**Main Idea:**

One central computer which is capable of running an Operating System.

**Strengths:**

* Minimizing outgoing traffic thus enhancing reliability on system connectivity and reducing network overhead.
* Ability to implement more complex interfaces using the solid platform provided with a well established OS (Ubuntu, Android).
* Cost reduction in network interfaces and interfacing devices for sensors and actuators.

**Some available approaches are:**

1. Using a real computer
2. Using a Raspberry Pi
3. Using a mini computer with onboard touch enabled screen
4. Using a mini computer connected to a touch screen and display

Most of current Operating Systems are capable of supporting different screen resolutions as well as touch screens, so having them combined with a minimal hardware would give the unit the flexibility to run smooth enough while making it easy to handle changes and create better user experience.

Here we propose taking advantage of the fourth option, using a mini computer connected to a touch screen and display, where a very low-cost computer (ranges from 30$ to 100$) could be used to control the whole unit while providing the content for the monitor.

**Some sample devices:**

<http://www.orangepi.org/>

**Some sample touch screens:**

<https://www.alibaba.com/product-detail/Low-Price-and-High-Quality-flexible_60325428975.html?spm=a2700.7724857.29.84.pWbSL6>

<https://wholesaler.alibaba.com/product-detail/17inch-resistive-touch-screen-panel-kit_1999605696.html?spm=a2700.7724857.29.226.pWbSL6>

**Customer Detection by Units:**

For customer detection sensing near the unit, there are three different scenarios:

1. iBeacon and automatic RFID detection
2. Generating a barcode on the unit to be scanned by mobile phones
3. Generating a barcode on the mobile phone to be scanned by the unit

Beacons are stand alone, and there’s no reliable central management tool for beacons. Beacons transmit “radio” signals – so reception varies. Problems include: iBeacon signal overlap, over-promising how accurate proximity will be. What happens when your phone is in your handbag is that Beacon’s signal, is disrupted by everything which save air…walls, vitrines, objects, people, etc. This problem is so bad, in fact, that I can be standing directly beside a beacon on the wall, and will find a stronger signal coming from one across the room.Although there is a third party for handling all setup and coding, Passbook, is on Apple only – forget about Android users and there is no good support (replacement etc)

**iBeacon:** your phone needs some software on it to do all those calculations. It’s the **software** that’s called iBeacon

* Detecting a beacon can be fairly quick, but is slow when it comes to calculating leaving a beacon region
* Your phone will ‘toggle’ between nearby beacons unless you do some coding to prioritize which beacon to listen for
* Your phone will “glitch” and turn location monitoring off entirely for a brief delay – this will make your phone think that its left the store and then reentered, potentially triggering another welcome message (we use counters and timers to prevent this)
* And finally because mobile devices should detect beacons, we have back-and-forth communication to update the server with the unit detection of a user, which increases the network traffic.

The problem with the second scenario is that we have to deal with different cameras with different resolutions for each device, and for this purpose our mobile app needs to have permission access to the camera. On the other hand, to have an image processing tool within the mobile app, make it complex.

We do suggest the third scenario through which we only need a display to show the generated barcode to be scanned by our barcode scanner device which is attached to the unit. The good thing about this approach is the fact that it satisfies our need to support customers who does not have mobile phone. Therefore we can print their assigned barcode in a piece of paper to be scanned and recognized by the unit. Consequently, we do not need to have RFIDs anymore.

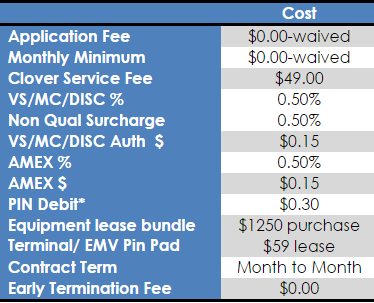
**Payments:**

For the sake of payment, if we want to have the option to save credit card information of the user, we need to have a PCI team and PCI is an annual audit that costs $50.000 per year. The solution is Credit Card Processors, which take care of payment stuff for us. Through our research, we found couple of good options:

(Main features needed: support Swipe Card Readers, Apple Pay and Google Wallet)

* **Bank of America Merchant Services (BAMS):**

Please take a look at the following figure for prices:



BOA seems to be a good option as they support Apple Pay and Google Wallet too, through their apps ([Clover link](https://help.clover.com/explore-apps/))

* + **Does your POS and service support holding payment for a period of time to be charged upon leaving the store?**
    - **Ans:** Yes, we do.
  + **If it is the case, do you charge and then return the remained amount or charge one time at the end?**
    - **Ans:** It could be done in a way so that only one transaction happens.
  + **How much is the cost of the service? monthly fee or per transaction?**
    - **Ans:** Look at the above figure. Prices may vary based on number of transaction per month.
  + **Do you support all credit cards (Visa, Master Card, Amex, Discover)**
    - **Ans:** Yes
* **Elavon:**
  + **Does your POS and service support holding payment for a period of time to be charged upon leaving the store?**
    - **Ans:** If we use tokenize service we can do it, although we dont have the PCI stuff
  + **If it is the case, do you charge and then return the remained amount or charge one time at the end?**
    - **Ans:** N/A
  + **How much is the cost of the service? monthly fee or per transaction?**
    - **Ans:** We need to get to servcies, one for face to face transaction, one for e-commerce. They have different options, For around 3000 Transaction per month:
* **retail :** 19.99$ monthly, from 1.96% to 3.69% for different CC and Debit cards + 0.20 to 0.30 + Purchase $336
* **E-commerce:** 19.99$ monthly, from 2.19% to 4.41% for different CC and Debit cards + 0.20 to 0.30 + Converge with tokenization

$199 one-time fee + $29 monthly fee

* + **Do you support all credit cards (Visa, Master Card, Amex, Discover)**
    - **Ans:** Yes we do, but in e-commerce, AMEX has more charges

**Note: We don't need to use Apple Pay/ Google Wallet**