Answers

# PRACTICAL 18: Design 2

**Tutor Led Example** (adapted from http://www.cems.uwe.ac.uk/jharney/table.html)

A store wishes to program a decision on non-cash receipts for goods into their intelligent tills.  
The conditions to check are agreed as:

1. Transaction under £50, over requires supervisor authority  
2. Pays by cash only  
3. Pays by credit card only, payments over £50 require the checking of a credit database

The possible actions that a cashier could take are agreed as:

1. Ring up sale  
2. Check credit card database  
3. Call a supervisor

**Step 1:** Create a decision table showing all possible conditions and actions

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Under £50 |  |  |  |  |  |  |  |  |
| Pays by cash |  |  |  |  |  |  |  |  |
| Pays by credit card |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Ring up sale |  |  |  |  |  |  |  |  |
| Check credit card database |  |  |  |  |  |  |  |  |
| Call Supervisor |  |  |  |  |  |  |  |  |

**Step 2:** Show all possible combinations of alternatives. There are 3 conditions each with 2 possible values; Y or N. Number of alternatives is therefore 2x2x2=8

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Under £50 | Y | Y | Y | Y | N | N | N | N |
| Pays by cash | Y | Y | N | N | Y | Y | N | N |
| Pays by credit card | Y | N | Y | N | Y | N | Y | N |
|  |  |  |  |  |  |  |  |  |
| Ring up sale |  |  |  |  |  |  |  |  |
| Check credit card database |  |  |  |  |  |  |  |  |
| Call Supervisor |  |  |  |  |  |  |  |  |

**Step 3:** Delete any invalid conditions; the customer cannot pay by cheque AND pay by credit card or not pay by either method. This reduces the decision table to 4 condition rules.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Under £50 | Y | Y | N | N |
| Pays by cash | Y | N | Y | N |
| Pays by credit card | N | Y | N | Y |
|  |  |  |  |  |
| Ring up sale |  |  |  |  |
| Check credit card database |  |  |  |  |
| Call Supervisor |  |  |  |  |

**Step 4:** Indicate the actions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Under £50 | Y | Y | N | N |
| Pays by cash | Y | N | Y | N |
| Pays by credit card | N | Y | N | Y |
|  |  |  |  |  |
| Ring up sale | X | X |  |  |
| Check credit card database |  |  |  | X |
| Call Supervisor |  |  | X |  |

**Student Exercises**

1. Write a decision table based on the following:

* To take out a loan of under £5,000 applicants must supply proof or their identity and address
* The loan repayments must be less than 25% of their monthly salary for an automatic decision to be made
* If the loan repayments are between 25% and 30% a supervisor must manually review the application

Answer:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Rules | | |
| Conditions | Under £5000 | Y | Y | Y |
| Less than 25% of monthly salary | Y | N | N |
| Between 25% and 30% of monthly salary | N | Y | N |
| Proof of identity | Y | Y | Y |
| Proof of address | Y | Y | Y |
| Actions | Decision rejected |  |  | X |
| Decision accepted | X |  |  |
| Call supervisor |  | X |  |

1. Write a decision table to diagnose printer problems for a technical support company using the following conditions and rules.

|  |  |
| --- | --- |
| Conditions | Printer does not print |
| A red light is flashing |
| Printer is unrecognised |

|  |  |
| --- | --- |
| Actions | Check the power cable |
| Check the printer-computer cable |
| Ensure printer software is installed |
| Check/replace ink |
| Check for paper jam |

Determine the actions to take for each rule set

Answer:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Printer Troubleshooter** | | | | | | | | | |
|  |  | **Rules** | | | | | | | |
| Conditions | Printer does not print | Y | Y | Y | Y | N | N | N | N |
| A red light is flashing | Y | Y | N | N | Y | Y | N | N |
| Printer is unrecognised | Y | N | Y | N | Y | N | Y | N |
| Actions | Check the power cable |  |  | X |  |  |  |  |  |
| Check the printer-computer cable | X |  | X |  |  |  |  |  |
| Ensure printer software is installed | X |  | X |  | X |  | X |  |
| Check/replace ink | X | X |  |  | X | X |  |  |
| Check for paper jam |  | X |  | X |  |  |  |  |

*Note – this can be different depending on the type of printer or software etc.*

(http://en.wikibooks.org/wiki/A-level\_Computing/AQA/ Problem\_Solving,\_Programming, \_Data\_Representation\_and\_Practical\_Exercise/Problem\_Solving/Decision\_tables)

1. Write a decision tree to determine the cost of a meal based on the following rules :

* Lunches cost £7.95 for adults and £3.95 for children under 12
* Evening meals cost £15.95 for adults and £8.50 for children under 12

Answer:

|  |  |  |  |
| --- | --- | --- | --- |
| Meal Price | Evening? | Child | Price |
| Y | Y | £8.50 |
| N | £15.95 |
| N | Y | £3.95 |
| N | £7.95 |