```
nd_comp_extend_wf  THM

⊢  ∀Alph,St:Type, C:NComp(Alph;St), a:Alph, q:St.
|  C+[a;q] ∈ NComp(Alph;St)
| by Unfold ‘nd_computation‘ 0 THEN Unfold ‘nd_comp_extend‘ 0
|    THEN
|    Unfold ‘list_p‘ 0
|
1. Alph : Type
2. St : Type
3. C :
|  {C:{l:((St×Alph*)*)| ||l||>0 }| ∀i:ℕ(||C||-1). ||2of(C[i])||>0 }
4. a : Alph
5. q : St
⊢  (map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>])
|  ∈ {C:{l:((St×Alph*)*)| ||l||>0 }| ∀i:ℕ(||C||-1). ||2of(C[i])||>0 }
| by Analyze
|
|\
| ⊢  (map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>])
| |  ∈ {l:((St×Alph*)*)| ||l||>0 }  by Analyze
| |
| |\
| | ⊢  (map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]) ∈ (St×Alph*)*
| |   by Analyze
| |
| .\
| . .....set predicate .....
| . ⊢  ||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||>0
| . | by RWH
| . |    (LemmaC
| . |     Thm* ∀as,bs:T*. ||as @ bs|| = ||as||+||bs||
| . |     {length_append})
| . |    0
| . |
| . ⊢  ||map(λc.<1of(c),a.2of(c)>;C)||+||[<q,nil>]||>0  by Reduce 0
|
.\
. 6. i : ℕ(||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||-1)
. ⊢  ||2of((map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>])[i])||>0
. | by Analyze 6
. |
. 6. i : ℤ
. 7. 0 ≤ i < ||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||-1
. ⊢
. | by RWH
. |    (LemmaC
. |     Thm* ∀as,bs:T*. ||as @ bs|| = ||as||+||bs||
. |     {length_append})
. |    7
. |
. |\
. | 7. 0≤i
. | 8. i<||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||-1
. | ⊢  (i<||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||-1)
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. | |  =
. | |  (i<||map(λc.<1of(c),a.2of(c)>;C)||+||[<q,nil>]||-1)
. | | by Analyze
. | |
. | ⊢  ||map(λc.<1of(c),a.2of(c)>;C) @ [<q,nil>]||-1
. |    =
. |    ||map(λc.<1of(c),a.2of(c)>;C)||+||[<q,nil>]||-1
. |   by RWH
. |      (LemmaC
. |       Thm* ∀as,bs:T*. ||as @ bs|| = ||as||+||bs||
. |       {length_append})
. |      0
. |      THEN
. |      Reduce 0
. |
. .\
. . 7. 0 ≤ i < ||map(λc.<1of(c),a.2of(c)>;C)||+||[<q,nil>]||-1
. . ⊢   by Reduce 7
. . |
. . 7. 0 ≤ i < ||map(λc.<1of(c),a.2of(c)>;C)||+1-1
. . ⊢
. . | by RWH
. . |    (LemmaC
. . |     Thm* ∀as,bs:T*, i:ℕ||as||. (as @ bs)[i] = as[i]
. . |     {select_append_front})
. . |    0
. . |
. . ⊢  ||2of(map(λc.<1of(c),a.2of(c)>;C)[i])||>0
. . | by RWH
. . |    (LemmaC
. . |     Thm* ∀f:(A→B), as:A*, n:ℕ||as||. map(f;as)[n] = f(as[n])
. . |     {map_select})
. . |    0
. . |
. . |\
. . | 7. 0≤i
. . | 8. i<||map(λc.<1of(c),a.2of(c)>;C)||+1-1
. . | ⊢  i<||C||
. . |   by RWH
. . |      (LemmaC
. . |       Thm* ∀f:(A→B), as:A*. ||map(f;as)|| = ||as|| ∈ ℤ
. . |       {map_length})
. . |      8
. . |
. . .\
. . . ⊢  ||2of((λc.<1of(c),a.2of(c)>)(C[i]))||>0  by Reduce 0
. . . |

. . . ⊢  ||2of(C[i])||+1>0  by Auto
END
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