Decision Tables
Modeling Logic with Decision Tables

- A matrix representation of the logic of a decision
- Specifies the possible conditions and the resulting actions
- Best used for complicated decision logic
Modeling Logic with Decision Tables

- Consists of three parts
  - Condition stubs
    - Lists condition relevant to decision
  - Action stubs
    - Actions that result from a given set of conditions
  - Rules
    - Specify which actions are to be followed for a given set of conditions
Modeling Logic with Decision Tables

- Indifferent Condition
  - Condition whose value does not affect which action is taken for two or more rules

- Standard procedure for creating decision tables
  - Name the condition and values each condition can assume
  - Name all possible actions that can occur
  - List all rules
  - Define the actions for each rule
  - Simplify the table
### Figure 9-4
Complete decision table for payroll system example

<table>
<thead>
<tr>
<th>Condition Stubs</th>
<th>Conditions/Courses of Action</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee type</td>
<td>S H S H S H</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Hours worked</td>
<td>&lt;40 &lt;40 40 40 &gt;40 &gt;40</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action Stubs</th>
<th>Pay base salary</th>
<th>Calculate hourly wage</th>
<th>Calculate overtime</th>
<th>Produce Absence Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>X</td>
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</table>
Constructing a Decision Table

PART 1. FRAME THE PROBLEM.
- Identify the conditions (decision criteria). These are the factors that will influence the decision.
  - E.g., We want to know the total cost of a student's tuition. What factors are important?
- Identify the range of values for each condition or criteria.
  - E.g. What are they for each factor identified above?
- Identify all possible actions that can occur.
  - E.g. What types of calculations would be necessary?

PART 2. CREATE THE TABLE.
- Create a table with 4 quadrants.
  - Put the conditions in the upper left quadrant. One row per condition.
  - Put the actions in the lower left quadrant. One row per action.
- List all possible rules.
  - Alternate values for first condition. Repeat for all values of second condition. Keep repeating this process for all conditions.
  - Put the rules in the upper right quadrant.
- Enter actions for each rule
  - In the lower right quadrant, determine what, if any, appropriate actions should be taken for each rule.
- Reduce table as necessary.
**Example**

- Calculate the total cost of your tuition this quarter.
  - What do you need to know?
    - Level.  (Undergrad or graduate)
    - School.  (CTI, Law, etc.)
    - Status.  (Full or part time)
    - Number of hours
  - Actions?
• Actions?
  • Consider CTI only (to make the problem smaller):
    • U/G
      ▪ Part Time (1 to 11 hrs.): $335.00/per hour
      ▪ Full Time (12 to 18 hrs.): $17,820.00
      ▪ * Credit hours over 18 are charged at the part-time rate
    • Graduate:
      ▪ Part time (1 to 7 hrs.): $520.00/per hour
      ▪ Full time (>= 8 hrs.): $520.00/per hour

• Create a decision table for this problem. In my solution I was able to reduce the number of rules from 16 to 4.