Creation Review

STEM – Spatiotemporal Epidemiological Modeler

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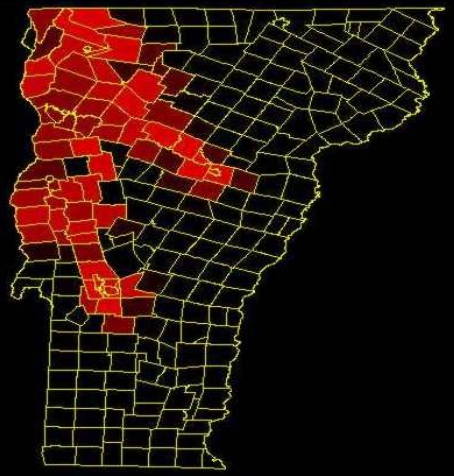
Communications Channel: http://www.eclipse.org/newsportal/thread.php?group=eclipse.technology.ohf

Overview

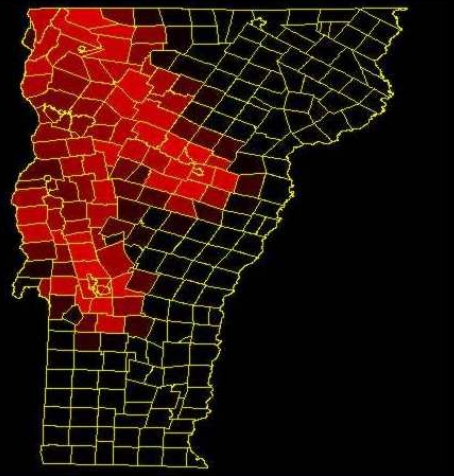
- STEM is a system for creating models and simulating the spread of infectious disease.
- STEM is currently a component of the Eclipse Open Health Care Framework.
- It is the only active component left in the framework.
  - Resolution of this situation is needed.
    - Extract STEM

Comparing Models for the Spread of Influenza in Vermont
(the road system in Vermont is primarily N-S aligned with the natural valleys)

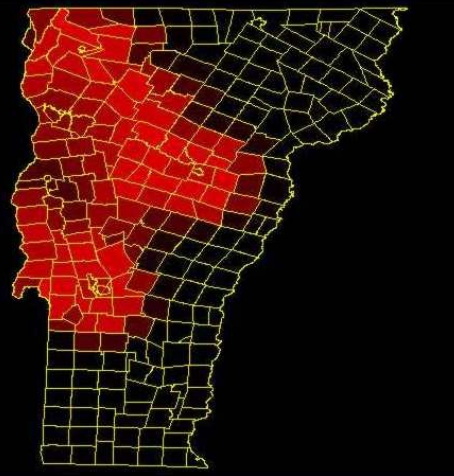
Human Transportation Models



Road Transportation Only



Roads *and* Nearest Neighbor Transportation



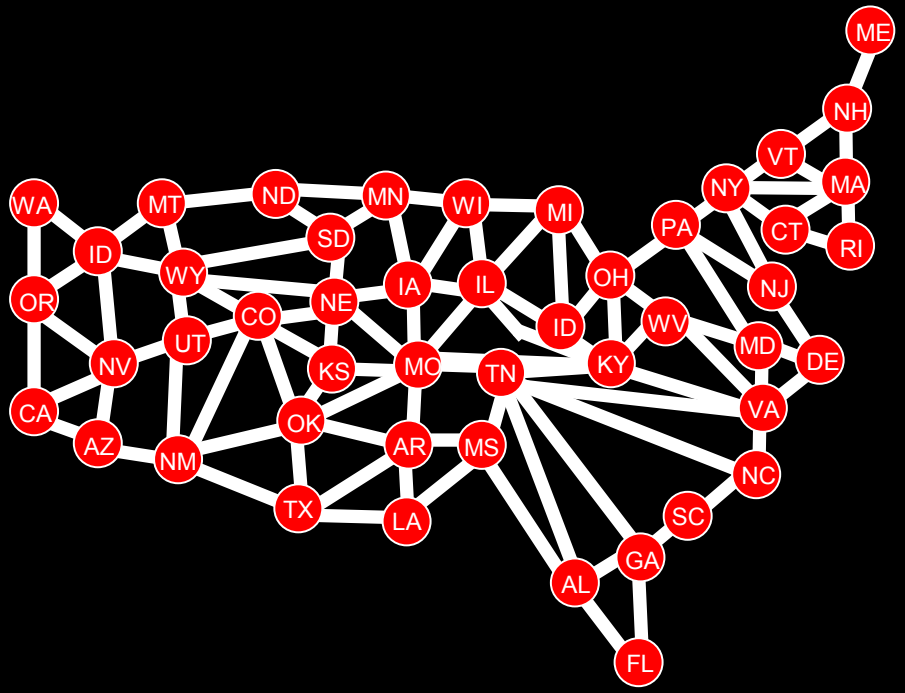
Nearest Neighbor Transportation Model

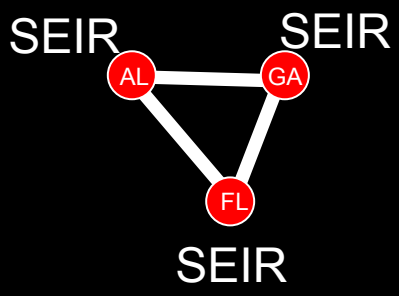
Participants

Overview

- Disease Models can be created from “Parts”
  - Geography Data
  - Population Demographics
  - Transportation Infrastructure
  - Mathematics
- Each Part is part of a Graph
  - Nodes (e.g., countries, provinces, cities)
  - Labels (e.g., population values, disease state)
  - Edges (e.g., roads, common borders, air transportation)
- For a simulation, the parts are combined to form a complete Graph

US States Graph

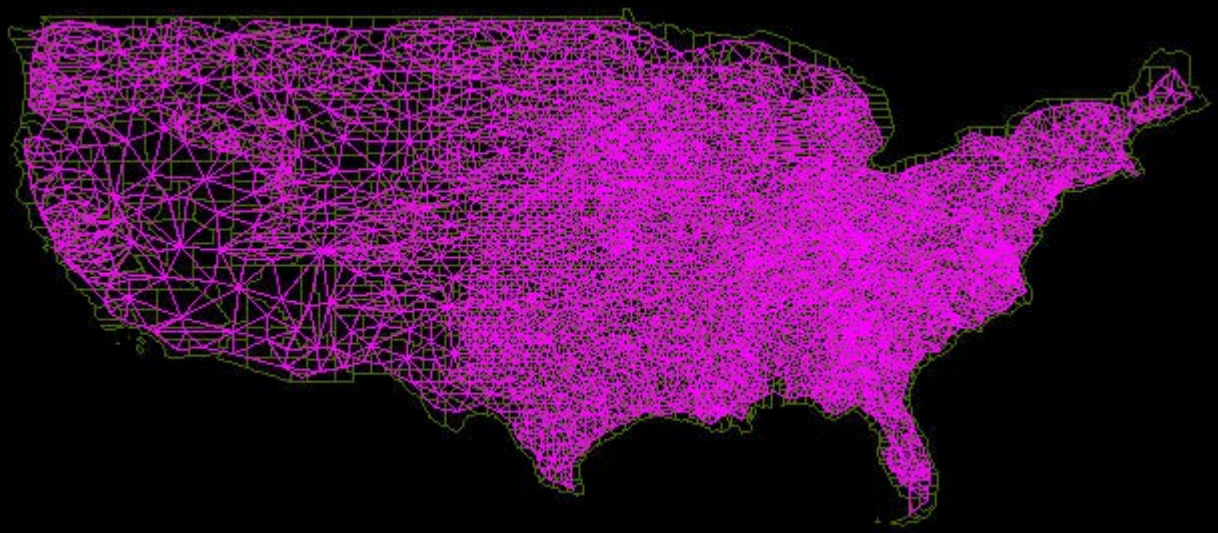




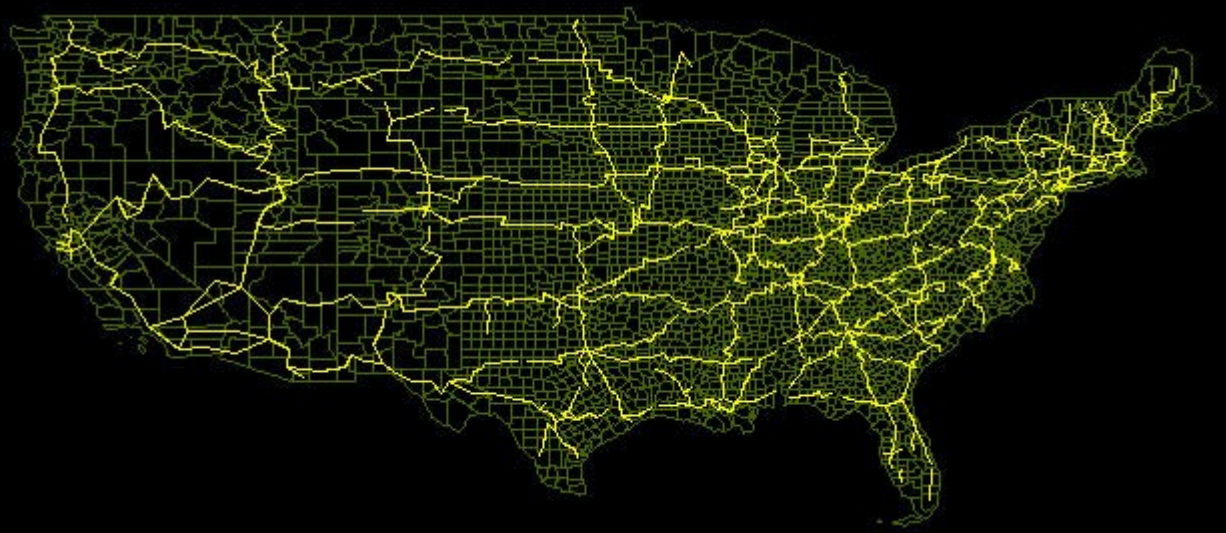
Common
Border Edges

US County Edges

Common Border Edges (7686)



US Interstate Edges

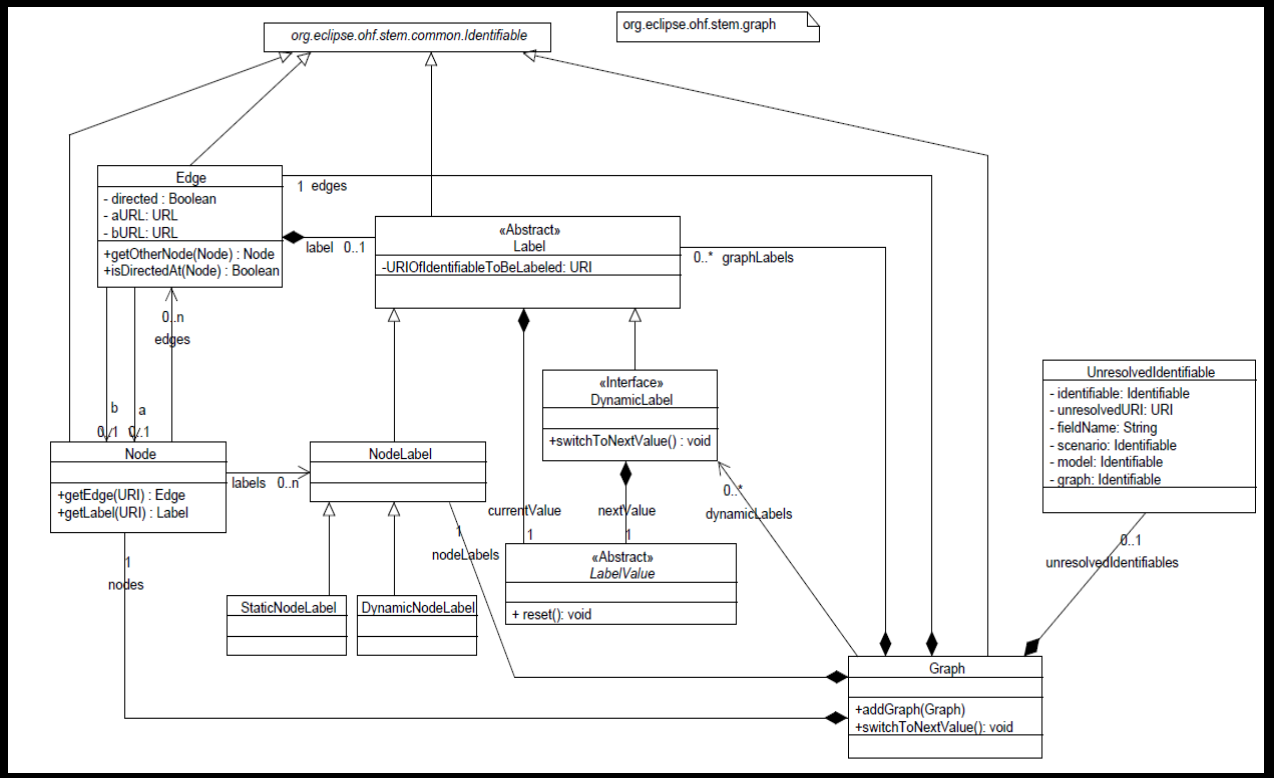


Scope

- Full Data Set for the entire political geography of the planet.
  - ISO-3166 (244 “Countries”).
  - Most countries represented to three levels of resolution (Country, Province, Municipality).
  - Resolution is extensible without limit.
  - Full common border interconnect between all levels of resolution
- Full Human population demographics for every country
  - Extensible to other populations (e.g., mosquitoes)
- Complete set of “text book” disease model implementations
  - Extensible through plug-ins.

Architecture and Implementation

- Completely EMF based (10+ Models, Generated Editors)
- Documented UML models
- Automated Builds
- JUnit Test Suites
- Available as an RCP



Schedule

- June 15, 2009 STEM 0.5 with example Scenarios
- Aug 15 2009 STEM 0.6 with Analysis perspective
- November 15, 2009 STEM 1.0 Release
- April 15, 2009 Multiserotype Disease Models

Mentors

Ed Merks,
- Macro Modeling,
- Member Eclipse Foundation Board of Directors,
- PMC Lead Eclipse Modeling Project,
- Member Eclipse Architecture Council

Chris Aniszczyk
- Code 9
- Member Eclipse Foundation Board of Directors,
- Member Eclipse Architecture Council
- Member Eclipse Planning Council

Committer Biographies

Daniel Ford. Daniel was the initial Eclipse Committer for STEM. His contributions to the system include the initial concept of a composable graph framework and the general architecture and organization of STEM. He also designed the UML models that underpin STEM's implementation and is responsible for their implementation using the Eclipse Modeling Framework (EMF). Daniel wrote the initial versions of most of the components that constituted the original STEM contribution. Daniel has a Ph.D. in Computer Science and is a Research Staff Member (RSM) at the IBM Almaden Research Center in San Jose, CA.

James Kaufman. James founded the STEM project with Daniel Ford and was the project's second Eclipse committer. He initiated the formation of the OHF. James is primarily responsibility in the development and implementation of mathematical models for the characterization of disease propagation and the development and implementation of mathematical tools and for epidemiological data analysis in STEM. James has a Ph.D. in Physics and is a Manager and Research Staff Member at the IBM Almaden Research Center in San Jose, CA.

Committer Biographies

Stefan Edlund. Stefan is an Eclipse Committer and has contributed to STEM since August 2008. Stefan has been working on the logging component in STEM, dramatically improving its performance. Stefan has also been contributing to the analytics perspective as well as the mathematics for STEM disease models. Stefan Edlund is a Senior Software Engineer at the IBM Almaden Research Center in San Jose, CA.

Yossi Mesika. Yossi is an Eclipse Committer who contributed several new features and improvements to the STEM project. Yossi worked on the graphical rendering of the geographical maps within STEM and added some useful features like presenting graph edges and the use of color providers. Yossi is also the release engineer of STEM and responsible for the automatic process of generating weekly builds and publishing those in the Web site. Yossi is a Research Staff Member at the IBM Haifa Research Labs in Israel.