B Broadcast Distributed Manager Protocol: Second Model

In the second model handlers and servers always synchronize before terminating their operations. A possible specification of this behaviour is specified as follows.

Initial States

$init \longrightarrow initp(i,p) \ : \ true$
$init_p(i,p) \longrightarrow init_i(i,p) \mid init_p(i,p') \ : \ p' > p$
$init_p(i,p) \longrightarrow \epsilon \ : \ true$
$init_i(i,p) \longrightarrow pt(i,p,o,a) \mid init_i(i',p) \ : \ i' > i, \ o = \neg\mathbf{own}, \ a = \mathbf{nil}$
$init_i(i,p) \longrightarrow pt(i,p,o,a) \ : \ o = \mathbf{own}, \ a = \mathbf{rd}$

Detection of Read and Write Faults

$\epsilon \longrightarrow rf(i,p) \ : \ true$
$\epsilon \longrightarrow wf(i,p) \ : \ true$

Read Fault

$rf(i,p) \mid pt(j,q,o,a) \mid pt(k,r,s,b) \longrightarrow pt(j,q,o,a') \mid pt(k,r,s,b') \ :$
$\quad i = j, \ i \neq k, \ p = q, \ p = r, \ o = \neg\mathbf{own}, \ a = \mathbf{nil}, \ a' = \mathbf{rd}, \ s = \mathbf{own}, \ b' = \mathbf{rd}$

Write Miss on the Owner Processor

$wf(i,p) \mid pt(j,q,o,a) \longrightarrow pt(j,q,o,a')$
$\quad [\ pt(k,r,s,b) \hookrightarrow pt(k,r,s,b')\ ] \ :$
$\quad\quad i = j, \ p = q, \ o = \mathbf{own}, \ a = \mathbf{rd}, \ a' = \mathbf{wrt}, \ k \neq i, \ p = r, \ b = \mathbf{rd}, \ b' = \mathbf{nil}$

Write Miss

$wf(i,p) \mid pt(j,q,o,a) \mid pt(z,v,u,c) \longrightarrow pt(j,q,o',a') \mid pt(z,v,u',c')$
$\quad [\ pt(k,r,s,b) \hookrightarrow pt(k,r,s,b')\ ] \ :$
$\quad\quad i = j, \ p = q, \ p = v, \ o = \neg\mathbf{own}, \ a = \mathbf{rd}(\mathbf{nil}), \ a' = \mathbf{wrt}, \ z \neq i, \ u = \mathbf{own},$
$\quad\quad u' = \neg\mathbf{own}, \ c' = \mathbf{nil}, k \neq i, \ p = r, \ b = \mathbf{rd}, \ b' = \mathbf{nil} \ , o' = \mathbf{own}$

C Proofs of Lemma 2 and Lemma 2

Constrained configurations in $\mathscr{A}$ can be represented as multigraphs where nodes are labelled with *propositional symbols* taken from the given (finite) set $\mathscr{P}$. For instance, consider the two constrained multisets

$$\mathcal{M} : \varphi \equiv p(x,y)|p(u,v)|q(w,z) : (x = u \wedge u > w) \wedge (z > v)$$
$$\mathcal{N} : \psi \equiv p(x',y')|p(u',v')|q(w',z')|r(z'') : (x' = u' \wedge u' > w') \wedge (y' > z' \wedge z' > v')$$

with p, q, r being predicate symbols and $x, y, z, \ldots$ variables. The corresponding multigraphs, drawn below, have $2n$ (here $n = 2$) different kinds of edges between nodes, corresponding to $=$ and $>$ constraints between variables, indexed w.r.t. argument positions.