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01:198:214:04 Systems Programming
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Linear search: comparing processes and threads

Preconditions for the test:

`(array size > partition size)`	array size must be greater than the partition size
`&& (array size > 1)`	array size must be 2 or greater
`&& (partition size > 0)`	partition size must be 1 or greater
`&& (array size % partition size == 0)`	array size must be divisible by partition size
	(this ensures each process/thread can do the same amount of work)

`&& (search key > -1) && (search key < array size)`

There are 3 test suites:

Control, Process, and Thread.

The control suite consists of 5 test cases that demonstrate a linear search algorithm on an array of 32-bit integers, using only one process. This will give a baseline for the results to follow from the other suites.

Both the **Process** and **Thread** suites each consist of 4 test sets; a test set is differentiated by the array partition size that will be designated to a process or thread during the linear search.

For example, `P0` is the first test set of the Process test suite, and `P0_0` is its first test case, which consists of a multiprocess linear search of an array of 500 32-bit integers; each process will search a unique 20-element partition within the array described

Each process/thread is assigned a unique partition to search, in pursuit of the user-defined key.

The key that will be used throughout all test cases will be **99**.

The denominations of array sizes are: `{ 500, 5000, 10000, 20000, 25000 }`
The designated partition sizes are: `{ 25, 50, 125, 250 }`

Each array size will be tested with the specified partition sizes;
the process/thread counts of each test vary according to the quotient of array size and partition size.

Control Suite - single process

Test case ID	Array size
C0_0	500
C0_1	5000
C0_2	10000
C0_3	20000
C0_4	25000

Process Suite - multiprocess

Test case ID	Partition size	Array size	Proc. count
P0_0	25	500	20
P0_1	25	5000	200
P0_2	25	10000	400
P0_3	25	20000	800
P0_4	25	25000	1000
P1_0	50	500	10
P1_1	50	5000	100
P1_2	50	10000	200
P1_3	50	20000	400
P1_4	50	25000	500
P2_0	125	500	4
P2_1	125	5000	40
P2_2	125	10000	80
P2_3	125	20000	160
P2_4	125	25000	200
P3_0	250	500	2
P3_1	250	5000	20
P3_2	250	10000	40
P3_3	250	20000	80
P3_4	250	25000	100

Thread Suite - multithreaded

Test case ID	Partition size	Array size	Thrd. count
T0_0	25	500	20
T0_1	25	5000	200
T0_2	25	10000	400
T0_3	25	20000	800
T0_4	25	25000	1000
T1_0	50	500	10
T1_1	50	5000	100
T1_2	50	10000	200
T1_3	50	20000	400
T1_4	50	25000	500
T2_0	125	500	4
T2_1	125	5000	40
T2_2	125	10000	80
T2_3	125	20000	160
T2_4	125	25000	200
T3_0	250	500	2
T3_1	250	5000	20
T3_2	250	10000	40
T3_3	250	20000	80
T3_4	250	25000	100