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