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TAD Binary Search Tree (BST)
$BST = [\ \text{parent} = \langle BST_P \rangle,\ \text{left\_child} = \langle BST_L \rangle,$ $\text{right\_child} = \langle BST_R \rangle,\ \text{data} = \langle data \rangle$ $\text{allowDuplicates} = \langle allowDuplicates \rangle]$ Data can be compared with another data of its same type
$\begin{cases} BST_L.data \leq BST_p.data \leq BST_R.data, & \text{if } allowDuplicates \equiv T \\ BST_L.data < BST_P.data < BST_R.data, & \text{otherwise} \end{cases}$ $\wedge \neg\exists(x)(x = BST \wedge x = BST.BST_P) \wedge$ allowDuplicates is immutable $\neg\exists(x)(x = BST \wedge data = x.data)$
- CreateBST: Boolean → BST - Delete: BST x data → BST - Add: BST x data → BST - Search: BST x data → data - InOrder: BST → List - PostOrder: BST → List - PreOrder: BST → List

Operación Primitiva: Constructoras

CreateBST(duplicates)
"Creates an empty Binary Search Tree that can contain duplicate data if duplicates is true"

$\{pre: TRUE\}$

$\{post: BST = \{\}\}$

Operación Primitiva: Modificadoras

Delete(data)

"Deletes an element from the BST"

$\{pre: TRUE\}$

$\{post: BST.data \notin BST\}$

Add(data)

"Adds an element to the BST"

$\{pre: TRUE\}$

$\{post: BST_{value} \in BST\}$

Operación Primitiva: Analizadoras

Search(data)
"Adds an element to the BST"

$\{pre: TRUE\}$

$\{post: TRUE\}$

InOrder()
"Returns the BST in InOrder"

$\{pre: TRUE\}$

$\{post: TRUE\}$

PostOrder()
"Returns the BST in PostOrder"

$\{pre: TRUE\}$

$\{post: TRUE\}$

PreOrder()
"Returns the BST in PreOrder"

$\{pre: TRUE\}$

$\{post: TRUE\}$

Weight()

"Calculates the number of elements in the BST"

$\{pre: TRUE\}$

$\{post: TRUE\}$

Height()
"Calculates the depth of the largest path in the BST"

$\{pre: TRUE\}$

$\{post: TRUE\}$