

**CSc 300 – Assignment #6 – Gamradt**  
**Due: 12-04-23 (Late: NONE ACCEPTED)**

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Show step by step how (1) Merge Sort and (2) Quick Sort would sort the following list in ascending order using the techniques discussed in class. Quick Sort uses a first element pivoting scheme. Clearly and neatly show and label all work. If no work is shown, 0 points will be earned. Submit this WORD document to **ken.gamradt@gmail.com** after you've added your solution to it.

43      12      32      20      14      39      21      28      48

## Merge Sort –

43   -   12   -   32   -   20   -   14   -   39   -   21   -   28   -   48      //Original List of 9 elements

43   -   12   -   32   -   20   -   14                      39   -   21   -   28   -   48      //Split into 2 lists

43   -   12   -   32                      20   -   14                      39   -   21                      28   -   48      //Split into 4 lists

43   -   12                      32                      20                      14                      39                      21                      28                      48      //Split into 8 lists

43                      12                      32                      20                      14                      39                      21                      28                      48      //Split into 9 lists  
(Splitting stops here since all lists are each a size of 1)

12   -   43                      20   -   32                      14   -   39                      21   -   28                      48      //Combine into pairs  
(Ommited the 48 based on what was shown in the slides)

12   -   20   -   32   -   43                      14   -   21   -   28   -   39                      48      //Combine into pairs

12   -   14   -   20   -   21   -   28   -   32   -   39   -   43                      48      //Combine into pairs

12   -   14   -   20   -   21   -   28   -   32   -   39   -   43   -   48      //Combine into pairs

# Quick Sort –

## With Gamradt’s Presentation Schema

**P** = Pivot element  
**L** = Left of pivot (smaller)  
**R** = Right of pivot (larger)  
**()**= Sorted

<b>43</b> P	-	<b>12</b> L	-	<b>32</b> L	-	<b>20</b> L	-	<b>14</b> L	-	<b>39</b> L	-	<b>21</b> L	-	<b>28</b> L	-	<b>48</b> L	//Original List of 9 elements
<b>12</b> P	-	<b>32</b> R	-	<b>20</b> R	-	<b>14</b> R	-	<b>39</b> R	-	<b>21</b> R	-	<b>28</b> R	-	<b>(43)</b>		<b>48</b> P	// After first partitioning
<b>(12)</b>	-	<b>32</b> P	-	<b>20</b> L	-	<b>14</b> L	-	<b>39</b> L	-	<b>21</b> L	-	<b>28</b> L				<b>(48)</b>	// After second partitioning
		<b>20</b> P	-	<b>14</b> L	-	<b>21</b> R	-	<b>28</b> R	-	<b>(32)</b>		<b>39</b> P					// After third partitioning
		<b>14</b> P	-	<b>(20)</b>	-	<b>21</b> P	-	<b>28</b> R				<b>(39)</b>					// After fourth partitioning
		<b>(14)</b>				<b>(21)</b>		<b>28</b> P									// After fifth partitioning
								<b>(28)</b>									// List size 1 is sorted
//Sorted List																	
<b>12</b>	-	<b>14</b>	-	<b>20</b>	-	<b>21</b>	-	<b>28</b>	-	<b>32</b>	-	<b>39</b>	-	<b>43</b>	-	<b>48</b>	

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### Full Work used to create the schema

<b>43</b>	-	<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>	-	<b>48</b>	//Original List of 9 elements
<b>(43)</b>	-	<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>	-	<b>48</b>	//Select 43 as pivot
<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>	-	<b>(43)</b>		<b>48</b>	//
<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>				<b>48</b>	//Split list into halves
<b>(12)</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>				<b>(48)</b>	//Select 12, 48 as pivots
<b>(12)</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>				<b>(48)</b>	//
		<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>					//Split list into halves
		<b>(32)</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>					//Select 32 as pivot
		<b>20</b>	-	<b>14</b>	-	<b>21</b>	-	<b>28</b>	-	<b>(32)</b>		<b>39</b>					//
		<b>20</b>	-	<b>14</b>	-	<b>21</b>	-	<b>28</b>				<b>39</b>					//Split list into halves
		<b>(20)</b>	-	<b>14</b>	-	<b>21</b>	-	<b>28</b>				<b>(39)</b>					//Select 20 and 30 as pivots
		<b>14</b>	-	<b>(20)</b>	-	<b>21</b>	-	<b>28</b>				<b>(39)</b>					//
		<b>14</b>				<b>21</b>	-	<b>28</b>									//
		<b>(14)</b>				<b>(21)</b>	-	<b>28</b>									//Select 14 and 21 as pivots
		<b>(14)</b>				<b>(21)</b>		<b>28</b>									//
								<b>28</b>									//
								<b>(28)</b>									//

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### Quick Glance View

<b>43</b>	-	<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>	-	<b>48</b>	// Original List of 9 elements
<b>12</b>	-	<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>				<b>48</b>	// After first partitioning
		<b>32</b>	-	<b>20</b>	-	<b>14</b>	-	<b>39</b>	-	<b>21</b>	-	<b>28</b>					// After second partitioning
		<b>20</b>	-	<b>14</b>	-	<b>21</b>	-	<b>28</b>				<b>39</b>					// After third partitioning
		<b>14</b>				<b>21</b>	-	<b>28</b>									// After fourth partitioning
								<b>28</b>									// After fifth partitioning
<b>12</b>	-	<b>14</b>	-	<b>20</b>	-	<b>21</b>	-	<b>28</b>	-	<b>32</b>	-	<b>39</b>	-	<b>43</b>	-	<b>48</b>	// Final sorted list