MODULE *Time*

EXTENDS *Naturals*

VARIABLES min, hr Declare hour and minute as our state variables

Some type definitions

$Hours \triangleq 1 \,..\, 12$

$Minutes \triangleq 0 \,..\, 59$

$time \triangleq \langle hr, min \rangle$ time is a pair of hour and minute
we can use this definition in several ways

$TimeType \triangleq$
$\quad \land hr \in Hours$
$\quad \land min \in Minutes$

$minuteTick \triangleq min' = (min + 1)\%60$

$HourTick \triangleq hr' = (hr\%12) + 1$

The CASE structure is just a multi-way if. Rather like those found in C and java

Each 'case' starts with a predicate followed by an arrow $\rightarrow$ The formula between the arrow and box $\Box$ is evaluated and is the value of the case expression

$Tick \triangleq$ CASE
$\quad min = 59 \rightarrow minuteTick \land HourTick\Box$
$\quad$ OTHER $\rightarrow minuteTick \quad \land$ UNCHANGED hr

$Initial \triangleq$ Pick some non-deterministic starting point
$\quad \land hr \quad \in Hours$
$\quad \land min \in Minutes$

$Clock \triangleq Initial \land \Box[Tick]_{time}$

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