Towards a New Inheritance Definition in Multi-Agent Systems

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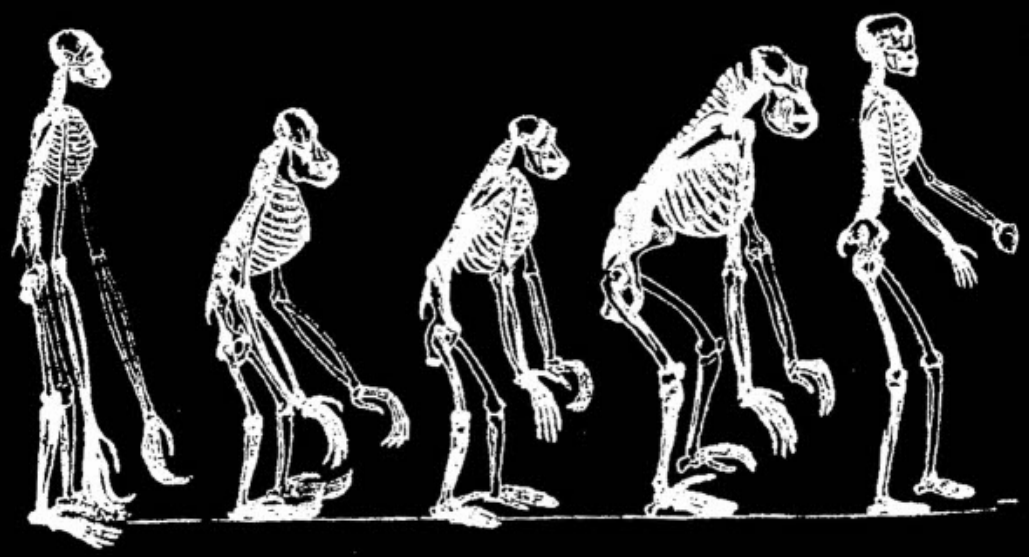
Evolution

- How can system entities evolve themselves in order to achieve the best fitness for solving a problem?

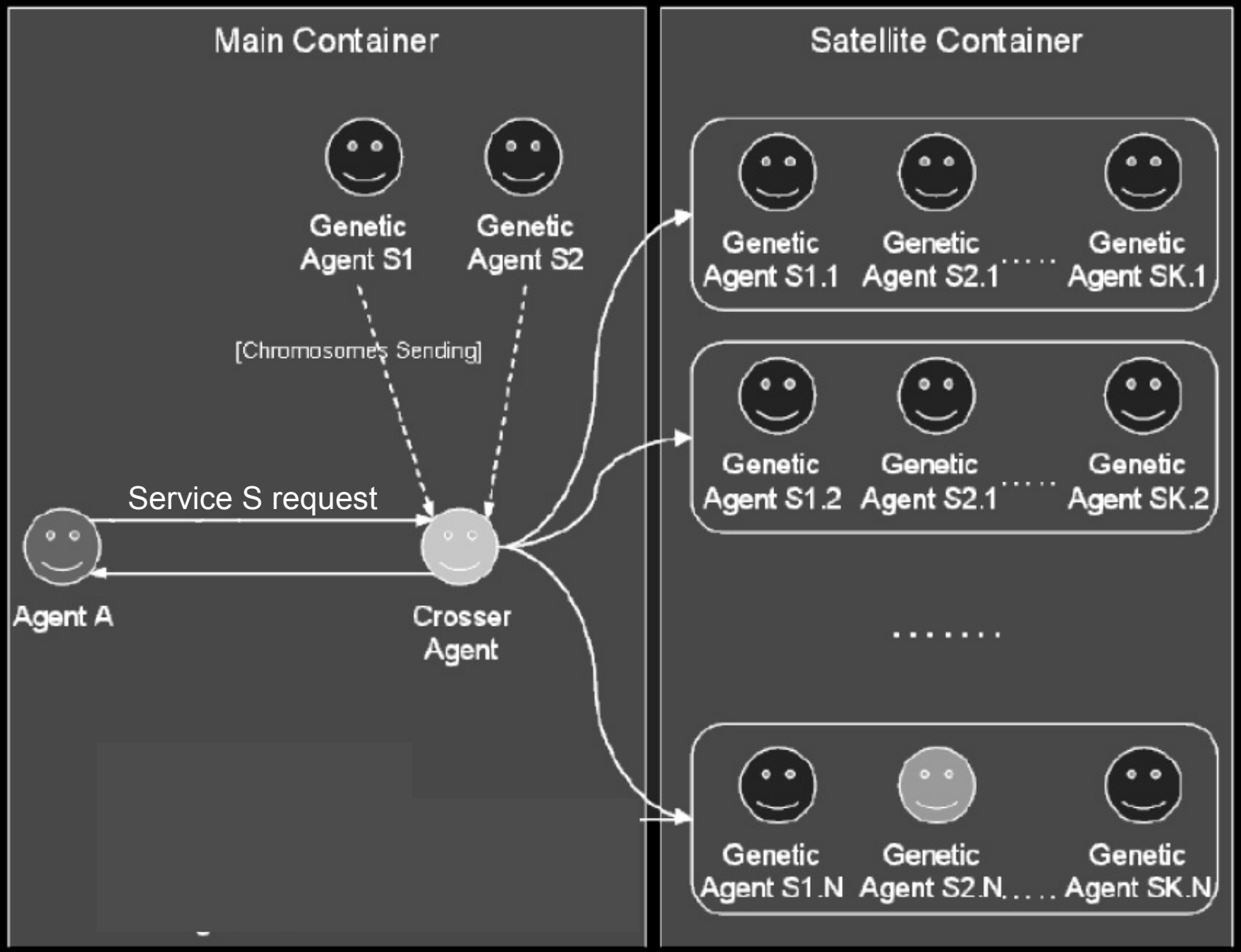
Not just an algorithm or a program



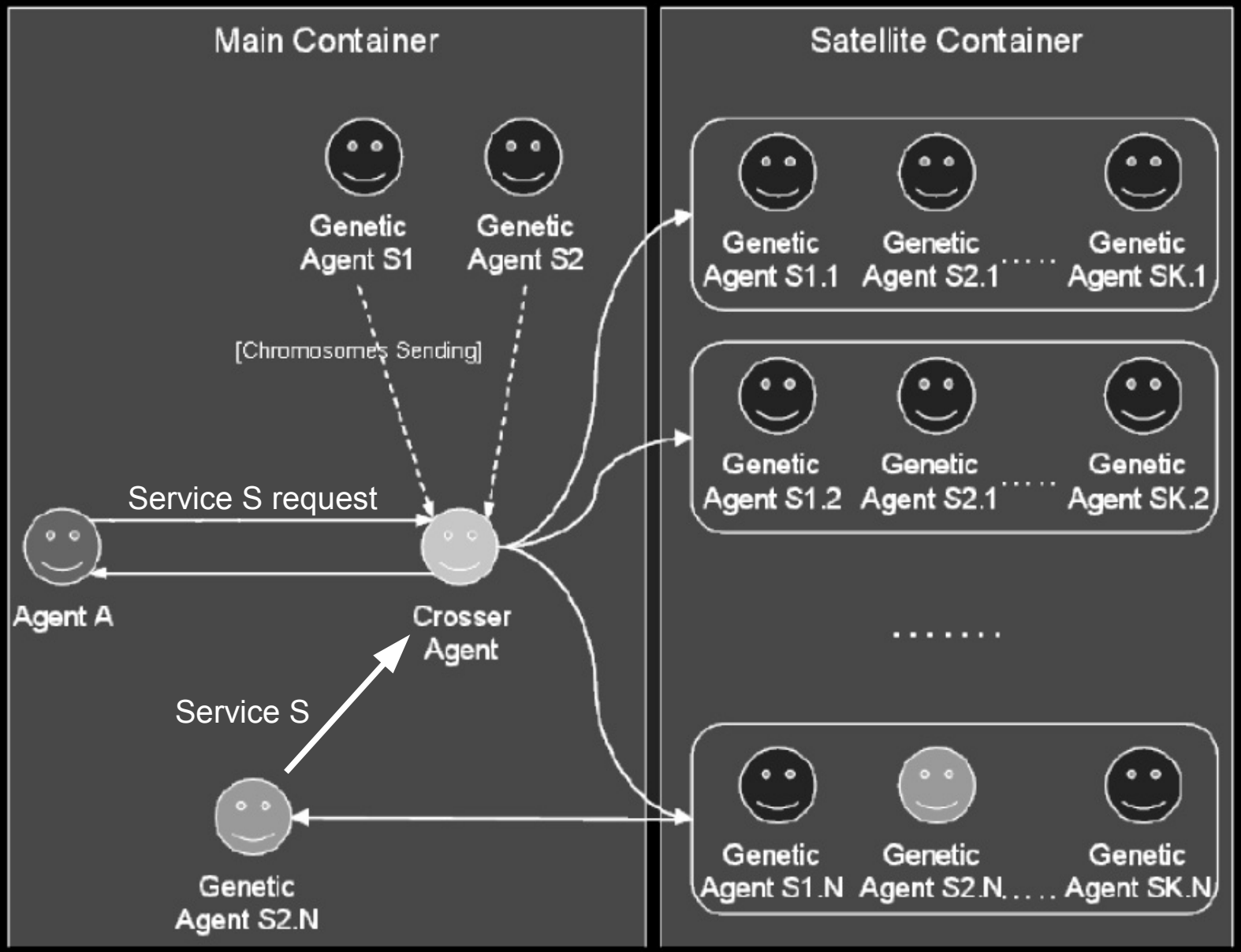
Inheritance

- Inheritance is a way to transmit knowledge and functions
- In our approach the focus of inheritance is not the code but knowledge and ability of the agents and the “user” is not a programmer but the CrosserAgent

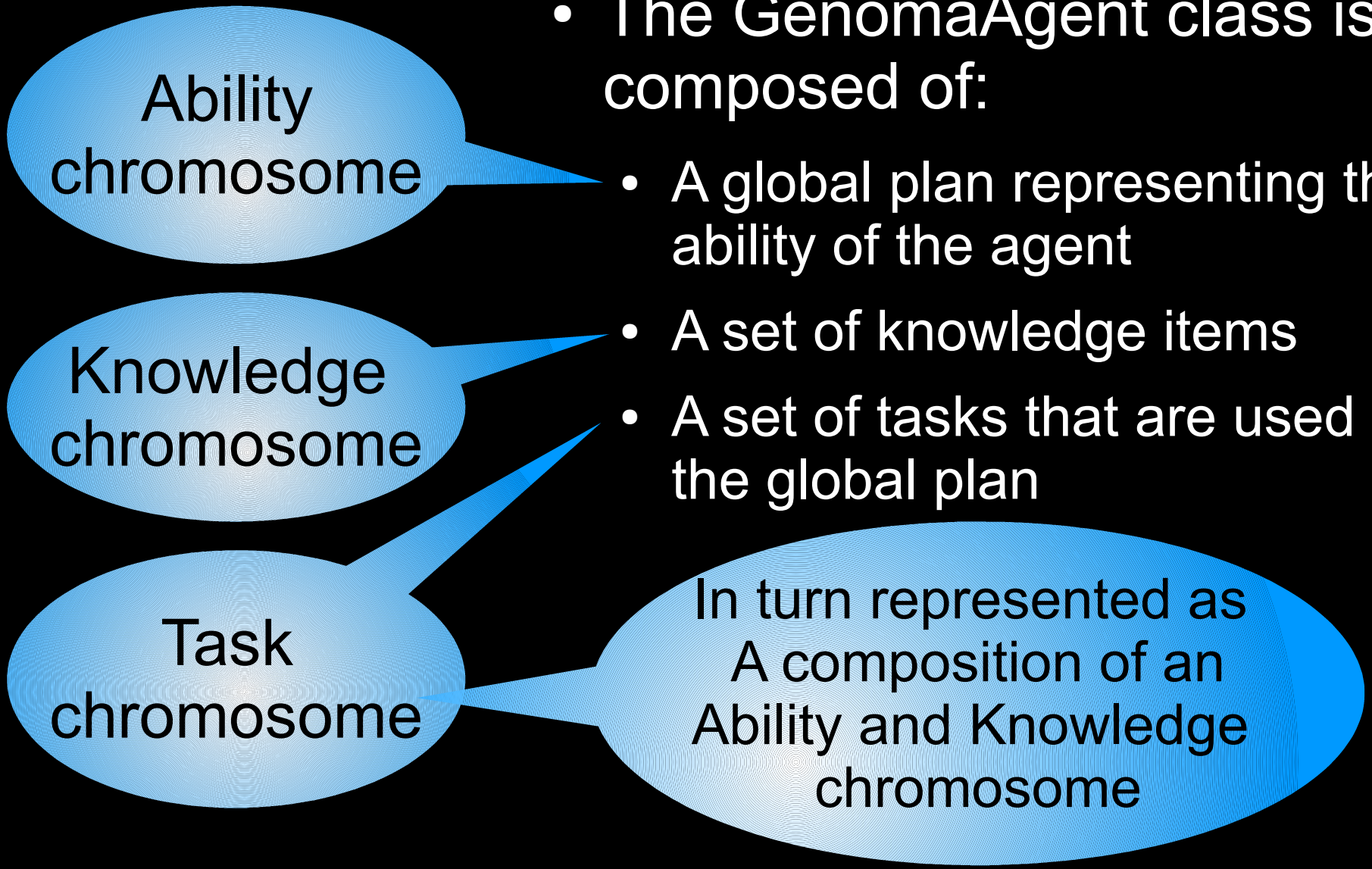
Agent Crossover procedure



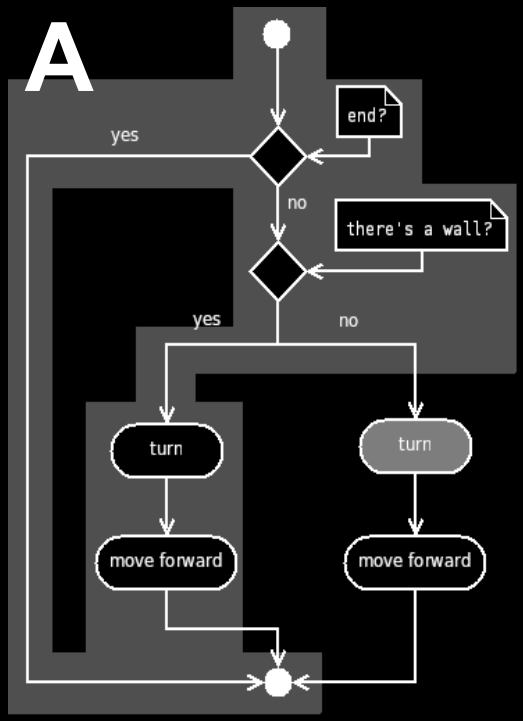
Agent Crossover procedure

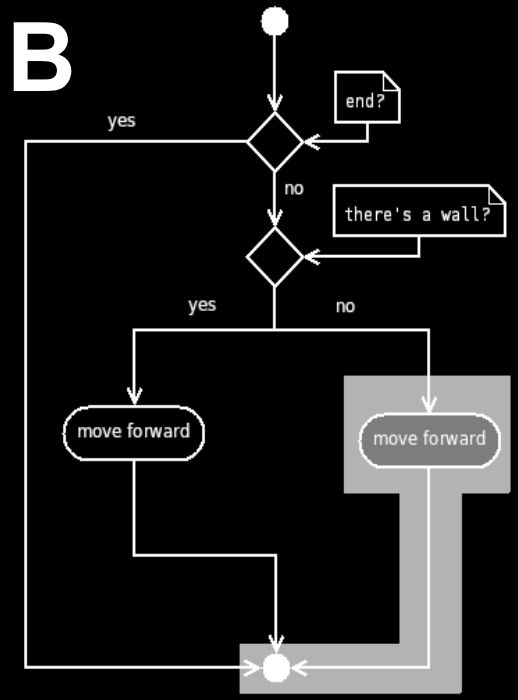


The GenomaAgent Structure

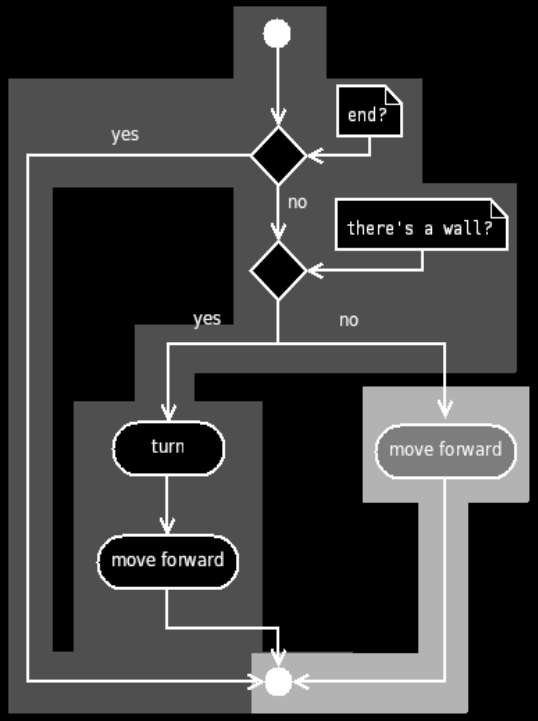


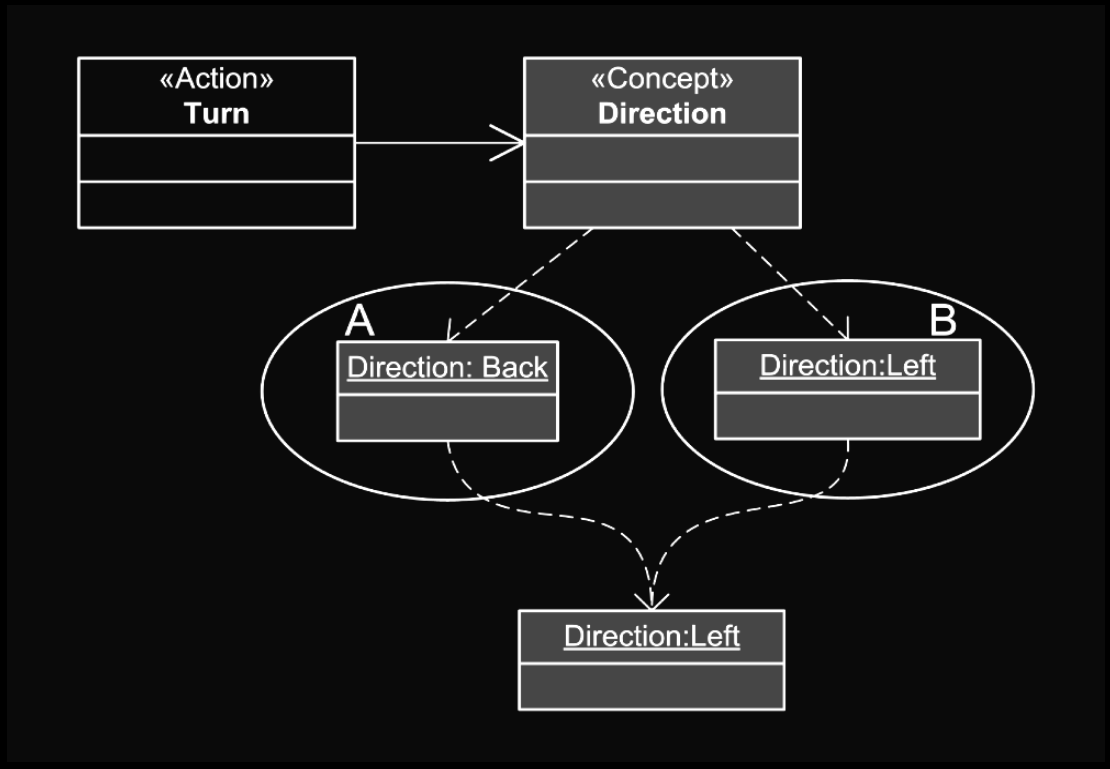
- The GenomaAgent class is composed of:
  - A global plan representing the ability of the agent
  - A set of knowledge items
  - A set of tasks that are used in the global plan





An example of successful crossing

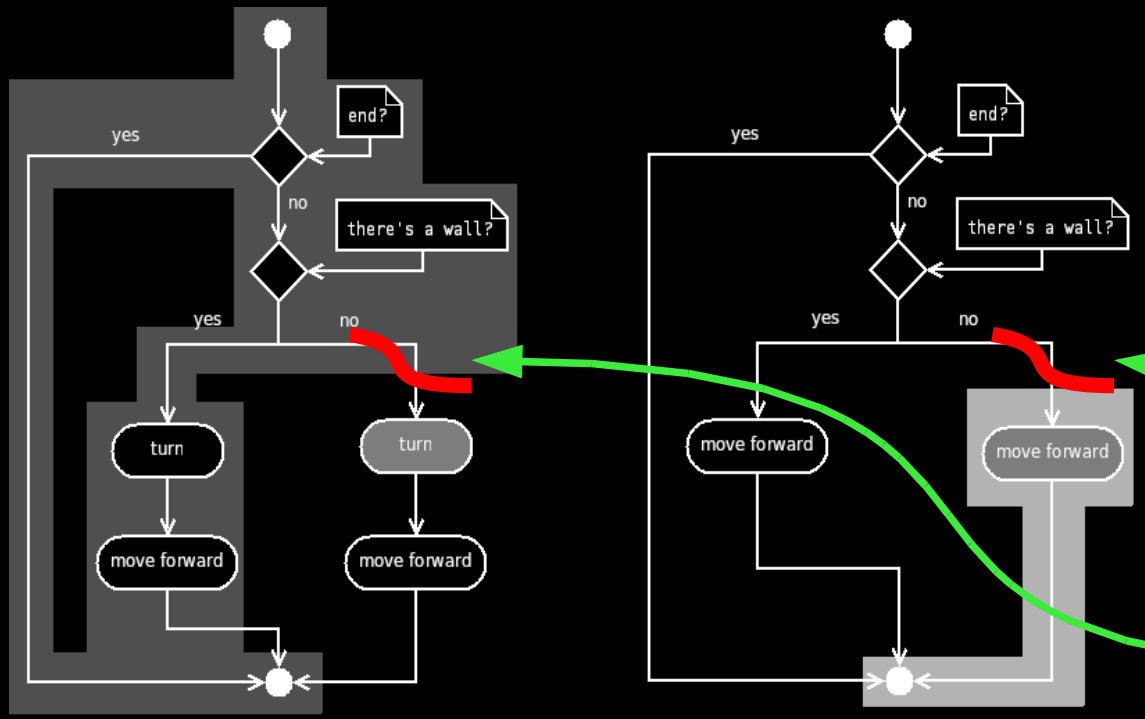




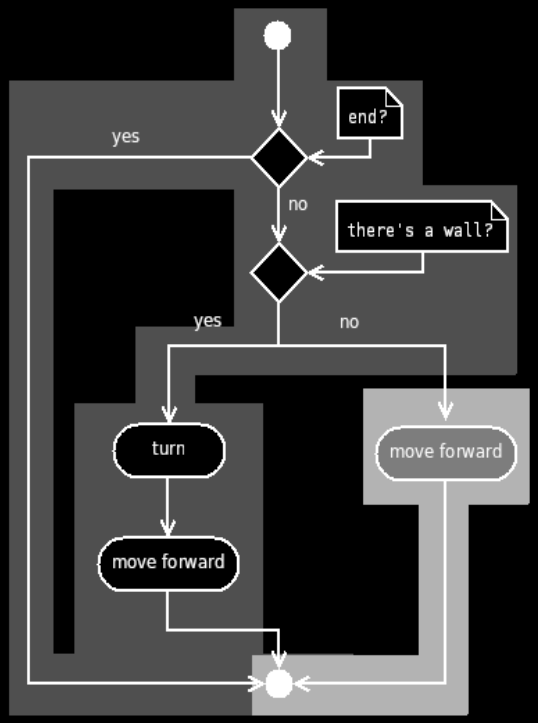
Knowledge Chromosome Crossing

- Fusion
  - The two parent's knowledge is unified into a single body of knowledge
- Selection
  - One of the two knowledge is copied the other is discarded
- Union
  - A new knowledge is obtained by the union of the two parents' bodies of knowledge
- Copy
  - If one of the parents has a knowledge that the other has not

Plan Chromosome Crossing

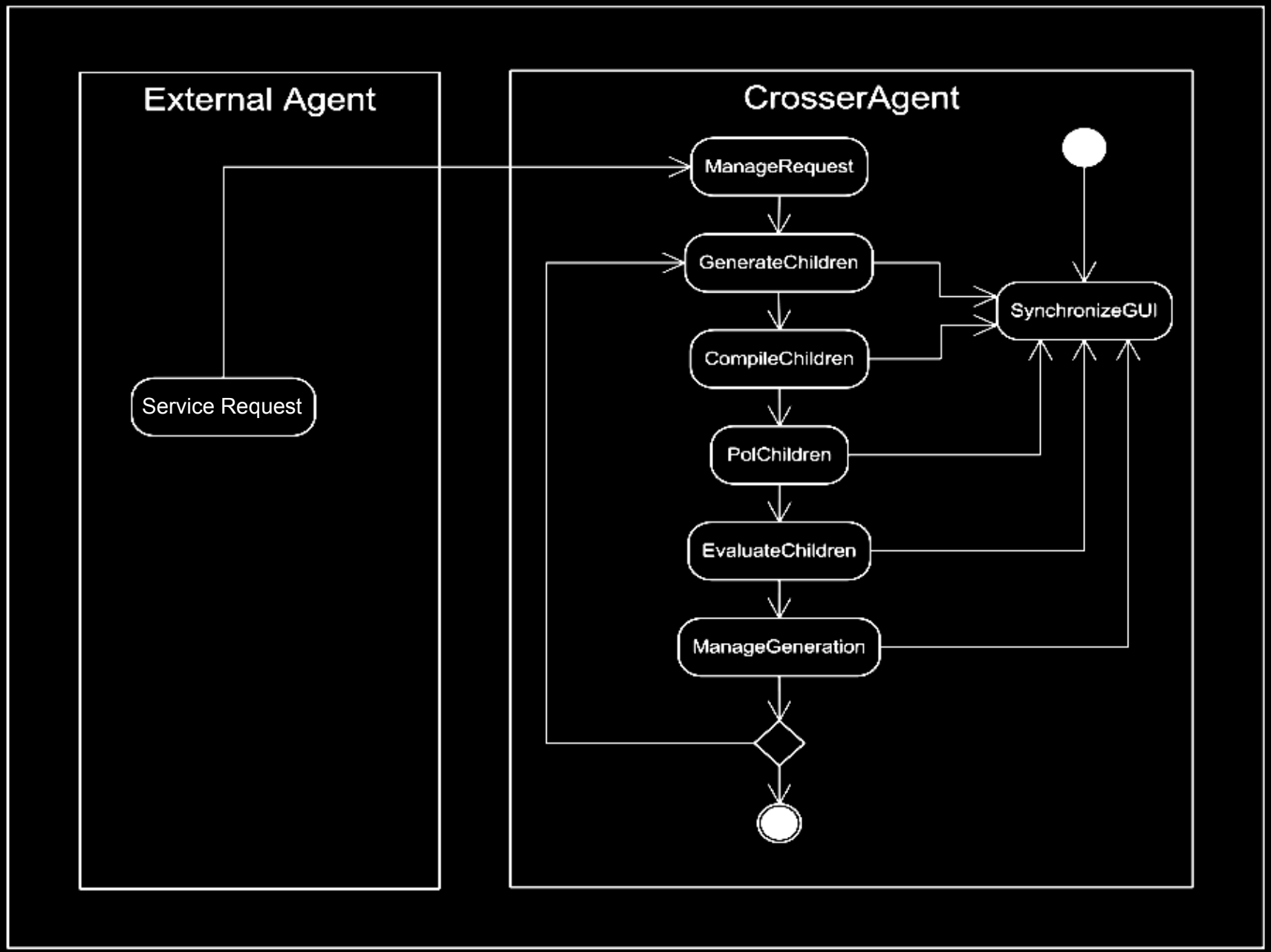


Cut Node

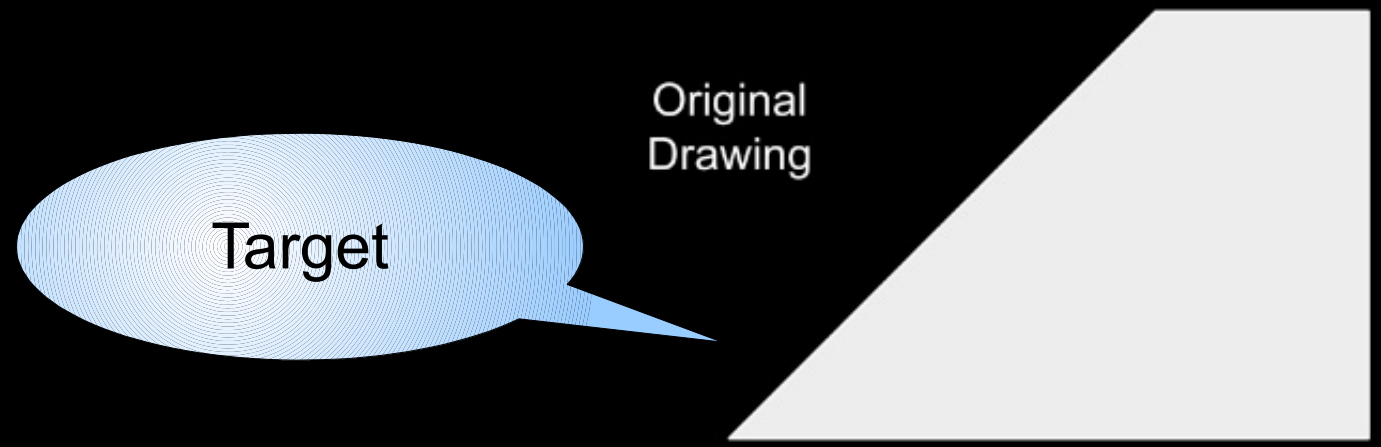


References are maintained

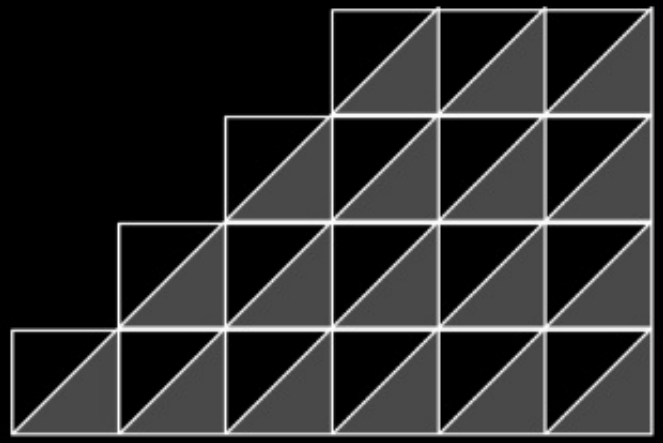
The CrosserAgent



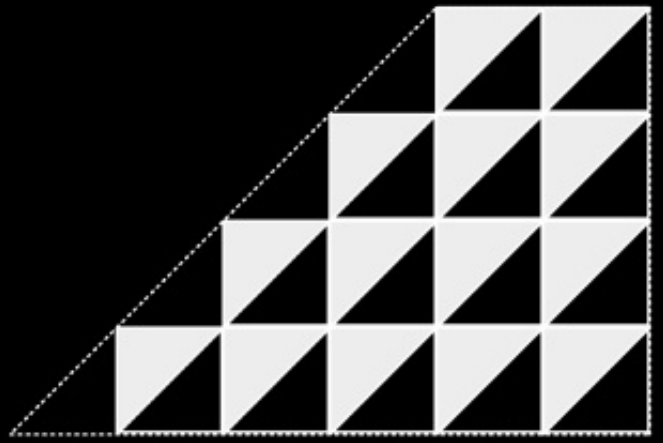
Application example



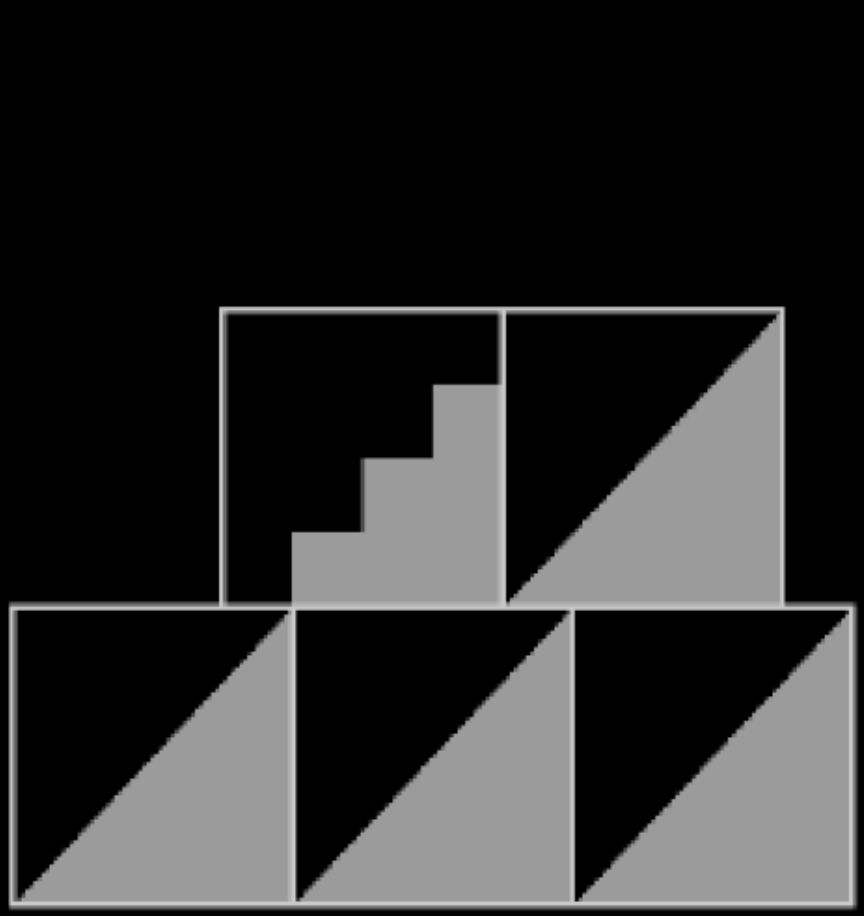

Agent 1



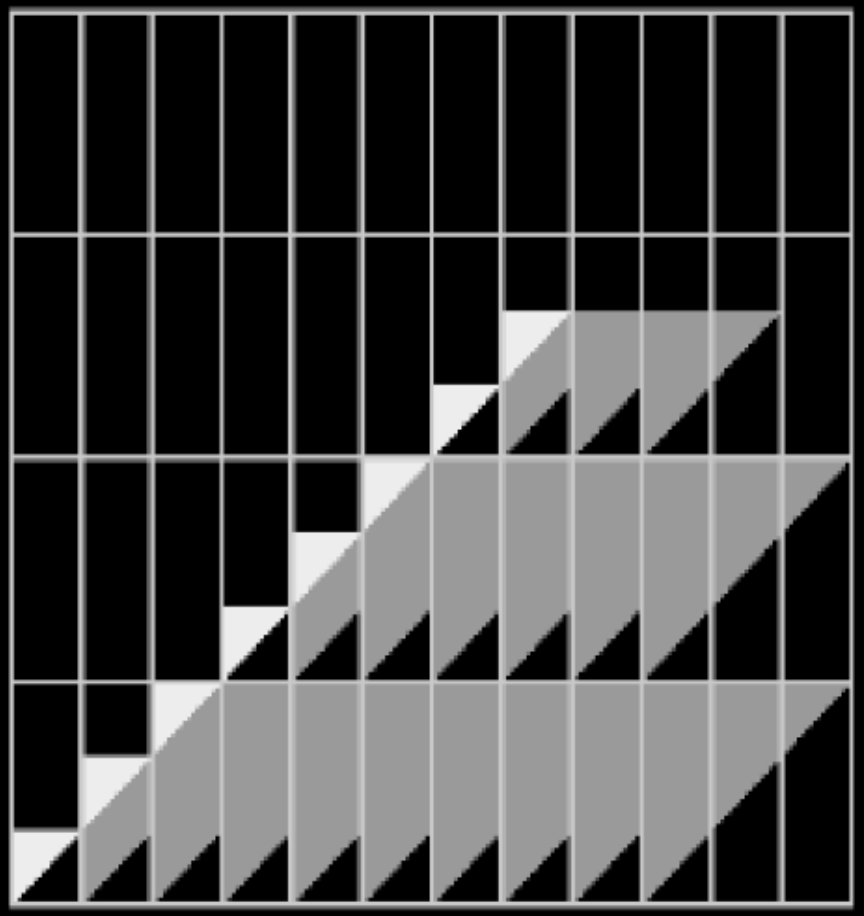

Agent 2



An approximation step



(a) $\alpha = 0.437$



(b) $\alpha = 0.351$

Final step