

CPSC 349: Front-End Web Engineering - Fall 2020

COVID-19 Project, due: 349-01 – 8 Dec, 349-02 – 11 Dec at start of class

Given the current state of events, many websites have been created to summarize the statistics, trends, and predictions of the COVID-19 virus, showing data at the country, state, and county levels, using a combination of maps, tables, graphs (linear and logarithmic scatter plots, bar charts and tree graphs) comparing the spread from region to region.

Your team's task is to use client-side JavaScript, forms, ReactJS, React frameworks, and Firebase to build a COVID-19 website. You may use any additional third-party Web Service APIs, libraries, or modules, provided you comply with the terms of their licenses.

Students will work in teams of 3-4 members, with one member serving as the Team Leader. The choice of Covid-19 website to create is up to the individual team; it will not be assigned. It will, however, require approval from the instructor.

To help you decide on a design, the most popular COVID-19 sites are shown in this document.

All of these sites pull their data from a relatively small number of International, national, and state sites. The top data sources are: BNO, 1point3acres, worldometers.info, the Covid tracking project, CDC, ECDC, WHO. Detailed links for these sites are shown at the end of this document.

All of these sites heavily use tables and graphs. The top 6 React CHART FRAMEWORKS all have a wide variety of examples on their sites, with code.

nivo rocks: <https://nivo.rocks/#/> (wide variety of data visualization components, built on React)

React-Vis: <https://uber.github.io/react-vis/> (Uber's large, composable charting library)

Victory: <https://formidable.com/open-source/victory/> (range of modular charting components)

Recharts: <https://recharts.org/en-US> (super simple, well-built, React composable charting library)

ChartJS: <https://www.chartjs.org/> (simple, flexible, JS charting library for developers)
repackaged as React-chartjs-2: <https://github.com/jerairrest/react-chartjs-2>

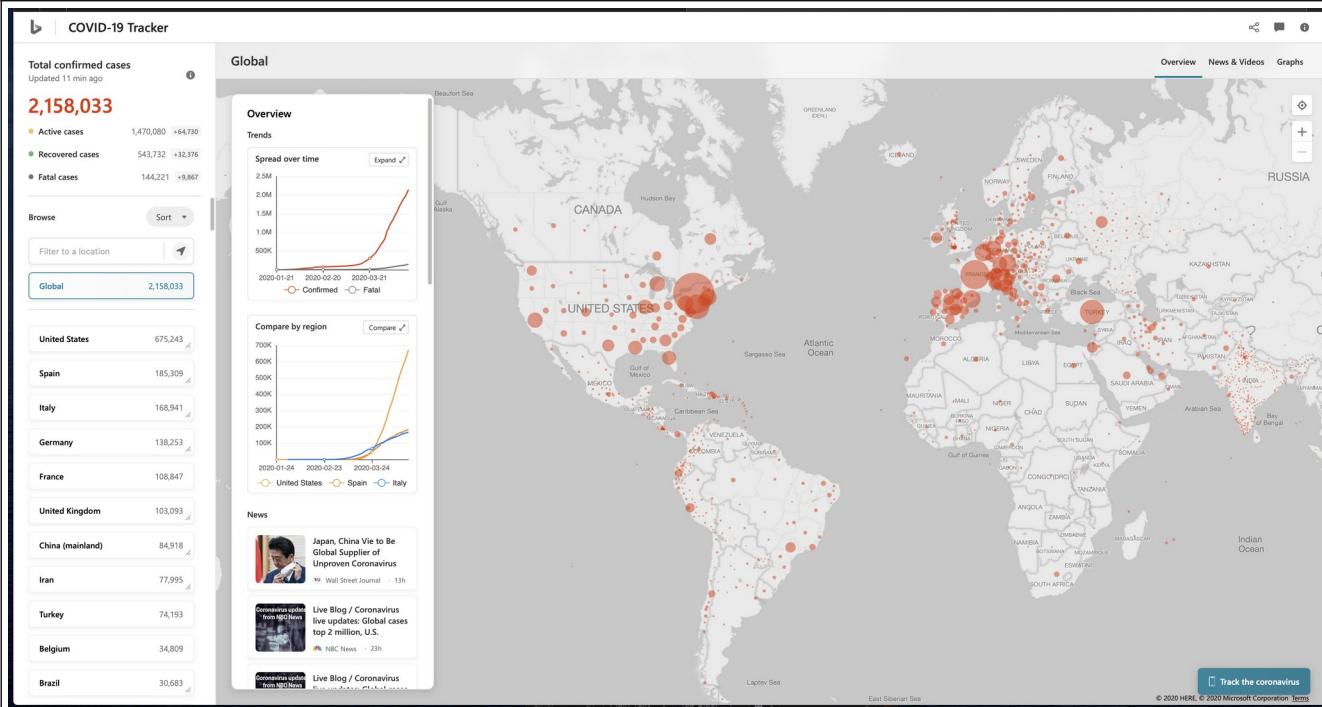
canvasJS: <https://canvasjs.com/react-charts/>

The screenshot shows the BNO News : USA homepage. At the top, there is a red header with the BNO logo. Below the header, a summary table provides global statistics: CASES (702,166), DEATHS (36,934), RECOVERED (42,138), and UNRESOLVED (623,094). Below this, a larger table details COVID-19 data for the United States by state, including columns for Cases, New cases, Deaths, New deaths, Death rate, Serious & Critical, Recovered, and Links. The table lists states such as New York, New Jersey, Massachusetts, Michigan, Pennsylvania, California, Illinois, and Florida.

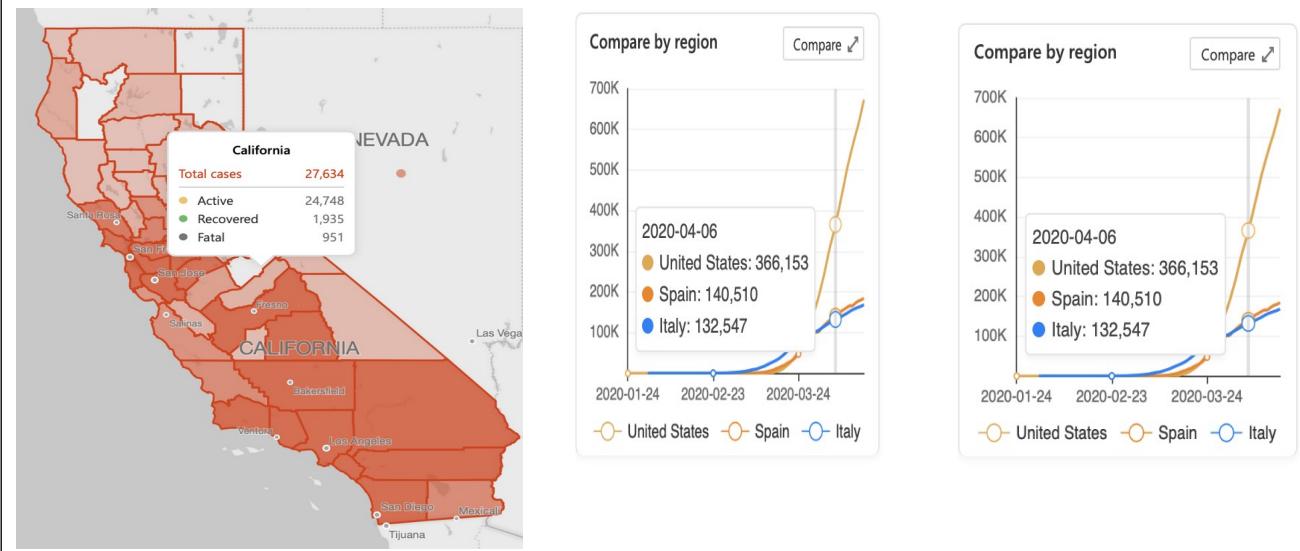
UNITED STATES	Cases	New cases	Deaths	New deaths	Death rate	Serious & Critical	Recovered	Links
New York	226,593	395	17,131	1,025	7.56%	4,504	13,366	Source
New Jersey	78,467	3,150	3,840	322	4.89%	1,961	5,811	Source
Massachusetts	34,402	2,221	1,404	159	4.08%	N/A	421	Source
Michigan	30,023	760	2,227	134	7.42%	N/A	433	Source
Pennsylvania	29,441	1,345	756	49	2.57%	N/A	404	Source
California	29,175	1,085	1,041	68	3.57%	N/A	1,935	Source
Illinois	27,575	1,842	1,134	62	4.11%	N/A	100	Source
Florida	24,753	1,413	726	58	2.93%	N/A	1,116	Source

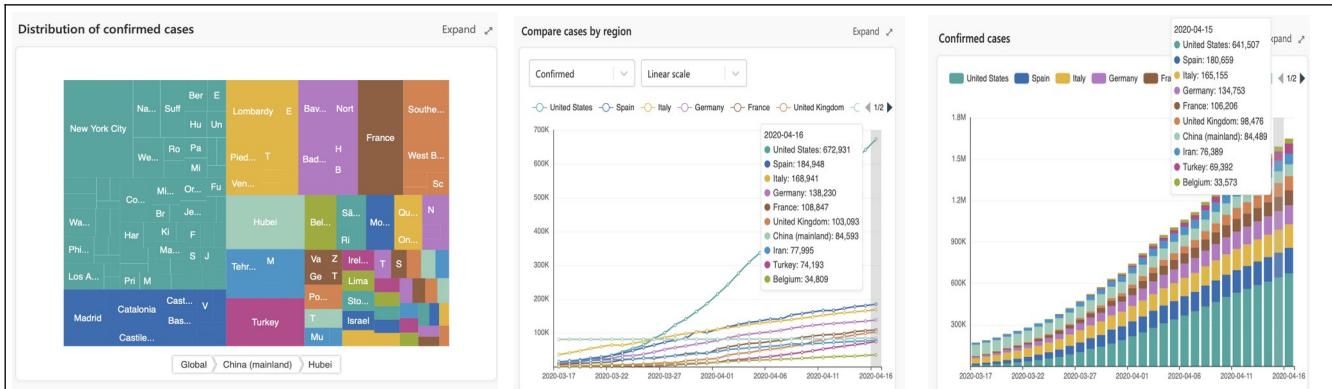
Data links on this site drill down

Bing COVID-19 tracker: Tracks local and global coronavirus cases. <https://www.bing.com/covid>
 Includes drill-down by country, state, and county (US examples)

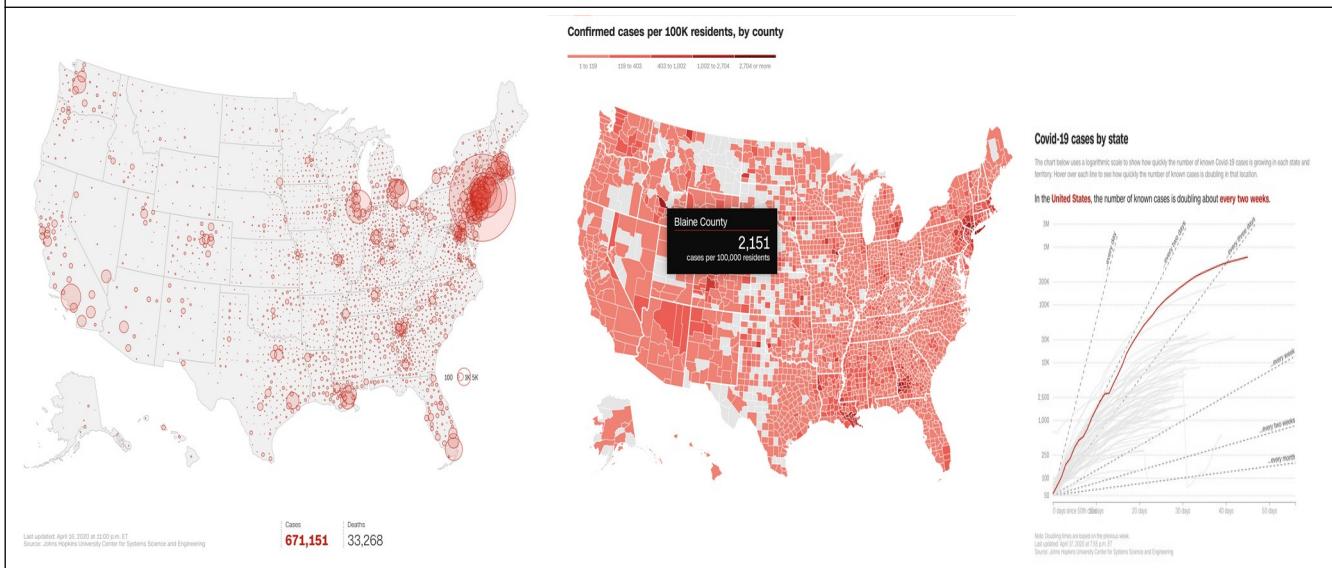


More examples from <https://www.bing.com/covid>





Tracking Covid-19 cases in the US: <https://www.cnn.com/interactive/2020/health/coronavirus-us-maps-and-cases/> State by state, and county by county. (First graph is a tree graph.)

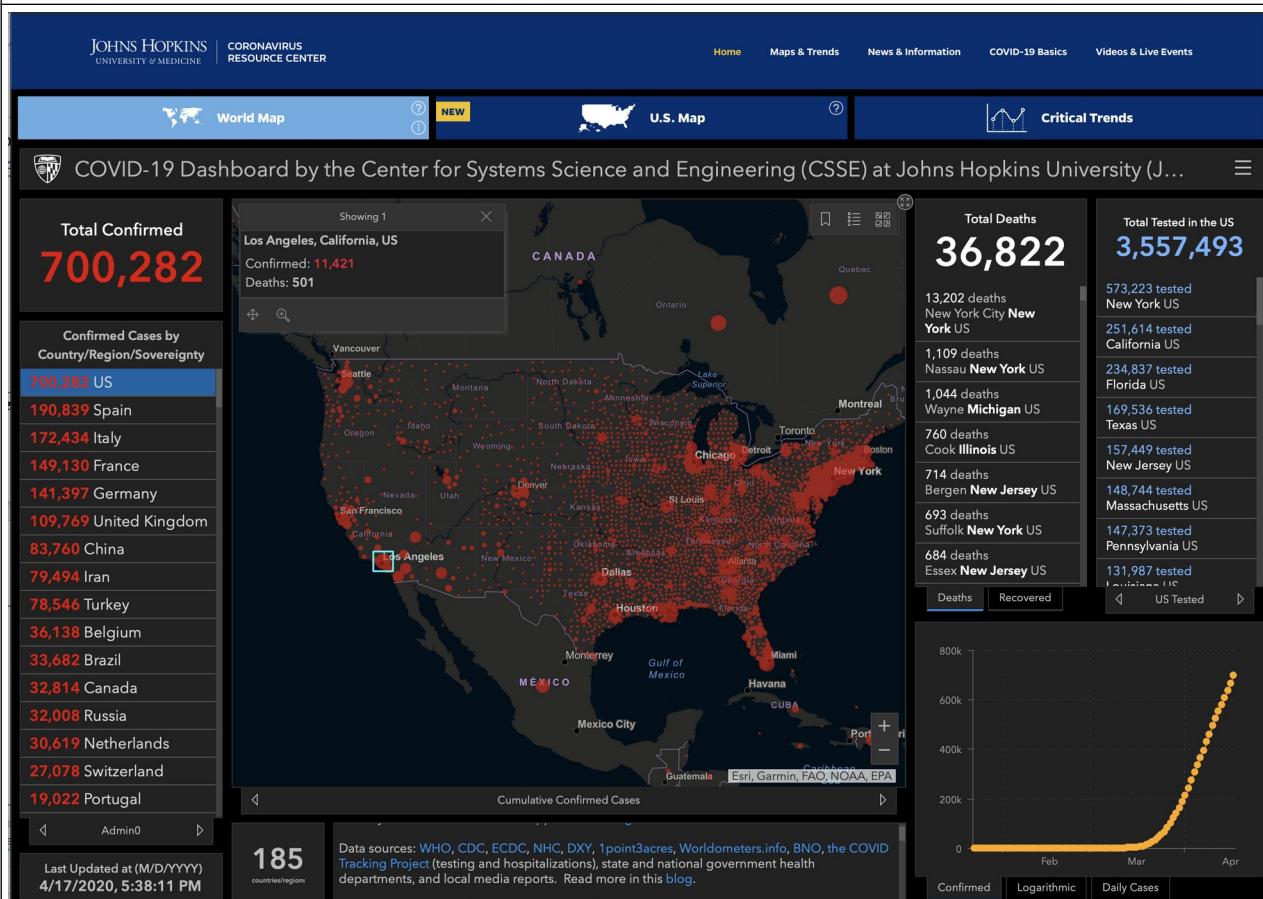


<https://coronavirus.thebaselab.com>



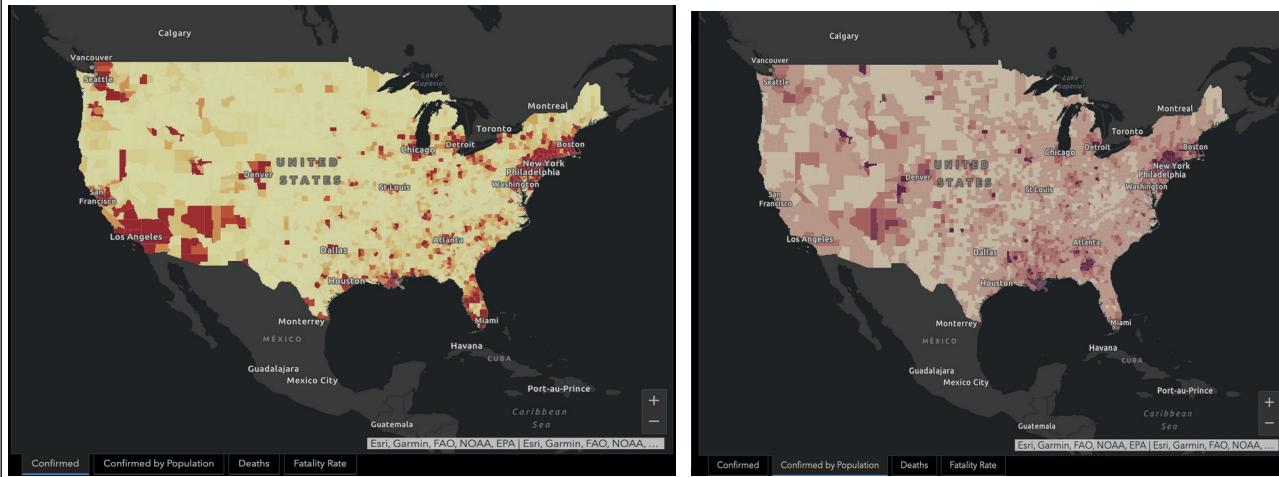


Note the startling speed of spread: <https://www.nbcnewyork.com/news/national-international/map-watch-the-coronavirus-cases-spread-across-the-world/2303276/>



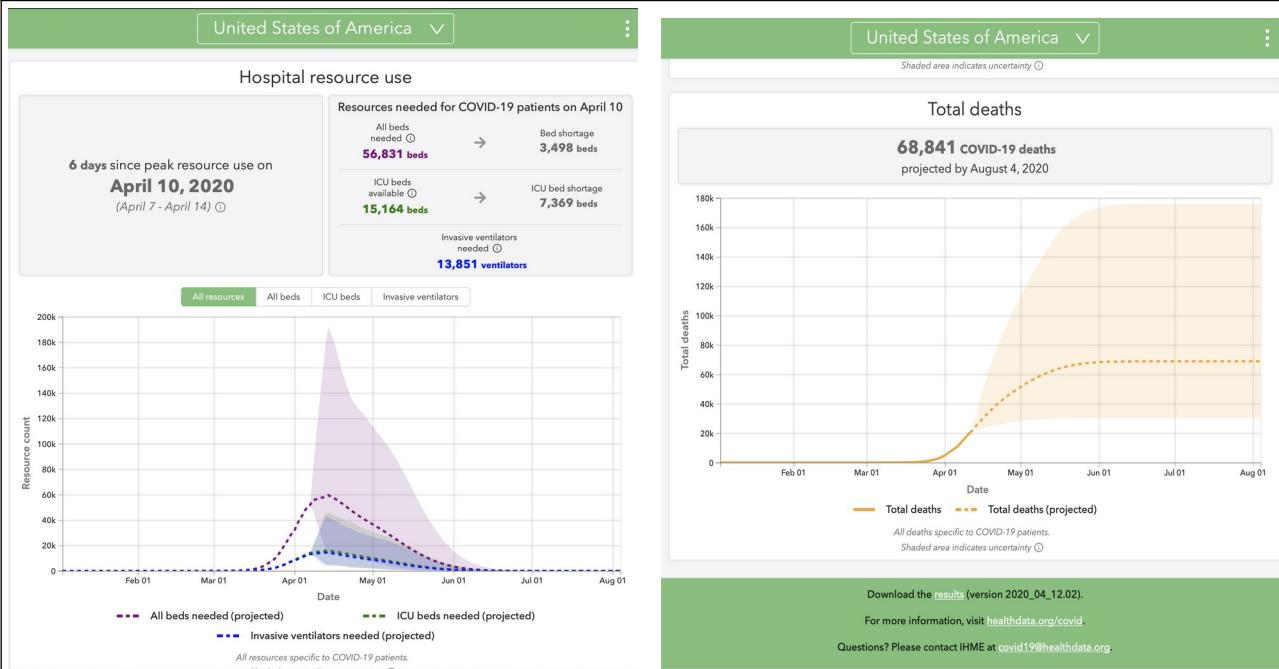
From johnhopkins (most websites get their data from here, which in turn gets its data from the Centers for Disease Control (CDC), and the World Health Organization (WHO).

<https://coronavirus.jhu.edu/us-map>



Total confirmed cases by county

Adjusted by population



From the Institute for Health Metrics and Evaluation (Univ. of Washington site supported by Microsoft). <https://covid19.healthdata.org/united-states-of-america>

NEW:
Testing numbers added, US state's recovered numbers are TEMPORARILY removed. CANADA AND AUSTRALIA ARE COMING BACK, they were TEMPORARILY removed.

Quick Facts

updated: a few seconds ago

2,178,149

Total Confirmed Cases

145,329

Total Deceased

18,161,936

Total Tested

546,743

Total Recovered

Go To Region

All Regions

World

USA

World COVID-19 Stats ↗

NAME	CONFIRMED	CHANGES TODAY	DECEASED	CHANGES TODAY	RECOVERED	TESTS
TOTAL	2,178,149	↑ 91,817 (4.40%)	145,329	↑ 6,855 (4.95%)	546,743	18,161,936
★ United States	675,640	↑ 27,637 (4.26%)	34,522	↑ 2,079 (6.40%)	1,868	3,394,173
★ Spain	184,948	↑ 4,289 (2.37%)	19,315	↑ 503 (2.67%)	19,259	930,230
★ Italy	168,941	↑ 3,786 (2.29%)	22,170	↑ 525 (2.42%)	15,729	1,178,403
★ France	165,027	↑ 17,164 (11.60%)	17,920	↑ 753 (4.38%)	7,928	333,807
★ Germany	137,698	↑ 2,945 (2.18%)	4,052	↑ 248 (6.51%)	15,824	1,728,357
★ United Kingdom	103,093	↑ 4,617 (4.68%)	13,729	↑ 861 (6.69%)	135	417,649
★ China	82,341		3,342		74,862	
★ Iran	77,995	↑ 1,606 (2.10%)	4,869	↑ 92 (1.92%)	14,656	310,340

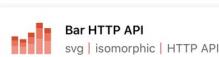
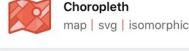
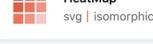
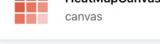
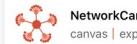
USA COVID-19 Stats ↗

NAME	CONFIRMED	CHANGES TODAY	DECEASED	CHANGES TODAY	RECOVERED	TESTS
TOTAL	675,640	↑ 27,637 (4.26%)	34,522	↑ 2,079 (6.40%)	1,868	3,394,173
★ New York	226,198	↑ 7,636 (3.49%)	16,106	↑ 606 (3.90%)	N/A	550,579
★ New Jersey	75,317	↑ 4,287 (6.03%)	3,518	↑ 362 (11.47%)	N/A	154,010
★ Massachusetts	32,181	↑ 2,263 (7.56%)	1,245	↑ 137 (12.36%)	N/A	140,773
★ Michigan	29,263	↑ 1,204 (4.29%)	2,093	↑ 172 (8.95%)	N/A	97,093
★ Pennsylvania	27,735	↑ 982 (3.67%)	837	↑ 58 (7.44%)	N/A	141,470

From a high school student's site in the state of Washington.

Sources: <https://bnonews.com/index.php/2020/01/tracking-coronavirus-u-s-data/><https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>

Examples from the Top 5 React Graphing Frameworks

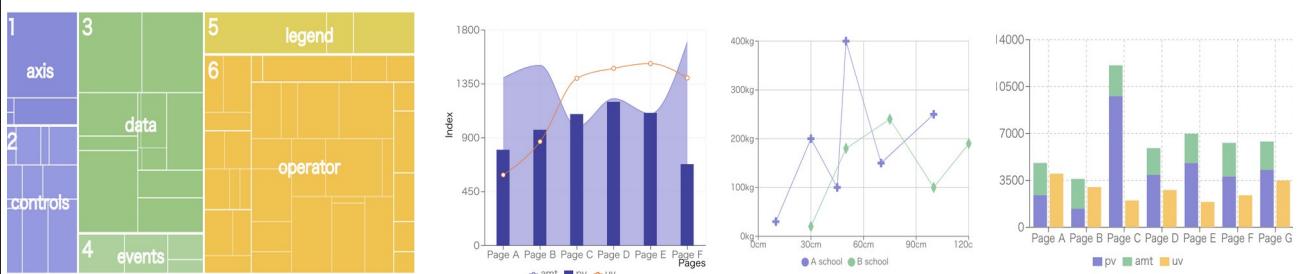
AreaBump
svg | isomorphicBar
svg | isomorphicBar HTTP API
svg | isomorphic | HTTP APIBarCanvas
canvasBubble
hierarchy | svg | isomorphicBubble HTTP API
hierarchy | svg | isomorphic | HTTP APIBubbleCanvas
hierarchy | canvasBubbleHTML
hierarchy | html | isomorphicBullet
svg | isomorphicBump
svg | isomorphicCalendar
svg | isomorphicCalendar HTTP API
svg | isomorphic | HTTP APICalendarCanvas
canvasChord
relational | svg | isomorphicChord HTTP API
relational | svg | isomorphic | HTTP APIChordCanvas
relational | canvasChoropleth
map | svg | isomorphicChoroplethCanvas
map | canvasGeoMap
map | svg | isomorphicGeoMapCanvas
map | canvasHeatMap
svg | isomorphicHeatMap HTTP API
svg | isomorphic | HTTP APIHeatMapCanvas
canvasLine
svg | isomorphicLine HTTP API
svg | isomorphic | HTTP APILineCanvas
canvasNetwork
svg | isomorphic | experimentalNetworkCanvas
canvas | experimentalParallelCoordinates
svg | isomorphicParallelCoordinatesCanvas
canvasPie
radial | svg | isomorphicPie HTTP API
radial | svg | isomorphic | HTTP API**nivo rocks:** <https://nivo.rocks/#/>



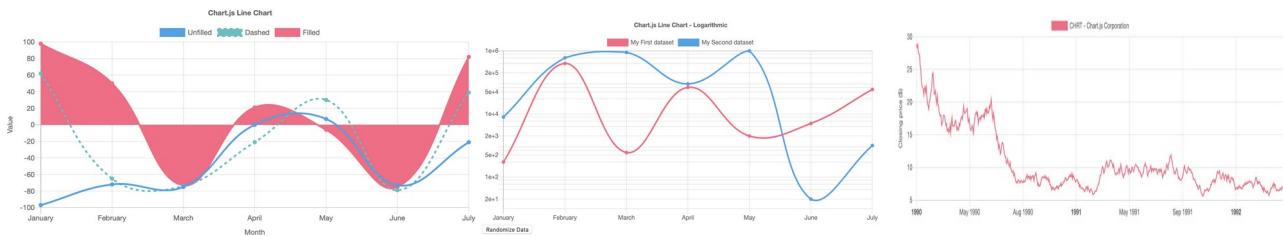
React-Vis: <https://uber.github.io/react-vis/>



Victory



Recharts: <https://recharts.org/>



ChartJS: <https://www.chartjs.org/>

Column and Bar Charts

Contains Column, Bar, Stacked Column, Stacked Column 100%, Range Column, Stacked Bar, Stacked Bar 100%, Range Bar and Waterfall Charts.



canvasJS: <https://canvasjs.com/react-charts/>

DATA SOURCES used by the most popular Covid-19 sites.

BNO: <https://bnonews.com/index.php/2020/01/tracking-coronavirus-u-s-data/>

1point3acres: <https://coronavirus.1point3acres.com>

worldometers.info: <https://www.worldometers.info/coronavirus/>

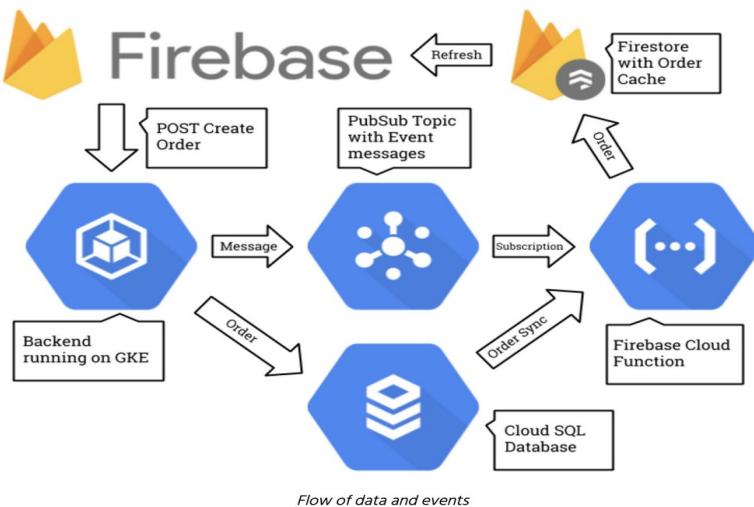
the COVID tracking project: <https://covidtracking.com/data>

CDC: https://urldefense.proofpoint.com/v2/url?u=https-3A__www.cdc.gov_coronavirus_2019-2Dncov_index.html&d=DwMFaQ&c=n6-cguzQvX_tUlZOS_4Og&r=ZNGvwmzlj8kMBY6JiOVCuA&m=l4tRzMk97krELxTIEBHo8DfBIHceLgA3njBSxpFaSkY&s=h6lhY9XL94FOKx6QJnNFE7oopNAn8i_x1i6gIDHTd0&e=

ECDC: <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>

WHO: https://urldefense.proofpoint.com/v2/url?u=https-3A__www.who.int_emergencies_diseases_novel-2Dcoronavirus-2D2019_situation-2Dreports&d=DwMFaQ&c=n6-cguzQvX_tUlZOS_4Og&r=ZNGvwmzlj8kMBY6JiOVCuA&m=l4tRzMk97krELxTIEBHo8DfBIHceLgA3njBSxpFaSkY&s=Kqo9h3kYNxWfxMkTXGNLn2mEPiaPYMNXYv6MBhwWxrQ&e=

Firebase articles you may want to read



Auto refreshing your Firebase app using Pub/Sub and Cloud Functions

<https://www.unacast.com/post/auto-refreshing-your-firebase-app-using-pub-sub-and-cloud-functions>

<https://web.dev/covid19/> Ensure your website is available and usable for everyone during COVID-19. **How to ensure the functionality of your website is available, accessible, secure, usable, discoverable, and fast.**

Functionality: Projects must...

Use ReactJS and one or more ReactJS frameworks

Use Firebase as the backend

Connect to at least one datasource for showing your statistics

Create a COVID-19 website that shows

- Cumulative confirmed, active, recovered, and died cases
- Current state of the spread of the virus in a table, ranked in descending order
 - **By country**, and/or
 - **By states or provinces within a country**, and/or
 - **By counties**, and/or
 - **By zip codes** (mail codes)
- Current state in a graph which updates as the user selects a geographic region
- Recent changes from the previous day, and/or a history of changes in a graph
- Prediction/rate of change (e.g., doubling every 2 days, or halving every 4 days)
- Predicted actual cases (not just confirmed – e.g., a possible number is between confirmed * 10 to deaths * 1000). For example, 40,000 confirmed / 900 deaths -> 400,000 to 900,000 actual
- Provide updates of your statistics throughout the day (at least once/day)

For debugging, allow your data to be downloaded and compared against the sources

Teams (max four members per team)

You Teams typically divide up into different functionalities: API communication, UI design such as page layout using HTML, CSS, and ReactJS frameworks for Bootstrap, Graphing, ReactJS custom components, Firebase development, and so on. You may discuss your project and the technologies you are using with other teams, but each team must build its own application and submit its own work.

Working with members of your team

Each student on the team will receive the same grade. If you run into issues with your teammates, it is your responsibility to attempt to resolve them. Failing that (if you cannot contact them), bring the problem to my attention as soon as possible -- do not wait until the due date.

Presentations Since we cannot meet in person, each group will produce a 10-15 minute video of their work. Each of the other groups will meet virtually to watch the other groups, and to grade them using the below categories. It is recommended that each member of your group participate in your group presentation. It should first go through the functionality of the main parts of the website, followed by the data sources and frameworks used, and finally by details of implementation you want other groups to see.

Grading Your project will be judged according to the rubric on the next page, and by other teams, with up to 3 points each for each of the following categories, for a total of up to 30%.

Scoring will be submitted online, through a poll

- 1) Quality of the presentation / teamwork
- 2) Quality of documentation describing your data sources and update speed
- 3) ReactJS charts and graphs functionality (how is data displayed – tree graph?)
- 4) ReactJS table functionality (display of statistics in tables, sortable ?)
- 5) Project regional data functionality (country, state, county, zip code)
- 6) Project data update (how often is the data updated)
- 7) Use of Firebase
- 8) Code quality
- 9) Innovation
- 10) Overall web design

Submission

Upload the code and documentation for this project to a new public GitHub repository.

To complete your submission, **print the next two sheets, fill out the spaces on the first sheet, and submit both sheets** to the professor in class by presentation day. Failure to follow the instructions exactly will incur a 10% penalty on the grade for this assignment.

**CPSC-349 COVID-19 Project Submission,
due: 349-01 – 8 Dec, 349-02 – 11 Dec at start of class**

Team Name:

Team Members:

Repository _____

.github.io

Verify each of the following items and place a checkmark in the correct column. Each item incorrectly marked will incur a 5% penalty on the grade for this assignment

Completed	Not Completed	COVID-19 website
<input type="checkbox"/>	<input type="checkbox"/>	Created a COVID-19 website that shows the spread of the virus in regional, geographic information (*must* use a map)
<input type="checkbox"/>	<input type="checkbox"/>	Showed regional information by at least two of the following: by country, and/or by state, and/or by county, and/or by zip code
		Has map showing current confirmed, active, recovered, and fatal cases by at least two of the following: by country, by state, by county, and/or by zip code
<input type="checkbox"/>	<input type="checkbox"/>	Has tables showing current confirmed, active, recovered, and fatal cases by region, including changes from the previous data
<input type="checkbox"/>	<input type="checkbox"/>	Has tables showing cumulative stats by region
<input type="checkbox"/>	<input type="checkbox"/>	Has graphs showing current confirmed, cumulative, and daily stats by region
<input type="checkbox"/>	<input type="checkbox"/>	Has graphs showing projected actual statistics per region (e.g., 10x confirmed cases, or 1000x confirmed deaths). For example, if it reports 52,000 confirmed cases and 930 deaths, actual statistics are between 520,000 and 930,000 cases.
<input type="checkbox"/>	<input type="checkbox"/>	Shows current state in a graph which updates as the user selects a region
<input type="checkbox"/>	<input type="checkbox"/>	Shows changes from the previous day in a graph
<input type="checkbox"/>	<input type="checkbox"/>	Shows graph of a history of changes by region in the past 14+ days
<input type="checkbox"/>	<input type="checkbox"/>	Graphs or tables showing prediction/rate of change of various regions (e.g., doubling every 2 days, or halving every 4 days)
<input type="checkbox"/>	<input type="checkbox"/>	Predicts actual cases (not just confirmed – e.g., 10x confirmed to 1000x fatalities, e.g., 40,000 confirmed / 900 deaths -> 400k to 900k actual)
<input type="checkbox"/>	<input type="checkbox"/>	Provide updates of your statistics throughout the day (at least once//hour)
<input type="checkbox"/>	<input type="checkbox"/>	Uses Firebase for storing data for performance
<input type="checkbox"/>	<input type="checkbox"/>	Shows (on website) links to sources of data, and authors of site
<input type="checkbox"/>	<input type="checkbox"/>	Project directory pushed to new GitHub repository listed above

Comments on your submission

Fill out and print this page, and submit it on the day this project is due.