

# Mandatory Exercise

1. Apply the encoding of Higher-order  $\pi$ -calculus into first-order  $\pi$ -calculus to the following expression

$$\bar{a}\langle\bar{b}\langle c\rangle\rangle.c() \mid a(X).(X \mid b(n).\bar{n}\langle\rangle)$$

2. Infer reductions in the encoding corresponding to

$$\bar{a}\langle\bar{b}\langle c\rangle\rangle.c() \mid a(X).(X \mid b(n).\bar{n}\langle\rangle) \longrightarrow c() \mid \bar{b}\langle c\rangle \mid b(n).\bar{n}\langle\rangle \longrightarrow c() \mid \bar{c}\langle\rangle \longrightarrow 0$$

3. Consider a Local Area Higher-order pi:

$$net[host[\bar{a}\langle\bar{b}\langle c\rangle\rangle.c()] \mid host[a(X).(X \mid b(n).\bar{n}\langle\rangle)]]$$

$$\longrightarrow net[host[c()] \mid host[\bar{b}\langle c\rangle \mid b(n).\bar{n}\langle\rangle]]$$

$$\longrightarrow net[host[c()] \mid host[\bar{c}\langle\rangle]] \longrightarrow net[host[0] \mid host[0]]$$

and assume that  $a$  and  $c$  operate at *net* level and  $b$  operates at *host* level. Explain what happens if we apply the encoding of 1. to the process in 3.