

Guarding a Gallery with Sleepy Robots

or

How to Turn
Computational Geometry Problems
into Programming Contests

Ilya Sergey





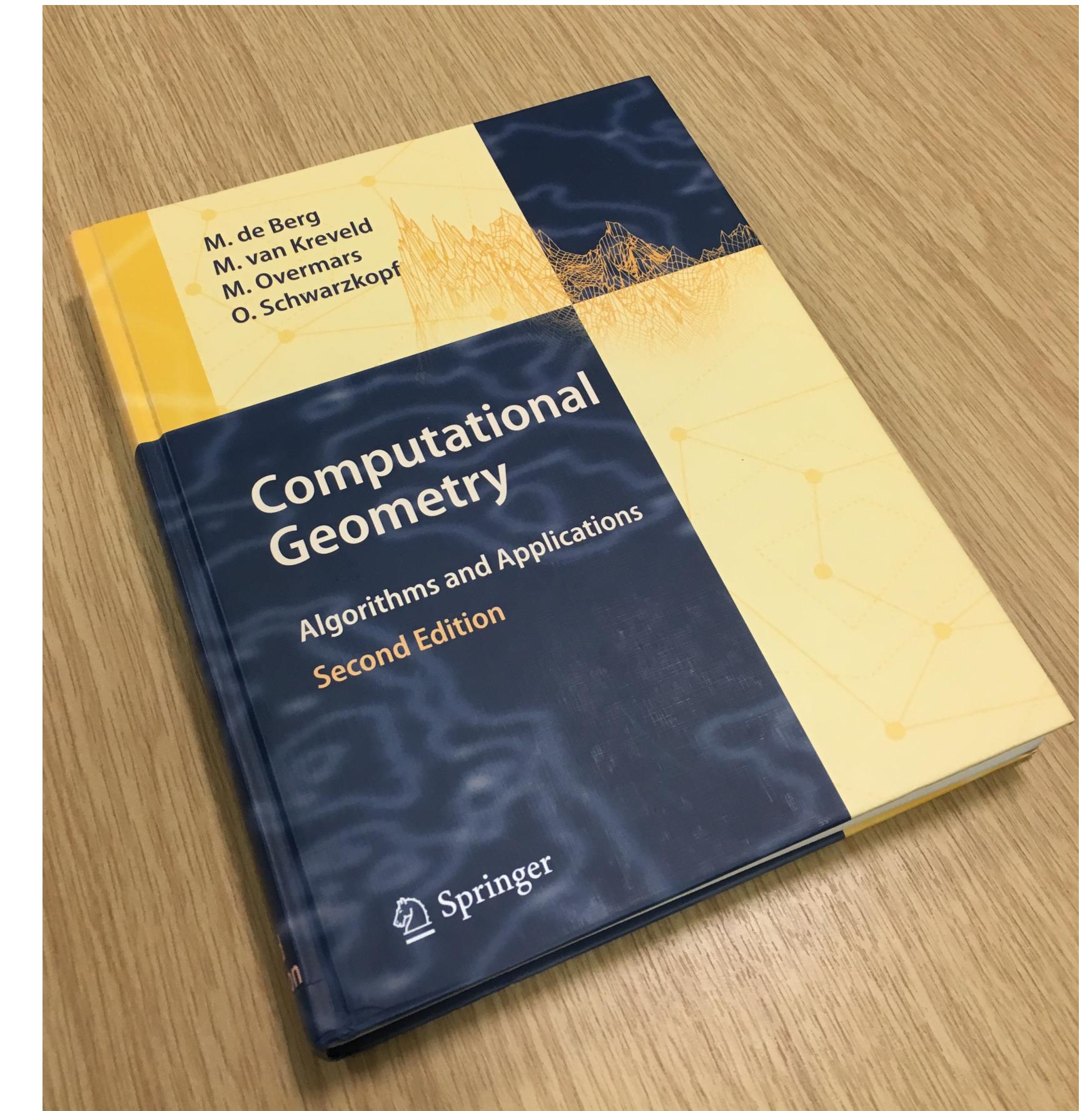


Would you like to run a scenario project this year?

Sure,
why not.

Scenario Project Requirements

- Targeting 2nd year undergrads, team work,
- One week-long,
- Should involve *math* and *programming*,
- Challenging for students, but easy to assess.



1 Computational Geometry**Introduction**

- 1.1 An Example: Convex Hulls
- 1.2 Degeneracies and Robustness
- 1.3 Application Domains
- 1.4 Notes and Comments
- 1.5 Exercises

2 Line Segment Intersection**Thematic Map Overlay**

- 2.1 Line Segment Intersection
- 2.2 The Doubly-Connected Edge List
- 2.3 Computing the Overlay of Two Subdivisions
- 2.4 Boolean Operations
- 2.5 Notes and Comments
- 2.6 Exercises

3 Polygon Triangulation**Guarding an Art Gallery**

- 3.1 Guarding and Triangulations
- 3.2 Partitioning a Polygon into Monotone Pieces
- 3.3 Triangulating a Monotone Polygon
- 3.4 Notes and Comments
- 3.5 Exercises

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- 4.1 The Geometry of Casting
- 4.2 Half-Plane Intersection
- 4.3 Incremental Linear Programming
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This Talk

- 2016: Art Gallery Competition
- 2017: Move-and-Tag Competition

Art Gallery Competition

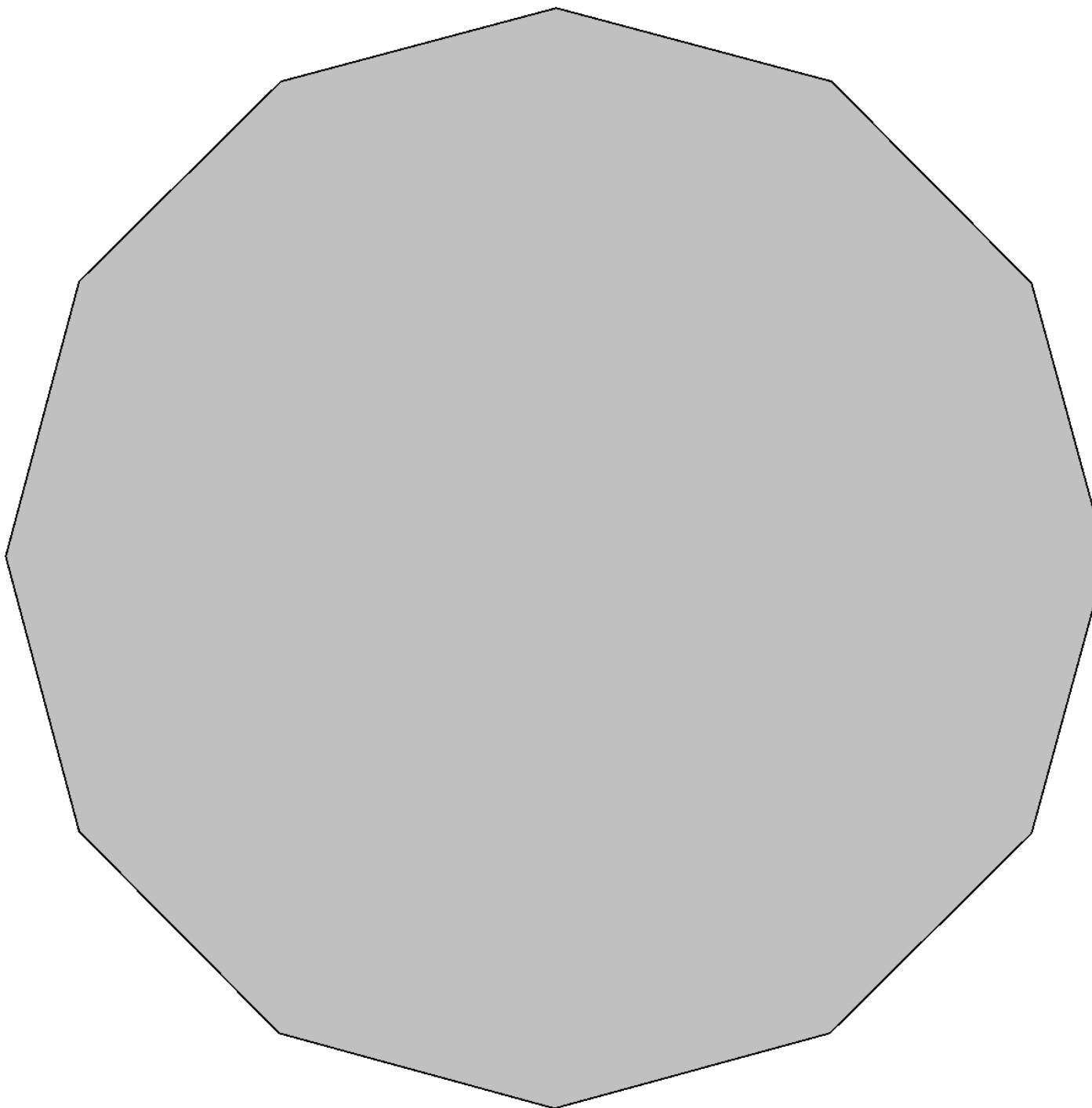
based on:

Chvátal's *Art Gallery Problem* (1975)



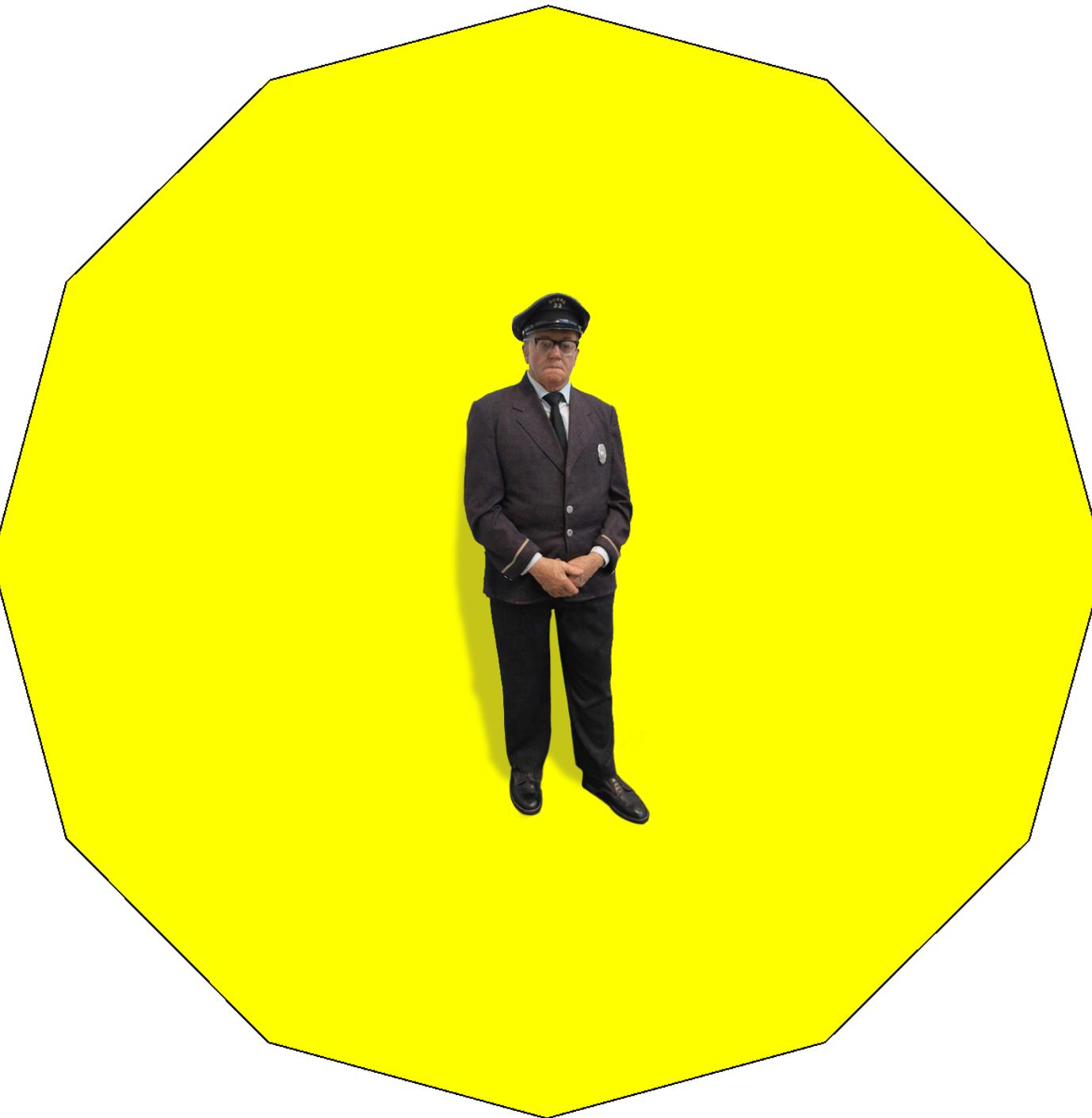
How many guards do we *really* need?

The answer depends on the shape of the gallery.

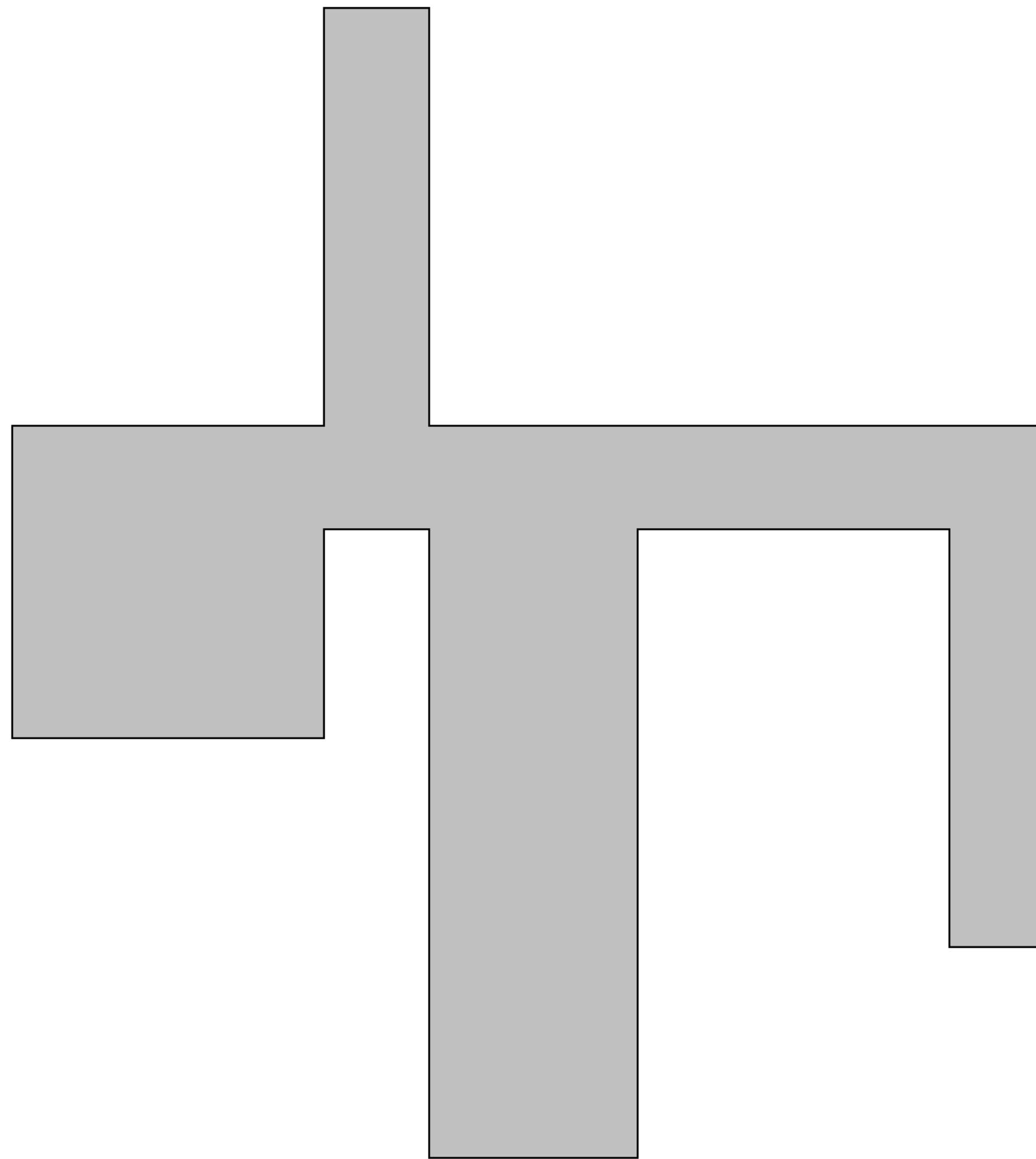


How many guards do we really need?

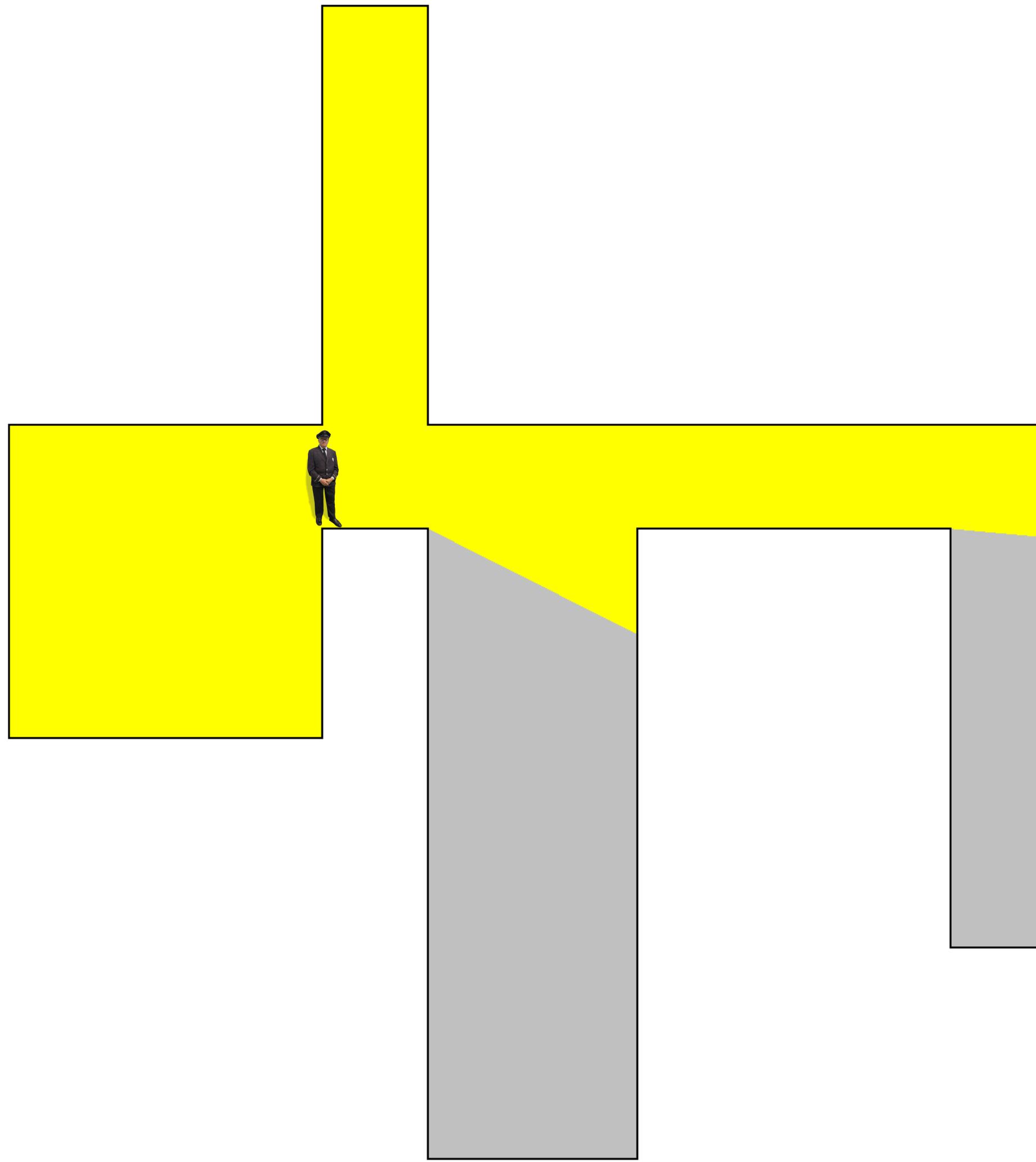
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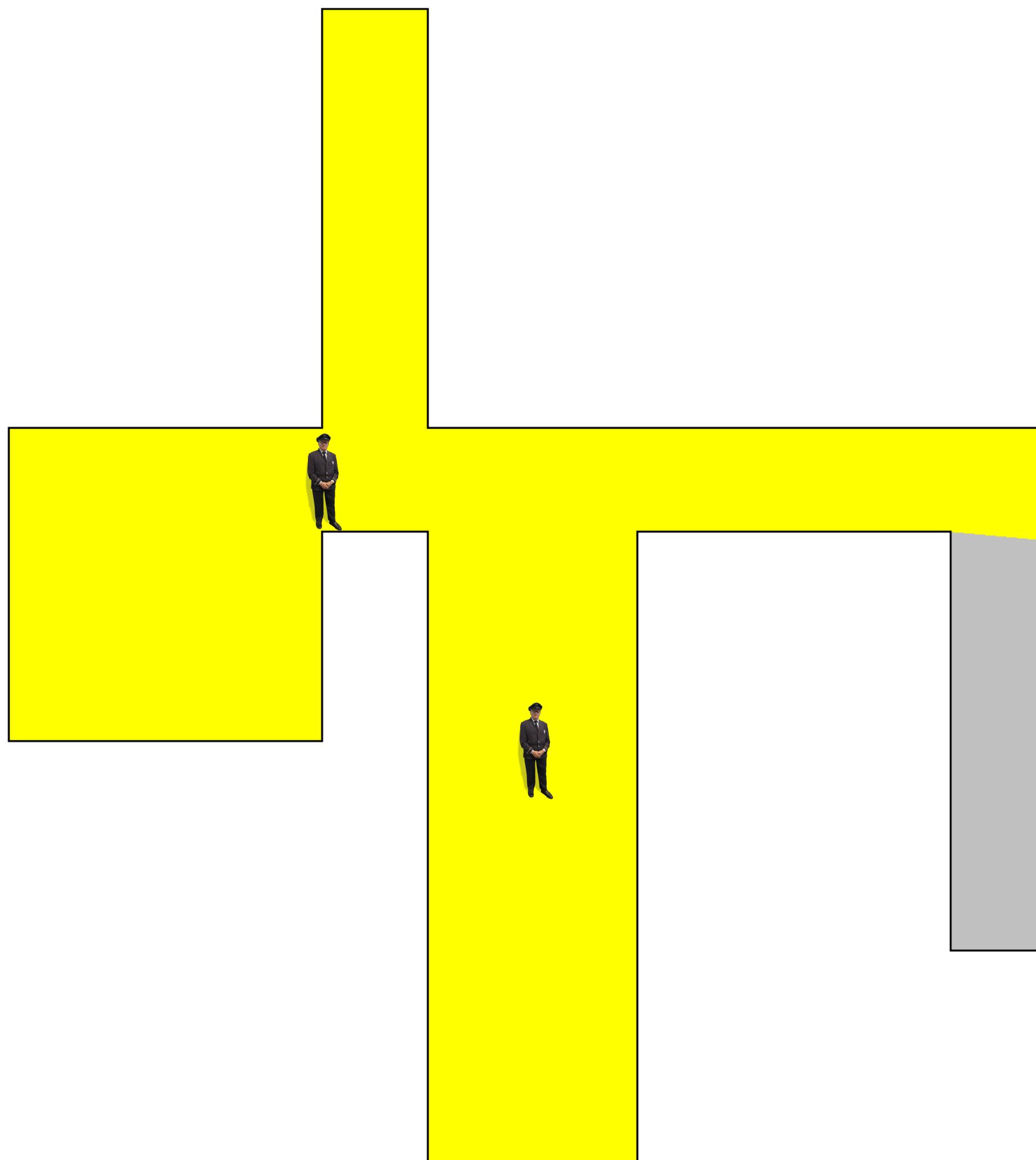
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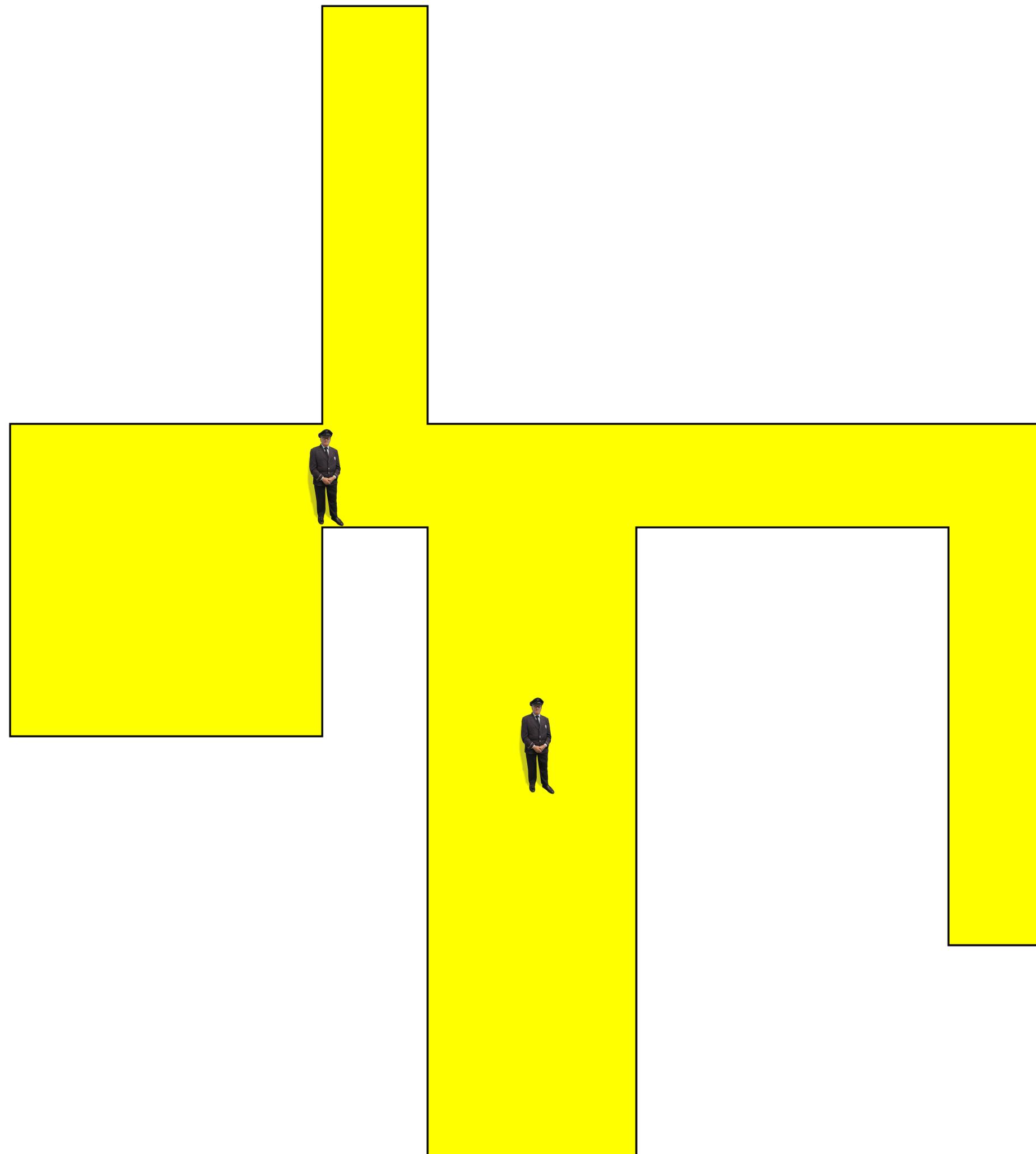
How many guards do we really need?



How many guards do we really need?



How many guards do we really need?



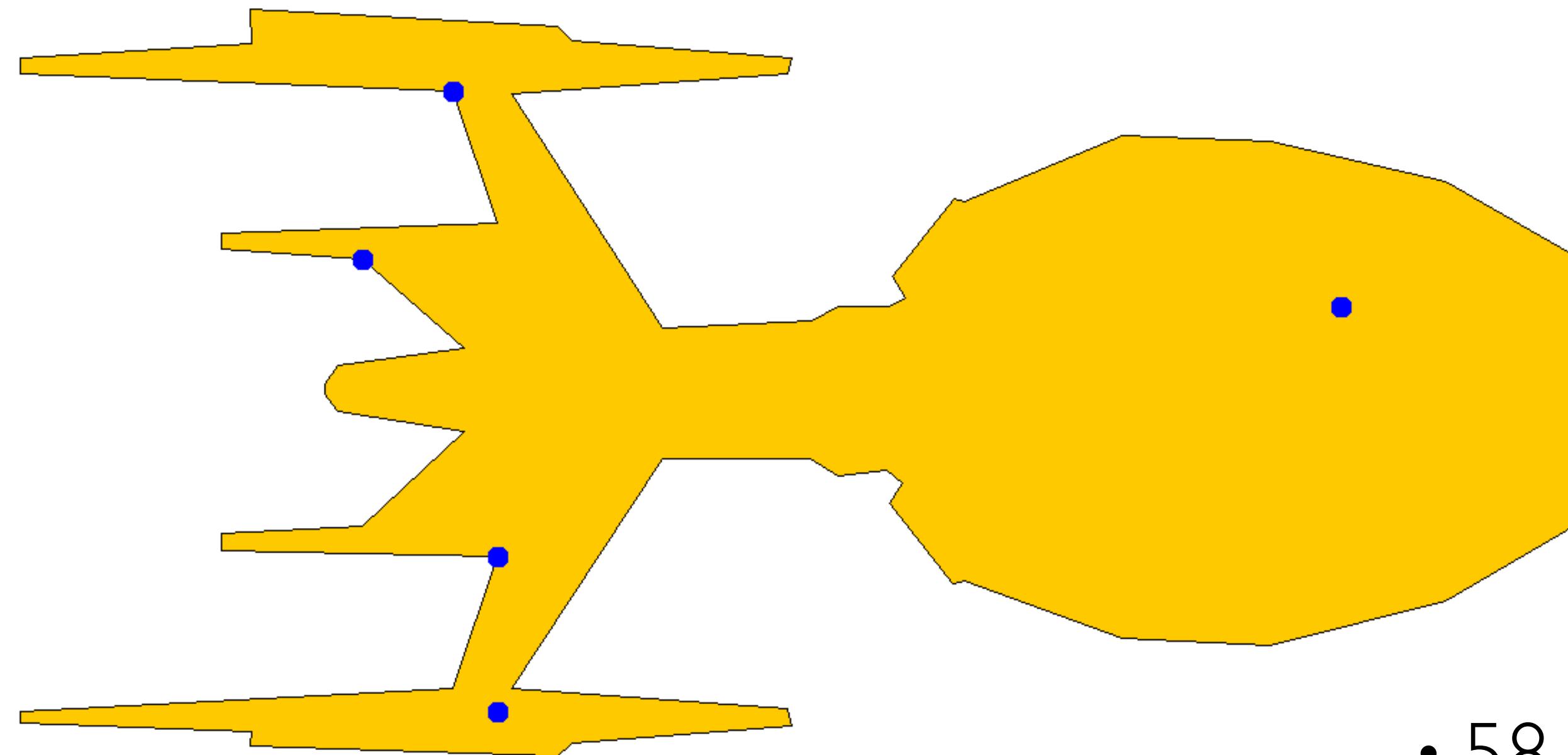
Art Gallery Problem

For a given gallery (polygon),
find the *minimal* set of guards' positions,
so together the guards can “see” the *whole* interior.



Project: Art Gallery Competition

Find the *best* solutions for a collection of *large* polygons.



- 58 vertices
- 5 guards

Organizers' TODO

- Problem generator;
 - ▶ Polygons with different “features” (convex, rectangular, etc.)
- Solution checker with online feedback
 - ▶ geometric machinery (triangulation, visibility, ...)
 - ▶ web-server
- Make sure that it all works.

Organizers' TODO

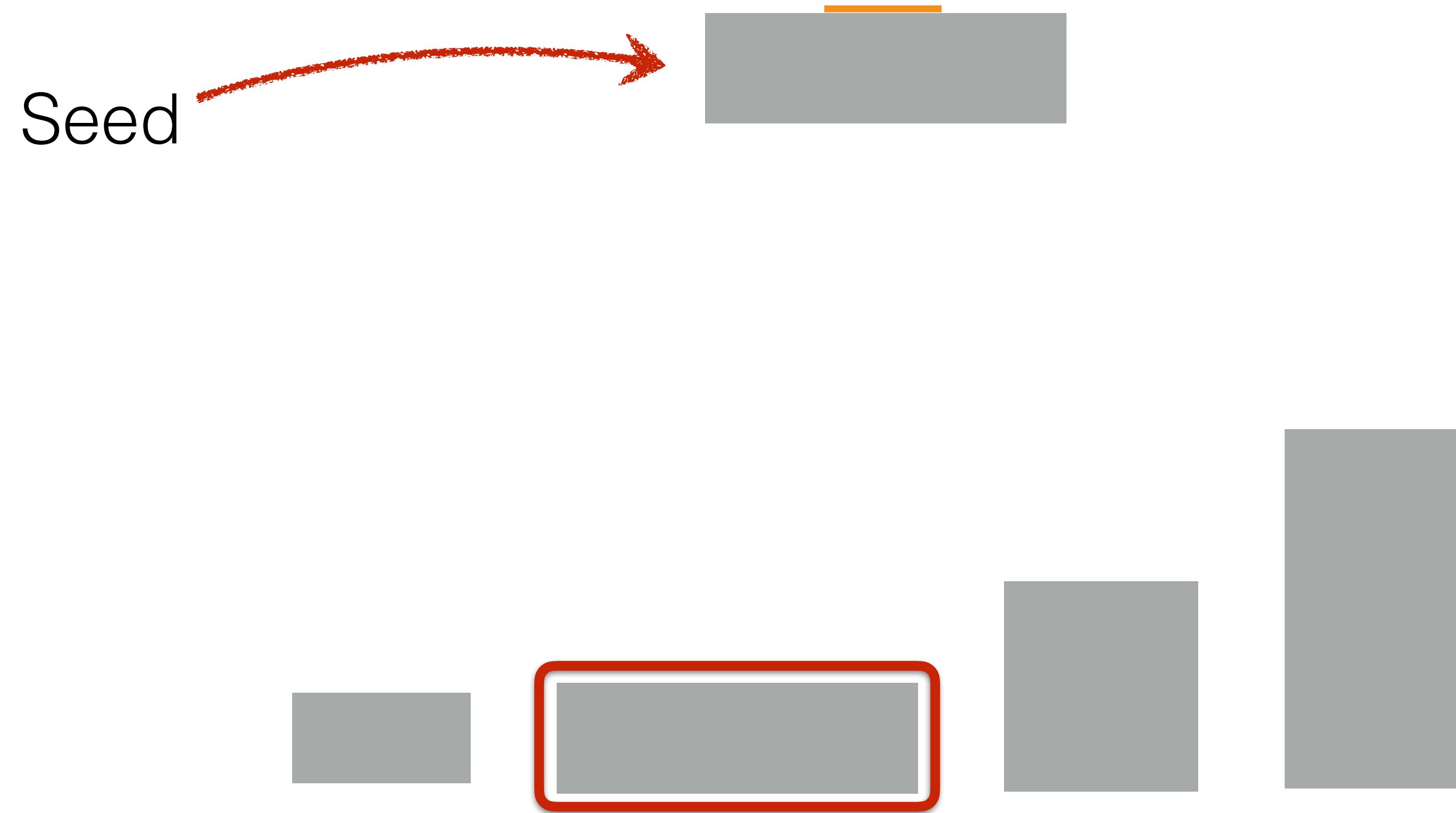
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Growing polygons

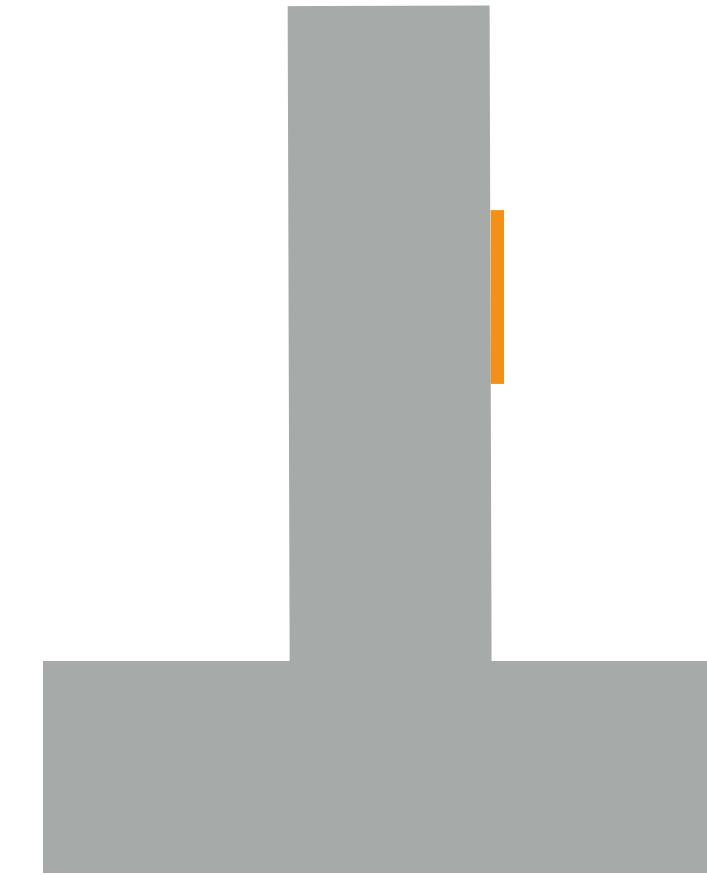


Primitive polygons with specific “features”

Growing polygons



Growing polygons



Growing polygons



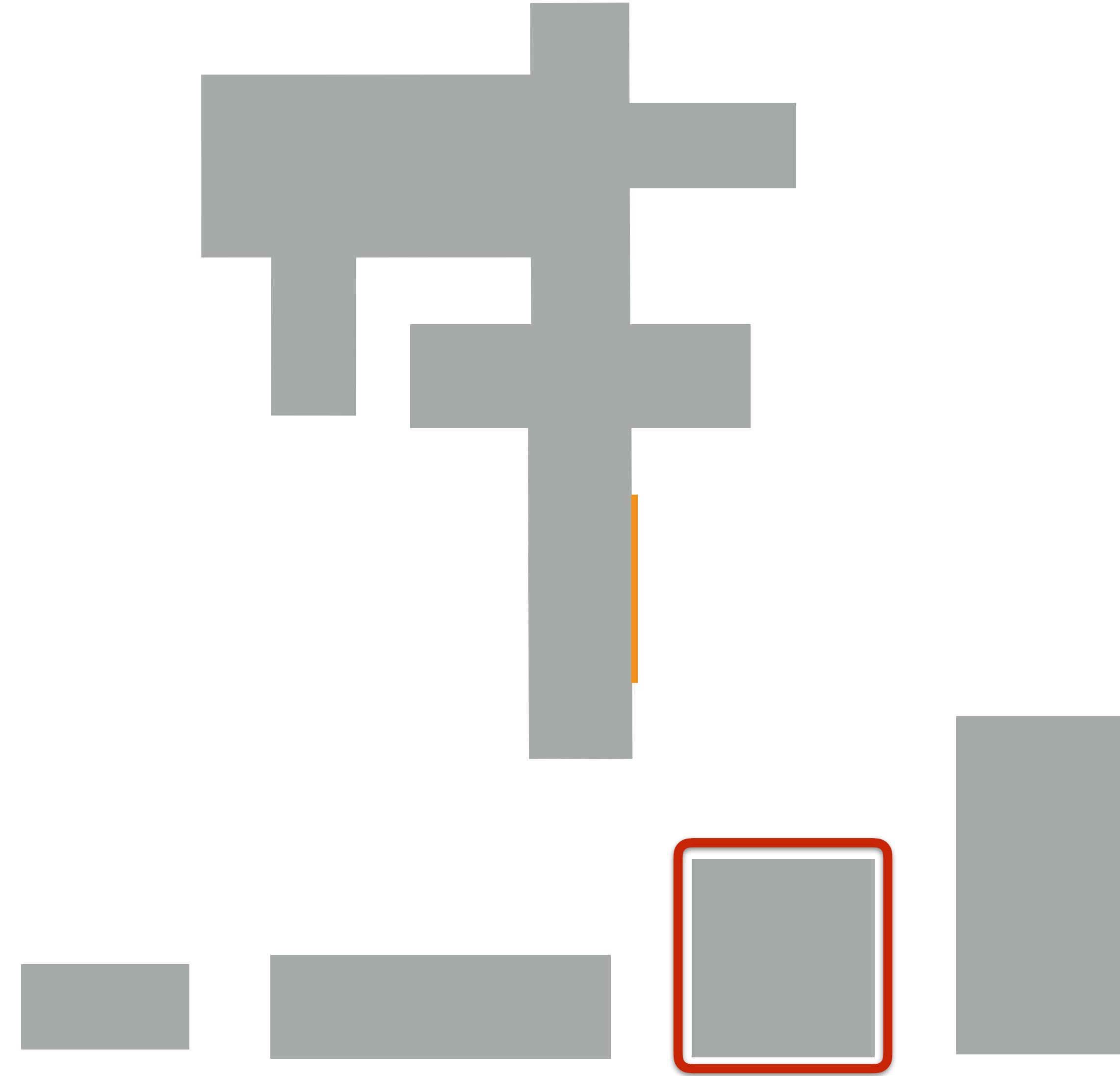
Growing polygons



Growing polygons



Growing polygons



Growing polygons

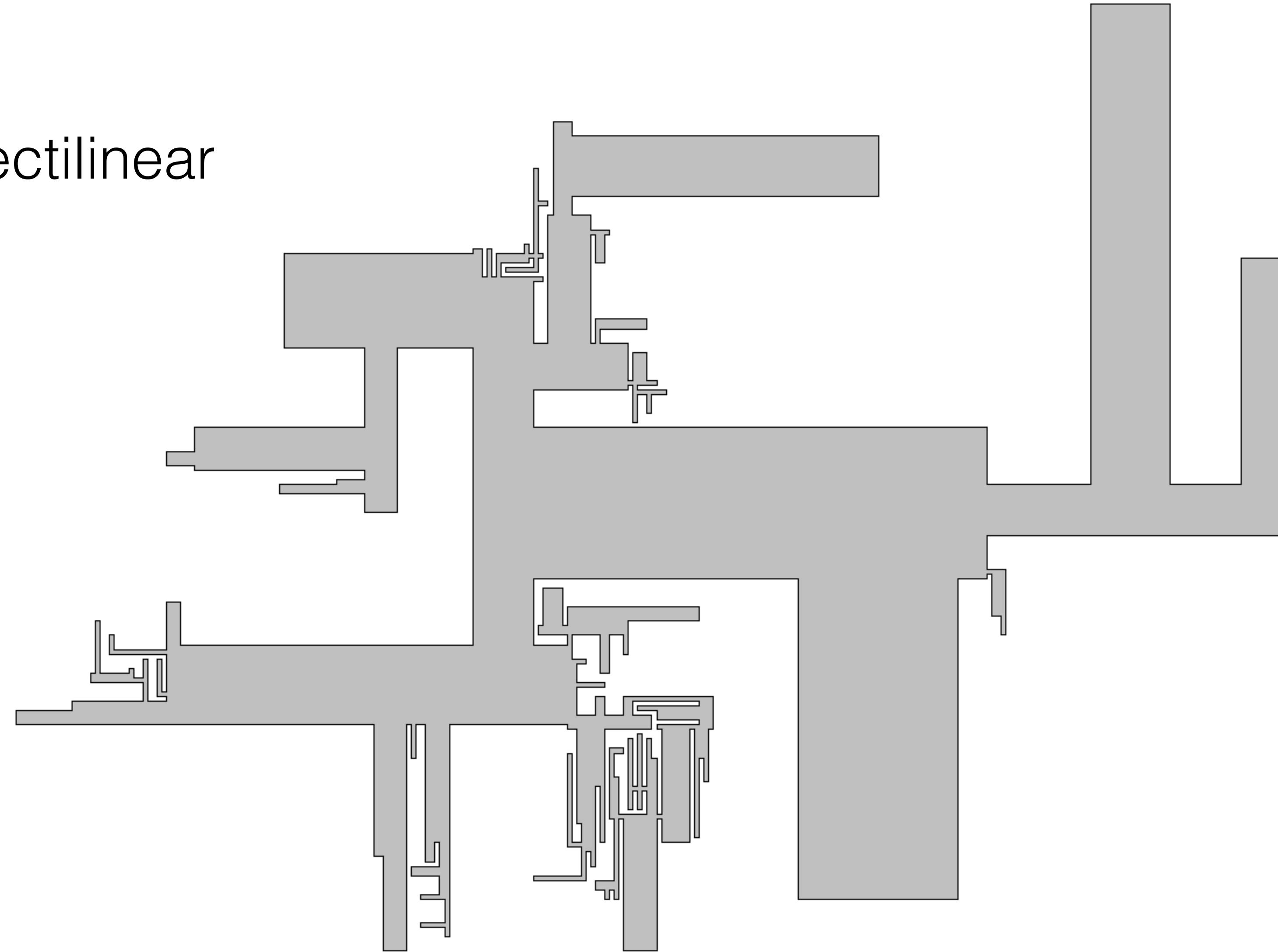


Algorithm for growing polygons

1. Pick a primitive polygon;
2. Locate a segment on a host polygon edge;
3. Scale, rotate and attach the primitive;
check for self-intersections
4. Repeat

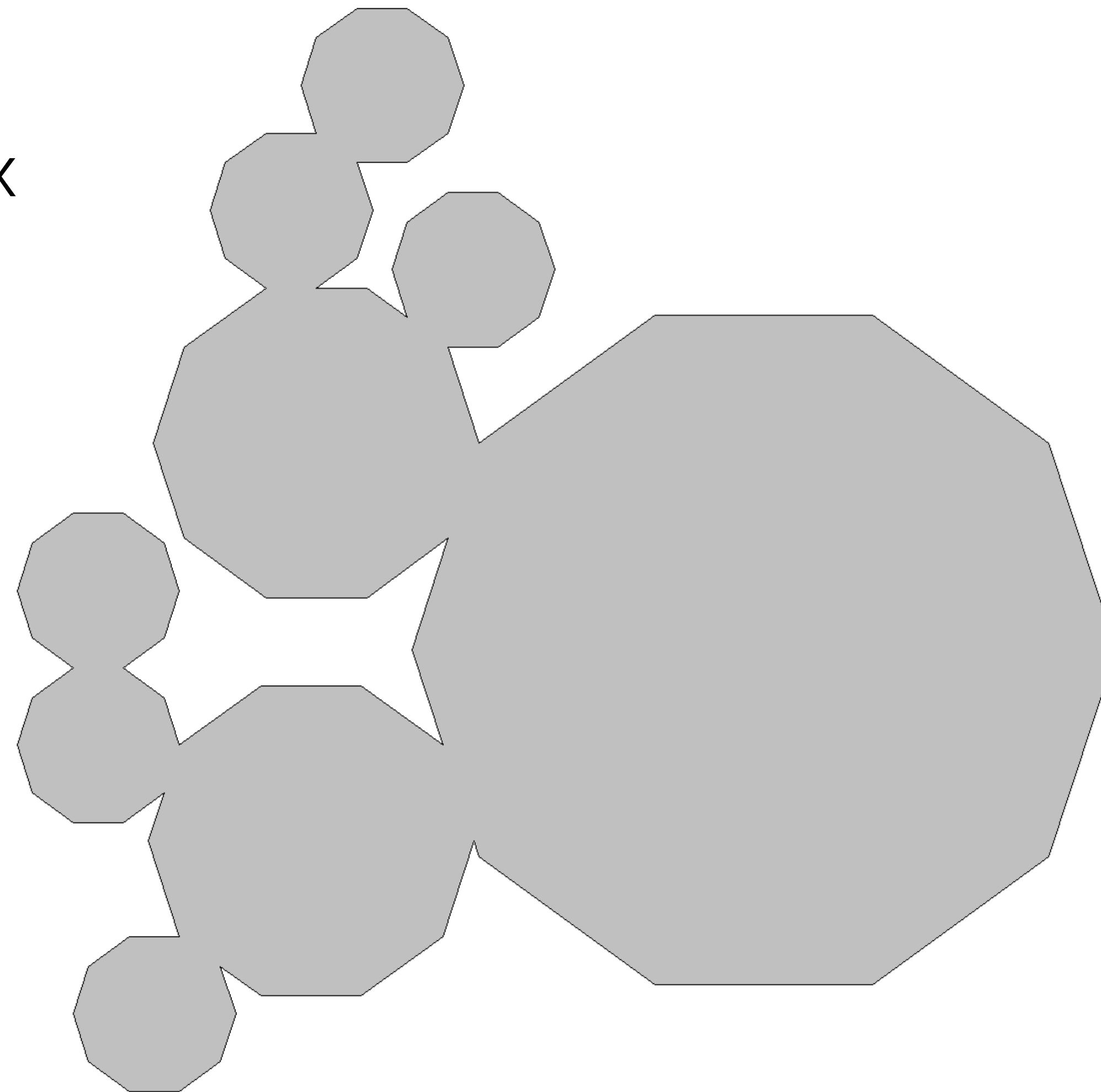
Generating contest problems

Rectilinear



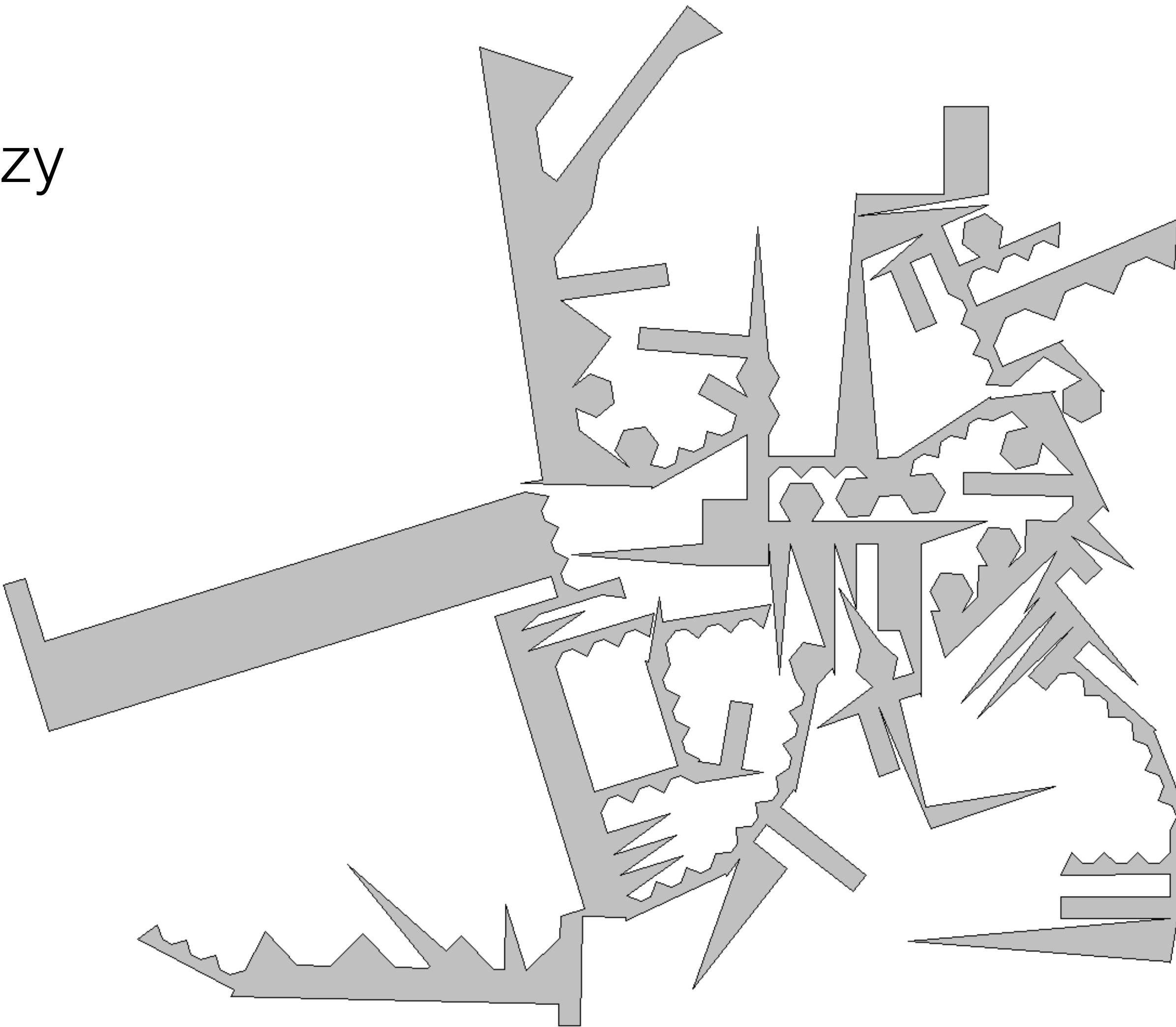
Generating contest problems

Quasi-convex



Generating contest problems

Crazy



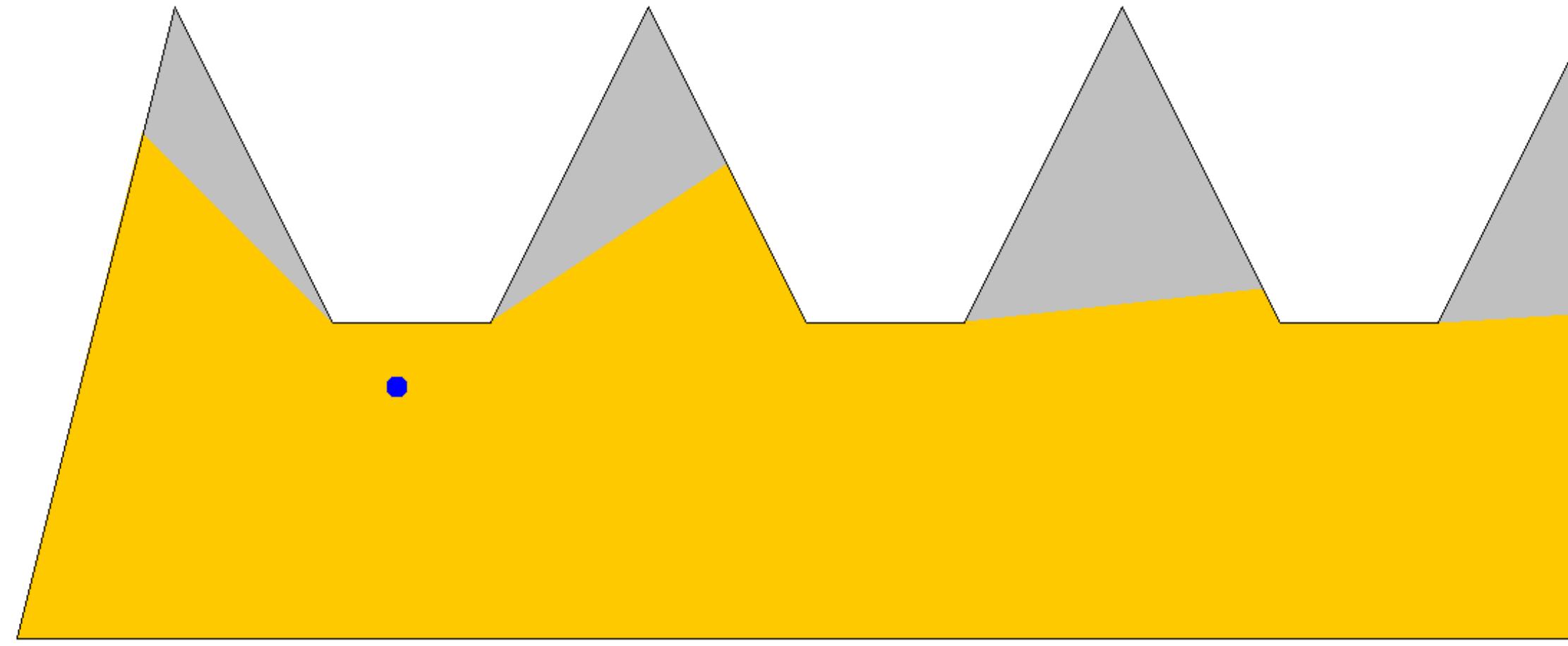
Organizers' TODO

- Problem generator;
 - ▶ Polygons with different “features” (convex, rectangular, etc.)
- Solution checker with online feedback
 - ▶ geometric machinery (triangulation, visibility, ...)
 - ▶ web-server
- Make sure that it all works.

Organizers' TODO

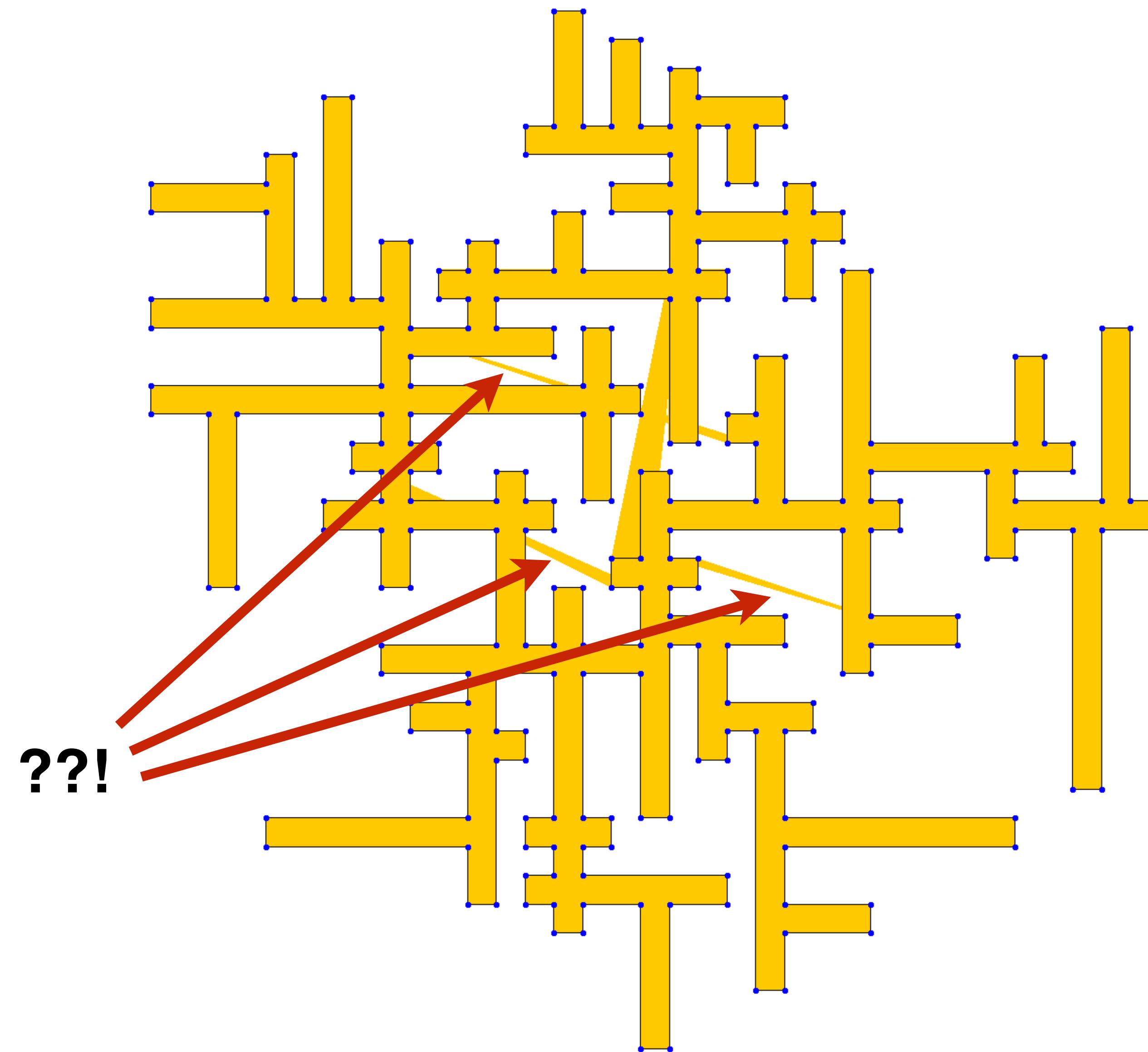
- Problem generator;
 - ▶ Polygons with different “features” (convex, rectangular, etc.)
- Solution checker with online feedback
 - ▶ geometric machinery (triangulation, visibility, ...)
 - ▶ web-server
- Make sure that it all works.

Testing basic visibility algorithm



- Main component for *checking* arbitrary solutions;
- Original description (1986) has a number of simplifications and is given in pseudocode.

Bug in Joe-Simpson algorithm



Randomly generated,
260 vertices,
guards in every node

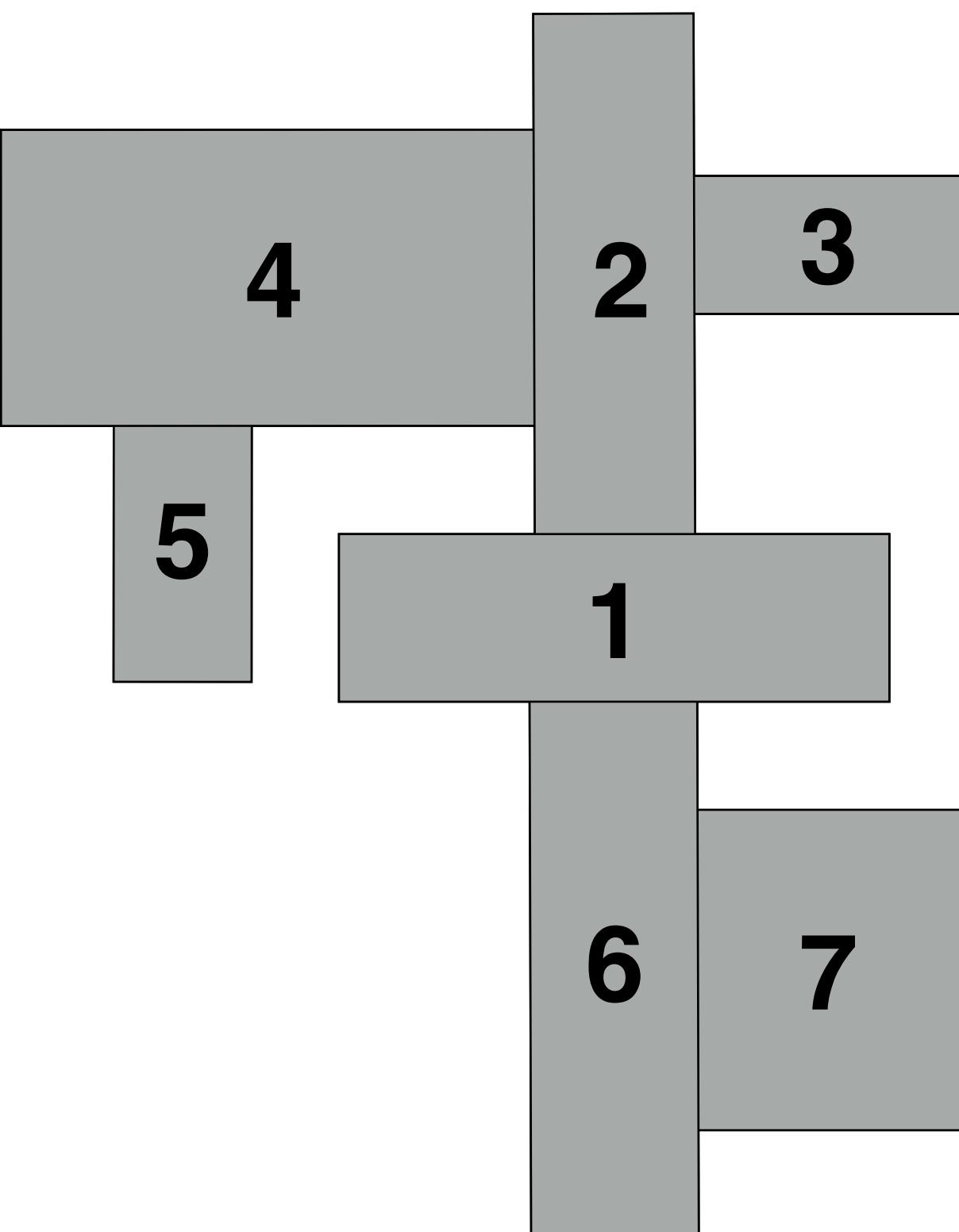
Trimming ~~Shrinking~~ Polygons



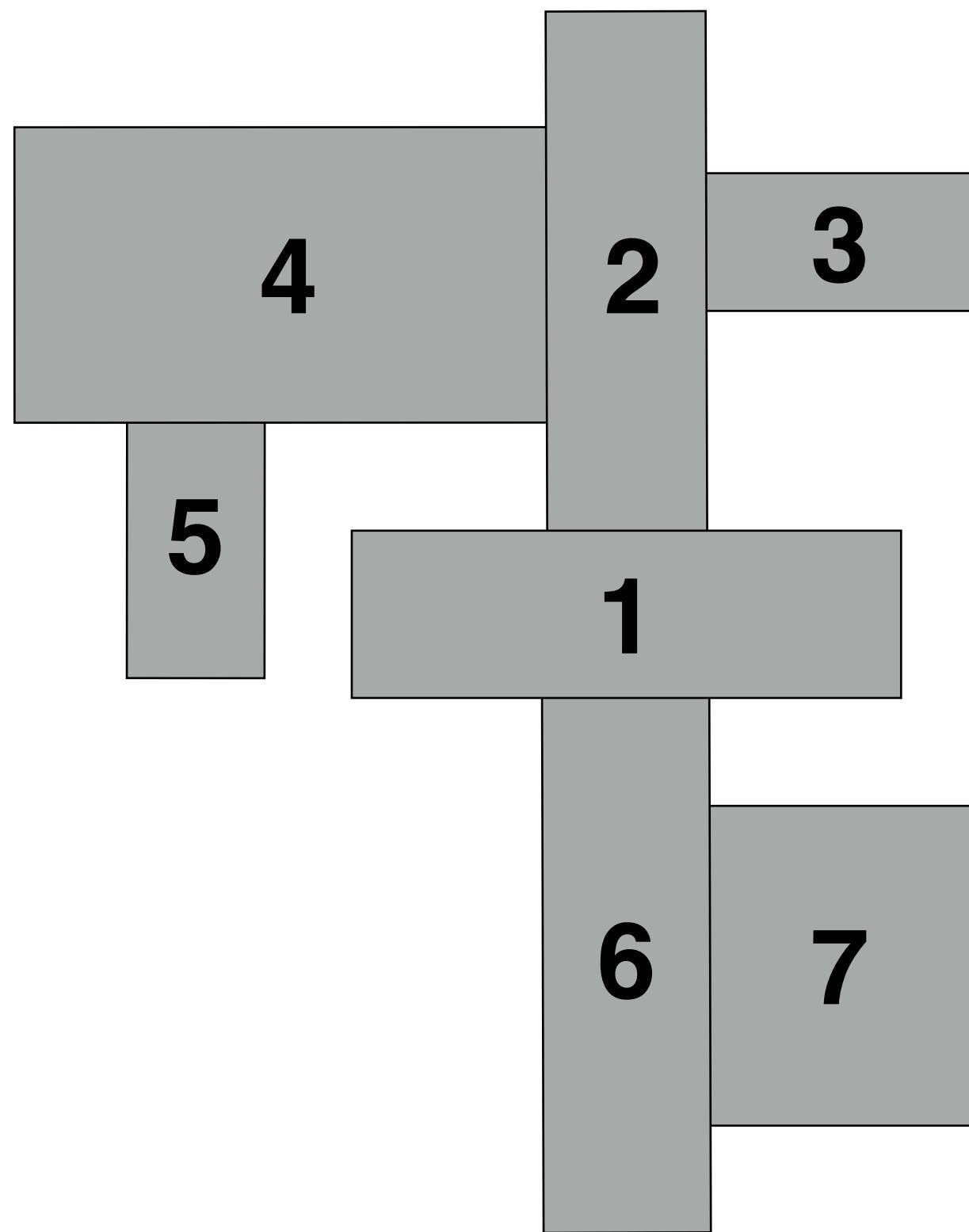
Reconstructing polygon generation



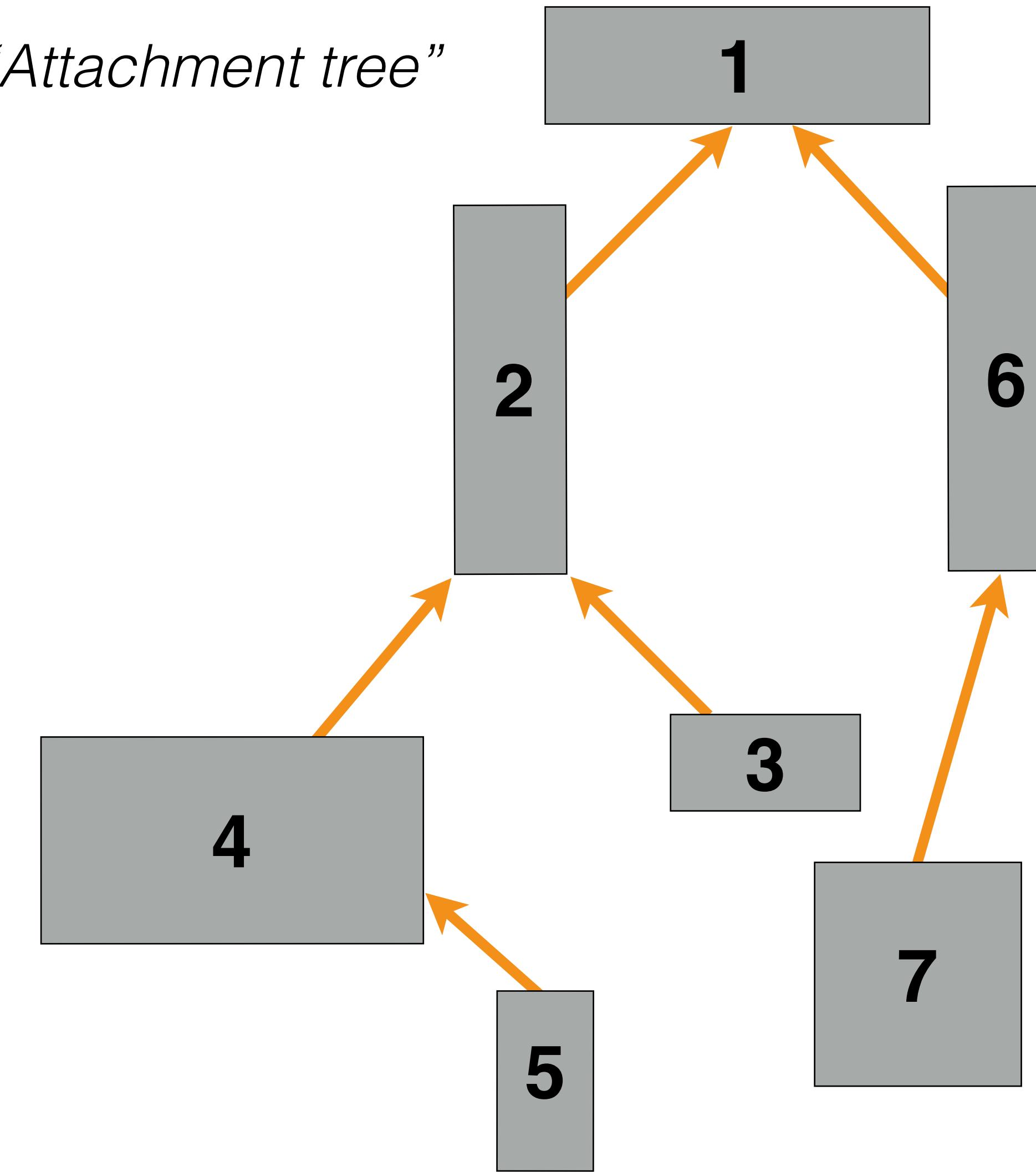
Reconstructing polygon generation



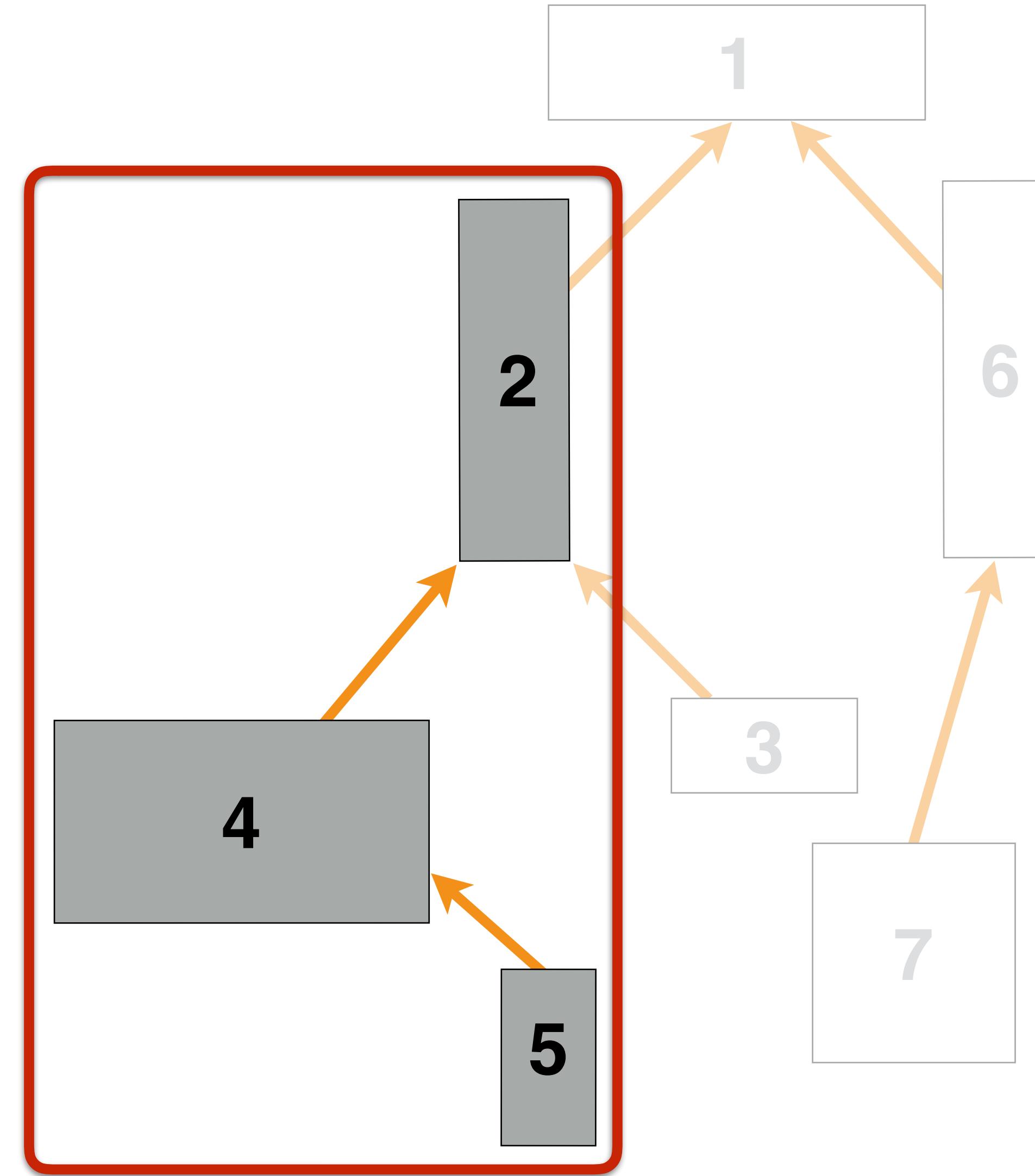
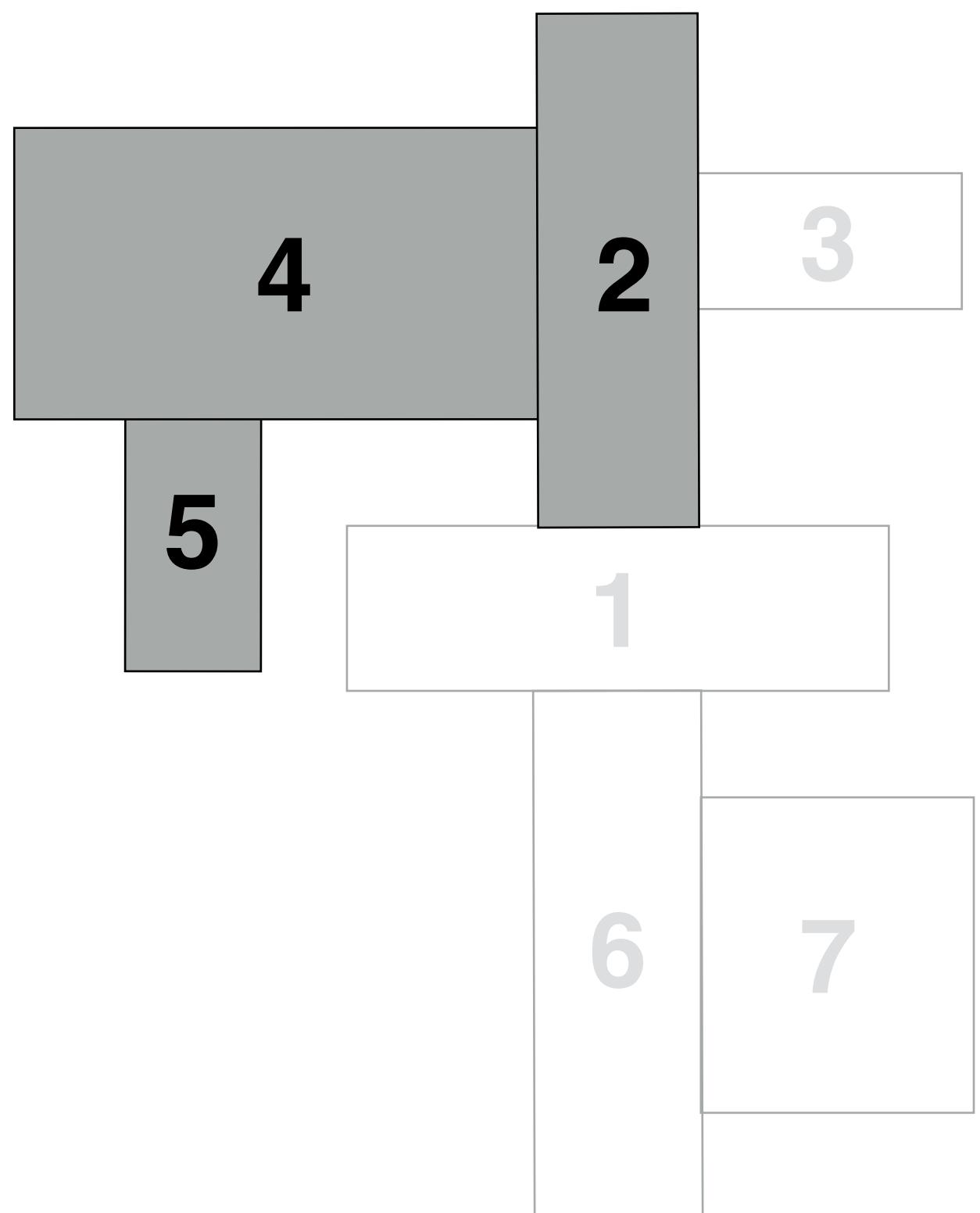
Reconstructing polygon generation



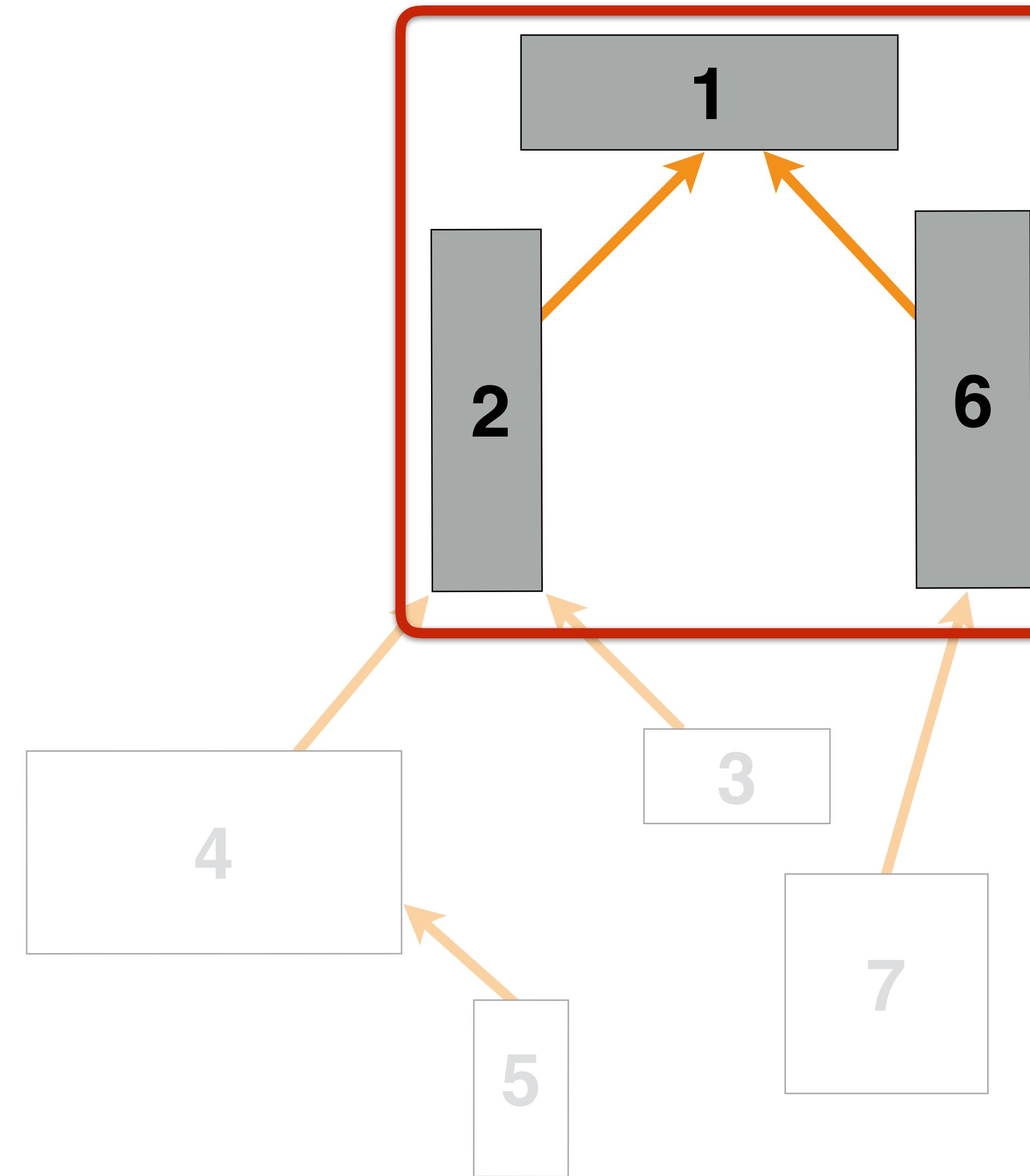
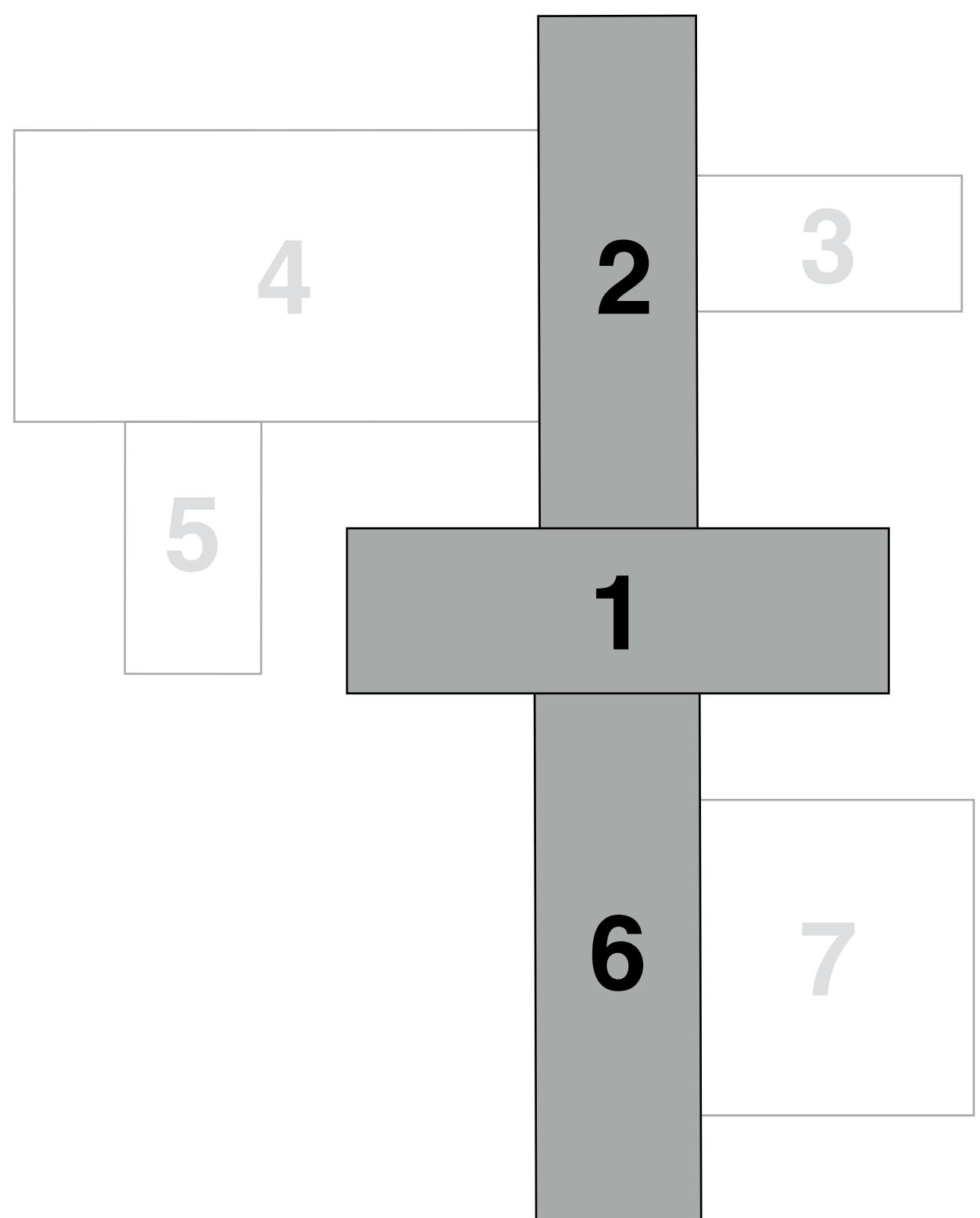
“Attachment tree”



Trimming polygons



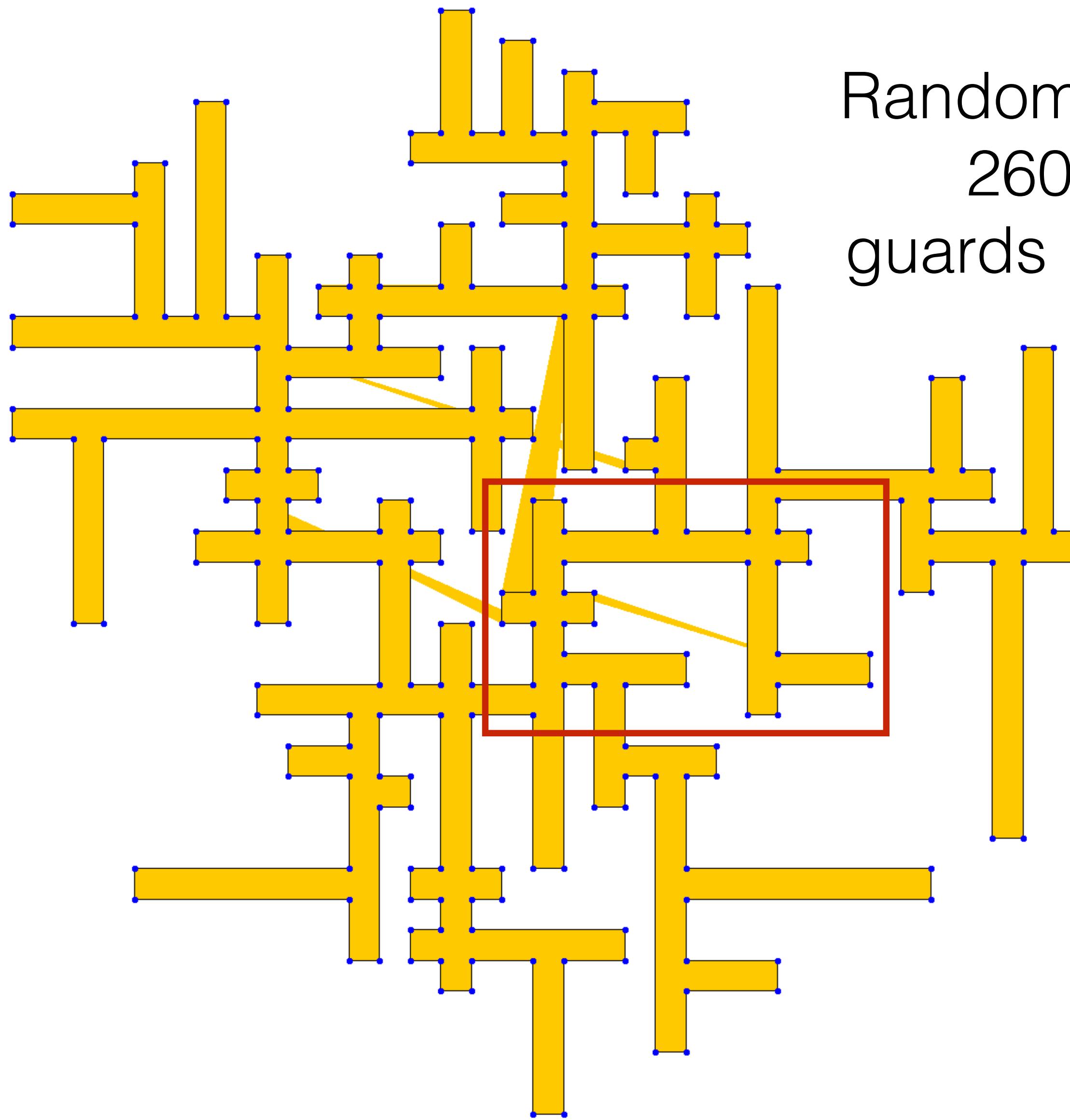
Trimming polygons



Shrinking strategy

- Build the *attachment tree* while constructing a random polygon;
- Construct all its subtrees;
- “Render” the corresponding trimmed polygons.

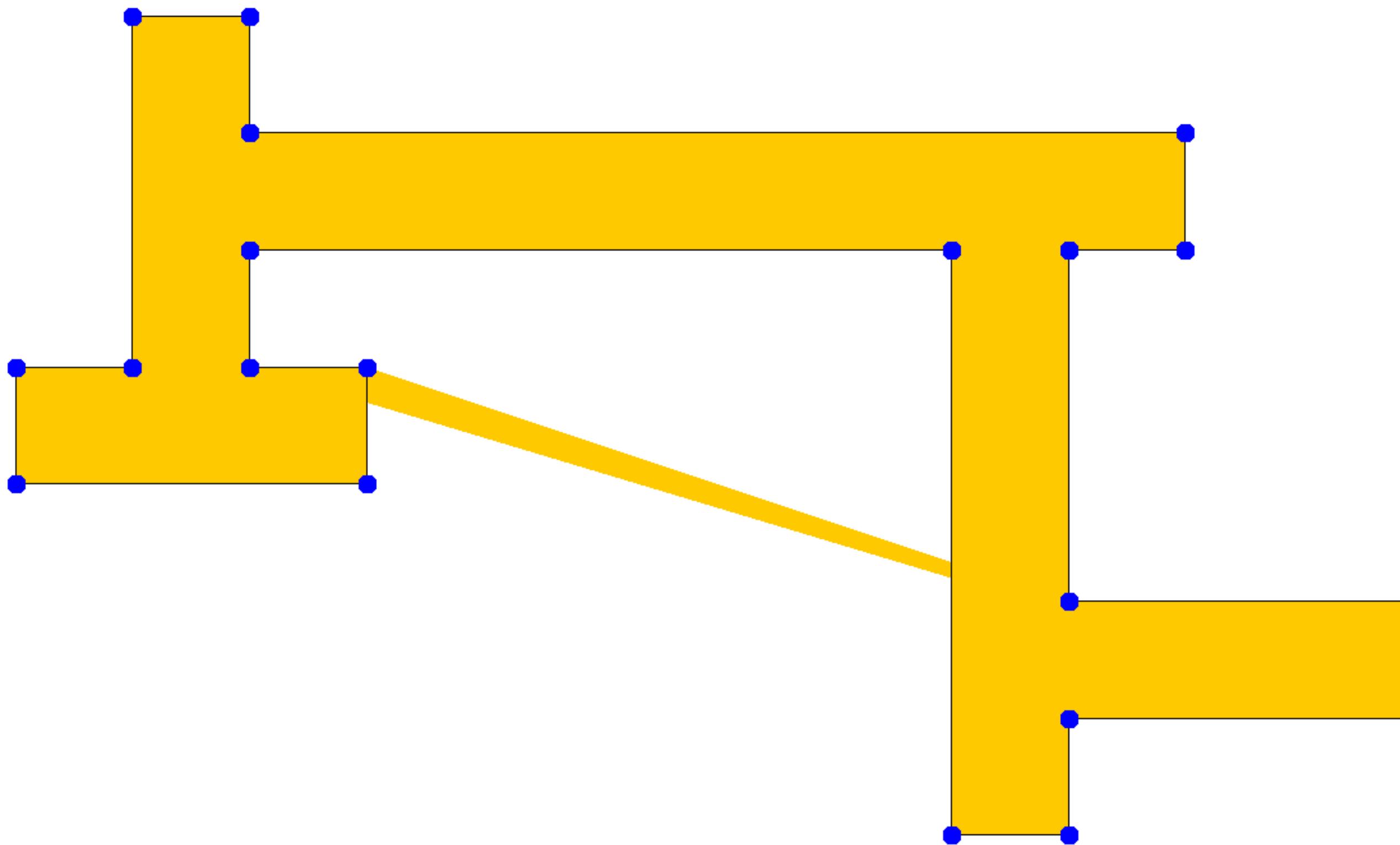
Bug in Joe-Simpson algorithm



Randomly generated,
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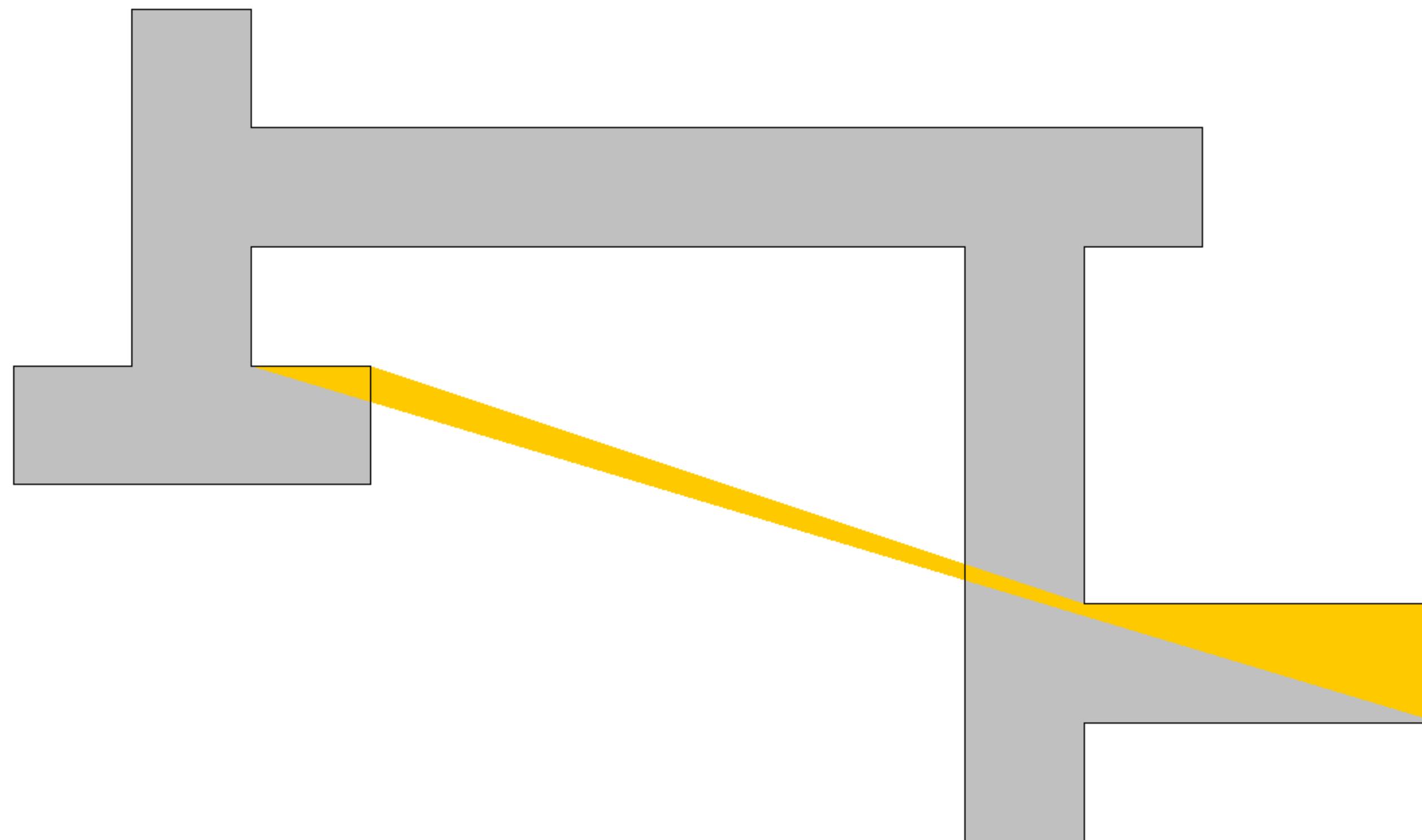
Bug in Joe-Simpson algorithm

After trimming,
20 vertices

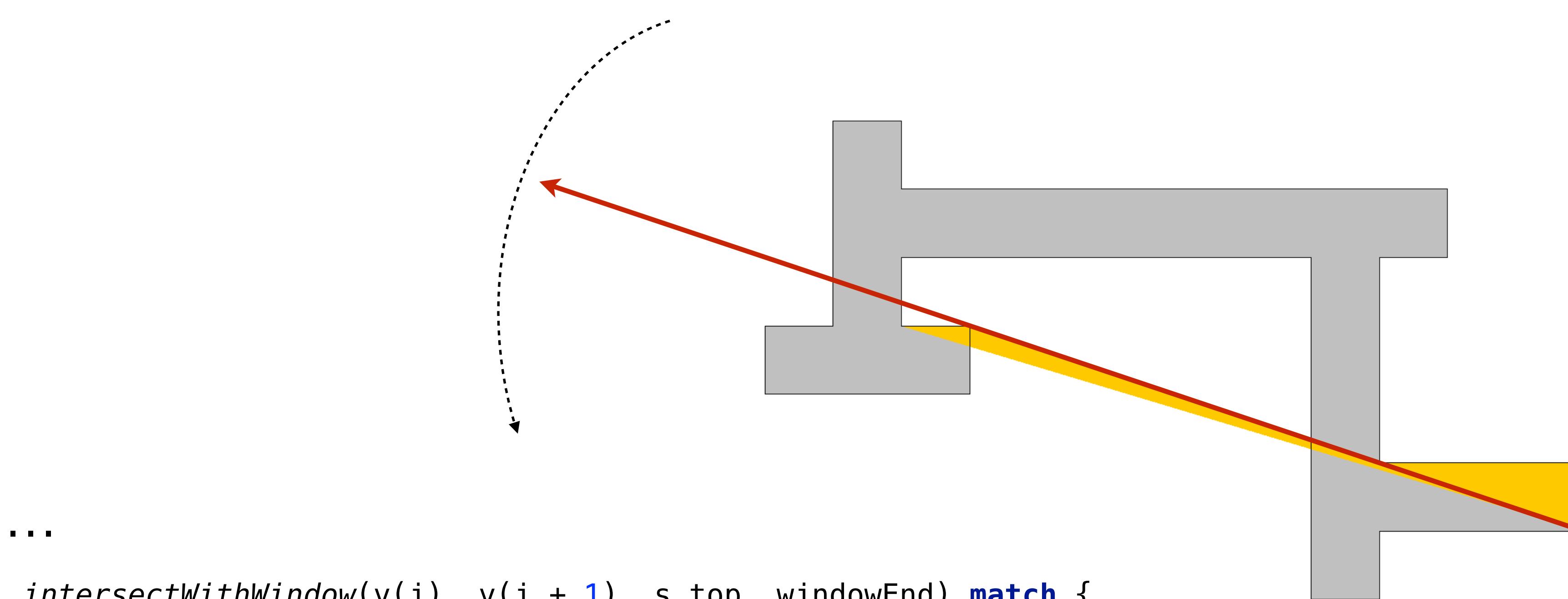


Bug in Joe-Simpson algorithm

Removed
irrelevant guards

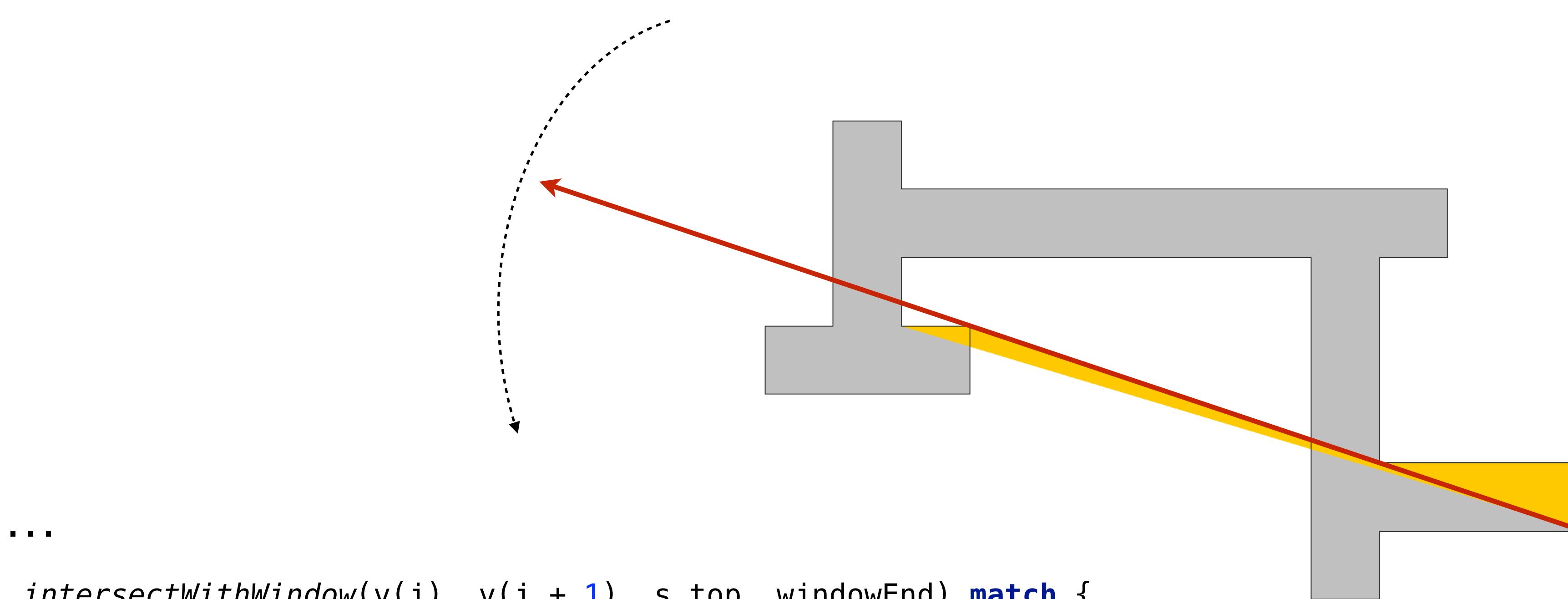


Bug in Joe-Simpson algorithm



```
...
intersectWithWindow(v(i), v(i + 1), s.top, windowEnd) match {
    case Some(p) =>
        s.push(p)
        advance(v, s, i)
    case _ =>
        scan(v, s, i, windowEnd, ccw)
}
```

Bug in Joe-Simpson algorithm



```
...
intersectWithWindow(v(i), v(i + 1), s.top, windowEnd) match {
    case Some(p) if !(windowEnd.isDefined && p ==~ windowEnd) =>
        s.push(p)
        advance(v, s, i)
    case _ =>
        scan(v, s, i, windowEnd, ccw)
}
...
```

Implementation effort

- Geometric primitives and procedures: **1450 LOC**
- Server infrastructure: **1500 LOC**
- Testing framework: **350 LOC**

The Competition

- 30 *very large polygons* (100-500 vertices) of different shapes;
- *100 hours* to accomplish;
- Can use *any language/library*; submit only text files;
- Automatic feedback and ranking;
- 60% score for implementing a textbook Chvátal's solution.

Score Table

Last submitted	Rank	Done	1 (3)	2 (4)	3 (6)	4 (8)	5 (12)	6 (180)	7 (92)	8 (244)	9 (74)	10 (338)	11 (104)	12 (288)	13 (334)	14 (58)
15:27:23, 24 Feb 2016	1	30	1	1	2	1	2	23	11	33	10	47	14	41	43	5
13:10:28, 26 Feb 2016	2	30	1	1	2	1	2	23	11	33	10	48	14	41	43	5
13:50:36, 26 Feb 2016	2	30	1	1	2	1	2	23	11	33	10	48	14	41	43	5
13:51:13, 26 Feb 2016	3	30	1	1	2	1	2	23	11	33	10	48	14	41	43	5
13:49:19, 26 Feb 2016	4	30	1	1	2	1	2	23	11	33	10	48	14	41	43	5
13:54:27, 26 Feb 2016	5	30	1	1	2	1	2	23	11	33	10	48	14	41	43	5
13:46:45, 26 Feb 2016	6	30	1	1	2	1	2	25	11	34	10	47	14	41	47	5
13:45:49, 26 Feb 2016	6	30	1	1	2	1	2	24	11	34	10	51	14	43	47	5
13:58:56, 26 Feb 2016	7	30	1	1	2	1	2	23	11	33	10	49	14	41	50	5
13:47:00, 26 Feb 2016	7	30	1	1	2	1	2	23	11	33	10	49	14	41	46	5
13:28:53, 26 Feb 2016	8	30	1	1	2	1	2	23	11	33	10	111	14	93	43	5

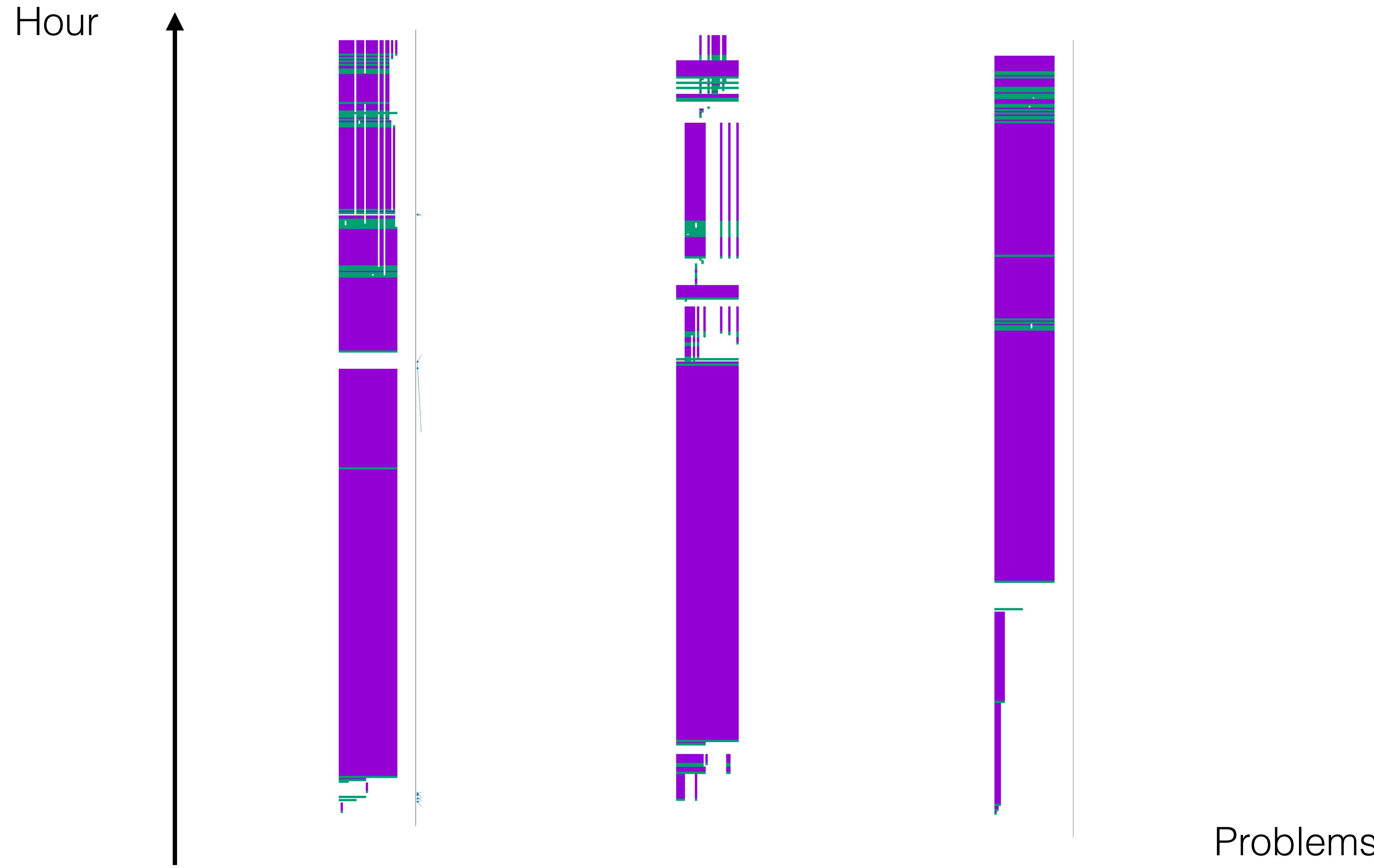
Running the Art Gallery Competition

- 94 participants, 24 teams, 2360 submissions in five days
- Server running 24/5
 - for different teams, solution processed concurrently
 - no crashes during the week
 - one *non-critical bug* in server logic (fixed without restarting)
- Most of the solutions: *textbook algorithm* with optimizations;
- The winning team implemented the *state-of-the art algorithm* (2014) using linear programming;

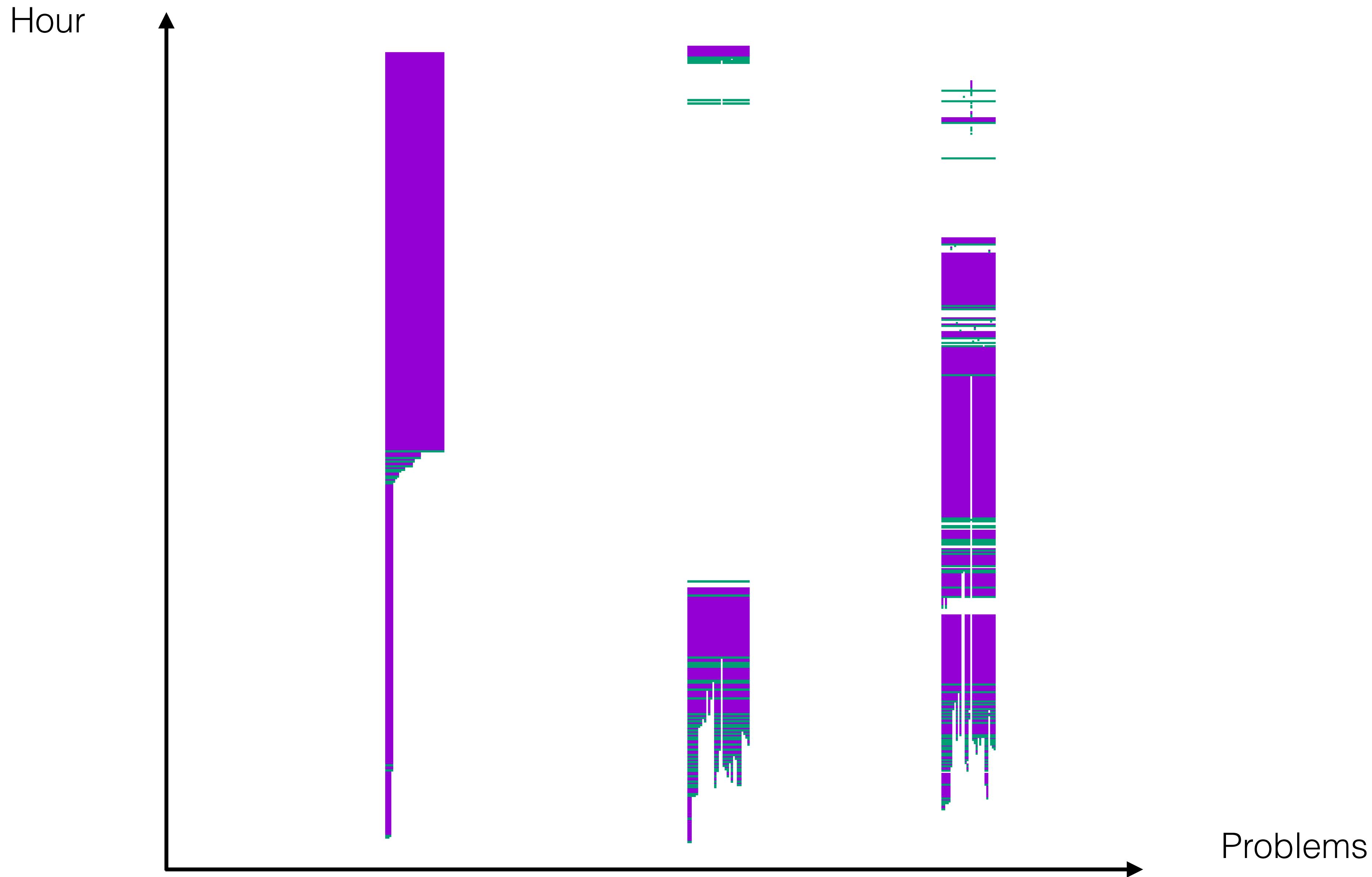
Submission patterns

- Recording time of successful submissions (green)
- Propagated submissions (purple)
- No submission (blank)

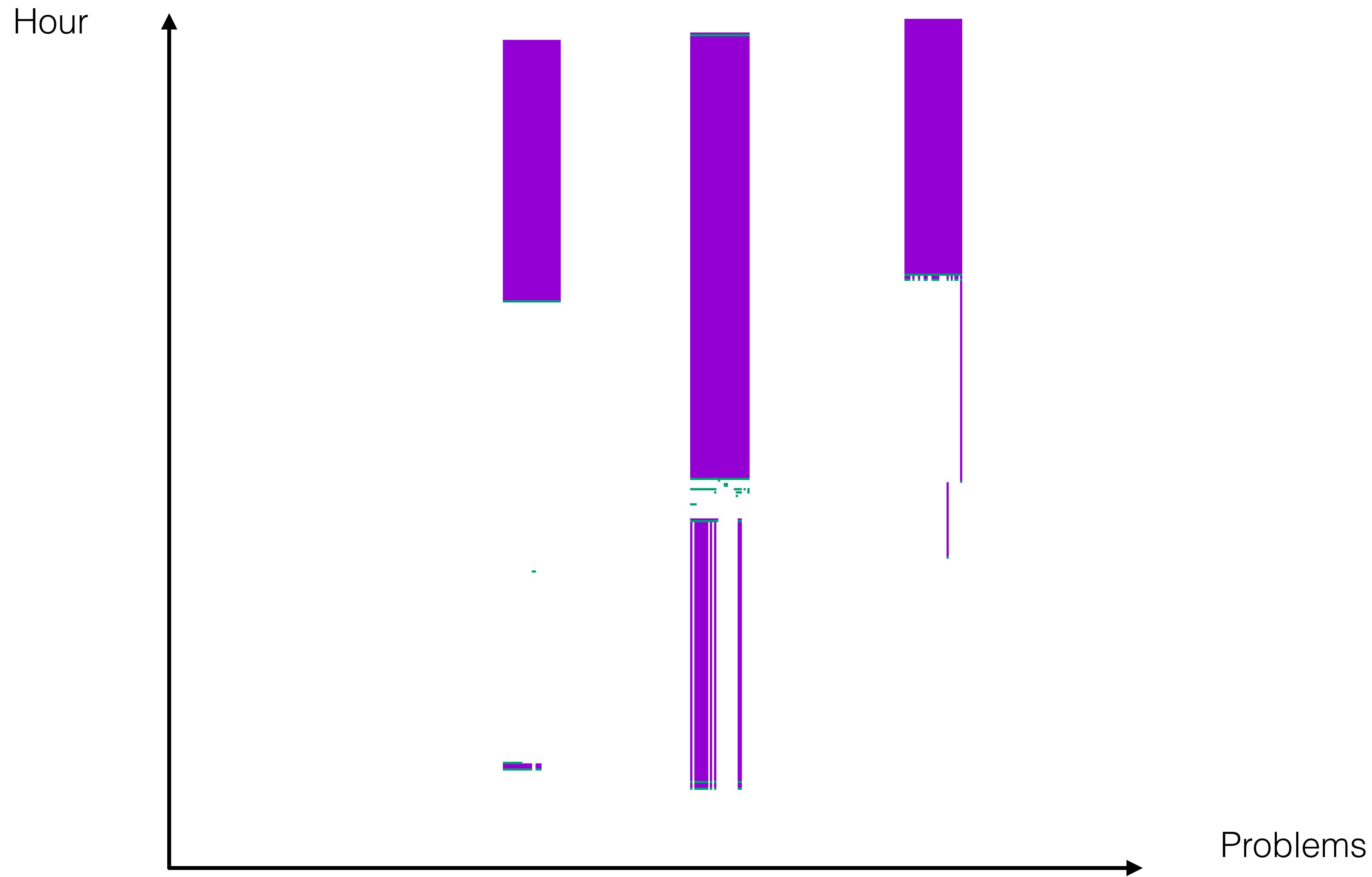
“Experimentators”



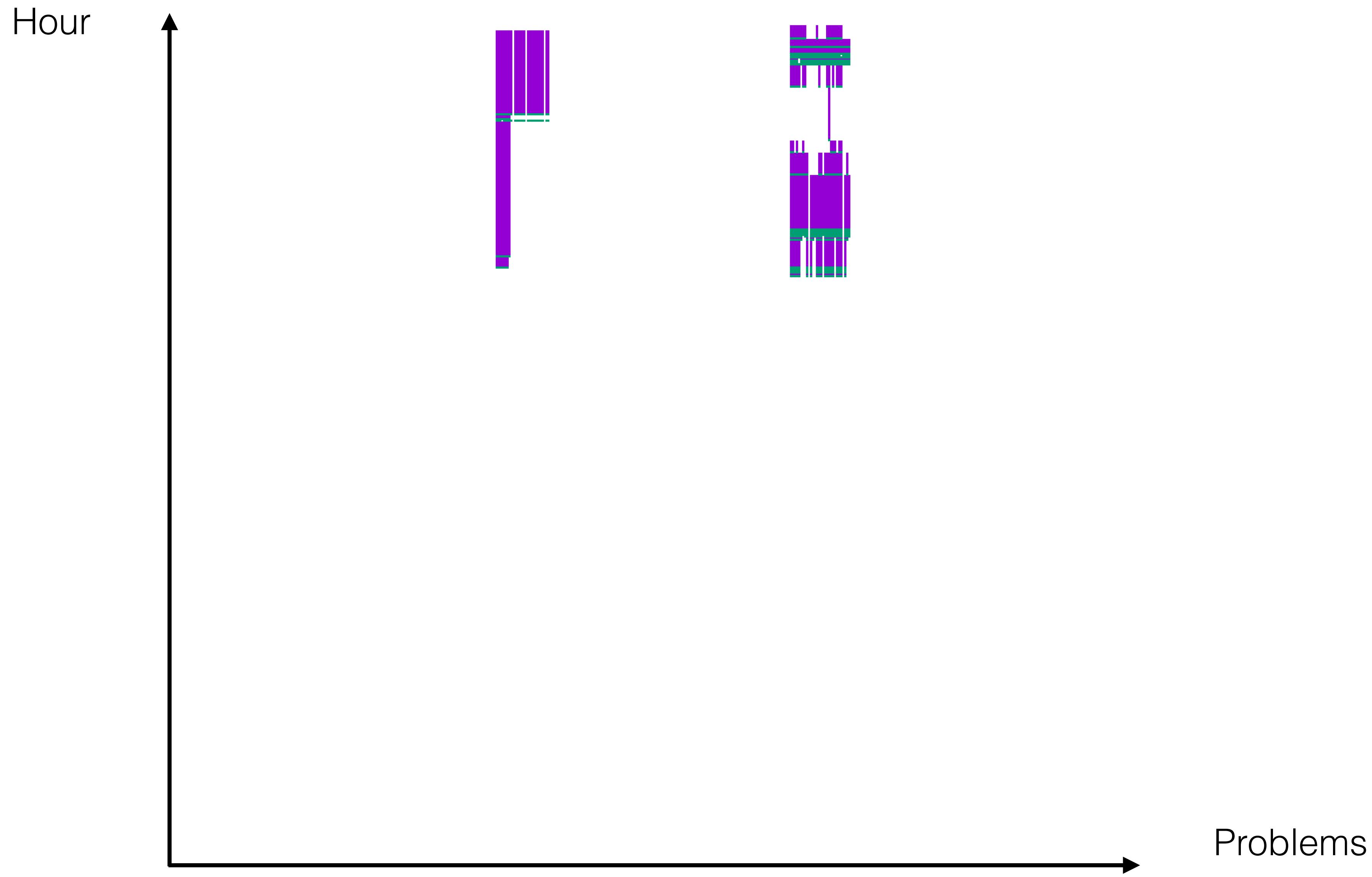
“Hard Workers”



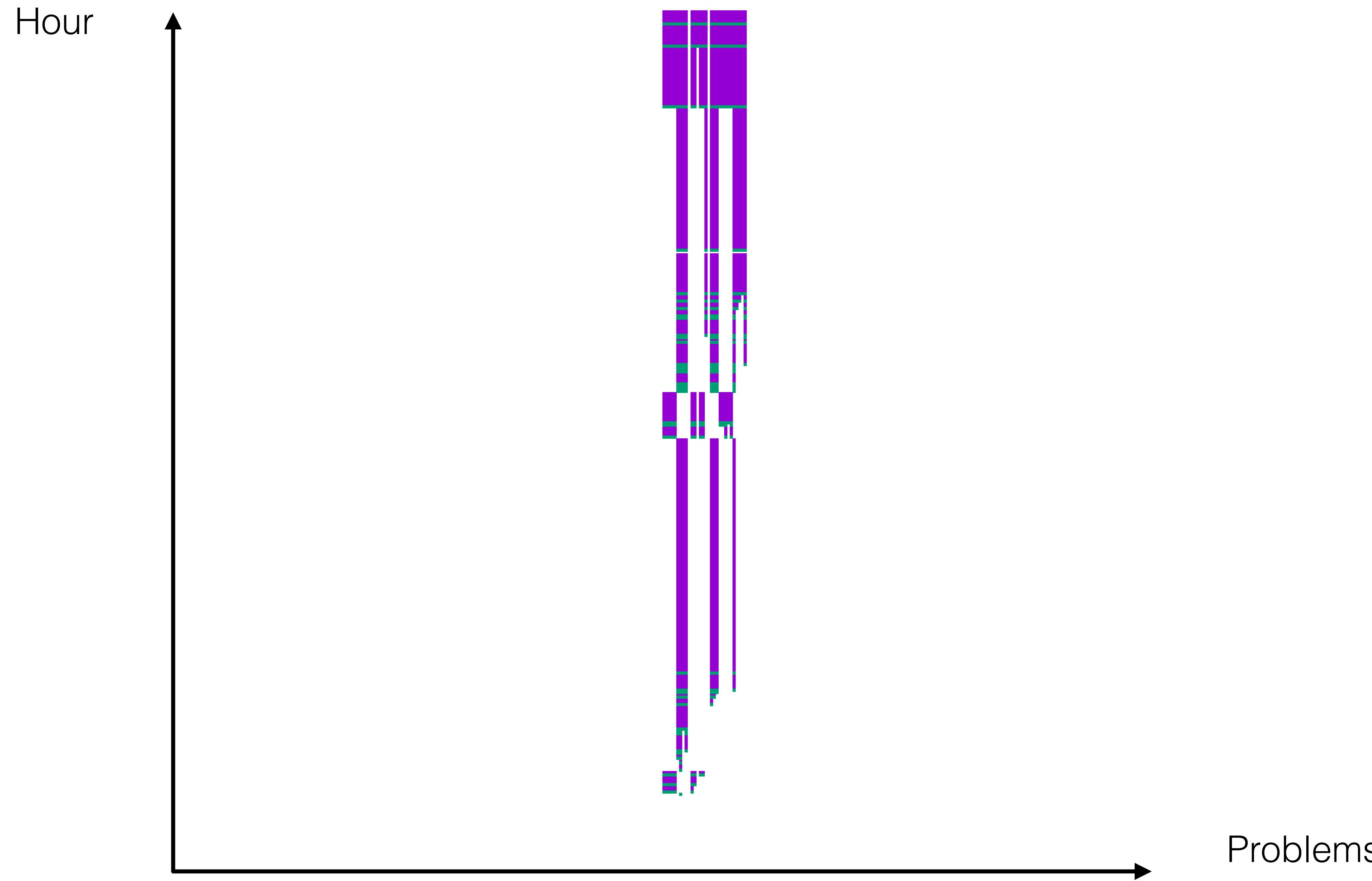
“Real Geeks”



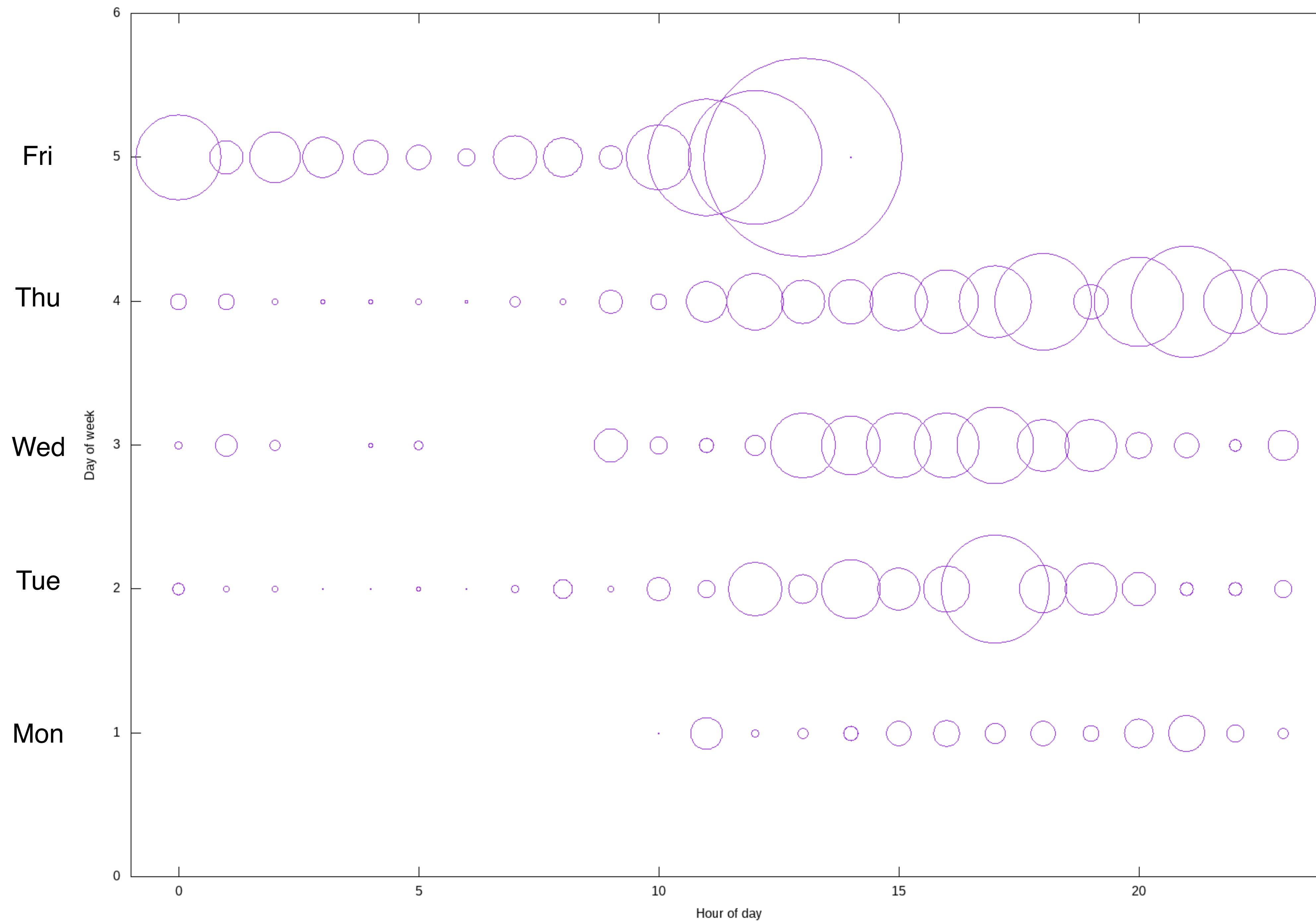
“Late Bloomers”



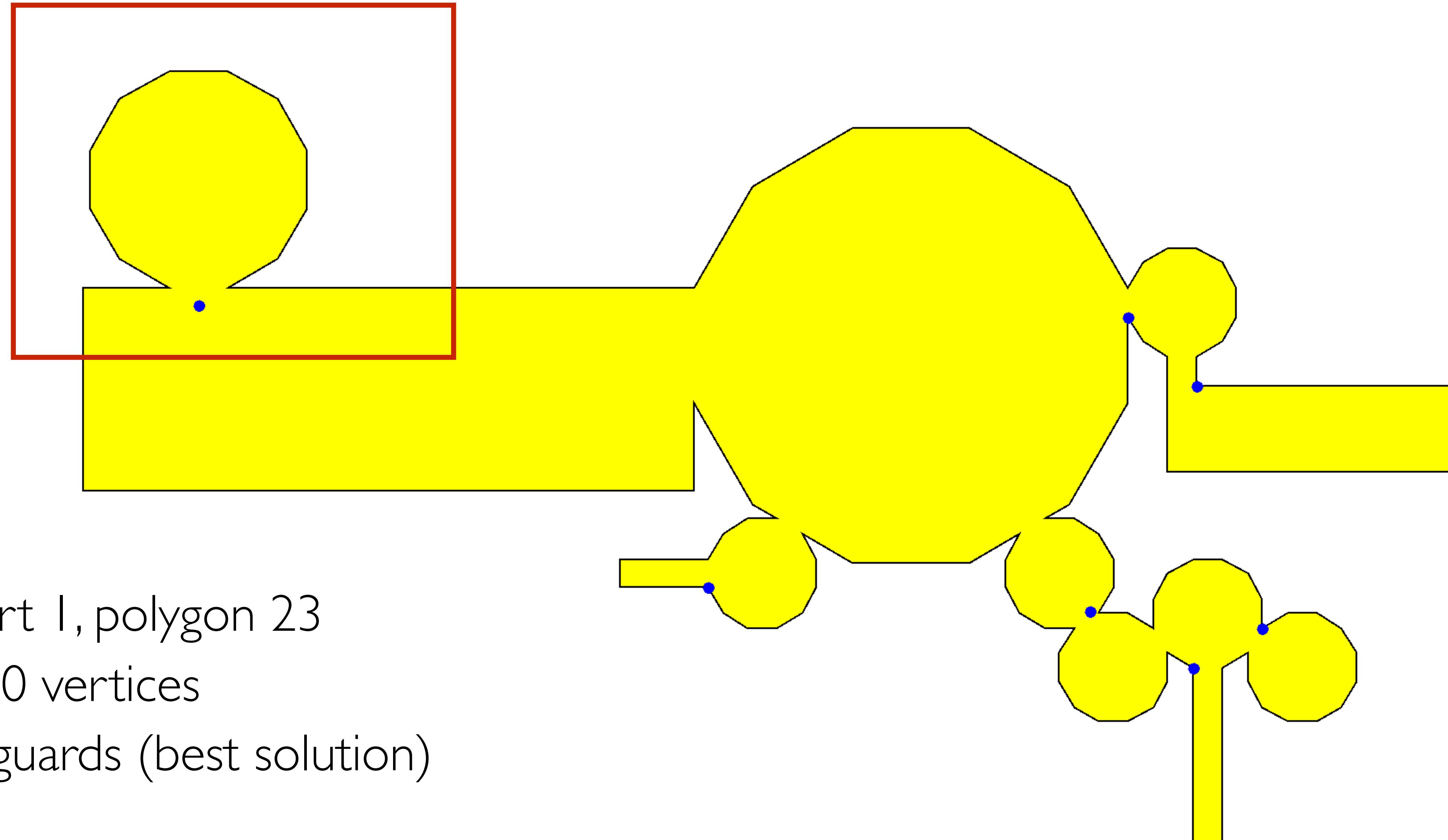
“Parallel Computers”

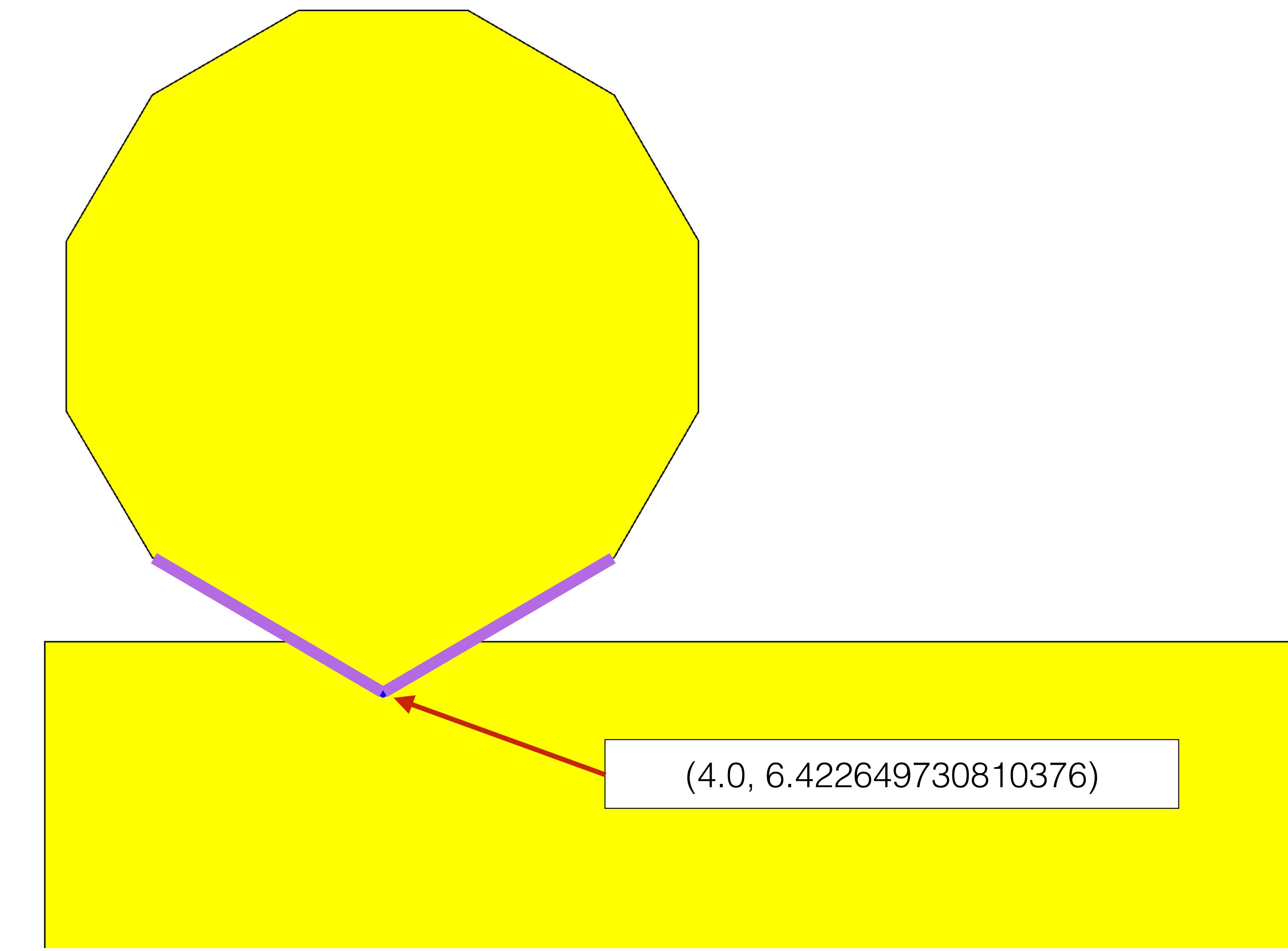


Number of submissions per timeslice: Team all



Surprises

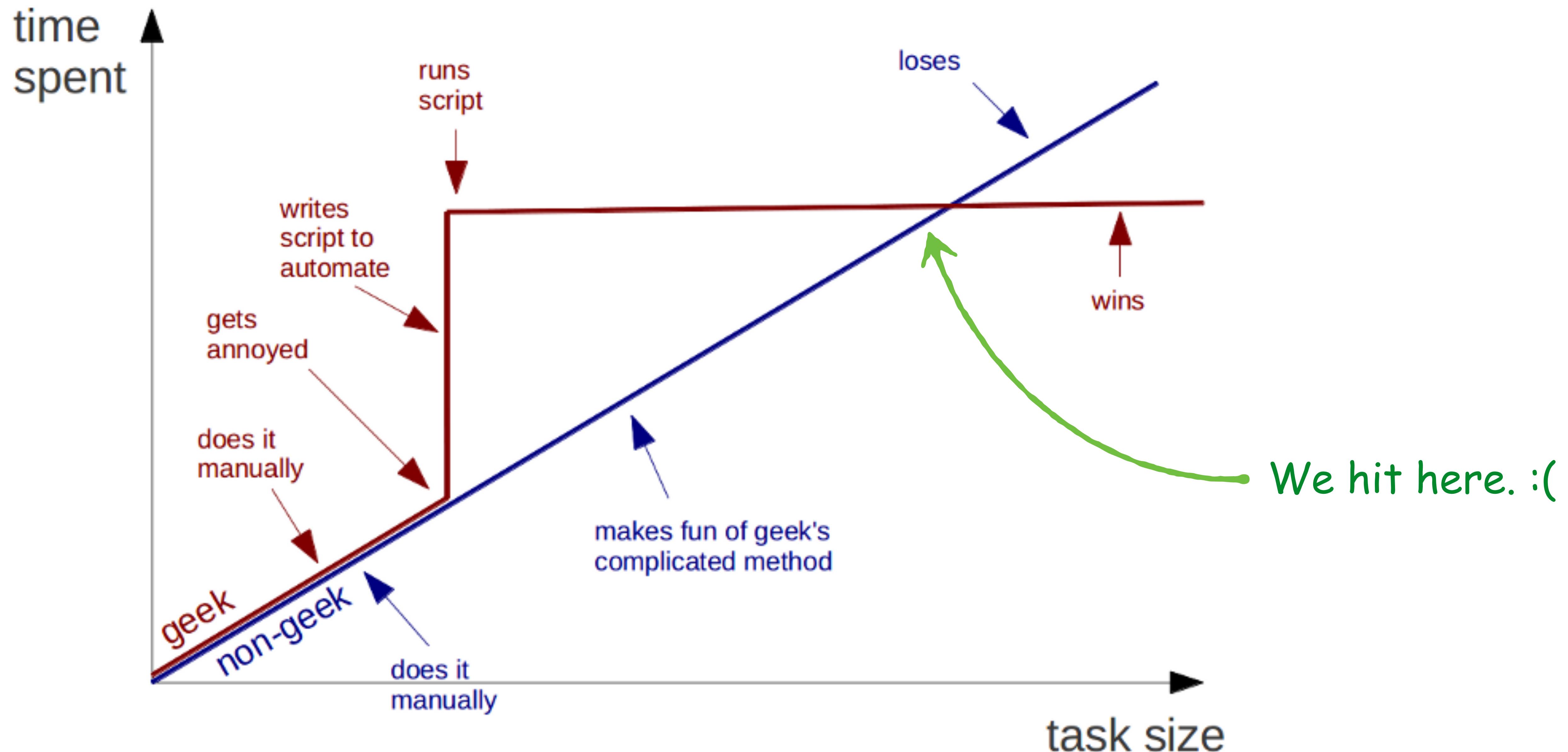




Anecdote: No more Mr Nice Server

Take-away for the organisers

Geeks and repetitive tasks



This Talk

- 2016: Art Gallery Competition
- 2017: Move-and-Tag Competition

This Talk

- 2016: Art Gallery Competition
- 2017: Move-and-Tag Competition

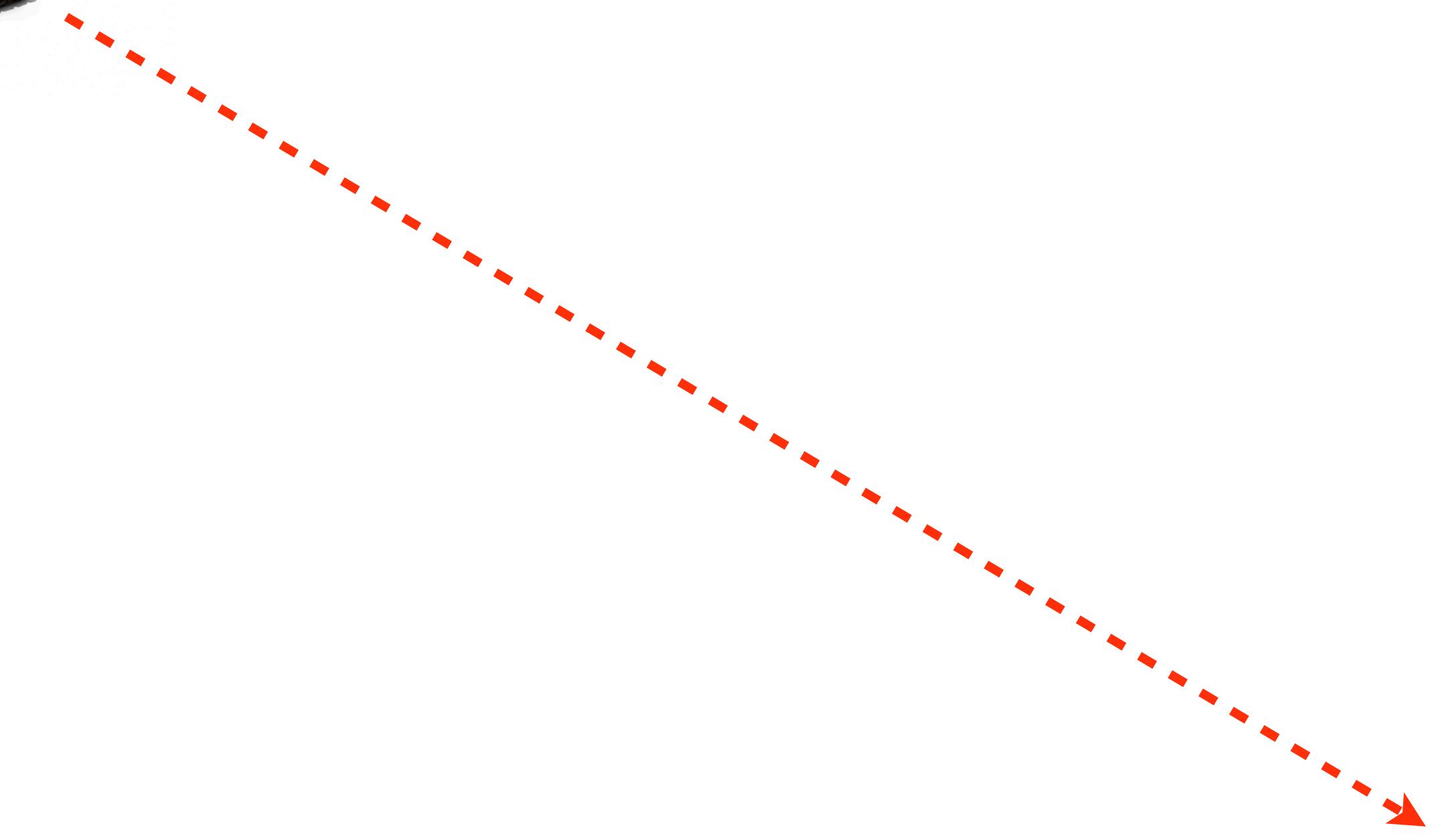
Move-and-Tag Competition

based on:

Dantzig & Ramser's *Vehicle Routing Problem* (1959)

Arkin et al.'s *Freeze-Tag Problem* (2004)

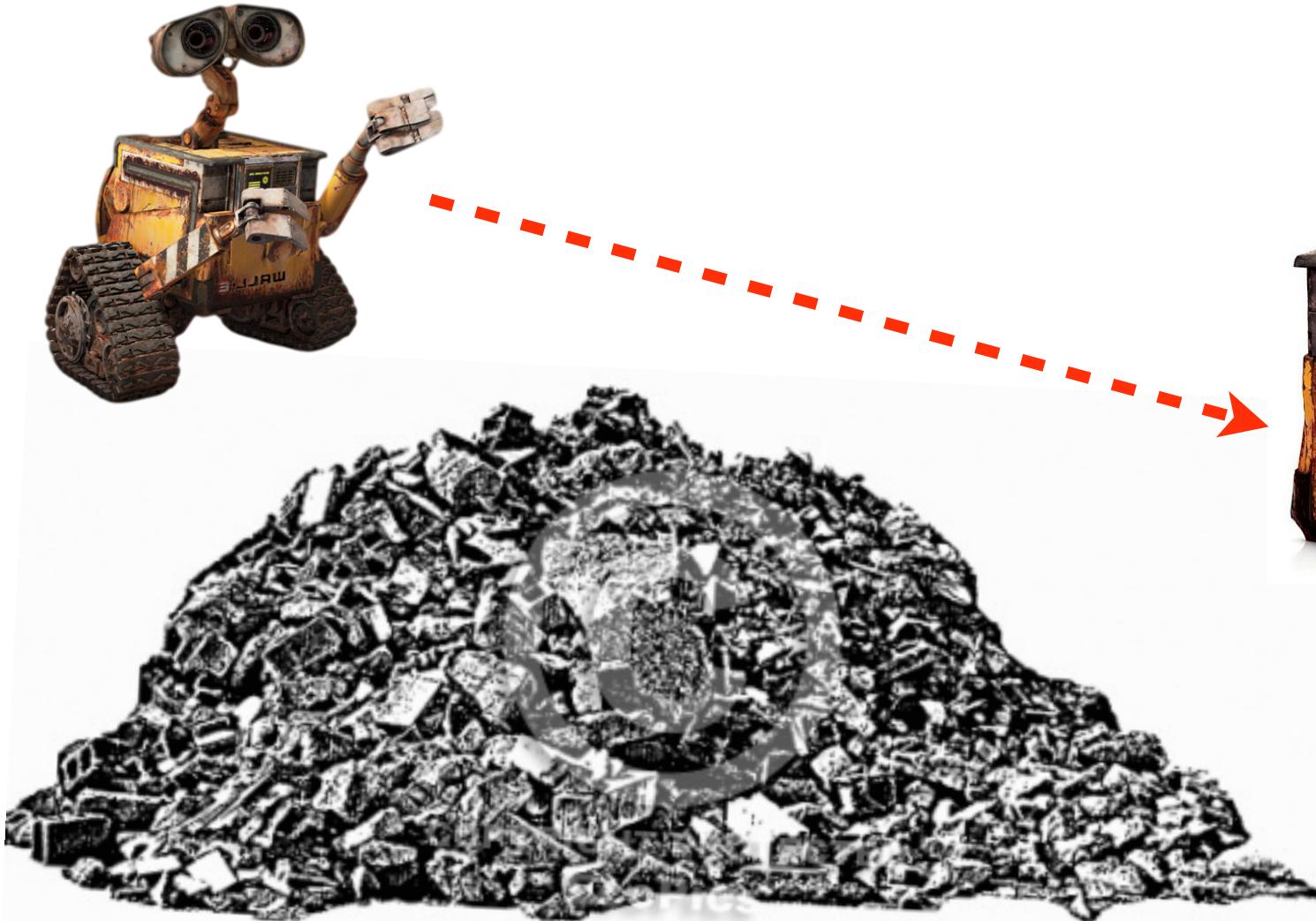




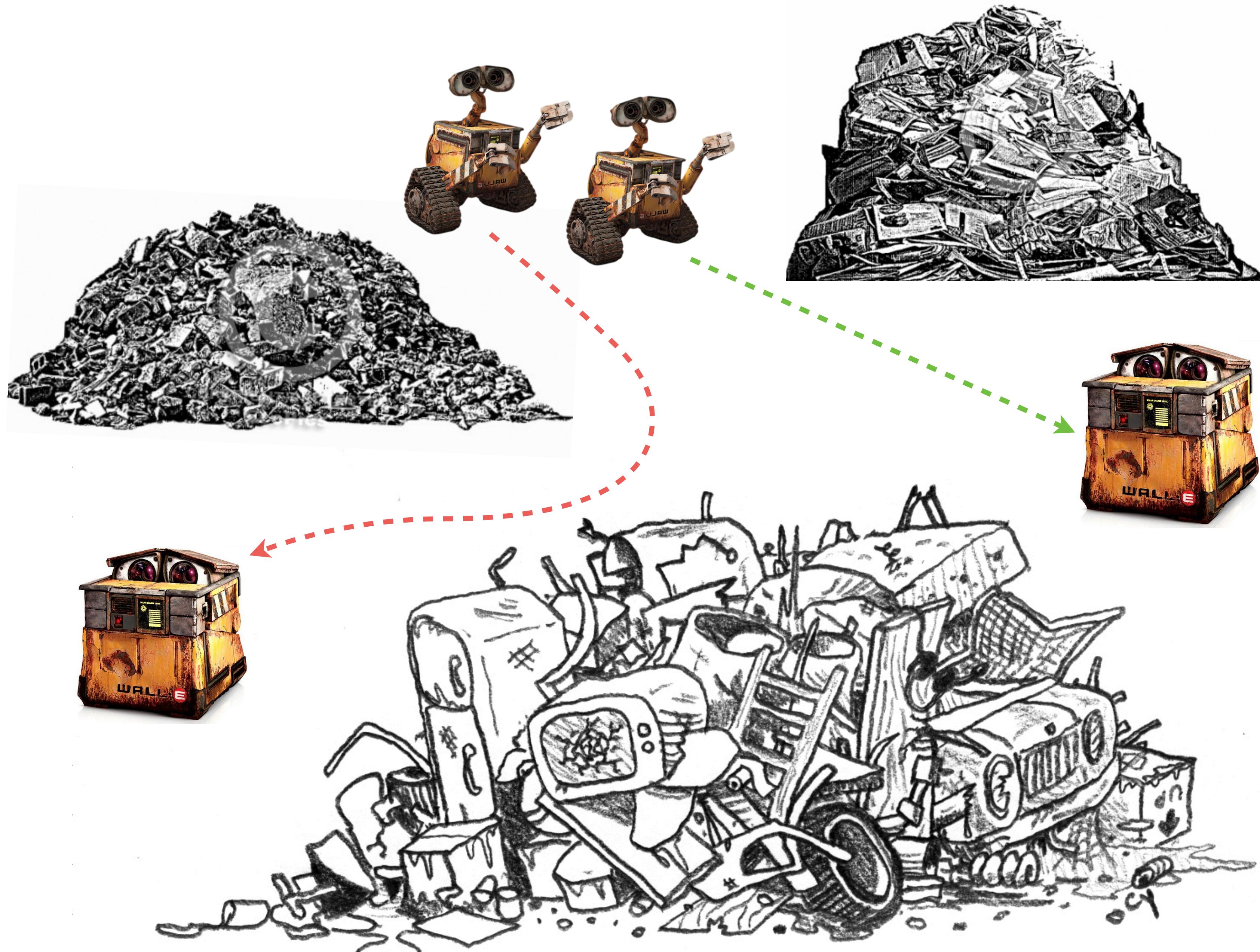


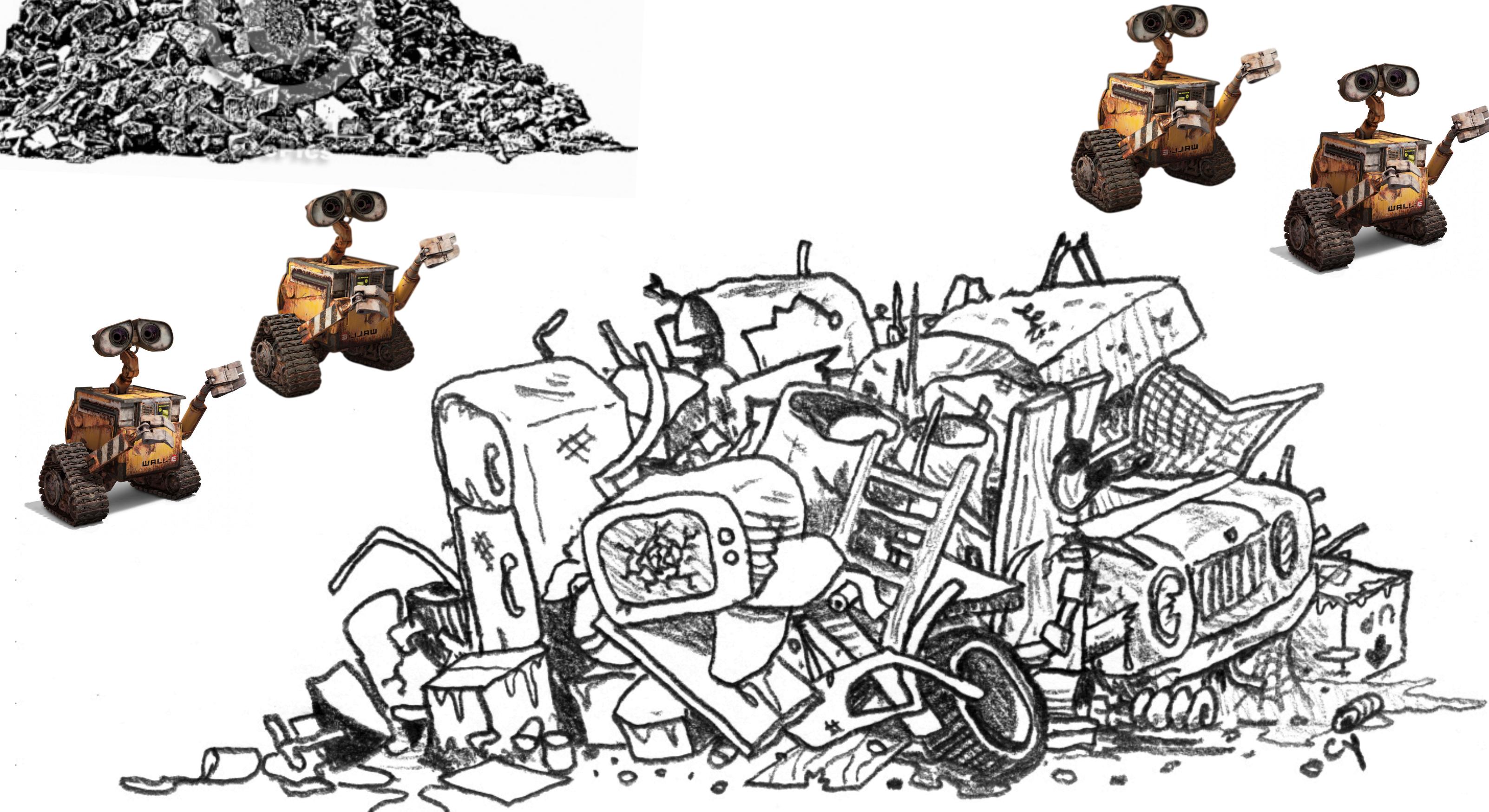


WALL-E #1

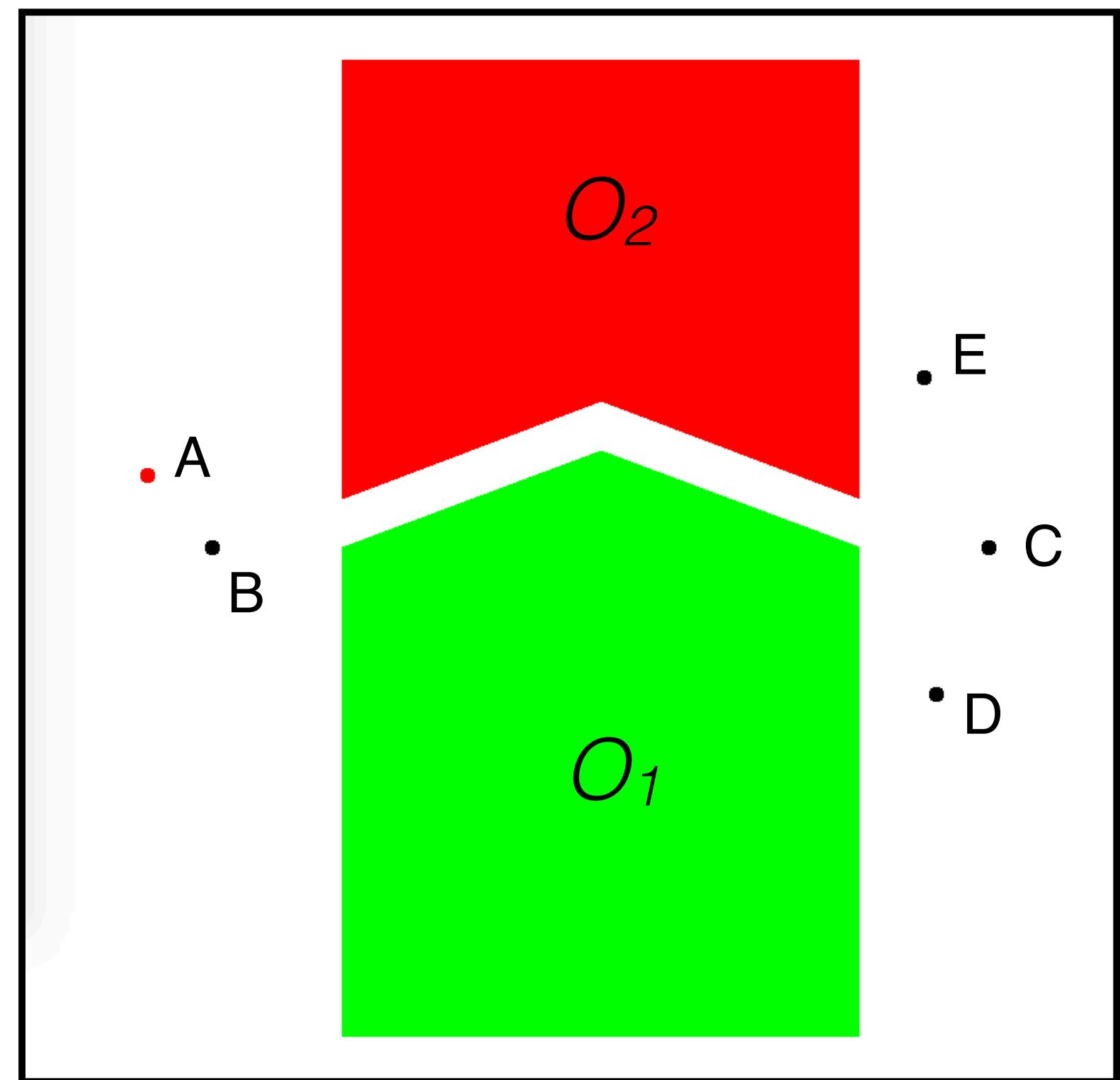




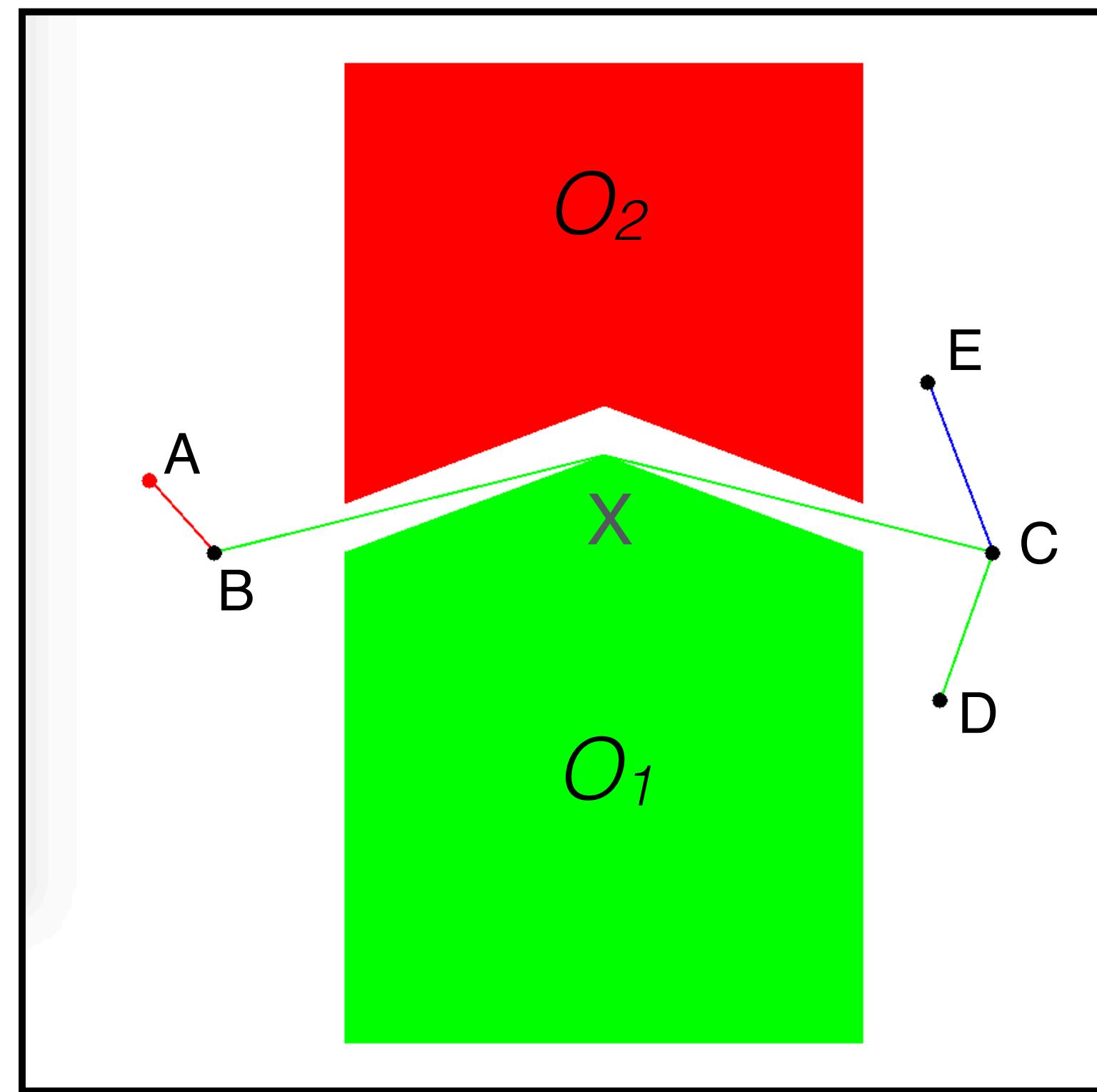




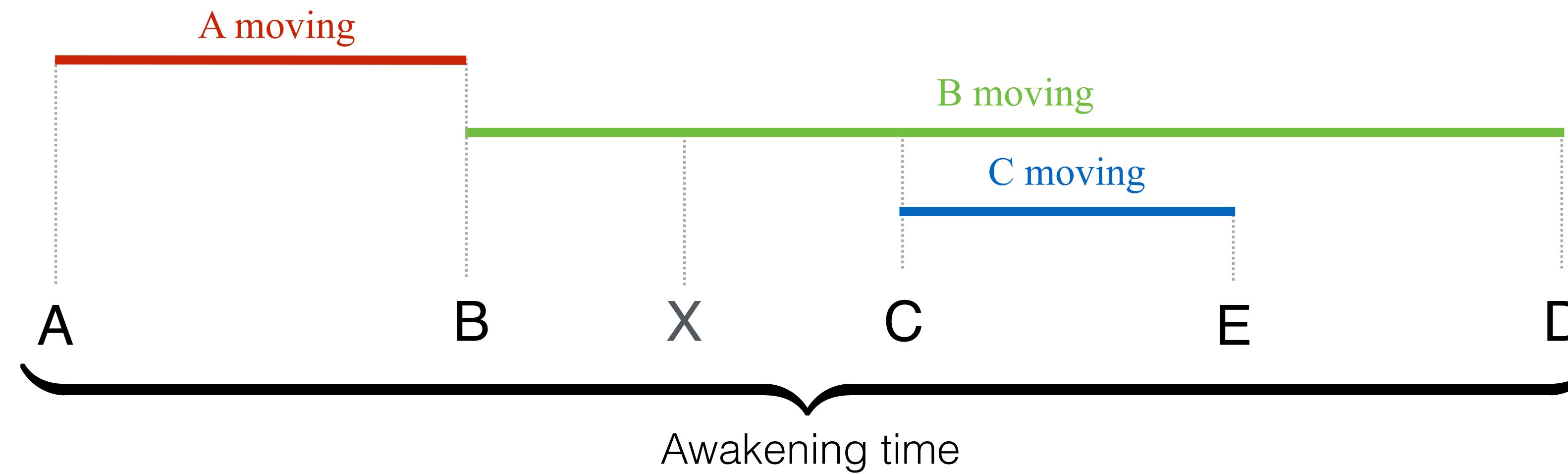
Problem



Solution



Timeline



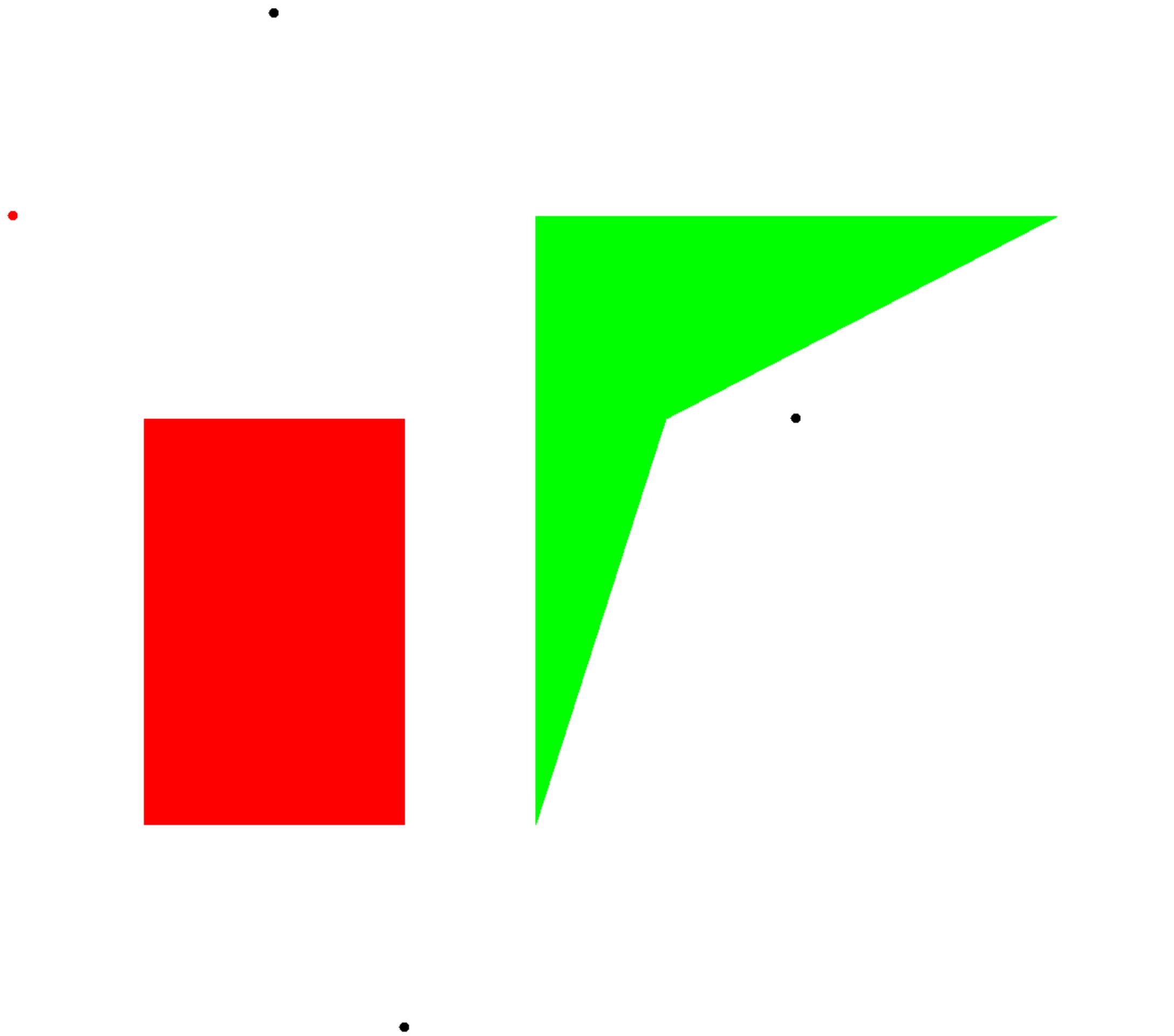
For given positions of robots and obstacles,
find the set of robots *paths* (starting from robot #1),
so by following them *all* robots would wake up
in the *shortest* period of time.



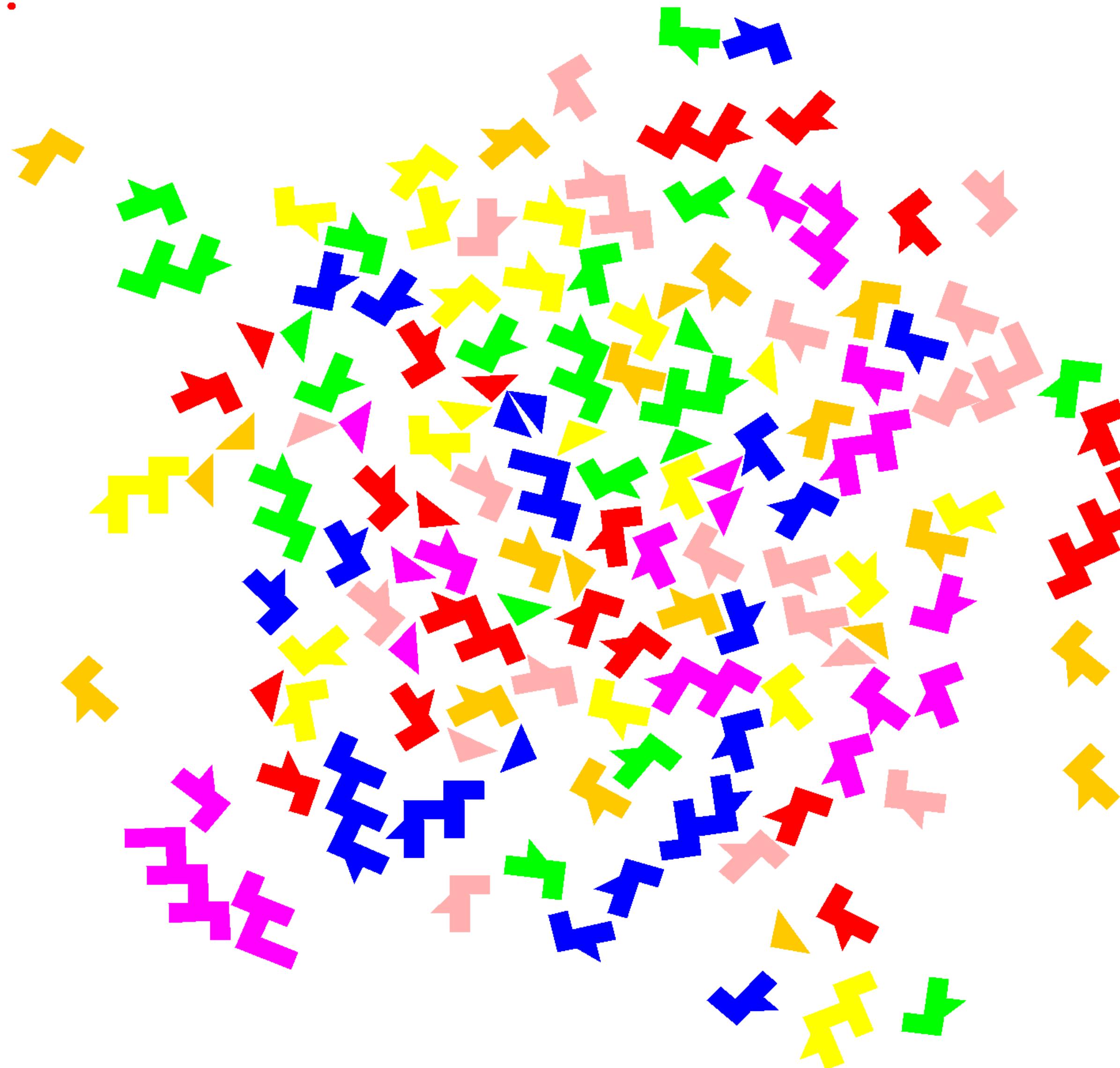
The Competition

- 30 *robot-obstacle maps*;
- *100 hours* to accomplish;
- 124 participants, 32 teams
- 2413 submissions, ~754 MB of data
- 60% score for implementing a *working* solution.

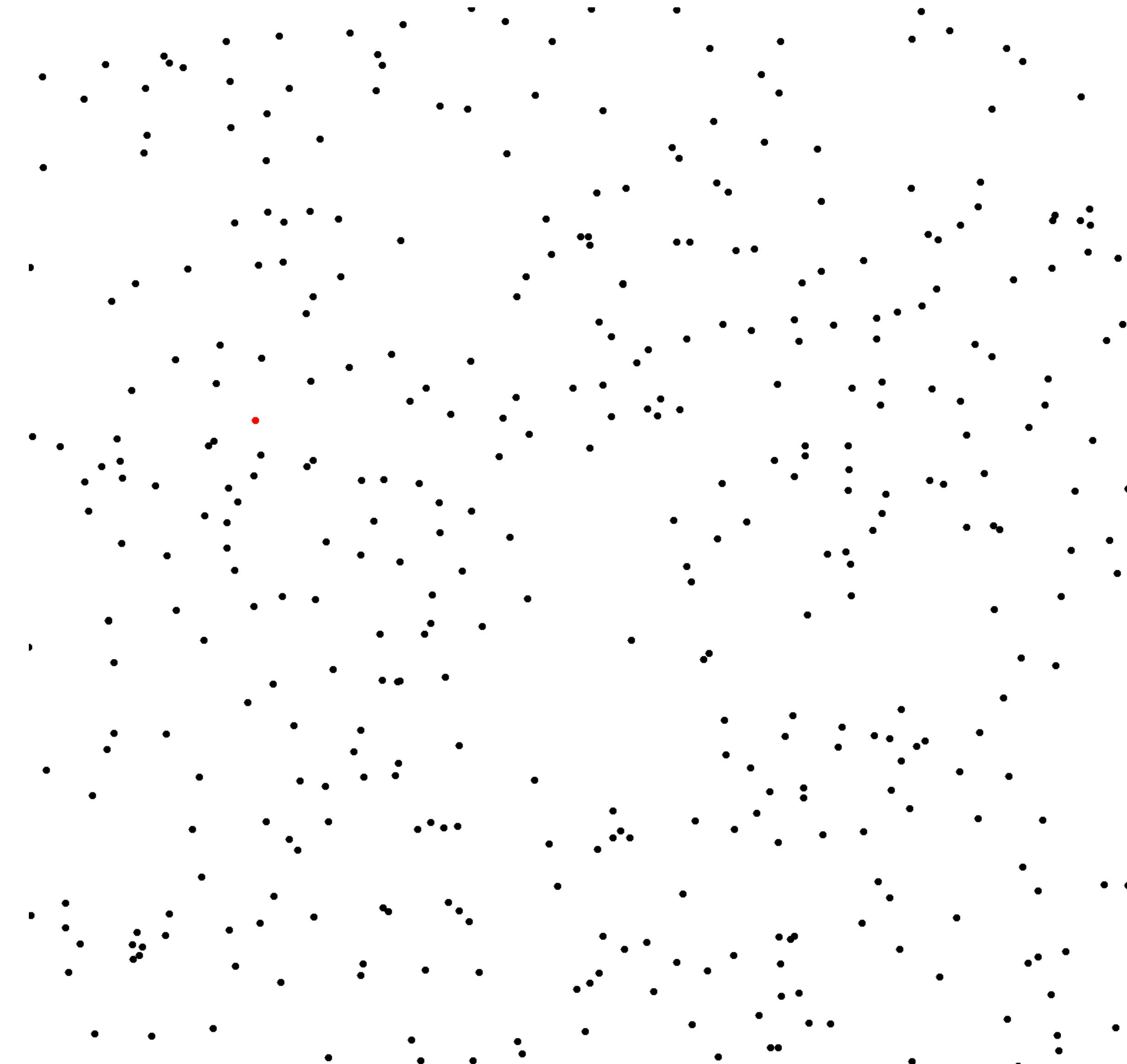
5 robots and 2 polygons



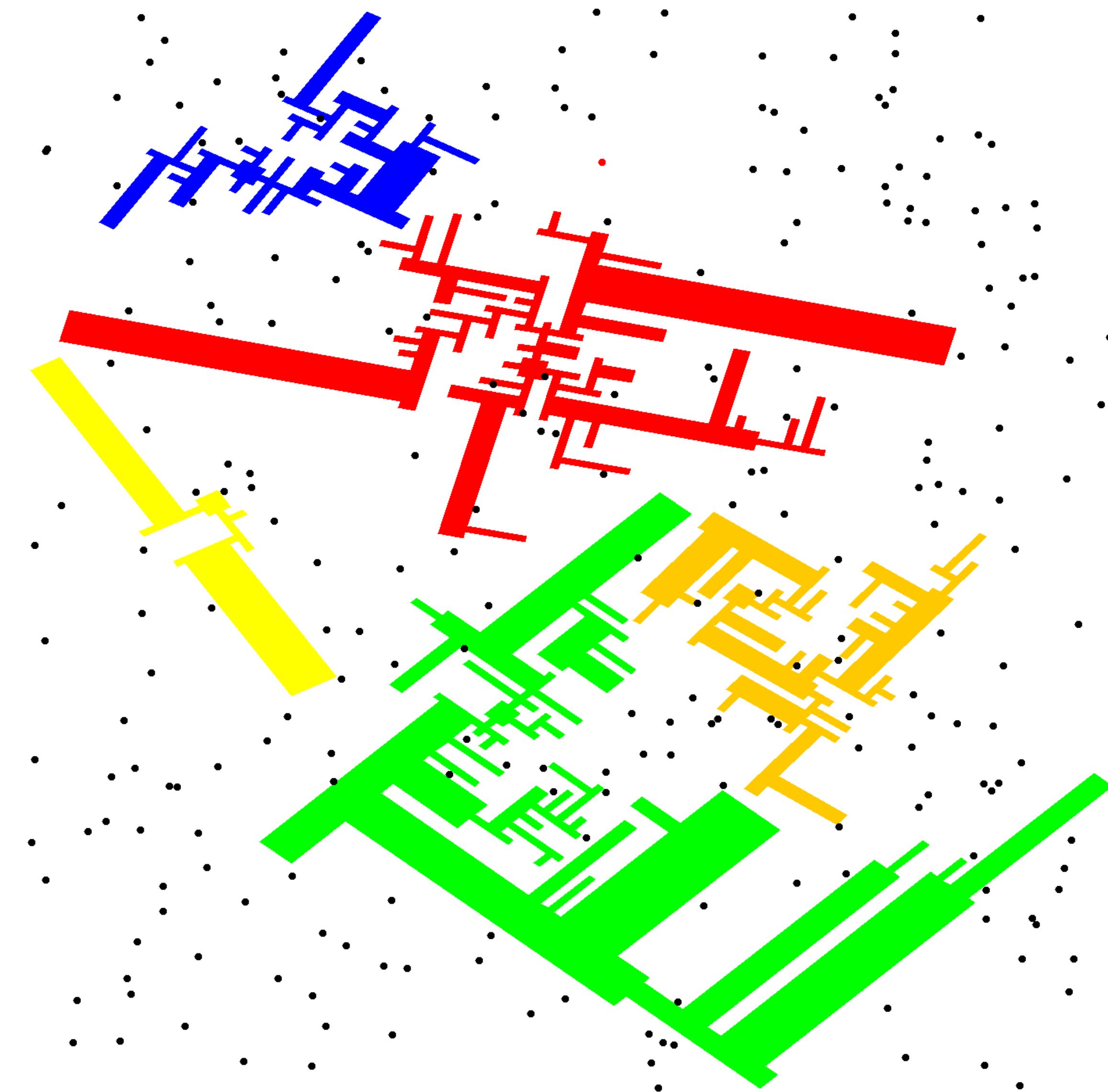
2 robots and 139 polygons



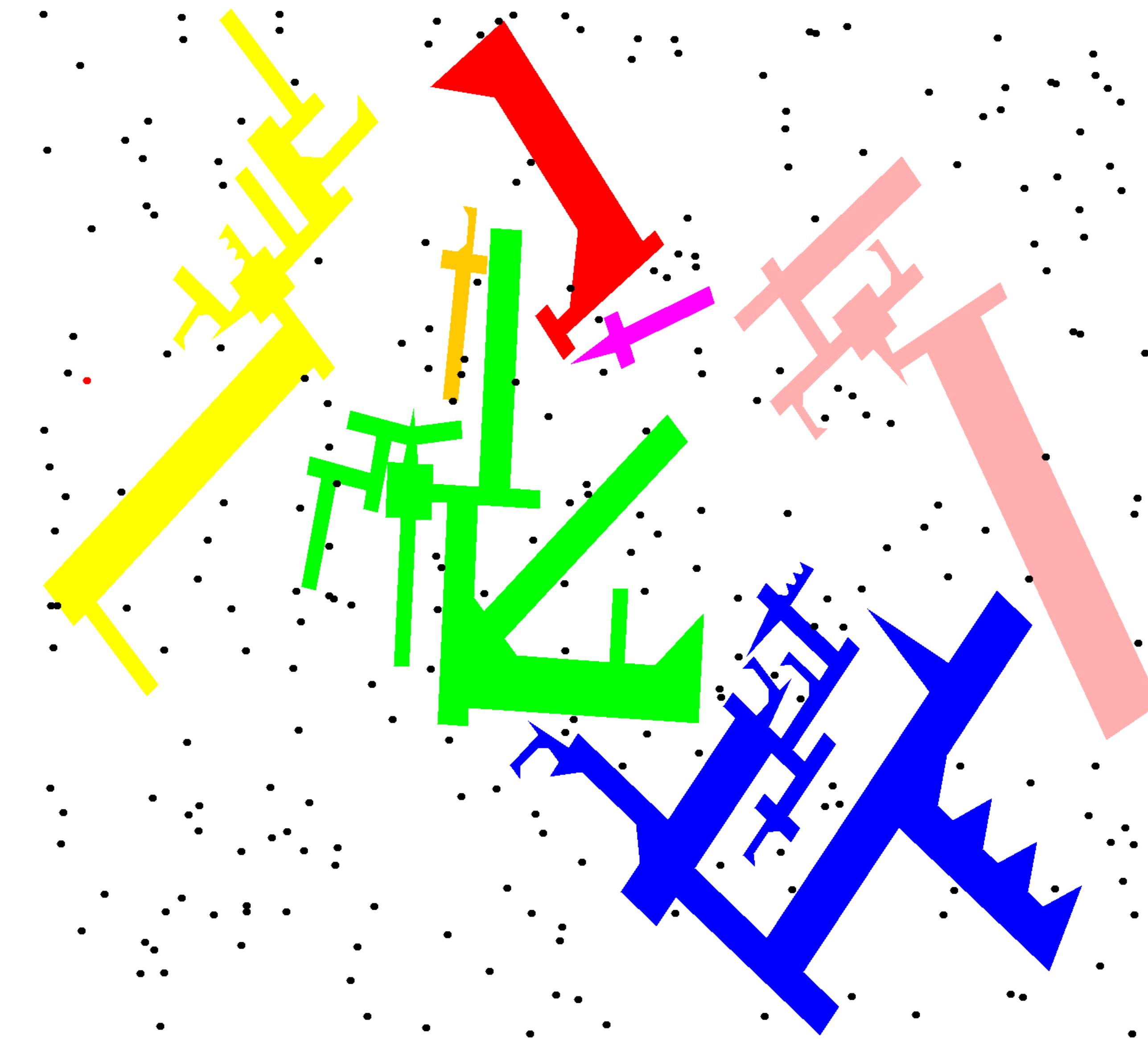
400 robots and 0 polygons



250 robots and 5 polygons

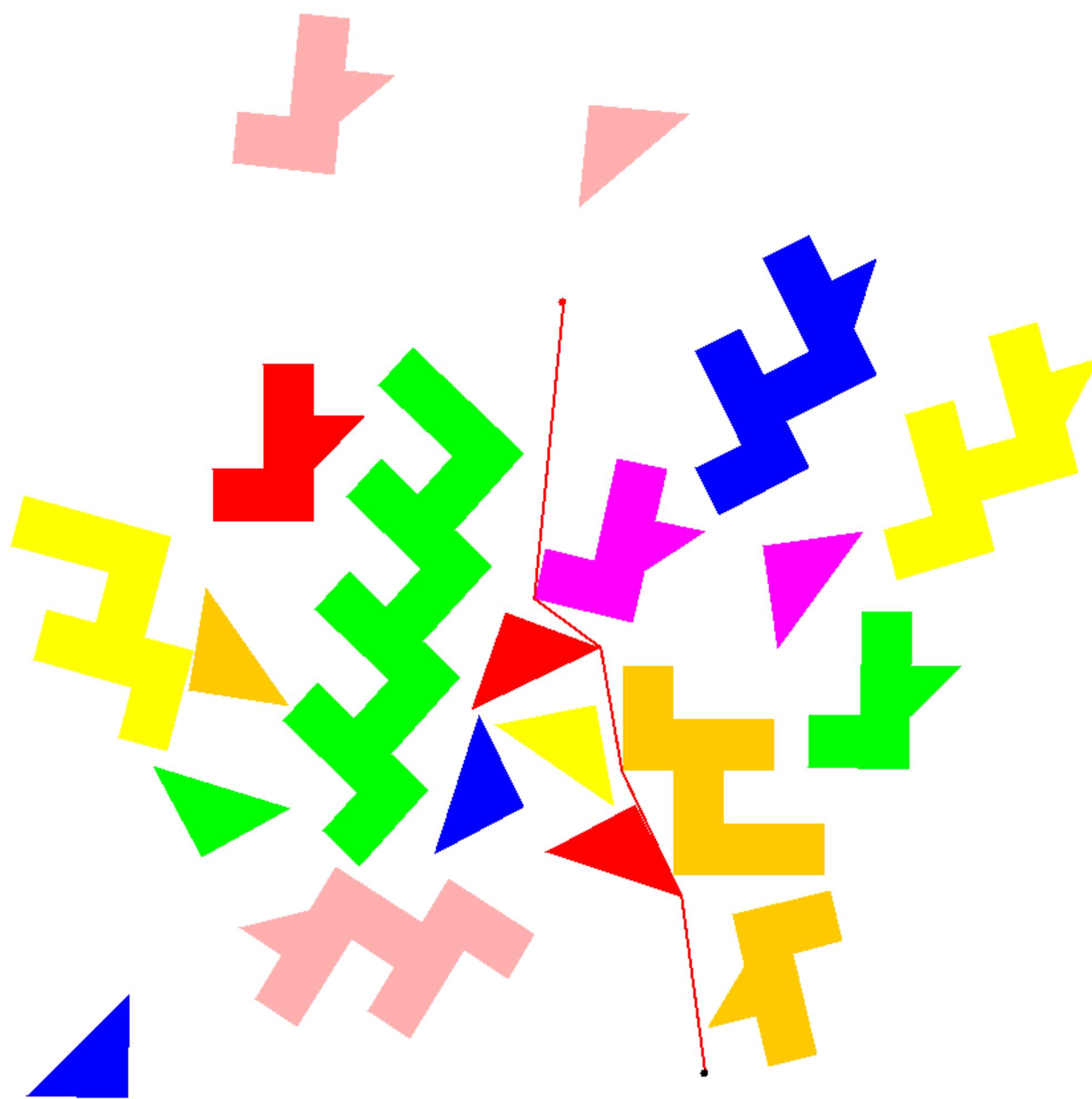


250 robots and 7 polygons

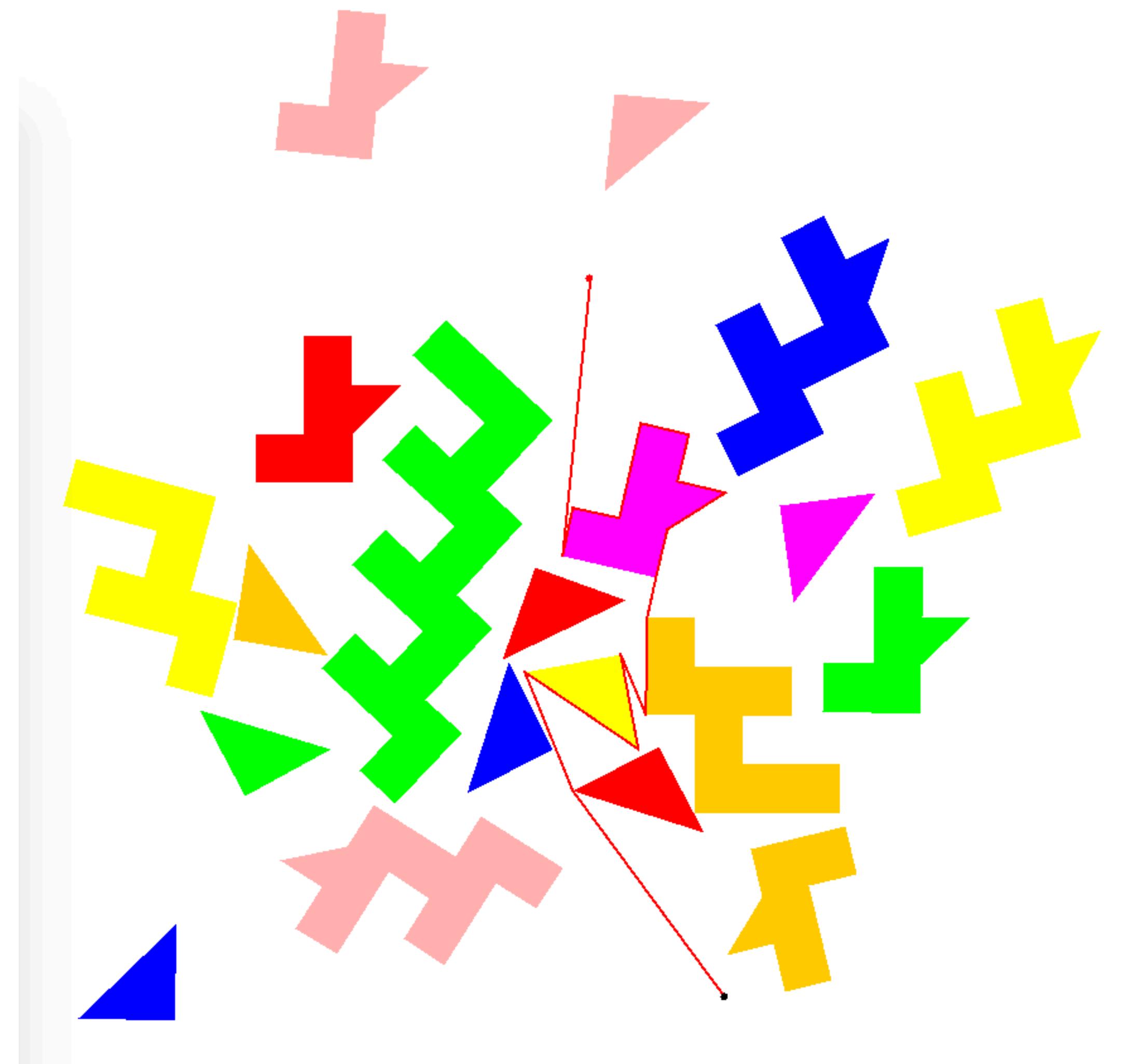


Solution Attempts

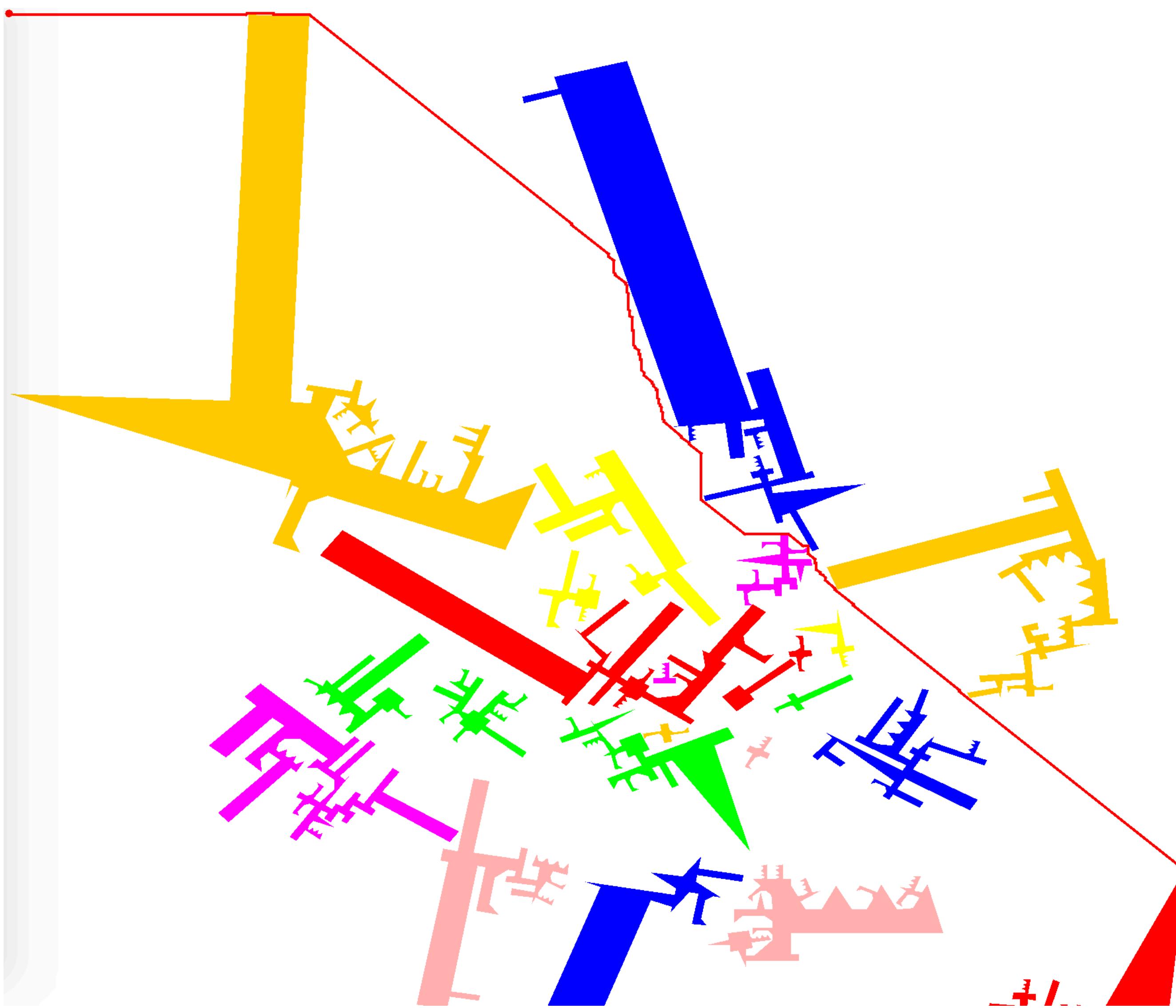
Our expectations



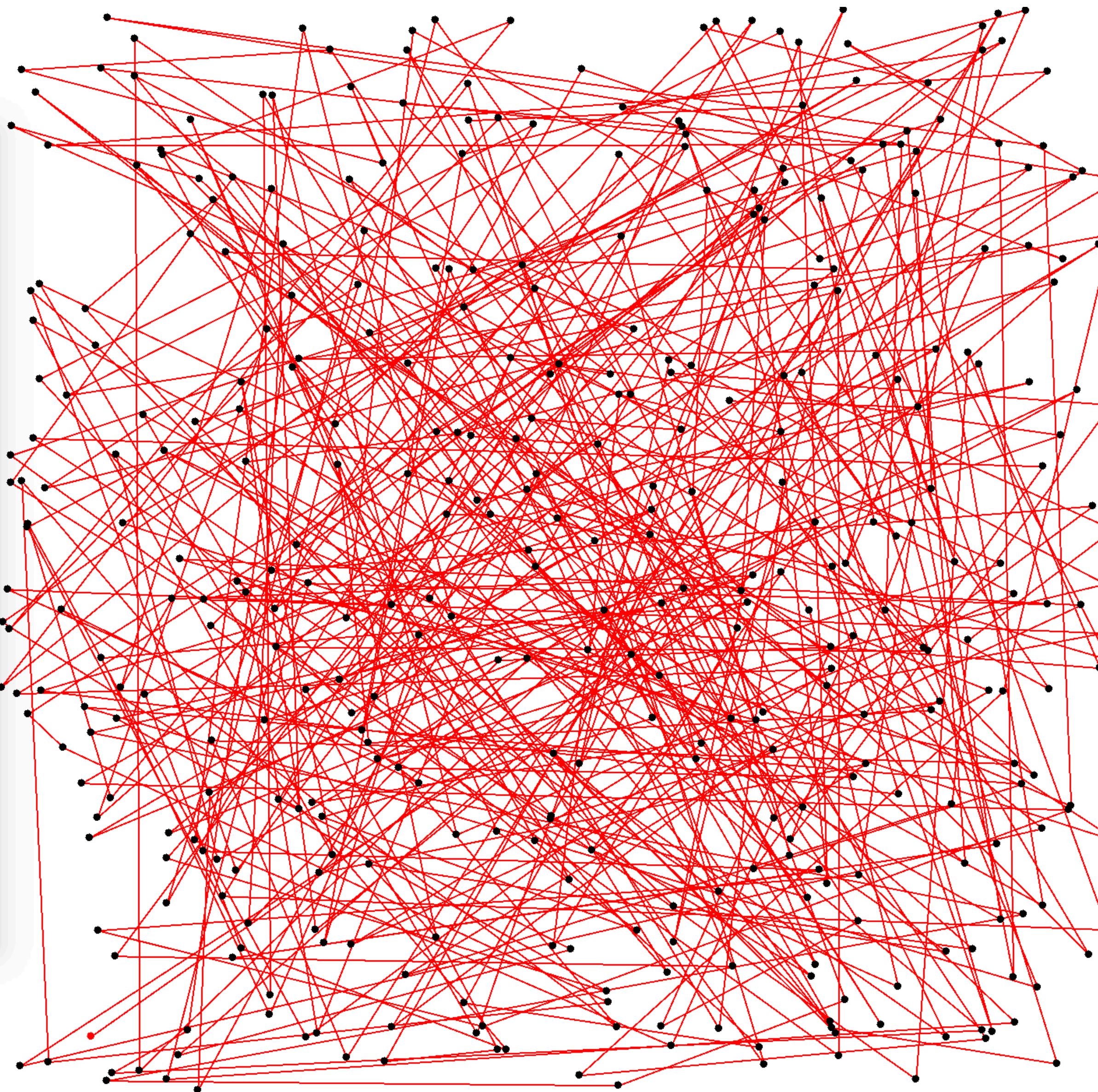
Monday



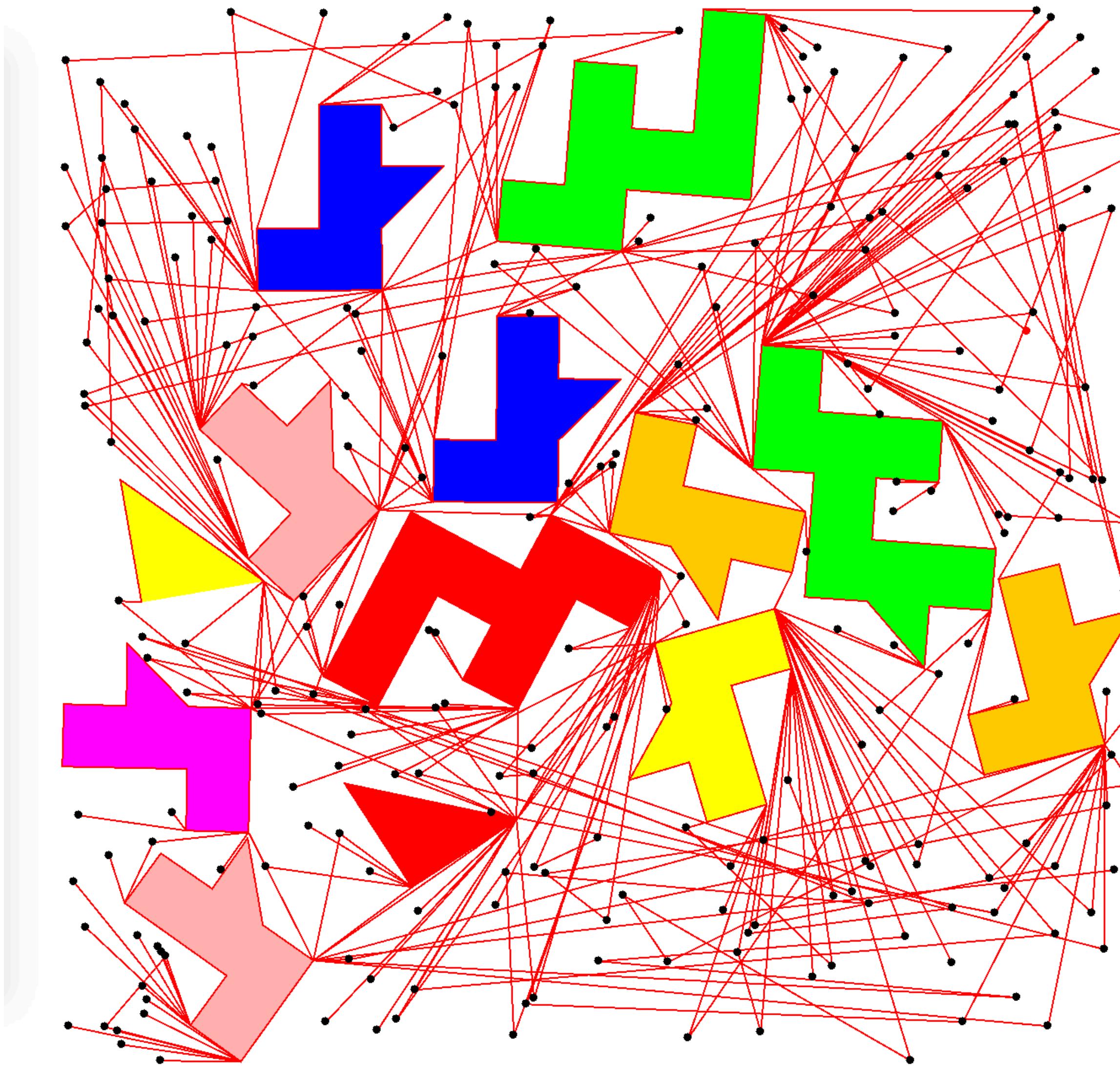
Monday



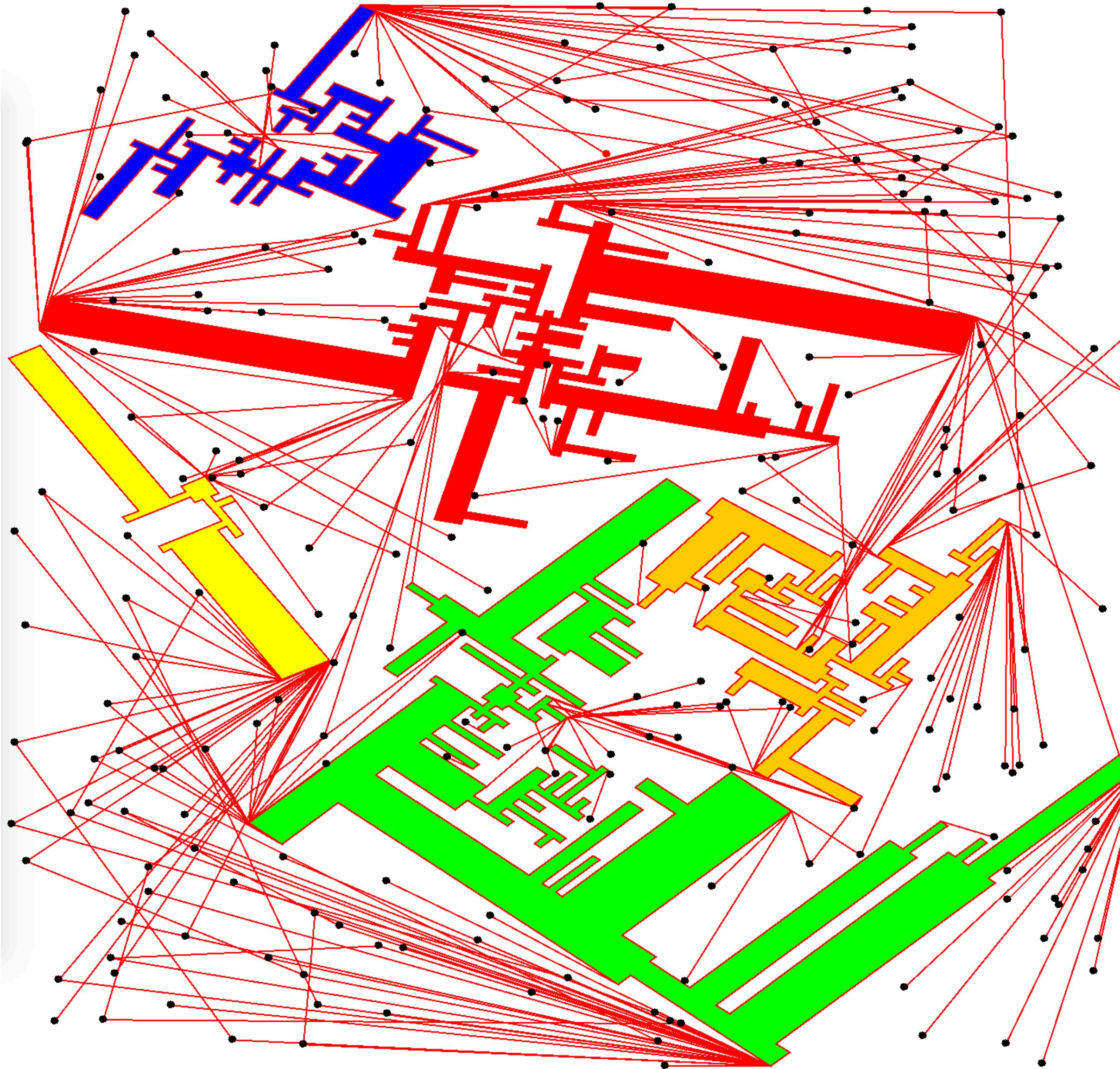
Monday



Monday

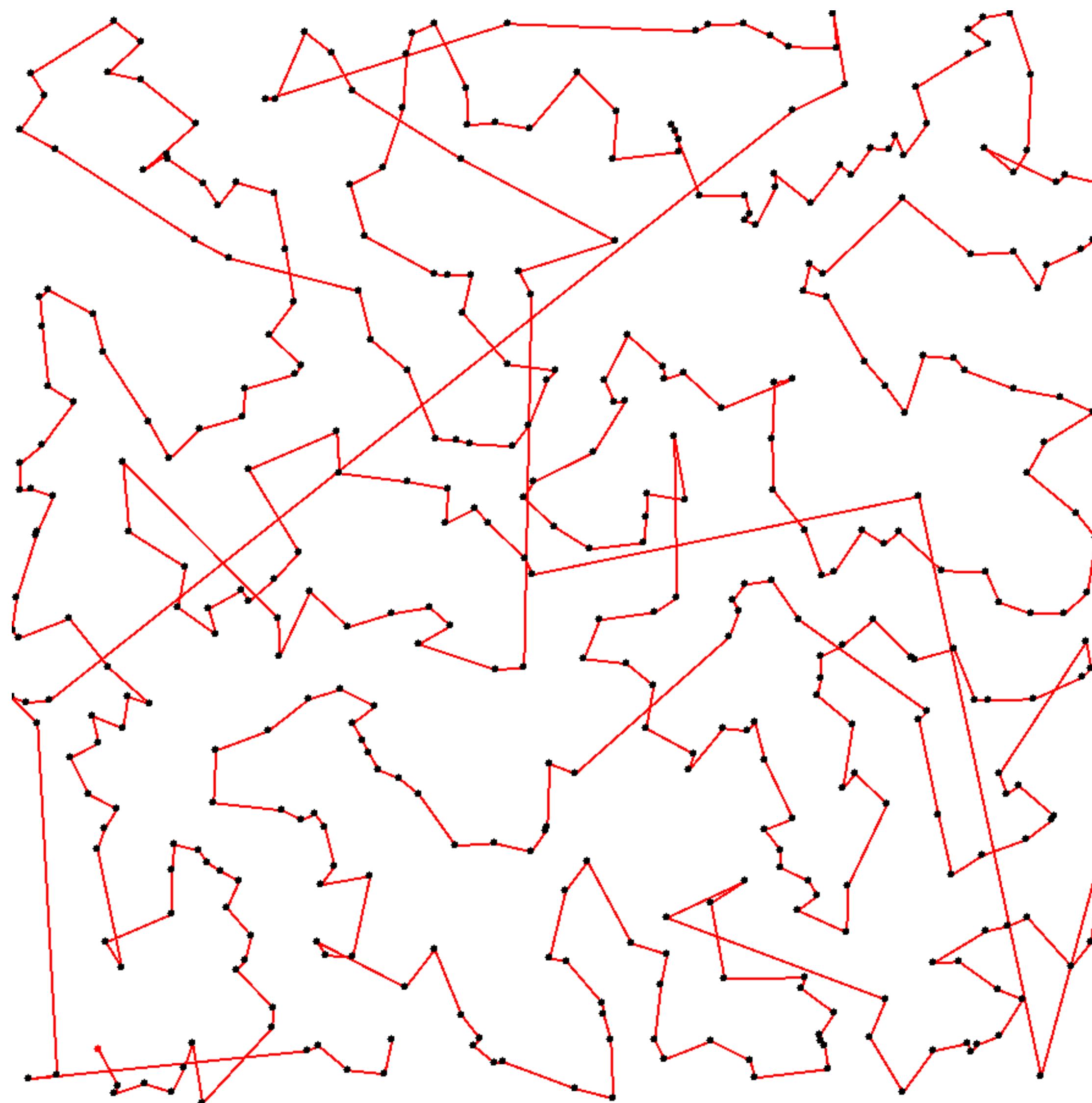


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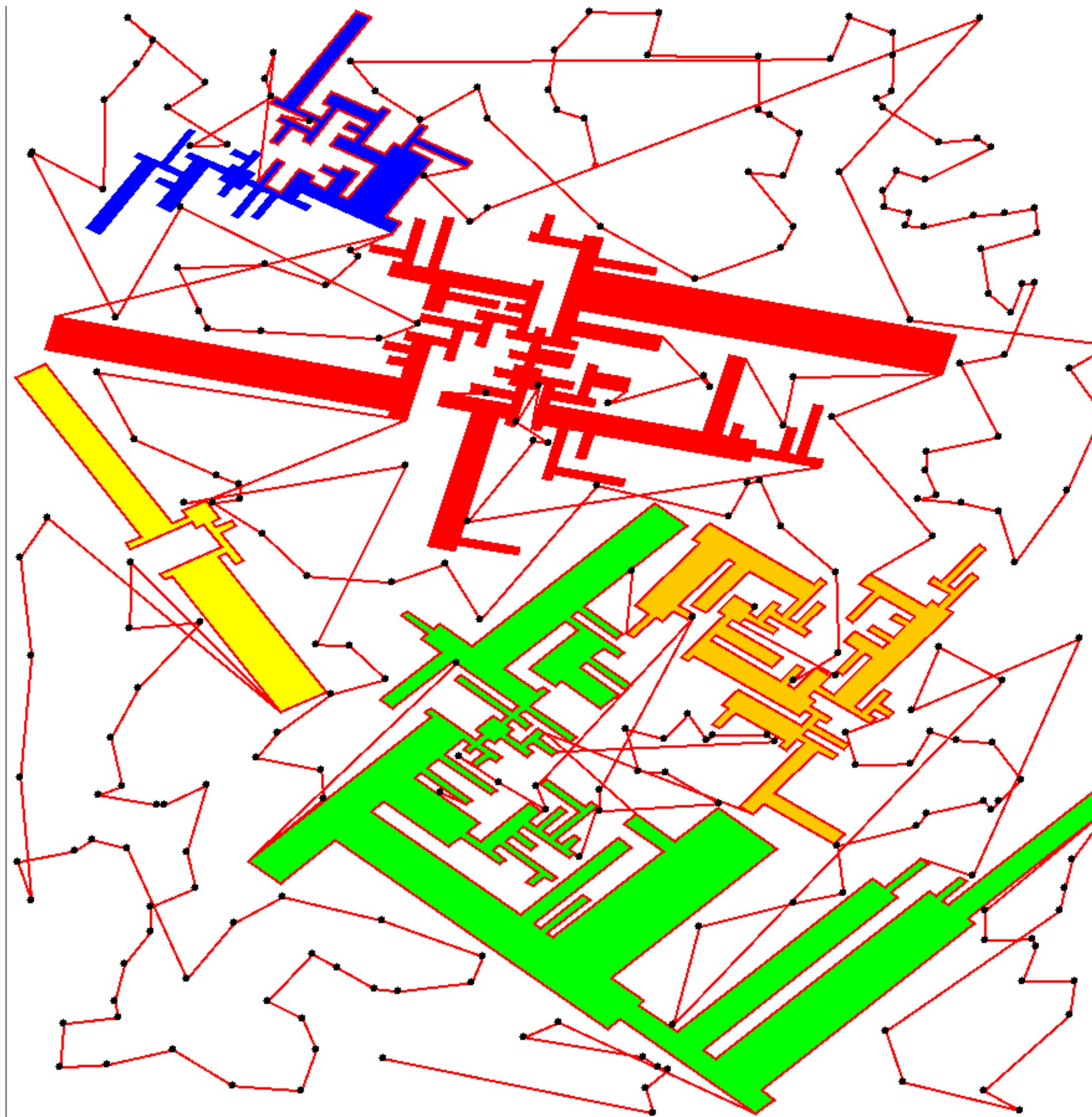


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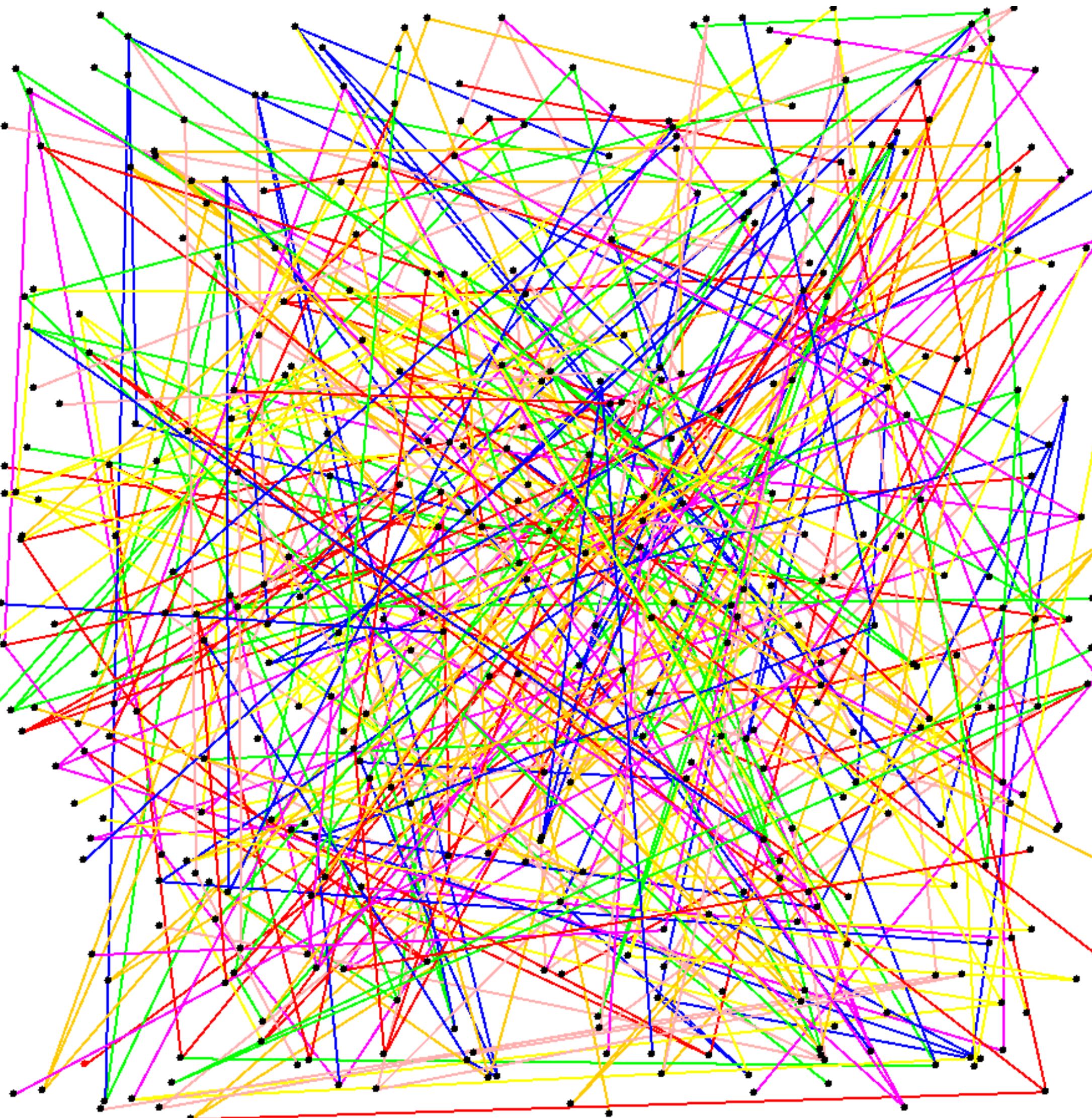
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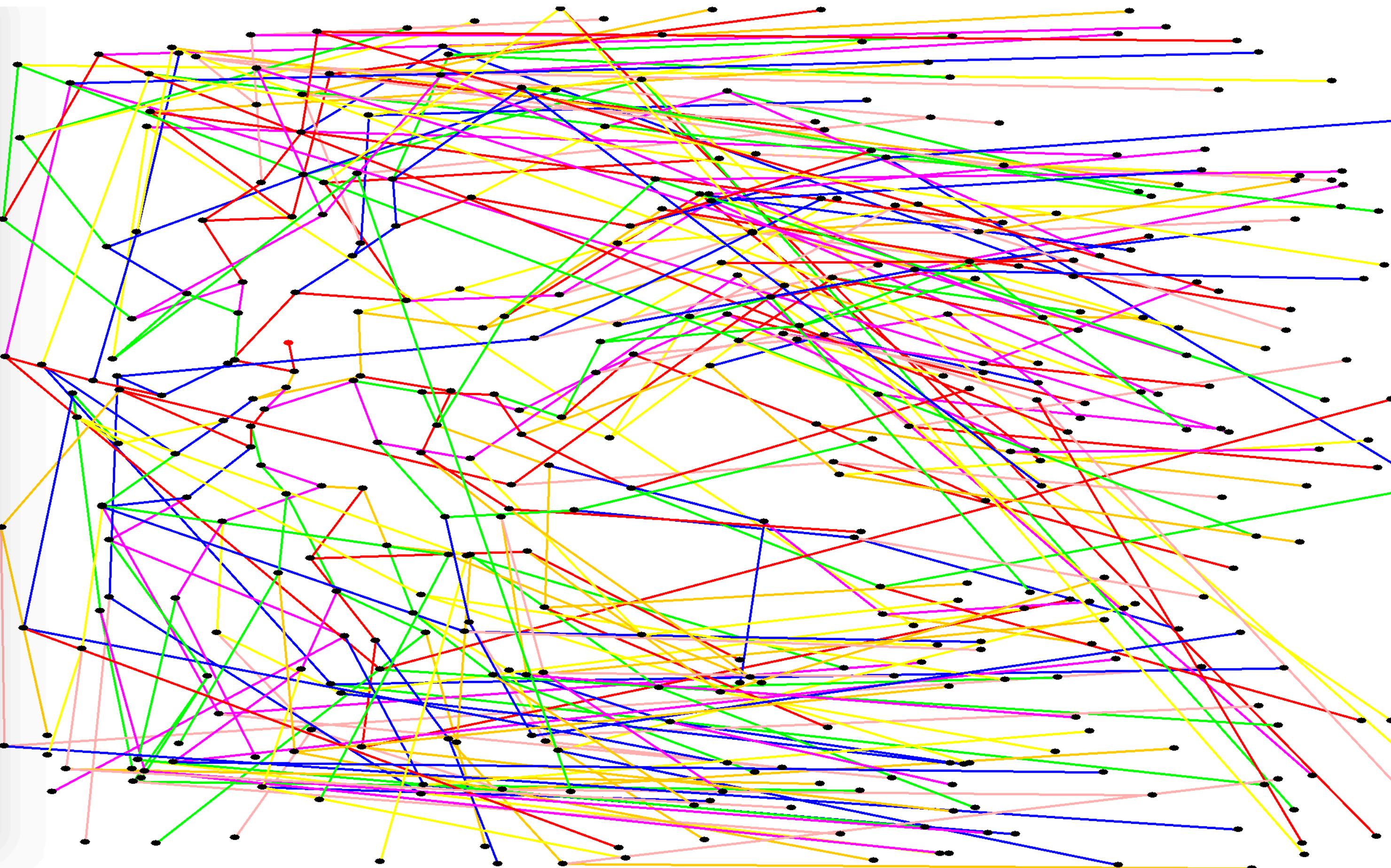
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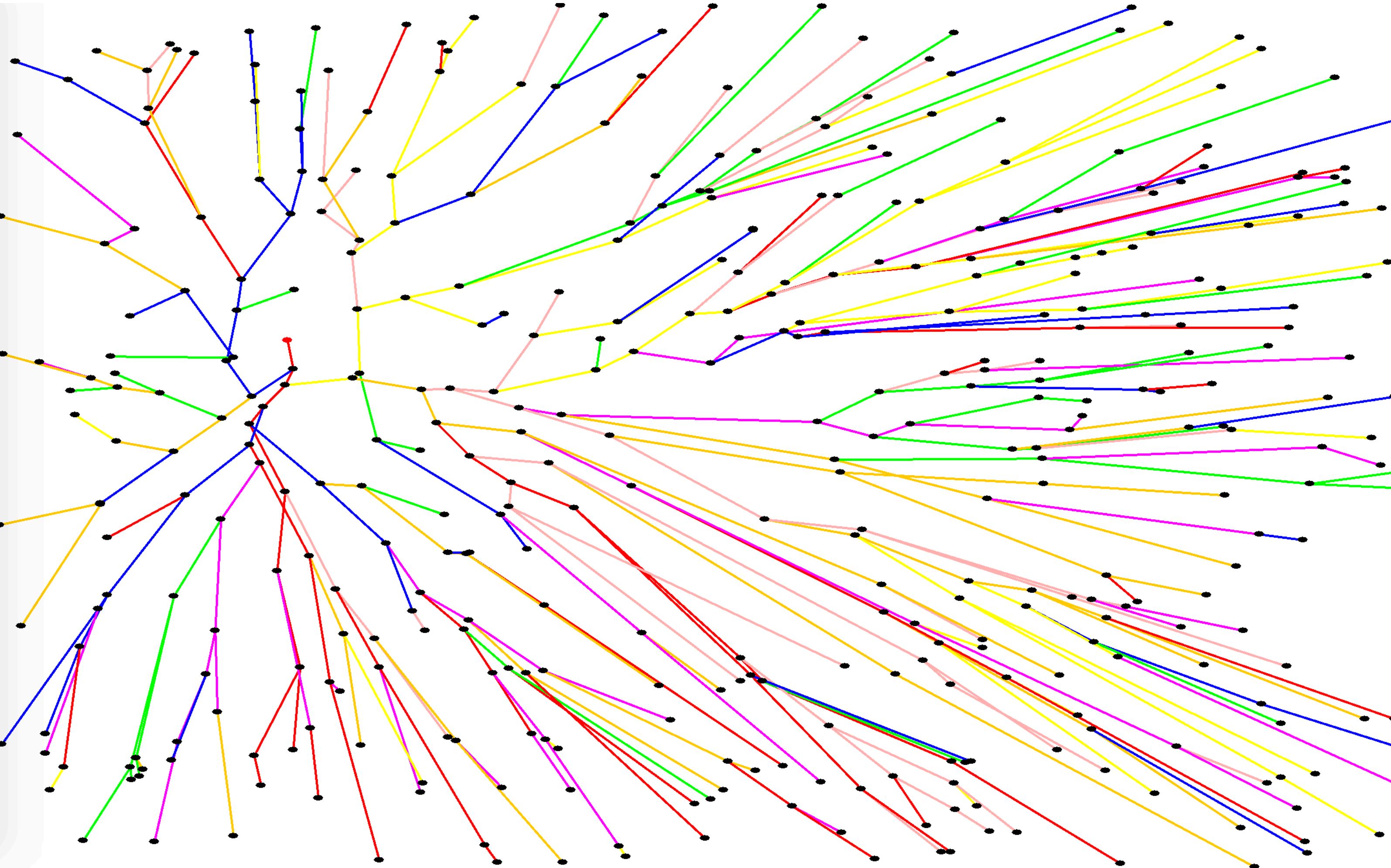
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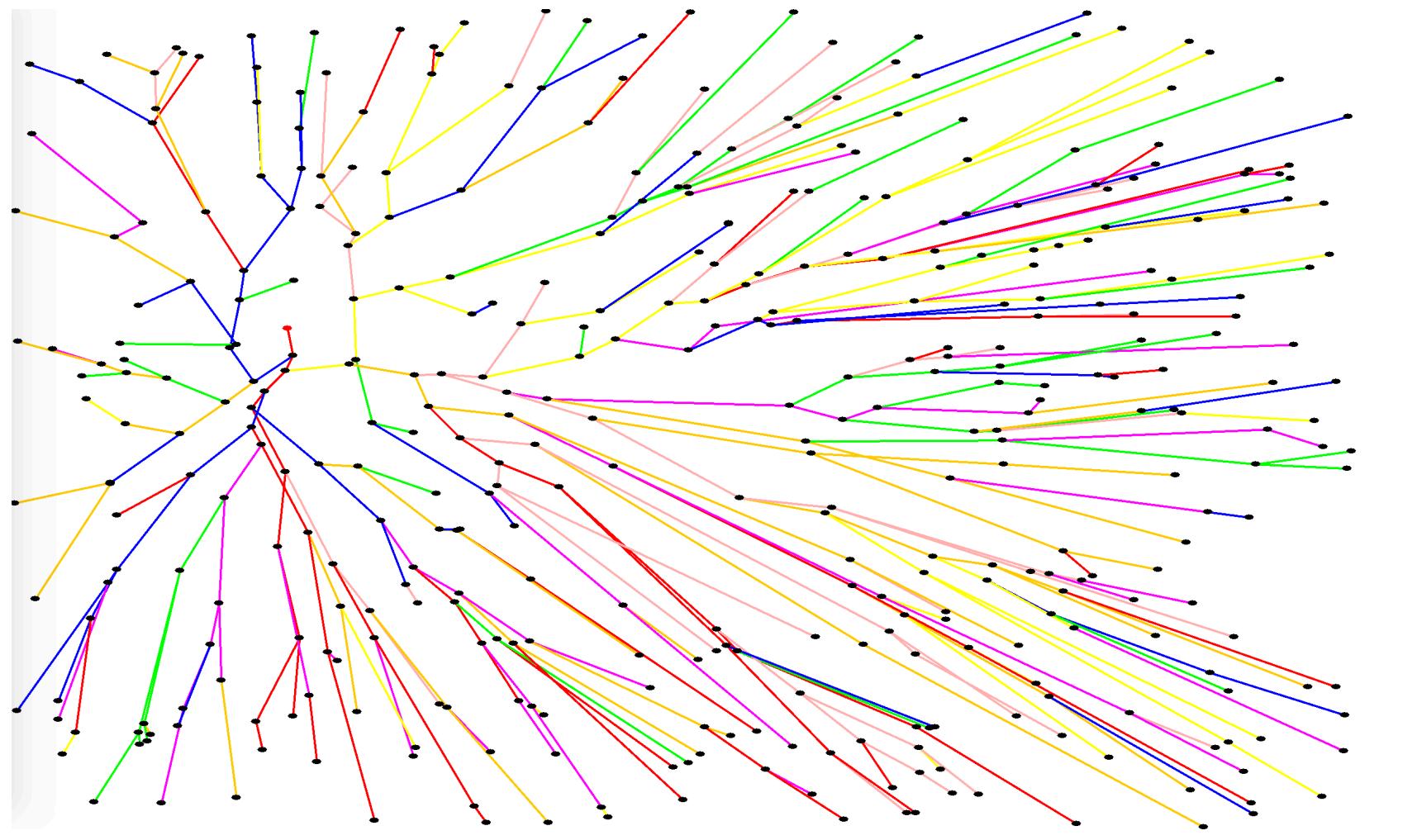


Wednesday

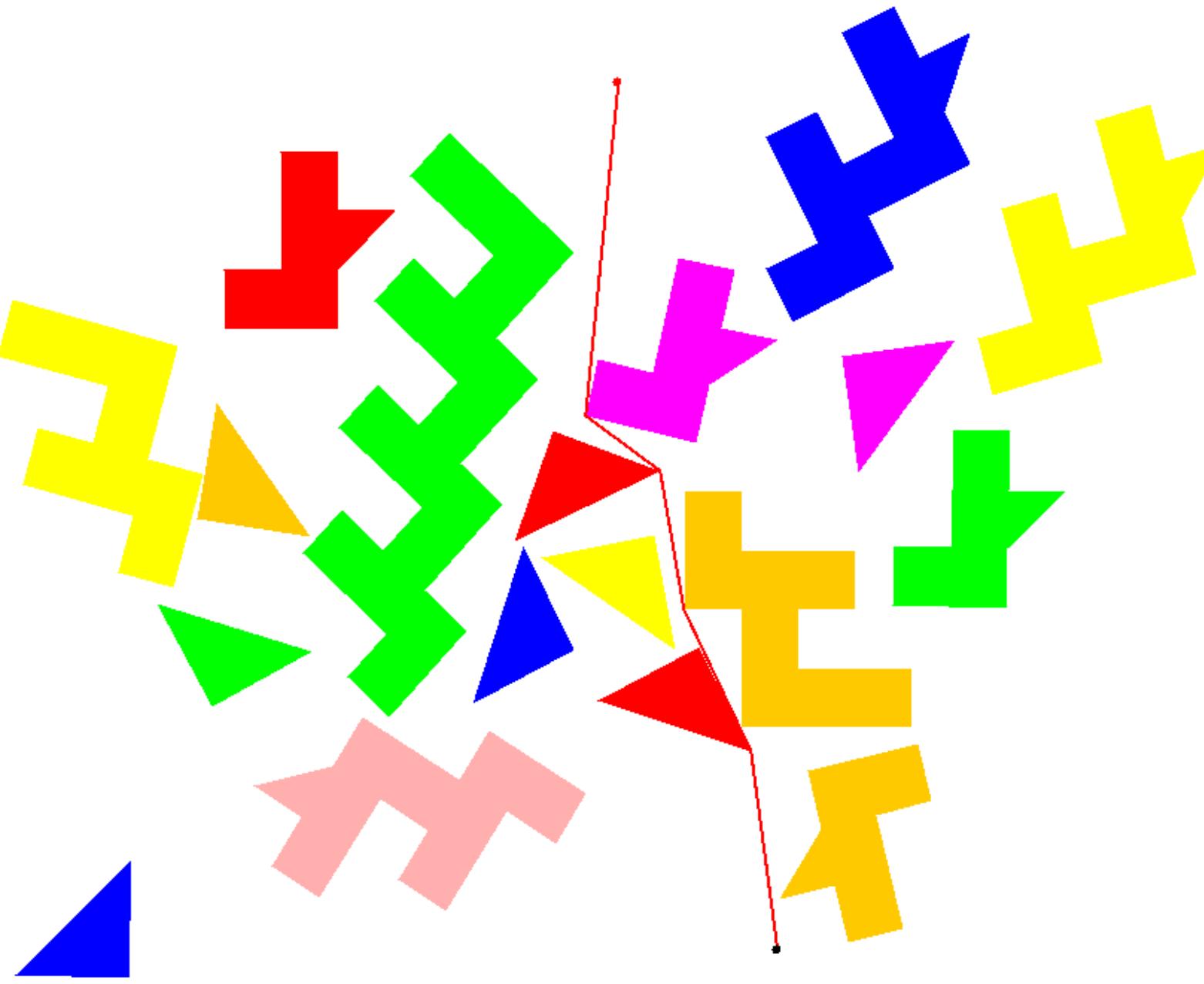


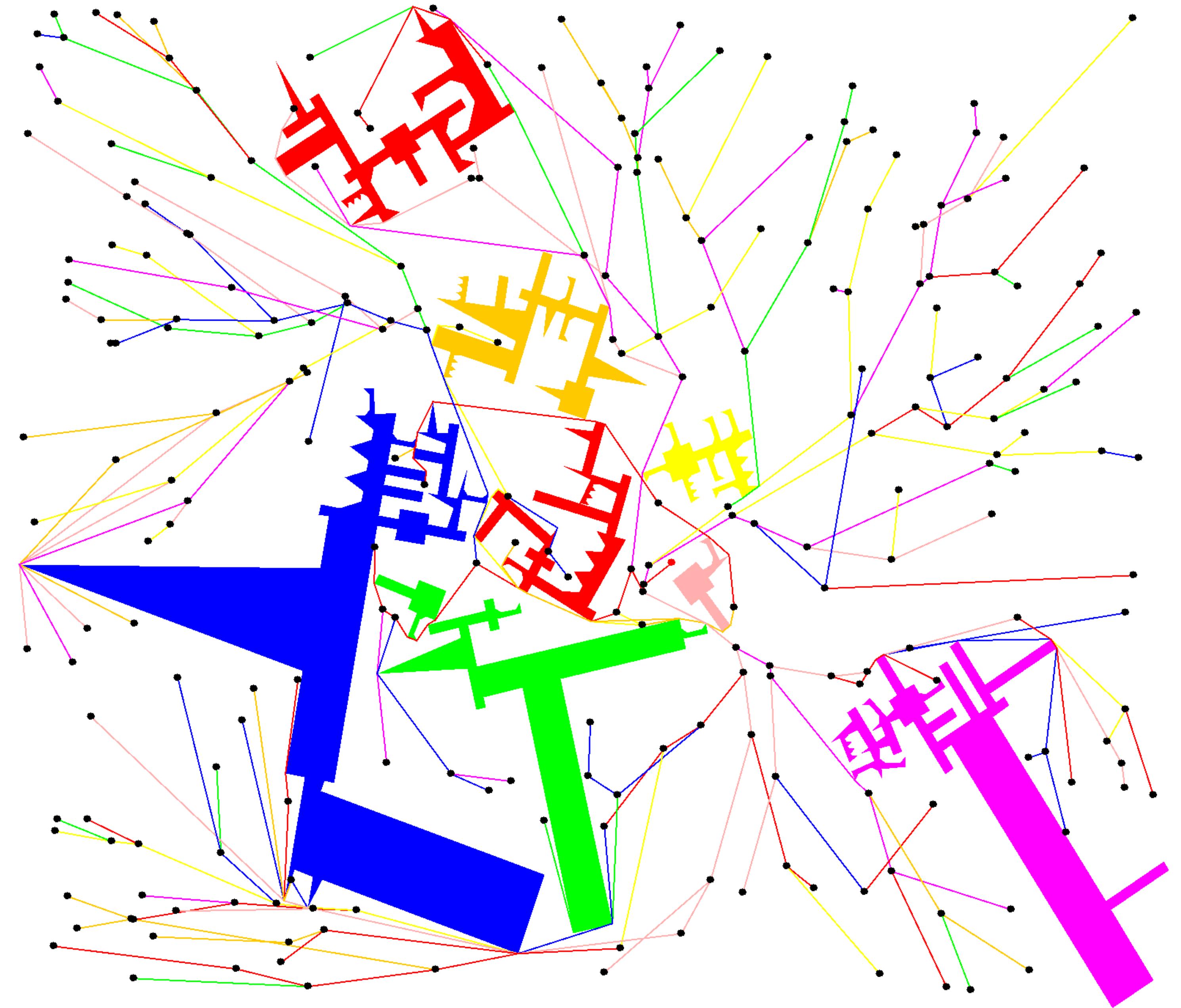
Wednesday





+

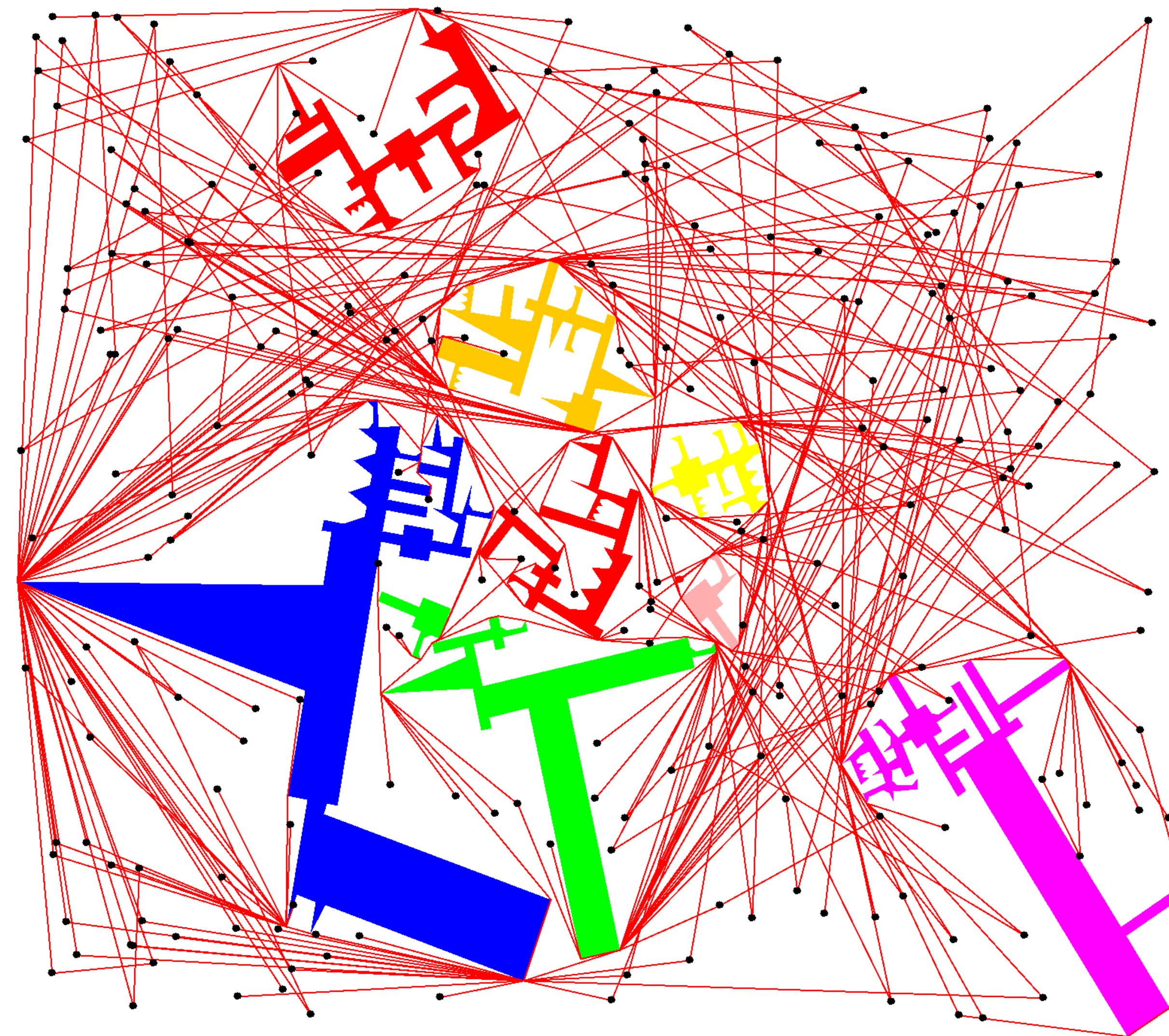




Friday: Final Solutions

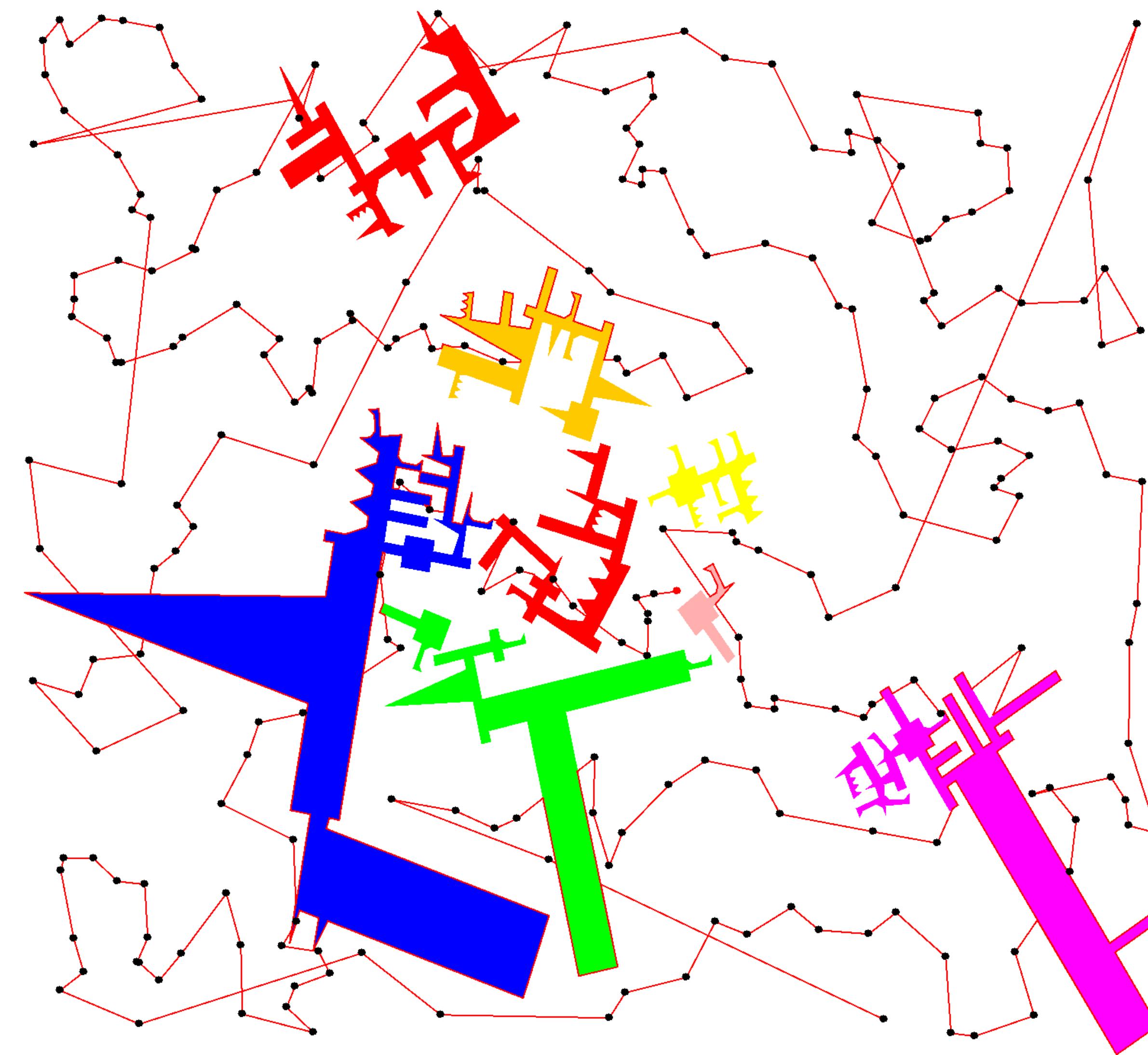
Ok routing, no parallelism, no distance optimisations

16,509.131

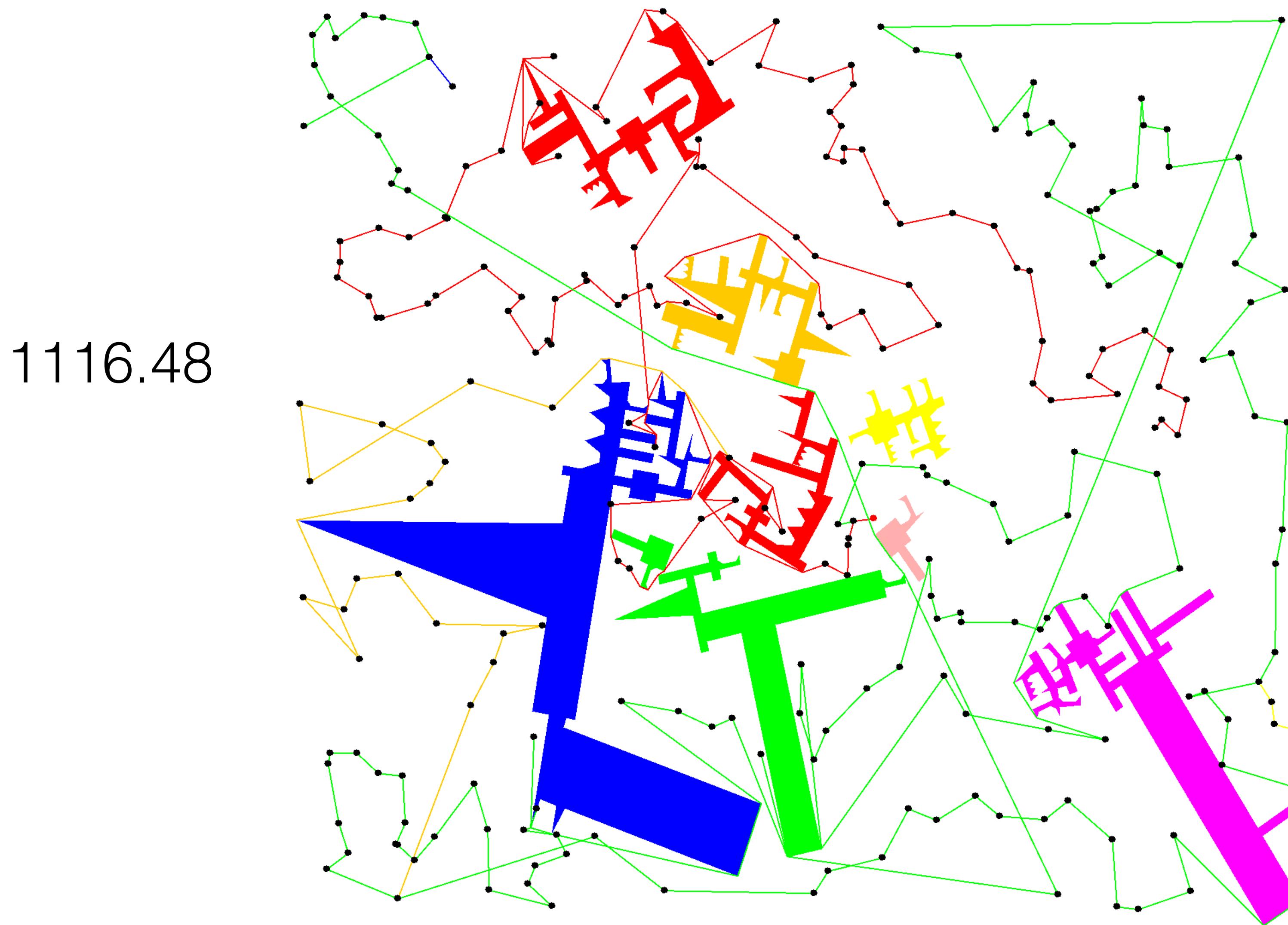


Bad routing, no parallelism, some distance optimisations

2488.268

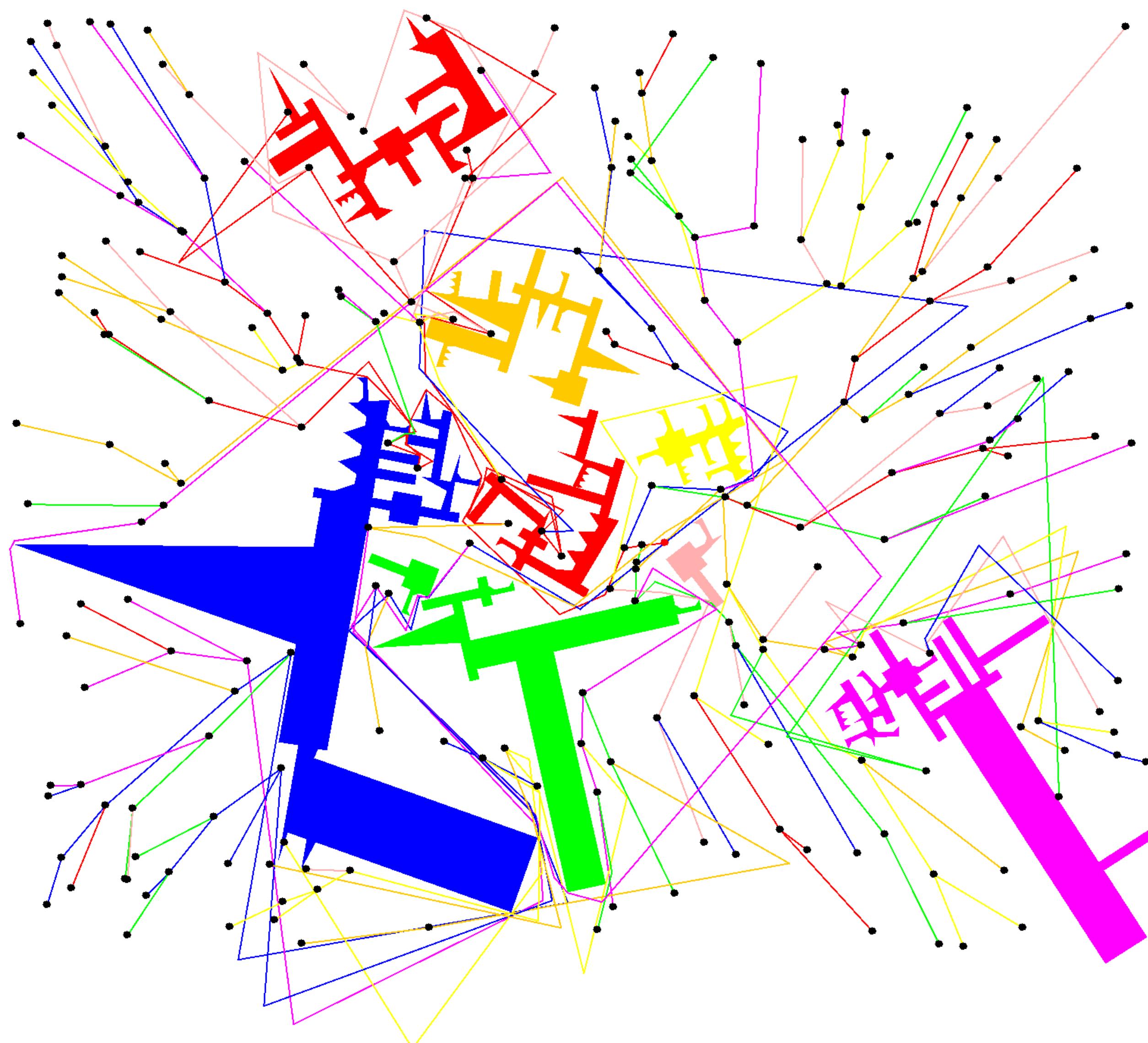


Ok routing, some parallelism, some distance optimisations



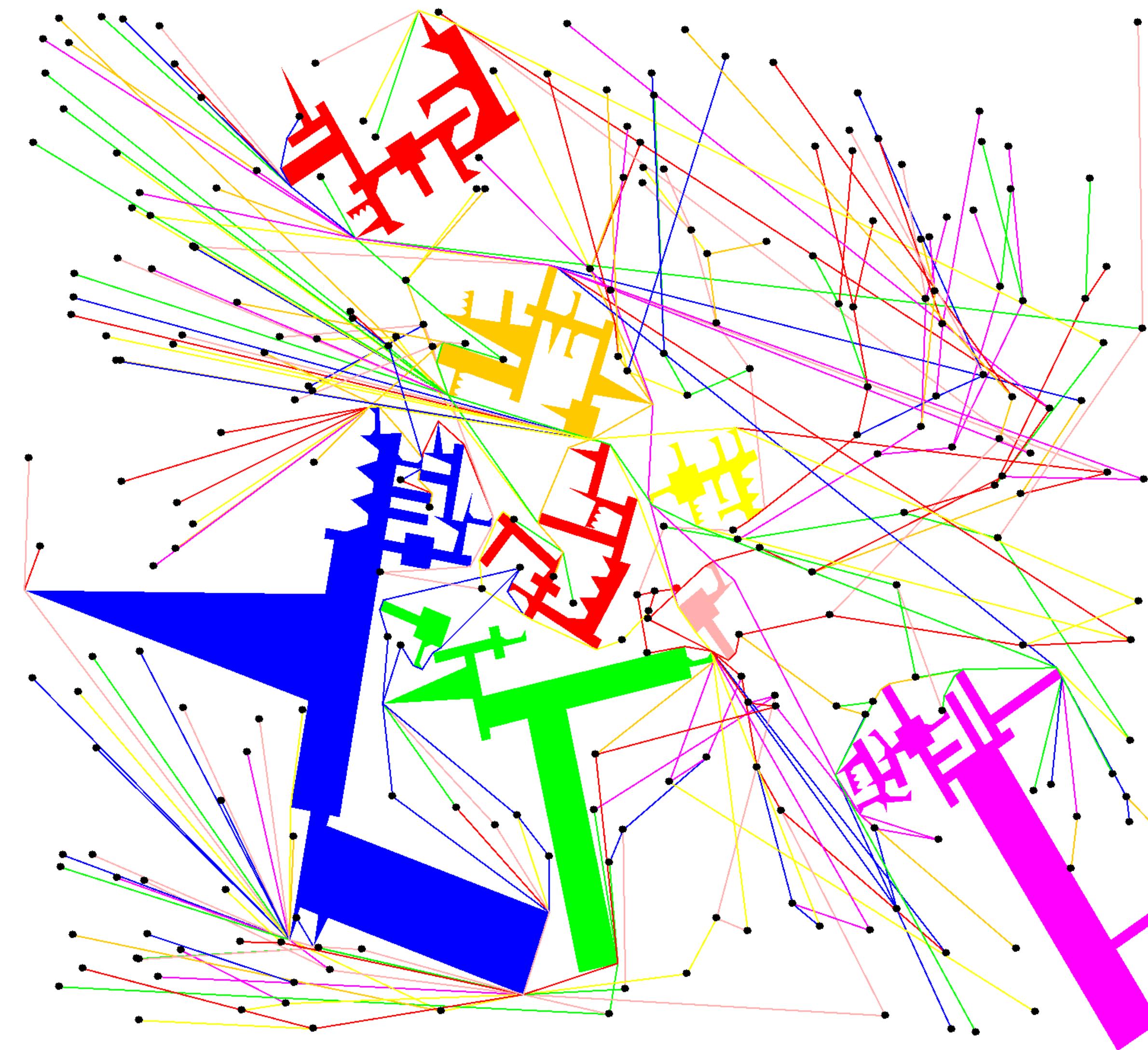
Strange routing, good parallelism, better distance optimisations

367.001

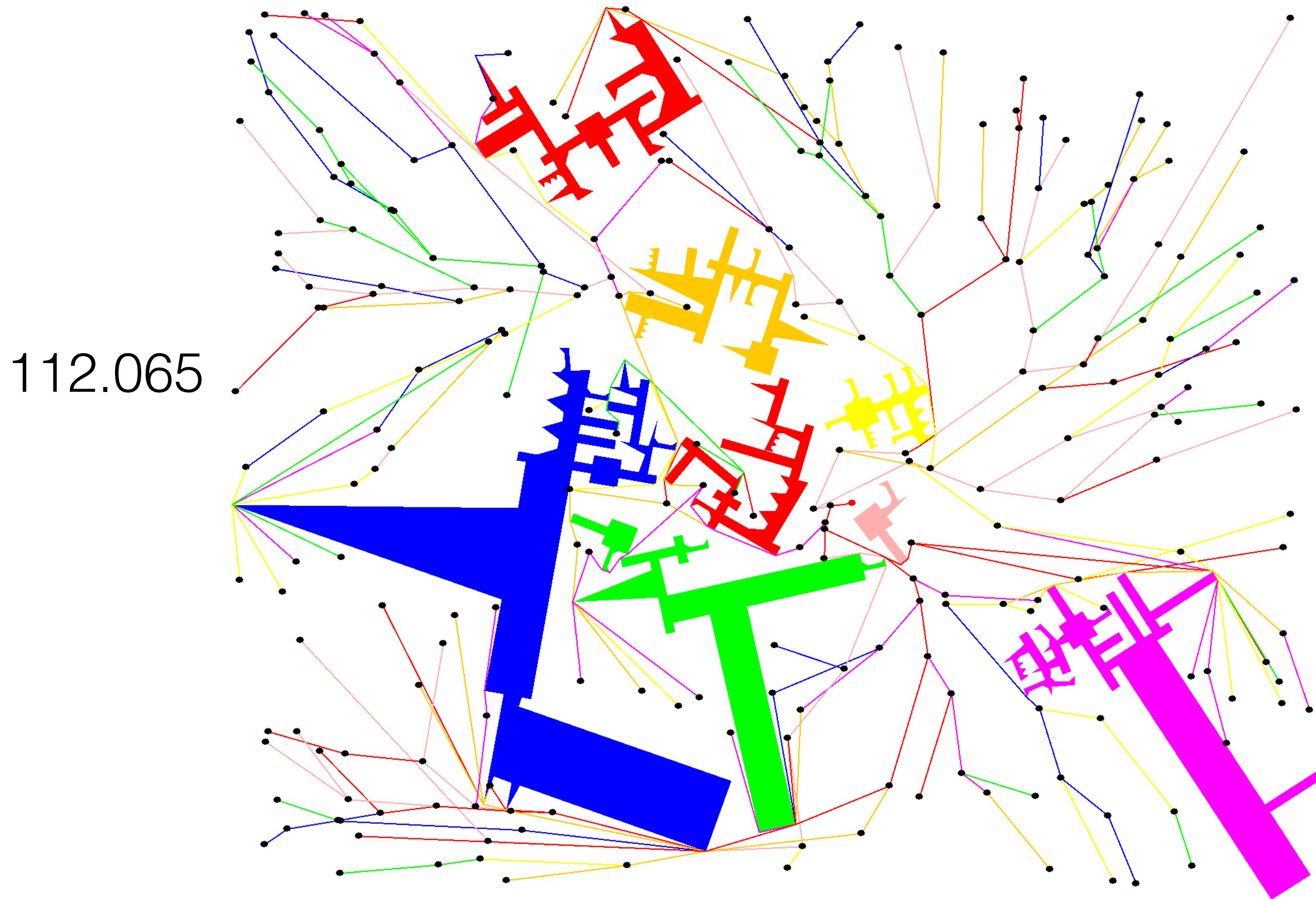


Better routing, good parallelism, good distance optimisations

203.552

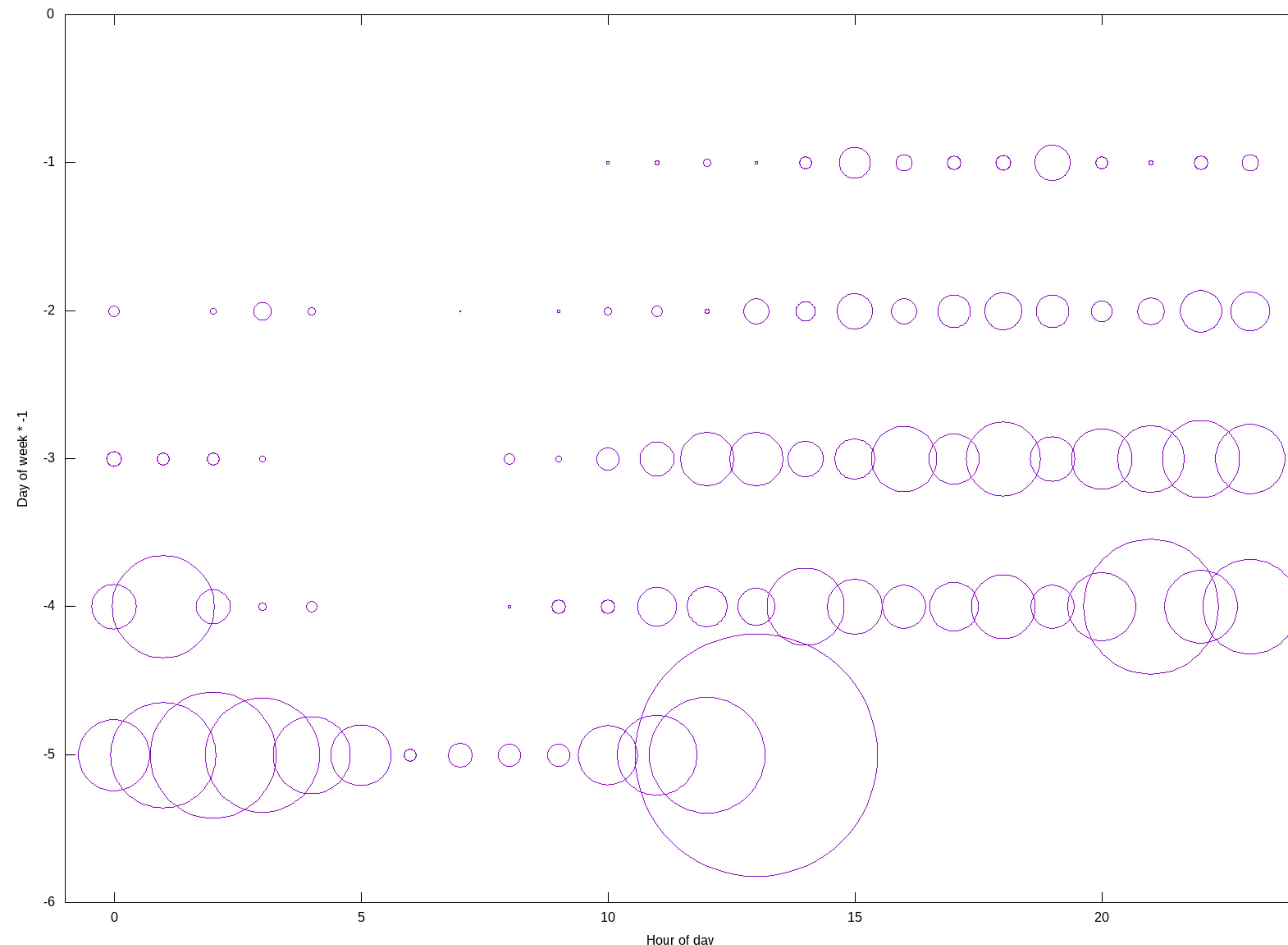


Perfect routing, excellent parallelism, excellent distance optimisations

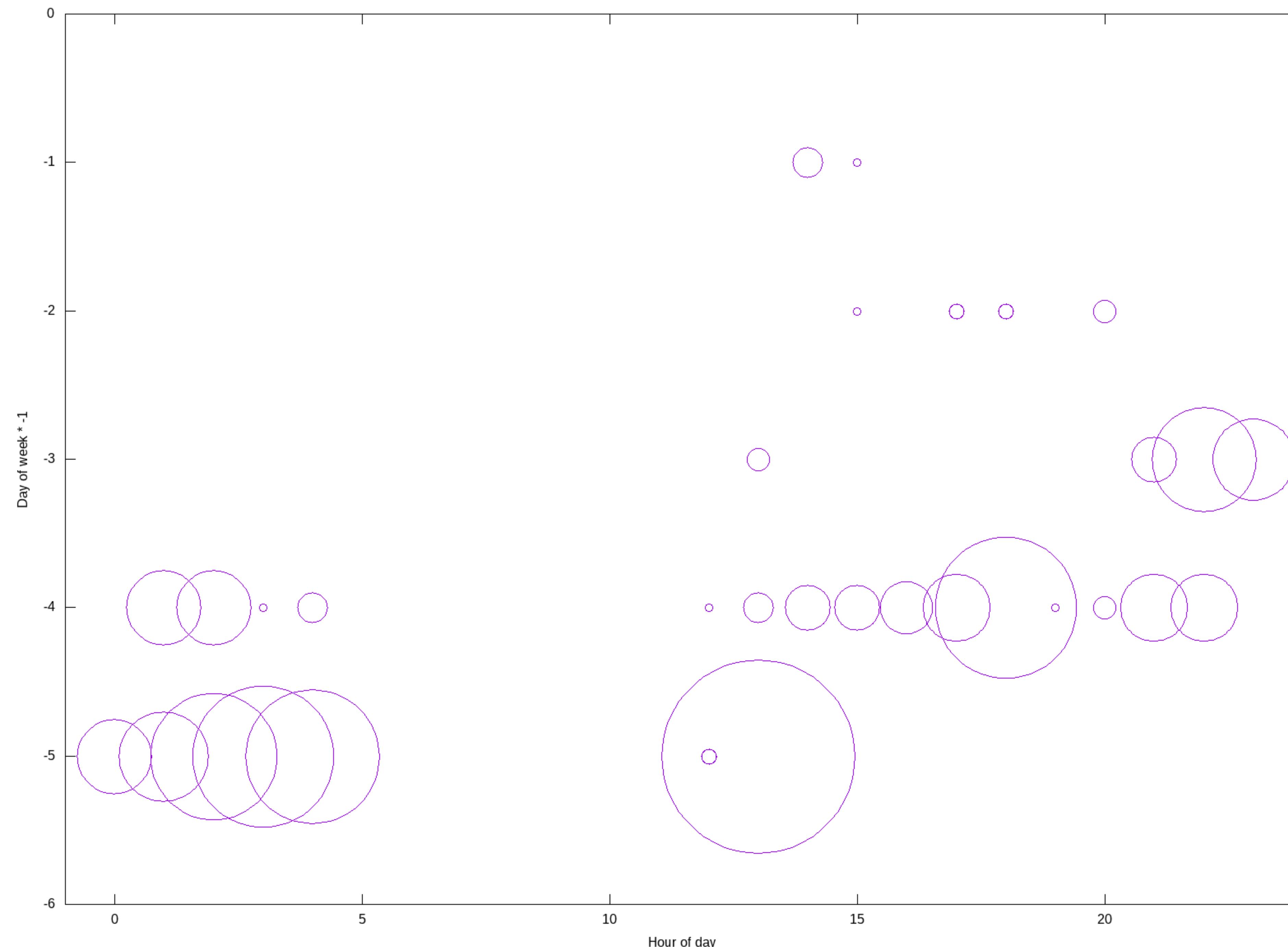


Behind the Scenes

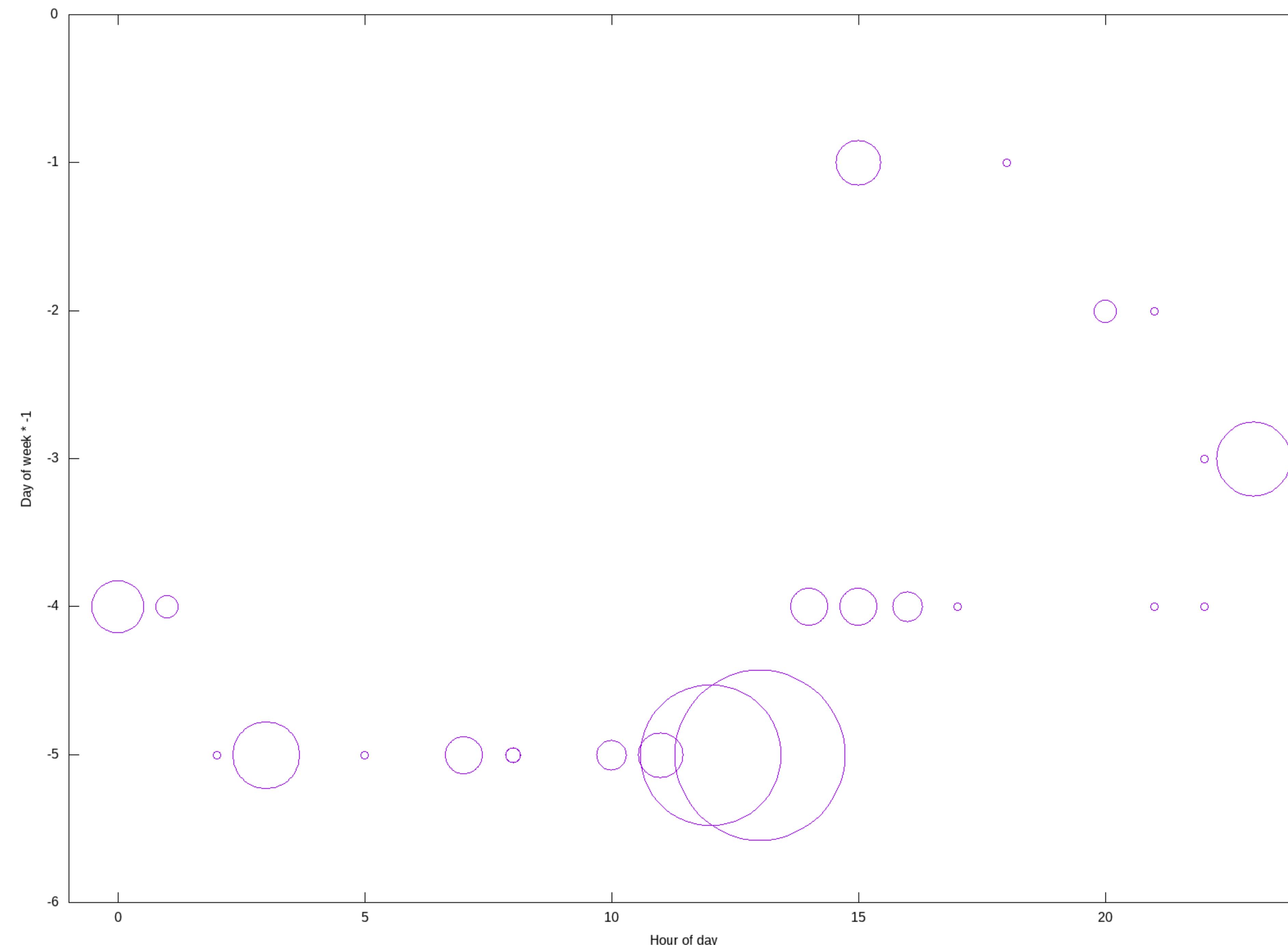
Number of submissions per timeslice: Team all

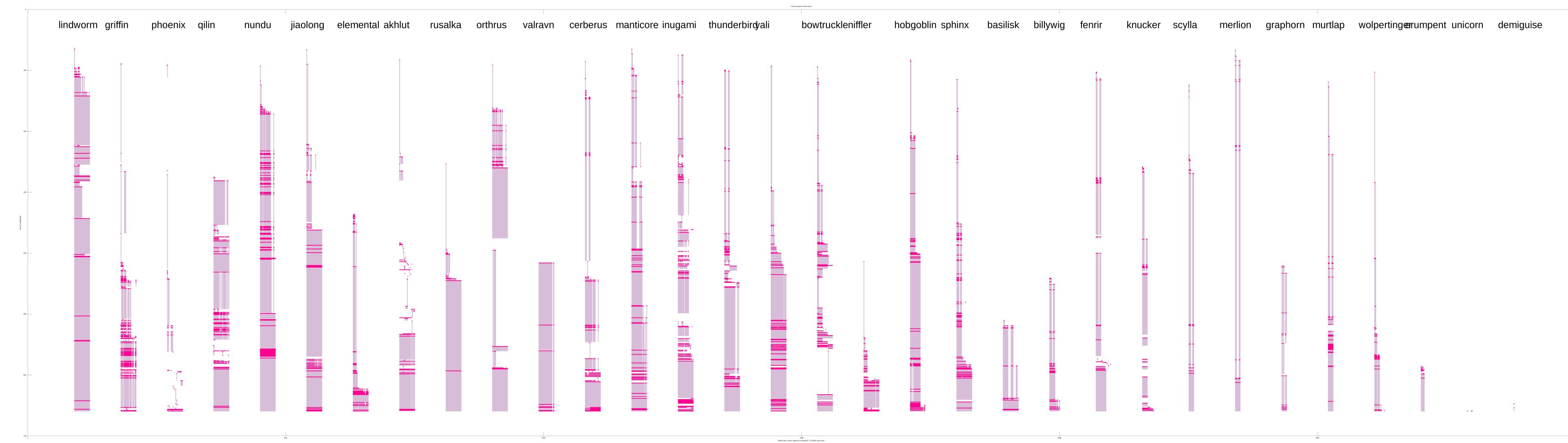


Number of submissions per timeslice: Team griffin



Number of submissions per timeslice: Team phoenix



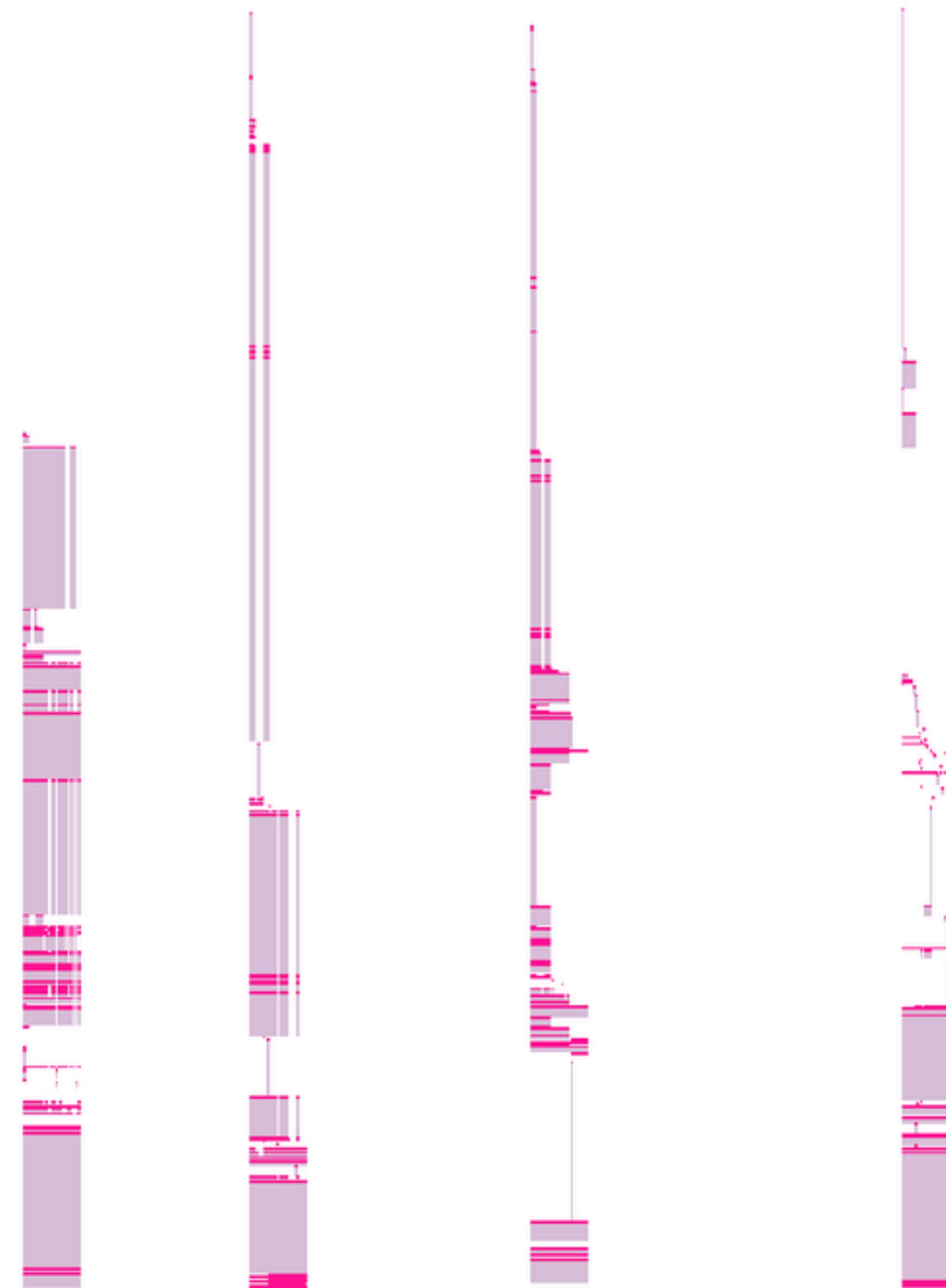


qilin

cerberus

bowtruckler

akhlut



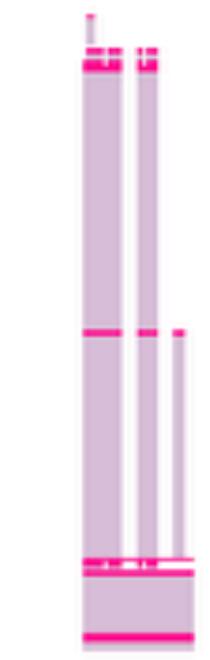
phoenix

elemental

:niffler

basilisk

billywig

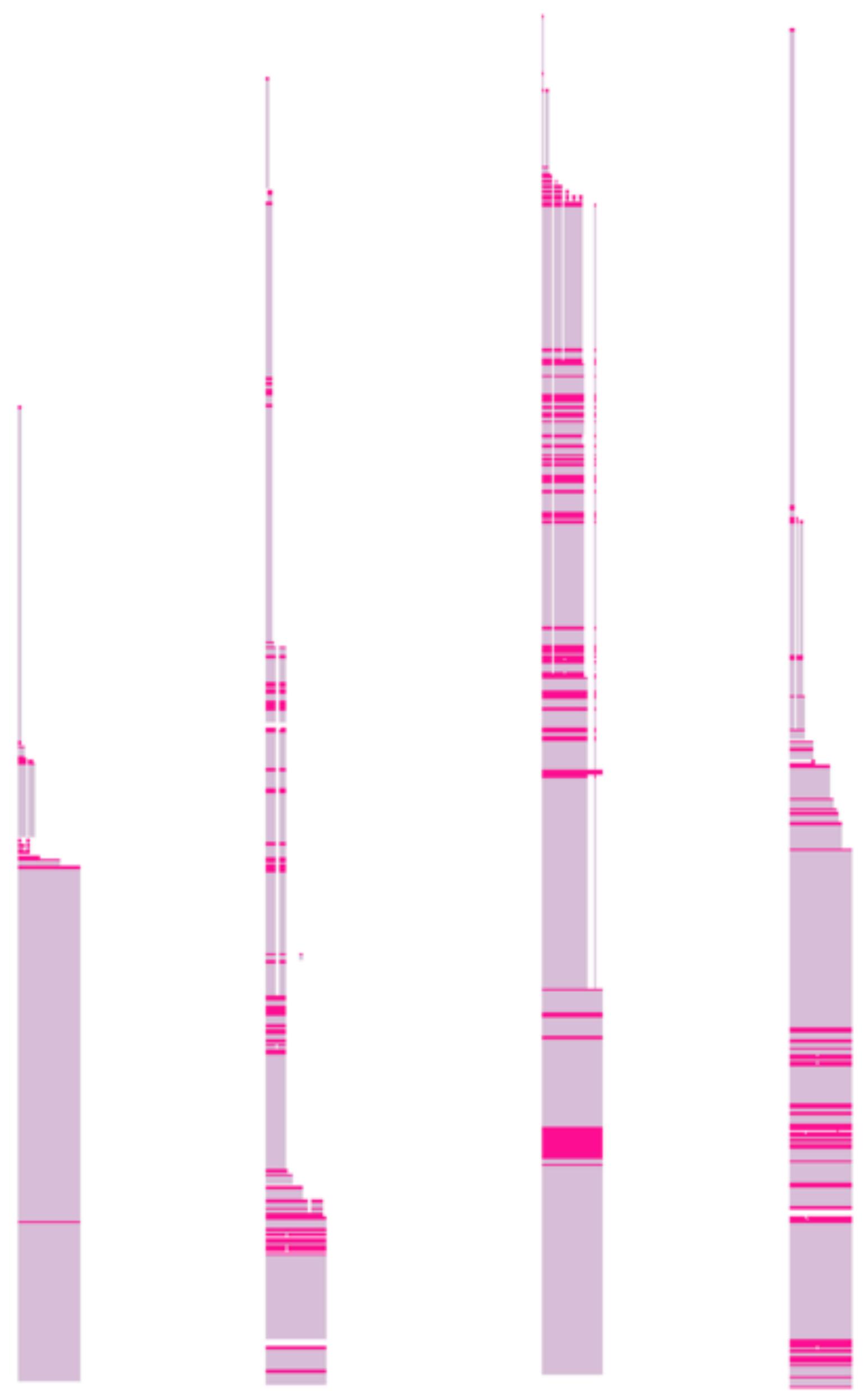


rusalka

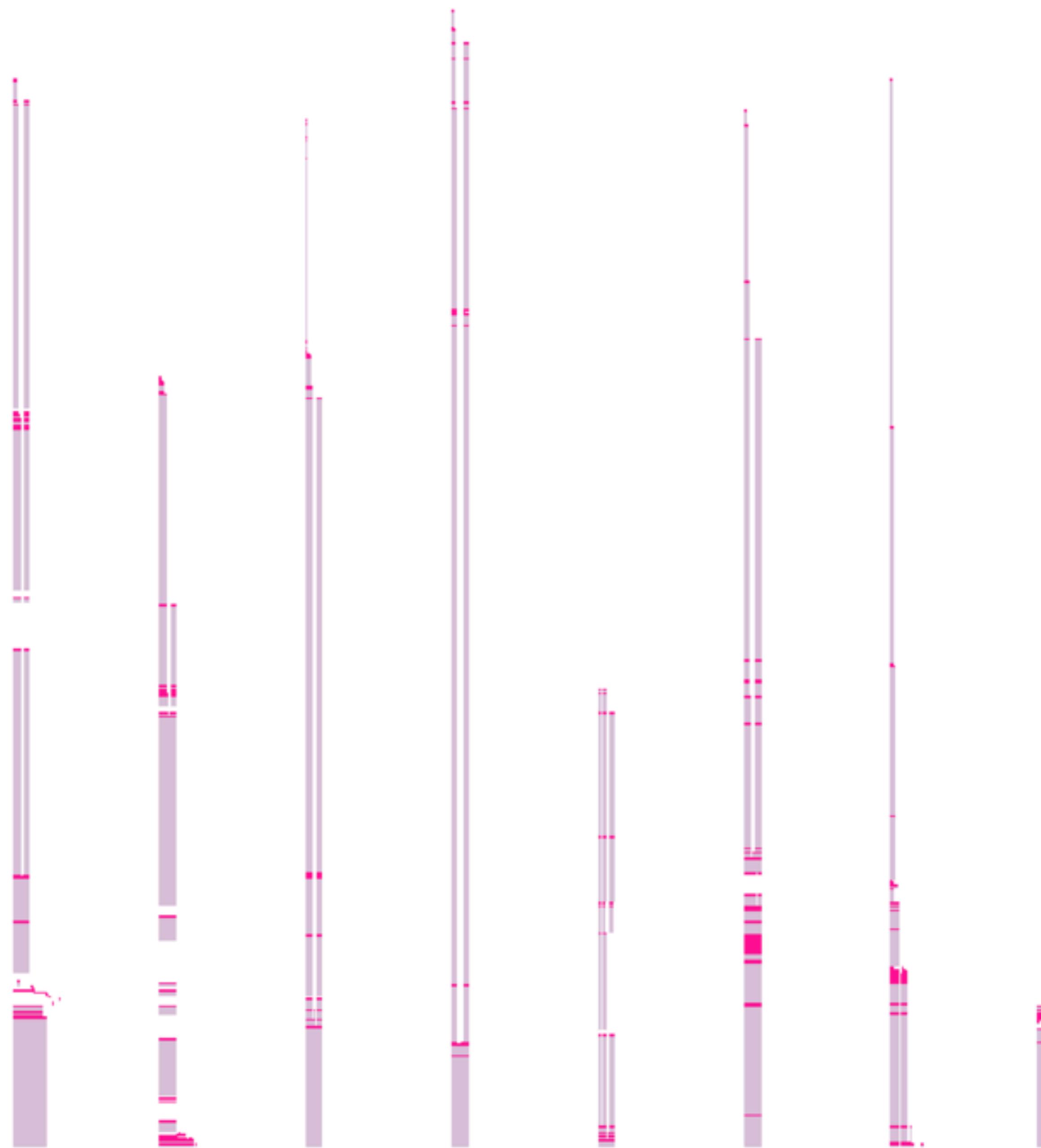
sphinx

nundu

ÿali



fenrir knucker scylla merlion graphorn murtlap wolpertinger grumpent



Move-and-Tag Competition Scoreboard

12:26:32, 20 Feb 2017

Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
manticore	12:18:26, 20 Feb 2017	1	2	37422	16.194	N/A																											
merlion	11:19:12, 20 Feb 2017	2	1	16.263	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
jiaolong	11:04:25, 20 Feb 2017	3	1	37422	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
lindworm	11:02:32, 20 Feb 2017	3	1	37422	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
akhlut	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
basilisk	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
billywig	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
bowtruckle	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
cerberus	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
demiguise	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
elemental	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
erumpent	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
fenrir	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
graphorn	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
griffin	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
hobgoblin	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
inugami	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
knucker	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
murtlap	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
niffler	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
nundu	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
orthrus	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
phoenix	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
qilin	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
rusalka	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
scylla	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
sphinx	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
thunderbird	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
unicorn	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
valravn	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
wolpertinger	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
yali	N/A	4	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

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Move-and-Tag Competition Scoreboard

13:06:05, 20 Feb 2017

Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
inugami	12:33:26, 20 Feb 2017	1	4	37.422	N/A	N/A	N/A	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A																			
mertlion	12:57:37, 20 Feb 2017	2	2	16.263	16.194	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
manticore	12:18:26, 20 Feb 2017	3	2	37.422	16.194	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
jiaolong	11:04:25, 20 Feb 2017	4	1	37.422	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
lindworm	11:02:32, 20 Feb 2017	4	1	37.422	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
akhhlut	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
basilisk	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
billywig	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bowtruckle	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cerberus	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
demiguise	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
elemental	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
erumpent	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
fenrir	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
graphorn	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
griffin	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
hobgoblin	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
knucker	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
murtlap	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
niffler	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
nundu	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
orthrus	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
phoenix	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
qilin	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
rusalka	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
scylla	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
sphinx	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
thunderbird	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
unicorn	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
valravn	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
wolpertinger	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
yali	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	23:44:43, 20 Feb 2017	1	30	25.125	27.414	25.129	26.297	129.256	593.29	791.487	7385.242	7279.276	7386.144	271.435	306.825	359.938	412.149	357.984	258.222	268.687	274.978	379.116	362.62	3139.297	8232.736	6587.407	6294.428	9558.399	3794.33	2139.731	3455.339	3864.555	1899.387
manticore	00:16:13, 21 Feb 2017	2	8	26.582	16.194	15.289	15.818	80.479	N/A	N/A	2557.179	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
inugami	00:01:10, 21 Feb 2017	3	7	37.422	16.194	15.953	N/A	N/A	N/A	281.392	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
fenrir	19:27:45, 20 Feb 2017	4	6	16.263	16.194	11.715	N/A	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
merlion	19:49:28, 20 Feb 2017	4	6	16.263	16.194	11.715	N/A	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
thunderbird	16:59:24, 20 Feb 2017	4	6	16.263	16.194	11.715	N/A	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
cerberus	00:19:00, 21 Feb 2017	5	6	16.263	16.194	12.886	N/A	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
bowtruckle	20:30:34, 20 Feb 2017	6	3	18.263	16.194	15.365	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
sphinx	19:19:11, 20 Feb 2017	7	2	16.263	16.194	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
nundu	20:46:31, 20 Feb 2017	8	2	25.125	N/A	15.365	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
hobgoblin	14:11:44, 20 Feb 2017	9	2	37.422	16.194	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
yali	15:39:09, 20 Feb 2017	9	2	37.422	16.194	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
jiaolong	15:05:09, 20 Feb 2017	10	2	37.422	N/A	23.765	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
murtlap	21:12:32, 20 Feb 2017	10	2	26.865	18.519	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
akhlut	13:51:25, 20 Feb 2017	11	1	16.263	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
scylla	00:09:32, 21 Feb 2017	11	1	16.263	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
orthrus	15:17:55, 20 Feb 2017	12	1	25.125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
wolpertinger	17:10:42, 20 Feb 2017	12	1	25.125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
griffin	15:05:58, 20 Feb 2017	13	1	36.008	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
basilisk	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
billywig	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
demiurge	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
elemental	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
erumpent	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
graphorn	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
knucker	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
niffler	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
phoenix	18:44:07, 20 Feb 2017	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
qilin	N/A	14	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
rusalka	N/A	14	0	N/A	N/A	N/A	N																										

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Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	18:41:20, 23 Feb 2017	1	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	527.866	349.485	406.496	14.993	22.468	15.754	24.655	17.704	17.718	18.4	18.361	20.129	26.749	97.188	231.996	199.271	279.191	349.571	112.67	103.198	111.567	103.219	77.04
nundu	21:06:55, 23 Feb 2017	2	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	551.208	365.524	427.813	18.698	24.87	17.564	25.784	18.715	20.937	20.849	24.922	21.231	27.783	124.657	247.897	205.247	415.549	396.529	129.456	108.108	133.302	113.957	86.31
rusalka	02:10:02, 23 Feb 2017	3	30	18.263	20.233	13.187	15.818	80.627	228.442	274.596	551.42	366.46	434.402	16.874	24.869	17.265	26.065	20.324	19.901	18.324	18.794	19.529	28.271	108.024	243.732	209.003	311.792	390.602	143.199	109.768	122.653	110.541	86.18
akhlut	17:30:00, 23 Feb 2017	4	28	16.263	16.194	11.715	15.818	80.479	166.625	272.513	684.042	506.112	597.403	28.301	33.583	32.175	37.671	29.18	23.432	28.473	22.867	37.21	38.33	130.07	269.611	N/A	397.052	421.606	203.552	N/A	166.664	146.988	109.98
orthrus	20:15:09, 23 Feb 2017	5	30	23.164	25.071	11.715	15.818	80.479	209.362	272.513	705.555	600.324	715.425	28.533	36.908	32.098	35.68	29.894	26.196	27.887	29.411	40.117	36.592	211.608	311.444	307.844	554.743	472.122	206.031	153.61	202.515	161.42	150.59
griffin	20:55:23, 23 Feb 2017	6	23	23.224	16.194	N/A	15.818	80.479	N/A	272.513	530.749	366.46	434.402	17.221	22.468	17.114	24.655	20.001	19.716	18.4	18.794	20.615	29.524	99.764	N/A	204.296	N/A	352.793	N/A	N/A	N/A	103.219	77.05
jiaolong	22:34:24, 22 Feb 2017	7	30	23.164	25.071	27.373	16.676	103.52	913.064	681.384	1530.637	1304.576	1201.438	51.121	67.031	53.422	69.365	55.205	46.032	75.093	65.695	75.732	79.536	322.432	1135.45	1292.506	1333.177	1564.628	524.092	338.334	391.847	481.43	467.36
manticore	13:58:00, 23 Feb 2017	8	26	23.164	16.194	13.187	15.818	80.479	282.612	291.325	842.2	893.886	879.231	54.804	62.269	62.338	74.091	54.218	27.457	93.556	23.355	35.706	46.165	286.906	N/A	581.811	1055.342	1064.726	N/A	N/A	516.841	N/A	376.81
valravn	14:24:06, 23 Feb 2017	9	28	37.422	16.194	15.365	16.471	84.686	228.442	295.776	84665.688	78162.869	79013.977	2133.548	2624.978	2486.836	3089.673	2598.807	2208.534	2176.207	2042.238	2892.404	3035.164	11751.471	26235.302	22870.461	32755.971	36845.725	17076.053	N/A	N/A	11429.447	11527.2
thunderbird	04:00:45, 23 Feb 2017	10	23	16.263	16.194	11.715	23.666	114.409	940.486	795.991	634.925	576.879	711.142	50.232	49.948	52.488	52.705	74.375	35.972	41.938	48.592	56.217	64.014	503.349	N/A	N/A	N/A	594.078	N/A	393.996	N/A	N/A	
hobgoblin	20:46:18, 23 Feb 2017	11	20	16.263	16.194	11.715	15.819	88.587	184.584	450.867	1971.792	1336.531	1215.872	31.643	34.842	37.483	52.801	36.871	40.838	33.122	29.813	83.14	77.403	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
basilisk	15:10:38, 23 Feb 2017	12	15	26.783	16.194	15.289	15.818	80.479	623.348	605.059	1724.142	1386.772	1314.765	N/A	N/A	N/A	N/A	37.408	46.148	28.861	52.899	66.353	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
fenrir	18:29:34, 23 Feb 2017	13	10	16.263	16.194	11.715	15.818	80.479	247.271	287.205	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
sphinx	14:56:26, 23 Feb 2017	14	10	16.263	16.194	22.184	15.818	80.479	169.982	272.513	84665.688	78031.466	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
murtlap	21:05:56, 23 Feb 2017	15	10	16.263	16.194	11.715	17.699	111.94	325.551	372.225	29111.466	24605.527	9031.386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
billywig	18:04:21, 23 Feb 2017	16	8	16.263	16.194	12.886	15.818	85.902	N/A	N/A	7385.242	7279.276	7386.144	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
scylla	19:36:09, 23 Feb 2017	17	7	16.263	16.194	11.715	15.818	N/A	N/A	N/A	84665.688	78162.869	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
elemental	22:28:13, 22 Feb 2017	18	6	16.263	16.194	11.715	15.818	81.673	N/A	289.168	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
merlion	14:37:55, 21 Feb 2017	19	6	16.263	16.194	11.715	N/A	N/A	N/A	N/A	770.331	672.188	727.789	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
phoenix	17:05:28, 23 Feb 2017	20	7	24.043	16.195	11.715	N/A	N/A	N/A	N/A	774.034	661.378	644.784	38.101	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
graphorn	19:26:48, 23 Feb 2017	21	4	25.405	17.071	N/A	15.818	80.627	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
wolpertinger	19:07:00, 23 Feb 2017	22	5	25.125	18.519	27.011	18.347	99.192	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
inugami	20:49:43, 23 Feb 2017	23	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	540.701	N/A	N/A	N/A
cerberus	19:10:52, 23 Feb 2017	24	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79013.977	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A								
qilin	20:19:21, 23 Feb 2017	25	1	23.224	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
bowtruckle	20:53:50, 23 Feb 2017	26	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
demiguise		26	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
erumpent		26	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
knucker	20:51:35, 23 Feb 2017	26	0	N/A	N/A	N/A</																											

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Move-and-Tag Competition Scoreboard

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Move-and-Tag Competition Scoreboard

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Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	11:09:58, 24 Feb 2017	1	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	523.979	345.115	394.563	14.548	22.259	15.754	24.224	17.39	17.545	15.641	18.028	19.476	25.727	97.188	228.293	197.533	276.512	342.503	112.065	100.73	110.239	101.429	76.241
qlin	12:31:28, 24 Feb 2017	2	30	23.224	16.194	11.715	15.818	80.479	168.418	272.657	530.749	350.572	406.496	16.762	22.497	17.114	24.565	17.87	17.718	18.4	19.338	20.615	26.749	99.785	236.283	204.296	323.803	359.158	113.807	211.222	111.567	122.041	77.252
nundu	23:24:05, 23 Feb 2017	3	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	546.629	361.093	406.64	18.698	24.87	17.564	25.784	18.715	19.838	18.159	24.007	21.231	27.783	113.331	228.108	205.247	415.549	356.481	121.454	104.613	114.313	106.459	81.702
jiaolong	04:39:48, 24 Feb 2017	4	30	17.44	16.194	11.715	15.818	80.479	166.625	272.513	606.527	537.048	531.604	22.57	26.03	24.904	30.03	25.373	22.593	21.835	20.466	26.083	33.035	117.534	277.558	216.457	341.016	381.91	176.884	126.26	139.776	128.278	108.348
rusalka	02:56:10, 24 Feb 2017	5	30	18.263	20.233	13.187	15.818	80.627	228.442	274.596	551.42	366.46	434.402	16.874	24.869	17.265	26.065	20.324	19.901	18.324	18.794	19.529	28.271	108.024	243.732	209.003	311.792	390.602	143.199	109.768	122.653	110.541	86.182
elemental	12:24:12, 24 Feb 2017	6	29	16.263	16.194	11.715	15.818	80.479	166.625	272.513	576.101	581.564	663.032	N/A	29.157	27.205	34.399	30.238	24.953	28.498	23.423	31.946	37.359	125.039	299.458	255.293	638.729	549.551	198.869	135.833	153.684	177.282	143.318
akhlut	03:48:47, 24 Feb 2017	7	28	16.263	16.194	11.715	15.818	80.479	166.625	272.513	684.042	506.112	597.403	28.301	33.583	32.175	37.671	29.18	23.432	28.473	22.867	37.21	38.33	130.07	269.611	N/A	397.052	421.606	203.552	N/A	166.664	146.988	109.985
orthrus	02:21:56, 24 Feb 2017	7	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	705.555	600.324	715.425	28.533	36.908	32.098	35.68	29.894	26.196	27.887	29.411	40.117	36.592	211.608	311.444	307.844	554.743	472.122	206.031	153.61	202.515	161.142	150.594
griffin	04:52:30, 24 Feb 2017	8	24	23.224	16.194	N/A	15.818	80.479	N/A	272.513	530.749	366.46	434.402	17.221	22.468	17.114	24.655	20.001	19.537	N/A	18.544	20.615	27.294	105.36	N/A	217.91	N/A	352.793	113.107	N/A	111.567	103.219	77.054
manticore	10:20:13, 24 Feb 2017	9	30	16.263	16.194	11.715	15.818	80.479	282.612	284.273	530.749	350.572	406.496	54.804	62.269	50.355	58.719	54.218	27.457	36.227	23.355	35.706	46.165	286.906	921.275	581.811	1055.342	1064.726	367.001	484.081	516.841	425.62	376.816
cerberus	05:53:33, 24 Feb 2017	10	30	16.263	16.194	11.715	15.818	84.996	184.703	296.028	663.431	619.845	588.314	37.182	42.961	35.671	44.366	44.233	31.088	36.718	35.827	42.954	44.02	220.645	370.168	345.35	470.555	524.168	239.167	168.221	224.711	213.998	134.394
vatravn	12:04:39, 24 Feb 2017	11	28	24.493	20.233	12.886	15.818	86.012	228.442	277.44	792.425	521.374	524.506	26.521	29.74	21.214	38.456	25.257	26.44	20.72	24.638	29.233	33.851	148.59	310.023	311.714	486.213	407.905	144.964	N/A	N/A	138.726	125.366
yali	12:28:17, 24 Feb 2017	12	30	16.263	16.194	11.715	22.293	103.222	345.712	429.534	553.633	428.055	761.186	31.643	34.842	37.483	52.801	36.871	40.838	33.122	29.813	83.14	77.403	228.011	579.483	533.112	563.46	448.069	321.462	218.694	384.258	195.643	163.408
thunderbird	07:14:11, 24 Feb 2017	13	30	16.263	16.194	11.715	17.49	84.996	615.901	569.989	634.925	576.879	711.142	29.035	41.313	42.712	56.628	31.071	33.247	35.601	33.917	39.408	43.597	228.345	634.013	488.756	1025.361	789.677	348.318	217.52	407.716	403.29	134.394
bowtruckle	12:11:21, 24 Feb 2017	14	30	18.263	16.194	11.715	16.673	89.71	393.459	318.941	767.298	707.57	761.186	32.172	33.105	33.82	60.644	40.408	34.384	37.698	36.299	38.489	46.241	400.877	796.496	657.299	1155.85	636.847	312.627	204.49	254.252	278.827	363.65
niffler	08:23:42, 24 Feb 2017	15	29	24.043	16.194	13.779	15.818	80.479	166.625	272.513	310.093	359.7199	592.9467	156.91	222.453	194.719	193.472	150.594	180.409	189.347	101.333	184.794	217.036	737.467	2806.189	1748.947	N/A	2561.202	1116.48	1026.356	860.469	1109.983	776.662
sphinx	11:21:02, 24 Feb 2017	16	30	16.263	16.194	22.184	15.818	80.479	169.982	272.513	7092.824	7370.436	7612.767	89.136	183.936	174.506	2947.862	2503.555	2142.508	2115.48	1990.489	2806.802	2927.256	11448.019	25429.783	22117.98	32132.739	35686.305	16509.131	10478.7	13557.625	11162.786	11191.307
basilisk	10:51:19, 24 Feb 2017	17	30	26.783	16.194	15.289	15.818	80.479	623.348	605.059	1724.142	1386.772	1314.765	305.452	341.649	309.87	340.911	313.714	37.408	240.5	28.861	52.899	66.353	1611.579	5777.157	3999.391	4741.546	5207.726	2488.268	1892.88			

Move-and-Tag Competition Scoreboard

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Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	11:09:58, 24 Feb 2017	1	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	523.979	345.115	394.563	14.548	22.259	15.754	24.224	17.39	17.545	15.641	18.028	19.476	25.727	97.188	228.293	197.533	276.512	342.503	112.065	100.73	110.239	101.429	76.241
phoenix	12:51:38, 24 Feb 2017	2	30	16.263	16.194	11.715	15.818	80.48	166.625	272.513	530.749	350.572	406.496	16.763	22.469	17.114	24.623	17.704	17.718	18.401	17.994	18.323	26.749	99.765	236.283	204.297	323.804	352.794	113.108	103.199	111.568	103.22	77.054
qlin	12:31:28, 24 Feb 2017	3	30	23.224	16.194	11.715	15.818	80.479	168.418	272.657	530.749	350.572	406.496	16.762	22.497	17.114	24.565	17.87	17.718	18.4	19.338	20.615	26.749	99.785	236.283	204.296	323.803	359.158	113.807	211.222	111.567	122.041	77.252
nundu	23:24:05, 23 Feb 2017	4	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	546.629	361.093	406.64	18.698	24.87	17.564	25.784	18.715	19.838	18.159	24.007	21.231	27.783	113.331	228.108	205.247	415.549	356.481	121.454	104.613	114.313	106.459	81.702
jiaolong	04:39:48, 24 Feb 2017	5	30	17.44	16.194	11.715	15.818	80.479	166.625	272.513	606.527	537.048	531.604	22.57	26.03	24.904	30.03	25.373	22.593	21.835	20.466	26.083	33.035	117.534	277.558	216.457	341.016	381.91	176.884	126.26	139.776	128.278	108.348
rusalka	02:56:10, 24 Feb 2017	6	30	18.263	20.233	13.187	15.818	80.627	228.442	274.596	551.42	366.46	434.402	16.874	24.869	17.265	26.065	20.324	19.901	18.324	18.794	19.529	28.271	108.024	243.732	209.003	311.792	390.602	143.199	109.768	122.653	110.541	86.182
elemental	12:24:12, 24 Feb 2017	7	29	16.263	16.194	11.715	15.818	80.479	166.625	272.513	576.101	581.564	663.032	N/A	29.157	27.205	34.399	30.238	24.953	28.498	23.423	31.946	37.359	125.039	299.458	255.293	638.729	549.551	198.869	135.833	153.684	177.282	143.318
akhlut	03:48:47, 24 Feb 2017	8	28	16.263	16.194	11.715	15.818	80.479	166.625	272.513	684.042	506.112	597.403	28.301	33.583	32.175	37.671	29.18	23.432	28.473	22.867	37.21	38.33	130.07	269.611	N/A	397.052	421.606	203.552	N/A	166.664	146.988	109.985
orthrus	02:21:56, 24 Feb 2017	9	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	705.555	600.324	715.425	28.533	36.908	32.098	35.68	29.894	26.196	27.887	29.411	40.117	36.592	211.608	311.444	307.844	554.743	472.122	206.031	153.61	202.515	161.42	150.594
griffin	12:52:11, 24 Feb 2017	10	24	23.224	16.194	N/A	15.818	80.479	N/A	272.513	530.749	366.46	434.402	17.221	22.468	17.114	24.655	20.001	19.537	N/A	18.544	20.615	27.294	105.36	N/A	217.91	N/A	352.793	113.107	N/A	111.567	103.219	77.054
valravn	12:48:05, 24 Feb 2017	11	28	24.493	16.194	12.886	15.818	85.426	166.625	273.44	792.425	521.374	524.506	26.521	29.74	21.214	38.456	25.257	26.44	21.91	24.734	26.937	35.383	148.59	320.618	292.517	505.909	415.839	148.27	N/A	N/A	138.726	125.366
manticore	10:20:13, 24 Feb 2017	12	30	16.263	16.194	11.715	15.818	80.479	282.612	284.273	530.749	350.572	406.496	54.804	62.269	50.355	58.719	54.218	27.457	36.227	23.355	35.706	46.165	286.906	921.275	581.811	1055.342	1064.726	367.001	484.081	516.841	425.62	376.816
cerberus	05:53:33, 24 Feb 2017	13	30	16.263	16.194	11.715	15.818	84.996	184.703	296.028	663.431	619.845	588.314	37.182	42.961	35.671	44.366	44.233	31.088	36.718	36.827	42.954	44.02	220.645	370.168	345.35	470.555	524.168	239.167	168.221	224.711	213.998	134.394
inugami	12:47:13, 24 Feb 2017	14	30	17.44	16.194	12.886	16.462	81.572	169.664	281.392	551.29	506.112	588.314	31.678	39.062	30.839	59.205	44.961	24.471	50.69	25.464	38.547	42.072	131.457	286.77	326.126	409.678	540.701	2488.268	146.573	1977.561	2431.2	1706.867
yali	12:28:17, 24 Feb 2017	15	30	16.263	16.194	11.715	22.293	103.222	345.712	429.534	553.633	428.055	761.186	31.643	34.842	37.483	52.801	36.871	40.838	33.122	29.813	83.14	77.403	228.011	579.483	533.112	563.46	448.069	321.462	218.694	384.258	195.643	163.408
thunderbird	07:14:11, 24 Feb 2017	16	30	16.263	16.194	11.715	17.49	84.996	615.901	569.989	634.925	576.879	711.142	29.035	41.313	42.712	56.628	31.071	33.247	35.601	33.917	39.408	43.597	228.345	634.013	488.756	1025.361	769.677	348.318	217.52	407.716	403.29	134.394
bowtruckle	12:11:21, 24 Feb 2017	17	30	18.263	16.194	11.715	16.673	89.71	393.459	318.941	767.298	707.57	761.186	32.172	33.105	33.82	60.644	40.408	34.384	37.698	36.299	38.489	46.241	400.877	796.496	657.299	1156.85	636.847	312.627	204.49	254.252	278.827	363.65
niffler	08:23:42, 24 Feb 2017	18	29	24.043	16.194	13.779	15.818	80.479	166.625	272.513	310.793	3597.199	5929.647	156.91	222.453	194.719	193.472	150.594	180.409	189.347	101.333	184.794	217.036	737.467	2806.189	1748.947	N/A	2561.202	1116.48	1026.356	860.469	1109.983	776.662
sphinx	11																																

Move-and-Tag Competition Scoreboard

13:36:10, 24 Feb 2017

Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	13:27:36, 24 Feb 2017	1	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	523.979	343.977	392.969	14.548	22.259	15.754	24.224	17.147	17.545	15.564	17.873	19.064	25.727	96.443	228.267	197.533	276.512	342.503	111.073	100.73	109.138	99.21	76.241
phoenix	13:35:37, 24 Feb 2017	2	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	530.749	350.572	406.496	16.763	22.469	17.114	24.623	17.704	17.718	18.4	17.994	18.323	26.749	99.765	236.283	204.297	323.804	352.794	113.108	103.199	111.568	103.22	77.054
qilin	12:55:03, 24 Feb 2017	3	30	16.263	16.194	11.715	15.818	80.479	168.418	272.657	530.749	350.572	406.496	16.762	22.497	17.114	24.565	17.87	17.718	18.4	19.338	20.615	26.749	99.785	236.283	204.296	323.803	359.158	113.807	211.222	111.567	122.041	77.252
nundu	23:24:05, 23 Feb 2017	4	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	546.629	361.093	406.64	18.698	24.87	17.564	25.784	18.715	19.838	18.159	24.007	21.231	27.783	113.331	228.108	205.247	415.549	356.481	121.454	104.613	114.313	106.459	81.702
jiaolong	13:31:19, 24 Feb 2017	5	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	652.407	581.564	663.032	26.916	27.887	27.205	34.399	28.733	24.953	27.146	22.61	34.306	37.359	122.694	305.838	254.867	377.686	454.142	201.501	131.783	153.684	156.766	135.089
akhlut	13:33:20, 24 Feb 2017	6	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	684.042	506.112	597.403	28.301	33.583	32.175	37.671	29.18	23.432	28.473	22.867	37.21	38.33	130.07	269.611	904.335	397.052	421.606	203.552	200.651	166.664	146.988	109.985
rusalka	02:56:10, 24 Feb 2017	7	30	18.263	20.233	13.187	15.818	80.627	228.442	274.596	551.42	366.46	434.402	16.874	24.869	17.265	26.065	20.324	19.901	18.344	18.794	19.529	28.271	108.024	243.732	209.003	311.792	390.602	143.199	109.768	122.653	110.541	86.182
orthrus	02:21:56, 24 Feb 2017	8	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	705.555	600.324	715.425	28.533	36.908	32.098	35.68	29.894	26.196	27.887	29.411	40.117	36.592	211.608	311.444	307.844	554.743	472.122	206.031	153.61	202.515	161.42	150.594
griffin	13:34:49, 24 Feb 2017	9	25	23.224	16.194	N/A	15.818	80.479	N/A	272.513	530.749	366.46	434.402	17.221	22.468	17.114	24.855	20.001	19.537	N/A	18.544	20.615	27.294	105.36	N/A	21.791	N/A	352.793	113.107	103.198	111.567	103.219	77.054
valravn	12:59:38, 24 Feb 2017	10	28	24.493	16.194	12.886	15.818	85.426	166.625	273.44	792.425	521.374	524.506	26.521	29.74	21.214	38.456	25.257	26.44	20.72	24.638	26.937	33.851	148.59	310.023	292.517	486.213	407.905	144.964	N/A	N/A	138.726	125.366
manticore	13:35:16, 24 Feb 2017	11	29	16.263	16.194	11.715	15.818	80.479	282.612	284.273	530.749	350.572	406.496	54.804	62.269	50.355	58.719	54.218	27.457	36.227	23.355	35.706	46.165	286.906	921.275	581.811	1047.361	N/A	367.001	484.081	516.841	425.62	376.816
yali	13:12:03, 24 Feb 2017	12	30	16.263	16.194	11.715	22.293	103.222	345.712	538.456	553.633	428.055	761.186	31.643	34.842	37.483	52.801	36.871	40.838	33.122	29.813	83.14	77.403	228.011	579.483	533.112	563.46	448.069	321.462	218.694	384.258	195.643	163.408
thunderbird	07:14:11, 24 Feb 2017	13	30	16.263	16.194	11.715	17.49	84.996	615.901	569.989	634.925	576.879	711.142	29.035	41.313	42.712	56.628	31.071	33.247	35.601	33.917	39.408	43.597	228.345	634.013	488.756	1025.361	769.677	348.318	217.52	407.716	403.29	134.394
bowtruckle	12:11:21, 24 Feb 2017	14	30	18.263	16.194	11.715	16.673	89.71	393.459	318.941	767.298	707.57	761.186	32.172	33.105	33.82	60.644	40.408	34.384	37.698	36.299	38.489	46.241	400.877	796.496	657.299	1155.85	636.847	312.627	204.49	254.252	278.827	363.65
hobgoblin	13:28:58, 24 Feb 2017	15	27	16.263	16.194	11.715	15.818	86.693	184.584	450.867	1971.792	1336.531	1215.872	31.643	34.842	43.159	52.801	36.871	40.838	33.122	29.813	83.14	77.403	224.218	496.591	433.082	535.16	N/A	298.478	N/A	267.314	206.515	N/A
niffler	13:35:43, 24 Feb 2017	15	29	16.263	16.194	13.779	15.818	80.479	166.625	272.513	3107.093	3597.199	5929.647	156.91	222.453	194.719	193.472	150.594	180.409	189.347	101.333	184.794	217.036	737.467	2806.189	1748.947	N/A	2561.202	1116.48	1026.356	860.469	1109.983	776.662
sphinx	13:08:37, 24 Feb 2017	16	30	16.263	16.194	22.184	15.818	80.479	169.982	272.513	7092.824	7370.436	7612.767	89.136	183.936	174.506	266.331	2503.555	2142.508	2115.48	1990.489	2806.802	2927.256	11448.019	25429.783	22117.98	32132.739	35686.305	16509.131	10478.7	13557.625	11162.786	11191.307
basilisk	13:34:02, 24 Feb 2017	17	30	26.783	16.194	15.289	15.818	80.479	623.348	605.059	1724.142	1386.772	1314.765	305.452	341.649	309.87	340.911	313.714	37.408	240.5	28.861	52.899	66.353	1611.579	5777157	3999.391	4741.546	5207726	2488.268	1892.8			

Move-and-Tag Competition Scoreboard

13:54:03, 24 Feb 2017

Team/Problem	Last submitted	Rank	Done	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
lindworm	13:27:36, 24 Feb 2017	1	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	523.979	343.977	392.969	14.548	22.259	15.754	24.224	17.147	17.545	15.564	17.873	19.064	25.727	96.443	228.267	197.533	276.512	342.503	111.073	100.73	109.138	99.21	76.241
griffin	13:52:30, 24 Feb 2017	2	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	512.866	346.797	396.455	14.54	22.468	15.607	24.622	17.21	17.862	16.541	18.092	17.594	27.03	96.365	231.801	204.189	279.416	304.875	113.107	103.198	111.567	102.024	77.054
phoenix	13:50:59, 24 Feb 2017	3	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	530.749	350.572	393.097	15.565	22.469	17.114	24.623	17.704	17.718	18.4	17.994	18.323	26.749	99.765	236.283	204.297	323.804	352.794	113.108	103.199	111.568	103.22	77.054
qilin	12:55:03, 24 Feb 2017	4	30	16.263	16.194	11.715	15.818	80.479	168.418	272.657	530.749	350.572	406.496	16.762	22.497	17.114	24.565	17.87	17.718	18.4	19.338	20.615	26.749	99.785	236.283	204.296	323.803	359.158	113.807	211.222	111.567	122.041	77.252
nundu	23:24:05, 23 Feb 2017	5	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	546.629	361.093	406.64	18.698	24.87	17.564	25.784	18.715	19.838	18.159	24.007	21.231	27.783	113.331	228.108	205.247	415.549	356.481	121.454	104.613	114.313	106.459	81.702
jiaolong	13:53:36, 24 Feb 2017	6	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	652.407	581.564	663.032	26.916	27.887	27.205	34.399	28.733	24.953	26.785	22.61	34.306	37.359	122.694	305.838	254.867	377.686	434.39	201.501	131.783	153.684	156.766	136.089
elemental	13:38:37, 24 Feb 2017	7	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	576.101	544.242	663.032	28.956	27.887	27.205	34.399	30.238	24.953	28.498	23.423	31.946	37.359	125.039	299.458	255.293	638.729	549.551	198.869	135.833	153.684	177.282	143.318
akhlut	13:53:20, 24 Feb 2017	8	30	16.263	16.194	11.715	15.818	80.479	166.625	272.513	684.042	506.112	597.403	28.301	33.583	32.175	37.671	29.18	23.432	28.473	22.867	37.21	38.33	130.07	269.611	904.335	397.052	421.606	203.552	290.605	166.664	146.988	109.985
rusalka	02:56:10, 24 Feb 2017	9	30	18.263	20.233	13.187	15.818	80.627	228.442	274.596	551.142	366.46	434.402	16.874	24.869	17.265	26.085	20.324	19.901	18.324	18.794	19.529	28.271	108.024	243.732	209.003	311.792	390.602	143.199	109.768	122.653	110.541	86.182
orthrus	02:21:56, 24 Feb 2017	10	30	16.263	16.194	11.715	15.818	80.479	209.362	272.513	705.555	600.324	715.425	28.533	36.908	32.098	35.68	29.894	26.196	27.887	29.411	40.117	36.592	211.608	311.444	307.844	554.743	472.122	206.031	153.61	202.515	161.42	150.594
valravn	13:51:09, 24 Feb 2017	11	29	24.493	16.194	12.886	15.818	85.426	166.625	273.44	792.425	521.374	524.506	26.521	29.74	21.214	38.456	25.257	26.44	20.72	24.638	26.937	33.851	148.59	310.023	292.517	486.213	407.905	144.964	149.119	N/A	138.726	125.366
cerberus	13:51:21, 24 Feb 2017	12	30	16.263	16.194	11.715	15.818	84.996	166.87	275.287	663.431	619.845	588.314	36.389	42.961	35.671	44.366	44.233	26.96	36.718	28.201	41.467	44.02	171.123	369.557	345.35	453.58	524.168	227.414	168.221	224.711	193.52	134.394
manticore	13:36:05, 24 Feb 2017	13	30	16.263	16.194	11.715	15.818	80.479	282.612	284.273	530.749	350.572	406.496	54.804	62.269	50.355	58.719	54.218	27.457	36.227	23.355	35.706	46.165	286.906	921.275	581.811	1047.361	1064.726	367.001	484.081	516.841	425.62	376.816
inugami	13:49:19, 24 Feb 2017	14	30	17.44	16.194	12.886	16.462	81.572	169.664	281.392	551.29	506.112	588.314	31.678	39.082	30.839	59.205	44.961	24.471	50.69	25.464	38.547	42.072	131.457	286.77	326.126	409.678	540.701	2488.268	146.573	1977.561	2431.2	1706.867
yali	13:12:03, 24 Feb 2017	15	30	16.263	16.194	11.715	22.293	103.222	345.712	538.456	553.633	428.056	761.186	31.643	34.842	37.483	52.801	36.871	40.838	33.122	29.813	83.14	77.403	228.011	579.483	533.112	563.46	448.069	321.462	218.694	384.258	195.643	163.408
thunderbird	07:14:11, 24 Feb 2017	16	30	16.263	16.194	11.715	17.49	84.996	615.901	569.989	634.925	576.879	711.142	29.035	41.313	42.712	56.628	31.071	33.247	35.601	33.917	39.408	43.597	228.345	634.013	488.756	1025.361	769.677	348.318	217.52	407.716	403.29	134.394
bowtruckle	12:11:21, 24 Feb 2017	17	30	18.263	16.194	11.715	16.673	89.71	393.459	318.941	767.298	707.57	761.186	32.172	33.105	33.82	60.644	40.408	34.384	37.698	36.299	38.489	46.241	400.877	796.496	657.299	115.585	636.847	312.627	204.49	264.252	278.827	363.65
niffler	13:52:53, 24 Feb 2017	18	30	16.263	16.194	13.779	15.818	80.479	166.625	272.513	310.793	3597.199	5929.647	156.91	222.453	194.719	193.472	150.594	180.409	189.347	101.333	184.794	217.036	737.467	2806.189	1748.947	2196.921	2561.202					

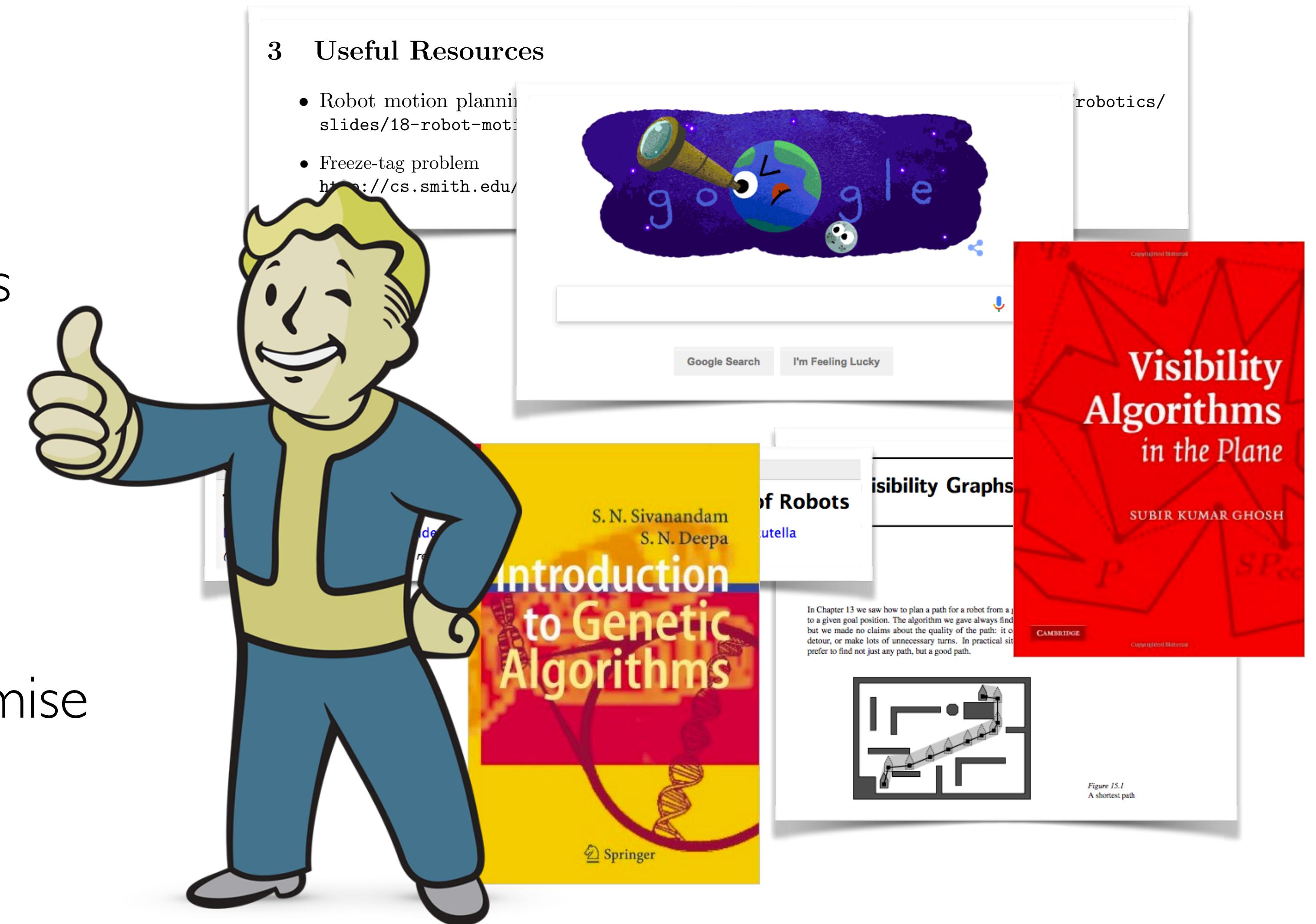
Anecdote I: Don't Trust the Snake

Anecdote 2: Size Matters

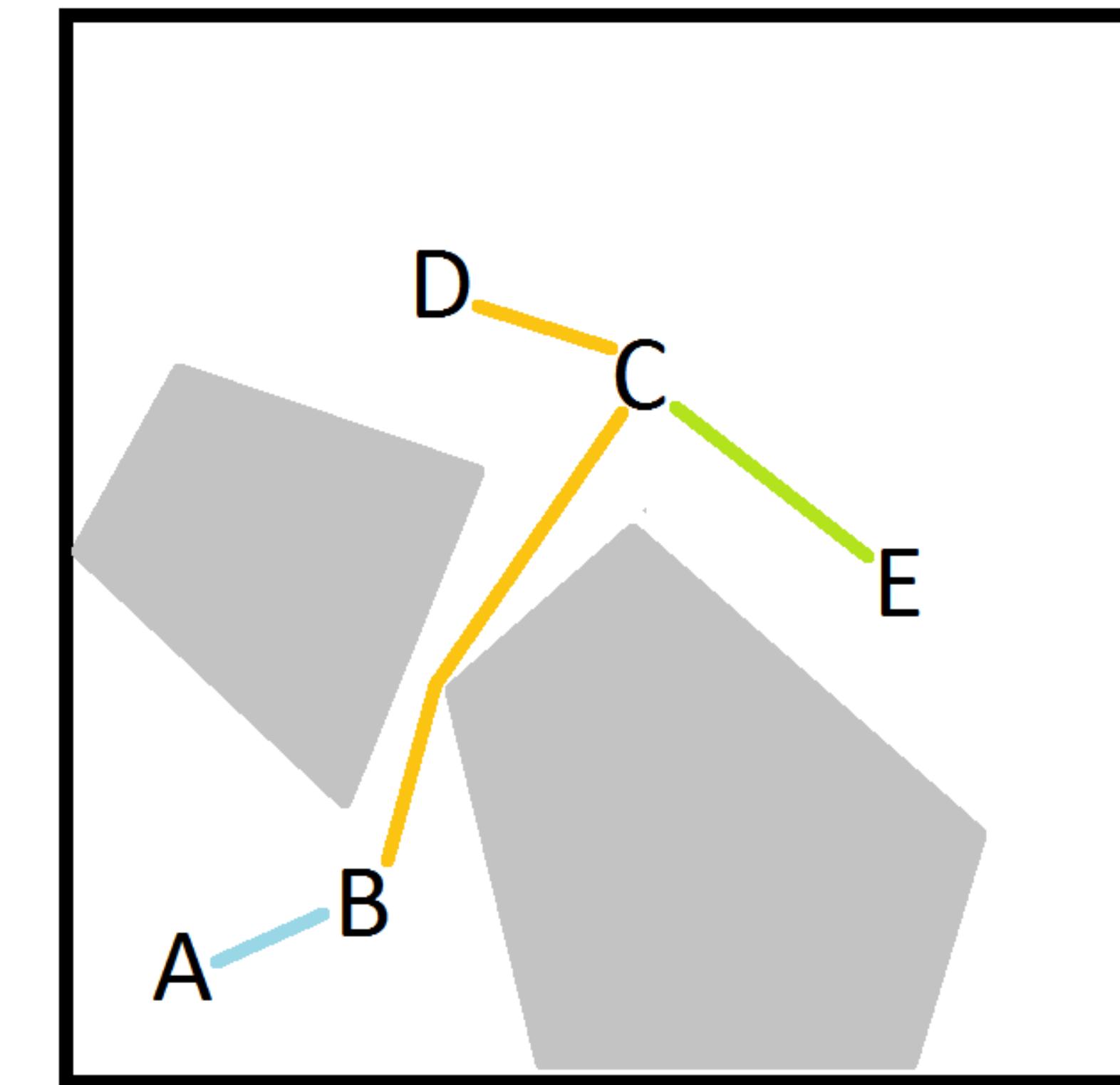
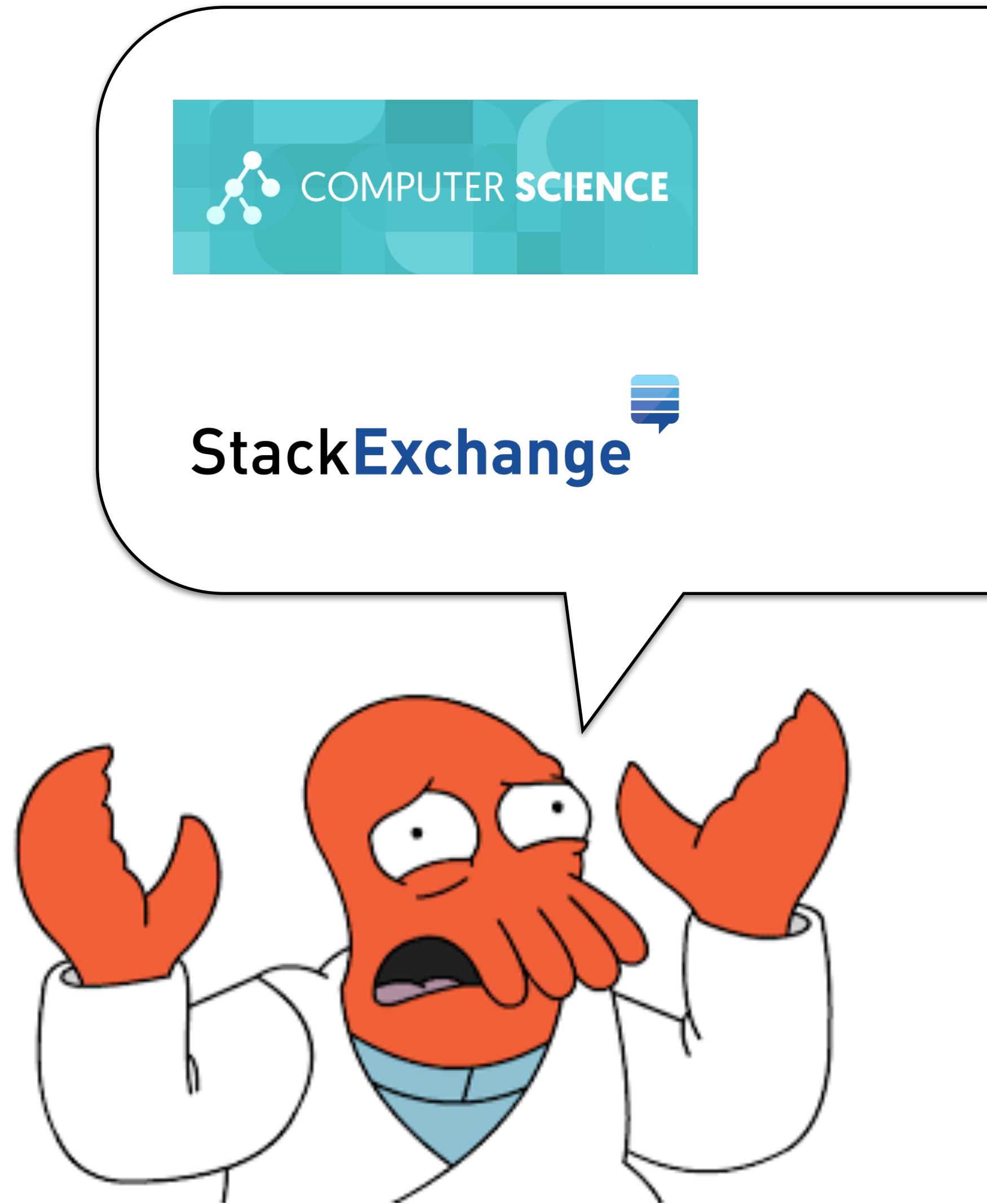
Anecdote 3: On precise requirement specification

How we expected them to approach it

- Check the references
- Break into sub-problems
- Google for topics
- Read articles
- Implement algorithms
- Brainstorm, profile, optimise
- Done!

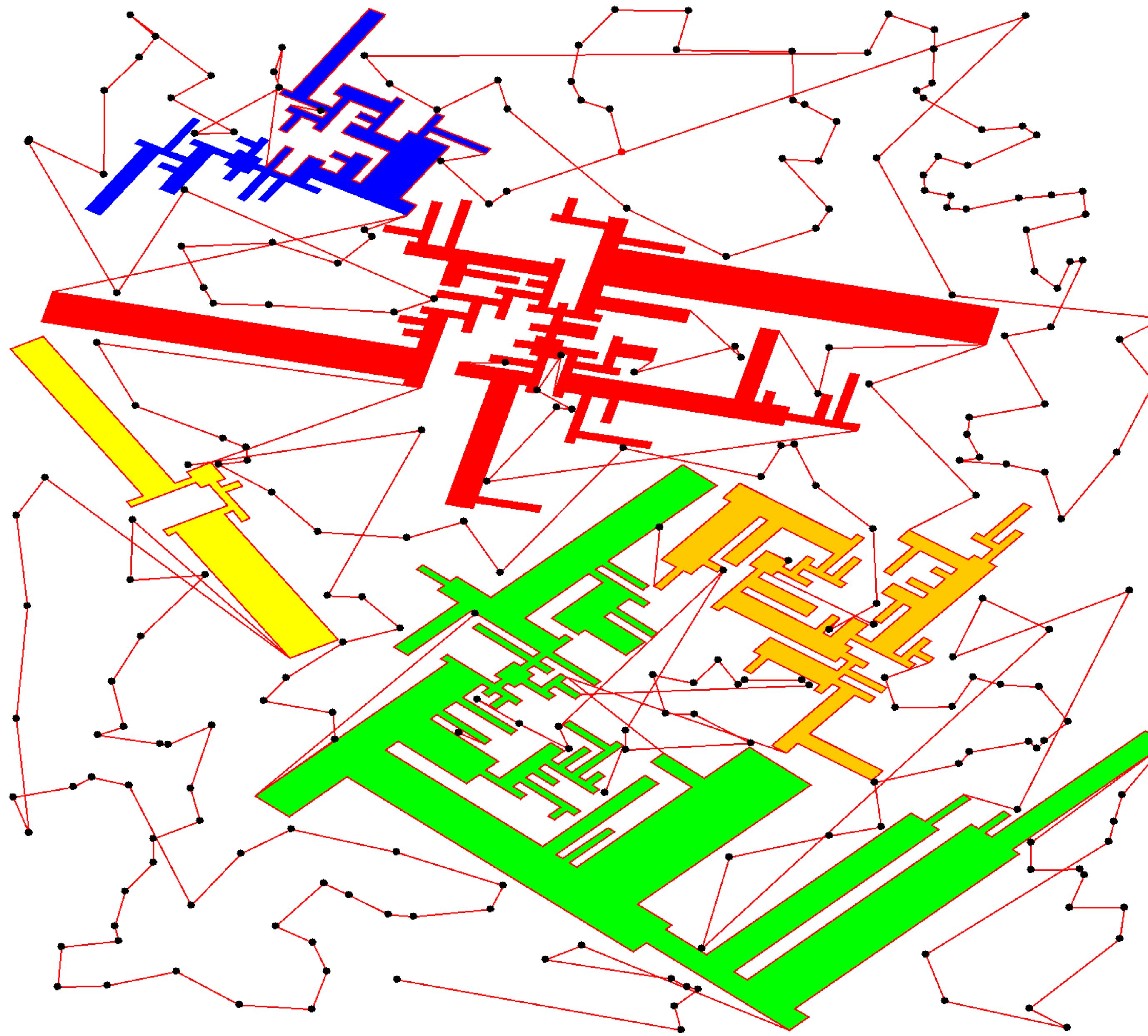


How some of them tried to solve it

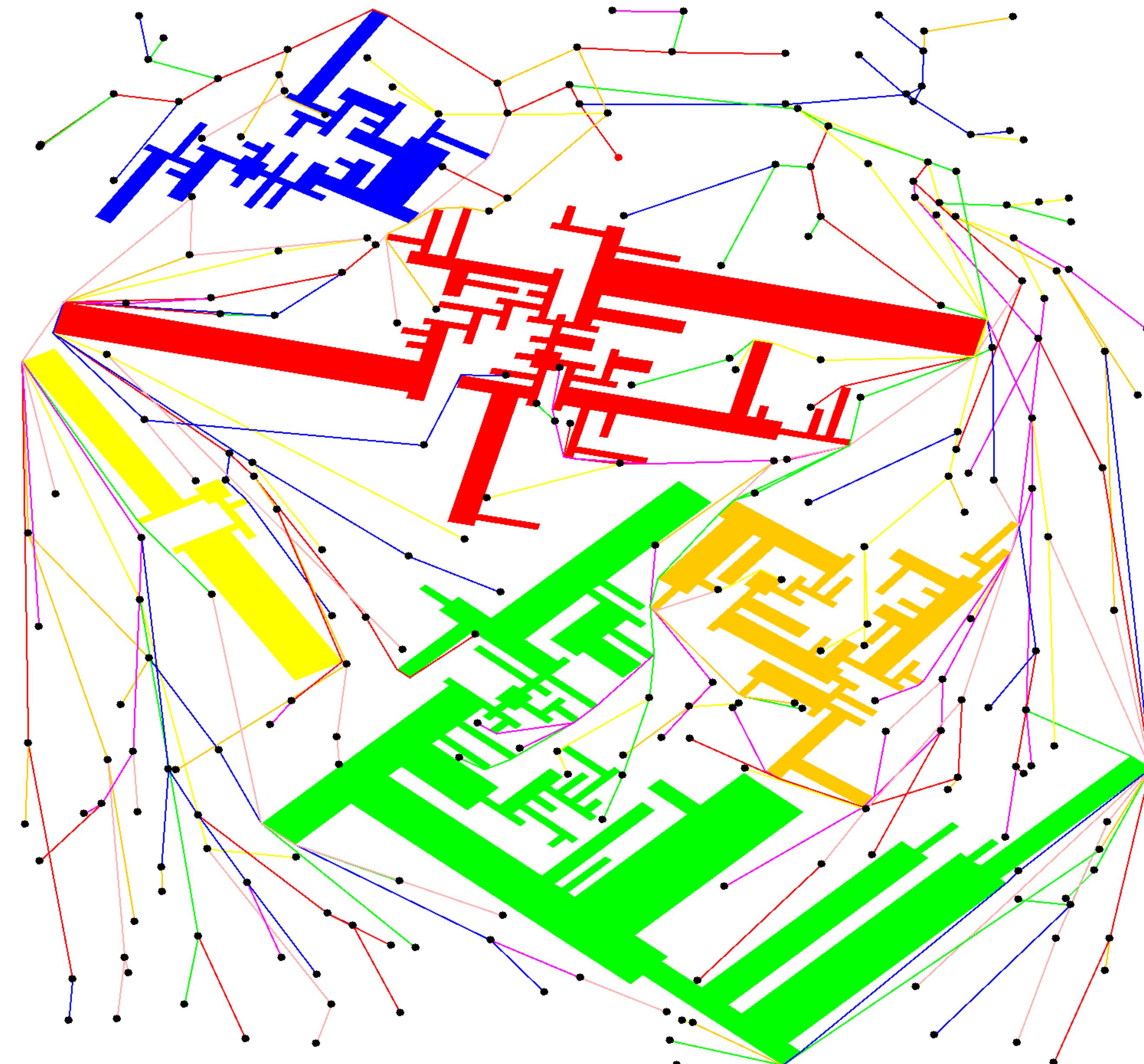


The Winner Team

Monday

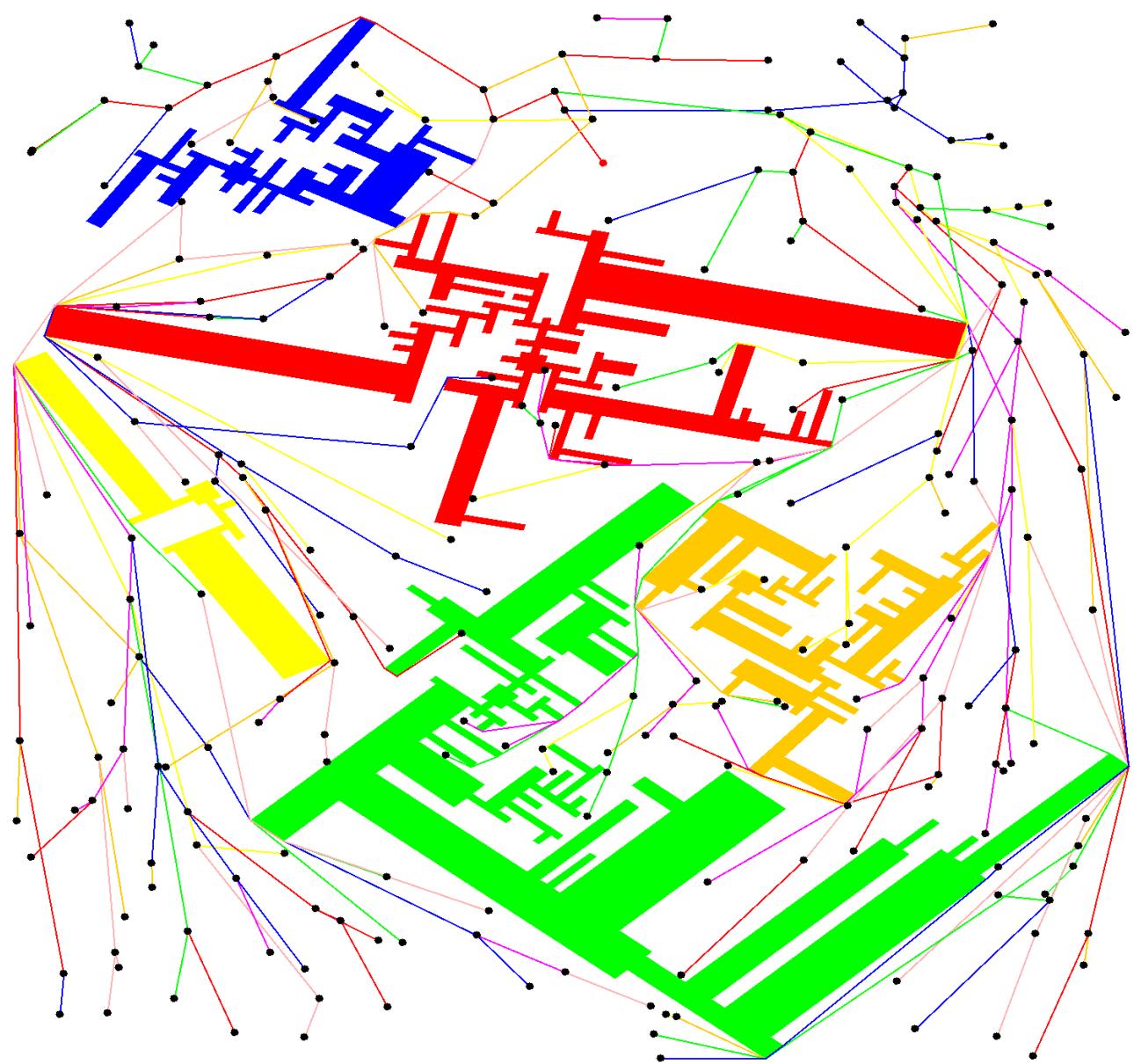


Friday



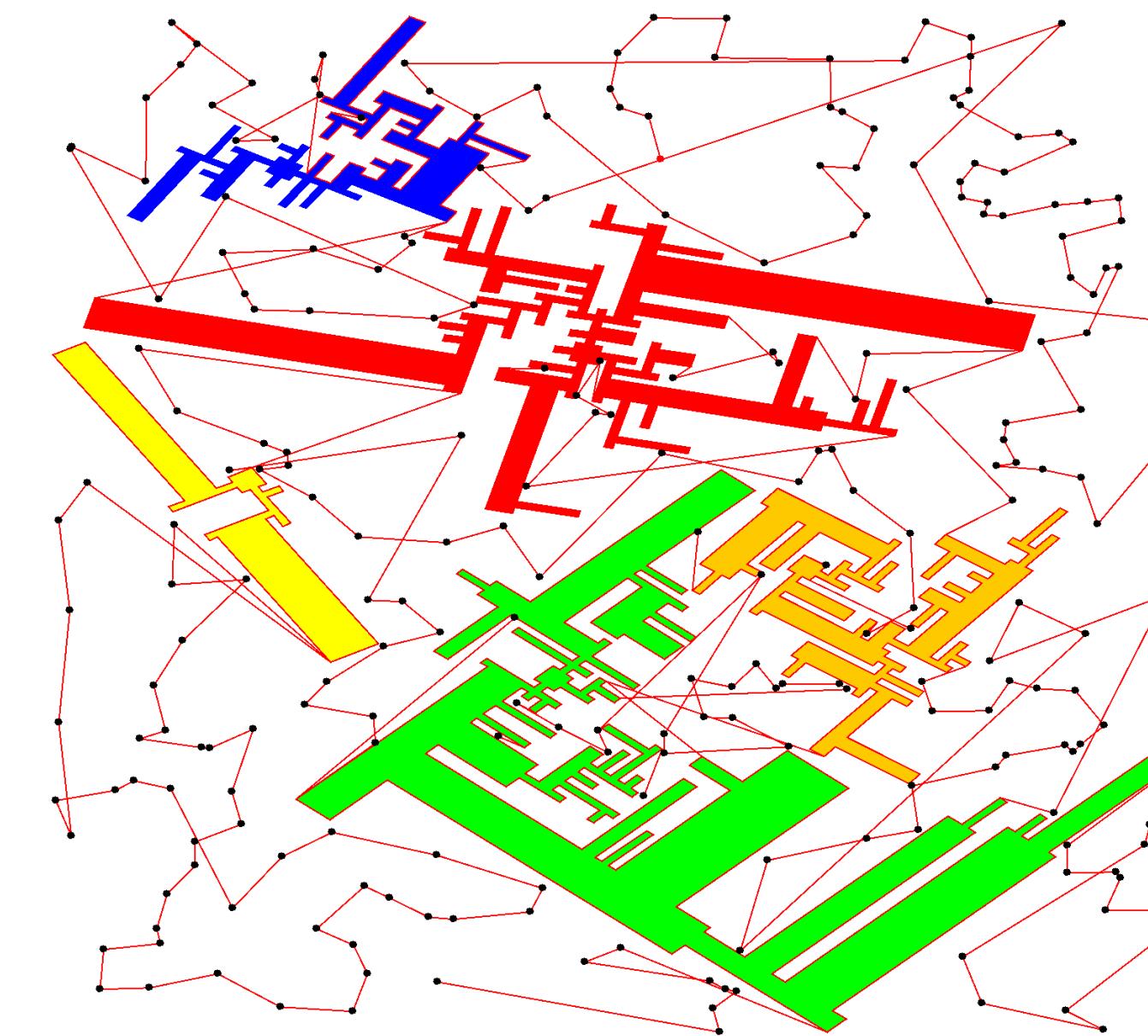
Overall file size <500 KB

44x speed-up



228.293

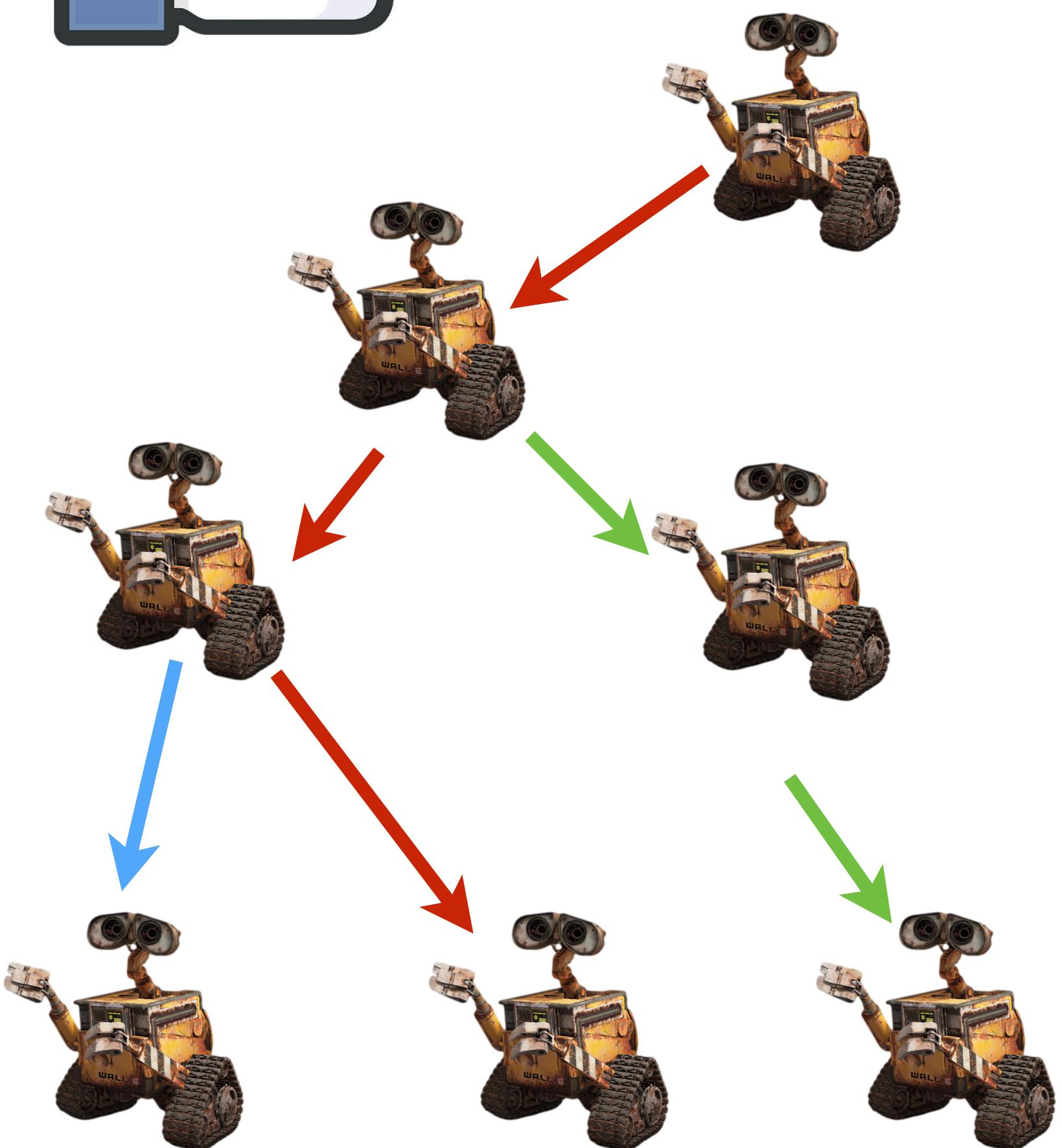
VS



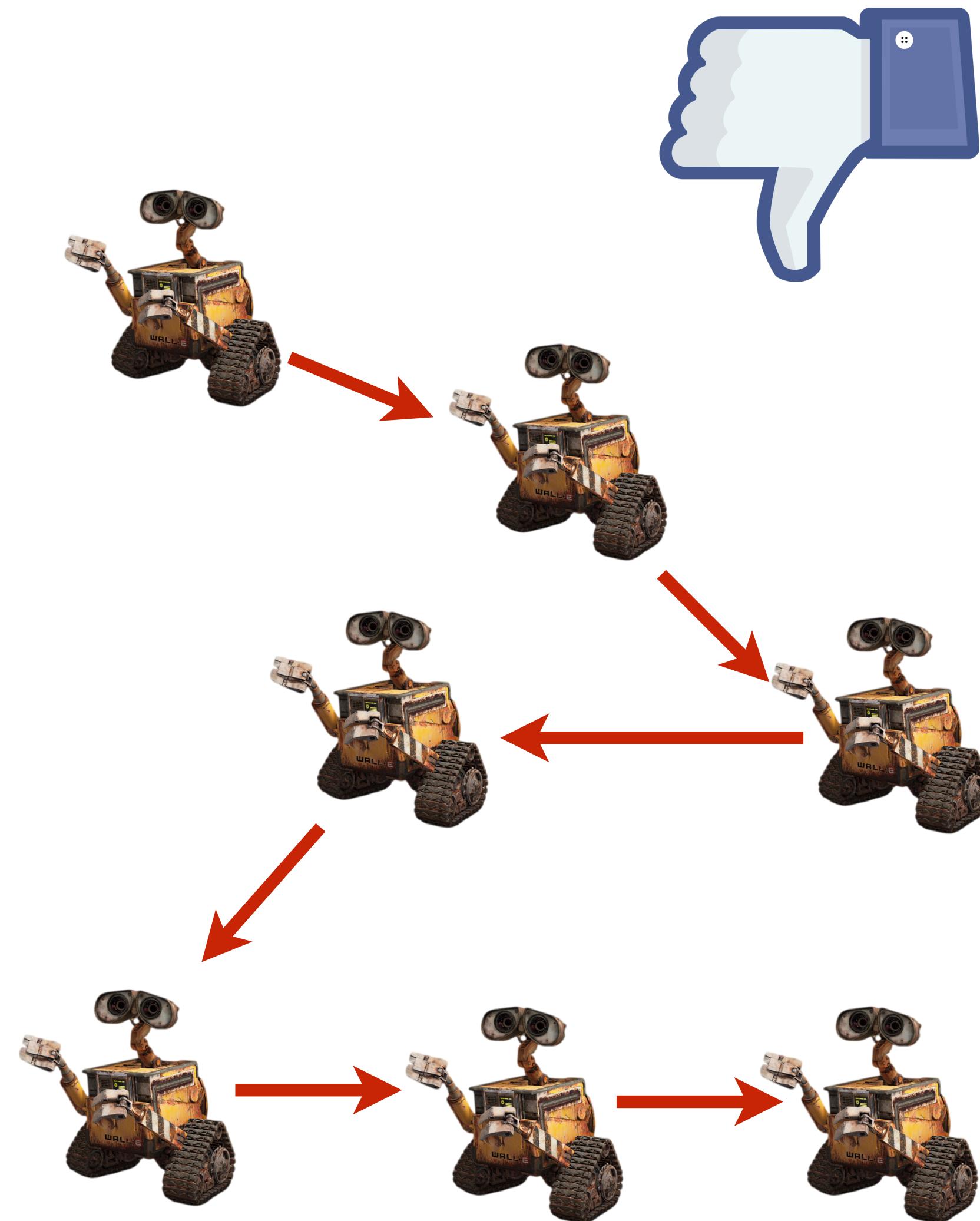
9,984.395

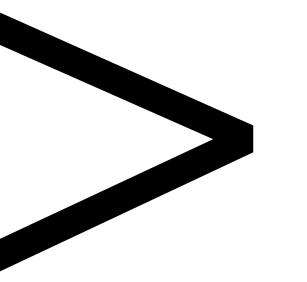
Take-aways for students





>

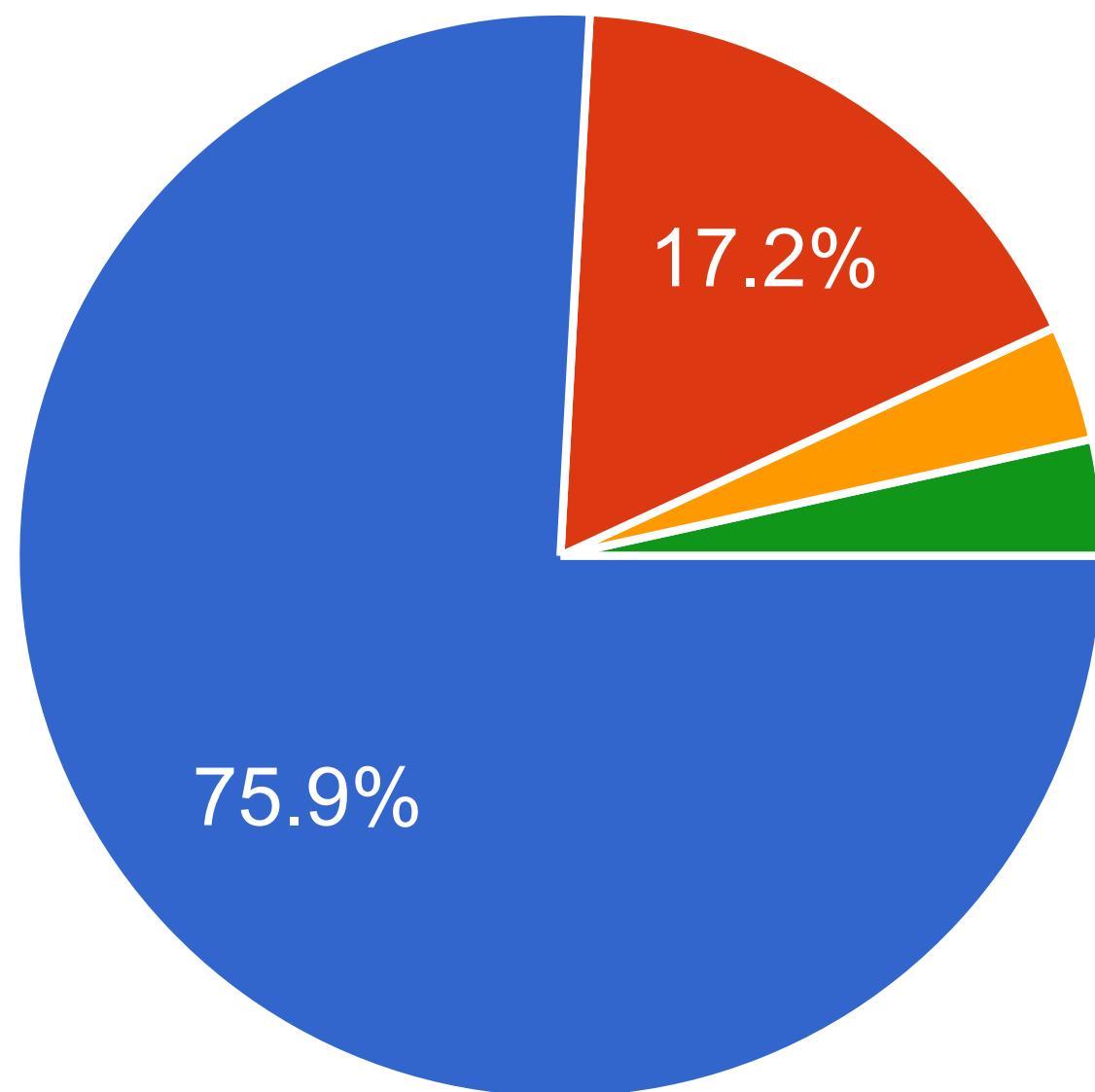




2017: Student's Feedback

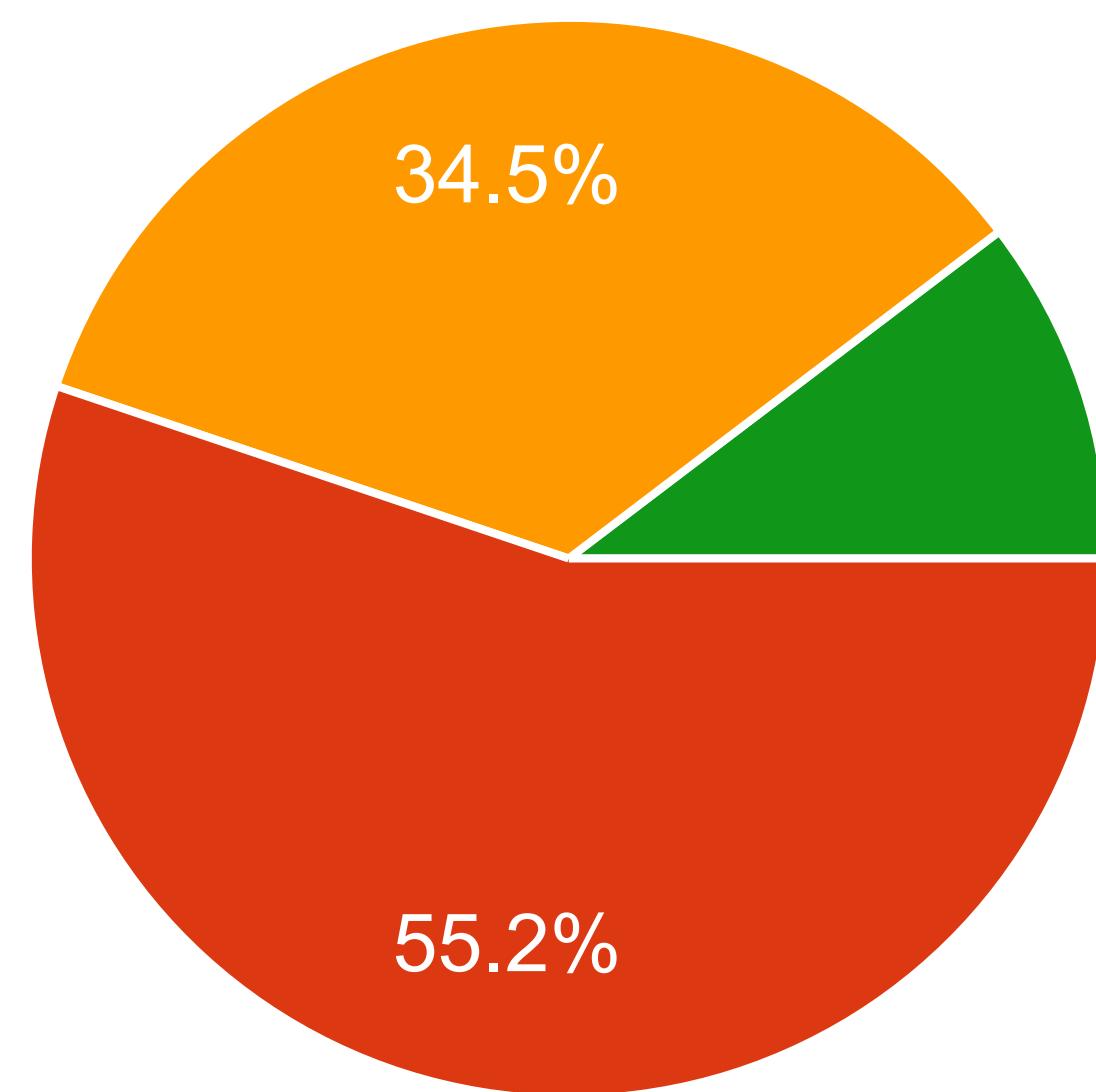
(29 anonymous respondents)

Did you find the scenario week interesting?



Yes!	22	75.9%
It was okay, but still better than other scenario projects.	5	17.2%
It was okay, more or less like other scenario projects.	1	3.4%
It was boring.	1	3.4%

Was the suggested problem difficult?



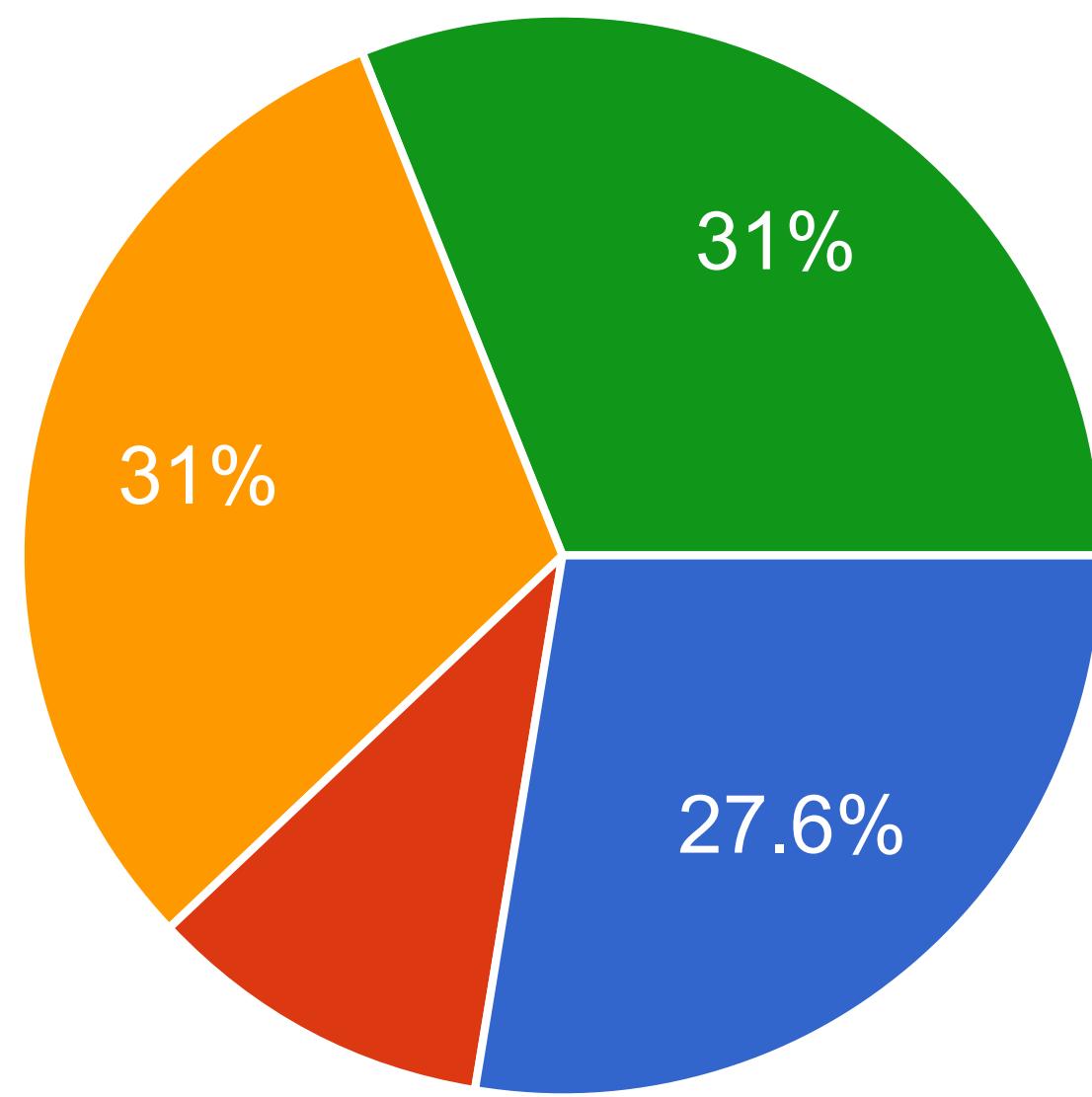
No, it was quite an easy task. 0 0%

It was at the right level of difficulty for a week-long project. 16 55.2%

It was quite difficult. 10 34.5%

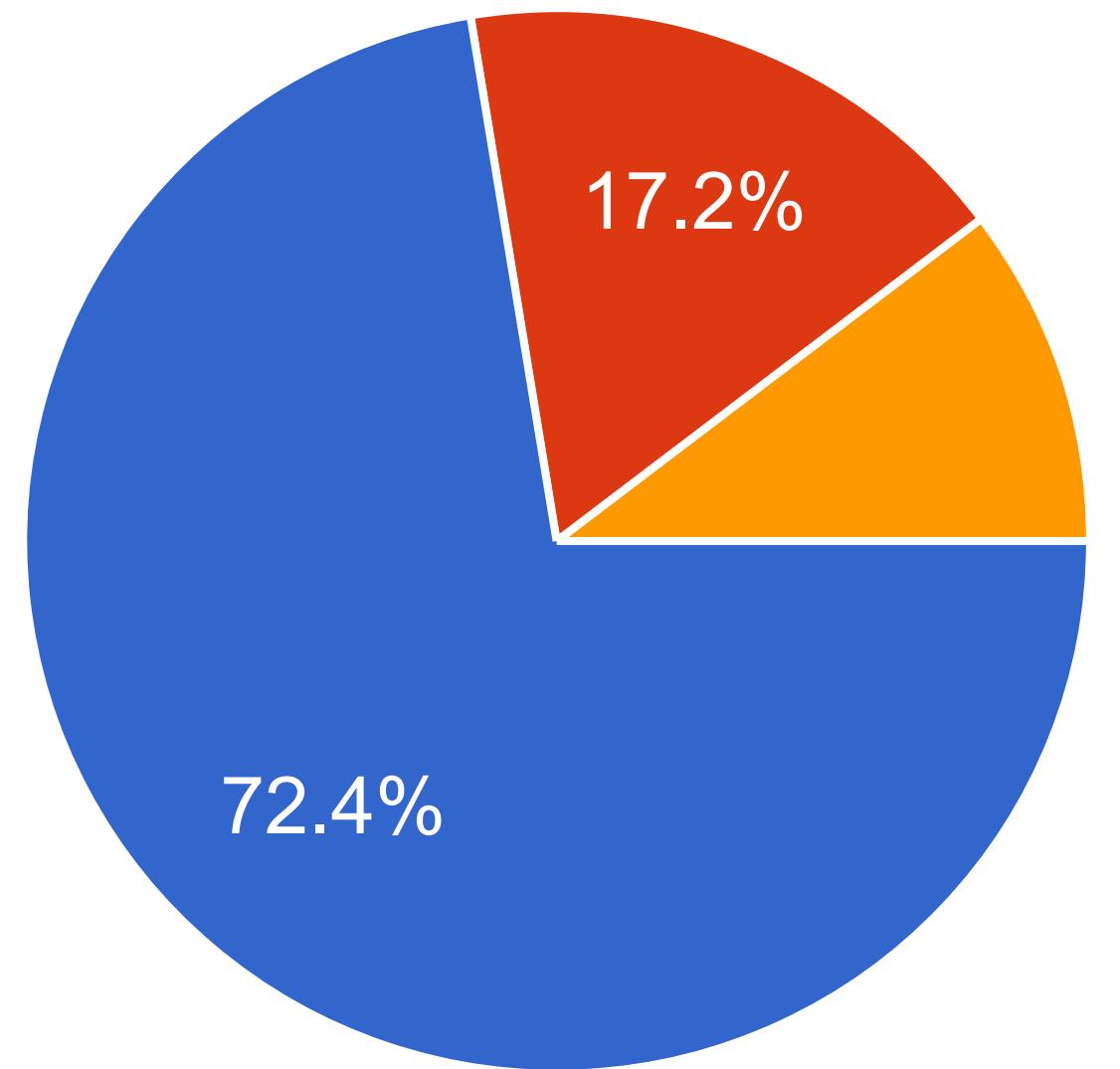
Are you kidding? It was absolutely impossible to complete in time. 3 10.3%

Did you try to implement any algorithms from the papers and slides given as Useful Resources in the specification?



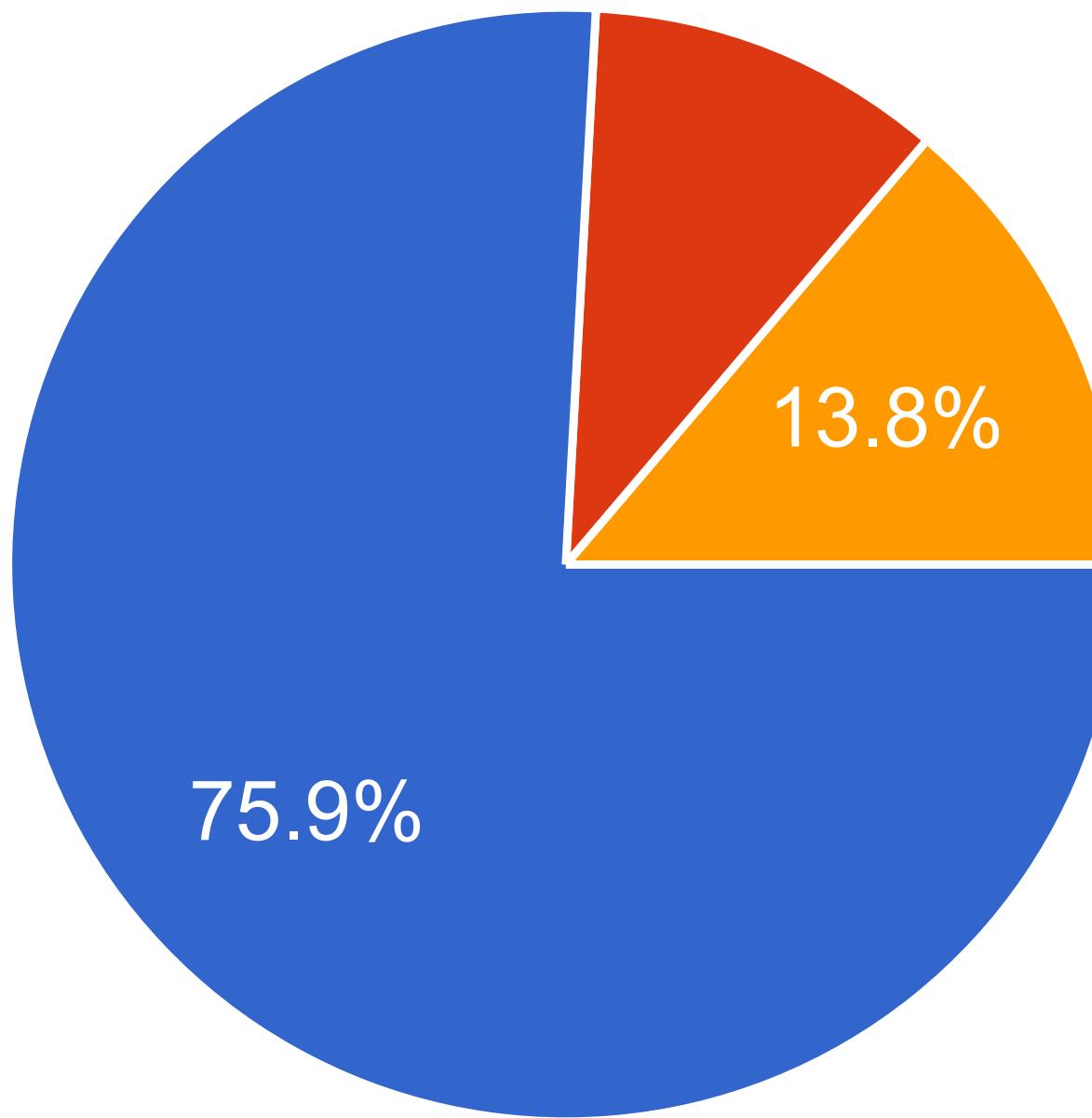
Yes, and it was helpful.	8	27.6%
Yes, but we eventually came up with something better.	3	10.3%
No, we designed our own algorithms.	9	31%
No, we implemented/reused the algorithms from other sources.	9	31%

Having a part of the week formed as a competition is a good idea.



Yes	21	72.4%
No	5	17.2%
I don't care	3	10.3%

It was useful to see the results of all teams online.

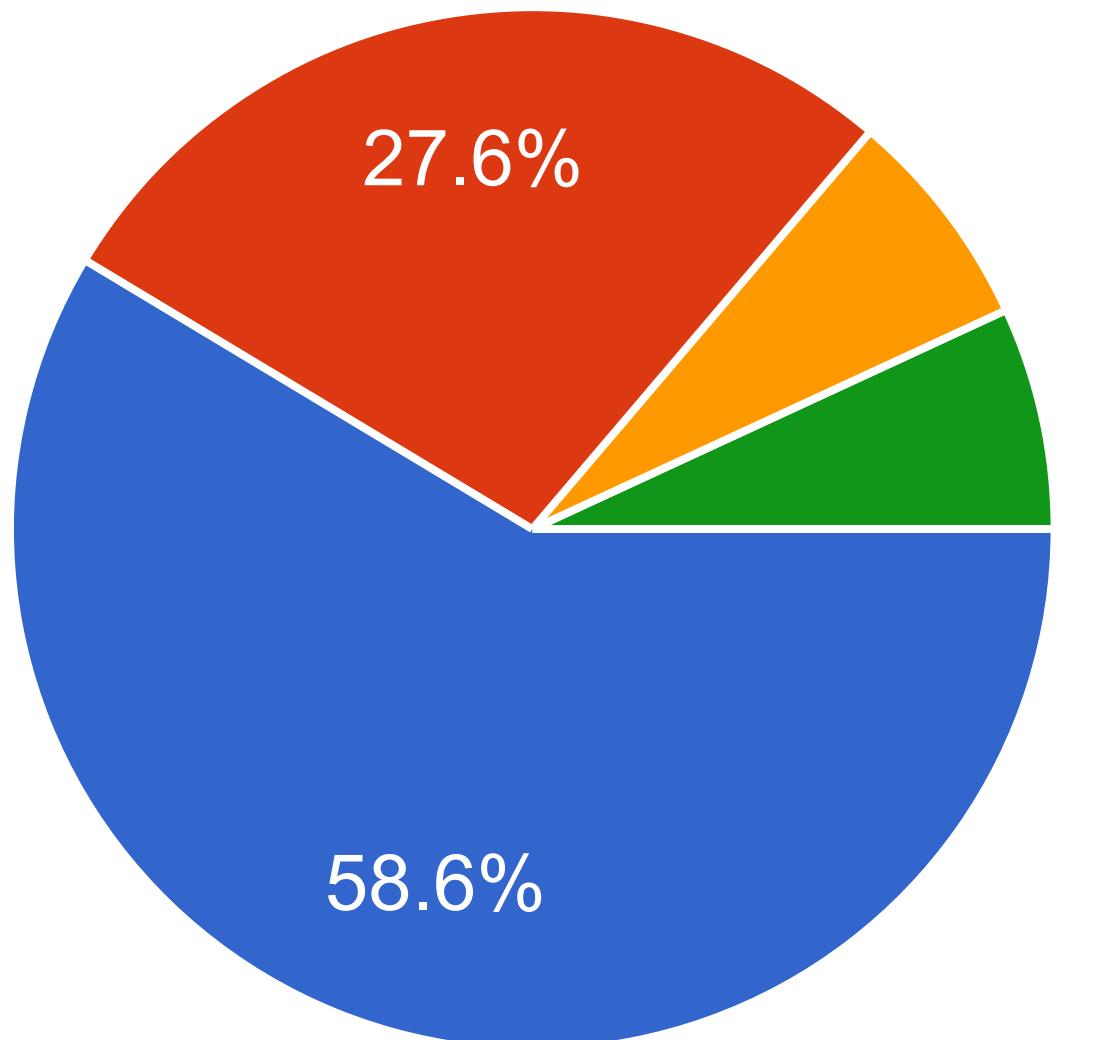


Yes, it was stimulating **22** 75.9%

No, it was distracting **3** 10.3%

I don't care **4** 13.8%

Your overall rating of this scenario week

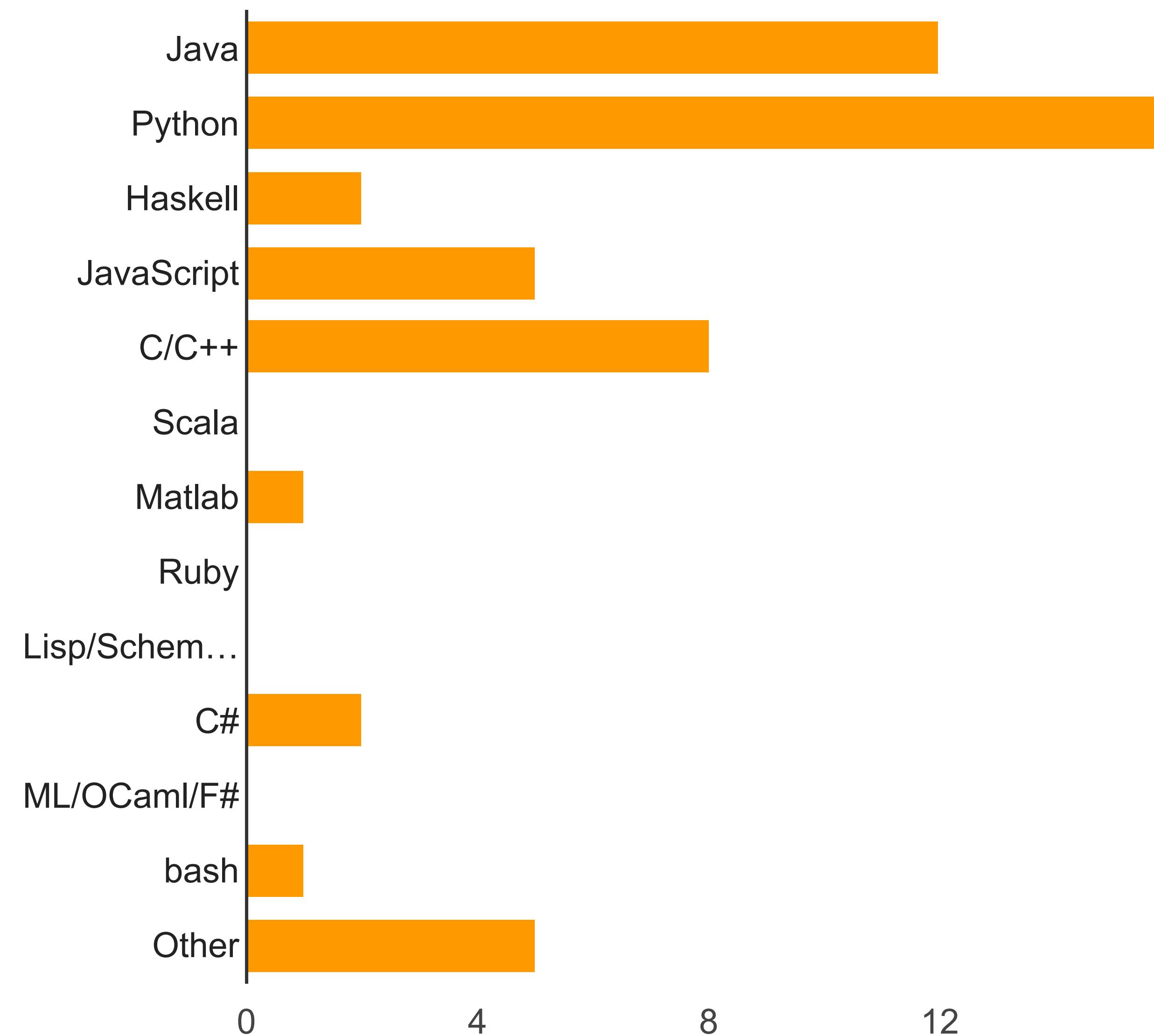


Excellent	17	58.6%
Good	8	27.6%
Okay	2	6.9%
Poor	2	6.9%
Awful	0	0%

Activities conducted by the teams

Reading articles, blogs and forums on the relevant algorithms	28	96.6%
Looking for useful third-party libraries and learning to use them	26	89.7%
Engineering your own implementations of geometric algorithms	29	100%
Testing your solutions	26	89.7%
Optimising your solutions for the shortest robot awakening time	26	89.7%
Implementing the visualisation procedure and admiring the results	28	96.6%
Brainstorming on the algorithms with the team members	27	93.1%
Writing tests for your algorithm	8	27.6%
Debugging the implementation	26	89.7%
Optimising the output file size	14	48.3%
Tweaking the solution files, hoping that the server will finally accept them	10	34.5%
Being depressed because of the complexity of the task	13	44.8%
Other	2	6.9%

Which programming languages did you use during the week?



Good bits

Most interesting learning about different algorithms, boring finding the right ways of implementation of the algorithms, like collision detection etc

It was very motivating to see everybody's results, especially if you knew who the people in some teams were, competition made it more fun.

Amazing problem and we could use any language and any library

I think the competition definitely adds in excitement for the week. Our team was finished by Thursday, but continued to work on our solutions to improve our timings.

Useful bits

My programming skills, I know now which areas i should work on to become a better programmer

Programming experience with Python, exposure on how to tackle an NP-hard problem

Got interested in computational geometry

All of it. I will be doing similar things in summer internship, so getting experience with search/sort graph algorithms was really useful

Bad bits

Make server less frustrating!!!

More guidance on algorithms that could be helpful, and what terminology we should be looking up. This was a one month project with the amount of technical guidance given, and the marking structure completely penalised those of us who worked really hard but were just not able to make much technical headway.

Personally, I found the task to be overwhelmingly difficult, especially for my team where no group member was a very experienced/advanced coder. Struggling with the programming aspect of the task was rather discouraging. Perhaps for future scenario weeks, group members can be allocated differently for a more even distribution of skills across teams.

Fun bits

What was suboptimal - my solution to the problem

Prizes for the top teams would have been cool,

Most difficult: when the server said there was an overlap when we could not see one even when zoomed into a visualisation, and when visibility graph libraries were plotting lines straight through the obstacles. Easiest: parsing the input. A bit of string manipulation boosted my self-confidence by a solid 2 - 3% before the next 4 days of turmoil, sleep-deprivation and about three times as many Git branches as people.

To take away

- Computational Geometry is a great source of elegant problems;
- Let's turn them into competitions for Fun and Education!



Thanks!



