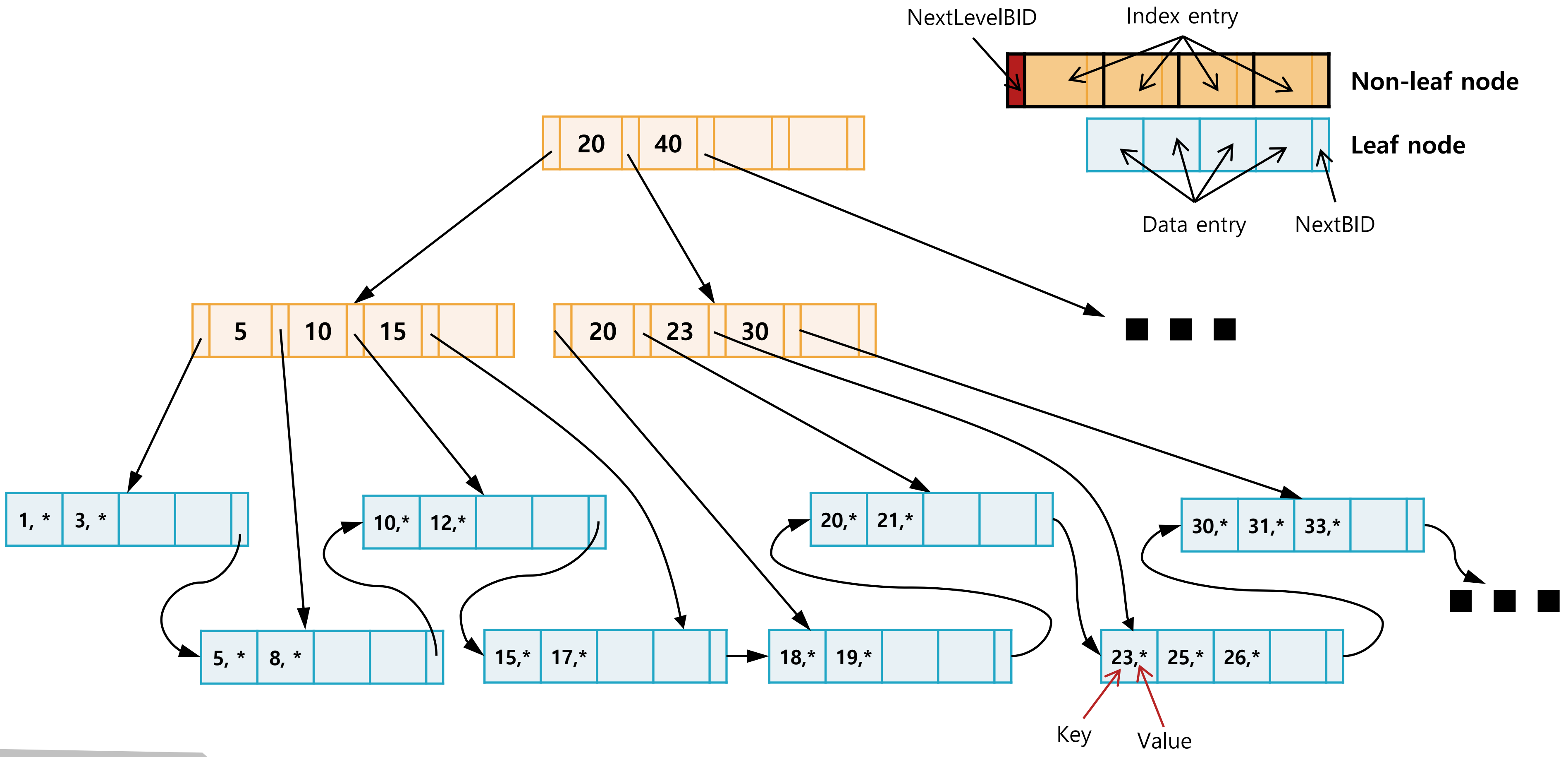
# Implementation of a Disk Based B$^+$-Tree

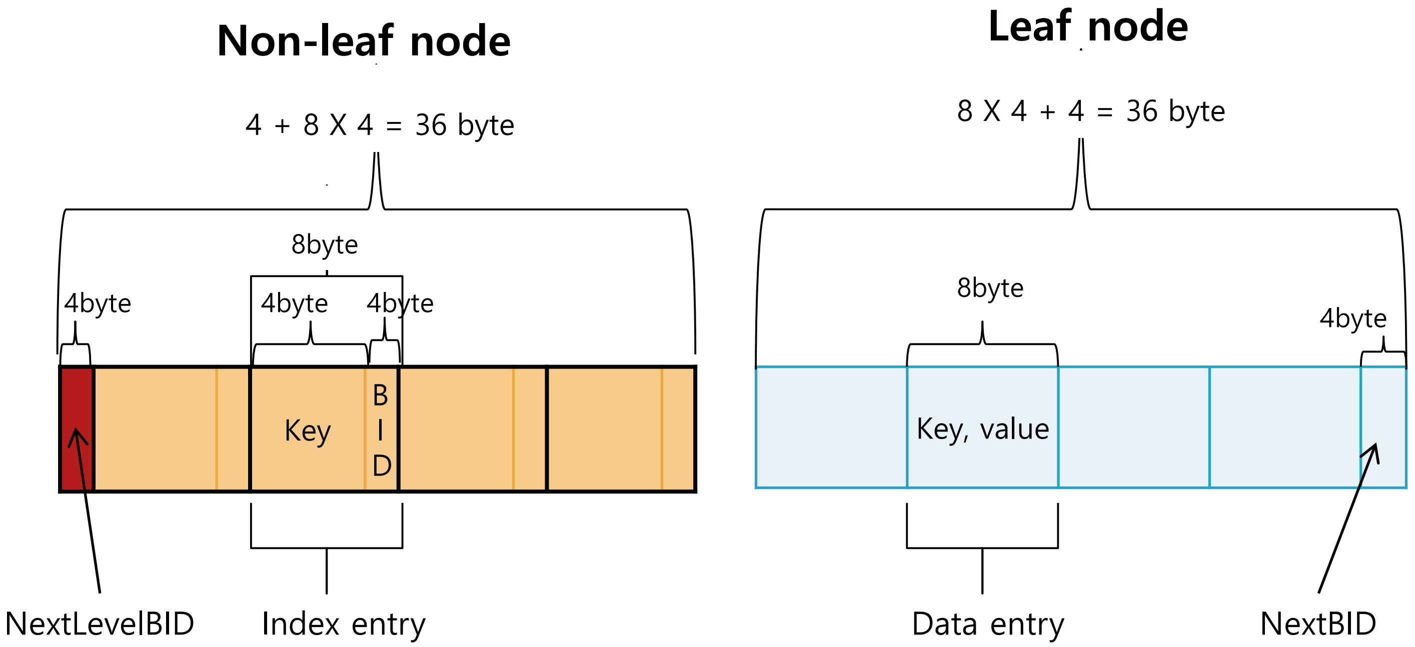
CSE3207 Database Project #2

**Assignment Date : May 16th, 2019**
**Due Date : June 21th, 2019**

# B$^+$-Tree Structure

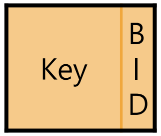


# Details of Nodes and Entries

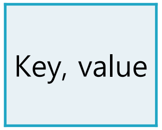


* page size = node size = 36 byte

**Index entry**
Key
NextLevelBID



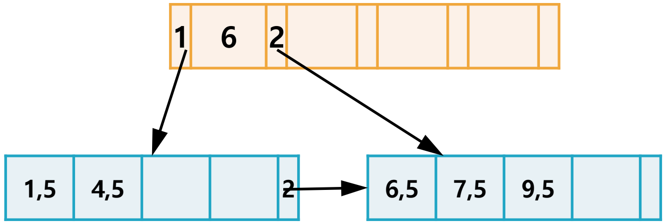
**Data entry**
Key
Value



# B+-Tree Data File Structure

**Insert data (key, ID)**

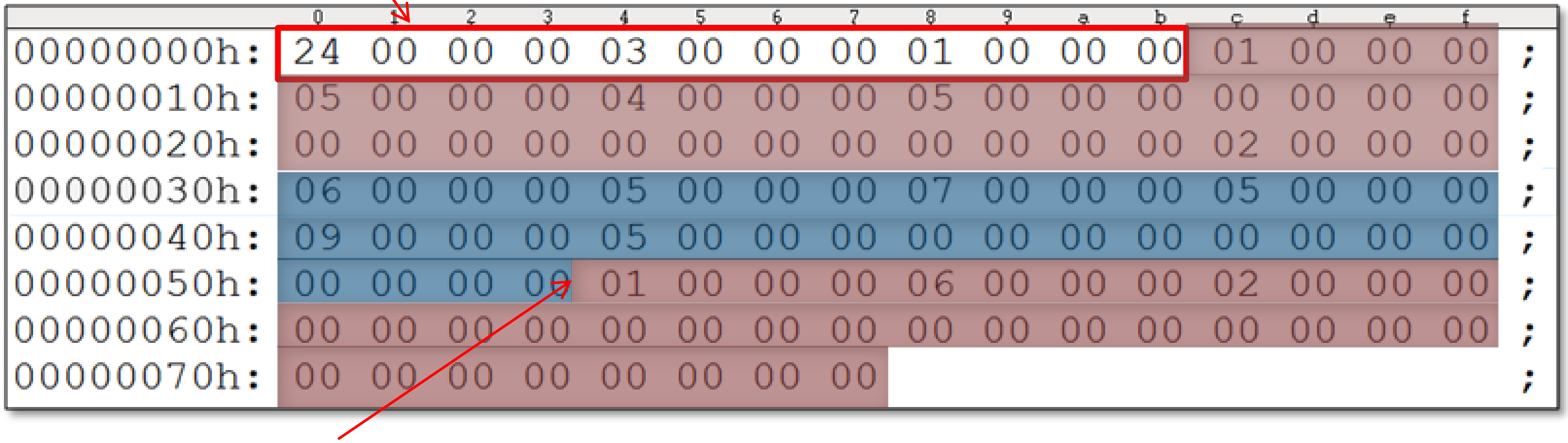
| | |
|---|---|
| 1 | 5 |
| 6 | 5 |
| 4 | 5 |
| 7 | 5 |
| 9 | 5 |



**12 bytes**

**File header**
`BlockSize, RootBID, Depth`

*36 bytes for each node



```
             0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00000000h:  24 00 00 00 03 00 00 00 01 00 00 00 01 00 00 00 ;
00000010h:  05 00 00 00 04 00 00 00 05 00 00 00 00 00 00 00 ;
00000020h:  00 00 00 00 00 00 00 00 00 00 00 00 02 00 00 00 ;
00000030h:  06 00 00 00 05 00 00 00 07 00 00 00 05 00 00 00 ;
00000040h:  09 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 ;
00000050h:  00 00 00 00 01 00 00 00 06 00 00 00 02 00 00 00 ;
00000060h:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ;
00000070h:  00 00 00 00 00 00 00 00                         ;
```

84 bytes from the file starting position

*Physical offset of a PageID = 12 + ((BID-1) * BlockSize)*

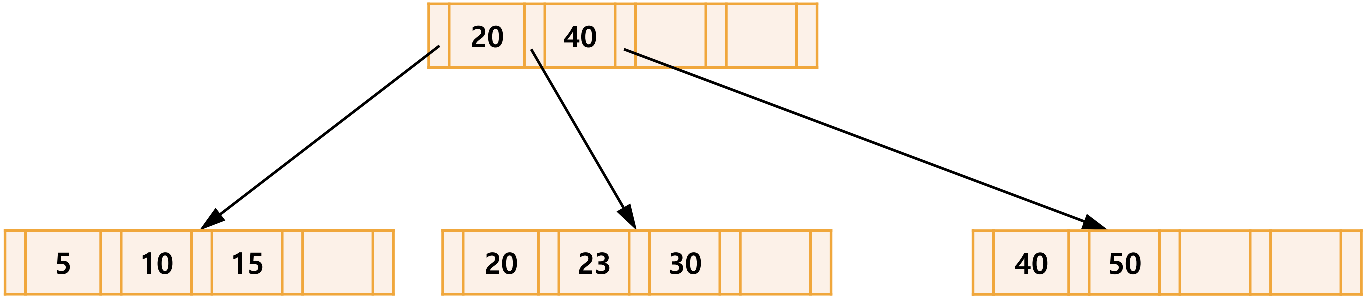
# Test & UI

- Index creation
  - *btree.exe c [btree binary file] [page_size], e.g., btree.exe c btree.bin 36*
    - Generates [btree binary file] with only header
- Insertion
  - *btree.exe i [btree binary file] [records text file], e.g., btree.exe i btree.bin insert.txt*
    - Inserts nodes(entries) to [btree binary file] using [records text file]
- Point(exact) search
  - *btree.exe s [btree binary file] [input text file] [output text file*],
    *e.g., btree.exe i btree.bin search.txt output.txt*
    - Output searched keys and IDs to [output text file] using [btree binary file]
- Range search
  - *btree.exe r [btree binary file] [input text file] [output text file],*
    *e.g., btree.exe r btree.bin rangesearch.txt output.txt*
    - Output searched keys and IDs to [output text file] using [btree binary file]

- MUST follow input and output file formats in the document

# Test & UI

- Print $B^+$-Tree structure
  - *btree.exe p [btree binary file] [output text file]*
    - Output node structure of [btree binary file] to [output text file]
    - Output only root node<level 0> and next level <level1>
    - Example



```
<0>
20, 40
<1>
5, 10, 15, 20, 23, 30, 40, 50
```

# Submission

- To the I-Class website
- Upload a zip file containing the followings:
  - A single source file, named as ***"btree.cpp or btree.c"***
  - README.doc explaining:
    - What you've implemented and what you've NOT
    - Brief explanation of your implementation (Do not make it look fancy, less than 0.5 page)
    - How to compile and run
    - Talk about your experience of doing this project
    - Contact information (just in case)