Assignment 1 – CST8244 Real-Time Programming

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A state transition machine is designed for a entry and exit system using interprocess communication on the QNX operating system.

The full list of states are shown below:

|  |  |
| --- | --- |
| State | Label |
| Q0 | Start |
| Q1 | Guard left (locked) |
| Q2 | Guard right (locked) |
| Q3 | Guard left (unlocked) |
| Q4 | Guard right (unlocked) |
| Q5 | Door (opened) |
| Q6 | Weight |
| Q7 | Left door (closed) |
| Q8 | Right door (closed) |
| Q9 | Guard (locked) |
| Q10 | Guard left (unlocked) |
| Q11 | Guard right (unlocked) |
| Q12 | Left door (opened) |
| Q13 | Right door (opened) |
| Q14 | Left door (closed) |
| Q15 | Right door (closed) |
| Q16 | Guard left (locked) |
| Q17 | Guard right (locked) |
| Q18 | Exit |

The list of possible inputs to the state machine are as follows:

|  |  |  |
| --- | --- | --- |
| State | Input | Additional Data Requirements |
| Q0 | ls | User ID |
| Q0 | rs | User ID |
| Q1/Q9 | glu | N/A |
| Q2/Q9 | gru | N/A |
| Q3/Q10 | lo | N/A |
| Q4/Q11 | ro | N/A |
| Q5 | ws | User’s weight |
| Q6/Q12 | lc | N/A |
| Q6/Q13 | rc | N/A |
| Q7/Q16 | gll | N/A |
| Q8/Q17 | grl | N/A |
| Any | exit | N/A |

The list of outputs that the state machine can produce are as follows:

|  |  |
| --- | --- |
| State | Output/Description |
| Q1/Q2 | The user is prompted to enter their ID |
| Q3/Q10 | The left guard is displayed as being unlocked |
| Q4/Q11 | The right guard is displayed as being unlocked |
| Q6 | The user is prompted to enter their weight |
| Q7/Q14 | The left door is displayed as being closed |
| Q8/Q15 | The right door is displayed as being closed |
| Q9 | Either the left or right guard is displayed as being locked depending upon whether the previous state was Q7 or Q8, respectively |
| Q12 | The left door is displayed as being opened |
| Q13 | The right door is displayed as being opened |
| Q16 | The left guard is displayed as being locked |
| Q17 | The right guard is displayed as being locked |
| Q18 | The des\_inputs program exits |

The list of conditions for transitioning between states is shown below:

|  |  |  |
| --- | --- | --- |
| State | Condition for State Transition | Next State |
| Q0 | The left scan command is entered or the right scan command is entered | Q1/Q2 |
| Q1 | The guard left unlock command is entered | Q3 |
| Q2 | The guard right unlock command is entered | Q4 |
| Q3 | The left door open command is entered | Q5 |
| Q4 | The right door open command is entered | Q5 |
| Q5 | The weight command is entered | Q6 |
| Q6 | The left door close command is entered or the right door close command is entered | Q7/Q8 |
| Q7 | The guard left lock command is entered | Q9 |
| Q8 | The guard right lock command is entered | Q9 |
| Q9 | The guard left unlock command or the guard right unlock command is entered | Q10/Q11 |
| Q10 | The left door open command is entered | Q12 |
| Q11 | The right door open command is entered | Q13 |
| Q12 | The left door close command is entered | Q14 |
| Q13 | The right door close command is entered | Q15 |
| Q14 | The guard left lock command is entered | Q16 |
| Q15 | The guard right lock command is entered | Q17 |
| Any | The exit command is entered | Q18 |

Below is a diagram of the state machine:

