

TIAMAT

OPEN SOURCE ROLE-PLAYING GAME FRAMEWORK

SPECIFICATIONS

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Introduction

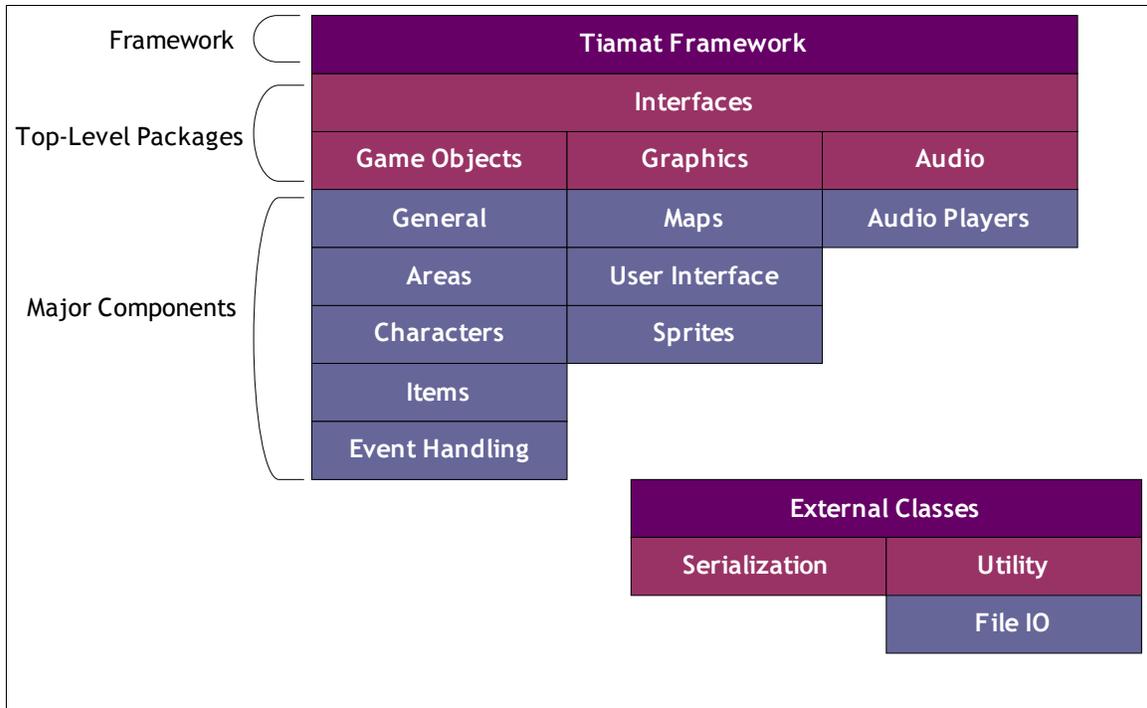
Overview

So what's the goal of this whole mess? Tiamat is designed to provide a framework for developing role-playing games. This is not the same thing as a "game engine", I don't know much about mechanics but I do know how to write libraries of highly reusable code. Tiamat is intended to provide all the basic elements of a role-playing game such as maps, characters, music, and to a limited degree graphics. I say "limited degree" for graphics because I'm not a particularly good graphics programmer and because graphic technologies change at a faster pace than I care to keep track of. The remaining elements of a role-playing game are relatively static. Tiamat should provide the building blocks of an RPG without forcing a developer to follow a specific set of rules.

So what are some of the design objectives of Tiamat? In no particular order.. All game objects (i.e. characters & maps) should be able to be stored in some platform neutral format. Basically, every game object should be able to be saved in a data file that has a clearly defined specification. Why? So that editors for these objects can easily be made and data is interchangeable between programs (even ones that don't use Tiamat).

What is the overall approach for designing the Tiamat Framework? Tiamat is being designed through an iterative process that resembles an agile or extreme programming methodology. The main principal is to break down the concept of an RPG framework into many small, manageable, and independent components.

The first step in this approach is to identify the major building-blocks an RPG framework should contain. These would be things like characters, maps, items, background music and sprites. The current version of Tiamat has identified and grouped these major components as diagrammed below:



So what games inspired this framework? This framework was designed to create games that resemble Phantasy Star I-IV. However, there are certain elements of the Phantasy Star series that I don't care for (such as random battles) that will not appear in Tiamat. Numerous other console role-playing/adventure games played a role in inspiring this framework. In no particular order they are: Lunar series, Chrono Cross, Legend of Heroes: Dragon Slayer, Ys I&II, Grandia II, Super Mario RPG, and Shadowrun.

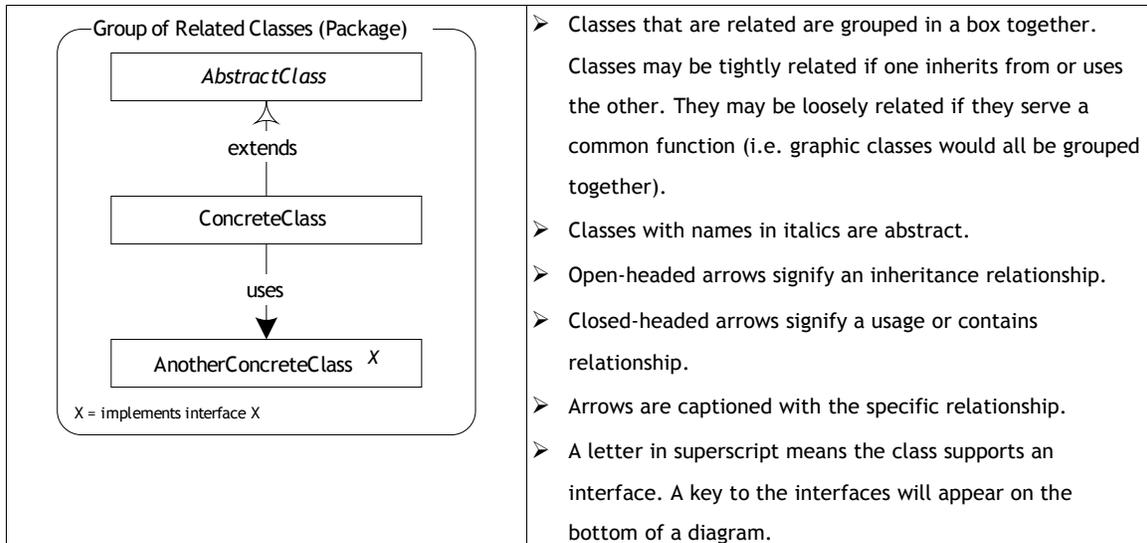
Framework Specifications Guide

Key

Don't you hate when you're reading a diagram and it doesn't tell you what any of the symbols mean? I sure do. These specifications use a syntax that is remotely similar to UML. However, I don't want to read the giant UML specifications so this won't conform to them. Anyway, here's what stuff means:

Class Hierarchy Diagrams

The purpose of this diagram is to show the relationship between classes. There's no class design here, just a visual representation of how classes relate to each other.



Class Diagrams

Defines the specification of a class. Defines all properties, methods, and constructors for a class. Also contains some notes about implementation. It would be nice to port Tiamat to multiple platforms so there needs to be notes about implementation in the class definitions.

<p>SomeClass</p> <p>private properties</p> <p>int whatever</p> <p>protected properties</p> <p>float[] arrayOfFloats</p> <p>public constants</p> <p>int CONSTANT=0</p> <p>constructors</p> <p>SomeClass(void)</p> <p>SomeClass(int someParameter)</p> <p>public properties</p> <p>string status</p> <p>readonly boolean isAlive</p> <p>public methods</p> <p>void doSomething(int parameter)</p>	<ul style="list-style-type: none"> ➤ The name of the class is at the top. If the name is in <i>italic</i> it is an abstract class. ➤ From here there are four groupings of class attributes: ➤ Properties: member variables, can be a simple data type or another class. ➤ Methods: invoke some function of the class. ➤ Constants: constant variables or enumerations. ➤ Constructor: create a new instance of the class, always public. ➤ The scope for these can be: ➤ Public: accessible to external classes, public in inherited classes. ➤ Private: not accessible to external classes, not accessible to inherited classes. ➤ Protected: not accessible to external classes, accessible & protected to inherited classes. ➤ Readonly: property that can only be read by an external class ➤ Data types: ➤ int: integer i.e. 4. ➤ float: decimal i.e. 3.14159. ➤ char: single character. ➤ string: array of characters. ➤ boolean: true or false. ➤ <class name>: another class. ➤ void: nothing. ➤ []: array
--	---

Sample Code

Code samples will be given for classes whenever possible. The purpose is to illustrate how a class would be used in an object-oriented programming language such as Java or C# .NET. Code samples will look remarkably like this:

```
//Hello World
public static void main(string[] arguments) {
    WriteLine("Hello World!");
    Exit();
}
```

Packages

A *package* is a logical grouping of classes that share a common function. The Tiamat RPG Framework has three packages so far:

- Game Objects: This is the root package of the framework. It is meant to contain

the logical elements required to construct an RPG. Classes at this root include things like characters, items, attributes, and areas.

- Audio: This package contains the classes required to play audio.
- Graphics: This package contains the classes needed to visually represent logical entities such as maps and sprites.

There are also a series of external classes and packages defined that are used by members of the Tiamat framework. They are not part of the Tiamat framework because they serve functions for other applications in addition to Tiamat.

External Classes and Interfaces

Serialization Package

Serialization is a mechanism for saving an object's state to a file or other physical representation. Most programming languages support serialization in some form. The purpose of this package is to provide a standard method for serializing objects regardless of platform. The underlying implementations will depend heavily on the serialization support provided in the target languages.

Storable

Indicates an object can be serialized. All storable objects must implement the method `onDeserialize(...)`. This method should be called by a formatter after it has loaded an object. This method allows the object to populate any transient members it has.

The `absoluteDir` parameter is used to tell the object what the current working directory is since any file paths it stores should be relative. Not all storable objects will necessarily need this information. Any storable object that contains paths to files will have a transient `absoluteDir` parameter. For example, a good way to store a path in an XML file would be:

```
<mapPath>.\maps\mymap.map.xml</mapPath>
```

and a bad way would be:

```
<mapPath>c:\some-dir-on-my-machine\maps\mymap.map.xml</mapPath>
```

In the first case, the full path to the XML file can be set at runtime by resolving the working directory and the relative path. In the second case, the path is hard-coded to a specific location which may not actually exist.

```
interface Storable  
public methods  
void onDeserialize(Formatter formatter,string absoluteDir) //event that should be fired after an object has been  
de-serialized, allows it to populate transient properties and de-serialize any storable members it contains
```

It would be desirable if all Storable objects had a platform independent schema associated with them.

Formatter

A Formatter is used to write a Storable object to a physical representation. After loading a storable object, the formatter should invoke the `onDeserialize(...)` method.

interface Formatter

public methods

void saveTo(Storable object,string outputPath) throws StorageException //save the object to the output path

Storable loadFrom(string sourcePath) throws StorageException //load an object from the specified source path

StorageException

Thrown if an error occurs while trying to save or load a serialized object.

StorageException

XmlFormatter

Stores and retrieves objects from an XML file.

XmlFormatter implements Formatter

Utility Classes

There are several classes used by the Tiamat framework that serve specific utility functions.

PathResolver

Utility class to resolve absolute and relative paths.

PathResolver

static public methods

string getRelativePath(string absolutePath1,string absolutePath2) //resolve the relative path from absolutePath1 to absolutePath2

string getAbsolutePath(string absolutePath,string relativePath) //resolve the absolute path from absolutePath to relativePath

ImageLoader

Utility class to load an image from a file into memory.

ImageLoader

static public methods

Image loadImage(string imagePath) //load the image stored at imagePath into memory

Common Interfaces

This section describes interfaces that can be implemented by any class within the Tiamat RPG Framework.

Drawable

Any object that can be drawn on a screen should implement the Drawable interface.

```
interface Drawable  
public methods  
void draw() //draw the entire object  
void draw(int x,int y) //draw the entire object at location specified by (x,y)  
void draw(int x1,int y1,int x2,int y2) //draw the object within the boundaries specified by (x1,y1) and (x2,y2)
```

Game Objects Package

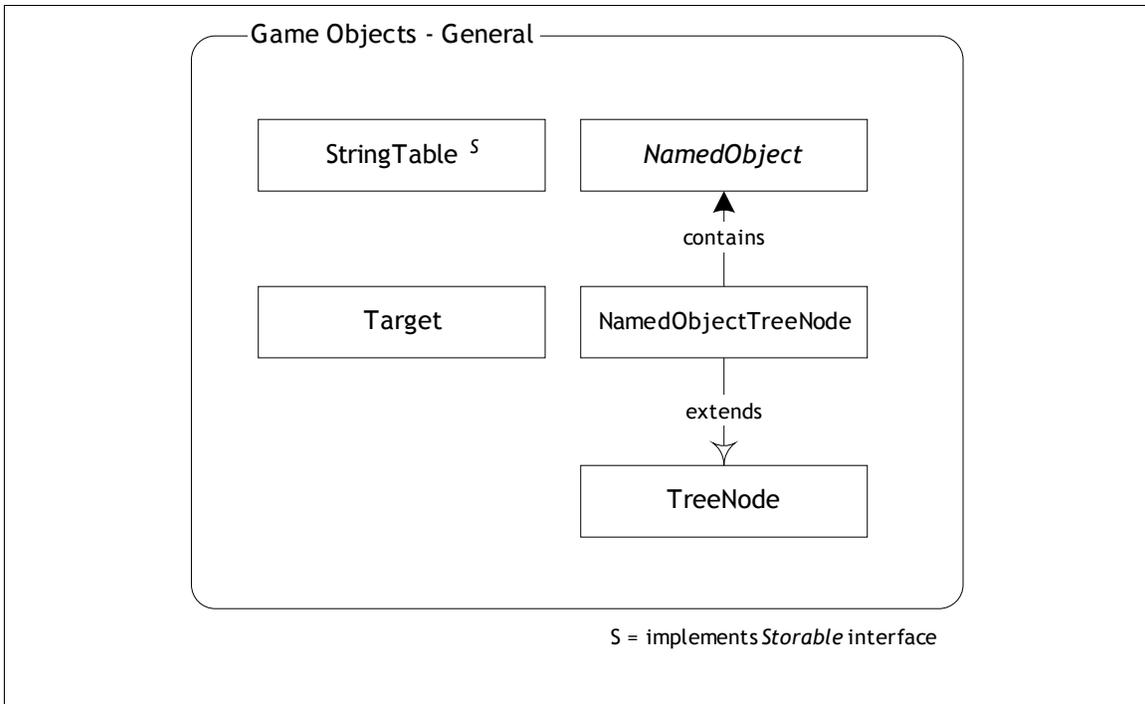
This is the root package for Tiamat. The package contains the core elements needed to build an RPG or adventure game. Although some objects may reference items in the Graphics package, everything in the root package should exist independent of a user interface. In theory, these objects should be usable in a text-only game.

Class Hierarchy

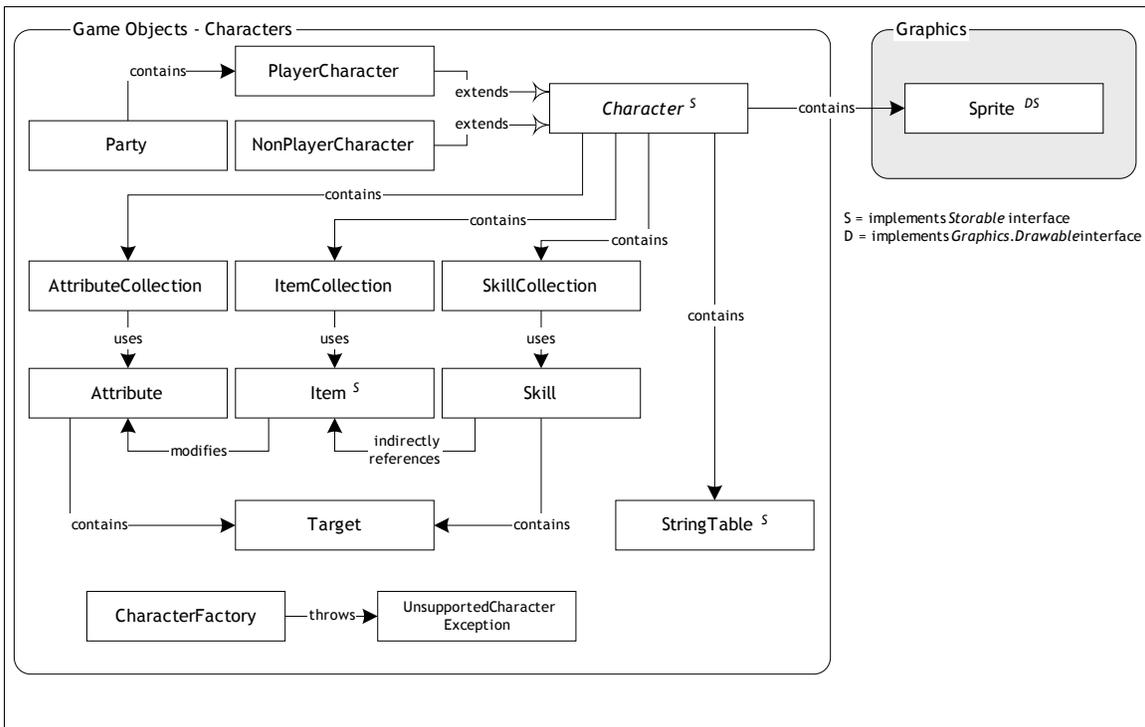
Classes within the root package can be logically grouped by function as follows:

Game Objects		
General	Characters	Items
StringTable ^S	<i>Character</i>	Item
TreeNode	NonPlayerCharacter	ItemCollection
<i>NamedObject</i>	PlayerCharacter	Event Handling
NamedObjectTreeNode	CharacterFactory	Event
Target	UnsupportedCharacter Exception	GameData ^S
Areas	Party	GameScript ^S
Area	Skill	ScriptTableKey
	SkillCollection	ScriptTableValue
	Attribute	
	AttributeCollection	

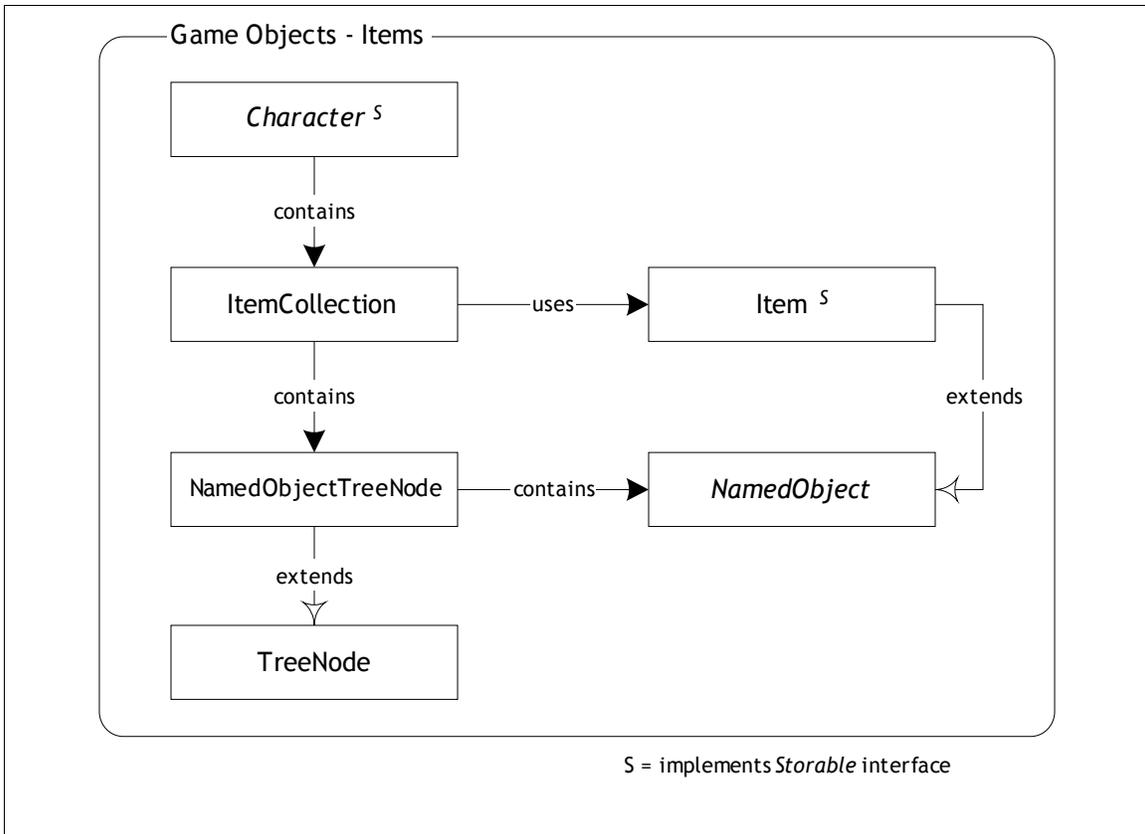
General classes are ones that support commonly used functionality across multiple classes.



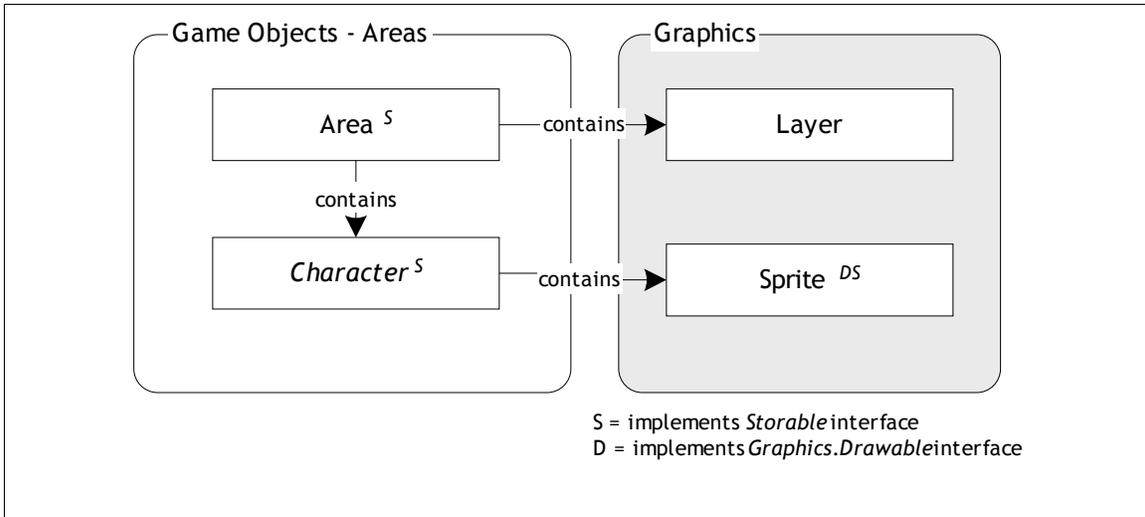
The Character and related classes are used to represent characters along with their skills and attributes.



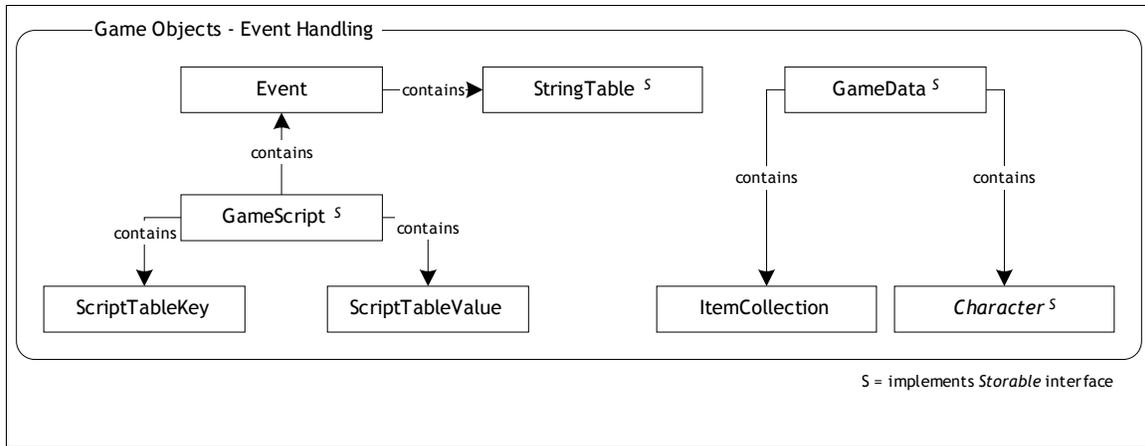
The Item and related classes are used to represent and store items.



Area classes deal with how a location is logically represented.

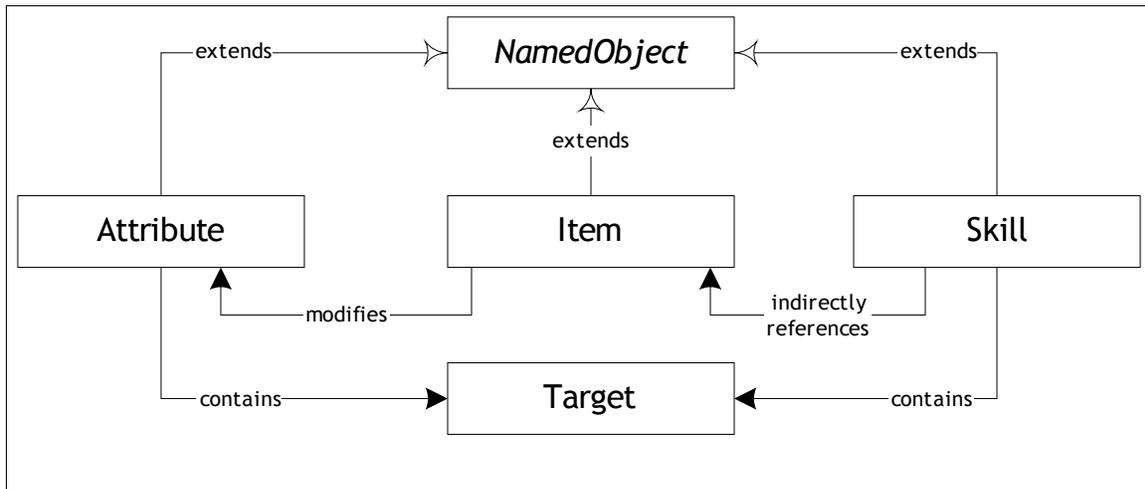


Event Handling classes support game events, data, and scripts.



NamedObject

So how is all this supposed to work? NamedObject is the base class for Attributes, Items, and Skills.



A NamedObject is simply something with a name and a description. Items, Skills, and Attributes all needed a name and a description. Having them inherit from a common base allows them to be stored in a common structure (NamedAttributeTreeNode). This all starts to come together with TreeNodes and collections which are a bit further down.

- An Attribute is used to store a value for a character. Examples include level, hit points, magic points, experience, strength, or poison resistance.
- An Item is something a character possesses. It item modifies an attribute, some can be equipped, some disappear after being used. Items include weapons, healing items, or even spells. The Target collection of the Item describes which

attributes are modified.

- A Skill represents a character's proficiency with a specific Item or class of Items. The Target collection of the Skill describes which Item the skill effects.

abstract NamedObject

constructors

NamedObject(string name,string description)

public properties

string name

string description

Item

```
Item extends NamedObject implements Storable
public constants
bool DEFAULT_EQUIPPED=false
bool DEFAULT_EQUIPABLE=false
bool DEFAULT_DISAPPEAR_ON_USE=false
public properties
string absoluteDir //full path to directory where images are stored, should be set at runtime
string fullImagePath //path to image for this item, changing this should re-load the actual image, relative to
    absoluteDir
string thumbnailImagePath //path to thumbnail image for this item, what would appear in a menu or dialog,
    changing this should reload the actual image, relative to absoluteDir
readonly Image fullImage //full-size image for this item, change this by setting fullImagePath
readonly Image thumbnailImage //thumbnail image for this item, what would appear in a menu or dialog, change
    this by setting thumbnailImagePath
Target[] targets //which attributes does this item modify
bool equipped //whether or not this item is currently equipped
bool equipable //whether or not this item can be equipped
bool disappearOnUse //whether or not this item disappears after being used
constructors
Item(string name,string description)
Item(string name,string description,Target[] targets)
Item(string name,string description,Target[] targets,bool equipable)
Item(string name,string description,Target[] targets,bool equipable,bool disappearOnUse)
Item(string name,string description,Target[] targets,bool equipped,bool equipable,bool disappearOnUse)
Item(string name,string description,string fullImagePath,string thumbnailImagePath,bool equipped,bool
    equipable,bool disappearOnUse)
Item(string name,string description,string fullImagePath,string thumbnailImagePath)
Item(string name,string description,string fullImagePath,string thumbnailImagePath,Target[] targets)
Item(string name,string description,string fullImagePath,string thumbnailImagePath,Target[] targets,bool
    equipable)
Item(string name,string description,string fullImagePath,string thumbnailImagePath,Target[] targets,bool
    equipable,bool disappearOnUse)
public methods
int getTargetCount(void) //how many targets for this item
void addTarget(Target target) //add a Target to the collection of Targets
private methods
Image loadImage(string imagePath) //convenience method to load images
```

Skill

Skill extends NamedObject

constructors

Skill(string name,string description) //blank skill with no targets

Skill(string name,string description,Target[] targets)

public properties

Target[] targets //what item is modified by this skill

public methods

int getTargetCount(void) //how many targets for this skill

void addTarget(Target target) //add a Target to the collection of Targets

Attribute

Attribute extends NamedObject

constructors

Attribute(string name,string description,long baseValue)

Attribute(string name,string description,long baseValue,long currentValue)

public properties

long baseValue //the base (initial) value for this attribute

long currentValue //the current value for this attribute

Target

```
Target
public constants
enum AffectedEntities{ //who this target effects
    USER //the character that used the item
    PARTY_SINGLE //a single member of the character's party
    PARTY_ALL //all members of the character's party
    ENEMY_SINGLE //a single enemy
    ENEMY_ALL //all enemies
    EVERYONE //everyone is effected }
AffectedEntities DEFAULT_AFFECTED_ENTITY=AffectedEntities.USER
constructors
Target(string targetPath,long value) //uses DEFAULT_AFFECTED_ENTITY
Target(string targetPath,long value,AffectedEntity affectedEntity)
public properties
string targetPath //describes the path of the item or attribute being modified
long value //how much to modify the target, used differently for items & skills
AffectedEntity affectedEntity //who this target effects
```

TreeNode

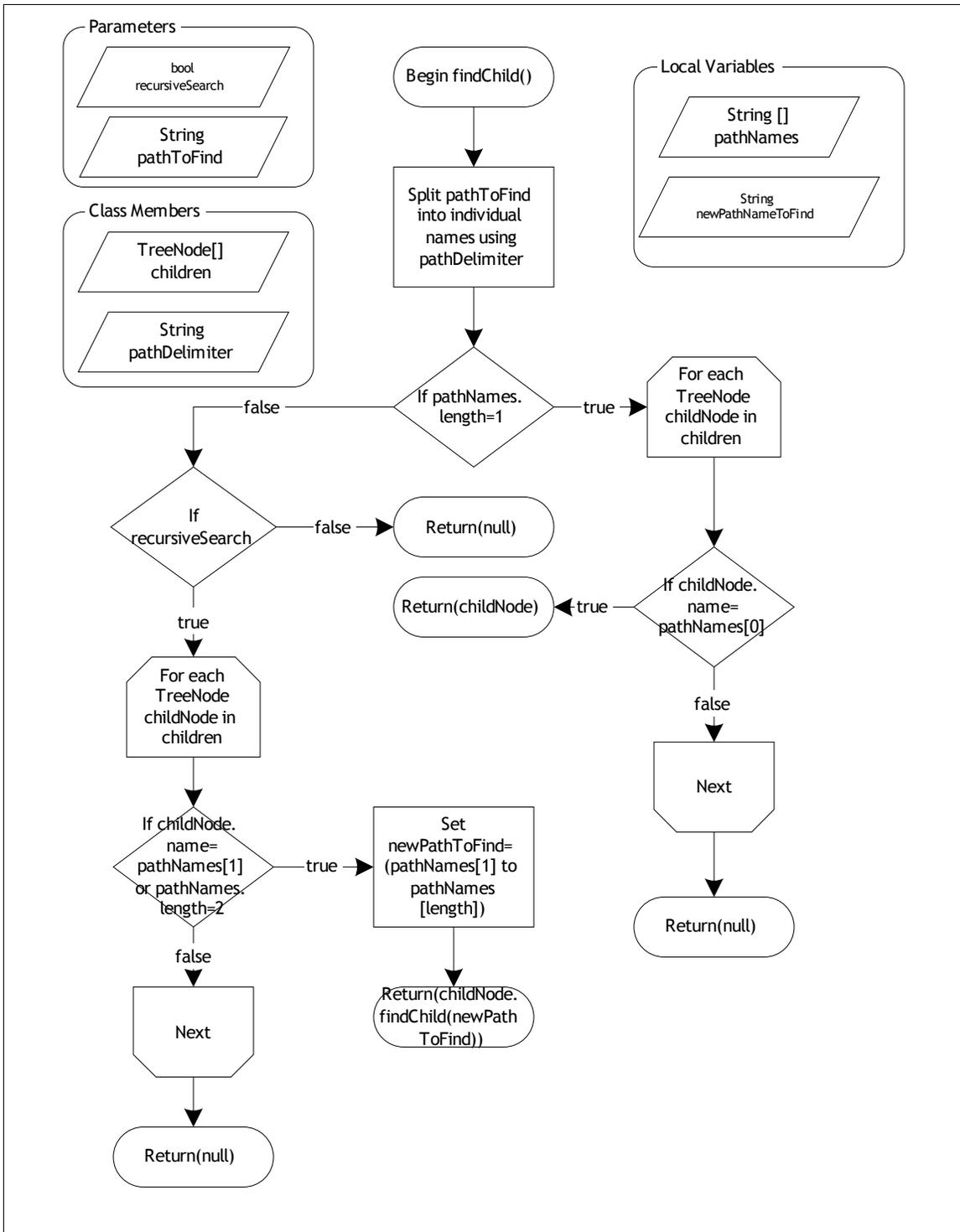
The purpose of TreeNodes are to store objects in a heirarchical structure. A TreeNode stores an object and a name for that object. Objects can be accessed through a fully qualified path. Setting the parent of TreeNode updates its path. The NamedObjectTreeNode extends the abstract TreeNode.

```

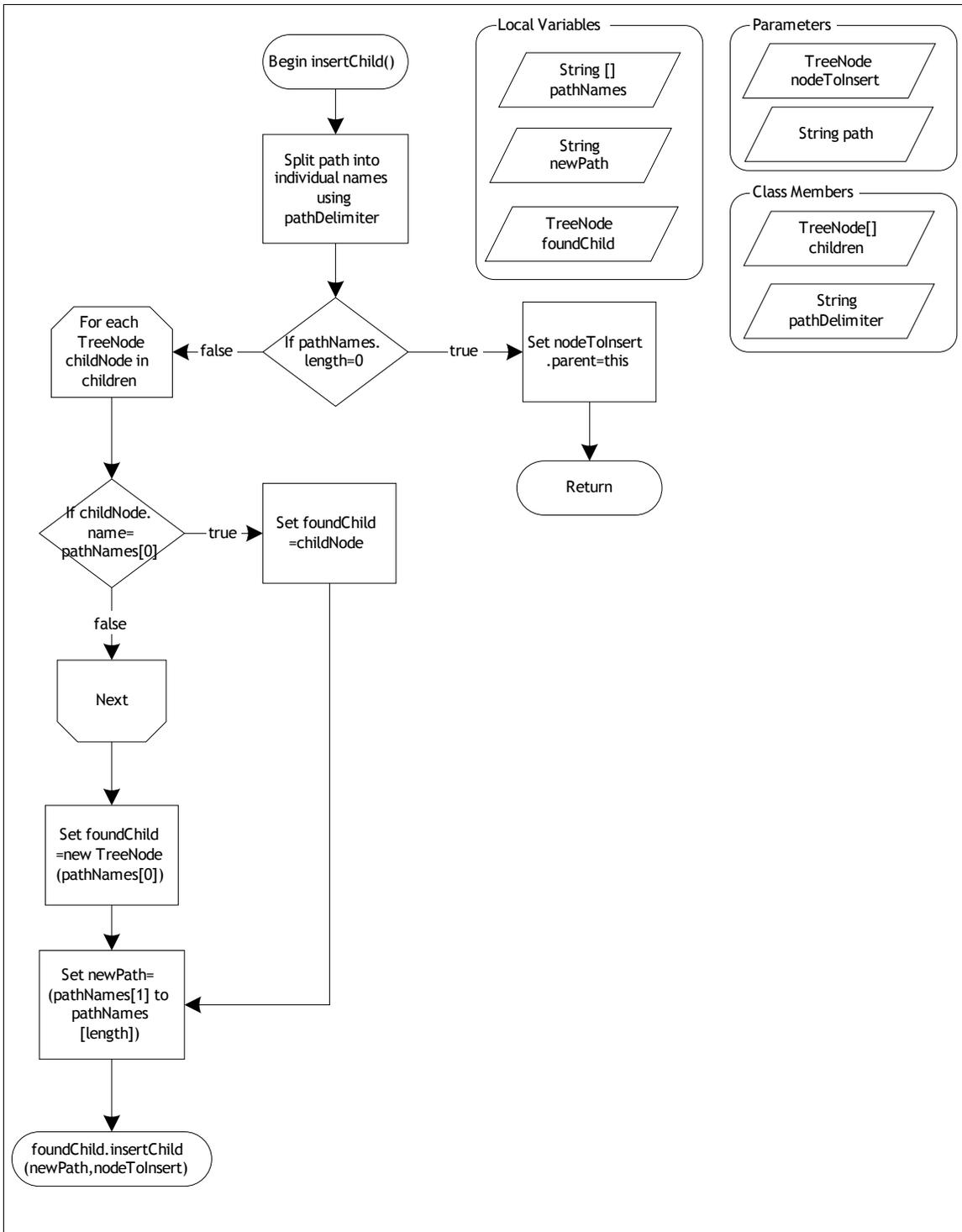
TreeNode
private members
string pathDelimiter //character used to separate names in path
public constants
string DEFAULT_PATH_DELIMITER="."
constructors
TreeNode(string name)
TreeNode(string name,string pathDelimiter)
TreeNode(string name,Object object)
TreeNode(string name,string pathDelimiter,Object object)
TreeNode(string name,Object object,TreeNode parent)
TreeNode(string name,string pathDelimiter,Object object,TreeNode parent)
public properties
TreeNode parent //each node can have at most one parent
TreeNode[] children //child nodes
Object object //the object this node is storing
string name //name of this node
protected methods
void addChild(TreeNode childNode) //should be called by another node when it sets this node as the parent
public methods
string getPath() //return the full path to this node, if this is not a root node, dynamically generate the path by
    recursively calling parent.getPath()
bool isRoot() //true if parent is null
bool isLeaf() //true if no children
bool removeChildNode(string path,bool recursive) //return success
TreeNode getChildNode(string path,bool recursive) //return the child node with that name if it exists, else null
int getChildNodeCount(bool recursive) //number of children for this node
int getChildLeafCount(bool recursive) //number of leaves for this node
TreeNode[] getChildLeaves(bool recursive) //get all leaves (terminal nodes) for this node
void insertChildNode(string path,TreeNode childNode) //recursively inserts the node

```

Logic to find a child node, used for getChildNode() and removeChildNode()



Logic to insert a child node, insertChildNode()



NamedObjectTreeNode

NamedObjectTreeNode extends TreeNode

constructors

NamedObjectTreeNode(NamedObject namedObject)

NamedObjectTreeNode(NamedObject namedObject,string pathDelimiter)

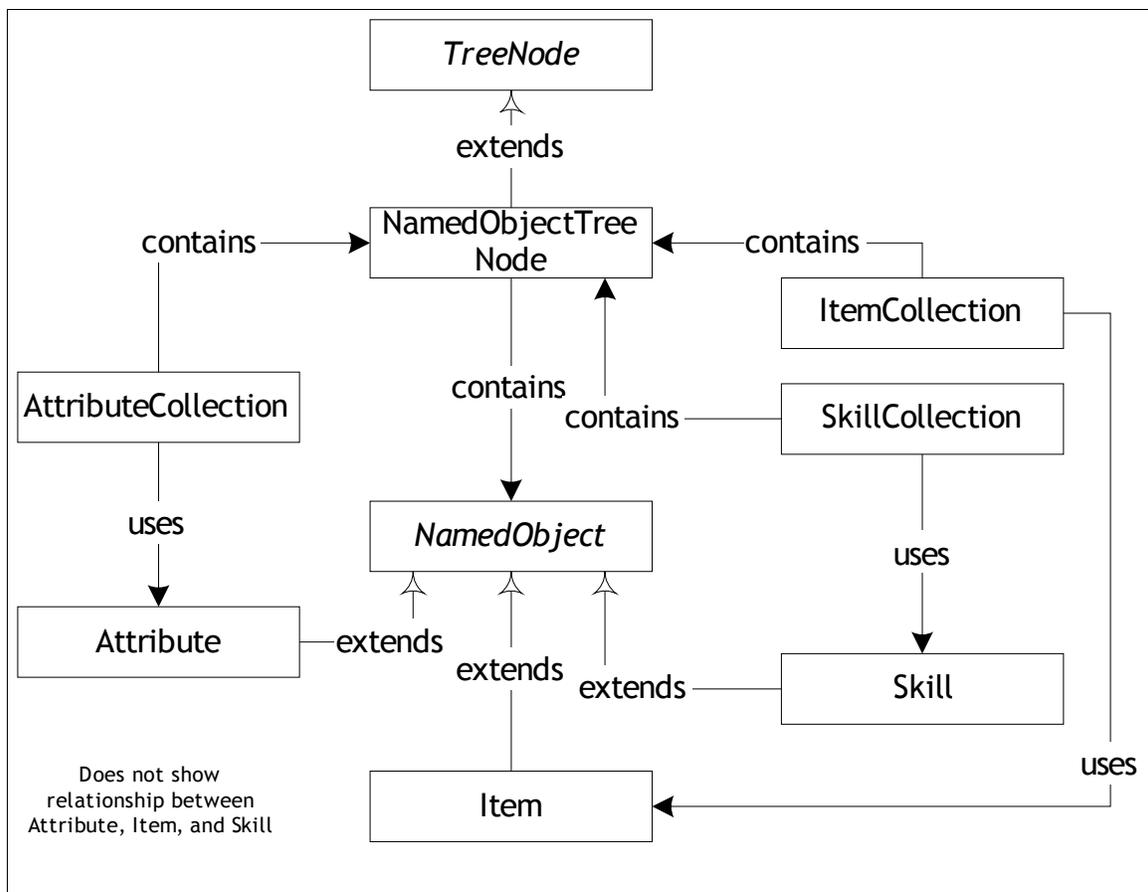
NamedObjectTreeNode(NamedObject namedObject,NamedObjectTreeNode parent)

NamedObjectTreeNode(NamedObject namedObject,string pathDelimiter,NamedObjectTreeNode parent)

protected properties

string name //override to return object.name

This next diagram is not as straightforward as I'd like, but I'll try to explain what's going on:



A NamedObjectTreeNode extends the abstract TreeNode. The only new functionality it offers is to override the name method to return the name of the NamedObject it's storing. The three collections (AttributeCollection, ItemCollection, and SkillCollection) each contain a NamedObjectTreeNode that serves as the root for

the collection. Each collection offers additional convenience functions to better use the items they store. Most of the functionality the collections need is found in the abstract `TreeNode` object.

AttributeCollection

```
AttributeCollection
private members
NamedObjectTreeNode rootNode
private constants
string ROOT_NAME="ATTRIBUTES"
string ROOT_DESCRIPTION="Root node for AttributeCollection"
constructors
AttributeCollection()
AttributeCollection(string pathDelimiter)
AttributeCollection(Attribute[] attributes)
AttributeCollection(Attribute[] attributes,string pathDelimiter)
public methods
bool removeAttribute(string path) //return success
Attribute getAttribute(string path) //return the Attribute with that name if it exists, otherwise null
void setAttribute(string path,Attribute attribute) //sets the Attribute with the given path, adds it if it doesn't
    exist
int getCount() //returns the total number of Attributes in the collection
Attribute[] getAll() //return all Attributes in the collection
```

ItemCollection

```
ItemCollection
private members
NamedObjectTreeNode rootNode
private constants
string ROOT_NAME="ITEMS"
string ROOT_DESCRIPTION="Root node for ItemCollection"
constructors
ItemCollection()
ItemCollection(string pathDelimiter)
ItemCollection(Item[] items)
ItemCollection(Item[] items,string pathDelimiter)
public methods
bool removeItem(string path) //return success
Item getItem(string path) //return the Item with that name if it exists, otherwise null
void setItem(string path,Item item) //sets the Item with the given path, adds it if it doesn't exist
int getCount() //returns the total number of Items in the collection
int getCount(string path) //returns the total number of Items starting from the path
ItemCollection getModifiersFor(string targetPath) //return an array of all equipped Items that have a target with a
    targetName equal to targetPath
int getNetModification(string targetPath) //use getModifiersFor() to get all the modifiers for a target, return the
    sum of their values
Item[] getAll()// return all Items in the collection
```

SkillCollection

```
SkillCollection
private members
NamedObjectTreeNode rootNode
private constants
string ROOT_NAME="SKILLS"
string ROOT_DESCRIPTION="Root node for SkillCollection"
constructors
SkillCollection()
SkillCollection(string pathDelimiter)
SkillCollection(Skill[] skills)
SkillCollection(Skill[] skills,string pathDelimiter)
public methods
bool removeSkill(string path) //return success
Skill getSkill(string path) //return the Skill with that name if it exists, otherwise null
void setSkill(string path,Skill skill) //sets the Skill with the given path, adds it if it doesn't exist
int getCount() //returns the total number of Skills in the collection
int getCount(string path) //returns the total number of Skills starting from the path
SkillCollection getModifiersFor(string targetPath) //return an array of all Skills that have a target with a targetPath
equal to targetPath
int getNetModification(string targetPath) //use getModifiersFor() to get all the modifiers for a target, return the
sum of their values
void adjustAllSkills(int percentage) //adjusts the values of all Skills in the collection by the given percentage,
useful for updating all Skills uniformly for gaining/losing a level
void adjustSkills(string rootPath,int percentage) //adjusts the values of all Skills under the rootPath by the given
percentage, useful for updating all Skills uniformly for gaining/losing a level
Skill[] getAll() //return all Skills in the collection
```

StringTable

A StringTable stores key-value pairs of strings. StringTable Implements *Storable* so it can be used to store simple configuration settings.

StringTable implements Storable

private members

HashTable table //underlying implementation

constructors

StringTable()

public methods

void set(string key,string value) //sets an entry in the table

string get(string key,string defaultValue) //returns the entry with the specified key, defaultValue if not found

string[2][] getAll() //return all key-value pairs in the collection, [0][n]=key for item n, [1][n]=value for item n

Character

abstract Character implements Storable

public properties

AttributeCollection attributes //attributes such as strength, hit points, or experience points

ItemCollection items //items the character is carrying

SkillCollection skills //skills the character possesses

StringTable profile //string values for a character such as names, class, or race

string spritePath //path to the public sprite's underlying file

readonly Sprite sprite //the physical sprite for the character, change by setting spritePath

string absoluteDir //full path to directory where images are stored, should be set at runtime

string fullImagePath //path to image for this character, relative to absoluteDir

string thumbnailImagePath //path to thumbnail image for this character, what would appear in a menu or dialog, relative to absoluteDir

readonly Image fullImage //full-size image for this item, change this by setting fullImagePath

readonly Image thumbnailImage //thumbnail image for this item, what would appear in a menu or dialog, change this by setting thumbnailImagePath

private methods

Image loadImage(string filePath) //convenience method to load images

constructors

Character() //creates an empty Character

NonPlayerCharacter

This represents a Character that the player does not have any control over. This would include townspeople or monsters.

NonPlayerCharacter extends Character

PlayerCharacter

This represents a Character that the player can control.

PlayerCharacter extends Character

CharacterFactory

CharacterFactory is an abstract static class that contains a single public method load(string path). This method is called with the path to a character file. The CharacterFactory creates an instance of the appropriate character, loads the character, and returns a reference to the loaded character. If no character can be found an UnsupportedOperationException is thrown.

abstract CharacterFactory

public static methods

Character load(string path,Formatter formatter) //determines the correct Character for the specified file and loads it uses the specified Formatter, throws exception if a suitable Character can not be found

UnsupportedCharacterException

This should extend the exception class for the platform it's running on. No special behavior is needed.

UnsupportedCharacterException

Party

Simply put, a Party is a collection of PlayerCharacters. The first character in the Party (zero element) is considered the "main character". If this character is moved the others will follow. The order of the elements in the collection is therefore important and could have specific implications in a game.

```

Party
public properties
PlayerCharacter[] members //the members of this Party
public methods
int getMemberCount() //return the number of characters in this Party
PlayerCharacter getMember(int index) //get the character at index, null if index<0 || index>=count
void add(PlayerCharacter character) //adds a character to the end of the Party
void addAt(PlayerCharacter character,int index) //adds a character at the specified index and shifts all character
    past index down a position, adds to the end of the list if index>=count, adds to the start of the list if
    index<=0
Character remove(int index) //removes and returns the character at the specified index, moves members down as
    needed, returns null if index<0 || index>=count
void swapMembers(int index1,int index2) //swaps the players at the two indexes
constructors
Party() //creates an empty Party
Party(PlayerCharacter character) //creates a Party with a single member
Party(PlayerCharacter[] members) //creates a Party with the specified members

```

Area

```

Area implements Storable
public properties
Layer[] layers //the layers for this area
readonly Character[] characters //the characters in this area, change by setting character paths
string absoluteDir //full path to directory where characters are stored, should be set at runtime
string[] characterPaths //the paths to saved character files, relative to absoluteDir
public methods
Character getCharacter(int index) //get the character at the specified index
Layer getLayer(int index) //get the layer at the specified index
constructors
Area() //creates an empty Area
Area(Layer[] layers,String[] characterPaths) //create a layer with the given Layers and Characters

```

GameData

The GameData class is used to store data that is used by a game. The major elements it contains are:

- Available Items: A collection of all Items that are available in the game.
- Game Script: The script for the game, see GameScript class.
- Characters: All the Characters that exist in the game.

GameData implements Storable

public properties

ItemCollection availableItems //the Items that exist in the game

GameScript script //the script for the game

string absoluteDir //full path to directory where characters are stored, should be set at runtime

scriptPath //the path to the script file, relative to absoluteDir

Character[] characters //the Characters that exist in the game

string[] characterPaths //the paths to saved character files, relative to absoluteDir

public methods

void addCharacter(string characterPath,Formatter formatter) //add a Character to the game

Character getCharacter(string name) //retrieve a Character by name

Item getItem(string path) //retrieve an Item by its path

constructors

GameData() //default constructor

Event

An Event is something that occurs in the game, initiated by either the player or the game itself. The Event contains an action and a set of parameters for that action.

Event

public properties

string action //the action to perform

StringTable parameters //the parameters (arguments) for the event

constructors

Event(string action)

Event(string action,StringTable parameters)

Some example usages of Event are:

```
void menuMove.Click(){
    //move the main character
    Event e=new Event("move");
    e.getParameters().set("old-area",this.txtCurrentArea.getName());
    e.getParameters().set("new-area",this.txtNewArea.getName());
    this.processEvent(e);
}
[...]
```

```
void receiveEvent(Event e){
    String actionText=new String(event.getAction());
    if(actionText.equals("look")){
        String target=event.getParameters().get("target","null");
        System.out.println("You are looking at a "+target);
    }
    [...]
}
```

GameScript

The GameScript is used to store and process the Events that occur in a game.

```
GameScript implements Storable
private properties
HashTable scriptTable //contains key-value pairings of game events
public methods
Event[] processEvent(Event event) //processes an event, returns any Events that are triggered by the initial Event
Event[] processEvent(Event event,string[] conditions) //processes an Event, returns any Events that are triggered
    by theinitial event
void add(Event event,string[] conditions,Event[] returnEvents) //add a new Event to the table
constructors
GameScript()
```

The internal scriptTable member is a HashTable that uses the ScriptTableKey and ScriptTableValue to store Events. An Event initiated by the player, or by the game itself, is used to construct the ScriptTableKey. A set of optional *conditions* can also be passed. Conditions can be used as a means of state management in a game if applicable. If the ScriptTableKey finds a matching ScriptTableValue then the Events stored in the ScriptTableValue are returned.

ScriptTableKey

The ScriptTableKey is used as the key value for the GameScript's internal script table.

```
ScriptTableKey
public properties
Event event //The Event for the key
string[] conditions //The conditions for the key
constructors
ScriptTableKey(Event event,string[] conditions)
```

ScriptTableValue

The ScriptTableValue is what is stored in the GameScript's internal script table. It simply contains a list of Events to process based on the original Event being processed.

ScriptTableValue**public properties**

Event[] events //The Event stored in this value.

constructors

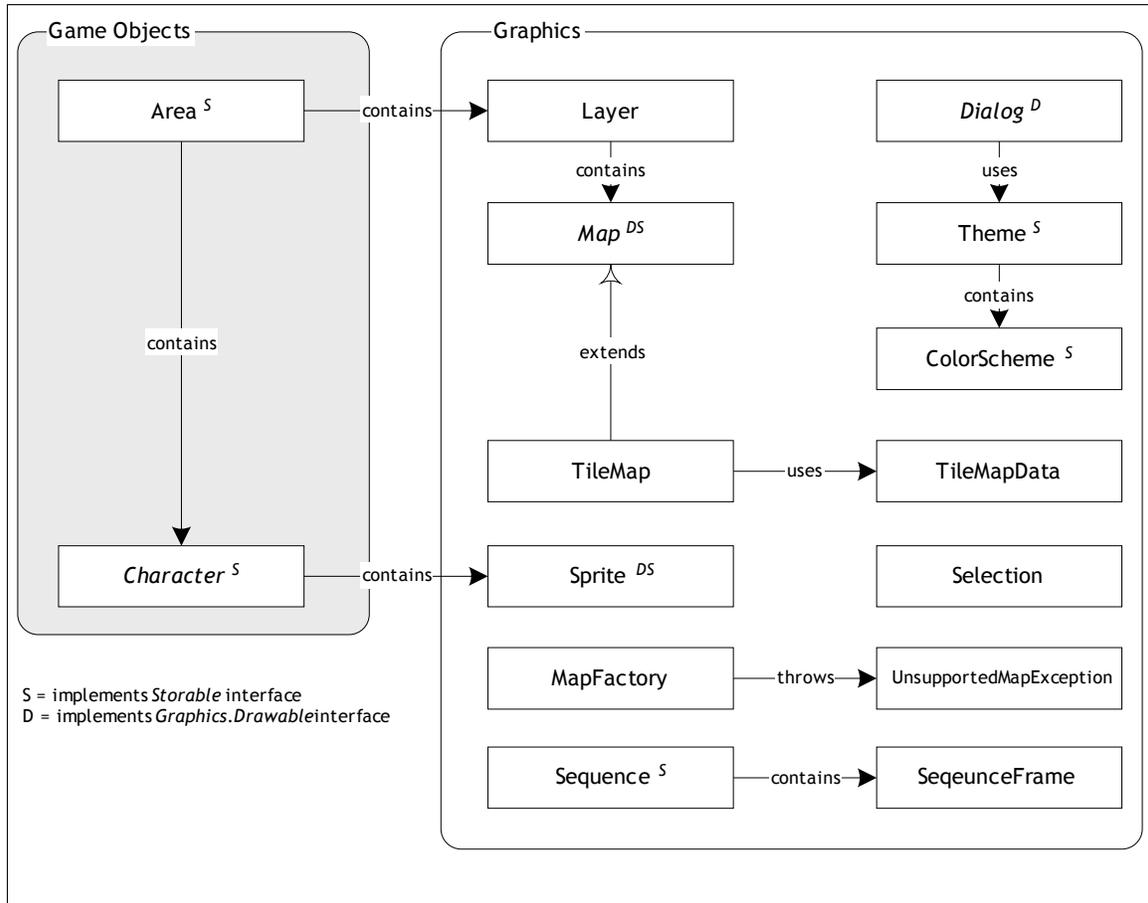
ScriptTableValue()

ScriptTableValue(Event[] events)

Graphics Package

The graphics package contains the classes needed to visually represent objects. Although the classes in this package were designed with RPGs in mind, they could be used for many other types of games or applications.

Class Hierarchy



Sprite

```
Sprite implements Storable, Drawable
public constants
enum directions{ UP, DOWN, LEFT, RIGHT }
int MAX_DIRECTION //top index of directions
bool DEFAULT_MOVABLE=true
constructors
Sprite(int direction,int x,int y,string basePath,string [][] imagePaths,Canvas canvas) //uses importImageData
public properties
int direction //must be one of directions defined above
int stepIndex //which frame of animation the sprite is in
int x //x-coordinate of sprite
int y //y-coordinate of sprite
Image[][] images //# of directions x # of steps in each movement animation, [n][0]=still image for direction n
string absoluteDir //full path to directory where images are stored, should be set at runtime
readonly string[][] imagePaths //location of images, relative to basePath, needed to save & load Sprite,
    relative to absoluteDir
Sprite follower //reference to another sprite that follows this sprite
bool movable //whether or not this sprite can be moved, true by default
Canvas canvas //where to draw this sprite
boolean isMoving //whether this Sprite is currently moving
public methods
boolean save(string filePath) //save this sprite to a file, return success
boolean load(string filePath) //load this sprite from a file, return success
boolean importImagedata(string basePath,string[][] imagePaths) //import image data, return success
void move(directions direction) //moves the sprite in the specified direction
Image getCurrentImage(void) //get the image representing the sprite in its current direction and stepIndex
private methods
boolean loadImages() //loads images (filePaths[][]) into memory (images[][]), return success
```

Layer

```
Layer  
public constants  
enum LayerTypes{  
    MAP //a layer with a map associated to it  
    SPRITE //a layer where sprites move  
    DIALOG //a layer where dialogs are displayed }  
LayerTypes DEFAULT_LAYER_TYPE=LayerTypes.SPRITE  
public properties  
LayerType type  
readonly Map map //map for this layer, should be null unless type==MAP, change by setting the map path  
string absoluteDir //full path to directory where the map is stored, should be set at runtime  
string mapPath //path to the file where the map is saved, relative to absoluteDir  
constructors  
Layer() //create a default layer  
Layer(LayerTypes type) //create a layer of the specified type  
Layer(string mapPath) //create a map layer with the map saved at mapPath, use MapFactory to load correct map  
    type
```

Map

```
abstract Map implements Storable, Drawable  
public properties  
int height  
int width  
string name  
Canvas canvas //where to draw stuff
```

MapFactory

MapFactory is an abstract static class that contains a single public method `load(string path)`. This method is called with the path to a map file. The MapFactory creates an instance of the appropriate map, loads the map, and returns a reference to the loaded map. If no Map can be found an `UnsupportedMapException` is thrown.

```
abstract MapFactory  
public static methods  
Map load(string path) //determines the correct Map for the specified file and loads it, throws exception if a  
    suitable Map can not be found
```

UnsupportedMapException

This should extend the exception class for the platform it's running on. No special behavior is needed.

```
UnsupportedMapException
```

TileMap

```
TileMap extends Map
```

```
constructors
```

```
TileMap(int width,int height,Canvas canvas) //assumes import methods will be used
```

```
TileMap(string filePath,Canvas canvas) //calls loadMap
```

```
private properties
```

```
string[] tilePaths //needed to save map
```

```
public properties
```

```
Image[] tileSet
```

```
TileMapData[][] mapData
```

```
string absoluteDir //full path to directory where images are stored, should be set at runtime
```

```
string[] tilePaths//paths to where images are stored, relative to absoluteDir
```

```
public methods
```

```
boolean importTileSet(string baseImagePath,string[] tilePaths)
```

```
boolean importTileData(int[][] tileData)
```

```
boolean importTypeData(int[][] typeData)
```

```
boolean importObjectData(Object[][] objectData)
```

```
void setObjectAt(int x,int y,Object object) //set the object at (x,y)
```

```
Object getObjectAt(int x,int y) //get the object at (x,y)
```

```
private methods
```

```
boolean loadImages() //loads images (tilePaths[]) into memory (tileSet[]), return success
```

TileMapData

```
TileMapData
public constants
enum TileTypes{
    NORMAL //tile you walk over with no effect on anything
    SOLID //tile that can not be walked over
    EXIT //exits the map
    EVENT //has some event associated to it }
TileTypes DEFAULT_TYPE=TileTypes.NORMAL
constructors
TileMapData(int tile) //create TileMapData with default settings
TileMapData(int tile,TileTypes type) //create TileMapData with default settings
TileMapData(int tile,TileTypes type,Object object)
public properties
int tile //index of tile in array or list of tiles
TileTypes type //one of TileTypes
Object object //an object that is standing on this tile
```

ColorScheme

```
ColorScheme implements Storable
public constants
Color DEFAULT_FORECOLOR=#666699
Color DEFAULT_BACKCOLOR=#c6c6c6
Color DEFAULT_BORDERCOLOR=DEFAULT_FORECOLOR
Color DEFAULT_BORDERINSETCOLOR=DEFAULT_BACKCOLOR
public properties
Color foreColor //the foreground color
Color backColor //the background color
Color borderColor //the color of the border
Color borderInsetColor //the color of the border inset
constructors
ColorScheme() //use default settings for everything
ColorScheme(Color foreColor,Color backColor) //borderColor=foreColor, borderInsetColor=backColor
ColorScheme(Color foreColor,Color backColor,Color borderColor,Color borderInsetColor)
```

Theme

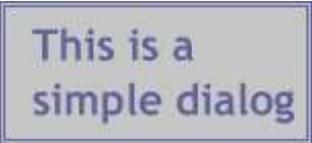
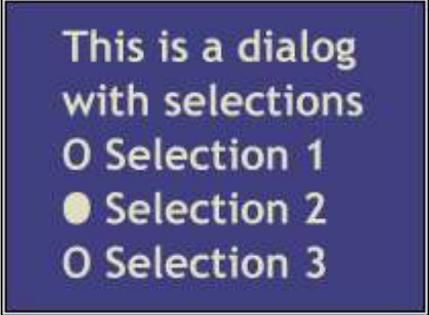
A Theme is used to define the style of a dialog or other top-level UI container.

It contains a ColorScheme to define the colors and attributes to define how specific UI elements should look.

```
Theme implements Storable
public properties
ColorScheme colorScheme //the color scheme for this theme
string absoluteDir //full path to directory where images are stored, should be set at runtime
readonly Image radioButtonImage //image to display on a radio button when it's not selected
string radioButtonImagePath //path to the file containing the image, relative to absoluteDir
readonly Image radioButtonSelectedImage //image to display on a radio button when it's selected
string radioButtonSelectedImagePath //path to the file containing the image, relative to absoluteDir
constructors
Theme() //create an empty theme
```

Dialog

A Dialog is used to display a message or present a list of options. A Dialog should be modal in that the game should effectively be paused while one is displayed.

	
<p>This is an example of a Dialog in the default style.</p>	<p>This is a Dialog that presents the user three selections.</p>

```

Dialog implements Drawable

private members
int textIndex //index of the text to display
int x,y,x1,y1 //used to save the position of the dialog

public properties
string[] text //the text to display, each array element represents one "screen" of text, using forward() and back()
methods scroll through the text

string[] selections //if this dialog allows a user to select an option after all the text has been displayed the
selections are stored here

Theme style //the style for this dialog

Canvas canvas //where to draw stuff

constructors
Dialog(string[] text,Canvas canvas,Theme style)
Dialog(string[] text,int x,int y,int x1,int y1,Canvas canvas,Theme style)
Dialog(string[] text,string[] selections,Canvas canvas,Theme style)
Dialog(string[] text,string[] selections,int x,int y,int x1,int y1,Canvas canvas,Theme style)

public methods
bool forward() //scrolls the text ahead one "screen", also causes redraw, returns false if on the last page of text
bool back() //scrolls the text behind one "screen", also causes redraw, returns false if on the first page of text
void hide() //hides the dialog
void onCancel() //called when the dialog is closed
void onSelection(int index) //invoked when the player has confirmed a selection in the dialog, index is the index of
the selection made (relative to the selections array)

```

Selection

A Selection is used to represent a menu option. It contains a caption and an associated Event.

```

Selection

public properties
readonly string caption //the caption for the Selection
readonly Event event //the Event associated with the Selection

constructors
public Selection(string caption,Event event)

```

An example usage of Selection is:

```

private void loadDefaultMenu() {
    Selection[] selections=new Selection[8];
    Event event=new Event("look");
    selections[0]=new Selection("Look",event);
    event=new Event("move");
    selections[1]=new Selection("Move",event);
    [...]
}

```

```

        event=new Event("help");
        selections[7]=new Selection("Help",event);
        this.frame.setSelections(selections);
    }

```

Sequence

A Sequence represents a non-interactive event. A dialog, game introduction, or ending credits would all be uses of a Sequence. It contains a collection of SequenceFrames and Events to execute upon completion of the Sequence.

<p>Sequence implements Storable</p> <p>public properties</p> <p>SequenceFrame[] frames //the underlying frames</p> <p>Event[] exitEvents //the Events to execute after the Sequence is complete</p> <p>constructors</p> <p>Sequence(SequenceFrame[] frames,Event[] exitEvents)</p> <p>public methods</p> <p>int getFrameCount //return the number of frames</p> <p>void addFrame(SequenceFrame frame) //adds a new frame to the end of the Sequence</p> <p>void removeFrame(int index) //removes the frame at the specified index</p> <p>SequenceFrame getFrame(int index) //returns the frame at the specified index</p> <p>int getExitEventCount //return the number of exit Events</p> <p>void addExitEvent(Event event) //adds a new exit Event to the end of the Sequence</p> <p>void removeExitEvent(int index) //removes the exit Event at the specified index</p> <p>Event getExitEvent(int index) //returns the exit Event at the specified index</p>
--

SequenceFrame

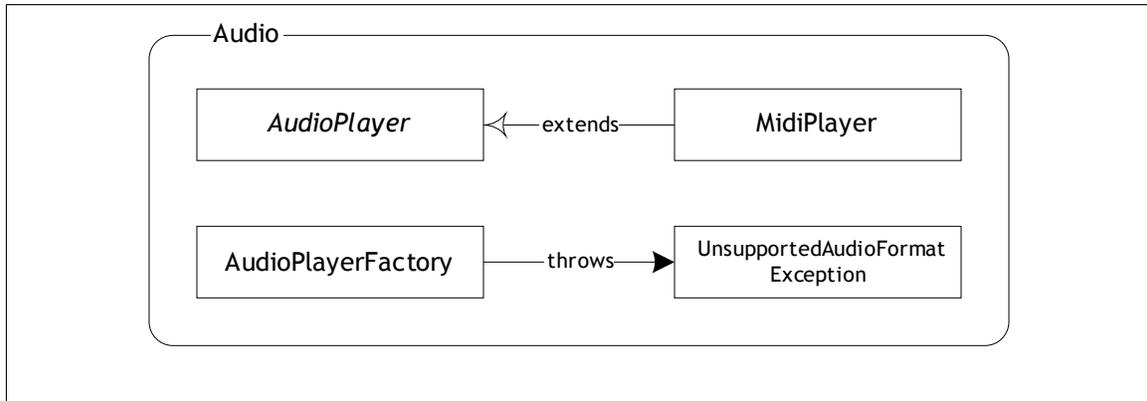
A SequenceFrame represents a single frame in a Sequence.

<p>SequenceFrame</p> <p>public properties</p> <p>string text //the text to draw</p> <p>string absoluteDir //full path to directory where images and music are stored, should be set at runtime</p> <p>string bgMusicPath //the path to the background music to play, relative to absoluteDir</p> <p>string bgImagePath //the path to the image to draw, relative to absoluteDir</p> <p>readonly image bgImage //the image to draw</p> <p>constructors</p> <p>SequenceFrame()</p> <p>SequenceFrame(string Text,string absoluteDir,string bgMusicPath,string bgImagePath)</p>
--

Audio Package

The audio package contains the basic classes needed to play audio. The purpose is to simplify development by providing components that hide the underlying audio implementation.

Class Hierarchy



AudioPlayer

```
abstract AudioPlayer
protected properties
int loop //number of times to loop
string[] trackList //list of tracks to play
protected int trackIndex //index of the track currently being played
public constants
int INFINITE_LOOP=-1
public methods
void play(string path) //no loop
void play(string path,int loop) // <0=infinite loop
void play(string[] paths) //no loop
void play(string[] paths,int loop) //loop back to 1st track after playing all
void stop() //stop playing
```

MidiPlayer

```
MidiPlayer extends AudioPlayer
```

AudioPlayerFactory

`AudioPlayerFactory` is an abstract static class that contains a single public

method `getAudioPlayerFor(string path)`. This method is called with the path to an audio file. The `AudioPlayerFactory` returns the correct `AudioPlayer` for the given file. If no `AudioPlayer` can be found an `UnsupportedAudioFormatException` is thrown.

abstract AudioPlayerFactory

public static methods

`AudioPlayer getAudioPlayerFor(string path) //determines the correct AudioPlayer for the specified file throws exception if a suitable AudioPlayer can not be found`

Below is an example of using an `AudioPlayerFactory` to obtain a player for an audio file:

```
....
String someAudioFile="c:\someAudioFile.mid";
try{
    AudioPlayer player=AudioPlayerFactory.getAudioPlayerFor(someAudioFile);
    player.play(someAudioFile,AudioPlayer.INFINITE_LOOP);
} catch(UnsupportedAudioFormatException uafx){
    //error handling
}
```

UnsupportedAudioFormatException

This should extend the exception class for the platform it's running on. No special behavior is needed.

UnsupportedAudioFormatException

Implementation Notes

External Classes

Several external classes are assumed to exist for Tiamat. Although one of the goals of Tiamat is to not rely on external classes, there are cases where it is not reasonable to recreate a class that already exists. Below is a list of external classes and what they map to in a specific language implementation:

<i>Class</i>	<i>Purpose</i>	<i>Java Equivalent</i>
Canvas	Area to draw images	javax.awt.Component
Image	Display image (gif,jpg) on Canvas	java.awt.image.BufferedImage
Color	Logical representation of a color	java.awt.Color
HashTable	Stores key-value pairs, used as the underlying implementation of StringTable	java.util.Properties (in StringTable class) java.util.Hashtable (everywhere else)

Java

- In Java there are no such thing as "properties". It's possible to expose members publicly but ill-advised. Instead, get/set methods are used to access public properties.
- Java does not have "readonly" data types. Readonly properties are represented by having a public get method and a private set method (or none at all).
- Enumerations don't exist in Java 1.4.x and earlier, public static members are used instead. These should be changed if enumeration support in 1.5 is adequate.
- Typed ArrayLists are used instead of arrays.
- A few public methods were added to some objects that are not defined in framework specification. This was done to accommodate serialization. Images were marked *transient* so they would not be stored in a file. This reduces the size of serialized objects and to makes it easier to change images. The specific changes are:
 - Item: added public `bufferImages()` method to be called after de-serializing an Item (or Character) from a file.
 - Character: added public `bufferImages()` method to be called after de-serializing a Character from a file. This file also calls `bufferImages()` for its sprite and item collection.
 - Sprite: added public `bufferImages()` method to be called after de-serializing

a Sprite (or Character) from a file. Sprite also has a private loadImages() method that's used by the constructor and importImageData() methods.

- TileMap: added public bufferImages() method to be called after deserializing a TileMap from a file. TileMap also has a private loadImages() method that's used by the constructor and importxxx() methods.
- Area: added public bufferCharacters() method to be called after deserializing an Area from a file.
- ScriptTableKey: added overrides of Object.equals(Object) and hashCode().

Desired Implementations

- C# .NET would be a logical platform to implement Tiamat in. The syntax is very similar to Java and it includes properties.
- Mobile Frameworks such as .NET Compact Framework or MIDP.

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