```
ring-leader1__feasible  THM

⊢  ∀R:(Id→𝔹), uid:(|R|→ℕ), out,in:(|R|→IdLnk).
|  ring(R;in;out)
|  ⇒
|  Inj(|R|; ℕ; uid)
|  ⇒
|  d-feasible(λloc.⊕(ring-leader1(loc;R;uid;out;in)))
| by Auto
|    THEN
|    Inst
|    Thm* ∀R:(Id→𝔹), in,out:(|R|→IdLnk).
|           ring(R;in;out) ⇒ (∃L:|R| List. 0<||L|| & (∀i:|R|. (i ∈ L)))
|    {ring_DASH_list}
|    [R;in;out]
|    THEN
|    ExRepD
|
1. R : Id→𝔹
2. uid : |R|→ℕ
3. out : |R|→IdLnk
4. in : |R|→IdLnk
5. ring(R;in;out)
6. Inj(|R|; ℕ; uid)
7. L : |R| List
8. 0<||L||
9. ∀i:|R|. (i ∈ L)
⊢  d-feasible(λloc.⊕(ring-leader1(loc;R;uid;out;in)))
| by Assert (∀i:Id. R(i) ⇒ (i ∈ L))
|
|\
| .....assertion .....
| 1. R : Id→𝔹
| 2. uid : |R|→ℕ
| 3. out : |R|→IdLnk
| 4. in : |R|→IdLnk
| 5. ring(R;in;out)
| 6. Inj(|R|; ℕ; uid)
| 7. L : |R| List
| 8. 0<||L||
| 9. ∀i:|R|. (i ∈ L)
| ⊢  ∀i:Id. R(i) ⇒ (i ∈ L)
|   by Auto THEN InstHyp [i] -3 THEN MaAuto
|      THEN
|      RepeatFor 2 (ParallelLast THEN MaAuto)
|      THEN
|      ExRepD
|      THEN
|      ParallelLast
|      THEN
|      MaAuto
|
.\
. 1. R : Id→𝔹
. 2. uid : |R|→ℕ
```

```
. 3. out : |R|→IdLnk
. 4. in : |R|→IdLnk
. 5. ring(R;in;out)
. 6. Inj(|R|; ℕ; uid)
. 7. L : |R| List
. 8. 0<||L||
. 9. ∀i:|R|. (i ∈ L)
. 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. ⊢  d-feasible(λloc.⊕(ring-leader1(loc;R;uid;out;in)))
. | by ProveFeasibleSupport L
. |
. .....interface .....
. 1. R : Id→𝔹
. 2. uid : |R|→ℕ
. 3. out : |R|→IdLnk
. 4. in : |R|→IdLnk
. 5. ring(R;in;out)
. 6. Inj(|R|; ℕ; uid)
. 7. L : |R| List
. 8. 0<||L||
. 9. ∀i:|R|. (i ∈ L)
. 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. ⊢  (∀i∈L.(∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i)....
. |                                                                ⇒
. |  interface-check(λloc.
. |  ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(ltg));2of(2of(
. |                                                              ltg)))))
. | by Assert
. |    (∀i:Id.
. |     R(i)
. |     ⇒
. |     (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i).(... ∈ L)
. |                                                             ⇒
. |     interface-check(λloc.
. |     ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. |                                                       ltg));2of(2of(
. |                                                             ltg)))))
. |
. |\
. | .....assertion .....
. | 1. R : Id→𝔹
. | 2. uid : |R|→ℕ
. | 3. out : |R|→IdLnk
. | 4. in : |R|→IdLnk
. | 5. ring(R;in;out)
. | 6. Inj(|R|; ℕ; uid)
. | 7. L : |R| List
. | 8. 0<||L||
. | 9. ∀i:|R|. (i ∈ L)
. | 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. | ⊢  ∀i:Id.
. | |  R(i)
. | |  ⇒
. | |  (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i).(... ∈ L)
. | |                                                          ⇒
```

```
. | |  interface-check(λloc.
. | |  ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. | |                                                   ltg));2of(2of(
. | |                                                         ltg))))
. | | by Auto
. | |
. | 1. R : Id→𝔹
. | 2. uid : |R|→ℕ
. | 3. out : |R|→IdLnk
. | 4. in : |R|→IdLnk
. | 5. ring(R;in;out)
. | 6. Inj(|R|; ℕ; uid)
. | 7. L : |R| List
. | 8. 0<||L||
. | 9. ∀i:|R|. (i ∈ L)
. | 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. | 11. i : Id
. | 12. R(i)
. | ⊢  (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i).(... ∈ L)
. | |                                                         ⇒
. | |  interface-check(λloc.
. | |  ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. | |                                                   ltg));2of(2of(
. | |                                                         ltg))))
. | | by Assert (destination(in(i)) = i)
. | |
. | |\
. | | .....assertion .....
. | | 1. R : Id→𝔹
. | | 2. uid : |R|→ℕ
. | | 3. out : |R|→IdLnk
. | | 4. in : |R|→IdLnk
. | | 5. ring(R;in;out)
. | | 6. Inj(|R|; ℕ; uid)
. | | 7. L : |R| List
. | | 8. 0<||L||
. | | 9. ∀i:|R|. (i ∈ L)
. | | 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. | | 11. i : Id
. | | 12. R(i)
. | | ⊢  destination(in(i)) = i
. | |   by DupHyp 5 THEN Unfold ‘ring‘ -1 THEN ExRepD
. | |      THEN
. | |      InstHyp [i] -3
. | |      THEN
. | |      ExRepD
. | |      THEN
. | |      MaAuto
. | |
. | .\
. | . 1. R : Id→𝔹
. | . 2. uid : |R|→ℕ
. | . 3. out : |R|→IdLnk
. | . 4. in : |R|→IdLnk
. | . 5. ring(R;in;out)
```

```
. | . 6. Inj(|R|; ℕ; uid)
. | . 7. L : |R| List
. | . 8. 0<||L||
. | . 9. ∀i:|R|. (i ∈ L)
. | . 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. | . 11. i : Id
. | . 12. R(i)
. | . 13. destination(in(i)) = i
. | . ⊢  (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i)....
. | .                                                          ⇒
. | .    interface-check(λloc.
. | .    ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. | .                                                    ltg));2of(2of(
. | .                                                          ltg))))
. | .   by CheckInterface
. |
. .\
. . 1. R : Id→𝔹
. . 2. uid : |R|→ℕ
. . 3. out : |R|→IdLnk
. . 4. in : |R|→IdLnk
. . 5. ring(R;in;out)
. . 6. Inj(|R|; ℕ; uid)
. . 7. L : |R| List
. . 8. 0<||L||
. . 9. ∀i:|R|. (i ∈ L)
. . 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. . 11. ∀i:Id.
. . |   R(i)
. . |   ⇒
. . |   (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i).(... ∈ L)
. . |                                                          ⇒
. . |   interface-check(λloc.
. . |   ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. . |                                                    ltg));2of(2of(
. . |                                                          ltg))))
. . ⊢  (∀i∈L.(∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i)....
. . |                                                              ⇒
. . |  interface-check(λloc.
. . |  ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. . |                                                   ltg));2of(2of(
. . |                                                         ltg)))))
. . | by UnfoldTop ‘l_all‘ 0 THEN RepeatFor 2 (Analyze 0 THENA MaAuto)
. . |    THEN
. . |    BackThruSomeHyp
. . |
. . 1. R : Id→𝔹
. . 2. uid : |R|→ℕ
. . 3. out : |R|→IdLnk
. . 4. in : |R|→IdLnk
. . 5. ring(R;in;out)
. . 6. Inj(|R|; ℕ; uid)
. . 7. L : |R| List
. . 8. 0<||L||
. . 9. ∀i:|R|. (i ∈ L)
```

```
. . 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. . 11. ∀i:Id.
. . |   R(i)
. . |   ⇒
. . |   (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i).(... ∈ L)
. . |                                                             ⇒
. . |   interface-check(λloc.
. . |   ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. . |                                                    ltg));2of(2of(
. . |                                                         ltg))))
. . 12. i : Id
. . 13. (i ∈ L)
. . ⊢  R(i)  by Assert (i ∈ |R|)
. . |
. . |\
. . | .....assertion .....
. . | 1. R : Id→𝔹
. . | 2. uid : |R|→ℕ
. . | 3. out : |R|→IdLnk
. . | 4. in : |R|→IdLnk
. . | 5. ring(R;in;out)
. . | 6. Inj(|R|; ℕ; uid)
. . | 7. L : |R| List
. . | 8. 0<||L||
. . | 9. ∀i:|R|. (i ∈ L)
. . | 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. . | 11. ∀i:Id.
. . |     R(i)
. . |     ⇒
. . |     (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i)....
. . |                                                             ⇒
. . |     interface-check(λloc.
. . |     ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. . |                                                    ltg));2of(
. . |                                                         2of(
. . |                                                         ltg))))
. . | 12. i : Id
. . | 13. (i ∈ L)
. . | ⊢  i ∈ |R|  by Analyze -1 THEN ExRepD THEN HypSubst' -1 0
. . |
. . .\
. . . 1. R : Id→𝔹
. . . 2. uid : |R|→ℕ
. . . 3. out : |R|→IdLnk
. . . 4. in : |R|→IdLnk
. . . 5. ring(R;in;out)
. . . 6. Inj(|R|; ℕ; uid)
. . . 7. L : |R| List
. . . 8. 0<||L||
. . . 9. ∀i:|R|. (i ∈ L)
. . . 10. ∀i:Id. R(i) ⇒ (i ∈ L)
. . . 11. ∀i:Id.
. . .     R(i)
. . .     ⇒
. . .     (∀ltg∈ma-outlinks(⊕(ring-leader1(i;R;uid;out;in));i)....
```

```
. . .                                                          ⇒
. . .     interface-check(λloc.
. . .     ⊕(ring-leader1(loc;R;uid;out;in));1of(ltg);1of(2of(
. . .                                                     ltg));2of(
. . .                                                          2of(
. . .                                                          ltg))))
. . . 12. i : Id
. . . 13. (i ∈ L)
. . . 14. i ∈ |R|
. . . ⊢  R(i)  by Analyze -1 THEN Unhide
END
```