

HCSP processes for WLCS

$WLCS ::= WaterTank \parallel Controller$

-----Water Tank-----

$WaterTank ::= Plant *$

$Plant ::= \langle \dot{h} = v.Q_{\max} - (\pi.r^2).\sqrt{2.g.h.u} \ \& \ (h > 30 \text{ and } h < 60) \rangle \triangleright Plant2Con!h; Con2Plant?v$

$Controller ::= Control *$

$Control ::= get_data \parallel Conn \parallel com_cmd$

-----Thread get_data-----

- Parameters: (Period=100ms; deadline =25ms, BCET = 25ms, WCET 25ms)
- Prefix “g” is added to every process and channel name for clarification

$get_data(100, deadline, bcet, wcet) ::= gACT* \parallel gDIS* \parallel gCOM *$

$gACT ::= gactive!complete$

$gDIS ::= gactive?acomp; wait \ 100; gdispatch!dis; gcomplete?rcomp$

$gCOM ::= (c := 0; t := 0; dispatch?x;$
 $gReady \parallel gRunning \parallel gAwaitResource$

$gReady ::= \langle t = 1 \ \& \ t < 25 \rangle \triangleright (gexecute!t \rightarrow (gunblock?t[]gcomp?x)); t = 25 \rightarrow gACT$

$gRunning ::= gexecute?ct; \langle c = 1, ct = 1 \ \& \ c \leq 25 \wedge ct \leq 25 \rangle \triangleright$
 $(gblock!ct[]gcomp!done; gcomplete!done \rightarrow c < 25 \rightarrow wait(25 - c); StC!done);$
 $c = 25 \vee ct = 25 \rightarrow gACT$

$gAwaitResource ::= gblock?act; \langle ct = 1 \ \& \ act \leq deadline \rangle \triangleright gunblock!act; act = 25 \rightarrow ACT$

-----Immediate connection-----

$Conn ::= StC ? x; com_cmd_idp = get_data_odp; CtD!dispatch$

-----Thread com_cmd-----

- Parameters: (**Period**=100ms; deadline =30ms, BCET = 30ms, WCET 30ms)
- Prefix “c” is added to every process and channel name for clarification

$com_cmd(100, deadline, bcet, wcet) ::= cACT* \parallel cDIS* \parallel cCOM*$

$cACT ::= cactive!complete$

$cDIS ::= cactive?acom; wait\ 100; cdispatch!dis; ccomplete?rcomp$

$cCOM ::= (c := 0; t := 0; dispatch?x;$
 $\quad cReady \parallel cRunning \parallel cAwait\ Re\ source$

$cReady ::= < t = 1 \ \& \ t < 30 > \triangleright (cexecute!t \rightarrow (cunblock?t[]ccomp?x)); t = 30 \rightarrow gACT$

$cRunning ::= cexecute?ct; < c = 1, ct = 1 \ \& \ c \leq 30 \wedge ct \leq 30 > \triangleright$
 $(cblock!ct[]ccomp!done; ccomplete!done \rightarrow c < 30 \rightarrow wait(30 - c); StC!done);$
 $c = 25 \vee ct = 25 \rightarrow cACT$

$cAwait\ Re\ source ::= cblock?act; < a \ ct = 1 \ \& \ act \leq deadline > \triangleright cunblock!act; act = 30 \rightarrow ACT$