Epidemic Simulation

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Chapter 1

epidemic-simulation

1.1 Detailed description

The application is C# object-oritented implementation of the epidemic simulation employing make building system. WinForms and XNA (FNA) frameworks were used to created graphical user interface. The user can set up different initial parameters of simulation including disease lethality, communicability, duration and simulated population. There are three different scenarios enriching the user experience: 1) single community simulation, 2) shopping community simulation and 3) multigroup community simulation. The user is able to observe the spread of the germ in real time as well as follow graphs depicting progress of the disease. At the very end of simulation, the file containg detalied statistics is being generated. The project has been created and developed as university project for the 'Object-Oriented Programming' course. It contains unit tests and automatically generated documentation thanks to doxygen.

1.2 Available commands

- `make` - builds the entire project (application, tests and documentation)
- `make compile` - builds only the application
- `make run` - runs the application
- `make test` - compiles and runs unit tests
- `make compile_tests` - compiles only unit tests
- `make documentation` - updates the project documentation
- `make clean` - cleans the project's auxiliary and temporary files

1.3 Requirements:

- C# implementation - dotnet or mono
- XNA or FNA framework
- make command
- doxygen command

Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all documented namespaces with brief descriptions:

Charting 9
EpidemicSimulation 9
TestSuite 9

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

EpidemicSimulation.ChartManager 11
EpidemicSimulation.Disease 14
Form
    Program 26
Game
Charting.Graph 15
EpidemicSimulation.ISimulation 18
    EpidemicSimulation.MultigroupCommunitySimulation 19
    EpidemicSimulation.ShoppingCommunitySimulation 28
    EpidemicSimulation.SingleCommunitySimulation 30
EpidemicSimulation.Person 21
    EpidemicSimulation.Dead 12
    EpidemicSimulation.Infectious 16
    EpidemicSimulation.Recovered 26
    EpidemicSimulation.Susceptible 32
TestSuite.PersonTest 25
TestSuite.SimulationTest 29
EpidemicSimulation.StatisticsPrinter 31
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Chapter 4

Class Index

4.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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EpidemicSimulation.Dead . . . 12
EpidemicSimulation.Disease . . . 14
Charting.Graph . . . 15
EpidemicSimulation.Infectious . . . 16
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Chapter 5

Namespace Documentation

5.1 Charting Namespace Reference

Classes

- class Graph

5.2 EpidemicSimulation Namespace Reference

Classes

- class ChartManager
- class Dead
- class Disease
- class Infectious
- interface ISimulation
- class MultigroupCommunitySimulation
- class Person
- class Recovered
- class ShoppingCommunitySimulation
- class **Simulation**
- class SingleCommunitySimulation
- class StatisticsPrinter
- class Susceptible

5.2.1 Detailed Description

Class manages the Graph class providing basic setup and letting easily update displayed statistics.

5.3 TestSuite Namespace Reference

Classes

- class PersonTest
- class SimulationTest
- class TestRunner

Chapter 6

Class Documentation

6.1 EpidemicSimulation.ChartManager Class Reference

Public Member Functions

- ChartManager (Vector2 position, Point size, Simulation simulation, GraphicsDevice graphicsDevice)
- void Update ()
- void Draw ()
- void LoadContent ()

6.1.1 Constructor & Destructor Documentation

6.1.1.1 ChartManager()

```
EpidemicSimulation.ChartManager.ChartManager (
            Vector2 position,
            Point size,
            Simulation simulation,
            GraphicsDevice graphicsDevice )  [inline]
```

Constructor sets position of the the graph inside a window, size of the graph, instance of Simulation providing data for plotting and a graphics card object.

Parameters

position	Position of the graph inside window
size	Size of the graph in pixels
simulation	Instance of Simulation to dervive data from
graphicsDevice	A graphics card object

6.1.2 Member Function Documentation

6.1.2.1 Draw()

```
void EpidemicSimulation.ChartManager.Draw ( )  [inline]
```

Plots all data: infected in red, susceptible in blue, recovered in green and dead in gray.

6.1.2.2 LoadContent()

```
void EpidemicSimulation.ChartManager.LoadContent ( )  [inline]
```

Initializes instance of Graph and configures it.

6.1.2.3 Update()

```
void EpidemicSimulation.ChartManager.Update ( )  [inline]
```

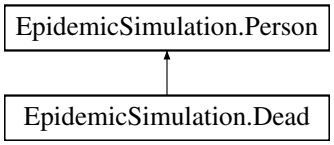
Updates the statistics culling them from provided instance of Simulation.

The documentation for this class was generated from the following file:

- src/ui/ChartManager.cs

6.2 EpidemicSimulation.Dead Class Reference

Inheritance diagram for EpidemicSimulation.Dead:



Public Member Functions

- Dead (Rectangle SimulationRect, Point startPosition, Vector2 MovementVector, float? immunity=null, int? repulsionRate=null)
- override void UpdateSelf ()
- override string Type ()

Additional Inherited Members

6.2.1 Detailed Description

Class representing a person that have died due to the simulated epidemic.

6.2.2 Constructor & Destructor Documentation

6.2.2.1 Dead()

```
EpidemicSimulation.Dead.Dead (
            Rectangle SimulationRect,
            Point startPosition,
            Vector2 MovementVector,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor invoked during creation an instance of a concrete class representing a dead person.

Parameters

simulationRect	Rectangle determining an area where this person can move
startPosition	Position where the person is located at the very beginning of the simulation or after being added to the simulation
MovementVector	Vector defining movement of this person
immunity	Number representing personal immunity
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected.

6.2.3 Member Function Documentation

6.2.3.1 Type()

```
override string EpidemicSimulation.Dead.Type ( )  [inline], [virtual]
```

Returns a type of person as a text label.

Implements EpidemicSimulation.Person.

6.2.3.2 UpdateSelf()

```
override void EpidemicSimulation.Dead.UpdateSelf ( )  [inline], [virtual]
```

Overrides base person UpdateSelf() method to prevent dead person from any action

Reimplemented from EpidemicSimulation.Person.

The documentation for this class was generated from the following file:

- src/backend/Dead.cs

6.3 EpidemicSimulation.Disease Class Reference

Static Public Member Functions

- static void s_SetUpParams (float? lethality=null, float? duration=null, float? communicability=null, float? requiredFieldIntersetion=null)

Static Public Attributes

- static float Lethality = 0.1f
- static float **Duration** = 2000f
- static float **Communicability** = 0.03f
- static float **RequiredFieldIntersetion** = 0.3f

6.3.1 Member Function Documentation

6.3.1.1 s_SetUpParams()

```
static void EpidemicSimulation.Disease.s_SetUpParams (
            float?  lethality = null,
            float?  duration = null,
            float?  communicability = null,
            float?  requiredFieldIntersetion = null )  [inline], [static]
```

Method responsible for setting chosen params from UI

Parameters

lethality	as factor of dying rate
duration	as number of simulation Update() calls required to change state
communicability	as factor of transmission probability
requiredFieldIntersetion	as minimal outhger field intersection value (0 - 1)

6.3.2 Member Data Documentation

6.3.2.1 Lethality

```
float EpidemicSimulation.Disease.Lethality = 0.1f  [static]
```

Class representing an instance of disease, contains all parameters used to simulate behavior of such.

The documentation for this class was generated from the following file:

- src/backend/Disease.cs

6.4 Charting.Graph Class Reference

Public Types

- enum **GraphType** { **Line** , **Fill** }

Public Member Functions

- **Graph** (GraphicsDevice graphicsDevice, Point size)
- void Draw (List< Tuple< float, Color > > values)

  Draws the values in given order, with specific color for each value
- void Draw (List< float > values, Color color)

  Draws the values in given order, in specified color

Properties

- GraphType **Type** `[get, set]`

  Determines whether the drawn graph will be line only, or filled
- Vector2 **Position** `[get, set]`

  The bottom left position of the graph
- Point **Size** `[get, set]`

  The size of the graph. The graph values will be scaled horizontally to fill width (Size.X) Vertically, the values will be scaled based on MaxValue property, where the position of the value that is equal to MaxValue will be Size.Y
- float **MaxValue** `[get, set]`

  Determines the vertical scaling of the graph. The value that is equal to MaxValue will be displayed at the top of the graph (at point Size.Y)

6.4.1 Member Function Documentation

6.4.1.1 Draw() [1/2]

```
void Charting.Graph.Draw (
            List< float > values,
            Color color )  [inline]
```

Draws the values in given order, in specified color

Parameters

values	Values to draw, in order from left to right
color	Color of the entire graph

6.4.1.2 Draw() [2/2]

```
void Charting.Graph.Draw (
            List< Tuple< float, Color > > values )  [inline]
```

Draws the values in given order, with specific color for each value

Parameters

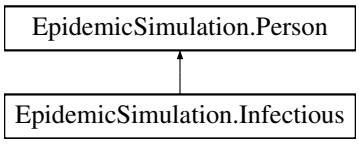
values	Value/color pairs to draw, in order from left to right

The documentation for this class was generated from the following file:

- vendor/Graph.cs

6.5 EpidemicSimulation.Infectious Class Reference

Inheritance diagram for EpidemicSimulation.Infectious:



Public Member Functions

- Infectious (Rectangle simulationRect, float? immunity=null, int? repulsionRate=null)
- Infectious (Rectangle simulationRect, Point startPosition, Vector2 MovementVector, float? immunity=null, int? repulsionRate=null)
- override string Type ()

Public Attributes

- new float **InfectionDuration** = 0

Additional Inherited Members

6.5.1 Detailed Description

Class representing a person that got infected and spreads the germs.

6.5.2 Constructor & Destructor Documentation

6.5.2.1 Infectious() [1/2]

```
EpidemicSimulation.Infectious.Infectious (
            Rectangle simulationRect,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor creating a concrete instance of a infectious person.

Parameters

simulationRect	Rectangle determining an area where this person can move
immunity	Number representing personal immunity
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected.

6.5.2.2 Infectious() [2/2]

```
EpidemicSimulation.Infectious.Infectious (
            Rectangle simulationRect,
            Point startPosition,
            Vector2 MovementVector,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor creating a concrete instance of a infectious person.

Parameters

simulationRect	Rectangle determining an area where this person can move
startPosition	Position where the person is located at the very beginning of the simulation or after being added to the simulation
MovementVector	Vector defining movement of this person
immunity	Number representing personal immunity
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected.

6.5.3 Member Function Documentation

6.5.3.1 Type()

```
override string EpidemicSimulation.Infectious.Type ( )  [inline], [virtual]
```

Returns a type of person as a text label.

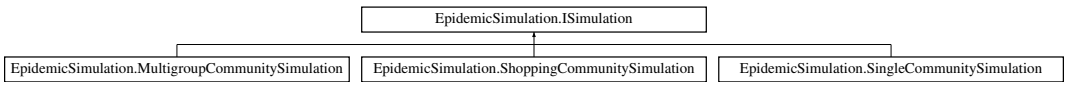
Implements EpidemicSimulation.Person.

The documentation for this class was generated from the following file:

- src/backend/Infectious.cs

6.6 EpidemicSimulation.ISimulation Interface Reference

Inheritance diagram for EpidemicSimulation.ISimulation:



Public Member Functions

- void Start ()
- void Close ()
- void **Pause** ()
- Dictionary< string, int > GetSimulationData ()

6.6.1 Detailed Description

Interface constituting abstraction of epidemic scenario.

6.6.2 Member Function Documentation

6.6.2.1 Close()

```
void EpidemicSimulation.ISimulation.Close ( )
```

Implemented in EpidemicSimulation.MultigroupCommunitySimulation, EpidemicSimulation.ShoppingCommunitySimulation, and EpidemicSimulation.SingleCommunitySimulation.

6.6.2.2 GetSimulationData()

```
Dictionary< string, int > EpidemicSimulation.ISimulation.GetSimulationData ( )
```

Implemented in EpidemicSimulation.MultigroupCommunitySimulation, EpidemicSimulation.ShoppingCommunitySimulation, and EpidemicSimulation.SingleCommunitySimulation.

6.6.2.3 Start()

```
void EpidemicSimulation.ISimulation.Start ( )
```

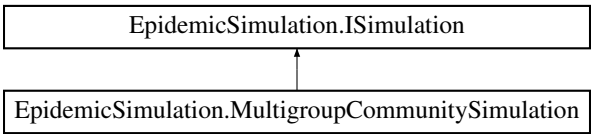
Implemented in EpidemicSimulation.MultigroupCommunitySimulation, EpidemicSimulation.ShoppingCommunitySimulation, and EpidemicSimulation.SingleCommunitySimulation.

The documentation for this interface was generated from the following file:

- src/backend/ISimulation.cs

6.7 EpidemicSimulation.MultigroupCommunitySimulation Class Reference

Inheritance diagram for EpidemicSimulation.MultigroupCommunitySimulation:



Public Member Functions

- MultigroupCommunitySimulation (uint population, uint infected)
- void Start ()
- void Close ()
- Dictionary< string, int > GetSimulationData ()

Protected Member Functions

- override void Update (GameTime gameTime)
- override void Draw (GameTime gameTime)

6.7.1 Detailed Description

This class constitues the multigroup community scenario, handling high-level events of simulation such as pausing, closing, starting a simulation, providing data and providing a simplified constructor.

6.7.2 Constructor & Destructor Documentation

6.7.2.1 MultigroupCommunitySimulation()

```
EpidemicSimulation.MultigroupCommunitySimulation.MultigroupCommunitySimulation (
            uint population,
            uint infected )  [inline]
```

Constructor sets the population and infected params. Calls to base class Simulation. Sets up the particular borders of communities, visiting probability and generates obstacles

Parameters

population	Number of people to be simulated
infected	entities to be simulated

6.7.3 Member Function Documentation

6.7.3.1 Close()

```
void EpidemicSimulation.MultigroupCommunitySimulation.Close ( )  [inline]
```

Closes the simulation.

Implements EpidemicSimulation.ISimulation.

6.7.3.2 Draw()

```
override void EpidemicSimulation.MultigroupCommunitySimulation.Draw (
            GameTime gameTime )  [inline], [protected]
```

Draws every drawable object in base simulation and adds obstacles

Parameters

GameTime	object inherited from base Game class, regulates the pace of calling this function

6.7.3.3 GetSimulationData()

```
Dictionary< string, int > EpidemicSimulation.MultigroupCommunitySimulation.GetSimulationData (
) [inline]
```

Returns numbers of dead, infected, healthy and recovered people.

Implements EpidemicSimulation.ISimulation.

6.7.3.4 Start()

```
void EpidemicSimulation.MultigroupCommunitySimulation.Start ( ) [inline]
```

Starts the simulation.

Implements EpidemicSimulation.ISimulation.

6.7.3.5 Update()

```
override void EpidemicSimulation.MultigroupCommunitySimulation.Update (
            GameTime gameTime ) [inline], [protected]
```

Updates the base Update method in order to maintain an offset between drawing new visit point for each person.

Parameters

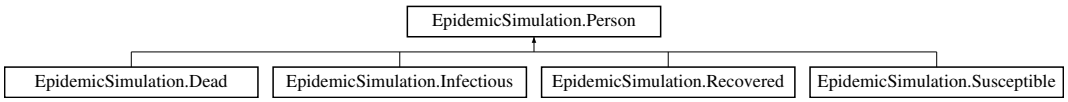
GameTime	object inherited from base Game class, regulates the pace of calling this function

The documentation for this class was generated from the following file:

- src/backend/MultigroupCommunitySimulation.cs

6.8 EpidemicSimulation.Person Class Reference

Inheritance diagram for EpidemicSimulation.Person:



Public Member Functions

- abstract string Type ()
- Person (Rectangle SimulationRect, float? immunity=null, int? repulsionRate=null)
- Person (Rectangle SimulationRect, Point startPosition, Vector2 MovementVector, float? immunity=null, int? repulsionRate=null)
- virtual void UpdateSelf ()
- void GoToPoint (Point? centerPoint=null, float probability=0)

Static Public Member Functions

- static bool s_CheckCollision (Rectangle obj1, Rectangle obj2)
- static float s_FieldIntersectionPrecentege (Rectangle obj1, Rectangle obj2)

Public Attributes

- Vector2 **MovementVector**
- bool **IsColliding** = false
- Rectangle **AnticipadedPositon**
- float **InfectionDuration**
- bool **IgnoreColision** = false

Static Public Attributes

- static List< Rectangle > **Obsticles** = new List<Rectangle>()

Protected Member Functions

- virtual void Move ()
- void MoveRadiusField ()
- int DrawDirection ()

Static Protected Member Functions

- static float RectSurface (Rectangle obj)

Properties

- Point **Position** `[get]`
- static int **_size** `[get]`
- static float **s_MovementSpeed** `[get, set]`
- Rectangle **Rect** `[get, set]`
- float **ImmunityRate** `[get]`
- int **RepulsionRate** `[get]`
- bool **RepulsionExpand** `[get]`
- Rectangle **RadiusRect** `[get]`

6.8.1 Detailed Description

The base class of person instance in simulation. As abstract unites all types of forseen states. Implements all moving and updating logic, generates and handles parametes used for every individual.

6.8.2 Constructor & Destructor Documentation

6.8.2.1 Person() [1/2]

```
EpidemicSimulation.Person.Person (
            Rectangle SimulationRect,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Elementary constructor generates all features of an individual wrapped in certain borders. Sets up initial vector of direction, speed and position.

Parameters

SimulationRect	as adjustment of relative position, restricts the accesible field .
immunity	as resistivity of getting infected and as counter factor to Diseases lethality.
repulsionRate	as the furthest reach of outhger field.

6.8.2.2 Person() [2/2]

```
EpidemicSimulation.Person.Person (
            Rectangle SimulationRect,
            Point startPosition,
            Vector2 MovementVector,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Secondary constructor constructing an instace of Person with predefinied position and direction vector.

Parameters

SimulationRect	as adjustment of relative position, restricts the accesible field .
startPosition	as initial point of spawn. @ MovementVector as initial set direction.
immunity	as resistivity of getting infected and as counter factor to Diseases lethality.
repulsionRate	as the furthest reach of outhger field.

6.8.3 Member Function Documentation

6.8.3.1 DrawDirection()

```
int EpidemicSimulation.Person.DrawDirection ( )  [inline], [protected]
```

Method that returns the chosen direction of turn.

6.8.3.2 GoToPoint()

```
void EpidemicSimulation.Person.GoToPoint (
            Point?  centerPoint = null,
            float probability = 0 )  [inline]
```

Method forsing Peron instance to immidiately follow to the set point.

Parameters

centerPoint	as the pointed point to arrive at.
probability	as rate of executing

6.8.3.3 Move()

```
virtual void EpidemicSimulation.Person.Move ( )  [inline], [protected], [virtual]
```

Method that handles boundries detection, off desired field position, detection of walls, colliding with others and setting up a direction of turn.

6.8.3.4 MoveRadiusField()

```
void EpidemicSimulation.Person.MoveRadiusField ( )  [inline], [protected]
```

Method containg logic of outhger field grown and shrinkage.

6.8.3.5 RectSurface()

```
static float EpidemicSimulation.Person.RectSurface (
            Rectangle obj )  [inline], [static], [protected]
```

Static method returning area of the Rectangle.

6.8.3.6 s_CheckCollision()

```
static bool EpidemicSimulation.Person.s_CheckCollision (
            Rectangle obj1,
            Rectangle obj2 )  [inline], [static]
```

Static method checks if collision is true by calculating overlapping area of two Person instances rectangles.

6.8.3.7 s_FieldIntersectionPrecentege()

```
static float EpidemicSimulation.Person.s_FieldIntersectionPrecentege (
            Rectangle obj1,
            Rectangle obj2 )  [inline], [static]
```

Static method calculating value of overlapping area of two Person instances rectangles.

6.8.3.8 Type()

```
abstract string EpidemicSimulation.Person.Type ( )  [pure virtual]
```

Implemented in EpidemicSimulation.Dead, EpidemicSimulation.Infectious, EpidemicSimulation.Recovered, and EpidemicSimulation.Susceptible.

6.8.3.9 UpdateSelf()

```
virtual void EpidemicSimulation.Person.UpdateSelf ( )  [inline], [virtual]
```

Main method of every change made to Person instance, contains partial logic of changing position, animating the outhger field and controlling the forced move to certain point action.

Reimplemented in EpidemicSimulation.Dead.

The documentation for this class was generated from the following file:

- src/backend/Person.cs

6.9 TestSuite.PersonTest Class Reference

Static Public Member Functions

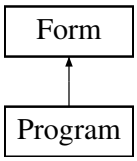
- static void **TestCheckCollisionWhileTheyAreIntersectingWithOnePoint** ()
- static void **TestCheckCollisionWhileIntersectingWithSomeArea** ()
- static void **TestCheckCollisionWhileOneContainsTheOther** ()
- static void **TestCheckCollisionWhileTheyNotShareAnyArea** ()
- static void **TestFieldIntersectionPrecentegeWith1Percent** ()
- static void **TestFieldIntersectionPrecentegeWith0Percent** ()
- static void **TestFieldIntersectionPrecentegeWith100Percent** ()

The documentation for this class was generated from the following file:

- test/PersonTest.cs

6.10 Program Class Reference

Inheritance diagram for Program:



Public Member Functions

- Program ()

Static Public Member Functions

- static void **Main** ()

6.10.1 Constructor & Destructor Documentation

6.10.1.1 Program()

```
Program.Program ( )  [inline]
```

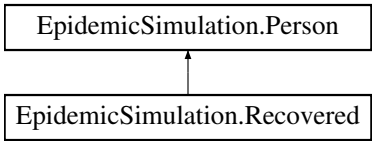
Constructor setting up the postions of all user interface components such as buttons, radio boxes, sliders, and the size of the main window.

The documentation for this class was generated from the following file:

- src/ui/Program.cs

6.11 EpidemicSimulation.Recovered Class Reference

Inheritance diagram for EpidemicSimulation.Recovered:



Public Member Functions

- Recovered (Rectangle SimulationRect, Point startPosition, Vector2 MovementVector, float? immunity=null, int? repulsionRate=null)
- override string Type ()

Additional Inherited Members

6.11.1 Detailed Description

Class representing a person that had been ill due to the simulated epidemic but has managed to recover.

6.11.2 Constructor & Destructor Documentation

6.11.2.1 Recovered()

```
EpidemicSimulation.Recovered.Recovered (
            Rectangle SimulationRect,
            Point startPosition,
            Vector2 MovementVector,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor creating a concrete instance of a recovered person.

Parameters

simulationRect	Rectangle determining an area where this person can move
startPosition	Position where the person is located at the very beginning of the simulation or after being added to the simulation
MovementVector	Vector defining movement of this person
immunity	Number representing personal immunity
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected.

6.11.3 Member Function Documentation

6.11.3.1 Type()

```
override string EpidemicSimulation.Recovered.Type ( )  [inline], [virtual]
```

Returns a type of person as a text label.

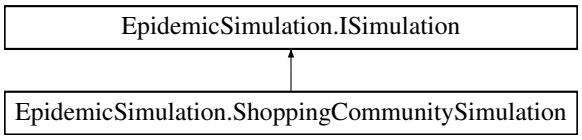
Implements EpidemicSimulation.Person.

The documentation for this class was generated from the following file:

- src/backend/Recovered.cs

6.12 EpidemicSimulation.ShoppingCommunitySimulation Class Reference

Inheritance diagram for EpidemicSimulation.ShoppingCommunitySimulation:



Public Member Functions

- ShoppingCommunitySimulation (Point? centerPoint=null, uint population=20, uint infected=2)
- void Start ()
- void Close ()
- Dictionary< string, int > GetSimulationData ()

6.12.1 Detailed Description

This class constitues the shopping community scenario, handling high-level events of simulation such as pausing, closing, starting a simulation, providing data and providing a simplified constructor.

6.12.2 Constructor & Destructor Documentation

6.12.2.1 ShoppingCommunitySimulation()

```
EpidemicSimulation.ShoppingCommunitySimulation.ShoppingCommunitySimulation (
            Point?  centerPoint = null,
            uint population = 20,
            uint infected = 2 )  [inline]
```

Constructor sets the population and center point.

Parameters

centerPoint	Location of the central point (like shopping mal). It can be null
population	Number of people to be simulated

6.12.3 Member Function Documentation

6.12.3.1 Close()

```
void EpidemicSimulation.ShoppingCommunitySimulation.Close ( )  [inline]
```

Closes the simulation.

Implements EpidemicSimulation.ISimulation.

6.12.3.2 GetSimulationData()

```
Dictionary< string, int > EpidemicSimulation.ShoppingCommunitySimulation.GetSimulationData ( )
[inline]
```

Returns numbers of dead, infected, healthy and recovered people.

Implements EpidemicSimulation.ISimulation.

6.12.3.3 Start()

```
void EpidemicSimulation.ShoppingCommunitySimulation.Start ( )  [inline]
```

Starts the simulation.

Implements EpidemicSimulation.ISimulation.

The documentation for this class was generated from the following file:

- src/backend/ShoppingCommunitySimulation.cs

6.13 TestSuite.SimulationTest Class Reference

Static Public Member Functions

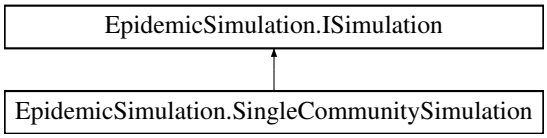
- static void **TestGenerateOutputLists** ()

The documentation for this class was generated from the following file:

- test/SimulationTest.cs

6.14 EpidemicSimulation.SingleCommunitySimulation Class Reference

Inheritance diagram for EpidemicSimulation.SingleCommunitySimulation:



Public Member Functions

- SingleCommunitySimulation (uint population=20, uint infected=2)
- void Start ()
- void Close ()
- Dictionary< string, int > GetSimulationData ()

6.14.1 Detailed Description

This class constitues the single community scenario, handling high-level events of simulation such as pausing, closing, starting a simulation, providing data and providing a simplified constructor.

6.14.2 Constructor & Destructor Documentation

6.14.2.1 SingleCommunitySimulation()

```
EpidemicSimulation.SingleCommunitySimulation.SingleCommunitySimulation (
            uint population = 20,
            uint infected = 2 )  [inline]
```

Constructor creating an instance of Simulation class taking as a parameter the desired population size.

Parameters

population	The desired population size expressed in the number of people.

6.14.3 Member Function Documentation

6.14.3.1 Close()

```
void EpidemicSimulation.SingleCommunitySimulation.Close ( )  [inline]
```

Closes the simulation.

Implements EpidemicSimulation.ISimulation.

6.14.3.2 GetSimulationData()

```
Dictionary< string, int > EpidemicSimulation.SingleCommunitySimulation.GetSimulationData ( )
[inline]
```

Returns numbers of dead, infected, healthy and recovered people.

Implements EpidemicSimulation.ISimulation.

6.14.3.3 Start()

```
void EpidemicSimulation.SingleCommunitySimulation.Start ( )  [inline]
```

Starts the simulation.

Implements EpidemicSimulation.ISimulation.

The documentation for this class was generated from the following file:

- src/backend/SingleCommunitySimulation.cs

6.15 EpidemicSimulation.StatisticsPrinter Class Reference

Public Member Functions

- StatisticsPrinter (ISimulation simulation)
- void Print ()

6.15.1 Detailed Description

Class saves statistics to an external text file.

6.15.2 Constructor & Destructor Documentation

6.15.2.1 StatisticsPrinter()

```
EpidemicSimulation.StatisticsPrinter.StatisticsPrinter (
            ISimulation simulation )  [inline]
```

Constructor takes an instance of ISimulation and assigns its reference to class's private property.

Parameters

simulation	An instance of ISimulation where the data will be culled from.

6.15.3 Member Function Documentation

6.15.3.1 Print()

```
void EpidemicSimulation.StatisticsPrinter.Print ( )  [inline]
```

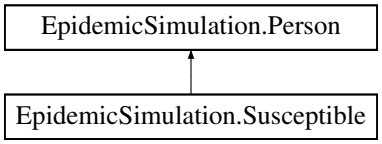
Creates a new file if none exists, otherwise, doesn't create or override anything. Saves information including date, time, chosen lethality, disease duration, communicability, overall population and the final number of infected, uninfected, recovered and dead people to the file. Closes that file.

The documentation for this class was generated from the following file:

- src/backend/StatisticsPrinter.cs

6.16 EpidemicSimulation.Susceptible Class Reference

Inheritance diagram for EpidemicSimulation.Susceptible:



Public Member Functions

- Susceptible (Rectangle simulationRect, float? immunity=null, int? repulsionRate=null)
- Susceptible (Rectangle simulationRect, Point startPosition, Vector2 MovementVector, float? immunity=null, int? repulsionRate=null)
- override string Type ()

Additional Inherited Members

6.16.1 Detailed Description

Class representing a person that is still healthy but prone to get infected.

6.16.2 Constructor & Destructor Documentation

6.16.2.1 Susceptible() [1/2]

```
EpidemicSimulation.Susceptible.Susceptible (
            Rectangle simulationRect,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor invoked during creation an instance of a concrete class representing a healthy but suscetible person.

Parameters

simulationRect	Rectangle determining an area where this person can move
startPosition	Position where the person is located at the very beginning of the simulation or after being added to the simulation
MovementVector	Vector defining movement of this person
immunity	Number representing personal immunity
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected.

6.16.2.2 Susceptible() [2/2]

```
EpidemicSimulation.Susceptible.Susceptible (
            Rectangle simulationRect,
            Point startPosition,
            Vector2 MovementVector,
            float?  immunity = null,
            int?  repulsionRate = null )  [inline]
```

Constructor invoked during creation an instance of a concrete class representing a healthy but suscetible person.

Parameters

simulationRect	Rectangle determining an area where this person can move
immunity	Number representing personal immunity. If it's null, a random value will be assigned
repulsionRate	Rate at which a person is repulsed from other. It hinders a risk of getting infected. If it's null, a random value will be assigned

6.16.3 Member Function Documentation

6.16.3.1 Type()

```
override string EpidemicSimulation.Susceptible.Type ( )  [inline], [virtual]
```

Returns a type of person as a text label.

Implements EpidemicSimulation.Person.

The documentation for this class was generated from the following file:

- src/backend/Susceptible.cs

6.17 TestSuite.TestRunner Class Reference

Static Public Member Functions

- static void **Main** (string[ ] args)
- static void **AssertTrue** (bool value)
- static void **AssertFalse** (bool value)
- static void **AssertEquals** (dynamic expected, dynamic actual)
- static void **PrintSummary** ()

Static Public Attributes

- static int **failedTests** = 0
- static int **numberOfTests** = 0

The documentation for this class was generated from the following file:

- test/TestRunner.cs

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