

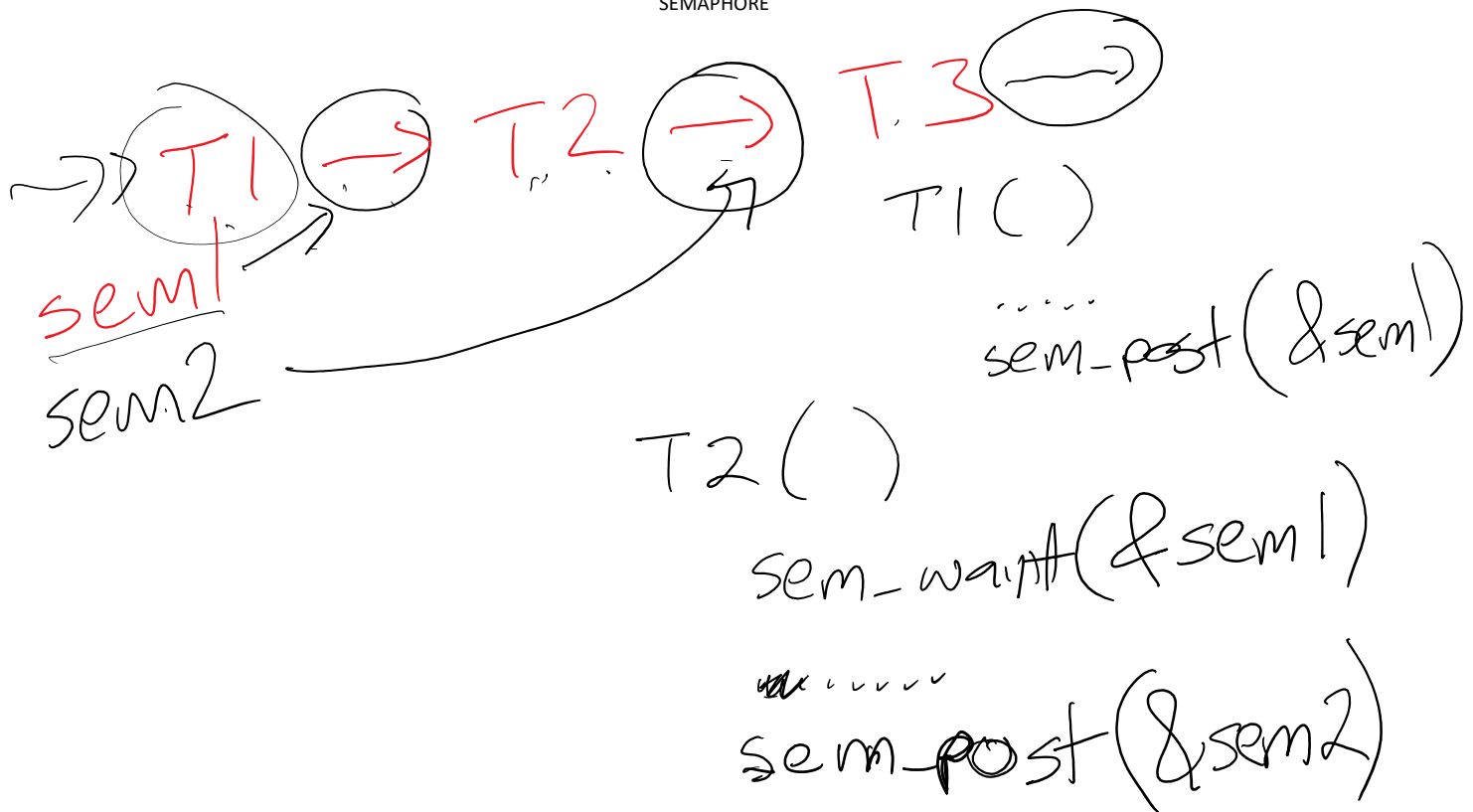
P5 released - Camellia sinensis

Academic honesty reminder

Examination

- 2 programming questions (1 serialised & 1 concurrency)
- write code, write comments
- upload to Canvas (no Ed)
- more information in week 13 Lecture

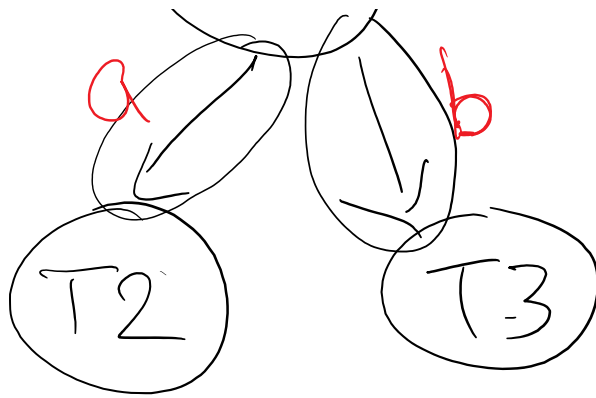
SEMAPHORE



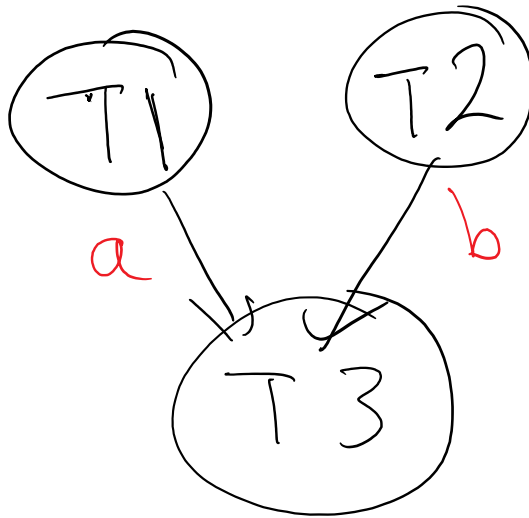
T3()
sem_wait(&sem2)



T1()
sem_post(&a)



sem_post(&a)
sem_post(&b)



T3() {
 sem_wait(&a)
 sem_wait(&b)

}

```
for(  $i = 0; i < 4; i++$  )
     $M[i] = i;$ 
```

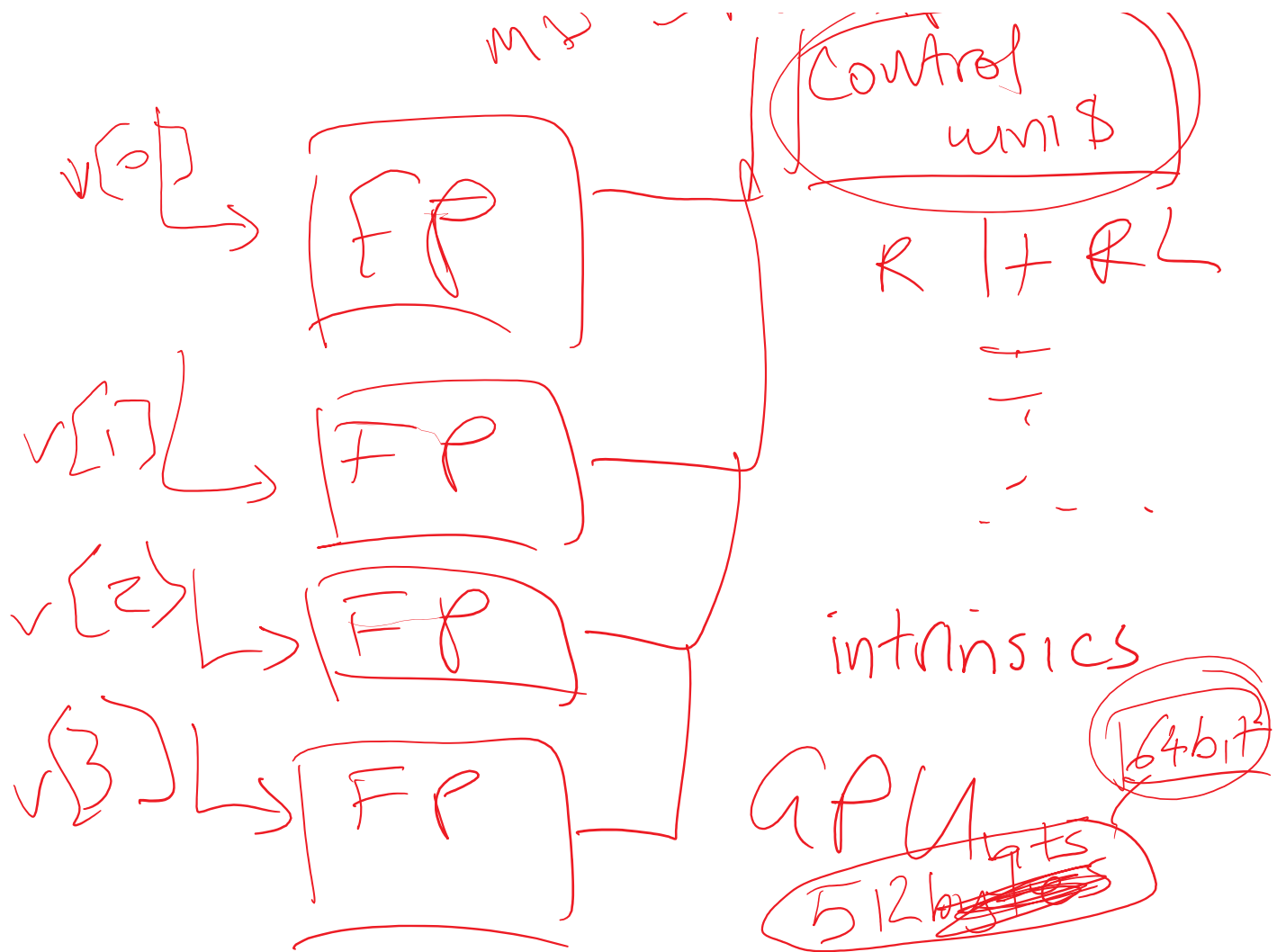
↓

$M[0] = 0$
 $M[1] = 1$
 $M[2] = 2$
 $M[3] = 3$

$$V_2 = V_2 + [3 \ 3 \ 3 \ 3]$$

$V[0] = V[0] + 3$
 $V[1] = V[1] + 3$
 $V[2] = V[2] + 3$
 $V[3] = V[3] + 3$

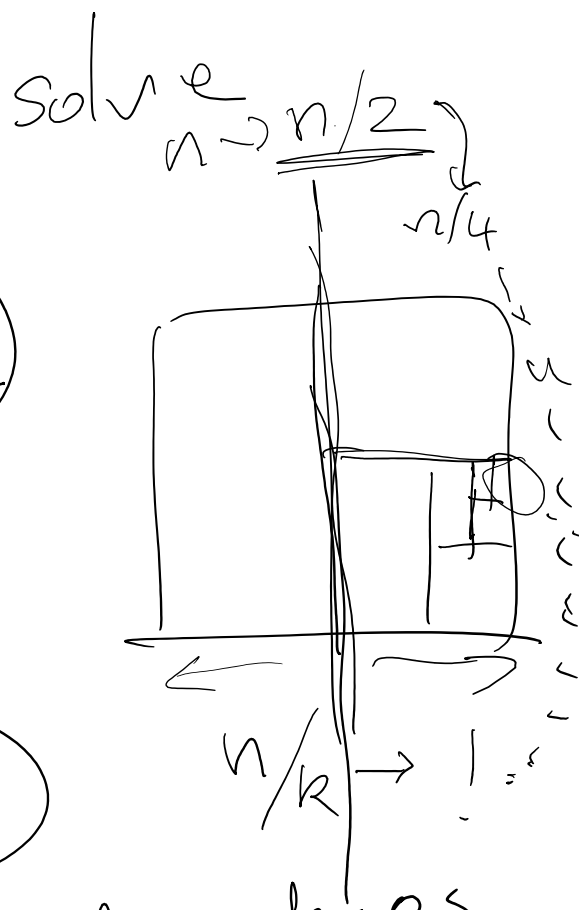
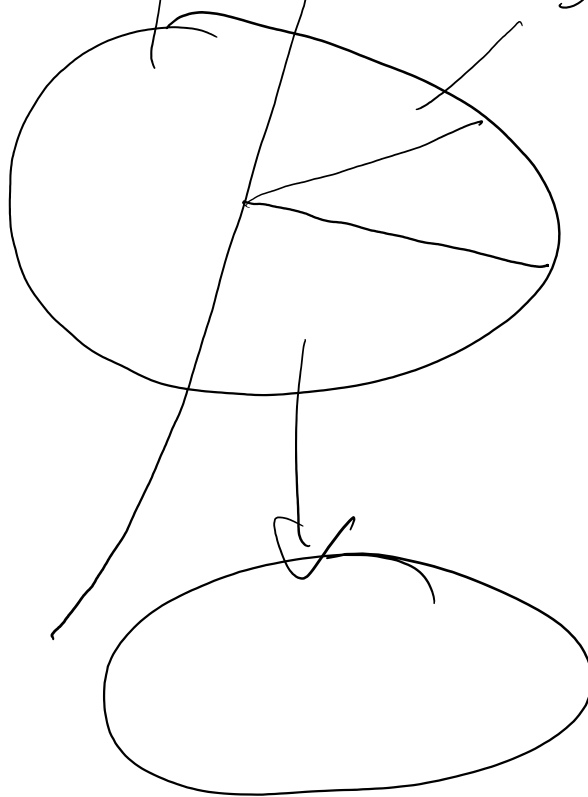
ST
 Single instruction
 MD - multiple data
 1/Control



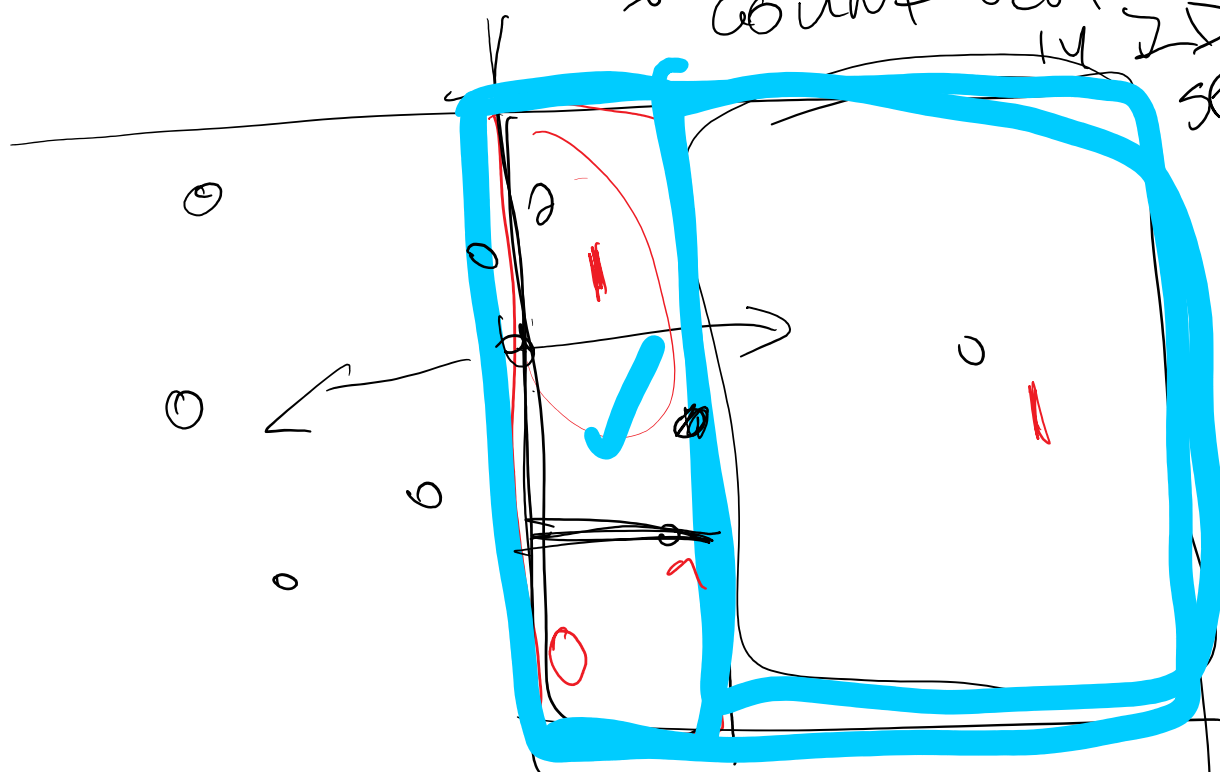
Divide and conquer

Friday, 21 May 2021 12:49 PM

Solve



count vertices
in 2D
space



add child 1 result
add child 2 result

+

add median point (==1)

3

← add child 1 3

11 1 2 11
add mod in 1

5

```
void problem ( int max_threads,  
               int *active_threads )
```

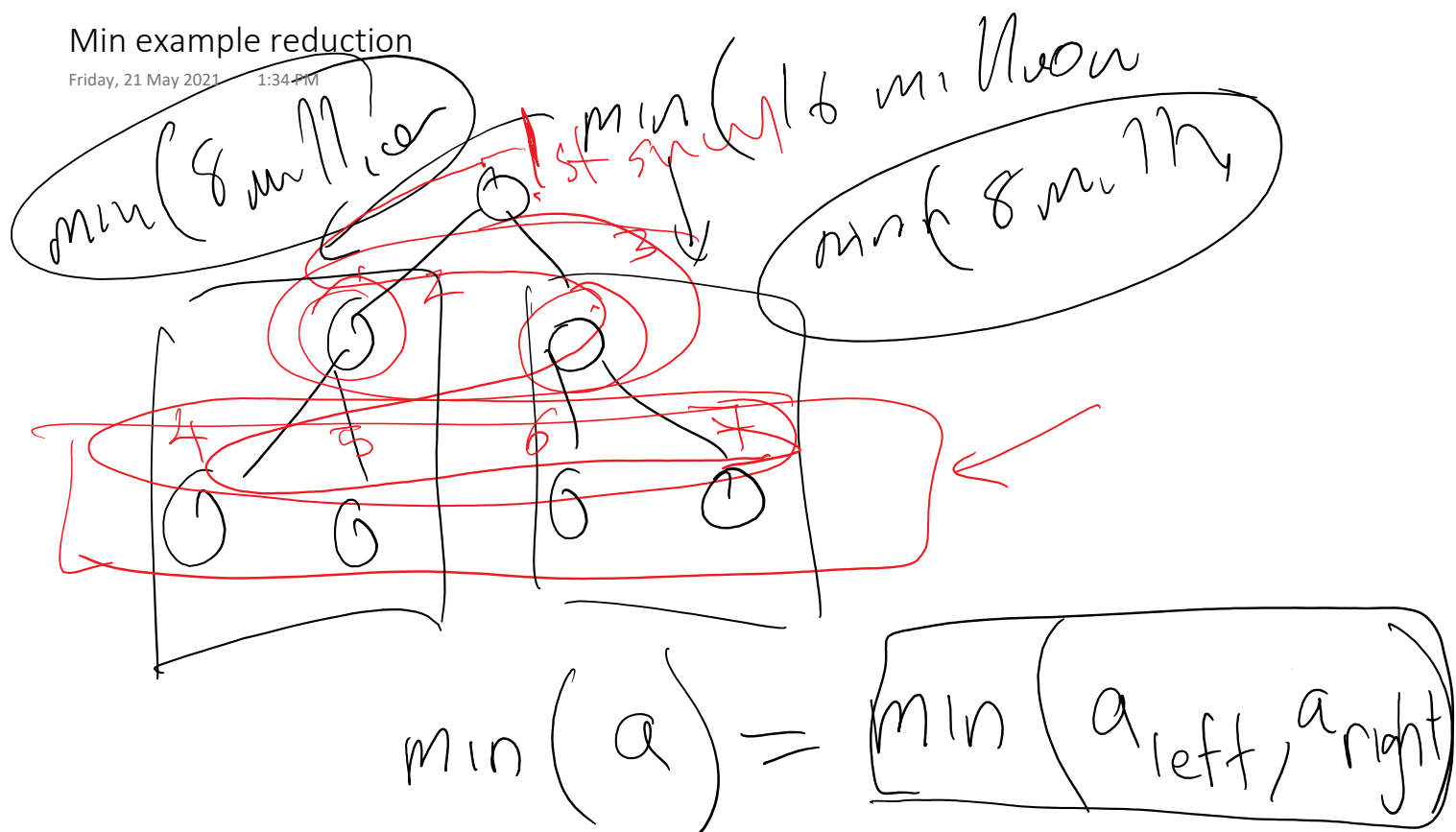
```
if ( *active_threads < max_threads )  
    pthread_create ( ... (problem)  
    *active_threads += 1;  
else problem ( ... );
```

```
main {
```

```
    int active_threads = 0;  
    int max_threads = 3;  
    problem ( max_threads, &active_threads )
```

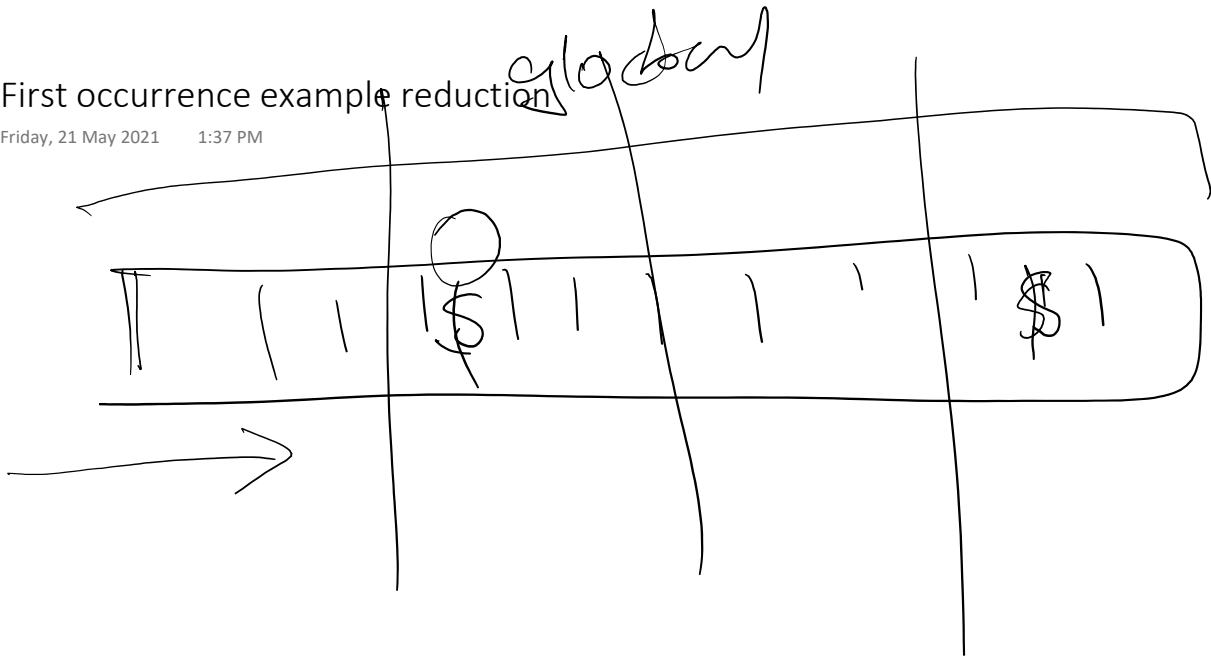
Friday, 21 May 2021 1:34 PM

Friday, 21 May 2021 1:34 PM



First occurrence example reduction

Friday, 21 May 2021 1:37 PM



if ~~(~~left~~ ~~right~~)~~
 $a_{left} = \text{solve}(A, 0, n/2)$

$a_{right} = \text{solve}(A, n/2, n)$

if ($a_{left} > 0$)
 return a_{left} ;

else
 return a_{right} ;

return a_{right};

Schwartz example with 16 threads

Friday, 21 May 2021 1:52 PM

16 threads

lock(&m);
sum += myresult[i];
unlock(&m)

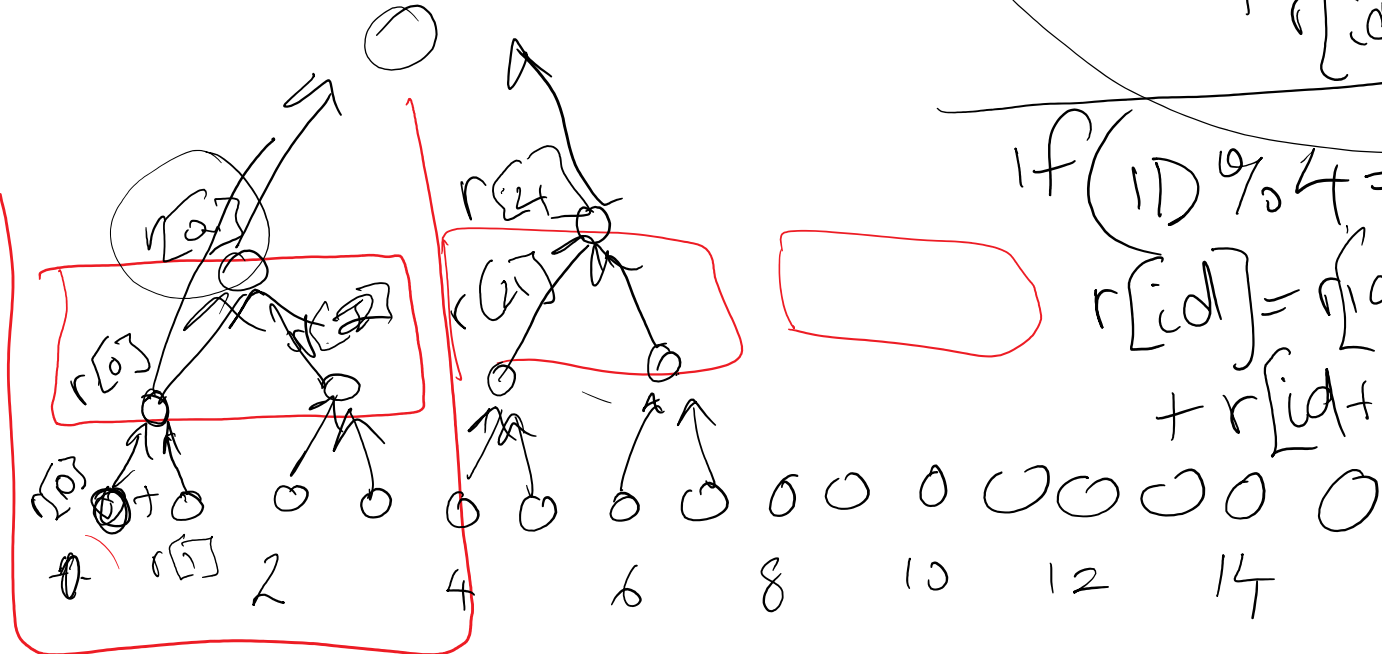


sum=0;

0, 1, 2, ..., 15
 $r[0] = r[0] + r[4]$

if (id % 2 == 0)
 $r[id] = r[id] + r[id+1]$

if (id % 4 == 0)
 $r[id] = r[id] + r[id+2];$



~~merge cost~~

transformation

1, 2, 3, ...
- - -

~~the~~ combin $O(n)$ time

4 threads for $4n$ time
global memory access

Schwartz

