ADT Block

<u>Service</u> : **Block**
<u>Type</u> : char, int, bool, Set< T >, Paire< T >

<u>Observators</u> :
getType : [Block] -> char
getSize : [Block] -> int
getNbPos : [Block] -> int
getXMin : [Block] -> int
getXMax : [Block] -> int
getYMin : [Block] -> int
getYMax : [Block] -> int
hasPos : [Block] * int * int -> bool
<u>précondition</u> : *hasPos*(B,x,y) <u>require</u> $1 <= x$ && $x <= getSize$(B) && $1 <= y$ && $y <= getSize$(B)
getAllPos : [Block] -> Set<Paire<int,int>>
getLowPos : [Block] -> Set<Paire<int,int>>

<u>Constructor</u> :
init : char -> [Block]
<u>précondition</u> : *init*(t) <u>require</u> $t = O \parallel t = L \parallel t = J \parallel t = T \parallel t = Z \parallel t = S \parallel t = I$

<u>Opérations</u> :
addPos : [Block] * int * int -> [Block]
<u>précondition</u> : *addPos*(B,x,y) <u>require</u> $1 <= x$ && $x <= getSize$(B) && $1 <= y$ && $y <= getSize$(B)
&& $\neg hasPos$(B,x,y)
removeAllPos : [Block] -> [Block]
RotateLeft : [Block] -> [Block]
rotateRight : [Block] -> [Block]

<u>Observations</u> :

- ○ *invariants*
  $getType$(B) = O $\parallel$ $getType$(B) = L $\parallel$ $getType$(B) = J $\parallel$ $getType$(B) = T $\parallel$
  $getType$(B) = Z $\parallel$ $getType$(B) = S $\parallel$ $getType$(B) = I
  $getSize$(B) = 2 $\parallel$ $getSize$(B) = 3 $\parallel$ $getSize$(B) = 4
  $0 <= getNbPos$(B) && $getNbPos$(B) $<= 4$
  $getXMin$(B) = min { $first(p) \mid p \in getAllPos(B)$ }
  $getXMax$(B) = max { $first(p) \mid p \in getAllPos(B)$ }
  $getYMin$(B) = min { $second(p) \mid p \in getAllPos(B)$ }
  $getYMax$(B) = max { $second(p) \mid p \in getAllPos(B)$ }
  $getAllPos$ = { $(x,y) \in Pair < 1..getSize(B), 1..getSize(B) > \mid hasPos$(B,x,y) }
  $getAllPos$ = { $(x,y) \in getAllPos(B) \mid \neg\exists(x,y2) \in getAllPos(B), y2 > y$ }

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○ *init*
 $getType(init(\text{type})) = \text{type}$
 $getNbPos(init(\text{type})) = 4$

○ *addPos*
 $getType(addPos(\text{B,x,y})) = getType(\text{B})$
 $getSize(addPos(\text{B,x,y})) = getSize(\text{B})$
 $getNbPos(addPos(\text{B,x,y})) = getNbPos(\text{B})+1$
 $(\text{x} < getXMin(\text{B})\ \&\&\ getXMin(addPos(\text{B,x,y})) = \text{x})\ \|\ (getXMin(addPos(\text{B,x,y}))$
 $= getXMin(\text{B}))$
 $(getXMax(\text{B}) < \text{x}\ \&\&\ getXMax((addPos(\text{B,x,y})) = \text{x})\ \|\ (getXMax(addPos(\text{B,x,y}))$
 $= getXMax(\text{B}))$
 $(\text{y} < getYMin(\text{B})\ \&\&\ getYMin(addPos(\text{B,x,y})) = \text{y})\ \|\ (getYMin(addPos(\text{B,x,y}))$
 $= getYMin(\text{B}))$
 $(getYMax(\text{B}) < \text{y}\ \&\&\ getYMax(addPos(\text{B,x,y})) = \text{y})\ \|\ (getYMax(addPos(\text{B,x,y}))$
 $= getYMax(\text{B}))$
 $hasPos(addPos(\text{B,x,y})) = \text{true}$
 $\forall\ \text{x1, y1, x1} \neq \text{x} \vee \text{y1} \neq \text{y} \Rightarrow hasPos(addPos(\text{B,x,y}),\text{x1,y1}) = hasPos(\text{B,x1,y1})$
 $\forall x1, y1 \in getAllPos = \{\ (x1, y1) \in getAllPos(addPos(B, x, y))\ \}$
 $(\text{x,y}) \in getAllPos(addPos(\text{B,x,y}))$

○ *removeAllPos*
 $getType(removeAllPos(\text{B})) = getType(\text{B})$
 $getSize(removeAllPos(\text{B})) = getSize(\text{B})$
 $getNbPos(removeAllPos(\text{B})) = getNbPos(\text{B})$
 $getXMin(removeAllPos(\text{B})) = getSize(\text{B})+1$
 $getXMax(removeAllPos(\text{B})) = 0$
 $getYMin(removeAllPos(\text{B})) = getSize(\text{B})+1$
 $getYMax(removeAllPos(\text{B})) = 0$
 $\forall\ (\text{x, y}) \in [1..\text{getSize(B)},1..\text{getSize(B)}], \neg\ hasPos(removeAllPos(\text{B}),\text{x,y})$
 $getAllPos(removeAllPos(\text{B})) = \text{null}$
 $getLowPos(removeAllPos(\text{B})) = \text{null}$

○ *rotateLeft*
 $getType(rotateLeft(\text{B})) = getType(\text{B})$
 $getSize(rotateLeft(\text{B})) = getSize(\text{B})$
 $getNbPos(rotateLeft(\text{B})) = getNbPos(\text{B})$

- *rotateRight*
  $getType(rotateRight(\text{B})) = getType(\text{B})$
  $getSize(rotateRight(\text{B})) = getSize(\text{B})$
  $getNbPos(rotateRight(\text{B})) = getNbPos(\text{B})$