

```
1 /**
2  * Controller interface.
3  *
4  * @author Bruce W. Weide
5  *
6  * @mathmodel <pre>
7  * type NNCalcController is modeled by
8  *   (model: NNCalcModel,
9  *    view: NNCalcView)
10 * </pre>
11 * @initially <pre>
12 * (NNCalcModel model, NNCalcView view):
13 *   ensures
14 *     this.model = model and
15 *     this.view = view
16 * </pre>
17 */
18 public interface NNCalcController {
19
20     /**
21      * Processes event to clear bottom operand.
22      *
23      * @updates this.model.bottom, this.view
24      * @ensures <pre>
25      *   this.model.bottom = 0 and
26      *   [this.view has been updated to match this.model]
27      * </pre>
28      */
29     void processClearEvent();
30
31     /**
32      * Processes event to swap operands.
33      *
34      * @updates this.model, this.view
35      * @ensures <pre>
36      *   this.model.top = #this.model.bottom and
37      *   this.model.bottom = #this.model.top and
38      *   [this.view has been updated to match this.model]
39      * </pre>
40      */
41     void processSwapEvent();
42
43     /**
44      * Processes event to enter bottom operand to top.
45      *
46      * @updates this.model.top, this.view
47      * @ensures <pre>
48      *   this.model.top = this.model.bottom and
49      *   [this.view has been updated to match this.model]
50      * </pre>
51      */
52     void processEnterEvent();
53
54     /**
55      * Processes event to do an add operation.
56      *
57      * @updates this.model, this.view
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58     * @ensures <pre>
59     * this.model.top = 0 and
60     * this.model.bottom = #this.model.top + #this.model.bottom and
61     * [this.view has been updated to match this.model]
62     * </pre>
63     */
64     void processAddEvent();
65
66     /**
67     * Processes event to do a subtract operation.
68     *
69     * @updates this.model, this.view
70     * @requires this.model.bottom <= this.model.top
71     * @ensures <pre>
72     * this.model.top = 0 and
73     * this.model.bottom = #this.model.top - #this.model.bottom and
74     * [this.view has been updated to match this.model]
75     * </pre>
76     */
77     void processSubtractEvent();
78
79     /**
80     * Processes event to do a multiply operation.
81     *
82     * @updates this.model, this.view
83     * @ensures <pre>
84     * this.model.top = 0 and
85     * this.model.bottom = #this.model.top * #this.model.bottom and
86     * [this.view has been updated to match this.model]
87     * </pre>
88     */
89     void processMultiplyEvent();
90
91     /**
92     * Processes event to do a divide operation.
93     *
94     * @updates this.model, this.view
95     * @requires this.model.bottom > 0
96     * @ensures <pre>
97     * #this.model.top =
98     *     this.model.bottom * #this.model.bottom + this.model.top and
99     * 0 <= this.model.top < #this.model.bottom and
100    * [this.view has been updated to match this.model]
101    * </pre>
102    */
103    void processDivideEvent();
104
105    /**
106    * Processes event to do a power operation.
107    *
108    * @updates this.model, this.view
109    * @requires this.model.bottom <= INT_LIMIT
110    * @ensures <pre>
111    * this.model.top = 0 and
112    * this.model.bottom = #this.model.top ^ (#this.model.bottom) and
113    * [this.view has been updated to match this.model]
114    * </pre>
```

```
115     */
116     void processPowerEvent();
117
118     /**
119     * Processes event to do a root operation.
120     *
121     * @updates this.model, this.view
122     * @requires 2 <= this.model.bottom <= INT_LIMIT
123     * @ensures <pre>
124     *   this.model.top = 0   and
125     *   this.model.bottom =
126     *     [the floor of the #this.model.bottom root of #this.model.top]   and
127     *     [this.view has been updated to match this.model]
128     * </pre>
129     */
130     void processRootEvent();
131
132     /**
133     * Processes event to add a new (low-order) digit to the bottom operand.
134     *
135     * @param digit
136     *   the low-order digit to be added
137     *
138     * @updates this.model.bottom, this.view
139     * @requires 0 <= digit < 10
140     * @ensures <pre>
141     *   this.model.bottom = #this.model.bottom * 10 + digit   and
142     *   [this.view has been updated to match this.model]
143     * </pre>
144     */
145     void processAddNewDigitEvent(int digit);
146
147 }
148
```