INF4140 Fall term 2012. Inference rules

This document is an attempt to collect the rules you need for the Hoare logic part of part one of the course on one sheet of paper. For explanations of the rules you have to look at the book and at the slides from the lectures. If you find errors please inform me at crystald@ifi.uio.no

Skip

$$\{P\}\texttt{skip}\{P\}$$

Assignment

$$\{P_{x\leftarrow e}\}\texttt{x = e}\{P\}$$

Composition

$$\frac{\{P\}S_1\{Q\} \quad \{Q\}S_2\{R\}}{\{P\}S_1\texttt{;}\ S_2\{R\}}$$

If

$$\frac{\{P \wedge B\}\texttt{S}\{Q\} \quad (P \wedge \neg B) \ \Rightarrow \ Q}{\{P\}\texttt{if (B) S;}\{Q\}}$$

If-then-else

$$\frac{\{P \wedge B\}\texttt{S}\{Q\} \quad \{P \wedge \neg B\}\texttt{T}\{Q\}}{\{P\}\texttt{if B then S else T fi}\{Q\}}$$

While

$$\frac{\{I \wedge B\}\texttt{S}\{I\}}{\{I\}\texttt{while (B) S;}\{I \wedge \neg B\}}$$

Consequence

$$\frac{(P' \ \Rightarrow \ P) \quad \{P\}\texttt{S}\{Q\} \quad (Q \ \Rightarrow \ Q')}{\{P'\}\texttt{S}\{Q'\}}$$

Await

$$\frac{\{P \wedge B\}\texttt{S}\{Q\}}{\{P\}\texttt{< await (B) S >}\{Q\}}$$

Co (parallel execution)

$$\frac{\{P_i\}S_i\{Q_i\} \text{ are interference free (p64)}}{\{P_1 \wedge \ldots \wedge P_n\}\texttt{co}\ S_1\ \texttt{//}\ \ldots\texttt{//}\ S_n\ \texttt{oc}\{Q_1 \wedge \ldots \wedge Q_n\}}$$

Wait(cv) - monitors

$$\{I_{\#cv \leftarrow (\#cv+1)}\}\{\texttt{<\#cv = \#cv + 1>}\}\{I\}\{\texttt{sleep}\}\{I\}$$

Signal(cv) - monitors

$\{((\#cv == 0) \Rightarrow P) \wedge ((\#cv \neq 0) \Rightarrow P_{\#cv \leftarrow (\#cv-1)})\}$`<if (#cv != 0) #cv = #cv - 1>`$\{P\}$

If we know that $\#cv \neq 0$ when signaling, the rule above may be simplified to:

$$\{P_{\#cv \leftarrow (\#cv-1)}\}\texttt{signal(cv)}\{P\}$$