─────── MODULE *AbstractFinish* ───────

EXTENDS *Integers*, *Sequences*
CONSTANTS *PLACE*, *MXFINISHES*, *PROG_HOME*, *MXTHREADS*, *NBLOCKS*, *MXSTMTS*
VARIABLES *fid*, *fstates*, *msgs*, *thrds*, *p0fstates*, *isDead*, *mseq*, *pstate*, *p0adoptSet*

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$SPMDRemote \triangleq$ INSTANCE *SPMDRemote*
$SPMDRoot \triangleq$ INSTANCE *SPMDRoot*
$DefaultRemote \triangleq$ INSTANCE *DEFRemote*
$DefaultRoot \triangleq$ INSTANCE *DEFRoot*
$P0ResilientFinish \triangleq$ INSTANCE *P0Finish*

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$Alloc(type, here, parent, root) \triangleq$
  $\lor type =$ "SPMDroot" $\land SPMDRoot!Alloc(type, here, parent, root)$
  $\lor type =$ "SPMDremote" $\land SPMDRemote!Alloc(type, here, parent, root)$
  $\lor type =$ "root" $\land SPMDRoot!Alloc(type, here, parent, root)$
  $\lor type =$ "remote" $\land DefaultRemote!Alloc(type, here, parent, root)$
  $\lor type \in \{$ "p0root", "p0remote" $\} \land P0ResilientFinish!Alloc(type, here, parent, root)$

$NotifySubActivitySpawn(dst) \triangleq$
  $\land\ fstates[fid].status =$ "waiting"
  $\land\ \lor\ \land\ fstates[fid].type =$ "SPMDroot"
     $\land SPMDRoot!NotifySubActivitySpawn(dst)$
   $\lor\ \land\ fstates[fid].type =$ "SPMDremote"
     $\land SPMDRemote!NotifySubActivitySpawn(dst)$
   $\lor\ \land\ fstates[fid].type =$ "root"
     $\land DefaultRoot!NotifySubActivitySpawn(dst)$
   $\lor\ \land\ fstates[fid].type =$ "remote"
     $\land DefaultRemote!NotifySubActivitySpawn(dst)$
   $\lor\ \land\ fstates[fid].type \in \{$ "p0root", "p0remote" $\}$
     $\land P0ResilientFinish!NotifySubActivitySpawn(dst)$

$NotifySubActivitySpawnError(dst) \triangleq$
  $\land\ fstates[fid].status =$ "waiting"
  $\land\ \lor\ \land\ fstates[fid].type =$ "SPMDroot"
     $\land SPMDRoot!NotifySubActivitySpawnError(dst)$
   $\lor\ \land\ fstates[fid].type =$ "SPMDremote"
     $\land SPMDRemote!NotifySubActivitySpawnError(dst)$
   $\lor\ \land\ fstates[fid].type =$ "root"
     $\land DefaultRoot!NotifySubActivitySpawnError(dst)$
   $\lor\ \land\ fstates[fid].type =$ "remote"
     $\land DefaultRemote!NotifySubActivitySpawnError(dst)$
   $\lor\ \land\ fstates[fid].type \in \{$ "p0root", "p0remote" $\}$
     $\land P0ResilientFinish!NotifySubActivitySpawnError(dst)$

needed for the local path of *Runtime.runAsync*

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$NotifyLocalActivitySpawnAndCreation(here,\ act) \triangleq$
 $\wedge\ fstates[fid].status =\ \text{"waiting"}$
 $\wedge\ \vee\ \wedge fstates[fid].type =\ \text{"SPMDroot"}$
    $\wedge SPMDRoot\,!\,NotifyLocalActivitySpawnAndCreation(here,\ act)$
   $\vee\ \wedge fstates[fid].type =\ \text{"SPMDremote"}$
    $\wedge SPMDRemote\,!\,NotifyLocalActivitySpawnAndCreation(here,\ act)$
   $\vee\ \wedge fstates[fid].type =\ \text{"root"}$
    $\wedge DefaultRoot\,!\,NotifyLocalActivitySpawnAndCreation(here,\ act)$
   $\vee\ \wedge fstates[fid].type =\ \text{"remote"}$
    $\wedge DefaultRemote\,!\,NotifyLocalActivitySpawnAndCreation(here,\ act)$
   $\vee\ \wedge fstates[fid].type \in \{\text{"p0root"},\ \text{"p0remote"}\}$
    $\wedge P0ResilientFinish\,!\,NotifyLocalActivitySpawnAndCreation(here,\ act)$

$NotifyRemoteActivityCreation(src,\ act,\ inMsg) \triangleq$
 $\wedge\ fstates[fid].status =\ \text{"waiting"}$
 $\wedge\ \vee\ \wedge fstates[fid].type =\ \text{"SPMDroot"}$
    $\wedge SPMDRoot\,!\,NotifyRemoteActivityCreation(src,\ act,\ inMsg)$
   $\vee\ \wedge fstates[fid].type =\ \text{"SPMDremote"}$
    $\wedge SPMDRemote\,!\,NotifyRemoteActivityCreation(src,\ act,\ inMsg)$
   $\vee\ \wedge fstates[fid].type =\ \text{"root"}$
    $\wedge DefaultRoot\,!\,NotifyRemoteActivityCreation(src,\ act,\ inMsg)$
   $\vee\ \wedge fstates[fid].type =\ \text{"remote"}$
    $\wedge DefaultRemote\,!\,NotifyRemoteActivityCreation(src,\ act,\ inMsg)$
   $\vee\ \wedge fstates[fid].type \in \{\text{"p0root"},\ \text{"p0remote"}\}$
    $\wedge P0ResilientFinish\,!\,NotifyRemoteActivityCreation(src,\ act,\ inMsg)$

$NotifyActivityTermination \triangleq$
 $\wedge\ fstates[fid].status =\ \text{"waiting"}$
 $\wedge\ \vee\ \wedge fstates[fid].type =\ \text{"SPMDroot"}$
    $\wedge SPMDRoot\,!\,NotifyActivityTermination$
   $\vee\ \wedge fstates[fid].type =\ \text{"SPMDremote"}$
    $\wedge SPMDRemote\,!\,NotifyActivityTermination$
   $\vee\ \wedge fstates[fid].type =\ \text{"root"}$
    $\wedge DefaultRoot\,!\,NotifyActivityTermination$
   $\vee\ \wedge fstates[fid].type =\ \text{"remote"}$
    $\wedge DefaultRemote\,!\,NotifyActivityTermination$
   $\vee\ \wedge fstates[fid].type \in \{\text{"p0root"},\ \text{"p0remote"}\}$
    $\wedge P0ResilientFinish\,!\,NotifyActivityTermination$

$PushException(e) \triangleq$
 $\wedge\ fstates[fid].status =\ \text{"waiting"}$
 $\wedge\ \vee\ \wedge fstates[fid].type =\ \text{"SPMDroot"}$
    $\wedge SPMDRoot\,!\,PushException(e)$
   $\vee\ \wedge fstates[fid].type =\ \text{"SPMDremote"}$
    $\wedge SPMDRemote\,!\,PushException(e)$
   $\vee\ \wedge fstates[fid].type =\ \text{"root"}$

$$\quad\quad\quad \wedge\ DefaultRoot\,!\,PushException(e)$$
$$\vee\quad \wedge\ fstates[fid].type = \text{``remote''}$$
$$\quad\quad \wedge\ DefaultRemote\,!\,PushException(e)$$
$$\vee\quad \wedge\ fstates[fid].type \in \{\text{``p0root''},\ \text{``p0remote''}\}$$
$$\quad\quad \wedge\ P0ResilientFinish\,!\,PushException(e)$$

$Terminated \ \triangleq$
$\quad \wedge\ fstates[fid].status = \text{``forgotten''}$

$Running \ \triangleq$
$\quad \wedge\ fstates[fid].status = \text{``waiting''}$

$IsRoot \ \triangleq$
$\quad \wedge\ fstates[fid].type \in \{\text{``root''},\ \text{``SPMDroot''},\ \text{``p0root''}\}$

$IsResilient \ \triangleq$
$\quad \wedge\ fstates[fid].type \in \{\text{``p0root''},\ \text{``p0remote''}\}$

$HasExceptions \ \triangleq$
$\quad \wedge\ Len(fstates[fid].excs) > 0$

$SendTermMsg \ \triangleq$
$\quad \wedge\ fstates[fid].status = \text{``finished''}$
$\quad \wedge\ \vee\ \ \wedge\ fstates[fid].type = \text{``SPMDroot''}$
$\quad\quad\quad\quad \wedge\ SPMDRoot\,!\,SendTermMsg$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``SPMDremote''}$
$\quad\quad\quad\quad \wedge\ SPMDRemote\,!\,SendTermMsg$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``root''}$
$\quad\quad\quad\quad \wedge\ DefaultRoot\,!\,SendTermMsg$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``remote''}$
$\quad\quad\quad\quad \wedge\ DefaultRemote\,!\,SendTermMsg$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type \in \{\text{``p0root''},\ \text{``p0remote''}\}$
$\quad\quad\quad\quad \wedge\ P0ResilientFinish\,!\,SendTermMsg$

$ProcessChildTermMsg(msg) \ \triangleq$
$\quad \wedge\ fstates[fid].status = \text{``waiting''}$
$\quad \wedge\ \vee\ \ \wedge\ fstates[fid].type = \text{``SPMDroot''}$
$\quad\quad\quad\quad \wedge\ SPMDRoot\,!\,ProcessChildTermMsg(msg)$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``SPMDremote''}$
$\quad\quad\quad\quad \wedge\ SPMDRemote\,!\,ProcessChildTermMsg(msg)$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``root''}$
$\quad\quad\quad\quad \wedge\ DefaultRoot\,!\,ProcessChildTermMsg(msg)$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type = \text{``remote''}$
$\quad\quad\quad\quad \wedge\ DefaultRemote\,!\,ProcessChildTermMsg(msg)$
$\quad\quad\ \vee\ \ \wedge\ fstates[fid].type \in \{\text{``p0root''},\ \text{``p0remote''}\}$
$\quad\quad\quad\quad \wedge\ P0ResilientFinish\,!\,ProcessChildTermMsg(msg)$

\ * Modification History
\ * Last modified Sun *Nov* 05 19:36:13 *AEDT* 2017 by *u5482878*
\ * Last modified *Tue Sep* 26 23:12:01 *AEST* 2017 by *shamouda*
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