Rho-calculus Constructions

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1 Workpaper week 10

The notation of the ρ-Calculus.[**?**]
P,Q ::= **0** Nil
$|x(y).$P Input
$|x\langle\!|P|\!\rangle$ Lift
$|^\ulcorner x^\urcorner$ Drop
$|$P$|$Q Parallel
x,y::= $^\ulcorner P^\urcorner$ Quot

1.1 Numbers

This example could be a way of expressing numbers in ρ - Calculus. Where the number takes place as x or y in the notation. By quoting the last number you get a higher number, and by droping a number you get a lower number, and at 0 you get the process P.

$0 : {}^\ulcorner\mathbf{0}^\urcorner$
$1 : {}^{\ulcorner\ulcorner}\mathbf{0}^\urcorner\langle\!|\mathbf{0}|\!\rangle^\urcorner$
$2 : {}^{\ulcorner\ulcorner}\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|\mathbf{0}|\!\rangle|\!\rangle^\urcorner$
$3 : {}^{\ulcorner\ulcorner}\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|\mathbf{0}|\!\rangle|\!\rangle|\!\rangle^\urcorner$
$4 : {}^{\ulcorner\ulcorner}\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|{}^\ulcorner\mathbf{0}^\urcorner\langle\!|\mathbf{0}|\!\rangle|\!\rangle|\!\rangle|\!\rangle^\urcorner$

1.2 Structure

We can express some of the programming terms in ρ-Calculus, but more has to be discovered.
if a == b then P Can be express in ρ-Calculus as: $a\langle\!|\mathbf{0}|\!\rangle$ $|b(x).$P
We send **0** on channel a and if channel a and channel b is equal then channel

b will get a **0** and execute P.

$P + Q$ Can be express in ρ-Calculus as: $a\langle\!| 0 |\!\rangle$ $|a(x).$P $|a(x).$Q
We can make a determanistic choice between P and Q by sending **0** on channel a and in parralel two channel a tryies both to recive, but only one would succed and would run its procces P or procces Q.

1.3   Yet to be solved

We need to express more programming structures, before we can use the ρ-Calculs to model a blockchain structure or even r-chain. These are a few exampels of what we need to express, and more should follow.

- if a$\neq$ b then P

- if a<b then P

- if a>b then P

- if a==b then P else Q