Average Complexity for the LOCAL Model

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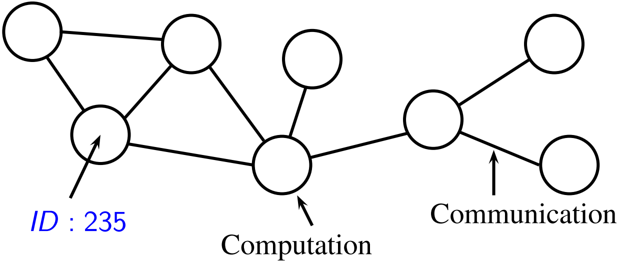
PODC 2015 · 22 July

The LOCAL model

- Computation model : a network of machines
- For every vertex, a unique identifier



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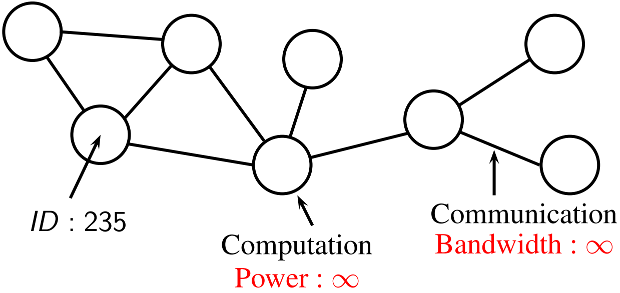
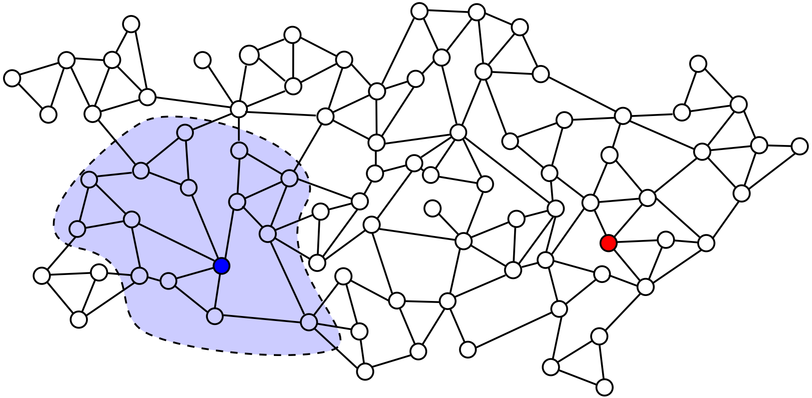


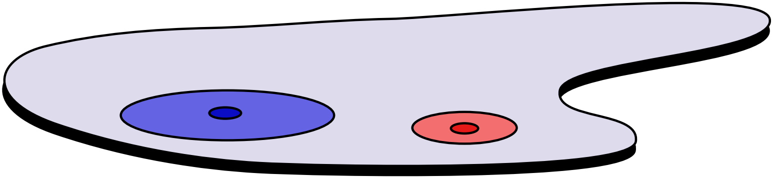
The LOCAL model

Minimize time = Localize computation



Complexity measures

The neighbourhoods are balls of potentially different radiuses.



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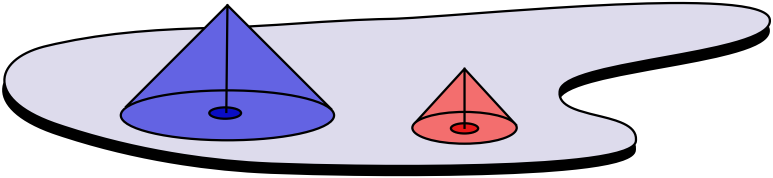

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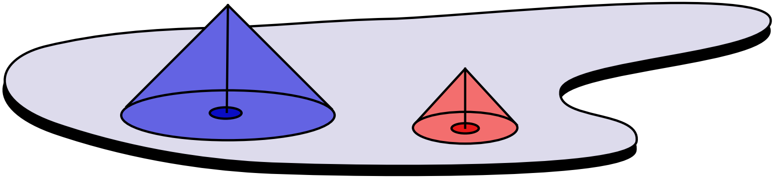
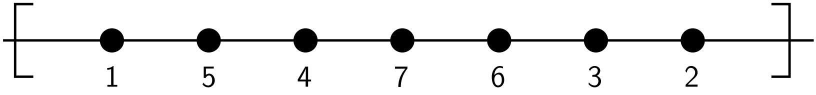


- Classic complexity : maximum radius
- Average complexity : average of the radiuses

Do I have the biggest identifier ?



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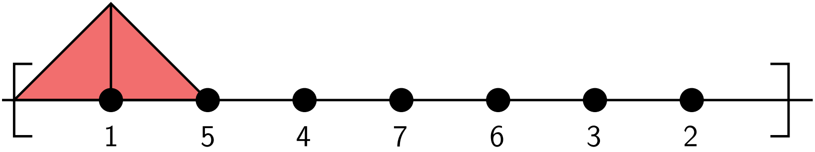

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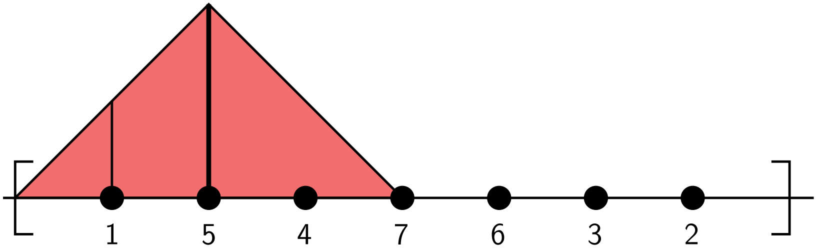

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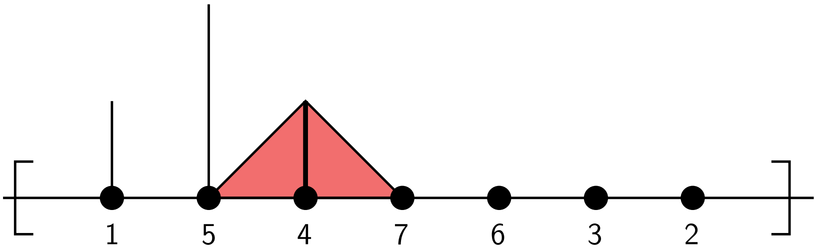

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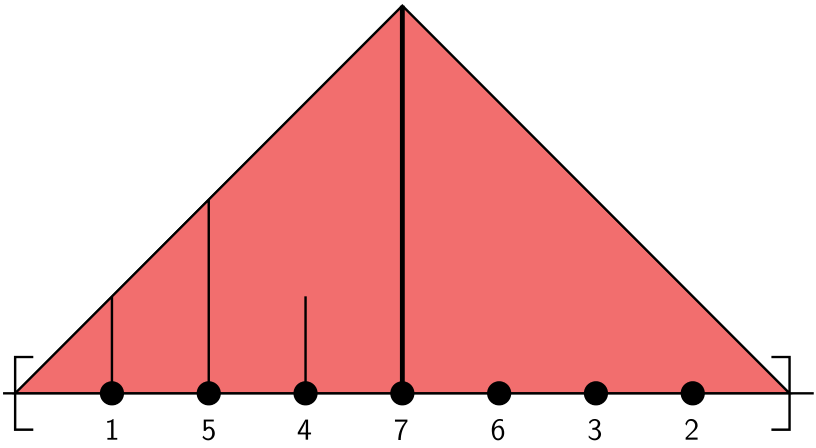

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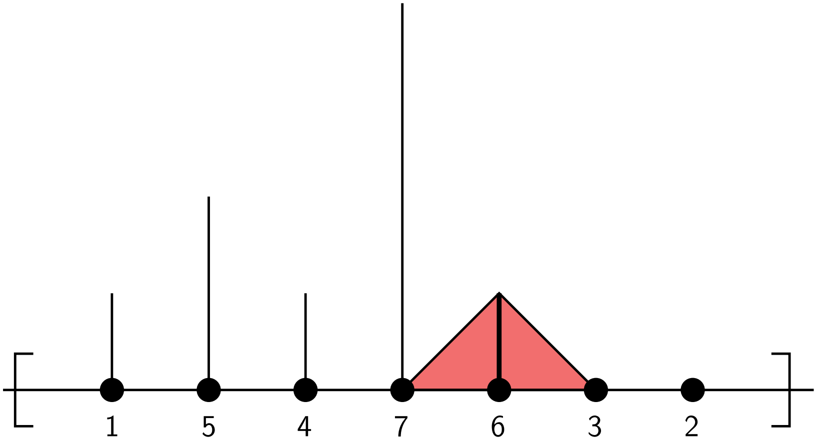

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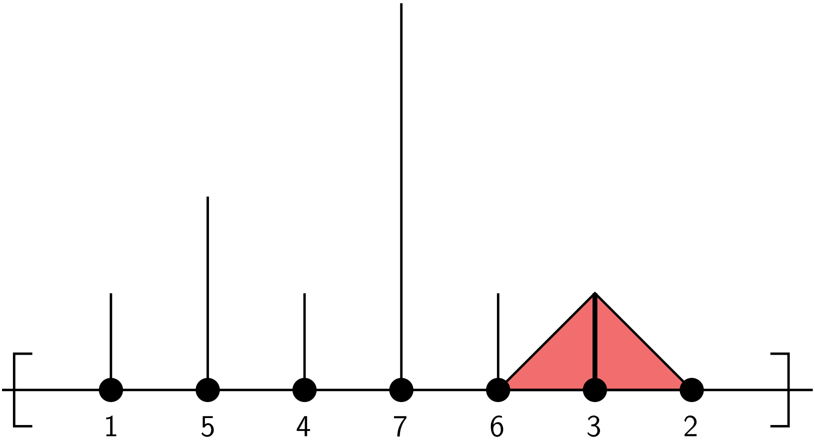

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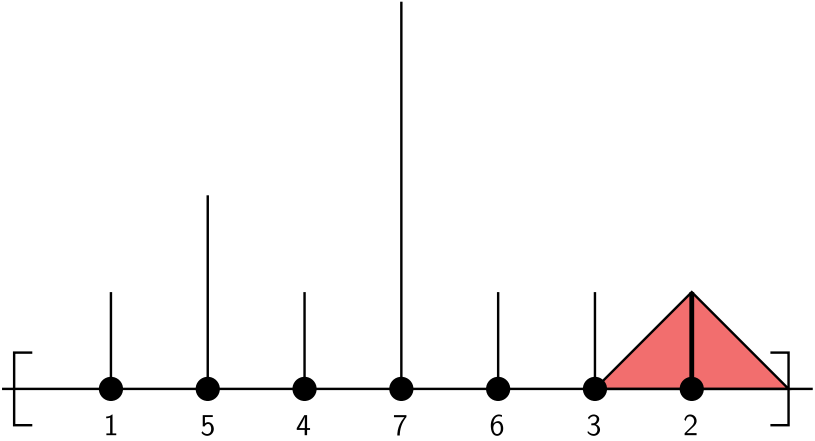

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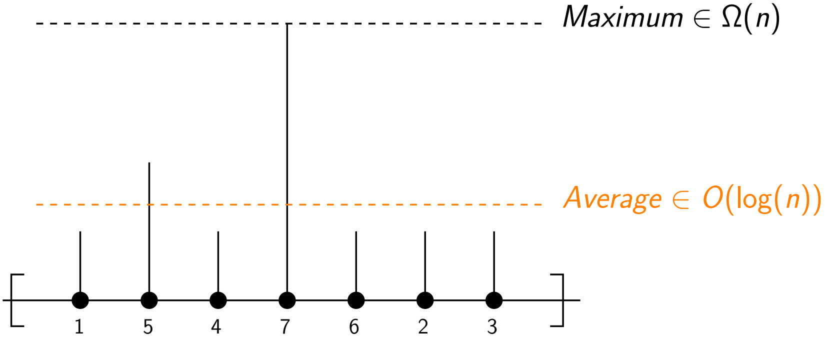
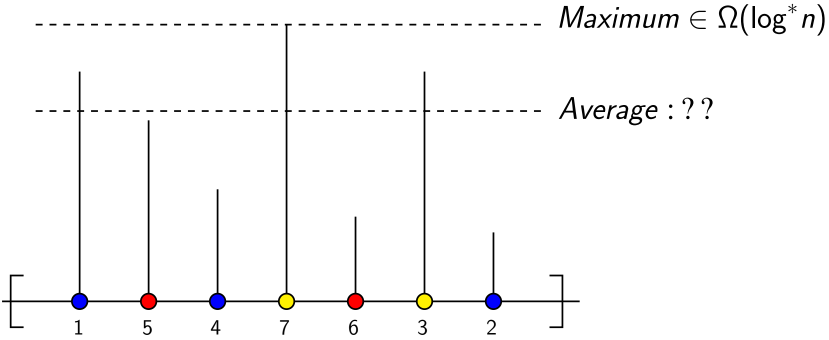


3-coloring of the ring

Theorem (Linial) :
The (classic) complexity of 3-coloring is in $\Theta(\log^* n)$.

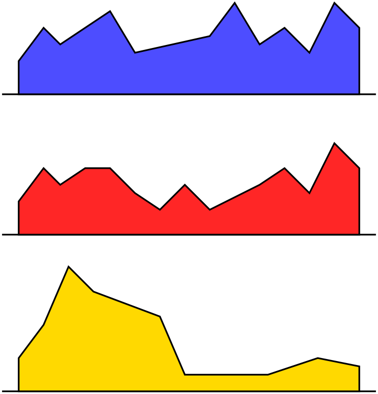


3-coloring of the ring

Theorem : The average complexity of 3-coloring is in $\Theta(\log^* n)$.

A glimpse of the proof

We consider minimal algorithms.



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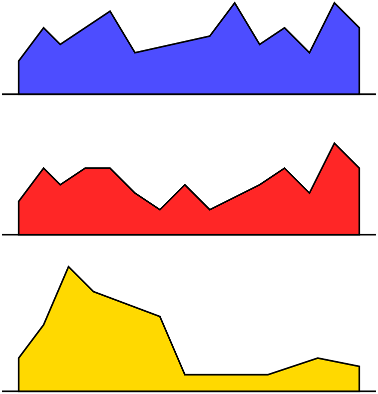

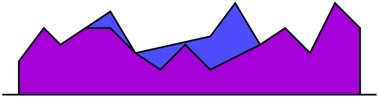

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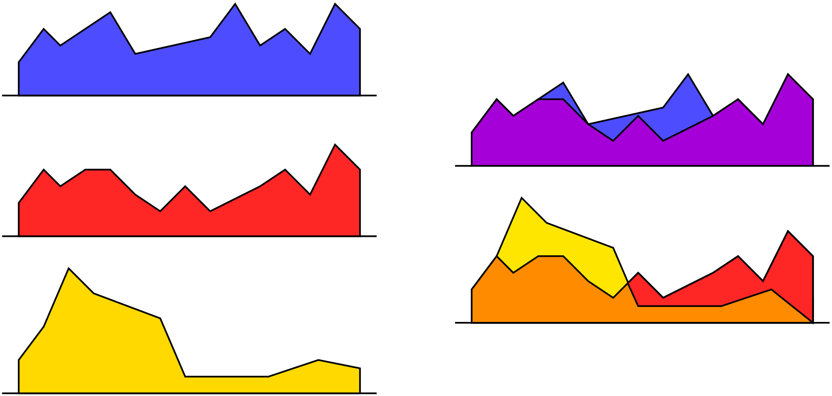
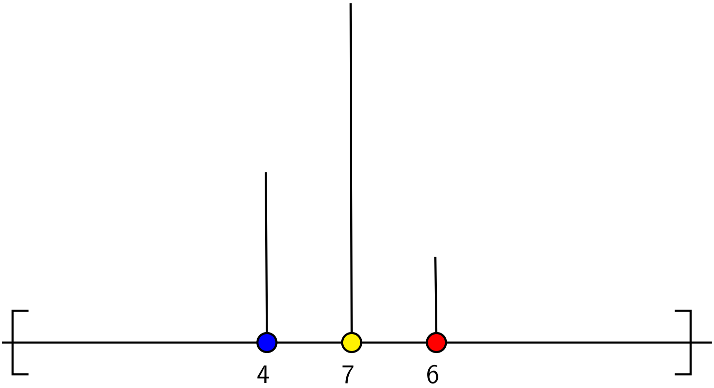


A glimpse of the proof

For a minimal algorithm, there is no isolated peak.



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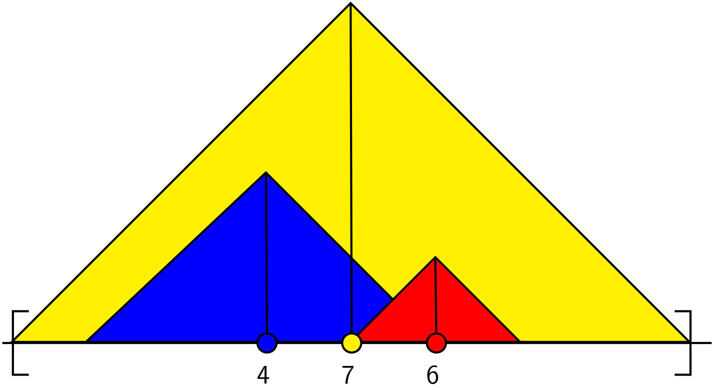

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