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**Assignment Description**

1. Do Problem 8 on page 131 of Software Testing. Make sure you create a decision table as part of your submission.
2. Create a complete set of test cases for the microwave oven state diagram shown in this week's section Make sure you cover all possibilities.

**Part 1**

The retirement pension salary of a Michigan public school teacher is a percentage of the average of their last 3 years of teaching. Normally, the number of years of teaching service is the percentage multiplier. To encourage senior teachers to retire early, the Michigan legislature enacted the following incentive in May of 2010:

* Teachers must apply for the incentive before June 11, 2010.
* Teachers who are currently eligible to retire (age ≥ 63 years) shall have a multiplier of 1.6% on their salary up to, and including, $90,000, and 1.5% on compensation in excess of $90,000.
* Teachers who meet the 80 total years of age plus years of teaching shall have a multiplier of 1.55% on their salary up to, and including, $90,000 and 1.5% on compensation in excess of $90,000.

Make a decision table to describe the retirement pension policy; be sure to consider the retirement eligibility criteria carefully. What are the compensation multipliers for a person who is currently 64 with 20 years of teaching whose salary is $95,000?

**Part 1 Summary of Results**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Combinations** | | | | | | | | | | | | | | | |
| **Cause** | **Values** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| Applied before June 11, 2010 | Y,N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N | N | N | N | N | N |
| Age ≥ 63 | Y,N | Y | Y | Y | Y | N | N | N | N | Y | Y | Y | Y | N | N | N | N |
| Salary > $90,000 | Y,N | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N |
| Age + Years of Teaching ≥ 80 | Y,N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N |
| **Effects** | | | | | | | | | | | | | | | | | |
| First 90k Multiplier = 1.6% | |  |  | X\* | X |  |  |  |  |  |  |  |  |  |  |  |  |
| First 90k Multiplier = 1.55% | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| First 90k Multiplier = 1.6% + in excess 1.5% | | X\* | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First 90k Multiplier = 1.55% + in excess 1.5% | |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| Number of years teaching service is multiplier | |  |  |  |  |  | X |  | X | X | X | X | X | X | X | X | X |

\*assume higher of the two multiplier (1.6%) for age ≥ 63, (age + year of teaching) ≥ 80 & salary ≤ $90,000

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Combinations** | | | | | |
| **Cause** | **Values** | **1** | **2** | **3** | **4** | **5** | **6** |
| Applied before June 11, 2010 | Y,N | Y | Y | Y | Y | Y | N |
| Age ≥ 63 | Y,N | Y | Y | N | N | N | - |
| Salary > $90,000 | Y,N | Y | N | Y | - | N | - |
| Age + Years of Teaching ≥ 80 | Y,N | - | - | Y | N | Y | - |
| **Effects** | | | | | | | |
| First 90k Multiplier = 1.6% | |  | X\* |  |  |  |  |
| First 90k Multiplier = 1.55% | |  |  |  |  | X |  |
| First 90k Multiplier = 1.6% + in excess 1.5% | | X\* |  |  |  |  |  |
| First 90k Multiplier = 1.55% + in excess 1.5% | |  |  | X |  |  |  |
| Number of years teaching service is multiplier | |  |  |  | X |  | X |

- denotes either Y or N

\*assume higher of the two multiplier (1.6%) for age ≥ 63, (age + year of teaching) ≥ 80 & salary ≤ $90,000

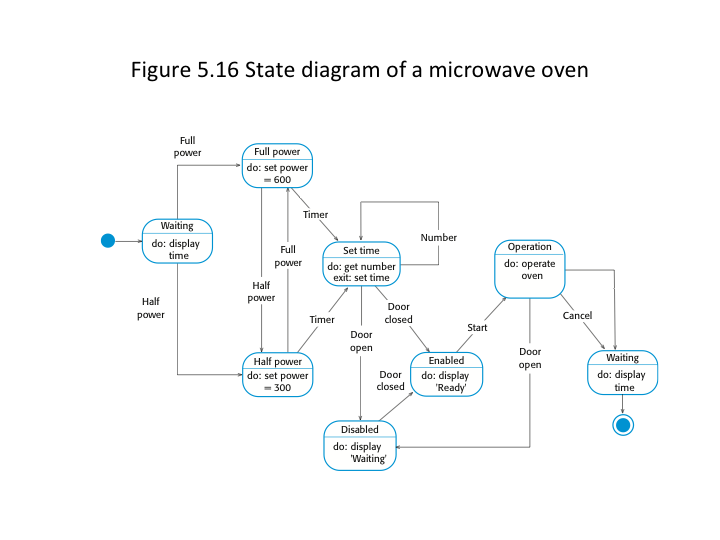
For a person who is currently 64 years old, 20 years of teaching, and salary of $95,000:

* Age > 63 = Y
* Salary > $90,000 = Y
* (64 + 20 = 84) ≥ 80 = Y

The compensation multiplier would be 1.6% for the first 90,000 and 1.5% for compensation in excess of 90,000.

\*Assume they applied before June 11, 2010

**Part 2: State diagram of a microwave oven**



**State Table for the Microwave**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State \ Inputs | Command Full Power | Command Half Power | Command Timer | Command Number | Command Exit | Door open | Door closed | Command Start | Command timeout | Command Cancel |
| Waiting | Full power: Set power=600 | Half power: Set power=300 |  |  |  |  |  |  |  |  |
| Full power |  | Half power: Set power=300 | Set time: get number |  |  |  |  |  |  |  |
| Half power | Full power: Set power=600 |  | Set time: get number |  |  |  |  |  |  |  |
| Set time |  |  |  | Set time: get number | Set time: set time | Disabled: display ‘Waiting’ | Enabled: display ‘Ready’ |  |  |  |
| Enabled |  |  |  |  |  |  |  | Operation: operate oven |  |  |
| Disabled |  |  |  |  |  |  | Enabled: display ‘Ready’ |  |  |  |
| Operation |  |  |  |  |  | Disabled: display ‘Waiting’ |  |  | Waiting: display time | Waiting: display time |

**Part 2 Summary of Results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case ID | Current State | Command/Sensor | Action | Next State |
| T-001 | Waiting | Full power | Set power=600 | Full Power |
| T-002 | Waiting | Half Power | Set power=300 | Half Power |
| T-003 | Waiting | Timer | Nothing | Waiting |
| T-004 | Waiting | Number | Nothing | Waiting |
| T-005 | Waiting | Exit | Nothing | Waiting |
| T-006 | Waiting | Door open | Nothing | Waiting |
| T-007 | Waiting | Door closed | Nothing | Waiting |
| T-008 | Waiting | Start | Nothing | Waiting |
| T-009 | Waiting | Timeout | Nothing | Waiting |
| T-010 | Waiting | Cancel | Nothing | Waiting |
| T-011 | Full Power | Full power | Nothing | Full Power |
| T-012 | Full Power | Half Power | Nothing | Full Power |
| T-013 | Full Power | Timer | Set power=300 | Half Power |
| T-014 | Full Power | Number | Get Number | Set time |
| T-015 | Full Power | Exit | Nothing | Full Power |
| T-016 | Full Power | Door open | Nothing | Full Power |
| T-017 | Full Power | Door closed | Nothing | Full Power |
| T-018 | Full Power | Start | Nothing | Full Power |
| T-019 | Full Power | Timeout | Nothing | Full Power |
| T-020 | Full Power | Cancel | Nothing | Full Power |
| T-021 | Half Power | Full power | Set power=600 | Full Power |
| T-022 | Half Power | Half Power | Nothing | Half Power |
| T-023 | Half Power | Timer | Get Number | Set time |
| T-024 | Half Power | Number | Nothing | Half Power |
| T-025 | Half Power | Exit | Nothing | Half Power |
| T-026 | Half Power | Door open | Nothing | Half Power |
| T-027 | Half Power | Door closed | Nothing | Half Power |
| T-028 | Half Power | Start | Nothing | Half Power |
| T-029 | Half Power | Timeout | Nothing | Half Power |
| T-030 | Half Power | Cancel | Nothing | Half Power |
| T-031 | Set time | Full power | Nothing | Set time |
| T-032 | Set time | Half Power | Nothing | Set time |
| T-033 | Set time | Timer | Nothing | Set time |
| T-034 | Set time | Number | Get Number | Set time |
| T-035 | Set time | Exit | Set Time | Set time |
| T-036 | Set time | Door open | Display ‘Waiting’ | Disabled |
| T-037 | Set time | Door closed | Display ‘Ready’ | Enabled |
| T-038 | Set time | Start | Nothing | Set time |
| T-039 | Set time | Timeout | Nothing | Set time |
| T-040 | Set time | Cancel | Nothing | Set time |
| T-041 | Enabled | Full power | Nothing | Enabled |
| T-042 | Enabled | Half Power | Nothing | Enabled |
| T-043 | Enabled | Timer | Nothing | Enabled |
| T-044 | Enabled | Number | Nothing | Enabled |
| T-045 | Enabled | Exit | Nothing | Enabled |
| T-046 | Enabled | Door open | Nothing | Enabled |
| T-047 | Enabled | Door closed | Nothing | Enabled |
| T-048 | Enabled | Start | Operate oven | Operation |
| T-049 | Enabled | Timeout | Nothing | Enabled |
| T-050 | Enabled | Cancel | Nothing | Enabled |
| T-051 | Disabled | Full power | Nothing | Disabled |
| T-052 | Disabled | Half Power | Nothing | Disabled |
| T-053 | Disabled | Timer | Nothing | Disabled |
| T-054 | Disabled | Number | Nothing | Disabled |
| T-055 | Disabled | Exit | Nothing | Disabled |
| T-056 | Disabled | Door open | Nothing | Disabled |
| T-057 | Disabled | Door closed | Display ‘Ready’ | Enabled |
| T-058 | Disabled | Start | Nothing | Disabled |
| T-059 | Disabled | Timeout | Nothing | Disabled |
| T-060 | Disabled | Cancel | Nothing | Disabled |
| T-061 | Operation | Full power | Nothing | Operation |
| T-062 | Operation | Half Power | Nothing | Operation |
| T-063 | Operation | Timer | Nothing | Operation |
| T-064 | Operation | Number | Nothing | Operation |
| T-065 | Operation | Exit | Nothing | Operation |
| T-066 | Operation | Door open | Display ‘Waiting’ | Disabled |
| T-067 | Operation | Door closed | Nothing | Operation |
| T-068 | Operation | Start | Nothing | Operation |
| T-069 | Operation | Timeout | Display time | Waiting |
| T-070 | Operation | Cancel | Display time | Waiting |

**Lessons Learned**

When working with decision tables it is important to account for every possible cause and effects that may not be explicitly stated. When working with state diagrams the team discovered to keep that when considering test cases each state should be as simple as possible. Over complicating each current state transitioning to another state can become difficult to understand and follow.

**Honor Pledge**

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