lib/main/order_unittest.ath

```
1   ## Test abstract order concepts and theorems
2
3   ##########################
4
5   open ST
6
7   load "order"
8
9   define Less1 := no-renaming
10
11  assert (theory-axioms Strict-Partial-Order.theory)
12
13  (!prove-property Strict-Partial-Order.asymmetric Less1 Strict-Partial-Order.theory)
14  (!prove-property Strict-Partial-Order.implies-not-equal Less1 Strict-Partial-Order.theory)
15
16  assert (theory-axioms SPO.theory)
17
18  (!prove-property Strict-Partial-Order.asymmetric Less1 SPO.theory)
19
20  (!prove-property Strict-Partial-Order.implies-not-equal Less1 SPO.theory)
21
22
23  define Less-equal1 := no-renaming
24
25  assert (Less-equal1 (theory-axioms SPO.theory))
26
27  (!prove-property PO-from-SPO.implies-not-reverse Less-equal1 SPO.theory)
28  (!prove-property PO-from-SPO.PO-reflexive Less-equal1 SPO.theory)
29  (!prove-property PO-from-SPO.PO-antisymmetric Less-equal1 SPO.theory)
30  (!prove-property PO-from-SPO.PO-transitive Less-equal1 SPO.theory)
31  (!prove-property PO-from-SPO.PO-inverse Less-equal1 SPO.theory)
32
33  (print-instance-check Less-equal1 PO.theory)
34
35  #####################################################################
36
37  define SWO1 := no-renaming
38
39  (assert (theory-axioms SWO.theory))
40
41  (!prove-property SWO.E-transitive SWO1 SWO.theory)
42  (!prove-property SWO.E-reflexive SWO1 SWO.theory)
43  (!prove-property SWO.E-symmetric SWO1 SWO.theory)
44  (!prove-property SWO.<-E-transitive-1 SWO1 SWO.theory)
45  (!prove-property SWO.<-E-transitive-2 SWO1 SWO.theory)
46  (!prove-property SWO.not-<-property SWO1 SWO.theory)
47  (!prove-property SWO.<-transitive-not-1 SWO1 SWO.theory)
48  (!prove-property SWO.<-transitive-not-2 SWO1 SWO.theory)
49  (!prove-property SWO.<-transitive-not-3 SWO1 SWO.theory)
50  (!prove-property SWO.not-<-is-transitive SWO1 SWO.theory)
51
52  (!prove-property SWO.<E-reflexive SWO1 SWO.theory)
53
54  (!prove-property SWO.<E-transitive SWO1 SWO.theory)
55
56  #####################################################################
57
58  define STO1 := no-renaming
59
60  (assert (get-property STO.strict-trichotomy STO1 STO.theory))
61
62  (!prove-property STO.E-iff-equal STO1 STO.theory)
63
64  #####################################################################
65
66  declare new<: (T) [T T] -> Boolean
67
68  (define-symbol EE
```

```
69      (forall ?x ?y
70            (iff (EE ?x ?y)
71                 (and (not (new< ?x ?y))
72                      (not (new< ?y ?x)))))))
73
74  define Less1 := (renaming |{SPO.< := new<, SPO.E := EE}|)
75
76  assert (Less1 (theory-axioms SPO.theory))
77
78  (!prove-property Strict-Partial-Order.asymmetric Less1 SPO.theory)
79
80  define SWO1 := Less1
81
82  (assert (SWO1 (theory-axioms SWO.theory)))
83
84  (!prove-property SWO.E-transitive SWO1 SWO.theory)
85  (!prove-property SWO.E-reflexive SWO1 SWO.theory)
86  (!prove-property SWO.E-symmetric SWO1 SWO.theory)
87  (!prove-property SWO.<-E-transitive-1 SWO1 SWO.theory)
88  (!prove-property SWO.<-E-transitive-2 SWO1 SWO.theory)
89  (!prove-property SWO.not-<-property SWO1 SWO.theory)
90  (!prove-property SWO.<-transitive-not-1 SWO1 SWO.theory)
91  (!prove-property SWO.<-transitive-not-2 SWO1 SWO.theory)
92  (!prove-property SWO.<-transitive-not-3 SWO1 SWO.theory)
93  (!prove-property SWO.not-<-is-transitive SWO1 SWO.theory)
94
95  #######################################################################
96  open STO
97
98  (define STO1 SWO1)
99
100 (assert (get-property strict-trichotomy STO1 theory))
101
102 (!prove-property E-iff-equal STO1 theory)
```