
Llista d'activitats

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Al final d'aquest enunciat hi podeu trobar un programa a mig fer que haureu de completar. Concretament, hi han dues funcions que estan pendents d'implementar. A continuació us expliquem amb quines dades treballa el programa i què han de fer aquestes funcions.

El programa treballa amb un tipus de dada `Activity`, que representa una activitat, que inclou el nom de l'activitat (`name`), l'instant de temps d'inici de l'activitat (`t1`), i l'instant de temps d'acabament de l'activitat (`t2`). Per simplificar, `t1` i `t2` son variables enteres, i el programa sempre treballa amb activitats correctament definides cumplint $t1 < t2$:

```
struct Activity {
    string name;
    int t1,t2;
};
```

El programa també treballa amb un tipus de dada `ListActivities`, que representa una llista d'activitats:

```
typedef vector<Activity> ListActivities;
```

Haureu d'implementar una funció per a verificar que dues activitats son compatibles en temps, és a dir, que no se sol.lapen en temps. En el cas particular en que una de les activitats acaba exactament quan l'altra comença, es consideren compatibles.

```
bool compatibleActivities(Activity a, Activity b)
```

A més a més, haureu d'implementar una funció que rep dues activitats i retorna cert si la primera és menor que la segona segons el criteri que descrivim a continuació. Una activitat és menor que una altra si comença estrictament abans que l'altra, o comença alhora que l'altra i acaba estrictament abans, o comença i acaba alhora que l'altra però el seu nom és menor que el nom de l'altra en ordre lexicogràfic.

```
bool smallerActivity(Activity a, Activity b)
```

La funció anterior es fa servir des d'un altre lloc del programa per a ordenar totes les activitats.

Completeu el següent codi a mig fer per tal de solucionar l'exercici:

```
#include <iostream>
#include <string>
#include <vector>
#include <algorithm>
```

```
// Here you can add more includes if you wish.
```

```
using namespace std;
```

```
struct Activity {
```

```

    string name;
    int t1, t2; // t1<t2 must be satisfied for a correct activity
};

typedef vector<Activity> ListActivities;

// Auxiliary functions (you can add more functions if you wish)

// Pre: The input contains a description of an activity with the format:
//
//     name t1 t2
//
//     where name is a non-empty string with lowercase letters and t1<t2
// Post: Returns the activity read from the input adapted to the format of struct
Activity readActivity()
{
    Activity a;
    cin >> a.name >> a.t1 >> a.t2;
    return a;
}

// Pre: listactivities represents a list of correct activities
// Post: Prints all activities from first to last, one per line, and with the format:
//
//     name t1 t2
void printActivities(const ListActivities &listactivities)
{
    for (int i = 0; i < int(listactivities.size()); i++) {
        const Activity &a = listactivities[i];
        cout << a.name << " " << a.t1 << " " << a.t2 << endl;
    }
}

// Pre: a, b represent correct activities.
// Post: Returns true iff the activities have a compatible timeline,
//        i.e. they do not overlap in time.
//        Note: if one of them finishes exactly when the other starts, then they are compatible.
bool compatibleActivities(Activity a, Activity b)
{
    // Implement this function.
    // ...
}

// Pre: a, b represent correct activities.
// Post: Returns true iff one of the following conditions holds:
//
//     - a starts strictly before b.
//     - a and b start at the same time but a finishes before b.
//     - a and b coincide in start and end time, but a has lexicographically smaller name.
bool smallerActivity(Activity a, Activity b)

```

```

{
    // Implement this function.
    // ...
}

int main()
{
    ListActivities listactivities;
    string command;
    while (cin >> command) {
        if (command == "NEW") {
            listactivities.push_back(readActivity());
        } else if (command == "SORT") {
            sort(listactivities.begin(), listactivities.end(), smallerActivity);
        } else if (command == "PRINT") {
            cout << "Current list activities:" << endl;
            printActivities(listactivities);
            cout << endl;
        } else if (command == "CHECKCOMPATIBLE") {
            int i, j;
            cin >> i >> j;
            string namei = listactivities[i].name;
            string namej = listactivities[j].name;
            if (compatibleActivities(listactivities[i], listactivities[j]))
                cout << "Activities " << namei << " and " << namej << " are compatible"
            else
                cout << "Activities " << namei << " and " << namej << " are incompatibl
            cout << endl;
        }
    }
}

```

Entrada

L'entrada consisteix en una llista de comandes per a crear noves activitats, ordenar-les, escriure-les totes, i comprovar si dues d'elles son compatibles. No us n'heu de preocupar massa perquè el main que us donem ja s'encarrega de cridar a les corresponents funcions per a manegar aquestes comandes.

Sortida

La sortida mostra els resultats de les comandes. No us n'heu de preocupar massa perquè el main que us donem ja s'encarrega de cridar a les corresponents funcions per tal de produir aquesta sortida.

Exemple d'entrada 1

```

NEW biking 169 277
PRINT
SORT
NEW cinema 224 598

```

```

| SORT
| PRINT
| NEW jogging 108 483
| PRINT
| CHECKCOMPATIBLE 0 1
| CHECKCOMPATIBLE 1 2

```

SORT
PRINT
NEW gym 24 184
NEW swimming 218 574
CHECKCOMPATIBLE 2 3
PRINT
SORT
NEW chatting 161 501
SORT
NEW climbing 26 510
PRINT
NEW reading 207 303
NEW siteseeing 440 561
PRINT
NEW strolling 318 385
PRINT
SORT
PRINT
CHECKCOMPATIBLE 1 7
NEW bowling 413 553
NEW boxing 42 253
PRINT
NEW writing 77 154
PRINT
SORT
NEW flirting 84 320
PRINT
NEW singing 281 548
CHECKCOMPATIBLE 6 7
PRINT
CHECKCOMPATIBLE 4 9
CHECKCOMPATIBLE 1 5
NEW dancing 398 498
CHECKCOMPATIBLE 7 8
NEW shopping 28 58
PRINT
CHECKCOMPATIBLE 3 5
CHECKCOMPATIBLE 0 13
SORT
NEW cooking 182 530
CHECKCOMPATIBLE 6 14
PRINT
NEW praying 54 433
SORT
NEW fishing 435 599
PRINT
CHECKCOMPATIBLE 9 14
SORT
CHECKCOMPATIBLE 0 7
PRINT
CHECKCOMPATIBLE 10 19
CHECKCOMPATIBLE 10 17
CHECKCOMPATIBLE 4 19
NEW hunting 380 465
PRINT
CHECKCOMPATIBLE 2 4
CHECKCOMPATIBLE 0 17
CHECKCOMPATIBLE 11 13
SORT
CHECKCOMPATIBLE 5 16
PRINT

CHECKCOMPATIBLE 1 14
CHECKCOMPATIBLE 7 14
CHECKCOMPATIBLE 7 14
CHECKCOMPATIBLE 1 13
CHECKCOMPATIBLE 4 12
CHECKCOMPATIBLE 9 12
CHECKCOMPATIBLE 5 8
CHECKCOMPATIBLE 8 15
CHECKCOMPATIBLE 5 7
CHECKCOMPATIBLE 5 11
CHECKCOMPATIBLE 9 10
CHECKCOMPATIBLE 17 18
CHECKCOMPATIBLE 1 9
CHECKCOMPATIBLE 3 18
CHECKCOMPATIBLE 5 16
CHECKCOMPATIBLE 4 17
CHECKCOMPATIBLE 10 16
CHECKCOMPATIBLE 8 17
CHECKCOMPATIBLE 1 3
CHECKCOMPATIBLE 17 20
CHECKCOMPATIBLE 1 12
CHECKCOMPATIBLE 8 10
CHECKCOMPATIBLE 0 3
CHECKCOMPATIBLE 4 11
CHECKCOMPATIBLE 4 11
CHECKCOMPATIBLE 12 19
CHECKCOMPATIBLE 0 16
CHECKCOMPATIBLE 4 11
CHECKCOMPATIBLE 9 11

Exemple de sortida 1

Current list activities:
biking 169 277

Current list activities:
biking 169 277
cinema 224 598

Current list activities:
biking 169 277
cinema 224 598
jogging 108 483

Activities biking and cinema are incompatible

Activities cinema and jogging are incompatible

Current list activities:
jogging 108 483
biking 169 277
cinema 224 598

Activities cinema and gym are compatible

Current list activities:
jogging 108 483
biking 169 277
cinema 224 598
gym 24 184
swimming 218 574

Current list activities:
gym 24 184
jogging 108 483
chatting 161 501
biking 169 277
swimming 218 574
cinema 224 598
climbing 26 510

Current list activities:
gym 24 184
jogging 108 483
chatting 161 501
biking 169 277
swimming 218 574
cinema 224 598
climbing 26 510
reading 207 303
siteseeing 440 561

Current list activities:
gym 24 184
jogging 108 483
chatting 161 501
biking 169 277
swimming 218 574
cinema 224 598
climbing 26 510
reading 207 303

siteseeing 440 561
strolling 318 385

Current list activities:
gym 24 184
climbing 26 510
jogging 108 483
chatting 161 501
biking 169 277
reading 207 303
swimming 218 574
cinema 224 598
strolling 318 385
siteseeing 440 561

Activities climbing and cinema are incompatible

Current list activities:
gym 24 184
climbing 26 510
jogging 108 483
chatting 161 501
biking 169 277
reading 207 303
swimming 218 574
cinema 224 598
strolling 318 385
siteseeing 440 561
bowling 413 553
boxing 42 253

Current list activities:
gym 24 184
climbing 26 510
jogging 108 483
chatting 161 501
biking 169 277
reading 207 303
swimming 218 574
cinema 224 598
strolling 318 385
siteseeing 440 561
bowling 413 553
boxing 42 253
writing 77 154

Current list activities:
gym 24 184
climbing 26 510
boxing 42 253
writing 77 154
jogging 108 483
chatting 161 501
biking 169 277
reading 207 303
swimming 218 574
cinema 224 598
strolling 318 385
bowling 413 553
siteseeing 440 561
flirting 84 320

Activities biking and reading are incompatible	reading 207 303 swimming 218 574 cinema 224 598 singing 281 548 strolling 318 385 dancing 398 498 bowling 413 553 siteseeing 440 561 cooking 182 530
Current list activities: gym 24 184 climbing 26 510 boxing 42 253 writing 77 154 jogging 108 483 chatting 161 501 biking 169 277 reading 207 303 swimming 218 574 cinema 224 598 strolling 318 385 bowling 413 553 siteseeing 440 561 flirting 84 320 singing 281 548	Current list activities: gym 24 184 climbing 26 510 shopping 28 58 boxing 42 253 praying 54 433 writing 77 154 flirting 84 320 jogging 108 483 chatting 161 501 biking 169 277 cooking 182 530 reading 207 303 swimming 218 574 cinema 224 598 singing 281 548 strolling 318 385 dancing 398 498 bowling 413 553 siteseeing 440 561 fishing 435 599
Activities jogging and cinema are incompatible	Activities biking and singing are compatible
Activities climbing and chatting are incompatible	Activities gym and jogging are incompatible
Activities reading and swimming are incompatible	Current list activities: gym 24 184 climbing 26 510 shopping 28 58 boxing 42 253 praying 54 433 writing 77 154 flirting 84 320 jogging 108 483 chatting 161 501 biking 169 277 cooking 182 530 reading 207 303 swimming 218 574 cinema 224 598 singing 281 548 strolling 318 385 dancing 398 498 bowling 413 553 fishing 435 599 siteseeing 440 561
Current list activities: gym 24 184 climbing 26 510 boxing 42 253 writing 77 154 jogging 108 483 chatting 161 501 biking 169 277 reading 207 303 swimming 218 574 cinema 224 598 strolling 318 385 bowling 413 553 siteseeing 440 561 flirting 84 320 singing 281 548 dancing 398 498 shopping 28 58	Activities writing and chatting are compatible
Activities writing and chatting are compatible	Activities gym and flirting are incompatible
Activities gym and flirting are incompatible	Activities jogging and dancing are incompatible
Activities jogging and dancing are incompatible	Current list activities: gym 24 184 climbing 26 510 shopping 28 58 boxing 42 253 writing 77 154 flirting 84 320 jogging 108 483 chatting 161 501 biking 169 277
Current list activities: gym 24 184 climbing 26 510 shopping 28 58 boxing 42 253 writing 77 154 flirting 84 320 jogging 108 483 chatting 161 501 biking 169 277	Activities cooking and siteseeing are incompatible Activities cooking and bowling are incompatible

Activities praying and siteseeing are compatible

Current list activities:

- gym 24 184
- climbing 26 510
- shopping 28 58
- boxing 42 253
- praying 54 433
- writing 77 154
- flirting 84 320
- jogging 108 483
- chatting 161 501
- biking 169 277
- cooking 182 530
- reading 207 303
- swimming 218 574
- cinema 224 598
- singing 281 548
- strolling 318 385
- dancing 398 498
- bowling 413 553
- fishing 435 599
- siteseeing 440 561
- hunting 380 465

Activities shopping and praying are incompatible

Activities gym and bowling are compatible

Activities reading and cinema are incompatible

Activities writing and hunting are compatible

Current list activities:

- gym 24 184
- climbing 26 510
- shopping 28 58
- boxing 42 253
- praying 54 433
- writing 77 154
- flirting 84 320
- jogging 108 483
- chatting 161 501
- biking 169 277
- cooking 182 530
- reading 207 303
- swimming 218 574
- cinema 224 598
- singing 281 548
- strolling 318 385
- hunting 380 465
- dancing 398 498
- bowling 413 553
- fishing 435 599
- siteseeing 440 561

Activities climbing and singing are incompatible

Activities jogging and singing are incompatible

Activities jogging and singing are incompatible

Activities climbing and cinema are incompatible

Activities praying and swimming are incompatible

Activities biking and swimming are incompatible

Activities writing and chatting are compatible

Activities chatting and strolling are incompatible

Activities writing and jogging are incompatible

Activities writing and reading are compatible

Activities biking and cooking are incompatible

Activities dancing and bowling are incompatible

Activities climbing and biking are incompatible

Activities boxing and bowling are compatible

Activities writing and hunting are compatible

Activities praying and dancing are incompatible

Activities cooking and hunting are incompatible

Activities chatting and dancing are incompatible

Activities climbing and boxing are incompatible

Activities dancing and siteseeing are incompatible

Activities climbing and swimming are incompatible

Activities chatting and cooking are incompatible

Activities gym and boxing are incompatible

Activities praying and reading are incompatible

Activities praying and reading are incompatible

Activities swimming and fishing are incompatible

Activities gym and hunting are compatible

Activities praying and reading are incompatible

Activities biking and reading are incompatible

Exemple d'entrada 2

```
NEW biking 1 3
PRINT
NEW cinema 2 3
CHECKCOMPATIBLE 0 1
PRINT
NEW jogging 0 3
NEW gym 1 3
PRINT
NEW swimming 2 3
PRINT
CHECKCOMPATIBLE 2 3
CHECKCOMPATIBLE 3 4
CHECKCOMPATIBLE 1 4
CHECKCOMPATIBLE 1 3
NEW chatting 0 1
CHECKCOMPATIBLE 0 2
NEW climbing 1 2
NEW reading 0 1
NEW siteseeing 1 2
PRINT
NEW strolling 0 1
CHECKCOMPATIBLE 2 7
CHECKCOMPATIBLE 3 6
CHECKCOMPATIBLE 0 7
PRINT
CHECKCOMPATIBLE 2 7
CHECKCOMPATIBLE 0 8
SORT
NEW bowling 0 1
CHECKCOMPATIBLE 4 10
PRINT
NEW boxing 0 1
CHECKCOMPATIBLE 4 7
PRINT
CHECKCOMPATIBLE 6 10
NEW writing 1 2
NEW flirting 1 3
SORT
PRINT
CHECKCOMPATIBLE 3 8
NEW singing 1 2
PRINT
CHECKCOMPATIBLE 1 4
NEW dancing 1 3
NEW shopping 1 3
PRINT
SORT
CHECKCOMPATIBLE 0 3
CHECKCOMPATIBLE 5 11
NEW cooking 2 3
PRINT
NEW praying 1 3
CHECKCOMPATIBLE 0 17
NEW fishing 0 3
PRINT
SORT
CHECKCOMPATIBLE 8 18
PRINT
NEW hunting 0 3
```

```
SORT
PRINT
CHECKCOMPATIBLE 4 5
CHECKCOMPATIBLE 3 8
CHECKCOMPATIBLE 7 13
CHECKCOMPATIBLE 14 16
CHECKCOMPATIBLE 8 17
CHECKCOMPATIBLE 15 17
CHECKCOMPATIBLE 18 20
CHECKCOMPATIBLE 4 16
CHECKCOMPATIBLE 0 11
CHECKCOMPATIBLE 4 8
CHECKCOMPATIBLE 2 15
CHECKCOMPATIBLE 15 16
CHECKCOMPATIBLE 2 3
CHECKCOMPATIBLE 1 11
CHECKCOMPATIBLE 4 17
CHECKCOMPATIBLE 8 11
CHECKCOMPATIBLE 9 19
CHECKCOMPATIBLE 11 20
CHECKCOMPATIBLE 11 17
CHECKCOMPATIBLE 10 12
CHECKCOMPATIBLE 6 14
CHECKCOMPATIBLE 6 16
CHECKCOMPATIBLE 2 3
CHECKCOMPATIBLE 1 19
CHECKCOMPATIBLE 16 20
CHECKCOMPATIBLE 5 11
CHECKCOMPATIBLE 1 6
CHECKCOMPATIBLE 4 12
CHECKCOMPATIBLE 0 10
CHECKCOMPATIBLE 8 11
CHECKCOMPATIBLE 0 7
CHECKCOMPATIBLE 9 16
CHECKCOMPATIBLE 10 17
CHECKCOMPATIBLE 2 9
CHECKCOMPATIBLE 2 11
CHECKCOMPATIBLE 4 11
CHECKCOMPATIBLE 5 14
CHECKCOMPATIBLE 19 20
CHECKCOMPATIBLE 1 19
```


Exemple de sortida 2

Current list activities:

biking 1 3

Activities biking and cinema are incompatible

Current list activities:

biking 1 3

cinema 2 3

Current list activities:

biking 1 3

cinema 2 3

jogging 0 3

gym 1 3

Current list activities:

biking 1 3

cinema 2 3

jogging 0 3

gym 1 3

swimming 2 3

Activities jogging and gym are incompatible

Activities gym and swimming are incompatible

Activities cinema and swimming are incompatible

Activities cinema and gym are incompatible

Activities biking and jogging are incompatible

Current list activities:

biking 1 3

cinema 2 3

jogging 0 3

gym 1 3

swimming 2 3

chatting 0 1

climbing 1 2

reading 0 1

siteseeing 1 2

Activities jogging and reading are incompatible

Activities gym and climbing are incompatible

Activities biking and reading are compatible

Current list activities:

biking 1 3

cinema 2 3

jogging 0 3

gym 1 3

swimming 2 3

chatting 0 1

climbing 1 2

reading 0 1

siteseeing 1 2

strolling 0 1

Activities jogging and reading are incompatible

Activities biking and siteseeing are incompatible

Activities climbing and bowling are compatible

Current list activities:

chatting 0 1

reading 0 1

strolling 0 1

jogging 0 3

climbing 1 2

siteseeing 1 2

biking 1 3

gym 1 3

cinema 2 3

swimming 2 3

bowling 0 1

Activities climbing and gym are incompatible

Current list activities:

chatting 0 1

reading 0 1

strolling 0 1

jogging 0 3

climbing 1 2

siteseeing 1 2

biking 1 3

gym 1 3

cinema 2 3

swimming 2 3

bowling 0 1

boxing 0 1

Activities biking and bowling are compatible

Current list activities:

bowling 0 1

boxing 0 1

chatting 0 1

reading 0 1

strolling 0 1

jogging 0 3

climbing 1 2

siteseeing 1 2

writing 1 2

biking 1 3

flirting 1 3

gym 1 3

cinema 2 3

swimming 2 3

Activities reading and writing are compatible

Current list activities:

bowling 0 1

boxing 0 1

chatting 0 1

reading 0 1
strolling 0 1
jogging 0 3
climbing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
flirting 1 3
gym 1 3
cinema 2 3
swimming 2 3
singing 1 2

Activities boxing and strolling are incompatible

Current list activities:

bowling 0 1
boxing 0 1
chatting 0 1
reading 0 1
strolling 0 1
jogging 0 3
climbing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
flirting 1 3
gym 1 3
cinema 2 3
swimming 2 3
singing 1 2
dancing 1 3
shopping 1 3

Activities bowling and reading are incompatible

Activities jogging and dancing are incompatible

Current list activities:

bowling 0 1
boxing 0 1
chatting 0 1
reading 0 1
strolling 0 1
jogging 0 3
climbing 1 2
singing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
dancing 1 3
flirting 1 3
gym 1 3
shopping 1 3
cinema 2 3
swimming 2 3
cooking 2 3

Activities bowling and cooking are compatible

Current list activities:

bowling 0 1
boxing 0 1
chatting 0 1
reading 0 1
strolling 0 1
jogging 0 3
climbing 1 2
singing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
dancing 1 3
flirting 1 3
shopping 1 3
cinema 2 3
swimming 2 3
cooking 2 3
praying 1 3
fishing 0 3

Activities singing and cooking are compatible

Current list activities:

bowling 0 1
boxing 0 1
chatting 0 1
reading 0 1
strolling 0 1
fishing 0 3
jogging 0 3
climbing 1 2
singing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
flirting 1 3
gym 1 3
praying 1 3
shopping 1 3
cinema 2 3
cooking 2 3
swimming 2 3

Current list activities:

bowling 0 1
boxing 0 1
chatting 0 1
reading 0 1
strolling 0 1
fishing 0 3
hunting 0 3
jogging 0 3
climbing 1 2
singing 1 2
sitereeing 1 2
writing 1 2
biking 1 3
dancing 1 3
flirting 1 3

gym 1 3	Activities writing and shopping are incompatible
praying 1 3	
shopping 1 3	Activities siteseeing and biking are incompatible
cinema 2 3	
cooking 2 3	Activities hunting and flirting are incompatible
swimming 2 3	
Activities strolling and fishing are incompatible	Activities hunting and praying are incompatible
Activities reading and climbing are compatible	Activities chatting and reading are incompatible
Activities jogging and dancing are incompatible	Activities boxing and cooking are compatible
Activities flirting and praying are incompatible	Activities praying and swimming are incompatible
Activities climbing and shopping are incompatible	Activities fishing and writing are incompatible
Activities gym and shopping are incompatible	Activities boxing and hunting are incompatible
Activities cinema and swimming are incompatible	Activities strolling and biking are compatible
Activities strolling and praying are compatible	Activities bowling and siteseeing are compatible
Activities bowling and writing are compatible	Activities climbing and writing are incompatible
Activities strolling and climbing are compatible	Activities bowling and jogging are incompatible
Activities chatting and gym are compatible	Activities singing and praying are incompatible
Activities gym and praying are incompatible	Activities siteseeing and shopping are incompatible
Activities chatting and reading are incompatible	Activities chatting and singing are compatible
Activities boxing and writing are compatible	Activities chatting and writing are compatible
Activities strolling and shopping are compatible	Activities strolling and writing are compatible
Activities climbing and writing are incompatible	Activities fishing and flirting are incompatible
Activities singing and cooking are compatible	Activities cooking and swimming are incompatible
Activities writing and swimming are compatible	Activities boxing and cooking are compatible

Informació del problema

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