```
{ realDomain t ;
  t.min=0;t.delta=0.1;t.max=20;

                    real x(t), y(t);

  when (t=t.min){x=2; y=1;}
                    // ODEs
  x:t =  x-x*y;
                    y:t = x*y-y;
}
```

# Introduction to JSim

# Tools for numerical simulation of ODEs

Write your own program: Fortran, C, Python, MATLAB

Simulation software with GUI:

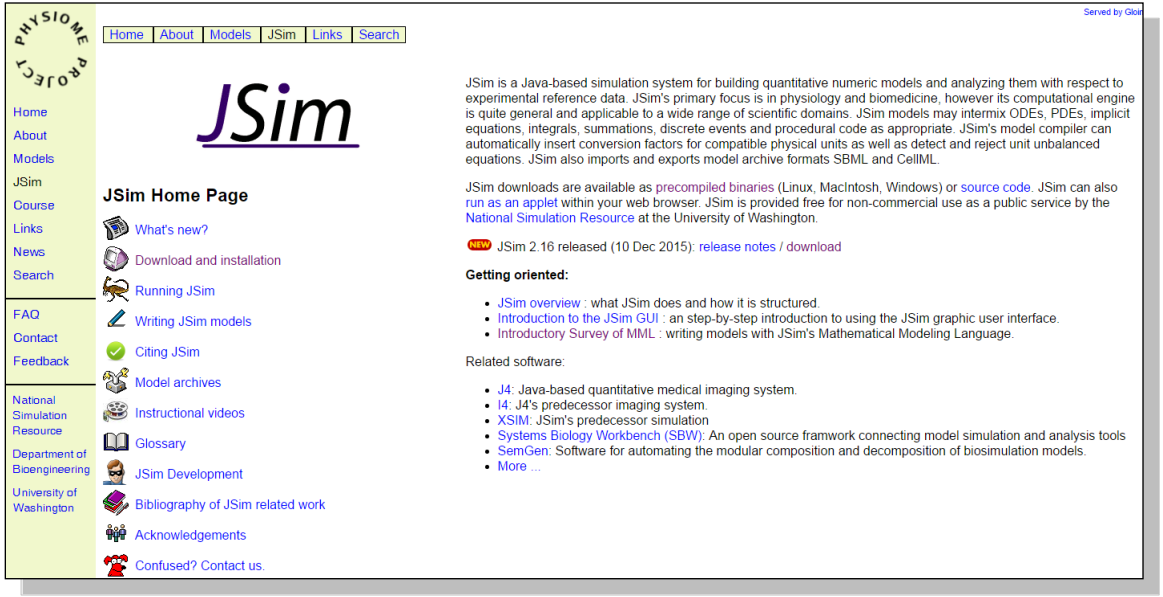
- Allows numerical integration using different in-built algorithms
- Allows other analysis like parameter sensitivity test
- Plot graphs

Define the model (ODEs, parameters) using:

- Reaction schemes and GUI tools (eg. COPASI)
- Markup language (eg. JSim)

# JSim

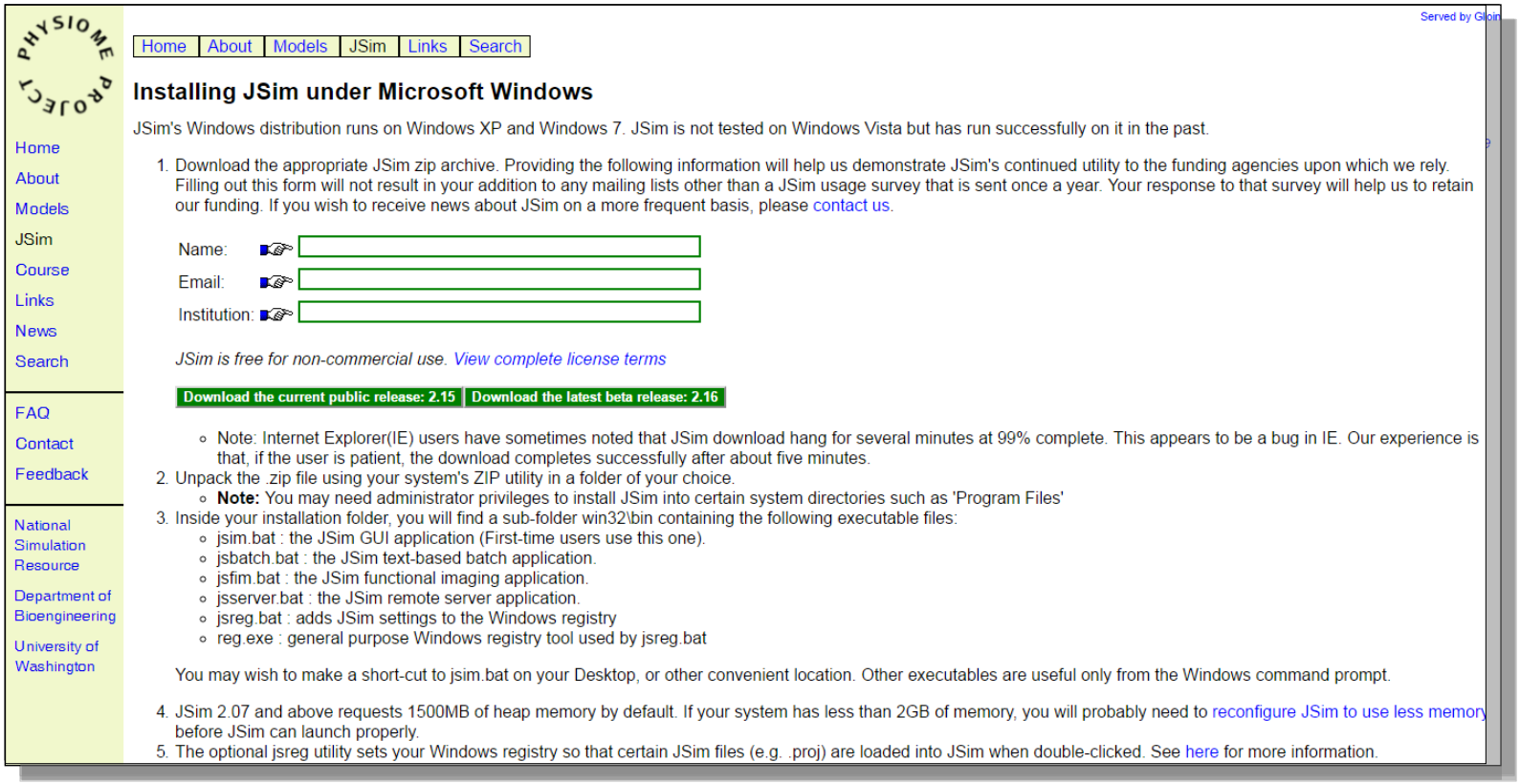
- Own language (Mathematical Modeling Language) and GUI
- Handle ODE, PDE and discrete events
- Graphical interface for plots
- Options to export data
- Import SBML model
- Can connect with MATLAB
- Well documented and versatile instructions provided at the website




~~http://www.physiome.org/jsim/~~

Updated link for JSim:
https://www.imagwiki.nibib.nih.gov/physiome/jsim

# Download JSim



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National Simulation Resource
Department of Bioengineering
University of Washington

## Installing JSim under Microsoft Windows

JSim's Windows distribution runs on Windows XP and Windows 7. JSim is not tested on Windows Vista but has run successfully on it in the past.

1. Download the appropriate JSim zip archive. Providing the following information will help us demonstrate JSim's continued utility to the funding agencies upon which we rely. Filling out this form will not result in your addition to any mailing lists other than a JSim usage survey that is sent once a year. Your response to that survey will help us to retain our funding. If you wish to receive news about JSim on a more frequent basis, please contact us.

   Name:
   Email:
   Institution:

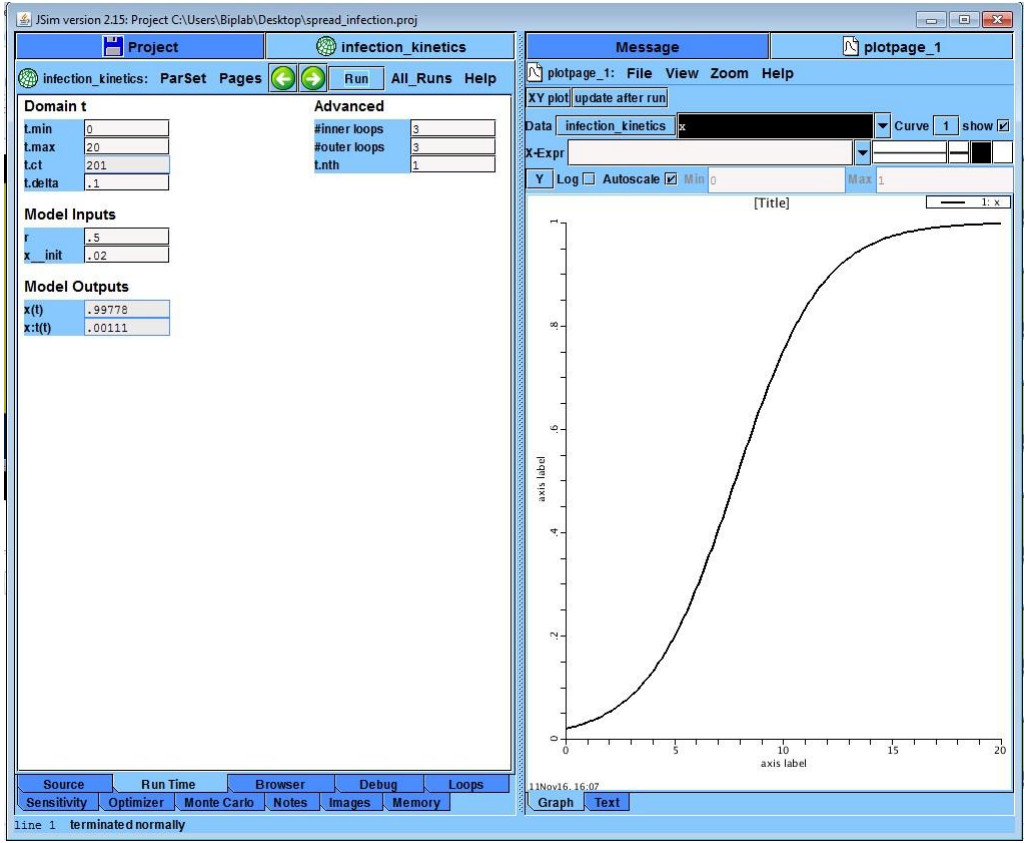
   *JSim is free for non-commercial use. View complete license terms*

   **Download the current public release: 2.15** | **Download the latest beta release: 2.16**

   - Note: Internet Explorer(IE) users have sometimes noted that JSim download hang for several minutes at 99% complete. This appears to be a bug in IE. Our experience is that, if the user is patient, the download completes successfully after about five minutes.
2. Unpack the .zip file using your system's ZIP utility in a folder of your choice.
   - **Note:** You may need administrator privileges to install JSim into certain system directories such as 'Program Files'
3. Inside your installation folder, you will find a sub-folder win32\bin containing the following executable files:
   - jsim.bat : the JSim GUI application (First-time users use this one).
   - jsbatch.bat : the JSim text-based batch application.
   - jsfim.bat : the JSim functional imaging application.
   - jsserver.bat : the JSim remote server application.
   - jsreg.bat : adds JSim settings to the Windows registry
   - reg.exe : general purpose Windows registry tool used by jsreg.bat

   You may wish to make a short-cut to jsim.bat on your Desktop, or other convenient location. Other executables are useful only from the Windows command prompt.
4. JSim 2.07 and above requests 1500MB of heap memory by default. If your system has less than 2GB of memory, you will probably need to reconfigure JSim to use less memory before JSim can launch properly.
5. The optional jsreg utility sets your Windows registry so that certain JSim files (e.g. .proj) are loaded into JSim when double-clicked. See here for more information.

# Using JSim


JSim version 2.15: Project C:\Users\Biplab\Desktop\spread_infection.proj
Project
infection_kinetics
Message
plotpage_1
infection_kinetics: ParSet Pages Run All_Runs Help
plotpage_1: File View Zoom Help
XY plot update after run
Domain t
t.min 0
t.max 20
t.ct 201
t.delta .1
Advanced
#inner loops 3
#outer loops 3
t.nth 1
Model Inputs
r .5
x__init .02
Model Outputs
x(t) .99778
x:t(t) .00111
Data infection_kinetics x Curve 1 show
X-Expr
Y Log Autoscale Min 0 Max 1
[Title]
1: x
axis label
axis label
11Nov16, 16:07
Source Run Time Browser Debug Loops
Sensitivity Optimizer Monte Carlo Notes Images Memory
Graph Text
line 1 terminated normally

**Key points:**

1. There are many tools for numerical analysis of ODEs in your computer: write your own program or use ready-made one.
2. Ready-made software differ in capabilities and level of difficulties in use.
3. Some commonly used software for ODE-based modeling in biology are: COPASI, XPPAUT, JSim