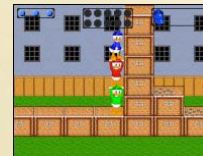
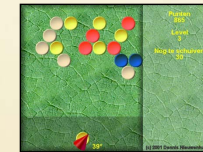
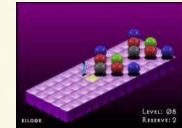


# Game Maker

Arno Kamphuis

Game Design 2009-2010



# Game Maker

- Integrated Development Environment for 2D games
- Global idea
  - Simple to use, using drag-and-drop
  - Still considerable power through built-in language
  - Integrated environment
  - Not focused on a particular type of game

# Architecture of Game Maker

- Uses DirectX as bottom layer
- Sprite based graphics engine with support for multiple views, etc.
  - Can also be used for isometric games
  - There is functionality for 3D graphics
- Sound engine, allowing for multiple buffers, sound effects, and positional sound
- Simple music engine (integrated in sound engine)

# Architecture of Game Maker

- Some simple user interface support
  - Message boxes, pop-up menus
- Simple automatic on-line help using text file
  - But better create your own inside the game
- Simple configuration system
  - Designer can easily create such systems himself
- Game data stores levels, resources, current collection of game tokens (instances) and further settings
  - Possibility to load resources on the fly
    - Improves speed, memory requirement and loading times

# Architecture of Game Maker

- Uses objects with behavior
  - Multiple instances of objects
  - Inheritance of behavior
- Event driven model
  - Events trigger actions in instances of objects
- Uses process-wait-draw timing model
  - Designer can make this reactive to game speed but this is difficult
- No separate physics engine (although collision detection is automatic)
- Logic engine either action based or through code

## Global Structure of GM

### DATA:

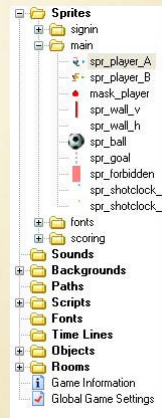
- Sprites
- Sounds
- Backgrounds
- Fonts

### CONTROL:

- Objects
- Timelines
- Scripts
- Paths

### LEVELS:

- Rooms
  - Views
  - Tiles



## Sprites

- A sprite is a collection of images that stores an animation of some game object.
- There can be multiple animations of the object depending on its status
  - direction of motion
  - mental state
  - ...

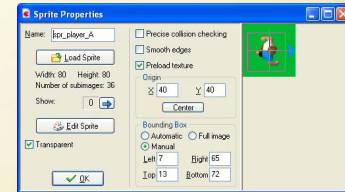


# Sprites

- Creating sprites
  - By hand
  - From 3D models but then often corrected by hand
  - Style (realistic/cartoon)
  - Plan carefully
  - Book:
    - Ari Feldman, Designing Arcade Computer Game Graphics, Wordware, ISBN 1-55622-755-8, now available electronically, through website: <http://www.gamemaker.nl/feldman.html>
  - You can also get them from the
    - <http://www.yoyogames.com/resources>

# Sprites in Game Maker

- Built-in drawing program
- Collision detection based on sprites
  - Different options
  - Using masks
- Objects can switch sprites
- Control over animation speed
- Additional actions, variables and functions to control blending, transformations, etc.
- Sprites can be used as textures on surfaces



# Backgrounds

- Background images play an important role
  - Setting
  - Replacing the graphics for static game objects (using invisible objects)
  - Head-up-display or status area (when uses as foreground)
- Scrolling backgrounds
  - Continuously or when the player moves
  - Repeating or large background of which a part is visible

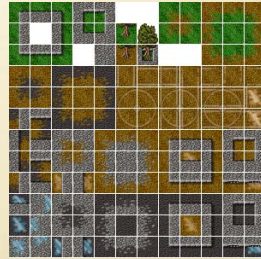
# Backgrounds

- In Game Maker
  - Each room can have 8 different backgrounds at different depths
  - They can scroll



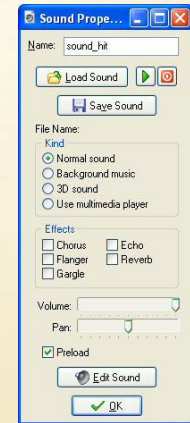
# Tiles

- A background can be used as a tile set
- In room editor tiles can be placed at different depths
- Uses
  - To save a lot of memory
  - To allow changes in the background
  - Much faster than game objects
- Must nicely match up



# Sounds and Music

- Wave, Midi, MP3
- Sound effects
- 3D sound



# Objects

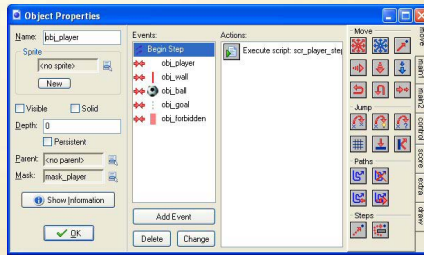
- Object have behavior
  - Sprites are only images
- Multiple instances can exist in a room
- (Instances of) objects get events, e.g.
  - Creation
  - Collision
  - User input
- They react to (some of) these actions

# Objects

- Objects can have a visual representation but this is not necessary
  - Sprite or Draw event
  - Create objects that represent a game status
    - You can even use them as data records
- Inheritance is simple
  - Parent object
  - Inherits behavior (can be overwritten)
  - Is seen as special instance of a type by e.g. collision events

# Objects in GM

- Sprite
  - Don't use
- Solid
- Visible
- Depth
- Persistence
- Parent
- Mask



# Events

- Many different types
  - Creation and Destruction
  - Alarm
  - Collisions
  - Mouse and Joystick
  - Various Keyboard events
  - Others and user-defined



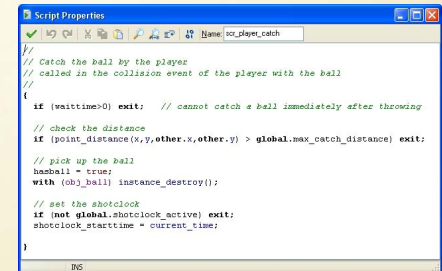
# Actions

- Many different types of actions
  - Motion
  - Creating, destroying, and changing objects
  - Control
  - Drawing
    - Only in the Draw event
  - Score, Life and Health systems
  - Variables and code
- All this can also (and easier) be done in code



# Scripts in GML

- Similar to C
- Use scripts, not code actions
- Interpreted but fast
  - 1.000.000 lines per second
  - Remember framerate!



## Scripts: variables

- Different types
  - Local in script
  - Local in instances
    - You can address variables in other objects or instances
  - Global
    - Also between rooms
- With statement
- Many built-in variables

```
{  
  // local to script  
  var i,j;  
  i = 24;  
  // local to instance  
  x = 32;  
  ammunition = 100;  
  ball.x = 32;  
  // global  
  score = 300;  
  global.target = 400;  
}
```

## Scripts: functions

- Scripts can be used as functions in other scripts and they can have arguments
- There are many built-in functions (> 1000)

## Scripts: build-in functions

- Motion
  - Path planning
- Graphics
  - Advanced drawing
  - Surfaces
  - Particle system
  - 3D graphics
- Data structures
- Files
- Multiplayer

## Extension Mechanism

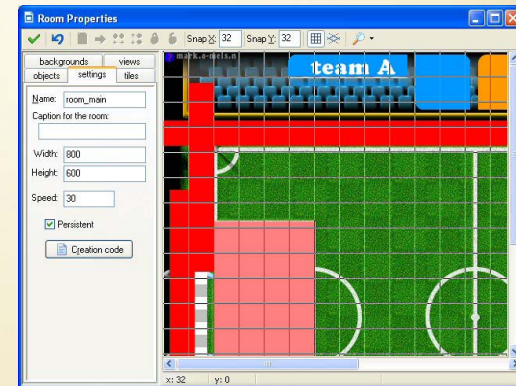
- Game Maker has an extension mechanism
- Extensions can be
  - DLLs
  - GML code
- Extension packages contain the extension, a description and additional required files
- They are automatically integrated in the games when used
- There is a program to create these
  - <http://www.yoyogames.com/extensions>

# Other Resources

- Fonts
- Timelines
- Paths

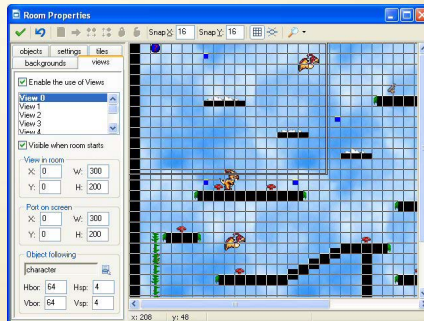
# Rooms

- Room settings
- Placing instances
- Persistence
- Creation code



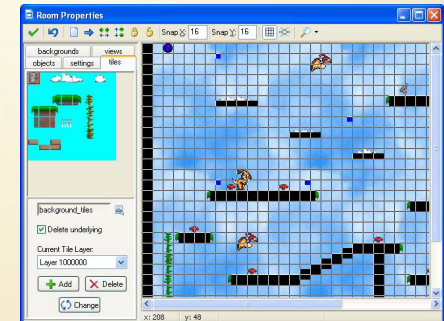
# Views

- To see only part of the room
  - Object following
- Split screen
- Rotated views
- Minimap
  - Change the drawing depending on the view



# Tiles

- Use tiles to make rooms nicer
- Use invisible objects for interaction



# YoYo Games

- <http://www.yoyogames.com>
- YouTube for Games
  - 10,000 games
  - You can upload your own
- Game Maker Home
  - Latest version
  - Tutorials
  - Resources
  - Wiki
  - GMC forum: <http://gmc.yoyogames.com>

# Next lecture

Characters/Archetypes

Chapter 5 of the book



The End

The image shows the words "The End" in a large, white, cursive script font. The text is set against a dark, textured background that resembles asphalt or a similar rough surface. The letters have a slight shadow, giving them a three-dimensional appearance.