

Exercise 1 (Expressivity, 11 minutes) Recall that *CCS!* denotes *CCS* with the replication or bang process $!P$. Given a *CCS!* process P , recall that the language generated by P , $L(P)$, is the set of all finite maximal sequences generated from the labeled transitions of P . More precisely,

$$L(P) = \{s \in \mathcal{L}^* \mid \exists Q : P \xRightarrow{s} Q \wedge \forall \alpha \in \mathcal{L} \cup \{\tau\} : Q \not\xrightarrow{\alpha}\}.$$

where \mathcal{L} denote the set of visible actions in *CCS!*.

- Question: The regular set

$$\{a^n \mid n \geq 0\}$$

is generated by one of the following of processes. Which one?

1. The process $!(a.0)$
2. The process $(\nu u)(\bar{u}.0 \mid !(u.a.\bar{u}.0) \mid u.0)$
3. The process $(\nu u)(\bar{u}.0 \mid !(u.a.0) \mid u.0)$