1 Jinja VCG Completeness

theory *JBC-VCG-Completeness* = *JBC-succsFprogress*:

constdefs *branch* :: *jbc-prog* ⇒ (*jbc-state* × *jbc-state*) *set*
branch Π ≡ {(*s*,*s'*). ∃ *B*. (*fst s'*,*B*) ∈ *set* (*succsTyF* Π (*fst s*)) ∧ Π,*s* ⊨ *B*}

constdefs *effS*$_B$:: *jbc-prog* ⇒ (*jbc-state* × *jbc-state*) *set*
effS$_B$ Π ≡ (*effS* Π) ∩ (*branch* Π)

constdefs *Starters*::*jbc-prog* ⇒ *jbc-state set*
Starters Π ≡ {*s*. Π,*s* ⊨ *initF* Π ∨ (∃ *A*. *anF* Π (*fst s*) = *Some A* ∧ Π,*s* ⊨ *A* ∧ Π,*s* ⊨ *safeF* Π (*fst s*))}

constdefs *strongAn*::*jbc-prog* ⇒ *bool*
strongAn Π ≡ (∀ *s* ∈ *ReachableFrom* (*effS*$_B$ Π) (*Starters* Π). Π,*s* ⊨ *aF* Π (*fst s*) ∧ Π,*s* ⊨ *safeF* Π (*fst s*))

theorem *succsTyFprogress*:
assumes *wf-Pi*: *wf* Π
assumes *p-B*: Π,(*p*,*m*,*e*) ⊨ *B*
assumes *p'-B-succsTyF*: (*p'*,*B*) ∈ *set* (*succsTyF* Π *p''*)
shows *p* = *p''* ∧ (∃ *m' e'*. ((*p*, *m*,*e*), (*p'*, *m'*,*e'*)) ∈ *effS* Π)

lemma *succsTyF-wpFcomplete*:
assumes *wf-Pi*: *wf* Π
assumes *p'-B-succsTyF*: (*p'*,*B*) ∈ *set* (*succsTyF* Π *p*)
assumes *p-B*: Π,(*p*,σ,*e*) ⊨ *B*
assumes *p-p'-effS*: ((*p*,σ,*e*),(*p'*,σ',*e'*)) ∈ *effS* Π
assumes *p'-Q*: Π,(*p'*,σ',*e'*) ⊨ *Q*
shows Π,(*p*,σ,*e*) ⊨ *wpF* Π *p p' Q*

lemma *succsTyF-domC*:
⟦ *wf* Π; (*p'*,*B*) ∈ *set* (*succsTyF* Π *p*) ⟧ ⟹ (*p* ∈ *set* (*domC* Π) ∧ *p'* ∈ *set* (*domC* Π))
lemma *paths-upg-succsF*:
paths (*upg invF sucF* Π) = *paths* (*sucF* Π)
lemma *CFG-axioms-succsTyF*:
CFG-axioms anF succsTyF JBC-VCG.wf
theorem *completeVCG-Ins-Ty*:
completeVCG effS TT FF And Imp valid domC ipc anF succsTyF wf initF wpF

theorem *vcgTy-tautology*:
$[\![\mathit{wf}\ \Pi;\ \mathit{strongAn}\ \Pi\ ]\!] \Longrightarrow \forall\ s.\ \Pi,s \models \mathit{vcgTy}\ \Pi$
theorem *vcgTy-completeness*:
$[\![\mathit{wf}\ \Pi;\ \mathit{strongAn}\ \Pi\ ]\!] \Longrightarrow \Pi \vdash \mathit{vcgTy}\ \Pi$
end