## 3. Activity Selection Problem

**Activity selection using earliest finish time:**
Consider the following activities are sorted by their end time. Here, we will select the activity with the earliest finish time and has start time after the most recently selected activity.

| # | Start Time | End Time |
|---|---|---|
| 1 | 0 | 5 |
| 2 | 3 | 7 |
| 3 | 6 | 11 |
| 4 | 8 | 13 |
| 5 | 15 | 16 |
| 6 | 17 | 18 |
| 7 | 19 | 20 |
| 8 | 14 | 29 |
| 9 | 31 | 34 |

Selected activities: 1, 3, 5, 6, 7, 9 (optimal solution)

**Activity selection using earliest start time:**
Here, activities are sorted by their start time. We will select the activity with the earliest start time which is after the most recently selected activity.

| # | Start Time | End Time |
|---|---|---|
| 1 | 0 | 5 |
| 2 | 3 | 7 |
| 3 | 6 | 11 |
| 4 | 8 | 13 |
| 5 | 14 | 29 |
| 6 | 15 | 16 |
| 7 | 17 | 18 |
| 8 | 19 | 20 |
| 9 | 31 | 34 |

Selected activities: 1, 3, 4, 9

This is not the optimal solution because the maximum number of activities which can be selected is 6. The problem with this approach is when it selects the activity based on the start time, it doesn't consider the finish time. This puts the approach in trouble if the activity has a very late finishing time (activity no. 5 has start time 14 and finish time 29). So, while the activity 5 is going on, we could've chosen other activities. But, due to this approach, we can't select any activities because of late finish time. Thus, sorting based on start time doesn't give the optimal solution.