

For our final project we plan to design and build a distributed ride-sharing application. Our motivation is to create a peer-to-peer network of users for this service that will allow the service to scale without needing to add and maintain more central servers. Such a service would be an alternative, decentralized version of Uber that could be useful for college campuses and communities as the cost to setup and maintain the service would be extremely low, but it would provide a valuable service to people and allow for more efficient use of resources.

The challenges we see in building such a system include the fact that we will have to propagate information throughout the network in a peer-to-peer fashion. Currently we are considering using a gossip based system where each node might not have perfect information, but the nodes communicate with each other to distribute information. Eventually the system would want to be able to incorporate location data, so we will want to design our system in a way that allows for this type of extension. Furthermore, in reality this service would be running on mobile devices, so the network will have to be robust enough to handle the constantly changing landscape that mobile device networks create. In other words, we predict that devices will be constantly entering and leaving the network, and devices will also have varying connection qualities. Since we will not have the time or resources to test this system in a real-world setting we plan to develop a robust simulation program that will allow us to test and evaluate our solution in a variety of configurations.

In general, our question is, can we create a peer-to-peer network that distributes information fast enough to enable a ride-sharing application to be viable and useful. Our hypothesis is that we will be able to use a gossip based system to create a system that allows a ride-requester to see, on average, a “useful” percentage of available rides. As the project progresses we will try to define and understand what this “useful” threshold is.

Timeline:

Week 1: Map out assumptions and design. Simple peer-to-peer network that shares information. Begin working on the simulator.

Week 2: Expand on the peer-to-peer network and tune it for ride-sharing. Work on the simulator.

Week 3: Run initial evaluations and prepare for presentation

Week 4: Final evaluation, consider extensions, and write the paper.