COMS6156
Justin Hudis

Final Project Progress Report

Overview

I intend to explore upcycling from the perspective of a "lazy" consumer by creating an app that pays an owner for their old phone's processing power. This is in contrast to the standard in academia which assumes phone providers will collect old phones into server farms, something which has not been seen in practice. Similar apps already exist but only use network bandwidth, not RAM/CPU. App use should be as frictionless as possible because consumers will give up on anything if it is hard, and mass adoption is the goal.

There are four relevant entities: the (app) maintainers, the (smartphone) owners, the (service) provisioners, and the environment. Ideally, the services this app will provide (similar to AWS Lambda / Google Cloud Functions) will be so much cheaper than traditional cloud that they will pay for my service instead. At the same time, the money they spend must be sufficient for maintainers to get paid for their work and for consumers to get paid considerably more than they spend on electricity keeping their phones running. Finally, this is all worth it only if the environment benefits, i.e. if it is more carbon efficient to use my service than traditional cloud alternatives.

Research Questions

1. How much would I need to charge provisioners (per 100ms) so that owners and developers make a sufficient profit?
2. Is that considerably less than what a Google Cloud Function (GCF) of the same memory/CPU costs?
3. Is the latency of my service comparable to GCF's?
4. Is the CCI (Computational Carbon Intensity) of my service lower than GCF's?

Value to User Community

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The two users of my project are the owners and provisioners. Owners would download my app onto their old phone and keep it running. They would get paid by the hour to do so and maybe feel a bit better about doing the right thing for the environment instead of just forgetting about their old phone or putting it in the e-waste stream. Provisioners would use an API to use the collective computing power of my service. It will hopefully be cheaper and more environmentally beneficial than alternative services. While in the future it would be nice to have my app on the Play Store and my service API be public, there would be too many security concerns to address in the scope of this paper, so it will only be private access for now.

Demo

I will explain that I created this app because it immediately addresses the issue of smartphone e-waste without relying on phone providers who aren't incentivized to do the work themselves. I will show the old phones running, my monitor phone with statuses of all the phones displayed, and some console output from the main server. I will initiate a sequence of queries from my laptop (proxy for the provisioners) and show the output. My idea at the moment is to pretend that a provisioner is trying to find primes and keeps sending random integers to the service to test; each phone will be accepting integers and testing/returning whether they are prime.

Delivery

I will deliver the code as a GitHub repository.

Addendum

The only thing I will be reusing is the CCI methodology from the "Junkyard Computing" paper by Switzer et al. that I presented at the beginning of the semester. This is how I will do an environmental assessment of my service.