

Bowling Alley Management System

1 Introduction

The Lucky Strikes Bowling Center (LSBC) is looking to automate their chain of bowling establishments located across the country. Like many modern bowling facilities, they will be installing new pin setting equipment which can detect the numbers of pins knocked down after a bowler has rolled his ball. This information can then be communicated to a scoring station that would be able to automatically score the bowler's game. They would also like to establish a service for their customers that would maintain a history of a bowler's scores, average and other related information.

2 Background










2.1 Lane Management

A bowling establishment is commonly referred to as a bowling *alley*. A bowling alley is composed of a number of bowling lanes. When a bowler enters a LSBC, he checks in at the control desk for a lane assignment. Bowlers may check in as a group or *party* so that they will be assigned to the same lane. Each lane can accommodate one to five bowlers. The order in which a party checks in determines the order in which they will bowl.

Once a party has started bowling, the control desk can monitor the number of *frames* completed by each bowler. When a bowler has completed a game, the control desk is notified of the bowler's score for that game. When the last bowler in the party has completed his game, the party may start a new game or check out at the control desk.

2.2 Scoring Station

Each lane is equipped with a stand-alone scoring station that lists the bowlers' names (in the order they checked in) and a graphic representation of their scores. A typical score sheet for one bowler looks like this:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|-----|---|---|-----|
|  | 7  | 9  |  |  8 | ⑧  | F 6 |  |   | 8 1 |
| 20 | 39 | 48 | 66 | 74 | 84 | 90 | 120 | 148 | 167 |

Bowlers alternate rolling the ball or taking *throws* according to the scoring rules of bowling referenced in the following section. The automatic pinsetter is able to detect the

number of pins still standing on a lane after each throw. This information is then transmitted back to the scoring station. The scoring station also displays the pins that are still standing after each throw.

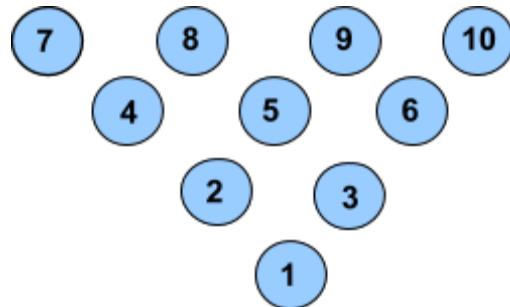
2.2.1 How to Keep Score in Bowling

Follow this link for a detailed explanation of how to keep score in bowling:

<http://slocums.homestead.com/gamescore.html>

2.3 Pinsetter Interface

The pinsetter interface communicates to the scoring station the pins that are left standing after a bowler has completed a throw. A throw is complete when the bowling ball hits the end of the alley beyond the last row of pins. The pins left standing are identified by number in the following manner:



The pinsetter will re-rack the pins (places all ten down) after two consecutive throws have been detected. The pinsetter interface also accepts a command that will be treated in the same manner as a thrown ball.

2.4 Bowler Management

LSBC supports a free bowling club for their patrons that maintains a history of a bowler's scores and their current average per game. Bowlers perform a one-time registration the first time they check in at the control desk by providing their full name and an email address. They also provide a preferred nickname to be displayed on the scoring station when they are bowling.

When a bowler has checked out at the control desk after completing his games, a report is generated containing the bowler's scores from games just completed, previous scores and

his current average. This report is automatically emailed to the bowler. The bowler may also request a printout of the report before he leaves the control desk.

2.5 Additional Control Desk Functions

The control desk operator has the ability to monitor the scores of any active lane. A configurable display option will allow the operator to view the score of an individual scoring station or multiple scoring stations.

In the event a lane has a mechanical problem – ball not returned, pinsetter did not re-rack, etc.– the bowler may contact the control desk through an interface on the scoring station. The control station sends an acknowledgement of the request back to the scoring station.

3 Project Guidelines

Your team has been contracted to produce a working prototype of a bowling alley management system for LSBC. Keep in mind the following guidelines and constraints when developing your project:

- The quality and functionality of your project will be used by LSBC to award future contracts to your development team. Your lab instructor represents LSBC in this project.
- Since all physical hardware is not yet in place (pinsetter for example) you will need to simulate certain actions to demonstrate your system.
- All functionality implemented in the project is coordinated through LSBC.

3.1 Design Constraints

- System must be implemented in Java.