21 Sweep Line

The Sweep Line Technique

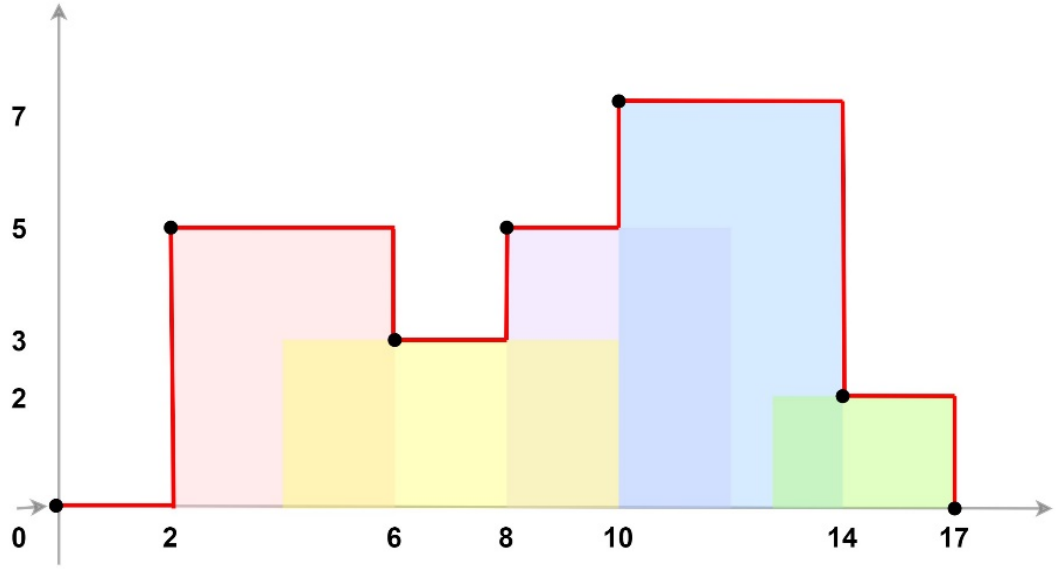
A sweep line is an imaginary vertical line (sometimes horizontal or radial) which is swept across the plane rightwards.

That's why, the algorithms based on this concept are sometimes also called plane sweep algorithms.

We sweep the line based on some events, in order to discretize the sweep.

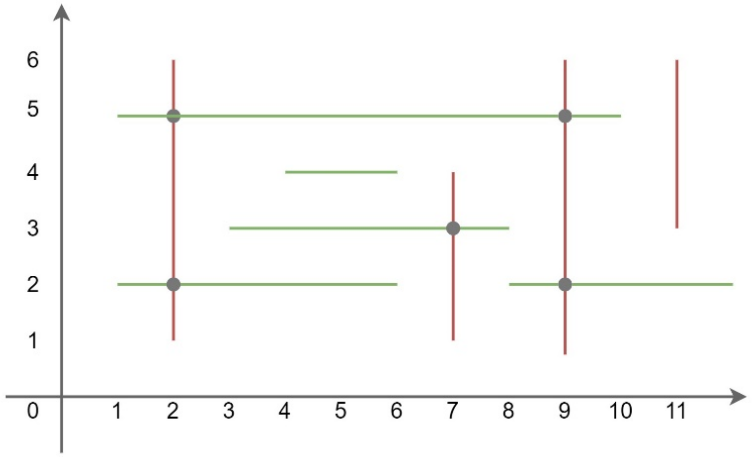
The Skyline Problem

In the skyline problem, the user is provided with the coordinates of rectangular buildings that have varying widths and heights. The user is required to return a silhouette that traces the outlines of all the buildings.



Intersection of Line Segments

Given a set of N horizontal and vertical line segments (2*N points), you need to find all the intersections of horizontal and vertical line segments. Here, we won't consider coincident endpoints to intersect. Print the intersection points sorted by x first and then by y.

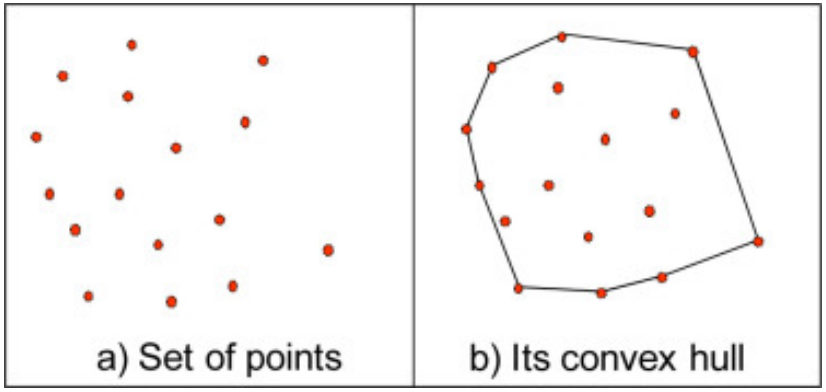


Exercise: Bentley Ottmann Algorithm

Given a set of N line segments (2*N points), you need to find all intersections between these line segments.

Convex Hull

Convex Hull of finite set of points S is the minimum convex polygon so that any point of S is either inside this polygon or at its border.



- Graham's Scan Algorithm
- Jarvis' March (Gift Wrapping) Algorithm

Area and Perimeter

Find the area and perimeter of union of N axis aligned rectangles.