Senior Design
Electrical and Computer Engineering
Howard University
Instructor: Dr. Charles Kim
Website: www.mwftr.com/SD1415.html

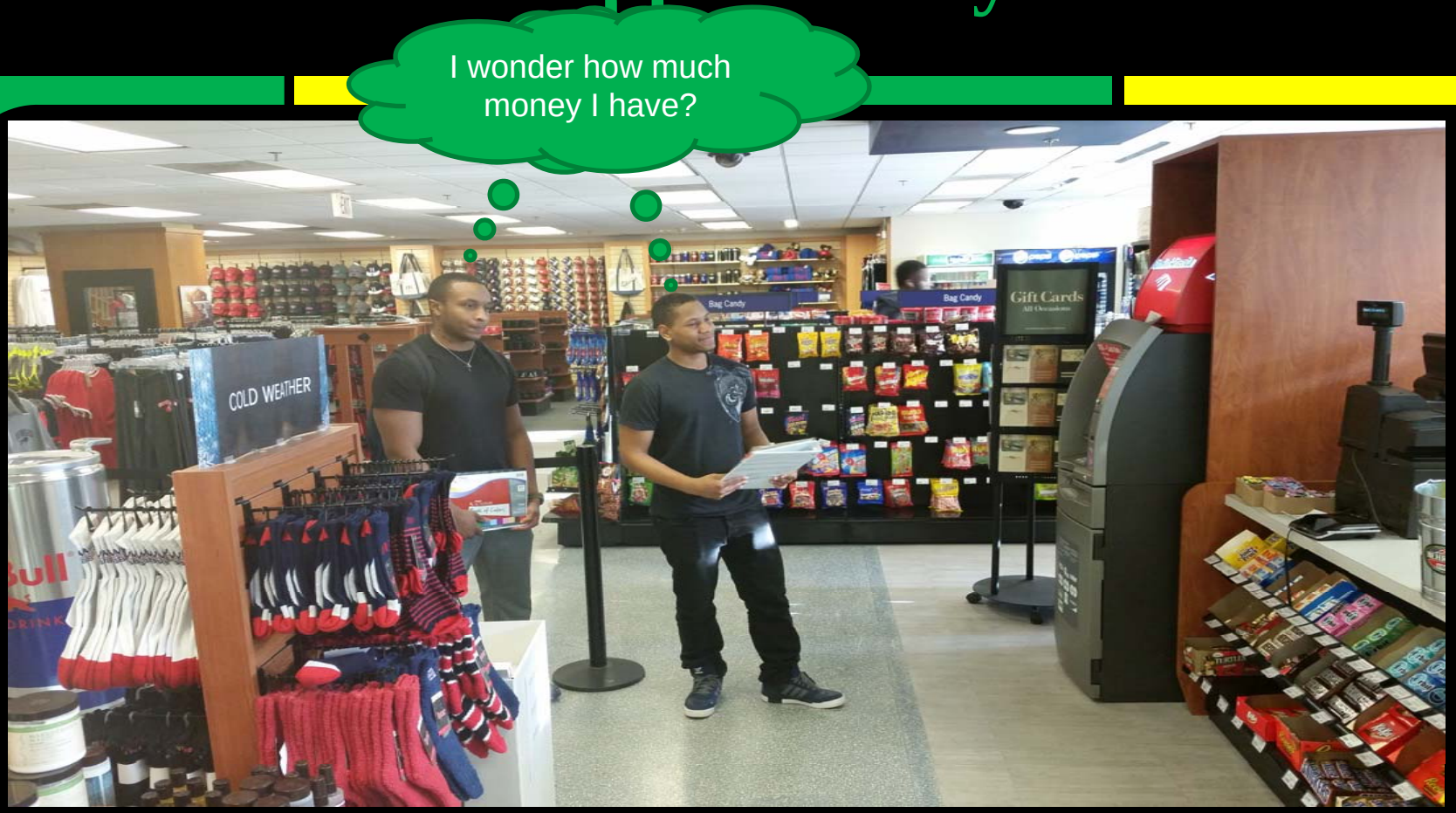
Watchmen

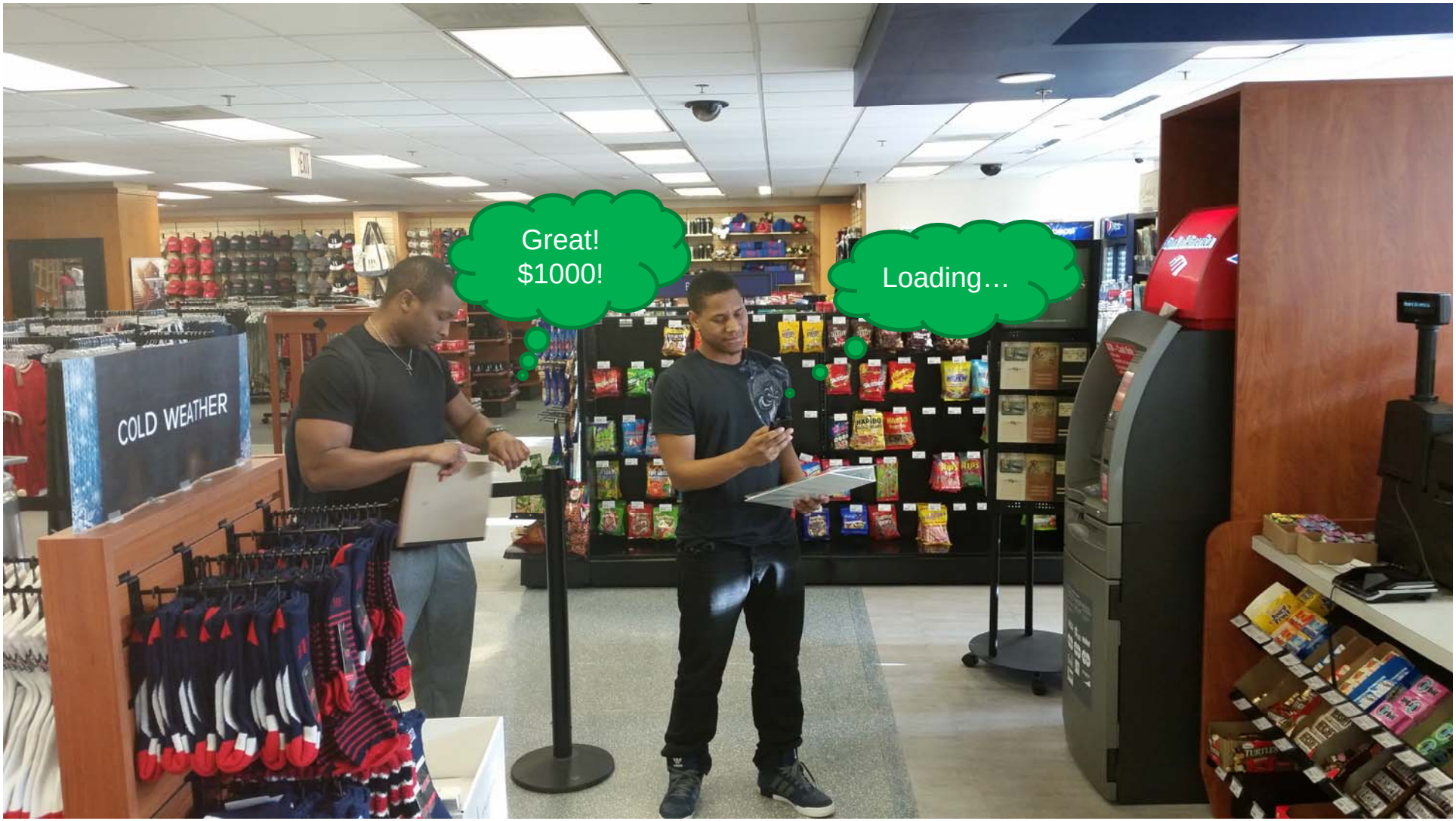
Smart Watch for Banking Alert

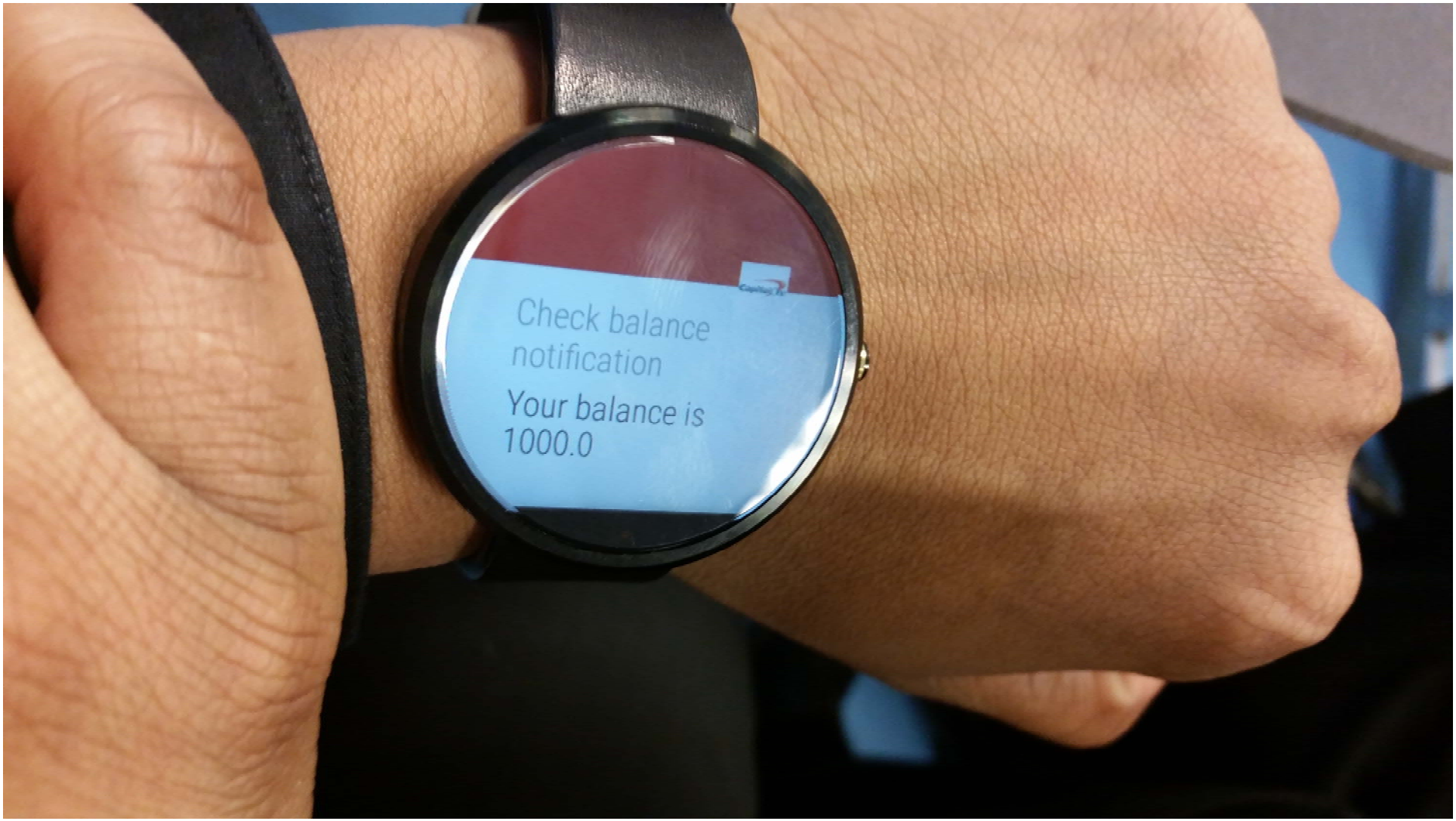
Dhuel Fisher
Jordan Monette
Derrick McElwee
Isa Edwards-El
Derrick Anang (GR)

Industry Advisor: Jared Alexander
Faculty Advisor: Dr. Charles Kim

Has this ever happened to you?




Great!
$1000!
Loading…
COLD WEATHER


Check balance
notification
Your balance is
1000.0

Still loading….
Well, that was quick!

Background

Mobile banking - a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or tablet.

Problem Statement

Capital One needs us to create a mobile application for the Android wear watch because they need to expand their services to their customer base with new technologies and further provide a quicker and more efficient way for users to access their bank accounts.

Design Requirements

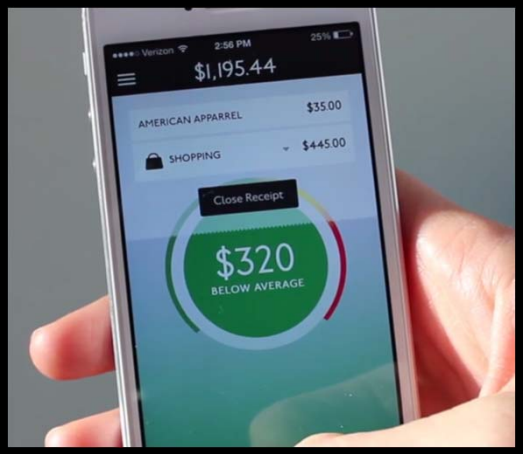
- Mobile device must have internet connection/data connection to receive data.
- Data must be retrieved in less that .5 sec.
- Data must be accurate .
- Fraud notification must activate quickly after incorrect purchase (under 5 minutes).

Current Status of Art

Every bank has its own phone applications with exclusive use for their clients.

Features:

- Login
- View balances and transactions
- Report stolen/lost credit cards
- Transfer money
- Pay bills



Conceptual Designs

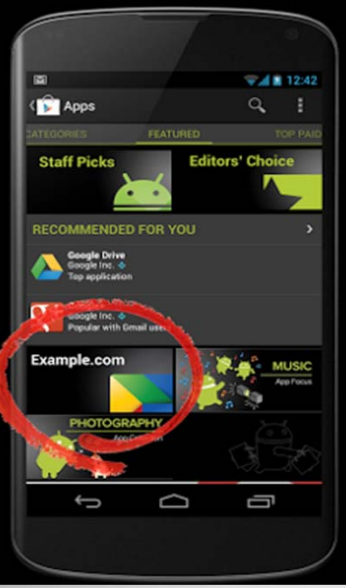
Design 1

- MySQL Database
- Eclipse Platform
- Square Face

Design 2

- Parse Database
- Android Studio
- Round Face

Final Top Design - Design 2



TOP DESIGN

Primary Functions

- ***Check Balance:*** Alerts user to the current balance in their account.
- ***Fraud Alert:*** Notifies the user when fraudulent activity has occurred and prompts the user for a response.
- ***Bill Pay:*** Alerts the user when a bill is due and asks if user wishes to pay the bill.
- ***Low Balance:*** Notifies the user when the bank balance falls below a threshold value.

Android Studio

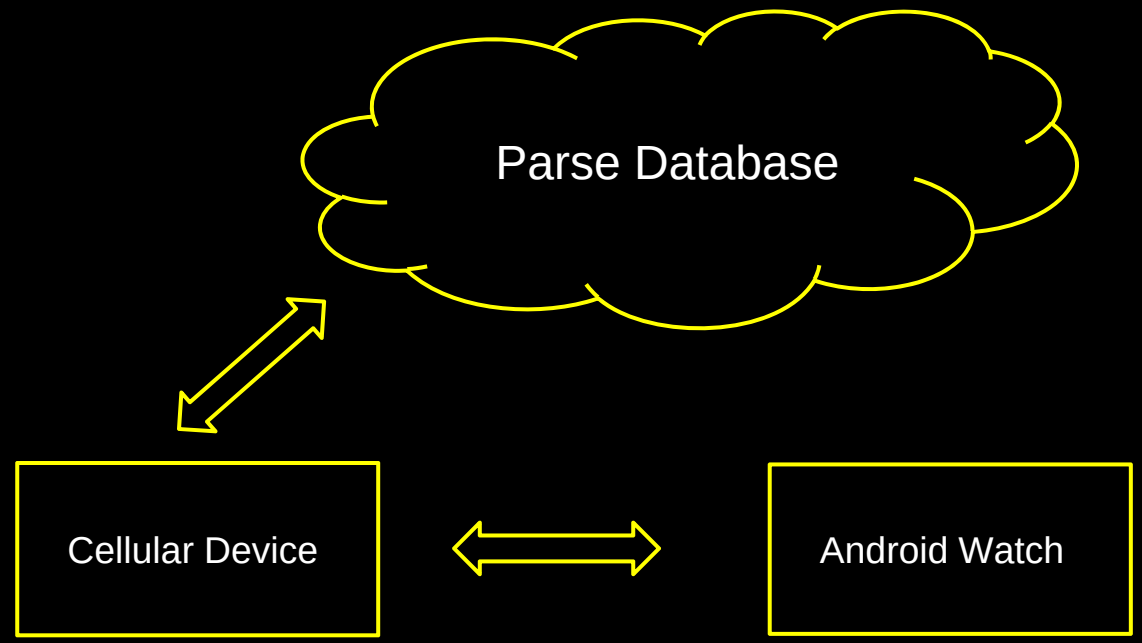
1. Bill Pay Function
2. Low Balance Function
3. Check Balance Function
4. Fraud Alert Function

Android Studio will serve as the platform for programming. The phone and watch will be in communication as well as the phone and parse database. The Capital One Firewall will act as security for the application.

Capital One Firewall

Parse/Capital One Database

Final Design Schematic



Testing and Evaluation

- To ensure that the app worked, there were four functions that needed to be tested and evaluated. These include:
  - Check balance function
  - Fraud detection
  - Low balance
  - Bill Pay

  Each function has its own specific set of requirements that needed to be met.

Check Balance Testing and Evaluation

- Successfully connect to parse and retrieve user balance information.
- Display Notification on watch using received data

```
public void receive_balance() {
    //code used for getting data from database

    ParseQuery<ParseObject> query = ParseQuery.getQuery("User_info");
    query.getInBackground("XuL6yaohoO", (parseObject, e) -> {
            if (e == null) {
                balance = parseObject.getInt("bank_balance");
            } else {
                //Log.d("score", "Retrieved the object.");
                Log.d("score", "The getFirst request failed.");

            }
    });
}
```

Fraud detection Testing and Evaluation

- Compare transaction location and display notification based on result
- Display fraud notification whenever suspicious activity occurs
- Display message on android watch.

```
public void check() { //checks users account info
    ParseQuery<ParseObject> query = ParseQuery.getQuery("User_info");
    query.getInBackground("XuL6yaohoO", (parseObject, e) -> {
            if (e == null) {
                int prev_bal = parseObject.getInt("Prev_bal");
                int curr_bal = parseObject.getInt("bank_balance");
                String location = parseObject.getString("Transaction_location");
                String bank_location = parseObject.getString("bank_location");
                if (prev_bal > curr_bal) {
                    if (location.equals(bank_location)){}
                    else
                    {
                        fraud_notification();
                    }
                }
            }
    });
}
```

Low balance Testing and Evaluation

```
public void check_balance(final Integer number)
{
    ParseQuery<ParseObject> query = ParseQuery.getQuery("User_info");
    query.getInBackground("XuL6yaohoO", (parseObject, e) -> {
            if (e == null) {
                int curr_bal = parseObject.getInt("bank_balance");
                if ( curr_bal <= number) {
                    low_Balance_notification();
                }
            }
    });
}
```

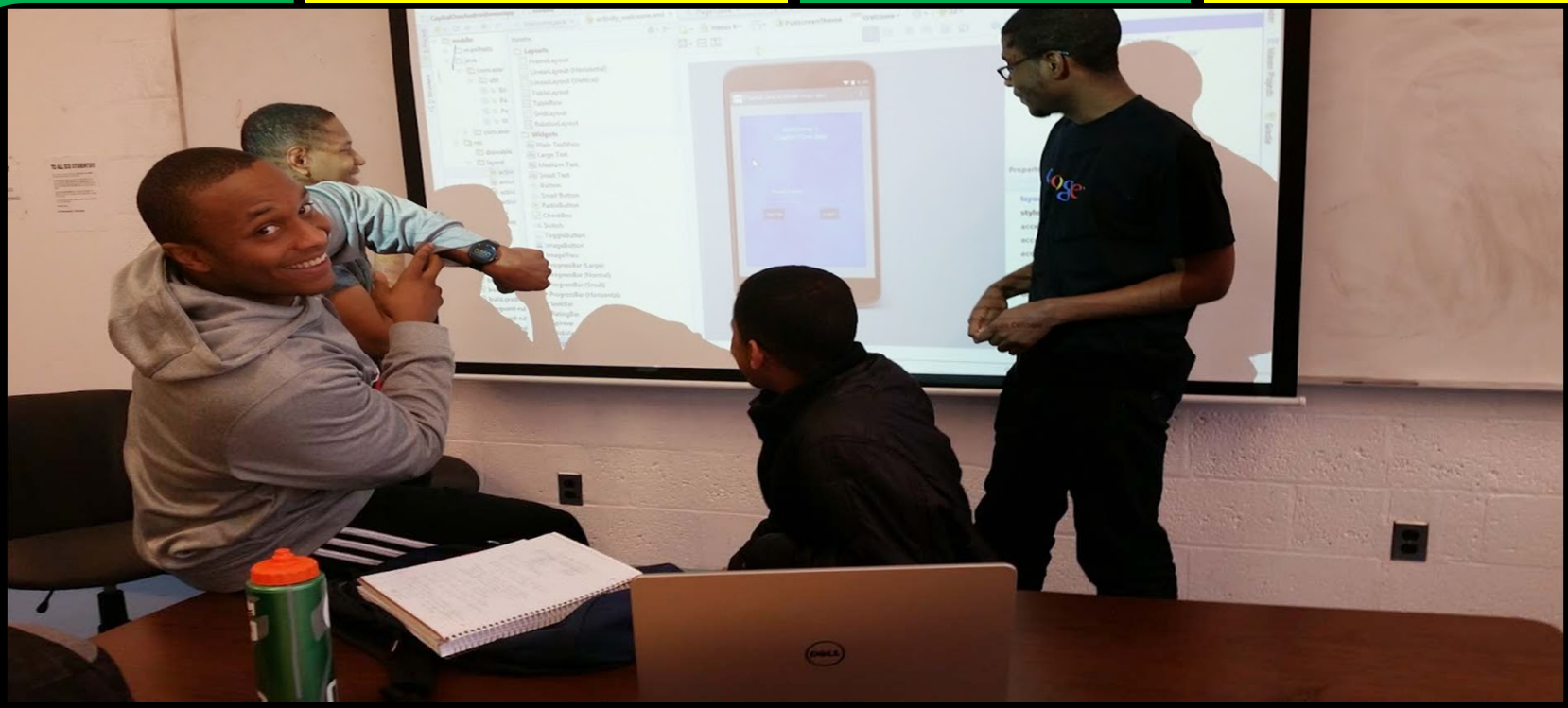
- Display message on android watch.

Bill Pay Testing and Evaluation

- Display bill notification when a bill is due
- Display message on android watch.
- Allow user to pay or confirm bill

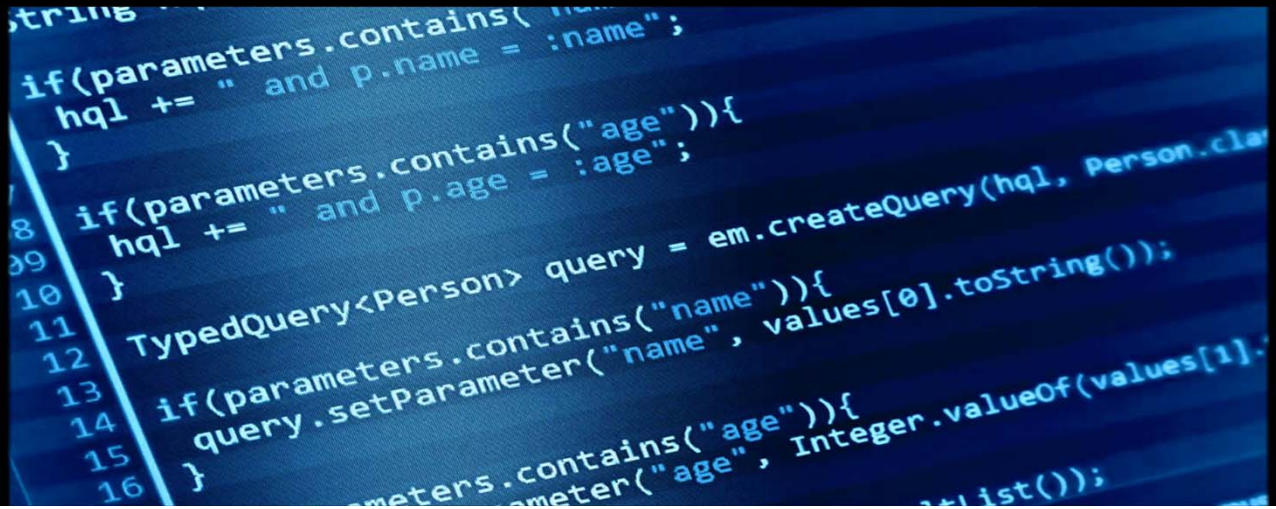
```
public void Bill_pay_notification () {//creates a check balance notification
    NotificationCompat.Builder mBuilder =
            new NotificationCompat.Builder(this)
                    .setSmallIcon(R.mipmap.ic_1)
                    .setContentTitle("Warning!")
                    .setContentText("Balance below $500");
    Intent resultIntent = new Intent(this, Page1.class);
    TaskStackBuilder stackBuilder = TaskStackBuilder.create(this);
    stackBuilder.addParentStack(Page1.class);
    stackBuilder.addNextIntent(resultIntent);
    PendingIntent resultPendingIntent =
            stackBuilder.getPendingIntent(
                    0,
                    PendingIntent.FLAG_UPDATE_CURRENT
            );
    mBuilder.setContentIntent(resultPendingIntent);
    NotificationManager mNotificationManager =
            (NotificationManager) getSystemService(Context.NOTIFICATION_SERVICE);

    mNotificationManager.notify(3, mBuilder.build());
}
```

Fun times!!!



Implementation

- After completing the app, we will hand it over to Capital One which will further develop the app to meet all of their company customs and standards. It will then be distributed to their users.



Resources and Budget

$400-600.00 + $200.00-300.00 = $600.00-900.00

Technical Limitations

- We were unable to put the Check Balance function directly onto the watch
- This was caused due to a problem with the Android wear application
- This issue will hopefully be addressed when the application updates.

Conclusion and Future Works

- Locating closest Capital One ATM
- Voice compatibility
- Transferring funds between accounts
- iOS equivalent

Q&A