Z part FMSE (IA164) examination autumn 2008

1. (a)

$[PROJ, TASK, EMP]$
$MESSAGE ::= ok \mid ko$

$maxtask : \mathbb{N}_1$

ProjMan

$projects : \mathbb{P}\ PROJ$
$emps : \mathbb{P}\ EMP$
$part : TASK \pfun PROJ$
$assign : EMP \pfun \operatorname{iseq} TASK$

$\operatorname{ran} part \subseteq projects$
$\operatorname{dom} assign = emps$
$\forall e : \operatorname{dom} assign \bullet \operatorname{ran}(assign\ e) \subseteq \operatorname{dom} part$
$\forall e, e' : \operatorname{dom} assign \bullet e \neq e' \Rightarrow$
$\quad \operatorname{ran}(assign\ e) \cap \operatorname{ran}(assign\ e') = \varnothing$
$\forall e : \operatorname{dom} assign \bullet \#(assign\ e) \leq maxtask$

Init

$ProjMan$

$projects = \varnothing$
$emps = emptyset$

(b)

AssignOK

$\Delta ProjMan$
$p? : PROJ$
$t? : TASK$
$e? : EMP$
$m! : MESSAGE$

$p? \in projects$
$t? \notin \operatorname{dom} part$
$e? \in emps$
$\#ran(assign\ e) < maxtask$
$emps' = emps$
$projects' = projects$
$part' = part \cup \{(t?, p?)\}$
$assign' = assign \oplus \{(e?, assign(e?) \frown \langle t? \rangle)\}$
$m! = ok$

AssignKO

$\Xi ProjMan$
$p? : PROJ$
$t? : TASK$
$e? : EMP$
$m! : MESSAGE$

$p? \notin projects \lor e? \notin emps \lor t? \in \operatorname{dom} part \lor$
$\quad \# \operatorname{ran}(assign\ e?) = maxtask$
$m! = ko$

$Assign \mathrel{\widehat=} AssignOK \lor AssignKO$

(c)

Finish

$\Delta ProjMan$
$e? : EMP$

$e? \in \operatorname{dom} assign \land assign(e?) \neq \varnothing$
$emps' = emps$
$projects' = projects$
$part' = part \setminus \{(head(assign(e?)), part(head(assign(e?))))\}$
$assign' = assign \oplus \{(e?, tail(assign(e?)))\}$

The precondition here is $e? \in \operatorname{dom} assign \land assign(e?) \neq \varnothing$.

(d)

Who

$\Xi ProjMan$
$p? : PROJ$
$ee! : \mathbb{P}\ EMP$

$ee! = \{e : EMP \mid \exists\, t : \operatorname{ran}(assign\ e) \bullet part\ t = p?\}$