


RADIX SORT

The background of the slide is a solid black field. It is decorated with several flowing, ribbon-like shapes. In the top left corner, there are ribbons of yellow and orange that curve downwards. In the bottom left corner, there are ribbons of red and orange that curve upwards. In the bottom right corner, there are ribbons of blue and cyan that curve upwards. These ribbons have a slight gradient and a soft, ethereal glow, giving the impression of liquid or smoke in motion.



Radix Means : The base of a system of
numeration

Examples:

- The decimal number system that we use every day has 10 digits $\{0,1,2,3,4,5,6,7,8,9\}$ and so the radix is 10.

RADIX SORT

- Radix sort is generalization of bucket sort.
- It uses several passes of bucket sort.
- Radix sort is stable and fast.

RADIX SORT

- Unlike other sorting algorithms Radix sort is not based on the general algorithm strategy, but on a totally different method. It is interesting because it requires the absolute minimum amount of space and the minimum amount of data movement, and, most amazing of all, it does *no* comparisons.



CLASSIFICATIONS

1. Least Significant Digit (LSD) radix sorts
2. Most Significant Digit (MSD) radix sorts

LEAST SIGNIFICANT DIGIT (LSD) RADIX SORTS

Examples :

4310 , 357 , 251 , 78

EXAMPLE (LSD)

Input list :

126	328	636	341	416	131	328
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EXAMPLE (LSD)

BinSort on lower digit / Pass

1 :

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
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EXAMPLE (LSD)

BinSort on lower digit / Pass

1:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
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[illegible]

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
						12 <u>6</u>			

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
						12 <u>6</u>		32 <u>8</u>	

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
						12 <u>6</u> 63 <u>6</u>		32 <u>8</u>	

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	34 <u>1</u>					12 <u>6</u> 63 <u>6</u>		32 <u>8</u>	

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	34 <u>1</u>					12 <u>6</u> 63 <u>6</u> 41 <u>6</u>		32 <u>8</u>	

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	34 <u>1</u> 13 <u>1</u>					12 <u>6</u> 63 <u>6</u> 41 <u>6</u>		32 <u>8</u>	

EXAMPLE (LSD)

BinSort on lower digit:

12 <u>6</u>	32 <u>8</u>	63 <u>6</u>	34 <u>1</u>	41 <u>6</u>	13 <u>1</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	34 <u>1</u> 13 <u>1</u>					12 <u>6</u> 63 <u>6</u> 41 <u>6</u>		32 <u>8</u> 32 <u>8</u>	

EXAMPLE (LSD)

0	1	2	3	4	5	6	7	8	9
	34 <u>1</u> 13 <u>1</u>					12 <u>6</u> 63 <u>6</u> 41 <u>6</u>		32 <u>8</u> 32 <u>8</u>	

After Sorting:

34 <u>1</u>	13 <u>1</u>	12 <u>6</u>	63 <u>6</u>	41 <u>6</u>	32 <u>8</u>	32 <u>8</u>
-------------	-------------	-------------	-------------	-------------	-------------	-------------

EXAMPLE (LSD)

BinSort on next higher digit / Pass 2:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
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EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
				3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
			1 <u>3</u> 1	3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
		1 <u>2</u> 6	1 <u>3</u> 1	3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
		1 <u>2</u> 6	1 <u>3</u> 1 6 <u>3</u> 6	3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
	4 <u>1</u> 6	1 <u>2</u> 6	1 <u>3</u> 1 6 <u>3</u> 6	3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
	4 <u>1</u> 6	1 <u>2</u> 6 3 <u>2</u> 8	1 <u>3</u> 1 6 <u>3</u> 6	3 <u>4</u> 1					

EXAMPLE (LSD)

BinSort on next higher digit:

3 <u>4</u> 1	1 <u>3</u> 1	1 <u>2</u> 6	6 <u>3</u> 6	4 <u>1</u> 6	3 <u>2</u> 8	3 <u>2</u> 8
--------------	--------------	--------------	--------------	--------------	--------------	--------------

0	1	2	3	4	5	6	7	8	9
	4 <u>1</u> 6	1 <u>2</u> 6 3 <u>2</u> 8 3 <u>2</u> 8	1 <u>3</u> 1 6 <u>3</u> 6	3 <u>4</u> 1					

EXAMPLE (LSD)

0	1	2	3	4	5	6	7	8	9
	4 <u>1</u> 6	1 <u>2</u> 6 3 <u>2</u> 8 3 <u>2</u> 8	6 <u>3</u> 6	3 <u>4</u> 1					

After Sorting:

4 <u>1</u> 6	1 <u>2</u> 6	3 <u>2</u> 8	3 <u>2</u> 8	6 <u>3</u> 6	1 <u>3</u> 1	3 <u>4</u> 1
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EXAMPLE (LSD)

BinSort on next higher or highest digit/
Pass 3 :

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
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EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
				<u>4</u> 16					

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26			<u>4</u> 16					

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26		<u>3</u> 28	<u>4</u> 16					

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26		<u>3</u> 28 <u>3</u> 28	<u>4</u> 16					

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26 <u>1</u> 31		<u>3</u> 28 <u>3</u> 28	<u>4</u> 16					

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26 <u>1</u> 31		<u>3</u> 28 <u>3</u> 28	<u>4</u> 16		<u>6</u> 36			

EXAMPLE (LSD)

BinSort on next higher/highest digit:

<u>4</u> 16	<u>1</u> 26	<u>3</u> 28	<u>3</u> 28	<u>1</u> 31	<u>6</u> 36	<u>3</u> 41
-------------	-------------	-------------	-------------	-------------	-------------	-------------

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26 <u>1</u> 31		<u>3</u> 28 <u>3</u> 28 <u>3</u> 41	<u>4</u> 16		<u>6</u> 36			

EXAMPLE (LSD)

0	1	2	3	4	5	6	7	8	9
	<u>1</u> 26 1 <u>3</u> 1		<u>3</u> 28 <u>3</u> 28 <u>3</u> 41	<u>4</u> 16		<u>6</u> 36			

After Sorting:

<u>1</u> 26	<u>1</u> 31	<u>3</u> 28	<u>3</u> 28	<u>3</u> 41	<u>4</u> 16	<u>6</u> 36
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EXAMPLE (LSD)

Completed

126	131	328	328	341	416	636
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EXAMPLE (LSD)

The Numbers are now sorted

126	131	328	328	341	416	636
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Thank You