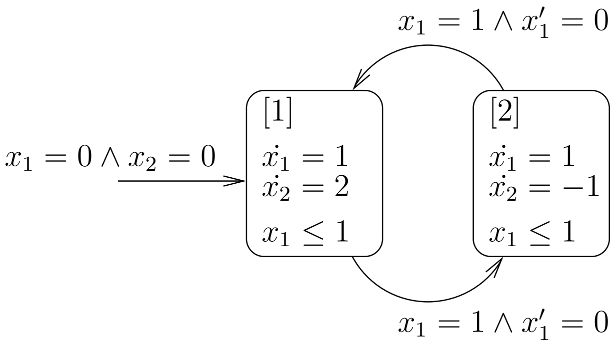
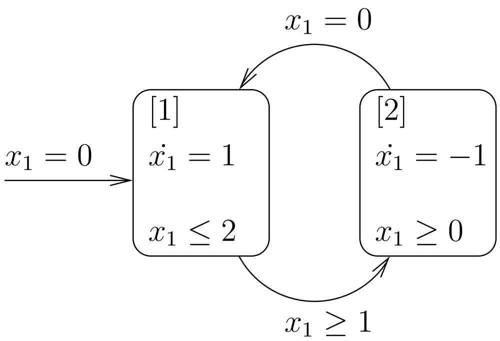
Systèmes hybrides

Exemple 1



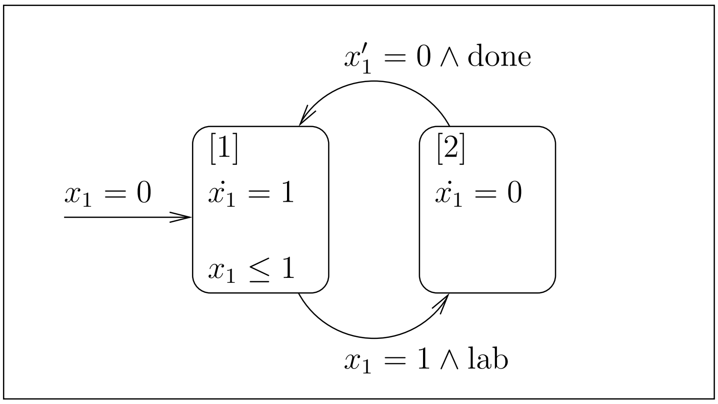
	$\rightarrow$	[1]	$x_1 = 0$	$\wedge$	$x_2 = 0$
time	$\rightarrow$	[1]	$0 \leq x_1 \leq 1$	$\wedge$	$x_2 = 2x_1$
$x_1 = 1$	$\rightarrow$	[2]	$x_1 = 0$	$\wedge$	$x_2 = 2$
time	$\rightarrow$	[2]	$0 \leq x_1 \leq 1$	$\wedge$	$x_2 = 2 - x_1$
$x_1 = 1$	$\rightarrow$	[2]	$x_1 = 0$	$\wedge$	$x_2 = 1$
			$\ldots$		

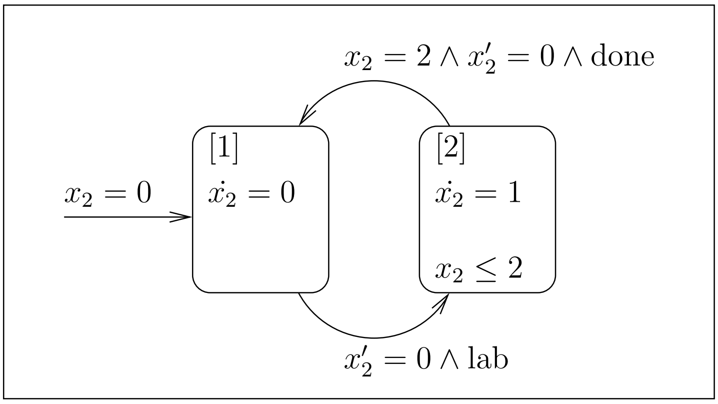
Exemple 2



	$\rightarrow$	[1]	$x_1 = 0$
time	$\rightarrow$	[1]	$0 \leq x_1 \leq 2$
$1 \leq x_1 \leq 2$	$\rightarrow$	[2]	$1 \leq x_1 \leq 2$
time	$\rightarrow$	[2]	$0 \leq x_1 \leq 2$
$x_1 = 0$	$\rightarrow$	[1]	$x_1 = 0$

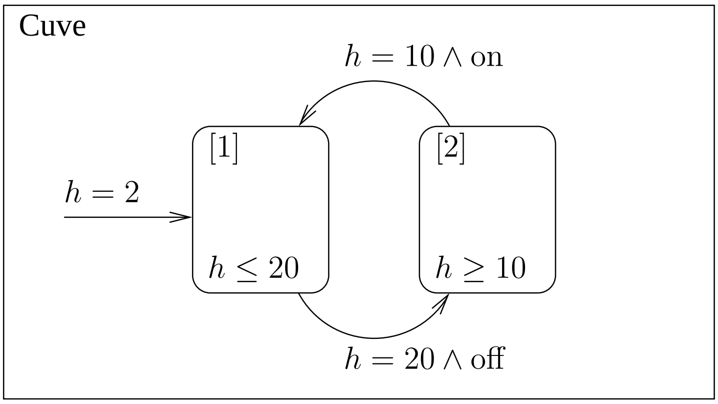
Exemple 3

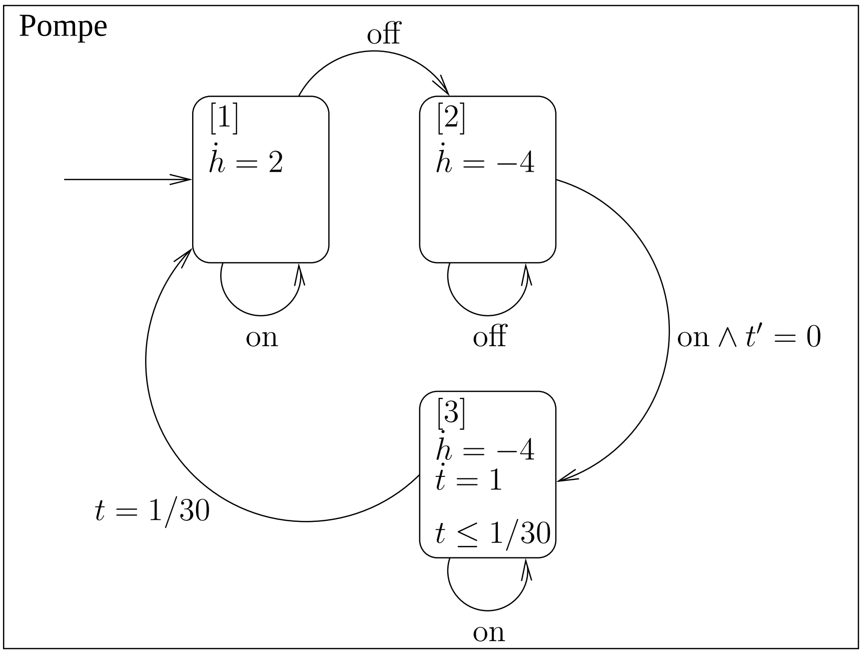




$$\begin{array}{llllll}
 & \rightarrow & [1][1] & x_1 = 0 & \wedge & x_2 = 0 \\
\mathrm{time} & \rightarrow & [1][1] & 0 \leq x_1 \leq 1 & \wedge & x_2 = 0 \\
\mathrm{lab} & \rightarrow & [2][2] & x_1 = 1 & \wedge & x_2 = 0 \\
\mathrm{time} & \rightarrow & [2][2] & x_1 = 1 & \wedge & 0 \leq x_2 \leq 2 \\
\mathrm{done} & \rightarrow & [1][1] & x_1 = 0 & \wedge & x_2 = 0
\end{array}$$

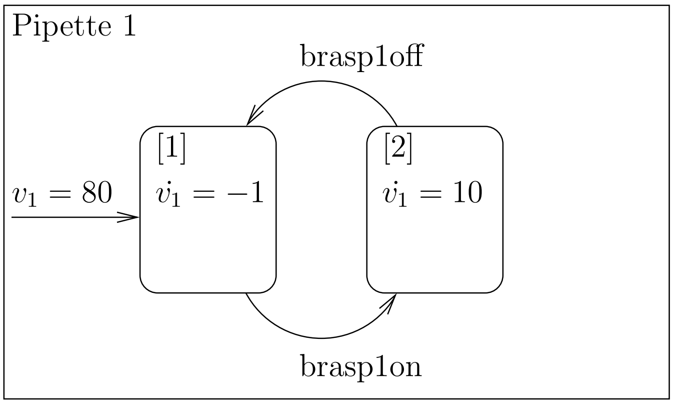
Exercice 2.1

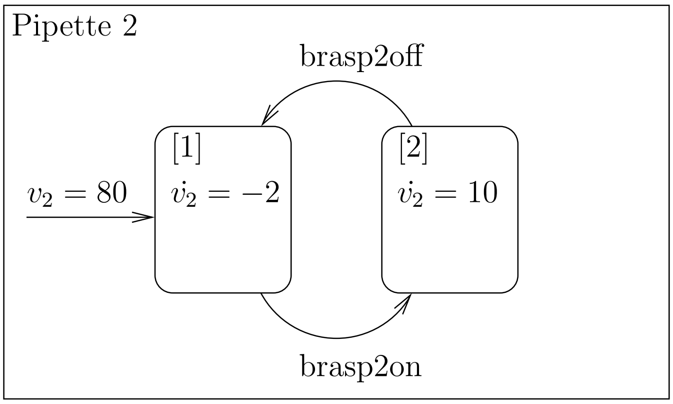


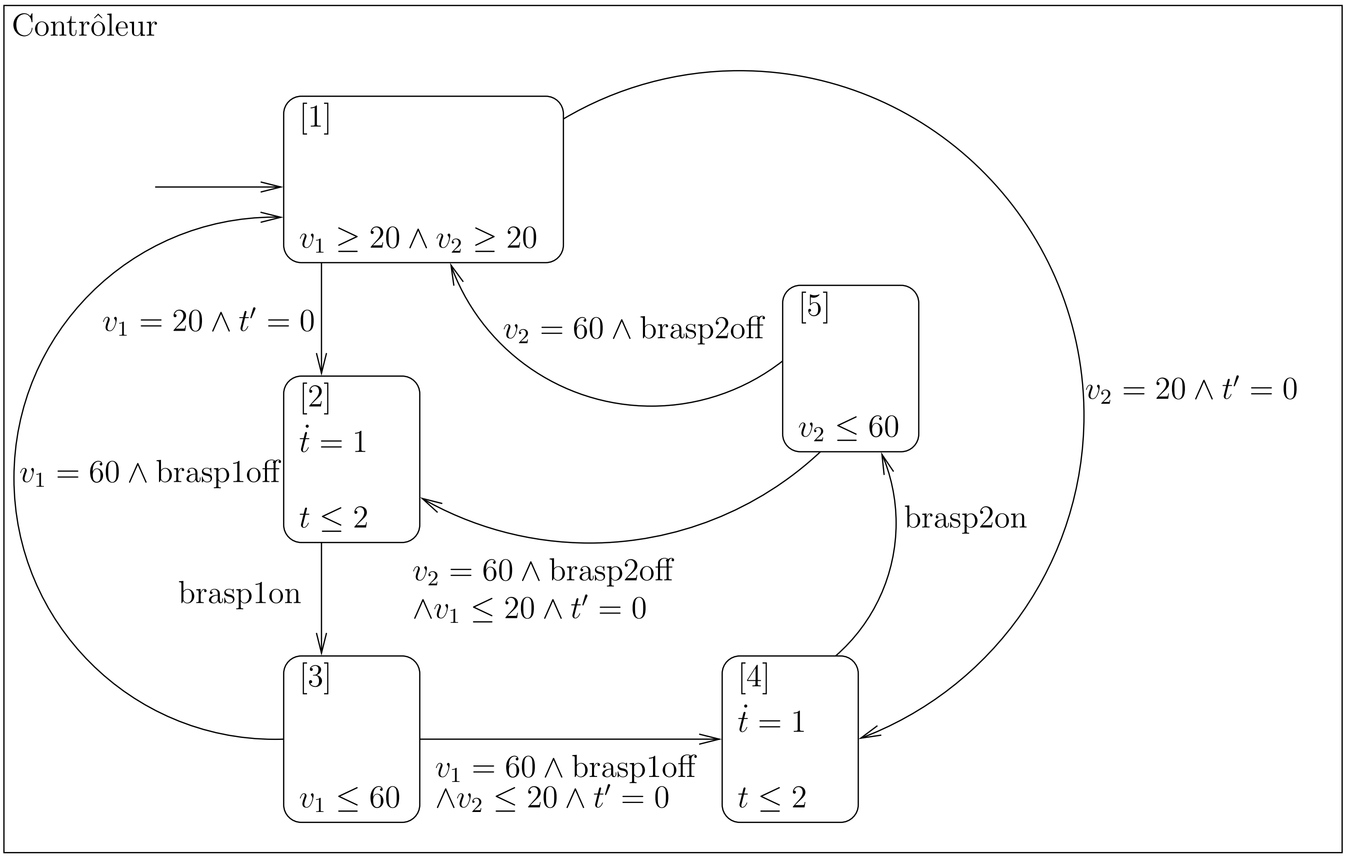


	$\rightarrow$	[1][1]	$h = 2$	$\wedge$	$t \in R$
time	$\rightarrow$	[1][1]	$2 \leq h \leq 20$	$\wedge$	$t \in R$
off	$\rightarrow$	[2][2]	$h = 20$	$\wedge$	$t \in R$
time	$\rightarrow$	[2][2]	$10 \leq h \leq 20$	$\wedge$	$t \in R$
on	$\rightarrow$	[1][3]	$h = 10$	$\wedge$	$t = 0$
time	$\rightarrow$	[1][3]	$h = 10 - 4t$	$\wedge$	$0 \leq t \leq \frac{1}{30}$
$t = \frac{1}{30}$	$\rightarrow$	[1][1]	$h = \frac{148}{15}$	$\wedge$	$t = \frac{1}{30}$
time	$\rightarrow$	[1][1]	$\frac{148}{15} \leq h \leq 20$	$\wedge$	$t = \frac{1}{30}$
			$\cdots$		

Exercice 2.6







	$\rightarrow$	[1][1][1]	$v_1 = 80$	$\wedge$	$v_2 = 80$	$\wedge$	$t \in R$		
time	$\rightarrow$	[1][1][1]	$v_1 = 80 - \lambda$	$\wedge$	$v_2 = 80 - 2\lambda$	$\wedge$	$t \in R$	$\wedge$	$0 \leq \lambda \leq 30$
$v_2 = 20$	$\rightarrow$	[1][1][4]	$v_1 = 50$	$\wedge$	$v_2 = 20$	$\wedge$	$t = 0$		
time	$\rightarrow$	[1][1][4]	$v_1 = 50 - t$	$\wedge$	$v_2 = 20 - 2t$	$\wedge$	$0 \leq t \leq 2$		
bras-p2-on	$\rightarrow$	[1][2][5]	$v_1 = 50 - t$	$\wedge$	$v_2 = 20 - 2t$	$\wedge$	$0 \leq t \leq 2$		
time	$\rightarrow$	[1][2][5]	$v_1 = 50 - t - \lambda$	$\wedge$	$v2 = 20 - 2t + 10\lambda$	$\wedge$	$0 \leq t \leq 2$	$\wedge$	$20 - 2t + 10\lambda \leq 60$
				$\ldots$					

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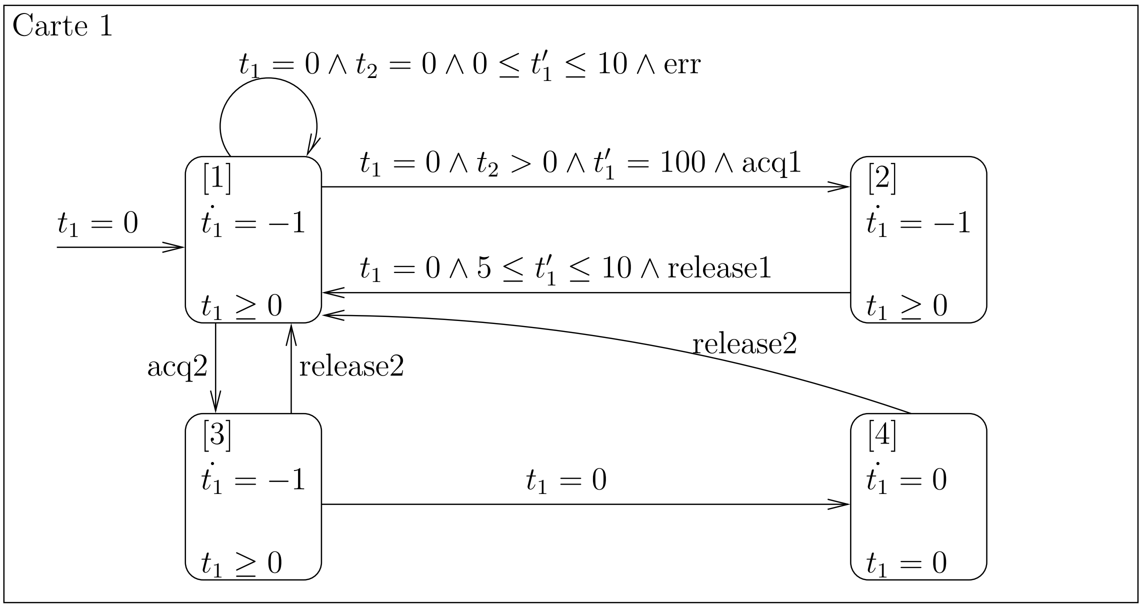
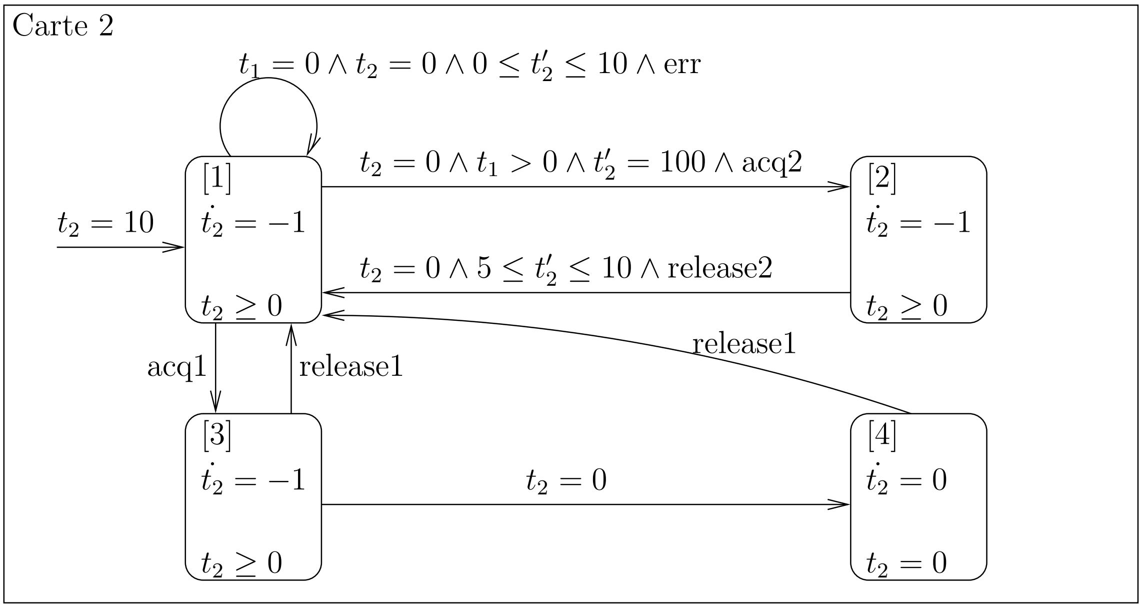


Carte 1
$t_1 = 0 \wedge t_2 = 0 \wedge 0 \leq t_1' \leq 10 \wedge \mathrm{err}$
[1]
$\dot{t_1} = -1$
$t_1 \geq 0$
$t_1 = 0 \wedge t_2 > 0 \wedge t_1' = 100 \wedge \mathrm{acq1}$
[2]
$\dot{t_1} = -1$
$t_1 \geq 0$
$t_1 = 0$
$t_1 = 0 \wedge 5 \leq t_1' \leq 10 \wedge \mathrm{release1}$
release2
acq2
release2
[3]
$\dot{t_1} = -1$
$t_1 \geq 0$
$t_1 = 0$
[4]
$\dot{t_1} = 0$
$t_1 = 0$



Carte 2
$t_1 = 0 \wedge t_2 = 0 \wedge 0 \leq t_2' \leq 10 \wedge \mathrm{err}$
[1]
$\dot{t_2} = -1$
$t_2 \geq 0$
$t_2 = 0 \wedge t_1 > 0 \wedge t_2' = 100 \wedge \mathrm{acq2}$
[2]
$\dot{t_2} = -1$
$t_2 \geq 0$
$t_2 = 10$
$t_2 = 0 \wedge 5 \leq t_2' \leq 10 \wedge \mathrm{release2}$
release1
acq1
release1
[3]
$\dot{t_2} = -1$
$t_2 \geq 0$
$t_2 = 0$
[4]
$\dot{t_2} = 0$
$t_2 = 0$

	$\rightarrow$	[1][1]	$t_1 = 0$	$\wedge$	$t_2 = 10$				
acq1	$\rightarrow$	[2][3]	$t_1 = 100$	$\wedge$	$t_2 = 10$				
time	$\rightarrow$	[2][3]	$t_1 = 100 - \lambda$	$\wedge$	$t_2 = 10$	$\wedge$	$0 \leq \lambda \leq 10$		
$t_2 = 0$	$\rightarrow$	[4][3]	$t_1 = 90$	$\wedge$	$t_2 = 0$				
time	$\rightarrow$	[4][3]	$0 \leq t_1 \leq 90$	$\wedge$	$t_2 = 0$				
release1	$\rightarrow$	[1][1]	$5 \leq t_1 \leq 10$	$\wedge$	$t_2 = 0$				
acq2	$\rightarrow$	[3][2]	$5 \leq t_1 \leq 10$	$\wedge$	$t_2 = 100$				
time	$\rightarrow$	[3][2]	$t_1 \geq 0$	$\wedge$	$t_2 = 100 - \lambda$	$\wedge$	$5 \leq t_1 + \lambda \leq 10$	$\wedge$	$5 \leq \lambda \leq 10$
$t_1 = 0$	$\rightarrow$	[4][2]	$t_1 = 0$	$\wedge$	$90 \leq t_2 \leq 95$				
time	$\rightarrow$	[4][2]	$t_1 = 0$	$\wedge$	$t_2 \leq 95$				
				$\ldots$					