

Assignment 3

B⁺-Tree

Submission

- **Code (Python)**
- **Report**
- **Due:**
 - 2nd Dec. 23:59
 - 3rd Dec. 23:59

Operations

- **INIT**
- **EXIT**
- **INSERT**
- **DELETE**
- **ROOT**
- **PRINT**
- **FIND**
- **RANGE**

INIT / EXIT

- **INIT K**

- Initialize K-degree b^+ -tree
- Input: integer K

- **EXIT**

- Quit the program

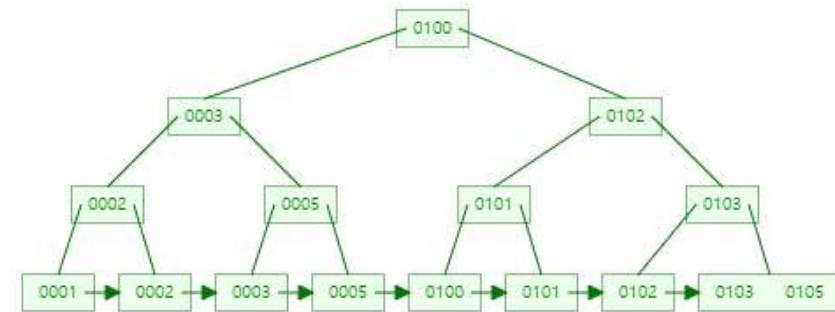
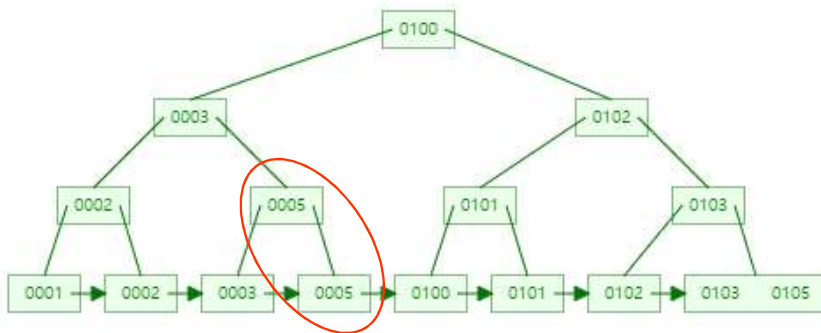
INSERT / DELETE

• INSERT A

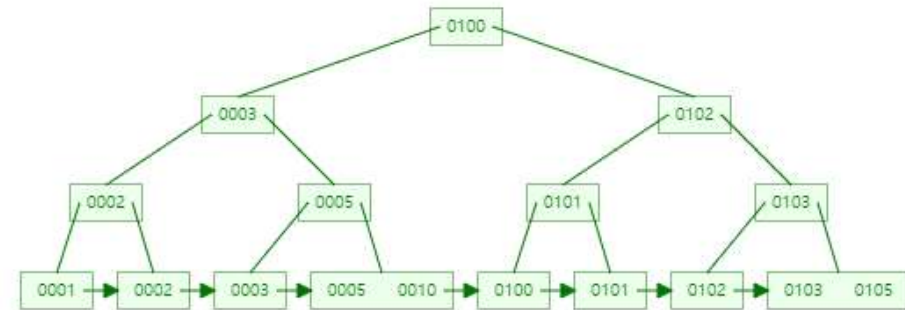
- Insert A into B⁺-tree
- Input: integer A

• DELETE A

- Delete A from B⁺-tree
- Input: integer A



INSERT 10



WARNING !!

Index position: right

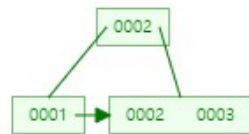
Borrow order: left → right

<https://www.cs.usfca.edu/~galles/visualization/BPlusTree.html>

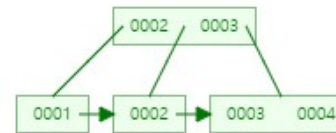
ROOT

- **ROOT**

- Print root of the tree
- Output:
 - [2]



[2, 3]



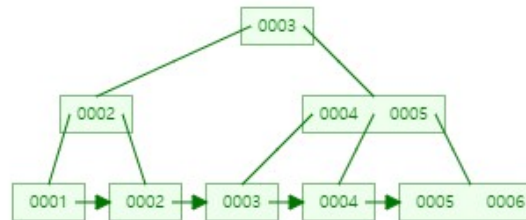
PRINT

- **PRINT**

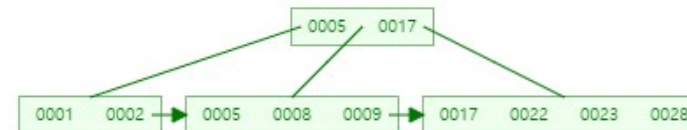
- Print the tree (print nodes level by level from the root)

- Output:

- PRINT
- [3]-[2],[4,5]
[2]-[1],[2]
[4,5]-[3],[4],[5,6]



- PRINT
- [5,17]-[1,2],[5,8,9],[17,22,23,28]

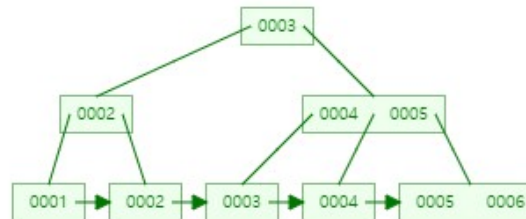


FIND

- **FIND K**

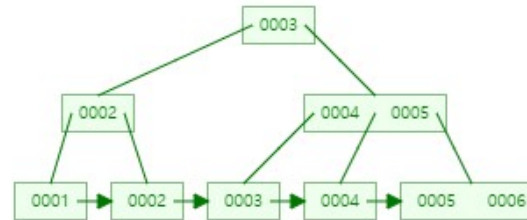
- Find the key from the tree
- Input: integer K
- Output: paths or NONE (if K does not exist)

- FIND 3
 - [3]-[4,5]-[3]
- FIND 6
 - [3]-[4,5]-[5,6]
- FIND 10
 - NONE



RANGE

- **RANGE** K_{from} K_{to}
 - Print all nodes in the range K_{from} k_{to}
 - Output:
 - RANGE 3 5
 - 3,4,5



Tip

- **Visualization**

- <https://www.cs.usfca.edu/~galles/visualization/BPlusTree.html>

- **Skeleton code**

- Please feel free to modify

- **Sample**

- test_bp.txt / gold.txt
 - `python bptree_202110475.py < test_bp.txt > result_202110475.txt`