Protein Domain Overlap — Z99185_en

Proteins contain different *domains* (structural or functional units responsible for a particular function).
We need a program that, given a list of domains in a protein, and their positions in it, determines domain overlapping regions in the sequence.

Input

The input is a list of protein domains found in a DNA sequence. For each domain, the id of the protein, the name of the domain, and its position span in the protein are given.
The input consists of an integer N (the number of protein domain records), followed by N lines, each consisting of two strings, and two integers:

```
protein_id domain_name start_position end_position
```

where:

- protein_id (string): The protein's identifier.
- domain_name (string): The name of the domain.
- start_position, end_position (integers): The span of the domain within the protein sequence.

Output

List proteins in alphabetical order. For each protein, list its domains in order of starting position. If any domain overlaps with the previous one, mark it with "OVERLAP".
Print a summary list of the overlapping domains at the end of each protein. If no overlaps exist, print "No overlaps".
Follow the format of the examples.

Sample input 1

```
6
P12X43 Kinase 5 50
T5678A Phosphatase 10 40
T5678A Transmembrane 50 90
P12X43 SH3 30 70
T5678A Immunoglobulin 35 60
P12X43 Pleckstrin 80 100
```

Sample output 1

```
P12X43:
  Kinase (5-50)
  SH3 (30-70) OVERLAP
  Pleckstrin (80-100)
  Overlapping domains in protein P12X43: Kinase-SH3
T5678A:
  Phosphatase (10-40)
  Immunoglobulin (35-60) OVERLAP
  Transmembrane (50-90) OVERLAP
  Overlapping domains in protein T5678A: Phosphatase-Im
```

Sample input 2

```
8
P12X31 RRM 5 20
R3012Y Collagen 35 45
H2F127 FN3 35 50
R3012Y EGF 5 15
R3012Y Cadherin 20 30
P12X31 Catalase 25 40
P12X31 Kinase 45 60
H2F127 RRM 10 30
```

Sample output 2

```
H2F127:
  RRM (10-30)
  FN3 (35-50)
  No overlaps
P12X31:
  RRM (5-20)
  Catalase (25-40)
  Kinase (45-60)
  No overlaps
R3012Y:
  EGF (5-15)
  Cadherin (20-30)
  Collagen (35-45)
  No overlaps
```

Sample input 3

```
12
P448X1 SH3 85 110
P59S87 Catalase 5 25
P59S87 HTH 10 35
P59S87 Immunoglobulin 75 90
P448X1 Transmembrane 10 40
P448X1 Kinase 30 60
P59S87 7TM 40 50
P59S87 PDZ 45 70
M32101 Pleckstrin 5 15
P448X1 SH2 55 90
P59S87 WD40 5 25
M32101 Porin 20 30
```

Sample output 3

```
M32101:
  Pleckstrin (5-15)
  Porin (20-30)
  No overlaps
P448X1:
  Transmembrane (10-40)
  Kinase (30-60) OVERLAP
  SH2 (55-90) OVERLAP
  SH3 (85-110) OVERLAP
  Overlapping domains in protein P448X1: Transmembrane-
P59S87:
  Catalase (5-25)
  WD40 (5-25) OVERLAP
  HTH (10-35) OVERLAP
  7TM (40-50)
  PDZ (45-70) OVERLAP
  Immunoglobulin (75-90)
  Overlapping domains in protein P59S87: Catalase-WD40
```

Problem information

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