Sailing competition

A friend of yours is a journalist and is writing an article about a sailing competition that took place last weekend. The organisers sent him a weird file with some details regarding the race, but since the format is not very easy to read, he now needs your help to understand this data better and to extract some statistics.

He explained the rules of the competition to you:

* The race takes places on water, where you have a Competition Area. All boats must stay inside this Competition Area during the entire time of the race, otherwise they will be disqualified
* Inside the Competition Area there are two more zones: the Start/Finish Area and the Checkpoint Area
* The boats start and end the competition in the Start/Finish Area
* Before returning to the Start/Finish Area, the boats must go through the Checkpoint Area
* Boats that don’t go through the Checkpoint Area are disqualified
* The winning boat is the one that enters the Finish Area first, after going through the Checkpoint Area
* Some boats are better than others. In order to cancel out the inherent advantages and disadvantages of each boat, they will have a handicap coefficient, so that results reflect crew skill rather than equipment superiority
* To find the true winning boat, you must adjust each boat’s time using their handicap coefficient (using multiplication)

The input file has the following format:

* On the first line, the coordinates of the Competition Area
* On the second line, the coordinates of the Start/Finish Area
* On the third line, the coordinates of the Checkpoint Area
  + Each area is defined as a rectangle in a two-dimensional space
  + In the input file you have the x and y coordinates for the top-left corner and for the bottom-right corner of the rectangle
  + The four coordinates are separated by a space
  + Example: For the line “500 700 950 950”, the rectangle has the top-left corner at (500,700) and the bottom-right corner at (950,950)
* On the fourth line, the number of boats that participated in the competition (N)
* On the next line, the details for the first boat
  + A boat has the following details, separated by a space: identifier, name, handicap coefficient, number of crew members (M)
  + Example: “MZ2090 Dream 0.12 2”
* The next M lines are used for the crew members of this boat
  + Identifier, first name, last name, captain or not (1 or 0), years of sailing experience
  + Example: “5344934 Kevin Goldman 1 5”
* The same for the rest of the (N-1) boats
* All the other lines are for location updates for the boats
  + On each line you have the following details, separated by a space: boat identifier, boat x coordinate, boat y coordinate, time offset in seconds since the competition started
  + Example: For line “MZ2090 500 500 300”, the boat with the identifier “MZ2090” was at location (500,500) 300 seconds after the competition started

In order to help your friend, you need to send him a file containing the following data, in the given order, one information per line:

1. The number of boats that were disqualified because they left the competition area
   * *Format: “Number of boats outside the competition area: 1”*
2. The number of boats that didn’t make it to the Finish Area
   * *Format: “Number of boats that didn’t enter the finish area: 1”*
3. The number of boats that didn’t enter the Checkpoint Area
   * *Format: “Number of boats that didn’t enter the checkpoint area: 2”*
4. A comma-separated list of boat names for the boats that boats that didn’t finish the race because they didn’t enter the Finish area or because they left the Competition Area, sorted by boat name in ascending order
   * *Format: “*Boats that didn’t finish the race: *Dream, Joy, Sky”*
5. A comma-separated list with the full names of the captains with more than 2 years of experience, together with the number of years of experience, sorted by years in descending order
   * *Format: “Most experienced captains: Joe Maye (8 years), Corliss Haig (4 years), Ivan Tuttle (3 years)”*
6. A comma-separated list of boat names for the boats that successfully finished the race, together with the time in minutes it took to finish the race (sorted by duration in ascending order)
   * *Format: “Partial standings: Sky (83 minutes), Joy (95 minutes), Dream (121 minutes)”*
7. A comma-separated list of boat names for the boats that successfully finished the race, together with the modified value of the duration after applying the handicap coefficient, sorted by duration in ascending order
   * *Format: “Final standings: Windsong (32 minutes / 0.21), Escape (35 minutes / 0.13), Whisper (42 minutes / 0.5), Orion (43 minutes / 0.39)”*

You can assume the following:

* The Start/Finish Area and the Checkpoint Area are inside the competition area
* The Start Area and the Finish Area are exactly the same
* The Checkpoint Area doesn’t overlap the Start/Finish Area
* All boats start inside the Start Area
* All boats that successfully finish the race end up back inside the Finish Area
* You will only have one location update for Start Area, Checkpoint Area, Finish Area per boat
* All coordinates are positive long numbers
* A boat can have only one captain

Your friend won’t mind if you don’t manage send him all the data he asked for. On the other hand, he will be very thankful if you send him everything (or even some stuff he didn’t asked for).

Don’t worry if your output is not exactly the same as our output! We might have missed some things. We want to see how you approached the problem, so just make sure you write the code right. Feel free to make assumptions and to contact us if something is not clear or well defined.

You can use the following tool to play around with some points and rectangles. We used it to generate the input files. Be sure you draw all rectangles starting with the top-left corner and ending with the bottom-right corner. <https://eduardvasilache.github.io/canvas-tool/canvas.html>