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MODULE *ICenSeq2*

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This module defines the TLA+ representation of the abstract program *ICenSeq2* of Figure 7.7 of the book “A Science of Concurrent Programs” by *Leslie Lamport*. The module is instantiated by the root module *ICenSeq1*.

EXTENDS *Integers*, *Sequences*

CONSTANT *Art*, *NotArt*

VARIABLES *inp*, *aw*, *disp*

*vars*  $\triangleq$   $\langle inp, aw, disp \rangle$

*TypeOKSeq*  $\triangleq$   $\wedge inp \in Art \cup \{NotArt\}$   
 $\wedge disp \in Art \times \{0, 1\}$   
 $\wedge aw \in Seq(Art)$

*InitSeq*  $\triangleq$   $\wedge inp = NotArt$   
 $\wedge aw = \langle \rangle$   
 $\wedge disp \in Art \times \{0, 1\}$

*InpOrNotSeq*  $\triangleq$   $\wedge inp = NotArt$   
 $\wedge inp' \in Art$   
 $\wedge \vee aw' = Append(aw, inp')$   
 $\vee aw' = aw$   
 $\wedge disp' = disp$

*AckSeq*  $\triangleq$   $\wedge inp \in Art$   
 $\wedge inp' = NotArt$   
 $\wedge UNCHANGED \langle aw, disp \rangle$

*DisplaySeq*  $\triangleq$   $\wedge aw \neq \langle \rangle$   
 $\wedge disp' = \langle aw[1], 1 - disp[2] \rangle$   
 $\wedge aw' = Tail(aw)$   
 $\wedge UNCHANGED inp$

*NextSeq2*  $\triangleq$  *InpOrNotSeq*  $\vee$  *AckSeq*  $\vee$  *DisplaySeq*

Although not done in the book, we define a fairness requirement for the *ICenSeq2* program. It is weak fairness of all the actions except the *InpOrNotSeq* action, since we don't want to require that the artist keep submitting works of art.

*FairnessSeq2*  $\triangleq$   $WF_{vars}(AckSeq \vee DisplaySeq)$

*ICenSeq2*  $\triangleq$  *InitSeq*  $\wedge \Box[NextSeq2]_{vars} \wedge FairnessSeq2$

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