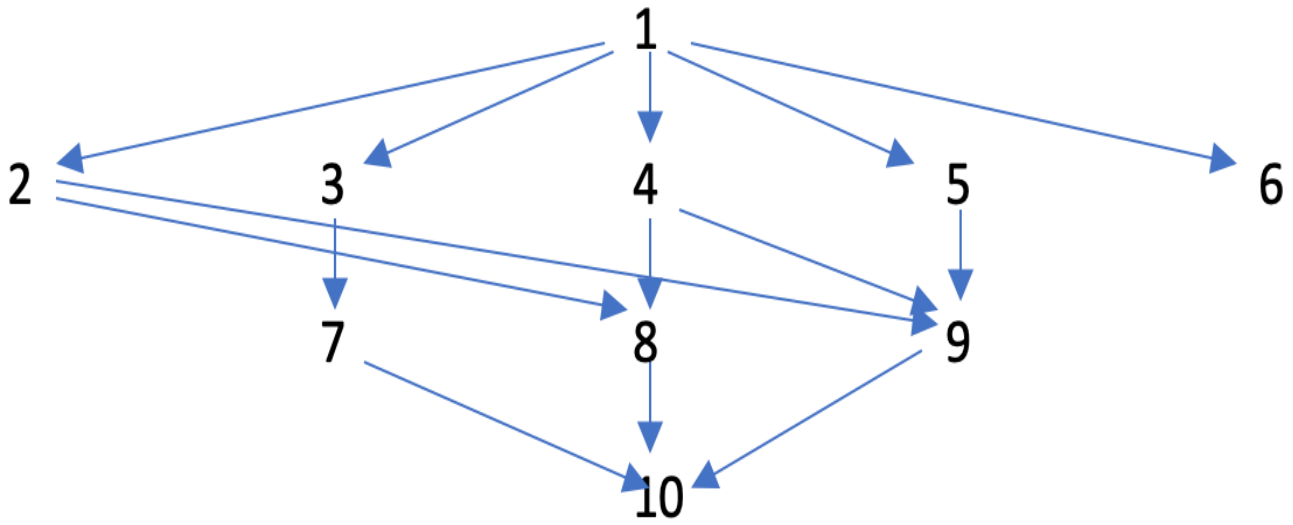
EECE7205 Final Project Report

Rohit Nair

NUID - 002924066

Task Graph 1

- Task Graph 1 consists of 10 tasks.
- There is one entry task and one exit task.



Execution Time for Task Graph 1

- Core 1 is the slowest and core 3 is the fastest

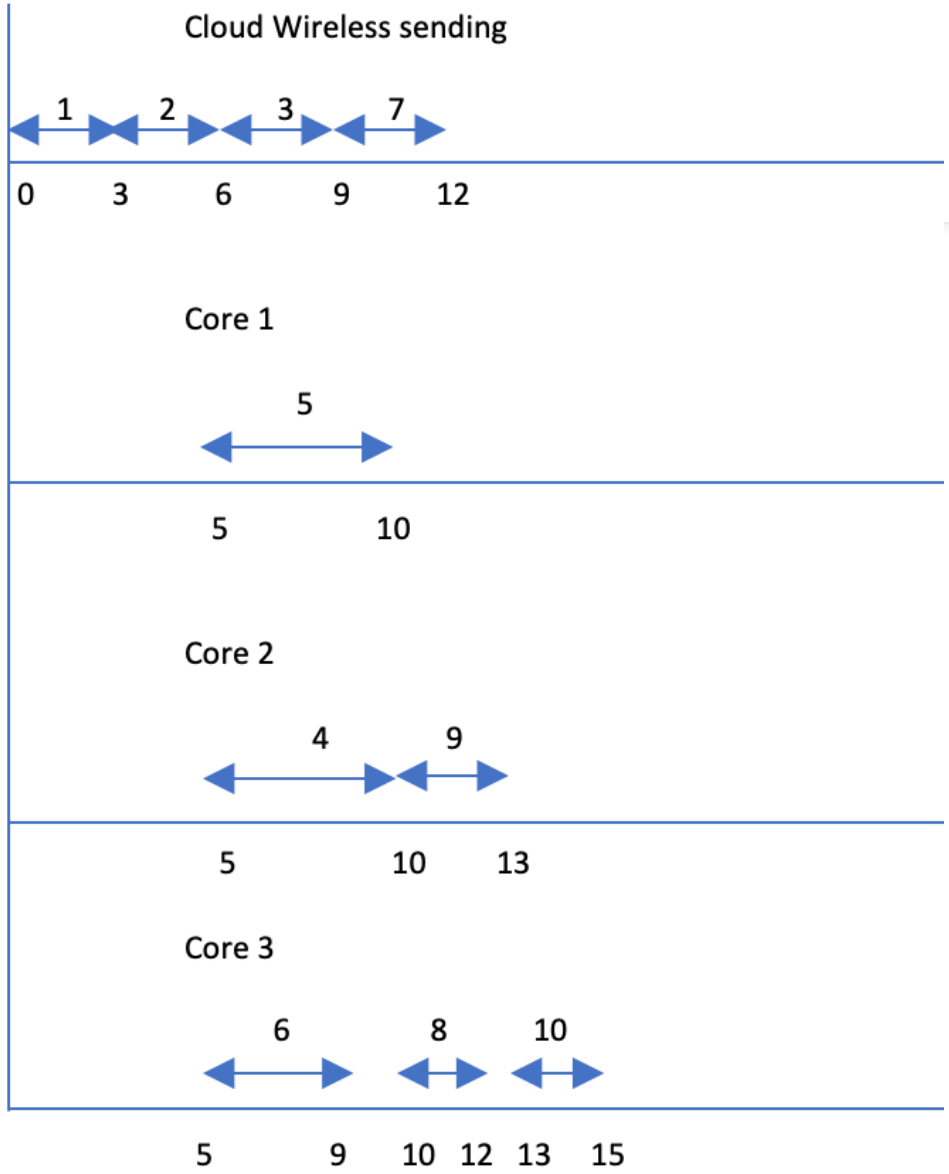
Task	Core 1	Core 2	Core 3
1	9	7	5
2	8	6	5
3	6	5	4
4	7	5	3
5	5	4	2
6	7	6	4
7	8	5	3
8	6	4	2
9	5	3	2
10	7	4	2

Initial scheduling for Task Graph 1

Program Output for initial scheduling – Program output provides scheduling times of respective tasks on the 3 cores and cloud.

Task Schedule on cloud processing is
Task = 1
Schedule = 3 to 4
Task = 2
Schedule = 6 to 7
Task = 3
Schedule = 9 to 10
Task = 7
Schedule = 12 to 13
Task Schedule on wireless receiving is
Task = 1
Schedule = 4 to 5
Task = 2
Schedule = 7 to 8
Task = 3
Schedule = 10 to 11
Task = 7
Schedule = 13 to 14
Task Schedule on cloud is
Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 7
Schedule = 9 to 12
Task Schedule on core 1 is
Task = 5
Schedule = 5 to 10
Task Schedule on core 2 is
Task = 4
Schedule = 5 to 10
Task = 9
Schedule = 10 to 13
Task Schedule on core 3 is
Task = 6
Schedule = 5 to 9
Task = 8
Schedule = 10 to 12
Task = 10
Schedule = 13 to 15
Total Energy = 59
Total time taken = 15
Program ended with exit code: 0

Initial scheduling Task graph –



- Task priority order is – 1,2,3,6,4,5,7,8,9,10

Comparison of code result with Task Graph from paper (Figure 3)

- Task Graph given in the paper is evidently different from the code output.
- One of the reasons for this difference is that, in the paper, entry tasks are necessarily scheduled only on cores and can't be scheduled on cloud. But in the code, this condition is not considered. Hence, task 1 is scheduled on cloud and not on core as cloud tasks take the least time.
- Another reason for the difference is that the task priority calculated in code is different from that of the paper. The ordered task priority as per the code output is – 1,2,3,6,4,5,7,8,9,10
- Due to these differences, total time taken as per the code result is 15 , which is 3 units faster than the result published in paper.

Program output for energy consumption (Initial scheduling)

Total Energy = 59
Total time taken = 15
Program ended with exit code: 0

- The last task is Task 10 on core 3. Total time taken is 15
- Thus T_max = 1.5 * 15 = 22.5
- The total energy consumption on core is 59

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	2	5	2*5
5	1	5	1*5
6	4	4	4*4
7	0.5	3	0.5 * 3
8	4	2	4*2
9	2	3	2*3
10	4	2	4*2
Total energy			59

Final scheduling for Task Graph 1

Program Output for Final scheduling

Task Schedule on cloud is

Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 4
Schedule = 9 to 12
Task = 5
Schedule = 12 to 15
Task = 7
Schedule = 15 to 18

Task Schedule on core 1 is

Task = 6
Schedule = 5 to 12
Task = 8
Schedule = 14 to 20

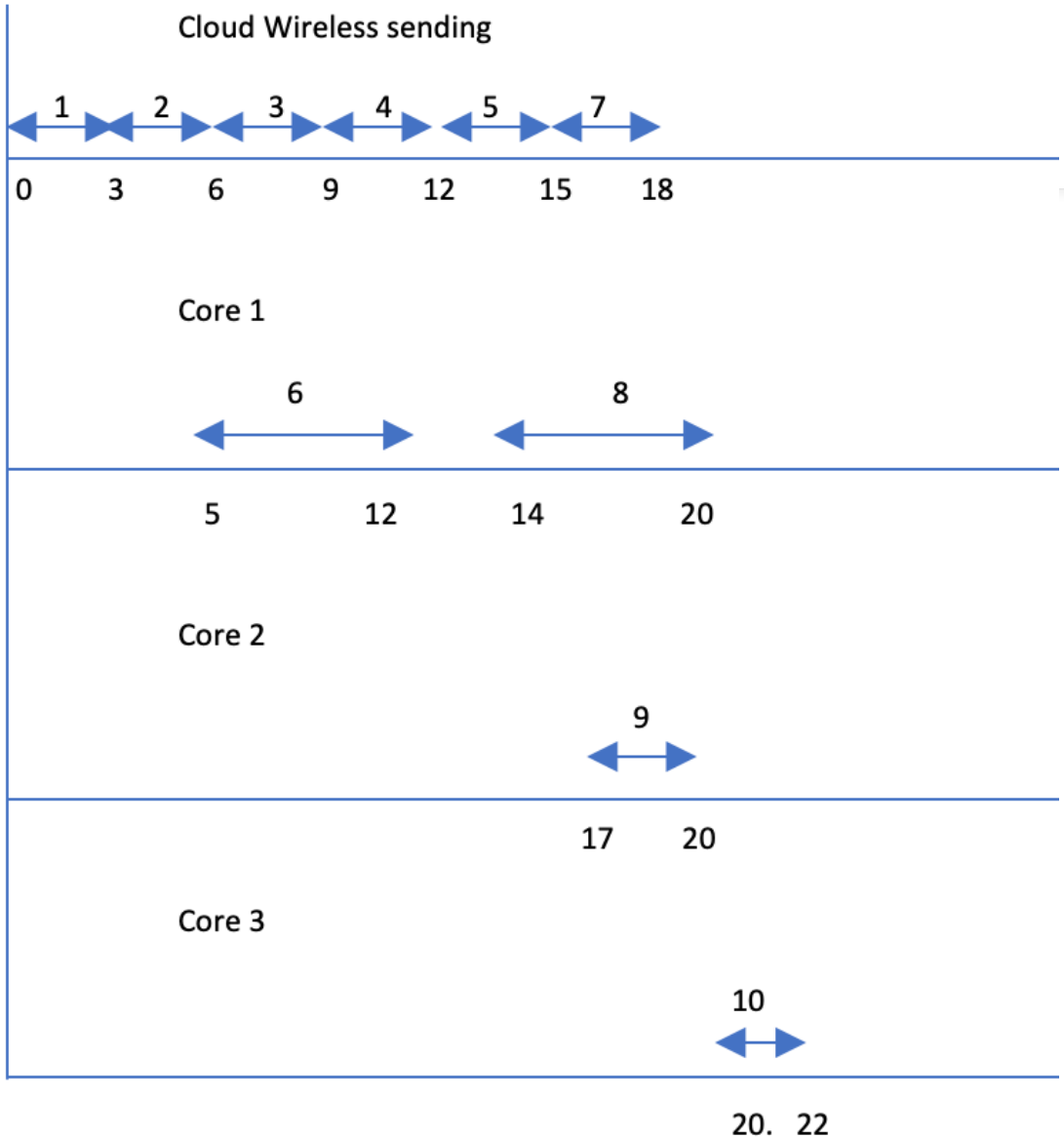
Task Schedule on core 2 is

Task = 9
Schedule = 17 to 20

Task Schedule on core 3 is

Task = 10
Schedule = 20 to 22

Final scheduling Task graph 1 –



Program output for energy consumption (Final scheduling)

$$Total\ Energy\ = 36$$
$$Total\ Time\ taken\ = 22$$

- The last task is Task 10 on core. Total time taken is 22, which is lesser than T_max.
- The total energy consumption on core is 36
- Energy consumption has decreased as compared to the initial scheduling, while Total time taken is lesser than T_max derived.

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	0.5	3	0.5 * 3
5	0.5	3	0.5 * 3
6	1	7	1*7
7	0.5	3	0.5 * 3
8	1	6	1*6
9	2	3	2*3
10	4	2	4*2
Total energy			36

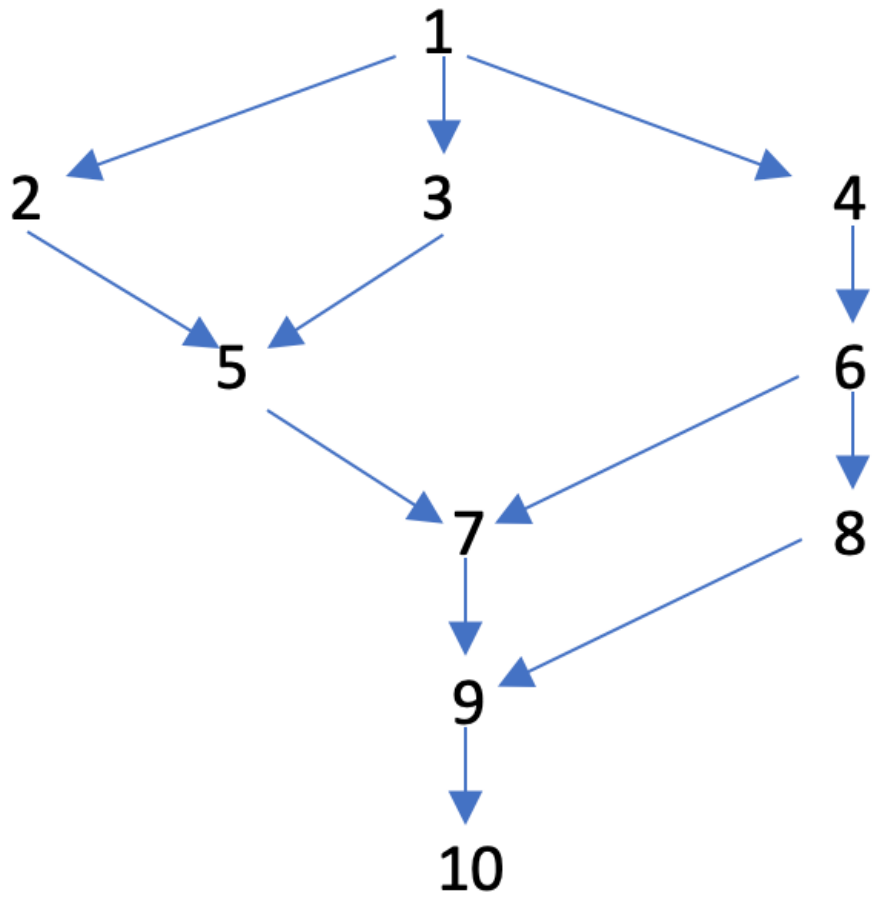
Summary of Task Graph 1

- The total time taken for **Initial scheduling** is 15. Thus,
  T_max = 1.5 * 15 = 22.5
- Total time taken for **Final scheduling** is 22.
- Compared to initial scheduling, Energy consumption in final scheduling is lesser while time constraint is also considered.

	Value
T_total (initial scheduling)	15
T_total (final scheduling)	22
E_total (initial scheduling)	59
E_total (initial scheduling)	36

Task Graph 2

- Task Graph 2 consists of 10 tasks.
- There is one entry task and one exit task.



Execution Time for Task Graph 2

- Core 1 is the slowest and core 3 is the fastest

Task	Core 1	Core 2	Core 3
1	9	7	5
2	8	6	5
3	6	5	4
4	7	5	3
5	5	4	2
6	7	6	4
7	8	5	3
8	6	4	2
9	5	3	2
10	7	4	2

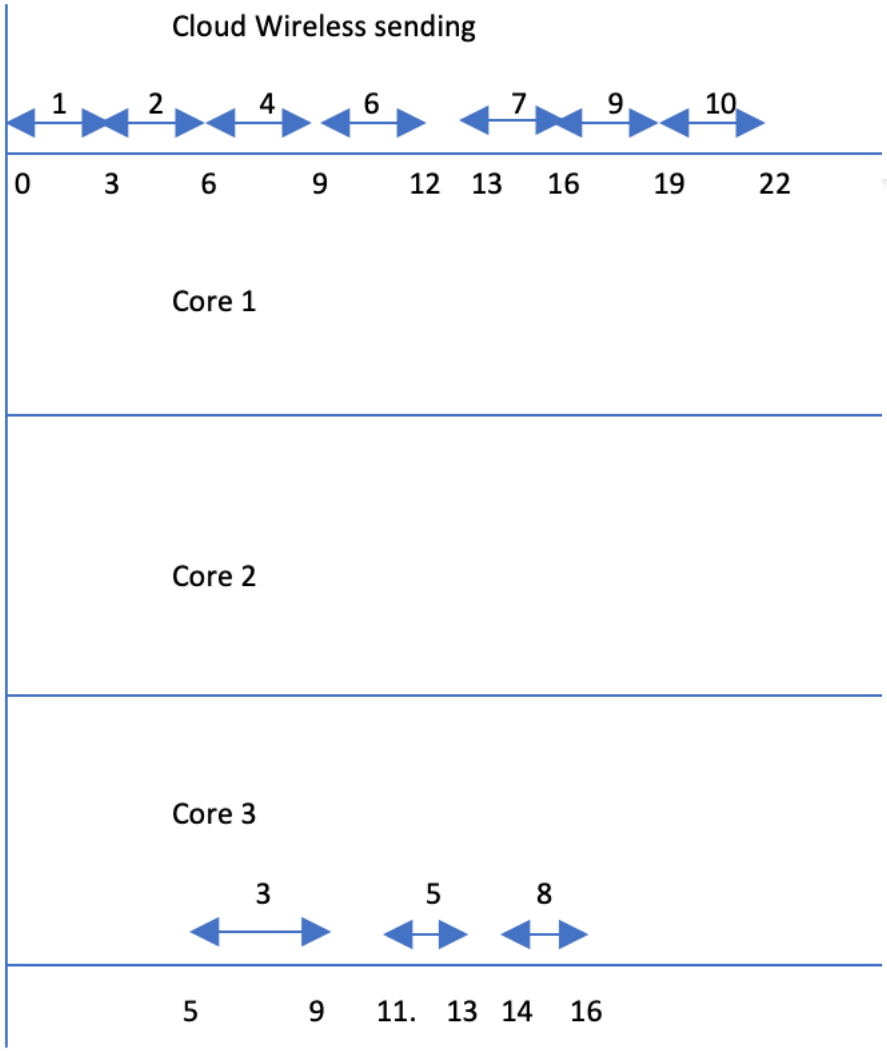
Initial scheduling for Task Graph 2

Program Output for initial scheduling – Program output provides time scheduling of each task in the 3 cores and cloud.

Task Schedule on cloud processing is
Task = 1
Schedule = 3 to 4
Task = 2
Schedule = 9 to 10
Task = 4
Schedule = 6 to 7
Task = 6
Schedule = 12 to 13
Task = 7
Schedule = 16 to 17
Task = 9
Schedule = 19 to 20
Task = 10
Schedule = 22 to 23
Task Schedule on wireless receiving is
Task = 1
Schedule = 4 to 5
Task = 2
Schedule = 10 to 11
Task = 4
Schedule = 7 to 8
Task = 6
Schedule = 13 to 14
Task = 7
Schedule = 17 to 18
Task = 9
Schedule = 20 to 21
Task = 10
Schedule = 23 to 24

Task Schedule on cloud is
Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 6 to 9
Task = 4
Schedule = 3 to 6
Task = 6
Schedule = 9 to 12
Task = 7
Schedule = 13 to 16
Task = 9
Schedule = 16 to 19
Task = 10
Schedule = 19 to 22
Task Schedule on core 1 is
Task Schedule on core 2 is
Task Schedule on core 3 is
Task = 3
Schedule = 5 to 9
Task = 5
Schedule = 11 to 13
Task = 8
Schedule = 14 to 16
Total Energy = 42.5
Total time taken = 24

Initial scheduling Task graph –



- Task priority order is – 1,4,2,3,6,5,7,8,9,10

Program output for energy consumption (Initial scheduling)

Total Energy = 42.5
Total time taken = 24
Program ended with exit code: 0

- The last task is Task 10 on cloud. Considering the time taken for cloud processing(1) and the time for wireless sending(1) , Total time taken is 24
- Thus T_max = 1.5 * 24 = 36
- The total energy consumption on core is 42.5

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	4	4	4*4
4	0.5	2	0.5 * 3
5	4	3	4*2
6	0.5	3	0.5 * 3
7	0.5	3	0.5 * 3
8	4	2	4*2
9	0.5	3	0.5 * 3
10	0.5	3	0.5 * 3
Total energy			42.5

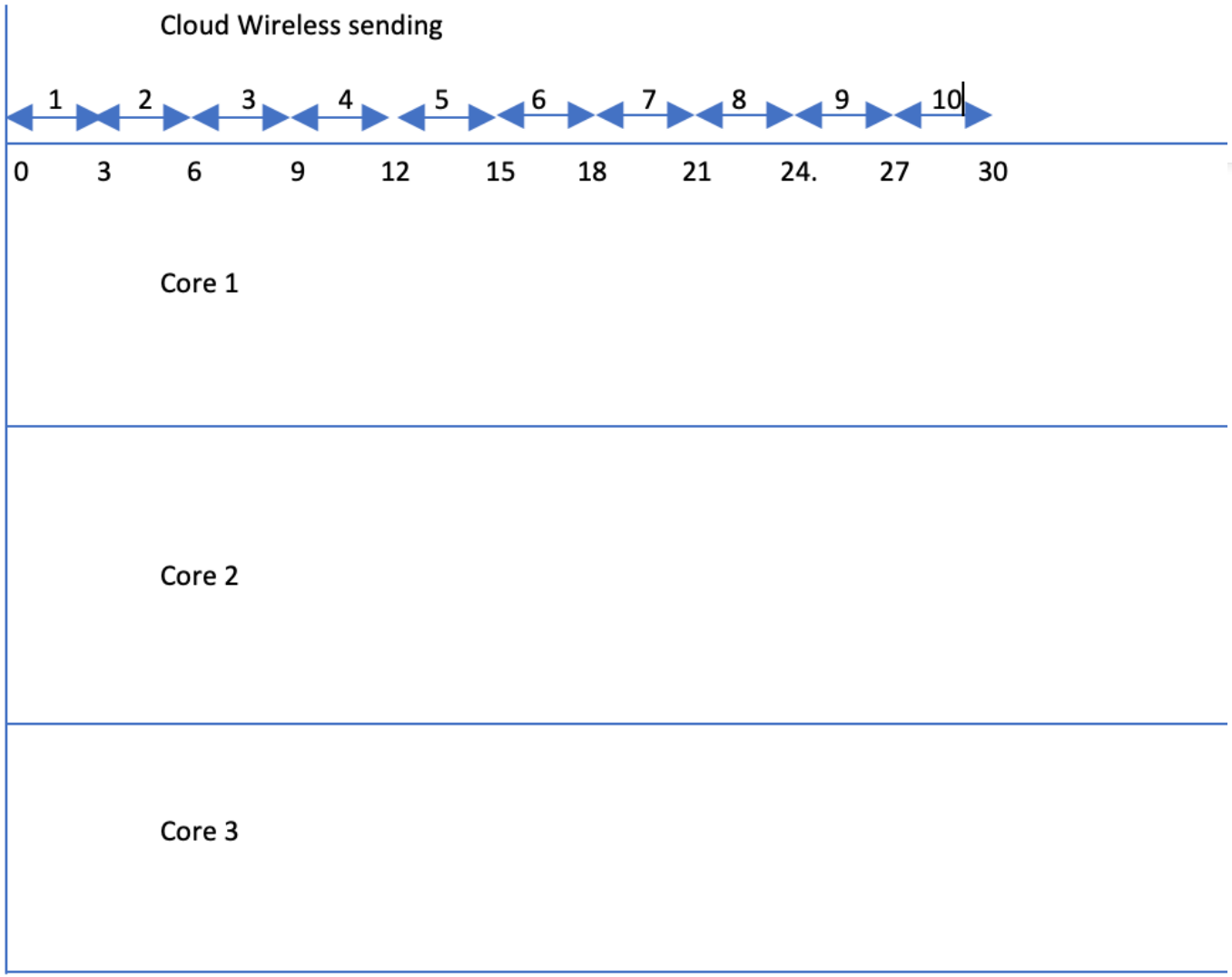
Final scheduling for Task Graph 2

Program Output for Final scheduling

Task Schedule on cloud is

Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 4
Schedule = 9 to 12
Task = 5
Schedule = 12 to 15
Task = 6
Schedule = 15 to 18
Task = 7
Schedule = 18 to 21
Task = 8
Schedule = 21 to 24
Task = 9
Schedule = 24 to 27
Task = 10
Schedule = 27 to 30
Task Schedule on core 1 is
Task Schedule on core 2 is
Task Schedule on core 3 is

Final scheduling Task graph 2 –



Program output for energy consumption (Final scheduling)

$$Total\ Energy\ = 15$$
$$Total\ Time\ taken\ = 32$$

- The last task is Task 10 on cloud. Total time taken is 32, which is lesser than T_max.
- The total energy consumption on core is 15
- Energy consumption has decreased as compared to the initial scheduling, while Total time taken is lesser than T_max derived.

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	0.5	3	0.5 * 3
5	0.5	3	0.5 * 3
6	0.5	3	0.5 * 3
7	0.5	3	0.5 * 3
8	0.5	3	0.5 * 3
9	0.5	3	0.5 * 3
10	0.5	3	0.5 * 3
Total energy			15

Summary of Task Graph 2

- The total time taken for **Initial scheduling** is 24. Thus,

  T_max = 1.5 * 15 = 36

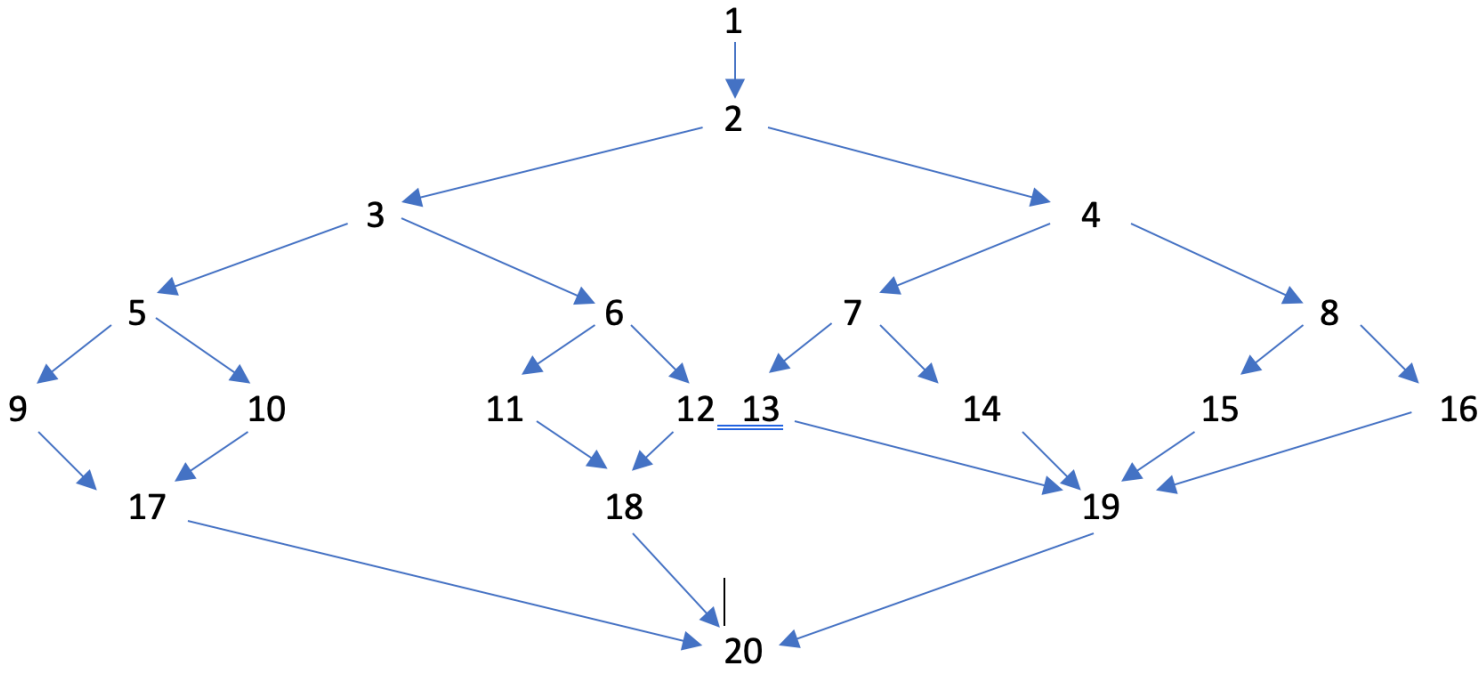
- Total time taken for **Final scheduling** is 32.

- Compared to initial scheduling, Energy consumption in final scheduling is lesser while time constraint is also considered.

	Value
T_total (initial scheduling)	24
T_total (final scheduling)	32
E_total (initial scheduling)	42.5
E_total (initial scheduling)	15

Task Graph 3

- Task Graph 3 consists of 20 tasks.
- There is one entry task and one exit task.



Execution Time for Task Graph 3

- Core 1 is the slowest and core 3 is the fastest

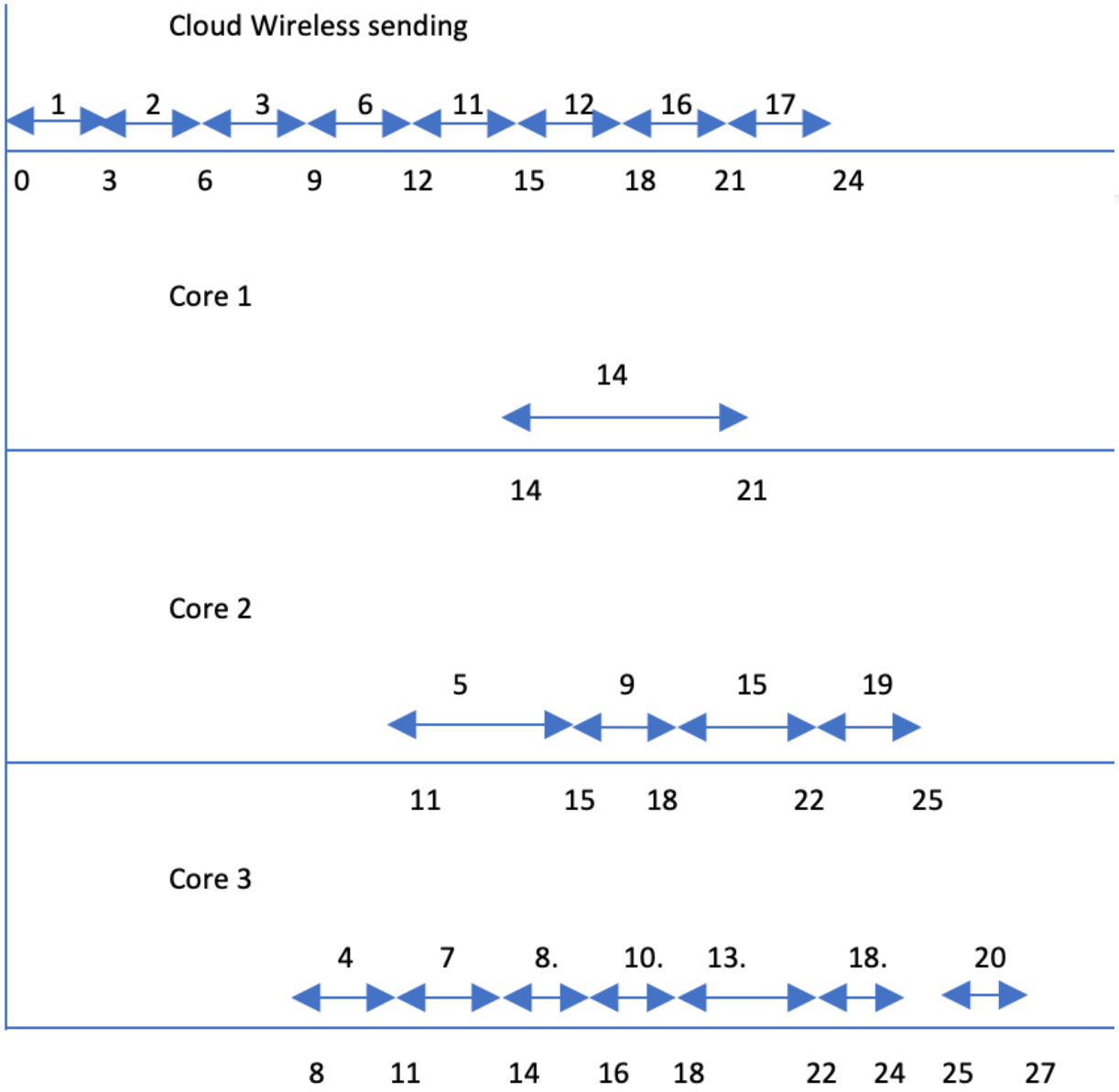
Task	Core 1	Core 2	Core 3
1	9	7	5
2	8	6	5
3	6	5	4
4	7	5	3
5	5	4	2
6	7	6	4
7	8	5	3
8	6	4	2
9	5	3	2
10	7	4	2
11	9	7	5
12	8	6	5
13	6	5	4
14	7	5	3
15	5	4	2
16	7	6	4
17	8	5	3
18	6	4	2
19	5	3	2
20	7	4	2

Initial scheduling for Task Graph 3

Program Output for initial scheduling – Program output provides time scheduling of each task in the 3 cores and cloud.

Task Schedule on cloud processing is
Task = 1
Schedule = 3 to 4
Task = 2
Schedule = 6 to 7
Task = 3
Schedule = 9 to 10
Task = 6
Schedule = 12 to 13
Task = 11
Schedule = 15 to 16
Task = 12
Schedule = 18 to 19
Task = 16
Schedule = 21 to 22
Task = 17
Schedule = 24 to 25
Task Schedule on wireless receiving is
Task = 1
Schedule = 4 to 5
Task = 2
Schedule = 7 to 8
Task = 3
Schedule = 10 to 11
Task = 6
Schedule = 13 to 14
Task = 11
Schedule = 16 to 17
Task = 12
Schedule = 19 to 20
Task = 16
Schedule = 22 to 23
Task = 17
Schedule = 25 to 26
Task Schedule on wireless sending
Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 6
Schedule = 9 to 12
Task = 11
Schedule = 12 to 15
Task = 12
Schedule = 15 to 18
Task = 16
Schedule = 18 to 21
Task = 17
Schedule = 21 to 24
Task Schedule on core 1 is
Task = 14
Schedule = 14 to 21
Task Schedule on core 2 is
Task = 5
Schedule = 11 to 15
Task = 9
Schedule = 15 to 18
Task = 15
Schedule = 18 to 22
Task = 19
Schedule = 22 to 25
Task Schedule on core 3 is
Task = 4
Schedule = 8 to 11
Task = 7
Schedule = 11 to 14
Task = 8
Schedule = 14 to 16
Task = 10
Schedule = 16 to 18
Task = 13
Schedule = 18 to 22
Task = 18
Schedule = 22 to 24
Task = 20
Schedule = 25 to 27
Total Energy = 119
Total time taken = 27
Program ended with exit code: 0

Initial scheduling Task graph –



- Task priority order is – 1,2,3,6,4,11,7,5,8,12,10,16,9,14,13,15, 17,18,19,20

Program output for energy consumption (Initial scheduling)

Total Energy = 119
Total time taken = 27
Program ended with exit code: 0

- The last task is Task 20 on core 3. Total time taken is 27.
- Thus T_max = 1.5 * 27 = 40.5
- The total energy consumption on core is 119

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Task	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	4	3	4*3
5	2	4	2*4
6	0.5	3	0.5 * 3
7	4	3	4*3
8	4	2	4*2
9	2	3	2*3
10	4	2	4*2
11	0.5	3	0.5 * 3
12	0.5	3	0.5 * 3
13	4	4	4*4
14	1	7	1*7
15	2	4	2*4
16	0.5	3	0.5 * 3
17	0.5	3	0.5 * 3
18	4	2	4*2
19	2	3	2*3
20	4	2	4*2
Total energy			119

Final scheduling for Task Graph 3

Program Output for Final scheduling

Task Schedule on cloud is

Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 4
Schedule = 9 to 12
Task = 5
Schedule = 12 to 15
Task = 6
Schedule = 15 to 18
Task = 7
Schedule = 18 to 21
Task = 8
Schedule = 21 to 24
Task = 9
Schedule = 24 to 27
Task = 10
Schedule = 27 to 30
Task = 11
Schedule = 30 to 33
Task = 17
Schedule = 33 to 36

Task Schedule on core 1 is

Task = 12
Schedule = 20 to 28
Task = 13
Schedule = 28 to 34

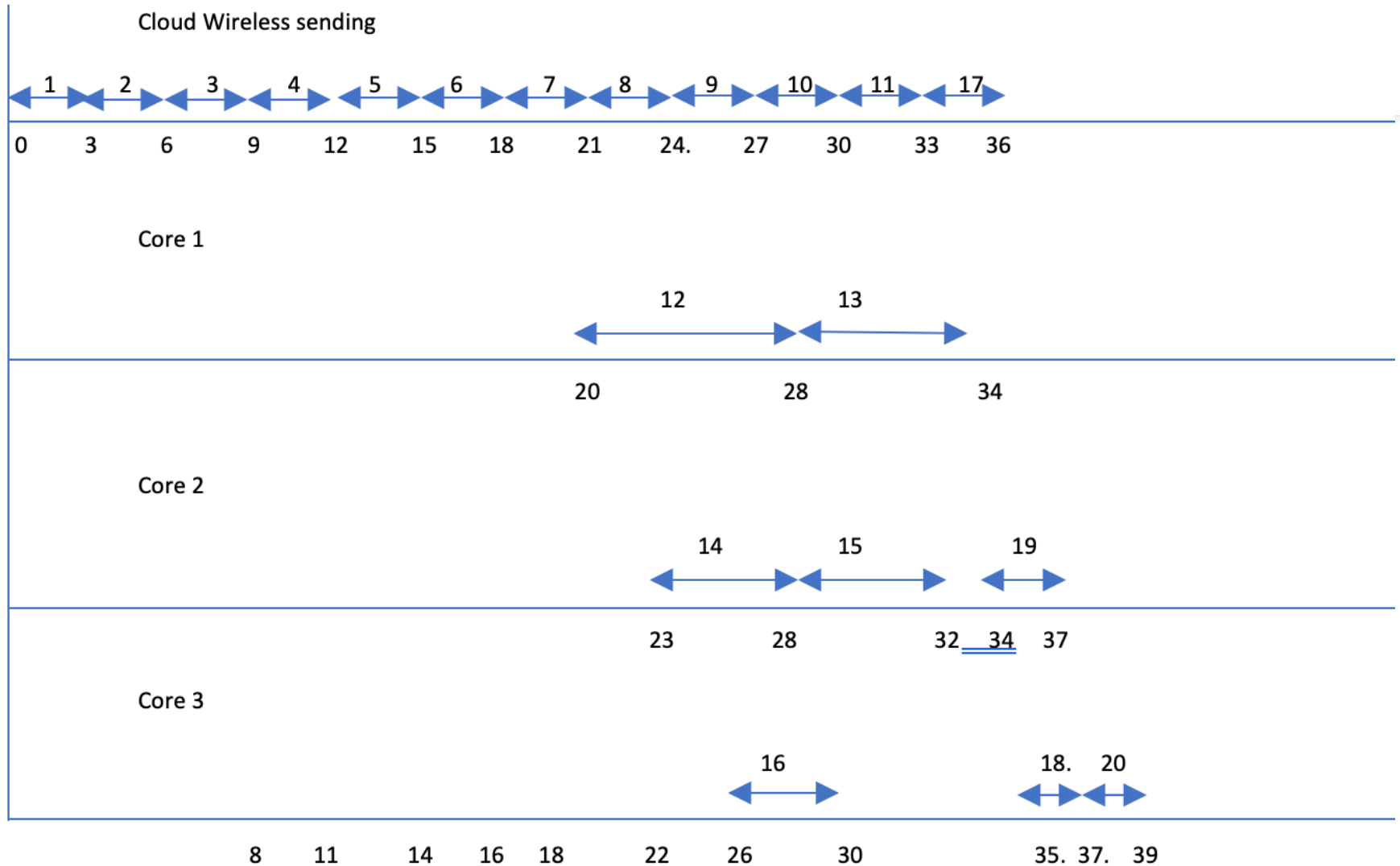
Task Schedule on core 2 is

Task = 14
Schedule = 23 to 28
Task = 15
Schedule = 28 to 32
Task = 19
Schedule = 34 to 37

Task Schedule on core 3 is

Task = 16
Schedule = 26 to 30
Task = 18
Schedule = 35 to 37
Task = 20
Schedule = 37 to 39
92988Program ended with exit code: 0

Final scheduling Task graph 3 –



Program output for energy consumption (Final scheduling)

Total Energy = 88
Total Time taken = 39

- The last task is Task 20 on core 3. Total time taken is 39, which is lesser than the T_max calculated.
- The total energy consumption on core is 88
- Energy consumption has decreased as compared to the initial scheduling, while Total time taken is lesser than T_max derived.

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	0.5	3	0.5 * 3
5	0.5	3	0.5 * 3
6	0.5	3	0.5 * 3
7	0.5	3	0.5 * 3
8	0.5	3	0.5 * 3
9	0.5	3	0.5 * 3
10	0.5	3	0.5 * 3
11	0.5	3	0.5 * 3
12	1	8	1*8
13	1	6	1*6
14	2	5	2*5
15	2	4	2*4
16	4	4	4*4
17	0.5	3	0.5 * 3
18	4	3	4*3
19	4	2	4*2
20	4	2	4*2
Total energy			88

Summary of Task Graph 3

- The total time taken for **Initial scheduling** is 27. Thus,

  T_max = 1.5 * 15 = 40.5

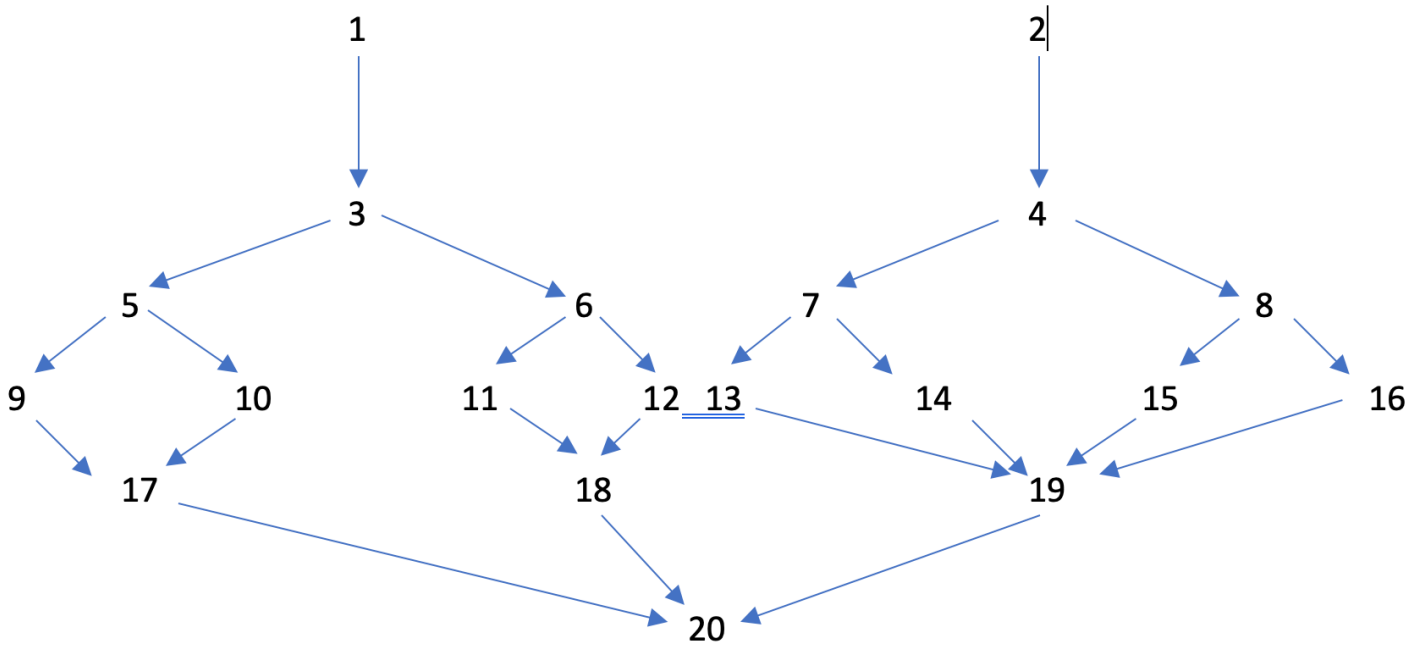
- Total time taken for **Final scheduling** is 39.

- Compared to initial scheduling, Energy consumption in final scheduling is lesser while time time constrain is also considered.

	Value
T_total (initial scheduling)	27
T_total (final scheduling)	39
E_total (initial scheduling)	119
E_total (initial scheduling)	88

Task Graph 4

- Task Graph 4 consists of 20 tasks.
- There are 2 entry tasks and one exit task.



Execution Time for Task Graph 4

- Core 1 is the slowest and core 3 is the fastest

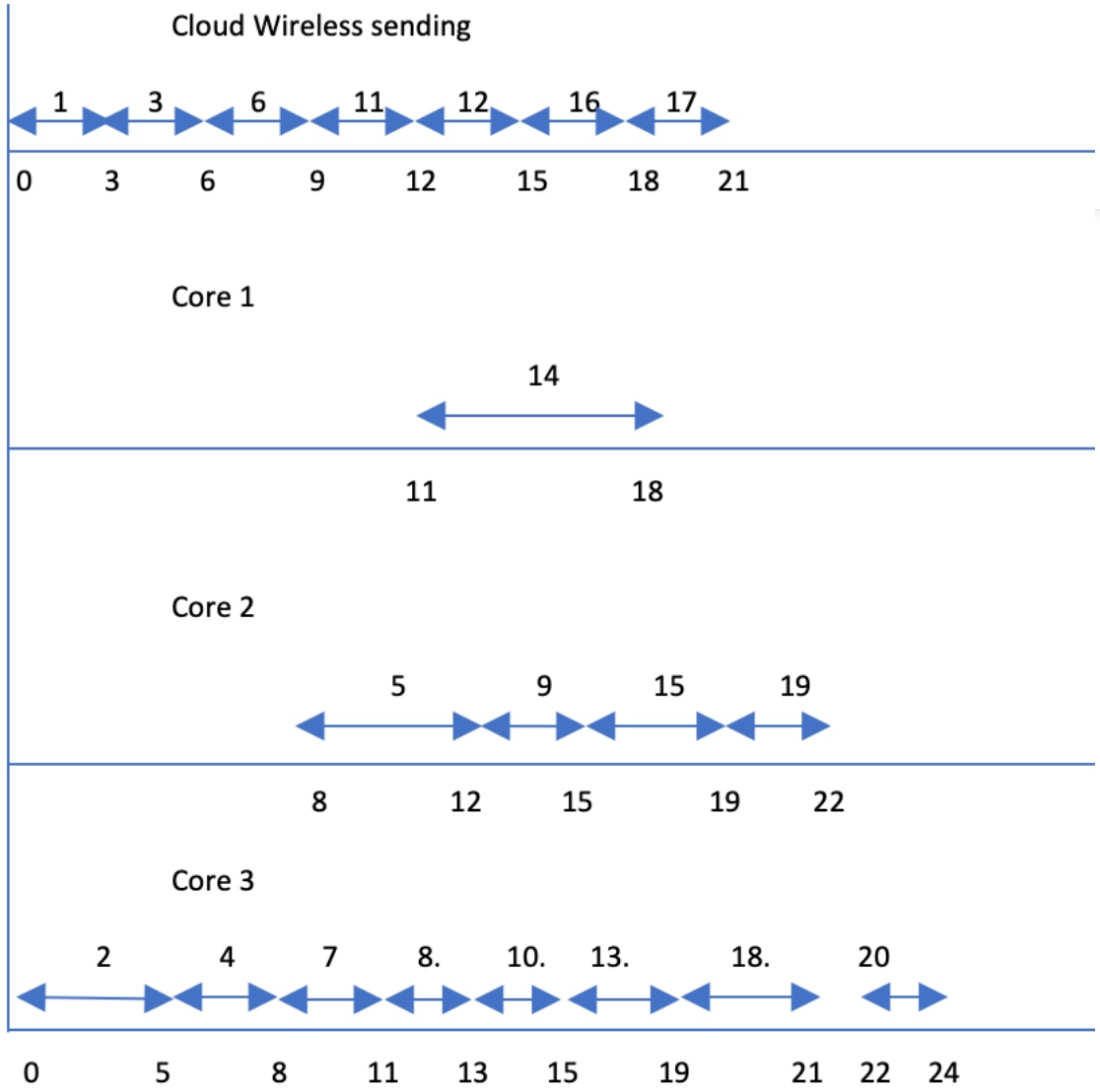
Task	Core 1	Core 2	Core 3
1	9	7	5
2	8	6	5
3	6	5	4
4	7	5	3
5	5	4	2
6	7	6	4
7	8	5	3
8	6	4	2
9	5	3	2
10	7	4	2
11	9	7	5
12	8	6	5
13	6	5	4
14	7	5	3
15	5	4	2
16	7	6	4
17	8	5	3
18	6	4	2
19	5	3	2
20	7	4	2

Initial scheduling for Task Graph 4

Program Output for initial scheduling

Task Schedule on cloud processing is
Task = 1
Schedule = 3 to 4
Task = 3
Schedule = 6 to 7
Task = 6
Schedule = 9 to 10
Task = 11
Schedule = 12 to 13
Task = 12
Schedule = 15 to 16
Task = 16
Schedule = 18 to 19
Task = 17
Schedule = 21 to 22
Task Schedule on wireless receiving is
Task = 1
Schedule = 4 to 5
Task = 3
Schedule = 7 to 8
Task = 6
Schedule = 10 to 11
Task = 11
Schedule = 13 to 14
Task = 12
Schedule = 16 to 17
Task = 16
Schedule = 19 to 20
Task = 17
Schedule = 22 to 23
Task Schedule on wireless sending
Task = 1
Schedule = 0 to 3
Task = 3
Schedule = 3 to 6
Task = 6
Schedule = 6 to 9
Task = 11
Schedule = 9 to 12
Task = 12
Schedule = 12 to 15
Task = 16
Schedule = 15 to 18
Task = 17
Schedule = 18 to 21
Task Schedule on core 1 is
Task = 14
Schedule = 11 to 18
Task Schedule on core 2 is
Task = 5
Schedule = 8 to 12
Task = 9
Schedule = 12 to 15
Task = 15
Schedule = 15 to 19
Task = 19
Schedule = 19 to 22
Task Schedule on core 3 is
Task = 2
Schedule = 0 to 5
Task = 4
Schedule = 5 to 8
Task = 7
Schedule = 8 to 11
Task = 8
Schedule = 11 to 13
Task = 10
Schedule = 13 to 15
Task = 13
Schedule = 15 to 19
Task = 18
Schedule = 19 to 21
Task = 20
Schedule = 22 to 24
Total Energy = 137.5
Total time taken = 24

Initial scheduling Task graph –



- Task priority order is – 1,3,2,6,4,11,7,5,8,12,10,16,9,14,13,15, 17,18,19,20

Program output for energy consumption (Initial scheduling)

Total Energy = 137.5
Total time taken = 24
Program ended with exit code: 0

- The last task is Task 20 on core 3. Total time taken is 24.
- Thus T_max = 1.5 * 27 = 36
- The total energy consumption on core is 137.5

Manual calculation of energy consumption (Initial scheduling)

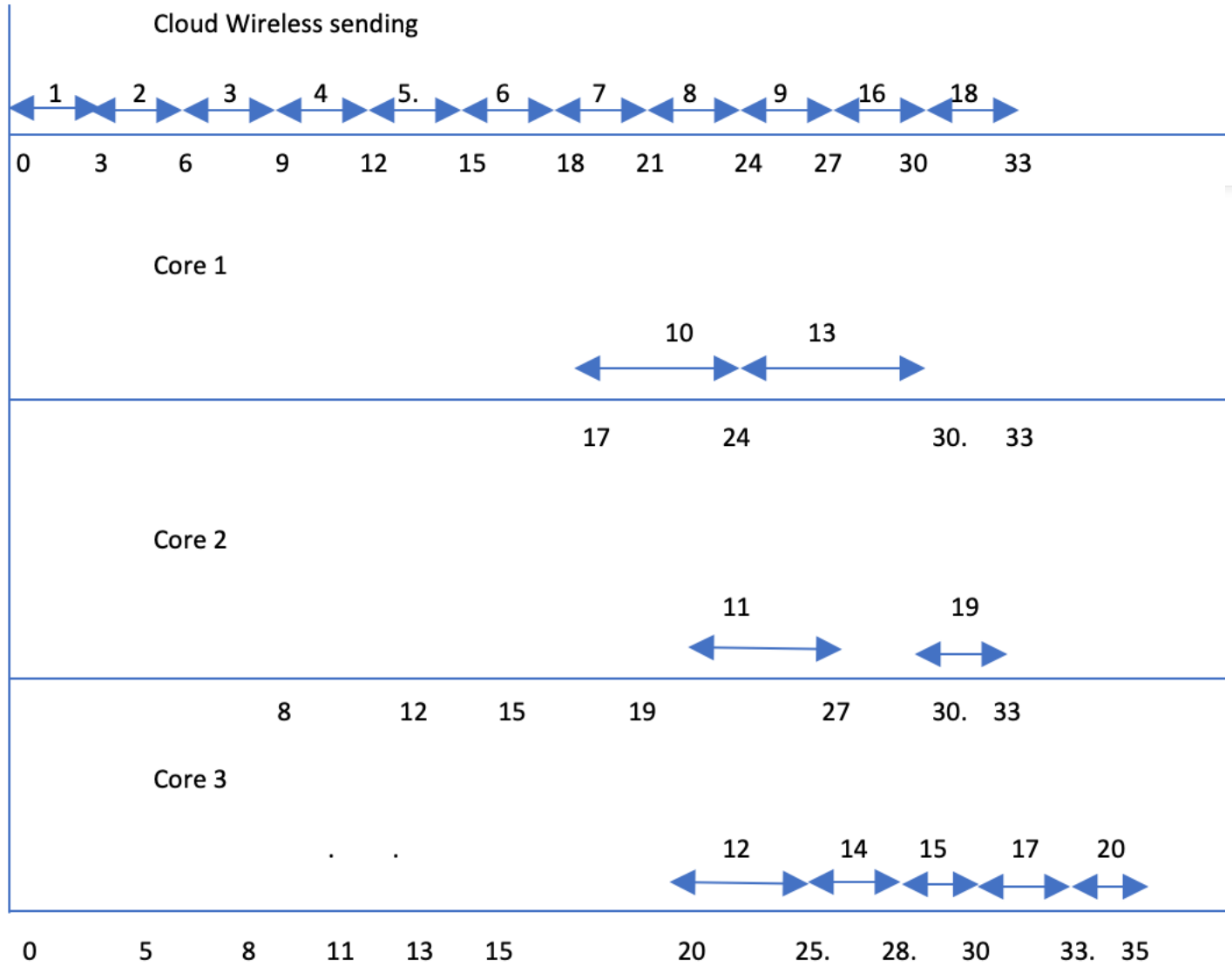
Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	4	5	4*5
3	0.5	3	0.5 * 3
4	4	3	4*3
5	2	4	2*4
6	0.5	3	0.5 * 3
7	4	3	4*3
8	4	2	4*2
9	2	3	2*3
10	4	2	4*2
11	0.5	3	0.5 * 3
12	0.5	3	0.5 * 3
13	4	4	4*4
14	1	7	1*7
15	2	4	2*4
16	0.5	3	0.5 * 3
17	0.5	3	0.5 * 3
18	4	2	4*2
19	2	3	2*3
20	4	2	4*2
Total energy			137.5

Final scheduling for Task Graph 4

Program Output for final scheduling

Task Schedule on cloud is
Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 4
Schedule = 9 to 12
Task = 5
Schedule = 12 to 15
Task = 6
Schedule = 15 to 18
Task = 7
Schedule = 18 to 21
Task = 8
Schedule = 21 to 24
Task = 9
Schedule = 24 to 27
Task = 16
Schedule = 27 to 30
Task = 18
Schedule = 30 to 33
Task Schedule on core 1 is
Task = 10
Schedule = 17 to 24
Task = 13
Schedule = 24 to 30
Task Schedule on core 2 is
Task = 11
Schedule = 20 to 27
Task = 19
Schedule = 30 to 33
Task Schedule on core 3 is
Task = 12
Schedule = 20 to 25
Task = 14
Schedule = 25 to 28
Task = 15
Schedule = 28 to 30
Task = 17
Schedule = 30 to 33
Task = 20
Schedule = 33 to 35

Final scheduling Task graph 4–



Program output for energy consumption (Final scheduling)

Total Energy = 109.5

Total Time taken = 35

- The last task is Task 20 on core 3. Total time taken is 35.
- The total energy consumption on core is 109.5
- Energy consumption has decreased as compared to the initial scheduling, while Total time taken is lesser than T_max derived.

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	0.5	3	0.5 * 3
5	0.5	3	0.5 * 3
6	0.5	3	0.5 * 3
7	0.5	3	0.5 * 3
8	0.5	3	0.5 * 3
9	0.5	3	0.5 * 3
10	1	7	1*7
11	2	7	2*7
12	4	5	4*5
13	1	6	1*6
14	4	3	4*3
15	4	2	2*4
16	0.5	3	0.5 * 3
17	4	3	4*3
18	0.5	3	0.5 * 3
19	2	3	2*3
20	4	2	4*2
Total energy			109.5

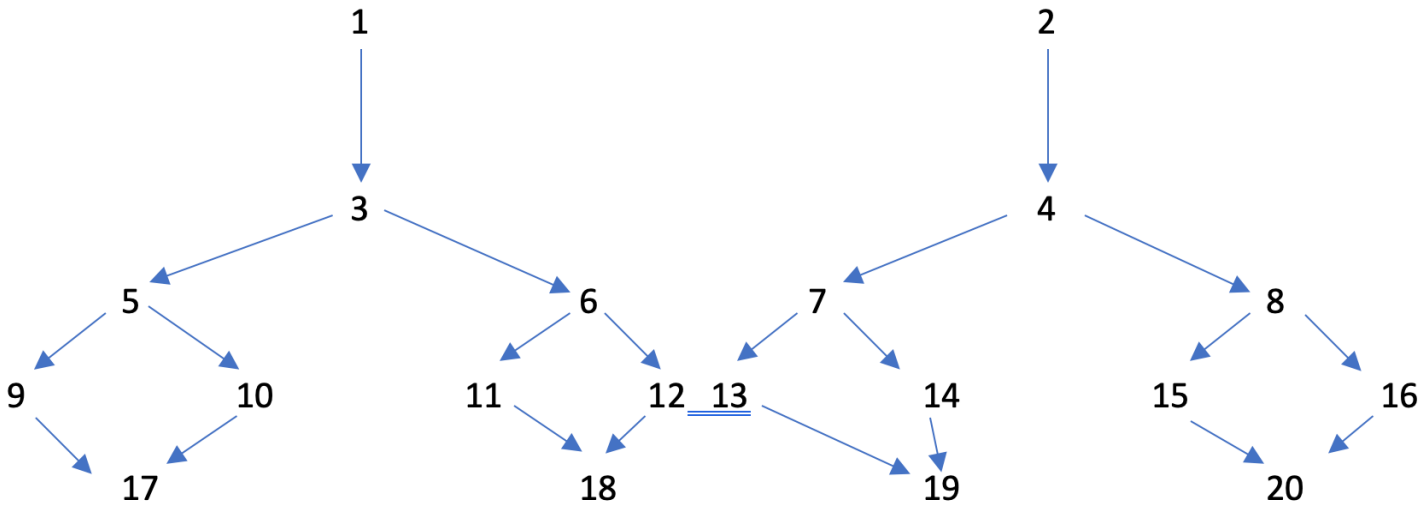
Summary of Task Graph 4

- The total time taken for **Initial scheduling** is 24. Thus,
  T_max = 1.5 * 15 = 36
- Total time taken for **Final scheduling** is 35.
- Compared to initial scheduling, Energy consumption in final scheduling is lesser while time constraint is also considered.

	Value
T_total (initial scheduling)	24
T_total (final scheduling)	35
E_total (initial scheduling)	137.5
E_total (initial scheduling)	109.5

Task Graph 5

- Task Graph 3 consists of 20 tasks.
- There are multiple entry and exit tasks.



Execution Table for Task Graph 5

- Core 1 is the slowest and core 3 is the fastest

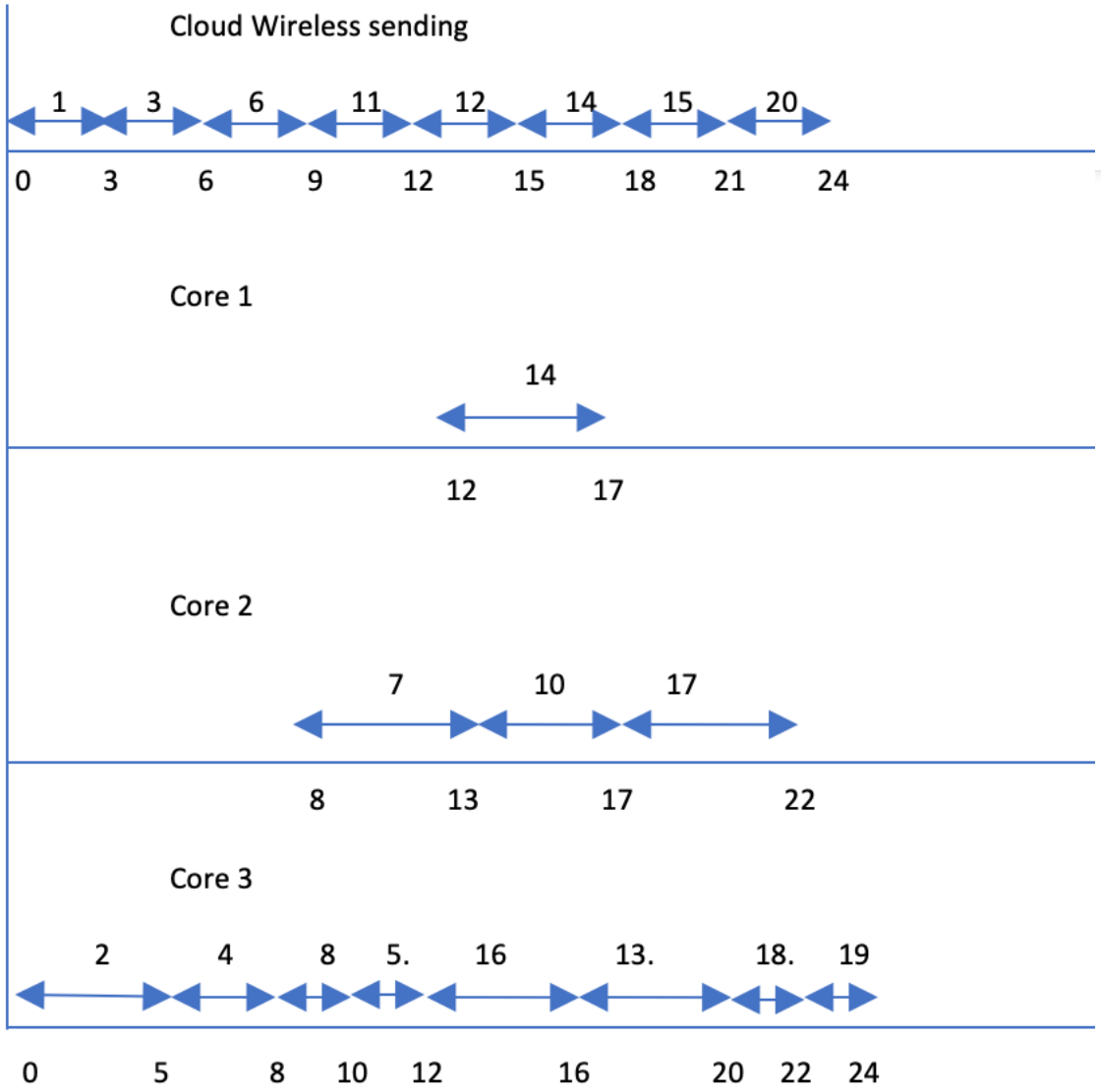
Task	Core 1	Core 2	Core 3
1	9	7	5
2	8	6	5
3	6	5	4
4	7	5	3
5	5	4	2
6	7	6	4
7	8	5	3
8	6	4	2
9	5	3	2
10	7	4	2
11	9	7	5
12	8	6	5
13	6	5	4
14	7	5	3
15	5	4	2
16	7	6	4
17	8	5	3
18	6	4	2
19	5	3	2
20	7	4	2

Initial scheduling for Task Graph 5

Program Output for final scheduling

Task Schedule on cloud processing is
Task = 1
Schedule = 3 to 4
Task = 3
Schedule = 6 to 7
Task = 6
Schedule = 9 to 10
Task = 11
Schedule = 12 to 13
Task = 12
Schedule = 15 to 16
Task = 14
Schedule = 18 to 19
Task = 15
Schedule = 21 to 22
Task = 20
Schedule = 24 to 25
Task Schedule on wireless receiving is
Task = 1
Schedule = 4 to 5
Task = 3
Schedule = 7 to 8
Task = 6
Schedule = 10 to 11
Task = 11
Schedule = 13 to 14
Task = 12
Schedule = 16 to 17
Task = 14
Schedule = 19 to 20
Task = 15
Schedule = 22 to 23
Task = 20
Schedule = 25 to 26
Task Schedule on wireless sending
Task = 1
Schedule = 0 to 3
Task = 3
Schedule = 3 to 6
Task = 6
Schedule = 6 to 9
Task = 11
Schedule = 9 to 12
Task = 12
Schedule = 12 to 15
Task = 14
Schedule = 15 to 18
Task = 15
Schedule = 18 to 21
Task = 20
Schedule = 21 to 24
Task Schedule on core 1 is
Task = 9
Schedule = 12 to 17
Task Schedule on core 2 is
Task = 7
Schedule = 8 to 13
Task = 10
Schedule = 13 to 17
Task = 17
Schedule = 17 to 22
Task Schedule on core 3 is
Task = 2
Schedule = 0 to 5
Task = 4
Schedule = 5 to 8
Task = 5
Schedule = 10 to 12
Task = 8
Schedule = 8 to 10
Task = 13
Schedule = 16 to 20
Task = 16
Schedule = 12 to 16
Task = 18
Schedule = 20 to 22
Task = 19
Schedule = 22 to 24
Total Energy = 141
Total time taken = 26
Program ended with exit code: 0

Initial scheduling Task graph –



- Task priority order is – 1,2,3,6,4,11,8,7,5,12,16,10,9,14,13,15, 17,20,18,19,20

Program output for energy consumption (Initial scheduling)

Total Energy = 141
Total time taken = 26
Program ended with exit code: 0

- The last task is Task 20 on cloud. Considering time taken for cloud processing(1) and time for wireless sending(1) , Total time taken is 26.
- Thus T_max = 1.5 * 26 = 39
- The total energy consumption on core is 141

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Task	Energy
1	0.5	3	0.5 * 3
2	4	5	4*5
3	0.5	3	0.5 * 3
4	4	3	4*3
5	4	2	4*2
6	0.5	3	0.5 * 3
7	2	5	2*5
8	4	2	4*2
9	5	5	5*5
10	2	4	2*4
11	0.5	3	0.5 * 3
12	0.5	3	0.5 * 3
13	4	4	4*4
14	0.5	3	0.5 * 3
15	0.5	3	0.5 * 3
16	4	4	4*4
17	2	5	2*5
18	4	2	4*2
19	4	2	4*2
20	0.5	3	0.5 * 3
Total energy			141

Final scheduling for Task Graph 5

Program Output for final scheduling

Task Schedule on cloud is

Task = 1
Schedule = 0 to 3
Task = 2
Schedule = 3 to 6
Task = 3
Schedule = 6 to 9
Task = 4
Schedule = 9 to 12
Task = 5
Schedule = 12 to 15
Task = 6
Schedule = 15 to 18
Task = 7
Schedule = 18 to 21
Task = 8
Schedule = 21 to 24
Task = 9
Schedule = 24 to 27
Task = 10
Schedule = 27 to 30
Task = 11
Schedule = 30 to 33
Task = 18
Schedule = 33 to 36

Task Schedule on core 1 is

Task = 12
Schedule = 20 to 28
Task = 13
Schedule = 28 to 34

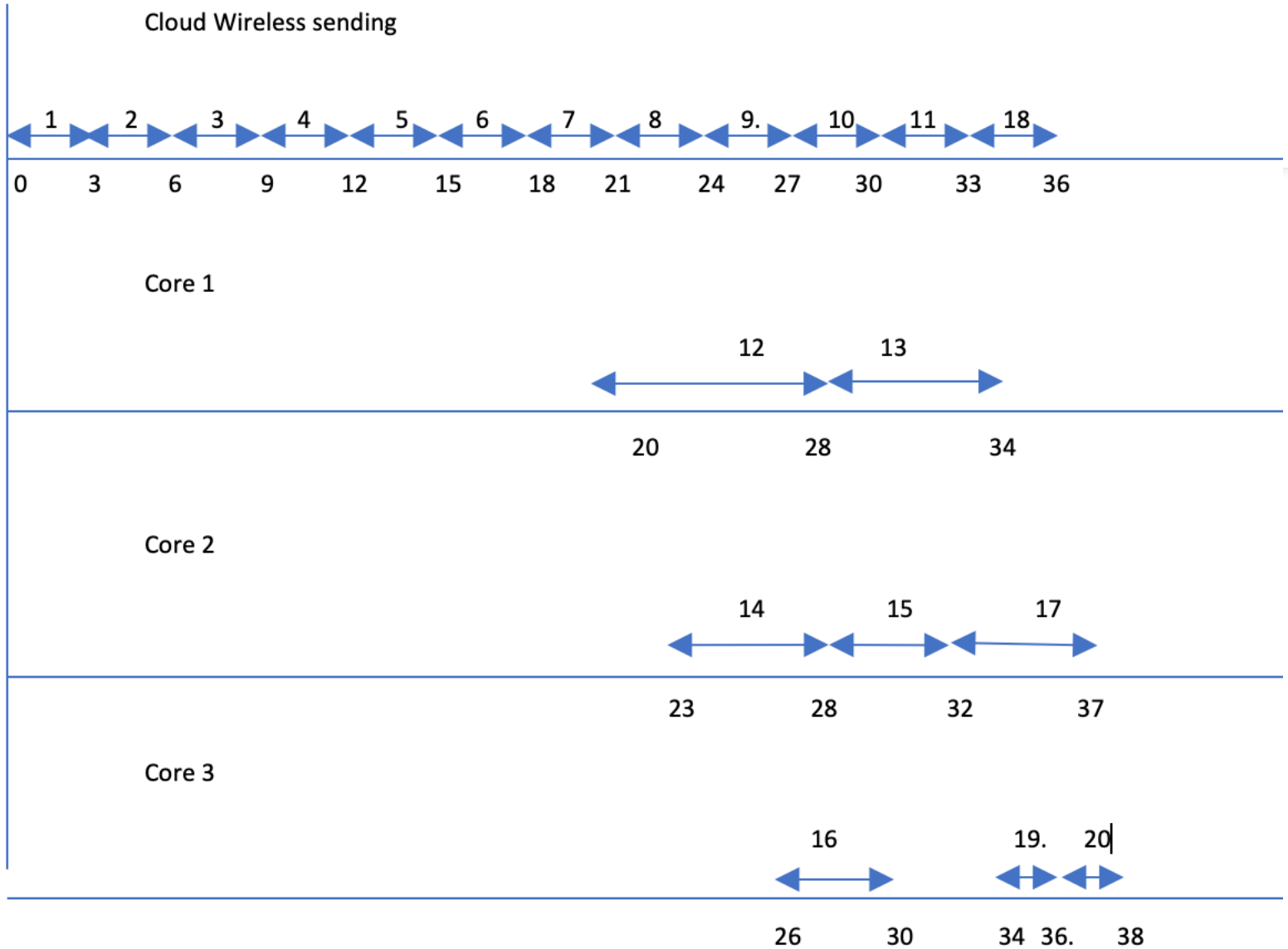
Task Schedule on core 2 is

Task = 14
Schedule = 23 to 28
Task = 15
Schedule = 28 to 32
Task = 17
Schedule = 32 to 37

Task Schedule on core 3 is

Task = 16
Schedule = 26 to 30
Task = 19
Schedule = 34 to 36
Task = 20
Schedule = 36 to 38

Final scheduling Task graph –



Program output for energy consumption (Final scheduling)

$$Total\ Energy\ = 92$$
$$Total\ Time\ taken\ = 38$$

- The last task is Task 20 on core 3. Total time taken is 38.
- The total energy consumption on core is 92
- Energy consumption has decreased as compared to the initial scheduling, while Total time taken is lesser than T_max derived.

Manual calculation of energy consumption (Initial scheduling)

Task	Power	Time	Energy
1	0.5	3	0.5 * 3
2	0.5	3	0.5 * 3
3	0.5	3	0.5 * 3
4	0.5	3	0.5 * 3
5	0.5	3	0.5 * 3
6	0.5	3	0.5 * 3
7	0.5	3	0.5 * 3
8	0.5	3	0.5 * 3
9	0.5	3	0.5 * 3
10	0.5	3	0.5 * 3
11	0.5	3	0.5 * 3
12	01	8	1*8
13	1	6	1*6
14	2	5	2*5
15	2	4	2*4
16	4	4	4*4
17	2	5	2*5
18	0.5	3	0.5 * 3
19	4	2	4*2
20	4	2	4*2
Total energy			92

Summary of Task Graph 5

- The total time taken for **Initial scheduling** is 26. Thus,

  T_max = 1.5 * 15 = 39

- Total time taken for **Final scheduling** is 38.

- Compared to initial scheduling, Energy consumption in final scheduling is lesser while time constraint is also considered.

	Value
T_total (initial scheduling)	26
T_total (final scheduling)	38
E_total (initial scheduling)	141
E_total (initial scheduling)	92