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shorten_list  THM

⊢  ∀L,La:T*.
|  Fin(T) ⇒
|  (∃La':T*.
|   (∀t:T. mem_f(T;t;La) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La'))
|   & (∀t:T. mem_f(T;t;La') ⇒ mem_f(T;t;La))
|   & (||La'||≥1 ⇒ ¬mem_f(T;hd(La');L)))
| by RepD THEN (ListInd 3) THEN (Reduce 0)
|
|\
| 1. T : Type
| 2. L : T*
| 3. T*
| 4. Fin(T)
| ⊢  ∃La':T*.
|    (∀t:T. False ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La'))
|    & (∀t:T. mem_f(T;t;La') ⇒ False)
|    & (||La'||≥1 ⇒ ¬mem_f(T;hd(La');L))
|   by (InstConcl [nil]) THEN (Reduce 0)
|
.\
. 1. T : Type
. 2. L : T*
. 3. T*
. 4. Fin(T)
. 5. u : T
. 6. v : T*
. 7. ∃La':T*.
. |  (∀t:T. mem_f(T;t;v) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La'))
. |  & (∀t:T. mem_f(T;t;La') ⇒ mem_f(T;t;v))
. |  & (||La'||≥1 ⇒ ¬mem_f(T;hd(La');L))
. ⊢  ∃La':T*.
. |  (∀t:T. u = t ∨ mem_f(T;t;v) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La'))
. |  & (∀t:T. mem_f(T;t;La') ⇒ u = t ∨ mem_f(T;t;v))
. |  & (||La'||≥1 ⇒ ¬mem_f(T;hd(La');L))
. | by (Inst
. |     Thm* ∀s:S, l:S*. Fin(S) ⇒ Dec(mem_f(S;s;l))    {mem_f_dec}
. |     [T;u;L])
. |    THEN
. |    (Analyze -1)
. |
. |\
. | 8. mem_f(T;u;L)
. | ⊢   by Analyze -2 THEN InstConcl [La']
. | |
. | |\
. | | 7. La' : T*
. | | 8. ∀t:T. mem_f(T;t;v) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La')
. | | 9. ∀t:T. mem_f(T;t;La') ⇒ mem_f(T;t;v)
. | | 10. ||La'||≥1 ⇒ ¬mem_f(T;hd(La');L)
. | | 11. mem_f(T;u;L)
. | | 12. t : T
. | | 13. u = t ∨ mem_f(T;t;v)
. | | ⊢  mem_f(T;t;L) ∨ mem_f(T;t;La')  by Analyze -1
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. | | | 13. u = t
. | | | ⊢   by (RWH (HypC -1) -3) THEN ProveProp
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. | | .\
. | | . 13. mem_f(T;t;v)
. | | . ⊢   by BackThru 8
. | |
. | |\
. | | 7. La' : T*
. | | 8. ∀t:T. mem_f(T;t;v) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La')
. | | 9. ∀t:T. mem_f(T;t;La') ⇒ mem_f(T;t;v)
. | | 10. ||La'||≥1 ⇒ ¬mem_f(T;hd(La');L)
. | | 11. mem_f(T;u;L)
. | | 12. t : T
. | | 13. mem_f(T;t;La')
. | | ⊢  u = t ∨ mem_f(T;t;v)
. | |   by (Sel 2 (Analyze 0)) THEN (BackThru 9)
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. | .\
. | . 7. La' : T*
. | . 8. ∀t:T. mem_f(T;t;v) ⇒ mem_f(T;t;L) ∨ mem_f(T;t;La')
. | . 9. ∀t:T. mem_f(T;t;La') ⇒ mem_f(T;t;v)
. | . 10. ||La'||≥1 ⇒ ¬mem_f(T;hd(La');L)
. | . 11. mem_f(T;u;L)
. | . 12. ||La'||≥1
. | . ⊢  ¬mem_f(T;hd(La');L)  by BackThru -3
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. .\
. . 8. ¬mem_f(T;u;L)
. . ⊢   by (Thin 7) THEN (InstConcl [u.v]) THEN (Reduce 0)
. . |
. . 7. ¬mem_f(T;u;L)
. . 8. t : T
. . 9. u = t ∨ mem_f(T;t;v)
. . ⊢  mem_f(T;t;L) ∨ u = t ∨ mem_f(T;t;v)  by ProveProp
END
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