

Smart Vending Machines

Andy: Hi, I'm Andy and I'm here with Kenn. We are both business analysts working for a small software development company. We're here talking with Dan, who is an owner of a vending machine company. Hi Dan!

Dan

Hi Andy. Hi Kenn.

Andy

Ok, well we're here because Dan needs some software. But before we get into the actual system that we want to build, let's talk about how things work now.

Dan

We have a bunch of vending machines across the country. These are what I call standard, dumb vending machines. They have no reporting capabilities back to corporate. They are restocked in a traditional manner - a restocker comes in, adds new items, removes expired or recalled items, and decides where the items will go. But, this is very error-prone. Sometimes they forget to remove expired items. Sometimes they don't remove items that aren't selling. Sometimes they don't properly add new items to the right spots. Additionally, when these restockers go to these locations they have to spend a lot of time counting out some items, and that leads to mistakes. So basically, I'm looking to reduce mistakes and reduce the amount of time they take on this activity.

Andy

That makes sense. Sounds like the restockers have to do a lot.

Dan

Yes. Ultimately, our restockers are making marketing decisions when they really should just be restocking. We have people analyzing and making decisions about this stuff back at corporate, but it's hard to reach out to these remote locations to make informed decisions. We are also getting pushback from restockers because they are paid to be drivers, and yet they are doing a lot of counting and deciding. Everything is manual, and it's a lot of work.

Kenn

How does the information flow right now? Are the restockers reporting back to the central hub?

Dan

The restockers do report back, but it's paper-based, which is expensive and slow. And we have to re-enter it into our systems. So it takes a long time. A restocker may not visit a location for a whole month, so it may take two months by the time they go through and we tell them to go through something. There's a long return cycle there. We'd like to get information back on a much faster basis, maybe instantaneous. That way we can contact our distributors to get a faster turnaround time.

Andy

What kinds of things are in these vending machines?

Dan

Pretty typical things. Some have soda, some have chips and cookies. Standard types of snacks. Nothing fancy.

Kenn

I just saw someone at a vending machine in this building. And he was retrieving the items because they were perishable. Is this expiration thing a common problem?

Dan

Yes, most definitely. The restockers are in charge of checking each bag to make sure that the expiration date has not elapsed.

Andy

Wow, one by one? That's slow.

Dan.

Yeah, and the silly thing is we have those expiration dates already when we purchase the items from the distributors. So there's no need for restockers to be checking every single date if we track it right. Not to mention that makes us open to tons of lawsuits. And it leads to poor brand image. Bad news.

Andy

Well, and I imagine that recalls are a factor into this as well. What if there's a problem in an item and you need to pull it from the vending machines?

Dan

Absolutely. Right now, we tell all of our restockers, but have little idea of what bag of chips went where.

Andy

Makes sense. Okay, so last we talked, you were talking about a smart vending machine system. So what does that look like?

Dan

Really there are three main features that I envision. The first is what the customer sees at the machine itself. So it's a basic set of touchscreen buttons where you place an order for a bag of chip or two sodas. And they simply insert their money, the system returns the correct amount of change. It's a pretty standard vending-machine type of thing.

The second feature I need is for the restockers. They would have an instruction list of what items need to be removed or added to this vending machine. So that includes things like expired, recalled, or just things that aren't selling. Additionally, the items that are added need to be there too. Along with the instructions of which slot to put the items into (because that's a marketing decision too). That way, all the restockers have to do is scan an item, and then check off the quantity they put in.

Kenn

So the vending machine learns the habits of its customers?

Dan

Sort of, although those marketing decisions come in from a human, so the machine is "smart" in that it reports information to marketing specialists back at corporate who then decide how many cookies or chips go into which slot. And that's a hard set of decisions - factors like being near a health store can help influence how many diet sodas you put in.

Kenn

Ah, okay.

Andy

So the restockers should be just doing just doing restocking, they are not making the marketing decisions. Currently, restockers are in charge of documenting all kinds of things that related to marketing, but a restocker is really just supposed to be restocking

Dan

Exactly. I want to make their job as simple as possible, so we can eliminate costs and time.

Andy

Ok, good. What's the third feature?

Dan

I call this our management tool. This directly connects to the vending machine, and can view in real time what the purchase history is, the inventory, and show some analytics. That way a marketing specialist can use this information to see how people purchase items . Are they more likely to buy cookies on weekends, or weekdays? Are they more likely to buy cookies that are higher up on the shelf, at eye level?

Kenn

So it sounds like you've got a customer interface and a restocker interface, which is more of a touch screen or touchpad type of interface, right?.

Dan

Correct. For the customer interface, it's got to be simple, with big buttons. Our dumb vending machines have touch screens, but we might be changing those screens in the future so we need the size of the buttons to scale to the screen. And then the restocker feature would be on a smartphone, or maybe a tablet - we're not sure what exactly we're giving them yet.

Kenn

Ok, that makes sense. We can work with that for now. But then it sounds like this management feature has more of a desktop-like feel to it.

Dan

Yes. The management interface will be presenting a lot more information, and will be able to push information out to the vending machine for the restockers. For example, maybe some text notes or instructions, or the list for re-stocking. We don't know if it's PC or Mac now.

Andy

So then this management tool enable folks at corporate to make stocking decisions about specific machine in certain locations. You want to be able to see how much things are being bought, how often, what time, what location. And then you want to be able to push instructions out to restockers. And all this gets done immediately.

Dan

Yes, there shouldn't be a paper trail, all digital. Information should be real time.

Kenn

So I'm also thinking about kiosks having a limited amount of space, but it can vary, right?

Dan

Yeah - good question. Each kiosk has a set number of rows, columns, and slots. A typical kiosk has eight rows, five columns, and fifteen slots deep, but it could vary.

Andy

So the software needs to check whether we've overloaded a given vending machine. So I imagine that if you are managing vending machines, you need information about that specific vending machine - so perhaps some information about each vending machine. Address? GPS? Nearby businesses?

Dan

Yes, all of that factors into marketing. Restockers don't need to change that information, but the management tool needs to present that information.

Kenn

So how do you envision the kiosk connecting to the headquarters? Is there any other information besides inventory and purchase history that can be relayed back to headquarters?

Dan

Well I've heard of some systems that keep track of a heartbeat for the system. Maybe the vending machine needs to report a status of the vending machine? It would be nice to know when exactly it gets restocked. Or know if the machine is offline.

Andy

And that should be part of the management tool?

Dan

Yes, that would be great. And the feedback should be specific. So if the customer encounters an error at some point, then that technical information needs to be reported back to the management tool and the customer interface fails gracefully.

Andy

Absolutely. That's very important. And as we develop the software, we will produce those errors to make sure that the system handles those gracefully. Now, I imagine all of these things have to be able to running at the same time, right?

Dan

Yes - a customer can be in the middle of a purchase while the manager is viewing the purchase records. It's okay if the current purchase list is a few minutes out-of-date, but they shouldn't be messing with each other. Also, the restocking interface and the customer interface would not be running at the same time - since nobody can buy from a machine while it's being restocked.

Kenn

Ah, okay that simplifies things. So it's not really realistic that a restocker would interrupt a customer, but management should be locked out during restocking.

Dan

Correct. And when a restocker is done, the management tool can then see what's new and any other notes the restocker noticed.

Andy

Ok. So what else does the management feature need to see?

Dan

Well, I want them to be able to drill down to a specific machine, and see how the inventory has changed over time. But also I want to see it in aggregate as well - maybe across zip codes, states, and the country. In the future, we would like to build upon that analytics somehow.

Kenn

Now, what about transactions - are these purchases always just cash?

Dan

For now, yes. In the future, we may allow purchases from, say, student id cards that allow us to identify purchasers individually. Then maybe be able to a correlation analysis, like "People buy chips and a Mountain Dew".

Andy

Wow, that would be interesting. Is that something you need now, or is that something you want the system to eventually evolve to?

Dan

It's not important now, but it would be nice if we could do it. Oh, and it would also be nice to have personalization where you can just choose the most recent things you've bought. So just hit the "Mountain Dew" button, and the machine finds it and gives it to you.

Andy

Ok, we'll tell our developers that that's a "stretch goal." We might not be able to fit that into the scope of the project we had in mind.

Dan

Ok. Yeah, that's fine.

Kenn

What about tracking information about distribution? Maybe you make a large purchase of Doritos, and you need to know if you have enough to go out to the current vending machines?

Dan

Actually, we have a separate system for that. So that's not much of a problem. What we need more of is the ability to make better marketing decisions on each vending machine.

Andy

Ok. So to come back to the analytics. It sounds like you want the tool to assist the decisions, but not necessarily making those decisions. So perhaps making some suggestions on price bumps, but not automatically doing it.

Dan.

Exactly. It's all about assistance. You know, I'm not looking for a complex data mining system - just some basic analytics. Visuals are great. Aggregation is great. Even some suggestions. But ultimately I don't need this tool to do the job of a marketing specialist. We can handle much of the actual analysis, merely having the data is the biggest goal.

Kenn

Ok, fantastic. Anything else you'd like to add about the system?

Dan

Nope, I think we've covered it. So how should we do this, build a prototype?

Andy

Ok, so here's what we're going to do. We have a bunch of young software engineers back at our shop, and we've got about ten weeks to devote to developing a prototype of this product. Eventually, we'll build Android apps and web applications for the various needs here, but for now, we'll build the core of this app with a basic Java Swing interface.

Dan

Sounds good.

Kenn

Yes, to keep things simple for now, we'll have three Java swing interfaces that are reading and writing to flat files. No databases. No networking. Just three interfaces.

Dan

And will that be easy to port over to future platforms?

Andy

Well... if our developers design it right it will. They'll keep the interface portion loosely coupled from the core logic of handling things like inventory, purchases, and re-stocking. But we'll also make sure that the interfaces are close mock-ups of what the final product will look like.

Kenn

Yeah, and we'll focus on the core first, then add the Swing user interface right after. That way we can build up our automated and manual test suite early.

Dan

Makes sense. Any chance I could see the product halfway between now and 10 weeks from now?

Andy

Sure - let's give the development team six weeks to come up with their first release. That might be a little challenging for the interface, so does a text-based interface make sense to you?

Dan

That's fine. And I'm sure that we didn't cover everything we need in this conversation, so I'm always open for the developers to directly ask me questions.

Andy

Fantastic! They most certainly will ask you questions, I'm sure.

Kenn

Well, anything else, or should we wrap this up?

Dan

I'm done. I'll see you guys later.

Andy

Bye!

Kenn

See ya!