$[PERSON]$

$[TOPIC]$

ProjectAlloc

$studInterests, lecInterests : PERSON \pfun \operatorname{iseq} TOPIC$

$allocation : PERSON \pfun PERSON$

$maxPlaces : PERSON \pfun \mathbb{N}$

$\operatorname{dom} studInterests \cap \operatorname{dom} lecInterests = \{\}$

$\operatorname{dom} allocation \subseteq \operatorname{dom} studInterests$

$\operatorname{ran} allocation \subseteq \operatorname{dom} lecInterests$

$\operatorname{dom} maxPlaces = \operatorname{dom} lecInterests$

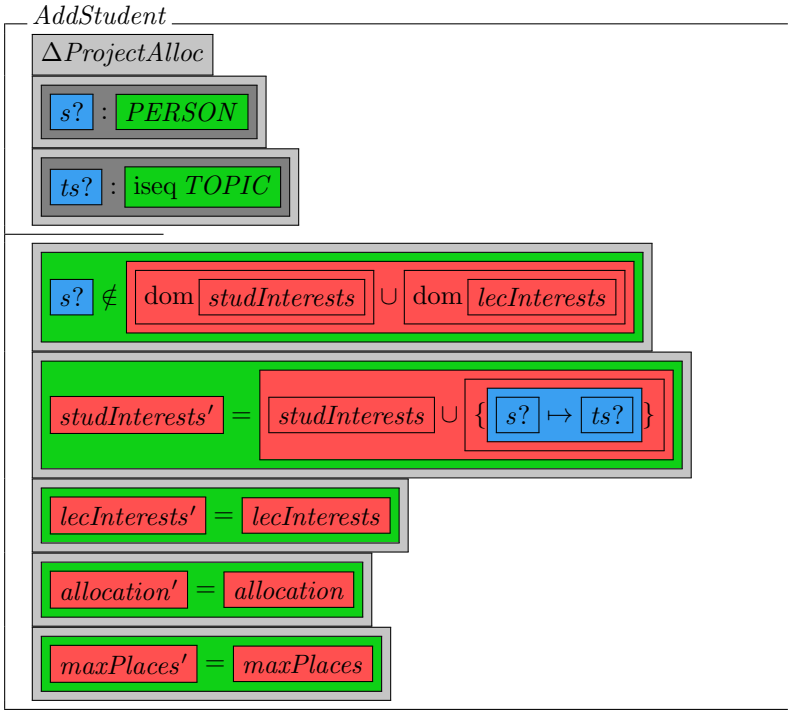
$\forall lec : \operatorname{dom} maxPlaces \bullet \#(allocation \rhd \{lec\}) \leq maxPlaces\ lec$

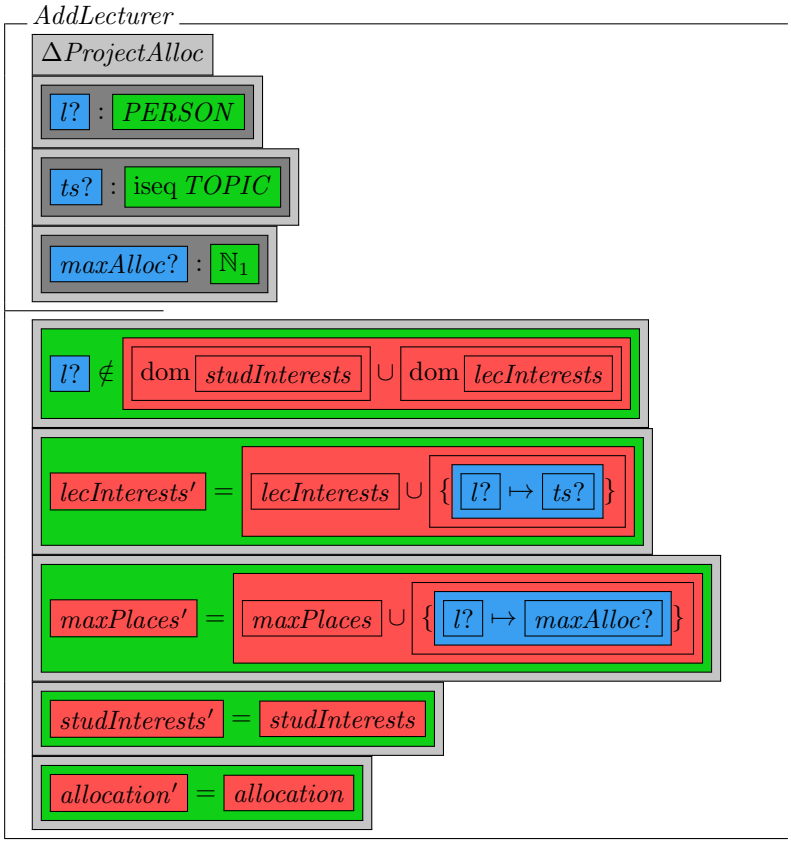
InitProjectAlloc

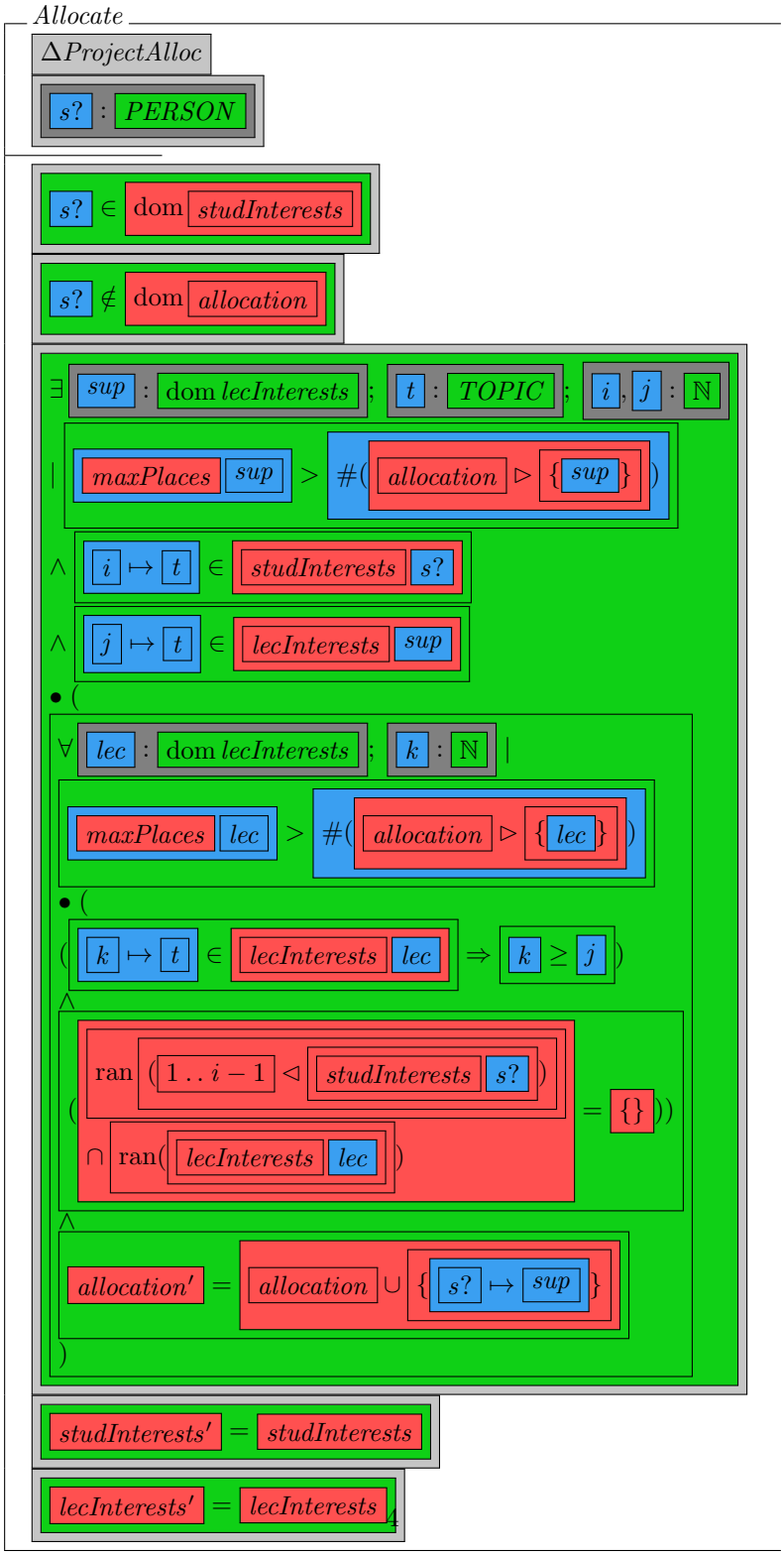
ProjectAlloc

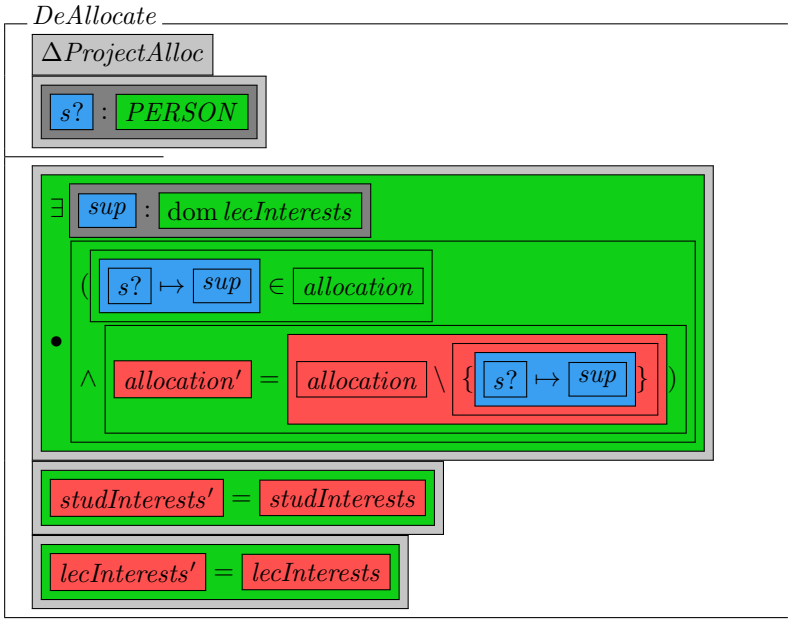
$lecInterests' = \{\}$

$studInterests' = \{\}$


AddStudent
ΔProjectAlloc
s? : PERSON
ts? : iseq TOPIC
s? ∉ dom studInterests ∪ dom lecInterests
studInterests′ = studInterests ∪ { s? ↦ ts? }
lecInterests′ = lecInterests
allocation′ = allocation
maxPlaces′ = maxPlaces


AddLecturer
ΔProjectAlloc
l? : PERSON
ts? : iseq TOPIC
maxAlloc? : ℕ1
l? ∉ dom studInterests ∪ dom lecInterests
lecInterests′ = lecInterests ∪ { l? ↦ ts? }
maxPlaces′ = maxPlaces ∪ { l? ↦ maxAlloc? }
studInterests′ = studInterests
allocation′ = allocation


Allocate
ΔProjectAlloc
s? : PERSON
s? ∈ dom studInterests
s? ∉ dom allocation
∃ sup : dom lecInterests ; t : TOPIC ; i , j : ℕ
| maxPlaces sup > #(allocation ▷ { sup })
∧ i ↦ t ∈ studInterests s?
∧ j ↦ t ∈ lecInterests sup
• (
∀ lec : dom lecInterests ; k : ℕ |
maxPlaces lec > #(allocation ▷ { lec })
• (
(k ↦ t ∈ lecInterests lec ⇒ k ≥ j)
∧
(ran (1 . . i − 1 ◁ studInterests s?)
∩ ran(lecInterests lec) = {}))
∧
allocation′ = allocation ∪ { s? ↦ sup }
)
studInterests′ = studInterests
lecInterests′ = lecInterests


DeAllocate
ΔProjectAlloc
s? : PERSON
∃ sup : dom lecInterests
(s? ↦ sup ∈ allocation
•
∧ allocation′ = allocation \ { s? ↦ sup })
studInterests′ = studInterests
lecInterests′ = lecInterests

RemoveLecsTopic

$\Delta ProjectAlloc$

$l? : PERSON$

$t? : TOPIC$

$l? \in \mathrm{dom}\ lecInterests$

$t? \in \mathrm{ran}(lecInterests\ l?)$

$lecInterests' =$

$lecInterests \oplus \{l? \mapsto squash(lecInterests\ l? \rhd \{t?\})\}$

$studInterests' = studInterests$

$allocation' = allocation$

LecsAvailable

$\Xi ProjectAlloc$

$t? : TOPIC$

$ps! : \mathbb{P}\ PERSON$

$ps! =$

$\{p : \mathrm{dom}\ lecInterests \mid t? \in \mathrm{ran}(lecInterests\ p)$

$\wedge\ maxPlaces\ p > \#(allocation \rhd \{p\})\}$

$$MESSAGE ::= success \mid isStudent \mid isLecturer \mid notStudent \mid isAllocated \mid noLecAvailable \mid notAllocated \mid notLecturer \mid notListedTopic$$

$$SuccessMessage \mathrel{\widehat=} [\, outcome! : MESSAGE \mid outcome! = success \,]$$

IsStudent

$$\Xi ProjectAlloc$$
$$s? : PERSON$$
$$outcome! : MESSAGE$$

$$s? \in \mathrm{dom}\ studInterests$$
$$outcome! = isStudent$$

IsLecturer

$$\Xi ProjectAlloc$$
$$s? : PERSON$$
$$outcome! : MESSAGE$$

$$s? \in \mathrm{dom}\ lecInterests$$
$$outcome! = isLecturer$$

NotStudent

$\Xi ProjectAlloc$

$s? : PERSON$

$outcome! : MESSAGE$

$s? \notin \mathrm{dom}\ studInterests$

$outcome! = notStudent$

IsAllocated

$\Xi ProjectAlloc$

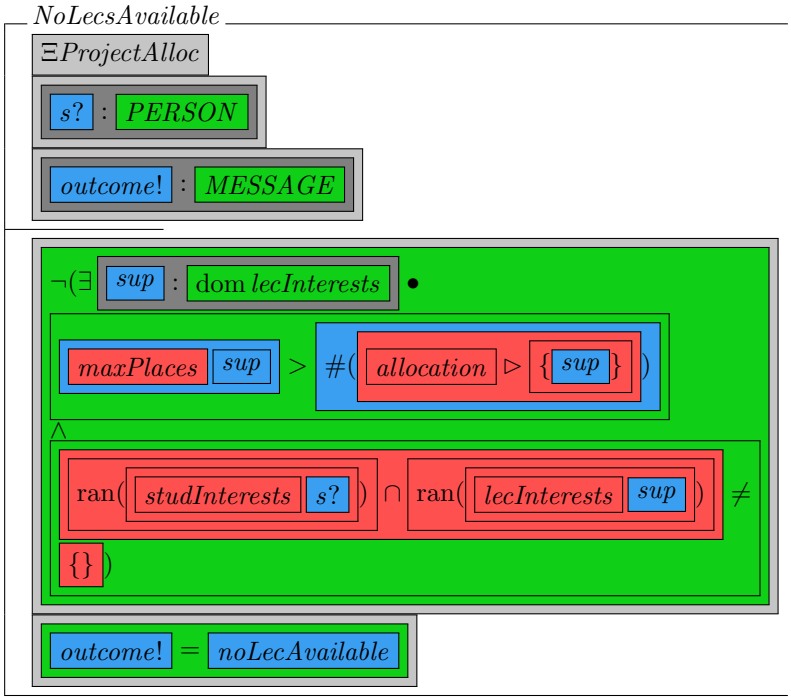
$s? : PERSON$

$outcome! : MESSAGE$

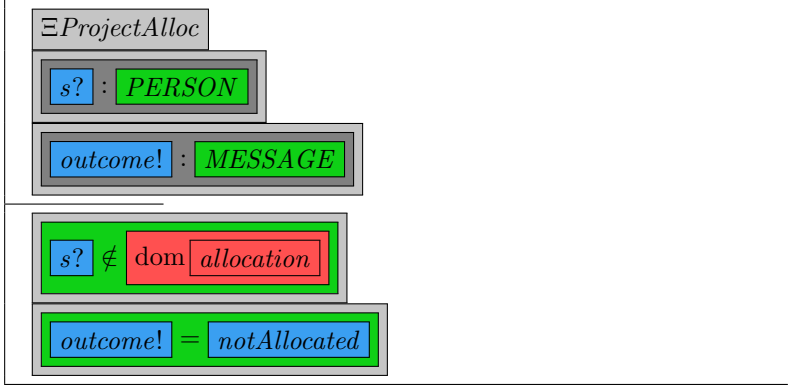
$s? \notin \mathrm{dom}\ allocation$

$outcome! = isAllocated$

NoLecsAvailable



NotAllocated



NoLecturer

$\Xi ProjectAlloc$

$l? : PERSON$

$outcome! : MESSAGE$

$l? \notin \mathrm{dom}\ lecInterests$

$outcome! = notLecturer$

NotListedTopic

$\Xi ProjectAlloc$

$l? : PERSON$

$t? : TOPIC$

$outcome! : MESSAGE$

$t? \notin \mathrm{ran}(lecInterests\ l?)$

$outcome! = notListedTopic$

SupsDiffer

$\Delta ProjectAlloc$

$s? : PERSON$

$\exists\ old, new : \mathrm{dom}\ lecInterests \bullet$

$(s? \mapsto old \in allocation \land$

$s? \mapsto new \in allocation' \land$

$old \neq new)$