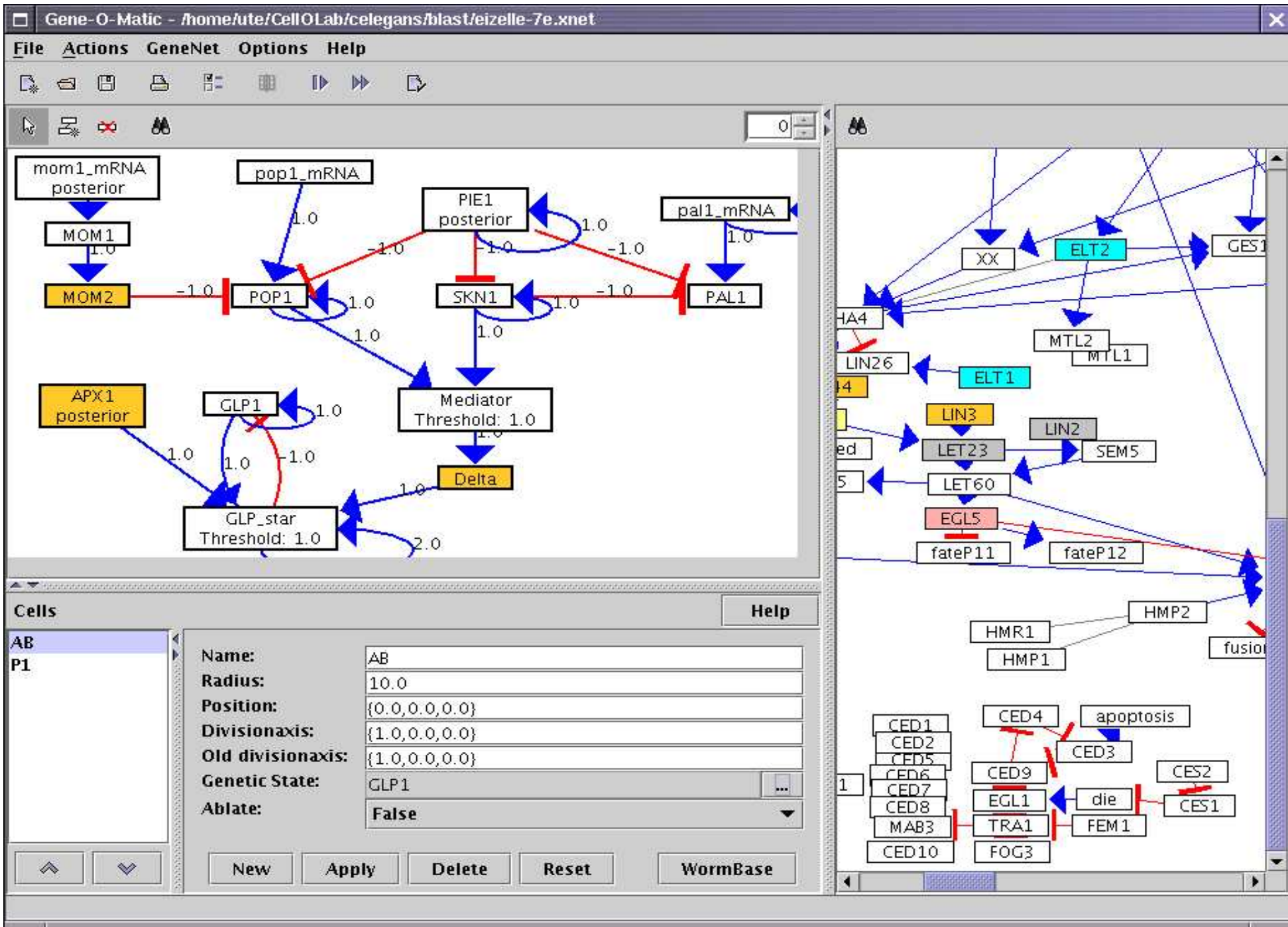


Gene-O-Matic

- **Genetic network modelling and simulation tool**
- **Graphical user interface to design networks**
- **Discrete model: Boolean network/ matrix multiplication**
- **Written in Java**



Gene-O-Matic - /home/ute/CellOlab/celegans/blast/eizelle-7e.xnet

File Actions GeneNet Options Help

Properties

BIC

Name: MOM2

Description: Wnt, acts in P2 (signaling cell) blastomere identity gene external

Protein Type: unspecified

Function:

Threshold: 0.0

Internal gene: external

Location:

Process: unknown

Origin: maternal

Reference:

OK Cancel Help

Customize Genetic State

<input checked="" type="checkbox"/> APX1	<input type="checkbox"/> Delta	<input type="checkbox"/> GLP1	<input type="checkbox"/> GLP_star
<input type="checkbox"/> Mediator	<input type="checkbox"/> MOM1	<input checked="" type="checkbox"/> mom1_mRNA	<input type="checkbox"/> MOM2
<input type="checkbox"/> PAL1	<input checked="" type="checkbox"/> pal1_mRNA	<input checked="" type="checkbox"/> PIE1	<input type="checkbox"/> POP1
<input checked="" type="checkbox"/> pop1_mRNA	<input checked="" type="checkbox"/> SKN1		

OK

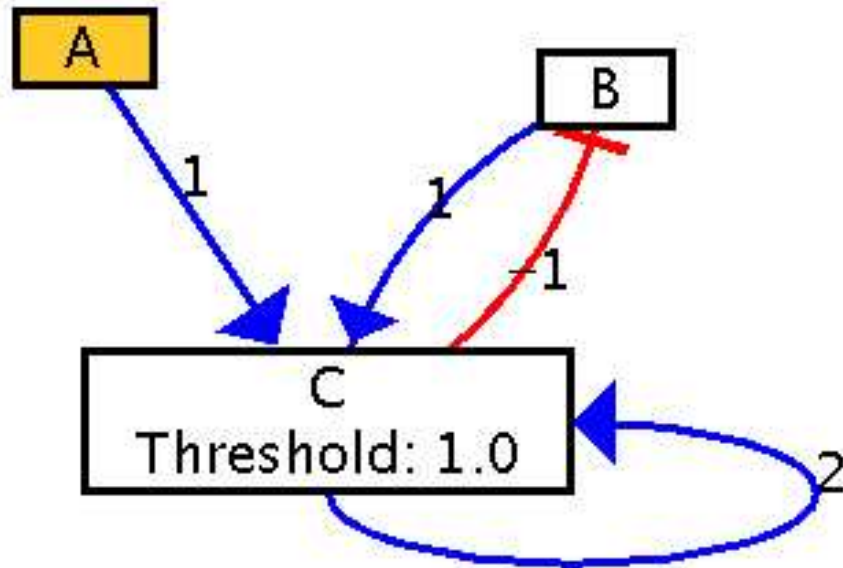
Cells

Name:	AB
Radius:	10.0
Position:	{0.0,0.0,0.0}
Division axis:	{1.0,0.0,0.0}

WormBase

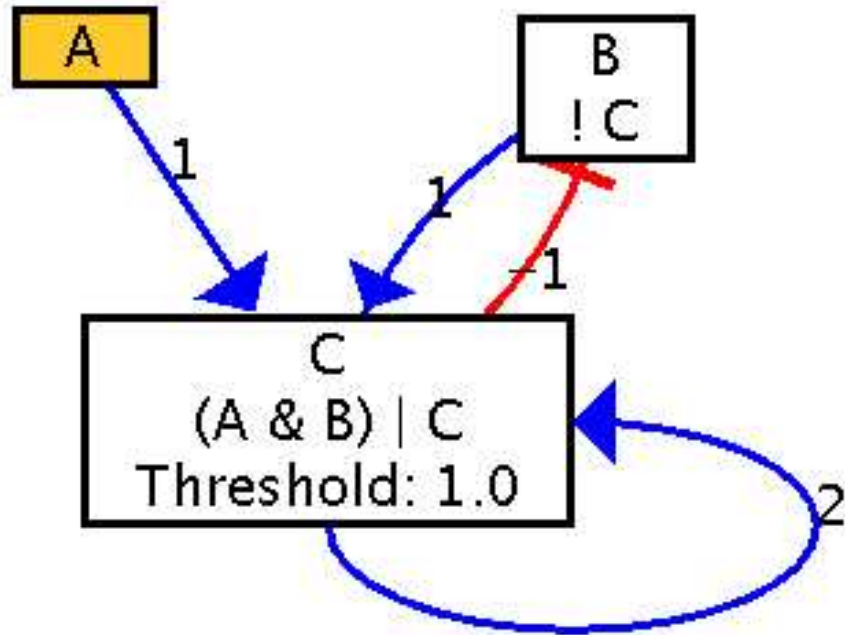
http://gen-o.org

Matrix and Boolean Network



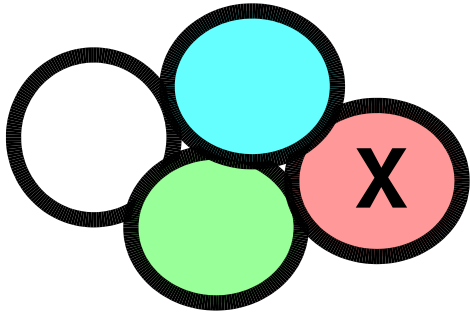
	A	B	C
A	0	0	0
B	0	0	-1
C	1	1	2

Matrix and Boolean Network



	A	B	C
A	0	0	0
B	0	0	-1
C	1	1	2

Calculation

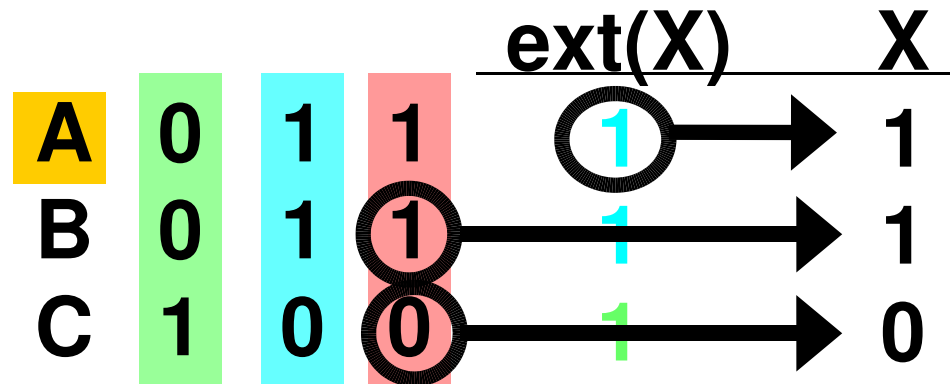
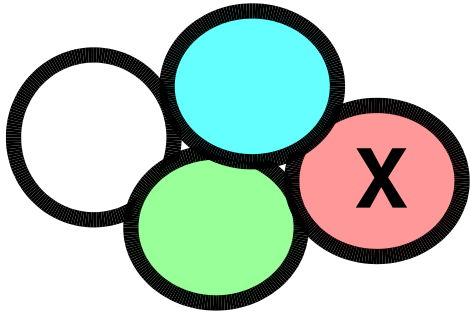


		<u>ext(X)</u>		<u>X</u>
A	0	1	1	1
B	0	1	1	1
C	1	0	0	0

$$\begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix} * \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1+1=2 \end{pmatrix} \begin{matrix} \text{greater} \\ ? \end{matrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \rightarrow \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

thresholds

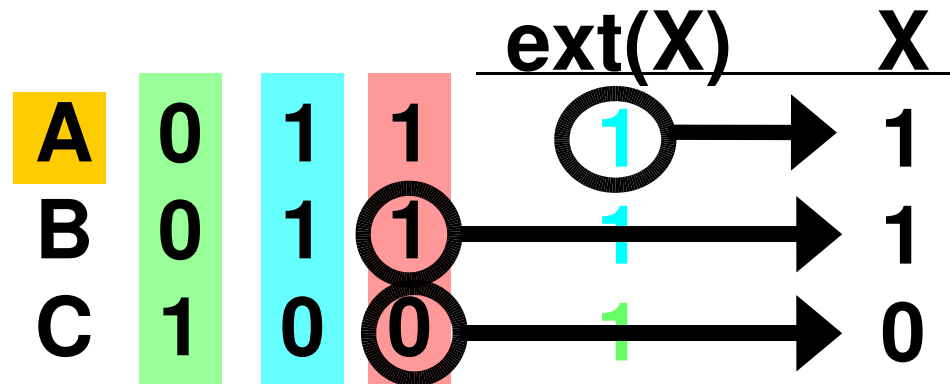
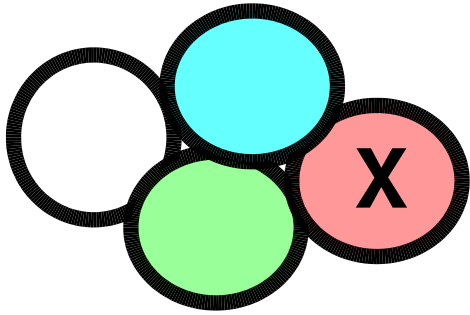
Calculation



$$\begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix} * \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1+1=2 \end{pmatrix} \begin{matrix} \text{greater} \\ ? \end{matrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \rightarrow \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

thresholds

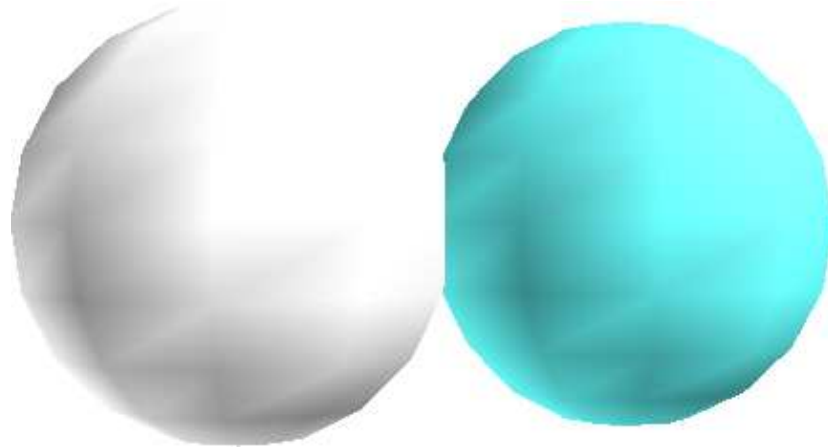
Calculation



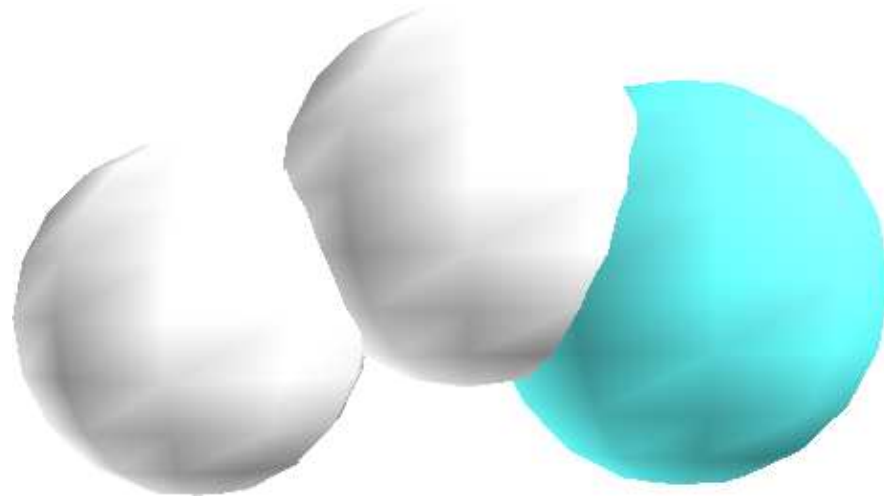
$$\begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix} * \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1+1=2 \end{pmatrix} \begin{matrix} \text{greater} \\ ? \end{matrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \rightarrow \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

thresholds

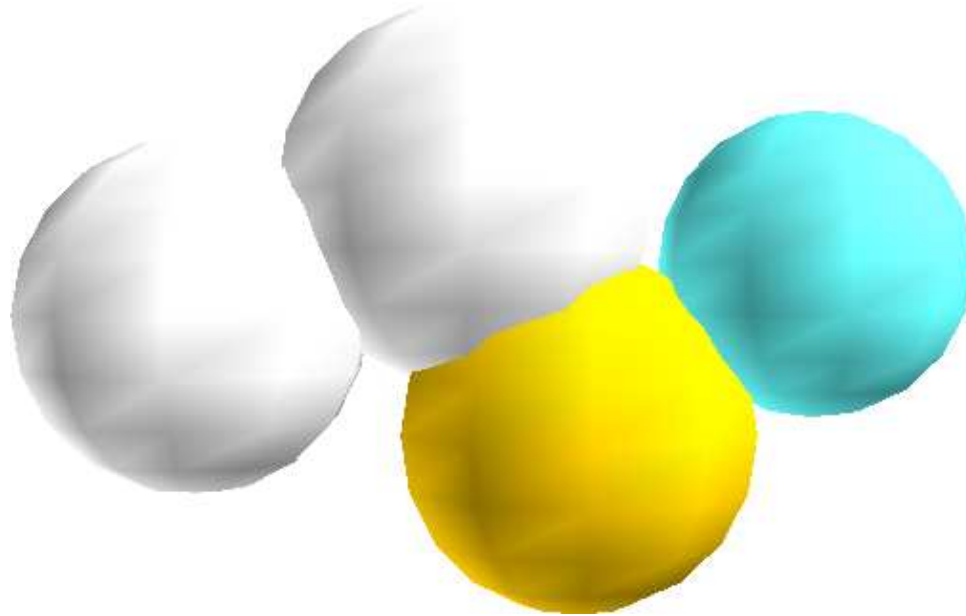
Example: *C. elegans* embryo



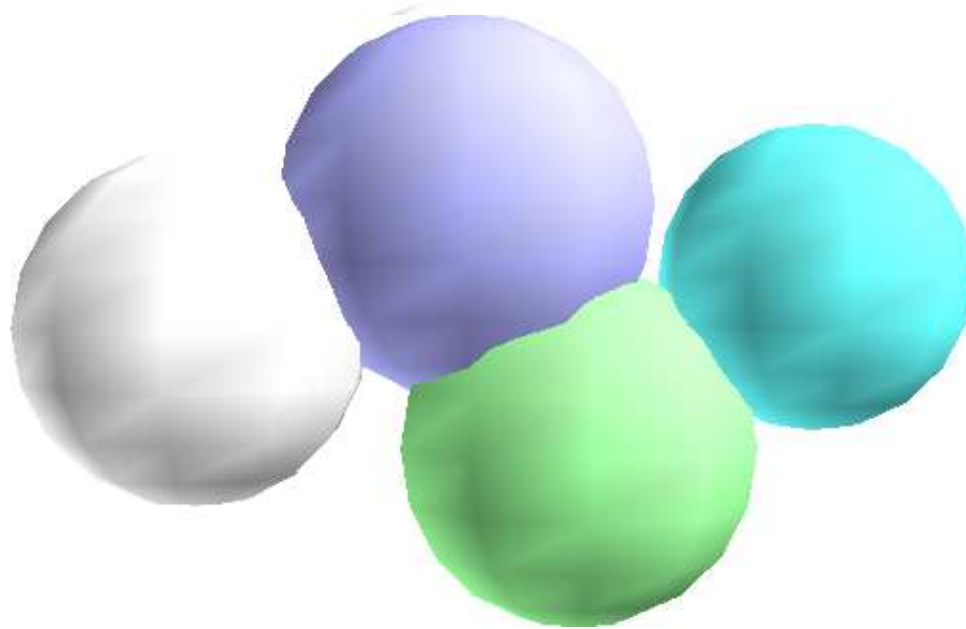
Example: *C. elegans* embryo



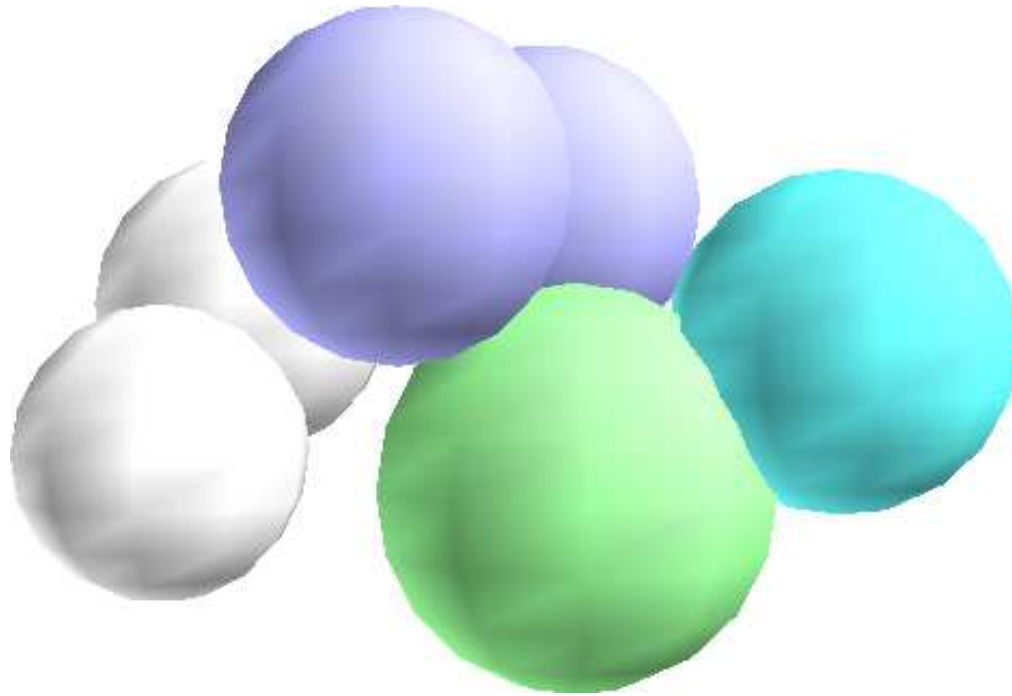
Example: *C. elegans* embryo



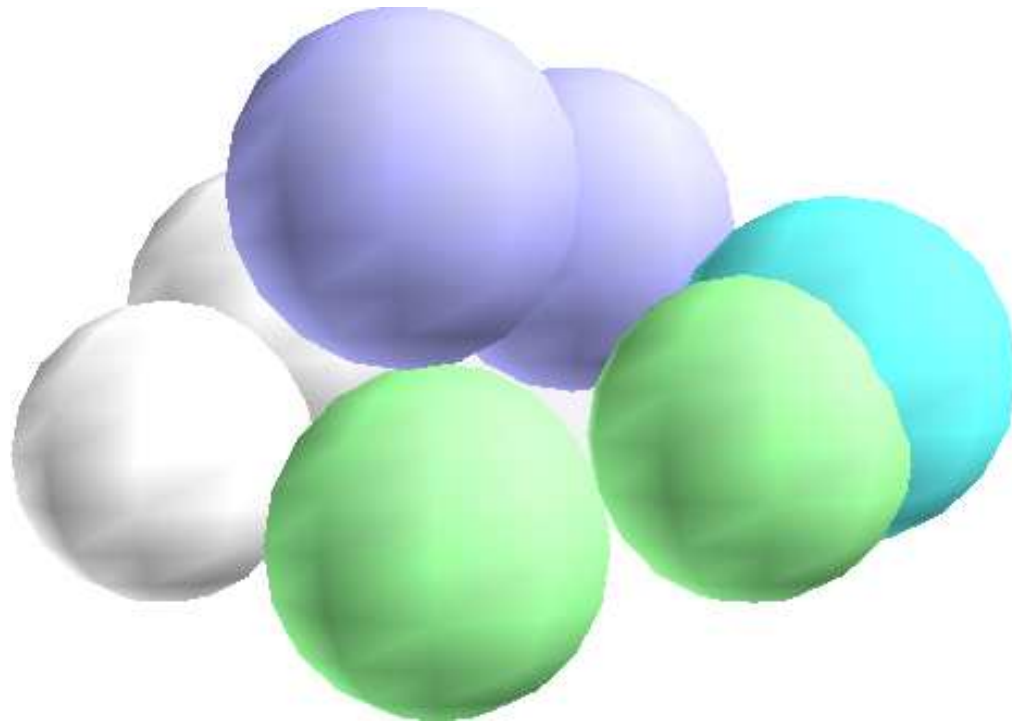
Example: *C. elegans* embryo



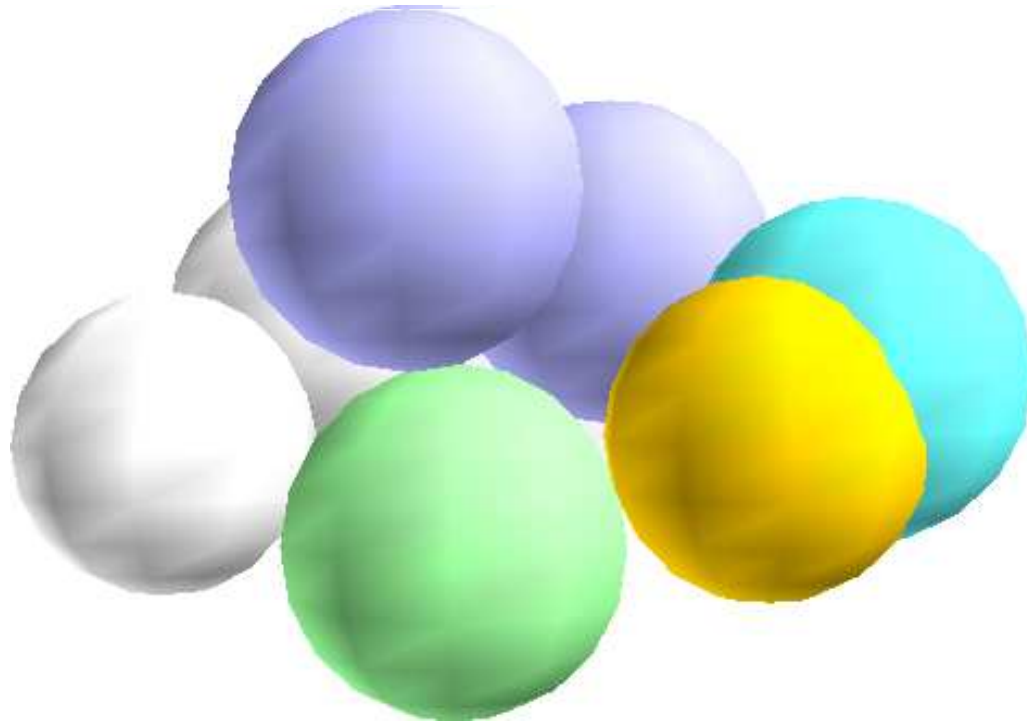
Example: *C. elegans* embryo



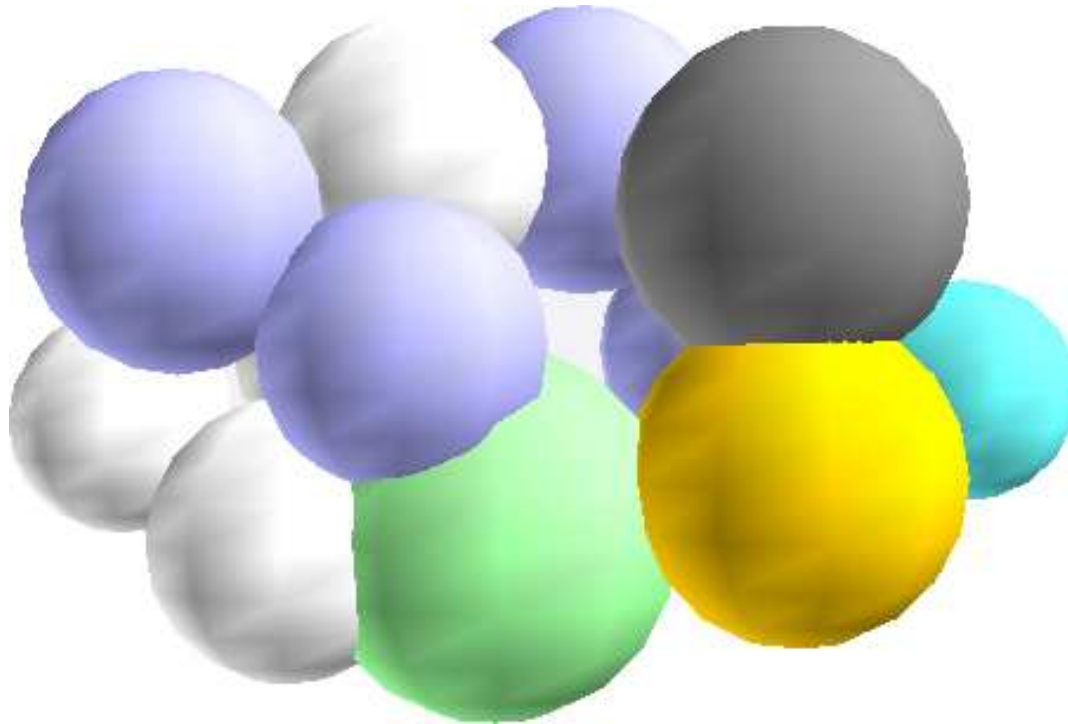
Example: *C. elegans* embryo



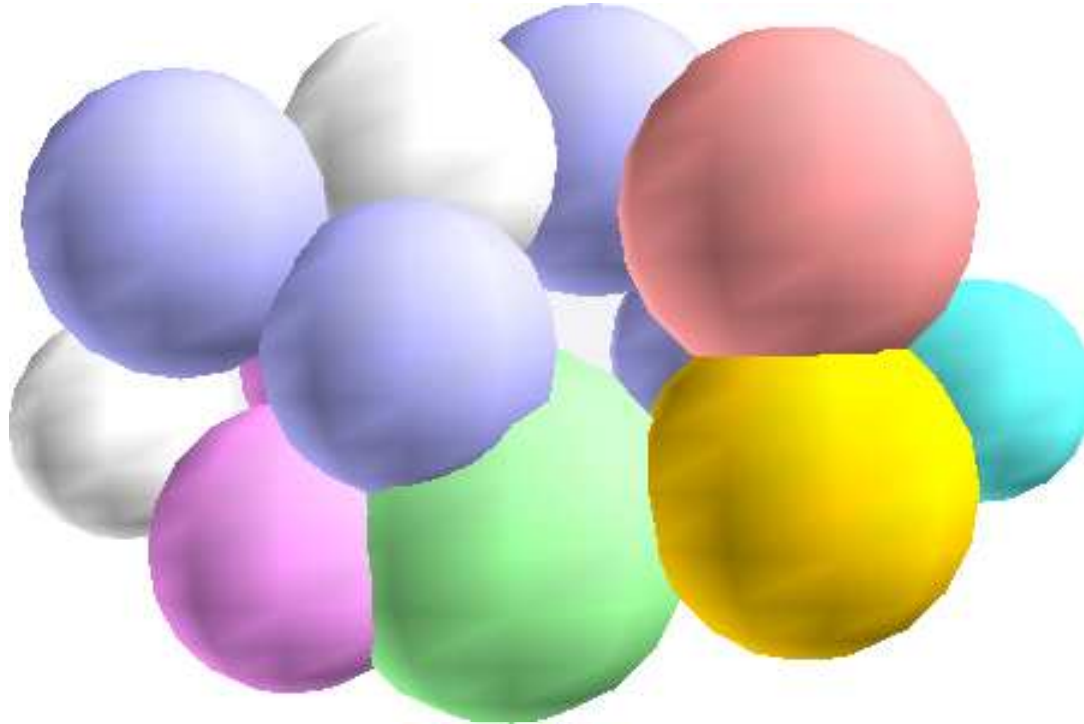
Example: *C. elegans* embryo



Example: *C. elegans* embryo



Example: *C. elegans* embryo



Information

- **Species names**
- **Interaction strengths or Boolean formulas**
- **Cell positions (x,y,z), radius**
- **[Cell division info]**
- **Initial state for all species in every cell**
- **[Species location]**