Eco-P colonies

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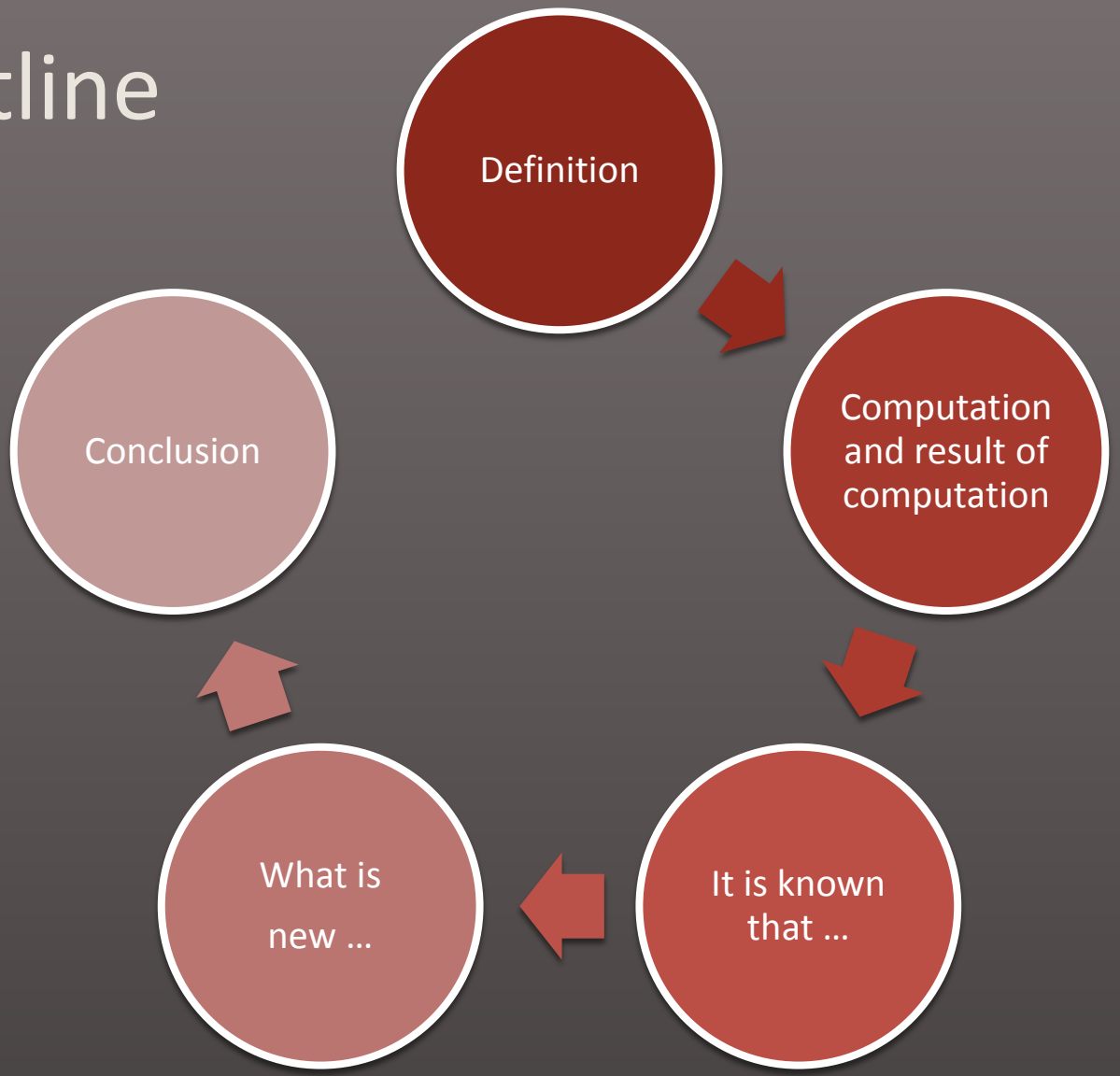
Outline


Definition
Computation and result of computation
It is known that …
What is new …
Conclusion

Eco-P colony

- A team of one membrane agents placed in dynamical environment
- Eco-P colony has only one **alphabet** – a set of objects, *e* is environmental object and *f* is final object
- A mechanism of changes of the environment is based on **0L scheme**
- Agents are working according to **generating** and **consuming programs**

Eco-P colony Π

is a structure

$$\Pi = (A, e, f, V_E, D_E, B_1, \ldots, B_n),$$

- A is an alphabet
- e is an environmental object
- f is a final object
- V_E is an initial content of the environment
- D_E is 0L scheme of the environment
- $B_1, \ldots, B_n$ are agents placed in the environment
- Agent B_i is a pair (O_i, P_i) where O_i is a multiset of objects, $|O_i| = 2$, and P_i is set of consuming or generating programs.

The computation

- Maximally parallel
- It starts from initial configuration (given by definition) and it ends when no one agent can apply any of its programs.

- The result is the number of final objects present in the environment at the end of computation

Notation

- $NEPCOL_{x,y,z}(n, h)$
- ***x*** – a kind of agents in eco-P colony – *s* = sender, *c* = consumer
- ***y*** – "activity" of the environment *active* or *passive*
- ***z*** = *ini* if the eco-P colony at the beginning of computation contains objects different from *e*.
- ***n*** – degree of eco-P colony (the number of agents)
- ***h*** – height of eco-P colony (the maximal number of programs associated with one agent)

It is known that …

Sender

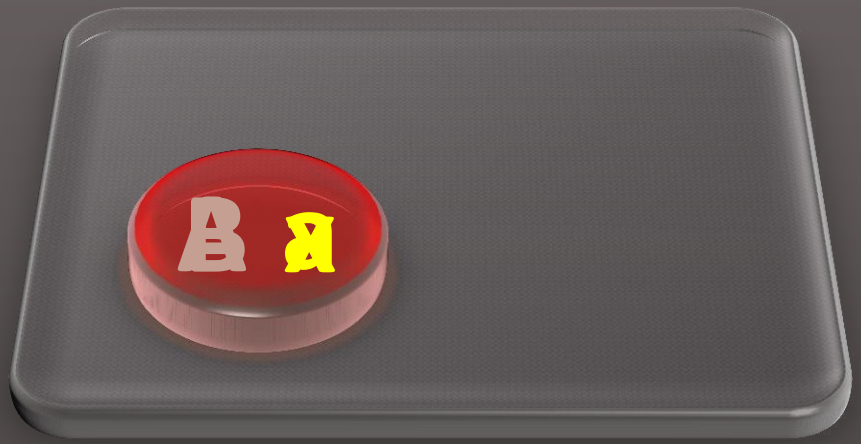
- Agent sender generates object according to its content, this new object it places to the environment in the next step of computation.

Regular grammar

- In each step of computation grammar generates one terminal from only one nonterminal.

It is known that …

Sender	Regular grammar



<A → aB; x out>

A → aB

It is known that …

Consumer

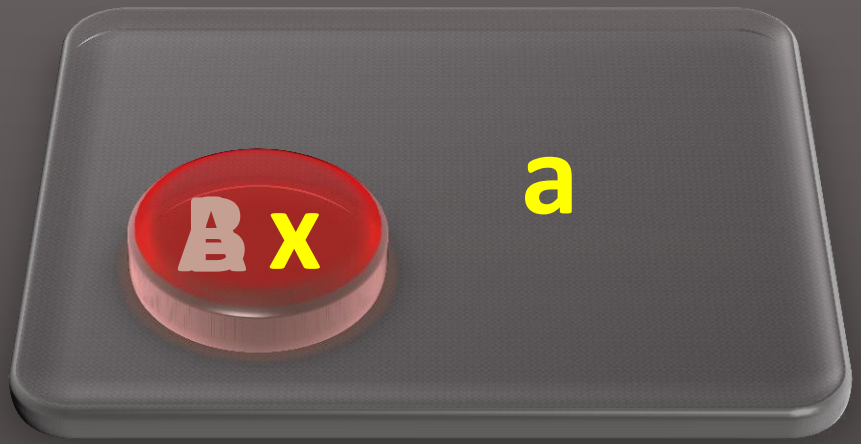
- Agent consumer according to its content takes object from the environment and it changes its content.

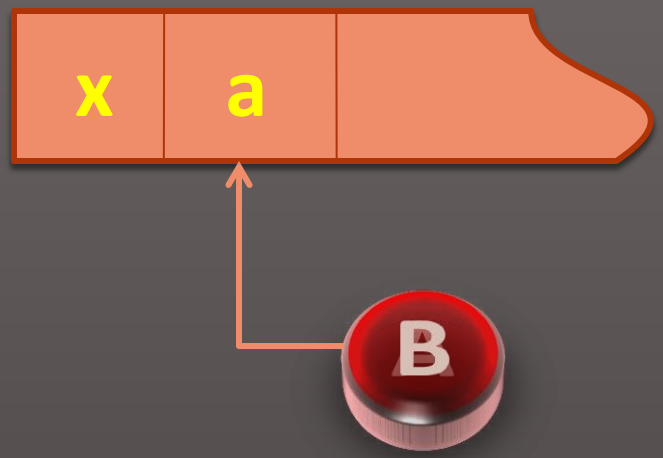
Finite automaton

- In every step of computation automaton reads one symbol from input tape and changes its state.

It is known that …

Consumer	Finite automaton





$\langle Ax \rightarrow B; a \text{ in} \rangle$

$\delta(A,a)=B$

It is known that …

- Eco-P colonies with passive environment and with three agents consumers and senders can generate the set of recursively enumerable sets of natural numbers

$$NEPCOL_{sc;passive}(3; *) = NRE$$

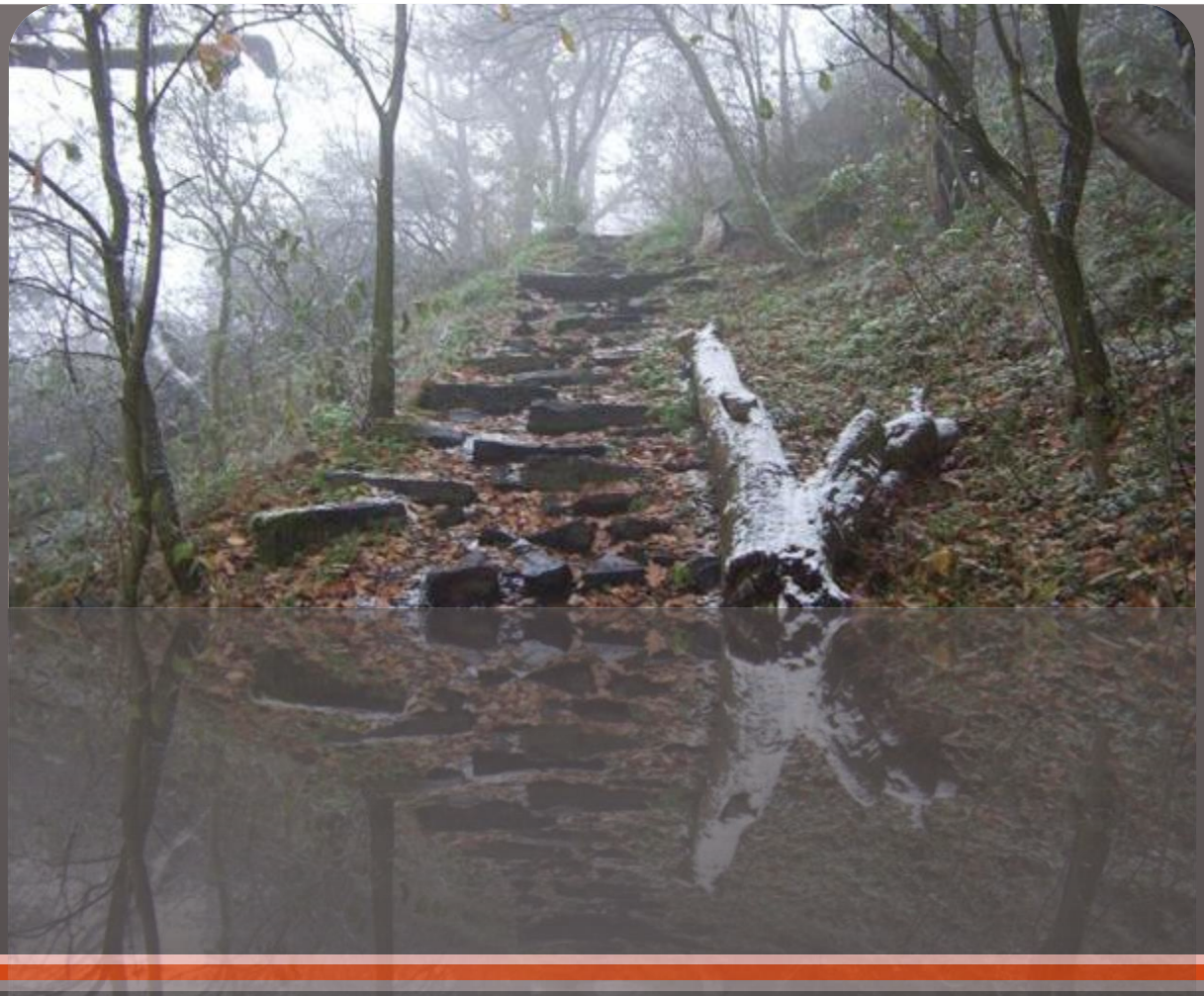
What is new …

- NEPCOL $_{c;active;ini}(2;*)$ = NRE
- NEPCOL $_{sc;passive}(2;*) \supseteq NRM_{pb}$

Conclusion

- NEPCOL $_{sc;passive}(2; *) = ?$

- Description and complexity of computation ?



Thank you for your attention.