

Final Project

Due Apr 29 by 11:59pm**Points** 15**Available** Feb 28 at 12am - Apr 29 at 11:59pm 2 months

Final Project

Description.

For your final assignment in this course, you will work on a project. The goal of the project is to design and implement a web-based interactive visualization tool that allows you to answer questions you have about some topic of your own choosing. You will acquire the data, design your visualization, implement it using modern web frameworks, and evaluate the results.

Team.

You will work closely with other classmates in a **3-person project team**. You can come up with your own teams and use Piazza to find prospective team members. If you can't find a partner, I will team you up randomly. In general, I do not anticipate that the grades for each group member will be different. However, I reserve the right to assign different grades to each group member based on peer assessments (see below).

Deliverables.

There are a few actions you have to for your final project. It is critical to note that **no extensions will be given** for the final project presentation and the final submission for any reason. **For due dates see the schedule below.** The late day policy does not apply to the final project. Projects submitted after the final due date will not be graded. Here are the project steps:

- **Project proposal** (treated as a homework) & announcing your project repository
- Weekly project updates
- **Milestone - a functional project prototype**
- **Final project presentations (including screen-cast) & peer evaluations**
- **Final project submission & peer evaluations**

Project Proposal.

You start your project by forming your groups and letting me know what topic you are interested in exploring by submitting a **project data form**. **Each team will only need to submit one form.** In addition to the form, you will create a proposal document, addressing the following points. Use these points as headers in your document.

- **Basic Info.** The project title, your names, e-mail addresses, IDs, a link to the project repository.
- **Background and Motivation.** Discuss your motivations and reasons for choosing this project, especially any background or research interests that may have influenced your decision.
- **Project Objectives.** Provide the primary questions you are trying to answer with your visualization. What would you like to learn and accomplish? List the benefits.
- **Data.** From where and how are you collecting your data? If appropriate, provide a link to your data sources.
- **Data Processing.** Do you expect to do substantial data cleanup? What quantities do you plan to derive from your data? How will data processing be implemented?
- **Visualization Design.** How will you display your data? Provide some general ideas that you have for the visualization design. Create **three alternative designs for your visualization**. Create **one final design that incorporates the best of your three designs**. Describe your designs and justify your choices of visual encodings. You use the **Five Design Sheet Methodology**. [_\(http://fds.design/\)_](http://fds.design/).
- **Must-Have Features.** List the features without which you would consider your project to be a failure.
- **Optional Features.** List the features which you consider to be nice to have, but not critical.
- **Project Schedule.** Make sure that you plan your work so that you can avoid a big rush right before the final project deadline, and delegate different modules and responsibilities among your team members. Write this in terms of weekly deadlines.

Each team member must submit this document on Canvas. As a ballpark number: your proposal should contain about 2-4 pages of text, plus 5-6 pages of sketches.

Weekly Project Updates.

We will dedicate class time to discuss final projects. Each team will have a chance to present their progress and ask any questions they may have. You may also schedule a project review meeting either during my office hours or at a time this is convenient for all team members.

Project Milestone.

For your Milestone 1, I expect you to hand in your **code** and your **process book** in its current state (see Final Project Submission for details), and your website template.

For your Milestone 1, you should have completed your data acquisition, or at least have a significant sample of your data. You must have your data structures in place. For example, if you plan to collect 1000 data records, but only have 200, that's fine. If you are missing one of two datasets, you want to use you will lose points since you have to have the whole structure.

You must have a working visualization prototype. You must not have all your views up and running, and it must not be completely interactive, but the direction and the content must be clear.

If you are uncertain about the scope, please contact me. The milestone will be submitted by **creating a release** [_\(https://help.github.com/articles/creating-releases/\)_](https://help.github.com/articles/creating-releases/) in GitHub.

Submission Requirements.

For your final project, you must hand in the following items:

- Process Book
- Code
- Website
- Presentation
- Peer Assessment

Process Book.

An essential part of your project is your process book. Your process book details your steps in developing your solution, including the alternative designs you tried, and the insights you got. Develop your process book out of the project proposal. **Equally important to your final results is how you got there!** Your process book is the place you describe and document the space of possibilities you explored at each step of your project. It is not, however, a journal or lab notebook that explains every detail - you should think carefully about the important decisions you made and insights you gained and concisely present your reasoning.

I strongly advise you to include many figures in your process book, including photos of your sketches of potential designs, screenshots from different visualization tools you explored, inspirations of visualizations you found online, etc. Several images illustrating changes in your design or focus over time will be far more informative than text describing those changes. Instead, use text to explain the rationale behind the evolution of your project.

Your process book should include the following topics. Depending on your project type the amount of discussion you devote to each of them will vary:

- Overview and Motivation: Provide an overview of the project goals and the motivation for it. Consider that this will be read by people who did not see your project proposal.
- Related Work: Anything that inspired you, such as a paper, a website, visualizations we discussed in class, etc.
- Questions: What questions are you trying to answer? How did these questions evolve throughout the project? What new questions did you consider in the course of your analysis?
- Data: Source, scraping method, cleanup, etc.
- Exploratory Data Analysis: What visualizations did you use to look at your data initially? What insights did you gain? How did these insights inform your design?
- Design Evolution: What are the different visualizations you considered? Justify the design decisions you made using the perceptual and design principles you learned in the course. Did you deviate from your proposal?
- Implementation: Describe the intent and functionality of the interactive visualizations you implemented. Provide clear and well-referenced images showing the critical design and interaction elements.

- Evaluation: What did you learn about the data by using your visualizations? How did you answer your questions? How well does your visualization work, and how could you further improve it?

As this will be your only chance to describe your project in detail, please make sure that your process book is a standalone **webpage** that fully explains your results and the final design.

Code.

Your web-based visualizations can be implemented using any API or programming language you would like as long as it runs in modern browsers, but I will only support and answer questions regarding Processing, Java, D3 and Javascript. I expect you to write high-quality and readable code. You should strive for doing things the right way and think about aspects such as reusability, error handling, etc. [Here](http://javascript.crockford.com/code.html) (<http://javascript.crockford.com/code.html>) are some guidelines specific to JavaScript code. We also expect you to document your code.

Project Website.

You will create a public website for your project using GitHub pages or any other web hosting service of your choice. The website should contain your interactive visualization, summarize the main results of the project, and tell a story. Consider your audience (the site is public) and keep the level of discussion at the appropriate level. Your process book and data should be linked from the website as well. If you are not able to publish your work (e.g., due to confidential data) please let me know in your project proposal.

Project Screencast.

Each team will create a **two-minute screencast with narration** showing a demo of your visualization and/or some slides. You can use any [screencast tool \(screencast.html\)](#) of your choice. Please make sure that the sound quality of your video is good - it may be worthwhile to invest in an external USB microphone. Upload the video to an online video-platform such as YouTube or Vimeo and embed it into your project web page. We will show the best videos in class.

We will strictly enforce the two-minute time limit for the video, so please make sure you are not running longer. Use principles of good storytelling and presentations to get your key points across. Focus the majority of your screencast on your main contributions rather than on technical details. What do you feel is the best part of your project? What insights did you gain? What is the single most important thing you would like your audience to take away? Make sure it is front and center rather than at the end.

Project Presentation.

Each team will do a 5-minute presentation showing a demo of your visualization and/or some slides. Focus the majority of your presentation on your main contributions rather than on technical details. What do you feel is the best part of your project? What insights did you gain? What is the single most important thing you would like your audience to take away? Make sure it is front and center rather than at the end.

Peer Assessment

It is important to provide positive feedback for people who indeed worked hard for the good of the team and to also make suggestions to those you perceived not to be working as effectively on team tasks. Please provide an honest assessment of the contributions of the members of your team, including yourself. The feedback you submit should reflect your judgment of each team member:

- Preparation - were they prepared during team meetings?
- Contribution - did they contribute productively to the team discussion and work?
- Respect for others' ideas - did they encourage others to contribute their ideas?
- Flexibility - were they flexible when disagreements occurred?

Your teammate's assessment of your contributions and the accuracy of your self-assessment will be considered as part of your overall project score.

Submission Instructions.

Submission will be handled through GitHub by [creating a release](https://help.github.com/articles/creating-releases/) (<https://help.github.com/articles/creating-releases/>) of your GitHub project repository.

Submission will be handled through GitHub. All teams must use a single shared GitHub repository. **If we cannot access your work because these directions are not followed correctly, we will not grade your work.**

Store the following in your GitHub repository:

- Code - All website files and libraries assuming they are not too big to include
- Data - Include all the data that you used in your project. If the data is too large for GitHub store it on a cloud storage provider.
- Process Book - Your Process Book in **.html** format.
- README - The README file must give an overview of what you are handing in: which parts are your code, which parts are libraries, and so on. The README must contain URLs to your project websites. The README must also explain any non-obvious features of your interface.

Also, you should host the website mentioned above on [GitHub pages](https://pages.github.com/) (<https://pages.github.com/>) (using the assigned repo) and embed the video you uploaded to YouTube or Vimeo.

Grading Criteria.

Final grades will be based on the following criteria:

- A. Work of exceptional quality which tackles a real-world problem, and goes beyond the stated goals of the individual projects. "A" level work must excel in all areas of concept, process, execution, functionality, usability, presentation, and the overall success of the final product.

- B. Very good work that solves the problem and demonstrates a full understanding of the course material. Shows success in at least three areas of concept, process, execution, functionality, usability, presentation, or final design.
- C. Average work that indicates a basic understanding and execution of the final project; passable. Shows proficiency in at least two area of concept, process, execution, functionality, usability, presentation, or final design.
- D. Below average work that indicates that the group does not fully understand the assignment, is unable to work together or lacks proficiency in all areas. Incomplete for the final project.
- F. Failed to submit the final project.

Consider the following questions:

- Process Book - Are you following a design process that is well documented in your process book?
- Solution - Is your visualization effective in answering your intended questions? Was it designed following visualization principles?
- Implementation - What is the quality of your implementation? Is it appropriately polished, robust, and reliable?
- Presentation - Is your website and presentation clear, engaging, and compelling?

Your peer evaluations will also influence your individual project score.

Schedule.

always at 11:59 pm

- Project proposal (due Mar 18)
- Milestone I - a functional project prototype (due Apr 1)
- Milestone II - a **fully** functional prototype (due Apr 15)
- In-class user studies (Apr 18)
- Final project presentation (Apr 25)
- Final project submission & peer evaluations (due Apr 29)

Inspiration.

Project examples from:

- **CSE 557, Fall 2018** [_\(https://washuvis.github.io/\)](https://washuvis.github.io/)
- **Harvard's Visualization Course** [_\(http://www.cs171.org/2015/fame/\)](http://www.cs171.org/2015/fame/)
- **University of Utah's Visualization Course** [_\(http://dataviscourse.net/2016/fame/\)](http://dataviscourse.net/2016/fame/)
- **UC Berkley's Information Visualization Course** [_\(http://courses.ischool.berkeley.edu/i247/s16/\)](http://courses.ischool.berkeley.edu/i247/s16/)

Tools.

- **GitHub** [_\(https://github.com/\)](https://github.com/): Great for collaborative coding

- **Trello** [_\(https://trello.com/\)_](https://trello.com/): Great for project management
- **Slack** [_\(https://slack.com/\)_](https://slack.com/): Great for communicating w/ team members
- **Google Docs** [_\(https://www.google.com/docs/about/\)_](https://www.google.com/docs/about/): Great for collaborative writing
- **Open Refine** [_\(http://openrefine.org/\)_](http://openrefine.org/): Great for data cleaning
- **Data Wrangler** [_\(http://vis.stanford.edu/wrangler/\)_](http://vis.stanford.edu/wrangler/): Great for data cleaning

Data Sources.

- **kaggle** [_\(https://www.kaggle.com/datasets\)](https://www.kaggle.com/datasets) (some cool data here!)
- **DataHub**
- **City of St. Louis Open Data** [_\(https://www.stlouis-mo.gov/data/\)_](https://www.stlouis-mo.gov/data/)
- **St. Louis Country GIS Open Data Website** [_\(http://openstlco.stlcogis.opendata.arcgis.com/\)_](http://openstlco.stlcogis.opendata.arcgis.com/)
- **FRED Economic Data St. Louis** [_\(https://fred.stlouisfed.org/\)_](https://fred.stlouisfed.org/)
- **Wolfram Alpha** [_\(http://www.wolframalpha.com/\)_](http://www.wolframalpha.com/)
- **Security Related Datasets** [_\(http://www.secrepo.com/\)_](http://www.secrepo.com/)
- **Quandl** [_\(http://www.quandl.com\)](http://www.quandl.com)
- **Datamob** [_\(http://datamob.org/datasets\)](http://datamob.org/datasets)
- **Factual** [_\(http://www.factual.com/\)_](http://www.factual.com/)
- **Metro Boston Data Common** [_\(http://metrobstondatacommon.org/\)_](http://metrobstondatacommon.org/)
- **Census.gov** [_\(http://www.census.gov/\)_](http://www.census.gov/)
- **Data.gov** [_\(http://www.data.gov/\)_](http://www.data.gov/)
- **Dataverse Network** [_\(http://thedata.org/\)_](http://thedata.org/)
- **Infochimps** [_\(http://infochimps.com/\)_](http://infochimps.com/)
- **Linked Data** [_\(http://linkeddata.org/\)_](http://linkeddata.org/)
- **Guardian DataBlog** [_\(http://www.guardian.co.uk/news/datablog\)](http://www.guardian.co.uk/news/datablog)
- **Data Market** [_\(http://datamarket.com/\)_](http://datamarket.com/)
- **Reddit Open Data** [_\(http://www.reddit.com/r/opendata\)](http://www.reddit.com/r/opendata)
- **Climate Data Sources** [_\(http://www.realclimate.org/index.php/data-sources/\)_](http://www.realclimate.org/index.php/data-sources/)
- **Climate Station Records** [_\(http://www.metoffice.gov.uk/climatechange/science/monitoring/subsets.html\)_](http://www.metoffice.gov.uk/climatechange/science/monitoring/subsets.html)
- **CDC Data** [_\(http://www.cdc.gov/nchs/data_access/data_tools.htm\)_](http://www.cdc.gov/nchs/data_access/data_tools.htm)
- **World Bank Catalog** [_\(http://data.worldbank.org/data-catalog\)](http://data.worldbank.org/data-catalog)
- **Free SVG Maps** [_\(http://www.d-maps.com/index.php?lang=en\)_](http://www.d-maps.com/index.php?lang=en)
- **UK Office for National Statistics** [_\(http://www.statistics.gov.uk/default.asp\)_](http://www.statistics.gov.uk/default.asp)
- **StateMaster** [_\(http://www.statemaster.com/index.php\)_](http://www.statemaster.com/index.php)
- **Datasets Available in R** [_\(http://vincentarelbundock.github.io/Rdatasets/datasets.html\)_](http://vincentarelbundock.github.io/Rdatasets/datasets.html)
- **VolVis** [_\(http://www.volvis.org/\)_](http://www.volvis.org/)
- **Whole Frog Project** [_\(http://froggy.lbl.gov/\)_](http://froggy.lbl.gov/)
- **Berkley Data Links** [_\(http://vis.berkeley.edu/courses/cs294-10-sp10/wiki/index.php/Online_Datasets\)_](http://vis.berkeley.edu/courses/cs294-10-sp10/wiki/index.php/Online_Datasets)
- **Google Public Data** [_\(http://www.google.com/publicdata/directory\)_](http://www.google.com/publicdata/directory)
- **Gordon Kindlmann's Brain** [_\(http://www.sci.utah.edu/~gk/DTI-data/\)_](http://www.sci.utah.edu/~gk/DTI-data/)
- **Volume Library** [_\(http://www9.informatik.uni-erlangen.de/External/vollbib/\)_](http://www9.informatik.uni-erlangen.de/External/vollbib/)
- **TU Vienna Vis Group Volume Datasets** [_\(http://www.cg.tuwien.ac.at/research/vis/datasets/\)_](http://www.cg.tuwien.ac.at/research/vis/datasets/)

- [Time-varying Hurricane Dataset](http://vis.computer.org/vis2004contest/data.html) [_ \(http://vis.computer.org/vis2004contest/data.html\)](http://vis.computer.org/vis2004contest/data.html)
- [Deep and interesting datasets for computational journalists](http://cjlabs.stanford.edu/2015/09/30/lab-launch-and-data-sets/)
[_ \(http://cjlabs.stanford.edu/2015/09/30/lab-launch-and-data-sets/\)](http://cjlabs.stanford.edu/2015/09/30/lab-launch-and-data-sets/) [_ \(https://fred.stlouisfed.org/\)](https://fred.stlouisfed.org/)

Project (1)		
Criteria	Ratings	Pts
Aesthetics/ Usability		5.0 pts
Solution		5.0 pts
Implementation		5.0 pts
		Total Points: 15.0