a) Graph 1: Figure 1 of the paper
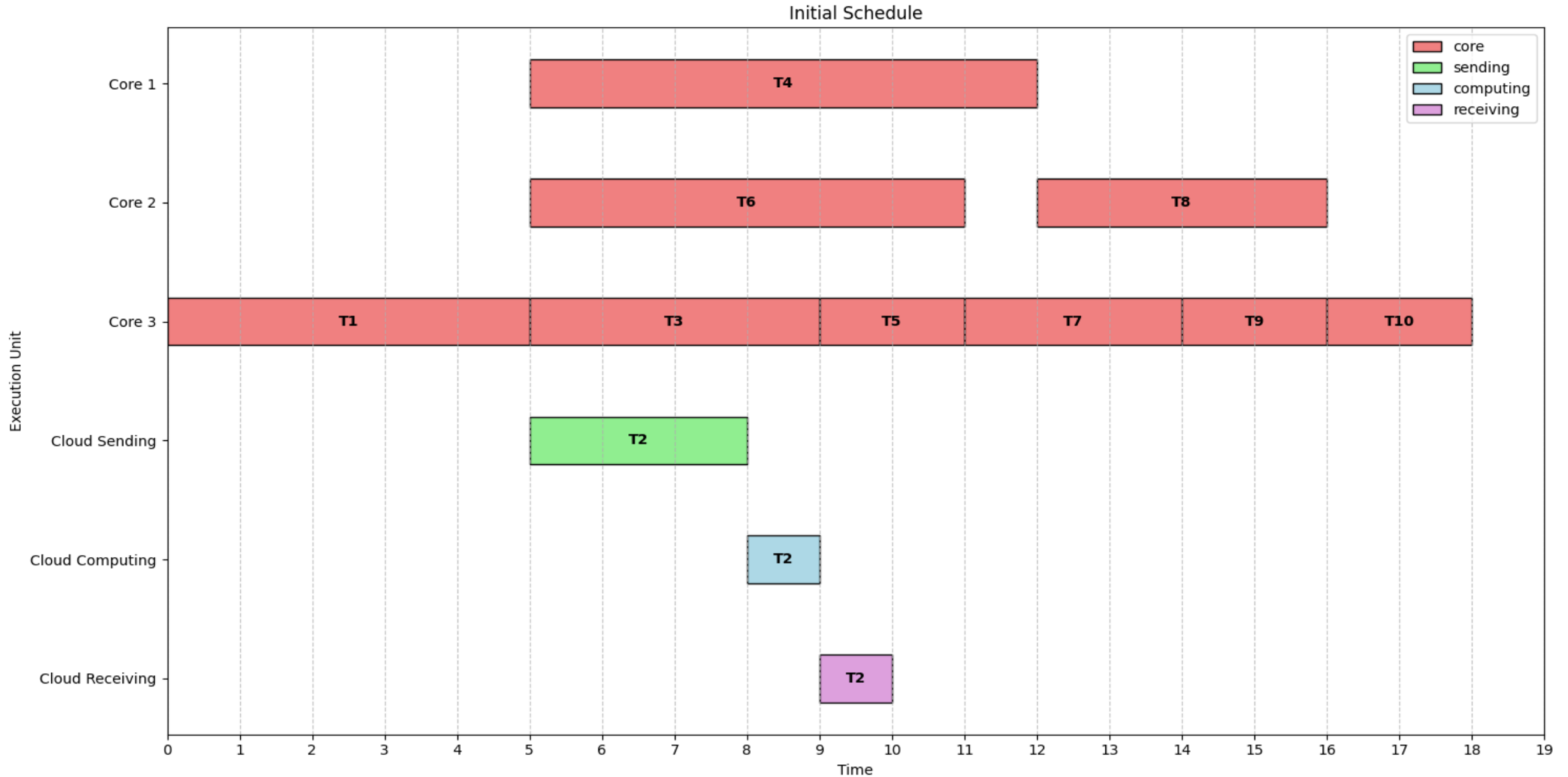
| Task | Core1 | Core2 | Core3 |
|------|-------|-------|-------|
| 1 | 9 | 7 | 5 |
| 2 | 8 | 6 | 5 |
| 3 | 6 | 5 | 4 |
| 4 | 7 | 5 | 3 |
| 5 | 5 | 4 | 2 |
| 6 | 7 | 6 | 4 |
| 7 | 8 | 5 | 3 |
| 8 | 6 | 4 | 2 |
| 9 | 5 | 3 | 2 |
| 10 | 7 | 4 | 2 |
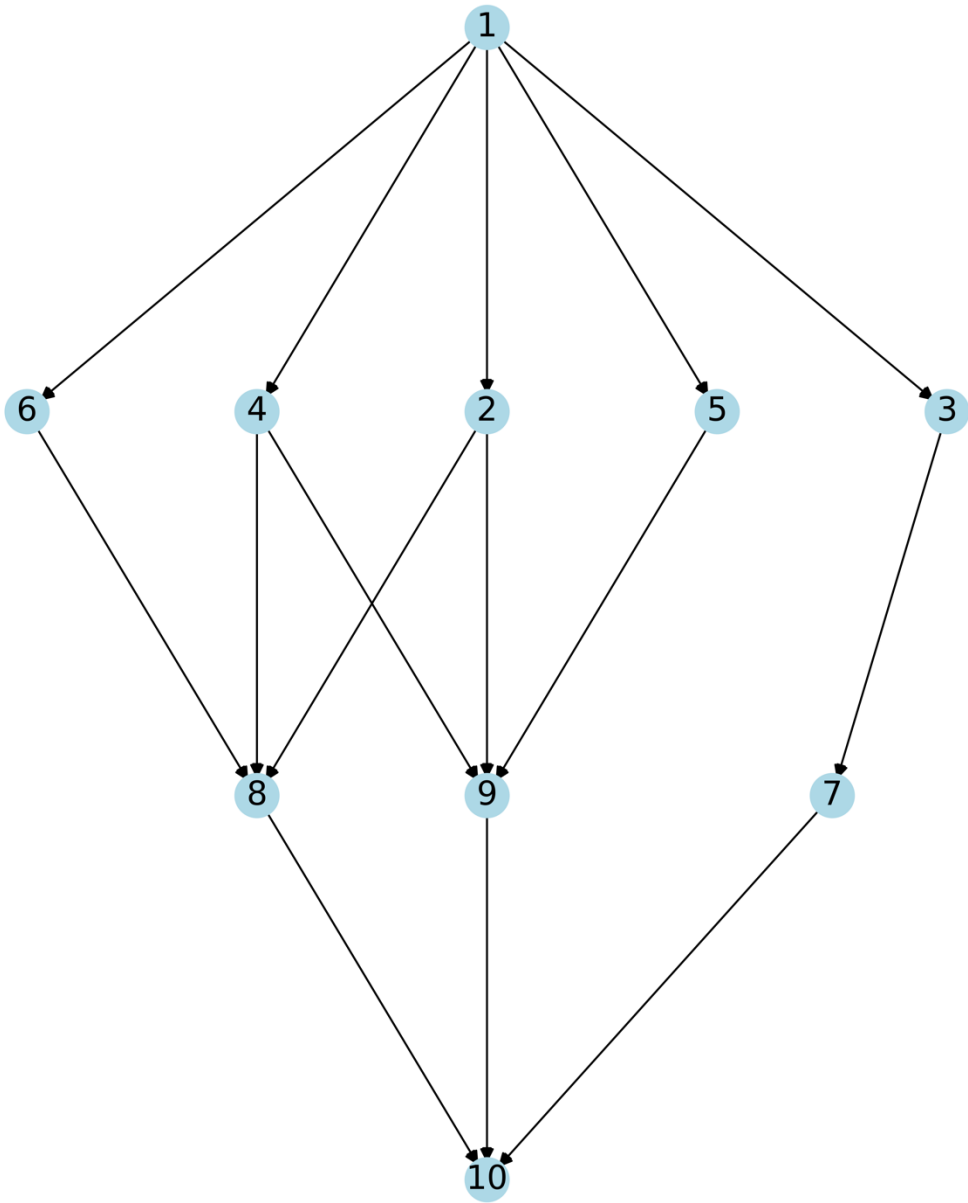
# b) Initial Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|---|---|---|---|---|---|---|
| 1 | Core 3 | 0 | 0=>5 | – | – | – |
| 2 | Cloud | 5 | – | 5=>8 | 8=>9 | 9=>10 |
| 3 | Core 3 | 5 | 5=>9 | – | – | – |
| 4 | Core 1 | 5 | 5=>12 | – | – | – |
| 5 | Core 3 | 9 | 9=>11 | – | – | – |
| 6 | Core 2 | 5 | 5=>11 | – | – | – |
| 7 | Core 3 | 11 | 11=>14 | – | – | – |
| 8 | Core 2 | 12 | 12=>16 | – | – | – |
| 9 | Core 3 | 14 | 14=>16 | – | – | – |
| 10 | Core 3 | 16 | 16=>18 | – | – | – |

# Initial Task Schedule

# Total energy consumption of initial scheduling: 100.5

- Core1(P1) =1, Core2(P2) = 2, Core3(P2) = 4, Cloud(Ps) =0.5
- Core 1 task count = 1(T4)
- Core 2 task count = 2 (T6, T8)
- Core 3 task count = 6 (T1,T3,T5,T7,T9,T10)
- Cloud task  Count =1(T2)
- E1 = 7 * 1 = 7
- E2 = 2 * (6+ 4) = 20
- E3 = 4 * (5+4+2+3+2+2) = 72
- E_cloud =  0.5 * 3 * 1 = 1.5
- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 7 + 20 + 72 + 1.5 = 100.5

# c) Energy Optimized Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|------------------|------------------|-------------------|---------------------|
| 1      | Cloud     | 0         | –                | 0=>3             | 3=>4              | 4=>5                |
| 2      | Cloud     | 3         | –                | 3=>6             | 6=>7              | 7=>8                |
| 3      | Cloud     | 12        | –                | 12=>15           | 15=>16            | 16=>17              |
| 4      | Core 1    | 5         | 5=>12            | –                | –                 | –                   |
| 5      | Cloud     | 6         | –                | 6=>9             | 9=>10             | 10=>11              |
| 6      | Cloud     | 9         | –                | 9=>12            | 12=>13            | 13=>14              |
| 7      | Cloud     | 18        | –                | 18=>21           | 21=>22            | 22=>23              |
| 8      | Cloud     | 15        | –                | 15=>18           | 18=>19            | 19=>20              |
| 9      | Core 1    | 12        | 12=>17           | –                | –                 | –                   |
| 10     | Cloud     | 21        | –                | 21=>24           | 24=>25            | 25=>26              |

# Energy Optimized Task Schedule
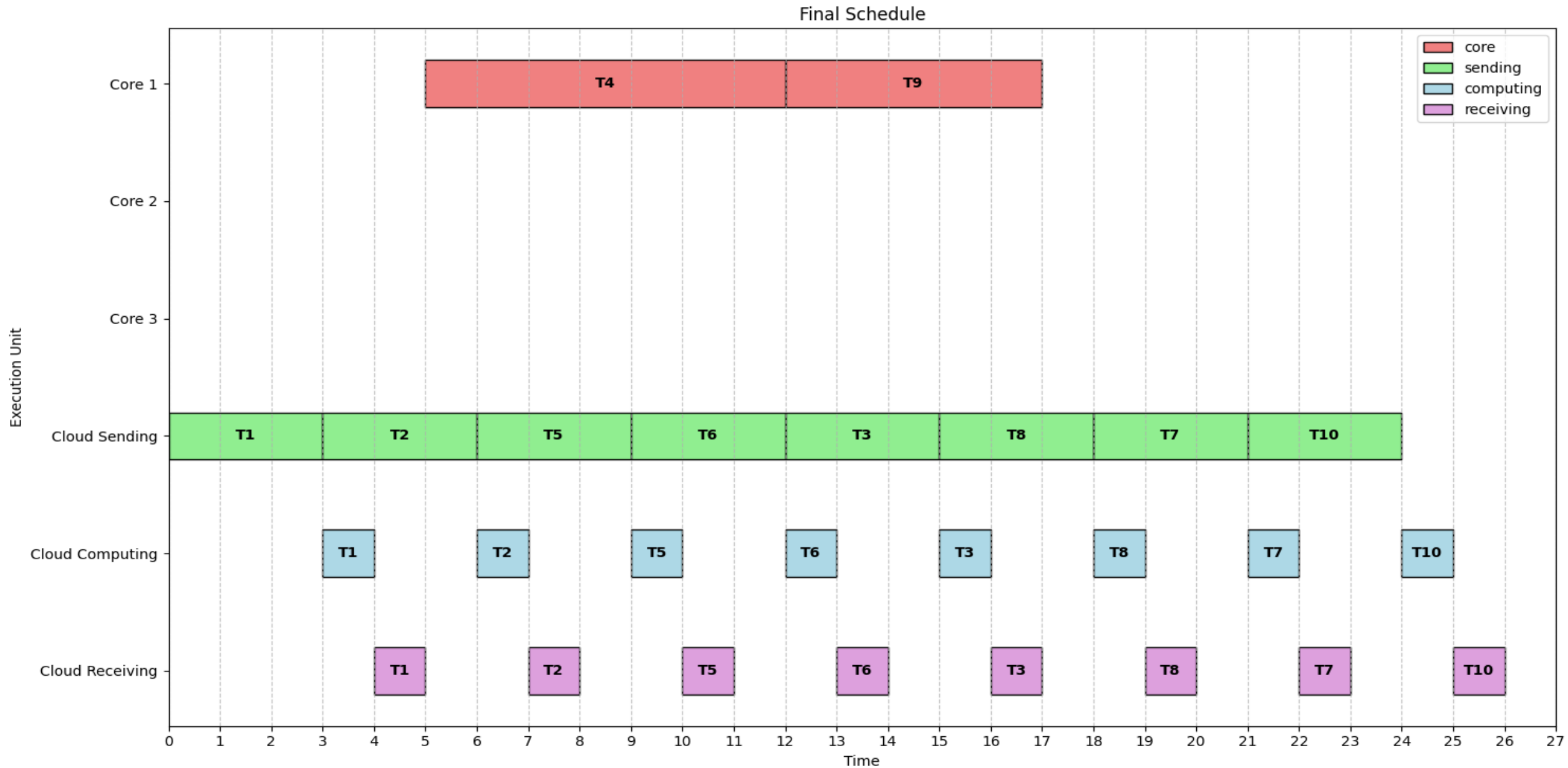


Final Schedule

# Total energy consumption of final scheduling: 24

- Core1(P1) =1, Core2(P2) = 2, Core3(P2) = 4, Cloud(Ps) =0.5
- Core 1 task count = 2 (T4,T9)
- Core 2 task count = 0
- Core 3 task count = 0
- Cloud task Count = 8 (T1,T2,T3,T5,T6,T7,T8,T10)
- E1 = 1 * (7+5) = 12
- E2 = 2 * 0 = 0
- E3 = 4 * 0 = 0
- E_cloud = 0.5 * 3 * 8 = 0.5 * 24 = 12
- E_total of final scheduling = E1 + E2 + E3 + E_cloud = 12 + 0 + 0 + 12 = 24

# d) Summary

- $T_{total}$ of initial scheduling : 18
- $E_{total}$ of initial scheduling : 100.5
- $T_{total}$ of final scheduling : 26 (< 27 (18*1.5))
- $E_{total}$ of final scheduling : 24
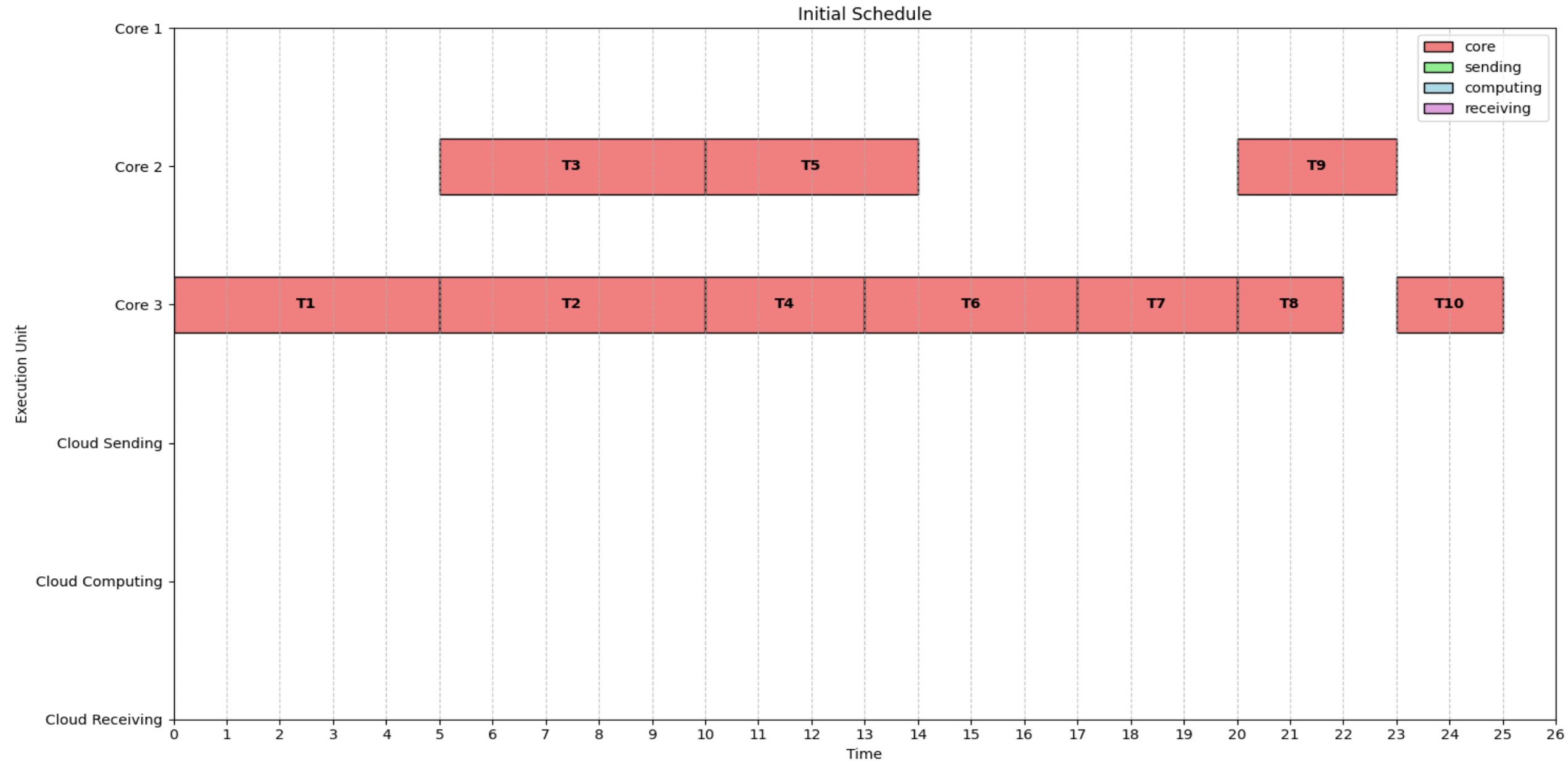
a) Graph 2: Graph1 with changed connections

| Task | Core1 | Core2 | Core3 |
|------|-------|-------|-------|
| 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 |
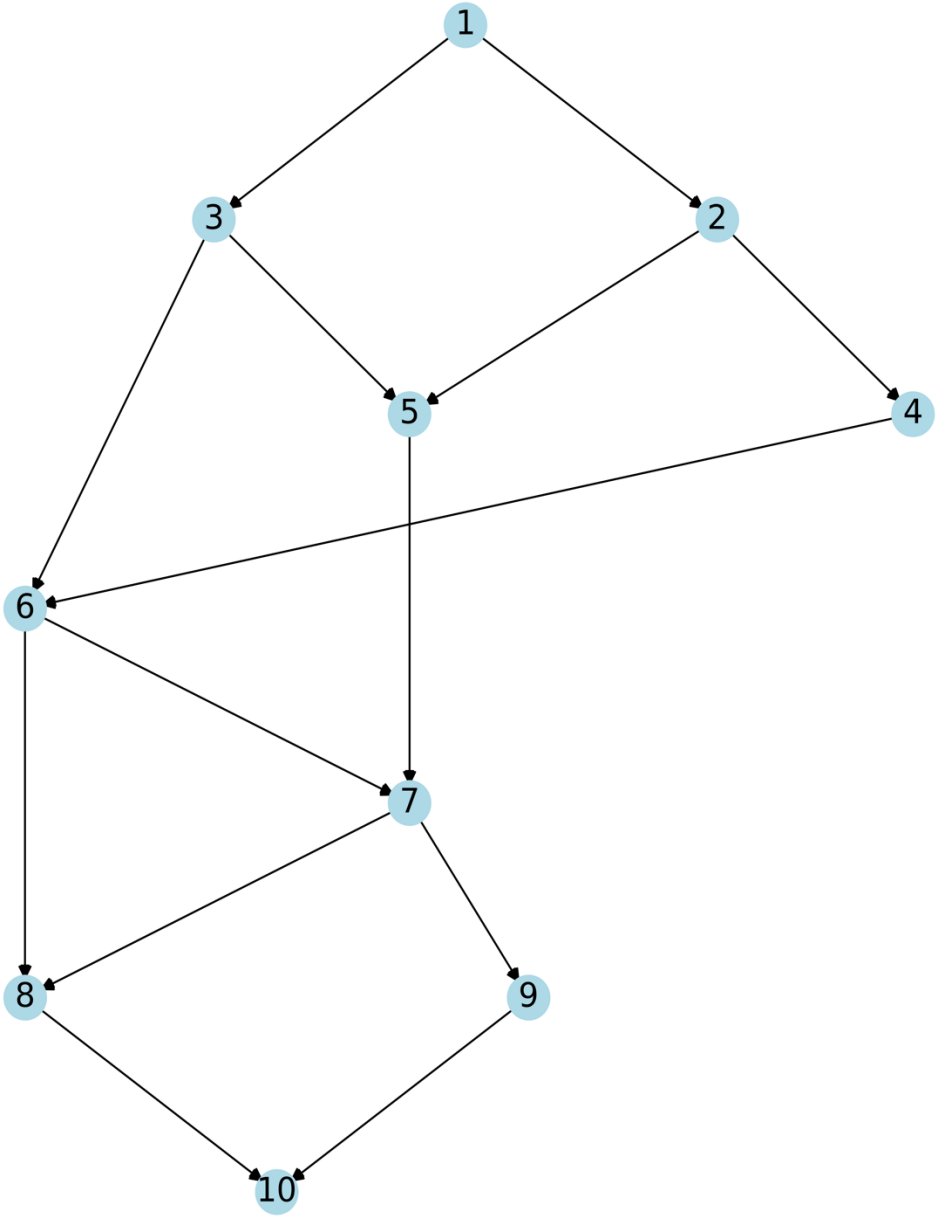
# b) Initial Task Schedule Program Output

```
--------------------------------------------------------------------------------------------------------
TaskID  Assignment  StartTime  ExecWindow(Core)  SendPhase(Cloud)  CloudPhase(Cloud)  ReceivePhase(Cloud)
--------------------------------------------------------------------------------------------------------
1       Core 3      0          0=>5              —                 —                  —
2       Core 3      5          5=>10             —                 —                  —
3       Core 2      5          5=>10             —                 —                  —
4       Core 3      10         10=>13            —                 —                  —
5       Core 2      10         10=>14            —                 —                  —
6       Core 3      13         13=>17            —                 —                  —
7       Core 3      17         17=>20            —                 —                  —
8       Core 3      20         20=>22            —                 —                  —
9       Core 2      20         20=>23            —                 —                  —
10      Core 3      23         23=>25            —                 —                  —
--------------------------------------------------------------------------------------------------------
```
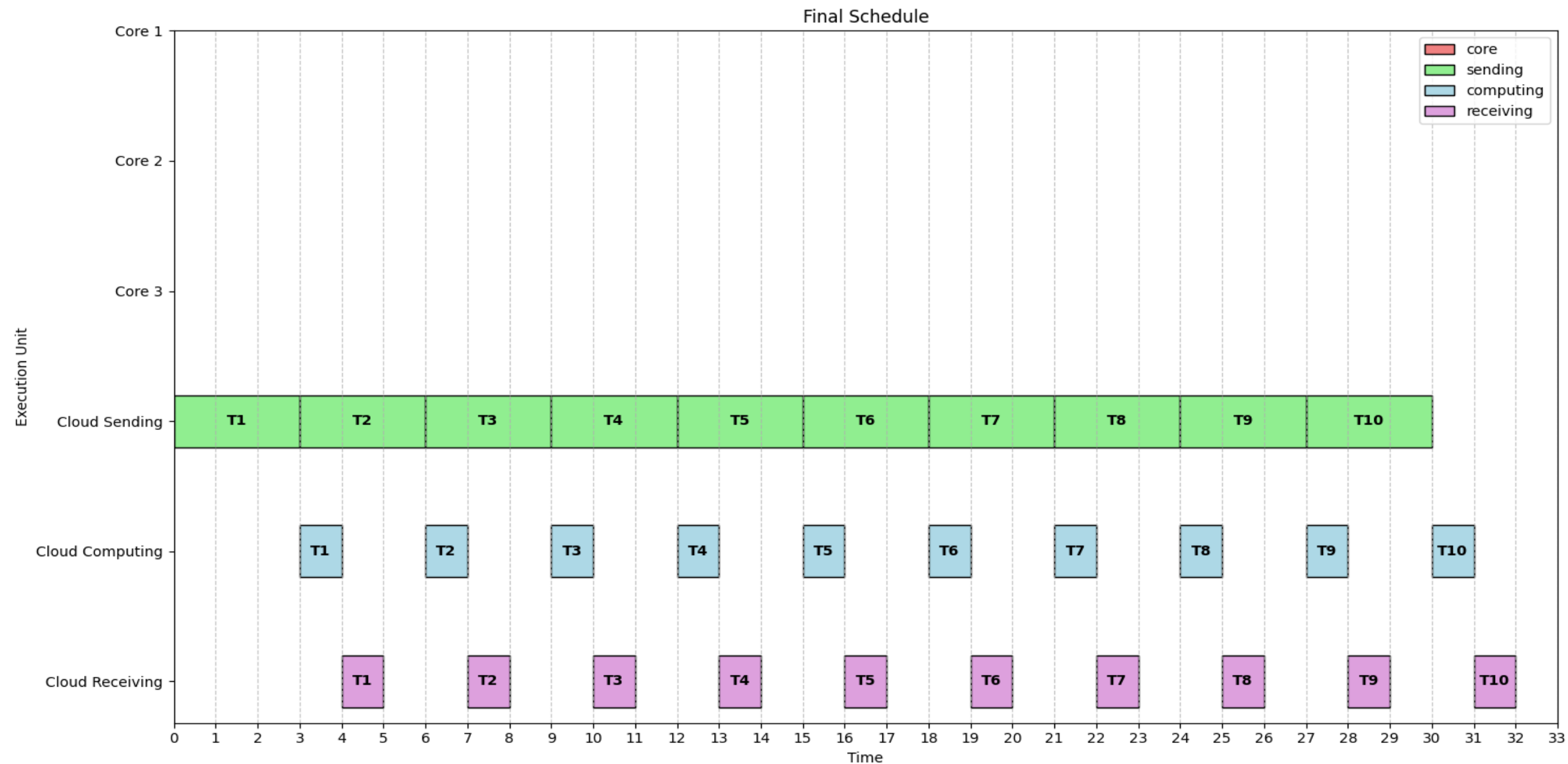
# Initial Task Schedule

# Total energy consumption of initial scheduling: 120

- Core1(P1) =1, Core2(P2) = 2, Core3(P2) = 4, Cloud(Ps) =0.5
- Core 1 task count = 0
- Core 2 task count = 3 (T3, T5, T9)
- Core 3 task count = 7 (T1, T2, T4, T6, T7, T8, T10)
- Cloud task Count = 0
- E1 = 1 * 0 = 0
- E2 = 2 * (5+4+3) = 2 * 12 = 24
- E3 = 4 * (5+5+3+4+3+2+2) = 4 * 24 = 96
- E_cloud = 0.5 * 0 = 0
- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 0 + 24 + 96 + 0 = 120

# c) Energy Optimized Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|------------|-----------|------------------|------------------|-------------------|---------------------|
| 1 | Cloud | 0 | – | 0=>3 | 3=>4 | 4=>5 |
| 2 | Cloud | 3 | – | 3=>6 | 6=>7 | 7=>8 |
| 3 | Cloud | 6 | – | 6=>9 | 9=>10 | 10=>11 |
| 4 | Cloud | 9 | – | 9=>12 | 12=>13 | 13=>14 |
| 5 | Cloud | 12 | – | 12=>15 | 15=>16 | 16=>17 |
| 6 | Cloud | 15 | – | 15=>18 | 18=>19 | 19=>20 |
| 7 | Cloud | 18 | – | 18=>21 | 21=>22 | 22=>23 |
| 8 | Cloud | 21 | – | 21=>24 | 24=>25 | 25=>26 |
| 9 | Cloud | 24 | – | 24=>27 | 27=>28 | 28=>29 |
| 10 | Cloud | 27 | – | 27=>30 | 30=>31 | 31=>32 |

Energy Optimized Task Schedule

# Total energy consumption of final scheduling: 15

- Core1(P1) =1, Core2(P2) = 2, Core3(P2) = 4, Cloud(Ps) =0.5
- Core 1 task count = 0
- Core 2 task count = 0
- Core 3 task count = 0
- Cloud task  Count =10 (T1,T2,T3,T4,T5,T6,T7,T8,T9,T10)
- E1 = 0
- E2 = 0
- E3 = 0
- E_cloud =  0.5 * 3 * 10 = 15
- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 0 + 0 + 0 + 15 = 15

# d) Summary

- T_total of initial scheduling : 25
- E_total of initial scheduling : 120
- T_total of final scheduling : 32 (<37.5 (25*1.5))
- E_total of final scheduling : 15

# a) Graph 3: Graph with 20 tasks

| Task | Core1 | Core2 | Core3 |
|------|-------|-------|-------|
| 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 | 10 | 7 | 4 |
| 12 | 11 | 8 | 5 |
| 13 | 9 | 6 | 3 |
| 14 | 12 | 8 | 4 |
| 15 | 10 | 7 | 3 |
| 16 | 11 | 7 | 4 |
| 17 | 9 | 6 | 3 |
| 18 | 12 | 8 | 5 |
| 19 | 10 | 7 | 4 |
| 20 | 11 | 8 | 5 |

# b) Initial Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|---|---|---|---|---|---|---|
| 1 | Core 3 | 0 | 0=>5 | – | – | – |
| 2 | Cloud | 5 | – | 5=>8 | 8=>9 | 9=>10 |
| 3 | Cloud | 8 | – | 8=>11 | 11=>12 | 12=>13 |
| 4 | Core 1 | 5 | 5=>12 | – | – | – |
| 5 | Core 2 | 5 | 5=>9 | – | – | – |
| 6 | Core 3 | 5 | 5=>9 | – | – | – |
| 7 | Cloud | 11 | – | 11=>14 | 14=>15 | 15=>16 |
| 8 | Core 3 | 15 | 15=>17 | – | – | – |
| 9 | Core 2 | 12 | 12=>15 | – | – | – |
| 10 | Core 3 | 9 | 9=>11 | – | – | – |
| 11 | Core 3 | 11 | 11=>15 | – | – | – |
| 12 | Cloud | 18 | – | 18=>21 | 21=>22 | 22=>23 |
| 13 | Core 3 | 17 | 17=>20 | – | – | – |
| 14 | Cloud | 15 | – | 15=>18 | 18=>19 | 19=>20 |
| 15 | Core 3 | 20 | 20=>23 | – | – | – |
| 16 | Core 2 | 15 | 15=>22 | – | – | – |
| 17 | Core 2 | 23 | 23=>29 | – | – | – |
| 18 | Cloud | 21 | – | 21=>24 | 24=>25 | 25=>26 |
| 19 | Core 3 | 23 | 23=>27 | – | – | – |
| 20 | Core 3 | 29 | 29=>34 | – | – | – |

# Initial Task Schedule
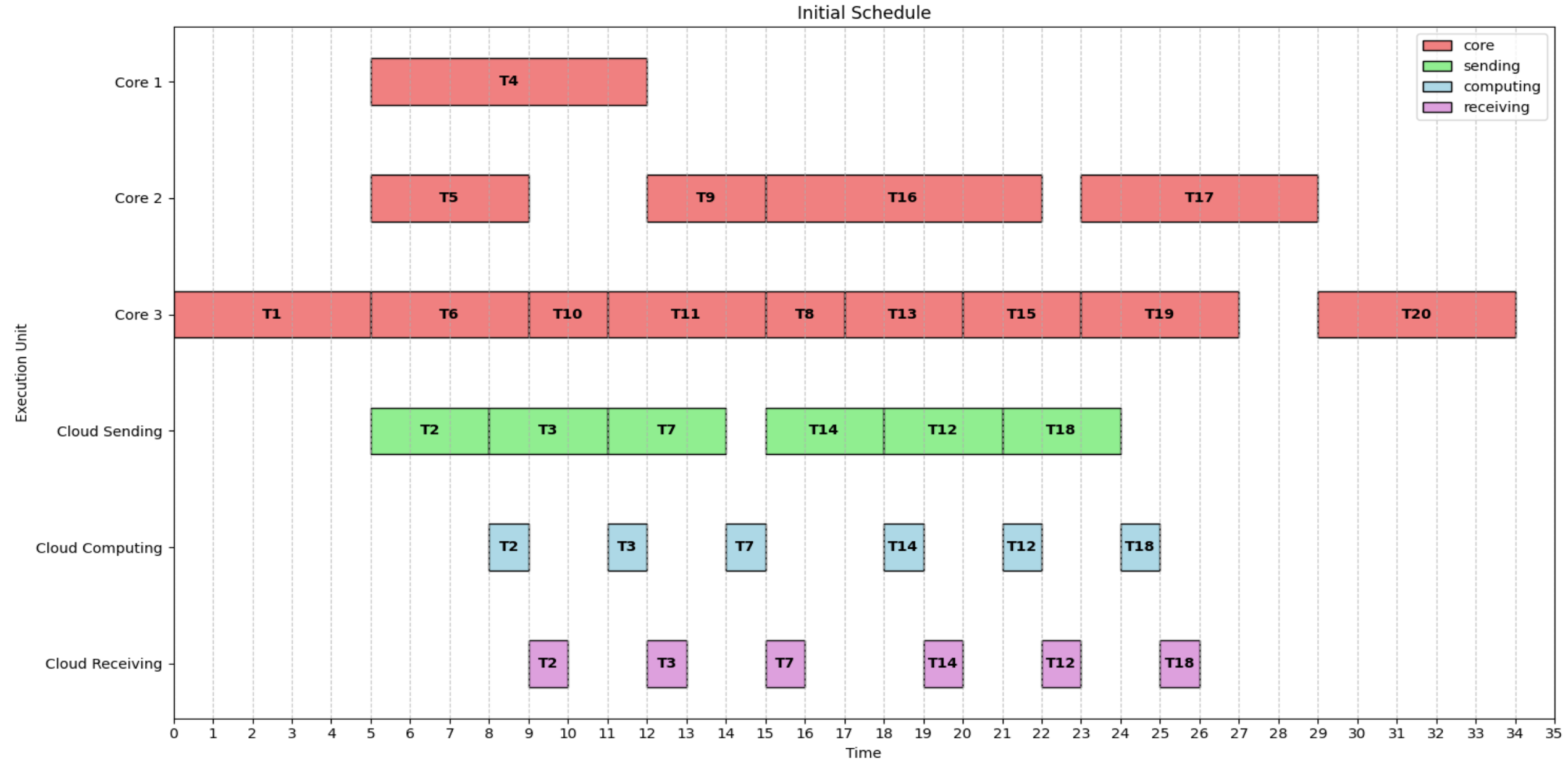


Initial Schedule

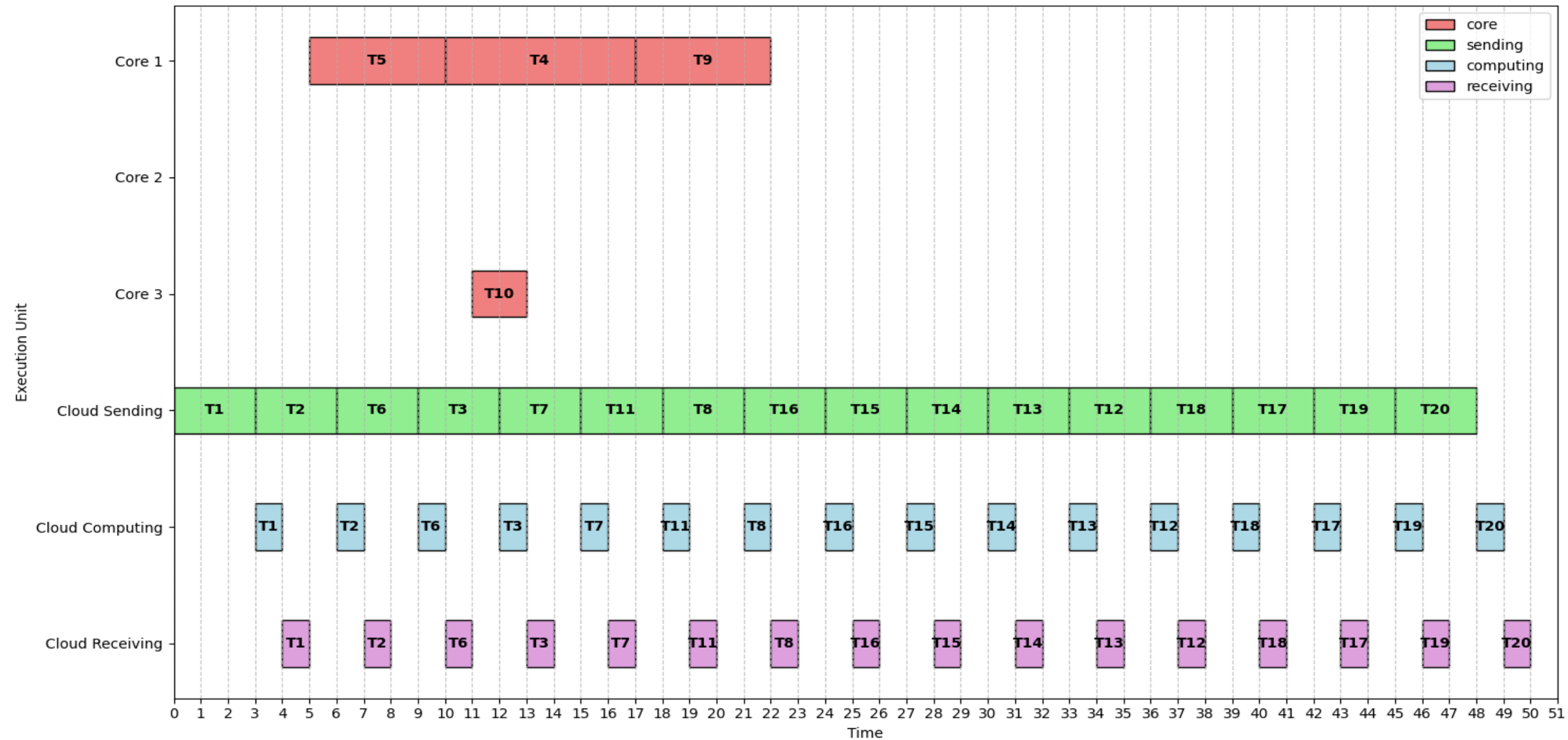# Total energy consumption of initial scheduling: 184

- Core1(P1) =1, Core2(P2) = 2, Core3(P2) = 4, Cloud(Ps) =0.5

- Core 1 Task Count: 1 (T4)

- Core 2 Task Count: 4 (T5, T9, T16, T17)

- Core 3 Task Count: 9 (T1, T6, T10, T11, T8, T13, T15, T19, T20)

- Cloud Task Count: 6 (T2, T3, T7, T14, T12, T18)

- E1 = P1 * (Core 1 total time) = 1 * 7 = 7

- E2 = P2 * (Core 2 total time) = 2 * 20 = 40

- E3 = P3 * (Core 3 total time) = 4 * 32 = 128

- E_cloud = Ps * (Total sending time) = 0.5 * 3 * 6 = 9

- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 7 + 40 + 128 + 9 = 184

# c) Energy Optimized Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|------------------|------------------|-------------------|---------------------|
| 1 | Cloud | 0 | – | 0=>3 | 3=>4 | 4=>5 |
| 2 | Cloud | 3 | – | 3=>6 | 6=>7 | 7=>8 |
| 3 | Cloud | 9 | – | 9=>12 | 12=>13 | 13=>14 |
| 4 | Core 1 | 10 | 10=>17 | – | – | – |
| 5 | Core 1 | 5 | 5=>10 | – | – | – |
| 6 | Cloud | 6 | – | 6=>9 | 9=>10 | 10=>11 |
| 7 | Cloud | 12 | – | 12=>15 | 15=>16 | 16=>17 |
| 8 | Cloud | 18 | – | 18=>21 | 21=>22 | 22=>23 |
| 9 | Core 1 | 17 | 17=>22 | – | – | – |
| 10 | Core 3 | 11 | 11=>13 | – | – | – |
| 11 | Cloud | 15 | – | 15=>18 | 18=>19 | 19=>20 |
| 12 | Cloud | 33 | – | 33=>36 | 36=>37 | 37=>38 |
| 13 | Cloud | 30 | – | 30=>33 | 33=>34 | 34=>35 |
| 14 | Cloud | 27 | – | 27=>30 | 30=>31 | 31=>32 |
| 15 | Cloud | 24 | – | 24=>27 | 27=>28 | 28=>29 |
| 16 | Cloud | 21 | – | 21=>24 | 24=>25 | 25=>26 |
| 17 | Cloud | 39 | – | 39=>42 | 42=>43 | 43=>44 |
| 18 | Cloud | 36 | – | 36=>39 | 39=>40 | 40=>41 |
| 19 | Cloud | 42 | – | 42=>45 | 45=>46 | 46=>47 |
| 20 | Cloud | 45 | – | 45=>48 | 48=>49 | 49=>50 |

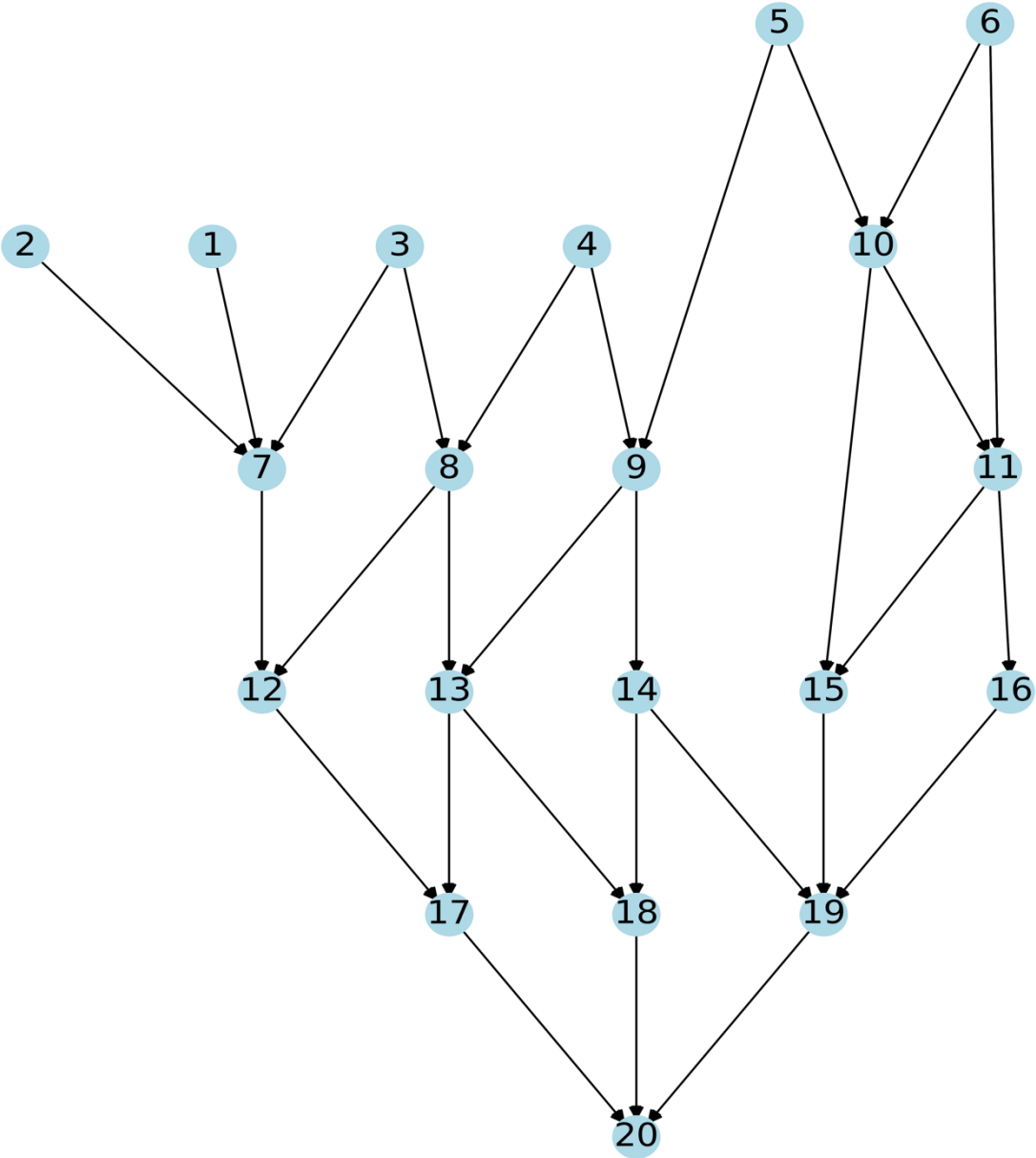# Total energy consumption of final scheduling: 49

- Core1 (P1) = 1, Core2 (P2) = 2, Core3 (P2) = 4, Cloud (Ps) = 0.5

- Core 1 Task Count: 3 (T5, T4, T9)

- Core 2 Task Count: None

- Core 3 Task Count: 1 (T10)

- Cloud Task Count: 16 (T1, T2, T3, T6, T7, T8, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20)

- E1 = 1 * 17 = 17

- E2 = 2 * 0 = 0

- E3 = 4 * 2 = 8

- E_cloud = 0.5 * 16 * 3 = 24

- E_total of final scheduling = E1 + E2 + E3 + E_cloud = 17 + 0 + 8 + 24 = 49

# d) Summary

- T_total of initial scheduling : 34
- E_total of initial scheduling : 184
- T_total of final scheduling : 50 (< 51 (34*1.5))
- E_total of final scheduling : 49

## a) Graph 4: Graph3 with multiple entry tasks

| Task | Core1 | Core2 | Core3 |
|------|-------|-------|-------|
| 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 | 10 | 7 | 4 |
| 12 | 11 | 8 | 5 |
| 13 | 9 | 6 | 3 |
| 14 | 12 | 8 | 4 |
| 15 | 10 | 7 | 3 |
| 16 | 11 | 7 | 4 |
| 17 | 9 | 6 | 3 |
| 18 | 12 | 8 | 5 |
| 19 | 10 | 7 | 4 |
| 20 | 11 | 8 | 5 |

# b) Initial Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|-------------------|-------------------|--------------------|---------------------|
| 1 | Core 1 | 0 | 0=>9 | – | – | – |
| 2 | Core 3 | 4 | 4=>9 | – | – | – |
| 3 | Core 3 | 9 | 9=>13 | – | – | – |
| 4 | Core 2 | 4 | 4=>9 | – | – | – |
| 5 | Core 2 | 0 | 0=>4 | – | – | – |
| 6 | Core 3 | 0 | 0=>4 | – | – | – |
| 7 | Core 3 | 13 | 13=>16 | – | – | – |
| 8 | Core 2 | 13 | 13=>17 | – | – | – |
| 9 | Core 2 | 9 | 9=>12 | – | – | – |
| 10 | Cloud | 4 | – | 4=>7 | 7=>8 | 8=>9 |
| 11 | Cloud | 7 | – | 7=>10 | 10=>11 | 11=>12 |
| 12 | Cloud | 18 | – | 18=>21 | 21=>22 | 22=>23 |
| 13 | Core 3 | 17 | 17=>20 | – | – | – |
| 14 | Cloud | 12 | – | 12=>15 | 15=>16 | 16=>17 |
| 15 | Core 1 | 12 | 12=>22 | – | – | – |
| 16 | Cloud | 15 | – | 15=>18 | 18=>19 | 19=>20 |
| 17 | Core 3 | 25 | 25=>28 | – | – | – |
| 18 | Core 3 | 20 | 20=>25 | – | – | – |
| 19 | Cloud | 22 | – | 22=>25 | 25=>26 | 26=>27 |
| 20 | Core 3 | 28 | 28=>33 | – | – | – |

# Initial Task Schedule
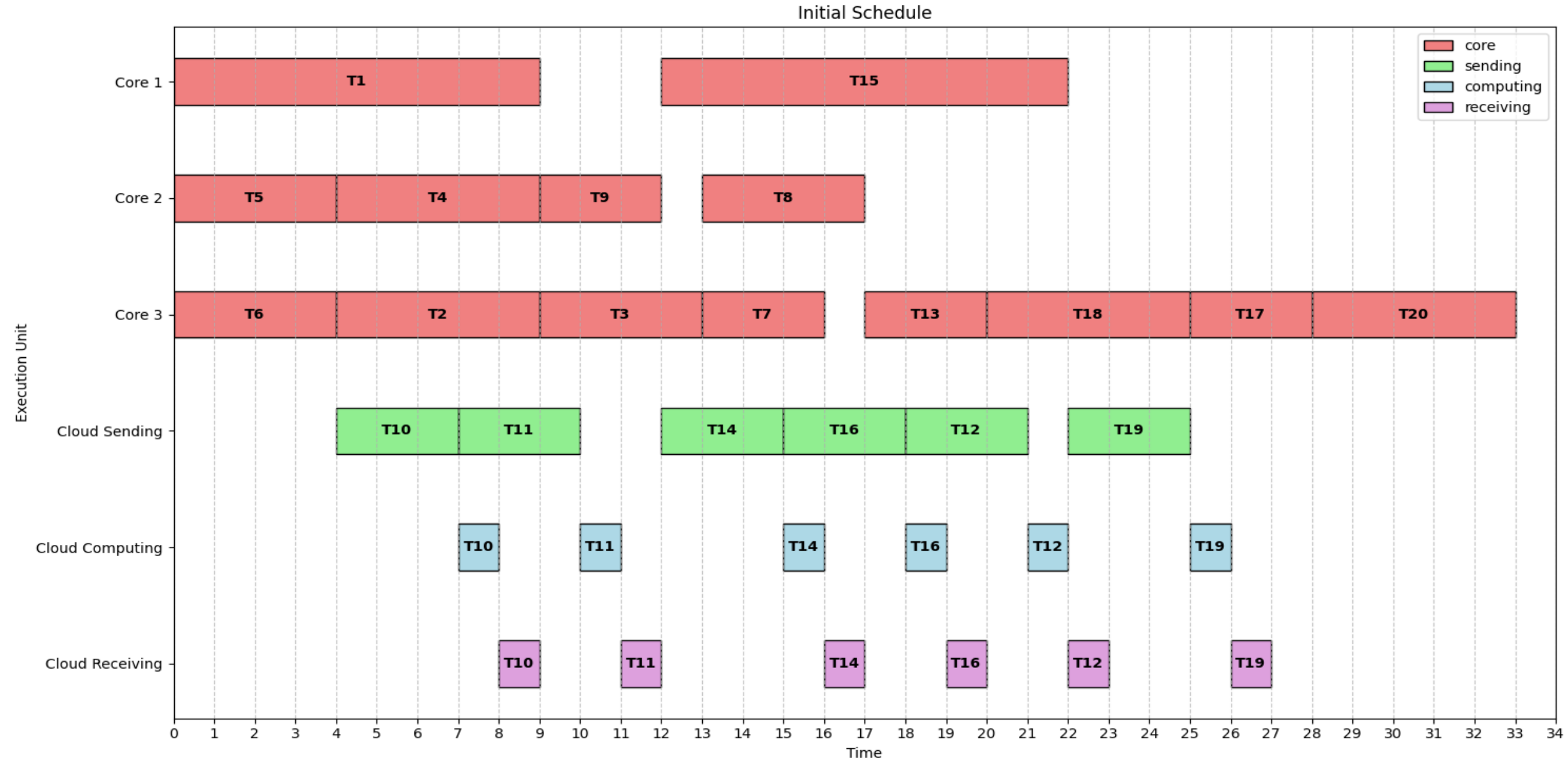


Initial Schedule

# Total energy consumption of initial scheduling: 188

- Core1 (P1) = 1, Core2 (P2) = 2, Core3 (P2) = 4, Cloud (Ps) = 0.5

- Core 1 Task Count: 2 (T1, T15)

- Core 2 Task Count: 4 (T5, T4, T9, T8)

- Core 3 Task Count: 8 (T6, T2, T3, T7, T13, T18, T17, T20)

- Cloud Task Count: 6 (T10, T11, T14, T16, T12, T19)

- E1 = 1 * 19 = 19

- E2 = 2 * 16 = 32

- E3 = 4 * 32 = 128

- E_cloud = 0.5 * 6 * 3 = 9

- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 19 + 32 + 128 + 9 = 188

# c) Energy Optimized Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|------------------|------------------|-------------------|---------------------|
| 1 | Core 1 | 10 | 10=>19 | — | — | — |
| 2 | Cloud | 9 | — | 9=>12 | 12=>13 | 13=>14 |
| 3 | Cloud | 6 | — | 6=>9 | 9=>10 | 10=>11 |
| 4 | Cloud | 0 | — | 0=>3 | 3=>4 | 4=>5 |
| 5 | Core 1 | 0 | 0=>5 | — | — | — |
| 6 | Cloud | 3 | — | 3=>6 | 6=>7 | 7=>8 |
| 7 | Cloud | 21 | — | 21=>24 | 24=>25 | 25=>26 |
| 8 | Core 2 | 11 | 11=>15 | — | — | — |
| 9 | Core 1 | 5 | 5=>10 | — | — | — |
| 10 | Cloud | 12 | — | 12=>15 | 15=>16 | 16=>17 |
| 11 | Cloud | 18 | — | 18=>21 | 21=>22 | 22=>23 |
| 12 | Cloud | 30 | — | 30=>33 | 33=>34 | 34=>35 |
| 13 | Cloud | 15 | — | 15=>18 | 18=>19 | 19=>20 |
| 14 | Cloud | 24 | — | 24=>27 | 27=>28 | 28=>29 |
| 15 | Core 1 | 23 | 23=>33 | — | — | — |
| 16 | Cloud | 27 | — | 27=>30 | 30=>31 | 31=>32 |
| 17 | Cloud | 36 | — | 36=>39 | 39=>40 | 40=>41 |
| 18 | Cloud | 33 | — | 33=>36 | 36=>37 | 37=>38 |
| 19 | Cloud | 39 | — | 39=>42 | 42=>43 | 43=>44 |
| 20 | Cloud | 42 | — | 42=>45 | 45=>46 | 46=>47 |

# Energy Optimized Task Schedule
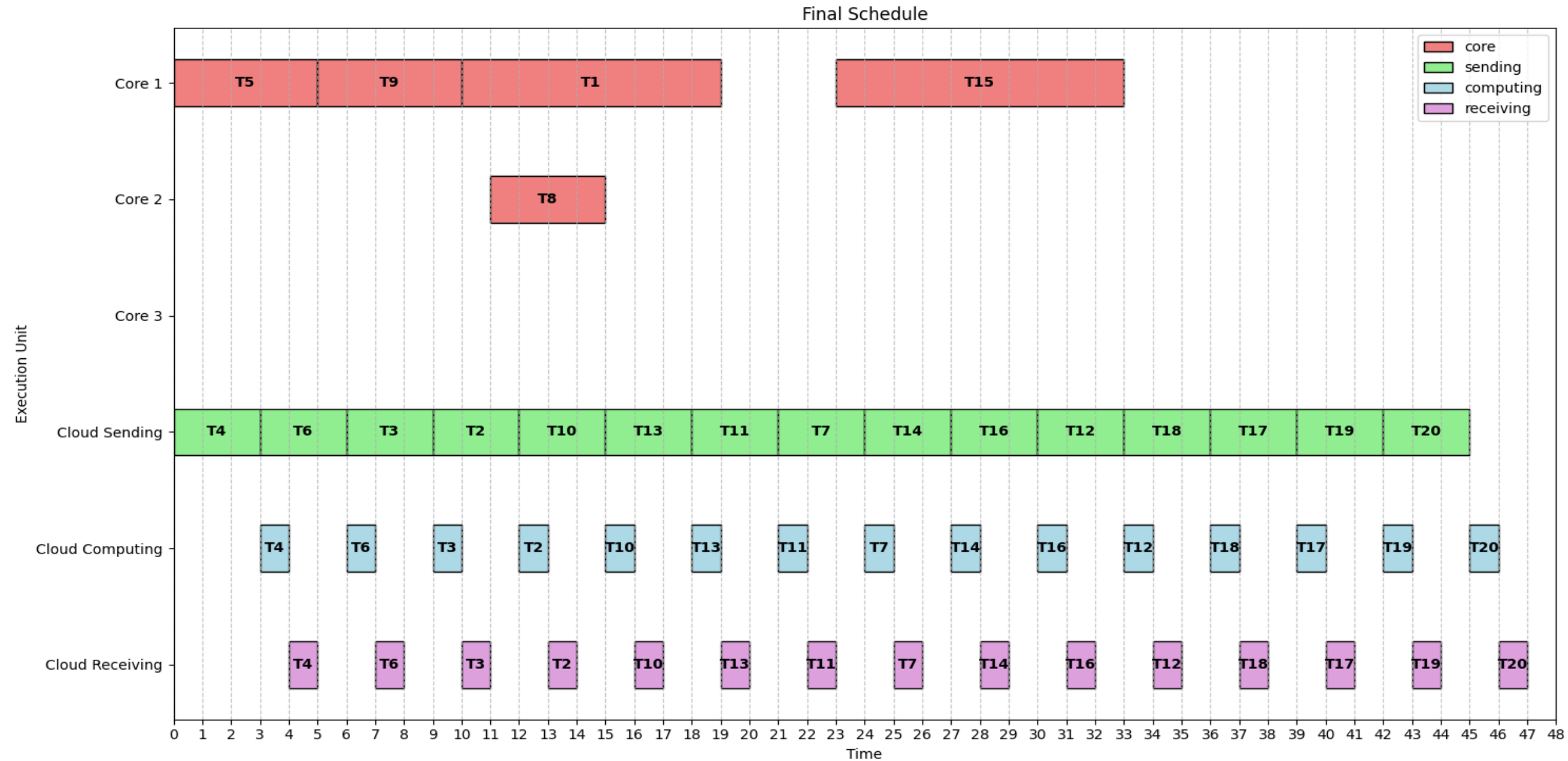


Final Schedule

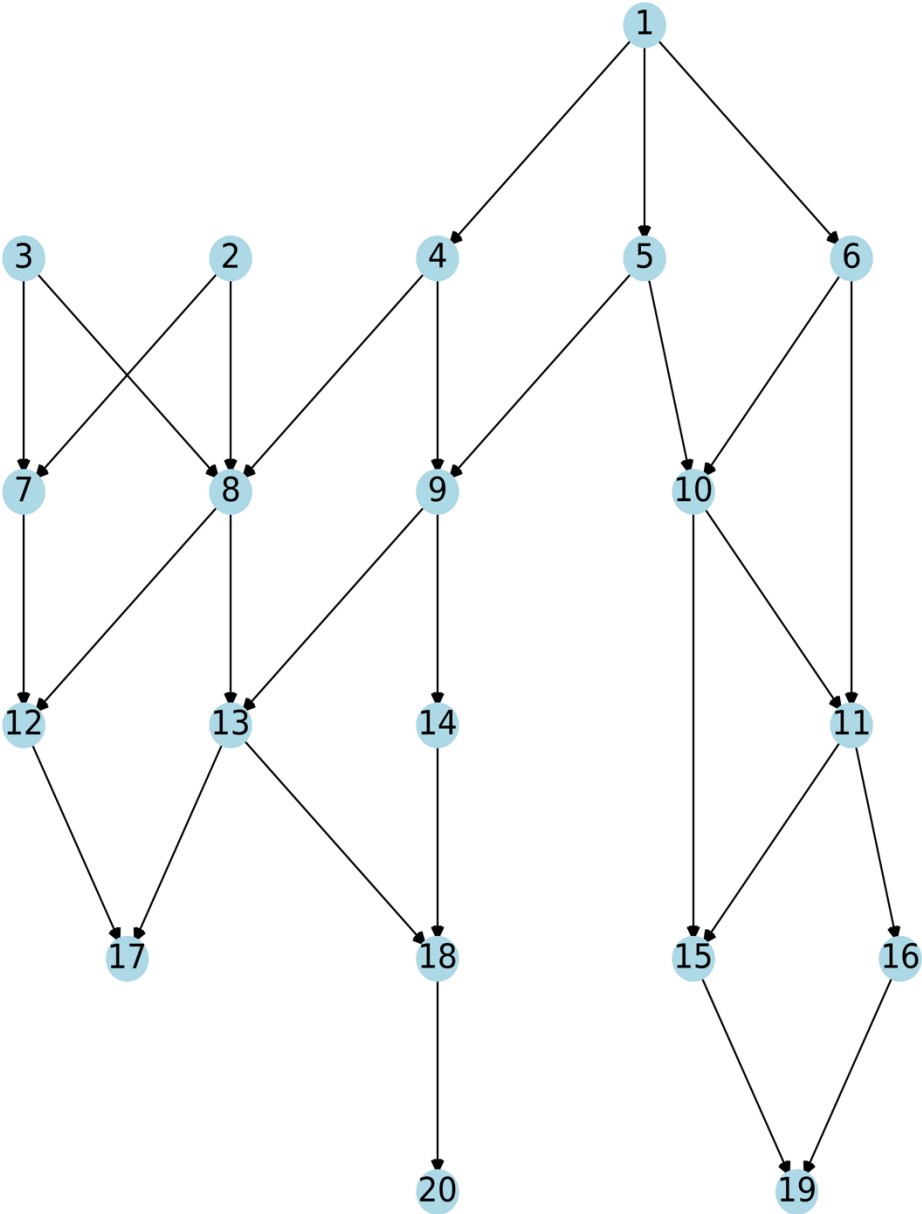# Total energy consumption of final scheduling: 59.5

- Core1 (P1) = 1, Core2 (P2) = 2, Core3 (P2) = 4, Cloud (Ps) = 0.5

- Core 1 Task Count: 4 (T5, T9, T1, T15)

- Core 2 Task Count: 1 (T8)

- Core 3 Task Count: 0

- Cloud Task Count: 15 (T4, T6, T3, T2, T10, T11, T13, T7, T14, T16, T18, T12, T17, T19, T20)

- E1 = 1 * 29 = 29

- E2 = 2 * 4 = 8

- E3 = 4 * 0 = 0

- E_cloud = 0.5 * 15 * 3 = 22.5

- E_total of final scheduling = E1 + E2 + E3 + E_cloud = 29 + 8 + 0 + 22.5 = 59.5

# d) Summary

- T_total of initial scheduling : 33
- E_total of initial scheduling : 188
- T_total of final scheduling : 47 (<49.5 (33*1.5))
- E_total of final scheduling : 59.5

# a) Graph 5: Graph3 with multiple entry tasks and multiple exit tasks

| Task | Core1 | Core2 | Core3 |
|------|-------|-------|-------|
| 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 | 10 | 7 | 4 |
| 12 | 11 | 8 | 5 |
| 13 | 9 | 6 | 3 |
| 14 | 12 | 8 | 4 |
| 15 | 10 | 7 | 3 |
| 16 | 11 | 7 | 4 |
| 17 | 9 | 6 | 3 |
| 18 | 12 | 8 | 5 |
| 19 | 10 | 7 | 4 |
| 20 | 11 | 8 | 5 |

# b) Initial Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|------------------|------------------|-------------------|---------------------|
| 1 | Core 3 | 0 | 0=>5 | – | – | – |
| 2 | Core 2 | 0 | 0=>6 | – | – | – |
| 3 | Core 1 | 0 | 0=>6 | – | – | – |
| 4 | Core 3 | 5 | 5=>8 | – | – | – |
| 5 | Core 2 | 6 | 6=>10 | – | – | – |
| 6 | Cloud | 5 | – | 5=>8 | 8=>9 | 9=>10 |
| 7 | Core 1 | 6 | 6=>14 | – | – | – |
| 8 | Cloud | 8 | – | 8=>11 | 11=>12 | 12=>13 |
| 9 | Core 3 | 10 | 10=>12 | – | – | – |
| 10 | Core 2 | 10 | 10=>14 | – | – | – |
| 11 | Core 3 | 16 | 16=>20 | – | – | – |
| 12 | Core 2 | 14 | 14=>22 | – | – | – |
| 13 | Cloud | 12 | – | 12=>15 | 15=>16 | 16=>17 |
| 14 | Core 3 | 12 | 12=>16 | – | – | – |
| 15 | Cloud | 20 | – | 20=>23 | 23=>24 | 24=>25 |
| 16 | Core 3 | 20 | 20=>24 | – | – | – |
| 17 | Core 2 | 22 | 22=>28 | – | – | – |
| 18 | Cloud | 16 | – | 16=>19 | 19=>20 | 20=>21 |
| 19 | Core 3 | 25 | 25=>29 | – | – | – |
| 20 | Cloud | 23 | – | 23=>26 | 26=>27 | 27=>28 |

# Initial Task Schedule
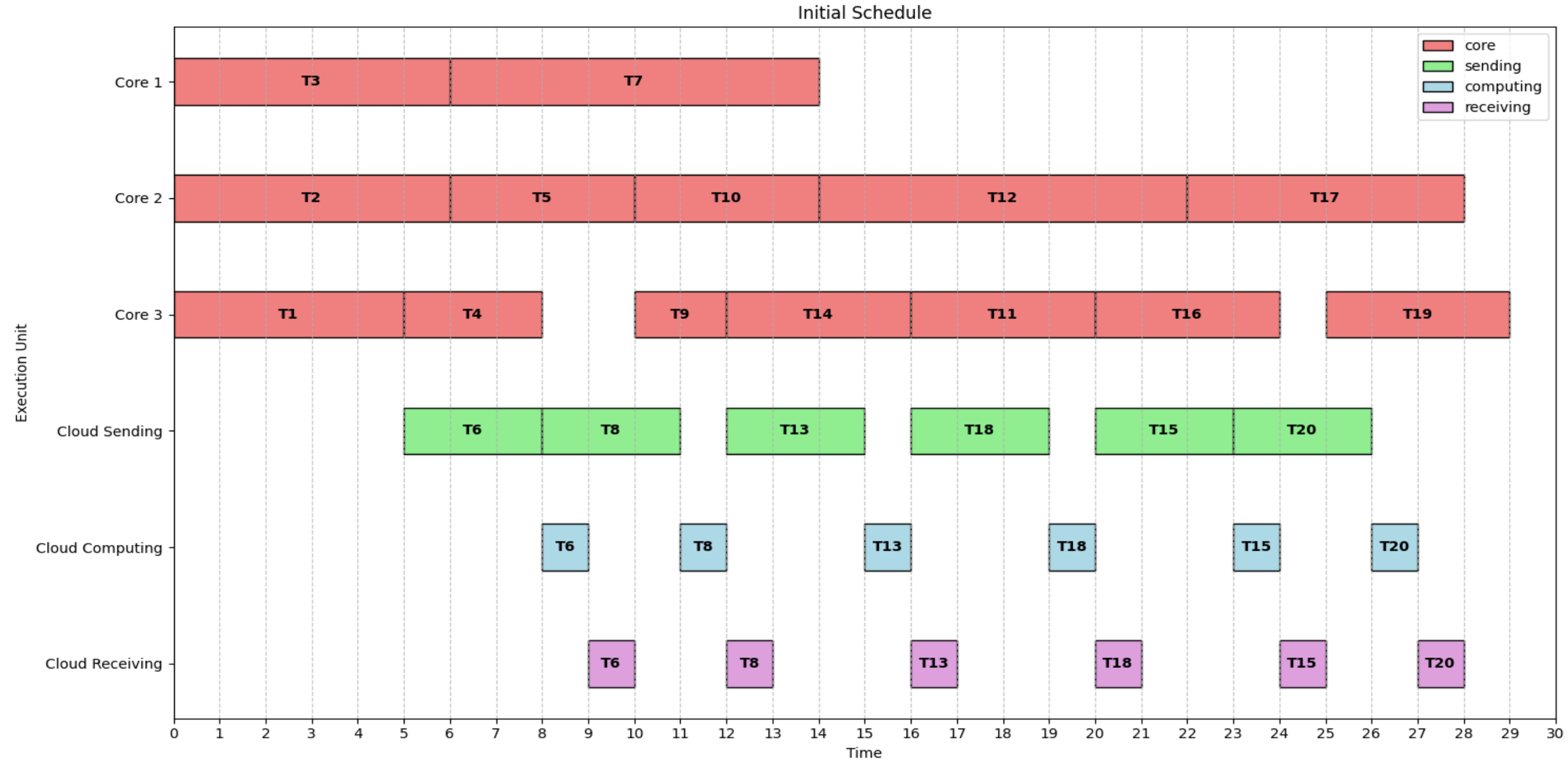


Initial Schedule

# Total energy consumption of initial scheduling: 183

- Core1 (P1) = 1, Core2 (P2) = 2, Core3 (P2) = 4, Cloud (Ps) = 0.5

- Core 1 Task Count: 2 (T3, T7)

- Core 2 Task Count: 5 (T2, T5, T10, T12, T17)

- Core 3 Task Count: 7 (T1, T4, T9, T14, T11, T16, T19)

- Cloud Task Count: 6 (T6, T8, T13, T18, T15, T20)

- E1 = 1 * 14 = 14

- E2 = 2 * 28 = 56

- E3 = 4 * 26 = 104

- E_cloud = 0.5 * 6 * 3= 9

- E_total of initial scheduling = E1 + E2 + E3 + E_cloud = 14 + 56 + 104 + 9 = 183

# c) Energy Optimized Task Schedule Program Output

| TaskID | Assignment | StartTime | ExecWindow(Core) | SendPhase(Cloud) | CloudPhase(Cloud) | ReceivePhase(Cloud) |
|--------|-----------|-----------|------------------|------------------|-------------------|---------------------|
| 1 | Cloud | 3 | – | 3=>6 | 6=>7 | 7=>8 |
| 2 | Cloud | 0 | – | 0=>3 | 3=>4 | 4=>5 |
| 3 | Core 1 | 0 | 0=>6 | – | – | – |
| 4 | Core 2 | 8 | 8=>13 | – | – | – |
| 5 | Core 1 | 8 | 8=>13 | – | – | – |
| 6 | Cloud | 6 | – | 6=>9 | 9=>10 | 10=>11 |
| 7 | Cloud | 9 | – | 9=>12 | 12=>13 | 13=>14 |
| 8 | Cloud | 13 | – | 13=>16 | 16=>17 | 17=>18 |
| 9 | Core 2 | 13 | 13=>16 | – | – | – |
| 10 | Core 1 | 13 | 13=>20 | – | – | – |
| 11 | Cloud | 22 | – | 22=>25 | 25=>26 | 26=>27 |
| 12 | Core 1 | 20 | 20=>31 | – | – | – |
| 13 | Cloud | 19 | – | 19=>22 | 22=>23 | 23=>24 |
| 14 | Cloud | 16 | – | 16=>19 | 19=>20 | 20=>21 |
| 15 | Cloud | 31 | – | 31=>34 | 34=>35 | 35=>36 |
| 16 | Cloud | 28 | – | 28=>31 | 31=>32 | 32=>33 |
| 17 | Core 1 | 31 | 31=>40 | – | – | – |
| 18 | Cloud | 25 | – | 25=>28 | 28=>29 | 29=>30 |
| 19 | Cloud | 37 | – | 37=>40 | 40=>41 | 41=>42 |
| 20 | Cloud | 34 | – | 34=>37 | 37=>38 | 38=>39 |

Energy Optimized Task Schedule
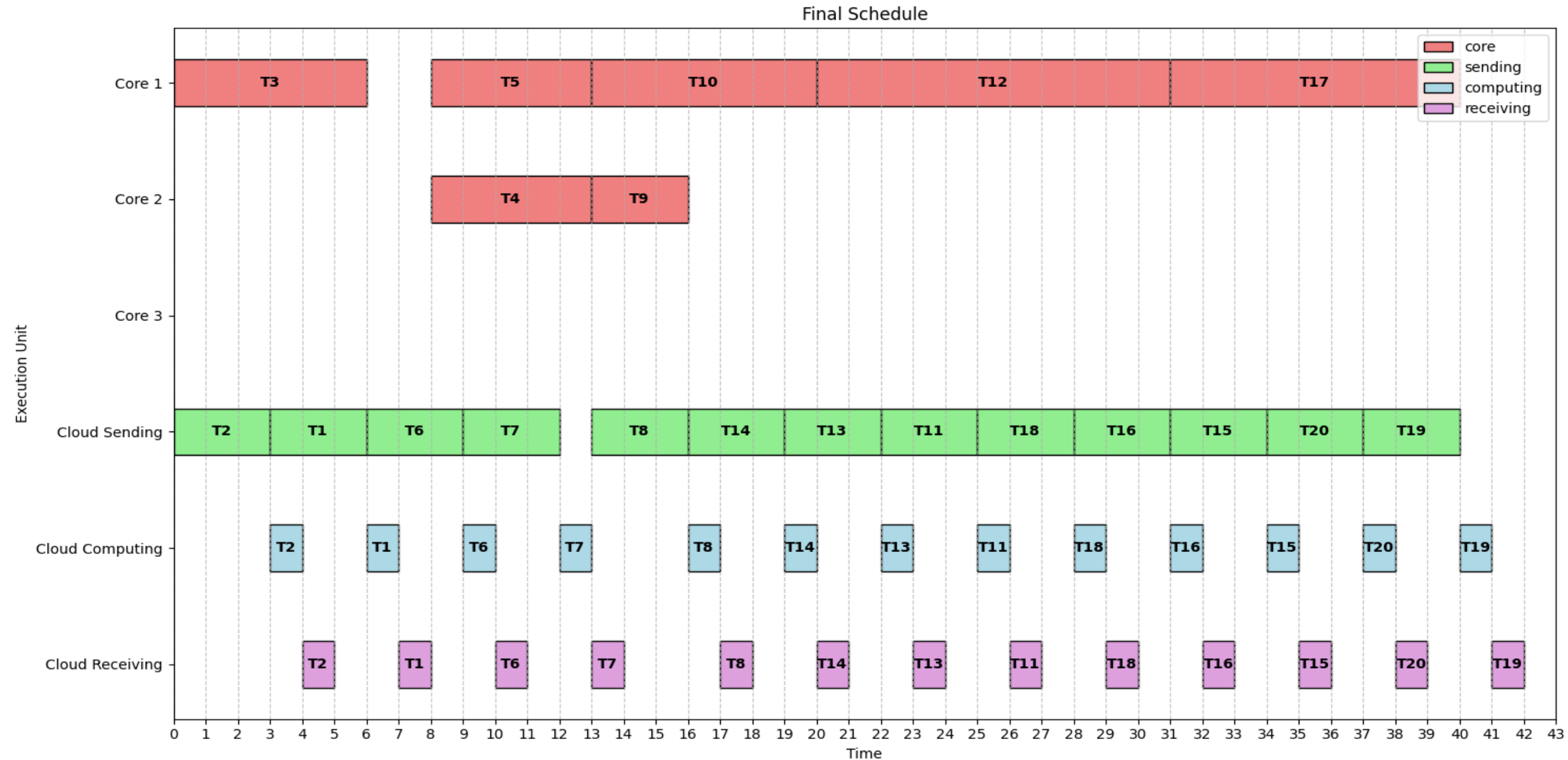
# Total energy consumption of final scheduling: 73.5

- Core1 (P1) = 1, Core2 (P2) = 2, Core3 (P2) = 4, Cloud (Ps) = 0.5

- Core 1 Task Count: 5 (T3, T5, T10, T12, T17)

- Core 2 Task Count: 2 (T4, T9)

- Core 3 Task Count: 0

- Cloud Task Count: 13 (T1, T2, T6, T7, T8, T11, T13, T14, T15, T16, T18, T19, T20)

- E1 = 1 * 38 = 38

- E2 = 2 * 8 = 16

- E3 = 4 * 0 = 0

- E_cloud = 0.5 * 13 * 3 = 19.5

- E_total of final scheduling = E1 + E2 + E3 + E_cloud = 38 + 16 + 0 + 19.5 = 73.5

# d) Summary

- $T\_total$ of initial scheduling : 29
- $E\_total$ of initial scheduling : 183
- $T\_total$ of final scheduling : 42 (<43.5 (29*1.5))
- $E\_total$ of final scheduling : 73.5