Project Documentation

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Prepared for:

Wei Yang

(Professor at UT Dallas)
⌂800 W Campbell, Richardson, TX 75080
wxy180002@UTDallas.edu

Prepared for:

Hongyao Huang/Wasif Haque

(Teacher's Assistant at UT Dallas)
⌂ 800 W Campbell, Richardson, TX 75080
✉ HHuang@UTDallas.edu
☎ (972) 883-2111

Web Development Team

Labeeba Rana - LFR160130
Gentry Jenkins - GLJ180000
Georpi Ikamba - GXI170230
Varika Pinnam - VXP171430
Sindura Boppudi - SLB170330
Christopher Guerra - CJG160230
Noman Syed-NAS171730

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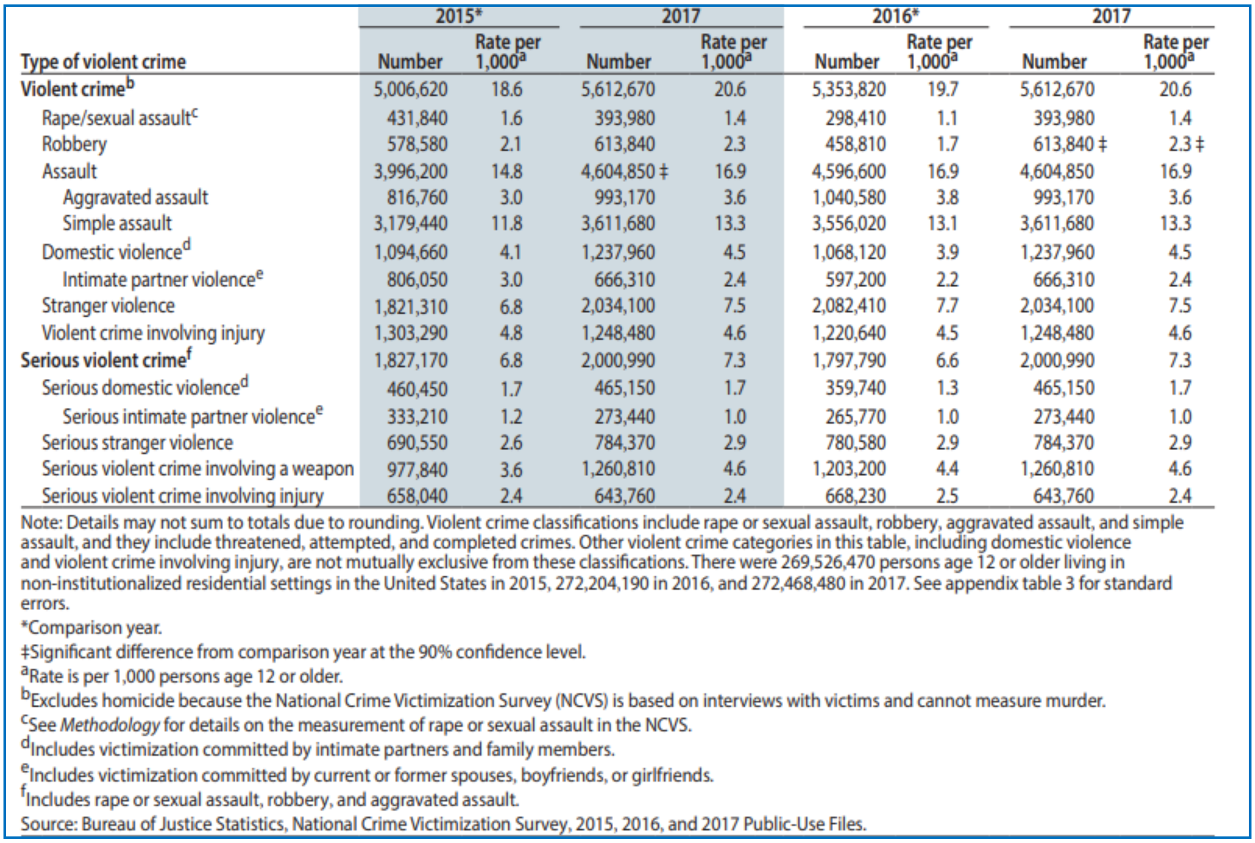
Description

The basis of this project is tracking chips that allow people to trace personal objects to prevent theft and reclaim stolen property. We created a database that allows users to create an account to register and store their products, so they can later view or track their items.

Motivation

When you buy a new tennis racket, pool cue, or any high-priced sports equipment you have just made an investment that you want to keep. Unfortunately, these items are the same products thieves love. The reason is sports equipment is easy to sell, hard to prove ownership of and expensive. For example, the price of a pool cue is $329.19 and can range over $1,000 [1]. With players buying jump sticks, break sticks, chalk, gloves, and other accessories, a cue case could be holding $10+ thousand in valuables [2]. Thieves know this too well. “Based on the 2017 survey, U.S. households experienced an estimated 13.3 million property victimizations, which include household burglaries, motor vehicle thefts, and other thefts”[3].



	2015*		2017		2016*		2017	
Type of violent crime	Number	Rate per 1,000[a]	Number	Rate per 1,000[a]	Number	Rate per 1,000[a]	Number	Rate per 1,000[a]
Violent crime[b]	5,006,620	18.6	5,612,670	20.6	5,353,820	19.7	5,612,670	20.6
Rape/sexual assault[c]	431,840	1.6	393,980	1.4	298,410	1.1	393,980	1.4
Robbery	578,580	2.1	613,840	2.3	458,810	1.7	613,840 ‡	2.3 ‡
Assault	3,996,200	14.8	4,604,850 ‡	16.9	4,596,600	16.9	4,604,850	16.9
Aggravated assault	816,760	3.0	993,170	3.6	1,040,580	3.8	993,170	3.6
Simple assault	3,179,440	11.8	3,611,680	13.3	3,556,020	13.1	3,611,680	13.3
Domestic violence[d]	1,094,660	4.1	1,237,960	4.5	1,068,120	3.9	1,237,960	4.5
Intimate partner violence[e]	806,050	3.0	666,310	2.4	597,200	2.2	666,310	2.4
Stranger violence	1,821,310	6.8	2,034,100	7.5	2,082,410	7.7	2,034,100	7.5
Violent crime involving injury	1,303,290	4.8	1,248,480	4.6	1,220,640	4.5	1,248,480	4.6
Serious violent crime[f]	1,827,170	6.8	2,000,990	7.3	1,797,790	6.6	2,000,990	7.3
Serious domestic violence[d]	460,450	1.7	465,150	1.7	359,740	1.3	465,150	1.7
Serious intimate partner violence[e]	333,210	1.2	273,440	1.0	265,770	1.0	273,440	1.0
Serious stranger violence	690,550	2.6	784,370	2.9	780,580	2.9	784,370	2.9
Serious violent crime involving a weapon	977,840	3.6	1,260,810	4.6	1,203,200	4.4	1,260,810	4.6
Serious violent crime involving injury	658,040	2.4	643,760	2.4	668,230	2.5	643,760	2.4

Note: Details may not sum to totals due to rounding. Violent crime classifications include rape or sexual assault, robbery, aggravated assault, and simple assault, and they include threatened, attempted, and completed crimes. Other violent crime categories in this table, including domestic violence and violent crime involving injury, are not mutually exclusive from these classifications. There were 269,526,470 persons age 12 or older living in non-institutionalized residential settings in the United States in 2015, 272,204,190 in 2016, and 272,468,480 in 2017. See appendix table 3 for standard errors.

*Comparison year.

‡Significant difference from comparison year at the 90% confidence level.

[a] Rate is per 1,000 persons age 12 or older.

[b] Excludes homicide because the National Crime Victimization Survey (NCVS) is based on interviews with victims and cannot measure murder.

[c] See *Methodology* for details on the measurement of rape or sexual assault in the NCVS.

[d] Includes victimization committed by intimate partners and family members.

[e] Includes victimization committed by current or former spouses, boyfriends, or girlfriends.

[f] Includes rape or sexual assault, robbery, and aggravated assault.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2015, 2016, and 2017 Public-Use Files.

Figure 1: Violent victimization, by type of crime, 2015, 2016, and 2017. Source: Adapted from [3]

Problem

To steal this fortune that people carry on their backs is as simple as picking it up and walking away. There is no way to prove ownership because all sports equipment is mass produced and is made of malleable material such as wood or metal.

One current option to prove ownership is to engrave the item, but this is minimally effective if at all. Engravings can include a name that becomes irrelevant outside the people who know the owner in that area. The owner could engrave his/her phone number or social security, but this info is best left private. All engraving options can also be grinded off leaving no evidence of a past owner.

Any registration of sporting equipment is only effective if the owner uses the service. The owner must also keep the warranty information for the life of the item and remember where that information is when the unfortunate occurs. Lastly, the owner must never sell the item. Once the equipment is sold, any warranty provided is void [1]. This action also voids the proof of ownership for the new owner. Second owners of a sporting equipment are left with a receipt written by a stranger to prove ownership at best.

This means that if you put your equipment bag down for one min while you go take a shot on the table, or a shot at the bar, that shot could cost you thousands with no action to get it back or prove ownership.

Solution

The solution would be to create a third-party database where users can register their products and refer to it in the future in the event of theft/loss. The product will have an engraving or sticker that can be used to cross-check with the database; or at the very least, the database will contain a description of the product.

Website

Currently there are no websites available for such as product and therefore a custom site will need to be created. Website and mobile apps such as Android will be considered be considered future goals of the project.

Timeline

In this project the system identified as extreme programming or XP is used. The timeline is divided into sections known as iterations. Team members will be checked on a two-week basis to show understanding or completion of the iteration that is being worked on at that time. **Projected iterations including testing are 8 each lasting two weeks; a total of two months of project time.**

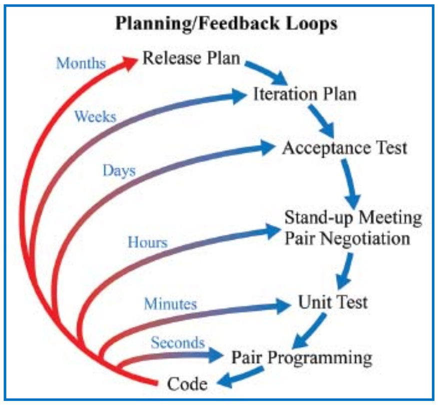


Figure 2: Model of Extreme programming
Source: Adapted from [14]

Iterations

a. Iteration 1 – Set up GitHub repository, got acclimated with new framework, tested pushing and pulling. Brainstormed for architecture and basic requirements for project.
b. Iteration 2 - Began implementing backend and frontend, set up Oracle database. Ran into many issues testing.
c. Iteration 3 – Merged/integrated GUI with backend, added remote connection to database, finished/resolved test code, double check all error throws. Demo project.

Architecture and Design

Our team utilized a GitHub repository to collaborate and commit code from different branches. There exists a DatabaseQuerying branch, a GUI branch, a User branch, a password branch, and finally the master branch. These branches have been merged and integrated to develop a functioning system. The initial Graphical User Interface (GUI) consists of a “Sign Up” and Sign In” button. Action listeners have been implemented for each of these buttons to direct users to a separate GUI. The “Sign Up” button leads to fields to input various personal information and a Sign Up button that will create a user. The “Sign In” button leads to fields to input Username, which would be an email, and Password, followed by a Login or Back button.

When a User is created, the information will be stored using queries to a Database. Oracle Database 19c is used for data storage on a remote server which makes use of Oracle's JDBC driver for connecting the server application and the database. The client application sends query requests to the database which the server then processes and returns necessary values. The client receives the result data and parses it into a form that may be displayed or stored temporarily on the client-side.

Within the password branch, the primary classes we worked with were User and Product. We used the password branch to work on the back-end and test sign up, product creation, and login separate from the database. We later synced the methods in the classes of the password branch, such as creating a new account, logging in, adding a product, and displaying products, to the GUI to test it and follow the path of the data before syncing up the GUI with the actual database.

In the User class, there are attributes that pertain to an account such as first and last name, middle initial, email, password, userID, and address. There is also a static counter we used to assign the userID number and increment with the creation of each new user. There are also two HashMaps, which acted as a temporary data storage before we linked to the actual server. The HashMaps contain the user email and ID or user email and password. The User class contains methods for creating a new user as well as returning attributes like name, address, email, and ID.

Both the Product class and Login class within the password branch are inherited from User due to needed access to the HashMaps. In the Product class, there is an additional HashMap, in which the key is the UserID and the same for every product that is added by a user, and the value is the description of the product. In this way, we created a list of products attached to the same UserID.

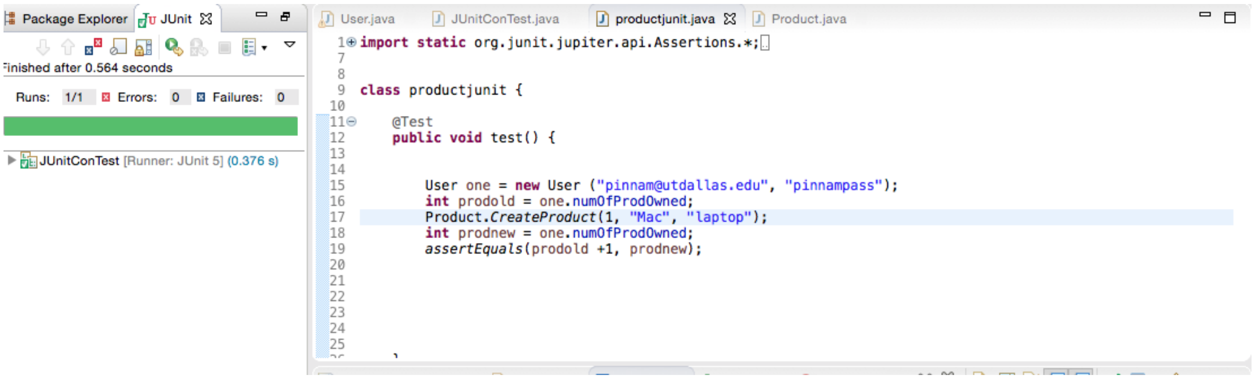
Running Test Appendix

In order to test the overall system, simply Sign Up or Sign In to create a product. If you enter empty fields into the database, it is not going to return anything or be entered into the database. Oracle databases do not allow null values for unique variables such as username and password. However, if you enter empty fields for the items, it will allow you to do so. Once you enter personal information on yourself and your products, our team can cross-check with the database to test its accuracy.

JUnitConTest.java Class is a JUnit test case that verifies a connection with the server. It utilizes an "assertNotNull" function that checks it against a null string. If it is not null, the test case passes. Simply run to the program and check for the bar to turn green to indicate passing.

JUnitQueryMethodsTest.java is a JUnit test case that verifies whether a method is returning correctly. It also utilizes an "assertNotNull", checking for a non-empty string.

The productjunit.java class is a JUnit test case that asserts equal when the number of products owned by a user is verified. Figure 1 below demonstrates a passing test case:



```
Finished after 0.564 seconds
Runs: 1/1   Errors: 0   Failures: 0
JUnitConTest [Runner: JUnit 5] (0.376 s)
```

```java
import static org.junit.jupiter.api.Assertions.*;


class productjunit {

    @Test
    public void test() {


        User one = new User ("pinnam@utdallas.edu", "pinnampass");
        int prodold = one.numOfProdOwned;
        Product.CreateProduct(1, "Mac", "laptop");
        int prodnew = one.numOfProdOwned;
        assertEquals(prodold +1, prodnew);
```

Figure 1.

RowsUpdated.java is a JUnit test case that returns the correct number of rows, or users if a new user is created. It utilizes the “assertTrue” function that checks it against a concrete parameter.

Skillset

All team members should understand Java and SQL on a basic level and be prepared to expand your knowledge throughout this project if needed. Each team member needs to be comfortable working in pairs and understand XP programming at its core. Learning any framework chosen by the team, or advanced features will be the sole responsibility of the member and is a side goal of this project.

Tools

The team will be using programs for communication as well as production. These applications include basic e-mail, GroupMe, and Google Hangouts if needed for communication purposes. The team will also use Git Hub as a place to develop the program. All team members should be able to work on these applications comfortably or be able to learn them in the time provided.

Challenges

By and far the largest challenge the team has faced is programming knowledge. Gaining access to the database and setting up a remote connection was a tremendous hurdle we did not anticipate. Although Java is known on a basic level by all members of the team, a more formal and detailed knowledge will have to be acquired throughout the project in order to build a well-developed database that is user-friendly and pleasant to look at. Another challenge was lack of communication and teamwork. Teamwork is truly the key with this software development process. If one or two developers fail to contribute, the whole team falls behind.

Conclusion

A database would show proof of ownership, proof of warranty and help reunite bats, cues, golf clubs, tennis rackets and much more to the true owners if lost or stolen. The website development would be a new idea in protection in a market that is in high demand for such a service. It is easy to implement and has a huge potential for actual profitable outcome. As the designer of this project I would like to say thank you by offering a piece of those profits to all team members that help finish this great idea. Let us build something that we can be proud of, something that we can show on a resume. We could even create something that has the potential to help millions and maybe even ourselves in the process.

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