For the following instance of SAT, determine whether or not it has a satisfying truth assignment by developing the smallest possible binary search tree.

$U = \{ u_1, u_2, u_3, u_4 \}$.

$C = \{ \{ u_1, u_2, \overline{u}_3, \overline{u}_4 \}, \{ \overline{u}_1 \}, \{ u_2 \}, \{ u_3 \}, \{ u_4 \} \}$.

Show the binary search tree, and state whether or not the instance has a satisfying truth assignment. If the answer is yes, show the satisfying truth assignment.

Answer:

To satisfy the clause $\{ \overline{u}_1 \}$ it is necessary to assign $u_1 = F$. This determines the first level of the tree. The other levels are determined in a similar way.

![Binary Search Tree](image)

This instance does not have a satisfying truth assignment.