

## C Language Programming: Homework #7

**Assigned on 12/15/2015(Tuesday), Due on 12/29/2015(Tuesday)**

This assignment allows you to practice processing numbers stored in a file. You are required to do the following:

- Input a number  $n$ , the number of numbers in a bucket, where  $n$  must not be less than the maximum number of numbers in a line of the input file.

<p>Original buckets</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>0</td><td>1,2,5,7</td></tr> <tr><td>1</td><td>2,3,5,7</td></tr> <tr><td>2</td><td>2,4,8</td></tr> <tr><td>3</td><td>2,3,8</td></tr> <tr><td>4</td><td>2,7</td></tr> <tr><td>5</td><td>1,3</td></tr> <tr><td>6</td><td>2</td></tr> <tr><td>7</td><td>1,5,6</td></tr> <tr><td>8</td><td>1,5,7</td></tr> </table>	0	1,2,5,7	1	2,3,5,7	2	2,4,8	3	2,3,8	4	2,7	5	1,3	6	2	7	1,5,6	8	1,5,7	<p>Direct mapping.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>0</td><td>1</td><td>2</td><td>5</td><td>7</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>5</td><td>7</td></tr> <tr><td>2</td><td>2</td><td>4</td><td>8</td><td></td></tr> <tr><td>3</td><td>2</td><td>3</td><td>8</td><td></td></tr> <tr><td>4</td><td>2</td><td>7</td><td></td><td></td></tr> <tr><td>5</td><td>1</td><td>3</td><td></td><td></td></tr> <tr><td>6</td><td>2</td><td></td><td></td><td></td></tr> <tr><td>7</td><td>1</td><td>5</td><td>6</td><td></td></tr> <tr><td>8</td><td>1</td><td>5</td><td>7</td><td></td></tr> </table>	0	1	2	5	7	1	2	3	5	7	2	2	4	8		3	2	3	8		4	2	7			5	1	3			6	2				7	1	5	6		8	1	5	7		<p>New mapping.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr><th>Bucket Index</th><th>bitmap</th></tr> </thead> <tbody> <tr><td>0</td><td>1111</td></tr> <tr><td>1</td><td>1111</td></tr> <tr><td>2</td><td>1110</td></tr> <tr><td>3</td><td>1011</td></tr> <tr><td>4</td><td>0101</td></tr> <tr><td>5</td><td>1100</td></tr> <tr><td>6</td><td>0100</td></tr> <tr><td>7</td><td>1011</td></tr> <tr><td>8</td><td>1011</td></tr> </tbody> </table>	Bucket Index	bitmap	0	1111	1	1111	2	1110	3	1011	4	0101	5	1100	6	0100	7	1011	8	1011	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>0</td><td>1</td><td>2</td><td>5</td><td>7</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>5</td><td>7</td></tr> <tr><td>2</td><td>2</td><td>4</td><td>8</td><td>3</td></tr> <tr><td>3</td><td>1</td><td>3</td><td>5</td><td>6</td></tr> </table>	0	1	2	5	7	1	2	3	5	7	2	2	4	8	3	3	1	3	5	6
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- Use the least number of buckets to store all the numbers in a file.
  - The following figure shows an example.
  - In addition to the main function, you need at least the following:
    - `int bucket_union(...)`
    - `int new_mapping(...)`
    - `void print_result(...)`, output total number of buckets
    - use the input file `buckets.in` and create two output files `mapping.out` and `buckets.out`
- output files example:

`mapping.out`  
(index bitmap)

0	1111
1	1111
2	1110
2	1011
...	
0	1011

`buckets.out`  
(Data)

1	2	5	7
1	3	5	7
2	4	8	3
1	3	5	6

We put the input file `buckets.in` at `/home/data/hw7`.

Score:

- Read/write file: 20%
- Logic: 30%
- Correctness: 30%
- Report: 20%