0.036	234	257	1
16	17	0.6	600	-20	0.072	0	140	0
17	18	0.6	700	-20	0.149	328	656	1
18	19	0.6	700	-20	0.026	234	164	0
19	20	0.6	700	-20	0.015	257	562	1
20	21	0.6	700	-20	0.066	257	281	0
21	22	0.6	700	-20	0.025	210	210	1
22	23	0.6	700	-20	0.023	164	164	0
23	24	0.6	700	-20	0.04	257	257	1

```
plt.bar([1,2],(np.mean(datamat[rows_male,max_rms]), np.mean(datamat[rows_female,max_rms]
plt.xlabel("Gender")
plt.ylabel("RMS Amplitude (A.U.)")
plt.title("Mean Peak RMS by Gender")
labels = ['' for item in ax.get_xticklabels()]
labels[2] = 'Male'
labels[6] = 'Female'
ax.set_xticklabels(labels)
plt.show()
```

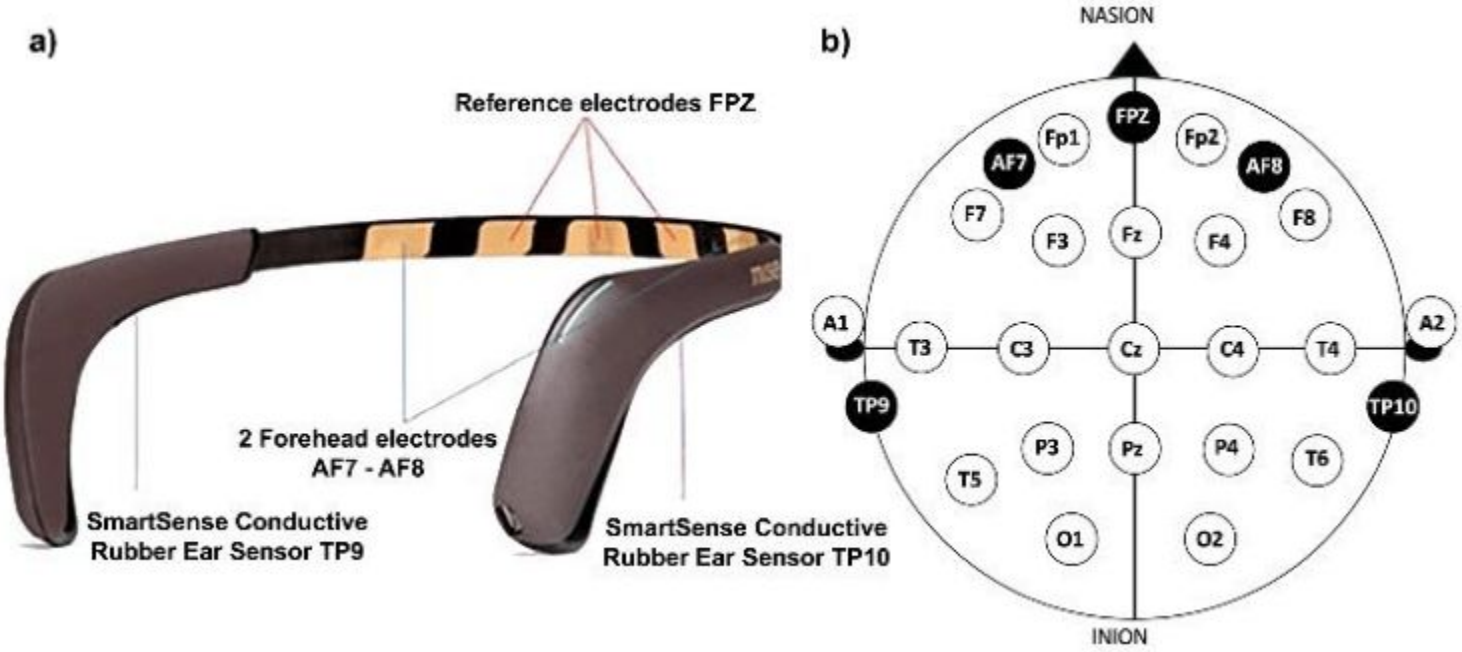



```
plt.bar([1,2],(np.mean(datamat[rows_happy,max_rms]), np.mean(datamat[rows_sad,max_rms]))
plt.xlabel("Emotion")
plt.ylabel("RMS Amplitude (A.U.)")
plt.title("Mean Peak RMS by Emotion")
labels = ['' for item in ax.get_xticklabels()]
labels[2] = 'Happy'
labels[6] = 'Sad'
ax.set_xticklabels(labels)
plt.show()
```



Back to offline data and data storage

Demo!



Friday

Class

- demo on grafana dashboard

Lab

- Lab5 == resto + analytics
- Have `index.md`, `menu.md`, and `contact.md` done by 2:30 on Friday
- website reviews according to assignment on Discord until 3pm
- 3-4:20 is for retrieving reviews, and examining google analytics for short post in analytics.md.
- Lab 5 is due at 11:59 pm on Friday Feb. 23.