Final Report – Suning Yao

Background & Project

I am working as a STEP intern at the Map Tiling team at Google Geo. The team is the owner of the infrastructure that builds the map tiles for Google Maps products.

My task is to add new labels by investigating traffic signs added to the base maps of Google Maps with the other STEP intern as my partner.

Experience

1. Working with PM, designers and other developers

PM and Designers:

I briefly talked with PM and designers through chat, but the project details and designs are not completely clear since PM and designers have different opinions at first.

There are different options to implement the styling and labeling of labels. Each option has its own strengths and disadvantages in internationalization, intentions, clarity, and technical difficulty.

The way we solve this and reach consensus is to have meetings with everyone brainstorming, asking questions, and discussing.

This makes me realize that a productive meeting is much better than going back and forth in chats or emails with each other.

Other Developers:

For our project, we spend most of our time understanding the existing approach and pipeline traffic signs take to add labels. We have a lot of conversations with the maintainer of the existing traffic signs implementation. The majority of the essential algorithm used is taught by the maintainer. From this, I learn how to ask the correct questions to the correct person.

Apart from communicating with the current maintainer, I also get to work with other teams from Map platform who are working on detailed maps. They give a lot of insights on how to conquer specific positioning of labels. One thing I know from working with them is that cross-team communication and cooperation are essential and helpful. Even though they are not working on the same project, they may have additional information for helping out.

2. Writing Tests and Code Reviews

Writing tests:

Every line of code submitted needs to be tested. I never write tests for my own projects before, since that means less work. However, working on a huge codebase and system needs 100% correctness, so that the new diffs won't crash the whole system.

I get to learn and use a lot of the different testing and mocking techniques including assertions for boolean expressions, floats, and errors. Also, with testing in mind, I pay more attention to each function's boundary checking and behaviors.

Code Reviews:

Code reviews are strict, but give a lot of knowledge to the submitter.

Each one of my patches will require my mentors, the owner of the file, and readability reviewers to review. They will inspect the code line by line to make sure every piece of the patch is at a perfect stage. Sometimes I have a small utility function patch, but I will receive about 20+ comments altogether.

Every comment matters, and teaches me how to design APIs, write tests, think about usage, and readability and maintenance.

3. Earth Geometry

For some functions, I need to calculate the direction and some forms of projections of lanes. For that, I need to manipulate and organize vertices and vectors. I have learned a lot about the geometry of Earth, map, and other geometries and projections in general from using the S2 Geometry library.

For this part, I wrote a lot of C++ code and tests.

4. Fix bugs created by my fixing of bug

First, for my direction and projection calculation functions, they need to check the type of labels. It passes the tests and reviews. But at runtime, when my partner calls the function, it always returns the unexpected error. It turns out that the check shouldn't be using equal to operator directly, but use some pre-existing functions that are dedicated to check the type.

Second, when I am using Maps platform's tool suites, I noticed that some of the data is not presented intuitively due to some existence of shortcuts for interaction and that missing data makes some developers confused. I decided to fix the bug by adding some simple text to the data field. But that generates a problem that the raw data itself cannot be double click selected if it has negative signs in it. It won't confuse developers now, but that makes interaction worse. Then I submitted patches with TypeScript and browser APIs to fix this bug created by my fixing of previous bugs. My two fixes leave the state of the Maps tool better.

These two issues make me realize the importance of designing ahead, and testing rigorously for coding more maintainable and solid code.

Other experience during the internship

The internship is coming to an end. I get the feeling that I just got used to everything on Maps, Google, and California but I'm leaving.

My mentors are welcoming and nice. They are making sure me and my project partner have things to look at, and tasks to do. They also answer every question I have about the work and the project. They teach me a lot at code reviews, stand ups, 1-on-1s, and lunches.

Google is a great company to work at as developers. It has all the support, resources, and developer tools for building the best softwares that billions of people use daily. If I have to nitpick one thing that Google can improve on, I will say about one thing that Google gets asked about at every public event. Google is building and maintaining the softwares (Maps, Search, YouTube, Cloud, Workspace) that makes people's daily activities complete. But it has been a long time since the last time Google took the lead and innovated like Apple in AR, Meta in Metaverse (this one is not a good example…), Amazon in Cloud. With all the great minds and engineering power, Google can be much better and lead the innovations of the next generation.