A Theory of Model-Based Testing

with Labelled Transition Systems

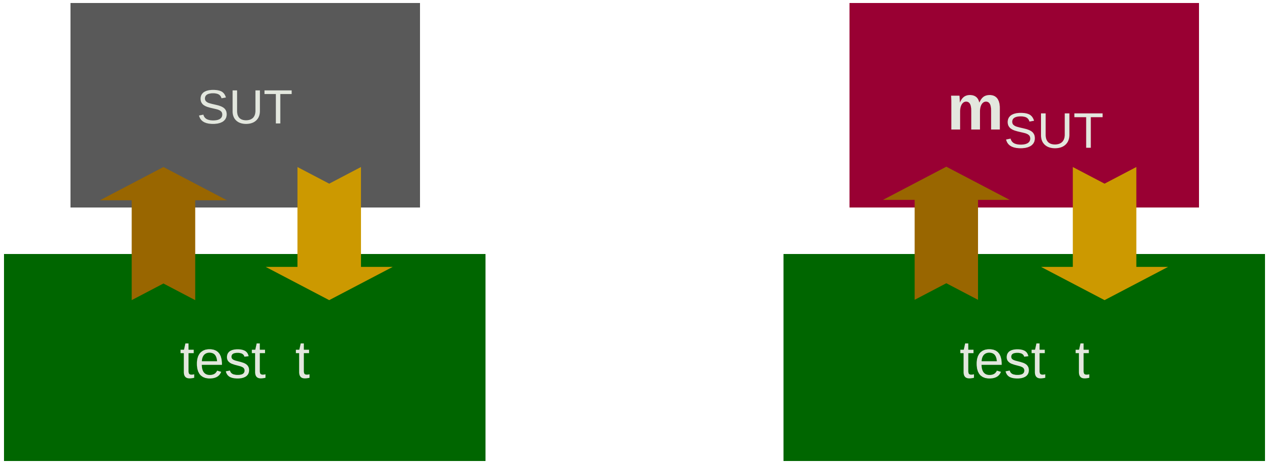
Various Topics

MBT: Testability Assumption

Testability assumption :

$\forall$ **SUT** . $\exists$ $m_{SUT} \in$ **IOTS** .

$\forall$ **t** $\in$ **TEST** . **SUT passes t** $\Leftrightarrow$ m_{SUT} **passes t**



MBT : Completeness

$$\text{SUT } \textbf{passes } T_s \overset{?}{\Leftrightarrow} \text{SUT } \textbf{conforms to } s$$

$\text{SUT } \textbf{passes } T_s$

$\Leftrightarrow$ $\quad$ $\text{SUT } \textbf{passes } T_s \Leftrightarrow_{def} \forall t \in T_s .\ \text{SUT } \textbf{passes } t$

$\forall t \in T_s .\ \text{SUT } \textbf{passes } t$

$\Leftrightarrow$ $\quad$ test hypothesis: $\forall t \in TEST .\ \text{SUT passes } t \Leftrightarrow m_{SUT} \text{ passes } t$

$\forall t \in T_s .\ m_{SUT} \textbf{ passes } t$

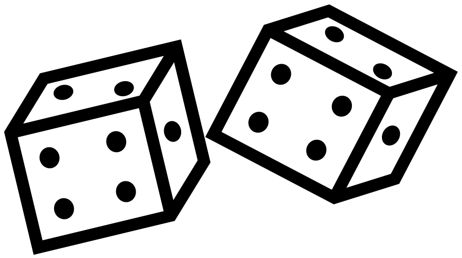
$\Leftrightarrow$ $\quad$ prove: $\forall m \in MOD .\ (\forall t \in T_s .\ m \textbf{ passes } t) \Leftrightarrow m \textbf{ imp } s$

$m_{SUT} \textbf{ imp } s$

$\Leftrightarrow$ $\quad$ define : SUT **conforms to** s iff m_{SUT} **imp** s

$\text{SUT } \textbf{conforms to } s$

Testability Assumption : Adder



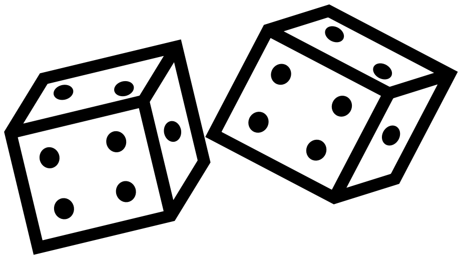
Test a function adding numbers of two dice:

int add (int x, y) for $x, y \in [1 \ldots 6]$

Is the following a complete test suite?

(1,1) (1,2) . . . . . (1,6)
(2,1) (2,2) . . . . . (2,6)
. . .
. . .
. . .
(6,1) (6,2) . . . . . (6,6)

Testability Assumption : Adder



Test a function adding numbers of two dice:

int add (int x, y) for $x, y \in [1\ldots6]$

The test suite

(1,1) (1,2) . . . . . (1,6)
(2,1) (2,2) . . . . . (2,6)
. . .
. . .
(6,1) (6,2) . . . . . (6,6)

is sound & exhaustive if

- the testability assumption is that implementation can be modelled as functions : $\boldsymbol{i} :: [1..6] \times [1..6] \rightarrow \text{Int}$