Assignment 3 - B-Trees

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1 Objectives

Given an implementation of a B-Tree code structure, continue to use Python to do the following:

1. Implement the function __print_tree, this function should print all keys in the B-Tree in increasing order.

2. Implement the function def search(x, k, nil=None) which should return a pointer to the node with key=k in the B-tree T where x is the root node in the B-tree T.

3. Update def search(x, k, nil=None) function to print all keys which would be compared to the value k before returning a pointer to the node in B-Tree T with key=k.

2 Application in Finance

One of the most basic fundamental applications of decision tree analysis is for the purpose of **option pricing**. The binomial option pricing model uses discrete probabilities to determine the value of an option at expiration. The most basic binomial models assume that the value of the underlying asset will either move up or down, based on calculated probabilities, at the maturity

date of the European option. Based on these expected payoff values, the price of the option can easily be determined.

Although not strictly a decision tree, a binomial tree is constructed in similar fashion and is used for similar purposes – to determine the impact of a fluctuating/uncertain variable. The upward and downward movement of interest rates has a significant impact on the price of fixed income securities and interest rate derivatives. Binomial trees enable investors to accurately valuate bonds with embedded call and put provisions using uncertainty regarding future interest rates.

Because the Black-Scholes model is not applicable to valuating bonds and interest rate based options, the binomial model is the ideal alternative. Corporate projects are often valued with decision trees which factor various possible alternative states of the economy. Likewise the value of bonds, interest rate floors and caps, interest rate swaps and other type of investment tools can be determined by analyzing the effects of different interest rate environments.

There are many other financial problems that are done using these structures(Many applications in financial instruments pricing)