

## 壹、 題目定義

延續先前作業的程式，增加支援類 Redis **Sorted Set** 的操作，指令包含 **ZADD**，**ZCARD**，**ZCOUNT**，**ZINTERSTORE**，**ZUNIONSTORE**，**ZRANGE**，**ZRANGEBYSCORE**，**ZRANK**，**ZREM**，**ZREMRANGE**，**ZREMRGEBYSCORE**。

## 貳、 想法及做法

新增 set 排序、搜尋、刪除、讀取的功能，命名為 "hw5.h" 形成函式庫 libhw5.a，在 hw5.c 程式中呼叫 ZADD，ZCARD，ZCOUNT，ZINTERSTORE，ZUNIONSTORE，ZRANGE，ZRANGEBYSCORE，ZRANK，ZREM，ZREMRANGE，ZREMRGEBYSCORE，FREE\_SORTED\_SET 的函式，此次繳交 homework5.c，hw5.h，libhw5.a 與解釋文檔共四個檔案，以下解釋程式碼：

### hw5.h

36~45 行: 宣告 SORTED\_SET 的結構

60~64 行: **INITIALIZE\_SORTED\_SET** 函式將 SORTED\_SET 初始化

56~87 行: **ZADD** 函式將資料新增進去，同時將資料排序

86~88 行: **ZCARD** 函式回傳該 set 的大小

90~98 行: **ZCOUNT** 函式計算在限定區間的資料數

100~110 行: **ZRANGE** 函式輸出起始點到終點(用陣列位置設定)的資料

112~126 行: **ZINTERSTORE** 函式用於計算兩筆 set 的交集數

128~151 行: **ZUNIONSTORE** 函式用於計算兩筆 set 的聯集數

153~160 行: **ZRANGEBYSCORE** 函式將 set 限定區間(用數值設定)輸出

162~169 行: **ZRANK** 函式用於搜尋該 member 在該 set 的排序如何

171~181 行: **ZREM** 函式用於移除一筆資料

183~221 行: **ZREMRANGE** 函式移除限定區間(用陣列位置設定)的資料

223~235 行: **ZREMRANGEBYSCORE** 移除限定區間(用數值設定)的資料

237~243 行: **FREE\_SORTED\_SET** 函式用於清除 set 記憶體空間

## 參、編譯結果

```
weijhth@weijhth-VirtualBox:~/桌面/homework/hw5$ ./hw5
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZADD
Enter the set name: set1
Enter the score and member (or enter '0 done' to finish):
89 Jen
Enter the score and member (or enter '0 done' to finish):
97 ken
Enter the score and member (or enter '0 done' to finish):
156 Jerry
Enter the score and member (or enter '0 done' to finish):
45 David
Enter the score and member (or enter '0 done' to finish):
0 done
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZCARD
Enter the set name: set1
Number of members in the set: 4

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set1
Enter the start index:(number) 0
Enter the stop index:(number) 3
Members in set set1, range [0, 3]:
Member: David, Score: 45.000000
Member: Jen, Score: 89.000000
Member: ken, Score: 97.000000
Member: Jerry, Score: 156.000000
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZCOUNT
Enter the set name: set1
Enter the minimum score: 33
Enter the maximum score: 189
Number of members in the specified range: 4

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZADD
Enter the set name: set2
Enter the score and member (or enter '0 done' to finish):
89 Jen
Enter the score and member (or enter '0 done' to finish):
156 Jerry
Enter the score and member (or enter '0 done' to finish):
23 Weddy
Enter the score and member (or enter '0 done' to finish):
29 Sandy
Enter the score and member (or enter '0 done' to finish):
0 done
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZINTERSTORE
Enter the first set name: set1
Enter the second set name: set2
Intersection result set created.
ZINTERSTORE: 2
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/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZUNIONSTORE
Enter the first set name: set2
Enter the second set name: set1
Union result set created.
ZINTERSTORE: 6
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGEBYSCORE
Enter the set name: set2
Enter the minimum score: 0
Enter the maximum score: 200
Weddy Sandy Jen Jerry
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANK
Enter the set name: set2
Enter the member: Jen
Rank of member Jen in set set2: 2

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/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZREMRANGE
Enter the set name: set1
Enter the start index: 1
Enter the stop index: 2
Members in the specified range:
Member: Jen, Score: 89.000000
Member: Ken, Score: 97.000000

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```

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set1
Enter the start index:(number) 0
Enter the stop index:(number) 1
Members in set set1, range [0, 1]:
Member: David, Score: 45.000000
Member: Jerry, Score: 156.000000

```

```

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZREM
Enter the set name: set2
Enter the member: Sandy
Member Sandy removed from set set2.

```

```

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 1
Members in set set2, range [0, 1]:
Member: Weddy, Score: 23.000000
Member: Jen, Score: 89.000000

```

```

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZREMRANGEBYSCORE
Enter the set name: set2
Enter the minimum score: 80
Enter the maximum score: 160
Members removed from set set2 within the specified score range.
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 0
Members in set set2, range [0, 0]:
Member: Weddy, Score: 23.000000

```

```

/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: QUIT
weijbhhgweijbhh-VirtualBox: ~/桌面/homework/hw5$

```

肆、 遇到的問題與解決辦法

遇到的問題	解決辦法
欲結束 ZADD 輸入時，只輸入 done 會造成 score 也讀到並顯示不合法	讓使用者在 done 前多輸入一個 0，讓 score 可以讀
無法順利整合過往作業與此作業	進行多次測試與耐心 debug

伍、 未裁剪的編譯結果截圖

```
weijih@weijih-VirtualBox: ~/homework/hw5
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZADD
Enter the set name: set1
Enter the score and member (or enter '0 done' to finish):
89 Jen
Enter the score and member (or enter '0 done' to finish):
97 ken
Enter the score and member (or enter '0 done' to finish):
156 Jerry
Enter the score and member (or enter '0 done' to finish):
45 David
Enter the score and member (or enter '0 done' to finish):
0 done
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZCARD
Enter the set name: set1
Number of members in the set: 4
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set1
Enter the start index:(number) 0
Enter the stop index:(number) 3
Members in set set1, range [0, 3]:
Member: David, Score: 45.000000
Member: Jen, Score: 89.000000
```

```
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZCOUNT
Enter the set name: set1
Enter the minimum score: 33
Enter the maximum score: 189
Number of members in the specified range: 4
/HW1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRANGE,DELETE,INSERT,UPGRADE,FREE
/HW4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HW4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HW5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREM, ZREMRANGE, ZREMRANGEBYSCORE, QUIT: ZADD
Enter the set name: set2
Enter the score and member (or enter '0 done' to finish):
89 Jen
Enter the score and member (or enter '0 done' to finish):
156 Jerry
Enter the score and member (or enter '0 done' to finish):
23 Weddy
Enter the score and member (or enter '0 done' to finish):
```





```
Invalid command. Try again.
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZREM
Enter the set name: set2
Enter the member: Sandy
Member Sandy removed from set set2.
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZREVRANGE
Enter the set name: set1
Enter the start index: 1
Enter the stop index: 2
Members in the specified range:
Member: Jen, Score: 89.000000
Member: ken, Score: 97.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 1
Members in set set2, range [0, 1]:
Member: Weddy, Score: 23.000000
Member: Jen, Score: 89.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
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```
Member: Jerry, Score: 156.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 2
Members in set set2, range [0, 2]:
Member: Weddy, Score: 23.000000
Member: Jen, Score: 89.000000
Member: Jerry, Score: 156.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZREVRANGEBYSCORE
Enter the set name: set2
Enter the minimum score: 80
Enter the maximum score: 160
Members removed from set set2 within the specified score range.
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 0
Members in set set2, range [0, 0]:
Member: Weddy, Score: 23.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
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```
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 2
Members in set set2, range [0, 2]:
Member: Weddy, Score: 23.000000
Member: Jen, Score: 89.000000
Member: Jerry, Score: 156.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZREVRANGEBYSCORE
Enter the set name: set2
Enter the minimum score: 80
Enter the maximum score: 160
Members removed from set set2 within the specified score range.
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: ZRANGE
Enter the set name: set2
Enter the start index:(number) 0
Enter the stop index:(number) 0
Members in set set2, range [0, 0]:
Member: Weddy, Score: 23.000000
/HM1,3/SET,GET,LPUSH,RPUSH,LPOP,RPOP,LLEN,LRange,DELETE,INSERT,UPGRADE,FREE
/HM4/Enter 'add' to add a new tree, 'addnode' to add a new node, 'print' to print all trees,
/HM4/Enter 'search' to search for a node, 'delete' to delete node, 'exit' to quit
/HM5/Enter ZADD, ZCARD, ZRANGE, ZCOUNT, ZINTERSTORE, ZUNIONSTORE, ZRANGEBYSCORE, ZRANK, ZREVRANGE, ZREVRANGEBYSCORE, QUIT: QUIT
weijih@weijih-VirtualBox: ~/桌面/homework/hw5
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