

$\{ \exists A. [ls(g_head, A, nil) * sort(A)] \wedge -\infty < e \}$

(Node*, Node*) locate(int e){

Node* p, c;

$\{ \exists A. [ls(g_head, A, nil) * sort(A)] \wedge -\infty < e \}$

p = g_head;

$\{ \exists z. B. [ls(g_head, E, p) * N(p, -\infty, z) * ls(z, B, nil) * sort(-\infty, B)] \wedge -\infty < e \}$

lock(p);

$\{ \exists z. B. [ls(g_head, E, p) * L(p, -\infty, z) * ls(z, B, nil) * sort(-\infty, B)] \wedge -\infty < e \}$

atomic{ c = p->next; }

$\{ \exists B. [ls(g_head, E, p) * L(p, -\infty, c) * ls(c, B, nil) * sort(-\infty, B)] \wedge -\infty < e \}$

atomic{ t = c->value; }

I $\{ \exists u. [\exists A, B, z. [ls(g_head, A, p) * L(p, u, c) * N(c, t, z) * ls(z, B, nil) * sort(A.u.t, B)] \wedge u < e \}$

while (t < e){

$\{ \exists u. [\exists A, B, z. [ls(g_head, A, p) * L(p, u, c) * N(c, t, z) * ls(z, B, nil) * sort(A.u.t, B)] \wedge u < e \}$

lock(c);

$\{ \exists u. [\exists A, B, z. [ls(g_head, A, p) * L(p, u, c) * L(c, t, z) * ls(z, B, nil) * sort(A.u.t, B)] \wedge t < e \}$

unlock(p);

$\{ \exists A, B, z. [ls(g_head, A, c) * L(c, t, z) * ls(z, B, nil) * sort(A.t, B)] \wedge t < e \}$

p = c;

$\{ \exists u. [\exists A, B, z. [ls(g_head, A, p) * L(p, u, z) * ls(z, B, nil) * sort(A.u, B)] \wedge u < e \}$

atomic{ c = p->next; }

$\left\{ \exists u. \left[\begin{array}{l} \exists A, B. \text{ls}(g_head, A, p) * L(p, u, c) \\ * \text{ls}(c, B, nil) * \text{sort}(A.u.B) \end{array} \right] \wedge u \leq c \right\}$

atomic{ t = c->value; }

I

$\left\{ \exists u. \left[\begin{array}{l} \exists A, B, z. \text{ls}(g_head, A, p) * L(p, u, c) \\ * N(c, t, z) * \text{ls}(z, B, nil) * \text{sort}(A.u.t.B) \end{array} \right] \wedge u \leq c \right\}$

}

$\left\{ \exists u, v. \left[\begin{array}{l} \exists A, B, z. \text{ls}(g_head, A, p) * L(p, u, c) \\ * N(c, v, z) * \text{ls}(z, B, nil) * \text{sort}(A.u.v.B) \end{array} \right] \wedge u \leq c \wedge v \leq c \right\}$

return (p, c);

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