# Programming Project I, First Report

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## 1 Abstract

Smartphone users launch many apps everyday, however one of the most fundamental things a smartphone does is abstracted away: memory management.

Although smartphones have advance significantly (RAM, architecture, processors) compared to their first predecessor's, deactivation [1] is a solution that is often less-than-perfect. Although Java's Garbage Collection and Swift's Automatic Reference Counting (ARC) have sufficed, there are other methods.

In this project I propose to solve this problem three techniques:

- Brute Force
- Dynamic Programming
- Greedy Solution

## 2 Introduction and Motivation

As stated previously, memory management is solved in a less-than-perfect manner. Although current technology suffices, we would like to compare algorithms to show the significant gains via three different approaches (Brute Force, Dynamics Programming, and Greedy).

## 3 Proposed Solution

For our project we decided to take a more skeuomorphic and object oriented approach, modeling objects after their real world counterparts, such as `Application` or `Smartphone`. As for the approaches, we have the following solutions:

[1] The process of "the operating system needing to choose and remove some apps from the memory", a subproblem of memory management.

### 3.1 Brute Force

```
knapsackBrute(items, napsackSize)
    max = 0
    for i = 0 to 2^n - 1
        subset = binaryToInteger(i)
        sum = 0

        for i to subset.length
            sum = sum + item[i].benefit * subset[i]
            size = size + item[i].weight * subset[i]

        if size <= napsackSize && sum > max
            max = sum
            greatestSubset = i

    subset = binaryToInteger(greatestSubset)
    for i = 0 to subset.size
        if subset[i] == 1
            optimalSolution.append(item[i])

    return optimalSolution
```

### 3.2 Dynamic Programming

### 3.3 Greedy Solution

## 4 Plan of Experiments

## 5 Team Roles

**Illya Starikov** Project Management, Development

**Timothy Ott** Development (Lead), Architecture

**Claire Trebing** Development, Quality Assurance, Documentation