

Cells versus Agents

Who is Master?

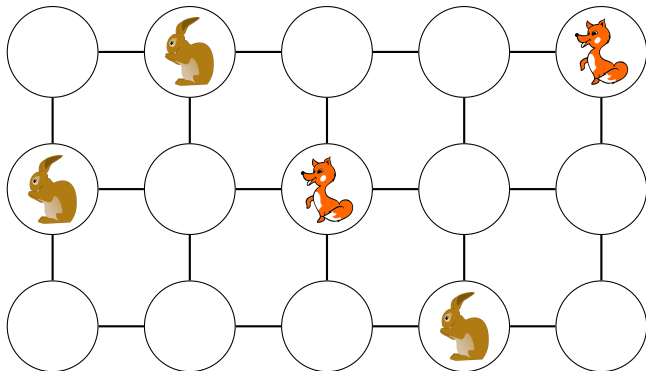
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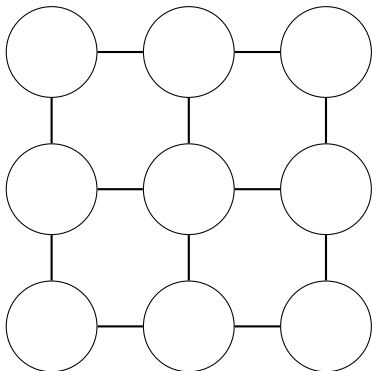
The grid world

What object contains the software logic?



Two approaches

Cellular Automaton



Agent-Based Model



Cellular Automata

What can happen in location X?

- Homogenous cells
- Matrix representation — grid = matrix
- Matrix transformations
 - mathematical analysis
 - functional implementation
- Object-Oriented Approach is possible
 - ① but not necessarily the best approach

Agent-Based Models

What does individual Y do?

- Very down to Earth
 - Model individuals
 - Agents can move freely
 - Decentralised behaviour
- Heterogenous landscapes are possible
- New agent types can be introduced easily
- Object-Oriented Modelling is natural
 - Straight-Forward Implementation
- Difficult to analyse global behaviour

Summary

- Two ways to model on a grid world
 - Active agents — agent-based models
 - Active cells — cellular automaton
- Agent-Based approaches are very flexible
 - straight-forward implementation of complex and flexible models
 - run the simulation and observe
- Cellular Automata depend on global homogeneity
 - may allow theoretical analysis
 - may allow fast implementation with matrix transformations