# Opal Calculator Program Notes

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In the development of the Opal Calculator Program, a structured-style approach to development will be taken in the first two major stages of development (defining the problem to be solved, and planning the solution for that problem). All subsequent stages of development (implementing, testing and maintaining) will be done through an evolutionary prototyping approach, which will frequently test the program to ensure that errors/bugs/glitches can be quickly detected and resolved before any significant issue is created.

The use of the structured development approach initially will ensure that a decent model can be conceptualised carefully before the coding starts, making use of abstraction and top-down design to achieve this. The main objective of defining the problem and planning the solution is to build a strong foundation where the subsequent development of this program will be significantly easier to do, minimising the risk of the program not doing what it was originally created to do, and logic errors in the software.

## The defined problem

The objective of the Opal Calculator program is to accurately calculate the cost of a single journey with the use of the Transport for NSW Opal Card (for simplification purposes, we will call this the "Opal fare"). The Opal Card is a smartcard that automates public transport fare collection via a series of "scanners", with each individual smartcard associated with a pre-paid account that customers may deposit money into for transport use; similar to other transport cards such as London Oyster, Melbourne Myki and Hong Kong Octopus.

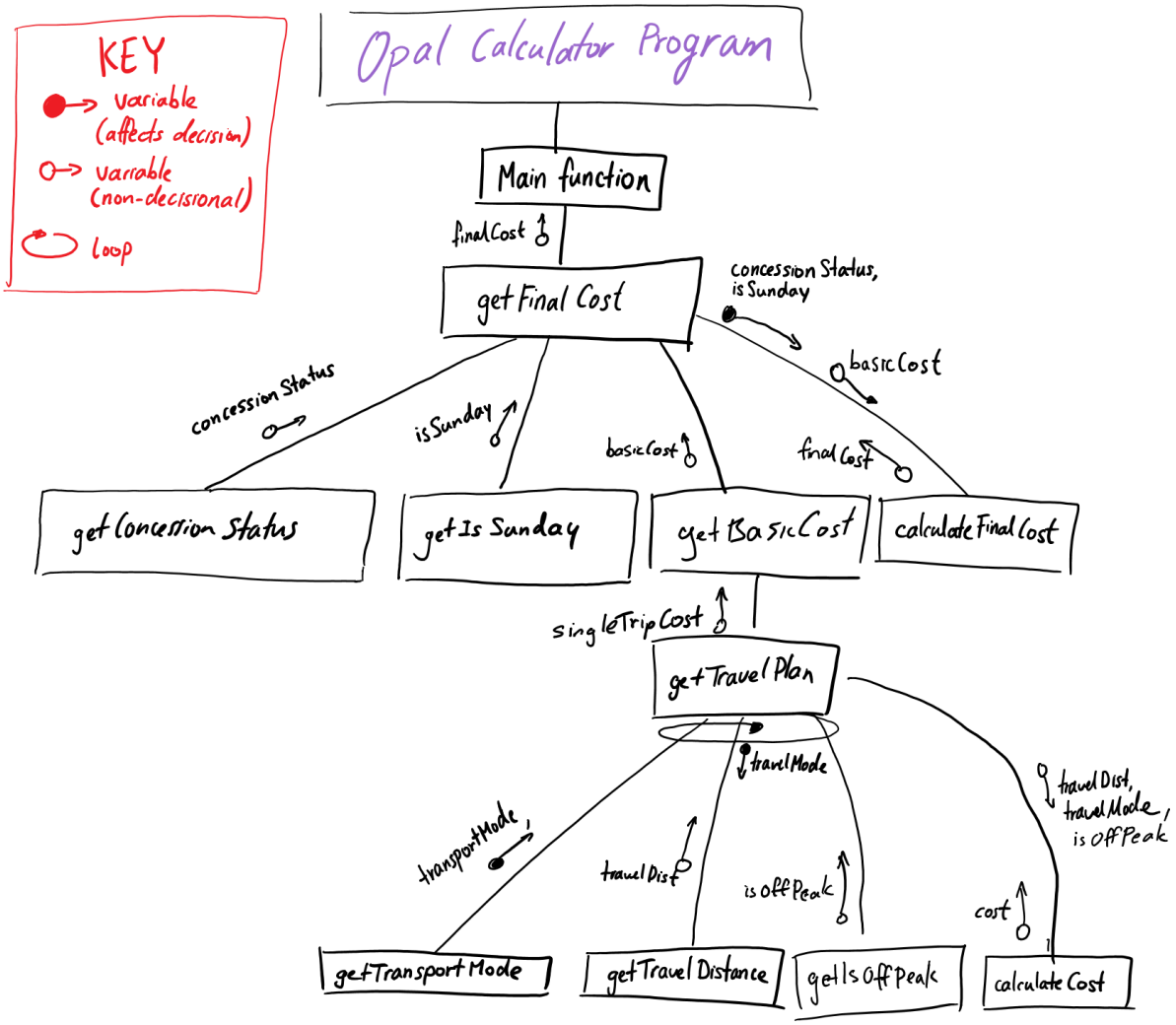
The main issue that inhibits simple calculation of a journey fare is that unlike other smart-card transport systems, the Opal fare was designed to reward travellers for frequent use, such as: • $15 daily travel cap

- $60 weekly cap
- Free travel after 8 journeys
- Off-peak periods for trains
- $2.50 cap for users of the Pensioner Opal Card (a type of concession card)
- $2.50 cap for all users on Sundays
- Half price for users of all concession cards, including:
    - Daily travel cap ($30 instead of $60)
    - Weekly cap
    - $2.50 cap remains the same for all users on Sundays

To further complicate this, travellers to and from the Domestic Airport and International Airport train stations further face a station access fee of $22.50. Thus, careful planning must be taken to ensure that all of these features are implemented effectively.

## The planned solution

In this stage, a model of the solution, as well as some algorithms will be designed here, so that coding this solution will be easier to do, and can be done at a faster pace. A larger version of drawn diagrams can be found in a separate document.


KEY
variable (affects decision)
variable (non-decisional)
loop
Opal Calculator Program
Main function
finalCost
getFinal Cost
concession Status, isSunday
basicCost
concession Status
isSunday
basicCost
finalCost
get Concession Status
get Is Sunday
get Basic Cost
calculate Final Cost
singleTripCost
get Travel Plan
travelMode
transportMode
travelDist
isOffPeak
travelDist, travelMode, isOffPeak
cost
getTransport Mode
get Travel Distance
get Is Off Peak
calculate Cost