

GreenBox Audiobook Lending System Problem

General Description

A public library system is conducting a pilot project to make audiobooks available through kiosks. Each branch location of the library will have one or more audiobook kiosks, called "Greenboxes." In order to use the kiosk system a customer must have a registered library card and set up a lending account that is secured with a credit card. In order to reserve or borrow an audiobook a customer must have an account that is in good standing (see general business rules).

Borrowing audiobooks is a two step process.

1. The customer uses the web interface to reserve an available book at a specific kiosk location.
2. The customer goes to the kiosk and retrieves the book.

The Greenbox website is part of the Library website. The user must first log on to the library website in order to use the GreenBox system. Logging on and off of the library website are outside the scope of the GreenBox system.

There are several actions a user may take after accessing the greenbox website.

1. **Search** for an audiobook. This is a keyword search similar to most shopping websites. The user can drill down until the desired title is located. The GreenBox system will indicate how many copies of the book are available at any particular kiosk.
2. **Reserve** an audiobook. The customer will select from the results of the search in the desired kiosk. The system will reserve the book for that customer for three days. If the customer doesn't pick up the book in that time, the reservation is cancelled.
3. If there are no copies of the book available at the desired kiosk, the customer may place a **request** for the title at that kiosk. Requests for a title at a kiosk are arranged in a first-in-first-out order. When an audiobook is returned to the kiosk, the system will service the first (oldest) request for that title by automatically creating a reservation for the customer for the book, and will send an email to the customer as a notification of the reservation. The rules for reservations are the same as before (i.e., the customer has three days to fulfill the reservation or else it is cancelled by the system, in which case the book is either made available or it is used to service the next request on the queue, if there is one).
4. **Cancel a reservation.** If the customer decides not to fulfill the reservation it may be manually cancelled prior to the two-day limit.
5. **Cancel a request.** If the request has not been fulfilled yet, it may be cancelled by the customer. Requests persist until either cancelled or fulfilled by the kiosk.
6. **Return** to the library website.

To access the functions at a kiosk, the user must be authenticated. Currently this is done by swiping the library card on the kiosk. The authentication is performed by the library system, and is outside the scope of the GreenBox system.

Here are the actions that may be performed at the kiosk by the customer after the user has been authenticated:

1. **Borrow** books – fulfill reservations for that customer at that kiosk. All loans are for two weeks.
2. **Return** books – Place the books back into circulation. If there are any pending requests for the title of the book, the system will create a reservation for that specific audiobook. A book may be returned to any kiosk in the system. If the kiosk book storage is full, the book must be returned to another kiosk.

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If the returned book is late (I.e., it was borrowed more than two weeks before), a fine will be due. Fines are handled by the library accounting system, which is outside the scope of the GreenBox system.

3. **Exit** the system.

Library employees have special cards that they may use to authenticate themselves to the kiosks.

Tasks that may be performed by library employees at the kiosk include these:

1. List contents of the kiosk.
2. Manually remove audiobooks from the kiosk.
3. Add audiobooks to the kiosk. These two tasks may be used to rebalance the distribution of books among the kiosks.

System administrators may perform various tasks using a special administrator web interface. These include:

1. Requesting various reports, such as indicating imbalances in the distribution of books among the kiosks. This report can help them determine which kiosks to visit to remove and add books.
2. Indicating the contents of each kiosk.
3. Indicating the status of each book held by the library (available in the kiosk, borrowed by a customer, reserved by a customer, in transit between kiosks).
4. Adding new titles (not books) to the inventory.
5. Adding book copy to inventory (by scanning the QR code and selecting the correct title). The initial status is "in transit" until added to a kiosk.
6. Removing a lost, damaged or misplaced book copy from inventory.

Business rules:

1. To set up an account, a customer may visit the library website or appear in person at a branch location. If the customer's account is not in good standing they will be required to pay all outstanding fines before their account is made active. A customer may also close a lending account via the website or in person.
2. Audiobooks may be periodically added to the kiosk offerings and deleted from the kiosk offerings. There may be multiple copies of each audiobook title available at the kiosk.
3. Kiosks shall be available 24/7/365, except for re-stocking and maintenance. Kiosks shall not be available to customers when maintenance or re-stocking is being performed.
4. Customer information is kept on the main library system that is separate from the kiosk system. Kiosks shall be periodically serviced by maintenance personnel.
5. The kiosk system shall be managed and supported by the library's administrative branch.
6. Audiobooks are identified by QR codes on the outside of the package. They can be inserted into the kiosk in only one way to allow the hardware to read the code.
7. All loans are for two weeks.
8. Fines for overdue books are computed by the library's existing fine mechanism. This system is external to the one you will be designing.
9. Account status is managed by the existing library system. This system is external to the one you will be designing.
10. An account in good standing is an account for which there are no outstanding fines for any borrowed materials (books, audiobooks, videos, etc.).
11. Managing audiobook inventory and re-distribution at the library system level is a process that

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is external to this project. Stocking and emptying kiosks will be within the scope of this project, however.

Notes:

If this looks a lot like the RedBox movie rental system, it is because the idea was inspired by that system. The GreenBox system is certainly not the same as the RedBox system. Its features are much more limited, and we really have no idea how the RedBox system is implemented.

On previous versions of this project we have received comments from students who were very familiar with the operation of public libraries, and they told us that this system does not accurately reflect the way that actual libraries work. If that bothers you, think of the GreenBox system as something separate from the public library. (Think out of the box, so to speak. Or maybe in our case, it's in the green box.) The purpose of this project is to do object-oriented modeling on a reasonably sized system. We had to make certain decisions to just keep the project to a size and complexity that is manageable in one semester by a small team of students working part time in an academic environment.

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