

DIGITAL ASSIGNMENT - I

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COURSE: SOFTWARE METRICS

COURSE CODE: SWE 2020

HALSTEAD METRICS

Halstead metrics is used for determining a quantitative measure of complexity directly from the operators and operands in the module to measure a program module's complexity directly from source code.

N_1 = number of unique (distinct operators)

N_2 = number of unique (distinct operands)

N_1 = Total no. of operators

N_2 = Total no. of operands

CODE: QUICK SORT

```
Void quick-sort ( int arr[20], int low, int high)
```

```
{ int pivot, j, temp, i;
```

```
  if ( low < high )
```

```
  { pivot = low;
```

```
    i = low;
```

```
    j = high;
```

```
  while ( i < j )
```

```
  {
```

```
    while ( (arr[i] <= arr[pivot]) && (i < high) )
```

```
    { i++;
```

```
    }
```

```
    while ( arr[j] > arr[pivot] )
```

```
    { j--;
```

```
  } if ( i < j )
```

```
  { temp = arr[i];
```

```
    arr[i] = arr[j];
```


arr[j] = temp;

}}

temp = arr[pivot];

arr[pivot] = arr[j];

arr[j] = temp;

quick-sort(arr, low, j-1);

quick-sort(arr, j+1, high);

}}

N1	N1	operator	N2	N2	Operand
1	1	int	1	6	pivot
2	6	{	2	12	j
3	6	}	3	5	temp
4	2	if	4	8	;
5	7	,	5	4	low
6	14	;	6	4	high
7	4	<	7	14	arr
8	8	=	8	2	quicksort
9	1	<=	9	2	1
10	12	[]			
11	8	(
12	8)			
13	1	&&			
14	1	++			
15	3	while			
16	1	>			
17	1	--			
18	1	-			
19	1	+			
19	73		9	57	

$$N = N_1 + N_2$$

$$= 130$$

$$V = N * \log_2(n)$$

$$n = n_1 + n_2 = 19 + 9 = 28$$

$$V = 130 * \log_2(28)$$

$$= 130 * (4.80735)$$

$$= 624.956$$

$$\text{Error} = \text{Volume} / 3000$$

$$= \frac{624.956}{3000} = 0.2083$$

$$\text{Difficulty } D = \left(\frac{n_1}{2} \right) * \left(\frac{N_2}{n_2} \right)$$

$$= \frac{n_1 * N_2}{n_2 * 2} = \frac{19 * 57}{9 * 2} = 60.166$$

$$\text{Effort} = D * V = 60.166 * 624.956$$

$$= 37601.1$$

$$\text{Time} = E * 18 = 2088.9 \text{ seconds}$$

$$\text{Program length } N^* = n_1 \log_2(n_1) + n_2 \log_2(n_2)$$

$$= 19 \log_2(19) + 9 \log_2(9)$$

$$= 19 * 4.247 + 9 * 3.169$$

$$= 80.693 + 28.521$$

$$= 109.214 \checkmark$$

$$n_2^* = i, j, \text{ pivot, temp,}$$

$$\text{Potential minimum value}$$

$$V^* = (2 + n_2^*) * \log_2(2 + n_2^*)$$

$$= (2 + 4) * \log_2(2 + 4)$$

$$= 6 * \log_2(6) = 15.48$$

$$\text{Program level } L = \frac{V^*}{V} = \frac{15.48}{624.96}$$

$$= 0.0247$$

$$\text{Estimated program level}$$

$$L^1 = 2^* (n_2) / (n_1) (N_2)$$

$$= 2^* (4) / (4) (57)$$

$$= 0.0166$$

— End —