

## **Non-Crossing Partitions in Binary, Ordered and Motzkin Trees**

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Non-Crossing Tree partitions are newer mathematical objects that have recent applications in genetics and mathematical biology. We explore several interesting connections between these partitions and the more commonly studied non-crossing set partitions. While non-crossing set partitions are counted by the Catalan numbers, we prove that non-crossing tree partitions in Binary trees are counted by the Fibonacci numbers. In addition, we introduce generating functions that count these partitions in Ordered and Motzkin trees. Lastly we explore a bijection between the complete parenthesization of Ordered trees and non-crossing tree partitions.

Keywords: Complete Binary Trees, Ordered Trees, Motzkin Treea, Non-Crossing Partitions, Generating Functions, Catalan numbers, Fibonacci numbers, Parenthesization