

**Goal 1 Shopping)**

Start: 1000hrs 2022/1/1

Deadline: 1300hrs 2022/1/1

Duration: 1

**Goal 2 (Dentist)**

Start: 1000hrs 2022/1/1

Deadline: 1100hrs 2022/1/1

Duration: 1

**Goal 3 (Exercise)**

Start: 1000hrs 2022/1/1

Deadline: 1800hrs 2022/1/1

Duration: 1

Calendar start:

0000hrs 2022/1/1

Calendar end:

0000hrs 2022/1/2

We start with three “Goals”, input by the user. We’re also given a “Calendar start” and “Calendar end” representing the bounds within which the scheduler should attempt to schedule the goals.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: None

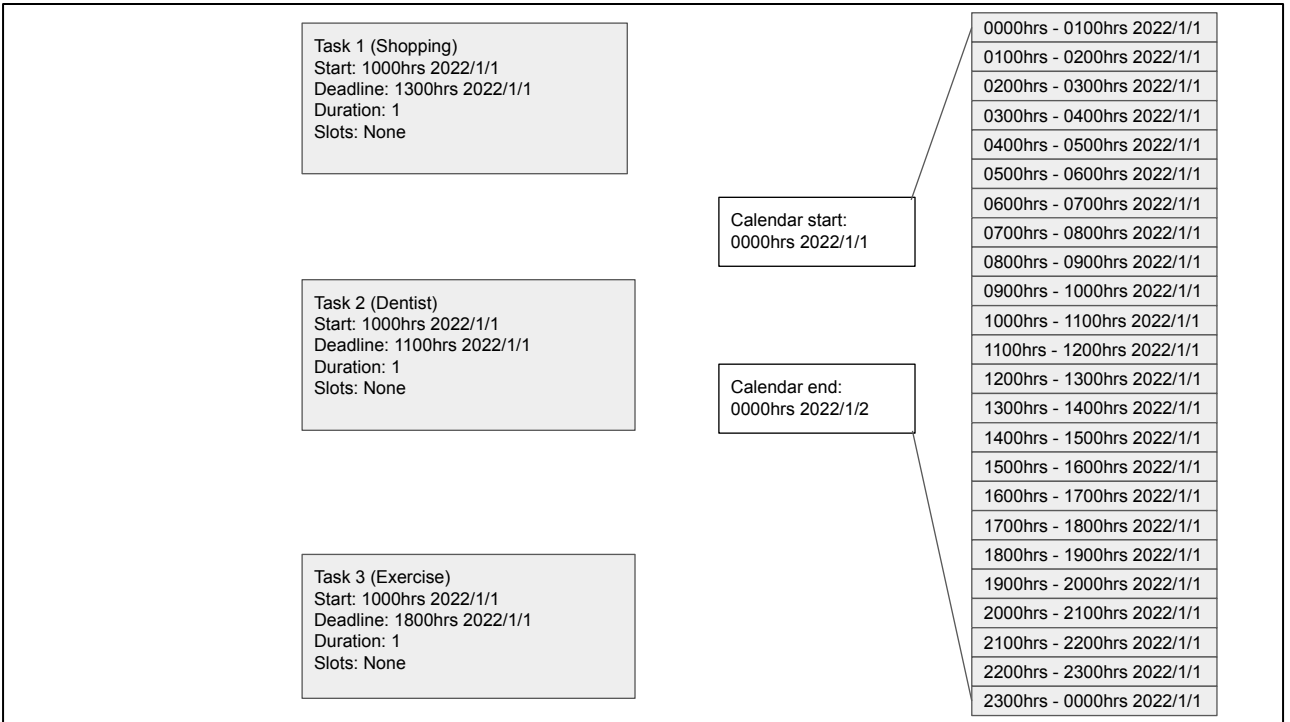
Calendar start:  
0000hrs 2022/1/1

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/1  
Duration: 1  
Slots: None

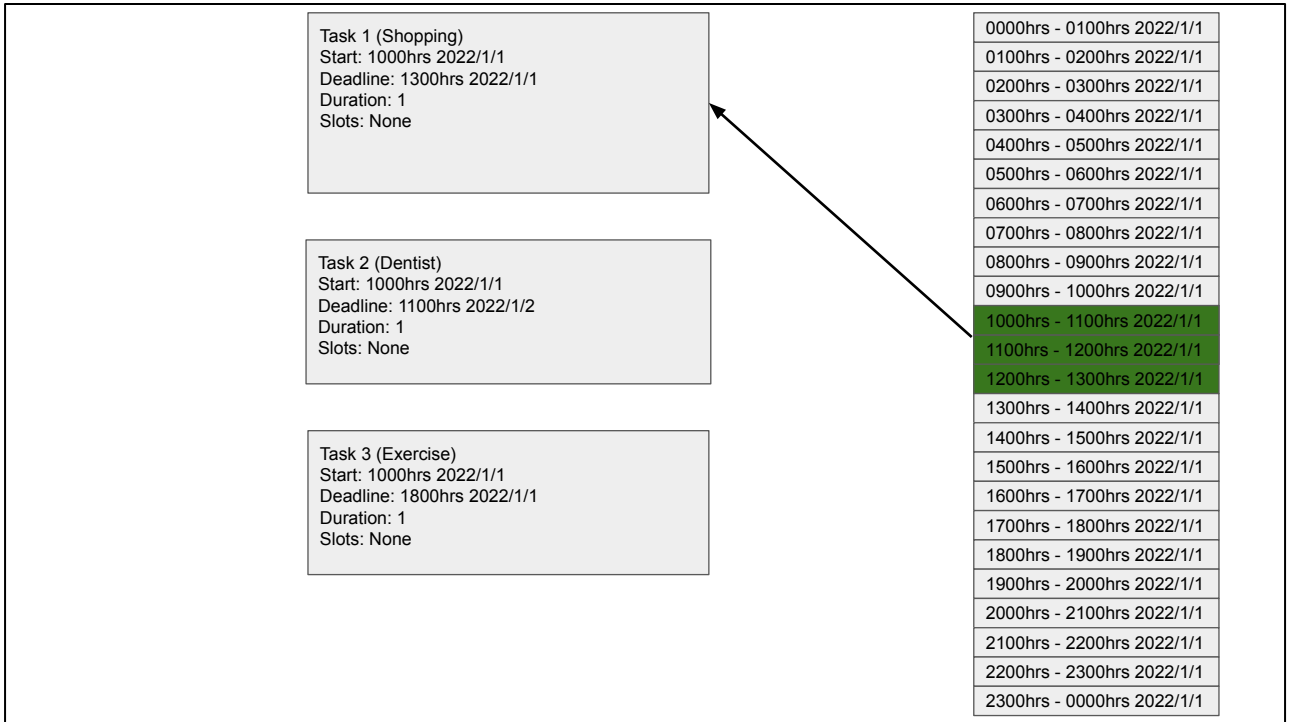
Calendar end:  
0000hrs 2022/1/2

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: None

We generate three tasks from the three goals. Each task has a start and deadline, and no slots assigned. In this case each goal has generated one task. However this is not always the case. For example if a goal has a 'repeat' such as 'daily', it will generate multiple tasks.



The first step is to generate all the time slots within the calendar start and end.



We then begin assigning slots to tasks. Assignment of slots to task 1.

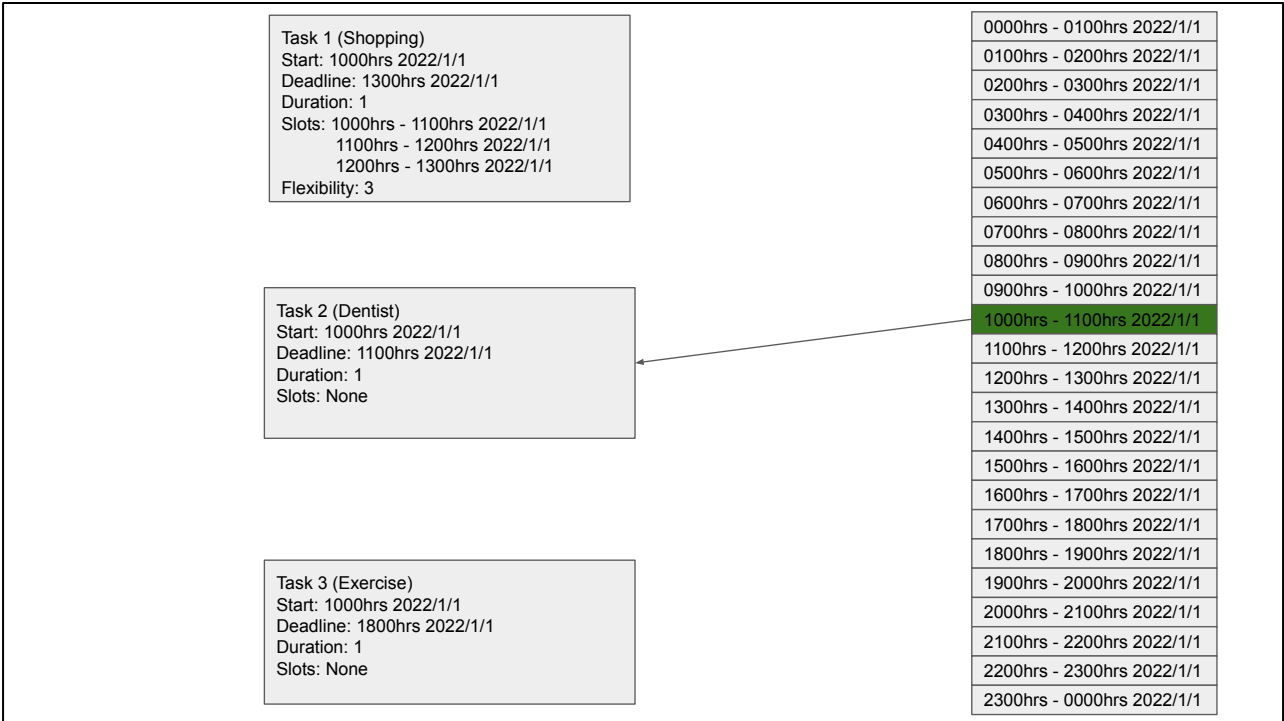
Task 1 (Shopping)  
 Start: 1000hrs 2022/1/1  
 Deadline: 1300hrs 2022/1/1  
 Duration: 1  
 Slots: 1000hrs - 1100hrs 2022/1/1  
       1100hrs - 1200hrs 2022/1/1  
       1200hrs - 1300hrs 2022/1/1  
 Flexibility: 3

Task 2 (Dentist)  
 Start: 1000hrs 2022/1/1  
 Deadline: 1100hrs 2022/1/2  
 Duration: 1  
 Slots: None

Task 3 (Exercise)  
 Start: 1000hrs 2022/1/1  
 Deadline: 1800hrs 2022/1/1  
 Duration: 1  
 Slots: None

0000hrs - 0100hrs 2022/1/1
0100hrs - 0200hrs 2022/1/1
0200hrs - 0300hrs 2022/1/1
0300hrs - 0400hrs 2022/1/1
0400hrs - 0500hrs 2022/1/1
0500hrs - 0600hrs 2022/1/1
0600hrs - 0700hrs 2022/1/1
0700hrs - 0800hrs 2022/1/1
0800hrs - 0900hrs 2022/1/1
0900hrs - 1000hrs 2022/1/1
1000hrs - 1100hrs 2022/1/1
1100hrs - 1200hrs 2022/1/1
1200hrs - 1300hrs 2022/1/1
1300hrs - 1400hrs 2022/1/1
1400hrs - 1500hrs 2022/1/1
1500hrs - 1600hrs 2022/1/1
1600hrs - 1700hrs 2022/1/1
1700hrs - 1800hrs 2022/1/1
1800hrs - 1900hrs 2022/1/1
1900hrs - 2000hrs 2022/1/1
2000hrs - 2100hrs 2022/1/1
2100hrs - 2200hrs 2022/1/1
2200hrs - 2300hrs 2022/1/1
2300hrs - 0000hrs 2022/1/1

As we assign slots, we also calculate the task's flexibility. The formula for calculating flexibility is: flexibility = total\_hours\_of\_slots - duration + 1



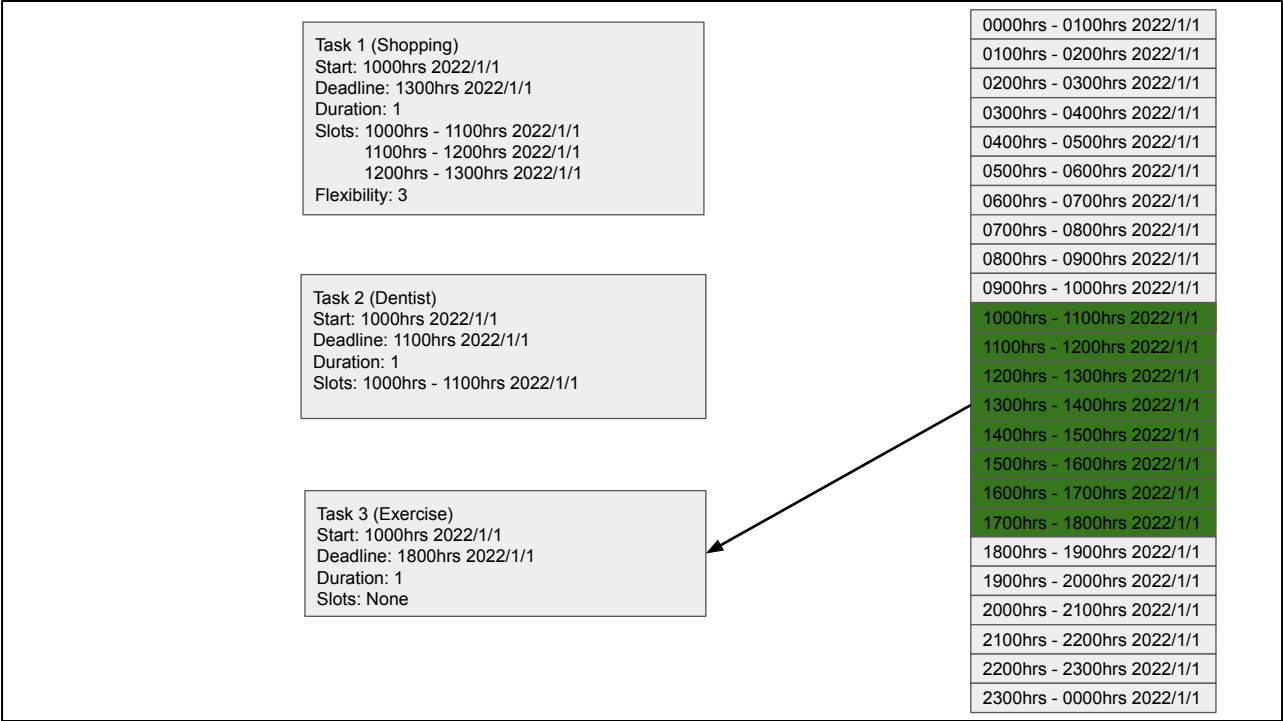
Assignment of slots to task 2.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
Flexibility: 3

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: None

0000hrs - 0100hrs 2022/1/1
0100hrs - 0200hrs 2022/1/1
0200hrs - 0300hrs 2022/1/1
0300hrs - 0400hrs 2022/1/1
0400hrs - 0500hrs 2022/1/1
0500hrs - 0600hrs 2022/1/1
0600hrs - 0700hrs 2022/1/1
0700hrs - 0800hrs 2022/1/1
0800hrs - 0900hrs 2022/1/1
0900hrs - 1000hrs 2022/1/1
1000hrs - 1100hrs 2022/1/1
1100hrs - 1200hrs 2022/1/1
1200hrs - 1300hrs 2022/1/1
1300hrs - 1400hrs 2022/1/1
1400hrs - 1500hrs 2022/1/1
1500hrs - 1600hrs 2022/1/1
1600hrs - 1700hrs 2022/1/1
1700hrs - 1800hrs 2022/1/1
1800hrs - 1900hrs 2022/1/1
1900hrs - 2000hrs 2022/1/1
2000hrs - 2100hrs 2022/1/1
2100hrs - 2200hrs 2022/1/1
2200hrs - 2300hrs 2022/1/1
2300hrs - 0000hrs 2022/1/1



Assignment of slots to task 3.



Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
Flexibility: 3

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1  
Flexibility: 8

0000hrs - 0100hrs 2022/1/1
0100hrs - 0200hrs 2022/1/1
0200hrs - 0300hrs 2022/1/1
0300hrs - 0400hrs 2022/1/1
0400hrs - 0500hrs 2022/1/1
0500hrs - 0600hrs 2022/1/1
0600hrs - 0700hrs 2022/1/1
0700hrs - 0800hrs 2022/1/1
0800hrs - 0900hrs 2022/1/1
0900hrs - 1000hrs 2022/1/1
1000hrs - 1100hrs 2022/1/1
1100hrs - 1200hrs 2022/1/1
1200hrs - 1300hrs 2022/1/1
1300hrs - 1400hrs 2022/1/1
1400hrs - 1500hrs 2022/1/1
1500hrs - 1600hrs 2022/1/1
1600hrs - 1700hrs 2022/1/1
1700hrs - 1800hrs 2022/1/1
1800hrs - 1900hrs 2022/1/1
1900hrs - 2000hrs 2022/1/1
2000hrs - 2100hrs 2022/1/1
2100hrs - 2200hrs 2022/1/1
2200hrs - 2300hrs 2022/1/1
2300hrs - 0000hrs 2022/1/1

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
Flexibility: 3

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1  
Flexibility: 8

We now have initial slots for all tasks. Next step is to schedule the tasks, beginning with any task that has flexibility of 1.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
Flexibility: 3

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
**Status: SCHEDULED**  
**Output {Start: 1000hrs Deadline: 1100hrs...}**

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1  
Flexibility: 8

Task 2 has flexibility of 1 so it is scheduled. It now has a confirmed start and deadline.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1

Flexibility: 3

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1

Flexibility: 8

The 1000hrs - 1100hrs slot is removed from all remaining tasks.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1

Flexibility: **2**

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1

Flexibility: **8**

Since some slots were removed from the tasks, we recalculate their flexibilities.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1

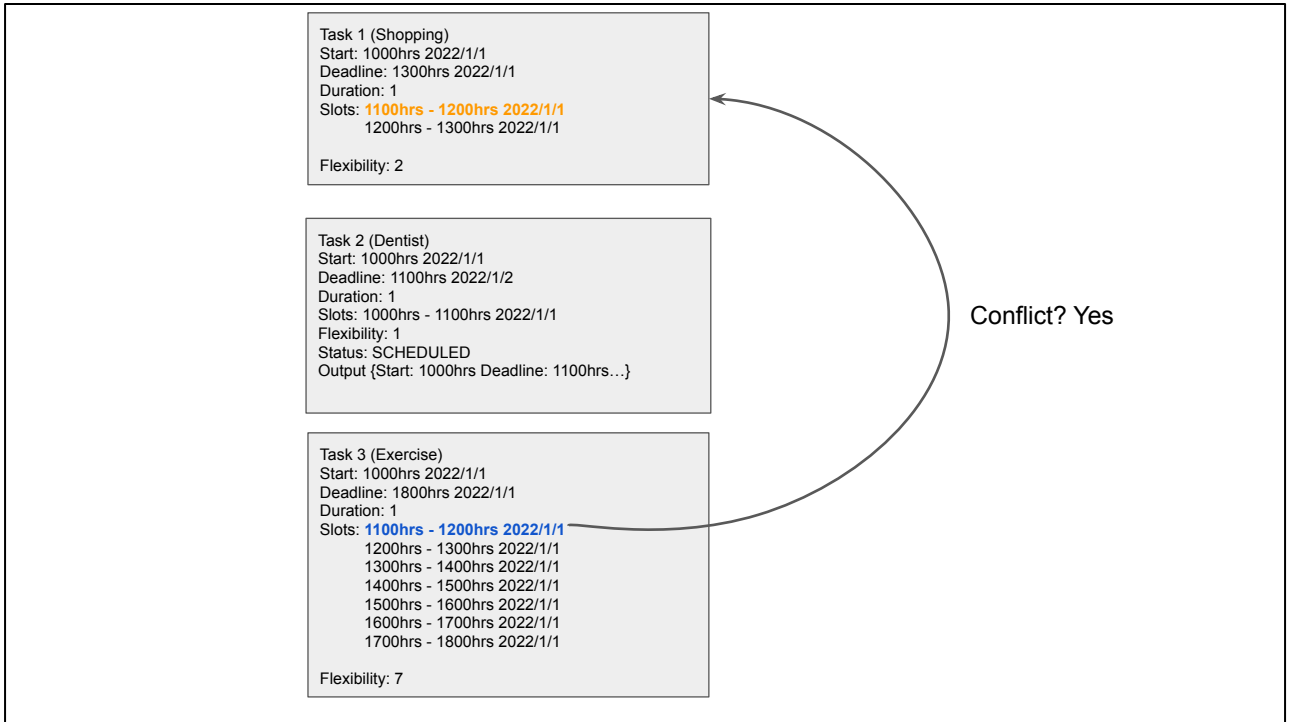
Flexibility: 2

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

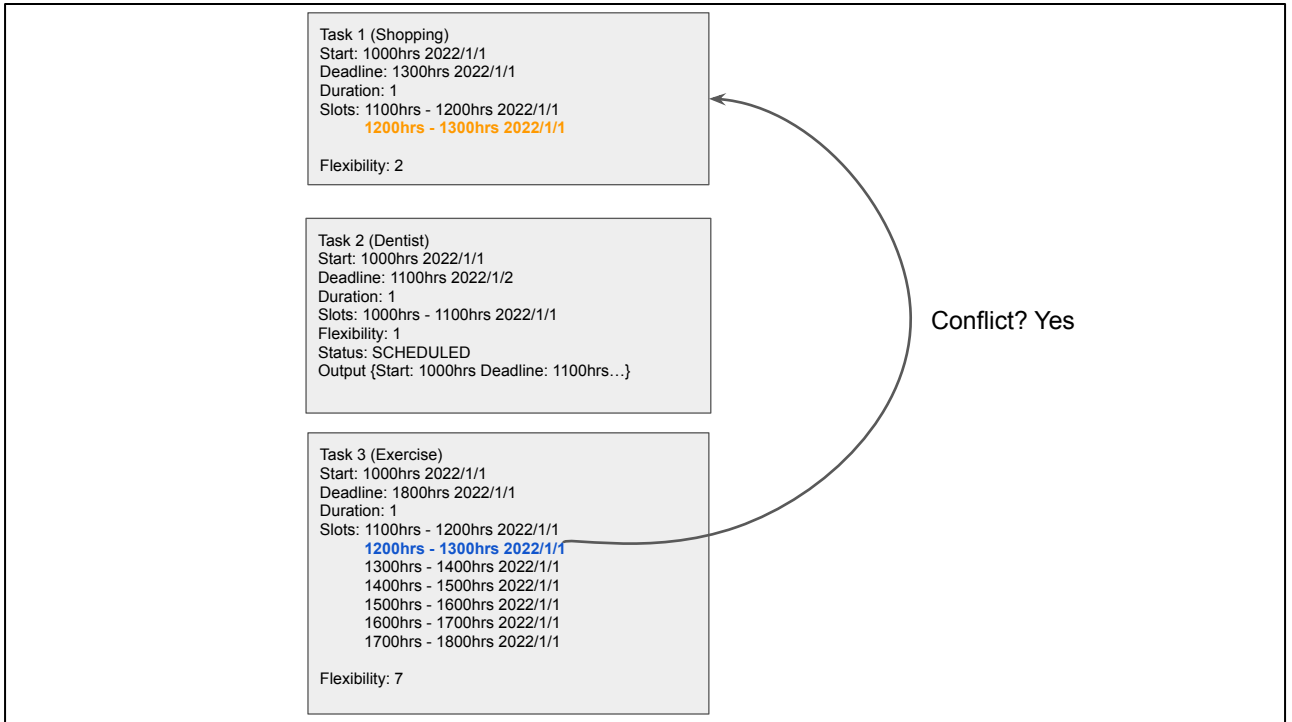
Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1

Flexibility: 7

We now attempt to schedule the tasks starting from the highest flexibility downwards. So the next one to be scheduled will be task 3. NOTE: If there had been any other tasks with flexibility 1, we would have scheduled them first.

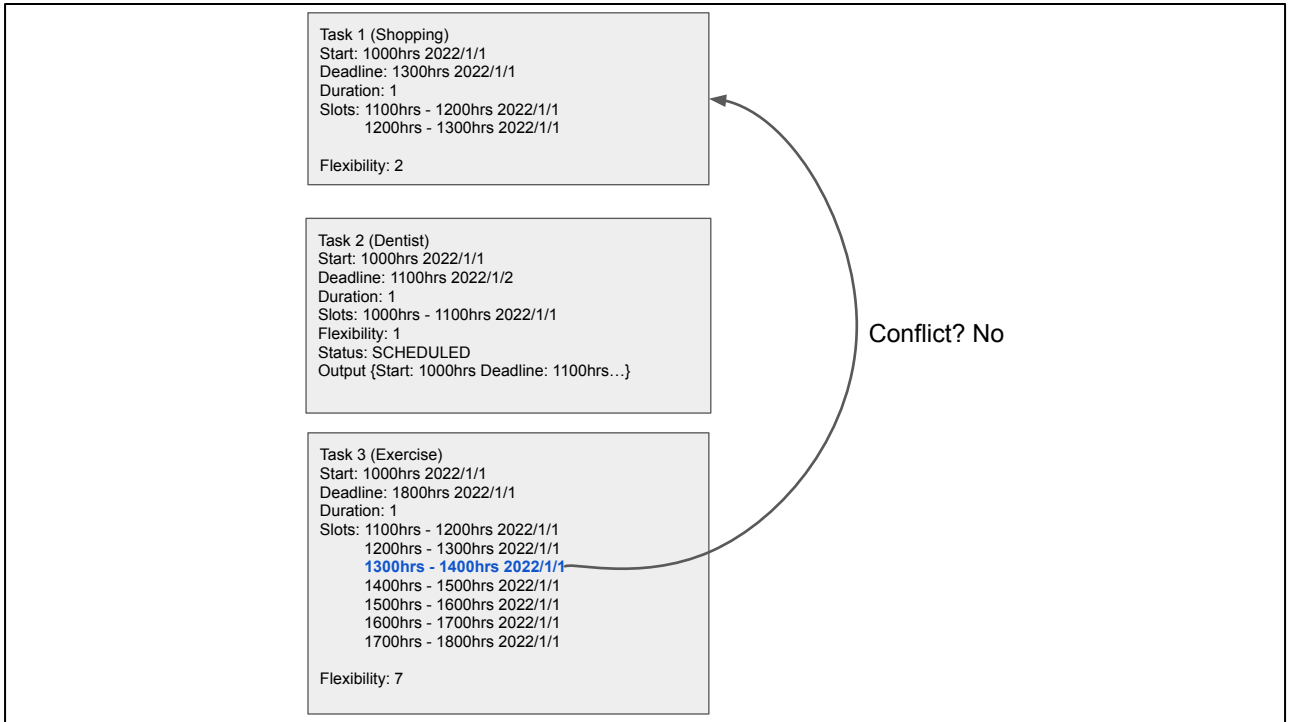


Task 3's first slot is 1100hrs - 1200hrs. It checks the other tasks to see if this conflicts with other UNSCHEDULED task's slots. There is a conflict with Task 1.



The next slot is 1200hrs - 1300hrs. We check for conflicts in the other UNSCHEDULED tasks. Again there is a conflict with task 1.





We then attempt to use the 1300hrs - 1400hrs slot. This time there is no conflict with the other UNSCHEDULED tasks.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
Flexibility: 2

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1  
Flexibility: 7  
Status: SCHEDULED  
Output {Start: 1300hrs Deadline: 1400hrs...}

Since there are no conflicts, we can confirm this as the slot for task 3 and change status to SCHEDULED. If any other tasks had 1300hrs-1400hrs in their slots list, we would have removed it from them at this stage.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1

Flexibility: 2

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1

Flexibility: 7  
Status: SCHEDULED  
Output {Start: 1300hrs Deadline: 1400hrs...}

Now we're left with task 1.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1

Flexibility: 2

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
1300hrs - 1400hrs 2022/1/1  
1400hrs - 1500hrs 2022/1/1  
1500hrs - 1600hrs 2022/1/1  
1600hrs - 1700hrs 2022/1/1  
1700hrs - 1800hrs 2022/1/1

Flexibility: 7  
Status: SCHEDULED  
Output {Start: 1300hrs Deadline: 1400hrs...}

We try 1100hrs - 1200hrs. It doesn't conflict with any other UNSCHEDULED task's slots.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
  
Flexibility: 2  
Status: SCHEDULED  
Output {Start: 1100hrs Deadline: 1200hrs...}

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
. .  
1700hrs - 1800hrs 2022/1/1  
  
Flexibility: 7  
Status: SCHEDULED  
Output {Start: 1300hrs Deadline: 1400hrs...}

Since there are no conflicts, we can confirm the 1100hrs-1200hrs slot for task 1 and mark it as SCHEDULED.

Task 1 (Shopping)  
Start: 1000hrs 2022/1/1  
Deadline: 1300hrs 2022/1/1  
Duration: 1  
Slots: 1100hrs - 1200hrs 2022/1/1  
1200hrs - 1300hrs 2022/1/1  
  
Flexibility: 2  
Status: SCHEDULED  
Start: 1100hrs Deadline: 1400hrs  
Output {Start: 1100hrs Deadline: 1200hrs...}

Task 2 (Dentist)  
Start: 1000hrs 2022/1/1  
Deadline: 1100hrs 2022/1/2  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
Flexibility: 1  
Status: SCHEDULED  
Output {Start: 1000hrs Deadline: 1100hrs...}

Task 3 (Exercise)  
Start: 1000hrs 2022/1/1  
Deadline: 1800hrs 2022/1/1  
Duration: 1  
Slots: 1000hrs - 1100hrs 2022/1/1  
. .  
1700hrs - 1800hrs 2022/1/1  
  
Flexibility: 7  
Status: SCHEDULED  
Output {Start: 1300hrs Deadline: 1400hrs...}

The tasks are all scheduled, with output start/deadline ready. These tasks will be formatted and then sent to the front end as output.