Marks

Question 22 (20 marks) Use a SEPARATE writing booklet.

The national railway network has been privatised. In its reorganisation, the new owners decide to automate the operation of the ticket sales and timetable information. They will install a computer system to dispense tickets and timetable information at all stations. Existing staff will be reassigned to assist in the day-to-day running of this system. Touch screens will be installed so that customers will not need to use keyboards to purchase tickets or gain information. Tickets can be paid for by swiping a credit or debit card through a standard magnetic card reader, or by cash. The system will perform the following tasks:

- process the purchase of tickets;
- display train timetable information on the screen;
- display information regarding the early or late arrival of trains currently running; and
- plan journeys.

(a) Discuss the software development approach that would be most suitable for this system. **3**

(b) Currently a feasibility study is being undertaken. **4**

Identify TWO key factors to be considered in determining the technical feasibility of the system. Discuss the importance of each factor you have identified.

(c) The development of the system involves the consideration of a number of interactive components.

(i) Construct a storyboard to describe the purchase of tickets. **4**

(ii) Design a screen that could be used as the main menu for the system. **2**

(d) The system has been implemented and it is found that the information on the touch screens is not accessible to all train travellers. **2**

Identify ONE group of travellers who may have a major problem in using touch screens and explain how this problem could be resolved.

Question 22 continues on page 13

Marks

Question 22 (continued)

(e) Write an algorithm to calculate the cost of the tickets that the train traveller wants to buy. **5**

Part of the algorithm is to conduct a search of an array of records containing the single full fare and return full fare for each destination. The search needs to extract fare information for the destination station selected by the train traveller.

The structure of the array of records is:

destination (index).station	destination (index).fullsingle	destination (index).fullreturn

A portion of the array of records is shown below.

Scone	$23.80	$42.50
Singleton	$15.40	$28.40
Springwood	$ 5.20	$ 9.60

Use the variable names:

UserDest	to stand for the destination station selected by the train traveller;
NumSingle	to stand for the number of one-way tickets the traveller wishes to purchase;
NumReturn	to stand for the number of return tickets the traveller wishes to purchase; and
TotalFare	to stand for the total cost of all tickets purchased.

For this algorithm you may assume that:

- there are 100 records in the array of records;
- no concession, child or student fares are available;
- the variables NumSingle and NumReturn could be zero. (If both variables were zero then TotalFare would be zero.)

End of Question 22

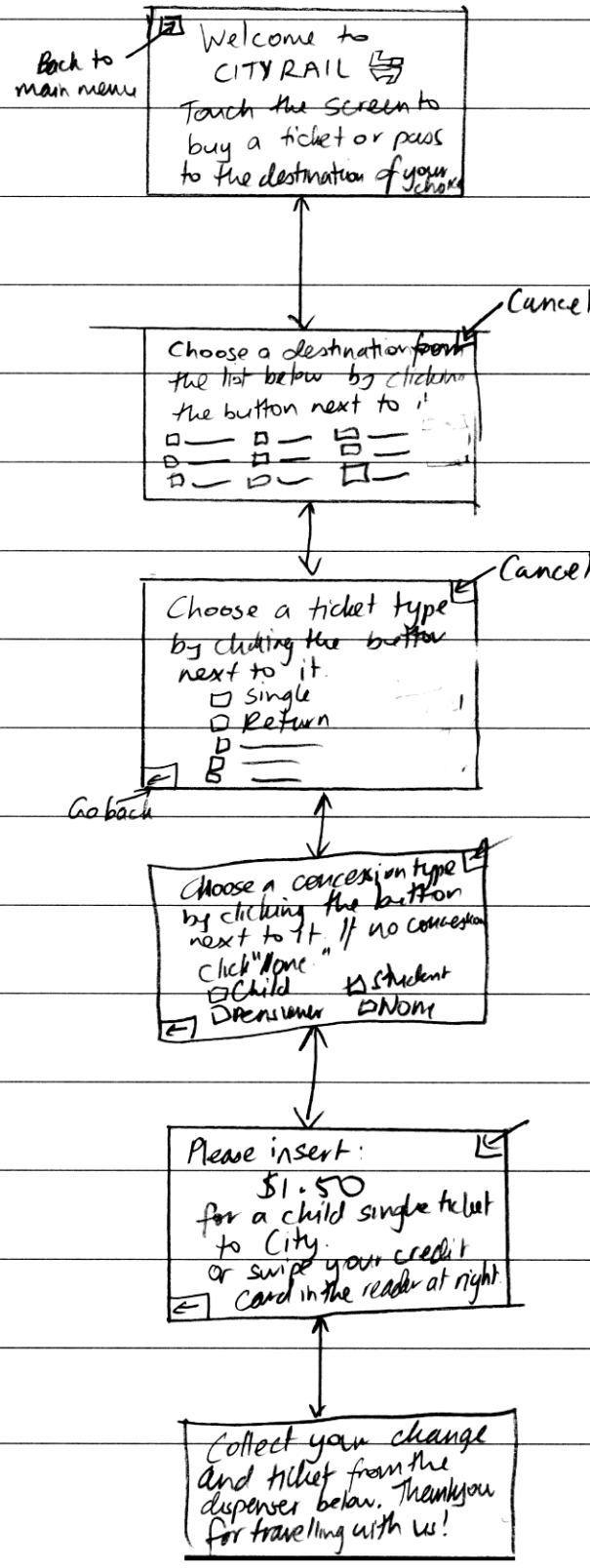
a) The very large scale and complex nature of the proposed system indicates that a structured approach would be the most suitable for this system - it is going to be implemented Australia-wide & ~~thus plenty of time & money should probably be allocated and a large team of specialist developers employed, especially since~~ it is a critical system where reliability and the ability to handle larger transaction loads are crucial. Also, the system will probably have to interface with other systems eg. in the processing of credit card payments and the display of up to the minute information about delays and early arrivals. Thus we can see that the system is very complex and will require a lot of time & money, as well as a large team of specialist developers - all characteristics of the structured

approach. Moreover, the requirement of the system are quite clearly defined lending itself to the waterfall method where the problem is clearly defined before design begins, unlike other more iterative & less structured methods eg. prototyping. Although the structured approach does have its drawbacks eg high level of expenditure, relatively slow deployment, the overall scale of the system requires this type of outlay. However a combination of approaches can be used eg. prototypes may be trialled on members of the public to gauge the effectiveness of the UI as this is an extremely important factor of the system

b) The analyst conducting the feasibility study has to determine firstly whether the technology required to implement the proposed solution exists. For example, there is little point designing a system which can use fingerprint identification to bill a particular bank account for the purchase of tickets, if such technology does not exist. It is important to ensure that realistic requirements are set in place for the system. Secondly even if the technology exists, it must also be within the capacity of the railways company to acquire. If the technology is only available in America, or is far too expensive, once again expecting such a solution to be implemented is not feasible. Both these factors must be considered to ensure that the design of the

system is realistic & does not lead to blow outs in expenditure or time taken for the project.

c) (i)



c)(ii)

Welcome to CITYRAIL!

Touchscreen System.

Touch a button on the screen to access a feature.

- Purchase a Ticket
- Look up Timetables
- Early / Late Arrivals
- Plan a Journey
- HELP

(iii) Visually impaired people may have problems reading the text on the screens especially small text such as timetable information. This may be resolved by providing text magnification options or zooming in and out (as seen in web browsers) to increase the legibility of text increasing the inclusivity of the system. Alternatively one manned counter may be left open to help those who are blind or seriously vision impaired & cannot use the

software system.

e)

```
BEGIN CalcTotalFare (UserDest, NumSingle, NumReturn, TotalFare)
    totalFare = 0
    Counter = 1
    found = false
    IF NumSingle ≠ 0 AND NumReturn ≠ 0 THEN
        WHILE counter ≤ 100 AND found = false
            IF Destination(counter).Station = UserDest THEN
                add Destination(counter).fullSingle x NumSingle to totalFare
                add Destination(counter).fullReturn x NumReturn to totalFare
                found = true
            END IF
            add 1 to counter
        END WHILE
    END IF
END CalcTotalFare
```