**Name and Info:**

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**Brief description on the model:**

There are three types: People, Time and Courses, for the three objects involved in the problem:

// Courses

type Courses = { Phy, Mat1, Mat2, Che1, Che2, AI, Logic, Prog, Fin, Spa, Ara, Jap };

// People

type People = { Andrew, Emily, Phoebe };

// Time

type Time = { 8, 9, 10, 11 };

Then comes the background assumption about the uniqueness: 1. Each course has only one teacher, 2. Each course will happen only at one time, 3. Each person can only have one course at one time.

// Each course will have only one teacher

forall c : Courses

exactlyone p : People

Teach(p,c)

end

end;

// Each course will happen at only one time

forall c : Courses

exactlyone t : Time

AtTime(c,t)

end

end;

// Each person can have only one course at a time

forall p : People

forall t : Time

exactlyone c : Courses

(AtTime(c,t) & Teach(p,c))

end

end

end;

Then comes the problem restrictions :

// 1.Only Emily can teach Spanish

Teach(Emily,Spa);

// 2.Only Andrew can teach Match2

Teach(Andrew,Mat2);

// 3.Only Phoebe can teach AI

Teach(Phoebe,AI);

// 4. Only Andrew and Emily can teach Logic

(Teach(Andrew,Logic) | Teach(Emily,Logic));

// 5. Only Andrew and Phoebe can teach the Chemistry courses, Japanese and Finnish.

( Teach(Andrew,Che1) | Teach(Phoebe,Che1) ) &

( Teach(Andrew,Che2) | Teach(Phoebe,Che2) ) &

( Teach(Andrew,Jap) | Teach(Phoebe,Jap) ) &

( Teach(Andrew,Fin) | Teach(Phoebe,Fin) ) ;

// 6. Math1 and Math2 cannot be simultaneous.

forall t : Time

(not (AtTime(Mat1,t) & AtTime(Mat2,t) ) )

end;

// 7. Only Phoebe and Emily can teach Arabic.

(Teach(Phoebe,Ara) | Teach(Emily,Ara));

// 8. Programming and Logic cannot be simultaneous.

forall t : Time

(not (AtTime(Prog,t) & AtTime(Logic,t) ) )

end;

// 9. The language courses must be later than 8am.

(not ( AtTime(Fin,8) | AtTime(Spa,8) | AtTime(Ara,8) | AtTime(Jap,8)));

**Output:**

sat

( (AtTime\_AI\_11 true)

(AtTime\_Ara\_9 true)

(AtTime\_Che1\_8 true)

(AtTime\_Che2\_10 true)

(AtTime\_Fin\_9 true)

(AtTime\_Jap\_10 true)

(AtTime\_Logic\_10 true)

(AtTime\_Mat1\_8 true)

(AtTime\_Mat2\_11 true)

(AtTime\_Phy\_8 true)

(AtTime\_Prog\_9 true)

(AtTime\_Spa\_11 true)

(Teach\_Andrew\_Che1 true)

(Teach\_Andrew\_Che2 true)

(Teach\_Andrew\_Mat2 true)

(Teach\_Andrew\_Prog true)

(Teach\_Emily\_Ara true)

(Teach\_Emily\_Logic true)

(Teach\_Emily\_Phy true)

(Teach\_Emily\_Spa true)

(Teach\_Phoebe\_AI true)

(Teach\_Phoebe\_Fin true)

(Teach\_Phoebe\_Jap true)

(Teach\_Phoebe\_Mat1 true))

**Description for the solutions:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Andrew | Emily | Phoebe |
| 8am | **Chemistry1** | **Physics** | **Math1** |
| 9am | **Programming** | **Arabic** | **Finnish** |
| 10am | **Chemistry2** | **Logic** | **Japanese** |
| 11am | **Math2** | **Spanish** | **AI** |

Finished it within 1.5 hours.