

Disease_Simulator

1.0

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Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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IWorld	11
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Chapter 2

Hierarchical Index

2.1 Class Hierarchy

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

Actor.Actor	15
Disease.Disease	29
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IDisease.IDisease	40
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Chapter 3

Class Index

3.1 Class List

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

Actor.Actor	15
ActorTest.ActorTest	26
Disease.Disease	
This Disease class is a sub-class of the Actor class	29
DiseaseTest.DiseaseTest	37
IDisease.IDisease	
Interface IDisease allows setting the strength and growth condition of a disease	40
IWorld.IWorld	
Interface IWorld allows initializing and setting diseases for a world	43
MyWorld.MyWorld	
This class has its default constructor, inherited methods from the World class, and the methods specified in the IWorld interface	50
MyWorldTest.MyWorldTest	57
World.World	
Class for holding Actor objects in cells of a grid in the world	61
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Chapter 4

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4.1 File List

Here is a list of all files with brief descriptions:

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Chapter 5

Namespace Documentation

5.1 Actor Namespace Reference

Classes

- class [Actor](#)

5.1.1 Detailed Description

[Actor](#) class, which is the base class for [Disease](#) objects.

Author

Paulo Cavalcanti

Date

20/02/2020

5.2 ActorTest Namespace Reference

Classes

- class [ActorTest](#)

Functions

- def [test_actOutput](#) (capsys)

5.2.1 Detailed Description

A class for testing the [Actor](#).

Usage:

- `py.test ActorTest.py`

Author

Paulo Roma

Since

22/02/2020

5.2.2 Function Documentation

5.2.2.1 `test_actOutput()`

```
def ActorTest.test_actOutput (
    capsys )
```

Definition at line 23 of file ActorTest.py.

5.3 Disease Namespace Reference

Classes

- class [Disease](#)
This [Disease](#) class is a sub-class of the [Actor](#) class.

5.4 DiseaseTest Namespace Reference

Classes

- class [DiseaseTest](#)

5.4.1 Detailed Description

A class for testing the [Disease](#).

Author

Paulo Roma

Since

23/02/2020

5.5 IDisease Namespace Reference

Classes

- class [IDisease](#)
Interface [IDisease](#) allows setting the strength and growth condition of a disease.

Variables

- [ABC](#) = object

5.5.1 Detailed Description

[Disease](#) Interface.

5.5.2 Variable Documentation

5.5.2.1 ABC

```
IDisease.ABC = object
```

Definition at line 12 of file IDisease.py.

5.6 IWorld Namespace Reference

Classes

- class [IWorld](#)
Interface [IWorld](#) allows initializing and setting diseases for a world.

Variables

- [ABC](#) = object

5.6.1 Variable Documentation

5.6.1.1 ABC

```
IWorld.ABC = object
```

Definition at line 12 of file IWorld.py.

5.7 MyWorld Namespace Reference

Classes

- class [MyWorld](#)
This class has its default constructor, inherited methods from the [World](#) class, and the methods specified in the [IWorld](#) interface.

Functions

- def [main](#) ()

5.7.1 Function Documentation

5.7.1.1 main()

```
def MyWorld.main ( )
```

Definition at line 283 of file MyWorld.py.

5.8 MyWorldTest Namespace Reference

Classes

- class [MyWorldTest](#)

5.8.1 Detailed Description

A class for testing the [MyWorld](#).

Author

Paulo Roma

Since

01/03/2020

5.9 Simulator Namespace Reference

Functions

- `def main (args=None)`

This is the main method that sets up a virtual world and simulates the growth of diseases in the world.

5.9.1 Detailed Description

Simulates the growth of diseases in a virtual world.

5.9.2 Function Documentation

5.9.2.1 `main()`

```
def Simulator.main (  
    args = None )
```

This is the main method that sets up a virtual world and simulates the growth of diseases in the world.

Parameters

<i>args</i>	command line arguments: <ul style="list-style-type: none">• Number of iterations.
-------------	---

Author

Paulo Cavalcanti

Date

22/02/2020

Definition at line 24 of file Simulator.py.

5.10 World Namespace Reference

Classes

- class [World](#)
Class for holding [Actor](#) objects in cells of a grid in the world.

Functions

- def [main](#) ()

5.10.1 Function Documentation

5.10.1.1 [main\(\)](#)

```
def World.main ( )
```

Definition at line 207 of file skeleton-AD1/World.py.

Referenced by [World.World.setGrid\(\)](#).

5.11 WorldTest Namespace Reference

Classes

- class [WorldTest](#)

5.11.1 Detailed Description

A class for testing the [World](#).

Author

Paulo Roma

Since

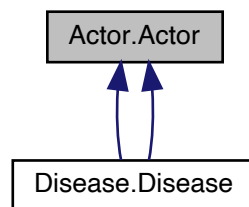
23/02/2020

Chapter 6

Class Documentation

6.1 Actor.Actor Class Reference

Inheritance diagram for Actor.Actor:



Public Member Functions

- def `__init__` (self)
Construct a new [Actor](#) object.
- def `getID` (self)
Used for testing.
- def `Iteration` (self)
Used for testing.
- def `act` (self)
Prints on screen in the format "Iteration <ID>: Actor <Actor ID>".
- def `setLocation` (self, x, y)
Sets the cell coordinates of this object.
- def `addedToWorld` (self, world)

- Sets the world this actor is into.*

 - def `getWorld` (self)
 - Gets the world this object in into.*
 - def `getX` (self)
 - Gets the X coordinate of the cell this actor object is into.*
 - def `getY` (self)
 - Gets the Y coordinate of the cell this actor object is into.*
 - def `__init__` (self)
 - Construct a new `Actor` object.*
 - def `getID` (self)
 - Used for testing.*
 - def `Iteration` (self)
 - Used for testing.*
 - def `act` (self)
 - Prints on screen in the format "Iteration <ID>: Actor <Actor ID>".*
 - def `setLocation` (self, x, y)
 - Sets the cell coordinates of this object.*
 - def `addedToWorld` (self, world)
 - Sets the world this actor is into.*
 - def `getWorld` (self)
 - Gets the world this object in into.*
 - def `getX` (self)
 - Gets the X coordinate of the cell this actor object is into.*
 - def `getY` (self)
 - Gets the Y coordinate of the cell this actor object is into.*

Private Attributes

- `__locX`
- X coordinate of this actor.*
- `__locY`
- Y coordinate of this actor.*
- `__world`
- World this actor belongs to.*
- `__actorID`
- Unique identifier for this actor.*
- `__itCounter`
- Iteration counter.*

Static Private Attributes

- int `__ID` = 0
- Holds the value of the next "free" id.*

6.1.1 Detailed Description

Definition at line 13 of file Actor.py.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 `__init__()` [1/2]

```
def Actor.Actor.__init__ (
    self )
```

Construct a new [Actor](#) object.

- Sets the initial values of its member variables.
- Sets the unique ID for the object and initializes the reference to the [World](#) object to which this [Actor](#) object belongs to null.
- The ID of the first [Actor](#) object is 0.
- The ID gets incremented by one each time a new [Actor](#) object is created.
- Sets the iteration counter to zero and initialize the location of the object to cell (0,0).

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 28 of file Actor.py.

Referenced by `Actor.Actor.__init__()`.

6.1.2.2 `__init__()` [2/2]

```
def Actor.Actor.__init__ (
    self )
```

Construct a new [Actor](#) object.

- Sets the initial values of its member variables.
- Sets the unique ID for the object and initializes the reference to the [World](#) object to which this [Actor](#) object belongs to null.
- The ID of the first [Actor](#) object is 0.
- The ID gets incremented by one each time a new [Actor](#) object is created.
- Sets the iteration counter to zero and initialize the location of the object to cell (0,0).

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 28 of file skeleton-AD1/Actor.py.

References `Actor.Actor.__actorID`, `Actor.Actor.__init__()`, `Actor.Actor.__itCounter`, `Actor.Actor.__locX`, `Actor.Actor.__locY`, and `Actor.Actor.__world`.

6.1.3 Member Function Documentation

6.1.3.1 `act()` [1/2]

```
def Actor.Actor.act (
    self )
```

Prints on screen in the format "Iteration <ID>: Actor <Actor ID>".

The < *ID* > is replaced by the current iteration number. < *ActorID* > is replaced by the unique ID of the [Actor](#) object that performs the `act(self)` method.

For instance, the actor with ID 1 shows the following result on the output screen after its `act(self)` method has been called twice.

```
Iteration 0: Actor 1
Iteration 1: Actor 1
```

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 72 of file `Actor.py`.

References `Actor.Actor.__actorID`, and `Actor.Actor.__itCounter`.

Referenced by `Actor.Actor.act()`.

6.1.3.2 `act()` [2/2]

```
def Actor.Actor.act (
    self )
```

Prints on screen in the format "Iteration <ID>: Actor <Actor ID>".

The < *ID* > is replaced by the current iteration number. < *ActorID* > is replaced by the unique ID of the [Actor](#) object that performs the `act(self)` method.

For instance, the actor with ID 1 shows the following result on the output screen after its `act(self)` method has been called twice.

```
Iteration 0: Actor 1
Iteration 1: Actor 1
```

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 72 of file `skeleton-AD1/Actor.py`.

References `Actor.Actor.act()`.

6.1.3.3 `addedToWorld()` [1/2]

```
def Actor.Actor.addedToWorld (
    self,
    world )
```

Sets the world this actor is into.

Parameters

<i>world</i>	Reference to the World object this Actor object is added.
--------------	---

Exceptions

<i>RuntimeError</i>	when world is null.
---------------------	---------------------

Definition at line 100 of file skeleton-AD1/Actor.py.

References Actor.Actor.addToWorld().

6.1.3.4 addToWorld() [2/2]

```
def Actor.Actor.addToWorld (
    self,
    world )
```

Sets the world this actor is into.

Parameters

<i>world</i>	Reference to the World object this Actor object is added.
--------------	---

Exceptions

<i>RuntimeError</i>	when world is null.
---------------------	---------------------

Definition at line 109 of file Actor.py.

References Actor.Actor.__world.

Referenced by Actor.Actor.addToWorld().

6.1.3.5 getID() [1/2]

```
def Actor.Actor.getID (
    self )
```

Used for testing.

Returns

ActorID

Definition at line 46 of file skeleton-AD1/Actor.py.

References Actor.Actor.__actorID, and Actor.Actor.getID().

6.1.3.6 getID() [2/2]

```
def Actor.Actor.getID (
    self )
```

Used for testing.

Returns

ActorID

Definition at line 46 of file Actor.py.

References Actor.Actor.__actorID.

Referenced by Actor.Actor.getID().

6.1.3.7 getWorld() [1/2]

```
def Actor.Actor.getWorld (
    self )
```

Gets the world this object in into.

Returns

the world this object belongs to

Definition at line 109 of file skeleton-AD1/Actor.py.

References Actor.Actor.getWorld().

6.1.3.8 `getWorld()` [2/2]

```
def Actor.Actor.getWorld (
    self )
```

Gets the world this object in into.

Returns

the world this object belongs to

Definition at line 120 of file Actor.py.

References Actor.Actor.__world.

Referenced by Disease.Disease.act(), Disease.Disease.getQuadrant(), and Actor.Actor.getWorld().

6.1.3.9 `getX()` [1/2]

```
def Actor.Actor.getX (
    self )
```

Gets the X coordinate of the cell this actor object is into.

Returns

the x coordinate of this [Actor](#) object.

Definition at line 118 of file skeleton-AD1/Actor.py.

References Actor.Actor.__locX, and Actor.Actor.getX().

6.1.3.10 `getX()` [2/2]

```
def Actor.Actor.getX (
    self )
```

Gets the X coordinate of the cell this actor object is into.

Returns

the x coordinate of this [Actor](#) object.

Definition at line 131 of file Actor.py.

References Actor.Actor.__locX.

Referenced by Disease.Disease.getQuadrant(), and Actor.Actor.getX().

6.1.3.11 getY() [1/2]

```
def Actor.Actor.getY (
    self )
```

Gets the Y coordinate of the cell this actor object is into.

Returns

the y coordinate of this [Actor](#) object.

Definition at line 127 of file skeleton-AD1/Actor.py.

References Actor.Actor.__locY, and Actor.Actor.getY().

6.1.3.12 getY() [2/2]

```
def Actor.Actor.getY (
    self )
```

Gets the Y coordinate of the cell this actor object is into.

Returns

the y coordinate of this [Actor](#) object.

Definition at line 140 of file Actor.py.

References Actor.Actor.__locY.

Referenced by Disease.Disease.getQuadrant(), and Actor.Actor.getY().

6.1.3.13 Iteration() [1/2]

```
def Actor.Actor.Iteration (
    self )
```

Used for testing.

Returns

number of iterations

Definition at line 54 of file skeleton-AD1/Actor.py.

References Actor.Actor.__itCounter, and Actor.Actor.Iteration().

6.1.3.14 Iteration() [2/2]

```
def Actor.Actor.Iteration (
    self )
```

Used for testing.

Returns

number of iterations

Definition at line 54 of file Actor.py.

References Actor.Actor.__itCounter.

Referenced by Actor.Actor.Iteration().

6.1.3.15 setLocation() [1/2]

```
def Actor.Actor.setLocation (
    self,
    x,
    y )
```

Sets the cell coordinates of this object.

Parameters

<i>x</i>	the column.
<i>y</i>	the row.

Exceptions

<i>ValueError</i>	when $x < 0$ or $x \geq$ world width,
<i>ValueError</i>	when $y < 0$ or $y \geq$ world height,
<i>RuntimeError</i>	when the world is null.

Definition at line 89 of file skeleton-AD1/Actor.py.

References Actor.Actor.setLocation().

6.1.3.16 setLocation() [2/2]

```
def Actor.Actor.setLocation (
    self,
    x,
    y )
```

Sets the cell coordinates of this object.

Parameters

<i>x</i>	the column.
<i>y</i>	the row.

Exceptions

<i>ValueError</i>	when $x < 0$ or $x \geq$ world width,
<i>ValueError</i>	when $y < 0$ or $y \geq$ world height,
<i>RuntimeError</i>	when the world is null.

Definition at line 90 of file Actor.py.

References Actor.Actor.__locX, Actor.Actor.__locY, and Actor.Actor.__world.

Referenced by Actor.Actor.setLocation().

6.1.4 Member Data Documentation**6.1.4.1 __actorID**

```
Actor.Actor.__actorID [private]
```

Unique identifier for this actor.

Definition at line 36 of file Actor.py.

Referenced by Actor.Actor.__init__(), Actor.Actor.act(), and Actor.Actor.getID().

6.1.4.2 __ID

```
int Actor.Actor.__ID = 0 [static], [private]
```

Holds the value of the next "free" id.

Definition at line 16 of file Actor.py.

6.1.4.3 __itCounter

```
Actor.Actor.__itCounter [private]
```

Iteration counter.

Definition at line 39 of file Actor.py.

Referenced by Actor.Actor.__init__(), Actor.Actor.act(), MyWorld.MyWorld.act(), and Actor.Actor.iteration().

6.1.4.4 __locX

```
Actor.Actor.__locX [private]
```

X coordinate of this actor.

Definition at line 30 of file Actor.py.

Referenced by Actor.Actor.__init__(), Actor.Actor.getX(), and Actor.Actor.setLocation().

6.1.4.5 __locY

```
Actor.Actor.__locY [private]
```

Y coordinate of this actor.

Definition at line 32 of file Actor.py.

Referenced by Actor.Actor.__init__(), Actor.Actor.getY(), and Actor.Actor.setLocation().

6.1.4.6 `__world`

```
Actor.Actor.__world [private]
```

[World](#) this actor belongs to.

Definition at line 34 of file Actor.py.

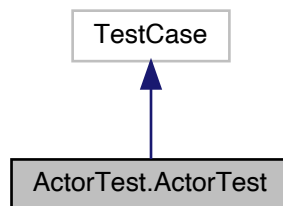
Referenced by `Actor.Actor.__init__()`, `Actor.Actor.addToWorld()`, `Actor.Actor.getWorld()`, and `Actor.Actor.setLocation()`.

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

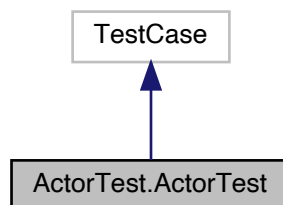
- [Actor.py](#)

6.2 ActorTest.ActorTest Class Reference

Inheritance diagram for ActorTest.ActorTest:



Collaboration diagram for ActorTest.ActorTest:



Public Member Functions

- def [test_constructor](#) (self)
- def [test_setLocation1](#) (self)
Exception tests for setLocation()
- def [test_setLocation2](#) (self)
Exception tests for setLocation()
- def [test_setLocation3](#) (self)
SetLocation() test.
- def [test_setLocation4](#) (self)
SetLocation() test.
- def [test_getWorld](#) (self)
- def [test_addedtoWorld](#) (self)

6.2.1 Detailed Description

Definition at line 29 of file ActorTest.py.

6.2.2 Member Function Documentation

6.2.2.1 test_addedtoWorld()

```
def ActorTest.ActorTest.test_addedtoWorld (  
    self )
```

Definition at line 90 of file ActorTest.py.

6.2.2.2 test_constructor()

```
def ActorTest.ActorTest.test_constructor (  
    self )
```

Definition at line 31 of file ActorTest.py.

6.2.2.3 test_getWorld()

```
def ActorTest.ActorTest.test_getWorld (
    self )
```

Definition at line 83 of file ActorTest.py.

6.2.2.4 test_setLocation1()

```
def ActorTest.ActorTest.test_setLocation1 (
    self )
```

Exception tests for setLocation()

Definition at line 42 of file ActorTest.py.

6.2.2.5 test_setLocation2()

```
def ActorTest.ActorTest.test_setLocation2 (
    self )
```

Exception tests for setLocation()

Definition at line 53 of file ActorTest.py.

6.2.2.6 test_setLocation3()

```
def ActorTest.ActorTest.test_setLocation3 (
    self )
```

SetLocation() test.

Definition at line 64 of file ActorTest.py.

6.2.2.7 test_setLocation4()

```
def ActorTest.ActorTest.test_setLocation4 (
    self )
```

SetLocation() test.

Definition at line 75 of file ActorTest.py.

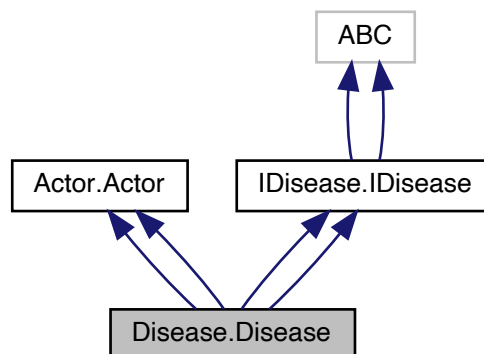
The documentation for this class was generated from the following file:

- [ActorTest.py](#)

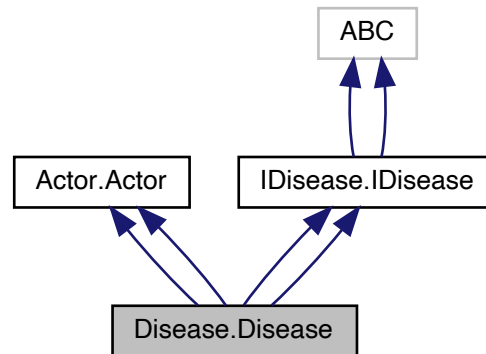
6.3 Disease.Disease Class Reference

This [Disease](#) class is a sub-class of the [Actor](#) class.

Inheritance diagram for Disease.Disease:



Collaboration diagram for Disease.Disease:



Public Member Functions

- `def __init__ (self)`
Constructor.
- `def setGrowthCondition (self, lTemp, hTemp, gRate)`
Sets the disease growth rate, lower temperature and higher temperature.
- `def getGrowthCondition (self)`
Returns the disease growth rate, lower temperature and higher temperature.
- `def getQuadrant (self)`
Returns the quadrant of this disease.
- `def act (self)`
Print on screen in the format "Iteration <ID>: Actor <Actor ID>." The < ID > is replaced by the current iteration number.
- `def getStrength (self)`
Return the disease strength of this object.
- `def __init__ (self)`
Constructor.
- `def setGrowthCondition (self, lTemp, hTemp, gRate)`
Sets the disease growth rate, lower temperature and higher temperature.
- `def getGrowthCondition (self)`
Returns the disease growth rate, lower temperature and higher temperature.
- `def getQuadrant (self)`
Returns the quadrant of this disease.
- `def act (self)`
Print on screen in the format "Iteration <ID>: Actor <Actor ID>." The < ID > is replaced by the current iteration number.
- `def getStrength (self)`
Return the disease strength of this object.

Private Attributes

- [__growthRate](#)
Rate at which the disease grows when subjected to the appropriate temperature range.
- [__lowerTemp](#)
Minimum temperature for the disease development.
- [__higherTemp](#)
Maximum temperature for the disease development.
- [__dStrength](#)
Disease strength.

6.3.1 Detailed Description

This [Disease](#) class is a sub-class of the [Actor](#) class.

Author

Paulo Cavalcanti

Date

22/02/2020

Definition at line 16 of file Disease.py.

6.3.2 Constructor & Destructor Documentation

6.3.2.1 `__init__()` [1/2]

```
def Disease.Disease.__init__ (
    self )
```

Constructor.

- Call its superclass's default constructor.
- Initialize the lower bound and the upper bound temperatures for the growth rate to 0.
- Set the growth rate to 0.
- Set the disease strength to 1.

Reimplemented from [Actor.Actor](#).

Definition at line 26 of file Disease.py.

Referenced by [Disease.Disease.__init__\(\)](#).

6.3.2.2 `__init__()` [2/2]

```
def Disease.Disease.__init__ (
    self )
```

Constructor.

- Call its superclass's default constructor.
- Initialize the lower bound and the upper bound temperatures for the growth rate to 0.
- Set the growth rate to 0.
- Set the disease strength to 1.

Reimplemented from [Actor.Actor](#).

Definition at line 26 of file skeleton-AD1/Disease.py.

References `Disease.Disease.__dStrength`, `Disease.Disease.__growthRate`, `Disease.Disease.__higherTemp`, `Disease.Disease.__init__()`, and `Disease.Disease.__lowerTemp`.

6.3.3 Member Function Documentation

6.3.3.1 `act()` [1/2]

```
def Disease.Disease.act (
    self )
```

Print on screen in the format "Iteration <ID>: Actor <Actor ID>." The < *ID* > is replaced by the current iteration number.

< *ActorID* > is replaced by the unique ID of the [Actor](#) object that performs the `act()` method.

Reimplemented from [Actor.Actor](#).

Definition at line 70 of file skeleton-AD1/Disease.py.

References `Disease.Disease.act()`.

6.3.3.2 act() [2/2]

```
def Disease.Disease.act (
    self )
```

Print on screen in the format "Iteration <ID>: Actor <Actor ID>." The < *ID* > is replaced by the current iteration number.

< *ActorID* > is replaced by the unique ID of the [Actor](#) object that performs the [act\(\)](#) method.

Reimplemented from [Actor.Actor](#).

Definition at line 84 of file Disease.py.

References Disease.Disease.__dStrength, Disease.Disease.__growthRate, Disease.Disease.__higherTemp, Disease.Disease.__lowerTemp, Disease.Disease.getQuadrant(), and Actor.Actor.getWorld().

Referenced by Disease.Disease.act().

6.3.3.3 getGrowthCondition() [1/2]

```
def Disease.Disease.getGrowthCondition (
    self )
```

Returns the disease growth rate, lower temperature and higher temperature.

Returns

growth rate, lower temp and higher temp

Definition at line 54 of file Disease.py.

References Disease.Disease.__growthRate, Disease.Disease.__higherTemp, and Disease.Disease.__lowerTemp.

Referenced by Disease.Disease.getGrowthCondition().

6.3.3.4 getGrowthCondition() [2/2]

```
def Disease.Disease.getGrowthCondition (
    self )
```

Returns the disease growth rate, lower temperature and higher temperature.

Returns

growth rate, lower temp and higher temp

Definition at line 54 of file skeleton-AD1/Disease.py.

References Disease.Disease.__growthRate, Disease.Disease.__higherTemp, Disease.Disease.__lowerTemp, and Disease.Disease.getGrowthCondition().

6.3.3.5 `getQuadrant()` [1/2]

```
def Disease.Disease.getQuadrant (
    self )
```

Returns the quadrant of this disease.

Returns

0, 1, 2 or 3.

Definition at line 61 of file skeleton-AD1/Disease.py.

References `Disease.Disease.getQuadrant()`.

6.3.3.6 `getQuadrant()` [2/2]

```
def Disease.Disease.getQuadrant (
    self )
```

Returns the quadrant of this disease.

Returns

0, 1, 2 or 3.

Definition at line 61 of file Disease.py.

References `Actor.Actor.getWorld()`, `Actor.Actor.getX()`, and `Actor.Actor.getY()`.

Referenced by `Disease.Disease.act()`, and `Disease.Disease.getQuadrant()`.

6.3.3.7 `getStrength()` [1/2]

```
def Disease.Disease.getStrength (
    self )
```

Return the disease strength of this object.

Returns

disease strength of the object.

Reimplemented from [IDisease.IDisease](#).

Definition at line 78 of file skeleton-AD1/Disease.py.

References `Disease.Disease.__dStrength`, and `Disease.Disease.getStrength()`.

6.3.3.8 getStrength() [2/2]

```
def Disease.Disease.getStrength (
    self )
```

Return the disease strength of this object.

Returns

disease strength of the object.

Reimplemented from [IDisease.IDisease](#).

Definition at line 95 of file Disease.py.

References Disease.Disease.__dStrength.

Referenced by Disease.Disease.getStrength().

6.3.3.9 setGrowthCondition() [1/2]

```
def Disease.Disease.setGrowthCondition (
    self,
    lTemp,
    hTemp,
    gRate )
```

Sets the disease growth rate, lower temperature and higher temperature.

Parameters

<i>lTemp</i>	Lower bound temperature for the disease to grow at this gRate.
<i>hTemp</i>	Upper bound temperature for the disease to grow at this gRate.
<i>gRate</i>	The growth rate.

Reimplemented from [IDisease.IDisease](#).

Definition at line 44 of file skeleton-AD1/Disease.py.

References Disease.Disease.__growthRate, Disease.Disease.__higherTemp, Disease.Disease.__lowerTemp, and Disease.Disease.setGrowthCondition().

6.3.3.10 `setGrowthCondition()` [2/2]

```
def Disease.Disease.setGrowthCondition (
    self,
    lTemp,
    hTemp,
    gRate )
```

Sets the disease growth rate, lower temperature and higher temperature.

Parameters

<i>lTemp</i>	Lower bound temperature for the disease to grow at this gRate.
<i>hTemp</i>	Upper bound temperature for the disease to grow at this gRate.
<i>gRate</i>	The growth rate.

Reimplemented from [IDisease.IDisease](#).

Definition at line 44 of file Disease.py.

References `Disease.Disease.__growthRate`, `Disease.Disease.__higherTemp`, and `Disease.Disease.__lowerTemp`.

Referenced by `Disease.Disease.setGrowthCondition()`.

6.3.4 Member Data Documentation

6.3.4.1 `__dStrength`

```
Disease.Disease.__dStrength [private]
```

[Disease](#) strength.

Definition at line 35 of file Disease.py.

Referenced by `Disease.Disease.__init__()`, `Disease.Disease.act()`, and `Disease.Disease.getStrength()`.

6.3.4.2 `__growthRate`

```
Disease.Disease.__growthRate [private]
```

Rate at which the disease grows when subjected to the appropriate temperature range.

Definition at line 29 of file Disease.py.

Referenced by `Disease.Disease.__init__()`, `Disease.Disease.act()`, `Disease.Disease.getGrowthCondition()`, and `Disease.Disease.setGrowthCondition()`.

6.3.4.3 `__higherTemp`

```
Disease.Disease.__higherTemp [private]
```

Maximum temperature for the disease development.

Definition at line 33 of file Disease.py.

Referenced by `Disease.Disease.__init__()`, `Disease.Disease.act()`, `Disease.Disease.getGrowthCondition()`, and `Disease.Disease.setGrowthCondition()`.

6.3.4.4 `__lowerTemp`

```
Disease.Disease.__lowerTemp [private]
```

Minimum temperature for the disease development.

Definition at line 31 of file Disease.py.

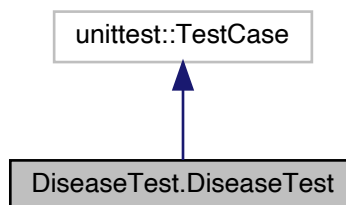
Referenced by `Disease.Disease.__init__()`, `Disease.Disease.act()`, `Disease.Disease.getGrowthCondition()`, and `Disease.Disease.setGrowthCondition()`.

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

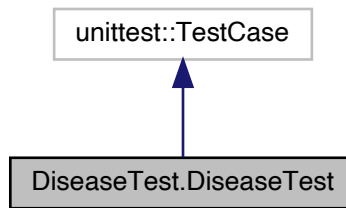
- [Disease.py](#)

6.4 DiseaseTest.DiseaseTest Class Reference

Inheritance diagram for DiseaseTest.DiseaseTest:



Collaboration diagram for DiseaseTest.DiseaseTest:



Public Member Functions

- def [test_checkTemp](#) (self)
Sets the temperature in each quadrant.
- def [test_getStrength](#) (self)
GetStrength() test.
- def [test_getStrength2](#) (self)
- def [test_quadrant](#) (self)
- def [test_quadrant1](#) (self)
- def [test_quadrant2](#) (self)

6.4.1 Detailed Description

Definition at line 19 of file DiseaseTest.py.

6.4.2 Member Function Documentation

6.4.2.1 test_checkTemp()

```
def DiseaseTest.DiseaseTest.test_checkTemp (
    self )
```

Sets the temperature in each quadrant.

Exceptions

<code>FileNotFoundException</code>

Definition at line 25 of file DiseaseTest.py.

6.4.2.2 test_getStrength()

```
def DiseaseTest.DiseaseTest.test_getStrength (
    self )
```

GetStrength() test.

Definition at line 40 of file DiseaseTest.py.

6.4.2.3 test_getStrength2()

```
def DiseaseTest.DiseaseTest.test_getStrength2 (
    self )
```

Definition at line 46 of file DiseaseTest.py.

6.4.2.4 test_quadrant()

```
def DiseaseTest.DiseaseTest.test_quadrant (
    self )
```

Definition at line 56 of file DiseaseTest.py.

6.4.2.5 test_quadrant1()

```
def DiseaseTest.DiseaseTest.test_quadrant1 (
    self )
```

Definition at line 63 of file DiseaseTest.py.

6.4.2.6 test_quadrant2()

```
def DiseaseTest.DiseaseTest.test_quadrant2 (
    self )
```

Definition at line 70 of file DiseaseTest.py.

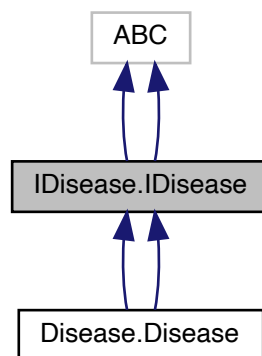
The documentation for this class was generated from the following file:

- [DiseaseTest.py](#)

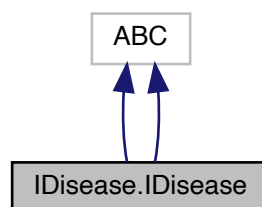
6.5 IDisease.IDisease Class Reference

Interface [IDisease](#) allows setting the strength and growth condition of a disease.

Inheritance diagram for IDisease.IDisease:



Collaboration diagram for IDisease.IDisease:



Public Member Functions

- def [setGrowthCondition](#) (self, lTemp, hTemp, gRate)
Set the growth condition of a [Disease](#) object to gRate.
- def [getStrength](#) (self)
Return the disease strength of the object implements this interface.
- def [setGrowthCondition](#) (self, lTemp, hTemp, gRate)
Set the growth condition of a [Disease](#) object to gRate.
- def [getStrength](#) (self)
Return the disease strength of the object implements this interface.

Static Private Attributes

- [__metaclass__](#) = ABCMeta

6.5.1 Detailed Description

Interface [IDisease](#) allows setting the strength and growth condition of a disease.

Author

Paulo Cavalcanti

Date

22/02/2020

Definition at line 21 of file IDisease.py.

6.5.2 Member Function Documentation

6.5.2.1 [getStrength\(\)](#) [1/2]

```
def IDisease.IDisease.getStrength (  
    self )
```

Return the disease strength of the object implements this interface.

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 36 of file IDisease.py.

Referenced by [IDisease.IDisease.getStrength\(\)](#).

6.5.2.2 `getStrength()` [2/2]

```
def IDisease.IDisease.getStrength (
    self )
```

Return the disease strength of the object implements this interface.

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 36 of file skeleton-AD1/IDisease.py.

References `IDisease.IDisease.getStrength()`.

6.5.2.3 `setGrowthCondition()` [1/2]

```
def IDisease.IDisease.setGrowthCondition (
    self,
    lTemp,
    hTemp,
    gRate )
```

Set the growth condition of a [Disease](#) object to `gRate`.

The value of `gRate` gets multiplied to the current disease strength only when the disease is located in the world region with the average temperature in between the values of `lTemp` and `hTemp`.

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 31 of file skeleton-AD1/IDisease.py.

References `IDisease.IDisease.setGrowthCondition()`.

6.5.2.4 `setGrowthCondition()` [2/2]

```
def IDisease.IDisease.setGrowthCondition (
    self,
    lTemp,
    hTemp,
    gRate )
```

Set the growth condition of a [Disease](#) object to `gRate`.

The value of `gRate` gets multiplied to the current disease strength only when the disease is located in the world region with the average temperature in between the values of `lTemp` and `hTemp`.

Reimplemented in [Disease.Disease](#), and [Disease.Disease](#).

Definition at line 31 of file IDisease.py.

Referenced by `IDisease.IDisease.setGrowthCondition()`.

6.5.3 Member Data Documentation

6.5.3.1 `__metaclass__`

```
IDisease.IDisease.__metaclass__ = ABCMeta [static], [private]
```

Definition at line 22 of file IDisease.py.

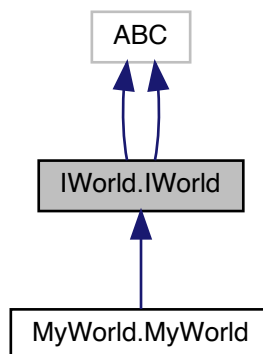
The documentation for this class was generated from the following file:

- [IDisease.py](#)

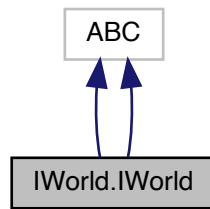
6.6 IWorld.IWorld Class Reference

Interface [IWorld](#) allows initializing and setting diseases for a world.

Inheritance diagram for IWorld.IWorld:



Collaboration diagram for IWorld.IWorld:



Public Member Functions

- def [prepare](#) (self)
- def [setTemp](#) (self, quad, temp)
- def [getTemp](#) (self, quad)
- def [getObjects](#) (self)
- def [getSumStrength](#) (self)
- def [initDiseases](#) (self, numDisStr)
- def [initLocations](#) (self, locationsStr, diseaseArr)
- def [initGrowthConditions](#) (self, growthStr, diseaseArr)
- def [initTemps](#) (tempStr)
- def [prepare](#) (self)
- def [setTemp](#) (self, quad, temp)
- def [getTemp](#) (self, quad)
- def [getObjects](#) (self)
- def [getSumStrength](#) (self)
- def [initDiseases](#) (self, numDisStr)
- def [initLocations](#) (self, locationsStr, diseaseArr)
- def [initGrowthConditions](#) (self, growthStr, diseaseArr)
- def [initTemps](#) (tempStr)

Static Private Attributes

- [__metaclass__](#) = ABCMeta

6.6.1 Detailed Description

Interface [IWorld](#) allows initializing and setting diseases for a world.

Author

Paulo Cavalcanti

Date

22/02/2020

Definition at line 20 of file IWorld.py.

6.6.2 Member Function Documentation

6.6.2.1 `getObjects()` [1/2]

```
def IWorld.IWorld.getObjects (
    self )
```

Definition at line 30 of file IWorld.py.

Referenced by `IWorld.IWorld.getObjects()`, and `MyWorld.MyWorld.getSumStrength()`.

6.6.2.2 `getObjects()` [2/2]

```
def IWorld.IWorld.getObjects (
    self )
```

Definition at line 30 of file skeleton-AD1/IWorld.py.

References `IWorld.IWorld.getObjects()`.

6.6.2.3 `getSumStrength()` [1/2]

```
def IWorld.IWorld.getSumStrength (
    self )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 32 of file IWorld.py.

Referenced by `MyWorld.MyWorld.act()`, and `IWorld.IWorld.getSumStrength()`.

6.6.2.4 `getSumStrength()` [2/2]

```
def IWorld.IWorld.getSumStrength (
    self )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 32 of file skeleton-AD1/IWorld.py.

References `IWorld.IWorld.getSumStrength()`.

6.6.2.5 getTemp() [1/2]

```
def IWorld.IWorld.getTemp (
    self,
    quad )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 28 of file IWorld.py.

Referenced by IWorld.IWorld.getTemp().

6.6.2.6 getTemp() [2/2]

```
def IWorld.IWorld.getTemp (
    self,
    quad )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 28 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.getTemp().

6.6.2.7 initDiseases() [1/2]

```
def IWorld.IWorld.initDiseases (
    self,
    numDisStr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 34 of file IWorld.py.

Referenced by IWorld.IWorld.initDiseases(), and MyWorld.MyWorld.prepare().

6.6.2.8 initDiseases() [2/2]

```
def IWorld.IWorld.initDiseases (
    self,
    numDisStr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 34 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.initDiseases().

6.6.2.9 initGrowthConditions() [1/2]

```
def IWorld.IWorld.initGrowthConditions (
    self,
    growthStr,
    diseaseArr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 38 of file IWorld.py.

Referenced by IWorld.IWorld.initGrowthConditions(), and MyWorld.MyWorld.prepare().

6.6.2.10 initGrowthConditions() [2/2]

```
def IWorld.IWorld.initGrowthConditions (
    self,
    growthStr,
    diseaseArr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 38 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.initGrowthConditions().

6.6.2.11 initLocations() [1/2]

```
def IWorld.IWorld.initLocations (
    self,
    locationsStr,
    diseaseArr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 36 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.initLocations().

6.6.2.12 initLocations() [2/2]

```
def IWorld.IWorld.initLocations (
    self,
    locationsStr,
    diseaseArr )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 36 of file IWorld.py.

Referenced by IWorld.IWorld.initLocations(), and MyWorld.MyWorld.prepare().

6.6.2.13 initTemps() [1/2]

```
def IWorld.IWorld.initTemps (
    tempStr )
```

Definition at line 40 of file IWorld.py.

Referenced by IWorld.IWorld.initTemps(), and MyWorld.MyWorld.prepare().

6.6.2.14 initTemps() [2/2]

```
def IWorld.IWorld.initTemps (
    tempStr )
```

Definition at line 40 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.initTemps().

6.6.2.15 prepare() [1/2]

```
def IWorld.IWorld.prepare (
    self )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 24 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.prepare().

6.6.2.16 `prepare()` [2/2]

```
def IWorld.IWorld.prepare (
    self )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 24 of file IWorld.py.

Referenced by IWorld.IWorld.prepare().

6.6.2.17 `setTemp()` [1/2]

```
def IWorld.IWorld.setTemp (
    self,
    quad,
    temp )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 26 of file IWorld.py.

Referenced by MyWorld.MyWorld.initTemps(), and IWorld.IWorld.setTemp().

6.6.2.18 `setTemp()` [2/2]

```
def IWorld.IWorld.setTemp (
    self,
    quad,
    temp )
```

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 26 of file skeleton-AD1/IWorld.py.

References IWorld.IWorld.setTemp().

6.6.3 Member Data Documentation

6.6.3.1 `__metaclass__`

```
IWorld.IWorld.__metaclass__ = ABCMeta [static], [private]
```

Definition at line 21 of file IWorld.py.

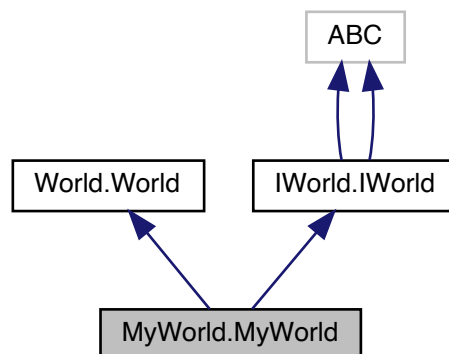
The documentation for this class was generated from the following file:

- [IWorld.py](#)

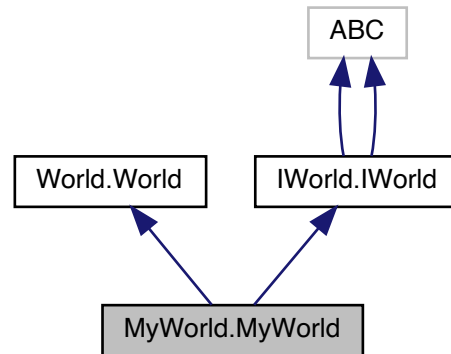
6.7 MyWorld.MyWorld Class Reference

This class has its default constructor, inherited methods from the [World](#) class, and the methods specified in the [IWorld](#) interface.

Inheritance diagram for MyWorld.MyWorld:



Collaboration diagram for MyWorld.MyWorld:



Public Member Functions

- `def __init__ (self)`
Constructor.
- `def setTemp (self, quad, temp)`
Sets the temperature of the given quadrant.
- `def getTemp (self, quad)`
Gets the temperature of the given quadrant.
- `def getSumStrength (self)`
Return the total disease strength of all the diseases in this world.
- `def initDiseases (self, numDisStr)`
Create [Disease](#) objects.
- `def initLocations (self, locationsStr, diseaseArr)`
*Add each [Disease](#) object into this [MyWorld](#) object, according to the information in *locationStr*.*
- `def initGrowthConditions (self, growthStr, diseaseArr)`
*Set the lower bound and upper bound temperature and the growth rate for each disease according to the input *growthStr*.*
- `def initTemps (self, tempStr)`
*Sets the temperature for each quadrant of the *MyWord* according to the value of the *tempStr*.*
- `def prepare (self)`
Prepare the world.
- `def act (self)`
This method overrides the [act\(\)](#) method in the [World](#) class.

Private Attributes

- `__temperature`
Array holding the temperatures of the four quadrants.
- `__itCounter`
Iteration counter.

6.7.1 Detailed Description

This class has its default constructor, inherited methods from the [World](#) class, and the methods specified in the [IWorld](#) interface.

Author

Paulo Cavalcanti

Date

22/02/2020

See also

<https://br.godaddy.com/engineering/2018/12/20/python-metaclasses/>

Definition at line 19 of file MyWorld.py.

6.7.2 Constructor & Destructor Documentation

6.7.2.1 `__init__()`

```
def MyWorld.MyWorld.__init__ (
    self )
```

Constructor.

Calls the constructor of the [World](#) class with the width and height of 720 and 640 cells, respectively. Initialize an array to keep the average temperature of each world region (quadrant). Call the [prepare\(\)](#) method.

Definition at line 28 of file MyWorld.py.

6.7.3 Member Function Documentation

6.7.3.1 act()

```
def MyWorld.MyWorld.act (
    self )
```

This method overrides the [act\(\)](#) method in the [World](#) class.

This method prints "Iteration <ITRID>: World disease strength is <WorldDisease>", where < *ITRID* > is replaced by the current iteration number and < *WorldDisease* > is replaced by the returned value of [getSumStrength\(\)](#) in 2 decimal places. An example is below:

```
Iteration 0: World disease strength is 2.00
Iteration 1: World disease strength is 3.00
```

Reimplemented from [World.World](#).

Definition at line 279 of file [MyWorld.py](#).

References [MyWorld.MyWorld.__itCounter](#), [Actor.Actor.__itCounter](#), and [IWorld.IWorld.getSumStrength\(\)](#).

6.7.3.2 getSumStrength()

```
def MyWorld.MyWorld.getSumStrength (
    self )
```

Return the total disease strength of all the diseases in this world.

See also

<http://docs.python.org/reference/expressions.html#generator-expressions>

Reimplemented from [IWorld.IWorld](#).

Definition at line 55 of file [MyWorld.py](#).

References [IWorld.IWorld.getObjects\(\)](#).

6.7.3.3 getTemp()

```
def MyWorld.MyWorld.getTemp (
    self,
    quad )
```

Gets the temperature of the given quadrant.

Reimplemented from [IWorld.IWorld](#).

Definition at line 45 of file [MyWorld.py](#).

References [MyWorld.MyWorld.__temperature](#).

6.7.3.4 initDiseases()

```
def MyWorld.MyWorld.initDiseases (
    self,
    numDisStr )
```

Create [Disease](#) objects.

The number of the objects equals to the value passed in numDisStr. An example of a valid numDisStr is: "2".

If numDisStr is null or it cannot be converted to a positive integer, print a message on screen: "Check the NumDiseases line in simulation.config." and return null.

Returns

an array of object references to the created [Disease](#) objects.

Reimplemented from [IWorld.IWorld](#).

Definition at line 69 of file MyWorld.py.

6.7.3.5 initGrowthConditions()

```
def MyWorld.MyWorld.initGrowthConditions (
    self,
    growthStr,
    diseaseArr )
```

Set the lower bound and upper bound temperature and the growth rate for each disease according to the input growthStr.

An example of a valid string for 2 [Disease](#) objects is: "10.0,15.0,2.010.0,13.0,3.0" If growthStr is empty or not in the correct format or does not have all the growth for all the [Disease](#) objects in the [Disease](#) array, print on screen "Check the DiseasesGrowth line in simulation.config." and return -1.

Returns

return 0 for a successful initialization of the [Disease](#) growth conditions.

Reimplemented from [IWorld.IWorld](#).

Definition at line 138 of file MyWorld.py.

6.7.3.6 initLocations()

```
def MyWorld.MyWorld.initLocations (
    self,
    locationsStr,
    diseaseArr )
```

Add each [Disease](#) object into this [MyWorld](#) object, according to the information in locationStr.

An example of a locationStr is "200,200400,480". This means that the first [Disease](#) is planted at cell (200,200) and the second [Disease](#) is at cell (400, 480). If the locationStr is empty or not in the correct format or does not have all the cell coordinates of all the [Disease](#) objects, print on screen "Check the Locations line in simulation.config" and return -1.

Returns

0 for a successful initialization of the [Disease](#) locations.

Reimplemented from [IWorld.IWorld](#).

Definition at line 100 of file MyWorld.py.

6.7.3.7 initTemps()

```
def MyWorld.MyWorld.initTemps (
    self,
    tempStr )
```

Sets the temperature for each quadrant of the MyWord according to the value of the tempStr.

An example of tempStr is below. The region temperatures for regions 0, 1, 2, and 3 are 12, 20, 50, and 100, respectively.
Ex: "122050100"

Definition at line 174 of file MyWorld.py.

References [IWorld.IWorld.setTemp\(\)](#).

6.7.3.8 prepare()

```
def MyWorld.MyWorld.prepare (
    self )
```

Prepare the world.

Open a text file named "simulation.config" in the current path (directly under the project directory). Parse the configuration file for the number of [Disease](#) objects, the cell locations of these objects, the growth rates, and the temperature ranges associated with individual growth rates.

Exceptions

<code>IOError</code>	
----------------------	--

Reimplemented from [IWorld.IWorld](#).

Definition at line 199 of file MyWorld.py.

References [World.World.addObject\(\)](#), [IWorld.IWorld.initDiseases\(\)](#), [IWorld.IWorld.initGrowthConditions\(\)](#), [IWorld.IWorld.initLocations\(\)](#), and [IWorld.IWorld.initTemps\(\)](#).

6.7.3.9 setTemp()

```
def MyWorld.MyWorld.setTemp (
    self,
    quad,
    temp )
```

Sets the temperature of the given quadrant.

Reimplemented from [IWorld.IWorld](#).

Definition at line 39 of file MyWorld.py.

References [MyWorld.MyWorld.__temperature](#).

6.7.4 Member Data Documentation

6.7.4.1 __itCounter

```
MyWorld.MyWorld.__itCounter [private]
```

Iteration counter.

Definition at line 33 of file MyWorld.py.

Referenced by [MyWorld.MyWorld.act\(\)](#).

6.7.4.2 `__temperature`

```
MyWorld.MyWorld.__temperature [private]
```

Array holding the temperatures of the four quadrants.

Definition at line 31 of file `MyWorld.py`.

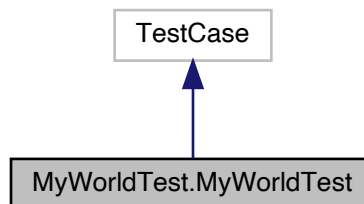
Referenced by `MyWorld.MyWorld.getTemp()`, and `MyWorld.MyWorld.setTemp()`.

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

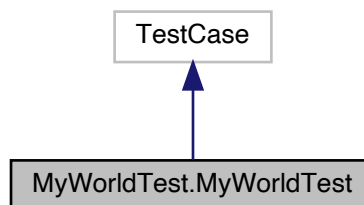
- [MyWorld.py](#)

6.8 MyWorldTest.MyWorldTest Class Reference

Inheritance diagram for `MyWorldTest.MyWorldTest`:



Collaboration diagram for `MyWorldTest.MyWorldTest`:



Public Member Functions

- def `setUp` (self)
Run for all tests.
- def `test_numberofObjects` (self)
Test number of objects.
- def `test_quadTemp` (self)
Test quadrant temperatures.
- def `test_diseasePos` (self)
Test disease position.
- def `test_strength` (self)
Test disease strength.
- def `test_diseaseGrowth` (self)
Test disease growth.

Public Attributes

- `wd`
world object.
- `nd`
number of objects (diseases) in wd.
- `objs`
list of objects (diseases) in wd.

6.8.1 Detailed Description

Author

Paulo Roma

Definition at line 24 of file MyWorldTest.py.

6.8.2 Member Function Documentation

6.8.2.1 `setUp()`

```
def MyWorldTest.MyWorldTest.setUp (  
    self )
```

Run for all tests.

Definition at line 29 of file MyWorldTest.py.

6.8.2.2 test_diseaseGrowth()

```
def MyWorldTest.MyWorldTest.test_diseaseGrowth (
    self )
```

Test disease growth.

Definition at line 77 of file MyWorldTest.py.

References MyWorldTest.MyWorldTest.objs.

6.8.2.3 test_diseasePos()

```
def MyWorldTest.MyWorldTest.test_diseasePos (
    self )
```

Test disease position.

Definition at line 54 of file MyWorldTest.py.

References MyWorldTest.MyWorldTest.objs.

6.8.2.4 test_numberofObjects()

```
def MyWorldTest.MyWorldTest.test_numberofObjects (
    self )
```

Test number of objects.

Definition at line 40 of file MyWorldTest.py.

References MyWorldTest.MyWorldTest.nd.

6.8.2.5 test_quadTemp()

```
def MyWorldTest.MyWorldTest.test_quadTemp (
    self )
```

Test quadrant temperatures.

Definition at line 46 of file MyWorldTest.py.

References MyWorldTest.MyWorldTest.wd.

6.8.2.6 test_strength()

```
def MyWorldTest.MyWorldTest.test_strength (
    self )
```

Test disease strength.

- $10 < 12 < 15$ - disease in region 0 (grows with rate 2)
- $10 < 100 > 13$ - disease in region 4 (does not grow)

Definition at line 64 of file MyWorldTest.py.

References MyWorldTest.MyWorldTest.objs, and MyWorldTest.MyWorldTest.wd.

6.8.3 Member Data Documentation

6.8.3.1 nd

```
MyWorldTest.MyWorldTest.nd
```

number of objects (diseases) in wd.

Definition at line 33 of file MyWorldTest.py.

Referenced by MyWorldTest.MyWorldTest.test_numberofObjects().

6.8.3.2 objs

```
MyWorldTest.MyWorldTest.objs
```

list of objects (diseases) in wd.

Definition at line 35 of file MyWorldTest.py.

Referenced by MyWorldTest.MyWorldTest.test_diseaseGrowth(), MyWorldTest.MyWorldTest.test_diseasePos(), and MyWorldTest.MyWorldTest.test_strength().

6.8.3.3 wd

`MyWorldTest.MyWorldTest.wd`

world object.

Definition at line 31 of file `MyWorldTest.py`.

Referenced by `MyWorldTest.MyWorldTest.test_quadTemp()`, and `MyWorldTest.MyWorldTest.test_strength()`.

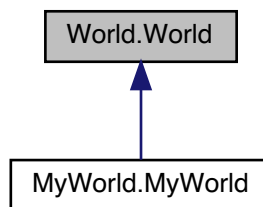
The documentation for this class was generated from the following file:

- [MyWorldTest.py](#)

6.9 World.World Class Reference

Class for holding [Actor](#) objects in cells of a grid in the world.

Inheritance diagram for `World.World`:



Public Member Functions

- `def __init__(self, worldWidth, worldHeight)`
Constructor.
- `def createGrid(self, h, w, d)`
Initializes each object of the array as None.
- `def __str__(self)`
Return a string representation of the grid.
- `def __repr__(self)`
Return a string representation of the grid.
- `def act(self)`
Blank method body.
- `def addObject(self, object, x, y)`

- Adds a new actor to this world at a given position.*

 - def `getHeight` (self)
Returns the world height.
 - def `getWidth` (self)
Returns the world width.
 - def `getDepth` (self)
Returns the world depth.
 - def `numberOfObjects` (self)
Returns the total number of objects in this world.
 - def `getObjects` (self)
Returns an array with all `Actor` objects in this world.
 - def `setGrid` (self, aGrid, numObjs)
It checks if aGrid is a 3D array with the same positive length in each dimension.
 - def `__init__` (self, worldWidth, worldHeight)
Constructor.
 - def `createGrid` (self, h, w, d)
Initializes each object of the array as None.
 - def `__str__` (self)
Return a string representation of the grid.
 - def `__repr__` (self)
Return a string representation of the grid.
 - def `act` (self)
Blank method body.
 - def `addObject` (self, object, x, y)
Adds a new actor to this world at a given position.
 - def `getHeight` (self)
Returns the world height.
 - def `getWidth` (self)
Returns the world width.
 - def `getDepth` (self)
Returns the world depth.
 - def `numberOfObjects` (self)
Returns the total number of objects in this world.
 - def `getObjects` (self)
Returns an array with all `Actor` objects in this world.
 - def `setGrid` (self, aGrid, numObjs)
It checks if aGrid is a 3D array with the same positive length in each dimension.

Private Attributes

- `__grid`
A 3D array of Actors.
- `__objCounter`
Counter for the number of added objects.
- `__width`
Width of the world.
- `__height`
Height of the world.
- `__depth`
Depth of the world.

6.9.1 Detailed Description

Class for holding [Actor](#) objects in cells of a grid in the world.

The world is represented by a 2 dimensional array of cells, with the specified width and height. One cell can keep at most 5 [Actor](#) objects.

Author

Paulo Cavalcanti

Date

20/02/2020

Definition at line 20 of file skeleton-AD1/World.py.

6.9.2 Constructor & Destructor Documentation

6.9.2.1 `__init__()` [1/2]

```
def World.World.__init__ (
    self,
    worldWidth,
    worldHeight )
```

Constructor.

Creates a world with the given width and height.

- The maximum width and height are 1000.
- The maximum number of [Actor](#) objects in a cell is 5.

```
If worldWidth <= 0 or worldWidth > maximum width
    use the maximum width instead.
If worldHeight <=0 or worldHeight > maximum height
    use the maximum height instead.
```

Parameters

<i>worldWidth</i>	Width in number of cells
<i>worldHeight</i>	Height in number of cells

Definition at line 38 of file skeleton-AD1/World.py.

Referenced by World.World.__init__().

6.9.2.2 __init__() [2/2]

```
def World.World.__init__ (
    self,
    worldWidth,
    worldHeight )
```

Constructor.

Creates a world with the given width and height.

- The maximum width and height are 1000.
- The maximum number of [Actor](#) objects in a cell is 5.

```
If worldWidth <= 0 or worldWidth > maximum width
    use the maximum width instead.
If worldHeight <=0 or worldHeight > maximum height
    use the maximum height instead.
```

Parameters

<i>worldWidth</i>	Width in number of cells
<i>worldHeight</i>	Height in number of cells

Definition at line 38 of file World.py.

References World.World.__depth, World.World.__grid, World.World.__height, World.World.__init__(), World.World.__objCounter, World.World.__width, and World.World.createGrid().

6.9.3 Member Function Documentation

6.9.3.1 __repr__() [1/2]

```
def World.World.__repr__ (
    self )
```

Return a string representation of the grid.

List by depth. Each slice is height x width.

Returns

string with the grid.

See also

<https://www.ict.social/python/basics/multidimensional-lists-in-python>

Definition at line 91 of file skeleton-AD1/World.py.

References World.World.__grid, World.World.getDepth(), World.World.getHeight(), and World.World.getWidth().

Referenced by World.World.__repr__().

6.9.3.2 __repr__() [2/2]

```
def World.World.__repr__ (
    self )
```

Return a string representation of the grid.

List by depth. Each slice is height x width.

Returns

string with the grid.

See also

<https://www.ict.social/python/basics/multidimensional-lists-in-python>

Definition at line 100 of file World.py.

References World.World.__grid, World.World.__repr__(), World.World.getDepth(), World.World.getHeight(), and World.World.getWidth().

6.9.3.3 __str__() [1/2]

```
def World.World.__str__ (
    self )
```

Return a string representation of the grid.

List by width. Each slice is height x depth.

Returns

string with the grid.

Definition at line 79 of file skeleton-AD1/World.py.

References World.World.__grid, World.World.getDepth(), World.World.getHeight(), and World.World.getWidth().

Referenced by World.World.__str__().

6.9.3.4 `__str__()` [2/2]

```
def World.World.__str__ (
    self )
```

Return a string representation of the grid.

List by width. Each slice is height x depth.

Returns

string with the grid.

Definition at line 88 of file World.py.

References `World.World.__grid`, `World.World.__str__()`, `World.World.getDepth()`, `World.World.getHeight()`, and `World.World.getWidth()`.

6.9.3.5 `act()` [1/2]

```
def World.World.act (
    self )
```

Blank method body.

Overriden in subclasses as appropriate

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 112 of file skeleton-AD1/World.py.

Referenced by `World.World.act()`.

6.9.3.6 `act()` [2/2]

```
def World.World.act (
    self )
```

Blank method body.

Overriden in subclasses as appropriate

Reimplemented in [MyWorld.MyWorld](#).

Definition at line 121 of file World.py.

References `World.World.act()`.

6.9.3.7 addObject() [1/2]

```
def World.World.addObject (
    self,
    object,
    x,
    y )
```

Adds a new actor to this world at a given position.

- The new object will be added at the cell (x,y) if there are less than 5 objects in this cell.
- Be sure to make the added object know that it is in this world and it is at this cell.
- Check which methods of the [Actor](#) class to call.

Parameters

<i>object</i>	the object to be added at this cell (x, y)
<i>x</i>	the column
<i>y</i>	the row

Returns

number of objects in cell (x,y).

Exceptions

<i>SyntaxError</i>	when already max number of objects are in that cell
<i>ValueError</i>	if x or y is not in the valid range
<i>NameError</i>	if the object is null

Definition at line 132 of file skeleton-AD1/World.py.

Referenced by World.World.addObject(), and MyWorld.MyWorld.prepare().

6.9.3.8 addObject() [2/2]

```
def World.World.addObject (
    self,
    object,
    x,
    y )
```

Adds a new actor to this world at a given position.

- The new object will be added at the cell (x,y) if there are less than 5 objects in this cell.
- Be sure to make the added object know that it is in this world and it is at this cell.
- Check which methods of the [Actor](#) class to call.

Parameters

<i>object</i>	the object to be added at this cell (x, y)
<i>x</i>	the column
<i>y</i>	the row

Returns

number of objects in cell (x,y).

Exceptions

<i>SyntaxError</i>	when already max number of objects are in that cell
<i>ValueError</i>	if x or y is not in the valid range
<i>NameError</i>	if the object is null

Definition at line 141 of file World.py.

References `World.World.__depth`, `World.World.__grid`, `World.World.__objCounter`, `World.World.addObject()`, `World.<←`
`World.getHeight()`, and `World.World.getWidth()`.

6.9.3.9 createGrid() [1/2]

```
def World.World.createGrid (
    self,
    h,
    w,
    d )
```

Initializes each object of the array as None.

Parameters

<i>h</i>	grid height.
<i>w</i>	grid width.
<i>d</i>	grid depth.

Returns

grid.

Definition at line 72 of file skeleton-AD1/World.py.

Referenced by World.World.__init__(), and World.World.createGrid().

6.9.3.10 createGrid() [2/2]

```
def World.World.createGrid (  
    self,  
    h,  
    w,  
    d )
```

Initializes each object of the array as None.

Parameters

<i>h</i>	grid height.
<i>w</i>	grid width.
<i>d</i>	grid depth.

Returns

grid.

Definition at line 72 of file World.py.

References World.World.createGrid().

6.9.3.11 getDepth() [1/2]

```
def World.World.getDepth (  
    self )
```

Returns the world depth.

Returns

the world depth.

Definition at line 158 of file skeleton-AD1/World.py.

References World.World.__grid.

Referenced by World.World.__repr__(), World.World.__str__(), and World.World.getDepth().

6.9.3.12 getDepth() [2/2]

```
def World.World.getDepth (
    self )
```

Returns the world depth.

Returns

the world depth.

Definition at line 185 of file World.py.

References World.World.__grid, and World.World.getDepth().

6.9.3.13 getHeight() [1/2]

```
def World.World.getHeight (
    self )
```

Returns the world height.

Returns

the world height.

Definition at line 141 of file skeleton-AD1/World.py.

References World.World.__grid.

Referenced by World.World.__repr__(), World.World.__str__(), World.World.addObject(), and World.World.getHeight().

6.9.3.14 getHeight() [2/2]

```
def World.World.getHeight (
    self )
```

Returns the world height.

Returns

the world height.

Definition at line 168 of file World.py.

References World.World.__grid, and World.World.getHeight().

6.9.3.15 `getObjects()` [1/2]

```
def World.World.getObjects (
    self )
```

Returns an array with all [Actor](#) objects in this world.

Returns

Array of [Actor](#) objects that are in this world.

Comments:

- Each class in Java is a subclass of the Object class.
- Observe that you use the implicit upcast where you assign an [Actor](#) object (sub-class) in an element of the Object array.

Definition at line 181 of file skeleton-AD1/World.py.

Referenced by `World.World.getObjects()`.

6.9.3.16 `getObjects()` [2/2]

```
def World.World.getObjects (
    self )
```

Returns an array with all [Actor](#) objects in this world.

Returns

Array of [Actor](#) objects that are in this world.

Comments:

- Each class in Java is a subclass of the Object class.
- Observe that you use the implicit upcast where you assign an [Actor](#) object (sub-class) in an element of the Object array.

Definition at line 208 of file World.py.

References `World.World.__depth`, `World.World.__grid`, `World.World.__height`, `World.World.__objCounter`, `World.↔World.__width`, and `World.World.getObjects()`.

6.9.3.17 getWidth() [1/2]

```
def World.World.getWidth (
    self )
```

Returns the world width.

Returns

the world width.

Definition at line 150 of file skeleton-AD1/World.py.

References World.World.__grid.

Referenced by World.World.__repr__(), World.World.__str__(), World.World.addObject(), and World.World.getWidth().

6.9.3.18 getWidth() [2/2]

```
def World.World.getWidth (
    self )
```

Returns the world width.

Returns

the world width.

Definition at line 177 of file World.py.

References World.World.__grid, and World.World.getWidth().

6.9.3.19 numberOfObjects() [1/2]

```
def World.World.numberOfObjects (
    self )
```

Returns the total number of objects in this world.

Returns

Total number of objects in this world.

Definition at line 167 of file skeleton-AD1/World.py.

References World.World.__objCounter.

Referenced by World.World.numberOfObjects().

6.9.3.20 numberOfObjects() [2/2]

```
def World.World.numberOfObjects (
    self )
```

Returns the total number of objects in this world.

Returns

Total number of objects in this world.

Definition at line 194 of file World.py.

References World.World.__objCounter, and World.World.numberOfObjects().

6.9.3.21 setGrid() [1/2]

```
def World.World.setGrid (
    self,
    aGrid,
    numObjs )
```

It checks if aGrid is a 3D array with the same positive length in each dimension.

If so, it sets the grid to aGrid and the other private fields of class [World](#) to the dimension lengths of aGrid and numObjs.

Note that some checks are omitted. For example, no check is performed to make sure that numObjs is consistent with the number of [Actor](#) objects in aGrid.

Each [Actor](#) object in aGrid has to be set to this [World](#) object.

Parameters

<i>aGrid</i>	reference to a 3D array of Actor objects.
<i>numObjs</i>	the number of Actor objects in aGrid.

Exceptions

<i>ValueError</i>	if the length of each dimension is out of range or 2nd/3rd dimension has different lengths.
-------------------	---

Definition at line 203 of file skeleton-AD1/World.py.

Referenced by World.World.setGrid().

6.9.3.22 setGrid() [2/2]

```
def World.World.setGrid (
    self,
    aGrid,
    numObjs )
```

It checks if aGrid is a 3D array with the same positive length in each dimension.

If so, it sets the grid to aGrid and the other private fields of class [World](#) to the dimension lengths of aGrid and numObjs.

Note that some checks are omitted. For example, no check is performed to make sure that numObjs is consistent with the number of [Actor](#) objects in aGrid.

Each [Actor](#) object in aGrid has to be set to this [World](#) object.

Parameters

<i>aGrid</i>	reference to a 3D array of Actor objects.
<i>numObjs</i>	the number of Actor objects in aGrid.

Exceptions

<i>ValueError</i>	if the length of each dimension is out of range or 2nd/3rd dimension has different lengths.
-------------------	---

Definition at line 243 of file World.py.

References [World.World.__depth](#), [World.World.__grid](#), [World.World.__height](#), [World.World.__objCounter](#), [World.<←](#)
[World.__width](#), [World.main\(\)](#), and [World.World.setGrid\(\)](#).

6.9.4 Member Data Documentation

6.9.4.1 __depth

```
World.World.__depth [private]
```

Depth of the world.

Definition at line 52 of file skeleton-AD1/World.py.

Referenced by [World.World.__init__\(\)](#), [World.World.addObject\(\)](#), [World.World.getObjects\(\)](#), and [World.World.setGrid\(\)](#).

6.9.4.2 `__grid`

```
World.World.__grid [private]
```

A 3D array of Actors.

Set the grid to aGrid.

Definition at line 40 of file skeleton-AD1/World.py.

Referenced by `World.World.__init__()`, `World.World.__repr__()`, `World.World.__str__()`, `World.World.addObject()`, `World.World.getDepth()`, `World.World.getHeight()`, `World.World.getObjects()`, `World.World.getWidth()`, and `World.World.setGrid()`.

6.9.4.3 `__height`

```
World.World.__height [private]
```

Height of the world.

Sets the private field for the number of rows to nrow.

Definition at line 49 of file skeleton-AD1/World.py.

Referenced by `World.World.__init__()`, `World.World.getObjects()`, and `World.World.setGrid()`.

6.9.4.4 `__objCounter`

```
World.World.__objCounter [private]
```

Counter for the number of added objects.

Sets the private field for the number of [Actor](#) objects to numObj.

Definition at line 43 of file skeleton-AD1/World.py.

Referenced by `World.World.__init__()`, `World.World.addObject()`, `World.World.getObjects()`, `World.World.numberOfObjects()`, and `World.World.setGrid()`.

6.9.4.5 `__width`

```
World.World.__width [private]
```

Width of the world.

Sets the private field for the number of columns to `ncol`.

Definition at line 46 of file `skeleton-AD1/World.py`.

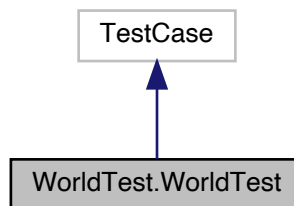
Referenced by `World.World.__init__()`, `World.World.getObjects()`, and `World.World.setGrid()`.

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

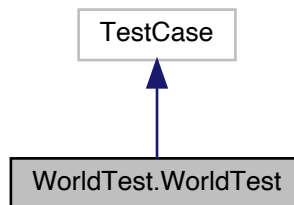
- [skeleton-AD1/World.py](#)

6.10 WorldTest.WorldTest Class Reference

Inheritance diagram for `WorldTest.WorldTest`:



Collaboration diagram for `WorldTest.WorldTest`:



Public Member Functions

- def [test_getWidthandHeight](#) (self)
Test initial height and width.
- def [test_addObj](#) (self)
Test to see if added object to correct cell.
- def [test_nullBeginning](#) (self)
Tests to see if the grid is completely initialized as null.
- def [test_exceptions](#) (self)
Tests the thrown exceptions of addObject()
- def [test_exceptions2](#) (self)
Tests the thrown exceptions of addObject()
- def [test_exceptions3](#) (self)
Tests the thrown exceptions of addObject()
- def [test_addObject](#) (self)
- def [test_setGrid](#) (self)
Tests the thrown exceptions of setGrid() - nRow > 1000.
- def [test_setGrid2](#) (self)
Tests the thrown exceptions of setGrid() - nRow > nCol.
- def [test_setGrid3](#) (self)
Tests the thrown exceptions of setGrid() - nCell > 5.
- def [test_setGrid4](#) (self)
Tests the thrown exceptions of setGrid() - len(aGrid[j]) != ncol.
- def [test_setGrid5](#) (self)
Tests the thrown exceptions of setGrid() - len(aGrid[j][k]) != ncel.
- def [test_largeWorld](#) (self)
Sets the world to an illegal size.

6.10.1 Detailed Description

Author

Paulo Roma

Definition at line 23 of file WorldTest.py.

6.10.2 Member Function Documentation

6.10.2.1 test_addObj()

```
def WorldTest.WorldTest.test_addObj (  
    self )
```

Test to see if added object to correct cell.

Definition at line 38 of file WorldTest.py.

6.10.2.2 test_addObject()

```
def WorldTest.WorldTest.test_addObject (
    self )
```

Definition at line 103 of file WorldTest.py.

6.10.2.3 test_exceptions()

```
def WorldTest.WorldTest.test_exceptions (
    self )
```

Tests the thrown exceptions of addObject()

Definition at line 63 of file WorldTest.py.

6.10.2.4 test_exceptions2()

```
def WorldTest.WorldTest.test_exceptions2 (
    self )
```

Tests the thrown exceptions of addObject()

Definition at line 86 of file WorldTest.py.

6.10.2.5 test_exceptions3()

```
def WorldTest.WorldTest.test_exceptions3 (
    self )
```

Tests the thrown exceptions of addObject()

Definition at line 96 of file WorldTest.py.

6.10.2.6 test_getWidthandHeight()

```
def WorldTest.WorldTest.test_getWidthandHeight (
    self )
```

Test initial height and width.

Definition at line 28 of file WorldTest.py.

6.10.2.7 test_largeWorld()

```
def WorldTest.WorldTest.test_largeWorld (
    self )
```

Sets the world to an illegal size.

Definition at line 172 of file WorldTest.py.

6.10.2.8 test_nullBeginning()

```
def WorldTest.WorldTest.test_nullBeginning (
    self )
```

Tests to see if the grid is completely initialized as null.

Definition at line 49 of file WorldTest.py.

6.10.2.9 test_setGrid()

```
def WorldTest.WorldTest.test_setGrid (
    self )
```

Tests the thrown exceptions of setGrid() - nRow > 1000.

Definition at line 121 of file WorldTest.py.

6.10.2.10 test_setGrid2()

```
def WorldTest.WorldTest.test_setGrid2 (
    self )
```

Tests the thrown exceptions of setGrid() - nRow > nCol.

Definition at line 131 of file WorldTest.py.

6.10.2.11 test_setGrid3()

```
def WorldTest.WorldTest.test_setGrid3 (
    self )
```

Tests the thrown exceptions of setGrid() - nCell > 5.

Definition at line 141 of file WorldTest.py.

6.10.2.12 test_setGrid4()

```
def WorldTest.WorldTest.test_setGrid4 (
    self )
```

Tests the thrown exceptions of setGrid() - len(aGrid[j]) != ncol.

Definition at line 151 of file WorldTest.py.

6.10.2.13 test_setGrid5()

```
def WorldTest.WorldTest.test_setGrid5 (
    self )
```

Tests the thrown exceptions of setGrid() - len(aGrid[j][k]) != ncel.

Definition at line 161 of file WorldTest.py.

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

- [WorldTest.py](#)

Chapter 7

File Documentation

7.1 Actor.py File Reference

Classes

- class [Actor.Actor](#)

Namespaces

- [Actor](#)

7.2 Actor.py File Reference

Classes

- class [Actor.Actor](#)

Namespaces

- [Actor](#)

7.3 ActorTest.py File Reference

Classes

- class [ActorTest.ActorTest](#)

Namespaces

- [ActorTest](#)

Functions

- def [ActorTest.test_actOutput](#) (capsys)

7.4 Disease.py File Reference

Classes

- class [Disease.Disease](#)
This [Disease](#) class is a sub-class of the [Actor](#) class.

Namespaces

- [Disease](#)

7.5 Disease.py File Reference

Classes

- class [Disease.Disease](#)
This [Disease](#) class is a sub-class of the [Actor](#) class.

Namespaces

- [Disease](#)

7.6 DiseaseTest.py File Reference

Classes

- class [DiseaseTest.DiseaseTest](#)

Namespaces

- [DiseaseTest](#)

7.7 IDisease.py File Reference

Classes

- class [IDisease.IDisease](#)

Interface [IDisease](#) allows setting the strength and growth condition of a disease.

Namespaces

- [IDisease](#)

Variables

- [IDisease.ABC](#) = object

7.8 IDisease.py File Reference

Classes

- class [IDisease.IDisease](#)

Interface [IDisease](#) allows setting the strength and growth condition of a disease.

Namespaces

- [IDisease](#)

7.9 IWorld.py File Reference

Classes

- class [IWorld.IWorld](#)

Interface [IWorld](#) allows initializing and setting diseases for a world.

Namespaces

- [IWorld](#)

Variables

- [IWorld.ABC](#) = object

7.10 IWorld.py File Reference

Classes

- class [IWorld.IWorld](#)
Interface [IWorld](#) allows initializing and setting diseases for a world.

Namespaces

- [IWorld](#)

7.11 MyWorld.py File Reference

Classes

- class [MyWorld.MyWorld](#)
This class has its default constructor, inherited methods from the [World](#) class, and the methods specified in the [IWorld](#) interface.

Namespaces

- [MyWorld](#)

Functions

- def [MyWorld.main](#) ()

7.12 MyWorldTest.py File Reference

Classes

- class [MyWorldTest.MyWorldTest](#)

Namespaces

- [MyWorldTest](#)

7.13 Simulator.py File Reference

Namespaces

- [Simulator](#)

Functions

- def [Simulator.main](#) (args=None)

This is the main method that sets up a virtual world and simulates the growth of diseases in the world.

7.14 World.py File Reference

Classes

- class [World.World](#)

Class for holding [Actor](#) objects in cells of a grid in the world.

Namespaces

- [World](#)

Functions

- def [World.main](#) ()

7.15 World.py File Reference

Classes

- class [World.World](#)

Class for holding [Actor](#) objects in cells of a grid in the world.

Namespaces

- [World](#)

Functions

- def [World.main](#) ()

7.16 WorldTest.py File Reference

Classes

- class [WorldTest.WorldTest](#)

Namespaces

- [WorldTest](#)

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