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ma-single-effect0_wf  THM

⊢  ∀x:Id, k:Knd, A,T:Type, f:(A→T→A).
|  ma-single-effect0(x;A;k;T;f) ∈ MsgA
| by Auto THEN Unfold ‘ma-single-effect0‘ 0 THEN Analyze
|    THEN
|    Try (Complete Auto)
|
.....subterm .....
1. x : Id
2. k : Knd
3. A : Type
4. T : Type
5. f : A→T→A
⊢  (λs,v. f(s(x),v))
|  ∈ State(x : A)→ma-valtype(k : T; k)→x : A(x)?Void
| by Analyze THENL [Analyze THENL [Id;Auto];Auto]
|
.....subterm .....
1. x : Id
2. k : Knd
3. A : Type
4. T : Type
5. f : A→T→A
6. s : State(x : A)
7. v : ma-valtype(k : T; k)
⊢  f(s(x),v) ∈ x : A(x)?Void
| by GenConcl (s(x) = z) THEN Try (Complete Auto)
|
|\
| .....wf .....
| 1. x : Id
| 2. k : Knd
| 3. A : Type
| 4. T : Type
| 5. A→T→A
| 6. s : State(x : A)
| 7. ma-valtype(k : T; k)
| ⊢  s(x) ∈ A  by Unfold ‘ma-state‘ -2 THEN DoSubsume
| |
| |\
| | 1. x : Id
| | 2. k : Knd
| | 3. A : Type
| | 4. T : Type
| | 5. A→T→A
| | 6. s : x@0:Id→x : A(x@0)?Top
| | 7. ma-valtype(k : T; k)
| | ⊢  s(x) ∈ x : A(x)?Top  by Auto
| |
| .\
| . .....subtype_rel .....
| . 1. x : Id
| . 2. k : Knd
| . 3. A : Type
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| . 4. T : Type
| . 5. A→T→A
| . 6. x@0:Id→x : A(x@0)?Top
| . 7. ma-valtype(k : T; k)
| . ⊢  x : A(x)?Top ⊆r A  by Reduce 0
|
.\
. 1. x : Id
. 2. k : Knd
. 3. A : Type
. 4. T : Type
. 5. f : A→T→A
. 6. s : State(x : A)
. 7. v : ma-valtype(k : T; k)
. 8. z : A
. 9. s(x) = z
. ⊢  f(z,v) ∈ x : A(x)?Void  by Assert (v ∈ T)
. |
. .....assertion .....
. 1. x : Id
. 2. k : Knd
. 3. A : Type
. 4. T : Type
. 5. A→T→A
. 6. s : State(x : A)
. 7. v : ma-valtype(k : T; k)
. 8. z : A
. 9. s(x) = z
. ⊢  v ∈ T  by DoSubsume THEN SubtypeRelEq
. |
. .....equality .....
. 1. x : Id
. 2. k : Knd
. 3. A : Type
. 4. T : Type
. 5. A→T→A
. 6. s : State(x : A)
. 7. ma-valtype(k : T; k)
. 8. z : A
. 9. s(x) = z
. ⊢  ma-valtype(k : T; k) = T
.   by Repeat
.      (Unfolds [‘ma-valtype‘;‘kindcase‘;‘islocal‘;‘actof‘] 0
.       THEN
.       Reduce 0)
END
```