Group 4

Analysis and Redesign of UREC's Equipment Rental System

By Sam Genske, Matthew Stiger,
Aila Ikuse, Evan Bullock,
& Alex Melchior

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Executive Summary

The purpose for our project to redesign the University Recreation (UREC) equipment rental system began with our group identifying a common issue that a majority of students have to deal with when going to the Student Recreation Center (SRC). Whenever you check something out from the equipment rental desk, the staff has to manually enter in your student ID number, search up the item in an unorganized/unstructured drop-down list, and ensure that the item they selected isn't already checked out by another student. After consulting with several members of University Recreation staff, two of whom are in this group, we determined that the current system is time consuming, complicated, inaccurate, and leads to lost equipment. A redesign of the inventory system and technology at the equipment rental desk would mitigate the issue of time and lost equipment at the SRC.

The solution the group came up with includes a newly designed inventory system interface that accurately shows which students currently have checked out what items, a card swiper for the student ID's, labeling the equipment with barcodes, and a barcode reader. The end result of the project would include ease of use, minimal training, and minimization of errors/system flaws. The general scope of the costs and time required for this project is relatively low. Given the criteria and needs for this redesigned system, it is currently estimated to cost roughly around $10,000 (if using hand scanners and two locations) and could be designed and implemented by WSU's in house development IT team in an estimated timeline of about 4 weeks.

Project Description

The equipment rental system at University Recreation is mainly used at the Student Recreation Center (SRC), with some light usage at the Chinook Student Center. Every time a patron enters the SRC and requests to check out a piece of equipment, the attendants at the service desk use this system. The professional staff also use this system to edit, add, or remove categories and pieces of equipment. With 3,000 students using the SRC each day, and 80% of WSU students using the facility at least once during the semester, this system is heavily utilized.

The current system in place is old, slow, and outdated. Service attendants manually type in the WSU ID number of the patron, manually select and type in the kind and number of the equipment to check it out, and manually type in the WSU ID number to check it back in. This introduces a number of areas to make mistakes, and the system, as a result, is far from accurate. A more efficient, accurate system would eliminate common issues that arise, such as overcharging or undercharging for damaged or broken items. Sometimes items are not checked out in the first place, and when returned damaged or broken, cannot be attributed to a certain patron. There are two employees of University Recreation in our group who can attest to these issues.

The system we are envisioning would be fast, efficient, and minimize the number of errors and stress the current system puts on both employees and patrons. With the use of barcodes, navigating through a myriad of categories would no longer be needed. The system would function the way it is intended, with no room for error, human or

otherwise. The system would be able to keep track of which patron has what equipment, what equipment is checked out, and what equipment is not checked out.

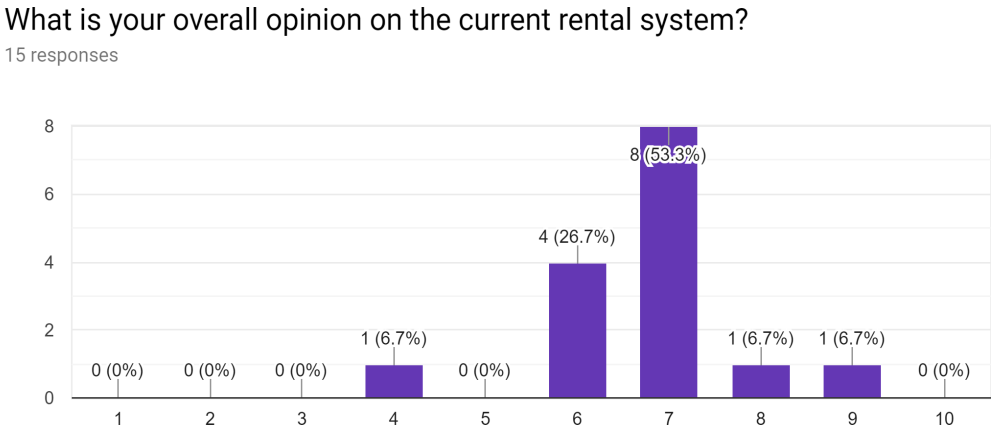
System Requirements Statement

The current main users of the system are service attendants and facility managers, who are student employees of UREC. There are also some administrative users, also known as the professional staff, that control the system if there needs to be any updates/removals of equipment and dealing with the charging of patrons due to missing/damaged equipment. After reaching out to UREC's head of IT department, we found out the system was over 7 years old and was created with a "rapid response" mindset. This means minimizing the time one's clicker system (hand, mouse, etc) has to travel between operations due to the repetitive nature of the tasks that happens within the system during busy hours.

The redesign of the system would need to be approved by many people. Firstly, The approval must be made from the service attendant's direct manager, then would need to be approved by the director of the facility. After the director of the facility, it would need to be approved by the board of the directors for UREC. This would also require help from the IT department from UREC, allowing for in-house development of the system which can be cheaper than going external because UREC already pays the IT salary, instead of occurring additional developmental costs.

Since the inventory system is becoming outdated and inefficient, we took it upon ourselves to reach out the some of the workers about their own opinions on the current system via a survey. As shown above, the responses were reasonable but not sufficient.

For our

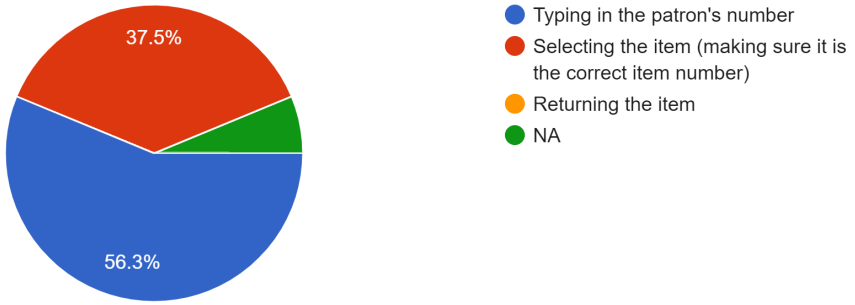


purposes we want this overall rating to be higher (9 or 10), for an efficient system that the users enjoy without any flaws.

The survey also introduced us to some of the major errors that we can use to fix the system. When errors are reduced, the overall speed of a transaction decreases, ensuring a more satisfied patron. In the graph shown below, we found that the major errors that need to be fixed are from “Typing the patron’s number in” and “Selecting the item”. This leads us to think that this is where most of the the focus needs to be on for the redesign of this equipment rental system. Also, we asked which part of the process was the most time consuming to the current system users (shown below). The same two issues from before were voted the highest; “Finding the item in the system” and “Typing in the patron's number”.

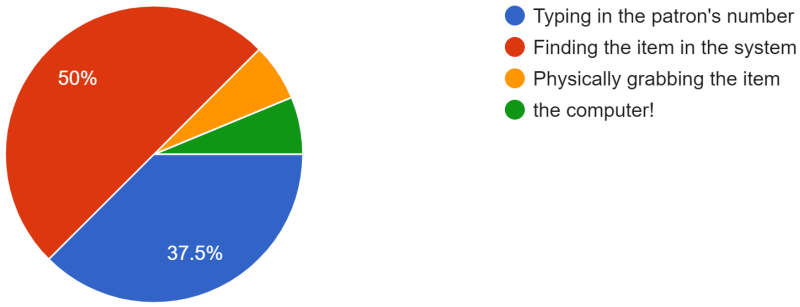
Where do you think the most errors are made in the system?

16 responses



What part of the transaction takes the most time?

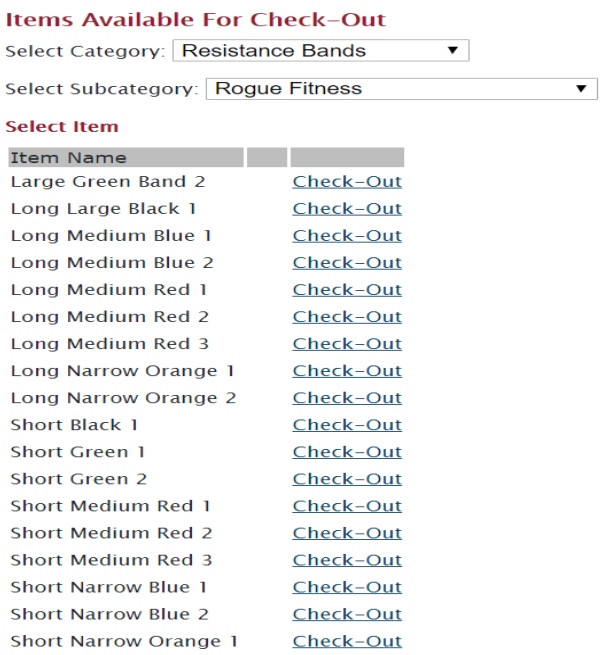
16 responses



The survey also provided us with some insight into what the current users like about the system. They often answered with things like “easy to use”, being “simple”, and “easy navigation”. Another major question that we asked in the survey was “If you could improve one thing about the system what would you do?”. The majority of the improvements that the users provided had to deal with the “typing in the patron's number” issue stated earlier. Most responses had to deal with either introducing the card scanner and/or a hand scanner. Since the UREC already has both of these assets found

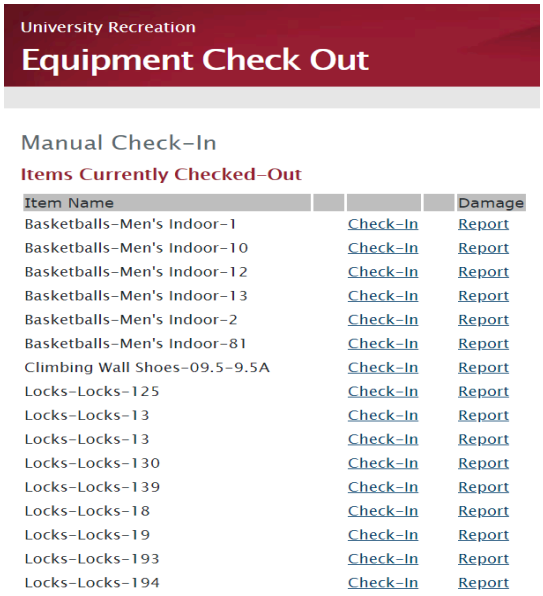
within the facilities, this would make perfect sense to bring them to the equipment rental process.

Our system has many intangible benefits that do not require transactions. For starters, our system is going to be much easier to use than the current system. Within the current system, we find that it is very cluttered, slow and inefficient. The new system will eliminate these issues and make the program much more efficient for employees to use by using barcodes to easily scan items in/out instead of chaotically categorizing the items in various subgroups (see Figure below) forcing the employee to search for the exact item. Employees also tend to make errors when selecting items such as resistance bands that have very specific traits (width, color, length). The list can make it very hard to determine which band is the correct one to select causing wrong items to be marked as "checked out" when it is not. With barcodes, employees will simply scan a barcode and the system will find the item for them. We also thought of introducing QR codes instead of Barcodes, which depends solely upon the end-users of the system, it is more of just a preferred choice for them. QR codes can store more detailed information and could fit better on trickier pieces of equipment (for example, a tennis racket). This will lead to fewer errors as well as eliminate the frustration caused by



the employees when using the current system. Customers have also complained that it takes too much time to check out something as simple as a racquetball set, as a set requires three items (ball, goggles, and racquet), which will also be improved vastly once the new system is implemented.

For tangible benefits, the loss prevention side of things will improve greatly as the new system makes it much easier to keep track of which items are checked in and out. To check things out currently, employees are required to manually type in not only the customer's card number but they also must manually type in the item number/find the item in the chaotic subcategories. However, when checking things back in, items can become easily lost when not checked into the proper person's account (caused by a mistake when initially typing in number). This is where manual check-in gets used. Manual check-in is just as confusing as the rest of the system. It does not show the number of the person that checked them out and employees are forced to individually count items and check if they have the proper ones checked in/out (see Figure to the right). Often times there are many items in "Manual Check-In" that aren't currently checked out and also as many items shown that shouldn't be checked out because the improper number was typed in.


University Recreation

Equipment Check Out

Manual Check-In

Items Currently Checked-Out

Item Name				Damage
Basketballs-Men's Indoor-1		Check-In		Report
Basketballs-Men's Indoor-10		Check-In		Report
Basketballs-Men's Indoor-12		Check-In		Report
Basketballs-Men's Indoor-13		Check-In		Report
Basketballs-Men's Indoor-2		Check-In		Report
Basketballs-Men's Indoor-81		Check-In		Report
Climbing Wall Shoes-09.5-9.5A		Check-In		Report
Locks-Locks-125		Check-In		Report
Locks-Locks-13		Check-In		Report
Locks-Locks-13		Check-In		Report
Locks-Locks-130		Check-In		Report
Locks-Locks-139		Check-In		Report
Locks-Locks-18		Check-In		Report
Locks-Locks-19		Check-In		Report
Locks-Locks-193		Check-In		Report
Locks-Locks-194		Check-In		Report

We have come up with a few different examples of tangible costs. Starting with the recurring costs, making/maintaining the system will be one of these costs. This cost

will be fixed as it will be the same amount every time we are required to maintain the system. Next, server cost is another recurring fixed cost that will require us to make the same payment every so often in order to keep the server up for the system. Switching over to the one-time cost, the system implementation will be a one-time fixed cost. Once the system is implemented the first time, we will not have to worry about it again.

For our purposes, we created Data Flow Diagrams that help us with visualizing how the equipment rental system would actually function. The Diagrams are found below, the process is laid out in its simplest form (Level-0). Essentially, the patron gives some form of membership verification (Card for Card Swipe/Manual Entry, or hand swipe), then the patron requests which item(s) are to be rented for usage, Attendant verifies membership, Attendant grabs requested item, Attendant scans item's barcode(s), and lastly gives the item(s) to the patron. While all this is happening, data is flowing through the back-end of the system updating the databases that store patron membership information, inventory information, and managerial reports.

We also created an Entity Relationship Diagram (ERD) for the relationships between all of the entities that would be used within the system. This covered the relationship between the patron and service attendant by use of equipment renting. This equipment is owned by the UREC Facility but can be rented from the patron for their own usage. The manager(s) manage the facilities operations and oversees the service attendant, while the service attendant checks all items and gives them to the patron, or receives returning items from the patron.

These Diagrams helped us visualize what actually is happening from within our system. The data flow points help us figure out where the data is being stored or updated. While the ERD help us visualize the relationships between all of the entities found within our system.

Our project has a few different one-time costs that WSU will have to pay for in order to upgrade the current system. Luckily for them, the only other costs they will have to worry about is upkeep after our system is installed. Currently, the computers are old and very slow. We are suggesting putting in touch screens at both the Student Recreation Center (SRC) and The Chinook. This is relatively cheap and will run at a cost of about $400. The addition of touch screens will cut down wait times in line during busy hours by allowing employees to quick and efficiently navigate around the computers using just their hand.

Another one-time direct cost we have is getting barcodes and a barcode scanner. It is currently a mess when searching for specific items to check out within the system. The new system would allow employees to easily use a barcode scanner to scan specific items and the computer will be able to locate it right away and pull it up on the screen. We believe there are around 600 different items available to rent at the SRC and and the Chinook. With the scanner itself being $150 and the barcodes being $250 (or less) we assume this will add another $400 to the budget. The plan is to also implement $20 card scanners at each location so employees can swipe customer cards instead of manually typing in their number every time. One more thing we plan on implementing into our system is the ability to use a biometric hand scanner. Washington State University

implemented these scanners into their gyms in 2017 to allow students to have even easier access to the facilities. Simply wave your hand under the scanner and instantly pull up your account through your fingerprints. These hand scanners cost $4700 per scanner which can be looked at as steep. However, students have left very good feedback for these scanners and it is known that they would be well appreciated if implemented into our system. This brings the total budget up to $5140. If we plan on putting this system into two locations then we will double that up to $10,280.

A comparable system to the one we designed is called “Fusion” (seen in the photo below). Used by 290+ universities in the United States such as Purdue and UCF, Fusion helps institutions manage their sports facilities with powerful, adaptable, and secure recreation management software.

UREC has made it clear they wish to remain with existing systems (ATTIC, the current point of sale system) or utilize their in-house IT department, so we only mention Fusion to demonstrate the existence of similar software.

With all the one time purchases we would need to make, we are looking at about $10,280 in total costs for our system to be implemented in two locations. Costs can be drastically lowered (by $9,400) if the hand scanners are not implemented, and only the card swipe. This system will not only be more efficient and fast but it will also save employees tons of stress and make the students here happier with how the facilities rent

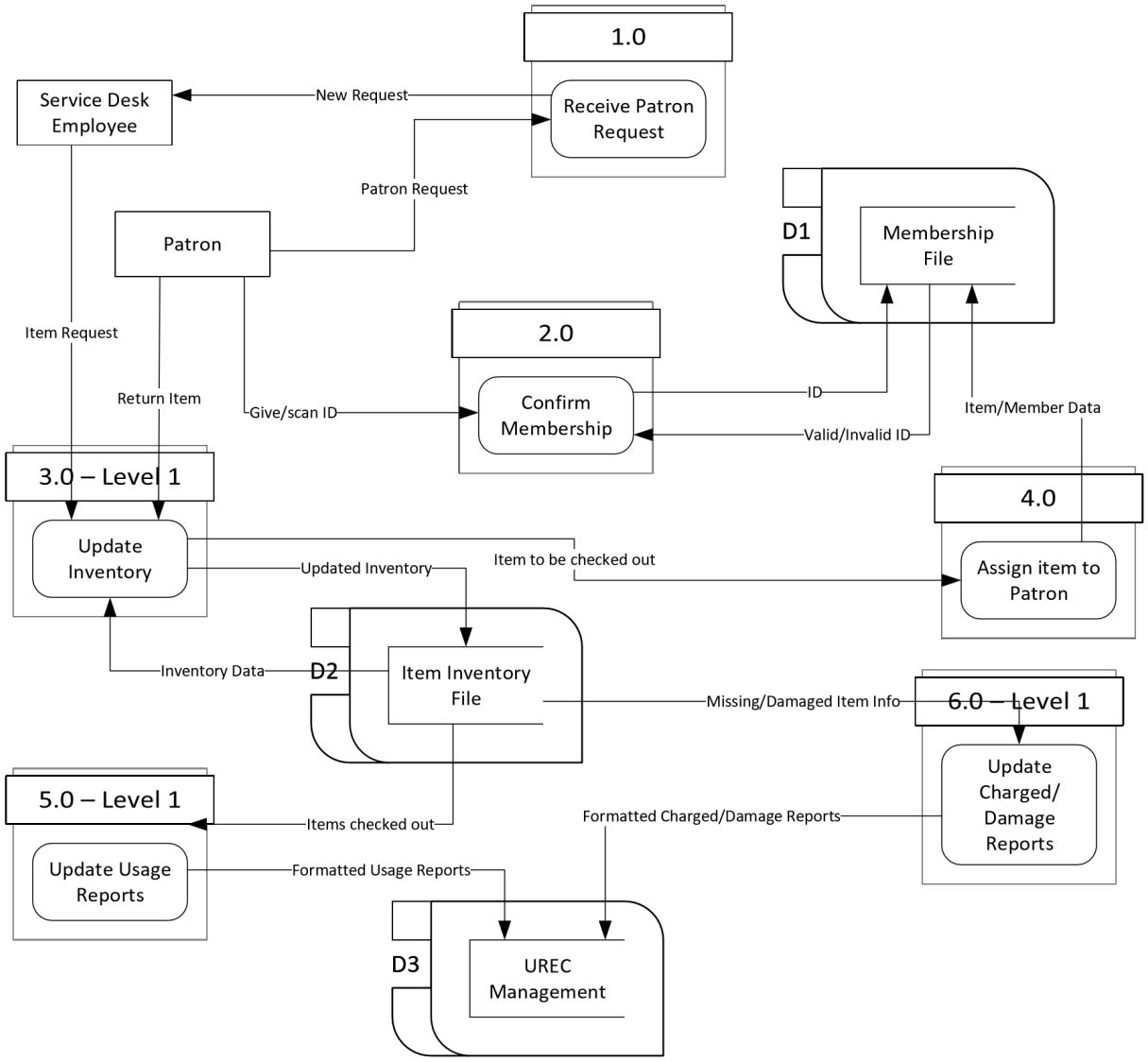
the equipment out. It will also make items easier to track throughout the system so they don’t end up getting lost like they do now.

Systems Design Document

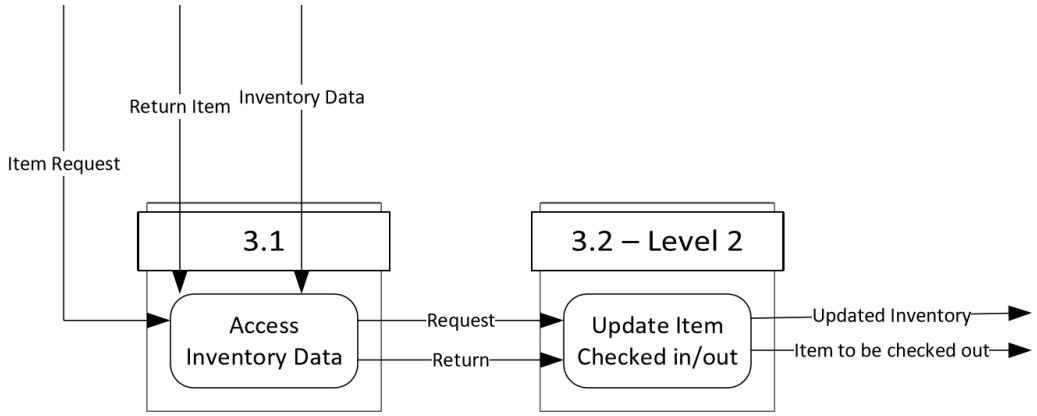
The system our group has designed is an equipment rental system for UREC facilities. This system streamlines the check-out process that will result in the service desk employees making less errors, and less of a wait time for UREC's patrons. Additionally, the check-in process is simplified too as items are linked to patron's accounts, making checking in equipment easier for the staff.

Data Flow Diagram

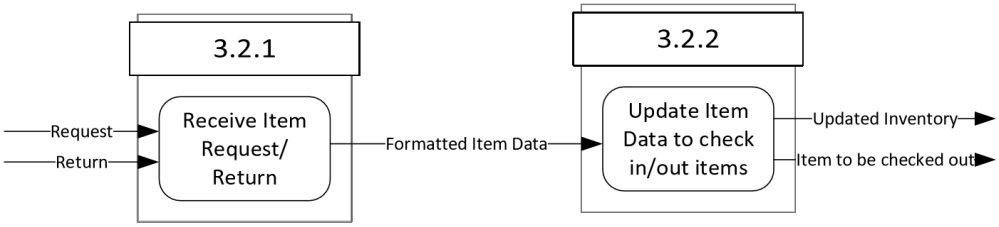
Top Process:



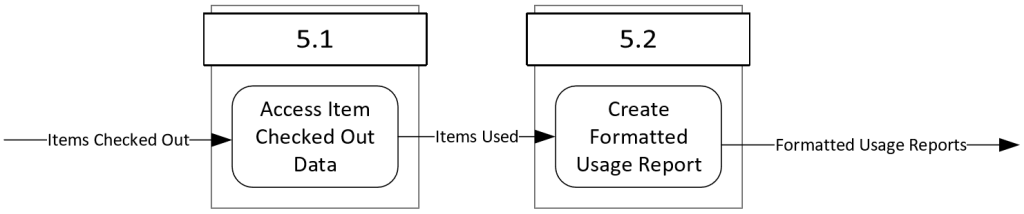
3.0 - Level 1:



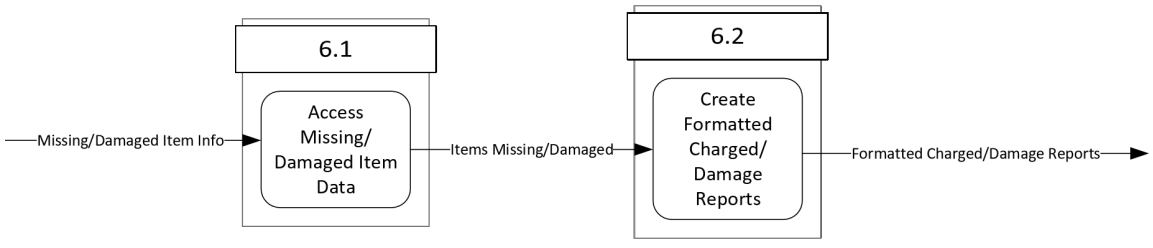
3.2 - Level 2:



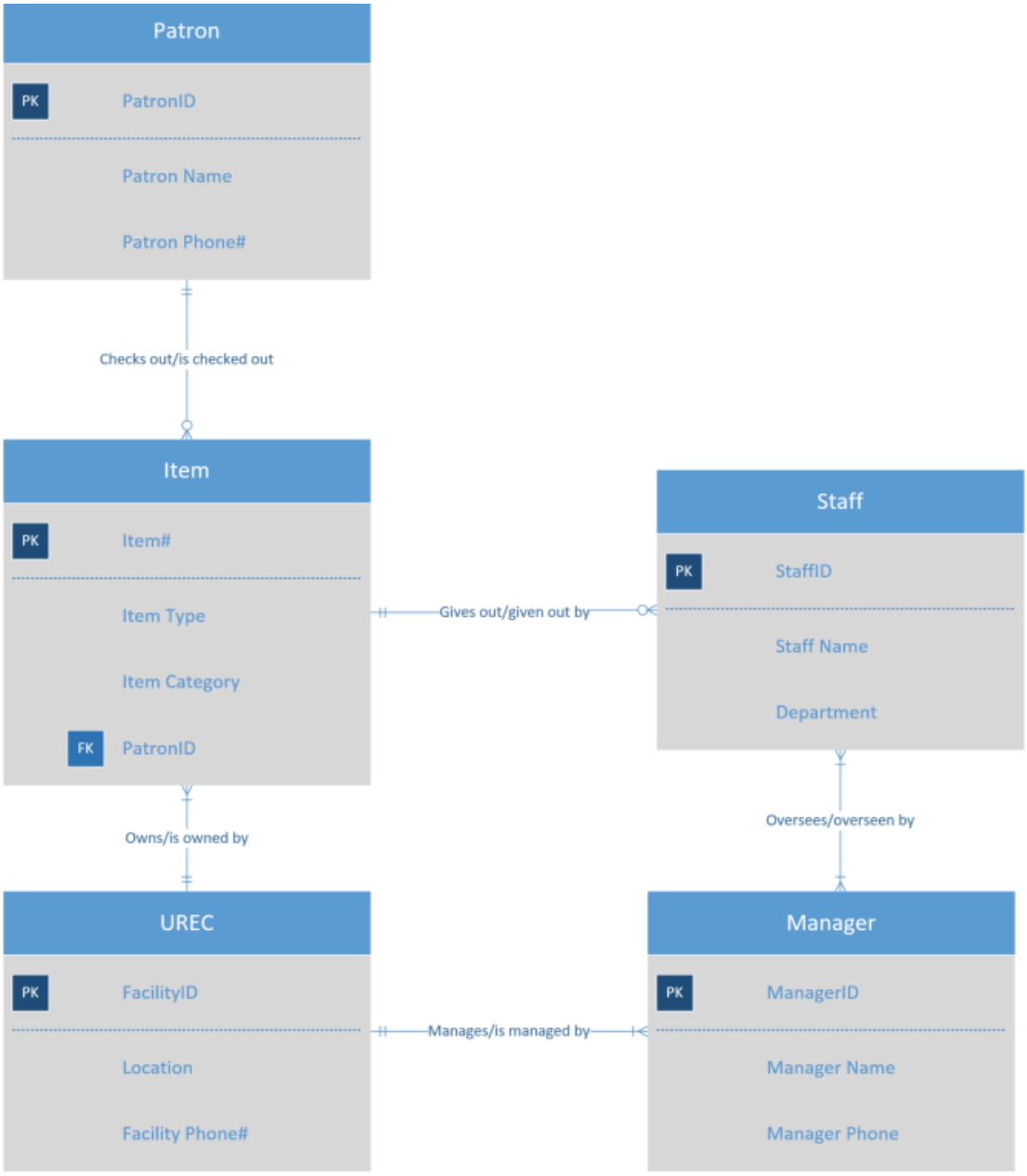
5.0 - Level 1:



6.0 - Level 1:



E-R Diagram


Patron
PK
PatronID
Patron Name
Patron Phone#
Checks out/is checked out
Item
PK
Item#
Item Type
Item Category
FK
PatronID
Gives out/given out by
Staff
PK
StaffID
Staff Name
Department
Owns/is owned by
Oversees/overseen by
UREC
PK
FacilityID
Location
Facility Phone#
Manages/is managed by
Manager
PK
ManagerID
Manager Name
Manager Phone

Conditions Stubs	Conditions/Course of Action	Rules			
		1	2	3	4
	Patron has missing item	Yes	No	Yes	No
	Patron has damaged item	Yes	No	No	Yes
Action Stubs	Check Item out		X		X
	Remind of charge	X		X	X
	Do not check item out	X		X	

Conditions Stubs	Conditions/Course of Action	Rules	
		1	2
	Patron has < 3 Items checked out	Yes	No
	Patron has > 3 Items checked out	No	Yes
Action Stubs	Check Item out	X	
	Do not check item out		X

Conditions Stubs	Conditions/Course of Action	Rules	
		1	2
	Patron has item(s) checked out at other locations	Yes	No
	Patron does not have other items checked out	No	Yes
Action Stubs	Check Item out	X	
	Do not check item out		X

Conditions Stubs	Conditions/Course of Action	Rules							
		1	2	3	4	5	6	7	8
	Patron has Cougar Card	Yes	-	Yes	Yes	No	No	No	No
	Patron has a Guest Pass	-	Yes	-	-	-	-	-	No
	Patron has a registered hand scan	Yes	-	Yes	No	Yes	No	Yes	No
	Patron has the GET app	Yes	-	No	Yes	No	Yes	Yes	No
Action Stubs	Allow Access	X	X	X	X	X	X	X	
	Do not Allow Access								X

Description of Data Elements

Data Stores

Membership File: Data on patron's information including PatronID, name, contact, and items checked out.

Item Inventory File: Data on items to be checked out including check-in and out dates and times.

UREC Management: Data used by management including information on how often items were checked out and missing/damaged items.

Data Flows

Patron Request: external entity, “Patron” requests an item that is processed by the UREC Service Desk Employee

Give/scan ID: Patron gives their ID and that data flows into the “Confirm Membership” process

New Request: The Patron’s request data flows to the UREC Service Desk Employee.

Item Request: Patron’s request flows from the Service Desk Employee to the “Update Inventory” process

Return Item: Data on the Patron’s returned item flows into the “Update Inventory” process

ID: The Patron’s ID flows from the “Confirm Membership” to the “Membership File” data store that will return whether the ID is valid or not.

Valid/invalid ID: The data on if the Paton’s ID is valid or not flows from the “Membership File” data store back to the “Confirm Membership” process.

Item to be checked out: Data on item that is being checked out flows from the “Update Inventory” process to the “Assign Item to Patron” process that will link the item’s number to the Patron’s account.

Inventory Data: Item data from the “Item Inventory File” data store flows to the “Update Inventory” process to update the status on the Item’s checked in/out status.

Updated Inventory: Updated item data flows from the “Update Inventory” process back to the “Item Inventory File” data store.

Item/Member Data: Data on which item is checked out to which patron flows from from the “Assign Item to Patron” process to the “Membership File” data store.

Items Checked Out: Data on which items were checked out flow from the “Item Inventory File” data source to the “Update Usage Reports” process to be formatted into a report.d

Missing/Damaged Item Info: Data on missing and damaged items is sent from the “Item Inventory File” data store to the “Update Charged/Damage Reports” process to be formatted into a report.

Formatted Usage Reports: The reports that flow from “Update Usage Reports” to the “UREC Management” data source for use of management.

Formatted Charged/Damage Reports: The reports that flow from “Update Charged/Damage Reports” to the “UREC Management” data source for use of management.

Processing Logic

3.0 - Update Inventory: this process takes data on newly requested or returned items, and updates the checked in/out status of an item and sends that data to the Item Inventory File. Data on which item is being checked out is sent to process 4.0 to be assigned to a patron.

3.2 - Update Item Checked in/out: this process uses the data from process 3.1 and updates the inventory file that sends out the updated data on an item’s checked in/out status, as well as data on which item is being checked out.

3.2.2 - Update Item Data to check in/out items: this process receives formatted item data to update the item's checked in/out status and sends out that updated inventory data as well as the data on the item that is being checked out.

5.0 - Update Usage Reports: this process receives data on items that have been checked out within a specified period (day, week, month, semester, etc.) and sends formatted item usage reports to UREC Management.

5.1 - Access Item Checked Out Data: this process takes the items that have been checked out and aggregates it to be formatted into a usage report.

5.2 - Create Formatted Usage Report: this process takes the aggregated data and sends out a formatted usage report.

Database Tables in Normalized Form

Patrons

	Column Name	Data Type	Allow Nulls
🔑	PatronID	nvarchar(10)	☐
	PatronName	nvarchar(50)	☑
	PatronEmail	nvarchar(30)	☑
	PatronPhone#	nchar(10)	☑

Staff

	Column Name	Data Type	Allow Nulls
🔑	StaffID	nchar(10)	☐
	StaffName	nvarchar(30)	☑
	StaffEmail	nchar(30)	☑
	StaffPhone#	numeric(10, 0)	☑

Items

	Column Name	Data Type	Allow Nulls
🔑	ItemID	nchar(10)	☐
	EquipmentType	nchar(10)	☑
	ItemScan	nvarchar(50)	☑
	PatronResponsibleID	numeric(10, 0)	☑

Group Statement

The process of ensuring this project was successful took a massive amount of teamwork, flexibility, and hard work. For many of us, this is the first MIS class we have taken (besides MIS 250, which is required for every Carson College of Business student) and as such many of the concepts we learned was the first time we were exposed to them. In our opinion, this project allowed us to solidify what we were learning in class and immediately apply those skills in real life.

Two of our members are student employees at UREC, one of whom is a service attendant at the SRC. Learning about the SDLC gave all of us more perspective, and especially allowed the UREC employees in our group to not only see errors with the current equipment rental system, but also to visualize how it might have been created in the first place. Having those members of the group with an intimate knowledge of the current system made the entire process easier and more meaningful. UREC was helpful though the entire semester, essentially letting us have free rein over what a potential system could look like, as they are aware the current system needs to be updated.

We did not have many issues as a group beyond time management, which we did manage to stay relatively on top of. Being able to meet when class was cancelled was a huge help, as we are all busy college students. We focused on dividing up parts of the project, keeping each other updated via group text, and set deadlines for ourselves beyond the deadlines set by our professor. For example, we would aim to have our individual parts done by a certain day, so we have a few days to edit, then finally turn in the deliverable.

The majority of the hard skills we learned had to do with the various software we used to create the systems design document (Visio, Microsoft Project). Learning the software, doing homework using it, then immediately turning it around and applying it to a hands on project was the best way one could have learned these softwares. Overall this has been one of the most positive group projects many of us have been a part of.